Late Quaternary glacial/interglacial variability in Arctic sea ice and related organic carbon flux: A 180 ka record from Yermak Plateau

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The recent dramatic decline of Arctic sea over the last decades and its controlling processes are still poorly understood. In order to distinguish between natural and anthropogenic processes controlling these changes in sea ice, we have to look back to the past beyond the times of direct measurements. For this purpose, we carried out a multi-proxy approach combining organic-geochemical data (bulk parameters: C/N, TOC, $\delta^{13}C_{org}$; biomarkers: IP_{25}, sterols, GDGTs) with sedimentological data (core lithology, physical properties, IRD counting, XRF scanning) determined in sediments of Yermak Plateau Core PS92/039-2. This core is situated close to the modern summer ice edge and thus very sensitive for environmental changes. Based on magnetostratigraphy and correlations with dated sediment cores, this core represents the time span from MIS 6 to 1 (ca. 180,000 years) and allows the reconstruction of sea ice variability and related changes in oceanic circulation patterns and the Svalbard Barents Ice Sheet (SBIS) fluctuations during glacial/interglacial changes.

As sea ice and phytoplankton biomarkers occur throughout the entire sedimentary section but show some strong variability, a more seasonal sea ice cover was probably predominant during the entire time interval, superimposed by a distinct short-term variability in extent. Significant fluctuations in most of our proxy records indicate highly variable sea ice conditions over the Yermak Plateau during MIS 6. Based on our biomarker data, the SBIS could not have reached the Yermak Plateau during MIS 6. During MIS 4 and 2, coevally elevated concentrations of the sea ice proxy IP_{25} and the biomarkers for phytoplankton productivity and terrigenous input point to a stationary ice margin above the core position at that time. Strengthened Atlantic Water inflow possibly coupled with katabatic winds from the protruding SBIS may have created this stable ice edge situation and the related sedimentary regime.