



Evaluation of bottom-up and downscaled emission inventories for Paris and consequences for estimating urban air pollution increments

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Since a major part of the Earth's population lives in cities, it is of great importance to correctly characterise the air pollution levels over these urban areas. Many studies in the past have already been dedicated to this subject and have determined so-called urban increments: the impact of large cities on the air pollution levels.

The impact of large cities on air pollution levels usually is determined with models driven by so-called downscaled emission inventories. In these inventories official country total emissions are gridded using information on for example population density and location of industries and roads. The question is how accurate are the downscaled inventories over cities or large urban areas.

Within the EU FP 7 project MEGAPOLI project a new emission inventory has been produced including refined local emission data for two European megacities (Paris, London) and two urban conglomerations (the Po valley, Italy and the Rhine-Ruhr region, Germany) based on a bottom-up approach. The inventory has comparable national totals but remarkable difference at the city scale. Such a bottom up inventory is thought to be more accurate as it contains local knowledge.

Within this study we compared modelled nitrogen dioxide (NO_2) and particulate matter (PM) concentrations from the LOTOS-EUROS chemistry transport model driven by a conventional downscaled emission inventory (TNO-MACC inventory) with the concentrations from the same model driven by the new MEGAPOLI 'bottom-up' emission inventory focusing on the Paris region.

Model predictions for Paris significantly improve using the new Megapoli inventory. Both the emissions as well as the simulated average concentrations of PM over urban sites in Paris are much lower due to the different spatial distribution of the anthropogenic emissions. The difference for the nearby rural stations is small implicating that also the urban increment for PM simulated using the bottom-up emission inventory is much smaller than for the downscaled emission inventory.

Urban increments for PM calculated with downscaled emissions, as is common practice, might therefore be overestimated. This finding is likely to apply to other European Megacities as well.