Geophysical Research Abstracts, Vol. 7, 01653, 2005
SRef-ID: 1607-7962/gra/EGU05-A-01653
© European Geosciences Union 2005

Effects of benthic macroinvertebrates on phosphorus release from Lake Ladoga sediments

N. Ignatyeva, T. Slepukhina and M. Menshoutkina

Institute of Limnology RAS, St. Petersburg, Russia

natali_ignatieva@mail.ru / Fax: +7 812-3887327

The effects of numerically dominant benthic macroinvertebrates (oligochaetes, amphipods and chironomids larvae) of Lake Ladoga, the largest lake in Europe, on fluid and particle upward transport of phosphorus from sediments to overlying water have been studied in set of short-term laboratory experiments under controlling conditions. The experiments have been carried out in laboratory chambers containing intact sediment cores covered by near-bottom water.

It was found that chironomids and amphipods, when populating a bottom area and/or growing of new generation, can greatly enhance the phosphorus release from the sediments, while oligochaetes are not important in regulating this process.

In all experiments, phosphorus released from the sediments mainly as inorganic particles. The presence of chironomids in the laboratory chambers was visually expressed in formation of turbid layer 1-2 cm thick in the water above the sediment surface. In case of amphipods the small particles were distributed throughout the whole water column, due to the animals' movement within the near-bottom water. Several mechanisms, whereby the macroinvertebrates affect the release of particulate matter from the sediments, are known. At the same time, one more mechanism is proposed based on the results of the study. The macroinvertebrates, moving within the sediment, serve as an internal source of vibration. As a result, fine-grained particles of neutral buoyancy at the sediment surface move upward, forming the turbid layer of distinct thickness. The fate of these particles then depends on hydrophysical and hydrodynamics characteristics of near-bottom zone such as the temperature, the thickness of viscous sublayer and the velocity of near-bottom currents.

The extent, to which the release of dissolved phosphorus is affected by the organisms, depends primarily on the shape of the concentration profile of phosphorus in sediment pore water and the organisms' life mode.