Geophysical Research Abstracts
Vol. 14, EGU2012-2268, 2012
EGU General Assembly 2012

Late Quaternary history of circum-Arctic ice sheets and Arctic Ocean paleoceanography: New insights from a sediment core transect across Mendeleev Ridge

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The Arctic Ocean plays an important role in the global climate system. However, due to the major technological and/or logistical problems in reaching this permanently ice-covered region and in retrieving long and undisturbed sediment cores, the knowledge of its short and long term paleoceanographic and paleoclimatic history is still limited. More well-dated and detailed records are needed to study the late Quaternary history of circum-Arctic ice sheets and its relationship to the paleoceanographic circulation pattern in the central Arctic Ocean. In this context, our research is aiming to answer the following key questions:

(1) Were extensive late Quaternary circum-Arctic ice sheets developed synchronously or asynchronously in North America, East Siberia, and Eurasia?
(2) How is the evolution of circum-Arctic ice sheets related to the paleoceanographic circulation patterns in the central Arctic Ocean, i.e. how did the major surface-water current systems (Beaufort Gyre and Transpolar Drift) evolve and change their extension?

For this research project, new sediment cores were recovered during the RV "Polarstern" ARK-XXIII/3 expedition (August-October 2008) along two transects from the Canada Basin across the central Mendeleev Ridge towards the Makarov Basin and the Lomonosov Ridge in the Eurasian Arctic (for background see Stein et al., 2010). Here, we mainly focus on the northern transect along 80°30′N. In all studied sediment cores, Clark's standard lithological units A to M (Clark et al, 1980) could be clearly identified, and the prominent pink-white layers and more sandy intervals are the key sedimentary characteristics used for core correlation and development of a preliminary age model (Stein et al, 2010). According to this age model, the first onset of coarse-grained dolomite-rich material probably occurred during MIS 16. In general, MIS 16, 12, 10, and 8 are characterized by increased dolomite contents and high amount of sand (>63μm) indicating ice-rafted debris (IRD) input from the Laurentide Ice Sheet (LIS). MIS 6, on the other hand, is characterized by low dolomite and high quartz contents, suggesting a different source region for the IRD input. In this poster, new XRD and grain-size data from the coarse-grained intervals related to major glaciations, are presented. These data allow a more detailed reconstruction of past Quaternary glaciations in North America, Siberia, and Eurasia.

References

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