Geophysical Research Abstracts
Vol. 13, EGU2011-3647, 2011
EGU General Assembly 2011

Simulating the heat island of Paris using remotely sensed thermal surface parameters

Koen de Ridder (1), Cedric Bertrand (2), and Abhijit Sarkar (1)

(1) VITO - Flemish Institute for Technological Research, Mol, Belgium (koen.deridder@vito.be), (2) Royal Meteorological Institute of Belgium, Brussels, Belgium (cedric.bertrand@oma.be)

We simulated the heat island of Paris using a mesoscale meteorological model containing simple urban surface physics, and mainly relying on a 'bluff-body' type of parameterization for kB-1 = ln(z0/z0t), with z0 and z0t the aerodynamic and thermal roughness length, respectively.

In order to make a selection between different existing parameterizations for kB-1, simulated surface temperature was compared with values obtained by the SEVIRI sensor onboard the METEOSAT satellite platform with a high temporal resolution. It was found that the parameterizations for kB-1 by Zilitinkevich and Brutsaert worked best, though in the latter case only when employing coefficients suggested by Kanda et al., and confirming the very low values of thermal roughness length found over cities. In our approach, thermal admittance of the built-up areas within the city of Paris was estimated together with thermal roughness length, yielding values of approximately 1800 J m-2 s-1/2 K-1.

Subsequently, we did a simulation for the area of Paris and surroundings, for a 12-day period in June 2006 characterized by a steady increase in both the air temperature and the urban-rural air temperature difference. The model was run using the previously estimated values for thermal roughness length and thermal admittance. Simulated 2-m air temperature was compared with observed values for urban and rural stations, yielding mean errors of around 1.5K. More importantly, it was found that the model also displayed an overall good capability of reproducing the observed urban-rural temperature differences. In particular, the magnitude (up to 6K) and timing of the diurnal cycle of the UHI intensity was simulated well, the model exhibiting a mean error of 1.15K.