



Height estimates using AATSR dual view

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We describe a height estimate algorithm based on radiances measured at the top of the atmosphere (TOA) by the Advanced Along Track Scanning Radiometer (AATSR) aboard the ENVISAT satellite. The algorithm is designed to estimate volcanic ash plume top heights, but it can be used for other high contrast features as well, such as dust and smoke plumes, meteorological clouds or surface features.

The algorithm is designed to be fully automatic, which allows it to be run in parallel with various retrieval algorithms used in Helsinki, such as aerosol and cloud optical depth retrievals and ash plume concentration retrievals. Information on the feature height is important for choosing the correct retrieval parameters, and could be used for example in dispersion calculations.

The center wavelengths of the AATSR visible (VIS) and near-infrared (NIR) channels are 0.555, 0.659, 0.865, 1.61 μm . The AATSR thermal channels are centered at 3.7, 11, and 12 μm and provide brightness temperature data. The visible channels can be used for aerosol optical depth (AOD) retrievals, while the thermal channels are useful in ash or dust detection.

The AATSR instrument has two views, a nadir view and a 55° forward view. The stereo view is used to estimate the feature height. A spatial correlation algorithm can be used to collocate the views, and the resulting parallax gives a height estimate with nominal accuracy of 1 km. Statistical methods are used to assess the quality of retrieved heights and to filter out unreliable data.

The stereo view is also used in the AOD retrieval, with the AATSR dual view (ADV) algorithm, which does not require a priori knowledge of the surface reflectance.