S6–P1

RADIOCESIUM IN THE SEDIMENTS OF THE RUSSIAN ARCTIC SEAS

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Various areas of Russian Arctic seas such as Novaya Zemlya, Yenisei Gulf and Ob Gulf were exposed to significant emission of radioactive nuclides. The purpose of this research study is to identify the characteristics of marine sediments, which determine the accumulation of radiocesium as result of statistical analyses. The study was based on the material collected by different international expeditions from 1993 to 2009 year.

Since 1950 the concentration of radiocesium originating from nuclear weapon tests in atmosphere and under water, and also due to the Chernobyl accident, have undergone radioactive decay and decline of its activity. Local anomalies in sediments are found only in bays and near the mouth of nuclear fleet, and in the estuaries of the Siberian rivers. They are radioactive discharge effluents.

In our study we tried to find out what factors affect the spatial distribution of radiocesium in the shelf zone of the Arctic seas of Russia. Hydrological and hydrochemical characteristics of bottom water, grain and componentwise composition of sediments were examined. During the multiple stepwise non-linear regression analysis, the following factors were founded: average diameter of sediment particles (median), mm; the content of gallium in the pelitic fraction of sediments, ppm; content of feldspar in sediments, %. The influence of median on the content of radiocesium may be explained by the fact that with decreasing size of soil particles increases the specific absorption surface. With respect to the other two parameters further research is necessary. The only difference is that the content of feldspar suggests the following. The content of this mineral determines the structure of bottom sediments, which is indirectly manifested in their absorptive capacity. Gallium is a rare-earth metals, its distribution in marine sediments may indicate a general migration process elements. In the suspended matter of rivers carries up to 99% Ga.

S6–P2

KOLYMA WATER BALANCE STATION – UNIQUE RESEARCH STATION IN THE ZONE OF CONTINUOUS PERMAFROST: HALF CENTURY HISTORY AND FUTURE PERSPECTIVES

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The Kolyma Water Balance Station (KWBS), 21.2 km2, was found in 1948 in the upper Kolyma River basin in the zone of continuous permafrost with mountainous relief. Soil thaw depth varies from 20 cm in bogged lowlands to more than 3 m at south-oriented rocky slopes. Landscape conditions and runoff regime of the KWBS are representative for vast territories of the North-Eastern Russia.

The measurements of runoff, water-balance components, evaporation from soil, water and snow surfaces, ground freezing and thawing depths at different landscapes were conducted. There were more than 30 ground thawing observational sites, 26 precipitation gauges, seven discharge gauges, two water balance plots. The data of long-term measurements was supported by detailed description of natural conditions enabling to study the interactions of particular hydrological processes with landscape components.

Since 1997 the research watershed doesn't exist as previously. Only discharge and standard meteorological observations have been conducted.

Collected for more than 50 years data are invaluable for building and testing the models of different types: runoff formation, climatic, environmental, vegetation dynamics. There is an urgent need to restart the studies at the Kolyma station due to increased interest to natural processes of the Arctic. The KWBS data if prolonged could become effective indicator of climate changes and the basis for the study of their impact on state of permafrost and hydrological regime.

The attention of international scientific community to unique research station with long and rich history could help to rebuild it and continue the mission of science.

S6–P3

Visible Remote Sensing Information for Snow Monitoring

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The launch of advanced instruments onboard of new operational and research satellites greatly improves the potential of mapping and monitoring snow cover. Increasing spectral coverage of the data and frequency of observations allows for more accurate snow cover detection and timely identification of changes in the snow pack properties. A higher spatial resolution of satellite observations provides better opportunity for a much more detailed characterization of the snow cover distribution needed for various applications. As a result of the advancement in remote sensing, the information on snow cover from satellites is being increasingly used not only in global and continental-scale studies but also in regional and local scale investigations. Snow monitoring to a great degree depends on using visible channels even though such data of satellite observations could have significant gaps.

The advance in snow remote sensing is accompanied by increasing requirements to snow products – resolution finer than 1 km, snow fraction in addition to snow extent, a wider range of snow properties. To meet those growing requirements, improved retrieval algorithms and snow models should be developed for visible spectral bands.

A promising direction to create automatic snow retrievals of improved quality is developed by the author of the presentation and implemented in several algorithms. The algorithms were accepted to retrieve all the Visible Infrared Radiometer Suite (VIIRS) snow products in NOAA and have been successfully used to routinely generate daily global maps of snow cover fraction from the Moderate Resolution Imaging Spectroradiometer (MODIS) at GSFC/NASA.

Proper validation is a critically important means to develop snow cover retrieval. Daily snow depth data acquired from more than 1000 World Meteorological Organization (WMO) stations and approximately 1500 US Cooperative stations are currently used to estimate the accuracy of snow derivation from daily VIIRS observations. Another method implemented to analyze the performance of snow algorithms utilizes high-resolution observations as an effective source of ground truth information for snow fraction.

To further improve processing of satellite observations on snow, the strategy characterized by the following distinguishing features is currently under development. Creating snow algorithms, first of all, it is proposed to derive scene-specific (or even pixel-specific) parameters characterizing local properties of snow and non-snow endmembers. The application of such approach requires adjustment of algorithms to varying regional conditions.

Another opportunity to improve snow retrieval is related to the use of snow BRDF models. It has been demonstrated that the means of geometric optics could reliably describe angular dependencies related to bidirectional snow reflectance, and a simple asymptotic analytical model could be used to calculate bidirectional reflectance. Possible applications of the asymptotic analytical BRDF model for remote sensing include sensor calibration, calculating snow albedo, normalizing reflectances, and retrieval of snow grain size needed, in particular, for microwave observations on snow.

The combination of scene-specific algorithms with analytical BRDF model and synergy of remote sensing retrieval algorithms with conventional observations will help create unbiased and consistent information on snow cover.