

Impact of microphysics on tropical precipitation extremes in a global storm-resolving model

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The impact of microphysics on tropical precipitation extremes is explored with a global storm-resolving model by modifying the terminal velocity of raindrops. Depending on the time scales, precipitation extremes respond differently. Hourly extremes are influenced dynamically through convective updraft speed, as a faster terminal velocity of raindrops increases the updraft speed by reducing the total rain in the atmosphere which increases the updraft buoyancy. However, the response of daily precipitation extremes is more sensitive to the microphysical modulation on convective organization. By being more organized with decreasing terminal velocity, daily precipitation extremes are enhanced due to increased precipitation efficiency and intensified updrafts. Thus, the results suggest that microphysics, despite often occurring at small scales, can influence the circulation at larger scales, and the microphysical imprint across different scales plays an important role in regulating tropical precipitation extremes.

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