Geophysical Research Abstracts, Vol. 8, 05916, 2006
SRef-ID: 1607-7962/gra/EGU06-A-05916

Analysis of Aerosol Nucleation Events observed at Mt. Kleiner Feldberg in Germany

J. Curtius (1), J. Schneider (2), A. Kürten (1), D. Jung (1), K. Kandler (3), S. Walter (2), B. Nillius (1), F. Drewnick (2), G. P. Frank (2), R. Winterhalter (2), G. K. Moortgat (2), H. Wernli (1), S. Borrmann (1,2), and M.O. Andreae (2)

(1) Institute for Atmospheric Physics, University of Mainz, Mainz, Germany, (2) Max Planck Institute for Chemistry, Mainz, Germany, (3) Institute for Applied Geosciences, Technical University Darmstadt, Darmstadt, Germany

The Feldberg Aerosol Characterization Experiments (FACE-2004 and FACE-2005) were conducted in the summer 2004 and summer 2005 at Mt. Kleiner Feldberg, a forested mountain site (825 m asl), located about 25 km north-west of Frankfurt/Main, Germany. During the campaigns, several aerosol nucleation events were observed. The instrumentation included three Condensation Particle Counters (CPCs) with 3, 7, and 10 nm lower size detection limits (cut-offs), respectively, a Sequential Mobility Particle Sizer (SMPS), as well as an Electrical Aerosol Spectrometer (EAS). A Quadrupole Aerosol Mass Spectrometer (Q-AMS) was operated to determine the size-resolved chemical composition of non-refractory aerosol components. The nucleation events usually occurred around noon-time. We focused our analysis on the strongest nucleation event observed on 29 July 2004, when maximum total particle concentrations $>$3 nm of up to 40 000 cm-3 were measured. The mass spectrometric analysis revealed that the composition of the aerosol particles $<$100 nm during the nucleation event was dominated by organics, not sulfates. These organics were predominately oxidized, most likely low-volatility ozonolysis products of terpenes, emitted by the forests surrounding the measurement site. Aerosol growth rates, aerosol composition, and their relation to meteorological parameters such as temperature, air mass origin and ozone concentration are discussed. Laboratory studies on the ozonolysis of several terpenes and one sesquiterpene with subsequent rapid particle formation yielded Q-AMS mass spectra very similar to the spectra obtained in the field.