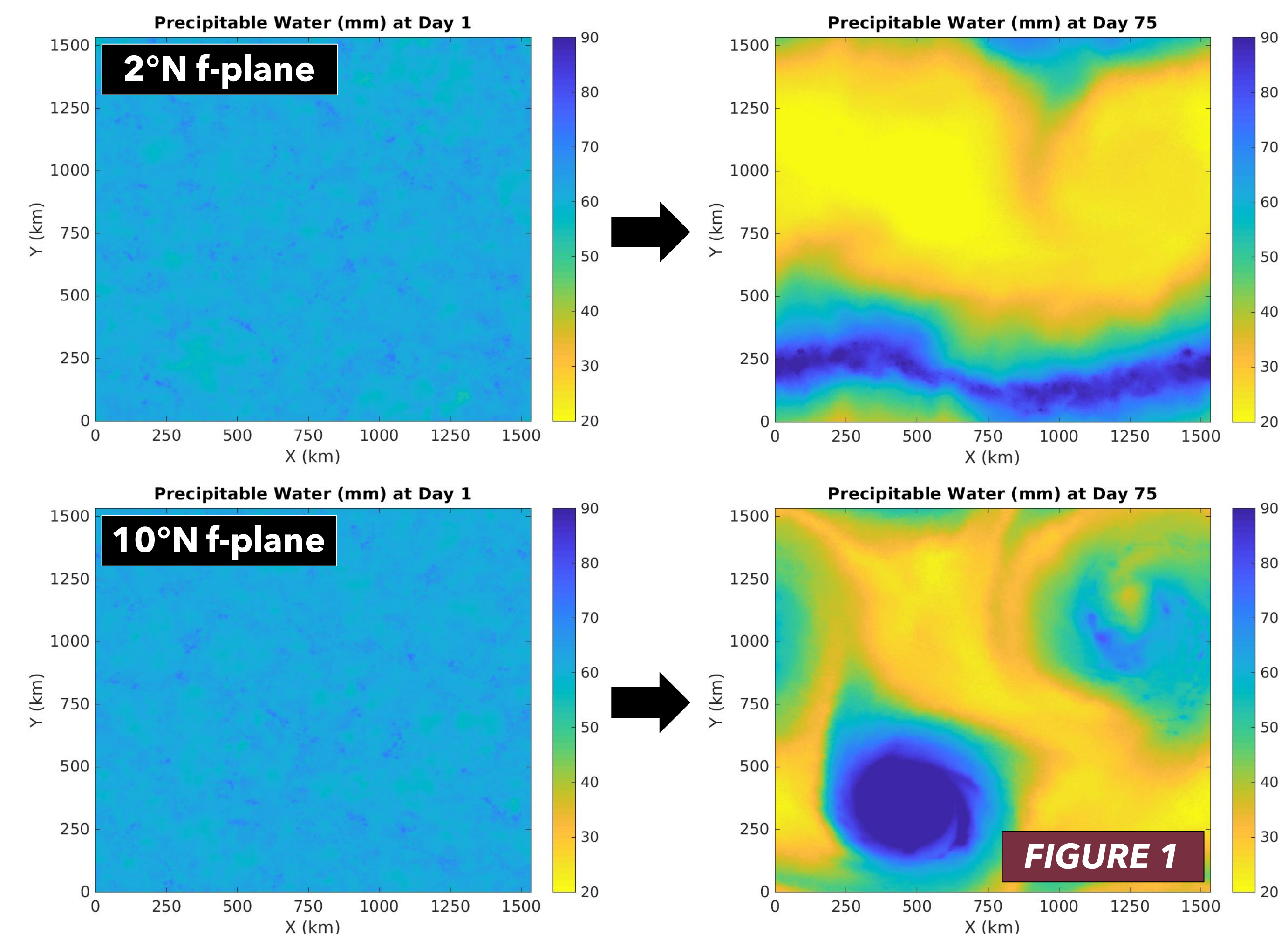


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MOTIVATION



Modes of organized convection, and the leading processes causing them, change with the background rotation in f-plane environments.

Can we describe this self-aggregation "spectrum" when a layer of complexity (β effect) is added?

SIMULATION DESIGN

System for Atmospheric Modeling (SAM) - Version 6.11.2

Near-Surface Temperature (K) at Day 0.04

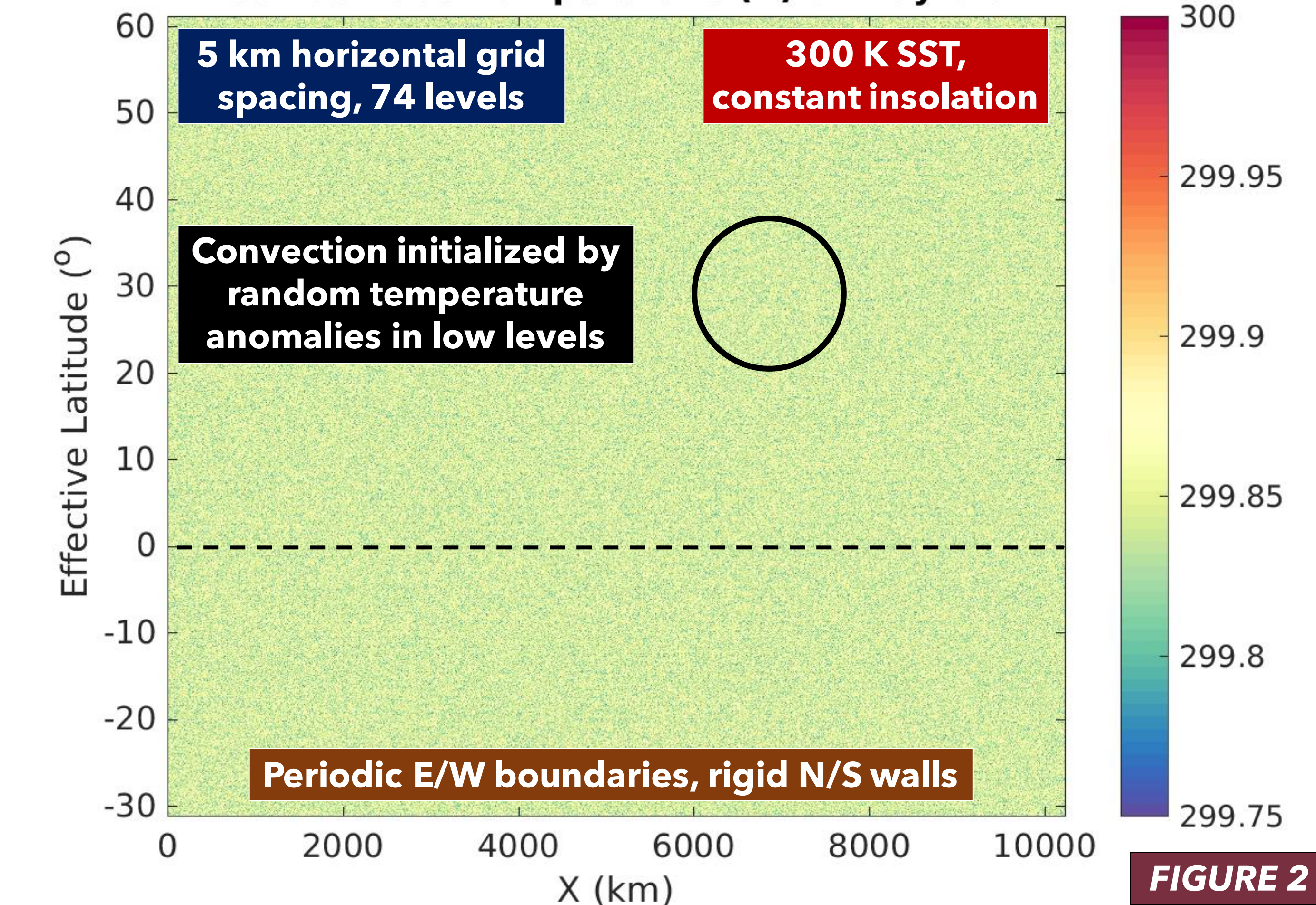


FIGURE 2

NAME	CENTER LAT.	MAGNITUDE OF β	EFFECTIVE LAT. RANGE
FULL15	15°N	Near-Real Earth (1)	30°S-60°N
HALF15	15°N	0.5	7.5°S-37.5°N
ENHD15	15°N	1.5	52.5°S-82.5°N
FULL45	45°N	1	0°-90°N
FULL00	0°	1	45°S-45°N

GENERAL SURVEY OF SELF-AGGREGATION

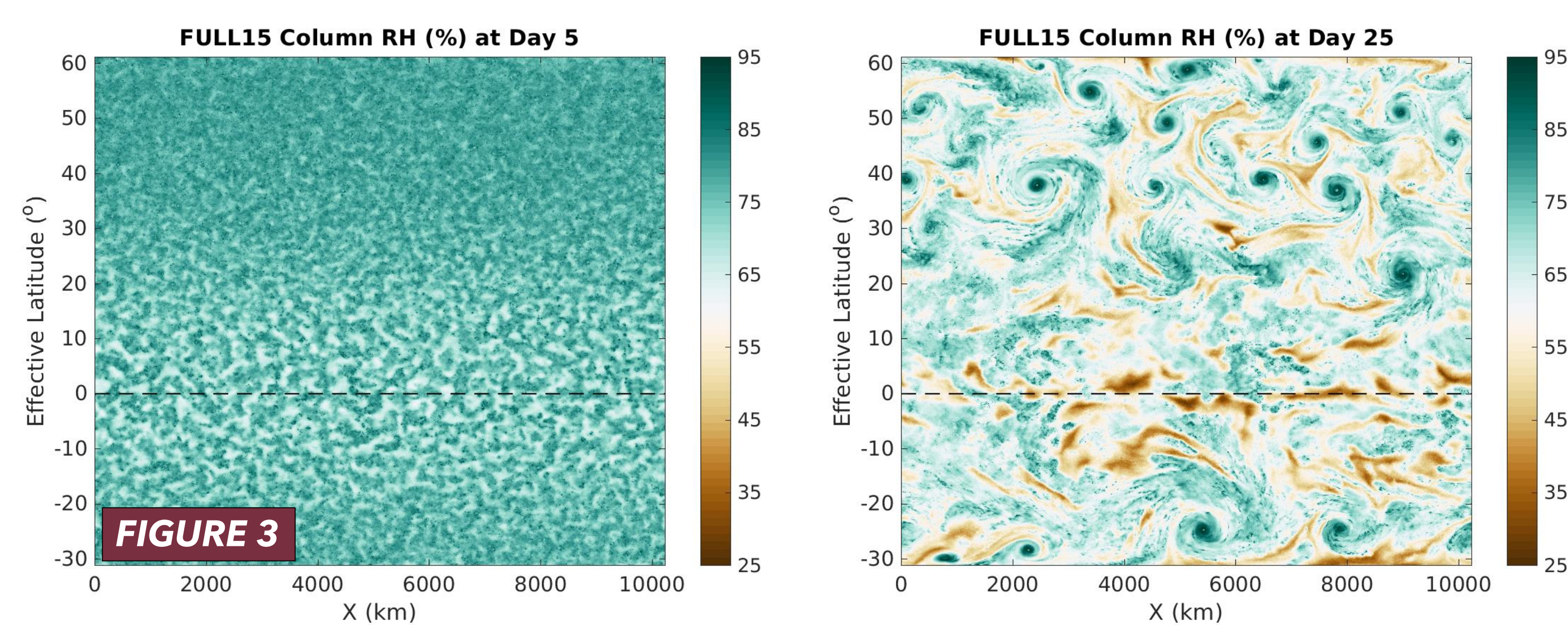
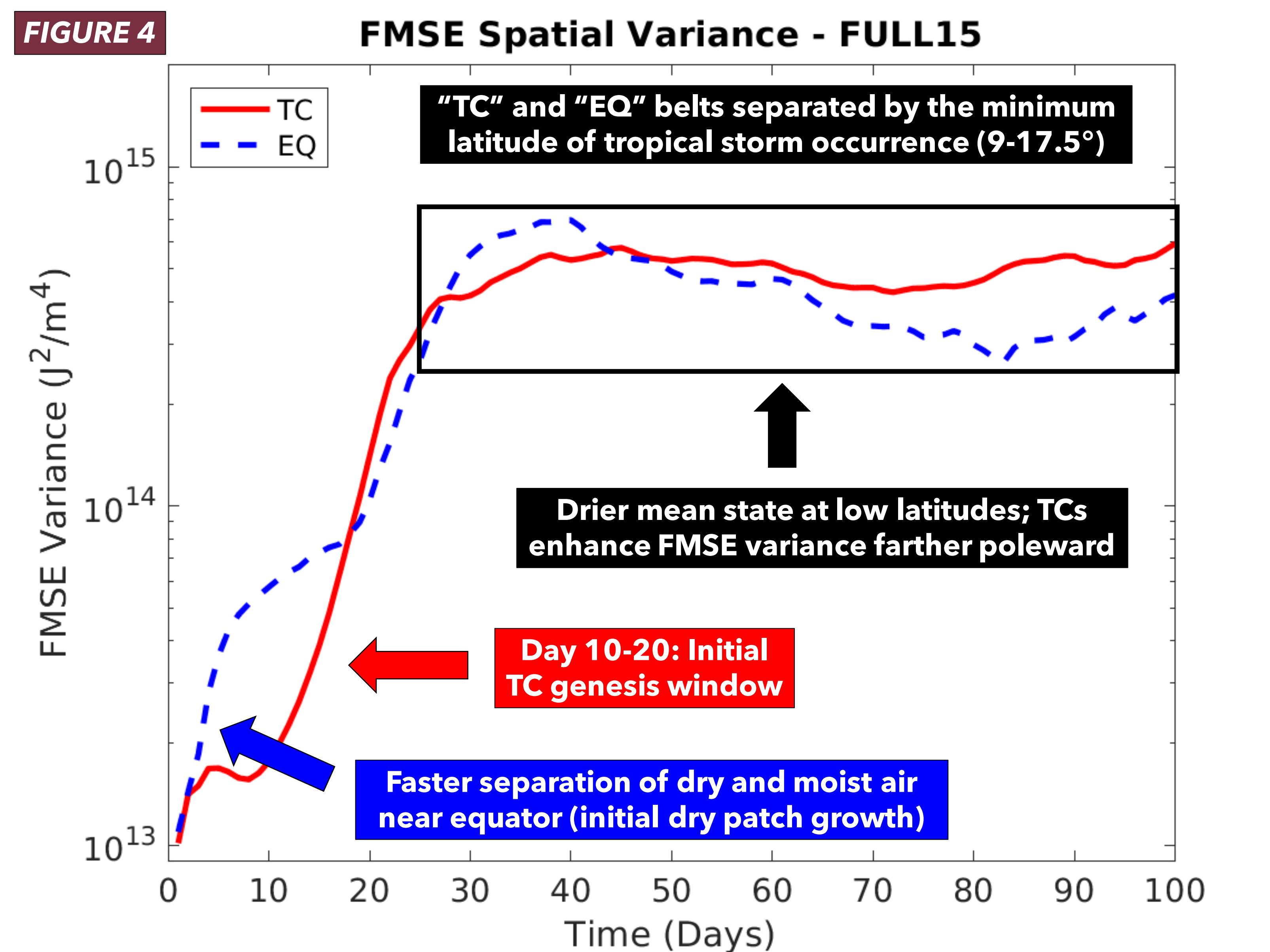
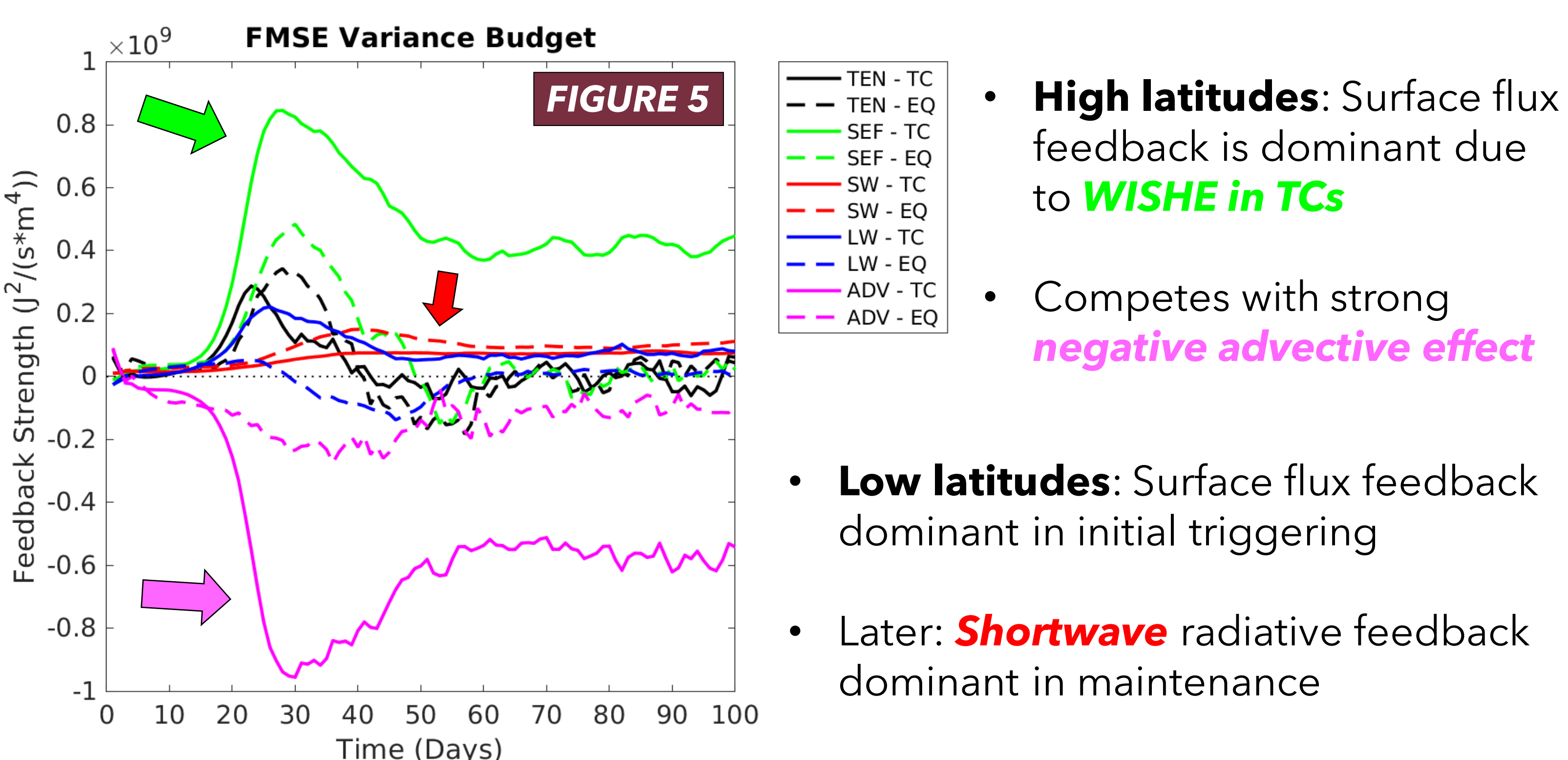


FIGURE 3



FMSE VARIANCE BUDGET: $\frac{1}{2} \frac{\partial \hat{h}'^2}{\partial t} = \hat{h}' SEF' + \hat{h}' NetSW' + \hat{h}' NetLW' - \hat{h}' \nabla_h \cdot \hat{u} \hat{h}$

Var. Tendency Surface Flux Shortwave Longwave Advective



2 regimes of organized convection emerge, driven by different processes: Equatorial waves and tropical cyclones.

LOW-LATITUDE MODES - WAVES

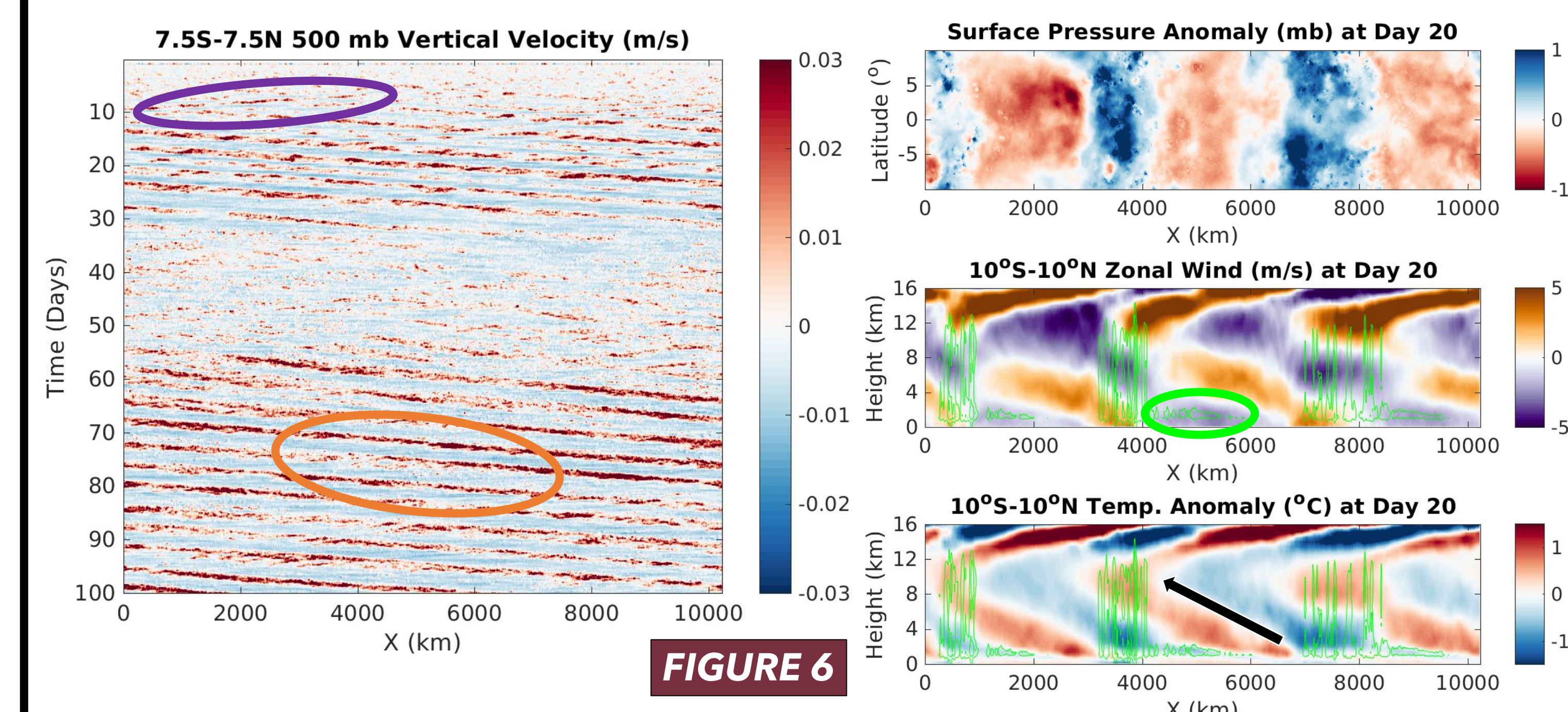


FIGURE 6

- Eastward-propagating **Kelvin** wave mode is dominant, with a less prominent westward **equatorial Rossby** wave mode
- Westward slope of equatorial zonal wind, temperature, pressure anomalies w/ height \rightarrow **classic Kelvin wave vertical structure**
- Convectively-active phase led by **layer of shallow clouds** \rightarrow similar to overturning circulation associated w/ "low-f" self-aggregation

HIGH-LATITUDE MODES - TROPICAL CYCLONES

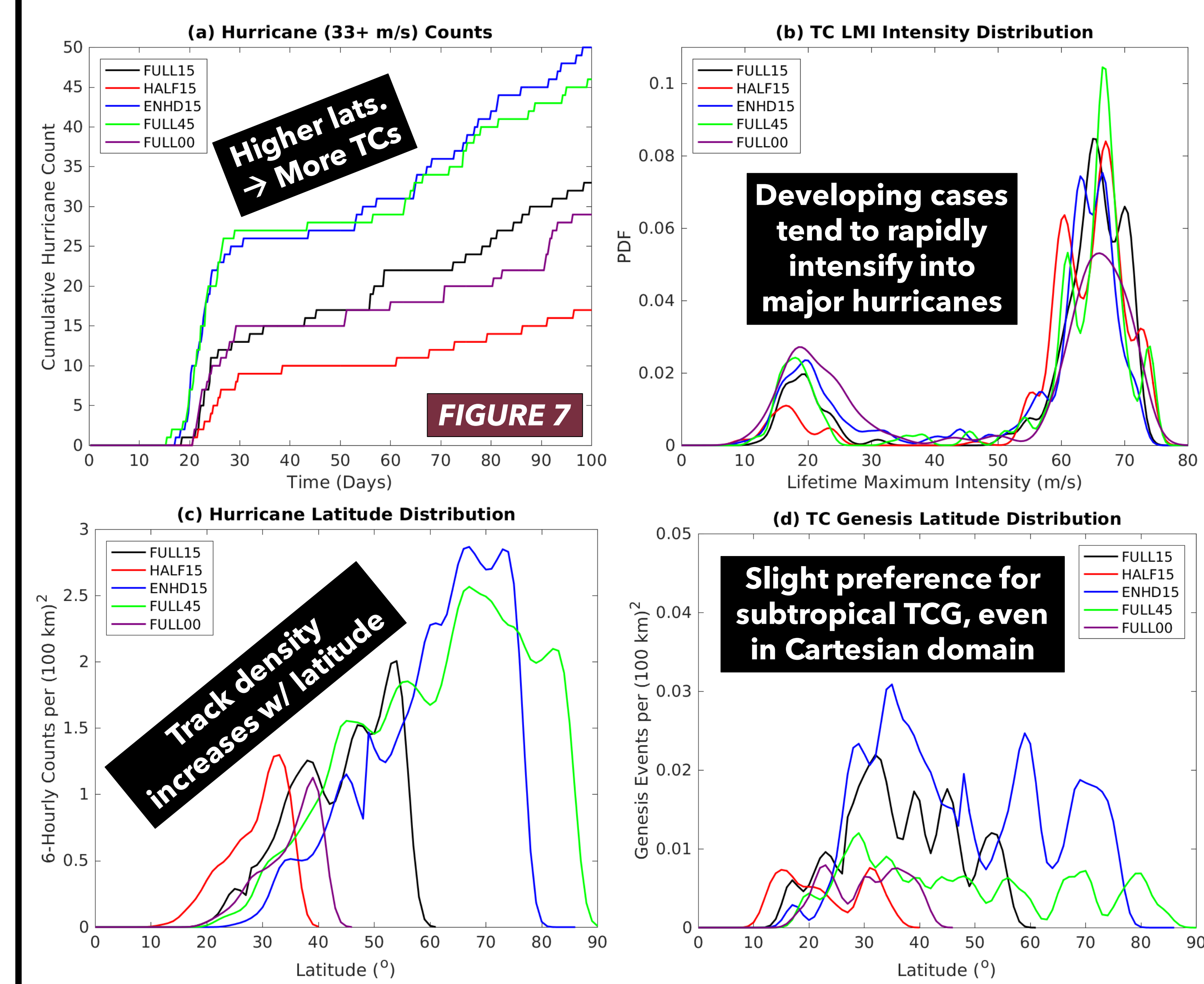


FIGURE 7

There's much more to be explored! These idealized simulations can be used to study Kelvin wave amplification, Kelvin wave-TC interactions, controls on TC size/frequency/rapid intensification, and more.

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