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Origin and fate of terrigenous organic matter mobilized in a warming Arctic

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Vast quantities of organic carbon reside in terrestrial Arctic permafrost, and its mobilization and loss due to warming climate is a growing concern. Inland warming, coastal erosion during warmer and longer ice-free summer seasons, and sea-level rise may lead to transport of permafrost-derived organic matter to the ocean. There is evidence from marine sediment records that permafrost carbon mobilization may have contributed to atmospheric greenhouse gas (GHG) rise during past periods of rapid climate warming, in particular during the last deglaciation. The extent to which permafrost carbon mobilization can contribute to atmospheric GHG rise strongly depends on the degree to which permafrost organic matter is re-mineralized during transport and after settling on the sea-floor.

In this presentation, I will present radiocarbon evidence for the delivery of ancient terrestrial organic matter to the ocean during the last deglaciation and today. The factors responsible for permafrost mobilization will be examined and the susceptibility of organic matter to degradation will be assessed based on various geochemical and radiocarbon-based techniques. These data help constraining the rate at which permafrost organic matter is re-mineralized in marine sediments, and ultimately in estimating the strength of the permafrost carbon feedback.