Comparison and analysis of European, national and local bottom-up emission inventories for European Megacities

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A state-of-the-art regional European emission data base is combined and cross-checked with bottom-up emission inventories for Paris, London, Rhine-Ruhr area (Germany) and the Po-valley (Italy). These Megacities have approximately 12, 8, 10 and 20 million inhabitants, respectively and cover a significant part (15-45%) of the respective national populations. It is shown that the allocation of the emission in the regional down-scaled inventory can deviate substantially from the megacity bottom-up inventories. For example, the PM10 and NO_x in local inventories are respectively 26% and 62% (London), 33% and 95% (Paris), 55% and 108 % (Rhine-Ruhr) and 110% and 107 %(Po valley) of the emission allocated to the same area in the regional inventory. The discrepancy for NO_x is limited but not for uncertain pollutants like PM and NMVOC. The match for the Po valley appears reasonable but if we zoom in on a city level (Milan) similar problems as seen in Paris and London surface. The major discrepancies caused by e.g. residential combustion and industry sectors (esp. solvent use) will be documented and explained. We conclude that the European scale inventory is consistent with official reported national emissions but local to national to regional scale inventories are not consistent. More important, the allocation and spatial distribution of emissions appears crucial. Since the discrepancies are large, predicted concentrations and population exposure may be significantly different. A first split of the PM emissions by chemical composition will be provided. Modeling of air quality combined with observational data may help to validate the emission estimates, confirm distribution patterns and/or identify gaps in emission inventories.