Road tunnels - particle properties, wet and dry conditions

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Particulate air pollution in traffic tunnels is often very high due to high emissions and restricted air exchange (e.g. Gëller *et al.*, 2005). Road traffic tunnels have both exhaust and non-exhaust particle sources such as tires, pavement and brakes. In tunnel environments the emissions of ultrafine particles would decrease due to high levels of particle surface area for deposition (Janhäll *et al.*, 2012).

In an on-going research project, airborne particles in one road and one railroad tunnel (Gustafsson *et al*, these proceedings) are characterized regarding concentrations, size distributions and elemental composition in relation to traffic. This abstract show initial project results for the road traffic tunnel, with the aim to characterise and identify the main particle sources to be able to suggest abatement measures.

Particle properties were studied during campaigns in the Söderledstunneln (road tunnel in central Stockholm). The measurements were performed in a small room adjacent to the tunnel and with the inlets mounted within the tunnel from drilled holes, while the road dust load was measured directly at the road surface when the tunnel was closed for maintenance. Dust sampling was made with the VTI wet dust sampler (Jonsson *et al.*, 2008, Blomqvist *et al.*, these proceedings).

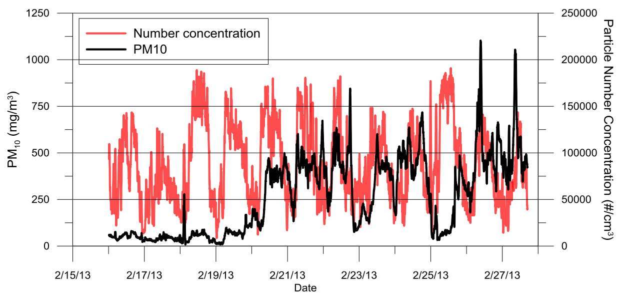

Figure 1.The concentrations of PM_{10} and particle number show the onset of abrasion particle suspension.

Figure 1 shows concentration of PM_{10} and of particle number. Around the 20th of February PM_{10} increase due to drying up of the road surface in the tunnel, while the particle number concentrations are not affected. The size distribution in the size range between 0.5 and 20 µm is shown in Figure 2, where it is clear that the wet conditions give a less pronounced peak as well as very much lower concentrations. Directly before the campaign started, also during wet conditions, samples of the road dust load showed very large levels as compared to road dust load at the surface roads in the same area.

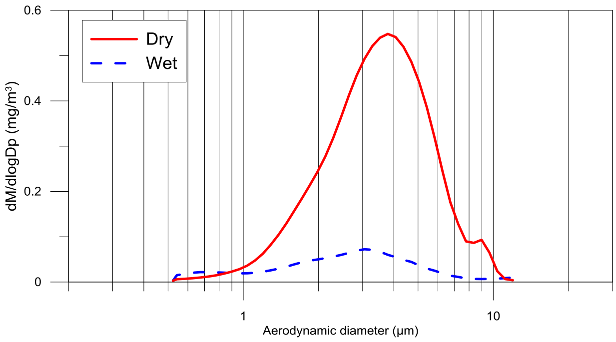

Figure 2. Particle mass size distribution averaged over the first, wet part of the campaign and over the second, dry part of the campaign, respectively.

Further work will describe differences between road and railroad tunnel particle emissions, size resolved particle composition, source apportionment and abatement strategies.

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