High-resolution records of ^{10}Be production rates during the Iceland Basin excursion

M.F. KNUDSEN[1] , G.M. HENDERSON[1], M. FRANK[2], C. MAC NIOCAILL[1], AND P. KUBIK[3]

[1] Department of Earth Sciences, University of Oxford; madsk@earth.ox.ac.uk; gideonh@earth.ox.ac.uk; conallm@earth.ox.ac.uk;

[2] IfM-GEOMAR, Leibniz Institute for Marine Sciences, University of Kiel; mfrank@ifm-geomar.de;

[3] Paul Scherrer Institut, c/o Institute of Particle Physics , ETH Zurich; kubik@particle.phys.ethz.ch

The Iceland Basin (IB) geomagnetic excursion (~188 kyr) has been recorded at very high resolution in sediments from Ocean Drilling Program (ODP) Site 1063 on the Bermuda Rise (sedimentation rate ~32 cm kyr^{-1}) and from ODP Site 983 in the far North Atlantic (sedimentation rate 18 cm kyr^{-1}). Detailed records of the geomagnetic field behaviour during the IB excursion from these two sites show that the onset and termination of the excursion were associated with abrupt, synchronous changes in relative palaeointensity (RPI). Based on the same discrete samples that were used to construct palaeointensity proxies, we present high-resolution records of the detailed variations in ^{10}Be flux to the sediments at these two sites during the IB excursion.

For sediments either ratios of ^{10}Be/^{230}Th$_{ex}$ or authigenic ^{10}Be/^{9}Be are traditionally used as proxies for past cosmogenic nuclide production rates. In this study we use both parameters to estimate variations in ^{10}Be flux to the sediments at Sites 1063 and 983 during the IB excursion. At both sites, two aliquots were taken from tightly-spaced samples from the intervals that recorded the excursion. The first aliquots from Sites 1063 and 983 were subjected to a strong leach, and the ^{10}Be concentrations measured from these aliquots are normalised to ^{230}Th$_{ex}$ concentrations, obtained from measurements of completely dissolved samples. ^{10}Be concentrations from the second aliquots were subjected to a weaker leach designed to extract only authigenic ^{10}Be. Authigenic ^{9}Be was measured on the same solution. The seawater ^{10}Be/^{9}Be signal recovered in this way provides an alternative estimate of ^{10}Be production rates during the excursion.

Preliminary results indicate that the observed drop in geomagnetic field intensity during the excursion was associated with a concomitant increase in ^{10}Be production rates. Given that estimates of RPI and ^{10}Be production rates are obtained from the same samples, we can investigate in detail how abrupt changes in Earth's magnetic field affect the depostion of ^{10}Be in marine sediment records. Such high-resolution records will furthermore help improve correlations among climate records from marine archives and ice cores.