

Evolution of Humidity and Convection Prior to MJO Onset and Their Sensitivities to Upper-Tropospheric Equatorial Wave Dynamics



Scott W. Powell

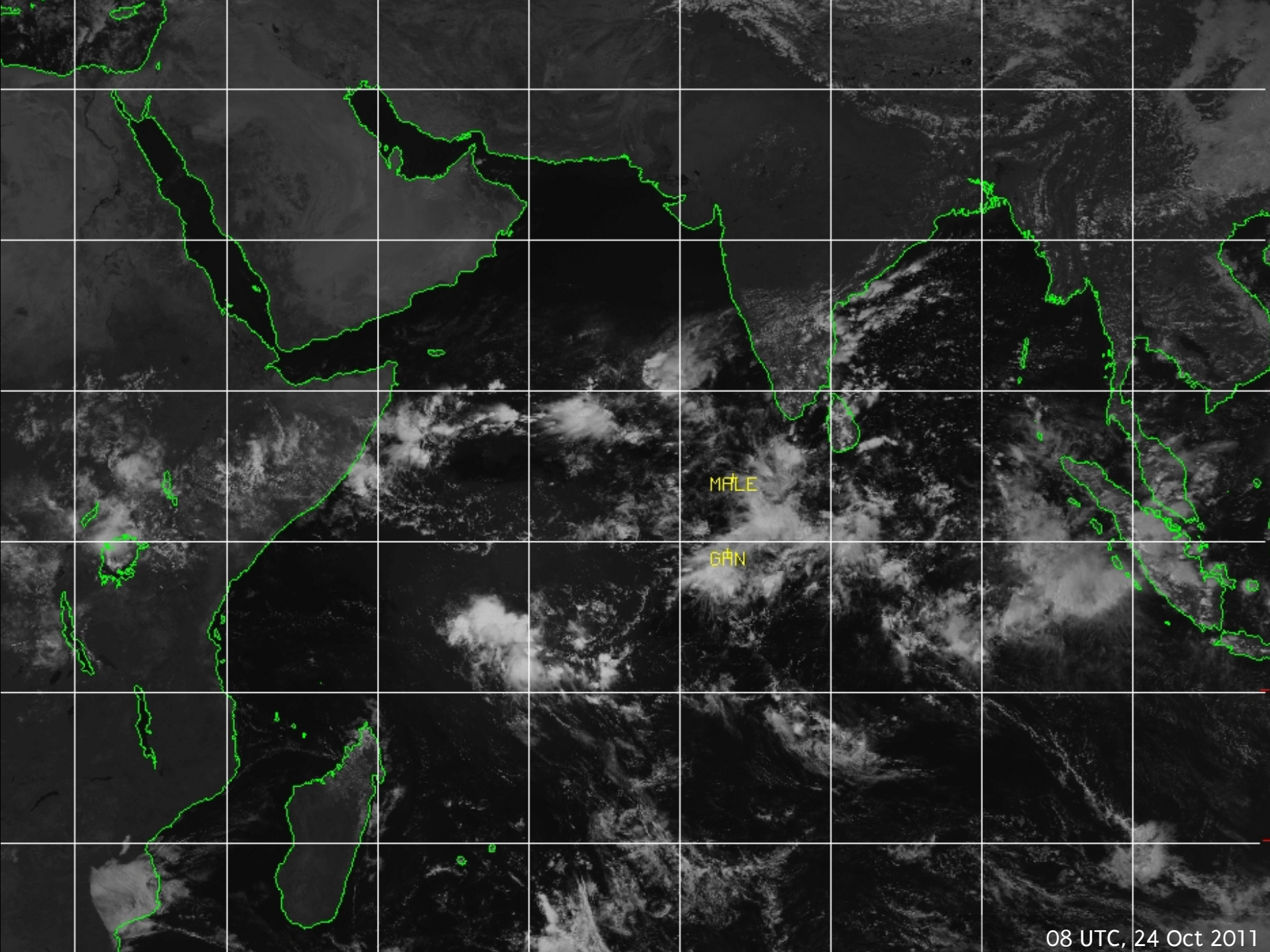
with R. A. Houze, Jr., *Univ. of Washington, Seattle*

1 April 2014

31st Conference on Hurricanes and Tropical Meteorology, San Diego

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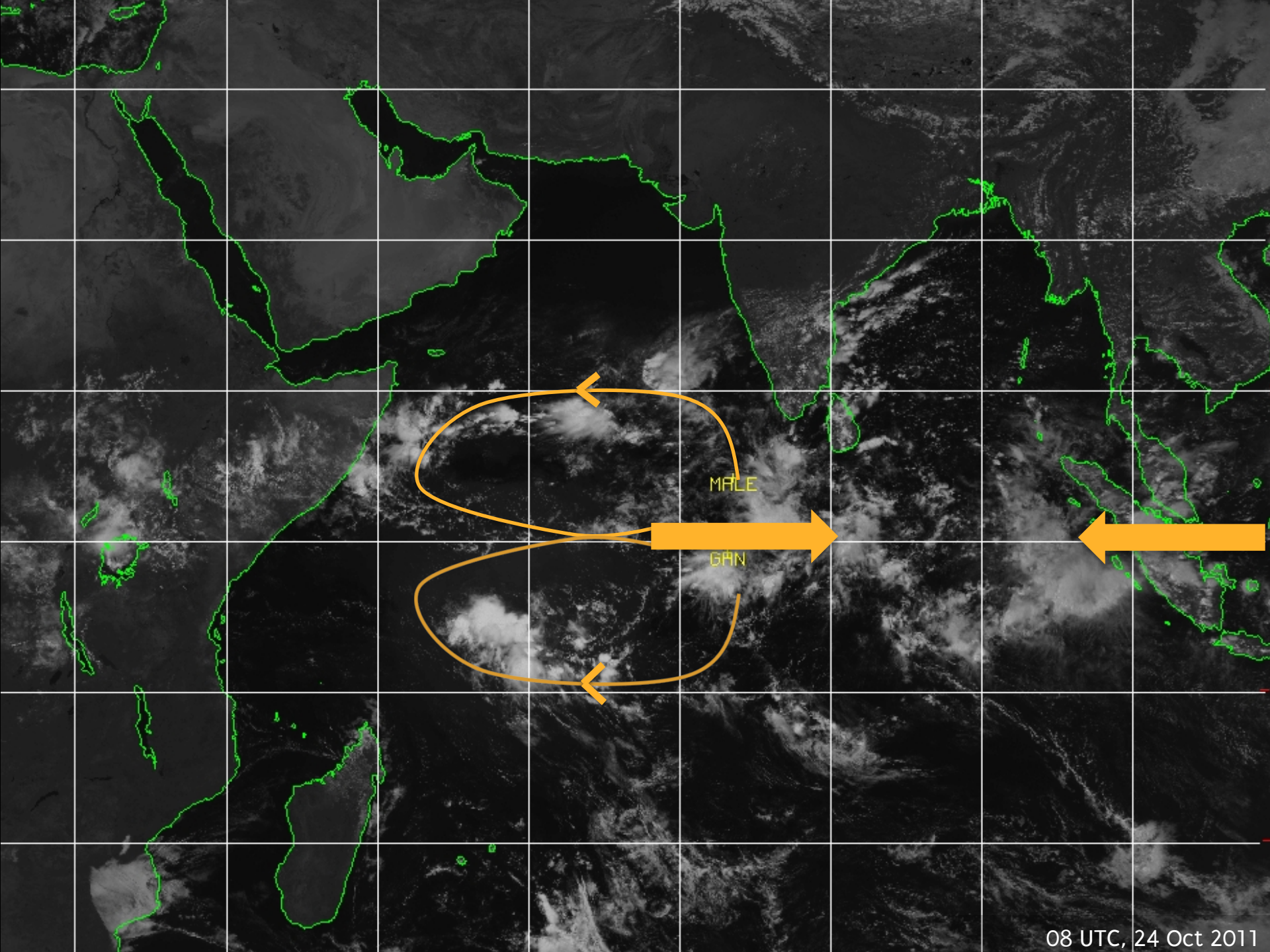
08 UTC, 24 Oct 2011



MALE

GÁN

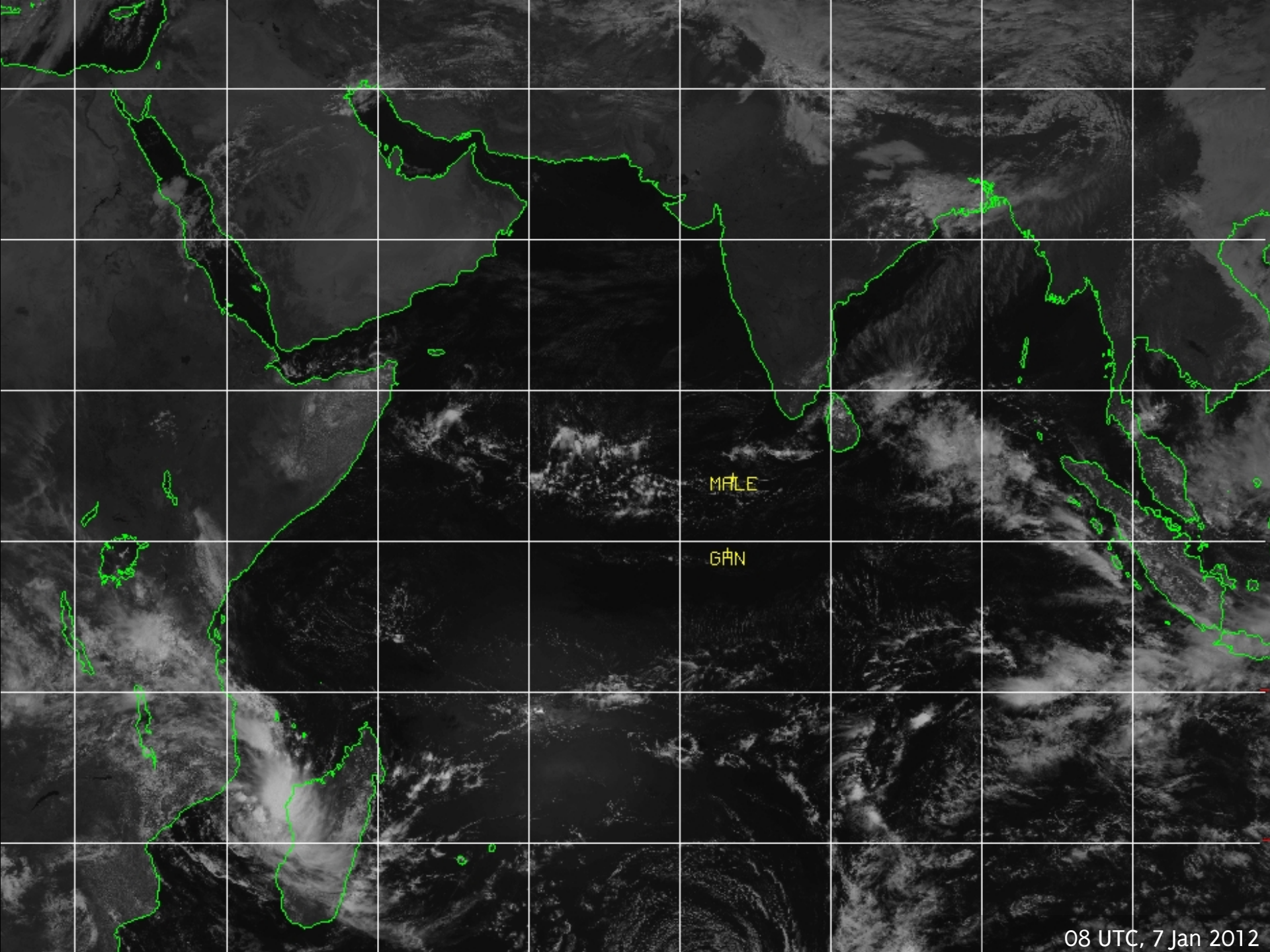
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MALE

GAN

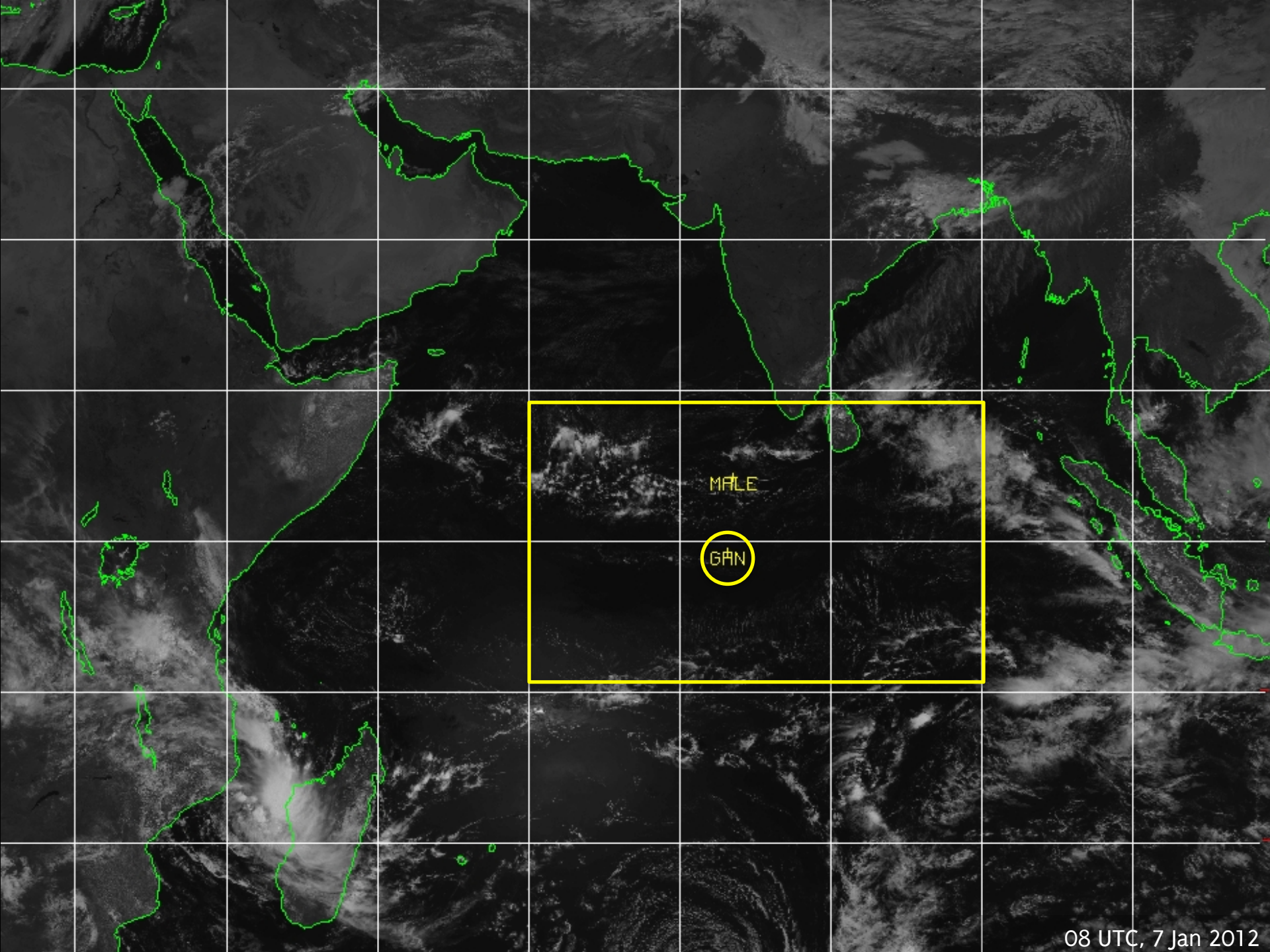
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MALE

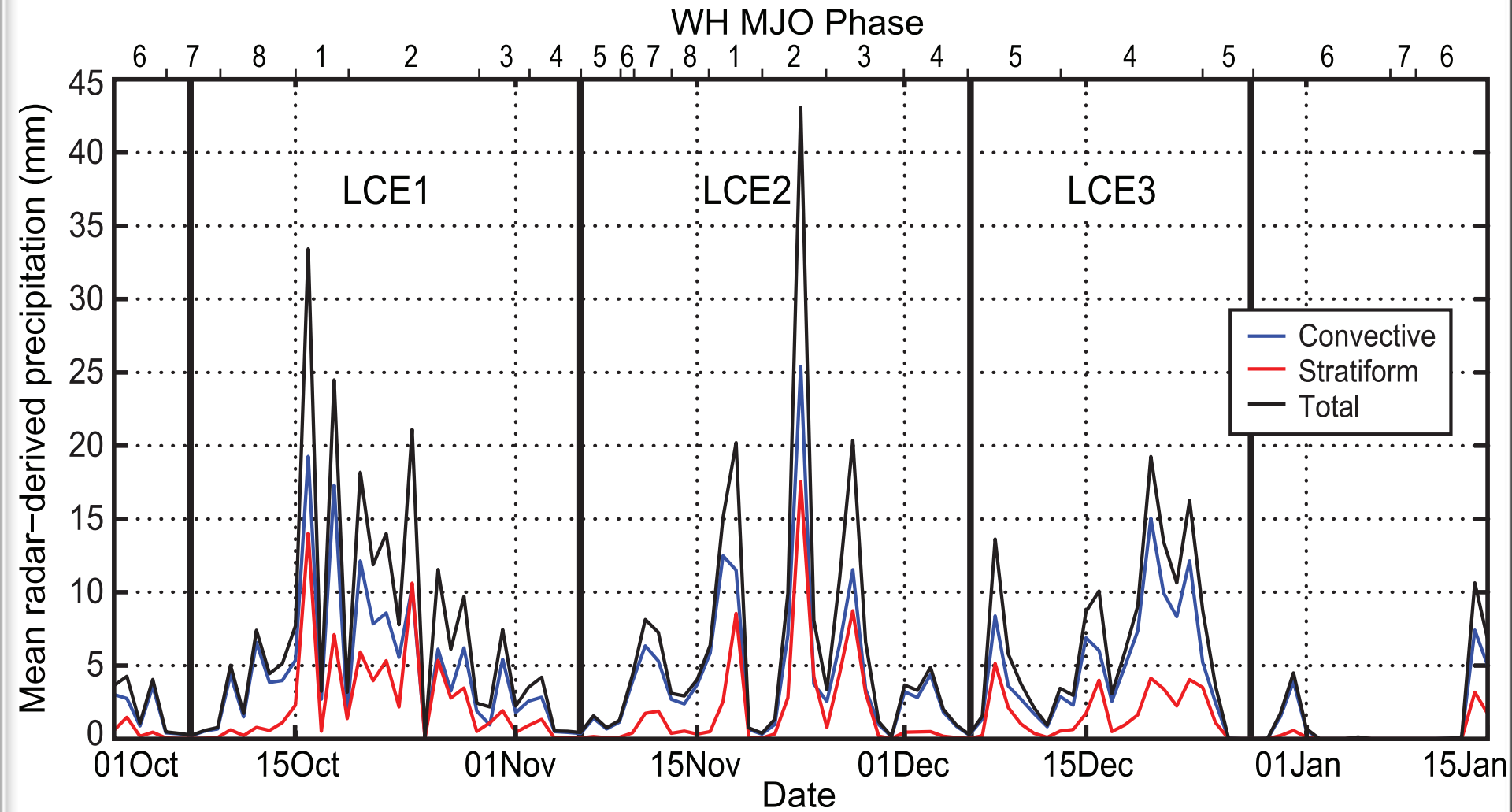
GPN

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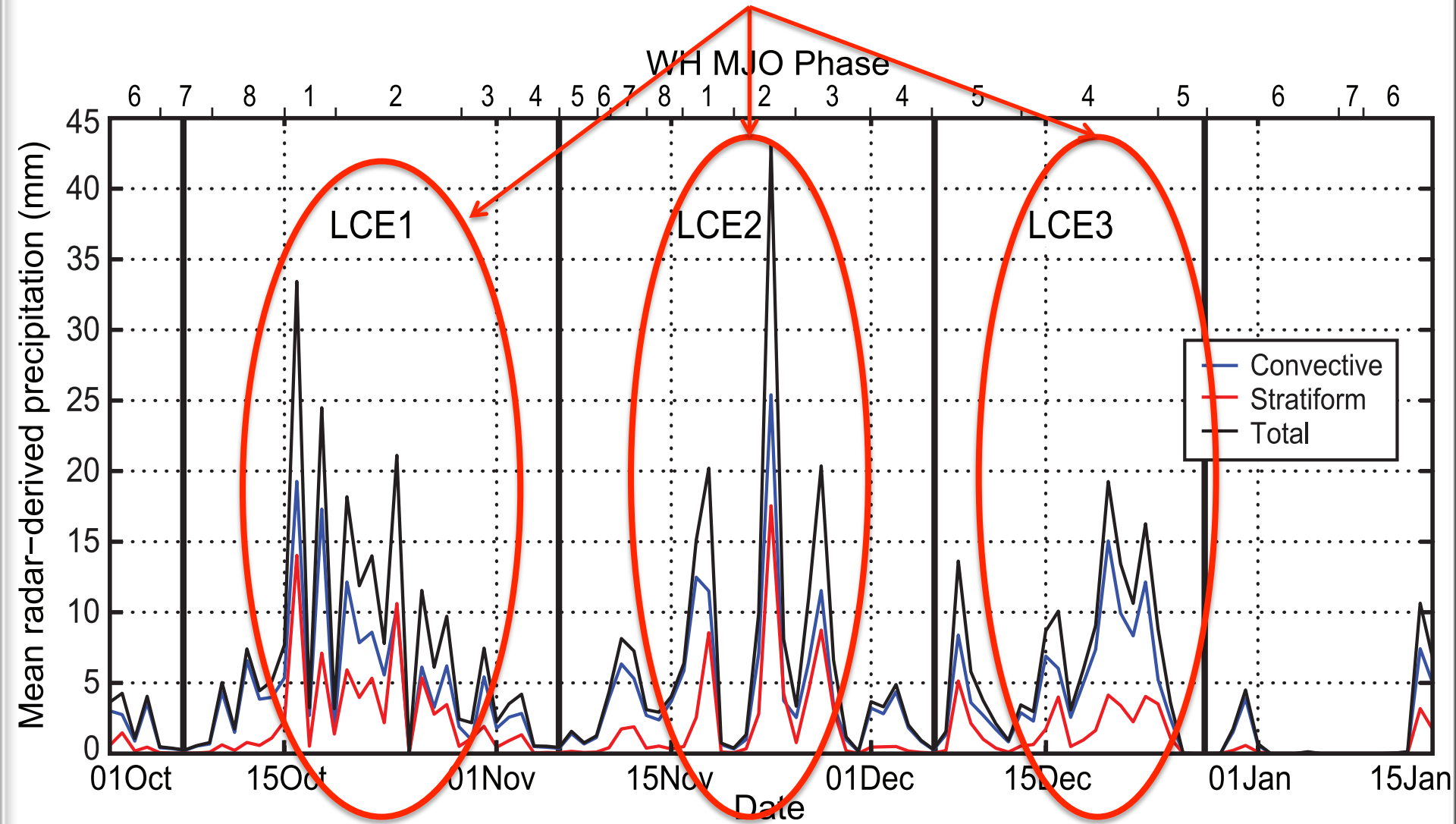


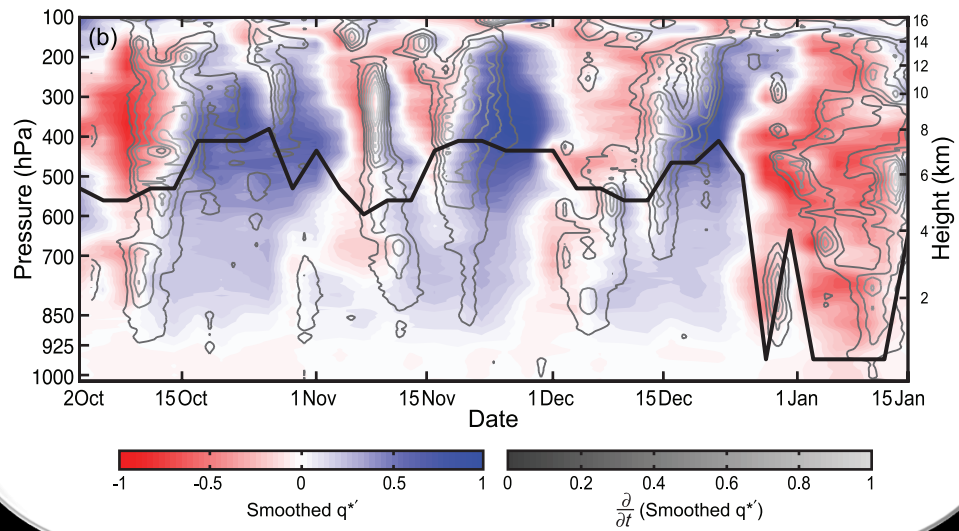
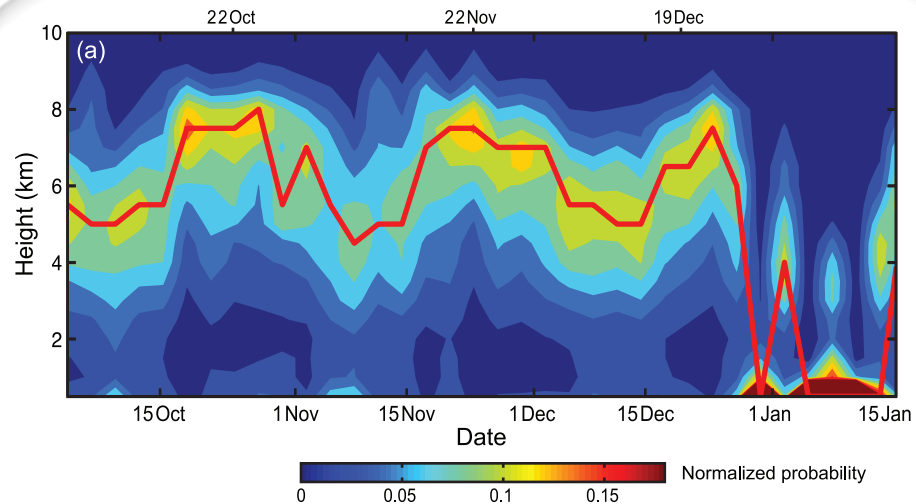
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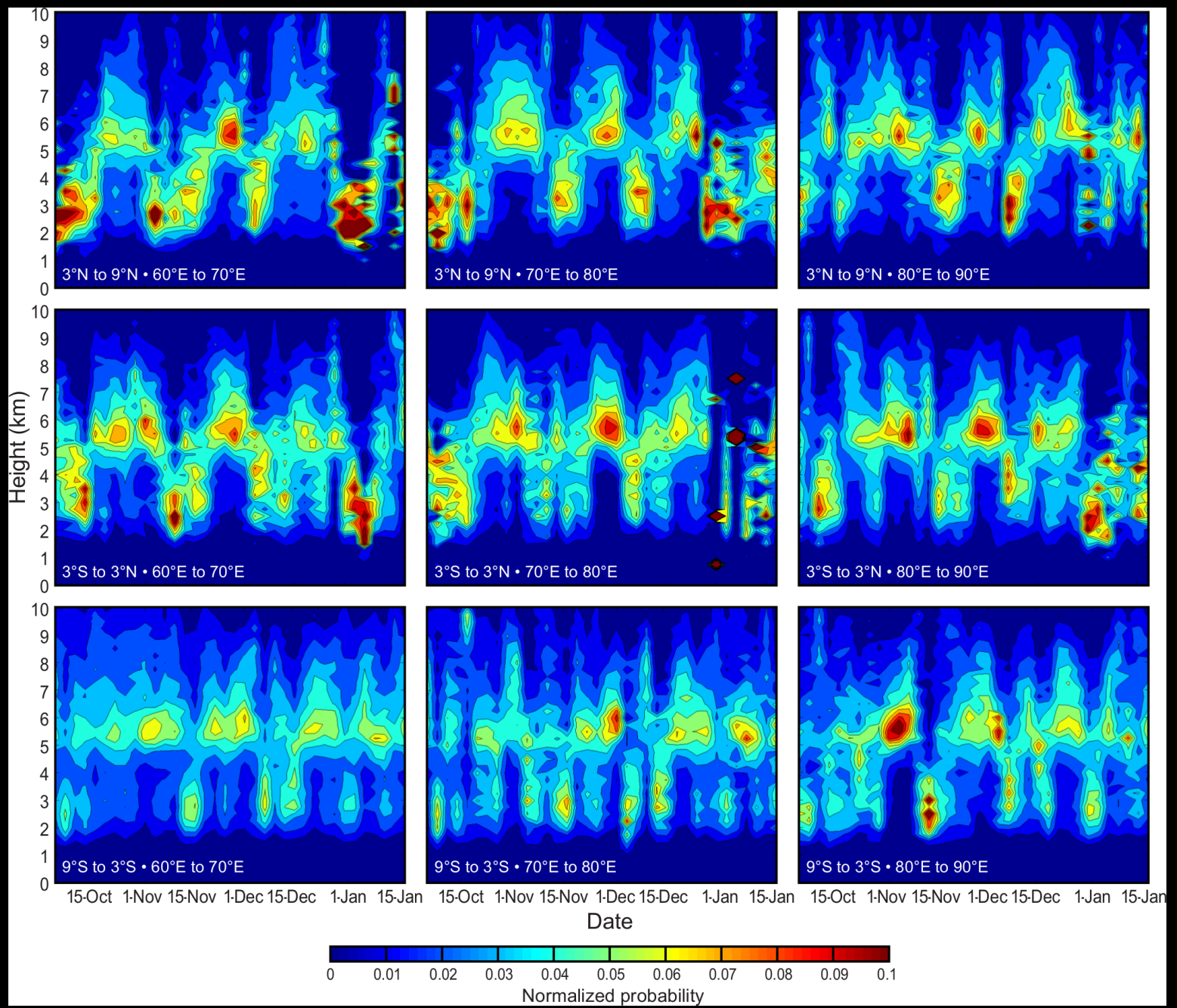
***Evolution of Cloud Population
and Humidity Fields***

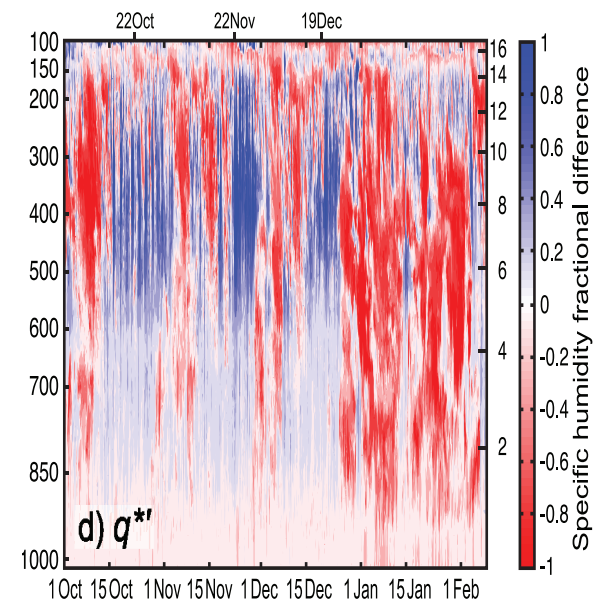
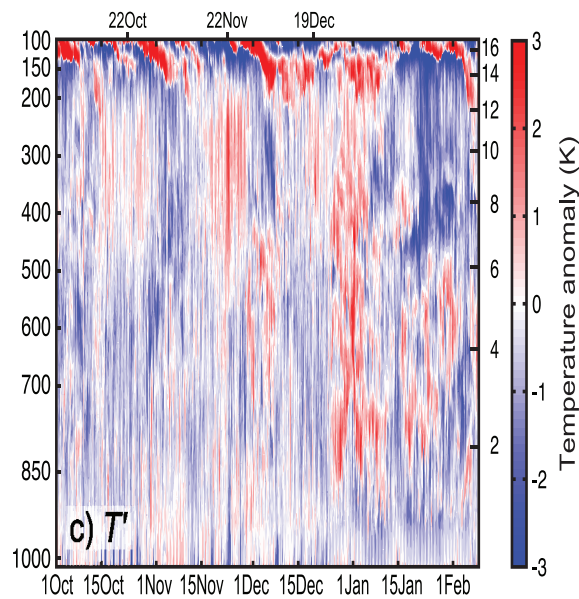
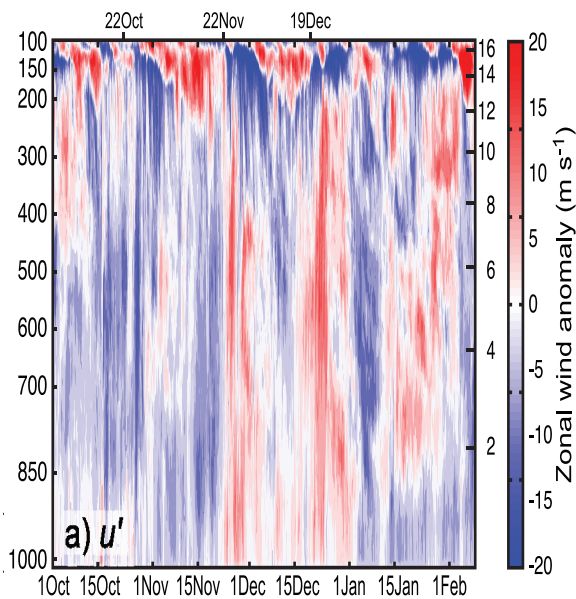


Gottschalck et al (2013), Powell and Houze (2013), Xu and Rutledge (2014)



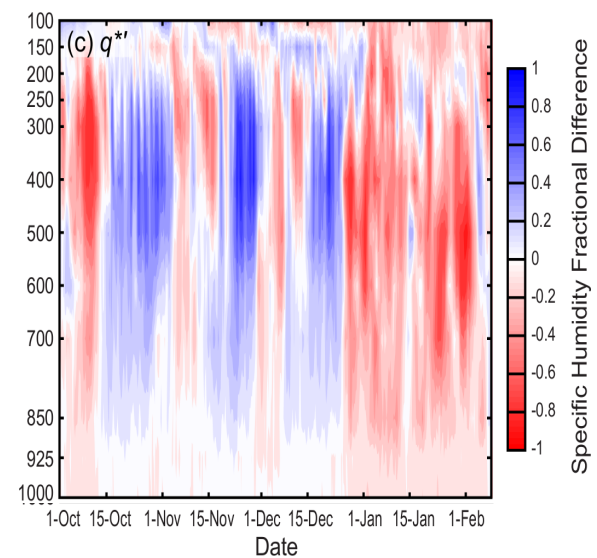
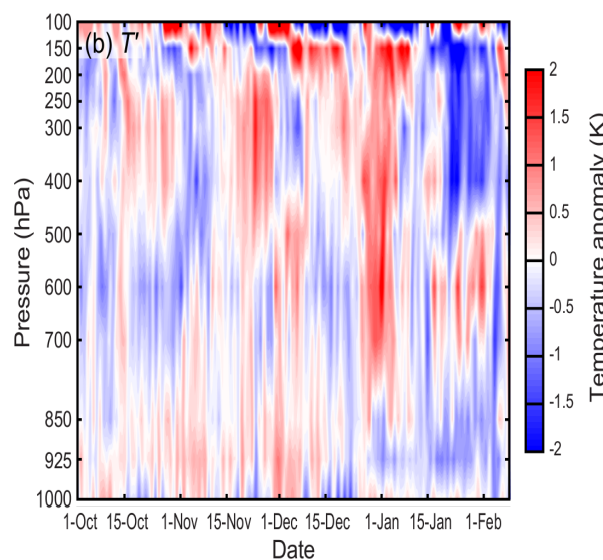
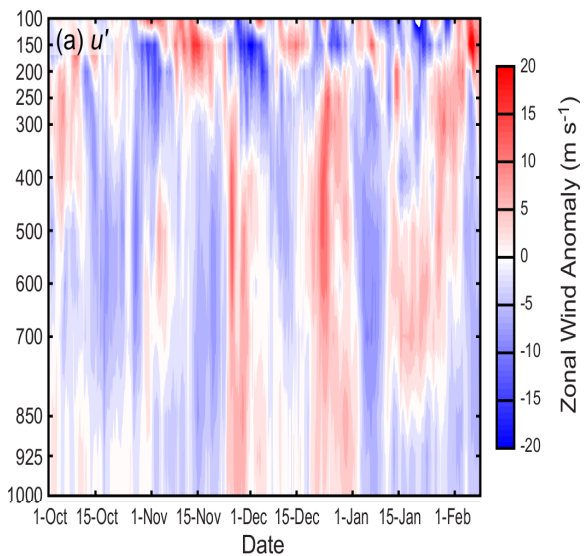






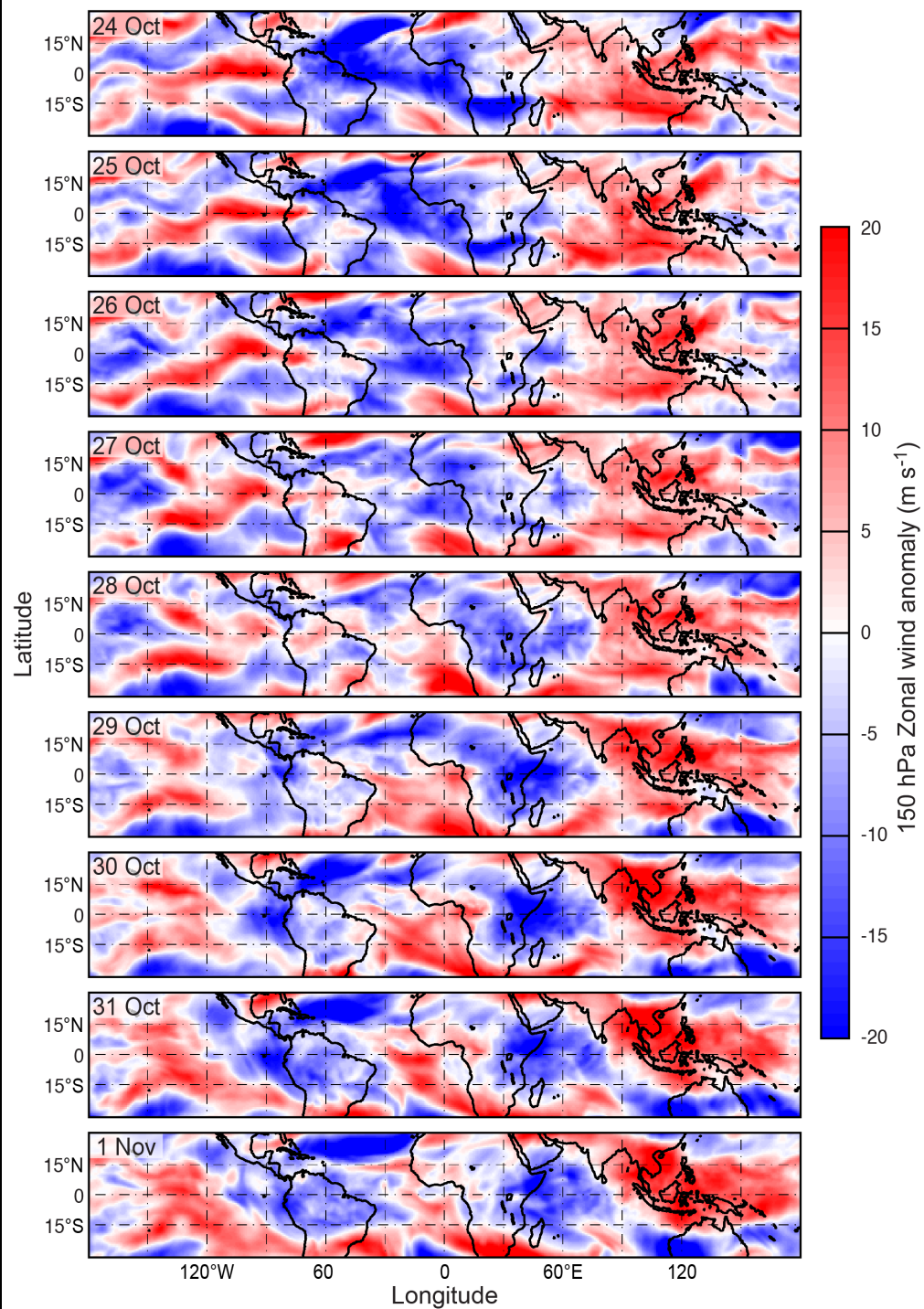
Top row: Gan rawinsonde data

Bottom row: ERA-Interim ($3^{\circ}\text{N} - 3^{\circ}\text{S}$, $68^{\circ}\text{E} - 78^{\circ}\text{E}$)

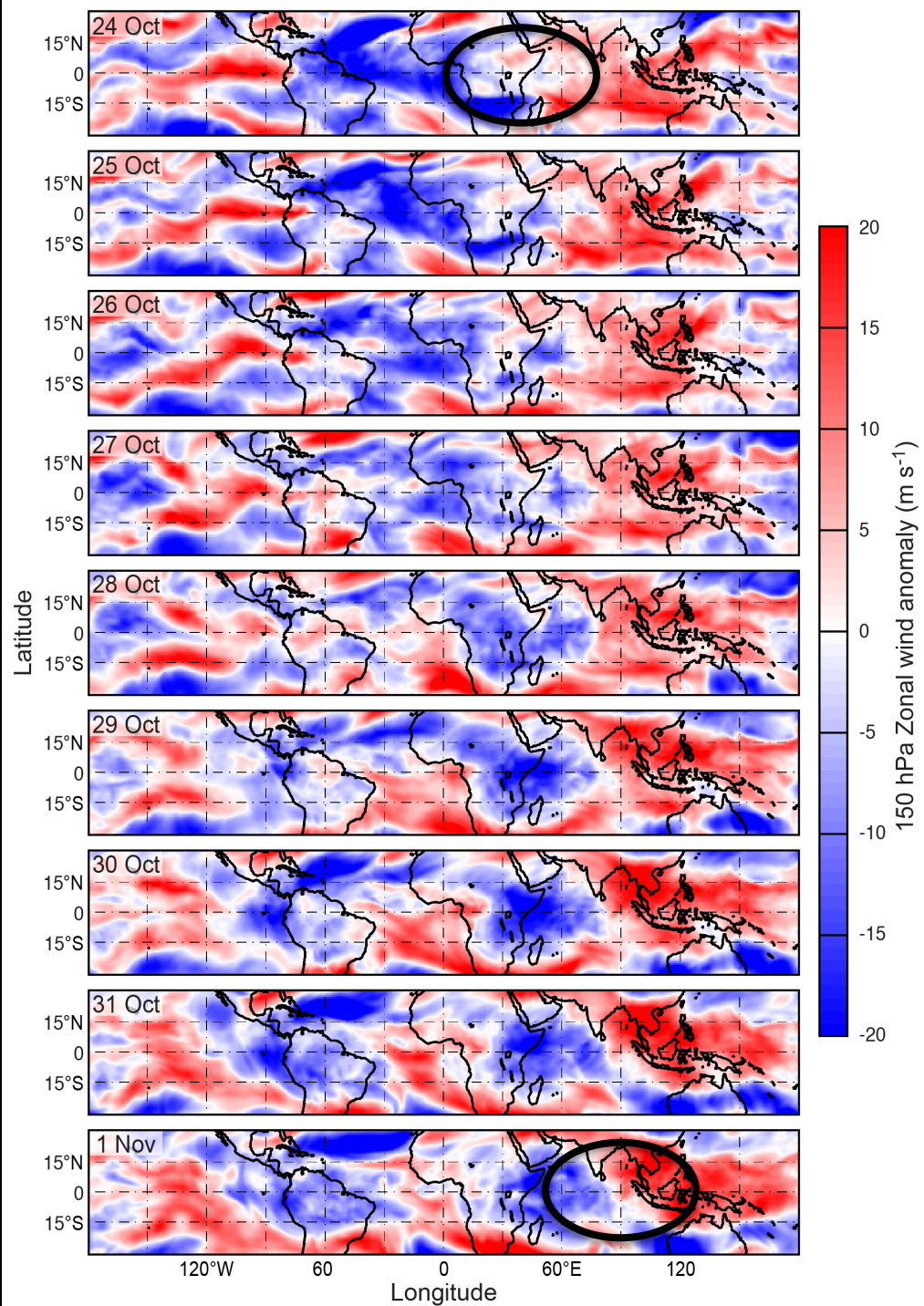


Upper-Tropospheric Dynamics

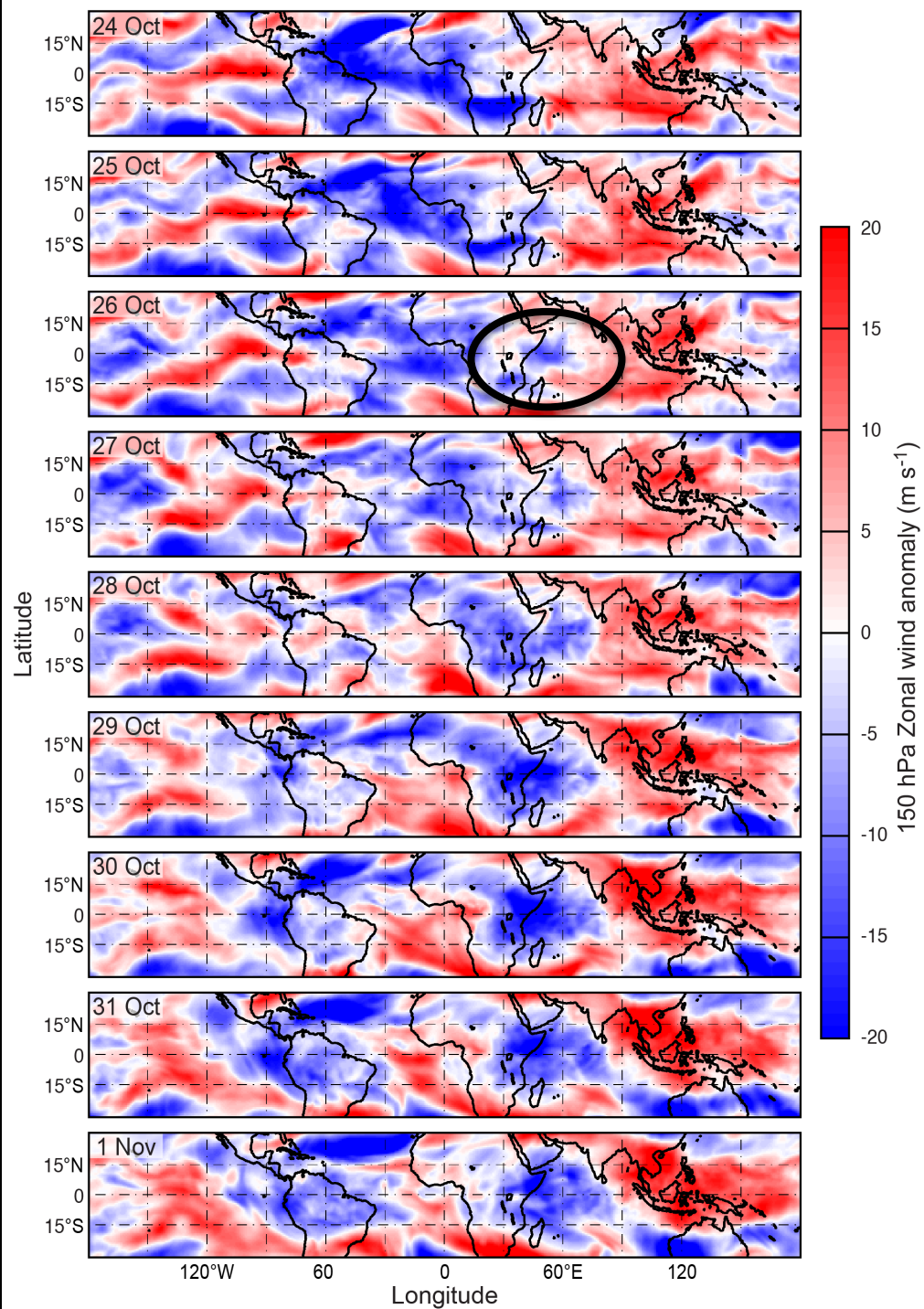
150 hPa u'
Blue: Easterly
Red: Westerly

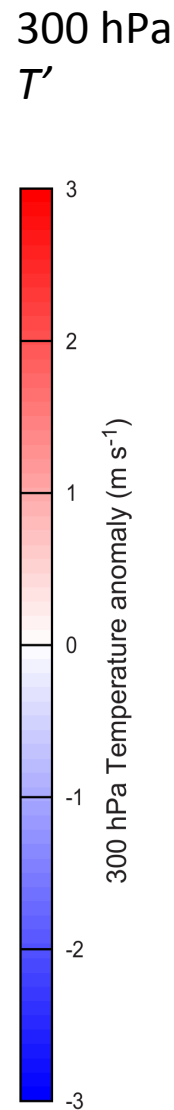
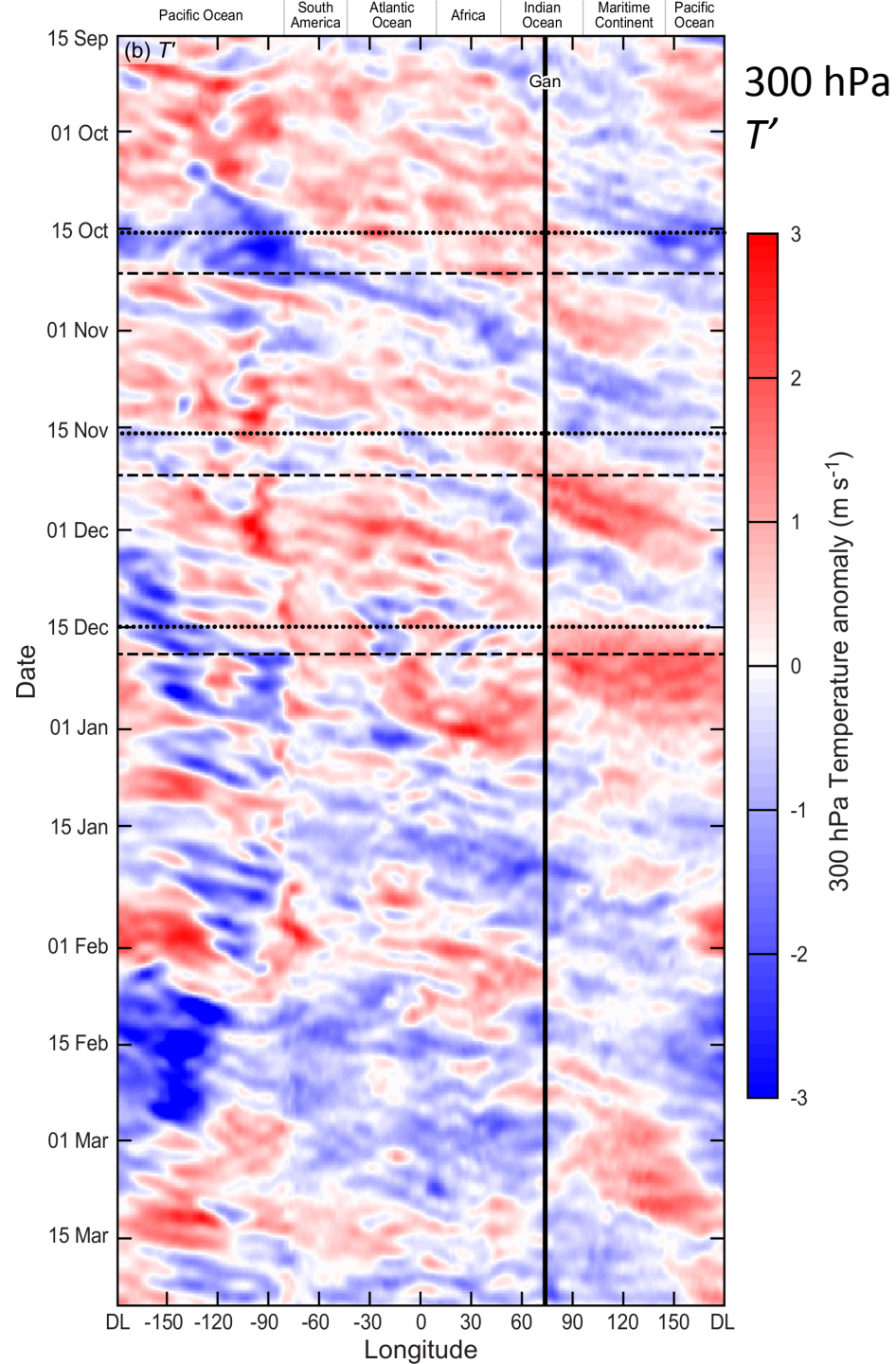
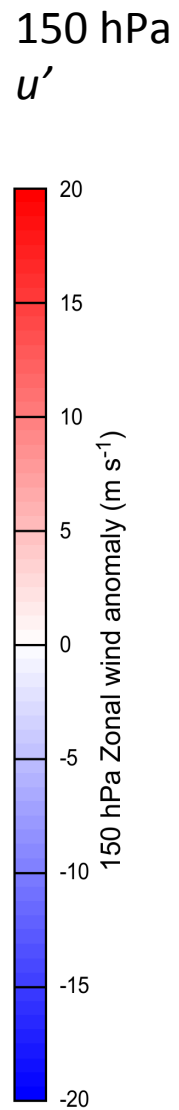
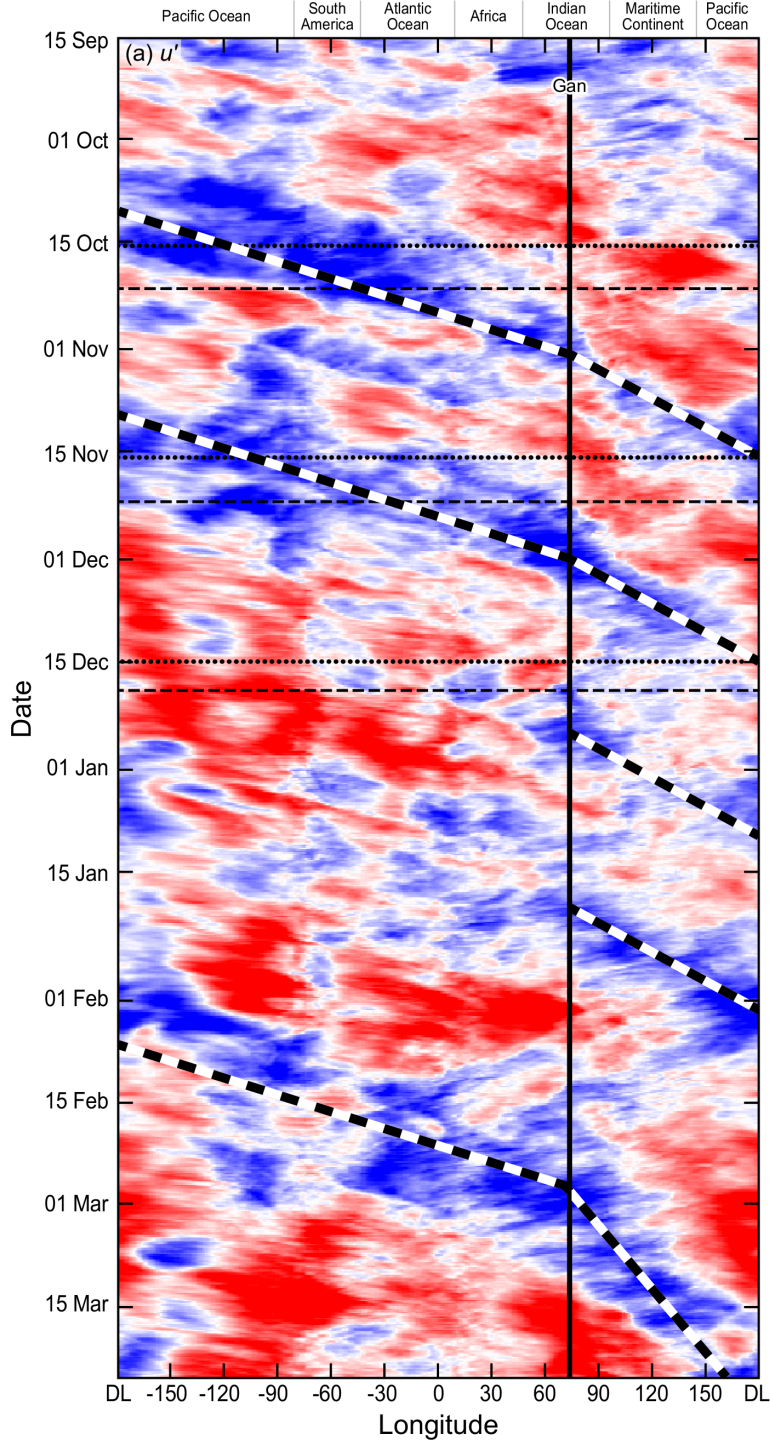


150 hPa u'
Blue: Easterly
Red: Westerly

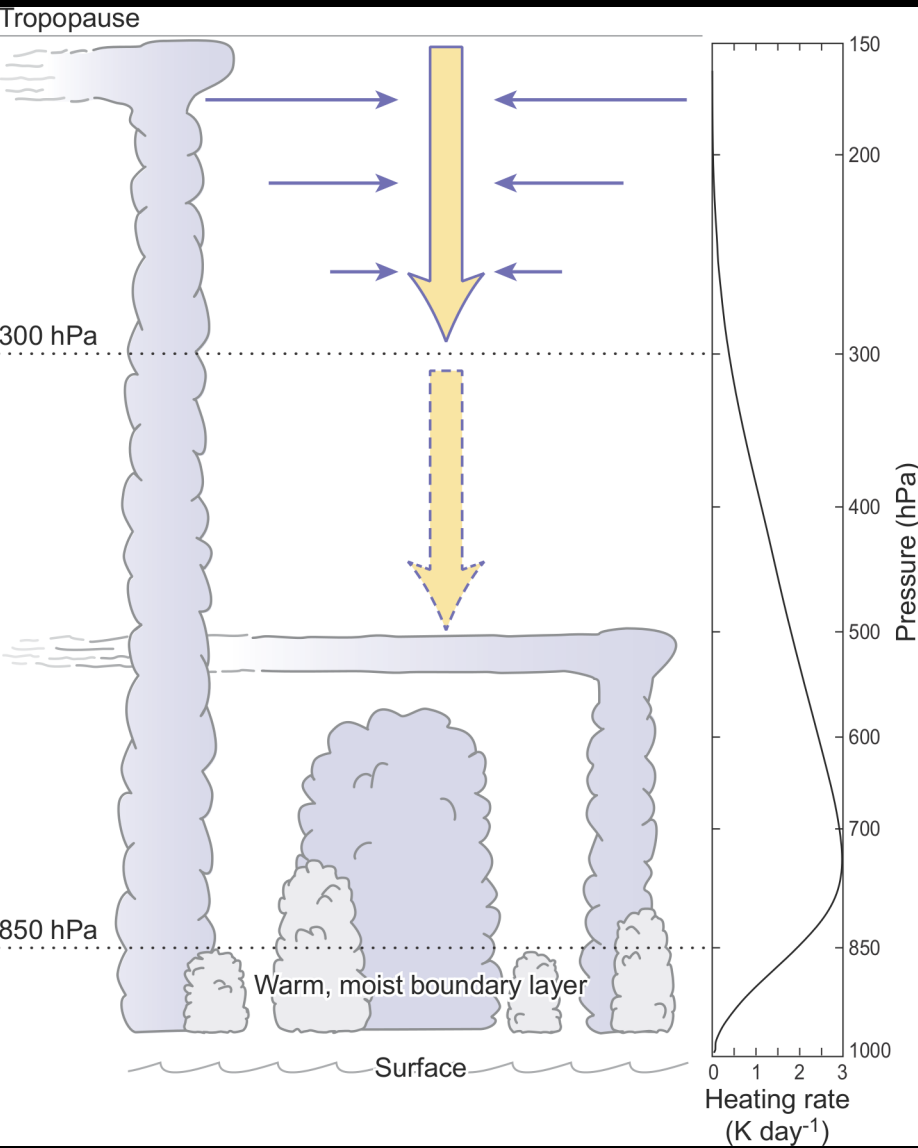


150 hPa u'
Blue: Easterly
Red: Westerly

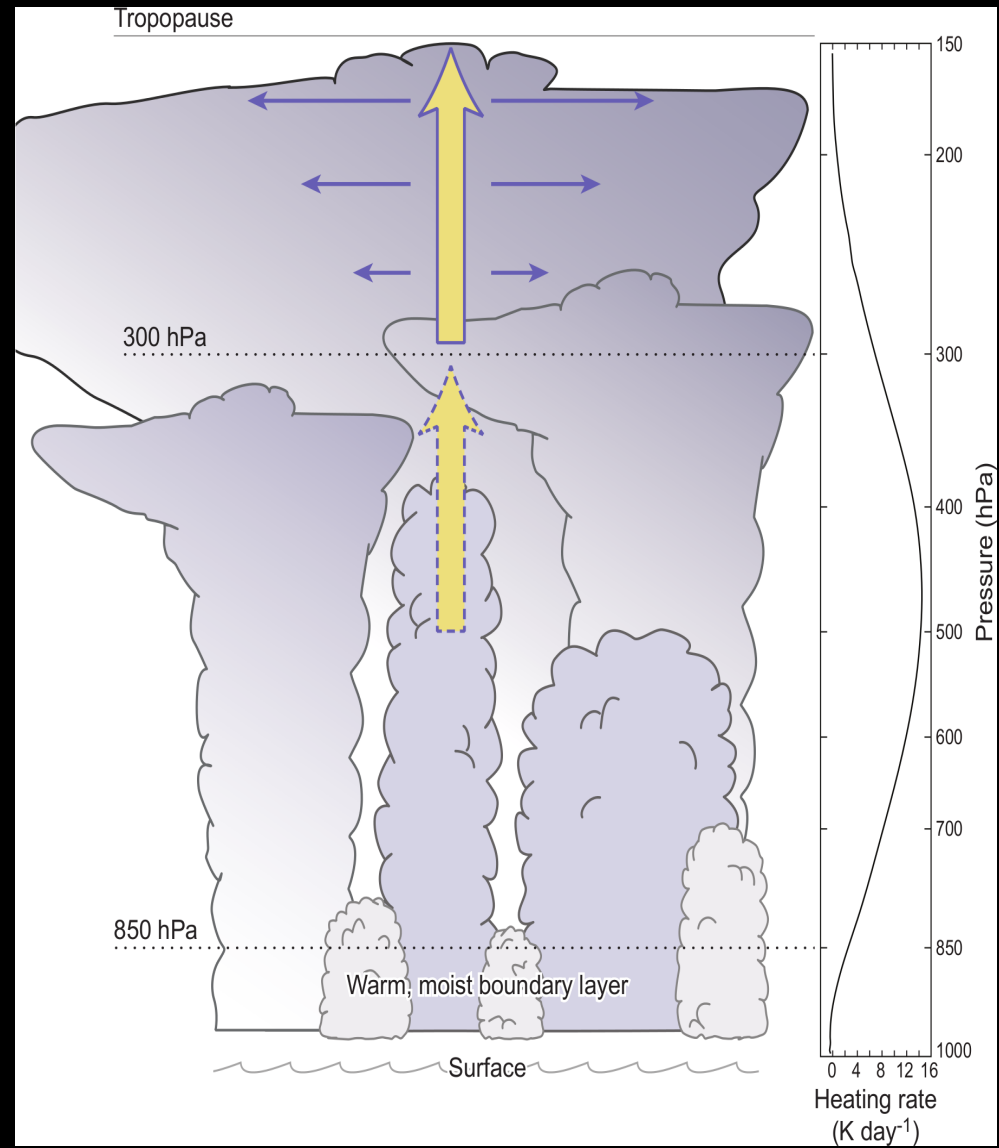




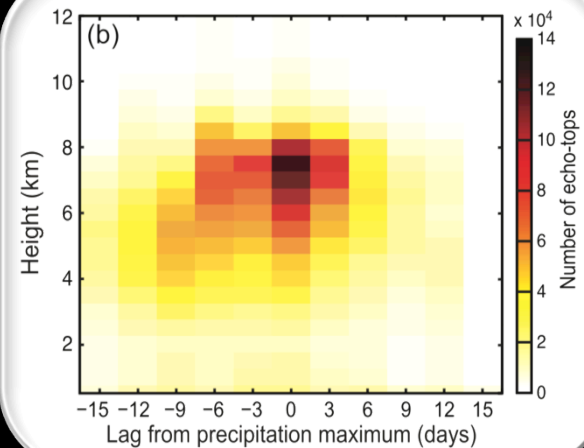
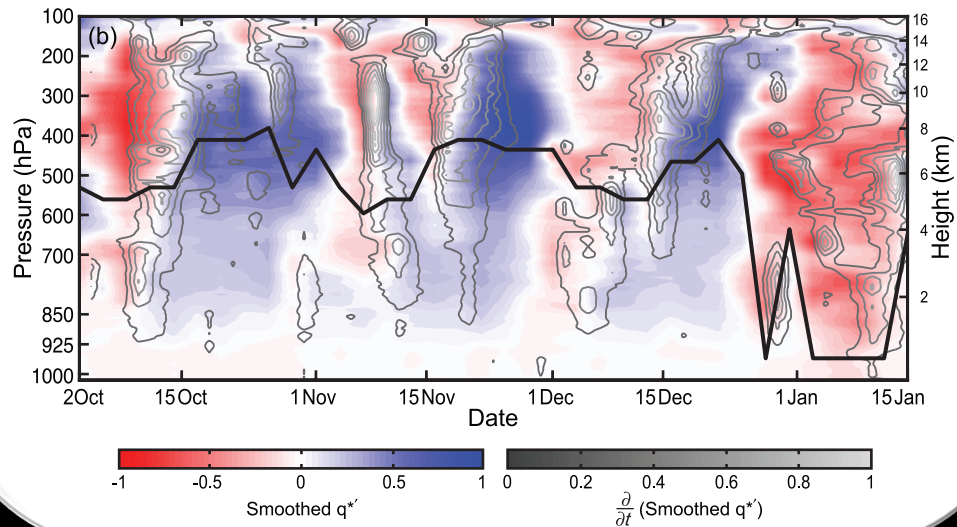
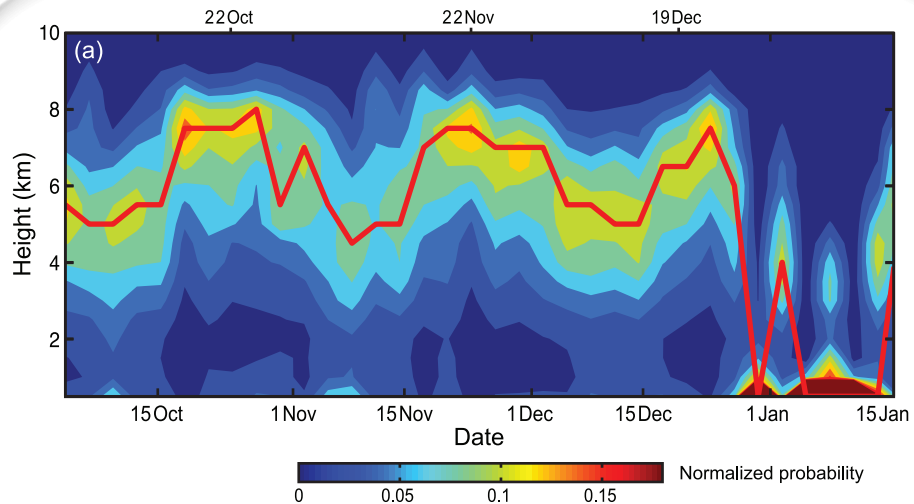
Suppressed Convection

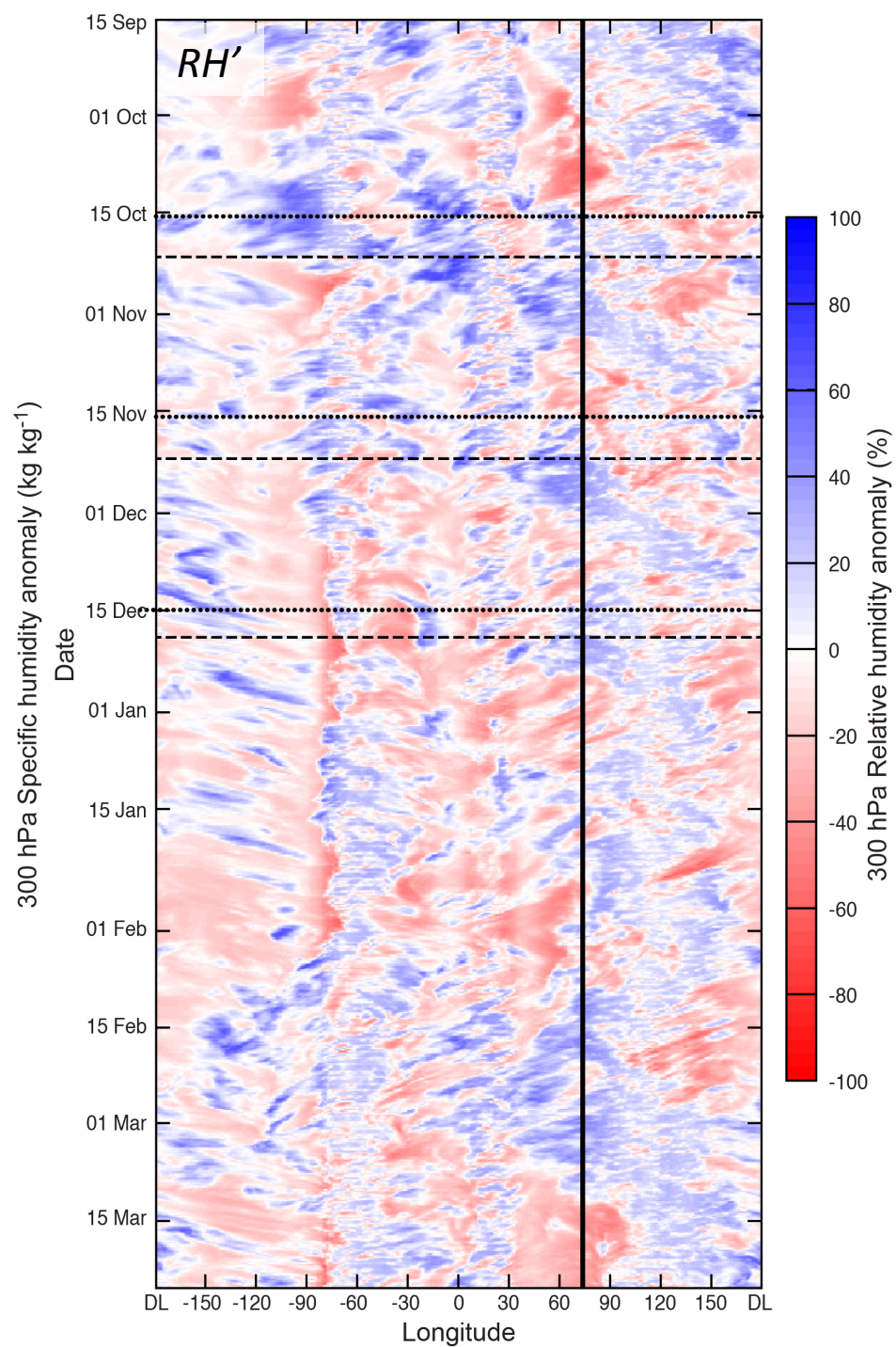
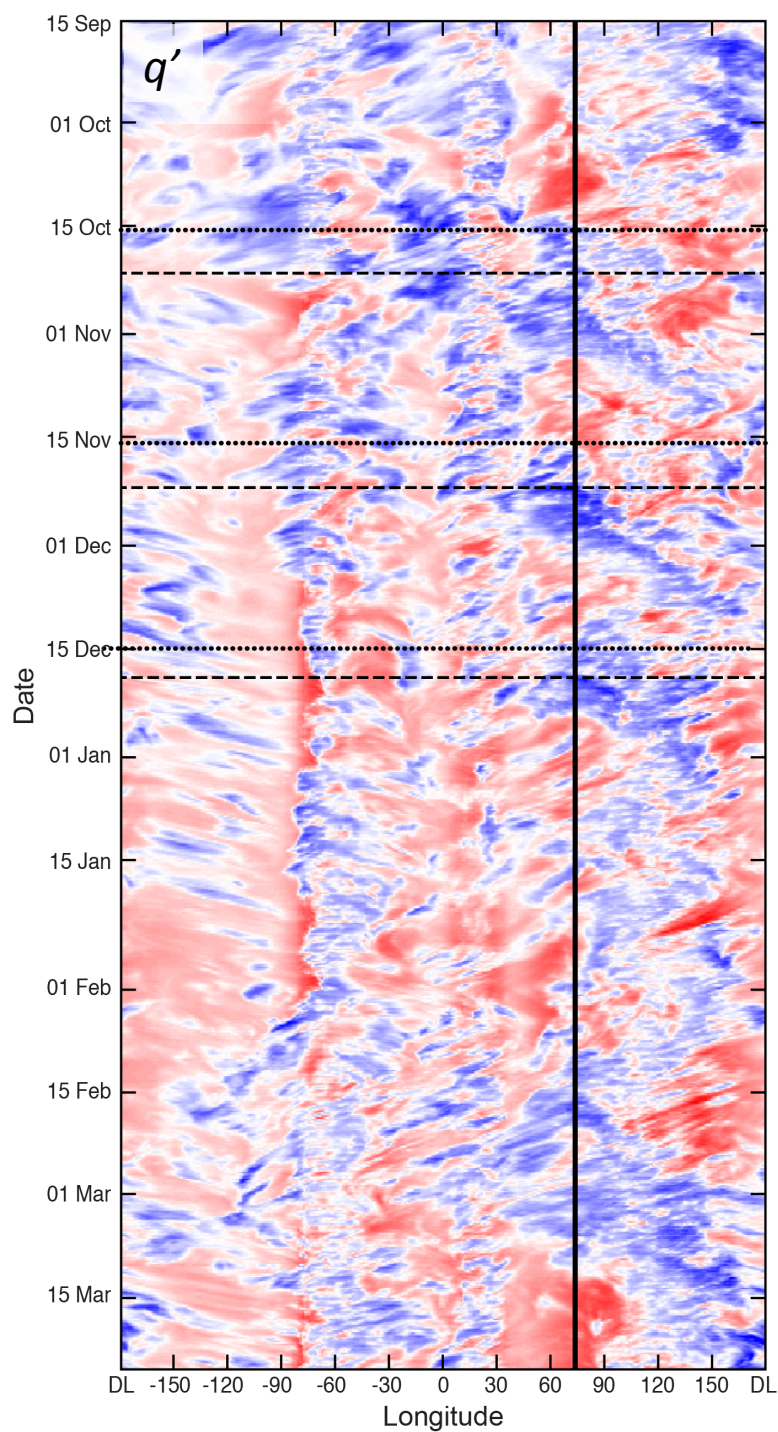


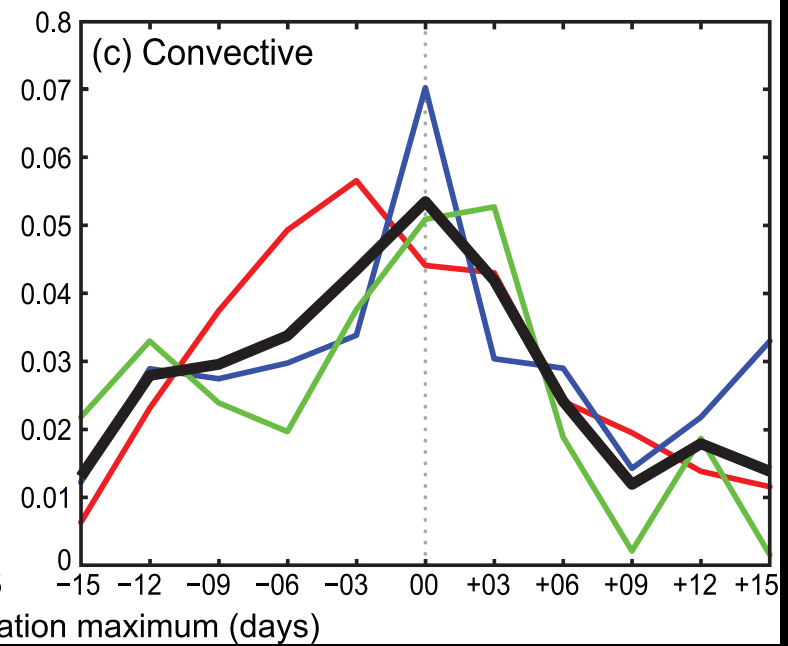
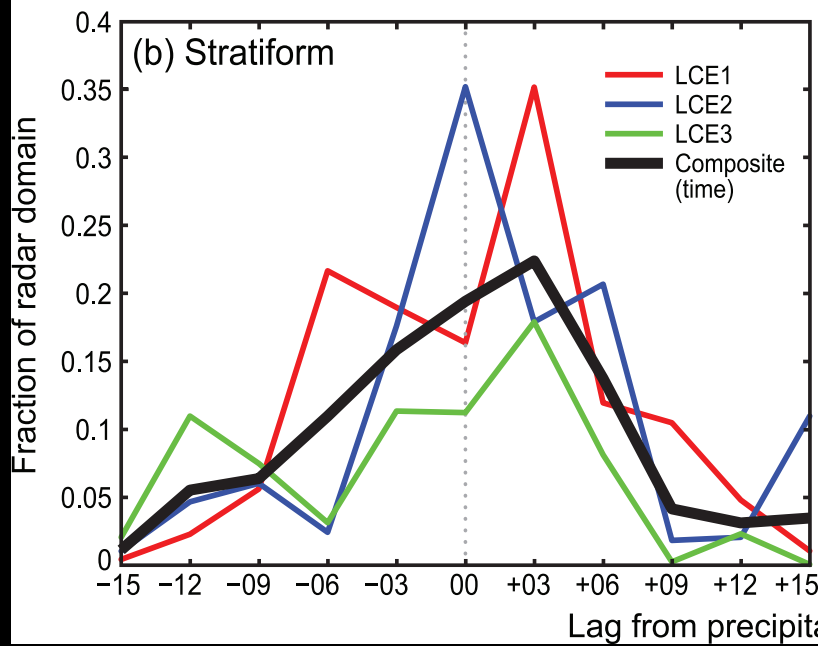
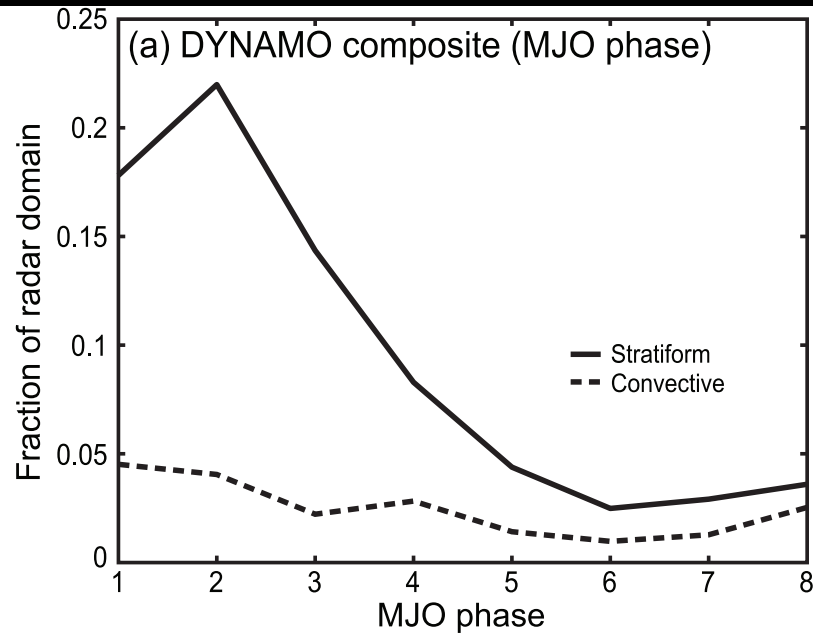
Enhanced Convection

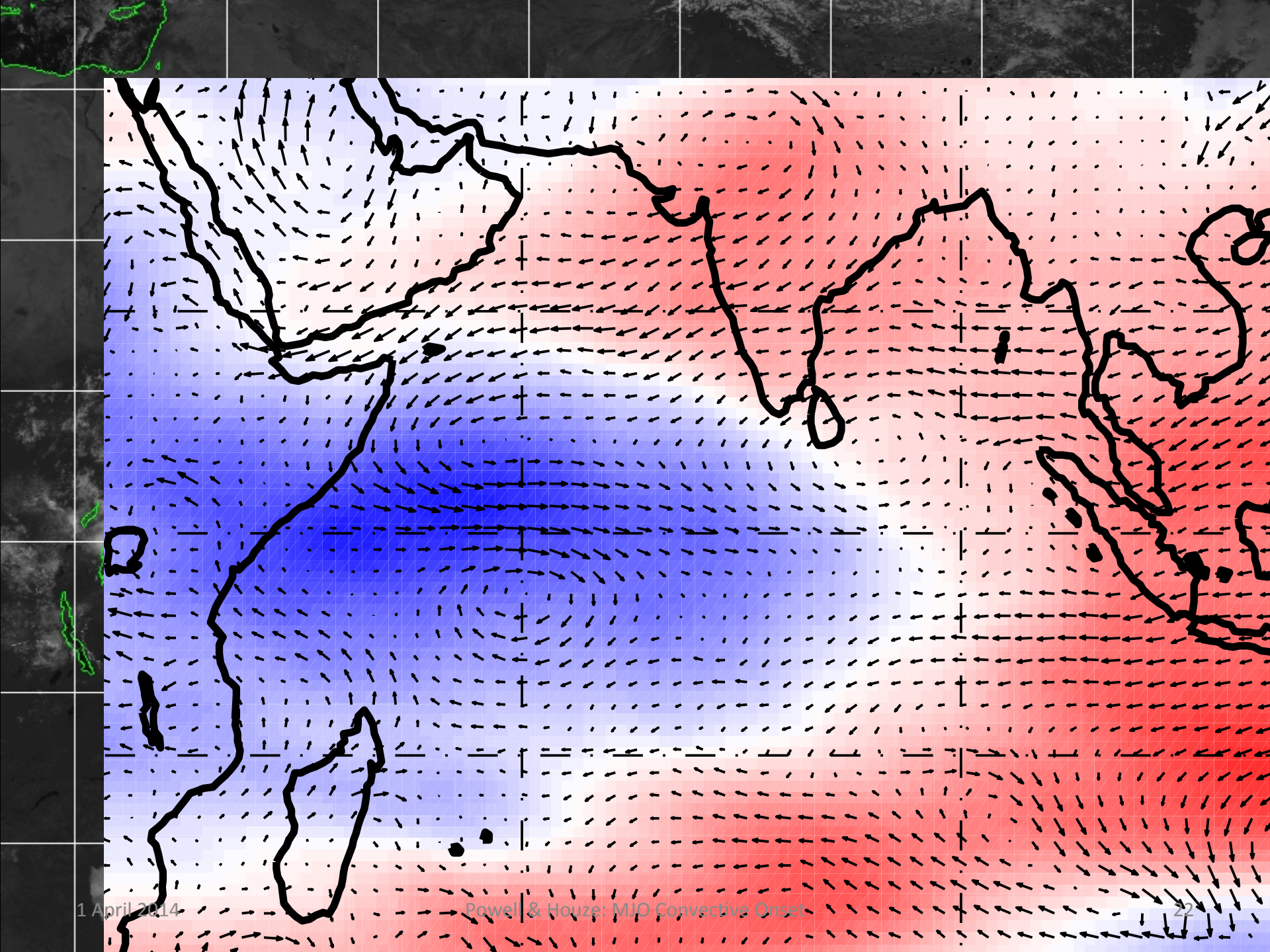


End







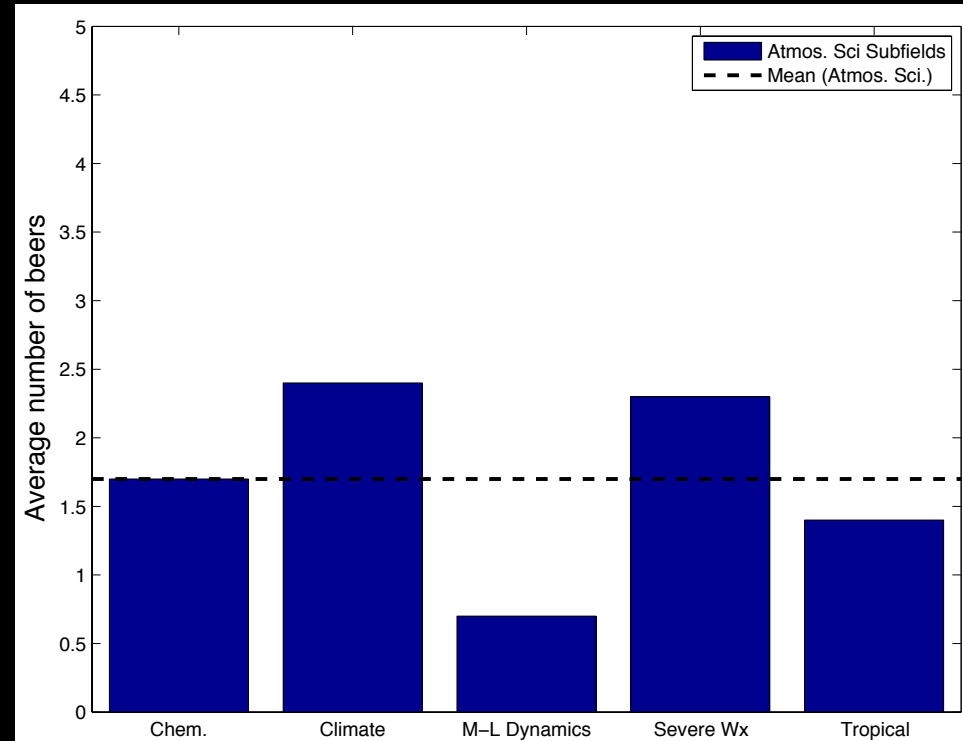


1 April 2014

Powell & Houze: MJO Convective Onset

Conclusions

- Depth of convection increases rapidly at LCE onset.
- Humidity increase is rapid too.
- Humidity anomalies form in place where widespread, organized convection develops.
- Westerly propagating UT divergence anomalies likely critical for stratiform, and thus MJO, maintenance.



Why the discrepancy?

- Higher ABV and so less volume?
- Is this a epidemic-like problem?