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Retrieval of aerosol optical thickness fort he EarthCARE Multi-Spectral Imager (MSI)

Wolfgang von Hoyningen-Huene (1), Alexander Kokhanovsky (1), John P. Burrows (1), Gerard Hesselmans (2), Leslie Gale (2), Ulla Wandinger (3), Marc Bouvet (4), and Michael Eisinger (4)

(1) University of Bremen, Institute of Environmental Physics (IUP), Bremen, Germany (hoyning@iup.physik.uni-bremen.de), (2) BMT Argoss, Vollenhove, The Netherlands (gerard.hesselmans@bmtargoss.com), (3) Institut for Tropospheric Research, Leipzig, Germany (ulla.wandinger@tropos.de), (4) ESA ESTEC, Noordwijk, The Netherlands (Marc.Bouvet@esa.int)

The future EarthCARE mission is a cloud – aerosol mission and is composed of 4 scientific instruments: a) the HSRL lidar - ATLID, providing vertical profiles of backscatter-, extinction- and depolarization profiles, b) the cloud – precipitation radar – CPR, giving vertical profiles of cloud and precipitation parameters, c) the multi-spectral imager – MSI as an imager with a swath width of 150 km and 0.5 km scene resolution, delivering the cloud and aerosol conditions in the vicinity of the lidar and radar beams and d) the broad band radiometer – BBR, measuring up-welling broad band radiation fluxes. The mission intends to use synergies between the vertical profiles from ATLID and CPR and the area and columnar information on clouds and aerosols from the MSI and the combination of all in the BBR up-welling fluxes.

The use of the MSI instrument as imager for aerosol optical thickness (AOT) requires retrieval methods for AOT over ocean and land, which are in development within projects (AMARSI and IRMA), supported by ESA. The algorithm development for the AOT retrieval consists of a target discrimination, the estimation of the surface reflectance and determination of aerosol reflectance, which is used for AOT determination, applying look-up-tables. The algorithms are tested with synthetic data from radiative modelling and MODIS measurements with a selection of the subset of MSI VIS and NIR channels (0.659, 0.865, 1.61 and 2.1 μm). For the instrument performance of MODIS the algorithms developed provide quite comparable AOT with AERONET observations.