Modeling of SO_2 dispersion from the 2014 Holuhraun eruption in Iceland using WRF-Chem

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The fissure eruption in Holuhraun in central Iceland is the country's largest lava and gas eruption since 1783 but has produced very little volcanic ash. The eruption started in late August 2014 and is still ongoing as of January 2015. The main threat from this event has been atmospheric pollution of SO_2 that is carried by wind to all parts of the country and produces elevated concentrations of SO_2 that have frequently violated National Air Quality Standards (NAQS) in many population centers.

The Volcanic Ash Research (VAR) group in Iceland is focused on airborne measurement of ash contamination to support safe air travel, as well as various gas concentrations. In relation to the Holuhraun eruption the VAR group has organized an investigation campaign including 10 measurement flights and performed measurements of both the source emissions and the plume distribution. SO_2 concentrations measured at the source showed clear potential for creating pollution events in the toxic range and contamination of surface waters.

The data obtained in the measurement campaign was used for calibration of the WRF-chem model of the dispersion of SO_2 and volcanic ash concentration. The model has both been run in operational forecast mode (since mid October) as well as in a dynamical downscaling mode, to estimate the dispersion and fallout of SO_2 from the plume. The model results indicate that a large part of the sulphur was precipitated in the Icelandic highlands. The first melt waters during the spring thaw are likely to contain acid sulphur compounds that can be harmful for vegetation, with the highland vegetation being the most vulnerable.

These results will be helpful to estimate the pollution load on farmlands and pastures of farmers.