Abstracts

Formation of chemical composition of the waters of the Murmansk Region under the conditions of functioning of mining and metallurgical enterprises

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The features of water quality formation in the Murmansk Region under the conditions of long-term operation of mining industry are considered. The characteristics of the key factors of pollution and the main man-caused processes in the waters of the land - metals pollution of water, oxidation and eutrophication – are given. The trends in changes of chemical composition of water in response to reduction of emissions of mining and metallurgical enterprises are assessed on the basis of data over twenty-year period of research.

Keywords: *anthropogenic stress, vulnerability, water quality, man-caused processes.*

Fracture mechanics and problems of Arctic development

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Examples of development and application of fracture mechanics methods and approaches to materials and structures for modelling of leading processes of deformation and destruction of ice cover in polar regions during natural processes and during interaction with vessels and constructions are given in the paper.

Keywords: *fracture, stress, stretching, compression, bend, destruction, limiting state, structure, durability, ice breaker, channel, strait.*

«Greening» of the Arctic in the twenty-first century as a synergy effect of global warming and economic development

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A review of forest boundary shift to the north, “greening” of tundra, “bush encroachment” and impact of these processes on the biological productivity of the landscape of the Russian Arctic was made in 2014-2015, using remote methods for Earth sensing. This makes it possible to reveal the prospects of their changes of different scales, different times and different directions under the conditions of synergy of changing climate and expanding economic activity. It is shown that at present, both the process of productivity growth (“greening”) as a synergy effect of global warming and economic development and productivity reduction due to anthropogenic transformation of landscape are observed in the Arctic at the same time.

Keywords: *The Arctic, the Arctic and subarctic regions, tundra “greening”, “bush encroachment”, “overgrowing” and tundra “delichenification”, biological productivity, NDVI vegetation index, biota trends.*

Arctic marginal planetary area

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A common circumpolar zone of influence of spreading zone of the Arctic Ocean on north mainland Eurasia are identified based on analysis of geological and geophysical data. It indicates the unity of modern geodynamic processes here and allows properly comparing the various materials on the northern territories of the Russian Federation. The results can serve as an additional argument in justifying the limits of the continental shelf of Russia.

Keywords: *The Arctic, geodynamics, Arctic continental margin area, north of Eurasia.*

The gold-quartz deposits in turbidites of the northeastern part of the Russian Arctic

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The article deals with the search model of gold-quartz vein deposits in turbidite strata (GQTS). The geological model emphasizes GQTS classification features with respect to other types of magmatic hydrothermal systems. The most important, according to the authors, indicator factors of GQTS formation is placed in the forefront of geological-genetic model. It is concluded that the deposit Sovinoe in the Kuulskom district of Northern Chukotka is potentially large and unique facility. It is shown that the Arctic regions of Yana-Kolyma and Chukotka fold zones of the Northeastern Russia are the most promising for GQTS search.

Keywords: *Arctic zone, Northeast Russia, turbidites, gold, quartz, saddle vein, forecast.*

Oil and gas potential of Canadian deep water basin and adjacent waters of the Arctic Ocean

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The high oil and gas potential of sedimentary strata of the Canada Basin, adjacent continental slope and other neighboring basins (South Chukchi, Novosibirsk-North-Chukchi, Podvodnikov Trench) is proved by the results of comprehensive studies. Sedimentary rock of bottom sedimentary cover basin in the most water areas of the potential oil and gas basins locates in the zones of meso- and apokatagenesis that allows one to assert that there are the intervals of sedimentary rocks in the oil and gas hydrocarbon generation windows.

Keywords: *the Arctic Ocean, Canada Basin, seismic prospecting, oil and gas, katagenesis, vitrinite reflectance.*

Arctic resources and opportunities for their development

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The resource potential of hydrocarbons in the Arctic is significant, and economic and political stability in the world will depend on the possibility of its development. But the countries of the Arctic Region should solve a set of technical and technological problems and clearly define the international legal status of the Arctic waters and territories to begin active work on the development of deposits. In fact, Russia is the only country which carries on practical activity in the Arctic at present. It has realized several large-scale maritime projects.

Keywords: *The Arctic, Arctic shelf, resource potential, sea hydrocarbon production, technology of exploration and development of Arctic fields.*

Experience of developing the strategy of Arctic development by foreign countries

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The economic and environmental aspects of the program documents for development of natural resources in the Arctic of Nordic countries (Norway, Denmark, Sweden, Iceland, Finland), American (the US, Canada), and Asian (China, India, Japan, Singapore, South Korea) states and their associations are analyzed. The conclusion about the importance of international cooperation and exchange of experiences in the interests of development of the Arctic zone of the Russian Federation is made.

Keywords: *The Arctic, Russia, Arctic development, international cooperation, natural resources, environment protection.*

Nuclear Energy in the Arctic Region

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The current state and prospects of development of atomic ice-specialized shipbuilding industry, as well as the creation of effective, reliable and safe floating nuclear power plants for heat and power supply are studied. Their suitable types and designs are analyzed. The prospects of nuclear power in the Arctic region are discussed.

Keywords: *The Arctic, the Northern Sea Route, nuclear power, nuclear icebreakers, Arctic shipping, ice shipbuilding, floating nuclear power plants.*

Structure of the costs of research on condition of hydraulic engineering storage of liquid industrial waste of the Kola region

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The cost structure for research on condition of hydraulic engineering storage of liquid industrial waste of the enterprises of the Kola region is analyzed. It was found that the engineering geodesic work is the most expensive, and the satellite survey is offered to optimize the work.

Keywords: *hydraulic engineering storage of liquid waste, research on condition, costs, analysis*.

Structure and dynamics of cargo transportation along the Northern Sea Route: the history, present and prospects

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The needs for nuclear-powered icebreakers and intensity of their operation continue to rise along with economic growth in the Russian Arctic. In the coming years, there will be tenfold increase in volumes of freight traffic along the Northern Sea Route (NSR). The traffic will be supported by nuclear icebreaker fleet. Dynamics of changes in traffic along the NSR, transit shipping development, the benefits of nuclear energy for icebreaker fleet by the examples of icebreakers of Russia and the United States, as well as prospects for nuclear icebreaker development are considered in the article.

Keywords: *nuclear icebreakers, the Northern Sea Route, NSR transit, icebreaker-months, icebreaker-leader, offshore icebreaker, liquefied natural gas, "panamaks", "Yamal SPG", year-round navigation.*