NOAA-CIRES Climate Diagnostics Center

CO WA&FTF
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Denver

Western Water Assessment

Seasonal Outlook into mid-2009

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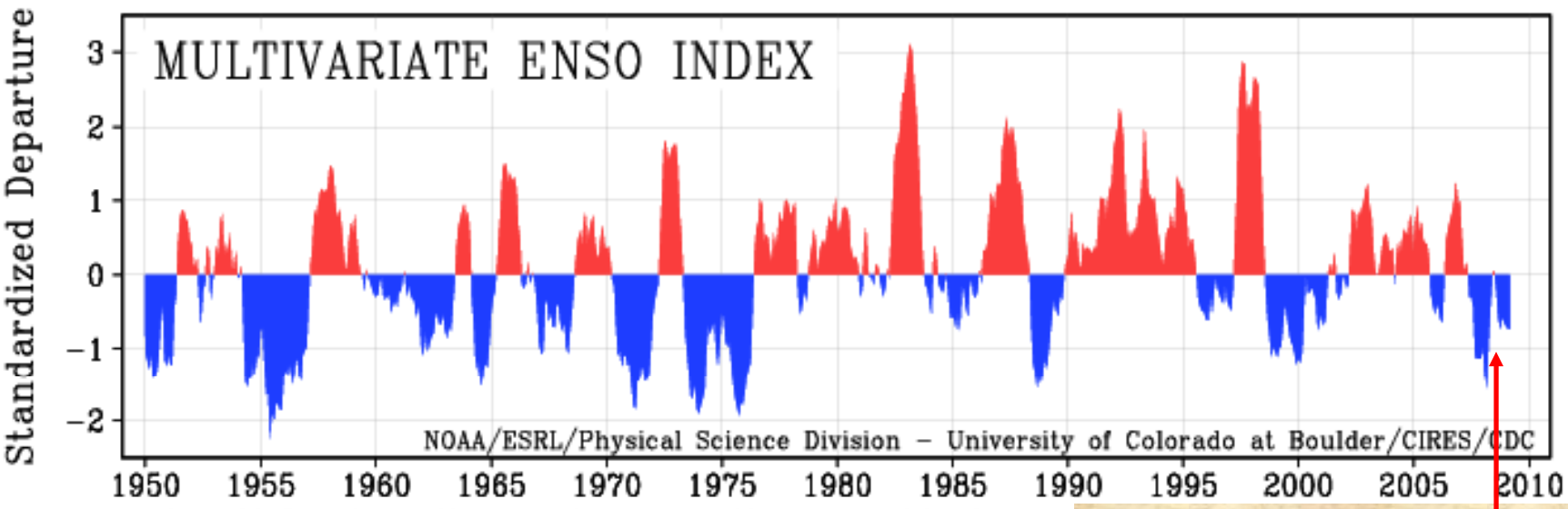
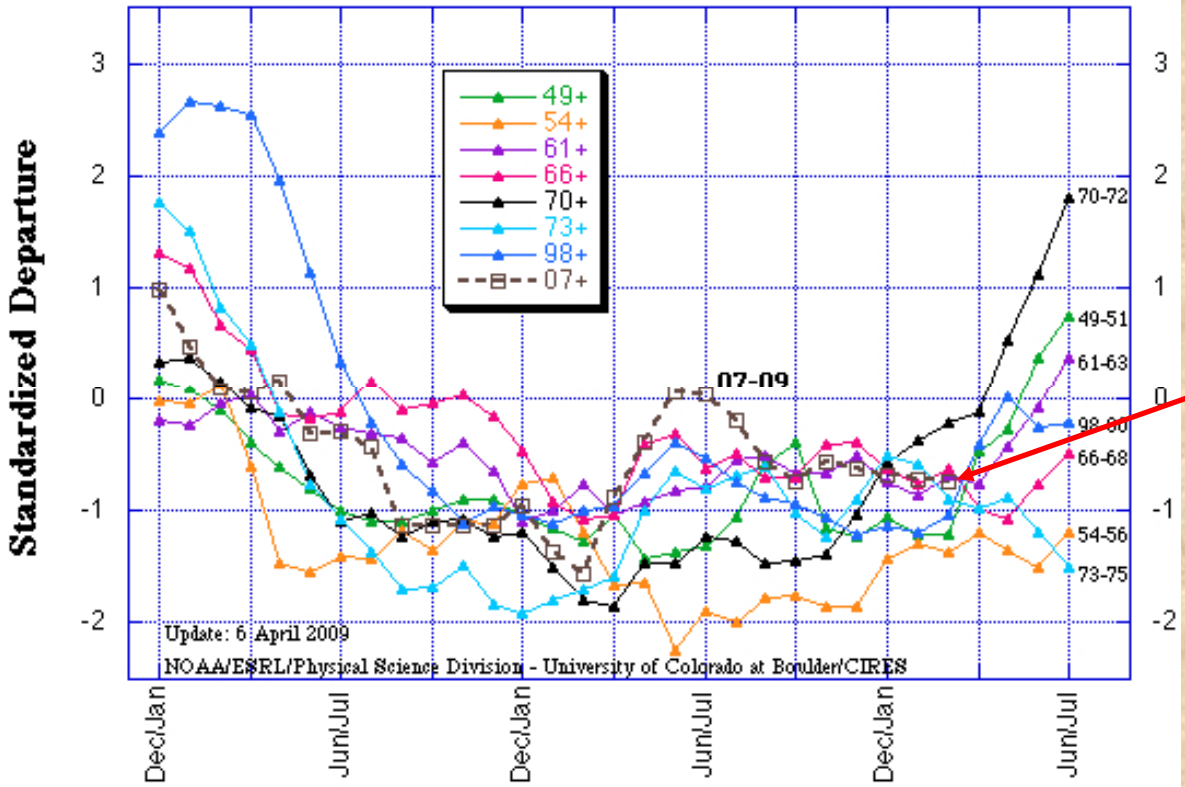
- **La Niña: Going on a Summer Vacation?!**
- **Turnaround month & expectations for next few weeks**
- **Fading La Niña/continued negative PDO scenario**
- **Experimental forecast guidance for April - June 2009**
- **CPC forecasts for May - August 2009**



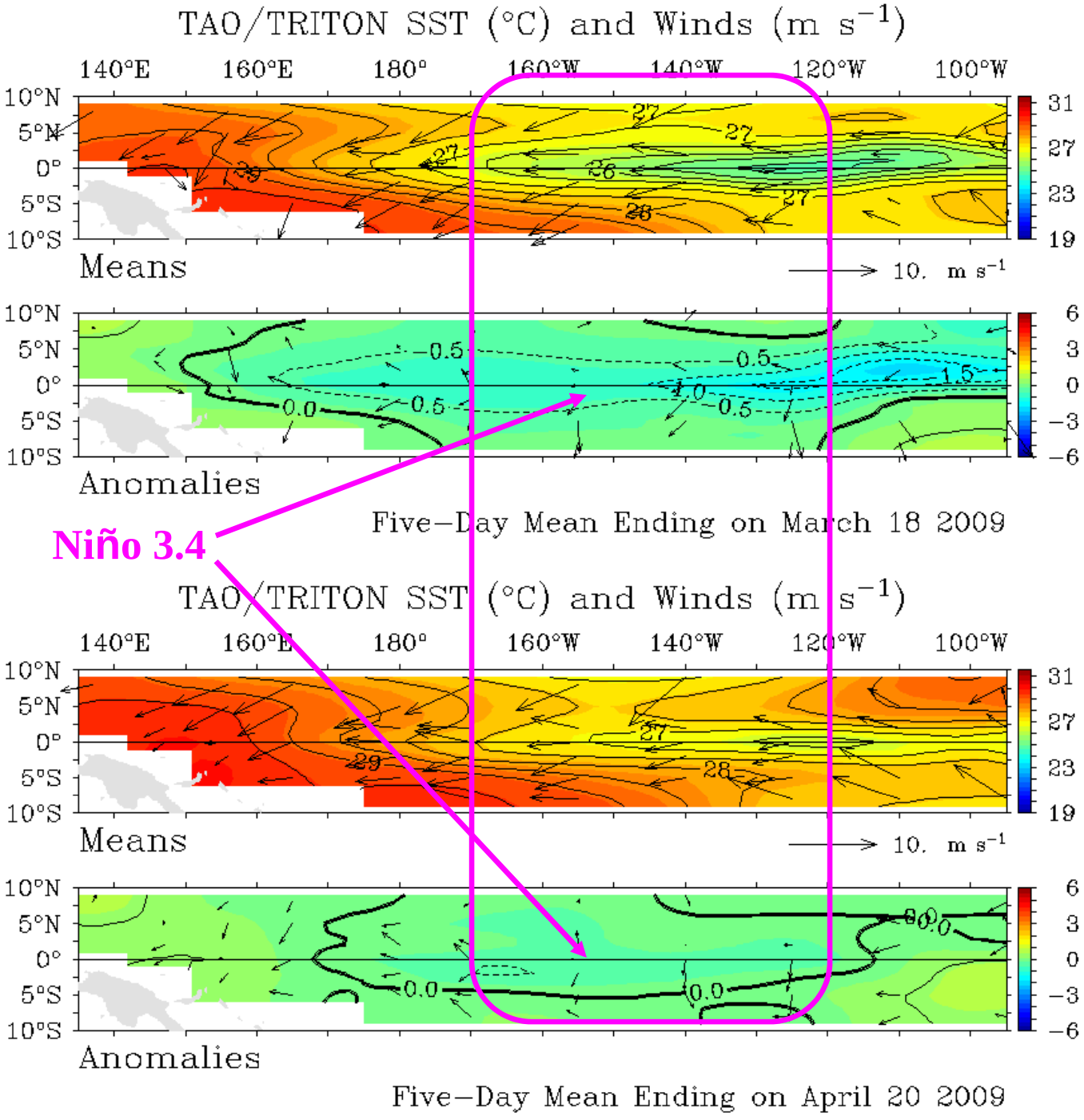
Multivariate ENSO Index (MEI) for 7 long-lasting La Niña events since 1949 vs. recent conditions



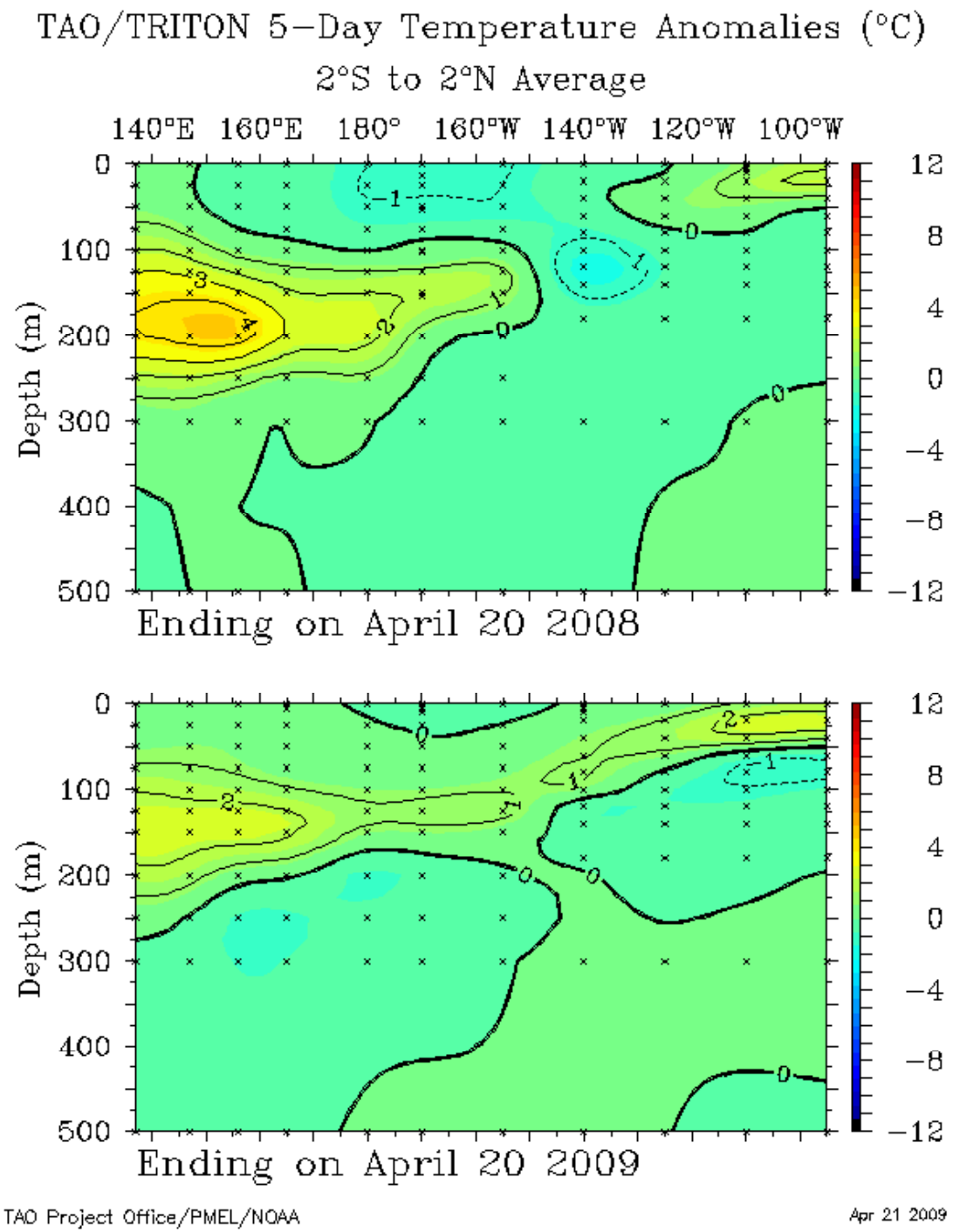
From 3rd strongest La Niña since 1950 (Feb-Mar'08) to above-normal in three months, and back to weak La Niña conditions - with little apparent change for Feb-Mar 2009.

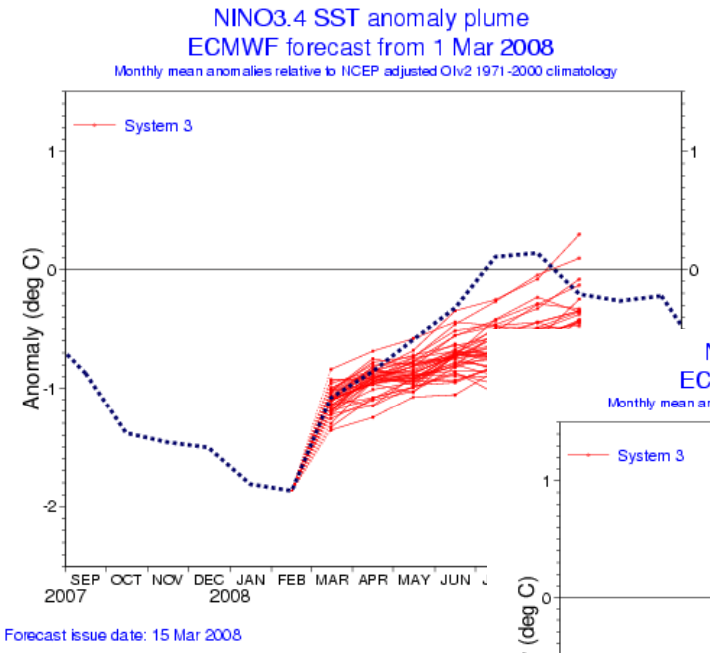
Multi-year La Niñas tend to occur during negative PDO runs.

Current state of ENSO (bottom) compared to last month (top): what a difference a month can make! While SST anomalies have collapsed, wind anomalies are fairly weak from the east, keeping all options on the table… Will there be a third La Niña winter or is this event over for good?

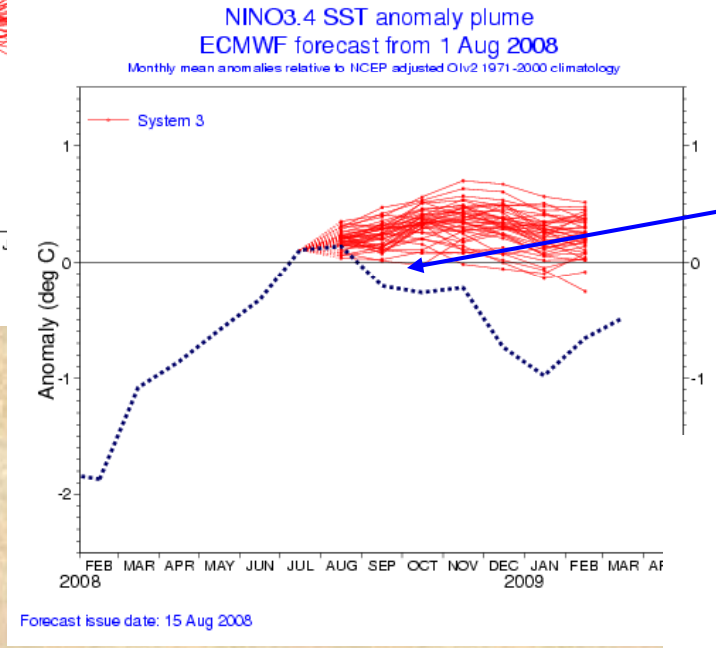


Current state of ENSO (bottom) compared to last year (top): this cross-section comparison shows a lot of similarities to last year, when the tropical Pacific was poised for a 'summer vacation' from La Niña!



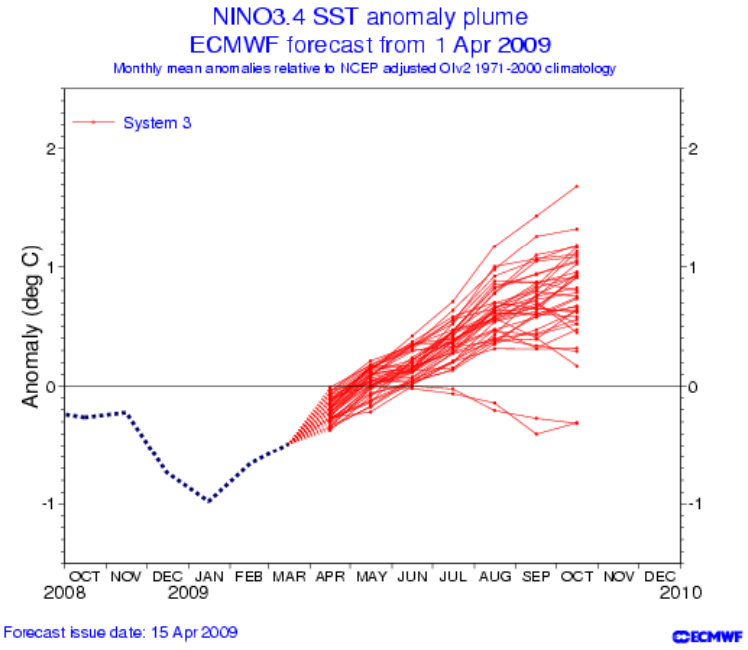


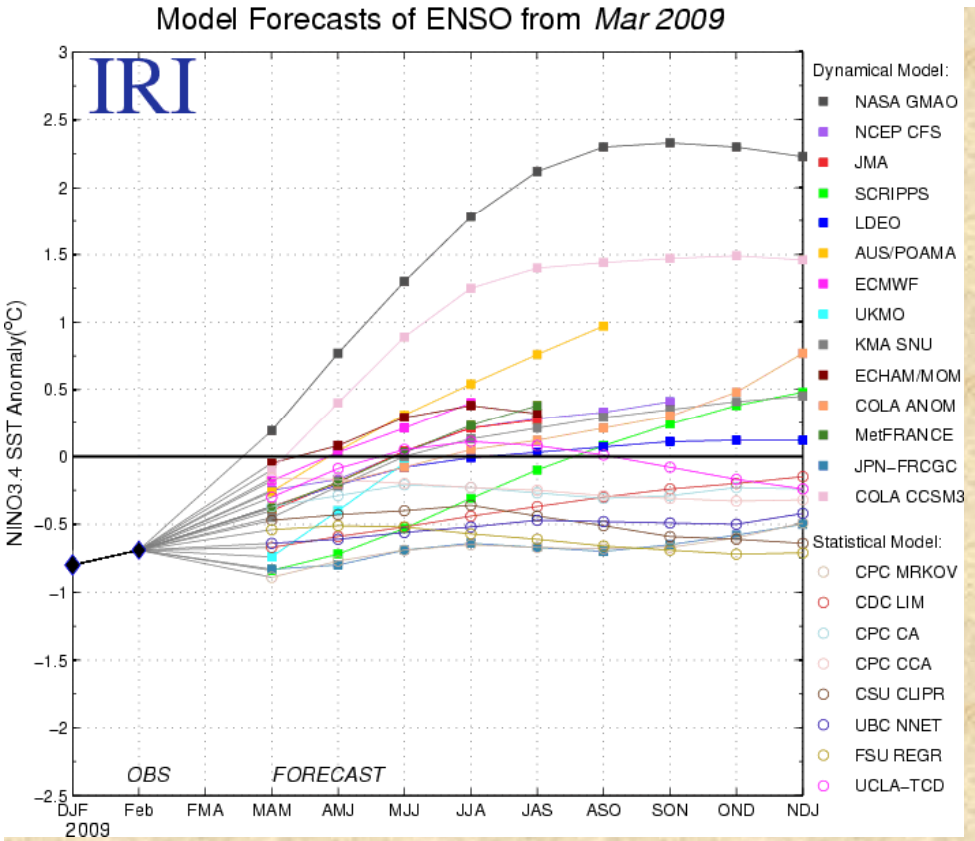
The European model's March '08 forecast (left) anticipated weakening La Niña conditions by mid-2008, a tad slow compared to the verification;



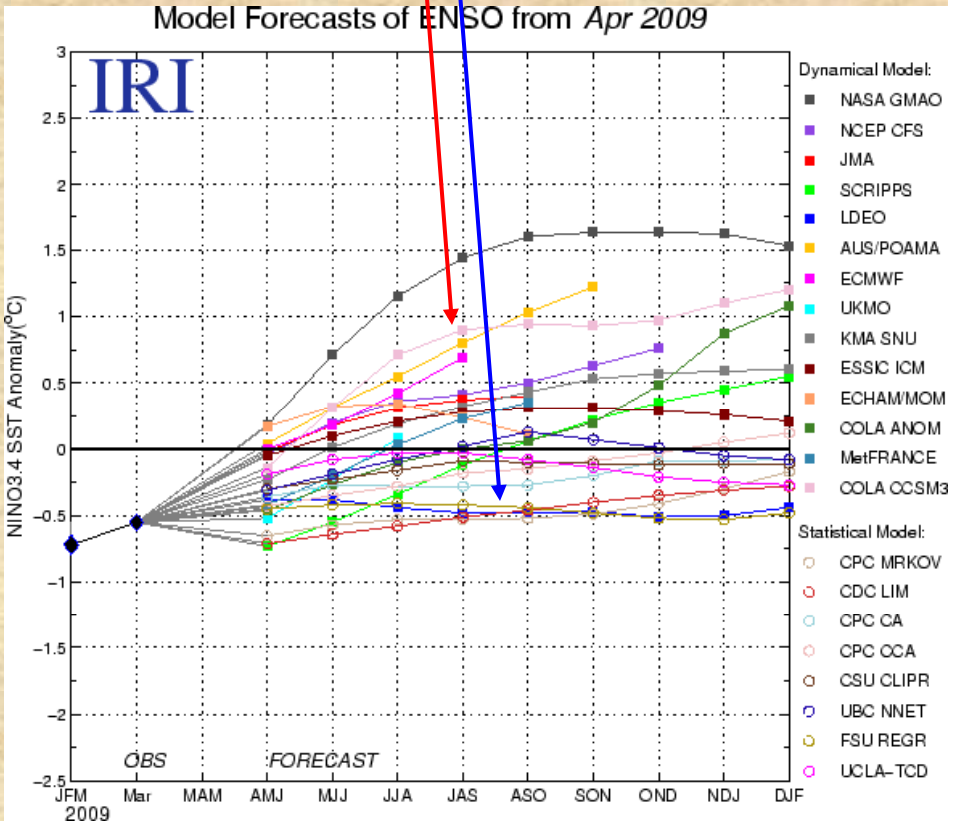
August was the last month with a 'bullish' (El Niño-like) forecast (left); by September, sea surface temperatures dropped below the forecast range already - highly unusual!

A more serious temperature drop commenced in November, and hit bottom near -1°C (moderate La Niña) in January. The most recent forecast (right) is adamant about a return to above-normal by July, with only 2 dissenters out of 50.



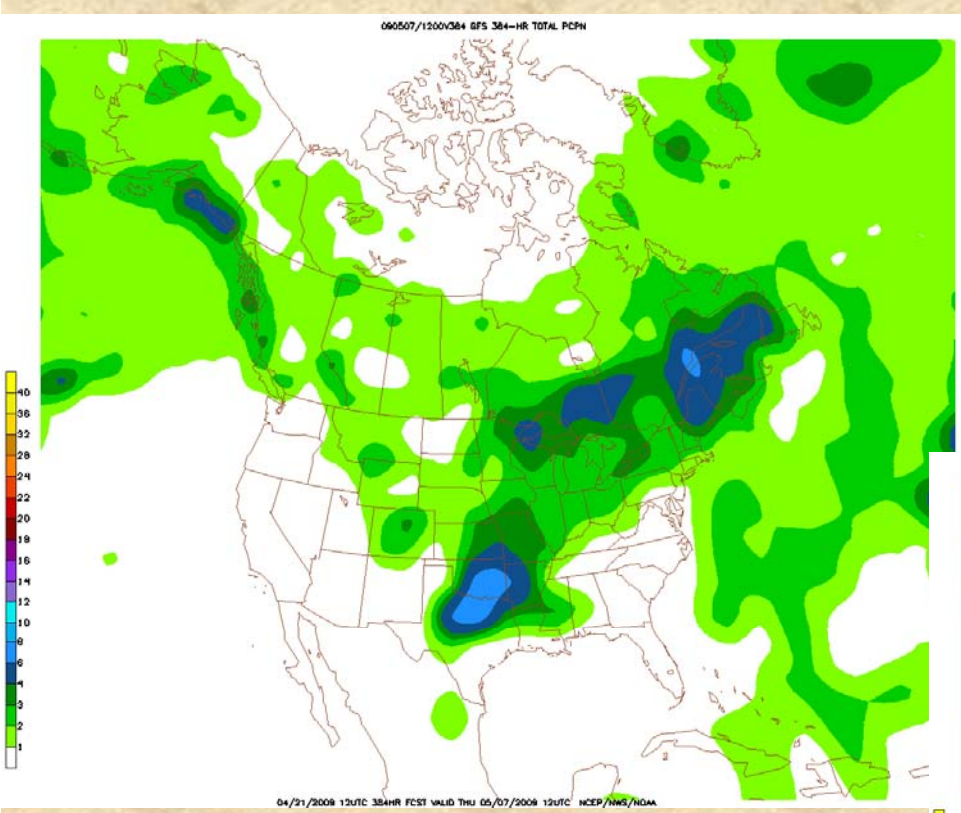


Latest ENSO forecasts from almost two dozen dynamical & statistical forecast models (below) vs. last month (left). All but one dynamic models show at least ENSO-neutral or even El Niño by summer, while most statistical models stay colder, if not as extreme as last month.

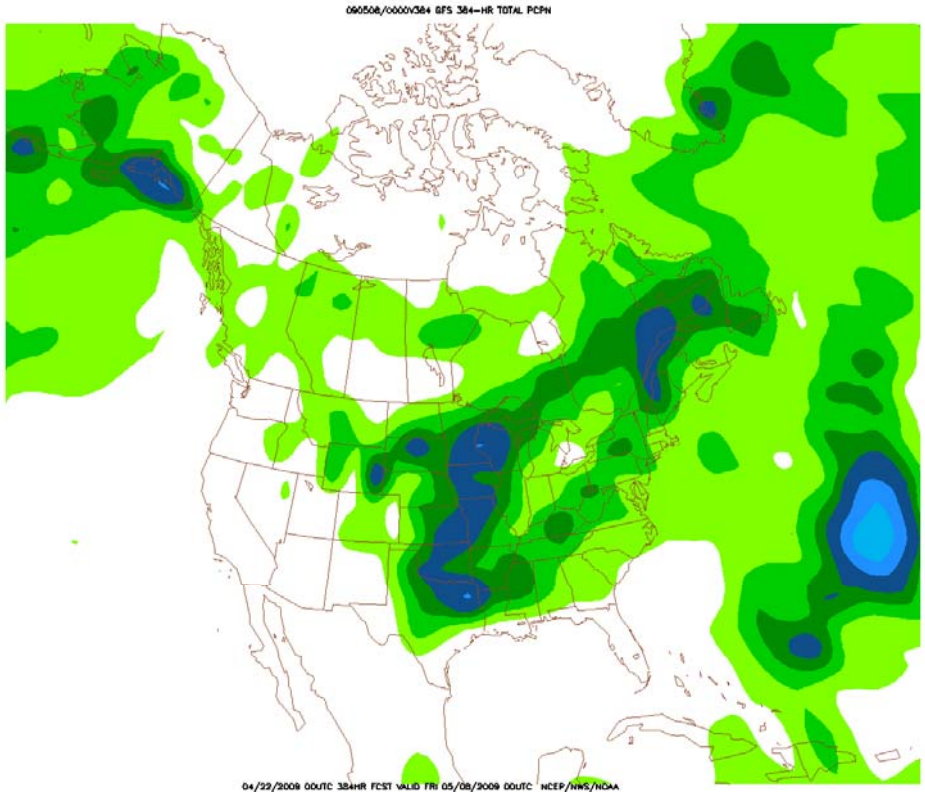


Historically, La Niña events of the recent magnitude have had a tendency to continue for three years (54-57; 73-76; 98-01), much more so than El Niños. Mean PDO values in '56: -1.8; '75: -1.0; 2000: -0.6. So far in 2009: below -1.4!

What can we expect in the next two weeks?

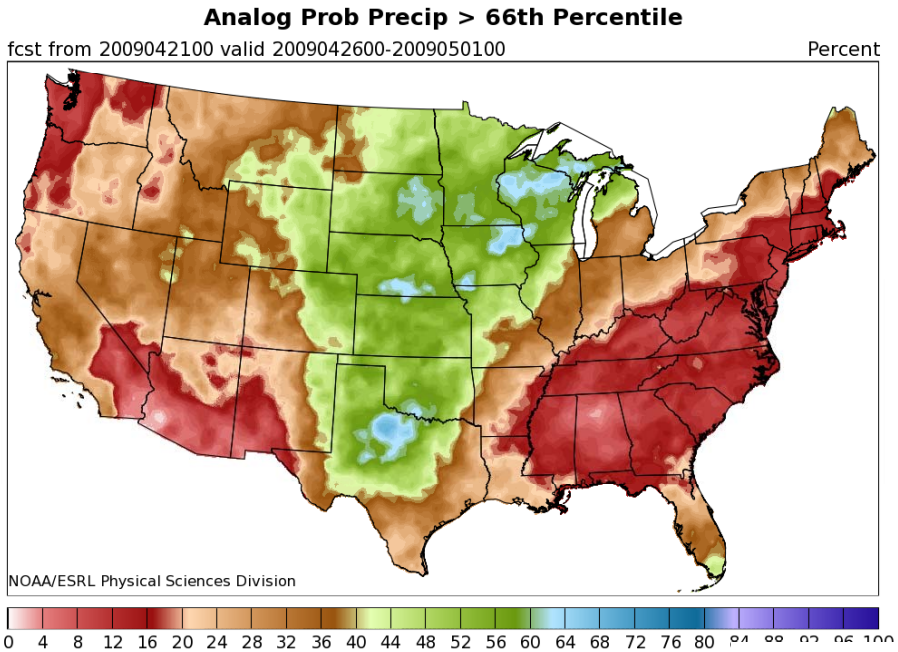


Looks like Colorado remains 'under the gun' - addressing drought and flood concerns jointly appears to be more appropriate this spring than many others - especially in the Front Range…

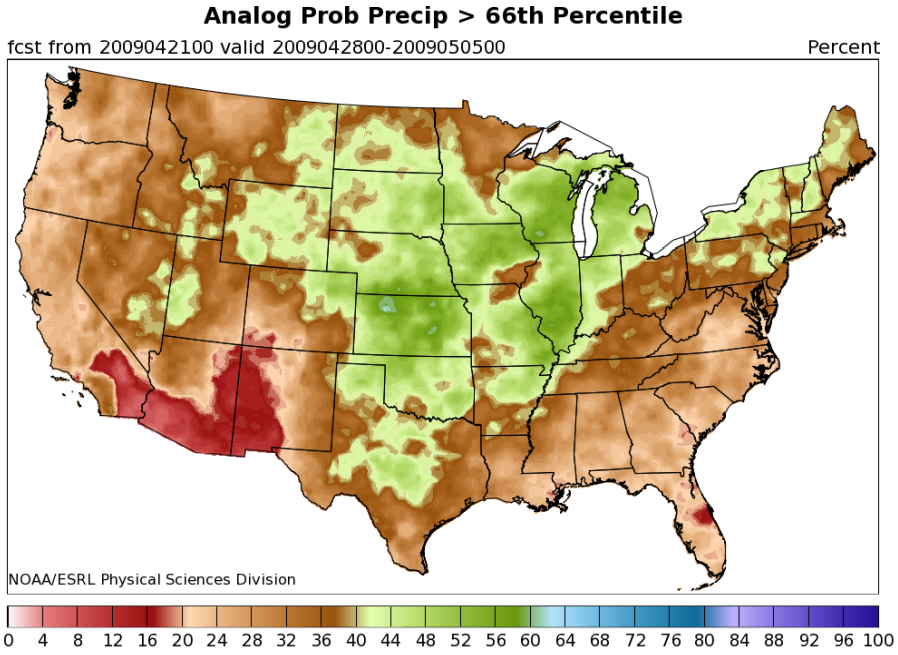


Yesterday's GFS control-run (top) generated up to 3" for us, while last night's run (right) shifted this bull's eye into SE Wyoming (with more than 1" remaining 'on the table' from storms ending in the middle of next week). Two weeks ago, this model was showing similar wobbles for the 16-day forecast period…

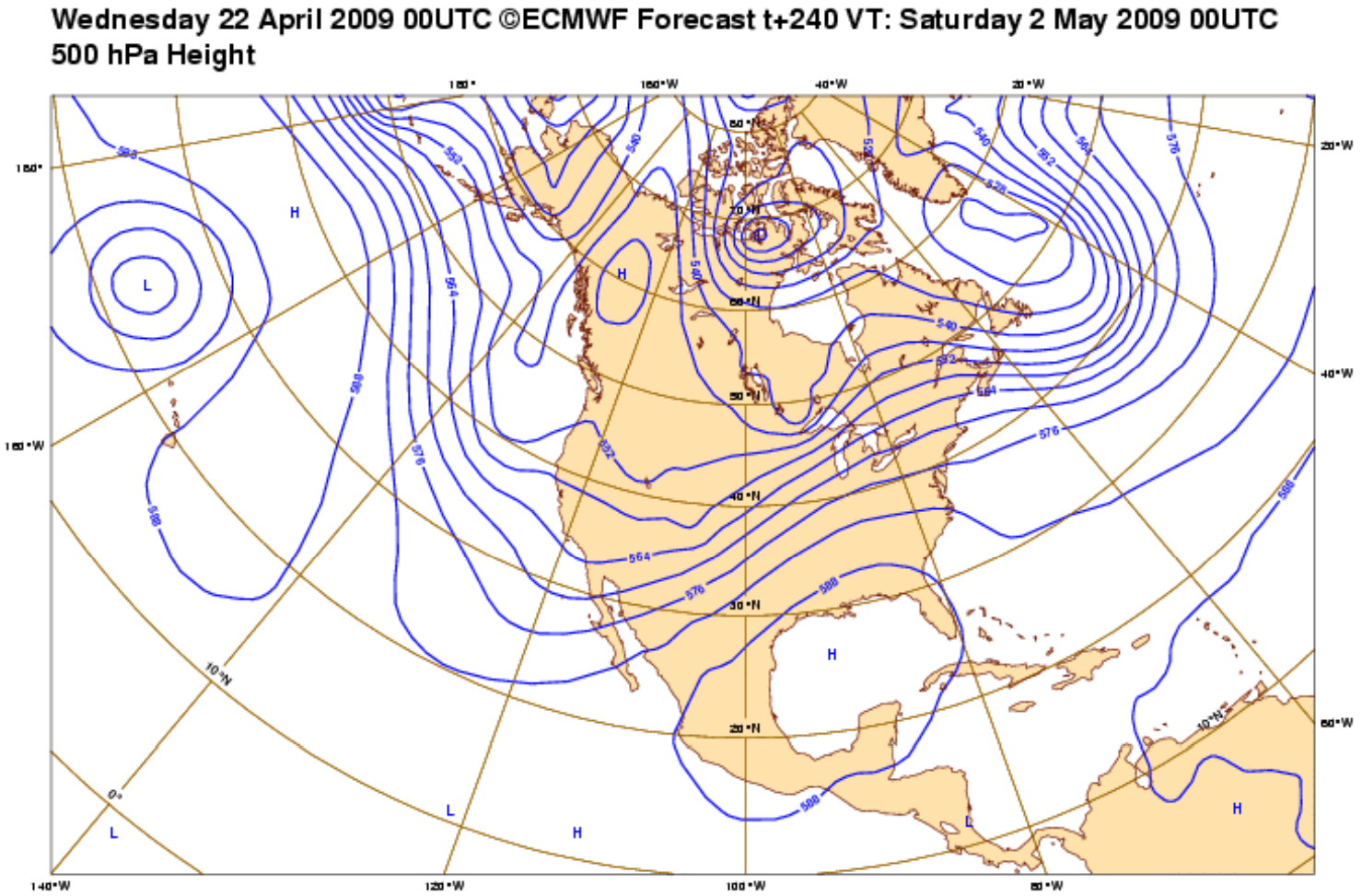
What can we expect in the next two weeks?



The next storm for Colorado should arrive by the weekend…

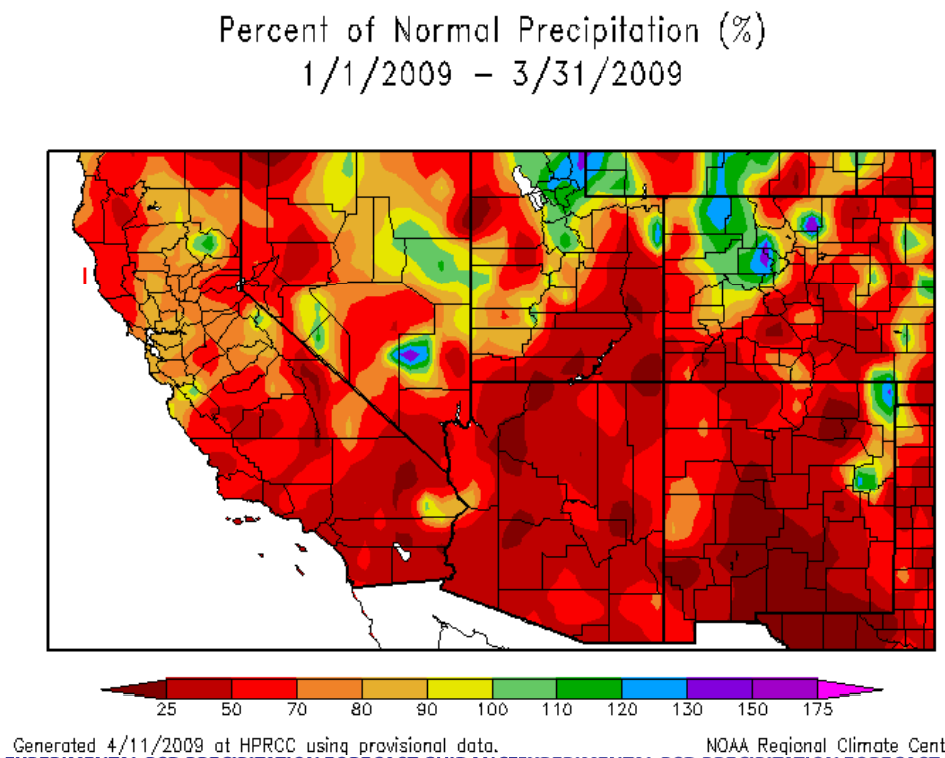


Mid-term?

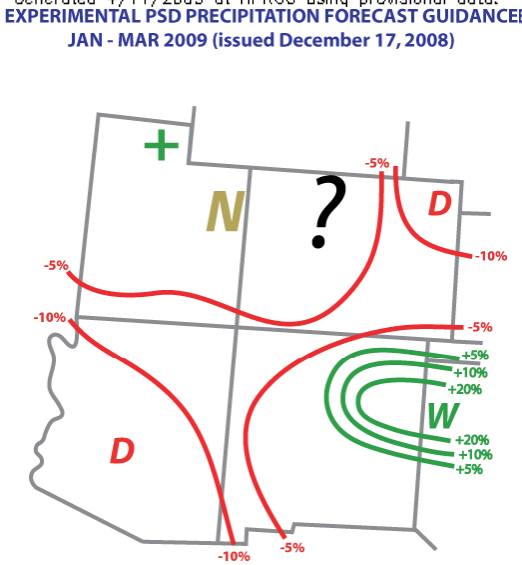


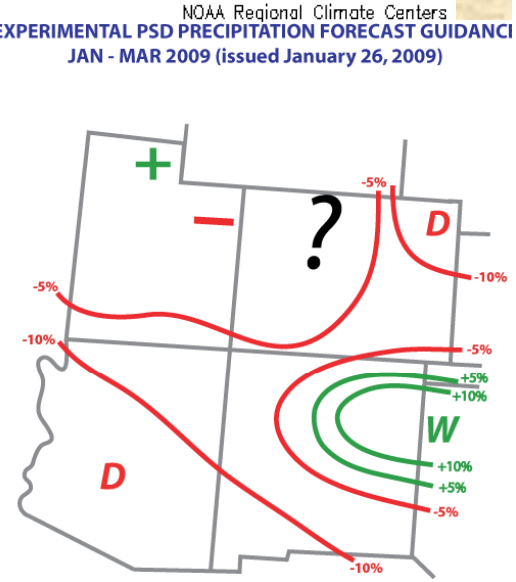
This weekend's return to unsettled weather for much of next week will be anchored by troughing aloft over the western U.S., which should be good for much slower melting in the mountains, and may still allow for one or two late winter storms around here.

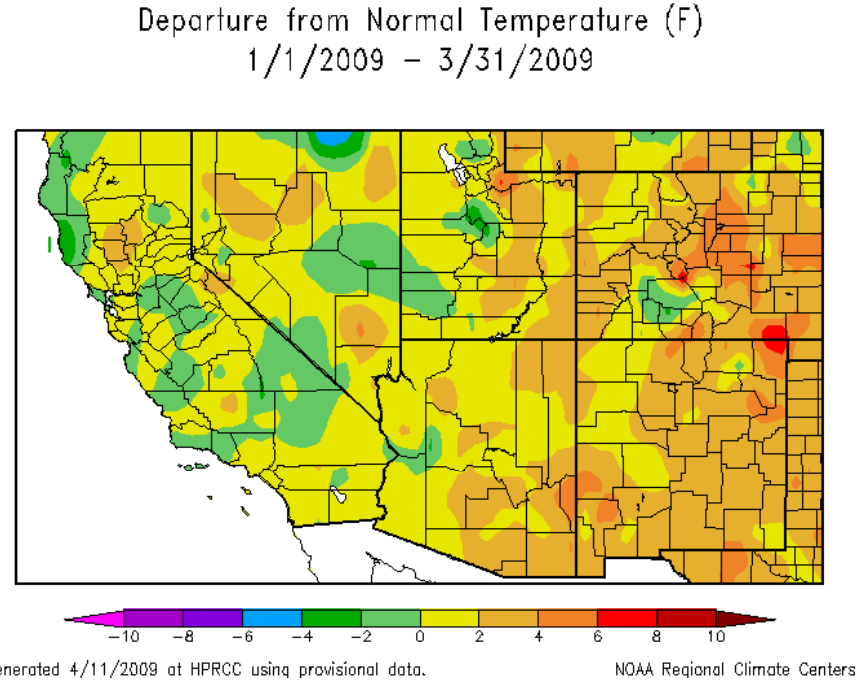
What has happened so far in 2009?



Our northern mountains (and northern Utah) have received decent moisture for Jan-Mar (left), while the rest of CO, UT, AZ, and NM have been dry. Except for NM, this is fairly consistent with my forecasts (bottom left). ***During the same period, it has not nearly been as cold (below) as last year, with frequent Chinooks to keep us 'warm' in the Front Range and wiping out our snowcover below ~9K.***







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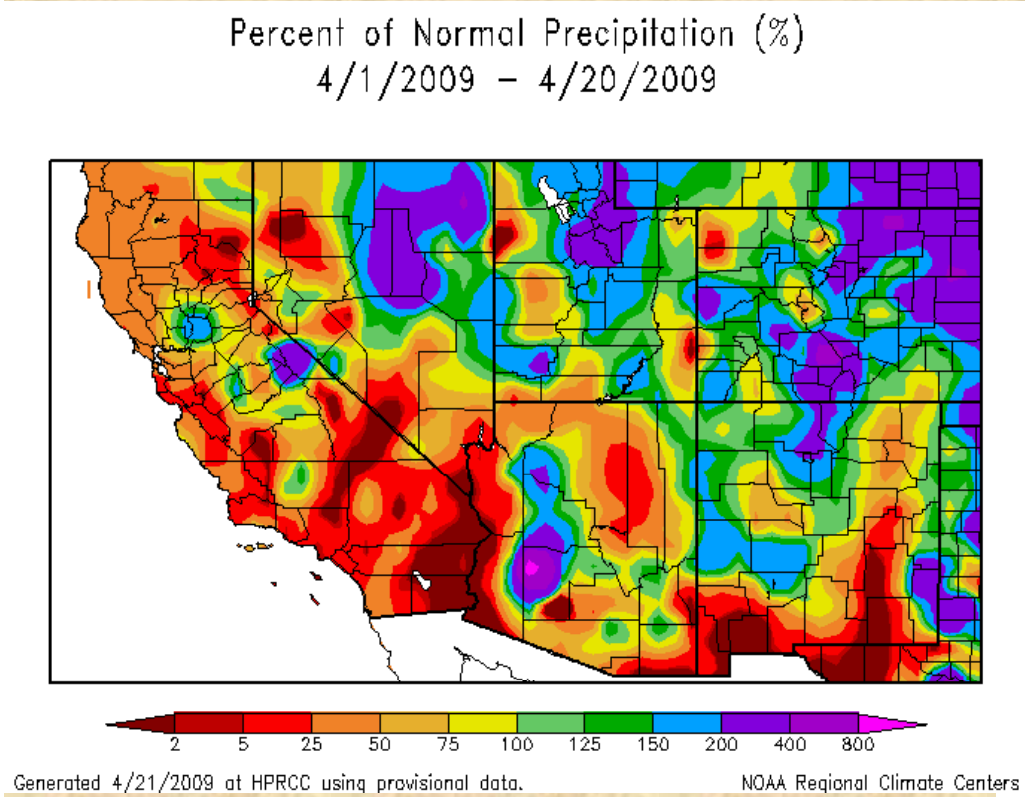
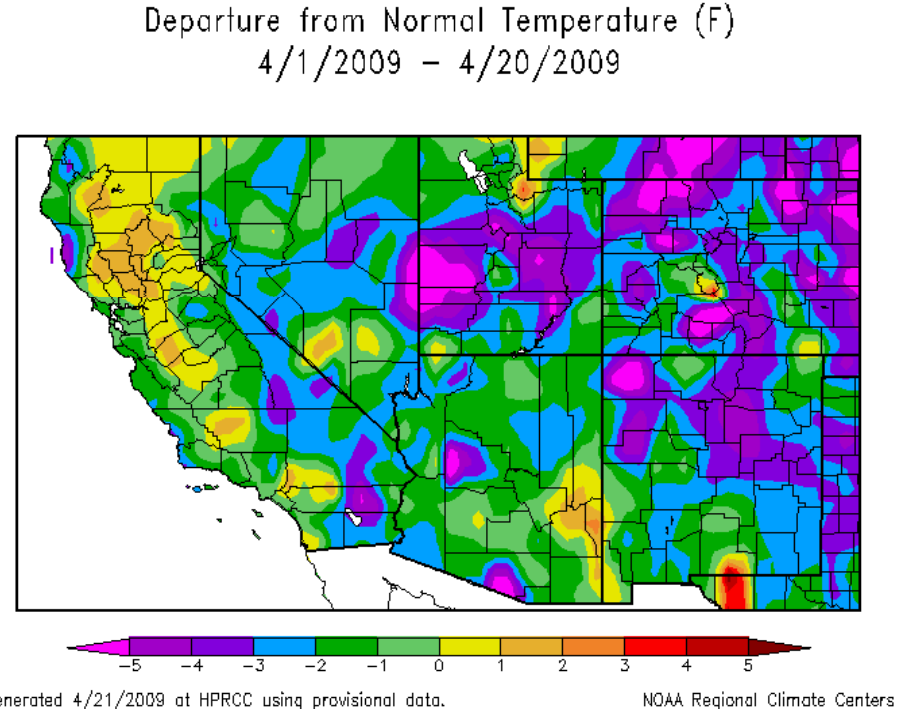
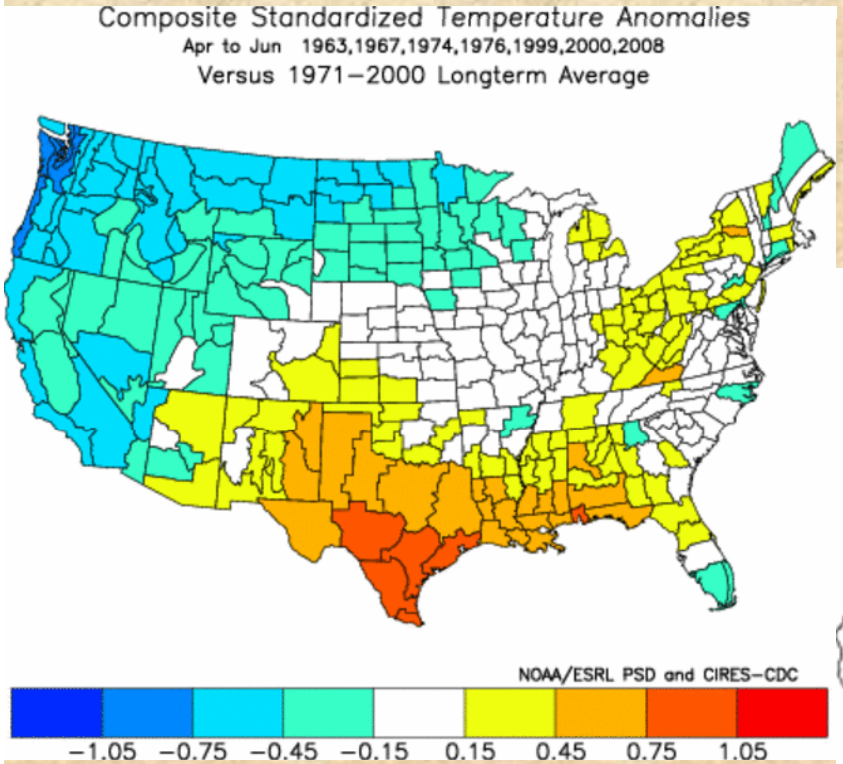


Ever since late March, we have seen a parade of storms 'march through' the Western U.S., crowned by the weekend storm that blasted us long enough to invoke memories of March 2003 (~2/3 of duration and amounts). This week's 'heat wave' has initiated green-up in the plains, and heavy runoff below about 9K.

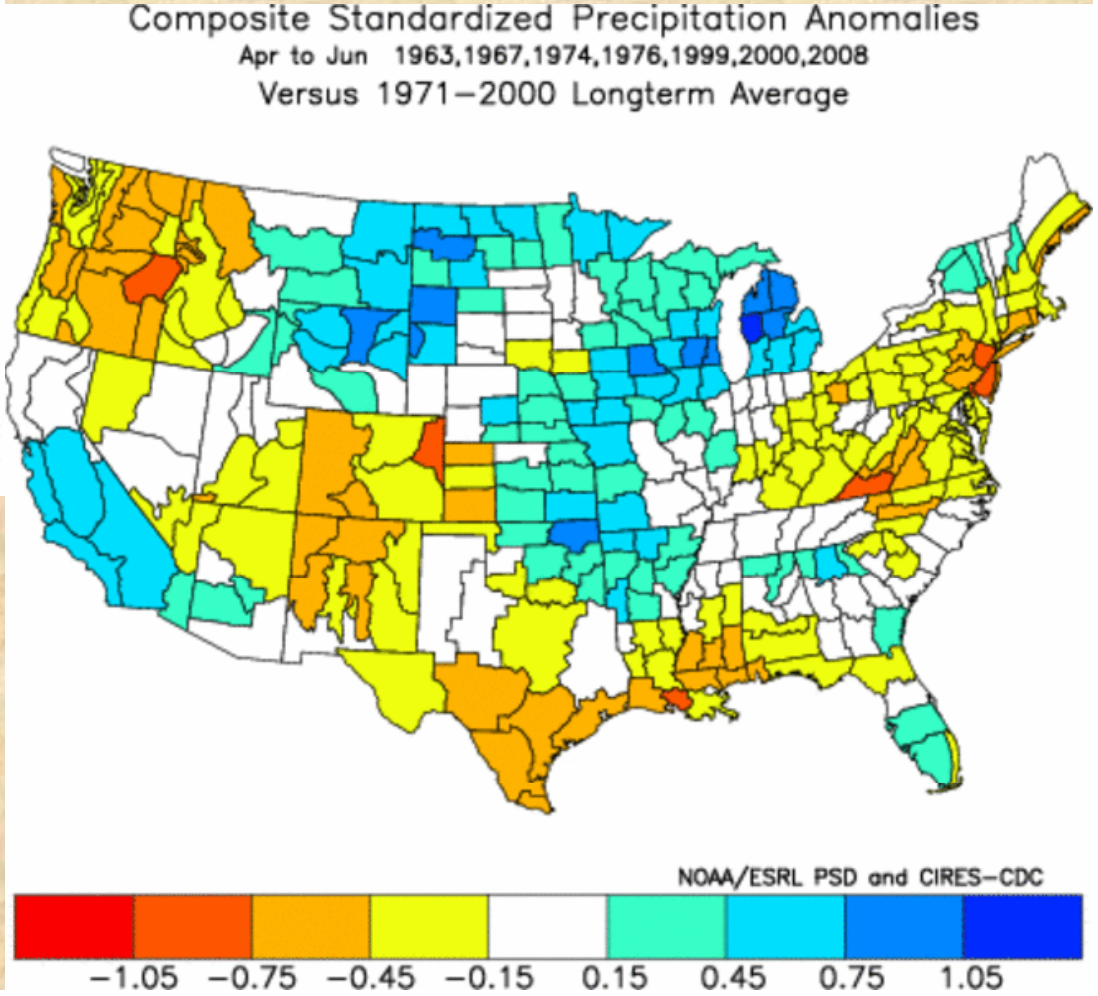


I remarked last month that Colorado has not shown a clear preference for either wet or dry in La Niña Aprils (in contrast with typically dry Marches and/or May/June) - looks like Mother Nature played her hand well!

What are typical temp&precip patterns in April-June with fading La Niña during negative PDO?

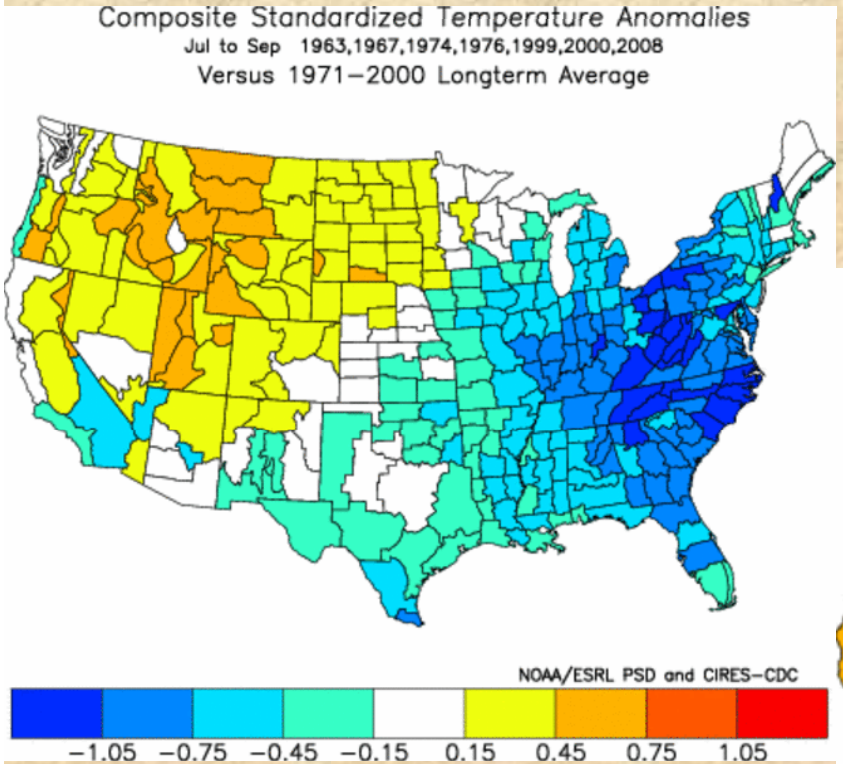


Significant temperature anomalies (left) over coastal PNW for cold, and Texas for warmth.

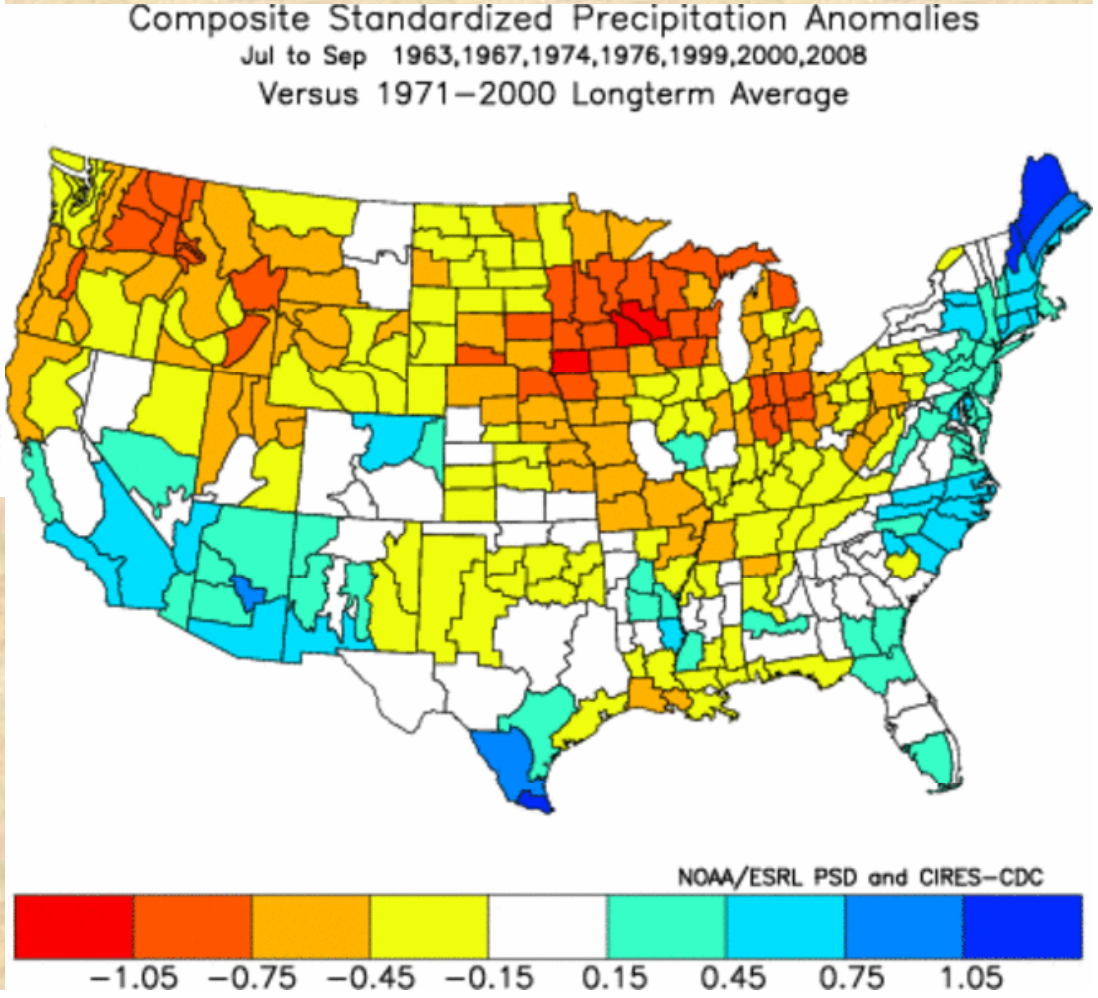


Significant precipitation anomalies (right) over WY, Upper Midwest, and parts of OK for wetness, while significant dry anomalies stick to just a few climate divisions (unfortunately including easternmost Colorado, part of an overall dry composite for our state).

What are typical temp&precip patterns in April-June with fading La Niña during negative PDO?

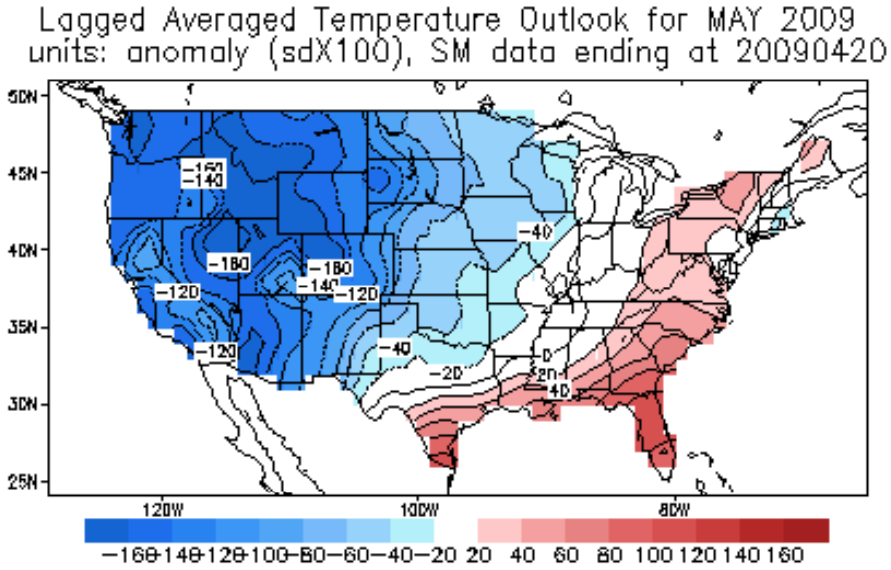


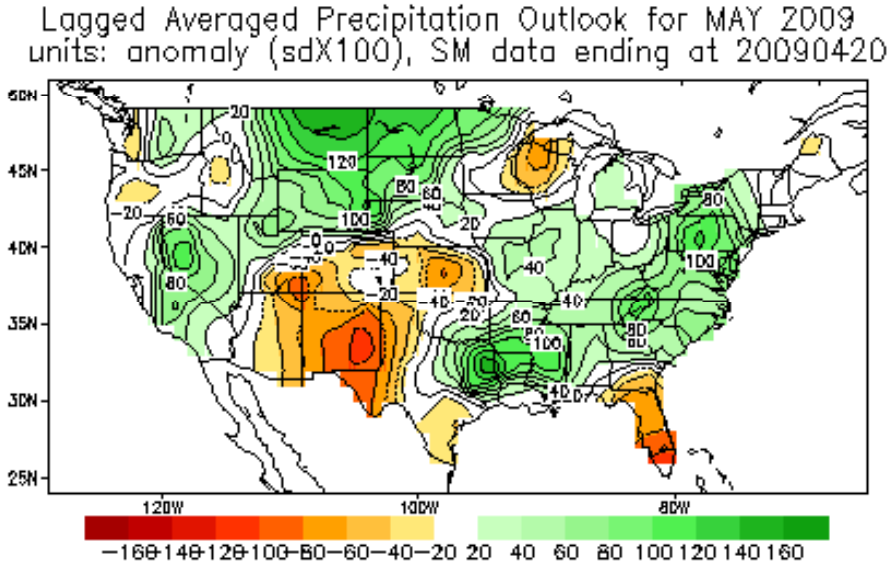
Significant temperature anomalies (left) over much of eastern states for cold, and nothing for warmth.

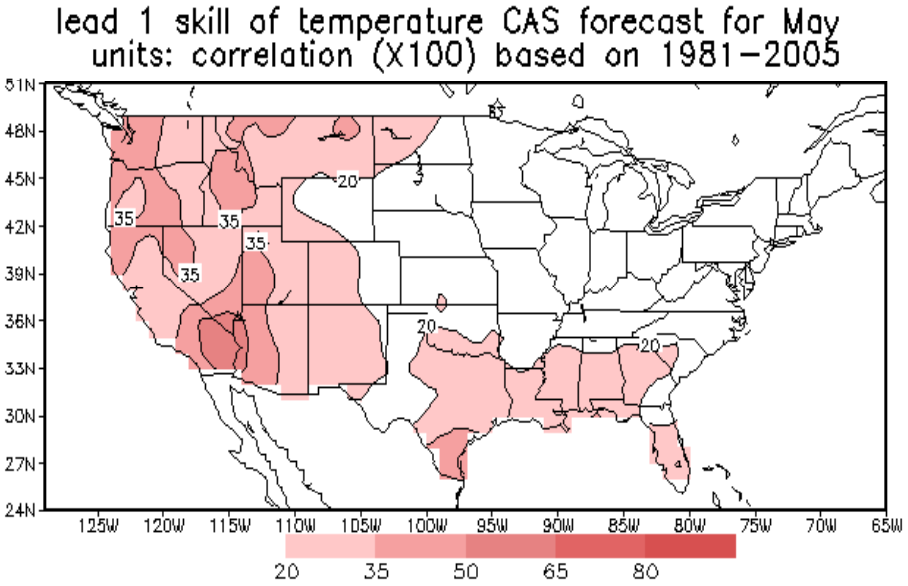


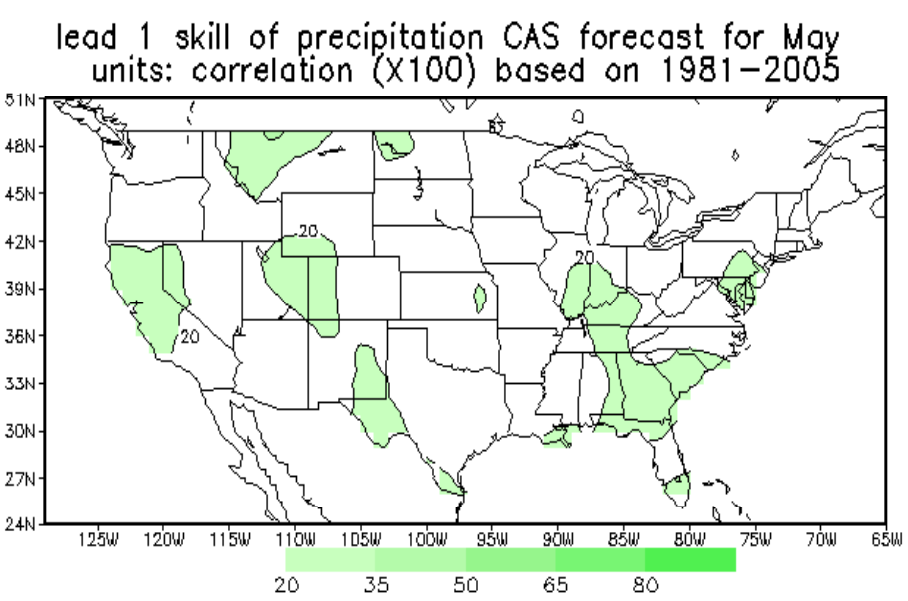
Significant precipitation anomalies (right) over southcentral AZ, southern TX, and ME for wetness, while significant dry anomalies are found from PNW and Upper Midwest. Colorado's odds are close to even, with a moderate preference for a wet late summer in the South Platte basin.

What about 'Constructed Analog' Forecasts?



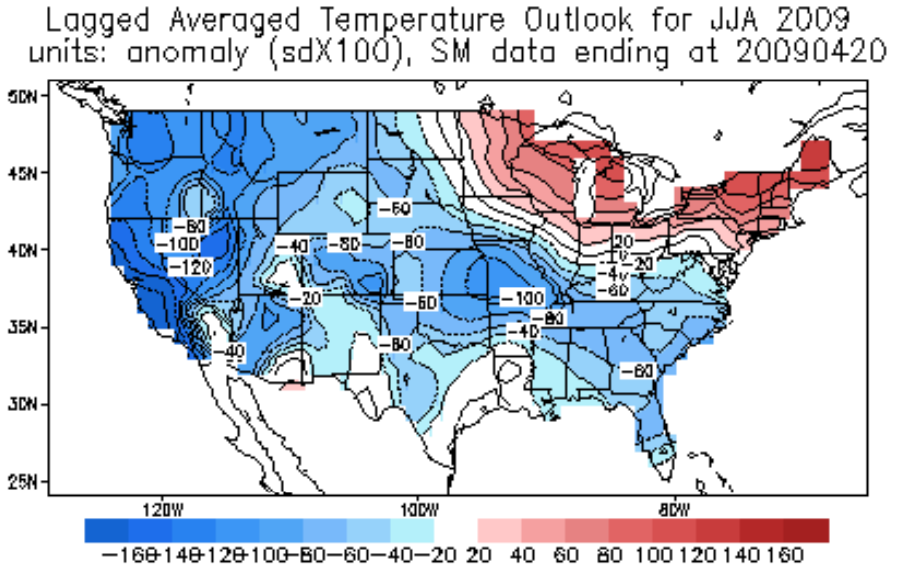


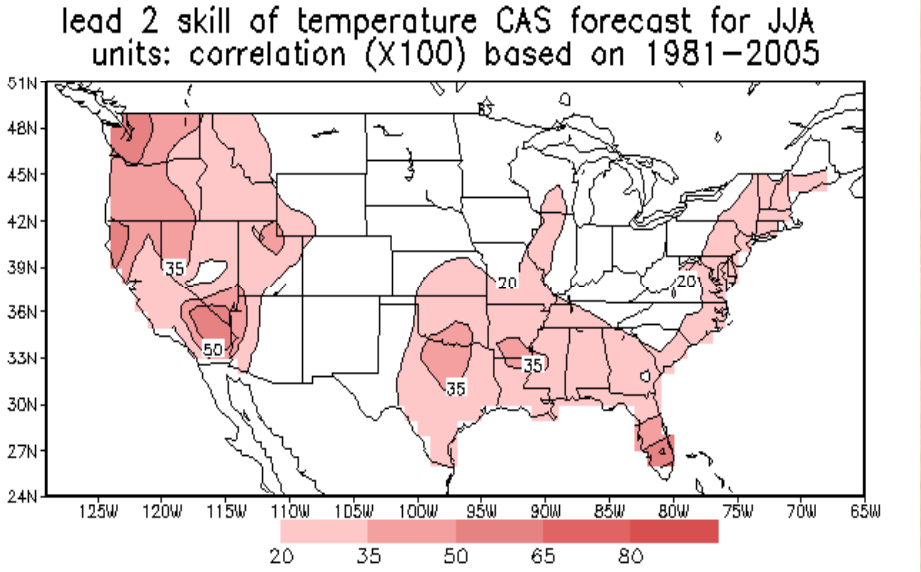


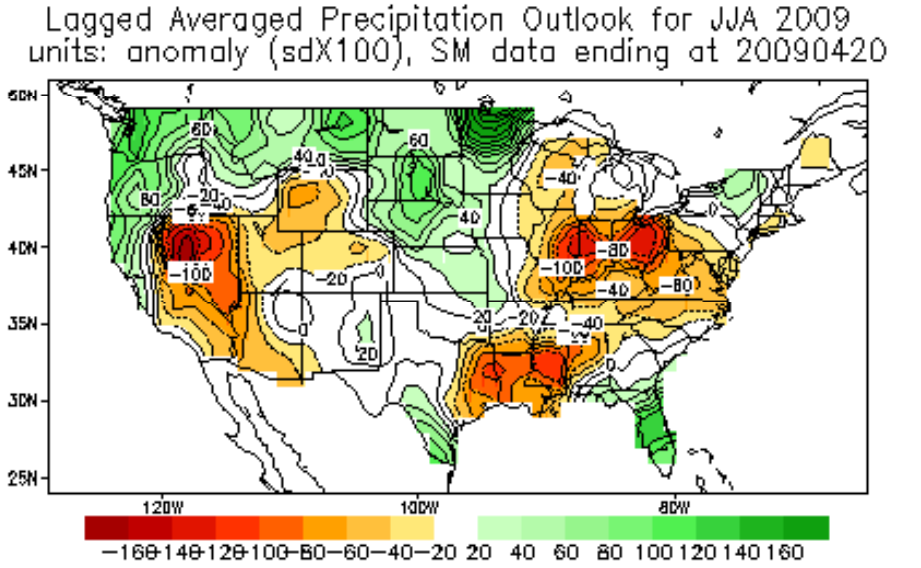


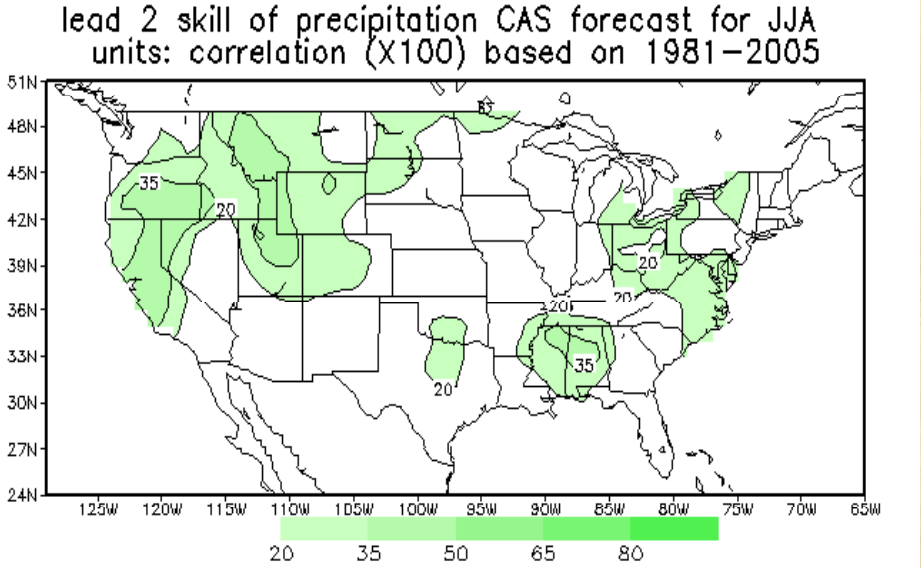
May forecasts have shown skill near the Four Corners, where an odd combo of cold & dry is predicted!

What about 'Constructed Analog' Forecasts?



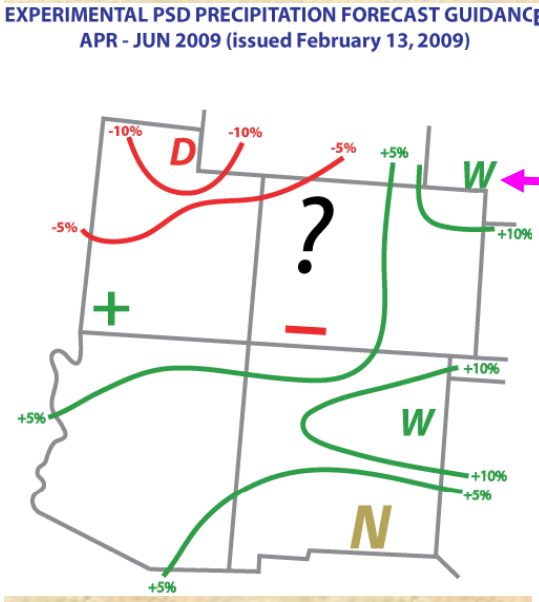


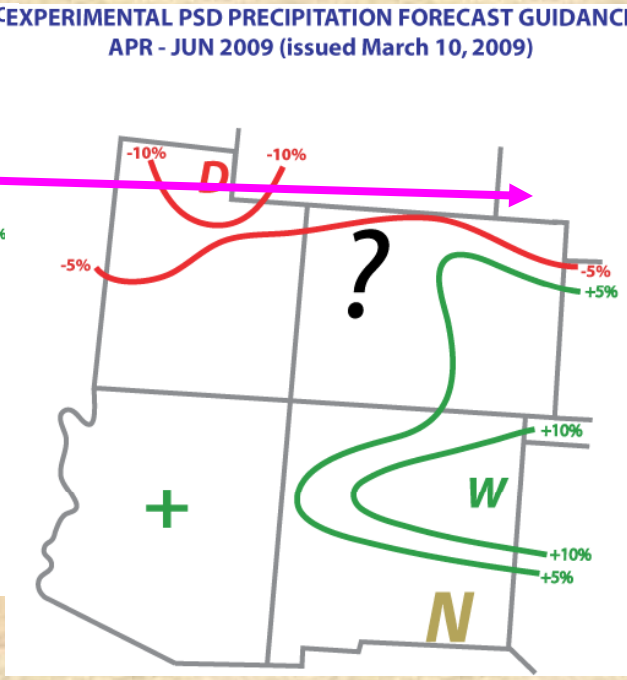


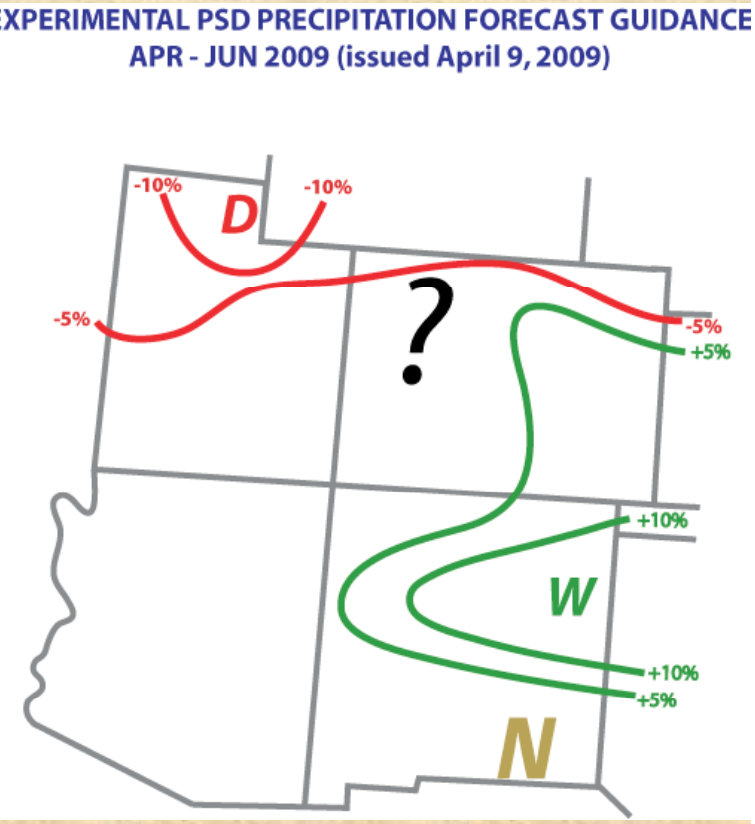


Dry June-August forecasts in CO&UT have skill, unfortunately!

Experimental CDC "Forecast Guidance"



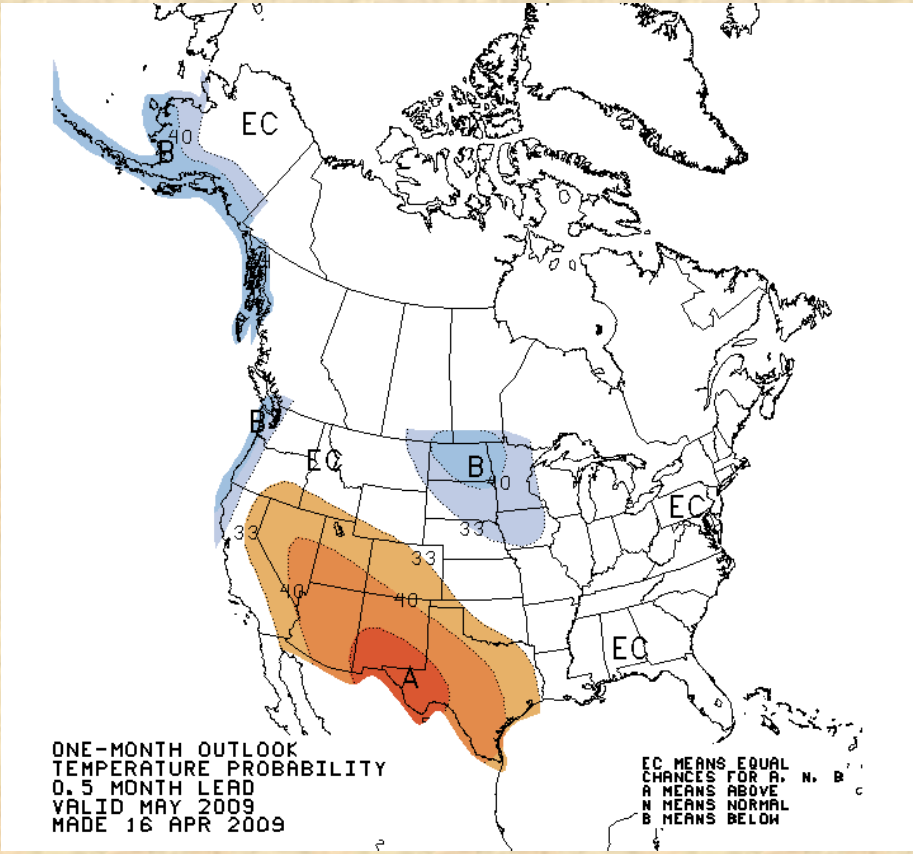


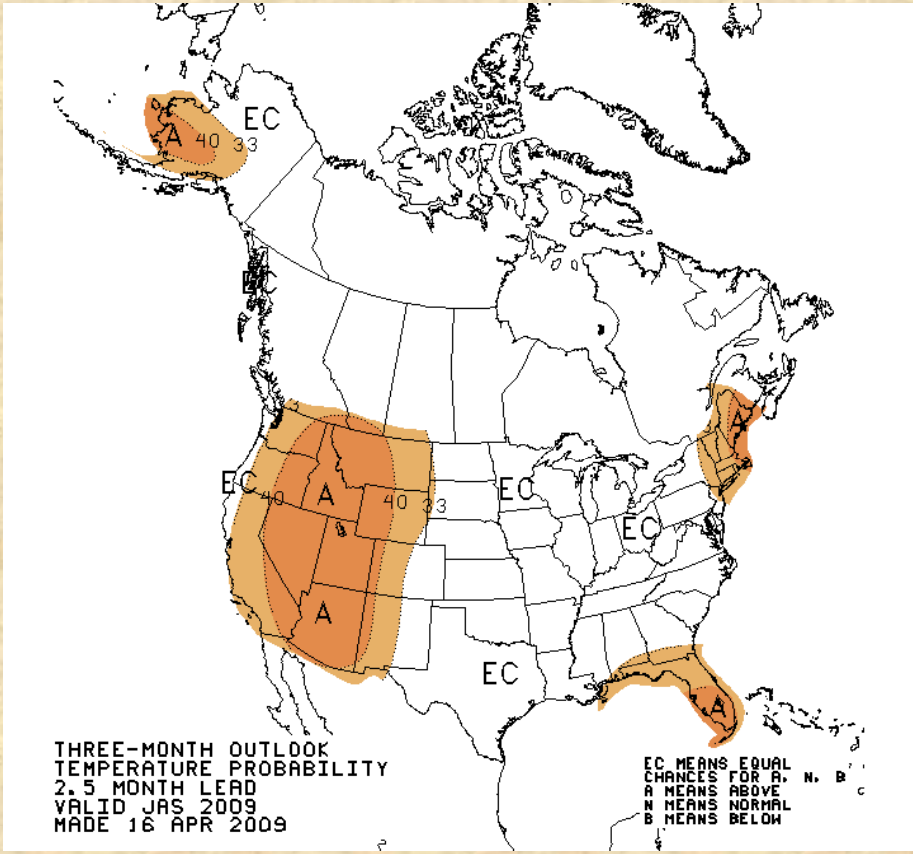


My late spring forecasts issued this year (most recent one on right) are fairly consistent with each other, anticipating a wet spring over much of Colorado's eastern plains, an undecided outcome west of the divide, and a dry spring to the north (big drop in tilt since last month over NE CO). Unfortunately, skill levels for both maps are lowest over wet regions/highest for the dry regions, which are also most consistent with lingering La Niña effects. *The only "wet" forecast supported by at least some skill in the last decade is the one for our eastern plains.*

Source: ***http://www.cdc.noaa.gov/people/klaus.wolter/SWcasts/***

CPC Temperature Forecasts

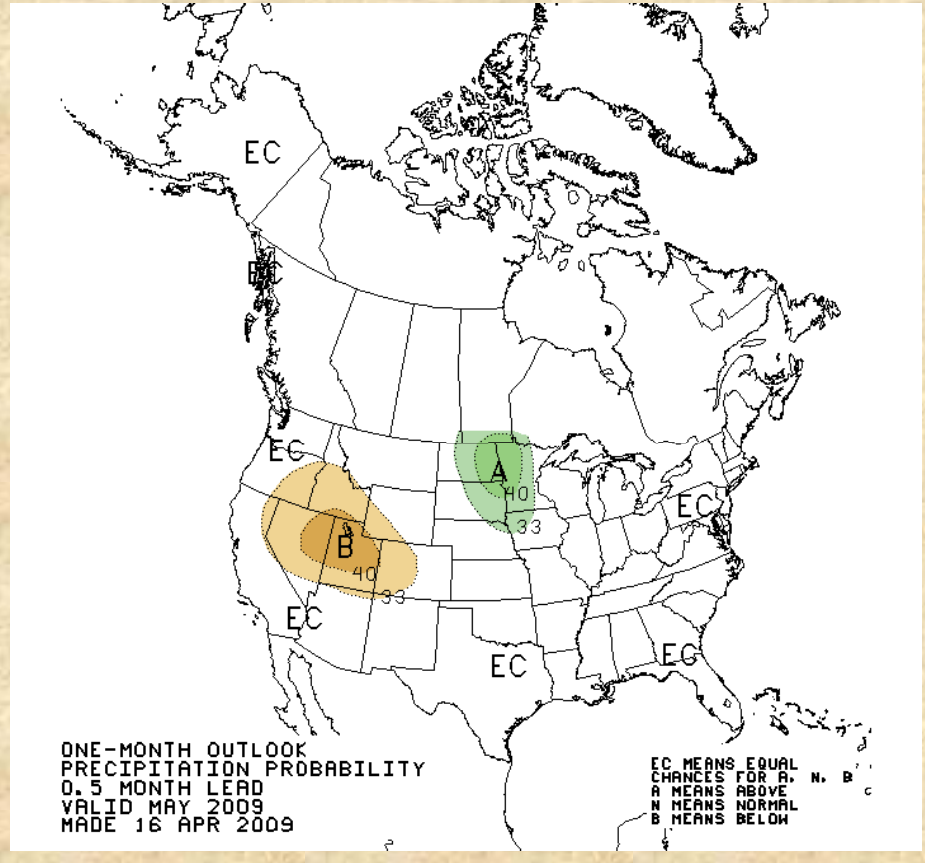


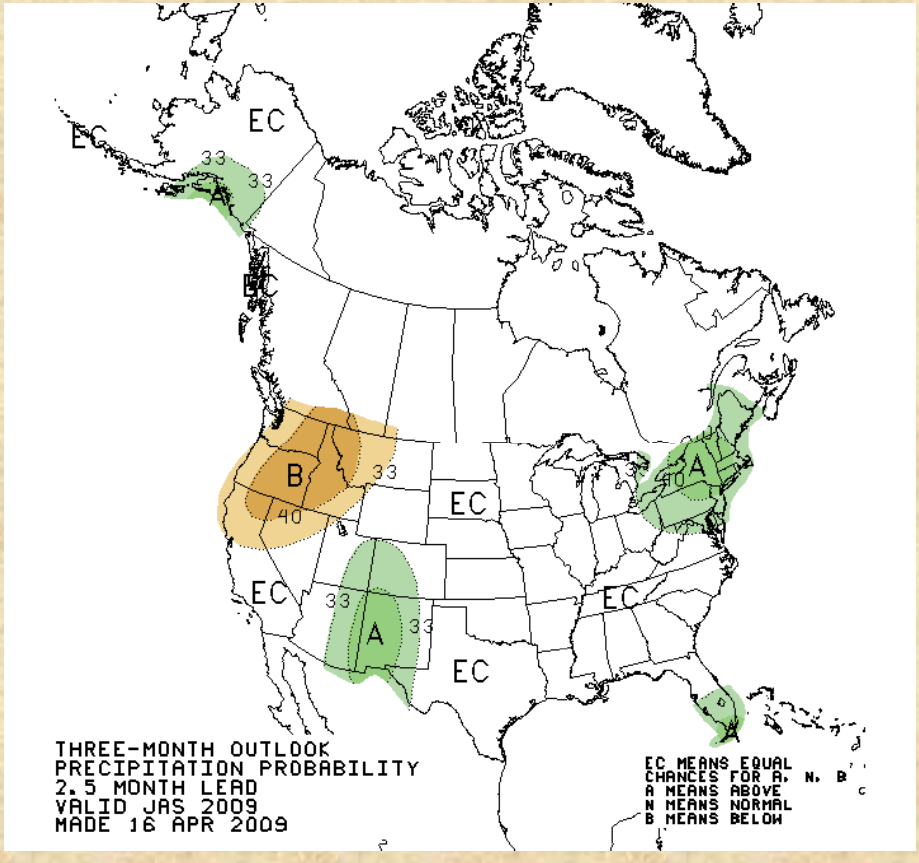


According to CPC's latest official forecasts from April, May (left) and July-September (right) temperature forecasts anticipate warmer-than-average conditions in most of Colorado, consistent with the long-term trend and lingering La Niña influences in the first month.

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

CPC Precipitation Forecasts





According to CPC's latest official forecasts from April, May (left) and July-September (right) precipitation forecasts start out on the dry side for us (mostly due to La Niña), and end up 'EC' (equal chances) or better in the summer (they remember the last one…)

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

Executive Summary (early version)

1. **During December 2008, weak-to-moderate La Niña conditions returned and influenced our weather right thru the winter. The recent weakening of this event is quite similar to last year's. Beyond the middle of 2009, there is large uncertainty as to whether La Niña returns or whether we see a switch to El Niño.**

2. **The last four weeks have seen above-normal moisture in much of Colorado, including the Front Range in particular. While not quite the turn-around of March 2003, this has significantly improved drought conditions, leading to local flooding due to rapid meltoff this week instead of an early fire season. This weekend should see a resumption of unsettled and cooler conditions.**

3. **My experimental forecast guidance for the late spring season (April-June 2009) reflects both lingering La Niña impacts (a dry forecast from northern Utah into northern Colorado), as well as the possibility of a return to near-normal ENSO conditions which would allow for a wetter-than-average season from Arizona to northeastern New Mexico and northward into southeastern Colorado.**

4. **Bottomline: The tropical Pacific is on a similar track as last year. As I wrote last month, even La Niña springs allow for occasional wet spells, in particular during April, while the season as a whole is more likely to end up on the dry side for much of the southwestern U.S. If the more 'bullish' models turn out correctly, we could see a switch to El Niño this summer that would bring more beneficial moisture to our state. Time will tell!**

Update by Friday: ***http://www.cdc.noaa.gov/people/klaus.wolter/SWcasts/***


Not quite the Front Range…