## Investigating large precipitation systems with GPM

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## Estimating the causal effect of climate change variables on the spatial extent of precipitation events

## **Generating the GPM large** systems dataset

Time period: 2014 - 2020 GPM precipitation features greater than 2500 km<sup>2</sup>

(http://atmos.tamucc.edu/)

## Exploring the data and relationship between variables

CAPE, TP, maximum height, size (number of pixels), volume of rain

Tropics vs extra-tropics Land vs Ocean Selecting relevant variables + additional variables from ERA5

Building AI models to relate larger systems to large scale thermodynamic variables Applying AI models to climate model simulation results (e.g CMIP6)

Projecting into future warming scenarios

Population of large precipitation systems from GPM 2014-2021 Density plot of Size vs Maximum height of system (SE Asia) 40°N 20.0 system (km) 17.5 15.0 20°N - 140 - 120 - 100 of Maximum height o 2.75 2.00 2.50 Size of system (log number of pixels \* 24.55km^2) 100 200 300 400 500 600 700 800 Above median height of system (12.4 km) Above median rain volume (15000 mm/hr\*km^2) Above median cape (573 J/kg) - 60 20°N 20°N 20°N 60 - 50 - 50 15°N 15°N 15°N - 50 10°N 10°N 10°N r 40 # 5°N 5°N 5°N - 30 - 30 - 30 0° 0° - 20 20 20 5°S 5°S 5°S 10 - 10 100°E 120°E 130°E 110°E 100°E 110°E 120°E 130°E 100°E 110°E 120°E 130°E