



Investigation of intra-urban and urban-rural surface thermal features in two Central-European cities

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Urban thermal properties mainly depend on surface cover features like building materials and structures. Therefore, the thermal patterns highlight subregions with different temperature, e.g. larger parks, densely or sparsely built areas within the city. Classification of these urban internal areas (using local climate zones, LCZs) provides an underlying system to compare different sites and their thermal features. Every LCZ has a predetermined description of structure demonstrating major differences in built-up density and vegetation/artificial cover ratio. The LCZ classifications of urban areas of Szeged (Hungary) and Novi Sad (Serbia) were completed with Bechtel's methodology, which requires high resolution remote sensing data. One of our goals is to reveal thermal differences between urban and rural areas, where urban area is defined as delineated built-up LCZs. These urban areas are (i) surrounded by the rural areas, which are fully uninhabited, and (ii) located in a given distance from the built-up areas. Since remotely sensed data serve as a convenient tool for monitoring thermal patterns across different land cover types, we analyzed the seasonal differences between urban and rural areas from the derived land surface temperature (LST) data of sensor MODIS found on satellites Terra and Aqua. Both the diurnal and annual periodic dynamics of LST are analyzed in case studies with higher spatial resolution ASTER and Landsat thermal images. The ideal periods selected for observation are generally clear days, moreover we examine the thermal reactions under particular weather conditions, e.g. heat waves. As both Szeged and Novi Sad have their own surface-based air observation networks representing each LCZ within the target cities since 2014, we determine the LST in the cells where the network stations are located in both cities in order to reveal intra-urban thermal features.