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Trace metal and nutrient fluxes into Arctic ocean by largest Siberian rivers (ArcticFlux)

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Precise estimates of river runoff are one the most challenging fields of river hydrology. Quantitative assessment of the fluxes of suspended and, especially, bed load, as well as their correlation with the flow dissolved loads remains weekly studied with a crucial need of in-situ observations, especially in large rivers.

The project is focused on semi-empirical and modeling study of flows, concentrations, modes and loads of trace metals and nutrients fluxes of the major rivers of Arctic. Monitoring stations were organized at the outlets of largest Siberian rivers: Ob, Yenisei, Lena, Kolyma, which transport more than 60 % of the water flow from the Russian Arctic. Observations were made for high and low water regime periods on the regular basis, and the total number of samples today exceeds 210. For each sample analyses were made for trace metals (68 elements), nutrients and dissolved and suspended organic carbon matter content both in dissolved and particulate (suspended and bed loads) forms. These samples can determine annual and seasonal distribution to 70% of the chemical elements and substances, carried by large rivers of the Russian Arctic into the Arctic Ocean.

For more accurate flux assessment, a new sampling technique was used. It allows to determine all components of the dissolved, suspended and, especially, bed load along the river section and includes sampling at 3-5 verticals on different depth. As a result, it is possible to determine the variability of the fluxes along the width of the section. As an example, concentrations of suspended sediments on the left and right banks of the Kolyma River differ in 6-7 times (up to70 mg / dm^3) and there are significant differences in Ni, Fe, Al, Cu, and Pb fluxes. Heterogeneity in the distribution of sediment and chemical flow across the width of the rivers arise due to the inflow of tributaries and as a result of permafrost melting and wave erosion of the banks. The study of the intensity of bank erosion and sedimentation at the outlets of Arctic rivers both in the field and according to remote sensing data is a significant part of the project. Based on the modeling techniques and application of erosion models for all four Arctic catchments it will also focus on the

novel quantitative assessment of bank and catchment erosion contribution into chemical and sediment loads.

The project concept is considered as a part of Marine component of Pan-Eurasian program (PEEX) and builds a bridge to integrate PEEX marine components with the existing terrestrial/atmospheric PEEX

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