Transport of Saharan Dust Aerosols over the Helmos Mountain during the CALISHTO-HELMOS Campaign studied by the Synergy of Remote Sensing Techniques

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The Cloud-AerosoL InteractionS in the Helmos background TropOsphere (CALISHTO-HELMOS campaign) is a synergy between the PANhellenic infrastructure for Atmospheric Composition and climatEchAnge (PANACEA) and the European Research Council Pyrogenic TRansformations Affecting Climate and Health (PyroTRACH) Projects. The experimental campaign took place in Grece at the Helmos mountain (38.006◦ N, 22.198◦ E, 1800 m a.s.l.). The main goal of the campaign is to gain a better understanding of the processes involved in the formation and evolution of mixed-phase clouds under pristine environmental conditions. An additional goal of this campaign was to study the phenomena of long-range transport of Saharan dust particles at a remote high-altitude site and their role in cloud formation.

To fulfill the goal of the campaign a synergy of remote sensing techniques was implemented at the Helmos remote site. More precisely, the mobile single-wavelength (532 nm) depolarization Aerosol lIdAr System (AIAS) was used to measure the spatio-temporal evolution of the vertical profiles of the aerosol backscatter coefficient and the particle linear depolarization ratio (PLDR), both at 532 nm, while a CIMEL sun photometer (CE318-T) provided the aerosol optical depth (AOD) and the columnar microphysical properties (Angström exponent and fine mode AOD, coarse mode AOD, and fine mode fraction). In total we recorded 14 days of intense dust transport with 26 aerosol dust layers (between 2.33–7.07 km a.s.l.) having a mean PLDR value of 16.98 ± 3.02 % at 532 nm. The mean CE318-T AOD values (level 1.5) were of 0.146 ± 0.007 at 340 nm, 0.142 ± 0.007 at 500 nm and 0.117 ± 0.006 at 1020 nm.