

Seasonal Outlook through September 2013

Klaus Wolter

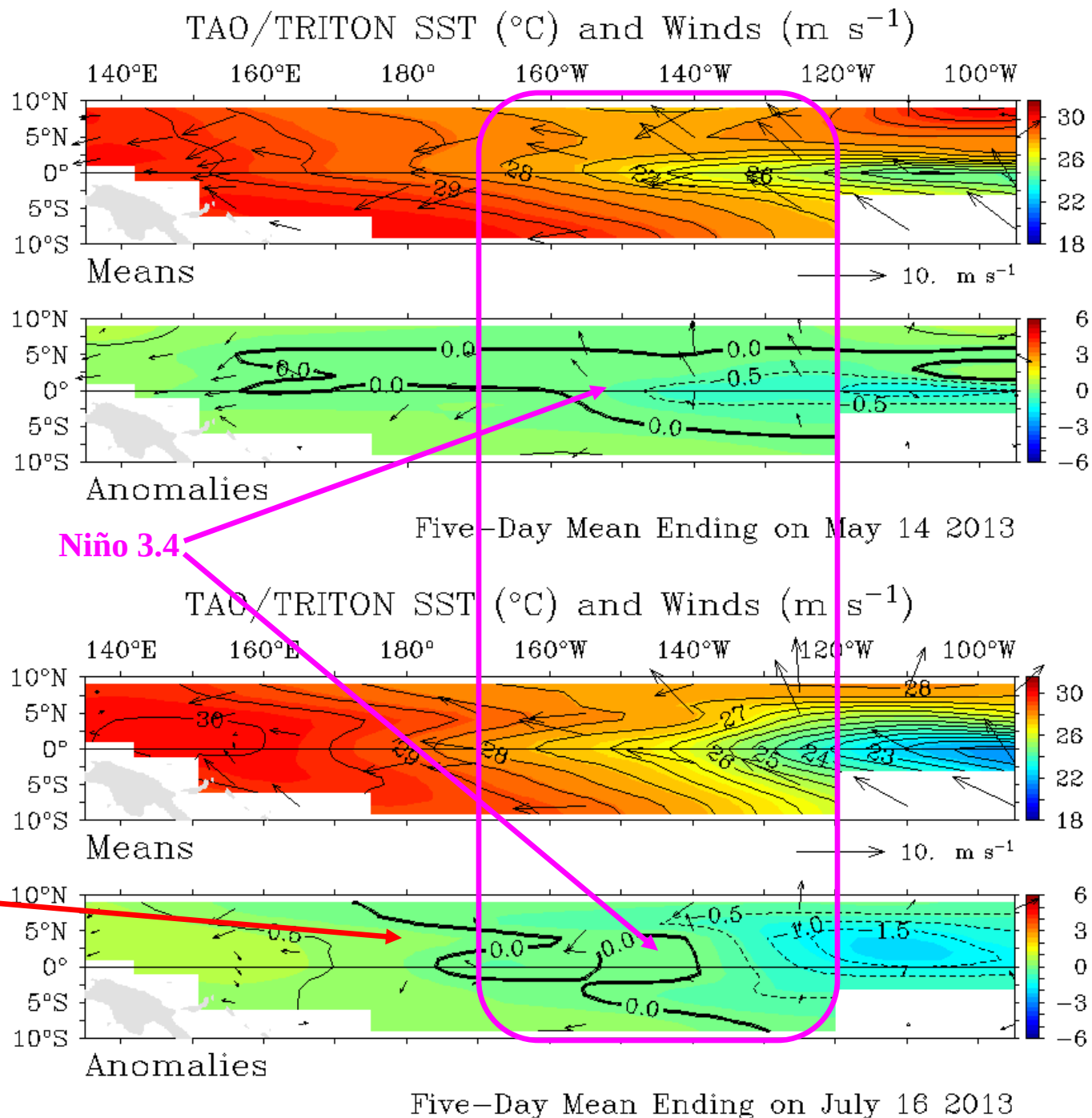
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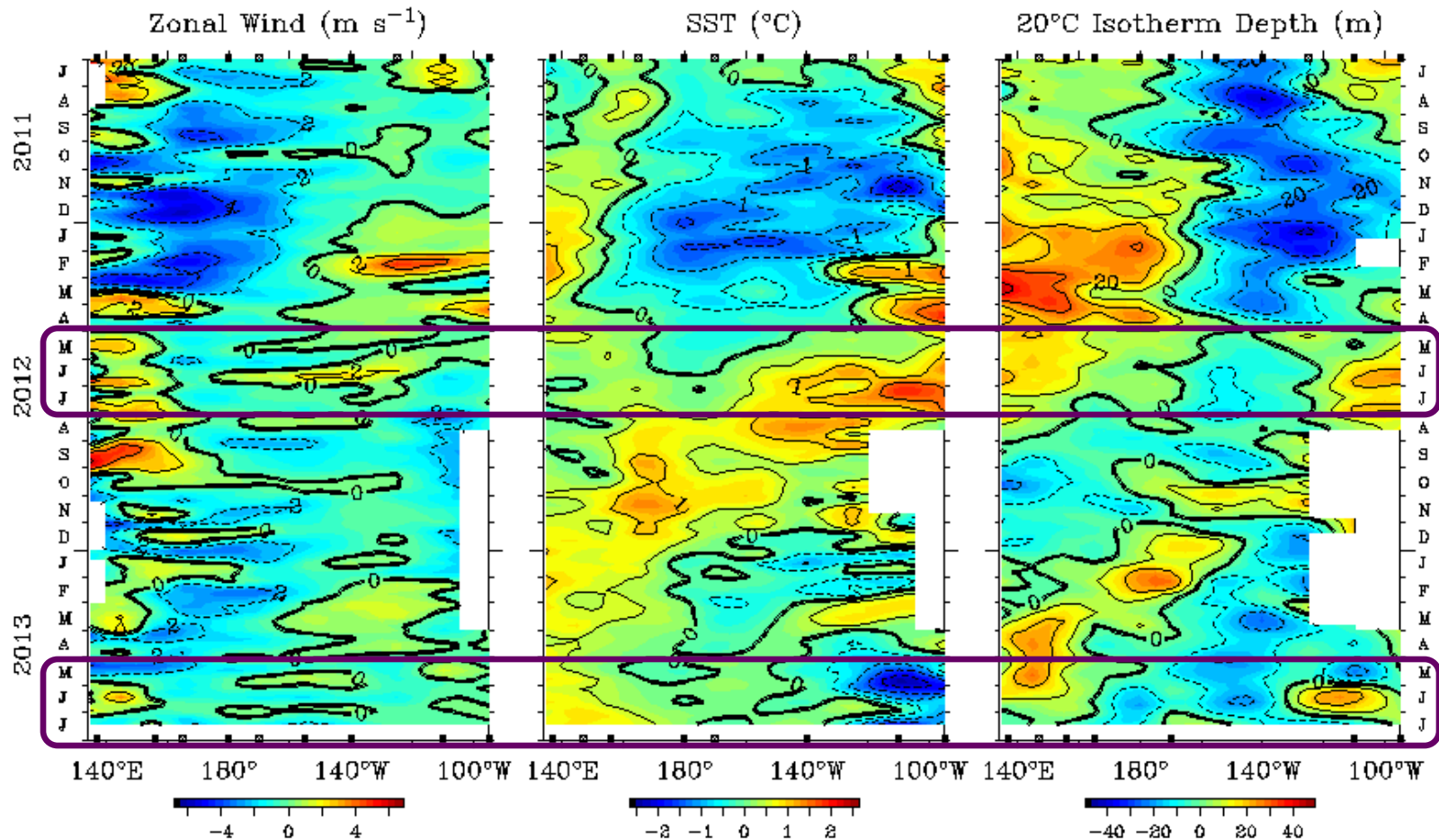
- **What has happened to ENSO, what will happen next, and what does that mean for us ?**
- **Expectations for the next two weeks**
- **CPC forecasts for August through December 2013**
- **My Seasonal Forecast Guidance**
- **Executive Summary**

Current state of El Niño/Southern Oscillation (ENSO) phenomenon (bottom), compared to last month (top): looks like we are still stuck in ENSO-neutral in the central Pacific, but La Niña is trying to develop further east. Recent wind anomalies have remained weak.

Note: serious data shortages present in recent TAO data!



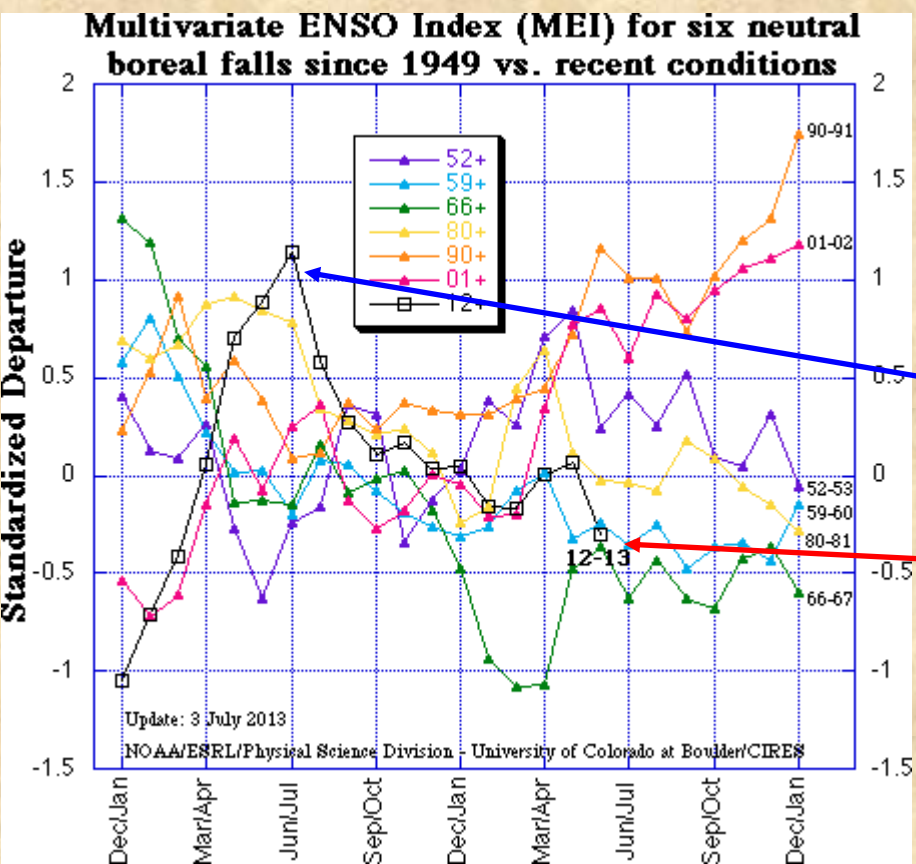
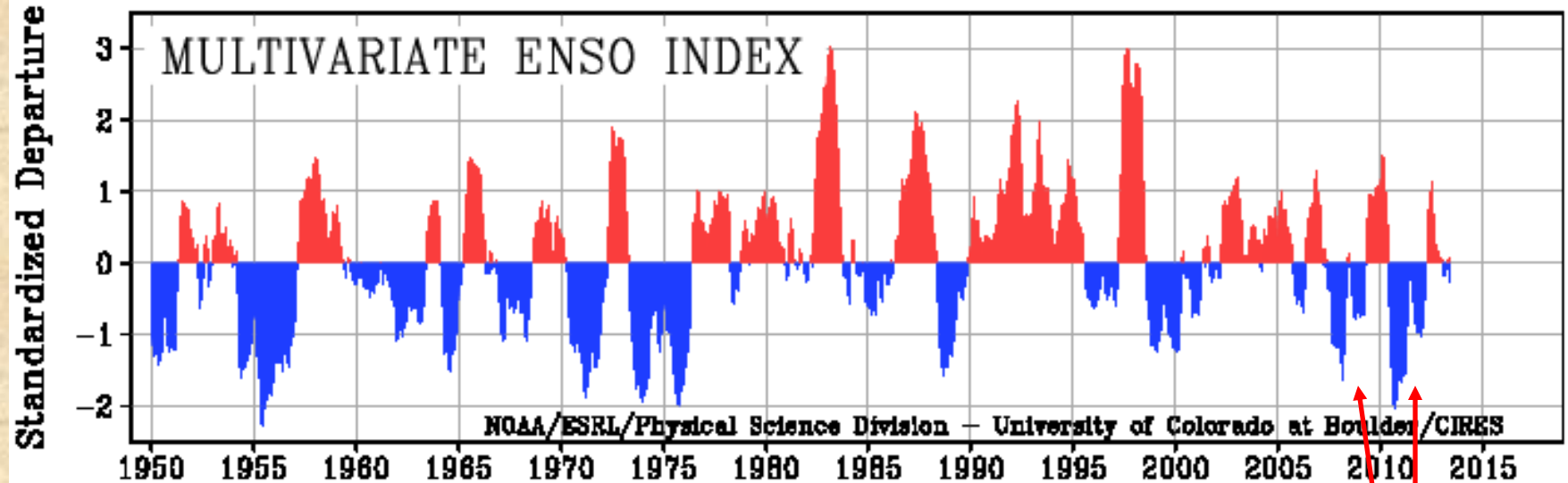
Five Day Zonal Wind, SST, and 20°C Isotherm Depth Anomalies 2°S to 2°N Average



TAO Project Office/PMEL/NOAA

Jul 17 2013

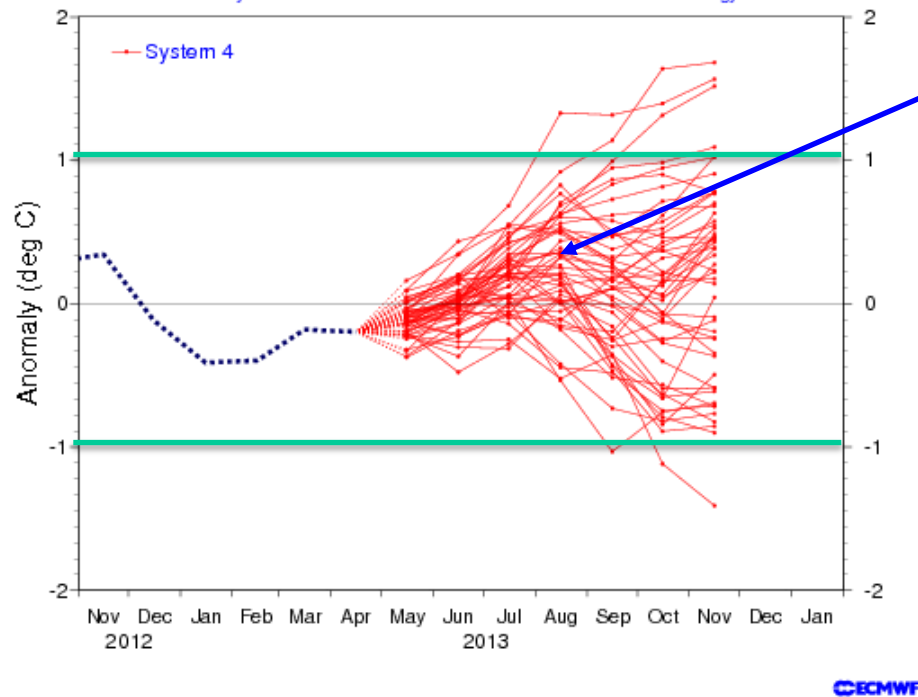
Evolution over last 24 months shows that we experienced a (short-lived) El Niño by this time last year – not really in the cards this year.



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, a return to ENSO-neutral conditions as of last fall, with a recent drift towards La Niña.

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

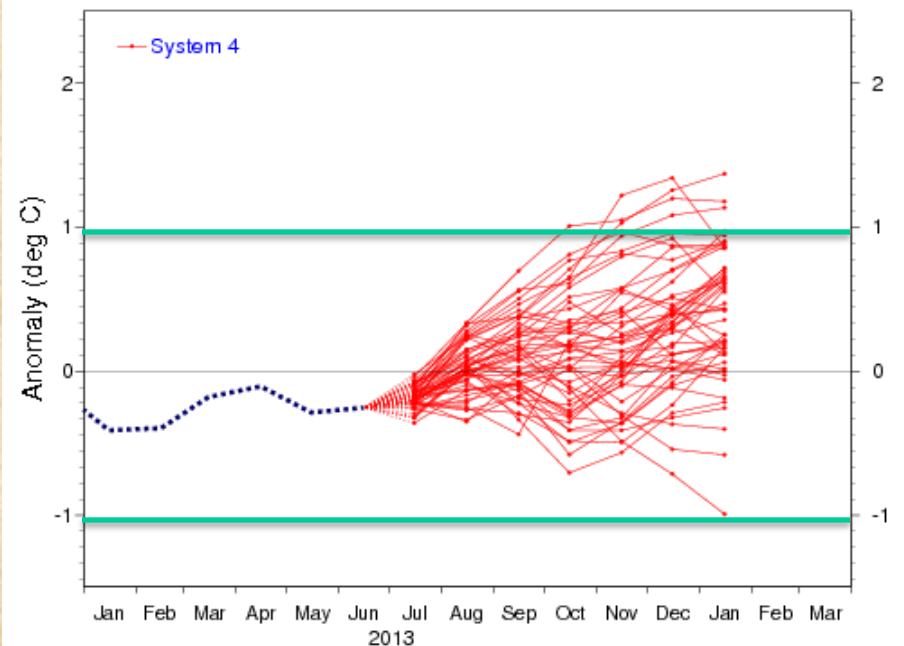
NINO3.4 SST anomaly plume
ECMWF forecast from 1 May 2013
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



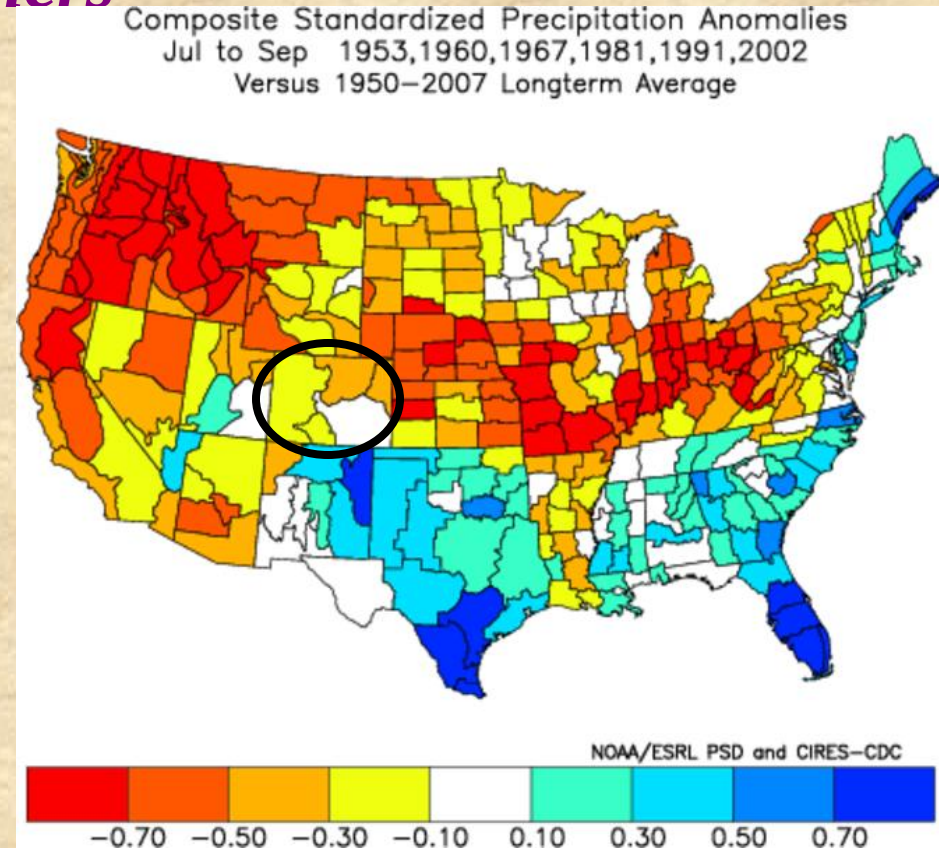
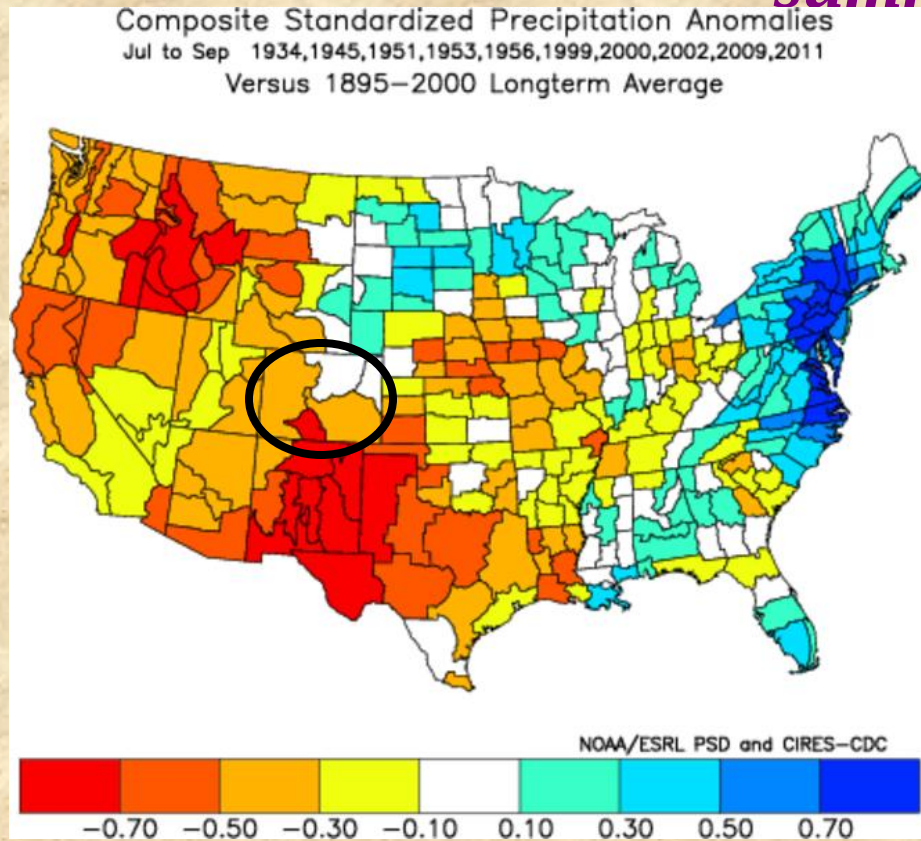
The ECMWF May 2013 forecast (left) showed a weak drift from neutral conditions towards weak El Niño-like conditions by about August 2013. This weak drift appeared to reverse itself later in the year.

The ECMWF July 2013 forecast (right) is similar to the above forecast, with fewer ensemble members reaching even weak El Niño status ($+0.5^{\circ}\text{C}$) than in May, and average values lower than before. *The IRI plume (not yet public) has the majority of dynamical models near-neutral, while 4 out of 8 statistical models favor weak La Niña.*

NINO3.4 SST anomaly plume
ECMWF forecast from 1 Jul 2013
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology

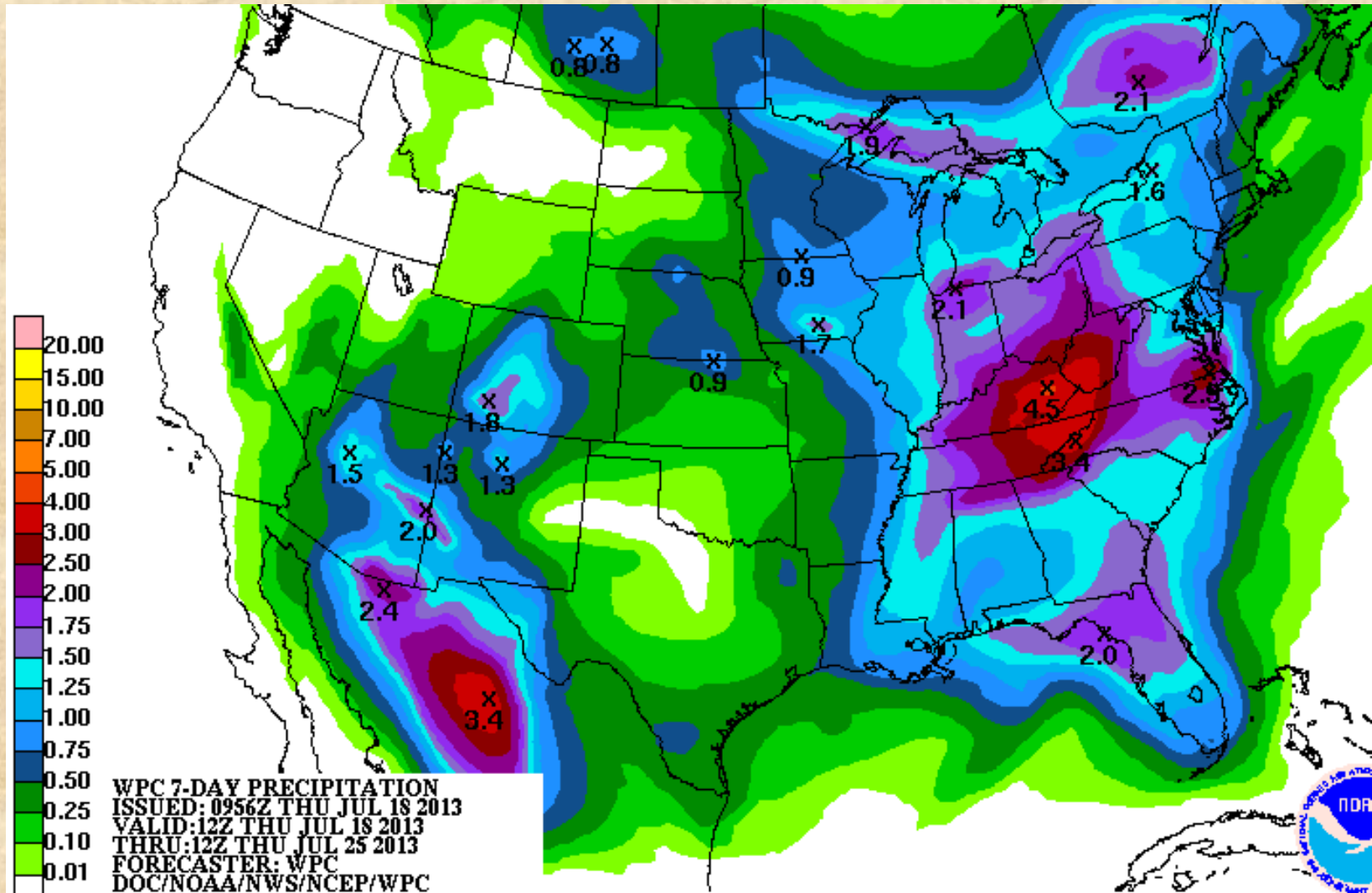


Post-low PDO-AMO and post-neutral ENSO summers



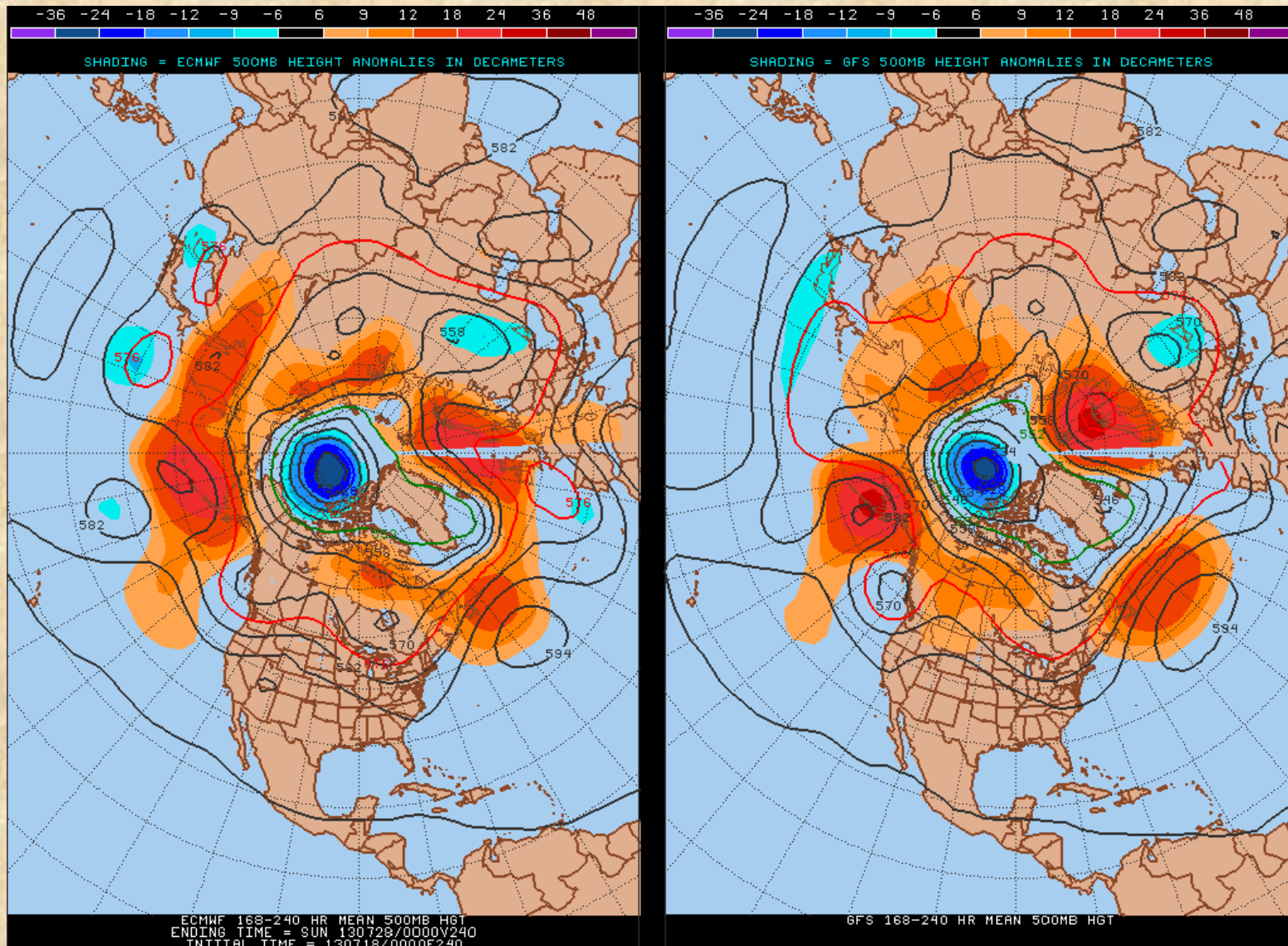
*Using the same set of 10 years based on last summer's low <PDO-AMO> conditions, the precipitation odds for the following summer (Jul-Sep; left) remain unfavorable over much of our state. ENSO-neutral patterns in the preceding fall and early winter have often 'produced' dry summers in our state (right), especially over the northeastern plains. **Update on PDO/AMO: PDO has wobbled but remains negative, while AMO is very close to 0.***

What can we expect in the next seven days?



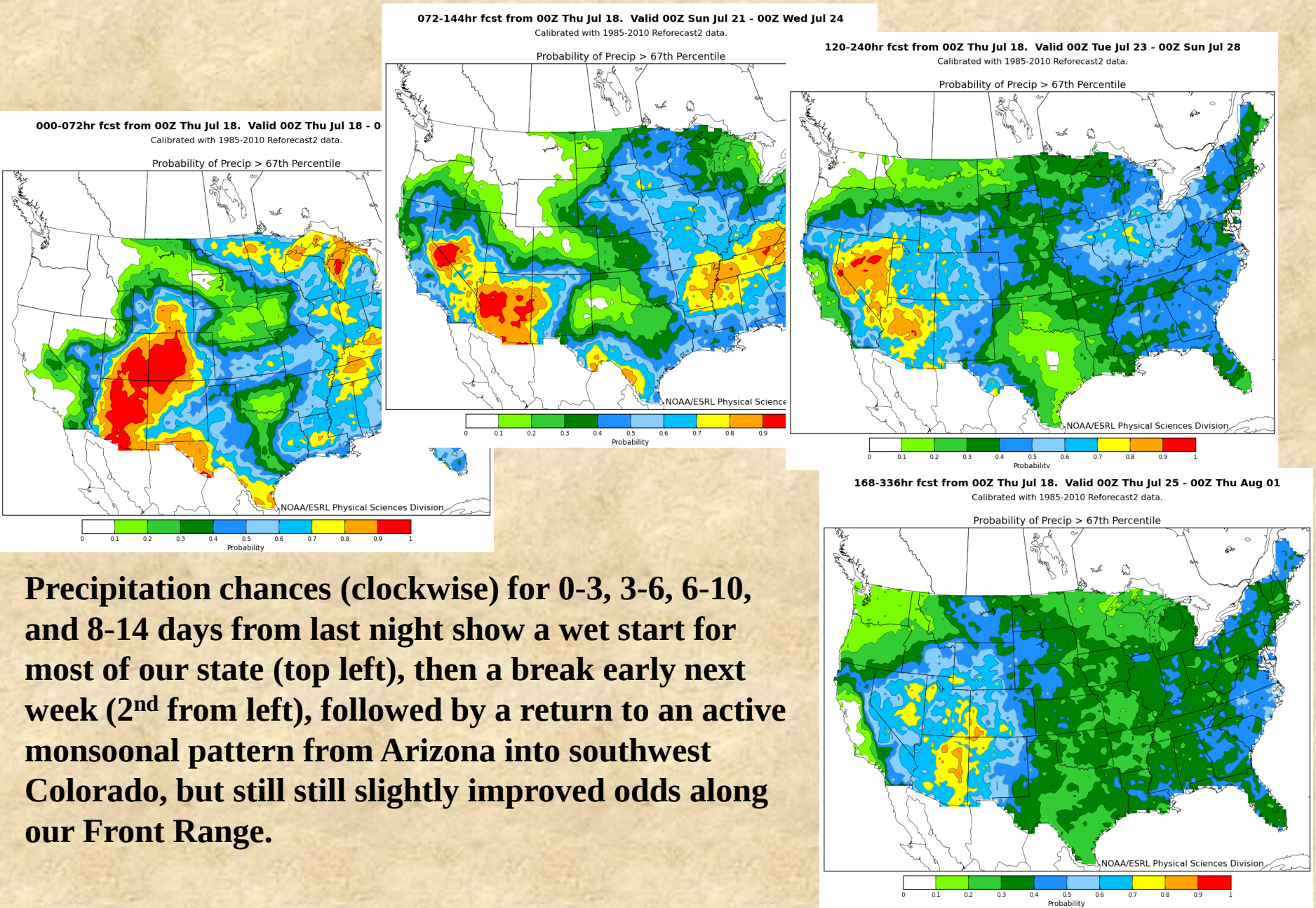
Expected total precipitation, according to the Hydrological Prediction Center (NOAA): Monsoonal flow pattern looks ‘juicy’ for southwestern CO, much less over the eastern plains of CO.

What can we expect by next weekend?



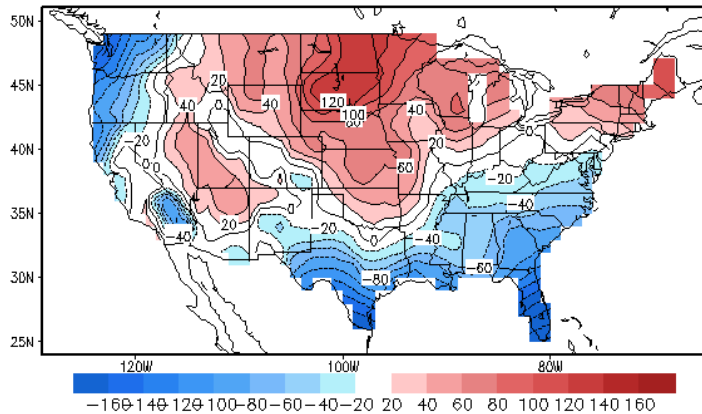
*European & U.S. models show slightly enhanced ridging over the west-central U.S., allowing for the continuation of monsoonal from Mexico, **no 'red flag' over us.***

Reforecast precipitation odds

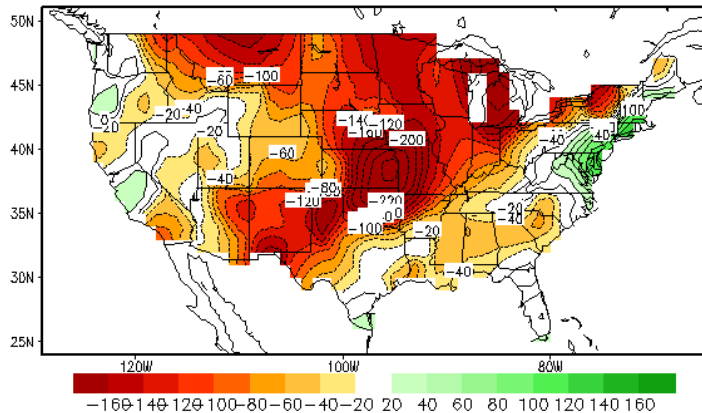


Climate Prediction Center 'Analog' Forecasts

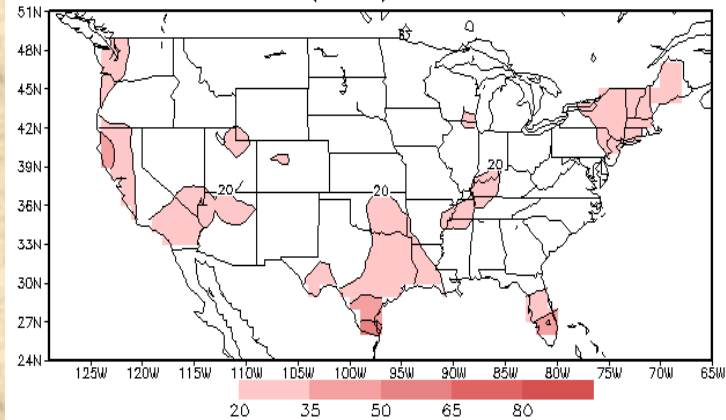
Lagged Averaged Temperature Outlook for ASO 2013
units: anomaly (sdX100), SM data ending at 20130715



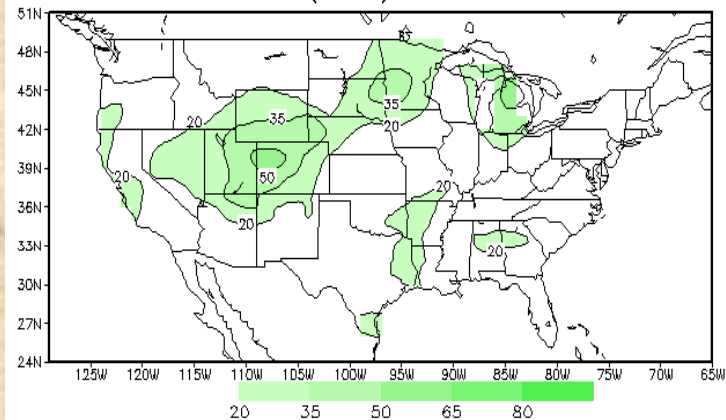
Lagged Averaged Precipitation Outlook for ASO 2013
units: anomaly (sdX100), SM data ending at 20130715



lead 1 skill of temperature CAS forecast for ASO
units: correlation (X100) based on 1981-2005



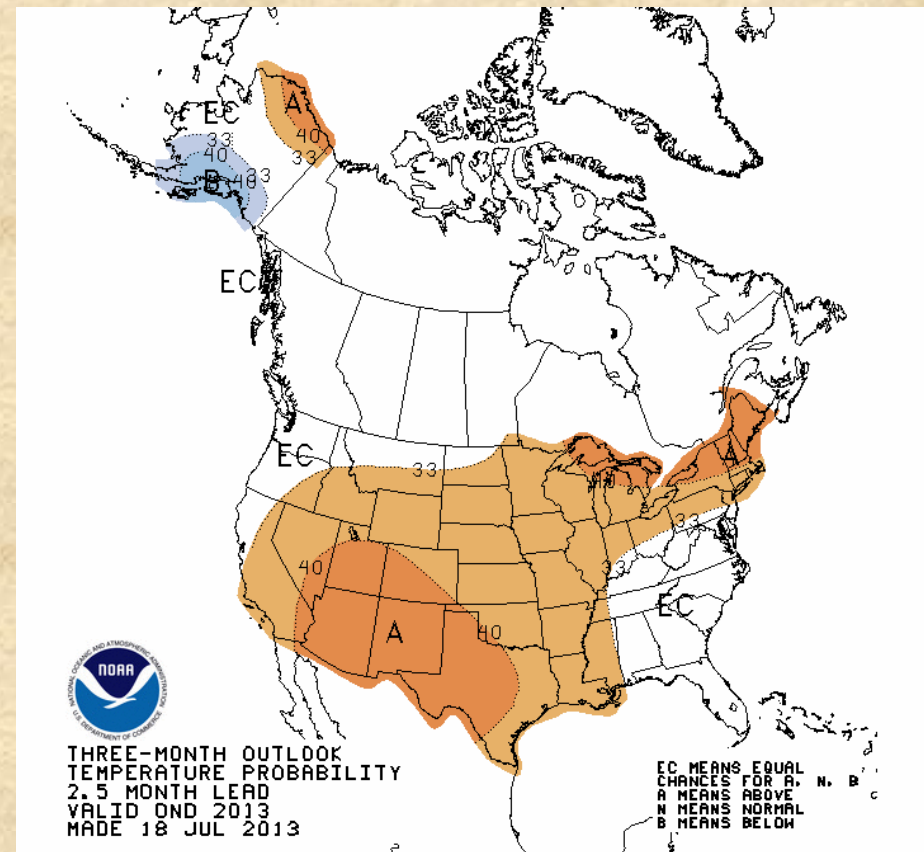
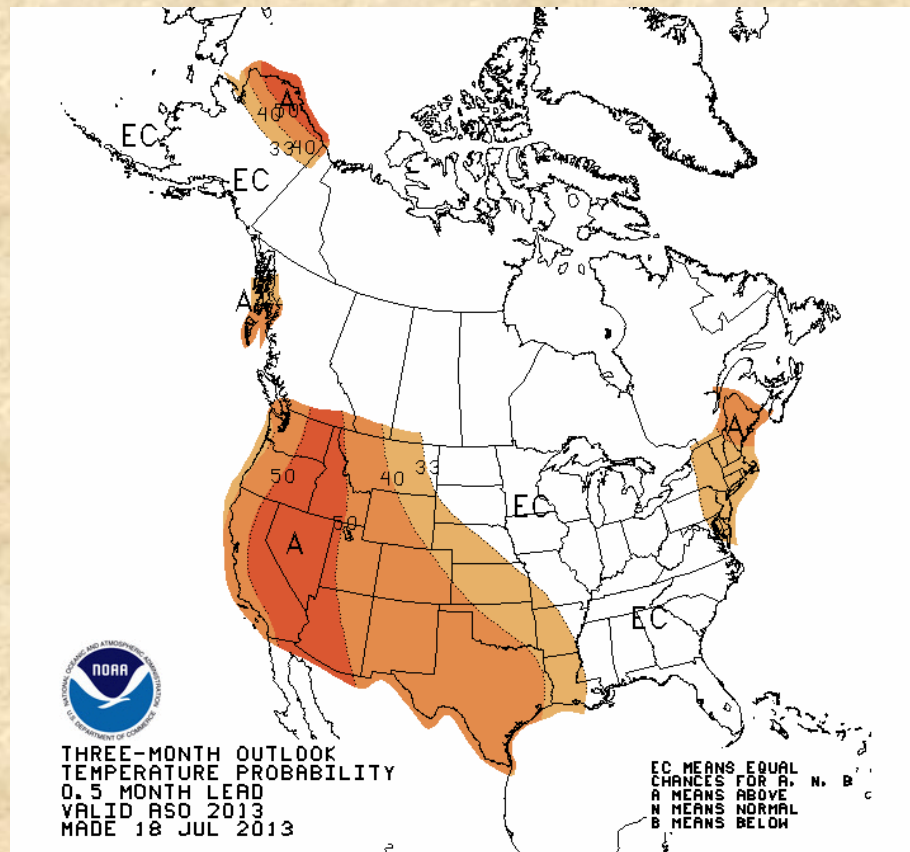
lead 1 skill of precipitation CAS forecast for ASO
units: correlation (X100) based on 1981-2005



According to the soil-moisture analog forecast, Colorado faces a modest risk of renewed drought conditions in the next three months (left). Skill at this lead-time (right) is much better than for August alone (not shown), in this case unfortunately.

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

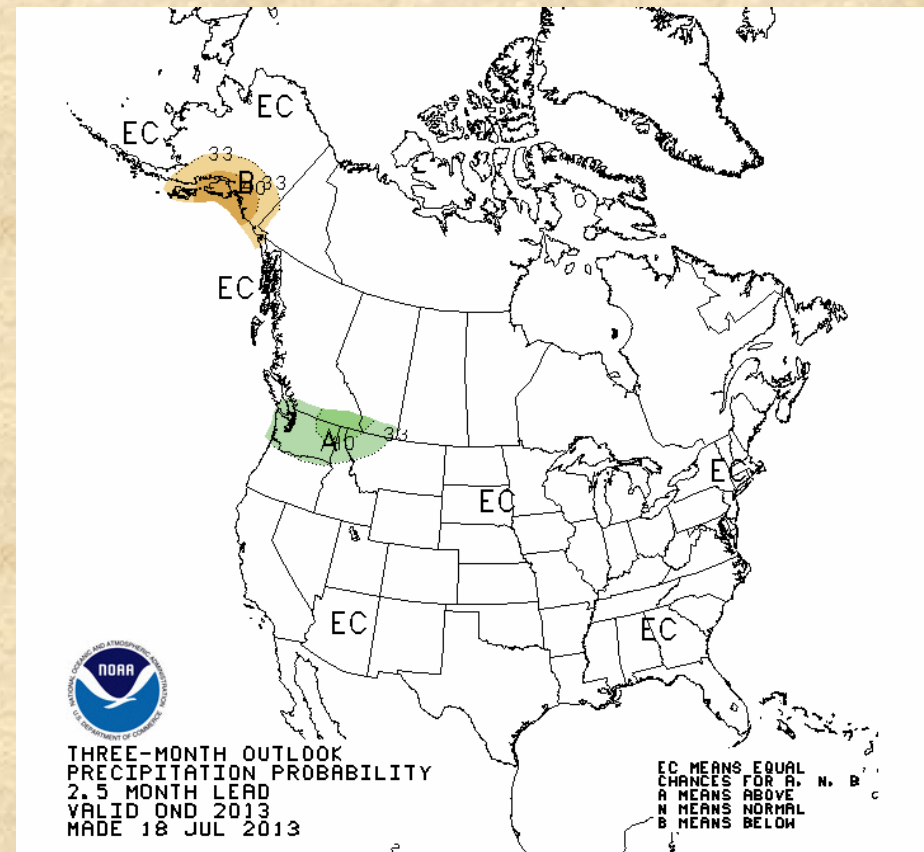
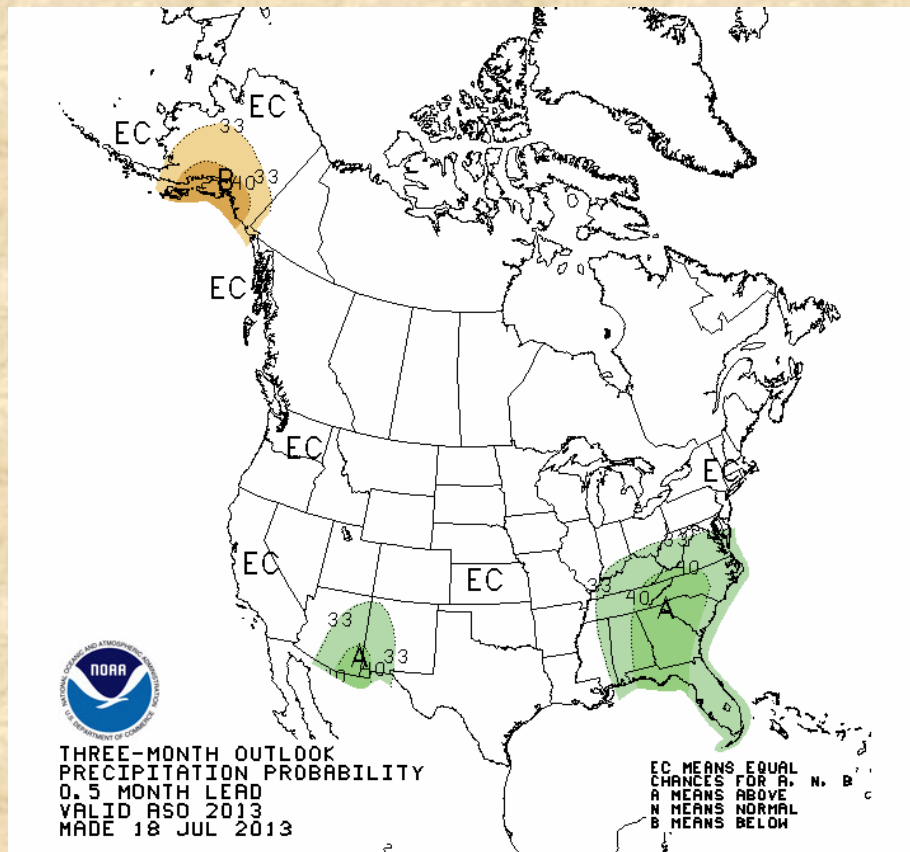
Climate Prediction Center Temperature Forecasts



CPC's temperature forecast for August-October (left) and October-December (right) reflects recent warming trends – ENSO-neutral conditions do not alter this outlook

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

Climate Prediction Center Temperature Forecasts



CPC's precipitation forecast for August-October (left) and October-December (right) shows no tilt in the odds for our state – ENSO-neutral does not help...

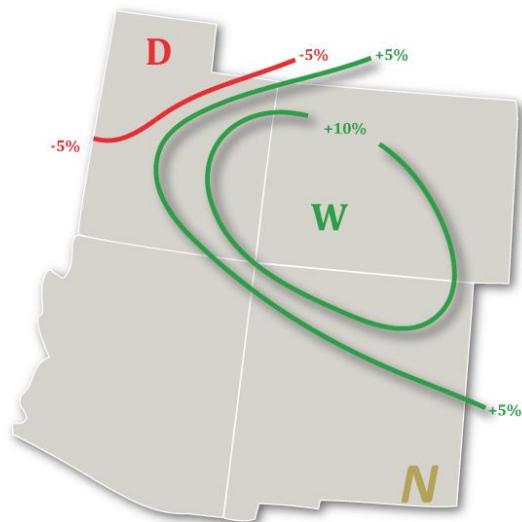
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Postmortem for April-June 2013



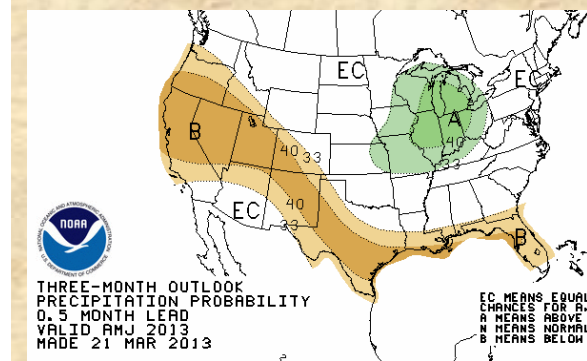
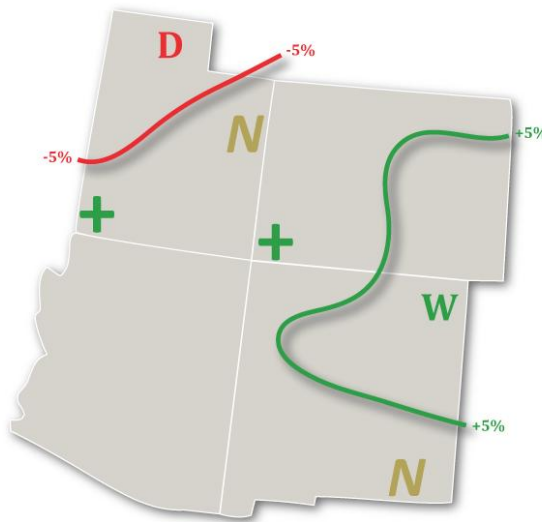
Experimental PSD Precipitation Forecast Guidance

APR - JUN 2013 (Issued March 5, 2013)

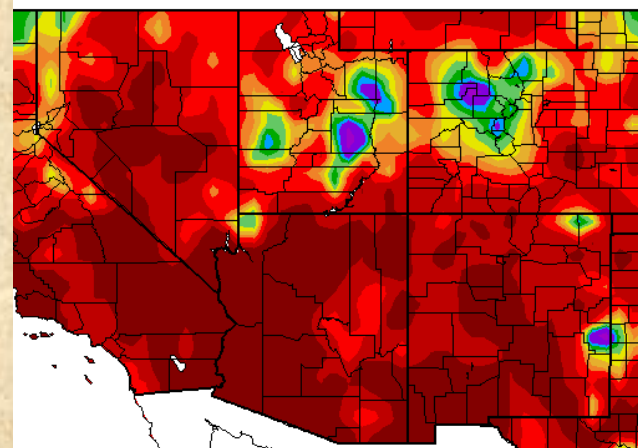


Experimental PSD Precipitation Forecast Guidance

APR - JUN 2013 (Issued April 12, 2013)

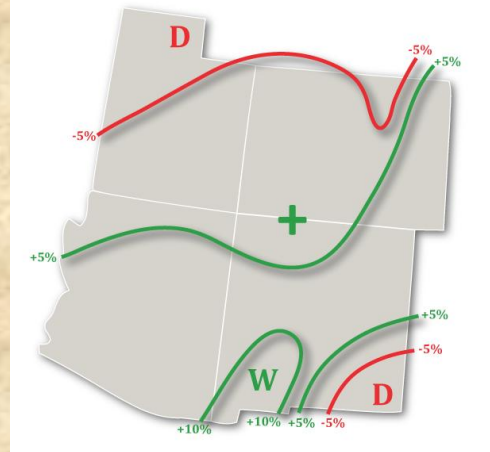


Percent of Normal Precipitation (%)
4/1/2013 - 6/30/2013

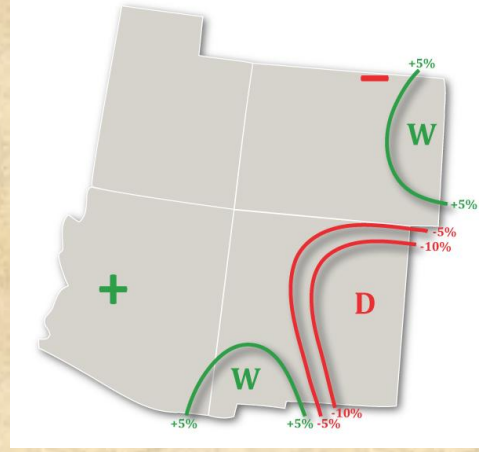


My March forecast for April-June 2013 (left) was confident that most of CO would see above-normal moisture, especially towards the Four Corners region. This is in stark contrast to 2012, and was backed up by operational skill over the last decade (not shown). The April update (right) reduced the tilt in the wet forecast region and moved its center of gravity to the east. The observed precipitation (bottom right) confirms the original forecast more than the updated map. *CPC predicted a dry spring for southwestern CO (top right). Unusual split in skill this time around...*

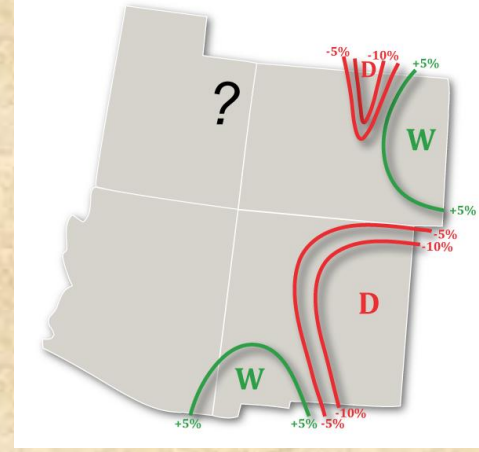
Experimental PSD Precipitation Forecast Guidance
JUL – SEP 2013 (Issued April 15, 2013)



Experimental PSD Precipitation Forecast Guidance
JUL – SEP 2013 (Issued May 14, 2013)

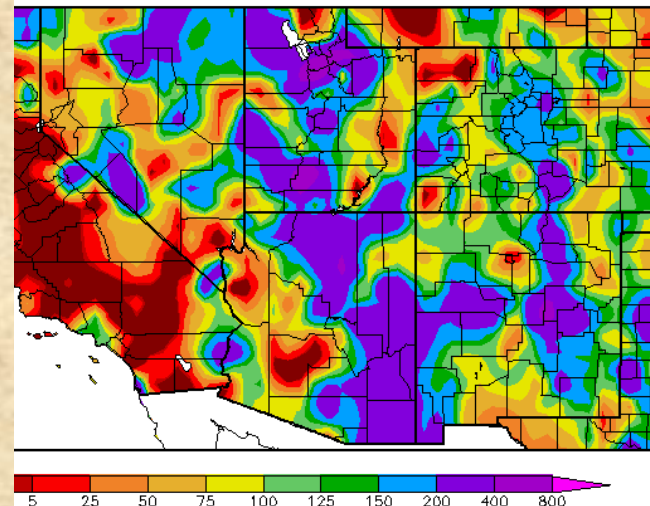


Experimental PSD Precipitation Forecast Guidance
JUL – SEP 2013 (Issued July 12, 2013)



The April forecast for July-September 2013 (left) was fairly confident that the monsoon axis would be shifted eastward, from NM into eastern CO. The May update (middle) reduced tilts in the odds pretty much across the board, except for increased dry probabilities in eastern NM. Not good for them, but not exactly wet for us. The final update (top right) keeps the eastern plains of CO “wet”, while raising the threat of a dry summer right along the northern Front Range, leaving all else up to chance. So far this month, most of the interior southwestern U.S. has seen an active monsoon pattern (bottom right).

Percent of Normal Precipitation (%)
7/1/2013 – 7/17/2013



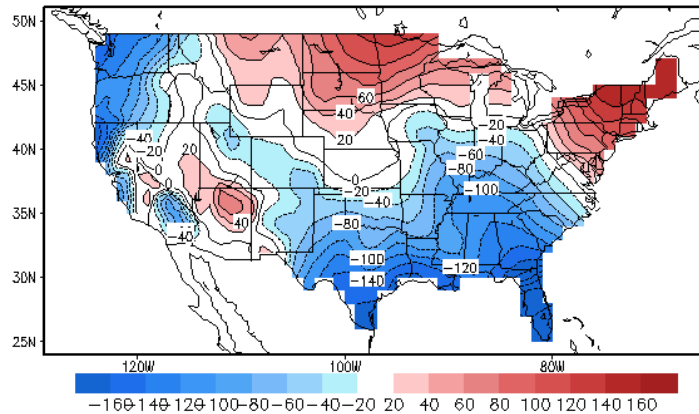
Executive Summary (18 July 2013)

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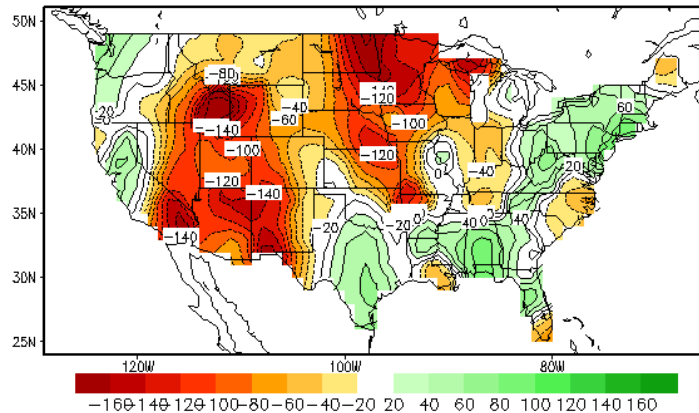
- While El Niño/La Niña can provide decent guidance for climate outlooks around here, this is less true for ENSO-neutral situations. A cold NE Pacific combined with a warm North Atlantic stacked the deck towards dry conditions in the southwestern U.S. in the current water year, as borne out so far.
- This year's snowpack got off to a slow start. However, a snowy spring almost wiped out this deficit in northern CO, while southern CO remained dry. Unfortunately, June returned even northern CO to drought conditions, albeit not as bad as last year's. July is off to a decent start, the monsoon has indeed arrived in a timely fashion, and appears inclined to stay for at least a couple more weeks.
- My statistical forecast for late summer (July-September) favors the eastern plains of CO over the rest of the state, while the northern Front Range may have to contend with renewed drought conditions later this summer – both regions have shown modest skill over last decade. The rest of CO has climatological odds.
- The odds for a switch to El Niño this summer are virtually nil. In fact, weak La Niña conditions by late 2013 remain a distinct possibility. A 1st year La Niña season is not necessarily dry for us, as last seen in 2010-11 and 2007-08.
- *Bottomline: Compared to last year, this year's spring was a lot more bearable, followed by a June that reminded us of the (wildfire and drought) stakes involved. My monsoon forecast is climatological for western Colorado, dry in the Front Range, and moist over the eastern plains. A switch to La Niña would reduce our odds for moisture through the fall season.*

Climate Prediction Center 'Analog' Forecasts

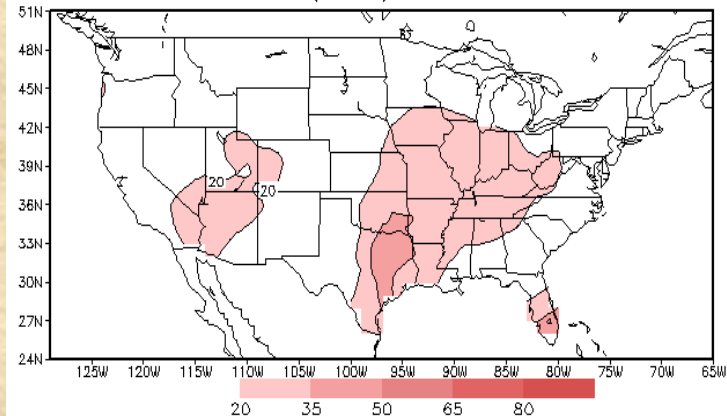
Lagged Averaged Temperature Outlook for AUG 2013
units: anomaly (sdX100), SM data ending at 20130715



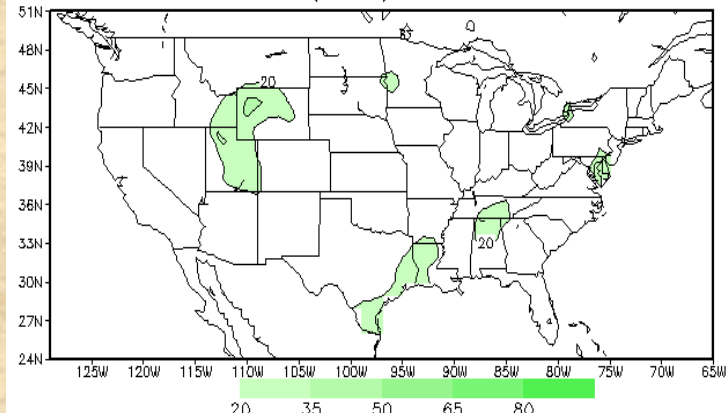
Lagged Averaged Precipitation Outlook for AUG 2013
units: anomaly (sdX100), SM data ending at 20130715



lead 1 skill of temperature CAS forecast for Aug
units: correlation (X100) based on 1981-2005



lead 1 skill of precipitation CAS forecast for Aug
units: correlation (X100) based on 1981-2005



According to the soil-moisture analog forecast, Colorado may experience a dry August (left). However, skill at this lead-time (right) is non-existent, showing how unpredictable August remains.

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