# Comparison of particle concentration and size distribution of urban aerosols in the city and county of Salzburg

F. Kwasny, P. Madl and W. Hofmann

Department of Materials Engineering & Physics, University of Salzburg, 5020 Salzburg, Austria

Keywords: Urban aerosols, Particle size distribution, Meteorology, SMPS, Ultrafine particles

This SMPS sampling campaign included four different sites – two of them located within the city of Salzburg, the reminder being situated in rural areas. Samplings were carried out during both summer and winter periods and took place at existing environmental monitoring stations of local authorities. This set-up made it possible to directly correlate meteorological and other environmental air quality data with the sampled nano-particle inventory.

The campaign investigated the particle number concentration in the range below 1 µm. In order to detect daily fluctuations, measurements at each site were carried out over several days. At all sites, distinct 24-hour fluctuations have been observed, along with lower concentrations on weekends or holidays. As expected, the main burden of urban aerosols originated from traffic exhaust. Obviously, the downtown sampling site (Rudolfsplatz), with intense traffic during the week, and significantly less on weekends revealed the most intense particle loads.

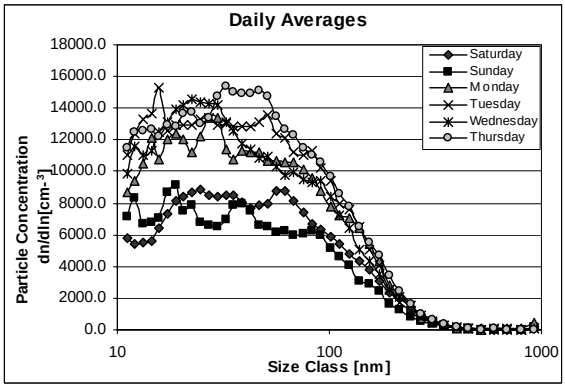


Figure 1. Particle size distribution of daily averagesat the downtown site (Salzburg - Rudolfsplatz).

The measurement site 30 km outside of Salzburg (Haunsberg) more closely approached the background concentrations of anthropogenic produced aerosols. Although it did not closely follow the day/night and weekend patterns, the fluctuations and influence of traffic exhaust was still recognizable and was most likely associated with the long-range transport of aerosols (Dorsey et al., 2002).

At all sites, temperature and humidity data were relatively stable and did not appear to influence ultrafine particle concentrations considerably. Wind direction and wind speed seemed to have little or no effect on particle concentration at sites close to highly frequented roads. Although $PM_{10}$ seemed to be correlated with trends in ultrafine particles, it did not provide enough evidence that ultrafine particle behavior can be considered simply as a fraction of $PM_{10}$ (Rosenbohm et al., 2005). On the other hand, traffic related exhaust pollutants like NO and $NO_2$ indeed unveiled a close link to the measured ultrafine particle concentrations. Hence, such exhaust chemicals can be used as an indicator for ultrafine particles in close proximity to road traffic conditions (Janhäll et al., 2006).

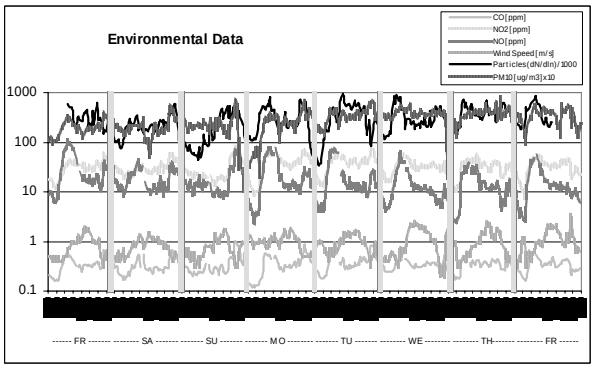


Figure 2. Environmental data compared with ultrafine particle concentration

Comparisons with measurements performed during the cold season will be presented at the conference. Such comparison could make evident different sources of the urban particle burdens as well as account for effects associated with inversion weather episodes (Janhäll et al., 2006).

This research was supported by the Landesregierung Salzburg.

Dorsey J.R. et al (2002). *Atmospheric Environment,* 36. 791 – 800. 2002

Janhäll S. et al (2006). *Atmospheric Environment,* 40. 5355 – 5366.

Rosenbohm E. et al (2005). *Atmospheric Environment,* 39. 5696 - 5709.

Shadbegian R.J. & W.B. Gray (2003) *Topics in Economic Analysis & Policy*. Vol. 3, Issue 1, Art. 15.