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Boron isotope composition of feldspars from peralkaline ignimbrite 'A', Gran Canaria: tracing magmatic processes.

V.R. Troll (1), F.M. Deegan (1), A. Deyhle (2), and T.H. Hansteen (3)

(1) Uppsala University, Sweden (valentin.troll@geo.uu.se), (2) Scripps Oceanographic Institute, San Diego, California, U.S.A., (3) Leibniz-Institute of Marine Sciences, IFM-Geomar, Kiel, Germany

Miocene peralkaline ignimbrite 'A' on Gran Canaria comprises three distinct end member magma types: a comenditic trachyte ($SiO_2 \approx 65\%$) and two comdenditic rhyolites ($SiO_2 \approx 70\%$). The three magmas are distinct in their field appearance, mineralogy, major and trace element concentrations, and their radiogenic and oxygen isotope compositions. Feldspar is the dominant phenocryst phase, with a characteristic feldspar composition identified in each end member magma. We analysed a suite of feldspar samples from ignimbrite 'A' for their boron concentrations and δ^{11}B composition to test the use of B isotopes in magmatic feldspar as a tracer for differentiation and magma chamber processes. The B concentrations and δ^{11}B ‰ values for ignimbrite 'A' feldspars range from 37.1ppm to 51.5ppm and from –3.55 to + 3.48 ‰ for trachyte to most evolved rhyolite compositions, respectively. We also analysed three crustal rock compositions: (a) igneous ocean crust, (b) sedimentary ocean crust, and (c) hydrothermally overprinted plutonic rocks from the island's intrusive core.

The overall B concentration and δ^{11}B trends displayed by the ignimbrite 'A' feldspar data can be explained by a combination of crystal fractionation and progressive contamination of trachyte to rhyolite magmas. The B data suggest a contaminant that is best reflected by a mixture between sedimentary portions of the oceanic crust and rocks of the island's intrusive core. The data also suggest initial contamination of a parental magma to the trachyte end-member by low-temperature altered basalt (ocean crust layer 2A) carrying a sea-water signature. The observed correlation between existing data and that from B in our feldspars demonstrates the applicability of the B isotopes as a potentially powerful petrogenetic tracer for dynamic igneous systems.