Geophysical Research Abstracts
Vol. 15, EGU2013-6338, 2013
EGU General Assembly 2013

Spatial and temporal variability of methane ebullition from aquatic sediments

Andreas Maeck and Andreas Lorke

University Koblenz-Landau, Institute for Environmental Sciences, Environmental Physics, Landau, Germany (maeck@uni-landau.de)

Ebullition is a key process for methane emissions from aquatic systems. It represents a direct flux path for methane from anoxic sediments to the atmosphere and further affects other transport pathways e.g. surface gas exchange by bubble dissolution and gas exchange with ambient water during bubble ascent. However, ebullition is characterized by a high variability in space and time and is difficult to assess on long temporal or large spatial scales. Here we combine different methods, including hydroacoustics, air-borne image analysis and continuously recording bubble traps, to identify and to analyze the scales of spatial and temporal variability of ebullition from a Central-European impounded river. Spatial variability on scales ranging from several meters up to the entire basin can mainly be attributed to spatial variations of sediment accumulation rates. On a temporal scale, we recorded ebullition fluxes with a resolution of 1 minute over several months and found a strong variability at a broad range of timescales ranging from minutes to months. Short-term water level and therefore hydrostatic pressure changes due to ship-lock induced surges can trigger individual ebullition events. However, on a timescale of days to weeks, the rate of bubble release is controlled by corresponding trends in atmospheric and hydrostatic pressure. Our findings highlight the importance to identify the driving factors for ebullition and to consider variability in space and time for estimating bubble-mediated methane emission rates from aquatic sediments.