Targets for Jan-Feb 2013

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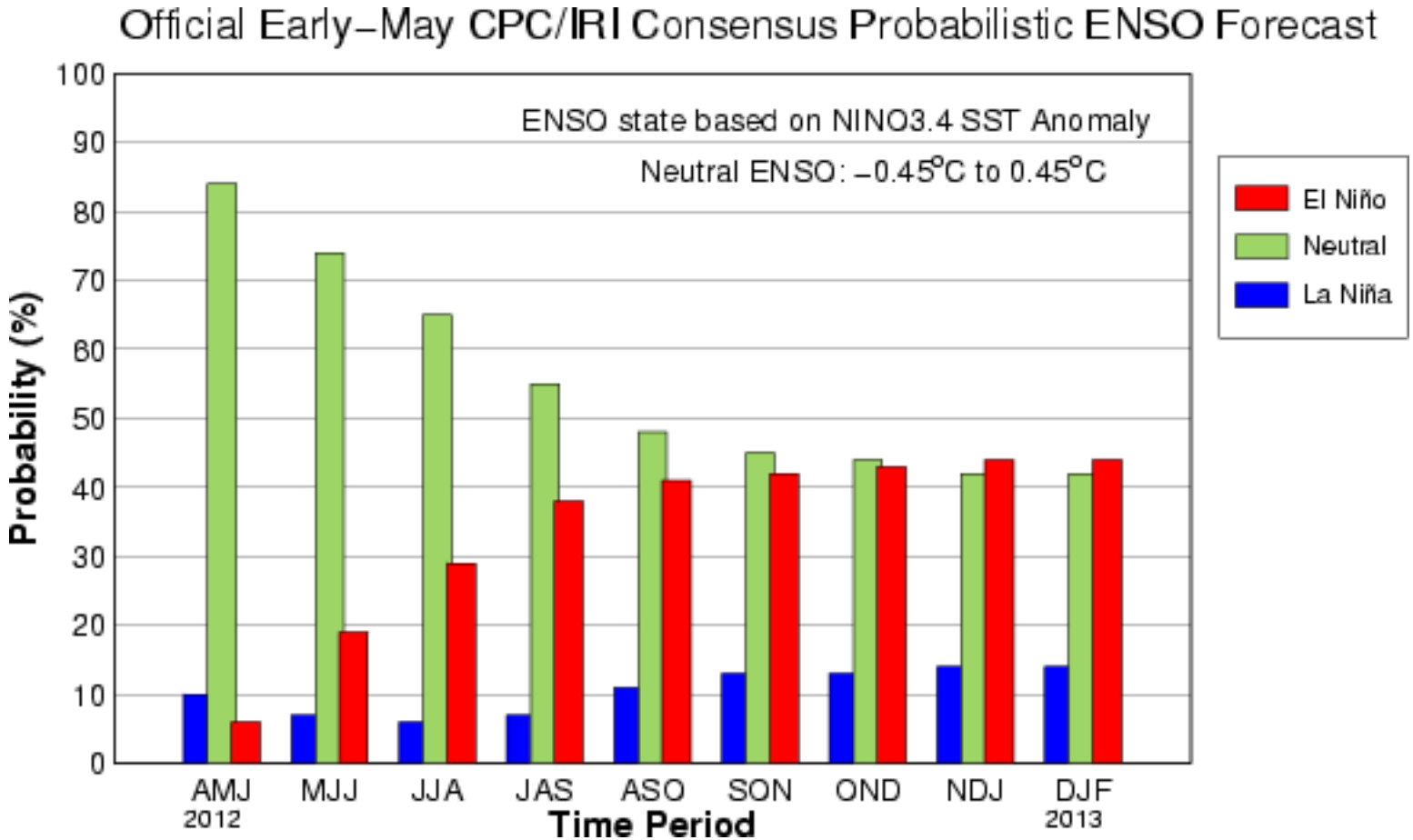
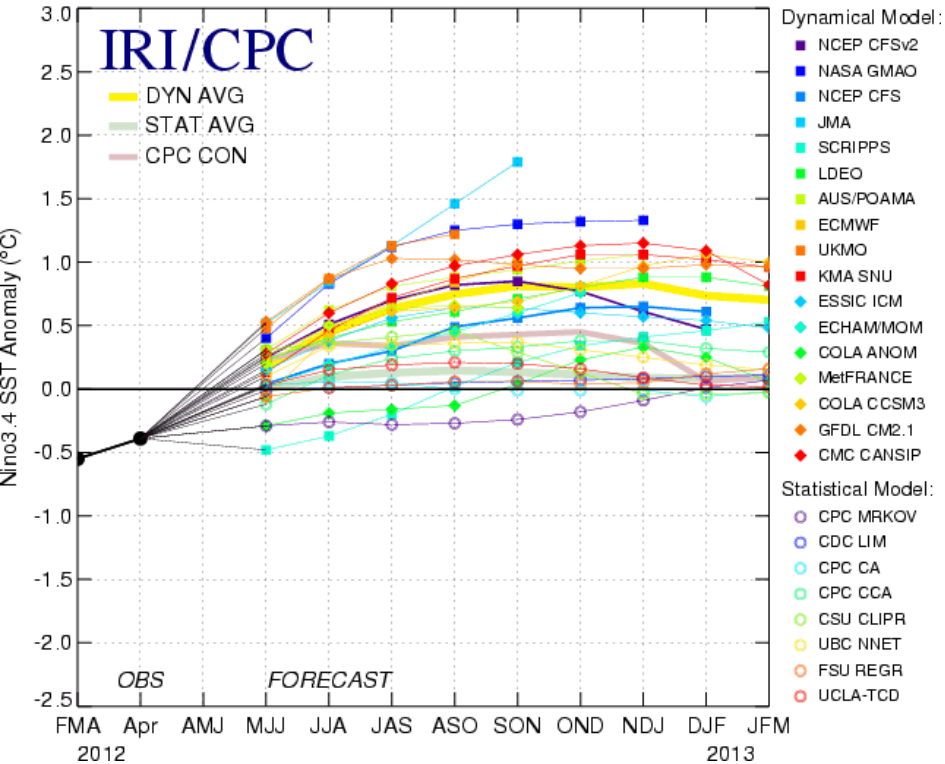
- Cold Temperatures
- Convective Outflow
- Midlatitude/Tropical Exchange
- Equatorial and near equatorial waves

Background(ENSO)

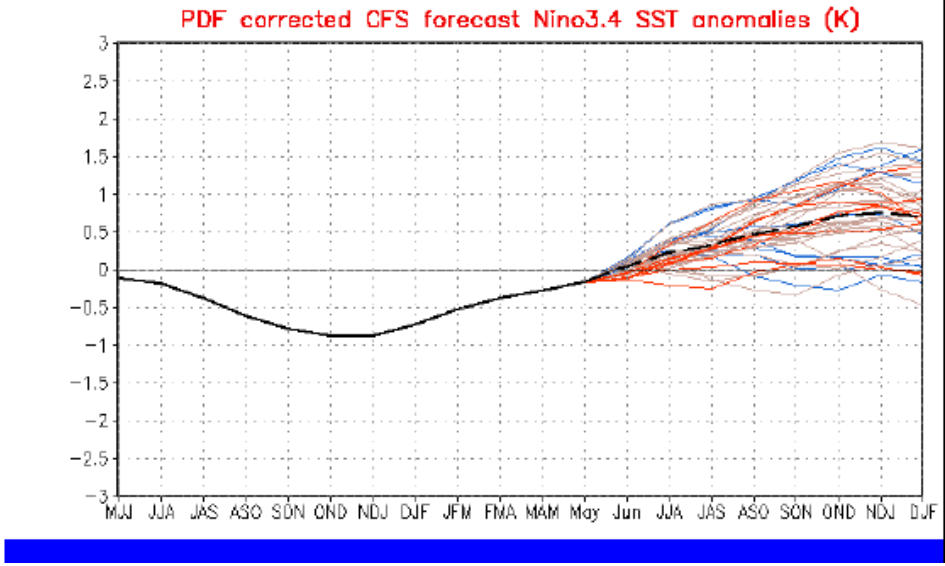
- ENSO forecasts are typically valid 6 months in advance, but it looks like we may have a weak El Nino next January. El nino shifts cold temperatures eastward, and does produce an overall (zonally averaged) cooling in the TTL (from CPC).



Mid-May 2012 Plume of Model ENSO Predictions

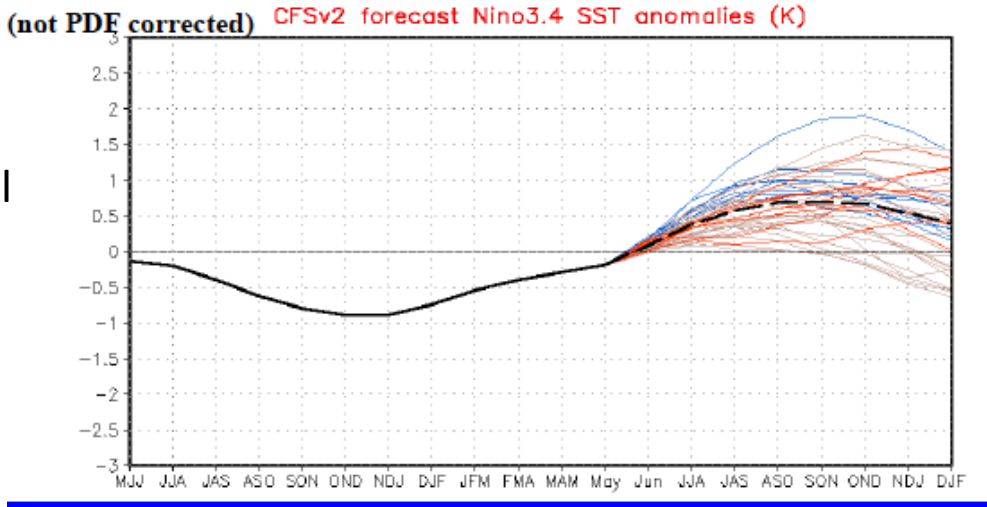


The CFS.v1 ensemble mean (black dashed line) predicts El Niño to develop by SON 2012.



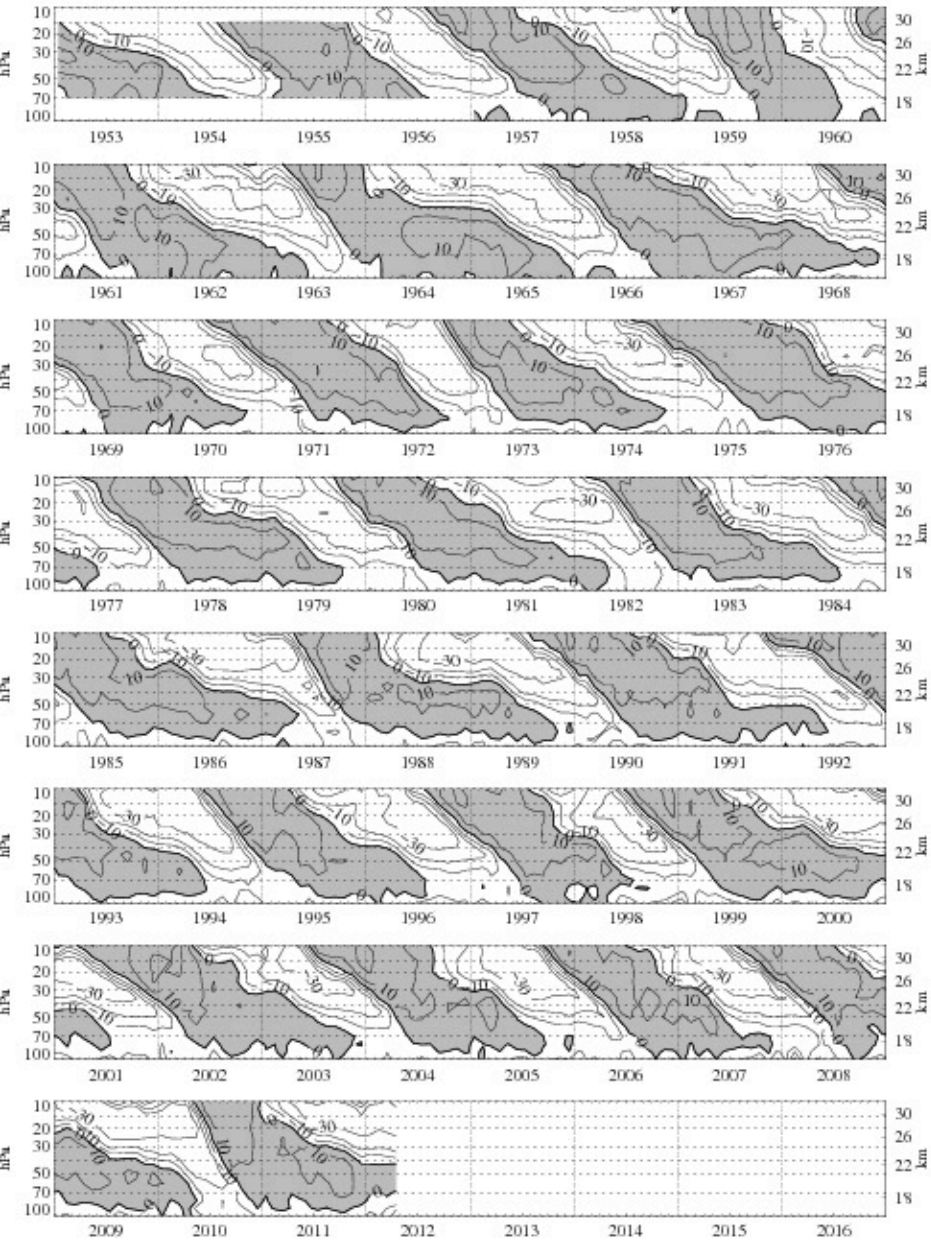
The CFS.v2 ensemble mean (black dashed line) predicts El Niño conditions to develop by JAS 2012.

(not PDF corrected)



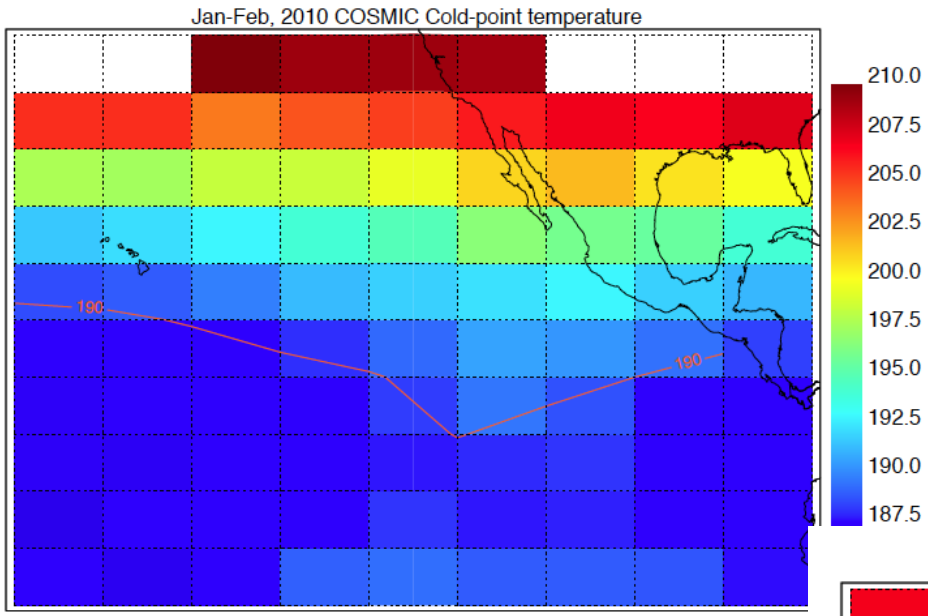
Forecasts vary from neutral (stat model average, above) to .75 (dynamical model average, above). CFS model (right) is closer to the dynamical model average. From CPC

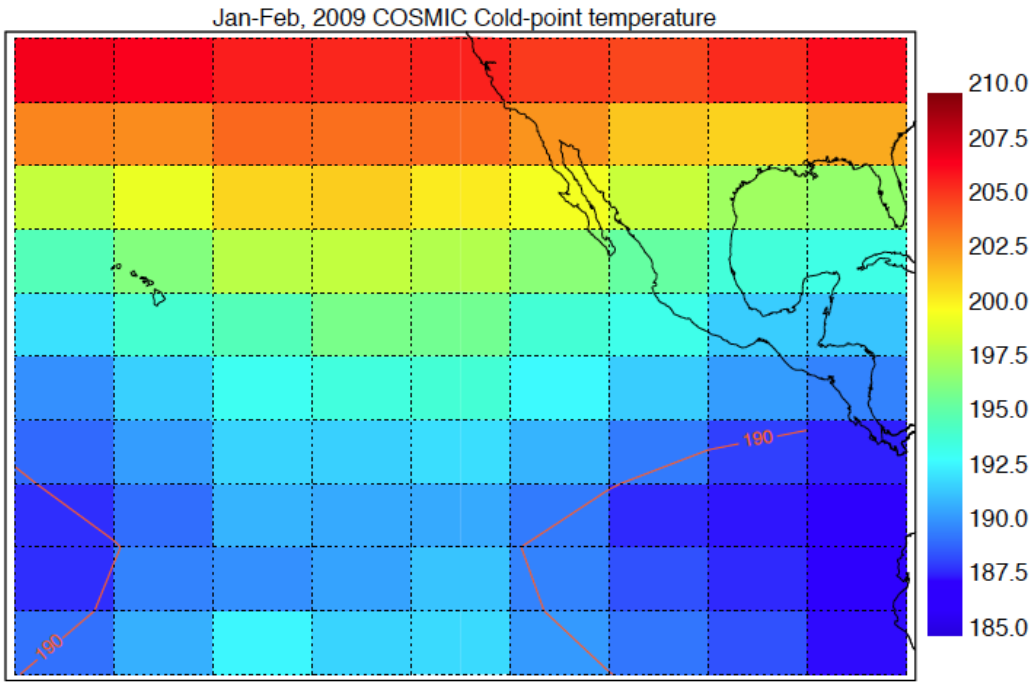
Background (QBO)



QBO temperature tends to be colder when the easterlies (unshaded) maximize at 70mb, just above 100mb. QBO TTL variation is .5-1 degreeK. (For example, early 2006 was a cold year). We will probably be in a cold phase in January 2013 (figure from FUB web page).

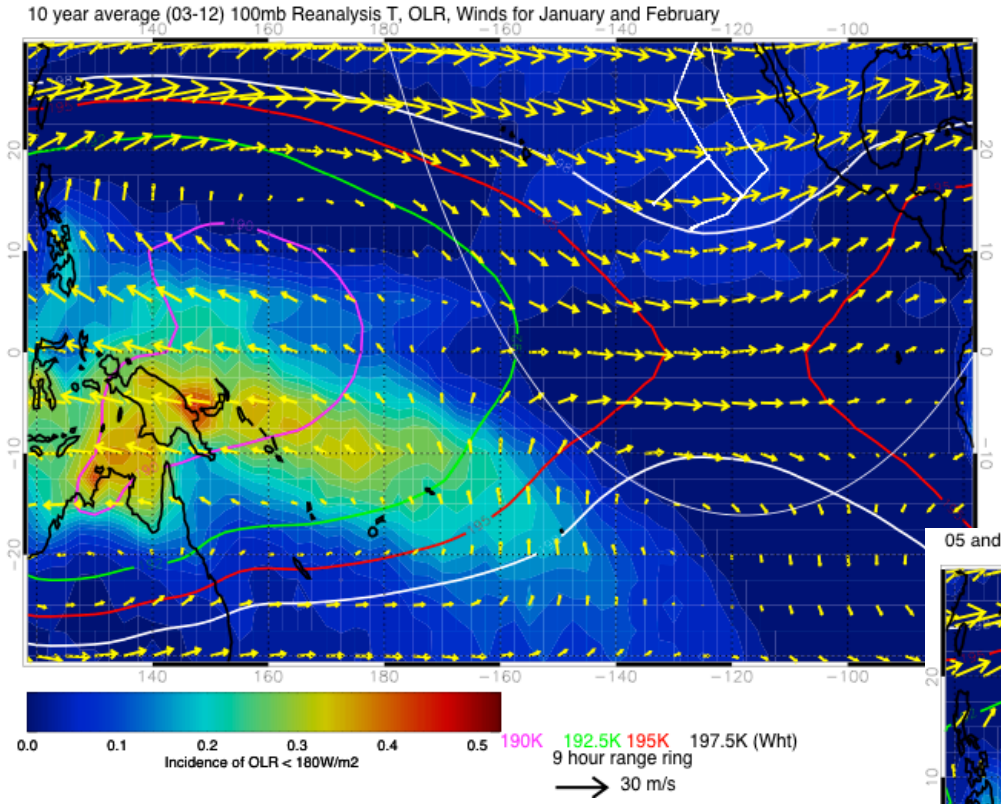
“Actual” cold point temperatures





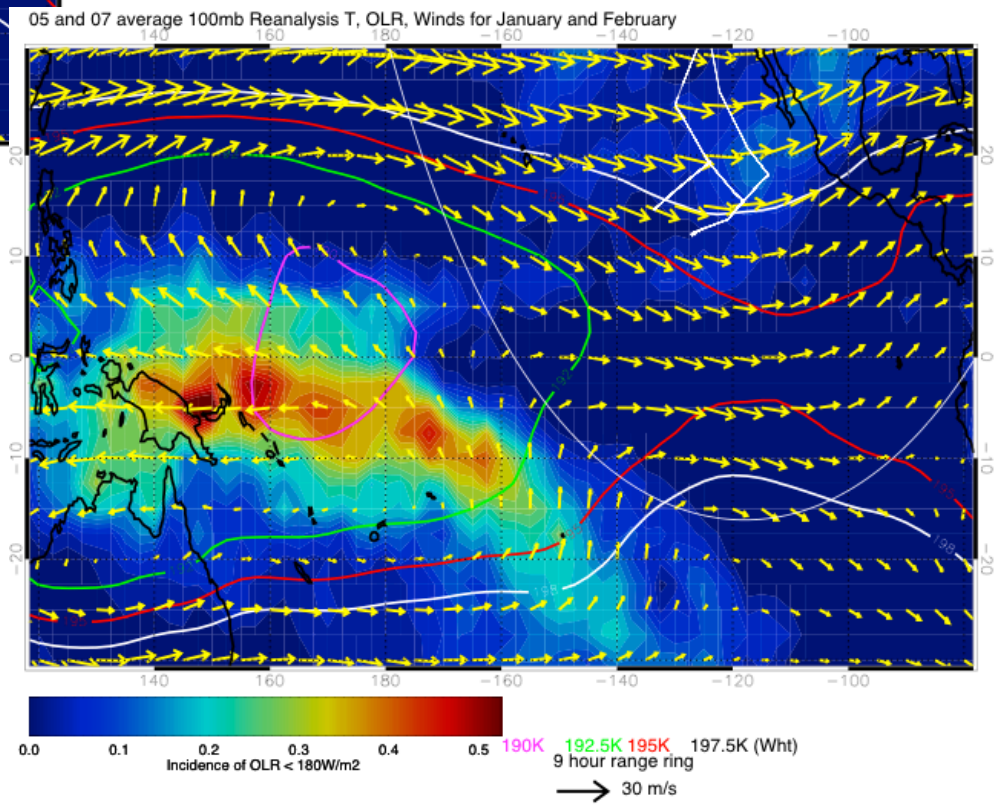
2010 was a strong El Nino (stronger than we expect), while 2009 was a moderate La Nina. 2010 was in the warm phase of the the QBO, while we expect to be in the cold phase. Even though the El Nino will probably be much weaker than 2010, CPTs will be only a bit warmer (1K) than in 2010.

100mb temperature, winds, January-February



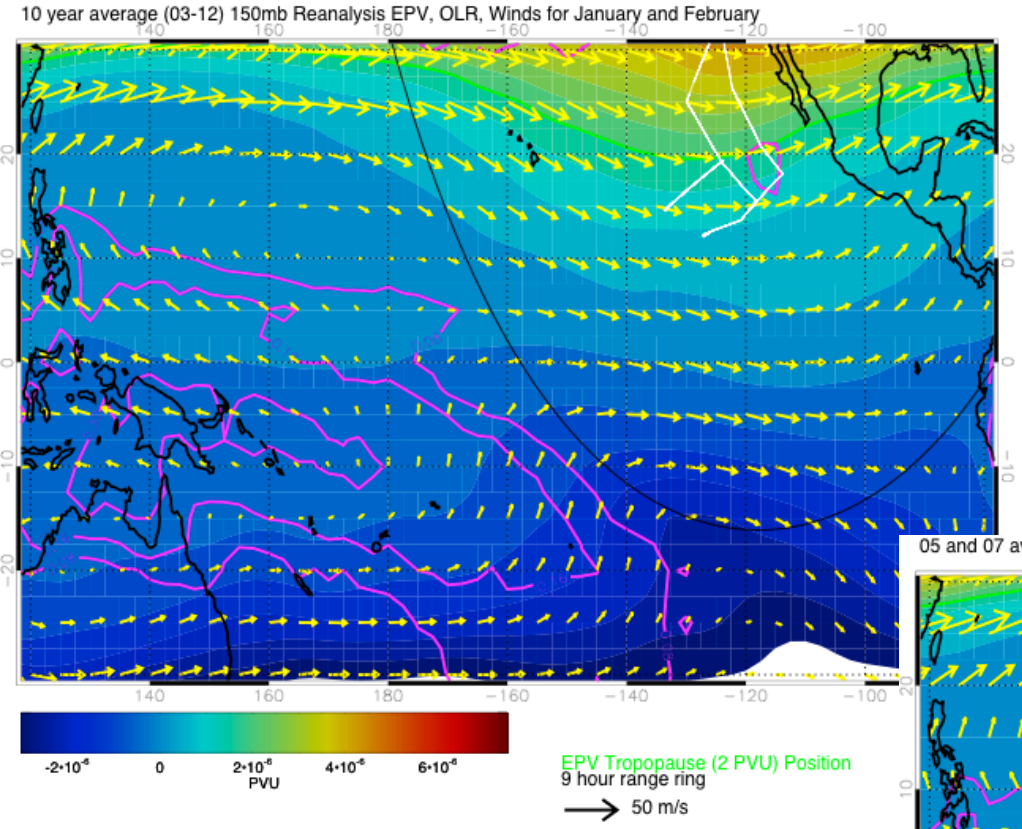
10 year average (left)

05 and 07 average (below)



Weak EN (2005 and 2007) displaces the boreal winter monsoon anticyclone eastward. SPCZ is a bit further north and east, as expected. T in the eastern Pac is cooler by 2K. Note the mean trough just at our longitude. This trough will tend to steer convectively influenced air from the SPCZ and maritime continent away from where we are flying.

150mb average EPV



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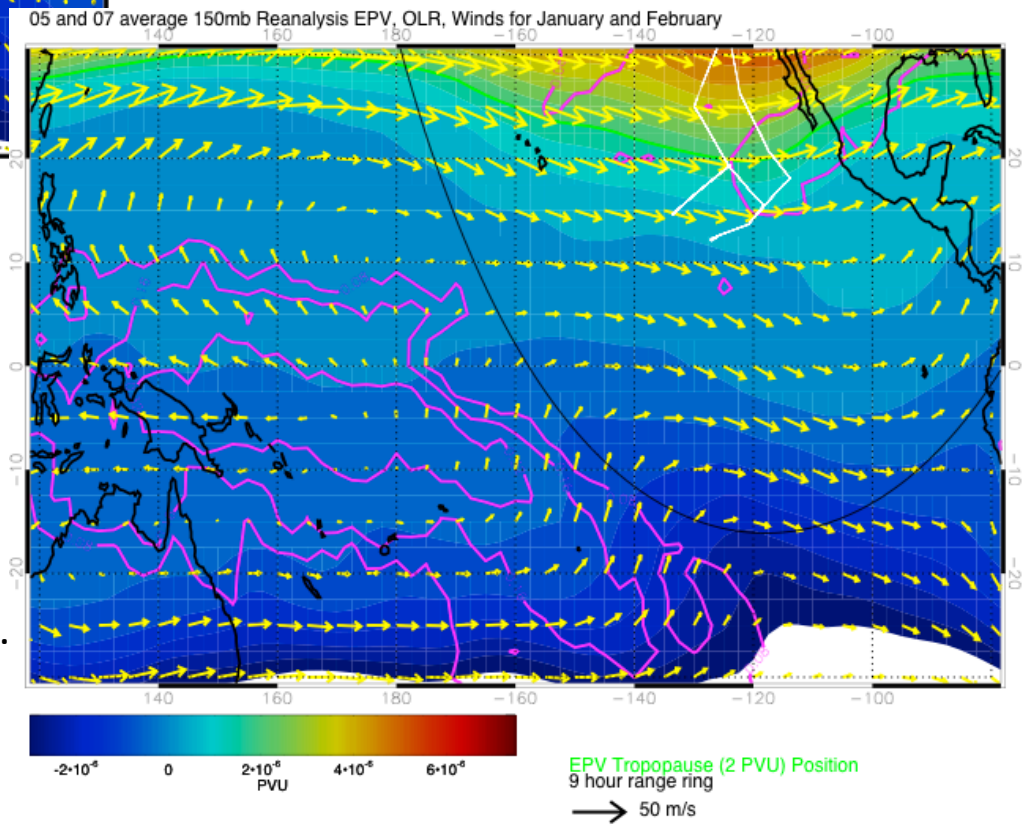
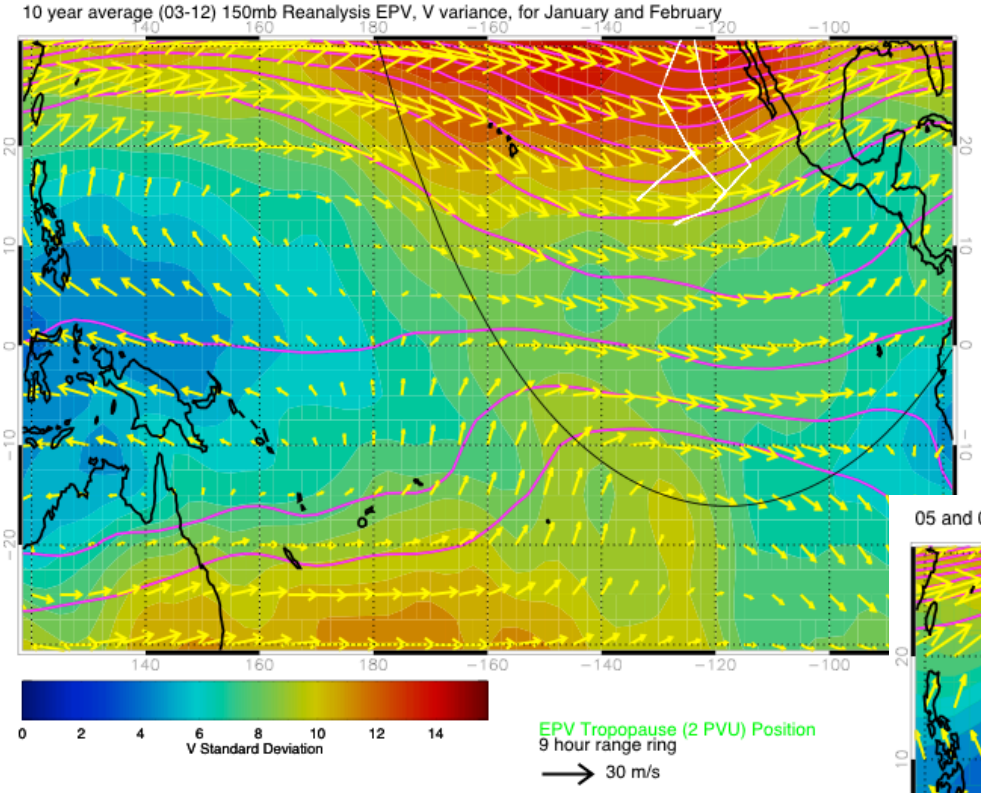
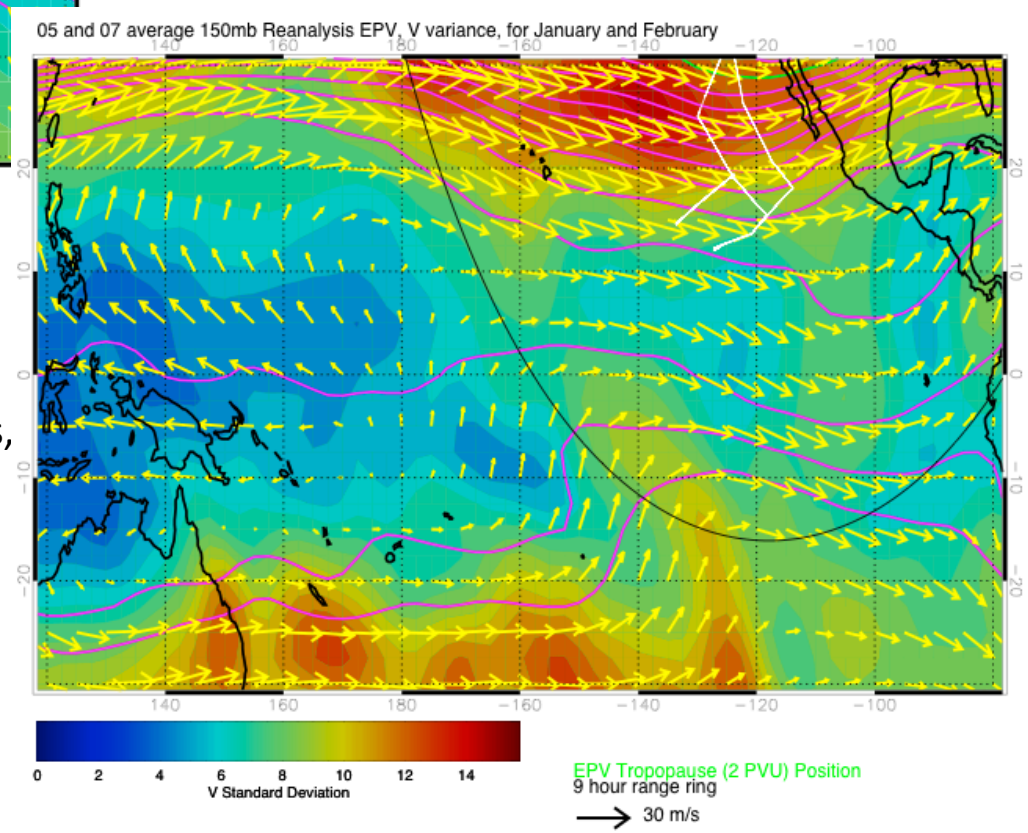


150mb is a level where significant midlatitude exchange can occur. As at 100mb, anticyclone is displaced slightly eastward in weak EN years, and the trough looks weaker. Chances of getting access to convective outflow from SPCZ improve slightly relative to “normal” year.

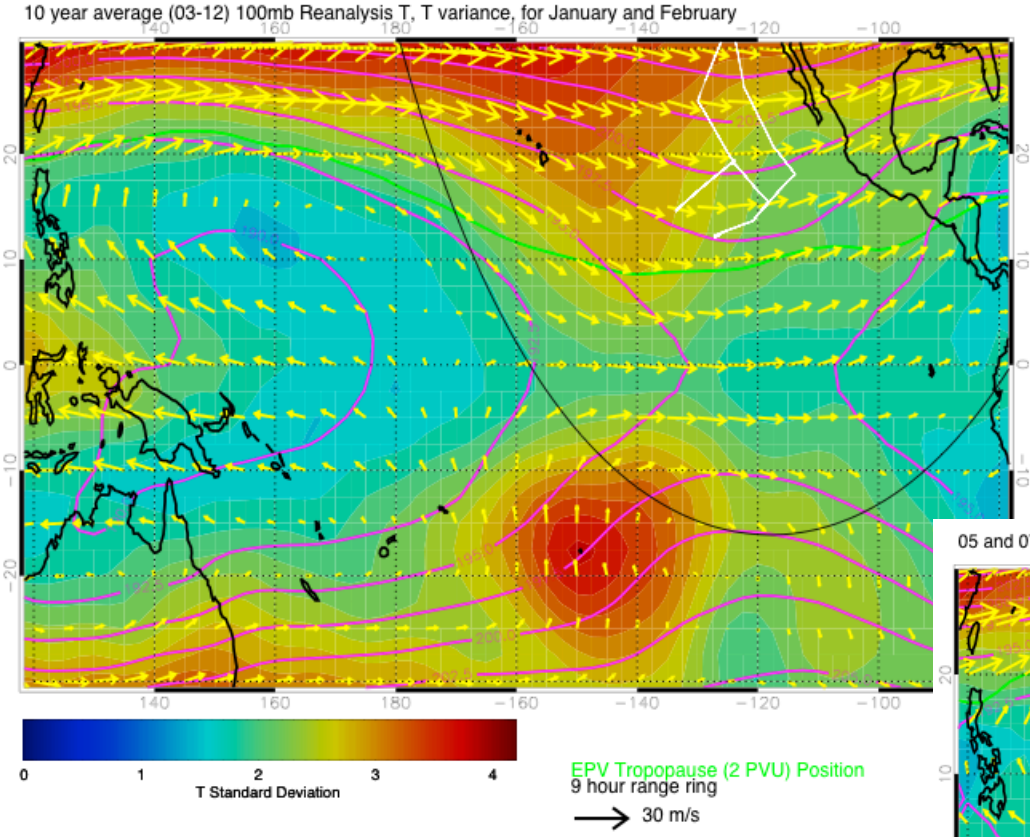
Meridional Wind Variance, 150mb

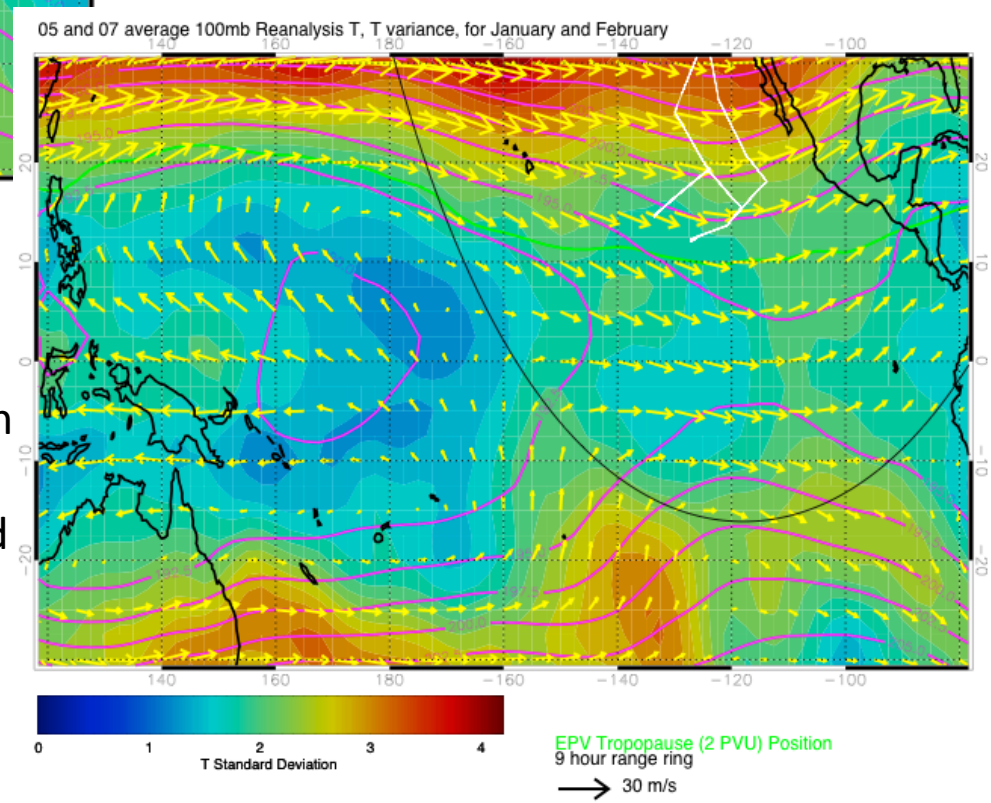




Meridional wind variance, an indication of latitudinal transport, is strongest at our longitudes, Coinciding with the mean trough. Penetration to low latitudes is reduced during the weak El Nino.

Temperature variance, 100mb

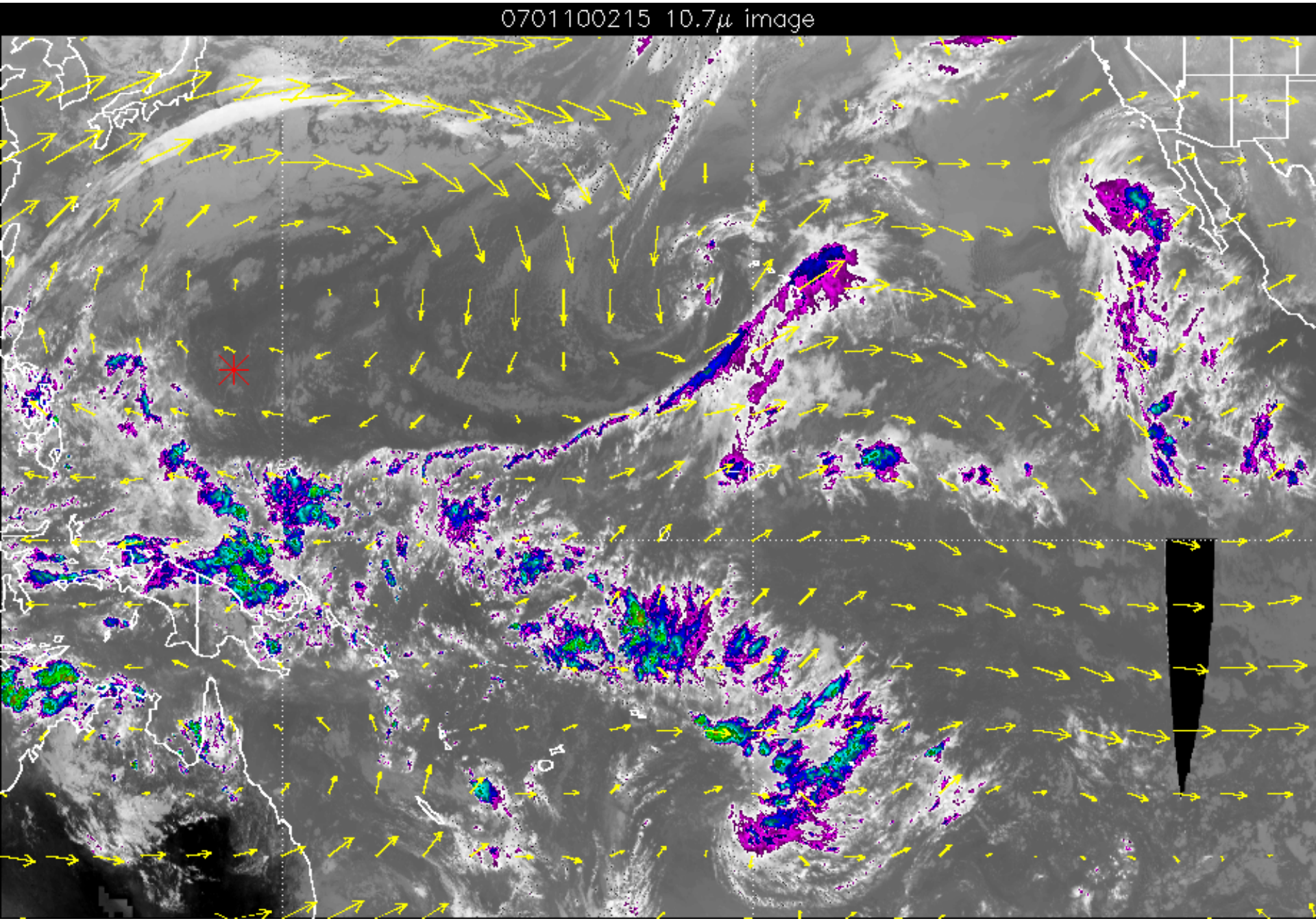




Temperature variance is minimal in the center of the cold pool, increasing at the edges, which should not be a surprise to anyone. The reduction in midlatitude wave penetration and reduced meridional wind variance leads to lower temperature variance.

150mb movie, satpic with 150mb winds

- Except at beginning, flow is fairly zonal.
- There are opportunities to sample both the western part of the SPCZ outflow and the southeastern part.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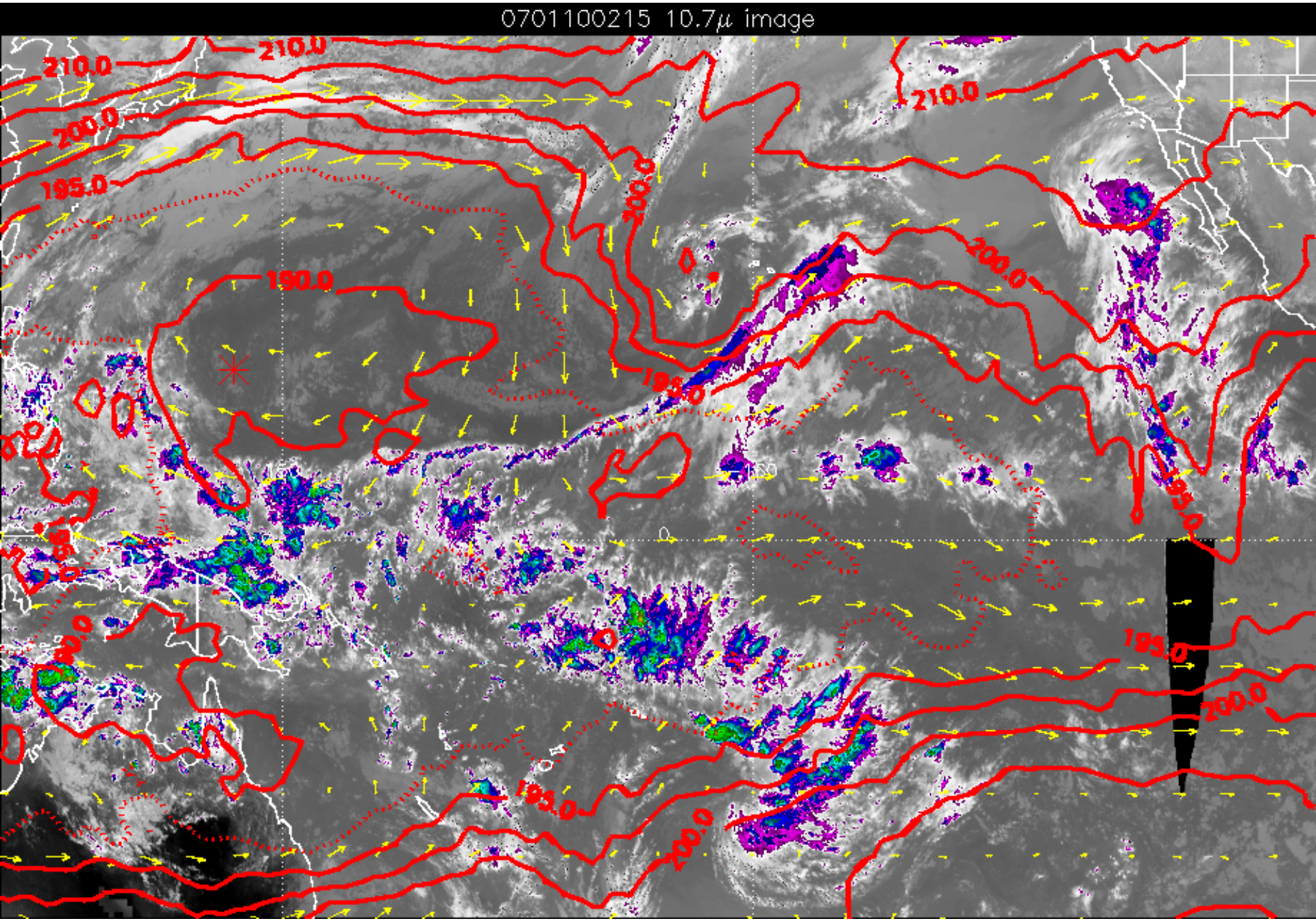
100mb winds, satpic, and temperatures

- At this level, there is much less direct flow from the SPCZ across the equator to our longitudes. Convective influence is more likely sampled from the western outflow that comes to our region via the southern edge of the subtropical jet.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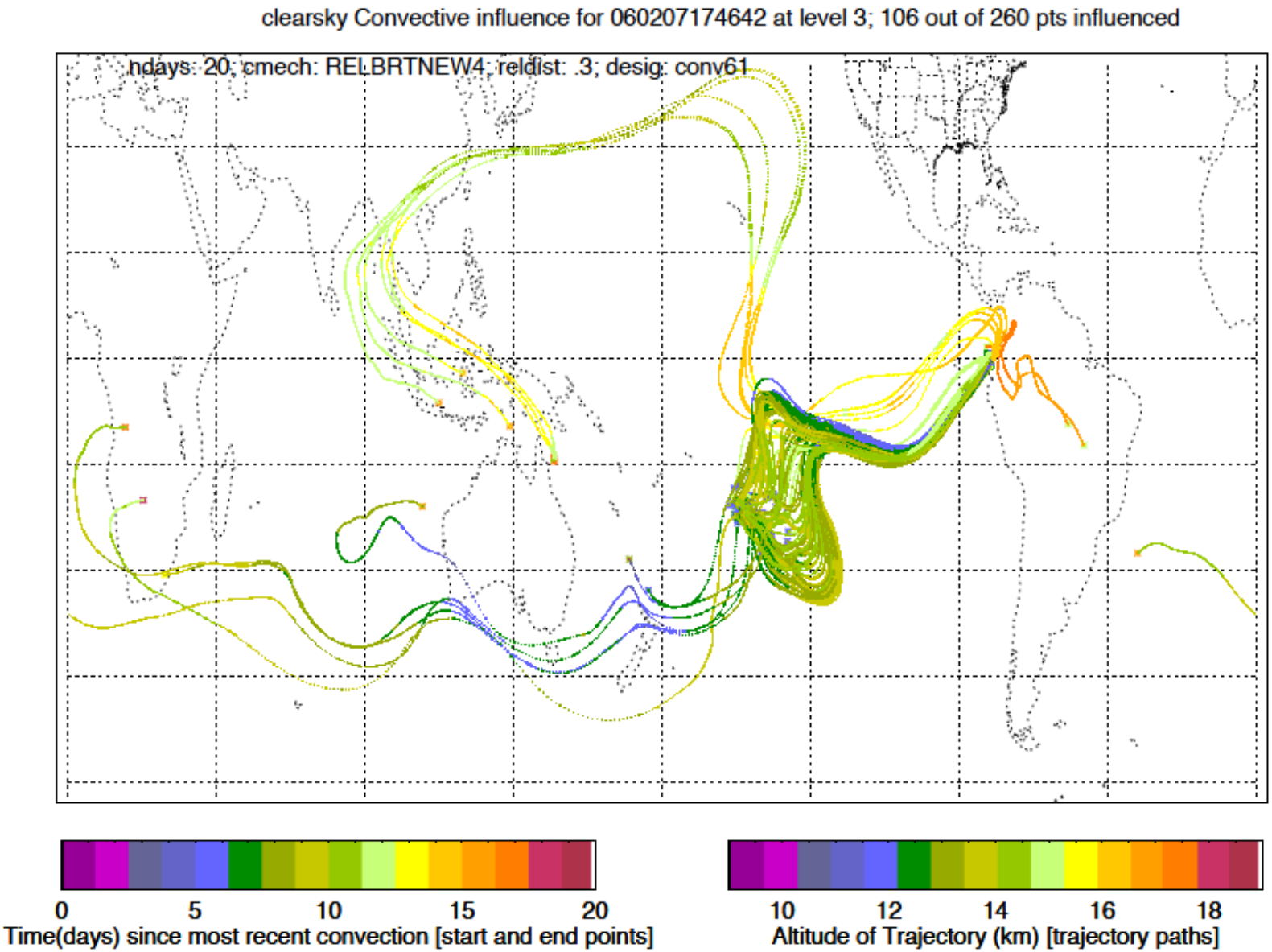

This sample trajectory from CRAVE illustrates higher convectively influenced trajectories coming "around the horn (subtropical jet)", and lower ones heading east north east from the eastern Part of the SPCZ. Note how the trough shelters our latitudes from these trajectories.

Summary

- Possible neutral to weak EN conditions next January/February
- QBO largely in cold phase for the TTL.
- Our longitudes are in a trough region, which means enhanced latitudinal transport and warmer temperatures than in the cold pool.
- Temperature and meridional wind variance are enhanced in this region.
- EN will reduce these variances significantly, but yield colder mean temperatures. EN also moves convection northward and eastward.
- We should expect to be able to sample convective outflow from the SPCZ, especially below 100mb
- Reduced midlatitude penetration may make this a good opportunity to observe equatorial waves (proceed along 5-10 north) at altitude.