COMPLEX VERTICAL AEROSOL LAYERING OF NATURAL AND ANTHROPOGENIC PARTICLES OVER THE SOUTHEASTERN MEDITERRANEAN: OBSERVATIONS WITH EARLINET LIDAR AND AERONET PHOTOMETER AT LEMESOS, CYPRUS AND COMPARISON WITH TRANSPORT MODELING RESULTS.

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In the south-eastern Mediterranean, complex aerosol profiles consisting of separate layers of different natural and anthropogenic particles or aerosol mixtures can be observed frequently. Consequently, these aerosols can have a complicated influence on climatic conditions, directly as well as indirectly via cloud processes. Observations of such complex aerosol layering within networks such as the European Aerosol Research Lidar Network (EARLINET) and the Aerosol Robotic Network (AERONET) and comparison of these observations with respective aerosol products of regional to global atmospheric transport modelling are required to improve our understanding of life cycles of aerosols and aerosol mixtures and their impact on climate. In this work is presented a case study of a desert dust outbreak from Syria and Saudi Arabia towards the eastern Mediterranean, occurred in September 2011. The observations were performed with a 532-nm polarization lidar (member of EARLINET) and a sun sky CIMEL sun-photometer (member of AERONET) operating at 8 channels from 340 to 1640 nm wavelength at Lemesos District, Cyprus (34°N, 33°E). The dust-laden air became mixed with air masses that crossed sources rich of biomass burning smoke and anthropogenic pollution (Ukraine, Russia, and Turkey). Over the Mediterranean Sea and more precisely over Cyprus, marine air and anthropogenic haze became mixed in the lower part of the plume by sea breeze circulations. This case study provides an ideal opportunity to demonstrate the potential of combined lidar-photometer observations to deliver detailed vertically resolved information of the aerosol characteristics in terms of particle backscatter and extinction coefficients, and the extinction-to-backscatter ratio, separately for the fine mode particle fraction (mostly smoke in the observed lofted layers) and the coarse mode fraction (mostly dust in the lofted layers), and volume and mass concentrations for fine and coarse mode particles. The retrieved aerosol profile data sets were compared with results of FLEXPART and the mineral dust regional BSC-DREAM8b model simulations. Good consistency of model and observational data were found and will be presented at the conference.

Acknowledgments: This research forms part of the project “AIRSPACE” [0609(BE)/12] funded by the Cyprus Promotion Research Foundation (CPRF). Additionally, AN thanks the CPRF for the support in the frame of E-II-PENEK [DESMI 2009-2010] project and REM for the support in the frame of “Webair-2” [EUREKA/EUNEA/0609/13] project. Additionally special thanks are given to EARLINET and ACTRIS project.