Earth System Research Laboratory
Physical Sciences Division

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Colorado WATF,
18 April 2013
Denver

Seasonal Outlook through September 2013

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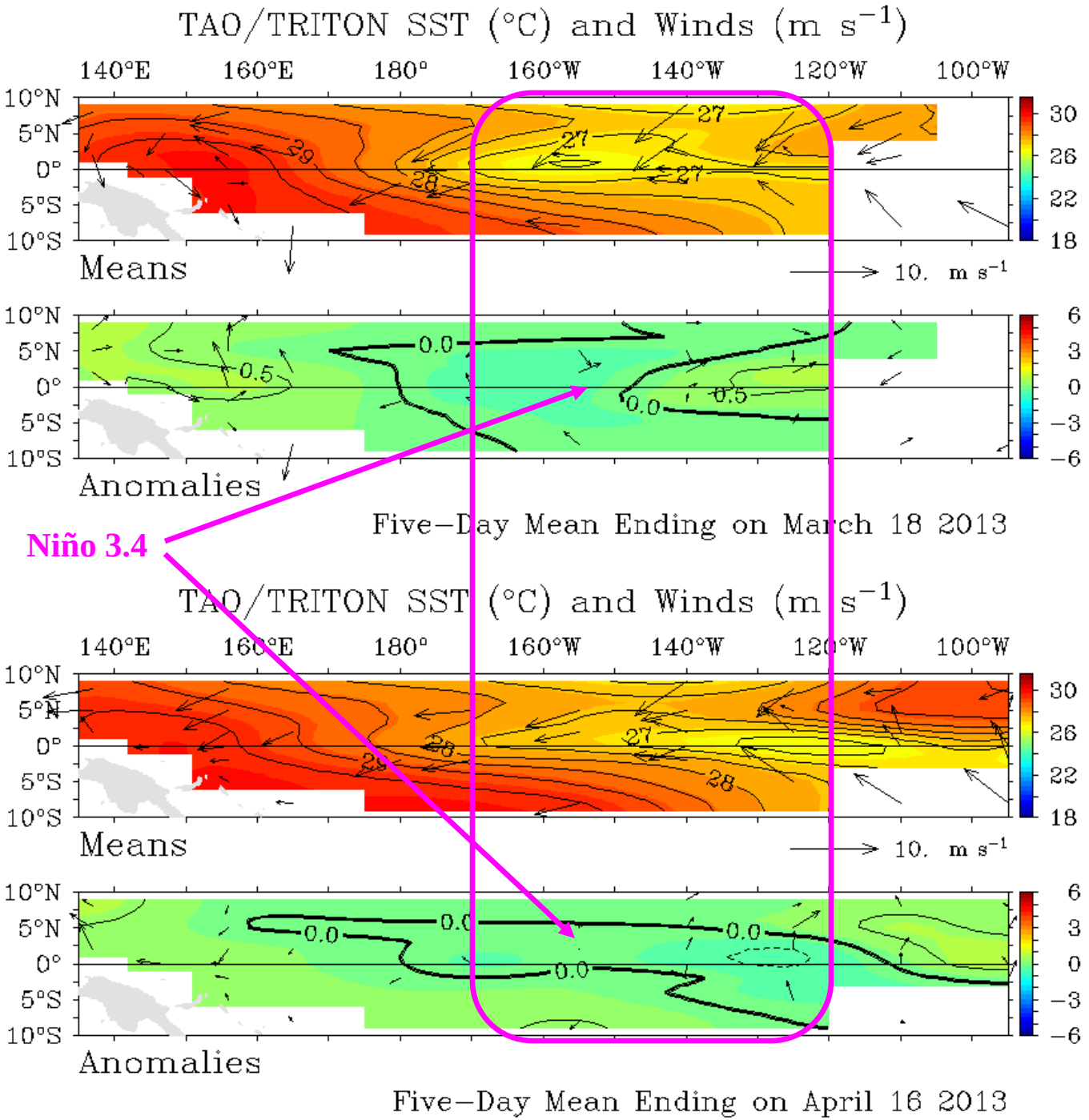
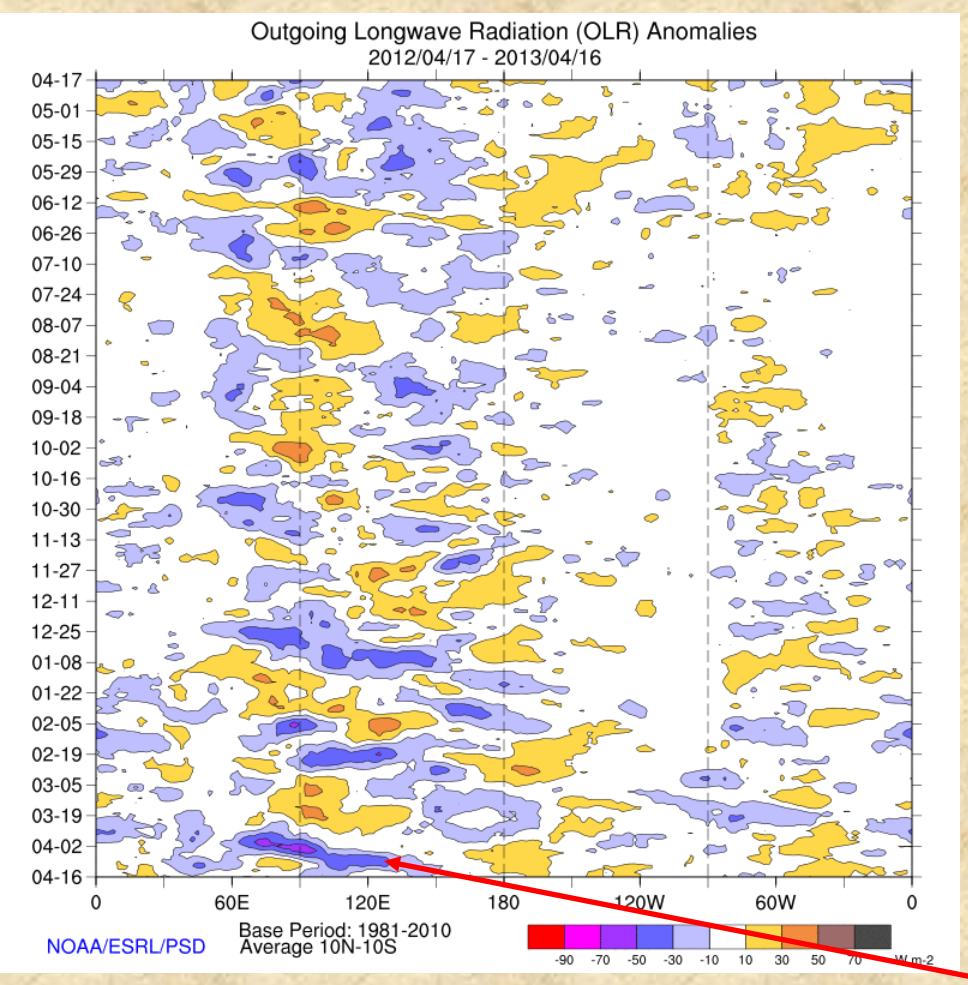
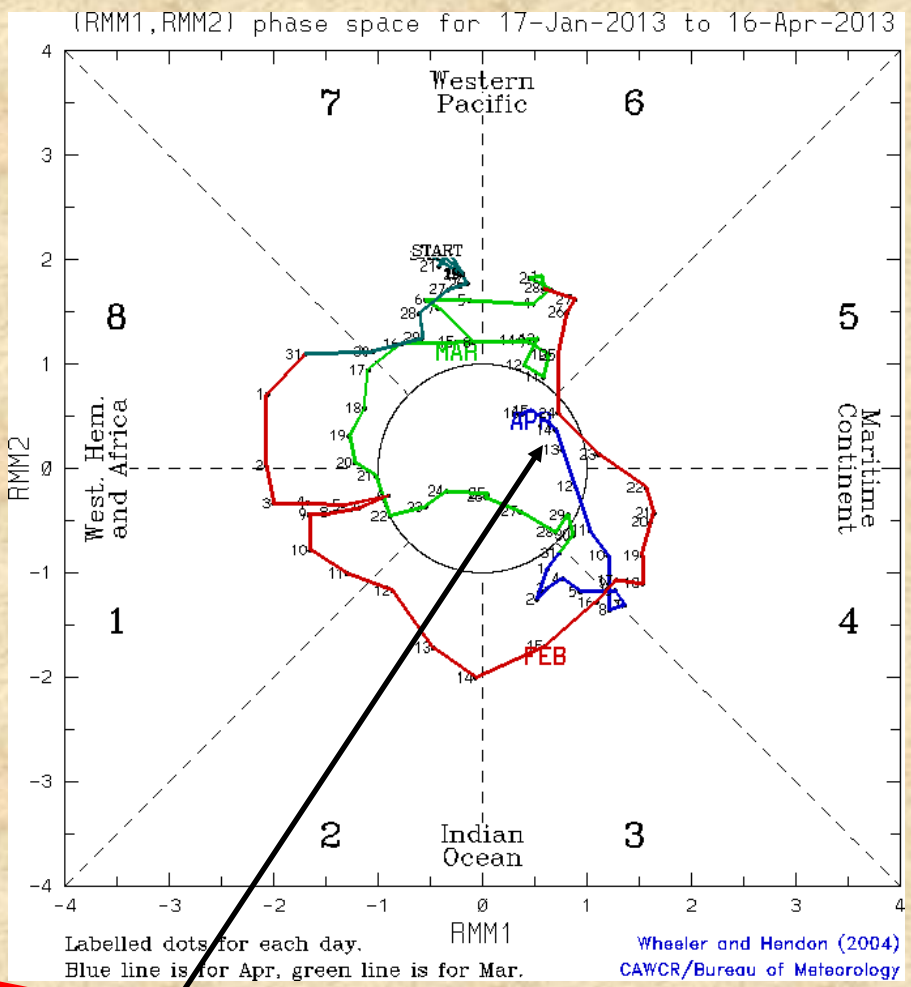
- **What will happen next with ENSO, and what does that mean for us ?**
- **Expectations for the next two weeks**
- **CPC forecasts for May through September 2013**
- **My Seasonal Forecast Guidance (spring&summer)**
- **Executive Summary**

Current state of El Niño/Southern Oscillation (ENSO) phenomenon (bottom), compared to last month (top): ENSO-neutral is the word. Current wind (& subsurface) anomalies are too weak to push the system one way or the other...

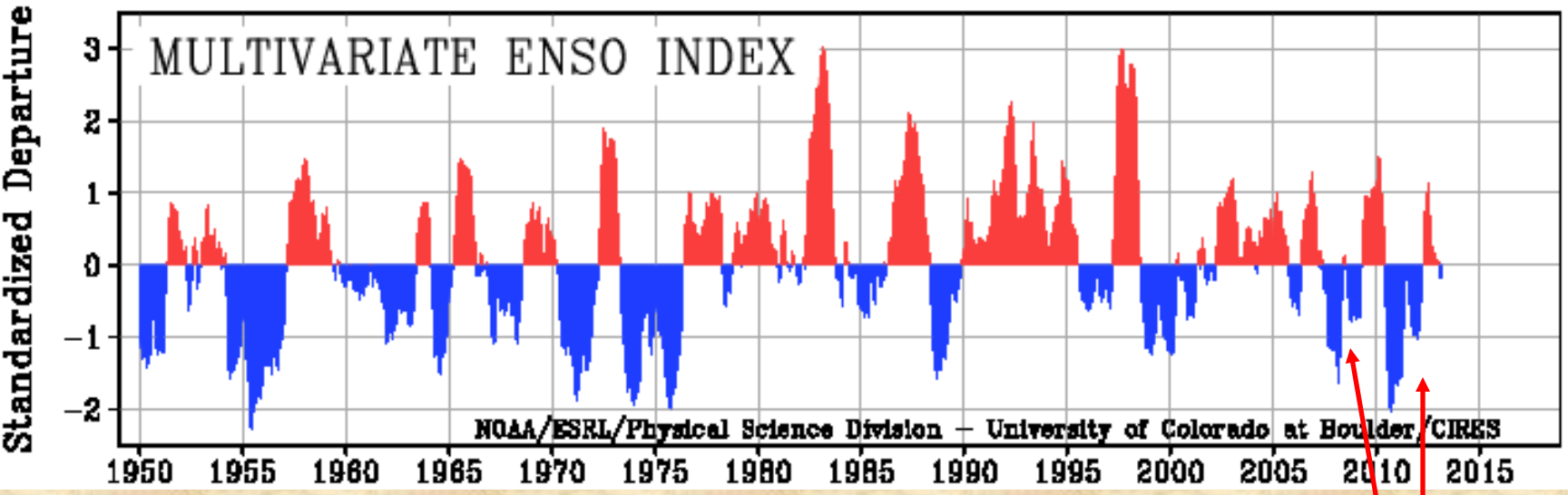


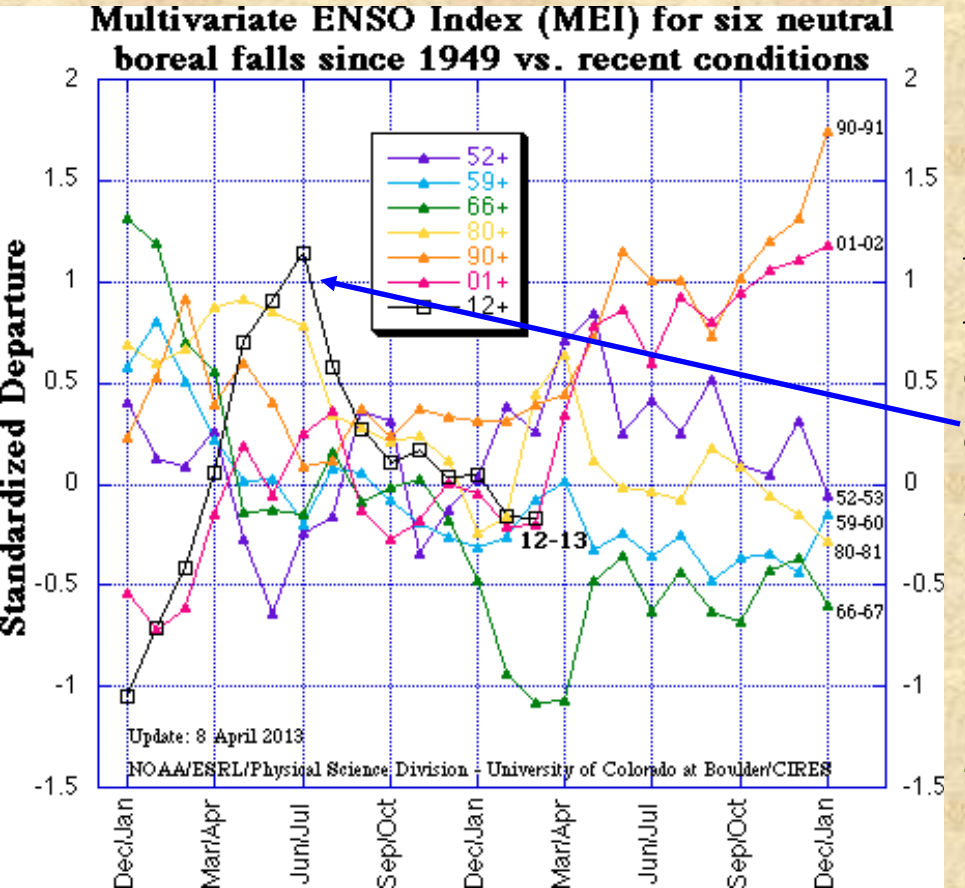
'Herman Cain' do-over has fizzled, as expected…





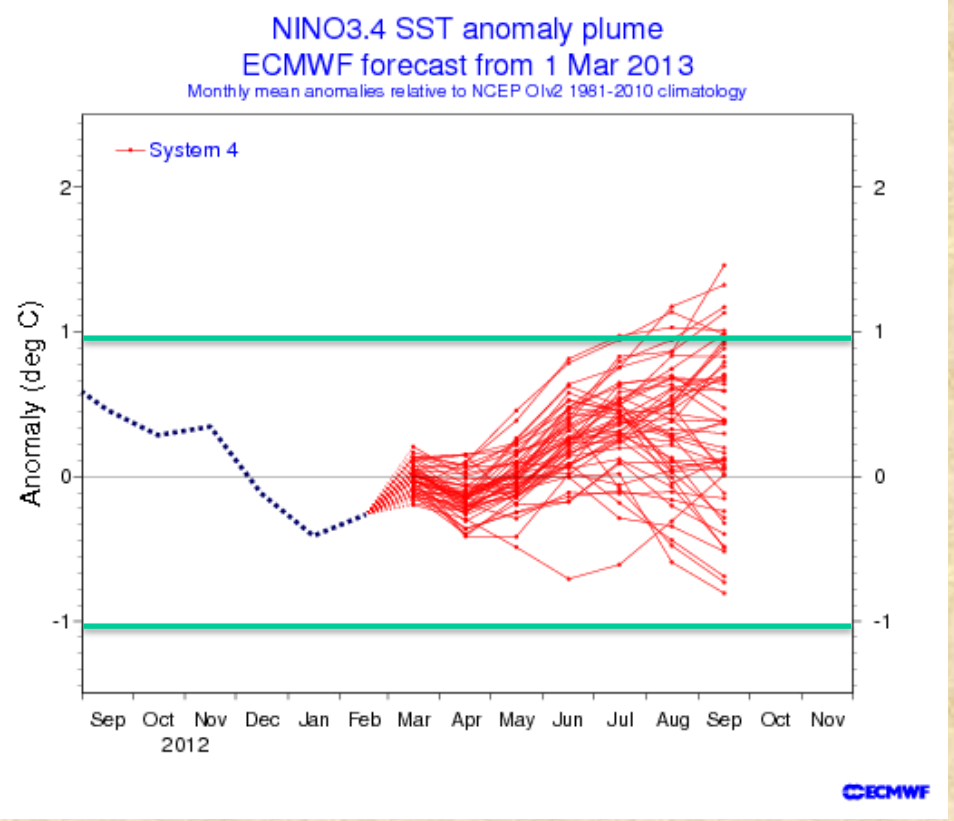
This year's strongest MJO has run its course, a new one is even weaker – no 'Hail-Mary-Pass' is in the offing right now





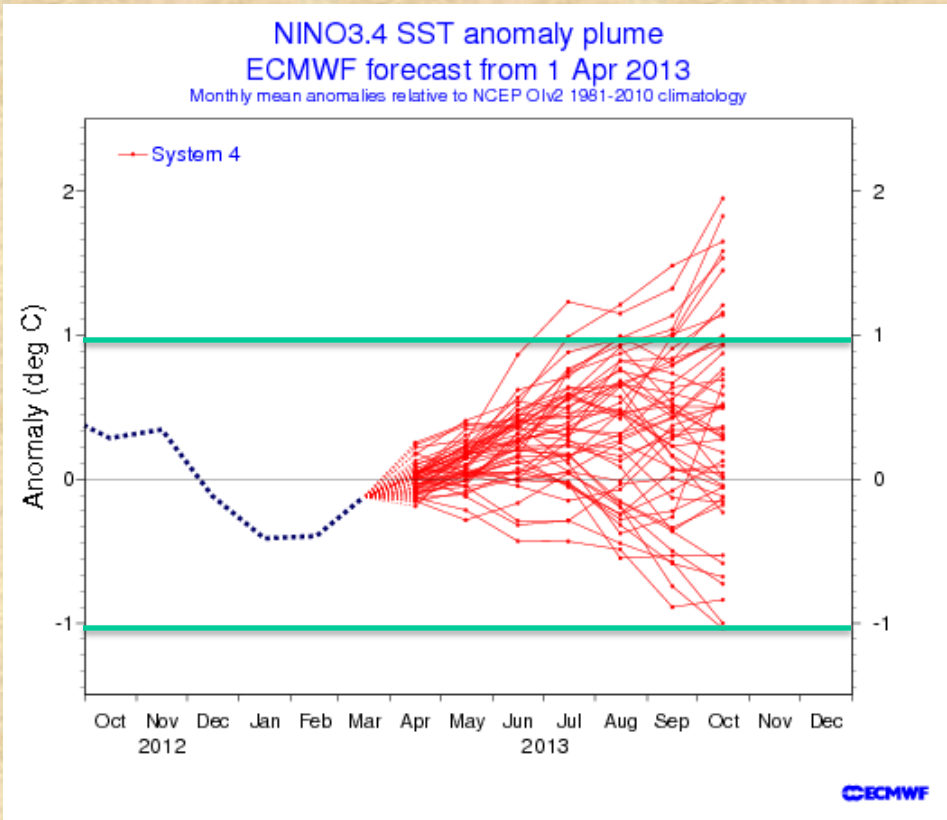
Last five years have seen two 'double-dip' Las Niñas in a row, followed by a brief excursion to what looked like an El Niño event in 2012, and a return to ENSO-neutral conditions as of last fall – highly unusual behavior, but not completely unprecedented (for instance in 1953).

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

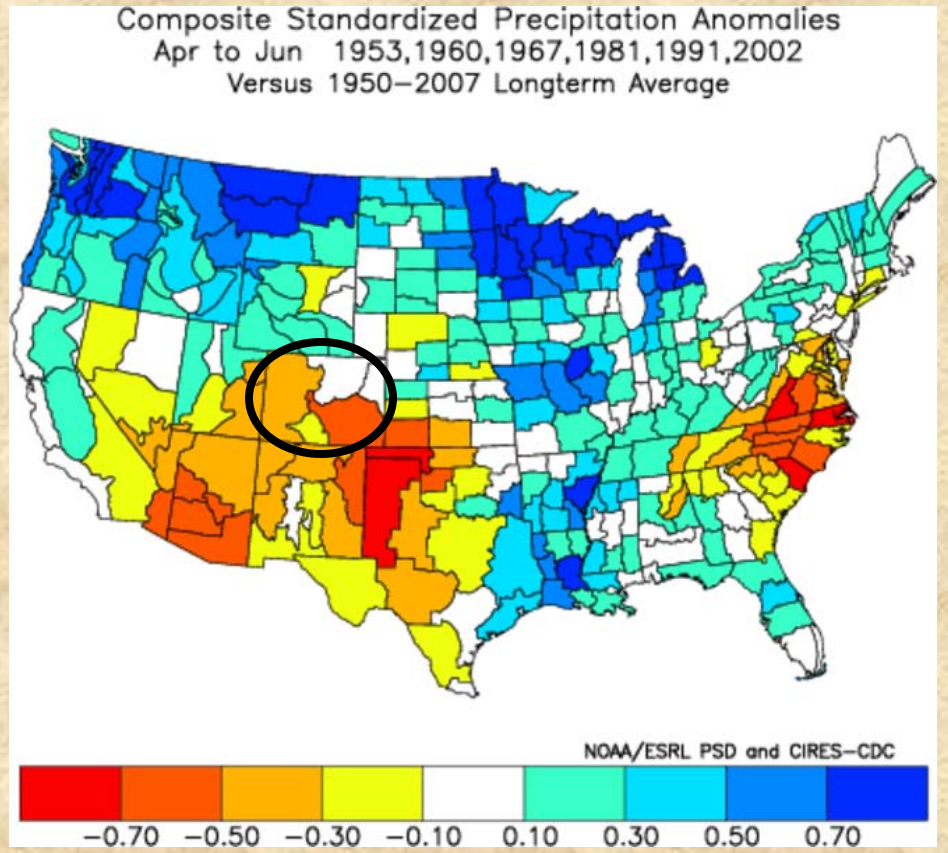


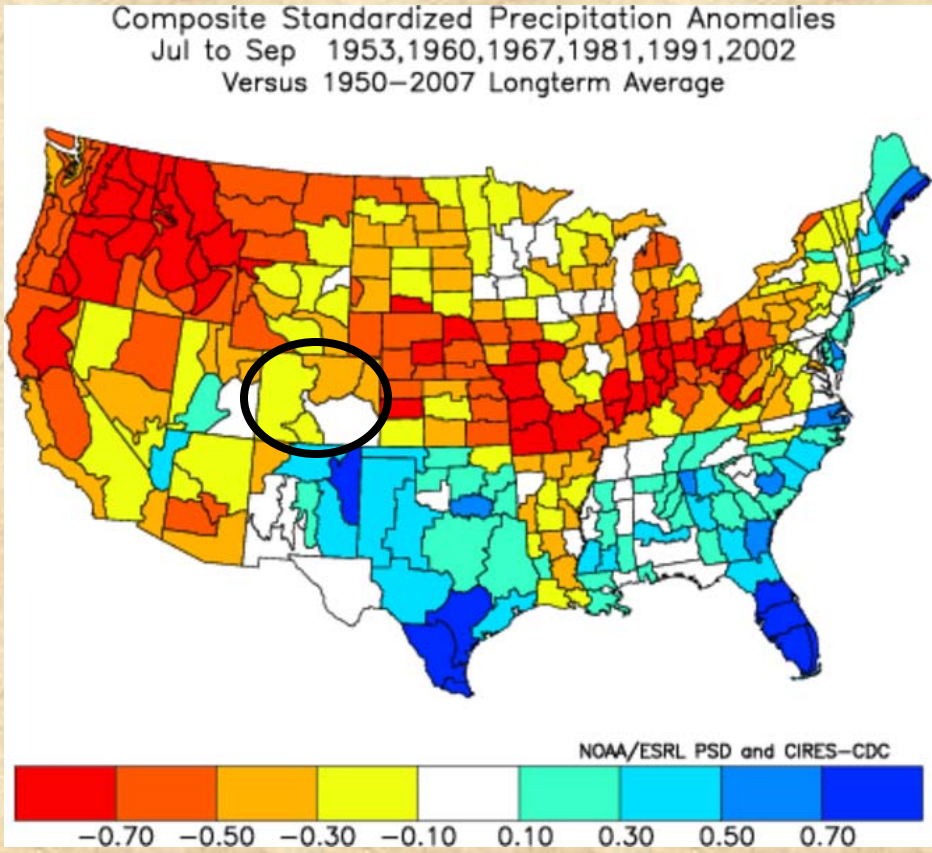
The ECMWF March 2013 forecast (left) showed a drift from weakly-negative / neutral conditions towards a weak El Niño by mid-2013. However, there were still a few ensemble members that drifted into weak La Niña conditions by early fall.

The ECMWF April 2013 forecast (right) is somewhat similar to the above forecast, with a wider range of possible outcomes, as is typical (recall that last year's April forecast went outside the range depicted here).



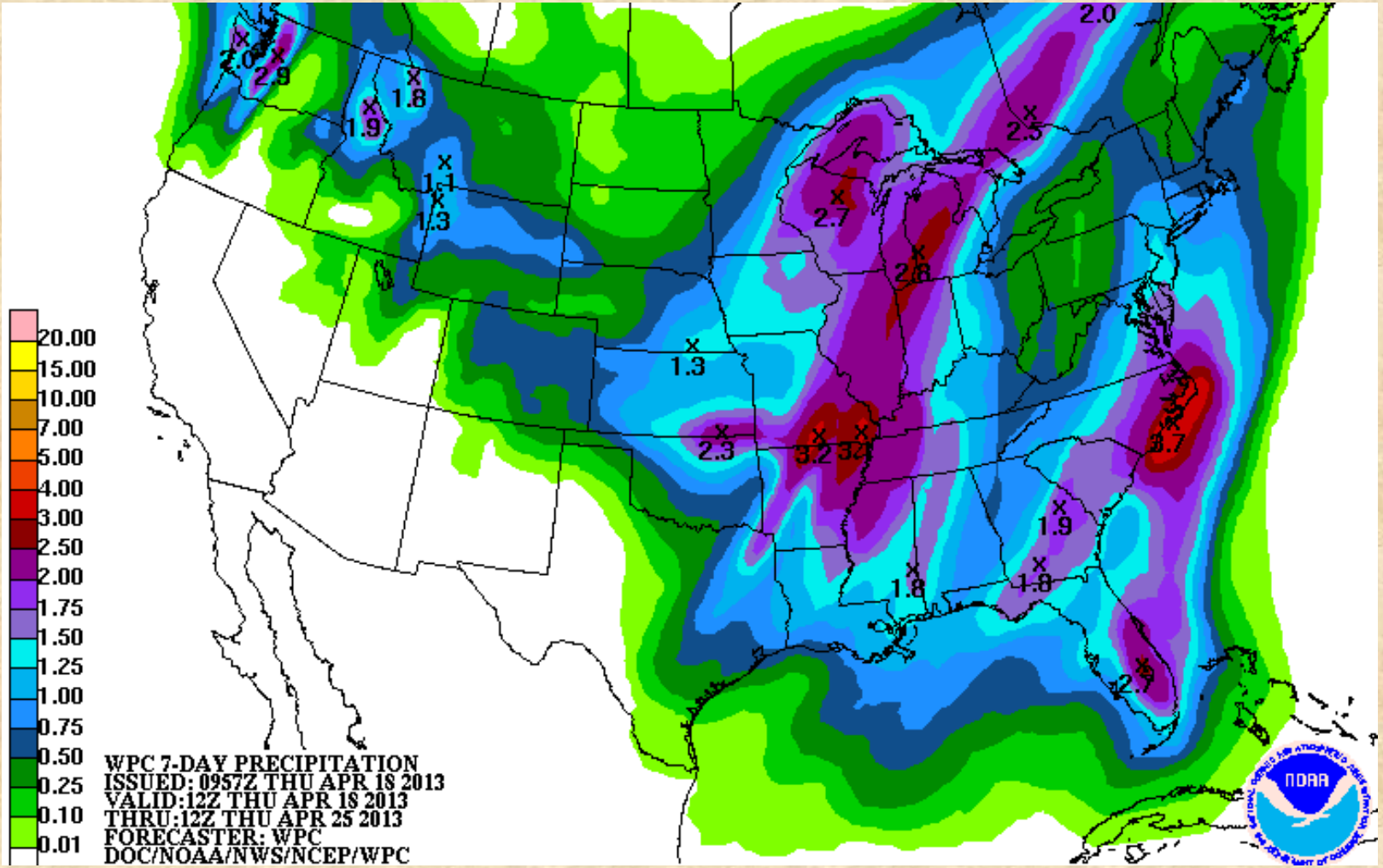
Post-Neutral ENSO springs and summers





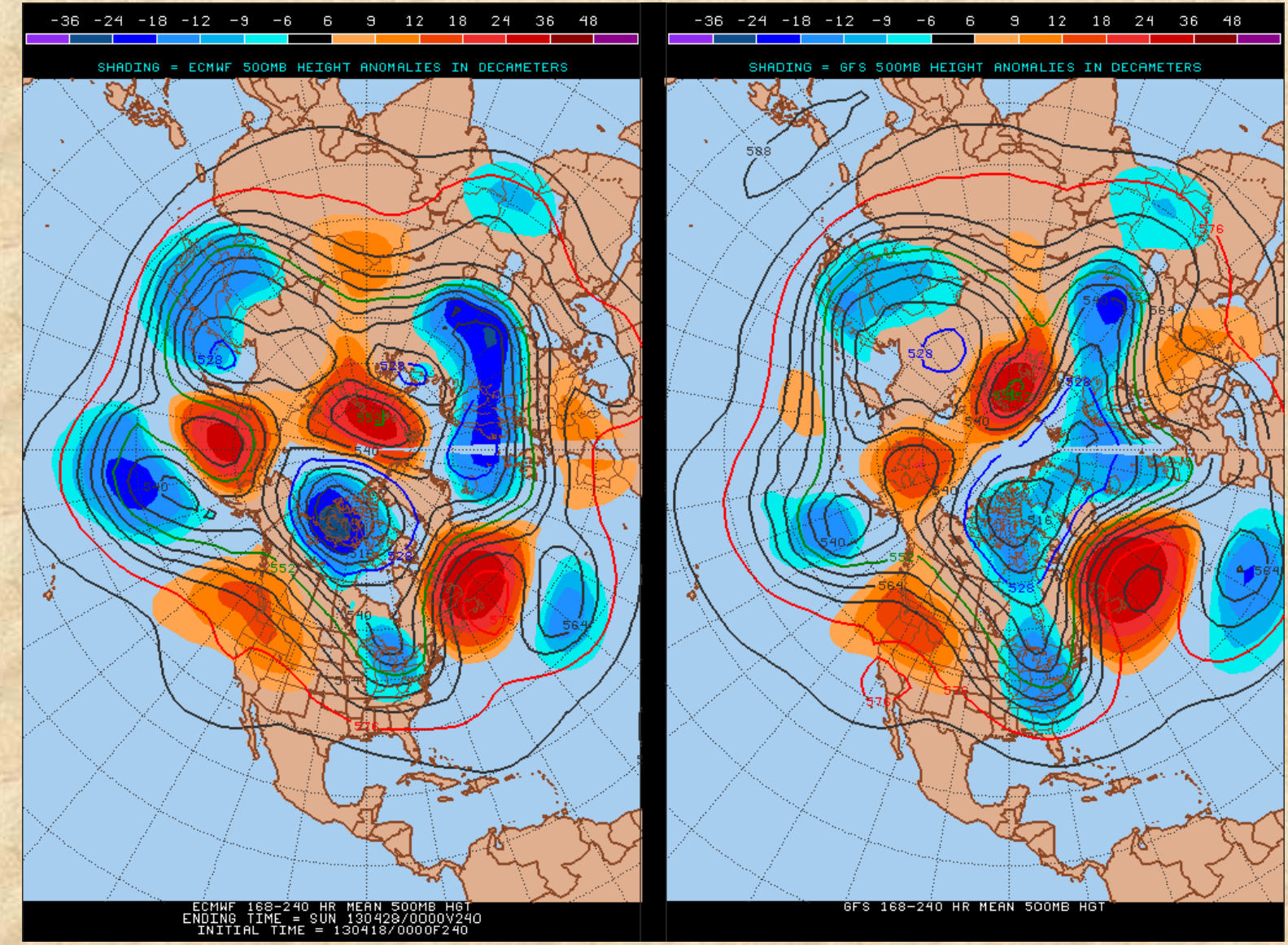
Similar ENSO-neutral patterns in the fall and early winter have often 'produced' dry springs in our state (left), especially for the Arkansas valley. Summers fare not much better (right). ***But the centers of gravity of the driest conditions are to our south (left) or north (right).***

What can we expect in the next seven days?



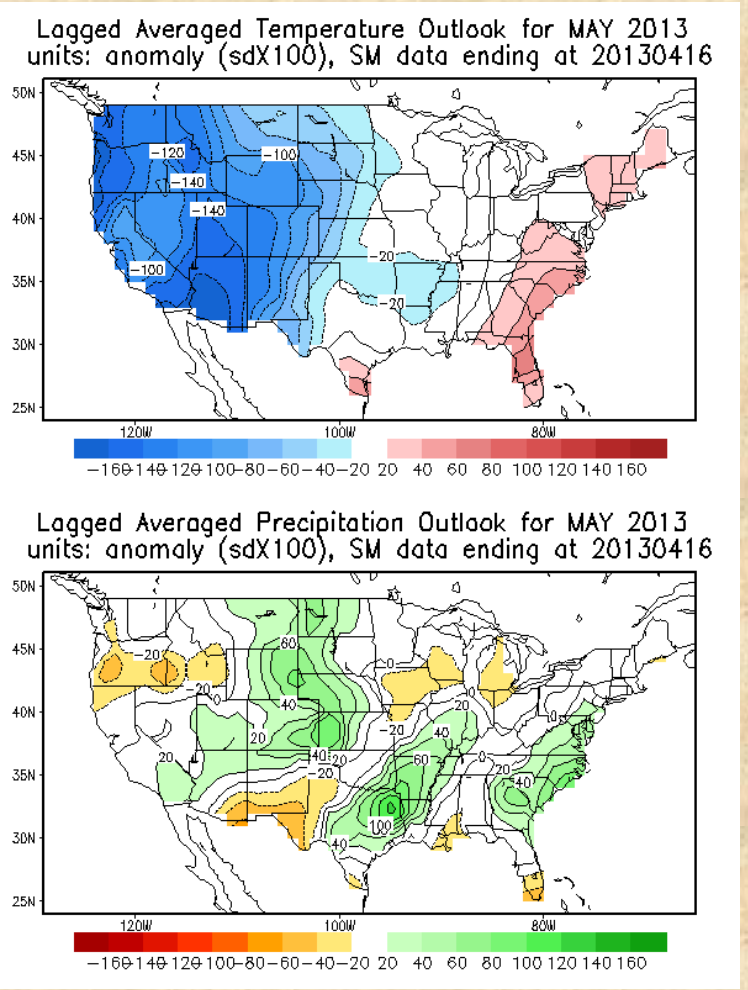
Expected total precipitation, according to the Hydrological Prediction Center (NOAA): Looks like at least one more storm will hit Colorado early next week.

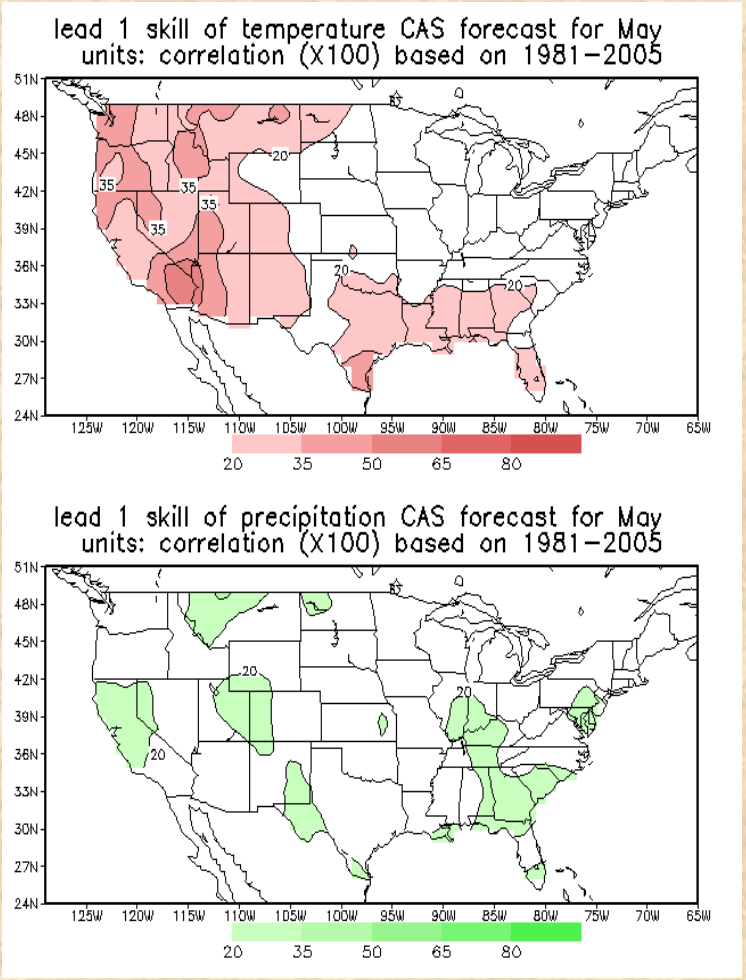
What can we expect next week?



European & U.S. models show West Coast ridge for the average circulation forecast 7-10 days out: could this be the pattern change that we have been dreading? ***<Week 2 looks dry>***

Climate Prediction Center 'Analog' Forecasts

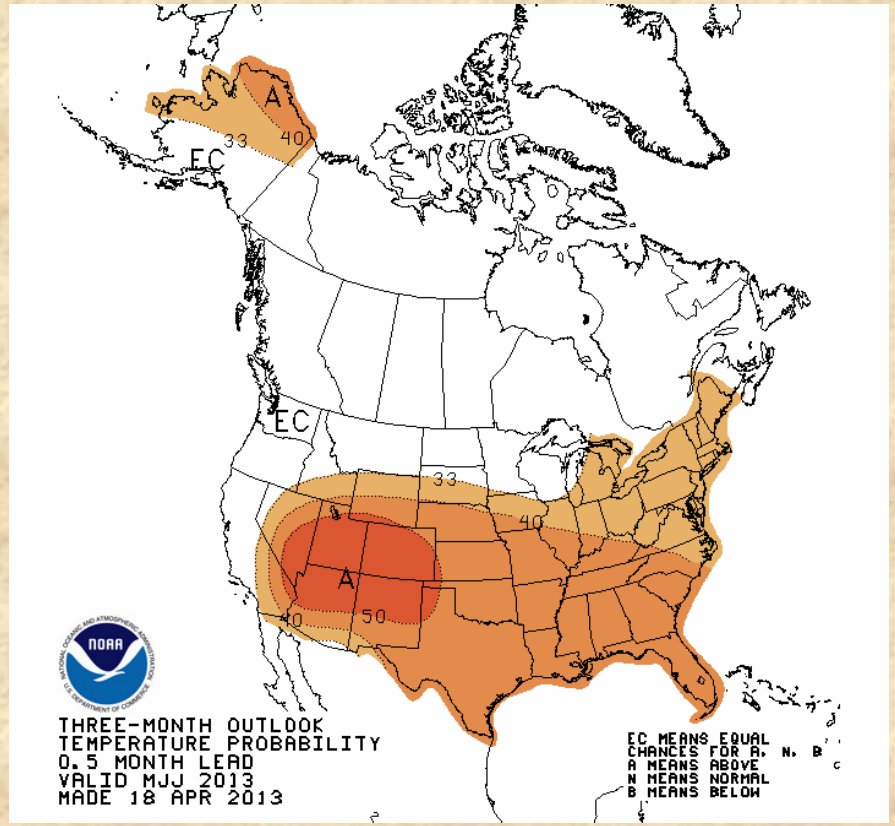


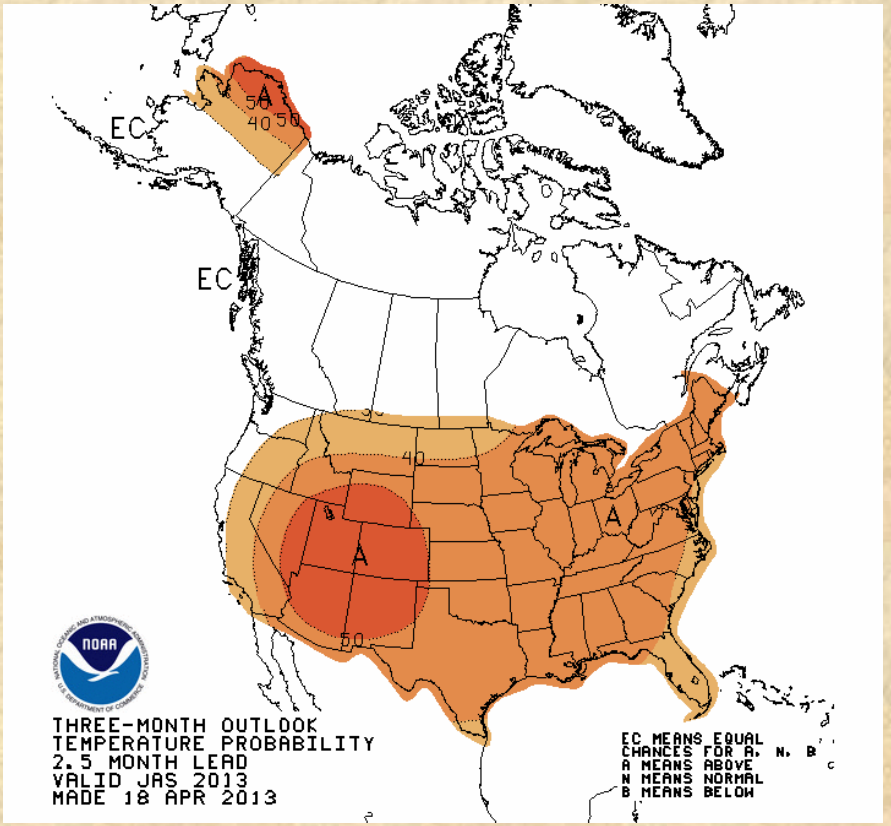


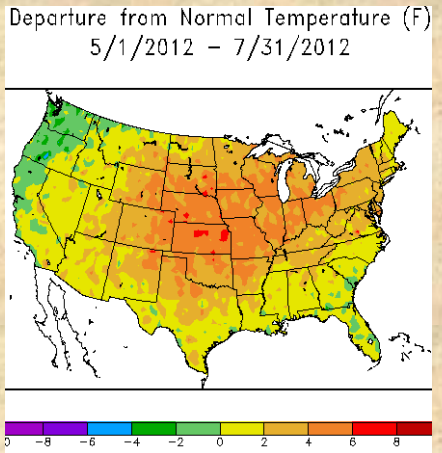
According to the ssoil-moisture analog forecast, SE Colorado is favored over NW Colorado next month (left), but keeping most of CO wet. The temperature forecast is amazingly cold for the Western U.S. Skill at this lead-time (right) is marginal for precipitation, better for temperatures. Seasonal forecast for MJJ (not shown) looks similar, with higher skill over CO.

Source: ***http://www.cpc.ncep.noaa.gov/soilmst/cas.shtml***

Climate Prediction Center Temperature Forecasts

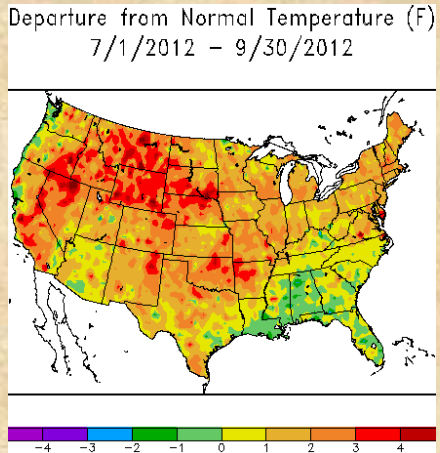




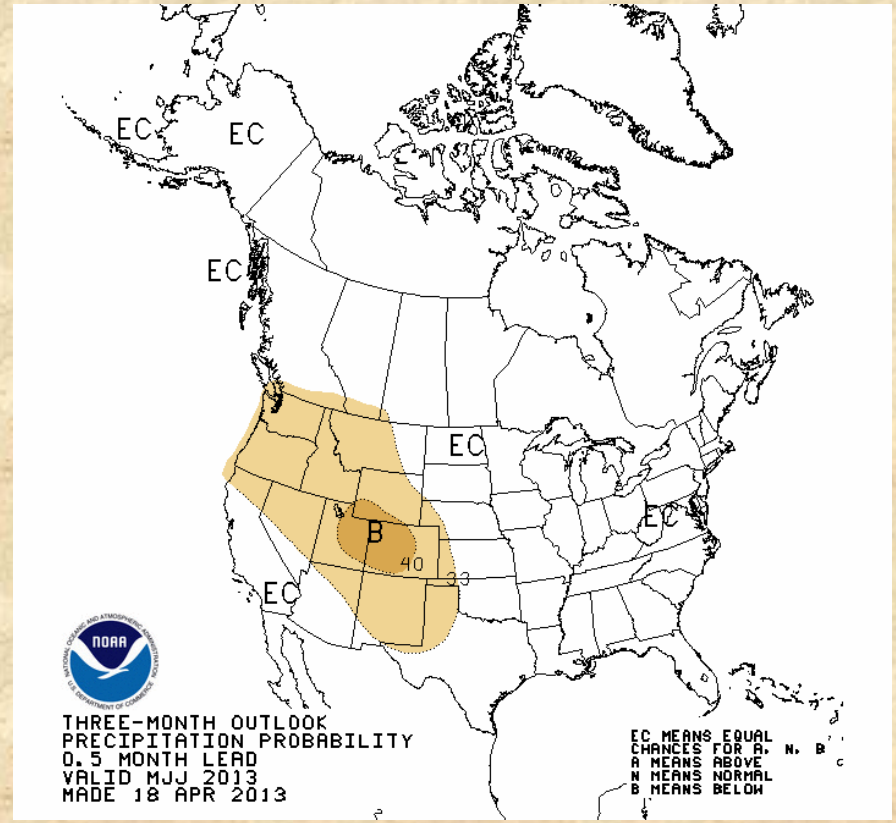


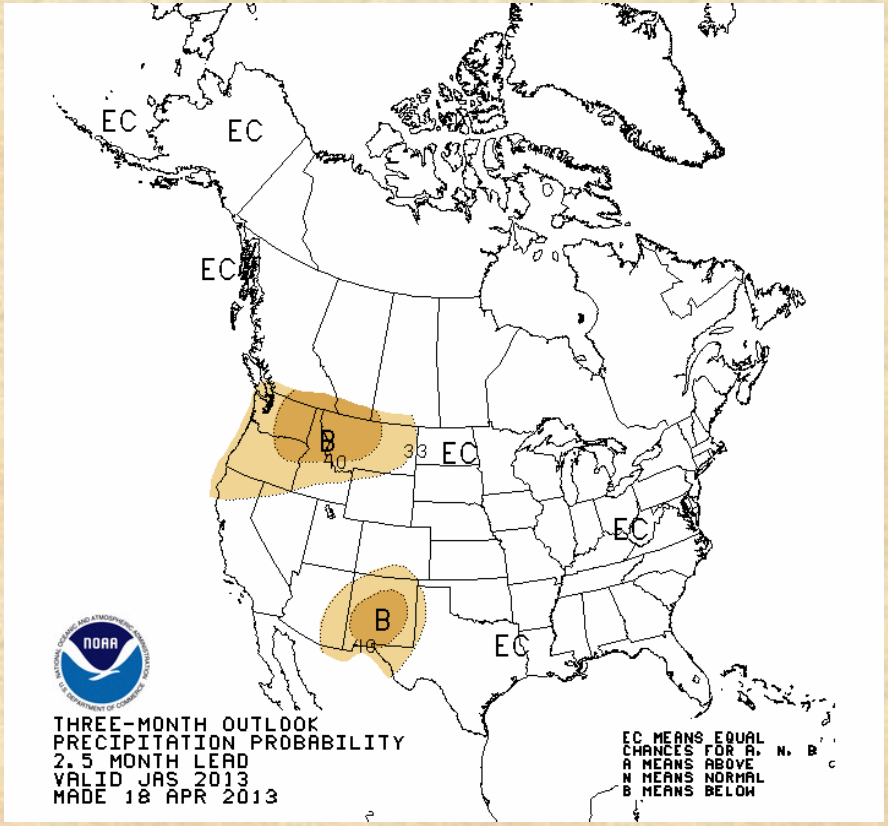
Temperature forecasts look like what they should have been last year, both for May-July and July-September. I would be surprised if this forecast ends up with high skill.

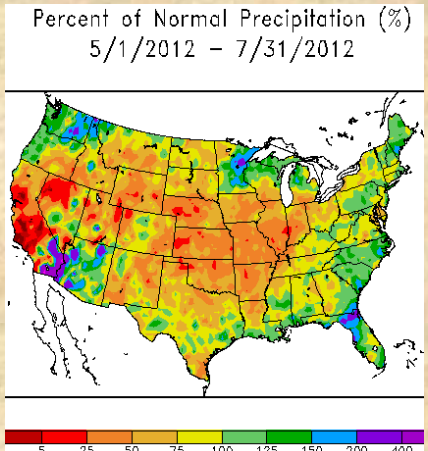
Source:
http://www.cpc.ncep.noaa.gov/products/pre



Climate Prediction Center Precipitation Forecasts

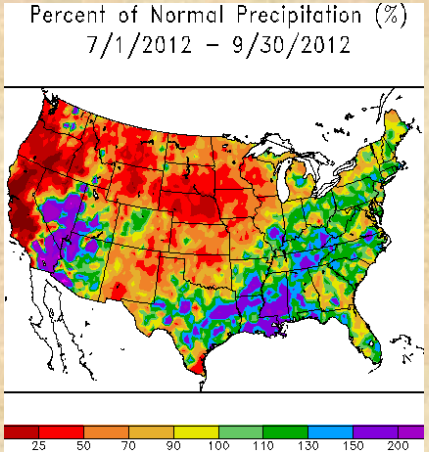




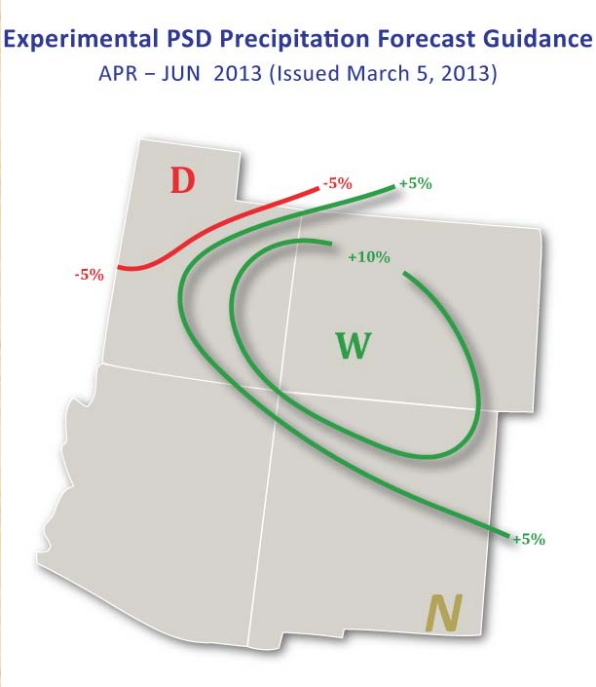


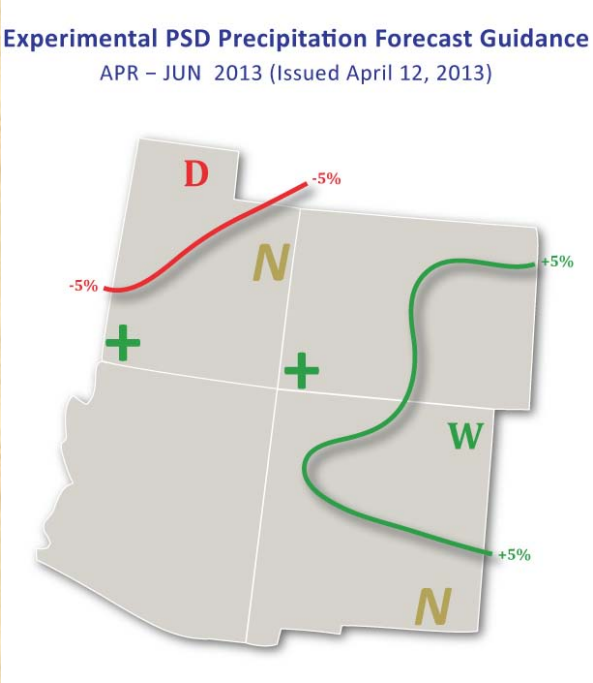
Precipitation forecasts for the next three months reflect the coupled CPC model and long-term trends (left), while the monsoon forecast reflects mostly long-term trends (right) – New Mexico has seen quite a few dry summers lately.

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

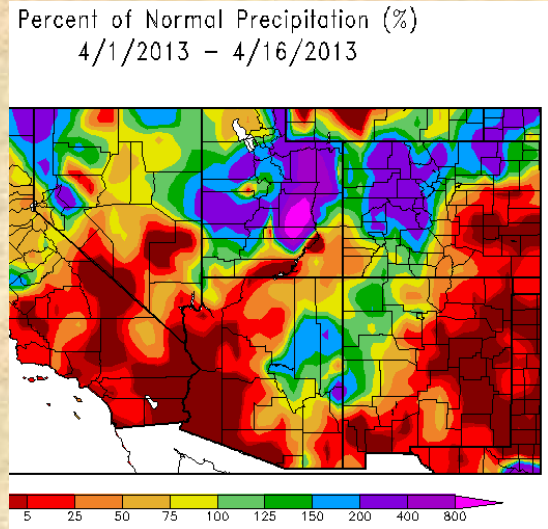


Statistical Forecast for April-June 2013

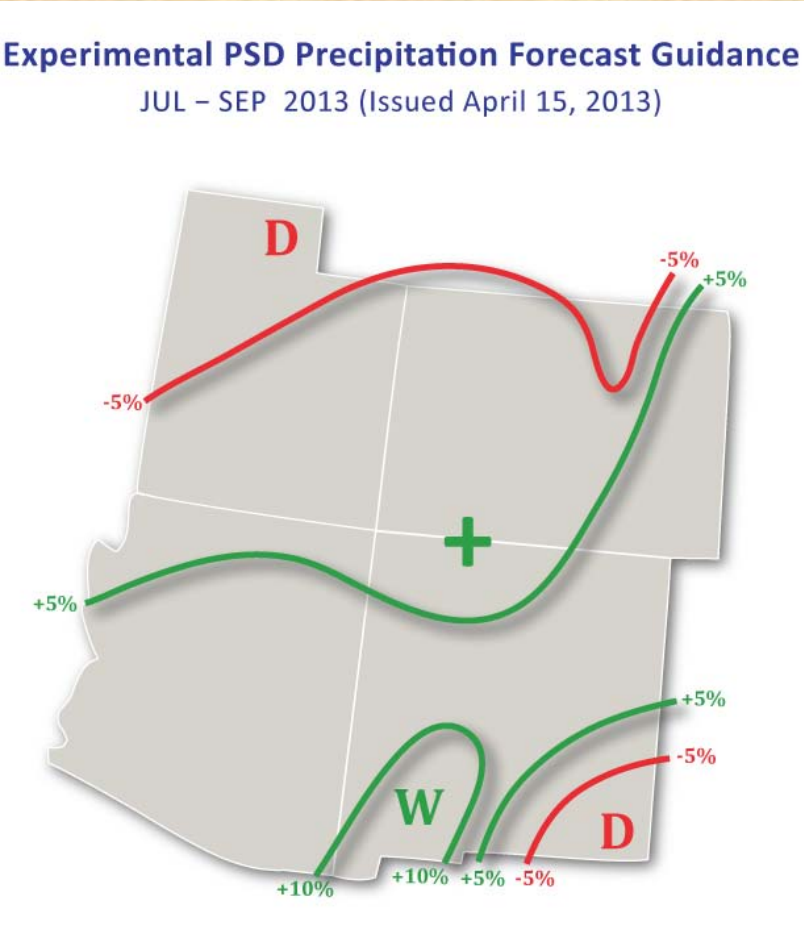




My March forecast for April-June 2013 (left) was fairly confident that most of CO would see above-normal moisture, especially towards the Four Corners region. This is in stark contrast to 2012, and was backed up by operational skill over the last decade (not shown). My updated forecast (right) reduces the confidence in the wet forecast regions and moves their center of gravity to the east. This month's observations confirms the original forecast more than the updated map – *for now*. *Note that CPC was predicting a dry spring last month.*

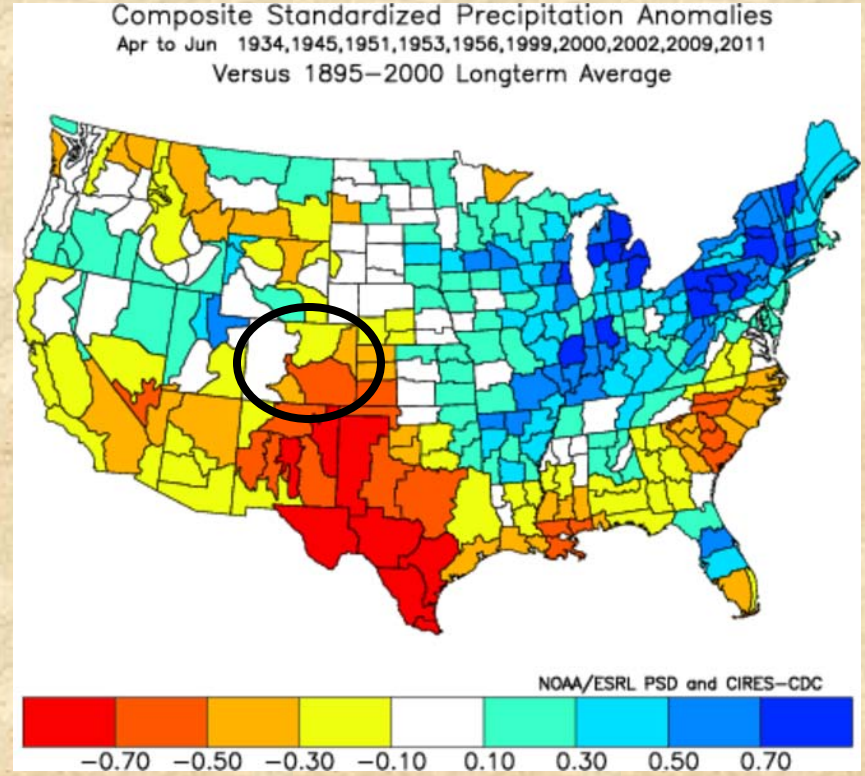


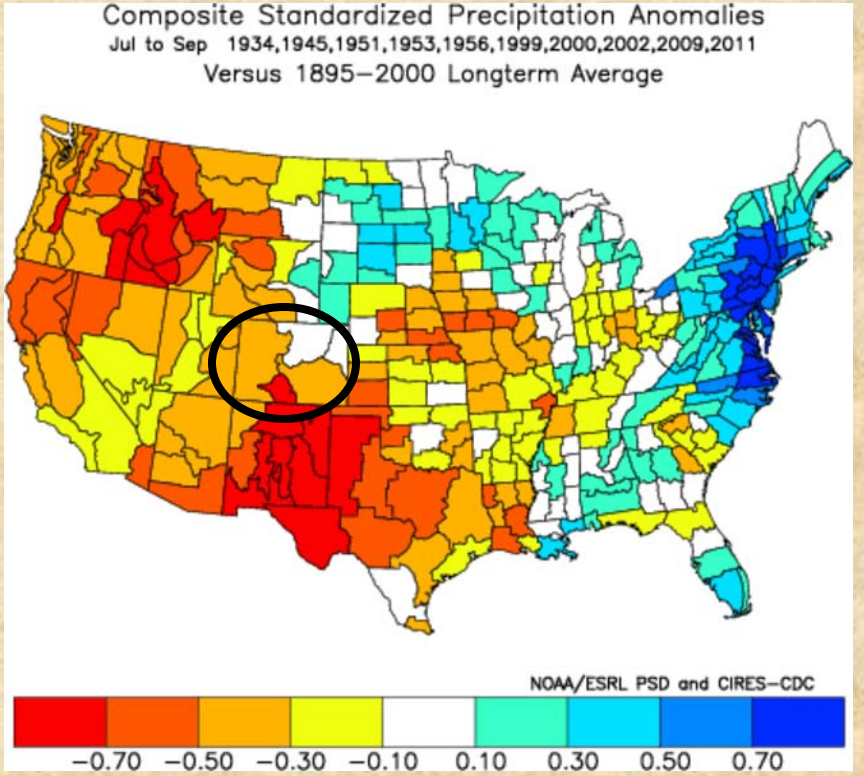
Statistical Forecast for July-September 2013



The first forecast of the year for July-September 2013 (left) is fairly confident that the monson axis will be shifted eastward from NM into eastern CO. That is pretty much the only region for which the last decade has shown operational skill at this lead-time. Forecasts will get more skillful as we get into late spring/early summer.

What might happen in the next six months if we use the same years that worked out this winter?

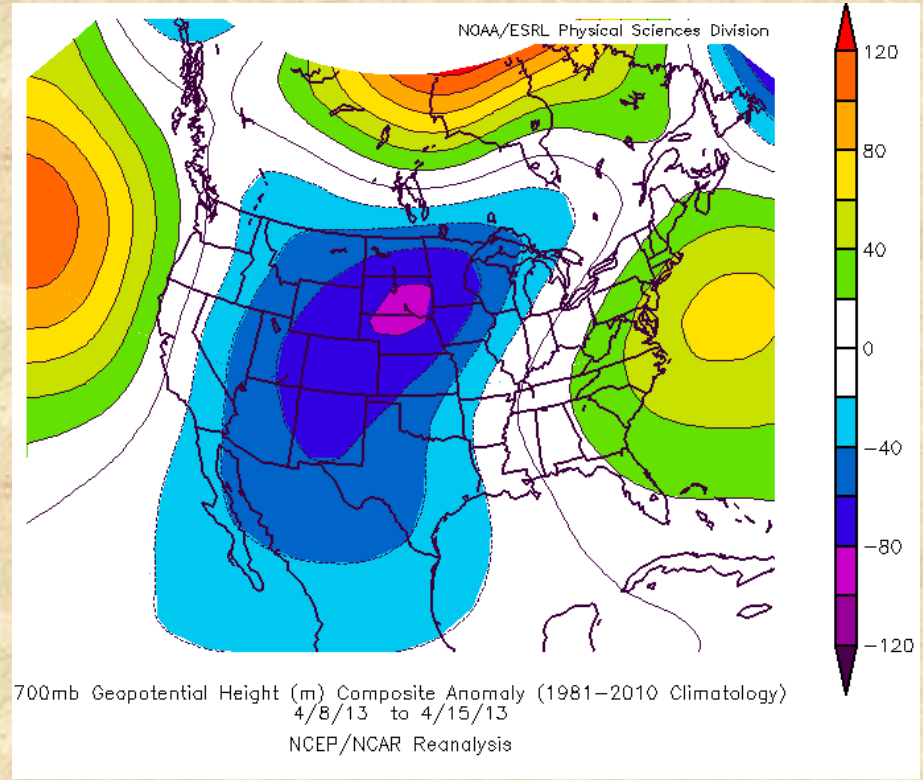


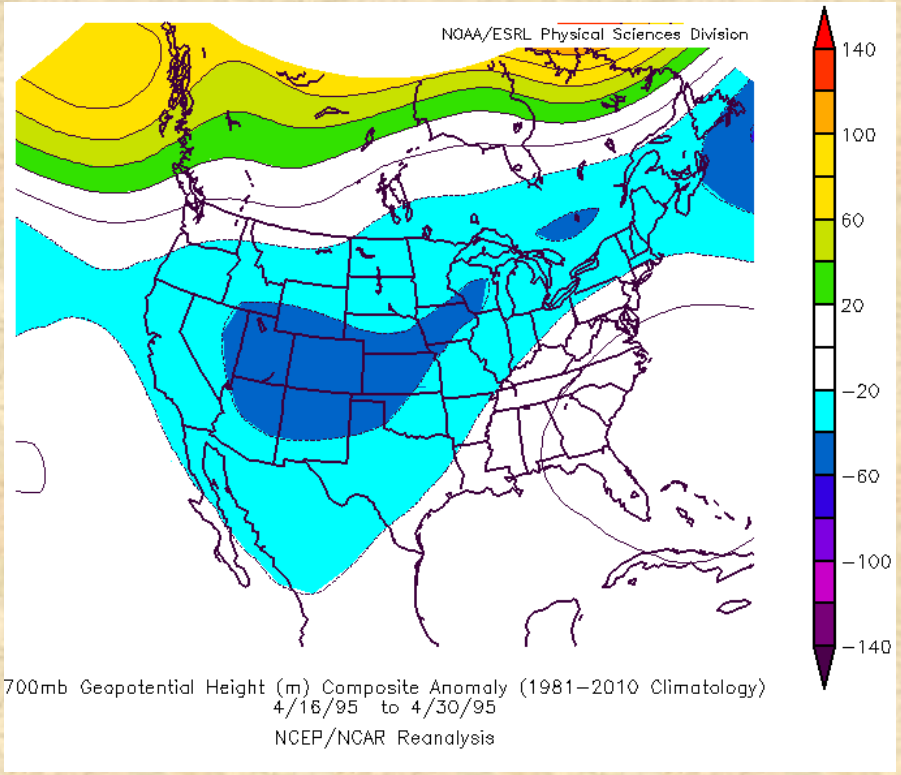


Using the same set of 10 years based on last summer's low <PDO-AMO> conditions, late spring precipitation (Apr-Jun; left) is facing uphill odds over southeast Colorado in particular. In late summer (Jul-Sep; right), precipitation odds remain unfavorable over much of our state.

This is the reminder that last year's low PDO-AMO situation might cast a long (dry) shadow on this year's growing season. But this is OLD information – new composites will be produced by next month.

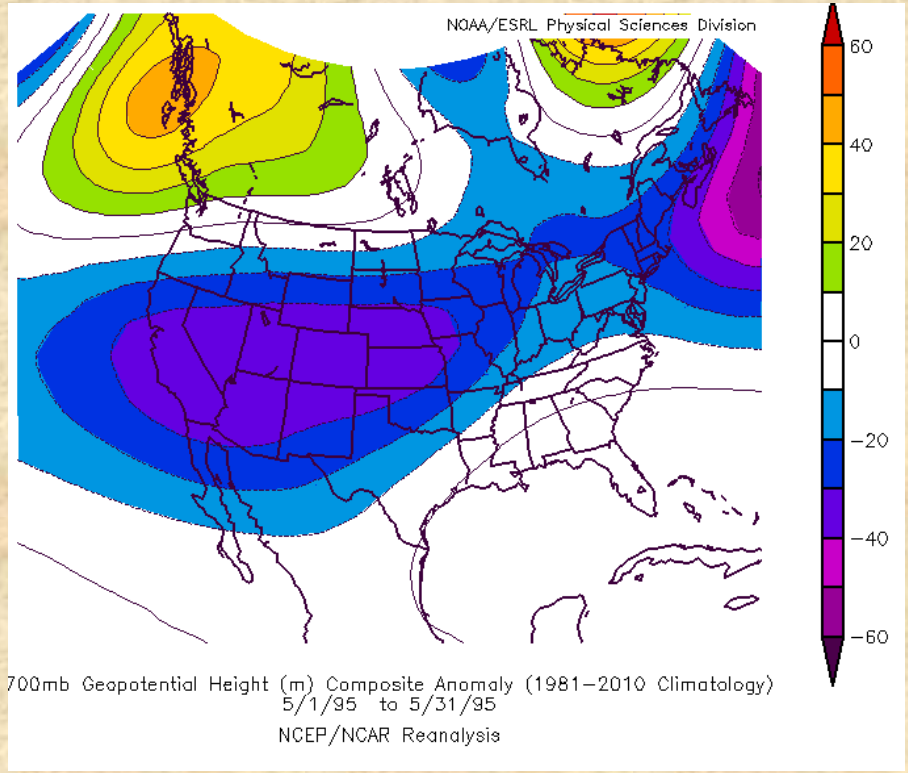
In contrast, here is a decent analogue for our unusual weather

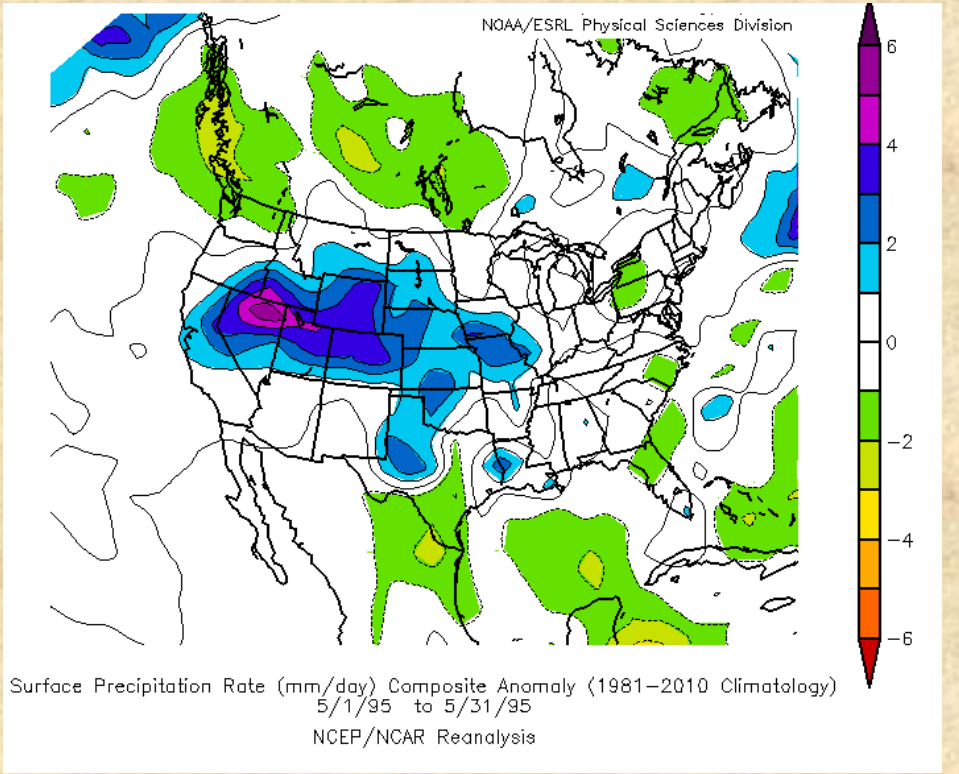




The weather has been quite extreme lately – circulation anomalies just below treeline (left) show a deep trough over Western U.S. that seems almost unprecedented, until I remembered April 1995 (right).

What happened in May 1995?





We should be so lucky, but the cold and snowy April 1995 was followed by the even wetter and colder May 1995. This was during a period when a long-lived El Niño event had just wound down, the North Atlantic was trying to switch to its warm phase, and the North Pacific was still in its warm phase. IOW, planetary features were not lined up in the same fashion as this year. But yet, a lot of that wet&cold weather stemmed from very persistent circulation anomalies from April that also kept recycling the moisture deposited previously. The odds for this to happen in 2013 are not zero...

Executive Summary (18 April 2013)

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- **While El Niño/La Niña can provide decent guidance for climate outlooks around here, this is not very helpful in our recent ENSO-neutral situation. A cold Northeast Pacific combined with a warm North Atlantic stacked the deck towards dry conditions in the southwestern U.S. in 2012-13 as in other recent years.**
- **Much of this year's low snowpack was 'precipitated' by a dry fall in 2012, confirming the critical role of that season in setting the stage for a 'good' or 'bad' runoff season. But we are playing catch-up, right after ski season has ended…**
- **My statistical forecast for late spring (April-June) continues to show a tilt towards wetness covering much of our state. Given that this forecast is not driven by a strong ENSO signal, and that other tools are more pessimistic, one should not 'bet the farm' on a wet spring. The first summer (July-September) forecast favors southeastern CO over other parts of the state, with fairly low skill this far out.**
- **The odds for a switch to El Niño this summer are very low. In fact, it would not be surprising if we ended up back in La Niña conditions by 2014.**
- **Bottomline: Spring has been good to 'us' (mostly northern CO) so far, and may do so for another month or so, making water restrictions much more bearable than last year. Given the state of Colorado's reservoirs, even a continued wet spring won't be enough to fill them, but every new foot of snow helps! Temperatures are running much below normal, and very much below last year's. This helps as well since there is not much 'ET' going on right now.**
- ***As stated last month, hope for the wettest outcome, prepare for the driest!***