

Intercomparison of satellite aerosol retrievals in the context of model evaluation

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One important application of satellite aerosol retrievals is the evaluation of global and regional aerosol models. Proper use of those data requires an understanding of errors in the retrievals. Here we present an intercomparison of satellite retrieval products of aerosol from 6 different sensors and 10 different algorithms, devised for the satellites Aqua, AURA, ENVISAT, PARASOL, noaa18, SeaStar and Terra. In addition we compare those satellite products against AERONET.

Standard evaluation of satellite products is done at individual pixel-level but the temporal and spatial scales interesting to models are much larger. Hence we perform our analysis at a range of temporal and spatial scales and show that substantial random errors, amenable to averaging, exists in these satellite products. Furthermore we show that, where available, AERONET observations usually fall within the range of satellite products. This suggests it may be possible to create an optimal product by further averaging over different satellite products.

We discuss how this product may be generated, how it can be evaluated and its remaining errors can be quantified. This new product is not truly global because we found some regions where most satellite datasets appear to have strong biases. Our analysis allows this to be concluded without reference to AERONET, due to our intercomparison of the satellite data at a range of scales.

Our analysis was performed for aerosol optical thickness and Angstrom exponent. A more limited analysis of single scattering albedo was performed as well. The analysis was performed on spatio-temporally collocated data to strongly reduce sampling artifacts. Initial results from the evaluation of AEROCOM models will also be discussed.