NOAA-CIRES Climate Diagnostics Center

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Western Water Assessment

Seasonal Outlook into mid-2009

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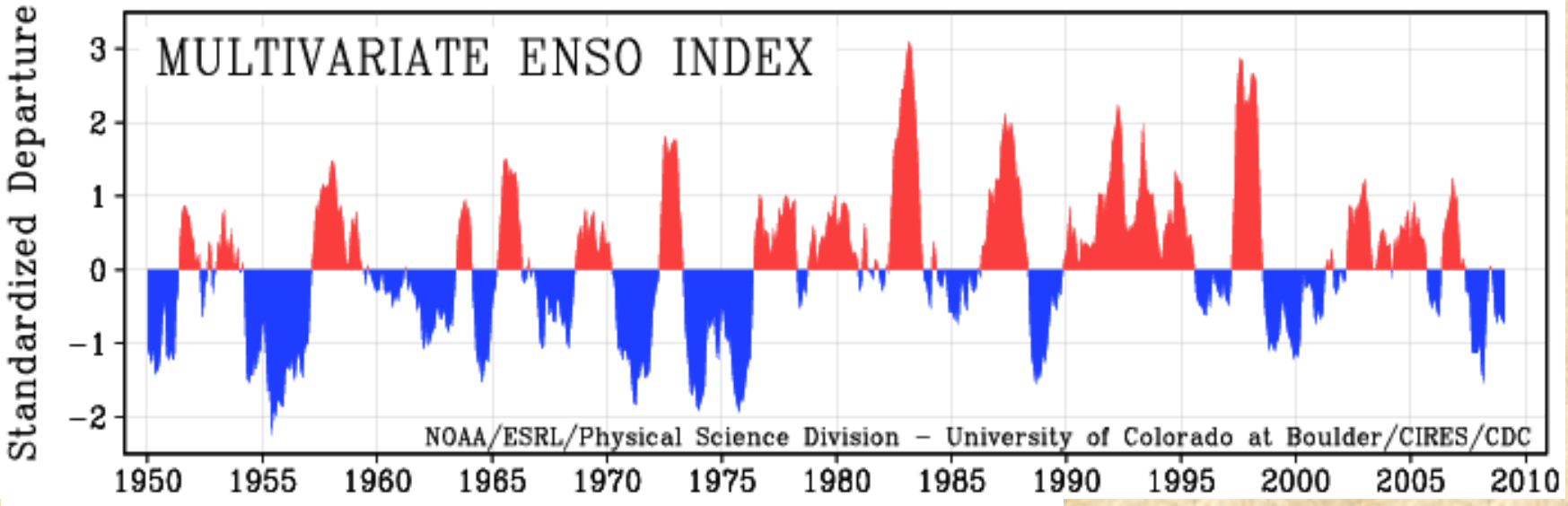
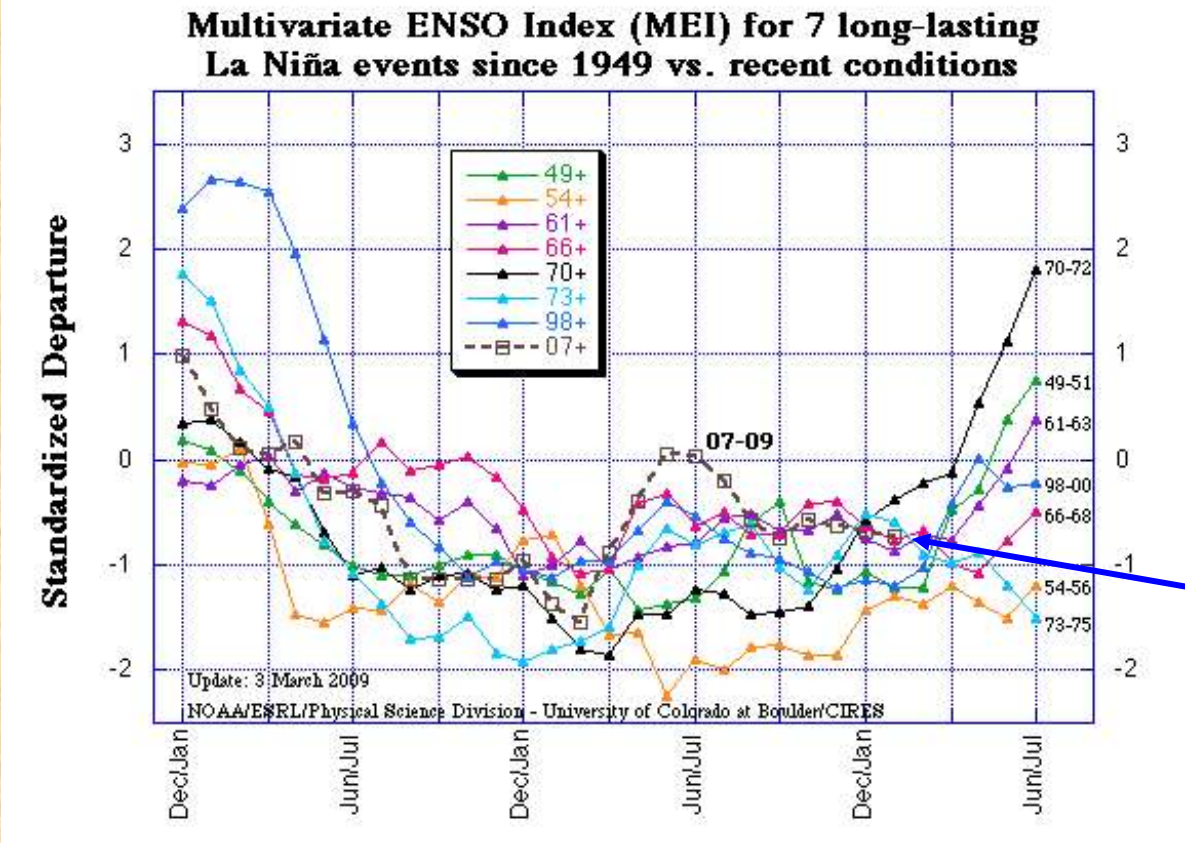
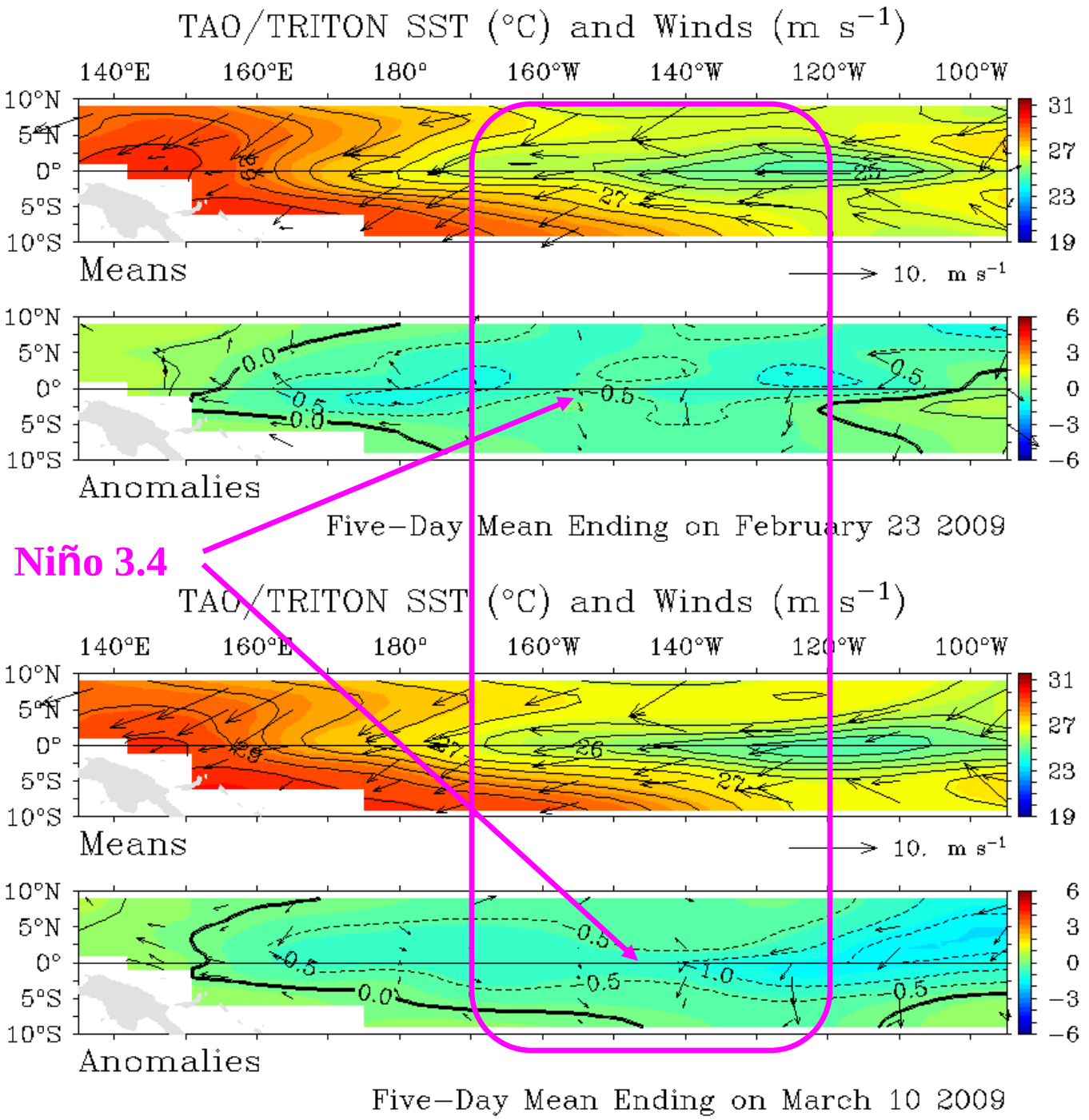
- **La Niña: Winter #2**
- **This winter so far & expectations for next few weeks**
- **CPC forecasts for March - June 2009**
- **Experimental forecast guidance for April - June 2009**

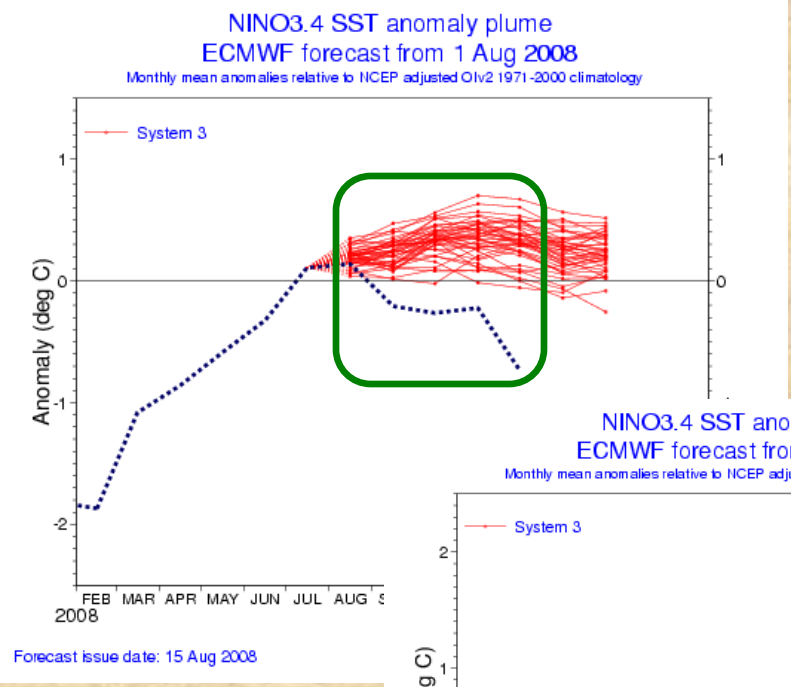




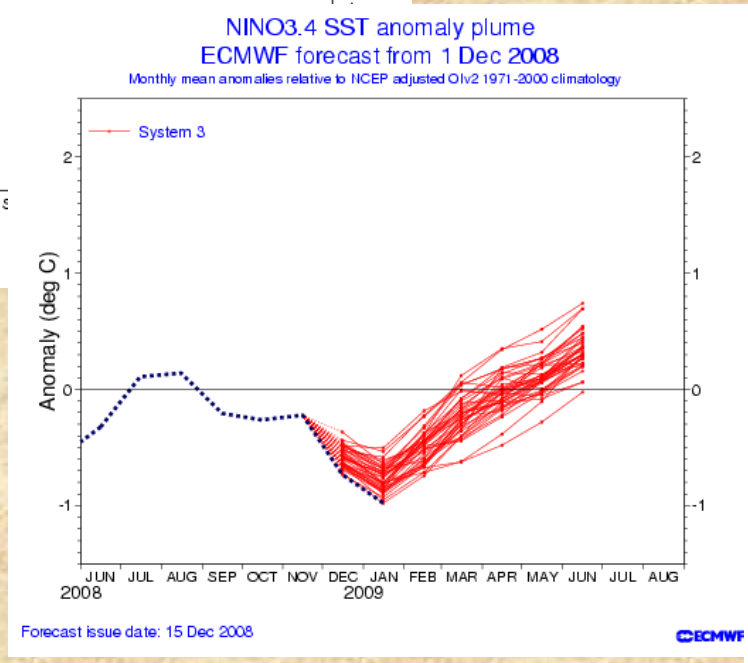
From 3rd strongest La Niña since 1950 (Feb-Mar'08) to above-normal in three months, and back to at least weak La Niña!

Current state of ENSO (bottom) compared to two weeks ago (top): the tropical Pacific has continued its weak La Niña event, but the emphasis has shifted to the eastern part of the basin where SST went from positive to highly negative anomalies. Trades remain stronger than normal in the east, but have shown signs of weakening near the dateline for the first time in months, a first sign of El Niño?

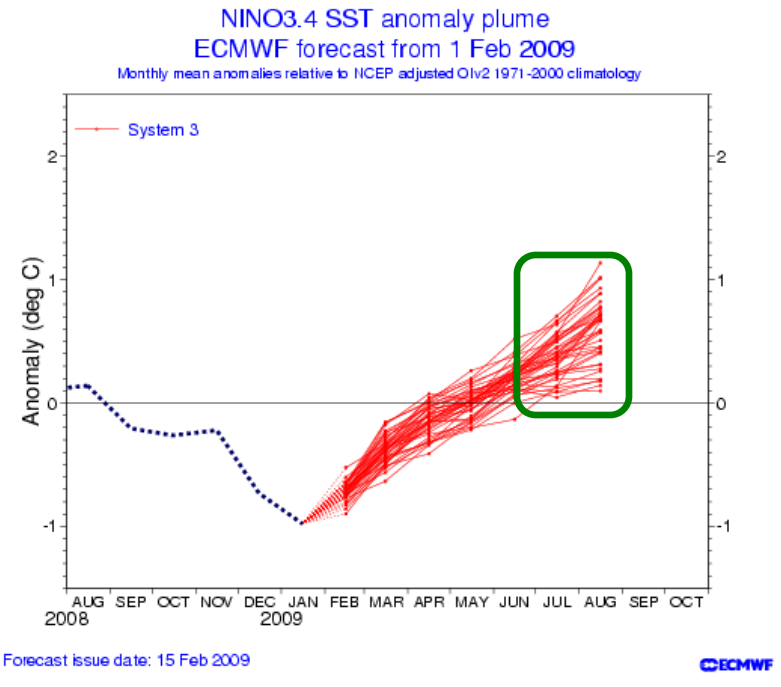




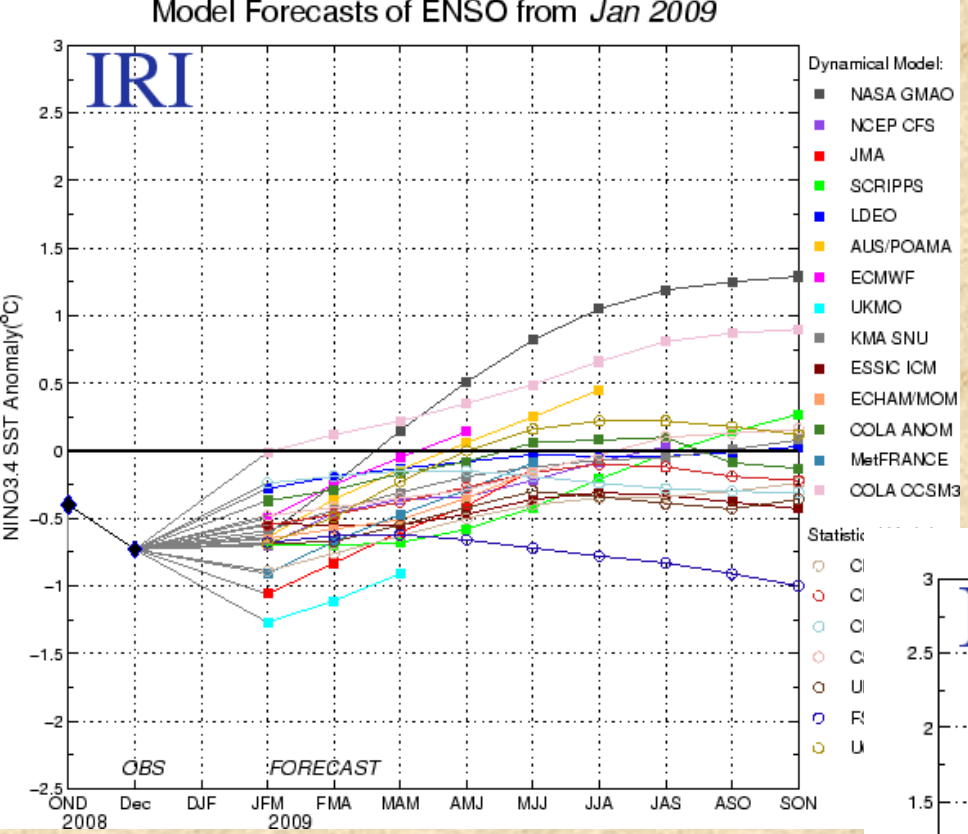
The European model's August forecast (left) anticipated weak El Niño conditions thru rest of 2008, while the observed SST dropped below the forecast range by *September* - highly unusual!



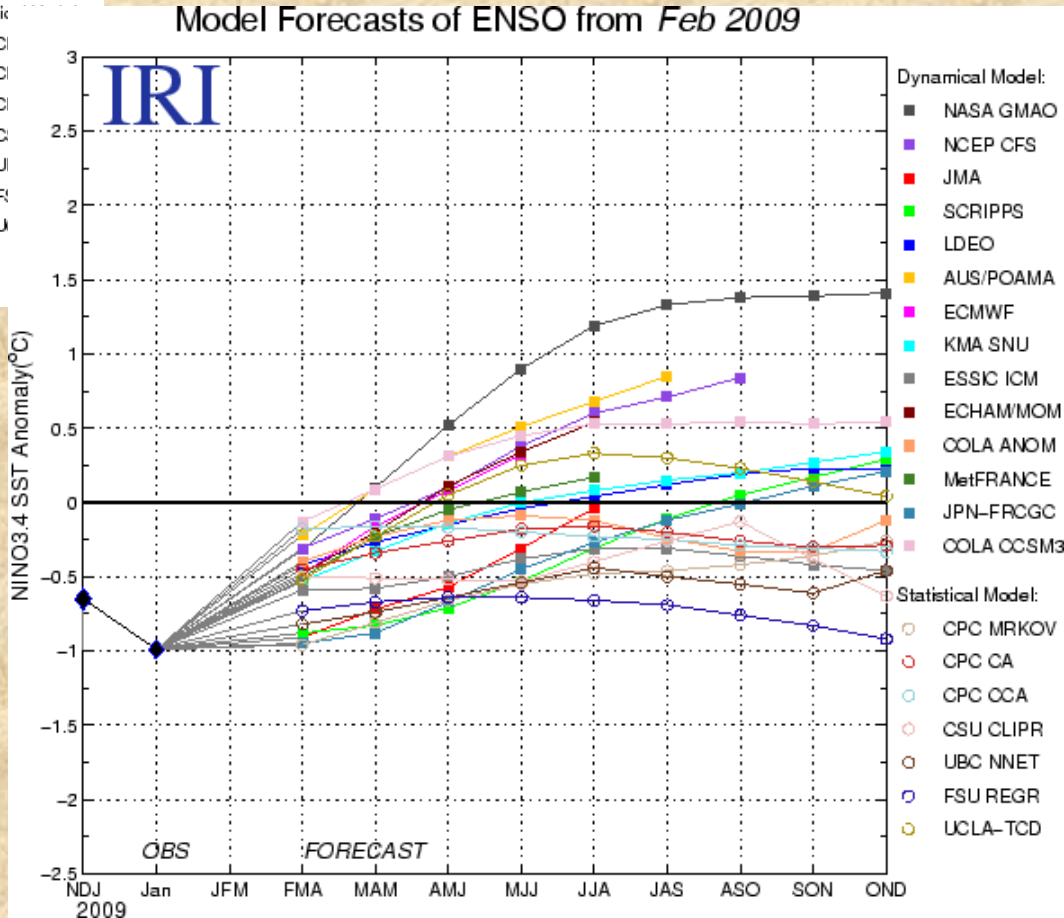
A more serious temperature drop occurred by late '08 (left), peaking near -1°C (moderate La Niña) in January.



The latest forecast (right) has a pretty clear trend towards at least neutral (if not El Niño) conditions by late spring (summer). The forecast range of less than 1°C thru July is comparatively small.

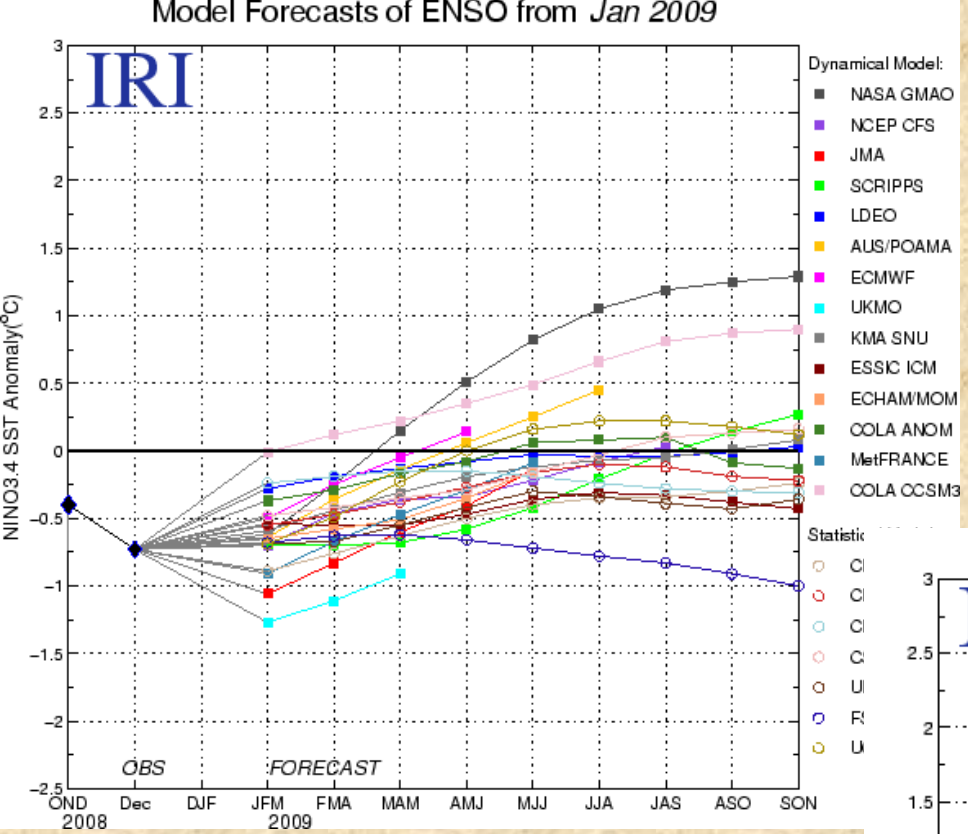


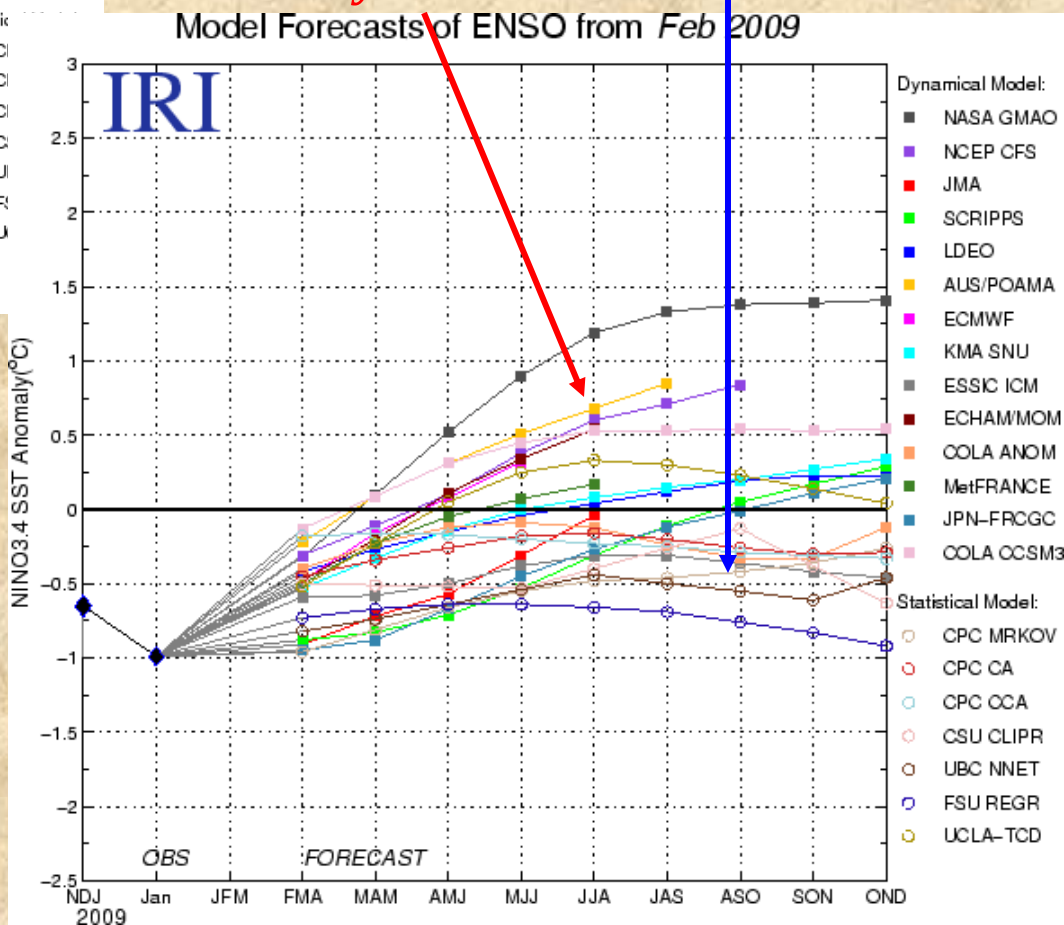
Latest ENSO forecasts from almost two dozen dynamical & statistical forecast models (below) vs. previous month (left). Most models show a return towards ENSO-neutral by the spring, with a wide range of possible outcomes (+/-1°C).



Historically, La Niña events of the recent magnitude have had a tendency to continue for three years+ (54-57; 73-76; 98-01), possibly involving re-emergence in boreal fall.

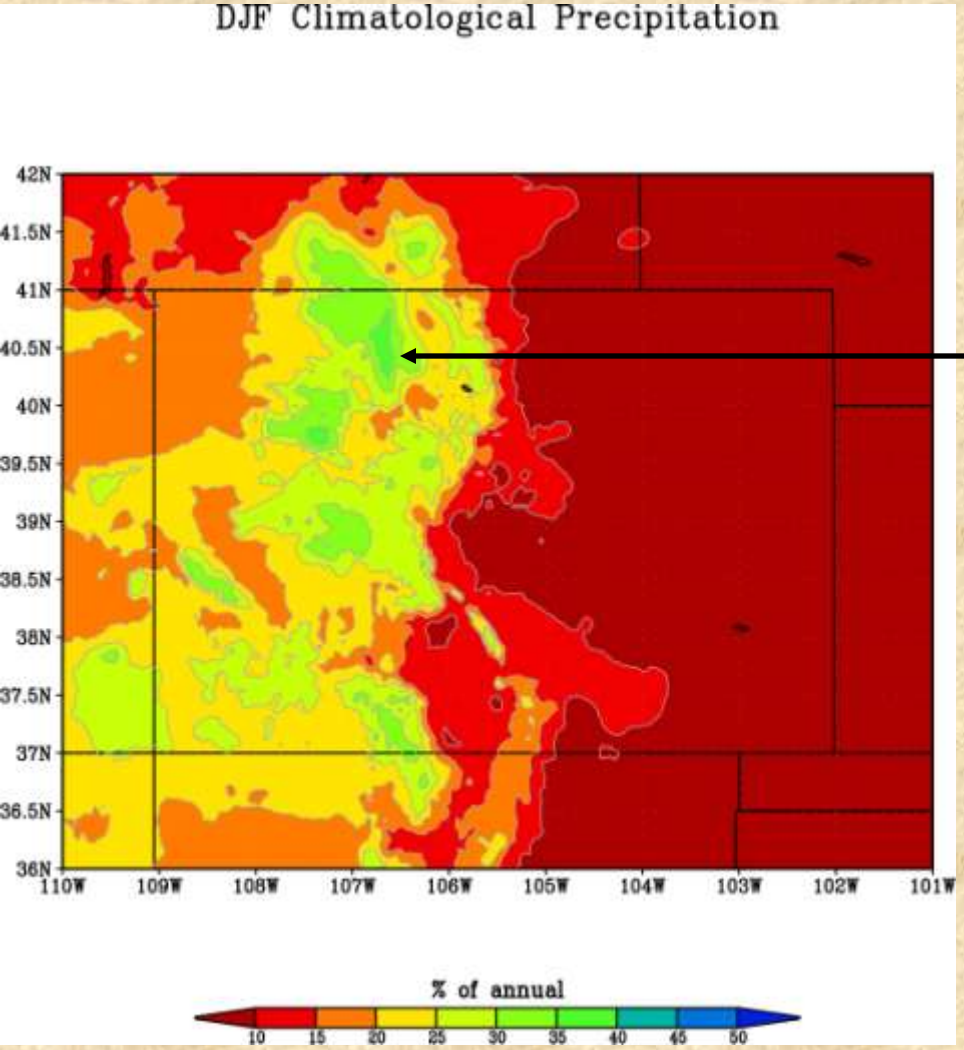
Latest ENSO forecasts from almost two dozen dynamical & statistical forecast models (below) vs. previous month (left). Most models show a return towards ENSO-neutral by the spring, with a wide range of possible outcomes (+/-1°C). *There is a widening gap between dynamical & statistical models!*

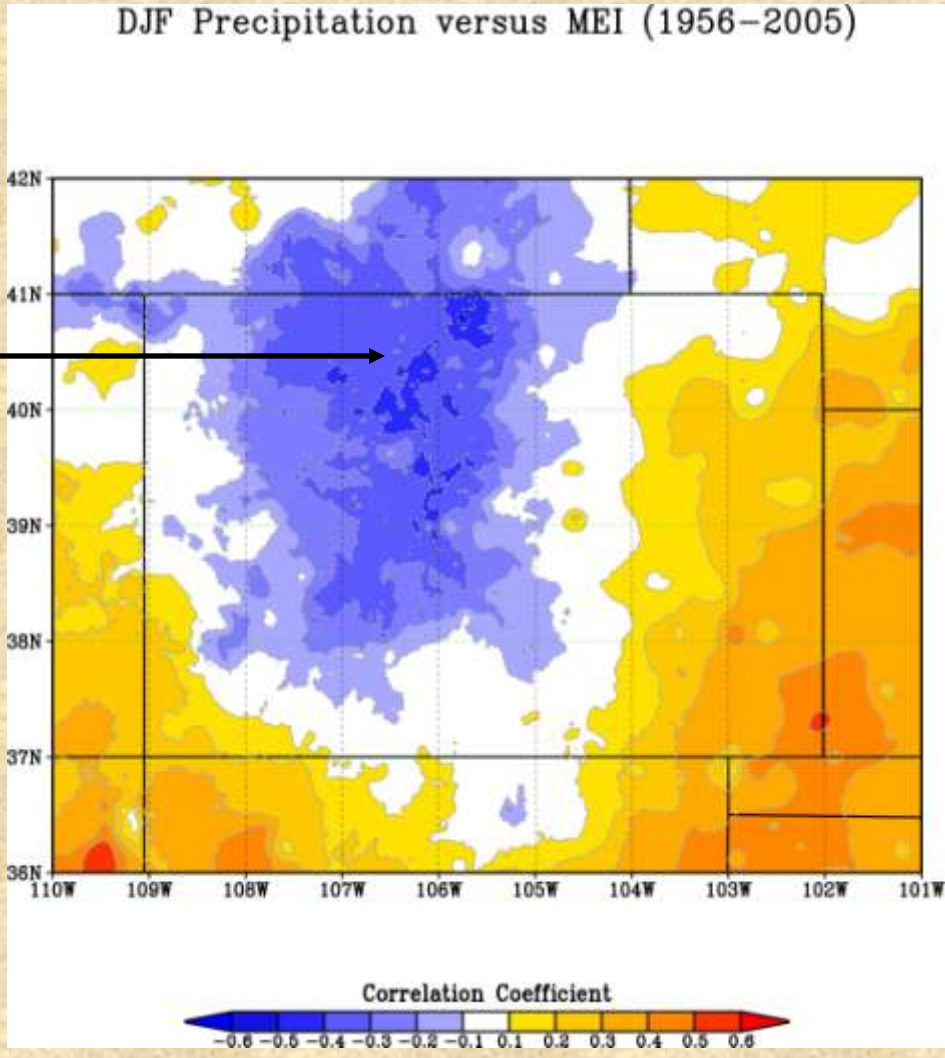




Historically, La Niña events of the recent magnitude have had a tendency to continue for three years+ (54-57; 73-76; 98-01), possibly involving re-emergence in boreal fall.

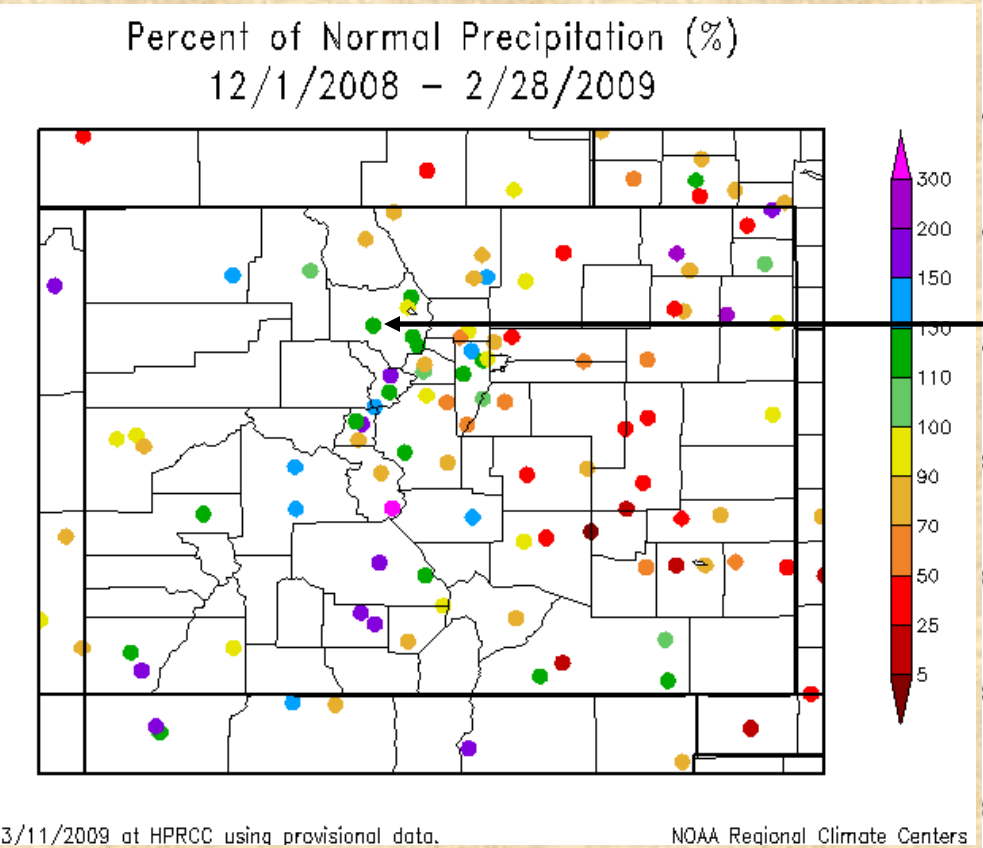
What are typical La Niña impacts in the winter?

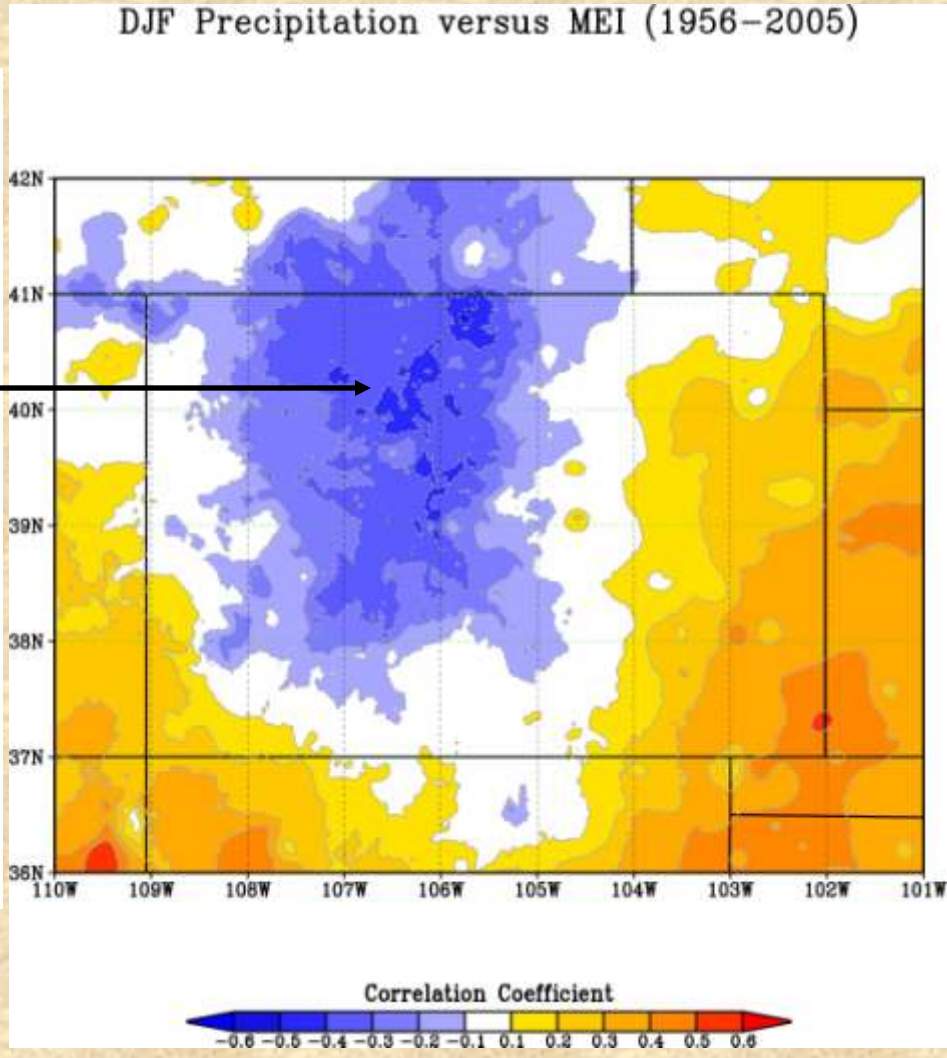




Northwest Colorado benefits the most from average winter seasons (left), even more so during La Niña conditions (negative correlations; right).

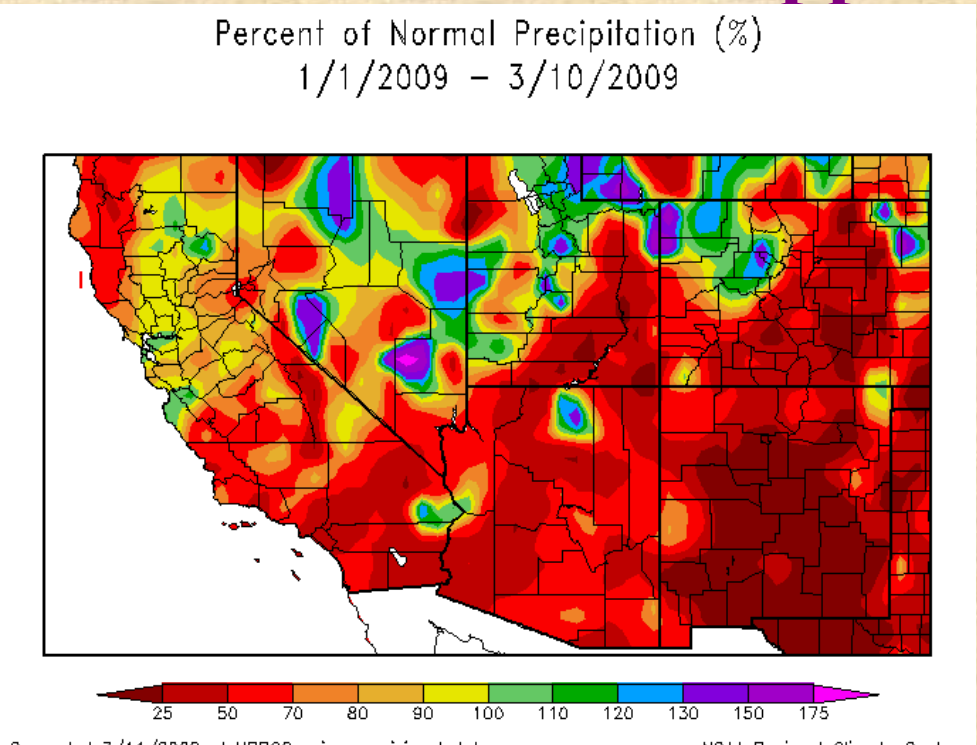
What about this winter?



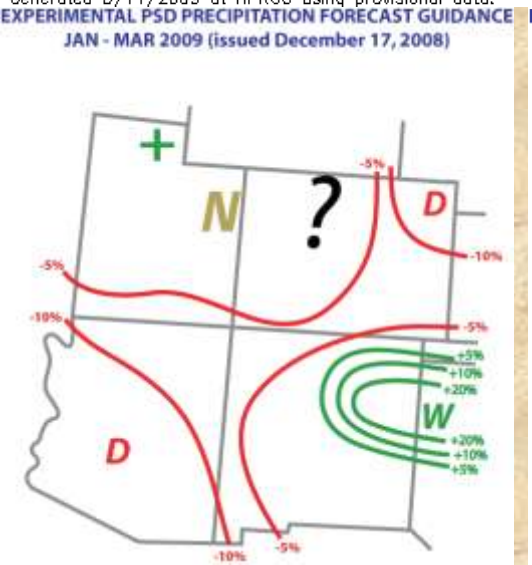


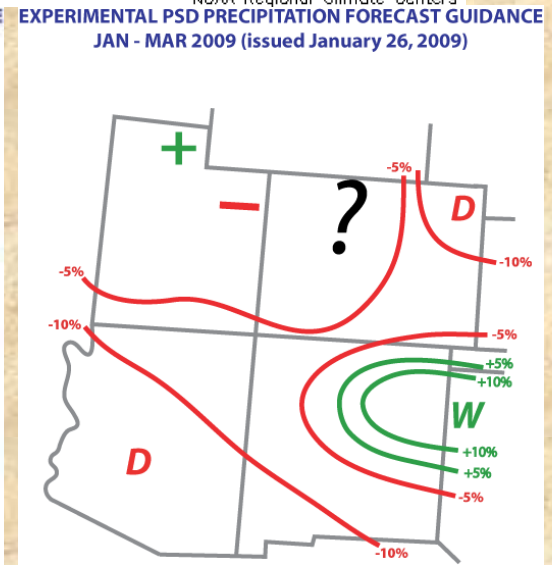
This winter has brought snow amounts pretty close to La Niña-based expectations - above normal in most mountain locations, below normal on most of the eastern plains!

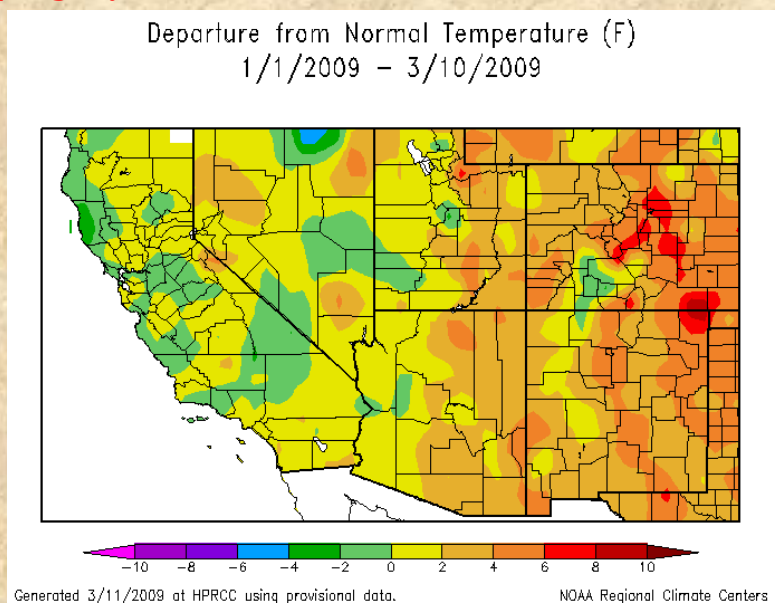
What has happened so far in 2009?



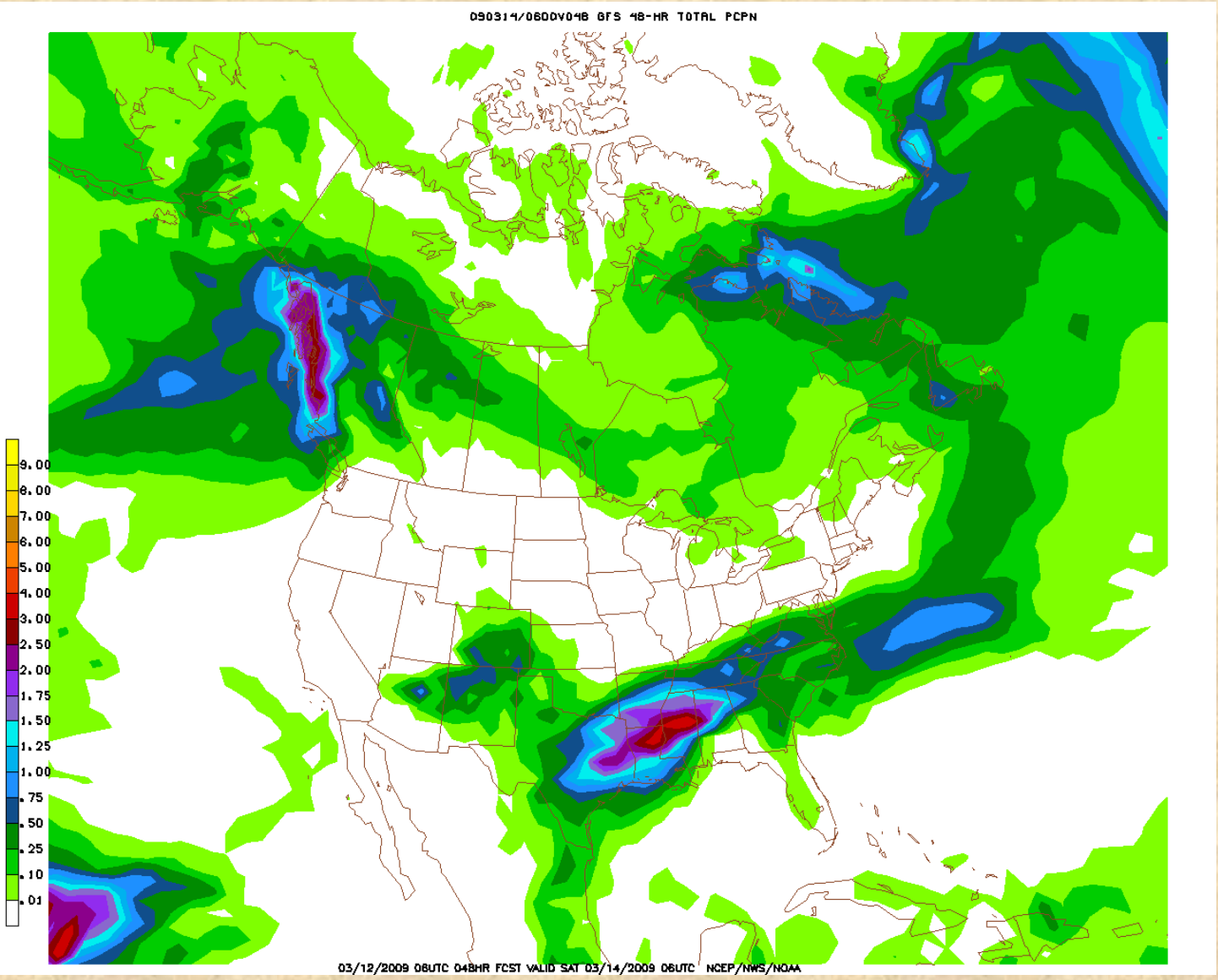
Our northern mountains (and northern Utah) have received decent moisture for the year so far (left), while the southern mountains have taken a 'break'. Dry conditions have covered southern Utah, most of Arizona, New Mexico, and most of our eastern plains. Except for NM, this is fairly consistent with my forecasts (bottom left). ***Since 1jan09, it has not 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.***





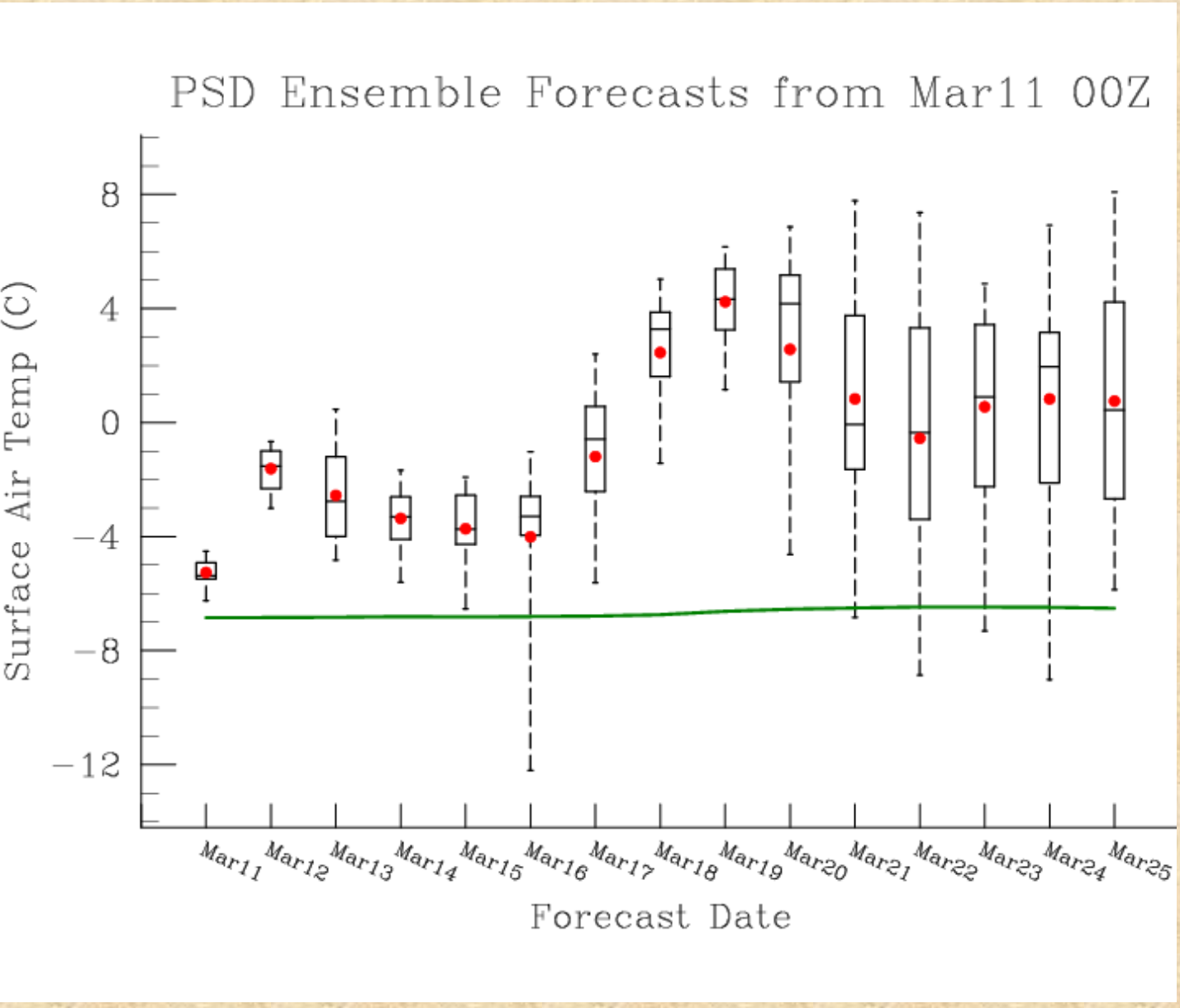


What can we expect in the near-term?

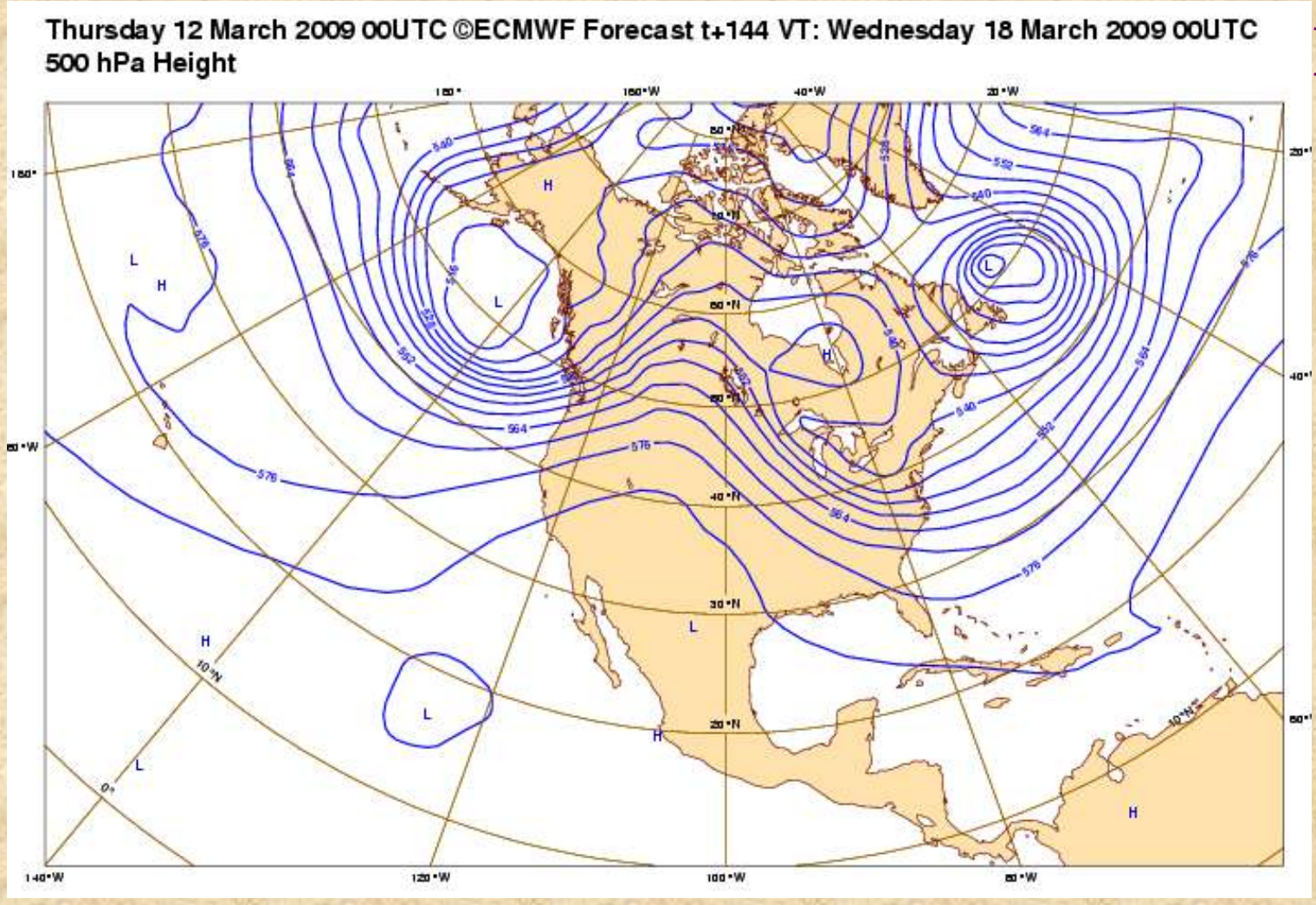


The next storm for Colorado will come in from the southwest today. Map (left) shows total precipitation thru Saturday: up to 1/2" for the San Juans & Arkansas Valley, with less to the north, despite widespread but weak upslope flow. The GFS model shown here is wetter for us than the NAM outcome - not good news!

What can we expect in the mid-term?



After this weekend (left) temperatures are expected to rise well above-normal again over Colorado (this output is based on 'reforecast' data for 107.5W/40N - see our website at: *http://www.cdc.noaa.gov/forecasts/reforecast/ensemble/*) - this should give Colorado a return to spring-melt conditions below 9K, maybe even up to 10K! Total expected H2O only ~0.5"!

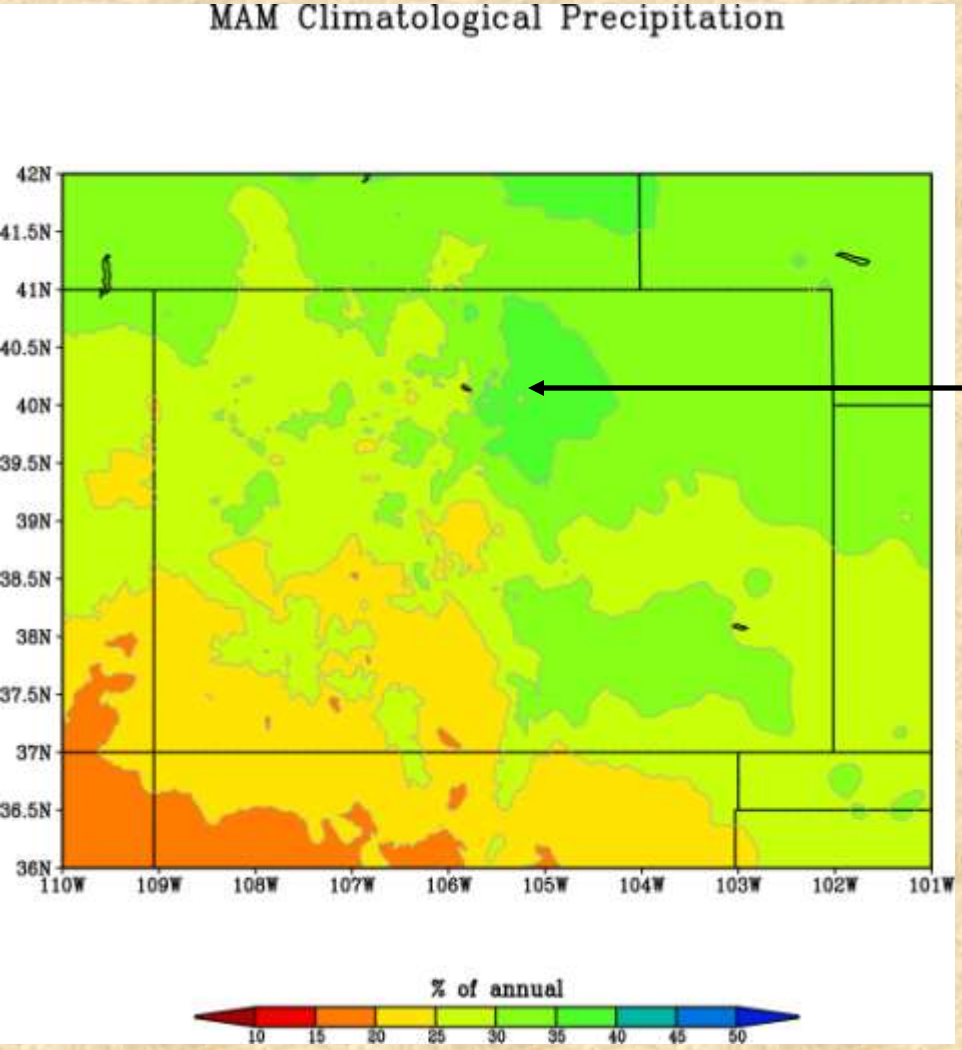


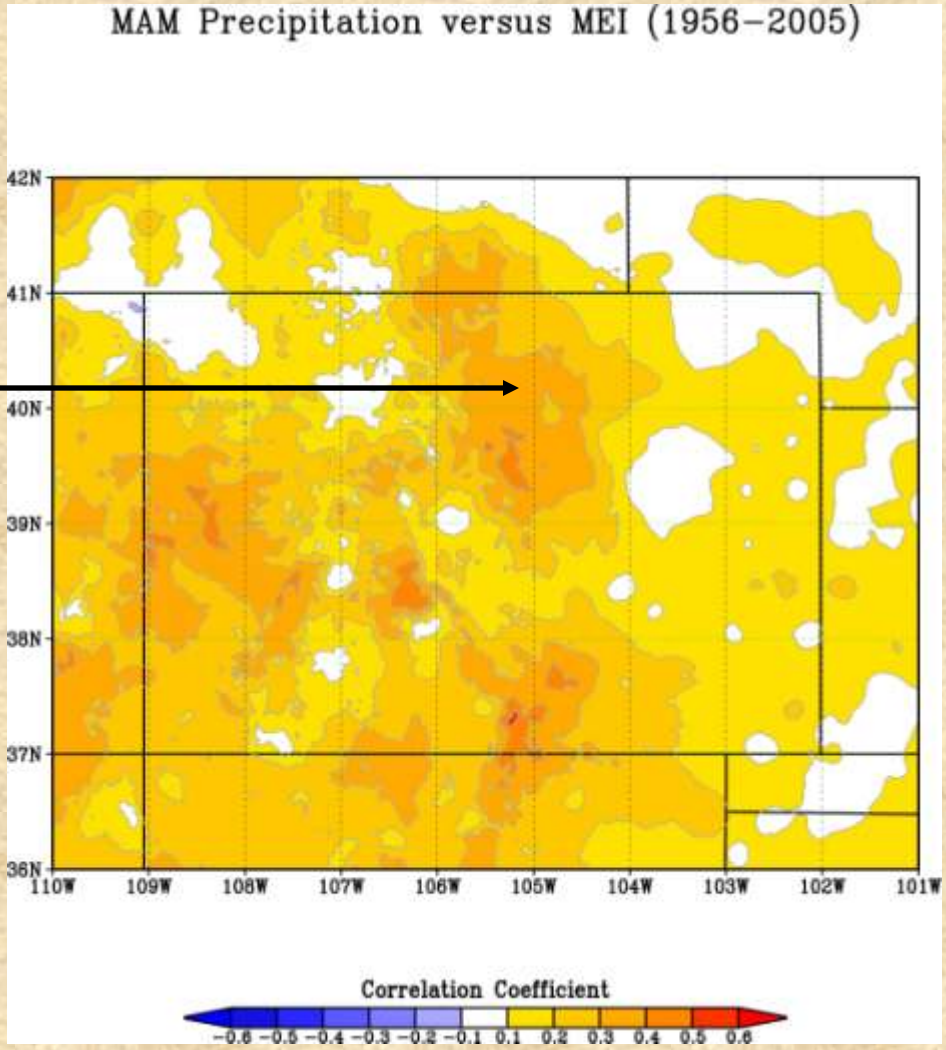
Mid-term?

Next week's warm spell will be anchored by ridging aloft which may allow for some trapped cold air in mountain valleys, but we are far enough into spring for this mechanism to become ineffective.

Warm and dry weather stretches are now getting to the point that they are 'nibbling away' at the lower edges of snowpack near 9K - this is at higher elevations/earlier than in 'normal' years, but should help reduce flooding threats.

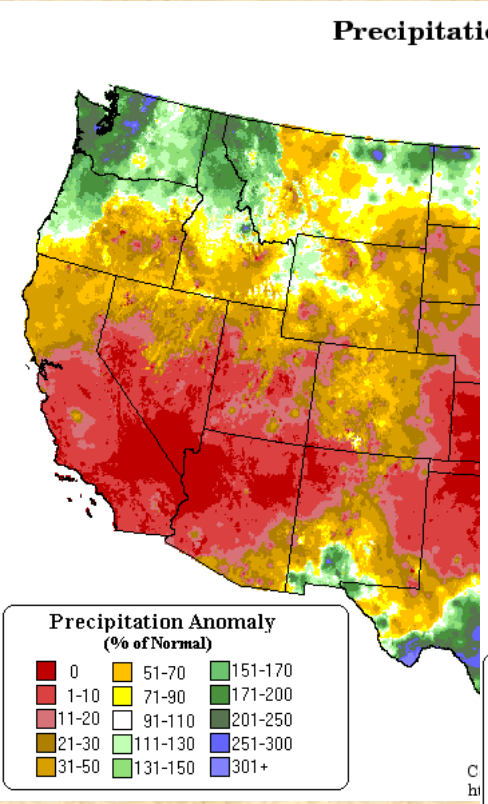
What are typical La Niña impacts in the spring?

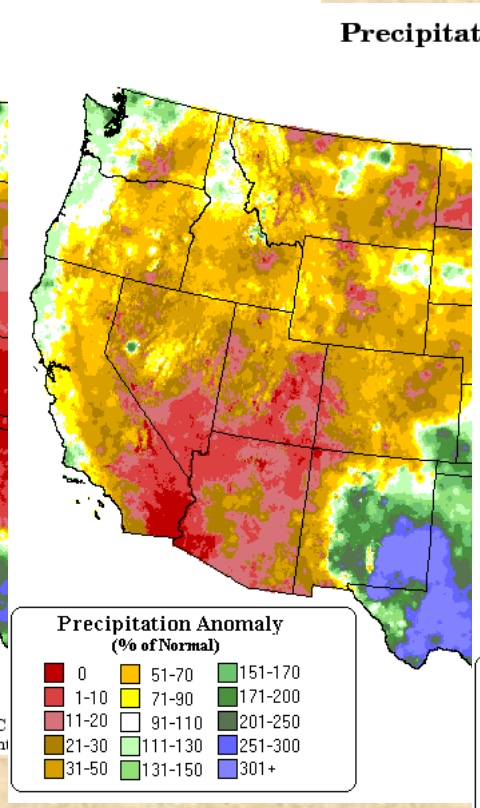


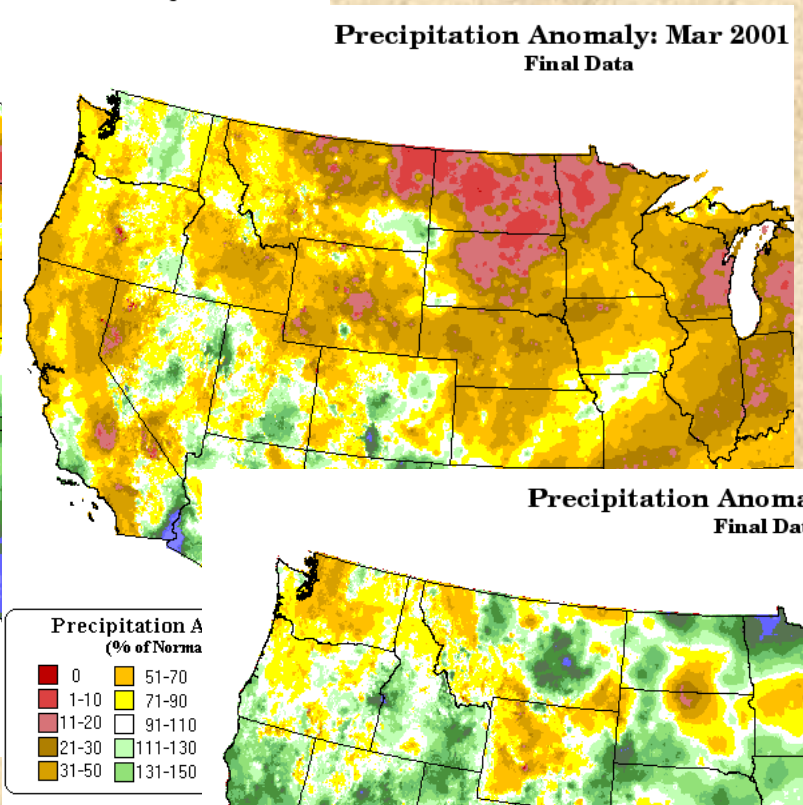


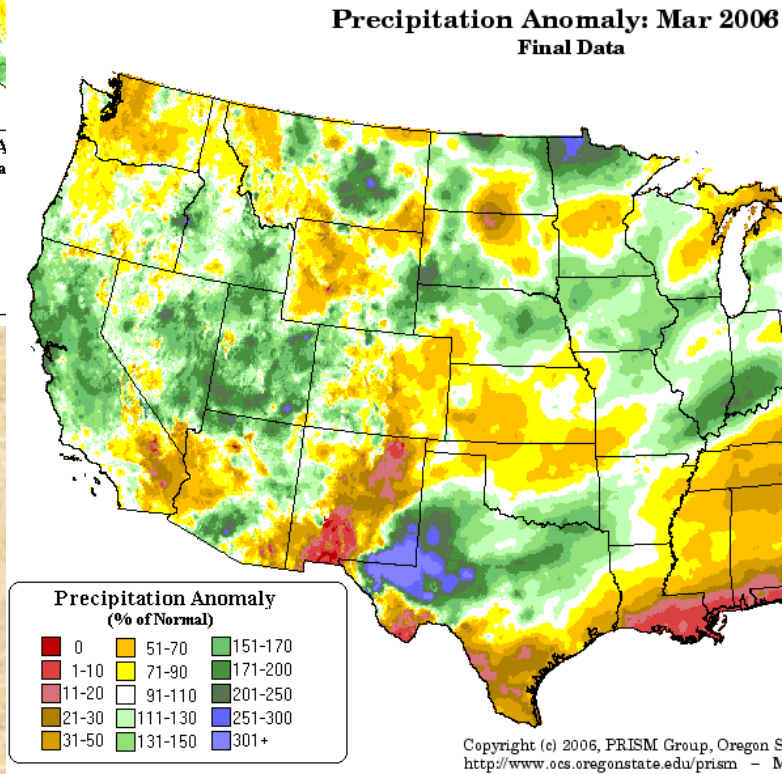
Northeast Colorado benefits the most from average spring seasons (left), but less so during La Niña conditions (positive correlations; right). Best case scenario: a switch from La Niña to El Niño early in year (such as 1957; 1997).

What are typical (weak) La Niña impacts in March?



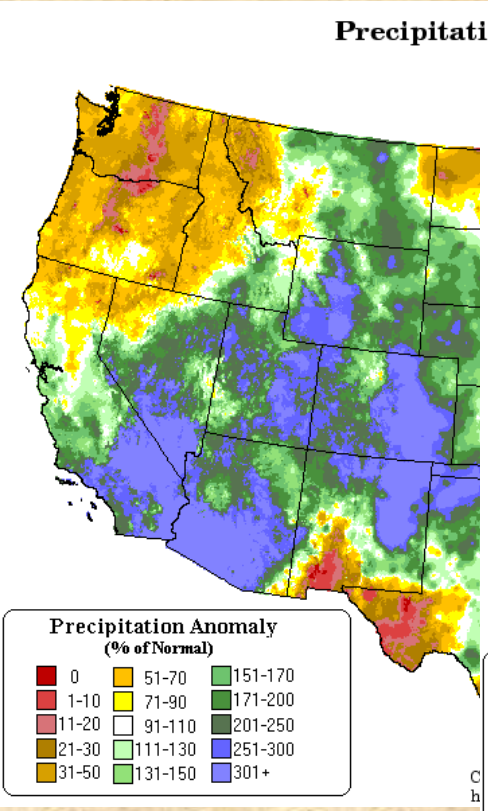


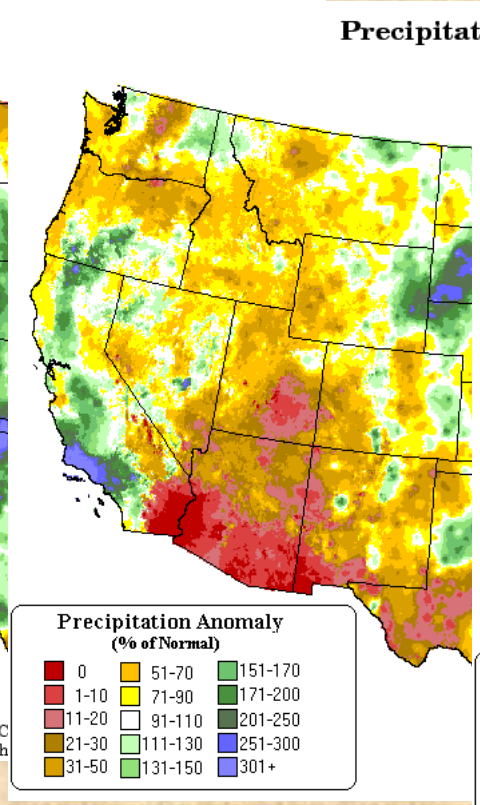


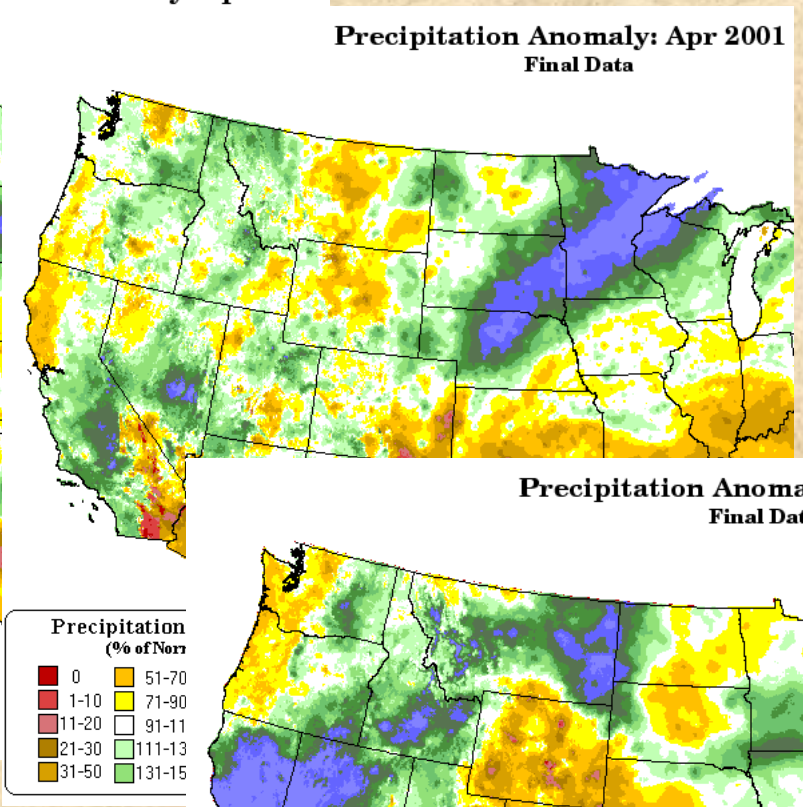


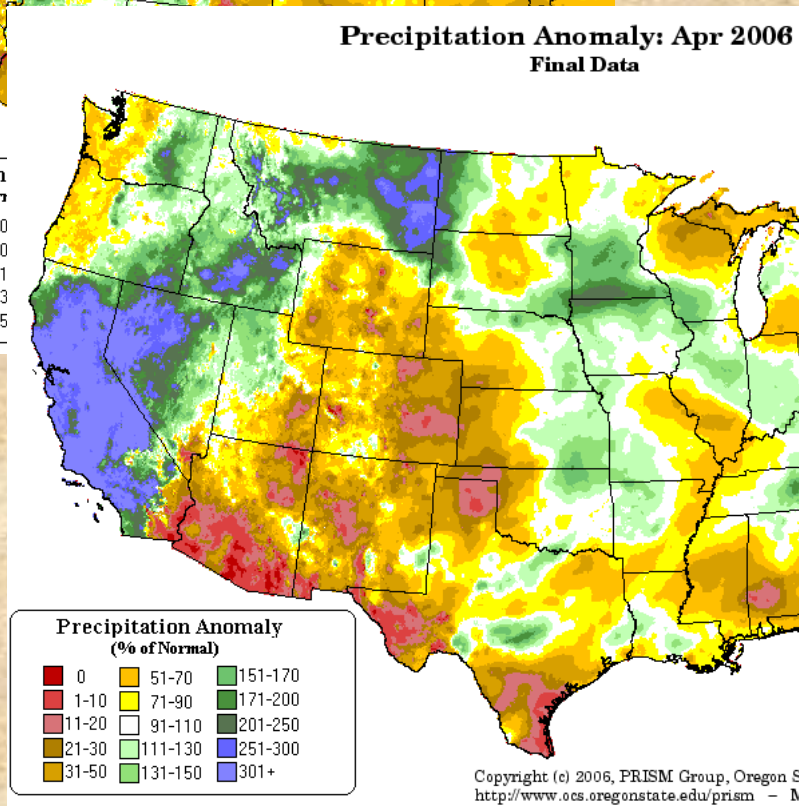
Last four March weak La Niña cases confirmed dry tendency for CO in this situation (1997, 99, 01, and 06). The last case, March '06 was actually the 'wettest' of the four in our mountains, while March '01 was the wettest along the Front Range.

What are typical (weak) La Niña impacts in April?



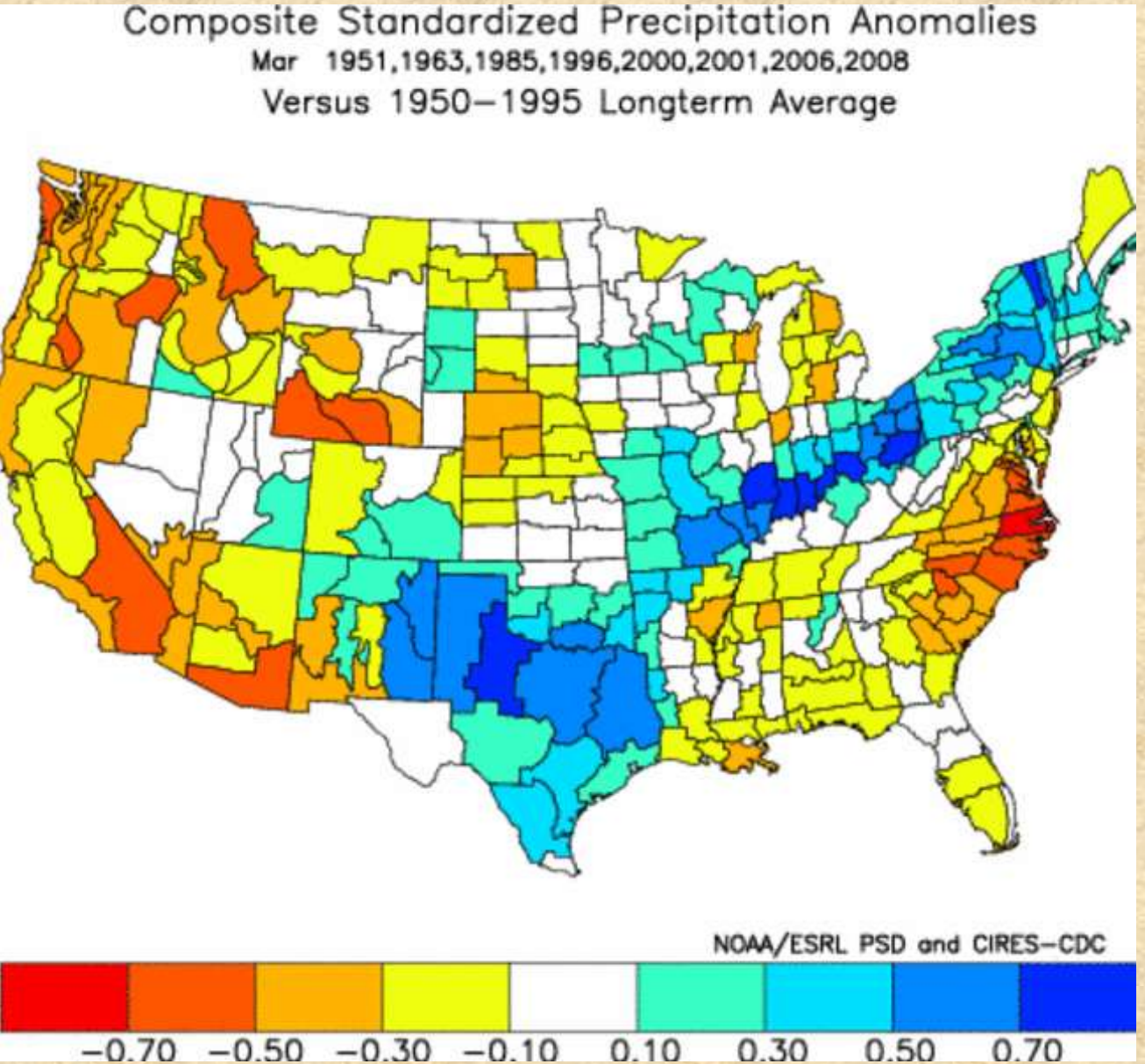






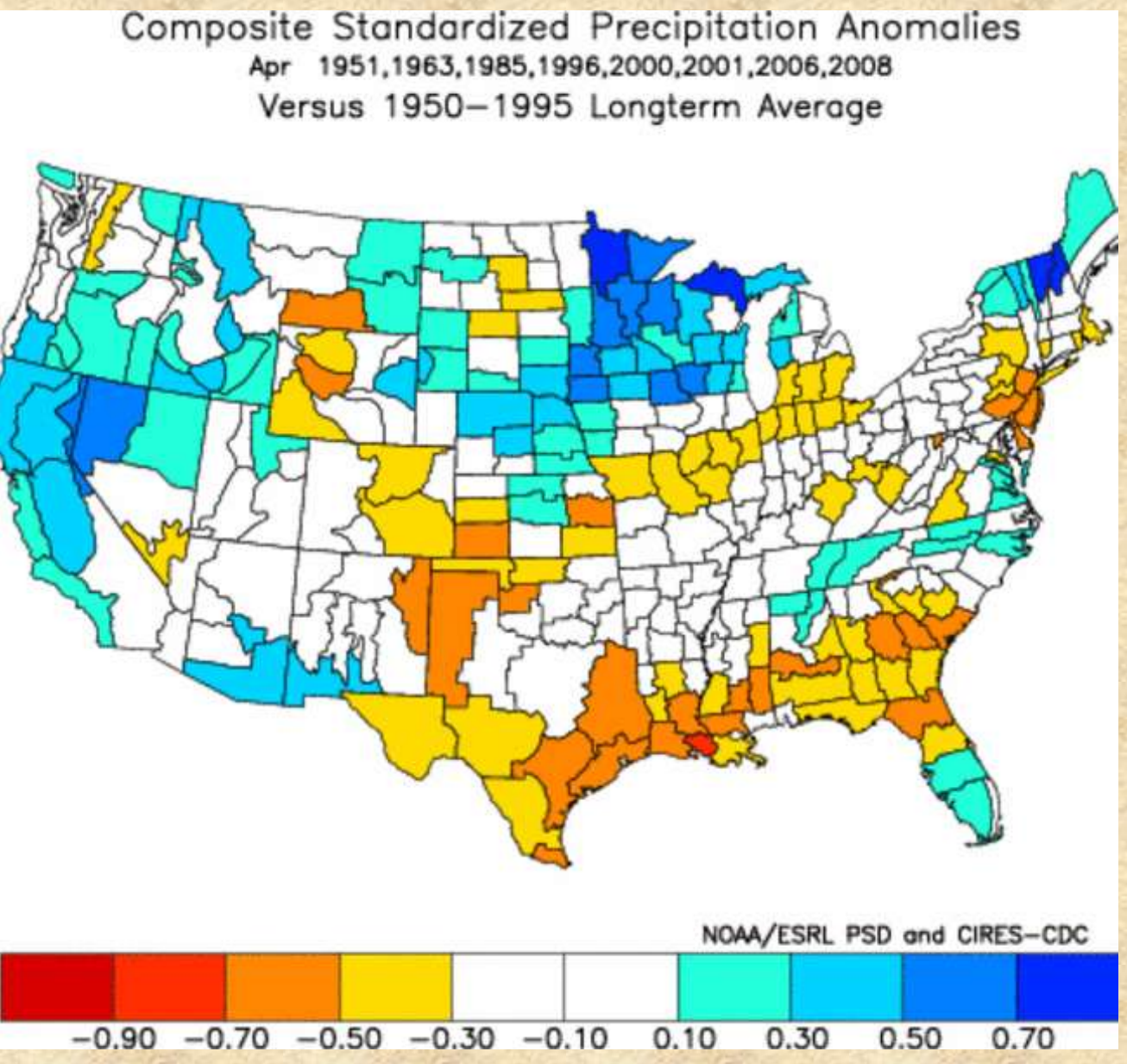
Four April La Niña cases confirmed dry tendency for CO in this situation (1999, 2000, ‘01, and ‘06). The first case, April ‘99 was by far the wettest of the four everywhere, but also the strongest La Niña, while April ‘00 and ‘06 were particularly dry.

What are typical precipitation patterns in March after La Niña (going into ENSO-Neutral)?



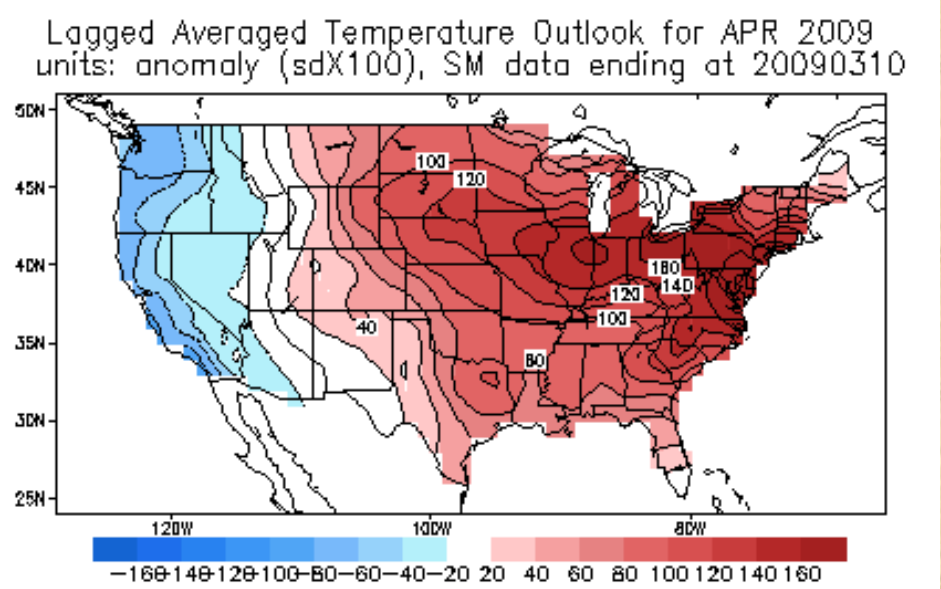
La Niña winters going into ENSO-neutral by the summer have been more common lately than early in the record. Colorado has faired reasonably well east of the mountains, but average anomalies are quite small, indicating a fair scatter / no guarantee of near-normal precipitation!

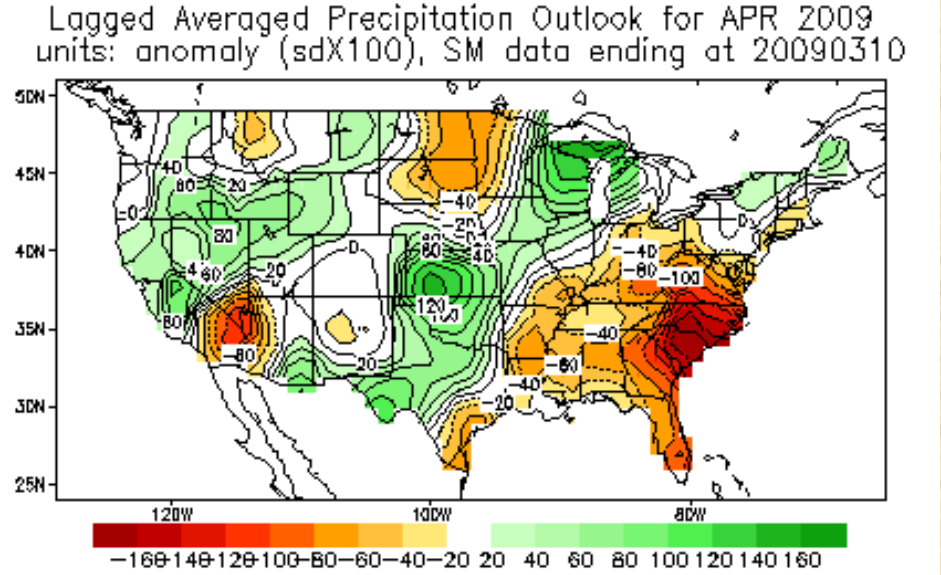
What are typical precipitation patterns in April after La Niña (going into ENSO-Neutral)?

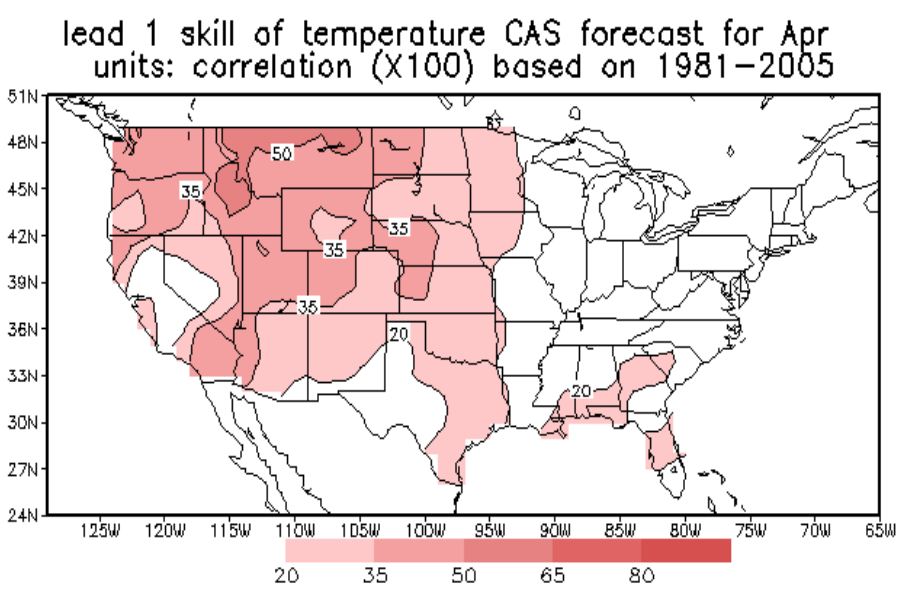


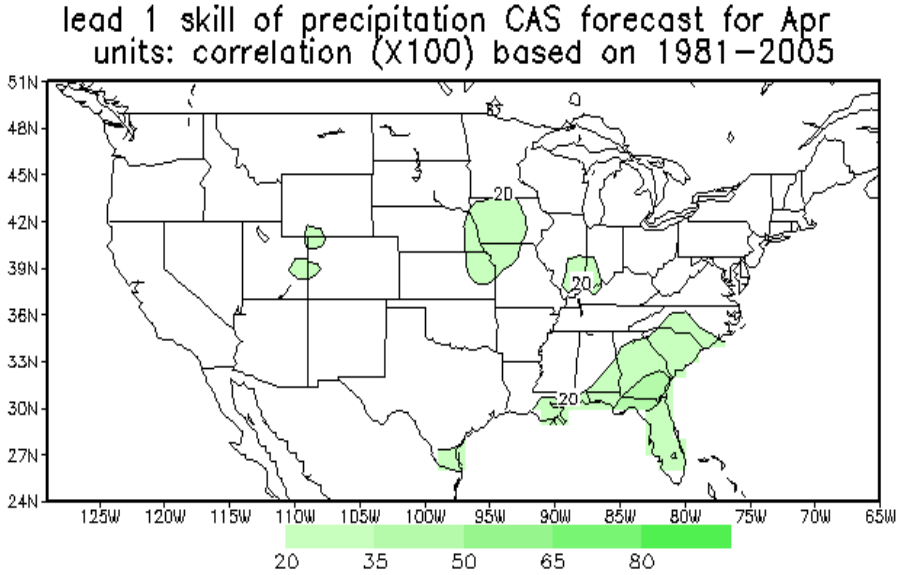
La Niña winters going into ENSO-neutral by the summer have been more common lately than early in the record. In April, Colorado has shown a tendency to be somewhat dry east of the mountains, and 'neutral' to the west.

What about 'Constructed Analog' Forecasts?



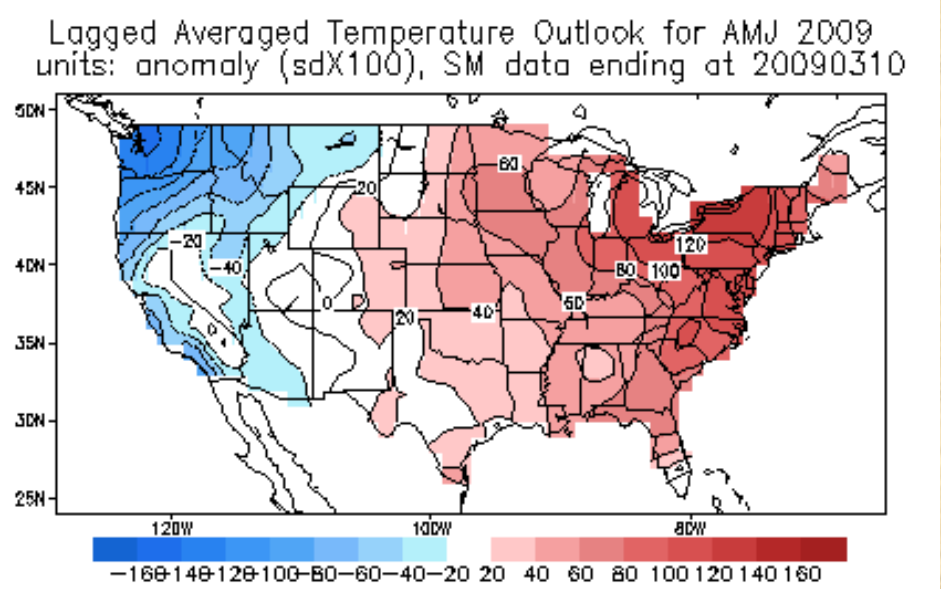


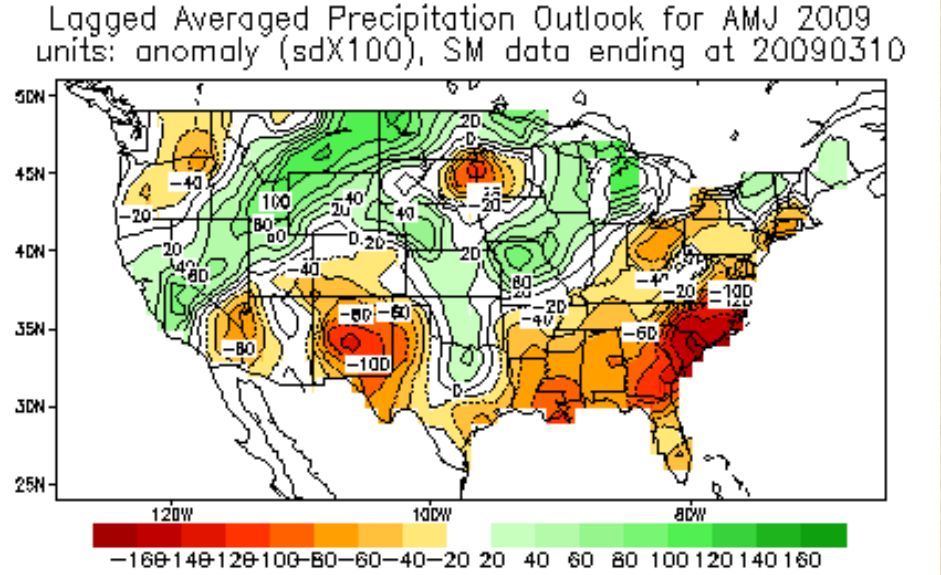


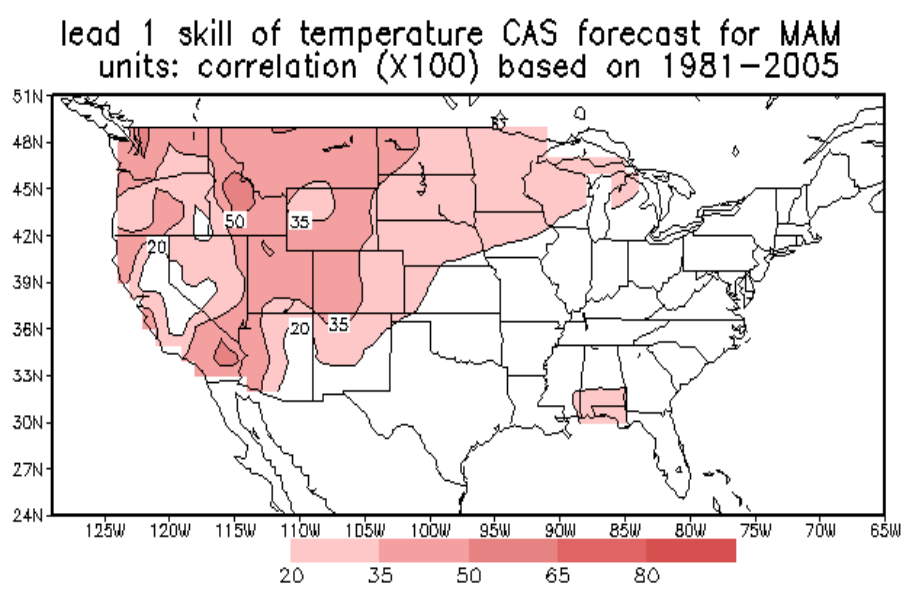


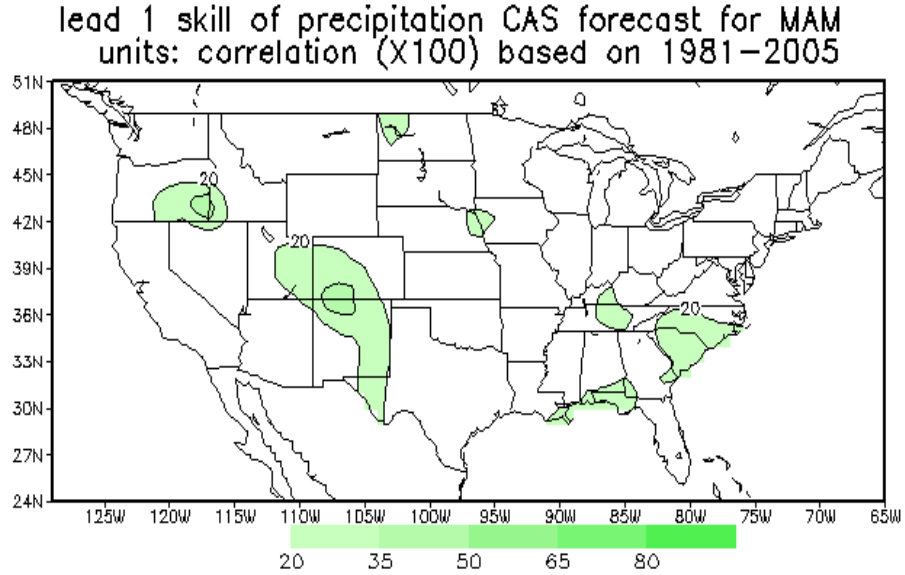
April forecasts near 4corners have shownonly little skill, while the warm outlook is supported over CO!

What about 'Constructed Analog' Forecasts?



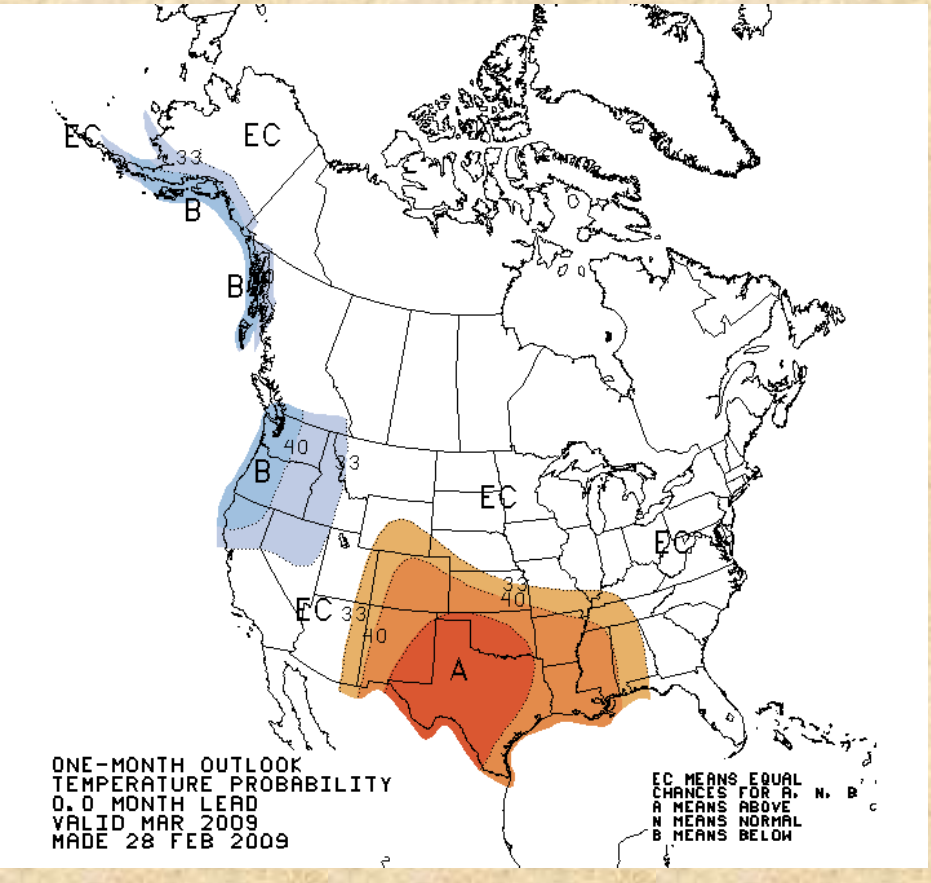


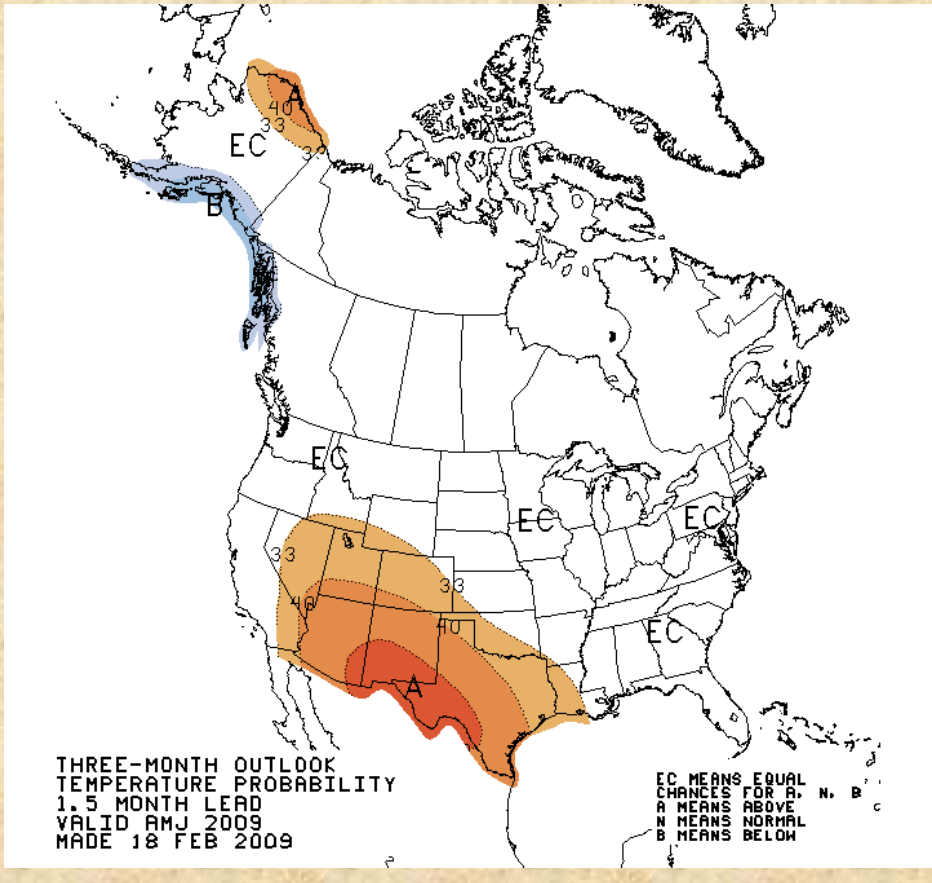




Dry April-June forecasts in CO&NM have skill! Warmth in eastern CO is also more likely than not.

CPC Temperature Forecasts

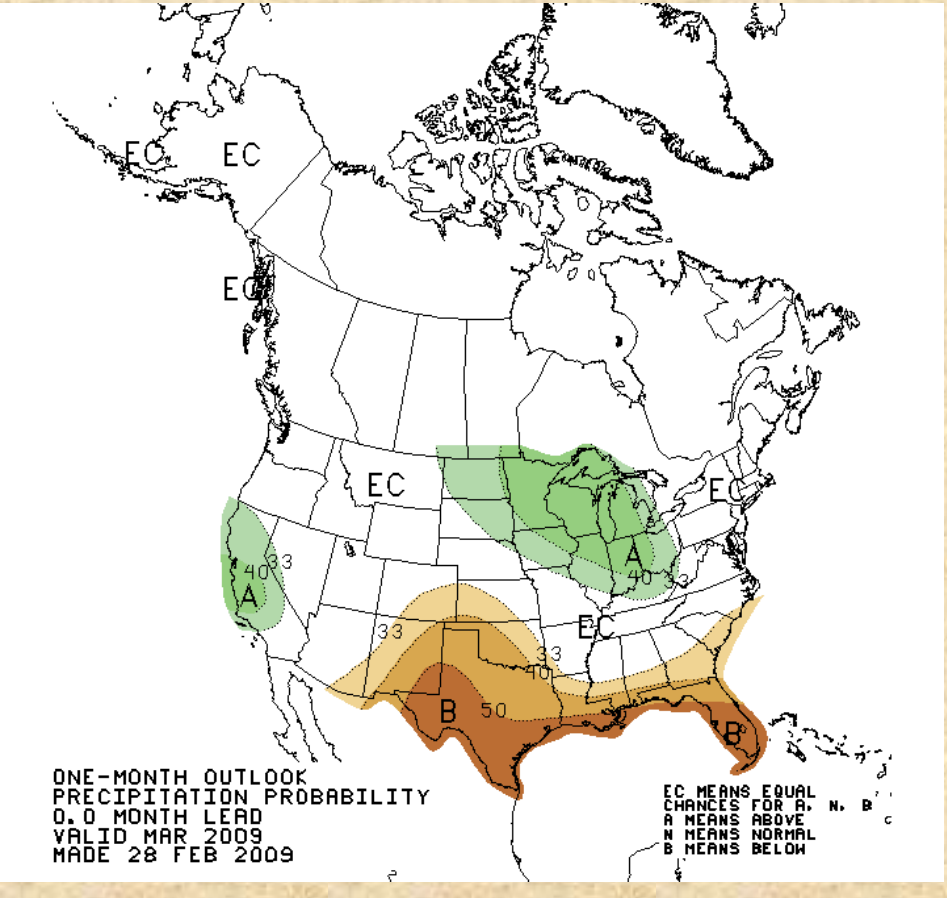


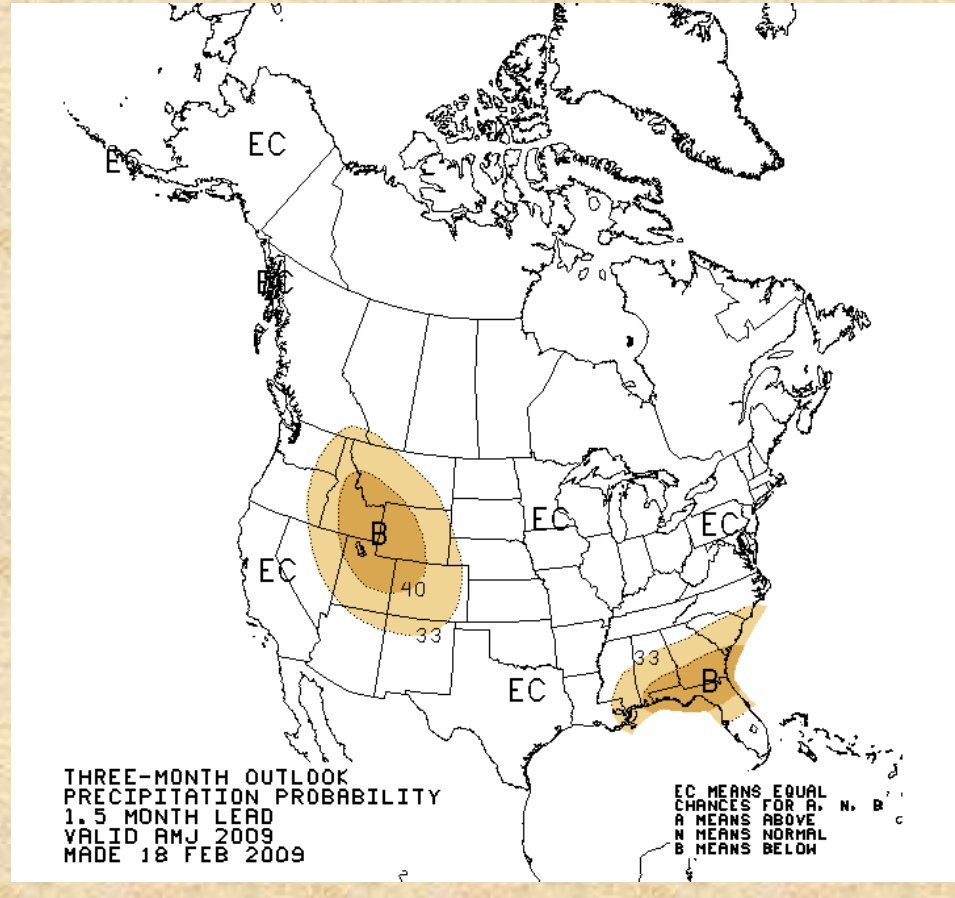


According to CPC's latest official forecasts from February, March (left) and April-June (right) temperature forecasts anticipate warmer-than-average conditions from March thru June in Colorado, consistent with the long-term trend and lingering La Niña influences for this season and region.

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

CPC Precipitation Forecasts

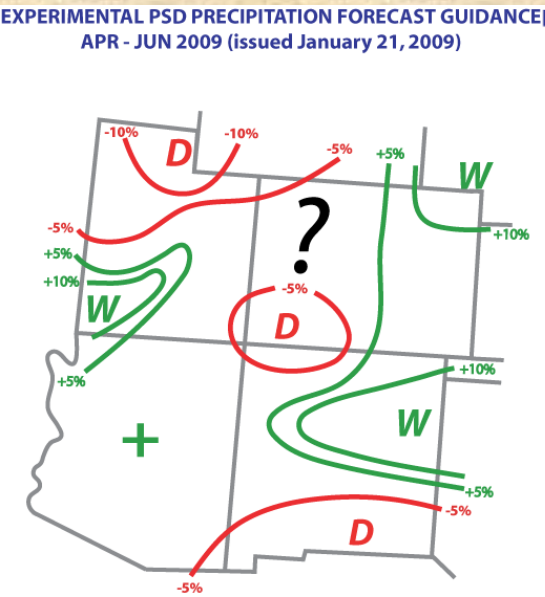


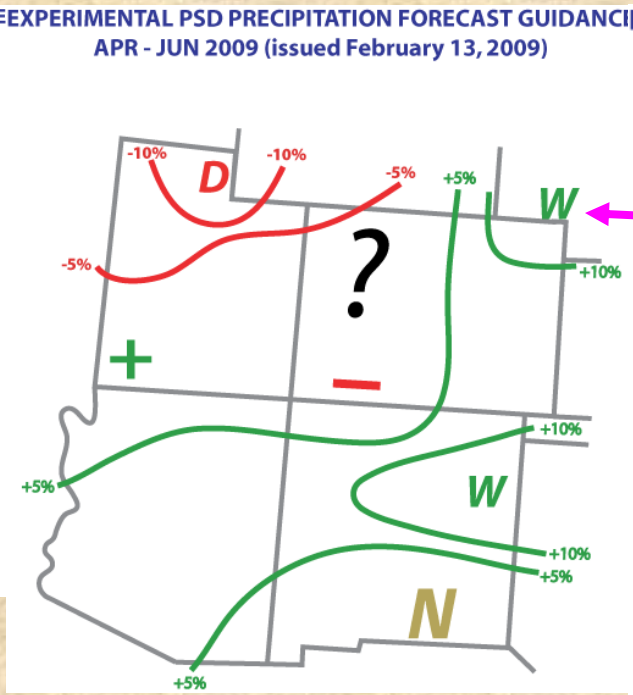


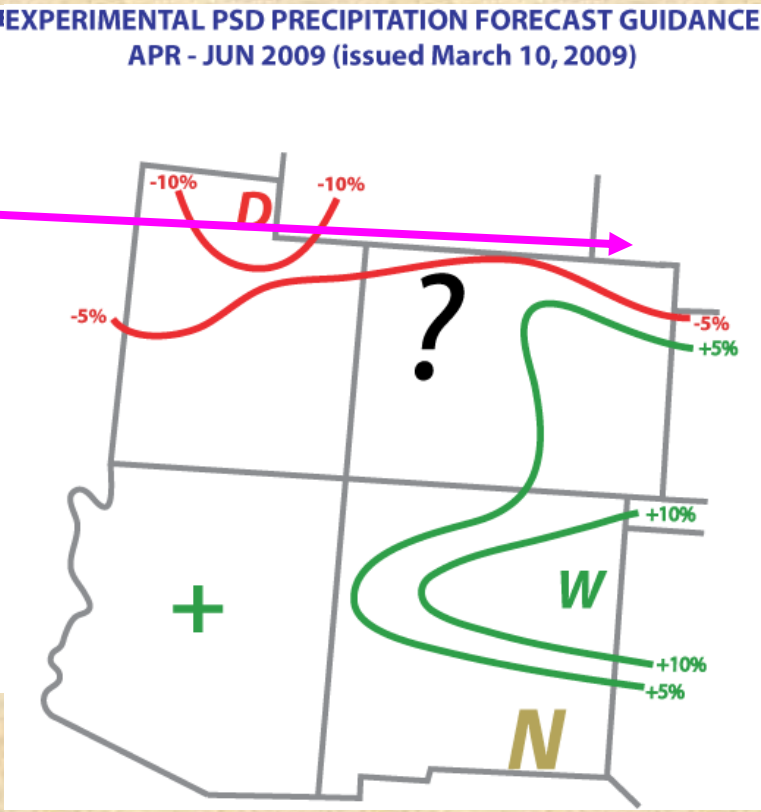
According to CPC's latest official forecasts from February, March (left) and April-June (right) precipitation forecasts are dryish to our south at the beginning, a tendency that shifts north in late spring, covering most of Colorado in that season. This can be attributed to lingering La Niña effects in some forecast tools.

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

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. The only "wet" forecast supported by some skill in last decade is the one for our eastern plains.***

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