# Assessing the Central US summer mesoscale convection signal in observations and across several versions of SP(CAM) using a Wheeler-Hendon type index

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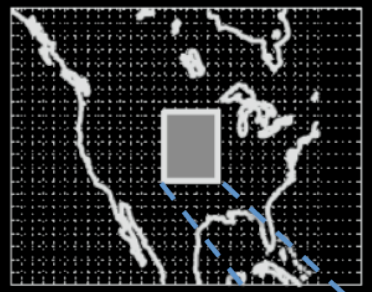
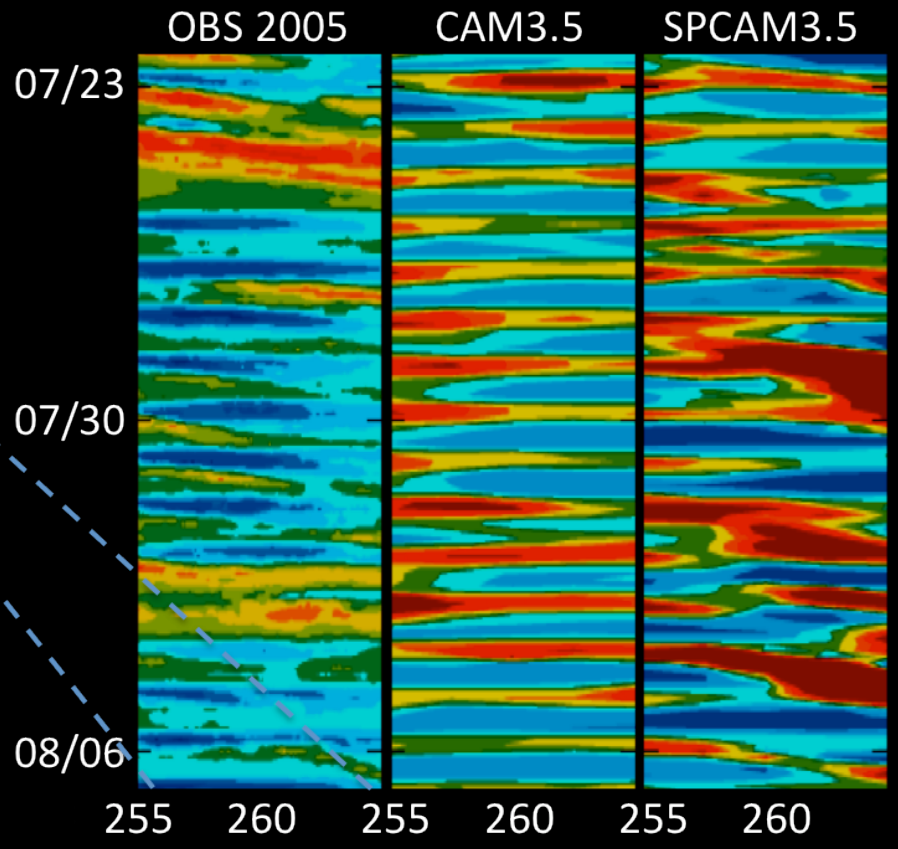
# Unanswered questions about the propagating summer central US convection in the MMF.






1. Does it exist in other versions of SPCAM other than MMF3.5 FV?
2. How realistic is the signal beyond just existing?

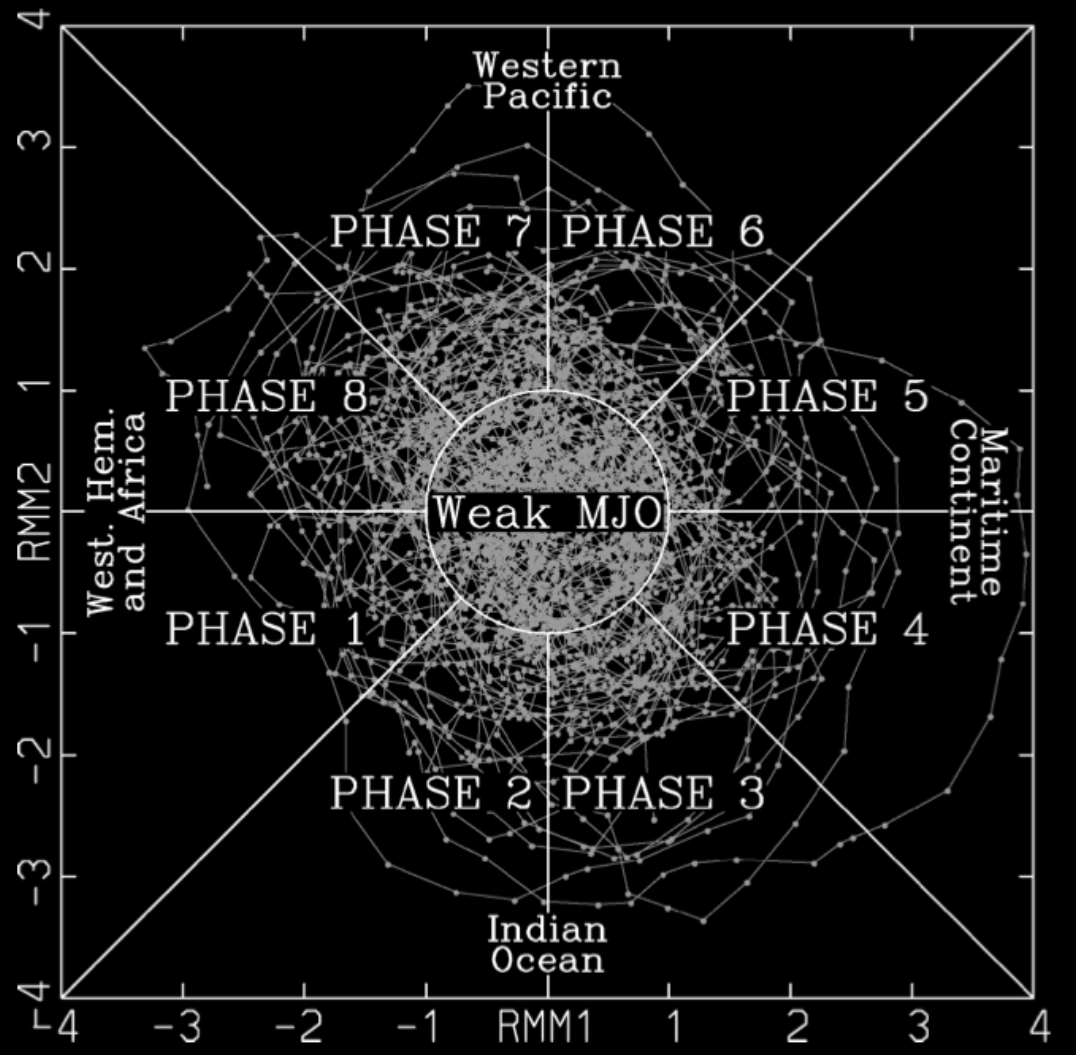
Pritchard et al. 2011

# Roadmap

- Why a Wheeler and Hendon type index for central US mesoscale convection?
- Developing the index from observations - NASA LaRC/ GEWEX SRB longwave cloud forcing.
- Applying the index across several versions of SP(CAM).
- Evaluating the timing and signature of composite events.
- Compositing variables of interest by phase of propagation.

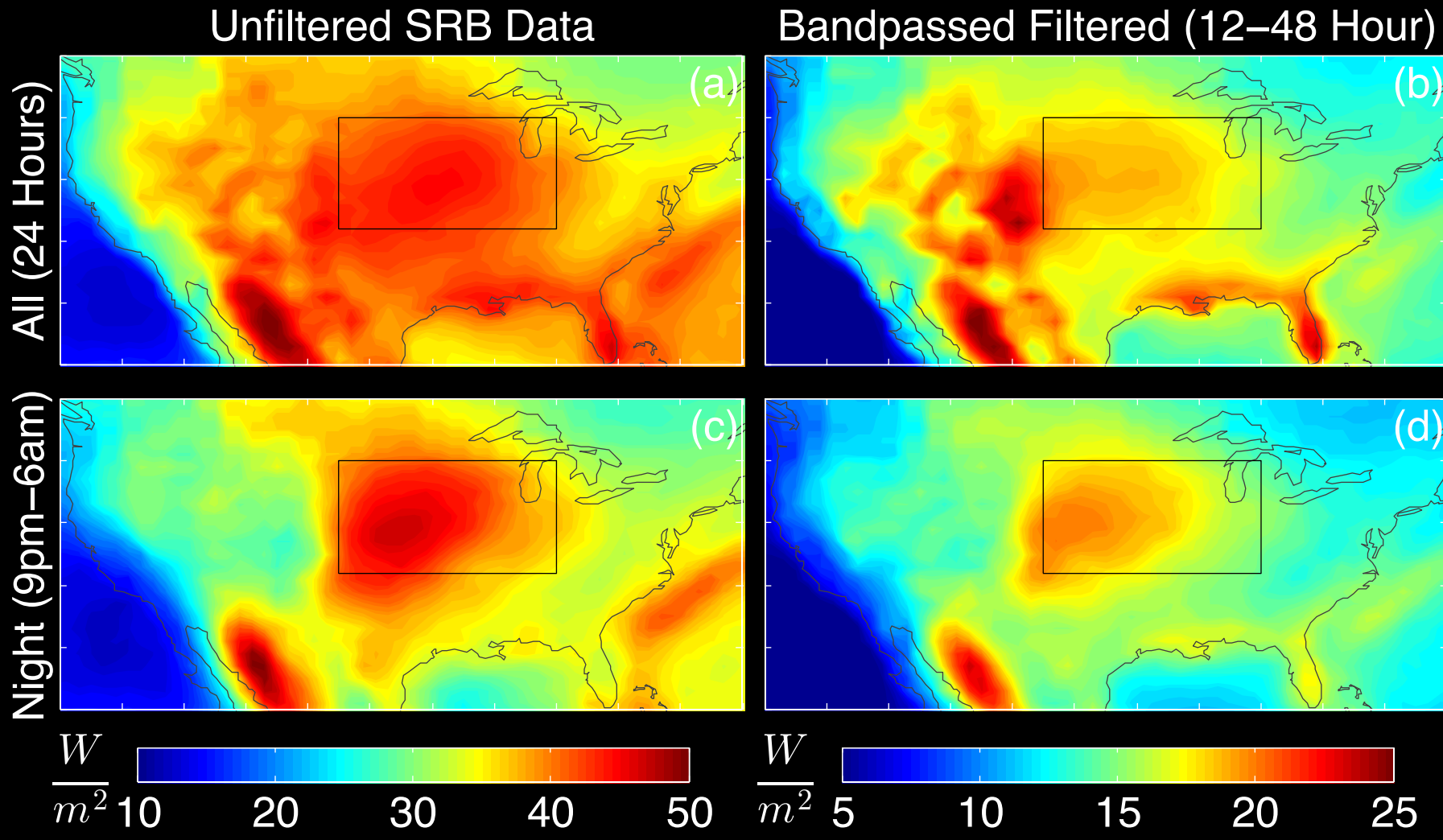
# Why a Wheeler and Hendon type index for central US mesoscale convection?

1. Organized convection in the tropics and mid-latitudes is a major source of variability.
2. And a major challenge for many GCMs.
3. The signal has a clear zonal propagation in both regions.
4. An EOF based index has been a useful tool for evaluating the MJO.

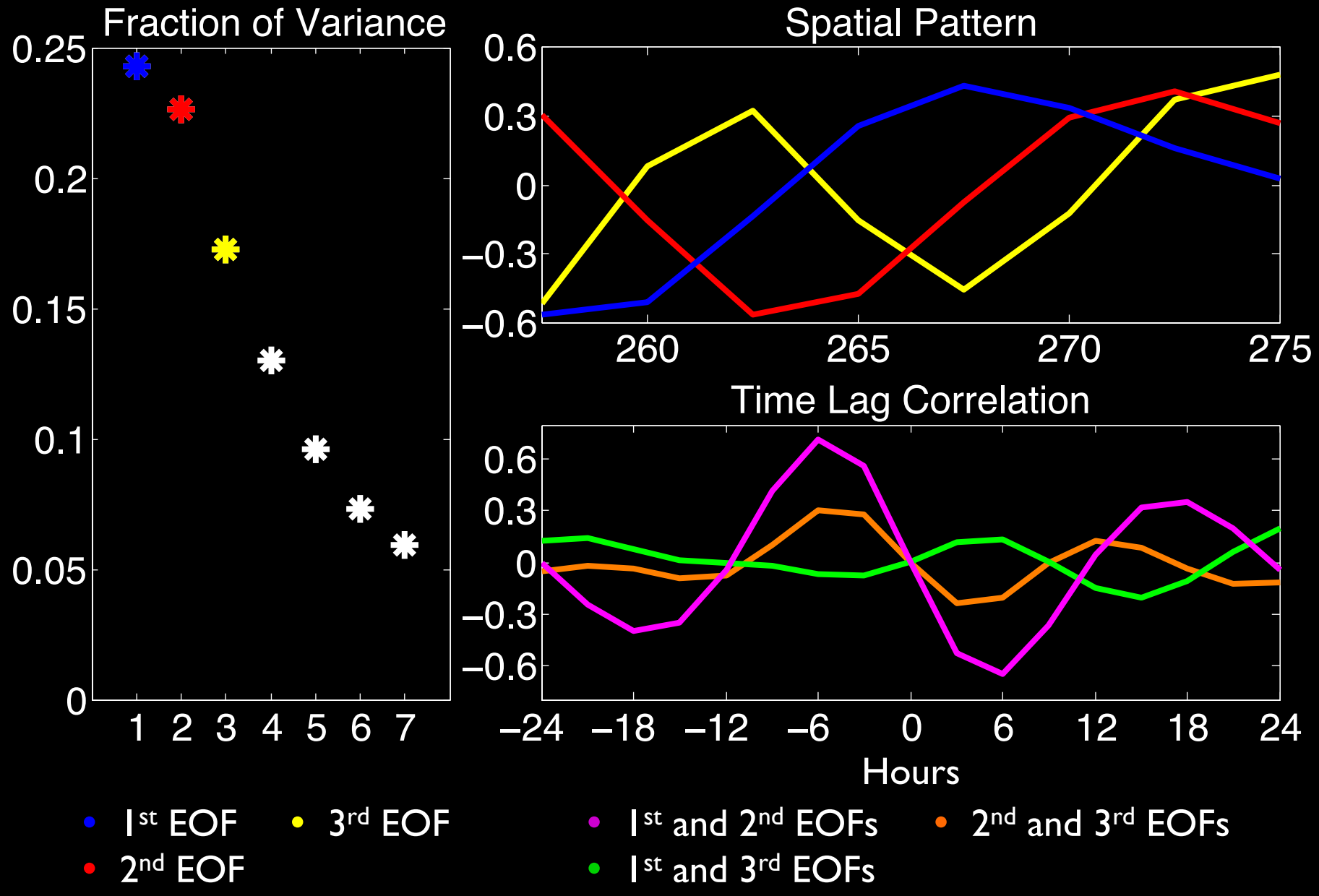


# Finding the region and signal of interest.

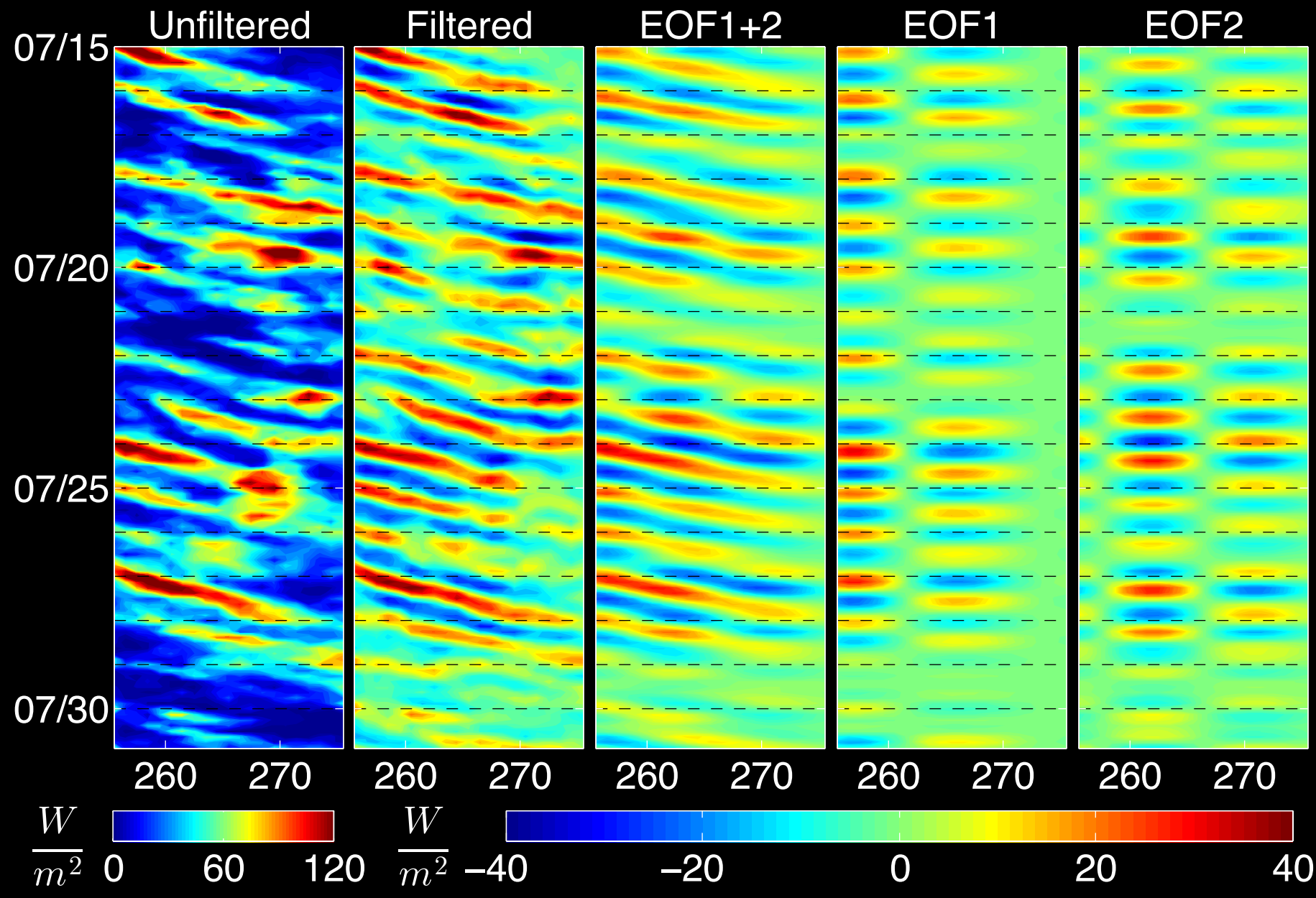
Standard Deviation of Longwave Cloud Forcing



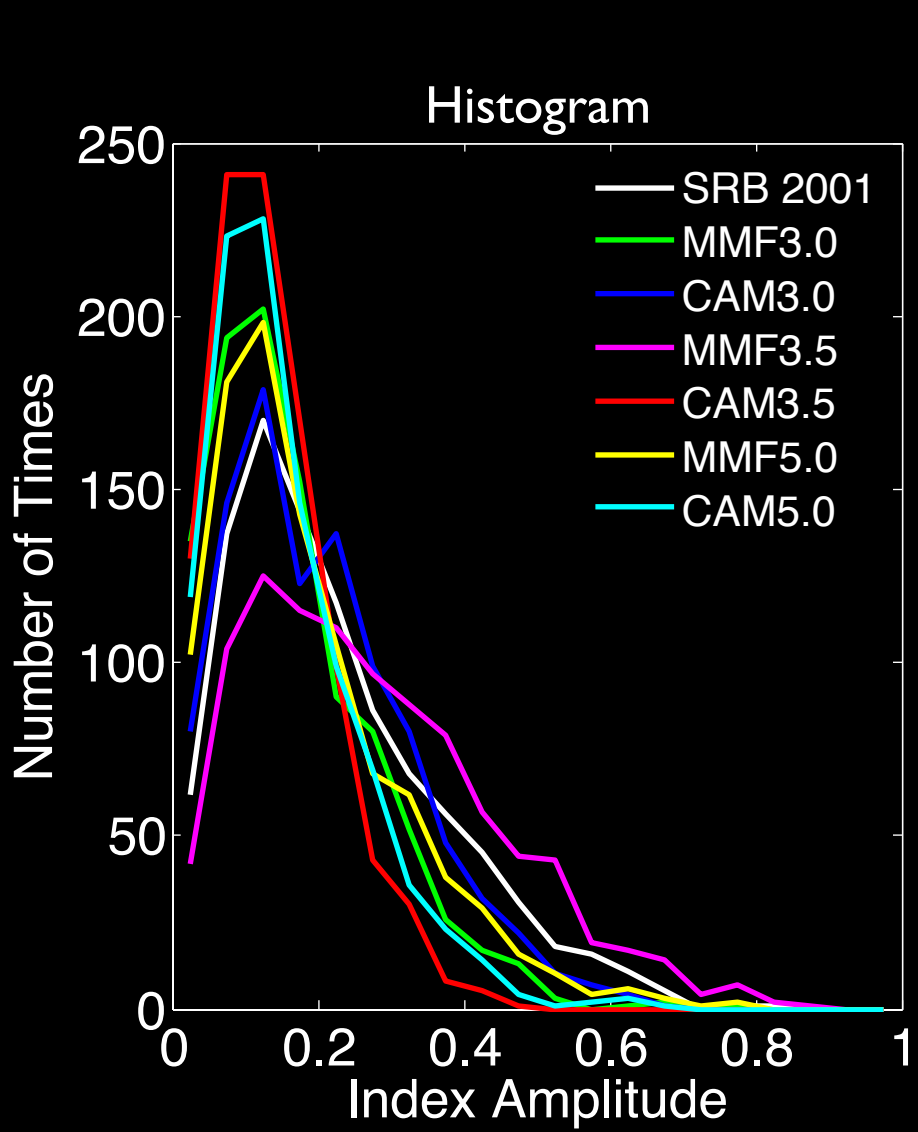
# Leading EOFs represent a propagating pair.

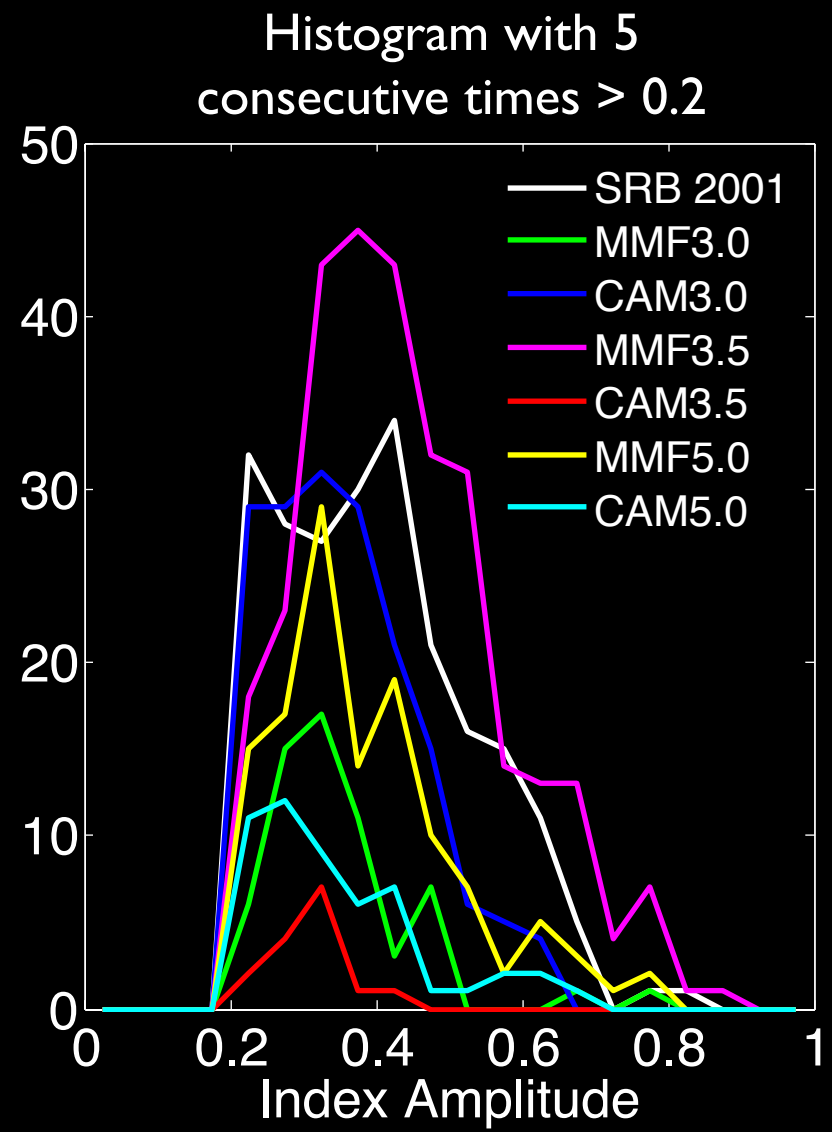


# Hovmöller reconstructed from leading EOFs.

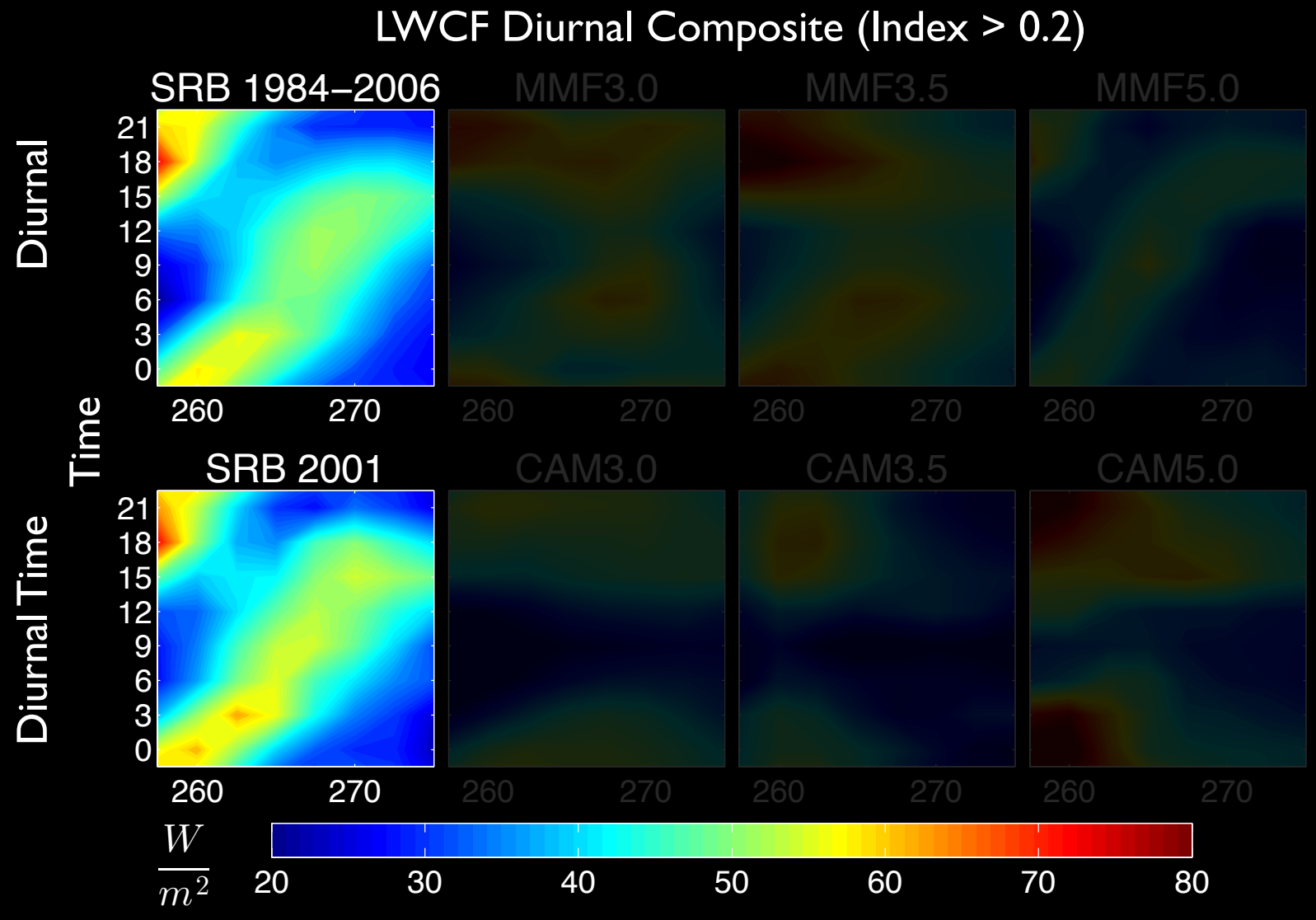


# High amplitude index is clear in observations and MMF3.5, known to have propagation.



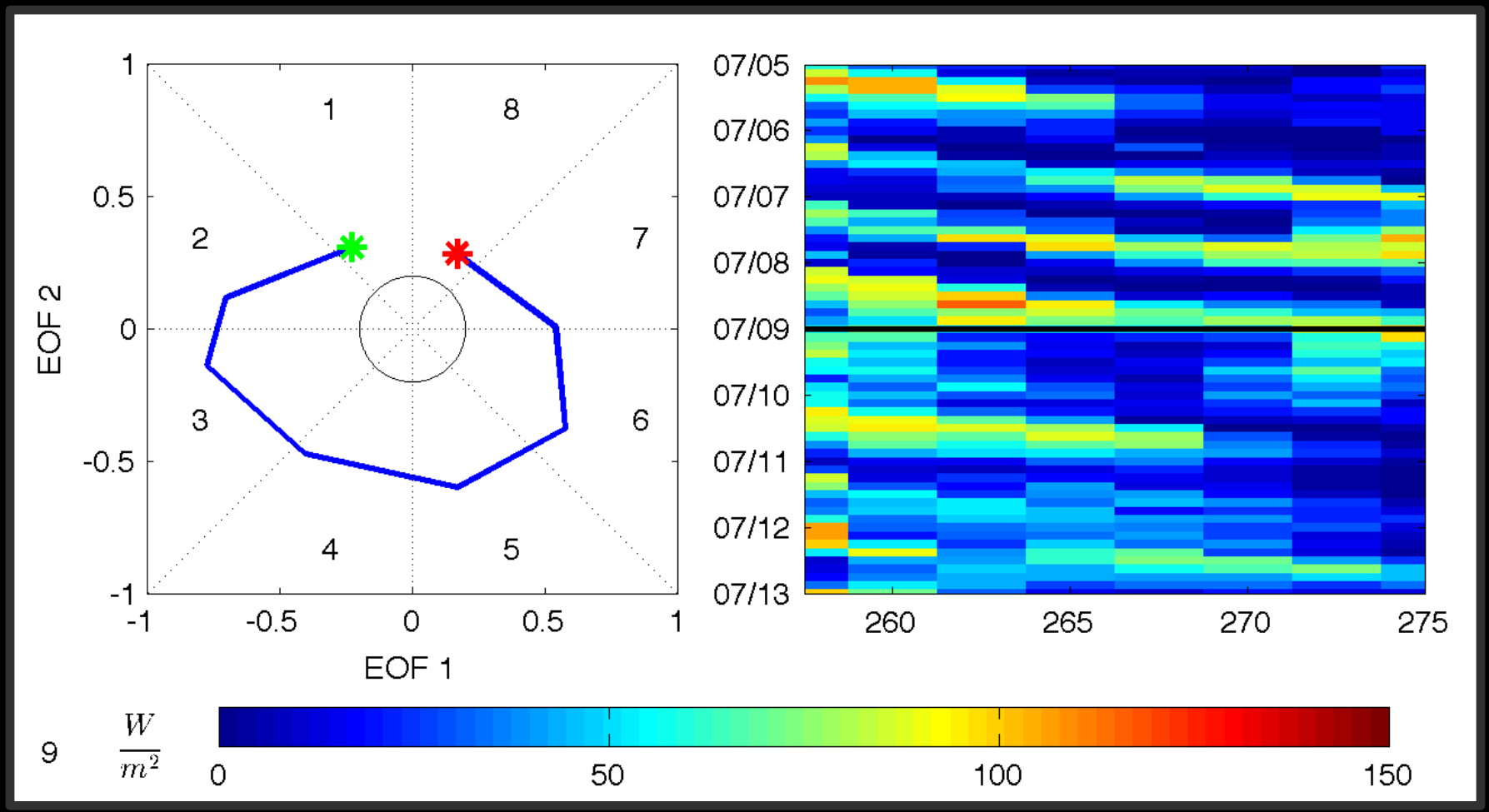
# Diurnal timing of the index is evident in observations and MMF3.5, and MMF3.0/5.0.



# Phase diagram of central US convection.

Developing event criteria:

1. Index ≥ 0.2.
2. At least 6 consecutive times.
3. Spans the longitude range.



# Conclusions

1. Does it exist in other versions of SPCAM?
2. How realistic is the signal beyond just existing?

- Broader analysis shows the (SPCAM3.5 / CAM3.5) version pair was an extreme case bracketing a subtle spectrum of MCC signal existence.
- Emergence of nocturnal US convection is a robust effect of SP across 3 simulation pairs (not a fluke of a particular model configuration).
- The signal is sensitive. MCC index statistics in SPCAM3.5 show events are too extreme and frequent. In contrast, SPCAM5.0 captures but underestimates the signal.