Geophysical Research Abstracts
Vol. 12, EGU2010-494, 2010
EGU General Assembly 2010

Late Quaternary glacial/ interglacial regimes at the East Siberian Sea continental margin: reconstructions based on sedimentary records from the Mendeleev Ridge

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The Quaternary history of the Arctic region comprises cyclical changes in the extension of the land-based ice sheets and sea-ice cover that affected sedimentary environments in the Arctic Ocean. That is why oceanic conditions, including paleoproductivity, surface and bottom currents et c., as well growth and decay of the continental ice sheets, providing input of the terrigenous material from the adjacent land, can be reconstructed from marine sediment records. The present study is based on sediment cores recovered during the ARK-XXIII/3 (Arctic-2008) Expedition of RV 'Polarstern' (Stein et al., 2009). Currently we report some results for the coring sites PS72/344-1 (boxcorer) and PS72/344-3 (kastenlot), located at the western flank of the Mendeleev Ridge, close to the East Siberian sea continental margin. The composite core PS 72/344 represents an undisturbed sedimentary sequence with the length of 8 m, scanned onboard for physical properties and then sampled according to the lithology at $\sim$ every 10 cm. We used various sedimentary proxies such as lithology, physical properties, bulk mineralogical composition, geochemistry and biostratigraphy to reconstruct paleoceonographical conditions in the Siberian part of the Amerasian Basin during the Late Quaternary times. The age model for core PS72/344 is constrained by correlation to the stratigraphy developed for the Mendeleev Ridge.
According to the proposed stratigraphical framework, the PS72/344 record comprises marine isotope stages (MIS) 5 to 1. The proxy record (E. Bazhenova, 2009) demonstrates that sedimentary environments at the East Siberian Sea continental margin were strongly variable during late Quaternary times. Based on the sedimentation patterns, we suggest that there were three major scenarios of transportation and deposition of terrigenous material derived from the adjacent shelves, generally controlled by the extension of sea-ice cover and iceberg discharge. These general paleoenvironmental scenarios are related to the history of glaciations in Northern Eurasia and North America during late Quaternary times (MIS 5 to present). Due to the common problems with the dating of sediment cores in the Arctic Ocean, the proposed age model is still preliminary. Ongoing studies include the determination of possible source areas for the terrigenous material coming to the Mendeleev Ridge from Eurasia and North America. Reconstructions of the sediment pathways will be based on the analysis of the mineralogical and geochemical composition of the sediments.

References:

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