



The effect of sediments on the chemical composition of lake waters in the humid zone (lakes of Karelia as the example)

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The processes of decomposition of organic matter in the bottom sediments are responsible for the rate of influx of mineral forms of elements from the sediment back into the water. Two types of early diagenesis of sediments can be distinguished for the sediments in lakes of the humid zone in the temperate climate. The first type is the oxidative diagenesis. It occurs in the presence of oxygen in waters at the bottom, and is typical of sediments in large lakes. Slow sedimentation and the qualitative composition of organic matter are the reason for the dominance of benthic bacteria in the processes of organic matter mineralization. The sediments are stratified by redox-processes. The process of mineralization of organic matter, followed by salt influx from sediments occurs mainly on the sediment surface under the effect of oxygen. Oxygen consumption by sediments varies from 0.01 to 0.1 g oxygen per square meter per day. The reactions of iron and manganese dominate at the geochemical barrier, and lead to the formation of ore layers in the sediments. The ore layers prevent the transport of ions from the body of bottom sediments. The nutrient load on such sediments is relatively low, ranging from 0.001 to 0.5 mg P and from 0.05 to 1 mg of N per square meter per day. There is no dissolution of the mineral part of bottom sediments. Trace elements are accumulated in the surface layer of the sediments.

The reducing type of diagenesis occurs in the bottom sediments of small lakes, which accumulate organic matter. These sediments have a significant effect on the oxygen regime of the lake. According to our data, oxygen consumption in sediments depends on the trophic status of the lake, and reaches more than 1 g per square meter per day in a eutrophic lake. In an oligotrophic lake the bulk of organic matter is mineralized at the water-bottom interface. In a mesotrophic reservoir this process takes place in the oxidized surface layer of the sediment. A large proportion of organic matter in a eutrophic lake decomposes under anaerobic conditions. The rate of the biogenic flux at the water-bottom interface increases with a rise in the trophic status of the lake, and ranges from 0 to 5 mg for P and 0.05-50 mg N per square meter per day. Water mineralization over the silt is noticeably higher than in the water column.