Geophysical Research Abstracts, Vol. 7, 06646, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06646

Unravelling the magnetic signal of Heinrich Events and Dansgaard-Oeschger Cycles in sediments from the Barra Fan off the north-west coast of Scotland

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The potential of mineral magnetic measurements to (i) identify different ice rafted debris (IRD) sources and phasing within Heinrich Layers (HLs), (ii) identify Dansgaard-Oeschger (D-O) cycles and IRD phasing within them and (iii) distinguish Heinrich Events (HEs) from D-O cycles is investigated. Measurements were carried out on three sections of the 30m long giant piston core MD95-2006 recovered from the Barra Fan off the north-west coast of Scotland, the major deposition centre of the last British Ice Sheet (BIS). The three sections studied span HLs 2, 4 and 5. Susceptibilities, anhysteretic remanent magnetisations (ARMs), isothermal remanent magnetisations (IRMs) and hysteresis loops were carried out at 1cm intervals through HL2 and HL5 and alternate 1cm intervals through HL4. Measurements on different grain sizes indicate on a mass fraction basis that the magnetic signal is carried by the $<63\mu$m grains, however important information relating to IRD sourcing is gained from measurement of the $>63\mu$m grains. Within the HLs magnetic parameters such as susceptibility, coercivity and IRM ratios show variability suggesting pulsing from potentially three different IRD sources with distinct lithologies. Superimposed on identifying source phasing in the region of HL5 is the climatic signal of D-O cycles as shown by the correlation of the ARM and it's ratios to susceptibility and IRM with the record of the polar foraminiferal species N. pachyderma (sinistral).