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A verification method for sub-daily rainfall intensity in short-range forecast

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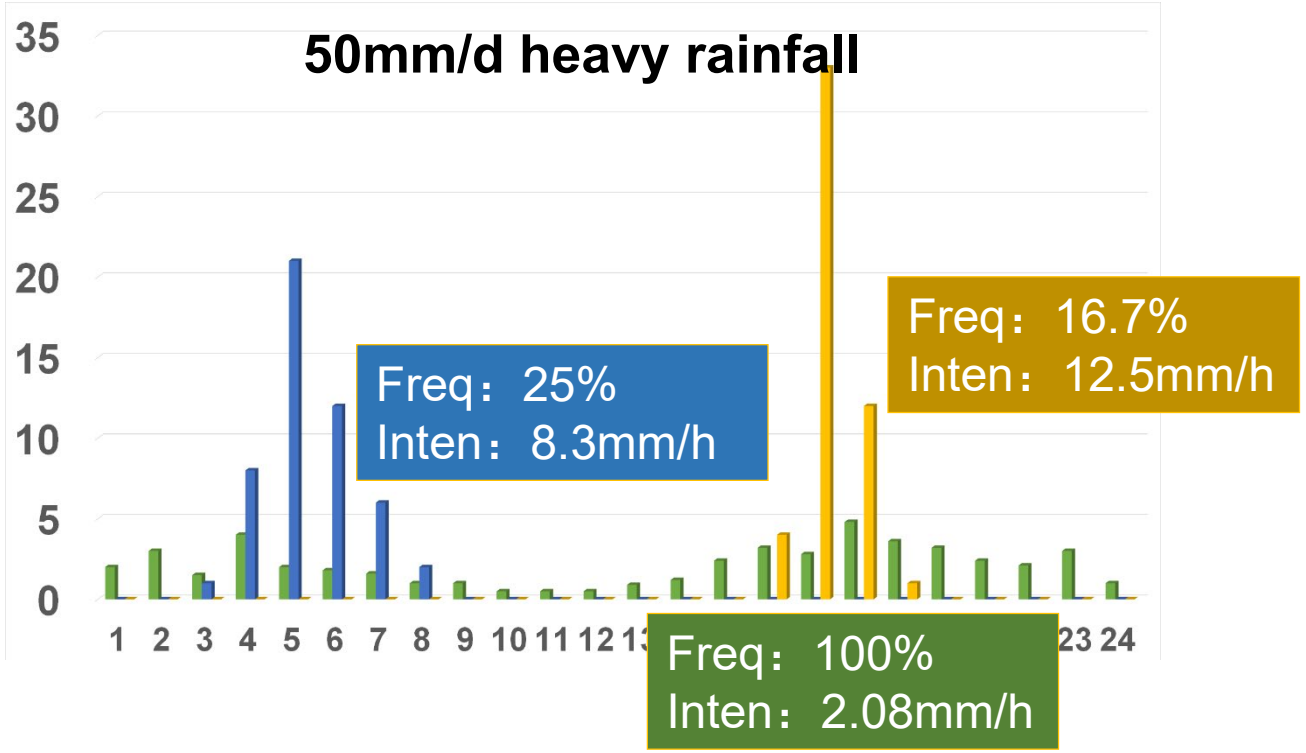
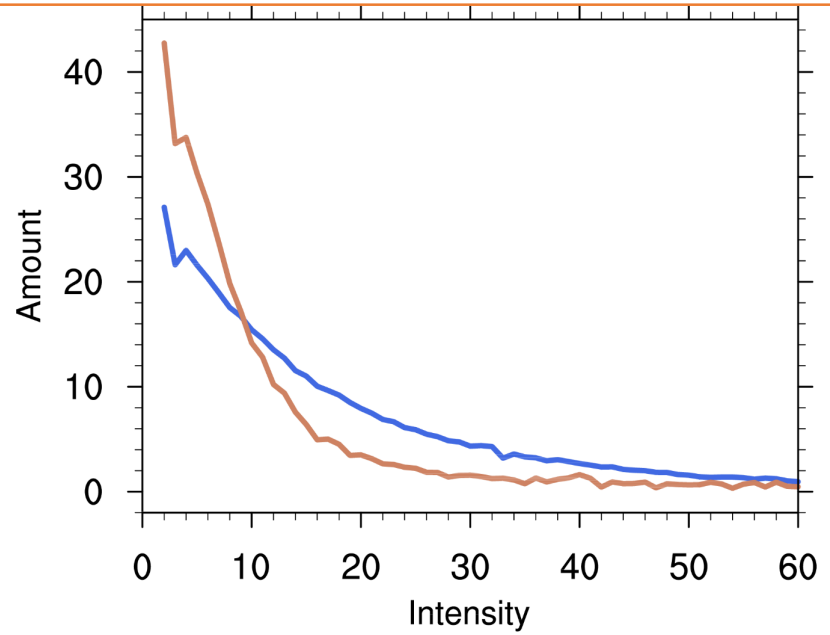
Motivation: Verification of QPF within 24-hour



Frequency=Rainy hour/All hours

Intensity=Amount/Rainy hour

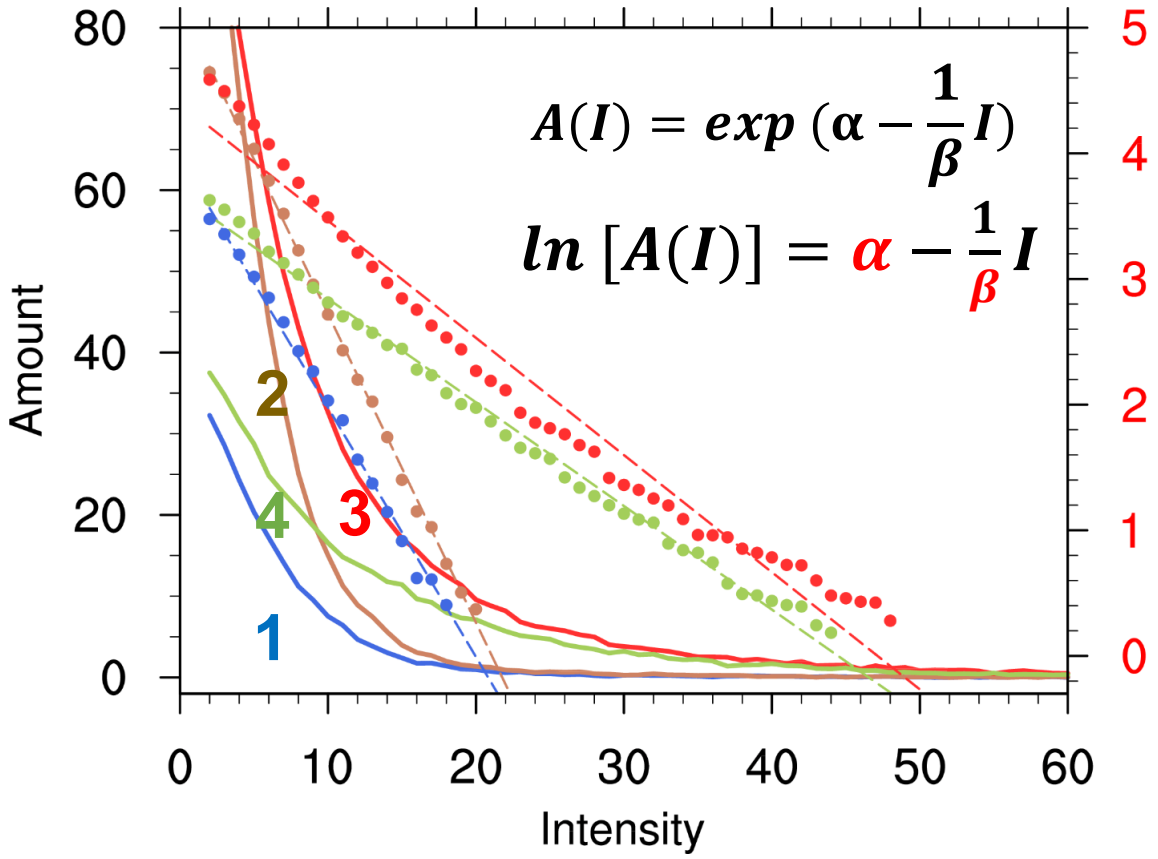
Intensity Distribution



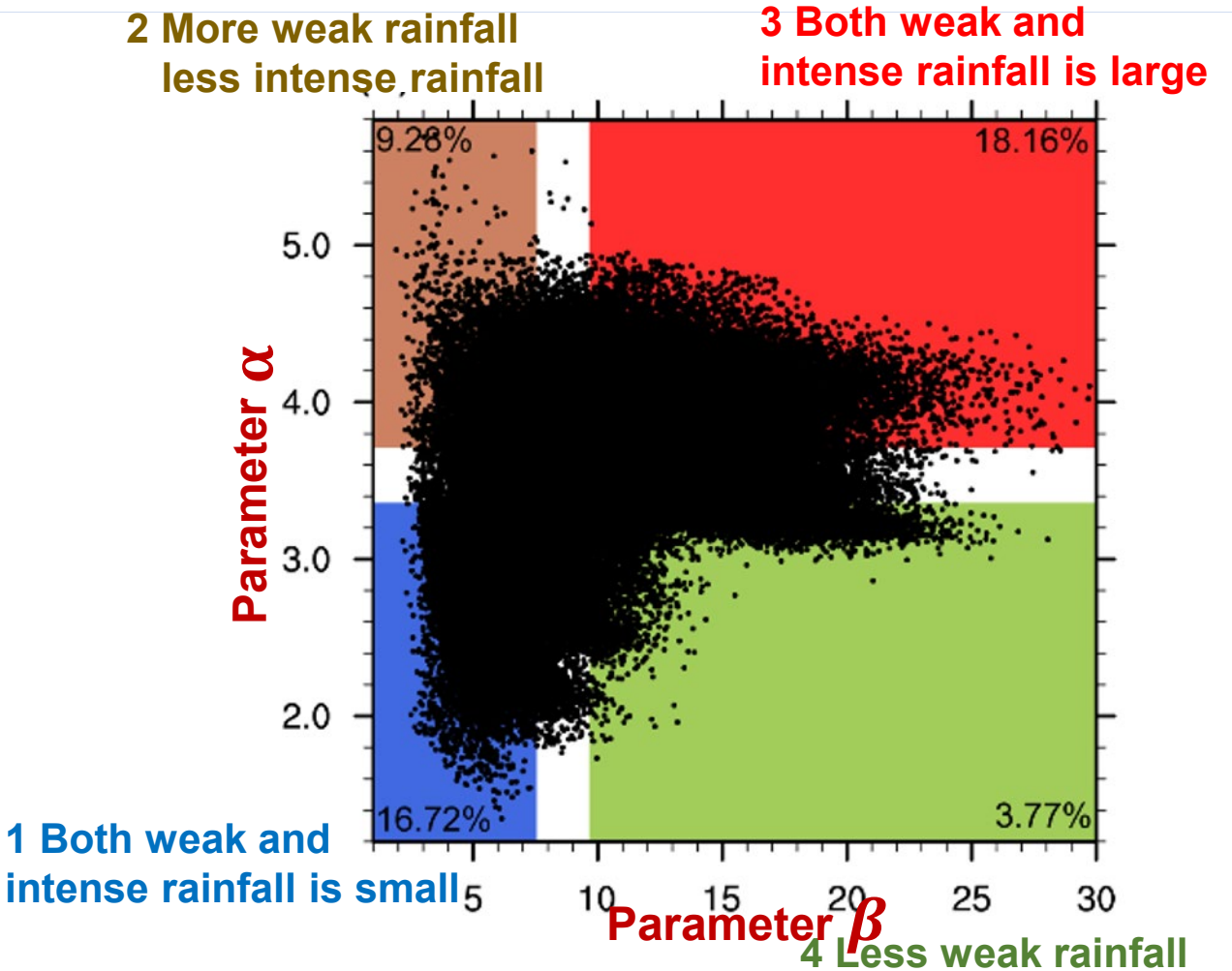
The average rainfall amount distributed with different hourly intensity over central eastern China

The motivation is to promote the application of high-resolution regional model products in short-range QPF within 24 hours. The chief concern is the sub-daily variation, such as frequency, intensity as well as diurnal cycles.

Quantitatively verification of Intensity Distribution



The JJA rainfall amount (mm/h) by hourly intensity (curves), the logarithm of rainfall amount at various intensities (dots) and its exponential fit line (dashed lines). Different colors denote 4 categories as shown in the right panel.

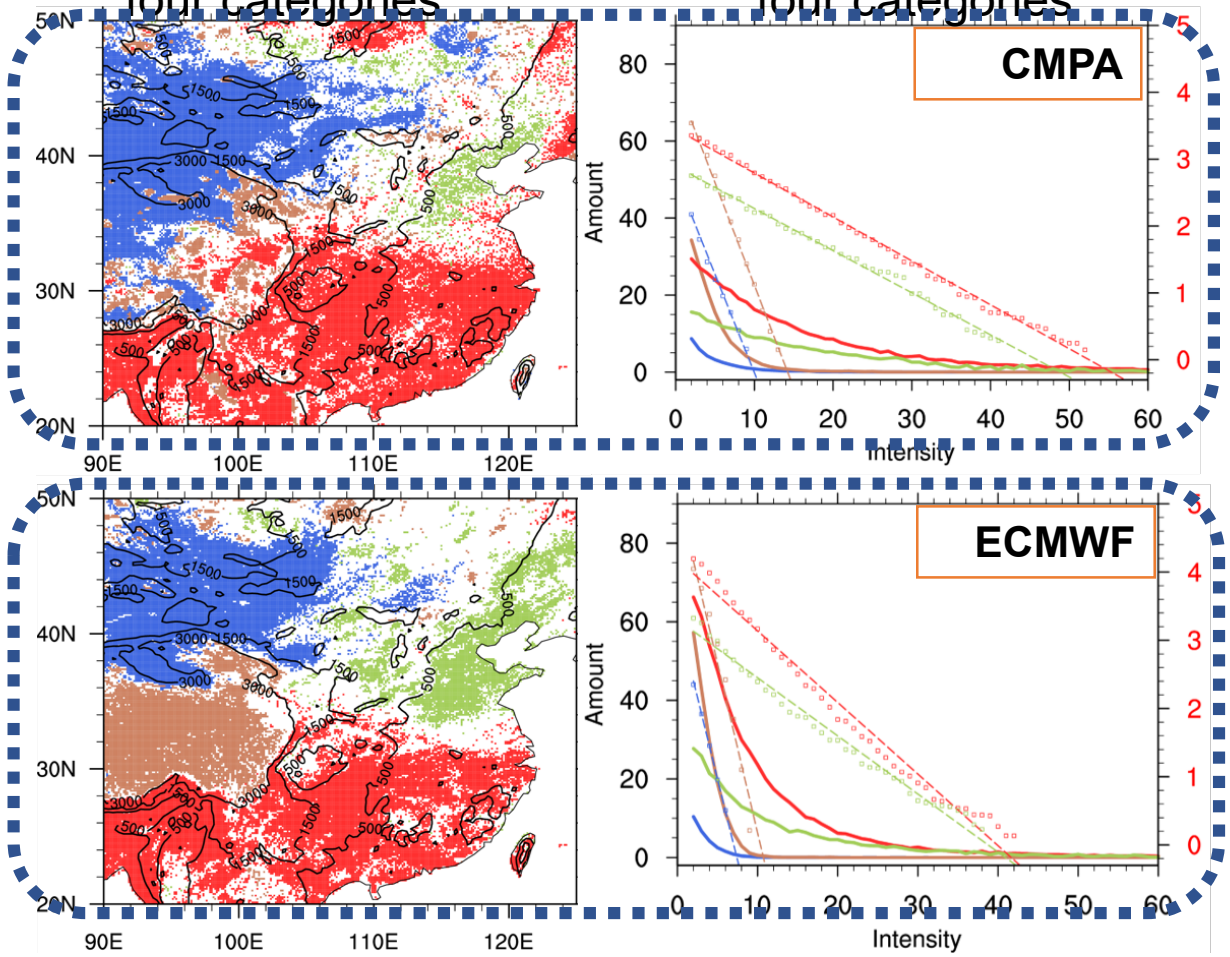


The parameter values (α,β) of each grid over central eastern China are shown by black circles on an α–β plane. The four color backgrounds denote four categories.

Quantitatively verification of Intensity Structure

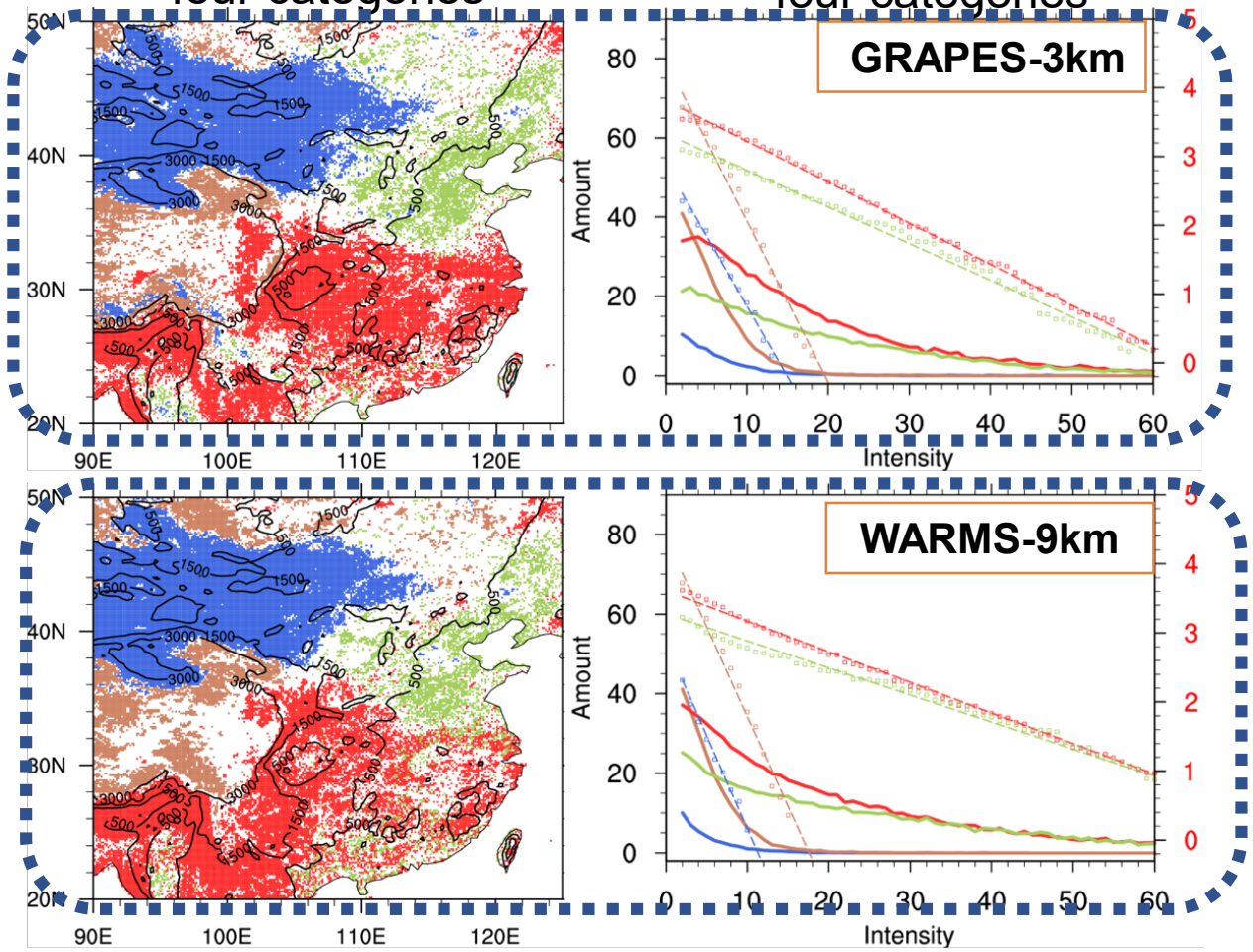
Spatial distribution of the four categories

Averaged Curves of the four categories



Spatial distribution of the four categories

Averaged Curves of the four categories

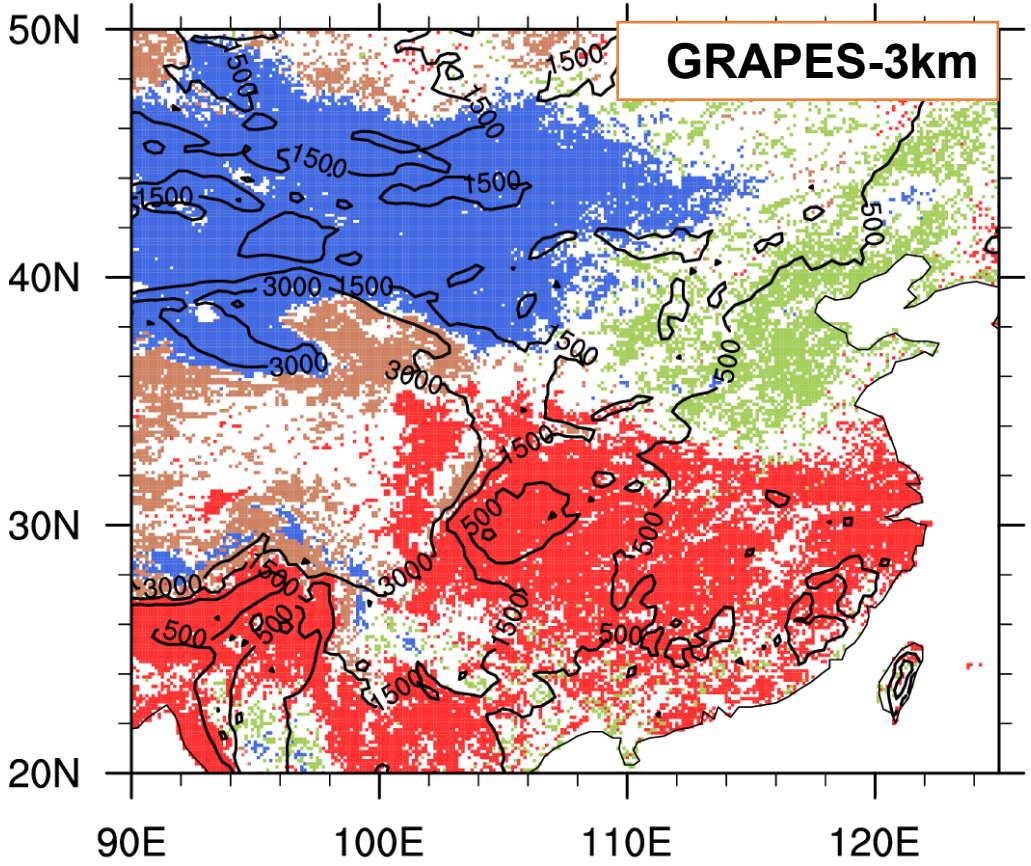


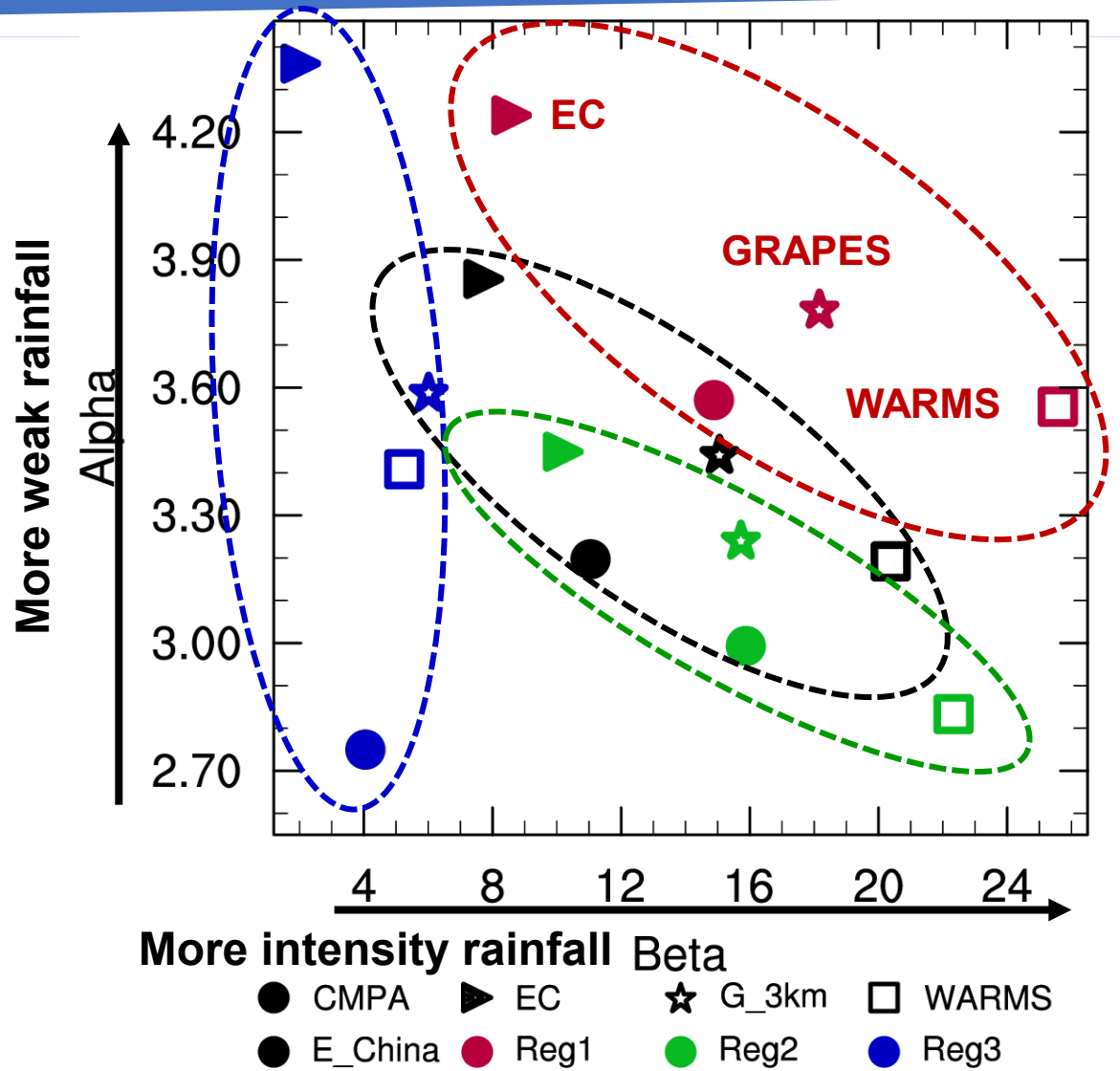
CMPA: CMA Multi-source merged Precipitation Analysis, and JJA data of 2020 are used

GRAPES and WARMS are operational regional NWP model in CMA, while the 12-36h hourly forecasts are verified

Quantitatively verification of Intensity Structure

Spatial distribution of the four categories in CMA operational regional forecast system





Blue（Red）denotes both weak and heavy rainfall is small (large)

Green（Brown）denotes less (more) weak rainfall while more (less) heavy rainfall

Thank you for your attention!

Reference

- Yu, Rucong and Jian Li, Hourly Rainfall Changes in Response to Surface Air Temperature over Eastern Contiguous China. *Journal of Climate*, 2012, 25, 6851-6861.
- Li, Jian and Rucong Yu, A Method to Linearly Evaluate Rainfall Frequency–Intensity Distribution. *Journal of Applied Meteorology and Climatology*, 2014, 53, 928-934.
- Yu, Rucong, Jian Li, and Pengqun Jia, Development of Operational Weather Forecasting Shaped by the “Triple-In” Properties of Numerical Models. *WMO Bulletin*, 2019, 68, 56-62.