



## **Magma mixing and hybridization processes in partially crystallized magma chambers: the Austurhorn intrusion (SE Iceland)**

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The Tertiary Austurhorn intrusive complex in SE Iceland is believed to represent a large exhumed magma chamber with an extensive history of magma mixing and mingling. The basal part of the intrusion consists of granophyric host rocks which have been intensively intruded by different pulses of more mafic rocks. The association of granophyres, basic and hybrid rocks at Austurhorn are known as a “net-veined complex” in the literature, but field relations suggests a much more complex history. Different mafic pillows can be distinguished in the field and morphologies range from near-ideal pillow shapes to fragmented pillows incorporated into intermediate rocks. Rapid quenching of some mafic pillows results in chilled margins, whereas others do not seem to follow the same thermal history. In pillows which lack a chilled rim plagioclase phenocrysts are randomly distributed and can be identified extending all the way to the outer rim compared to an absence of phenocrysts in outer parts of the quenched pillow margins. Complex cross-cutting correlations between different hybrid generations can be distinguished in numerous exposed outcrops. Near the contact of the intrusion the granophyric magma display brittle deformation indicated by the presence of sharp and blocky enclaves separated by mafic veins. The complexity of the mixing increases towards the center of the intrusion, where chaotic hybrid rocks dominate the lithology.

New magma input locally increases the host temperature and changes the rheology of both the felsic and basic magma. Repeated reheating episodes due to multiple magma injections decrease the viscosity of the granophyres and promote chemical diffusion. Compared to previous studies on the petrology of the Austurhorn intrusion our 65 bulk rock samples show linear trends suggesting continuous mixing between the mafic and silicic end-members. Textural observations in the field and bulk rock analysis suggest that hybrid rocks, in case of Austurhorn with andesitic composition, are formed by several mafic replenishment events into the basal part of an already partially crystallized felsic magma chamber.