



## **An overview of the Icelandic Volcano Observatory response to the on-going rifting event at Bárðarbunga (Iceland) and the SO<sub>2</sub> emergency associated with the gas-rich eruption in Holuhraun**

Sara Barsotti, Kristin Jonsdóttir, Matthew J. Roberts, Melissa A. Pfeffer, Benedikt G. Ófeigsson, Kristin Vögfjord, Gerður Stefánsdóttir, and Elin B. Jónasdóttir

Icelandic Meteorological Office, Iceland

On 16 August, 2014, Bárðarbunga volcano entered a new phase of unrest. Elevated seismicity in the area with up to thousands of earthquakes detected per day and significant deformation was observed around the Bárðarbunga caldera. A dike intrusion was monitored for almost two weeks until a small, short-lived effusive eruption began on 29 August in Holuhraun. Two days later a second, more intense, tremendously gas-rich eruption started that is still (as of writing) ongoing.

The Icelandic Volcano Observatory (IVO), within the Icelandic Meteorological Office (IMO), monitors all the volcanoes in Iceland. Responsibilities include evaluating their related hazards, issuing warnings to the public and Civil Protection, and providing information regarding risks to aviation, including a weekly summary of volcanic activity provided to the Volcanic Ash Advisory Center in London. IVO has monitored the Bárðarbunga unrest phase since its beginning with the support of international colleagues and, in collaboration with the University of Iceland and the Environment Agency of Iceland, provides scientific support and interpretation of the ongoing phenomena to the local Civil Protection. The Aviation Color Code, for preventing hazards to aviation due to ash-cloud encounter, has been widely used and changed as soon as new observations and geophysical data from the monitoring network have suggested a potential evolution in the volcanic crisis.

Since the onset of the eruption, IVO is monitoring the gas emission by using different and complementary instrumentations aimed at analyzing the plume composition as well as estimating the gaseous fluxes. SO<sub>2</sub> rates have been measured with both real-time scanning DOASEs and occasional mobile DOAS traverses, near the eruption site and in the far field. During the first month-and-a-half of the eruption, an average flux equal to 400 kg/s was registered, with peaks exceeding 1,000 kg/s. Along with these measurements the dispersal model CALPUFF has been initialized daily and run to provide the dispersal of the SO<sub>2</sub> volcanic cloud across the country. Daily 72-hours forecasts of SO<sub>2</sub> ground concentration are available on the IMO webpage. If critical concentration are expected in inhabited areas, the meteorologist on duty is in charge to promptly issuing a specific warning on the web. The IMO web-page has also been improved with a registration form, open to the public, for reporting SO<sub>2</sub> contamination and poor air quality conditions due to the eruption.

A long-term hazard assessment for the high concentrations of SO<sub>2</sub> affecting the country has also been requested from IVO (IMO) by the Icelandic Civil Protection. For this purpose two hazard zoning maps, showing the areas potentially affected by specific concentration levels have been produced. The two maps have been constructed for probability of occurrence equaling 50% and 90%, respectively.

Based on all these information and advices, the Civil Protection is taking decisions for what concerns precautionary measures like for example the limitation of accessibility to the eruption site, the evacuation of exposed areas, and the issuing of warnings and information for mitigating discomforts to inhabitants and tourists.