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Simulating the propagation of sulphur dioxide emissions from the fissure eruption in the Holuhraun lava field (Iceland) with the EURAD-IM

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In the emergency case of a volcano eruption accurate forecasts of the transport of ash and gas emissions are crucial for health protection and aviation safety.
In the frame of Earth System Knowledge Platform (ESKP) near real-time forecasts of ash and SO_2 dispersion emitted by active volcanoes are simulated by the European Air pollution Dispersion Inverse Model (EURAD-IM). The model is driven by the Weather Research and Forecasting Model (WRF) and includes detailed gas phase and particle dynamics modules, which allow for quantitative estimates of measured volcano releases. Former simulations, for example related to the Eyjafjallajökull outbreak in 2010, were in good agreement with measurement records of particle number and SO_2 at several European stations.
At the end of August 2014 an fissure eruption has begun on Iceland in the Holuhraun lava field to the north-east of the Bardarbunga volcano system. In contrast to the explosive eruption of the Eyjafjallajökull in 2010, the Holuhraun eruption is rather effusive with a large and continuous flow of lava and a significant release of sulphur dioxide (SO_2) in the lower troposphere, while ash emissions are insignificant.
Since the Holuhraun fissure eruption has started, daily forecasts of SO_2 dispersion are produced for the European region (15 km horizontal resolution grid) and published on our website (http://apps.fz-juelich.de/iek-8/RIU/vorhersage_node.php). To simulate the transport of volcanic emissions, realistic source terms like mass release rates of ash and SO_2 or plume heights are required. Since no representative measurements are currently available for the simulations, rough qualitative assumptions, based on reports from the Icelandic Met Office (IMO), are used. However, frequent comparisons with satellite observations show that the actual propagation of the volcanic emissions is generally well reflected by the model.
In the middle of September 2014 several European measurement sides recorded extremely high SO_2 concentrations at ground level which were predicted quite accurately in advance by the EURAD-IM. Further more, the simulations indicate that the unusual high SO_2 values are due to the transport of sulphur dioxide rich air from the Bardarbunga towards continental Europe.
Presently, SO_2 dispersion forecasts are also conducted on a finer spatial resolution grid (1 km) for the Icelandic region. These simulations will be validated against measurements from different observation sides in Iceland.