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Conference Report

Current research in the British Tertiary Igneous Province

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A one-day meeting on current and recent research in the British Tertiary Igneous Province, convened by Andrew Kerr, was held at the Department of Geological Sciences, University of Durham, on 1 May 1993. The meeting attracted over 50 participants, from a wide range of disciplines, including geochemistry, volcanology, petrology and structural geology. There were nine speakers and six poster presentations.

After a brief welcome, by **R.N. Thompson** on behalf of the Durham Department, **S.A. Gibson** (Durham University) reviewed her work on the Little Minch Sill Complex, Skye. Field and petrographic evidence were used to show that the internal stratigraphy of the sills could be explained by multiple intrusion. Previous workers had proposed that the sill complex were fed by the same magmatic conduits as the Skye lavas. Geochemical data, however, prove that this can not be the case since the sills had been contaminated with amphibolite facies upper crust, in contrast to the predominantly lower crustal contamination of the lavas. **G.R. Kitchener** (Glasgow University) spoke on oxygen isotope exchange during hydrothermal alteration around the Cullin intrusion, Skye. Focusing on one lava flow, close to the margin of the intrusion, he showed how $\delta^{18}O$ varied with height throughout the flow, and cast some doubt on the interpretations of $\delta^{18}O$ values by previous workers on the Skye lavas. Analysis of secondary mineral separates revealed that the chlorite and the zeolites have different $\delta^{18}O$, which suggests that the hydrothermal alteration was caused by many different pulses of fluid with variable $\delta^{18}O$ values. **S.J. Day** (Liverpool University) presented detailed field and petrographic evidence, from the Ardnamurchan central volcanic complex, for the sub-division of the 'Outer cone sheets of Centre 2' into five distinct groups. The relative ages and extent of metamorphism of each cone sheet group was shown to support a model of a magma chamber which was stable for most of its life and only underwent rapid inflation at the time of a hydrothermal quenching event. This was associated with central up-lift and caldera subsidence. **C.H. Emeleus** (Durham University) reviewed the history of research on the Sgurr of Eigg Pitchstone. Detailed field evidence was used to show that the Sgurr was indeed a late (52 Ma) lava flow, and not an intrusive body, as had been proposed by some earlier workers. The pitchstone flowed into valleys eroded in Palaeocene lavas, which were partly filled with fluviatile boulder and pebble deposits. An initial ash-fall was followed by one or more pitchstone lavas, which were in turn intruded by sub-horizontal sheets of slightly more evolved magma.

The first talk after lunch was given by **R. Kanaris-Sotiriou** (Sheffield University). He presented the results of a geochemical and mineralogical study of some Tertiary volcanic rocks drilled close to the centre of the Erlend Volcanic Complex, north of the Shetland Isles. The sequence consists of MORB-like basalts over-lying peraluminous, cordierite-bearing dacites, containing graphite. Geochemical and petrological data were used to demonstrate an origin for these rocks by crystallization of a melt formed by anatexis of carbonaceous crustal material. **A.C. Kerr** (Durham University) reported on the results of a geochemical re-investigation of the Mull lava succession, now nearing completion. The petrogenesis of main part of the succession, the Mull Plateau Group, could be explained by processes of fractional crystallization and assimilation of fusible Lewisian crust by the hottest magmas, during their turbulent ascent. Evidence for contamination of some of the earliest lavas by an incompatible element-enriched small-fraction-melt from the lithospheric mantle, was also presented. **B.R. Bell** (Glasgow University) spoke on the geochemistry and petrology of a suite of olivine tholeiite cone sheets, which cut the Cullin intrusion, Skye. He showed how the intra-suite variation could be explained in terms of low pressure fractionation of olivine, clinopyroxene and plagioclase. Radiogenic isotopes supported this conclusion, in that the cone sheet magmas had assimilated amphibolite facies Lewisian upper crust *during* fractional crystallization, in contrast to the Skye Main Lava Series, where assimilation occurred *after* fractionation.

After coffee, **J. Holroyd** (Manchester University) discussed the deformation mechanisms involved in the formation of annular fold systems around the British Tertiary intrusive complexes. With particular reference to the Suardal and Strathaird folds on Skye, he showed that they formed *before* the emplacement of the central complexes, and could not therefore, have formed during their intrusion. It was emphasized that regional (plate) stresses, the effects of regional detumescence and gravitational loading could all play a role in the development of annular fold systems. **R.W. Kent** (Edinburgh University) reviewed the geochemistry of some Hebridean picrite dykes and some picritic basalts. These were shown to be derived from parental liquids containing 12–14% MgO. In contrast, Tertiary picrites from west Greenland have been derived from parental liquids containing *c.* 19% MgO. This difference in primary magma composition between the eastern and western flanks of the infant Atlantic Ocean, was probably caused by higher mantle potential temperatures, and greater degrees of

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mantle melting in west Greenland as opposed to the Hebrides. This talk stimulated an interesting closing discussion on the nature and shape of the North Atlantic plume.

Several posters were also presented at the conference. **J. Seedhouse** (St Andrews University) presented an extensive petrogenetic reappraisal of the Glen More ring-dyke. This intrusion, with olivine-gabbro at the base and granophyre at the top, had originally been interpreted as a magma chamber displaying in-situ differentiation. New field, petrographic and geochemical evidence, however, supported an origin by magma mixing between an injected granophyric liquid and a residual dioritic magma. **D. Stephenson** (BGS Edinburgh) displayed the new redraft of the Mull BGS 1:50 000 map (Sheet 44W and part of 44E). **C.H. Emeleus** (Durham University) presented a draft version of the new BGS 1:50 000 Rum map (Sheet 60). The last two contributions related to research in progress on some of the more recent volcanism associated with the North Atlantic plume. **S.C. Loughlin** (Durham University) presented a poster on the tectonomagmatic evolution of southern Iceland and particularly the Eyjafjallajokull volcano. **V.L. Hards** (Durham University) presented data relating to the evolution of the Snaefell subglacial complex, Eastern Iceland.

The meeting successfully drew together people working on many aspects of the British Tertiary Igneous Province, and the informal atmosphere of the meeting encouraged much discussion. The conference clearly showed that, although the Province has been the subject of much attention in the past, there is still much work to be done especially in attempting to relate the magmatism of the Province to the wider North Atlantic Igneous Province.

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