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Chemical and Physical Properties of Organic Aerosols

U. Baltensperger (1), A.S.H. Prevot (1), M.R. Alfarra (1), J. Dommen (1), H. Hellen (1), A. Metzger (1), J. Duplissy (1), P.F. deCarlo (1), V. Lanz (2), C. Hueglin (2), G. McFiggans (3)

(1) Laboratory of Atmospheric Chemistry, Paul Scherrer Institut, Villigen, Switzerland, (2) Empa, Swiss Federal Laboratories for Materials Testing and Research, Switzerland, (3) Centre for Atmospheric Sciences, University of Manchester, Manchester, UK

urs.baltensperger@psi.ch / Fax: +41 56 310 4525 / Phone: +41 56 310 2408

Organic aerosols comprise a large fraction of the total atmospheric aerosol. Recent developments such as the Aerodyne aerosol mass spectrometer have brought the possibility to retrieve information on the total mass and size distributed non-refractory chemical composition of the submicron ambient aerosol at a high temporal resolution. In the first studies, the AMS data were deconvolved into hydrocarbon-like OA (HOA) and several types of oxygenated OA (OOA) components using individual mass fragments or a combination thereof. A recent novel approach takes advantage of the full spectrum rather than individual mass fragments and uses positive matrix factorization (PMF) to identify the main components of the total organic aerosol and their sources. A first part of the talk will give an overview of the potential of these new methods.

Features of the chemical composition such as the degree of oxidation are not only useful for source apportionment but also determine important physical properties such as the hygroscopicity and the cloud formation potential, as shown by recent smog chamber experiments. These experiments have also shown that smog chambers should be operated at conditions as closely to atmospheric concentrations as possible in order to be able to mimic atmospheric processes. The second part of the talk will thus focus on a comparison between lab and field experiments.