



Aerosol chemical composition in a continental boreal forest, southern Finland, during the quest experiment 2003

F. Cavalli (1), M.C. Facchini (1), S. Decesari (1), L. Emblico (1), M. Mircea (1) and S. Fuzzi (1)

(1) Istituto di Scienze dell'Atmosfera e del Clima, C.N.R., Bologna, Italy,
(f.cavalli@isac.cnr.it)

As part of the EC-project QUEST (Quantification of Aerosol Nucleation in the European Boundary Layer), the boreal forest of Finland has provided the focus for a dedicated nucleation field experiment aimed at refining the chemical and physical pathways leading to the formation and growth of biogenic aerosols. In this study, we have investigated the aerosol size-dependent chemical composition, both organic and inorganic, under different conditions and air mass histories, and related the chemical characteristics observed to the typical aerosol nucleation and growth events and non-events, occurred during the QUEST intensive campaign. The chemical composition shows quite significant differences between event and non-event cases, indicating that new particle formation is preferentially associated with clean air masses and confirming that pre-existing aerosol condensation sink represents a relevant limiting factor for nucleation. In general, the “event aerosol” exhibits a natural background chemical character while the “non-event aerosol” shows chemical features typical of European continental polluted sites, with a marked increase in the concentrations of the major anthropogenic aerosol constituents as sulphate, nitrate, ammonium and water-soluble organic carbon. The experimental evidences provide insight into the links between air masses, chemistry and new particle formation.