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Satellite retrieval of aerosol optical properties using OMI and AATSR data

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Aerosols have a direct effect on climate by absorbing and reflecting the incoming solar flux and an indirect effect, they influence the radiative properties of clouds. It's hard to make an estimation of the radiative forcing due to the aerosols - because of a large variety of sources and precursors - but necessary for a better understanding and modeling of the terrestrial climate. In 1995, IPCC considered aerosol as the major source of uncertainties in today's climate models. The most efficient way to follow large scale variations of the aerosol properties is the use of remote sensing data. For the Ozone Monitoring Instrument (OMI), a new multi-wavelength method has been developed, that uses up to 20 wavelength bands between 350 and 500 nm to derive aerosol optical properties. For cloud-free pixels, the OMI measured reflectance at the top of the atmosphere (TOA) at these wavelengths is fitted for in total 50 aerosol models. Based on the fit diagnostics and a priori information, a best-fit aerosol model is selected. The a priori used is a monthly aerosol climatology for each location. For successful aerosol retrieval it is very important to have accurate information on the surface reflectance and its dependence on wavelength. Over land the reflectance is determined using a surface reflectivity climatology, over sea an ocean color model is used. The retrieval of aerosol properties from AATSR data is based on the use of two algorithms which were developed and evaluated for it predecessor ATSR-2: the single (Veefkind & de Leeuw, 1998) and dual (Veefkind et al., 1998) view algorithms. The assumptions are that the reflectance TOA is a linear function of the aerosol optical depth (AOD) and that the multiple scattering reflectances from a mixture of two aerosols can be approximated by the weighted average of the reflectances of each aerosol. After correction

of the molecular scattering, the surface reflection and the interactions between the atmosphere and the surface, the aerosol contribution, can be determined. The single and dual view algorithms are merged to allow for retrieval of the spectral AOD above both sea and land, as well as the mixing ratio. In this study, the consistency of aerosol optical properties derived from the OMI will be evaluated by using both ground based data collected during the DANDELIONS field campaign with data and other satellite remote sensing measurement provided by AATSR.