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Understanding the variability of urban heat islands for climate change adaptation

Ranhao Sun
Chinese Academy of Sciences, China

Climate change adaptation in urban areas is among the biggest challenges humanity faces due to the combined effects of urban heating and global warming. The variability of urban heat islands (UHI) is known to influence the effectiveness of climate adaptation strategies, but current understanding of urban climate variability is still limited. Here, we quantify the diurnal and seasonal variabilities of surface UHIs in 245 Chinese cities that vary in population and physical size, and examine their relationships with the underlying drivers. We found that local background climate, urban green spaces, and local anthropogenic heat emissions can explain 32-39%, 3-11%, and 4-12% of the diurnal UHI variability, respectively. These three variables also account for 17%, 7%, and 22% of the summer-winter UHI variability during the daytime, and 29%, 4%, and 26% during the nighttime, respectively. Our research suggests that the improvement of urban climate-change adaptation necessitates the local climate-smart strategies, reduction in local anthropogenic heat emissions, and rational use of green planning for sustainable urban development.

Biography

Ranhao Sun has completed PhD from University of Chinese Academy of Sciences in 2008. He is an Associate Professor at the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (RCEES – CAS). His main areas of expertise are landscape ecology, physical geography, and geographic information systems. His current studies focus on two fields: (1) urban heat island effects in large cities related to landscape design and planning; and (2) ecosystem services evaluation and modeling using GIS and remote sensing technologies.

rhsun@rcees.ac.cn

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