Geophysical Research Abstracts, Vol. 9, 04344, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04344

Source apportionment of submicron organic aerosol during wintertime inversions: a new factor analytical approach

V. A. Lanz (1), M. R. Alfarra (2), U. Baltensperger (2), B. Buchmann (1), C. Hueglin (1), A. S. H. Prévôt (2)

(1) Empa, Swiss Federal Laboratories for Materials Testing and Research, Laboratory for Air Pollution and Environmental Technology, 8600 Dübendorf, Switzerland, (2) Paul Scherrer Institute, Laboratory of Atmospheric Chemistry, 5342 Villigen PSI, Switzerland

Real-time measurements of submicron aerosol were performed during three weeks at an urban background site (Zurich, Switzerland) in January 2006. A new hybrid receptor model (solved by the Multilinear Engine, ME-2) was applied to highly time-resolved organic aerosol mass spectra measured by an Aerodyne aerosol mass spectrometer (AMS) during temperature inversions in wintertime. A priori known source composition was needed in receptor modelling to resolve different aerosol sources and components. Sensitivity of source apportionments to incorporating a priori knowledge was studied. Three sources of submicron organic aerosols were identified. The major component was oxygenated organic aerosol (OOA), representing highly aged and secondary particles, accounting on average for 52-57% of the particulate organic mass. OOA estimates were strongly correlated with measured particulate ammonium. Particles from wood combustion (35-40%) plus 3-13% traffic-related hydrocarbon-like organic aerosol (HOA) fractions accounted for the other half of measured organic matter (OM) and were found to be somewhat enriched during a high particulate matter (PM) episode. Estimated source profiles were verified by measured emission profiles and modelled source strengths by time series of indicative tracer species from collocated instruments. Emission factors for modelled HOA to measured nitrogen oxides (NOx) and OM from wood burning to levoglucosan from filter analyses were found to be consistent with values retrieved from literature.