AAAR 2004 Annual Conference

Presented by **American Association for Aerosol Research**

Gerald Spindler

SIZE-SEGREGATED CHEMICAL PARTICLE CHARACTERIZATION IN WINTER 2003 AT THE IFT-RESEARCH STATION MELPITZ (GERMANY)

GERALD SPINDLER, Erika Brüggemann, Thomas Gnauk, Achim Grüner, Hartmut Herrmann, Konrad Müller, Leibniz-Institut für Troposphärenforschung e.V., Leipzig, Germany; Horst Werner, Umweltbundesamt, Berlin, Germany

Abstract Number: 130
Last modified: April 7, 2004

Preference: Poster Presentation
Working Group: Atmospheric Aerosols
Keyword(s): particulate matter; impactor; particle mass; water soluble ions; total carbon; source regions

Abstract

Size-segregated chemical characterizations of tropospheric aerosol were performed in November and December 2003 at the research station of the Leibniz-Institut für Troposphärenforschung (IfT) in Melpitz (Germany), which is a spot in the air quality measuring network of the Umweltbundesamt (UBA) and an EMEP level 3 aerosol station. Melpitz is an air chemistry and physics station situated in a flat terrain in middle Europe (12°56' E, 51°32' N, 86 m asl.). In the last 10 years the PM concentration continuously decreased and is now constant. Hence the PM concentration mainly depends on transport from different source regions. Under the dominating wind direction from Southwest air masses from the Atlantic Ocean with integrated showers were transported to Melpitz. The second important wind direction maximum is East. Here, during high-pressure conditions continental air masses are transported over long distances often with moderate wind velocity and without precipitation. The main sources for these air masses are Russia, Poland, Belarus, Ukraine, and the North of Czech Republic. In these areas coal heated power plants sometimes with little exhaust treatment, old industry, and older cars still exist as important air pollution sources.
Particles were sampled over 24 hours (start was 10:00 MEZ) in five size classes (BERNER low pressure impactor with the cut-off sizes 10, 3.5, 1.2, 0.42, 0.14, and 0.05 µm) and analysed for mass and the content of water-soluble ions and total carbon. The particle mass concentration was determined gravimetrically (at 50% relative humidity, 20 °C), conditioning time: 24 hours (Mettler AT 261 Delta Range balance). The concentration of water-soluble ions was detected by ion chromatography (Metrohm, Switzerland). Total carbon (TC) was quantified as sum of organic (OC) and elemental (EC) carbon by a

thermographic method applying a Ströhlein C-mat 5500 carbon analyzer. For identifying air mass source region 96 hours backward trajectories (www.arl.noa.gov) for 200, 500 and 1500 m were used at 18:00 and 02:00 MEZ. Particle samples with constant transport from the same source regions for the whole day (9 of 13 days) were compared with means for three different source regions. These regions are the Northern Atlantic (NA), the Western Atlantic with Western Europe (WA) and Eastern Europe (EE). The stages 2, 3 and 4 (0.14-0.42, 0.42-1.2, and 1.2-3.5 µm) are strongest influenced by long-range transport and stage 3 shows usually the maximum concentration. The mass concentration in stage 3 transported from EE amounts to 22 µg m-3 and is more as four times higher as for the source region NA with 5 µg m-3. Also the mass concentrations for the ions Nitrate, Sulfate, Ammonium and for TC are much higher for region EE. The concentration differences between regions NA and WA are low; mostly WA shows hardly higher concentrations.

home | overview
program | submission | organization

Top