

Synergy of PollyXT Lidar & sun/sky photometer to retrieve aerosol properties utilizing GRASP algorithm in Limassol, Cyprus

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The coastal city, Limassol, located in Cyprus (34.7°N, 33°E) is strongly influenced by the aerosol transport from neighboring regions (Mamouri *et al* (2016)). Saharan and Arabian desert dust, marine aerosols, fresh smoke from nearby areas and aged smoke from distant regions (Nisantzi *et al* (2014) are the common aerosols observed over the area. Studying aerosol particles is crucial due to their impact on air quality, cloud formation, radiative forcing, health and climate (IPCC, 2021).

In this study selected cases of different atmospheric conditions will be used to characterize aerosol layers in Limassol by retrieving optical and microphysical properties. The Generalized Retrieval of Atmosphere and Surface Properties (GRASP) algorithm (Dubovik *et al* (2014, 2022)) is used for the retrieval of particles' size distribution, complex refractive index, AOD and the aerosol vertical distribution. Dust-dominated, smoke-dominated, and marine-dominated cases were analyzed and compared with measurements from the instruments. The synergy of Lidar and radiometer (Lopatin *et al* (2013)) enables the characterization of fine and coarse mode aerosols.

Aerosol observations from the PollyXT Polarization Raman Lidar (Engelmann *et al* (2016)) and the CUT-TEPAK AERONET (Aerosol Robotic NETwork) sun/sky photometer of the Cyprus Atmospheric Remote Sensing Observatory National facility (CARO NF) of Eratosthenes Centre of Excellence provide the vertical aerosol characteristics to the algorithm, while the sun photometer provides constraints on the quantity and type of aerosol.

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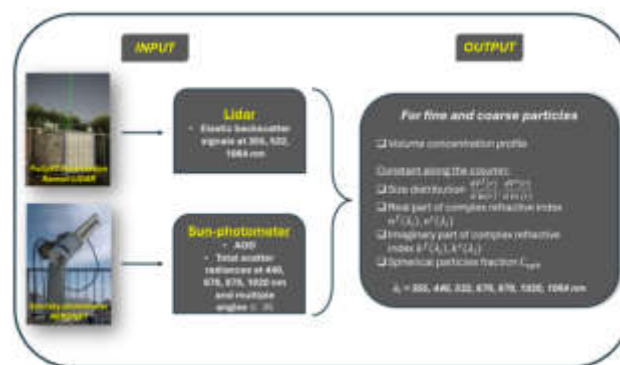


Figure 1. GRASP algorithm input and output parameters derived from the synergy of the PollyXT Polarization Raman Lidar and the sun/sky photometer AERONET at the Limassol site, Cyprus.

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