IndianaView Student Scholarship 2017

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Introduction and methodology: Knowing the spatiotemporal dynamics of impervious surfaces (IS) is of significance for assessing and addressing urban-related environmental problems (e.g., urban heat island effects, increased carbon emission, reduced biodiversity, etc.). Given the difficulty of acquiring sub-pixel IS information and the lack of dense temporal-resolution IS maps, this supported research aimed at proposing an object-based pixel unmixing method for mapping annual IS abundance from 2000 to 2016 for the Marion County, Indiana. Preprocessed time series Landsat images were combined into a stack and segmented into objects. Object-constrained pixel unmixing method was then used to estimate yearly IS abundance, which assumed that pixels within an object share the same endmembers (i.e., high-albedo IS, low-albedo IS, vegetation, and soil). To simplify the methodology, endmembers were derived and updated from NLCD products and weighted by NTL intensity and distance. Further, Urban-archetype based adjustment was conducted to make IS time series consistent over time.

Results: The results showed that the proposed method was effective to generate dense temporal-resolution IS maps in a cost-efficient manner. The derived IS maps showed a high correlation with NLCD impervious product over 0.8. According to the results, the Marion county has experienced relatively slow urbanization during the period of 2000 to 2016 (Figure 1). Although its slow pace, the major IS increase was concentrated on the conversion from developed open space and low intensity IS to medium and high intensity developed land. Moreover, the IS increase in the county was more rapid from 2000 to 2010 than from 2010 to 2016, with the construction of a new Indianapolis International Airport terminal and its Parking Garage being one of the major contributions.

Fund usage: The fund was used to attend AAG Annual Conference held in Boston, MA on April 5-9, 2017 (Figure 2). The cost included registration fee and traveling expense.

FOR FURTHER READING:

Wu, C., & Murray, A. T. (2003). Estimating impervious surface distribution by spectral mixture analysis. Remote Sensing of Environment, 84(4), 493-505.

Song, X.-P. et al. (2016). Characterizing the magnitude, timing and duration of urban growth from time series of Landsat-based estimates of impervious cover. Remote Sensing of Environment, 175, 1-13.

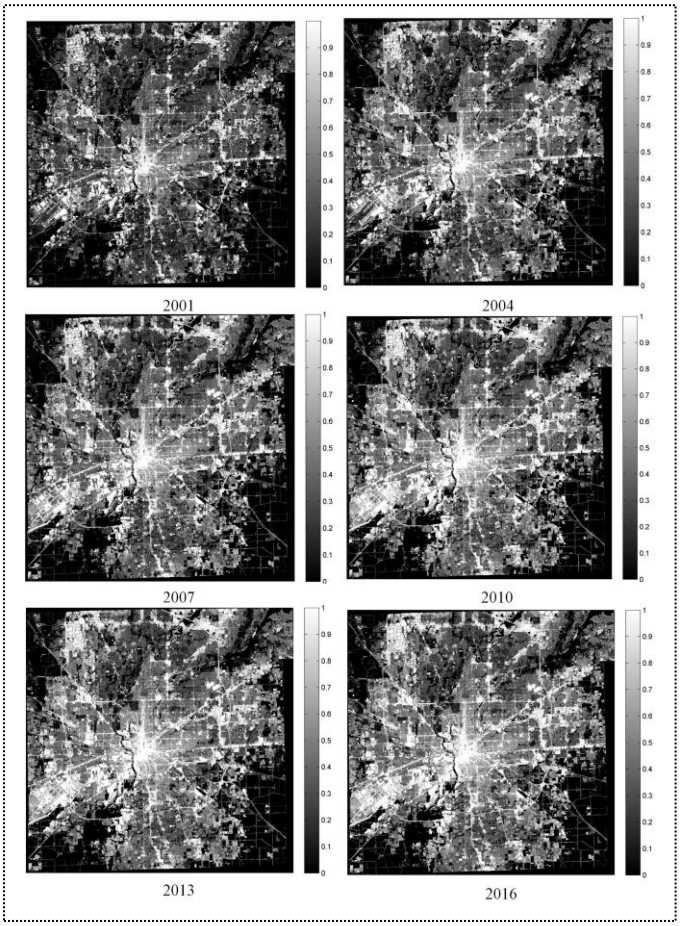
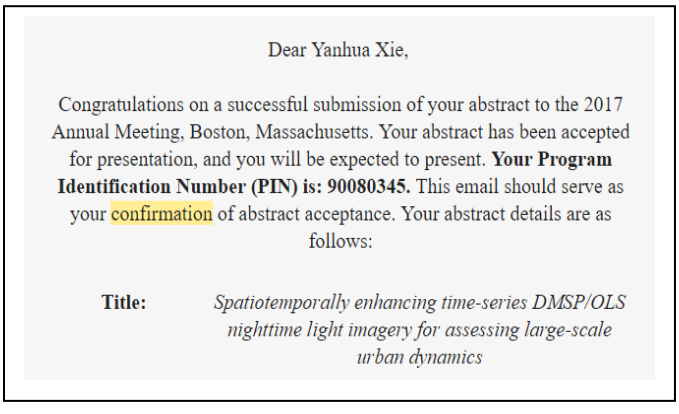


Figure 1. Impervious surfaces maps for the Marion County, Indiana in 2001, 2004, 2007, 2010, 2013, and 2016.



Dear Yanhua Xie,

Congratulations on a successful submission of your abstract to the 2017 Annual Meeting, Boston, Massachusetts. Your abstract has been accepted for presentation, and you will be expected to present. **Your Program Identification Number (PIN) is: 90080345.** This email should serve as your confirmation of abstract acceptance. Your abstract details are as follows:

Title: *Spatiotemporally enhancing time-series DMSP/OLS nighttime light imagery for assessing large-scale urban dynamics*

Figure 2. Presentation supported by the fund.