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Dispersion modeling and science into operations at the Icelandic Met. Office

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The Icelandic Volcano Observatory (IVO) coexists within the Icelandic Meteorological Office (IMO) and includes staff from different departments: Early-warning and Forecasting, Research, Observation and IT ones. During a volcanic unrest, IVO is in charge to monitor the ongoing event, to issue warnings in case of impending volcanic hazards and to forecast their evolution and impact to the population on a local scale. At the same time IMO is in charge to issue warnings to the aviation and provide the information regarding the transport of volcanic ash in the atmosphere. Its twofold soul makes IMO an exceptional player, in case of an eruption, that will coordinate and manage communication and dissemination of data toward a wide range of end-users (Civil protection, local population, aviation community, VAAC, meteorological offices).

Since the eruption at Eyjafjallajökull in 2010 and the most recent eruption at Holuhraun in 2014-2015, IMO/IVO has worked to improve its monitoring network, the data processing and the numerical modelling capabilities. This has been aimed to facilitate the interpretation of the ongoing events and to improve both the implemented early-warning system and the quality of the issued forecasts.

Different numerical models to simulate volcanic gas and ash dispersal have been implemented at IMO and are used for operational use. Dispersal model results are currently available to the meteorologists in charge of issuing SIGMET for volcanic ash. In case of an eruption these information, together with the official volcanic ash charts produced by London VAAC, are important elements used to draw the polygon around the „contaminated“ area that will be communicated to the aviation stake-holders.

In order to estimate the size of the eruption, and consequently the input data for the dispersal models, the first information available is the observation of the plume height as detected by the radar network. This information is then processed to assess the mass flow rate and to constrain better the intensity of the ongoing event taking into account atmospheric effects on the plume dynamics and the final height.

During the gas-rich eruption occurred at Holuhraun, hourly SO₂ dispersal forecasts, initialized with data from DOAS measurements, have been publicly accessible on the IMO's web-site with references to the health safety concentration values defined by the Environmental Agency of Iceland. Probabilistic maps of SO₂ ground concentrations have also been produced during the eruption to assess hazards around the eruption site and to address and support decisions taken by the Civil Protection for what concerns the closure of the area.

The talk will present the procedures that take place at IMO/IVO during an eruption originating from Icelandic volcanoes. Special focus will be dedicated to the main steps occurring from the acquisition of the observation, to the dispersal modelling, to the forecast, to the final products disseminated to different end-users.