High resolution LST climatology in an urban area using Landsat 8 thermal data

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The Landsat 8 satellites retrieve land surface temperature (LST) values at 30-m spatial resolution since 2013, but the urban climate studies frequently use a limited number of images due to the problems related to missing data over the area of interest. This paper proposes a procedure for building a long-term LST data set in an urban area using the high-resolution Landsat 8 imagery. The methodology is demonstrated on 94 images available through 2013-2018 over Bucharest (Romania). The raw images contain between 1.1% and 58.4% missing data. Based on an Empirical Orthogonal Filling (EOF) procedure, the LST missing values were reconstructed by means of the function dineof implemented in sinkr R packages. The output was used for exploring the LST climatology in the area of interest. The gap filling procedure was validated by comparing artificial gaps created in the real data sets. At the best of our knowledge, this is the first study using full spatial coverage high resolution remote sensing data for investigating the urban climate. The validation pursued the comparison between LST and Ta at 3 WMO stations monitoring the climate of Bucharest, and returned strong correlation coefficients ($R^2 > 0.9$). Further research may be envisaged aiming to update the data set with more recent LST information and to combine data from various sources in order to build a more robust urban LST climatology.

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