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Ground-based aerosol measurements during CHARMEX/ADRIMED campaign at Granada station

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In the framework of ChArMEx/ADRIMED (Chemistry-Aerosol Mediterranean Experiment, http://charmex.lsce.ipsl.fr/; Aerosol Direct Radiative Impact on the regional climate in the MEDiterranean region) projects, a field experiment based on in situ and remote sensing measurements from surface and airborne platforms was performed. The ADRIMED project aimed to capture the high complexity of the Mediterranean region by using an integrated approach based on intensive experimental field campaign and spaceborne observations, radiative transfer calculations and climate modelling with Regional Climate Models better adapted than global circulation models. For this purpose, measurements were performed at different surface super-sites (including Granada station) over the Occidental Mediterranean region during summer 2013 for creating an updated database of the physical, chemical, optical properties and the vertical distribution of the major "Mediterranean aerosols". Namely, measurements at Granada station were performed on 16 and 17 July 2013, in coincidence with the overpasses of the ATR aircraft over the station. The instrumentation used for the campaign includes both remote sensing instruments (a multiwavelength Raman lidar and a sun photometer) and in-situ measurements (a nephelometer, a Multi-Angle Absorption Photometer (MAAP), an Aerodynamic particle sizer (APS), a high volume sampler of PM10 and an aethalometer). During the measurement period a mineral dust event was detected, with similar dust load on both days. According to in-situ measurements, the event reached the surface level on 16 of June. Vertically resolved lidar measurements indicated presence of mineral dust layers up to 5 km asl both on 16 and 17 June 2013. Temporal evolution analysis indicated that on 17 June the dust layer decoupled from the boundary layer and disappeared around 14:00 UTC. In addition, lidar and sun-photometer data were used to retrieve volume concentration profiles by means of LIRIC (Lidar-Radiometer Inversion Code algorithm) [Chaikovsky et al., 2008]. The retrieved volume concentration profiles were compared with data from ATR flights above the station at 14:30 UTC on 16 June and 07:30 UTC on 17 June, obtaining in general good agreement in the location of the aerosol layers and discrepancies in the volume concentration values ranging between 15 and 40 μm3/cm3 for the coarse mode.

References: Chaikovsky, A., O. Dubovik, et a., (2008), Software package for the retrieval of aerosol microphysical properties in the vertical column using combined lidar/photometer data, Tech. Rep., Institute of Physics, National Academy of Sciences of Belarus.

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