Dynamic error estimates provided by GRASP algorithm for POLDER/PARASOL observations: generation and evaluation

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Comprehending the uncertainties involved in retrieving aerosol and surface properties is crucial for accurately characterizing atmospheric processes. Nonetheless, accurately characterizing the error budget of retrieval products is a highly demanding task that has not yet been entirely resolved in most remote sensing approaches. The uncertainty levels in most remote sensing products are mainly determined through post-processing validations and comparisons with other data, with dynamic errors rarely being provided.

Over the past decade, the GRASP (Generalized Retrieval of Atmosphere and Surface Properties) algorithm has been modified for operational processing of polarimetric satellite observations, leading to the generation of different aerosol and surface products for POLDER/PARASOL observations, which are publicly accessible. The GRASP algorithm can estimate the dynamic behavior and full covariance matrices, providing not only variances of retrieval errors but also correlation coefficients of these errors. Therefore, in this study we follow the error estimate approach realized in the GRASP algorithm that has already been published and demonstrated for ground-based application (Herrera et al., 2022) and we focus our efforts on establishing the generation of the dynamic errors at the pixel level for the retrieved parameters for POLDER/PARASOL observations.

In this work different tests were analyzed using simulated and real POLDER/PARASOL observations over different AERONET stations. The different tests were performed using real POLDER data in order to optimize the performance of the GRASP approach with an overall objective to provide reliable quality indicators in global processing of the observations. Specifically, different levels of both random and systematic errors were tested as the assumptions in the error estimation generator. The known results of validation against AERONET were used for evaluations of the performance of different assumptions.

Keywords: dynamic errors, aerosol products, POLDER/PARASOL observations

References
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