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If precipitation extremes are increasing, why aren't floods?

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As the climate warms, so extreme rainfall should also increase as dictated by the Clausius-Clapeyron relationship. Knowing that a thermodynamic relationship exists linking rainfall and temperature it could be expected that historical sensitivities of rainfall and temperature would be useful in informing us how climate change will affect rainfall. But in practice the use of these sensitivities is fraught with difficulty. Rainfall-temperature sensitivities, the artifacts that arise in their calculation, and how they can help inform potential changes in rainfall and flooding in a warmer world, in the context of design flood estimation, are presented.

Rainfall extremes are expected to increase and intensify, with such changes a critical consideration for infrastructure design. However, the change in rainfall extremes is not necessarily a concern, but the resultant impact on flooding that is of great societal impact. The evidence for increasing flooding is more prominent in urban areas, with non-urban areas showing mixed a response. A holistic approach to changes in rainfall extremes, moving beyond a focus on the flood causing extreme rainfall, and towards the changing nature of rainfall patterns across multiple scales is recommended.