Geophysical Research Abstracts
Vol. 13, EGU2011-7101, 2011
EGU General Assembly 2011

Cyclic patterns in rock magnetic records of Pleistocene deep-sea sediments from the NW-Pacific near Shatsky Rise - indication of decreased bottom water ventilation?

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In summer 2009, the international SO202-INOPEX (Innovative North Pacific Experiment) cruise led to the North Pacific and the Bering Sea. Here we present results of rock and palaeomagnetic measurements as well as geochemical analyses for 20.23 m long piston core SO202-39-3, which was recovered at a water depth of 5102 m at 38°01'N, 164°27'E northeast of the northern Shatsky Rise about 2000 km east off Japan.
Biogenic content of sediments from the North Pacific is mainly silicious diatomaceous. Carbonate is usually missing due to the large water depth. For this reason magnetostratigraphic methods like Relative Paleointensity (RPI) and reversal stratigraphy were applied in order to develop an age-model. A set of rock magnetic parameters gives insight into the magnetic inventory of the terrigenous fraction. These data may identify paleoceanographic changes in that area in particular the impact of climate change on the marine environment on regional scales.
Mean sedimentation rate of core SO202-39-3 was calculated to about 2 cm/kyr. Thus the record extends back to about 935 kyrs. The Bruhnes/Matuyama boundary as well as some geomagnetic excursions (e.g. Island Basin, Stage 17, Bruhnes precursor) were identified in its geomagnetic record. A tephra layer in a depth of about 1.77 m can be correlated to ash layer Aso-4. The combination of these findings results in a consistent age-model.
Both, natural and artificial remanence magnetisations reveal a distinct cyclicity with some intercalated sections of very weak magnetization. ARM/IRM ratio (Anhysteretic Remanent Magnetisation normalized to Isothermal Remanent Magnetisation) indicates a larger mean grain-size of magnetite in these horizons as a result probably of dissolution of small magnetite grains (single-domain). This interpretation is supported by the S ratio (hematite / magnetite ratio) showing a shift to relative higher hematite contents. Darker sediment colours and relative high contents of organic carbon nourishes the assumption that these horizons may have originate by early diagenetic processes leading to a partial dissolution of magnetic minerals.
We will demonstrate, whether these reductive conditions show a signal of higher biological productivity or rather lower preservation due to diminished bottom-water ventilation in this part of the North Pacific. Furthermore we will discuss how this is related to global oceanographic and climatic changes with respect to (interhemispheric) glacial-interglacial cycles.