Particle spatial distribution in suburban area Celakovice: The effect of commuter vehicle traffic.

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Background

Celakovice is a suburban small city. Inhabitants commute daily to work to Prague by public transportation and many of them by car. This situation is typical for the most small cities and satellites around larger cities.

Celakovice location

The Aim

to determine the effect of traffic peaks on particle concentrations near main roads and their effect on farther dwellings.

Traffic peaks	
Road	150m far from road
$2x10^4$ #/cm^3 with peaks around $4x10^4$ #/cm^3	$1.5x10^4$ #/cm^3
After traffic peaks	
Up to 10:00 AM 1.5-$2x10^4$#/cm^3 After 10:00 concentrations gradually decreased to a concentration about 10^4#/cm^3 at midday (3rd February), and $7x10^3$#/cm^3 (30th January)	

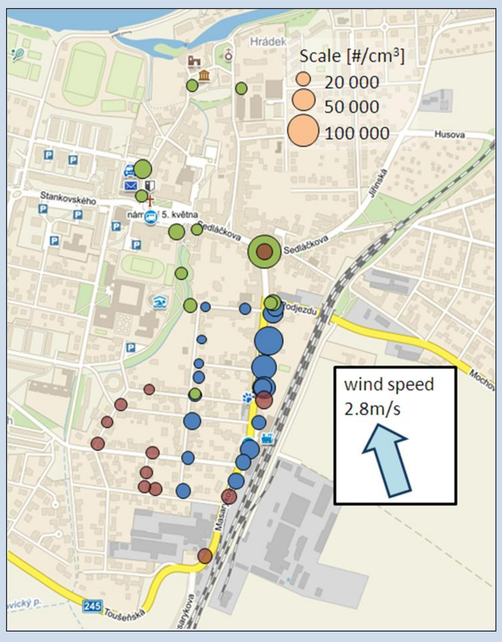
Methods

two mobile sets of instruments

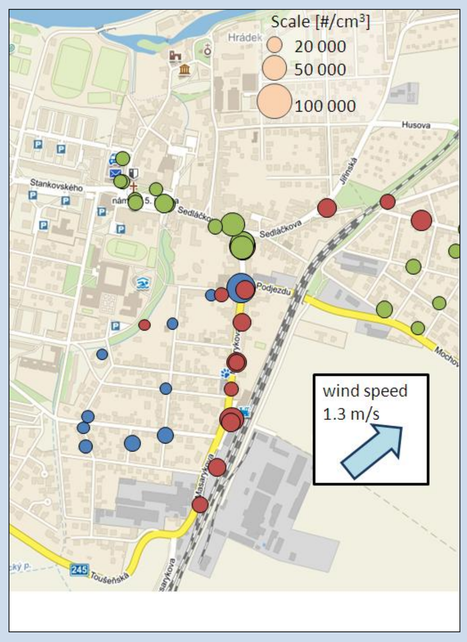
-**Particle classifier** with size-resolved measurements of particles in the 5 - 500nm (EEPS, TSI), bateries, GPS, and other accessories

One set includes additionally

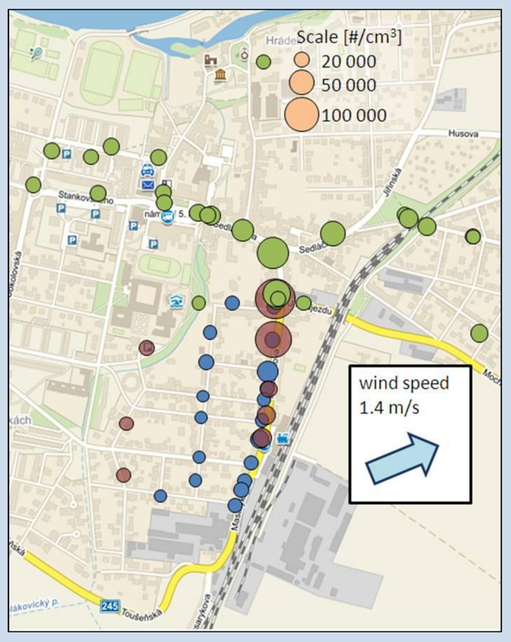
-**Condensation particle counter** (UF - CPC 200 Palas) counts particles from 5nm to 10µm



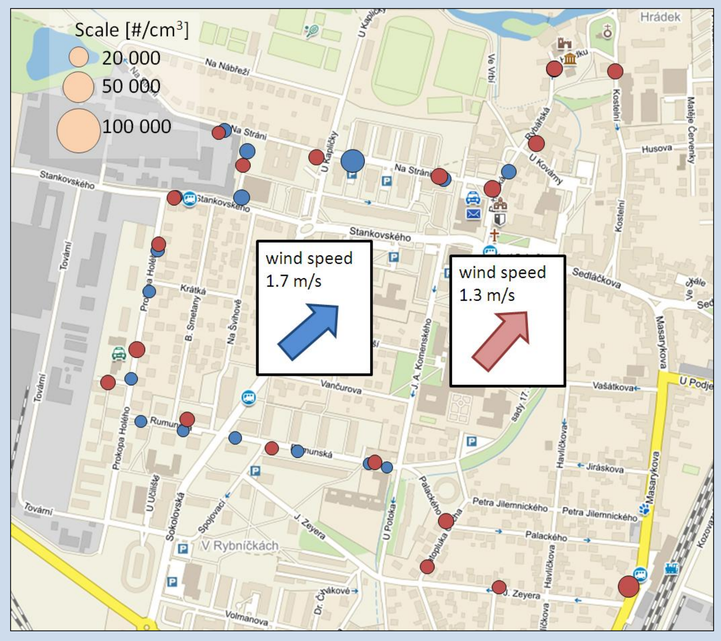
Particle number concentrations 30th January; simultaneous measurement at 7:30-8:00; 8:00-8:20; 8:20-9:00



Particle number concentrations 3rd February; simultaneous measurement at 6:45-7:20; 7:20-7:35; 7:35-9:00

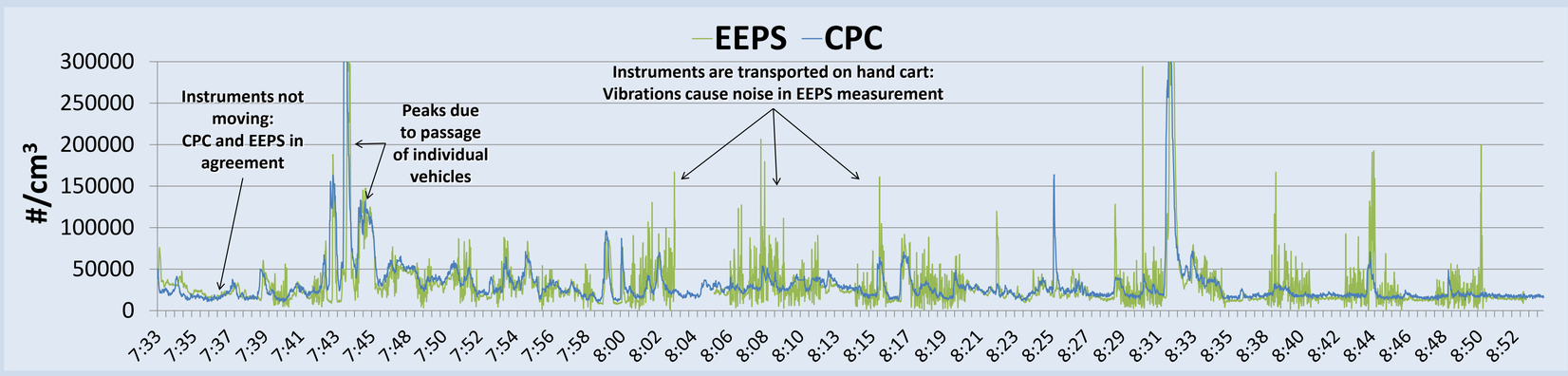


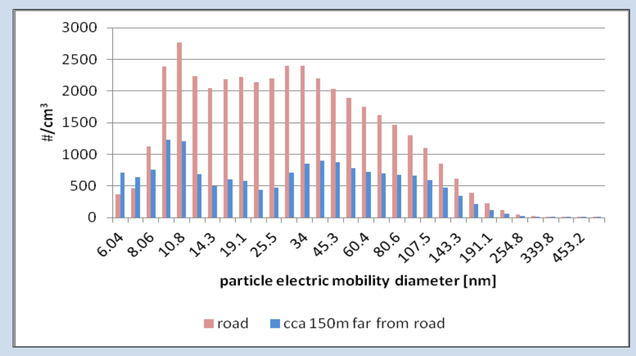
Particle number concentrations 3rd February; simultaneous measurement at 16:10-17:15; 17:15-17:50; 17:50-18:30



Particle number concentrations measured after traffic peaks on 30th January and 3rd February

EEPS measurement affected by vibrations during instrument movement; data are reliable only during stops, where EEPS total concentrations (5-560 nm) are in agreement with the UF-CPC (> 5 nm).





Averaged particle number distributions during simultaneous measurement by two instruments sets, one near the main road, the second cca 150m far from the road (30th January, 7:30-8:00).

Conclusions

- **Concentrations along main road were elevated in comparison with places at least 150m far from the road; however, the difference was relatively small.**
- **Concentration between morning and afternoon traffic peaks ($7x10^3$ to $1.5x10^4$#/cm^3) was elevated in comparison with Prague background concentration, $7.3x10^3$ #/cm^3**
- **Although concentrations followed daily pattern corresponding to traffic intensity, the main road did not seem to be the main source of measured particles in areas 150 m from the road.**

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