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REGIONAL PROBLEMS

Development of the Russian Arctic Zone: Challenges Facing the Renovation of Transport and Military Infrastructure

I. E. Frolov

Institute of Economic Forecasting, Russian Academy of Sciences, Moscow, Russia
Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg, Russia
e-mail: i.frolov99@gmail.com

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Abstract—This paper analyzes the resumption of works aimed at rebuilding and modernizing transport and related military infrastructure in the Russian part of the Arctic. The misalignment and incoherence of activities pursued by both public entities (including the power ministries) and private businesses is highlighted. The objective of linking various state programs involved in the research and development of the Arctic is formulated in view of various types of risks, as well as the overall need to develop appropriate procedures for elaborating a tree of objectives assigned to these programs in the context of uncertain changes in the timeline and volume of funding allocated for different programs.

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The problems of the research and exploration of the Arctic, as well as the related prospects and future research priorities are actively discussed in the scientific community. The levels of analysis specifically include physical geography, climate, hydrometeorology, geology and mining, evolutionary history and ethnography of the Arctic region, and Nordic nature and environmental protection, as well as geopolitical, legal, technological, economic, and other aspects related to the development of the Northern Sea Route. The most representative periodicals that publish scientific results of the related studies include the works of the State Scientific Center of the Russian Federation Arctic and Antarctic Research Institute [1] and Lomonosov Northern (Arctic) Federal University (e.g., [2]). However, the vast majority of these publications ignore issues related to the redeployment of the military infrastructure operated by the Russian Armed Forces in polar areas and its harmonization with other Arctic infrastructural facilities.

However, it is important to tackle a wide range of problems related to the development of military infrastructure in the Russian Arctic zone given the following factors:

1. Geopolitical challenges given that, according to some rough estimates, the Arctic region may contain at least 20–25% of the world's oil and gas reserves. This fact has been emphasized by top international transnational corporations that operate in this area, as well as the Arctic states, including Russia, Canada, Denmark, and Norway, as well as countries that have no access to the Arctic, i.e., the United Kingdom, Japan, and China. At the same time, nearly 46% of the Arctic shelf, which concentrates approximately two-thirds of the major explored oil and gas fields, belong to Russia (as estimated by the Scientific Council for Geology and Mining of the Russian Academy of Sciences).[1]

2. The need to restore the port and other transportation and logistical infrastructure of the Northern Sea Route, which holds relevance as a convenient transportation artery because of global warming.[2]

3. The renovation of the military infrastructure, which helps to protect, the northern, northwestern, and northeastern borders of the Russian Federation (which are particularly vulnerable to air and missile threats) by antimissile and aerospace defense by the Russian Air Forces. In addition, this infrastructure is necessary to protect and defend a large part (22500 km) of Russia's Arctic borders.

The renovation of the military infrastructure should be regarded in close relation to the development of the port and marine infrastructure required by the Northern Sea Route, including the manufacturing of ships with ice-resistant hull plating, development of

[1] The total deposits of hydrocarbons in the Arctic part of Russia exceed 1.6 trillion tons [3].

[2] The ice surface of the Arctic Ocean reached the record minimum level in summer 2012. Currently, the square surface and the mass of the planet's ice cap are two and four times smaller than 30 years ago, respectively. Record temperatures have be observed in Alaska, Greenland, and other parts of the Arctic coast. As estimated by the Interservice Council for Climate Change, the Arctic waters will be free of ice during the summertime after 2035.

hydrographic and hydrometeorology navigation support and communication means, construction of collocated military facilities technologically linked to the facilities that support the exploration and development of mining fields, as well as the scientific work focused on the development of the Arctic (including basic research on iceberg glaciers, Arctic climate change patterns, and geological, seismic, oceanographic, meteorological, biological, and environmental trends).

In Soviet times, the Northern Strategic Aerospace Area, which included Greenland, Canada, and Alaska areas,[3] was considered to be of the foremost posts through which the opponent aircraft could reach the industrial and administrative center of the country. Only the western sector of the Soviet Arctic was defended by five battalions and sixteen radiotechnical platoons of the 4th Air Defense Division (Novaya Zemlya, Belushya guba), as well as multiple anti-aircraft missiles and interceptors.

The division had a number of radar stations that were scattered across the icy islands and capes. Graham Bell Island (archipelago of Franz Josef Land), Nagurskoe village based on the northern tip of Alexander Island of Franz Josef Land archipelago), Belyi Island in the Kara Sea, Cape Marresale (Yamal Peninsula), and Ust'-Kara village (Nenets Autonomous District) were included in the first line of radar coverage. The second line was covered by the radiotechnical troops deployed at Cape Zhelaniya, in Russian harbor at Cape Nicholas (Novaya Zemlya archipelago). The third line was operated by the units of the 10th Air Defense Army stationed on the mainland Arctic coast of the Soviet Union. The evacuation of the military units started in 1992. The General Staff of the Russian Army ordered the air defense units to leave the airports, stations, control points, and housing (living houses, barracks, and canteens) based on Graham-Bell, Nagurskoe, Cape Zhelaniya, Russian Harbour, and Cape Nikolai starting from January 1, 1993. Russia's existing capacity and resources are significantly smaller than those of the Soviet Union. Although this fact can be considered an obstacle, it does not change the need to return Armed Forces to the Arctic region in order to ensure its complex development. An important step in this direction has been the resolution "On the State Commission for Arctic Development," adopted by the Russian Federation's Government Decree No 228 of 14 March 2015, pursuant to the related Presidential Decree of February 3, 2015 [4–5]. The first meeting of the Commission was chaired by Deputy Prime Minister Dmitrii Rogozin April 14, 2015.

The Commission is responsible for the coordination of activities implemented by federal and regional agencies involved in the exploration of the Arctic. The Commission's decisions are binding for all agencies. (Presidential and governmental acts may be issued to implement them). The Commission meets at least once every 6 months and the presidium is responsible for its operational management. The Commission's mandate covers socioeconomic and political issues, including military aspects of regional development. The Commission will assess the effectiveness of using Arctic resources and decide on the development and implementation of priority investment programs. The Chairman of the Commission has five deputies, i.e., the Russian Federation's ministers, who are responsible for natural resources and the environment, energy, economic development, and transport; there is also and a Deputy Secretary of the Russian Security Council. Overall, the Commission consists of more than 60 members, including representatives of key state-owned enterprises such as Gazprom, Rosneft, and Transneft. Governors and representatives of the Ministry of Defense, Federal Security Service of the Russian Federation, Presidential Administration, and other public authorities are also members of the Commission.

According to Rogozin, the total amount of funding to be allocated for various activities of sector programs that support the development of the Arctic region in the 2015–2020 will amount to approximately 222 billion rubles, including federal budget funding (approximately 160 billion rubles) [6].

This paper reviews the issues related to the development of the coastal infrastructure of the Northern Sea Route and the military infrastructure.

Modernization of the infrastructure and shipbuilding base of the northern sea route. In our opinion, the target function related to modernizing and developing the infrastructure for the Northern Sea Route should be the creating a backbone transport corridor, which connects two extreme regions of Russia, i.e., the northwest and the Far East. It is necessary to take a scientific approach to this issue and rely on a dedicated state support system. In that case, in the long run, it will be possible to create a special northeastern technological arch that would enrich the existing Northern Sea Route with new engineering and building technology, and communications, and connect the northwest European part of the country's with its Far East regions through the Arctic.

From this perspective, the Northern Sea Route could compete with the traditional marine route,

[3] The total land and water surface of the foreign part of the Northern Strategic Aerospace Area is about 84 million sq. km. The land territory represents one third of the area. The Northern Strategic Aerospace Area covers the aerospace of North and Central America, the Arctic Ocean, the eastern Pacific and western Atlantic. It also extends to the territory of the western, eastern, and inner regions of Russia. More than 30 countries and territories with a population of over 510 million people are located in the foreign part of the Northern Strategic Aerospace Area.

which connects Asia and Europe via the Suez Canal.[4] Given the rising temperatures and ice melting, the Northern Sea Route is getting safer, easier to navigate, and more commercially attractive. The real prospects of a new traffic artery that delivers hydrocarbons mined in the North of Russia to its foreign partners are emerging, as this option may be cheaper than building oil and gas pipelines.

In 2010–2013, the number of vessels and the volume of goods transported through the Northern Sea Route increased rapidly. In 2010, only ten commercial vessels (two and five vessels in 2007 and in 2009, respectively) used this route, whereas their number increased to 71 in 2013.[5] For the first time ever, oil was shipped during the wintertime. A gas carrier of the Aframax standard and the Panamax tanker used the route that was previously considered impossible (by world standards, these tankers are of average tonnage; however, under the conditions of the North, they are considered to be ultra-large). However, in 2014, the Russian government abolished subsidies allocated for the icebreaker escort of cargo ships as one of the austerity measures. This has led to a sharp increase in tariffs to a level that was almost unacceptable for shipping companies. As a result, only 30 ships used the Northern Sea Route in 2014.

In this context, it should be noted that Russia is currently not prepared to transform its national transport route into a global trade corridor. For example, Russia is not capable of guaranteeing the full safety of maritime navigation given than depth measurements have not been made in the Arctic since the 1990s–2000s. The coastal infrastructure of the Northern Sea Route (ports, means of navigation, hydrographic, and hydrometeorological support and communication) is dilapidated. Most of the remaining infrastructure has become outdated in the post-Soviet era. Almost all meteorological stations were closed in the 1990s. At present, many stations were recreated by Rosneft on the Belyi Island in the Kara Sea, Zhokhov Island in the East Siberian Sea, Preobrazheniya Island in the Laptev Sea, and on the Novaya Zemlya archipelago.

To create an effective transport corridor, it is necessary to modernize the existing Arctic ports in Khatanga, Tiksi, Pevek, Dudinka, and Dixon Island. It is also necessary to develop new port facilities and roadstead shipping terminals. The Northern Sea Route has to be brought in line with the current requirements of the international navigation system. Specifically, it should be possible to ensure loodsman, icebreaking, maintenance, and repair services at each port. For this purpose, it is necessary to restore the entire system of icebreakers, ice detection aircraft, hydrographic service, hydrometeorological support, rescue infrastructure, and drifting stations that help forecast ice conditions. However, a positive signal has come from by the Government of the Russian Federation, which has allocated 205 million rubles for the drifting North Pole station under the Hydrometeorology and Environmental Monitoring subprogram. This funding will be used to relaunch the station's activity [7].

The Arctic fleet, particularly the nuclear icebreaker fleet, requires urgent modernization.[6] The annual growth of transit traffic through the Northern Sea Route may be limited by the lack of modern icebreakers. According to some optimistic forecasts, 8–20 million tons of cargo will be annually transported through the Northern Sea Route in 2020–2030. By 2016, icebreaking support will be needed at least 100 times a year. This number is expected to reach 200–250 by 2030.

To ensure a reliable year-round operation of the Northern Sea Route, it is necessary to dispose between one and three nuclear-powered icebreakers with the capacity of 110 MW, ice passability of more than 3–5 m, and a width of 33–35 m. In addition, five to six nuclear icebreakers with capacity of 60–65 MW, ice passability of 3–4 m, and a width of 30–33 m are needed[7]. However, due to the crisis and manufacturing difficulties,

[4] Traditionally, Hamburg–Yokohama is considered to be a reference route, which goes through the Suez Canal and the Mediterranean Sea. The length of this route is 11400 nautical miles. The journey between these two cities through the Northern Sea Route is almost two times shorter (6600 nautical miles). However, this option has a significant limitation due to difficult ice conditions. Therefore, the biggest part of the journey requires accompanying by an icebreaker, which is an additional cost. Furthermore, the ship owner has to bear additional costs incurred by insurance premiums. At the same time, time saving varies between seven and 22 days per trip and represents a significant advantage, which helps reduce the overall cost (calculated for three vessel trips per year) by USD 18–20 million annually. Savings on fuel costs accounts for nearly 800000 USD for one way only.

[5] Experts' statistical assessments of transits through the Northern Sea Route vary. Some analysts ignore trips that include a stop in ports on the way to the final destination. Other researchers do not count the ships that navigate without support of an icebreaker. Finally, some experts consider a trip from Murmansk to Vladivostok a coastal rather than transit journey. This paper relies on the calculation method proposed by the information office of the Far North Logistics Center in Norway.

[6] At present, Russia has the largest icebreaker fleet (nearly 40 vessels of various classes and purposes) and the world's only nuclear icebreaker fleet (four nuclear-powered icebreakers and four maintenance ships; two nuclear-powered icebreakers and one container ship have recently been decommissioned). However, the majority of nuclear-powered ships are approaching their critical age. "Russia" and "Soviet Union" were in operation for over 25 years before their withdrawal. "Yamal" operated for more than 20 years. Almost all nuclear icebreakers have to be replaced within the next five to seven years. By 2022, only one domestic nuclear-powered icebreaker called "50 Years of Victory" will remain operational.

public investment in the construction of blueprints and serial nuclear icebreakers planned for 2015–2016 will be reduced and postponed until 2017 or later.[8] Experts believe that this will cause a delay in the commissioning of blueprints and serial icebreakers until 2019 and 2020, respectively.

It should also be noted that the demand for ships as means of transportation of conventional cargo is decreasing. Transportation of oil, gas, and ore, which has come to the forefront, requires the use of specialized means of transport. For example, once the construction works of the Sabetta port are completed, a fleet of sixteen Arctic LNG carriers supported by Russian icebreakers will be required to ensure year-round navigation for the development of the Yuzhno-Tambeyskoe minefield and export of LNG and gas condensate under the Yamal LNG project.

In 2013, the production capacity of the Arctic ports was estimated at the level of 72 million tons per year, whereas the real turnover reached 46 million tons (approximately 8% of the country's total turnover), i.e., the consumed capacity of the port was about 60%. In the medium term, the construction of the Sabetta port will result in an increase in the turnover by nearly 16.5 million tons. The construction of the Arctic oil export terminal on the Yamal Peninsula and the reconstruction of the Murmansk commercial port will increase the capacity by 8.5 and 2 million tons, respectively. As estimated by Rosmorport, the annual port capacity of the Arctic basin will increase to 115 million tons by 2030 [9].

As estimated by the United Shipbuilding Corporation, the development of the Arctic shelf will require deploying a fleet of 50 platforms and terminals, as well as 85 transport and 100 auxiliary vessels by 2030.

By 2022–2025, about 30 support vessels of various classes and ten mining platforms will have to be produced by the Russian shipbuilding industry only.

Reconstruction of the regional military infrastructure. In recent years, the Russian Armed Forces have intensified the reconstruction of military infrastructure in the Arctic. Specifically, in December 2014, a new Joint Strategic Command called Sever was created within the structure of the Armed Forces based on the forces and means of the Northern Fleet (pulled out of the Western Military District). The creation of the Command will be finalized by 2017. In particular, the Northern fleet will include two Arctic Army Brigades. The units will fulfill the following tasks: patrolling of the coastal zone, protecting facilities and territories along the shores of the northern seas and the Arctic Ocean, escorting of ships along the Northern Sea Route, and demonstrating the Russian military presence in the Arctic.

In January, the formation of the 80th separate motorcycle Arctic Infantry Brigade deployed in the Alakurtti village of the Murmansk region was completed. It is expected to deploy the second Arctic brigade (the 200th separate infantry brigade) in Pechenga (Yamal Nenets Autonomous District) by 2016.

By the end of 2015, it is planned to complete the extension of a military group on the Kotel'nii Island (Novosibirsk Islands archipelago), which will deploy the 99th Task Force of the Northern Fleet. It includes coastal missile and anti-aircraft missile units, as well as radar lighting and logistics units. Specialized facilities of the Arctic infrastructure, e.g., the construction of Severnii Klever military town are being deployed [10].

In addition, modular towns of the Polyarnaya Zvezda standard are currently built on the following islands: Alexander Land (archipelago of Franz Josef Land), Novaya Zemlya, Wrangel, and Cape Otto Schmidt. They will host radar stations and aircraft guidance points. It is expected that the reconstruction of the air defense infrastructure on the Arctic islands will be completed by October 2015. It is also planned to strengthen the naval forces of the Border Service of the Russian Federation.[9]

Furthermore, the Arctic aerodromes are being rebuilt. Until recently, the most distant point of the polar building was Severomorsk-1. At present, this

[7] The Government of the Russian Federation is planning to build three nuclear-powered icebreakers by 2020. The Baltic plant launched the production of the first vessel, a universal icebreaker of LK-60YA type (Project 22220), in 2012. The electric power of the Rhythm-200 reactor is 60 MW (thermal power of 175 MW). The breadth is 34 m. The nuclear icebreaker will be able to operate independently in the Arctic on a year-round basis. An important feature of the LC 60YA is its double-draft design. Thanks to the installed rapid ballast system, the icebreaker can change the draft from 8.5 to 10.5 m in four hours only. Thus, the icebreaker will be able to operate both in the ocean and in shallow areas, including the estuaries of Siberian rivers. The project cost is approximately 37 billion rubles. The operation of the principal vessel is scheduled for start in 2018. It is planned to launch two nuclear-powered icebreakers in this series in 2019 and 2020 (42 billion and 44 billion rubles are allocated for the second and the third icebreakers, respectively). In spring 2016, it is expected to put the nuclear lighter called the Northern Sea Route into operation after its renovation. The lighter will provide access to the North, and support shelf development, and exploration of Pavlovskii lead and zinc ore deposits in Novaya Zemlya. Furthermore, a competition will be announced in 2014 to design a nuclear icebreaker with capacity of 110 MW under the Leader project. It will be the world's largest icebreaker with multihull design, which will be able to lay a wider channel than the existing icebreakers. It will also provide year-round navigation of vessels with deadweight of up to 150000 t from the Cape Zhelanii to the Bering Strait with an average speed of ten knots).

[8] Specifically, 5 million rubles will be allocated for the construction of the blueprint icebreaker in 2015 instead of the planned 7.9 billion rubles. In 2016, only 583.6 million rubles will be allocated for the same purpose, instead of the planned 5.6 billion rubles [8].

[9] For example, in late May 2015, a principal patrol boat of rank 1 (Project 22100, Ocean code), designed for the Coast Guard of the Federal Border Service of the Russian Federation, has left Zelenodol'sk for tests. Ships of this type will operate in the northwest Pacific, Arctic, and non-Arctic freezing seas of Russia. The ships are equipped with ice-strengthened hulls, which enables them to pass through 80-cm bridges between ice holes. Autonomous navigation can last for about 60 days. May 24, 2015, JSC Zeledolskii Shipbuilding Plant n.a. Gorkii and the Federal Security Service signed a 17.2 billion rubles contract for the construction of two production vessels provided with Russian equipment instead of imported technology [11].

aerodrome is almost complete; it only needs to be provided with radiotechnical equipment. Furthermore, it is planned to rebuild aerodromes on the Novosibirsk Islands, Vorkuta, Naryan-Mar, Noril'sk (Alykel), Anderma, Rogachevo, and Nagurskoe, among others. A collocated airport in Naryan-Mar and a number of other airports will be reconstructed. Specifically, the Arctic Tiksi airport will be modernized in 2015. Starting from 2017, it will become a permanent base for Su-27M3 and/or Su-35S frontline aircraft and MiG-31BM interceptors. Furthermore, MiG-31 will be deployed in the airport of Anadyr. Overall, it is planned to clean up more than a hundred runways of military aerodromes by 2025.

New military camps will be built along the Northern Sea Route.

Spetsstroii of Russia was allocated more than 6 billion rubles for the reconstruction of radar stations and points of guidance on the islands of several archipelagos, namely Severnaya Zemlya, Novaya Zemlya, and Franz Josef Land. In early October 2014, air defenses units started their experimental combat duty on the islands of Wrangel and Kotel'nii, and at Cape Otto Schmidt. In total, ten air target detection positions are reerected on the Arctic coast. Several sites will be equipped with autonomous radar stations that can operate 24 hours a day without supporting staff.

The Air Defense Forces are reequipped with the track-headed radar complex of dual-use (Sopka-2). This complex is designed by the newly created Research and Production Organisation Actaris for intelligence and airspace control at a range of up to 400 km and at an altitude of 30 km. Sky-ME radar complexes can detect airborne targets at a range of over 1000 km. Ten of these radars will be deployed in 2014. The first Sopka-2 has been on combat duty on Kotel'nii Island since the summer of 2014.

However, all these efforts are still insufficient to protect the Yamal Peninsula. The Northern Fleet can maintain control over the islands and archipelagos of the Arctic seas and the coast. It can also cover the deployment of submarines to blow a missile strike, but it cannot protect Yamal.

First, it is necessary to expand the Northern Fleet in order to prevent the access of potential enemy ships to the Barents Sea, or keep them beyond the range of cruise missiles. For this purpose, it is necessary not only to build new warships, but also to create new military naval bases in the Arctic. As part of this task, one can suggest to consider the deployment of the Northern Fleet both on the Kola Peninsula and on Novaya Zemlya, particularly in the bays of the southern part of the archipelago.

Secondly, it is necessary to strengthen the air defense/missile defense systems around the Yamal based on the deployment of the S-400 surface-to-air missile system, and in the long term S-500 in order to prevent possible destruction of the mining industry facilities by air or missile strikes by a potential opponent. The regional landscape allows one to create at least three lines of defense:

1) the external line is Kola Peninsula–Franz Josef Land–Severnaya Zemlya;

2) the medium line is Ukhta–Novaya Zemlya–Dixon;

3) the domestic line is Yamal and the surrounding areas.

Yamal can be defended from the air from Novaya Zemlya, which has a strategic position that covers the most likely direction of an attack.

The defense of Yamal requires major restructuring of the Arctic units of the Russian Armed Forces and a significant reorganization of the Northern Fleet. Specifically, this task requires not only increasing the quantity, but also improving the quality of the armed forces and navies, including the design of special combat vehicles for the Arctic region and new types of vessels, such as military diesel-electric icebreakers.

CONCLUSIONS

The analysis of the open source materials shows that, in 2011–2012, work aimed at reconstructing closely interrelated transport and military infrastructure in the Russian Arctic significantly intensified. Furthermore, both the state and private businesses, the latter of which are mainly engaged in the development of previously inaccessible mining fields and the construction of the necessary infrastructure, actively take part in this process.

Nevertheless, the timeline and focus of the plans commissioning the objects of infrastructure (including ships) demonstrate a lack of coherence and coordination between public organizations, including the Russian Defense Ministry units, and other law-enforcement agencies, as well as private businesses. This leads to the duplication of costs spent on similar activities.

The establishment of the State Commission for Arctic Development is aimed at strengthening the coordination of the development in the region. However, it does not involve any scientific or expert support, which would be provided to the entire complex of the related, incoherent targeted programs.

Therefore, it is important to provide dedicated funding for a research center, which would coordinate complex scientific and expert support and bridge the existing public programs, which focus on a highly complex object, which is difficult to coordinate, such as the Arctic. This center is required to analyze different types of risks, and build a tree of objectives (subgoals) for related programs that correspond to a complex system in view of an uncertain duration and volume of funding allocated for these programs.

The proposed research center can be organized based on the existing State Research Center of the

Russian Federation Arctic and Antarctic Research Institute, other institutes of the Russian Academy of Sciences and sector institutes of the Russian Ministry of Industry and Trade, as well as Lomonosov Northern (Arctic) Federal University.

We support the idea of creating major strategic transport hubs in the North of Russia and deploying public logistics centers that lie at the intersection of the most important transport routes used by the key means of transport (particularly maritime ports located in the estuaries of the major Russian rivers), including the comprehensive deployment of air, rail, road, and pipeline transport [12].

Finally, it is worth noting that it is important to assess the multiplying effects of investment in transport and military infrastructure in the Arctic region, which will propel growth in heavy machine-, equipment-, and ship-building, and indirectly in metallurgy and other sectors of the economy.

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Frolov, Igor Eduardovich, Dr. Sci. (Econ.),
head of laboratory, senior researcher

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