



The 2014 Holuhraun volcanic eruption gas emission: a case study of an extreme SO₂ concentration event

Elín Björk Jónasdóttir (1), Guðrún Nína Petersen (1), Halldór Björnsson (1), Melissa Anne Pfeffer (1), Sara Barsotti (1), Þorsteinn Jóhannsson (2), and Tobias Dürig (3)

(1) Icelandic Meteorological Office, Reykjavik, Iceland (elin@vedur.is), (2) The Environment Agency of Iceland, Reykjavik, Iceland (thorsteinnj@umhverfisstofnun.is), (3) Earth Science Institute, University of Iceland, Reykjavik, Iceland (tobi@hi.is)

The ongoing fissure eruption in Holuhraun associated with the volcanic unrest in Bárðarbunga, is unique among recent eruptions in Iceland for its high emission rates of volcanic gases. The plume is relatively ash free, but predominantly a bent over vapour plume and its height depends mainly on the atmospheric conditions at the eruption site.

CO₂ and SO₂ are abundant in the primarily water vapor plume with lower concentrations of H₂S, HCl and HF. During the first month and a half the preliminary SO₂ flux was ~400 kg/s with some days greater than 1000 kg/s. The gas is dispersed from the eruption and transported by wind, and can lead to high pollution levels in exposed populated areas in Iceland. During high wind events and when nearby weather systems lead to rapid change in wind directions the local population has not been much affected by the emission, as the gas is transported off land and/or the pollution plume is narrow and moves around.

However, during certain conditions, usually light winds and low-level temperature inversions, the concentration of gas builds up at the eruption site and then either flows down from the highlands with katabatic wind or is advected from the eruption site when the synoptic situation changes. Depending on the atmospheric conditions, high concentrations of SO₂ can be transported in the boundary layer and have been detected at ground level in populated areas.

Here we describe one such event, the event of 26 and 27 October 2014, when the village Höfn, in southeast-Iceland, experienced gas concentrations exceeding 14000 µg/m³, a concentration considered hazardous to health. We describe the weather conditions prior and during the event as well as the gas dispersion.