



Fully automated extraction and analysis of surface Urban Heat Island patterns from moderate resolution satellite images

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Comparison of thermal patterns across different cities is hampered by the lack of an appropriate methodology to extract the patterns and characterize them. What is more, increased attention by the urban climate community has been expressed to assess the magnitude and dynamics of the surface Urban Heat Island effect and to identify environmental impacts of large cities and “megacities”. Motivated by this need, we propose an innovative object-based image analysis procedure to extract thermal patterns for the quantitative analysis of satellite-derived land surface temperature maps. The spatial and thermal attributes associated with these objects are then calculated and used for the analyses of the intensity, the position and the spatial extent of SUHIs. The output eventually builds up and populates a database with comparable and consistent attributes, allowing comparisons between cities as well as urban climate studies. The methodology is demonstrated over the Greater Athens Area, Greece, with more than 3000 LST images acquired by MODIS over a decade being analyzed. The approach can be potentially applied to current and future (e.g. Sentinel-3) level-2 satellite-derived land surface temperature maps of 1km spatial resolution acquired over continental and coastal cities.