

Interaction of the MJO with intraseasonal extratropical waves of the Western Hemisphere

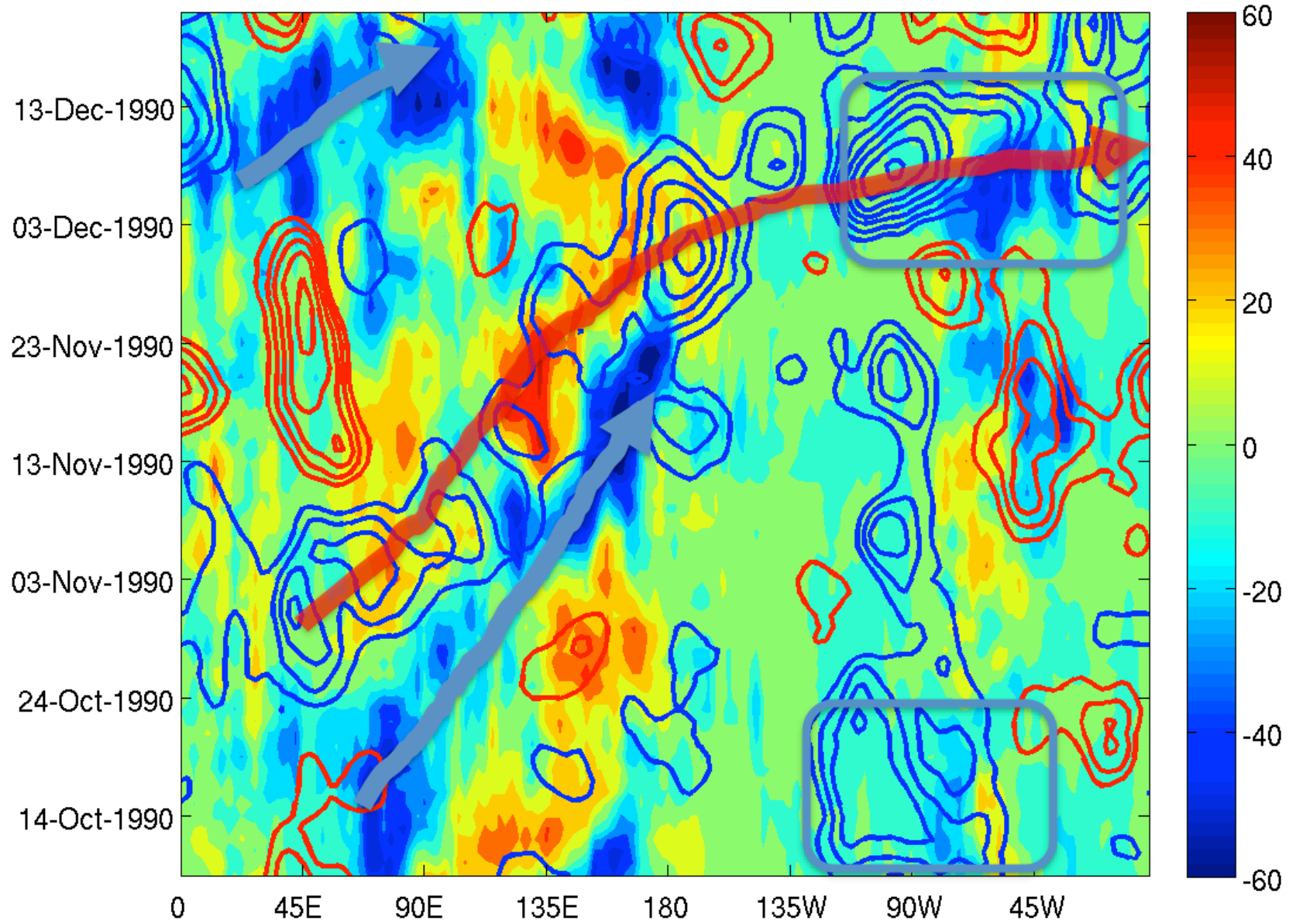
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AMS Conference on Hurricanes and Tropical Meteorology

2014

Equatorial OLR and 200 hPa Zonal Wind Anomalies



The MJO and Western Hemisphere Circulation

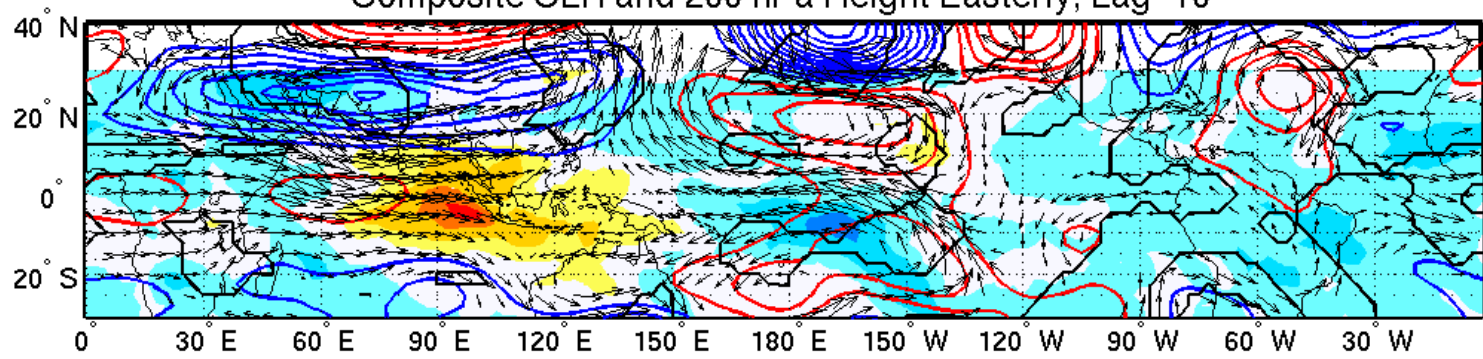
- * Roundy (2014, JAS)
 - * 86% of Indian basin MJO events are preceded by easterly wind anomalies over the equatorial Western Hemisphere
 - * Events Preceded by easterly wind anomalies behave differently from those preceded by westerly wind anomalies

Approach

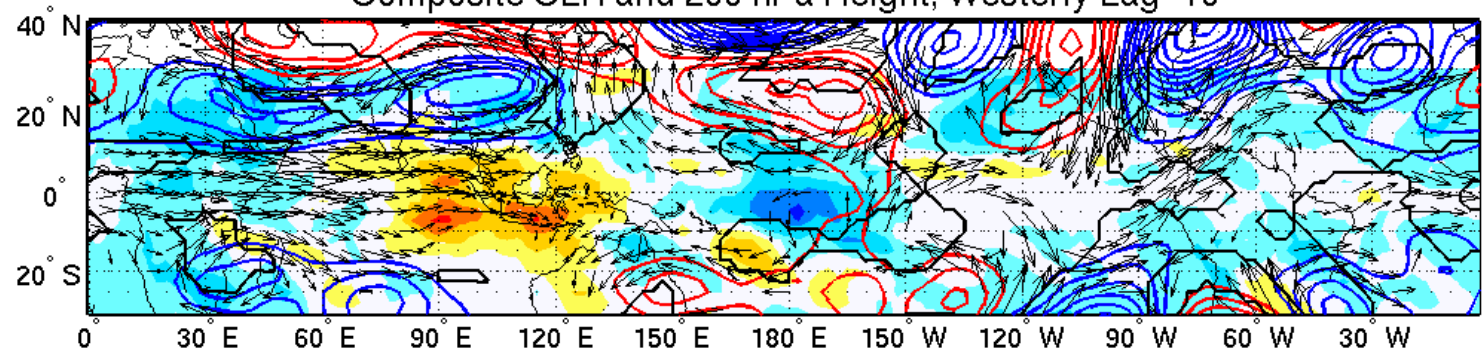
- * OLR-based MJO index, based on OLR anomalies filtered for 30-100 day periods
 - * PCs extracted, and phase numbers rotated to overlap best with Wheeler and Hendon's RMM Index
 - * Western Hemisphere equatorial zonal wind anomaly index: 140W to 40W
 - * Identify events in phase 1 simultaneous with easterly or westerly winds
 - * Composite average over the two sets of events



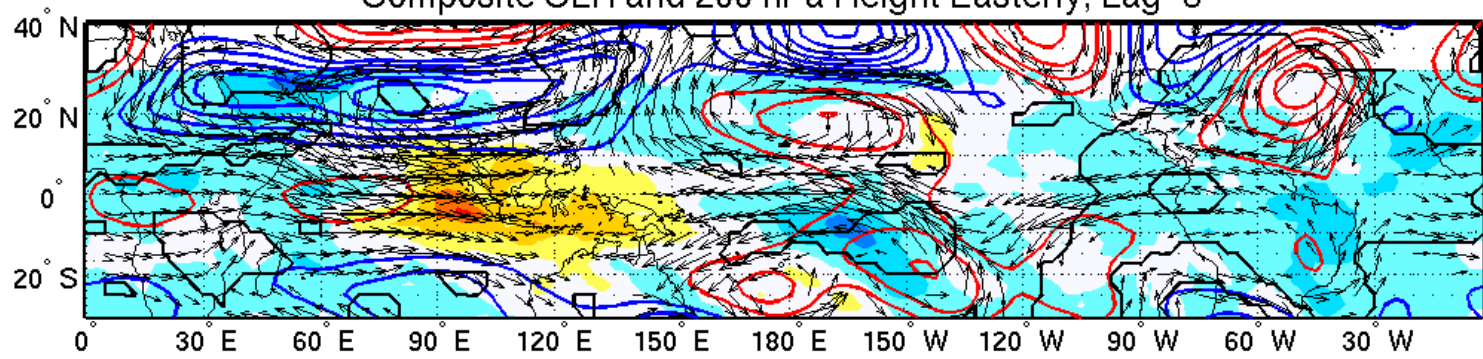
Composite OLR and 200 hPa Height Easterly, Lag -10



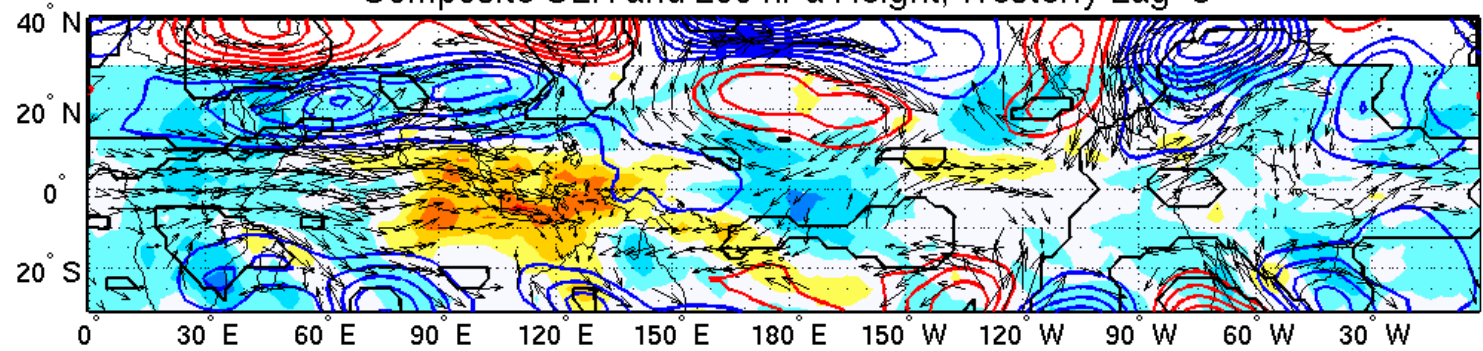
Composite OLR and 200 hPa Height, Westerly Lag -10



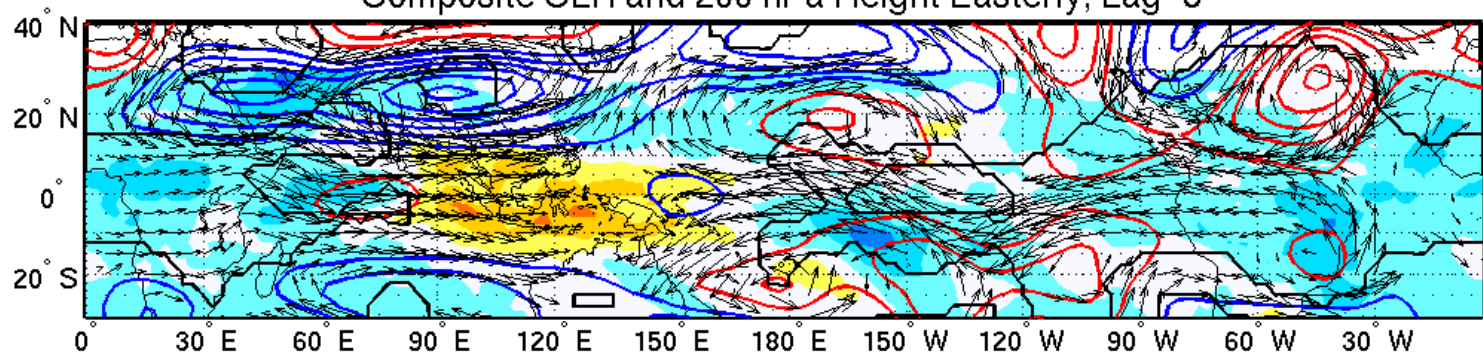
Composite OLR and 200 hPa Height Easterly, Lag -8



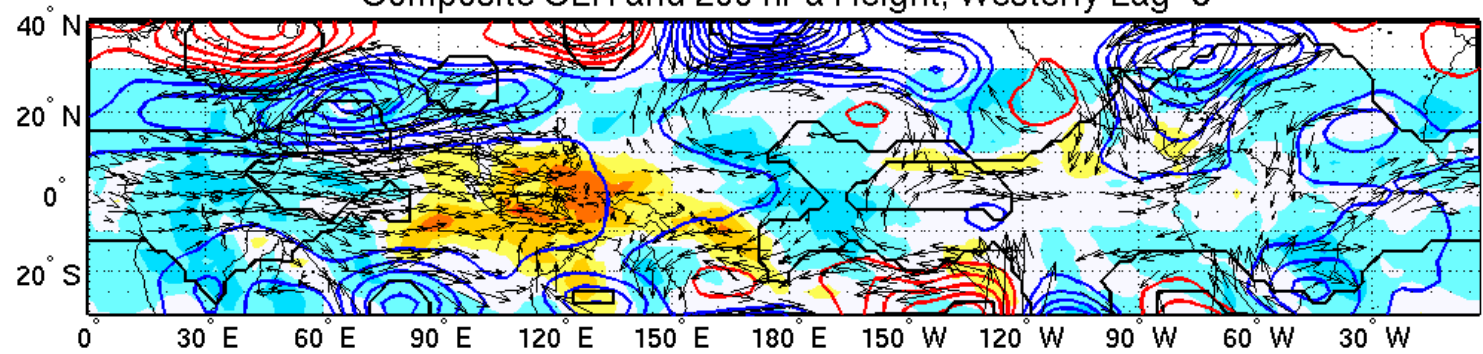
Composite OLR and 200 hPa Height, Westerly Lag -8



Composite OLR and 200 hPa Height Easterly, Lag -6

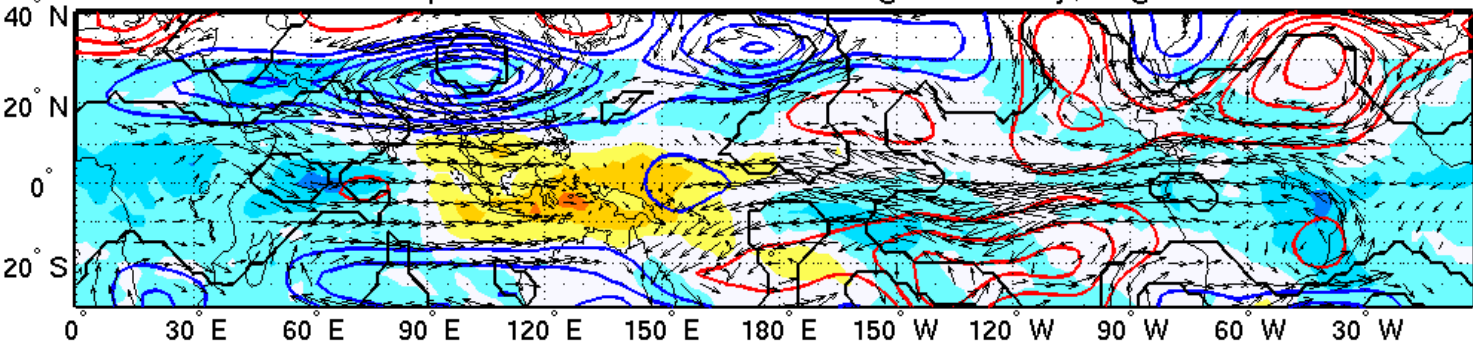


Composite OLR and 200 hPa Height, Westerly Lag -6

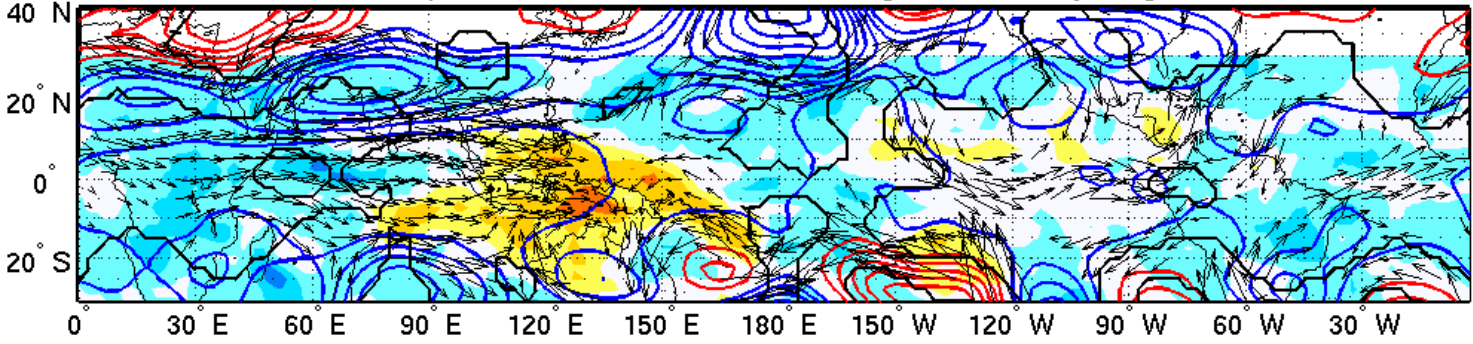




Composite OLR and 200 hPa Height Easterly, Lag -4

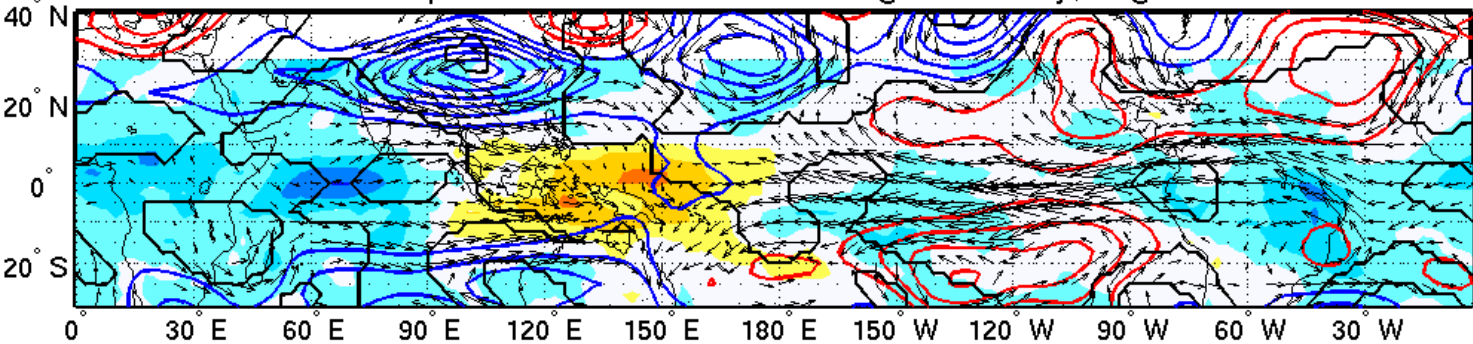


Composite OLR and 200 hPa Height, Westerly Lag -4

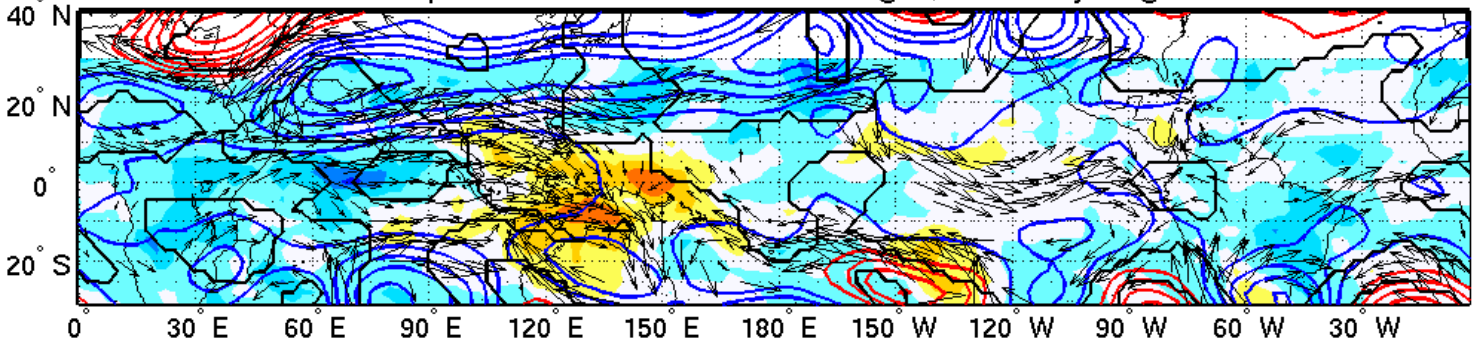




Composite OLR and 200 hPa Height Easterly, Lag -2

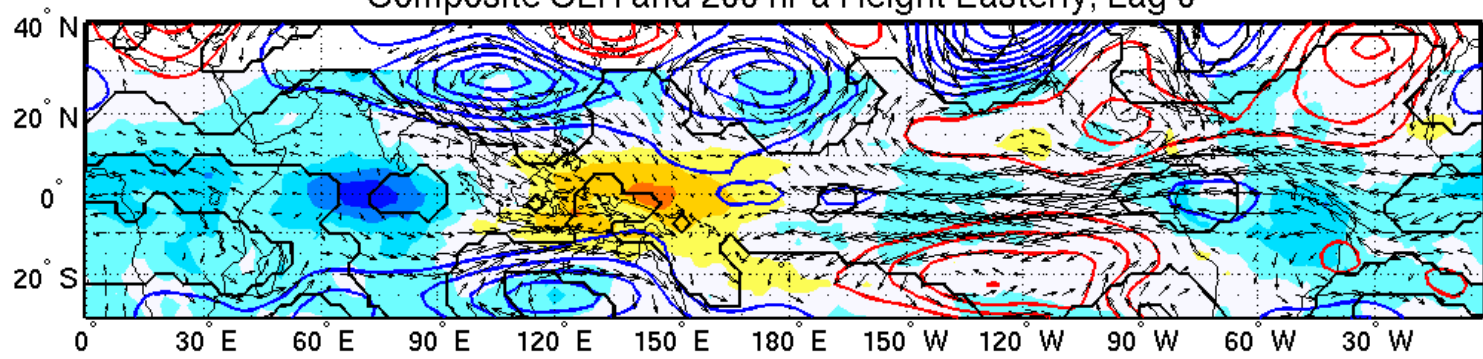


Composite OLR and 200 hPa Height, Westerly Lag -2

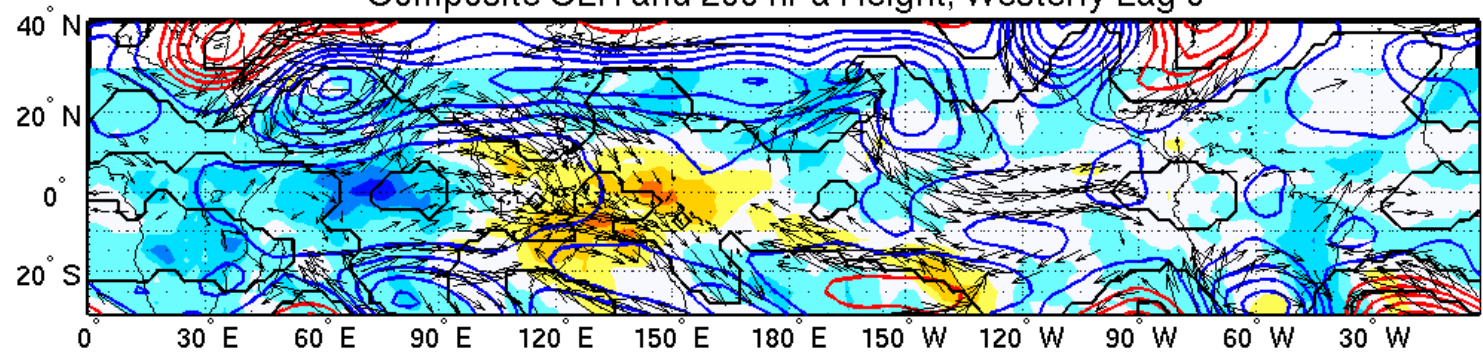




Composite OLR and 200 hPa Height Easterly, Lag 0

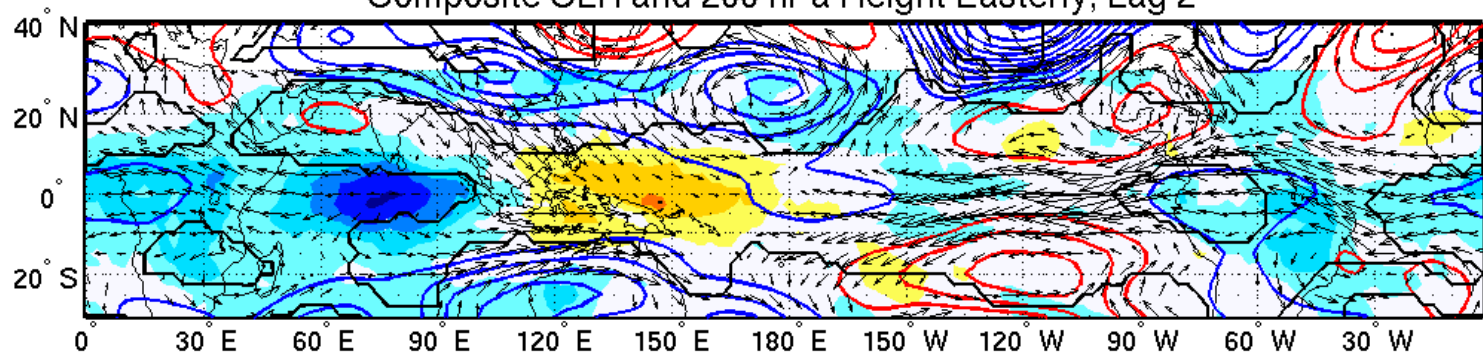


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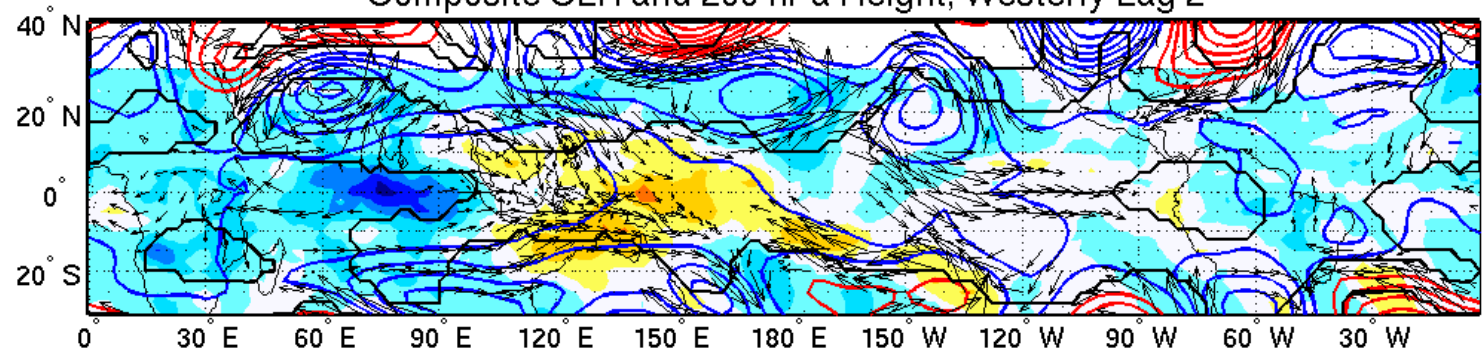




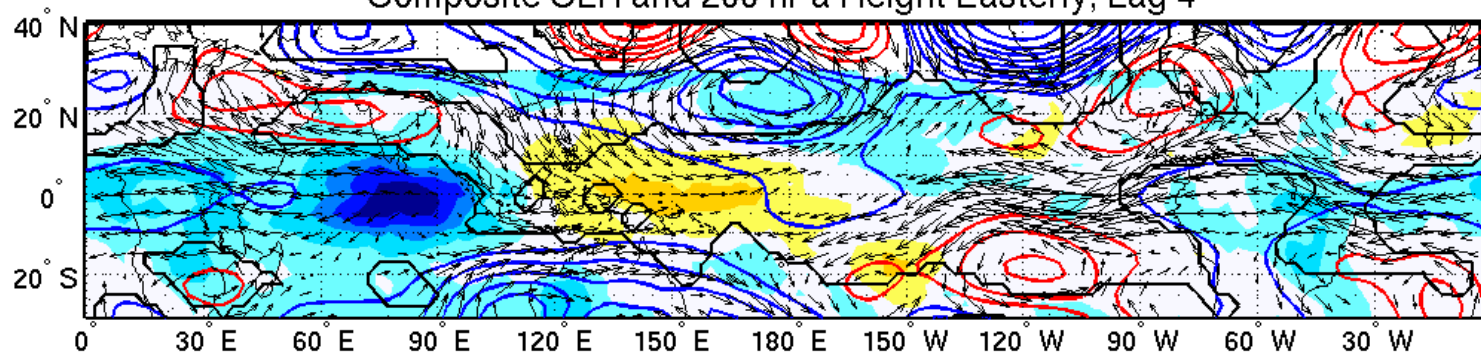
Composite OLR and 200 hPa Height Easterly, Lag 2



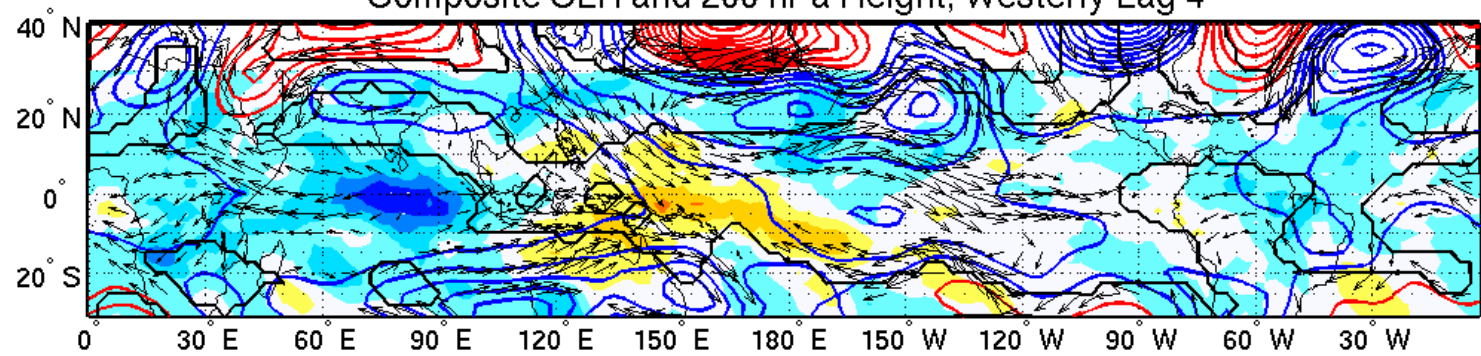
Composite OLR and 200 hPa Height, Westerly Lag 2



Composite OLR and 200 hPa Height Easterly, Lag 4

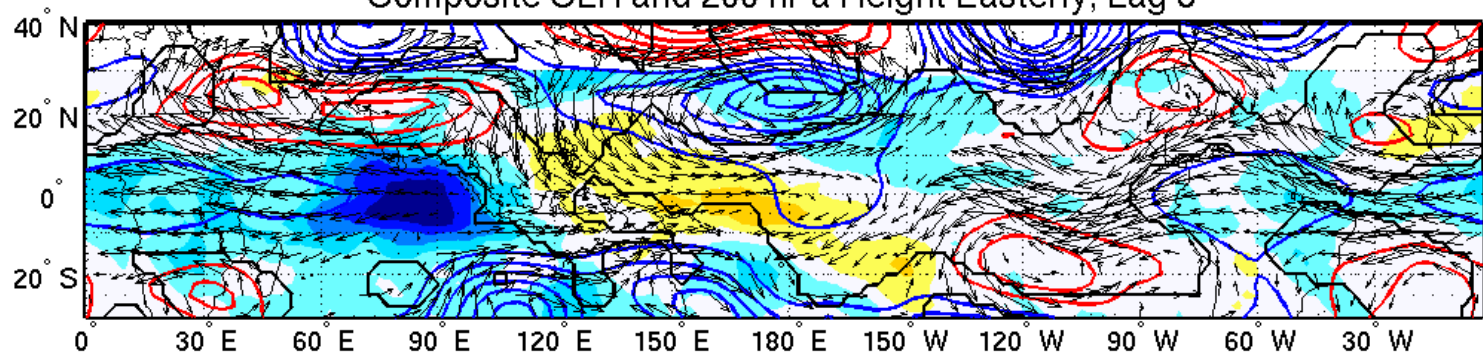


Composite OLR and 200 hPa Height, Westerly Lag 4

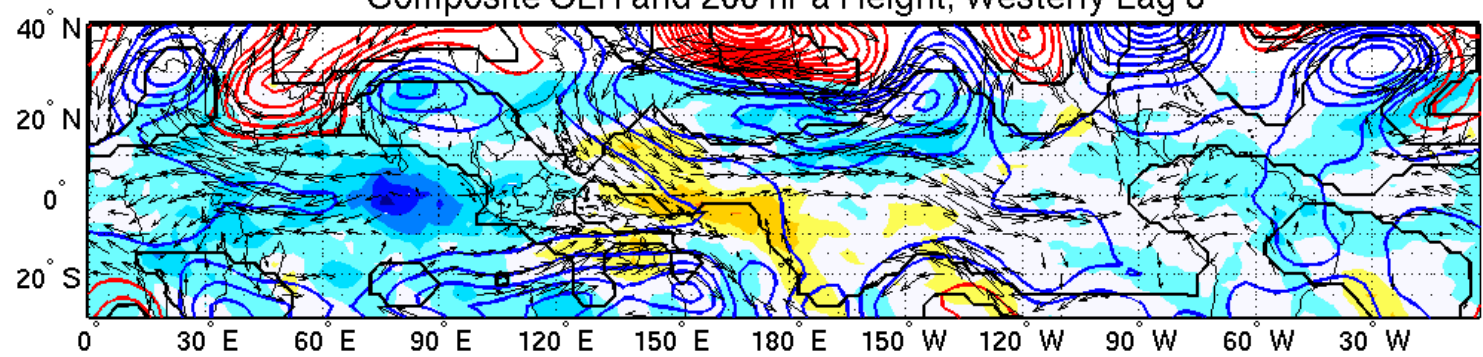




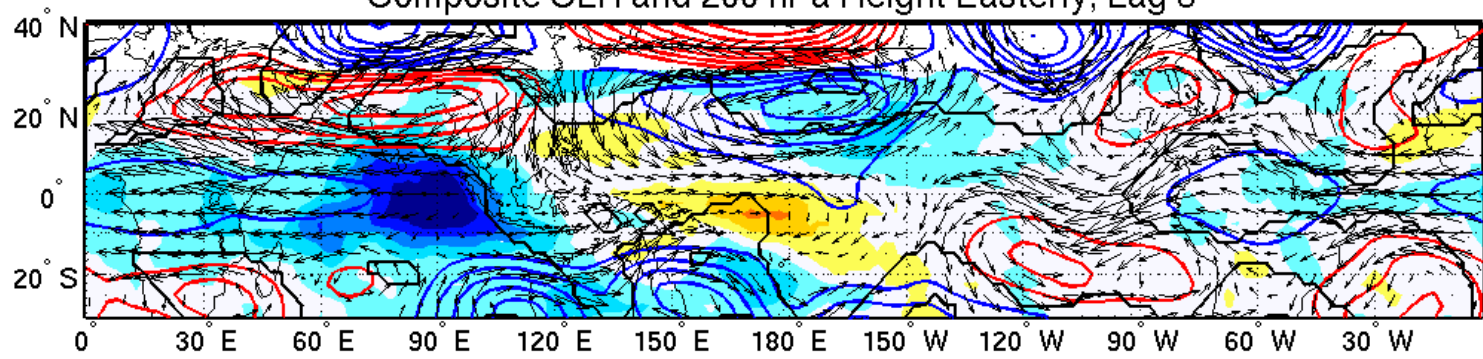
Composite OLR and 200 hPa Height Easterly, Lag 6



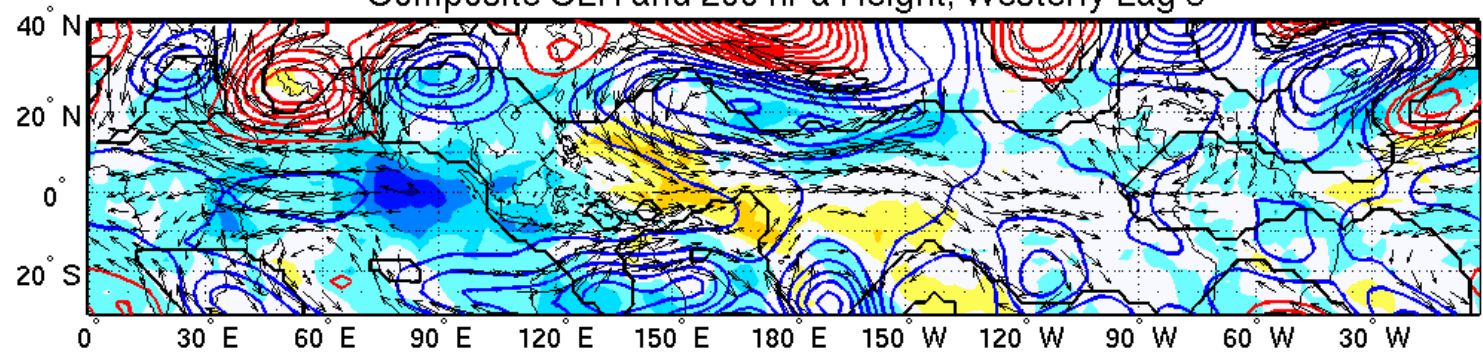
Composite OLR and 200 hPa Height, Westerly Lag 6



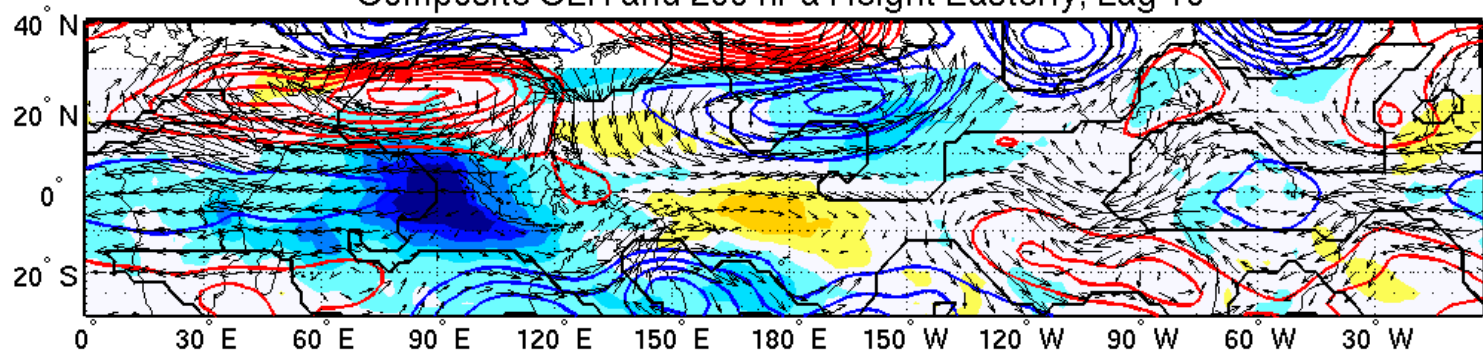
Composite OLR and 200 hPa Height Easterly, Lag 8



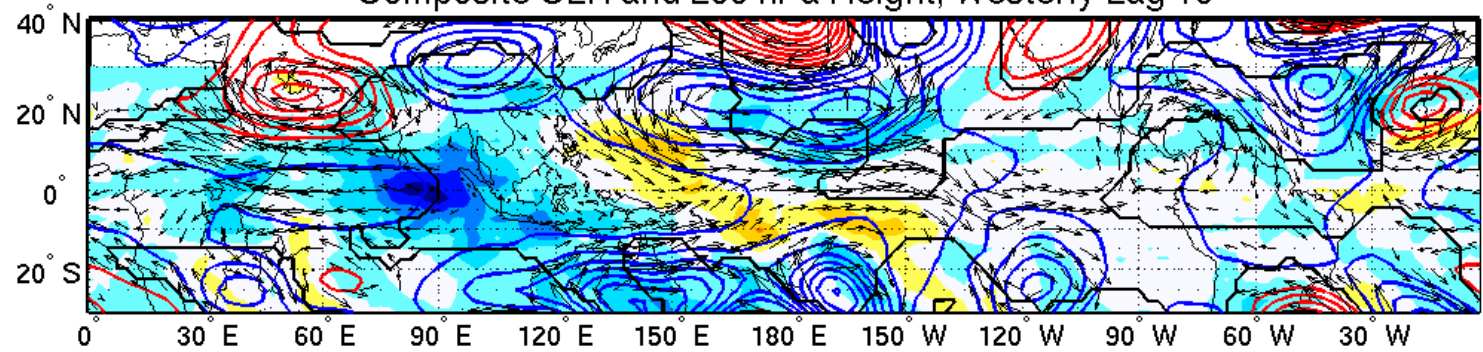
Composite OLR and 200 hPa Height, Westerly Lag 8



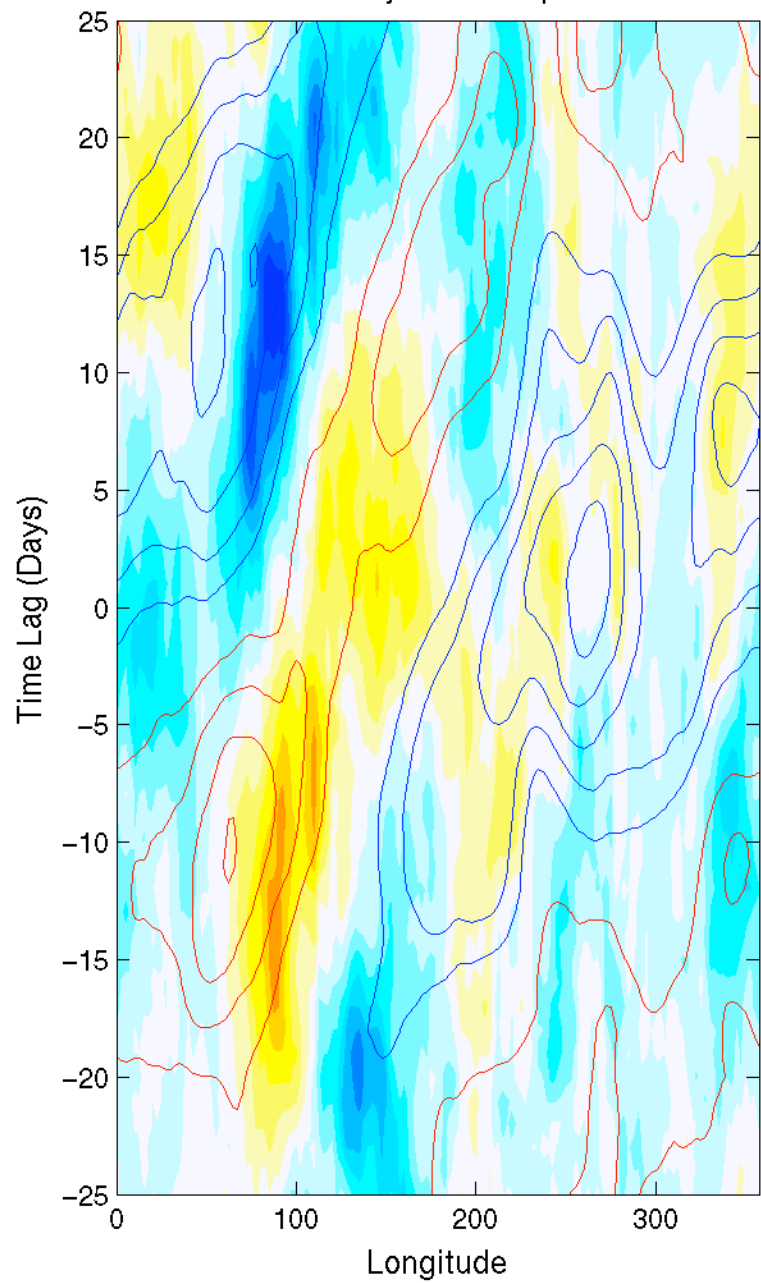
Composite OLR and 200 hPa Height Easterly, Lag 10



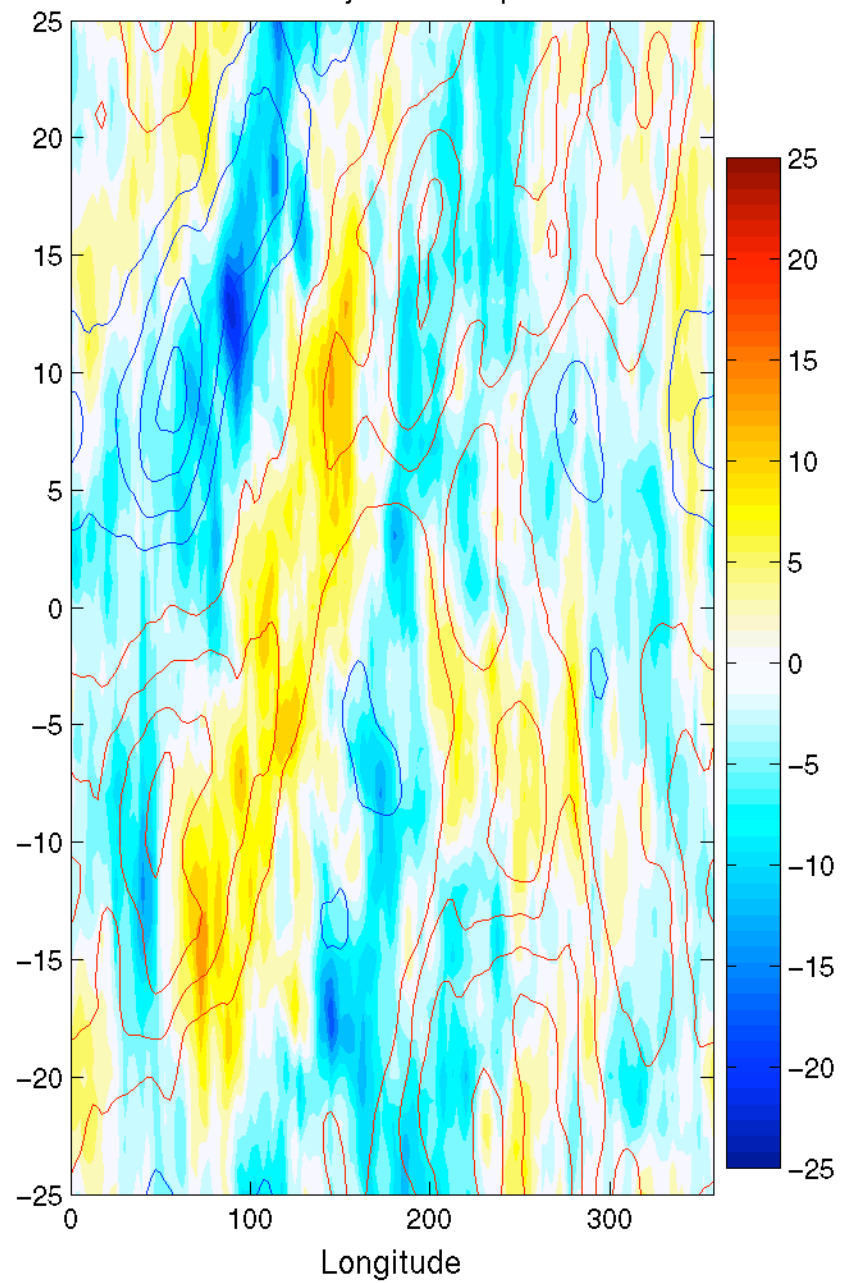
Composite OLR and 200 hPa Height, Westerly Lag 10



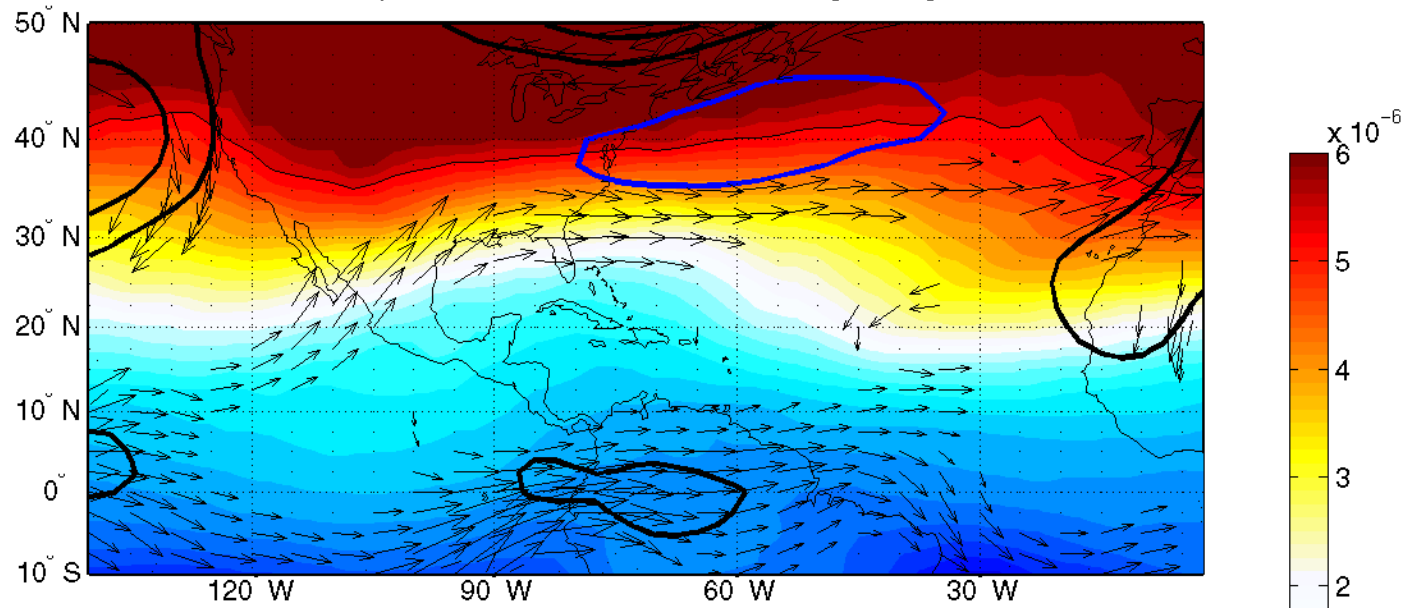
a. Easterly W. Hemisphere



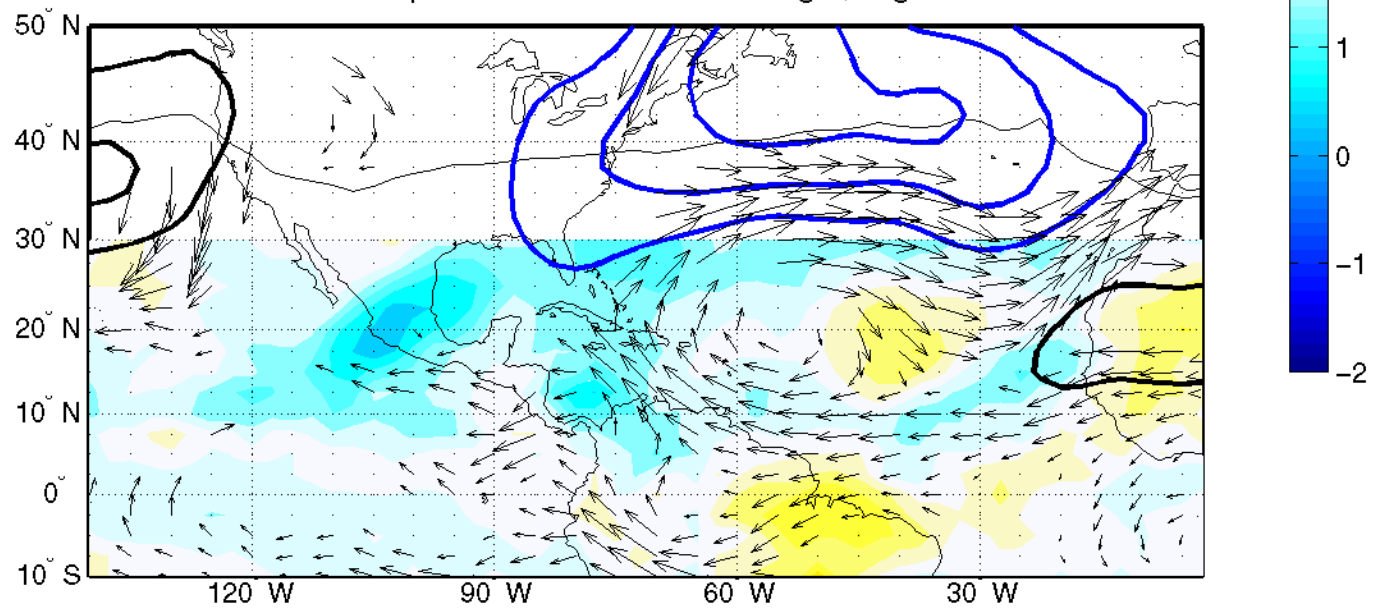
b. Westerly W. Hemisphere



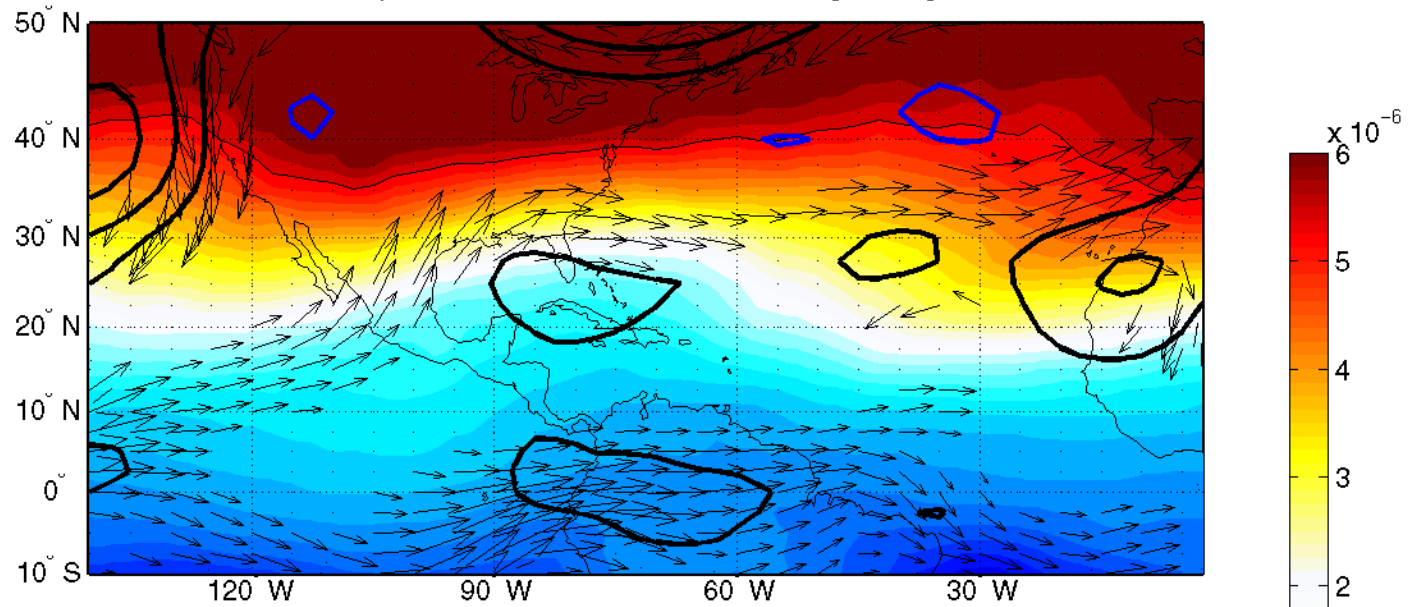
a. Composite 350K PV and 200 hPa Height, Lag -23



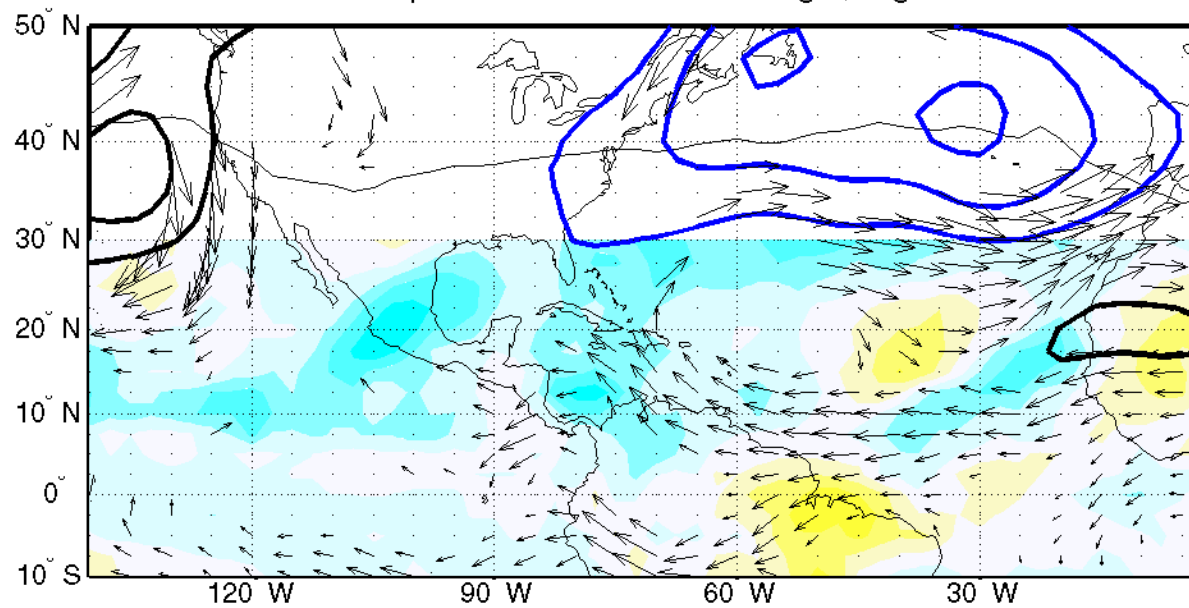
b. Composite OLR and 850 hPa Height, Lag -23



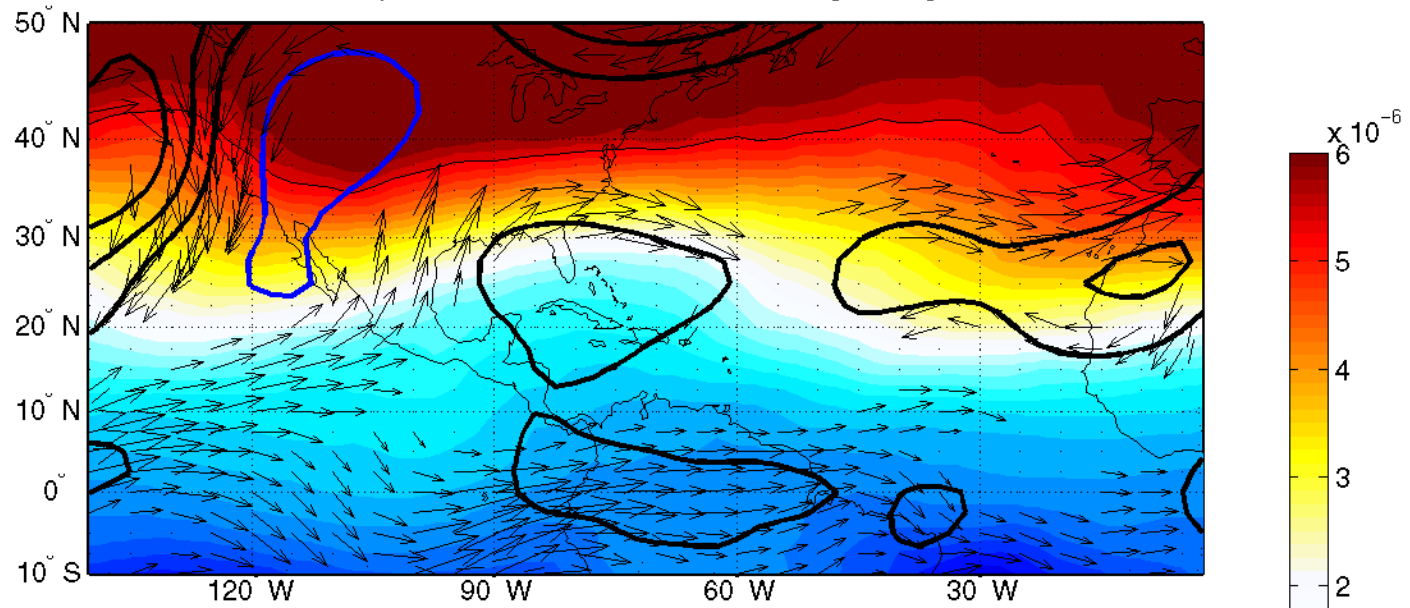
a. Composite 350K PV and 200 hPa Height, Lag -22



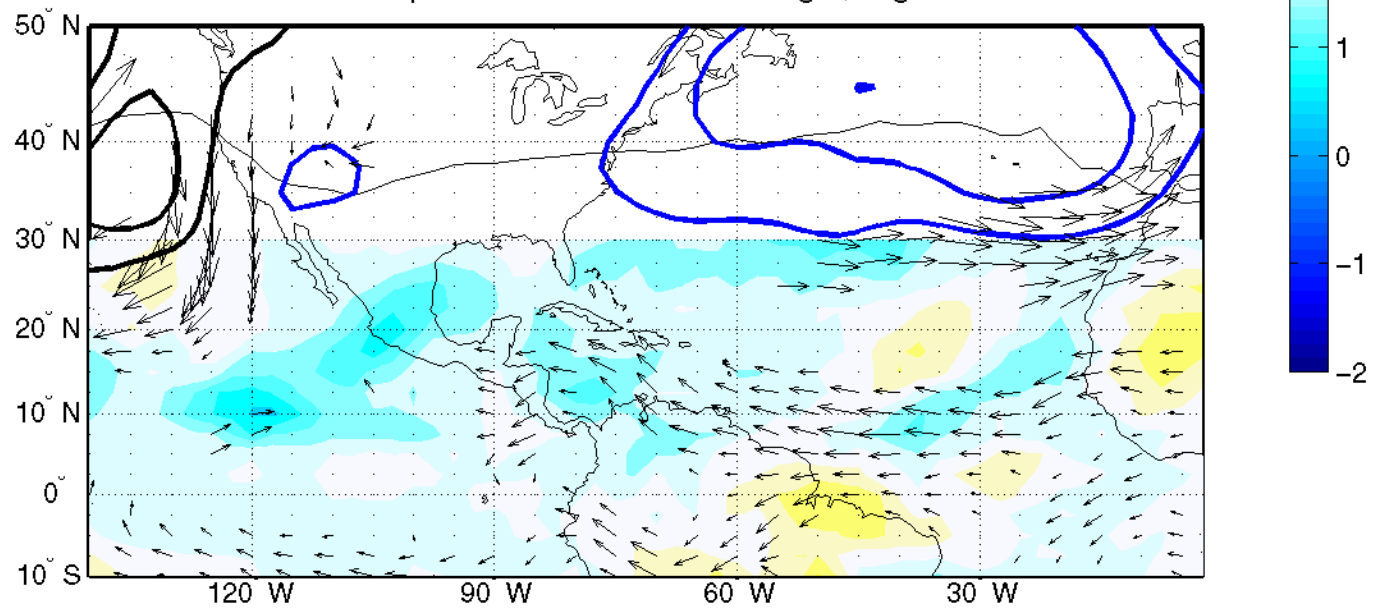
b. Composite OLR and 850 hPa Height, Lag -22



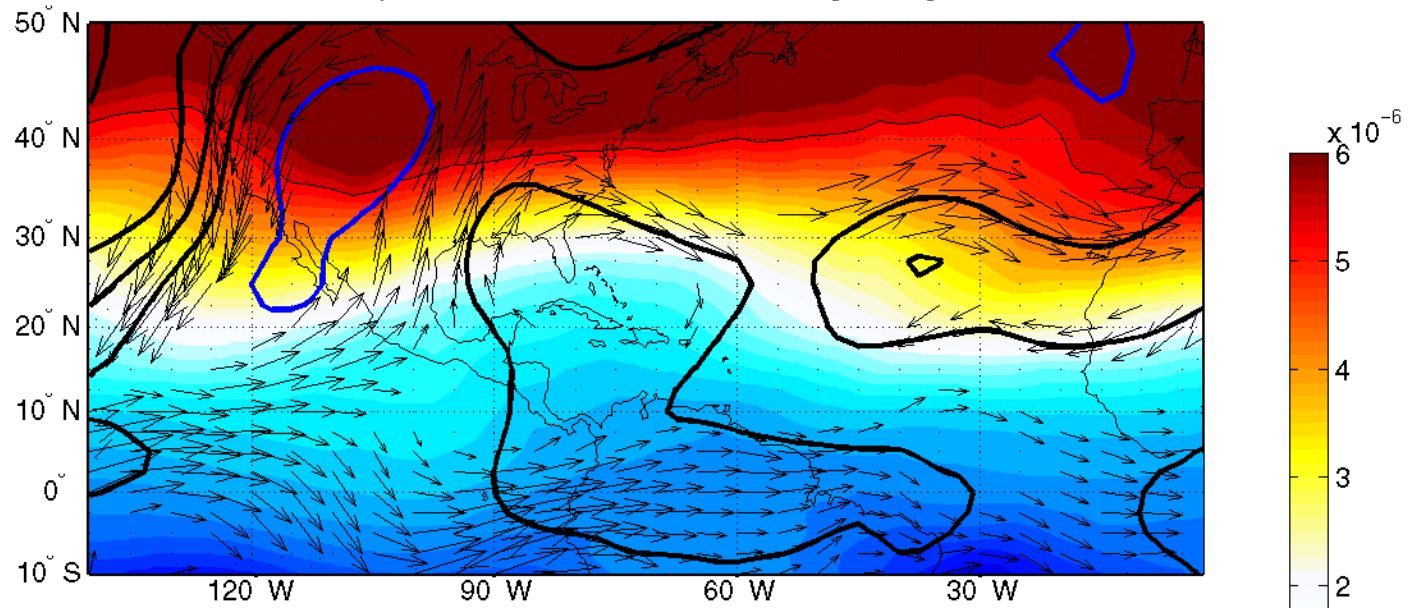
a. Composite 350K PV and 200 hPa Height, Lag -21



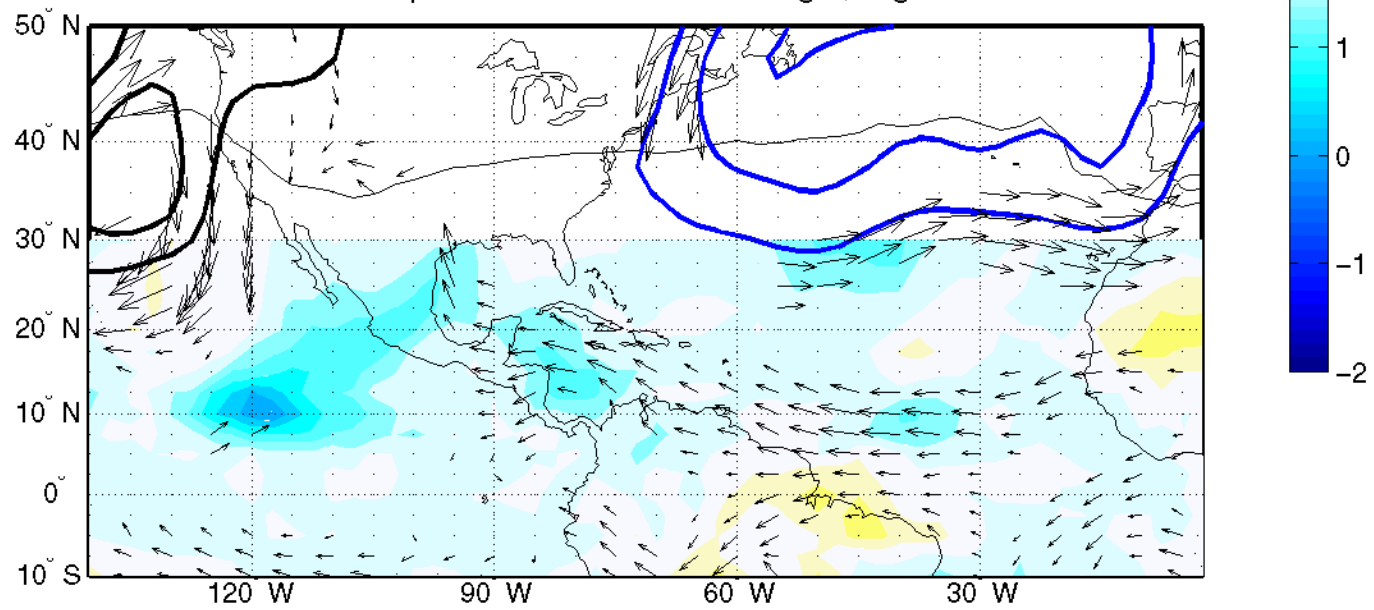
b. Composite OLR and 850 hPa Height, Lag -21



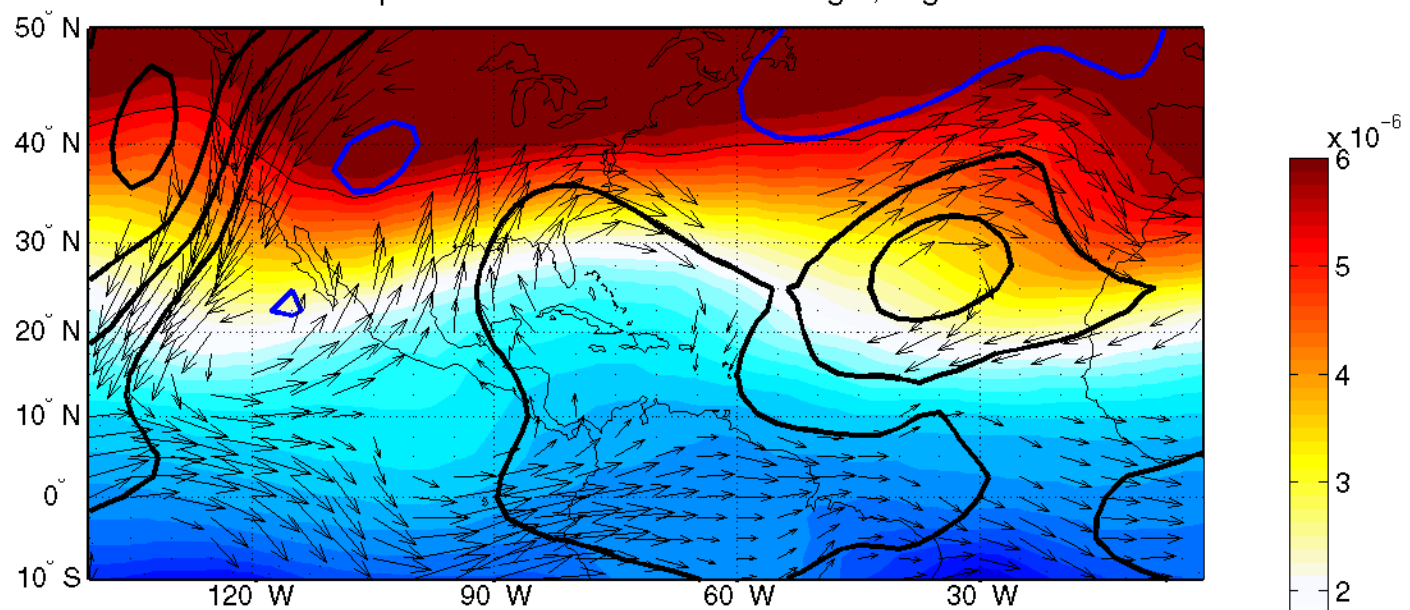
a. Composite 350K PV and 200 hPa Height, Lag -20



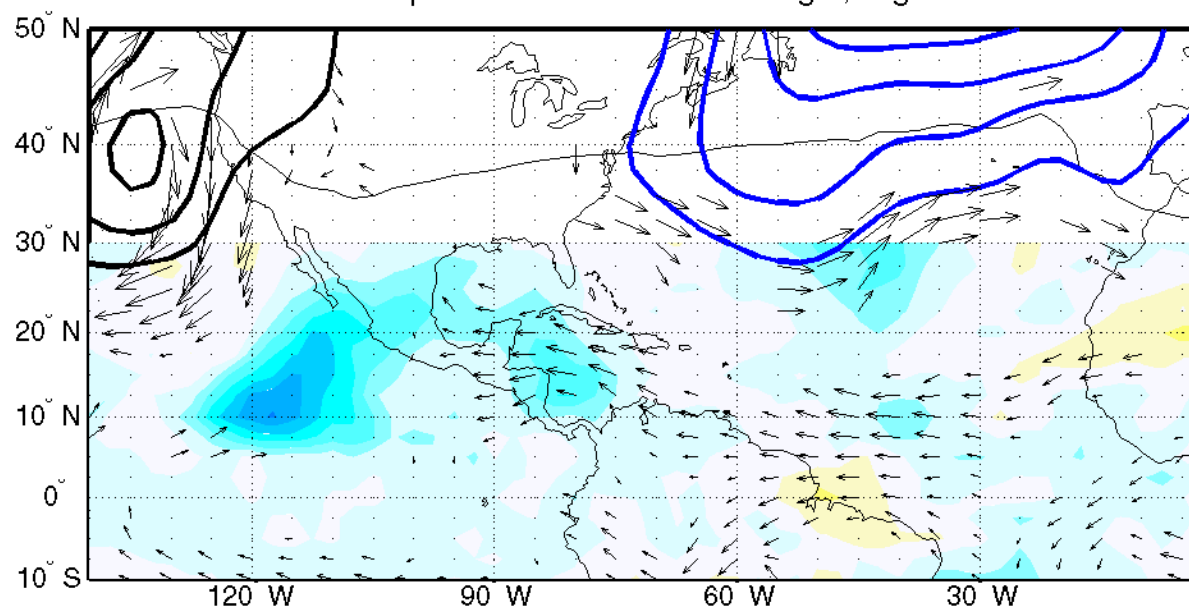
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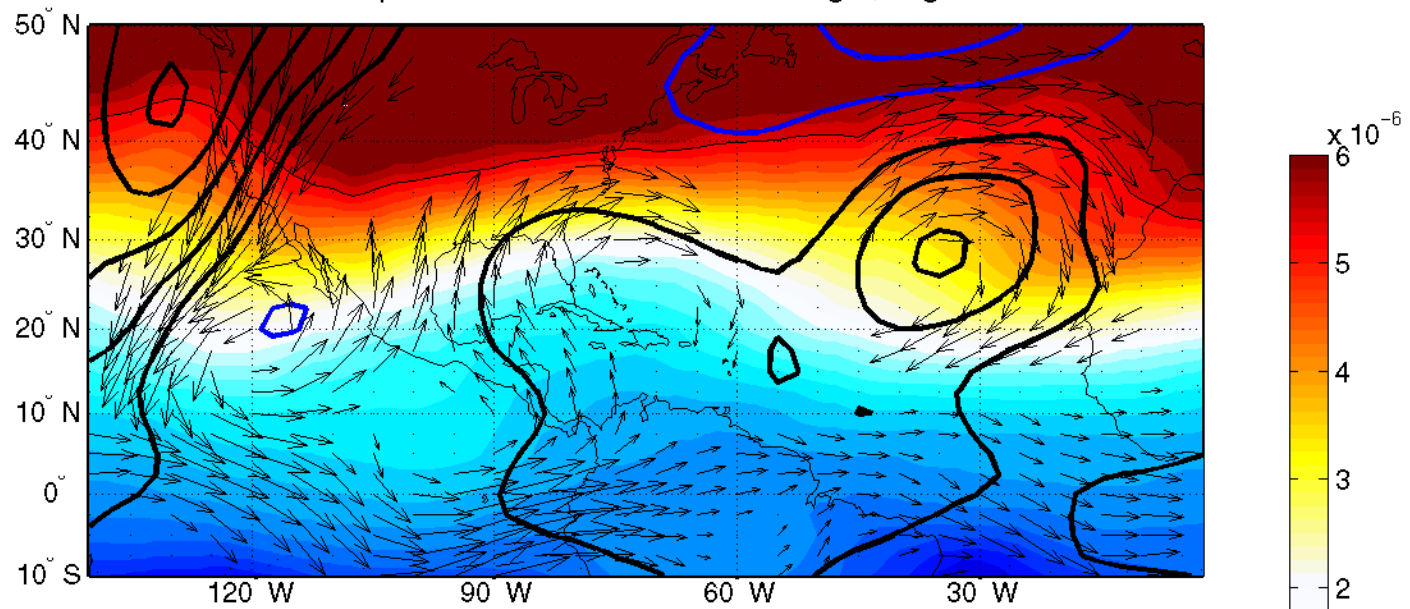
a. Composite 350K PV and 200 hPa Height, Lag -19



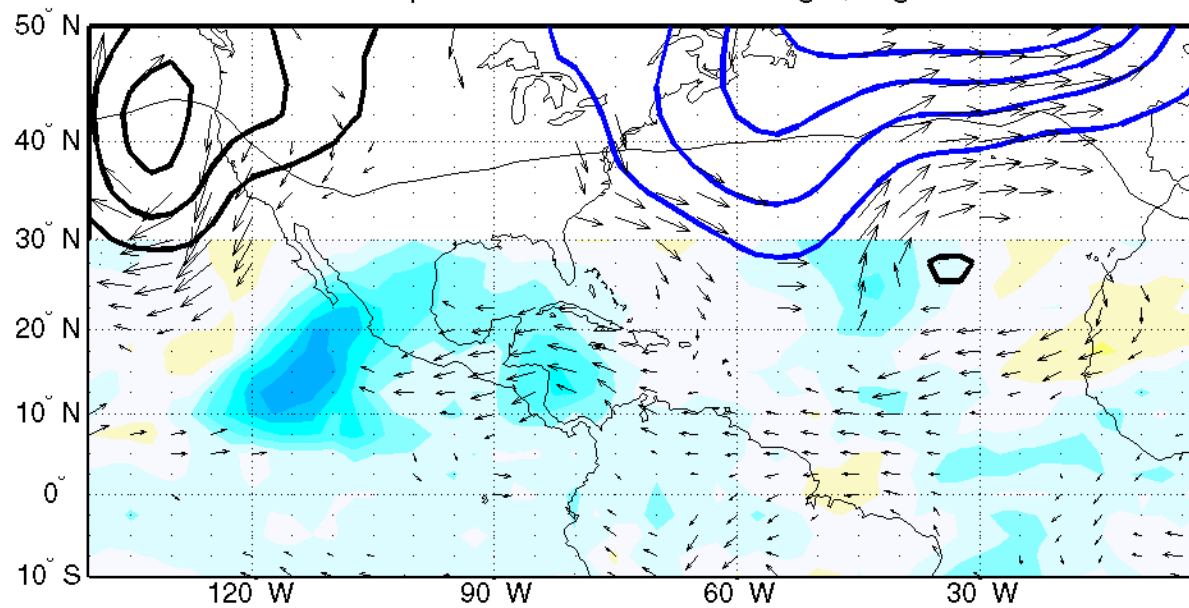
b. Composite OLR and 850 hPa Height, Lag -19



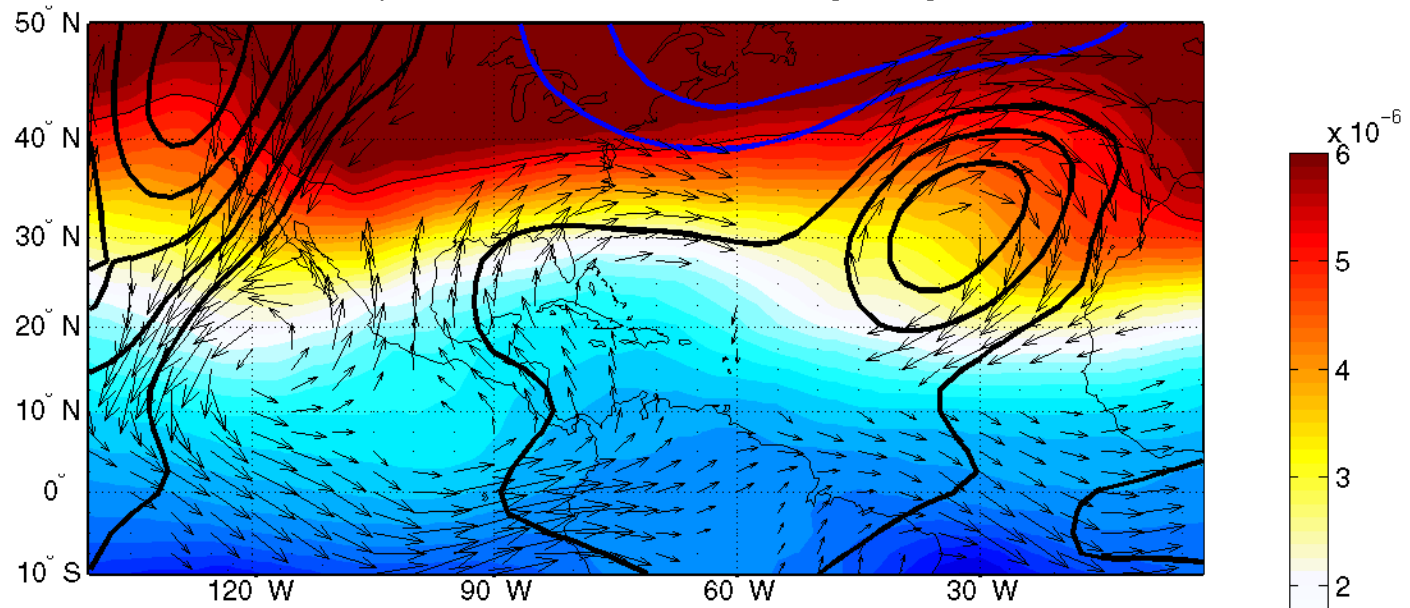
a. Composite 350K PV and 200 hPa Height, Lag -18



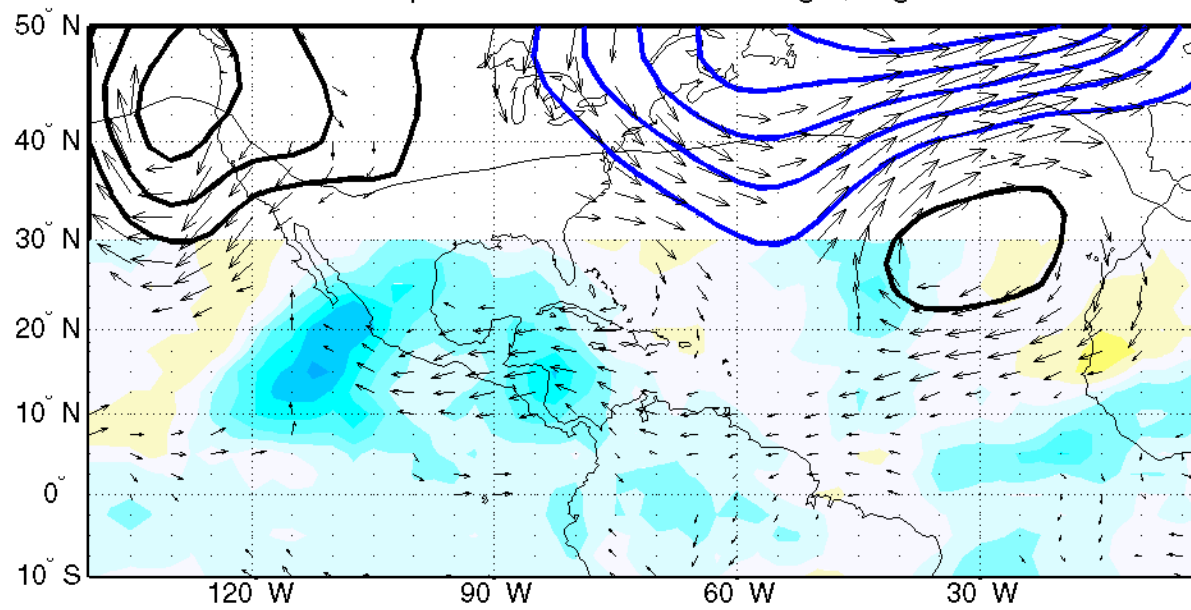
b. Composite OLR and 850 hPa Height, Lag -18



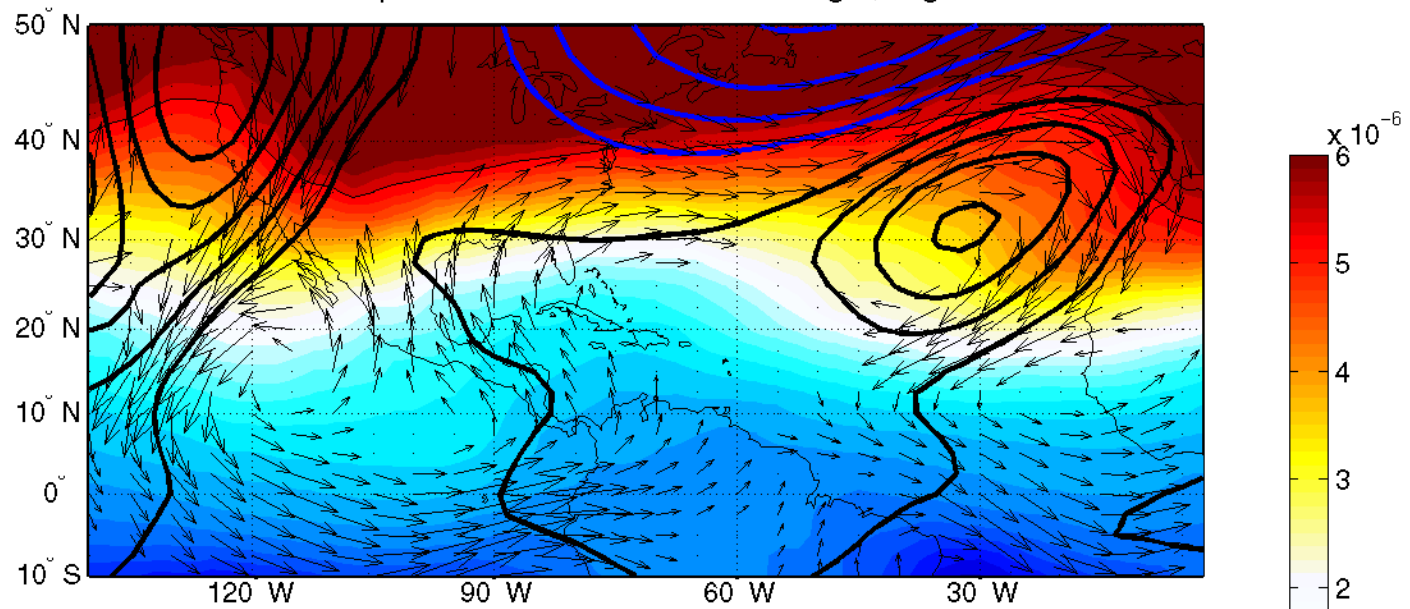
a. Composite 350K PV and 200 hPa Height, Lag -17



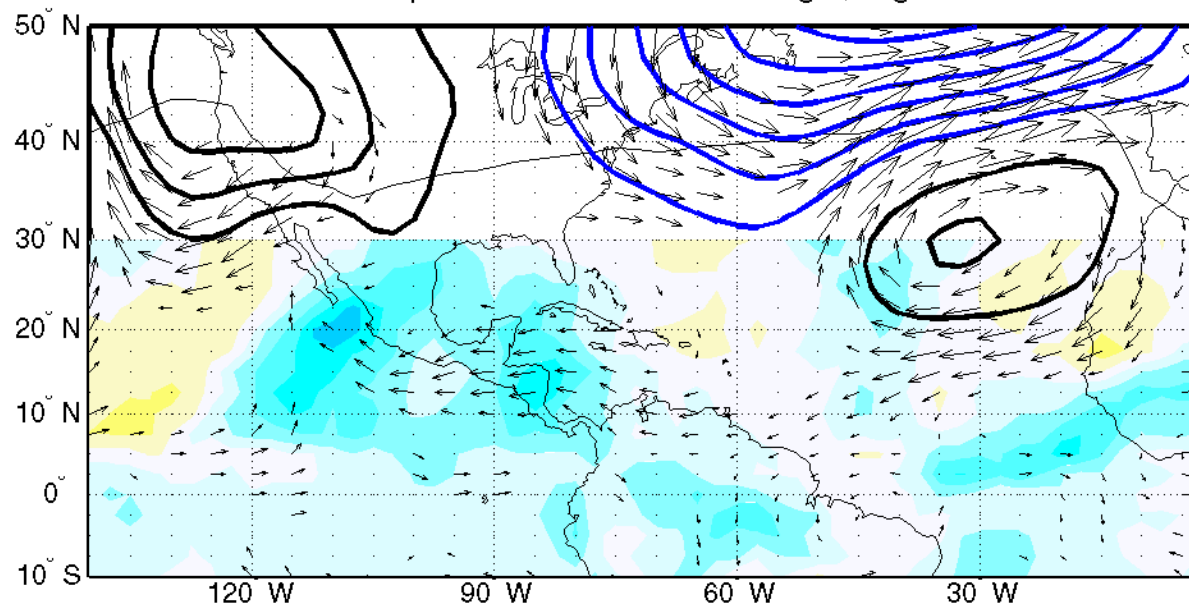
b. Composite OLR and 850 hPa Height, Lag -17



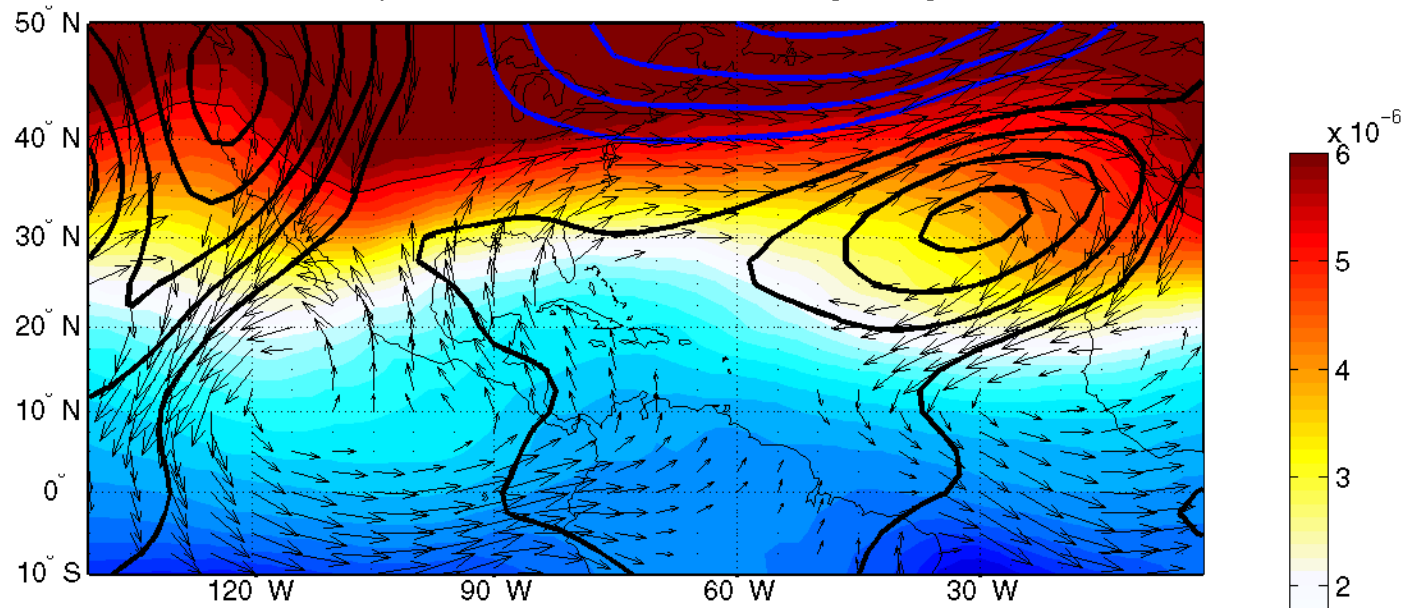
a. Composite 350K PV and 200 hPa Height, Lag -16



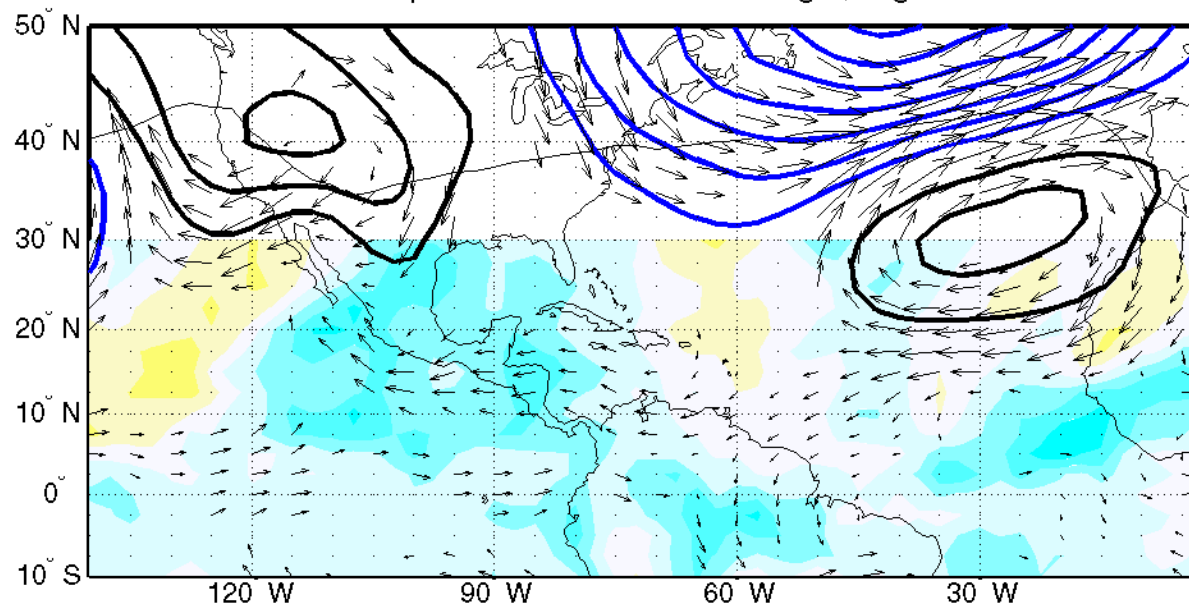
b. Composite OLR and 850 hPa Height, Lag -16



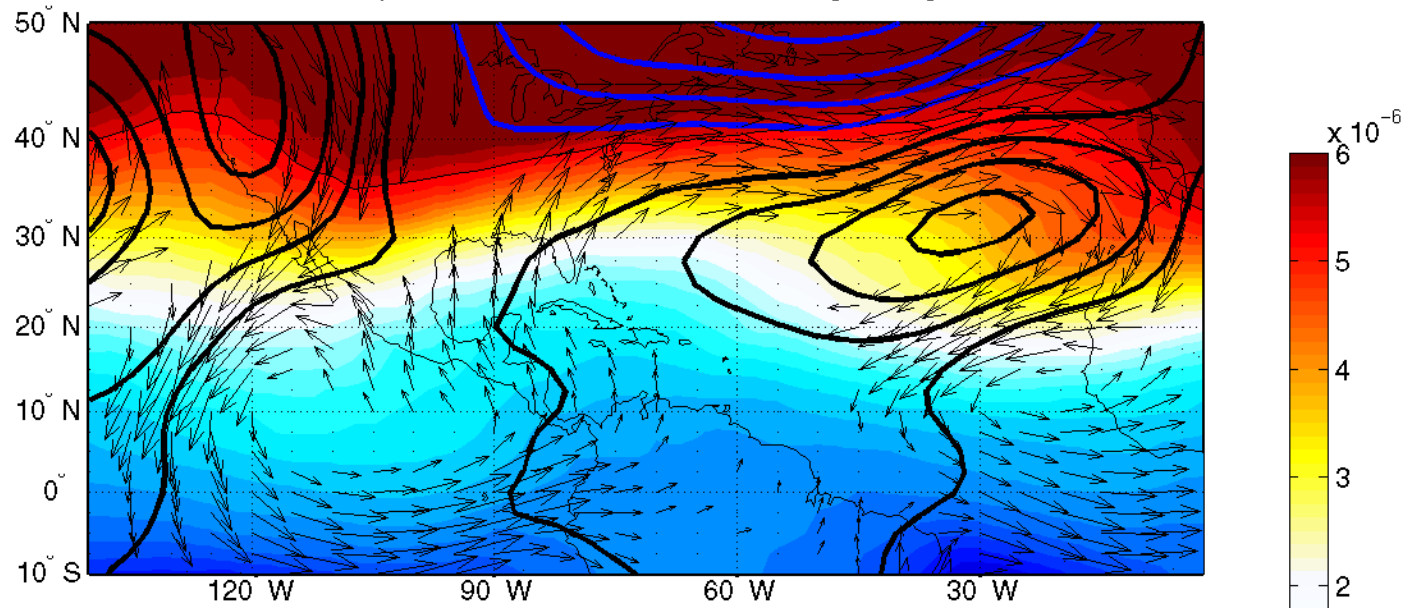
a. Composite 350K PV and 200 hPa Height, Lag -15



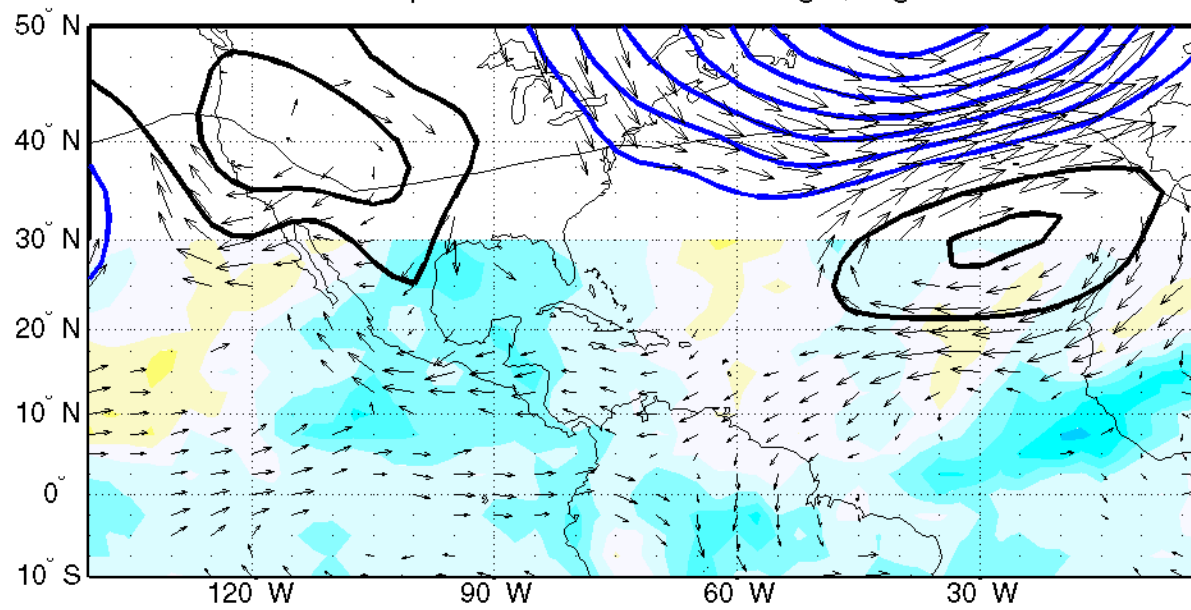
b. Composite OLR and 850 hPa Height, Lag -15



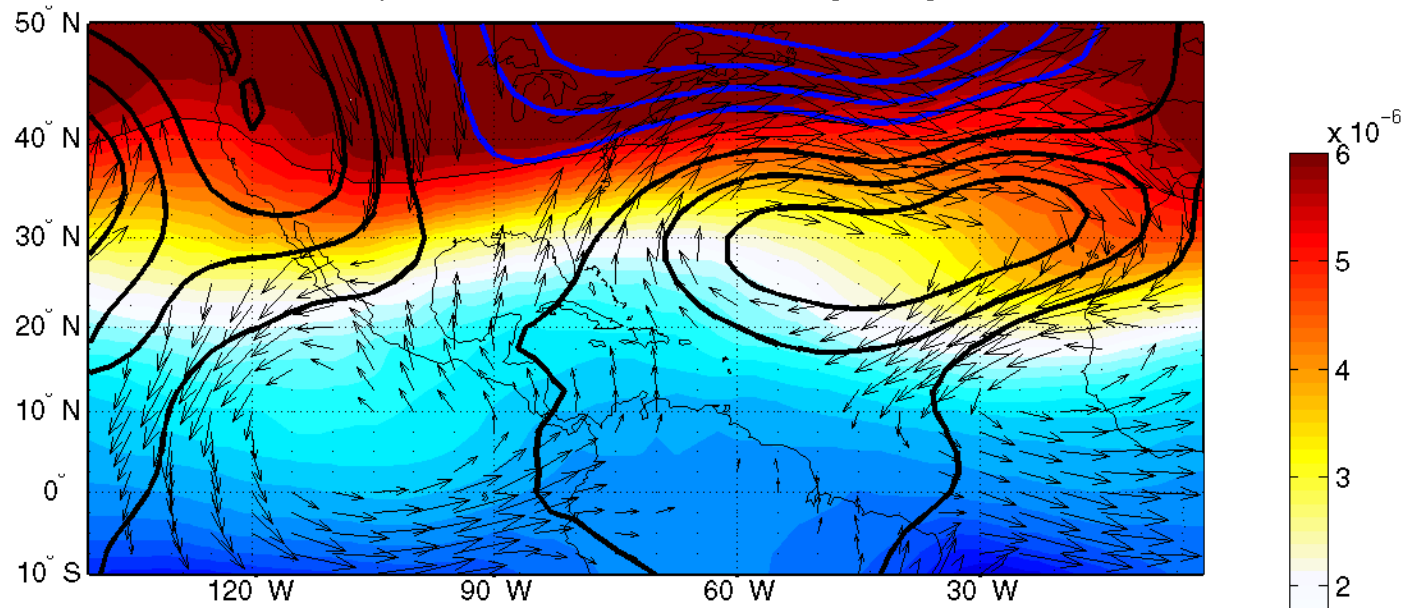
a. Composite 350K PV and 200 hPa Height, Lag -14



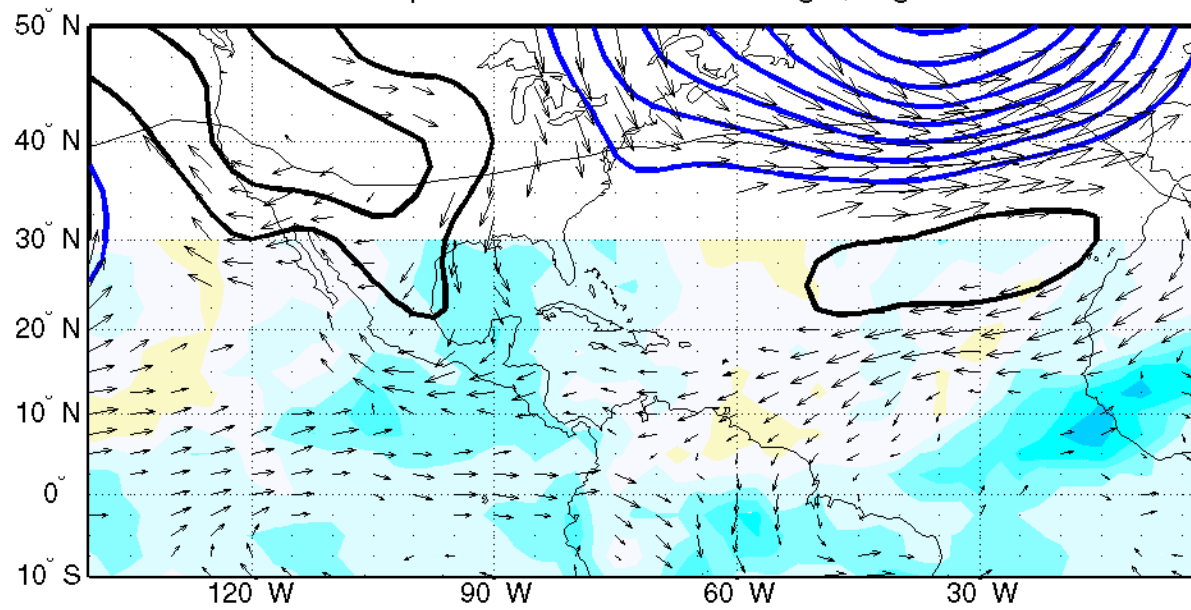
b. Composite OLR and 850 hPa Height, Lag -14



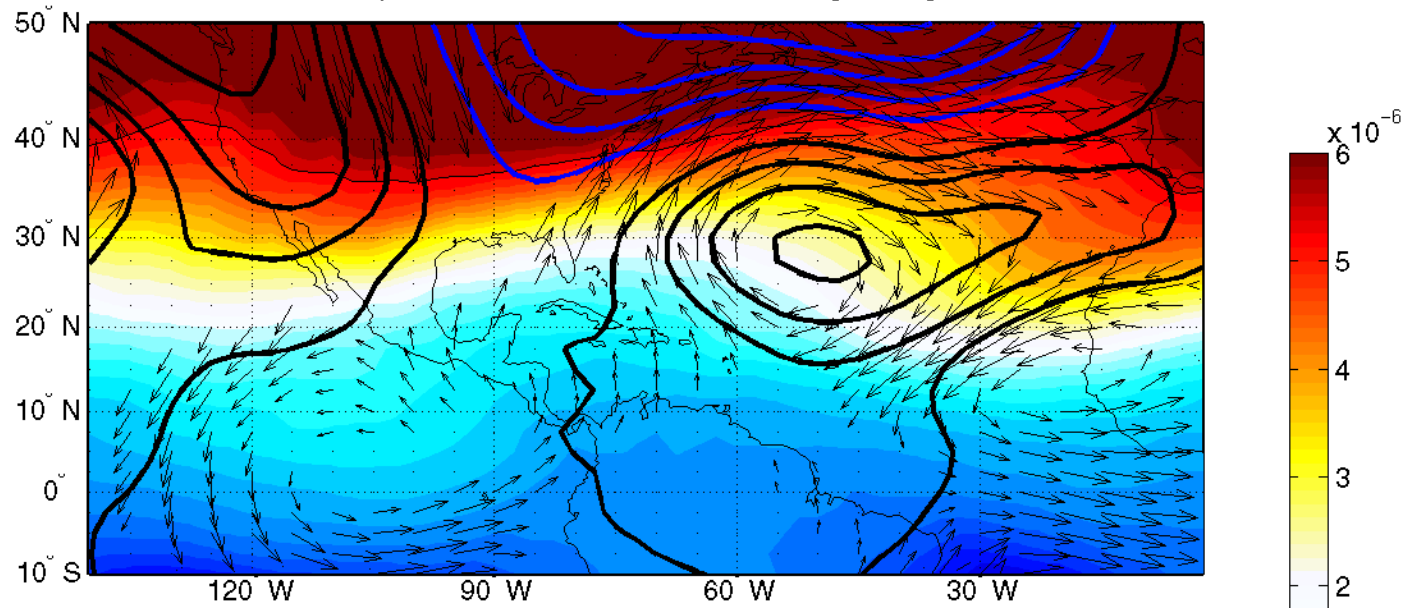
a. Composite 350K PV and 200 hPa Height, Lag -13



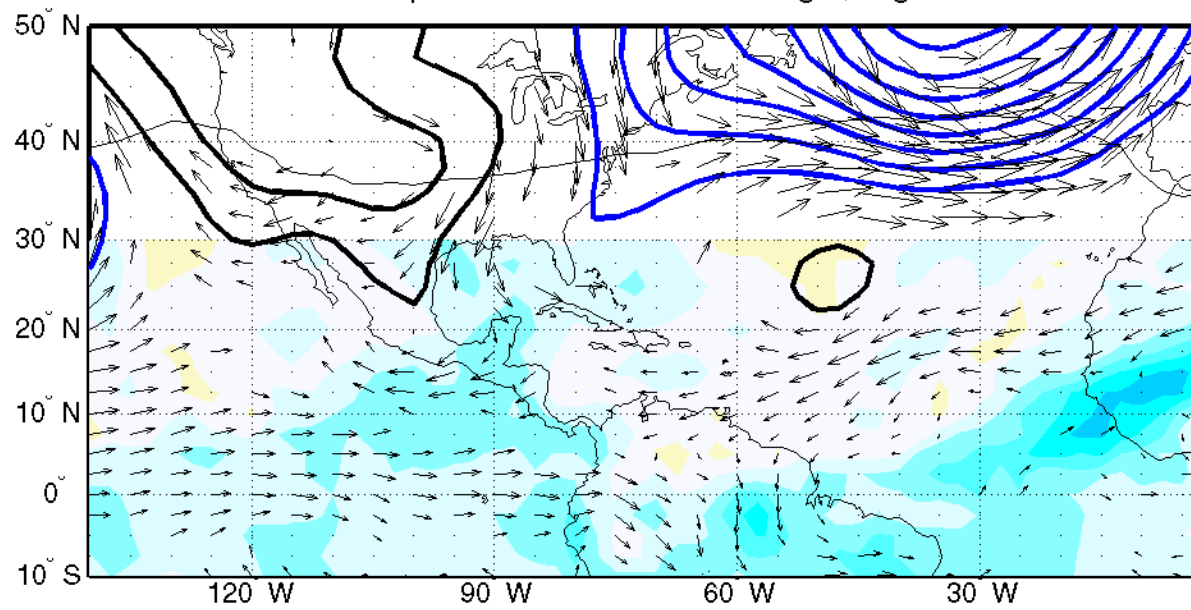
b. Composite OLR and 850 hPa Height, Lag -13



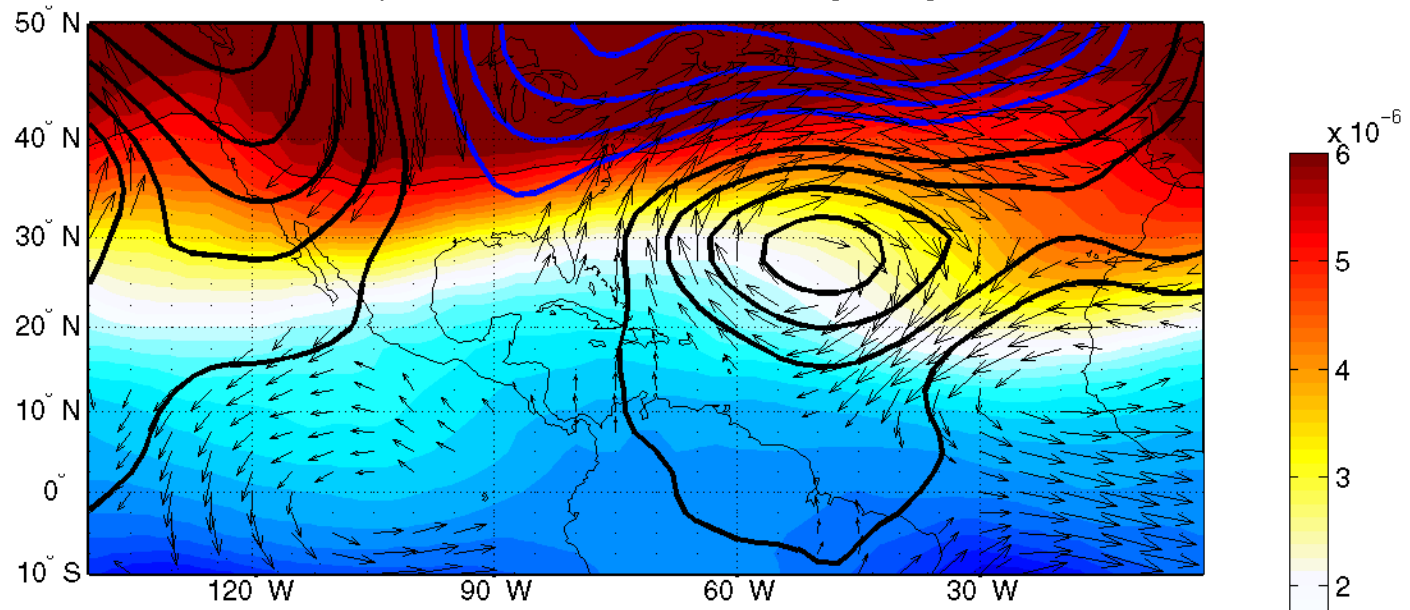
a. Composite 350K PV and 200 hPa Height, Lag -12



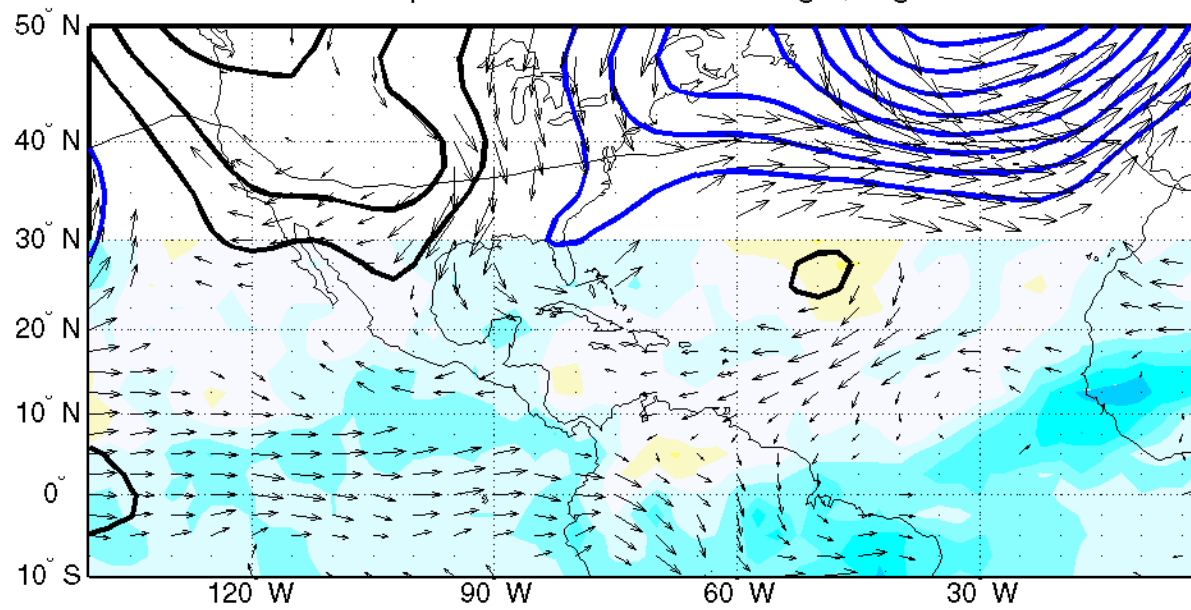
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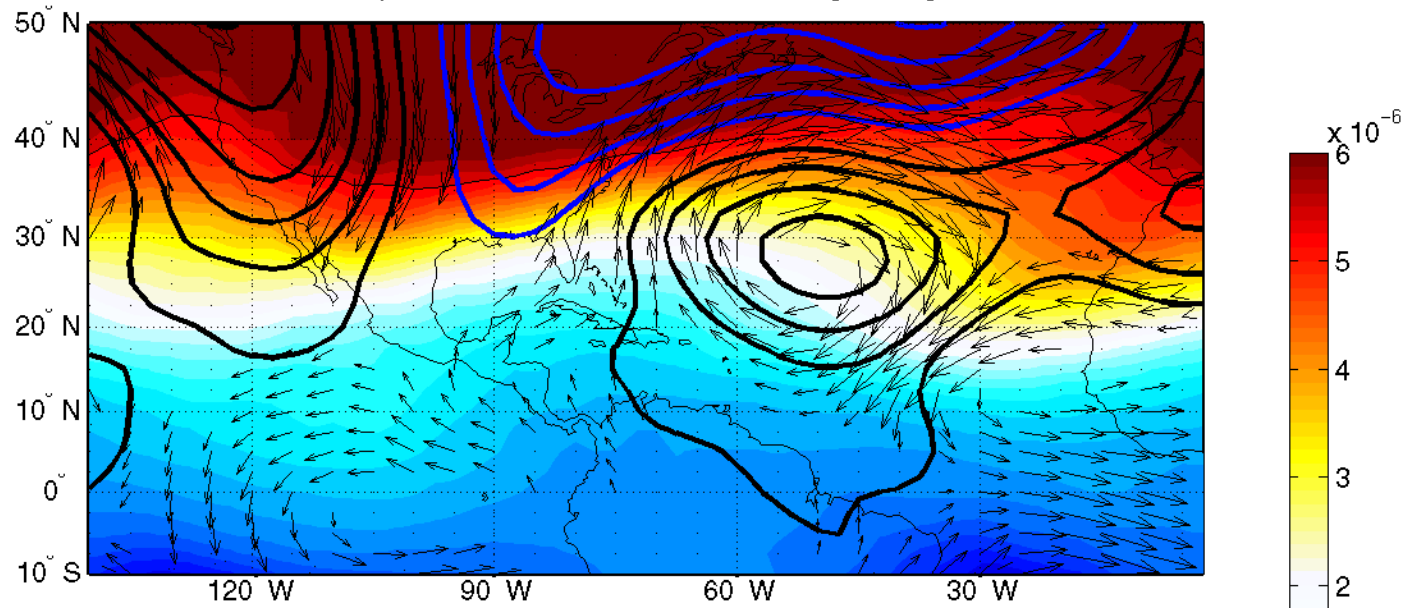
a. Composite 350K PV and 200 hPa Height, Lag -11



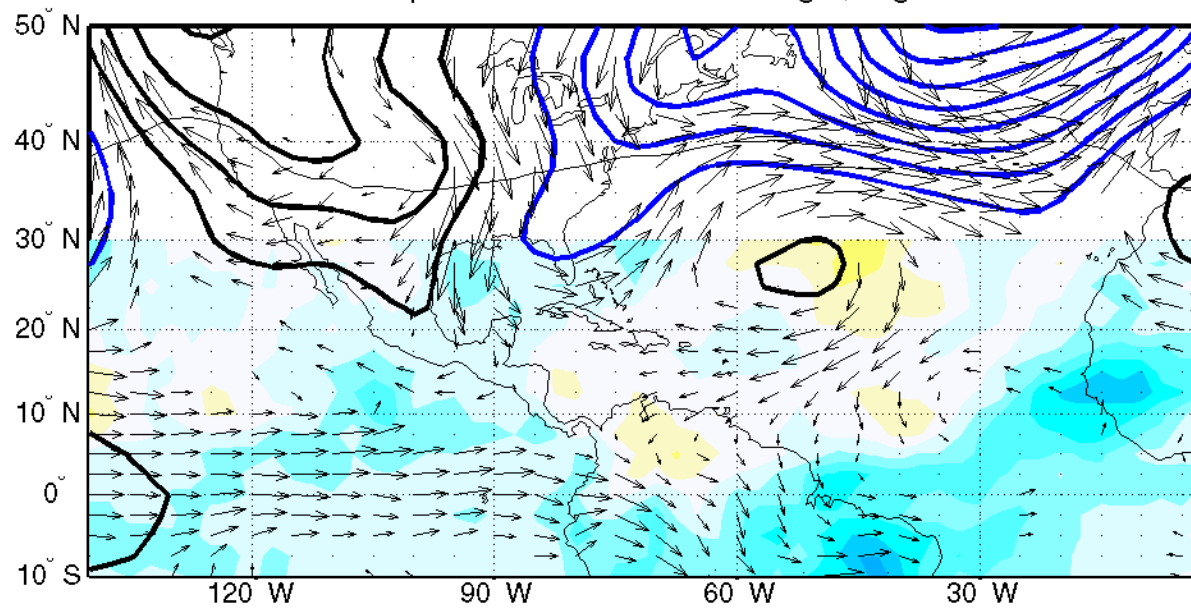
b. Composite OLR and 850 hPa Height, Lag -11



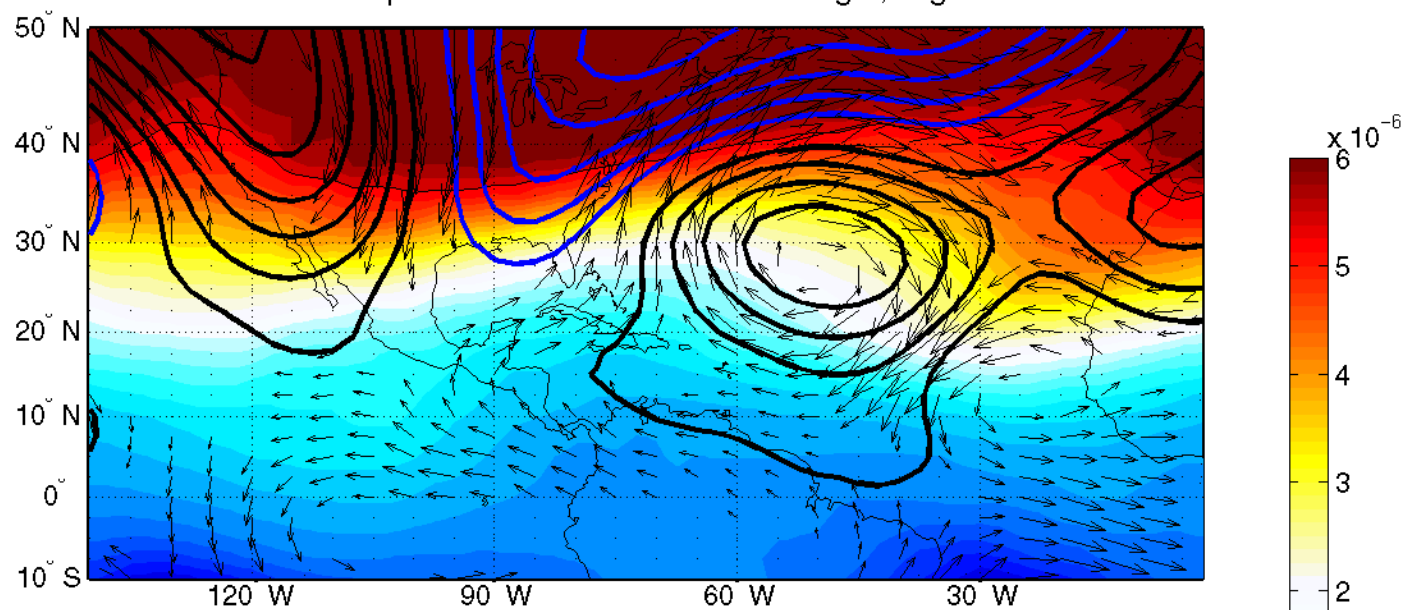
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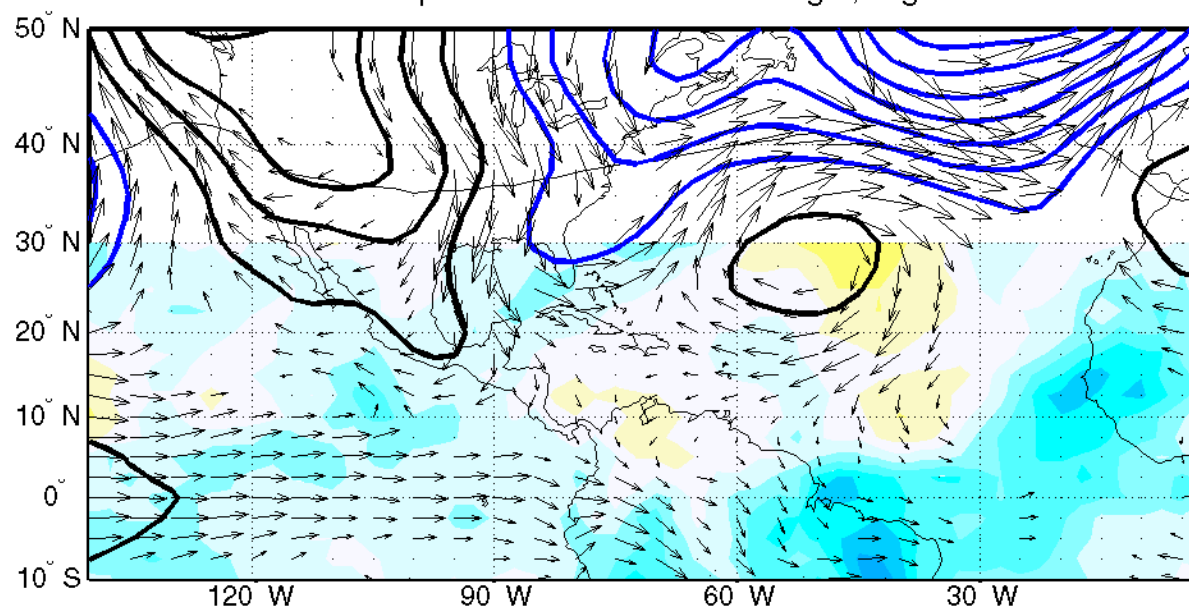
b. Composite OLR and 850 hPa Height, Lag -10



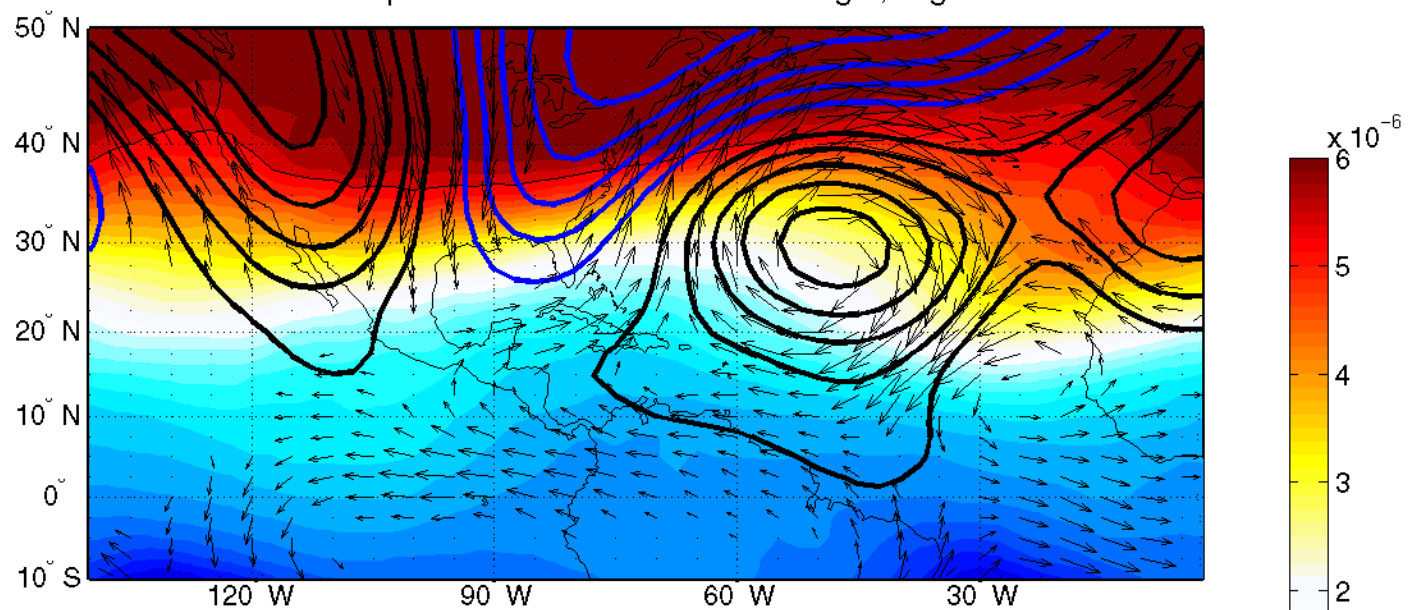
a. Composite 350K PV and 200 hPa Height, Lag -9



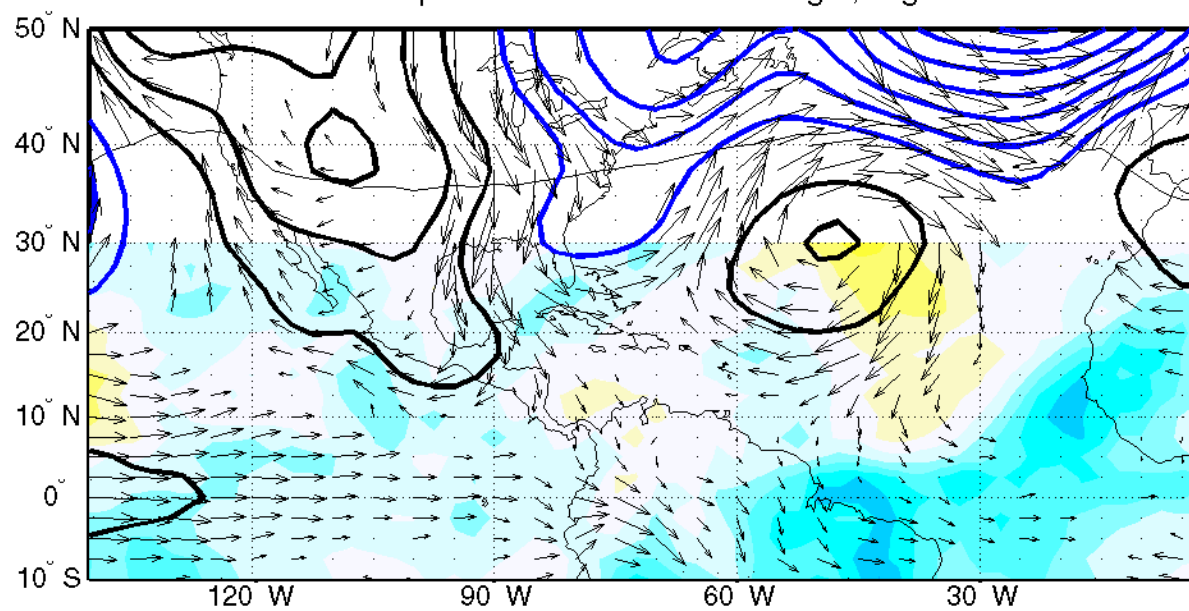
b. Composite OLR and 850 hPa Height, Lag -9



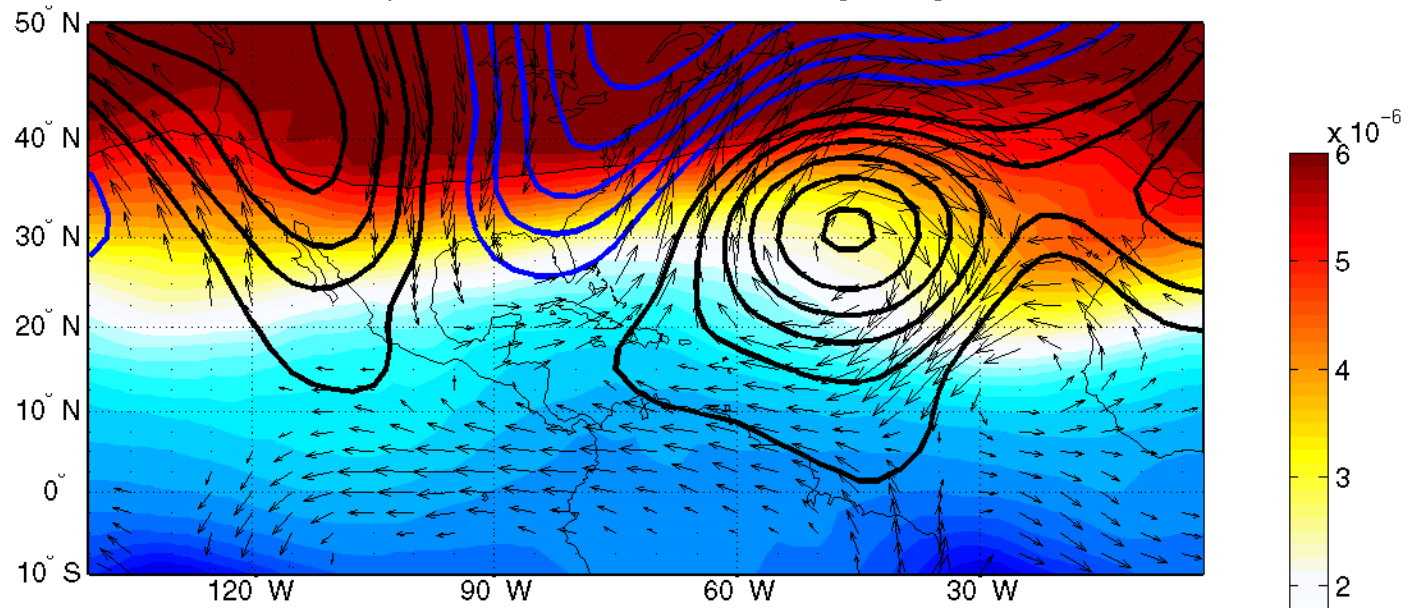
a. Composite 350K PV and 200 hPa Height, Lag -8



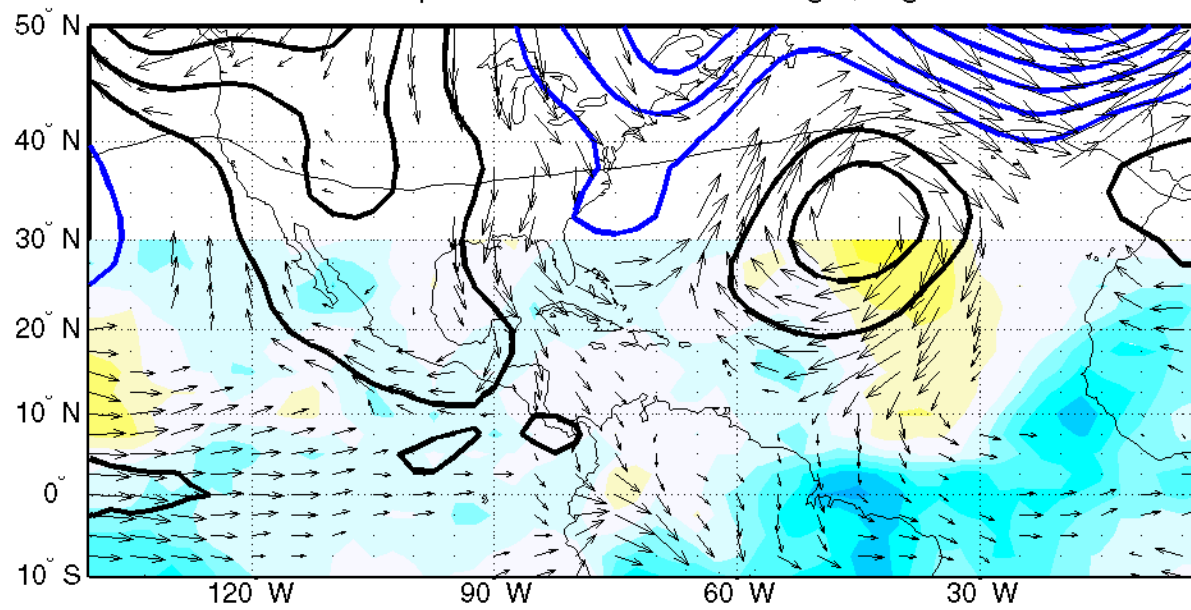
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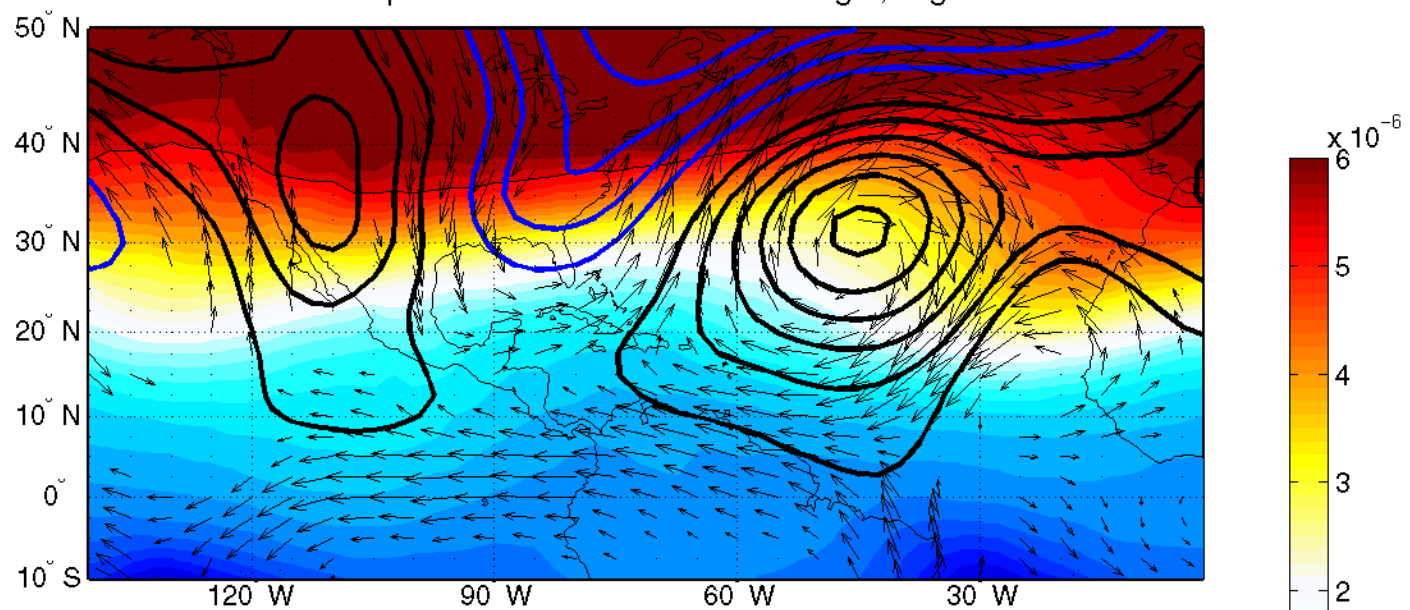
a. Composite 350K PV and 200 hPa Height, Lag -7



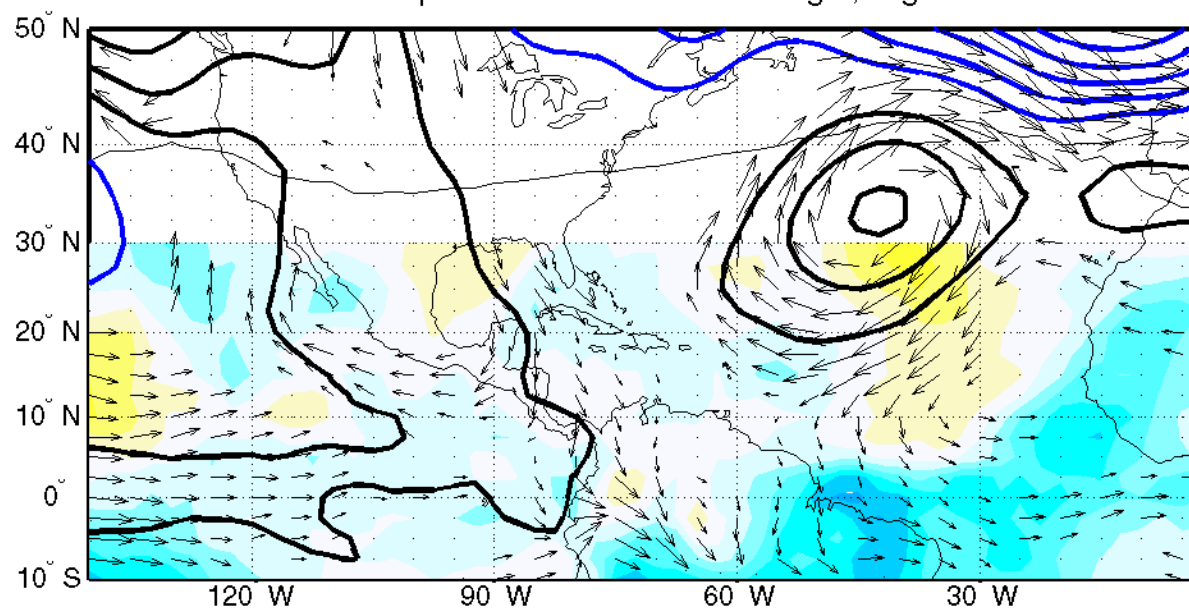
b. Composite OLR and 850 hPa Height, Lag -7



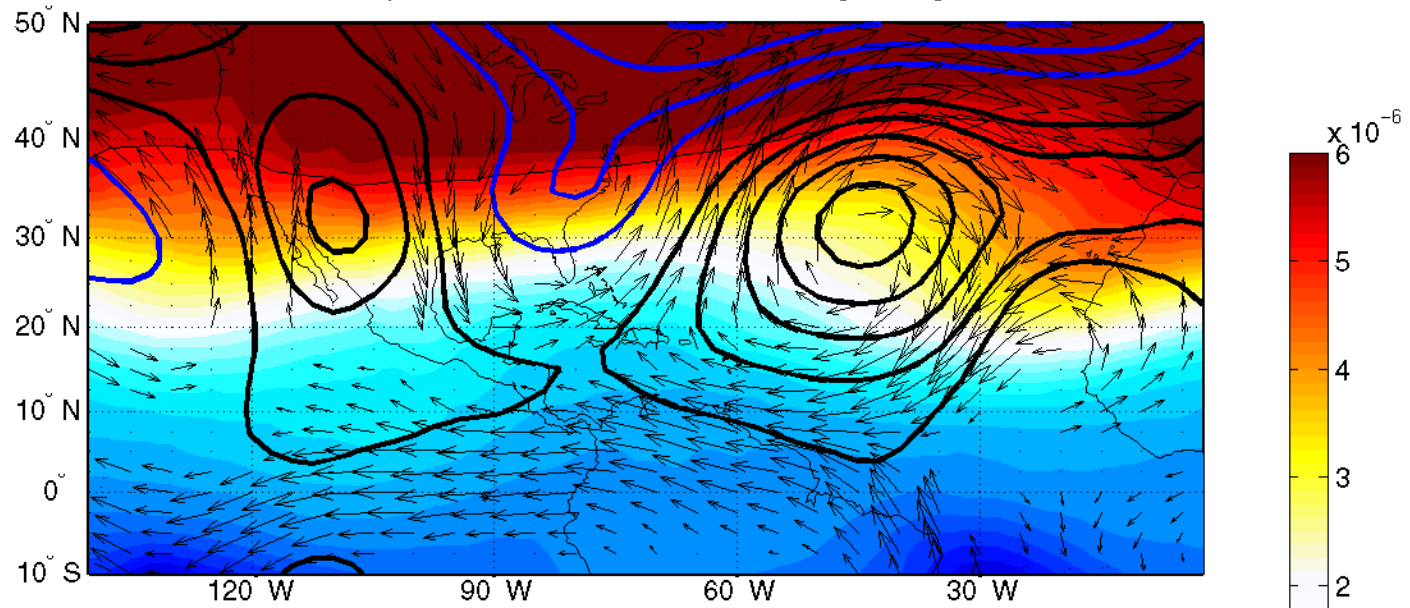
a. Composite 350K PV and 200 hPa Height, Lag -6



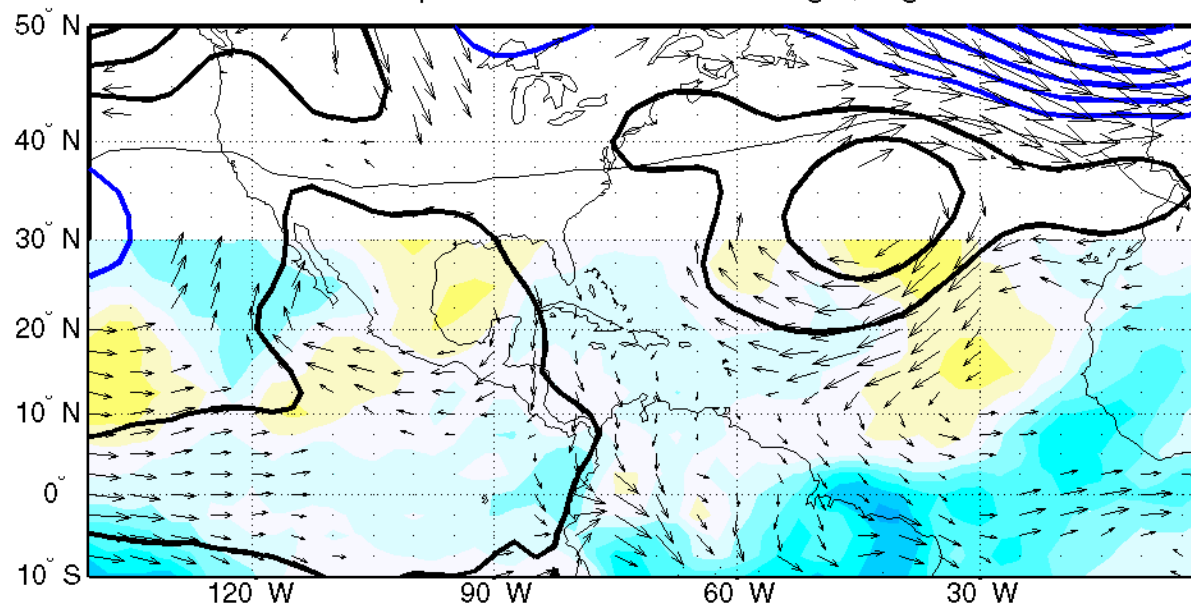
b. Composite OLR and 850 hPa Height, Lag -6



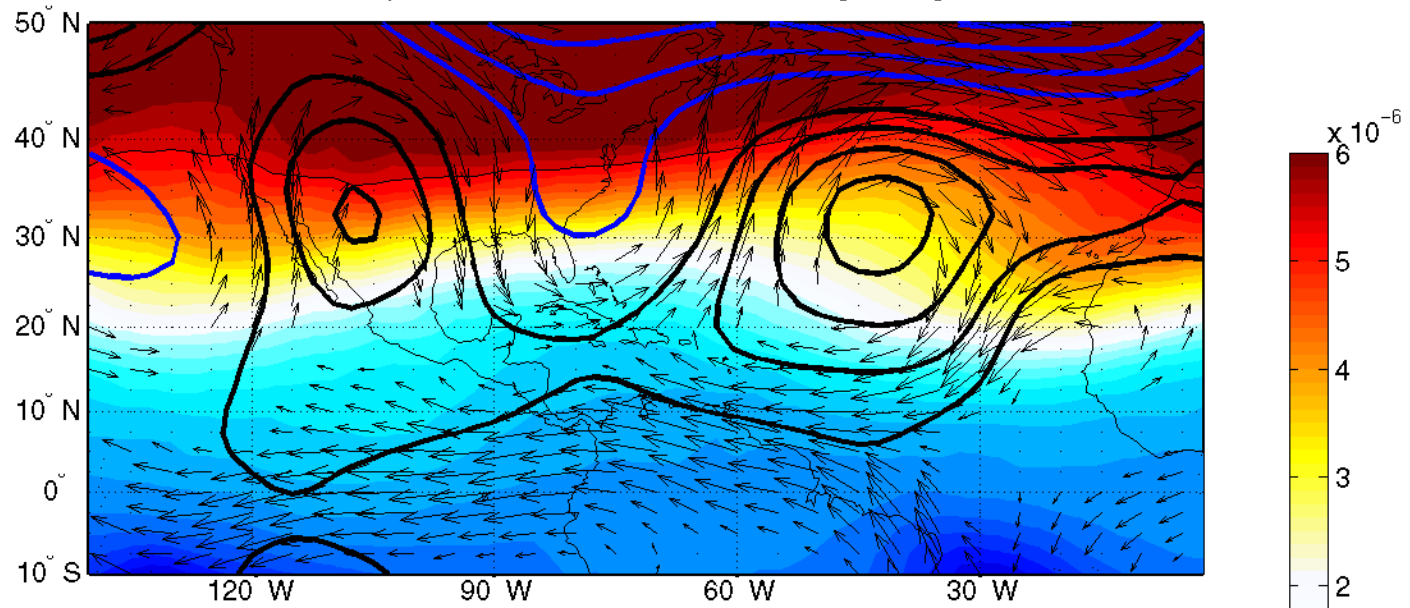
a. Composite 350K PV and 200 hPa Height, Lag -5



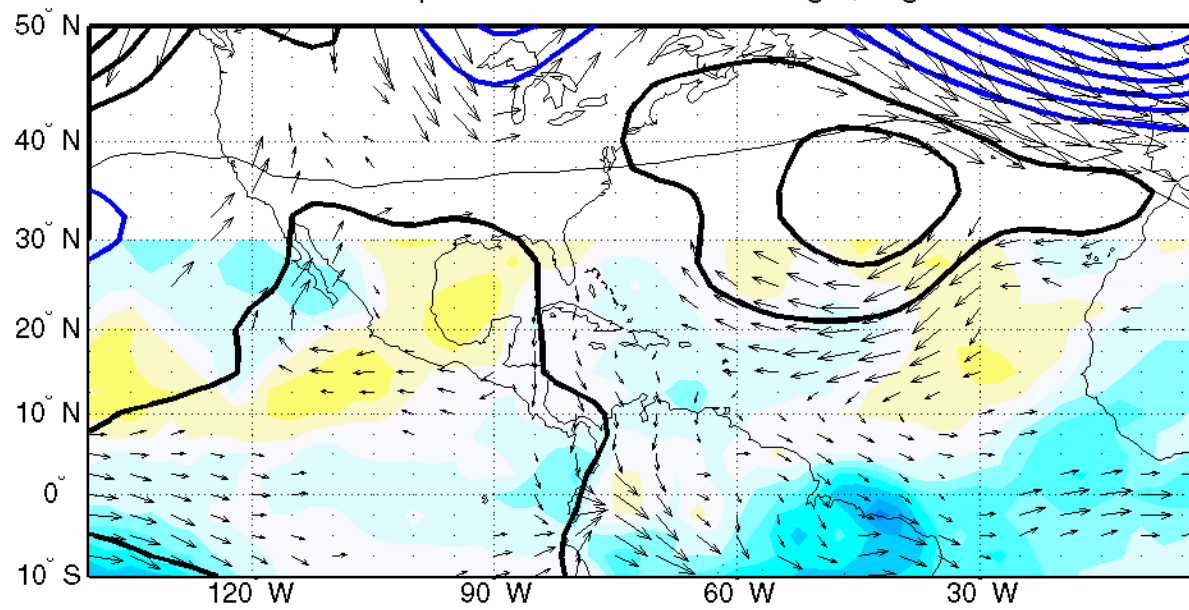
b. Composite OLR and 850 hPa Height, Lag -5



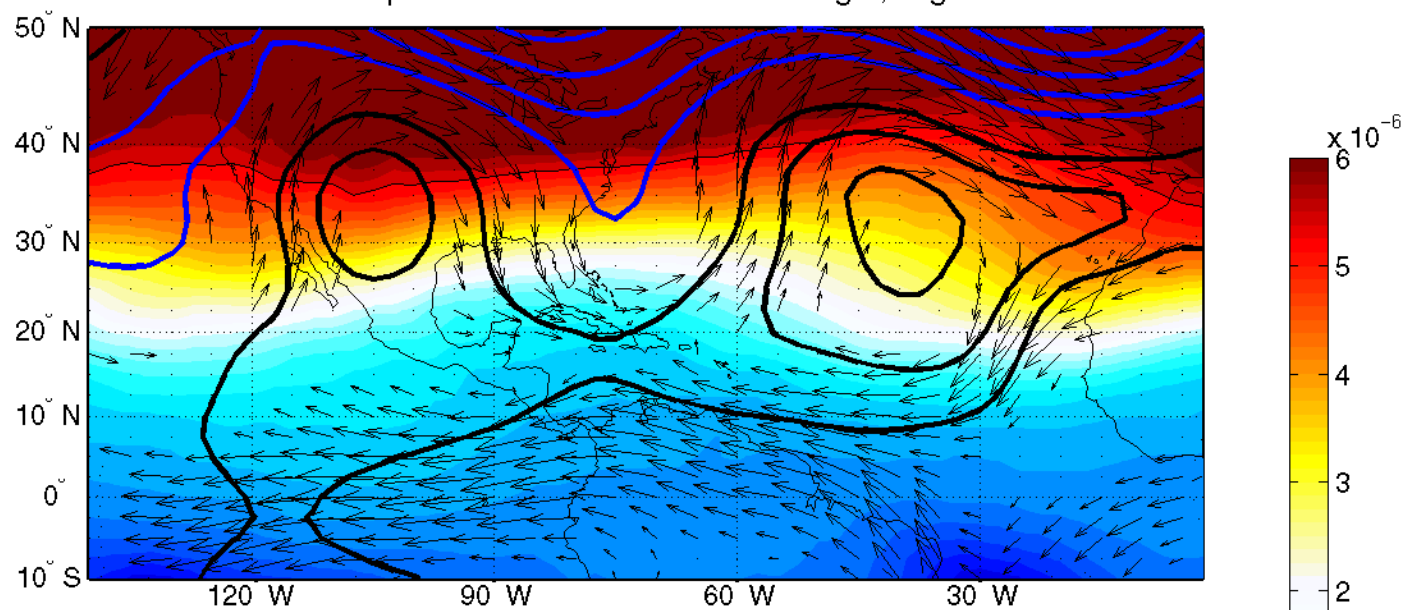
a. Composite 350K PV and 200 hPa Height, Lag -4



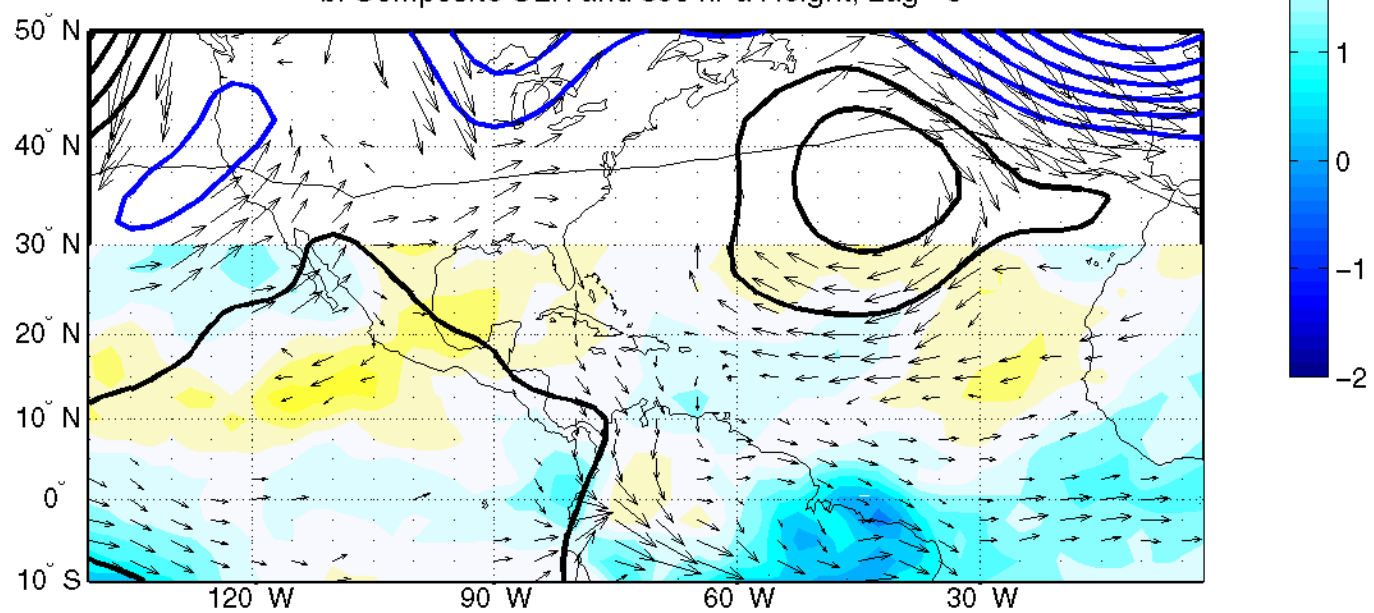
b. Composite OLR and 850 hPa Height, Lag -4



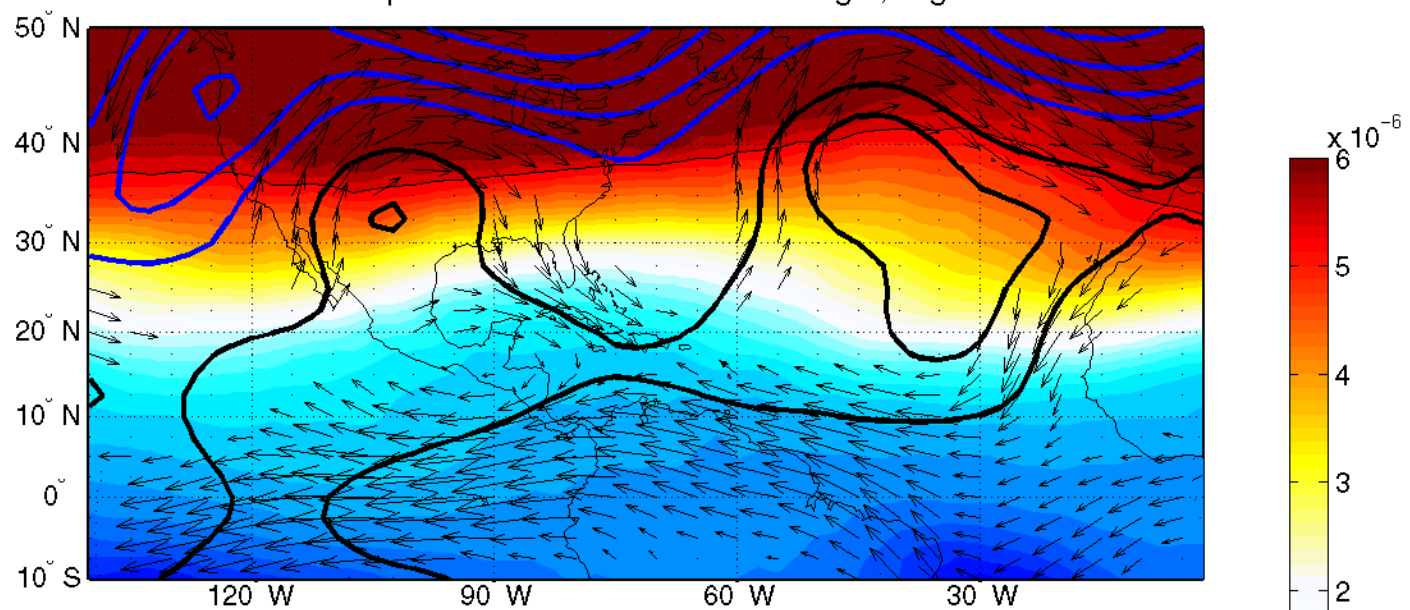
a. Composite 350K PV and 200 hPa Height, Lag -3



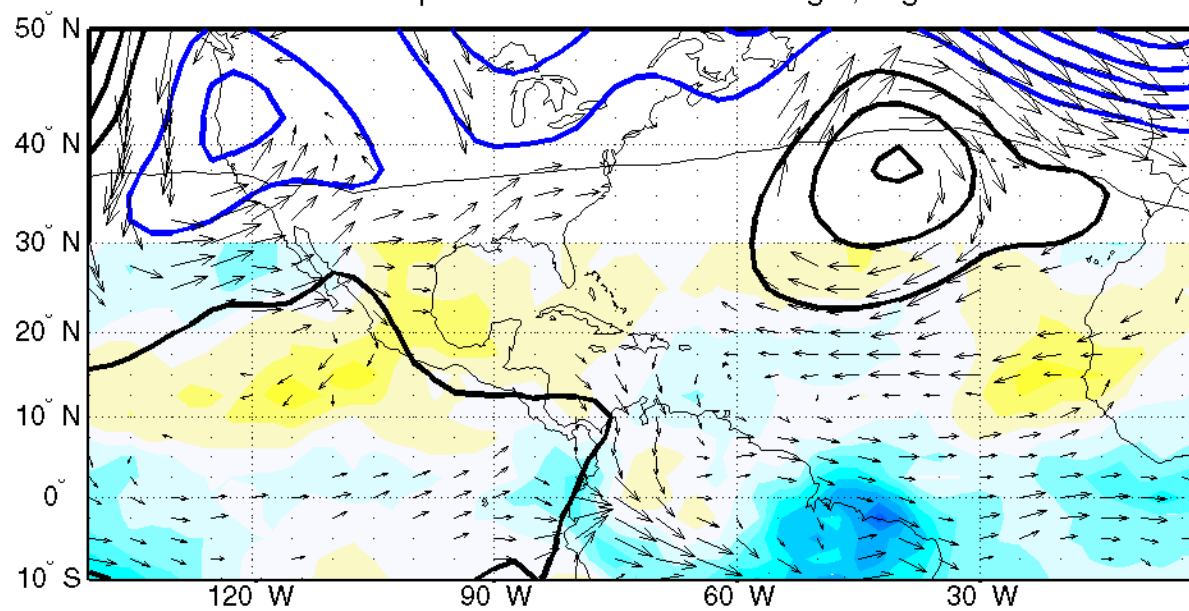
b. Composite OLR and 850 hPa Height, Lag -3



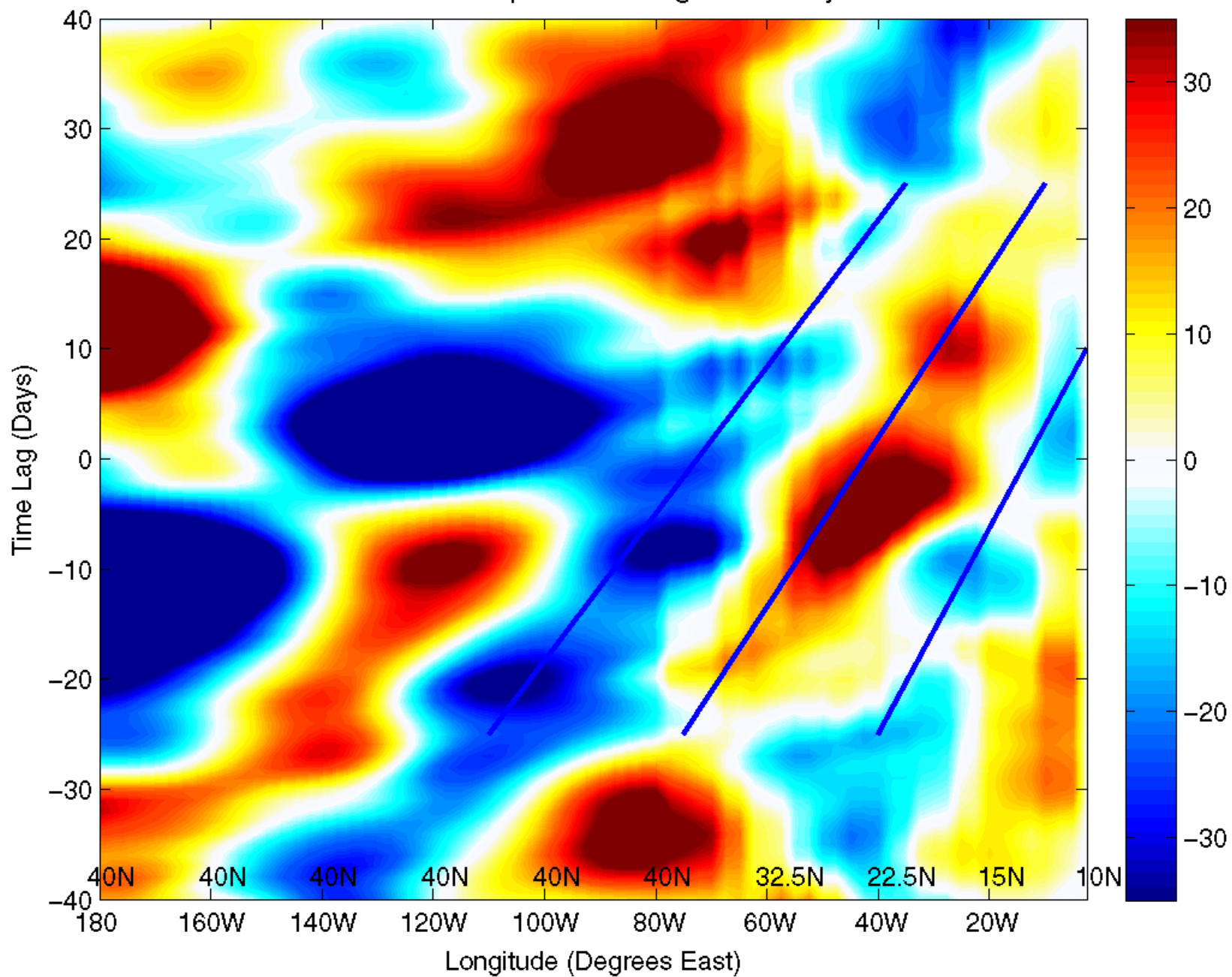
a. Composite 350K PV and 200 hPa Height, Lag -2



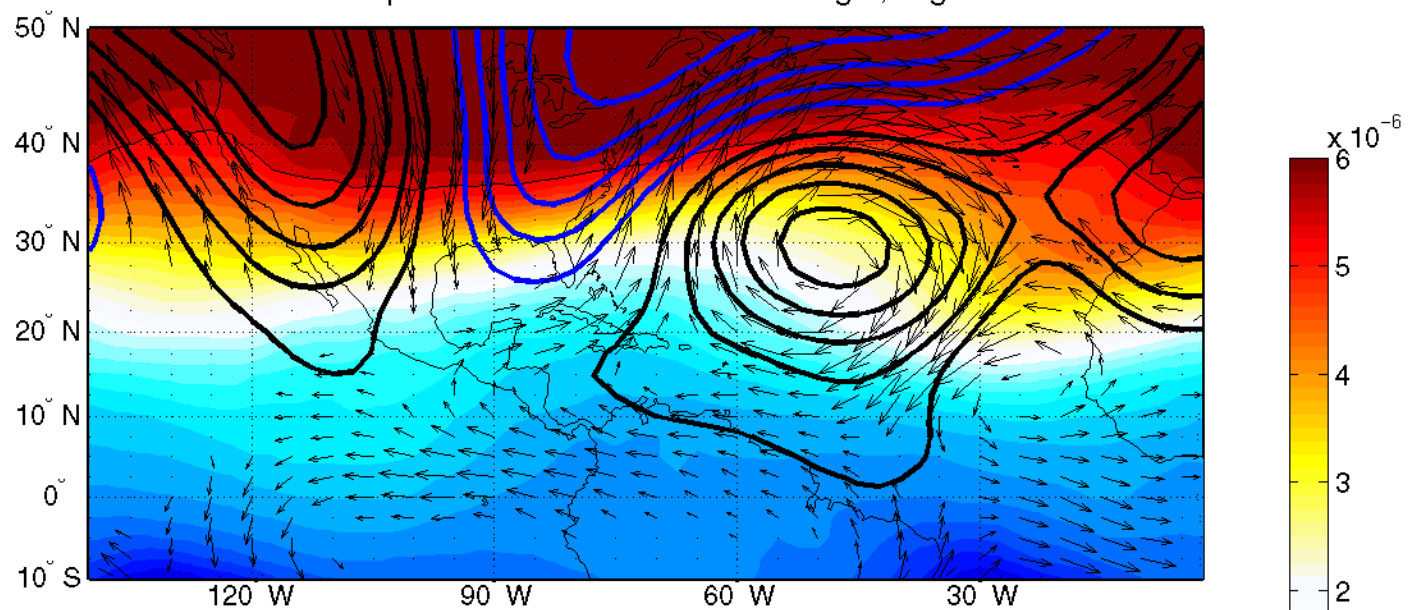
b. Composite OLR and 850 hPa Height, Lag -2



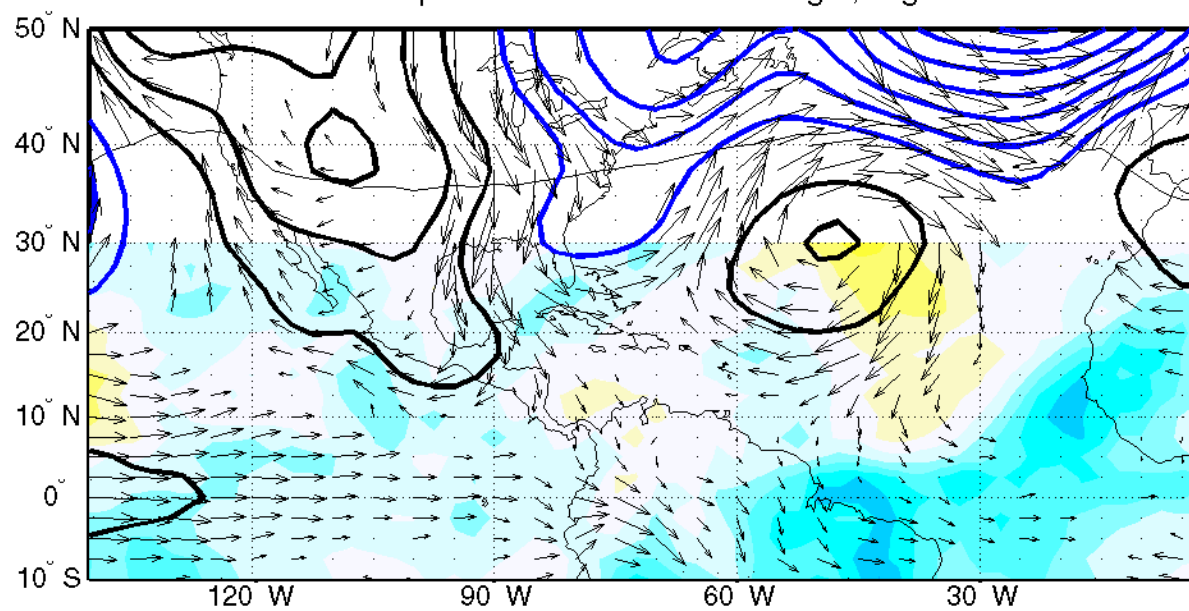
200 hPa Geopotential Height Anomaly



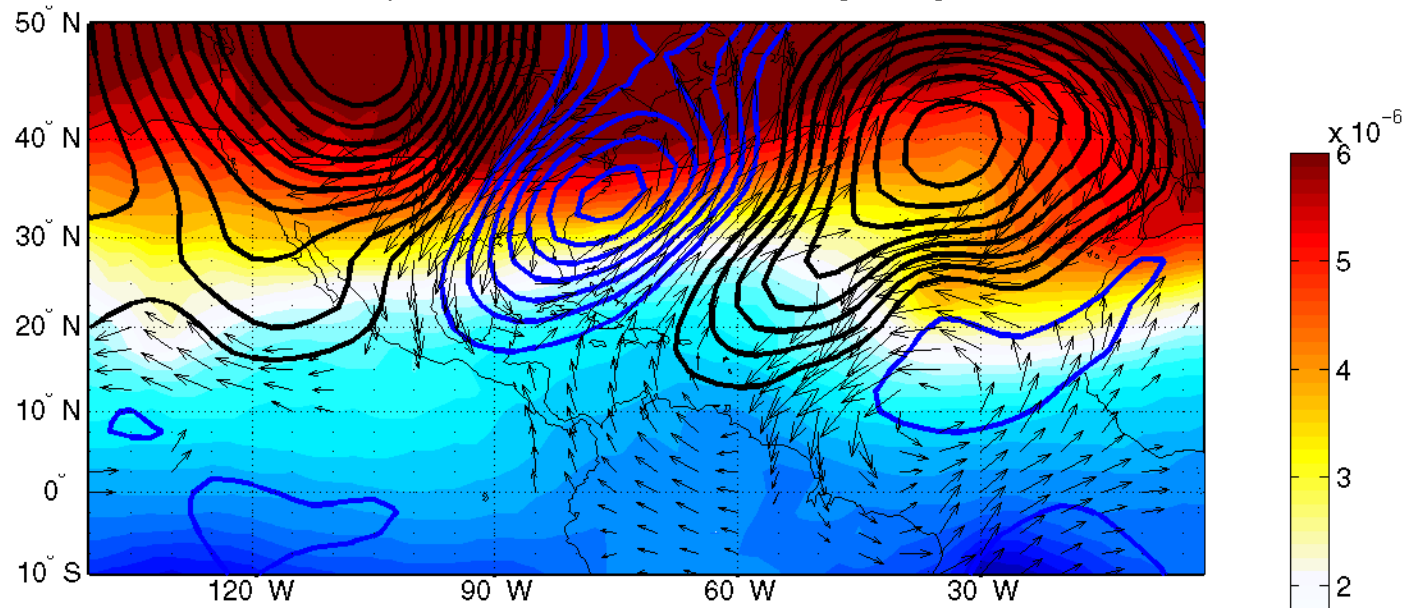
a. Composite 350K PV and 200 hPa Height, Lag -8



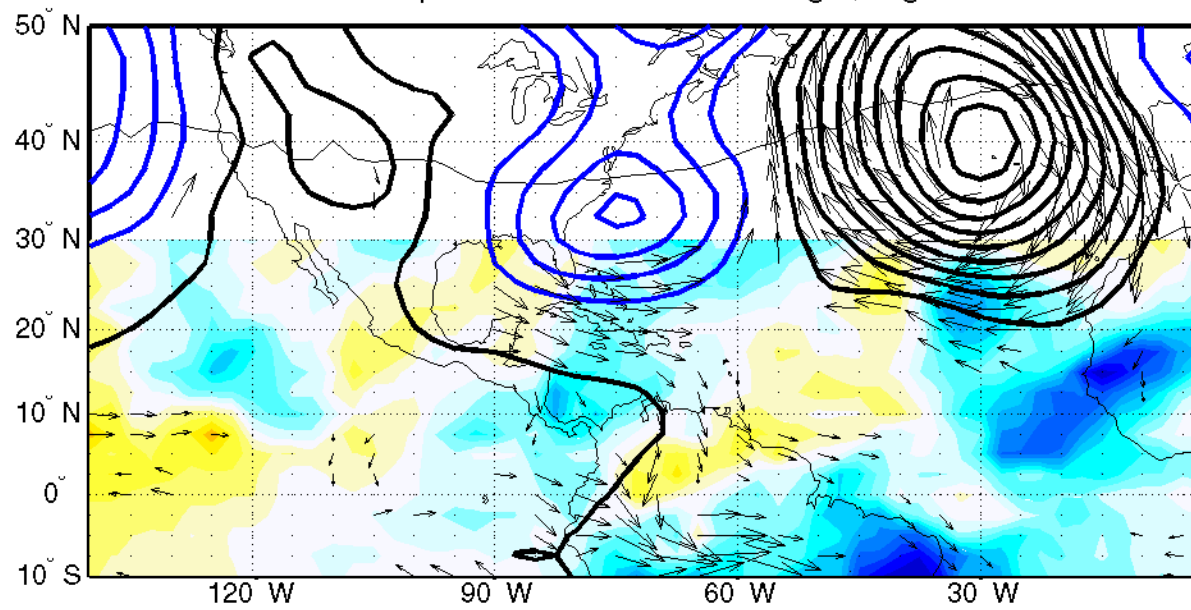
b. Composite OLR and 850 hPa Height, Lag -8



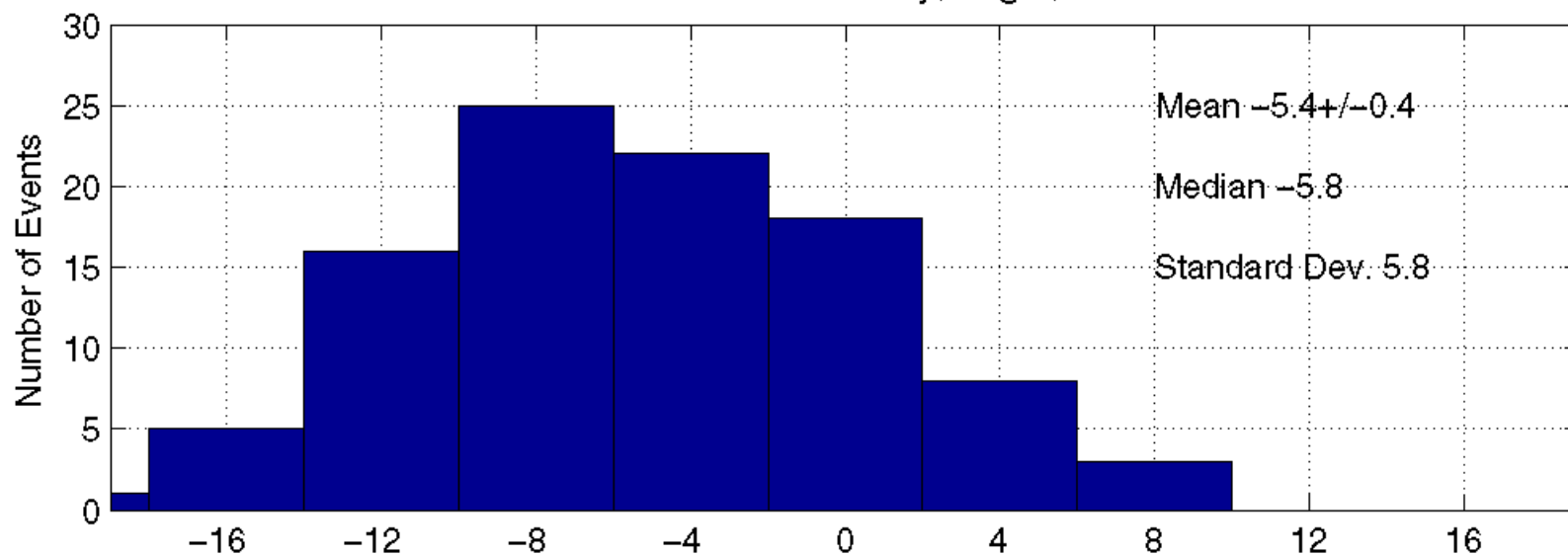
a. Composite 350K PV and 200 hPa Height, Lag -8



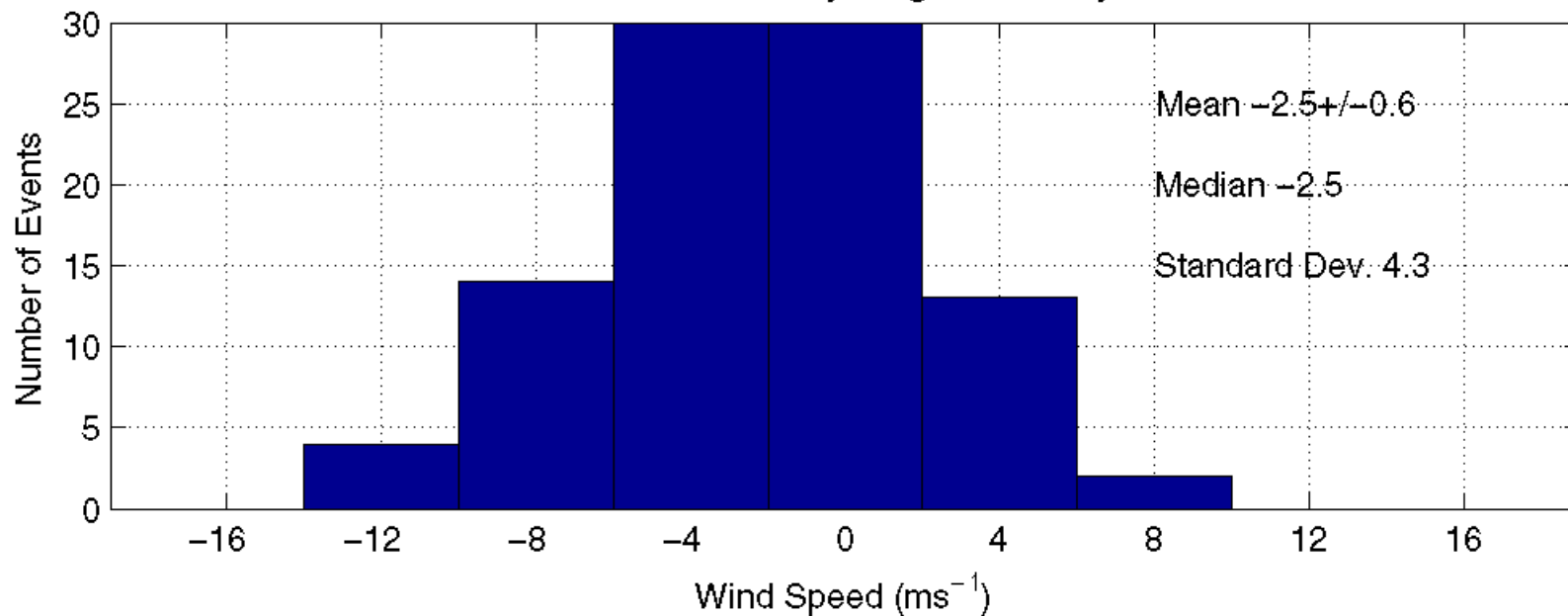
b. Composite OLR and 850 hPa Height, Lag -8



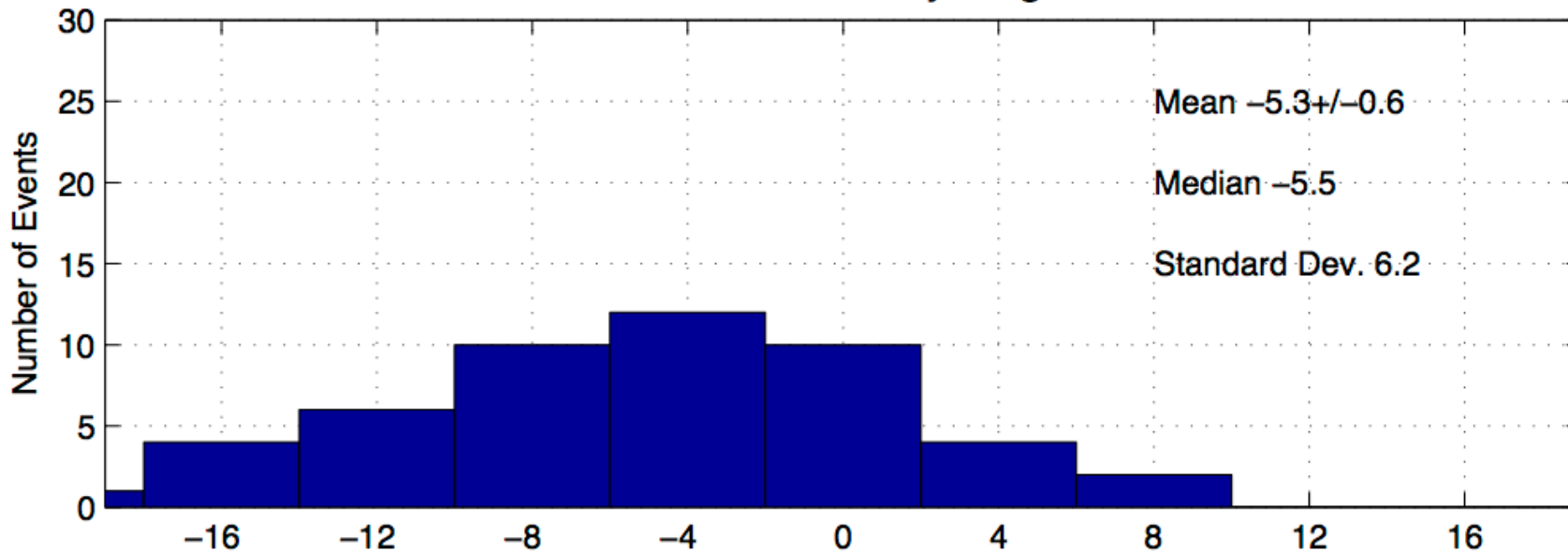
a. Zonal Wind Anomaly, Lag 0, 90W



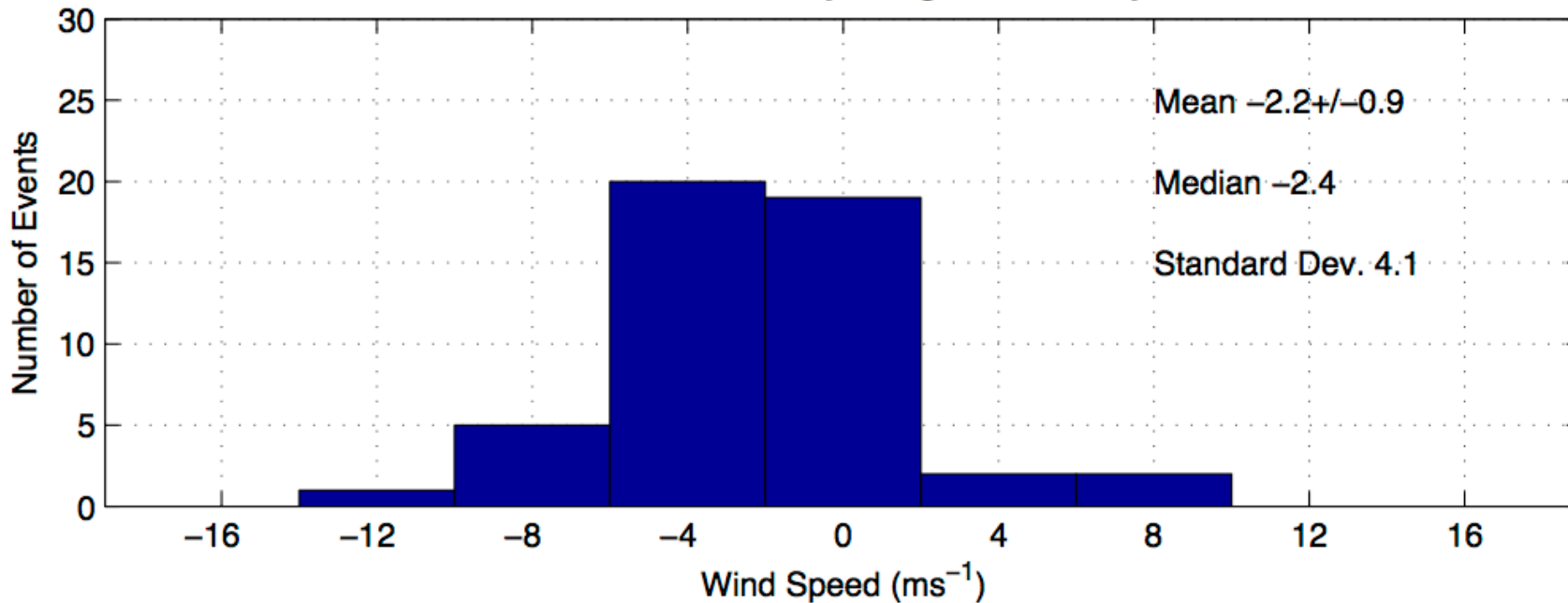
b. Zonal Wind Anomaly, Lag = -10 Days, 180E



a. Zonal Wind Anomaly, Lag 0, 90W



b. Zonal Wind Anomaly, Lag = -10 Days, 180E



Conclusions

- * The global circulation response to the MJO includes circumnavigating signals in the extratropics
- * Acceleration of easterly wind over the equatorial Western Hemisphere is timed both with the arrival of easterly wind anomalies from the west along the equator as well as from the north in extratropical waves
- * Most zonal momentum on the equator over the Western Hemisphere comes from the extratropics rather than directly from the west