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Eruption reconstruction and geochemical evolution of the post-glacial Grænavatnsbruni lava field, Krafla volcanic system, NE Iceland

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The Krafla fissure swarm, in north eastern Iceland, is characterized by open fissures, faults and nested grabens. The Grænavatnsbruni lava field constitutes the southernmost eruption in the Krafla fissure system, and is situated just south of the Lake Myvatn. The eruption belongs to the Hverfell cycle (2500-1500 BP).

The Grænavatnsbruni lava was stagnant for a while in a lava lake, which extended over the full length of the fissure. In the early stages the crust of the lava behaved plastically as pahoehoe toes formed, but when the crust attained a certain thickness it behaved more rigidly and eventually developed enough strength to retain incoming lava, thus increasing the hydrostatic pressure at the flow front. An estimate of the minimum duration of the eruption can be made by calculating the time of inflation of individual flow-lobes that are clearly separated in time. Inflation of flow lobes does not occur when the lava supply is terminated and the maximum time calculated for inflation must correspond to the minimum duration. The Grænavatnsbruni lava is well suited for testing the hypothesis that the duration of pre-historic eruptions can be estimated from inflation features, since the abundant inflation features are easily measured and the majority of lava flows emplaced during the eruption are well exposed. We also evaluate the paleo effusion rate by correlating erupted volumes with the eruption duration.

Differences in volcanism and composition of erupted magmas within the Krafla volcanic system, as well as other volcanic settings are characterized. We aim to understand the correspondence between lava chemistry, magma emplacement and rift tectonics.