Further refinement and evaluation of a statistical approach for determining concentration increments in urban areas

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The simple methodology presented in this study is implemented in the form of a computational tool that allows for the efficient assessment of the urban increment of PM10 and NO_2 caused by traffic, as well as other local sources, such as space heating (domestic and commercial), industrial activities, etc. and aims at the determination of an urban concentration increment on top of the regional scale background, for urban areas in the entire European region. This approach builds on earlier attempts to provide estimates of the urban increment for various pollutants, by improving key aspects concerning the treatment of the meteorological parameters.

The method operates by establishing a functional relationship between the concentration increment and the local meteorological conditions, the city characteristics, the urban emissions and background concentrations. The method has already been tested using Pasquill-Gifford stability classes for describing atmospheric stability but in the frame of recent applications of the methodology, an alternative approach using the mixing height is employed to describe the development of the atmospheric boundary layer.

The results demonstrate the capability of this simple approach to assess the urban increment with satisfactory accuracy, thus providing a tool for fast but still reliable quantitative assessments of urban air quality that can subsequently be used in calculations of exposure and health impact assessment. Further validation is foreseen in order to verify the applicability of the method in more diverse situations, including the use of input data obtained from regional scale models instead of measurements. Additionally, scenario calculations for the urban increments can be based on scenario emissions and respective modelled regional background concentrations, a feature that will be particularly useful for urban air quality assessment.