# DYNAMICAL AND THERMODYNAMICAL EFFECTS OF URBAN AND RURAL LAND SURFACES ON THE AIR FLOW IN MESOSCALE METEOROLOGICAL MODELLING

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The earth's surface, as the lower boundary of the atmosphere, is a mixture of various types of land cover, each with different physical properties which can modify the mesoscale atmospheric flows. Physical processes of the lower part of the atmosphere influence the flow inside canopies and throughout the planetary boundary layer, especially over urban environments where the vertical structure is more complex. This non-stationarity results in complicated meteorological fields in the roughness sub-layer. Such effects of urban and rural areas on the air flow have usually been represented in numerical mesoscale meteorological models through the roughness approach. Over the last decade, mesoscale models have been adapted to the simulation of meteorological fields within and above the urban and rural canopy. Since these urbanization approaches have a number of limitations, a more sophisticated method of representing the dynamical and thermodynamical effects of urban and rural areas is required; a method which (i) estimates the mean winds, turbulence and thermal fluxes within the canopy area, (ii) does not depend on a logarithmic wind profile and (iii) is simple enough to be used by a mesoscale meteorological model.

The aim of the present study, which was carried out within the abovementioned framework, was the implementation and validation of an advanced urban / rural canopy parameterisation into the non-hydrostatic mesoscale model MEMO, in order (a) to account for the average area - effect of drag and turbulence production, as well as to offer a detailed representation of the complex thermodynamic processes and (b) to examine the role of the interaction between the boundary layer developed above an urban area and the mesoscale circulation induced by topography. Support for up-to-date biophysical, land-use and terrain databases, derived from GIS and remote sensing applications, was incorporated as a further enhancement to the model. The Greater Athens Area, a dense urban fabric surrounded by mountains with only its southern part open to the sea, was used as a representative case study for the validation of the model.

**EXTENDED ABSTRACT NOT SUPPLIED**