

Studying Desert Dust from the Sahara and the Middle East using the Cyprus Atmospheric Remote Sensing Observatory over Limassol, Cyprus

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The Eastern Mediterranean basin is frequently affected by mineral dust air masses originating from major desert dust regions such as the Sahara and the Middle East, transported by synoptic-scale meteorological systems. The primary objective of this study is to examine and characterize desert dust intrusions over Limassol, utilizing observations of the Cyprus Atmospheric Remote Sensing Observatory (CARO), a National Facility operated by the Eratosthenes Centre of Excellence. CARO NF, as an ACTRIS station, provides quality controlled and assured datasets. This study focuses on the detailed analysis of selected dust events over Limassol. A multi-parameter aerosol typing scheme which relies on the intensive and extensive aerosol properties retrieved from Polly^{XT} Raman-Polarization lidar is used for the characterization of the aerosol layers. This active remote sensing instrument has been operating continuously since October 2020, providing vertically resolved measurements of aerosol optical properties. The analysis is complemented by the AOD and inversion products from the CIMEL sun/sky photometer at the CUT-TEPAK site, which is part of the Aerosol Robotic Network (AERONET) network. The synergetic dataset of lidar and sun-photometer observations enables the characterization of the upcoming dust layers with high spatiotemporal resolution. These observations provide constraints on aerosol classification, support the validation of dust transport models and satellite products.

Key Words: Desert dust, Sahara, Middle East, Aerosols, Aerosol Characterization, Lidar, Sun-photometer, Remote Sensing, Limassol, Cyprus

Acknowledgements: The study is supported by the 'EXCELSIOR': ERATOSTHENES: EXcellence Research Centre for Earth Surveillance and Space-Based Monitoring of the Environment H2020 Widespread Teaching project (www.excelsior2020.eu). The 'EXCELSIOR' project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 857510, from the Government of the Republic of Cyprus through the Directorate General for the European Programmes, Coordination and Development and the Cyprus University of Technology. The authors acknowledge the ATARRI project funded by the European Union's Horizon Europe Twinning Call (HORIZON-WIDERA-2023-ACCESS-02) under the grant agreement No 101160258.