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Characterizing the Composition and Volatility of Aged Organic Aerosol from Different Source Regions: The Finokalia Aerosol Measurement Experiment - 2008

L. Hildebrandt (1), B.-H. Lee (1), C. Mohr (2), E. Kostenidou (3), A. Tsimpidi (3), V. Karydis (3), U. Baltensperger (2), N. M. Donahue (1), N. Mihalopoulos (4), S. N. Pandis (1,3), and the FAME-08 AMS and Volatility Team

(1) Center for Atmospheric Particle Studies,Carnegie Mellon University, Pittsburgh, PA 15213, USA (lhildebr@andrew.cmu.edu), (2) Laboratory of Atmospheric Chemistry, Paul Scherrer Institut, CH-5232 Villigen, Switzerland, (3) Institute of Chemical Engineering and High Temperature Chemical Processes (ICE-HT), Foundation of Research and Technology (FORTH), University of Patras, Patra, Greece, (4) Department of Chemistry, University of Crete, Heraklion, Greece

We present results on the volatility and chemical composition of aerosol measured during the Finokalia Aerosol Measurement Experiment – 2008 (FAME-2008). Finokalia is a remote site located in the Southeast of Crete, Greece. We measured the volatility of the aerosol at Finokalia as a function of its size by combining several instruments. We used an Aerodyne aerosol mass spectrometer (AMS) to measure the size-resolved chemical composition of the particles, a scanning mobility particle sizer (SMPS) to measure the volume distribution of particles, and a thermodenuder system to induce changes in size and composition via moderate heating of the particles. Air-parcel trajectories calculated using the Flexpart model show that the aerosol sampled during FAME-08 had different source regions. Preliminary results suggest that all air masses sampled during FAME-2008 feature highly oxidized, low-volatility organic aerosol, regardless of their source region: Significant changes in air-parcel trajectories and wind direction lead to only modest changes in the chemical composition and volatility of the sampled aerosol. Small diurnal cycles of the organic aerosol ions at a mass-to-charge ratio of 44 (m/z 44) and m/z 43 suggest that oxidation is ongoing but may be slow when the aerosol is close to the sampling site. Furthermore, the composition of the organic particles (the relative organic mass spectrum) does not change noticeably when the particles are heated in a thermodenuder system. These results suggest that the organic aerosol in the atmosphere appears to approach a stable oxidation state with a characteristic AMS mass spectrum in 1-3 days under strongly oxidizing conditions.