Springtime boreal VOCs: The role of monoterpenes in selected intense nucleation events (source inventory)

G.EERDEKENS[1,2]*,V.SINHA[1], N.YASSAA, P.P. AATLO[3], H. AUFMHOFFF[4], F.ARNOLD[5] M.KULMALA[3] AND J.WILLIAMS[1]

[1]Max Planck Institute for Chemistry, Airchemistry, Mainz, Germany (*correspondence: eerdekns@mpch-mainz.mpg.de)
[2]Plant and Vegetation Ecology, University of Antwerp, Belgium
[3]Department of Physics, University of Helsinki, Helsinki, Finland
[4]Atmospheric Trace Gases and Ions, Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany
[5]Institute of Atmospheric Physics Atmospheric trace gases, DLR, Oberpfaffenhofen-Wessling, Germany

Boreal coniferous forests have been shown to profoundly influence regional atmospheric chemistry through the emission of reactive trace gases such as monoterpenes and their oxidation products. The role of these organics in new particle formation has been the subject of considerable research activity in recent years, but is not fully understood. The composition of newly formed ultrafine atmospheric aerosols is not known with certainty. A small number of field studies on newly formed particles (3–5 nm) have concluded that they were primarily composed of high molecular weight oxidised organic species. However, sulphate/organic mixtures have also been suggested.

In this study we present measurements of trace gases and aerosol made in a boreal forest during the BACCI-QUEST IV intensive field campaign in Hyytiälä, Finland in April 2005. Several clear aerosol events were observed and some of these events are synchronized with huge increases in monoterpenes, while others seemed to correlate more strongly with sulphuric acid. Here we elucidate these two distinct forms of aerosol production at the Hyytiälä using the data from the measurements, the information from the back trajectories of air masses and optical stereoisomery of monoterpenes.

Radiogenic isotope signatures of clay-size sediments in the Eastern Indian Ocean: Weathering inputs and current regimes during the latest quaternary

C. EHLERT[1], M. FRANK[1], B.A. HALEY[1], F. GINGELE[2] AND P. DEDECKKER[2]

[1]IFM-GEOMAR, Leibniz-Institute of Marine Sciences, Kiel, Germany
[2]Research School of Earth Sciences, Australian National University,Canberra,Australia

The terrigenous sediments along the Indonesian and western Australian shelves either originate from the Indonesian islands, which are mainly characterised by young volcanics, or from western Australia, which consists of old, Archaean to Proterozoic rocks. The geochemical composition of the terrigenous shelf sediments is directly linked to erosion and weathering of rocks in the hinterland. This detrital material is advected by the local currents and gets deposited at various distances from its origin as a function of grain size.

Analyses of the radiogenic Nd, Sr, and Pb isotope ratios on the terrigenous clay size fraction of eastern Indian Ocean sediments allow the distinction of three different source provinces: Northern and Central Sumatra, the Java-Banda Province, and northwestern Australia. All isotope systems show a large range in isotopic composition, as well as a high spatial variability. Nd (Sr) isotope compositions range from $\varepsilon Nd = -21.5$ (0.8299) off the northwest Australian coast to $\varepsilon Nd = +0.7$ (0.7069) in samples southwest of Java. Pb isotope compositions also show a very large variability between 17.44 and 19.89 in $^{206}Pb/^{204}Pb$ and between 0.7962 and 0.8916 in $^{207}Pb/^{206}Pb$.

Two cores, FR10/95-GC5 and FR10/95-GC17, located under the present pathway of the Indonesian Throughflow (ITF) and the Leeuwin Current (LC), respectively, recorded changes in sediment transport and provenance related to ocean circulation and weathering inputs during the latest Quaternary. The radiogenic isotope records indicate that the area north of 18°S was relatively stable during the last glacial and interglacial, and was mainly affected by the eastward flowing South Java Current. In contrast, the area south of 18°S experienced major changes in isotope composition of the clay size minerals: The intensity of the ITF was greatly reduced and the LC was absent at the location of the core during the last glacial, while the West Australian Current was stronger and showed a larger extension.