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TITLE: Inflation and deflation episodes in the Krisuvik volcanic system

AUTHORS (FIRST NAME, LAST NAME): Karolina Michalczewska¹, Sigrun Hreinsdottir¹, Thora Arnadottir², Sigurlaug Hjaltadottir³, Thorbjorg Agustsdottir¹, Magnus Tumi Gudmundsson¹, Halldor Geirsson⁴, Freysteinn Sigmundsson², Gunnar Gudmundsson³

INSTITUTIONS (ALL): 1. Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland.
2. Nordic Volcanological Center, Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland.
3. Research Department, Icelandic Meteorological Office, Reykjavik, Iceland.
4. Department of Geosciences, Pennsylvania State University, Dunmore, PA, United States.

ABSTRACT BODY: Krísuvík is a volcanic system with a high-temperature geothermal area, located in the central part of the Reykjanes Peninsula, SW Iceland. The area is seismically very active with the largest earthquakes (M 5-6) associated with a system of N-S trending, right-lateral strike-slip faults. In early 2009 GPS measurement at a continuous station KRIV suggested inflation of the Krísuvík geothermal area, which was confirmed by ENVISAT interferometric synthetic aperture radar (InSAR) data. The uplift episode continued until fall of 2009 when the area began to subside, reaching the pre-inflation state in early spring 2010. In April 2010 another uplift episode started which continued until the end of 2011. It was followed by another subsidence episode however at present the area is re-inflating, confirmed both by GPS and InSAR data.

The deformation registered by the GPS stations in Krisuvik show variable uplift / subsidence rates. At station closest to the inflation center the uplift rate exceeded 50 mm/yr in 2010. TerraSAR-X images (in both ascending and descending orbits) have been acquired at different phases of crustal deformation showing the extent of the uplift and supporting the GPS observations.

Modeling of the collected data is used to determine the deformation source parameters. The background strain accumulation is estimated and removed from the data by a simple screw dislocation model for data acquired prior to 2009. The remaining deformation signals are then modeled using simple Mogi sources, estimating the volume change and depth to the source. The preliminary results suggest an inflation source at 4-5 km depth located beneath Sveifluháls area. In addition to geodetic data repeated gravity measurements will be used to help constraining the nature of the source and its depth. Precise gravity measurements have been performed regularly on numerous sites since 2010 in the Krisuvik area, including sites along a profile crossing the inflation center.

Seismic activity in the Krísuvík area in last two years has been reflecting the ongoing deformation character, more frequent earthquakes were recorded during the inflation periods. In late February 2011 a seismic swarm occurred in Krísuvík with eight events of magnitude exceeding 3, many felt in Reykjavík. The largest (M 4.2) occurred on the 27 February and was located just west of lake Kleifarvatn. The earthquakes lineate a N-S trending structure and coseismic GPS displacements suggest right lateral rupture on a N-S trending strike-slip fault. On 1 March 2012 a swarm of earthquakes of magnitudes up to M 4.2 stroke near Helgafell, just few km NE of the inflating area. The fault plane solutions indicate right lateral motion on another N-S trending fault, consistent with characteristics of the Reykjanes Peninsula. Since May 2012,

when another inflation episode started, an increased seismic activity in the Krísuvík region is observed.

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Additional Details

Previously Presented Material:

Contact Details

CONTACT (NAME ONLY): Karolina Michalczewska

CONTACT (E-MAIL ONLY): karolina@hi.is

TITLE OF TEAM:
