



Urban maps of **Black Carbon** Pollution



Motivation

Urban air includes many microenvironments to which the citizen is exposed at different times of the day, with the air quality of most of them being very different from that measured at urban background monitoring sites. Access to detailed comparisons in air quality variations encountered when commuting through a city offers the urban traveler more informed choice on how to minimize personal exposure to inhalable pollutants.

Research topics

Measurements on public transport

- Public transport like bus, tram and taxis are a great way to measure concentrations all over the city.
- BC concentrations in the city differ by orders of magnitude.

Exposure during commute

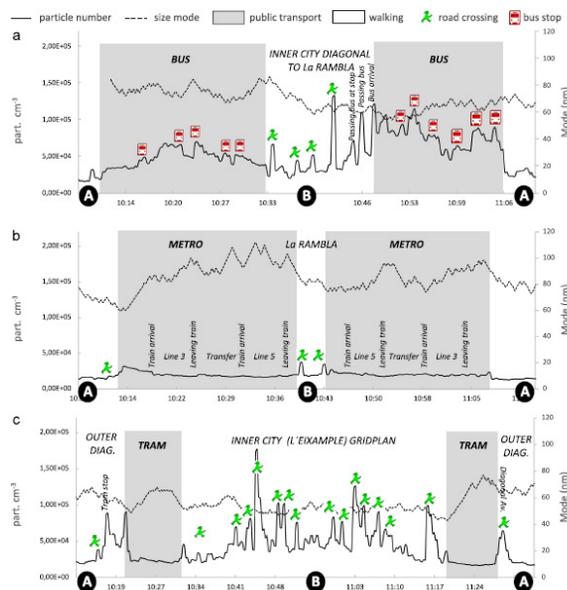
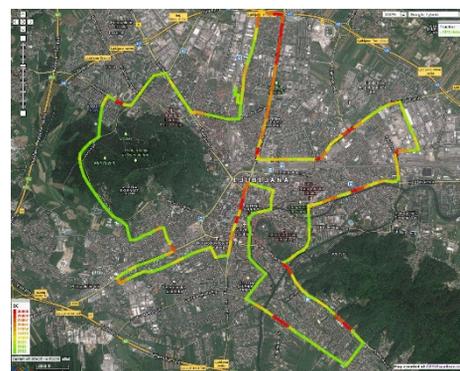
- On person measurements during commute using different routes.
- airQmap: volunteers were used to measure BC on bikes and on foot in different cities.
- Measurements in Barcelona showed:
 - In terms of exposure tram is the best option for commuting, followed by bus, subway and walking.
 - BC concentrations jump by a factor of 10 when crossing main roads.

Local vs. Urban pollution

- Short-duration pulses (5-min averages) can be attributed to middle-scale contributors, while longer durations (hourly averages) can be attributed to urban-scale emitters.
- The effect of road proximity can be measured.

Related articles

- T. Moreno et. al., „Urban air quality comparison for bus, tram, subway and pedestrian commutes in Barcelona“, *Env. Research*, 495-510 (2015).
- L. Dekoninck et. al., „An instantaneous spatiotemporal model to predict a bicyclist's Black Carbon exposure based on mobile noise measurements“, *Atmos. Environment*, 623-631 (2013).
- W. Choi et. al., „The effects of the built environment, traffic patterns, and micrometeorology on street level ultrafine particle concentrations at a block scale: Results from multiple urban sites“, *Sci. Of the Total Environment*, 474-485 (2016).
- J. G. Watson et. al., „Estimating Middle-, Neighborhood-, and Urban-Scale Contributions to Elemental Carbon in Mexico City with a Rapid Response Aethalometer“, *Air & Waste Manage. Assoc.*, 51, 1522-1528 (2001).



GENERAL INQUIRIES:

Aerosol d.o.o., Kamniška 41, SI-1000 Ljubljana, Slovenia
tel: +386(1)4391700 fax: +386 59 191 221 www.aerosol.eu
US, Mexico, Canada:

Magee Scientific Corp., 1916 M.L. King Jr. Way,
Berkeley CA 94704, USA tel: +15108452801 fax: +15108457137
www.mageescientific.com

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