



Vertical profiling of marine aerosol, dust and their mixtures utilizing the synergy of sunphotometer and lidar measurements

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Current and future lidar products from space missions (CALIPSO, ADM-Aeolus, EarthCARE) aim to improve our understanding of atmospheric dynamics and aerosol/cloud interactions on global scale. However, the lidar instruments onboard these three missions (CALIOP, ALADIN, ATLID) are different systems, operating at different wavelengths and providing different sets of measured parameters. In order to spectrally homogenize the datasets, aerosol/cloud-type-dependent spectral conversion factors are needed to be applied to all lidar-related properties (extinction, backscatter and depolarization), based on the aerosol/cloud classification of the space-borne observations.

The well-established European Aerosol Research Lidar Network (EARLINET) offers the unique opportunity to support such an effort. However, EARLINET database suffers from lack of information for specific aerosol types such as marine and mixed dust/marine cases. Unfortunately, these types are not observed in EARLINET's core stations, since the stations are mostly located at continental sites and are influenced by urban pollution. Moreover, the lidar systems near the coastlines suffer from the inability to measure at the first few hundred meters (500-1000 m) due to their technical design, which results in an incomplete laser/telescope overlap region.

Towards the study of marine and marine-dust aerosol mixtures we organized the experimental campaign of "Characterization of Aerosol mixtures of Dust And Marine origin" (CHARADMexp), on June 20 to July 10, at Finokalia, Grete, Greece. Our aim was to derive optical, microphysical and chemical properties of the marine component and its mixtures with dust, employing sophisticated instrumentation installed on the site of Finokalia ACTRIS station, where only marine and dust particles are present 95% of the time. Specifically, aerosol characterization was established by the "Generalized Aerosol Retrieval from Radiometer and Lidar Combined data" (GARRLiC), a technique that combines ground-based lidar and sunphotometer measurements, developed in the frame of ACTRIS. Our results for cases of marine-only, dust-only and mixtures of marine and dust retrievals provide an evaluation of the algorithm capabilities for marine environments, producing vertical profiles of physical and optical properties of marine and dust particles.