Assembly of the British Tertiary Igneous Province

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Large igneous provinces (LIPs) represent the largest localised magmatic events to occur within the last few hundred million years. With an estimated volume of extrusive rocks of 2 x 10^6 km^3 the North Atlantic Igneous Province (NAIP) is one of the largest LIPs. It includes the lavas of Baffin Island, West and East Greenland, the seaward dipping reflectors associated with the rifted margins of Greenland and NW Europe, the BTIP, the aseismic Greenland-Faeroes-Icelandic ridge and Iceland.

The BTIP forms the focus of this study. Although dated at relatively low precision, many questions persist concerning the age and duration of the volcanism preserved at many Tertiary igneous centres across the west coast of Scotland, as well as their temporal relationship to the Paleocene-Eocene boundary. The formation of these centres followed a basic pattern: (1) eruption of fissure-fed plateau lavas; (2) formation of central complexes; and (3) injection of cross-cutting dykes. This contribution details extensive fieldwork to sample the igneous centres up and down the west coast of Scotland for both high-precision geochronology (Ar/Ar and U-Pb at SUERC) and paleomagnetism (measurements to be made by the student at the Berkeley Geochronology Center). Field relationships and paleomagnetism measurements will allow for construction of a robust magnetostratigraphy for each igneous centre and subsequent state-of-the-art high-precision Ar/Ar and U-Pb ages to construct an accurate and precise geomagnetic timescale for the BTIP.

The data will allow determination of the volcanological and petrological processes at work during magma ascent through the crust, through to intrusion of plutons and dykes and eruption of lavas and pyroclastic rocks. These results will place rigorous constraints on the timing, lifespan and nature of magmatism up and down the west coast of Scotland, as well as the controls on intrusive and eruptive style. As the study sites are located on the eastern fringe of the ancestral Iceland plume head the study will provide valuable information about its structure and therefore its origin.