Improvement on the retrieval of aerosol properties when accounting for light polarization in inversion algorithms

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An accurate knowledge of the microphysical and optical properties of aerosols is key to assess their impact on climate. The retrieval of these characteristics is influenced by many factors. Many inversion algorithms employ iterative methods which try to fit simulated radiometric measurements to the real observations. For that, they employ a radiative transfer model (RTM) to simulate the measurements for certain aerosol scenario. The aerosol footprint can be observed in sky radiances, which are mainly caused by aerosol and gases scattering; therefore they contain valuable aerosol information. This scattered light is partly polarized, then, a good characterization of this polarization is important to accurately retrieve aerosol properties.
In this work we aim to evaluate the differences in the retrieval of aerosol properties for several aerosol scenarios when considering or not light polarization in the RTM. For that, GRASP (Generalized Retrieval of Atmosphere and Surface Properties; [1]) has been employed since its RTM can be selected to consider scalar or vectorial theory of light. The improvement on the retrieval when considering the light polarization will be evaluated for different aerosol types and loads.

References

[1] Dubovik, O., D. Fuertes, P. Litvinov, A. Lopatin, T. Lapyonok, I. Doubovik, C. Federspiel, 2021: *A Comprehensive Description of Multi-Term LSM for Applying Multiple a Priori Constraints in Problems of Atmospheric Remote Sensing: GRASP Algorithm, Concept, and Applications*. Front. Remote Sens. 2: 706851

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