

UFIPOLNET: Concentration of Particle Number Distributions at 4 Stations in Europe

H. Gerwig¹, G. Löschau¹, L. Hillemann², B. Wehner³, A. Wiedensohler³, A. Zschoppe⁴, C. Peters⁴, A. Rudolph⁴, C. Johansson⁵, J. Cyrys⁶, M. Pitz⁶, R. Rückerl⁶, J. Novak⁷, H.G. Horn⁸, R. Caldow⁹, G.J. Sem⁹

¹LfUG - Section Air Quality, Saxon State Agency for Environment and Geology, 01109 Dresden, Germany

²UBG – Staatliche Umweltbetriebsgesellschaft, 01445 Radebeul, Germany

³Leibniz-Institute for Tropospheric Research, 04318 Leipzig, Germany

⁴Topas GmbH, 01279 Dresden, Germany

⁵ITM – Department of Applied Environmental Science, Stockholm University, 106 91 Stockholm, Sweden

⁶GSF National Research Centre for Environment and Health, 85764 Neuherberg, Germany

⁷CHMI – Czech Hydrometeorological Institute, 14306 Prague, Czech Republic

⁸TSI GmbH, 52068 Aachen, Germany

⁹TSI Inc., Shoreview, Minnesota, 55126, USA

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Several studies show a decline of particle mass concentrations in Central Europe of TSP and PM₁₀ since 1990. In contrast, particle number concentrations of ultrafine particles (< 100 nm = UFP) were not changed during winter periods 1991 – 1999 in Erfurt/Germany (Cyrys et al. 2002). There are however only a limited number of long-term UFP measurements in Europe. Epidemiological studies showed a relationship between high number concentrations of UFP and adverse health effects.

The European Commission needs therefore more information about UFP concentrations for evaluation processes within the CAFE process and the Thematic Strategy on Air Pollution.

The project UFIPOLNET (Ultrafine Particle Size Distributions in Air Pollution Monitoring Networks) intends to demonstrate that the newly developed Ultrafine Particle Monitor UFP 330 is able to perform adequately in routine network operation.

The instrument produces a number size distribution from 20 to 500 nm. Only 6 size classes >20, > 30, > 50, > 70, > 100, >200 (N1 – N6) are transferred to the central measurement network stations to reduce the amount of data collected in the databases.

First comparisons with a DMPS for ambient aerosols (Wehner et al. this issue) show a good correlation with a DMPS measuring in parallel at a street canyon site.

Since December 2006 in Dresden and February 2007 in Augsburg, Stockholm and Prague, the UFP 330 will run continuously until October. It is planned to run the instruments on a permanent basis for a longer period. All sites are near busy roads; Augsburg is an urban background site.

The number concentrations will be correlated with nitrogen oxides, benzene and other continuously measured parameters in a routine measuring network. In some places, traffic numbers will be correlated with the measurements.

At three stations, SMPS/DMPS size spectrometers have been monitoring for several years. Figure 1 compares the annual mean

concentrations of total number concentrations per station (2003 – 2005). Augsburg shows about half, Stockholm twice as many particles as Dresden. Prague and Dresden show almost the same concentration of NO_x in 2005, while the street canyon of Stockholm shows almost twice the concentration. The correlation with NO_x indicates the traffic influence (Birmili, 2006).

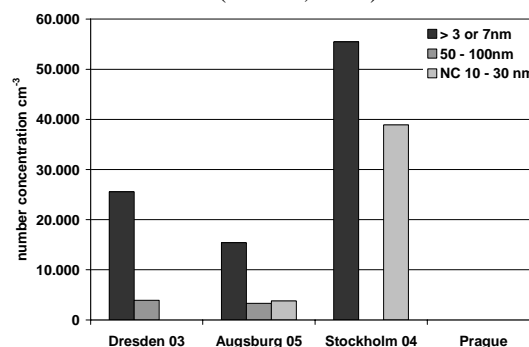


Figure 1: Number concentrations at the 3 stations with reference instruments

One aim of UFIPOLNET is to harmonise the sampling conditions (particle pre-impaction and humidity) as well as the evaluation of identical size classes. In this way, interpretations of particle number concentrations and size distributions will be facilitated. Comparable results will permit analysis of absolute differences between ultrafine aerosol size distributions at many polluted sites over long periods.

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