

DISTANT EVALUATION OF ATMOSPHERIC POLLUTION INFLUENCE ON THE REMOTE TERRITORIES

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Abstract. The paper presents a back-trajectory approach to the evaluation and forecasting the influence from different atmospheric emissions on the environment of the remote and hard-to-reach regions of Russia. Air mass transport trajectories are calculated with the help of HYSPLIT4 model presented on the website of the Atmospheric Research Laboratory NOAA. The mean anthropogenic heavy metal (HM) concentrations in air, snow and rainfalls, as well as their total fluxes onto the surface are calculated for the 2000s. We studied three state nature reserves (Nenetzky, Gydansky, and Ust'-Lensky) situated along the Russian Arctic Ocean coast. The State Roshydromet Service provides the data on anthropogenic HM (Ni, Cu, Pb, Cd, Zn, Cr, As) atmospheric emissions for Russian cities and regions. We use the mean values of aerosol HM deposition velocity for different seasons calculated on the basis of the literature data taking into account the climatic distinctions. The spatial distributions of potential source functions for different seasons and reserves are presented on the maps. One can use these maps to estimate the impact of existing pollution sources, as well as to forecast the impact of future ones. This concerns not only point sources, but also distributed ones, such as forest and grass fires. We established the most important sources of anthropogenic HM for each of three Reserves under consideration. Seasonal and spatial variations of anthropogenic exposure through the atmosphere in the Russian Arctic coast are analyzed.

Keywords: environment, long-range atmospheric transport, heavy metals, anthropogenic sources, Arctic, nature reserves.