Geophysical Research Abstracts
Vol. 13, EGU2011-14208, 2011
EGU General Assembly 2011


# Forecasting Eruptions of Hekla Volcano, Iceland, using Borehole Strain Observations

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For over 30 years, deformation signals from seismic and volcanic processes in south-west Iceland have been captured by a regional network of Sacks-Evertson strainmeters. Grouted into bedrock at borehole depths ranging 125 to 400 m, these instruments record dilatational strain continuously, allowing strain changes as small as 0.1 nanostrain to be resolved. When installed originally, the network comprised seven stations - four of which are operational today. Here we outline the role and future potential of the network in forecasting and monitoring volcanic eruptions. The strainmeter network has proved essential for forecasting eruptions of Hekla - historically Iceland's most active volcano with 25 summit eruptions since the twelfth century. Positioned 15 km north-west of the volcano's summit, BUR was the closest strainmeter to Hekla between 1979 and 2010. Strain changes registered at BUR tens of minutes before the 1991 and 2000 eruptions of Hekla enabled public warnings to be issued before each eruption began. To further monitoring capabilities, and to better-resolve magma geometry during Hekla eruptions, we installed a fifth volumetric strainmeter 5 km south-east of the volcano in September 2010; positioned at a depth of 178 m, this site (HEK) is thought to be about ten times more sensitive than BUR to dike intrusions beneath Hekla. Alongside the installation of HEK, a network-wide upgrade of strain acquisition and telemetry hardware is under way. In combination with continuous GPS observations and space geodetic data, strategically sited strainmeters can offer unparalleled insights into magmatic processes leading to volcanic eruptions.