Workshop on "Recent advancements in remote sensing and modeling of aerosols, clouds and surfaces",
GRASP ACE Summer school,
Lille, France, May 22-26, 2023

GRASP as a universal platform for atmospheric remote sensing: idea, realization, outcome and perspectives

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One of the main challenges in the development of remote sensing retrieval is adequate addressing of limitations in the observation information content. Indeed, the information content with the respect to atmospheric parameters changes strongly depending on the type of measurements. Correspondingly, the number and type of retrieved characteristics and used a priori constraints need to be adequately chosen for each specific observation. This challenge can be essentially addressed by establishing advanced retrieval frameworks such as GRASP platform.

GRASP (Generalized Retrieval of Atmosphere and Surface Properties) is a versatile algorithm developed by Dubovik et al., [2011, 2021] for deriving atmospheric parameters from diverse observations. Several rigorous strategies have been realized in frame of GRASP for optimizing forward model and the parameter set to be retrieved. First, the amount and type of a priori information used by GRASP can be changed depending on the application. For example, (i) for any retrieved parameter direct a priori estimate can be used, (ii) to limit variability of retrieved continues functions, such as aerosol size distribution, etc., a priori smoothness constraints can be applied and (iii) once a group of coordinated observations is inverted simultaneously, e.g. satellite pixels, multi-pixel a priori smoothness constraints can be used for liming spatial and temporal variability of parameters retrieved in different pixels. Second, many aspects in GRASP forward model can be changed depending on the application. Third, GRASP allows rather straightforward evaluation and testing of the developed retrieval by applying it to the observations with higher information content. GRASP is now Open Source algorithm (https://www.grasp-open.com/) has been successfully applied to both actives and passive satellite and ground-based observation as well as diverse synergies. The overview of the concept, achievement and perspective will be discussed.

References

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