EMS Annual Meeting Abstracts
Vol. 9, EMS2012-76, 2012
12th EMS / 9th ECAC


# Influence of evapotranspiration on human thermal comfort in a Central European city

A. Goldbach and W. Kuttler
University of Duisburg-Essen, Applied Climatology and Landscape Ecology, Germany (anja.goldbach@uni-due.de)

The knowledge of atmosphere-surface interactions especially in urban areas is important to improve living and environmental conditions for the inhabitants. Especially in view of the fact that in future, more and more people will be exposed to the negative thermal effects of urban climate, which will be exacerbated by predicted climate change. Therefore, it is necessary to develop adaptation and mitigation strategies tailored to the problem area for reducing sensible heat fluxes.

For this purpose eddy-covariance technique has been carried out in Oberhausen (Germany; 51° N, 6° E) between 01 August 2010 and 31 July 2011 to quantify turbulent sensible and latent heat fluxes in areas with various types of urban land use.

The results show that land use and water availability are two main factors that influence the ratio of turbulent heat and latent fluxes. At the urban (URB) site sensible heat flux (QH) is 20 % higher, latent heat flux (QE) is 90 % lower compared to the suburban one (SUB). Furthermore, partition of the turbulent heat fluxes (QH/Q* resp. QE/Q*) clearly depends on plan area density ($\lambda$P). The human-biometeorological thermal index, the physiologically equivalent temperature (PET), demonstrates that green spaces counteract growing thermal stress on city-dwellers due to improving thermal comfort. Aside from the positive effect of shading, inner-city green spaces can only be effective if an adequate water supply is ensured. Otherwise, the positive thermal effects of green spaces resulting from transpiration will be reduced to a minimum or eliminated entirely, which is confirmed by the measured values.

Additional planning recommendations for urban planners within cities located at mid-latitudes derived from measuring results are given.