Earth System Research Laboratory
Physical Sciences Division

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Colorado WATF,
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Denver

Seasonal Outlook for Colorado

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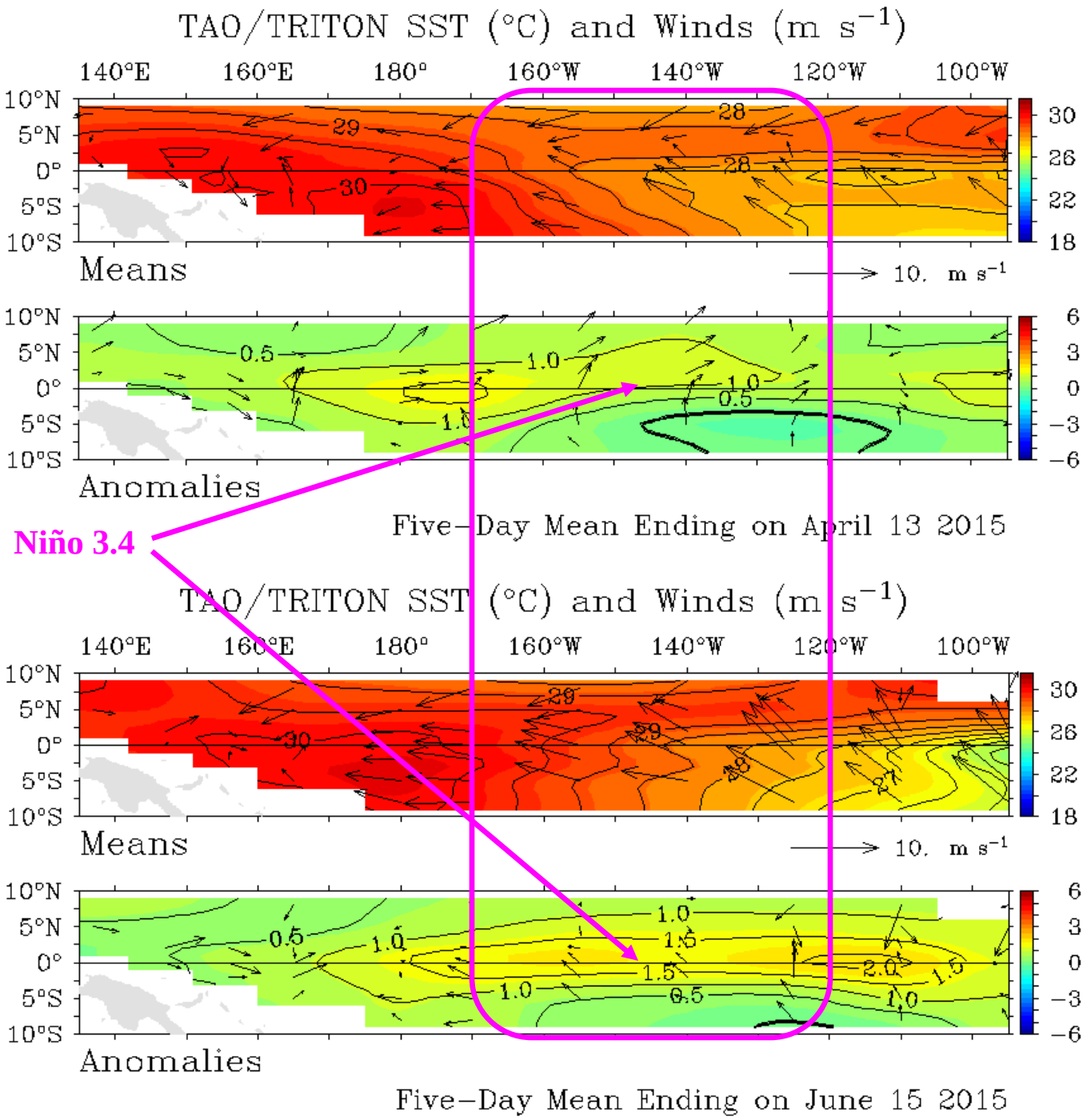
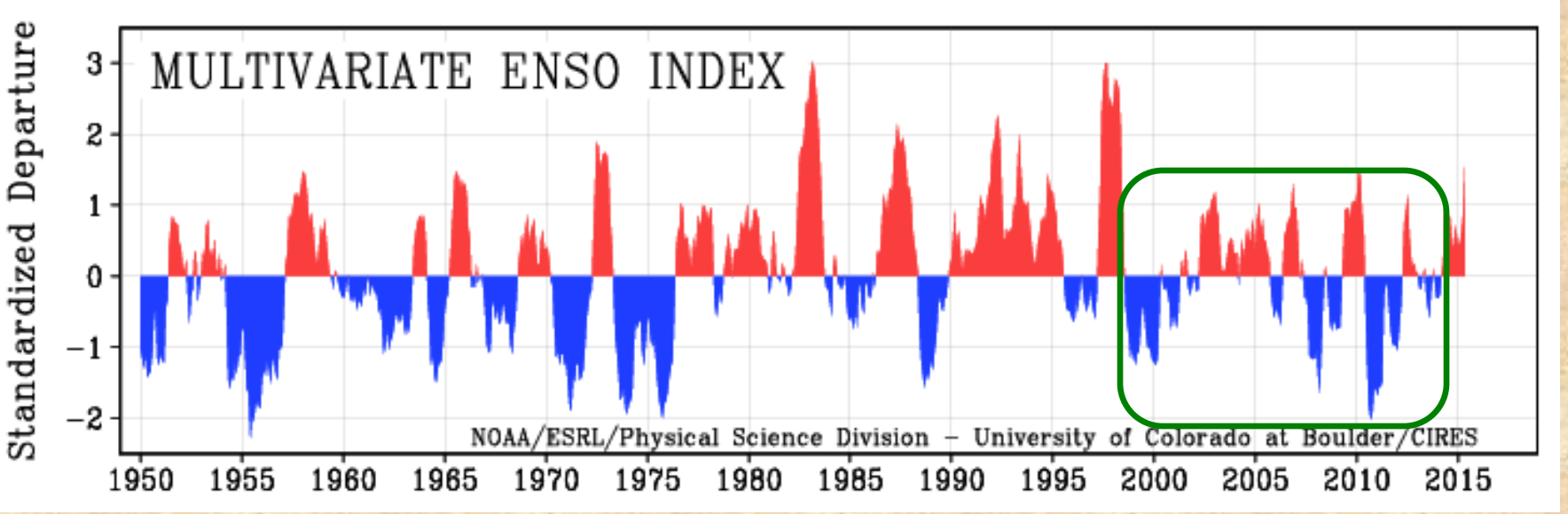
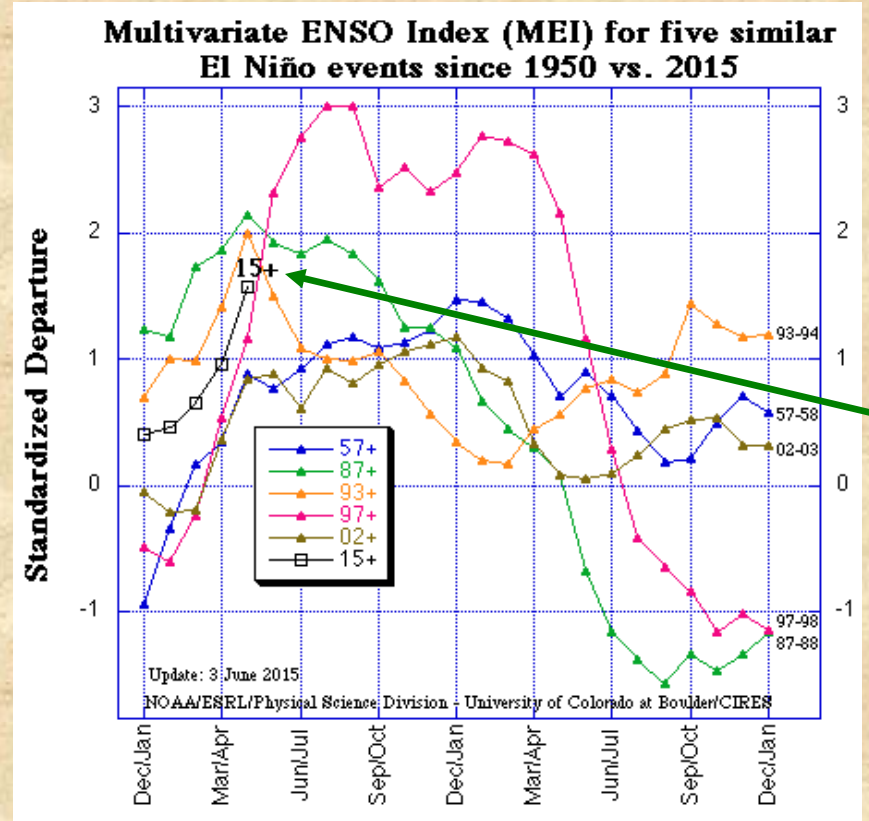
- **El Niño has come on strongly: What does that mean for us?**
- **CPC forecasts for the remainder of 2015**
- **Experimental precipitation guidance**
- **Executive Summary**

Current state of El Niño/Southern Oscillation (ENSO) phenomenon (bottom), compared to last time (top): Recent SST have come up a lot along the Equator (Niño 3.4 now at +1.3C), while westerly wind anomalies are finally 'taking a break'.



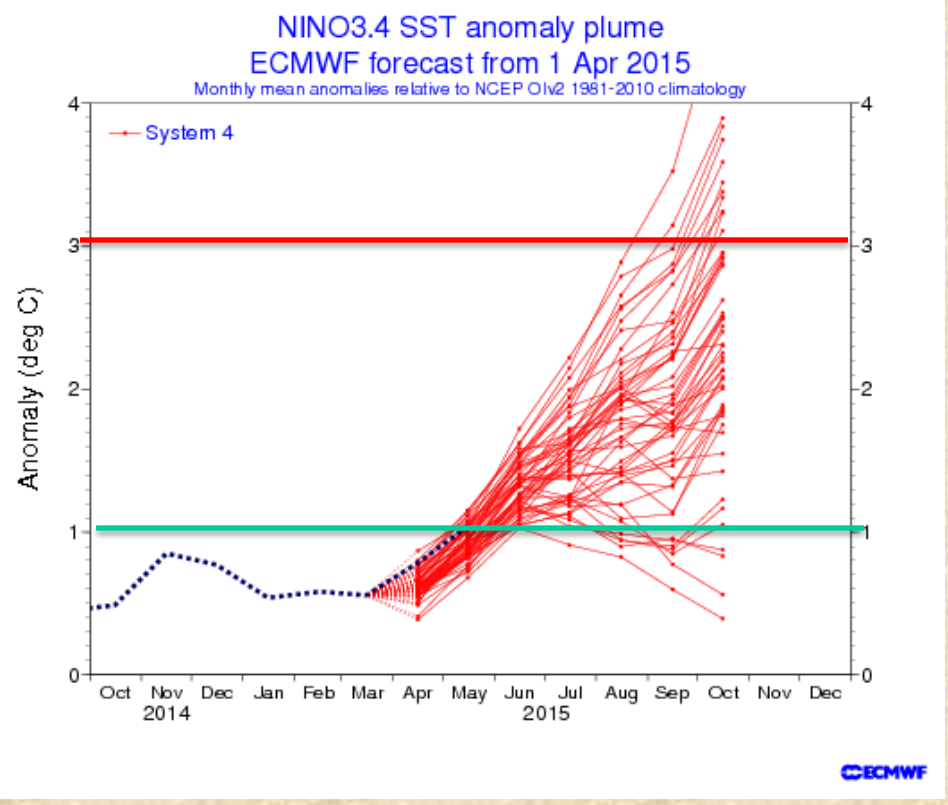




From 1998 through 2013, we were in a regime that favored La Niña, but did allow for occasional El Niño events, mostly of the weak-to-moderate variety.

The current El Niño has already reached +1.57 standard deviations, the largest MEI value since 1998. If it continues to grow, it could become the third 'Super El Niño' in just over three decades. *We will know within a few months.*

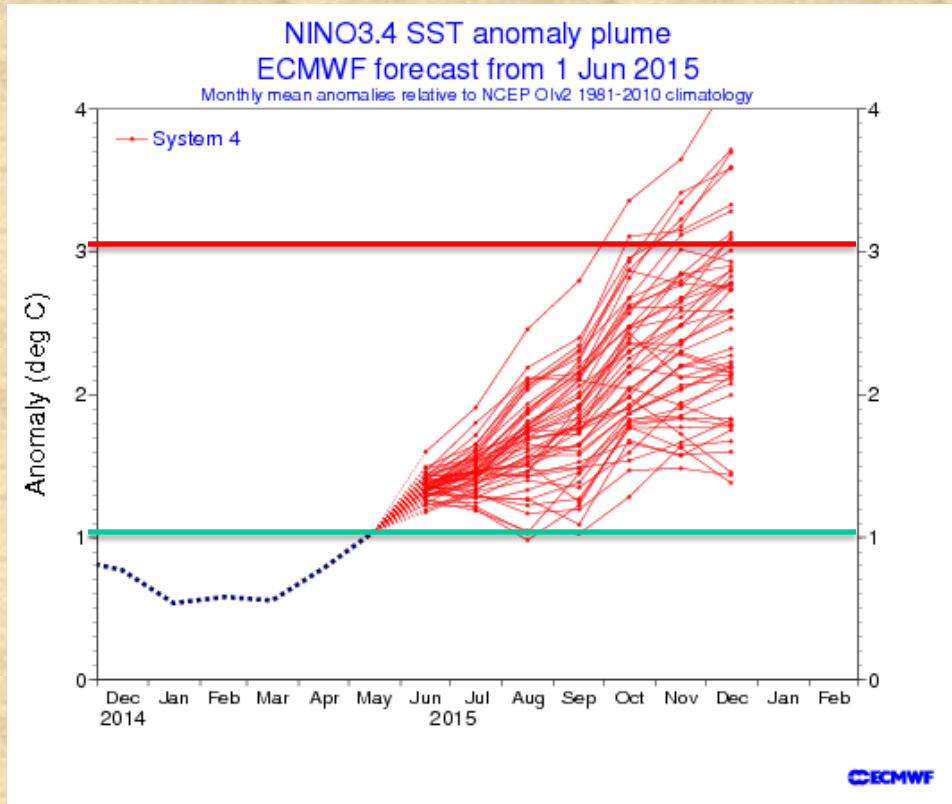
http://www.esrl.noaa.gov/psd/enso/mei



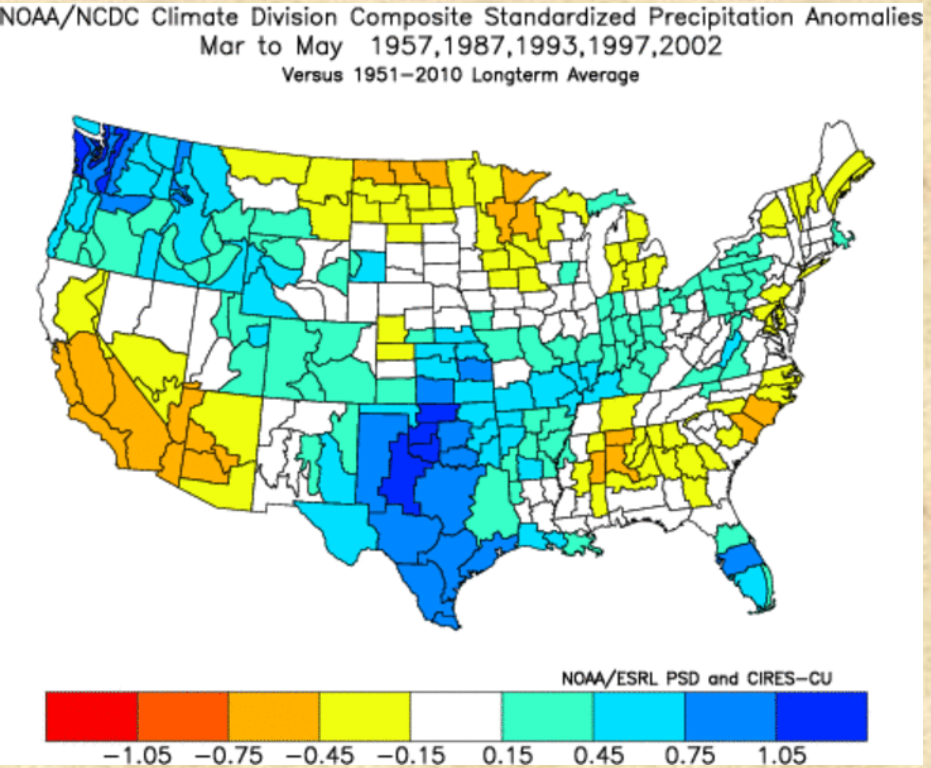
The ECMWF April 2015 forecast (left) was very bullish, with observed (blue) Niño 3.4 warming on the high end of plume! More than 20% of runs even hit new records (3˚ C+) by October...

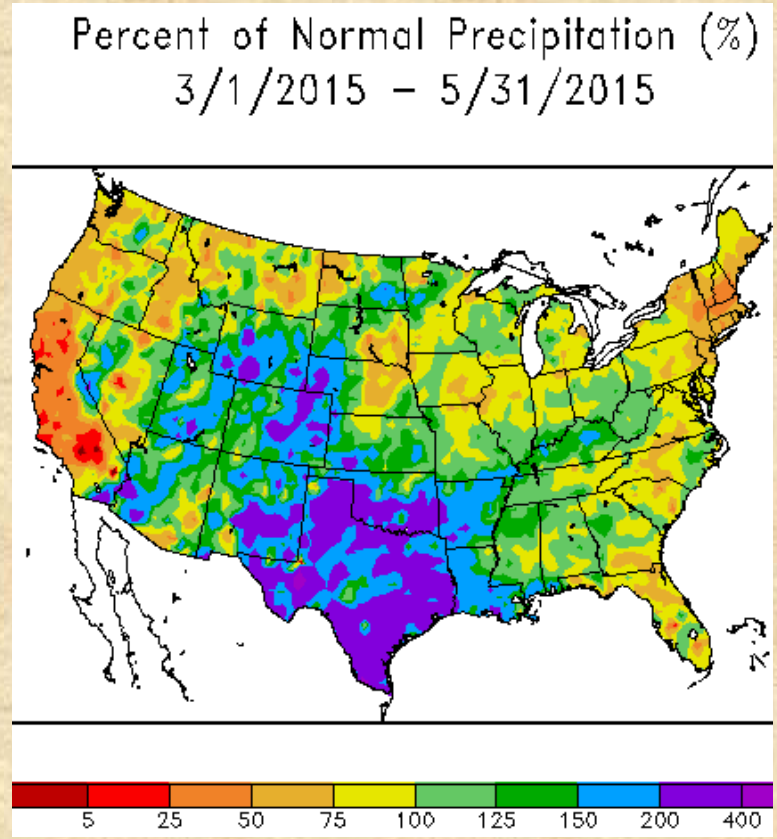
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/

The updated ECMWF forecast (right) shows a more compact plume, with no more runs below 1C, but only a handful of runs above +3C. The median peak well above +2C would be closest to a *'Super-El-Niño'* since 1997-98. *New IRI plume not public yet, but does support a peak near +2C.*



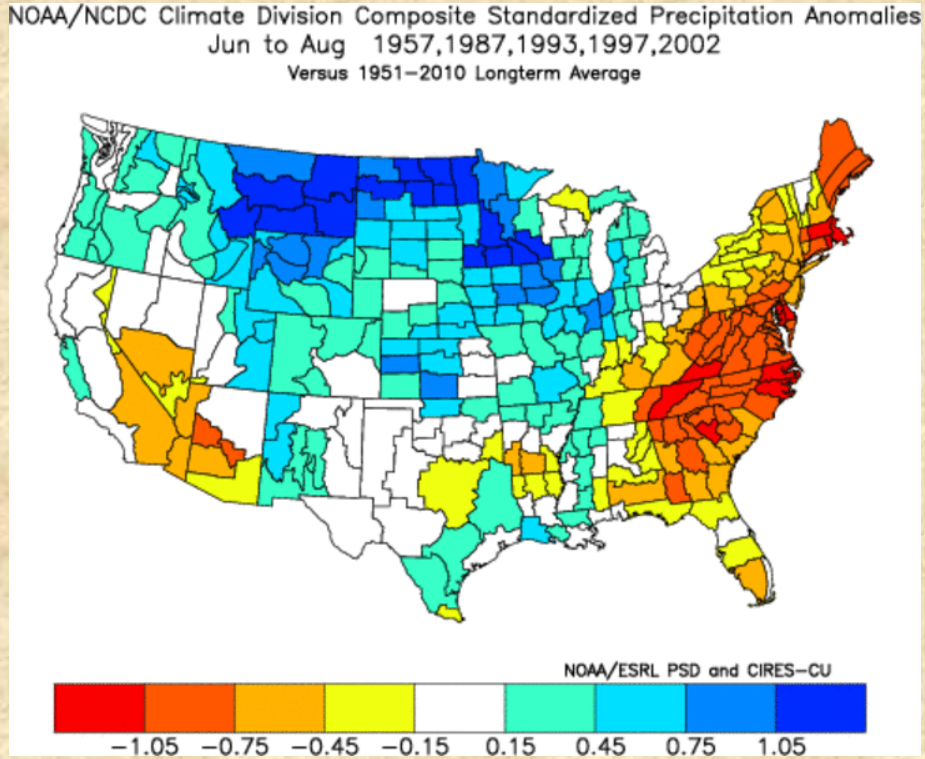
MEI-based analog cases (similar size and growth)

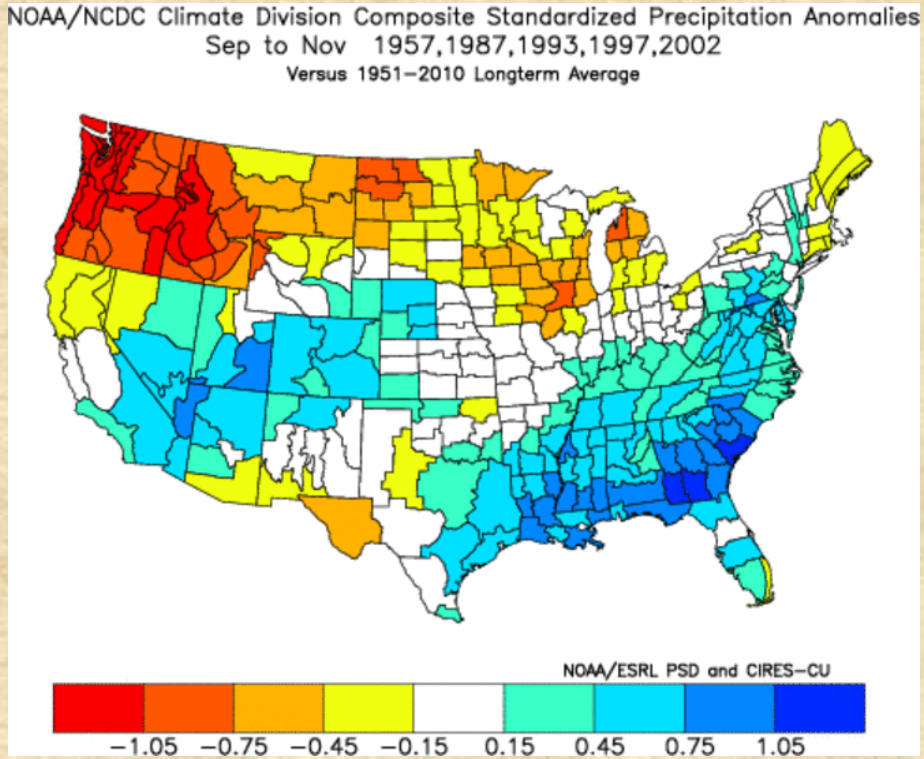




Incoming El Niño of similar caliber to 2015 has occurred five times since 1950 (left) – 2015 has not disappointed (right), with wetness from TX into CO and WY, while most of CA continued to suffer from drought conditions.

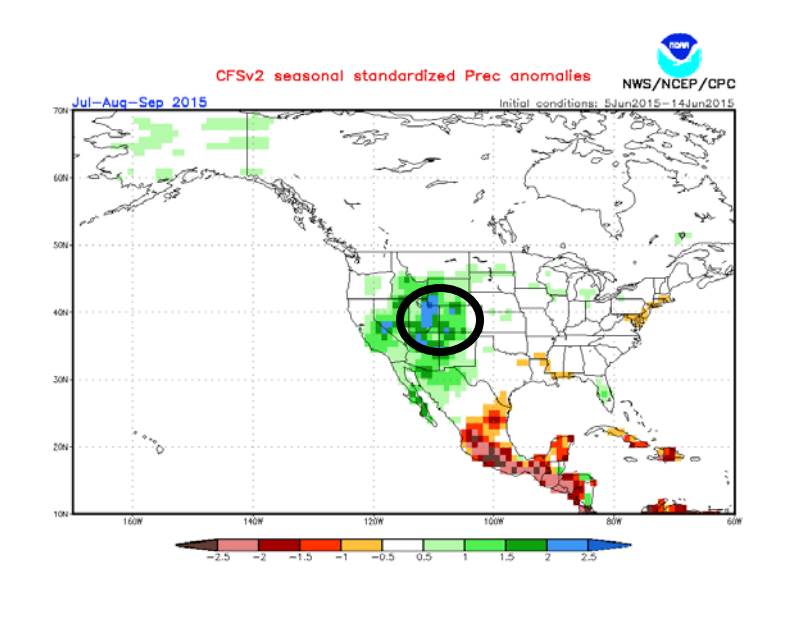
MEI-based analog cases (similar size and growth)

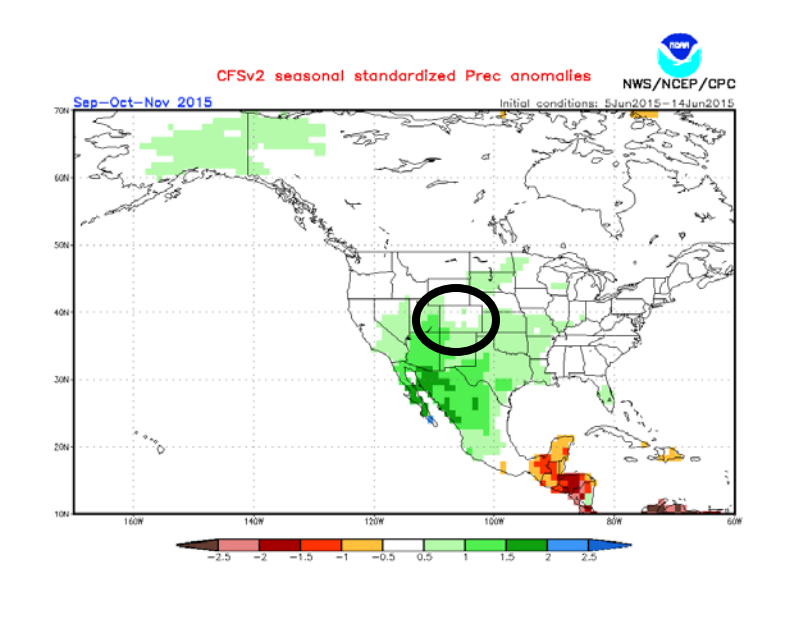




The upcoming summer is favored to remain near-normal or even wetter than normal (left), while the upcoming fall leans towards wet for this region. ***Note that 2002 is part of this composite, a significant 'drag' on the summer outcome which otherwise would have been wetter. The 2002 monsoon was severely hamstrung by a series of wildfires that kept our skies hazy, a very unlikely scenario in 2015.***

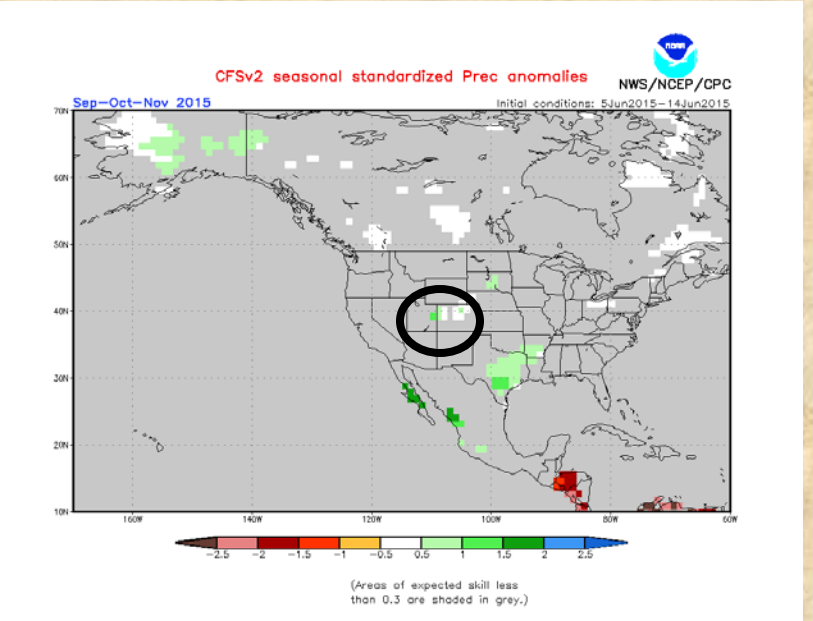
CPC Coupled Forecast System Version 2



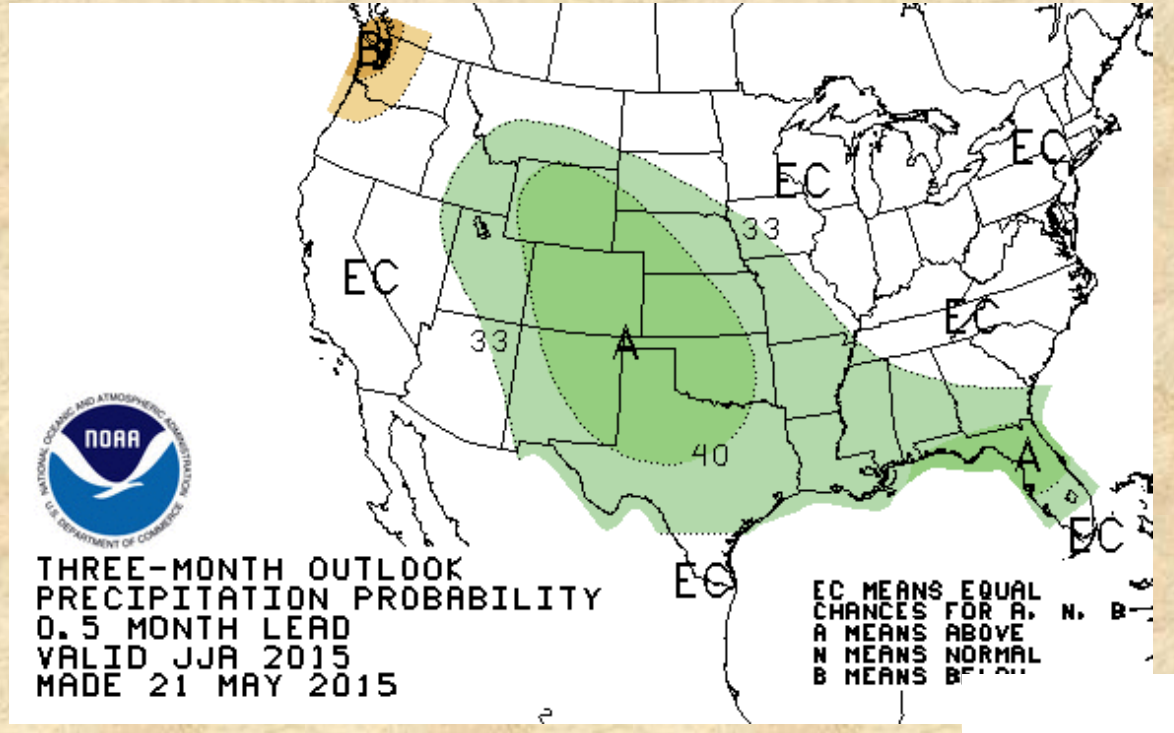


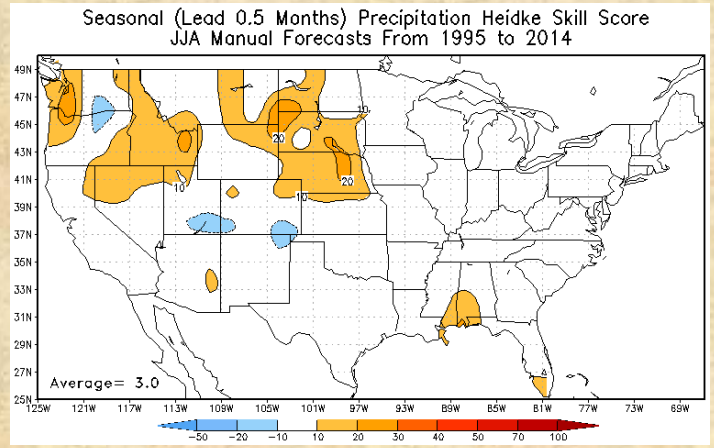
CFS forecasts for and July-September (left) and September–November (right; top = standardized anomalies/bottom = same with skill mask) favor wet monsoon and near-normal to wet fall, however with only little skill (better for fall than summer).
These forecasts have 'sounded like a broken record' for the last few seasons – so far, so good!

http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/index.pri.html



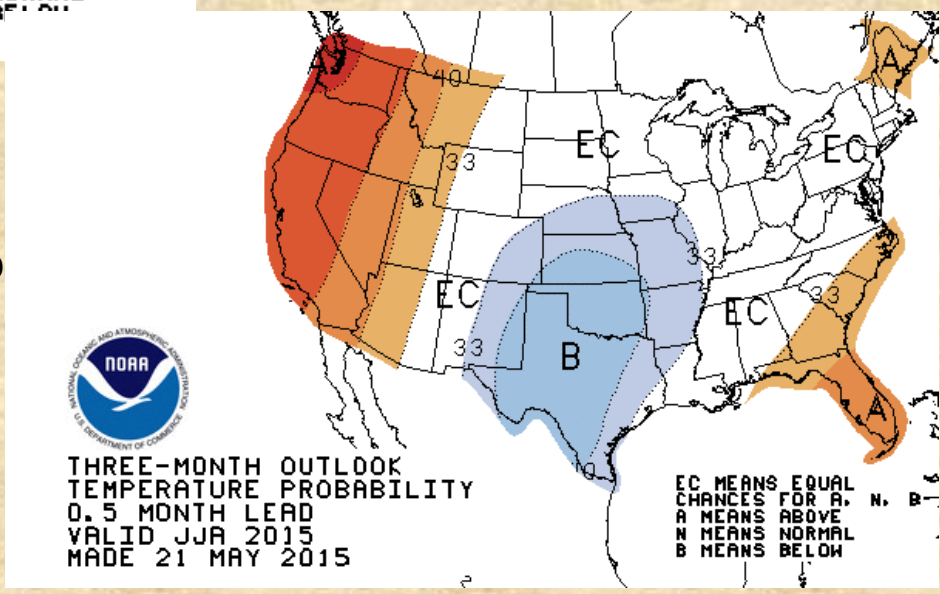
Climate Prediction Center Forecasts





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

The summer temperature forecast by CPC (right) keeps Colorado between colder than normal conditions from the eastern plains into TX, while excessive warmth stays to the west. Their precipitation forecast (top left) is unusually bullish for us (related to El Niño and CFSv2), with little skill to back this up (top right).



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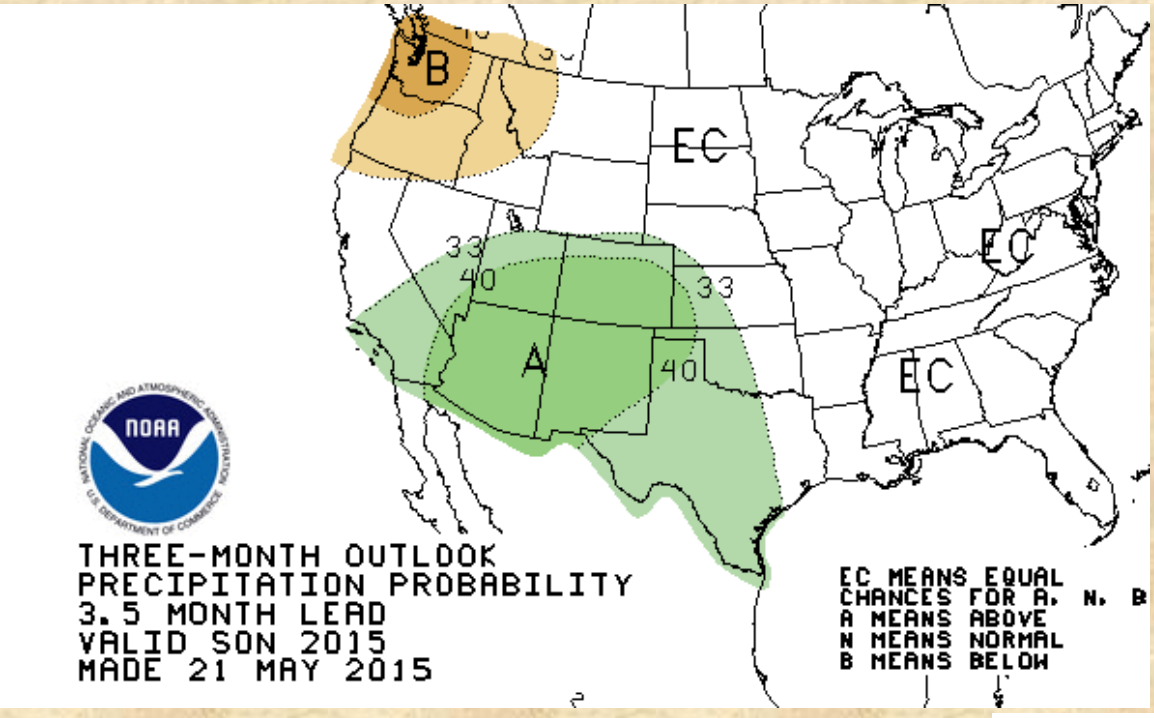
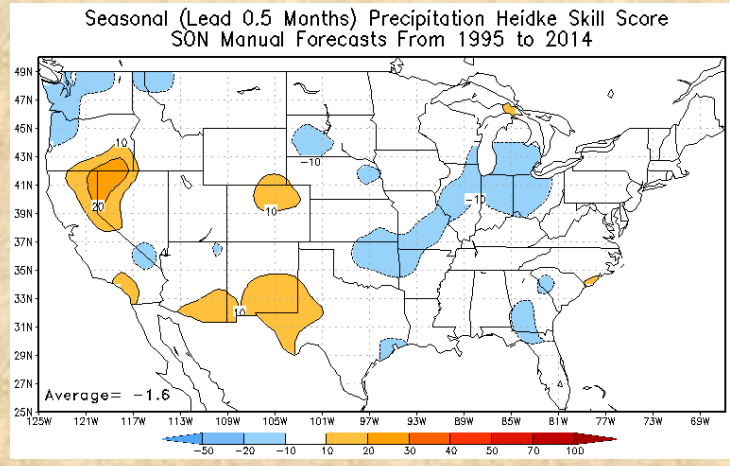
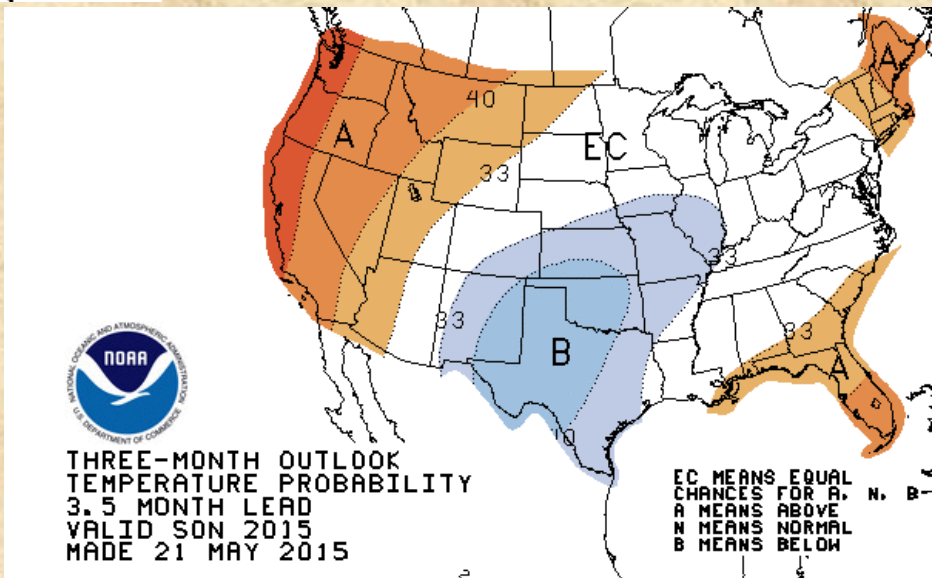




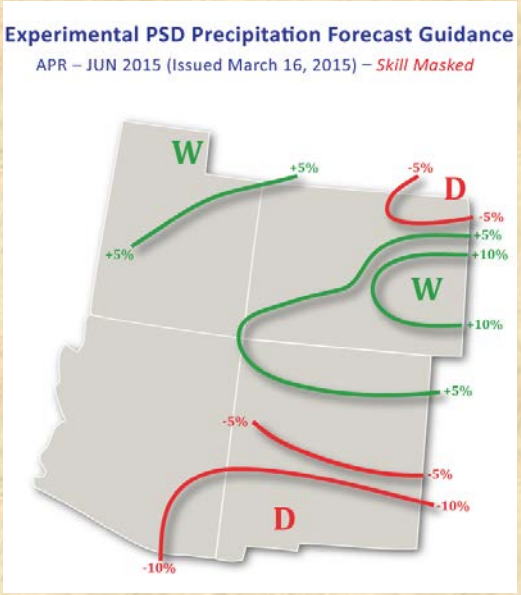
http://www.cpc.ncep.noaa.gov/products/predictions/

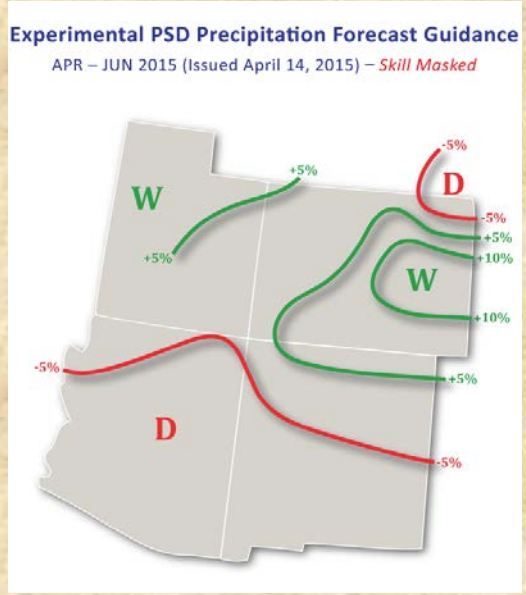
The fall temperature forecast by CPC (right) keeps Colorado between colder than normal conditions from southeastern CO into TX, while excessive warmth still remains to the west. Their precipitation forecast (top left) continues unusually bullish for us, again, with little skill over last two decades (top right).

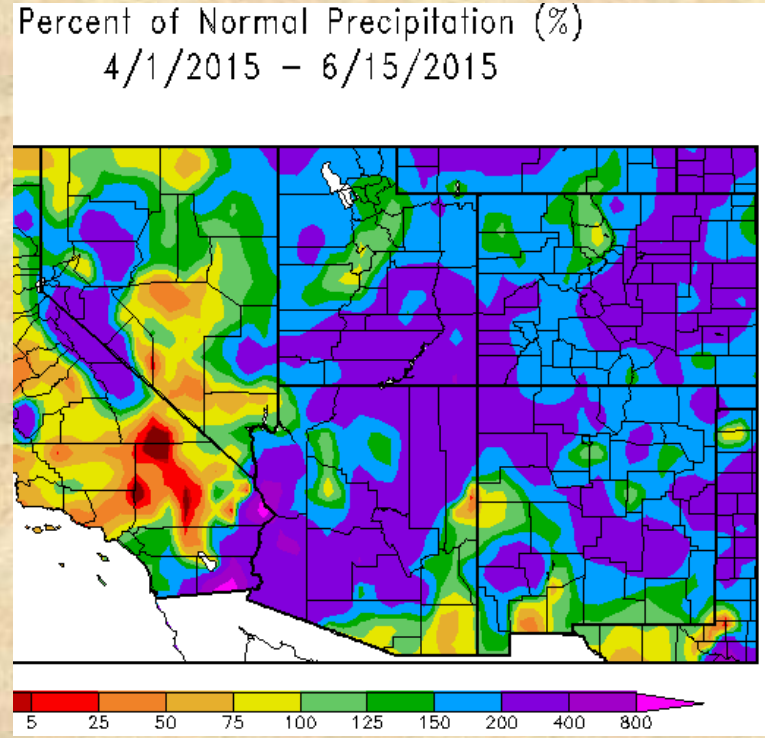
Updated forecasts on Thursday!



‘Postmortem’ April-June 2015



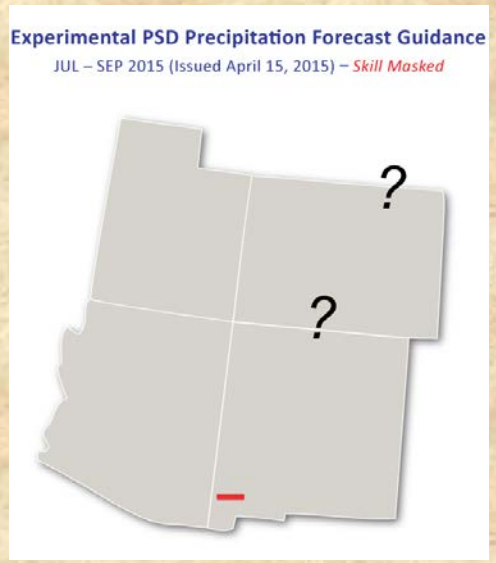


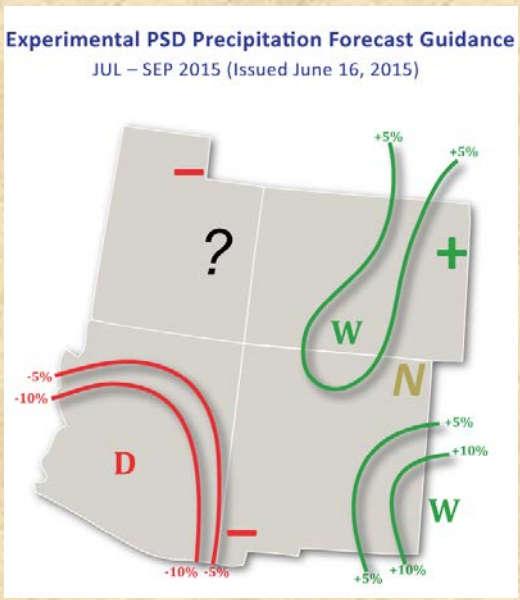


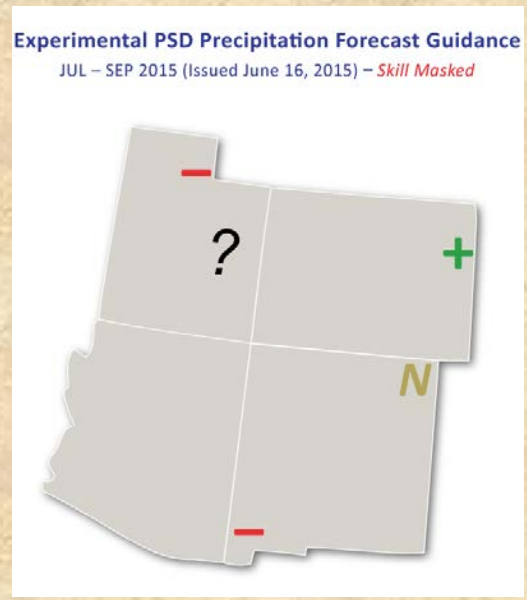
The skill-masked spring forecasts (left = issued in March; middle = issued in April) showed a wet tilt for most of CO, with the northeast corner being withheld.

This spring, all regions that were forecast with a wet preference ended up wet, while some of the dry forecast regions to our south were lucky enough to also end up wet. This is a nice reversal from many seasons where dry forecasts verified better than wet forecasts.

Statistical Forecast for July-September 2015

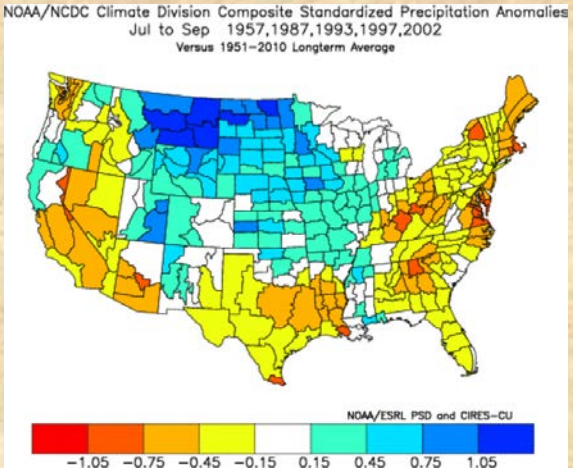




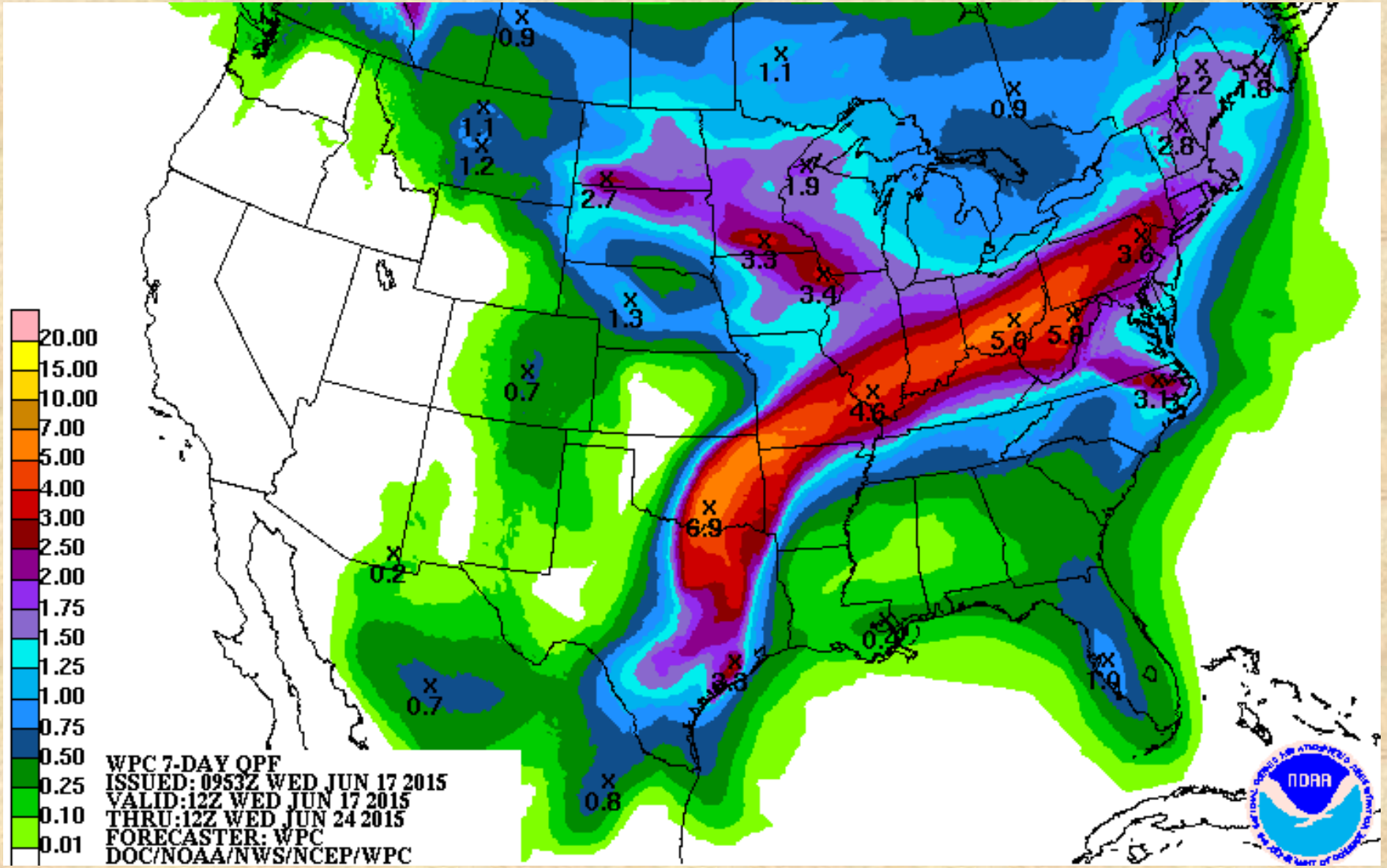


Experimental summer forecast was ambiguous for us back in April (left), while the updated version (middle = all regions; right = only skill-masked regions) is showing more of a hint of wet monsoon season over eastern Colorado.

Flashback to current El Niño composite (right) supports modest expectations for our state, but not well lined-up with above maps!

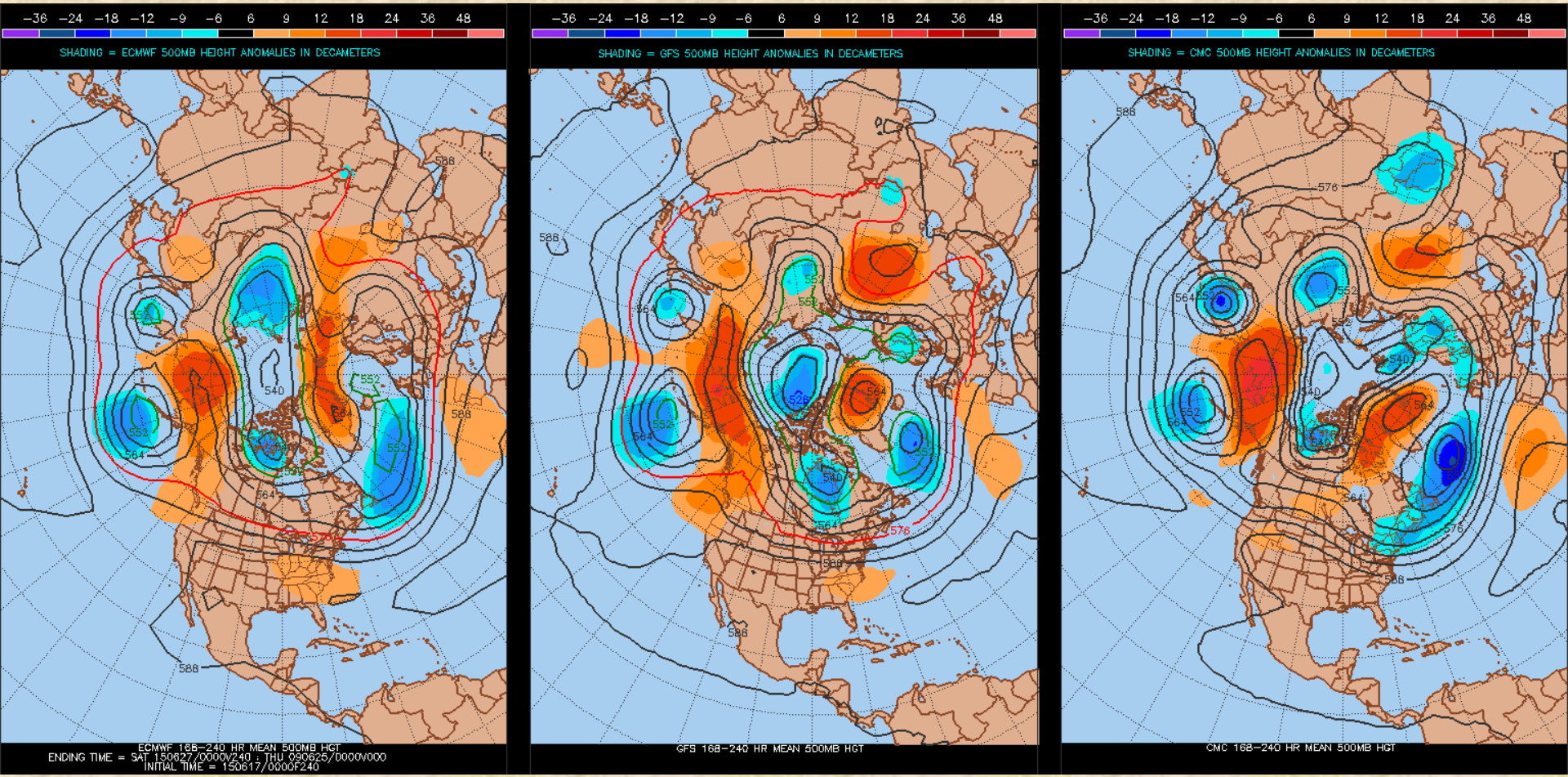


What can we expect in the next seven days?



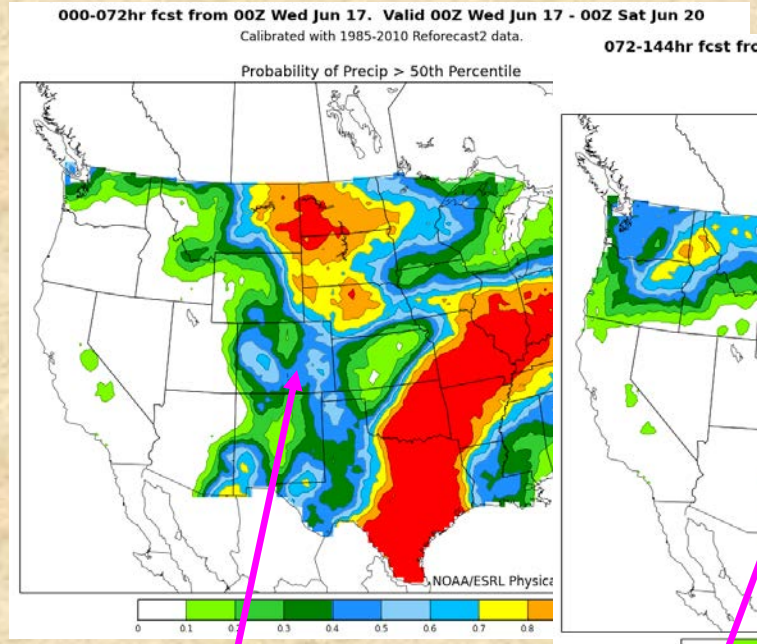
The 'Weather Prediction Center' (formerly 'Hydrological Prediction Center') forecast for the next seven days recycles some of the moisture that has fallen over last two months, but the expected amounts are actually below climatology.

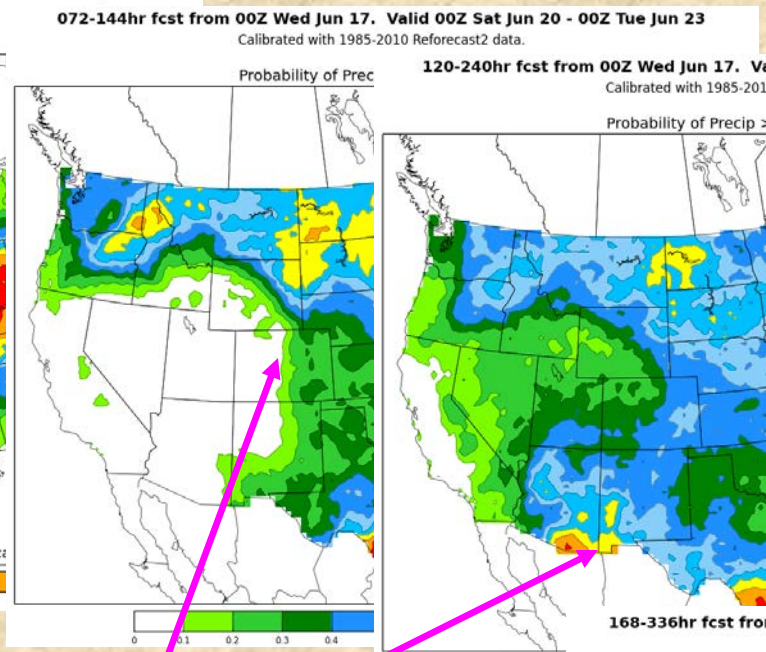
What can we expect for Days 7-10?

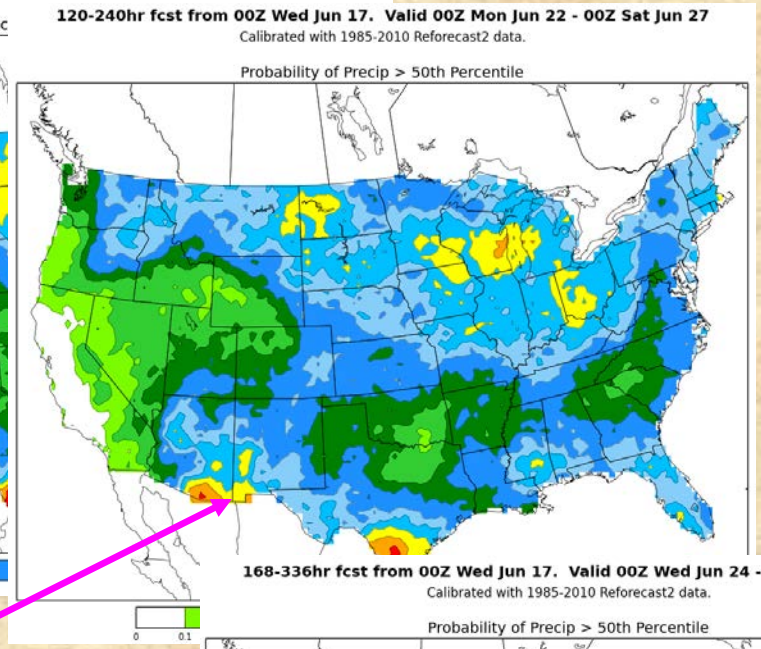


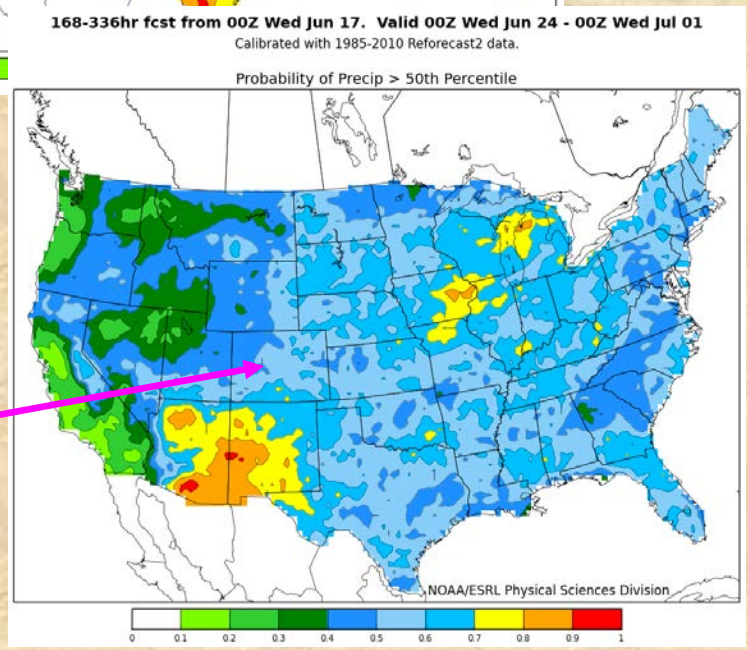
European & U.S. models show near-normal height anomalies over us, with a hint of a westward shifted Bermuda high into the SE U.S. After a hot&dry spell this weekend, this could already result in an early monsoon stage by late June, not too unusual in last few years!

Reforecasts for next two weeks









Reforecast odds above the median show some leftover rains for the 1st three days (left), then a drying out over the subsequent three days (middle), and the beginnings of a monsoonal pattern focused on AZ by Days 6-10 (top right), and pushing north- and eastward in Week 2 (bottom right). Enjoy the warm and hot days over the weekend!

Executive Summary (6jun15)

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- **El Niño has gained strength over the last few months, and appears poised to not only become a strong event, but perhaps even a 'Super El Niño'. The latter would make a bigger difference for California than for us.**

- **Our wet spring was consistent with this, and was fairly well predicted.**

- **Summer and fall are more likely to be wet rather than dry under this scenario, although not every El Niño has 'delivered' (*remember 2002!*).**

- **Experimental favors eastern over western CO, although the immediate Front Range has been less well forecast than further east and west.**

- **CPC's forecasts are wetter for our state than statistical expectations. This is based on their new coupled model that has been showing promise over the last year or two.**

- **Bottomline: Most of Colorado should enjoy a normal, if not wet summer, however, be concerned about a heightened risk of flash-flooding.**