Geochemistry and Hf-Nd isotope systematics of Archaean boninite-norite dykes, Maniitsoq, Greenland

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Noritic magmas with boninite-like geochemical affinities were emplaced in a number of Archaean cratons worldwide during the Neoarchaean and Palaeoproterozoic[1]. A notable occurence are boninite-norite (BN) dykes from the North Atlantic Craton in southern West Greenland. These dykes show excellent preservation of igneous textures and little evidence for crystal accumulation[2], making them an ideal subject to study the petrogenesis of this widespread but temporally restricted magmatic suite.

We present new major and trace element, preliminary Lu-Hf and Sm-Nd isotope data, and preliminary U-Pb baddeleyite and zircon age data for the BN dykes of the Maniitsoq region, southern West Greenland. Similar to other BN suites, these dykes are highly magnesian (13 – 23 wt% MgO), with highly fractionated trace element patterns showing elevated LILEs, depleted HFSEs (with the exception of Zr), and fractionated REEs (La/Yb > 10). Depleted HREE concentrations imply that the dykes formed from a highly depleted source, while elevated highly incompatible elements suggest the source or magmas were later re-enriched through mantle metasomatism and/or assimilation of continental crust. Preliminary U-Pb baddeleyite and zircon age data suggests that the dykes formed at ca. 2.5 Ga, and the presence of older xenocrystic zircons confirms that the magmas incorporated older Archaean crust. Modelling of trace element, Lu-Hf, and Sm-Nd data is used to quantify and correct for the effect of this crustal assimilation, and constrain the mantle source composition of the BN dykes. We discuss whether an asthenospheric or lithospheric source is required, and the implications of BN magmatism for the geodynamic environment of the North Atlantic Craton at 2.5 Ga.

[1] Srivastava (2008), *Int. Geology Review* 50, 61 – 74
[2] Hall and Hughes (1987), *Contrib. Mineral. Petrol.* 97, 169 – 182