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# Spatial and temporal changes in methane ebullition in relation to sediment characteristics in Lake Kinneret: hydroacoustic approach

I. Ostrovsky (1), J. Tęgowski (2), F. R. Knudsen, and (3)

(1) Israel Oceanographic & Limnological Research, Kinneret Limnological Laboratory, Migdal, Israel (ostrovsky@ocean.org.il, (+972) 4 6724627), (2) Institute of Oceanography, University of Gdansk, al. Marszalka Pilsudskiego 46, 81-378 Gdynia, Poland, (3) Simrad As, Kongsberg Maritime, Horten, Norway

Quantification of gaseous methane in aquatic ecosystems is a complex task due to large spatial and temporal variability of the gas emission events. As a result, there is a gap in knowledge about the contribution of gas ebullition to the total methane flux from sediments in aquatic ecosystems. This information is necessary to determine what portion of deposited organic carbon is utilized by methanogenic bacteria, to evaluate the fate of bubbles in the water column, and the amount of methane that ultimately reaches the atmosphere. In contrast to conventional gas traps and optical methods, hydroacoustic technology allows quantifying bubble gas abundance over large areas. On the other hand, acoustic reflectance and scattering properties of surface bottom sediment (SBS) permit bottom sediment characterizing and mapping based on information about energy distribution in the frequency domain and fractal description of the echo envelope shape. Data collected with a scientific echo sounder in Lake Kinneret (Israel) were used to simultaneously determine the acoustical properties of SBS and estimate the gaseous methane fluxes from the bottom. Intensity of methane emission showed its close association with acoustical properties of SBS. Factors responsible for formation of spatial heterogeneity of sediment distribution and methane ebullition are discussed.