Lidar Aerosol Characterization Based on Graphical Method of Gobbi Diagrams

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In this study we aim to link lidar optical aerosol properties with different pollen types. Vertical lidar profiles were analyzed during the experimental campaign at Finokalia between 23/02/2018 and 11/05/2018. A Hirst type volumetric air sampler at ground level was also used which enables the identification of pollen type and concentration. The study makes use of the proposed methodology by Gobbi et al. (2007). The method relies on the combined analysis of the Ångström exponent $å_{355/1064}(z)$ and its spectral curvature $\Delta å(z) = å_{355/532}(z) - å_{532/1064}(z)$.

Three intensive pollination periods (IPPs) were identified based on the dominant pollen types observed, *i.e.* IPP1 for Cupressus (67%), IPP2 for a mixture of Olea (56 %) and Platanus (15%) and IPP3 for Olea (70%). Data on the Gobbi diagrams were grouped with the use of the linear particle depolarization ratio at 532 nm. HYSPLIT back trajectories and BSC–DREAM model simulations were also used for the dust characterization and thus interpretation of the results.

The first layer of the observed profile was identified by using the Wavelet Covariance Method and then mean Ångström exponent backscatter related values were computed. Ångström differences, $\Delta å(z)$, were found negative for the 92% of the 356 aerosol layers, indicating the dominant presence of fine particles within the first aerosol layer for the period under study. During IPP1 we observed larger depolarization ratio and smaller Ångström exponent, while within IPP2, smaller effective radius with larger contribution of fine particles was observed. During IPP3 the data covers mainly two distinguish areas in the Gobbi diagram: one with large depolarization ratio with Ångström exponent lower than 1 and fine mode contribution (FMC) between 10-30% and a second one with moderate depolarization ratio with Ångström exponent between 1 and 2 and FMC between 30 and 50%.