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Impact of urbanization and climate change on spatial patterns of precipitation

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More than half of the world's population now resides in cities and the amount of urban population is expected to further increase during the coming decades. Urbanization and the associated changes in land use/land cover can have a notable impact on the climate at local and regional scales. Specifically, several studies recently concluded that urbanization can modify the temporal and spatial properties of precipitation. On top of that, global warming is expected to enhance the magnitude and frequency of short-duration heavy precipitation, with consequential effects on the severity and frequency of urban pluvial flood events. Therefore, improving our understanding of the separate and combined effects of urbanization and climate change on short-duration precipitation is imperative for flood risk assessments and planning of future cities. To this end, we investigate the impact of climate change and urbanization on the space-time properties of precipitation by conducting current and future simulation scenarios over cities with different climates using the Weather Research and Forecasting (WRF) physically-based climate model. The results of this study elucidate the important role of urban land cover on the spatial structure of precipitation under a changing climate.