EMS Annual Meeting Abstracts
Vol. 14, EMS2017-109, 2017

Intra-urban outdoor human thermal sensation based on long-term database

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The research gives a comprehensive picture on the intra-urban diurnal and seasonal general outdoor human thermal sensation levels based on long-term (almost three years) data series from Szeged, Hungary. The intra-urban comparison is based on a thermal aspects classification of the surface, namely the local climate zone (LCZ) system, on an urban meteorological station network and on the utilization of the Physiologically Equivalent Temperature (PET) comfort index with categories calibrated to the local population. The general aim of this study is the detailed investigation of the PET index related to sunlit urban spaces in different LCZs occuring in and around Szeged, based on data series of measurement sites representative to these zones. In addition, we examine the situation in one of the several-day long heat wave periods which are more and more frequent in the last decades in the study area. The results show that the seasonal and annual average magnitudes of the thermal load exerted by LCZs in the afternoon and evening follow their LCZ numbers. It is perfectly in line with the LCZ concept originally concentrating only on air temperature differences between the zones. Our results justified the subdivision of urban areas into LCZs and give significant support to the application possibilities of the LCZ concept as a broader term covering different thermal phenomena. The results presented here relate to a given zone type generally, that is they can only apply to exposed open areas well inside the LCZs and are not applicable to a specific complex urban micro environments. These type of long-term studies based on LCZ division could locate the thermally stressful areas within the cities providing valuable information for urban planners and decision-makers for evolving strategies against the adverse effects of urban climate and climate change in order to create lively urban areas for its residents in the future.