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Assessment of microphysical and chemical factors of aerosols over seas of the Russian Artic Eastern Section

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The newly observed kickoff of the Northern Route development drew serious attention to state of the Arctic Resource environment. Occurring climatic and environmental changes are more sensitively seen in polar areas in particular. Air environment control allows for making prognostic assessments which are required for planning hazardous environmental impacts preventive actions. In August – September 2013, RV «Professor Khlustin» Northern Sea Route expeditionary voyage took place. En-route aerosol sampling was done over the surface of the Beringov, Chukotka and Eastern-Siberia seas (till the town of Pevek). The purpose of sampling was to assess spatio-temporal variability of optic, microphysical and chemical characteristics of aerosol particles of the surface layer within different areas adjacent to the Northern Sea Route. Aerosol test made use of automated mobile unit consisting of photoelectric particles counter AZ-10, aetalometr MDA-02, aspirator on NBM-1.2 pump chassis, and the impactor. This set of equipment allows for doing measurements of number concentration, dispersed composition of aerosols within sizes d=0.3-10 mkm, mass concentration of submicron sized aerosol, and filter-conveyed aerosols sampling. Filter-conveyed aerosols sampling was done using method accepted by EMEP and EANET monitoring networks. The impactor channel was upgraded to separate particles bigger than 1 mkm in size, and the fine grain fraction settled down on it. Reverse 5-day and 10-day trajectories of air mass transfer executed at heights of 10, 1500 and 3500 m were analyzed. The heights were selected by considerations that 3000 m is the height which characterizes air mass trend in the lower troposphere. 1500 m is the upper border of the atmospheric boundary layer, and the sampling was done in the Earth's surface layer at less than 10 m. Minimum values of the bespoken microphysical characteristics are better characteristic of higher latitudes where there are no man induced sources of aerosols while the natural ones are of lower severity due to low temperatures endemic for the Arctic Ocean areas. For doing the assessment of the air mass components chemical formulation samples of water soluble fraction of the atmospheric aerosol underwent chemical analysis. Sum of main ions within the aerosol composition varied from 0.23 to 16.2 mkg/m3. Minimum ion concentrations are defined in the aerosol sampled over the Chukotka sea surface at still. Chemical composition of the Beringov and Chukotka sea aerosol was dominated by impurities of sea origin coming from the ocean with air mass. Ion sum increased concentrations were observed in the Pevek area (Eastern Siberia Sea). Aerosol chemical composition building was impacted by air mass coming from the shore. Maximum concentrations of the bespoken components are seen in the aerosol sampled during stormy weather. Increase of wind made it for raising into the air of the sea origin particles. Ingestion of sprays onto the filter was eliminated by covering the sample catcher with a special protective hood. This completed survey is indicative of favourable state of atmosphere in the arctic resource of the Russian Arctic Eastern Section during Summer-Autumn season of 2013. The job is done under financial support of project. 23 Programs of fundamental research of the RAS Presidium, Partnership Integration Project, SB RAS. 25.