Earth Observation for Urban Climate: Mapping the Local Climate Zones

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Abstract *(300-500 words)*

Data collected by Earth Observation (EO) satellites provide a valuable source of information for understanding, monitoring, modelling and thus protecting the urban environment. The increasing availability of EO systems and the advances in remote sensing techniques increase the opportunities for monitoring the urban environment and its thermal behaviour. Several parameters related to the urban climate can be derived from EO data, providing valuable support for advanced urban studies and climate modelling. Recently, attention has been drawn to the quantitative description of the urban thermal patterns and their correlations to fundamental surface descriptors. A detailed classification scheme of Local Climate Zones (LCZ) was introduced (Steward and Oke, 2012), based on various former typologies, which explicitly defines urban landscapes according to their thermal properties. The individual classes aim to have relatively homogenous air temperature within the canopy layer and they are defined by fact sheets with both qualitative and quantitative properties.

In this study, EO data are used to derive quantitative information for discriminating between the LCZ and a methodology to combine the different scales and delineate the zones is developed. A set of parameters is estimated from EO data and the methodology is applied to three case studies of the URBANFLUXES project, i.e. Heraklion, Greece, Basel, Switzerland and London, UK. Parameters like the impervious and the pervious surface fraction and the surface albedo were quantified using satellite data. Combining ancillary information for the morphology of the city, parameters like the buildings density and the mean building height and the canyon aspect ratio are also quantified for the study sites. A methodology to handle the different scales of the EO products was established and a Graphical User Interface (GUI) was built to outline the possible LCZ.

References:

Stewart, I. D., & Oke, T. R. (2012). Local Climate Zones for Urban Temperature Studies. Bulletin of the American Meteorological Society, 93(12), 1879–1900.