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## **Real-Time Estimation of Mass Eruption Rate and Ash Dispersion During Explosive Volcanism**

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The Icelandic Meteorological Office (IMO) is responsible for monitoring over 30 active volcanic systems. For explosive volcanic eruptions, the principal scale parameters are plume height and mass eruption rate. IMO operates two fixed position C-band weather radars and two mobile X-band radars, which are crucial in monitoring plume height, due to their independence of daylight, weather and visibility. During initial phases of an explosive eruption, all available radars will be set to a more detailed scan, optimized to observe the volcanic eruption plume. Radar volume data above the active volcano are automatically analyzed at IMO-headquarters in Reykjavík. These data are available for the natural hazard specialists and meteorologists at IMO's 24/7 monitoring room in near real-time, and are communicated to London VAAC to support their ash transport simulations for aviation safety purposes. The newly-developed VESPA software uses the plume height estimates to calculate the eruptive source parameters through an inversion algorithm. This is done by using the coupled system DAKOTA-PlumeMoM which solves the 1D plume model equations iteratively by varying the input values of vent radius and vertical velocity. The model accounts for the effect of wind on the plume dynamics, using atmospheric vertical profiles extracted from the ECMWF numerical weather prediction model. Furthermore, the estimate of mass eruption rate provided by VESPA are used to initialize the VOL-CALPUFF dispersion model to assess the local-scale hazards due to tephra fallout.