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Hydroacustic detection of spatial distribution of green house gasses ebullition in Czech artificial reservoirs

Jaroslava Frouzova (1,2) and Michal Tušer (1)

(1) Biology Centre CAS, SoWa, Ceske Budejovice, Czech Republic (jarkafrouzova@gmail.com), (2) Institute for Environmental Studies, Faculty of Science, Charles University, Czech Republic (frouzova@natur.cuni.cz)

Water reservoirs are important, but neglected anthropogenic source of greenhouse gasses and methane in particular. Artificial reservoirs formed by river impoundment cover relatively large areas, with many specific habitats which are absent in normal river courses or natural lakes. This enhances natural spatial variability of GHG production and made reliable estimates difficulty. In this study we tested newly developed techniques of hydroacustic detection of GHG to study spatial distribution of GHG ebullition.

Three Czech reservoirs with different hydrology and water dynamics were monitored in the end of July by acoustical technique: sonar EK60 (Simrad), 120 kHz frequency. During acoustic survey we discovered patches with maximal GHG fluxes up to 1970 ml ml.m-3.day-1 but the mean flux was up to 5.8 ml ml.m-3.day-1 because the most of the area (up to 70%) was find to be without ebullition. In July the most bubbling occurred in the water column with bottom depth around 9 meters, this fact correlates with temperate of water above sediment. These findings are in good agreement with our earlier data about seasonal dynamic of methane ebullition in one of the reservoirs.

Hydroacoustic method seems to be the most promising and approved method for adequate monitoring of ebullition patchiness. Moreover this method is able to sample large areas, efficiently capture the spatiotemporal scale of ebullition and to size individual sizes of bubbles.