Bibliometric analysis of evolution of night-time light data in urban planning studies

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Abstract

The capability of nighttime light (NTL) data to intuitively detect human activities has made it a crucial tool for urban remote-sensing studies over the past 15 years. There is an urgent need for a thorough assessment of this topic because new data and technology are continually being developed, resulting in an accumulation of research. This study examines the evolution of nighttime light research using a bibliometric analysis. Data were retrieved from Scopus, covering publications from 2015 to 2025. A topic-based search approach was employed to ensure comprehensive coverage of the literature. A total of 962 publications were identified, primarily comprising journal articles and conference papers. The number of publications has shown a steady increase since 2015, with a sharp rise from 2022 onwards, reaching a peak of 165 publications in 2024. The growth trend exhibits a strong positive correlation (R^2 = 0.9283),

indicating an accelerating trend in research activity. This bibliometric study reveals a steady rise in nighttime light research for urban studies, with a significant surge in 2022. China leads in publication output and international collaborations. This study utilizes VOSviewer to analyze nighttime light research trends, identifying key terms and their evolution over time. Early studies focused on remote sensing fundamentals, while recent research emphasizes urban sustainability and climate impact. Advances in satellite technology, including VIIRS, Luojia 1, UAVs, and SDGSAT-1, have enhanced data quality and expanded the application scope. The shift toward high-resolution, multispectral nighttime light sensors enhances urban and environmental research. By providing a structured overview of research developments, this study serves as a valuable reference for future investigations and the effective management of urban nighttime environments. © The Author(s) 2025.

Author keywords

Bibliometric and urban planning; Nighttime light data; Remote sensing; Urban growth

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