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Aerosol physical and optical properties in the Eastern Mediterranean Basin, Crete, from Aerosol Robotic Network data

A. Fotiadi[1,2], N. Hatzianastassiou[2,4], E. Drakakis[2,3], C. Matsoukas[2,5], K. G. Pavlakis[1,2,7], D. Hatzidimitriou[1,2], E. Gerasopoulos[6,8], N. Mihalopoulos[6], and I. Vardavas[1,2]

[1]Department of Physics, University of Crete, Crete, Greece
[2]Foundation for Research and Technology-Hellas, Heraklion, Crete, Greece
[3]Department of Electrical Engineering, Technological Educational Institute of Crete, Greece
[4]Laboratory of Meteorology, Department of Physics, University of Ioannina, Greece
[5]Department of Environment, University of the Aegean, Greece
[6]Environmental Chemical Processes Laboratory, Department of Chemistry, University of Crete, Greece
[7]Department of General Applied Science, Technological Educational Institute of Crete, Greece
[8]Institute for Environmental Science and Sustainable Development, National Observatory of Athens, Athens, Greece

Abstract. In this study, we investigate the aerosol optical properties, namely aerosol extinction optical thickness (AOT), Angström parameter and size distribution over the Eastern Mediterranean Basin, using spectral measurements from the recently established FORTH (Foundation for Research and Technology-Hellas) AERONET station in Crete, for the two-year period 2003–2004. The location of the FORTH-AERONET station offers a unique opportunity to monitor aerosols from different sources. Maximum values of AOT are found primarily in spring, which together with small values of the Angström parameter indicate dust transported from African deserts, whereas the minimum values of AOT occur in winter. In autumn, large AOT values observed at near-infrared wavelengths arise also from dust transport. In summer, large AOT values at ultraviolet (340 nm) and visible wavelengths (500 nm), together with large values of the Angström parameter, are associated with transport of fine aerosols of urban/industrial and biomass burning origin. The Angström parameter values vary on a daily basis within the range 0.05–2.20, and on a monthly basis within the range 0.68–1.9. This behaviour, together with broad frequency distributions and back-trajectory analyses, indicates a great variety of aerosol types over the study region including dust, urban-industrial and biomass-burning pollution, and maritime, as well as mixed aerosol types. Large temporal variability is observed in AOT, Angström parameter, aerosol content and size. The fine and coarse aerosol modes persist throughout the year, with the coarse mode dominant except in summer. The highest values of AOT are related primarily to southeasterly winds, associated with coarse aerosols, and to a less extent to northwesterly winds associated with fine aerosols. The results of this study show that the FORTH AERONET station in Crete is well suited for

studying the transport and mixing of different types of aerosols from a variety of sources, especially those associated with major dust events from the Sahara.

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