Geophysical Research Abstracts
Vol. 19, EGU2017-12875-1, 2017
EGU General Assembly 2017

Quantification of surface urban heat island intensity using impervious surface area

Huidong Li (1) and Sahar Sodoudi (2)

(1) Free University of Berlin, Institute of Meteorology, Berlin, Germany (huidong.li@met.fu-berlin.de), (2) Free University of Berlin, Institute of Meteorology, Berlin, Germany (sodoudi@zedat.fu-berlin.de)

Accurate quantification of urban heat island could contribute to efficiently evaluate potential heat risk. This paper come up with a new approach to calculate urban heat island intensity (UHII) using remote sensing data based on the linear regression slope between temperature and urban indicators. Urban fraction and sealing degree were used here as the urban indicators. Meanwhile, given the footprint of temperature measurement over each pixels, a new urban indicator, Urban Index, was calculated using sealing degree and Kernel Density Estimation. The results showed that the MODIS land surface temperature presents a strong linear correlation with the Urban Index, with R2 of 0.92 during the day and 0.94 at night compared to urban fraction and original sealing degree data. Further, the linear regression function between LST and Urban Index was used to analyze the SUHII characteristic. The daily SUHII show larger values in summer and during the day than in winter and at night with maximum values of 8.86, 9.22, 5.47 and 5.54 K at 11 am, 12:30am, 10 pm and 2 am, respectively. The new SUHII presents good correlation with the UHII calculated from the approach using in-situ measurements data, in particular at night. Given the good relationship between temperature and Urban Index, the potential heat stress risk is divided into five grades. The risk map is generated based on the spatial distribution of Urban Index.