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Evaluation and comparison of aerosol retrieval algorithms

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The retrieval of aerosol properties from space is an underdetermined problem which can only be solved by using a number of assumptions. These include the treatment of the underlying surface and the description of the aerosol optical properties. In addition the potential influence of clouds on the retrieval results requires a very thorough identification of cloud occurrence to avoid any contamination. Different approaches are used in each aerosol retrieval algorithm to tackle these problems, based on the information available from the sensor used, such as multiple wavelengths and spectral range, one or more viewing angles or polarization. And even for the same instruments, such as the Advanced Along-Track Scanning Radiometer (AATSR) or the MEdium Resolution Imaging Spectrometer (MERIS), different approaches are used. The European Space Agency (ESA) Climate Change Initiative project aerosol_cci aims at the production of essential climate variables (ECV's) from European Earth Observation instruments (ATSR-2, AATSR, MERIS, SCIAMACHY, POLDER, GOMOS and OMI) providing information on column integrated scattering and absorption properties as well as on stratospheric aerosol. In order to achieve this, differences between the various algorithms used need to be evaluated to provide the best possible products. To study the effect of the choice of the aerosol models used in the retrieval, the algorithms have been used with a variety of aerosol models, using four base models which are combined in several ways. These models have been used together with an aerosol climatology based on AEROCOM model results and AERONET observations which was optionally used to provide a priori information on the occurrence of each aerosol type. The algorithms have been run with either their own cloud mask or with a prescribed common cloud mask. Based on the tests, the best possible algorithms for each EO sensor or each algorithm for the same sensor have been used to provide a test data set for a round robin comparison for 4 months, covering the different seasons, in 2008. As part of this process the performance of each algorithm has been improved as is evident form comparison with AERONET. An overview of the current results will be presented.