Title: The impact of spatial configuration of anthropogenic features on urban warming

Topics: Urban Monitoring; Geospatial for land reform; Geospatial for land reform

Buildings and other paved materials can alter air and surface temperature in desert cities. Several studies have shown a positive relationship between building and impervious surface abundance and urban thermal characteristics. While the relationship between fractional cover of anthropogenic features and the UHI has been well studied, relationships of how spatial arrangements (e.g., clustered, dispersed) of these features influence urban warming are not well understood. As buildings and paved materials are a defining feature of the urban environment it is important to explore the spatial pattern of them and understand how they influence urban warming. Since a diversity of spatial patterns can be observed under the same percentage of man-made cover, it is of great interest and importance to investigate the amount of variation in certain urban thermal feature such as surface temperature that is accounted for by the inclusion of spatial arrangement component. The various spatial arrangements of buildings and impervious surfaces cover can give rise to different urban thermal behaviors that may not be uncovered with the information of buildings fraction only, but can be captured to some extent using spatial analysis. The goal of this study is to examine if and how spatial arrangements of anthropogenic features influence and shape surface temperatures in a desert urban setting. This study focuses on Las-Vegas, NV, a desert city that has undergone dramatic urban center expansion and population growth since the 1960s. The data used to classify land cover and extract building consist of Geoeye-1 (formerly Orbview 5) image. The image used was taken on October 12, 2011 and has a spatial resolution of 3m. Classification was carried out using object based image analysis (OBIA). We employed a spatial autocorrelation approach (i.e., local Moran’s I) that measures the spatial dependence of one point to its neighboring points and describes how clustered or dispersed points are arranged in space. Results from this study suggest that spatial configuration of buildings and other anthropogenic features in a desert environment influence urban warming.