Diurnal Variability of Tropical Cyclone Tornadoes and its Sensitivity to Distance from the Coast

Ben Schenkel[1,2] (benschenkel@gmail.com),

Ivan Sloan[3], Roger Edwards[4], Michael Coniglio[1,2], and Sean Waugh[2]

1: University of Oklahoma, 2: National Severe Storms Laboratory

3: Howard University, 4: Storm Prediction Center

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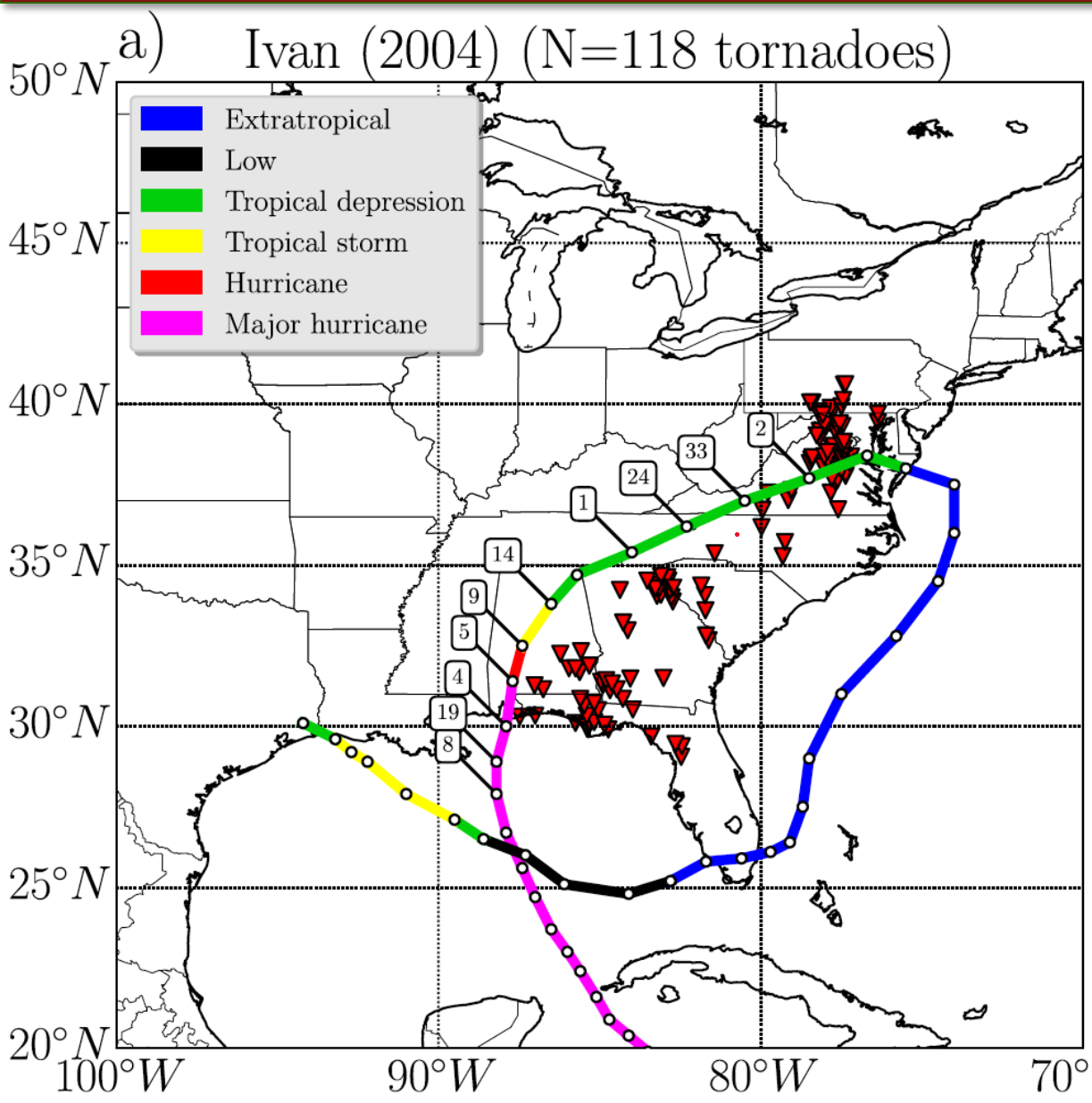
5/9/2022

Funding from NSF AGS-2028151

Example of Diurnal Variability in TC Tornadoes



Schenkel et al. (2020)

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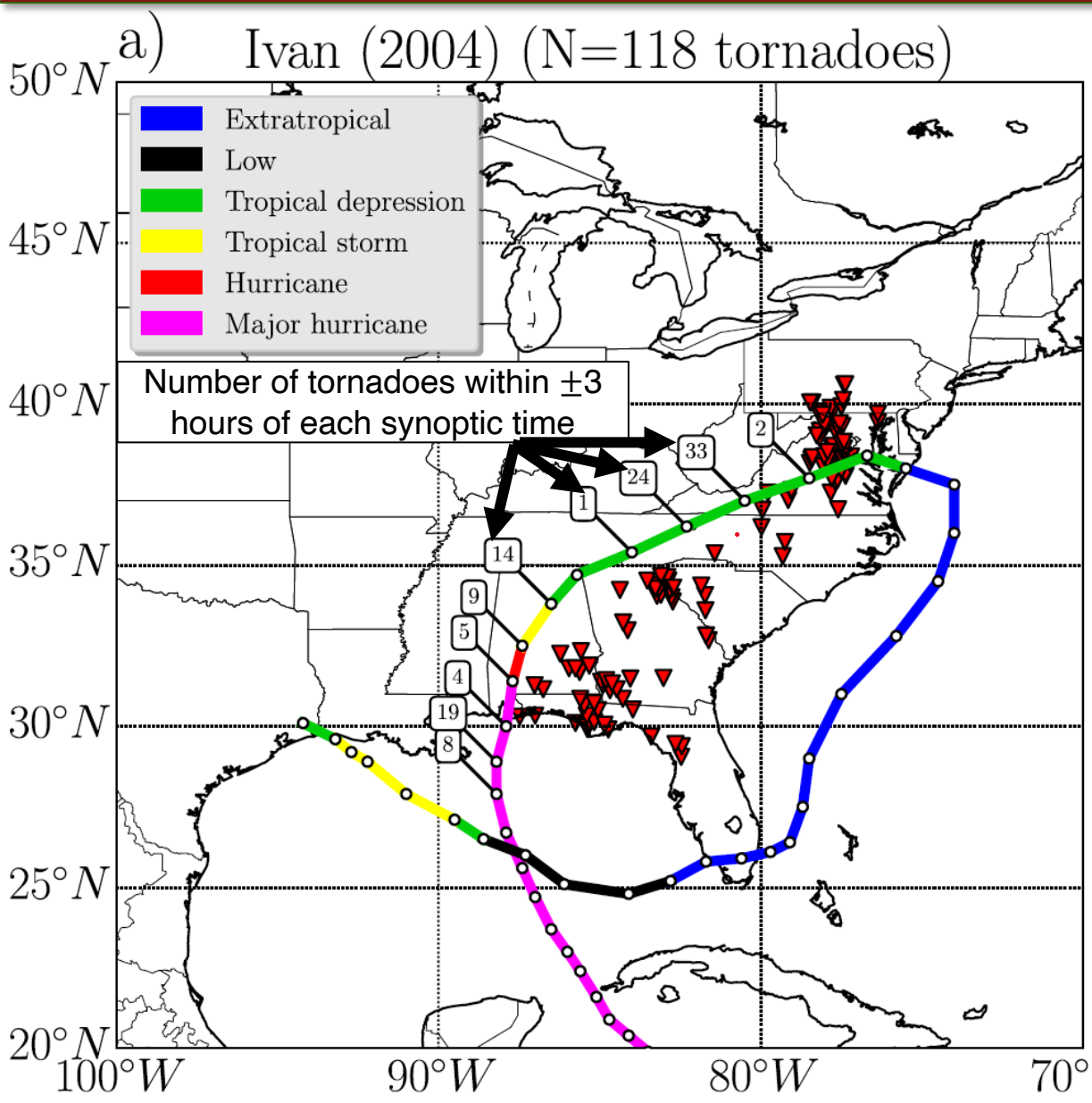

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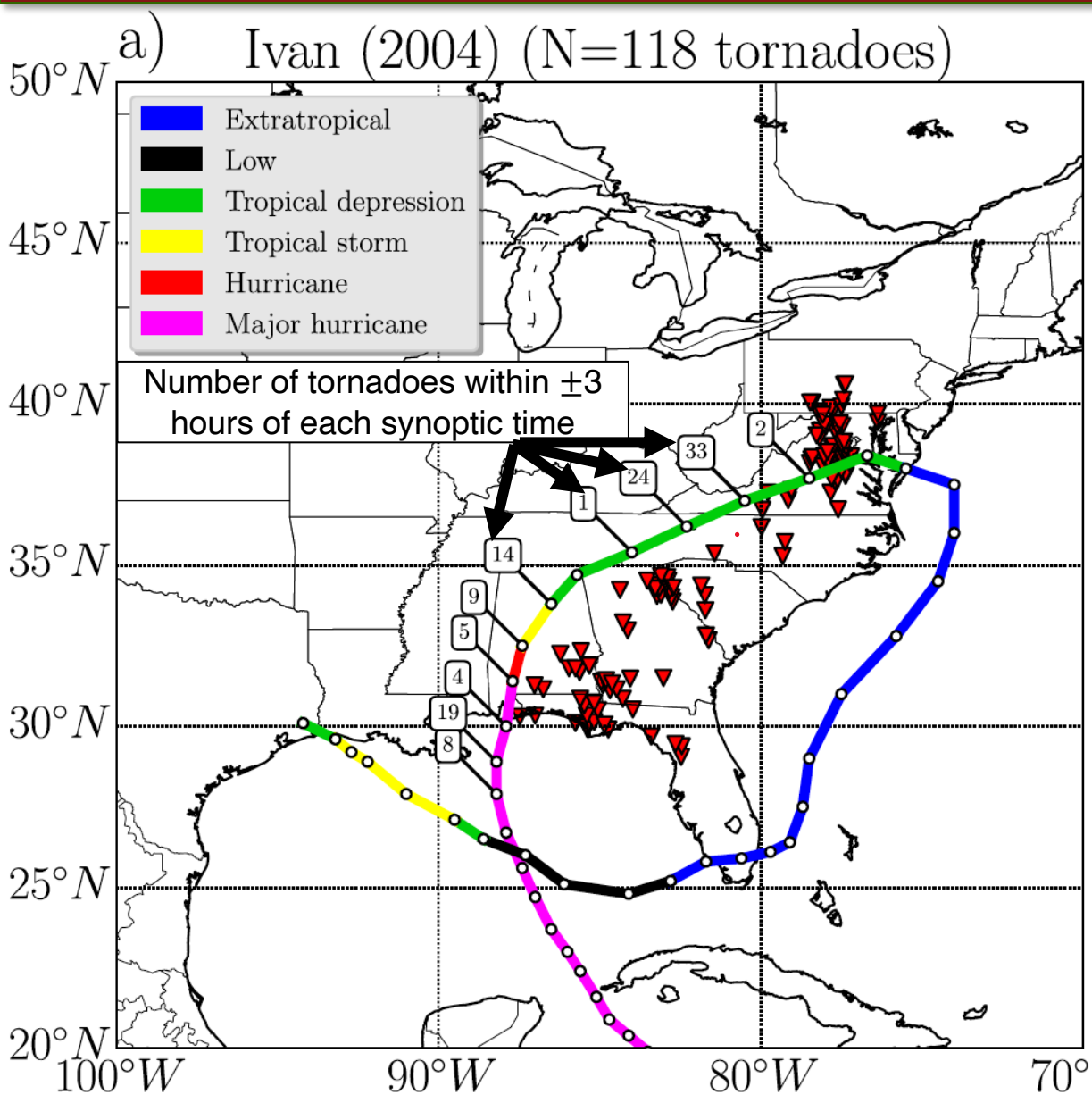

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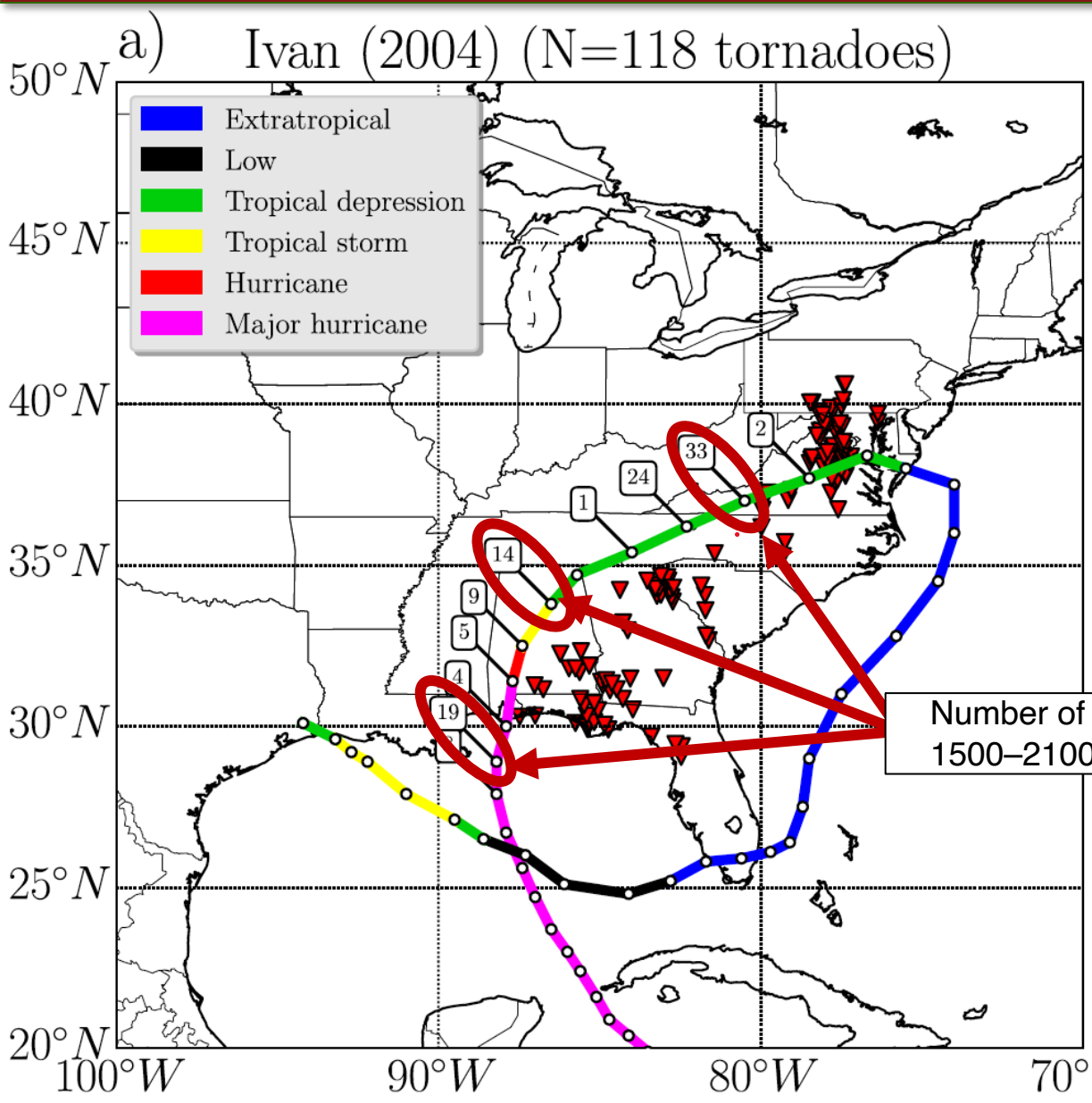

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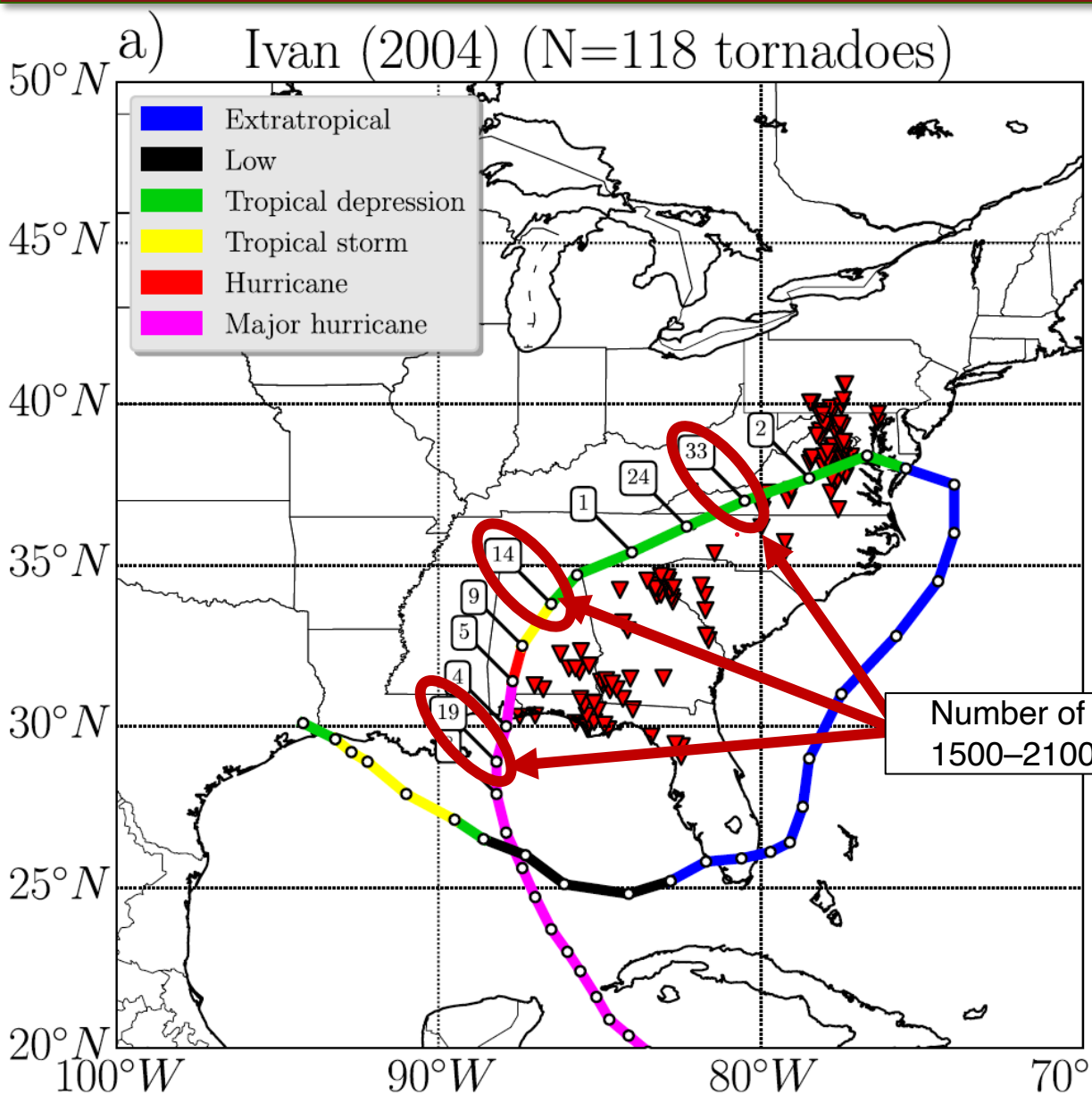

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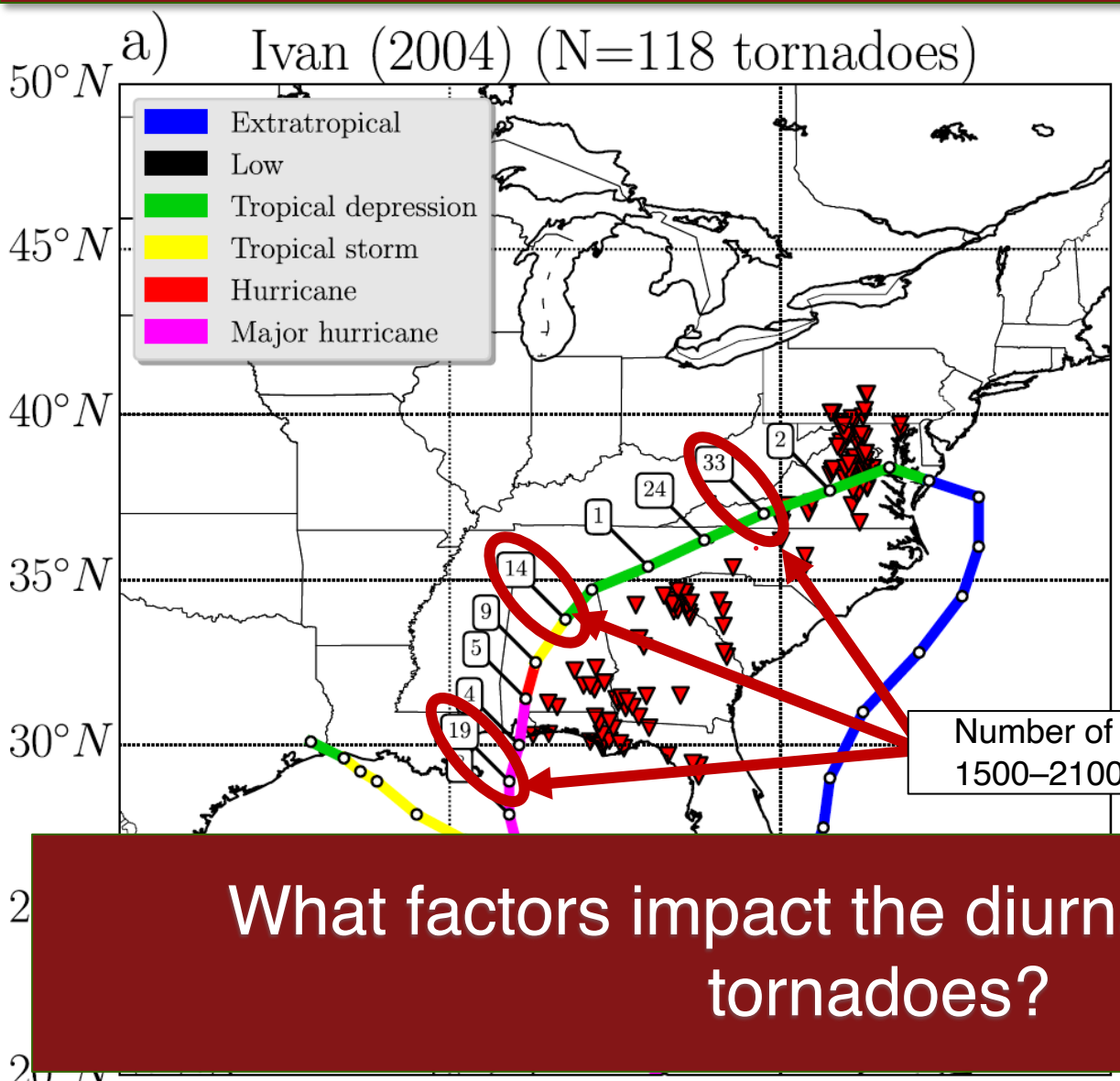

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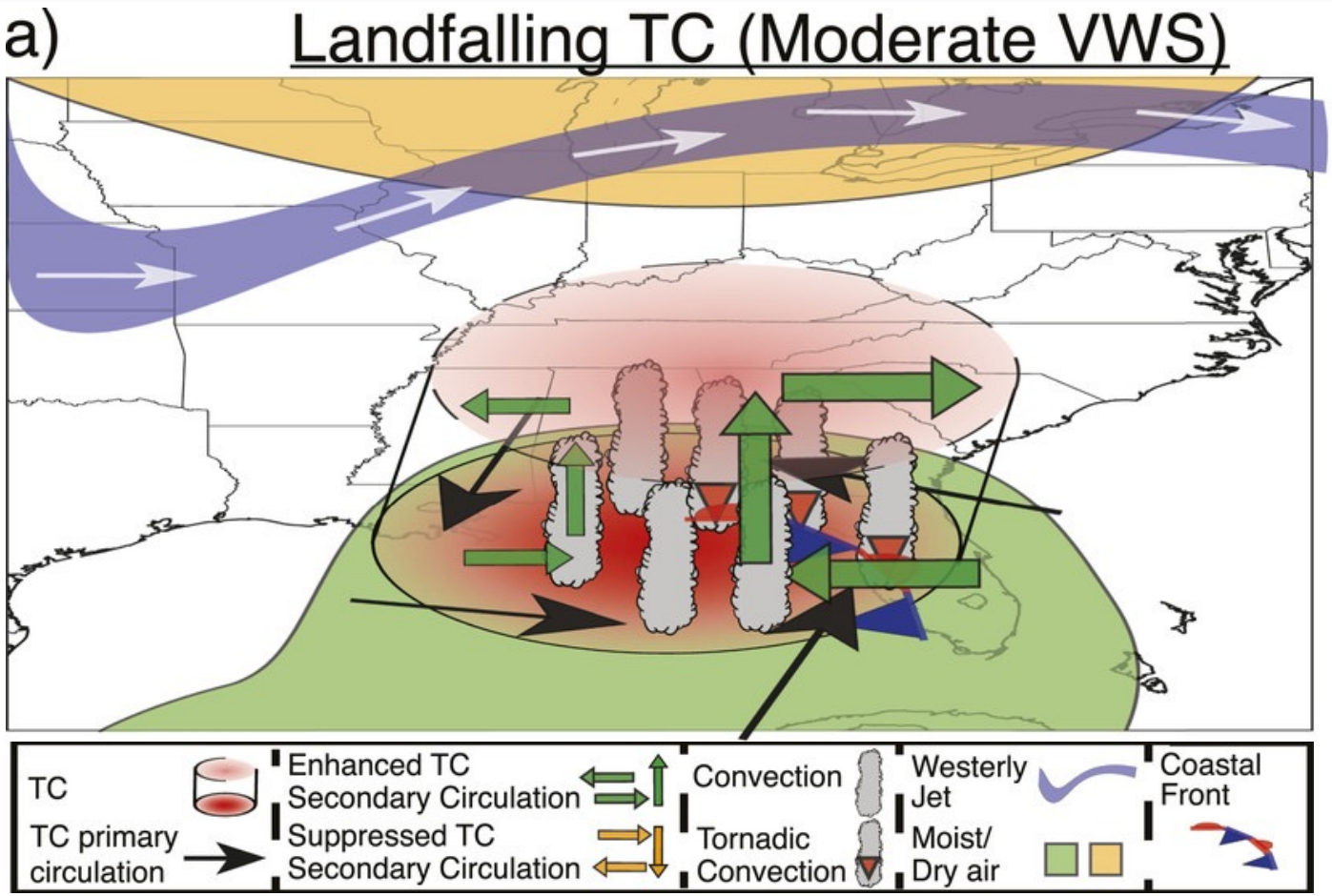
What factors impact the diurnal cycle of TC tornadoes?

Schenkel et al. (2020)

How Might Diurnal Variability of Tornadoes Change as TC Moves Inland?



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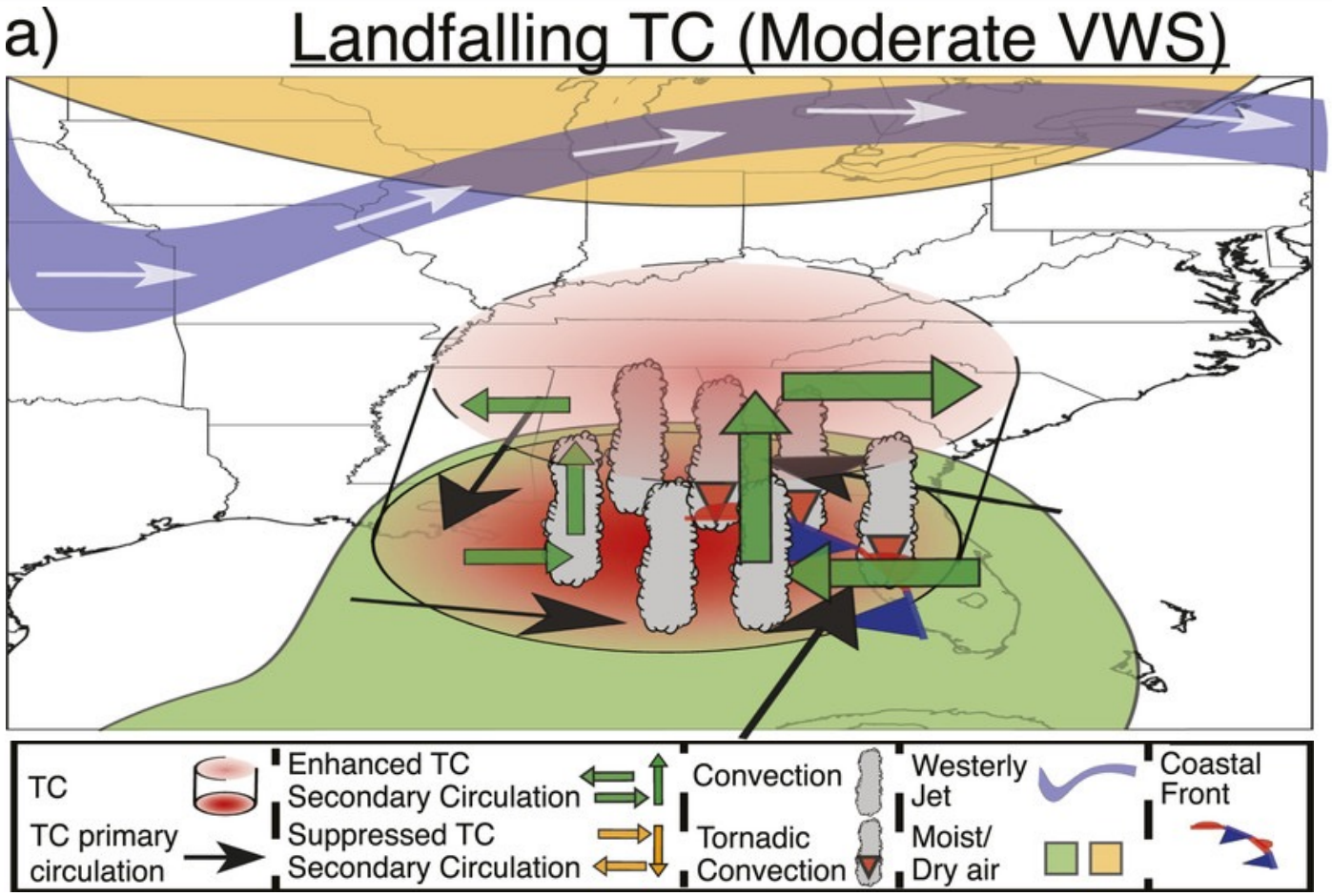

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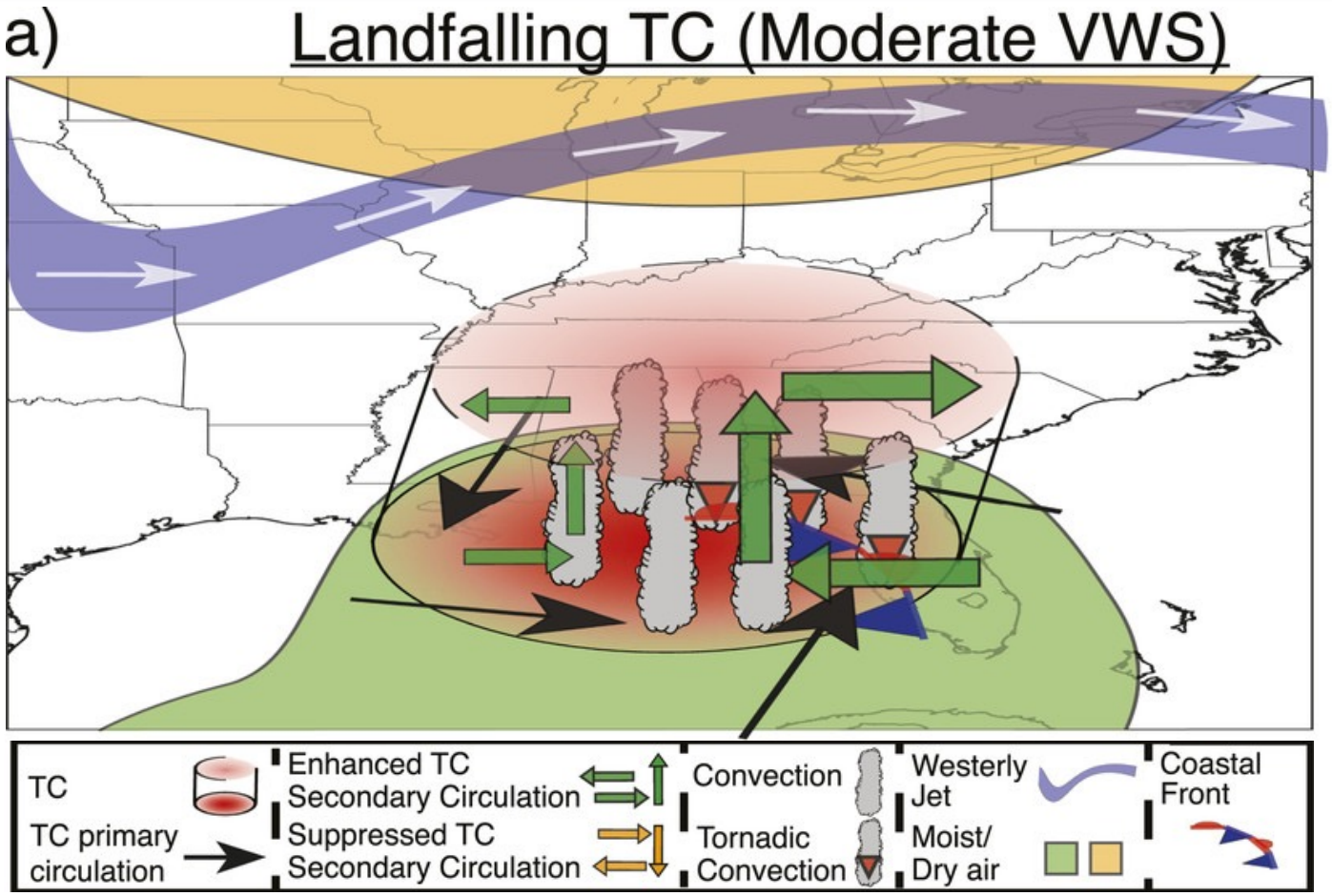

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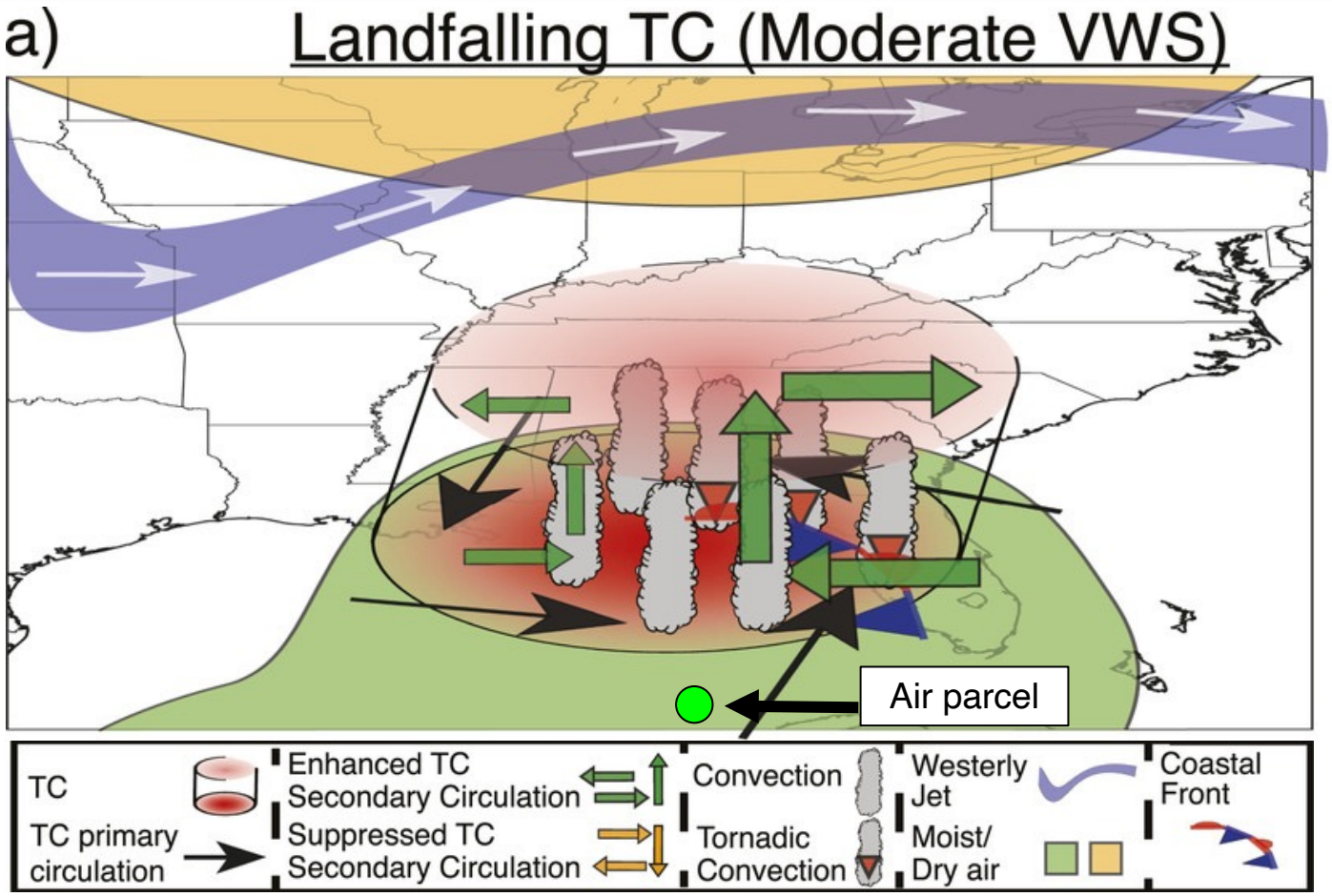

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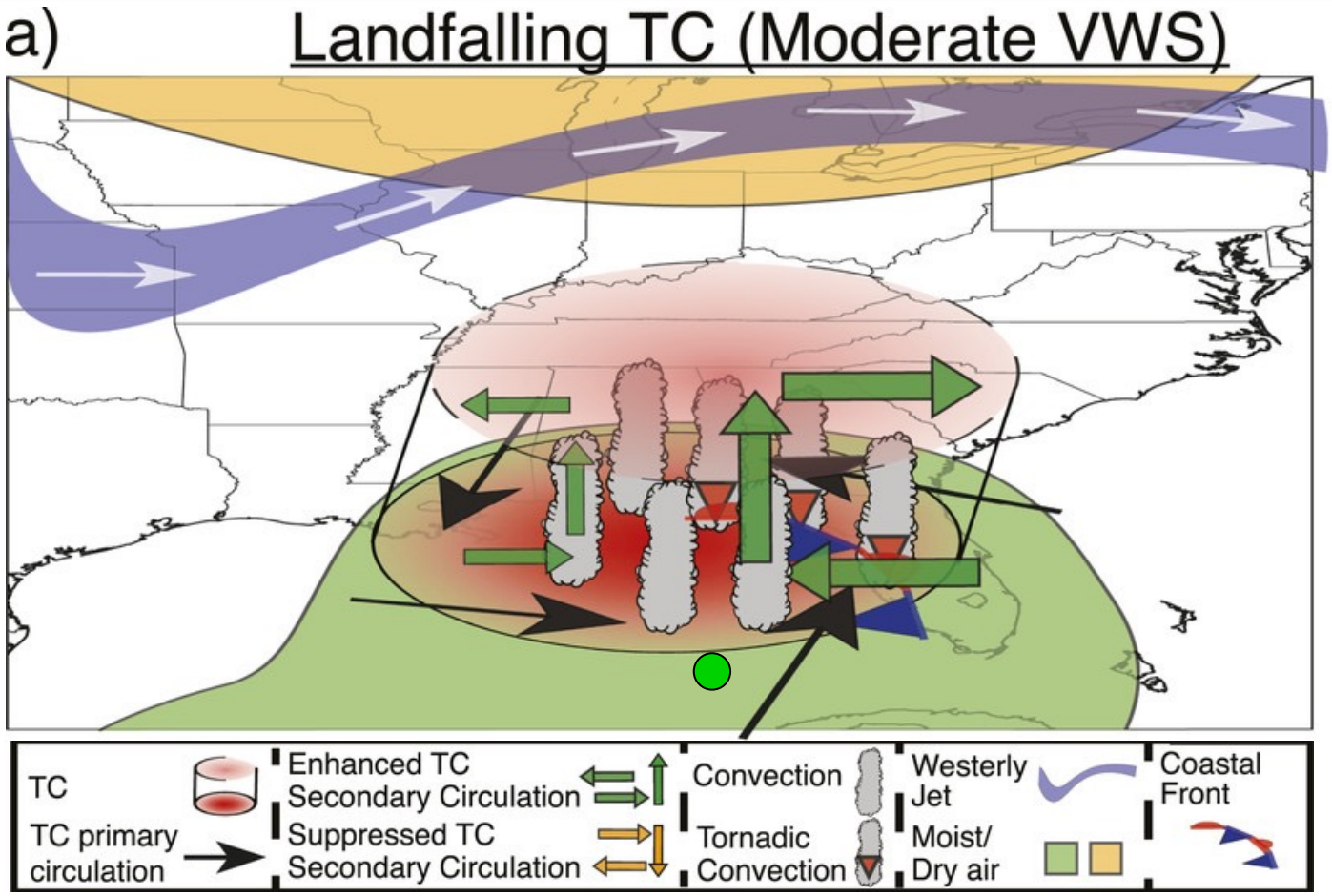

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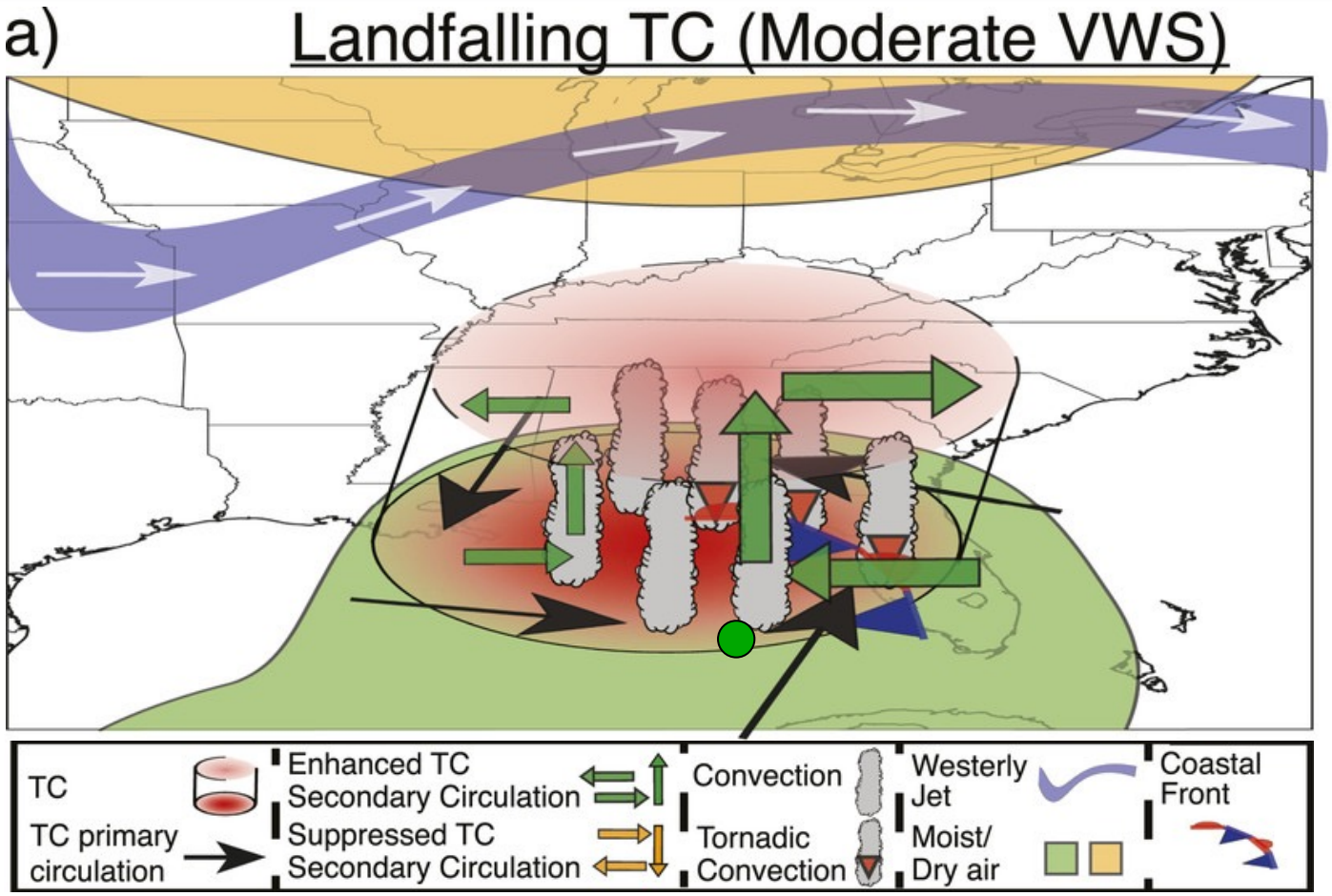

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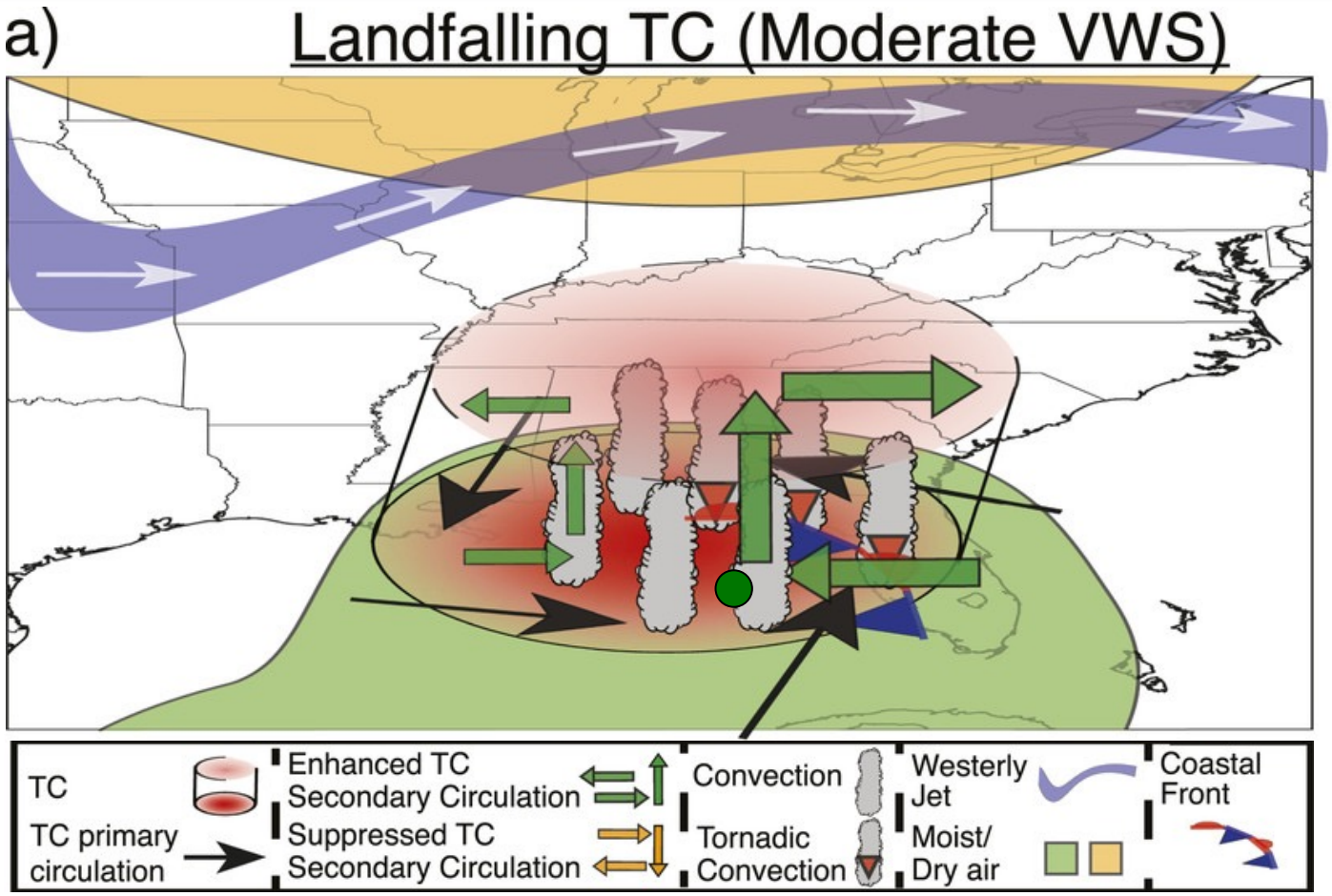

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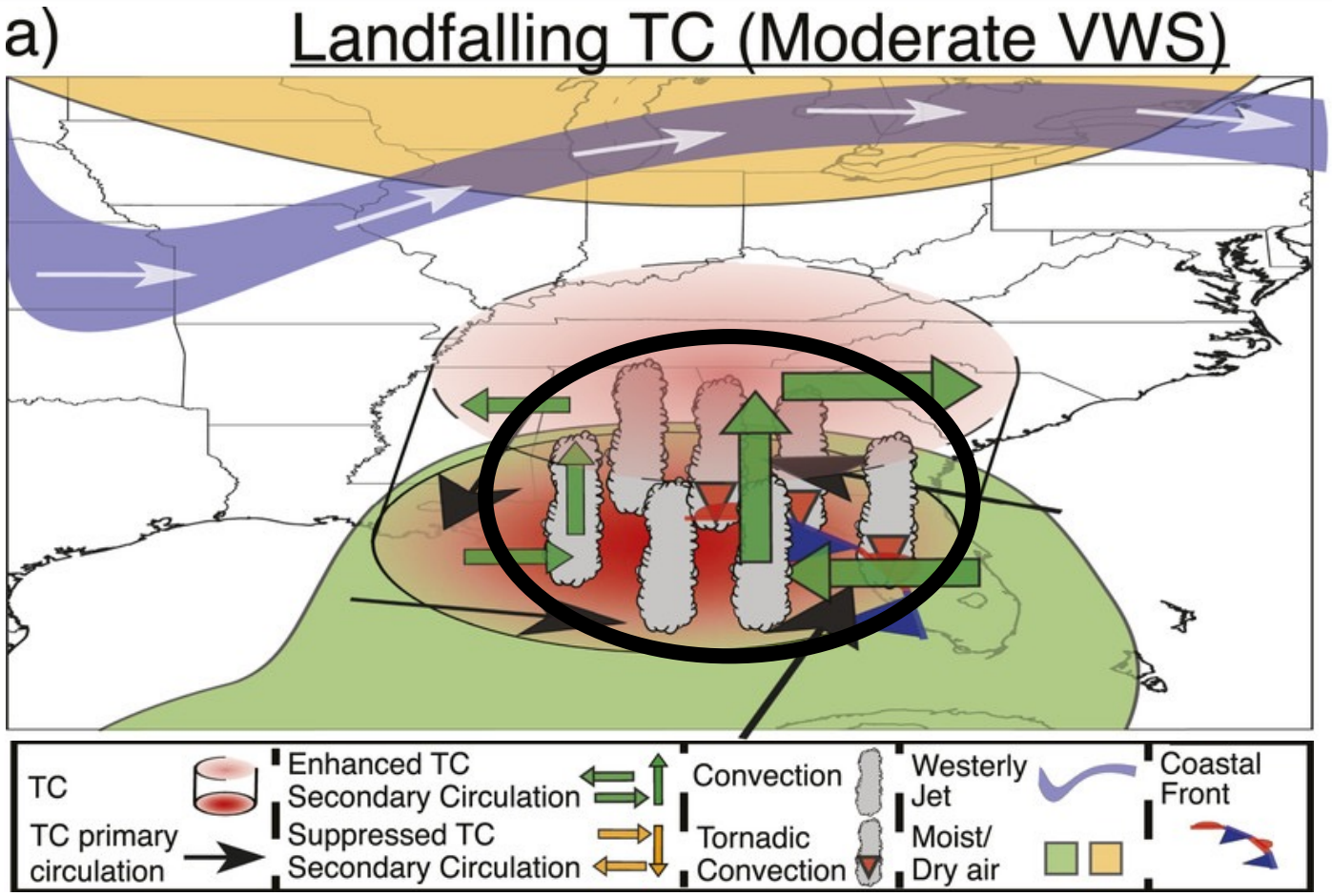

- Weak diurnal variability of coastal tornadoes due to:
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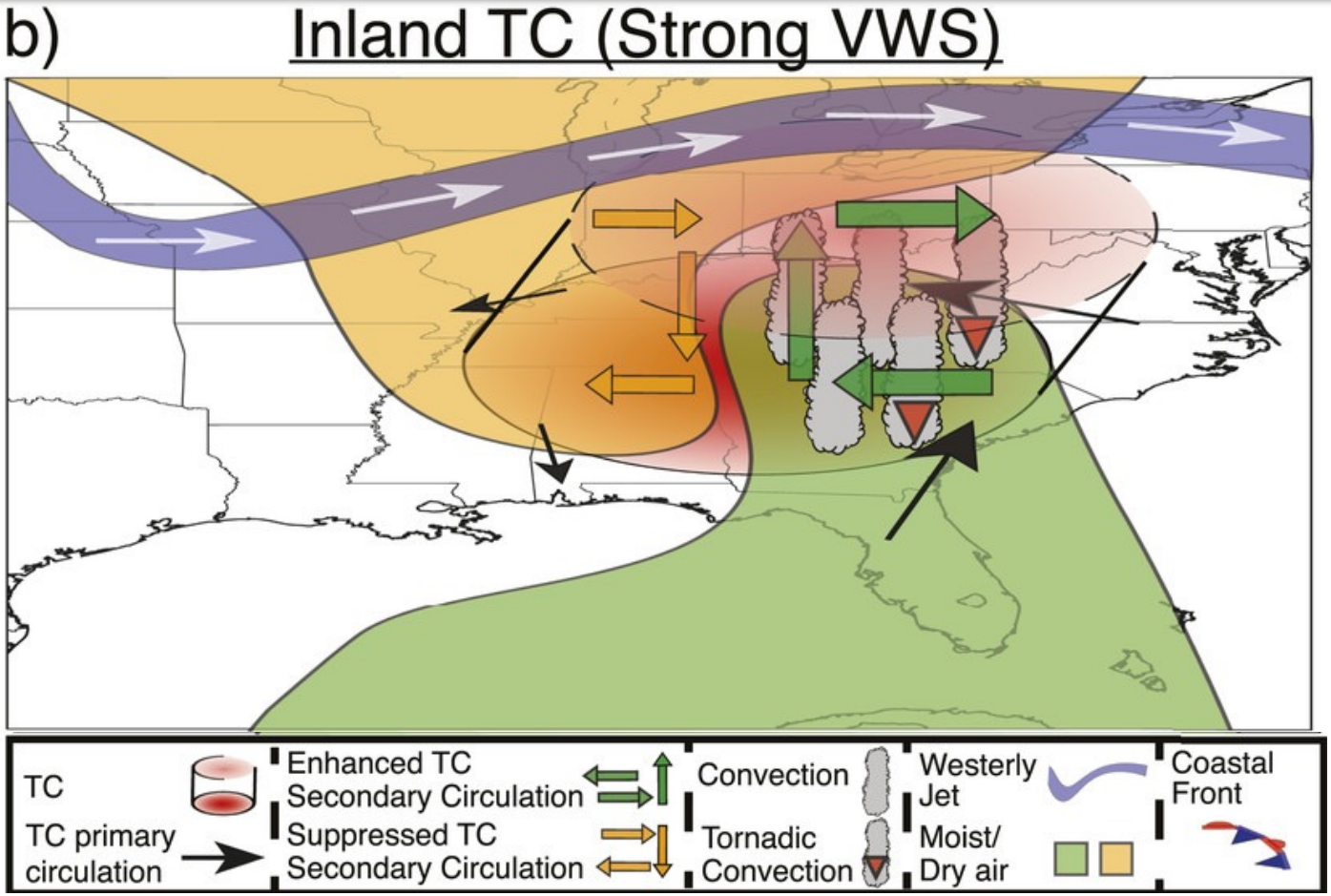

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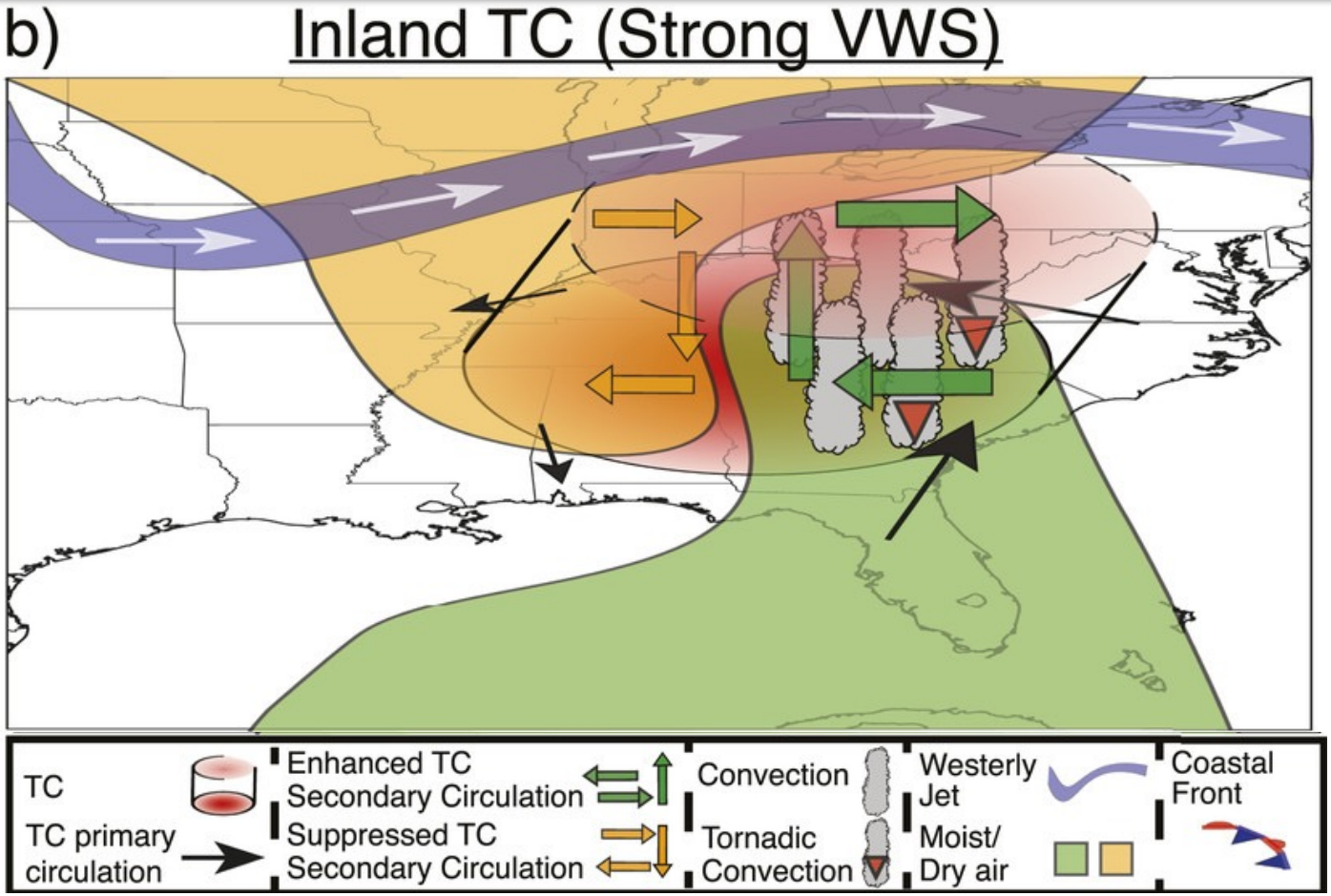

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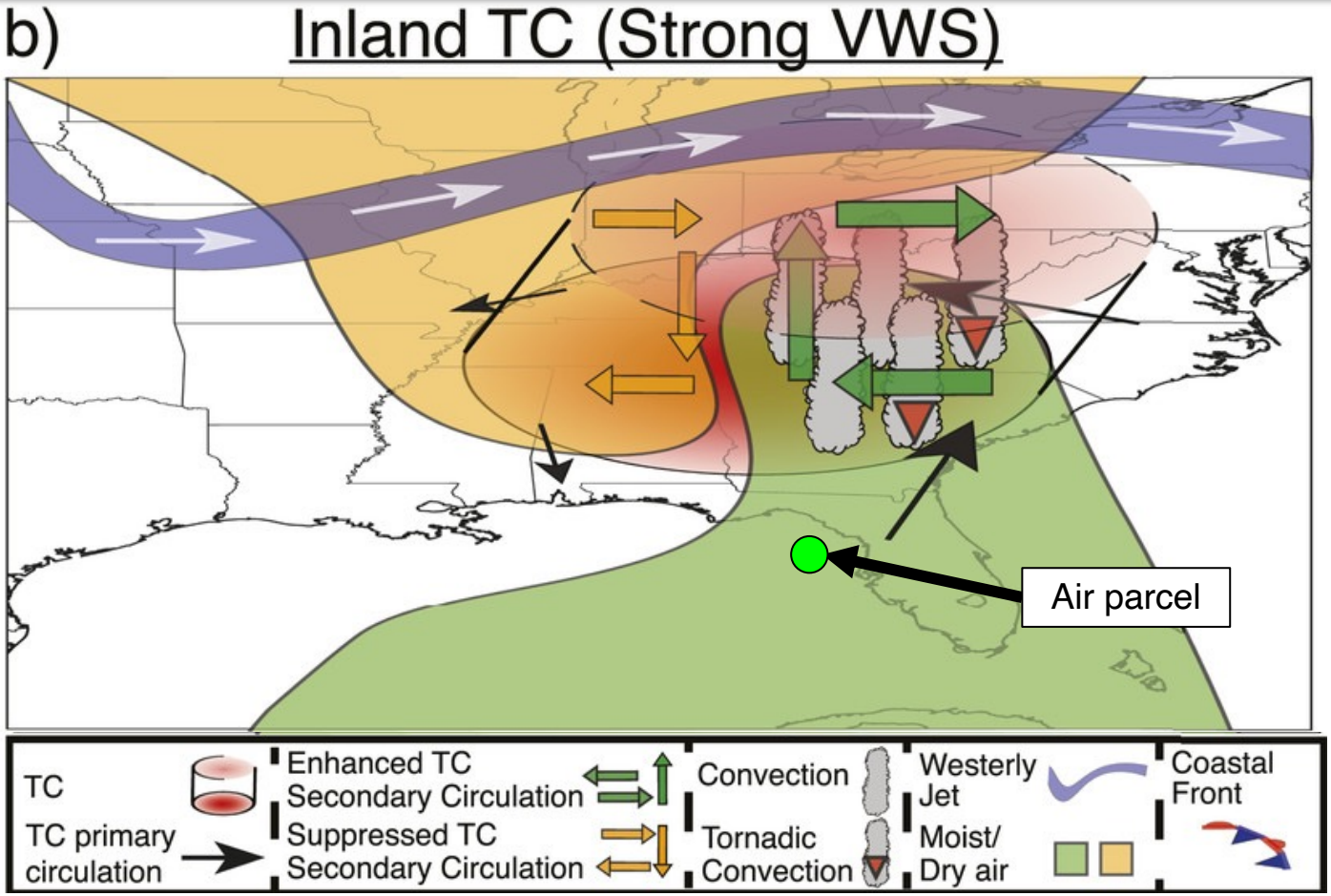

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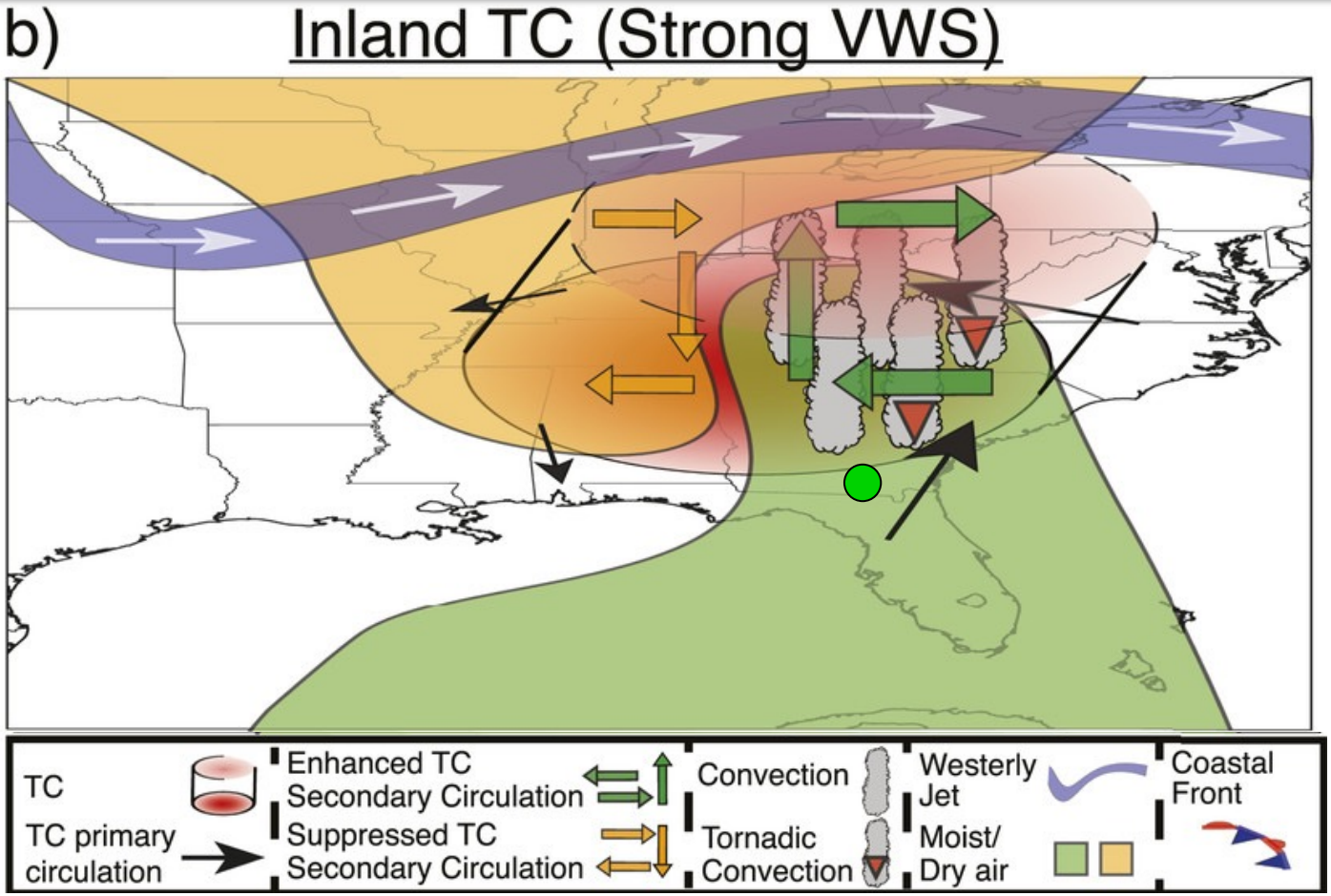

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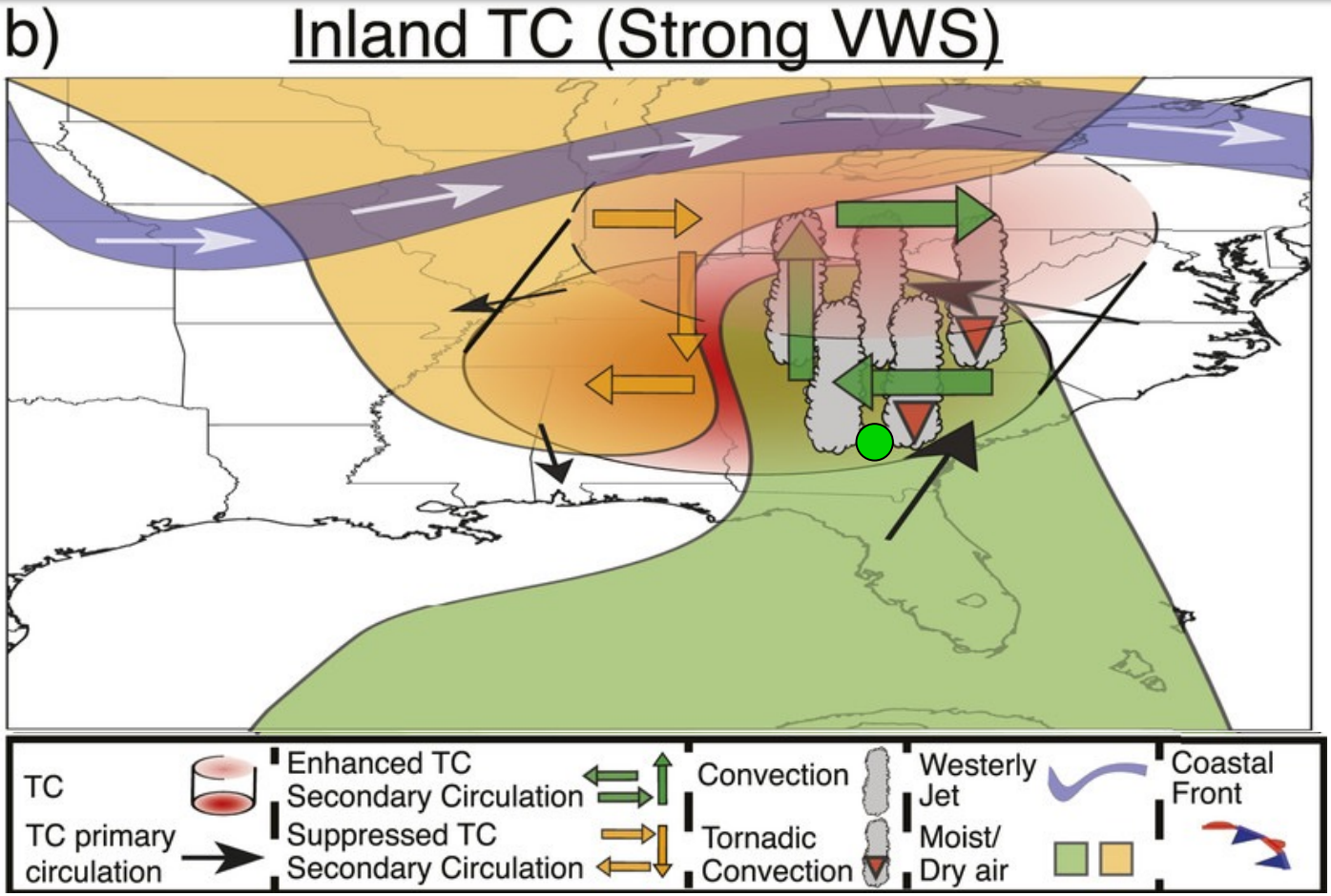

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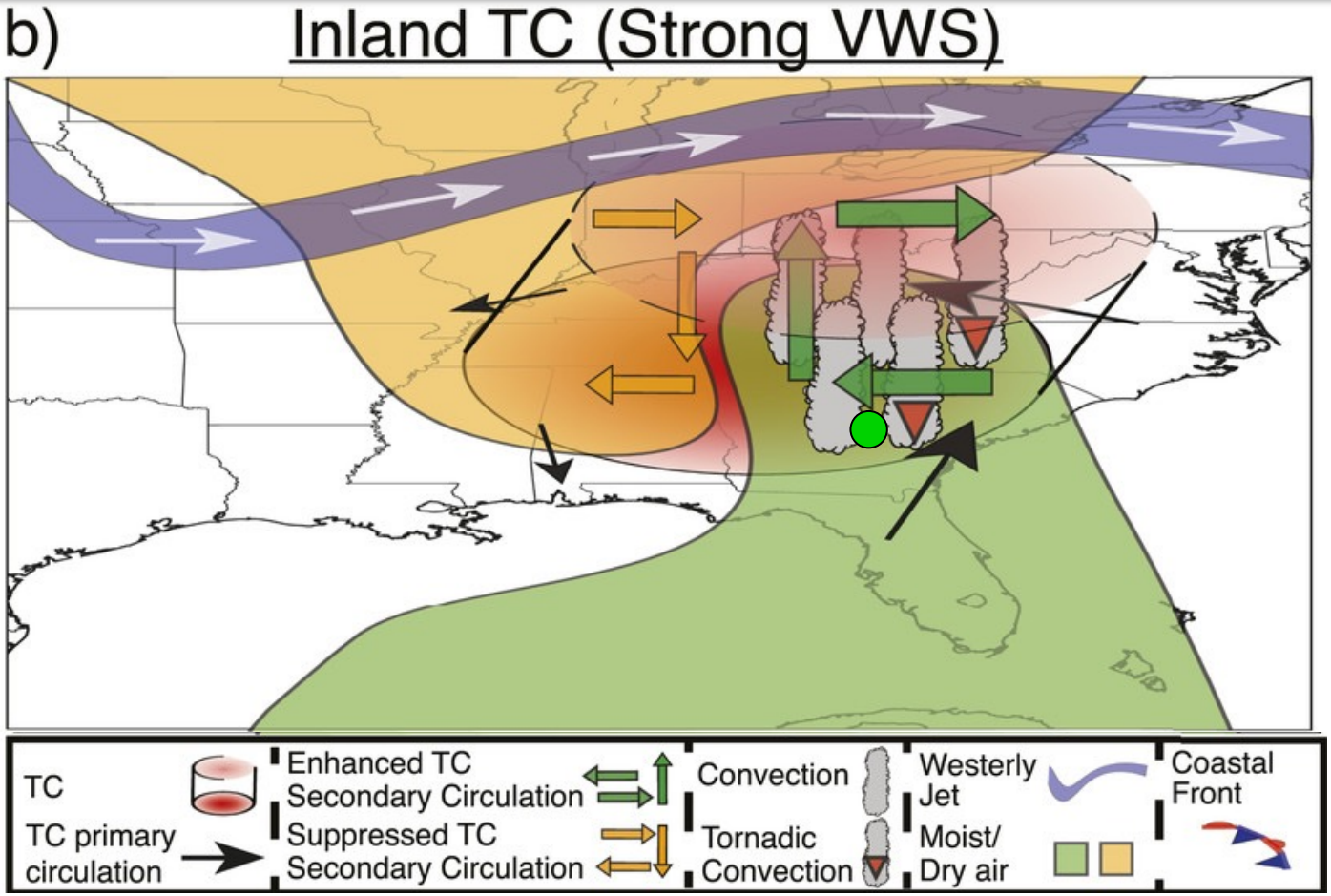

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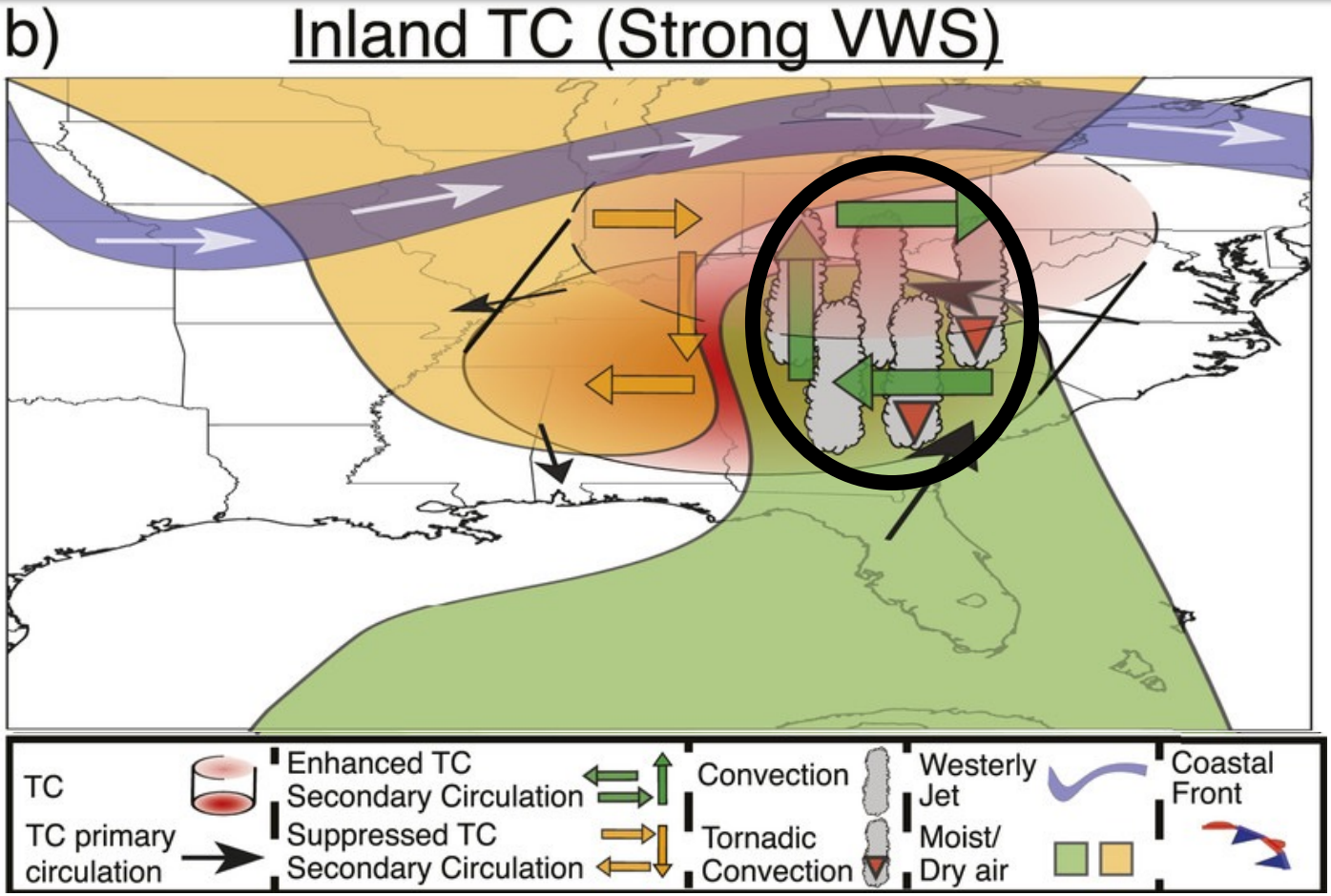

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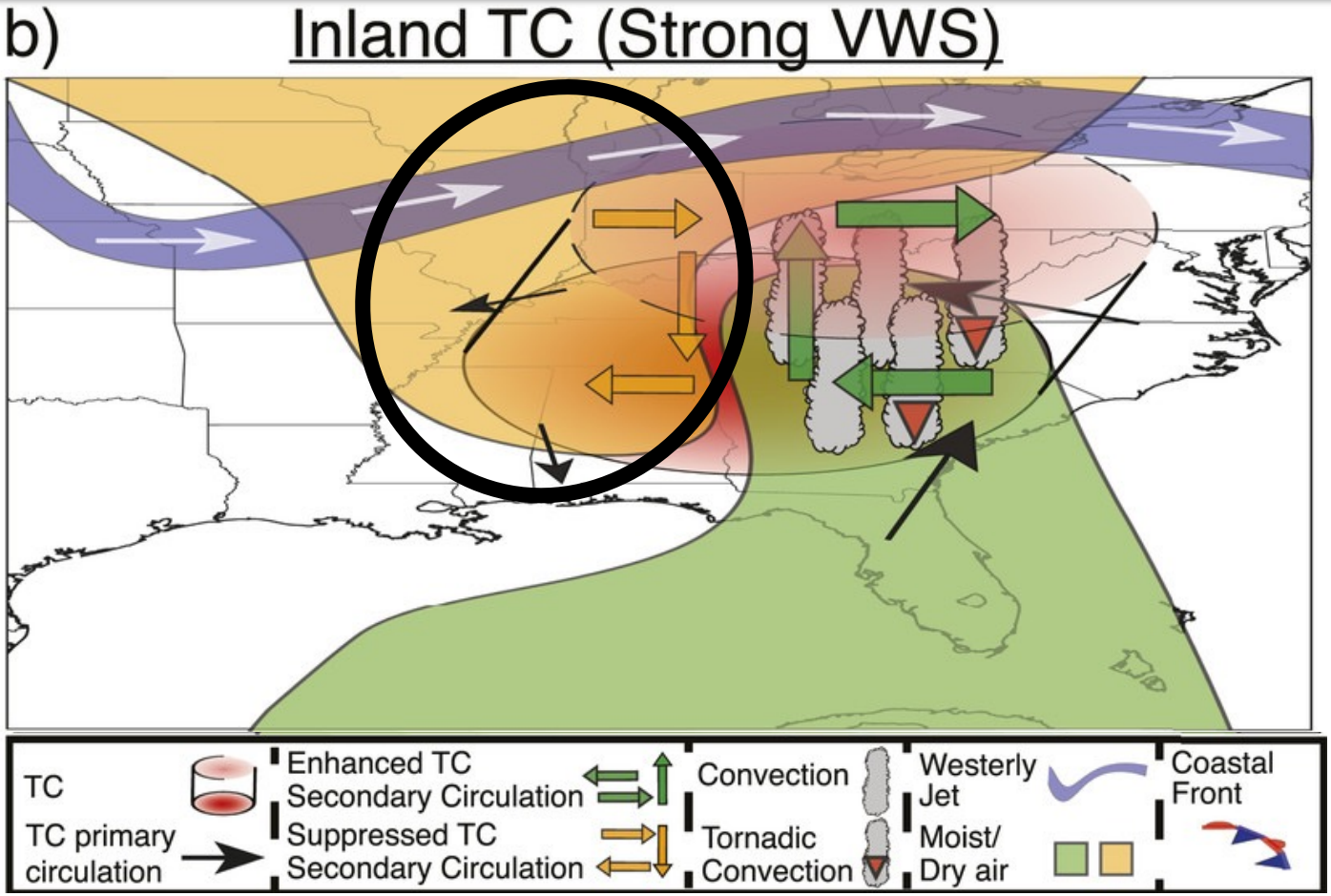

- Strong diurnal variability of inland tornadoes due to:
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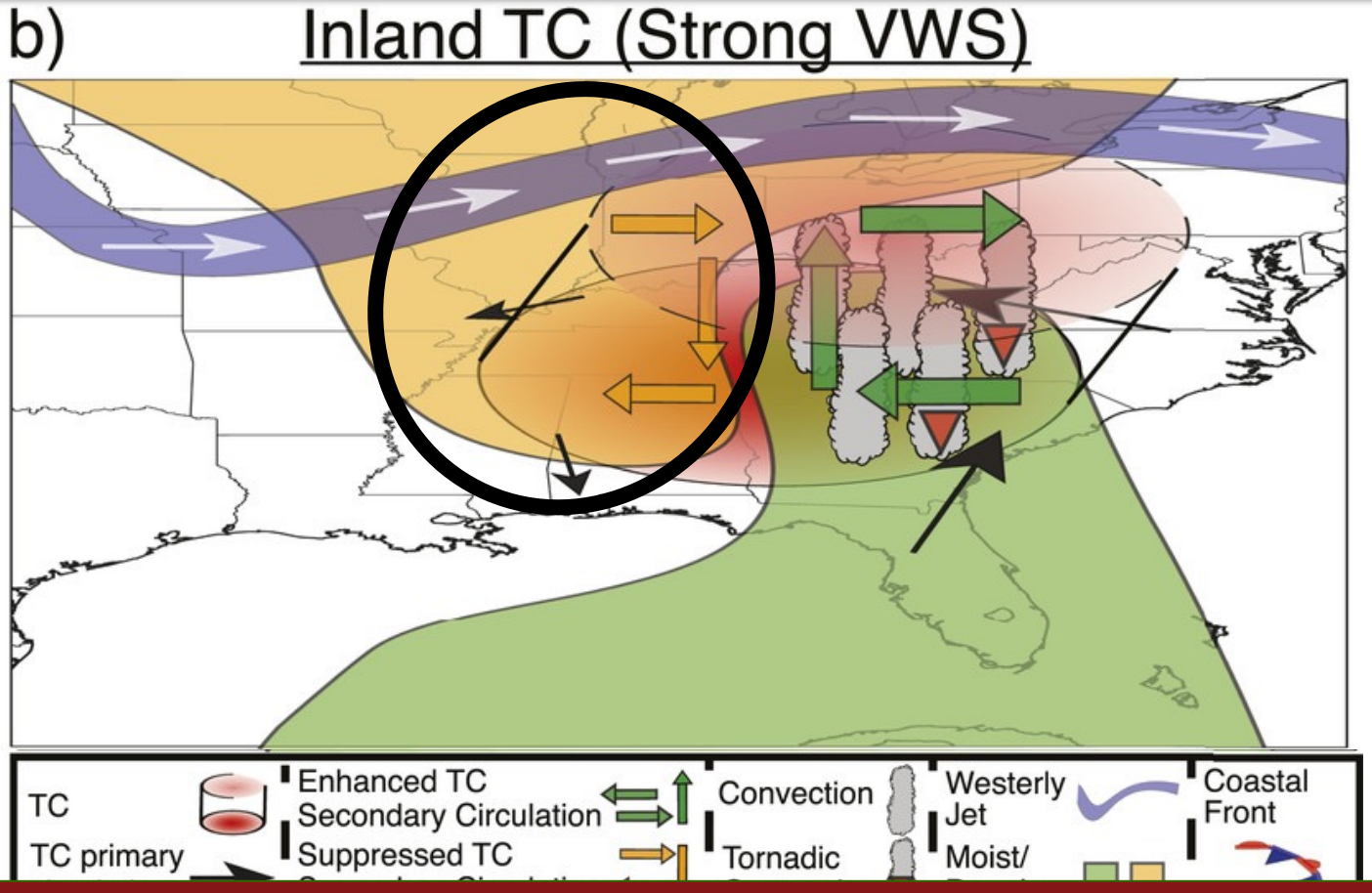

- How does the diurnal variability of tornadoes change as TCs move inland?

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  - NOAA Integrated Global Radiosonde Archive v2 for sondes within 75–500 km of TC center from 1995–2020 (N=5786 sondes, 259 TCs; Durre et al. 2006).

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- Analyze changes in the timing and location of tornadoes along with their convective-scale environments for inland, transition, and coastal regimes.

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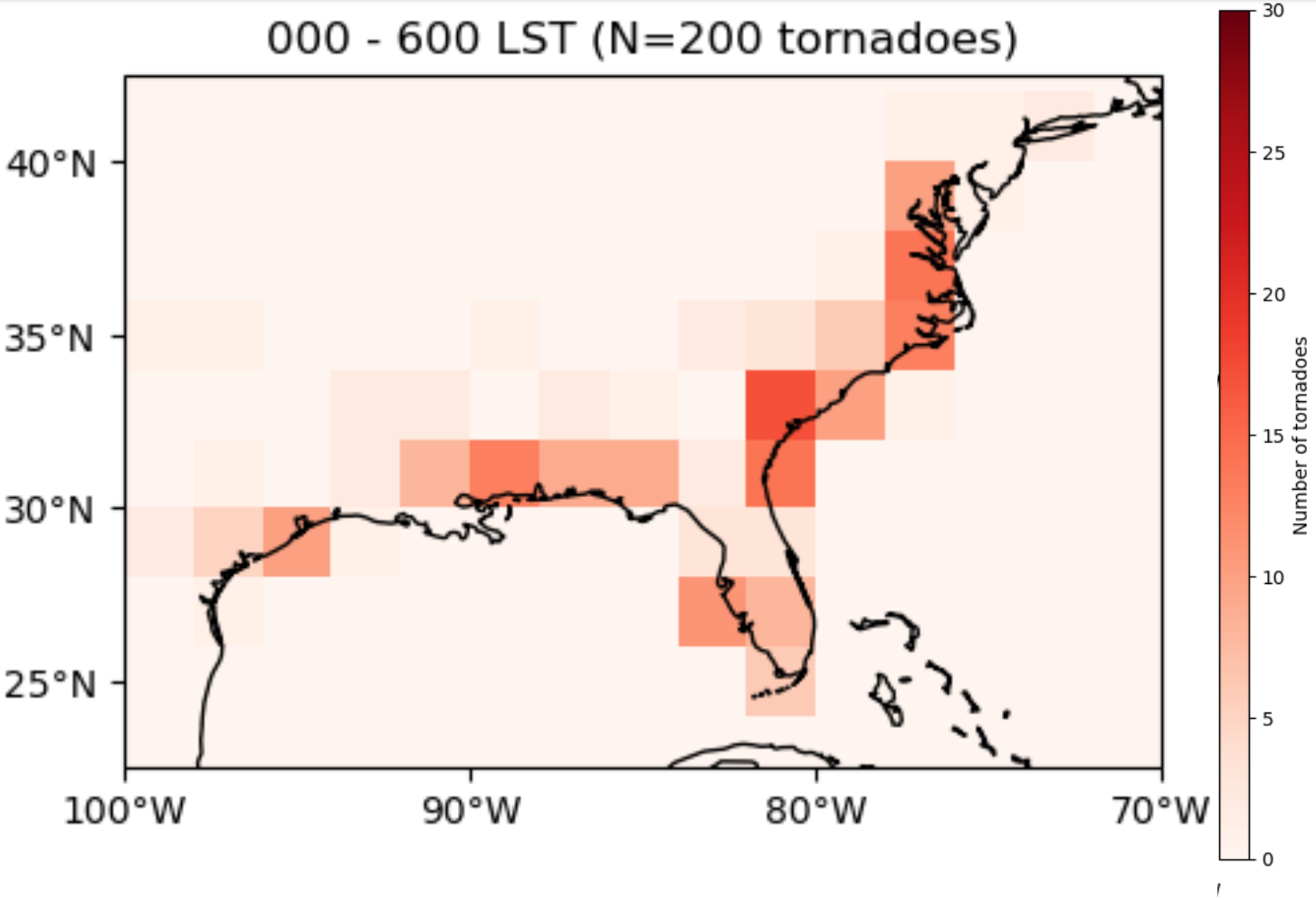

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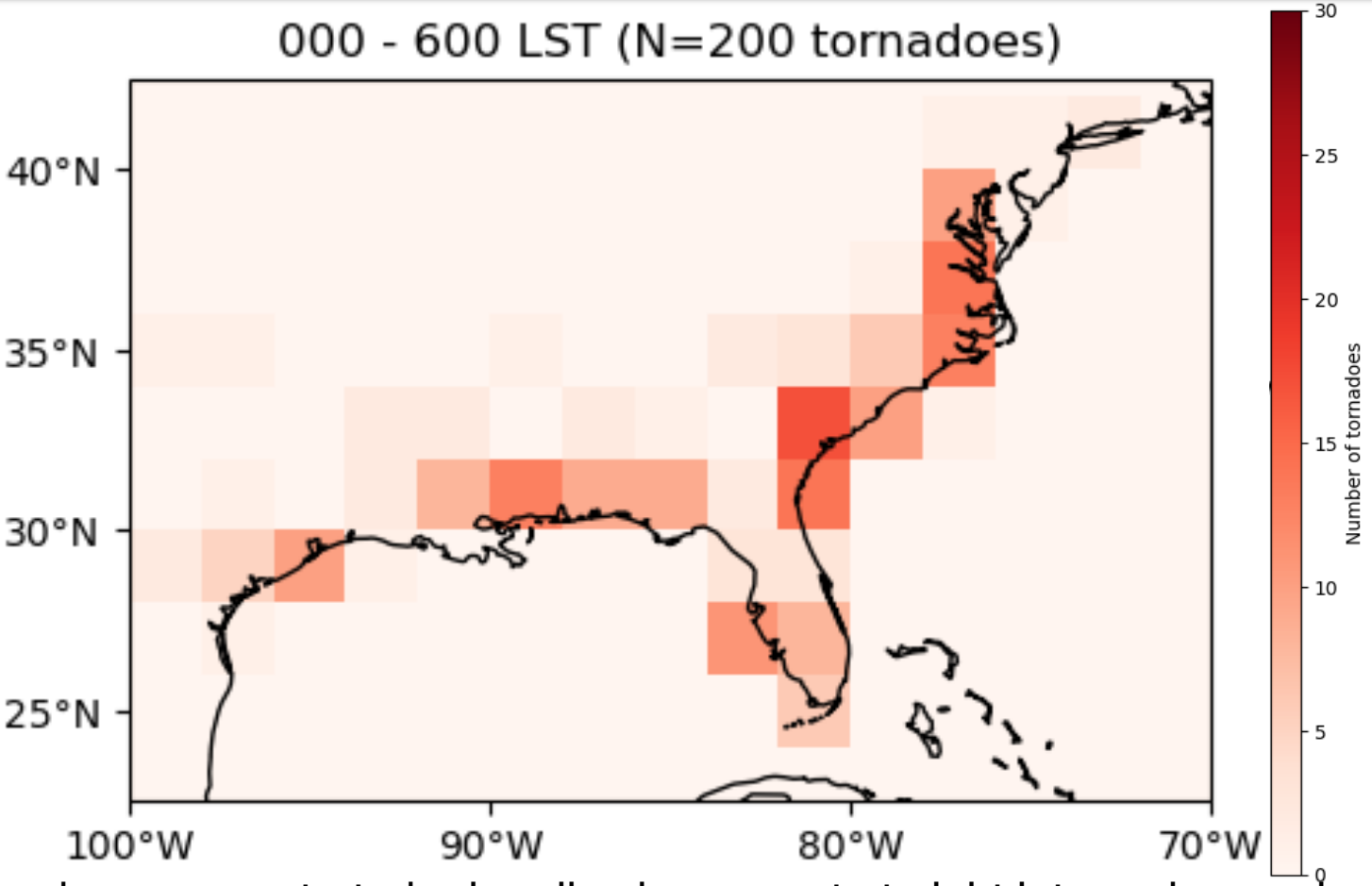

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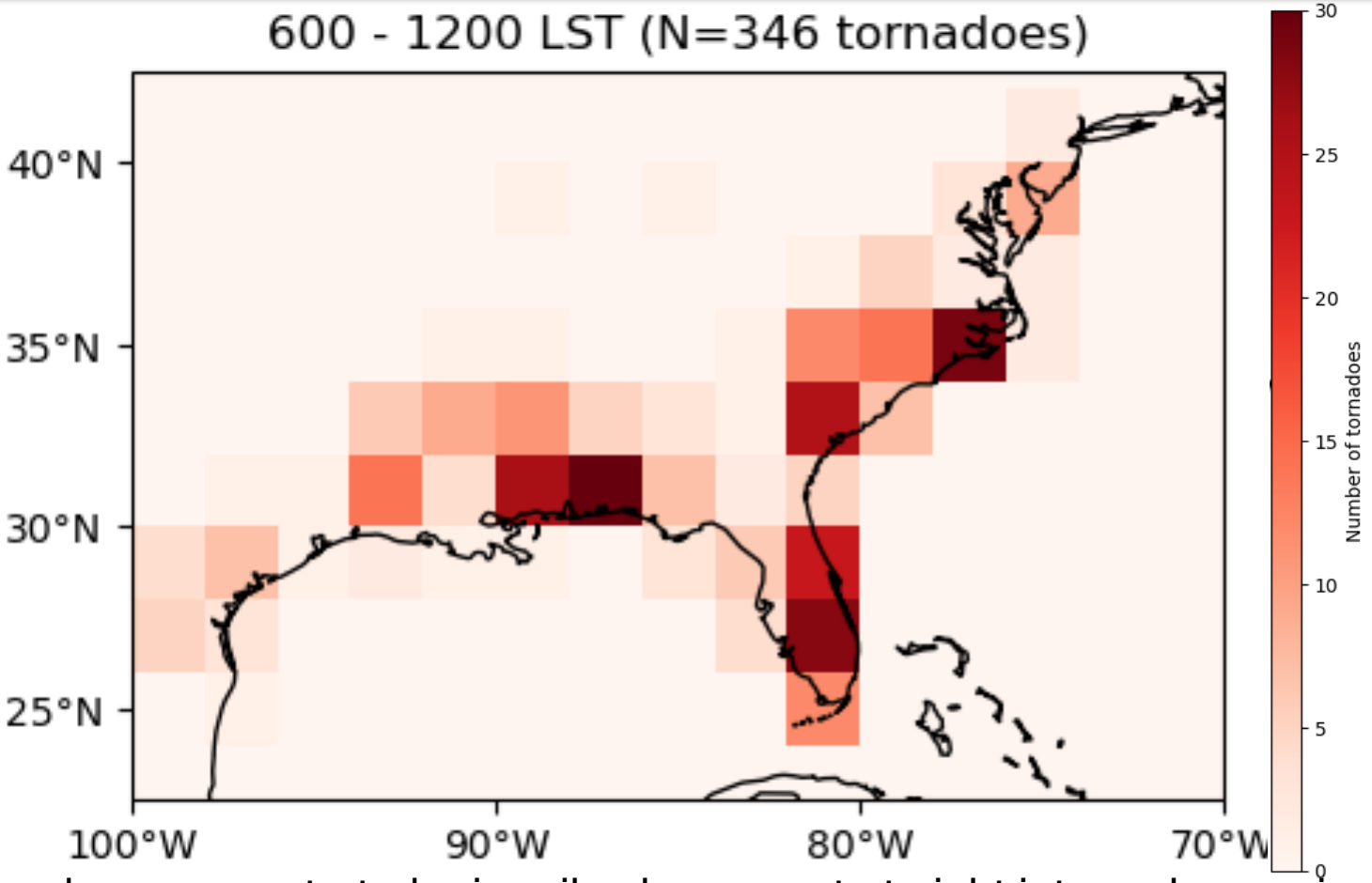

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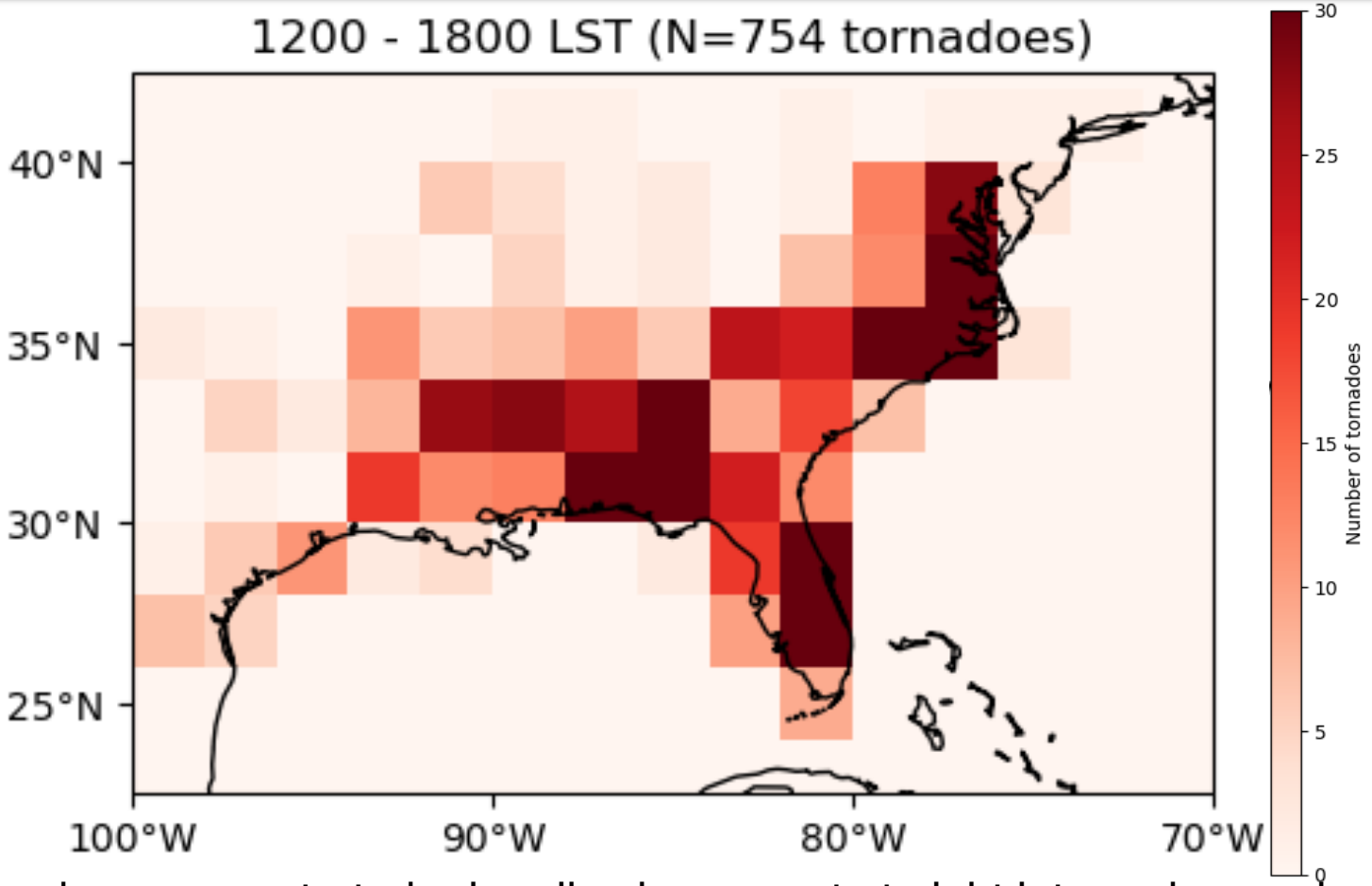

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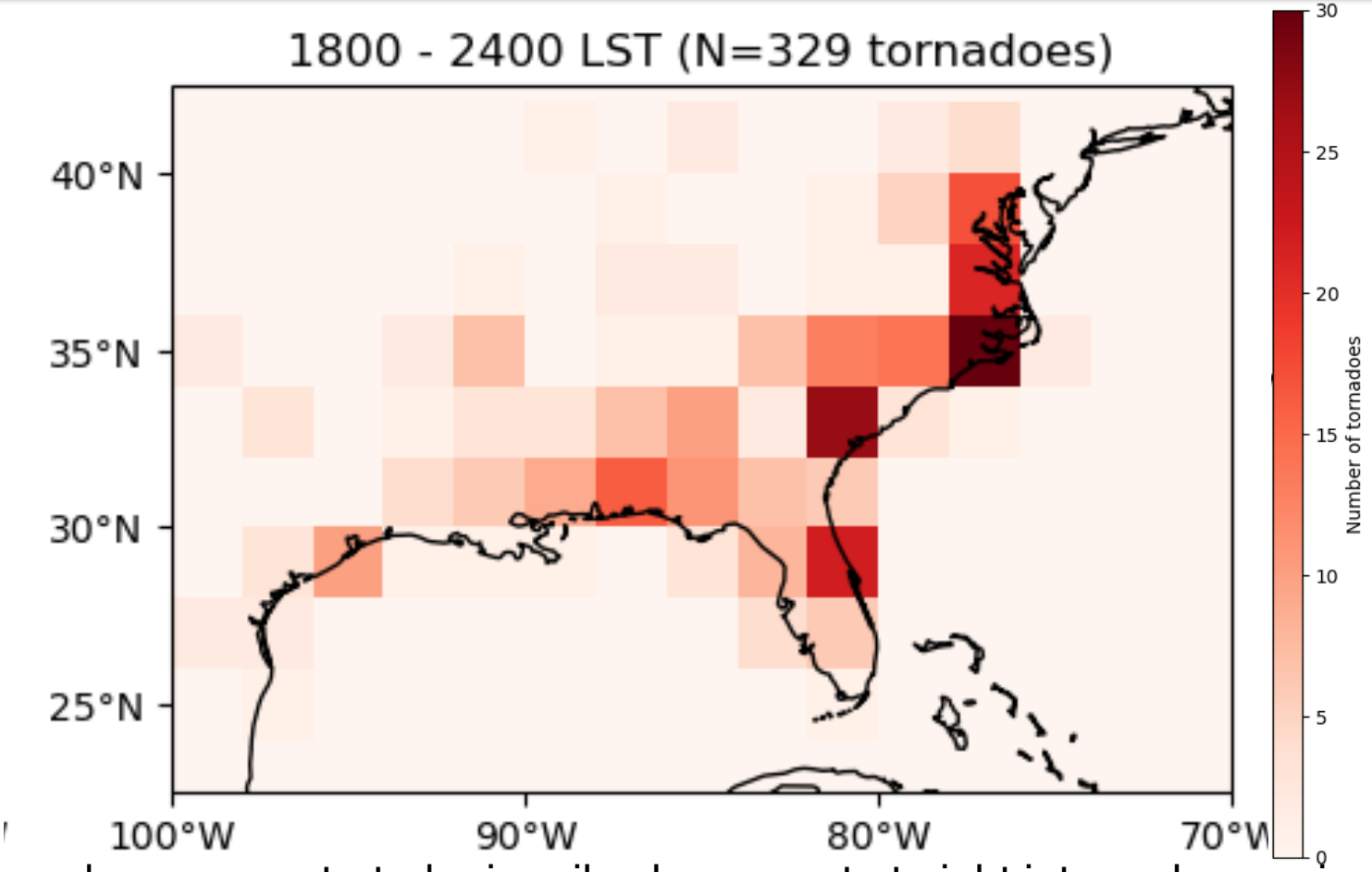

- Tornadoes concentrated primarily along coast at night into early morning;
- More tornadoes, especially inland, from late morning through early evening;
- Rapid reduction in tornadoes in evening into night.

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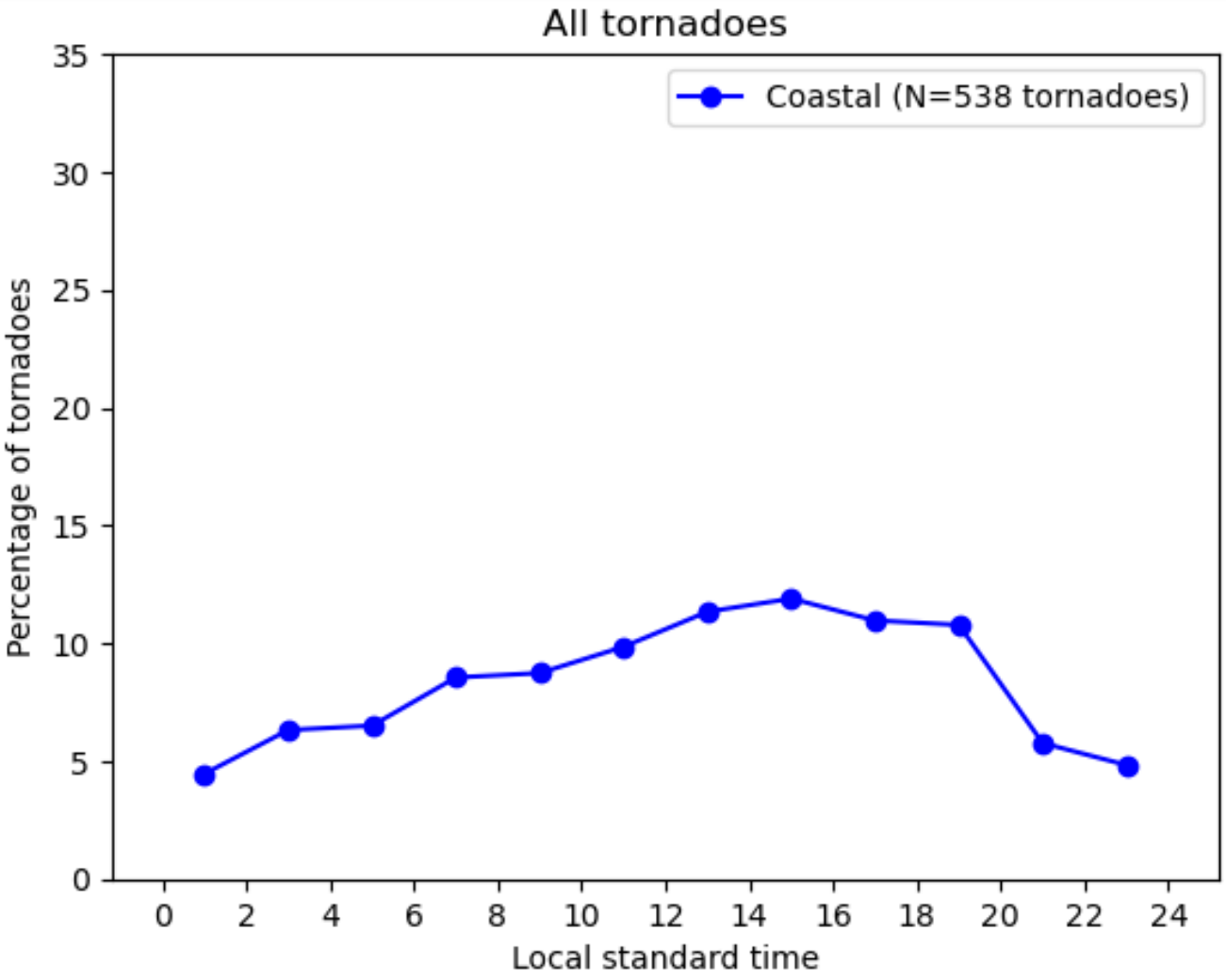

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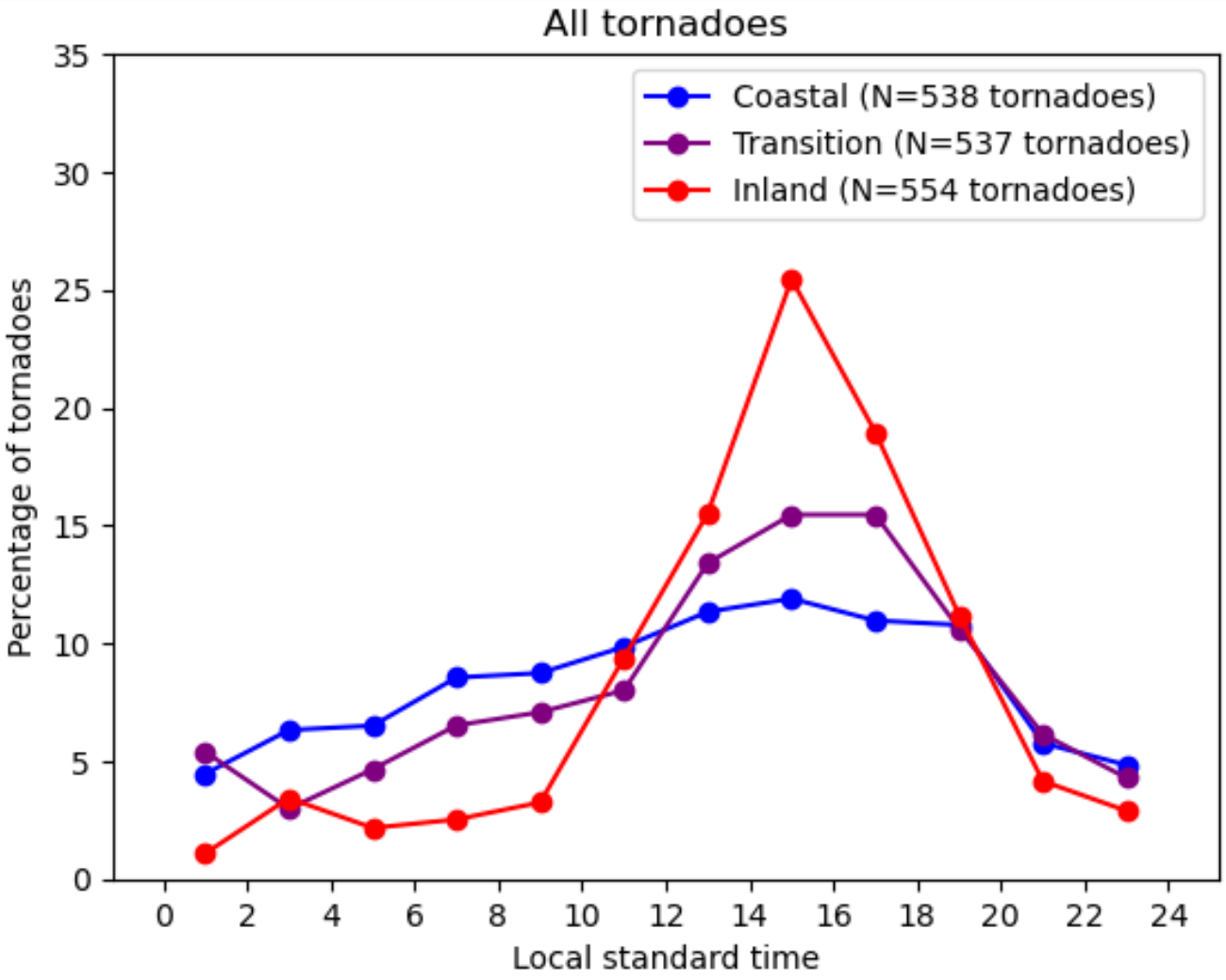

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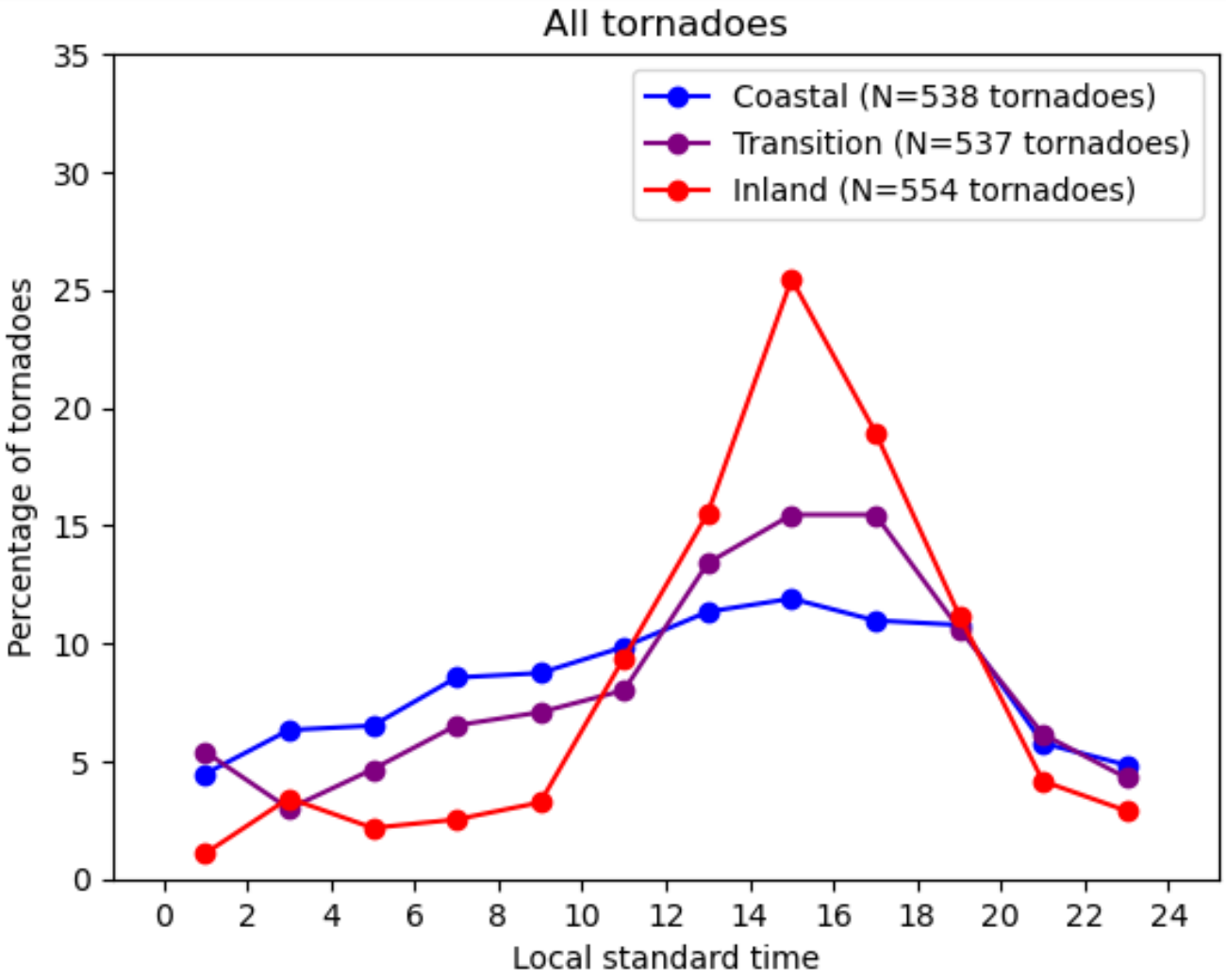

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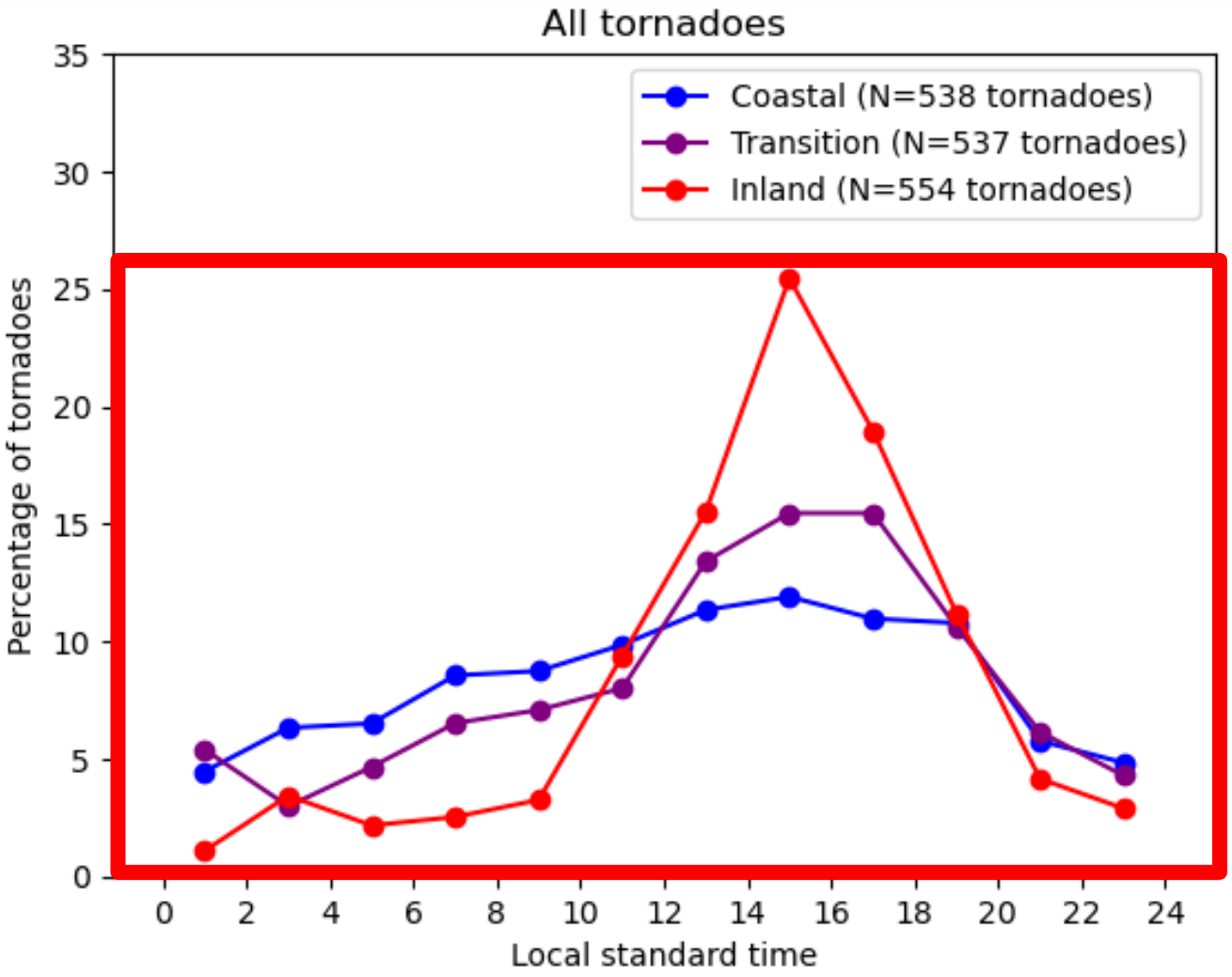

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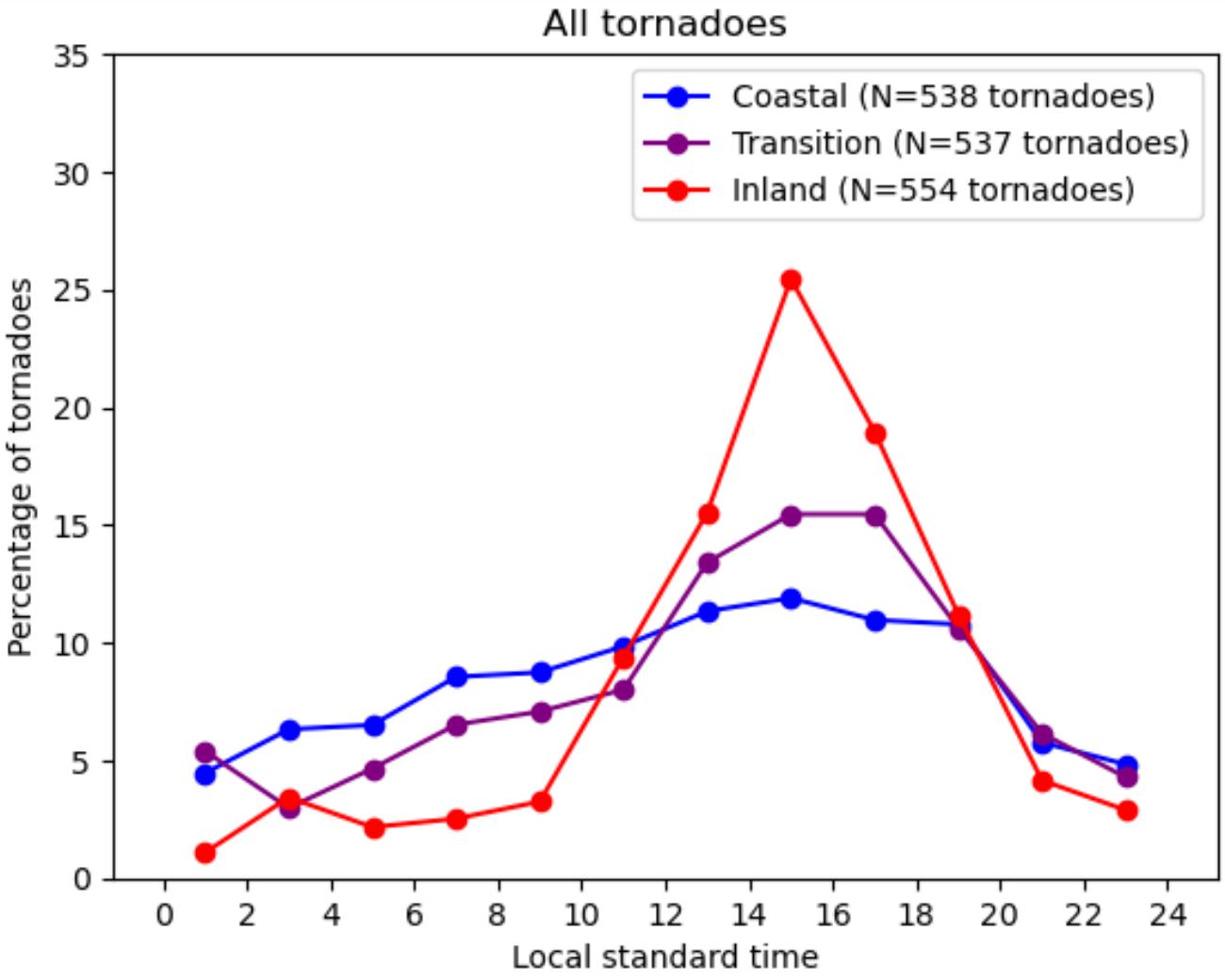

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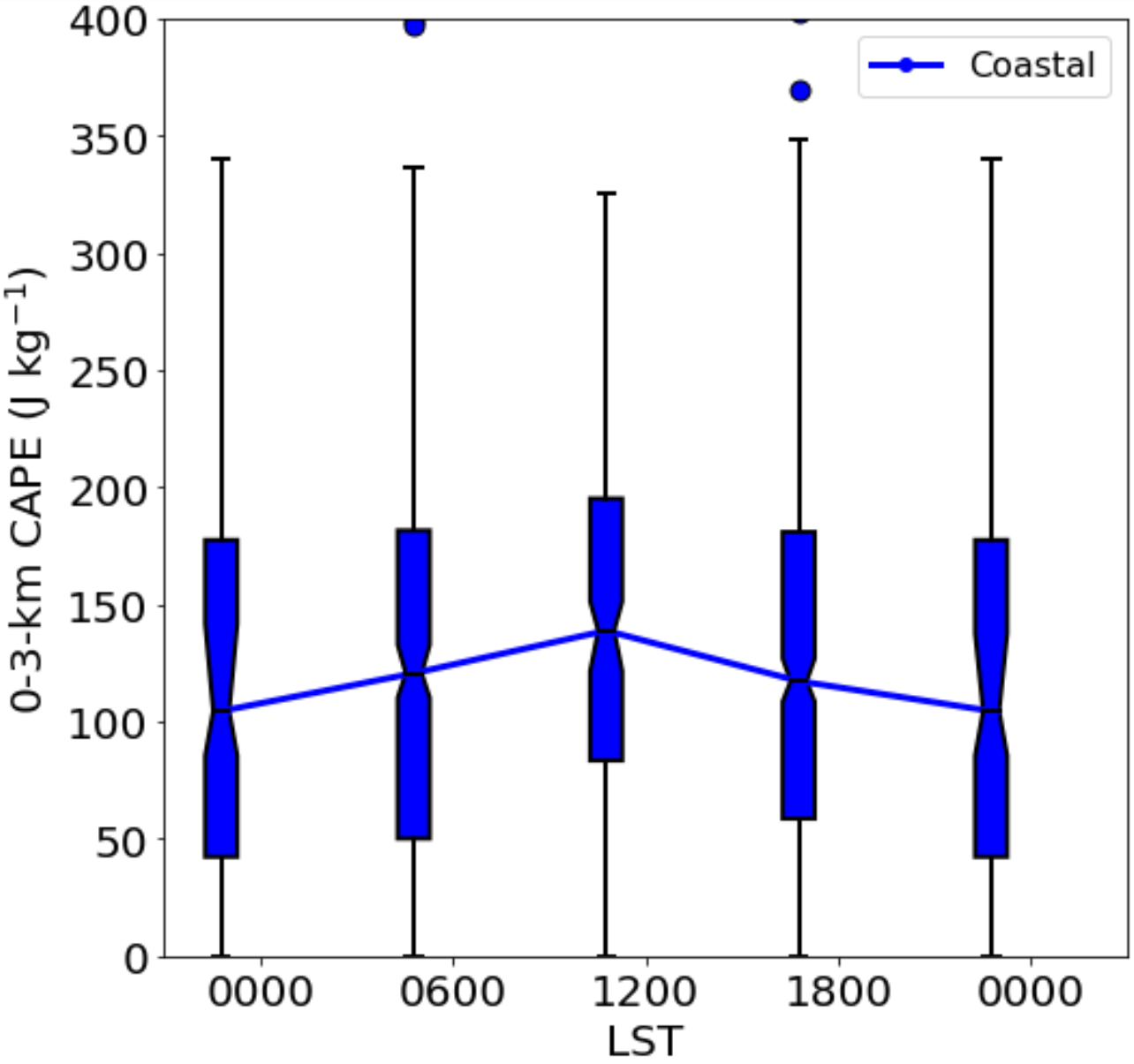
- Do convective-scale environments show similar diurnal variability?

Diurnal Variability of CAPE versus Coastal Distance



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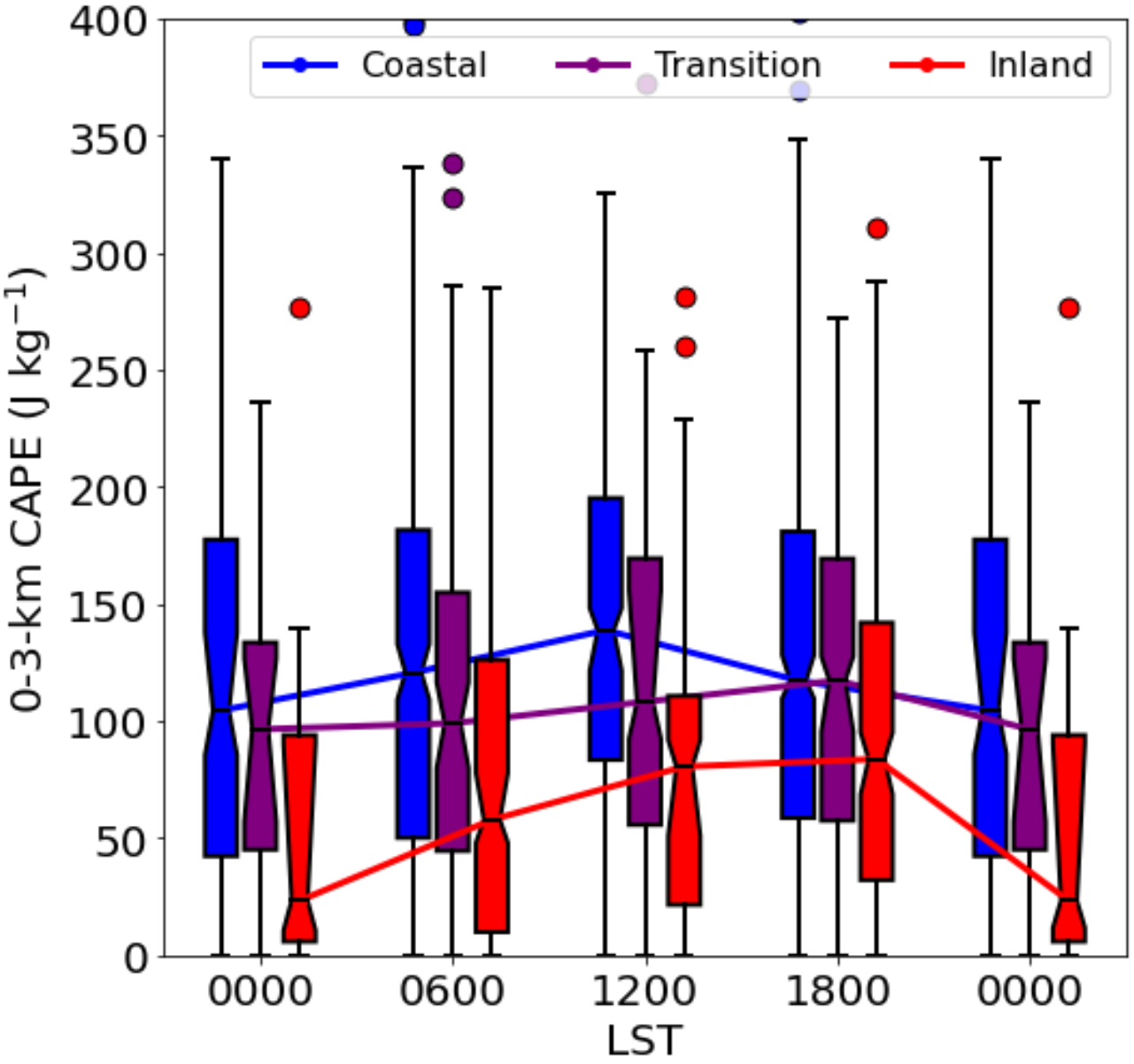

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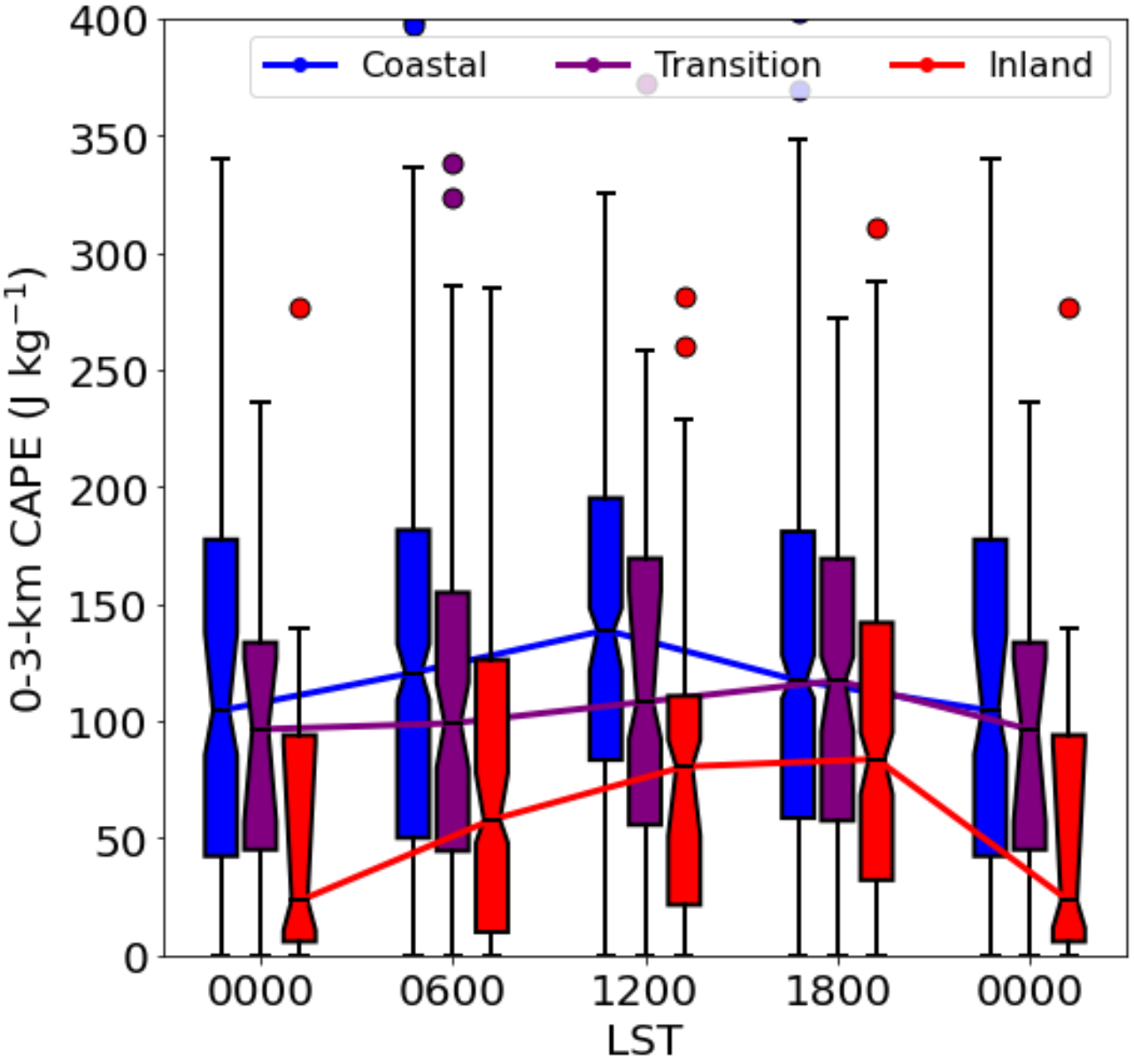

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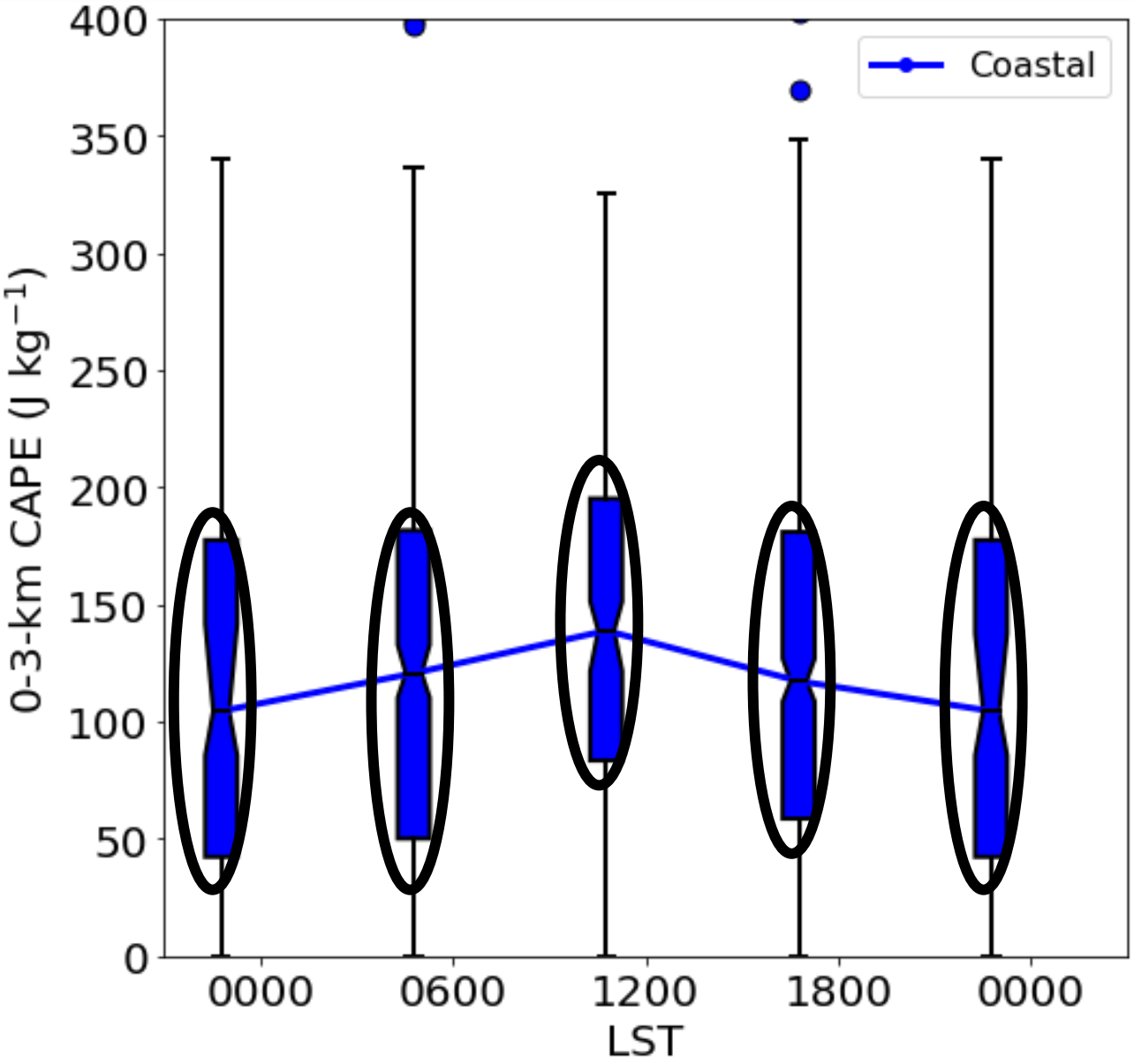

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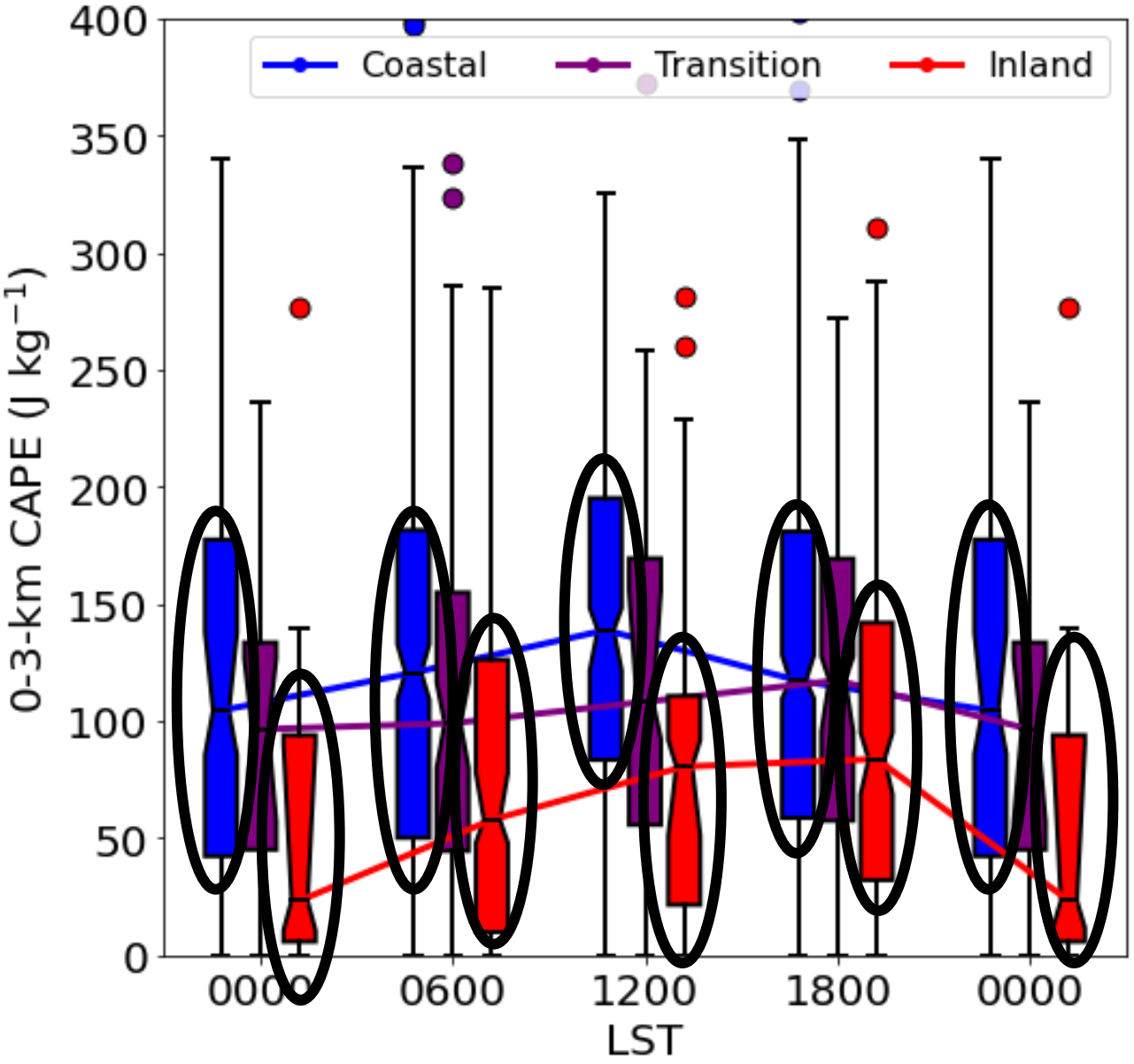

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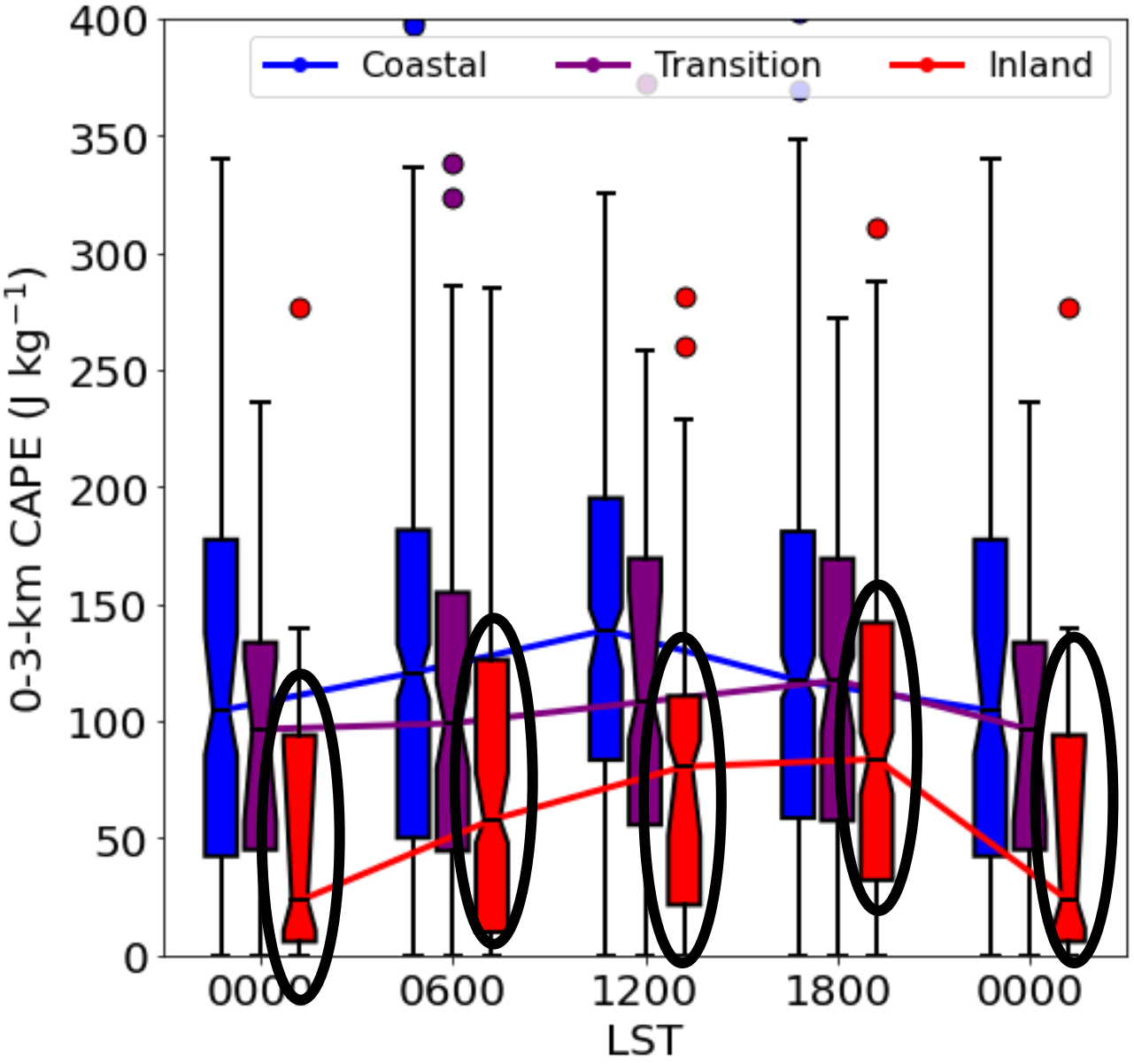

- Weak variability in CAPE at coast in TCs;
- Stronger diurnal variability in CAPE with distance from coast;
- Inland TC environments have marginal CAPE at night before becoming favorable for tornadoes in afternoon;

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  2. These differences are driven by stronger diurnal variability of CAPE in inland environments;
  3. Suggests diurnal variability driven by processes associated coastal proximity.