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Estimation of Volcanic Ash Plume Top Height using AATSR

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The AATSR Correlation Method (ACM) height estimation algorithm is presented. The algorithm uses Advanced Along Track Scanning Radiometer (AATSR) satellite data to detect volcanic ash plumes and to estimate the plume top height. The height estimate is based on the stereo-viewing capability of the AATSR instrument, which allows to determine the parallax between the satellite's 55° forward and nadir views, and thus the corresponding height.

Besides the stereo view, AATSR provides another advantage compared to other satellite based instruments. With AATSR it is possible to detect ash plumes using brightness temperature difference between thermal infrared (TIR) channels centered at 11 and 12 μm. The automatic ash detection makes the algorithm efficient in processing large quantities of data: the height estimate is calculated only for the ash-flagged pixels. In addition, it is possible to study the effect of using different wavelengths in the height estimate, ranging from visible (555 nm) to thermal infrared (12 μm). The ACM algorithm can be applied to the Sea and Land Surface Temperature Radiometer (SLSTR), scheduled for launch at the end of 2015.

Accurate information on the volcanic ash position is important for air traffic safety. The ACM algorithm can provide valuable data of both horizontal and vertical ash dispersion. These data may be useful for comparisons with existing volcanic ash dispersion models and retrieval methods. We present ACM plume top height estimate results for the Eyjafjallajökull eruption, and comparisons against available ground based and satellite observations.