Geophysical Research Abstracts
Vol. 19, EGU2017-16820, 2017
EGU General Assembly 2017

Relationship between Surface Urban Heat Island intensity and sensible heat flux retrieved from meteorological parameters observed by road weather stations in urban area

Lech Gawuć
Warsaw University of Technology, Faculty of Environmental Engineering, Warsaw, Poland (lech.gawuc@is.pw.edu.pl)

Urban Heat Island (UHI) is a direct consequence of altered energy balance in urban areas (Oke 1982). There has been a significant effort put into an understanding of air temperature variability in urban areas and underlying mechanisms (Arnfield 2003, Grimmond 2006, Stewart 2011, Barlow 2014). However, studies that are concerned on surface temperature are less frequent. Therefore, Voogt & Oke (2003) proposed term "Surface Urban Heat Island (SUHI)", which is analogical to UHI and it is defined as a difference in land surface temperature (LST) between urban and rural areas.
SUHI is a phenomenon that is not only concerned with high spatial variability, but also with high temporal variability (Weng and Fu 2014). In spite of the fact that satellite remote sensing techniques give a full spatial pattern over a vast area, such measurements are strictly limited to cloudless conditions during a satellite overpass (Sobrino et al., 2012). This significantly reduces the availability and applicability of satellite LST observations, especially over areas and seasons with high cloudiness occurrence. Also, the surface temperature is influenced by synoptic conditions (e.g., wind and humidity) (Gawuc & Struzewska 2016). Hence, utilising single observations is not sufficient to obtain a full image of spatiotemporal variability of urban LST and SUHI intensity (Gawuc & Struzewska 2016). One of the possible solutions would be a utilisation of time-series of LST data, which could be useful to monitor the UHI growth of individual cities and thus, to reveal the impact of urbanisation on local climate (Tran et al., 2006).
The relationship between UHI and synoptic conditions have been summarised by Arnfield (2003). However, similar analyses conducted for urban LST and SUHI are lacking.
We will present analyses of the relationship between time series of remotely-sensed LST and SUHI intensity and in-situ meteorological observations collected by road weather stations network, namely: road surface kinetic temperature, wind speed, air temperature, soil temperature at a depth of 30 cm, road surface condition, relative humidity. Also, as there are wind speed and temperature observations at different heights available, we will calculate sensible heat flux in order to relate it to the intensity of SUHI.