EGU24-13324, updated on 20 May 2024
https://doi.org/10.5194/egusphere-egu24-13324
EGU General Assembly 2024

Disagreements among current-generation global urban estimates across scales

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The rise in high-resolution satellite technology and computational advancements has enabled the development of global urban land cover datasets, crucial for understanding climate risks in our increasingly urbanizing world. Here, we analyze urbanization patterns across spatiotemporal scales from several such widely used current-generation datasets and find substantial discrepancies in percentage of urban land influenced by differing urban definitions and methodologies. Despite these inconsistencies, the datasets show a rapidly urbanizing world, with global urban land nearly tripling between 1985 and 2015. We also discuss the implications of these inconsistencies for several use cases, including for monitoring urban climate impacts, such as localized urban warming and urban flood risks, and for modeling urbanization and its influence on weather and climate from regional to global scales. Our results demonstrate the importance of choosing application-appropriate datasets for examining specific aspects of historical, present, and future urbanization with potential implications for informing sustainable development, resource allocation, and quantifying climate impacts.