

Climate in the Urban Environment in The Netherlands

G.J. Steeneveld, L.W.A. van Hove, H.W. ter Maat, C.M.J. Jacobs, E. J. Moors, A.A.M. Holtslag

Objectives

Heat waves and excessive rainfall will likely to become more frequent in the near future (IPCC 2007). This may form an important threat to the liveability in urban areas. Adaptation strategies have to be developed to mitigate the impact of extreme weather conditions on citizens, to ensure human well-being outdoors and indoors (**Figure 1**).



Fig. 1. More city 'green' as adaptation measure

To assess the effectiveness of proposed adaptation measures quantitative information is needed. Models designed to simulate the urban climate can serve as valuable tools to provide this information. The project aims at the development of a model framework for urban climate covering the different scales of the urban environment in the Netherlands (**Figure 2**).

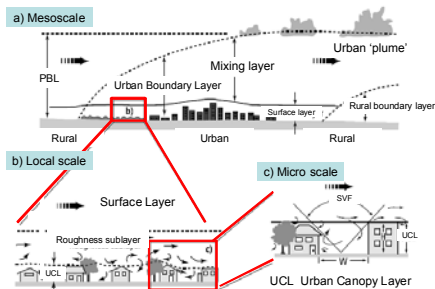


Fig. 2. Schematic of scales and vertical layers found in urban areas (modified from Oke, 1997)

Activities

- > Review of the performance of existing models for urban climatology. We participate in the *Urban Surface Energy Balance: Land Surface Scheme Comparison project* (PILPS URBAN)*.
- > Limited data collection for initial verification
- > Development of a modelling framework
- > An inventory of needs of city planners and architects
- > Design of a measurement strategy to obtain observational data.

First Results

Figure 3 shows the first results of a model run in which the temperature and humidity in the city of Utrecht during extreme conditions were simulated.

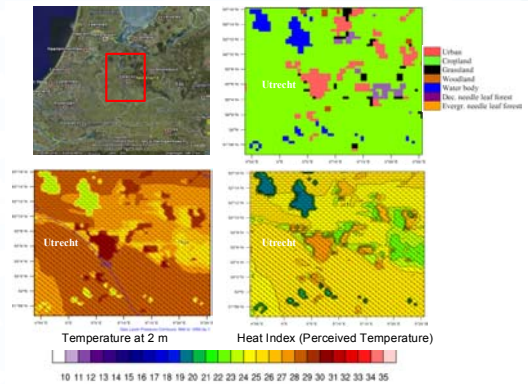


Fig. 3. Modelled temperature and heat index Utrecht area, 19 July 2006, 20.00 UTC.

The conditions in the city are compared with the simulated conditions in the rural environment. A temperature difference of approximately 5 °C between the city and the rural area was obtained. This is in agreement with the observations (**Figure 4**). The observations also show a clear difference in humidity between city and surroundings.

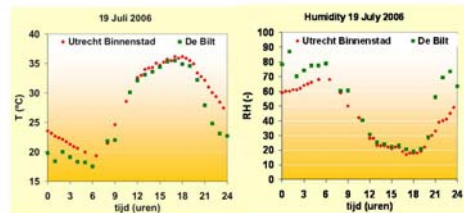


Fig. 4. Observed temperature (left) and relative humidity (right) Utrecht (city) and nearby De Bilt, (rural) 19 July 2006, 20.00 UTC.

This project is part of the research programme Climate Changes Spatial Planning (**project COM 29**).
<http://www.klimaatvooruimte.nl/>
<http://www.klimaatindestad.nl>