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Unravelling source regions of ice rafted debris within three NE Atlantic marine sediment cores during the deglacial interval: a multi-proxy approach

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Ice-rafted debris (IRD) within marine sediments of the North Atlantic provide an important archive of glacial activity on adjacent landmasses and attest to the activity of multiple calving ice margins during the last glacial cycle. IRD records therefore provide a means to reconstruct ice sheet dynamics and their interaction with the climate system, providing evidence of both the source of the ice and the location of melting (e.g. Ruddiman, 1977; Bond and Lotti, 1995).
The complex interaction of the circum-Atlantic ice sheets and limitations of individual techniques often hinders firm source designations (i.e. IRD may be derived from multiple sources which cannot be differentiated by, for example, visual characterisation). Initial work identified diagnostic grain types that could be attributed to source areas of palaeo ice-sheets (eg: Bond & Lotti 1995) however, for the BIS, "diagnostic" basalt may be derived from sources to the east and west of the cores (Hibbert et al 2009, Scourse et al 2009). We therefore, utilise a multi-proxy approach to investigate the deglacial dynamics of the last British Ice Sheet (BIS) using inter alia lithic characterisation, fluxes of IRD to the core sites, magnetic susceptibility and a magnetic un-mixing model.
A novel application of major element geochemistry of garnets contained within ice-rafted debris of the three high resolution marine sediment cores is presented. Garnets can be used to infer provenance (e.g. Oliver 2001) as major element composition may be assigned to specific metamorphic terranes. The IRD present within these cores is believed to be predominantly sourced from the BIS (cf: Knutz et al 2001, Hibbert et al 2009). This assertion is tested through multiple analytical techniques used and replication of records across the Hebridean shelf into the deep ocean.

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