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No evidence for 20th century acceleration in mobilization of ancient carbon from thawing permafrost in the Lena River catchment

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Release of carbon from thawing permafrost in high northern latitudes is a potential positive feedback in a warming climate, particularly since large quantities of carbon-rich organic matter have been stored in the permafrost soils for many millennia. Thawing of permafrost is expected to make this ancient organic matter bioavailable resulting in increased emissions of greenhouse gases. Thawing of permafrost may also result in increased transport of particulate organic matter through river systems to the ocean, where parts of this organic matter may escape remineralization and will be buried in marine sediments. This process might have accelerated over the past century in a warming Arctic with more frequent thaw slumping and increased river discharge. We therefore studied short sediment cores that were recovered off two of the main branches of the Lena River Delta, receiving the suspended matter transported from the mainly permafrost covered catchment of this great Russian Arctic river. The cores were recovered in 2013 from water depths of approximately 15 m and dated using 210Pbxs and 137Cs. The sediment records cover the past 70 to 120 years. We obtained compound-specific radiocarbon ages of aquatic (C16 n-alkanoic acids) and terrigenous (C28 n-alkanoic acids) biomarkers extracted from these cores. Besides, we analysed the geochemical composition of the sediment. Our results reveal that throughout the records' length, the age at deposition of the terrigenous biomarkers remained constant, while that of the aquatic biomarker decreased in the most recent decades. We will discuss these findings in context of the increases in Lena River discharge observed since the late 1980ies.