

Monitoring Urban Growth Process with Remote Sensing Techniques: An Empirical Study of Shanghai, China



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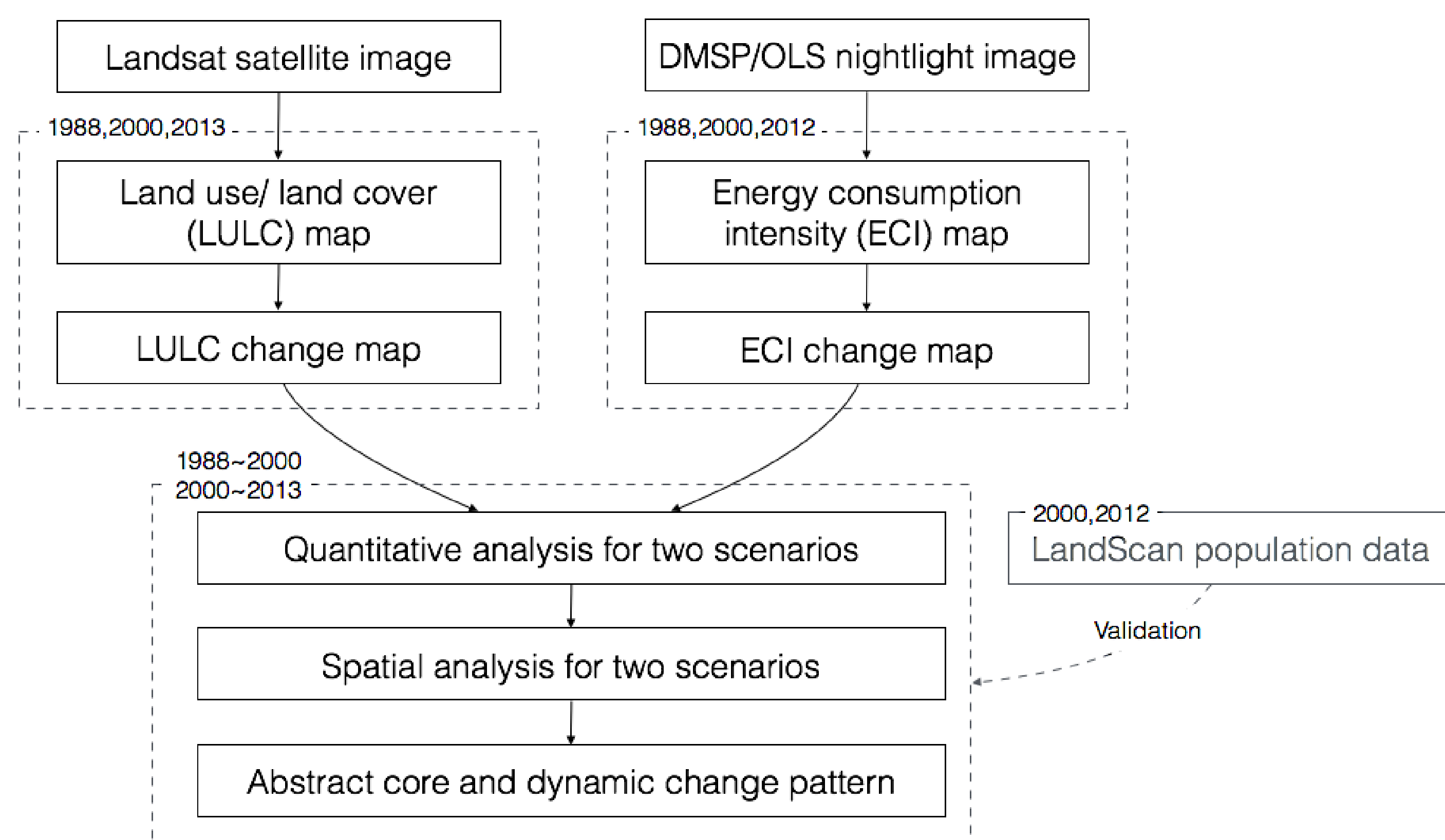
1. Introduction

Shanghai is the largest Chinese city by population. As one of the most vital cities in Asia, Shanghai has booming economy and vitality of expanding the city to react the globalization and the second stage of Chinese economic reform since the late of the 1980s.

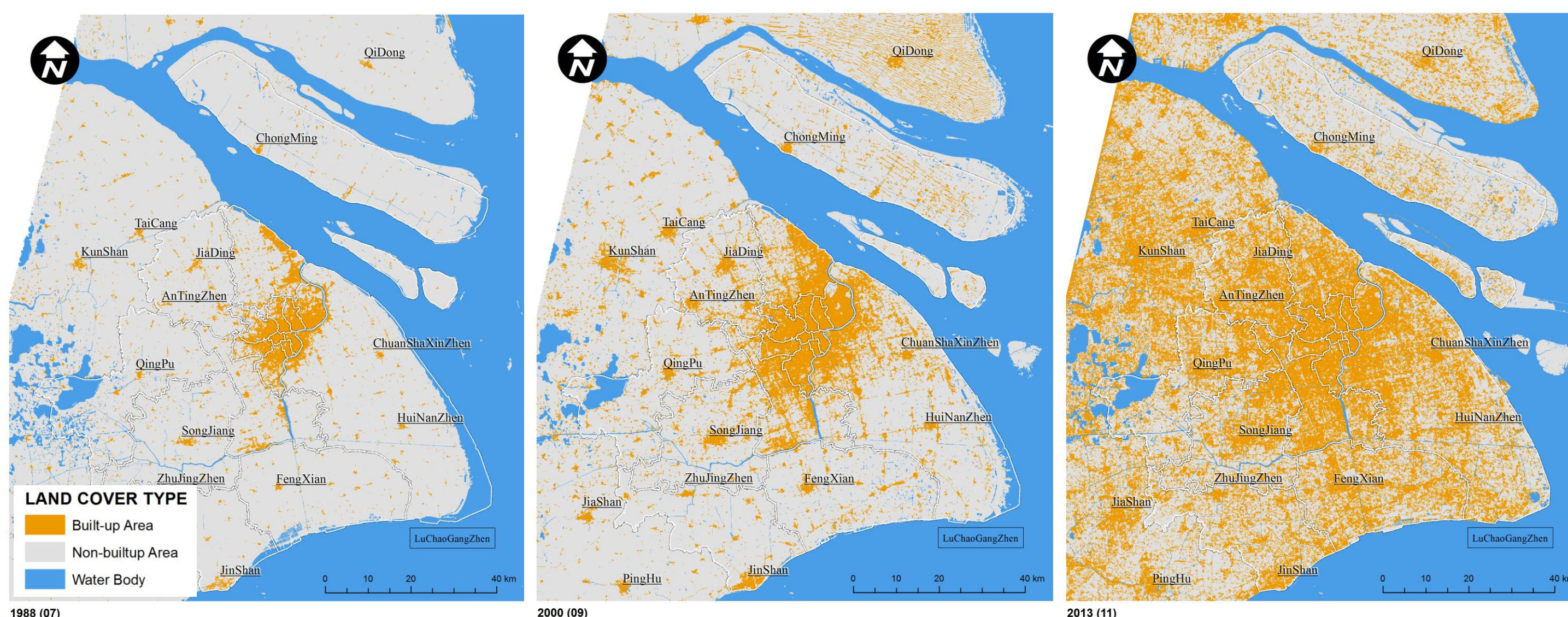
By utilizing the remote sensing techniques, the urban growth process can be monitored in a certain time interval. This study aims to detect the social structure change in a macroscopic perspective by using several kinds of satellite image datasets with remote sensing techniques.

2. Data and Methods

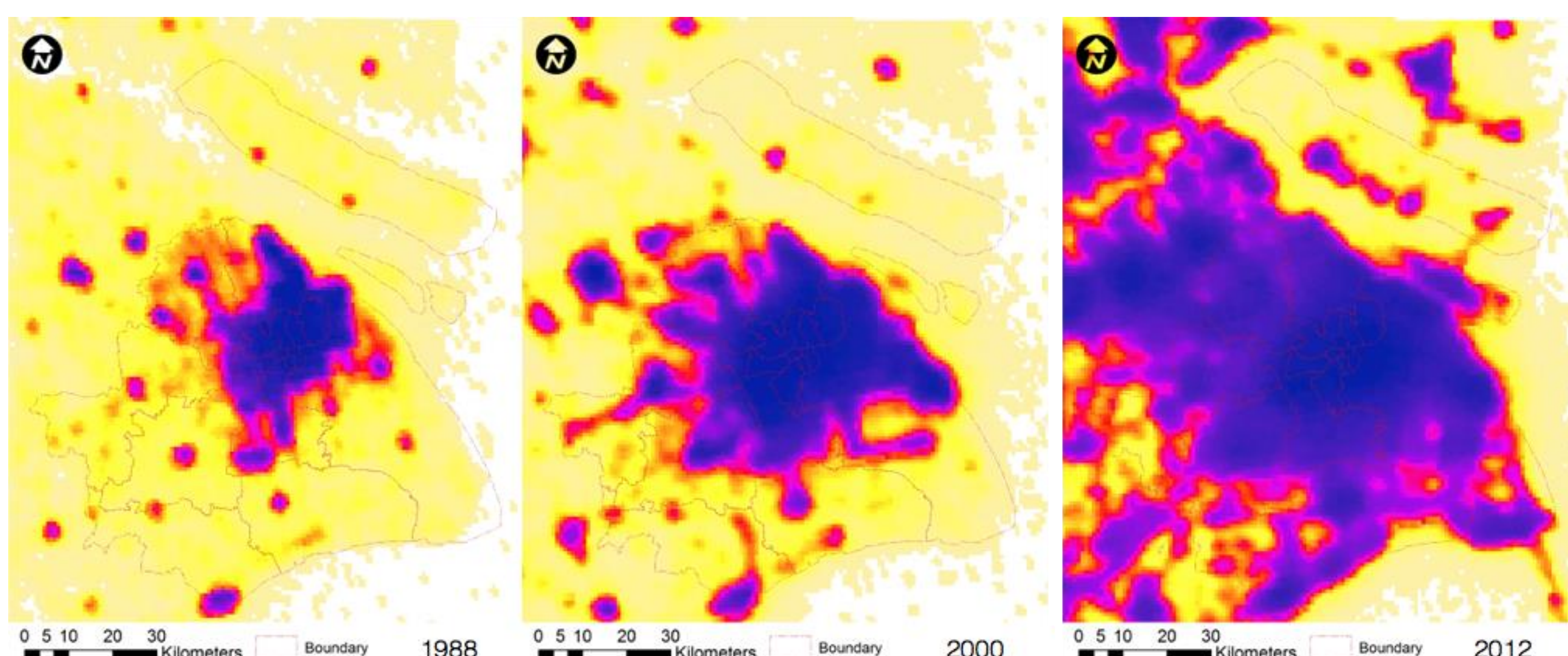
In order to monitor the city changes, not only the land use and land cover (LULC) changes, but also the pattern changes of human economic activities, three different kinds of datasets are used to monitor the study area by each 12 years since 1988 year.



- LULC map: With object based image classification, the LULC map can be derived from the Landsat middle resolution satellite image data.



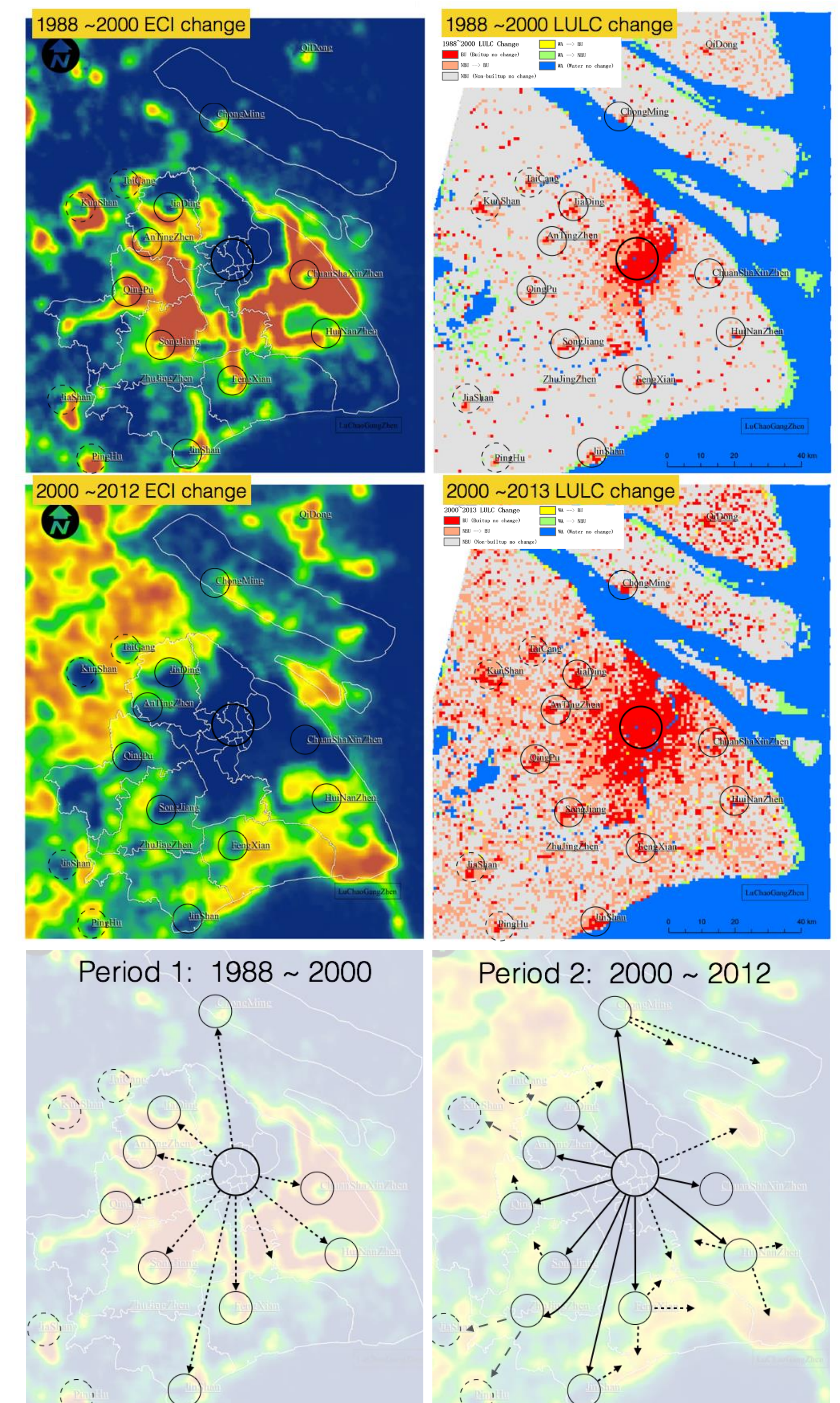
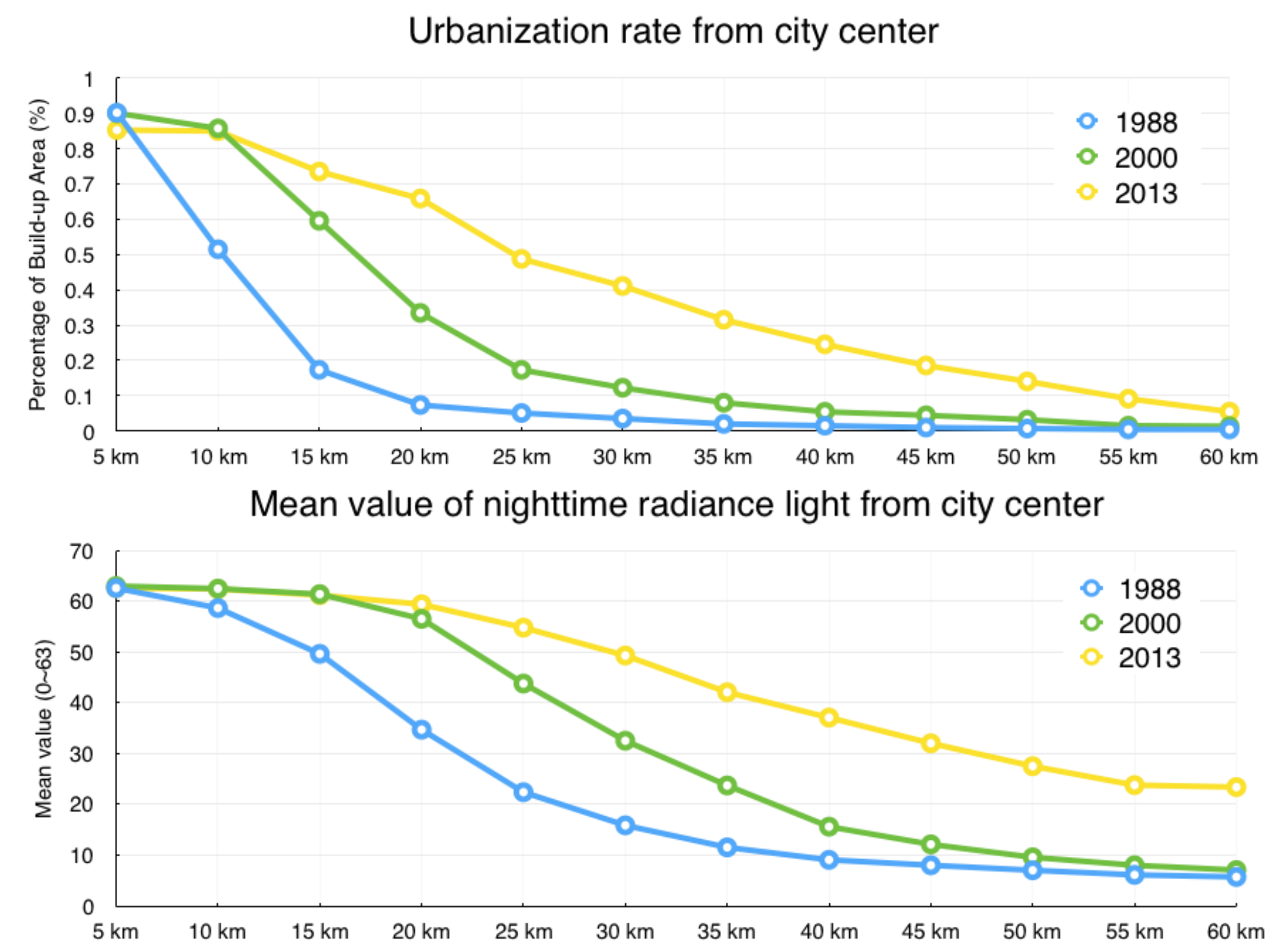
- Energy consumption intensity (ECI) map: With the stable averaged DMS/OLS nighttime lights data, the intensity map of energy consumption can be estimated year by year.



- LandScan population data: the population data were utilized to verify the calculated result.

3. Results and Conclusions

Through this study, several various kinds of dataset were used to monitor the urbanization process in Shanghai. The results show that an incredible rapid expanding of urban fringe was happened. The percentages of the built-up areas were increased from 6.8% to 44.9% since 1988.



Both the LULC change map and ECI change map show the similar pattern. Based on the two scenarios (1988~2000, 2000~2013) results, the city core and dynamically changing pattern can be evidently abstracted and recognized.