

## Operational challenges in Volcanic Ash Advisory Centre remote sensing

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Significant volcanic eruptions cause high workloads in Volcanic Ash Advisory Centres (VAACs). In this environment, the correct interpretation and fast assimilation of data of all kinds, much of which may be contradictory, is essential for prompt analysis and preparation of evidence based advice to the aviation industry. The use of remote sensing data in VAAC analysis is affected by the trust that the operational team has in those data, easy access and straightforward interpretation of the data, and embedding of the data in operational procedures.

The Darwin Volcanic Ash Advisory Centre has, since 1993, relied heavily on a combination of pattern analysis and reverse absorption remote sensing for most of its operations, and preferably using geostationary data to ensure timeliness. Increasingly, higher resolution MODIS infrared data and SO<sub>2</sub> data such as from AIRS or GOME 2 is used to supplement and assist in reinterpreting geostationary imagery, particularly when these images are easy to access or automatic alerting systems are in place. For example, an automated SACS alert during the Soputan eruption of 27 August 2012 was extremely useful. However, the experiences of recent eruptions such as from Soputan and Merapi in Indonesia demonstrate that, on many days, remote sensing must be supplemented by timely and accurate ground and air based reports for effective VAAC operations. Image frequency, cloud, sub resolution eruptions, and water entrainment into the eruption plume all remain major issues.

Many eruptions are identified first on satellite imagery, particularly from more remote volcanoes such as Manam in Papua New Guinea. The introduction of the Himawari 8 satellite in the Asia Pacific Region will increase the chances of eruption detection. In order to fully take advantage of these new data, a greater reliance will need to be placed on automatic monitoring algorithms, whilst recognising that many eruptions are not easily distinguishable from non volcanic convection in their early stages, particularly in the moist tropics but also elsewhere. Long term observations of Mt Sakurajima in Kagoshima, for example, show that volcanic eruption clouds will change character according to the season. The role of the human analyst will remain important in VAAC operations for the foreseeable future.