SEDIMENTARY NUTRIENTS IN THE EASTERN GULF OF FINLAND, BALTIC SEA: DISTRIBUTION AND EXCHANGE ACROSS THE SEDIEMNT-WATER INTERFACE

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The high nutrient (nitrogen and phosphorus) loading from the Neva River - St. Petersburg (NW Russia) region during the decades is responsible for the eastern Gulf of Finland (GOF) to be the most eutrophied and polluted Baltic area. In the eutrophic situation, bottom sediments play an increasing role in nutrient recycling. In order to assess the relative importance of benthic processes to the water quality, the nutrient exchange across the sediment-water interface in terms of sedimentation, degradation, burial within the sediment and release to the water column has been studied in different GOF areas. The results of the study indicate that sediments of the Gulf act as an efficient sink for nutrients - 20-50 % of P and 40-65 % of N are buried with accumulating sediment. The rest is released to the overlying water, creating an internal nutrient load. In the Neva Bay burial nutrient flux is almost equal to nutrient sedimentation due to transition bottom in this area. The results revealed extensive and strong increasing gradient in nutrient benthic fluxes from the open Gulf to the Neva Estuary, thus indicating in shallow waters the intensity of nutrient benthic processes is mainly governed by the external nutrient loading. Due to significant land-based inputs of Mn and Fe to the GOF, large portion of phosphorus is probably adsorbed on metal oxides in oxic sediment and occurs in authigenic minerals in reduced sediment. As for nitrogen, substantial portion of ammonium-ions, which is produced during mineralization, is oxidized to nitrate-ions accompanied by subsequent denitrification and loss of nitrogen from the sediment. Diffusive benthic flux could supply generally a small fraction of estimated phytoplankton nutrient demand (0-10 % of P and 1-5 % of N). It may be concluded that the benthic processes (accumulation, adsorption, authigenic minerals formation, denitrification) partly counteract eutrophication of the eastern Gulf of Finland.