

Effects Of Urbanization On Climate Through Remote Sensing Image-Based Analysis

M. Zoran

National Institute of R&D for Optoelectronics, Environmental Remote Sensing Department, Bucharest Magurele, Romania
(marianazoran@yahoo.com, +40 21 457 45 22)

European cities face a range of challenges over the coming decades that will influence the nature of urban growth and development across the continent. Climate change is central amongst these, and will have direct implications for urban processes through changes to temperature and precipitation patterns. The intensity of extreme climate events (like heat waves, flooding, storming, freezing etc.) is of great environmental concern facing mankind in this century. As urbanization has become an important contributor for global warming, Urban Heat Island (UHI) effect, will be sure to influence the regional climate, environment, and socio-economic development. Urban heat island (UHI) is one of the important outcomes of land cover surface changes processes induced by urbanization, which represents the difference in albedo, roughness, and heat flux exchange of land surface. Much more, extreme climatic events as heat waves will amplify the UHI effect with severe urban ecosystem health consequences. Satellite remote sensing imagery is a key tool for urban surface energy budgets and urban heat islands investigation as well as for urban climatology research. The surface energy budget has been used to illustrate the influence of urban landscape on both global and regional climate.

In this study Landsat TM/ETM, MODIS and IKONOS satellite images over 1990 to 2010 period have been selected to retrieve the urban biogeophysical parameters and brightness temperatures in relation with changes of land use/cover types over Bucharest metropolitan area, Romania. The spatial distribution of heat islands has been changed from a mixed pattern, where bare land, semi-bare land and land under development were warmer than other surface types, to extensive UHI. Our analysis showed that higher temperature in the UHI was located with a scattered pattern, which was related to certain land-cover types. In order to analyze the relationship between UHI and land-cover changes, this study attempted to employ a quantitative approach in exploring the relationship between temperature and several vegetation indices. Heat waves events of 2003 and 2007 summers have been correlated with UHI effect for Bucharest metropolitan area. This study tries to examine the relationship between climate change and anthropogenic activities around Bucharest metropolitan area by integrating remote-sensing imagery and in situ measurements data. Also have been assessed the urbanization impacts on urban climate at local and regional levels.