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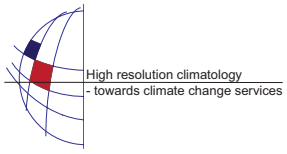

The urban impact on the regional climate of Dresden

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The principal objective of this research is to clarify the impact of urban elements such as buildings and streets on the regional climate and air quality in the framework of the BMBF-project “Regionales Klimaanpassungsprogramm f¨ur die Modellregion Dresden” (REGKLAM). Drawing on the example of Dresden this work explores how the presence of cities influences the atmospheric flow and the characteristics of the boundary layer. Persuing this target, an urban surface exchange parameterisation module (Martilli et al., 2002) was implemented in a high resolution version of the COSMO model, the forecast model of the German Weather Service (DWD). Using a mesoscale model for this regional climate study implies the advantage of embedding the focused area in a realistic large scale situation via downscaling by means of one way nesting and allows to simulate the urban impact for different IPCC-szenarios.
The urban module is based on the assumption that a city could be represented by a bunch of “urban classes”. Each urban class is characterised by specific properties such as typical street directions or probability of finding a building in a special height. Based on urban structure data of Dresden (vector shape-files containing the outlines of all buildings and the respective heights) an automated method of extracting the relevant geometrical input parameters for the urban module was developed.
By means of this model setup we performed case studies, in which we investigate the interactions between the city structure and the meteorological variables with regard to special synoptical situations such as the Bohemian wind, a typical flow pattern of cold air, sourced from the Bohemian Basin, in the Elbe Valley, which acts then like a wind channel. Another focal point is formed by the investigation of different types of artificial cities ranging from densely builtup areas to suburban areas in order to illuminating the impact of the city type on the dynamical and thermal properties of the atmosphere.