Popular science abstract

The identification and quantification of processes controlling the methane (CH_4) cycle in aquatic environments is fundamental considering the current demand for an exact understanding of global CH_4 cycle on the Earth. It is especially important to identify processes that contribute to reducing CH_4 emissions from these environments. Anaerobic oxidation of methane (AOM) is one of the processes occurring in sediments, where the end acceptors of electrons are compounds other than oxygen. The importance of the process is almost unknown in inland water. Thus, there is a great demand for this type of the research, especially in ecosystems exposed to a long-term anaerobic conditions, e.g. in eutrophic reservoirs. A few scientific publications on AOM in freshwater aquatic ecosystems concern mainly lakes and wetlands, while information on reservoirs are rare. It will be also interesting to identify mechanisms of methane production in the context of the quality composition of organic matter deposited in sediments.

The main scientific goal of the project will be identification of pathways of methane (CH_4) production and consumption in selected reservoirs and analysis of factors influencing on these pathways. The goal will be achieved by realisation a number of specific goals.

The research will include three eutrophic reservoirs located in south-eastern Poland. The reservoirs selected for the research differ in age, trophic state and influence of anthropogenic factors, which make it possible to transpose some observations and statements to reservoirs with similar characteristics. A studies of stable carbon isotopes will be used as a main study tool. An isotopic marker of $^{13}CH_4$ will be also used to measuring the AOM value.

Conclusions from the project can contribute to the change of existing knowledge on the CH_4 cycle in inland water systems. The detailed knowledge of CH_4 cycle in freshwater aquatic ecosystems is important in assessing current and future climate change. It will contribute to the improvement of existing CO_2 balance models (both regional and global). Thus, the results obtained during the project realisation will be an important link in the global carbon balance of studied reservoirs and will provide essential information on the functioning of reservoirs and their role in global warming.