**Incorporating Satellite Observations into a Volcanic Ash Dispersion Ensemble Prediction System**

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In support of the operations in the Darwin Volcanic Ash Advisory Centre (VAAC), the Bureau of Meteorology (BoM) is investing in the development of the Dispersion Ensemble Prediction System (DEPS), an operational modelling system for the forecasts of volcanic ash (e.g. Potts et al. 2017). The current version of DEPS uses an ensemble of NWP forecast data, mostly from the BoM's ACCESS model suite, to drive the National Oceanic and Atmospheric Administration's (NOAA) Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) dispersion model (Stein et al. 2015) and produce a probabilistic forecast of ash dispersion that accounts for meteorological uncertainty. The ensemble is initialized from eruption parameters (e.g. volcano, plume height) input by the user via a web interface.

The next version of DEPS, currently in development, extends its capability by accounting for uncertainties in the source term. This is being done through the assimilation of observations into the ensemble forecast. Observations potentially come from two sources: i.) polygons of ash location produced by the VAAC as part of their advisories; and/or ii.) real time quantitative satellite ash retrievals from the NOAA Volcanic Cloud Analysis Toolbox (VOLCAT) system (e.g. Pavolonis et al. 2018). Incorporating both types of observations will allow for probabilistic estimates of the top and bottom heights of the plume along with quantitative estimates of the ash mass loading or concentration. These products are highly desired by the aviation industry to help manage the risks for flight operations and to ensure safety.

The performance of the system will be discussed in the relation to the eruption of Mt. Merapi in central Java, Indonesia on 11 May 2018, a short-lived eruption that extended a plume to approximately 8 km height. While the impacts of this event to aviation were localized, the relatively dry and mostly cirrus-free atmosphere at the time allowed for consistent, good-quality VOLCAT retrievals for over 6 hours and provides an excellent opportunity to evaluate DEPS as it is being developed. The presentation will discuss the impact that incorporating these observations has on the resulting forecast and highlight some practical issues around the use and interpretation of both quantitative satellite retrievals and advanced dispersion modelling techniques in an operational environment.

**References**

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