

Abstracts

**Priority projects
of the program of the Arctic
Sea rehabilitation from
sunken and submerged
nuclear and radiation
hazardous objects and the
necessity for international
cooperation**

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An overall stance of the problem related to the consequences of submerging of the nuclear and radiation hazardous objects and of the nuclear submarines (NS) wreckage in the world Ocean is observed. The data on the residual activity of the submerged solid radioactive waste (SRW) and objects of spent nuclear fuel (SNF) is presented. It is shown based on the radioactive contamination of sediments of the Gulf Stepovij, that at present the radioecological situation in the Arctic region is formed by technogenic radionuclides obtained as a result of the destruction of containers with SRW. A forecast of the radiation and technical condition of submerged objects with SNF is given and the periods and intensity of radionuclides in seawater is presented. A potential impact of objects with SNF and SRW on the Kara Sea shelf development with enhanced carbohydrate extraction is indicated. Objects recommended for lifting and disposal in accordance with their potential hazards, technical capacity of the lifting and disposal, as well as the international interest in the economic development of the Arctic are listed. Organizational and technical issues and aspects of the international cooperation are stated.

Keywords: *submerging, wreckage, lifting, disposal, nuclear object, radiation hazardous object, solid radioactive waste, spent nuclear fuel, technogenic radionuclides, radioecological situation, international cooperation, etc.*

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**Sustainability of the
natural environment of the
Pechora-Ural Arctic**

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The article deals with the resistance level of the natural environment of the Arctic sub-region of the Komi Republic. Factors of low resilience to climate change and anthropogenic pressure are listed. The experience of development of the northern territories is observed and recommendations for further exploitation are given.

Keywords: *sustainability of natural environment, tundra and forest tundra ecosystems, biodiversity, self-recovering ability.*

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**State of whitefish
of Pechora basin
in terms of multi-factor
anthropogenic impact**

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The paper considers the current state of whitefish of the Pechora basin (at population and organism levels) under the multi-anthropogenic impact resulting from years of functioning of the oil and gas industry enterprises.

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Operational control of the concrete strength properties using a non-destructive method in the construction of critical concrete structures in the Arctic conditions

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The results of experimental studies of concrete strength properties in the reinforced concrete constructions of the berth plates and technological facilities of the Station for long-term storage of reactor compartments of the decommissioned nuclear submarines and the Center for conditioning and long-term storage of the radioactive waste on the Kola Peninsula are stated in present article. The quality of concrete relative to design parameters is confirmed as appropriate.

Keywords: *Station for long-term storage of reactor compartments of decommissioned nuclear submarines, non-destructive testing of concrete strength, construction of radiation hazardous ground facilities*

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Characteristics and economic efficiency of the transient processes method of electrical resistivity prospecting for engineering and geological studies in the North and Arctic Russia

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By means of induction methods of electroinvestigation, in particular, a method of transients it is possible to receive detailed representation about the increasing overburden in difficult geological conditions. Such information allows to estimate correctly the bearing ability and stability of rocks' massif within grounds under the impact of engineering constructions (industrial, civil, hydrotechnical, transport, etc.), both on a design stage and in the course of their operation. Economic efficiency of works is defined not only considerable reduction of means for prospecting and terms of their carrying out, but also essential decrease in risks of occurrence of technogenic accidents and connected with them expenses for contingencies on liquidation of their consequences.

Keywords: *cryolithozone; engineering prospecting; geophysical methods of prospecting; induction electroinvestigation; a method of transients; a geoelectric cut; a geoelectric cut on depth; the electromagnetic response of the geological environment; economic efficiency, economic risks.*

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History and current state of establishing the planned ice fleet in the Russian Federation

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Problems of the further exploration of the Arctic region, the foundation for the dynamic development of Russia in the new century, are primarily related to the prospects of the national icebreaker construction industry and further development of the ice channeling tactics. Ice sailing has a long history. Russian engineers stand at the origins of the creation of the first steam-powered icebreakers. They are also the pioneers in the creation of powerful linear icebreakers. Our country has opened the nuclear era in the difficult task of icebreaker construction to the world. At present times, while following the traditions, Russian shipbuilders create fundamentally new diesel-electric and nuclear-powered icebreakers, which in the next three to five years will take to the open spaces of the Arctic, providing a year-round ice channeling through the Northern Sea Route. The article is devoted to the history of Russian icebreaker construction industry and to its current state.

Keywords: *Arctic, icebreaker steamer, diesel-electric icebreaker, nuclear icebreaker, ice channeling tactics, icebreaker construction industry*

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GLONASS in the Arctic: results of a comprehensive study of the navigation situation during the transition on the Northern Sea Route in August-September 2011

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The paper discusses the main results of the experiments of the navigation situation studies in the high northern latitudes during the transition of the border patrol vessel from Murmansk to Nevelsk (Sakhalin Island) in 2011.

The main goals of the experiment: testing of domestic and foreign consumer navigation equipment (CNE) samples, including usage of differential navigation mode; estimating the accuracy of the formation of the vessel movement trajectory on the basis of a posterior data processing of various dual frequency GLONASS / GPS receivers; evaluation of the real navigation conditions during the transition; development of the data exchange technology between the ship and the IAC CTNS.

The experiment involved more than ten samples of the navigation equipment. Test samples of navigation equipment operated in different modes of navigation: based on Global Navigation Satellite Systems (GNSS), GLONASS, GPS and in a joint mode GLONASS+GPS, and also using differential mode navigation definitions.

The results of the estimation of the positioning accuracy of the CNE samples in their various modes of operation and the results of the quality assessment of the navigation situation using GNSS GLONASS and GPS are presented.

Keywords: *satellite navigation in high northern latitudes, evaluation of the positioning accuracy using differential mode navigation definitions, local networks of the control and correction stations.*

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Experience of using automatic drifting devices to study the water column and ice cover in the Arctic at the beginning of XXI century

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The article observes basic information about the design and operation principals of a modern fleet of automatic ice drifting devices used for transmission of the information collected in real time, which have been used since the beginning of the century for many months of sustained data collection on the upper water masses and characteristics of the ice in the Arctic. The review of the technical documentation and publications, as well as the personal experience of the author gained in international Arctic expeditions in the Central Arctic is presented.

Keywords: *buoy for "balance" measuring of the sea ice, CTD-measurements, Arctic scientific observations*

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Contemporary climate change in the Arctic: results of a new assessment report of the Arctic Council

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The paper presents the results of a new report from the Arctic Council, "Snow, Water, Ice and Permafrost in the Arctic," devoted to the evaluation of the current situation in the Arctic cryosphere. Climate change has become a major problem in the Arctic over the past decade. Climate change impacts including buildings, roads and pipelines damage, reduction of the possibility for hunting, fishing and herding, and the negative impact on the health of the population of northern territories require the development of the adaptation strategies.

Keywords: *Arctic cryosphere, climate change in the Arctic, global climate studies, ground hydrometric networks.*

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“Arctic-2012” Training: Achievements and Lessons

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In the North-West region of Russia large-scale operations for decommissioning radiation hazardous objects of the Navy are conducted. Challenges of nuclear, radiation and environmental safety take the most important place in the implementation of such operations.

A key element to the safety of potentially hazardous objects decommissioning is the availability to respond to potential radiological incidents and accidents.

The response system is checked for its availability to eliminate emergency situations at the facility, municipal, territorial and federal levels by carrying out exercises and training on a regular basis.

Keywords: *radiation monitoring, emergency response, automated radiation environment monitoring system, radioactive waste management, training.*

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Intelligence activities of the naval forces of foreign countries in the Arctic region

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This article summarizes the main aspects of the security of the Arctic area adjacent to the Russian Federation. Aspiration of foreign countries Navy to conduct continuous exploration and research of the Russian sector of the Arctic during the Cold War and in the modern world is shown.

Keywords: *Arctic, Navy, naval forces of foreign countries, military intelligence, economic intelligence, submarine.*

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X International Conference “The resources and risks of regions with permafrost in the changing world”

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X International Conference held on 25-29 June 2012 in Salekhard «The resources and risks of regions with permafrost in the changing world», organized by the International Permafrost Association - IPA and the Institute of Earth Cryosphere of the Siberian Branch of the Russian Academy of Sciences, summed up the research and identified priority areas for the next 4 years: climate modeling, mapping, studies of the carbon and other cycles in permafrost areas, the initiation of new educational and cultural programs.

Keywords: *permafrost study, permafrost studies conference, problems of construction in permafrost, permafrost and climate*

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