Monitoring volcanoes in Iceland: an update

Melissa Anne Pfeffer (melissa@vedur.is), Sigrún Karlsdóttir, bôður Arason, Hermann Argrímssson, Sara Barsotti, Baldur Bergsson, Bergur H. Bergsson, Hálfdór Björnsson, Evgenia Ilyinskaya, Kristín Jónsdóttir, Ingvar Kristinsson, Sibylle von Löwis, Guðrún Nina Petersen, Matthew J. Roberts, Gunnar S. Sigurðsson, Kristín Vogfjörð, Richard Yeo and Hróbjartur Þorsteinsson

Icelandic Meteorological Office

Pre-eruptive monitoring

The Icelandic Meteorological Office is responsible for monitoring pre- and syn-eruptive volcanic activity, monitoring volcanic emissions in the atmosphere, and disseminating information. There are ~32 active volcanic systems in Iceland (Fig. 1).

Pre-eruptive monitoring has emphasized seismic- (Fig. 2), GPS- (Fig. 3), strain-, tilt- and hydrological measurements (Fig. 4). These networks are being expanded and gas- and infrasound measurements are now included.

Air-borne eruption product monitoring

The atmospheric monitoring system includes ~210 weather stations, a mobile sounding station (Fig. 5), and lightening detectors (Fig. 6) to provide meteorological properties inside and outside of an eruption cloud. Two fixed C-band weather radars and two mobile dual-polarization X-band radars (Fig. 7) are operated. Radars provide information on the maximum height and location of the eruption cloud, indicate emission rate, and may provide experimental products such as columnar ash concentration. Two scanning Lidars will arrive in November 2013. One will be fixed at Keflavík airport and one mobile. These may provide information on the location of air-borne ash, sphericity of particles, and cloud thickness. Seven ceilometers will retrieve cloud base height.

Two particle counters will measure the concentration and ash size distribution at the ground. Fixed and mobile DOAS (Fig. 8) and MultiGas (Fig. 9) instruments may provide information on the emission rate of SO$_2$ and the ratios of H$_2$S, CO$_2$, and H$_2$O. UV, visible and IR cameras will provide information on maximum cloud height and particle velocities within a cloud. Satellite products based on SEVIRI, AVHRR, MODIS and GOME-2 instruments will be used for determining the location of an eruption cloud and deposited products and to provide information about the ash and SO$_2$ mass loading, cloud height, and ash effective radius.