

# **THE PRINCIPLES AND ACTIVITIES OF THE NATIONAL SCIENTIFIC DEVELOPMENT STRATEGY IN THE ARCTIC ZONE OF THE RUSSIAN FEDERATION**

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The paper considers the priorities of the state policy of the Russian Federation in the Arctic, from the point of view of the development of scientific research, identified by the main strategic documents of national policy and security in the Arctic zone of the Russian Federation. Measures for implementation of priorities in the development of scientific research in the Arctic can be divided into three main sections:

- 1. Scientific projects and expeditions in the Arctic;**
- 2. International activities;**
- 3. Coordination and implementation of integrated research in the Arctic.**

Note that currently the Ministry of education and science of the Russian Federation develops the Analytical Coordination Program “Comprehensive research of the Arctic and Antarctic”, in cooperation with the federal state bodies and Governance of the Subjects of the Arctic zone of the Russian Federation. The mechanism of the Program will ensure coordination between state bodies for integrated scientific researches in the Arctic in the interests of economic and scientific development of the region, and the creation of the scientific, technical and technological reserve in order to ensure of national security in the Arctic zone of the Russian Federation.

*Key words: Arctic zone of the Russian Federation, development strategy, coordination of scientific research*

## **I. INTRODUCTION**

Today it has witnessed great interest to the Arctic zone. The Arctic contains a huge amount of energy sources, oil and gas, and proven reserves of oil in the Arctic (both offshore and onshore) are slightly less than 100 billion barrels. Through the Arctic the cross-polar air link (the shortest way between North America and Asia) the Northern Sea Route (the shortest sea route between East Asia and Europe) are passed.

The use of resources in the Arctic is extremely difficult and dangerous process from the environmental point of view, because due to the harsh Arctic climate the probability of accidents increases significantly. On the whole, the nature of the Arctic is one of the most vulnerable ecosystems on the planet. In 1991, Canada, Denmark, Finland, Iceland, Norway, Russian Federation, Sweden and the United States adopted the Arctic Environment Protection Strategy (AEPS). In 1996, the Ministry of Foreign Affairs of the Arctic region have signed the Ottawa Declaration and formed the Arctic Council.

However, the Arctic is one of the few places on the planet, whose resources were not shared between countries. The Arctic areas are claimed at least five countries: Russia, Norway, Denmark, Canada and the United States who have access to the coast of the Arctic ocean. National claims may in the future be supported by different arguments, but it is clear that the main of them is practical – a real willingness of the country to actively explore the Arctic.

Russia has always been closely linked with the Arctic in its historical development. In the XI century Russian explorers came to the sea of the Arctic ocean, the middle of the XVII century is the time of development by Russian pioneers of the Eastern section of the Northern Sea Route from Lena river to the Kolyma river. Semen Dezhnev passed by sea from the mouth of the Kolyma river to the most easterly point on the mainland, and in 1648 he discovered the strait between Asia and America. The first Europeans who visited Alaska, were members of the team of "St. Gavriil" vessel. By the result of the great Northern expedition (1733-1743) in Russia, all the Siberian coast of the Arctic ocean was studied, described and mapped. Russia is the first country using the drifting polar station. The first drifting expedition called "North pole" was worked at the North pole at May, 1937. Due to the existence of the drifting polar station, Russian scientists got an opportunity to explore the Arctic year-round.

## II. STATE POLICY OF THE RUSSIAN FEDERATION IN THE ARCTIC

In the "Principles of State Policy of the Russian Federation in the Arctic for the Period till 2020 and Further Prospect" there were formulated the problem for use of the Arctic zone as the strategic resource base for socio-economic development, preservation of the Arctic as the zone of peace and cooperation and the conservation of local unique ecosystems.

Priority directions of development of the Arctic zone of the Russian Federation and national security are development of science and technology and security of international cooperation in the Arctic, in addition to the comprehensive socio-economic development of the Arctic zone of the Russian Federation and ensuring of ecological and military security, protection and safeguarding of the state border of the Russian Federation in the Arctic.

In the field of science and technology currently, there is shortage of technical means and technological possibilities for study, exploration and use of Arctic space and resources, with a simultaneous increase of technogenic and anthropogenic load on the environment. Development of science and technology of Arctic orientation in the Russian Federation conducts work on formation of a competitive scientific and technological sector in the development and introduction of advanced technologies and materials adapted to the climatic conditions of the Arctic, as well as the introduction of technical means and instrument base adapted for carrying out polar scientific research, particularly in the area of environmental management, development of offshore mineral deposits and water biological resources as well as the prevention and elimination of oil spills in ice conditions.

Russia seeks to increase the number of comprehensive scientific studies of natural hazards, technologies and methods of their forecasting in the context of climate change, including studying the impact on health of harmful environmental factors. In those aspects important to the development of expedition activities in the Arctic, including international participation, and the use of international scientific and technological cooperation, ensuring the participation of Russian scientific and scientific-educational organisations in global and regional technological and research projects in the Arctic.

### III. DEVELOPMENT OF SCIENTIFIC RESEARCH IN THE ARCTIC

Measures for implementation of priorities in the development of scientific research in the Arctic can be divided into three main sections.

1. Scientific projects and expeditions in the Arctic
2. International activities
3. Coordination and implementation of integrated research in the Arctic

From this side, the Russian Federation expresses a particularly high degree of interest to participation in two topics:

1. Identifying Arctic-Science Challenges and their Regional and Global Implications.
2. Strengthening and Integrating Arctic Observations and Data-Sharing.

In the first subject it is necessary to allocate as the basic directions of research conducted in Russia, the following main works:

- Seismic geodynamic analysis and seismic zoning of the coastal-shelf region of the Russian Arctic;
- Comprehensive system for prospecting and exploration of mineral deposits in the shelf zone of the Arctic, based on seismic and electromagnetic (magnetotelluric) methods;
- The thermal state of the upper horizons of cryolithozone of the Russian Arctic and subarctic;
- Ecosystem evolution of thermokarst lakes in the context of climate change and anthropogenic load;
- Comprehensive assessment of the sustainability of coastal systems and coastal infrastructure in the tasks of spatial planning of maritime activities and socio-economic development of the Arctic zone of the Russian Federation;
- The expert system of forecasting of climate changes in the Arctic and the navigability of the Northern Sea Route;
- Dynamics of transport and transformation of carbon system in the Arctic land-shelf-atmosphere in the global warming and degradation of permafrost;
- Comprehensive monitoring and forecasting the state of the environment and creation the Arctic national system of environmental risk management due to climatic factors, including black carbon (black carbon).

In Russian State Hydrometeorological University successfully operating a unique Laboratory for Satellite Oceanography, which developed and maintains an information system for integrated monitoring of hydrometeorological state of the Arctic region on the basis of integrated analysis of satellite data, and created a fundamentally new approach to the study of Arctic cyclones.

In the Yamalo-Nenets Autonomous Okrug there are field-research hospitals which make detailed study of exogenous geological processes and phenomena.

A number of studies holds the Moscow State University, including study of integral factors determined by climate affect human activity in the Arctic region, and to develop recommendations to adapt and counter the negative influence of the specificity of the natural environment of the Arctic.

Within the second theme, it is first necessary to note the research activity, conducted by the Arctic and Antarctic Research Institute (AARI), having big international activity. Starting in 2012, it's implemented a joint Russian-German project "Transpolar system of the Arctic ocean", including a wide range of expeditionary marine and polar research in the Arctic. AARI continue

monitoring in Tiksi Hydrometeorological Observatory, together with the United States and Finland. In 2015 in the framework of Russian-American cooperation on the project "Monitoring system for Nansen and Amundsen marine areas", the expedition studies the role of transformation processes of Atlantic water in the formation of modern climatic changes in the Arctic. In cooperation with the Finnish Meteorological Institute on the Ice Base "Cape Baranova" it's deployed complex of modern equipment for measurements of concentrations of greenhouse gases and aerosols in the surface layer of air.

In addition, AARI is the base a permanent research institute on the Spitsbergen archipelago of the Russian Scientific Arctic Expedition.

As for other organizations, leading its research activities, it is necessary to highlight the following works:

- Development of expert system to predict climate changes in the Arctic and the navigability of the Northern Sea Route;
- Development of integrated monitoring system in the coastal-shelf zone of the Russian Arctic seas;
- Development of methods and technologies of monitoring of the Arctic by space images and data of ground-based observations;
- Monitoring and forecast of extreme events in the Arctic;
- Development of comprehensive system for prospecting and exploration of mineral deposits in the Arctic shelf zone.

There is no doubt that for Russia the expansion of international scientific cooperation in the Arctic is one of the priorities. First and foremost, it needs to develop such research areas as:

- international project activities which are directly linked to the technology data exchange and collection of information;
- Russia's participation in international projects ("SIOS", "Inter-Act", "SAON", etc.);
- development of joint scientific expedition activities.

#### IV. PRINCIPLES OF THE ANALYTICAL COORDINATION PROGRAM (ACP) "COMPREHENSIVE RESEARCH OF THE ARCTIC AND ANTARCTIC"

Note that currently the Ministry of education and science of the Russian Federation develops the Analytical Coordination Program (ACP) "Comprehensive research of the Arctic and Antarctic", in cooperation with the federal state bodies and Governance of the Subjects of the Arctic zone of the Russian Federation.

The necessity of the ACP due not only to the importance of coordinating between Federal and Regional Authorities, but also the necessity of mutual coordination of activities with the research foundations, educational and scientific organizations which active in scientific and technological processes in the Russian Arctic, located in all regions of the Russian Federation.

The mechanism of the Program will ensure coordination between state bodies for integrated scientific researches in the Arctic in the interests of economic and scientific development of the region, and the creation of the scientific, technical and technological reserve in order to ensure of national security in the Arctic zone of the Russian Federation.

ACP is divided into 4 sub-programs by functional basis:

- Sub-program 1. Provision of monitoring and comprehensive analysis of state and prospects of scientific research development in the Arctic zone of the Russian Federation and the Antarctic;

- Sub-program 2. Monitoring and coordination of the comprehensive marine and coastal research in the Arctic and Antarctic;
- Sub-program 3. Monitoring and coordination of applied research aimed at solving tasks related to the strategic priorities of the Polar state policy of the Russian Federation;
- Sub-program 4. Activities of the regional research programs of the Arctic zone of the Russian Federation;

In the list of sub-programs, it is important the selection of individual regional components, which will allow to involve subjects of the Russian Arctic in the implementation of ACP activities. In addition, in frame of ACP it's possible to engage state programs and research funds and their financial resources for support of scientific, scientific-technical, innovative activities to the implementation of routines and specific activities of ACP.

As the participants in the implementation of ACP activities notes:

- the profile Federal Executive Authorities;
- scientific funds of support of scientific, scientific-technical and innovation activity;
- specialized scientific and educational organizations, which have active research and innovation activities in the Russian Arctic;
- enterprisers, including with state participation, supporting scientific and technological developments for the implementation of activities in the Russian Arctic;
- Arctic regional research centers.

The result of the ACP implementation will enhance the role and effectiveness of the Arctic scientific research, in the field of creation and development of technical means and instrument base for use in the Arctic, including the processes of import substitution, in implementing the policy of socio-economic development of the Russian Federation and increase of efficiency of use of budgetary appropriations for these purposes.

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