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Atmospheric aerosol characterization in different urban background sites across Europe

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In support of the harmonization of PM measurements in Europe, the European Commission's Joint Research Centre (JRC) is carrying out an intercomparison exercise for PM in collaboration with the Network of Air Quality Reference Laboratories (AQUILA) and with local monitoring networks in the Member States. For this purpose two-weeks measuring campaigns were carried out in urban background sites in Portugal, Spain, Slovenia, Austria, Czech Republic, Germany and in the Po Valley (Italy). For the purpose of PM10 intercomparison, JRC used two sequential Low Volume Samplers (LVS) mounted inside a mobile laboratory which was maintained at 20°C. Equivalence of the sequential samplers to the PM10 reference method has been assured prior to the launch of the campaigns, according to the procedures described in the Report by the European Commission's Working Group on Equivalence. Additionally, in order to complete the chemical-physical characterization of PM in the selected monitoring station, the JRC mobile laboratory was also equipped with: one sequential LVS for PM2.5 and one for PM1 gravimetric determination, a TEOM-FDMS system for PM10 online measurement, a semi-continuous organic/elemental carbon (OC/EC) analyzer and an optical particle sizer (ranging from 300 nm to 20 μm). Furthermore, in parallel with the aerosol samplings, temperature, atmospheric pressure, wind speed, wind direction and relative humidity data were collected. In the Po Valley locations, also ozone measurements were available. Chemical analyses by means of ion chromatography were performed on Portugal, Spain and Po Valley samples. Results of the intercomparison showed that good agreement between JRC Equivalent PM10 samplers and the Member States instrumentation is not always easy to attain: although standard methods to measure PM10 and PM2.5 have been validated and set up by CEN TC 264/WG 15, there are still difficulties at European scale in comparing data

because of differences in application of the Standard method, methodology and reporting between countries, regions and even cities. The evaluation or the aerosol chemical composition evidenced that the fine fraction (PM1) is mainly composed by sulfate, nitrate, ammonia and organic matter, and may be strongly influenced by secondary aerosol formation; in the coarse (PM10-PM1) fraction calcium is also important, and in some cases the influence of sea-salt as a natural source may be relevant. Meteorological parameters and the analysis of air masses back trajectories proved to be useful to explain variations in PM loadings and aerosol composition.