SPATIAL AND TEMPORAL CHARACTERIZATION OF TRAFFIC EMISSIONS IN URBAN AREA WITH MOBILE LABORATORY

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Traffic emissions significantly contribute to regional air pollution. Meteorology, traffic characteristics, road design and side structure affect near-road air quality by modifying dispersion of emissions (Hagler et al., 2010). To obtain more detailed assessment of physical and chemical characteristics and source contributions of fine-particles in urban environment an advanced measurement method was developed as part of the MMEA (Measurement, Monitoring and Environmental Assessment) program.

Three weeks street canyon campaign was performed in December 2010 in Helsinki. Mobile laboratory Sniffer (Pirjola et al., 2004) was driven on a 20 km route in the city center during the morning and afternoon rush hours, occasionally also at noon. The main street Mannerheimintie was driven back and forth always 5 times. Similarly, the measurements were carried in side streets and background locations. A special attention was given for the urban microenvironments close to the high traffic density street. Stationary measurements were conducted in four measurement stations by HSY, along the driving route.

The spatially and temporally high-resolution data included number concentration and size distribution of particles larger than 3 nm (ELPI, CPC and SMPS) as well as black carbon (Ethalometer). Also continuously measured were NO, NO_2, NOx, CO, CO_2, PM_{10}, $PM_{2.5}$, meteorological and geographical parameters. A thermodenuder was used for volatility studies of particles.

Meteorological conditions as well as traffic characteristics and urban planning was shown to have an effect on the measured air quality. The surrounding built environment combined to the predominant wind conditions changed the dispersion around the high traffic density streets markedly. The comparison of the stationary measurements to mobile measurements corresponded well promoting the mobile measurement method in an urban air quality studies.

MMEA is supported by Tekes **(**the Finnish Funding Agency for Technology and Innovation) and coordinated by the Finnish energy and environment cluster - CLEEN Ltd.

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