

EGU2020-21923

<https://doi.org/10.5194/egusphere-egu2020-21923>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Spatiotemporal dynamics of land development intensity and summertime extreme surface urban heat island effect in Greater Shanghai (1990-2017)

Hao Zhang and Xiao-yan Dai

Fudan University, Department of Environmental Science and Engineering, China (zhokzhok@163.com)

Greater Shanghai, one of China's top megacities, is susceptible to extreme heat events during the summer. This study investigated the spatiotemporal dynamics of land development intensity and its influence on summertime extreme surface urban heat island (SUHI) effect in Greater Shanghai, during 1990 and 2017. Driven by the robust economic development and population growth, the formation of Greater Shanghai has dramatically changed from a traditionally compact city to an explosively urbanizing region in 1990–2017. The results revealed an overall increase in regional LDI of Greater Shanghai in the loss of cropland and water bodies. Simultaneously, the intensified SUHI effect was measured by the increasing relative SUHI intensity (from 1.81 in 1990 to 3.16 in 2017) and magnitude (from 306.80 km² in 1990 to 1570.56 km² in 2017). The urban-rural gradient analysis based on centric buffers and the representative transects further revealed the spatiotemporal heterogeneity of LDI and its linkage with the evolutionary pattern of the SUHI effect. As indicated, the areal extent of downtown Shanghai within the 0–15 km buffer increased by 201.70 km² in 1990–2017. However, its stably decreasing trends in LDI and associated SUHI effect were observed across the study period. In contrast, the urban periphery and exurban area, which attracted huge investment to develop the infrastructure required for population resettlement and the industrial restructure, experienced a dramatic increase in 1660.57 km² of newly developed land. Concurrently, the remarkably increases in LDI and associated SUHI effect the urban periphery and exurban area were notable. Finally, focusing on the overall alarming situation of the summertime SUHI effect in Greater Shanghai, policy implications, and practical suggestions towards sustainable land development and UHI mitigation were discussed.