Geophysical Research Abstracts, Vol. 9, 03107, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03107

Magnetic Mineral Inputs in Sediments Off Baja California. Inference on Climate Variability of the Last Glacial-Interglacial Cycle

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The sediments of the western margin of the Baja California peninsula have demonstrated their ability to record climate changes at millennial time scale. Both the sedimentary dynamics (van Geen et al., 2003) and the export of biogenic compounds (Ortiz et al., 2004) respond to a northern latitude climatic forcing during the last 52 ka BP. The core MD02-2508 has been collected during the scientific cruise IMAGESVIII-MONA at the latitude of Tropic of Cancer (23°N). The present sedimentation is characterized by high terrigenous inputs, deposited under the influence of a strong seasonal and spatial climatic variability and with high accumulation rates (35 cm/ka), allowing to monitor the rhythms of the terrigenous input at a centennial resolution.

The magnetic parameters (magnetic susceptibility, anhysteretic and isothermal remanent magnetizations and hysteresis properties) here trace variations in concentration and nature of magnetic minerals originating from the continent and carried following different ways (aeolian or fluvial), providing reliable insights on climate variability on-land. The relative contents of major and trace elements (measured by X-ray fluorescence scanner) and concentrations of carbonates and organic carbon on key interval of the cores, helped to improve the interpretations.

The sedimentary sequence was dated using 12 calibrated ^{14}C ages and identification of paleomagnetic excursions and covers the last glacial-interglacial cycle (0-120 ka).

The magnetic minerals are more concentrated during the bioturbated intervals, corresponding to glacial and stadial periods of North Atlantic whilst low concentrations are recorded in intervals presenting millimetric to centimetric laminations, corresponding

to interglacial and interstadial periods. High (low) magnetic mineral concentrations are also associated to high (low) total reflectance, high (low) carbonate contents and low (high) organic carbon contents. The relative concentrations of titanium and iron, varying similarly to the magnetic parameters indicate that the concentration of magnetic minerals is mainly modulated by variations of the terrigenous input, rather than dissolution of the iron oxides. The magnetic susceptibility signal tracing variations of coarse magnetite concentration is supposed to be linked with fluvial transport; it closely matches the Greenland oxygen isotope record. The Hard IRM (HIRM) signal, carried by high coercivity mineral (hematite and/or goethite) classically interpreted as tracers of aeolian transport, contains its major power in the precessional frequency band. Strong (resp. weak) hematite or goethite concentrations matches low (resp. high) insolation. The residual magnetic terrigenous input off Baja California recorded two types of climatic variability during the last Glacial/Interglacial cycle: fluvial (Ti)magnetite input was governed by the Northern hemisphere variability and aeolian hematite/goethite input was governed by the low latitudes variability.