



Parameterisation of radiative exchange in microscale urban climate modelling: How much detail should we include?

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Radiative exchange within an urban area includes the exchange of diffuse and direct shortwave radiation (SW) flux from the sun, longwave radiation (LW) flux from the atmosphere, and LW emissions from urban surfaces (pavements, walls, and roofs). In addition, SW and LW are both absorbed and reflected at urban surfaces. Vegetation (i.e. trees, shrubs) takes part in this interaction as well. However, modelling all these processes in a microscale urban climate model requires extra code development, detailed input data, and huge computer resources (memory and CPU time). Within the framework of the joint project MOSAIK, the parameterisation of radiative exchange within an urban area is implemented to develop the new urban climate model PALM-4U, based on the well-established large-eddy simulation code PALM. Here we will quantify the effect of each radiation process using this model. To this end, we will study the effect of different levels of radiation detail and multiple reflections on the radiation and energy fluxes as well as on the wind field of microscale urban simulations. Several test cases will be adopted in order to cover a wide range of urban complexity and urban surface parameters (such as urban surface albedo and emissivity). The results of this study will answer the question raised in the title to show how much radiative exchange details can reasonably and usefully be considered in simulations.