# New urban meteorological pre-processor

A. Baklanov

Danish Meteorological Institute, Copenhagen, Denmark

(alb@dmi.dk / Fax: +45 3915 7460 / Phone: +45 3915 7441)

Development of interfaces from numerical weather prediction (NWP) models to urban air quality models and urban meteorological pre-processors was one of the key objectives of the FUMAPEX project (http://fumapex.dmi.dk/). Different modelling strategies were tested to upgrade model interfaces, depending on the specific models features, forecasting system configuration and modellers choices. The urbanisation of the modelling system can be located in the NWP model or implemented inside the interface module building an urban meteorological pre-processor capable to correct the input meteorological NWP fields to keep into account urban meteorological phenomena. Due to difficulties to realise the first way, especially for operational NWP models, urban meteorological pre-processors could be a good and cheap way to improve the urban air quality information and forecasting systems.

A new Urban Meteorological Pre-processor (DMI-UMP), which is recently developed at DMI, is considered in this paper. It includes the following parameterizations and formulae for urban conditions:

- Urban morphology parameters classification;

- Calculation of displacement height;

- Calculation of effective roughness lengths for momentum and scalars;

- Stability-dependent roughness length;

- Parameterization of wind profile in the urban canopy layer (with a much higher vertical resolution when NWP models can produce);

- Calculation of anthropogenic and storage urban heat fluxes;

- Correction of external parameters and fluxes for grid cells;

- Improved parameterizations for urban mixing height.

Requirements for an optimal use of the Urban Pre-processor include:

- High-resolution urban-scale NWP data (horizontal resolution 1-5 km; option 1: non-urbanized, option 2: urbanized),

- Urban parameters should be available from high resolution building-resolved electronic city maps (list of the parameters is discussed),

- Dispersion model resolution should be increased: horizontally up to 100-500 m; vertically – up to few meters (to describe the urban canopy layer).

Possible applications of the DMI-UMP to different models for urban air quality forecasting/assessment and emergency preparedness are discussed.