Retrieval of aerosol inhomogeneity by application of modified GRASP\Components algorithm to AERONET and PARASOL

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While atmospheric aerosols commonly exhibit inhomogeneity, current remote sensing algorithms do not account for models with inhomogeneous particles. This study aims to bridge this gap by incorporating an aerosol core-shell parameterization into the GRASP remote sensing retrieval algorithm [1]. In our approach, we simulate aerosol inhomogeneity using Mie calculations for layered spheres, with a liquid shell composed of ammonium nitrate/sulfate and various compositions assumed for the particle core [2]. We examine the resulting optical characteristics in relation to changes in core/shell dimensions, refractive index, and size, revealing sensitivity to particle inhomogeneity in single scattering scenarios. However, the feasibility of retrieving inhomogeneity from measured radiances remains to be evaluated. To this end, we integrate new kernels into the updated GRASP/Components algorithm, which account for particle inhomogeneity.

In this talk we discuss the sensitivity of AERONET measurements to inhomogeneous particles through a study of inversions performed over several AERONET sites. We are comparing three different results which are the inversion from AERONET's algorithm, GRASP/Components and GRASP/Components modified with homogeneity to try to understand the implications of the modification on the retrieval. Analysis also showed that polarimetric measurement exhibit even stronger sensitivity to core-shell structure. The next step is thus application of the developments to satellite POLDER/PARASOL polarimetric observations.

References

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Preferred mode of presentation: Oral