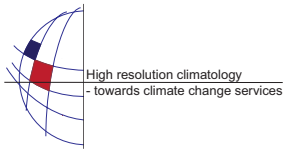
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-70, 2010
10th EMS / 8th ECAC
© Author(s) 2010



Effects of historical urbanization in the Brussels Capital Region on surface air temperature time series: a model study

R. Hamdi

Royal Meteorological Institute, II section 3, Brussels, Belgium (rafiq.hamdi@oma.be)

In the present study we examine the local impact of change in impervious surfaces in the Brussels Capital Region (BCR, Belgium) on trends in maximum, minimum, and mean temperatures between 1960 and 1999. Specifically, we combine data from remote sensing imagery and a land surface model including state-of-the-art urban parameterization, the Town Energy Balance scheme. In order to: (i) isolate effects of urban growth on near surface temperature independent of atmospheric circulations and (ii) be able to run the model over very long period without any computational cost restrictions, we run the land surface model in a stand-alone mode coupled to downscaled ERA-40 reanalysis data. We also consider BCR as a lumped urban volume and the rate of urbanization was assessed by estimating percentage of impervious surfaces from Landsat images acquired for various years. Model simulations show that: (1) the annual mean urban bias (AMUB) on minimum temperature is rising at a higher rate (slightly 3 times) than on maximum temperature, with a linear trend of 0.14°C and 0.05°C per decade respectively, (2) the 40-year AMUB on mean temperature is estimated to be 0.62°C, (3) 45% of the overall warming trend is attributed to intensifying urban heat island effects rather than to changes in local/regional climate, (4) during summertime, a stronger dependence between the increase of urban bias on minimum temperature and the change in percentage of impervious surfaces is found.