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Features of the distribution of mercury in bottom sediments of Russian Arctic lakes

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Bottom sediments of Arctic lakes that are not subject to direct anthropogenic influences are a kind of paleoclimatic and paleogeochemical archives that contain information about biogeochemical processes on the catchment and in the reservoir itself, informatively reflect environmental changes.

The aim of the research is to assess the dynamics of sedimentation of mercury and identify a possible anthropogenic contribution to the period of industrial activity.

The results of research of mercury distribution in sediments are presented for cores from five Arctic lakes located in Malozemelskaya tundra, Lovetsky Island in the mouth of the Pechora River, Yamal Peninsula and Gydan Peninsula.

Sedimentation rates were estimated using 210Pb and 137Cs geochronology. Chemical composition, granulometry and loss on ignition were determined layer by layer for all sediment cores.

The layer-by-layer analysis of all cores showed that the distribution of mercury differs significantly from the distribution of other elements by a significantly stronger enrichment of the surface layers, which can be caused not only by pollution as a result of transboundary mercury transport, but also by an increased content of organic matter in the upper horizons. Determination of the real anthropogenic component remains the main problem of Hg input into sediments. For continental lakes, the lithogenic contribution to the Hg flux is approximately the same and amounts to 2-5 μg Hg/m^2 year. The absence of dating can lead to erroneous deductions.

The nature of the distribution of mercury along the length of the cores and the distribution over fractions with different particle sizes showed that the total concentration of Hg in the slices is determined not by the finest fraction, but mainly by the fraction of particles less than 0.1 mm in size. All columns contain large particles (> 0.2 mm) with a high Hg content; their contribution to the total concentration of individual slices can exceed 20%.

The concentration distributions of elements in sediments showed that all lakes for all studied elements (except for mercury) are background. For Hg the lakes are not background, but remain unpolluted.

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