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Magnetism and paleomagnetism of core PROMESS PRGL1-4 : chronostratigraphic inferences on pleistocene sedimentation on the Gulf of Lion Margin.

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Core PRGL1-4 drilled during summer 2004 on the Gulf of Lion margin, at lat. 42˚ 42', long. 3˚50 E and 298 m water depth, through 300 m of sediment deposits was submitted to paleo- and a rock-magnetic studies. Natural and artificial remanent magnetizations were measured on Uchannels samples collected through the upper 50 m at a 2 cm resolution and on discrete cubic samples collected at 5 cm or 10 cm spacing in organic rich facies (loaw sed rates) and in terrigenous facies (high sed. rates) respectively. The natural remanent magnetization (NRM) is acquired by alignment of the ferrimagnetic particles [mostly the magnetite (Fe_3O_4) and titanomagnetite ($Fe_{3-x}Ti_xO_4$) in the 0.1 – 10 μm size range] along the earth magnetic field lines. NRM intensity thus depends on concentration of this fraction and on the intensity of the Earth magnetic field. The anhysteretic remanent magnetization (ARM), artificially imparted, primarily depends on the concentration of the same minerals and thus is an appropriate normalization parameter of the NRM intensity to reconstruct relative paleointensity (RPI) variation of the field. In high sedimentation rates marginal environments, these minerals mostly originate from lithogenic sources, i.e. from magmatic rocks outcropping in the drainage basin. Therefore, the ARM intensity constitutes a proxy of the erosion and transport of the lithogenic fraction, secondarily modulated by a dilution effect due to the dia- or paramagnetic carbonate matrix.

When plotted alongside the δ^{18}O record of core MD90-0963 (Indian ocean; Bassinot et al. 1994), the ARM is revealed as a high resolution paleoclimatic proxy, balancing between two poles: weak ARM correlating to glacial isotopic signals and strong ARM correlating with interglacial isotopic signals. The main modulation of this magnetic

enhancement/dilution system is probably linked with the sea level variation: during high sea-level stands the sediment input comes from the river drainage basins, while during low sea-level stands it is fed by the continental shelve freshly covered by carbonates and silicates during the previous high stand. The ARM proxy-climate record provides quasi-continuous chronological information at least down to marine isotope stage 11 ($\sim$400 ka BP).

In the time interval covered, several excursions of the geomagnetic field accompanied by low RPI phases are reported (e.g. Channel et al. 1999, Thouveny et al. 2004). These are recorded along PRGL1-4 under the form of low RPI and low (or negative) inclination intervals. A low relative paleointensity (RPI) event at $\sim$40 m depth, related to the Laschamp provides an age of 41 ka BP, agreeing with the sedimentation rate of the short core MD99-2338 collected at the same site (Jouet et al. in press). Low RPI features at 120 m and 160 m are related to the Icelandic basin excursion (190 ka BP) and to the Portuguese margin excursion (290 ka BP). A low RPI at 215 m depth is related to the Levantine excursion (390 ka BP), in coherence with the correlation of the low ARM feature at the same depth with MIS 11 ($\sim$400 ka BP). These data sets must be compared to those issued from δ^{18}O and other geochemical studies, in order to propose a robust chronostratigraphic synthesis for this key sedimentary sequence.