

Abstracts

Integrated Problems of Sustainable Development of the Transport Complex in the Russian Arctic

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Development of transport systems in the Arctic considering environmental priorities is addressed.

Keywords: *sustainable development; environmental problems; transport complex; space development.*

Integrated Problems and Directions for Improving Compensatory Measures to Restore Fish Resources of the Northern Fishery Basin

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A critical analysis of the legal and regulatory framework governing the main areas of compensatory measures, such as artificial reproduction and acclimatization of aquatic biological resources, amelioration of fishery water bodies, creation of new and expansion or modernization of existing production facilities to ensure the implementation of measures to compensate damage to fish resources, is provided. Proposals to improve the efficiency of compensatory measures are formulated. Methods to determine the capacity of large water bodies and practical implementation of compensatory measures will be discussed later.

Key words: *artificial reproduction and acclimatization of aquatic biological resources; amelioration of fishery ponds; efficiency of compensatory measures.*

Development of Information System and Electronic Atlas on the Status and Use of Resources of the White Sea and Its Catchment

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By the example of the White Sea and its catchment area (Belomorye), the outcomes of the authors' investigations on the development of databases and knowledge bases, electronic atlas, geoinformation and expert systems supporting the generation and reporting of information on the availability and use of resources are reviewed. The experience in establishment of such information systems may be useful for other Russian arctic regions and helpful in solution of present-day and future challenges regarding conservation and exploration of natural resource in the Arctic.

Key words: *atlas; databases; GIS technologies; modeling; forecasting; natural resources.*

Risk Analysis of Oil Spill Spread: Case of the Ob Bay of the Kara Sea

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Risk assessment of the impact of oil spills on the environment is needed as a starting condition for development of a set of measures to ensure environmental safety in arctic regions where exploration, extraction and transportation of oil and oil products are held or planned. The range and format of presentation of the data used when planning elimination of accidental oil spills are considered. An accidental oil spill at sea is represented as a random event, which time, place and scale are difficult to predict. It is assumed that all data about the emergency are known except the time of its occurrence, and the basic risk assessment principles are provided. To demonstrate the output products of risk assessment of oil spill spread, hydro-meteorological conditions for the Ob Bay of the Kara Sea are reconstructed, and the results of routine calculations for a specified point of diesel fuel spill are presented.

Key words: *emergency oil spill; risk analysis and risk assessment of oil spread at sea; likelihood of impact; oil degradation statistics; reconstruction of hydro-meteorological conditions.*

The Acidity of Atmospheric Precipitations and Depositions of Sulfur and Nitrogen in the Russian Arctic According to the Data of Snow Cover Chemical Composition Monitoring

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The results of observations under the 'Monitoring of Snow Cover Chemical Composition in the Russian Arctic' Program are presented. Various calculations were performed, and schematic maps of average pH indices and the intensity of sulfur and nitrogen depositions were generated for each monitoring point in regions with snowfalls in 2005-2013. The overall pattern of pH distribution in the snow cover demonstrates the absence of large-scale processes of snowfall acidification in the Russian Arctic. The performed analysis of the dynamics of time variations of the intensity of atmospheric sulfur and nitrogen fluxes also indicates relative stability of these indices in the studied regions during 2005-2013. Mean values of indices determined in most regions of the Arctic Zone (except the Murmansk Region and Arctic regions of Krasnoyarskiy kray) correspond to the global background in atmospheric precipitations.

Key words: *monitoring of chemical composition of snow cover; monitoring points; pH; sulfur and nitrogen; acidification of atmospheric precipitations.*

Mineral Resources of the Russian Arctic Continental Margin and Prospects for Their Development

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Mineral resources of the arctic continental margin of Russia are briefly reviewed. The state of knowledge regarding the main groups of mineral resources is described. Information about the structure of regional quantitative assessment of hydrocarbon resources and the state of the Arctic shelf exploration knowledge is provided. The status of licensing systems for shelf areas and the trends of their development which determine the paces of exploration and industrial development of the Arctic shelf hydrocarbon potential are analyzed. Information is provided about the availability and the status of studying solid minerals in the Russian arctic shelf including islands and archipelagos: placers of petrogenic and biogenic origin, chemogenic-sedimentary and ore deposits. A conclusion is reached that geological, geophysical and resource level of knowledge as well as the Arctic continental margin infrastructure are generally insufficient for full involvement of its mineral resources into economic activities of Russia.

Key words: *arctic continental margin; shelf; mineral resources; oil; gas; solid minerals; placers; quantitative assessment of mineral resources; expected resources and reserves.*

The Northern Futurology: the Next Two Decades

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The trends of development of the circumpolar countries after the 1990s, their driving forces and impacts on the current development of the Arctic region at the national, regional and municipal levels are analyzed. A new concept of the northern futurology is offered as a special field of research and a platform for consolidation of efforts of specialists on forecasting the development of northern and arctic territories of the Earth. Positive role of international cooperation in economic forecasting is highlighted.

Key words: *northern futurology; social and economic development of arctic territories; international cooperation in the Arctic.*

Environmental Impact Assessment of Construction and Operation of Gas Pipeline Underwater Crossing through the Baydaratskaya Bay (Kara Sea)

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The results of environmental impact assessment of the construction of a multiline underwater gas pipeline crossing through the Baydaratskaya Bay (Kara Sea) are presented. The data on natural conditions of the sea and land construction sites are provided. The scale of impact of construction works and the effects of hypothetical accidents on the marine environment are determined. As demonstrated, sediment detachment when burying the pipeline in the bottom sediments has the greatest impact on the habitat conditions of marine biota. A conclusion is reached on minor damage during the underwater crossing construction which is compensated in accordance with the current legislation.

Key words: *arctic seas; the Baydaratskaya Bay; underwater pipeline; environmental impact assessment; exaration; oil; methane; hydrobionts; environmental safety.*

Specifics of Implementation of New Environmental Safety Requirements for Ships and Offshore Installations in Northern Seas and on the Arctic Shelf

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The effects of implementation of new international environmental safety requirements for ocean vessels, offshore installations and ship fuel used on the continental arctic shelf and along the Northern Sea Route are considered. Various options of engineering and environmental equipment ensuring the implementation of current requirements for environmental safety and environmental protection are analyzed. Examples of equipment providing compliance with the current environmental standards are given.

Key words: *environmental safety; emission control; arctic requirements; cleaning systems; environmental equipment.*

Designs of 'RITM-200' Reactor Installation Intended to Provide Environmentally Safe and Cost-effective Operation of Multipurpose Nuclear Icebreaker on Arctic Routes

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The paper focuses on basic engineering solutions put into the design of 'RITM-200' reactor installation for new multipurpose nuclear icebreaker that enable its enhanced performance characteristics compared to existing icebreakers. The reactor installation will be equipped with an integral-type steam generating unit and high-performance steam generators with adjustable speed; it will also have optimized primary coolant parameters. The designed high level of safety is based on broad introduction of passive systems and non-waste technologies and the use of equipment with standardized element base.

Key words: *multipurpose nuclear icebreaker; reactor installation; integral-type steam generating unit; enhanced performance characteristics; radiation and environmental safety.*

The Polar Odyssey of Alexander Kolchak (to the 140th Anniversary of the Birth)

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The paper describes how the naval officer Alexander Kolchak (1874—1920) took part in the polar research at the beginning of the XX century.

Key words: *the Arctic; the Russian polar expedition; the Academy of Sciences; A. V. Kolchak; E. V. Toll; 'Vaygach'; B. A. Vilkitsky.*