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Overview of aerosol components retrieval from solar and synergy with thermal IR in the framework of GRASP and what is next.

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Retrieval of aerosol composition from current remote sensing instruments in sense of detailed aerosol chemistry is not possible, however, retrieval of optically distinguishable aerosol components is different. The presented approach aims retrieval of proxies of such elements as BC, BrC, OC, mineral dust, iron oxide, sulfates/nitrates and water. The importance is in bridging between remote sensing and global chemical transport modeling. The advantage is in absence of intermediate steps that relay on formerly derived aerosol optical and microphysical characteristics. The concept is realized within the GRASP (Generalized Retrieval of Aerosol and Surface Properties) algorithm [1]. Synergy with TIR enabled refining of dust mineralogical composition and provided additional sensitivity to aerosol size, layer height and water vapor. An important update of the GRASP algorithm was thus done on incorporation of TIR into the employed Successive Orders of Scattering radiative transfer scheme [2]. Application to spectral multangular polarizing observations (POLDER/PARASOL), sunphotometric observations (AERONET) and synergy with a TIR radiometer has been shown providing consistent aerosol optical properties and the aerosol components concentrations that reasonably agree with some in-situ measurements [3]. The aerosols in this methodology are assumed to be a mixture of hydrated soluble components and insoluble inclusions. The volume fractions of the components are derived along with other conventional aerosol optical characteristics while the complex refractive index is calculated assuming a mixing rule and prescribed from literature refractive indices of each component. Neglecting or assumption on particles inhomogeneity is however done in the current and most others remote sensing application. The question of influence of particles morphology is thus posed.

Keywords: aerosol composition, retrieval algorithm, GRASP

References

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