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A New High-Resolution Record of the Blake Geomagnetic Excursion from ODP Site 1062

Mark Bourne (1), Conall Mac Niocaill (1), Gideon Henderson (1), Alex Thomas (1), and Mads Knudsen (2)

(1) Department of Earth Sciences, University of Oxford, United Kingdom (mark.bourne@earth.ox.ac.uk), (2) Geologisk Institut, Aarhus Universitet, Denmark

We present a high resolution record of the Blake geomagnetic excursion from Ocean Drilling Program (ODP) Site 1062 on the Blake-Bahama Outer Ridge. The excursion is recorded in three separate cores, with the high average sedimentation rate (10 cm ka^{-1}) at this location allowing the determination of transitional field behaviour during the excursion.

A complex geometry is observed for the excursional geomagnetic field. The directional records show an initial deviation from the expected directions across an interval of 1 m that achieves a completely reversed state, and then returns to normal polarity. A second, although less well-defined, short-lived phase of anomalous directions is observed immediately following the first event in two of the three cores. Measurements of the magnetic susceptibility show little variation through the core indicating that the concentration and grain size of the remanence carriers remains relatively constant throughout the studied interval. Measurements of the S-Ratio and remanence coercivity also remain constant through the core sections of interest, and indicate magnetite to be the primary remanence carrier.

The relatively homogeneous sediment enables the determination of two relative palaeointensity proxies by normalizing natural remanent magnetization measurements using artificially induced magnetizations (anhysteretic remanence, ARM and isothermal remanence, IRM). These records are consistent between all three cores. The relative palaeointensity proxies suggest that the Earth's magnetic field decreased substantially in intensity up to 70 ka prior to the initial event, before reaching an intensity minimum coinciding with the directional excursion maximum. A second palaeointensity minimum is also observed after the excursional event with no associated directional change. These features are consistent with global palaeointensity stacks.

A preliminary age model based on an oxygen isotope stratigraphy, and an average sedimentation rate, implies an age of c. 122 ka for the Blake event, in broad agreement with published ages of the excursion. The age model also gives a minimum duration for the directional excursion of $\sim$9 ka. This duration is similar to that proposed for some full polarity reversals, and appears to suggest that there is no clear distinction between the duration of reversals and excursions. Our age model, however, assumes a constant sedimentation rate between two tie-points from the oxygen isotope stratigraphy. We are currently refining the age model by use of measurements of ^{230}Th concentrations in the sediments in order to assess possible variations in the sedimentation rates through the core sections of interest.

Unlike previous records of the Blake excursion that show American longitudinal preference, the transitional virtual geomagnetic poles (VGPs) obtained from Site 1062 exhibit Atlantic and African longitudinal preference. This would suggest that the dipolar component accounts for a reduced proportion of the transitional geomagnetic field. The paths show a high proportion of transitional VGPs in regions associated with low seismic velocities in the lower mantle. Therefore, unlike recent records of the Iceland Basin Excursion, the Site 1062 paths do not support the hypothesis of a link between lower mantle heterogeneities and VGP distribution; whereby transitional states preferentially coincide with 'metastable' points associated with regions of high seismic velocity.