

Investigating Seasonal Changes of Urban Land Cover with High Spatio-Temporal Resolution Satellite Data via Image Fusion

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Abstract : Divisions between wealthy and poor, private and public landscapes are propagated by the increasing economic inequality of cities. While these are the spatial reflections of larger social issues and problems, urban design can at least employ spatial techniques that promote more inclusive rather than exclusive, overlapping rather than segregated, interlinked rather than disconnected landscapes. Indeed, the type of edge or border between urban landscapes plays a critical role in the way the environment is perceived. China experiences rapid urbanization, which poses unpredictable environmental challenges. The urban green cover and water body are under changes, which highly relevant to resident wealth and happiness. However, very limited knowledge and data on their rapid changes are available. In this regard, enhancing the monitoring of urban landscape with high-frequency method, evaluating and estimating the impacts of the urban landscape changes, and understating the driving forces of urban landscape changes can be a significant contribution for urban planning and studying. High-resolution remote sensing data has been widely applied to urban management in China. The map of urban land use map for the entire China of 2018 with 10 meters resolution has been published. However, this research focuses on the large-scale and high-resolution remote sensing land use but does not precisely focus on the seasonal change of urban covers. High-resolution remote sensing data has a long-operation cycle (e.g., Landsat 8 required 16 days for the same location), which is unable to satisfy the requirement of monitoring urban-landscape changes. On the other hand, aerial-remote or unmanned aerial vehicle (UAV) sensing are limited by the aviation-regulation and cost was hardly widely applied in the mega-cities. Moreover, those data are limited by the climate and weather conditions (e.g., cloud, fog), and those problems make capturing spatial and temporal dynamics is always a challenge for the remote sensing community. Particularly, during the rainy season, no data are available even for Sentinel Satellite data with 5 days interval. Many natural events and/or human activities drive the changes of urban covers. In this case, enhancing the monitoring of urban landscape with high-frequency method, evaluating and estimating the impacts of the urban landscape changes, and understanding the mechanism of urban landscape changes can be a significant contribution for urban planning and studying. This project aims to use the high spatiotemporal fusion of remote sensing data to create short-cycle, high-resolution remote sensing data sets for exploring the high-frequently urban cover changes. This research will enhance the long-term monitoring applicability of high spatiotemporal fusion of remote sensing data for the urban landscape for optimizing the urban management of landscape border to promoting the inclusive of the urban landscape to all communities.

Keywords : urban land cover changes, remote sensing, high spatiotemporal fusion, urban management

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