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Estimation of aerosol water through combined analysis of remote sensing measurements and aerosol-hygroscopicity modelling.

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Remote sensing of aerosols provides important information on the atmospheric aerosol abundance. However, aerosol matter is often of hygroscopic nature. As a result, the observed the aerosol optical thickness (AOT) and other optical properties are influenced by the atmospheric humidity, and the measurements do not unambiguously characterize the aerosol dry mass and composition.
In this study we aim to disentangle the contributions to AOT by the aerosol water and the actual aerosol matter by an approach that combines remote sensing measurements of aerosol properties and a detailed 1D atmospheric column model that represents water uptake by aerosol while considering the chemical composition and size distribution in detail. Computed aerosol optical properties are compared with observations. A direct search minimization method is applied to iteratively retrieve the atmospheric aerosol water and aerosol dry mass. We will present the atmospheric model and the current state of the minimization method applied in our study. Results from the application of the method on data from the intensive aerosol measurement campaign IMPACT (Cabauw, the Netherlands, 2008) will be discussed. These results indicate that under certain conditions a reasonably accurate estimate of aerosol water and dry mass is feasible. The results may be used to improve our understanding of aerosol-humidity interactions and enable a more consistent validation of GCM model performance.