



Silicic Magma Genesis in Neogene Central Volcanoes in Northeast Iceland

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We report on a geological expedition to NE Iceland in August 2011. A comprehensive sample suite of intrusive and extrusive rocks, ranging from basaltic to silicic compositions, was collected from the Neogene silicic central volcanic complexes in the region between Borgarfjörður eystri and Loðmundarfjörður. The area contains the second-most voluminous occurrence of silicic rocks in Iceland, including caldera structures, inclined sheet swarms, extensive ignimbrite sheets, sub-volcanic rhyolites and silicic lava flows. Yet it is one of Iceland's geologically least known areas (c.f. Gústafsson, 1992; Martin & Sigmarsdóttir, 2010; Burchardt et al., 2011).

The voluminous occurrence of evolved rocks in Iceland (10-12 %) is very unusual for an ocean island or a mid-oceanic ridge, with a typical signal of magmatic bimodality, often called "Bunsen-Daly" compositional gap (e.g. Bunsen, 1851; Daly, 1925; Barth et al., 1939). The Bunsen-Daly Gap is a long-standing fundamental issue in petrology and difficult to reconcile with continuous fractional crystallization as a dominant process in magmatic differentiation (Bowen, 1928), implying that hydrothermal alteration and crustal melting may play a significant role. Our aim is to contribute to a solution of this issue by unravelling the occurrence of voluminous evolved rhyolites in NE Iceland.

We will use a combined petrological, textural, experimental and in-situ isotope approach. We plan to perform major, trace element and Sr-Nd-Hf-Pb-He-O isotope geochemistry, as well as U/Pb and Ar/Ar geochronology on rocks and mineral separates. In addition, high pressure-temperature partial melting experiments aim to reproduce and further constrain natural processes. Using the combined data set we intend to produce a comprehensive and quantitative analysis of rhyolite petrogenesis, and of the temporal, structural and geochemical evolution of the silicic volcanism in NE Iceland. The chosen field area serves as a good analogue for active central volcanoes in Iceland, such as Askja and Krafla, where a close interaction of basaltic and more evolved magma has led to explosive eruptions.

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