

Airborne observations of transported dust and local anthropogenic pollution during SLOPE campaigns

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The SLOPE (Sierra Nevada Lidar aerOsol Profiling Experiment) campaigns were performed during the summers of 2016 and 2017 (SLOPE I and SLOPE II, respectively), with the main objective of comparing remote sensing retrievals with in-situ measurements. To this end, a high-altitude measurement station was established in the upper slope of Sierra Nevada (SNS: 37.09° N, 3.38° W, 2500 m a.s.l.) which is less than 25 km apart in horizontal distance from Granada station (UGR: 37.16°, 3.61°W, 680 m a.s.l.).

Within the frame of SLOPE, airborne in-situ measurements were performed during an intensive operation period (IOP) of around one week. During SLOPE I, the IOP lasted from 15 to 19 June 2016 and during SLOPE II from 21 to 24 June 2017. A light aircraft (PARTENAVIA P68) was equipped with an isokinetic and isoaxial inlet with two flow splitters that divided the sampled air among the different instruments. The different instruments provided measurements of aerosol particle light scattering coefficient, aerosol particle light-absorption coefficient, particle number size distribution and integrated particle number concentration. In addition, both UGR and SNS stations measured the same variables during this IOP periods. The aircraft performed vertical spirals over UGR station, with flight altitudes ranging from less than 400 m a.g.l up to 3000 m a.g.l.

During SLOPE I clean conditions prevailed and during SLOPE II, the presence of transported mineral dust dominated the IOP period. Vertical profiles before, during and after a decoupled dust outbreak were obtained with the aircraft, showing differences in the aerosol optical and microphysical properties and their change with the entrainment of the dust into the boundary layer.