



## **Retrieval of microphysical properties of a volcanic plume using the multispectral satellite instrument SEVIRI: Application to the Eyjafjallajökull eruption in April and May 2010.**

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Volcanic ash plumes from the Eyjafjallajökull eruption in April and May 2010 caused the majority of European airports to be closed from 15-21 April 2010 with further closures for airports in the British Isles, the Iberian Peninsula, the Azores and Italy from 5-8 May 2010 and 10-12 May 2010. SEVIRI is a geostationary satellite which produces data every 15 minutes covering the area of responsibility for the London Volcanic Ash Advisory Centre (VAAC). Therefore, accurate detection of volcanic ash from SEVIRI is important for the London VAAC for evaluation of dispersion models and the issuing of warnings.

Multispectral satellite data from SEVIRI has been used to detect the volcanic ash plume and estimate the ash height and ash mass loading. The detection algorithm uses SEVIRI channels 7 (8.7  $\mu\text{m}$ ), 9 (10.8  $\mu\text{m}$ ) and 10 (12.0  $\mu\text{m}$ ). A series of spectral and spatial tests are used to assess whether a pixel contains volcanic ash with both brightness temperature differences and effective absorption optical depth ratios used in the analysis. This technique represents an improvement in our ability to detect pixels which contain volcanic ash relative to a 2-channel method normally used with SEVIRI.

The retrieval technique uses channels 7 (8.7  $\mu\text{m}$ ), 9 (10.8  $\mu\text{m}$ ), 10 (12.0  $\mu\text{m}$ ) and 11 (13.4  $\mu\text{m}$ ) to estimate the ash height and ash mass loading. Evaluations of the results are difficult but an initial comparison with the spaceborne lidar CALIOP is presented. Results are presented for the second phase of the eruption during the early part of May 2010 when the CALIOP lidar intersected the volcanic plume on several occasions.

There were several CALIOP overpasses of the main volcanic plume between the 5-8 May 2010. Results from these comparison show the ash height retrieval is within the region of uncertainty when there is a single continuous layer of ash. When there are multilayer ash clouds the retrieval of the ash cloud height is more difficult and retrievals from SEVIRI are less representative.

The results presented here represent an improvement in the detection of volcanic ash relative to a two channel approach. The retrieved ash cloud heights are within the necessary tolerance for single layer clouds but uncertainties for multi-layer clouds still remain high.