Size-segregated analysis of PM10 at a tandem urban – rural site combination

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Introduction
In January 2006, size segregated measurements and analysis of the chemical composition of PM10 samples, collected twice daily with Berner type impactors, were made to determine its source patterns. The measurements were performed at two sites in Münster, NW Germany. One of the sites was located in the centre of Münster, next to a four- to six- lane main road. The second one was set up in a bird nature protection area 6 km to the North.

Method
The samples were taken with two five stage Berner type impactors. They were collected on Tedlar® foils and on quartz fiber filters (Whatman) taken simultaneously, with sample integration time being 6 hours.

Analysis
The carbon analysis was made with an OCEC Lab Analyser. The main ions (Cl⁻, NO₃⁻, SO₄²⁻) were analyzed with an ion chromatograph. NH₄⁺ was detected with a flow injection analyser and Ca²⁺, Mg²⁺, and Na⁺ with an atom-absorbing spectrometer.

Results
The mean mass concentration, calculated as the sum of ions plus carbon, was clearly higher at the roadside than in the surrounding (31 µg/m³ to 24 µg/m³). Between the two sites, there was no significant difference in ion mass concentration, correlation coefficient of 0.92.

Conclusions
Carbon made the main difference between the two sites in Münster. The difference between the two sites averages 7 µg/m³, meaning about 23 % coming from traffic and 77 % originating from background concentration.

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