

A highway study of PM and black carbon (BC) in Flanders (Belgium)

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From April 2012 until February 2013 the Flemish Environment Agency (VMM) carried out measurements near a **busy highway** as part of the European Life+ ATMOSYS project. Four mobile instrument vans were placed along a perpendicular transect oriented along the dominant south-west wind direction near the busy E40 highway in Affligem (Flanders, Belgium). Each mobile instrument van was equipped with automated monitors to measure **PM₁₀** and **PM_{2.5}** as well as **black carbon (BC)**. Additionally passive samplers were used to determine the concentrations of **NO₂**, **NH₃** and volatile organic compounds (**VOC**). This highway campaign focused on determining the pollutant contributions coming from the highway as well as their **concentration gradients**.

Experimental setup:

In total 4 mobile instrument vans were used of which one was placed upwind (at 14m from the highway) and the other three downwind (at 6m, 55m and 96m from the highway respectively). Measurements of PM were done with TEOM-FDMS monitors and black carbon with MAAP monitors. Passive sampler measurements were also done at the locations of the mobile instrument vans and two additional downwind locations for the determination of NO₂, NH₃ and VOC. The local meteorological parameters wind speed and wind direction were also measured at a height of 9m at the upwind location.



Figure 1 One of the mobile instrument vans placed downwind with a Leckel alongside (left).

Additionally sampling with Leckel SEQ 47/50 low volume samplers was done for 24h at 2.3 m³/h on 47mm Pallflex® Tissuquartz™ 2500 QAT-UP filters. Alongside each mobile instrument van such a Leckel was placed (see Figure 1) in order to compare the daily PM₁₀ mass concentrations to those reported by the TEOM-FDMS monitors.

Results:

The importance of black carbon (BC) on health and climate effects is known from scientific literature (see for example¹). It is a very good tracer for combustion due to vehicle exhaust. Our **first results** show that there is a **very strong gradient of BC** as a function of distance to the highway (see Figure 2).

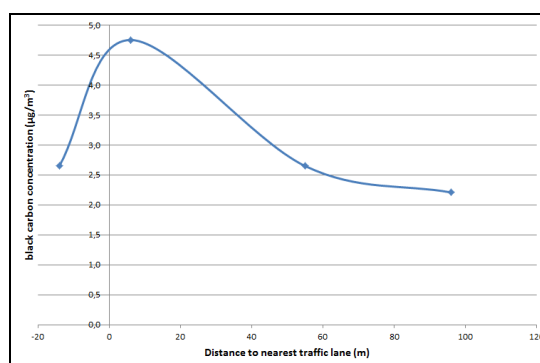


Figure 2: Gradient of black carbon (BC) measured near a busy highway.

Results for the other measured pollutants (PM, NO₂, NH₃ and VOC) will be presented along with a detailed analysis including traffic numbers and meteorological conditions.

¹ Health effects of black carbon, WHO (2012), <http://www.euro.who.int/en/what-we-publish/abstracts/health-effects-of-black-carbon>