Comparison of UFP concentration and size distribution instruments at an urban site

J. Staelens[1], E. Frijns[2], P. Berghmans[2], C. Matheeussen[1], P. Panteliadis[3], G. Kos[4], E. Weijers[4], K. Wyche[5], B. Bergmans[6], E. Roekens[1]

[1] Flemish Environment Agency (VMM), Department Air, Environment and Communication, Belgium
[2] Flemish Institute for Technological Research (VITO), Belgium
[3] Public Health Service of Amsterdam, Department of Air Quality, the Netherlands
[4] Energy research Centre of the Netherlands (ECN), Environment & Energy Engineering, the Netherlands
[5] University of Leicester, Department of Chemistry, United Kingdom
[6] Institut Scientifique de Service Public (ISSeP), Air Quality, Belgium

Corresponding author e-mail: j.staelens@vmm.be

Quality assurance is an important issue for ambient air quality measurements. This in particular holds true for ultrafine particles (UFP), which are not yet included in regular policy-oriented air quality monitoring programmes. One of the aims of the Joaquin project (Interreg IVB North-West Europe) is to carry out continuous long-term UFP measurements in different cities in the North-West European region. Within the project different types of UFP instruments will be deployed. To evaluate the comparability of the instruments, a short-term measuring campaign was carried out in January 2013.

Four types of UFP instruments were used: (i) a particle counter with water as condensation liquid (TSI-3783, n = 5), (ii) a differential mobility analyzer with electrometer and corona discharger to ionize the sampled aerosol (TSI-3031, n = 3), (iii) a scanning mobility particle sizer (SMPS) with a butanol condensation particle counter and a Kr-85 source (Grimm-5420/L-DMA, n = 3), and (iv) a second type of SMPS with butanol and a Ni-83 source (TSI-3772/L-DMA, n = 1).

All devices were set up in measuring cabins or trailers at an urban location in Antwerp (Belgium), next to a moderately busy road. In total 12 instruments simultaneously measured the UFP number concentration and/or size distribution during 3-6 weeks, depending on the type of instrument. The obtained results will be discussed with respect to the comparability of ambient UFP measurements at an urban location carried out with the same type of instrument on the one hand and with different measurement systems on the other hand.

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