

Changes of sedimentary mineral composition in the Makarov Basin for the last ~1 Ma

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ABSTRACT

The Quaternary is characterized by the development of cryosphere which mainly consists of sea ice and ice sheet. In spite of its significance in terms of climate changes during the Quaternary, cryosphere changes in the Arctic Ocean and the surrounding lands have remained uncertain. Here, we present long sedimentary records which cover early to late Quaternary (~1 Ma), focusing on mineralogical features to constrain both sedimentary sources and transport mechanisms. In general, quartz and feldspars dominate the bulk mineral composition, but carbonates and pyroxenes are also abundant. Dolomite contents drastically vary after the end of early-middle Pleistocene Transition (EMPT) and show periodic occurrence since the middle Brunhes. The occurrence of detrital dolomite indicates the onset of the Laurentide Ice Sheet (LIS) impact on the Arctic Ocean at MIS 20 (~800 ka) and periodic impacts of ~100 kyr since MIS 12 (~450 ka) based on wavelet analysis. The contents of other minerals such as quartz, plagioclase, K-feldspar, and pyroxenes and their ratios also show potential as indicators of sedimentary source changes in the continental margins of the Arctic Ocean. However, further studies are needed to better constrain mineral source areas and transport mechanisms in relation to cryosphere changes of the Arctic region during the Quaternary.