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## Experimental Validation and Application of a Micro-Pulse Lidar for Aerosol Optical and Vertical Profiling during a Saharan Dust Event

### Abstract

Aerosol lidar systems are widely used for studying aerosol vertical distributions due to their high vertical spatial and temporal resolution. Polarized channels equipped by lidar can determine aerosol shapes and separate as fine (*Df*) and coarse (*Dc*) dust particles (total dust, $DD = Dc + Df$), in terms of the measure of particle backscatter coefficient. In this presentation, two papers will be presented, one is from Córdoba-Jabonero et al. (2021) containing the correction method for lidar signals, the other one is from López-Cayuela et al. (2023) which using the corrected instruments to analyze a dust event.

Córdoba-Jabonero et al (2021) performed an experimental assessment regarding both the overlap (OVP) correction of the P-MPL total range-corrected signal (RCS) profiles and the volume linear depolarization ratio (VLDR) analysis. The averaged OVP function obtained by comparing P-MPL data with two reference lidars provided the most consistent results in both near and far-field ranges. López-Cayuela et al. (2023) analyzed an intense and long-lasting Saharan dust outbreak that crossed the Iberian Peninsula (IP) from 25 March until 7 April 2021. Meteorological conditions determined the aerosol scenario along the overall dust event. The analysis showed that the dust was well mixed with no significant differences in the vertical structure of the *Dc* and *Df* particle backscatter coefficients. This uniformly well-mixed state of the *Dc* and *Df* particles over the IP could be related to the atmospheric instability during the dust outbreak.

**Keywords:** Backscatter Coefficient; Depolarization ratio

### References:

Córdoba-Jabonero, C., et al., 2021. Experimental assessment of a micro-pulse lidar system in comparison with reference lidar measurements for aerosol optical properties retrieval. *Atmos. Meas. Tech.*, 14(7), 5225–5239. https://doi.org/10.5194/amt-14-5225-2021

López-Cayuela, M. Á., et al., 2023. Vertical characterization of fine and coarse dust particles during an intense Saharan dust outbreak over the Iberian Peninsula in springtime 2021. *Atmos. Chem. Phys.*, 23(1), 143–161. https://doi.org/10.5194/acp-23-143-2023