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# TRACEing Last Glacial Period (25-80 ka b2k) Tephra Horizons between North Atlantic marine-cores and the Greenland ice-cores

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Tephrochronological investigations are currently being undertaken on a network of marine cores from a range of locations and depositional settings within the North Atlantic. This work forms a component of the ERC-funded project Tephra constraints on Rapid Climate Events (TRACE). The main aim of this project is to utilise isochronous tephra horizons as direct tie-lines to correlate North Atlantic marine sequences and the Greenland ice-cores to determine the relative timing of oceanic and atmospheric changes associated with the rapid climate events that dominated the last glacial period.

Early comparisons of six North Atlantic marine records (MD99-2251, MD04-2820CQ, MD04-2829CQ, MD04-2822, MD01-2461 and JM11-19PC) and the Greenland ice-cores highlight six tephra horizons common to the ice record and one or more marine sequences. These horizons are within GS-3 (26,740 $\pm$ 390 a b2k and 29,130 $\pm$ 456 a b2k), GS-9 (38,300 $\pm$ 703 a b2k), GS-10 (40,220 $\pm$ 792 a b2k) and GS-12 (43,680 $\pm$ 877 a b2k) and the widespread North Atlantic Ash Zone II (55,380 $\pm$ 1184 a b2k). New high-resolution proxy information from MD04-2820CQ allows us to explore the relative timing of climatic changes between the Goban Spur, North Atlantic and Greenland over GI-12 to GI-8 using two tephra correlations that link the records.

Tephra horizons have been identified in the marine records through the successful use of cryptotephra extraction techniques more commonly applied to the study of terrestrial sequences. All horizons have an Icelandic source with horizons of both rhyolitic and basaltic composition isolated. The acquisition of high-resolution profiles of shard concentration and comprehensive geochemical characterisations for horizons is vital to this work. This allows us to disentangle the processes that transported material to core sites, which can include primary airfall, sea-ice rafting and iceberg rafting, and the potential impact of secondary reworking processes such as bottom current reworking and bioturbation on the stratigraphic integrity of horizons. We are also applying the innovative techniques of micromorphology and X-ray tomography to the study of these processes.