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Desert dust satellite retrieval intercomparison

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In this work we compare satellite retrievals of aerosol optical depth (AOD) of Saharan desert dust over a variety of different surfaces ranging from bright desert to dark ocean. The aim is to identify and understand the differences seen between currently available algorithms and hence improve future retrieval algorithms.
The case study chosen is the dust event of March 2006, when a large plume spreads over desert, vegetation and ocean. The satellite instruments considered are: AATSR, AIRS, MERIS, MISR, MODIS, OMI, POLDER and SEVIRI. The resulting AOD datasets are hence varied in terms of instrument characteristics and temporal and spatial resolution and sampling.
An interesting aspect is that the different algorithms make use of different instrument characteristics to obtain retrievals over bright surfaces, such as: multi-angle approach (MISR, AATSR), polarisation measurements (POLDER), single-view approach using the solar wavelengths (OMI, MODIS) or the infrared spectral region (SEVIRI, AIRS). These differences, together with the comparison of different retrieval algorithms applied to measurements from the same instrument, provide a unique insight into the performance and characteristics of the various techniques employed.
As well as inter-comparing the different satellite products, each one has also been compared to co-located AERONET data. Despite the fact that the agreement between satellite and AERONET AODs is reasonably good for all of the datasets, there are significant differences between them when compared to each other, especially over land. These differences are certainly partially due to differences in the algorithms, aerosol models and other assumptions. However, at least as significant as these differences are the quality control flags of each dataset.