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SOCIAL AND ECONOMIC DEVELOPMENT

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Mining-Geological and Economic Characteristics of Lead-Zinc Ore Deposits in the Russian Arctic *

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Abstract. The article analyzes the possibilities for prospecting, evaluation, exploration and extraction of zinc and lead deposits in the Arctic. The reserves and resources of zinc and lead deposits and ore occurrences on the Novaya Zemlya archipelago, on Vaygach Island, in the Polar Urals and in the Northern Timan are calculated on the territory of the Russian Arctic. The predominant reserves are represented by the Pavlovskoye deposit, which is being prepared for development by JSC First Mining Company of the Rosatom State Corporation. In 2019, the design of a mining enterprise was initiated, no lead and zinc mining has been carried out within the Arctic zone. A promising object is the Saureyskoye deposit in the Polar Urals. The problem is the remoteness of the site from transport highways. It is necessary to plan the construction of a dirt road from the deposit to the railway. Cargo can then be sent to the ports of the Gulf of Ob or to the port of Indiga when it is put into operation. Lead and zinc deposits on the island of Vaygach and on the Arctic coast near Amderma were previously developed. It is necessary to reassess their reserves and to determine possible development options. The extracted ore will be transported through the port of Amderma. In the Northern Timan, reassessment of non-ferrous metal ores should be carried out in a complex (lead, zinc, molybdenum, copper, nickel). Ore mining may be appropriate in connection with the construction of the deep-water seaport of Indiga. The purpose of this article is to study the mining, geological and economic characteristics of lead-zinc ore deposits and the spatial organization of marine communications for the development of the mineral resource complex of the Arctic zone of Russia. Mining facilities in the Arctic have an important strategic importance for strengthening national security of the country.
Keywords: *mining, geology, economics, deposit, lead, zinc, ore, Pavlovskoye, Samurayskoye, Amderminskoye, Novaya Zemlya, Vaygach, Northern Timan, Arctic*

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tion and Quarries" with training in the mining and geological information system Micromine at the Northern (Arctic) Federal University.

Introduction

Mineral resource centers are decisive in the economy of the Arctic territories of all states in terms of solid mineral extraction. Russia's Arctic territories with their strategic metal deposits are the largest domestic and export suppliers of metals.

Deposits of solid minerals in the Arctic are of interest to the industry of all countries related to the Arctic [1, Bortnikov N.S., Lobanov K.V., Volkov A.V., Galyamov A.L., Lalomov A. V., Murashov K.Yu., Vikentiev I.V., Tarasov N.N., Distler V.V., Aristov V.V., Chizhova I.A.], [2, Dodin D.A., Ivanov V.L.], [3, Dodin D.A., Evdokimov A.N., Kaminskiy V.D.], [4, Goldfarb R.J., Ayuso R., Miller M.L.].

The article analyzes the possibilities of prospecting, evaluation, exploration and production of zinc and lead deposits in the Russian Arctic.

The total amount of zinc production in the Arctic territories is 4.64% of world production, the share of Arctic zinc ores in world reserves is 3.8% [1, Bortnikov N.S., Lobanov K.V., Volkov A. V., Galyamov A.L., Lalomov A.V., Murashov K.Yu., Vikentiev I.V., Tarasov N.N., Distler V.V., Aristov V.V., Chizhova I.A.].

According to the information compiled in the Solid Mineral Reserves Statement for the Arctic Territories of Russia as of 2021, the reserves of lead and zinc are distributed as indicated in the VSEGEI Statement [1].

The Pavlovskoe deposit is one of the largest in terms of zinc reserves; it is being prepared for development by JSC First Mining Company of the state corporation Rosatom. The total zinc reserves of category B+C1 are determined at 1325.3 thousand tons, category C2 is 1162.6, off-balance reserves are 531.1 thousand tons. In 2019, the design of a mining facility was started; no lead and zinc mining has been carried out within the Arctic zone of Russia.

The Saureyskoe deposit of lead and zinc is located in the Polar Urals within the Yamalo-Nenets Autonomous Okrug. The reserves of the deposit are estimated at more than 320 thousand tons of lead, 21 thousand tons of zinc, 300 tons of silver, 550 thousand tons of barite [5, Kontar E.S.]. The development of the deposit is not carried out yet.

The Amderminskoe lead-zinc-fluorite deposit is located on the coast of the Kara Sea in the Northern Pay-Khoy near the village of Amderma within the Nenets Autonomous Okrug. From 1932 to 1951, fluorite was mined at the deposit; it is currently under conservation. The ores of the deposit are represented by fluorite, sphalerite, galena and pyrite. The zinc content in the ores ranges from 0.33 to 1.11%, the lead content is 0.2%. At a depth of 100 m, the concentration of lead and

[1] Statement on the state and prospects of use of mineral resource base of the Arctic zone of the Russian Federation as of 15.03.2021. The statement was prepared by FSBI VSEGEI under the State Assignment of the Federal Agency for Subsoil Use dated 14.01.2021. No.049-00016-21-00. URL: https://www.rosnedra.gov.ru/data/Fast/Files/202104/45bb8bcc7b844220954744c0149a86f4.pdf (accessed 14 March 2022).

zinc in the ore increases in total to 1.5%. Lead-zinc resources have not been determined [5, Kontar E.S.].

Lead-zinc deposits and ore occurrences are known on Vaygach Island. Ore was mined at the Krasnoye and Razdelnoye deposits from 1931 to 1934. Ore occurrences of lead and zinc were discovered on the Northern Timan [6, Wittenburg P.V.]. In areas with the listed ore occurrences, additional exploration is required. These ore deposits will be of interest for industry in case of railway and motorways construction in the designed and reconstructed ports of Indiga, Amderma and Ust-Kara in the Nenets Autonomous Okrug.

Problem statement

The information framework is based on the experience of prospecting, evaluation and exploration of lead-zinc ore deposits in the Arctic. The experience of field development in Alaska (USA) was used [4, Goldfarb R.J., Ayuso R., Miller M.L.].

The methodological and theoretical basis was the open-cut projects for the development of deposits of ores of solid minerals in the Arctic. Development of lead and zinc ore deposits in the Arctic territories is a new trend for Russian extractive industries. Transportation of cargoes and mined ore from the Pavlovskoe deposit on Novaya Zemlya, Saureyskoe and Amderminskoe deposits in the Polar Urals has not been started. One of the problems is ensuring the regional security of Russia in the context of the struggle for control over the mineral resources of the Arctic.

Lack of considerable researches of the analyzed region makes the study of the most rational approaches to the spatial organization of sea communications for the development of the mineral resource complex of the Arctic zone of Russia relevant.

Methodology

The purpose of this work is to study the mining-geological and economic characteristics of lead-zinc ore deposits and the spatial organization of sea communications for the development of the mineral resource complex of the Arctic zone of Russia.

The tasks, which were solved to achieve the set goal, were as follows:

- to study the deposit design process using the example of the Pavlovskoe field on the Novaya Zemlya archipelago;
- to consider the geological and industrial characteristics of the deposit, to calculate the technological parameters of the development of the deposit;
- to carry out a calculation of open-cut transport with the parameters of transportation and the number of equipment used, as well as its performance;
- to describe drainage, power supply, water supply of the entire enterprise, including the open-cut;

- to consider environmental protection and to carry out calculations on emissions of harmful substances into the atmosphere from drilling and blasting operations and from the operation of equipment;
- to describe industrial safety and labor protection;
- to make economic calculations on the costs of starting the operation of an open-cut and to show an approximate annual costs calculation;
- to show the prospects for the development of the Saureyskoye and Amderminskoye lead-zinc deposits in the Polar Urals;
- to show the spatial organization of sea communications for the development of lead-zinc deposits in the Arctic.

Discussion

The experience of studying lead-zinc deposits in the Arctic is given in the publications of many geologists, mining engineers and economists [2, Dodin D.A., Ivanov V.L.], [3, Dodin D.A., Evdokimov A.N., Kaminskiy V.D.], [4, Goldfarb R.J., Ayuso R., Miller M.L. et al.], [7, Evdokimov A.N., Kalenich A.P., Kryukov V.D., Lastochkin A.V., Semenov Yu.P.], [8, Lazhentsev V.N.], [9, Karpuzov A.F., Rundkvist D.V., Cherkasov S.V.], [10, Vartanyan S.S., Krivtsov A.I., Migachev I.F.], [11, Goverdovskaya T G., Dodin D.A., Evdokimov A.N.], [13, Mikhailov B.K., Petrov O.V., Kimelman S.A.], [14, Mikhaylov B.K., Vorobyov Yu. Yu., Kimelman S.A.], [15, Gusev G.S., Golovin A.A., Gushchin A.V.], [16, Karpuzov A.F., Lebedev A.V., Zhitnikov V.A., Korovkin V.A.], [17, Plyakin A.M.], [18, Dodin D.A., Ivanov V.L., Kaminskiy V.D.], [19, Kochnev-Pervukhov V.I., Migachev I.F., Zvezdov V.S.], [20, Badtiev B.P., Bibik S.D.], [21, Orlov V.P.], [22, Vercheba A.A.], [23, Lipina S.A., Cherepovitsyn A.E., Bocharova L.K.], [24, Cherepovitsyn A.E., Lipina S.A., Evseeva O.O.], [25, Kondratyev V.B.], [26, Kuznetsov S.K., Timonina N.N., Kuznetsov D.S.], [27, Tolvanen A., Eilu P., Juutinen A., Kangas K., Kivinen M., Markovaara-Koivisto M., Naskali A., Salo-kannel V., Tuulentie S., Similä J.].

The economic development of the mineral resource complex of the Arctic territories is based on the spatial organization of sea communications associated with the transportation of ores from mining and processing plants to consumers. The implementation of the goals of mineral resources development involves the formation of competitiveness clusters in the Arctic region in the field of spatial organization of sea communications, which will mobilize the resource of the network organization of the Arctic space, which becomes the basis of competition at the global level. Regional sea communications in the Western Arctic can be the basis of the country's national security, they must function in the form of clusters and guarantee free access to the markets for mined ores. Maritime systems must be competitive and have sufficient resources to upgrade the fleet during the development of the Arctic territories for the development of the mineral resource complex.

Mining and geological characteristics of Pavlovskoe silver-bearing lead-zinc deposit

The Pavlovskoye deposit is located on Novaya Zemlya, Arkhangelsk Oblast, in the north-west of the Yuzhnyy Island of the archipelago, 16–17 km east of the mouth of the Bezymyannaya River within the Bezymyanskiy polymetallic mineragenic cluster.

In order to develop the Pavlovskoye deposit, JSC First Mining Company (FMC) was established in 1998. In 2000, it obtained a license to use the subsoil in the basin of the Bezymyannaya River for geological exploration. In 2001–2002, a set of prospecting and appraisal works resulted in obtaining a certificate confirming the deposit discovery. In 2013–2014, a project was drawn up and confirmed by the FSFI GKZ Rosnedra, which was approved by the Scientific and Technical Council of Subsurface Management Department of the Arkhangelsk Oblast. In 2014, a licence for lead-zinc ore exploration and mining was obtained. An exploration project at Pavlovskoe has been completed and approved by Rosgeoekspertiza. The work was approved by the Russian Ministry of Defense. A set of geological exploration works was carried out, and the environmental condition of the site was assessed.

In 2016, permanent exploration conditions and reserves of ores of zinc, lead and silver of industrial categories were approved for open-pit mining. FMC and Northern (Arctic) Federal University named after M.V. Lomonosov signed a cooperation agreement, which provides for the training and retraining of specialists, carrying out research work necessary for the development of the Pavlovskoe deposit. In 2018, the Pavlovskoe field development project received the status of a priority investment project in the Arkhangelsk Oblast. In 2019, engineering surveys were completed for the design of the port complex and the mining and processing plant.

In 2019, framework pre-off-take agreements and letters of intent were signed with a number of European traders, which are necessary for credit institutions as confirmation of the marketing and sales strategy.

In 2020, exploration work was carried out to assess the mineral resources in accordance with the JORC code, and engineering surveys were carried out as part of the Pre-Feasibility study. Repeated public hearings on the issue of environmental impact assessment were held. An agreement with a Finnish technology company to cooperate in the design, delivery and commissioning of a concentrator for the processing of lead-zinc ores was signed.

In 2021, the Northern (Arctic) Federal University opened a Mining and Pit Laboratory with training in the mining and geological information system Micromine, financed by the First Mining Company. The FMC performed the first JORC-compliant reserves assessment at the deposit and submitted the first estimate of ore reserves for open-pit mining.

In 2021, the Pavlovskoe project was included in the list of projects to be implemented in the Arctic zone of Russia. The conclusion of the ecological expertise of the project for the construction of the mining and processing plant and the port complex was received.

The silver-bearing lead-zinc deposit Pavlovskoe is divided into three blocks: Eastern, Central and Western.

Within the Eastern block, a network of boreholes and mine workings 150–200 x 100 m (6 profiles, 14 holes) was carried out.

The deposit structurally belongs to the Pay-Khoy–Novaya Zemlya fold system and is late Triassic – early Jurassic in age.

The Pavlovskoe ore field covers an area of more than 12 km^2 and is composed of Silurian–Devonian terrigenous, terrigenous-argillaceous and carbonate rocks. They are dislocated and form the Bezymyanskaya anticline with wings 3–4 km in size. The Pavlovskoye field is confined to the southeastern flank of the anticline, which is composed of carbonate formations of the Early Devonian Gribovskaya Formation (D1gr). The carbonate formations of the Gribovskaya are partially overlain by a sequence of carbonate-argillaceous deposits of the Taininskaya Formation (D1-2 tn).

About half of the ore intersections is associated with organogenic varieties, more than a third is associated with fine and microgranular varieties, 16% of ore intersections are attributed to sedimentary breccias, dolomite and clay varieties.

The degree of sulphide saturation in carbonate rocks varies from scattered sulphide (pyrite, sphalerite, galena) phenocrysts and isolated veins to breccia-like and massive ores.

Ore content and ore morphology of the deposit

Three ore deposits have been established at Pavlovskoe — Tsentralnaya, Vostochnaya and Pravoberezhnaya. Tsentralnaya and Vostochnaya deposits are located on the left bank of the Bezymyannaya River, explored in detail and contain the main reserves of lead-zinc ores of the deposit of categories B, C1 and C2.

The ore bodies of the Tsentralnaya Deposit are partially exposed to the day surface in the west of the deposit, dipping to a depth of 300–450 m on the eastern flank within the adjacent tectonic block, where they overlap with the substantially argillaceous formation of the Taininskaya Formation, which composes the core of the graben-syncline forming this block.

The ore bodies isolated from the main mineralization and detected in the work are also attributed to the Tsentralnaya Deposit in its extreme northeastern and southwestern extensions.

The projection of the deposit on a horizontal plane (surface) has a complex configuration, the maximum dimensions are ~ 1500x1000 m, and it is oriented in the northeast (50–55°) direction. The Tsentralnaya and Vostochnaya deposits, expected to be joined at depth within the graben-syncline, have not been confirmed by exploration work; the deposits are separated by a north-east trending fault that forms the elevated Eastern tectonic block — the Eastern horst anticline.

The Vostochnaya Deposit is located within the Eastern and Diabase tectonic blocks. The mineralization of the deposit comes to the surface in the core of the horst anticline, also being exposed in the coastal cliff of the Bezymyannyi River in the north of the structure, and plunging to the south. In the west, the mineralization is limited by a northeast-trending discontinuity; in the

east, it is overlain by deposits of the Taininskaya suite and was traced by drilling to a depth of 290–310 m.

The deposit has a simpler horizontal projection configuration than the Tsentralnaya Deposit and extends in a northeaster direction. The maximum plan dimensions are 870x320 m.

In fact, it is a combination of one powerful (main) ore body that forms the core and wings of a horst — anticline and several thin and non-extended ore bodies that occur mainly above, less often — below the main ore body. The main ore body from the west and east is cut by north-east trending faults and traced behind them by a sparser network of boreholes. The thickness of the body decreases sharply behind the fault in the west and splits into 2–3 separate bodies ("branches") in some lines. On the contrary, to the east, behind the fault, its thickness either remains the same or increases. In resource estimation, the main ore body extensions beyond the faults have been separated into separate extraction blocks.

The right-bank deposit, which is a continuation of the Vostochnaya deposit on the right bank of the Bezymyannaya River, has dimensions of ~ 120x210 m and is also oriented in the northeast (25°) direction.

As a result of the appraisal and exploration work, the previously established mineralization patterns have generally been confirmed. The previously assumed local stratigraphic control of mineralisation by certain members or horizons within the Gribovskaya Formation has not been established.

The morphology of the main ore body for the Vostochnaya Deposit is confirmed, and the continuation of mineralization to a depth on the eastern flank of the deposit, several thin and non-extended ore bodies occurring mainly above, less often under the main ore body, has been established. An extension of the mineralization on the right bank of the Bezymyannaya River (Pravoberezhnaya deposit) has been identified.

Compared with the data of previous studies, the Tsentralnaya Deposit has a more complicated morphology of the deposit and its configuration due to increase of dissociation and number of ore bodies as well as ore bodies detached from the main mineralization and identified by 2014 works on its extreme northeastern and southwestern extensions (Table 1).

Table 1

Average thickness of ore bodies of Vostochnaya and Tsentralnaya deposits by pit wall grades

Deposit	*Average thickness of ore bodies*			
	Pit wall 1.0%	Pit wall 1.5%	Pit wall 2%	Pit wall 2.5%
Vostochnaya Deposit	32.25	29.8	28.2	28.3
Tsentralnaya Deposit	12.0	10.7	11.7	11.1

Pavlovskoe is classified as a geological-industrial stratiform lead-zinc deposit type in carbonate strata.

The genetic nature of stratiform (confined to lithological and stratigraphic levels) sulfide ore deposits is debatable. There are four prevailing points of view on the formation of ore deposits:

- from buried metal-bearing solutions-brines within the limits of carbonate strata with subsequent post-sedimentary redistribution with the implementation of solutions in the form of subconformable and concordant with the lamination of lenticular-stratal deposits;
- due to deep hydrothermal springs that supplied metal-containing solutions to the bottom of the paleobasin of carbonate accumulation with the subsequent transition of solutions into a gel-like and metacolloidal state with the formation of zoned ore deposits (along the normal to the ore deposit and the stratification of host rocks);
- due to reservoir migration of metal- and bitumen-containing solutions from oil source basins (with predominantly sandy-argillaceous facies) to their sides (with predominantly carbonate rock facies) with the implementation of metal-bearing solutions in the form of subconsistent ore deposits;
- due to hydrothermal metal-bearing solutions metasomatically replacing “favorable” rocks, while the source of such solutions, as a rule, is not established.

The first two points of view assume at least a two-stage formation of ore deposits. The first is at the stages of diagenesis and catagenesis (pre-folded). The second is the subsequent transformation and regeneration of the ore material into syn- and postfold plicative-disjunctive structural traps. In this case, near-ore metasomatic transformations are clearly manifested — dolomitization, calcitization, silicification, etc. Metasomatic changes in ore-bearing rocks are also characteristic of the formation of ore deposits according to elision-catagenetic and hydrothermal models. In addition, ore deposits formed according to these models have a symmetrical zoning along the normal of the ore body (from the axial part of the body to its hanging and recumbent sides).

Based on the studies of the sequence of ore mineral formation and its staging, structural and morphological features of ore minerals, the shape and position of ore deposits in the section, we can draw the following conclusions about its formation.

The ore deposits were probably formed synchronously with sedimentation due to the influx of hydrothermal solutions to the bottom of the paleobasin. Their formation took place in at least three stages.

At the first (sedimentary-diagenetic) stage, pyrite and galena-sphalerite-pyrite ores were formed in favorable facies settings.

Ores were formed from carbonaceous-sulfide-siliceous-carbonate gels. The origin of such gels is synchronous with sedimentation — from the solutions that came to the bottom along the system of consedimentary faults in the peripheral parts of organogenic structures.

The second stage is the repeated redistribution of the ore material during its diagenesis and catagenesis, accompanied by self-cracking of weakly diagenetic and diagenetic sulfide ores

with the formation of intraore breccias and the formation of sulfide minerals of several generations.

The third stage probably associated with ellision-hydrothermal processes during tectonic activation and fixed by “post-ore” fault tectonics and folding, leads to the formation of vein-nested and vein segregations (quartz-carbonate-sulfide, quartz-carbonate, quartz and carbonate compositions). In some cases, such formations compose reticulate-veinlet, stockwork, nested-disseminated and disseminated essentially galena-sphalerite aggregates on a carbonate and quartz-carbonate basis. At the same stage, partial linting and boudinage of ore bodies occur.

Qualitative characteristics of mineral resources

Lead-zinc ores of the Pavlovskoe Deposit are localized mainly in the section of organogenic-riphogenic rocks of the Gribovskaya Formation of the early Devonian.

The Northern ore field includes the zinc occurrence of the Andreevskiy site and the lead of the Severnyy site, associated with mineralized faults.

The Bezymyanskiy ore cluster also includes the Perya, Promyslovoe, Pyritovoe, Daykovoe, and Perevalnaya ore prospective ore occurrences. According to the works of 2013, the prospects for the Perevalnaya area are assessed as negative.

The structure of the Tsentralnaya Deposit shows ore bodies located in clusters on several (from 2 to 5) levels. The length of ore bodies for the 1% slope is from 3.6 to 667 m down dip, 115.7 m on average; the minimum thickness is 0.5 m, maximum in swells — up to 54 m; average thickness (for slope variants from 1% to 2.5%, respectively) is 12.0 to 10.7 to 11.7 to 11.1 m.

For different options for the pit wall grade used for contouring, massive and breccia ores, according to block modeling, are 46% (cut-off 1%), 59% (cut-off 1.5%), 81% (cut-off 2%). The distribution of various morphological types of ores is unsystematic, massive and breccia ores are located both in the lying and in the hanging side, the change of disseminated ores to massive ones and vice versa is often noted along the fall of ore bodies. The average content of standard metal for the deposit for various options for the sides ranges from 3.78 to 6.51%.

The length of the ore bodies of the Eastern deposit for a wall of 1% is from 5.9 to 283.4 m in dip, 110.5 m on average; the minimum thickness is 1.4 m, the maximum is 69.5 m, the average thickness for the deposit is from 1% to 2.5%, respectively, 32.25 – 29.8 – 28.2 – 28.3 m.

For different options for pit wall grade used for contouring, massive and breccia ores, according to block modeling, account for 75% (cut-off 1%), 90% (cut-off 1.5%), 92% (cut-off 2%) of the total volume of ores of the deposit. In contrast to the ore bodies of the Tsentralnaya deposit, massive and breccia ores, which make up most of the ore bodies, are located mainly in the lying side of the bodies, alternating along the normal with vein-disseminated ores, or occupy the entire volume of the body.

The average content of useful components both for individual bodies and on average for the deposit is higher than in the Tsentralnaya deposit for pit wall grades 1%; 1.5%; 2% and practically coincide for the 2.5% bead option.

The right-bank deposit was identified by areal gravimetric works as an intense positive gravity anomaly and was discovered by wells in 2013. It is represented by one ore body that goes under the cover of Quaternary deposits, plunging to the east under the mudstones of the Taininskaya suite (dip angle 45°) according to the bedding and traced by dip 165 m to the horizon — 100 m from the surface. The thickness of the ore body is 11–12 m; from the north, south, and east, the body is bounded by faults. It is composed of massive and breccia ores.

As of February 2021, the resources of Pavlovskoe are estimated at 55 million tons with average zinc content of 4%, metal resources: zinc — 2 million tons, lead — 430 thousand tons, silver — 30.3 million ounces. Such an assessment of mineral resources confirms the status of Pavlovskoe as the country's largest zinc deposit among new projects [17]. The drilling program has provided a reasonable degree of confidence in the Mineral Resource estimate in the open pit zone. Geotechnical drilling with core orientation was carried out.

The resource estimate for the Pavlovskoe deposit is based on open pit contour optimization with a forecast price of $3.145/t for zinc, $2.176/t for lead, and $30/oz for silver. The extraction of zinc is planned to be 90%, the extraction of lead — 53%, the extraction into silver lead concentrate — 33%. Relative zinc (ZnConv) was calculated by the formula ZnConv% = Zn (%) + 0.408 * Pb (%) + 0.003 * Ag (g/t) based on metal prices and metal recovery into concentrate [18].

The average zinc content is 6.32%, lead — 1.26%, silver — 42.57 g/t, with a cut-off content of conventional zinc of 2%.

Table 2 shows the balance and off-balance reserves of minerals of the Pavlovskoe deposit by categories (according to the First Mining Company).

Table 2

Mineral reserves of the Pavlovskoe Deposit

Reserve category	Ore reserves, thousand tons	Metal reserves			Average content		
		lead, thousand tons	zinc, thousand tons	silver, tons	lead, %	zinc, %	silver, g/t
Balance reserves							
B	5234.68	56.92	234.40	122.04	1.09	4.48	23.31
C_1	21653.05	246.14	1090.92	418.41	1.14	5.04	19.32
$B+C_1$	26887.73	303.06	1325.32	540.45	1.13	4.93	20.10
C_2	20830.05	246.31	1162.57	654.40	1.18	5.58	31.42
Total	47717.78	549.37	2487.89	1194.85	1.15	5.21	25.04
Off-balance reserves							
C_2	13461.48	107.58	531.07	239.23	0.80	3.95	17.77

A draft was drawn up, including a business plan for the activities of the First Mining Company of the State Corporation Rosatom (based on materials from the First Mining Company).

The Pavlovskoe investment project is aimed at the effective development of a lead-zinc deposit. On the basis of the deposit, a mining enterprise will be created for the extraction and processing of ores with a capacity of 3.5 million tons of ore per year.

The production will consist of two types of concentrate: 1) lead concentrate with silver content; 2) zinc concentrate. Annual production of concentrates is estimated at 260.000 tons for zinc concentrate and 67.000 tons for lead concentrate with silver by-product.

It is planned to build berthing facilities 20 km from the processing plant for loading containers with concentrates onto container ships.

The mining enterprise includes an open pit, a processing plant, a tailing dump, a 30 MW liquefied natural gas power plant, a shift camp, storage facilities and other objects.

The deposit is supposed to be developed on a rotational basis year round. The number of personnel is 436 employees. The duration of development is up to 14 years.

The zinc concentrate is planned to be sold to the Swedish concern Boliden, which has subsidiaries in Norway, Finland and Sweden; lead concentrate — to Chinese state-owned company Chinalight Resources Imp.&Exp. Corp.

Alternatively, concentrates could be sold to commodity trader Glencore International AG.

Commodity trader Trafigura has proposed an option for pre-paid supplies, which may be considered after the start of construction of the Pavlovskiy Mining and Processing Plant.

The project's further implementation strategy includes design and survey work and construction and installation work on the deposit's facilities.

Design and survey work includes engineering investigations and the development of design documentation for the construction of a mining and processing plant; the necessary approvals and examinations of the design documentation; and the development of detailed design construction documentation.

The construction of port and its facilities is envisaged: backfilling of a highway and organization of a base in the construction area; arrangement of a temporary storage of fuel and lubricants with a total capacity of 2000 m^3 using flexible storage tanks; backfilling of the approach dam of the protective structure and the site of coastal structures; construction of a temporary floating berth for reloading construction and quarry equipment and oil products.

The purpose of the main construction phase is to commission the mining and processing facilities. An open pit diverter, a dam on the Bezymyannaya River and a drainage canal of the Bezymyannaya River should be built for mining facilities.

At the time of writing the business plan (March 2016), the main components of the project technology were identified for the basic option as one of the most cost-effective: open pit mining; processing of lead-zinc ores by the flotation method to obtain lead and zinc concentrates.

The deposit development system is transport, deepening, longitudinal, single-sided for the Central and Southern pits and double-sided for the Eastern pit, with the movement of overburden

by vehicles to dumps, with external and possible internal dumping in the worked-out area of the Central pit (on the gentle western side) and the Southern pit.

This system is the most suitable for the specific mining and geological conditions of the Pavlovskoe deposit.

The general direction of mining operations is taken in accordance with the direction of deepening, horizontal ledges, longitudinal penetrations when performing overburden and mining operations. Mining equipment for quarrying is adopted according to the scale of mining operations.

The technological scheme provides for mining in ledges 10 m high in overburden operations, and 5 m high in ore mining (in order to minimize losses and impoverishment). When approaching the limiting boundaries of the quarry, the working ledges are repaid — they are doubled or built with one 20 or 30-meter ledge, respectively, with a stable offset angle.

The structure of complex mechanization of mining processes is provided with the use of mining (drilling and excavation-loading) equipment with an electric drive.

The excavation of cover semi-rock overburden (to the level of bedrock) is planned to be carried out with a front loader with preliminary preparation of the rock mass for excavation by mechanical means — preliminary loosening with the help of a ripping-bulldozer unit, followed by stacking and loading by a loader into vehicles.

The rock mass (bedrock) is excavated by means of drilling and blasting preparation for extraction.

The mined ore is transported to the warehouse of the processing plant, located to the west of the Central pit (1.25 km).

Overburden rocks are transported to rock dumps. The stockpiles are bulldozed.

Mining processes

The following drilling machines will be used for blast-hole drilling:

- overburden works (electric drive) — machine tool 4SBSH-200-40, bit diameter 215.9 mm;
- mining (electric drive) — machine tool SBU-100GA-50, pneumatic hammer P-110 (or P-130), drill bit diameter 110 mm.

Wells with a diameter of 216 mm are used in drilling and blasting operations on overburden with a ledge height of 10 m; wells with a diameter of 110 mm are used in the extraction of minerals. For the ores of the Pavlovskoe deposit, it is possible to use the Poremit emulsion explosive.

Rock mass loading after the explosion during the mining is carried out by a mining hydraulic excavator Komatsu PC750SE-7 “backhoe” with a bucket capacity of 2.8 m3 with the possibility of replacing it with a bucket of 4.5 m3 “front shovel”. Loading is planned in 30-ton BelAZ-7540 dump

trucks. On the overburden, a EKG-10 “straight shovel” mining excavator with a bucket capacity of 10 m3 will be used. Loading will be carried out in 90-ton BelAZ-7557 dump trucks.

Current state and mining technology

It is planned to develop the reserves by open-pit mining method. Ore enrichment will be carried out at the concentrating plant, designed at the deposit, with the production of lead and zinc concentrates separately. The design capacity is at least 2000 thousand tons of ore per year.

As of February 2021, the reserves of the Pavlovskoe deposit are accounted for at 55 million tons (with a zinc concentration of 4%), metal reserves: zinc — 2 million tons, lead — 430 thousand tons, silver — 30.3 million ounces.

A mining and processing plant will be built to produce ore concentrate. In November 2020, the PKRK entered into a preliminary agreement with the Finnish company Metso Outotec for the design of a floating processing plant.

Estimated date for the mining and processing plant to reach industrial volumes is 2024.

One of the authors of this article Ushakova V.A. within the framework of the graduation project, defended on February 3, 2022 at the Northern (Arctic) Federal University, proposed the following option for the Pavlovskoe field development.

The deposit development system was determined by Sheshko E.F. The system is referred to group B with longitudinal (frontal) movement of rocks into disposal areas by means of vehicles; the B-5 system is provided with rock transportation to external disposal areas.

N.V. Melnikov’s mining system is defined as a transport mining system where overburden rocks are transported to external dumps by means of motor vehicles.

V.V. Rzhevskiy’s development system is a deepening longitudinal single-side system.

The development of the deposit will be carried out in two stages with ledges 20 m high and with preliminary loosening of minerals, overburden rocks using drilling and blasting.

The first four ledges have a height of 10 m, since the first 40 m are more subject to deformation displacement; there are interlayers of weaker rocks at this depth undergoing annual freeze-thaw cycles, which also reduces the strength characteristics of the rocks. In addition, once the field is completed, the first lower benches will be easier to reclaim (Fig. 1).

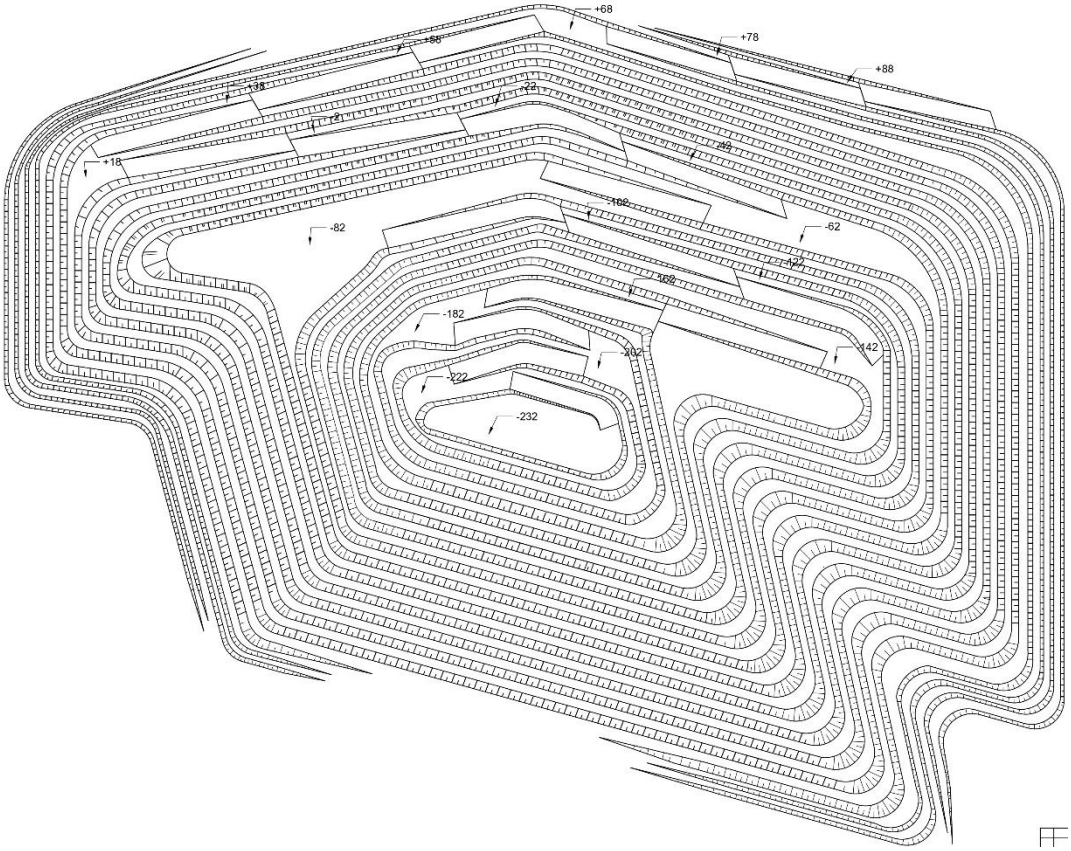

Fig. 1. The final contour of the open pit of the Tsentralnaya Deposit (executor Ushakova V.A.).

The projected concentrator is designed to process silver-bearing lead-zinc ores from the Pavlovskoe deposit to produce two types of commercial products — lead and zinc flotation concentrates. The processing plant will have a capacity of 3.5 million tons of raw ore per year.

To average the ore and to ensure its uninterrupted supply to the plant, it is planned to locate two stockpiles of commercial ore with a capacity of up to 150.000 tons each.

The initial ore is transported from the stockpile by a slatted feeder to a jaw crusher with a feeder opening.

Crushed ore with grain size of 0-250 mm (P80 — 152 mm), together with spills from the apron feeder, is delivered via a conveyor gallery to the intermediate ground stockpile of crushed ore. Ore from the intermediate storage of crushed ore through the conveyor gallery enters the grinding department.

The main lead flotation feed is the hydrocyclone overflow from the grinding section. Before the ore is fed into flotation, it enters the operation with reagents and with additional air supply to enhance pyrite depression. The tailings of the 1st and 2nd main lead flotation are sent to the check flotation, and the concentrate is fed to the sump, after that it is pumped to the 1st cleaning lead flotation. Lead control flotation tailings will be directed to the main zinc flotation.

The main zinc flotation is fed by the combined tailings of the lead flotation section. The main zinc flotation concentrate goes to the 1st cleaning zinc flotation, and the tailings are sent to the control zinc flotation.

The thickening section provides for the installation of two radial thickeners for the commercial concentrates of the lead and zinc flotation sections. Filtration of lead and zinc concentrates is carried out in chamber press filters.

To ensure stable, uniform and trouble-free operation of the concentrating plant, a system is provided for distributing automatic control over the technological parameters of equipment and automated control of technological processes based on logic controllers (DCS) with the output of all indicators and control actions to the central control room. The system is aimed at compliance with regime parameters and prevention of emergencies associated with equipment failure and violations of the technological regime.

The priority status of the Pavlovskoe project will provide further support and assistance to the Arkhangelsk Oblast authorities at all stages of its implementation. It provides for the granting of income tax and corporate property tax exemptions for JSC First Mining Company in the amount of about 500 million rubles. Successful implementation of the project, along with a contribution to the socio-economic development of the Arctic territories of the country, will increase the gross regional product of the region and create more than a thousand new jobs [7, Evdokimov A.N., Kalenich A.P., Kryukov V.D., Lastochkin A.V., Semenov Yu.P.].

Lead-zinc ore occurrences on Novaya Zemlya

The Severnoe and Perevalnoe ore occurrences are located near the Pavlovskoe Deposit.

The northern ore field has not yet been studied enough, but it is promising for the extraction of lead-zinc ores. Average zinc content ranges from 32 to 58%, and lead — from 10 to 30%. The ore minerals sphalerite and galena do not form aggregates in the rock, but are located separately. Such a textural feature of ores can be used in the selective development of a deposit and subsequent enrichment of ores. The resources of the Severnoe ore field are taken into account in the amount of more than 5 million tons of zinc and about 1 million tons of lead.

The Perevalnoe ore field is located 20 km northeast of the Pavlovskoe Deposit. According to geophysical data, the ore bodies of the Perevalnoe field are similar in size to the deposits of massive lead-zinc ores of the Pavlovskoe Deposit. A two-tier ore deposit with a thickness of 25 to 50 m was identified on an area of 3 km^2.

JSC First Mining Company is going to continue exploration work on new areas. The discovery of zinc and lead deposits in the archipelago is quite likely. The Shumilikhinskiy mineralization is known on the Yuzhnyy Island, which covers an area of 1.2 km^2, where several ore deposits 1–3 m thick and tens of meters long have been found. The contents of zinc range from 1.2 to 24.89%, lead grades from 1.0 to 14.33% [6, Wittenburg P.V.].

Lead-zinc deposits and ore occurrences on Vaygach

Lead-zinc deposits Krasnoe and Razdelnoe are known on the southwestern coast of Vaygach Island within the Lyamchinskiy ore cluster. In 1930s, ore was mined there by Gulag prisoners. The lead-zinc ore occurrences of Paygoto, Talata-Sale and Tsinkovyy Nos have been record-

ed. Zinc reserves at Vaygach are 9.0 thousand tons of C2 category, zinc resources: 22.8 thousand tons — P1, 705 thousand tons — P2, 3400 thousand tons — P3. Lead resources on Vaygach Island amounted to 0.5 thousand tons — P1, 68.0 thousand tons — P2, 260.0 thousand tons — P3. The ores contain impurities of silver, cadmium, germanium, gold. In total, the resources of various categories of zinc and lead on Vaygach Island reach 4 million tons.

Lead-zinc occurrences in the Northern Timan and Amderma areas of the Nenets Autonomous Okrug

On the Northern Timan, small occurrences of lead and zinc are associated with greisenized pegmatites. Ore occurrences are disseminated galena, pyrite, chalcopyrite, molybdenite, pyrrhotite, sphalerite, pyrochlore and fluorite. The lead content ranges from 0.001 to 1.0%; zinc reaches up to 0.05%; copper — 0.005–0.01%. The total thickness of the mineralization zone is 16.5 m with an average lead content of 0.12%; zinc — 0.017%, cerium — 0.046% and lanthanum — 0.052%. Dense phenocrysts and nests of galena up to 5 cm in size are observed in mica at Malyy Rumyanichnyy Cape. Lead content is 0.61%, zinc — 0.18%, molybdenum — 0.02% with a thickness of the ore zone of 0.5 m. Mineralization confirmed by boreholes to a depth of 142 m [17, Plyakin A.M., Belyaev V.V.]. In Northern Timan, the zinc ore occurrence has been estimated to have a P2 resource of 700 thousand tonnes [6, Wittenburg P.V.].

Ore occurrences of copper-nickel ores are known in the Northern Timan [28, Danilov M.A., Ermolenko Yu.P., Skripnichenko V.A.], which were discovered by exploratory boreholes in gabbroid rocks. Copper resources in the Ruchievskaya area are estimated at 800 thousand tonnes in category P2. Nickel resources in the Bugrovskaya area are evaluated as 7.5 thousand tons P1, 23.7 thousand tons P2, 2000 thousand tons P3. Apatite-titanium-vanadium ores are discovered by wells within the layered gabbro-syenite complex of Northern Timan [29, Danilov M.A., Skripnichenko V.A.]; they can be mined in a complex with other minerals.

The **Amderminskoe** Deposit of fluorite, lead and zinc is known near the village of Amderma on the coast of the Kara Sea (Northern Pay-Khoy). Since 1932, ores have been mined at the deposit; the deposit has been mothballed since 1951. Ores are composed of fluorite and fluoritized limestones bearing sulfide (sphalerite, galena, pyrite) dissemination. The content of zinc is 0.33–1.11%, lead is 0.2%; at a depth of 100 m, the content of lead and zinc in total reaches 1.5%. Lead and zinc resources have not been estimated. Mining operations can be organized at the Amderminskoe field. Transportation of complex lead-zinc-fluorite ores will be carried out through the seaport of Amderma.

Employees of the Institute of Geology of the Komi Scientific Center of the Russian Academy of Sciences determined the value of reserves and resources of solid minerals in billion rubles: 1) in the subsoil of the Nenets Autonomous Okrug (Northern Timan), reserves + resources (P1 + P2) of zinc — 26 billion rubles; 2) in the subsoil of Vaygach Island, reserves + resources (P1 + P2) of zinc — 13 billion rubles, lead — 0.7 billion rubles [6, Wittenburg P.V.].

Lead-zinc deposits and ore occurrences in the Polar Urals

The **Saureyskoe** lead-zinc deposit, discovered in 1967, is defined by its genesis as a stratiform telethermal regenerated deposit. The area is promising for the discovery of new ore deposits based on lead and zinc occurrences.

The Saureyskoe Deposit of lead ores is located in the Priuralskiy District in the upper reaches of the river Malaya Khuuta, 70 km northwest of the Obskaya-Bovanenkovo railway. The average copper-zinc-lead ore composition is 6.18% lead, 0.15% zinc, 0.059% copper. The reserves of the Saureyskoe Deposit are estimated at 2898 thousand tons of ore in category C1, (lead — 182.1 thousand tons, zinc — 9.0 thousand tons); 2578 thousand tons of ore in category C2, (lead — 144.6 thousand tons, zinc — 12.5 thousand tons).

A geological report was compiled by the Saureyskoe geological prospecting party (authors B.S. Kotelnikov, B.V. Malivanchuk, V.V. Donchak and others) was compiled based on the results of the works. Additional exploration work is required. The subsoil user of the Saureyskoe Deposit is CJSC Nefteresursy, which carries out exploration and mining of lead ores in the Saureyskoe ore field (License СЛХ 02276 ТЭ dated 10/11/2010). The mineralization zone of the deposit was traced for 1400 m, fixed at 200–700 m — along the dip with a width of about 100 m. There are 13 ore bodies in the Main and Eastern ore zones of the Saureyskoe Deposit.

The main ore minerals on the deposit are sulphides: galena, sphalerite, tetrahedrite, sulphate-baryte; pyrite, chalcopyrite, arsenopyrite, bournonite; copper green, cerusite, anglesite and smithsonite are found in the oxidation zone.

The reserves of the Saureyskoe Deposit are accounted for in categories C1+C2: ore in the amount of 6100.7 thousand tons, including lead — 357.6 thousand tons (content 5.86%), barite — 596.6 thousand tons (content 9.78%), zinc — 28.8 thousand tons (content 0.47%), silver — 183.6 tons (concentration 30.1 g/t), gold — 0.378 tons, copper — 1700 tons, cadmium — 278.6 tons, antimony — 236.4 tons [5, Kontar E.S.].

There are several ore occurrences on the flanks of the Saureyskoe Deposit: Novoe, Yuzhnoe (Tsinkovoe), Orangskoe, Spokoynoe, Pridorozhnoe, Svintsovoe.

The development of the Saureyskoe field is hampered by the lack of roads. The site is located on the banks of the Malaya Khuta River, which flows into the Baidaratskaya Bay, 70 km from the Obskaya-Bovanenkovo railway.

On the Taimyr Peninsula in the Krasnoyarsk Krai, the Partizanskoe deposit is represented by sphalerite-galena-siderite veins with a strike of 2–3 km. The average thickness of the veins ranges from 1.1 to 1.5 m, the content of zinc and lead in the ore reaches 4%; the admixture of silver is 800 g/t. The deposit is considered to be a promising ore-mining target, as it is located near the Nizhnyaya Taymyra River.

Conclusion

The sites associated with mining in the Arctic are of strategic importance for strengthening the country's national security.

Lead-zinc deposits and ore occurrences in the Russian Arctic are located on the Novaya Zemlya archipelago, on Vaygach Island, in the Polar Urals and Northern Timan.

The Pavlovskoe Deposit on Novaya Zemlya is ready for development with an investment volume of 71 billion rubles. PGRK should receive 7 billion rubles from the budget as a subsidy for the construction of infrastructure facilities. Tax deductions will amount to at least 43 billion rubles for the development period. The company completed the calculation of ore reserves, carried out engineering surveys, and designed the mine and port complex.

Pavlovskoe mine will annually produce up to 47 thousand tons of lead and 223 thousand tons of zinc concentrates. Domestic and major foreign industrial groups have expressed interest in the production.

The deposit developers can achieve economic efficiency at the expense of open-pit mining with low stripping ratio, due to high metal content in ore (5.21% zinc, 1.15% lead), by using innovative technological solutions, for example , installation of an enrichment plant on a floating platform. The project is being implemented with the Finnish company Outotec.

The next most promising site is the Saureyskoe Deposit in the Polar Urals. The problem in developing the field is its remoteness from transportation routes. The field is located 70 km northwest of the Obskaya-Bovanenkovo railway line, so it is necessary to plan the construction of a road from the field to the railway. Cargo could then be shipped to the ports of the Gulf of Ob or Indiga, when it is put into operation.

Deposits of lead and zinc on Vaygach Island and on the shore near Amderma have been previously mined. It is necessary to re-evaluate their reserves and identify possible development options. Transportation of mined ore will be carried out through the port of Amderma.

In the Northern Timan, the reassessment of the reserves of non-ferrous metal ores should be carried out as a whole (lead, zinc, molybdenum, copper, nickel). Mining of ores may be feasible in connection with the construction of the deep sea port of Indiga, which is planned to be located several kilometers from non-ferrous metal ore occurrences.

Thus, the lead-zinc deposits of the Arctic territories of the Timan-Severouralsk region, including the Novaya Zemlya archipelago, Kolguev Island, the Polar Urals and Northern Timan, can be combined into a mineral resource center of great economic importance for Russia.

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Problems of Improving the Socio-Economic Efficiency of Fishing Activities in the Arctic *

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Abstract. The data on the growth of prices for Arctic fish species in 2015, 2018, compared to 2013, the period of the relatively "hard" ruble, are presented. The reasons for the price increase are shown. An important one is the replacement of the "historical" method of providing biological resources to fishermen with the "auction" one, since it is associated with payment for the right to harvest. This leads to an increase in production costs and prices for fish products, as well as to a decrease in fish consumption by the population. Objectives of the article: to develop proposals to increase the supply of products from Arctic fish to Russian markets (primarily to the markets of the North-West of the country) and to reduce their prices. The relevance of the article is due to the lack of practical measures to reduce the prices of Arctic fish products and increase consumption. The most important results: the author's proposals to stimulate increased sales of fish products in Russia provided by the fish products of the Northern basin are substantiated. Practical significance: it is shown that the use of the developed proposals will reduce consumer prices for fish products, an increase in visits of fishing vessels to Arctic ports and unloading of fish products will lead to a multiplier effect by improving the activities of fish processing enterprises and servicing the fishing fleet.
Keywords: *Western Arctic, fishing, socio-economic efficiency, improvement measure*

Introduction

High prices for fish products and their low consumption by the Russian population have recently been frequently discussed in scientific and analytical publications. Various ways to solve them have been proposed. For example, V.I. Sauskan and co-authors suggest that "... a new socially oriented state policy is necessary, […] which should allow the industry to significantly intensify its participation in ensuring the food security of the country" in the article "Modern Problems of Sustainable Development of the Fishery Sector of the Russian Economy and Ways to Solve Them" [1]. E.V. Osipov and G.S. Pavlov see a solution to problems in the creation of a state fisheries corporation (SFC), the purpose of which is "the development of underutilized aquatic biological resources (ABR), including quota-based ones, the sale of which will be carried out on the domestic market" [2]. Mnatsakanyan A.G. and Kharin A.G. state that the development of fishery in Russia should not take place only under the influence of market mechanisms or actions of administrative bodies. "The state, together with the business community, needs to develop collective solutions,

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the priority of which should be the saturation of the internal market with various qualitative and accessible fish products...” [3].

The implementation of the above proposals to change the socially oriented policy in the field of fisheries, to create a state fisheries corporation and to change the policy of exporting fish products, in our opinion, is unlikely.

Issues of fish prices and a decrease in demand for fish products are constantly discussed in the analytical publication “Fish Courier-Profi” and other sources by officials and fish industry workers. The culprits of the current situation are mostly cited as dealers and retailers. However, the initiator of the price increase was fisheries, which raised prices for cod in Northwest Russia in 2014 by 100%, for other fish species — by slightly lower values. Therefore, it is necessary to start looking for ways to reduce retail prices for fish products from selling (wholesale) prices. Rules on access to biological resources for fishing can be an instrument to reduce prices. Bioresources are public property. Therefore, the system of access to them should serve the interests of the state and society.

Main section

The State Council is the body that determines the main directions of development of some sectors of the economy of the Russian Federation. The last meeting of the Presidium of the State Council for the Development of Fisheries was held on November 19, 2015 in the context of the devaluation of the ruble by about 100% and the growth of first-hand wholesale prices in the North-West of Russia for the main types of fish in the Arctic, compared with prices at the end of 2013: cod — 80.6%, haddock — 38.4%, mackerel — 53.3%, herring — 63.3%. Prices for other fish species from the Arctic seas and other basins have also increased [1]. That is why, when opening the meeting, the President of the Russian Federation, V.V. Putin said: “The main objective of our meeting is to identify measures that will contribute to filling the Russian market with quality and affordable domestic products”.

Since 2004 and until now, fishing in Russia, including in the Arctic waters, has been operating under conditions of large state preferences and, along with agriculture and mining, exploits natural resources, the payment for which has had a minimal impact on indicators of economic efficiency of production since 2007. For example, according to the regional statistical offices of the Murmansk and Arkhangelsk oblasts and the Republic of Karelia, in 2018, the total fees for the use of biological resources amounted to 0.35% of the cost of the economic turnover of fishing and fish farming in the Northern Basin. This feature — the absence of a significant fee for the use of resources — distinguishes it from a number of other industries [4, Endovitskiy D.A.]. “It can be as-

[1] Nauchnye i prikladnye osnovy ustoychivogo razvitiya i modernizatsii morekhozyaystvennoy deyatel'nosti v zapadnoy chasti arkticheskoy zony Rossiyskoy Federatsii: otchet o NIR (promezhut.): 0226-2019-0022 [Scientific and applied foundations for sustainable development and modernization of maritime activities in the western part of the Arctic zone of the Russian Federation: research report (interim): 0226-2019-0022] / Institute of Economic Problems of the Kola Scientific Center of the Russian Academy of Sciences; scientific adv. Vasilyev A.M.; resp. performer: Vasilyev A.M., Vopilovskiy S.S., Fadeev A.M. et al. Apatity, 2020, 128 p.

sumed that the extremely high profitability of fishing, as well as its other non-typical financial indicators, are largely ensured by the use of natural rent by mining enterprises" [5, Kuzin V.I.]. The actual average level of profitability in the fishing industry of the Murmansk Oblast in 2013 was 37.0% (2013 was the last period with a relatively "stable" Russian currency). A considerable part of the named level of profitability, along with preferences, was provided by the presence of natural rent, which, according to our researches, makes ~35% of the level of economic turnover [6, Vasiliev A.M., p. 73].

The above factors were supplemented by the increase in export prices for fish and their conversion into rubles at the devalued exchange rate since 2015. According to Rosstat, the share of export income in the total revenue of fisheries organizations in 2017 was 77.0% [2]. The weighted average profitability of sales in fisheries for the three analyzed regions increased to 67.3% [3,4]. At the same time, it is important to note that mining companies used increased export prices in the domestic market, which should not have been done in the situation described above. This was stated by the President of the Russian Federation V.V. Putin in a speech at a meeting of the Presidium of the State Council on November 19, 2015. "However, this has not reached the owners of fishing companies. They continued to use the high profitability in fisheries for the benefit of a narrow circle of bioresource users and to raise the prices of fish products" [5]. As a result, first-hand prices for the main species of Arctic fish in the North-West at the end of 2018, compared to the end of 2013, increased: for cod — up to 295 rubles/kg (3.2 times), for haddock — up to 210 rubles/kg (1.9 times), for mackerel — up to 125 rubles/kg (2.1 times) and for herring — up to 70 rubles/kg (1.4 times) [6]. The profitability of fishing in the Northern Basin was 77.5%, and 15 mining enterprises had a profitability level of over 100.0%.

Some experts believe that one of the factors for using unreasonably high wholesale prices for fish on the domestic market is the fact that fishermen do not need it (the market) for currency-intensive fish production, such as cod, haddock, and other bottom species. For example, B.I. Pokrovsky and co-authors note that it "does not have the necessary degree of competition, and supplies are carried out according to the residual principle" [7, Pokrovsky B.I.]. The negative impact of excessive exports on the domestic market is also noted by A.G. Mnatsakanyan and A.G. Kharin [3]. This statement applies to the markets of the North-West of Russia and other Russian

[2] Finansy Rossii. 2018: Stat.sb. [Russian finances. 2018: Stat.col.] / Rosstat. Moscow, 2018, 439 p.
[3] Rybokhozyaystvennaya deyatel'nost' v Murmanskoy oblasti [Fisheries activities in the Murmansk Oblast] / Federal State Statistics Service, Territorial body of the Federal State Statistics Service for the Murmansk Oblast. Murmanskstat, 2019, 48 p.
[4] According to the Territorial body of the Federal State Statistics Service for the Arkhangelsk Oblast and the Republic of Karelia, 2013, 2018.
[5] Korotaev I. Za lakomyy kusochek rybnoy otrasli nachalas' neshutochnaya bor'ba [A serious struggle began for a tidbit of the fish industry]. URL: https://konkurent.ru/article/18819 (accessed 15 December 2021).
[6] Rybnye ryady. Obzor situatsii na rynke ryby 29 dekabrya 2018 g. [Fish lines. Overview of the situation on the fish market December 29, 2018]. URL: http://www.nfr.ru/media/files/monitoring/monitoring.29.12.2018.pdf (accessed 17 December 2021).

regions, where Arctic fishermen supply fish products, primarily, since they sell fish abroad to a greater extent than fishermen of other basins — an average of 71.0% and over 90.0% for cod [7].

The increase in wholesale prices for Arctic fish species served as the basis for the increase in retail prices. Table 1 shows the average consumer (retail) prices by type of processing in the three main regions of the North-West at the end of 2013 and 2018.

Table 1 shows that prices for all types of fish products have risen sharply. Thus, for the most purchased fish — frozen cut fish (excluding salmon) — the price increase in 2018, compared to 2013, amounted to 241.8% and 203.7% in the Murmansk Oblast, 233.5% in the Arkhangelsk Oblast and 181.5% in the Republic of Karelia. For fillets, the rates were 272.3% and 243.1% in the Murmansk Oblast, 219.9% in the Arkhangelsk Oblast, and 166.9% in the Republic of Karelia. As for salted herring, the Murmansk Oblast had 263.9% and 189.0%, while the Arkhangelsk Oblast had 195.9% and the Republic of Karelia had 173.6%. The rest of the range of fish products has similar results.

The increase in prices for fish products caused an adequate response from consumers. The purchasing power of the population of the Murmansk Oblast, compared with the level of 2013, decreased by almost 40%, in the Republic of Karelia — by 35%.

Fish consumption decreased to the greatest extent — by 19% — in the Murmansk Oblast, by 4% in the Arkhangelsk Oblast, and even slightly increased in Karelia. The given results, in our opinion, can be explained by the reorientation of the population to the purchase of blue whiting and pollock, which are much cheaper than fish caught in the Western Arctic waters. In addition, the above results of the consumption of fish products are associated with the great development of fishery in the inland waters of the Arkhangelsk Oblast and Karelia. Despite the reduction of fish consumption and the purchase of a cheap assortment of products, in comparison with cod and haddock, its cost in all regions has increased by a third or more.

Table 1

Average consumer prices for fish products at the end of the year, rub/kg [8,9]

Product	Murmansk Oblast			Arkhangelsk Oblast			Republic of Karelia		
	2013	2018	Ratio of 2018 to 2013, %	2013	2018	Ratio of 2018 to 2013, %	2013	2018	Ratio of 2018 to 2013, %

[7] Nauchnye i prikladnye osnovy ustoychivogo razvitiya i modernizatsii morekhozyaystvennoy deyatel'nosti v zapadnoy chasti arkticheskoy zony Rossiyskoy Federatsii: otchet o NIR (promezhut.): 0226-2019-0022 [Scientific and applied foundations for sustainable development and modernization of maritime activities in the western part of the Arctic zone of the Russian Federation: research report (interim): 0226-2019-0022] / Institute of Economic Problems of the Kola Scientific Center of the Russian Academy of Sciences; scientific adv. Vasilyev A.M.; resp. performer: Vasilyev A.M., Vopilovskiy S.S., Fadeev A.M. et al. Apatity, 2020, 128 p.

[8] Rybokhozyaystvennaya deyatel'nost' v Murmanskoy oblasti [Fisheries activities in the Murmansk Oblast] / Federal State Statistics Service, Territorial body of the Federal State Statistics Service for the Murmansk Oblast. Murmanskstat, 2019, 48 p.

[9] According to the Territorial body of the Federal State Statistics Service for the Arkhangelsk Oblast and the Republic of Karelia, 2013, 2018.

1	2	3	4	5	6	7	8	9	10
Live and chilled fish	122.3	284.6	232.7	n/d	n/d	-	172.8	329.4	190.6
Salted, marinated and smoked fish	276.9	491.2	177.4	195.6	345.8	176.8	326	488.9	144.9
Salmon caviar, domestic	3024.1	4363.1	144.3	2607.2	3766.8	144.5	3836.4	3728.0	131.4
Frozen cut fish, except for salmon species	147.3	298.6	203.7	112.8	263.4	233.5	134.4	243.9	181.5
Frozen uncut fish	65.7	131.4	200.0	86.7	148.6	170.7	60.0	122.5	204.2
Cut salmon	308.3	728.2	236.2	382.6	816.8	213.5	…	527.1	-
Fillet	177.22	430.8	243.1	175.6	386.2	219.9	193.5	322.9	166.9
Salted herring	123.0	232.5	189.0	107.0	209.6	195.9	123.0	213.5	173.6
Salted herring fillet	296.1	427.4	144.3	268.7	402.2	149.7	249.7	405.9	162.5
Canned naturally and with oil	59.8	110.9	185.5	57.2	113.9	199.1	57.8	124.8	215.9
Canned in tomato sauce	45.0	82.0	182.2	40.9	66.3	162.1	35.8	78.0	218.5
Preserves	47.6	…	…	113.7	-	-	137.3	…	-

The President of Russia V.V. Putin signed Instructions on the issues discussed at the meeting of the Presidium of the State Council on November 19, 2015 to government agencies, which are of a market nature [10].

Thus, in order to reduce prices for fish products, instructions were sent to the Government of the Russian Federation to improve statistical accounting in the fishery complex of the Russian Federation (p. 1e), to form a unified system for managing and coordinating the activities of state bodies and organizations engaged in management, storage, transportation and sale of fish products, to improve the delimitation of powers between the state authorities of the Russian Federation, the state authorities of the constituent entities of the Russian Federation and local governments in the field of fisheries (p. 2a), to carry out activities aimed at identifying and suppressing cartel collusion in the field of the fishery complex, including in relation to specialized associations, as well as in the field of trade in ABR (p. 5). The Federal Antimonopoly Service and the Federal Tax Service have been instructed to analyze the formation of the wholesale price of fish products, the margins of intermediaries and retailers, as well as the costs of transport and logistics services (p. 6).

The above data on the prices of Arctic fish products shows that the measures taken by the authorities at various levels to implement the decisions made at the meeting of the Presidium of the State Council on 19 November, 2015 have not yet achieved the desired result, as they are mostly local in nature.

Thus, the improvement of statistical accounting has so far been reduced to the fact that the data published by the Territorial bodies of the state statistics of the Murmansk, Arkhangelsk oblasts and the Republic of Karelia no longer provide information on salmon mariculture, as well

[10] Perechen' porucheniy Prezidenta RF po itogam zasedaniya prezidiuma Gossoveta po razvitiyu rybokhozyaystvennogo kompleksa 19 noyabrya 2015 g. [List of instructions of the President of the Russian Federation following the meeting of the Presidium of the State Council on the development of the fishery complex on November 19, 2015]. URL: http://www.kremlin.ru/acts/assignments/orders/50665 (accessed 19 December 2021).

as on the export of fish and crustaceans, mollusks and other aquatic invertebrates in natural terms. In this regard, it is impossible to conduct an analysis on the efficiency of growing salmon fish and exporting fish products. In other countries, for example, in Norway, such issues are resolved by contacting the relevant authority issuing the document, while in Russia, it is necessary to apply to higher authorities, and this information is not always possible to obtain.

In accordance with the instruction to improve the division of powers in the field of fishing, it was decided to increase the quotas of bioresources for participants in coastal fishing by 20% in 2017. It was supposed to improve the provision and financial situation of coastal consumers of chilled fish. However, due to insufficient fish volumes and lack of competition, prices for coastal fishery products are not much lower than frozen products. A radical solution would be to switch to trade at contractual prices, taking into account the profitability of the main consumers of chilled fish — coastal enterprises, as is done in most fishing countries located on the shores of the Atlantic [8, Sogn-Grundvåg G.; 9, McEvoy D.M.].

The government and other competent authorities of the country are trying to develop measures that exclude the accounting of export prices by producers of products when trading on the domestic market, but so far no general solution for the country has been found. The introduction of higher export duties and various temporary arrangements have been used to fill the domestic market.

For example, in the Murmansk Oblast, there has been fish trade under the program "Our Fish" since 2019. The project is being implemented within the framework of an agreement on cooperation between the fish industry and retail chains. The goal is to provide residents of the Murmansk Oblast with high-quality fish products at reduced prices.

According to the Ministry of Fisheries and Agriculture of the Murmansk Oblast, the project covers 26 outlets in 13 cities of the region, as well as weekly fish fair, which is held on Saturdays in Forum shopping center in Murmansk. It presents the most popular fish — cod, haddock, flounder, ruff, catfish, perch, halibut, whitefish, pike, burbot and others, mostly chilled, as well as non-traditional sea delicacies. Products are sold at prices 10-15% below the usual selling prices of fishermen, and large queues line up for them. As far as we know, similar markets are organized in other coastal regions of the country.

The main tool in the fight against monopoly in the field of fisheries is the Federal Law of July 26, 2006 No. 135-FZ “On Protection of Competition”. This Law is of a general nature. It does not contain specific provisions concerning fisheries as some states do. In Iceland, for example, a maximum share of the total allowable catch (TAC) of one participant in the fishery is set at 12.0%. It also specifies the possible catch limit for each species of fish. Such criteria are more convenient to avoid monopoly in fisheries [11].

[11] Korolev Yu. Zalog kvot i uroki krizisa dlya rybakov Islandii [Pledge of quotas and lessons of the crisis for fishermen in Iceland]. URL: https://fishnews.ru/rubric/lichnoe-mnenie/5748 (accessed 18 December 2021).

In accordance with this law, the Federal Antimonopoly Service of Russia in 2012 found the Pollack Harvesters Association and its 26 member companies guilty of a cartel conspiracy to raise prices in the domestic market by delaying the supply of fish products and affiliation with the Hong Kong Pacific Andes fish holding. This FAS decision was positively assessed by three judicial instances. As a result of court proceedings, the guilty legal entities were fined 120 million rubles.

There is only one large fishing company in the Northern Basin that can be suspected of monopoly — the vertically integrated holding Norebo. The Norebo group includes 16 fishing companies, including 9 companies in the Northern Basin: Alternativa LLC, Karat LLC, Karelian Seafood LLC, Rybprominvest LLC, Sogra LLC, Strelets LLC, Taurus LLC, Eridan LLC, Murmansk Trawl Fleet LLC and PJSC. The holding includes 2 modern fish processing plants, a logistics company, a cargo terminal and trade enterprises in Russia and abroad. The company produces more than half of the volume of fillets produced by the enterprises of the Northern Basin. According to our calculations, the holding's revenue for 2021 amounted to ~1.0 billion US dollars [12].

Norebo Holding, like most fishing enterprises in the Northern Basin, supports the supply of cod to the domestic market in minimal volumes and at high prices.

One of the authors considering the issues of structure and competition in classical economic theory is Krugman P. [10]. To study competition in industries, Hannah L. and Kay J.A. developed a concentration index determined by the formula [11]:

$$CR_k = \sum_{i=1}^{k} \frac{Q_i}{Q_\Sigma}$$

where Q_i – the volume of output of the studied products of the *i-th* manufacturer; Q_Σ — the total volume of production of the studied products.

This indicator is equal to 0 for a perfect market, and it is 1 for a monopoly market. The higher the value of the concentration index, the less competitive the market is. If the value of CRk is less than 45%, the market is considered unconcentrated, if CRk is in the range from 45% to 70%, it is considered moderately concentrated, and if CRk is more than 70%, it is considered highly concentrated.

The calculation of fishing concentration indices in the Northern Basin, based on the availability of quotas for 2021 for fishing the most valuable object — cod — at the Norebo Holding showed an index value of 30.6%, and for the three largest enterprises — Rybprominvest JSC , Alternativa JSC and Murmansk Trawl Fleet JSC — 13.0%. Thus, theoretically, fishing in the Arctic should be considered non-concentrated. At the same time, the calculation made for the sum of all fishing resources for 2021 shows that CR3 will be in the range from 45% to 75% — the fishery is moderately concentrated. However, it should not be considered as such, since 80.0 thousand tons

[12] Kostyrev A. «Norebo» popolnyaet seti ["Norebo" replenishes the network]. URL: https://www.kommersant.ru/doc/5087103 (accessed 18 December 2021).

of quotas of the Murmansk trawl fleet are located in a separate fishing area — the Central Atlantic. As a rule, fish products from this region do not enter Russia.

In our opinion, Russian market is necessary for the fishermen of the Northern basin only to sell fish, which can be sold there at a higher price than in European markets. These are herring, blue whiting, polar cod, capelin and blue catfish. They supply the rest of the fish products in minimal quantities, satisfying the demands of the authorities rather than the population. In order to increase supplies to the Russian market to the volumes recommended by the Food Security Doctrine, they need to be stimulated.

Fulfilling the instructions of the President of the Russian Federation V.V. Putin on the analysis of the formation of the wholesale price for fish products, the margins of intermediaries and retail trade, the FAS and the Federal Tax Service prepared a report on measures to limit prices for fish products. The report is not publicly available. Based on the published data, it can be concluded that, according to the FAS, the largest increase in fish prices occurs in the area between the selling prices of producers and the purchasing prices of stores. Development of mariculture is also considered an effective measure in the struggle against price growth by the FAS [13].

In 2011, the Antimonopoly Service investigated the structure of retail prices for fish and found that the share of fishermen in the price of most fish species ranges from 10.0% to 50.0% [14]. In their opinion, intermediaries between fishermen and retailers had a great influence on the price structure. It can be assumed that this is also their viewpoint in the report to the President of Russia. There are no publications on the topic of combating this.

It is known that the producers' selling prices of fish products stored in industrial refrigerators can change even without moving them. Any citizen can purchase fish products and sell them to anyone. These actions may take place several times before the product enters the distribution network.

In order to reduce such manipulations in the Northern Basin, in our opinion, it is necessary to have a sales organization. According to many owners of mining enterprises, it should be private or public-private and sell fish both abroad and on the domestic market through electronic trading.

It is not advisable to propose to solve the problems of the fish industry in food safety via fish farming, as proposed by the FAS, due to low volumes of commodity production, low quality products and the same high prices. Owners of fish farming companies also monitor changes in fish prices in Russia and abroad. For example, the head of the project "Fish Showcases", "VkusVill" Sychev R.V. said in an interview with Rossiyskaya Gazeta: "Last year, the euro rose sharply. And, for example, Murmansk salmon became more expensive than it was supplied to us in spring and at the end of summer. It has risen in price quite seriously. I don't see any reason for this price in-

[13] FAS proanalizirovala rybnye tseny [FAS analyzed fish prices]. URL: https://fishnews.ru/news/29136 (accessed 20 December 2021).
[14] FAS napravila prezidentu Rossii doklad o merakh, napravlennykh na ogranichenie rosta tsen na rybu [FAS sent a report to the President of Russia on measures aimed at limiting the rise in fish prices]. URL: https://fas.gov.ru/news/2061 (accessed 20 December 2021).

crease. Obviously, manufacturers also have their ear to the ground. They understand that if everyone took salmon for 1000 rubles per kilogram, then there is no need to sell it for 700 rubles. Although it would seem that our fish should be much cheaper, since we are not tied to the exchange rate and customs duties. But it turns out that our manufacturers are guided by the global price tag" [15].

It should be reminded that, in accordance with the Doctrine of Food Security 2020, in order to ensure the consumption of 22 kg of whole fish by the population, a catch of ~3230.0 thousand tons is required, including 2750 thousand tons (85.0%) of fish of domestic production. Fish farming in 2021 amounted to 273.5 thousand tons, including 97.1 thousand tons in the Murmansk Oblast and Karelia. Consequently, the whole country's fish production is now 9.9% of the recommended by the Doctrine volumes of Russian fish consumption [16]. Such small volumes cannot significantly affect prices.

The Murmansk and Arkhangelsk oblasts and the Republic of Karelia are currently home to 2.469.000 people. Therefore, farmed fish provides 21% of the volume recommended by the Doctrine [17]. Prices for farmed salmon are slightly lower than those for wild salmon. However, it must be remembered that it is a genetically modified product and can cause harm when eating.

At the State Council "On the development of the fishery complex" in November 2015, the President of Russia placed the main responsibility for rising prices for fish products and strengthening the country's food security on the fishing sector, recalling that the state has created preferential conditions for fishing and the high results achieved in fisheries should be extended to the population of the country. However, the words of the President that "the main task of the fishery complex is the use of national biological resources in the interests of the whole society" have not been realized [18].

The FAS considers the lack of competition in allocating the fishermen with the quota of aquatic resources based on the so-called "historic" system as one of the reasons why fishermen fail to fulfill their moral obligations to the country and society [19]. The FAS expressed its detailed opinion on this topic in the report "On the state of competition in the Russian Federation". It claims that "the use of auctions will lead to the emergence of new market participants and a cor-

[15] Mikhaylov A. Pochemu rossiyane stali men'she est' ryby [Why do Russians eat less fish]. Rossiyskaya gazeta – Ekonomika Severo–Zapada, 2021, no. 161 (8512). URL: https://rg.ru/2021/07/20/reg-szfo/pochemu-rossiiane-stali-menshe-est-ryby.html (accessed 20 December 2021).

[16] Rybnyy Kur'er-Profi: ezhenedel'nyy byulleten' o mezhdunarodnom rybnom biznese [Fish Courier Profi: A weekly newsletter on the international fish business]. 2021, no. 44 (272), November 10.

[17] Population of subjects of the Russian Federation. URL: https://ru.wikipedia.org/wiki/%D0%9D%D0%B0%D1%81%D0%B5%D0%BB%D0%B5%D0%BD%D0%B8%D0%B5_%D1%81%D1%83%D0%B1%D1%8A%D0%B5%D0%BA%D1%82%D0%BE%D0%B2_%D0%A0%D0%BE%D1%81%D1%81%D0%B8%D0%B9%D1%81%D0%BA%D0%BE%D0%B9_%D0%A4%D0%B5%D0%B4%D0%B5%D1%80%D0%B0%D1%86%D0%B8%D0%B8 (accessed 20.12.2021).

[18] Korotaev I. Za lakomyy kusochek rybnoy otrasli nachalas' neshutochnaya bor'ba [A serious struggle began for a tidbit of the fish industry]. URL: https://konkurent.ru/article/18819 (accessed 15 December 2021).

[19] FAS proanalizirovala rybnye tseny [FAS analyzed fish prices]. URL: https://fishnews.ru/news/29136 (accessed 20 December 2021).

responding decrease in the level of concentration of large groups, which indirectly will lead to creation of effective competitive environment, and also will contribute to reduction of prices for fish production for final consumers" [20].

This FAS statement refers to competition for the right to own quotas, and not to the production of fish products at affordable prices. Competition for the acquisition of quotas has always existed. Companies are used to enter the fishery, according to the Fisheries Act, to acquire companies. According to the law, from 2005 to 2017, ~240 billion rubles were allocated for the purchase of businesses. Auctions will increase the presence of large companies in the fisheries sector, as small and medium-sized businesses are financially constrained [21].

Auction experience 2001–2003 showed that the fish companies, which paid for fish quotas, included those amounts in their costs, which resulted in higher prices for fish products and lower efficiency of fishing.

It should be remembered that the auctions of 2001–2003 led to the stagnation of the fish industry. At the meeting of the Presidium of the State Council "On the development of the fishery complex", the following results of those auctions were given: Profit of the industry in 2001 fell 9-fold in comparison to 2000, in 2003 — 18 billion rubles. Accounts payable increased from 37.7 billion rubles in 1999 to 70 billion rubles in 2004, reaching 82% of the cost of production [22].

In accordance with the "Law on Fisheries ...", new fishery participants can acquire biological resources in the following ways: buying quotas for newly introduced biological resources at auctions, shares of quotas taken away from dishonest users, quotas of bankrupt enterprises, enterprises under foreign control etc. However, it should be said that any purchase of quotas leads to an increase in the cost of production and, consequently, to an increase in prices for fish products. The chairman of the board of directors of the Fishnews media holding, E. Klimov said at the meeting of industry associations and fish companies that they discuss high prices for fish: "The task of supplying Russians with cheap fish or providing high-quality food is not worth it. If business sells resources at auctions, then any lowering of prices is out of the question" [23]. The majority of scientists and fishery specialists agree with this formulation of the issue of providing fishermen

[20] Rybopromyshlenniki otvetili na doklad FAS [Fishermen responded to the FAS report]. URL: https://finance.rambler.ru/other/40678745-rybopromyshlenniki-otvetili-na-doklad-fas/ (accessed 20 December 2021).

[21] Perspektivy istoricheskogo printsipa raspredeleniya kvot obsudili na sovmestnom zasedanii obshchestvennykh sovetov pri FAS i Rosrybolovstve [Prospects for the historical principle of quota distribution were discussed at a joint meeting of public councils under the FAS and the Federal Agency for Fishery]. URL: https://www.fishnet.ru/news/novosti_otrasli/perspektivy-istoricheskogo-principa-raspredeleniya-kvot-obsudili-na-sovmestnom-zasedanii-obschestvennyh-sovetov-pri-fas-i-rosrybolovstve/ (accessed 20 December 2021).

[22] O razvitii rybokhozyaystvennogo kompleksa Rossiyskoy Federatsii: rabochaya gruppa prezidiuma Gosudarstvennogo soveta [On the development of the fishery complex of the Russian Federation: a working group of the Presidium of the State Council]. URL: http://vniro.ru/files/Gossovet_doklad.pdf (accessed 20 December 2021).

[23] Rybnyy Kur'er-Profi: ezhenedel'nyy byulleten' o mezhdunarodnom rybnom biznese [Fish Courier Profi: A weekly newsletter on the international fish business]. 2021, No. 29 (857), June 28. URL: https://www.fishnet.ru/issues/rk-profi/857.html (accessed 20 December 2021).

with bioresources for fishing. Therefore, we suggest transferring the above mentioned ABR free of charge to the most cost-effective enterprises supplying fish products to the domestic market.

Conducting auctions for biological resources every 3–5 years, as proposed by the FAS, will lead to curtailment of the investment policy of mining companies, since the payback of vessels at some fishing sites is higher than these terms.

Conclusion

The research shows that fisheries were responsible for the significant increase of fish prices in the Northern Basin in 2014–2015. Among the factors responsible for this situation, the main ones are excessive exports and the failure of fishermen to take into account the low income of Russians compared to Europeans, where the bulk of fish products were supplied. As a consequence, the Russian domestic market was impoverished, both in terms of the volume and variety of products supplied.

The state of marine bioresources and available fishery and coastal fish-processing complexes allow high production and socio-economic results. However, for this purpose, it is necessary to create the norms stimulating calls of trawlers to Russian ports, unloading of fish products there and sale of products on the territory of Russia. In this case, it would be advisable to substantially increase and differentiate fees for ABR when exporting products and supplying them to Russia, as well as to link the allocation of some bioresources quotas for fishing with the obligations to implement the Food Security Doctrine. Currently, the Food Security Doctrine approved by the President of Russia is not systematically implemented due to excessive exports.

The access of economic entities to the exploitation of aquaculture resources in most (if not all) countries is linked to the unloading and sale of fish products, firstly on the domestic market, and then to their export with the permission of customs and other authorities established by the authorities. Russia is probably the only state that allows uncontrolled export of fish directly from the sea. The absence of regular visits of fishing vessels in Russian ports is one of the reasons for the decrease in export prices of fish production and its increase in the domestic market. The coastal infrastructure and enterprises related to fish and seafood processing, maintenance and repair of the fleet incur huge economic losses. Without entering Russian ports, ships leave abroad up to 7 billion rubles per year for maintenance and repair [12, Vasiliev A.M.]. Export of products directly from the sea and dosed deliveries to the domestic market contribute to maintaining high wholesale prices for fish in the domestic market.

Numerous fish brokers and retailers contribute to increase in prices for fish products. Actions of some authorities, encouraging fish export without proper justification, also affected the provision of the domestic market with fish products.

There are no proposals to reduce the influence of intermediaries on prices in the published information about the FAS report to the President of Russia on high prices for fish products. In our opinion, a special organization in the form of a distribution center should deal with the supply of

fish products to the domestic market. Creation of the fish market is planned in Murmansk. It is advisable to include the functioning of the Center for the electronic sale of fish products and their delivery to consumers in its structure.

It is pointed out in the introduction of this article that officials and most of the workers in the fish industry blame trade for high retail prices of fish products. For example, the chairman of the Fish Union, A. Panin, claims that retail chains markup fish from 63% to 85% [24]. The President of the All-Russian Association of Fisheries and Exporters, G. Zverev, stated at a quarterly (2021) briefing, that store markups double the prices for caviar and red fish [25]. The results of a study by the Centre for Social Design Platforma show that "the long chain from catching fish to its appearance on shop shelves in packaging leads to a 2 2.5–3.0-fold increase in prices" [26].

Research by the Institute of Economic Problems of the Kola Scientific Centre of the Russian Academy of Sciences, carried out in the retail and entertainment center "Okay" and the "Euroros" shop in Murmansk in 2010–2011, showed that the trade markup ranged from 24.0% to 200.0%, depending on the type of fish and products [27].

The share of fishermen in the retail price in 2013 was about 30.0% [28]. After the fishermen increased fish prices in 2014–2015, it rose to 85.0%. However, in the following years, the share of fishermen in the retail price decreased and was 51.0% in 2018 [29]. Currently, there are no effective market measures to limit retailers' markups, except for limiting them by law or by decree of the Government of the Russian Federation based on the results of a relevant scientific study.

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[26] Mikhaylov A. Pochemu rossiyane stali men'she est' ryby [Why do Russians eat less fish]. Rossiyskaya gazeta – Ekonomika Severo–Zapada, 2021, no. 161 (8512). URL: https://rg.ru/2021/07/20/reg-szfo/pochemu-rossiiane-stali-menshe-est-ryby.html (accessed 20 December 2021).

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[28] O razvitii rybokhozyaystvennogo kompleksa Rossiyskoy Federatsii: rabochaya gruppa prezidiuma Gosudarstvennogo soveta [On the development of the fishery complex of the Russian Federation: a working group of the Presidium of the State Council]. URL: http://vniro.ru/files/Gossovet_doklad.pdf (accessed 20 December 2021).

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Development of Small and Medium-Sized Business in the Arkhangelsk Oblast *

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Abstract. The article examines the dynamics of the number of small and medium-sized businesses in the Arkhangelsk Oblast from 2017 to 2021. The main reason for the sharp decrease in the number of subjects in 2020 is determined. The most vulnerable and affected areas of small and medium-sized businesses are listed. The measures of support for these areas of entrepreneurship at the federal level are reviewed. The measures taken by the Arkhangelsk regional government to regulate the situation are studied. The specific organizations that give support directly in the territory of the Arkhangelsk Oblast are given. The reasons why it is necessary to support and develop small and medium business in the Arkhangelsk economy are given. The methods used in this paper are an analysis of the number of small and medium-sized enterprises, drawing conclusions about the economic situation in the Oblast on the basis of this analysis, and researching support measures. This article might be useful for entrepreneurs in the Arkhangelsk Oblast to study the support measures. The information described in the article could be useful for scientific research, for statistics and analysis of small and medium business in the Arkhangelsk Oblast.
Keywords: *small and medium-sized business, gross domestic product, entity, microloan, rate, tax*

Introduction

The development of small and medium-sized businesses is an essential trend in a market economy. This topic is highly relevant at present, since the rate of economic growth of small and medium-sized entrepreneurship is important for the regions of Russia. These types of businesses generate large tax revenues for the local budget, provide jobs, and produce a variety of goods and services for the population [1]. The development of small and medium-sized entrepreneurship (SME) is considered important not only for the regions, but also for the country's gross domestic product as a whole [2]. That is why it is necessary for the state to promote its development and expansion.

The scientific novelty of this article is a review of SMEs in the Arkhangelsk Oblast over the past five years against the backdrop of a coronavirus infection, which entails difficulties in development and expansion for business.

In this regard, the aim of this article is not only to study the dynamics of the number of SMEs, but also to examine the state support measures that can help entrepreneurs in the Arkhangelsk Oblast.

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This goal is achieved by collecting information, analyzing it and drawing up conclusions about the situation in the Oblast and support measures.

Overview of small and medium-sized businesses

As of December 10, 2021, the number of SMEs in the Arkhangelsk Oblast is 33935 [1]. Figure 1 shows the statistics for the last five years.

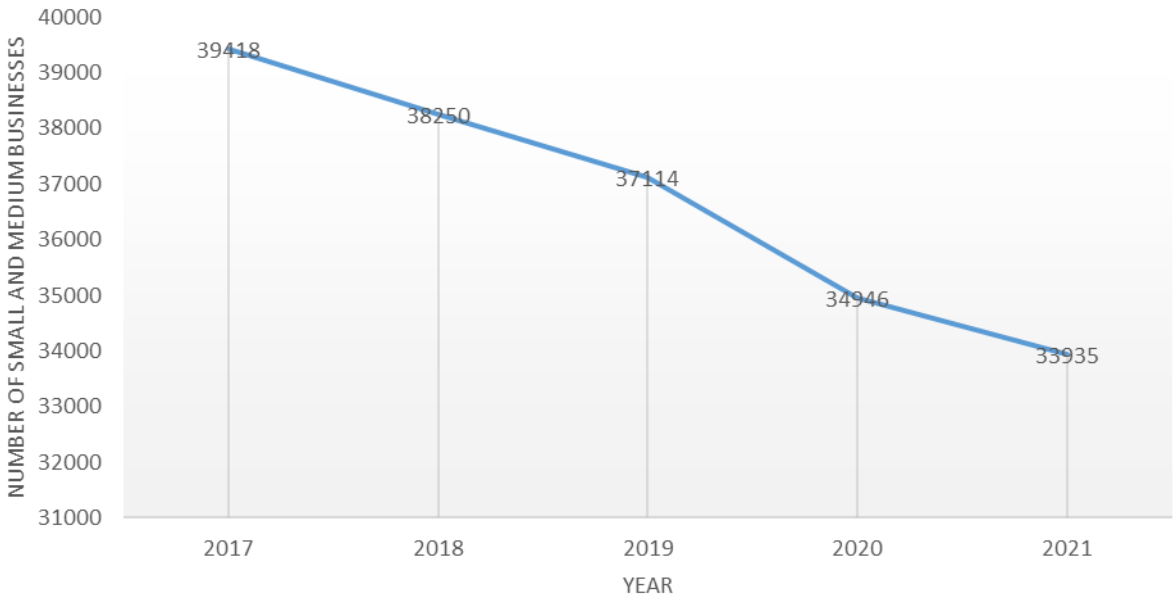

Fig. 1. Number of SMEs from 2017 to 2021.

Figure 1 shows that the number of SMEs is decreasing over time, with the largest decrease in 2020 and 2021.

In 2018, compared to 2017, and in 2019, compared to 2018, the number does not differ much: there is a decrease by 1168 and 1136 units of economic entities, respectively, or by 3%, as shown in Table 1.

Table 1

Change in the number of SMEs

Year	Number of SMEs [2]	Absolute change [3]	Growth rate, %	Rate of increase, %
2017	39 418			
2018	38 250	-1 168	97.0	-3.0
2019	37 114	-1 136	97.0	-3.0
2020	34 946	-2 168	94.2	-5.8
2021	33 935	-1 011	97.1	-2.9

[1] Unified register of small and medium-sized businesses. URL: https://rmsp.nalog.ru/index.html (accessed 01 December 2021).
[2] Unified register of small and medium-sized businesses. URL: https://rmsp.nalog.ru/index.html (accessed 01 December 2021).
[3] Authors' calculations.

The largest decrease is observed in 2020 — almost 6% (2168 units of economic entities). In 2021, the decrease is already less than in 2020 — by 2.9% (1011 units of economic entities), but at the same time, the lowest number of SMEs in five years is recorded.

New businesses are being opened in small numbers. Figure 2 shows how many new SMEs are created each year between 2017 and 2021 in the Arkhangelsk Oblast.

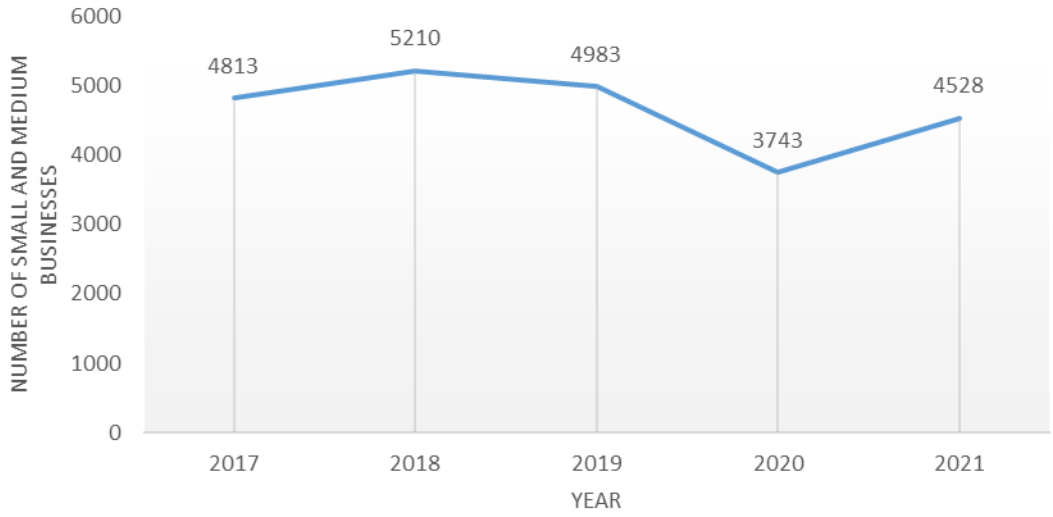

Fig. 2. Newly created SMEs.

The figure shows that the smallest number of newly created SMEs is in 2020 (3743 units). Table 2 shows the change in the number of newly created SMEs.

Table 2

Change in the number of newly created SMEs

Year	Number newly created SMEs [4]	Absolute change [5]	Growth rate, %	Rate of increase, %
2017	4 813			
2018	5 210	397	108.2	8.2
2019	4 983	-227	95.6	-4.4
2020	3 743	-1 240	75.1	-24.9
2021	4 528	785	121.0	21.0

As can be seen from table 2, for all the five years under consideration, there is the largest reduction in newly created entities in 2020 (decreased by almost 25% or by 1240 units of economic entities).

The Arkhangelsk Oblast is part of the Northwestern Federal District of Russia (NWFD). From 2018 to 2021, the share of SMEs in the Arkhangelsk Oblast remains unchanged and amounts to 5% of the total number of subjects of the entire district.

The largest number of SMEs in the NWFD is in St. Petersburg: from 2018 to 2021, the share of SMEs there remains unchanged and amounts to half of the total number of subjects of the district, or 52%.

[4] Unified register of small and medium-sized businesses. URL: https://rmsp.nalog.ru/index.html (accessed 01 December 2021).
[5] Authors' calculations.

Figure 3 shows statistics on the number of SMEs in the NWFD.

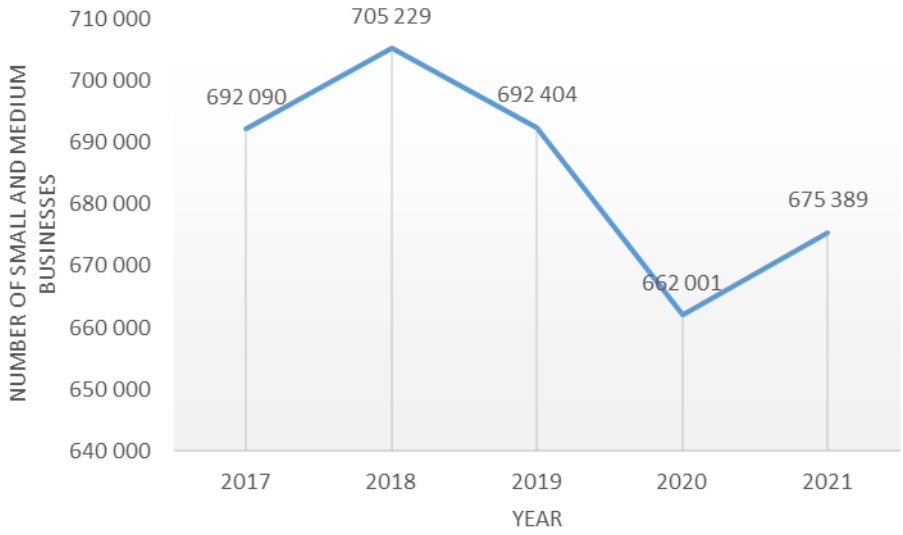

Fig. 3. Number of SMEs in the Northwestern Federal District from 2017 to 2021.

Figure 3 shows that the lowest indicator of the number of SMEs in the NWFD for the last five years is in 2020. The situation is similar in the Arkhangelsk Oblast: there is a decrease in the number of SMEs in 2020.

The reason is that the COVID-19 pandemic started on January 31, 2020. Small and medium-sized businesses were affected by the spread of the coronavirus.

Professional areas of SMEs were significantly impacted, as shown in Table 3.

Table 3

Areas of SMEs significantly affected during the pandemic [3]

Areas of economic activity	OKVED codes
Activities in the field of transport services	49.3, 49.4, 51.1, 51.21, 52.21.21, 52.23, 49.10.1, 50.1, 50.3
Activities in the field of culture and entertainment	90, 59.14, 91.02, 91.04.1
Activities in the field of sports, activities of sanatoriums and resorts	93, 96.04, 86.90.4
Activities in the field of tourism	79
Hospitality industry	55
Activities in the field of catering	56
Activities in the field of additional education	85.41, 88.91
Activities in the field of organizing conferences and exhibitions	82.3
Activities in the field of personal services	95, 96.01, 96.02
Dental activities	86.23
Non-food retail activities	45.11.2, 45.11.3, 45.19.2, 45.19.3, 45.32, 45.40.2, 45.40.3, 47.19, 47.4, 47.5, 47.6, 47.7, 47.82, 47.89, 47.99.2
Activities for the production of folk art crafts	32.99.8
Activities in the field of media and production of printed products	60, 63.12.1, 63.91, 18.11, 58.11, 58.13, 58.14

Support measures for SMEs

The state needs to have information about the difficulties faced by small and medium-sized businesses and the reasons for their liquidation. Based on these data, support measures for these activities are developed [4].

Federal support measures for SMEs during the pandemic are the following:

1) The government has reduced the total insurance premiums to 15% from April 1, 2020, which is shown in figure 4.

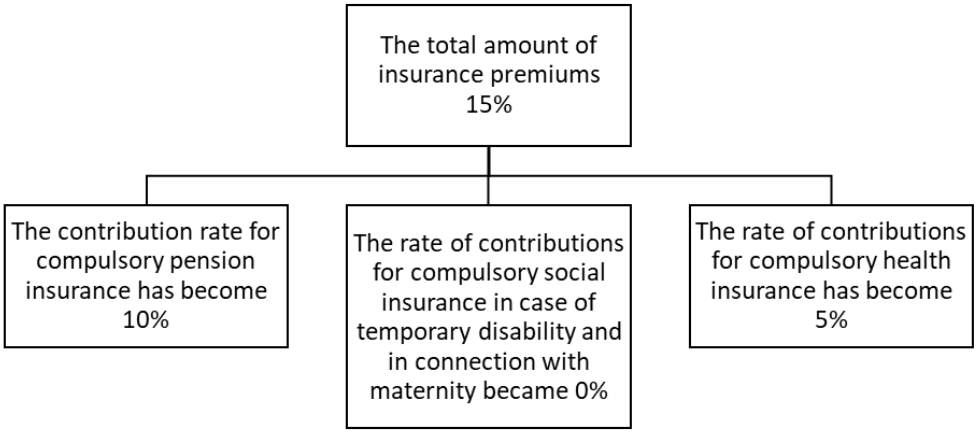

Fig. 4. Interest rates of insurance premiums [7].

The support measure covers only the part that exceeds the minimum wage each month.

2) An opportunity to reimburse the commission for financial operations with individuals is provided for the period from July 1, 2021 to December 21, 2021. This support is provided by the fast payment system [6].

3) Prohibition of annual scheduled inspections for small businesses for 2021. Exceptions are provided. Small businesses that have been prosecuted for an administrative offence in the form of suspension of professional activity or if less than three years have elapsed following an

[6] Postanovlenie pravitel'stva RF ot 30.06.2021 N 1103 «Ob utverzhdenii Pravil predostavleniya subsidiy iz federal'nogo byudzheta rossiyskimi kreditnymi organizatsiyami na vozmeshchenie zatrat sub"ektam malogo i srednego predprinimatel'stva na oplatu bankovskikh komissiy pri osushchestvlenii perevoda denezhnykh sredstv fizicheskimi litsami v pol'zu sub"ektov malogo i srednego predprinimatel'stva v oplatu tovarov (rabot, uslug) v servise bystrykh platezhey platezhnoy sistemy Banka Rossii» [Decree of the Government of the Russian Federation of June 30, 2021 N 1103 "On approval of the Rules for the provision of subsidies from the federal budget by Russian credit organizations for reimbursement of expenses to small and medium-sized businesses for paying bank commissions when transferring funds by individuals in favor of small and medium-sized businesses in payment for goods (works, services) in the service of fast payments of the payment system of the Bank of Russia"]. URL: http://publication.pravo.gov.ru/Document/View/0001202107120042 (accessed 03 December 2021).

audit that revealed the offence, will not be exempt from the audit. Small businesses with high-risk assets are also not exempt from audits [7].

4) Ability to purchase software at half price. The support measure is executed by the Russian Fund for the Development of Information Technologies.

5) Exemption and deferrals on penalties in public procurement.

6) Opportunity to take a loan on favorable terms at 3% from November 1, 2021 to December 30, 2021.

7) Opportunity to receive a one-time subsidy in 2021 on non-working days for SMEs most affected by the spread of coronavirus infection in the amount of one minimum wage multiplied by the number of employees.

In addition to federal support measures for SMEs, there are also regional support measures that may vary depending on the region [4].

Support measures for SMEs in the Arkhangelsk Oblast during the pandemic are the following:

1) Reduced interest rates have been established for SMEs for 2020 and 2021, using the simplified taxation system (STS), as shown in figure 5.

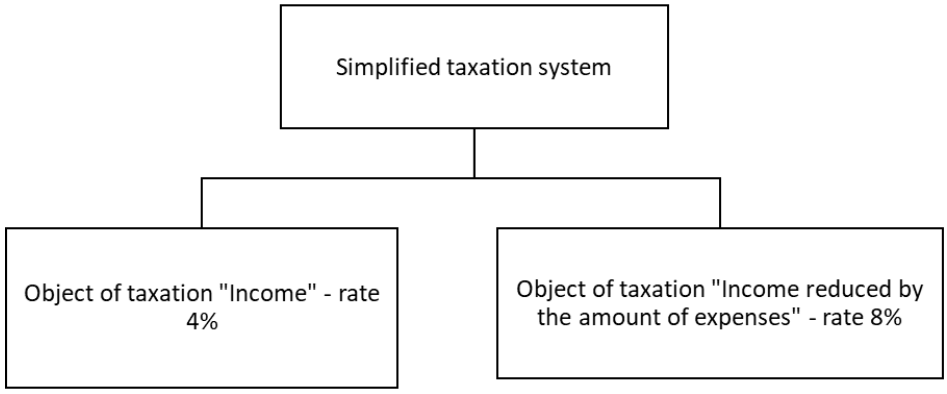

Fig. 5. Interest rates for the simplified tax system.

2) For organizations using special tax regimes, the government reduces the tax base for certain real estate objects (retail, non-residential areas and areas intended for public catering) for 2020 [8].

[7] Postanovlenie pravitel'stva RF ot 30.11.2020 N 1969 «Ob osobennostyakh formirovaniya ezhegodnykh planov provedeniya planovykh proverok yuridicheskikh lits i individual'nykh predprinimateley na 2021 god, provedeniya proverok v 2021 godu i vnesenii izmeneniy v punkt 7 Pravil podgotovki organami gosudarstvennogo kontrolya (nadzora) i organami munitsipal'nogo kontrolya ezhegodnykh planov provedeniya planovykh proverok yuridicheskikh lits i individual'nykh predprinimateley» [Decree of the Government of the Russian Federation of November 30, 2020 N 1969 "On the features of the formation of annual plans for scheduled inspections of legal entities and individual entrepreneurs for 2021, conducting inspections in 2021 and amending paragraph 7 of the Rules for the preparation by state control (supervision) bodies and bodies municipal control of annual plans for scheduled inspections of legal entities and individual entrepreneurs"]. URL: http://www.consultant.ru/document/cons_doc_LAW_369317/ (accessed 04 December 2021).

3) For 2020, reduced real estate tax rates for SMEs are applied in the following amounts:

- 1.2% for the general tax regime;
- 1% for special tax regimes, if the total area of real estate does not exceed 900 m2;
- 1% for special tax regimes. The rate applies only to residential premises, which are not considered as fixed assets in accounting;
- 0.2% for consumer cooperatives that apply special tax regimes for rural real estate in the Arkhangelsk Oblast, which are not administrative centers. It does not apply to real estate objects that are rented out.
- 0.2% for consumer cooperatives that apply special tax regimes, provided that they operate in premises where at least 40% of the area is allocated for personal services. Applies only to classes 13–15, 31, 85 (group 41), 93 (groups 12, 13 and 19) OKVED.

5) The government has adopted the value of the potential annual income, which is equal to 1 ruble, for individual entrepreneurs (IEs) who switched to the patent taxation system in 2020 (the only exception is for individual entrepreneurs who acquired a patent before April 28, 2020 [9].

6) Possibility of postponing the payment of advance payments and taxes for SMEs that are included in the list of industries most affected by the spread of coronavirus infection [10]. The government of the Arkhangelsk Oblast extended the payment deadlines, which are indicated in Table 4.

Table 4

Tax payment deadlines

Type of tax	For the period	Extended until / for
Corporate property tax	For the first and second quarters of 2020	Extended until the end of 2020
Transport tax		
Tax paid under the simplified tax system	For 2019	Extended for 6 months
	For the first quarter of 2020	Extended for 9 months
Tax paid under the patent tax system	For the second quarter of 2020	Extended for 4 months

7) The Government of Arkhangelsk Oblast provides SMEs with the opportunity to conclude additional agreements under state property lease agreements, which provide for the deferral of rent payments until 1 October, 2020. Thereafter SMEs will be required to pay the debt from Janu-

[8] Oblastnoy zakon Arkhangel'skoy oblasti ot 14.11.2003 N 204-25-OZ «O naloge na imushchestvo organizatsiy» [Regional law of the Arkhangelsk Oblast, November 14, 2003 N 204-25-OZ "On the tax on property of organizations"]. URL: https://www.nalog.gov.ru/rn29/about_fts/docs/6101148/ (accessed 05 December 2021).

[9] Oblastnoy zakon Arkhangel'skoy oblasti ot 19.11.2012 N 574-35-OZ «O primenenii individual'nymi predprinimatelyami na territorii Arkhangel'skoy oblasti patentnoy sistemy nalogooblozheniya» [Regional law of the Arkhangelsk Oblast, November 19, 2012 N 574-35-OZ "On the application by individual entrepreneurs in the territory of the Arkhangelsk region of the patent taxation system"]. URL https://www.nalog.gov.ru/rn29/about_fts/docs/4344011/ (accessed 06 December 2021).

[10] Postanovlenie Pravitel'stva Arkhangel'skoy oblasti ot 14.04.2020 N 200-pp «O predostavlenii otsrochki po uplate sub"ektam predprinimatel'skoy deyatel'nosti nalogovykh platezhey v oblastnoy byudzhet» [Decree of the Government of the Arkhangelsk Oblast, April 14, 2020 N 200-pp “On granting a deferral for the payment of tax payments to the regional budget by business entities”]. URL: http://publication.pravo.gov.ru/Document/View/2900202004160012 (accessed 07 December 2021).

ary 1, 2021 and no later than January 1, 2023. The debt is paid in stages, once a month. The amount of payment should be made in equal installments and may not exceed half the amount of the monthly rent under the agreement.

8) The Government of the Arkhangelsk Oblast has set a rent for SMEs in the amount of 1 ruble per 1 m^2 of area under lease agreements for real estate and land plots owned by the region until March 1, 2021 [11].

Support measures provided to SMEs during the spread of the coronavirus infection are not basic, but special ones. Outside of this situation, the state has always tried and is still trying to support SMEs by developing strategies for financial, guarantee, property, information and consulting support.

The Ministry of Economic Development, Industry and Science of the Arkhangelsk Oblast provides support to SMEs.

Infrastructural support measures for the Arkhangelsk Oblast are listed below:

1) Microcredit company Arkhangelsk Regional Fund "Razvitie". The main goal of the company is to increase the availability of borrowed funds for SMEs.

The company provides financial assistance to SMEs in the Arkhangelsk Oblast in the form of microloans.

Special benefits:

- absence of commissions and hidden payments;
- grace period depending on seasonality and business environment;
- possibility to repay the debt ahead of time. No additional costs are required.

Table 5 shows annual interest rates, range of amounts and terms for microloans [12].

Table 5

Annual rates for microloans at MCC "Razvitie"

Programs	Program participants	Terms			
		Amount	Rate	Period	Benefit period
"Anti-crisis measures"	SMEs most affected by the spread of coronavirus infection	Up to 500 thousand rubles.	1%	Up to 24 months	Up to 23 months
"Arktika-SME"	SMEs registered in the municipalities of the Arkhangelsk Oblast	Up to 5 million rubles	4,25%	Up to 24 months	Up to 23 months
"Leasing-SME"	SMEs that have entered into a	Up to 5	8,25%	Up to	Up to

[11] Postanovlenie Pravitel'stva Arkhangel'skoy oblasti ot 14.04.2020 N 199-pp «O razmere arendnoy platy malogo i srednego predprinimatel'stva po dogovoram arendy gosudarstvennogo nedvizhimogo imushchestva Arkhangel'skoy oblasti» [Decree of the Government of the Arkhangelsk Oblast, April 14, 2020 N 199-pp "On the amount of rent for small and medium-sized businesses under lease agreements for state-owned real estate in the Arkhangelsk Oblast"]. URL: http://publication.pravo.gov.ru/Document/View/2900202004160007 (accessed 08 December 2021).

[12] Agency for Regional Development of the Arkhangelsk Oblast. URL: https://msp29.ru/ru/service_support/lgotnye-kredity/ (accessed 10 December 2021).

	leasing agreement or received a conclusion from a leasing company on the approval of a leasing transaction	million rubles		24 months	23 months
"Local Producer"	SMEs engaged in manufacturing (not engaged in the production and sale of excisable goods)	Up to 5 million rubles	8,25%	Up to 24 months	Up to 23 months
"Monocity-SME"	SMEs implementing their business activities in the territories of single-industry towns of the Arkhangelsk Oblast	Up to 5 million rubles	4,25%	Up to 24 months	Up to 23 months
"Refinancing-SME"	SMEs that have open credits and loans taken for entrepreneurial activities	Up to 5 million rubles	8,25%	Up to 24 months	Up to 23 months
"Recycling"	SMEs whose main activity belongs to group 38 OKVED, with the exception of subgroups 38.32.2, 38.32.3, 38.32.4	Up to 5 million rubles	7%	Up to 24 months	Up to 23 months
"Self-Employed Citizens"	Individuals who are engaged in entrepreneurial activities, provided that they practice the tax regime "Tax on professional income"	Up to 500 thousand rubles.	4,25%	Up to 24 months	Up to 23 months
"Agricultural Producer"	SMEs operating in the agricultural sector	Up to 5 million rubles	8%	Up to 24 months	Up to 23 months
"Social Entrepreneurship"	SMEs with the status of a social enterprise in the Arkhangelsk Oblast	Up to 5 million rubles	7%	Up to 24 months	Up to 23 months
"Standard"	SMEs	Up to 5 million rubles	8,5%	Up to 24 months	Up to 23 months
"Tourism"	Tourism entrepreneurs	Up to 5 million rubles	4,25%	Up to 24 months	Up to 23 months
"Express Loan"	Individual entrepreneurs	Up to 100 thousand rubles	8,5%	Up to 12 months	Not

Microloans up to 500 thousand rubles are granted without collateral or guarantee.

2) Guarantee support is provided by SUE JSC Investment Company “Arkhangelsk”, which provides guarantee services to SMEs.

When a borrower (SME subject) applies for a loan, the credit institution needs guarantees for the return of funds. Not all enterprises and have such guarantees: financial resources or property. In this case, a guarantee fund acts to support SMEs, providing a guarantee service [6].

Figure 6 shows the scheme of operation of the guarantee fund.

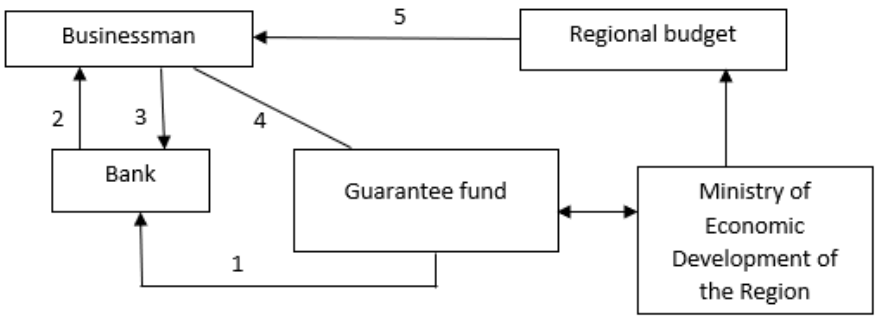

Fig. 6. Scheme of work of the guarantee fund [8].

The Fund has set the annual guarantee fee for borrowers, which ranges from 1 to 1.5% of the guaranteed amount.

3) JSC Guarantee Organization of the Arkhangelsk Oblast introduced a preferential guarantee for residents of the Arctic zone from 06.12.2021. The annual cost of the guarantee is 0.5% of the sum guaranteed. The payment of fees can be made by installments according to an agreed schedule.

4) Entrepreneurs of the Arkhangelsk Oblast can apply for information and consulting support to the ANO “Regional Development Agency”.

5) The State Unitary Enterprise of the Arkhangelsk Oblast “Property and Investment Fund” provides the property lease, consults on the issues of the real estate valuation, investment activities and procedure for management and disposal of the state property in the territory of the Arkhangelsk Oblast.

Conclusion

This article analyzes the dynamics of the number of SMEs, as well as investigates the state support measures for SMEs in the Arkhangelsk Oblast.

The development of small and medium-sized businesses in the Arkhangelsk Oblast is currently at a low level, and the indicators are declining every year (in 2021, the lowest number of SMEs over the past five years is recorded). In this regard, the economic competitiveness of the region is affected, jobs are closed, and tax revenues to the budget are reduced [5].

When considering the negative dynamics of the number of SMEs in the Arkhangelsk Oblast, it is difficult to talk about the significant impact of support measures from the state. If we consider the number of newly created SMEs in the Arkhangelsk Oblast, it is clear that after the lowest rates in 2020 (a decrease of almost by 25%), there is an increase in newly registered entrepreneurs by 21% in 2021. This positive effect was due to the support measures taken by the state.

If we compare the number of entities of the Arkhangelsk Oblast with the NWFD, it can be seen that government support measures for entrepreneurs in the NWFD had a much greater positive im-

pact on business than in the Arkhangelsk Oblast. Thus, after the negative impact of the spread of the coronavirus infection in 2020, an increase in the number of SMEs is observed in the North-West Federal District a year later.

One of the important priorities of the state is the expansion and strengthening of SMEs. Small and medium-sized enterprises are the most vulnerable in modern conditions and need the support. The government, both at the federal and regional levels, needs to develop areas of support for SMEs.

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Analysis of Forecasting Documents for the Socio-Economic Development of the Russian Arctic *

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Abstract. The tasks of forecasting the development of Russian territories, in particular the territory of the Arctic, are the most problematic due to the urgent need of the economy and management for a reliable forecast, the uncertainty of the near future caused by the turbulence of geopolitics, and the ongoing impact of the COVID-19 pandemic on socio-economic processes, which are also not fully measurable. The purpose of the article is to present the initial grounds and forecast of the socio-economic development of the regions of the Russian Arctic with a lead time up to 2023. The methodological peculiarity of the research is to take into account geopolitical, national, regional, industrial factors and development trends on the basis of using: 1) the analysis results of real and perspective global trends recorded in statistical indicators, forecast documents of the IMF, WTO, Central Bank, Ministry of Economic Development of Russia; 2) generalizations, comparisons of official forecasts and development plans of the AZRF adopted at the federal, regional levels, as well as forecasts, plans of corporations operating in the AZRF; 3) analysis of real statistical data using the author's econometric models. Given the considerable amount of analytical information received, the aspects and factors that have a key influence on the prospects of socio-economic development of the Arctic are outlined and classified according to the following levels: global, national, regional. Forecasts are made for the regions entirely located in the Arctic zone — Yamalo-Nenets, Nenets and Chukotka Autonomous okrugs, the Murmansk Oblast with an anticipation period up to 2021–2023. The importance of scientific forecasting in modern conditions is emphasized, encouraging reflection, new hypotheses, discussions.

Keywords: *Russian Arctic, forecast, social and economic development, COVID-19 pandemic, special operation in Ukraine*

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Introduction

The issues of forecasting the development of territories of the Russian Federation are currently the most problematic, due to the urgent need of the economy and management for a reliable forecast, the uncertainty of the future due to the turbulence of the geopolitical environment, as well as the continuing impact of the consequences of the COVID-19 pandemic on the socio-economic processes that are also not fully evaluated.

The Arctic Zone of the Russian Federation (AZRF) is of particular importance for at least four reasons. Firstly, the special geo-political and economic significance of this territory for the Russian Federation, confirmed by a series of strategic documents [1, Kryukov V.A., Kryukov Ya.V., pp. 27–29; 2, Kudryashova E.V., Lipina S.A., Zaikov K.S., Bocharova L.K., p. 445; 3, Gagiev N.N., Goncharenko L.P., Sybachin S.A., Shestakova A.A., p. 113; 4, Skufina T.P., Mitroshina M.N., pp. 94–96]. Secondly, the increased costs of the functioning of the economy and the social sphere, which means increased risks and potential economic losses, including those caused by shortcomings in forecasting and planning [1, Kryukov V.A., Kryukov Ya.V., p. 28; 5, Volkov A.D., Tishkov S.V., pp. 16–21; 6, Minakir P.A., Krasnopolskiy B.Kh., pp. 12–20]. Thirdly, economic and managerial specifics, including an increased presence of the state and corporations in the economy of the Arctic, greater economic stability during periods of crisis due to the relative simplicity of the economy and extractive specifics [4, Skufina T.P., Mitroshina M.N., pp. 98–100; 7, Skufina T.P., Korchak E.A., Baranov S.V., pp. 57–66; 8, Pavlov K., Selin V.]. Fourthly, the high vulnerability of demographic processes and the low level of medical and demographic reserves, manifested, among other things, during the COVID-19 pandemic [7, Skufina T.P., Korchak E.A., Baranov S.V., pp. 67–69; 9, Toropushina E.E., pp. 620–626; 10, Skufina T.P., Korchak E.A., pp. 51–61].

The specificity of the presented forecast is in the fact that we consider the projected dynamics mainly from the standpoint of the impact of the COVID-19 pandemic. At the same time, the factor of the military special operation (MSO) in Ukraine and its consequences for the Russian economy was taken into account; however, it is not possible to reliably assess the impact of this factor on the socio-economic processes in the regions of the Russian Arctic at the present stage. This is due to the following reasons. Firstly, the MSO in Ukraine is still in progress, there is no information on its final results. Namely, it determines the consequences for the geopolitical position of the country, which means the specifics and scale of sanctions pressure and the associated impact on the regions of the Russian Arctic. Secondly, the scale and long-term nature of new projects being implemented in the Russian Arctic, as well as the long-term and sustainable functioning of existing industries in the extraction and processing of natural Arctic resources, which traditionally ensures greater stability of economic processes in crisis years and a certain resistance to sanctions pressure, demonstrated in practice, despite the special focus of sanctions on the Arctic projects [8, Pavlov K., Selin V., pp. 59–66; 7, Skufina T.P., Korchak E.A., Baranov S.V., pp. 63–64; 10, Skufina T.P., Korchak E.A., pp. 64–93]. Thirdly, our studies indicate that the quantitative ratios of the main

factors of GRP production in the regions of the Russian Arctic are preserved even during periods of crisis, which allows us to use the model and the ratio of the influence of regional factors during the modern crisis, caused not only by restrictive measures, to predict the model and the ratio of the influence of regional factors — a reaction to the COVID-19 pandemic, but also sanctions pressure [11, Skufyina T.P., Baranov S.V., pp. 53–54; 12, Skufina T.P., Baranov S.V., Korchak E.A., pp. 27–33]. In this context, rather sharp changes in the forecasts of world analytical agencies for Russia, which are connected precisely with political factors, and not with objective ones, purely economic trends of the world, regional, national economies, are of particular interest. For example, according to the updated forecast of the IMF[1] in March 2022, the Russian economy will decrease by 8.5% in 2022 and by another 2.1% in 2023; according to the previous forecast of the IMF, the Russian economy was projected to grow by 2.8% in 2022, and by 2.1% in 2023 [14]. However, the accuracy of this forecast in the context of continuing high level of geopolitical uncertainty and incompleteness of the MSO in Ukraine raises reasonable doubts.

Data used and methodological features of the forecast

The forecast is made on the basis of the following initial data. Firstly, it is based on an analysis of real and prospective global trends recorded in statistical indicators (including social, demographic, economic indicators, indices and market prices for primary commodities according to the IMF) and forecast documents of the IMF, WTO, Central Bank of the Russian Federation, Ministry of Economic Development of Russia. In order to identify the impact of the pandemic and the consequences of the MSO in Ukraine on the prospective dynamics of indicators of the development of the global and national economy, forecast data for both 2021 and 2022 are used for comparison.

Secondly, it is based on generalization, comparison of official forecasts and plans for the development of the Russian Arctic, adopted at the federal, regional levels, as well as forecasts, plans of corporations operating in the Russian Arctic.

Thirdly, it is based on the analysis of real statistical data for the Russian Federation, subjects of the Russian Arctic, statistics of municipalities, including the use of author's econometric models. It should be noted that a number of regional forecast indicators of the subjects of the Russian Arctic have been adjusted taking into account the author's econometric models [11, Skufina T.P., Baranov S.V., pp. 53–54; 12, Skufina T.P., Baranov S.V., Korchak E.A., pp. 27–33], taking into account the latest monthly dynamics indicators for 2021–2022, including indicators of industrial production, unemployment, inflation, and demographic indicators.

The object of the study is the socio-economic situation in regions located entirely in the Russian Arctic (Murmansk Oblast, Nenets Autonomous Okrug, Chukotka Autonomous Okrug, Yamalo-Nenets Autonomous Okrug).

[1] International Monetary Fund. World Economic Outlook. Washington, DC, April., 2022. URL: mf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022 (accessed 10 April 2022).

Forecasting time is up to and including 2023. Let us note the main factors limiting the prediction of the forecast for a longer period:

- lack of most indicators and accumulated dynamics of the "covid stage" (which also explains 2021 as a forecast year);
- frequent and often significant adjustments to official forecast values of indicators, including at the level of the Russian Arctic regions;
- instability of the current geopolitical, macroeconomic situations that limit the long-term forecast estimates;
- on the one hand — medical and economic imperatives that level the current impact of the COVID-19 pandemic on social development in the world and at the national level, on the other hand — the preservation of unprecedented uncertainty and significant economic risks caused by the pandemic, which provides a high degree of probability of change global, as well as national, regional, corporate situations beyond 2023, etc.

Given the significant amount of analytical information received, we paid special attention to precisely those aspects that have a key impact on the prospects for the socio-economic development of the Russian Arctic, placing them by levels for convenience.

Global and national level

According to the IMF [2] (October–December 2021 database):

- The global economic recovery in 2022–2023 will continue despite the new pandemic waves: global economic growth of 5.9% in 2021, 4.9% in 2022, 3.3% in 2023, which falls within the range of estimates of leading analytical agencies and recognized experts, is confirmed by current world statistics and the World Economic Forum 2021 estimates, is reflected in the Forecast for the Social and Economic Development of the Russian Federation for 2022 and for the planning period 2023 and 2024;
- Russia's GDP decreased by 3% in 2020 compared to 2019, it is expected to grow by 4.7% in 2021, by 2.9% — in 2022, that is close to the forecasts of the Central Bank of the Russian Federation, which estimated GDP growth to 4–4.5% in 2021, lowered growth estimates in 2022 to 2–3%, leaving 2–3% in 2023 (the actual figures for 2021 were 4.6%, while the estimate made by the Ministry of Economic Development before the MSO in Ukraine was 3% in 2022 and 2023).

However, the global economy in 2022 turned out to be in a worse situation than expected, which is usually associated with the spread of a new strain of COVID-19 "omicron", causing the return of restrictive measures [14]. Turning to the major drivers of global economic development, we argue that the lowered growth forecast for the global economy (relative to previous forecasts) by early 2022 has been caused not only by the impact of the new waves of the COVID-19 pandem-

[2] IMF website. URL: https://blogs.imf.org/ (accessed 10 April 2022).

ic but also by problems in the economies of the developed world caused by disruption to supplies of resources and components. Among the fundamental causes of these problems, we have identified the main ones affecting the dynamics in the Russian Arctic: 1) the energy crisis (largely caused by management shortcomings, for example, liberalization of the European gas market, etc.); 2) focus on "green" energy, the switch to electric vehicles, etc., which caused a sharp increase in demand and prices for silicon, aluminum, magnesium, lithium, cobalt, nickel, and other elements, indicating an increase in prices for minerals in general; 3) inflation caused, among other things, by anti-epidemic measures and the associated financial and fiscal supporting regulators of developed economies. However, these factors increase the forecasts for GDP growth in 2022 for resource based economies, in particular for the Russian Federation.

These fundamental reasons and current global trends coincide with the well-known hypothesis of the cyclical nature of the world economy, according to which the world economy has entered a new commodity cycle since mid-2020, the growth phase begins (duration 5-7 years) since mid-2020, accompanied by rising prices for raw materials, high global inflation (indeed, the analysis of behavior of the Bloomberg Commodity Index, a key indicator of the raw materials market (reflects the cost of 23 commodities, of which 30% are energy products, 35% are agricultural products and 35% are metals), USD Index (weighted average ratio of US dollar to a basket of 6 major currencies) clearly demonstrates not only the objective existence of commodity cycles lasting for about 20 years, but also the fact that the global economy is entering a phase of raw materials price growth, which traditionally is in the phase of the US dollar strength)[3]. It is important that the indicated phase of the growth of the raw material cycle also indicates the opportunities for economic and associated social development for the regions of the Russian Arctic, significantly reducing the risks for the main export items of the extractive regions, providing conditions for economic growth. If we ignore the fact of escalating geopolitical tension caused by the events in Ukraine, it allows us to expect industrial production growth in 2021–2022 in the AZRF regions.

The assertion is confirmed for the majority of the AZRF regions on real statistical data: monthly dynamics of industrial production of the regions of the Russian Arctic, unemployment rates, as well as industrial production indicators in Russia as a whole are considered. The indicators used are the index of industrial production, the index of officially registered unemployed, which ensures a comparable type of indicators. In order to eliminate seasonal fluctuations, as well as the possibility of comparison with the "pre-pandemic" period (2019), we calculated the indicators in a comparable form, in % to the corresponding month of the previous year, which eliminates the problem of seasonality. The calculation results and the technique used are given in [7, Skufina T.P., Korchak E.A., Baranov S.V., pp. 63–66]. The analysis of the obtained results indicates that the behavior of the indices in 2020 for most regions of the Russian Arctic has specific features — for

[3] Bloomberg Commodity Index. URL: https://www.bloomberg.com/quote/BCOM:IND (accessed 10 April 2022).

most points of the dynamic series, there is a smaller reduction in production than in the Russian Federation as a whole, as well as a smaller rate of growth of unemployment.

Typical and new reasons for economic sustainability under restrictive measures, lower prices and demand for the basic items of industrial production of the Russian Arctic in 2020 are the following: a significant proportion of large industrial enterprises (which did not interrupt work during the period of restrictive measures); low level of development of small and medium-sized businesses; low level of consumer market development; high costs of the Russian Arctic regions to combat the consequences of the COVID-19 pandemic for the economy, labor market, and social sphere.

However, the dynamics of demographic indicators during the pandemic in most subjects of the Russian Arctic turned out to be worse than the Russian average, which is mainly explained by the low medical and demographic reserves of the Arctic regions, the lack of medical care, which could not be fully compensated by the increased infusions of the state and business into medicine of the Russian Arctic regions, prevention, social support during the pandemic [9, Toropushina E.E., pp. 620–627; 13, Kryukov V.A., Kryukov Ya.V., pp. 140–148; 14, Fauser V.V., Smirnov A.V., Lytkina T.S., Fauzer G.N., Klimenko V.A., pp. 229–235].

Statistical data confirm that in 2021, the recovery of production began in the Russian Federation, including in most regions of the Russian Arctic. According to the data of the Federal State Statistics Service, industrial production increased by 8.6% in January 2022 compared to the same period in 2021 (Table 1). An analysis of the statistical data of all four sectors of the economy taken into account in the calculation of the index of industrial production (heat and gas supply, extractive industries, manufacturing industries, and the energy sector) indicates that such a significant growth was ensured due to the growth of extractive industries (growth in January 2022 by 9.1% compared to January 2021), as well as manufacturing industries (growth in January 2022 by 10.1% compared to January 2021). The growth of industrial production in the Russian Federation (January 2022 to January 2019) at the beginning of 2022 (compared to the period before the pandemic) amounted to 7.8% due to an increase in the volume of manufacturing by 14.0% (analysis by sector shows that it was primarily the manufacturing industries servicing the extractive industries), as well as a direct increase in the production of the raw materials industry by 1.6%, the energy sector by 3.2%. In 2021–early 2022, most regions of the Russian Arctic show an increase in industrial production, and at a rate greater than in the whole of the Russian Federation (the exception is the Chukotka Autonomous Okrug) (Table 1).

Table 1

Index of industrial production in the AZRF regions, in % of the corresponding month of previous year [4]

Subject of the Russian Arctic	2021		2022		
	January	December	January	February	March
Murmansk Oblast	102.2	125.1	116.0	109.5	106.5

[4] Compiled by the authors according to the Federal State Statistics Service. URL: https://www.gks.ru/ (accessed 10 April 2022).

Nenets Autonomous Okrug	86.7	111.2	121.9	124.2	123.6
Chukotka Autonomous Okrug	90.6	97.0	87.3	94.2	92.7
Yamalo-Nenets Autonomous Okrug	105.6	125.9	105.1	104.7	105.2
Russian Federation	97.7	106.1	108.6	106.3	103.0

However, it is possible to expect a gradual compensation of growth caused by the fundamental reason in 2022–2023 — the raw material cycle of the global economy, in the Russian Federation as a whole, due to a whole range of factors, including inflation, but most importantly — due to the sanctions pressure caused by the MSO in Ukraine.

The impact factor of high geopolitical tensions is taken into account in the IMF's April 2022 global economic outlook as the main reason for the decline in previously expected stronger global economic growth [5] (Table 2). The widespread sanctions against Russia have led to increased global inflation, disrupted supply chains, increased financial deficits in a number of countries, reduced industrial and energy security, increased financial risks and tighter financial conditions for private businesses, etc. In the latest global economic outlook, these factors are reflected in the expectation of a decline in global growth from 5.9% in 2021 to 3.6% in 2022 and 2023, which is 0.8 and 0.2 percentage points below the January forecast 2022 (Table 2) [6 7].

Table 2

World economic growth forecast by IMF, April 2022, January 2022 (January forecast data are given in brackets) [8]

Real GDP, annual change, %	2021	2022	2023
Worldwide production	6.1 (5.9)	3.6 (4.4)	3.6 (3.8)
Advanced economies	5.2 (5.0)	3.3 (3.9)	2.4 (2.6)
USA	5.7 (5.6)	3.7 (4.0)	2.3 (2.6)
Euro area	5.3 (5.2)	2.8 (3.9)	2.3 (2.5)
Germany	2.8 (2.7)	2.1 (3.8)	2.7 (2.5)
France	7.0 (6.7)	2.9 (3.5)	1.4 (1.8)
Italy	6.6 (6.2)	2.3 (3.8)	1.7 (2.2)
Spain	5.1 (4.9)	4.8 (5.8)	3.3 (3.8)
Japan	1.6 (1.6)	2.4 (3.3)	2.3 (1.8)
United Kingdom	7.4 (7.2)	3.7 (4.7)	1.2 (2.3)
Canada	4.6 (4.7)	3.9 (4.1)	2.8 (2.8)
Other advanced economies	5.0 (4.7)	3.1 (3.6)	3.0 (2.9)
Emerging and developing	6.8 (6.5)	3.8 (4.8)	4.4 (4.7)

[5] In the IMF forecast, the factor of geopolitical tensions caused by the SMO in Ukraine is considered as more significant than the slowdown (relative to those expected at the end of 2021) in the pace of economic recovery of the world's largest economies — the United States and China.

[6] International Monetary Fund. World Economic Outlook. Washington, DC, April., 2022. URL: mf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022 (accessed 10 April 2022).

[7] International Monetary Fund. World Economic Outlook. Washington, DC, Jan., 2022. URL: https://www.imf.org/ru/Publications/WEO/Issues/2022/01/25/world-economic-outlook-update-january-2022#Overview (accessed 10 April 2022).

[8] Compiled by the authors based on IMF data: April 2022. URL: mf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022 (accessed 10 April 2022), for comparison IMF data as of January 2022 are in parentheses. URL: https://www.imf.org/ru/Publications/WEO/Issues/2022/01/25/world-economic-outlook-update-january-2022#Overview (accessed 10 April 2022).

economies			
Emerging market and developing Asia	7.3 (7.2)	5.4 (5.9)	5.6 (5.8)
China	8.1 (8.1)	4.4 (4.8)	5.1 (5.2)
India	8.9 (9.0)	8.2 (9.0)	6.9 (7.1)
ASEAN-5	3.4 (3.1)	5.3 (5.6)	5.9 (6.0)
Emerging market and developing Europe	6.7 (6.5)	-2.9 (3.5)	1.3 (2.9)
Russia	4.7 (4.5)	-8.5 (2.8)	-2.3 (2.1)
Latin America and the Caribbean	6.8 (6.8)	2.5 (2.4)	2.5 (2.6)
Brazil	4.6 (4.7)	0.8 (0.3)	1.4 (1.6)
Mexico	4.8 (5.3)	2.0 (2.8)	2.5 (2.7)
Middle East and Central Asia	5.7 (4.2)	4.6 (4.3)	3.7 (3.6)
Saudi Arabia	3.2 (2.9)	7.6 (4.8)	3.6 (2.8)
Sub-Saharan Africa	4.5 (4.0)	3.8 (3.7)	4.0 (4.0)
Nigeria	3.6 (3.0)	3.4 (2.7)	3.1 (2.7)
South Africa	4.9 (4.6)	1.9 (1.9)	1.4 (1.4)

Regional level

Based on the analysis of the legal literature concerning the development of the Russian Arctic as a whole and its regions, forecasted and planned development indicators are collected, correlated with real data. It was found that the majority of forecast and planned economic and social indicators of the regions of the AZRF were not achieved at the end of 2020. At the same time, the study of the adjusted forecasts of the AZRF subjects and the statistical data of 2021 allows us to speak about the stabilization of the situation, which makes it possible to use econometric models and the results of analysis of the behavior of real indicators for forecasting.

A series of models was built for forecasting on the basis of exponential production function (PF), Cobb-Douglas PF (both with and without scientific and technological progress), and the CES function. On the basis of modeling, the specifics of production processes in the regions of the Russian Arctic were revealed, taking into account which a model was selected for each region, best corresponding to real data [9]. The models of GRP production reflect the interaction of the main factors of production (labor and capital). Given the volume limitations, only the most significant characteristics are given when describing the forecast in this article. For the forecast, the planned indicators presented in the official forecasts for the development of the Russian Arctic were used: indices of the physical volume of investments in fixed assets (I), the number of employees (E). These official forecasts also include GRP forecasts, but the official GRP forecasts, as a rule, do not match the forecast values, as indicated by analysis of the feasibility of past pro-forecast GRP indicators for the regions of the AZRF (while the main indicators that determine GRP production, including those used in our modeling, are close to the predicted values).

Forecast for the Yamalo-Nenets Autonomous Okrug

[9] An example of the approach used to select the most realistic model, see e.g.: [11, Skufina T.P., Baranov S.V., pp. 53–54; 12, Skufina T.P., Baranov S.V., Korchak E.A., pp. 27–33].

The GRP forecast was carried out using the Cobb-Douglas function. Forecast of the index of the physical volume of GRP relative to the previous year (for comparison, the official forecast values of the indices of the physical volume of investments in fixed capital (I), the number of employees (E) and GRP (Y) are given in: 2021 = 101.6% (I = 102.3, E=101.2, Y=101.6), 2022 = 97.5% (I=94, E=100.02, Y=103.4), 2023 = 103.% (I=100.8, E=100.02, Y=100.8).

Consideration of the structure of economy and capital investments, specifics of projects being implemented, corporate strategies allow us to state: the economic growth of the region in 2023 will be provided mainly by growth of natural gas production (in 2021, the region accounts for 82% of natural gas production, new deposits are being developed), LNG production growth (construction of Arctic LNG-2 plant with a design capacity of 19.8 million tons per year is underway in the region; by the end of Q3 2021, the project is 52% ready; construction of the terminal on liquefied natural gas Obskiy GCL liquefied natural gas terminal with 2 lines of 2.5 million tons per year). However, a review of corporate plans for LNG production and output shows that our lower GRP forecasts for 2021, 2022 and higher ones for 2023 (relative to the official forecast) are more realistic.

Data analysis showed that there was an increase in the number of employed in 2021, mainly due to an increase in the number of workers on a rotational basis and living outside the district; we predict that the number of employees will remain unchanged in 2022–2023, which is explained by the implementation of construction work on large facilities and the development of new oil and gas condensate fields. Population growth was ensured by the birth rate, however, having considered the age and sex structure of the population, the authors established the exhaustion of this source of growth in the coming years; we also noted a significant increase in mortality in 2020–2021, caused by the consequences of the COVID-19 pandemic. These factors in our forecast do not allow us to expect natural population growth as a source of population growth in the region in the period 2021–2023.

Forecast for Chukotka Autonomous Okrug

It is impossible to do the same modeling and make GRP forecast by econometric models for Chukotka Autonomous Okrug due to revealed peculiarity of economics functioning: there is no significant positive relation between GRP and production factors for period 2000–2020 (no relation between GRP and investments (correlation = 0.18), no relation between investments and fixed assets (correlation = –0.19), which means that basic conditions of using SPF tool were broken.

However, limiting the analysis to data from 2014 to 2019, the authors found a significant correlation between investment in fixed assets and GRP (correlation 0.87) and a weak relationship between the number of employed and GRP (0.35). The simulations show that the coefficient describing the contribution of the number of employed to GRP is statistically insignificant. For the period 2014–2019, the linear PF with one factor of production (investment in fixed capital) corresponds best to the real data (r2 value per one degree = 0.7).

However, the use of this model is associated with a problem: it is impossible to use the official forecast and planned indicators for the development of the Chukotka Autonomous Okrug for projection. For example, we have analyzed the Strategy for the socio-economic development of the Chukotka Autonomous Okrug up to 2030, where GRP growth (1.6 times) is accompanied by a strong decline in investment (2.8 times decline) in the period from 2020–2023. The strategy of the Chukotka Autonomous Okrug (unlike that of other regions of the AZRF) provides only projected values of GRP and investment in value terms (and it is not clear whether the values are deflated or not), and physical volume indices are not given.

Among the analytical results of assessing the prospects for the development of the Chukotka Autonomous Okrug, we present the development of the transport and logistics system (the main one is the construction of a new port for cargoes of the Baimskiy Mining and Processing Plant, the development of port infrastructure, including a berth for floating nuclear power plants, equipment with a fleet for year-round operation, development of road infrastructure, including the section to Bilibino), development of the extractive industry (in addition to the main product — gold mining (consideration of the plans of companies and regional development allows us to expect an increase in gold production in 2021–2023 due to the development of new deposits Klen, Kekkura, Peschanka , which compensates for the withdrawal of large Kupol and Dvoynoye deposits), the prospects for the development of the Beringovskiy coal basin, the Baimskaya ore zone (the world's richest porphyry copper area in terms of reserves — the data of 2021 indicate the acceleration of work on the construction of the Baimskiy MPP and related infrastructure projects) are considered. The possibilities and plans for the development of fisheries in the North-Western part of the Bering Sea, the development of fish processing are noted. Our joint analysis of demographic indicators (mortality, birth rate, migration, ethnic composition, gender and age structure), investment projects and the specifics of their implementation, focusing on a predominantly rotational work method, indicates that we should expect an increase in the number of employees in 2021–2023 due to the accounting of workers on a rotational basis by 4 thousand people (an average of 1.3 thousand per year), maintaining the population at the level of 49.5–49.9 thousand people.

Forecast for Nenets Autonomous Okrug

The GRP forecast was carried out using the Cobb-Douglas function. The index of the physical volume of GRP relative to the previous year (in brackets are the official forecast values of the indices of the physical volume of investments in fixed assets (I), the number of employees (E) and GRP (Y)): 2021 — 102.4% (I=103.9, E=101.1, Y=111.2), 2022 — 102.8% (I=105.3, Y=103.2), 2023 — 102.8% (I=105.1, Y=103.1). Our estimates of the GRP of the Nenets Autonomous Okrug for 2022 and 2023 are close to the official estimates of the conservative scenario, but below the baseline scenario of the official forecast (given above in brackets).

The analysis of real situation (part of the results is given below) shows that our forecast is realistic. The GRP of the Nenets Autonomous Okrug depends on demand and prices, primari-

ly for oil (the share of oil production in the GRP of the region is 75%, the share of workers in oil production in the number of employees is 25%), the demand for which is more unstable and the price is more volatile than for gas (gas production is much less in the region), which reflects the results of 2020 (in 2020, the decrease in export volumes of the Russian Federation: oil = –11%; oil products = –3.9%; gas = –6.3%; coal = –3%), and in 2021, the volume of oil supplies has just started to recover (unlike the gas market).

Consideration of the prospects for diversifying the economy of the Nenets Autonomous Okrug in terms of reindeer breeding, fishing, fish farming, harvesting of wild plants, processing of these products, fur production, fur farming, and tourism made it possible to note their importance for socio-economic development. However, the stabilizing factors for the growth of the region will be the development of hydrocarbons, the corresponding development of the transport infrastructure (including gas pipelines for the transportation of associated gas), and the construction industry, but most importantly, the development of hydrocarbon processing (the main development constraints are the transport infrastructure, which is currently being solved by investment projects, lack of energy capacity).

Comparative analysis of investment processes by regions of the Russian Arctic in the period 2010–2021 pointed to the lag in the intensity of investment processes in the Nenets Autonomous Okrug. The most promising projects that go beyond our forecast horizons are the construction of a gas chemical complex for deep processing of natural gas into methanol and the development of the Kumzhinskoe and Korovinskoe fields, which will create 1000 jobs and increase methanol exports to the Russian Federation from 4 to 8 million tons.

Analysis of demographic indicators pointed not only to the problem of high mortality during the COVID-19 pandemic, but also to the traditionally high mortality among the working-age population. A joint analysis of demographic indicators (mortality, birth rate, migration, national composition, gender and age structure) and investment projects allow us to expect the population to remain at the level of 44.2–44.6 thousand people in the period 2021–2023.

Forecast for Murmansk Oblast

The GRP forecast was carried out on the basis of the linear PF. At the same time, only investments in fixed assets were used as factors of production, since there is a negative correlation between the number of employees and GRP.

The index of the physical volume of GRP relative to the previous year (the official forecast values of the indices of the physical volume of investments in fixed assets (I), the number of employees (E) and GRP (Y) are given in brackets): 2021 = 100.4% (I=103, Y=101.4), 2022 = 100.2% (I=101.5, Y=101.6), 2023 = 100.3% (I=102.2, Y=102.0). GRP of the Murmansk Oblast in 2021–2023 will depend on the intensity of the implementation of large investment projects, in particular, on the accelerated in 2021 Center for the construction of large-tonnage offshore structures.

Low growth rates of 2021–2022 are also explained by the exit of investment projects to their design capacity beyond the planning horizons, the insufficiency of diversification of the economy to replace the stagnation of a number of positions of traditional items of the region's economy (including the instability of the situation with fishing quotas).

Our more conservative estimates of GRP growth in 2021–2023 coincided with a decrease in metallurgical production in the Murmansk Oblast, both planned (2020: shutdown of the city-forming industries — smelters in Nikel and Monchegorsk), and initiated by accidents in 2021 (Nornickel, a subsidiary of Medvezhiy Ruchey LLC). Our GRP estimates are consistent with the official estimates of the Ministry of Economic Development in the Forecast of the socio-economic development of the Russian Federation for 2022 and for the planned period of 2023 and 2024, which placed the Murmansk Oblast in the top ten subjects of the Russian Federation with the expected worst GRP dynamics in 2022–2024 (place 79, rate 101.2).

The dynamics of the working-age population is analyzed in connection with the implementation of large investment projects, indicating the lack of communication, which is due to the predominant use of the rotational method. Our analysis of demographic indicators, the activation (including at city-forming enterprises) of the use of the rotational method in our version of the forecast worsens the population indicators compared to the official forecast (due to increased migration and high mortality rates). We expect a decrease in the annual population of the Murmansk Oblast by an average of 1.2% per year.

Instead of a conclusion: on the achievability of target indicators for the implementation of the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035, of the Program "Socio-economic development of the Arctic zone of the Russian Federation"

Of particular interest is the statement of compliance (non-compliance) of our assessments with the target indicators for the implementation of the Strategy for Developing the Russian Arctic Zone and Ensuring National Security until 2035 (Decree of the President of the Russian Federation of October 26, 2020 No. 645, hereinafter referred to as the Strategy for Developming the Russian Arctic Zone), the Program "Socio-economic development of the Arctic zone of the Russian Federation" (Decree of the Government of the Russian Federation of March 30, 2021 No. 484). Let us recall once again that, as we determined at the beginning of the article, it is currently not possible to reliably take into account the factor of influence of the MSO in Ukraine. Therefore, the assessments include the latest trends that have developed at the global, national, and regional levels without taking into account the qualitative breakdowns of trends, which are impossible to predict within the framework of scientific forecasting.

Indicators with a low probability of achievement are as follows. Firstly, the increase in the migration growth rate (it is planned to decrease to (–2.5) in 2024, reset to zero by 2030, increase to 2 by 2035 in the Development Strategy of the Russian Arctic) is limited by the acti-

vation of labor productivity growth, digitalization, automation and robotization, increased use of the rotational method and remote work in the Russian Arctic.

Secondly, the increase in life expectancy (it is planned to be 78 years in 2021, 80 years in 2030, and 82 years in 2035 in the Development Strategy of the Russian Arctic) is limited by the extremely negative impact of the pandemic on the population of the Russian Arctic regions, despite significant costs. For instance, of the 4 regions that are fully included in the ASRF, three subjects are in the top ten in spending on pandemic COVID-19 (according to the Accounts Chamber, spending in 2020, thousand rubles per person): Chukotka Autonomous Okrug = 32.1 (1st place among the regions of the Russian Federation); Yamalo-Nenets Autonomous Okrug = 29.0 (2nd place), Murmansk Oblast = 10.5 (10th place)), with mortality growth in 2020–2021 above the Russian average (according to preliminary data, November 2021), and life expectancy has decreased more than in the Russian Federation as a whole (in the Russian Federation — a decrease by 1.8 years) in the Murmansk Oblast — by 1.94 years, in the Yamalo-Nenets and Chukotka Autonomous Okrug — by 2.27 years, and in the Nenets Autonomous Okrug — by 2.79 years.

The achievement of the following strategic goals and indicators should be expected: an increase in the share of GRP produced in the Russian Arctic in the total GRP of Russia; increasing the share of crude oil and gas production in the Russian Arctic; increasing indicators for attracting private investment and creating new jobs, ensuring the growth of high-tech and knowledge-intensive sectors of the economy, increasing the share of domestic spending on research and development and technological innovation in the Arctic, ensuring 100% broadband access of households to the Internet, wage growth of workers in the Arctic. Reasons: institutional support at the national level, accelerated growth in global demand for fertilizers, gas, oil, metals, agricultural products (demand for fish is also important for the northern regions, the Russian Federation is the world leader in fish exports in 2020, 2021), recovery of domestic demand; increasing the possibilities of developing new and known deposits, etc. At the same time, there are also limiting factors, including the accumulated problems of the mineral resource base, remoteness, etc. However, the main one is transport and infrastructure, which cannot be resolved in an accelerated mode, but is envisaged for leveling within the framework of the adopted November 26, 2021 of the Transport Strategy of the Russian Federation up to 2030 with a forecast for the period up to 2035

We believe that it is necessary not only to talk about the achievability of indicators related to supporting the traditional economic activities of indigenous peoples, and increasing share of investments in fixed assets carried out for the protection and rational use of natural resources in the total investments in fixed assets of the Russian Arctic, but also to emphasize an increase in the significance of these indicators in the period 2020–2021, which is also expected in the future, including due to the consequences of climate warming, the increased likelihood of man-made disasters due to the intensification of economic activity. However, the

main reason for the increased significance of these factors is that the conditions of the COVID-19 pandemic and a number of major environmental disasters in the Russian Arctic have accelerated the strategic transition to providing real factors for the sustainable development of the Russian Arctic. Thus, consideration of the policy and practice of state and corporate governance during the pandemic period of 2000–2021 in the AZRF pointed to the primacy of environmental issues, social responsibility, related issues of climate change [7, Skufina T.P., Korchak E.A., Baranov S.V.]. Reviewing the latest global peculiarities of functioning of oil and gas, mining and metallurgical enterprises, analysis of international rating 2021 of risks and opportunities in the mining and metallurgical sector confirms the accelerated implementation of the worldwide strategy for ensuring the factors of sustainable development of the area of operation, including ecologization of production, compliance with ethical standards, support for economic growth, social responsibility of business [10, Skufina T.P., Korchak E.A., pp. 21–51, 141–176]. In fact, this is a paradox — previous crises mainly delayed the introduction of sustainable development factors, including in the Russian Arctic.

This paradox confirms the importance of our chosen broad context of research into the dynamics and prospects for the development of the Russian Arctic, considered not only in terms of achieving the economic performance of specific enterprises, not only from the standpoint of achieving target indicators set at the regional and national levels, but precisely the movement within the global trends in the global strategy for the development of the oil and gas, mining, metallurgical business, taking into account risks, opportunities, as well as new roles in social stabilization in the context of the COVID-19 pandemic. It should be noted that the actualization of the risks and opportunities of ecology and social responsibility for the Russian Arctic enterprises requires additional in-depth study.

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Industrial Policy and Transformation of the Consumer Market of the Russia's Arctic Regions *

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Abstract. The article considers the state of industrial policy in the subjects of the Arctic zone of the Russian Federation both in terms of the status and dynamics of the regional consumer market and the mechanisms of state regulation and support. In the current situation of economic sanctions and external threats, the main problems of the consumer market are the following: rising prices, transformation of transport and logistics schemes, declining quality of goods and services, reduction of their assortment. Opportunities for solving them could include: location of production sites closer to the end consumer, inter-production and interregional cooperation and specialization, state regulation and compensation of fuel, energy and transport tariffs, infrastructure development. The article considers a number of generalized cases of consumer preferences formation depending on the goods belonging of local producers to this or that sector of the "Price x Quality" matrix. A number of systemic problems associated with the need for local producers to respond to the transformational changes to which the regional consumer market is exposed today has been identified. In order to create a set of support measures and effective tools, it is necessary to develop a system of long–term guidelines and strategizing in the field of regional industrial policy: on the one hand, it is integrated into the state vertical of industrial management, on the other hand, it takes into account territorial features, industrial potential and consumer expectations of the population in the regions. Based on the analysis, the authors propose to create a single document in each region of the Russian Federation with the working title "Fundamentals of regional industrial policy and consumer market development".
Keywords: *North, Arctic, region, socio-economic development, transformation process, import substitution, industrial policy, consumer market*

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Introduction

The current state of domestic industrial production is quite far from the desired and annually announced in the Addresses of the President of Russia to the Federal Assembly. The basis of

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exports is still formed by products of low processing — oil, gas, coal, metals. On the contrary, the domestic market of high-tech goods is characterized by a high dependence on imports, reaching (for high-tech goods) in oil and gas engineering — 47.3%, and in machine tool building — 70–80% (for certain types of equipment) [1, Manturov D.V., p. 8].

Today, in the context of severe economic sanctions against Russia and current external threats, import substitution of goods, products, works and services of European and American origin is one of the priorities of state policy and the logic of economic entities' actions, which requires not only revision, but also development of new measures to support domestic industry and Russian market. It should be noted that in the situation of ongoing geopolitical changes and the turn of transport and logistics flows towards India and China, the issues of the development of the Northern Sea Route and the Arctic territories of the Russian Federation are of particular relevance.

It is well known that the regions of the Arctic zone of the Russian Federation, having a number of specific problems and peculiarities described in detail in [2, Tutygin A.G., Chizhova L.A.], have a high demand for reformatting the current system of strategic and target-program documents, which, in turn, will lead to significant changes both in the consumer market and in the behavior of its participants. It should be noted that the state of the consumer market, including the level of prices for essential goods and services, their range and quality, determines the level of personal consumption, the level of development of industrial relations, the stability of monetary circulation, and the standard of living of the population.

One of the most important areas of socio-economic development of any subject of the Russian Federation is the formation of a regional industrial policy, which, on the one hand, is part of the industrial policy of the state as a whole, and on the other, an integral part of the regional strategy. Today, there is a critical discrepancy between industrial policy as a system tool for making strategic decisions at the state level and the consumer market as a set of end consumers (buyers) of goods and services. This problem is addressed in this paper.

Regional industrial policy

Russian legislation defines industrial policy as a set of legal, economic, organizational and other measures aimed at developing the industrial potential of the country, ensuring the production of competitive industrial products [1]. At the same time, one of the goals of this policy is to improve the living standards. The participants of the formation of the domestic industrial policy are the state authorities of the federal and regional levels, local self-government, business entities and industrial support infrastructure organizations. Thus, the formation of industrial policy is carried out both at the level of the country as a whole and at regional sites. This is confirmed, for example, by the recently published government document, which amends the state program of the

[1] Federal'nyy zakon "O promyshlennoy politike v Rossiyskoy Federatsii" ot 31.12.2014 № 488-FZ [Federal Law "On Industrial Policy in the Russian Federation" dated December 31, 2014 No. 488-FZ]. URL: http://www.consultant.ru/document/cons_doc_LAW_173119/ (accessed 26 April 2022).

Russian Federation "The development of industry and its competitiveness" [2], which, in particular, establishes a fairly rigid system of requirements for the content of events and performance indicators for relevant regional programs.

The constituent entities of the Russian Federation have their own legislative and other normative legal acts. For example, in the Arkhangelsk Oblast, the law on industrial policy was adopted in 2013, and the state program "Economic development and investment activity in the Arkhangelsk Oblast" includes the subprogram "Development of industry and investment activity in the Arkhangelsk Oblast" [3]. However, it should be noted that the "Industrial policy" itself as a separate strategic document that sets long-term guidelines for the industrial development of the territory, is currently absent in this region.

If we take a close look at the above mentioned policy document on the development of industry in the Arkhangelsk Oblast, the first thing that can be noticed is its pronounced focus on supporting the export-oriented sector. Even today, under conditions of severe foreign economic sanctions, support for the export component of the regional economy continues to be one of the key priorities of the authorities. Historically, this can be explained by the fact that since the times of the USSR, the Arkhangelsk Oblast was considered as "the all-union sawmill" and "the currency shop of the country" [3, Smetanin A.V.]. Secondly, the traditional export goods of the Arkhangelsk Oblast have always been and still remain wood and pulp and paper products, rough diamonds, fish industry products, which, as a rule, have a low degree of processing, which means they have a low share of added cost.

In the planned Soviet economy, such specialization of regions, including the division into "raw materials" and "processing", was quite common, and the supply of the population with consumer goods and food was purely distributive in nature. As it was mentioned in the reference book published in 1976 [4, Kurotchenko V.S.], which was the reference book of USSR Gosplan and Gossnab managers and specialists, "the material and technical supply of the national economy is a process of production means distribution and organization of their rational circulation implemented by socialistic state in a planned manner. However, today, the market economy dictates other conditions, often coming into conflict with the principles of centralization of production and distribution systems. Therefore, one of the tasks of the regional industrial policy should be to link the needs of the population with the offers of local producers of goods and services. At the same time,

[2] Postanovlenie Pravitel'stva RF "O vnesenii izmeneniy v gosudarstvennuyu programmu Rossiyskoy Federatsii "Razvitie promyshlennosti i povyshenie ee konkurentosposobnosti" ot 02.06.2022 № 1012 [Decree of the Government of the Russian Federation "On Amendments to the State Program of the Russian Federation "Development of Industry and Increasing its Competitiveness" dated 02.06.2022 No. 1012]. URL: http://publication.pravo.gov.ru/Document/View/0001202206060009 (accessed 07 June 2022).

[3] Postanovlenie Pravitel'stva Arkhangel'skoy oblasti "Ob utverzhdenii gosudarstvennoy programmy Arkhangel'skoy oblasti "Ekonomicheskoe razvitie i investitsionnaya deyatel'nost' v Arkhangel'skoy oblasti" ot 10.10.2019 № 547-pp. [Decree of the Government of the Arkhangelsk Oblast "On Approval of the State Program of the Arkhangelsk Oblast "Economic Development and Investment Activities in the Arkhangelsk Oblast" dated October 10, 2019 No. 547-pp.] URL: http://publication.pravo.gov.ru/Document/View/2900201910180004 (accessed 07 June 2022).

the emphasis should be placed on the development of domestic brands and trademarks, and production should be optimally brought closer to the end consumer. This is especially true for natural food products (milk, meat, fish, vegetables), which are included in the food part of the consumer basket and have the potential for production in this territory.

The tasks of regional authorities include, on the one hand, the creation of conditions for the development of local producers, on the other hand, the formation of a stable competitive environment on regional markets. At first sight, these two tasks are oppositely directed both in terms of goals and implementation mechanisms: direct lobbying on the one side and market diversification on the other. As a variety of practice shows, to solve the first of these tasks, it is sometimes enough to take administrative and organizational measures of regional protectionism of local products and the introduction of various barrier restrictions for imported goods, accepted even within the framework of the existing legal framework. At different times and in different regions, measures such as granting additional preferences of permissive, property, tax, financial and other nature to local enterprises, inducing trading organizations to conclude agreements specifying a minimum share of local products in the product range, etc. were quite popular, and in some regions they still are today. However, administrative and organizational measures will not be sufficient to promote competition in the region. Economic and social mechanisms of motivating and stimulating nature should prevail in solving this problem. However, this topic requires a separate discussion, clearly beyond the scope of this article.

The harsh conditions of the North and the Arctic impose their impact on the activities of economic entities both in the field of production and related infrastructure, and in the system of trade and logistics relations [5, Tutygin A.G., Chizhova L.A., Lovdin E.N.]. For example, a cold climate and low average annual temperatures with the seasonality factor lead to large volumes of energy consumption, high tariffs, higher prices for products, works, services, as well as to the presence of rather high risks of economic activity. Problems with the inaccessibility of territories that do not have sustainable year-round transport links affect the low communication and logistics activity of local producers and their wholesale partners.

Consumer market in regions

The consumer market is a mobile structure that is sensitive to any socio-economic changes. The system of internal and external factors influencing the regional consumer market is shown in Figure 1.

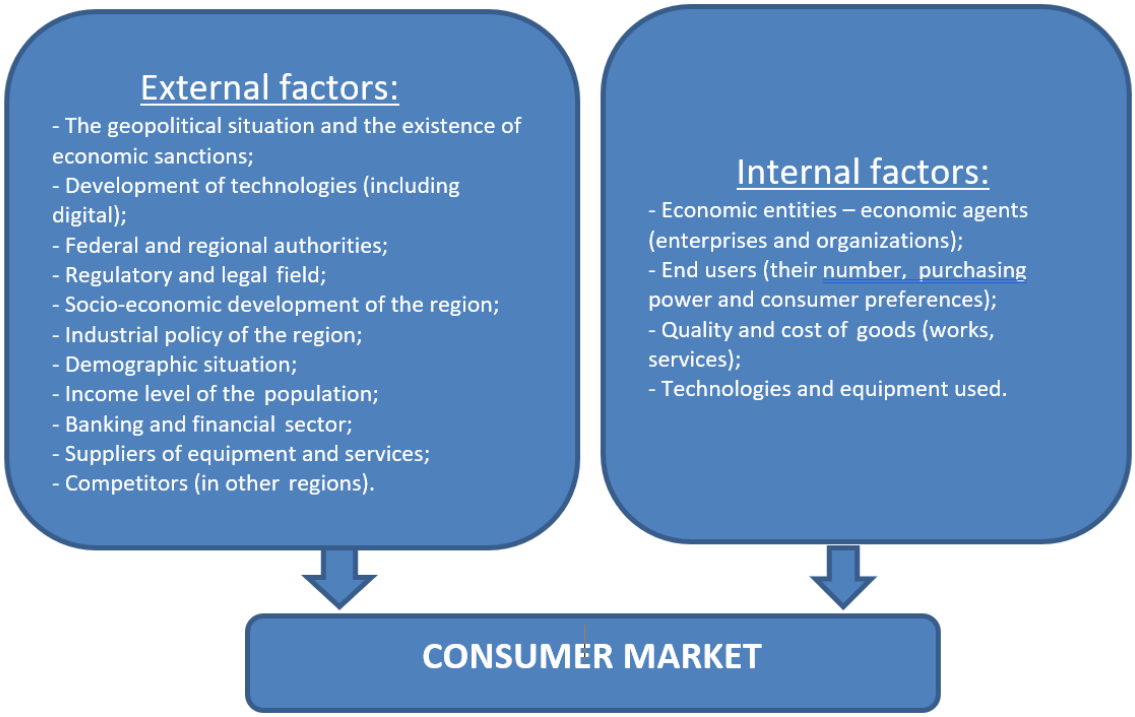

Fig. 1. The system of factors influencing the regional consumer market.

The consumer market is a kind of springboard for the formation of consumer behavior of the population. The two key conditions presented by the market are price and quality, so transformational changes in consumer behavior should primarily be considered in this system. At the same time, other equally important factors that have an external origin in relation to the consumer market also influence consumer behavior. They, in turn, may also lead to significant transformations that cannot be directly explained by intramarket factors. Such factors include, for example, targeted information impact that deforms natural expectations, various phenomena of group behavior and communication effects [6, Andreeva E.V., Gerasimova S.A., p. 154].

The formation of consumer preferences under the conditions of import substitution by goods of local producers in the coordinates “Price x Quality” is shown in Figure 2.

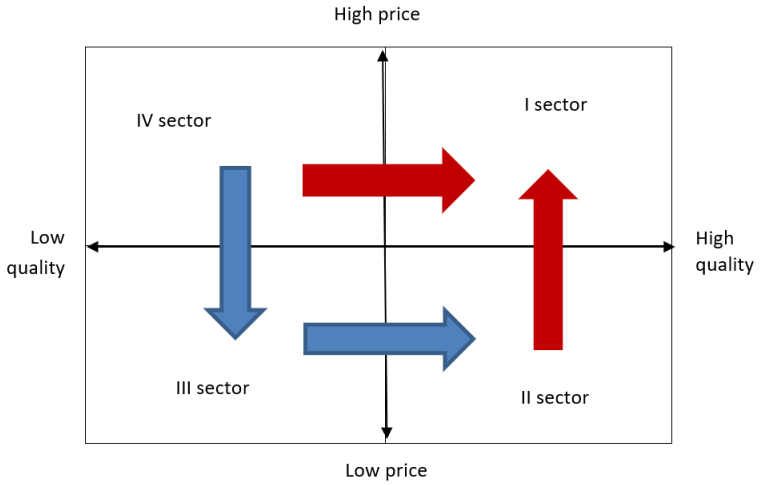

Fig. 2. Matrix of consumer preferences formation.

Let us consider a number of generalizing cases of the formation of consumer preferences, depending on whether the goods of local producers belong to one or another sector of the "Price x Quality" matrix.

Belonging to the first sector of the matrix means that the local manufacturer is a recognized leader in its industry, its products with high quality characteristics are in constant demand, despite the rather high price. At the same time, high-quality foreign analogues of such products have a higher cost, as a rule, due to belonging to a well-known brand. This sectoral affiliation is ideal and is considered as a target for local producers belonging to other sectors of the matrix. However, this position also has its risks. For example, a study of consumer preferences in the organic food market conducted in 2019–2020 showed that, on the one hand, about two-thirds of consumers are willing to pay more for organic products, and on the other hand, the need to save overrides the desire for healthy eating (40% of respondents are not willing to pay for high quality products), while the number of such consumers has been steadily increasing over the past years [7, Cheremushkina I.V., Oseneva O.V., p. 171]. At the same time, as today's examples from the local food industry show, the increase in the cost of imported ingredients is already practically nullifying the price difference between goods from abroad (or goods produced using such ingredients) and local natural high-quality, but not cheap products, which ultimately eliminates the risks noted above.

The positioning of goods in the second sector indicates either a high social responsibility of the manufacturer offering high quality goods at an affordable price, or the subsidized component of this production of vital products from the state (subsidies, compensation, etc.), seeking to ensure population of a certain group of goods at regulated or fixed prices.

The third sector is associated with the manufacturer's choice of a strategy that allows him to earn on the scale (volumes) of production and sales while maintaining low prices in combination with low product quality. If we turn to the example of trade organizations, these are the Svetofor, FixPrice, Dobrocen networks, where most basic necessities are about 30% cheaper to buy. This is achieved through a narrower assortment and partnerships with specific producers, savings on transport and logistics, maintenance of these goods in stores, reducing staff costs (involved in receiving, laying out and maintaining it in stores of a different format).

The fourth sector is determined by the ambiguity and instability of the position of the commodity producer, since when selling low-quality products at a high price, the entry into action of competitive forces is only a matter of time. However, under conditions close to force majeure, in short periods, taking such a position was even justified in some ways (suffice it to cite a recent example with an outbreak of shortages and rush demand for sugar, cereals, canned food, etc.). But in the longer term, a local producer has only two possible ways to stay on the market: either improve the quality of products or reduce the price (simultaneously implementing two directions of movement is often unrealistic).

Possible transitions from one sector of the matrix to another are indicated in figure 2 by arrows, while the red ones reflect the most preferable trajectories for the commodity producer in terms of maintaining market equilibrium. We also note that in the context of the digital economy and the development of marketplaces, manufacturers need to move from the already largely outdated "produce and sell" business model to the modern "understand and respond" model, which involves the creation of more original and technically more advanced products with the obligatory attribute of customer focus [8, Oyner O.K., p. 5].

Consumer market transformation

The management of consumer preferences, especially in the situation of import substitution, should be reduced to encouraging local producers to improve the quality of their products, bringing them as close as possible to the corresponding characteristics of their foreign analogues (Fig. 3).

Fig. 3. Scheme of consumer preference management.

It should be noted that, influencing the change in consumer preferences, the authorities change the structure of demand through the legal, administrative, regulatory, compensatory and other mechanisms, which in turn determines the structure of supply and, as a result, the structure of incomes of producers, that requires consideration in the preparation of strategic decisions, including those related to food security and the shortage of high-quality consumer goods [9, Samygin D.Yu., p. 63].

Taking into account the current situation of economic sanctions and external threats, the main problems of the consumer market are the following: rising prices, transformation of transport and logistics schemes, decrease in the quality of goods and services, and reduction in their range. The possibilities for solving them can be: location of production sites closer to the end consumer, inter-production and inter-regional cooperation and specialization, state regulation and compensation of fuel, energy and transport tariffs, infrastructure development. Let us present some key problems of the regional consumer market and the possibilities for their solution in the corresponding matrix compiled according to the "Problems × Opportunities" type (Table 1).

Table 1

Matrix of problems and opportunities for their solution for the regional consumer market [4]

Problems	**Solution possibilities:**			
	Placement of production sites	*Inter-production and interregional cooperation and specialization*	*State regulation of tariffs*	*Infrastructure development*
Price growth	The lower the costs of transport logistics (both relative to suppliers of raw materials and end users), the lower the prices.	The creation of strong inter-production and inter-regional ties will help to stabilize prices.	Reduced tariffs should be established for the production of essential goods, as well as groups of goods that are strategically important for the development of the territory.	It will optimize transport and logistics processes and reduce the time and cost of delivery.
Transformation of transport and logistics schemes	The approximation of production to the sources of raw materials and the consumer.	It will lead to the optimization of transport and logistics processes within the regions and the country as a whole.	In order to ensure accelerated import substitution, it is necessary to establish reduced tariffs for affected enterprises.	It will facilitate the debugging of transport and logistics processes and schemes in a milder form and in a shorter time interval.
Decrease in the quality of goods and services	It will not have an impact on reducing the quality of goods.	It will contribute to the production of better products.	It will not have an impact on reducing the quality of goods.	The development of various types of infrastructure (industrial, transport, financial, social) will contribute to the growth of the quality of goods and services.
Reduction of the range of goods and services	The location closer to the consumer will make it possible to more fully meet the needs of the assortment.	Promotes a more detailed study of consumer needs and the production of only the necessary and economically justified assortment. Reduction of the assortment is possible in some cases.	It will contribute to the preservation of the assortment of domestic producers in the near future and its expansion in the long term.	It will contribute to the preservation of the assortment of domestic producers in the near future and its expansion in the long term.

Commenting on table 1, we note, for example, that the location of production sites closer to the end consumer will reduce transport logistics costs, which in turn should help to keep prices down. The creation of strong inter-industrial and inter-regional ties will also stabilize prices. Lower prices and tariffs for essential goods, and also for strategically important groups of goods for the development of the area, should be set. All the possibilities mentioned in the table will contribute

[4] Compiled by the authors.

to the solution of the problem of transformation of transport and logistics schemes. It is also important to note that inter-production and inter-regional cooperation and specialization will contribute to the optimization of transport and logistics processes within the regions and the country as a whole, and the development of transport infrastructure will help to debug these processes and schemes in a milder form and in a shorter time.

For example, proceeding from the need to ensure food security in time and with the purpose of solving the task set by the President of Russia to increase the output and supply of qualitative and affordable foodstuffs, the Government of Russia is taking measures to create wholesale food markets in cities [5]. The placement of manufacturing facilities and wholesale capacities closer to the end consumer, combined with the measures of the state regulation of tariffs, will not lead to the deterioration of product quality, and the inter-regional cooperation, specialization and infrastructure development will promote the production of higher quality products.

In the case of product and service reductions, inter-productive and inter-regional cooperation and specialization will encourage a better understanding of consumer needs and ensure that only an adequate and economically viable range of products is produced. Closer proximity to the consumer will enable the range needs to be met more fully. State tariff regulation and infrastructure development will contribute to preserving the range of domestic producers in the short run and expanding it in the long run.

An important feature of the transformational processes taking place in the regional consumer markets is their reciprocal nature. Producers, who offer their products in the market, are oriented to their needs, including purchasing power, and final buyers (consumers) are fully aware of the possibilities of those producers that are represented in the market. In fact, these processes are a game-theoretic model of the conflict, in which the parties must come to an equilibrium situation [10, Neumann J., Morgenstern O.].

In addition, studies of price dynamics in January–March 2022, conducted using non-parametric methods, showed that there is a significant structural shift, which largely determines subsequent transformational changes [11, Koshunyaeva N.V., Tutygin A.G.]. Monitoring of public opinion on the state of Russian society showed that the consumer sentiment index decreased significantly in March-April 2022 (by 6 p.), which indicates a deterioration in the population's forecasts regarding the future of the economic situation in the country and their personal financial position. In the period from February to April 2022, the share of positive characteristics of social mood decreased in 8 of the 14 main socio-demographic categories of the population, while the most negative changes were noted among women (by 7 p.), as well as among people over 55 years old (by 10 p.) [12, Morev M.V., Paranicheva I.V., Urvanova T.V., pp. 261–262]. However, de-

[5] Minpromtorg: Izmeneniya v zakonoproekt o regulirovanii rynkov vnesut do 1 iyulya [Ministry of Industry and Trade: Amendments to the bill on regulating markets will be introduced by July 1]. URL: https://rg.ru/2022/06/06/minpromtorg-izmeneniia-v-zakonoproekt-o-regulirovanii-rynkov-vnesut-do-1-iiulia.html (accessed 08 June 2022).

spite the deterioration of social mood, we should note that the history and practical experience of activities in crisis situations show the possibility of effective mobilization in the face of common danger, taking into account the socio-economic integration of representatives of authorities, business communities, public organizations and citizens.

Reaction to changes and influence mechanisms

As noted in the June review of the Bank of Russia [6], consumer activity was restrained in most regions in April–May of this year. The decline in sales was due to the rapid exhaustion of rush demand in the context of the ruble strengthening and the transition of the population to a savings regime, including because of increased uncertainty and a decrease in real incomes. In addition, there was a reduction in stocks and assortment of imported goods. Under such conditions, almost half of the enterprises faced interruptions or cancellation of supplies. Partially, industrial enterprises find a way out of this situation today by starting to implement various projects aimed at import substitution. For example, due to the reduction in the supply of spare parts and components for equipment, special equipment and transport, the need for the production of spare parts on their own has increased. The enterprises needed additional equipment for this, as well as the modernization of existing production facilities.

It should be noted that the authorities in the Arkhangelsk Oblast promptly responded to such business requests by expanding the range of investment products sold by regional support institutions. Thus, the program “Industrial facilities” of the regional industrial development fund, adopted in June 2022, aimed at financing projects related to the acquisition, construction, reconstruction of industrial facilities (buildings, structures, infrastructure, etc.), logically supplemented already existing programs for the acquisition and leasing of equipment, transport and special equipment [7]. For these purposes, about 280 million rubles were attracted additionally from the federal and regional budgets within the framework of the state program “Economic development and investment activity in the Arkhangelsk Oblast” only this year. However, when implementing these mechanisms, which have several sources of funding, certain problems of a systemic nature arise.

In the current situation, the rules of providing different types and measures of support to industry are initiated and regulated from the federal level by decrees and instructions of the Government of the Russian Federation and then detailed by departmental normative acts; the regions do not actually have an opportunity to work out their own path to support those types of industry which are the most important for their territories and population. As a typical example, it would be appropriate to mention the financial mechanisms laid down in the Decrees of the Government

[6] Regional'naya ekonomika: kommentarii Glavnogo upravleniya Tsentral'nogo banka Rossiyskoy Federatsii. 2022 god № 12 (2 iyunya) [Regional economy: comments of the Main Department of the Central Bank of the Russian Federation. 2022 #12 (June 2)]. URL: http://www.cbr.ru/analytics/dkp/report_06 (accessed 08 June 2022).
[7] Regional Industry Development Fund of the Arkhangelsk Oblast. URL: https://cmf29.ru (accessed 08 June 2022).

of the Russian Federation No. 194 dated March 15, 2016 [8] and No. 686 dated April 18, 2022 [9], aimed at co-financing regional industrial development programs. Despite the fact that the key point in both documents is the development of regional industrial systems, the corresponding requirements for their implementation are adjusted to the usual "patterns" of the Ministry of Industry and Trade of Russia, within which the consideration of regional specifics is purely declarative.

A similar situation is developing around joint federal-regional programs to support industry. Thus, the enterprises of one of the key industries in the northern regions — the timber industry complex (TIC) — had high hopes on the program developed in 2021 by the Ministry of Industry and Trade of Russia and the Industrial Development Fund (IDF) in accordance with the instruction of the President of the Russian Federation V.V. Putin on the decriminalization and development of the forest complex, the program of state support for enterprises "Projects of the timber industry". The program was aimed at providing financial and credit support for the modernization of small and medium-sized enterprises involved in the harvesting and processing of wood. Despite the clear preferences for timber industry enterprises included in the program, in particular, a low annual interest rate (1%–3%), quite loyal requirements for applicants for soft loans, etc., the effect of them is to a large extent degree today is leveled by severe restrictions set by the developers of the rules. For example, many timber industry enterprises that sell their products for export, declare wholesale trade in timber and sawn timber as their main activity (codes 46.73.1 and 46.73.2 OKVED [10]). But one of the conditions for participation in the joint federal-regional program "LPK Projects" is the presence of the main activity related to section C "Manufacturing industry" ac-

[8] Postanovlenie Pravitel'stva RF «Ob utverzhdenii Pravil predostavleniya inykh mezhbyudzhetnykh transfertov iz federal'nogo byudzheta byudzhetam sub"ektov Rossiyskoy Federatsii v tselyakh sofinansirovaniya raskhodnykh obyazatel'stv sub"ektov Rossiyskoy Federatsii, voznikayushchikh pri realizatsii regional'nykh programm razvitiya promyshlennosti» ot 15.03.2016 № 194 (red. ot 21.12.2021) [Decree of the Government of the Russian Federation "On approval of the Rules for the provision of other interbudgetary transfers from the federal budget to the budgets of the constituent entities of the Russian Federation in order to co-finance the expenditure obligations of the constituent entities of the Russian Federation arising from the implementation of regional industrial development programs" dated March 15, 2016 No. 194 (as amended on December 21, 2021)] URL: http://www.consultant.ru/document/cons_doc_LAW_195368/ (accessed 08 June 2022).

[9] Postanovlenie Pravitel'stva RF «Ob utverzhdenii Pravil predostavleniya i raspredeleniya v 2022 godu inykh mezhbyudzhetnykh transfertov iz federal'nogo byudzheta byudzhetam sub"ektov Rossiyskoy Federatsii, istochnikom finansovogo obespecheniya kotorykh yavlyayutsya byudzhetnye assignovaniya rezervnogo fonda Pravi-tel'stva Rossiyskoy Federatsii, v tselyakh sofinansirovaniya raskhodnykh obyazatel'stv sub"ektov Rossiyskoy Federatsii, voznikayushchikh pri realizatsii dopolnitel'nykh meropriyatiy po finansovomu obespecheniyu deya-tel'nosti (dokapitalizatsii) regional'nykh fondov razvitiya promyshlennosti v ramkakh regional'nykh programm razvitiya promyshlennosti» ot 18.04.2022 № 686 [Decree of the Government of the Russian Federation "On approval of the Rules for the provision and distribution in 2022 of other interbudgetary transfers from the federal budget to the budgets of the constituent entities of the Russian Federation, the source of financial support for which is the budgetary allocations of the reserve fund of the Government of the Russian Federation, in order to co-finance the expenditure obligations of the constituent entities of the Russian Federation arising from implementation of additional measures to financially support the activities (recapitalization) of regional industrial development funds within the framework of regional industrial development programs" dated 18.04.2022 No. 686]. URL: http://www.consultant.ru/document/cons_doc_LAW_4 (accessed 08 June 2022).

[10] All-Russian classifier of types of economic activity (approved by Order of Rosstandart dated January 31, 2014 No. 14-st) (as amended on December 23, 2021). URL: http://www.consultant.ru/document/cons_doc_LAW_163320/ (accessed 08 June 2022).

cording to OKVED. If within the framework of regional programs implemented only at the expense of the constituent entities of the Russian Federation, this restriction can be removed, this already becomes impossible with the participation of federal co-financing within the framework of the Decree of the Government of the Russian Federation of March 15, 2016 No. 194.

Obviously, the introduction of the above described mechanism of "manual control" of the processes at the regional level is not the best practice. However, the indicators and signals from the regions to the federal government and decision-makers should be indicators from the macroeconomic set, reflecting the state and dynamics of the regional socio-economic system as a whole (GRP, investment, living standards, demographic characteristics, etc.). It seems quite natural, of course, to delegate the powers to resolve procedural issues related to the allocation of financial and investment resources to the regional government and development institutions. On the one hand, such an approach would significantly increase the responsibility of regional decision-making centers, but on the other hand, it would transfer the subject of control from the process to the final result, which would undoubtedly increase the efficiency of the use of allocated resources as a whole. It is hoped that the mechanism of a single regional subsidy will be the first step towards solving the above-mentioned problem.

Conclusion

The main task of the regional industrial policy de facto today is to support local commodity producers, which is reflected in the regulatory-legal and program-target documents of the constituent entities of the Russian Federation. However, the lack of long-term guidelines and strategic documents in this area in many regions, including those that are part of the AZRF, is often a serious obstacle to the development of system mechanisms and effective tools for the development of territories using their industrial potential.

Another problem typical for such socio-economically complex regions as the subjects of the Russian Arctic is the state and dynamics of the consumer market, which is often focused on imported products and therefore dependent on a number of external influences. At the same time, an insignificant share of the presence of local producers in the regional consumer market makes this problem a systemic one in the current harsh conditions. The formation of consumer orientation towards local products today necessitates the development of a whole range of solutions both in the field of industrial policy and in the regulatory practice carried out by the authorities.

In the current socio-economic situation, regional industrial policy in the Arctic regions of Russia today requires structural strategic decisions rather than point-by-point adjustments. They should be adopted in a single package with those conceptual guidelines that will be responses, primarily of the state, to transformational processes that change the face of the consumer market and the consumer behavior of the population of the respective territories.

The solution to the problem situation, outlined in this article, appears in the form of developing a procedure for systematic harmonization of the principles, goals and objectives of industrial

policy, on the one hand, the concept and trends in the development of the consumer market, on the other hand, as part of a single set of strategic decisions on socio-economic development of the region. Given the current lack of both industrial policy and consumer market development concept in a number of northern regions, it would be logical to create a single document with the working title “The basis of regional industrial policy and consumer market development”.

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Arctic Military Posturing and Its Influence on the Development of the Northern Sea Route *

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Abstract. The author traces the evolution of military presence in the Arctic by Russia and NATO in the article. He analyses the impact of military posturing on Arctic geopolitics. The author advocates that while military capabilities are essential for deterrence, unnecessary military rhetoric by NATO and Russia is detrimental to peace and security in the Arctic. Arctic geopolitics is fraught with tensions due to regular highly publicized military exercises and posturing in the area. The new Arctic Cold War is likely to affect Russia more adversely due to Western sanctions post-2014 and the requirement to develop the NSR as an internationally competitive transport corridor. Russia has a legitimate right to protect its security in the Arctic. However, the author argues it is unnecessary to highlight such events regularly, and it may be more useful to focus on the economy and rationalize military spending. Russia needs to focus on its relationship with the Nordic countries and reemphasize its peaceful and cooperative engagement in the Arctic. Its leadership of the Arctic Council is crucial to reducing tensions in the Arctic.
Keywords: *Arctic, The Northern sea route (NSR), Russia, geopolitics, military posturing cooperation*

Introduction

The NSR is a historically developed national transport corridor of the Russian Federation through the Arctic. It means a water area adjoining the Northern coast of the Russian Federation, including the internal sea waters, territorial sea, contiguous zone and exclusive economic zone of the Russian Federation; limited in the East by the line delimiting the sea areas with the United States of America and by the parallel of the Dezhnev Cape in the Bering Strait, and in the West by the meridian of Cape Zhelanie to the Novaya Zemlya archipelago, by the east coastal line of the Novaya Zemlya archipelago, and the Western limits of the Matochkin Shar, Kara gates and Yugorski Shar gates [1] (see Fig. 1). The NSR, being an integral part of the Russian transport system, historically served as a transit corridor between the north-western and far-eastern reaches of Russia. It is the shortest sea route connecting European and East Asian markets and a potential alternative to the Suez Canal.

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[1] Russian Federation. Postanovleniye Pravitel'stva RF ot 18 sentyabrya 2020 g. N 1487 "Ob utverzhdenii Pravil plavaniya v akvatorii Severnogo morskogo puti [Decree of the Government of the Russian Federation "Concerning approval of the Rules of Navigation in the Water Area of the Northern Sea Route" of 18 September 2020, N 1487]. URL: http://static.government.ru/media/acts/files/1202009220024.pdf (accessed 20 April 2022).

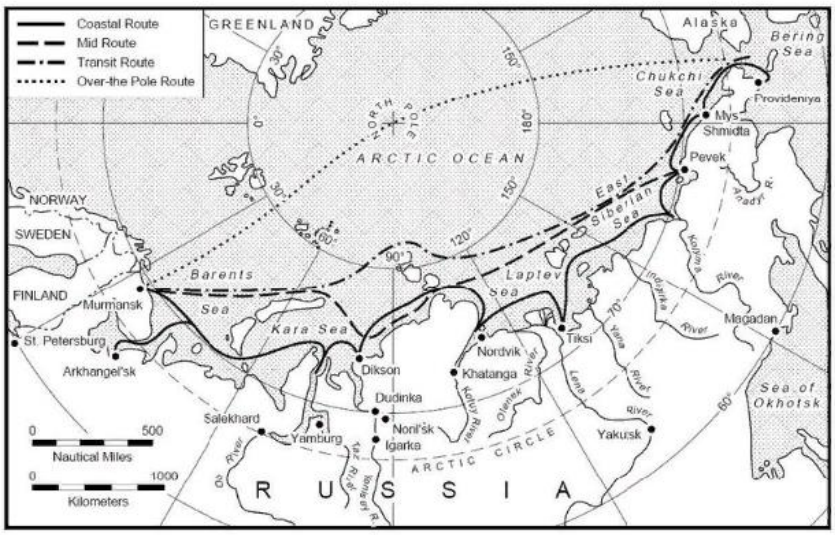

Fig. 1. Northern Sea Route (NSR) [2].

Russia stated its intention to integrate the Northern Sea Route into international shipping routes in 1991. Over the years, the Russian government has introduced various regulations to facilitate this. However, due to various reasons related primarily to the challenging ice conditions, weak infrastructure and inadequacy of search and rescue assets, the growth of international transit shipping along the NSR was slow. Arctic geopolitics is fraught with tensions due to regular highly publicized military exercises and posturing in the area by both NATO and Russia. In 2019, there was no joint declaration at its biennial ministerial meeting for the first time ever. Even though, the declaration was nixed by the United States primarily due to its reluctance to include climate change; there was also an unusually confrontational speech by the American secretary of state Mike Pompeo in which he criticized China's Arctic policy, Russia has alleged militarization of the Arctic, and Canada's stance on the North-West passage [3]. This has affected the interest shown by shipping companies in the NSR, primarily those of Western origin. The article hypothesizes that the new Arctic Cold War may likely affect Russia more adversely due to Western sanctions post-2014 and the requirement to develop the NSR into a major international shipping route. The purpose of the research is to examine the way ahead for Russia within the backdrop of the deteriorating geopolitical situation and current military posturing in the Arctic, given its stated goal of converting the NSR from a national transport route to an internationally competitive transport corridor.

The first section of the article presents the methodology and literature review. The following section traces the evolution of military presence in the Arctic. Section 3 examines the status of Arctic geopolitics with reference to military deployments. Section 4 discusses the impact of high politics on the development of the NSR. Section 5 puts forth certain recommendations to mitigate the current situation.

[2] Bemuse. Map of the Northern Sea Route, 2008. URL: https://benmuse.typepad.com/arctic_economics/2008/10/russias-shallow-arctic-seas-and-straits.html (accessed 20 April 2022).

[3] Chater A. Takeaways from the 11th Arctic Council Ministerial Meeting in Rovaniemi, May 15, 2019. URL: https://polarconnection.org/arctic-council-ministerial-rovaniemi (accessed 20 April 2022).

The first section of the paper presents the methodology and literature review. The next section traces the evolution of the military presence in the Arctic. The third section examines the status of Arctic geopolitics in terms of military deployment. The impact of high politics on the development of the NSR is then discussed. The fifth section offers some recommendations for alleviating this situation.

Methodology

The article aims to highlight the pitfalls of militarization of the Arctic with reference to the development of the NSR and suggest measures to deescalate the situation. The methodological basis of the research is synthesis and analysis, description and explanation, dialectical approach, systemic and comparative analysis, as well as the historical method. System analysis is applicable because of the relationship between the policy choices made in respect of deterrence by Arctic governments in relation to the Arctic geopolitical environment. Comparative analysis was used to compare the approaches to militarization of the Arctic by NATO and Russia. The historical method is relevant for analyzing the rationale behind military deployments in the Arctic from their inception. The dialectical approach is relevant in discussing the problem from different points of view and then suggesting some recommendations.

Literature review

The article has benefited from the historical works in tracing military deployments in the Arctic (Belov M.I., Shirokorad A. Timoshenko A.). It has examined the Arctic strategies of Russia, NATO countries, such as the USA and Norway, and the US Army's Arctic strategy released for the first time in 2021. It has analyzed the work of many international experts on Arctic geopolitics (Sergunin A., Gjorv G.H., Heininen L., Zagorskiy, A.V., Godzimirski J.), Russian security and strategy in the Arctic (Zaikov K.S., Kondratov N.A., Lipina S.A., Bocharova L.K., Grinyaev S.N., Zhuravel V.P.) and international cooperation in the Arctic (Gudev P.A.). Russian experts have almost unanimously justified the need for military modernization and reorganization in the Russian Arctic in response to NATO deployments. Further, it has evaluated the work of international experts on Arctic military posturing and deployments (Runner E., Sokolsky R., Stronski P., Rourke R., Folland R.). Western experts have noted the upgrading of Russian military facilities in the Arctic and the need for active NATO deterrence measures [1, Petersen M.B., Pincus R., pp. 490–491]. However, some experts acknowledge that these are a reactivation of Soviet bases and defensive measures (US Army Strategy, 2021). Some experts on both sides have advocated the necessity for de-escalation measures and avoidance of unannounced deployments [1, Petersen M.B., Pincus R., pp. 510–512; 2, Berbick W., Saunes L., pp. 45–63, 3, Zagorskiy A.V., Todorov AA, pp. 81–86], and the American initiative from an expert group convened by the US Naval War College has advocated a reduced role for NATO considering inherent suspicions by the Russian side. While all the works mentioned

have established linkages between Arctic geopolitics and military deployments, none of them has examined the impact on the evolution of the NSR.

History of military presence in the Arctic

Some Russian scholars tend to trace Russia's "Arctic" history back to the times of the Pomors in the 10th century and others — to Mangazeya in the 16th century. The origin of the development of the Northern Sea Route was the outstanding Russian scientist M. V. Lomonosov, who devoted extensive fundamental theoretical and practical research to this issue and personally participated in the organization of the pioneering expeditions [4, Lukin Y.F., pp. 191–192].

In 1648, S. Dezhnev demonstrated that navigation along the NSR was feasible. He was followed by V. Bering (1725–1743). In his writings, M. V. Lomonosov expressed the idea that the development of the polar seas in future will serve other, more important purposes, for example, in the field of economics. Based on the works of Lomonosov, the great Russian Empress Catherine II organized two secret expeditions (1765 and 1766) to the Northern Sea Route. However, the expeditions did not achieve all their goals despite careful preparations. [5, Ogorodov S.A., Romanenko F.A., Solomatin V.I., pp. 12–14].

In addition, this step was only the beginning of a long and not consistently successful path to the development of the Arctic. The explorers F. Vrangel (Russia) in 1821–1824, N. Nordensheld (Sweden) in 1878–1879, D. De Long (USA) in 1879–1881, F. Nansen (Norway) in 1893–1896 made several expeditions confirming the possibility of using the NSR. Attention from the Russian authorities was received only at the end of the 19th century. Until then, most of the research was organized and conducted by military sailors. In the 16th–17th century, the discovery of new lands was already considered the basis for their inclusion in the territory of the country. In the 19th century, it was necessary to indicate interest in the land by placing the state symbol.

However, from the end of the 19th century until the First World War, the security of the Russian Arctic was threatened by Great Britain and Germany, which was the reason for the development of the infrastructure of the North. In 1901, under the leadership of the naval figure S.O. Makarov, a polar expedition was launched on the first Russian icebreaker "Ermak". As a result of this voyage, basic information about the Barents and Kara Seas was collected, and a detailed Arctic map was compiled. In addition, a document was prepared to justify the feasibility of developing the North, which reflected the economic and political benefits for the country [6, Belov M.I., pp. 72–73].

In 1910, a hydrographic expedition was organised using two vessels designed similar to icebreakers, the command staff of which consisted of their military personnel. Thus, the Navy entered the Northern Sea Route for the first time [7, Timoshenko A.I., pp. 2–3]. As a result, new territories were discovered. It was essential to consolidate all the realised achievements legally, and, therefore, in 1916, The Ministry of Foreign Affairs of the Russian Federation announced that "the territories and islands located in the Arctic Ocean and discovered by Vilkitsky are included in the

Russian Empire" [8, Zaikov K.S., Kondratov N.A., Lipina S.A., Bocharova L.K., p. 79]. The Russian Empire was the pioneer in indicating at the treaty level sector limits to define its polar territories.

At the beginning of the First World War, the Russian Empire had only two channels of communication with the allies-the routes through the Barents and White Seas, which began in the port of Arkhangelsk. To connect the Northern Sea Route with the internal territories of the state, the Arkhangelsk–Vologda railway was expanded in 1915. In addition, a new seaport was built in Murmansk. A railway line connected it to Petrograd.

In 1916, major emergency construction of the Northern Navy was organized and implemented. The task of the fleet was to ensure the normal implementation of trade between Russian Arctic territories along the Northern Sea Route. The work carried out made it possible to identify all the existing shortcomings of the coastal infrastructure. However, despite all the actions taken by 1918, the ports of Arkhangelsk and Murmansk continued to deal with mainly military cargo.

In 1918, the Brest-Litovsk Peace was concluded between Soviet Russia and the Central Powers. In this regard, under the pretext of preventing the transfer of accumulated military reserves to Germany, an Anglo-American intervention was made in the North of Russia. Moreover, the naval forces available at that time could not cope with the threat to military security [9, Timoshenko A.I., pp. 6–7].

In 1920, the events that later were called the "first Arctic race" began. On the one hand, the Soviet government tried to strengthen its shaky power over the northern territories; on the other hand, foreign opponents tried to take advantage of the relaxation and challenge Russian sovereignty in the Arctic lands. As a result, a system of division of the northern territories into sectors controlled by the actors was formed.

In 1926, USSR, indicated by a decree that the entire northern territory in the sector between the meridians 32°4'35" W and 168°49'30" W, except for Svalbard, is an inseparable part of the USSR. Until the Second World War, the Soviet government systematically strengthened its position in the northern territories with measured actions [7, Timoshenko A.I., pp. 2–3]. USSR followed Canada to confirm the meridian limits of its Arctic sector at the level of national laws. Canada was the first Arctic country to do so in 1923.

In 1931, under the directive of Stalin, the document "On the protection of the northern coast" was prepared, according to which a naval base was to be established on the Kola Peninsula. This document activated the work of the Defense Commission. Therefore, in 1933, the Northern Flotilla was formed, which in 1937 was transformed into the Northern Fleet. In addition, the Main Directorate of the Northern Sea Route in the Arctic territories formed many military stations and wintering grounds [10, Shirokorad A., pp. 111–112].

However, the period of rapid development of the North got affected due to the beginning of the Second World War. It is worth noting that Germany was interested in the capture of the ice-

free Murmansk port that would allow the German army to receive military cargo freely, as well as to extract the nickel necessary for the needs of the army [10, Shirokorad A., pp. 125–130].

During the war period, with the help of the Allies, more than 2500 transports were organized along the Northern Sea Route; the German navy was able to prevent only 18 ones from reaching their destination [10, Shirokorad A., pp. 142–157].

The Second World War highlighted the need for the development of the north and the importance of the development of northern cities, such as Murmansk and Arkhangelsk, even more clearly. Thus, the experience of victory in the Northern Sea is essential both from the historical perspective and understanding current Russian policies oriented towards the Arctic.

During the war, all existing contradictions between the USSR and the allies were forgotten. However, with the advent of peace, they made a new round, largely caused by the results of the Second World War. In the post-war period, the Arctic Ocean and its airspace began to be considered nuclear test sites.

In accordance with Directive No. 432/D of 14.12.1945, issued by the Joint Committee of the Military Command, "the only weapons that the United States can effectively use for a decisive strike on the main centres of the USSR are atomic bombs delivered by long-range aircraft" [4]. That is, the existing nuclear experience and the advantages of equipment the US were superior to the Soviet forces. However, the USSR was considered the unquestioning leader with respect to the army. In accordance with the strategy of "massive retaliation", formed by the US military leadership, in order to win, it was necessary to launch nuclear strikes on the most vulnerable and, at the same time, important territories of the USSR, which included the Russian Arctic. In addition, at the same time, the Arctic territories were the most accessible for a nuclear strike [10, Shirokorad A., pp. 185–191].

Thus, the US military forces began large-scale preparations for the formation of nuclear military bases in the Arctic to strike the USSR and other socialist countries. As a result, as the Cold War progressed, the Arctic began to be considered a training ground for further military operations, and appropriate training was conducted. These circumstances served as an incentive for the Soviet authorities to study the Arctic lands more thoroughly and to form a strategy for conducting military operations in the northern territories [10, Shirokorad A., pp. 185–191].

The Soviet government took measures to improve security in the North. Therefore, in 1948, an extremely secret expedition "North" was organized, during which bases for Soviet aviation and ground forces were planned, including in the ice of the Arctic Ocean. In addition, in order to create a network of airfields, a large number of airfield construction battalions were sent to the northern lands [10, Shirokorad A., pp. 185–191]. In 1958, four years after the USS Nautilus, Soviet engineers prepared the first nuclear submarine K-3 "Leninskiy Komsomol", which was an im-

[4] NATO. Report to the Council on The Future Tasks of the Alliance (Harmel report), December 13-14, 1967. URL: https://www.nato.int/cps/en/natohq/official_texts_26700.htm?selectedLocale=en (accessed 20 April 2022).

portant step to ensure the elimination of the American monopoly on this military field. By 1960, the Soviet-American confrontation had moved into the waters of the Arctic Ocean. This was due to significant technical improvements in the intercontinental ballistic missiles and the advent of nuclear submarines [10, Shirokorad A., pp. 185–191].

Skilful sailors who commanded the early sailing ships were confronted with gigantic problems in their attempts to penetrate the frozen Arctic. Pack ice was the most obvious obstacle, and that was a serious challenge; much more difficult were the problems of high-latitude navigation and sailing. As soon as submarines became more robust and reliable, it was clear that submarines would be useful in exploration under the ice pack. After years of struggle with the ice pack by diesel-electric boats in both the Arctic and Antarctic, Admiral Arleigh Burke, the US Chief of Naval Operations, played a significant role during the final years of the breakthrough of the last unexplored frontier. For decades, man dreamed of reaching the North Pole by ship. With the personal support of President Dwight D. Eisenhower, the great Nautilus, the United States' first nuclear-powered submarine, gave the country one of its greatest achievements [11, Williams M.D., p. xi].

A whole new set of circumstances arose in 1955, specifically the culmination of the defence of the mainland against aircraft threats overflying the Arctic, with the construction of the early warning radar fence stretching along the north coast of Alaska and Canada, to Greenland. The strategic planning of this project had supported work on submarines, and icebreakers were drawn into use to help complete more important tasks [11, Williams M.D., pp. 34–41]. The fall of 1957 was a period of considerable agitation for the United States; in early October, the Russians launched the "*Sputnik*", their first space success. Capt. Peter Aurand, President Eisenhower's naval aide, later described what he had learnt about an under-ice expedition up north a few weeks earlier. The purpose was to find a good way for a submarine to cruise under the ice. The new nuclear-powered Nautilus, with its greater underwater capabilities, had gone several hundred miles inside the pack [11, Williams M.D., pp. 34–41].

Captain Aurand explained the reasons for the final decision: "*We knew the trip could be made underwater, but that would take at least 30 days. That would take too long. It would be dramatic enough just to go from the Pacific to the Atlantic; crossing the North Pole get world-wide attention, both inside and outside the United States. The United States' image, especially in the space program, was under impact and, of course, if Nautilus failed, it would be bad. It was decided at the White House's request that it would be done in the deepest secrecy* [11, Williams M.D., p. xi]."

American nuclear submarines began to patrol regularly the waters of the USSR. By 1970, more than half of the American nuclear arsenal was located on the submarine and aircraft carrier forces of the fleet. The principles on which NATO deployed its forces were based on the 1967 Harmel report that was based on the pillars of deterrence and détente [5]. Since the US military

[5] NATO. Report to the Council on The Future Tasks of the Alliance (Harmel report), December 13-14, 1967. URL: https://www.nato.int/cps/en/natohq/official_texts_26700.htm?selectedLocale=en (accessed 20 April 2022).

forces took regular forward deployments using nuclear submarines, the Soviet navy was forced to take retaliatory measures [10, Shirokorad A., pp. 192–198].

During this period, the Soviet Union steadily developed the NSR. However, it was only utilised for internal purposes for security reasons, as mentioned above. The US claims about the international use of the NSR date back to the Cold War. In 1964, Washington and Moscow exchanged notes of protest over the attempt of American ships to pass along the coast of the USSR without the requisite approvals. America challenged the rights of coastal states to implement rules for the deployment of ships in northern latitudes. Similarly, since the 1960s, it did not recognize Canada's right to control Arctic routes. In 1969, Americans sent an oil tanker, and in 1985, its Coast Guard icebreaker Polar Sea, without informing Canada. Canada responded with the Arctic Waters Pollution Prevention Act of 1970, and in 1972, the Shipping Safety Control Zones Order and the Arctic Shipping Pollution Prevention Regulations that prohibited the discharge of fuel and oil substances. In 1977, Canadians introduced the NORDREG vessel traffic reporting system that became mandatory for travelling along the North-West Passage in 2010. Canada also was instrumental in proposing Article 234 of the UNCLOS on special navigation rules for ice-covered areas. The Soviet Union keenly followed the Canadian lead and duly implemented similar regulations regarding the passage of foreign vessels along the NSR.

The introduction of nuclear-powered icebreakers significantly increased the period of navigation along the NSR. The amount of cargo carried along the NSR steadily increased over time until reached its maximum in 1987, before the dissolution of the Soviet Union. By this time, the policies of glasnost and perestroika, introduced by Mikhail Gorbachev, with little planning and control had already introduced economic decline and chaos. In 1989, an increase in tariffs for the use of icebreakers along the NSR led to a steep decline in cargo carried throughout the 1990s [6].

The 1980s also was the final stage of the Cold war. By this time, the Soviet navy, consisting of the first and third flotillas, consisted of 38 nuclear submarines with ballistic missiles, as well as 79 multi-purpose submarines. The boats were armed with 940 ballistic missiles with 2804 nuclear warheads. Thus, the main part of the Soviet nuclear force was located in the northern territories. The nuclear technology at the disposal of the USSR was a powerful deterrent to NATO [10, Shirokorad A., pp. 192–198].

In 1987, a speech by Mikhail Gorbachev, head of the Soviet Communist party in Murmansk, stated that the Arctic should become an area of cooperation. He further stated, *"Across the Arctic, the shortest sea route runs from Europe to the Far East, to the Pacific. I think that, depending on*

[6] USSR. Item 3.7.6 of "Price list N 11-01. Tariffs for the carriage of goods by sea (coastal navigation)" (approved by Decree of the State Committee on Prices of the USSR of 27.03.1989 N 274), extract: "Dues for icebreakers shall be levied once per ton (container) of the cargo being transported, arriving or departing from (to) ports of the Northern Sea Route, or being transported through the NSR as transit by coastal navigation and foreign voyages year-round, also year-round fee shall be levied for passing along the NSR of vessels not belonging to the Ministry of Maritime Fleet of the USSR". URL: http://www.economics.kiev.ua/download/ZakonySSSR/data01/tex11346.htm (accessed 20 April 2022).

how the normalisation of international relations goes, we could open the Northern Sea Route to foreign ships under our icebreaker escort" [7]. Gorbachev was perhaps also acknowledging the futility of the arms race. The advent of a new stage in the history of the development of the Soviet Arctic was in 1991. The collapse of the USSR caused stagnation in the northern territories due to the restructuring of the political and economic system [12, Panikar M.M., Shaparov A.E., pp. 33–44]. The crisis, which manifested itself in almost all areas of life in the new Russia, made it only possible to maintain the military forces at a minimum level and with suspect capabilities due to lack of maintenance and modernization.

President Vladimir Putin put on agenda the question of the catastrophic situation of the Russian northern territories only in 2000. During his speech in Murmansk, the president indicated that the Russian North is of fundamental importance to Russia. According to Vladimir Putin, "almost all aspects of national security are concentrated in the Arctic: military-political, economic, technological, environmental and resource". It may be noted that it was this speech that outlined the country's future policy in the Arctic and the NSR. Subsequently, a number of laws and policy documents on the Russian Arctic including the NSR were issued starting in 2008, and these have been regularly revised.

The document "On the fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2035" highlights the following main areas of activity in the Arctic:

- ensuring the protection of the population and territories of the Arctic zone of the Russian Federation from natural and anthropogenic emergencies;
- ensuring public safety in the Arctic zone of the Russian Federation;
- development of the NSR;
- ensuring the military security of the Russian Federation; protection of the state border of the Russian Federation [8].

According to the Strategy for the development of the Arctic zone of the Russian Federation and ensuring national security for the period up to 2035, the priority areas for the development of the Arctic Zone include:

- integrated socio-economic development of the region, including the NSR;
- development of science and technology;
- creation of modern information and telecommunications infrastructure;
- ensuring environmental safety;
- international cooperation in the Arctic;
- ensuring military security,

[7] Byers M. Towards a Canada-Russia axis in the Arctic, 2012, URL: https://globalbrief.ca/author/michael-byers/ (accessed 20 April 2022).
[8] Russian Federation. Ukaz Prezidenta RF ot 5 marta 2020 g. N 164 «Ob Osnovakh gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda» [Decree of the President of the Russian Federation of March 5, 2020 N 164 "On the Fundamentals of State Policy of the Russian Federation in the Arctic for the Period up to 2035"]. URL: http://publication.pravo.gov.ru/Document/View/000120200305001 (accessed 20 April 2022).

- protection of the state border of the Russian Federation in the Arctic [9].

The Soviet Union in 1990, and then Russia's Federal Law in July 1998 [10] defined the Northern Sea Route as "a historic national transportation passageway of the Russian Federation". Foreign vessels could utilise the NSR if they complied with the Navigation Rules for the NSR. For example, in September 2013, Russia detained the Greenpeace ship Arctic Sunrise that trespassed the NSR waters during a protest action at the Prirazlomnaya platform in the Pechora Sea.

For Russia, the development of the Northern Sea Route (NSR) is vital for the social-economic progress of the Arctic North; the Russian government has formulated a detailed plan for its transformation into an internationally competitive transport corridor [8, Zaikov K.S., Kondratov N.A., Lipina S.A., Bocharova L.K., pp. 86–87]. Russia's plan is to create it as an alternative to the Suez Canal, and the six-day blockage in the canal in 2021 got various comments in the Russian media advocating the advantages of the NSR as a suitable and reliable alternative. However, Laruelle's study of the new Arctic strategy stated that Russia's goals involve human and financial outlays, which it cannot rely upon under current budgetary and social constraints [13, Laruelle M., pp. 18–19]. However, many factors such as the unpredictable ice and weather conditions, poor port infrastructure, high investments in ice-strengthened vessels, comparatively greater insurance costs, inadequate search and rescue assets, gaps in communication and navigation coverage, and the "just in time" principle inherent in commercial transit shipping are likely to affect the development of the NSR.

Current Arctic geopolitics

For quite a long time, the Arctic has been a sphere of international interest. Geopolitics in the Arctic has been regulated by cooperation amongst the Arctic Council members. The international order in the Arctic is based on the international legal framework of UNCLOS and other international agreements such as the Polar Code and the interests of the primary and secondary actors. The main actors are the Arctic coastal states of Russia, the United States, Canada, Denmark, Norway, Finland, Iceland, and Sweden, which are also members of the Arctic Council. In the 1920s, Canada and Russia asserted influence over the Arctic according to the sectoral principle, which was not objected to by other countries, though not officially confirmed due to the lack of any international Convention on the Law of the Sea, which was signed only in 1982. The main Arctic ac-

[9] Federal'nyy zakon ot 31.07.1998 g. № 155-FZ «O vnutrennikh morskikh vodakh, territorial'nom more i prilezhashchey zone Rossiyskoy Federatsii» [Federal Law No. 155-FZ of 31.07.1998 "On the internal sea waters, the territorial sea and the adjacent zone of the Russian Federation"]. URL: http://www.kremlin.ru/acts/bank/12742 (accessed 20 April 2022).

[10] Ukaz Prezidenta RF ot 26 oktyabrya 2020 g. N 645 «O Strategii razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2035 goda» [Decree of the President of the Russian Federation of October 26, 2020 N 645 "On the Strategy of Development of the Arctic Zone of the Russian Federation in the Arctic for the Period up to 2035"]. URL: http://publication.pravo.gov.ru/Document/Text/0001202010260033 (accessed 20 April 2022).

tors are fully aware of the natural resource potential of the territory; thus, the United States are actively trying to designate their sovereignty over as large a territory as possible.

In the 21st century, the potential for a possible conflict in the Arctic has increased. In 2007, during a scientific expedition, Russian scientists installed a flag on the bottom of the Arctic Ocean, which was met with sharp dissatisfaction from other Arctic actors. However, despite some aggravation of the situation, in 2008, the Ilulissat Declaration was adopted in Greenland, according to which five countries-actors (Russia, the United States, Canada, Norway and Denmark on behalf of Greenland) confirmed their commitment to existing international standards. Russia and Norway agreed to a maritime boundary in 2010. Russia's relations with the Nordic countries have been characterised by cooperation. In the case of Norway, there has been a 1000-year peace between the countries [11]. It seemed that during the period 2008–2012, Russia's Arctic policy was moving towards greater international cooperation [14, Heininen L., Sergunin A., Yarovoy G., p. 92].

The Ukrainian and Crimean issues, which have been on agenda in 2014, served to complicate the existing situation and had its fallout on economic cooperation within the Arctic. Western oil and gas companies such as ExxonMobil, Norwegian Statoil and Italian Eni withdrew from investments in the Russian Arctic due to Western sanctions. Russia was excluded from various Arctic forums, such as the Arctic Chiefs of Defense Meetings and the Arctic Security Forces Roundtable [2, Berbick W., Saunes L., pp. 12–13]. Russian Arctic policy documents have outlined security concerns that were supported by modernizing old Soviet military bases in the Arctic [15, Sergunin A., Gjørv G.H., pp. 252–254].

Thus, the current state of geopolitics in the Arctic has been characterized by researchers as bipolar with features of cooperation and deterrence. That is why, despite the fact that there are some contradictions between the leader of the Western coalition — the United States and other Arctic Council states except Russia, it does not lead to open disagreements. In fact, researchers have noted that while competition has increased, the Arctic can be characterized as an area where risk of conflict is negligible due to various international agreements such as the fishing agreement, Polar Code and search and rescue agreements [16, Zagorskii A. pp. 107–108]. The build-up of Russian military potential is a reason for other states-actors to take collective measures, predominantly as part of NATO to ensure collective military and political security [17, Runner E., Sokolsky R., Stronski P., pp. 2–15].

In this case, for a long time, the following axiom applies – "for a stable international existence, it is important not to allow excessive strengthening of one of the states". This axiom is the unifying factor for Western countries against Russia. Russia has no allies in the Arctic, which means that the country's geopolitics is based on its own interests. The Arctic Council has had the

[11] Folland R. ArcticSecurity: Deterrence and Détente in the High North, Arctic Insitute, March 30, 2021. URL: https://www.thearcticinstitute.org/arctic-security-deterrence-detente-high-north/ (accessed 20 April 2022).

greatest influence in the Arctic since it was formed by the Arctic countries, despite the fact that the organization appeared in 1996.

The European Union is also taking active steps to strengthen its position in regulating the geopolitical situation in the Arctic. This interest is explained by the fact that a number of member states of the European Union, which do not have access to the northern lands, are, however, interested in the resource potential of the Arctic and the scientific and technological development of the entire region. Other countries that are not directly related to the Arctic, such as China, Japan, South Korea and India, have shown a clear interest in it. It is worth noting that the engagement of an economic power, like China, will not be superfluous since the Arctic needs new vistas for development [18, Gudev P.A., pp. 58–66].

It should also be noted that the military-political situation in the Arctic continues to become more complicated due to the desire of various states to control resources and transport routes in the region. In order to strengthen the defense capability of the Arctic and ensure national security, Russia is actively developing the Northern fleet [17, Runner E., Sokolsky R., Stronski P., pp. 2–9]. Therefore, in 2020, the Northern Fleet held more than 20 major organisational and staff events, about 4000 test events, carried out 8 combat deployments of ships with visits to 12 foreign ports, and practised firing of all types of weapons [12]. Russia has its rights to conduct such exercises within its EEZ, and Western experts have also remarked that these are primarily defensive actions [17, Runner E., Sokolsky R., Stronski P., pp. 2–23]. This is even more relevant because since 2018, NATO has been conducting regular military exercises and deployments within the Arctic not far from Russian territory [19, Grinyaev S.N., Zhuravel V.P., pp. 51–54]. In September 2020, US, UK and Norway exercised in the Barents Sea for the first time without notification of the Russian authorities. Norwegian ships operated east of the Varenger Fjord despite reservations by the Norwegian military [1, Petersen M.B., Pincus R., p. 511].

However, extensive publicity of military deployments in the official media that is replayed in the Western press fuels the claim of the US and European leaders that Russia is militarising the Arctic [13]. This has given rise to certain experts predicting a military conflict in the Arctic. Some of them have stated that it is a repeat of the Cold war period. Reporting of recent events in the Arctic has been heavily influenced by frequent military exercises by both NATO and Russia. In April 2021, three Russian submarines simultaneously surfaced in the ice in different parts of the Arctic [14]. Whilst all this is part of regular military training again extensive publicity given in the official Russian media to these activities and the statement by President Putin that this had no analogy in Soviet and Russian history was given wide media hype in the official Russian government media.

[12] Folland R. ArcticSecurity: Deterrence and Détente in the High North, Arctic Insitute, March 30, 2021. URL: https://www.thearcticinstitute.org/arctic-security-deterrence-detente-high-north/ (accessed 20 April 2022).
[13] Rourke R. Changes in the Arctic: Background and Issues for Congress, October 12, 2021. URL: https://sgp.fas.org/crs/misc/R41153.pdf (accessed 20 April 2022).
[14] Three Russian Submarines surface and break Arctic ice during drills, March 26, 2021. URL: https://www.reuters.com/article/us-russia-military-arctic-idUSKBN2BI2RZ (accessed 19 April 2022).

These deployments have been utilised by NATO to expand the scope of its regular military exercises [17, Runner E., Sokolsky R., Stronski P., p. 2]. Satellite pictures of Russia's rejuvenation of its military bases in the Arctic have also been widely discussed in the Western media [15]/

These developments have also been used by the Pentagon to advocate more military spending, particularly to bolster its weak fleet of icebreakers [16]. In 2019, the US Department of Defense (DoD) updated its 2016 DoD Arctic strategy [17] and its Coast Guard Strategy for the Arctic [18]. In July 2020, the US Air Force released its strategy [19]. In 2021, the US Navy released an updated Arctic strategy [20] and the US Army released its service strategy related to the Arctic for the first time [21]. In the latter strategy, it acknowledged that the Russian military buildup in the Arctic was largely a defensive capability. Notwithstanding the political and military rhetoric of the USA, other than for its submarines, it is unlikely in the near term to be capable of carrying out freedom of navigation (FON) operations in the NSR due to the state of the icebreaker fleet. Only one foreign warship Rhone, an offshore support and assistance vessel from France, has carried out a passage across the NSR so far, and this was in September 2018. There is a significant differential in terms of the capabilities of the naval forces of NATO and Russia in the Arctic despite the projection of the Arctic as a military battleground (see Table 1). Therefore, the United States and NATO forces cannot realistically hope to control the battleground where it will be contested by Russian armed forces that are more experienced and comfortable with the weather and terrain.

Table 1

Comparison of military capabilities of NATO and Russia within the Arctic Circle [22]

US/ NATO	Russia
Temporary deployment of naval ships. No capabilities for permanent deployment in the Arctic. It may noted that ships have to return to bases to refuel and rearm periodically.	Permanent deployment of naval ships

[15] CNN. Satellite images show huge Russian mililtary buildup in the Arctic, April, 05, 2021. URL: https://edition.cnn.com/2021/04/05/europe/russia-arctic-nato-military-intl-cmd/index.html (accessed 19 April 2022).
[16] Rourke R. Changes in the Arctic: Background and Issues for Congress. October 12, 2021. URL: https://sgp.fas.org/crs/misc/R41153.pdf (accessed 19 April 2022).
[17] US Department of Defense. Department of Defense Arctic Strategy, June 06, 2019. URL: https://media.defense.gov/2019/Jun/06/2002141657/-1/-1/1/2019-DOD-ARCTIC-STRATEGY.PDF (accessed 19 April 2022).
[18] US Coast Guard. US Coast Guard Arctic Strategic Outlook, April, 2019. URL: https://www.uscg.mil/Portals/0/Images/arctic/Arctic_Strategic_Outlook_APR_2019.pdf (accessed 19 April 2022).
[19] US Air Force. The Department of the Air Force Arctic Strategy, July, 2020. URL: https://www.af.mil/Portals/1/documents/2020SAF/July/ArcticStrategy.pdf (accessed 19 April 2022).
[20] US Navy. Blue Arctic: A Strategic Blueprint for the Arctic, January, 2021. URL: https://media.defense.gov/2021/Jan/05/2002560338/-1/-1/0/ARCTIC%20BLUEPRINT%202021%20FINAL.PDF/ARCTIC%20BLUEPRINT%202021%20FINAL.PDF (accessed 19 April 2022).
[21] US Army. The Department of the Army: Regaining Arctic Dominance, January, 2021. URL: https://www.army.mil/e2/downloads/rv7/about/2021_army_arctic_strategy.pdf (accessed 19 April 2022).
[22] Compilation by the author based upon NATO. Regional Perspectives Report on the Arctic, January, 2021. URL: https://www.act.nato.int/application/files/8516/3236/7596/regional-perspectives-2021-04.pdf (accessed 19 April 2022) and other sources as indicated.

Temporary deployment of naval submarines	Permanent deployment of naval submarines. The Northern Fleet has the bulk of the Russian SSBN and SSN force.
Limited experience of operating in Arctic conditions except for nuclear submarines	Extensive experience of operating in Arctic conditions
Limited capability of ships to operate in ice conditions. The US and Norwegian navies have no capabilities; Canada limited capability – 2008 program to build six Arctic patrol ships behind schedule; Denmark has four Tethys-class ice-reinforced patrol frigates; UK has one ice-reinforced patrol ship[23].	
The US Navy does not have plans to build any ice capable warships taking into account limited threats and suitability	Excellent capability of ships to operate in ice conditions supported by icebreakers
The operational U.S. polar icebreaking fleet has one heavy polar icebreaker (Polar Star) and one medium polar icebreaker, Healy. Polar Sea, a second heavy polar icebreaker is with the US Coast Guard. Polar Sea has had a defect since June 2010 and is therefore not available. Polar Star and Polar Sea were commissioned in 1976 and 1978. There is a plan to build six icebreakers (three heavy and three medium), also called polar security cutter (PSC). Only two have been funded so far and the first may fructify only by 2025[24].	Fleet of nuclear icebreakers and building more at a rapid pace.
No significant change in Arctic specific military equipment induction plans post 2014	Rapid surge in military capabilities, including the deployment of S-400 missile systems and induction of modern platforms including new weapons such as the heavy Intercontinental Ballistic Missile (ICBM) capable of kinetic energy impact without a nuclear payload, called the RS-28 Sarmat, a nuclear-powered cruise missile named Burevestnik (Skyfall), a laser system named Peresvet, a nuclear-armed underwater vehicle, and Avangard and Kinzhal hypersonic missiles into the Russian Armed Forces inventory [25].
No change in coastal infrastructure plans post 2014	Extensive construction / revitalisation of coastal infrastructure to facilitate military deployments
US plan approved in 2021 to develop a port at Nome, 250 km south of the Bering strait. However, this port freezes from November to May.	Numerous ports along the NSR, including naval bases in Murmansk and Kamchatka. Murmansk is the only ice-free port.
Re-activation of the GIUK gap between Greenland and Iceland to monitor Russian submarine activity (see Figure 2). Enhanced radar coverage of respective areas by members of NATO	No open-source intelligence is available on a corresponding Russian system for monitoring NATO submarines. Russia is stated to have unbroken radar coverage of the NSR coast

[23] Rourke R. Changes in the Arctic: Background and Issues for Congress, March 24, 2021. URL:https://sgp.fas.org/crs/misc/R41153.pdf (дата обращения: 20.04.2022).
[24] Ibid.
[25] Rivero J. The Future of Russia's Hypersonic Weapons program, December 10, 2021. URL:https://www.military.com/daily-news/opinions/2021/12/10/future-of-russias-hypersonic-weapons-program.html (дата обращения: 20.04.2022).

Armies: No US Army base within the Arctic circle. Canada and Denmark do not have any forces. Norway has limited capabilities.	Extensive deployment of Russian armed forces who regularly train in these conditions.
Air Force: Forward deployment of US bombers at Thule air base in Greenland. The US also signed an agreement with Norway to permit temporary basing of B-1 nuclear weapon capable bombers and P-8 anti-submarine aircraft at Rygge, Solav and Evenes airfields in case of necessity. Of the other NATO countries, only Norway has aircraft within striking range of Russian Arctic bases.	Extensive deployment of Russian aircraft and modernisation of old Soviet air bases to facilitate regular training

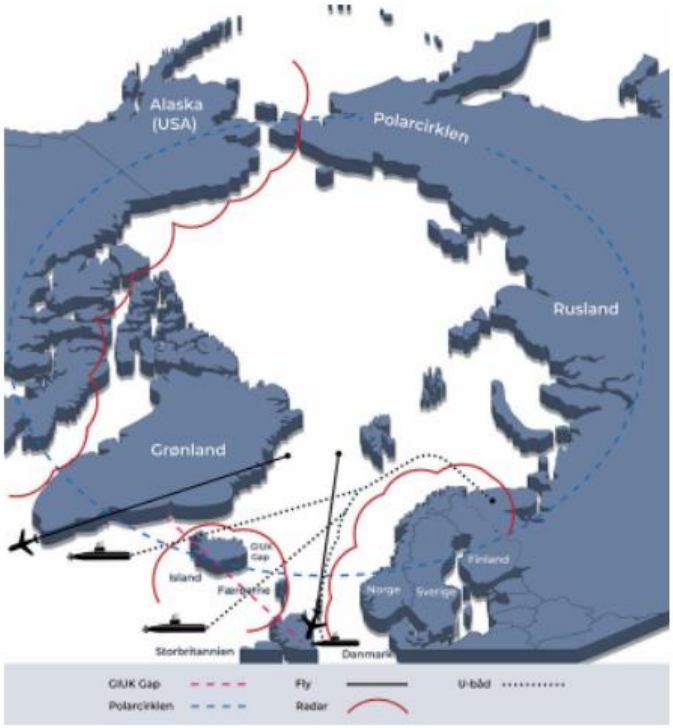

Fig. 2. Overview of NATO anti-submarine monitoring and radar coverage in the Arctic [2, p. 37].

Notwithstanding the overwhelming advantages in defence capabilities (Table 1) within the Arctic Circle, the primacy of the Russian defence establishment and the military-industrial complex in an increasingly resurgent and nationalist Russia may result in increased military spending by Russia not commensurate with actual threats, especially with respect to further build-up of Arctic capabilities [1, Petersen M.B., Pincus R., pp. 505–507]. As former US Secretary of the Navy argued in his assessment of US strategy in 2021 that it is important not to over-estimate another side [20, Lehman J.F., p. 674]. In contrast to other military hardware, Arctic specific military equipment has to be specially designed and engineered to cater for the vagaries of the weather and inevitably cost more. According to a study released in May 2019 by an influential American think tank "The Centre for Strategic and Budgetary Investments" the withdrawal of the US from the Intermediate-Range Nuclear Forces Treaty in 2019 could coerce Russia into investing in expensive defences and

retaliatory measures [26]. The United States withdrew from the treaty on August 02, 2019 [27]. President Putin remarked that Russian would respond appropriately, but not be drawn into an arms race [28]. However, it remains to be observed whether Russia would indeed follow this declaration. Unlike the USA, whose currency rules the world's financial markets despite trillion- dollar deficits, Russia will not be able to compete in military spending, and this will have a negative impact on the already fragile socioeconomic and demographic status of the Russian Arctic that has been noted by various experts [8, Zaikov K.S., Kondratov N.A., Lipina S.A., Bocharova L.K., pp. 71–72].

This may result in a repeat of the 1980s Cold War when increased military spending by the USSR to combat the US President's Star Wars rhetoric, which was more hype than reality, coupled with Soviet presence in Afghanistan, created enormous budgetary constraints that related to the economic crisis before the disintegration of the Soviet Union [29]. The aim was to defeat the Soviet Union without combat [20, Lehman J.F., pp. 674–675]. The Russian political leadership and military strategists may also revisit the history of Napoleon's and Hitler's invasion of Russia. Though the rest of Europe caved in to their invasions despite all odds, Russia and the USSR, through the bravery, courage and grit of the people with the aid of "General Winter" were able to win the wars. Similarly, there is a need to study the victories of Vietnam over the French at Dien Bien Phu and the mighty Americans. These are shining examples of grit and determination to evict foreign invaders despite limited resources. A similar situation was faced by the American war machine in Afghanistan. Some of the reasons for the American failures include overconfident political leadership, a deficient military leadership, blind faith in advanced technology, over-reliance on firepower that killed or injured the civilian population, and most of all a determined enemy who made up for the lack of technology and advanced weapons with a dogged determination to struggle and die for a just cause [30].

German philosopher Georg Hegel famously said, "The only thing that we learn from history is that we learn nothing from history". If Russia does not learn from history, then history will repeat itself, and internal fissures may take place that is accentuated by socio-economic limitations. In the modern world, economic strength is of utmost importance, and all nations must regulate military spending taking into account realistic threat perceptions. For this, it is essential to debate

[26] Cohn J., Walton T.A., Lemon A., Yoshihara T. Re-introducing U.S. Theater-Range Missiles in a Post-INF World, May 21, 2019. URL: https://csbaonline.org/uploads/documents/Leveling_the_Playing_Field_web_Final_1.pdf (accessed 20 April 2022).
[27] United States State Department. U.S. withdrawal from the INF Treaty on August 02, 2019, Press statement Michael R. Pompeo, Secretary of State, August 02, 2019. URL: https://2017-2021.state.gov/u-s-withdrawal-from-the-inf-treaty-on-august-2-2019/index.html (accessed 20 April 2022).
[28] Deveraux B. Why Intermediate Range missiles are a focal point in the Ukraine, January 28, 2022. URL: https://warontherocks.com/2022/01/why-intermediate-range-missiles-are-a-focal-point-in-the-ukraine-crisis/?utm_source=WOTR+Newsletter&utm_campaign=114a878190-(accessed 20 April 2022).
[29] Roberts P.C. Washington has resurrected the Specter of Nuclear Armageddon, March 17, 2021. URL: https://thesaker.is/washington-has-resurrected-the-specter-of-nuclear-armageddon/ (accessed 20 April 2022).
[30] Basevich A. Why can't Washington learn, January 23, 2022. URL: https://tomdispatch.com/a-very-long-war (accessed 20 April 2022).

this and take into account alternate viewpoints because when people with related backgrounds and opinions encompass the entire chain of intelligence compilation and policy formulation, group-think and tunnel vision are inescapable penalties.

In May 2019, there was no joint statement of the Arctic Council due to the US reluctance to include climate change. This was preceded by a speech by US Secretary of State Pompeo alleging that Russia and China both were disturbing the Arctic peace by military deployments in the Arctic [31]. This development and aggressive military signalling by both sides are undoubtedly aggravating the geopolitical situation in the Arctic [17, Runner E., Sokolsky R., Stronski P., pp. 2–23]. It is necessary to realise that it is in the interests of the United States and its military-industrial complex to project Russia as a threat to the stability of Arctic geopolitics. However, after the events of 2014, Russian experts are divided in their view of Arctic geopolitics between the neo-realists and the neo-liberalist schools of international relations [21, Godzimirski J., Sergunin A. pp. 25–31]. In our opinion, the official narrative with its stress on national security promulgated in official documents in Arctic State Policy (March 2020) [32] and Arctic Strategy (October 2020) [33], as well as the National Security Strategy [34] released in July 2021, coupled with the need to publicise military exercises as a form of diplomatic signalling appears to be based upon Realpolitik, and this may be fraught with risks, especially for the development of the Arctic and the NSR due to the frailty of the Russian economy post sanctions, specially as it is based on exports of natural resources. The latter document notes the use of protectionist procedures, multiple sanctions and the preservation of the environment as reasons to restrict access of Russian companies to export markets, constrain the development of its industry, establish control over shipping routes and prevent the growth of the Russian Arctic [35].

Considering the above, there is a need to adopt a pragmatic approach and update various agreements introduced during the Cold War to maintain peace and avoid misunderstandings in respect of military deployments in the Arctic. The Organisation for Security and Cooperation in Europe (OSCE)'s Vienna Document on "Confidence and Security Building Measures" is a vital document first signed in 1990 that is followed even today, the last update was in 2011. However, this

[31] Rourke R. Changes in the Arctic: Background and Issues for Congress, March 24, 2022. URL: https://sgp.fas.org/crs/misc/R41153.pdf (accessed 20 April 2022).
[32] Ukaz Prezidenta RF ot 5 marta 2020 g. N 164 «Ob Osnovakh gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda» [Decree of the President of the Russian Federation of March 5, 2020 N 164 "On the Fundamentals of State Policy of the Russian Federation in the Arctic for the Period up to 2035"]. URL: http://publication.pravo.gov.ru/Document/View/000120200305001 (accessed 20 April 2022).
[33] Ukaz Prezidenta RF ot 26 oktyabrya 2020 g. N 645 «O Strategii razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2035 goda» [Decree of the President of the Russian Federation of October 26, 2020 N 645 "On the Strategy of Development of the Arctic Zone of the Russian Federation in the Arctic for the Period up to 2035"]. URL: http://publication.pravo.gov.ru/Document/Text/0001202010260033 (accessed 20 April 2022).
[34] Ukaz Prezidenta RF ot 2 iyulya 2021 g. N 400 «O Strategii natsional'noy bezopasnosti Rossiyskoy Federatsii [Decree of the President of the Russian Federation of July 02, 2021 N 400 "On the Strategy of National Security of the Russian Federation "]. URL: http://www.kremlin.ru/acts/bank/47046 (accessed 20 April 2022).
[35] Ibid.

document does not include the advanced warning of naval exercises [36]. The 1972 agreement between the United States and the Soviet Union for Prevention of Incidents on and over the high seas (INSEAs) was a landmark document that was signed as a fallout of various incidents due to close encounters during the Cold War, but it needs to be revised [37].

Influence of Arctic geopolitics on the NSR

During the period of the Soviet Union, though the NSR was officially activated in 1932 with the formation of the Glavsevmorput, it was not open to international traffic except for the period of WWII due to national security considerations [22, Armstrong T.E., p. 136]. Even though there was an invitation accorded in 1967 that was supported by a trial voyage, it was never taken up by international shipping and reportedly tacitly withdrawn after the Arab-Israeli war [38]. The internationalization of the NSR began only in 1991. Slow progress was achieved thereafter due to the new Russia's economic difficulties. In the 21st century, there was a revival of interest in the Arctic and the NSR due to rising oil and gas prices. However, due to Western sanctions after Crimea, Russia's growth slowed, and it now needs financial assistance and technology to implement its Arctic strategy and the detailed development plan for the NSR. The Russian government's "Fundamentals of state policy in the Arctic", released in March 2020, acknowledges the non-adherence of timelines for the development of the NSR, including infrastructure of ports, navigation and communication facilities, icebreakers, auxiliary fleet, and Search and Rescue infrastructure. It categorises this as a "*risk to national security*" [39]. There could be three reasons attributed to this delay. Firstly, the non-allocation of the requisite funds for the development of the NSR due to fall in oil prices post 2014 and increasing requirements of the Russian military. This has translated into significant military expenditure in terms of purchasing power parity (PPP) which is considered to be a more realistic estimate as compared to the traditional exchange rate evaluation used by organizations such as the Stockholm International Peace Research Institute (SIPRI) (see Fig. 3). This is particularly relevant due to the sharp fall in the value of the rouble after 2014 and the fact that military procurement in Russia is mostly internal. Both methods showed a high rate of military spending between 2005 and 2018, 125% in the case of market-rate evaluation and 90% in case of the PPP evaluation. However, it may be noted that Russian military expenditure, with a high percentage spent on new

[36] Organisation for Security and Cooperation in Europe. Vienna Document 2011 on Confidence and Security Building Measures, 2011 URL: 11042018-Incidents-Management-Review-Tom-Frear.pdf (europeanleadershipnetwork.org) (accessed 20 April 2022).
[37] Frear T. Lessons Learned? Success and Failure in managing Russia-West accidents 2014-2018. Euro-Atlantic Security Policy Brief, April, 2018. URL: https://www.europeanleadershipnetwork.org/wp-content/uploads/2018/04/11042018-Incidents-Management-Review-Tom-Frear.pdf (accessed 20 April 2022).
[38] Armstrong T. quoted in Mulherin N.D. The Northern Sea Route its development and evolving state of operations in the 1990s. US Army Corps of Engineers, Cold Regions Research and Engineering Laboratory, April, 1996. URL: https://apps.dtic.mil/sti/pdfs/ADA310144.pdf (accessed 20 April 2022).
[39] Ukaz Prezidenta RF ot 5 marta 2020 g. N 164 «Ob Osnovakh gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda» [Decree of the President of the Russian Federation of March 5, 2020 N 164 "On the Fundamentals of State Policy of the Russian Federation in the Arctic for the Period up to 2035"]. URL: http://publication.pravo.gov.ru/Document/View/000120200305001 (accessed 20 April 2022).

procurement under the State Armament Program-2020 as compared to other countries, has largely been focused on rebuilding Soviet military bases in the Arctic and also on new platforms and weapon systems that would be deployed in the Arctic. The expenditure may also be catering for the replacement of a large proportion of obsolete Soviet military platforms or equipment and enhanced external threat perceptions enunciated in the Russian National Security Strategy (2021), which presumably takes into account the strategies proposed for the US by influential think tanks such as the RAND Corporation [40], and the Center for Security and Budgetary Assessments (CSBA) [41]. Furthermore, Russian military expenditure, even in terms of PPP is still low as compared to the United States (see Fig. 4).

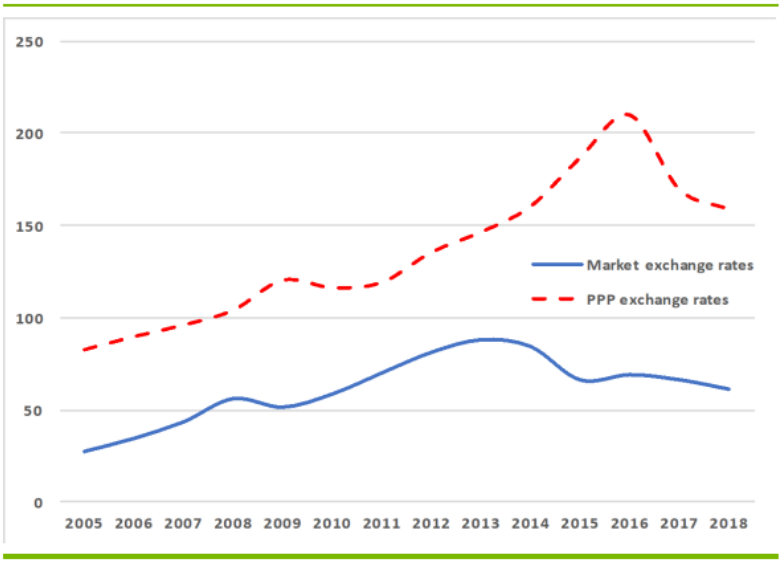

Fig. 3. Russian military expenditure at market exchange rates and PPP exchange rates, 2005-2018 USD billion Source: SIPRI; IMF; CNA [42].

[40] Rand Corporation. Overextending and Unbalancing Russia. Assessing the Impact of Cost Imposing Options, 2019. URL: https://www.rand.org/pubs/research_briefs/RB10014.html (accessed 22 April 2022).
[41] Center for Security and Budgetary Assessments. Leveling the playing field and Unbalancing Russia. Assessing the Impact of Cost Imposing Options, 2019. URL: https://csbaonline.org/research/publications/leveling-the-playing-field-reintroducing-us-theater-range-missiles-in-a-post-INF-world/publication/1 (accessed 22 April 2022).
[42] Connolly R. Russian Military Expenditure in comparative perspective: A Purchasing Power Parity estimate. (2022). URL: https://www.cna.org/CNA_files/PDF/IOP-2019-U-021955-Final.pdf (accessed 20 April 2022).

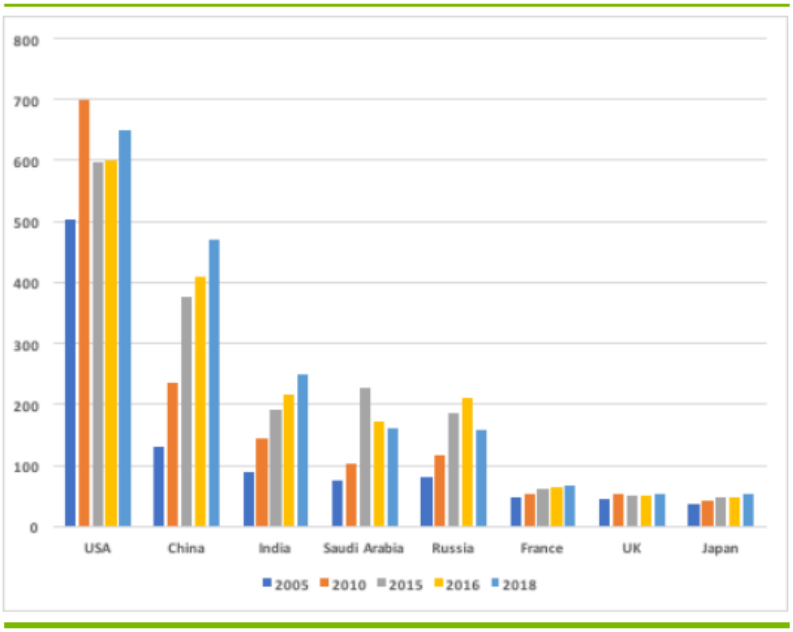

Fig. 4. Military expenditure of selected powers at PPP exchange rates, 2005-2018 USD billion Source: CAN [43].

Secondly, there is a dependence on foreign technology for certain aspects of development. For example, new generation icebreakers are being built with the help of Korean shipyards [44]. There are also ships being built in China with the help of the Dutch company Damen. In addition, navigation and communication equipment for implementing Search and Rescue (SAR) along the NSR is also dependent upon foreign suppliers. For example, the use of the Global Maritime Distress Maritime Safety System, flight data recorders, gyrocompasses, radars, thermal imagers and video surveillance systems. Certain marine engines used for various ships and auxiliary craft are also sourced from abroad. Furthermore, the International Association of Classification Societies took a decision in March 2022 to exclude the Russian Maritime Register of Shipping [45]. This would mean that timelines of activities related to foreign partners would inevitably be affected. Thirdly, Russia has been cautious about inviting foreign partners for the development of the NSR, except for the development of oil and gas fields (for example, Yamal LNG and Arctic LNG-2 projects) and for the building of icebreakers.

In view of the aforementioned, it is not surprising that current traffic on the NSR is mainly focused on natural resources and there is limited international transit shipping [23, Gunnarson B., Moe A., p. 1–12]. The NSR will be acceptable not only for commercial viability but also for safety, service and convenience, and this is presently inadequate due to the status of the NSR ports [24, Wang D., Li D., Gong Y., Wang R., Wang J. and Huang X., p. 11]. Another research study indicated

[43] Ibid.
[44] Financial Times. Russia's Arctic Gas ambitions at risk as sanctios imperil LNG icebreakers, March 28, 2022. URL: https://www.ft.com/content/2164d1e3-ee68-43ab-8c3d-61bd6ccde239 (accessed 19 April 2022).
[45] Classification Society - Russian Maritime Register of Shipping. The International Association of Classification Societies has taken an illegal decision to exclude the Russian Maritime Register of Shipping, March 11, 2022. URL: https://rs-class.org/news/general/mezhdunarodnoy-assotsiatsiey-klassifikatsionnykh-obshchestv-prinyato-nezakonnoe-reshenie-ob-isklyuch/ (accessed 19 April 2022).

that uncertainties in the political and safety spheres are presently viewed as risk factors for the deployment of vessels on Arctic routes [25, Tseng P-H., Cullinane K. pp. 422–438].

The current budgetary and human resource support for the NSR project is considered insufficient by international experts [15, Laruelle M., p. 21; 26, Moe A., pp. 15–16]. The Russian economy is heavily dependent upon oil and gas revenues. Most of the regions of the Arctic Zone of the Russian Federation are afflicted with out migration of skilled manpower, which is likely to affect the growth of the infrastructure of the NSR unless mitigated by government support [27, Shaparov A.E., Kharisovna F.K., Magomedov A.K.,and Bhagwat J., pp. 10–12]. The government's socio-economic policies would need to focus on these critical aspects for the smooth and timely development of the NSR.

Although there were statements by the Russian President seeking international cooperation for the development of the NSR, mentioning in the "Basic principles of Arctic State policy" (2020) and "Strategy for the Arctic Zone of the Russian Federation" (2020). After the Crimean-Donbass crisis in 2014, the focus was on the security of the route in terms of introducing regulations for foreign ships to take permission to transit the NSR [26, Moe A., pp. 4–10]. The 2013 regulations aimed at identical rules for both Russian and foreign vessels taking into account UNCLOS and the rights and freedoms contained therein. It mandated the use of a Russian icebreaker and a Russian ice pilot onboard. The US strategy for the Arctic region, released in 2013 and 2019, advocates "freedom of the sea" in the Arctic. However, UNCLOS is specific with respect to freedom of the sea (Article 87). On May 29, 2015 the US government issued a diplomatic note to Russia expressing concern over provisions of the NSR regulatory scheme that, according to it was inconsistent with international law, especially the need for foreign-flagged vessels to take permission to use the NSR [28, Vylegzhanin A., Bunik I., Torkunova E., Kienko E., pp. 293–300]. In 2019, a regulation for 45 days advance notice to be given for transit by warships was introduced after passage of the French warship Rhone in September 2018 [26, Moe A., pp. 4–10]. However, this law was not enacted, presumably due to the reticence of the Russian government to mention warships separately. However, regulations for rules of navigation along the NSR issued by the Russian Federation in 2020 stated that they are applicable to all ships, and applications must be submitted "no later than 15 working days before the expected date of entry of the vessel into the waters of the Northern Sea Route" [46]. A new law was also introduced for protection of the Russian shipping industry in respect of the carriage of oil and natural gas [26, Moe A., pp. 4–10] in 2018 [47], the latter being similar to American regulations. This law was introduced clearly to aid the Russian shipbuilding industry taking into account the deteriorated economic situation post-sanctions in 2014.

[46] Postanovleniye Pravitel'stva RF ot 18 sentyabrya 2020 g. N 1487 "Ob utverzhdenii Pravil plavaniya v akvatorii Severnogo morskogo puti [Decree of the Government of the Russian Federation "Concerning approval of the Rules of Navigation in the Water Area of the Northern Sea Route" of 18 September 2020, N 1487], September 18, 2020 URL: http://static.government.ru/media/acts/files/1202009220024.pdf (accessed 20 April 2022).

[47] Shelf nakryvayut flagom. [The (Continental) Shelf is Being Covered by the Flag], Kommersant, June 16, 2015. http://www.kommersant.ru/doc/2747598 (accessed 19 April 2022).

Therefore, it can be inferred that Russia has made changes with respect to the control, management and development of the NSR in response to geopolitical developments that it considers a threat to its security, including economic interests. However, in the past, some Russian experts recommended a policy of international cooperation and internationalization rather than nationalization of the Arctic from the point of view of progress [14, Heininen L., Sergunin A., Yarovoy G., pp. 91–92]. In order to achieve this, it is necessary to create and sustain a favourable political climate.

One of the reasons why international shipping companies may not be venturing into the Arctic is the uncertain political situation [23, Gunnarson B. and Moe A., pp. 10–12]. This is a factor that needs to be taken into account by the Russian government. The development of an international transport corridor necessitates adherence to international norms, and this has to be facilitated by a favourable geopolitical and geo-economic situation for international investors and shipping companies.

The special operation in Ukraine has had its fallout on cooperation within the Arctic Council because the remaining seven countries issued a joint declaration ceasing cooperation [48]. Sweden and Finland are now thinking about joining NATO [49]. Despite the Crimean crisis in 2014, the Arctic Council continued cooperation reinforcing Arctic exceptionalism. It is hoped that cooperation will resume as in the past [50], especially with respect to SAR, because the Arctic is a unique region where countries cannot progress without cooperation. The heavy economic sanctions imposed, including the unprecedented sanctions on the Central Bank, indicate that Russia is likely to undergo an economic downturn [51]. This would undoubtedly have an effect on the allocation of funds for the development of the NSR. It would be unrealistic to expect that companies would provide two-thirds of the required funds [52] under the prevailing inflation and economic conditions.[53] Even though, the Russian President proclaimed that Arctic projects should be continued [54]; it may be prudent to carry out a fresh cost-benefit analysis, and only pursue projects that are likely

[48] US State Department. Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine, March 06, 2022. URL: https://www.state.gov/joint-statement-on-arctic-council-cooperation-following-russias-invasion-of-ukraine/ 61bd6ccde239 (accessed 20 April 2022).

[49] The Atlantic Council. Going Nordic: What NATO membership would mean for Finland and Sweden, April 15, 2022. URL: https://www.atlanticcouncil.org/blogs/new-atlanticist/going-nordic-what-nato-membership-would-mean-for-finland-and-sweden/ (accessed 20 April 2022).

[50] Byers M. Arctic Cooperation endures for now, October, 2015. URL: https://globalbrief.ca/2015/10/arctic-cooperation-endures-for-now/ (accessed 20 April 2022).

[51] The New York Times. Bleak Assessments of Russia's Economy clash with Putin's rosy claims, April 18, 2022. URL: https://www.nytimes.com/2022/04/18/world/europe/russian-economy-bleak-assessments.html (accessed 20 April 2022).

[52]Reuters. Rosatom sees NSR cost at 735 million roubles, Russian budget to provide a third, June 24, 2019. URL: Rosatom sees Northern Sea Route costs at 735 billion roubles, Russian budget to provide a third | Reuters (accessed 20 April 2022).

[53] Kommersant. Naibullina: The Russian economy can live on reserves for some time, April 18, 2022. URL: https://www.kommersant.ru/doc/53160398 (accessed 20 April 2022).

[54] Russian Federation. Meeting on the development of the Arctic zone. April 13, 2022. URL: http://kremlin.ru/events/president/news/68188 (accessed 20 April 2022).

to garner economic gains. This is particularly relevant as vital projects such as building next-generation icebreakers may be impacted due to the sanctions imposed [55]. The NSR is a prestigious project for Russia. However, the ambitious targets set earlier may need to be revised taking into account geopolitical and geo-economic realities, especially as Russia is unlikely to revise military spending under the present circumstances [56].

Recommendations

It is essential for Russia to project itself as a cooperative power in the Arctic. Showcasing its military build-up in the Arctic, especially in the light of recent events in Ukraine is only likely to re-inforce the Western viewpoint that Russia advocates a so-called "power" strategy in the Arctic and will consequently slow down the development of the Arctic and NSR due to lack of interest by other countries. Firstly, it may also be prudent for Russia to re-evaluate its current policy of widely publicising military exercises in the area and also weapon or platform inductions, as these contribute to enhancing military rhetoric and may lead to avoidable misunderstandings. Secondly, it may consider rationalising military requirements and spending in view of the limited capabilities of NATO and the US Navy to operate off the NSR. Thirdly, to counteract the USA and NATO, it may explore the possibility of having bilateral non-aggression pacts with Norway, Sweden, Denmark, Finland and Canada. The below-mentioned measures to de-escalate militarisation may also be considered individually with the Arctic Council countries if they are not willing to discuss it on a multilateral basis. Fourthly, it could follow a policy of outreach to all interested countries to participate in the development of the NSR. Establishing joint forums on the lines of China's Belt and Road Initiative and regular meetings of an internationally constituted expert advisory panel are likely to bring better dividends and more international interest than the current declaratory measures that are being followed. Finally, it needs to work with other Arctic Council countries to enhance confidence-building measures and establish defence cooperation forums. The US–Russia Syria de-confliction measures between 2015–2017 could be a model to be followed. The following specific measures are suggested to facilitate demilitarisation and de-escalation in the Arctic:

(a) Restart the Arctic Chiefs of Defence forum (ACHOD), including Russia.
(b) Reactivate the Arctic Security Forces Round table (ASFR). It can play a supporting role to the ACHOD.
(c) Advance warning of naval exercises in accordance with norms existing for other military exercises.

[55] Financial Times. Russia's Arctic Gas ambitions at risk as sanctios imperil LNG icebreakers, March 28, 2022. URL: https://www.ft.com/content/2164d1e3-ee68-43ab-8c3d-61bd6ccde239 (accessed 20 April 2022).
[56] The Washington Post. Russia test fires new intercontinental ballistic missile, April 20, 2022. URL: https://www.washingtonpost.com/world/russia-test-fires-new-intercontinental-ballistic-missile/2022/04/20/ec14e20a-c0e0-11ec-b5df-1fba61a66c75_story.html (accessed 20 April 2022).

(d) Update the 1972 agreement between the United States and the Soviet Union for Prevention of Incidents on and over the high seas (INSEAs). This may include the following aspects:

(i) Surface ships, submarines and aircraft are not to close the coast of other countries to less than 24 nautical miles.

(ii) Surface ships, submarines and aircraft are not to close each other less than three nautical miles when in international waters or airspace.

(e) Introduction of hotlines between Arctic Defence Ministers and Chiefs of Defence.

(f) Update the OSCE's Vienna Document on "Confidence and Security Building Measures".

Conclusion

The conducted research shows that military posturing has resulted in increased tensions in the Arctic. This has reached levels not seen since the Cold War. The Arctic is undoubtedly an arena of great opportunity. However, this can only happen if the current sabre-rattling measures are restricted. This will require concerted efforts by all Arctic Council countries, including Russia, who may also consider reviewing military spending, which is only in the interest of the US political leadership and the military-industrial complex. The need for an institutionalised military dialogue in the Arctic has been reemphasised. Based on our analysis, we can conclude that it is in Russia's national interest to support its goal to maintain the Arctic as a zone of international cooperation. This is crucial if it intends to develop the NSR as an international competitive transport corridor. Given the current infrastructure bottlenecks and hesitancy of shipping companies accentuated due to the current crisis in Ukraine, Russia is unlikely to achieve its aim without significant domestic budgetary support as well as international cooperation and investment. In order to achieve this, it needs to establish a favourable political climate. Notwithstanding the strained geopolitical climate, it needs to re-emphasise bilateral cooperation with its Arctic neighbours to counteract NATO influence in the region. It could also utilise its chair of the Arctic Council from 2021 to strengthen peace and cooperation in the Arctic by pushing for the introduction of a military dialogue forum and also for updated confidence-building measures relating to the deployment of naval and air forces in order to avoid misperceptions, reduce risk and prevent inadvertent escalation.

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Socio-Labor Potential of Youth in the Russian Arctic: Reproduction Problems *

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Abstract. Active efforts to develop the elements of territorial socio-economic systems of the Russian Arctic are the key to the efficient development of its resources. One such element is the labor potential, which, on the one hand, is a social factor of territorial self-development in the Russian Arctic, and, on the other hand, is capable of effectively implementing national interests in the Arctic. In this regard, the quality of labor potential of the regions of the Arctic zone of Russia is of particular relevance, which is the focus of the author's research. The first two stages of the study identified labor potential as a social factor in the self-development of the regions and local communities of the Russian Arctic, and also analyzed child poverty as a systemic factor limiting the possibilities of quality reproduction of labor potential of the regions of the Arctic zone of Russia. The purpose of the next stage of the study, the results of which are presented in this article, was to analyze the socio-economic situation of young people in the regions of the Russian Arctic as part of the formation of qualitative characteristics of labor potential of the Arctic zone of Russia. The research methods include statistical analysis of socio-economic situation of youth in the regions of the Russian Arctic and analysis of normative legal documents regulating certain issues of socio-labor relations. In the course of the study the main problems of socio-economic situation of the youth in the Russian Arctic, limiting the promising opportunities of their life activity in the regions of the Arctic zone of the Russian Federation, were identified. The results of the study are focused on their practical use in the management of the development of labor potential of the regions of the Russian Arctic.
Keywords: *Youth, Russian Arctic, labor market, education, labor potential, wages, material well-being, unemployment, quality of life*

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Introduction

The Arctic zone is an area of strategic interest for the Russian Federation, one of which is the rational use of the resource base in order to accelerate the country's economic growth [1]. The

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[1] Ukaz Prezidenta RF ot 5 marta 2020 g. № 164 «Ob Osnovakh gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda» [Decree of the President of the Russian Federation of March 5, 2020 No. 164 "On the Fundamentals of the State Policy of the Russian Federation in the Arctic for the period up to 2035"]. URL: https://base.garant.ru/73706526/ (accessed 14 November 2021).

threat that forms the risks to this interest is the reduction of population (Table 1), the basis of the labor potential of the Russian Arctic.

Table 1

Working-age population and natural growth rate by regions of the Russian Arctic, 2000, 2005, 2010, 2015, 2020, thousand people

Region	Working-age population [2], thousand people					Natural increase rate [3], ‰				
	2000	**2005**	**2010**	**2015**	**2020**	**2000**	**2005**	**2010**	**2015**	**2020**
Nenets AO	28.5	27.6	26.4	25.8	24.8	0.3	2.3	4.7	8.4	3.4
Murmansk Oblast	669.9	600.5	518.5	461.8	434.6	-2.9	-3.6	-0.2	0.3	-4.7
Yamalo-Nenets AO	354.5	375.3	368.0	353.5	347.9	6.2	7.7	10.3	11.3	6.9
Chukotka AO	52.4	37.2	34.2	32.0	30.7	1.6	3.9	0.9	4.1	0.4

In 2000–2020, the number of people of working age in the regions, the territories of which are fully attributed to the Arctic zone of the Russian Federation, decreased by 267.3 thousand people, including by 41.4% in the Chukotka Autonomous Okrug, by 35% in the Murmansk Oblast, by 13% in the Nenets Autonomous Okrug, by 1.9% in the Yamalo-Nenets Autonomous Okrug. Since 2005, there has been a decrease in the values of total fertility rates: on average, for the regions under consideration, the birth rate in 2005–2020 decreased by 23.6% (from 14‰ to 10.7‰). In 2015–2020, the level of natural population growth has significantly decreased (in the Nenets Autonomous Okrug — by 2.5 times, in the Chukotka Autonomous Okrug — by 10 times); the Murmansk Oblast has entered a natural population decline. In the Nenets Autonomous Okrug, the mortality rate of the population of working age increased from 590 to 629.2 deaths per 100.000 people of the corresponding age, in the Murmansk Oblast — from 635.4 to 664.1 [4]. The COVID-19 pandemic made adjustments to the qualitative characteristics of the labor potential of the Russian Arctic (Fig. 1): in 2020, the life expectancy of the population of the Nenets Autonomous Okrug was 70.4 (in 2019 — 73.19), the Murmansk Oblast — 69.81 (71.75), Yamalo-Nenets Autonomous Okrug — 71.91 (74.18), Chukotka Autonomous Okrug — 65.82 years (68.09 years).

[2] Author's estimates. Source: Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 February 2022).
[3] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 February 2022).
[4] Ibid.

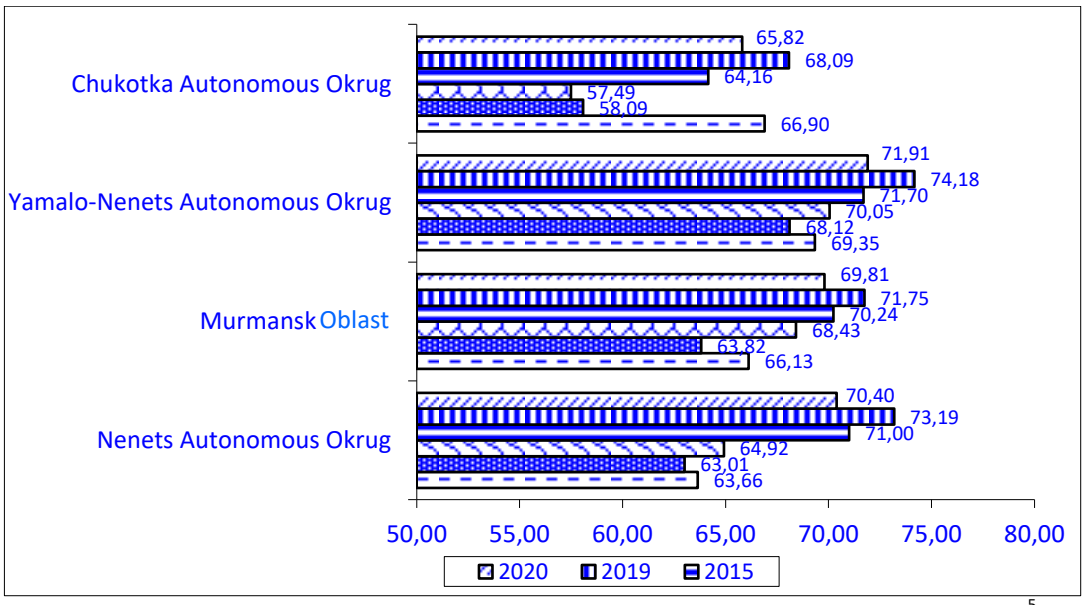

Fig. 1. Life expectancy at birth in the regions of the Russian Arctic, years, 2000, 2019, 2020 [5].

The labor potential of the Russian Arctic is a social factor of territorial development that has the ability for economic activity, the quantitative and qualitative characteristics of which are formed under the influence of the Arctic specifics and determine the level of sustainability of the development of the Arctic regions of the Russian Federation [1, Korchak E.A., p. 7]. Of particular importance in terms of formation of the labor potential of the Russian Arctic is the socio-economic situation of young people, since the youth (citizens aged 14–35 years) makes up the modern and promising part of the labor potential of the AZRF regions. In this aspect, the issues of professional and social self-realization [6] and life strategies of young people, formed under the influence of existing living conditions in the harsh natural and climatic conditions of the Arctic, are especially relevant.

The degree of the problem development

Few Russian studies have examined the youth of the Russian Arctic, mostly from a sociological perspective. Sociological research deals with important issues of identity and migration attitudes among young people and indicates that their migratory moods are formed under the influence of socio-cultural and economic factors — "*a prosperous past, a problematic present and an unpromising future*" [2, Tsilev V.R., p. 123]" of the Arctic regions and local communities. The "*prosperous past*" was associated, first of all, with an effective system for attracting young qualified personnel [3, Galimulin E.Z., p. 100]. As sociological studies show, young people are not satisfied with modern social conditions of life, which leads to an unfavorable prognosis [4, Osipova O.V., Maklashova E.G., p. 24] in relation to the socio-economic development of the Arctic territo-

[5] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 February 2022).
[6] Arktika ob"edinyaet molodezh': vozmozhnosti dlya samorealizatsii i kar'ernogo rosta [The Arctic unites young people: opportunities for self-realization and career growth]. URL: https://forumarctica.ru/news/arktika-obedinjaet-molodezh-vozmozhnosti-dlja-samorealizatsii-i-karernogo-rosta/ (accessed 07 March 2022).

ries — "*unpromising future*" — the lack of development prospects and the leveling of the historical significance of the Arctic cities and towns [5, Sharova E.N., p. 97]. Today, the vectors of youth self-realization "contradict the objectively existing opportunities" [6, Nedoseka E.V., p. 153] of regions and local communities of the Russian Arctic. Thus, the low attractiveness of life in single-industry Arctic settlements and the uncertainty in potential employment at local enterprises produce the predominance of young people in the age structure of the migration outflow of the population [7, Nedoseka E.V., Zhigunova G.V., p. 122, 130]. Single sociological studies of educational strategies and the situation of young people in the Arctic labor markets indicate that the migration outflow of young people is associated with a desire to get an education outside the region of residence [8, Zhuravlev N.Yu., p. 188]: graduates, due to limited opportunities to obtain the desired professional education in their place of residence, leave to study in other regions [9, Volgin N.A., Shirokova L.N., Mosina L.L., p. 126]. At the same time, a significant part of such youth is "irreturnable", including due to the discrepancy between the education received and the possibilities of professional implementation in the "native" region/city [10, Ivanova M.V., Klyukina E.S., p. 187].

The quality of the labor potential of the Russian Arctic is largely determined by the starting conditions for young people to enter the labor force [7], and, as shown by sociological research in the youth environment, in particular in the Murmansk Oblast [8], the interest of young people in employment "in their hometown/region" is directly related with the creation of jobs and the expansion of production, as well as with the provision of wages corresponding to the harsh Arctic climate. Undoubtedly, the role of youth in the processes of formation of the labor potential of the Russian Arctic in the framework of the implementation of the national Arctic interests of the Russian Federation is important due to the qualitative characteristics of youth, socio-psychological characteristics [9] and life strategies in the Arctic space. Therefore, the purpose of this study is to analyze the socio-economic situation of young people (population aged 14–35 years) in the Russian Arctic (regions whose territories are fully assigned to the Arctic zone of the Russian Federation — the Murmansk Oblast, the Nenets, Chukotka and Yamalo-Nenets Autonomous okrugs) based on official data of Rosstat and territorial employment centers. The designated goal is the next stage in the study of labor potential as a social factor in the territorial self-development of the Russian Arctic [1, Korchak E.A., p. 7; 11, Korchak E.A., p. 47].

[7] Ustoychivyy Sever: obshchestvo, ekonomika, ekologiya, politika: sbornik trudov IV vserossiyskoy nauchno-prakticheskoy konferentsii (13–14 marta 2018 g., g. Yakutsk) [Sustainable North: society, economy, ecology, politics: collection of proceedings of the IV All-Russian Scientific and Practical Conference (March 13–14, 2018, Yakutsk)]. Ufa, AETERNA Publ., 2018, 494 p.

[8] Chto dumaet molodezh' o perspektivakh Kol'skogo Severa [What do young people think about the prospects of the Kola North]. URL: https://goarctic.ru/society/chto-dumaet-molodyezh-o-perspektivakh-kolskogo-severa/ (accessed 04 February 2022).

[9] Ustoychivyy Sever: obshchestvo, ekonomika, ekologiya, politika: sbornik trudov IV vserossiyskoy nauchno-prakticheskoy konferentsii (13–14 marta 2018 g., g. Yakutsk) [Sustainable North: society, economy, ecology, politics: collection of proceedings of the IV All-Russian Scientific and Practical Conference (March 13–14, 2018, Yakutsk)]. Ufa, AETERNA Publ., 2018, 494 p.

Demographic characteristics of the youth of the Russian Arctic

In 2015–2020, the share of young people in the total population of the regions of the Arctic zone of the Russian Federation (Table 2) decreased by 9.4% (the share of urban youth decreased by 10.4%, rural — by 4.4%; men aged 14–35 years — by 8.7%, women aged 14–35 — by 10.3%).

Table 2

The share of citizens aged 14–35 in the total population of the AZRF regions, 2015–2020, % [10]

Region	2015	2016	2017	2018	2019	2020
Nenets AO	30.9	29.9	29.3	28.4	27.7	27.3
Murmansk Oblast	30.2	29.6	29.2	28.8	28.2	27.8
Yamalo-Nenets AO	32.6	29.7	31.0	30.3	29.6	28.9
Chukotka AO	30.7	30.1	29.6	29.5	29.2	28.7

In the Nenets Autonomous Okrug, the share of young people in the total population of the region in 2020 amounted to 27.3% (in 2015 — 30.9%), including men — 29.3% (33.4%), women — 25.3% (28.5%); in the Murmansk Oblast — 27.8% (30.2%), 32.3% (34.7%), 23.6% (26%); in the Yamalo-Nenets Autonomous Okrug — 28.9% (32.6%), 29.6% (33.4%), 28.1% (31.9%); in Chukotka Autonomous Okrug — 28.7% (30.7%), 29.7% (31.5%), 27.8% (29.8%). Positive dynamics in the number of young people in the period under review was recorded in the age groups of 15–19 years.

The largest share of marriages (Table 3) falls on young people aged 25–34 years. Thus [11], in the Yamalo-Nenets Autonomous Okrug, 1560 marriages are for grooms aged 25–34, 1280 for brides aged 25–34 (since 2017, there has been a downward trend in the number of marriages across all age groups in the okrug).

Table 3

Marriages of young people by age group by regions of the Russian Arctic, 2020 [12]

Region	under 18	18–24 years old	25–34 years old
Nenets AO	1	62	159
Murmansk Oblast	16	1691	3719
Yamalo-Nenets AO	16	1448	2840
Chukotka AO	5	103	231

[10] Author's calculations. Sources: Chislennost' naseleniya Rossiyskoy Federatsii po polu i vozrastu na 1 yanvarya 2016 goda [Population of the Russian Federation by sex and age as of January 1, 2016]. URL: https://gks.ru/bgd/regl/B16_111/Main.htm (accessed 12 February 2022); Chislennost' naseleniya Rossiyskoy Federatsii po polu i vozrastu na 1 yanvarya 2017 g [Population of the Russian Federation by sex and age as of January 1, 2017]. URL: https://gks.ru/bgd/regl/B17_111/Main.htm; Chislennost' naseleniya Rossiyskoy Federatsii po polu i vozrastu na 1 yanvarya 2018 goda [Population of the Russian Federation by sex and age as of January 1, 2018]. URL: https://gks.ru/bgd/regl/B18_111/Main.htm (accessed 12 February 2022); Chislennost' naseleniya Rossiyskoy Federatsii po polu i vozrastu na 1 yanvarya 2019 goda [The population of the Russian Federation by sex and age as of January 1, 2019]. URL: https://gks.ru/bgd/regl/b19_111/Main.htm; Chislennost' naseleniya Rossiyskoy Federatsii po polu i vozrastu na 1 yanvarya 2020 goda [Population of the Russian Federation by sex and age as of January 1, 2020]. URL: https://gks.ru/bgd/regl/b20_111/Main.htm (accessed 12 February 2022); Chislennost' naseleniya Rossiyskoy Federatsii po polu i vozrastu na 1 yanvarya 2021 goda [Population of the Russian Federation by sex and age as of January 1, 2021]. URL: https://rosstat.gov.ru/storage/mediabank/Bul_chislen_nasel-pv_01-01-2021.pdf. (accessed 12 February 2022).

[11] Statistical Yearbook. Yamalo-Nenets Autonomous Okrug (1990–2020) / in II parts in 3 volumes, part I (1990–2016), part II (2017–2020). URL: https://tumstat.gks.ru/ofpublic/document/72222 (accessed 18 January 2022).

[12] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 February 2022).

The highest value of the birth rate (Table 4) is in the age group of 25–29 years (with the exception of the Chukotka Autonomous Okrug). In the Yamalo-Nenets Autonomous Okrug, there are 133.9 live births per 1000 women aged 25–29 (versus 139.1 in 2017), and 91.1 per 1000 women aged 30–34 (there is a steady upward trend in the number of births in this age category in 2017–2020). In the Chukotka Autonomous Okrug [13], the largest number of live births per 1000 women falls on the age groups of 20–24 years (there was a significant decrease in the birth rate in this group in 2016–2020) and 25–29 years [14].

Table 4

Age-specific fertility rates (live births per 1000 women, years) in the Russian Arctic regions, 2020 [15]

Region	15–19 years old	20–24 years old	25–29 years old	30–34 years old
Nenets AO	23.8	91.1	152.5	115.1
Murmansk Oblast	8.8	64.5	95.1	73.1
Yamalo-Nenets AO	13.7	82.6	133.9	91.1
Chukotka AO	31.1	98.2	93.4	74.0

In relation to the qualitative characteristics of young people, health issues play a special role. Climatic and geophysical territorial features determine the syndrome of polar stress in the regions of the Russian Arctic, caused by changes in metabolism and endocrine regulation, and expressed in polar dyspnea, decreased performance and depression [12, Belisheva N.K., Petrov V.N., p. 155]. In addition, 60% of all gross emissions in the AZRF regions come from ferrous and non-ferrous metallurgy enterprises; long-term activity of the city-forming enterprises of the mining industry and non-ferrous metallurgy has led to significant consequences for the flora and fauna; during periods of anticyclonic nature in the resource-producing cities of the Russian Arctic, increased concentrations of pollutants are recorded [12, Belisheva N.K., Petrov V.N., p. 157]. For example, the territories of the Murmansk Oblast that are unfavorable in terms of the incidence of adolescents aged 15–17 years are resource-producing settlements — the city of Kirovsk, Kovdorskiy and Lovozerskiy districts [13, Kovshov A.A., Tikhonova N.A., Fedorov V.N., Novikova Yu.A., p. 916]; in the Yamalo-Nenets Autonomous Okrug — Tazovskiy district (the highest level of primary incidence of adolescents with diseases of the digestive system has developed here), Muravlenko and Gubkinskiy cities [16]. The Chukotka Autonomous Okrug accounts for the highest morbidity rate for adolescents with neoplasms in Russia [14, Karpova O.B., Shchepin V.O., Zagoruchenko A.A., p. 93] (it should be noted that the region has a positive trend in terms of reducing mortality among young people in 2016–2020).

Youth in the labor market of the Russian Arctic

[13] Movement of the population. URL: https://habstat.gks.ru/folder/27977 (accessed 12 February 2022).
[14] There is no information for the Nenets Autonomous Okrug and the Murmansk Region.
[15] There is no information for the Nenets Autonomous Okrug and the Murmansk Region.
[16] Non-infectious morbidity of the population of the Yamalo-Nenets Autonomous Okrug in 2016. URL: http://89.rospotrebnadzor.ru/s/89/files/directions/monitoring/146492.pdf (accessed 21 February 2022).

An analysis of the structure of the employed population by age groups (Table 5) shows that in 2015–2020, the level of employment on average decreased in the age group of 20–29 years (from 20.9% to 14.6%) against the background of an increase in employment in the age groups of 30–39 years (from 29.1% to 31.6%), 40–49 years (from 25.5% to 28.5%) and 60–72 years old (from 3.9% to 5.2%). In the structure of the employed population of the Nenets Autonomous Okrug, the share of the population aged 20–29 years has decreased by 31%, in the Murmansk Oblast — by 30%.

Table 5

The structure of the employed population in the regions of the Russian Arctic, %, 2015, 2020 [17]

Region	15–19 years old	20–29 years old	30–39 years old	40–49 years old	50–59 years old	60–72 years old
Structure of the employed population aged 15–72 (by age group), 2015						
Nenets AO	0.5	21.7	30.7	23.4	20.0	3.6
Murmansk Oblast	0.6	22.7	27.6	24.2	19.5	5.3
Yamalo-Nenets AO	0.2	18.6	31.2	27.5	20.9	1.7
Chukotka AO	0.8	19.2	27.5	25.0	21.6	6.0
Structure of the employed population aged 15–72 (by age group), 2020						
Nenets AO	0.4	14.9	31.9	27.7	19.5	5.6
Murmansk Oblast	0.5	15.8	30.8	27.4	18.3	7.3
Yamalo-Nenets AO	0.1	13.4	32.9	30.0	21.3	2.2
Chukotka AO	0.1	12.5	27.7	27.5	23.4	8.8

In the structure of unemployed citizens in the regions under consideration (Table 6), the share of the unemployed in the age groups of 15–19 years and 20–29 years has decreased against the background of its significant increase (2.2 times) in the age group of 60–72 years. In the Nenets Autonomous Okrug, in 2015–2020, the share of the population aged 20–29 years in the structure of unemployed citizens has decreased by 36%, 15–19 years old — by 43%. On the contrary, in the Chukotka Autonomous Okrug, the share of the population aged 20–29 in the structure of unemployed citizens increased 1.5 times against the backdrop of a 10.2-fold increase in the share of unemployed aged 50–59.

Table 6

The structure of unemployed population in the regions of the Russian Arctic, %, 2015, 2019, 2020 [18]

Region	15–19 years old	20–29 years old	30–39 years old	40–49 years old	50–59 years old	60–69 years old
Structure of unemployed population aged 15–72 (by age group), 2015						
Nenets AO	7.2	42.0	23.7	17.4	8.7	1.0
Murmansk Oblast	9.9	30.6	19.0	17.1	18.7	4.8
Yamalo-Nenets AO	2.4	46.5	22.6	15.9	11.8	0.9
Chukotka AO	2.8	32.9	21.9	19.1	21.5	1.7
Structure of unemployed population aged 15–72 (by age group), 2019						
Nenets AO	2.2	28.3	29.1	21.7	14.3	3.9
Murmansk Oblast	3.5	32.8	23.4	18.3	15.0	0.7

[17] Labor force, employment and unemployment in Russia. URL: https://rosstat.gov.ru/folder/210/document/13211https://rosstat.gov.ru/folder/210/document/13211 (accessed 21 February 2022).

[18] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 21 February 2022).

Yamalo-Nenets AO	2.3	52.2	24.6	5.9	15.0	0.0
Chukotka AO	1.3	49.0	32.2	12.7	4.8	0.0
Structure of unemployed population aged 15–72 (by age group), 2020						
Nenets AO	4.1	26.8	31.9	16.9	17.4	2.8
Murmansk Oblast	4.4	30.6	19.8	16.5	17.6	10.2
Yamalo-Nenets AO	4.2	41.4	34.7	8.4	10.1	1.2
Chukotka AO	1.2	52.0	42.3	2.4	2.1	0.0

Average age of the unemployed in the regions of the Russian Arctic in 2015–2020 increased from 35 years to 37 years. In the Nenets Autonomous Okrug, the average age of unemployed citizens in 2020 was 37.1 years (in 2015 — 32.5 years), in the Murmansk Oblast — 38.7 (36.3); in the Yamal-Nenets Autonomous Okrug, the average age of unemployed citizens decreased from 33.4 to 31.7 years; in the Chukotka Autonomous Okrug — from 37.2 to 28.9.

The COVID-19 pandemic had a negative impact on the labor markets of the regions of the Russian Arctic: in 2020, the level of general unemployment in the Murmansk Oblast increased by 42.6% compared to 2019 (registered — by 68.7%), in the Nenets AO — by 11.4% (2 times), in Chukotka AO — by 15.8% (5%), in Yamalo-Nenets AO — by 26.3% (3 times). The problem of youth unemployment has worsened. For example, in the Yamalo-Nenets Autonomous Okrug, the number of officially registered unemployed in the age group of 16–29 [19] increased by 4 times, of which 25% had a higher professional education, 29% had a secondary vocational education, 19% had a general secondary education, and 16% had a basic general education. Today, in the region [20], 26.2% in the total number of unemployed citizens are young people aged 16–29: the lowest percentage (14.5%) of unemployed youth is in the city of Gubkinskiy, the highest percentage (55%) is in the Tazovskiy district. In the structure of registered unemployed, 0.7% is citizens aged 16–17, 2.3% — 18–19 years, 11.4% — 20–24 years, 11.8% — 25–29 years old. According to Tyumenstat [21] data, the share of graduates of educational organizations in the total number of unemployed in 2020 was 4.6% (in Muravlenko — 8%, in the Tazovskiy district — 7.5%, in the Priuralskiy district — 0.9%), 29.3% of them are graduates of higher education, 56.1% — of professional education, 14.6% — of general education organizations.

Analysis of a sample survey of the employment of graduates with secondary vocational and higher education [22] conducted by the Federal State Statistics Service shows that the highest unemployment rate is among skilled workers and employees, while the overall employment rate

[19] Monitoring of the youth labor market in the Yamalo-Nenets Autonomous Okrug. URL: https://rabota.yanao.ru/content/мониторинг__рынка_труда_молодежи_в_ямало_ненецком_автономном_округе (accessed 21 February 2022).
[20] The main indicators of the labor market of the Yamalo-Nenets Autonomous Okrug for 2019. URL: https://rabota.yanao.ru/cms_data/usercontent/regionaleditor/издания/лето%202020%20год/статбюллетень%20рынок%20труда%20янао%20за%202019%20год(иап).pdf (accessed 21 February 2022).
[21] Ibid.
[22] The results of sample observation of employment of graduates who have received secondary vocational and higher education. URL: https://gks.ru/free_doc/new_site/population/trud/itog_trudoustr/index.html (accessed 21 February 2022).

does not reach 50%. Thus, in the Chukotka Autonomous Okrug [23], the employment rate among graduates of 2016–2018 amounted to 69.2%, with the Russian average of 83.7%; unemployment rate — 13.5% (7.1%). With a generally very high level of employment (94.2%) in the Chukotka Autonomous Okrug, the level of employment of young people with higher education is lower than the average for the regions of the Russian Federation [15, Razumova T.O., Zolotina O.A., p. 148]. For enterprises in the fields of coal mining, metal ores and diamonds, transport and logistics, construction and production of building materials in the region, vocational training is provided by the Chukotka branch of the M.K. Ammosov North-Eastern Federal University, Chukotka North-West Technical College of Bilibino, Chukotka Multidisciplinary College, Chukotka Polar College in Egvekinot, Chukotka North-Eastern College in Providence. The level of employment of graduates of educational institutions who completed their studies in educational programs of secondary vocational education is the highest in the Russian Federation — 81.2%. Nevertheless [24], employers in the region experience a significant need for highly qualified specialists (in science and technology, education, healthcare), skilled workers in industry, construction, transport, and specialists of an average level of qualification.

On average for the regions of the Russian Arctic, as sociological studies show [16, Simakova A.V., Gurtov V.A., p. 156], almost a third of employers experience a shortage of personnel, 10% — an acute shortage; among professions demanded by employers, 27% require higher education [16, Simakova A.V., Gurtov V.A., p. 160]. Almost 80% of the list of the most popular professions and specialties in the Russian Arctic belong to the system of secondary vocational education; however, not all of them are trained [17, Simakova A.V., Stepus I.S., Pitukhin E.A., p. 160]. An analysis of Rosstat data (Table 7) shows that employers in the Chukotka Autonomous Okrug experience the greatest need for “operators of production plants and machines, assemblers and drivers”, in the Murmansk Oblast — for “skilled workers in industry, construction, transport and related occupations”, in Yamalo-Nenets Autonomous Okrug — in “specialists of the highest qualification level”.

Table 7

Distribution of organizations’ demand for workers to fill vacancies by professional groups in the Russian Arctic regions as of October 31, 2020, % [25]

Professional group	Nenets AO	Murmansk Oblast	Yamal-Nenets AO	Chukotka AO
Highly qualified specialists	9.6	20.2	22.9	20.5
Specialists of intermediate level	14.8	12.8	10.3	11.1
Workers in the service sector and trade, pro-	8.5	7.5	7.2	4.7

[23] Regional differences in employability of university graduates. URL: https://www.hse.ru/data/2021/01/18/1348766917/release_2_2021.pdf (accessed 18 February 2022).
[24] On the situation in the labor market of the Chukotka Autonomous Okrug. URL: https://trud87.ru/content/экспресс_информация_о_положении_на_рынке_труда (accessed 21 February 2022).
[25] On the number and needs of organizations in workers by professional groups. URL: https://rosstat.gov.ru/compendium/document/13266 (accessed 21 February 2022).

tection of citizens and property				
Skilled workers in industry, construction, transport and related occupations	13.4	46.9	3.9	19.5
Plant and machine operators, assemblers and drivers	44.4	4.1	18.2	13.3
Unskilled workers	3.9	4.9	9.0	10.5

The most acute problem in the field of employment of graduates of educational organizations is the low level of employment in the first job related to the profession or specialty received. Thus, in the Nenets Autonomous Okrug, the share of 2010–2015 graduates who got jobs in their specialty graduates with secondary vocational education in training programs for mid-level specialists amounted to 58%, in training programs for skilled workers and employees — 55.2% (the level of employment of graduates of educational organizations who completed their studies in educational programs of secondary vocational education is 61.4%). In the Murmansk Oblast — 48.4% and 30% [26] (61.7%), respectively (for example, the level of actual employment of graduates of the Murmansk Civil Engineering College graduating in 2019/2020 in the specialty "applied geodesy" was 30%, "automatic control systems" — 20%, "driver of urban electric transport" — 76.9%, "technology of catering products" — 78.9%, "construction and operation of buildings and structures" — 100% [27]).

Another aspect is the choice of future profession. According to the study of professional intentions of students in the 9th and 11th grades of general educational organizations [28], conducted by the employment service of the Murmansk Oblast, most graduates after finishing school plan to continue their studies in educational organizations of higher (in 2019 — 57%) and secondary (28%) professional education. At the same time, since 2017, the share of students oriented towards higher education has been decreasing, while the share of secondary vocational education has been increasing; every year, almost 50% of high school students finally decide on the choice of an educational organization for receiving education (according to preferences, this is the Murmansk Oblast, the cities of St. Petersburg, Petrozavodsk, Moscow). Among students in 11th grades, the share of those who have decided on a particular profession is 44%, in 9th grades — 35%; the share of those who haven't decided is 28%. The share of graduates who plan to work in the Murmansk Oblast after receiving education is 23%, in other regions — 35% (of which 42% in St. Petersburg

[26] The results of sample observation of employment of graduates who have received secondary vocational and higher education. URL: https://gks.ru/free_doc/new_site/population/trud/itog_trudoustr/index.html (accessed 14 September 2021).
[27] Information about the employment of graduates. URL: http://msk-murman.ru/main/studentam/praktika (accessed 21 February 2022).
[28] Analytical review of the results of a study of professional intentions of students in the 9th and 11th grades of educational institutions of the Murmansk Oblast in 2019. URL: https://murman-zan.ru/cms_data/usercontent/regionaleditor/комитет%202016/психологи/анализ%20результатов%20исследования%202019.pdf (accessed 18 January 2022).

and the Leningrad Oblast, 15% in Moscow and the Moscow Oblast; 7% plan to leave outside the country). In this regard, it should also be noted that one of the main obstacles to the implementation of life plans in the region of residence is the unwillingness of employers to "employ young citizens without work experience" (more than 70% of young people in the Murmansk Oblast need help in finding employment) [29], as well as the impossibility of obtaining education in specialties of interest that are not available in educational institutions in the region of residence.

The successful implementation of the largest investment projects in the regions of the Russian Arctic depends on the promising quality of labor potential. In this aspect, such an important stage in determining the life trajectories and intentions of young people as the choice of profession is of particular importance. Mistakes in such a choice and work not in the received specialty lead not only to a decrease in the efficiency of budget investments in the educational sphere (economic losses) [18, Kekkonen A.L., Simakova A.V., Stepus I.S., pp. 89–90], but also to an increase in unemployment (due to the lack of demand for specialists and a decrease in the professional level of those who were not employed in their specialty immediately after graduating from an educational institution), the migration outflow of young people and, ultimately, to a prospective decrease in the qualitative characteristics of the labor potential of the regions of the Russian Arctic.

Quality of life in the Russian Arctic

Along with difficulties in employment, the top reasons for emigration of young people from the regions of the Russian Arctic are the low quality of life associated with limited opportunities to meet the basic human needs for nutrition, safety, reproduction, as well as the needs for sociocultural life, self-actualization [19, Eremeeva L.I., p. 82].

Material well-being has a significant influence on the formation of the qualitative characteristics of young people. As sample studies of household budgets by Rosstat show [30], in the Chukotka Autonomous Okrug, 56% of households classify themselves as poor, in the Nenets Autonomous Okrug — 53.2%, in the Murmansk Oblast — 43.1%, in the Yamalo-Nenets Autonomous Okrug — 17.1%. In the structure of poor households in the Nenets Autonomous Okrug, 96% have children under the age of 18, in Chukotka Autonomous Okrug — 94.2%, in Yamalo-Nenets Autonomous Okrug — 92.3%, in Murmansk Oblast — 60.4%. Figure 2 graphically shows the poverty level of the population of the regions under consideration in comparison with the regions and cities that young people prefer for their future life.

[29] PORA vyyasnit', chego ne khvataet molodezhi v Arktike [IT'S TIME to find out what young people are missing in the Arctic]. URL: https://24rus.ru/news/economy/177787.html (accessed 18 February 2022).
[30] Household income, expenditure and consumption in 2020 (based on the Household Budget Survey). URL: https://gks.ru/bgd/regl/b20_102/Main.htm (accessed 21 February 2022).

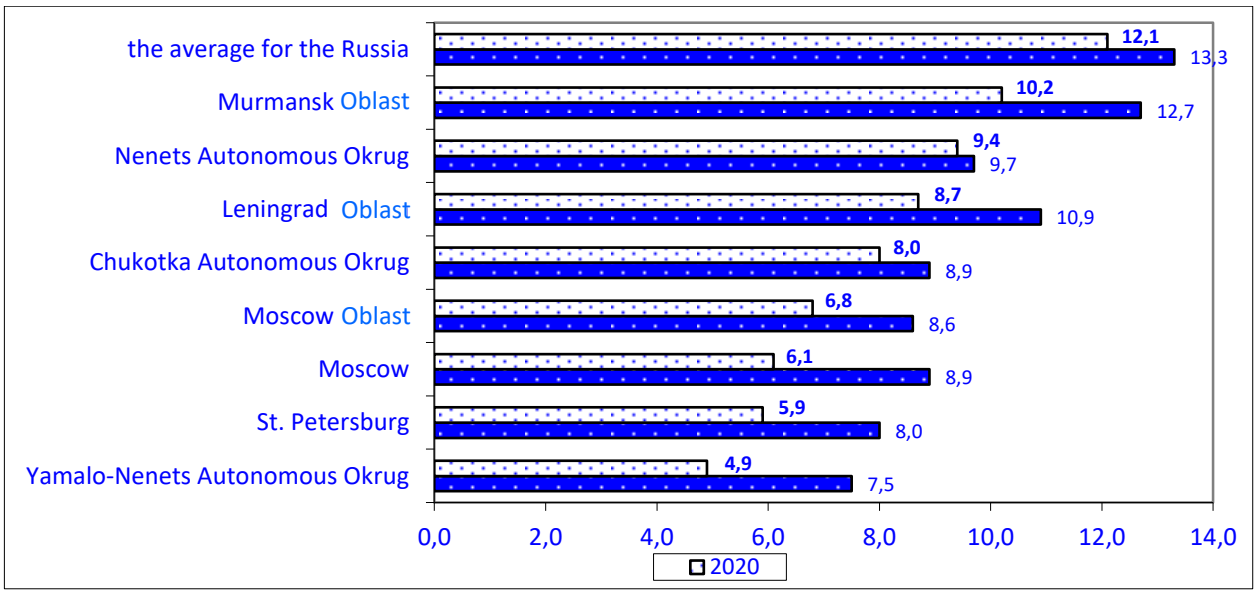

Fig. 2. The level of poverty in the regions of the Russian Arctic in comparison with the average for the Russian Federation, Moscow and Leningrad oblasts, 2015, 2020 [31].

The highest proportion of the population with average per capita cash incomes below the subsistence minimum in 2020 was registered in the Murmansk Oblast: the poverty level is almost 2 times higher than the average in St. Petersburg and Moscow. In the Nenets Autonomous Okrug, the poverty rate is 9.4%, in the Chukotka Autonomous District — 8%. If we compare the absolute and relative levels of poverty [20, Baranov S. V., Gasnikova A. A., Biev A. A., pp. 160–163], it should be noted that in the Yamalo-Nenets Autonomous Okrug, the share of the population with average per capita cash income below the median level was 4 times higher than the share of the population with average per capita cash income below the subsistence level of the able-bodied population (4.9 % against 19.9%), in the Chukotka Autonomous Okrug — 2.2 times (8% and 17.9%), in the Nenets Autonomous Okrug — 2 times (9.4% and 19%), in the Murmansk Oblast — 1 .2 times (10.2% and 2.8% respectively).

Poverty in the regions of the Russian Arctic is more severe than in regions with comfortable natural and climatic conditions: limited cash income produces financial constraint on paying for housing and communal services (in the regions of the Arctic zone of the Russian Federation, there are high costs in the sphere of housing and utilities, due to the duration of the heating season and the lighting period in the polar night), the purchase of medicines. Thus [32], in 2020, 9.5% of households experienced financial difficulties in reimbursement of payments for housing and communal services, 4.6% — in purchasing medicines prescribed by a doctor for emergency treatment. In general, the purchasing power of the income of the population in most of the Arctic settlements does not reach the average Russian level and does not provide a socially acceptable standard of living for the population living in harsh climatic conditions [21, Bobkov V.N., Gulyugina A.A., Zlenko

[31] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 January 2022).
[32] Household income, expenditure and consumption in 2020 (based on the Household Budget Survey). URL: https://gks.ru/bgd/regl/b20_102/Main.htm (accessed 21 February 2022).

E.G., Odintsova E.V., p. 62]. In this aspect, it is necessary to note the decrease in the efficiency of the district wage system — it has actually lost the function of compensating for the rise in the cost of living and stimulating the retention of qualified personnel, including due to the selectivity of the norm for the payment of district coefficients and polar bonuses to salary of youth [22, Zlenko E.G., p. 39]. According to Rosstat (Fig. 3), in 2020, the group of regions with a level of labor income (in comparison with the subsistence level of the able-bodied population) below the average for the Russian Federation, in addition to the Murmansk Oblast, included the Nenets Autonomous Okrug.

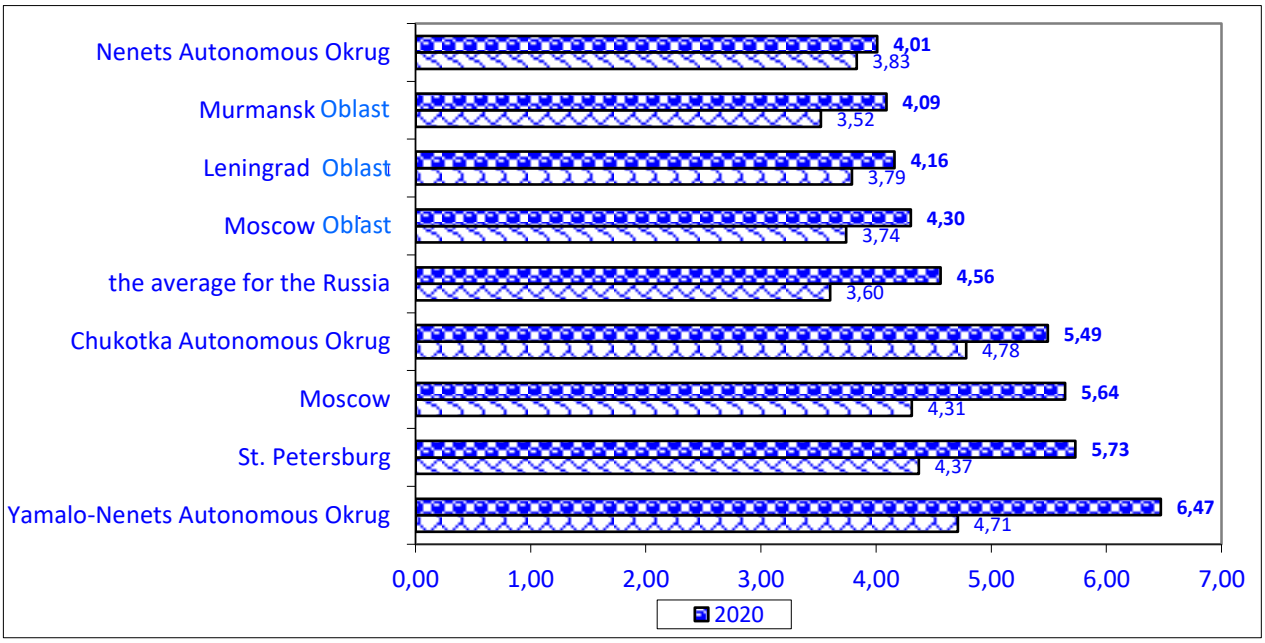

Fig. 3. The ratio of the average monthly accrued wages to the subsistence level of the able-bodied population in the regions of the Russian Arctic in comparison with the average for the Russian Federation, Moscow and Leningrad oblasts, 2015, 2020 [33]

Comparison of the values of this indicator with its limiting critical value (5 times for the Arctic regions and 3 times for the rest of the regions of the Russian Federation [23, Korchak E.A., p. 96]) shows that the Yamalo-Nenets and Chukotka Autonomous okrugs have achieved high social standards in 2020 in terms of living standards. However, this situation cannot be interpreted unambiguously, since such regions are characterized by the dominance of extractive industries with a high level of wages, where a significant proportion of the employed are citizens working on a rotational basis. The wages of “shift workers” are spent mainly outside the autonomous okrugs and do not have a significant impact on the monetary incomes of the local population through the formation of demand, therefore, accounting for wages in the structure of monetary incomes of the population of the Chukotka and Yamalo-Nenets Autonomous okrugs statistically overestimates their meaning [34]. Another aspect is the differentiation of wages: an analysis of the distribution of

[33] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 January 2022).
[34] Sotsial'no-ekonomicheskiy profil' Chukotskogo avtonomnogo okruga — 2020 [Socio-economic profile of the Chukotka Autonomous Okrug – 2020]. Khabarovsk, FANU "Vostokgosplan" Publ., 2021, 48 p.

the number of employees by the amount of accrued wages [35] indicates that in the mining sector in the Yamalo-Nenets Autonomous Okrug, 62.8% of workers have wages below the industry average; in Chukotka Autonomous Okrug — 64.3%.

Wage issues directly affect youth employment strategies and thereby on the availability of human resources in economic sectors and the social sphere. An example is the Murmansk Oblast, where the issues of staffing in healthcare are especially acute. Doctors under 36 years old make 29.9% of all medical staff in the region, doctors aged 36–45 make 25.4%, specialists with secondary medical education — 25.5% and 24.3%, respectively [36]. Additional measures are being implemented in the region to stimulate young personnel. In 2020, 66 doctors received one-time compensation payments in the amount of 500 thousand rubles, and 7 paramedics received 300 thousand rubles; quarterly cash compensation for housing and utilities in the amount of 15 thousand rubles was provided to 142 medical workers [37]. A one-time social payment for the purchase or construction of housing for certain categories of medical workers (in amount of 50% of the initial payment) was provided to 25 medical workers in 2020 (the funds are free of charge, but the medical worker is obliged to be employed in the region at least 10 years). Within the framework of the "Zemskiy Doctor" and "Zemskiy Paramedic" programs, 20 medical specialists and 1 paramedic were employed in 2020: according to the programs, being employed in a village or urban-type settlement, a doctor is paid 2 million rubles, a paramedic — 1 million rubles, for employment in cities with a population of up to 50 thousand people — 1 million rubles and 500 thousand rubles, respectively. However, the measures being implemented are criticized by doctors in the Murmansk Oblast, since, firstly, they are aimed at rural and small urban settlements; secondly, they cause tension between local and visiting specialists due to the fact that "*health workers who worked in polyclinics and hospitals in the region for decades have never received such payments*" [38], thirdly, against the background of a small number of visiting medical specialists, a significant proportion of doctors left the region (for example, in 2018, 16 doctors were recruited, while about a hundred doctors, mostly of working age, left the region [39]).

Official statistics [40] show that in the Murmansk Oblast, the average monthly salary of workers in the healthcare and social services sector is 66.164 rubles, however, an analysis of the distri-

[35] Trud i zanyatost' v Rossii 2021 g. [Labor and employment in Russia 2021] URL: https://gks.ru/bgd/regl/b21_36/Main.htm; Svedeniya o raspredelenii chislennosti rabotnikov po razmeram zarabotnoy platy [Information on the distribution of the number of employees by wages]. URL: https://rosstat.gov.ru/compendium/document/13268 (accessed 08 January 2022).

[36] Annual report on the progress of implementation and evaluation of the effectiveness of the state program of the Murmansk Oblast "Health Development" for 2020. URL: https://minzdrav.gov-murman.ru/documents/programs/gosproject/gp-report/poyasnitelnaya-zapiska-2020.pdf (accessed 14 January 2022).

[37] Ibid.

[38] Praktikuyushchie vrachi kritikuyut programmu «Arkticheskiy doktor» [Practitioners criticize the Arctic Doctor program]. URL: https://severpost.ru/read/78730 (accessed 17 February 2022).

[39] Vrachey ne khvataet, no ikh aktivno uvol'nyayut [There are not enough doctors, but they are actively fired]. URL: https://severpost.ru/read/85919/ (accessed 01 February 2022).

[40] Regions of Russia. Socio-economic indicators. URL: https://rosstat.gov.ru/folder/210/document/13204 (accessed 12 January 2022).

bution of employees by size of accrued wages [41] indicates that 72.1% [42] of workers in this sector receive wages below this value. In 2020, the average salary of doctors and employees of medical organizations with higher education [43] in the Murmansk Oblast was 120.171 rubles, in the Moscow Oblast — 118.002 rubles, in the Leningrad Oblast — 95.827 rubles, in St. Petersburg — 123.552 rubles, in Moscow — 158.136 rubles. The average monthly salary of paramedical personnel is 66.712 rubles, 70.309 rubles, 51.600 rubles, 72.979 rubles and 91.967 rubles, respectively. At the same time, it should be taken into account that in the Murmansk Oblast, unlike the compared regions, the regional coefficient (50% of the salary) and the percentage allowance (80% of the salary) are applied to official salaries. In this regard, in relation to the issues of remuneration of medical workers, it is necessary to focus on the remuneration system itself (Table 8).

Table 8

Minimum official salaries for healthcare workers (professional qualification group "doctors and pharmacists"), rubles, 2021 [44]

Positions of employees classified by qualification levels	Nenets AO	Murmansk Oblast	Yamalo-Nenets AO	Chukotka AO	Moscow Oblast
1 qualification level					
Trainee doctor	11 000	8 412	21 952	13 404	29 795
2 qualification level					
Specialist doctors	11 500	9 103	24 147	19 298	35 030
3 qualification level					
Specialist doctors of inpatient units, general practitioners, pediatricians, etc.	12 300	10 244	26 561	20 375	37 956
4 qualification level					
Surgical specialists, senior doctor, etc.	12 700	11 148	29 218	21 442	44 269

[41] Information on the distribution of the number of employees by wages. URL: https://rosstat.gov.ru/compendium/document/13268 (accessed 12 January 2022).

[42] Author's calculated data.

[43] The results of federal statistical monitoring in the field of remuneration of certain categories of workers in the social sphere and science for January–December 2020. URL: https://rosstat.gov.ru/storage/mediabank/1eEUBIVB/itog-monitor05-20.htm (accessed 17 February 2022).

[44] Ob oplate truda rabotnikov gosudarstvennykh uchrezhdeniy zdravookhraneniya Chukotskogo avtonomnogo okruga [On the remuneration of employees of public health institutions of the Chukotka Autonomous Okrug]. URL: https://docs.cntd.ru/document/446289254 (accessed 15 February 2022); Ob utverzhdenii Otraslevogo polozheniya ob oplate truda rabotnikov gosudarstvennykh meditsinskikh organizatsiy, podvedomstvennykh departamentu zdravookhraneniya Yamalo-Nenetskogo avtonomnogo okruga [On approval of the Sectoral Regulation on the remuneration of employees of state medical organizations subordinate to the Health Department of the Yamalo-Nenets Autonomous Okrug]. URL: https://docs.cntd.ru/document/444962007 (accessed 15 February 2022); Ob oplate truda rabotnikov byudzhetnykh uchrezhdeniy gosudarstvennoy sistemy zdravookhraneniya Nenetskogo avtonomnogo okruga [On the remuneration of employees of budgetary institutions of the state health care system of the Nenets Autonomous Okrug]. URL: https://docs.cntd.ru/document/441796502 (accessed 15 February 2022); Ob oplate truda rabotnikov gosudarstvennykh uchrezhdeniy zdravookhraneniya Moskovskoy oblasti [On the remuneration of employees of public health institutions of the Moscow Oblast]. URL: https://docs.cntd.ru/document/819008253 (accessed 15 February 2022); Prikaz Ministerstva zdravookhraneniya Murmanskoy oblasti ot 02.09.2021 № 538 [Order of the Ministry of Health of the Murmansk Oblast No. 538 dated September 2, 2021]. URL: https://minzdrav.gov-murman.ru/documents/npa/2021/ (accessed 15.02.2022). There is no information for Moscow, St. Petersburg and the Leningrad Oblast.

For reference: the subsistence level of the able-bodied population, rub.	*23 423*	*22 047*	*17 707*	*24 875*	*14 987*

The official salary is set for the performance of labor (official) duties of a certain complexity for a calendar month, while, in accordance with the labor legislation of the Russian Federation, incentive and compensation payments (such as: northern allowances, allowances for length of service, complexity of work, etc.) should not be included in the official salary [24, Zhelomeeva N.V., p. 102, 104]. Thus, the size of the official salary should actually correspond to the subsistence level of the able-bodied population. Nevertheless, in the Murmansk Oblast, the salary of doctors of the 1st qualification level is 38% of the subsistence level of the able-bodied population, the 2nd level — 41.3%, the 3rd level — 46.4%, the 4th one — 50.5% (in the Nenets Autonomous District — 46.9%, 49.1%, 52.5%, 54.2%, in the Chukotka Autonomous District — 53.9%, 75.5%, 81.9%, 86.2%; in Moscow Oblast — 198.8%, 233.7%, 253.2% and 295.4%, respectively). Today, federal legislation regulating the issues of remuneration, including healthcare, is advisory in nature, so the size of the "regional" official salaries of doctors of the same qualification level can differ by 5 times, which leads to a decrease in the efficiency of the remuneration system workers, to a decrease in productivity and motivation to work, and produces problems of labor migration [25, Obukhova O.V., Bazarova I.N., Gavrilenko O.Yu., pp. 132–133]. Thus, in 2020 [45], 35 students and 32 residents received higher medical education under targeted training agreements for the Murmansk Oblast. Of the 35 graduates (specialist programs), only 9 people were employed, 10 people unilaterally terminated the contracts, 2 people did not fulfill their obligations for good reasons and 14 people continued their studies under the residency program. Of the 32 residents, 19 people were employed in regional medical organizations, 11 persons refused to be employed without any reasonable excuse. Today, hospitals in the Murmansk Oblast are only 58% full of doctors, medical institutions lack more than 1000 specialists [46].

The issues of wages are particularly relevant in relation to the work attitudes and migration moods of the youth of the Russian Arctic and the changes in the pension sector: according to recent sociological studies, the modern pension reform had a negative impact on the migration attitudes of the Arctic youth: "*distrustful of the promises of a decent standard of living after retirement, most of them are concerned about the fact that, with a lower life expectancy than in developed countries, an additional five years of work will shorten life expectancy*" [26, Gushchina I.A., Yakovchuk A.A., pp. 63–64].

[45] Annual report on the progress of implementation and evaluation of the effectiveness of the state program of the Murmansk Oblast "Health Development" for 2020. URL: https://minzdrav.gov-murman.ru/documents/programs/gosproject/gp-report/poyasnitelnaya-zapiska-2020.pdf (accessed 17 February 2022).

[46] Ukomplektovannost' vrachami v Murmanskoy oblasti sostavlyaet 58% [Staffing with doctors in the Murmansk Oblast is 58%]. URL: https://ria.ru/20190530/1555111266.html (accessed 18 February 2022).

In addition to indicators of material well-being, the quality of life of the population is assessed by the level of comfort of living: housing conditions play a special role in shaping youth employment strategies and their migration moods. Today, more than 30% of the population of the Russian Arctic needs to improve their housing conditions, while providing housing for Arctic settlements is an acute problem that requires significant capital expenditures for the construction and maintenance of infrastructure [27, Pavlenko V.I., Kutsenko S.Yu., p. 53]. Almost 30% of housing [47] recognized as emergency is in the Arctic zone; about 80% of housing needs major repairs; 322 thousand people live in emergency housing. In the Yamalo-Nenets Autonomous Okrug [48], 10% of the housing stock is recognized as emergency and is subject to demolition, the annual rate of recognizing housing as emergency reaches 200 thousand square meters. (in the city of Salekhard, the average percentage of depreciation of preschool educational institutions is 99%; the city of Labytnangi has no central supply of clean drinking water; in the Priuralskiy municipal district, the level of depreciation of water disposal facilities is 53%, heat supply — 81%, water supply — 61%). In the Nenets Autonomous Okrug [49], only 40% of the housing stock is equipped with all types of amenities (in the city of Naryan-Mar, the deterioration of sewerage networks is 65%, water supply — 82%); 22.8% of families are registered as those in need of better living conditions. In the Murmansk Oblast, 30–50% of water does not reach consumers due to a high percentage of depreciation; heat losses in networks are 8%; the degree of depreciation of fixed assets in the production, transmission and distribution of steam and hot water, air conditioning — 79%, intake, purification and distribution of water — 55.7% [50].

The overall state of transport infrastructure does not provide the necessary quality of life in the regions of the Russian Arctic [28, Melnichuk V.A., Samarin A.M., p. 51]: the modern Arctic

[47] Arktika kak bol'shaya stroyploshchadka — no dlya kogo, i za kakie den'gi? [The Arctic is like a big construction site - but for whom, and for what money?]. URL: http://ancb.ru/publication/read/11053 (accessed 18 February 2022).

[48] Osobennosti zhilishchnogo stroitel'stva v Arkticheskoy zone Rossiyskoy Federatsii [Features of housing construction in the Arctic zone of the Russian Federation]. URL: http://council.gov.ru/activity/activities/roundtables/126006/ (accessed 18 February 2022); Strategiya sotsial'no-ekonomicheskogo razvitiya Yamalo-Nenetskogo avtonomnogo okruga na period do 2035 goda [Strategy for socio-economic development of the Yamalo-Nenets Autonomous Okrug for the period up to 2035]. URL: https://www.economy.gov.ru/material/file/8f625fc17c793fe19282005c51294d88/proekt_strategii.pdf (accessed 18 February 2022).

[49] Tipichnye problemy dlya regionov Arkticheskoy zony [Typical problems for the regions of the Arctic zone]. URL: http://nvinder.ru/article/vypusk-no-20-21077-ot-4-marta-2021-g/91210-tipichnye-problemy-dlya-regionov-arkticheskoy (accessed 18 February 2022); Otchet glavy munitsipal'nogo obrazovaniya "Gorodskoy okrug "gorod Nar'yan-Mar" o rezul'tatakh svoey deyatel'nosti i deyatel'nosti administratsii munitsipal'nogo obrazovaniya "Gorodskoy okrug "gorod Nar'yan-Mar" za 2020 god [Report of the head of the municipality "City District" City of Naryan-Mar "on the results of its activities and the activities of the administration of the municipality "City District" City of Naryan-Mar "for 2020]. URL: https://www.adm-nmar.ru/vlast/glava-administratsii-/ (accessed 18 February 2022).

[50] Na poteri v setyakh vodosnabzheniya predlozhili vvesti normativ [It was proposed to introduce a standard for losses in water supply networks]. URL: https://kn51.ru/2020/10/13/na-poteri-v-setyah-vodosnabzheniya-predlozhili-vvesti-normativ.html/ (accessed 04 February 2022); Zhilishchnoe khozyaystvo v Rossii — 2019 g [Housing in Russia – 2019]. Https://gks.ru/bgd/regl/b19_62/Main.htm (accessed 04 February 2022).

transport system is characterized [51] by underdevelopment and low technical condition of the transport network, high depreciation of rolling stock, etc. Thus, in the Zapolyarniy municipal district of the Nenets Autonomous Okrug, 92.1% of the population lives in settlements that do not have regular bus service to the administrative center [52]. In the Chukotka Autonomous Okrug, almost every settlement is isolated due to the lack of land transport infrastructure (with neighboring settlements and the district center): 100% of the population of the Anadyrskiy municipal district, 71.6% of the Chukotskiy district, 23.4% of the Bilibinsky district [53] live in settlements without regular transport communication with the administrative center.

The issues of transport accessibility are relevant in the aspect of supplying remote Arctic settlements with food and the formation of the necessary stocks of products and essential goods [29, Ivanov V.A., p. 601]. Thus, the supply of fresh food to the stores of the Iultinskiy district of the Chukotka Autonomous Okrug depends on sea supplies; at the same time, the specificity of the redistribution of products within the district is that during navigation periods, the stores of the district center are replenished with imported goods, while rural stores — with products that have not been sold in the district center and have expired [30, Davydova E.A., p. 38]. In case of interruptions in sea supplies, food is delivered by air, but the prices for "air deliveries" are 8-10 times higher than the prices for "navigation supplies" [54]. This situation, along with limited agricultural opportunities due to the uncomfortable natural and climatic conditions of the Arctic, negatively affects the qualitative characteristics of the labor potential of the Arctic settlements: according to Rosstat [55], in Chukotka AO, the share of men who eat at least 400 grams of fruit and vegetables daily is only 1.66%, the share of women — 0.61% (for comparison, in Moscow Oblast — 12.55% and 11.68%, in the Russian Federation average — 10.59% and 11.61%, respectively).

Conclusion

An analysis of the socio-economic situation of young people in the regions of the Arctic zone of Russia shows that the "*problematic present*" has a negative impact on the qualitative characteristics of the labor potential of the Russian Arctic:

- high level of adolescent morbidity for certain classes of diseases, produced by the resource specificity of single-industry settlements;
- high proportion of low-income households with children;
- low level of living comfort, including unsatisfactory housing conditions, as well as low transport accessibility, limiting the possibilities of food supply for the Arctic settlements, and

[51] Tendentsii razvitiya transportnoy infrastruktury rossiyskoy Arktiki [Trends in the development of transport infrastructure in the Russian Arctic]. URL: http://rosacademtrans.ru/arktika/ (accessed 17 February 2022).
[52] Database "Indicators of municipalities". URL: https://rosstat.gov.ru/munstat (accessed 12 January 2022).
[53] Ibid.
[54] Vlasti Chukotki dogovorilis' o dostavke prodovol'stviya na pyati sudakh [The authorities of Chukotka agreed on the delivery of food on five ships]. URL: https://www.interfax.ru/russia/800205 (accessed 18 February 2022).
[55] Vyborochnoe nablyudenie sostoyaniya zdorov'ya naseleniya [Selective observation of the state of health of the population]. https://gks.ru/free_doc/new_site/zdor21/publishsite_2021/index.html (accessed 14 February 2022).

the possibility of obtaining services in the areas of employment, education and vocational training;

- opportunistic nature of youth employment; high level of youth unemployment among skilled workers and employees against the background of a low level of their employment, including employment for the first job associated with the profession or specialty received;
- selectivity of the operation of norms in the field of social and labor partnership in relation to employees of budgetary institutions at the regional and municipal levels due to the "*recommendatory*" nature of the relevant regulatory legal acts of the federal level, primarily in terms of setting official salaries. In this aspect, the issues of remuneration in the public sector are relevant, in particular, in the healthcare sector, where there is an acute issue, de jure, of the permanent part of wages — salaries, which should not include various types of compensatory and incentive payments (including northern allowances), de facto, about the variable part of wages — allowances, subjectively and with variable frequency, set by the heads of specific institutions, the amounts of which, firstly, depend on regional and municipal budgets, and secondly, it is several times less than the subsistence level of the able-bodied population.

Problems of this kind form the "*unpromising future*" of the regions and local communities of the Russian Arctic, negatively affecting the migration moods and life strategies of young people.

It is also necessary to focus on the fact that the main obstacles to a qualitative analysis of the socio-economic situation of young people in the Russian Arctic regions, limiting the possibility of developing effective directions for appropriate state policy measures, are the narrowness of the set of statistical indicators characterizing the socio-economic situation of youth, and the closeness of regional executive authorities and local governments in terms of providing information on certain aspects of the socio-economic development of regions and municipalities, and territorial employment departments in terms of providing information on the situation of youth in the labor markets.

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Intergenerational Differences of the Religiosity Level of Russian Arctic Residents in the Context of the Values Transformation in the Russian Society *

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Abstract. The article examines the problem of intergenerational dynamics of the religiosity level in post-Soviet Russia in the context of cultural transformations, combining the movement towards postsecularity and the domination of secular values of late modern societies. The paper analyzes the all-Russian data, obtained within the framework of the project "World Values Survey", as well as data on religiosity and value orientations of the population of some Russian Arctic regions, obtained with the direct participation of the author. As a result of the analysis, the author verifies several hypotheses and comes to certain qualitative results. Firstly, there is a generational shift from traditional values to secular-rational values in modern Russia (according to R. Inglehart). The beginning of this process falls on the period of the socialization of the Millennial generation, the context of which is the economic and political reforms of the 1990–2000s. Secondly, the process of the intergenerational transformation of values is organically associated with a decline in the level of religiosity, but it is "delayed" by one generation. The author offers an explanation for this desynchronisation. Thirdly, it is shown that the religiosity level of the population of the Arctic territories is lower (in general and by generations) in comparison with the all-Russian religiosity level. The factors contributing to these differences, according to the author, are the relatively low share of Muslim population in the Russian Arctic and its high level of urbanization.
Keywords: *religiosity, generation, value orientation, Russian Arctic, secularization, cultural transformation, World Values Survey*

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Introduction

Over the past century and a half, one of the fundamental trends in the cultures of modernizing societies has been a gradual but steady (and in some cases very rapid and causing massive cultural shock) increase of secularism in public consciousness, accompanied by a loss of interest in religious practices, doctrines, and moral imperatives. This trend has become part of a broader value transformation that has swept industrial societies around the world. Despite the fact that a

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number of researchers note an increase in religiosity in certain regions, primarily those that are in the orbit of Islamic cultural influence [1, Gottlieb A., pp. 80–81], the general trend remains unchanged [2, Inglehart R., p. 139]. The religious revival observed in Russia in the first post-Soviet decade affected a significant part of the population [3, Markin K.V., p. 277], but, as we will try to show below, it has become more of a generational phenomenon than a sustainable progressive process.

In Russia, due to the multi-ethnicity of its population and deep regional differences, the levels of religiosity/secularity differ significantly among the subjects of the Russian Federation and even among territories of the same subject. However, Russia's nationwide sample surveys do not adequately reflect these differences, especially in comparatively sparsely populated regions that are often overlooked by leading Russian researchers. This circumstance predetermines the importance of regional and local sociological studies for filling the existing empirical gaps: without claiming to make any broad generalizations, these works allow accumulating significant amounts of data that form the contours of the sociocultural portrait of the region, and, thus, create prerequisites for comparative interregional studies.

The present work belongs to this type of research. We verify three hypotheses in it:

- as the post-war generations change, there is a gradual decrease in the level of religiosity and an increase in secularism among the residents of the Russian Arctic;
- this process is part of a broader process of intergenerational transformation of value orientations;
- the European part of the Russian Arctic, excluding territories traditionally inhabited by indigenous peoples, due to the high level of urbanization, the industrial nature of the economy, the presence of scientific and educational centers and the composition of the population of mixed origin, is characterized by a lower level of religiosity than the Russian average, which includes regions with preserved elements of traditional society culture.

The theory of generations in Russian sociology

If we turn to the problem of conceptualization of the phenomenon denoted by the concept of "generation", it becomes obvious that it is not essentially identical to the phenomenon that is defined through the term "age cohort", which is widely used in statistics, demography, and often in sociology. According to the tradition laid down in the works of K. Mannheim, the boundaries of a generation are determined not so much chronologically, but through the general experience of socialization in specific historical and cultural conditions that differ from those of the previous and subsequent generations. According to Mannheim, people's realization that their personal formation has taken place in specific historical conditions does not necessarily lead to a monolithic unity of values, worldview and political views, but sets the unity of the socio-historical "location" and a common range of meaningful life issues for these people. At the same time, within one gen-

eration, separate "fractions" can be observed, the origin of which can already be associated with class, estate, professional differentiation within a generation [4, Mannheim K.].

In line with Mannheim's ideas about generations as special socio-cultural communities that replace each other in time, the theory of generations was formed and developed in the second half of the 20th century. The modern version of this theory is usually traced back to the works of N. Howe and W. Strauss in the 1990s [5, Strauss W., Howe N.]. They proposed their own periodization of generations for the 20th century, which up to the present time remains very popular in various kinds of scientific and journalistic works. It is important to note that the empirical basis of the Howe-Strauss model was data on various aspects of life of the US population over the past century. This circumstance automatically implies the need for its adaptation, taking into account the historical, cultural and socio-political realities of the society to which it is planned to be applied. Examples of this kind of adaptation to the realities of the Soviet/post-Soviet society can be found in the works of a number of domestic researchers published over the past quarter of a century (for more details, see: [6, Maksimov A.M., pp. 5–6]).

Table 1 presents both the original periodization (generational change model) by W. Strauss and N. Howe, and its modifications, taking into account the specifics of the historical development of the USSR/Russia in the 20th – the beginning of the 21st centuries, authored by such prominent sociologists as Yu.A. Levada and V.V. Radaev.

Table 1

Models of generational change in the second half of the 20th – the beginning of the 21st centuries

Model by W. Strauss and N. Howe	**Model Yu.A. Levada**			**Model V.V. Radaev**		
Generation (period of birth)	Generation	Period of birth	Period of growing up	Generation	Period of birth	Period of growing up
-	"Thaw"	1929–1943	1953–1964	Thaw generation	1939–1946	1956–1964
Post-war baby boom generation (1946–1964)	"Stagnation"	1944–1968	1964–1985	Generation of stagnation	1947–1967	1964–1984
Generation X (1965–1983)	"Perestroika" and "reforms"	since the late 1960s	1985–1999	Reform generation	1968–1981	1985–1999
Generation Y (1984–1999)				Millennial generation	1982–2000	1999–2016
Generation Z (2000–2015)				Generation Z	since 2001	since 2016

It is easy to notice that V.V. Radaev's and Yu.A. Levada's intervals of birth and growth years are not identical for different generations; it reflects the idea of the uneven pace of the historical process and once again emphasizes the idea that generational boundaries do not coincide with the boundaries of age cohorts.

In the models presented, there is some variation in chronological boundaries for the same generations. As a result, the extreme age groups of each generation intersect with representatives of the "neighboring" generations that are close in age, which gives rise to the phenomenon of the

so-called “echo generations”. In turn, this requires the allocation for each generation of its age “core”. Comparison of the age limits of generations in different models made it possible to solve this problem. The chronological framework of the “core” of the generation ranges from 9–15 years. The “thaw generation” included people born in 1930–1945, the Soviet “baby boomers” (“generation of stagnation”) — 1950–1965, “generation X” — 1971–1980, “millennials” — 1984–1993 and “generation Z” — 1997–2010.

Regarding the last generation, it should be clarified that referring its lower limit (by year of birth) to the beginning of the 2000s seems to be excessively conditional, if not formal. It is commonplace to say that the specific cultural context of Generation Z in which the socialization of its representatives takes place is the completion of the digital information and communication environment, the widespread use of mobile digital devices, the general availability of the Internet and the routine use of various digital gadgets. In Russia, all of the above occurred in the second half of the 2000s – early 2010s. During this period, those born after 2000 began to go to school, and people born in the second half of the 1990s were in their teenage years and adolescents. From this point of view, it is advisable to designate the approximate boundaries of generation Z in the range of 1995–2015, which does not contradict the placement of the “core” of generation Z in the time boundaries indicated above [6, Maksimov A.M., p. 7].

The phenomenon of religiosity in post-Soviet Russia

The return of the rhetoric of religious teachings to the public discourse, the political activation of religious organizations and movements, some external signs of clericalization — all these phenomena, observed today in many secular societies that have successfully passed the stage of modernization, prompted Western researchers to examine secularization theory more seriously and have triggered a broader discussion to revise their ideas about the very nature of the secularization process, how it occurred historically in Europe and beyond its borders, its universality and irreversibility, as well as the nature of the religious renaissance in developed countries [7, Gorski P.S., Altmordu A., pp. 68–75; 8, Inglehart R., pp. 3–32; 9, Possamai A., pp. 823–826].

One of the leading sociologists of religion, Adam Possamai, points out that the functioning of modern religiosity should be interpreted differently than religious institutions in traditional societies: in the context of global capitalism, the state of post-secularity [for more details see: 10, Habermas J.] reflects the way the elites of modernized societies make systematic efforts to integrate various kinds of religious groups. If successful, this reduces the potential for conflict between these groups (as well as between believers and non-believers), institutionalizes and controls their relationships, and allows the elites to appropriate the symbolic capital of religious leaders and organizations. Thus, the penetration of religious doctrines and practices into the public space is of a controlled nature, accompanied by their inclusion in a modern, secular in essence, culture and subordinates them to the norms of a secular state. As a result, there is not a desecularization of

Modern societies, but only a greater stabilization of their political and cultural subsystems [9, Possamai A., pp. 828–829].

Without delving into the question of the strengths and weaknesses of Possamai's logic and the validity of his arguments, two conclusions follow from his interpretation, which make it possible to clarify the phenomenon of the post-Soviet flourishing of religious identities in Russia:

- the active presence of religious associations and their leaders in the public sphere of modern societies [1] is in most cases not accompanied by either a return to religious norms as regulators of routine social practices, or a massive rejection of secularized culture and rational perception of the world in favor of religious and mystical ideas;
- if the movement towards modernization at the initial stage was associated with the suppression of those religious groups that acted as agents of preserving the institutions and values of the traditional society, then in the future, the weakening of political pressure on these groups (which is one of the results of successful modernization) will lead to their hyperactivity and make the task of their reintegration into modern society urgent.

Political liberalization, which began in our country back in Perestroika and unfolded throughout the 1990s, caused a rapid increase in the number of those who defined themselves as believers, the majority of whom were Orthodox Christians, whose share increased almost threefold during the first post-Soviet decade [3, Markin K.V., p. 277]. At the same time, all surveys show an extremely low percentage of those who can be called church-bound, that is, they regularly practice religious rites and interact with representatives of the clergy, who know the basics of dogma and share the principles of religious morality [11, Emelyanov N.N., p. 35; 12, Zadorin I.V., Khomyakova A.P., p. 166, 180]. This confirms the above thesis about the preservation of the secular nature of thinking, values and corresponding habits in the modernized society among the majority of those who declare their religiosity.

There are several explanations for this phenomenon. The first one was proposed by the American sociologist Ronald Inglehart as part of his evolutionary theory of modernization. According to his approach, a systemic crisis within society and, as a result, a massive spread of a sense of insecurity of existence and uncertainty about the future, create conditions for a "conservative turn", which can be expressed, among other things, in an increase in interest in religious doctrines and practices, religiously-communal foundations of social solidarity. The avalanche-like growth in the number of those who identify themselves with any religious group, which was observed in the Soviet Union in the late 1980s and in post-Soviet Russia in the 1990s, when the old system broke down and the country entered a phase of deep national crisis, represents is a vivid illustration of this mechanism [2, Inglehart R., pp. 144–145]. Indirectly, this effect is evidenced by individual

[1] The term "modern society" is used in the meaning of a society in which the process of economic, political and scientific and technical modernization has completed, marking the transition to a developed industrial society, i.e. modern societies in this sense are opposed to traditional ones according to D. Bell's classification.

studies of Russian scientists [13, Prutskova E.V., p. 129]. A consequence of this interpretation of the "explosive" growth in the number of Orthodox Christians in the first post-Soviet decade is the assumption that this growth was provided mainly by people born in the 1960s and 1970s, who were the core of the economically active population during the period of market reforms and should have been subjected to stress and frustration to the greatest extent in connection with the events taking place in the country. We verify this assumption on empirical data below.

Another possible explanation is related to the concept of "ethnodoxy", which describes the phenomenon when ethnocultural identity is important for an individual, but his daily existence is no longer connected with traditional folk culture, and to reinforce his identity, the individual turns to bright external markers of ethnicity, such as the dominant religion in his ethnic environment (Russian is equal to Orthodox, Chechen is equal to Muslim, etc.). As a result, according to the principle of association, ethnic and religious identities are mixed [14, Karpov V., Lisovskaya E., Barry D., p. 644].

Finally, the mass declaration of belonging to the religious mainstream can be partially explained by the fact that if such religious teachings are supported by national or regional political elites, ordinary citizens perceive these teachings as elements of state ideology. Public adherence to Orthodoxy, if we are talking about Russia as a whole, or, for example, to Islam (in some subjects of the Russian Federation), performs the function of demonstrating loyalty to the state and its agents, including public opinion polls, which are often perceived as such [3, Markin K.V., p. 279]. This approach allows and explains the continued growth in the number of believers during the period of stabilization of the Russian economic system in 2000 – early 2010s: during this period, Russian millennials (generation Y) entered adulthood, the most politically conformist part of them in the conditions of political regime consolidation and its gradual rhetorical turn towards conservatism could be inclined to demonstrate their commitment to the dominant religious trends in the country. This assumption will also be tested empirically later in the text.

Religiosity of Russians in the context of intergenerational transformation of values

In order to characterize the level of religiosity of Russian citizens in general, as well as to describe the context associated with the dynamics of the value orientations of Russians, we turned to the data of the World Values Survey (WVS), cross-country comparative study, in particular, to the results of large-scale surveys of the 6th and 7th "waves" (2010–2014 and 2017–2020, the sample for Russia for the 6th wave was 2500 people; for the 7th — 1810 people).

In the WVS methodology, the axes "traditional values – secular-rational values" and "survival values – self-expression values" are singled out as key "value axes" [15, Welzel C., Inglehart R., pp. 48–56]. In specific societies, the value orientations of their members are distributed between the poles of these axes, reflecting the degree of adherence to one or another (traditionalist or modern/postmodern) value systems. Within the framework of this article, we are interested in the position of modern Russia along the first of two axes.

The position of Russia on the map of cultures (in terms of dominant value orientations in society) by R. Inglehart and K. Welzel is shown in Figures 1 and 2.

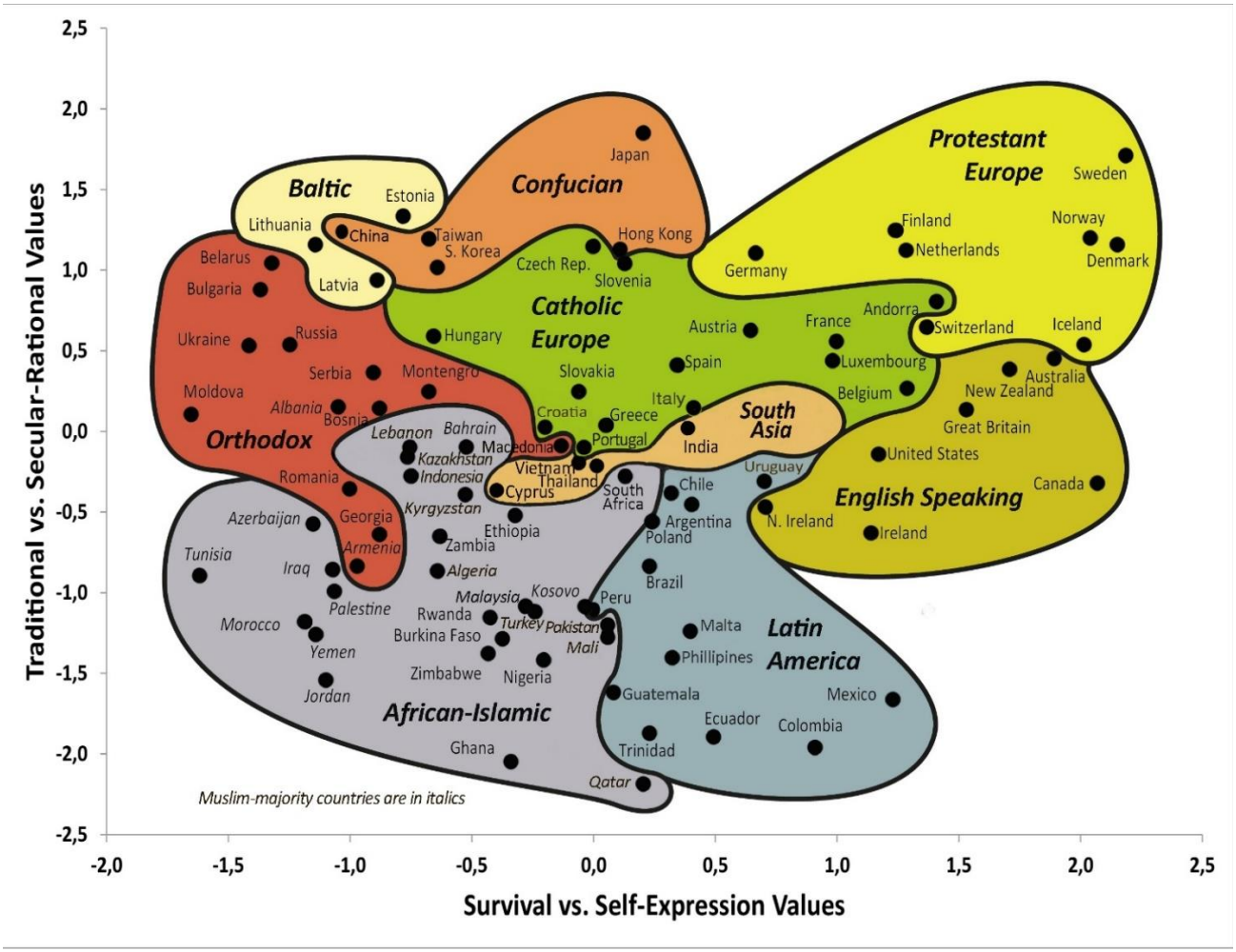


Fig. 1. World map of cultures by R. Inglehart – K. Welzel. Based on data from the surveys of the 6th wave of the WVS, 2014 [2]

In general, over the period between the last two "waves" of research, Russia's position on the axis "traditional values – secular-rational values" has not changed — the country is located approximately in the middle of it. For comparison: the same position is taken, for example, by Austria and Iceland. The attitudes of the country's population can be characterized as moderately secular and moderately conservative. However, the integral indicator of the degree of adherence to traditional (secular-rational) values aggregates a set of particular indicators — significant differences can be observed between countries that occupy a similar position in the system of cultural (in the sense of value systems) coordinates in certain parameters. One of these parameters is the religiosity of the inhabitants of a particular country (region).

[2] The Inglehart-Welzel World Cultural Map — World Values Survey 6 (2014). URL: https://www.worldvaluessurvey.org/WVSContents.jsp (accessed 08 January 2022).

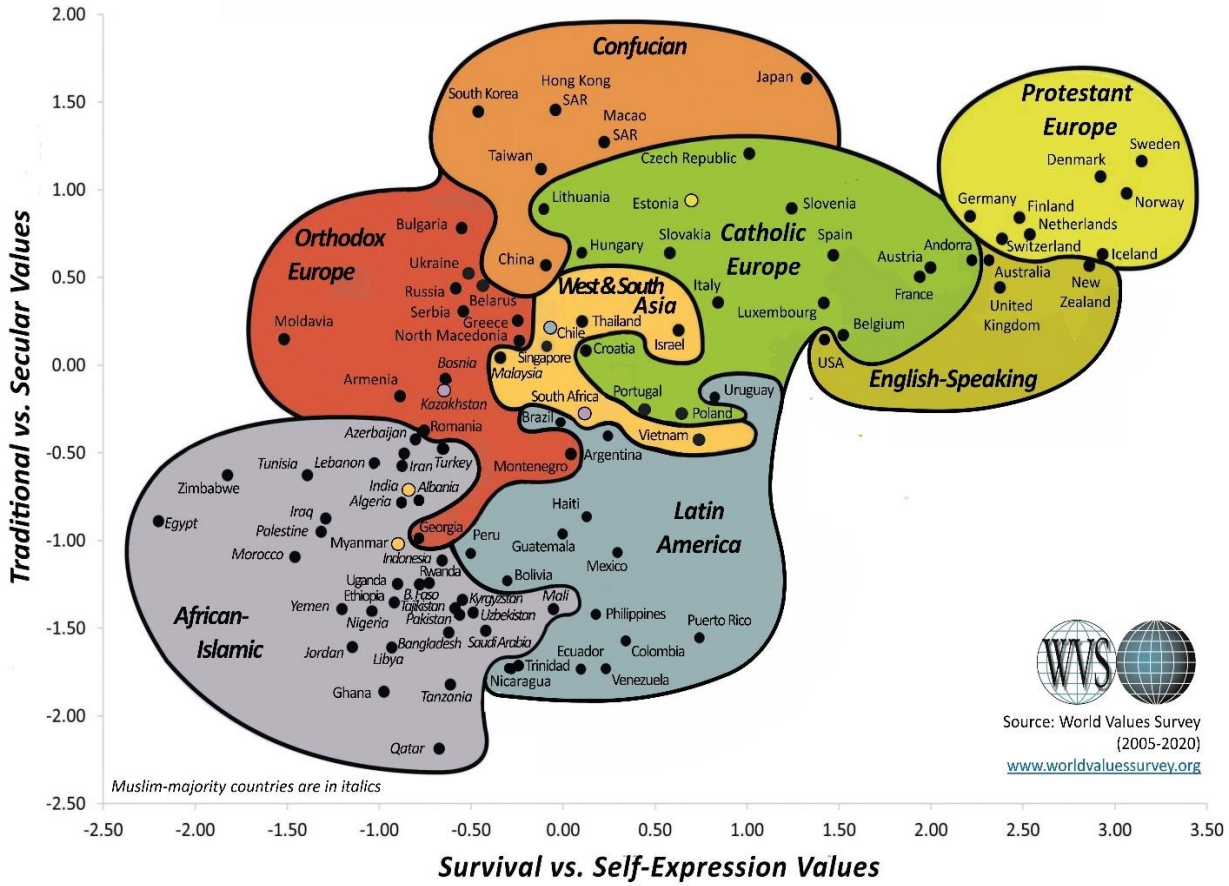


Fig. 2. World map of cultures by R. Inglehart – K. Welzel. Based on data from the surveys of the 7th wave of the WVS, 2020 [3]

In the studies of R. Inglehart and his colleagues, a number of indicators are used to determine the level of religiosity, some of which allow for a comprehensive assessment of religiosity of followers of certain religious teachings (for example, some Christian denominations), while others are more universal in nature. Among the latter, the key ones are: 1) respondents' assessment of the importance of religion in their daily lives, 2) respondents' assessment of the degree of their adherence to any religious doctrine – identifying themselves as a religious, non-religious (indifferent to religious issues) person or an atheist.

According to the indicator of the religion importance in life (important in life: religion), there are no significant intergenerational differences in the 6th wave of the WVS, however, significant ($p < 0.05$) differences were recorded in the 7th wave, although the values for the indicator under consideration and for the age indicator are weakly correlated (Table 2). These differences arise due to the contribution of the youngest post-war generation: the value of its index of the importance of religion is not only higher in comparison with other generations, but also significantly exceeds the average value of the index for the sample.

A more detailed analysis of the data leads to the conclusion that for Russia as a whole, such a high value for this index among citizens born in the late 1990s and early 2000s is achieved at the

[3] The Inglehart-Welzel World Cultural Map - World Values Survey 7 (2020). URL: https://www.worldvaluessurvey.org/WVSContents.jsp (accessed 08 January 2022).

expense of regions with a high proportion of Muslims in their population. Thus, according to the results of a survey conducted in 2017, the share of Orthodox who, when asked about the importance of religion in their lives, answered "very important" was 17.6% (17.9% in 2011), and Muslims — 50.9% (36% in 2011) [4].

Table 2

Indicators of the importance of religion in the lives of respondents[5] by generation. Based on data from surveys of the 6th and 7th waves of WVS, 2011 and 2017, respectively [6]

	Wave 6 (2010–2014) [7]	Wave 7 (2017–2020)
Baby boom generation (1950–1965)	0.65	0.60
Generation X (1971–1980)	0.68	0.61
Generation Y (1984–1993)	0.68	0.63
Generation Z (1997–2002)	-	**0.73**
For the sample as a whole	0.67	0.64

Table 3

Distribution of respondents with different values of the indicator of the importance of religion in life by individual religious groups (data for Generation Z (born 1997–2002), in % (by line) [8]

The importance of religion in life of respondents	Confessional affiliation		
	Does not belong to any religion	Orthodox	Muslim
Very important	14.3	0	85.7
Rather important	11.5	76.9	11.5
Not very important	56.8	40.5	2.7
Not important at all	67.9	32.1	0

If we turn to the answers of respondents, whom we classify as generation Z, then 85.7% of those who indicated the high importance of religion in their lives are Muslims (Table 3). The share of such respondents in the group of Muslims of generation Z is 60%, more than among Muslims of any other generation (Orthodox zoomers, on the contrary, showed the lowest value of the indicator under consideration).

Figures 3 and 4 clearly show intergenerational differences in terms of religious self-identification (identification with groups with varying degrees of declared religiosity).

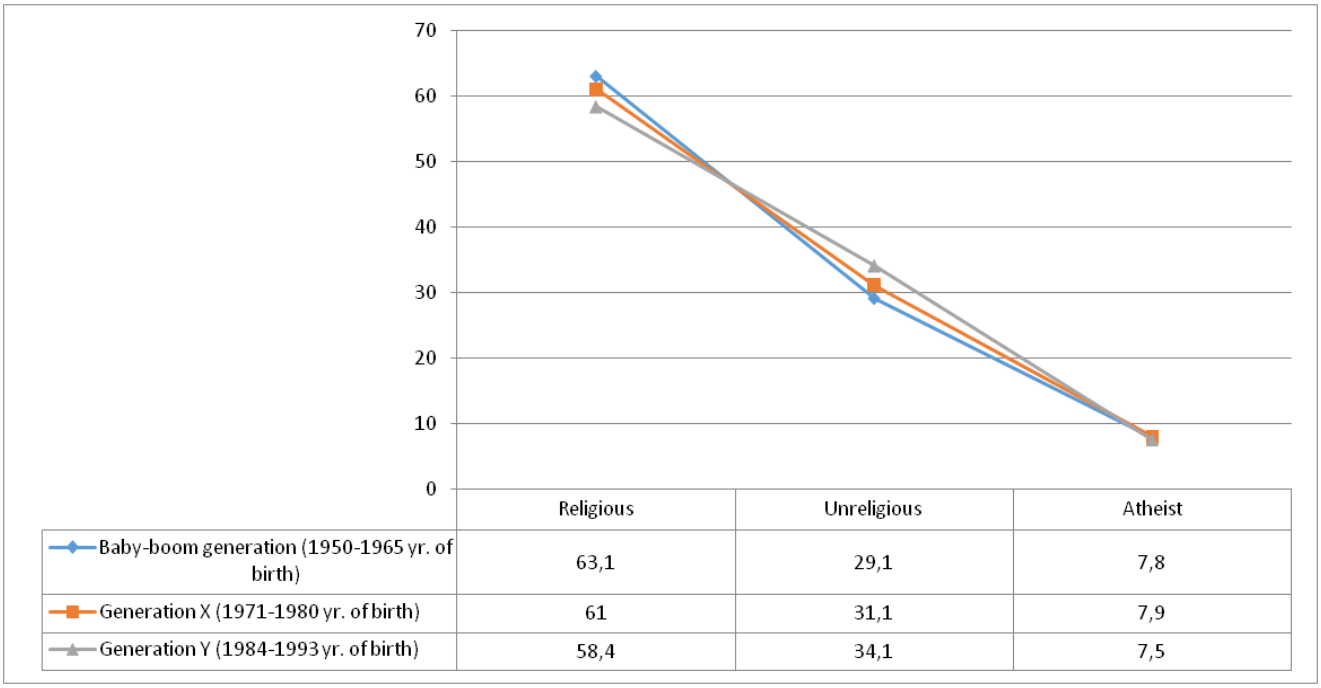
[4] Data are provided only for those religious groups whose share in the sample was at least 2%, i.e. value comparable (not less) with the value of the confidence interval.

[5] The indices are calculated as the ratio of the subsample mean value to the number of scale values.

[6] Sources: Inglehart R., Haerpfer C., Moreno A., Welzel C., Kizilova K., Diez-Medrano J., Lagos M., Norris P., Ponarin E., Puranen B. et al., eds. 2014. World Values Survey: Round Six - Country-Pooled Datafile Version. Madrid: JD Systems Institute. URL: www.worldvaluessurvey.org/WVSDocumentationWV6.jsp (accessed 08 January 2022); Haerpfer C., Inglehart R., Moreno A., Welzel C., Kizilova K., Diez-Medrano J., Lagos M., Norris P., Ponarin E., Puranen B. et al., eds. 2020. World Values Survey: Round Seven - Country-Pooled Datafile. Madrid, Spain & Vienna, Austria: JD Systems Institute & WVSA Secretariat. URL: https://www.worldvaluessurvey.org/WVSDocumentationWV7.jsp (accessed 08 January 2022).

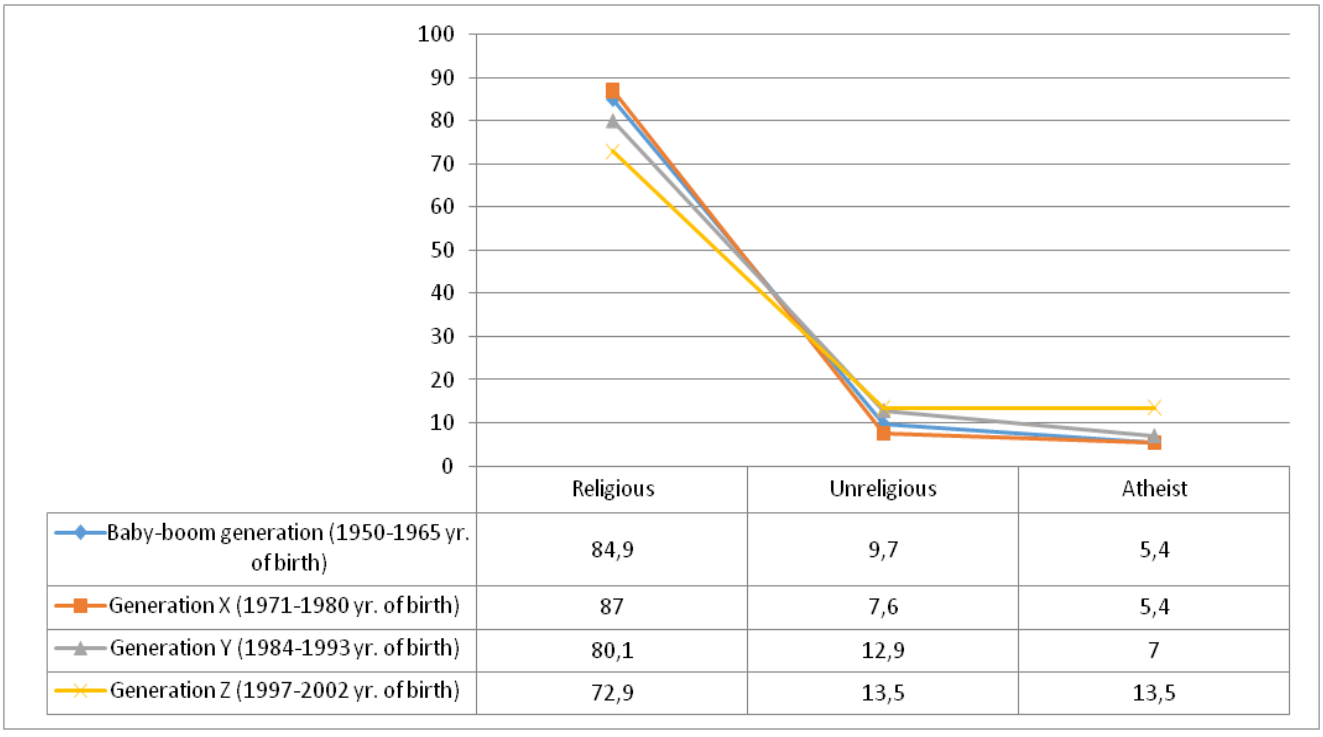
[7] Representatives of generation Z did not take part in the survey of the 6th wave of WVS, since at the time of the survey they were not adults. In this regard, hereinafter, for the 6th wave of WVS, data are given for three post-war generations.

[8] Source: Haerpfer C., Inglehart R., Moreno A., Welzel C., Kizilova K., Diez-Medrano J., Lagos M., Norris P., Ponarin E., Puranen B. et al., eds. World Values Survey: Round Seven - Country-Pooled Datafile. Madrid, Spain & Vienna, Austria: JD Systems Institute & WVSA Secretariat. 2020. URL: https://www.worldvaluessurvey.org/WVSDocumentationWV7.jsp (accessed 08 January 2022).



	Religious	Unreligious	Atheist
Baby-boom generation (1950-1965 yr. of birth)	63,1	29,1	7,8
Generation X (1971-1980 yr. of birth)	61	31,1	7,9
Generation Y (1984-1993 yr. of birth)	58,4	34,1	7,5

Fig. 3. Distribution of respondents from different generations by level of religiosity based on declared religious self-identification, in %. WVS. 2011, n=2500.



	Religious	Unreligious	Atheist
Baby-boom generation (1950-1965 yr. of birth)	84,9	9,7	5,4
Generation X (1971-1980 yr. of birth)	87	7,6	5,4
Generation Y (1984-1993 yr. of birth)	80,1	12,9	7
Generation Z (1997-2002 yr. of birth)	72,9	13,5	13,5

Fig. 4. Distribution of respondents from different generations by level of religiosity based on declared religious self-identification, in %. WVS. 2017, n=1810.

The general conclusion from the data obtained can be reduced to two theses:

- all post-war generations, except generation Z (late 1990s–2000s), have a similar distribution between religious, non-religious and atheists; at the same time, as expected theoretically, there is a very high proportion of people among generations X and Y who identify themselves as believers; in 2017 survey, the percentage of such persons is noticeably higher compared to the shares of those who indicated the importance of reli-

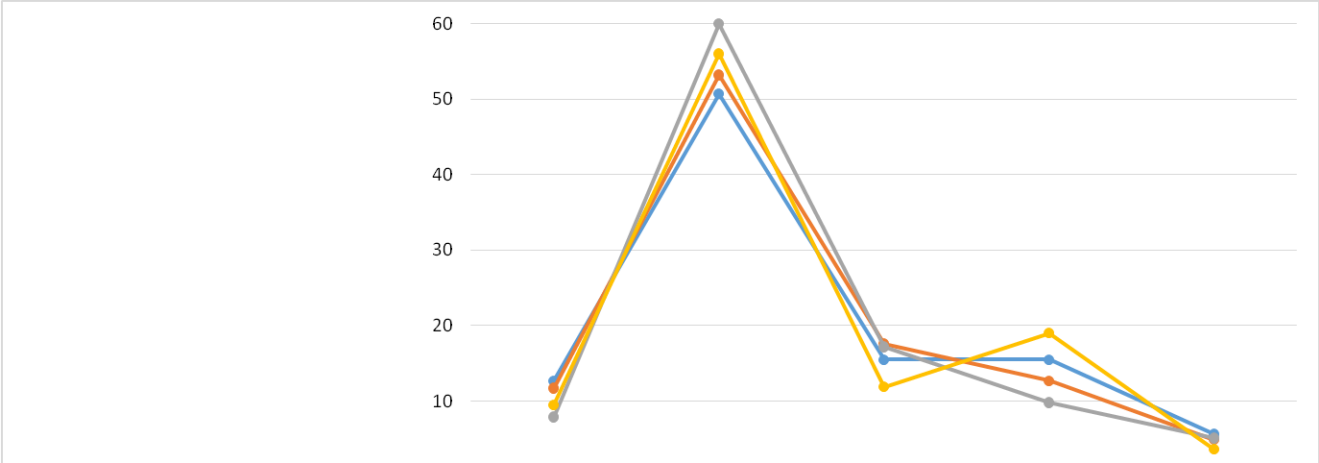
gion in their lives; in other words, declared religiosity is growing, while the subjective significance of religiosity is declining — of all the theoretical explanations, the most relevant is the interpretation of the growth of declared religiosity as a demonstration of loyalty to the state and solidarity with the publicly broadcast ideology of the Russian elite, in which the conservative and statist components were strengthened throughout 2010s;

- representatives of generation Z, despite the increase in the number of those for whom religion is an important part of their lives, declare their religiosity to the least extent (in comparison with other generations) and to the greatest extent — religious skepticism and atheism; "digital natives", thus, act as conductors of the global trend of post-secularity, when religious teachings, on the one hand, are not driven into marginal cultural niches, but on the other hand, adapting, they are built into a pluralistic (cultural diversity) culture, initially based on secular values.

Intergenerational differences in the level of religiosity of residents of the Arctic zone of the Russian Federation

As an empirical basis for the analysis of intergenerational differences in the level of religiosity, determined through self-identification, data obtained during the implementation of the research project supported by the Russian Foundation for Basic Research "The influence of intergenerational differences in the value orientations of the population of the Arctic zone of the Russian Federation on the economic development of its territories" (field stage completed in 2020), as well as (as a source of additional data) the materials of another project supported by the Russian Foundation for Basic Research "Value and cognitive factors of entrepreneurial behavior of the population of the Arctic territories of Russia" (field stage completed in 2018) was used. The author of this article was directly involved in both projects.

The 2018 survey included residents of the Yamalo-Nenets Autonomous Okrug and the Arctic territories of the Arkhangelsk Oblast. The sample (within the age limits set for the studied post-war generations) was 646 people. Since the research topic did not directly concern the religiosity of the inhabitants of the Arctic regions, only one indicator was used to measure the level of religiosity, based on the respondent's self-identification with groups with varying degrees of adherence to religious beliefs, placed on a 5-rank scale (from those who not only declare their religiosity, but also indicates the regularity of visiting temples and observance of rituals up to persons who define themselves as atheists). We present these data (figure 5) in order to compare the level of religiosity of different generations over time (including identifying the possible effect of the COVID-19 pandemic).



	Religious: I'm attend church (mosque, synagogue) regularly, observe rituals	I believe in God, but I consider it optional to go to church regularly, to observe rituals	I do not profess any religion, but I believe in supernatural power	I doubt the existence of God and supernatural powers	Earnest atheist
Baby-boom generation (1950-1965 yr. of birth)	12,7	50,7	15,5	15,5	5,6
Generation X (1971-1980 yr. of birth)	11,7	53,2	17,6	12,7	4,9
Generation Y (1984-1993 yr. of birth)	7,9	60	17,2	9,8	5,1
Generation Z (1997-2002 yr. of birth)	9,5	56	11,9	19	3,6

Fig. 5. Distribution of respondents from different generations by level of religiosity based on declared religious self-identification, in %. 2018, n=646.

In general, the 2018 data for the Arctic territories of the two constituent entities of the Russian Federation are consistent with the all-Russian pattern: equally high rates of declared religiosity in all generations and a relatively high proportion of religious skeptics among representatives of generation Z (as well as in the generation of the Soviet post-war Baby boom, which can probably be explained by the inertia of Soviet secular education in case of the most “indoctrinated” representatives of this generation).

In 2020, the author of the article, together with his colleagues from the FECIAR Ural Branch of the Russian Academy of Sciences, conducted more than two hundred in-depth interviews with residents of four constituent entities of the Russian Federation, the territories of which are part of the Arctic zone of the Russian Federation (“Arctic” municipalities of the Murmansk and Arkhangelsk oblasts, Nenets and Yamalo-Nenets Autonomous okrugs). The sample of interviewees was quota by gender, age and region of residence. Quotas were set in such a way as to have approximately equal representation of each of the studied generations in the sample. During the study, the emphasis was on obtaining qualitative data, but along with the interviews, a formalized survey of an exploratory nature was also implemented. The key goal of this survey was to identify common socio-cultural characteristics of the population of the regions of the Russian Arctic, represented by different generations, understood as socio-historical communities with similar cultural experience, values, attitudes and patterns of behavior. It was in the course of a formalized survey that both the level of religiosity of the inhabitants of the Russian Arctic and their value orientations were measured. Despite the fact that the total number of respondents (n = 212) is not enough to ensure high accuracy of the data, the random nature of the selection of respondents

allows us to consider the sample representative and the data reliable enough to determine the most obvious intergenerational differences in the value systems of the respondents.

As part of our study, traditionalism/secularity (rationality) indices were calculated on the basis of ten variables borrowed from the questionnaire used during the 7th wave of the World Values Survey [9]. These variables were used to measure the attitude of respondents to the values of work, family, religion, loyalty to the subjects of political power, tolerance for abortion, divorce, euthanasia, as well as the degree of expression of national pride. The variables were selected according to the principle of the highest correlation coefficients with the values along the axis "traditional values – secular-rational values" determined in earlier studies by R. Inglehart and K. Welzel [15, Welzel C., Inglehart R., pp. 49–53].

As indicators of the level of religiosity, the question of the importance of religion in the life of the respondent was used (a 5-rank ordinal scale), as well as the question of the respondent's self-identification as a believer/non-believer (also a 5-rank ordinal scale with a qualitative description of its values). The index values for the first indicator demonstrate a linear relationship between the importance of religion and age: the older the respondents, the higher the corresponding values (table 4) [10]. At the same time, checking the statistical significance of the relationship between two variables (belonging to a generation and the importance of religion), the Chi-square test gives a negative result ($p > 0.1$) — the difference in values is not so great as to talk about a significant cultural "gap" between generations, although the general trend towards growing secularism in consciousness from generation to generation is quite observable.

Table 4

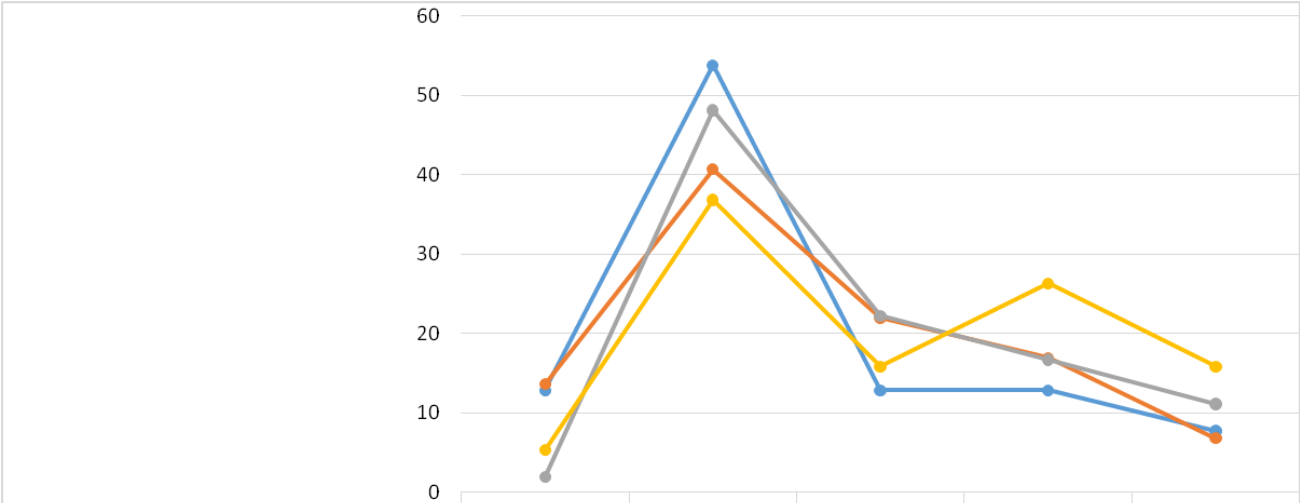
Indices of the importance of religion in the lives of respondents [11] by generation. 2020, n=212

	Index of the importance of religion
Baby boom generation (1950–1965)	0.62
Generation X (1971–1980)	0.55
Generation Y (1984–1993)	0.48
Generation Z (1997–2002)	0.44
For the sample as a whole	0.52

The connection between the belonging to a generation and the religious self-identification of respondents is even less evident. Chi-square testing also shows no statistical significance between the two variables. At the same time, some peculiarities can be noted in the answers of respondents belonging to different generations (Fig. 6). Thus, the representatives of the youngest generation who were born and/or socialized in the era of the total spread of digital technologies and the triumph of cultural globalization are the most prone to religious skepticism. They are also the least likely to identify themselves as believers.

[9] WVS-7 Master Questionnaire 2017–2020 English. URL: https://www.worldvaluessurvey.org/WVSDocumentationWV7.jsp (accessed 08 January 2022).
[10] Here and below, we do not provide data by regions due to the fact that the comparison of regional subsamples using the Kruskal-Wallis test did not reveal significant differences in the indicators of interest to us.
[11] The indices are calculated as the ratio of the subsample mean value to the number of scale values.

It is worth noting that we found no significant correlations between the level of religiosity on the one hand and self-esteem of income or level of education on the other. Thus, neither financial status nor education, in contrast to generational affiliation, has any influence on religiosity among the residents of Russia's Arctic territories.



	Religious: I'm attend church (mosque, synagogue) regularly, observe rituals	I believe in God, but I consider it optional to go to church regularly, to observe rituals	I do not profess any religion, but I believe in supernatural power	I doubt the existence of God and supernatural powers	Earnest atheist
Baby-boom generation (1950-1965 yr. of birth)	12,8	53,8	12,8	12,8	7,7
Generation X (1971-1980 yr. of birth)	13,6	40,7	22	16,9	6,8
Generation Y (1984-1993 yr. of birth)	1,9	48,1	22,2	16,7	11,1
Generation Z (1997-2002 yr. of birth)	5,3	36,8	15,8	26,3	15,8

Fig. 6. Distribution of respondents from different generations by level of religiosity based on declared religious self-identification, in%. 2020, n=212.

The data we obtained in 2020 are generally consistent with our own data for 2018 [12], as well as with the nationwide data (World Values Survey) for 2017. The difference with the national trend is a lower level of religiosity among the population of the European part of the Russian Arctic in general and generation Z in particular. In our opinion, this is explained by the relatively insignificant proportion of Muslims in general and young Muslims in particular in the population of the surveyed territories [13], which somewhat correct the values of key indicators of the level of religiosity in the direction of their increase on the scale of Russia. The differences observed can also be explained by the higher level of urbanization in the Arctic regions: in comparison, the rural population is a better bearer of traditional norms and values, including religiosity, than the urban population.

[12] Observed differences, for example, in the baby boomer generation, are explained by the difference in the structure and size of the samples and the different values of the confidence interval.

[13] The Yamalo-Nenets Autonomous Okrug is a well-known exception due to the increased (compared to other Arctic regions) share of the newcomer Muslim population. However, it has a relatively small population, and the proportion of Muslims in it has not yet reached values comparable to the traditionally Muslim regions of the Volga region. In this regard, the answers of respondents from the YNAO do not change the overall picture in any significant way.

Finally, if we turn to the differences between the representatives of different generations on the axis "traditional values – secular-rational values", we can find a clear trend towards the growth of secular consciousness and the rejection of traditional values (in the interpretation of R. Inglehart and K. Welzel) as the generations change.

Based on the calculated values of the traditionality/secularity (rationality) indices, we divided all respondents into four groups: pure traditionalists (absolute predominance of traditional values), traditionalists of a mixed type (an intermediate position on the axis "traditional – secular-rational values" with a pronounced inclination towards "traditionalism"), mixed-type rationalists (secular) (the same as in the previous group, but with a more pronounced shift towards secular-rational values), pure rationalists (the absolute predominance of secular-rational values). The resulting distribution by groups for each of the generations is shown in Figure 7.

It is easy to see that, starting from generation Y, which was included in the economic and political life of the country in the period of the 2000s, a trend towards intergenerational transformation of the value system towards an increase in the proportion of adherents of secular-rational values begins to appear. By now, in the surveyed Arctic territories, the largest share of the bearers of these values is in the Z generation, where their number is approximately equal to the number of "traditionalists".

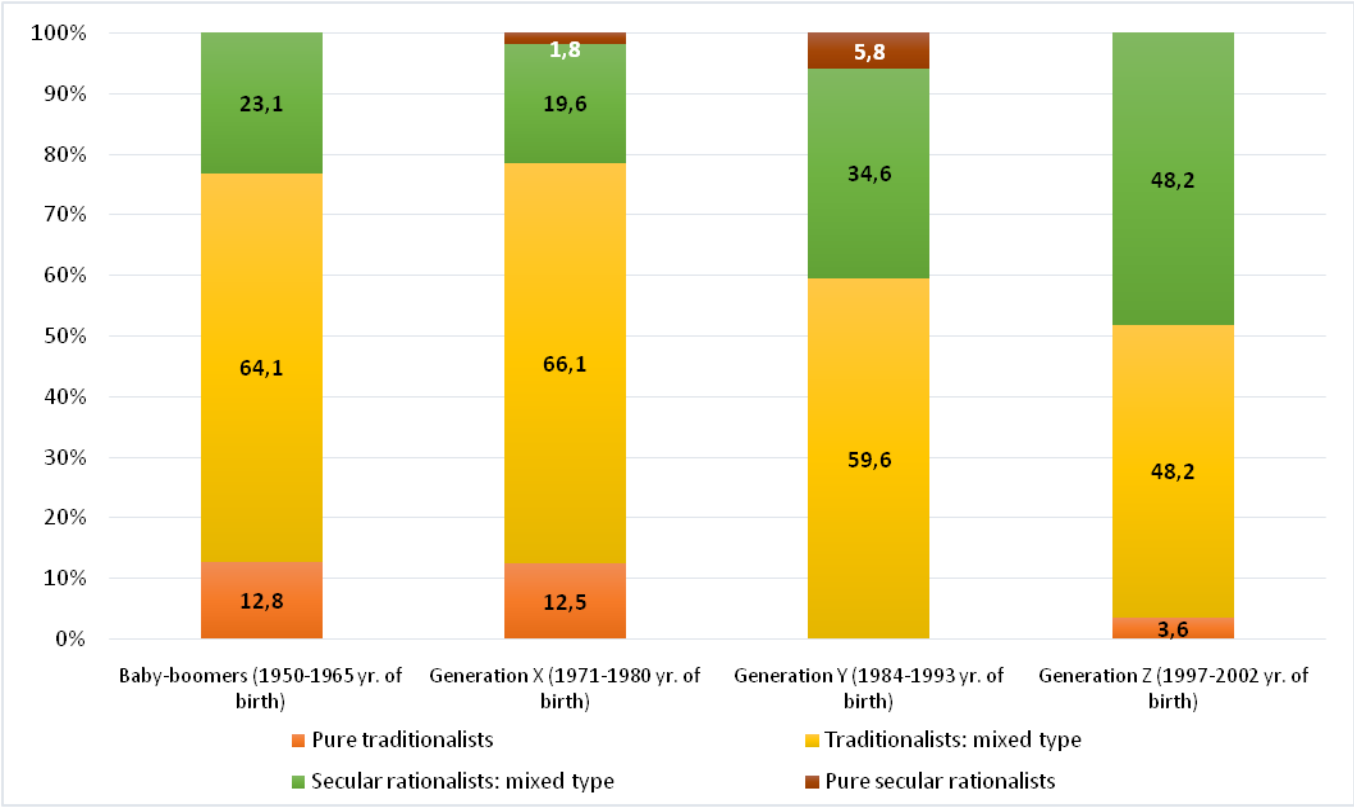


Fig. 7. Distribution of respondents from different generations by groups on the basis of differentiation of the index of traditional – secular-rational values, in%. 2020, n=212.

Conclusion

The analysis of empirical data reflecting the value orientations and religiousness levels of the population in Russia as a whole and in part of the territory of the Russian Arctic partially proved some of the hypotheses stated at the beginning of the article.

Firstly, using data from polls of the population of the Arctic territories of 4 subjects of the Russian Federation, it was found that there is a trend towards an intergenerational shift in the direction of secular-rational values; it started with the transition from the generation born in 1971–1980 to the generation born in 1984 and early 1990s, which socialized mainly in the period after market reforms and democratic transition and till the post-Soviet political and economic system stabilized at the turn of the 2000s–2010s.

Secondly, the intergenerational decrease in the level of religiosity and, consequently, the increase in religious skepticism, although part of a broader process of the above-mentioned value transformations, is not synchronized with them, which is confirmed by both all-Russian data and data on the Arctic regions. The only generation that differs in any significant way in terms of the level of religiosity is the youngest post-war generation Z, whose representatives are just entering the status of full-fledged and economically active citizens. This lack of synchronism can be explained by rising declarative religiosity, associated with a demonstration of loyalty to the state and its agents: since conservative rhetoric has been growing in the public discourse of the political elite for the past 10–15 years, adherence to the dominant religious teachings in Russia is perceived by a significant part of the population as a component of state ideology.

Thirdly, the hypothesis of a lower level of religiosity in the Arctic compared to Russia as a whole was confirmed, which we attribute to a comparatively lower share of Muslims among their population, characterized by a higher degree of religiosity. An additional factor contributing to the lower level of religiosity of the residents of the Russian Arctic is its high degree of urbanization.

At the same time, for the purposes of a more subtle and in-depth analysis of the religiosity of the inhabitants of the Russian Arctic and its connection with the intergenerational transformation of values, large amounts of data are needed, which implies an expansion of the scope of sociological research in the territories of the Russian Arctic, primarily regionally oriented mass surveys of the population.

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Assessment of the Governance of Arctic Cities in the Resilience Context *

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Abstract. The aim (research question) of the paper is to theoretically comprehend and empirically generalize the phenomenon of governance of Russia's Arctic cities in the context of their resilience (resistance to shocks and crises). The main tasks to be solved are: 1) searching for specific indicators to characterize the administrative and managerial system of a sample of Arctic cities; 2) distinguishing the types (groups) of Arctic cities according to the selected indicators of administrative and management system; 3) characterizing the local government structure of the three Arctic cities in the context of the previously conducted typology of Arctic cities according to the parameters of administrative and management system. The main results of the work are: 1) determination of the range of indicators (six) for assessing the quality of management of the 29 largest Arctic cities in terms of strengthening their resilience: these are indicators of openness to the outside world ("basicness" of the city); governance efficiency, degree of independence of decisions of city authorities; 2) identification of five clusters of cities with similar properties of the administrative and managerial subsystem: compact high-quality management, "low-cost" municipal management, "strong average" cities, significant reserves for improving management efficiency, case-anomaly; 3) institutional and geographic factors, acting together, determine the appearance of the administrative and managerial subsystem of the Arctic city. Among geographical factors, it is not latitude but longitude that is the location of the city in the European or Asian Arctic that is of primary importance; 4) For Arctic cities, where frequent natural and social force majeure demands a super-operational response to external threats, the model of power with a strong mayor is in most cases preferable to the "consensus" model of collective leadership with a weak mayor; 5) the ideal administrative and management system of the city, which implements the imperatives of basicness/openness, efficiency and autonomy to the maximum extent, and guarantees the city resilience, should have nature-like properties of self-organization, plasticity, flexibility, mobility and diversity. Their strengthening is provided by rejection of unification, including the ultimate consideration of specific features of a particular type and exploitation phase of the main natural asset nearest to the city.

Keywords: *Arctic city resilience, administrative and managerial subsystem, Arctic city management quality assessment, BES-model («basicity»-efficiency-self-sufficiency), environmentally compatible technologies and practices*

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Introduction

Among the five main urban subsystems that affect the resilience of the Arctic city, identified in the work of N. Zamyatina and co-authors [1], administrative and managerial one is of particular interest. Firstly, there are practically no special works on the peculiarities of managing Arctic cities either in Russia or in the world. This topic is dominated by works of a very wide profile: for example, the state administration of the Arctic zone as a whole, the Arctic "megaproject" [2] or work related to international cooperation in the Arctic and management of its problems through new structures created for the global Arctic in the 1990s and 2000s (Arctic Council, Conference of Parliamentarians of the Arctic Region, University of the Arctic, etc.) [3].

In Russia, the topic of managing Arctic cities is adjoined by the topic of "reloading" of single-industry cities [4–6], without a clear specification of a specific natural zone, and they, as a legacy of the industrial era, are found everywhere, both in the temperate zone of the main Russian settlement and in the North zone, and in the Arctic zone. Foreign literature develops the topics of urban management (and co-management) in general, and a significant pool of literature (dozens of works) in this direction has been accumulated in recent decades [7]. However, due to the significant specifics of the cities of the Russian Arctic, the conclusions from these works are difficult to apply. For our study, the efforts of colleagues to describe management under force majeure in the interests of ensuring the viability of socio-economic systems are of relevance [8]. But these works do not have a geographical (latitudinal) reference.

There are works on the factors and assessment of resilience of the world's Arctic cities that have appeared in recent years, which use, among others, the indicators that can be related to the administrative and management system of the city [9]. However, in this case, which is closest to our topic, the administrative and management system of the city is not distinguished separately, it is just that in the general pool of attracted indicators of urban sustainability assessment, there are those that can be conditionally attributed to the management system.

Secondly, in our practical work on the preparation of strategies for the socio-economic development of the Arctic and northern cities, we have always analyzed the state of the local government system, the quality and efficiency of local authorities (city self-government bodies). But previously, it has not been possible to summarize this accumulated experience in the form of a separate work, in the form of an analysis of the activities of the administrative and management system of the Arctic city in the framework of the resilience paradigm. Such an effort therefore seems timely, urgent and relevant.

Here, for example, is only a short list of questions that need to be addressed scientifically: What exactly are the particularities of governance in an Arctic city compared to a non-Arctic city of comparable size? Is and how is the management of an Arctic city changed during the transition from the state to the corporate model of Russian Arctic development? Do management issues differ in the coastal and "land" expanding Arctic cities?

Thirdly, in the last decade, a new idea of Arctic urbanization has been maturing as a holistic and specific phenomenon that requires a separate study [10–12]. Therefore, it seems relevant not only to isolate the Arctic cities into a separate production, but also to study the phenomenon of Arctic management, the activities of the urban administrative and management subsystem, taking into account the significant diversity of situations within the Arctic itself. This is also a theme we have focused on in this paper.

The purpose (research question) of the work is to theoretically comprehend and empirically generalize the phenomenon of managing Russian Arctic cities in the context of ensuring their resilience (resistance to shocks and crises). This goal determined the solution of three tasks: 1) search for specific indicators to characterize the administrative and management system of a sample of Arctic cities; 2) isolation of types (groups) of cities in the Arctic according to selected indicators of the administrative and management system; 3) characterization of the structure of local government of the three cities of the Arctic in the context of the previously conducted typology in terms of the parameters of the administrative and management system.

The information basis for this work was provided by municipal statistics, strategies for socio-economic development of Arctic and Northern cities that we have developed, and the work of colleagues on the resilience and sustainability of the world's Arctic cities and the forms (methods) of its measurement.

Methodology and research methods

The peculiarity of studying the administrative and managerial system of an Arctic city is that this research is always ideological. The fact is that, depending on the ideological framework in which the research question is posed, it sounds completely different.

In the logic of liberal and market administrative and management system, it remains to "adjust" the urban development that the market could not regulate; in other words, the object of local administrative regulation is formed on the residual principle, as one of many others, one might even say, closing. On the other hand, the administrative and managerial block is central in the logic of state dirigisme, active influence on the course of socio-economic processes and the entire dynamics of urban resilience, all others depend on it, and it sets the goal-setting for the work of the rest — socio-cultural, economic specialization and life support, even natural and ecological blocks.

Our approach is that it is the central unit of the entire urban system, which significantly affects the overall resilience and its dynamics. The argument for this approach was our entire experience of interaction with the authorities of the Arctic cities, where the extent to which the city will survive the challenges of radical economic reform and the deep economic crisis in Russia in the 1990s and early 2000s depended on the skills and competence of the particular government and the assembled team of local officials. It was this living experience, familiarity with specific management practices of survival that convinced us that in such bifurcation situations, the man-

agement factor, the quality of the administrative and management system can decisively influence the choice of a new one — depressive-crisis or successful, upward — trajectory of city development.

In this work, we understand the management of Arctic cities as a process that is the result of the activities of the administrative and management system, which includes structures (departments, committees, administrations, offices) of the city municipal government and various authorized structures in the form of municipal unitary enterprises, autonomous non-profit organizations, agencies, non-profit partnerships, etc. Over time, the size and content of this system can both expand enormously, which was characteristic of the Soviet era of total nationalization, and shrink, which was typical for 1990s radical market reforms in Russia, in the Russian North and in the Arctic. Now, we are witnessing a slow expansion of this system from the extremely compressed state of the 2000s.

The target function of the process of managing Arctic cities (activities of the administrative and management system) is to strengthen the resilience (anti-crisis stability) of the city. In the Arctic, every (even a relatively large) city faces the threat of non-existence, i.e. transformation into a shift settlement. The amplitude of constant and typical for the city pulsations can, at some catastrophic moment, lead to standstill of year-round life and transition to seasonal type of existence. So, the activity of the administrative and managerial system of the city must be assessed by whether it expands the horizon of the city's existence, or, conversely, narrows it to the extreme, to the point of turning into a shift camp. This question is directly related to the specificity of the Arctic city. Its viability is unambiguously determined by specificity.

The realities of the 1990s crisis showed that if the local authority fought desperately to strengthen the specificity of the city, to emphasize and reinforce it, to protect the uniqueness and separateness of the city and its unique functions, it managed to save and conserve the city for the future. If it surrendered to the "mainland" standard of unification and devalued (exchanged it for the promises of a great shift future) its specificity, then the city became doomed to radical depopulation, lowering of status, and, in the limit, closure. Therefore, the smart management of the Arctic city is a full-fledged accounting and strengthening of its specifics and differences from the mainland counterpart. It works directly to ensure its resilience.

But the question arises: in what ways is the Arctic city's specificity and uniqueness being strengthened? These are, for example, new basic functions for the surrounding area or the whole country or even the whole world. Thus, Reykjavik is desperately fighting to become not only an air but also a maritime hub between the US and Europe. This is the acquisition of new competencies and the radical strengthening of local human capital, including through the development of local scientific and educational structures. So, for example, the University of Alaska invited the Nobel laureate in economics to radically increase its specificity and its home city — Anchorage. This is the strengthening of local specifics, including through new unique material assets. For example, the city of Gubkinskiy gained an advantage due to the construction of a swimming pool with a

unique 50-meter walkway (all neighboring cities have swimming pools, but with a 25-meter walkway).

Here we are talking about the man-made strengthening of the specificity of the Arctic cities through the activities of the administrative and management system. But the Arctic cities already have an important special feature compared with the "mainland" cities. What is this specificity?

Arctic cities, much more than cities in the temperate zone, tend to have a structure-forming organization, which is a "support" for others, cementing the urban system into integrity. In one city, it is a city-forming economic enterprise, in another one — it is an educational structure, in a third one — it is a structure-forming airport or military unit, etc. The internal system of an Arctic city always needs to be "physically" based on something, just to exist. This is its internal feature (the forms of its manifestation from city to city can be diverse).

The external feature is that the Arctic city itself plays the role of a support base for the surrounding territory in most cases. It is not the Christaller's central place of social services, for which there is simply no population around, but the supporting production base from which production is carried out, including rotational activities for the surrounding resource industries.

Another feature of the Arctic city: even if it is not directly engaged in resource extraction, its vitality, dynamics of development are directly connected with the dynamics of extraction of neighboring natural resources. The life cycle of resource development determines population fluctuations and migration to and from the city, and many other socio-economic processes.

These super-significant external interactions, on which the very life of the Arctic city depends, denote its extremely open character, open to the outside world. In this sense, it is a miniature of a global city. It is greatly aided here by waterways, both sea and river routes, which many cities of the Arctic use to "communicate" with their patronized external environment.

One could say that there is a paradox here: the resilience of the Arctic city is an internal phenomenon but it depends crucially on the external interactions of the city. The administrative and management system has an overriding responsibility to link, integrate the inner city and the effectiveness of its external interactions, on which the very future existence of the Arctic city depends.

The management of Arctic cities, in order to be successful in strengthening their resilience, must be smart in terms of emphasizing and strengthening their specificity, adaptable to rapidly changing natural and economic conditions (for example, climate change in recent decades) and work to increase the reserves of internal systems (intelligence, energy, food, etc.). Only management, which does not deplete, but increases the supply of urban reserves, is effective.

Main results

1. Selection of indicators for assessing the quality of management of Arctic cities to strengthen their resilience

The task was to compare the largest cities of the Russian Arctic (29) in the "management" block, which, along with other blocks, is designed to strengthen the resilience of Arctic cities in response to natural and social challenges and disasters. As part of the overall concept of Arctic city resilience, governance is designed to a) strengthen its openness to the outside world and the success of its basic functions for the surrounding area, flexibility and innovation; b) effectively (rationally, economically) mobilize key assets and multiply them; and c) strengthen the financial, economic and administrative autonomy of the city. The set of indicators that is able to characterize these three most important vectors of sustainable management (we call it the "**BES model**" — basic economy, effective management, self-sufficiency) differs from standard and well-known indicators of municipal management efficiency.

About two tens of indicators of municipal statistics, which are being developed for urban districts and characterize the parameters "basicness/innovativeness" (B); management effectiveness (E) and and self-sufficiency ("control of the city of its own destiny") (S), were preliminarily calibrated:

B5 (basicness/innovativeness/openness to the outside world):

- employment in the basic sector, oriented to external markets — through the average number of employees of organizations by actual types of economic activity;
- share of shipments of own production in the basic sector of the city's economy — through the indicators of shipments of organizations by actual types of economic activity;
- number of municipal services provided by local governments, municipal institutions in electronic form (the degree of implementation of digital technologies);
- level of education (per 1000 people aged 15 and over, indicating the level of education);
- cost of contracts (per year) for the purchase of high-tech and innovative products.

E9 (management efficiency, including the main assets of the city):

- budget expenses of the municipality for the maintenance of employees of local governments per one inhabitant of the municipality;
- surplus (+), deficit (-) of the budget of the municipality (local budget), actually executed;
- number of municipal officials per 1000 residents of the city — through the number of employees of local self-government bodies at the end of the reporting year;
- share of fixed assets of organizations of municipal ownership that are in bankruptcy in the fixed assets of organizations of municipal ownership (at the end of the year, at full book value);
- volume of construction not completed within the established time frame, carried out at the expense of the budget of the urban district (municipal district);
- share of the area of land plots that are objects of land taxation in the total area of the city district (municipal district);
- share of apartment buildings located on the land plots with the state cadastral registration;

- number of municipal services provided by local self-government bodies, municipal institutions;
- total area of dilapidated residential premises and emergency residential buildings.

S3 (self-sufficiency):

- administrative status (expert score);
- share of own revenues of the local budget (with the exception of gratuitous receipts, receipts of tax revenues under additional standards of deductions and income from paid services provided by municipal budgetary institutions) in the total volume of revenues of the budget of the municipality;
- investments in the fixed capital of organizations of municipal ownership (without funds for shared construction of organizations of municipal ownership);
- investments in fixed capital at the expense of the budget of the municipality.

As a result of repeated testing of indicators for multicollinearity, reliability/political motivation, monotony/provision of geographical differences across Arctic cities, only six indicators were left in the final set, the rest were excluded. The main criterion for their capacity: each provides a significant amount of information in the distribution of values across a sample of cities, while not duplicating the other five left indicators, that is, it actually carries new information about the work of the administrative and management system of the city.

The *first* indicator reflects our five-point assessment of the strength of the administrative status of the city (how far this city extends its influence on the surrounding territory — based on the hypothesis that it is critical for the viability of a typical Arctic base city to have influence on the external space). The high administrative status of the city indicates significant independence in making decisions about its development (regional center, district center, single-industry town — the center of the urban district, port-district center, etc.). It is clear that a mere city within an urban district has a weaker status than the center of an urban district. The question of who has the "greater" status in terms of independence in making decisions on their economic fate — the center of a city district or the center of a municipal district — was determined individually for a particular city, taking into account the values of other indicators.

Not only the official status of the city (regional, district, center of an urban district) was taken into account, but also its informal influence on the surrounding territory as an outpost development base typical of an Arctic city. Therefore, in a number of cases in our expert assessment, the actual score turned out to be higher or lower than the formal administrative status of the city.

The *second* indicator of the share of own revenues in the city budget (average for 2017–2019) gives a concise description of the degree of independence of decisions made in matters of local development: how much are they provided with their own financial resources? To what extent does the city control its own destiny? The ability to have their own sources of budget revenues is critical for sparse cities in the Russian Arctic and relatively more important than for cities in

the main settlement zone. This is because their own financial and budgetary capacity allows them to mobilize resources promptly in times of crisis and disaster, even before the arrival of federal assistance.

The *third* indicator of the share of apartment buildings located on land plots with state cadastral registration (as a percentage) reflects the diligence of local authorities in establishing local control and registration. Unfortunately, other (and more reliable) indicators in this area, such as the number of days to take a decision on approval of a land plot for residential construction, are not currently being developed. Therefore, our search was extremely narrowed and forced us to use those indicators that are developed annually for all cities in the Arctic.

The *fourth* indicator of municipal budget expenditure on the maintenance of local government staff per resident of the municipality (average for 2017–2019, in rubles) reflects the resource intensity of local government as a whole. It is assumed that there is a certain average norm for sustainable management, because both the maximum and minimum values characterize the presence of problems within the city management system (irrationality, overstaffing or vice versa, extreme, up to a shortage of competent specialists, tightness).

The *fifth* indicator of the number of people employed in the public administration and military security, social security per 1000 population (average 2017–2019) reflects the size of the governance sector in relation to the overall size of the city. It is important to find inherent optimum, based on the features of economic and geographical position, sectoral structure, basic functions, etc. There is no one general optimal solution here: what suits one city, definitely does not suit another. But on average, “corporate” single-industry cities have a lower value of this indicator than the cities of “white-collar”, budgetary services and non-manufacturing commercial services.

The *sixth* indicator of budget expenditures per inhabitant (average for 2017–2019, rubles) reflects the amount of financial resources of the authorities for a quick response to crises. This is not the size of the city’s economy and this is not the volume of the city budget, it is precisely the resource equipment of the authorities, which is important for crisis situations, what can be quickly mobilized.

The resulting indicators differ significantly from the initial pool of indicators, which originally guided our work on assessing the administrative and management system of Arctic cities. However, there is a conviction that they economically grasp the basic information about the management of Arctic cities, which can be obtained by means of municipal statistics. At the same time, of course, they must be supplemented by materials from in-depth field surveys of the real situation in the cities of the Arctic, which are laborious, costly, and do not provide continuous, but only selective observation. But only a combination of continuous statistical observation methods with selective sociological (anthropological) studies allows obtaining the most reliable results. However, in the context of the pandemic, we did not have the opportunity to organize expeditionary surveys in key cities, so we have to rely on municipal statistics when conducting a typology (classification)

of Arctic cities according to the criterion of the work of the administrative and management system.

2. Clustering of Arctic cities according to selected management indicators

The selected indicators, which are considered by us the most informative in terms of the characteristics of the administrative and management system, did not have reliable values for some cities in the Arctic from our sample (there were gaps in the data for years). In this case, it was necessary to use indicators for administrative cells of a higher rank (for example, municipal districts). The initial table "cities–indicators", which was used for subsequent cluster analysis in order to identify the main groups (types) of cities according to the characteristics of the management system, is given below (Table 1).

Table 1

Initial table for clustering (classification) of Arctic cities

City	Administrative status [2]	Share of own tax and non-tax revenues in total budget revenues, average for 2017-2019, %	The share of apartment buildings located on land plots, with state cadastral registration, average for 2017-2019, %	Average budget expenditures per person for 2017-2019, thousand rubles	Number of people employed in the O sector (OKVED2) per 1000 people, average for 2017-2019, people	Budget expenditures of the municipality for the maintenance of employees of local governments per one inhabitant of the municipality, average for 2017-2019, rub.
Apatity	3	41.7	100	40.6	20	1793
Arkhangelsk	5	51.8	62	25.7	42	1672
Bilibino	3	*15.3* [3]	n/d [4]	19.8	*78*	*15395*
Vorkuta	3	26.4	90	50.5	33	1928
Gubkinskiy	3	53.7	100	152.3	33	10763
Dudinka	3	37.5	*37*	40.5	*71*	*7657*
Zapolyarnyy	1	67.2	*90*	15.9	*62*	n/d
Inta	3	20.3	100	64.5	38	3815
Kandalaksha	3	47.9	*99*	79.9	*40*	n/d
Kirovsk	3	51.2	100	68.9	18	2483
Kovdor	3	46.8	*47*	55.0	*16*	*2868*
Kola	3	*28.6*	*56*	240.0	*234*	n/d
Kostomuksha	3	50.9	70	29.8	24	1589
Labytnangi	3	14.5	96	201.8	53	14040
Leshukonskoe	1	10.6	93	65.8	43	8695
Monchegorsk	3	44.1	100	47.1	17	2108
Muravlenko	3	15.4	100	156.2	30	11952
Murmansk	5	59.7	21	47.1	50	2292
Nadym	2	44.3	*100*	13.6	*32*	*8932*
Naryan-Mar	4	67.2	99	36.6	80	7762
Novodvinsk	3	37.9	100	26.2	18	2180

[2] 1 - urban settlement, city; 2- urban settlement, the center of the district; 3 - the center of the urban district, municipal district, municipal district; 4 - the center of the autonomous region; 5 - regional center.
[3] Italics indicate cases where, due to the lack of data for the city, data for a larger administrative unit (for example, a municipal district) was used.
[4] n/d - no data.

Novyy Urengoy	3	39.0	100	109.5	30	4963
Norilsk	3	43.3	100	101.2	25	3811
Noyabrsk	3	30.3	100	109.1	23	5976
Olenegorsk	3	40.7	97	46.4	43	2321
Onega	1	43.4	*96*	*4.3*	*27*	1678
Polyarnye Zori	3	44.8	95	58.4	27	3192
Revda	1	32.0	*100*	12.4	*101*	n/d
Salekhard	4	25.4	100	154.9	132	11179
Severodvinsk	3	53.9	100	37.2	33	1721
Segezha	3	47.9	66	25.9	51	998
Tarko-Sale	2	29.6	*99*	15.5	*45*	*11699*
Usinsk	3	48.5	54	73.2	25	4762

Clustering was carried out using the Grouping Analysis tool in the ArcGIS program. This tool clusters points into groups, minimizing the variance within groups for each of the variables taken as the basis for clustering, while the spatial position is not taken into account. Additional important criteria were the evenness of distribution of settlement points in clusters and the absence of a predominant influence of one of the variables, the clustering bases, with little involvement of other variables.

The clustering of the six variables revealed a decisive influence of the administrative status indicator. Therefore, in the final version, clustering was based on five variables, which allowed the initial population of Arctic cities to be divided into clusters of comparable size, within which each variable was characterized by minimal variance.

The result was five groups of cities with similar properties of the administrative and management system, primarily in three priority areas — “basicness”, “efficiency”, “self-sufficiency” (BES-model). The first group of *compact quality management* includes seven cities: Gubkinskiy, Kandalaksha, Kirovsk, Naryan-Mar, Novyy Urengoy, Norilsk, Severodvinsk, which are distinguished by effective municipal management with an average staff of managers themselves, and significant budgetary opportunities. From the position of implementing the BES model, this is the best situation in the interests of ensuring the viability of the city: in most of these cities, in addition to budgetary ones, there are also significant corporate resources capable of emergency mobilization in force majeure situations; the administrative staff is not bloated, and, as our expeditionary surveys have shown, it has a significant layer of old-timers, experienced municipal employees who know the city system well and are able to adequately assess its potential for adaptation to crises and disasters that are not unexpected for them precisely in the strength of long experience of living and working in the city.

The second group of “*low-cost municipal government*” includes 11 cities: Arkhangelsk, Murmansk, Dudinka, Zapolyarniy, Kovdor, Olenegorsk, Onega, Revda, Usinsk, Kostomuksha, Segezha. The situation here, in terms of implementation of BES-model priorities, is relatively favorable — there are experienced managers, but the available budgetary resources are not used to strengthen the administrative and management system as the core of the city’s overall resilience; a high share of own income, while the costs of municipal management per one inhabitant of the city is the minimum among all groups.

The third group of "*strong average*" includes nine cities: Apatity, Vorkuta, Monchegorsk, Nadym, Novodvinsk, Noyabrsk, Polyarnye Zori, Tarko-Sale, Inta. Here we have average values for all indicators. It can be regarded as the fact that the administrative and management system of the city has a certain resource to ensure the city's resilience in times of crisis, but it is not prohibitive.

The fourth group of *significant reserves for improving management efficiency* includes five settlements: Muravlenko, Kola, Labytnangi, Salekhard, Leshukonskoe. With their own revenues being low, the expenditures on residents and managers are maximal here, and the share of managerial personnel of municipalities is large (partly due to the lack of other areas of employment). None of the priorities of the BES-model is fulfilled by the management system.

The fifth group includes the only city-*anomaly* — Bilibino. Here, the maximum costs for the maintenance of managers in terms of a resident, while the budget costs per resident are minimal, the share of managers is average. Taking into account the depth of the forthcoming restructuring of the local economy in view of the closure of the Bilibino nuclear power plant and depletion of the nearby deposits, which have been exploited for many decades, the city's potential for resilience is extremely weakened, as evidenced by the fact that all urban systems (and the fact of the maximum population outflow) are functioning. Without exaggeration, this is the most problematic case in our entire sample of Arctic cities.

Having received this result, it was interesting to evaluate the role of factors of geographical location, geographic latitude and longitude in the costs of municipal government. We already have an idea of the enormous and overriding factor of the administrative status of the city. We know what the typologies of cities are by the criterion of governance, if this "overhanging" factor is removed. Does geography have any bearing on the internal differences in the operation of the administrative system between the cities of the Arctic? Or is everything determined by institutions, by administrative status?

It turned out that geography is as important as institutions. But it is not the breadth of zonality, as we have expected, that creates a regular rhythm in the parameters of the governance system (Fig. 1).

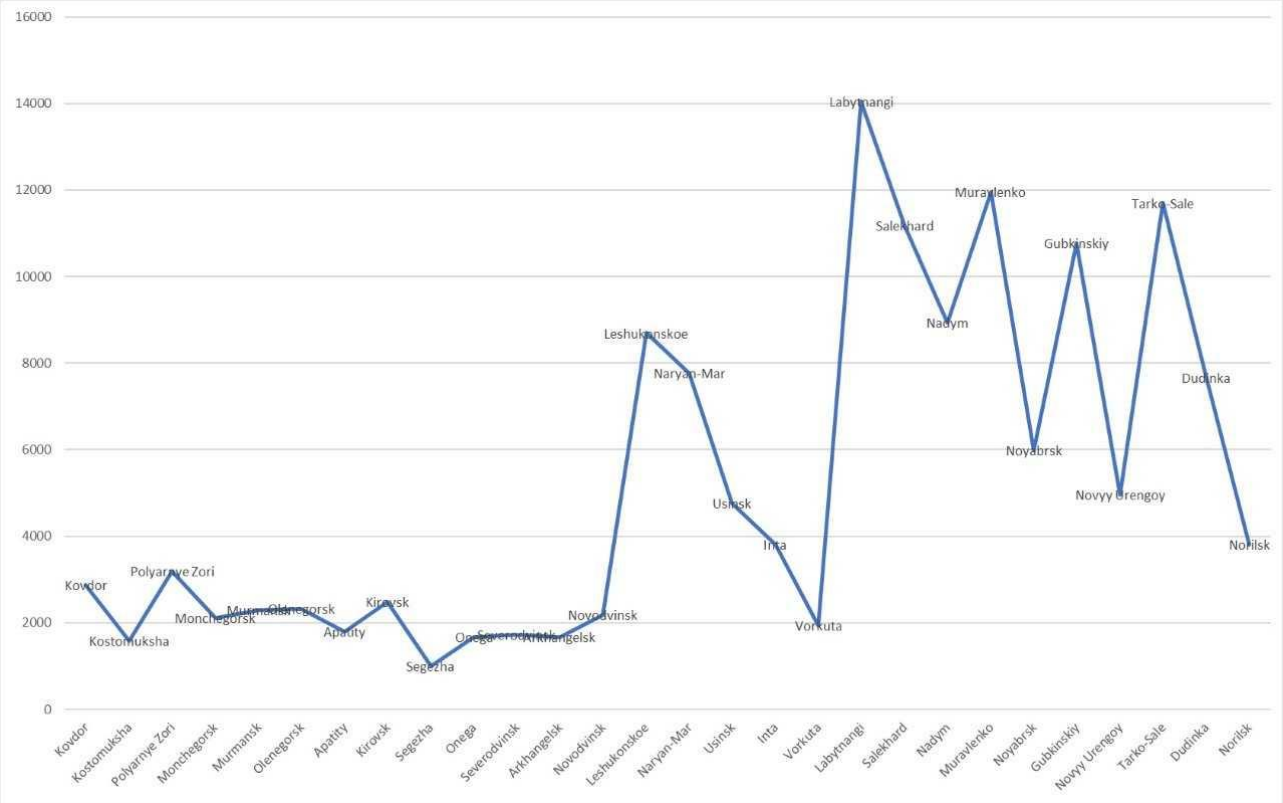

Fig. 1. Lack of dependence between geographical latitude of the city and its costs of municipal administration (the action of institutional factors prevails). The horizontal axis is degrees of northern latitude; the vertical axis is per capita budgetary expenditures on local government in rubles.

Longitude matters, that is, the location of the city in the European or Asian Arctic (Fig. 2). The graph clearly shows the trend of rising costs of municipal administration as the Arctic city "shifts" from the west of Russia to the east. This fact is not surprising in itself, but it is usually forgotten when cities within the Arctic zone are compared. In our study, the significance of longitude is as fundamental to the evaluation of the administrative system of the city as it is to the administrative status of the city. In the literal sense, institutional and geographical factors that have a powerful effect on the appearance of the city's administrative and management system go hand in hand.

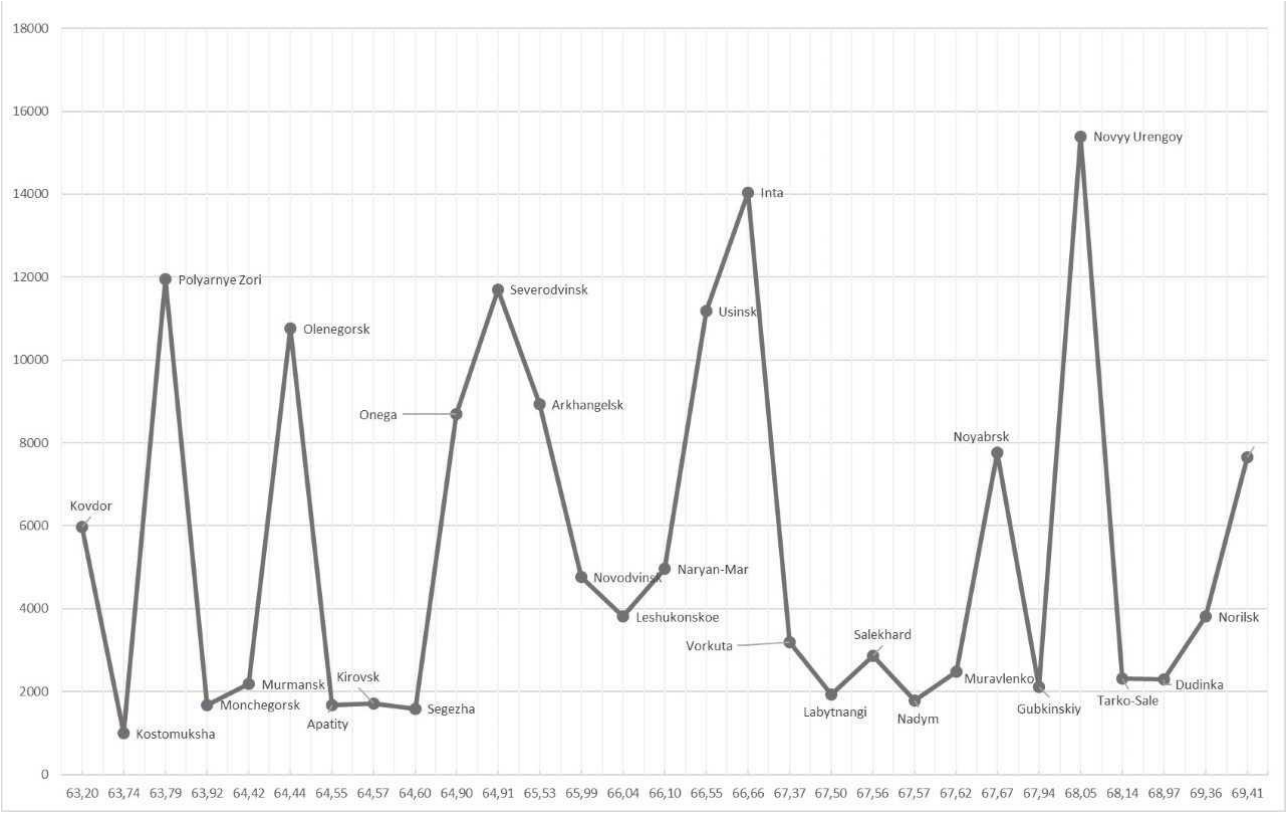

Fig. 2. Does the cost of managing Arctic cities depend on longitude? The horizontal axis is degrees eastern longitude; the vertical axis is per capita budgetary expenditures on local government in rubles.

3. Is the structure of local government linked to a particular type of Arctic city in terms of the quality of the administrative and management system?

The administrative and managerial system of an Arctic city should be characterized not only from the outside, by the tools of municipal statistics, but also from the inside, as a result of an analysis of the structure of local government, the positions of its main units (departments and divisions), their functionality, staffing, etc. Work on the strategies for the cities of Gubkinskiy, Noyabrsk and Muravlenko gave us a unique opportunity to supplement the completed typology of Arctic cities in terms of statistical parameters of the quality of municipal government, understanding the organizational structure of city management.

Cluster typology, based on selected, information-intensive indicators of municipal statistics, made it possible to classify the initial sample of Arctic cities into five groups according to the properties of the administrative and management system. The question arises, is there a relationship between the internal organizational structure of local government and a specific type of administrative and management system of the city, in other words, does the organizational structure of power affect the fulfillment of three imperative requirements for the administrative and management system of the Arctic city: to ensure basicness, efficiency, self-sufficiency (BES - model)? To answer this question, we mobilized our experience in preparing socio-economic development strategies for the cities of Gubkinskiy, Noyabrsk and Muravlenko, which are in the first, third and fourth groups of our classification according to administrative and management systems.

What characterized the internal structure of the administration of the city of Gubkinskiy during the period of our preparation of the Strategy for the socio-economic development of the city in the early 1910s? This type of structure can be conditionally called “political”, since the administration is headed by a popularly elected head (“strong” mayor), in contrast to the “technical” structure of local governments, in which the head, elected by people or among the deputies, heads only the representative body of the municipal entity (“weak” mayor who does not manage budget funds directly, but does so through the decisions of the representative body and the contracted head of administration).

For Arctic cities, where frequent natural and social force majeure makes it imperative to respond to external threats with extreme urgency, the strong mayor model is in most cases preferable to the “consensus” model of collective governance with a weak mayor. It is no coincidence that most cities of the first, most successful type of government, belong to the model of personalized leadership, with a strong mayor (Fig. 3).

Being the highest-ranking local politician, the head of the municipality of the city of Gubkinskiy is not only responsible for the performance of the administration, but is also responsible to the population that elected him for the implementation of the election promises and programs, forms the city development policy and presents it for public discussion. Clarity, distinctness, simplicity of the structure of local government and the powers of each structural element, which we clearly felt in the process of working on the Gubkinskiy City Strategy, is undoubtedly the strength of this model of city government with its reliance on a strong, charismatic mayor. This structure is able to implement all three of the most important priorities for the management of the Arctic city: B — to increase its basic functions for the surrounding territory of resource industries, openness and innovation; E — to ensure the effective management of the main city assets; S — to protect under all circumstances the important political, financial and economic self-sufficiency of the city. These are the most important conditions for the resilience (resistance to crises and disasters) of the entire urban system.

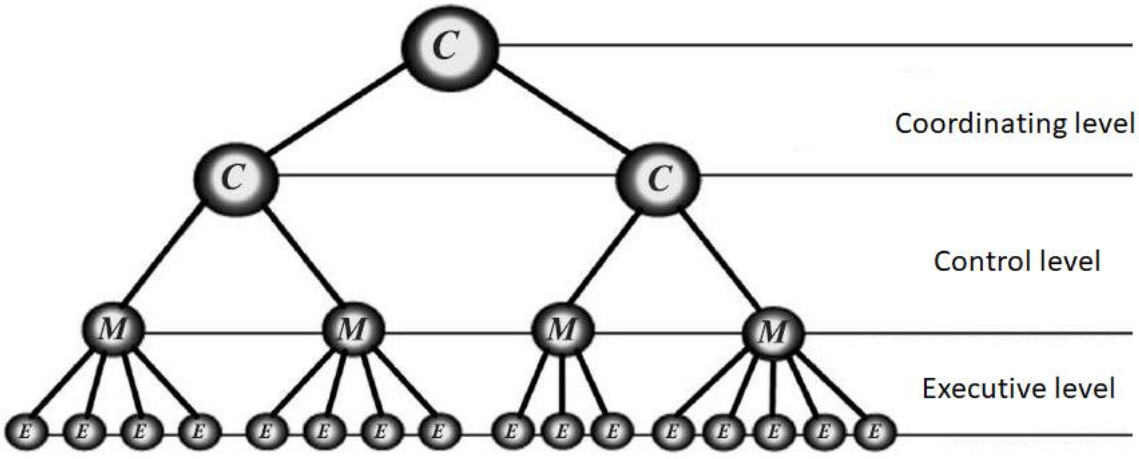

Fig. 3. Multi-level management system [13], implemented in the structure of the local government of the city of Gubkinskiy.

The disadvantage of this model is its excessively personalized nature: the change of the head, as a rule, entails both a change in the structure itself and the top management personnel. This happened, for example, with the departure of the veteran mayor of Gubkinsky V.L. Lebedevich.

In general, if we compare this ("political") type of municipal government structure, it usually turns out to be more expensive than the "technical" type, in which the head of the city is appointed by contract. In our classification, these are cities included in the second and third types.

The third type is the city of Noyabrsk, for which we also developed the Strategy for social and economic development. In terms of local government structure, it was a complete opposite of Gubkinskiy in the sense that it had a constantly changing corps of local government managers and a technical type of municipal government structure ("city manager").

Therefore, only one of the priorities of our management triad "basicity/innovation-efficiency-self-sufficiency" was implemented in the city, simply "automatically": we are talking about the political and economic independence of Noyabrsk due to the headquarters status ("Noyabrskneftegaz"), as well as a smart decision of the first city planners to separate the new city from the much larger Surgut, giving it to the Yamalo-Nenets Autonomous Okrug, and not the Khanty-Mansiysk AO (Noyabrsk is located on the border between the okrugs). Over the past decades, the city has not acquired any new basic functions. In terms of efficiency, none of the municipal government teams has managed to establish accountable, compact and effective management of local development, as evidenced by the weak position of Noyabrsk in entrepreneurship development, despite all external favorable prerequisites, against the backdrop of cities of comparable development in the Arctic and North.

Frequent changes in local government teams have meant that the city has failed to create an effective and necessary partnership between the government and civil society structures in order to address key urban issues. This is why we have identified the task of consolidating the efforts of the authorities, business, and the public in the city as very important for the dynamic development of the city in the Noyabrsk strategy.

We discovered even more problems within the city's management system when working on the Muravlenko city strategy, which belongs to the fourth, least effective type of administrative and management system. Here it was not possible to fully implement any of the priorities of the BES model: there are no new basic functions or activities, the inefficiency of the management system is proved by numerous statistical parameters, lack of independence is fixed by the subordinate status of the city-forming enterprise — a division of Noyabrskneftegaz.

For a small town like Muravlenko, the administrative structure looks rather complicated from a functional point of view. It is an intermediate option between the "technical" (in terms of the method of formation) and the "political" administration (in terms of the institution of deputies, assistants to the head of administration, the "image" department of information and public relations). In the functional blocks of the administration structure, there is a great mismatch: for example, absolutely different issues of the current maintenance of the city infrastructure are brought together in one direction; urban development; public safety. In terms of staffing, the same type of administration

bodies had serious differences in the number of employees: for example, organizational management (41 people) and legal department (9 people) [5]. There is an imbalance in the distribution of functions and financial resources within the structure of the city administration. There is also a certain duplication of functions: financial planning is simultaneously handled by the Department of finance, the financial and economic department of the Department of social protection of the population.

The transition to a more compact, clear and distinct structure of the administration of the city of Muravlenko city administration will improve the position of the city on the type of administrative and management system in terms of formal indicators of its performance. We are talking about 1) the formation of self-sufficient blocks of development (economic and territorial) within the structure; the current content of the urban economy; social issues; ensuring municipal activities; 2) ensuring comparability in terms of the scope of powers and financial resources included in the blocks of one to three departments; 3) ensuring the comparability of the powers and financial resources of the departments included in the departments; 4) consolidation of the functions of information, technical and organizational support of different departments within the same department of organizational, legal and technical support.

There is a correspondence between the place of the city in terms of the quality of the management system in formal indicators, and the internal state of its municipal management "economy": the leader Gubkinskiy, by formal indicators of the quality of the administrative and management system, turned out to be the most distinct, clear, although quite costly, managerial "vertical". On the other hand, Muravlenko, which is included in the most problematic type of Arctic cities in terms of the quality of the administrative and management system (except for the city of Bilibino), in the 2010s had an irrationally cumbersome structure of local government, with multiple duplication of functions and asymmetry between human resources and the volume of tasks assigned to management or department.

Discussion

We evaluated the existing administrative and management system of dozens of the largest Arctic cities in Russia according to the available quantitative criteria and qualitative features. But the question arises: what should be the "ideal" administrative and management system that implements the three indicated imperatives "basicity/innovation – efficiency – self-sufficiency" to the maximum extent, guarantees the city's vitality, resistance to natural and social crises and disasters?

It seems that the answer to this question lies in the mainstream of the ideas of sociobiology by Edward Wilson [14] and the ideas of rationality of nature-compatible solutions, which are very close to his worldview [6]. How can nature-like solutions that carry the features of the proper-

[5] The data on the staffing table of the Administration of the city of Muravlenko in 2011.
[6] The banner of environmentally compatible solutions has been raised in recent years by Corresponding Member of the Russian Academy of Sciences M.V. Kovalchuk in numerous journalistic articles and media appearances. Our differ-

ties of biological systems (self-organization, plasticity, flexibility, diversity, mobility, etc.) implement the three main priorities of the management system of the Arctic city: basicity/innovation, efficiency, self-sufficiency?

The first property in modern conditions is provided by mobile, focused on a certain (and often short) time period, solutions that are based on new technological capabilities of artificial intelligence (digital transformation of management — an electronic city/a digital twin of the city's management system, etc.). The most important challenge is to overcome the corporate tightness of many single-industry towns in the Arctic and enter the global and national networks of partner cities in order to join the accumulated best practices of urban management in extreme conditions of cold discomfort and peripheries [7].

The second requirement for the effectiveness of the management system in the Arctic conditions is provided by nature-compatible solutions, i.e. the maximum adaptation of the management process to the specific stage of the life cycle of the development of the dominant (anchor) natural resource. The modern unification of management systems and decisions is simply unacceptable for the Arctic cities, which all, even the largest ones, depend on the process of exploitation of mineral and fuel-energy resources.

On the contrary, the management system of such a city should be very resource-"colored" — adaptive to a particular type of resource and the phase of the life cycle of exploitation of a resource field (the town management system at the "oil fountain" phase, when financial possibilities and migration turnover go off the average value is one thing; town management at the dying-out phase, when we speak about controlled contraction or anti-crisis stabilization of the whole town system is quite another).

The ideal environmentally compatible (and therefore the most effective) solution in these conditions is the management of the city as if it did not depend on the exploitation of non-renewable and depleted natural resources, but on biological resources that are constantly renewed (for example, fish, forest , water). This means the necessity to reserve all types of city assets — financial (technically easy to do due to their mobility, but legally very difficult, due to limitations of the Budget code to accumulate insurance reserves in local budgets); material (but these basic funds of municipal enterprises should be constantly renewable, so that the technology does not become obsolete), human resources (the pool of available talents should not be depleted, land resources. Let us dwell on the latter in more detail.

The most important paradox of the Arctic city development is the fact that, being located inside the Arctic desert (there is no one else to present the demand for land plots), the city faces enormous difficulties in expanding its city limits, that is, in adding new lands. These prohibitions

ence from his position is only one: we believe that for fragile and turbulent Arctic systems, the effectiveness of environmentally compatible solutions is much higher than for other latitudinal zones.

[7] These two terms were proposed by Ph.D. T.E. Dmitrieva.

and restrictions apply both to large cities with a population of over one million and to small Arctic cities.

But, unlike a large millionaire city, land resources are the few that an Arctic city has around in abundance ("few people – a lot of land"). Therefore, it is wrong to legally limit its spatial growth. On the contrary, land assets are the few that can be relatively easily reserved for the future by creating a kind of stabilization fund when force majeure occurs in the form of buildings collapsing from melting permafrost, the need to move some production and residential buildings for other reasons, the deployment of smart technology parks and special economic zones. The Arctic city should have too much land. This is its insurance.

On the other hand, advocating this artificial redundancy of the territory and the generosity of drawing the city limits, it is necessary to ensure rational use of the land plots included in the inventory. Therefore, all modern indicators of municipal statistics in terms of their involvement and turnover [8] (and there are about ten of them) are extremely significant for the Arctic city. The use of land reserves, as well as financial resources, can become a safety cushion for the city during periods of force majeure. Managing an Arctic city is a real art of mobilizing reserves of all kinds and constantly taking care of their increment.

The priority of the city's independence in terms of environmentally compatible solutions means "soft" management, which combines difficultly compatible things: on the one hand, strong responsible and personalized leadership; on the other hand, co-management, that is, divided leadership between the mayor and the city administration, the city administration, civil society structures represented by active residents and city businesses.

Environmental compatibility means "automatism" of managerial decisions that do not depend in a decisive way on the personality of only the first person. But it would also be wrong to reduce the governance of the city to a consensual, collective co-management, especially for the Arctic, because of the need to respond quickly to emerging challenges. The city must have a "face", and it must be personified, not collective.

This means that a difficult and fluid balance must be struck between the authoritarianism of the mayor's personality and the democracy of collective co-management. In the Arctic city, this managerial harmony is facilitated, on the one hand, by its small size (the effect of the "direct perception pyramid" works [15], when people know each other and at least once a year meet with every other inhabitant); on the other hand, it is extremely difficult due to the usual shortage of

[8] Availability in the urban district of the approved general plan of the urban district; area of land provided for construction - total; the area of land plots provided for housing construction, individual housing construction; the share of the area of land plots that are objects of taxation by land tax in the total area of the territory of the urban district; the share of apartment buildings located on land plots in respect of which state cadastral registration has been carried out; the share of land plots that are in municipal ownership, as well as state ownership of which is not delimited; the area of land plots provided for the construction of housing construction facilities, in respect of which, from the date of the decision to allocate a land plot or the signing of the protocol on the result of bidding (tenders, auctions), permission for commissioning has not been received within three years, etc.

human resources and the very strong distorting influence of the super-actors of local development represented by large resource corporations.

Conclusions

1. An important factor in ensuring the resilience of the Arctic city to the challenges of external crises and disasters is the work of the administrative and management system, which, depending on the ideology of the researcher, occupies a central, core place in the entire urban system (state dirigisme) or a place along with other systems — sociocultural, life support, industrial and economic, etc. (market liberalism). The activity of the administrative and management system of the city must be assessed by whether it expands the horizon of the city's existence or narrows to the point of turning it into a shift camp. Realities of the 1990s clearly demonstrated that these outcomes directly depend on the degree of specificity of the Arctic city, which is not only given by God, but is largely determined by the efforts of local authorities. Smart management, effective work of the administrative and management system strengthen the original specificity of the Arctic city.

2. Our initial hypothesis was that in order to work effectively for resilience, the management system of an Arctic city should work on three priorities: the basic nature (innovation, openness) of the city's economy, management efficiency, independence of political decisions of the city government. As a result of preliminary selection, out of almost two dozen indicators of municipal statistics, which characterize the work of the city's management system from different angles, six indicators were eventually left. The first reflects a five-point assessment of the strength of the city's administrative status. The high administrative status indicates a considerable degree of autonomy in making decisions about its development. The second one is the share of own revenues in the city budget (average for 2017–2019) that characterizes the degree of independence of decisions made in matters of local development. The third indicator of the share of multi-apartment buildings located on land plots with state cadastral registration (in percent) reflects the promptness of local authorities in establishing local control and accounting. The fourth indicator of municipal budget expenditures for the maintenance of employees of local governments per one inhabitant of the municipality (average for 2017–2019, in rubles) demonstrates the resource intensity of local government. The fifth indicator of the number of people employed in the sector "Public administration and ensuring military security; social security per 1000 people" (average for 2017–2019) shows the size of the governance sector in relation to the overall size of the city. The sixth indicator of budget expenditures per inhabitant (average for 2017–2019, rubles) reflects the amount of financial resources of the authorities for a quick response to crises.

3. The use of the described indicators in the cluster analysis of 29 largest cities in the Russian Arctic made it possible to identify five groups of cities with comparable properties of the administrative and management system: 1) compact quality management — Gubkinskiy, Kandalaksha, Kirovsk, Naryan-Mar, Novyy Urengoy, Norilsk, Severodvinsk: effective municipal govern-

ment with an average amount of managers. This is the best situation in terms of implementing the BES ideals of "basicness/innovativeness-efficacy-self-sufficiency" in the interests of urban sustainability; 2) "low-cost municipal government" — Arkhangelsk, Murmansk, Dudinka, Zapolyarnyy, Kovdor, Olenegorsk, Onega, Revda, Usinsk, Kostomuksha, Segezha. There are experienced managerial staff here, but the available budgetary resources are not used to strengthen the administrative and management system: the cost of municipal administration per citizen is the lowest among all groups; 3) "strong middles" — Apatity, Vorkuta, Monchegorsk, Nadym, Novodvinsk, Noyabrsk, Polyarnye Zori, Tarko-Sale, Inta. The administrative and managerial system of the city has a certain resource to ensure the viability of the city in times of crisis, but it is not outrageous; 4) the necessity to increase management efficiency —Muravlenko, Kola, Labytnangi, Salekhard, Leshukonskoe. The management system does not fulfill any of the priorities of the BES model here; 5) the city-anomaly Bilibino is the most problematic case in the entire sample, the potential for resilience is extremely weakened.

4. More detailed analysis of internal structure of management of three cities in the sample — Gubkinskiy (first type), Noyabrsk (third type), Muravlenko (fourth type) allowed to make several preliminary conclusions: a) the "political" structure of local government with an elected mayor to fulfill the priorities of the BES-model and ensuring the viability of the city are preferable to the "technical" structure with a city manager due to the special requirements for prompt response to force majeure, which are constantly heard for Arctic cities; b) the frequent change of teams of local authorities near the Arctic city reduces the efficiency of its management system and makes collective co-management difficult; c) cumbersomeness, inconsistency, duplication of functions, imbalance in the volume of functions and resources of the local government structure do not allow realizing the potential of the administrative and management system in ensuring the viability of the city (Muravlenko's case).

5. An ideal Arctic city management system would necessarily include environmentally compatible technologies and practices. The priority of economic basicity/innovativeness/openness is ensured by mobile, time-bound solutions and the decoupling of Arctic mono-cities. The priority of management efficiency is ensured by the maximum adaptation of the administrative and management system of a specific stage of the life cycle of mining the dominant (anchor) natural resource. Effective management of an Arctic city is a true art of mobilizing reserves (material, land, financial, human) of all kinds and constantly taking care of their increment. An Arctic city should have an excessive amount of land: this is the little that it can relatively easily reserve for the future. However, advocating the artificial redundancy of the territory and the generosity of the city limits, local authorities need to achieve the rational use of the land plots involved in the accounting. The priority of the political independence of the city in terms of environmentally compatible solutions means achieving a difficult and fluid balance between the authoritarianism of the mayor's personality (responsible and personified leadership) and the democracy of collective co-

management — a divided leadership between the mayor and the city administration, the city duma, structures of civil society represented by active residents and urban businesses.

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Preservation of Geological Material and History of Karst Formations Discoveries in the Pechora-Severouralskiy Speleological Area and Adjacent Territories *

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Abstract. The paper describes the history of discovery and study of karst formations of the European North of Russia. More than 100 karst formations have been identified. The main periods in the history of exploration of caves and grottoes of the Pechora Urals are reflected. The first caves descriptions which were made by travellers and scientists in the 18th–19th centuries are given. During that period the most famous caves were Uninskaya and Kaninskaya caves. The main karst formations were discovered and described at the beginning of the 20th century. Geologist V.N. Mamontov discovered 4 caves on the Pervokamennaya River. Systematic geological studies by V.A. Varsanofyeva in the Northern Urals allowed her to discover small karst formations in the upper reaches of the Pechora on the Ilych and Unya rivers. In 1960, B.I. Guslitzer discovered the largest cave in the Northern Urals — the Medvezhya Cave. Promising and little-studied areas of karst are the Bolshezemelskaya Tundra, the Polar and Nether-Polar Urals, Pai-Hoi and Timan. Only a few small caves and grottoes are known on these territories. Most of the karst is located in specially protected areas. The caves are unique paleontological monuments of nature. The funds of the A.A. Chernov Geological Museum of the Institute of Geology contain 12 monographic collections of paleofaunistic material with a volume of more than 30 thousand storage units. The remains of vertebrate caves consist of bones of mammoth fauna and small mammals.
Keywords: *history, karst, cave, grotto, Northern Urals, Timan, natural heritage, paleontology, museum*

Introduction

The European North of Russia is the most interesting large region with diverse conditions for the karst and caves development, covering the northeastern part of the East European Platform with the adjacent Timan Ridge, the northern part of the Ural system with a geological continuation (Pay-Khoy uplift) and the island chain (Vaygach, Novaya Zemlya) [1, Astakhova I.S., Zhdanova L.R., p. 40]. Within the northern Cis-Urals, the Chernyshev, Pay-Khoy and Timan ridges contain intensively dislocated rocks, among which carbonate and sulfate strata are widespread, which are favorable for the karst formation. Mineral composition, strong fracturing and shearing

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of rocks, intense exogenous processes predetermine a huge variety of karst formations [2, Lavrov I.A., Andreychuk V.N., p. 8].

More than 100 karst formations are known in the European North of Russia [3, p. 70]. The largest part of karst forms is developed within the Pechora River basin. Karst funnels, karst ravines, caves, niches, sheds, and karsts were found there [4, Gladkova I.G., Guslitser B.I., p. 145]. The largest ones have their own names, but most of the objects remain unnamed due to their insignificance (Fig. 1). Thus, the density of craters within the Upper Pechora basin reaches several hundred per 1 km2 [5, Gladkova I.G., Guslitser B.I., p. 201]. The best known caves of the Pechora, Unya and Ilych rivers are Medvezhya (480 m) and Uninskaya (390 m) — archaeological sites of the Upper Paleolithic with clusters of bones of the Pleistocene fauna (cave bear, tiger lion, etc.) [3, p. 15]. Kaninskaya Cave is a sanctuary of the Bronze, Early Iron and Middle Ages, as well as a place of discovery of animal remains of the Pleistocene and Holocene [6, Murygin A.M., p. 93]. The largest vertical cave in the Northern Urals is Shezhimskaya (the total depth of the well and the hall is 20 m). Quite often there are buried caves (Pervokamennaya and Tufovaya), the remains of destruction in the form of small grottoes and arches (Arka cave in the Sukhoy Log on the Unya River, an arch at the mouth of the Pikhtovka River) [7, Guslitser B.I. et al.]. However, the results of the study and the history of the discovery of karst formations remain largely unpublished, so the data given from the study of caves may be incomplete.

Caves of the Pechora Urals

The first reliable data on the caves of the Northern Urals date back to the 18th century. During that century, they were not the goal of research by scientists and travelers, but they came into view during geographical and ethnographic studies of the region. The discovery and history of studying the caves of the Northern Urals begins with academic expeditions. In 1771–1772, I.I. Lepekhin and N.Ya. Ozeretskovskiy made a trip to the north of the European part of Russia to study the natural resources of the regions, cities and population, historical monuments, mines and factories. Describing the Bolshezemelskaya tundra, I.I. Lepekhin paid attention to the antiquities of the Samoyeds living in the Arkhangelsk province. “The entire Samoyed land in the current Mezen okrug is filled with desolated dwellings of some ancient people. They are found in many places, near lakes on the tundra and in forests near rivers, in mountains and hills in the form of caves with door-like openings. Stoves and fragments of iron, copper and clay household items and, moreover, human bones can be found in these caves” [8, Lepekhin I.I., p. 203]. Later, historical writings of the late 18th and early 19th centuries mention caves as dwellings of the local population [9, Krestinin V.V., p. 11]. This is confirmed by the information collected in 1837 by the traveler A.G. Schrenk. In his report, he provides detailed information about “caves that are located on the lower Pechora and in various other places” and which the Russians call “Chudskie caves ... which undoubtedly owe their name to the river Pechora” [10, p. 327]. He notes that these caves are man-made and represent the most convenient and most natural kind of dwellings. The traveler cites the

information received about the location of the Chudskie “caves”: near the mouth of the river Indiga, near village Chuchepala on the middle Mezen, near the mouth of the river Pechora, in the Kara river basin, near the mouth of the Korotaiha river. Other researchers also mention underground dwellings [11, Latkin V.N., p. 151; 12, Uvarov A.A., p. 207].

Only at the end of the 18th century, academician I.G. Georgi, a member of the “Physical Expedition” together with P.S. Pallas, noted that “... there are large, but not yet explored caves in the Pechora […] and to the west of the Pechora, at its latitude, there are limestone mountains with many abysses and grottoes” [7, Guslitser B.I., p. 9].

The study of the caves of the Northern Urals was associated mainly with the development of geological academic research in the 19th century. The first reliable information about the karst of the Pechora territory is contained in the article of the geologist A.N. Chekletsov, who carried out “geognostic” surveys on the western slope of the Northern Urals. The author paid attention to the significant development of limestones and karst forms on the territory of the Cherdynskiy uyezd, noting that the Uninskaya cave is the most extensive among these caves. The cave consists of “several tiers, mutually interconnected by narrow passages. The walls of this cave are decorated with various incrustations of carbonic lime” [13, p. 171].

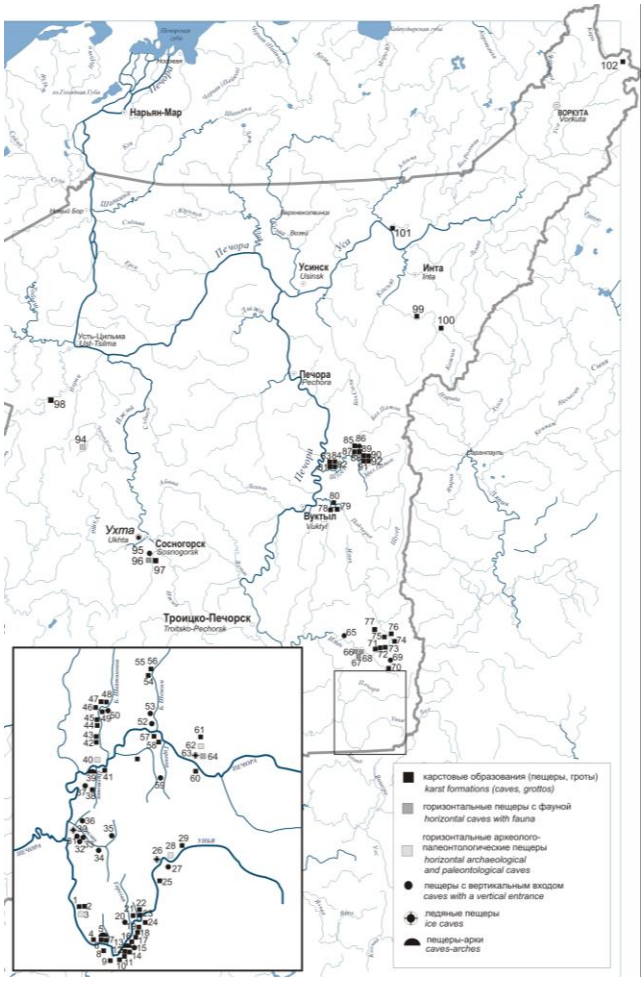

Fig. 1. Schematic map of the caves of the Pechora Urals and adjacent regions (based on the materials of I.G. Gladkova, B.I. Guslitser (1965); D.V. Ponomarev (2001)). Caves: 3 — Pervokamennaya; 5 — Arka; 16 — Kremennaya; 26 — Lednik; 28 — Uninskaya; 39 — Pikhtovaya; 40 — Kaninskaya; 52 — Shezhimskaya; 54 — Talaya; 56 — Dvoynaya; 61 —

Dalnyaya; 62 — Medvezhya; 63 — Ledyanaya; 64 — Tufovaya; 87 — Sher-Kyrta;94 — Eshmesskaya; 96 — Sedyuskaya; 101 — Adakskaya.

In 1847, the Uninskaya Cave was visited by a geographical expedition led by E. Hoffmann, who carried out extensive work in the Northern Urals. In his report, E. Hoffman described in detail his visit to the cave. This description is of historical interest as a document about the first scientific survey of a cave in the Pechora Urals. “Having passed a narrow passage, we entered a gallery closed at the opposite end by a wall, the floor of which was strewn with stone fragments. Between them, however, I soon found a bear’s vertebra. To the left, near the entrance to this gallery, there was a hole big enough for one person to pass” [14, p. 23].

The expedition of E. Hoffmann, on their way up the right tributary of the middle Pechora, discovered caves in the valley of the Shchugora River. The diary gives a description of the limestone outcrop at the Nizhnie Vorota (Uldor-Kyrta): “The layers, collapsing, produced caves, and in one of them, which had a depth of 10 to 11 sazhens, we still found a large amount of ice, which, however, according to the guides, does not melt for a whole year” [14, p. 247]. Caves were also found upstream of the Shchugora river, in the limestone rocks of the Srednie Vorota.

Since 1980s, interest in the Pechora Territory has increased due to geological surveys, but the study of caves was conducted only occasionally. In 1874, geologist P.M. Burnashev was searching for eolian placer in the upper Pechora and its tributaries. In his work, he gives a description of the Uninskaya Cave from the words of local residents: “Small caves ... are quite common; but one of them, located on the right side of the Unya River, 10 versts below the mouth of the Imperatorskaya River, attracts special attention in terms of its vastness: it consists of many underground passages that intersect in different directions and are located on several floors, which is why this cave is very similar to underground workings. Some residents of Pechora, who visited this cave out of curiosity, say that they walked through its labyrinths for more than 8 hours with a torch, but could not reach the end. In order not to get lost in it, they put various notes on the turns and reached the inner reservoir in the form of a lake in the vast emptiness of the cave. They noticed some strange footprints leading into the lake, and superstitiously, ascribing them to a strange creature in the cave, returned in fear” [15, Burnashev P.M., p. 70]. In 1888, E.S. Fedorov visited the Pechora region and mentioned the Uninskaya Cave [16, p. 369]. Thus, the Uninskaya Cave has been known for quite a long time and has been visited by the local population and travelers at different times.

In 1900, folklorist N.E. Onchukov visited the Kaninskaya Cave, located on the right bank of the Pechora River, about 2 km upstream from the mouth of the Pikhtovka River and 47 km upstream from the mouth of the Unya River. He writes: “4–5 versts away from Sobintsy, my drivers and me got out of the boat, and everyone went into a collapsed cave, 10 sazhens above the water in the mountain, clearly visible from the river” [17, p. 34]. At the mouth of the cave, they found up to 70 white “apparently boiled” skulls of horses and other animals. N.E. Onchukov notes that this

cave was visited, in particular, by “Manchi (Voguly)”, who used it as a sacrificial place. The cave was collapsed, but the traveler managed to crawl 5–7 fathoms from the mouth.

In 1911, geologist A.A. Chernov with a group of students of the Moscow Higher Women's Courses examined the Uninskaya Cave. This group included V.A. Varsanofyeva, who would later carry out geomorphological research of the Upper Pechora. In the same years, a mining engineer V. N. Mamontov visited the Unya River, carrying out geological and engineering surveys of the projected Solikamsk–Ukhta railway. He described 4 insignificant caves. “The largest one is located at the mouth of the Pervokamennaya River, 1.5 sazhens from the water level, and has the following dimensions: 3 arsh. width, 4 arsh. length and 2.5 arsh. heights” [18, Mamontov V.N., p. 82]. He was the first to discover caves at the mouth of the Pervokamennaya River.

After the October Revolution, in connection with a broad study of the mineral resource base of the Urals, extensive geological and geomorphological studies were carried out, which significantly expanded knowledge about the caves. Since 1921, systematic geological research began in the basin of the upper and middle Pechora basins. V.A. Varsanofyeva explored caves in the upper Pechora on the Ilych and Unya rivers. On the watershed between Unya, 6 km east of the village Ust-Unya, V.A. Varsanofyeva examined two small caves. One of them has a vertical entrance at the bottom of a sinkhole, and the other one starts in a narrow pit [19, p. 97–98]. In the same years, the Uninskaya Cave was inspected and described again. In 1926, under the guidance of V.A. Varsanofyeva, N.N. Jordanskiy studied a large grotto in a karst log near the Nizhnie Klyuchi, above the confluence of the Shezhim River to Pechora (later the log was named after Jordanskiy, and the cave was named Medvezhya) (Fig. 2). Several small caves were discovered on the Unya River. Of those, the arch in Sukhoy Log, near the mouth of the Pisanaya Poteryakha River, and Kremennaya Cave with two exits, located above the Belyy Mokh Stretch are particularly interesting (Fig. 1, 16). A small cave with two exits is above the mouth of the Nizhnyaya Poteryakha River [20, Varsanofyeva V.A., Iordanskiy N.N.].

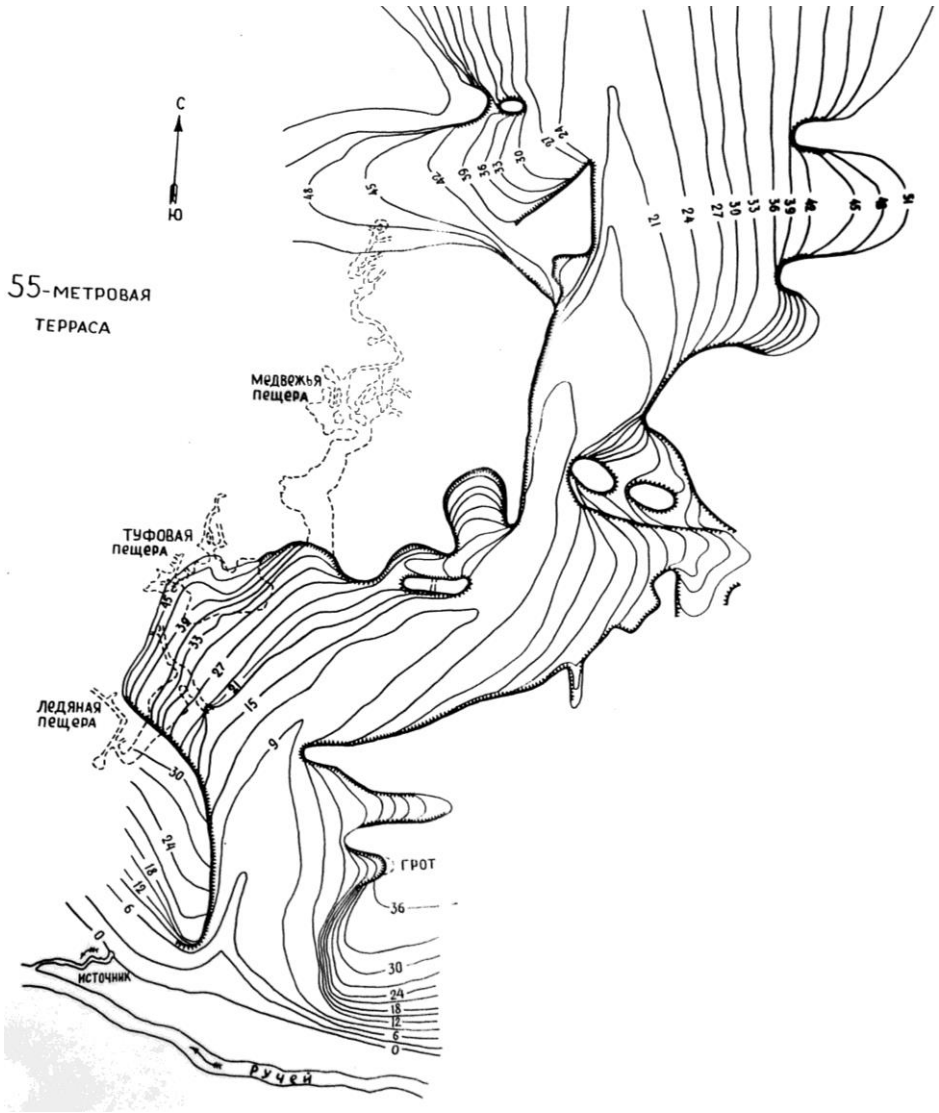

Fig. 2. Sketch of Iordanskiy Log by B.I. Guslitser, 1960–1964 [4, p. 200].

There was almost no information about caves in the Ilych River basin until the mid-20th century. In the literature, only underground voids are noted in an outcrop on the river. The literature notes only underground cavities in the outcrop on the Shezhim Ilychskiy River and in the rocks in the lower reaches of the Ispered-dikost-yol brook [21, Varsanofyeva V.A., p. 201]. In 1947, together with V.A. Varsanofyeva, V.S. Lukin carried out geomorphological observations in the basin of the upper Pechora. They discovered the Uninskaya Arch (Fig. 1, 37). V.S. Lukin visited the Uninskaya Cave and the caves on the river Utlan. He discovered the Lednik cave on the right bank of the river Unya below the mouth of Dubrovaya River (Fig. 1, 26) and the Snezhnaya Cave on the slope of the left bank of the Garevka River to the south of its inflow into the Pechora River (Fig. 1, 59). The generalizing results of the caves and karst study were given by V.A. Varsanofyeva in her work on the geomorphology of the Komi ASSR, in which she indicated the Kaninskaya, Uninskaya caves and Utlan-Parma [22, p. 283–284]. Thus, by the mid-1950s, about 15 karst formations were known on the Unya, Malaya Pechora and Ilych rivers.

Since 1955, the Ural geological team was formed in the Komi branch of the Academy of Sciences of the USSR under the leadership of B.I. Guslitser. Its purpose was to study the geomor-

phology and quaternary deposits of the Upper Pechora basin. During four expedition seasons, the group has examined and described all previously known caves on the Unya River and in the upper reaches of the Pechora. More than 40 new karst formations were discovered (Fig. 1, 10–21, etc.). In 1959, B.I. Guslitser examined the Pikhtovskaya arch, which was previously discovered by V.A. Varsanofyeva (Fig. 1, 39). The arch is located in the Sukhoy Log in the Unya River valley, 200 m below the mouth of the Pisanaya Peteryakha River [23, p. 124]. Since 1959, B.I. Guslitser and archaeologist V.I. Kanivets began to excavate cave monuments in the Pechora Urals. Pits were closed up in the Uninskaya and Kaninskaya caves in order to clarify the stratigraphy of the deposits and to reveal the cultural layers of ancient sacrificial places [7]. In 1960, excavations were carried out in the Medvezhya Cave (Fig. 1, 62), the largest of the known karst cavities in the Pechora Urals (Fig. 3). The remains of ancient mammals were found in the cave, and a study of an Upper Paleolithic site was carried out. The age of the cave, the formation of which began at the end of the Neogene, was determined [5, p. 240].

Fig. 3. B.I. Guslitser (left) near the entrance to the Medvezhya Cave. Collection of the Geological Museum named after A.A. Chernov.

Along with these excavations, other caves of the Upper Pechora basin, both previously known and newly discovered, were studied — in the Jordanskiy Log in Ledyanaya (Fig. 1, 63; Fig. 4), Tufovaya (Fig. 1, 64), Shezhimskaya and Talaya caves (Fig. 1, 52, 54) and a grotto (Fig. 1, 57) on the right bank of Bolshoy Shezhim river, Pervokamennaya Cave and cavities (Fig. 1, 4) near the Ust-Berdysh village on the Unya River, caves on Tyagly river in 3.5 km from Garevka village (Fig. 1, 36), small caves on the right slope of the Gorelaya River (Fig. 1, 20) and above the Dubrovnaya River (Fig. 1, 27), several small caves on the Ilych River (Fig. 1, 71–73). On the Utlan River tributaries, B.I. Guslitzer found several small caves (Fig. 1, 33–35).

Fig. 4. Ledyanaya Cave. Sculptural forms [5, p. 235].

In 1962–1963, B.I. Guslitser carried out geomorphological studies on the Ilych River, during which small caves were discovered. Three of them (Figurnaya (Fig. 1, 66), Azhurnaya (Fig. 1, 67), Anyuskaya (Fig. 1, 68)) begin as entrance grottoes, in the deposits of which numerous bones of Pleistocene mammals were found [24, Guslitzer B.I.]. Thus, the Figurnaya Grotto was discovered next to the Azhurnaya Cave. A description of a large canopy located on the Podcherem River, 150 m downstream of the B. Drovatnitsa River, was also made. In 1963, speleological exploration began on the Schugor and Podcherem rivers, tributaries of the Middle Pechora. On the Podcherem River, in its lower reaches, V. I. Kanivets examined four grottoes near the confluence of the Bolshaya and Malaya Drevyatnitsa streams (Fig. 1, 78–80) [6, Murygin A.M., p. 94]. In 1965, B.I. Guslitser discovered 15 caves and grottoes near the Verkhnie, Srednie, Nizhnie gates on the Shchugor River, among which the most significant is the Sher-Kyrta Cave (Fig. 1, 87), which is located above the mouth of the Bolshoi Patok River [6]. The grottoes in the Shchuger river valley are not more than 100 m from each other, at different heights from the water's edge. In the 2000s, D.V. Ponomarev conducted studies of fouling in the grottoes where the remains of small mammals were found [23].

Arctic Karst formations

Karst formations in the Cis-Urals Arctic, and, in particular, the Polar speleological region, remain poorly studied. Most often, karst forms are confined to river valleys and slopes, which are observed in the upper reaches of the Vorkuta, Usa, Malaya and Bolshaya Usa rivers. They are represented by funnels and small caves.

Noteworthy is the Verkhneusinskiy area, formed by Devonian and Carboniferous karst rocks. Thus, the first data on caves in this area are given in the works of V.N. Latkin: “Under Adak Mountain… there are caves on this shore; one of them is in a cliff, ten meters above the river hori-

zon of water. I went up to it; there is a place for 13 people in the cave. There is another cave a little lower down the river" [11, p. 151]. The processes of karst formation in this area are described in the works of the well-known researcher of the Northern Urals A.V. Zhuravskiy, who was carrying out geological and geographical works in 1904–1905. He found a cave with preserved ancient items on the left tributary of the Adzva River in Pymvashora. Archaeological excavations were carried out there later, in 1994–1995. The site is a small ruined rock cave with a height of 30 metres. The work by Voinovskiy-Krieger (1946) briefly mentions karst phenomena in the area of limestone development in the Elets River basin [22, Varsanofeva V.A., p. 283]. There is another cave on the Usa River, 2 km below the village of Adak. Adakskaya I Cave was discovered and described in 1969–1971 by V.I. Kanivets and is a sanctuary. Adakskaya II Cave is located on the left bank of the Usa River, between the settlement of Adak and the village of Adak (Fig. 1, 101). Exploration works revealed flint objects (arrowhead, scraper, plate) and a bone arrowhead. The length of the rock massif with grottoes and caves along the Usa River is about 5 km. The height of the rocks reaches 40 m. In 1984, a natural reserve of national importance "Adak" was organized.

The Polar Ural speleological area remains poorly studied, scientists have been conducting speleological research only in recent decades. Small karst formations are confined to limestones, marbles and slates [26, Kadebskaya O.I., p. 146]. Thus, the Zveroboy Grotto is located on the eastern slope of the Yangana-Pe ridge of the Polar Urals (Fig. 1, 102). The grotto is small in size: 1 m high, 1.5 m wide, 3 m long. The grotto was discovered in 1995 by a field team of the Institute of Plant and Animal Ecology, Ural Branch of the Russian Academy of Sciences, led by N. G. Smirnov. Besides, in the western part of the Yangana-Pe ridge, a narrow low (from 0.1 to 1.0 m high) cavity 12 m wide and more than 10 m long was found [23, Ponomarev D.V., p. 10].

In the Bolshozemelskaya tundra, within the Chernov uplift, karst funnels are known in the Silurian, Devonian and Carboniferous carbonate deposits, and a small cave was found on the Kara River in the Pay-Khoy speleological area. [27, Chermnykh V.A., Yushkin N.P., p. 29].

Karst formations of the Subpolar Urals region

The issues of karst formation within the Subpolar Urals remain poorly studied, and information in the literature is scattered. The first information on karst was noted by G.A. Chernov on the Syvya River in Silurian limestones. "The entrance to the cave is 0.5 m wide and 1 m high. The cave goes straight into the shore with a declivity of the floor. The latter is covered with small pointed pieces of dolomite. The length of the cave is 8 m. It ends with a deep vault, up to 50 cm in diameter" [22, Varsanofyeva V.A., p. 321]. D.V. Ponomarev, an employee of the Institute of Geology of the Komi Scientific Centre, Ural RAS Department, has been conducting karst formations in the Kozhim River basin since 2011. He gave a description of the locality Kozhim-1 and 2 (Fig. 1, 99) on the right bank of the Kozhim River in Ordovician limestones. One is located 5 km above the mouth of the Syvyu River, another is located 1 km downstream from the Kayuk-Nyrd rock.

Sokolinyy Grotto is located 1.5 km from the mouth of the Limbekhayu river in the rock outcrop (Fig. 1, 100). Small mammal teeth were found in the Kozhima River valley [28, Ponomarev D.V., p. 334].

The Lemvinskaya cave is situated on the right bank of the Lemva River, 20 km below the mouth of the Malaya Nadota River. The cave was formed in carboniferous limestones and has a length of 207 m. It was explored in 1978 by A.Z. Bikbaev [2, p. 15].

Caves of the Timan Ridge

Devonian and Carboniferous limestones in the Pechorskaya Pizhma River basin within the Middle Timan Range contain relatively small grottoes. Pizhma-1, 3 and 4 sites (Fig. 1, 98) are located in Carboniferous calcareous rocks, the outcrops of which extend for 400 m along the left bank of the Pechorskaya Pizhma River. The grottoes are located at a height of about 50 m from the water's edge [25, Ponomarev D.V., p. 12]. They contain remains of Late Pleistocene and Holocene vertebrate fauna.

Several grottoes in the Devonian limestones are known on the Southern Timan. Sedyu-1 and Sedyu-2 are located just a dozen meters from each other on the right bank of the Sedyu River (a tributary of the Izhma River) at an altitude of about 10 m from the river's edge, about 1 km downstream from the Sedyu village in coastal outcrop of Paleozoic reef limestones. The site of Sedyu-1 is a small grotto with an entrance width and height of 1 m and a depth of 5 m. Excavations were carried out in 2003 and the remains of Late Quaternary mammal, bird and other vertebrate fauna were found [29, p. 15].

The most famous cave on Timan is Eshmesskaya Cave, located between the Belaya Kedva and Belyy Eshmes rivers (Fig. 1, 94). It is about 12 m long and 4 m wide, 3 m high at the entrance and 1 m deep. The Eshmes Cave was first mentioned in the 1920s. In 1924, Pavel Vokuev, a fifty-year-old hunter from the village of Poromes, accidentally discovered a cave with wooden idols, one of which was taken by him. In 1926, the famous ethnographer D.T. Yanovich delivered the idol to the Komi Regional Museum (now the National Museum of the Komi Republic). It was not until the summer of 1965 that the archaeologist V.E. Luzgin attempted to find the Eshmesskaya Cave. An important role in the rediscovery of this archaeological monument belongs to Ukhta resident V.P. Torlopov, who organised an archaeological expedition in 1981 [30, p. 49]. Excavations were conducted by A.M. Murygin in 1982, during the works a great number of beaver bones and skulls, 29 bone arrowheads, 1 flint arrowhead, 35 silver and bronze items were found. The cave was a cult place in the late Iron Age [6, Murygin A.M., p. 96].

Sedyuskaya Cave, the largest in the South Timan, with a length of more than 500 m, was also part of the Sedyusky canyon; it was discovered in 1902 by the famous traveler V.A. Rusanov. Unfortunately, it was destroyed by blasting in the middle of the last century.

Paleontological material of caves and grottoes of the A.A. Chernova Geological Museum

Caves are widespread in limestones and dolomites of Paleozoic age in the Northern, Polar, Subpolar Urals, Timan and on the Chernyshev Ridge. Loose cave deposits hide a large number of bone remains of Pleistocene and Holocene mammals, birds, reptiles, amphibians and fish. The works of A.K. Agadzhanyan, V.I. Gromova, B.I. Guslitser, K.I. Isaichev, V.A. Kocheva, E.A. Kuzmina, D.V. Ponomareva, I.V. Kryazheva, etc. are fundamental in terms of studying the vertebrate formations of the region for the purposes of Quaternary stratigraphy.

Many researchers at the Institute of Geology, Ural Branch of the Russian Academy of Sciences, have discovered new caves and grottoes in the north-eastern part of European Russia, and studied the bone remains. B.I. Guslitser, a senior researcher at the Institute of Geology, Candidate of Geographical Sciences, has been studying Quaternary deposits and geomorphology in the northeast of the European part of Russia for many years. He made a great contribution to paleontology, the discovery of Late Paleolithic human sites and many caves and grottoes [5].

Part of the paleofaunal material of the caves, discovered by B.I. Guslitser, was studied by his colleagues. Thus, most of the material on the Quaternary theriofauna, published in the works of V.A. Kochev, consists entirely of the collections of B.I. Guslitser. V.A. Kochev, senior researcher at the Institute of Geology, Candidate of Biological Sciences, was engaged in the study of fossil remains of small mammals for the purposes of stratigraphy of Quaternary deposits. V.A. Kochev traced the evolution of the dental systems of ungulate lemmings of the region in the Neopleistocene and revealed the features of the composition and structure of rodent assemblages from Late Quaternary cave deposits [29]. D.V. Ponomarev, a senior researcher at the Institute of Geology, Doctor of Geological and Mineralogical Sciences, studies the Neopleistocene mammals of the region. He made an empirical generalization on large mammals, showed the history of the development of the theriofauna of the region.

The systematic study of Pleistocene and Holocene vertebrates in the northeast of the European part of Russia led to the accumulation of unique collections, which are represented in the funds of the A.A. Chernov Geological Museum, Institute of Geology, Komi Science Center, Ural Branch, Russian Academy of Sciences.

The faunal remains of caves found on the territory of the Komi Republic are represented by bone accumulations of Pleistocene and Holocene mammals. The remains of vertebrate caves consist of large bones of animals of the so-called mammoth fauna: mammoth, cave bear, Ural horse, woolly rhinoceros, primitive bison, reindeer. Small mammals are more often represented by bone remains of four taxa: ungulate (*Dicrostonyx Gloger*) and Siberian (*Lemmus sibiricus Kerr*) lemmings, narrow-skulled voles (*Lasiopodomys gregalis Pallass*) and Middendorf voles (*Alexandromys middendorffii Poljakov*) [28, Beznosov P.A., Ponomarev D.V., pp. 4–5].

The species composition of the fauna of the largest Medvezhya Cave includes 34 species of mammals, birds, etc. [31, Beznosov P.A., Ponomarev D.V., p. 4], and the number of taxa of the

Pleistocene fauna of all the caves of the Pechora Ural reaches 42 species of mammals, birds, etc. [5, p. 259]. Paleontological material of the Northern Urals caves of the A.A. Chernov Geological Museum is presented in 6 monographic author's collections with a volume of more than fifteen thousand items. Monographic collection donated by B.I. Guslitser to the museum's funds, consists of large bones of Pleistocene mammals from the Medvezhaya, Kaninskiye and Uninskiye caves. The museum's expositions from the caves of the Northern Urals demonstrate large bone remains of six species of mammals from four orders of vertebrates. These are large bones: cave bear (*Ursus spelaeus Rosen*) (Fig. 5), reindeer (*Rangifer tarandus Linnaeus*), cave lion (*Panthera spelaela Goldfuss*) (Fig. 6), Siberian musk ox (*Ovibos pallantis N. Smiths*), beaver (*Castor fiber Linnaeus*), ungulate lemming (*Dicrostonyx guilieilmi Sanford*), Ural horse (*Eguus uralensis Kuzmina*).

Material on the Quaternary theriofauna studied by V.A. Kochev, transferred to the museum and kept in five collections. The number of bone remains from the Medvezhaya, Studenaya, Kaninskaya and Uninskaya caves of the Iordanskiy log is more than 15000 storage units. The collections mainly consist of bone remains and molars of three taxa of small mammals: ungulate (*Dicrostonyx Gloger*) and Siberian (*Lemmus sibiricus Kerr*) lemmings, underground vole (*Microtus subterraneus*). Based on this material, V.A. Kochev developed an original method for assessing the degree of development of the molars of ungulate lemmings by calculating a special coefficient. He proposed to use an ocular transporter to measure angles on teeth, traced the evolution of the dental systems of ungulate lemmings of the region in the Neopleistocene and revealed features of the composition and structure of rodent complexes from the Late Quaternary deposits [32].

Fig. 5. Skull of the cave bear *Ursus spelaeus Rosen*. Medvezhya cave. 40x18x10cm. No. 562/48. Funds of the A.A. Chernov Geological Museum.

A number of localities, where the remains of the Quaternary microtheriofauna have been found, are known in the Subpolar Urals. D.V. Ponomarev and I.V. Kryazheva present the results of studies of late Pleistocene and Holocene small mammals from cave-type localities on the Kozhym and Shchugor Rivers [33; 34]. The paleofauna of the Subpolar Urals caves is represented in the museum by bone remains of small mammals of Holocene – Late Pleistocene, which were selected

from the Sokolinyy Grotto. The collection consists of 4500 skeletal remains of lagomorphs, insectivorous and cheek teeth of rodents. The assemblage of small rodent remains from the Sokolinyy Grotto consists of several species of the gray vole (*Microtus gregalis. Microtus middendorffii, Microtus agrestis, Microtus oeconomus*); ungulate (*Dicrostonyx sp.)*, forest (*Myopus schisticolor*) and Siberian (*Lemmus sibiric*) lemmings; bank vole *(Clethrionomus rufocanus. Clethrionomus ex.gr.rutilus-glareolus)* and water vole *(Arvicola terrestris).*

Fig. 6. Fragment of the facial section of the skull of the cave lion Panthera spelaela Goldfuss. Medvezhya cave. 17x16x4 see No. 562/29. Funds of the A.A. Chernov Geological Museum.

The study of the Quaternary microtheriofauna from the Timan cave-type localities is the subject of many works by the researcher of the Institute of Geology D.V. Ponomarenko and his colleagues. He studied Late Pleistocene-Holocene mammals from the Pizhma 1, Sedyu 1, and Sedyu 2. The fauna complex of these localities includes almost two dozen species of small mammals from three orders: rodents, lagomorphs and insectivores, as well as large mammals [28, Ponomarev, p. 334]. More than 16000 bone remains of large and small mammals have been gathered in four collections. Collections of bone remains of the Eshmess 1 and Eshmess 2 caves, collected by V.A. Kochev, consist of the bone remains of Pleistocene rodents in the amount of more than 2500 units. The complex of bone remains of mammals in the caves, kept in the museum, consists of representatives of rodents: gray (*Microtus sp.*), red (*Clethrionomus sp.*) and water voles (*Arvicola terrestris*); Siberian lemming (*Lemmus sibiricus*); representatives of mammalian families of shrews (*Sorex sp*.) and pikas (*Ochofona sp*.) and mustelids (*Mustella sp*.).

As paleontological monuments of nature, caves are a unique source of paleomass and taphonomic unification of remains. In the funds of the A.A. Chernov Geological Museum of the Institute of Geology contains 12 monographic collections of paleofaunal material from loose deposits of caves and grottoes of the European North-East of Russia. The total number of bone remains of vertebrates from the deposits of caves and grottoes of the region in the museum's funds

is more than 34000 items. This material, obtained during the excavation of karst formations, is unique in scientific and historical terms.

Conclusion

Caves as geomorphological objects and manifestation of karst processes are geological and archaeological monuments of nature. Karst formations on the territory of the north-east of Europe are unique sources of information on the history and culture of the peoples and biota that inhabited the territory of the North in the Quaternary period. By the Decree of the Council of Ministers of the Komi ASSR dated March 5, 1973, the Uninskaya Cave was declared a geological natural monument of republican significance. Most of the objects of the Pechora-Severouralsk speleological region, located in the Iordanskiy Log, Medvezhya, Tufovaya, Ledyanaya, Kaninskaya caves, are located within the Pechoro-Ilychskiy reserve. Small caves and grottoes are located on the territory of the Yugyd va National Park (Polar Urals), Pizhemskiy complex reserve (Timan Ridge), Adakskiy complex reserve (Chernyshev Ridge).

Even being in protected areas, it is necessary to take into account the status and regime of protection of speleological objects: both promising and already included in the system of protected areas. Caves can be tourist sites, which serves the development of ecological tourism in the territory. However, it is necessary to take into account the possible use of caves for recreational purposes, establishing certain regimes for the protection of speleological objects: especially strict protection; limited protection without recommendations for mass tourism; limited protection with recommendations for mass tourism [35, p. 55]. Climatic phenomena and tourist trips can have a significant impact on the preservation and development of caves. For a long time, the walls and vaults of caves have been actively exposed to the environment. It is not uncommon to encounter collapsed grotto vaults and landslides that close entrances, so it is necessary to conduct a systematic monitoring of the condition of speleological sites.

Thus, karst processes and products in the European North of Russia remain poorly studied. Promising areas for the discovery of new grottoes and small caves are the Timan Ridge and the northern regions of the Polar Urals, the Bolshezemelskaya tundra and Pay-Khoy.

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The First Scientific Expeditions to the Bering Strait and to the Russian Colonies in America *

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Abstract. Based on the geographical atlases of the 16th century, the German scientist G. Leibniz proposed to Peter I a project aimed at discovering a strait between Asia and America, studying the Earth's magnetic field, cartographic and other research in Russia. In December 1724, Peter I signed a decree on equipping the expedition, which was called the First Kamchatka Expedition (1725–1730). In 1732, the expedition of I. Fedorov and M.S. Gvozdev through the Bering Strait approached the northwestern coast of America in the area of Cape Gvozdev (now — Cape Prince of Wales). At the same time, members of the Admiralty Board N.F. Golovin and T. Sanders proposed organizing Russian round-the-world voyages and creating a Pacific Fleet to protect Russia's Far Eastern borders. In 1741, the Second Kamchatka Expedition of V.I. Bering and A.I. Chirikov explored the northwestern coast of America and the islands of the Aleutian ridge. In 1763, M.V. Lomonosov justified the possibility of passing the Northern Sea Route through the Pole to Kamchatka. In 1764–1769, by the order of Catherine II, K. Krenitsyn and M.D. Levashov sent a secret expedition to the Bering Strait, which initiated a systematic mapping of the Aleutian Islands and Alaska. The expedition of I. Billings and G.A. Sarychev (1785–1796) resulted in the publication of maps of the Pacific Ocean. By the beginning of the 19th century, the question of the sea route to the Atlantic from the Bering Sea through the Arctic Ocean remained open. I.F. Kruzenshtern developed his own plan for organizing round-the-world voyages and received state support. Emperor Alexander I granted the request of the head of the Russian-American Company, N.P. Rezanov about sending goods to the Pacific colonies by sea and establishing interstate relations with Japan, which made it possible to equip the first Russian round-the-world expedition under the command of I.F. Kruzenshtern and Yu.F. Lisyanskiy (1803–1806).
Keywords: *Bering Strait, Arctic Ocean, Great Northern Expedition, circumnavigation, Alaska*

On October 21, 2021, the State Historical Museum hosted the opening ceremony of the international exhibition project "Kruzenshtern. Around the World", widely covered in the central press. The exhibition is dedicated to the 250th anniversary of Ivan Fyodorovich Kruzenshtern and

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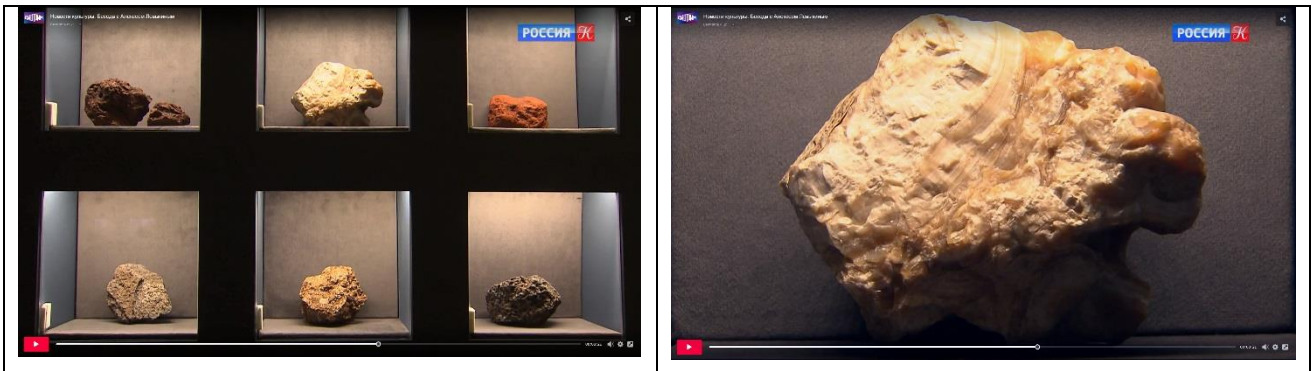
the 215th anniversary of the completion of the first Russian round-the-world expedition. This exhibition represented samples of the 1826–1829 round-the-world expedition on the sloops "Moller" and "Senyavin" under the command of lieutenant captains Konstantin Mikhailovich Stanyukovich and Fyodor Petrovich Litke, held on the initiative of I.F. Kruzenshtern. The Ore-Petrographical Museum of the Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry RAS (IGEM RAS) keeps an almost complete collection of rocks and minerals (287 samples), collected by geologist Alexander Philippovich Postels during this trip (another 4 samples of minerals are in the Fersman Mineralogical Museum RAS) (Fig. 1).



a b

Fig. 1. Exposition of the Ore-Petrographical Museum of the IGEM RAS at the exhibition "Kruzenshtern. Around the World" at the State Historical Museum (a); aragonite, St. Helena Island (b) [1].

Thanks to the first round-the-world expedition of Ivan Fedorovich Kruzenshtern and Yuri Fedorovich Lisyanskiy, which took place in 1803–1806, the era of regular circumnavigation began, aimed at providing Russian settlements in America with material resources, protecting its borders with naval forces and helping the Russian American Company (RAC) to conduct trade activities.

Finding a sea connection with Kamchatka and the hypothetical Strait of Anián

Due to the long distance between the Baltic and Alaska, finding a shorter and safer route was an urgent issue. Kamchatka and Chukotka were visited by overland travellers along river and lake routes until the early 18th century. These were, in essence, military campaigns that took place on the territory of independent and at first militant peoples. By decree of Peter I, in 1713, a party of shipbuilders and sailors was sent to Okhotsk to find a sea connection with Kamchatka. The boat Vostok, built here and commanded by the Yakut Cossack Kozma Sokolov and sailor Nikifor Moiseev Treska, opened the sea route to Kamchatka [1, Alekseev, p. 327].

It was no less important for Peter I to discover the sea route to China and Japan and to find out whether Asia is connected to America or there is a strait between them, as it was reflected on geographical atlases starting from the end of 16th century (a hypothetical strait between Asia and America, called Streto de Anian (Anian) (Fig. 2–3).

[1] TV channel Culture. URL: https://smotrim.ru/article/2629347. Taken from IGEM RAS website News. URL: http://www.igem.ru/periodic/news/news_21.html (accessed 12 February 2022).

Fig. 2. Map of America by Sebastian Münster, 1540 (reprinted in 1572) (from Nordenskiöld. Facsimile Atlas). North America is separated from Asia by an unnamed strait (in the northwest) [2, Berg L.S., p. 379] [2].

Fig. 3. Map of the northern countries by Gerardus Mercator, 1569, from the atlas of R. Mercator, 1595 (from Nordenskiöld. Facsimile Atlas). The map between Asia and America (in the north-northeast) shows the hypothetical Streto de Anian at the site of the Bering Strait, as well as the northwest and northeast passages to the eastern Spice Islands. The American side of the Strait of Anian is called the Kingdom of Anian (Anian regnum) [2, Berg L.S., p. 379] [3].

[2] Sebastian Munster's 1540 map of America (1572 reprint) (from Nordenskiöld. Facsimile Atlas). URL: https://en.wikipedia.org/wiki/File:Map_of_America_by_Sebastian_Munster.JPG (accessed 12 February 2022).
[3] Map of the northern countries by Gerardus Mercator 1569 from R. Mercator's 1595 atlas (from Nordenskiöld. Facsimile Atlas). URL: https://en.wikipedia.org/wiki/Mercator_1569_world_map (accessed 12 February 2022).

The concept of the Strait of Anian first appeared thanks to the Italian cartographer Gastaldi in 1562, and the origin of the name Anian is associated with the name of Marco Polo (second half of the 13th century). In New World cartography, it is depicted as an island, in line with a European fervor to find northwest and northeast passages to the Pacific. With the appearance of the Strait of Ania on maps, there were many people who claimed to have followed this route from the Pacific to the Arctic Sea.

Scientific justification for Russian expeditions to resolve the issue of whether Asia is connected to America

The question whether Asia was joined to America was of interest to the German mathematician, philosopher and historian Gottfried Wilhelm Leibniz, founder (in 1700) and the first president of the Prussian (Berlin) Academy of Sciences for more than 20 years. In 1697, while travelling in Europe, Peter I met G. Leibniz. Their meetings resulted in the emperor's approval of the creation of the Academy of Sciences in St. Petersburg (1724) and the beginning of the development of scientific research in Russia according to the Western European model. Gottfried Leibniz received from Peter I the title of Privy Councilor of Justice and a pension of 2000 guilders. Leibniz proposed a project of scientific research in Russia related to its unique geographical location, such as the study of the Earth's magnetic field, cartographic research, the study of languages and customs of the peoples, and most importantly, the study of the coast of northeast Asia to find out whether Asia was connected to America or if they were separated by a strait [2, Berg L.S., p. 379] [4]: *"No one can solve this doubt better than the king, and this will be more glorious and even more important than anything that the Egyptian kings did in their time to explore the origins of the Nile"; "Only in one place this border has not been explored, and this place is in the possession of the king; a large strip of land stretches far to the north, to the so-called, although still unknown, Arctic cape, and it would be necessary to investigate whether this cape exists and whether that strip of land ends in it. I believe that the natives of the surrounding region could undertake such a journey in the summer months…"* (excerpts from letters to the artillery general Yakov Vilimovich Bruce, the closest associate of Peter I, in 1711 and 1712) [3, Leibniz G., p. 372]. In 1716, G. Leibniz met with Peter I on the waters in Pyrmont (Braunschweig). He handed over a note through the diplomat Peter Pavlovich Shafirov, the Vice-Chancellor of Peter the Great, in which he pointed out in detail the ways in which the Tsar could promote civilization and the development of science with great glory [2, Berg L.S., p. 379].

The first Russian scientific expeditions to search for a sea passage from Asia to America

In January 1719, the educatees of the Naval Academy, geodesists Ivan Mikhailovich Evreinov and Fedor Fedorovich Luzhin, received his decree *"to describe locations near Kamchatka and*

[4] Leibniz, Gottfried Wilhelm (From Wikipedia, the free encyclopedia). URL: https://en.wikipedia.org/wiki/Gottfried_Wilhelm_Leibniz (accessed 15 February 2022).

to resolve the question: is northeast Asia connected with America?": "… from Tobolsk, taking escorts, go to Kamchatka and further, where indicated, and describe the places there: whether America is connected with Asia, and it must be done very carefully, not only [on] the Zuyd and Nord, but also Ost and West, and put everything on the map properly" [5] (other rulers also got the decree).

In 1720–1721, on the Vostok boat, surveyors described the first six islands of the Kuril ridge, mapped all the Kuril Islands and Kamchatka. The strait between America and Asia was not reached due to insufficient equipment of vessels (Fig. 4).

Fig. 4. "Map of the Kuril Islands with nearby places", compiled by Gerdhard Friedrich Miller no later than 1755, based on the results of the Second Kamchatka Expedition (1733–1743) and previous ones [6].

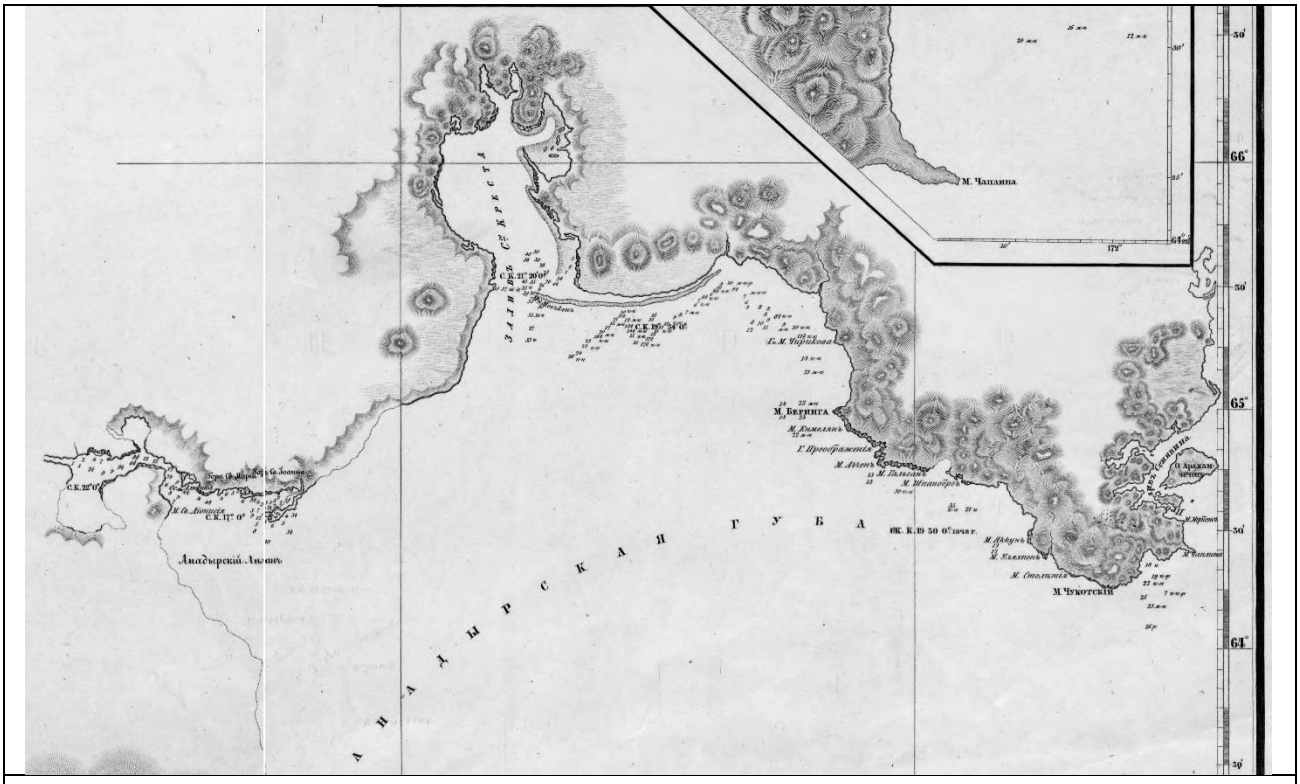
On December 23, 1724, shortly before his death, Peter I signed a decree on equipping the expedition, which later became known as the First Kamchatka Expedition. In the instruction No. 4649 "On the opening of the connection between Asia and America", approved already during the

[5] Polnoe sobranie zakonov Rossiyskoy imperii. Sobranie 1-e. S 1649 po 12 dekabrya 1825 g [Complete collection of laws of the Russian Empire. 1st collection. From 1649 to December 12, 1825]. t. Petersburg: Type. 2nd Division own. E.I.V. Office, 1830, No. 3266, p. 607. URL: http://elib.shpl.ru/ru/nodes/183-t-5-1713-1719-1830#mode/inspect/page/611/zoom/4 (taken from the website of the Digital Library of the GPIB of Russia (http://elib.shpl.ru/ru/nodes/9347-elektronnaya-biblioteka-gpib) (accessed 12 February 2022).

[6] History of the Kuril Islands. URL: https://www.kuriles-history.ru/maps/geo/russian/id-1/ (accessed 15 February 2022).

reign of Catherine I, it was indicated: *"1. It is necessary to build one or two boats with decks in Kamchatka, or in another place there. 2. On these boats, near the land that goes to the north, and on expectation (they don't know the end of it), it seems that the land is part of America. 3. And to look for where it converges with America, and to reach any city of the European possessions; or if will see any European ship, to check up from it as it [coast] named, and to take on the letter, and to be on coast, and to take the true statement, and having put on the map, to come back here"* [7].

Ivan Ivanovich (Vitus Ponesen) Bering, the head of the First Kamchatka Expedition, with assistant lieutenants Martyn Petrovich Shpanberg and Alexey Ilyich Chirikov, set off from St. Petersburg at the beginning of 1725 and arrived in Okhotsk in January 1727. The journey was burdensome, since they first had to cross Siberia by land, and then, in Kamchatka, to build and supply their ship "Saint Gabriel". In July 1728, the team of V.I. Bering went to sea and headed to the mouth of the Anadyr River. While the "Saint Gabriel" went north, records of daily reports by year were kept, indications of latitude and longitude, as well as geographical position. At the beginning of August, the Cross Bay was opened — the northernmost point, which was reached by the "Senyavin" sloop under the command of Lieutenant Commander F.P. Litke100 years later; here, mineralogist and draftsman A.F. Postels selected 36 samples currently stored in the Russian Geological Museum of the IGEM RAS (Fig. 5).



a

[7] Polnoe sobranie zakonov Rossiyskoy imperii. Sobranie 1-e. S 1649 po 12 dekabrya 1825 g [Complete collection of laws of the Russian Empire. 1st collection. From 1649 to December 12, 1825]. t. Petersburg: Type. 2nd Division own. E.I.V. Office, 1830. vol. VII, No. 4649, p. 413. URL: http://elib.shpl.ru/ru/nodes/185-t-7-1723-1727-1830#mode/inspect/page/417/zoom/4 (accessed 15 February 2022).

Fig. 5. Cross Bay. A fragment of the Mercator's map of the Bering Sea with the northeastern coast of Asia, between Capes Olyutorskiy and Chukchi. "Map of Captain Litke, supplemented by an inventory of the Anadyr Bay, made since 1847 on the ships of the Russian-American Company, and engraved in the Hydrographic Department of the Naval Ministry" (fragment), 1849 [8] (a); sample of metalabreccia and its label, St. Cross Bay, coast of Anadyr Bay, Bering Sea [9] (b).

The first Kamchatka expedition (1725–1730) did not conclusively solve the question of the strait between Asia and America. Bering's findings were inconclusive, as ice and bad weather prevented him from confidently proving the presence or absence of land communication between Asia and America. The successors of Peter I insisted that he return for a second journey, which took place more than ten years later, with expanded tasks (Fig. 6).

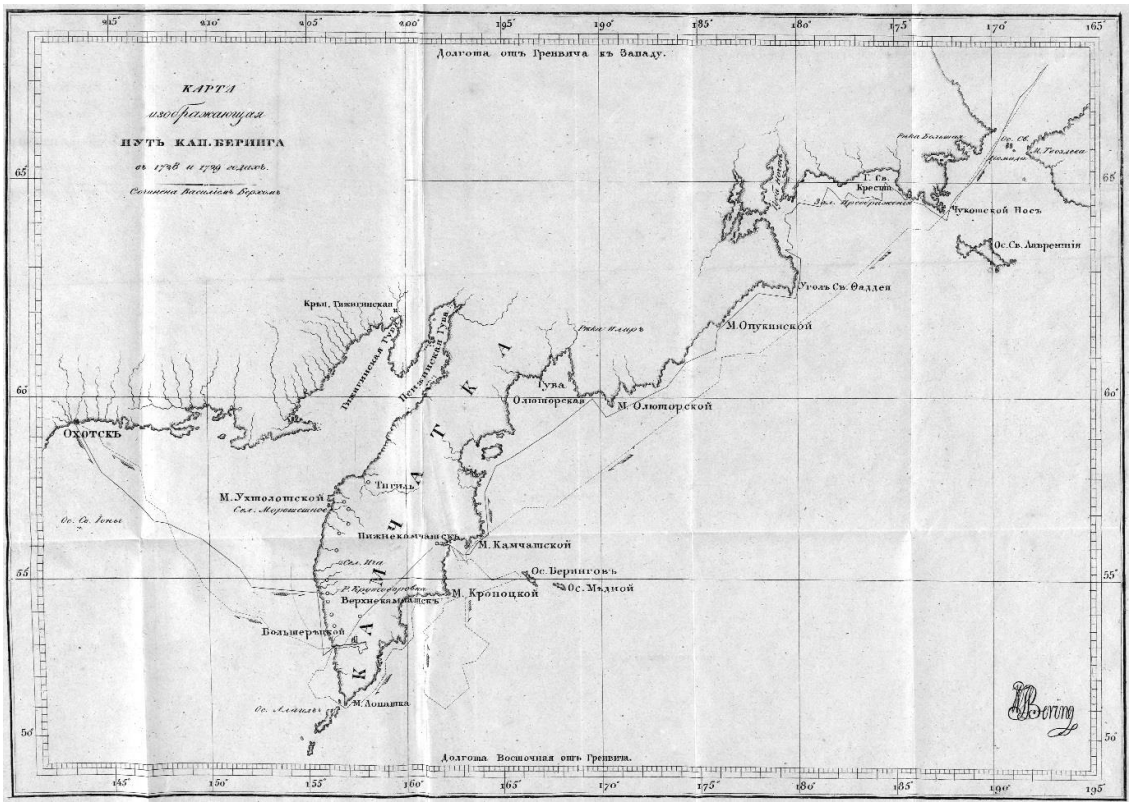


Fig. 6. Map depicting the route of Captain Bering in 1728 and 1729, composed by Vasiliy Berkh [4, V. Berkh, p. 126].

In August 1732, the sea expedition of Ivan Fedorov and Mikhail Spiridonovich Gvozdev through the Bering Strait approached the "Great Land" (translated from the Aleutian "a-la-as-ka")

[8] Library of Congress. URL: https://www.loc.gov/resource/gdclccn.2018693896/?r=-0.495,1.064,1.806,0.859,0 (accessed 15 February 2022).

[9] Taken from the website of the Ore-Petrographic Museum of the IGEM RAS. URL: http://igem.ru/museum/regions/zaliv-svkresta (accessed 15 February 2022).

northeast of the cape, which was named after Gvozdev (its modern the name is Cape Prince of Wales, this is the westernmost continental point of North America, which is located on the Seward Peninsula (Alaska) at a distance of 86 km from Cape Dezhnev (Chukotskiy Nose) — the easternmost continental point of Eurasia) (Fig. 7).

Fig. 7. Fragment of the map of new discoveries in the Eastern Ocean (1781). The places visited by the surveyor M.S. Gvozdev in 1732 [10].

First attempt to organize round-the-world expeditions for protection of Russian Far Eastern borders, description of American shores, search for new lands and ensuring commercial activity

The first attempt to organize a Russian circumnavigation was made by members of the Admiralty Board Admirals Nikolay Fedorovich Golovin and Thomas Sanders in connection with the organization of the Second Kamchatka Expedition in October 1732. N.F. Golovin made *"Representation of Golovin to Empress Anna Ivanovna on the introduction of maritime practice for sailors by equipping sea expeditions to Kamchatka and Siberia"* and *"Submission of the Inspector General of*

[10] Library of Congress. URL: https://www.loc.gov/item/2018693880/ (accessed 15 February 2022).

the fleet, Vice Admiral Count N.F. Golovin to Anna Ioannovna on the further development of the Russian fleet and assistance to the expedition of V.Y. Bering" [11, 12].

In the projects of N.F. Golovin, the question of the need to create a Pacific Fleet to protect the Far Eastern borders of Russia was first raised: "*2. <…> I have to suggest to Your Majesty a good way to set up universal maritime practice for training young officers and sailors in the Russian fleet, so that <...> during war and in case of attack of the enemy on the caravans of Your Majesty of Russia, in order to avoid attacks on the ships of Your Majesty, so that not only will they be able to defend themselves, but also to defend and protect the land, and not to be in the state which I now find them in, much to my sorrow and regret*".

Further, N.F. Golovin gave the following justification for the need to organize annual round-the-world expeditions to the Far East: "*3. Your Majesty ordered to send to Kamchatka in Siberia by land, Captain Commander Bering with several naval officers, artisans, sailors and appropriate materials for the construction of several sea vessels to explore new lands there and land them on America and the Japanese islands, also to describe the Siberian coast from the Ob River even to Okhotsk and beyond. <...> But, for the above-mentioned importance, now Mr. Captain Commander Bering must go by land through Siberia to Kamchatka, however <...> there is another way to send from here to Kamchatka next spring, two Russian military frigates with a last ship across the sea, on which to put any provisions in reserve for a year or more, <...> which have to go from here through a large sea of oceans around Cape Horn [Cape Horn at the tip of South America] and into the South Sea [South Pacific Ocean] and between the Japanese islands even to Kamchatka. And these frigates can make this way in the time of eleven months or less, since the Golan ships sail every year to the Japanese islands and return in eighteen or sixteen months, and this way is very well known to any good navigator or naval officer.*

<...> the description of these shores and exploration of new lands and islands is very necessary and very useful for the country of Your Majesty and for the sake of spreading the regions and powers and for the knowledge of the sea route in those places and for other necessary reasons of the state. And besides the thieves' hoods, there is no need to be afraid of anyone on that voyage and on those seas, as frigates of our country should be equipped with at least forty cannons and a double set of chiefs and under-officers, as well as a fair amount of ammunition of every kind. And so those frigates will always be in a good state to defend themselves and give a proper rebuff.

<...> and other nations, Japanese and Chinese, do not have such ships with cannons. When these frigates come to Kamchatka, they can supply commander Bering and his crew with materials

[11] Presentation of Golovin to the Empress Anna Ivanovna on the introduction of sea practice for sailors by equipping sea expeditions to Kamchatka and Siberia 1732, October 1. URL: https://drevlit.ru/docs/russia/XVIII/1720-1740/Golovin_N_F/text1.php (accessed 12 February 2022).

[12] Presentation of the Inspector General of the Fleet, Vice Admiral Count N.F. Golovina Anna Ioannovna about the further development of the Russian fleet and assistance to the expedition of V.Y. Bering. 1732, October 12. URL: https://vostlit.info/Texts/Dokumenty/Reisen/XVIII/1700-1720/Issl_russ_tich_ok_XVIII_perv_pol/81-100/82.phtml?id=6229 (accessed 12 February 2022).

and sufficient ammunition, <...> and upon their arrival, they will be more able to move everywhere without any fear and look for all sorts of lands and islands.

When those ships return safely, then every year they should be sent from here to Kamchatka, two frigates, and those who arrived should stay here to re-explore lands, islands and passages, sea harbors, bays and other things, and that is more for maritime practice , <...> and from this the following public benefit may come.

1. This way will be a way to teach young officers and sailors, who will know the sea and the state of it, by going there and returning back, as well as the declination and the change of the compass, different sea currents, the change of winds and all the things a good naval officer should know. And so in one such way those officers and sailors can learn more than by the local sea in ten years.

2. In the exploration of America, there may be the following great state benefit for us, because there are mines [ores] rich in both silver and gold, of which <...> as is known <...> the kingdom of Gishpanskoe, Aglinskoe and Portugal profit, and what importance those kingdoms have from this commerce and navigation in those parts to this day. <...> And especially with different peoples, a real cam-mertion can be established, as with the Japanese <...> and some harbours and ports of call could be found near those lands, where a fortress [military fortification] could be founded and a few Russians settled and troops posted, and many other attractions [benefits] <...> can be derived from that sending. <…>

If this suggested way will not be soon put into practice, then we will lose many officers, because of one year delay. Furthermore, it is also possible that henceforth there will be no such prosperous time as there is at present. If war should break out with some other country or some alien powers should try to regulate the fleet of their ships, then that would make it a lot harder to do this useful cause. <…>

Your Majesty's servant GOLOVIN reports on this. Peterborkh. October, the 1st day of the year 1732".

These proposals of Vice Admiral N.F. Golovin were not supported by the Senate, and the opportunity to organize the first Russian circumnavigation in 1733 was missed.

Discovery of the Strait between Asia and America, geographical and scientific research of its shores

In July 1741, the Second Kamchatka Expedition under the command of Captain-Commander V.I. Bering and Captain A.I. Chirikov discovered and explored a significant part of the northwestern coast of America and many islands of the Aleutian ridge [5, Bolkhovitinov N.N.]. Their packet boats "St. Peter" and "St. Pavel", and later other ships of the "leading industrialists" made numerous voyages to the shores of America (the industrialists were the miners of the sea otter, which they called the sea beaver; therefore, the Bering Sea was called Beaver Sea on early maps) (Fig. 8).

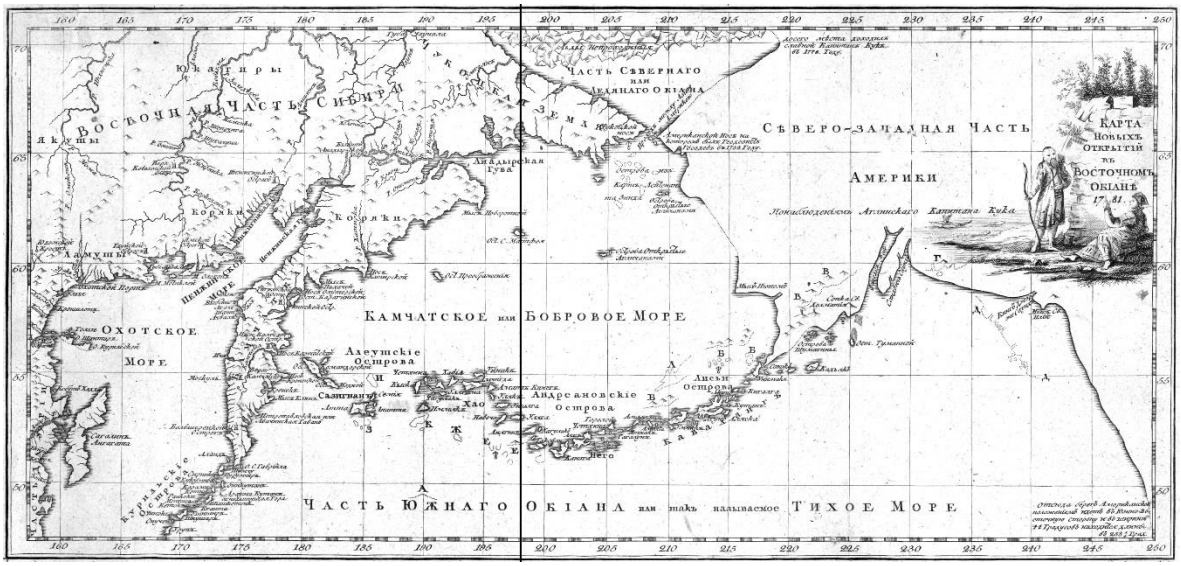


Fig. 8. Kamchatka or Beaver Sea on the map of new discoveries in the Eastern Ocean (1781) [13]

As a result of the Second Kamchatka Expedition, which was part of the Great Northern Expedition (1733–1743), V.I. Bering finally found Mount St. Elias in southern Alaska in July 1741. The expedition demonstrated Russia's claim to the North American region, starting from Mount St. Elias and far south and east of the Bering Strait. The expedition confirmed that Siberia and Alaska are indeed separated by a strait.

The naturalist Stepan Petrovich Krasheninnikov was a member of the expedition of V.I. Bering and the first explorer of Kamchatka. He studied in detail the local flora and fauna, as well as the culture and languages of the indigenous peoples of the peninsula, Koryaks and Itelmens. S.P. Krasheninnikov received a scholarship from prominent German specialists who also participated in the expedition (Georg Wilhelm Steller, Gerhard Friedrich Müller and Johann Georg Gmelin) to carry out his research. He published a two-volume work containing numerous illustrations: various landscapes, active volcanoes of Kamchatka, ports and fortresses on the coast, customs and activities of indigenous peoples, etc. His work also covered the areas adjacent to Kamchatka (Kuril Islands, western regions of the Aleutian Islands and some areas of North America). The book includes maps of Kamchatka and the Kuril Islands and nearby areas of Eastern Siberia (Fig. 9) and a brief dictionary of basic Russian words in the languages of the peoples of Kamchatka. S.P. Krash-

[13] Library of Congress. URL: https://www.loc.gov/item/2018693880/ (accessed 12 February 2022). Comment by the American developers of the site: the map shows parts of Eastern Siberia and the northwestern part of the North American continent and the places reached by the Russians Mikhail Gvozdev and Ivan Sind, the English explorer Captain James Cook and others. In 1732, an expedition led by Gvozdev and the navigator Ivan Fedorov crossed the Bering Strait between Asia and America, discovered the Diomede Islands and approached Alaska in the area of Cape Prince of Wales. The expedition members landed on the coast of the North American mainland, marked on the map as the "American Nose", and reported that they had discovered not an island, but a much larger territory. South of the Bering Strait, the map shows the islands mapped by Lieutenant Sindh in 1764-1768 and several islands discovered by the British. Northeast of the Bering Strait, in the far north of present-day Alaska, is the point reached by Cook in 1778 on his third voyage to the Pacific in search of the elusive Northwest Passage. It is marked on the map [near the upper frame] with the words: "the glorious Captain Kukk reached this place in 1778." The map also shows areas inhabited by various ethnic groups with which Russian and European researchers established early contacts: Yakuts, Koryaks, Yukaghirs, and others. World Digital Library.

eninnikov returned to St. Petersburg in 1734, where he was appointed professor of botany and was later elected a member of the Imperial Academy of Sciences.

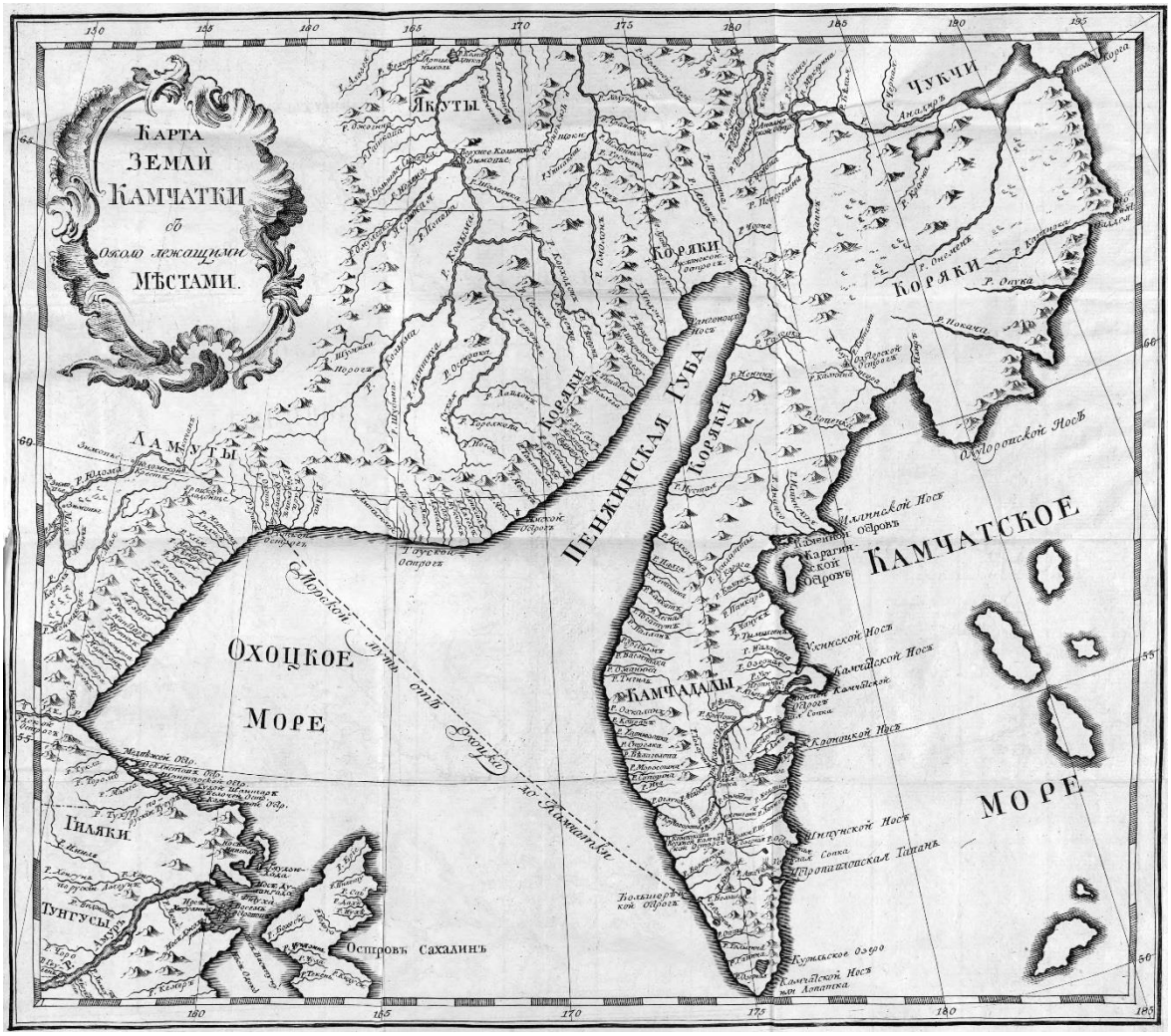


Fig. 9. Map of the Kamchatka Land with nearby places [14].

Secret expeditions to strengthen Russian conquests in the east

In the 18th century, Russian navigators headed to America along the Aleutian Ridge or through the Bering Strait. The Aleutian route was more profitable for industrialists due to the generally benevolent attitude of local residents towards them, while the route through the Bering Strait, in addition to natural dangers, was associated with the problem of "*non-peaceful Chukchi*" [1, Alekseev A.I., p. 327].

Despite numerous geographical discoveries and practical development of the American coast, Russia did not officially declare to the world its right to these lands. Therefore, Russian settlements in Alaska and the board members of the future Russian-American Company (1799) had many problems providing for the population and establishing trade relations with neighbouring

[14] Krasheninnikov S.P. Opisanie zemli Kamchatki. Tom 1-2 [Krasheninnikov S.P. Description of the land of Kamchatka. Volume 1-2]. St. Petersburg, Imperial Academy of Sciences Publ., 1755, 319 p.; taken from the site of Library of Congress. URL: https://www.loc.gov/item/2018694160/ (accessed 12 February 2022).

countries [5, Bolokhvitinov N.N.; 6, Grinev A.V.; 7, Esakov V.A. et al.; 8, Zubov N.N.; 9, Okun S.B.; 10, Pasetsky V.M.; 11, Tikhmenev P.A. et al.].

In relation to the territory under the jurisdiction of the Russian-American Company, official documents used the names: “Russian-American villages”, “Russian colonies in America”, “Russian North American colonies” and very rarely “Russian America” [12, Fedorova S.G., p. 276].

After reviewing the results of the voyages of V.I. Bering and A.I. Chirikov, Academician Mikhail Vasilievich Lomonosov came to the conclusion: *“America, lying against Kamchatka, begins with islands, as Beringov and its neighboring ones, and therefore it can be asserted, not without reason, that the places, seen by the aforementioned navigators, are the essence of the island and make up the Archipelago”* [13, Lomonosov M.V., p. 150].

In 1763, M.V. Lomonosov addressed the heir to the throne, Pavel, who was considered an admiral general, with a *“Letter on the Northern Route to the East Indies by the Siberian Ocean”*, in which he proposed to pass the Northern Sea Route in high latitudes (through the polar area) to Kamchatka and reach the Pacific Ocean through the Bering Strait (Fig. 10).

Fig. 10. Drawing for the book by M.V. Lomonosov “A brief description of various travels in the northern seas and an indication of a possible passage by the Siberian Ocean to East India, October 20, 1763”, or “Circumpolar map” (stored in the Russian National Library).

In order to counteract possible foreign encroachments, a “secret expedition” was undertaken under the leadership of Vasiliy Yakovlevich Chichagov, developed by M.V. Lomonosov and proposed by Catherine II, who had just ascended the throne. Having studied the history of polar navigation and summarizing all the available geographical information, M.V. Lomonosov came to the conclusion that in summer the sea between Svalbard and Novaya Zemlya should be free of ice. Therefore, starting sailing from Svalbard and leaving the Polar Basin, following along the North American coast, the Bering Strait can be reached. By special order of Catherine II, the enterprise was declared “*an expedition to resume whale and other animal and fish breeding*”.

On August 3, 1765, the expedition reached 80°26'N and, having encountered impassable ice, was forced to return to Arkhangelsk (August 20). The expedition proved the correctness of M.V. Lomonosov that there is an ocean to the north of Svalbard (Grumant) and confirmed the correctness of his scheme of currents and ice movement.

At the direction of Catherine II, a secret expedition of lieutenant commanders Petr Kuzmich Krenitsyn and Mikhail Dmitrievich Levashov (1764–1769) was sent to the Bering Strait, which marked the beginning of systematic mapping of the Aleutian Islands (to the islands Umnak and Unalaska) and Alaska: *"to find out from the inhabitants about the sea to the north, to the noon and west of them, whether there is a Greater land or still unknown islands in the vicinity of Umnak, and whether the inhabitants of Umnak have any acquaintance and communication with the inhabitants of those lands*"([14, Archive, sh. 20] — quoted from [1, Alekseev, p. 327]) (Fig. 11). Since at the same time, a decree on the expedition under the project of M.V. Lomonosov was issued, it was decided to supplement the instructions of P.K. Krenitsyn with points in case of a meeting with the expedition of V.Ya. Chichagov.

Fig. 11. The Beaver Sea (Bering Sea) and the Aleutian Islands. Underlined +5 — Unalashka Island, to the west — Umnak Island, to the east — Unimak Island, Isanak Strait and the Alaska Peninsula. "Map of maritime discoveries made by Russian sailors in the Pacific and Arctic seas in different years. It was composed and engraved according to the latest observations of foreign sailors in 1802" (excerpt) [15].

These two outstanding expeditions did not meet. Two attempts in 1764 and 1765 resulted in Chichagov failing to pass east of Svalbard, but his expedition returned without loss, spent the winter on Svalbard, collected important scientific information about the currents and drift of ice, measured depths and took soil samples, described the flora and fauna of Svalbard.

In 1769, a secret expedition of M.K. Krenitsyn and M.D. Levashov returned to Kamchatka; it completed the discovery of the giant Aleutian arc and brought extensive information on the geography, history and ethnography of the "hitherto unknown islands" [15, Glushankov I.V., p. 84].

[15] Library of Congress. URL: https://www.loc.gov/resource/g9235.mf000027/?r=0.093,0.146,0.192,0.091,0 (accessed 12 February 2022).

Thanks to this expedition, the Russian government demonstrated its determination to consolidate the conquests of Russian sailors in the east (Fig. 12).

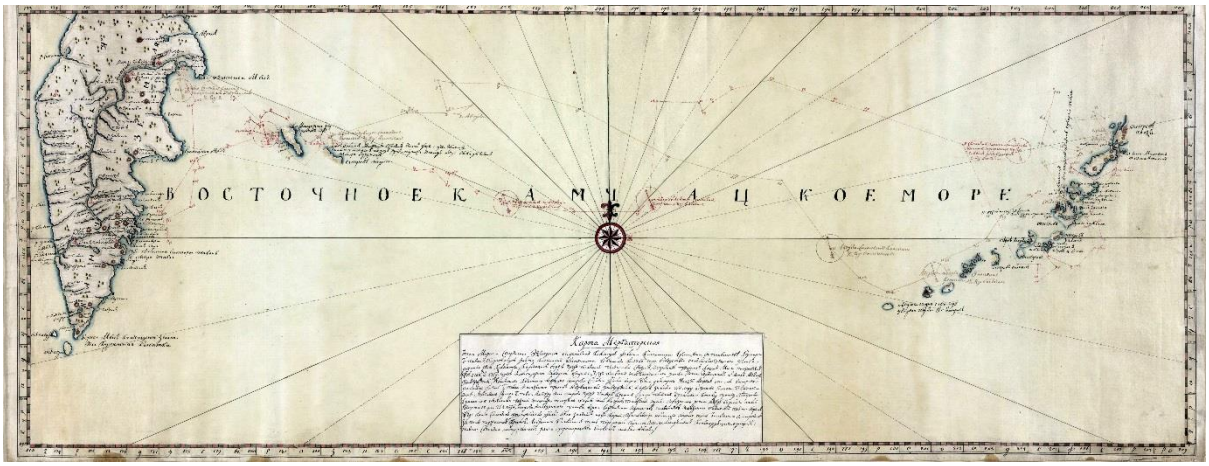


Fig. 12. Photocopy of the original Mercator's map of M.K. Krenitsyn – M.D. Levashov [16].

On the final survey map, M.K. Krenitsyn and M.D. Levashov showed the island "Alyaksa" (Fig. 12, the inscription near the right frame), and as a peninsula with the name Alaska, this geographical object appeared on the map according to the results of the third round-the-world expedition of the English captain James Cook (1778–1779) (Fig. 11), but without the Shelikhov Strait, which separates the Aleutian Islands (Kodiak, Shuyak, and Marmot) from the mainland. At the end of the 18th century, in Russian documents, Alaska began to be called the entire northwestern continental ledge of North America [12, Fedorova S.G., p. 276].

The situation on the eastern frontiers worsened in 1780, when British ships under the command of Captain Charles Clerc (a member of the third round-the-world expedition of John Cook, who led it after his death) visited the shores of the Russian colonies in America and Kamchatka. This expedition reached the Chukchi Sea, but due to the state of the ice was forced to return. The subsequent trading activity of the British in the Russian "possessions" and their rivalry with Russian industrialists pushed Catherine II to act more decisively.

In the 18th century, international relations were governed by the "right of first discovery", which required a country to formally declare the discovery. The results of the expeditions of V.Y. Chichagov (1765–1766) and M.K. Krenitsyn – M.D. Levashov (1764–1769) did not satisfy Catherine II. In 1785–1796, an expedition of Joseph Billings and Gavriil Andreevich Sarychev took place. In order to resolve the contradictions with the British about the "rediscovery" of the already known Russian islands and separate sections of the coast, Joseph Billings, a member of the third expedition of J. Cook, was accepted into the Russian service. Lieutenant Roman Romanovich Gall, an Englishman on Russian service, and Lieutenant Gavriil Andreevich Sarychev were assigned as Billings' assistants. This event, like all the northern and north-eastern expeditions of the time, was declared top secret. A strict order was established for the storage of materials and their delivery to

[16] A photocopy of the original Mercator sailing chart of M.K. Krenitsyn. M.D. Levashova. URL: http://www.polarpost.ru/Karta-merkatorskaia.jpg (accessed 12 February 2022).

the Admiralty. According to the instructions, the purpose of the expedition was to describe the Chukchi coast from Kolyma to the Bering Strait, which was not carried out by the Great Northern (Second Kamchatka) Expedition, as well as to study the seas between the lands of Irkutsk Province and the opposite shores of America [8, Zubov N.N., p. 485].

The maps by G.A. Sarychev, placed later in the “Atlas of the Northern Part of the Eastern Ocean...” (1826), were for a long time the only ones for this part of the Pacific Ocean (Fig. 13).

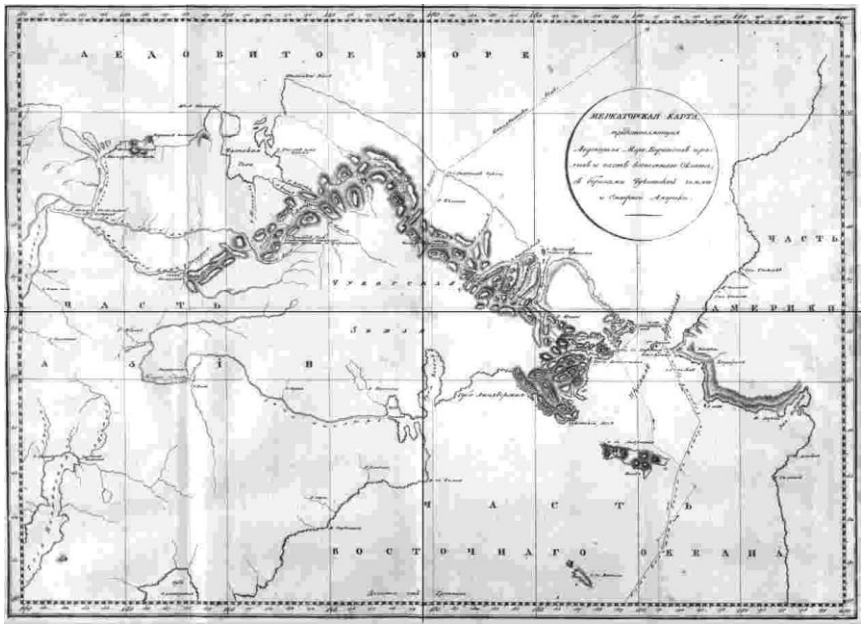


Fig. 13. “Mercator map representing the Arctic Sea, the Bering Strait and part of the Eastern Ocean; with the shores of the Chukchi land and North America”, compiled by G.A. Sarychev [17].

[17] Sarychev G.A. Puteshestvie kapitana Billingsa Chrez" Chukotskuyu zemlyu ot" Beringova proliva do Nizhnekolymskago ostroga, i plavanie Kapitana Galla Na sudnъ Chernom" Orlъ po Sъverovostochnomu Okeanu v 1791 godu; S" prilozheniem" Slovarya dvenadtsati narъchiy dikikh" narodov", nablyudeniya nad" stuzheyu v" Verkhnekolymskom" ostrogъ, i nastavleniya dannago Kapitanu Billingsu iz" Gosudarstvennoy Admiralteystv"-Kollegii [Journey of Captain Billings Through the Chukotka Land from the Bering Strait to the Nizhnekolymsky Ostrog, and the voyage of Captain Gall On the Black Eagle ship along the North-Eastern Ocean in 1791; With the appendix of the Dictionary of the twelve dialects of wild peoples, observations of the cold in the Verkhnekolymsky prison, and instructions given to Captain Billings from the State Admiralty College]. St. Petersburg, Marine Printing House, 1811. 202 p. Taken from the Library of Congress website. URL: https://tile.loc.gov/image-services/iiif/service:gdc:gdclccn:20:18:69:41:65:2018694165:2000000/full/pct:100/0/default.jpg (accessed 12 February 2022). Comment by the American developers of the site: At the end of her reign (in 1785), Empress Catherine the Great commissioned a Russian naval reconnaissance under the command of Captain Joseph Billings, which became known as the Northeast Geographic and Astronomical Expedition. Billings, an Englishman in the Russian civil service, went with two assistants, Gavriil Sarychev and Robert Hall (Roman Gall in Russian usage). The book by G.A. Sarychev, published in 1811, tells about the research of Billings and Sarychev in 1791, carried out on the ship "Glory of Russia" along the Chukotka Peninsula, from the Bering Strait to the west to the Lower Redoubt of the Kolyma River in the Northeast Passage over Siberia. It also describes Captain Hall's travels in the North Pacific Ocean on the Black Eagle ship along Kamchatka, the Kuril Islands, the Bering Sea and the Aleutian Islands. In addition to text based on relevant ship's logs, the book contains detailed engravings of the surveyed regions shown on the accompanying series of maps. The Billings Expedition produced some of the earliest and most detailed Russian cartographic material on both sides of the Bering Strait and nearby coastlines along the Arctic Ocean and the Bering Sea. The crews of the ships made extensive zoological, botanical and ethnographic observations, and the Russian Admiralty instructed how to name these previously unnamed lands and islands. Catherine the Great charged Billings with investigating [merchant] Grigory Ivanovich Shelikhov's fur trade operations on Kodiak Island and elsewhere in Alaska. Shelikhov has long been a controversial figure. Even in the capital of the Russian empire, St. Petersburg, there were rumors about his mistreatment of

I.F. Kruzenshtern assessed the results of the expedition of I. Billings – G.A. Sarychev: "*This voyage, completed in 1796, has recently been published by two descriptions, of which the first in English is by the secretary of Captain Billings Sauer, and the second one is by the current Vice Admiral Sarychev. The latter contains the main goal of this expedition, many curious descriptions and details, very important and useful for navigation. <...> This expedition did not meet expectations, judging by the efforts and costs used for it by the government for ten years. Among the officers of the Russian fleet there were then many who, being in command, could have made this expedition with greater success and honor than was done by this Englishman. Everything useful that has been done belongs to Mr. Sarychev, who is as skilled as an industrious navigator. Without his tireless work in astronomical determination of places, removal and description of islands, coasts, ports, etc.; perhaps, Russia would not have acquired a single map from the head of this expedition" [16, Kruzenshtern I.F., p. 388]. In this regard, I.F. Kruzenshtern came to the conclusion that the crew of a round-the-world expedition should be Russian: "I was advised to accept several foreign sailors, but I, knowing the predominant properties of Russian ones, whom I even prefer to English, did not agree to follow this advice. On both ships, except Mr. Horner, Tilesius, Langsdorff and Laband, there was not a single foreigner*" [16, Kruzenshtern I.F., p. 388].

Struggle of the great maritime powers for control over the Bering Strait and territories in the northwest of America

The activity of Russian sailors and industrialists in the development of open lands on the shores of the Beaver (Bering) Sea forced England, France and Spain to take retaliatory actions. Beginning in 1775, the Spanish sent five expeditions (three of them by sea) to prevent the Russians from entering California. After the first unsuccessful attempt to reach Alaska, made in 1774 by Juan José Perez Hernandez, the expedition of Eseta and Bodega y Cuadra visited Monterey Bay in Upper California in 1775, discovered the mouth of the Columbia River, reached the 58th parallel (entered the Sitka Strait) and visited the Alexander Archipelago, located in the southeast of Alaska. The third Spanish expedition of Arteaga and Bodega y Cuadra (1779) entered Prince Wilhelm Bay (Russian name – Chugatskiy Bay, area of the Kenai Peninsula) and reached the 61st parallel — the northernmost point of Spanish exploration in Alaska. On the Kenai Peninsula, the Spaniards held a ceremony declaring the territory the property of Spain and returned to California without meeting the Russians. Arteaga and Bodega y Cuadra knew that in 1778, J. Cook sailed off the northwestern coast of North America and had the task of capturing it "in Spanish waters", but the meeting with the British did not take place. In March 1788, an expedition of Esteban José Martinez-Fernandez y Martinez de la Sierra and Gonzalo López de Haro set off from San Blas (Mexico) to study Russian activity in the northwest of America. The Spaniards visited Russian possessions in the Aleutian Is-

local workers and violation of Russian laws in Alaska. The book provides an overview of local working conditions for natives and compliance with Russian laws in Alaska. Although Shelikhov's company persevered and eventually prospered as a Russian-American company, the Russian government pressed for change in regards to the Alaskan natives, and by 1794, sent a group of Russian Orthodox missionaries to Kodiak in an attempt to improve the situation.

lands (Unalaska and Kodiak). The Spaniards received three maps of the Aleutian Islands from the managers of the settlements and learned that Russian sloops were trading along the coast as far south as Nutka Bay and that large Russian ships (expeditions of I. Billings – G.A. Sarychev) were due to arrive soon. Unalaska became the extreme western point of the Spanish expeditions in this region. In August, the Spaniards left Unalaska and went back to California. Immediately upon their return, Martínez Fernández and Aro were ordered to take possession of Nutka Bay before the Russians or the British did. The struggle for Nootka Bay and the right to trade furs here, partly provoked by Russian industrialists, almost led to war between Great Britain and Spain in 1790.

In 1498, Sebastian Cabot, an Italian navigator in English service, made the first attempt to sail the Northwest Passage from east to west. With four ships and a crew of 300 men, he rounded the island of Newfoundland, but was able to reach only 58° N, having encountered solid pack ice in the north. In the following years, numerous British expeditions, funded by various companies and the British Crown, were undertaken. The search for a Northwest Passage was officially approved as one of the main aims of the Hudson Bay Company (HBC), which had been founded by the British crown in 1670 (its possessions bordered the territory controlled by the Russian-American Company).

The discovery of the Northwest Sea Route was officially the main goal of the third round-the-world voyage of the British navigator James Cook on the ships “Resolution” and “Discovery” in 1776–1779, namely, to find a way from the Pacific to the Atlantic, bypassing North America from west to east. J. Cook described the coast of North America from California to the Bering Strait. On the island of Unalashka (Aleutian Islands), the head of the fur artel, Gerasim Grigorievich Izmailov, pointed out to J. Cook the errors on his maps, telling him about the discoveries of Russian travelers in these places. J. Cook noted in his diary: “*I made sure that he knows the geography of these places very well and that he knows all the discoveries made by the Russians, and he immediately pointed out errors on new maps ...*” [17, Bolkhovitinov N.N., p. 303]. J. Cook received reliable data on the location of a number of the Aleutian Islands, as well as information about sailings to the Alaska Peninsula, to Chukotka, Kodiak Island, etc.: “*We learned the name Kodiak from Izmailov, and it refers to the largest of the Shumaginskiy Islands. <...> The names of other islands are taken from the map (Izmailov) and written down as he pronounced them. He said that all these names are Indian ... I have already noted that here both the Indians and the Russians call the American mainland Alaska <...> and they are well aware that this is the Great Land* ”(thus, thanks to J. Cook, the Russian toponym “Alyaksa” became “Alaska” [12, Fedorova S.G., p. 276]).

During the expedition of J. Cook, there was a Russian settlement on Unalashka Island (1770s): the Russians had “*small trading posts on all the main islands of the Anadyr Sea and in many places along the American coast*”, about 500 people including Kamchadals [17, Bolkhovitinov N.N., p. 303; 12, Fedorova S.G., p. 276].

In 1775–1778 French navigator Jean-Francois de La Perouse visited the Sakhalin region, mistaking it for a peninsula.

After visiting Unalaska, J. Cook's expedition went to the Hawaiian Islands, where the British stocked up on food and spent the winter. After the death of J. Cook in an absurd clash with the Hawaiians in the village of Kaavaloa on February 14, 1779, an expedition under the command of Captain Charles Clerk (Clark) visited Petropavlovsk in April 1779 and was cordially received by the head of Kamchatka, Prime Major Magnus Karl von Behm. As a token of gratitude, the British presented Boehm with a map of the expedition's discoveries and "some natural rarities for Her Majesty the Empress" — the so-called "Cook's" collection, collected by the crews of the "Resolution" and "Discovery" on the Pacific Islands, now stored in the Museum of anthropology and ethnography (Kunstkamera) named after Peter the Great.

The expedition sailed north again in search of a route around the America. But the ships were almost covered with ice in the Chukchi Sea. On the way back, C. Clerk died and was buried in Petropavlovsk. The ships of the expedition, following the route around Asia and Africa, returned to England in October 1780.

Along with administrative measures to strengthen Russian influence on the newly discovered lands, the government encouraged the navigation of industrialists in every possible way. It was the company of I.L. Golikov and G.I. Shelikhov that turned out to be the strongest of the numerous fishing companies. After the death of G.I. Shelikhov, his son-in-law N.P. Rezanov started the Russian-American Company (it was approved by the order of Emperor Paul I in July 1799).

To protect the coast, Catherine II instructed the Admiralty to equip a "scientific" expedition to Northeast Asia and the Pacific Ocean in August 1785.

In the Note of Counts A.R. Vorontsov and A.A. Bezborodko to Catherine II "On the rights of Russia to the islands and lands discovered by Russian sailors in the Pacific Ocean" (1786), the need for the presence of a military force there was especially noted [18]: *"The northwestern coast of America with the islands located near Onago and other ridges, stretching from this peninsula to Kamchatka and extending from this peninsula to Japan, was discovered from ancient times by some Russian navigators <…>. But as according to the generally accepted rule, those peoples who made the first discovery of them, have the right to unknown lands, as in former times and on the search for America, it was usually done that some European people, having found an unknown land, put their mark on it, <...> then, as a result of this, they must undeniably belong to Russia:*

1st. The American coast, extending from 55°21' latitude to the north, bypassed by captains Bering, Chirikov and other Russian sailors.

[18] Note by A.R. Vorontsov and A.A. Bezborodko to Catherine II about the rights of Russia to the islands and lands discovered by Russian navigators in the Pacific Ocean. URL: https://ru.wikisource.org/wiki/Записка_А.Р._Воронцова_и_А.А._Безбородко_Екатерине_II_о_правах_России_на_острова_и_земли,_открытые_русскими_мореплавателями_в_Тихом_океане (accessed 12 February 2022).

2nd. All the islands near this mainland and the peninsula of Alaska, such as: the Montague, found by Bering and Cook, St. Stephen, St. Dalmatian, the Eudocian, the Shumagins, and other islands lying between the coasts of these navigators and the mainland.

3rd. All the islands, from there to the west, lying in a ridge called Fox and Aleutian, and others, stretching to the north, are annually visited by Russian industrialists.

4th. The ridge of the Kuril Islands, touching Japan, discovered by Captain Spanberg and Walton. <…>

But as such a declaration without significant reinforcement will hardly be sufficient, <…> then <…> would it not be pleasing to the highest command:

1st. That in the neighborhood of this part, which belongs to your Power, there should be a number of military naval vessels built, with adequate naval officers and in proportion to them junior naval officers, so as to be able <...> to obey the prohibition laid down here, to send there any European vessels for the taking of possession of or trading with the inhabitants there. <...> Though we also have merchant ships on our side, it is doubtful whether they can <...> forbid such private foreign enterprises. <...>

Further, <...> the following recommendations are made: <…> to send from the Baltic Sea two armed small vessels, similar to those used by Captain Cook, and two armed sea boats or other vessels, <…> which should be assigned to go around the Cape of Good Hope, and then, <…> leave Japan on the left side, go to Kamchatka. Thus, <...> it is possible to have a flotilla in those seas that is quite sufficient to keep if not military forces, at least private industrialists of maritime powers, from an attempt on animal hunting, which belongs to all the rights of Russia. And at the same time <...> such an enterprise will also force the Chinese <...> to have more respect <...> for any proposal to restore the interrupted bargaining with them, which <...> is very necessary especially for the Siberian region.

<…> These vessels <…> can <…> proceed to the newest discoveries <…>. The first of these flotillas can examine in more detail the islands stretching from Japan to the Kurilskaya Lopatka, which <...> by establishing the most convenient port on the Sea of Okhotsk, may in time be the source of a new branch of trade with Japan <...>. The other part <...> of the ships, having entered Kamchatka and provided themselves with translators, those who know the language of the islanders, and other needs, will visit the not quite described from the Aleutian and Fox Islands and discover the American coast, lying between 60° and 64° latitude, or survey the midday shore [studies the southward coast] of the Alaska peninsula as far as the entrance of Prince Wilhelm, which is still <…> not quite described.

<...> In addition, the sent ships will have harbors on their way, <...> where they can be supplied with food and other supplies for further travel <...>.

When this expedition is sent, it is necessary to provide it with scientists to make observations related to astronomy and natural history during that journey, both from local colleges and from German or England.

In conclusion, <...> it is very necessary and useful to establish a new port at the mouth of the Uda River [in the Uda Bay of the Sea of Okhotsk] instead of the hitherto existing Okhotsk port, which is recognized as extremely inconvenient for the current intention" [18, Russian expeditions ..., p. 229].

Decree of Catherine the Great on organization of the first naval round-the-world expedition: "to approve and protect trading by sea between Kamchatka and the western American shores"

In December 1786, a decree of Catherine II followed on the organization of a round-the-world expedition in connection with the need to protect "our right on the lands discovered by Russian navigators... on the occasion of attempt on the industrialists and production of trade and animal trades on the 'eastern sea'" [1, Alekseev A.I., p. 327].

The first Russian round-the-world expedition was planned to be carried out on five armed ships led by Grigoriy Ivanovich Mulovskiy, a well-educated and experienced naval officer. The Admiralty Board in its secret and detailed instruction "*to Mr. Fleet Captain 1st Rank Grigoriy Mulovskiy, in command of the squadron assigned through the Indian Sea to the Eastern Ocean, to sail between Kamchatka, Japan and the western American shores*", prescribed grandiose tasks that were not inferior in scale to those set before the Second Kamchatka Expedition [19]: *"<...> to confirm and protect the trading on the sea between Kamchatka and the western American coasts, which belong to the Russian state, as its subjects hitherto and <...> have been discovered and produced. The reasons and intentions that prompted to equip and send this squadron, you will see <...> from other applications <...>*

1. The squadron <...> will consist of [four] ships <...>, to which a fifth will join, <...> loaded with guns, shells, rigging, canvas, lead for small arms and other things needed for Okhotsk and others local ports. These ships <...> are supplied by people according to your choice and according to their own desire, with the best supply and provisions of any kind. <…>

For the fulfillment of the observations entrusted to you and other scientific notes, you will receive <…> the best astronomical and other instruments and marine clocks, as well as books and maps, concerning <…> ... be equipped for observations <...> by learned people, such as astronomers, historiographers and naturalists, <...> ... you must make your best efforts to preserve their manuscripts and collections under seal in the best condition <...> until you return.

... you will receive from all Russian navigators in those seas, between Kamchatka, Japan and America — copies of all available journals, dating 1724 till 1779, as well as 14 different maps with attached catalogue and of them the general map, composed by the Collegium <... >. <...> so you <...> may find and believe what is true, what is doubtful or false in these, and may draw a correct map after your voyage <...> of the new Russian coast and sea. <...>

[19] From the instruction of the Admiralty Board to the head of the first round-the-world expedition, Captain 1st Rank G.I. Mulovskiy about its tasks. 1787. Not earlier than April 17. URL: https://runivers.ru/doc/d2.php?SECTION_ID=6770&CENTER_ELEMENT_ID=147253&PORTAL_ID=6770 (accessed 12 February 2022).

For confirmation of Russian right, for all hitherto taken by Russian navigators or by you again take charge of any discoveries, you will be given plenty of cast-iron coats of arms of Russian Empire and created for this expedition <...> medals <...>

... at the end of December or at the beginning of January, when the most capable time for the East Indian ships happens, you have to go from England across the Atlantic Sea to the Cape of Good Hope, and from there <...> along the East Indian Ocean ... <...> From the cape Good Hope <...> the path lies ahead of the Bourbon and French Islands to the Sound Strait, where <...> you can stock up on fresh food supplies. <...> After this <...> enter the China Sea, where you can go to one of the Philippine Islands —Manilia for the same reserves ... <...>

Being in the neighborhood of Japan, do not miss the slightest opportunity to receive the most reliable news about this land, <...> in all cases, treat the Japanese and smokers <...> in a friendly manner and try to start bargaining with them. <…>

<...> having sent a captain senior to you with two ships to inspect the islands extending to Kamchatskaya Lopatka, to go to Kamchatka with other ships to receive interpreters and other needs. <…>

The captains of the ships remaining on the Kuril Islands received the following instructions:

... the captain in charge will remain at the Kuril Islands to study them, and you yourself with the other ships will go to the American shores. <…>

1) Go around by swimming and describe all the small and large Kuril Islands from Japan to Kamchatskaya Lopatka, most likely put them on the map, and from Matmay to that Lopatka classify everything as the possession of the Russian state, placing or strengthening coats of arms and burying medals in decent places with an inscription in Russian and Latin <…>; inspect the coasts, bays, harbors, describe their condition, location, quality of land, forests ..., [availability] of fresh water <...>. And especially on the island of Urupe, or the eleventh axis of the Kuril Islands, or where it is more capable of opening <...> it should be most noted whether there is a good harbor and a convenient place for laying a fortress and a settlement, for arable farming and cattle breeding, and if there is enough fresh water and forest for building and repairing sea vessels in the future. If such a harbor is opened anywhere on those islands, then <...> describe it in all accuracy <...>. And <...> get, where possible, interpreters and counselors, and in addition, you will provide a dictionary of the Kuril and Japanese languages, of which you are given two copies each. <…>

2) <...> When sailing between the Kuril Islands, be careful because of strong and dangerous currents between the islands, at low tide and high tide, fogs that also often continue in those places. <…>

3) <...> new, not described by any European explorers and possibly noble islands, which shall be described in detail and in Her Majesty's name, taken possession of according to the above model.

4) Go around the large island of Sagalin Anga-Gata, lying opposite the mouth of the Amur, describe its coasts, bays and harbors, as well as the mouth of the Amur itself, and <...> reaching

the island, visit the state of its population, the quality of land, forests and other products. The same <...> to judge, with the Shantar Islands and <...> for the establishment of a new harbor at the mouth of the Uda River <...>.

5) <…> you will separate from your future scientists and draftsmen for all the observations and collection of rarities necessary for their rank, <…> having the main subject <…> preventing foreigners from collaborating or sharing by Russian subjects in the soft junk of bargaining or barter on islands, shores or lands discovered by Russian navigators and rightfully belonging to Russia ...”

After the direction of the group of ships to the Kuril Islands, “...to guide your journey between 40 and 50 degrees north latitude to the shores of North America. Upon reaching these, survey the so-called St. Georges Sound, or Nootka Harbor, so named by the English captain Cook, where you will see if there is a settlement from the English or any other European power, or at least any preparation for that.

Further, “you can follow along the stretching American coast to the open part by the Russian captains Chirikov and Bering, and take this coast from the harbor of Nutka to the initial point of the discovery of Chirikov into the possession of the Russian state, if it has not previously been occupied by any power. And from there along the entire open part of the coast by the Russian captains described above to Olaska, and from that place, all along the whole open part of the coast, as well as all the islands that can be found there, will be formally seized by Russian navigators. And all the coats of arms and signs of other nations, which Russia has no right to possess in those countries, will be dug down, leveled out, and destroyed.

Above all things you must enquire into what Captain Cook called Prince William’s Bay and the other, named Cook’s Bay after him, to see if any strange ships sail there, if there is any unloading or if there is no settlement. And in this case, having the main subject of preserving the right to land, open to Russian sailors, and preventing foreigners from cooperating and dividing trade with Russian subjects, those aliens who encroach on such unauthorized appropriation, by the power of the authority given to you to force from these, by right first committed discoveries of places belonging to the Russian state, to leave as soon as possible and henceforth not to think about settlements, or about auctions, or about navigation. And if there is any fortification or settlement, then you have the right to destroy it, and to tear down and destroy signs and emblems. You should do the same with the ships of these aliens, in those waters or harbors and islands you will meet those who are able for similar attempts, forcing them to leave from there. In the event of resistance, or rather strengthening, use the force of arms with such improvement as the duty and honor of the glory of Russian weapons and the very benefit of the expedition entrusted to you require from a skilled officer, since your ships are so well armed.

<...> the shores and islands located to the north from Alyaksa, <...> there is no reason for you with your ships to follow such a dangerous journey between the islands, according to the former name Aleutian and Fox, it will be more similar <...> to make your way along the Cape of Alaska and islands lying near it, whose number and condition are still not quite known, and whose inhab-

itants are also not yet completely brought under citizenship, to the island of Unalakshi, and from there follow the southern side of the Aleutian Islands to Kamchatka to the Peter and Paul Harbor to connect with those sent from you for the inventory of the Kuril Islands by ships. As you pass by these islands, try, as far as possible, through navigation to confirm them by bearings and put them on the map ... <…>

On all the lands and islands that you will discover for the first time, <...> as a sign of the dominion of Russia in all places belonging to it and newly acquired by you, you are given full power, where, depending on the circumstances, you please, by the name of Her Imperial Majesty Catherine II and the Russian state ..., <...> solemnly raise the Russian flag in all order and, moreover, the aforementioned coats of arms, <...> strengthen it on an elevated place near a cross or a pillar placed in the ground with a carved inscription and <...> putting one silver and one copper medal into a tarred stone vessel, also putting an inscription in Russian and Latin into a strong tarred bottle, meaning your journey, bury everything in the ground, or strengthening these coats of arms on large pillars, which are dug into the ground or along cliffs, having hollowed out a nest, insert them with strong grease. At this end, you are given some coats of arms without inscriptions in order to put them in those only places that have already been described by former Russian navigators, <...> others, with a Russian and Latin inscription and a year, put on those lands and islands, which you yourself will discover and add to Russian possession.

<...> in suitable cases, wherever you happen to converse with the wild, you may adorn the noblest and the most important of them with a shield and, by means of an interpreter, persuade them to submit to a strong and gentle autocracy and assure them in future for ever to the grace and protection of our most gracious sovereign. <…> You have the prescribed signs of Russian dominion to supply and approve with the consent of the inhabitants <…> and take possession of the places, harbors or freedoms that you consider most useful <…>.

Since, no doubt, none of the Europeans has yet managed to upset and irritate such people, then your first effort should be to sow in them a good idea about the Russians. <...> You are given the power to name the lands and islands you have acquired, as you please, if they still do not have any name ...

During all navigation on all ships, ordinary marine registers <...> must record the state of the barometer and thermometer, air phenomena and other circumstances. For the purpose of calculating your voyage, you will use sea clocks, checking them against the clocks on other ships. In the same way you will always make observations of latitude and longitude and find out the declination of the compass. You should also describe and chart types of the first-visible high places, signs and types of coast, bays, piers and anchorages (roads) with their positions, pointing out whether they are profitable or not, fishery and so on. Mentioning time, strength and elevation of high tide, low tide and currents. Describing and marking the spots of underwater or surface rocks, shoals and other dangerous places <...> as well as the places where the winds are blowing one way, prevailing, temporal, alternating and in one direction, the periods, atmospheric phenomena

and above all northern lights, the state of electric current in the air and their effects on the compass, as well as barometric and thermometric notes.

Though the scientists of the expedition have special regulations for making geographical and natural observations, it would not be useless <...> if you yourself, as well as commanders and subordinate officers, <...> keep your own special journals, concerning possessions and works, especially newly discovered and little known islands and lands... <...> Trying as much as possible to reproduce dialects in Latin and Russian letters according to the above-mentioned dictionary; to find and describe also the goods used by those people, arms, clothes and needlework...

<…> The Board <…> expects <…> that your detailed investigations and descriptions must not detain or hinder you in fulfilling the chief intention of your expedition <...> "so as not to allow foreigners to collaborate or divide with Her Majesty's subjects the so important trade in the soft loot [furs] which the empire requires".

The outbreak of the war with Turkey and the aggravated relations with Sweden disrupted the departure of the expedition of G.I. Mulovskiy — the squadron was sent to the Mediterranean Sea [1, Alekseev A.I., p. 327]. In 1789, the captain of the brigadier rank G.I. Mulovskiy participated in the battle near the island of Eland, during which he was killed. Naval officers previously assigned to the expedition by G.I. Mulovskiy, participated in numerous battles in the Baltic. Future famous Russian navigators took part in these battles: midshipman Ivan Kruzenshtern on the ship Mstislav by Grigoriy Mulovskiy, midshipman Yuri Lisyanskiy on the Podrazhislav frigate, midshipman Vasiliy Golovnin on the ship Don't Touch Me. Ivan Kruzenshtern participated in the Battle of Eland on July 26, 1789, when commander G.I. Mulovskiy was killed by a cannonball in front of him. Ivan Kruzenstern and Yuri Lisyanskiy, close friends, were promoted to lieutenants.

Conclusion

1. The possibility of reaching the Atlantic from the Bering Sea region through the Arctic Ocean was still remained open by the beginning of the 19th century (see Fig. 8).

By the beginning of the first Russian round-the-world expedition, four European countries had already completed 15 round-the-world voyages, starting with Ferdinand Magellan (1519–1522) and ending with the third voyage of James Cook (1776–1779). Eight expeditions were on account of British sailors (including three ones under the command of J. Cook). Five expeditions were made by the Dutch, one each by the Spaniards and the French. Russia became the fifth great maritime power, and in terms of the number of round-the-world voyages on sailing ships, it subsequently surpassed all its predecessors combined.

2. In 1793, twelve of the best young officers (including Ivan Kruzenshtern, Yuri Lisyanskiy and Yakov Bering, the grandson of the great navigator) were sent to England to improve in maritime affairs.

I.F. Kruzenshtern had his own practical experience and the baggage of knowledge received from his predecessors on the organization of round-the-world and Arctic voyages. To implement

his own plan for a round-the-world expedition, he needed not only his own initiative, but also state support. It was represented by Minister of Maritime Affairs Nikolay Semenovich Mordvinov, Minister of Commerce Nikolay Petrovich Rumyantsev and the head of the Russian-American Company Nikolay Petrovich Rezanov. As a result, Emperor Alexander I, who himself was a shareholder of the Russian-American Company, granted N.P. Rezanov about sending goods to the Pacific colonies by sea, which in fact meant permission to equip the first Russian round-the-world expedition, which became known as the expedition of I.F. Kruzenshtern – Yu.F. Lisyanskiy.

3. Sailing ships of Russian circumnavigations left the Baltic Sea and returned back around the world (to the west or east). The ships of the semi-circumnavigation, leaving the Baltic Sea and passing to the Far East, either remained there forever or returned the same way [8, Zubov N.N., p. 485]. From 1803 to 1855, 28 round-the-world voyages were made (12 along the western route and 16 along the eastern route). In general, during round-the-world and semi-circumnavigation, Russian vessels bypassed Cape Horn 40 times and the Cape of Good Hope 35 times [8, Zubov N.N., p. 485].

4. A significant contribution to the study and development of the Northern and Far Eastern territories of Russia was made by immigrants from Western Europe — Swedes, Danes, British, but especially Germans: both Russian (Baltic) and those who arrived from the German states, and later from the German empire (unification around the kingdom of Prussia took place in 1871) [19, Wittram V., p. 414; 20, Grinev A.V., p. 180; 21, Germans in Russia..., p. 605; 22, Reznichenko A.Ya., p. 176; etc.].

Even during the reign of Grand Duke Vasiliy III (1505–1533), merchants, artisans, doctors, pharmacists and other artisans from Protestant North German cities and Scandinavian countries began to arrive in Russia. Tsar Ivan the Terrible (Ivan IV, 1541–1584) invited to Russia a large number of “very rich doctors”, “gunners”, “searchers for gold and silver”, “cunning masters”, “izographers, taught in the sciences”, translators , artists and others, who began to be called “Luthors” or “Germans”. When the northwestern regions were conquered under Ivan the Terrible, it was announced to the inhabitants of the surrendered Derpt (Tartu, Estonia) (in July 1558): “*Derpt citizens remain with their religion of the Augsburg [Lutheran] confession without any changes and will not compelled to retreat from it; their churches with all their accessories remain as they were, as well as their schools”*. In the 16th–17th centuries, Protestants fled en masse to Russia, fleeing religious wars and persecution in Europe. Under the son of Ivan IV, Fyodor Ioannovich (1584–1598), more than five thousand Germans served in the Russian army, including officers who trained the army according to the Western model. Under Tsar Fyodor III Alekseevich (1676–1682) and the ruler Sofya Alekseevna (in 1682–1689, regent under younger brother Peter, the future Great), 63 infantry and cavalry regiments of the Russian army were commanded exclusively by German commanders. In the reign of Peter I, after the Northern War with Sweden (1700–1721), Russia returned Ingria, Karelia and access to the Baltic Sea, lost under the terms of the

Stolbovskiy Peace of 1617. Estland (Estonia) with islands, Livonia (Latvia) and a protectorate was established over Courland. Captured "*Swedes who can speak Russian are ordered to translate books from the Swedish language. <...> Peter took up geographical maps. The Swedish captives brought him maps of Russia and northern Europe and Asia*" [23, Pushkin A.S., p. 336]. After peace, Peter the Great made a special offer to the Livonian and Estonian nobles, inviting them to enter the Russian service. Many impoverished families took well the opportunity that opened up for their younger sons to get a job in the Russian state service, mainly in the army and navy. The Baltic nobility participated in the battles of the Russian army, served at the imperial court, in the diplomatic field and in academic scientific institutions. The descendants of invited specialists and mercenaries became "Russified", retaining foreign surnames (Fig. 14)).

Fig. 14. Peter I Alekseevich (1672–1725) (А), Catherine II Alekseevna (1729–1796) (Б); Mikhail Vasilyevich Lomonosov (1711–1765) (В); Gottfried Wilhelm Leibniz (1646–1716) (Г), Vitus Jonassen Bering (1681–1741) (Д), James Cook (1728–1779) (Е), Nikolay Fedorovich Golovin (1695–1745) (Ж), Ivan Fedorovich Kruzenshtérn (1770–1846) (З) [20].

The first attempt to establish scientific contacts with Europe was made back in the time of Boris Godunov (in 1602), when a group of Russian students was sent with Hanseatic merchants to England. The appearance of the new Russian capital served as a powerful impetus to the development of cultural and scientific contacts with foreign countries. The establishment of the St. Petersburg Academy of Sciences by Peter I on January 28 (February 8), 1724, and the role played by the founder (in 1700) and the first president of the Prussian Academy of Sciences in Berlin Gottfried Wilhelm Leibniz, served to ensure that the strongest scientific ties formed with Germany. The first head of the Academy was Lavrentiy Alferyevich Blumentrost, who defended his doctoral dis-

[20] Lithographs taken from: (А, Б, З) – Portrait Gallery of Russian Figures. A.E. Munster. Vol.1., 1864–1865; (В) – Collection of portraits published by Platon Beketov. Moscow, 1802; (Г) – Les Merveilles de la science, 1867–1891, Volume 1; (Д) – Around the world. No. 8, 1992; (Е) – National Portrait Gallery, London; (Ж) – Great Russian Biographical Encyclopedia, 2005.

sertation in 1713 in Leiden. The Russian emperor entrusted him with the preparation of the "Project of the regulations on the establishment of the Academy of Sciences". In the first composition of the RAS, there were only foreigners. Next after L.A. Blumentrost, the presidents of the Academy were Baron Hermann von Keyserling (1733–1734), Johann von Korfe (1734–1740) and Carl von Breven (1740–1741).

Germans who were members of the Second Kamchatka expedition of V.I. Bering and A.I. Chirikov (1741–1742): Georg-Wilhelm Steller (Steller), midshipman Johann Sindt, corporal Friedrich Plenisner and assistant doctor Andreas Ezelberg (possibly Swedish) were at the origin of the discovery of Alaska and colonization of Russian America. Important role in the colonization of the Aleutian Islands (1743–1783) was played by the Germans, appointed by the Emperor Siberian (Irkutsk) governors-general, who supported the Siberian merchants: Ivan Alferievich (Johann Alfred) Pill, Larion Timofeevich Nagel, Adam Ivanovich Bril, Ivan Varfolomeevich Jacobi, the commander of Kamchatka, Prime Minister Magnus Karlovich von Behm, and others.

Lieutenants Fyodor von Romberg, Ermolai von Levenshtern, warrant officers Fad-dei von Bellingshausen (the future discoverer of Antarctica), Vasiliy Berkh, cadets Otto and Moritz von Kotzebue served on the ships "Nadezhda" and "Neva", which circumnavigated the earth for the first time under the Russian flag. The expedition was commanded by Lieutenant Commander Ivan Fedorovich von Kruzenshtern.

Among the most prominent Russian navigators, the Germans who had repeatedly visited Russian America, were polar explorers Otto Eustafievich von Kotzebue, Ferdinand Petrovich von Wrangel and Fedor Petrovich Litke (Lyutke). Among the twelve main rulers of the Russian-American Company, in addition to F.P. Wrangel, the Germans were sailors Leontiy Adrianovich von Gagemeister and Nikolay Yakovlevich Rosenberg.

One can draw up a long list of Russian Germans, naval officers who led round-the-world and semi-circumnavigation trips under the flag of the Imperial Navy or the Russian-American Company. So, for example, Captain-Lieutenant Evgeniy Andreevich Berens commanded the military transport "America" during a round-the-world voyage (1834–1836) with a call to the capital of the Russian colonies — Novo-Arkhangelsk on Baranova Island (Sitka). E.A. Behrens made a semi-circumnavigation (a commercial flight of 1837–1839) on the three-masted barque Nikolay, owned by the Russian-American Company, in a record time for that time: the passage from Kronstadt to Novo-Arkhangelsk around Cape Horn took 8 months 6 days and back — 7 months 14 days. At the same time, he "exported from the colonies a cargo of furs and other products worth 3 million rubles". The ship was built at one of the best Russian shipyards in the Finnish city of Abo (Turku), and the crew was recruited from ethnic Swedes. Baron Alfred von Geiking was the supercargo (second assistant captain in charge of the cargo), and Fyodor Fyodorovich Fischer is the expedition doctor and author of the geological collection stored in the IGEM Ore-Petrographic Museum. The official form of F.F. Fisher noted: "*For the disinterested and significant enrichment of the museums of the*

Imperial Academy of Sciences, the Minister of Public Education expressed gratitude" [24, Russian State Archive].

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The St. Petersburg International Economic Forum (SPIEF-2022) and Its Arctic Agenda *

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Abstract. The article summarizes the results of the 25th St. Petersburg International Economic Forum (SPIEF-2022), which was held in St. Petersburg from June 15 to 18, 2022. As a participant of the forum, the author focuses on the analysis of Arctic issues, which were considered at the last event. They include current problems in the Arctic Council's activities, issues of the development of the Northern Sea Route, shipbuilding and ship repair in the Arctic, ensuring security in the region by the forces and means of the Russian EMERCOM, the state and prospects of building the international Arctic station Snezhinka, and problems of education and personnel training. Particular attention is paid to increasing the role of science, scientific and educational centers in making strategic decisions on the development of the economy, social and spiritual spheres of the Arctic territories. It is noted that, for the first time, heads of Arctic regions of the Russian Federation successfully presented investment projects in their regions at the Forum.
Keywords: *Arctic, Arctic Council, Russia, shipbuilding, ship repair, EMERCOM, Snezhinka, human resources, science, investment project*

Introduction

The 25th St. Petersburg International Economic Forum (SPIEF–2022, Forum) was held in St. Petersburg from June 15 to 18, 2022. Interest in holding it was caused by the fact that it was not held in 2020 due to the pandemic as well as the fact that there have been events over the past 2 years that have dramatically complicated the situation in the world. At the Forum, Russian and international experts, representatives of federal departments and regional authorities, Russian and foreign companies discussed a wide range of pressing problems of the international and national economy. The author of the article, as a participant of the Forum, summarizes the main results of the event, paying special attention to its Arctic issues.

Forum representation

Despite the fact that some countries took active measures to limit the participation of the business community and officials in the St. Petersburg International Economic Forum, more than 14 thousand people from 130 countries of the world took part in the events, 81 countries sent their official representatives. The Arab Republic of Egypt acted as a guest country of honor at the anniversary event. Its pavilion has become a real decoration of the Forum exhibition.

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The international economic event was attended by over 130 high-ranking officials at the level of vice-presidents and prime ministers of foreign states, heads of foreign cities and regions, foreign ministers, heads of parliaments, leading international organizations and associations, as well as heads of the diplomatic corps.

More than 60 representatives of federal executive and legislative authorities took part in the forum. The forum was attended by delegations from all regions of Russia, 80 of which were led by regional heads. The governors had the opportunity to establish both international contacts and exchange of experience with other regions of the country. 1700 business leaders attended the Forum.

Over four days, 214 events were held, covering a wide range of political, economic, management, technology development, digitalization, environmental, and social development issues. More than 1500 moderators and speakers, Russian and foreign experts made their reports and presentations. The work of the Forum was covered by 3500 media representatives from 33 countries [1].

Business program of the Forum

The main topic of the Forum is "New World — New Opportunities". Analyzing the main business program of SPIEF-2022, we can single out four thematic areas dedicated to the issues of the global and Russian economy, the social and technological agenda, and human development. Their analysis is given in the speeches of Adviser to the President of the Russian Federation, Executive Secretary of the SPIEF Organizing Committee, Anton Kobyakov [2]. It should be noted that the idea of the organizers was fully implemented in practice during the four-day work of the Forum.

The first thematic block, "The New Economic Order: Responding to the Challenges of the Time", included discussions which stated that the changes in global geopolitics and the restructuring of the entire global economy have deep roots and are not short-term in nature. It was noted that the decisions currently being made by the country's leadership are related to the issues of restoring the Russian economy, taking into account the transformation of world trade, maintaining relations with the SCO, BRICS and EAEU countries. The session participants emphasized that today, as a matter of priority, it is necessary to create a new system of international settlements on a bilateral and multilateral basis; the financial system must ensure the restructuring of the economy in the face of growing credit risks and learn how to finance innovations.

The second track of the business program, "The Russian Economy: New Challenges and Horizons", was dedicated to the anti-crisis agenda, the investment climate in the regions, the development of the financial market and key industries. During the discussions, experts noted that the economy is smoothly adapting to new challenges, macroeconomic stability is maintained, and all planned social programs are being implemented. It is important to ensure the economic and tech-

[1] Organizatory PMEF 2022 podveli itogi yubileynogo XXV foruma [SPIEF 2022 organizers summed up the results of the 25th anniversary forum]. URL: https://tass.ru/novosti-partnerov/14994139 (accessed 26 June 2022).
[2] PMEF-2022: ekonomika novykh vozmozhnostey [SPIEF 2022: the economy of new opportunities]. URL: https://forumspb.com/news/news/spief-2022-new-opportunities-in-a-new-world/ (accessed 26 June 2022).

nological sovereignty of the Russian Federation. The country has enough resources to continue development, reducing attempts at economic and political pressure on the country.

The third block, "Modern Technologies for Humanity: Creating a Responsible Future", touched upon topical issues of information security and digitalization. The key issue of structural adjustment is new technologies, since their absence leads to the degradation of the economy. It is especially emphasized that there will be no development and breakthrough without private initiative.

The participants of the fourth block, "Investments in Humans – Investments in Development", discussed issues related to the development of human capital, including those related to the development of creative industries, sports and education. Since 2020, the issue of social protection has come to the forefront in parallel with the state's increased efforts to provide financial support to various social groups. This has become the main basic condition that has made it possible to begin a systematic transformation of our social system in the interests of people in recent years.

The central event of SPIEF-2022 is the speech of the President of Russia Vladimir Putin at the plenary meeting on June 17, which was also attended by the President of the Republic of Kazakhstan, Kassym-Jomart Kemeluly Tokayev. President of the People's Republic of China Xi Jinping and President of Egypt Abdelfattah Sisi participated in the video message format. The head of state emphasized the key principles of state development: "The first principle is openness. Truly sovereign states are always committed to equal partnership to contribute to global development. <…> The second principle of our long-term development is the reliance on entrepreneurial freedoms. <…> The third principle is a responsible and balanced macroeconomic policy. … The fourth principle of our development is social justice. ... The fifth principle on which Russia builds its economic policy is the priority development of infrastructure. <...> The sixth, cross-cutting, unifying principle of our development is achieving real technological sovereignty, creating an integrated system of economic development, which is independent of foreign institutions as far as critical components are concerned [3].

The traditional cross-country business dialogues with representatives of business communities from Africa, Belarus, the Middle East, Europe, Egypt, India, Iran, Kazakhstan, China, and Latin America, as well as the EAEU-ASEAN, were successfully held on the sidelines of the SPIEF.

The business program of the event also included breakfast for representatives of pharmaceutical companies, Sber-breakfast and IT-breakfast. On the sidelines of SPIEF, the following events took place: the Russian Forum for Small and Medium Enterprises, the International Youth Economic Forum, the B20 Regional Consultative Forum, the Creative Business Forum and the Medicines Safety Forum, the SPIEF Junior Dialogue and other events.

[3] Plenarnoe zasedanie Peterburgskogo mezhdunarodnogo ekonomicheskogo foruma [Plenary session of the St. Petersburg International Economic Forum]. URL: http://www.kremlin.ru/events/president/news/68669 (accessed 26 June 2022).

SPIEF Arctic agenda

The Arctic agenda was a significant one at the Forum, and received a great deal of attention. This was due to the fact that, as part of the plan for the Russian Chairmanship of the Arctic Council in 2021–2023, the VI International Forum "The Arctic – the Future of the Russian Federation" was canceled due to a number of international reasons caused by powerful sanctions pressure on Russia in the first quarter of 2022, including in the Arctic. It was supposed to take place in April in St. Petersburg with an invitation for more than 3 thousand participants. This event previously contributed to the increase of Russia's international prestige among the countries of the Arctic Council and was an important platform for communication [1, Zhuravel V.P.].

It was decided that the planned sessions of the forum would be held as part of other upcoming events of the Russian Federation's chairmanship in the AC and at other international venues.

On March 3, 2022, seven countries of the Arctic Council (AC, Council) — Canada, Denmark, Finland, Iceland, Norway, Sweden, the United States — officially refused to participate in events and meetings chaired by Russia, as was reported in their joint statement on the website of the US State Department [4]. It should be noted that for more than a quarter of a century, cooperation between the countries of the Council has been stable and consistent, and has never been a hostage to the current international situation.

On June 8, 2022, these countries decided to resume the activities of the AC, but without the participation of Russia. The Telegram channel of the Russian Embassy in the United States quotes the words of Ambassador A. Antonov: "Such a step cannot but cause concern not only for Russia as the current chairman of the Council, but also for the entire international community interested in the further sustainable development of this region. We state that this unique format of interstate interaction continues to be politicized. Decisions on behalf of the Arctic Council, taken without our country, will be illegitimate and violate the principle of consensus stipulated by its governing documents" [5].

In this regard, a separate platform was prepared at the Forum — the stand of the Ministry for Development of Russian Far East of Russia "The Arctic – the Territory of Dialogue". There were 16 events on the problems of development and exploration of the Arctic, including the official plan for the chairmanship of Russia in the Arctic Council in 2021–2023. It is positive that all this was considered and discussed at one platform, strictly according to the program.

The relevance of the Arctic issues considered at the Forum is due to the fact that problems are accumulating in the Arctic, which require discussion, reflection and solution [2, Leksin V.N., Porfirev B.N.]. They include unclear boundaries of the AZRF, changes in the Arctic (development or

[4] U.S. Department of State. Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine. 03 March 2022. Available at: https://www.state.gov/joint-statement-on-arctic-council-cooperation-following-russias-invasion-of-ukraine/ (accessed 20 June 2022).

[5] Embassy of Russia in the USA. Answer of Ambassador A.I. Antonov to a media question. URL: t.me/EmbUSA/300 (accessed 09 June 2022).

re-development of the Arctic territories), people's respond to risks in their daily activities, climate change and militarization of the Arctic, and specifics of state management of regional development in the Russian Arctic, etc.

Over four days, the Forum widely discussed issues of comprehensive security in the Arctic, shipbuilding and ship repair, telecommunications development and digitalization, education and training, the Northern Sea Route, and human capital in the Arctic, including indigenous peoples of the North. Particular attention was paid to climate change in the region, increasing the role of science, scientific and educational centers in making strategic decisions on the development of the economy, social and spiritual spheres of the Arctic territories. The heads of the Arctic subjects of the Russian Federation presented investment projects of their regions. A number of events were dedicated to the development of tourism in the Arctic.

The main organizer of these events was the Ministry of the Russian Federation for the Development of the Far East and the Arctic. Representatives of Roshydromet, the Arctic regions, educational and scientific institutions of the Ministry of Education and Science and the Russian Academy of Sciences took an active part in the Forum.

The Arctic is the most important strategic region for Russia. Therefore, it is no accident that its development and the development of Arctic transport communications are so crucial today. The Northern Sea Route plays a key role here, so the session "Northern Sea Route: International Transport Corridor" was very informative and enlightening. It should be noted that the problem of the Northern Sea Route was also considered in other events, since the NSR is one of the key priorities in the context of the Arctic development. The key issue is to increase traffic along its route until 2030. As Deputy Prime Minister Yuriy Trutnev said, a large team of specialists from various departments and companies is currently working together on such a long-term program. It was noted that transit should play an important role in the growth of cargo traffic. In turn, the head of the Ministry for the Development of the Far East, Alexey Chekunkov, said that the contribution of already invested projects carried out on the Northern Sea Route to Russia's GDP will amount to 35 trillion rubles by 2035, and during this period, thanks to the NSR, the revenue part of the federal budget will increase by 13.5 trillion rubles [6].

The discussion of the problems of the Northern Sea Route continued on June 23 at a meeting of the State Commission for the Development of the Arctic. According to the Secretary of State, Deputy Minister of Industry and Trade Viktor Yevtukhov, the NSR infrastructure development plan provides for the construction of 37 vessels (8 icebreakers, 16 rescue and 13 hydrographic vessels), including icebreakers of "22220" and "Leader" projects. Two of them, the icebreakers Arktika and Sibir, have already been built and are operating on the Northern Sea Route.

[6] Arktika segodnya. Arkticheskie itogi PMEF-2022 [Arctic today. Arctic results of SPIEF-2022]. URL: https://goarctic.ru/news/arktika-segodnya-arkticheskie-itogi-pmef-2022/?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews%2Fsearch%3Ftext%3D (accessed 26 June 2022).

In November, it is planned to commission the serial universal nuclear icebreaker Ural. According to the state corporation Rosatom, in order to ensure the sustainable operation of the Northern Sea Route, it is necessary to provide for the construction of an additional 6 icebreakers and a nuclear service vessel. In addition, for the implementation of Arctic investment projects, it is planned to build another 32 ice-class transport ships. 15 gas carriers are planned to be built at the Zvezda shipyard. The plans include the construction of additional vessels for transporting investors' products along the Northern Sea Route [7].

The measures taken contributed to a significant increase in the volume of cargo transportation along the NSR. Thus, the volume of cargo transportation in 2021 amounted to about 34.9 million tons. This is almost 2 million tons more than in 2020, when 32.9 million tons were transported, of these: 7.9 million tons of oil, 20.6 million tons of LNG and gas condensate, 0.1 million tons of coal, 0.9 million tons of metals, 2 million tons of transit and 2.9 million tons of support cargo. A total of 1.6 trillion rubles worth of cargo was transported, of which metals and ores accounted for 856 billion rubles. Thus, the target indicator of the federal project "Development of the Northern Sea Route" was exceeded, according to which it was necessary to reach 32 million tons of cargo traffic by 2021. At the same time, positive dynamics remain: according to preliminary estimates, the volume of cargo traffic along the Northern Sea Route in the first half of 2022 may grow by 5–7% compared to the first half of 2021. By 2024, it is planned to create an infrastructure to increase cargo traffic to 80 million tons and increasing the total capacity of ports along the Northern Sea Route to 83 million tons in 2024 [8].

According to Evgeniy Ambrosov, Deputy Chairman of the Management Board, Director for Marine Operations, Shipping and Logistics of PJSC NOVATEK, 6 icebreakers are needed to ensure year-round navigation in the Arctic, including 3 icebreakers in the Kara Sea (2 icebreakers assure bilateral vessel passage through the Sea Canal Gulf of Ob and 1 icebreaker builds and maintains channels in fast ice in the area between the Matissen and Vilkitskiy straits, escorts supply vessels) and 3 nuclear-powered icebreakers for escort in the eastern sector of the Arctic to maintain the commercial speed of gas carriers.

The work on the development of the international transport corridor Europe–Arctic–Asia, which will connect Belarus, Kaliningrad, Saint Petersburg and Murmansk with Petropavlovsk-Kamchatskiy and the countries of the Asia-Pacific region, was continued. The Northern Sea Route acts as a link between European and Asian states [3, Vardomskiy L.B.], being the Arctic vector for the countries of Greater Eurasia. The transport strategy of the Russian Federation until 2030 provides for the integrated development of maritime, inland waterway and rail transport in the Arctic

[7] Yuriy Trutnev provel zasedanie Gosudarstvennoy komissii po voprosam razvitiya Arktiki [Yuri Trutnev held a meeting of the State Commission for the Development of the Arctic]. URL: http://government.ru/news/45812/ (accessed 26 June 2022).
[8] Ibid.

zone of Russia, as well as the modernization of the ports of Murmansk, Arkhangelsk, Indiga, Dikson, Pevek, Sabetta, Dudinka and Tiksi.

The International Seminar on Shipbuilding and Ship Repair in the Arctic focused on meeting the targets set by the President of the Russian Federation of transporting at least 80 million tons of cargo along the Northern Sea Route by 2024 and 150 million tons by 2030. Gadzhimagomed Huseynov, First Deputy Minister of the Russian Federation for the Development of the Far East and the Arctic, drew attention to this during the session: "Such volumes require large investments and the construction of a fleet. Today, we feel a shortage of ship repair capacities, especially in the Arctic and the Far East, we have to solve a number of fundamental tasks". According to him, preferential regimes operate in the region. In particular, benefits for insurance premiums are available for companies: residents of the Arctic zone pay 7.5% instead of 30%. In addition, there are income tax preferences and the possibility of applying the free customs zone procedure, which provides for 0% VAT on goods placed under the FCZ procedure. However, according to the first Ministry for the Development of the Far East, in addition to the existing benefits for ship repair enterprises, it is necessary to provide for 0% VAT [9].

After this proposal, at the seminar, the possibility of reducing repair costs at Russian shipyards and possible changes in the preferential treatment of the ship owners were discussed. Aleksey Rakhmanov, Chairman of the Board, General Director, United Shipbuilding Corporation JSC, noted that "Zero VAT will immediately give 20% benefits compared to the same Norwegian shipyards. This is the first. Secondly, we need to work with the structure so that the huge overhead costs that a dual-use shipyard incurs are somehow bracketed." He also said that the Russian flag must be made comfortable for the development of ship repair. "Only 10% of the entire national wealth of the Russian Federation is exported on ships flying the Russian flag. Accordingly, those, including Russian ship owners, who sail under a foreign flag, will naturally be repaired abroad. Until we make the Russian flag convenient for navigation, nothing really will happen with ship repair," Alexey Rakhmanov concluded [10].

In his speech, the Governor of the Arkhangelsk Oblast Alexander Tsybulskiy noted that about half of foreign ports are closed for the repair of Russian ships today, while Indonesia and Turkey have significantly increased the cost of work in this area. "Our prices are not only becoming competitive, but we can already do it cheaper." It should be noted that the ship repair plants of the Arkhangelsk transport hub are indeed capable of performing all types of ship repair: factory repair with docking, docking with related work, modernization of ships, inter-cruise repair and

[9] Sudostroenie i sudoremont v Arktike obsudili na PMEF [Shipbuilding and ship repair in the Arctic discussed at SPIEF]. URL: http://minvr.gov.ru:443/press-center/news/sudostroenie_i_sudoremont_v_arktike_obsudili_na_pmef/ (accessed 26 June 2022).

[10] Obnulenie NDS dlya sudoremonta dast vygodu rossiyskim predpriyatiyam v 20% v sravnenii s zarubezhnymi – Aleksey Rakhmanov [Resetting VAT for ship repair will benefit Russian enterprises by 20% compared to foreign ones – Alexey Rakhmanov]. URL: https://portnews.ru/news/330766/ (accessed 26 June 2022).

maintenance, a full range of works for presenting ships to classification societies, all types of repair of power plants, deck and auxiliary equipment.

The International Workshop on Shipbuilding and Ship Repair was also attended by Deputy Chairman of the Board of PJSC NOVATEK, Chairman of the Arctic Economic Council Evgeniy Ambrosov, Director of the Department of Shipbuilding Industry and Marine Engineering of the Ministry of Industry and Trade of the Russian Federation Boris Kabakov, Deputy Governor of the Murmansk Oblast Olga Kuznetsova , as well as Deputy General Director, Director of the Directorate of the Northern Sea Route of the State Atomic Energy Corporation Rosatom Vyacheslav Ruksha and General Director, Chairman of the Board of PAO Sovcomflot Igor Tonkovidov.

The event confirmed the focus of Russia's activities on a responsible approach to the ecology of the Arctic. One of the brightest examples is the Sulfur Project launched by Norilsk Nickel. Thus, thanks to the project, emissions of pollutants in Norilsk will decrease by 45% in 2023 and by 85% in 2025. At the same time, the effects of the project on the country's GDP will amount to 575 billion rubles, on tax revenues of the budget — 118 billion rubles. Total in 2018–2025, more than 300 billion rubles will be invested in the implementation of the project in Norilsk [11].

The session dedicated to the activities of the Ministry of Emergency Situations in the region was interesting. There are over 500 potentially hazardous industrial and infrastructural facilities in the Arctic zone, which can become sources of man-made emergencies, of which, according to the Ministry of Emergency Situations, occur on average more than 100 per year. Development of anthropogenic activities in the Arctic zone necessitates an increase in the appropriate level of protection of the Arctic territories from emergencies.

First Deputy Minister of the Russian Federation for Civil Defense, Emergencies and Disaster Relief Alexander Chupriyan opened a strategic session organized by the Russian Emergencies Ministry "Arctic Regions: Dialogue on Integrated Security" within the framework of SPIEF-2022, where regional experience of sustainable functioning of the Arctic regions against the background of possible and most typical emergencies in the Russian Arctic was shared, and effective interaction mechanisms were developed between the Russian Emergencies Ministry and the subjects of the Arctic zone of the Russian Federation. It was emphasized that the department has been developing an integrated security system in this region since 2014. He noted that during this period, six Arctic integrated emergency and rescue centers have been created. By 2025, it is planned to deploy four more rescue centers and seven aviation rescue units. Interaction with regional authorities, the Maritime Rescue Service, Rosatom and other stakeholders in the Arctic has been organized [12]. About 35.000 specialists work as part of the subdi-

[11] Arktika segodnya. Arkticheskie itogi PMEF-2022 [Arctic today. Arctic results of SPIEF-2022]. URL: https://goarctic.ru/news/arktika-segodnya-arkticheskie-itogi-pmef-2022/?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews%2Fsearch%3Ftext%3D (accessed 26 June 2022).

[12] Voprosy kompleksnoy bezopasnosti Arkticheskogo regiona RF i sovershenstvovaniya mekhanizma nadzornoy deyatel'nosti obsudili na PMEF-2022 [Issues of integrated security of the Arctic region of the Russian Federation and improvement of the mechanism of supervisory activity were discussed at SPIEF-2022]. URL: https://mchs.fun/voprosy-

visions of the Russian Emergencies Ministry in the Arctic regions of Russia. The Russian Ministry of Emergency Situations regularly conducts exercises of the forces of the Ministry of Emergency Situations in the Arctic to improve the efficiency of their work. During the exercises held in 2021, the Ministry of Emergency Situations carried out research on 91 scientific tasks specific to the department, tested 41 samples of equipment of the Ministry of Emergency Situations in the Arctic conditions (aircraft, all-terrain vehicles, communications equipment, special equipment, etc.). It was noted that in future, developers of fire and rescue equipment will be invited to the most significant trainings so that they can demonstrate new developments in action. Moreover, it is proposed to introduce the practice of comparative tests during the exercises, when several samples of machinery, equipment or outfit of one function, but different manufacturing enterprises, demonstrate their potential. The First Deputy Minister noted that the next exercises in the Arctic will be held in 2023 and will cover all the Arctic regions of Russia. The headquarters of the exercises will be located in the village Sabetta, near the port of the same name — one of the key ports in the transport system of the YaNAO and Western Siberia — and the plant for the production of liquefied natural gas "Yamal LNG". He briefly outlined the immediate prospects for organizing emergency rescue activities of the Russian Emergencies Ministry in the Arctic. Thus, an experimental test of the operation of System 112 in the Arctic will be carried out. By 2027, the Arctic aviation group of the Ministry of Emergency Situations will be significantly increased, primarily its helicopter component. The aviation of the Ministry of Emergency Situations will include 13 helicopters, including 9 ones in the Arctic version. The construction of the Arctic centers of the Ministry of Emergency Situations of Russia will continue, one of them will be located on Dixon Island [13].

The participants of the Forum were interested and concerned about the construction of the future international Arctic station "Snezhinka". Its creation was initiated by Russia as the chairman of the Arctic Council. The construction and implementation of projects at the station are provided for by the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security in the period up to 2035. An ambitious project implemented by the team of the Moscow Institute of Physics and Technology is planned to be launched on the Yamal Peninsula, in the center of gas production for in Russia. "Snezhinka"will be built near a large lake in the Jade Valley between the Rai-Iz and Dinosaur mountain ranges. The project was supported by the Ministry of Foreign Affairs of the Russian Federation, the Ministry for the Development of the Far East and the Arctic, the Ministry of Science and Higher Education, and the Governor of the YaNAO. The station will be a fully autonomous complex operating on the basis of renewable energy sources and hydrogen energy. Scientists will be able to conduct research here in a whole range of areas, including hydrogen energy, thermal stabilization of permafrost, carbon footprint reduc-

kompleksnoj-bezopasnosti-arkticheskogo-regiona-rf-i-sovershenstvovaniya-mehanizma-nadzornoj-deyatelnosti-obsudili-na-pmef-2022/(accessed 26 June 2022).

[13] Aleksandr Chupriyan: v 2023 godu v Arktike proydut krupnye ucheniya MChS [Alexander Chupriyan: Major exercises of the Ministry of Emergency Situations will be held in the Arctic in 2023]. URL: https://www.securitymedia.ru/news_one_15620.html (accessed 26 June 2022).

tion technologies, Arctic medicine, telecommunications in high latitudes, aero and hydroponics, robotic platforms with artificial intelligence. The research program announced during the development of the project was supported by the Russian Academy of Sciences. By the end of 2022, design and estimate documentation for the creation of the station is to be developed, and a positive conclusion of the state expert examination is to be obtained. Construction is planned to start next year. Test operation of the project is scheduled to start in 2024. The concern is that the project for the construction of the scientific station "Snezhinka" has risen in price by 2.5 times, now it is estimated at 5.6 billion rubles [14]. The price of construction has changed due to the expansion of the area and the increase in the cost of building materials and equipment, but it can be reduced during the development of the project. The project is currently financed from the federal budget; in the future, large corporations are not excluded from joining the project [15]. It is important to take into account the statement of the Chairman of the Committee of Senior Officials of the Arctic Council Nikolay Korchunov, who noted that, despite the fact that the member countries of the Arctic Council have suspended their participation in it, the work planned by the Russian side will continue, and the project will be implemented [16]. He also noted that the Arctic station of the same name will also be built in the Murmansk Oblast near the village of Teriberka [17].

One of the main sessions was the Conference on the Development of Telecommunications and Digitalization in the Arctic. Its participants discussed the introduction of digital technologies in the Arctic, as well as the provision of high-quality communications and high-speed Internet in the region.

The Forum participants were interested in the problem of training and retention of personnel in the Arctic [4, Terentyeva M.A.]. Positive experience has been accumulated in the Murmansk Oblast. In 2019, the region approved the strategic plan "Live in the North!". Over 3 years, thanks to regional payments and the Zemskiy Doctor program, more than 270 doctors have been involved, and a minimum wage has been set for young teachers. Special attention is paid to the development of medium and small businesses, the programs "Arctic Hectare", "Governor's Startup" are being implemented. In 2021, the migration loss decreased by 1.8 times compared to 2020. According to Governor Andrey Chibis, the creation of the first and only territory of advanced socio-economic development "Capital of the Arctic" in the region made it possible to create good economic dynamics in three years. Thus, the growth of investments amounted to 30% (600 billion

[14] Proekt arkticheskoy stantsii «Snezhinka» podorozhal do 5,6 mlrd rub. [The project of the Arctic station "Snezhinka" has risen in price to 5.6 billion rubles]. URL: https://www.dp.ru/a/2022/06/26/Proekt_arkticheskoj_stanci (accessed 26 June 2022).

[15] RBK: vazhnyy nauchnyy proekt v YaNAO rezko podorozhal [RBC: an important scientific project in the Yamalo-Nenets Autonomous Okrug has risen in price]. URL: https://ura.news/news/1052564876 (accessed 26 June 2022).

[16] MID: Arkticheskiy proekt «Snezhinka» budet realizovan vne zavisimosti ot uchastiya inostrantsev [MFA: The Arctic project "Snezhinka" will be implemented regardless of the participation of foreigners]. URL:https://vz.ru/news/2022/6/15/1163078.html (accessed 26 June 2022).

[17] V Zapolyar'e postroyat arkticheskuyu stantsiyu "Snezhinka" na vodorode [In the Arctic, an Arctic station "Snezhinka" will be built on hydrogen]. URL: https://rg.ru/2022/06/15/reg-szfo/v-zapoliare-postroiat-arkticheskuiu-stanciiu-snezhinka-na-vodorode.html?utm_source=yxnews&utm_medium=desktop (accessed 26 June 2022).

rubles). Not a single project, large enterprise or construction site has stopped its work. All this gave an increase in industrial production by 17%, the economy — by 16%, wages — by 29% (real income — 13%). The migration loss decreased by 1.8 times compared to 2020; in 2021, 9.5% less people left [18].

Head of the Arkhangelsk Oblast Alexander Tsybulskiy made a number of topical proposals at SPIEF. He drew attention to strengthening the system of integrated training of engineering personnel for the Arctic. The governor recalled that the region is the scientific and educational center of the Russian North, where the only Arctic federal university and the largest medical university in the North-West are located, training personnel for the entire western part of the Russian Arctic. In the region, about 17.000 students are enrolled in higher education programs, 27.500 young people are enrolled in secondary vocational education programs. In addition, Arkhangelsk is the home of the world-class scientific and educational center "Russian Arctic: New Materials, Technologies and Research Methods", created jointly by the three Arctic regions. One of the REC's tasks is to improve the system of training professional personnel, focused on rapid adaptation to the requirements of the scientific and technological development of Russia and the country's needs in the Russian Arctic. Another unique competence of the Arkhangelsk Oblast is the "factory-technical college" training system. This model is based on a system of continuous engineering education, which has a multilevel character: from vocational guidance work at school to the preparation of a certified integrated master. The most important aspect is the interest of potential employers. The system is being implemented in the Arkhangelsk Oblast with the participation of enterprises of the military-industrial complex. Interaction between the Institute of Shipbuilding and Marine Arctic Technology of NArFU and the enterprises Sevmash, Zvezdochka and Arktika has been established. Students acquire the skills of working and engineering and technical activities while still studying, in the process of engineering and production practice. Creation of the only interuniversity campus in the western part of the Russian Arctic in Arkhangelsk has been started. It will include multifunctional educational and laboratory buildings, sports infrastructure facilities, cultural and leisure spaces. The total area of the campus will be more than 125 thousand square meters. Its structure takes into account a large residential complex, about 72 thousand square meters for student dormitories [19].

The speech of Irina Yarovaya, Deputy Chairman of the State Duma of the Federal Assembly of the Russian Federation, was listened to with interest and support. She noted that wages in the Arctic should be higher and suggested that the northern allowance and coefficient should be paid not through accumulated work experience, but from the first day of work.

[18] Murmanskiy gubernator rasskazal na PMEF o merakh bor'by s ottokom naseleniya [The Murmansk governor spoke at SPIEF about measures to combat the outflow of the population]. URL: https://ria.ru/20220615/murmansk-1795612359.html (accessed 26 June 2022).

[19] PMEF-2022: glava pomor'ya vystupil s predlozheniyami po kadrovym voprosam [SPIEF-2022: the head of the Pomorye region made proposals on personnel issues]. URL: https://bclass.ru/news/novosti/pmef-2022-glava-pomorya-vystupil-s-predlozheniyami-po-kadrovym-voprosam/ (accessed 26 June 2022).

Elvira Nurgalieva, First Deputy Director General for Social Development of the Far East and Arctic Development Corporation, shared her experience of implementing a large personnel project supported by the Ministry of Defense, the Arctic Appeal: "We are working with young people who are now finishing their military service; many of them have secondary specialized education but no experience yet. We offer them the opportunity to work in the Arctic, a specific life trajectory. Last year we launched a pilot project with Norilsk Nickel. 3.5 thousand young people, approaching their retirement, were offered to live and work in the Arctic zone of the Russian Federation. 40% of them confirmed their interest. Some of them are already employed. In 2022, we are expanding our geography: we will work with 25 thousand people who are completing military service, several dozen employers have joined this program" [20].

It should be noted that this practice was actively applied in the past years and had positive results. According to the head of the Political Directorate of the Internal Troops of the USSR Ministry of Internal Affairs, Lieutenant-General Alexander Ivanovich Grienko, the internal troops sent about 30.000 servicemen to the Norilsk mining and processing plant named after A.P. Zavinyagin after completing compulsory military service. They formed a stable backbone of the enterprise's workforce, became foremen, heads of workshops and shifts, were able to create families and eventually became real northerners who conquered the Arctic territories.

SPIEF successfully hosted the seminar "The Role of World-Class Scientific and Educational Centers in the Implementation of Arctic Projects". It was stressed that any technology or material used in the Arctic must be science-intensive, innovative, because the extreme conditions, risks and challenges determine this. There is no margin for error, so reliability, economy, functionality are the main requirements for materials and devices in use. Rector of the Northern (Arctic) Federal University named after M.V. Lomonosov Elena Kudryashova pointed out the need to reformat the activities of the REC. "We cannot afford to solve certain issues for a long time — we need to respond quickly to the tasks that modern reality sets for us. Being engaged only in import substitution, we will always only catch up in terms of technology, but we need to think about tomorrow. Therefore, we must change the REC development programs in a very mobile way in accordance with the requirements of the state, region, industry and those companies that work in the Arctic" [21]. M.K. Yeseev, Head of Research and Educational Centre "Russian Arctic: new materials, technologies and research methods", Alexander Nikolaev, Rector of M. Ammosov North-Eastern Federal University, Igor Manzhurov, Director for Development of the Urals Interregional Scientific and Educational Centre of World-class Advanced Manufacturing Technologies and Materials, Sergey La-

[20] Privlechenie i uderzhanie kadrov v Arkticheskuyu zonu Rossii obsudili na PMEF-2022 [Attracting and retaining personnel to the Arctic zone of Russia was discussed at SPIEF-2022]. URL: http://minvr.gov.ru:443/press-center/news/privlechenie_i_uderzhanie_kadrov_v_arkticheskuyu_zonu_rossii_obsudili_na_pmef_2022/ (accessed 26 June 2022).

[21] Na PMEF obsudili rol' nauchno-obrazovatel'nykh tsentrov v realizatsii arkticheskikh proektov [The role of scientific and educational centers in the implementation of Arctic projects was discussed at SPIEF]. URL: http://dvinanews.ru/-5zb03xo3 (accessed 26 June 2022).

dyzhenko, ANO "Corporation for the Development of the Yenisei Siberia", REC "Yenisei Siberia", and others participated in the discussion.

As part of the Day of the Arctic Investor, at the stand of the Ministry for the Development of the Russian Far East, the governors of the regions of the Russian Arctic personally presented investment projects to Russian entrepreneurs and the media [5, Dyadik N.V., Chapargina A.N.].

A special place on the agenda was given to the presentation of the tourism potential of the Arctic regions of Russia. The projects of their regions were presented by T.Yu. Khandy, Minister of Entrepreneurship, Trade and Tourism of the Republic of Sakha (Yakutia), A.V. Eliseev, Chairman of the Committee for Tourism of the Murmansk Oblast, A.B. Borchikova, head of the tourism department of the Republic of Karelia, A.Yu. Terentiev, head of the ANO "Agency for the Development of Tourism and the Promotion of the Republic of Komi", A.V. Klepikovskaya, director of development of the Golubino cultural and landscape park, director of the Association for the Preservation and Development of Cultural and Natural Heritage "Voice of the North", Alexey Zhirukhin, blogger, car traveler and Bogdan Bulychev, blogger, ambassador of the Arctic and the Far East.

All session participants noted that the trend of recent years is the intensive development of tourism [6, Timoshenko D.S.]. It was emphasized that, despite the overall increase in the number of tourists in the Russian Arctic, the Arctic regions remain at the bottom of the list among all regions of the Russian Federation in terms of the number of tourists. In addition, people who come to work in the Arctic on a rotational basis are counted as tourists; it distorts the real number of tourists in the region. The speakers, using the example of their regions, emphasized that the development of tourism is impossible without creating the necessary conditions for building a system of operational and successful communication, which includes all participants in the process of production, promotion, sale and consumption of the tourist product, as well as interested parties from related industries. Attention was paid to the training of specialists in the tourism sector. At the same time, it seems that there is no in-depth analysis of the tourism sector in the subjects of the Russian Arctic, which is in extremely difficult condition after the COVID-19 pandemic. Under these conditions, it is necessary to analyze the tourist and recreational potential and its promotion on the Internet; development of tourism infrastructure; dynamics of tourist flows; economic factor in the development of domestic tourism; factors hindering the development of tourism. It is positive that the speakers have an understanding that the emphasis should be shifted towards domestic tourism.

As part of the business program, in the presence of the governors of the regions of the Russian Arctic and the heads of the largest companies implementing investment projects in the Arctic, the Arctic Challenge project was launched. The event was attended by Alexey Chekunkov, Minister of the Russian Federation for the Development of the Far East and the Arctic, Nikolay Zapryagaev, General Director of the Corporation for the Development of the Far East and the Arctic, Dmitriy Peskov, the Special Representative of the President of Russia for Digital and Technological Development and Director of the Young Professionals Department of the ASI, Governor of the

Murmansk Oblast Andrey Chibis, Governor of the Krasnoyarsk Krai Alexander Uss, Governor of the Arkhangelsk Region Alexander Tsybulsky, Head of the Komi Republic Vladimir Uyba, Senior Vice President, Head of Strategy and Strategic Project Management, Logistics and Resources at PJSC MMC "Norilsk Nickel" Sergey Dubovitskiy, Special Representative of the Rosatom State Corporation for the Development of the Arctic Vladimir Panov, Deputy Chairman of the Management Board of PJSC NOVATEK Eduard Gudkov, General Director of Vasta Discovery LLC Sergey Bachin and others. The project is aimed at attracting managers from all regions of the Russian Federation for key positions in the governments of the Arctic regions and in the leading enterprises of the Arctic zone and thus the creation of social elevators for the inhabitants of Russia. The project is being implemented by the Far East and Arctic Development Corporation together with the Agency for Strategic Initiatives with the support of the Russian Ministry for the Development of the Far East [22]. The objective of the project is to search and select qualified personnel for further employment in the system of state and municipal government and in key regional industries, as well as the creation of social elevators for the purpose of growth and self-realization of citizens. Together with the regions, a list of 200 vacant managerial positions of the subjects of the Russian Arctic was compiled. The project involves the selection of candidates in absentia, a series of public events, stages of group and individual evaluation. During the project implementation, it is planned to attract and evaluate more than 10.000 candidates. The first job offers will be received by candidates at the Eastern Economic Forum 2022, which will be held in September in Vladivostok.

The topic "International Cooperation as a Guarantee of Sustainable Development of the Arctic" was considered within the framework of the "Think Arctic" project. The speakers emphasized the harm of the sanctions policy of the West in terms of the development and exploration of the Arctic [7, Zhuravel V.P.], and drew attention to the growth of confrontation between the leading Arctic states [8, Raikov Yu.A.].

Leading experts confirmed that Russia, as the largest Arctic state, will continue to implement investment projects that have already begun, which, among other things, will contribute to an increase in cargo traffic along the Northern Sea Route. Against the backdrop of EU sanctions that limit the entry of Russian ships into European ports, the international transport corridor can become a serious alternative to other routes. This is a kind of "road of life" for supplying vast territories of the Far North through northern delivery, as well as a critical route for Russian foreign trade with the countries of the Pacific region, with China and India. The significance of the Northern Sea Route is also growing for the development of its own territories as the world's largest special economic zone.

[22] Komanda Arktiki: na XXV PMEF zapustili «Arkticheskiy vyzov» [Team of the Arctic: Arctic Challenge launched at XXV SPIEF]. URL: http://minvr.gov.ru:443/press-center/news/komanda_arktiki_na_xxv_pmef_zapustili_arkticheskiy_vyzov/ (accessed 26 June 2022).

Conclusion

Over a quarter of a century, the Forum has become a sought-after global platform for establishing cooperative ties, an authoritative and representative world-class event. This year, it was much more modest than in previous years. The event took place against the backdrop of a special operation in Ukraine, large-scale sanctions and the withdrawal of a huge number of foreign companies from Russia.

The sessions that took place made a significant contribution to a comprehensive understanding of the real situation in the Arctic, made it possible to develop steps and effective solutions to fulfill the tasks set by the Russian leadership to ensure a balanced sustainable development of the Arctic region and improve the well-being of its inhabitants, including the indigenous peoples of the North. The leadership of the country and the heads of the subjects of the Russian Arctic have an understanding that this region is an important and promising territory of Russia. In this regard, systematic work is needed to form an Arctic consciousness and involvement of Russian citizens in great Arctic affairs. In the foreseeable future, according to experts, economic projects will be the main focus. Under these conditions, it is important to actively involve our closest EAEU allies in the problems of the Arctic. As a result of the forum, 691 agreements worth 5.639 trillion rubles were signed (only agreements, the amount of which is not a commercial secret, are taken into account) [23].

The Forum was organized by the Roscongress Foundation, a socially oriented non-financial development institution, the largest organizer of all-Russian, international, congress, exhibition, business, social, youth, sports and cultural events. It was created in accordance with the decision of the President of the Russian Federation in 2007 with the aim of promoting the development of economic potential, promoting national interests and strengthening the image of Russia.

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India's Arctic Policy: The Historical Context *

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Abstract. India released its Arctic Policy in March 2022, a long-awaited document by one of the four Observer countries to the Arctic Council indicating India's realisation of the significance of the Arctic. This article examines the evolution of India's Arctic engagement through a historical analysis of India's Arctic discourse. Apart from enunciating the scientific and political endeavours to date, the article traces the historical evolution of India's Arctic dialogue by political, strategic and academic experts and the process of India's engagement in the region. The objective of the article is to trace the historical context of India's Arctic policy. The article's analysis of India's recently published Arctic policy suggests that India's cooperation with Arctic council countries needs to be expanded, and it also must build up on its Arctic expertise by forging links with scientific institutions and universities across the Arctic. The practical significance of the article is in its use by policymakers and researchers interested in cooperation with India in the Arctic and for academic use at universities.
Keywords: *Arctic, India, Arctic policy, scientific research, cooperation*

Introduction

"It will thus be seen that if the Vedic evidence points to an Arctic home, where the ancestors of the Vedic Rishis lived in ancient times, there is at any rate nothing which would warrant us in considering the result improbable."

Bal Gangadhar Tilak [1, Tilak B.G., p. 35]

India released its Arctic policy on March 17, 2022. Prior to that, India was only one of the four observers in the Arctic Council to release an Arctic policy. Over the past five years, India has intensified its economic cooperation with Russia in the Arctic. Given the current attempts to isolate Russia by the Arctic Council member countries and the obvious turn to the east of Russian policy in the Arctic, a qualitative analysis of India's current agenda and strategy in the Arctic is extremely relevant. The article aims to highlight the reasons and the evolution of India's Arctic engagement through a historical analysis of India's Arctic discourse.

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Methodology

Primarily, Indian scholars have examined the reasons for India's Arctic engagement. In this regard, the pioneering contribution was made by Vijay Sakhuja [1] [2, Sakhuja, pp. 6–13; 3, Sakhuja V., Narula K., pp. 1–163]. Many Indian researchers supported the Global commons theory [4, Chaturvedi S., p. 226–260; 5, Kumar, p. 14–22; 6, Nayak, pp. 649–677; 7, Rajan, pp. 31–39; 8, Gautam P.K., pp. 1–10]. This was supported for changing the existing governance system in the Arctic and maintaining the existing management system in the Antarctic influenced indirectly by India's intervention in the United Nations in the 1950s spearheaded by India's first Prime Minister Jawaharlal Nehru and by an influential former diplomat Shyam Saran [234] . Most Indian researchers also supported the view that scientific research should be given primacy [9, Sinha U.K., pp. 23–30; 10, Sinha U.K., Gupta A., pp. 872–885], with few arguing for strategic necessity [5] [11, Gadihoke, pp. 1–12]. Some foreign researchers were intrigued by India's interest and attributed to science diplomacy [6], geopolitical and geo-economic interests, including following China's lead [7] as the primary drivers notwithstanding India's public stance [12, Lackenbaur P.W., pp. 1–19]. Russian researchers also examined India's interest in the Arctic [13, Gudev P., pp. 57–73; 14, Vopilovskiy S.S., pp. 29–43]. This study has used historical research methods at every stage. Primary and secondary sources have been utilised in the preparation of the thesis. The primary sources are Government of India policy documents, including India's Arctic policy (2022) [8], India's draft Arctic policy (2020) [9], Parliamentary debates, Lok Sabha; Government of India, Parliamentary debates, Rajya Sabha; Government of India, Ministry of External Affairs, Foreign Affairs Documents, Annual Reports; Government of India, Foreign Policy of India. In addition, secondary sources include conference proceedings of the Institute for Defence Studies and Analysis (IDSA), international conference

[1] Sakhuja V. The Arctic Council: Is There a Case for India (Policy Brief). New Delhi: Indian Council of World Affairs, March 30, 2010. URL: http://www.icwa.in/%5C/pdfspolicy%20briefs%20dr.pdf (Resource removed/no longer available) (accessed 18 July 2022).

[2] Saran S. India's stake in Arctic cold war, The Hindu, January 02, 2011. URL: http://www.thehindu.com/opinion/op-ed/indias-stake-arcticcoldwar/article2848280. ece (accessed 18 July 2022).

[3] Saran S. Why the Arctic Ocean is important to India, Business Standard. December 16, 2011. URL: http://www.business-standard.com/article/opinion/shyam-saran-why-thearctic-ocean-is-important-to-india-111061200007_1.html (accessed 18 July 2022).

[4] Saran S. India's date with the Arctic, The Hindu, July 15, 2013. URL: http://www.thehindu.com/opinion/op-ed/indias-date-with-thearctic/article4915241.ece (accessed 18 July 2022).

[5] Bisen A. MP-IDSA Issue Brief - India's Arctic Policy: Building a partnership for sustainable development, March 17, 2022. URL: https://idsa.in/issuebrief/india-arctic-policy-abisen-170322 (accessed 18 July 2022).

[6] Gewelt A.E. India in the Arctic: Science, Geopolitics and soft power, 2016. URL: https://www.duo.uio.no/bitstream/handle/10852/52355/GeweltMAfinal1.pdf?sequence=1&isAllowed=y (accessed 18 July 2022).

[7] The Diplomat. India releases draft Arctic Policy, January 10, 2021. URL: https://thediplomat.com/2021/01/india-releases-draft-arctic-policy/ (accessed 18 July 2022).

[8] India, Ministry of Earth Sciences. India's Arctic Policy: Building a partnership for sustainable development, March 17, 2022, https://www.moes.gov.in/sites/default/files/2022-03/compressed-SINGLE-PAGE-ENGLISH.pdf (accessed 18 July 2022).

[9] India, Government. Draft Arctic policy, December 27, 2020, URL: https://www.arcticpolicyindia.nic.in (page removed) (accessed 26 January 2021).

"AsiArctic" on the Arctic, 23–24 September, 2013, organised along with the Fridtjof Nansen Institute (FNI), Norway and the National Maritime Foundation (NMF), international conference SaGAA III which discussed Science and Geopolitics of the Arctic-Antarctic-Himalaya, 29–30 September, 2015.

Establishing India's Arctic interest: from the Vedas to the Svalbard Treaty

India's official engagement in the Arctic started with its first expedition to Svalbard in 2007, during the International Polar Year. Nevertheless, some locate India's interest and engagement with the region further back, to both colonial and pre-colonial times. These arguments view India as a non-polar state within the domain of Arctic affairs, establish historical grounds for India to be viewed as a rightful player in the Arctic and refer to India's historical links with the Arctic region. At the international conference on SaGAA (SaGAA III), which discussed the Science and Geopolitics of the Arctic–Antarctic–Himalayas in Delhi, in September 2015, Director General IDSA, Arvind Gupta, together with UK Sinha, a research fellow at IDSA, traced India's "Arctic roots" back to the Vedic era, by referring to Bal Gangadhar Tilak's work, *The Arctic Home in the Vedas* [10]. This book (1903) was ostensibly founded on astrological observations found in Vedic texts that the Aryans subsisted in the Arctic region in prehistoric times, and subsequently emigrated to Europe and the Indian subcontinent [1, Tilak B.G., pp. 1–238]. Tilak tried to establish a link between the Arctic region and India by propagating this idea. This Vedic historical scholarship is intriguing as it was written in 1903 by Bal Gangadhar Tilak, one of the great leaders of India's freedom struggle, who was also an eminent scholar, activist and lawyer. It will thus be seen that if the Vedic evidence points to an Arctic home, where the ancestors of the Vedic Rishis lived in ancient times, there is nothing which would warrant us in considering this result as a priori improbable [11]. It represents how the Arctic is viewed from India, as both a distant, and yet an important region, connected with Indian history and culture.

Arvind Gupta and UK Sinha highlighted that during British rule, India was a signatory to the Spitsbergen (or Svalbard) Treaty in 1920. Therefore, as Gupta and Sinha stated, "The Arctic is not alien to India" [12]. Further, they stressed that for India, "The Arctic has a racial memory and a colonial participation" [13]. Along similar lines, Dr Sanjay Chaturvedi also referred to India's Arctic Vedic roots at the Science & Geopolitics of Arctic-Antarctic-Himalaya [SaGAA III] conference in Delhi in September, 2015. During his talk on India's polar challenge, Sanjay Chaturvedi reminded the audience that Bal Gangadhar Tilak wrote a book "Arctic Home in the Vedas". The most important in

[10] India and the Arctic, SaGAA III Conference 'Arctic – Antarctic - Himalayas' September 2015 – Conference material, Iris Publications, New Delhi, 2015. URL: https://saghaa.org/SaGAA-Report-2015.pdf (accessed 18 July 2022).
[11] Gewelt A.E. India in the Arctic: Science, Geopolitics and Soft Power, op.cit., p. 50.
[12] India and the Arctic, SaGAA III Conference 'Arctic – Antarctic - Himalayas', op.cit.
[13] Ibid.

this book was that the Arctic was integrated into Indian historical memory and, in truth or imagination, embraced linkages with far-flung regions north of the Eurasian continent [14].

India's current Arctic presence and engagement are fairly new, just about fifteen years. Due to its considerable geographic distance from the region and the minuscule Indian presence, India's participation in Arctic affairs is not obvious too much. However, linking Bal Gangadhar Tilak's book with contemporary Indian foreign policy priorities is fascinating. It adds an element of entitlement and ancient connectivity to India's Arctic engagement by establishing a prehistoric bond between India and the Arctic region. The justification for India's links with the Arctic is strengthened by invoking Tilak's Vedic scholarship, providing a traditional link to the region. Linking contemporary foreign policy issues with India's cultural and civilisational heritage, regularly surfaces in contemporary debates and discourses, on Indian foreign policy, particularly under the BJP-led government headed by Prime Minister Narendra Modi. Nevertheless, this argument has pitfalls as it contradicts India's views on China's imaginary nine–dash line and freedom of navigation in the South China Sea.

Svalbard is more than 6000 kilometres away from India and about 1200 kilometres away from the North Pole. India signed the "Treaty concerning Spitsbergen" on February 9, 1920 [15]. The Svalbard Treaty awarded sovereignty of the Archipelago of Spitsbergen to Norway, and other member countries of the Treaty could access its natural resources [16]. The membership of the Treaty has expanded over the years [17].

India in the Arctic: science

The Indian scientific mission in the Arctic falls under the Ministry of Earth Sciences [MoES]. In July 1981, the Department of Ocean Development (DOD) was formed as a part of the Cabinet Secretariat, directly under the charge of the Prime Minister Mrs Indira Gandhi, under whose personal initiative India's first expedition to Antarctica was launched in 1981. It became a separate Department in March 1982 [18]. The erstwhile DoD functioned as a nodal Ministry for ocean development in the country. In February 2006, the Government notified the Department as the Ministry of Ocean Development [19]. The Government of India reorganised the Ministry of Ocean Development, and the new Ministry of Earth Sciences (MoES) came into being vide Presidential Notification dated July 12, 2006. According to the website of MoES, the mission of the ministry is to conduct scientific and technical activities, related to Earth System Science to improve forecasting of weather, monsoon, climate and hazards, exploration of polar regions, the seas around India, and

[14] Sanjay Chaturvedi, Polar Challenge, Talk at the SaGAA III Conference 'Arctic – Antarctic - Himalayas', September 29, 2015, New Delhi.
[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] Ministry of Earth Sciences, Government of India, About the Ministry of Earth Sciences, URL: http://moes.gov.in/, 2022. URL: https://www.moes.gov.in/about-us/about-our-Ministry (accessed 18 July 2022).
[19] Ibid.

develop science and technology for ocean resources and coordinate Antarctic/Arctic research [20]. According to the plans released by the ministry, polar science is a focus area for the MoES [21]. To further this vision, the Antarctic mission appears to have topmost priority and consequently garners more funding. The size of the Arctic programme is currently small, with an estimated annual budget of approximately one tenth that of the Antarctica mission [22].

India watched with interest the evolving Arctic climate change. On July 30, 2007, India launched its first scientific expedition to the Arctic and established a scientific research station Himadri, at the International Arctic Research Base at Ny-Alesund, Svalbard, Norway (1200 km from the North Pole), under the guidance of the National Centre for Antarctic and Ocean Research (NCAOR), which is administered by the MoES [15, Chaturvedi S., pp. 73–79]. The research base named "Himadri" was officially opened at Ny-Alesund in July 2008, for research in glaciology, atmospheric sciences, biogeochemical studies and cryosphere studies [23]. India also entered into a MOU with the Norwegian Polar Research Institute of Norway, for cooperation in science, as also with Kings Bay (A Norwegian-Government owned company) at Ny-Alesund for logistic and infrastructure facilities for undertaking Arctic research and maintaining Himadri. NCPOR, which was earlier called the NCAOR, is the nodal agency, makes sure that the requisite facilities are available at Himadri [24]. In 2007, India launched its first official expedition to the Arctic region when five Indian scientists were dispatched for a month to Ny-Ålesund at Spitsbergen, the largest island in the Svalbard archipelago. On August 04, 2007, the Indian newspaper *Live Mint* reported that the goal of the expedition was to do scientific research: "*The scientists will be specifically studying the impact of aerosols, which are solid and liquid particles that stay suspended in the atmosphere, (sic) on global warming. They will use this knowledge to understand environmental changes taking place in India*" [25]. The purpose of the first Arctic expedition was to study bacterial life and to measure environmental changes in the Arctic [26]. The scientists also hoped to establish a link between the Arctic region and glacial melting in the Himalayas, sparking debates over the negative effects of global warming [27]. According to the Live Mint article, when asked whether India would follow nations like South Korea, China and Japan in establishing a research base on Svalbard, the director of India's Antarctic and Arctic research activities at the MoES, Ajai Saxena said: *"There are*

[20] Ministry of Earth Sciences, Government of India. About the Ministry of Earth Sciences, op.cit.
[21] Ibid.
[22] Ministry of Earth Sciences, Government of India. Detailed demand for grants. URL: https://www.moes.gov.in/sites/default/files/DDG%202021-22%20scanned%20copy.pdf (accessed 18 July 2022).
[23] S. Rajan and K.P. Krishnan, India's Scientific Endeavours in the Arctic, Talk at the National Maritime Foundation, Conference 'Asia and the Arctic – Opportunities and Challenges', New Delhi, 19 – 20 February 2015.
[24] NCPOR, Himadri Station, July 2022. URL: https://ncpor.res.in/app/webroot/pages/view/340-himadri-station (accessed 18 July 2022).
[25] Koshy J.P. India's first Arctic expedition to study bacterial life, climate change. Live Mint, April 08, 2007. URL: https://www.livemint.com/Industry/KOCaR2LXYluWxiNsmpoqmL/India8217s-first-Arctic-expedition-to-study-bacterial-lif.html (accessed 18 July 2022).
[26] Ibid.
[27] Shailesh Nayak, Secretary, Ministry of Earth Sciences, Discussions on Melting Glaciers in The Himalayas, Arctic – Antarctic – Himalayas SaGAA III Conference', New Delhi, September 2015.

no plans yet for establishing an Indian research station, or oil-exploration, centre in the area" [28]. However, one year later, on July 01, 2008, the Indian research base *Himadri* ("the abode of snow") located in Ny-Ålesund, Svalbard was inaugurated [29].

Considering the immense scope for scientific research, NCAOR, as the nodal agency for the Indian Arctic Programme, entered into an MoU with the Norwegian Polar Institute for scientific cooperation in Polar Sciences. In view of the successful achievements in the very first year of research in Arctic science, India's proposal to become a member of the Ny-Ålesund Science Managers Committee (NySMAC) was accepted in November 2008 [30]. The major role of NySMAC is to enhance cooperation and coordination amongst research activities at the Ny-Ålesund International Arctic Research and Monitoring Facility. Mr Prithviraj Chavan, the Minister of Science and Technology, together with Ms Tora Aasland, Hon. Minister of Research and Higher Education of Norway, led a high-level delegation to Ny-Ålesund on June 06, 2010. At Himadri, both the Ministers formally launched the Indian Arctic web portal. The major development of the Indian Arctic programme was in 2013, when India became an observer in the Arctic Council [31].

India's Arctic research includes glaciology, atmospheric sciences, biogeochemical studies and cryosphere studies. The atmospheric research encompasses investigations into aerosols and precursor gases with respect to their radiative, physical-chemical and optical properties, and studies of the effects of space weather on the auroral ionosphere. Biological studies include sea-ice microbial communities, and marine research: phytoplankton pigments, nutrients, pH, DO, seawater salinity, and other ecological parameters have been investigated. Earth sciences and glaciological observations include studies of snow-pack production of carbon monoxide and its diurnal variability. India has a multi-purpose floating observatory, "IndArk" at Kungsforde in Svalbard since 2014. It also has plans for a polar research ship. However, the progress on this project, originally announced in 2008–2009 and initially approved in 2010, has been tardy. The last clarification by the MoES in Parliament was on May 06, 2015 [32].

Nevertheless, apart from India, several Asian countries have also shown great interest in doing research at Svalbard. A few Indian politicians have emphasised that it is important for India to be active in the Arctic region. In an interview in December 2008, shortly after India had opened its research base in Ny-Ålesund, Mr Kapil Sibal expressed pride and excitement over India's polar programme. Mr Sibal emphasised: "*Polar Regions offer an exceptional environment to study the natural processes operating on the earth, which cannot be recreated on the mainland. The research on microbial diversity and climate change processes is going to have a large impact on our*

[28] Koshy J.P. India's first Arctic expedition to study bacterial life, climate change, op.cit.
[29] NCAOR, Polar Sciences and Cyrosphere, July 2022. URL: https://ncpor.res.in/pages/view/260/189-polar-science-cryosphere (accessed 18 July 2022).
[30] Ibid.
[31] Ibid.
[32] MOES, India. *Construction of Polar Research Vessel*, May 06, 2015. URL: https://moes.gov.in/sites/default/files/LS_US_6595_06052015.pdf l (accessed 18 July 2022).

existence. Any investment in polar research is therefore essential for answering fundamental questions that are linked to human survival itself" [33]. Mr Sibal highlighted the importance of scientific research in the Arctic from a wider perspective, transcending the region, and indicating the reasons why polar science is vital for India. India's official scientific engagement in the Arctic is summed up on the website of the MoES, and the scientific objectives in the Arctic highlighted are the following:

(a) "*Continuation of the scientific programs in the Arctic in atmospheric sciences, climate change, geosciences and glaciology, and polar biology.*

(b) *Ensuring India's prominent and sustained presence in the Arctic through the initiation of scientific research in some of the frontier realms of polar science*" [34]

India's Arctic research Program focuses on climate change in the circumpolar north. Several scientists from different national institutions have participated in the Arctic programme and in recognition of its scientific contribution, India was invited to the Council of the International Arctic Science Committee (IASC) in 2012. The MOES listed the major objectives of the Indian Research program in the Arctic Region as follows:

- *"To study the hypothesized teleconnections between the Arctic climate and the Indian monsoon by analyzing the sediment and ice core records from the Arctic glaciers and the Arctic Ocean.*
- *To characterize sea ice in the Arctic using satellite data to estimate the effect of global warming in the northern polar region.*
- *To research the dynamics and mass of Arctic glaciers focusing on the effect of glaciers on sea-level change.*
- *To comprehensively assess the flora and fauna of the Arctic vis-à-vis their response to anthropogenic activities. In addition, it is proposed to undertake a comparative study of the life forms from the Polar Regions."* [35]

Another reason for India's scientific presence in Svalbard is that some scientists were of the opinion that there is a hypothesised connection between the changing climate in the Arctic and the Indian monsoon [36]. It means that variations in the Arctic climate may directly affect the monsoon weather system, which consequentially could impact India. This hypothesised connection between the Arctic and the Indian monsoon system was a much-discussed issue during the third Science & Geopolitics of Arctic-Antarctic-Himalaya (SaGAA III) Conference in New Delhi in September 2015. The monsoon rains are crucial to India, and monsoon instabilities have a major impact

[33] Indian Journal of Marine Sciences, *Interview with Minister Kapil Sibal, 2008.* URL: http://studylib.net/doc/7251160/indian-journal-of-marine-sciences (accessed 18 July 2022).
[34] MOES, India. Scientific Endeavours in the Arctic, July 2022. URL: http://www.moes.gov.in/programmes/indian-scientific-endeavors-arctic (accessed 18 July 2022).
[35] MOES, India, *Scientific Endeavours in the Arctic*, *op.cit.*
[36] SaGAA III Conference, *Discussions on Variations in Arctic Climate Affecting the Indian Monsoon System,* Arctic – Antarctic – Himalayas SaGAA III Conference', New Delhi, September 2015.

on the Indian economy, in particular, in the agricultural sector. The melting of glaciers in the Himalayas is controversial, which became evident during the discussions of the Science & Geopolitics of Arctic-Antarctic-Himalaya [SaGAA III] Conference in New Delhi in September 2015 [37]. A scientist from the Norwegian Polar Institute (NPI) displayed satellite images, indicating that in certain parts of the Himalayas, especially in the Western part, the Karakoram mountains in Pakistan, the amount of snow and ice had in fact increased in recent years [38]. This led to an extensive discussion, and there was a variation in the procedural approaches applied in measuring the ice, that created this discrepancy [39].

The National Centre for Polar and Ocean Research (NCPOR)

All polar research in India is coordinated through the National Centre for Antarctic and Ocean Research (NCAOR) in Vasco da Gama, Goa. NCAOR is an autonomous research and development institute under the MoES. The NCAOR's location allows direct access to the Arabian Sea, the Indian Ocean and onwards to the Southern Ocean, in other words, a direct route to the Antarctic continent. The NCAOR is responsible for the management and practical execution of India's Arctic programme. A handful of scientists, about eight people, are dispatched for a period of approximately 30–40 days before being rotated with a new group. The research station in NyÅlesund is manned from March to November, being closed for the rest of the year. The composition of scientists is diverse, with a wide difference in disciplinary backgrounds such as biology, chemistry and glaciology. The main priority for Indian research appears to be the teleconnection between the Arctic and the monsoon system [40].

A paper published by researchers of the NCAOR in 2018 stated that the pace of Arctic ice melt had accelerated post-1970. The research spearheaded by Manish Tiwari and Vikash Kumar of the NCPOR examined organic productivity from sediment samples of the Arctic. This assisted them in the reconstruction of Arctic warming for the last two centuries. The researchers conclude that the surging effects of changes in the Arctic are likely to considerably alter the state and equilibrium of the earth's climate system. The NCAOR projected that the quicker melting of the Arctic ice could have deleterious effects on the Indian monsoon. The scientists expressed optimism that this research would help in furthering understanding of global climate and particularly India's southwest monsoon, which they assert hinges on the rate of melting of polar ice caps [41]. In July 2018, India renamed the National Centre for Antarctic and Ocean Research [NCAOR] based in Goa, as the National Centre for Polar and Ocean Research [NCPOR].

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[37] SaGAA III Conference, Discussions on Variations in Arctic Climate Affecting the Indian Monsoon System, op.cit.
[38] Ibid.
[39] Ibid.
[40] Ibid.
[41] DeSouza G. Fast Melting Ice May Hit Indian Monsoon. August 18, 2018. URL: https://www.hindustantimes.com/environment/fast-melting-arctic-ice-may-hit-indian-monsoon-study/story-6KcXhvTGp5QDoNPeGKlViM.html (accessed 18 July 2022).

Current research studies in the Arctic include monitoring of aerosols over the polar regions under the aegis of the Indian Polar Aerosol Network (POLAERNET), role of ocean advection on decadal variability of sea-ice in the Arctic, phylogenetic null modelling of bacterial communities in Kongsfjorden, metagenome assembled genomes (MAGs) from MidtrelLovenbreen glacier foreland ecosystems and phytoplankton dynamics and bio-geochemistry of Kongsfjorden [42].

Prerequisites to India's Arctic Policy – geopolitics and geo-economic aspects

In March 2010, Dr Vijay Sakhuja, Director of Research at the Indian Council of World Affairs in New Delhi, unambiguously stated that "by virtue of the Svalbard Treaty, India is a 'stakeholder' in the region" [43] and presented a pioneering brief on the Arctic emphasizing articulation of an Arctic strategy including cooperation, policy research, scientific expeditions, developing technical capability and promoting *a nuclear-free Arctic"* [44]. This proposal did not seem to have taken into account that the Arctic is a highly militarized zone dating back to the Cold War.

The Norwegian Minister of Foreign Affairs, Jonas Gahr Støre, during the Indo-Norwegian seminar on maritime safety in New Delhi in March 2010, stated that major changes in the Arctic were underway [45]. The Minister emphasised that the Arctic is a test bed of climate science, necessary to understand and mitigate the deleterious effects of climate change, and confirms the accelerated pace and effects of climate change resulting in the development of nascent sea routes, increased economic development and new strategic interests [46].

In 2012, an official foreign ministry note stated that India was "seeking an observer status in the Arctic Council as we want to undertake scientific studies from Antarctica to the Arctic" [47]. In April 2012, India was given observer membership of the International Arctic Science Council, a working group of the Arctic Council in April 2012 [48]. On May 15, 2013, India was granted observer status in the Arctic Council at the Kiruna Ministerial Meeting of the Arctic Council, along with other Asian countries, China, Japan, South Korea and Singapore [49]. This landmark event in the 20-year history of the Arctic Council happened six years after India's first scientific expedition to the Arctic region and establishment of its first research station in Ny-Ålesund. The Ministry of External Affairs [MEA] supervises the geopolitical and geo-economics aspects of India's engagement in the Arctic. In addition to the focus on science, geopolitical and geo-economics aspects are also part of

[42] MOES, India. Annual Report 2021-22, July 2022. URL: https://www.moes.gov.in/documents/annual-reportsc (accessed 18 July 2022).
[43] Sakhuja V. The Arctic Council: Is There a Case for India, op.cit.
[44] Ibid.
[45] Støre J.G. Keynote Address - IDSA-IFS Bilateral Seminar, March 02, 2010. URL: https://www.idsa.in/keyspeeches/JonasGahrStoreMinisterofForeignAffairsofNorway_02032010 (accessed 18 July 2022).
[46] Gewelt A.S. India in the Arctic: Science, Geopolitics and Soft Power, op.cit, p. 50.
[47] Gupta A. and Sinha U.K. Discussions on India and the Arctic, op.cit.
[48] International Arctic Science Committee, About the International Arctic Science Committee. July 2022. URL: https://iasc.info/about (accessed 18 July 2022).
[49] MEA, India. India and the Arctic, June 10, 2013. URL: https://mea.gov.in/in-focus-article.htm?21812/India+and+the+Arctic (accessed 18 July 2022).

the Indian Arctic dialogue [16, Sinha U.K., pp. 119–120; 17, Bhagwat J., pp. 73–90]. India's official position in the Arctic region was projected through the Indian MEA's website:

"The impact of rapid changes in the Arctic region goes beyond the littoral states, and any legitimate and credible mechanism to respond to these challenges calls for active participation of all those actors who have a stake in the governance of global commons. The interplay between science and policy has the potential to contribute to the better handling of the complex issues facing the Arctic. India, which has significant expertise in this area from its association with the Antarctic Treaty System, can play a constructive role in securing a stable Arctic. India, in its new role as a permanent observer in the Arctic Council, is committed to contributing to the deliberations of the council to develop effective cooperative partnerships that can contribute to a safe, stable and secure Arctic" [50].

Apart from Norway, India also attempted to engage with other Arctic Council countries through joint declarations. The Saint Petersburg declaration of June 01, 2017, by the Russian Federation and India [a vision for the 21st century, stated, *"we are interested in launching joint projects on exploration and exploitation of hydrocarbons in the Arctic shelf of the Russian Federation"* [51]. The joint statement of February 23, 2018, released during the State visit of Mr Justin Trudeau, the Prime Minister of Canada, to India on February 18–24, 2018, includes reference to Canada actively considering Indian participation in Canadian Arctic research [52]. However, in reality, none of these declarations have become significant joint projects or collaborative scientific research [18, Bhagwat J., Shaparov A., pp. 16–22].

India's Arctic Policy

India's Arctic policy was released on March 17, 2022 by the Minister of Earth and Natural Sciences after revisions to its draft Arctic policy that was released in December 2020. The draft policy invited comments from Indian citizens by January 26, 2021. The document states that the pillars of India's Arctic policy are "*Science and research, Climate and Environmental Protection, Economic and human development cooperation, Transportation and connectivity, Governance and international cooperation and National capacity building"* [53]. The main justification for India's Arctic engagement can be attributed to the statement, "*India is particularly impacted due to the likely*

[50] Ministry of External Affairs (MEA), India. India and the Arctic, op.cit.
[51] MEA, India, The Saint Petersburg declaration by the Russian Federation and India: A Vision for the 21st Century, Saint Petersburg, June 01, 2017. URL: https://mea.gov.in/bilateral-documents.htm?dtl/28507/saint+petersburg+declaration+by+the+russian+federation+and+the+republic+of+india+a+vision+for+the+21st+century (accessed 18 July 2022).
[52] MEA, India. Joint Statement between India and Canada, State visit of PM Canada, New Delhi, February 23, 2018. URL: https://mea.gov.in/bilateral-documents.htm?dtl/29512/indiacanada+joint+statement+during+state+visit+of+prime+minister+of+canada+to+india+february+23+2018 (accessed July 16 2022).
[53] Ministry of Earth Sciences (MoES), India. India's Arctic Policy: Building a partnership for sustainable development, March 17, 2022. URL: https://www.moes.gov.in/sites/default/files/2022-03/compressed-SINGLE-PAGE-ENGLISH.pdf (accessed 18 July 2022).

effect of these changes on critical aspects of national development such as economic security, water security and sustainability, weather conditions and monsoon patterns, coastal erosion and glacial melting" [54]. It refers to the "*Indian philosophy of Vasudhaiva Kutumbakam – the world is but one family*" [55].

The policy is a neutral, politically correct document and steers clear of any controversies, such as the "near Arctic state" concept propagated by China. The policy document emphasises India's rich scientific base in terms of personnel, expertise in space, as well as entrepreneurship, which could be utilised by the Arctic Council countries for mutual benefit, recognizes the existing legal regime established in the Arctic by the Ilulisaat declaration and acknowledges India's interest in the development of the Northern Sea Route and Arctic natural resources in a sustainable manner. This has been reflected in certain discussions that have started, for example, between India and Russia [56] [19, Bhagwat J., pp. 488–506]. So far, India's focus has been on scientific research, mainly with Norway and the EU [57]. It remains to be observed whether this will change after the publication of this policy. For India's Arctic endeavour to be successful, the country needs to build up its Arctic-specific expertise, and for this, it needs to follow the example of China, Japan and the Republic of Korea, all of whom have extensive scientific and academic exchange programs with all Arctic Council countries, including Russia.

Conclusion

This article has focused on the manner in which India's Arctic policy evolved, with a distinction between the geopolitical and geo-economics focus of the MEA and the scientific mission under the MoES. The MoES provides clear visions and goals for its Arctic programme. Analysis of the Arctic debate and dialogue by strategic experts, foreign policy advisors, commentators and journalists have conclusively established that India cannot afford to be oblivious of the transition underway in the Arctic.

The analysis has enunciated India's Arctic interests, from its origins to the current engagements, strategic and geopolitical significance and what the Arctic implies for India in terms of scientific research, climate change, shipping, energy, natural resources and other geopolitical considerations. It also revealed the role played by different voices in the discussions on India in the Arctic and the role of Indian science and scientists in the Arctic region. The policy accentuates that India's interests in the region are scientific, environmental, commercial as well as strategic, though

[54] Ministry of Earth Sciences, India. India's Arctic Policy. op.cit.
[55] Ibid.
[56] Sputniknews. India expedites dialogue with Russia to trade via Arctic route amid Ukraine crisis, April 22, 2022. URL: https://sputniknews.com/20220422/india-expedites-dialogue-with-russia-to-trade-via-arctic-route-amid-ukraine-crisis-1094971865.html (accessed 18 July 2022).
[57] The European Union. EU-India calls on Polar Climate and Developing the next generation of Earth system models, December 13, 2019. URL: https://euraxess.ec.europa.eu/worldwide/india/eu-india-calls-polar-climate-and-developing-next-generation-earth-system-models (accessed 18 July 2022).

most analysts seem to advocate that science ought to be leveraged as India's main thrust towards these interests.

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A Word about the "Russian North" Concept *

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Abstract. The purpose of the review is to study the essence of the concept “Russian North” in the available written sources and in various branches of scientific knowledge. The historical process of the article is localized in a vast space from the Velikiy Novgorod, the Novgorod Veche Republic to Karelia, the coasts of the White and Barents Seas — the Arkhangelsk and Kola North, the NorthEast (Komi). The Russian North is understood as a hybrid concept that requires interpretation of economics, politics, society, culture, archeology, history, geography, ethnology, ethnography, philosophy, philology and other branches of scientific knowledge. The conceptual content is associated with modern understanding of historical evolution from the past to the present as a result of the thesaurus of knowledge accumulated over centuries.
Keywords: *Russian North, Novgorod Veche Republic, archeology, image-geographical map, historical and cultural groups, cultural space, civilizational wave*

Introduction

The Russian North, firstly, was not always Russian. Ancient people have long explored the vast northern space, which later became known as the “Russian North” in Russia’s history. The developed and settled northern space historically includes both the primordial ecumene and the ecumene of the Russian North. The primitive ecumene chronologically covers the time of the multi-thousand-year era of the Paleolithic, Mesolithic, Neolithic. The migrations of ancient people were largely determined by changes in the natural-climatic, geophysical conditions of their habitat, the duration of interglacial periods, and directly in the Far North, by the Arctic weather conditions. Population increased during the Neolithic, when the ecumene of the northern taiga, along the banks of rivers and forest lakes, were settled by permanent population. Well-known artefacts, in fact the most ancient works of art, confirming the occupation of ancient people, are the petroglyphs of Lake Onega and the White Sea. These are images of animals, birds, fish, boats, people, signs, carved on the surface of coastal granite rocks, dating back to the 4th-3rd centuries B.C. The habitation of the northern space by the Slavs, the Russian ethnos and its transformation into the ecumene of the Russian North took place in the second millennium A.D.

Secondly, in the scientific and methodological sense, the assessment of certain historical concepts, the terminology is given by time itself, making the necessary correction in the history of the most ancient eras, which can look completely different than in antiquity, or even in the 20th

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century. It does not matter whether this or that concept, for example “Russian North”, was or was not used in the available written historical sources: annals, acts, charters and other documents, in scientific publications of previous years. In the scientific sense, it is not only a question of terminology, but also the essence of conceptual content, coupled with a modern understanding of historical evolution from the past to the present as a result of the thesaurus of knowledge accumulated over the centuries.

Thirdly, a comparative analysis of the Slavic ecumene of Velikiy Novgorod and Kievskaya Rus allows us to conclude that Russian statehood came from Ladoga, Novgorod, from the Russian North, and not from the southern outskirts. Academician of the Russian Academy of Sciences V.L. Yanin, back in 2008, was one of the first to speak publicly about the new paradigm of the entire national history. Princely power, in the aspect that relates to Novgorod, was not introduced by the spread of the political system of Kievskaya Rus to Novgorod. “On the contrary, the impetus for the unification of the Northwestern and Southern Russian lands was given not from Kiev, but from Novgorod by the famous campaign of Oleg in 882, when Kiev was conquered by the Novgorod prince, who moved his residence there.” V.L. Yanin, on the basis of the scientific facts, singled out two main cores of statehood — Kiev and Novgorod [1, Yanin V.L., p. 10]. The history of a single ancient Russian state in Kiev has a shorter chronological period than the history of Velikiy Novgorod, the Novgorod Veche Republic, as the core, organic part and beginning of the Russian land since the time of Rurik, ensuring its security and protection [1]. In the 12th–15th centuries, the Novgorod Veche Republic represented a higher type of the state power and administration of that time. The most difficult period of the formation of Russian statehood was objectively connected with the permanent defence against Viking expansion and the northern crusades against Orthodoxy on the Novgorod and Pskov Veche Republics. In 13th–15th centuries, for the Novgorod Veche Republic, as well as for all Russian lands, the Grand Duchy of Moscow, the military-political threat from the East increased sharply.

Fourthly, in the scientific literature, the conceptual definition of the “Russian North” by scientists of various specialties and directions is usually interpreted depending on their goal and motivation, the subject and object of research, and the branch of scientific knowledge. Exploring the scientific literature on the Russian North, one can confidently interpret its concept as a kind of hybrid concept that requires understanding of the economy, politics, society, culture, archeology, history, geography, ethnology, ethnography, philosophy, philology and other branches of science. In modern scientific research, there are concepts not only of the “Russian North”, but also “European North of Russia”, “North of Europe”, “Arkhangelsk North”, “Kola North”, “Far North”, “Dvina Land”, “Zavolochye”, “Pomorye” and others, chronologically related to the second millennium A.D. Slavs appeared in the north in the 10th–11th centuries, and for several hundred years, they

[1] Lukin Yu.F., Kudryashova E.V. Otkuda poshla rossiyskaya gosudarstvennost' [Where did the Russian statehood come from]. Arktika i Sever: Arkticheskie novosti [Arctic and North: Arctic News], 2021. URL: http://www.arcticandnorth.ru/news.php?ELEMENT_ID=359837 (accessed 15 July 2022).

pushed the borders of Ancient Russia to the White Sea, the lower reaches of the Northern Dvina and hundreds of miles to the northeast. As a matter of fact, this is actually the initial chronological stage of the formation of the historical and cultural group of the future Russian world at the beginning of the second millennium of the new era. Without claiming to provide a complete review of all available concepts, discussions on this issue, this article only partially explores this topic.

Archeology of the Russian North

The concept of "Russian North" is used in archeology, although its conceptual definition appeared and was fixed in the scientific literature much later. The formation of archaeological science in the Arkhangelsk province, the contribution of the founders of the archeology of the region — A.G. Tyshinskiy, P.S. Efimenko, K.P. Reva, V.I. Smirnov — are studied in the article of the candidate of historical sciences, archaeologist A.G. Edovina [2, pp. 6–14]. The publication of the work "Zavolotskiy Chud" by ethnographer Pyotr Savvich Efimenko (1835–1908) is associated with the beginning of archaeological science in the Arkhangelsk province.

In the 20th–21st centuries, the archeology of the Russian North, including the Arkhangelsk North, Karelia, the Kola North, the European Northeast (Komi), was carried out by A.E. Belichenko, V.A. Burov, I.V. Vereshchagin (1947–2006), N.N. Gurina (1909–1990), A.G. Edovin, V.I. Kanivets (1927–1972), A.A. Kuratov (1936–2014); N.V. Lobanova, N.A. Makarov, A.Ya. Martynov, O.V. Ovsyannikov, P.Yu. Pavlov, Yu.A. Savvateev, M.V. Shulgin and other scientists. Analyzing the main sources of history and culture of the Arkhangelsk North and available artifacts, professor A.A. Kuratov singled out, following M.E. Foss and A.Ya. Bryusov, the Kargopol archaeological culture, which is also widespread in the White Sea basin, the White Sea and Pechora archaeological cultures, including the world-famous islands of the Solovetskiy archipelago, as well as island cultures of the oceanic basin, sites on the islands of Kuzov, Morzhovets, Mudyug, Vaygach, Kolguev, Franz Josef Land. Doctor of Historical Sciences N.N. Gurina, exploring the archaeological sites of Karelia, the Leningrad Oblast, the Kola North, the coasts of the White Sea, made a decisive contribution to the identification of a number of archaeological cultures of the Neolithic era, including the Valday, Kola, developed a number of issues of settlement and periodization of the North-West of the European part of the USSR [3]. Interesting information about archaeological sites that have come down to us from ancient Russia is connected with diplomacy. In a long dispute with Denmark, defending the rights of Russia to the "Lop land" (Lapland), the Russian envoys I.S. Rzhevskiy and S.V. Godunov in 1603 reported to the Danish ambassadors the text of the letter stating that "*Lopskaya land is all of old to our fatherland, to Novgorod land, and a Korelian sovereign named Valit, also Varent, took it by war, and its Russian name was Vasiley, which now is in those places on the Murmansk Sea in its name the town of Valitovo and other signs, as you have been truly announced*" [4, Formozov A.A., p. 22].

Russian North, as defined by archaeologist N.A. Makarov, Director of the Institute of Archaeology since 2003 and RAS Academician since 2011, "*means a vast territory, including the basin*

of Lake Onega in the west and the basin of the Mezen in the east, with a southern boundary running along the watershed line of the Volga and Sukhona. The Russian population of this region is characterized by a certain unity of the dialect and the traditional everyday culture. We can also talk about the unity of the historical fate of the region in the Middle Ages" [5, pp. 61–71]. The Slavs appeared there only at the turn of the 10th–11th centuries, and for several hundred years, they pushed the borders of Russia hundreds of miles to the northeast, to the White Sea and the lower reaches of the Northern Dvina. The Old Russian settlement of the North noticeably intensified in the middle of the 12th century, when things of Old Russian types spread over a vast area from Beloozero and the Volga–Sukhonskiy watershed to Finnmark and the Northern Urals. This area roughly corresponds to the concept of the zone of "Russian tributes", outlined on the basis of chronicles, charters and other documents. On the archaeological map of N.A. Makarov of 1986, containing finds from the 10th–13th centuries, 177 sites were localized.

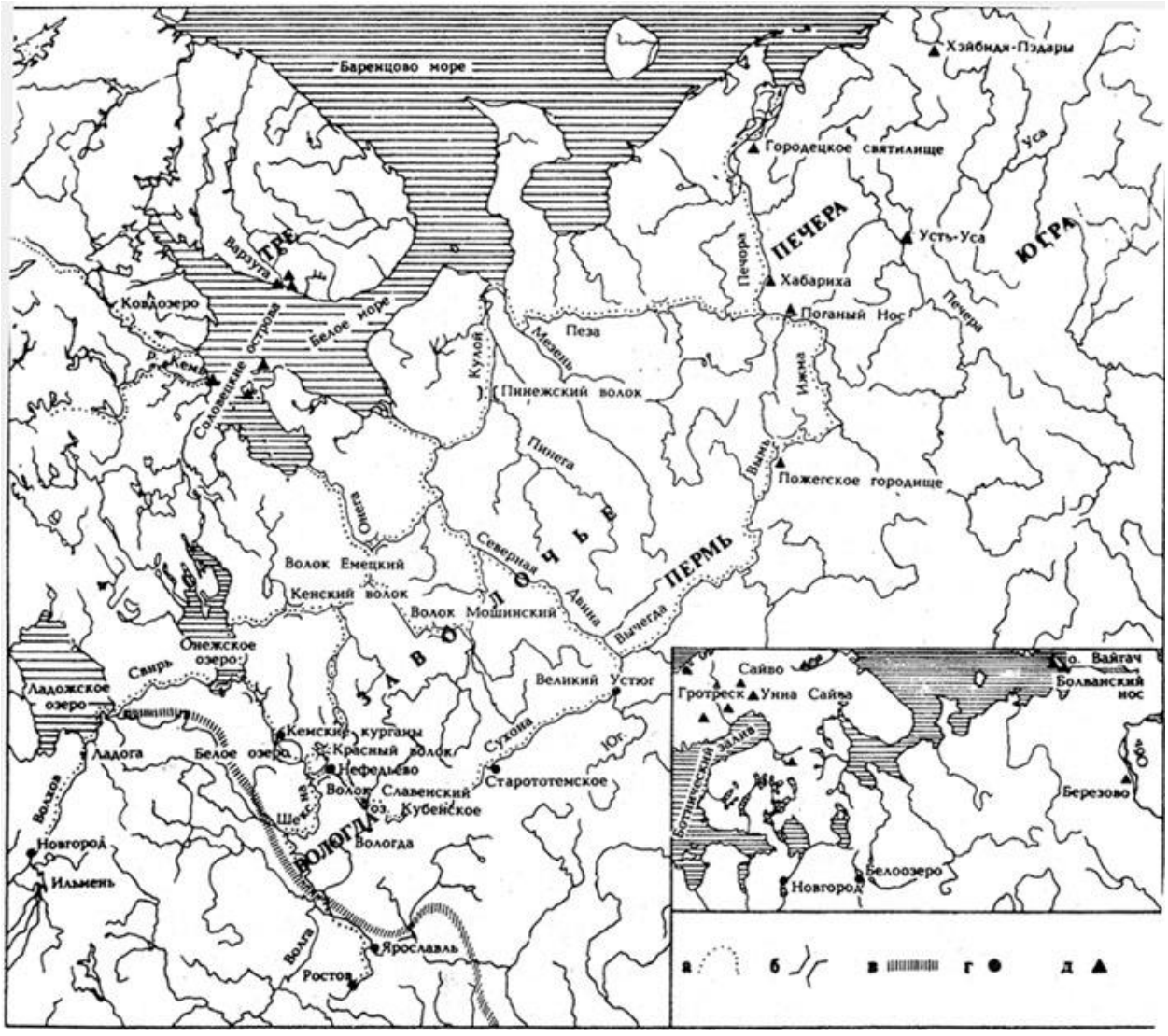

Fig. 1. Makarov N.A. Waterways of the North in the 11th–13th centuries: а – routes of waterways; б – floats; в - northeastern border of the zone of distribution of ancient Russian barrows; г – cities and archaeological sites of the 11th–13th centuries; д – finds of objects of ancient Russian origin in the Far North.

By 1993, the archaeological map contained over 220 points, each followed by a settlement, a burial ground, a coin hoard or an occasional find of medieval ornamentation. The monuments on the map differ in appearance, their state of preservation and their richness in antiquities. They have only one thing in common — they are material remains, firmly dated the 11th–13th centuries, evidence of a permanent or temporary stay of a person in the inhabited ecumene of the Russian North in that era. For centuries, the Svir and Sheksna remained the main gates of the North, giving rise to two waterways: Svir – Lake Onega – Onega – Northern Dvina and Sheksna – Sukhona – Northern Dvina. Analysis of the map makes it possible to assess the population of certain northern territories, the distribution of the population, and the direction of migration flows. The social structure of the population of the ecumene of the Russian North is examined by N.A. Makarov in the monograph “Russian North: the mysterious Middle Ages”, where the indicated map was published. In fact, this is one of the well-known maps of the ecumene of the future Russian North of the 11th–13th centuries, scientifically substantiated, based on artifacts, material and written primary sources, which has no analogues in Russian history.

The 11th–13th century chronicles contain references to princes and free communes, druzhinniks and smerds, pagan magi and Orthodox priests. Archeology makes it possible to substantively understand the ethnic picture of settlement, the Chud heritage, traces of the Scandinavians, the culture and rituals of ancient people. N.A. Makarov gave a description of the funeral rite, regarding it as Christian. In the 11th–12th centuries, the population of Belozerye and Kargopol no longer burns their dead, as the Slavs and Finns did at the end of the first millennium A.D. Like the inhabitants of most other regions of Ancient Russia, the northerners bury the dead. The change in the rite is undoubtedly the result of the influence of Christianity. Under its influence, the funeral rite is gradually changing, clearing itself of pagan elements. The absence of princely towns and fortresses in the North is indicative. All graveyards named in the charter of 1137 and surveyed by the expedition of N.A. Makarov, turned out to be unfortified. The need for protection was not as acute in the North as in the southern and central regions, which more often became the scene of hostilities. If we compare the North with the conquest of Siberia, then in thirty years, it has passed from the Yermak’s detachment arrived on the Irtysh until 1618, when the annexation of Western Siberia to Russia was basically completed, 14 cities and prisons were built on the new lands by the efforts of the government, and for a hundred years — about 150 fortifications. In the North, for 250 years, starting with the penetration of the first colonists in Zavolochye and ending with the Batyev invasion, only three cities were founded: Beloozero (redevelopment in 1170), Gleden (1178) and Velikiy Ustyug (1212). Exploring the problem of “Man and the State”, N.A. Makarov noted that the monks who left the rich monasteries of Moscow, Rostov and Novgorod in the 14th–15th centuries, went to the North in search of deserted places, solitude. The walls of suburban monasteries could not protect them from too close contact with the secular and spiritual authorities, the proximity of which guaranteed material prosperity, but deprived them of independence. For all set-

tlers, “solitude” was synonymous to “freedom”, which meant a “hidden” existence, but if not complete, then relative isolation. This, by the way, was well known to my ancestors [6, Kuznetsova V.P.].

A significant contribution to the archeology and history of the Russian North was made by Doctor of Historical Sciences O.V. Ovsyannikov. As a result of intensive searches on the banks of the rivers Vaga and Tikhmanga, Varzuga and the Northern Dvina, on the Terskiy coast of the White Sea, burial grounds and treasures of the late 11th–13th centuries, left by the Finnish-speaking aboriginal population and the ancient Russian pioneers, were discovered and investigated. The Arkhangelsk treasure, discovered in 1989, 40–45 km up the Northern Dvina from its confluence with the White Sea, included 1915 coins (more than 90% of them were German minted in the 10th–12th centuries) and about 20 pieces of jewelry, including Old Russian and Scandinavian manufacture. This treasure on the Vikhtui River dates back to the 1130s. Perhaps, there was an ancient settlement in the mouth of the Northern Dvina River. The study of Orletskiy, Vazhskiy, Yemetskiy, Varenga, Votlozhma, Kevrola, Topsy and other northern towns made it possible to substantiate their dating of the 14th–15th centuries, to show that these were rural fortified patrimonial centers (boyar estates). In collaboration with M.E. Yasinskiy, O.V. Ovsyannikov published a monograph “A look at the European Arctic: the Arkhangelsk North: problems and sources” in two volumes [7]. He took part in the famous Mangazeya historical and geographical expedition led by M.I. Belov in 1981.

A review of the archaeological study of the Finno-Ugric and Slavic settlements, the study of the ethno-political situation in the north of Russia, was carried out by the largest researcher in the archeology of the Finno-Ugric peoples of Ancient Russia, Doctor of Historical Sciences E.A. Ryabinin (1948–2010). His work is based on the use of archaeological sources accumulated over 150 years of active study of the Finno-Ugric and Old Russian monuments. E.A. Ryabinin comprehensively studied the Finno-Ugric population of the Northern Dvina (on the problem of studying the Zavolochskaya Chud). He gave an overview of the history of the issue, analyzed in detail the available sources, found artifacts, scientific literature. Considering the concept of settlement of Zavolotskaya Chud in the lower reaches of the Northern Dvina, the scientist noted the identification of this area with Bjarmia of Scandinavian sources, mentioned since the end of the 9th century, considered archaeological data on ethnocultural processes in Zavolochye. The problem of Chud assimilation in the era of mass colonization of Zavolochye in the conditions of a lack of archaeological knowledge, according to E.A. Ryabinin, is solved mainly using information on history, ethnography, linguistics, anthropology [8, pp. 5–7, 113–148].

V.N. Kalutskov: figurative-geographical map of the Russian North (2018)

Each region of Russia has its own conceptual and geographical system, due to the uniqueness of ethno-cultural traditions and natural landscapes. Diverse topics of a series of reports on the Russian North, made at seminars at Moscow State University named after M.V. Lomonosov in 1995–1997, gave a picture of the North Russian cultural landscape. V.N. Kalutskov, Yu.A. Davydo-

va, E.A. Rodionov, L.V. Fadeeva and others discussed issues at these seminars: typical landscape-toponymic situations of the Russian North, archaic spatial structures of the Russian North, sacred geography of the Russian North, folk Orthodoxy and the cultural landscape of the Russian North, ethno-cultural boundaries of the Russian North (based on the Pinezhye material), etc. Interest to the Russian North was manifested not only in the topics of reports, but also in interdisciplinary interaction with the Pomor University named after M.V. Lomonosov. In November 1996, the first round table “Cultural landscape of the Russian North” was held in Arkhangelsk within the framework of the international conference “M.V. Lomonosov and the National Heritage of Russia”, which was attended by geographers, historians, culturologists, ethnolinguists, folklorists and teachers of higher and secondary educational institutions from Arkhangelsk, Moscow, Murmansk, Pinezhskiy district. In 2009, Doctor of Geographical Sciences, Professor V.N. Kalutskov defended a dissertation on the landscape concept and cultural geography, published the monograph “Landscape in cultural geography” (2008), a number of articles on the Russian North: Regional cultural landscape and its cycles (2005), Cultural and landscape zoning of the Russian North: statement of the problem (2007), Russian North and its age-old geopolitical trends (2010), On the geoconcept of the Russian North (2011). An analysis of the humanitarian studies of the region, carried out by prominent scientists, allowed V.N. Kalutskov to identify the most typical complex characteristics, which include: remoteness, the outlying position of the Russian North, the absence of serfdom and landowners, harsh natural conditions, the North Russian housing complex, poor development of the territory, a complex type of peasant economy, polyethnicity with the leading role of Northern Russian traditional culture, Northern Russian dialects, Old Believers and folk Orthodoxy. The author’s figurative map of the Russian North by V.N. Kalutskov is based on three main concepts: volnitsa, northern wilderness, Russian archaic [9, Kalutskov V.N.].

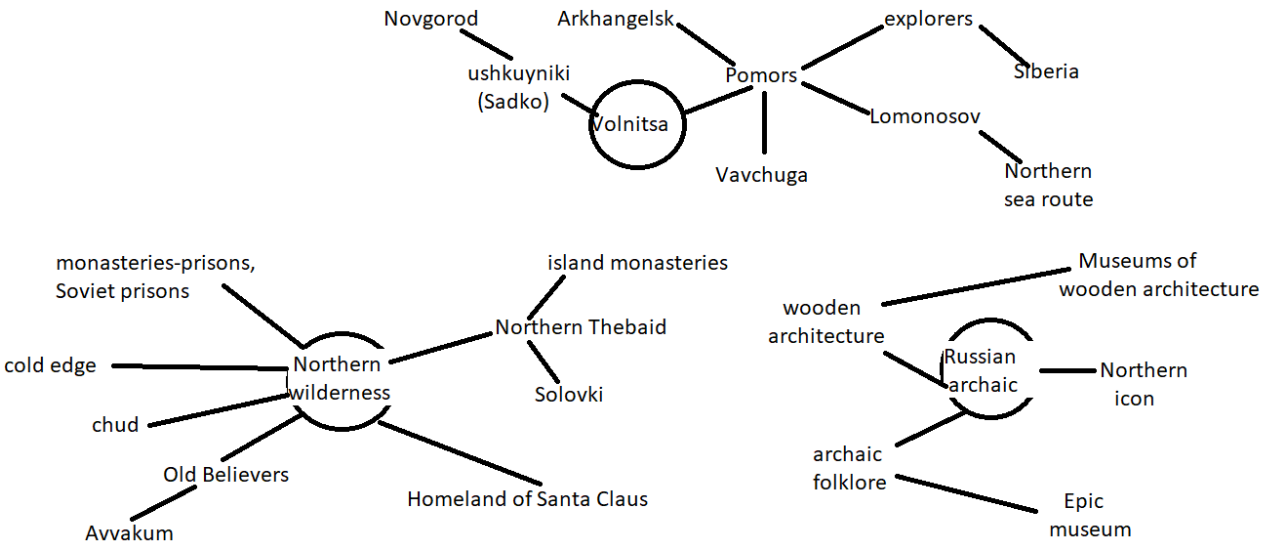

Fig. 2. V.N. Kalutskov: figurative-geographical map of the Russian North (2018).

Historical and cultural groups of the Russian nation

The Russian nation is characterized by a unity of language, a great community of material and spiritual culture. However, such unity does not exclude regional differences, and some of them go back in their basis to deep antiquity, as it was emphasized in the section “Historical and cultural groups of the Russian people” of the first volume of “Ethnographic Essays”. The division of the population into historical and cultural groups, and not fruitless discussions around the Pomeranian identity, seems to me the best scientific approach when studying the concept of “Russian North”. The author of the above section is the largest specialist in the ethnography of the Russian people, Doctor of Historical Sciences G.S. Maslova (1904–1991) noted that peculiar historical and cultural groups arose as a result of various migrations from one region to another, the formation of a military population on the borders of the state (Cossacks, monodvortsy, etc.). She singled out the Northern, Southern, Central Russian, transitional and other groups, the Far North [10, pp. 125, 143–147].

The *Northern* group. Typical “northern Russian” culture and lifestyle traits and a northern “o-pronounced” dialect can be traced from the Volkhov river basin in the west to the Mezen river and the upper courses of Kama and Vyatka in the east (i.e. Novgorod region, Karelian ASSR, Arkhangelsk, Vologda, parts of Kalinin, Yaroslavl, Ivanovo, Kostroma, Gorki and other regions). In fact, this is the “Russian North”, although in the cited edition of 1964 such a term was used only in the context of the fact that the wooden architecture of the Russian North was distinguished by the richness and variety of decoration of the external parts of buildings. The northern historical and cultural group did not include the Murmansk Oblast (Kola North), the Komi Republic (northeast), the geographical space of which was developed in the 11th–15th centuries. The study of dialect differences provides interesting and valuable material for clarifying the ethnic history of the Russian people, migration processes and phenomena, as well as the problems of cultural mutual influences between the individual peoples of our country. The oldest written monuments testify that the Novgorod “ts-pronounced” dialect of the 11th–12th centuries was already characteristic, which was absent in the Kievskaya land. As part of the North Russian dialect, five groups were distinguished: Arkhangelsk, or Pomeranian; Olonets; Western, or Novgorod; Eastern, or Vologda–Kirov; and Vladimir–Volga region.

According to G.S. Maslova, the *Southern* group included most of the Ryazan, Penza, Kaluga, Kursk, Lipetsk, Orel, Tula, and Tambov regions. The South Russian features in culture, life and the southern “a-pronounced”dialect prevailed from the Desna River basin in the west to Penza Region in the east, and approximately from the Oka River in the north to the Khopyor and Middle Don basins in the south.

The *Central* Russian group occupied the territory, mainly the Volga–Oka interfluves, where the Russian principalities began to unite around Moscow in the 14th century and where the Russian nucleus of the Russian nation was forming. According to the modern administrative division,

these are Moscow, Vladimir, northern Ryazan, Kaluga, parts of Kalinin, Yaroslavl, Gorkiy, Kostroma, Ivanovo and some other adjacent regions. The region of the Central Russian transitional dialect distinguished by dialectologists (along the lines of Pskov, Kalinin, Moscow, Ryazan, Penza, Saratov) is somewhat narrower than the region that stands out according to ethnographic data. The Central Russian group is a link between the northern and southern Russian populations. Its material and spiritual culture combined northern and southern features. On the other hand, many local characteristics (in clothing, buildings, customs) are widespread in the north and south.

According to dialectological and ethnographic data, a *transitional* group between the northern and central, central and southern Russian populations, as well as Russians and Belarusians, included the population of the ancient Russian territory in the basin of the Velikaya River, the upper reaches of the Dnepr and the Western Dvina (Pskov, Smolensk, parts of the Kalinin and other adjacent areas). In addition to the above and other large ethnographic groups and subgroups, the Russian population of Siberia, Russian Ustinians on the Indigirka River, Markovians at the mouth of the Anadyr River and other smaller, peculiar groups of the Russian population with special names or self-names were distinguished. For example, the Far North – the coast of the White Sea was inhabited by Pomors. Pomors, according to G.S. Maslova, rather a geographical than an ethnographic term and means: 1) the population of the White Sea coast from the Onega River to Kem; 2) residents of the northern sea coast.

The Pomors, who are the descendants of the ancient Novgorod settlers, are similar in their material and spiritual culture to the rest of the Russian population of the North and differ mainly in the features of their economic life; From time immemorial they have been known as brave seafarers, sea animal hunters and experienced fishermen. In general, the analysis of the historical and cultural groups of G.S. Maslova is the foundation, the scientific basis for understanding the essence of the concepts “Russian North”, “Far North”, “Siberia” and other regions of Russia both in the past and in the present.

Ethnography of the Russian North

Ethnography has accumulated a significant number of facts and concepts related to the historical evolution of the East Slavic peoples. The ethnographic study of the North began in the 18th century, at the time of M.V. Lomonosov, and continues to this day. The executive editors of the book “Folklore and Ethnography of the Russian North”, Doctor of Philology B.N. Putilov (1919–1997) and Doctor of Historical Sciences, Corresponding Member of the Russian Academy of Sciences K.V. Chistov (1919–2007) determined “Russian North” as the northern regions of the European part of the USSR, predominantly populated by Russians. From the standpoint of ethnography — the territory, where the complex of the Northern Russian traditional household culture was spread, which by its geographical configuration is very similar to the area of the Northern Russian dialects. From the dialectological point of view, these are the areas where the speakers of the North Russian dialects lived. Well-known scientists emphasized the relevance of a detailed study

of the history of the settlement of the Russian North by immigrants from the Novgorod and Rostov-Suzdal. Among the features of the development of the Russian North, without studying of which it is impossible to understand many of the processes that played an important role in the socio-economic history of our country, they attributed the fact that the northern territories were not affected by the Tatar-Mongol invasion in the 13th–15th centuries, not covered by the most cruel, the landlord (privately owned), form of serfdom in the 17th–19th centuries. The North Russian regions were formed as a natural repository of folk everyday traditions and folk art culture, became famous for their wonderful examples of folk architecture, embroidery, carving, and partly painting. World-famous Russian epic songs (epics) were discovered here, a large number of ancient folk songs, lamentations and fairy tales, distinguished by their unique originality and high artistic merit, were recorded [11]. At the same time, it was emphasized that many problems of studying the history and culture of the Russian North are still waiting to be developed, which is still relevant in the first quarter of the 21st century.

In 1948–1960, professor K. V. Chistov organized and headed numerous scientific expeditions to study the folk (peasant) culture of the Russian North. Among his famous students was T.A. Bernshtam (1937–2008), author of several monographs on the ethnography of the Russian North. She defined Russian North (or simply North) as the territory lying to the north of that area which the Eastern Slavs settled in primitive communal life, before part of the Eastern Slavs began to recognize themselves as Russians. The northern border of the area of dominance of the Eastern Slavs passed to the east from the southern part of Chudskoe Lake by the 9th century, crossed the Volkhov River, turned behind the Meta River to the southeast, crossing the upper reaches of the Volga River, reached the Oka River west of Murom. Further, to the east, this border can be conditionally continued along the right bank of the Oka and Volga rivers, along the lower reaches of the Kama, Belaya and Ufa rivers to the Ural Mountains. The eastern border of the western part of the Russian North can be drawn from the confluence of the Oka and the Volga, through the lower Vychegda and along the Mezen River to the White Sea. As a result of numerous expeditions in the Russian North (Arkhangelsk, Murmansk, Vologda oblasts, Karelia) in the 1960s–1990s, Tatyana Alexandrovna collected significant field materials, which later formed the basis of the collections “Russian North” on the problems of ethnocultural history, ethnography and folklore, the cultural tradition of local groups, other aspects of the unique in ethno-cultural history and folk tradition [12].

The traditional culture of the Russian North is the subject of a monograph, dissertation of Doctor of Philology and other scientific works, professor N.V. Drannikova. Her research is based on records made during expeditions in the Russian North and North-West of Russia (Arkhangelsk, Vologda, Kirov, Murmansk, Novgorod oblasts, Karelia and the Komi Republic). The historical and cultural memory of the society is an integral part of the local identity [13].

Russian North in the history of Russia

The history of ancient people who explored the coast and islands of the White, Barents and

Baltic Seas, includes a significant list of knowledge both in available sources and in the scientific literature. The Slavic language has come a long way of development within the framework of an older and more extensive linguistic community — the Indo-European: “with a certain probability related to the 5th–4th millennia B.C., to a certain spatially limited locus (“ancestral home”), to specific archaeological culture”, emphasized Academician of the Russian Academy of Sciences V.N. Toporov (1928–2005) [14, pp. 49–50].

Velikiy Novgorod historically became the cradle of the future Russian North in the first millennium A.D. Rurik came to Lake Ilyimen, founded the city over the Volkhov River and called it Velikiy Novgorod. The mention of Slovenians, Gostomysl (790–860) near Lake Ilmen, the name “Rus”, is found in “About Velikiy Novgorod and Russia” of the Ipatievskaya and Voskresenskaya annals. The arrival of Rurik and his brothers was described by Nestor of Kiev (1056–1114) in The Tale of Bygone Years, the date of its writing was about 1110–1118, but the original has not been preserved. The author of the Joachim Chronicle was the first Bishop of Novgorod, Joachim Korsunyanin (992–1030). At the request of the Grand Duke Vladimir, the Patriarch of Constantinople from 979 to 991 Nicholas II Chrysoverg sent to Russia several clergymen, among whom was Joachim. Later Russian chronicles of the 14th–16th and even 17th centuries recorded the subsequent stages of the development of the northern lands and its final settlement by the end of this period [2]. The Tale of Bygone Years and other chronicles mention Chud, Perm, Pechora, Yugra, Korela, Lop, Samoyed, Toymokars among the peoples inhabiting the northern lands all [3].

Professor S.N. Azbelev (1926–2017) carefully analyzed the information about Gostomysl, who was known not only from Russian chronicles, but also from Western European chronicles of the 9th century, as the king of the obodrite state [15, pp. 381–392]. He also studied the annals of Velikiy Novgorod, chronicles of the 11th–17th centuries as cultural monuments and as historical sources. “Rus” is an older word than “Varyagi,” emphasized Doctors of Historical Sciences D.S. Raevskiy (1941–2004) and V.Ya. Petrukhin [16].

Doctors of Historical Sciences V.O. Klyuchevskiy (1841–1911), D.S. Likhachev (1906–1999), K.A. Nevolin (1806–1855), S.M. Solovyov (1820–1879), V.L. Yanin (1929–2020) and other scientists have made an important contribution to the history of Velikiy Novgorod, to the development of its statehood. Analyzing the Icelandic sagas, A.A. Vasilyev tried to create an ancient history of Northern Russia without the Varangians in the middle of the 19th century. He, as M.V. Lomonosov did before, criticized the Norman theory, argued that the Varangians were Slavs as Russ, cited the names of the country found in foreign sources: Russi, Russia, Rugia, Ruthenia, Risaland. For many

[2] Ustyug chronicle. Moscow; Leningrad, 1950; Vologda-Perm chronicle. Moscow; Leningrad, 1950; Moscow annalistic code of the end of the 15th century. Moscow; Leningrad, 1949; FCRC. Moscow; Leningrad, 1959, vol. 26.

[3] Chronicle according to the Resurrection List // FCRC. Vol. 7. St. Petersburg, Eduard Pratz printing house, 1856, p. 262; About the Grand Duke Rurik, from him the great reign of Russia will begin and our people will be called Rus // FCRC. Vol. 2. Ipatiev Chronicle. St. Petersburg, Eduard Pratz printing house, 1845, pp. 235-236; The Tale of Bygone Years. Moscow, Leningrad, 1950, Vol. 1, pp. 10, 167; Novgorod First Chronicle. Leningrad, 1950, pp. 27, 260; Diplomas of Velikiy Novgorod and Pskov. Moscow, 1949, 407 p.; Kholmogory chronicle // FCRC, vol. 33, Leningrad, Nauka Publ., 1977, pp. 10-147; Dvina chronicler // FCRC, vol. 33, Leningrad, Nauka Publ., 1977, pp. 148–221.

centuries before Rurik, the Slavs of the North had a settled life, significance, citizenship and laws. There were wars and reconciliations; there were cities, well-organized communities. According to A.A. Vasilyev, the information about the history of the Northern Slavs had to be sought in the North, and for this reason, traditions were collected in Sweden, Norway, Denmark, Prussia and Iceland. He believed that Biarmia was a strong eastern state that occupied the current Arkhangelsk, Vologda, Vyatka and Perm provinces, which became part of the Novgorod domain in the following centuries [17, p. 36]. Long before the discovery of Greenland and Vinland (America), at the time when Iceland was inhabited, the ancient Scandinavians went on their ships to the northernmost countries in the Arctic Sea, to the shores of the White Sea and rich Bjarmia, — explains Anders Magnus Strinnholm, 1786–1862, a member of the Swedish Academy of Sciences, in the tenth chapter of his work about the voyages of the Nordic peoples to Bjarmia [18]. There is historical evidence about the trip of the Normans to the White Sea, which is in the Anglo-Saxon translation of "History against the Gentiles", authored by Paulus Orosius (about 385–420) [19]. The localization of the places visited by the Vikings caused a discussion in the scientific community, the details of which were carefully studied by Karl Tiander, G.V. Glazyrina, E.A. Melnikova, T.N. Jackson and other scientists. Toponyms were mentioned in the Scandinavian sagas: Bjarmaland — the Land of the Bjarms, Kirjalaland — the Land of the Karelians; hydronyms Gandvik — White Sea, Vina — Northern Dvina; Novgorod, Holmgard — Holmgaror; Russaland — Land of the Russians, etc. In most sagas, the mouth of the Northern Dvina River was called the final destination of the campaigns of the Scandinavians [4].

Slavic colonization from the Novgorod lands went to the Lower Dvina along the Onega River and other rivers, lakes, and then to the White Sea. The second route from the Rostov–Suzdal, Moscow princedoms passed along the Sukhona, the upper and middle Dvina. Farming, agriculture was the main occupation of the Slavs. Therefore, they settled along the banks of rivers and lakes suitable for agriculture [20, Sedov V.V., p. 236]. By the end of the 1070s, Velikiy Novgorod has already spread its graveyards in Zavolochye [21, Nasonov A.N., p. 100]. The discovery of new geographic routes, land passage to the Urals and Siberia, the collection of tribute in Zavolochye, on the Northern Dvina, Pechora, and Yugra took place in the 11th–15th centuries. Huge expanses of northern lands with a low population density of local hunters and fishermen, the development by the Slavs of the northern taiga, river valleys suitable for agriculture and cattle breeding, a higher level of culture — these and other circumstances predetermined the mostly peaceful, non-violent nature of Slavic migration to the north, in contrast to the later conquest of Siberia. The development of the ecumene of the northern lands by the Novgorodians did not lead to a clash with the

[4] Ancient Russia in the light of foreign sources: Chrestomathy / Ed. By T.N. Jackson, I.G. Konovalova, A.V. Podosinova. Vol. V: Ancient Scandinavian Sources. Compiled by G.V. Glazyrina for Parts VI, IX, X, by T.N. Jaxson for Parts III, IV, V, VII, VIII, XI, by E.A. Melnikova for Parts I, II, XII. Moscow, Russian Foundation for Assistance to Education and Science, 2009, 384 p.; Glazyrina G.V. Icelandic Viking sagas about Northern Russia: Texts. Translation. Commentary / [Ros. acad. Sciences. In-t of Russian history]. Moscow, Ladomir Publ., 1996; Jackson T.N. "Austr í Görðum", Old Russian toponyms in Ancient Scandinavian Sources. Moscow, Languages of Russian culture, 2001, 207 p.

aboriginal population, whose main occupation was traditionally fishing and hunting. The Slavs plowed the land and cultivated cereals. Each of the ethnic groups gravitated towards different natural areas of settlement in the northern ecumene, without interfering with each other. Land passage to Pechora, Yugra, beyond the Urals, in contrast to the colonization of Zavolochye, the Dvina land, the coast of the White Sea, was not aiming at settling these distant and hostile areas, was limited to the collection of tribute. The assimilation of the Slavs with the local Finno-Ugric local tribes promoted the interpenetration of different cultures, trade, and the socio-economic development of the northern lands. The development of the northern territories by the Novgorodians was distinguished by religious tolerance and was predominantly of a trade and economic nature, rather than a military one, although severe wars, typical for those times, were not excluded.

Christian Orthodoxy, parish churches, monasteries, chapels, and votive crosses played an important role in the settlement of the Slavic ecumene of the Russian North. The active Orthodox monasteries, parish churches brought beauty and holiness to life, the arrangement of the entire surrounding ecumene, as ancient centers of Christian education, writing, annals, and icon painting. Their contribution to culture, architecture, painting, art, book printing, archiving, organization of libraries is invaluable. Multifunctional Orthodox monasteries, including those in the Russian North, were not only monastic cloisters, spiritual centers of culture, Christian education and art, but also acted as defenders of the Orthodox faith. There are many examples of this in national history. Giles Fletcher (1548–1611), Doctor of Law, an English diplomat who visited Russia in 1588–1589 during the reign of Fyodor Ivanovich, called Russia a country of monasteries [22].

The scale of military attacks on the lands of Velikiy Novgorod, the Novgorod Veche Republic from the western and northwestern directions can be judged by the following very impressive figures, which were cited by Academician of the Russian Academy of Sciences D. S. Likhachev in his well-known work “Essay on the history of the culture of Novgorod in the 11th–17th centuries”. Novgorodians persistently, stubbornly, courageously waged incessant defensive wars on their borders, firmly holding a shield over the entire north-west of Russia. During the period from 1142 to 1446, Novgorod fought 26 times with Sweden, 11 times with the Livonian Order, 14 times with Lithuania and 5 times with Norway. There were two main directions of foreign expansion in the 12th–15th centuries on the lands of the Novgorod Republic: western and eastern. D.S. Likhachev reasonably emphasized the exceptional importance of Novgorod for preserving the culture of the entire Russian land in the difficult years of “languor and torment of the Tatar-Mongol yoke”. The hordes of Batu did not reach Novgorod, Kholmogor and other cities in the North, which happily escaped defeat and destruction. This made it possible to develop culture, architecture, preserve the manuscript wealth of Ancient Russia, book education, fresco painting, and icon painting in the Russian North [23]. Armed conflicts, their outcome, defeats or victories, negotiations, concluded truces, certainly could not fail to affect all life activities of the Russian North ecumene.

The Crusades are an attempt to unite and expand the Christian Catholic world under the rule of the Roman papacy in the 11th–15th centuries by using force. In 1096–1270, eight crusades took place, aimed primarily at Palestine, the capture of Jerusalem with the Holy Sepulcher. The northern crusades of the Danish, German and Swedish knights were already sent to the Baltic, to the lands of Poland, Estonia, Finland, Karelia, the Novgorod and Pskov Veche republics, where there were permanent missions of Christian Orthodox churches, though not of the faith pursued by the Catholic Pope. One more specific feature of the crusades in the North was their multi-vector nature at the first stage, and then their insistence on punishing, ruining and subduing Slavic state formations, especially Novgorod and Pskov. In 1232, Pope Gregory IX called on the crusaders to attack the Novgorod lands. During the Livonian campaign of 1240–1242, German knights captured Izborsk and Pskov, but were defeated by the Novgorod Veche Republic. Attacks by Swedish, Lithuanian and other foreign troops on Novgorod, Pskov, and the Russian North were allegedly carried out with the aim of Christianizing ethnic tribes, converting Orthodox Slavs to Catholicism. In reality, most often their goal was colonization by force of arms, the “ordinary” seizure of foreign lands, Novgorod possessions and robbery of the population. The campaign of Magnus in 1348 was the last of the “crusades” of the Swedish knights to the lands of the Novgorod Republic. Ancient Russia, Velikiy Novgorod, Pskov were actually an integral part of the entire Christian world and a completely unanimous country by that time. Attempts of the Novgorod Veche Republic to defend its economic and political interests in the 13th–14th centuries were perceived as helping and aiding the pagans, which served as an ideological justification for the expansion of the crusaders. In fact, under the guise of Christianization, the lands conquered by the crusaders were forcibly colonized; and new towns (Riga, Berlin, Revel, Vyborg), state formations, and the holdings of the Teutonic and Livonian Holy Orders of Chivalry were being established.

According to many researchers, archaic rites, rituals and traditions have been preserved in the Russian North, which are older than the ancient Greek ones and are also recorded in the Vedas, the oldest cultural monument of the ancient Indian nations. A well-known Russian specialist in the history and culture of the Russian North S.V. Zharnikova (1945–2015) analyzed the origins of folk culture, ceremonies and holidays, fairy tales, epics, incantations, the semantics of folk costume, and the archaic roots of the Northern Russian ornament; Sanskrit roots in the topo- and hydronyms of the Russian North [24, Zharnikova S.V., pp. 57–69].

An overview of the economic and industrial life of the Russian North was carried out by A.P. Engelgard, governor of the Arkhangelsk province in 1893–1901, in the book “Russian North: Travel Notes” (1897). At the same time, the concept of “Russian North” is used only in the title of the entire book and in the general overview. There is no specific definition of this concept further in the text. Judging indirectly from the table of contents of the text, A.P. Engelgard included in the structure of the Russian North Kemskiy and Kola counties, Korela or Koreliya, Pomorie, Lapland, Murman, Novaya Zemlya, Pechora Territory, Zyryans, Samoyeds [25, pp. 1–15]. The founder of the

Pechora natural history station, researcher of the economy and social sphere of the Russian North, A.V. Zhuravskiy (1882–1914) uses the concept of “Russian North” in the context of the actual life of the Russian North, love for Russia and the Russian North on the basis of faith and service in his work “European Russian North. On the question of the future and the past of its life” (1911) [26, p. 6, 12].

The vast expanses of the northern part of the East European Plain from the shores of the Arctic Ocean to the watershed separating the left tributaries of the upper and middle Volga from the river basins of the extreme Russian North, and from the Russian-Norwegian border to the Ural Range (1919), — this might seem to be a land of harsh ruggedness, lack of appealing cultural development and promise in terms of natural resources and natural diversity. However, A.A. Kizevetter (1866–1933), Master (1903), Doctor of Russian History (1909), Privatdozent (1893–1909), Professor at Moscow University (1909–1911, 1917–1920), could not agree with this image in the form of a dead capital, supposedly its withering away. This territory was a part of the Russian land in the past epochs of historical life not as a motionless dead weight, attached to the Russian state organism and hindering with its weight the free disclosure of the internal forces of this organism, but as a viable nourishing cell, significantly contributing to its overall internal prosperity. In the second chapter, “The Russian North and the Novgorod State”, A.A. Kizevetter substantiated that the Russian North really attracted immigrants from Velikiy Novgorod and Suzdal land with its vast expanses, free land, natural abundance, fur and other riches, opportunities for fish and salt trade, agriculture, and entrepreneurial activities. The North abundantly supplied the inner provinces of the Moscow state with the products of its local industry, among which the most important belonged to fish (especially salmon), salt, lard, skin of sea animals and furs; almost all foreign trade of the state was concentrated in the North; The North served as the main connecting link between European Russia and Siberia in terms of trade. In the 16th–17th centuries, Muscovite Russia received abundant fruits from the industrial boom of the “Russian North”, but in the 18th century, the economic and political importance of the North began to diminish [27, Kizevetter A.A., pp. 3–4, 12–22, 58–66].

Exploring the historical and cultural development and identity of the population, I.V. Vlasova (1935–2014), Doctor of Historical Sciences, Professor, Honored Scientist of the Russian Federation, gave the following definition of the Russian North: “*The territory from the Arctic Ocean in the north to the Volga–Northern Dvina watershed in the south, from Karelia in the west to the Ural Mountains in the east*, although it is inhabited not only by Russians, but also by Karelians, Komi, Veps, Saami (Lapps), Nenets. In the 17th–18th centuries, there were other names for this territory: Pomorye, North, Northern Russia. Since the 19th century, the name “European North” is known, in contrast to the northern lands beyond the Ural Range [28, p. 16].

Professor V. N. Bulatov (1946–2007), Doctor of History, who comprehensively studied the mysteries of the North, published five books on the history of the Russian North and a fundamental textbook "Russian North" in the framework of the “Gaudeamus: Academic Project” in

1997–2006 [29]. His other scientific publications are also known. Among the works published by G.P. Popov (1928–2019), his works on the history of the Arkhangelsk port (1992), the governors of the Russian North are well known. G.P. Popov and R.A. Davydov co-authored books on the defense of the Russian North during the Crimean War, maritime navigation in the Russian North in the 19th–early 20th centuries, etc.

The Russian North — the cultural space of the Russian lands

The Russian North is not only a socio-economic, geopolitical, but also a vast cultural space of Russian lands in the European North of Russia. Culture in all its manifestations, language as its part and art reliably united the people inhabiting the ecumene space of the Russian North, no less than the power or socio-economic relations.

Candidate of Art History A.K. Chekalov (1928–1970) noted that the area of culture of the Great Russian North, the boundaries of which are commonly defined in ethnography on the basis of typical forms of housing, clothing as well as language, included not only Obonezhye and Belozerskiy Krai, Severodvinsk area (including the areas of the Sukhona Rivers , Vaga, Pinega), Mezen and Pechora lands, but also some areas to the south of the Belozersk–Vologda–Veliky Ustyug line, Cherepovets, the northern parts of the Yaroslavl and Kostroma area. The vast Northern Dvina region in the Russian North was the busiest and richest trade and craft zone with large cities and local peasant self-government. In the east, the northern types were dissolved in the cultures of the Komi and Vyatka–Perm area. The western border of the Great Russian culture, where it mixed with the Karelian–Finnish culture, was also blurred [30, p. 37].

Doctor of Philology, Professor, Academician of the Russian Academy of Sciences D.S. Likhachev (1906–1992) noted the uniqueness of the Russian North as a monument of world and national culture, as a treasure trove of peasant, seafaring, fishing, handicraft and cultural traditions. There is an amazing combination of the present and the past, modernity and Russian history — the most significant, the most tragic in the past and the most philosophical, of man and nature, the watercolor lyricism of water, earth, sky and the formidable power of stone, storms, cold snow and air. But the most important thing is that the North cannot but touch the heart of every Russian person, by the fact that it is the most Russian and has played an outstanding role in Russian culture. It not only saved Russia in the most difficult times of Russian history — the era of the Polish–Swedish intervention, in the era of the First Patriotic War and the Great War, it saved from oblivion Russian epics, Russian ancient customs, Russian wooden architecture, Russian musical culture, the Russian great lyrical poetry — song, word, Russian labor traditions — peasant, craft, navigation, fishing [5].

History of culture of the Russian North of 988–1917 is deeply and comprehensively researched in the monograph by Doctor of Historical Sciences, Professor G.S. Shchurov (1935–2012).

[5] Likhachev D.S. Russkiy Sever [Russian North]. URL: http://www.tradicii.info/ru/lihachev-ru/98-russkij-sever-lihachev.html (accessed 24 June 2022).

In the section “Artistic creativity”, he showed folk — artistic, literary, musical, visual, theatrical creativity, architecture. In the second section, “In order to preserve spiritual values”, the museum work, monastic and secular libraries were covered. The undoubted success of the author of this unique scientific work is the third and fourth sections on spiritual and secular education, discoverers and national healers, M.V. Lomonosov, scientific founders of fundamental trends, scientific societies and the first scientific institutions [31]. The monograph was recognized as the best book of 2004 and presented in Moscow and Paris at book exhibitions.

Doctor of Cultural Studies A.B. Permilovskaya is known as the author of monographs about the northern, peasant house in the culture of the Russian North (19th–early 20th century), about the Russian North as a special heritage territory, Russian wooden architecture, cultural meanings of the folk architecture of the Russian North, about Siberia and the Russian North: problems of migrations and ethno-cultural interactions (19th–early 21th century). In 2004, Anna Borisovna created a new line of research by conducting a comprehensive study of the folk architecture of the Russian North as a reflection of the cultural meanings of the life of a unique Russian region, formed and substantiated the concept of “The Russian North as a special heritage area”. In one of her articles, A.B. Permilovskaya justified the Russian North as a vast territory from the interfluve of the Volga and Sukhona to the White and Barents Seas, including modern Arkhangelsk, Vologda, Murmansk oblasts, northern Leningrad oblast, as well as the Republic of Karelia and the Komi Republic [32, p. 155–163]. Only the Novgorod Oblast is excluded from the modern space of the Russian North, which historically started the development of the northern lands more than a thousand years ago. In general, such a broad understanding of the modern Russian North is not always reflected in the publications of other authors, who understand the “Russian North” as a small part of it — the Arkhangelsk North or Karelia, the Kola North, forgetting the history of the formation and development of the entire Russian North as a huge unified northern territory, which was noted earlier by N.A. Makarov, T.A. Bernshtam and other scientists.

A. N. Davydov (1951–2016), a prominent specialist in the ethnography of the Russian North, the history and ethnography of Arkhangelsk, the maritime culture of the peoples of the European North, and the history of bells and bell ringing, was a member of the Scientific Council of the RAS on the History of World Culture.

Poetry of the northern ecumene: images of sea, river, forest, swamp, tundra and the motif of the path in the northern text of Russian literature, the northern text as a logos form of life of the Russian North; sociocultural space of the northern Russian village; the dynamics of the culture of the Russian North in the conditions of modern social transformations; ethnicity and culture: the problems of discourse analysis were studied in the works of professors E.Sh. Galimov, V.N. Matonina, Yu.P. Okuneva, A.N. Solovyova. With the participation of E.Sh. Galimova, a scientific project on holding All-Russian scientific conference with international participation “The Northern text of

Russian literature: the Russian North in the system of points of view" has been implemented in 2019.

Exploring the problems of archeology, ethnology, philosophy of culture and sacred geography of the peoples of the European North, Doctor of Philosophical Sciences N.M. Terebikhin revealed the features of the northern Russian traditional spatial mentality, which is important for understanding the meanings of the development of the ecumene of the Russian North. Each ethnic group has a well-known specific set of unconscious habits, stereotypes of spatial behavior and worldview, which are determined by the concept of spatial mentality. The process of mastering the macrospaces of the North, according to N.M. Terebikhin, reflected the centrifugal aspirations of the Russian soul, aimed at leaving this world and opening the Russian expanse [33, Terebikhin N.M., pp. 3–210].

Russian North and M.V. Lomonosov

A unique place in the conceptualization of the Russian North belongs to the life and writings of M.V. Lomonosov (1711–1765). M.V. Lomonosov did not use the concept "Russian North" in his works on Russian history. However, he became an iconic figure, whose unique image of a scientist is associated precisely with the Russian North. Mikhail Vasilyevich focused on the fact that peoples do not begin with names, names are given to peoples, and that the ancient Slavs and Chuds in Russia were known by the chronicles for a long time. Permia, which they call Biarmiya, stretched from the White Sea up near the Dvina River, and was a strong nation of the Chuds. They traded expensive animal skins with the Danes and other Normans; they worshipped an idol Iomala. "Chud" and the Slavs were united into one nation in some places. The Russian North was not accidentally the home of one of Russia's greatest scholars in the 18th century. It is very important to understand exactly this interrelation and not to dwell only on when the concept "Russian North" first appeared in history.

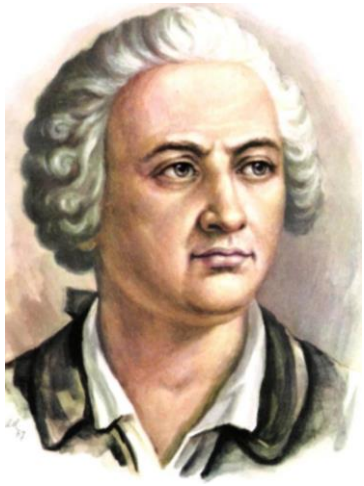

Fig. 3. M.V. Lomonosov.

The Russian North, where M.V. Lomonosov spent his childhood and youth, had a great influence on his scientific interests, emphasized D.A. Shirina, Doctor of Historical Sciences, Profes-

sor, Honored Scientist of the Republic of Sakha (Yakutia). M.V. Lomonosov studied the northern lights, the nature of cold and heat, the characteristics of sea ice, the possibility of conducting northern sea expeditions, the conditions for moving along the Arctic Ocean, and a number of other issues related to the development of the Arctic territories [34].

According to the Honored Worker of the Higher School of the Russian Federation, Doctor of Pedagogical Sciences, Professor T.S. Butorina (1946–2018), in the birth of the genius M.V. Lomonosov, the peculiarities of socio-economic and cultural environment of the Russian North, its unique historical and cultural wealth played a leading role in the birth of M.V. Lomonosov's genius [35, pp. 8–13]. Here he was formed as a citizen, having absorbed folk traditions, the culture of the region and spiritual values. The norms of people's behavior, personal requirements, family values and deep respect for each other were transmitted from the older to the younger generations. The people valued qualities such as patriotism, honesty, collectivism, a humane attitude towards others, and courage.

Historian N.F. Markov (1854–1916) noted that the Russian North and Lomonosov are two concepts that are inseparable from one another. The North, hitherto motionless and almost unknown, came to life with the name of Lomonosov in his poetry and science. Although the importance of Lomonosov for the Russian North is, of course, a partial one, because the genius of this man covered the interests of the whole Russia, in all the areas of its life, nevertheless, we must admit that the Russian North is a prominent part of Lomonosov's poetry and science [36]. Similar assessments of these and other scientists show a close vital relationship between M.V. Lomonosov with the Russian North and explain its role in understanding the concept under study.

Civilization waves of the North ecumene

The possessions of the ecumene of the Novgorod Veche Republic, the Great Moscow principality, and then Russia, were constantly growing, and not only at the expense of the territories of the Russian North. The territories of the North-East, Siberia and others were constantly annexed and settling in. The fall of Novgorod in 1478, the annexation of Pskov in 1510 and the defeat of the Ryazan principality in 1521 was the e culmination of a long struggle for the creation of a unified Russian state with its center in Moscow. Thus, historically, the civilization of the entire Russian world gradually began to shape. All historians and publicists recognize the impact of certain powerful factors (reasons, conditions) on the development of Russia, which determine the significant difference between the history of Russia and the history of other countries. Usually, there are four factors: natural-climatic, geopolitical, confessional, social organization. Westerners or "Europeanists" — V.G. Belinskiy, T.N. Granovskiy, A.I. Herzen, N.G. Chernyshevskiy and others believed that Russia is part of a common European civilization, and therefore the West and Russia should develop according to the same economic, social and political laws. The Westerners openly rejected the traditional Russian spiritual heritage of Orthodoxy. Slavophiles — A.S. Khomyakov, K.S. Aksakov, F.F. Samarin, I.I. Kireevskiy and their followers associated the idea of the originality of

Russian history with the special path of development of Russia and the originality of Russian culture. The fundamental idea of Russian Orthodoxy, and, consequently, the whole system of Russian life, is the idea of sobornost. Sobornost is manifested in all spheres of life Russian man: church, family, society, relations between states. Eurasianists — N.A. Berdyaev, P.A. Karsavin, I.S. Trubetskoy, G.V. Florovskiy and others, unlike the Slavophiles, insisted on the exclusivity of Russia, but not in Russian Orthodoxy, but in the Russian ethnos [37, Sokolova F.H.].

The author's periodization of cultural, ethnic, civilizational waves in Russia, taking into account the Russian North, includes five main periods.

- *Ancient North B.C.* — Late Paleolithic, Mesolithic, Neolithic, Copper-Bronze and Iron Ages. Late Paleolithic — settlement and development of the northern territories by ancient people, hunting, gathering. Mesolithic Era (10th–5th millennia B.C.) — fishing, new tools and means of transport. Neolithic, Copper-Bronze and Iron Ages (5th–1st millennium B.C.) — production and use of copper, bronze, iron.
- *Pre-Slavic period* of development of the North until the 9th–10th centuries A.D. The development of the northern lands by the Finno-Ugric tribes — the Chud Zavolochskaya, the northern Komi, Ves and other Saami. Hunting, fishing, forest and sea crafts, production of iron and copper are developing.
- *Russian North in the 9th–10th centuries — 1917* — as part of Velikiy Novgorod, the Novgorod Veche Republic, the Moscow Grand Duchy from 1478, Russia from the 16th century. The areas to the north from watershed of Volga and Onega, Volga and Northern Dvina, named later "Russian North", were not originally part of the Old Russian state. Slavs appeared here in the 10th–11th centuries and for several centuries pushed the borders of Russia hundreds of miles to the northeast, to the White Sea and the lower reaches of the Northern Dvina, the Kola North. From the end of the 14th century, in the Russian North, after the foundation of the Mikhailo-Arkhangelsk Monastery, the Arkhangelsk North was formed. Traditional society, original culture, Orthodoxy and Old Believers. Acceleration of social stratification. Agriculture, crafts, domestic and foreign trade, shipbuilding, sawmilling and other industries are developing in the economy of the northern territories.
- *Soviet North in 1918–1991*. Foreign intervention of the North in 1918–1920, USSR 1921–1991. Collectivization, industrialization, cultural revolution, Gulag. The Great Patriotic War 1941–1945. Creation of a military-industrial complex in the North, three training grounds, including Nyonoksa, Novaya Zemlya, and the Plesetsk cosmodrome; pulp and paper industry, construction and other sectors of the economy. Urbanization of the region. Continued development of the Arctic, the Northern Sea Route. Crisis of the 1980s and the collapse of the Soviet Union in 1991.

- *Russian North from 1991 to the present* — a modern civilizational wave. Transition to democracy, market, post-industrial stage. Turn to traditional values, including Orthodoxy, in the conditions of confrontation with the collective West. Development of culture, infrastructure, digitalization of all spheres of social life. Functioning of the Northern Sea Transport Corridor in the changing Russian Arctic, development of seaports, roads. Implementation of national projects for the socio-economic development of the Russian Federation. Special military operation in Ukraine, liberation of Donbass. The new quality of modern Russia since 2022.

The five main civilizational waves of Russia include not only archeology, ethno-cultural history, but also the economy, statehood. The essence of conceptual approach here is that statehood, culture in its broadest sense, the evolution of ethnic groups, their movement, religion, traditional and modern forms of management, economy, politics, and society are the basis for the proposed classifications. The history of the Russian North as a geocultural, civilizational space is practically inseparable from the Russian national history during the seven stages of statehood in the 9th–21st centuries I have identified:

- Velikiy Novgorod (862–1136) and Novgorod Veche Republic (1136–1478) from the Baltic Sea to the Ural Mountains, from the White Sea to the upper reaches of the Volga and the Western Dvina (Novgorodskaya land). Pskov and Vyatka Veche republics.
- Kievskaya Rus (882–1240). The Rurik dynasty, originating in Velikiy Novgorod.
- Moscow principality (1263–1478).
- Russian State, Russia (1478–1721).
- Russian Empire (1721–1917). February Revolution.
- Soviet period. October Revolution. Civil war, foreign intervention in the North. USSR in 1922–1991, Great Victory in the Patriotic War 1941–1945. The collapse of the Union State in 1991.
- The Russian Federation: a time of hope and disappointment, 1991 to the present. 2022 — the start of change.

Conclusion

Man has lived and continues to live in the North in harsh natural conditions. The Russian North is special, mysterious, beautiful, rich, immense and dangerous; it attracts people and unites them, because one will not master it alone and will not conquer it, no matter how strong and even impudent a person is. Simon, Metropolitan of Murmansk and Monchegorsk, said the most important words for understanding the meaning of the habitation of the ecumene. "*And on the new*

wave of development of the Russian, namely the Russian, North, we must not forget that the main thing is the spiritual component, cultural values, social environment" [6].

The ethnic picture of the settlement of the northern ecumene does not remain unchanged in time and space. Even before the arrival of Slovenes, Ladoga, Novgorodians in the 10th–12th centuries, people lived in the North for many centuries — an autochthonous, indigenous population. Forests and the sea, rivers and lakes ensured the development of the northern Finno-Ugric civilization. The main occupations were agriculture and hunting, fishing, forestry and sea crafts, handicrafts. Chud, Merya, Karelian, Murom occupied the entire north of the East European Plain in the first millennium of our era. The example of the Chud question shows that the Russian North has always been characterized by linguistic and cultural diversity. The predominant ethnic element in the Novgorod and Upper Volga colonization was the Russian population, although other ethnic groups also took a significant part in this movement.

Periodization and determining the historical and archaeological areas of the Russian North in the 21st century are largely conditional and justified by the fact that the Republics of Karelia and Komi, Arkhangelsk, Vologda, Murmansk, Novgorod, Pskov, Leningrad oblasts have their own administrative bodies, their own scientific schools and centers, including regional sources of funding.

In the civilizational paradigm, the multicultural Orthodox civilization, like the Russian world, has had its own complicated history for twelve centuries, including all of the aforementioned stages of statehood, forming its own identity. Russia in its significance is a key part of the Russian world today. The modern world is changing radically. In fact, there is a process of demarcation of the global geopolitical space into several poles of economic, military-political power, socio-cultural diversity — the Euro-Atlantic, Eurasian, Asia-Pacific, Russian world, etc.

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The Russian and World Arctic — a Monographic Study of Demographers, Sociologists and Economists *

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Abstract. At the beginning of 2022, the Political Encyclopedia Publishing House (ROSSPEN) published a collective monograph “Russian and World Arctic: Population, Economy, Settlement” / Fauzer V.V., Smirnov A.V., Lytkina T.S., Fauzer G.N.; ed. by prof. Fauzer, Moscow, Political Encyclopedia Publ., 2022, 215 p. ISBN 978-5-8243-2479-2. The reviewers were well-known scientists: S. V. Ryazantsev, Corresponding Member of the RAS, Doctor of Economic Sciences, Professor, Director of the Institute for Demographic Studies of the Federal Research Sociological Centre of RAS, and A. N. Pilyasov, Doctor of Geographical Sciences, Professor, Professor of the Department of Socio-Economic Geography of Foreign Countries, Faculty of Geography, M.V. Lomonosov Moscow State University.
Keywords: *World Arctic, Arctic country, population, settlement, economy*

Fig. 1. Cover of the monograph.

The monograph summarizes many years of research on the Arctic topics by the staff of the Laboratory of Demography and Social Management of the Institute for Socio-Economic and Energy

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Problems of the North of the Federal Research Center of the Komi Science Center of the Ural Branch of the Russian Academy of Sciences. The focus is on eight Arctic states: Russia, Canada, USA, Norway, Denmark, Finland, Sweden and Iceland. The study of the World Arctic is based on official publications and databases of the statistical agencies of these Arctic countries. International databases on settlement and regional population (citypopulation.de), spatial distribution of settlements (geonames.org), and climatic conditions (climate-data.org) were also used. The sources of data on the Russian Arctic are the results of population censuses from 1897 to 2010; statistical bulletins and collections of the Federal State Statistics Service (Rosstat); statistical information on the socio-economic development of the Russian Arctic, collected in accordance with the Federal Plan of Statistical Works; publications of ministries and departments; data from the Unified Interdepartmental Statistical Information System (EMISS).

The paper considers the history of the development and settlement of the Russian and World Arctic; approaches to the study of demographic problems and the settlement of the Arctic territories; considers the features of population formation and the specifics of its distribution; explains the differentiation of the Arctic territories in terms of population density and economic development. The author's methodology of determining the basic settlements is offered; the classification of urban settlements according to their correspondence to the basic ones is given on its basis. Local labor markets are discussed in detail, their classification by types of economic activity is given. The migration of the population of the Russian Arctic has received considerable attention, the main models and preferred routes of migration are highlighted. The municipal human development index is used to describe human development and the prospects for a knowledge-based economy in the Russian Arctic.

Another reason for the Arctic's interest is that it is the place of residence of indigenous peoples, who are referred to as the "fourth world" in international political discourse. In Russia, they are called a special community of the "fourth dimension", which forms an ecological system of values, as well as "saviors of civilization".

The publication was financially supported by the Russian Foundation for Basic Research under the project No. 21-110-00049 (2021, supervised by V.V. Fauzer). According to the terms of the competition, the main circulation (300 copies) was sent to the largest libraries and scientific and educational organizations in Russia. These are Arkhangelsk and Murmansk regional scientific libraries; national libraries of Komi Republic, Republic of Karelia and Sakha Republic (Yakutia); Komi and Karelian scientific centres; Northern (Arctic) and North-Eastern federal universities; Murmansk, Petrozavodsk and Syktyvkar state universities. The electronic version of the monograph will be available for reading on the website of the Russian Foundation for Basic Research in the second half of 2022. The book from the additional edition (500 copies) can be purchased on the website of the Political Encyclopedia publishing house (https://rosspen.su) and in online bookstores.

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