



Derivation and analysis of flow and pollutant dispersion parameters from urban Digital Elevation Models (DEMs)

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Operational modelling of flow and pollutant dispersion in urban areas require the use of parameters linked to urban morphometry. There is often a preference to use simpler models that need a minimum number of input parameters but this can be restrictive when dealing with a complex geometry such as an urban area. A more complex model often needs more input parameters. For example urban canopy parameterisations require morphometric information cross-correlated with land use, average building height, plan area density, and building frontal area density. The calculation of these parameters is now possible because of the increasing availability of high-resolution 3-D urban databases. This paper deals with the construction of a digital elevation model (DEM) of parts of Lecce, a city in Southern Italy and the calculation and analysis using image-processing technique of relevant parameters to be used as input to flow and dispersion models. The DEM was obtained from a planar map of the city and the measurements of the building heights using a laser technique. From raw measurements, images were obtained and analysed. Several sensitivity analyses were performed on the images and several relevant parameters were calculated. An analysis of the parameters is included focussing on their spatial, vertical and directional variability (such as changes of the aerodynamic surface roughness length with different orientations and from one urban portion to another within the same city). This work builds on the recent works by Ratti et al. (2001, 2004), extending the analysis of DEMs of North-American and North-European cities to a Southern European city. Flow and pollutant dispersion parameters calculated for the Southern European city are compared with those calculated for the North-American and North-European cities and their differ-

ences are analysed. A discussion on the local meteorology is also included and an analysis on its influence on the local dispersion characteristics is performed.

References

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