Optimization of polarization measurements for AERONET aerosol retrievals

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Recent research developments have emphasized the importance of using polarization measurements to improve accuracy of aerosol retrievals from both satellite and ground-based observations [1]. For ground based observation, CIMEL dual polar wheel sun photometer provides measurements of sky radiances and degree of linear polarization at four standard AERONET wavelength thus doubling the volume of measurements compared to the intensity measurements only. As a consequence, the corresponding acquisition time increases comprising about 30 min for the complete set of measurements which is unacceptably large for operational monitoring. Specifically, this results in large temporal gaps in spectral AOD measurements.

In this talk we present the results of sensitivity studies which illustrate the possibility of reducing the number of polarization channels while preserving the accuracy of aerosol retrievals. In particular, we show that using any one of the first three channels (440, 675, or 870 nm) allows significant improvement in the accuracy of the real part of refractive index retrievals, in comparison to retrievals made without polarization measurement input data.

References

[1] Dubovik, O., Z. Li, M. I. Mishchenko, *et al.*, 2019: Polarimetric remote sensing of atmospheric aerosols: Instruments, methodologies, results, and perspectives. *J. Quant. Spectrosc. Radiat. Transfer* **224**, 474–511.

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