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Extreme precipitation changes in relation to urbanization

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The rising frequency of extreme precipitation is a major concern linked to climate change, commonly associated with increased atmospheric water vapor due to global warming. In densely populated areas, intense rainfall has particularly severe impacts, with urbanization amplifying extreme weather through changes in land surface and local atmospheric conditions. As attribution science increasingly informs climate policy, it is crucial to discern the extent to which shifts in extreme event probability stem from global versus local anthropogenic drivers. This study analyzes multi-decadal daily precipitation records alongside urbanization indices. In line with previous research, results show a general rise in extreme rainfall frequency, with more intense events exhibiting a larger increase. Analysis of population and urban development metrics reveals that the increase is notably smaller in rural areas, suggesting that the rise attributable to local urban development is of the same order of magnitude as that resulting from global warming. This result is shown to be associated with the urban amplification of convective updraft intensification.