Geophysical Research Abstracts, Vol. 8, 07086, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07086
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Records of millennial-scale NW African climate change from off-shore Senegal

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Rock magnetic, geochemical and colour reflectivity records are combined to unravel the major mineralogical components, environmental conditions and changes in the N African monsoon system during the Late Quaternary. Sediment cores recovered along the NW African continental margin show a systematic sequence of alternating reddish brown and dark green layers. Core GeoB 9516-5 located between tropical and arid conditions (13° 40.40' N, 18° 25.14' W recovered at 3437 m water depth) is investigated and it is expected to strongly register changes in the N African monsoon.
Room and low temperature magnetic measurements determine the concentration, grain sizes and dominant magnetic minerals whilst X-ray fluorescence analyses were carried out to infer the elemental concentrations and degree of diagenesis. Diffuse reflected light spectroscopy was used to determine the sediment mineral components.
Susceptibility values are high at glacial terminations 1 and 2, reaching values of about $600 \cdot 10^{-6}$ SI whilst $\kappa_{fd\%}$ reaches values of $\sim$12%. Opposing trends in ARM and IRM records suggest that the system is controlled by two material types, with more Ti enriched magnetic minerals occurring during glacials (evident in low temperature thermomagnetic measurements). The ARM/IRM ratio shows SD particles are dominant during warm periods, corresponding to dark layers of marine clay. This record also shows a strong cyclicity in climate history during the last 160 ka. We suggest that the high $\kappa_{fd\%}$ is a result of high coercivity SP minerals which may have been formed in-situ. Two mineral end-member components were revealed by the color spectral data. C1 with first derivative peaks at positions typical of hematite and goethite, and C2 indicative of clay minerals. Most of the proxy-parameters suggest high coercivity minerals (hematite and goethite) as the main magnetic minerals at this site. This is further confirmed by the ratios of the two mixing coefficients C1 and C2 which strongly mirrors the magnetic susceptibility, $S_{-0.3T}$ ratio, $\kappa_{fd\%}$ and IRM records.