



The Icelandic Volcanoes Supersite: Integrating InSAR space geodetic results into interdisciplinary hazard response and volcano science studies

Freysteinn Sigmundsson (1), Michelle Parks (1), Stéphanie Dumont (1), Vincent Drouin (1), Werner Wittman (1), Andy Hooper (2), Marco Bagnardi (2), Karsten Spaans (2), Jeanne Giniaux (2), Benedikt G. Ófeigsson (3), Sigrún Hreinsdóttir (4), Halldór Geirsson (1), Kristín Vogfjörð (3), Kristín Jonsdóttir (3), Siqi Li (1), Talfan Barnie (1), Magnús Tumi Gudmundsson (1), Sara Barsotti (3), Ágúst Gunnar Gylfason (5), and Björn Oddsson (5)

(1) Nordic Volcanological Center, Institute of Earth Sciences, University of Iceland (fs@hi.is), (2) COMET, School of Earth and Environment, University of Leeds, Leeds, UK, (3) Icelandic Meteorological Office, Iceland, (4) GNS Science, Lower Hutt 5040, New Zealand, (5) National Commissioner of the Icelandic Police, Department of Civil Protection and Emergency Management, Iceland.

The Icelandic Volcanoes Supersite was established in 2013 as a permanent supersite under the GEO initiative on Geohazard Supersite and Natural Laboratories. The supersite has received support from the Committee on Earth Observation Satellites (CEOS) in the form of several hundred SAR satellite images per year. The most extensively used satellite data are those from the COSMO-SkyMed and TerraSAR-X satellites. Interferometric Synthetic Aperture Radar (InSAR) techniques have been used to generate a time series of high-resolution ground displacement along the line-of-sight from ground to satellite. The data have been integrated and interpreted together with ground-based observations including continuous and campaign GPS measurements of three-dimensional ground displacements, and earthquake observations. In 2012-2016 this was carried out within the framework of the FUTUREVOLC project, a 26-partner project funded by FP7 Environment Programme of the European Commission, addressing the topic “Long-term monitoring experiment in geologically active regions of Europe prone to natural hazards: the Supersite concept”. Data, results and information on Icelandic volcanoes produced during this project are stored at the Icelandic Volcanoes Web Portal operated by the Icelandic Met Office (<http://icelandicvolcanoes.is>). The InSAR data were used throughout the 2014-2015 Holuhraun eruption to study the major unrest, dyking and caldera collapse within the Bardarbunga volcanic system, and contributed significantly to the response to these events. The data have also been used to study ground deformation and subsurface pressure changes at Hekla, Krafla, Askja, Eyjafjallajökull, Katla, Krísuvík and Reykjanes volcanoes. We present an overview of results and lessons learned at several example volcanoes in terms of magma transfer and storage, changes in volcano behaviour, and how the supersite data have been used for disaster risk reduction.