Harmonization of aerosol assumptions in remote sensing and climate models: results and perspectives

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The presentation discusses the harmonization of aerosol modeling assumptions used in remote sensing with those used in climate and atmospheric composition models. Indeed, the assimilation and reanalysis of remote sensing observations advanced strongly in last years, while existing gaps between aerosol assumption in remote sensing and climate models limit the efficiency of assimilation and model forecasts. This gap also limits the efficiency of synergy of models with remote sensing reducing positive potential of using climatological aerosol information from climate models (e.g., aerosol type, vertical profiles, etc.) as a source of a priori information to constrain the retrievals.

The presented studies demonstrate the aligning of aerosol retrieval from multi-angular polarimeters using GRASP algorithm [1] with the global CAMS system and MERRA-2. Specifically, the GRASP/Components approach [2] was used that considers aerosol as a mixture of aerosol components with known spectral index of refraction and derives particle size distribution together with fractions of different aerosol components. The properties of components used in GRASP are compared to those of CAMS and MERRA-2. As a result, several modifications were realized in GRASP and helped to improve aerosol retrieval, as demonstrated for POLDER data. In addition, several modifications were suggested for the atmospheric composition models and it is expected that the harmonization of assumption will help both for optimizing assimilation of the observation and for efficient constraining the remote sensing retrieval by model forecast (e.g., aerosol vertical variability, humidity effects, etc.). The most of presented results were obtained with support of the CAMS EvOlution (CAMEO) project (EU Horizon program) and EUMETSAT SCAERP-G framework projects.

References

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