



European collaboration for improved monitoring of Icelandic volcanoes: Status of the FUTUREVOLC project after the initial 18 months

Stéphanie DUMONT (1), Michelle Parks (1), Freysteinn Sigmundsson (1), Kristín Vogfjörð (2), Heiðveig María Einarsdóttir (2), Magnús Tumi Gudmundsson (1), Ingvar Kristinsson (2), Sue Loughlin (3), Evgenia Ilyinskaya (3), Andrew Hooper (4), Arve Kylling (5), Claire Witham (6), Chris Bean (7), Aoife Braiden (7), Maurizio Ripepe (8), Fred Prata (9), Einar Pétur Heiðarsson (10), and other members of the FUTUREVOLC team (11)

(1) Nordic Volcanological Center, Institute of Earth Sciences, University of Iceland, Reykjavik, Iceland (sd@hi.is), (2) Icelandic Meteorological Office, Reykjavik, Iceland, (3) British Geological Survey, Edinburgh, UK, (4) School of Earth and Environment, University of Leeds, Leeds, UK, (5) NILU-Norwegian Institute for Air Research, Kjeller, Norway, (6) UK Met Office, Devon, UK, (7) University College Dublin, Dublin, Ireland, (8) University of Florence, Florence, Italy, (9) Nicarnica Aviation, Kjeller, Norway, (10) Department of Civil Protection and Emergency Management, Reykjavik, Iceland, (11) FUTUREVOLC Consortium, EC FP7 project

The FUTUREVOLC project funded by the European Union (FP7) is devoted to volcanic hazard assessment and establishing an integrated volcanological monitoring procedure through a European collaboration. To reach these objectives the project combines broad expertise from 26 partners from 10 countries, focusing on the four most active volcanoes of Iceland: Grímsvötn, Katla, Hekla and Bárðarbunga. The geological setting of Iceland, the high rate of eruptions and the various eruption styles make this country an optimal natural laboratory to study volcanic processes from crustal depths to the atmosphere.

The project, which began on 1 October 2012, integrates advanced monitoring and analytical techniques in an innovative way, focusing on (i) detailed monitoring to improve our understanding of the seismic/magmatic unrest, in order to estimate the amount of magma available for an eruption and to provide early warnings (ii) the dynamics of magma in the conduit and a near real time estimation of the mass eruption rate and (iii) observing and modelling the plume dynamics. The project design considers effective collaboration between partners and aims for efficient cross-disciplinary workflows.

A major step during the first 18 months of the project was the installation of additional equipment in the volcanic regions of Iceland to reinforce and complement the existing monitoring. The instruments include: seismometers, GPS stations, MultigAS detectors, DOAS, infrasonic arrays, electric field sensors, radars, and optical particle sizers. Data streaming is designed to withstand extreme weather conditions.

The FUTUREVOLC project has an open data policy for real and near-time data. Implementation of a data hub is currently under way, based on open access to data from the 2010 Eyjafjallajökull eruption. Access to volcano monitoring data through a common interface will allow timely information on magma movements facilitated through combined analysis.

A key part of the project is to combine ground based measurements with satellite observations for both monitoring ground deformation (e.g. GPS, tilt and InSAR) and quantifying the plume parameters (using ground and space based IR sensors). An important complementary effort is the establishment of an "Icelandic Volcanoes" permanent Geohazard Supersite by the Committee on Earth Observation Satellites (CEOS). The support by CEOS plays a vital role in providing greater access to past and future SAR acquisitions over the coming years, therefore promoting a better understanding of magma migration over long time periods.

New methods will be developed within FUTUREVOLC, taking into consideration all aspects of a volcanic crisis - not only to improve our understanding of magmatic processes, but also for the delivery of relevant information to civil protection and local authorities. A report on the lessons learned from Eyjafjallajökull 2010 is in preparation in this regard.