Geophysical Research Abstracts
Vol. 12, EGU2010-3422-2, 2010
EGU General Assembly 2010


# Holocene palaeomagnetic secular variation records and a relative palaeointensity estimate from Western Greenland (Disko Bugt)

Ian Snowball (1), Andreas Nilsson (1), Per Sandgren (1), Jerry Lloyd (2), David McCarthy (2), and Matthias Moros (3)

(1) Department of Earth and Ecosystem Sciences, Division of Geology, Lund University, Lund, Sweden (ian.snowball@geol.lu.se), (2) Geography Department, Durham University, UK., (3) Leibniz Institute for Baltic Sea Research, Warnemünde, Germany.

Good quality, well-dated and high resolution palaeomagnetic secular variation records based on marine sediments are rare, but they are necessary to improve time varying global models of geomagnetic field development. We took part in the MSM05-3 research cruise with the RV Maria S. Merian to the western Greenland coast in 2007 and report here the mineral magnetic and palaeomagnetic properties of selected sediment cores recovered from the Disko Bay and the Uummannaq shelf. On-board magnetic susceptibility scans show that the magnetic concentrations of postglacial sediments recovered from the Disko Bay are relatively low ($<$1 x $10^{-6}$m$^3$/kg), while the sediments recovered from the eastern part of the Uummannaq shelf are considerably higher (3 x $10^{-6}$m$^3$/kg). These differences in magnetic concentration, which reflect sediment provenance, are also reflected in the quality of palaeomagnetic data. A 10m long core from the Uummannaq shelf (station 343520) has a chronology based on 11 $^{14}$C dates and $^{137}$Cs, which show that the sediment sequence covers the period from 10,000 cal. yr BP to the present day. Alternating field demagnetization spectra of discrete subsamples reveal a stable palaeomagnetic vector with median destructive fields that range between 15 and 25 mT and mean angles of deviation $<2^o$. The average sample inclination is 76$^o$, which compares well to the expected GAD inclination (79$^o$) and inclination ranges between 60$^o$ and 90$^o$. A relative palaeointensity curve (RPI) was produced by normalization of NRM to ARM at alternating field levels between 10 and 40 mT. Due to the steep inclination and lack of orientation to an azimuth the declination data are difficult to interpret. However, a clear westerly swing dated to between 2351 and 1876 cal. yr BP (95.4% confidence) is associated with steep inclinations and high RPI, suggesting that the north magnetic pole was close to the site at this time. This feature may be an expression of gradual movement of the north magnetic pole towards the west because a similar feature in Fennoscandia is dated to 2650 cal. yr BP (Snowball et al. 2007) and north of Iceland to 2500 cal. yr BP (Stoner et al. 2007). Additional peaks in inclination occurred between 3464-2867, 5758-5177 and 8488-8130 cal. yr BP (ranges express the 95.4% confidence intervals) and these may prove useful for regional correlation and dating. Given that the sediments conform to established reliability criteria for the reconstruction of RPI we note that the most significant feature is a broad intensity peak between 9500 and 8200 cal. yr BP. This feature suggests that the geomagnetic field during this period was significantly stronger than previous reconstructions indicate. Our study shows the potential to reconstruct geomagnetic field variability from the Uummannaq shelf in more detail.