

International Journal of Remote Sensing >

Volume 40, 2019 - [Issue 22](#)

1,279 43

Views | CrossRef citations to date | Altmetric | 1

Articles

An estimation of housing vacancy rate using NPP-VIIRS night-time light data and OpenStreetMap data

Luyao Wang , Hong Fan  & Yankun Wang


Pages 8566-8588 | Received 17 Sep 2018, Accepted 21 Apr 2019, Published online: 19 May 2019

🗨️ Cite this article <https://doi.org/10.1080/01431161.2019.1615655>

 Check for updates

Sample our
Geography
Journals

>> [Sign in here](#) to start your access
to the latest two volumes for 14 days



 Full Article

 Figures & data

 References

 Citations

 Metrics

 Reprints & Permissions

Read this article

Share

ABSTRACT

As an informative proxy measure for a range of socio-economic variables, satellite-derived night-time light (NTL) data have been widely used to investigate the diverse anthropogenic activities and reveal urbanization development. Due to the rapid increase of Chinese urbanization rate, from 25.3% in 1987 to 58.5% in 2017, and ‘crazy expansion’ of city space, the sick phenomenon – ‘Ghost Town’ – has been brought out, generally defined as places with high housing vacancy rate (HVR), which will cause the huge waste of the limited land source in China. To investigate the HVR of urban areas in China, this study attempts to establish a hybrid model combining data derived from National Polar-Orbiting Partnership-Visible Infrared Imaging Radiometer Suite (NPP-VIIRS) NTL sensors with OpenStreetMap (OSM) data. By distinguishing non-residential

areas and introducing detailed residential building information, we proposed a novel HVR estimation model, thus realizing the estimation of HVR in 31 Chinese provincial cities with different development levels (Tier 1–Tier 3). The results showed the average HVR of Tier 2 cities (0.204) was higher than that of Tier 1 cities (0.189) and Tier 3 cities (0.233). The model was proven more accurate (root mean square error of approximation (RMSE) = 0.022) when compared with previous models. To explore the reasons causing different HVRs in these provincial cities, the relationship between HVR and typical socio-economic factors – gross domestic product (GDP), population, and housing price – was also revealed. Through correlation verification and built of a regression model, HVR was found positively correlated with housing price (0.409), however, negatively correlated with population (−0.829) and GDP (−0.356). The research is an indication of the applicability of using data derived from NPP-VIIRS NTL sensors in reflecting HVR and an exploration to distinguish socio-economic factors influencing HVR in different cities. The model we proposed can potentially provide guidance for urban planners to formulate better land-use plan and rental measures.

Author Contributions

Wang Luyao and Fan Hong conceived and designed the main idea and experiments; Wang Luyao and Wang Yankun performed the experiments; Wang Luyao wrote the paper.

Disclosure statement

No potential conflict of interest was reported by the authors.

Additional information

Funding

This research was supported by the National Natural Science Foundation of China (Grant Nos. 41471323, 91746206, and 41661086), the National Key Research and

Related research

People also read

Recommended articles

Cited by
43

Information for

Authors
R&D professionals
Editors
Librarians
Societies

Opportunities

Reprints and e-prints
Advertising solutions
Accelerated publication
Corporate access solutions

Open access

Overview
Open journals
Open Select
Dove Medical Press
F1000Research

Help and information

Help and contact
Newsroom
All journals
Books

Keep up to date

Register to receive personalised research and resources by email



Sign me up

