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Carbonaceous aerosols in the Western Mediterranean during summertime and their contribution to the aerosol optical properties at ground level: First results of the ChArMEx-ADRIMED 2013 intensive campaign in Corsica

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As part of the Chemistry-Aerosol Mediterranean Experiment (ChArMEx, http://charmex.lsce.ipsl.fr/), the COR-SiCA (http://www.obs-mip.fr/corsica) and the ANR-ADRIMED programs, a large set of real-time measurements of carbonaceous aerosols was deployed in June 2013 at the Cape Corsica atmospheric supersite (http://gaw.empa.ch/gawsis/reports.asp?StationID=2076203042).

Submicron organic aerosols (OA) were monitored every 30 min using an Aerosol Chemical Speciation Monitor (ACSM; Aerodyne Res. Inc. MA, USA); Fine ($PM_{2.5}$) Organic Carbon (OC) and Elemental Carbon (EC) were measured every 2h using an OCEC Sunset Field Instrument (Sunset Lab, OR, USA) and every 12h using a low-vol (Leckel) filter sampler running at 2.3m3/h. Equivalent Black Carbon (BC) was monitored using two Aethalometers (models AE31 and AE33, Magee Scientific, US & Aerosol d.o.o., Slovenia) and a MAAP instrument (Thermo).

Quality control of this large dataset was performed through chemical mass closure studies (using co-located SMPS and TEOM-FDMS) and direct comparisons with other real-time instruments running in parallel (Particle-Into-Liquid-Sampler-Ion-Chromatograph for ions, filter sampling, . . .).

Source apportionment of OA was then performed using the SourceFinder software (SoFi v4.5, http://www.psi.ch/acsm-stations/me-2) allowing the distinction between hydrogen- and oxygen-like organic aerosols (HOA and OOA, respectively) and highlighting the major contribution of secondary OA in the Western Mediterranean during summer.

Using this time-resolved chemical information, reconstruction of the optical aerosol properties were performed and compared with integrating nephelometer (Model 3563, TSI, US) and photoacoustic extinctiometer (PAX, DMT, US) measurements performed in parallel.

Results of these different closure studies (chemical/physical/optical) are presented and discussed here in details. They highlight the central role of carbonaceous aerosols on the optical properties of aerosols at ground level in the Western Mediterranean Sea during summertime.

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