



Urban effects in climate simulations at different spatial scales

K. Trusilova (1), B. Früh (1), S. Brienen (1), and K. Keuler (2)

(1) Deutscher Wetterdienst, Department for Climate and Environment Consultancy, Offenbach, Germany
(kristina.trusilova@dwd.de), (2) BTU Cottbus, Environmental Meteorology, Cottbus, Germany

The non-hydrostatic regional climate model COSMO CLM is increasingly employed for studying effects of urbanization on the environment. As such applications require a possibility to represent urban areas and to resolve feedbacks between the urban cover and the atmosphere, the surface layer parameterization of COSMO CLM was extended by the

the Town Energy Budget (TEB) scheme (Masson 2000). The TEB parameterization resolves energy budgets for urban surfaces and air conditions in street canyons taking into account the shape and materials of city representative buildings. The TEB is coupled to the standard multi-layer land surface model TERRA of COSMO-CLM using the “tile approach” for a single urban class.

The new implementation of COSMO-CLM+TEB is used for a 1989-2008 simulation over Europe at a spatial resolution of 0.11° (~ 12 km) and for a smaller domain around the city of Hamburg at a spatial resolution of 0.025° (~ 2.8 km) and evaluated.

We quantify the possible urban effect to the climate variables (daily mean 2m-temperature and daily total precipitation) comparing the model simulations with the standard and the “urbanized” models for two model domains: Europe and Hamburg on the respective spatial resolutions. Additionally we analyze the statistical significance of the urban effects on the climate variables on the two spatial scales. This study allows us to better design the model set-up for the future modeling studies on the urbanization effects on the regional climate.