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Carbon burial and its influences on methane ebullition in a Swiss hydro-electric reservoir.

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The burial of organic carbon in sediments is a major sink in the global carbon cycle. While substantial research efforts in chemical oceanography were directed towards a mechanistic understanding of the factors governing burial efficiencies, studies on carbon accumulation in lakes were more fragmented. Published burial rates in different lakes differ by more than two orders of magnitude. Therefore, a more precise assessment of the role of lakes in global carbon budgets requires better mechanistic models of carbon accumulation and remobilization.

The second important unknown in the carbon balance of many lakes is methane emission, mainly through bubble ebullition in littoral sediments. Recent research suggests that lakes emit significant amounts of methane to the atmosphere, and that ebullition probably is the major emission pathway. Still, the magnitude and variability of methane ebullition from lakes has hardly been studied, largely due to methodological limitations.

We studied the relationships between organic carbon burial and methane emission in the sediments of Lake Wohlen, a hydro-electric reservoir near Berne, Switzerland, with extensive visible ebullition.

Our data show a strong influence of oxygen exposure time and organic matter concentration on methane production in lake sediment, and these two parameters are therefore important predictors of the ebullition potential from sediment. Oxygen exposure time was also found to influence the efficiency of organic carbon burial, and is thereby an important regulator of both methane emission and organic carbon burial in lake

sediments.