Detailed histories of magma transfer and contamination in a flood basalt province – a Sr isotope micro-sampling study of Skye basalts

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Existing models for the magmatic plumbing system under the volcanic centres from the British Tertiary Igneous Province (e.g. Isle of Skye), suggest a complex structure of basic magmas following different routes through the crust and being delayed at various levels within the crust, where fractional crystallisation ± crustal assimilation ± magma mixing processes occurred. These models, based on whole rock data, are thought to have generated wide variations in trace element and isotopic compositions characteristic of the BTIP lavas. Here, we aim to determine if this model held true or could be further constrained at the crystal scale. We focus on dykes and lavas associated with the Preshal More magma-type. Albitic feldspars (An35) from the glassy margins of a dyke have radiogenic $^{87}Sr/^{86}Sr$ ratios (0.7072-0.7077) compared with anorthitic plagioclase (An52) from the dyke centre (0.7047-0.7057). These variations are from fresh drilled feldspars that have not been affected by hydrothermal alteration. Crystals from the dyke centre show oscillatory zoning in $^{87}Sr/^{86}Sr$, suggesting a prominent role for multiple magma chamber filling episodes and crystal recycling. The Preshal More lava flow contains feldspars (An89) that display minimal zonation for $^{87}Sr/^{86}Sr$ (0.7032-0.7039). Whole rock data indicates a close relationship between the dykes and the lava. However, our micro-sampling clearly indicates that the lava feeder escaped any significant crustal interaction compared with the dykes and may not have paused en-route to the surface. We will present data from the Skye Main Lava Series that, together the above data document a highly variable, often complex physical and chemical evolution of each sample.