

# Abstracts

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## Scientific Component of Russian policy in the Arctic: the actual aspects of programming and institutional support of the Arctic researches

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The role of research system as a key instrument for ensuring the effectiveness of policy of balanced development of the Russian Arctic is described. The necessity of developing and implementing a national program of comprehensive research in the Arctic, creation of state structure for management in the Arctic area is substantiated.

**Keywords:** *the Arctic zone of the Russian Federation, social and economic development, scientific support, basic and applied research, national program.*

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## The issues of forecasting of development in the Far East Arctic regions

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The current model of development of the Russian Arctic is analyzed; the issues of strategic development of the Arctic are examined; the main problems of implementation of regional policy in the Russian Arctic are described; the approaches to long-term forecast of Far East development are proposed.

**Keywords:** *the Arctic, the Far East of Russia, regional policy, forecasting of region development.*

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## Current State and Prospects of Arctic Shipbuilding and Navigation

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The current state and prospects of development of specialized ice shipbuilding, as well as the creation of effective, reliable and secure facilities for exploration, production and transportation of hydrocarbons in the Arctic are investigated. Their suitable types and designs are analyzed. The prospects of Arctic navigation are described.

**Keywords:** *the Arctic, the Northern Sea Route, Arctic navigation, Arctic shipbuilding, tanker shuttle and deliveries, floating half-plunge rigs.*

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## Mobile Marine Drilling Rig in Arctic Version (choice of a concept)

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Russian Arctic seas are characterized by multi-year ice. Exploration and appraisal drilling in these areas without the use of modern technology in the ice-resistant performance is impossible. In addition, assessment of the possibility to increase global production of hydrocarbons is related to the Arctic. This fact explains the active efforts of world leaders of oil and gas industry to create drilling rigs for year-round drilling. However, progress in this direction is small, although the works are active for more than thirty years.

**Keywords:** *the Arctic, mobile marine drilling rig, ice conditions, mobility, water depth.*

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## Arctic resources of nonferrous and noble metals in global prospects

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The Arctic zone is a region of exceptional importance to the economy, national security and foreign economic relations of the Russian Federation. Mineral resource potential of Russia as a whole is sufficient to conduct an independent and effective economic policy in the Arctic. There is a well-developed infrastructure of sea communications. Effective integration of mineral resources of the zone in the process of development of the country requires turning to the ideology and practice of sustainable development in conjunction with contemporary political, federative, socio-economic and organizational approaches. The article analyzed and summarized representative material for assessing the Arctic resources of nonferrous and noble metals in global prospects.

**Keywords:** *Arctic zone, source of raw material, resource regions, nonferrous and noble metals, mining.*

### Methodical aspects of exploration of gravel deposits on the shelf of Arctic and Far East seas using magnetoacoustic techniques

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To date, a number of coastal-marine gravel deposits (including underwater objects) with reserves, expected and potential resources of alluvial tin, gold, minerals of titanium and zirconium, et al. is forecasted and discovered on the shelf of marginal seas of Russia. The deposits are a real reserve of mineral resources of the country. Intensification of exploration and assessment work on the shelves of the Arctic and Far Eastern regions difficult of access necessitates the development of efficient searching geological and geophysical methods. The article deals with the theoretical issues of development of the methods for detection, selection and interpretation of weak magnetic anomalies (intensity from 0.3 nT), caused by concentration of magnetically active minerals (magnetite, titan magnetite, ilmenite), which are often associated with concomitant valuable minerals.

**Keywords:** *Arctic shelf, gravel deposits, exploration and assessment, geophysical methods, magnetic anomaly.*

### Satellite Dataware for Prospecting and Development of Oil and Gas Fields in the Arctic Seas

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The article deals with the problems of diagnosis of surface layer of the ocean, sea ice cover and its dynamics according to satellite remote sensing. The conditions and approaches to development of technologies of satellite information support for oil and gas exploration in the Arctic shelf, calculations of load on production platforms, safe steering and environmental monitoring of the sea surface are considered. The new techniques for calculation of ice drift and flow velocity, daily flow of such information for any water area, short-term forecast of surface water movement are described in detail. The problems of sea brightness calculating on the basis of color scanners, used for environmental monitoring of sea surface, and possible solutions are discussed. Created software systems are installed in the Satellite Center of the Far Eastern Branch of the Russian Academy of Sciences for daily information of users. The problems of such informing and approaches to their solution are considered.

**Keywords:** *satellite monitoring, drift velocity of ice, biooptics parameters of water, спутниковый мониторинг, satellite dataware.*

### Renewable energy for power supply in the Arctic zone of the Russian Federation

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Some aspects of the use of renewable energy sources (RES) for the Russian Arctic are examined. Brief description of energy consumption in the territory is given; some niches promising for energy supply from renewable energy sources are highlighted. The results of evaluation of solar energy resources in the territory are given. The calculations were performed on the basis of multi-year solar radiation observations, as well as international thematic databases that are based on mathematical modeling of incoming radiation and the results of satellite observations (project NASA SSE). Design of portable power plant of two types, developed by the authors, is described: on the basis of flexible photoelectric modules and energy storage system, and on the basis of uninterruptible power supply (gasoline unit and hydrogen-air fuel cell). The features of energy storage systems in the harsh environment of the Arctic region are described.

**Keywords:** *renewable energy, the Arctic region, energy consumption, solar energy resources, actinometry data sources, portable solar power installation, photoelectric modules, accumulators.*

### Medical and physiological aspects of vital activity in the Arctic

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The studies of climatic factors in the Arctic and their impact on the efficiency and health of permanent and temporary residents of the Arctic are reviewed. Some of the medical and physiological recommendations for human life in the Arctic and adaptation to the harsh environmental conditions are given.

**Keywords:** *the Arctic, human, harmful factors, physiological condition, adaptation, health, capacity for work, prophylactic measures.*

### Regulatory and legal aspects of search and rescue support of Russia's maritime activity in the Arctic

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equipment and technologies"

The current states and ways for solving the regulatory and legal problems in the field of search and rescue support of Russia's maritime activity in the Arctic as a part of Russia's maritime activity.

**Keywords:** *national security, search and rescue support, laws and regulations, marine activity, search and rescue, concept of search and rescue ensuring of marine activity of the Russian Federation.*

### Technical issues of decommissioning of nuclear icebreakers

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The sequence of technical stages and presents is considered, and the options for decommissioning of nuclear icebreakers of 1052 Project are given. Decommissioning of one-reactor icebreakers of 10580 Project will require the development of a special project, however, fundamental differences in decommissioning technology can not be noticeable.

**Keywords:** *nuclear icebreakers, reactor installation, block package, closedown, decommissioning.*

### International Scientific Initiatives in the Russian Arctic: Twenty Years of Positive Activities in the framework of the International Arctic Science Committee

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The activities of the Working Group of the International Arctic Science Committee «International Science Initiative in the Russian Arctic» are covered. Over the past few years, international scientific cooperation in the Russian Arctic has been highly demanded; an interest in collaboration among the scientists from different disciplines, as well as in new research programs and projects, has grown. This international scientific cooperation in the Arctic allows expanding and strengthening the instrumentation and analytical support for the Russian Arctic research. Purpose of the working group is to make it a permanent platform for development of scientific cooperation in the Russian Arctic.

**Keywords:** *the Arctic, the Arctic zone of the Russian Federation, international scientific cooperation, Arctic states, International Arctic Science Committee, International Polar Year, research programs and projects.*

### Исправление

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