Using AATSR reflectance and the ADV algorithm for the global retrieval of aerosol properties

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The AATSR Dual-View (ADV) algorithm employs the forward and nadir views of the Advanced Along Track Scanning Radiometer (AATSR). The AATSR instrument is on board the Envisat satellite. The measurement data that is used for the retrieval of atmospheric aerosol properties is the top-of-atmosphere (TOA) reflectance which is modeled as the sum of atmospheric and ground reflectance. The unknown ground reflectance can be formally treated by the ratio of forward and nadir reflectance at the AATSR 1600 nm channel. The end product of the retrieval is the aerosol optical depth (AOD) at 555, 659 and 1600 nm wavelengths. The nominal resolution of AATSR reflectance is 1x1 km2. While this resolution gives good spatial coverage, it also means that for very large retrieval tasks the computation time is too long. For this reason it has been decided that global, multi-year retrievals will be made using a coarse 10x10 km2 resolution. To ensure that the coarse resolution retrieval is reliable, two assumptions are made. First, the ground reflectance must be constant for the 10x10 km2 area. This can be achieved by checking TOA reflectance at 1600 nm channel, as atmospheric reflectance is usually negligible at this wavelength. Second, aerosol conditions must be constant for the area. This can be checked using the standard deviation of the TOA reflectance at 555 nm. We show in this work that by checking these two assumptions, more reliable AOD can be retrieved than by just averaging the AATSR reflectance over the 10x10 km2 area.