

## Exposure of schoolchildren to traffic-related air pollution: the HEAPS study

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To assess the health impact of traffic related air pollution on schoolchildren, the HEAPS study (Health Effects of Air Pollution in Antwerp Schools) was performed.

The HEAPS study comprises the biomonitoring of 130 children (aged 6-12) from 2 schools by measuring oxidative stress, inflammation and cardiovascular markers and simultaneous air quality monitoring.

To assess the exposure of the children, air quality measurements were performed at the two schools, at a selection of 40 home locations and while in transport. One of the schools was located next to a busy road of 20,000 vehicles/day (School 2), the other school was located at an urban background (School 1). The schools were located in the same urban area. Measurements were performed in two seasons: in spring (May – June 2011) and in autumn (November – December 2011). This paper discusses the air quality measurements at the school locations.

BC, EC, NO<sub>x</sub>, PM and UFP were measured at the playground of both schools. Also traffic counts were performed at each of the school locations. At school 2, measurements were also performed at the street side and at the windows of 7 classes to assess the spatial variability within the school area. In addition, NO<sub>2</sub> and BC measurements were performed during the entire monitoring campaign at an urban location of the AQ monitoring network.

Nitric oxides were measured using a mobile platform (Airpointer, Recordum) comprising a Chemiluminescent technique for measuring NO and NO<sub>2</sub>. UFP number concentrations were measured using CPC (TSI type 3783, 3786 and 3787) and Nanocheck (Grimm). Size distribution was measured using SMPS (TSI). PM<sub>2.5</sub> mass concentration measurements were performed using a low volume filter sampler (Partisol, Thermo). Selected filters were subsequently analyzed for EC/OC using TOT (Thermo Optical Transmission, Sunset) technique. PM fractions (PM<sub>10</sub>, PM<sub>2.5</sub>, PM<sub>1</sub>) were measured using a Grimm optical counter (model 1.108). In addition, NO<sub>2</sub> was monitored using diffusive sampling tubes and BC was measured using μ-Aethalometers (AethLabs); these techniques were used at the home locations because they can be easily deployed at 10 (or more) locations simultaneously. The measurements at the school were

used to assess exposure at school and to compare the different measurement techniques and correlation between pollutants and traffic.

The results showed similar concentrations at the playground of both schools, despite the difference in traffic. However at school 2, increased concentrations were measured at the street side showing up to 2 times higher concentrations of BC in spring, as compared to the concentrations measured at the playground of the school. UFP, EC were increased by 70% in spring. Higher concentrations were observed in autumn compared to springtime, however a slightly different behaviour was observed for different pollutants. A good correlation was found between UFP concentrations and BC or NO<sub>2</sub>. Pollutants showed good correlation with traffic counts, whereas the correlation was better if only heavy duty vehicles were considered.

This paper will further discuss the seasonal variability of UFP, BC and NO<sub>2</sub> at school locations, the correlation between pollutants and spatial variability.

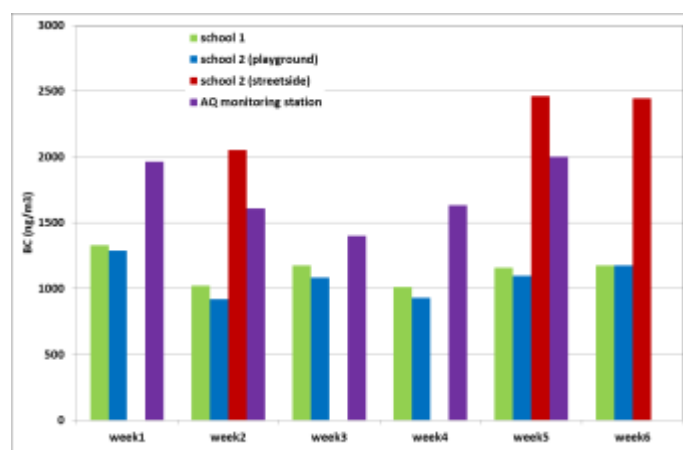


Figure 1. BC concentrations at school 1, school 2 (playground), school 2 (street side) and urban AQ monitoring station, measured in spring

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