

Tracing sediment provenance across glacial cycles in the Eurasian Arctic margin

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Geological records of previous ice sheet collapse and retreat provide useful analogues to understand the effects of future ice sheet dynamics on nutrient delivery and carbon cycling. We used radiogenic isotopes to trace changes in sediment provenance and chemical weathering to better understand how dramatic changes to the configuration of the Quaternary Eurasian ice sheet affected sediment pathways. Three sediment cores spanning the past ~200 ka were collected from the Yermak Plateau by the TRANSSIZ Expedition in 2015. We performed radiogenic isotope analyses of Nd, Sr and Pb, using samples with distinct characteristics from multiple glacial-interglacial cycles of the Svalbard-Barents Ice Sheet. We targeted intervals of 1) high terrigenous input, and 2) elevated sedimentary Fe contents. We leached powdered sediment samples to remove authigenic sediment grain coatings. The residual sediment was then dissolved in an HF:HNO₃ mixture that was processed to isolate Sr, Nd, and Pb, and analyzed on a MC-ICPMS to determine radiogenic isotope ratios with the goal of fingerprinting the sediment source regions. Results suggest that sediment delivery patterns have varied both over time and between sites. ⁸⁷Sr/⁸⁶Sr and εNd ratios broadly fall into two groups: higher ⁸⁷Sr/⁸⁶Sr (> 0.720) and more negative εNd (less than -11) values are consistent with a Spitsbergen bedrock source, while lower ⁸⁷Sr/⁸⁶Sr and higher εNd suggest a Siberian or Kara Sea source region. ²⁰⁶Pb/²⁰⁴Pb ratios declined during the Last Glacial Maximum, suggesting changes in weathering conditions, but do not show clear decreases during previous glacial periods. Based on initial results, there does not appear to be a consistent source of sediment across high Fe or elevated terrigenous input events; however, these events do record sediments with distinct provenance as compared to those before and after.