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TITLE: Magma movements and Iceland's next eruptions *(Invited)*

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ABSTRACT BODY: Iceland, created by hotspot-ridge interaction, is characterized by higher magmatic input and more complicated plate boundary structure than other parts of the Mid-Atlantic rift system. It has 30+ volcanic systems, where 20 confirmed eruptions have occurred in the last 40 years, the most recent at Eyjafjallajökull in 2010 and Grimsvotn in 2011. Likely candidates for the next eruption include the four most active volcanoes in Iceland (Hekla, Katla, Grimsvotn, and Bardarbunga) and other areas of volcanic unrest (Askja region, the Krisuvik area). Present volcano monitoring and research, including the FUTUREVOLC project, aims at providing warnings of impending eruptions and their character. Earthquake monitoring and deformation studies have hereto provided the most relevant information. Hekla continuously accumulates magma at a rate of about 0.003-0.02 km3/yr, according to GPS and InSAR studies, in a magma chamber placed below 14 km depth. A sequence of M0.4-1 earthquakes early this year stands out from otherwise mostly aseismic character of Hekla during repose periods. The Hekla magma chamber does not fail at a constant amount of magma volume, rather a clear pattern is observed with eruption size scaling with the length of the preceding period of dormancy. The ice capped Katla volcano shows unusual annual deformation pattern, seismic activity, and hydrological variations depending on time of year, presumably related to ice load and water pressure variations. It may be in a critical stage and renewed inflow of magma may quickly move the volcano towards failure. Bardarbunga had major earthquake and magma transfer activity in 1996, and has been the site of deep low-frequency earthquakes. Grímsvötn volcano is the only volcano with a shallow magma chamber with ongoing confirmed recharging, and failure criteria closest to "expected". A large eruption occurred in 2011 compared to much smaller eruption in 2004. However, the amount of erupted magma did not scale with the amount of deflation in these eruptions. The above examples show how the style of magma transfer and plumbing systems at Icelandic volcanoes have different characteristics, even though these volcanoes are all in an area of hotspot-ridge interaction.

KEYWORDS: 8419 VOLCANOLOGY Volcano monitoring, 8414 VOLCANOLOGY Eruption mechanisms and flow emplacement, 8488 VOLCANOLOGY Volcanic hazards and risks, 4341 NATURAL HAZARDS Early warning systems.

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Additional Details

Previously Presented Material: 10% previous AGU meetings

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