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Denver

Seasonal Outlook through September 2012

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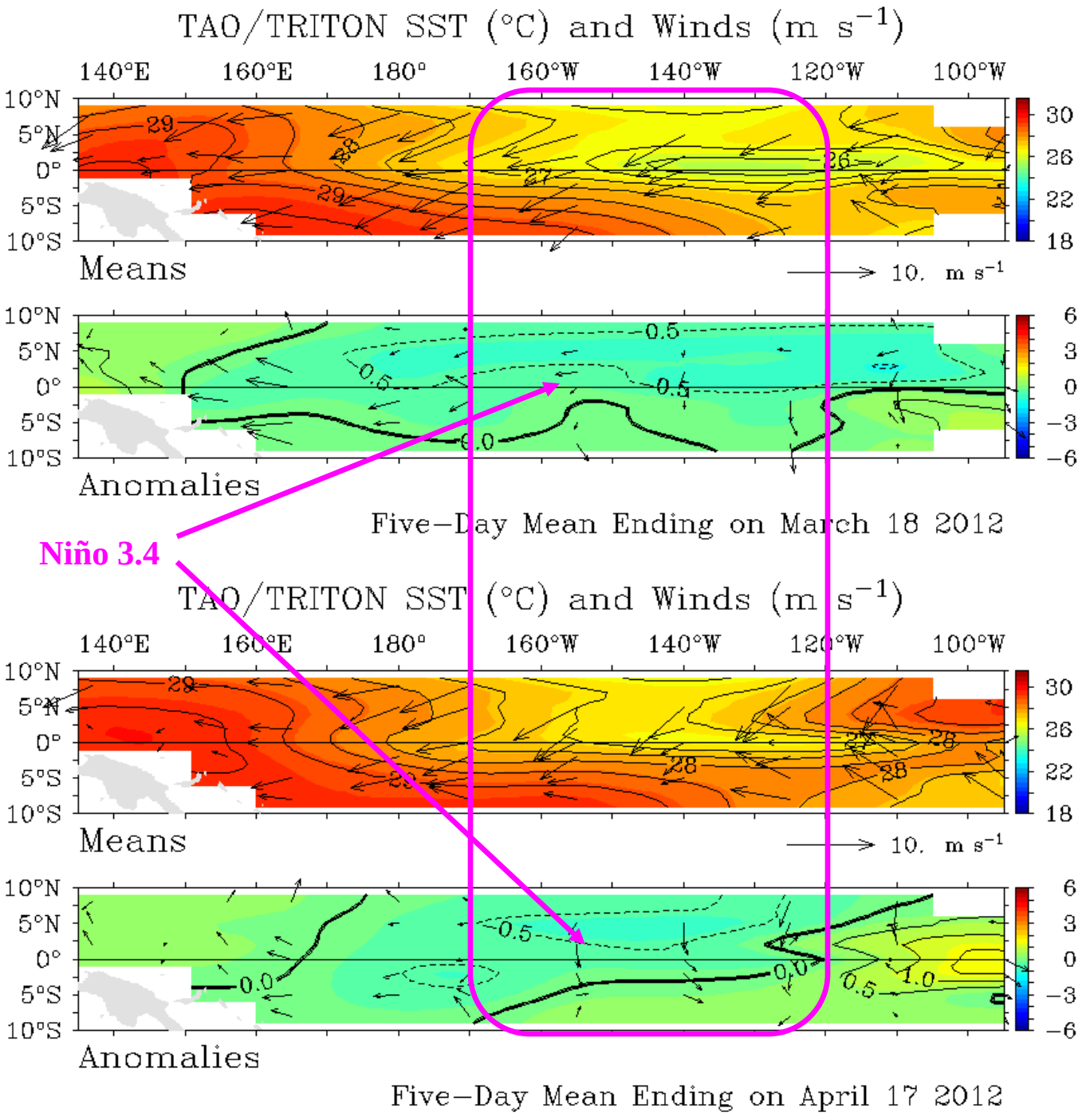
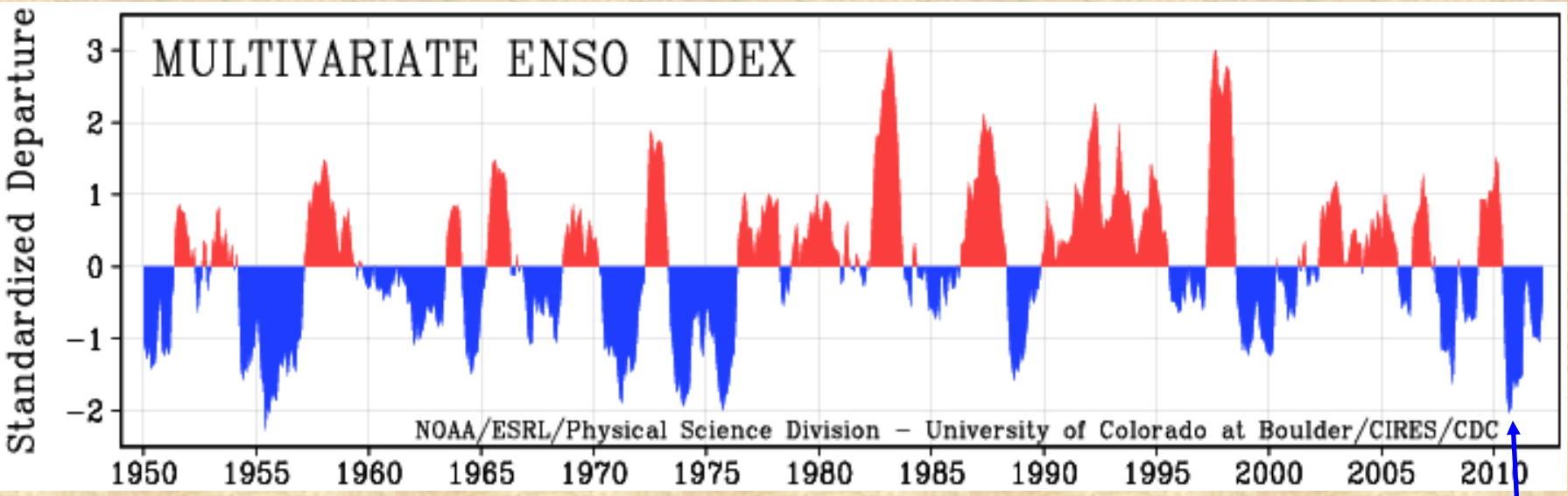
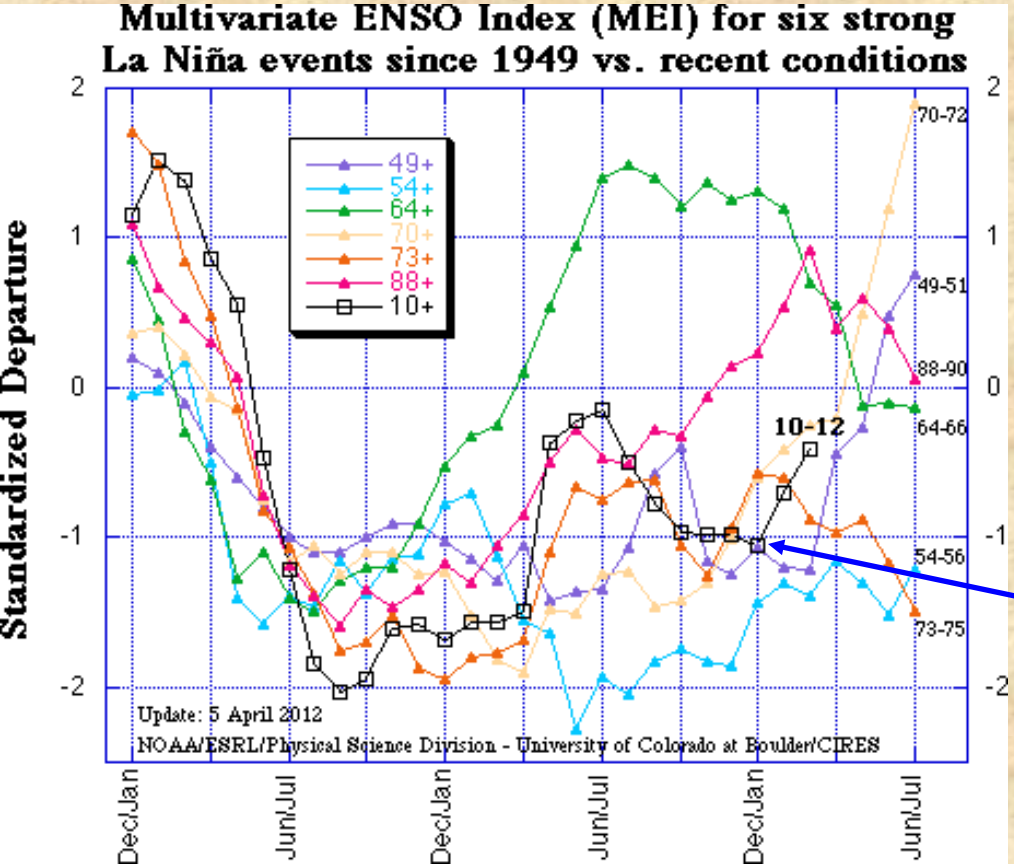
- **'Double-dip' La Niña has finished 'Round 2'**
- **What will happen next, and what does that mean for us ?**
- **Expectations beyond next week**
- **CPC forecasts for April through September 2012**
- **Experimental Seasonal Forecast Guidance**
- **Executive Summary**

Current state of El Niño/Southern Oscillation (ENSO) phenomenon (bottom), compared to last month (top): La Niña has weakened. This includes smaller equatorial SST anomalies, and growing positive SST anomalies in eastern tropical Pacific. Trade winds are not as strong as they were just a month ago, especially near and west of dateline.

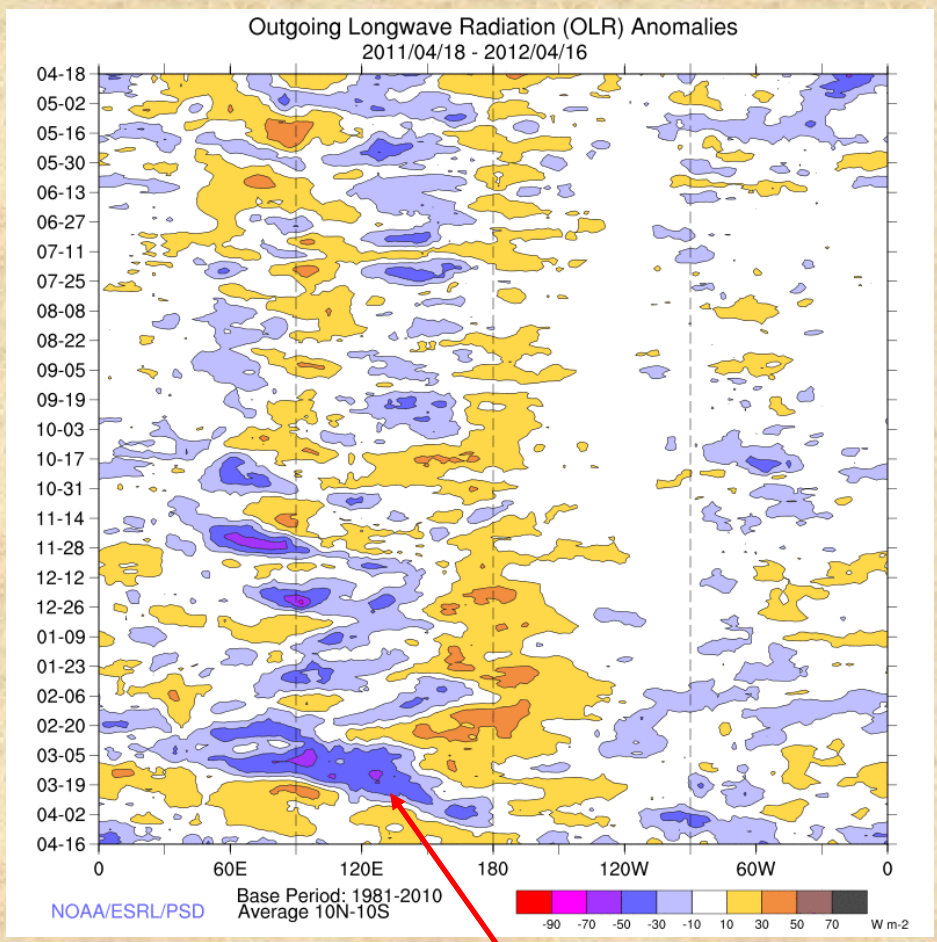


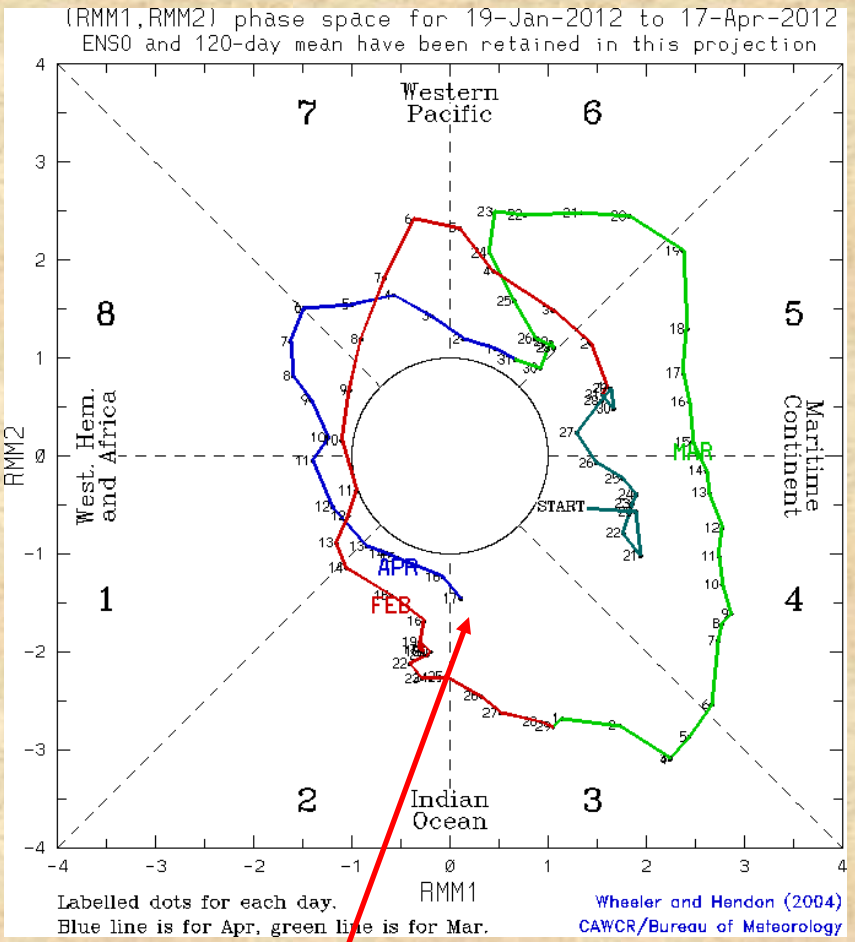




Current La Niña event reached its first peak in late 2010, followed by a brief excursion to ENSO-neutral conditions during mid-2011; it reached its second peak in December-January 2011-12, weakening rapidly since then.

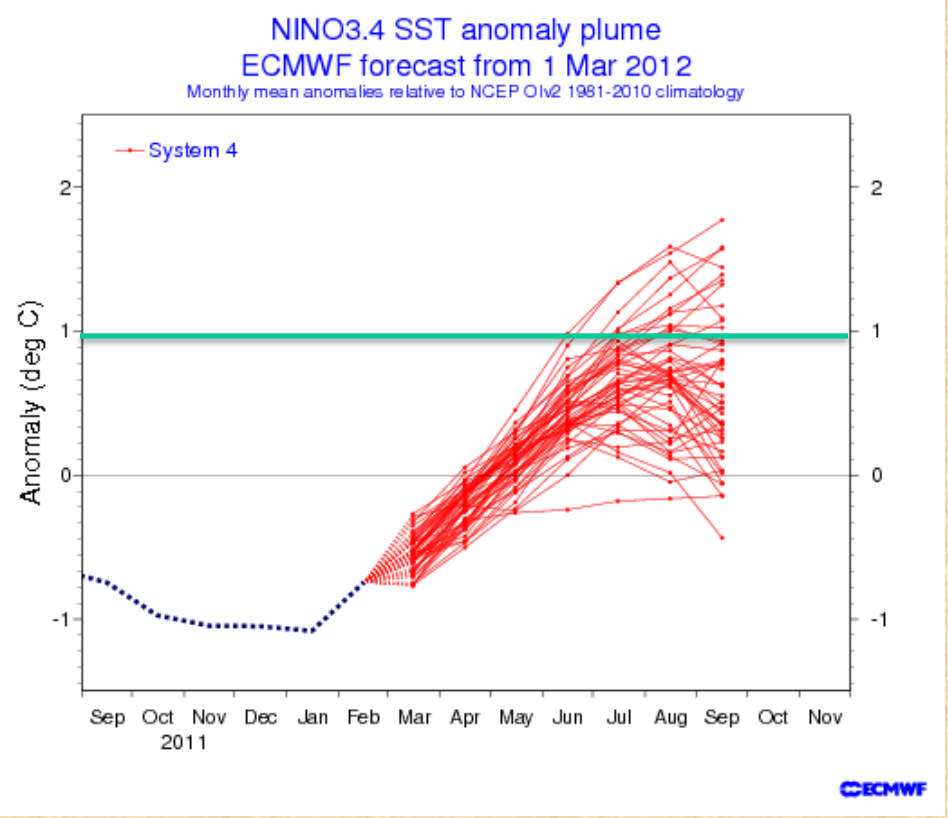
http://www.esrl.noaa.gov/psd/enso/mei





One factor that is very different from last year: Intraseasonal tropical activity ('MJO') is much enhanced compared to last year, although that by itself does not 'cause' a switch to El Niño, it can be big contributing factor ('Hail Mary Pass' to El Niño)!

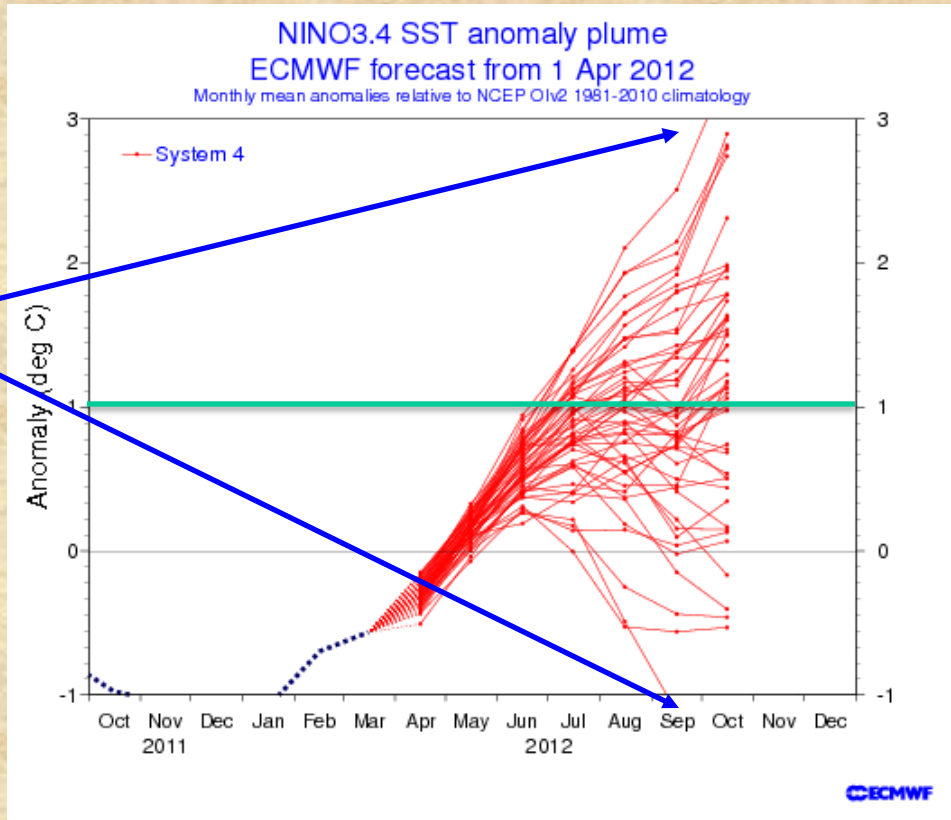
It certainly increases volatility in climate forecast models!

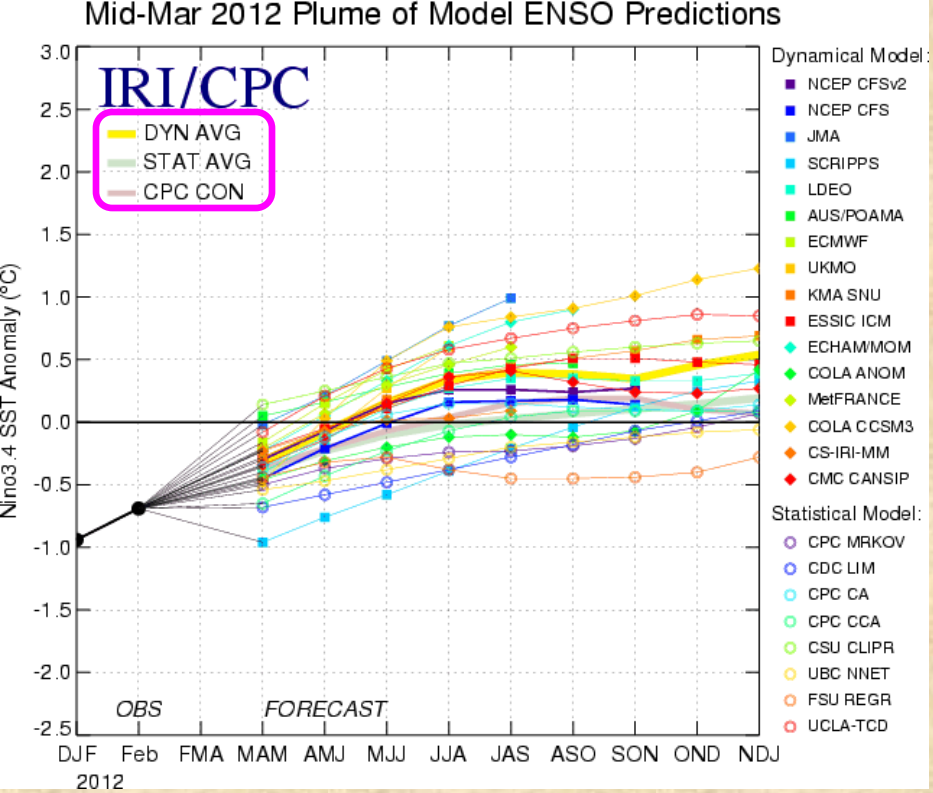


The March 2012 ECMWF forecast (left) shows a fairly dramatic transition *towards* El Niño during the next six months; the majority of the 50 ensemble members ('spaghetti plot') reach at least weak strength (+0.5°C) at some point during our summer, while about five members hint at a return of La Niña (<0°C) by September.

The ECMWF April 2012 forecast (right) shows an astonishing range – with a single member in the moderate-to-strong *La Niña* category (-1°C) to seven members reaching 'Super-*El Niño*-size' of +2°C or more by October 2012.

Given this range of the best forecast model, anything is possible, but the mean outcome (+1°C) is now solidly pro-El Niño

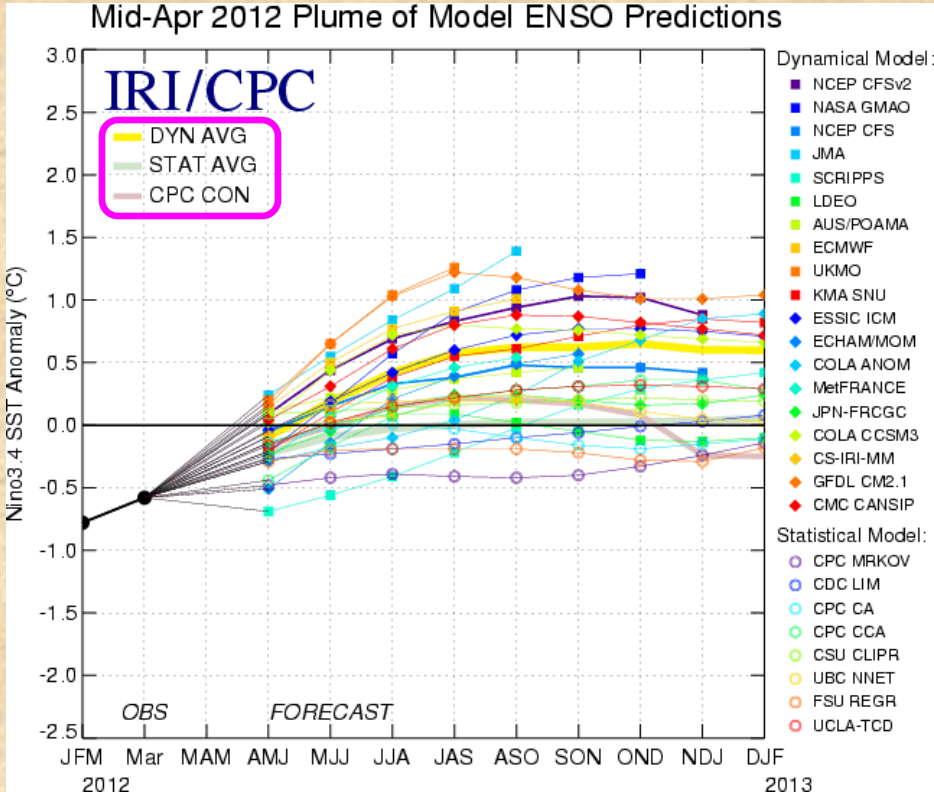




ENSO forecasts from 16 dynamical & 8 statistical forecast models from last month (left):

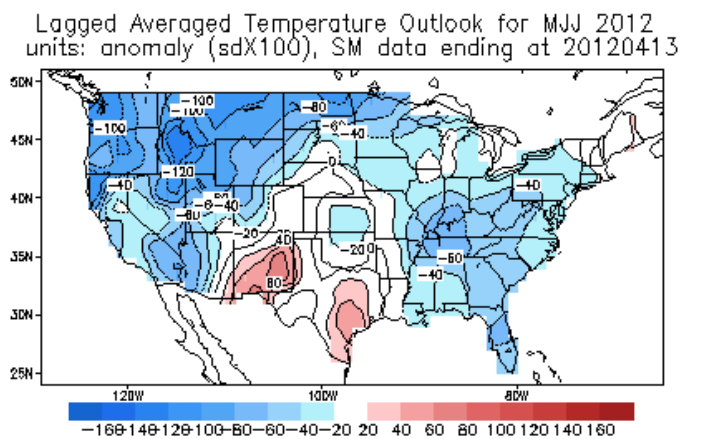
Expect ENSO-neutral conditions by late spring 2012, but beware of unusually weak scatter for this time of year...

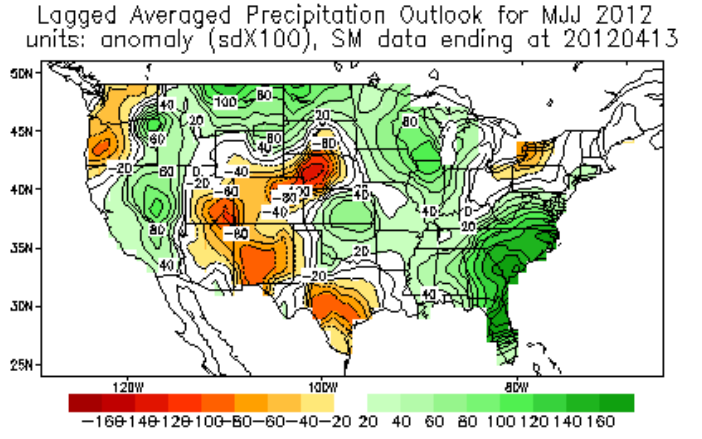
On average, dynamical models warmer than statistical models – the latter do not 'see' MJO's.

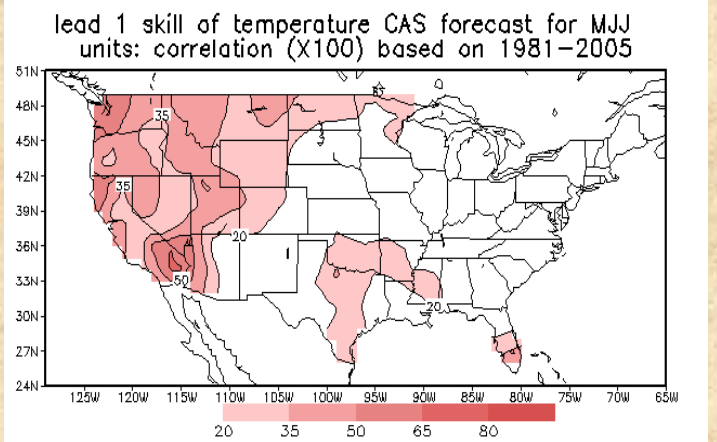


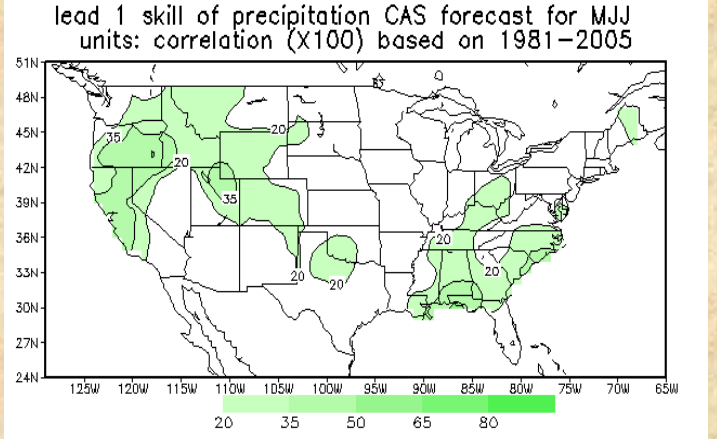
The most recent forecasts (right, yesterday's draft from Tony Barnston at IRI) show more of a shift towards El Niño than the statistical models, and a more pronounced tilt towards El Niño than last month's forecasts. In fact, the majority of dynamical models show El Niño conditions from 'JAS' onwards, while none of the statistical models reach that level.

Other considerations – ‘Constructed Analog’



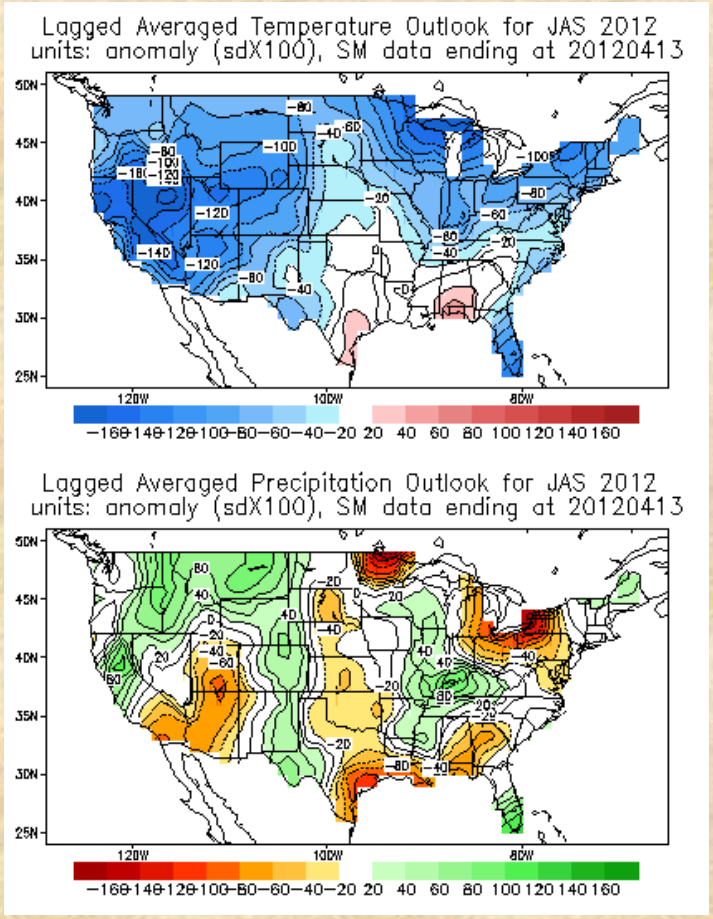


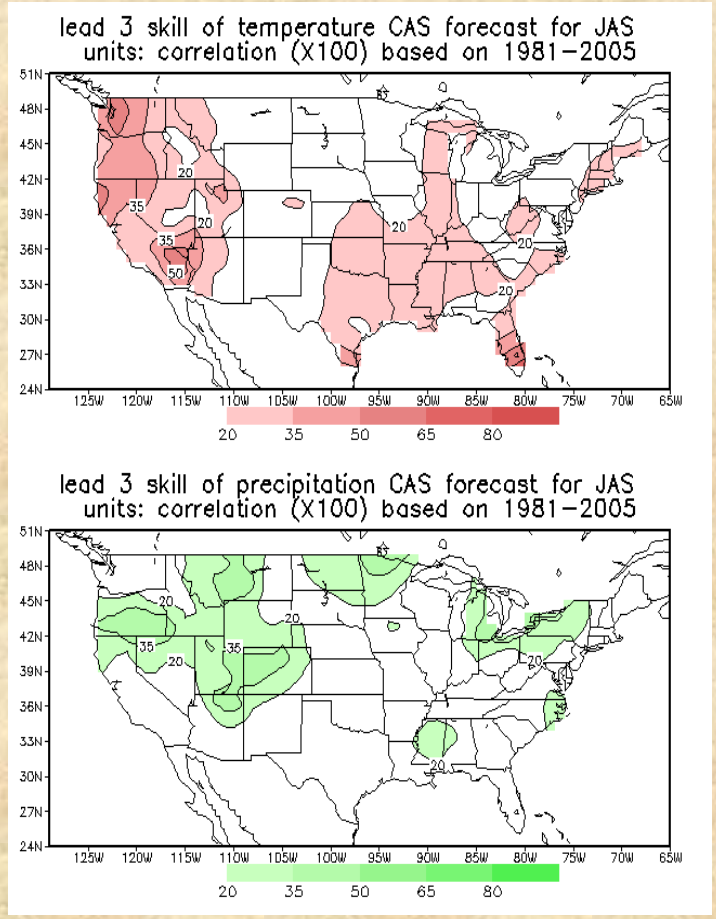




According to CPC’s soil-moisture analog forecast, the next three months are more likely to be on the cool side for much of the Western U.S., except from NM into TX, along with dry conditions over southwestern U.S., and wet conditions from CA to MT and back down to Midwest and SE U.S. (left). Skill at this lead-time (right) is decent over Western U.S., both for temperatures and precipitation. Source: ***http://www.cpc.ncep.noaa.gov/soilmst/cas.shtml***

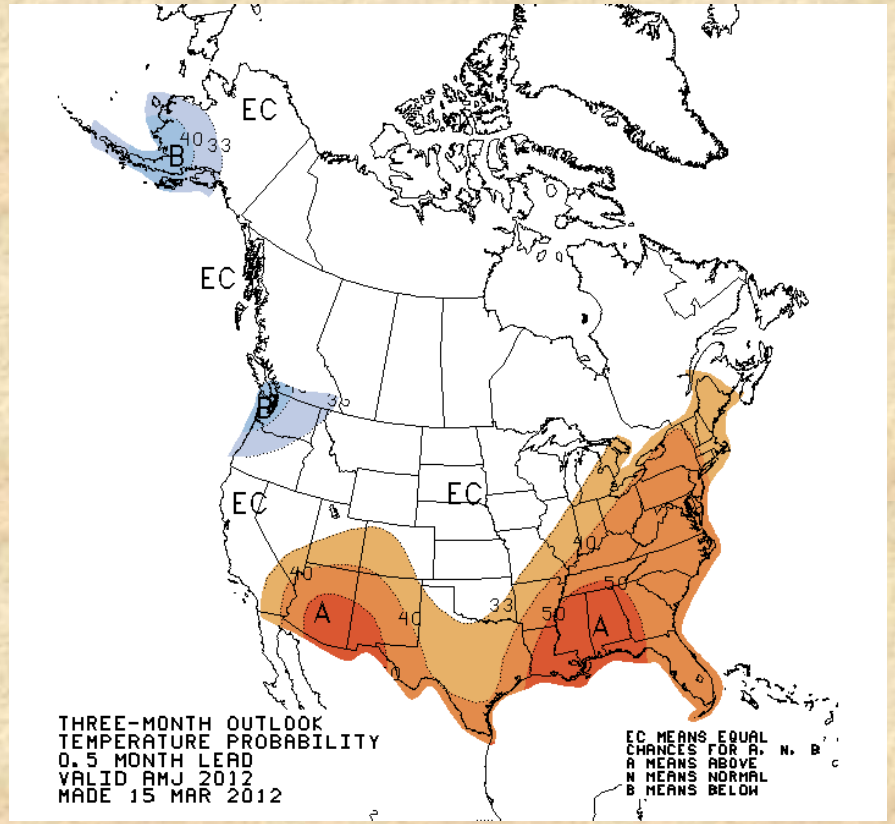
Other considerations – ‘Constructed Analog’

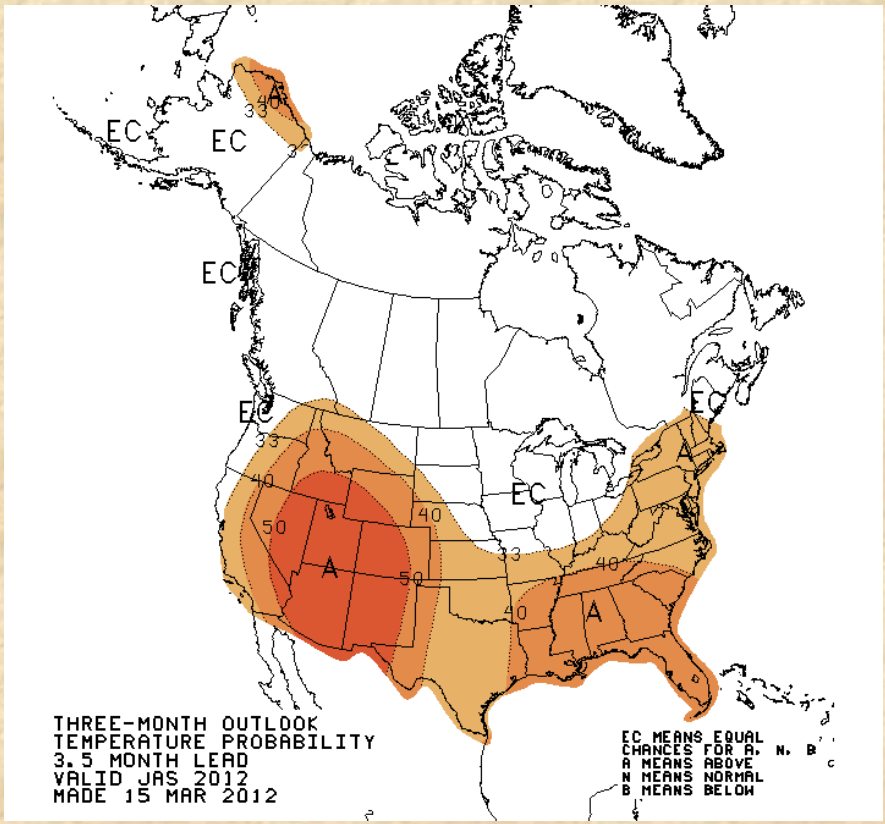




According to CPC’s soil-moisture analog forecast, the late summer (Jul-Sep’12) is more likely to be on the cool side for much of the U.S., except near the Gulf coast, along with dry conditions from AZ into UT, and wet conditions from interior northwest down through eastern CO into western TX (left). Skill at this lead-time (right) is surprisingly good for Colorado in precipitation. **Source**: ***http://www.cpc.ncep.noaa.gov/soilmst/cas.shtml***

Climate Prediction Center Temperature Forecasts

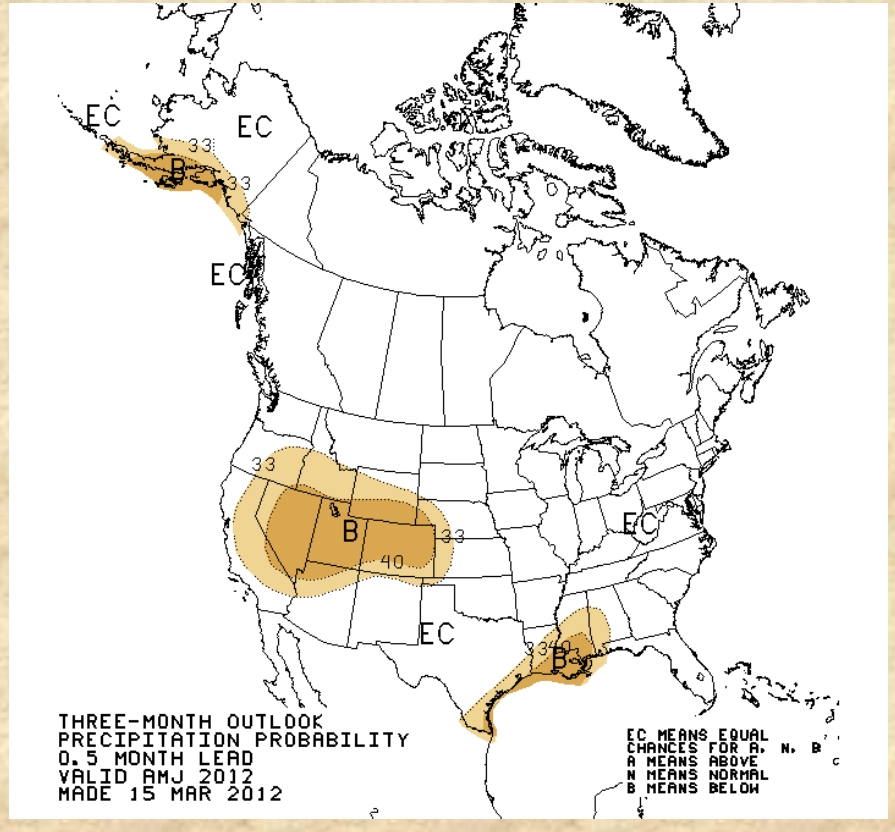


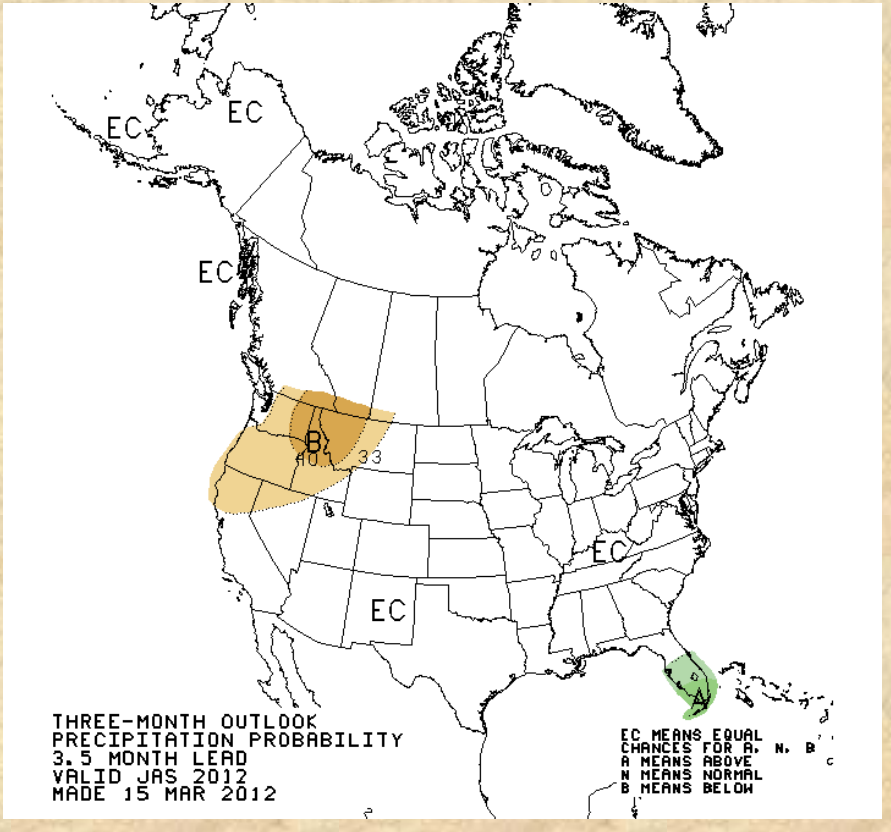


CPC's temperature forecast for April-June (left) and July-September reflects recent warming trends – more pronounced in summer (right) than in spring (left). CPC is playing it safe for now, and goes for ENSO-neutral conditions. This will be updated by tomorrow.

Source: ***http://www.cpc.ncep.noaa.gov/products/predictions/***

Climate Prediction Center Precipitation Forecasts

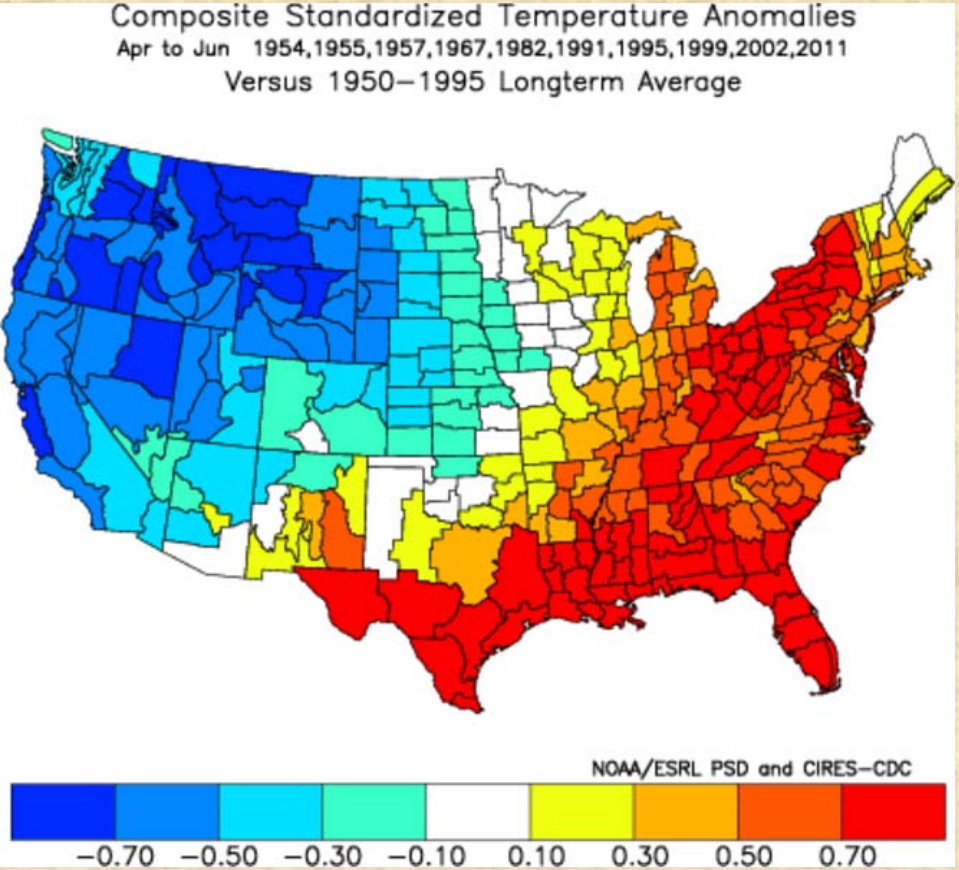


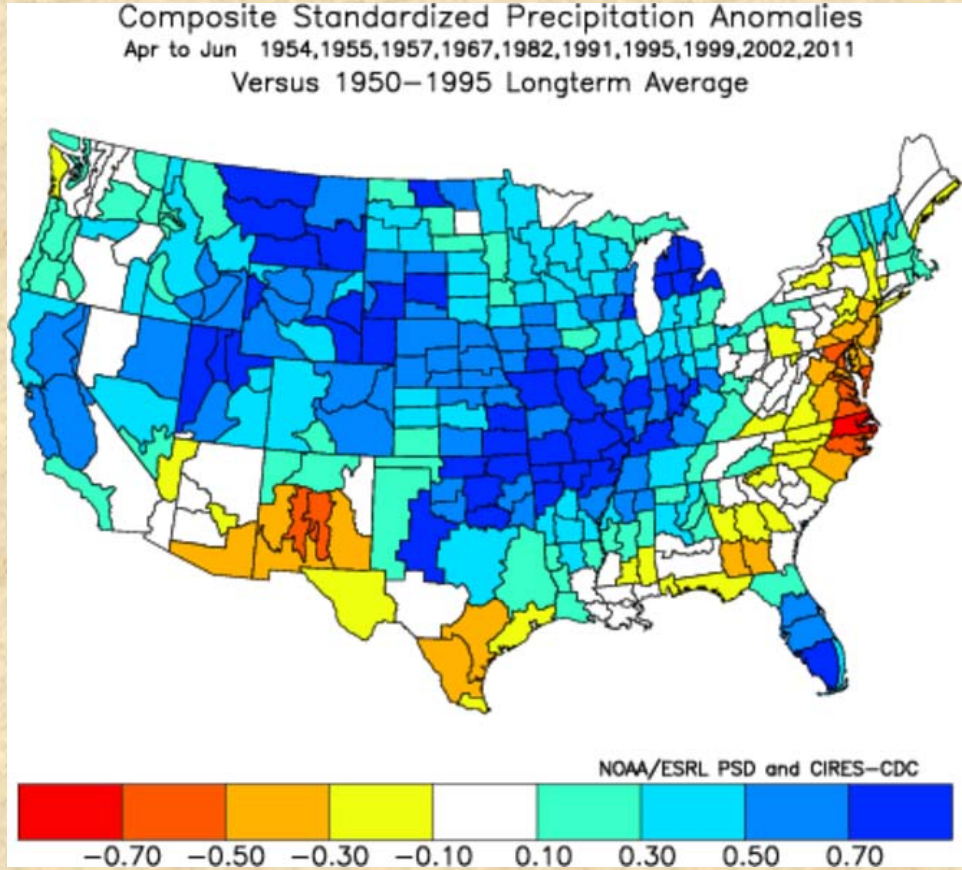


CPC's precipitation forecast for April-June (left) was still informed by La Niña, while July-September reflects recent moisture trends (right). For Colorado, this still means a dry spring (left) and climatological odds for summer (right). This will be updated by tomorrow.

Source: ***http://www.cpc.ncep.noaa.gov/products/predictions/***

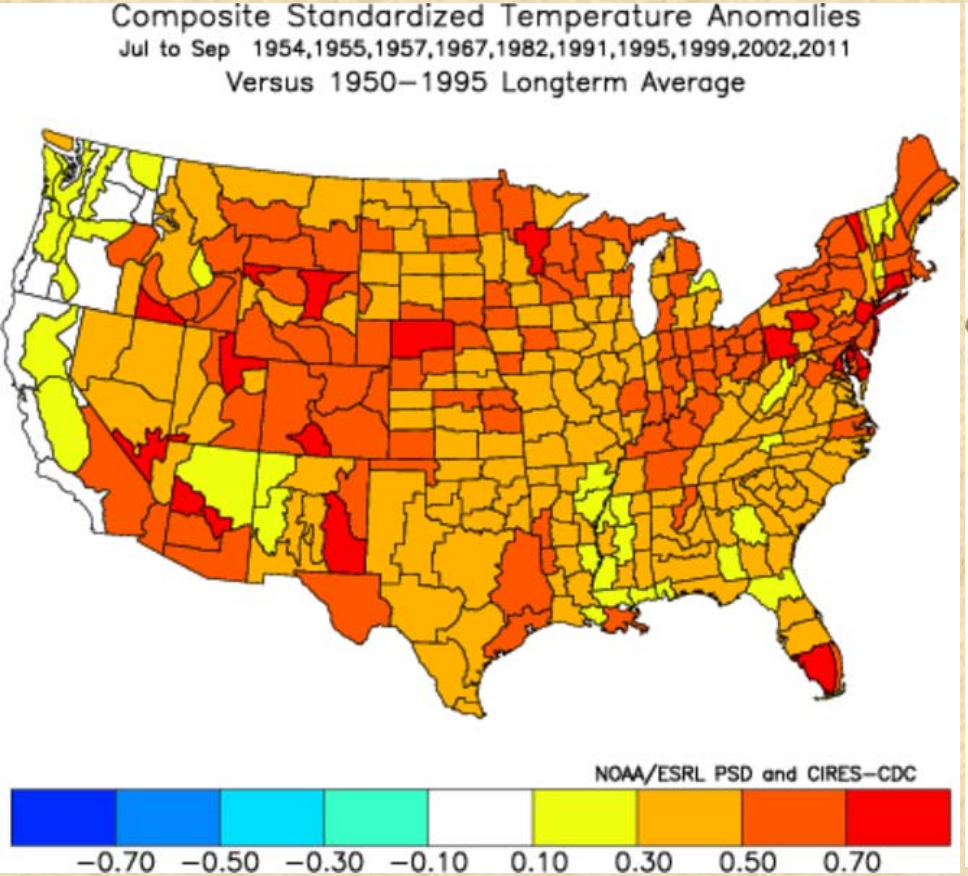
Other considerations - Warm Gulf of Mexico (≠AMO)

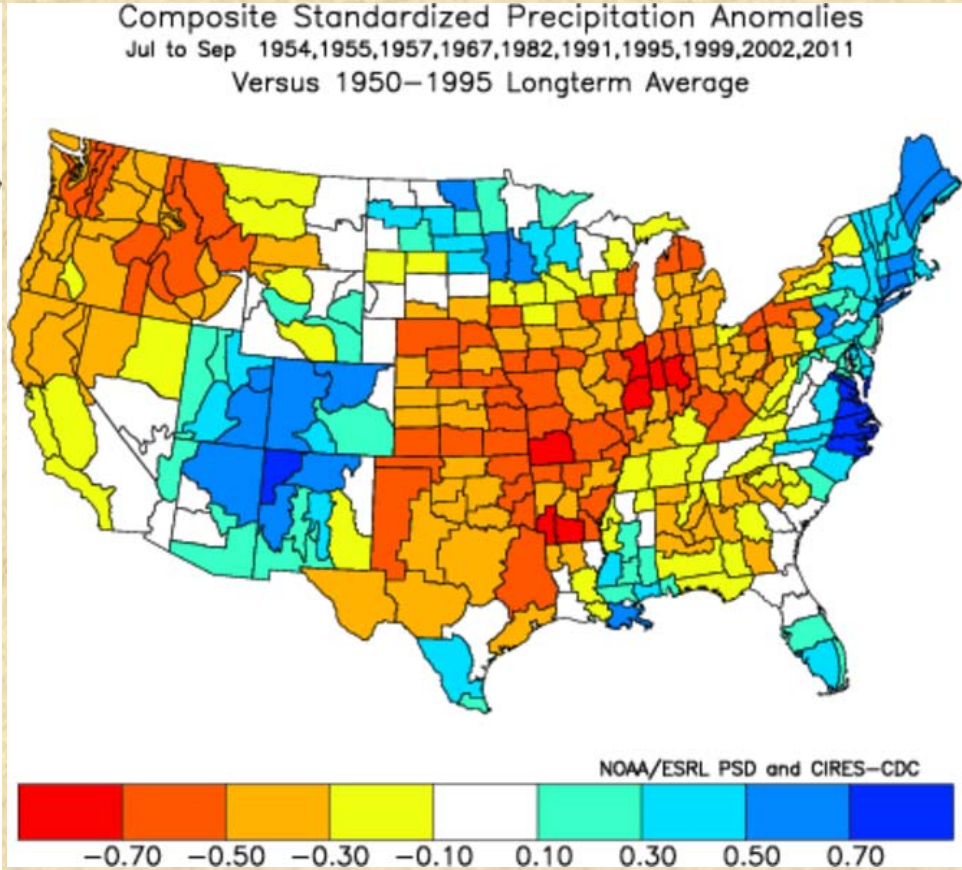




Gulf of Mexico is quite warm this month (was 10th highest in March) – if I take the Gulf average temperature over last 62 years (since 1950) and pick the 10 warmest cases in April, I get the composites shown above, *cutting across ENSO categories*, and being in the warm AMO phase 7 out of 10 times. Both 2002 and 2011 are part of this composite. For Colorado, this would be a cool and wet scenario.

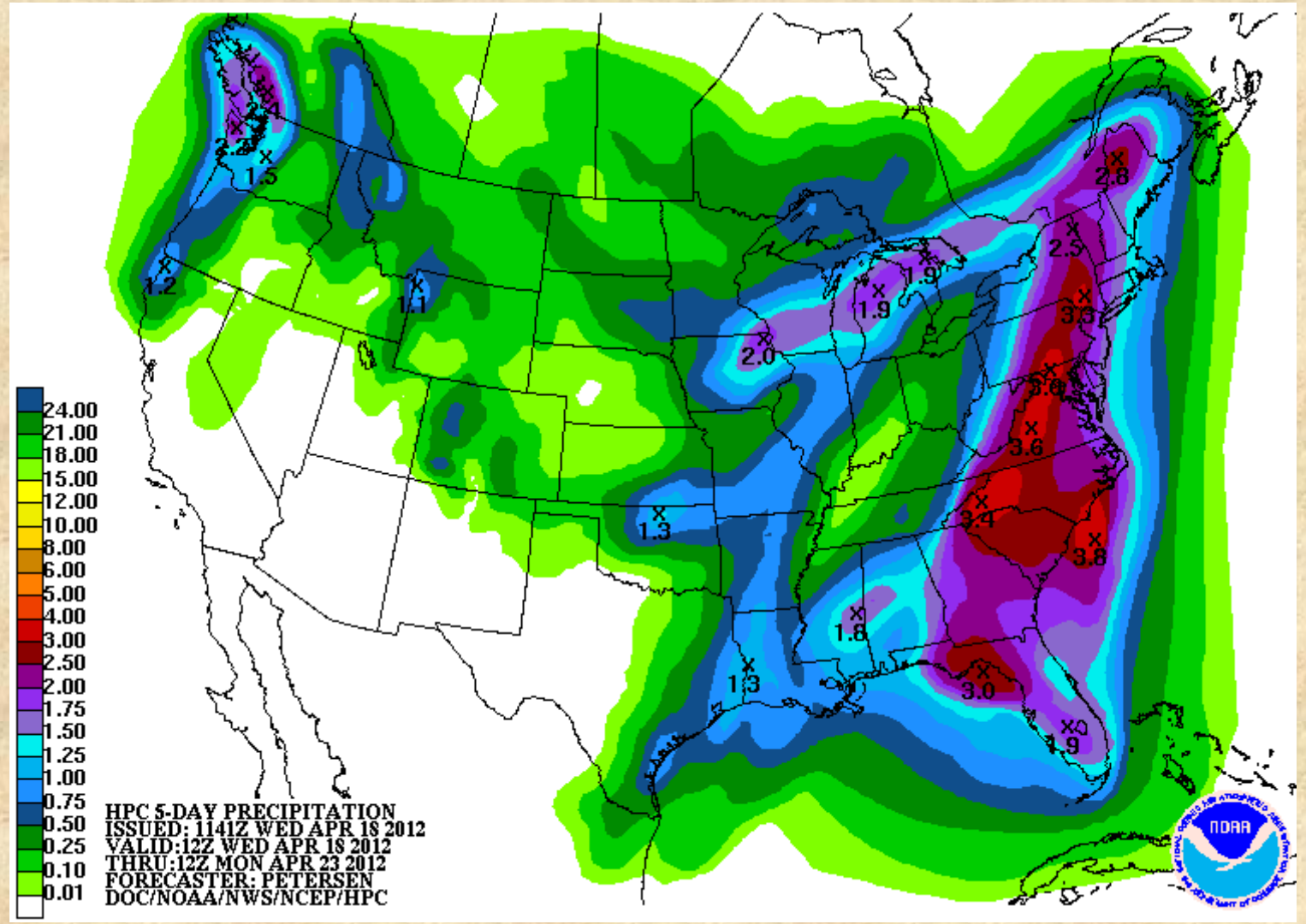
Other considerations - Warm Gulf of Mexico (≠AMO)





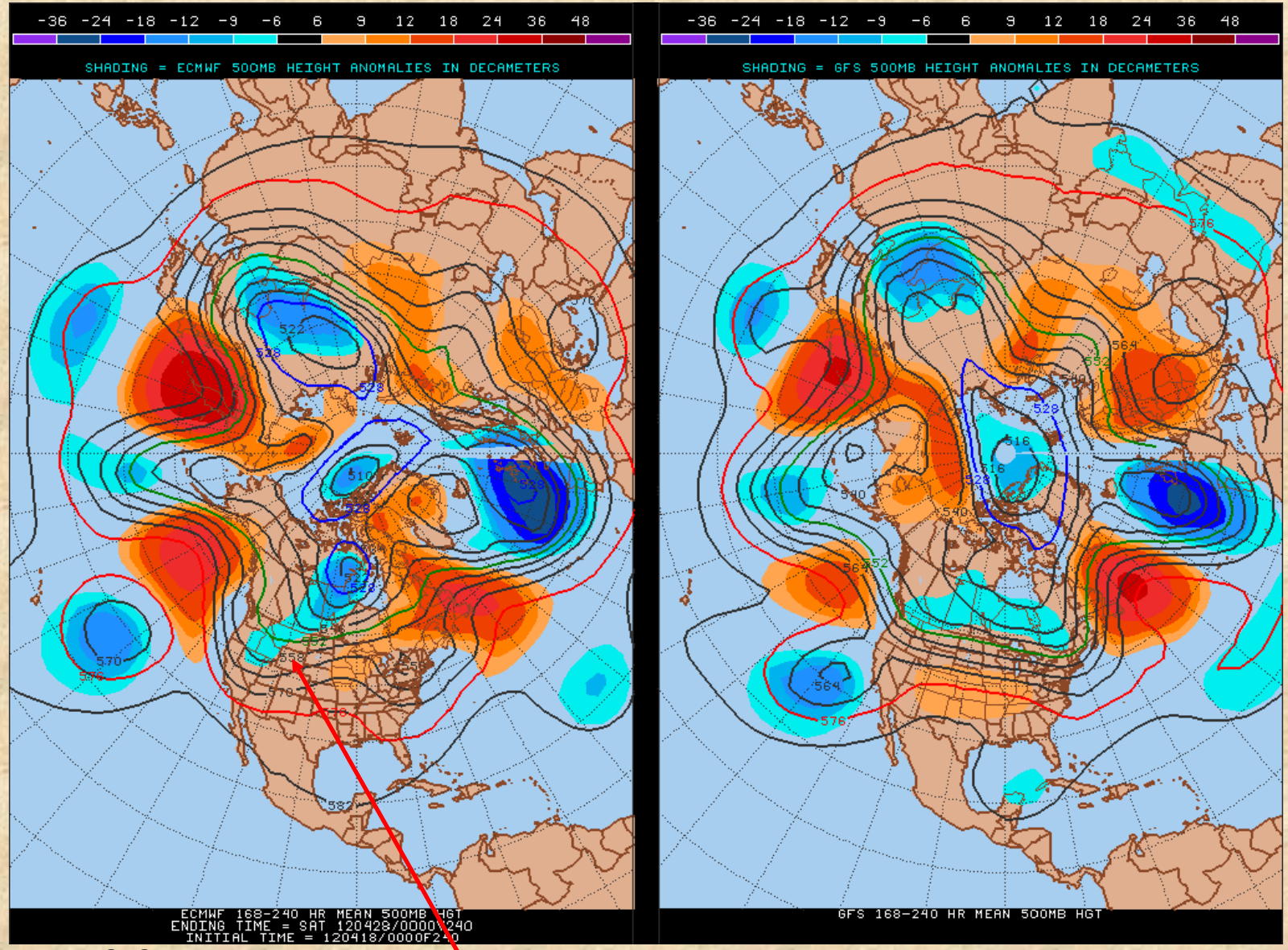
These are the composites for late summer (July-September) based on warm Gulf of Mexico SST in April (same as before). For Colorado, this would be a *warm and wet scenario* (in most cases – certainly not in 2002).

What can we expect in the next two weeks?



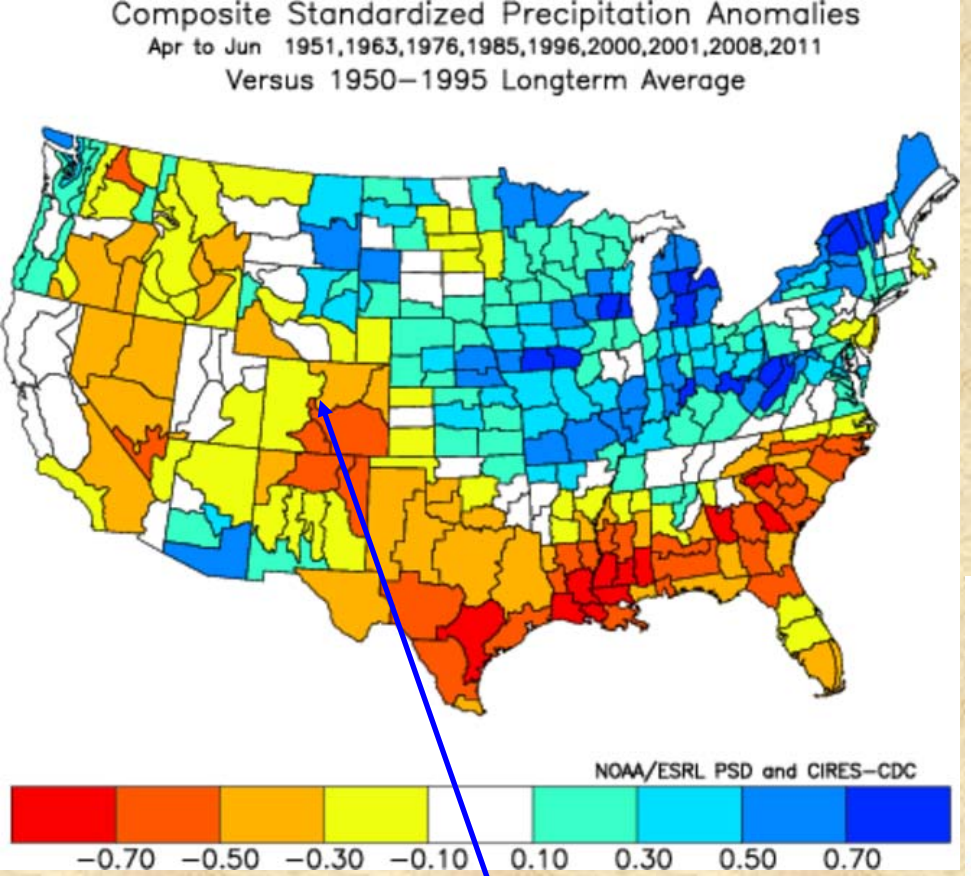
Expected total precipitation thru Monday morning, according to the Hydrological Prediction Center (HPC): Colorado can expect to see at least some moisture, but no big relief.

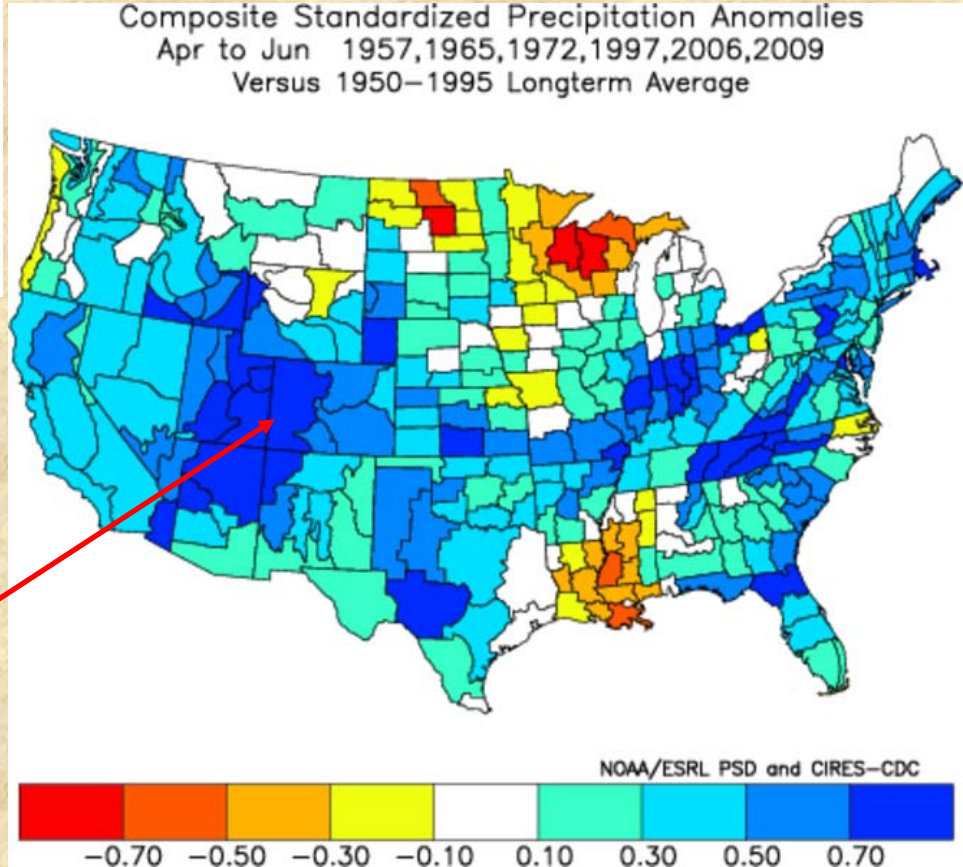
What can we expect next week?



In a major shift from yesterday, ECMWF shows developing trough in Western U.S., while GFS still has mostly ridging over us for 7-10 days from last night.

Post-La Niña springs

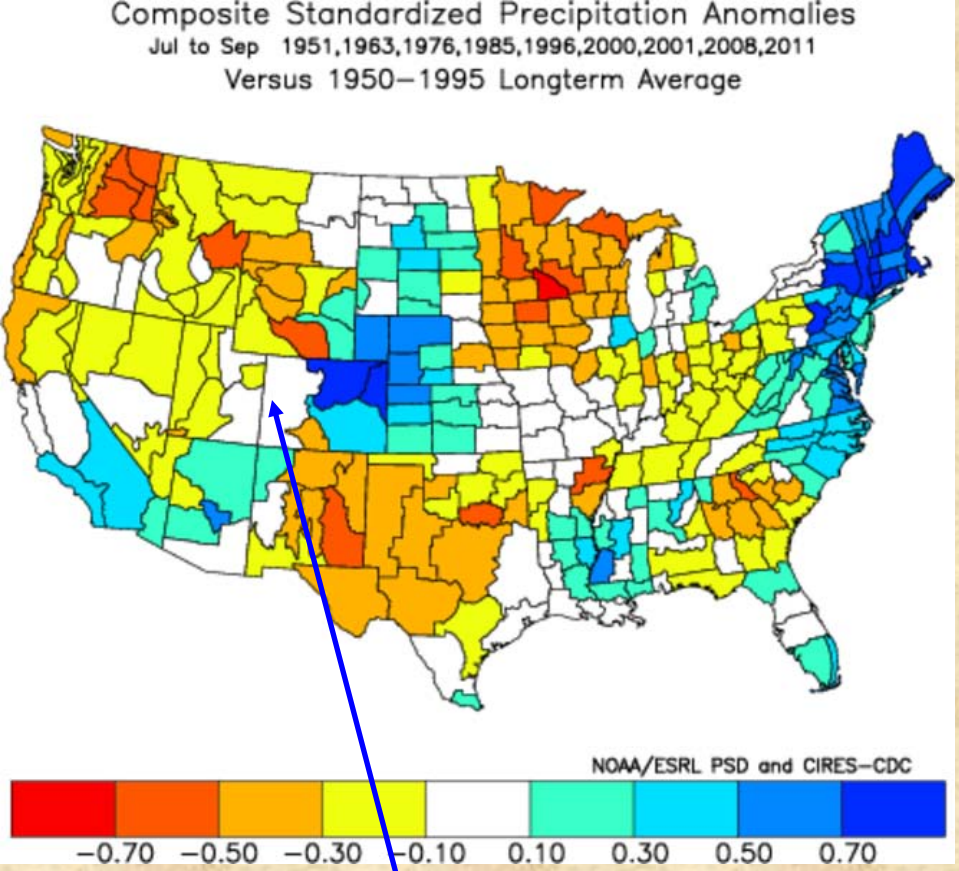




IF we go from La Niña in winter to just ENSO-neutral conditions by May-June, we tend to end up with a dry spring (top).

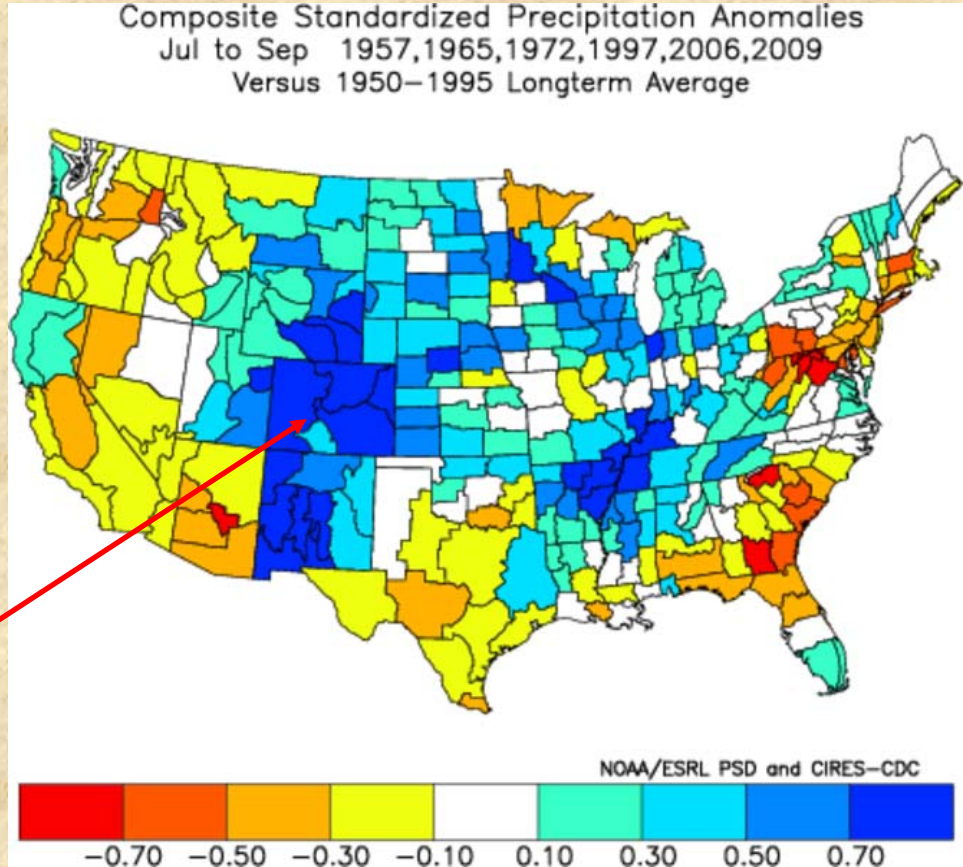
IF we were to reach El Niño conditions by May-June, we could get a much wetter spring (right). ***This scenario has recently become more likely…***

Post-La Niña summers

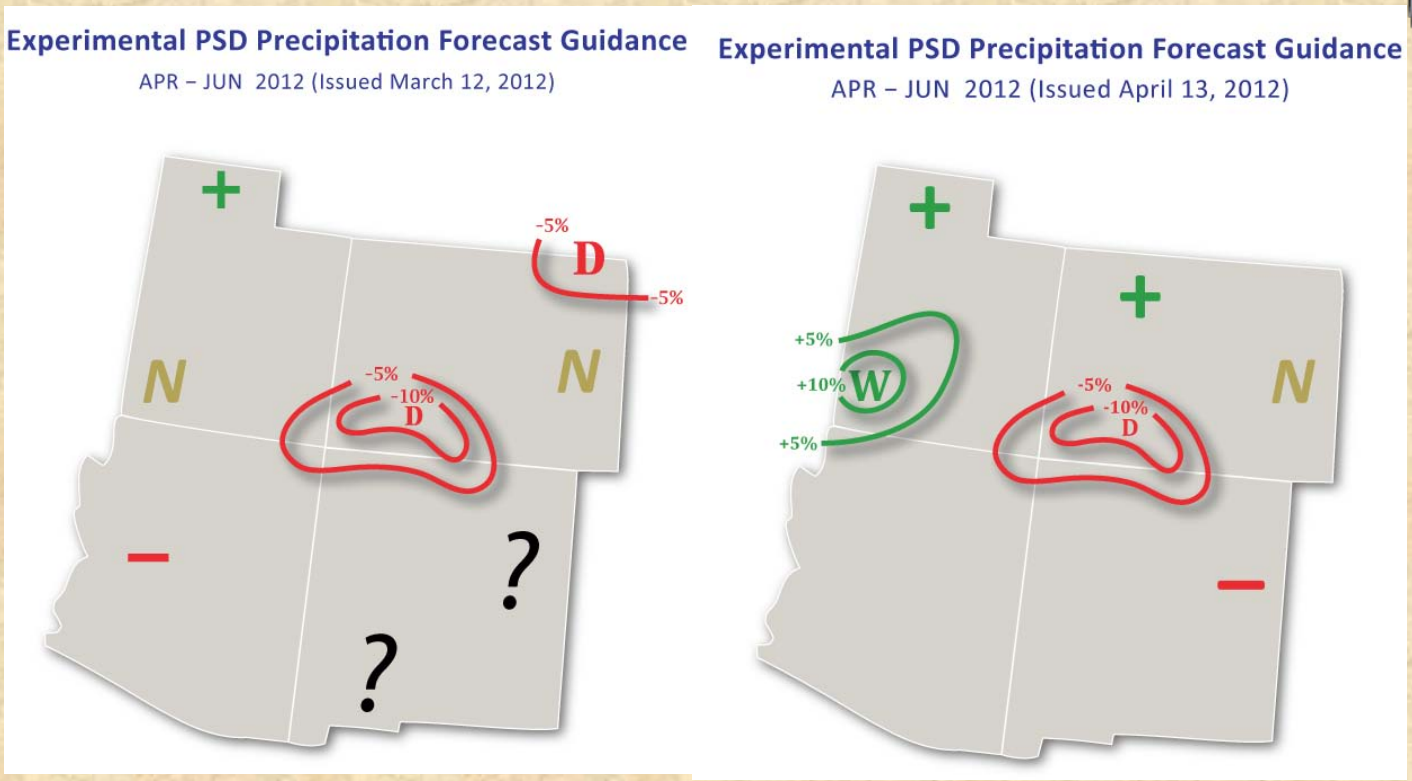


IF we go from La Niña in winter to ENSO-neutral conditions by May-June, we tend to end up with a wet summer in eastern CO, near-normal in western CO (top).

IF we were to reach El Niño conditions by May-June, we could get a wetter summer in all of our state (right). ***This scenario has recently become more likely…***

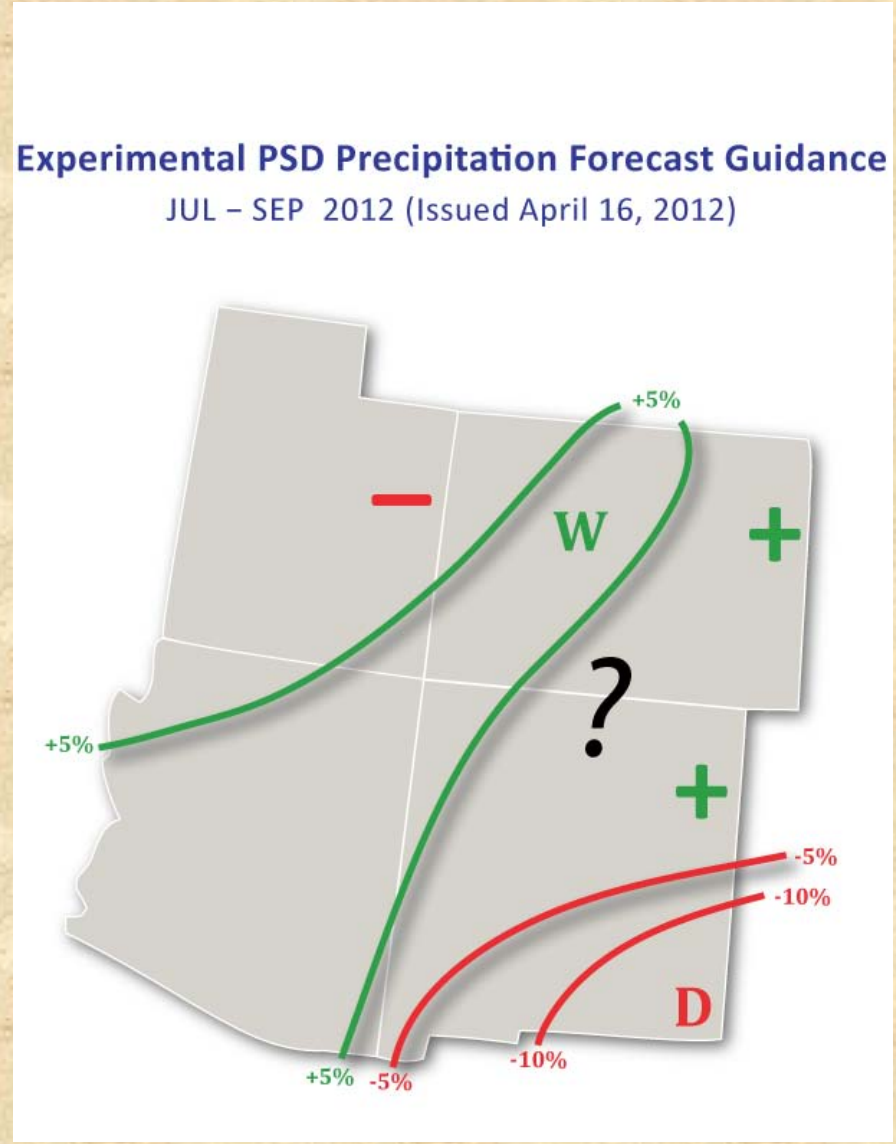


Statistical Forecast for April-June 2012



March's (left), and current (right) forecasts for April-June 2011 are fairly confident that SW Colorado will see below-normal moisture. However, the odds for a wet spring have increased from UT into northwestern CO. The new forecast map looks a little bit more similar to the 6 La Niña-El Niño transition composite shown earlier. *Historical skill since 2000 has been better over Utah and Colorado than over New Mexico.*

Statistical Forecast for July-September 2012



The first forecast of the year for July-September 2012 is optimistic from AZ into CO, and pessimistic for eastern UT and southern NM. This forecast map looks more like the ENSO-neutral scenario map than the El Niño map.

At this long-lead time, historical skill performance has been quite poor except for northwestern UT ('EC'), southwest NM (dry), as well as the eastern half of CO (wet).

Executive Summary (18 April 2012)

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1. **La Niña ended up weaker than last year, and did not leave all the typical footprints. For Colorado, an overall drier season was correctly anticipated based on typical 2nd year La Niña outcomes. A full transition to El Niño has become more likely, but still not guaranteed.**

1. **A dry La Niña March was typical indeed for La Niña. While April can be fairly wet even during La Niña conditions, 2012 has not been too promising (if wetter than March). There are some modest indications that the end of April will see wetter weather.**

1. **My forecast for late spring (April-June) shows a tilt towards dryness covering southwest Colorado, near-normal moisture over the eastern plains, and a slight tilt towards wetness in northwest Colorado. There is a realistic chance that we could see a rapid transition towards El Niño within the next few months in which case our prospects for a wet spring would be better. *Stay tuned!***

1. **Bottomline: Aside from a few extreme (for La Niña) snowstorms along the northern Front Range this winter, and dryness from December into early January in the mountains, this winter did bring many of the expected La Niña impacts. This includes more than our fair share of windstorms, as well as a warm and dry March. The remainder of spring and summer will be much more likely to end up on the wet side if we actually switch to El Niño soon. At present I put the odds for this at 40%.**