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Online mass spectrometric aerosol measurements during the MINOS campaign (Crete, August 2001)

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Abstract. Mass spectrometric analysis of volatile and semi-volatile (=non-refractory) aerosol particles have been performed during a field study in the summer Eastern Mediterranean. A size-resolved, quantitative mass spectrometric technique (the Aerodyne Aerosol Mass Spectrometer, AMS) has been used, and the results are compared to filter sampling methods and particle sizing techniques. The different techniques agree with the finding that the fine particle mode (D<1.2 μm) consisted mostly of ammonium sulfate and of organic material. The aerosol sulfate ranged between 2 and 12 μg/m^3. On most days, ammonium was closely correlated with sulfate, suggesting ammonium sulfate as the major aerosol component, but on days with high sulfate mass concentrations, the sulfate was not fully neutralized by ammonium. Trajectories indicate that the aerosol and/or its precursors originate from South-Eastern Europe. The source of the ammonium sulfate aerosol is most likely fossil fuel burning, whereas the organic aerosol may also originate from biomass burning. Ion series analysis of the organics fraction in the mass spectrometer indicated that the major component of the organics were oxygenated organics which are a marker for aged, photochemically processed aerosol or biomass burning aerosol. The non-refractory aerosol compounds, measured with the Aerosol Mass Spectrometer, contributed between 37 and 50% to the total aerosol mass in the fine mode. A second mass spectrometer for single particle analysis by laser ablation has been used for the first time in the field during this study and yielded results, which agree with filter samples of the coarse particle mode. This mode consisted of sea salt particles and dust aerosol.

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