Monitoring black carbon concentrations with mobile devices in the city of Liège

Bertrand L1, Lenartz F1., Cornet Y2. and C. Louis 2

1. TISSeP, rue du Chéra 200, 4000 Liège, Belgium - l.bertrand@issep.be
2. Geomatics Unit (University of Liège), allée du 6-août 19, 4000 Liège, Belgium

Context

For a city of 200 000 inhabitants (around 500 000 with its suburbs) Liège (Wallonia, Belgium) has a small share of public transport (mainly diesel buses for urban transport), high share of car use and low share of cycling, with consequencies for population exposure to traffic pollutants and quality of life. Liège and Walloon authorities presently strive to correct errors of past decades (kind of urban highways), re-build streetcar lines (stripped away 50 years ago)1, foster bicycle use1, give back riverbanks and green areas to pedestrians, etc.

ISSeP’s ExTraCar project (2014-2016) focuses on Black Carbon (BC) because this pollutant is linked to the most toxic components of PM2.52. BC is a chemically inert pollutant and is a more sensitive traffic pressure indicator than the (presently) regulated pollutants.

Materials and methods

The BC analyser that we use is the AE51 of AethLabs, it is highly portable (281 g) and battery operated (keeps running around 8h). The GPS is a DG 200 of Global cycles the loop 3 or 4 times during a measurement sessions, which enables to represent the spatial tracks simultaneously, mostly during the morning and evening rush hours on schooldays. The operators Six tracks (loops) covering the territory of Liège were designed. Several cycling operators follow different analyser) are available.

GIS processing for BC (1s) results

A 60’s centered rolling median of BC analyser 1 s valais is currently used. This choice is subject to revision.

Modelling urban background concentrations and at street level

The regional model Ausial 20003 will be used to generate background concentrations, at least for wintertime. Measurement from at least one station of the automatic network (AE22 from Magee scientific) are available for the North tip of the study area. Domestic heating emissions were obtained from an inventory made at AwAC and then disaggregated to get a higher spatial resolution. For tailpipe exhaust data, we refer to recent BC studies in Flanders4. At street level, the CANSm model from O. Brasseur5 will be used. This package relies on the same equations as OSPM6. Six street sections were chosen to this end with various orientations and H/W ratios.

Fig. 1. Georeferenced PostSQL/PostGis database and interface developed for ExTraCar

Fig. 2. Simultaneous measurements for 3 of the 6 loops

Fig. 3. Various data processing for BC (1s) results

Table 1. To assess the temporal distribution of BC concentrations, the set of observations must be representative of the various pollutants dispersion condition. For each measurement on a loop, this is recorded and the status of the data set is checked against a representativeness objective.

Table 2. Meteorological representativeness of observations set

References