EMS Annual Meeting Abstracts
Vol. 9, EMS2012-419, 2012
12th EMS / 9th ECAC

Evolution and future projections of the urban heat island at the coastal urban area of Athens

D. Founda (1), C. Giannakopoulos (1), M. Hatzaki (1), M. McCarthy (2), C.M. Goodess (3), D. Hemming (2), and F. Pierros (1)

(1) Institute for Environmental Research and Sustainable Development, National Observatory of Athens, Athens, Greece (cgiannak@meteo.noa.gr, +30- 2108103236), (2) Met Office Hadley Centre, Exeter, UK, (3) Climatic Research Unit, School of Environmental Sciences, University of East Anglia, UK

This study examines the temporal evolution of the UHI for the coastal urban area of Athens over the period 1975-2010. Although the study of the spatial distribution of the UHI in Athens has revealed large differences between the urban and the surrounding rural stations (reaching up to 10°C in certain cases), it is quite important to study the rates of UHI changes over time. It is found that the intensity of UHI increases by approximately +0.2°C/decade on an annual basis, but the results are strongly dependent on the season. In summer and spring, the rate of UHI changes is more pronounced, amounting to +0.4°C/decade. The rate of change is higher for the maximum than for the minimum temperature, while the urban effect accounts for almost half of the observed warming trends in the area, on an annual base.

As the linkage between UHI and climatic change is of particular importance , this study also involves simulations derived from a novel climate model that includes a sub-grid urban land-surface model (HadRM3 climate model modified to include MOSES2.2) capable of capturing the main meteorological characteristics of a Mediterranean UHI. Different experiments are explored both for the present day (1971-1990) and a future A1B climate (2041-2060) that include the influence of the urban surface and anthropogenic heat emissions.

The UHI magnitude, based on the temperature differences between the city-centre gridcell and the surrounding gridcells, is analysed, while to assess the credibility of the simulations, a comprehensive comparison of the simulated present climate against the above mentioned observations is conducted. The UHI magnitude seems to be sensitive to the anthropogenic heat emissions assumptions. The main emphasis of the results is on the sensitivity to urban induced climate change and they do not represent a robust prediction of future climate change.