

No evidence for 20th century acceleration in fossil carbon supply to the ocean from thawing permafrost in the Lena River catchment

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Release of carbon from thawing permafrost is a potential positive feedback in a warming climate. Thawing of permafrost is expected to make ancient organic matter bioavailable resulting in increased emissions of greenhouse gases and may also result in increased transport of particulate organic matter through river systems to the ocean. This might have strong effects on near-shore biogeochemistry. Organic matter delivery to the near-shore zone likely has accelerated over the past century in a warming Arctic with increased river discharge leading to increased mobilization of ancient permafrost organic matter. We studied short sediment cores recovered off two of the main branches of the Lena River Delta, receiving the suspended matter transported from the mainly permafrost covered Lena catchment. The cores were dated using ²¹⁰Pb_{xs} and ¹³⁷Cs and cover the past 70 to 120 years. Our compound-specific ¹⁴C results for aquatic/marine and terrigenous *n*-alkanoic acids isolated from the sediments reveal constant age at deposition of the terrigenous biomarkers, while that of the aquatic biomarkers decreased in the most recent decades. Paired with evidence from compound-specific $\delta^{13}\text{C}$ and δD , this suggests a rapid decrease in relative contributions of aquatic/marine-derived compounds, likely through selective degradation, while the source and supply of the terrigenous fraction remained constant in spite of known climatic changes in the hinterland.