NOAA-CIRES Climate Diagnostics Center

CO WATF, 25feb2009, Denver

Western Water Assessment

Seasonal Outlook into mid-2009

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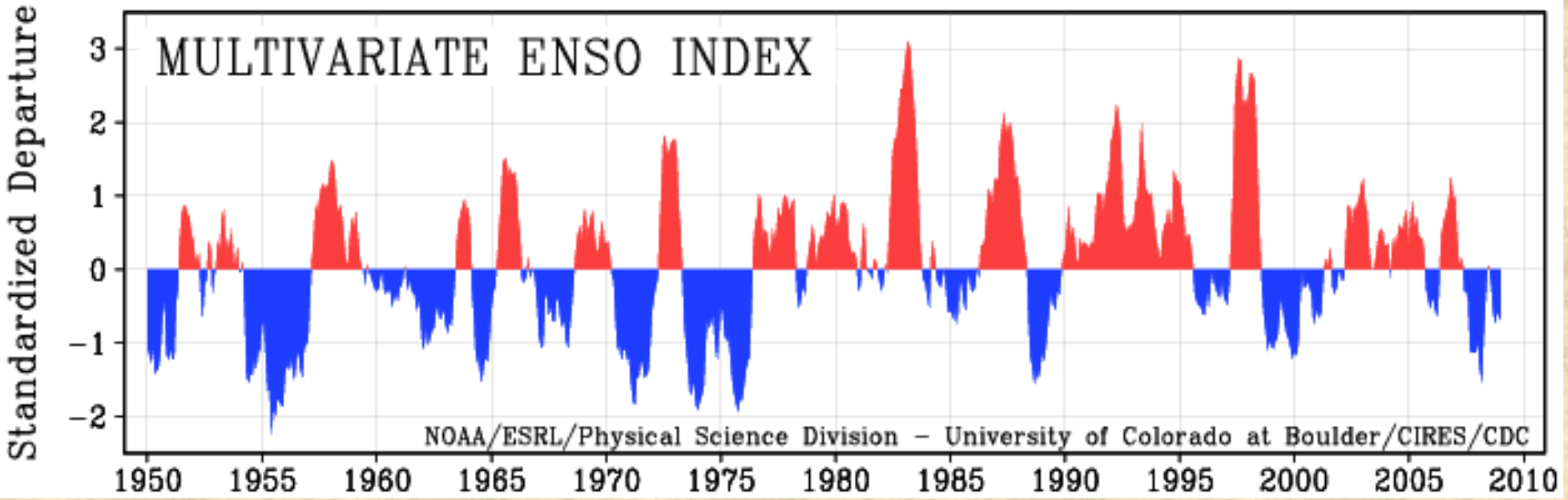
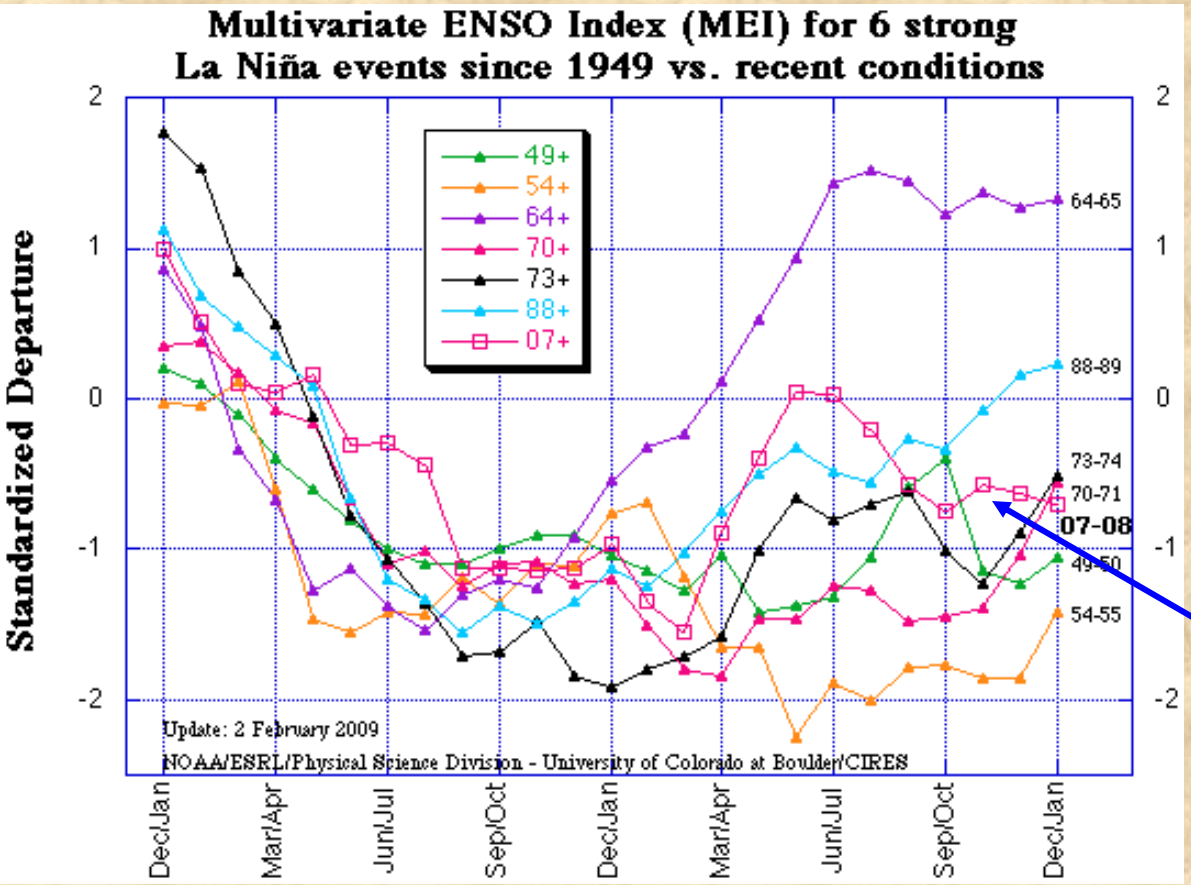
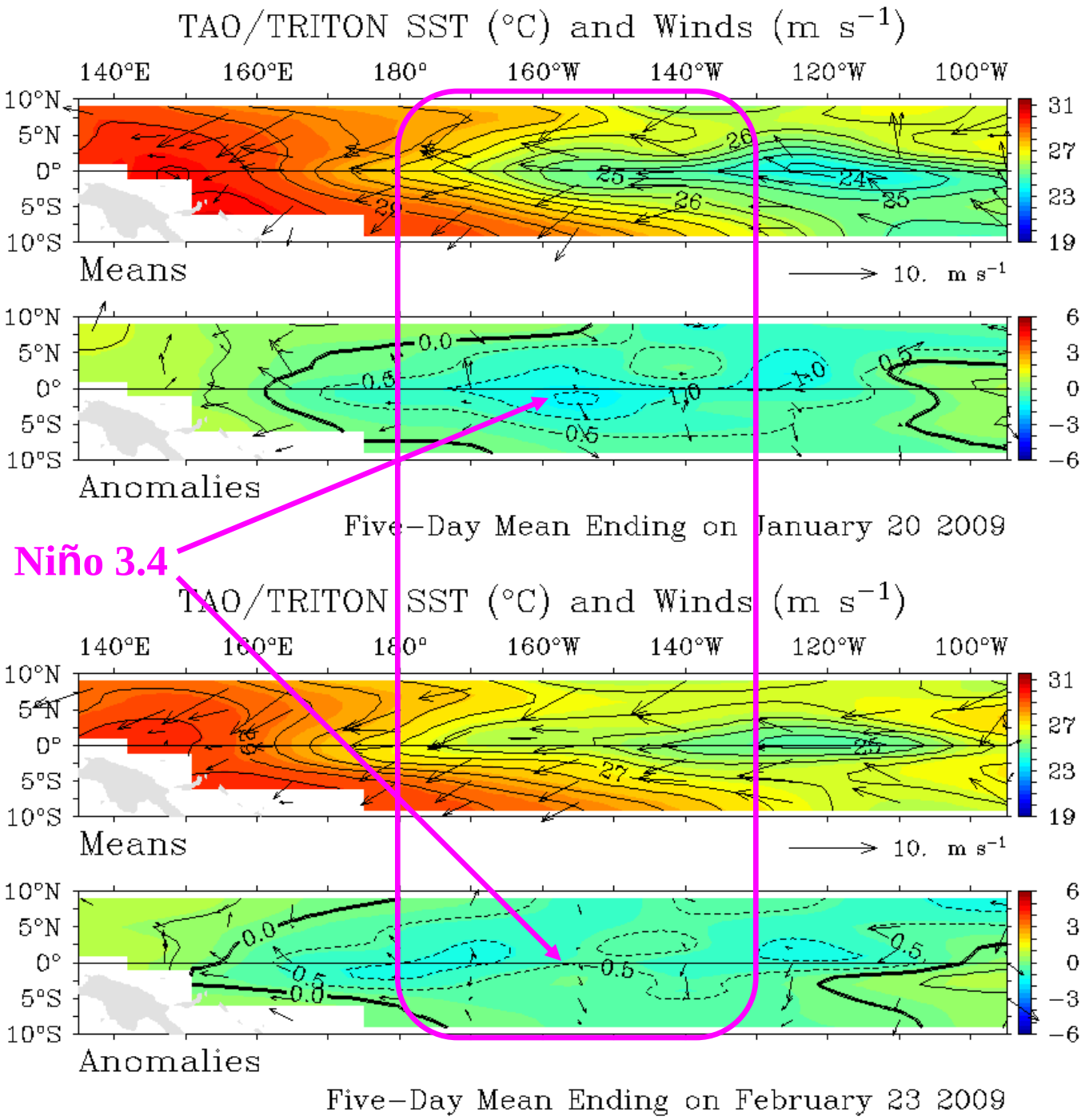
- **La Niña: Winter #2**
- **This winter so far & expectations for next few weeks**
- **CPC forecasts for March - June 2009**
- **Experimental forecast guidance for April - June 2009**

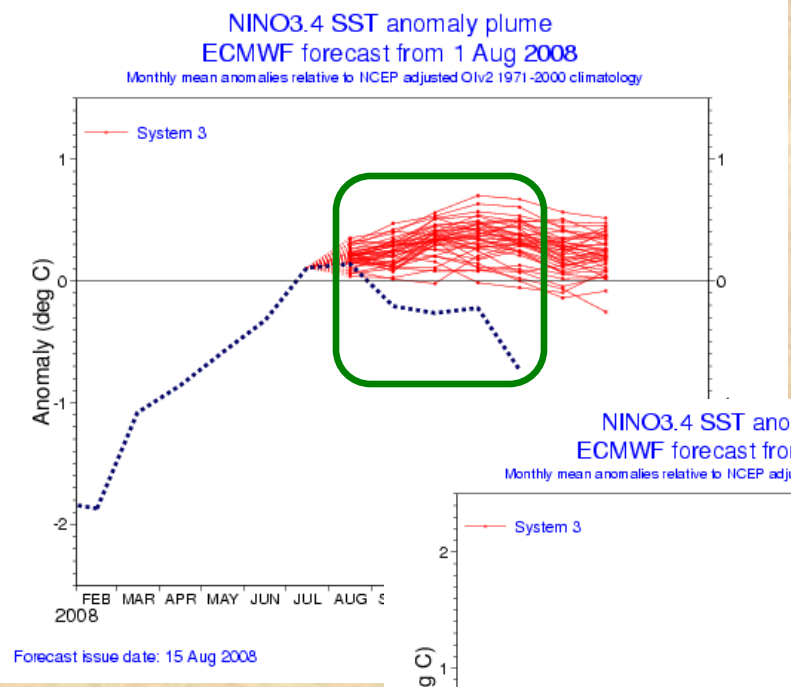




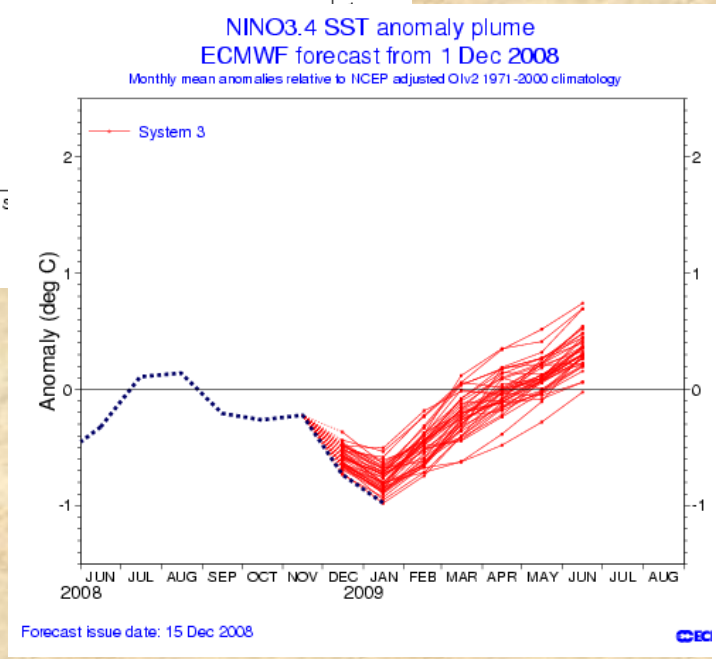
From 3rd strongest La Niña since 1950 (Feb-Mar'08) to above-normal in three months, and back to at least weak La Niña!

Current state of ENSO (bottom) compared to last month (top): the tropical Pacific has continued its weak-to-moderate La Niña event, but weakening since last month. Trades are not particularly strong either (and mostly to the west of the dateline).

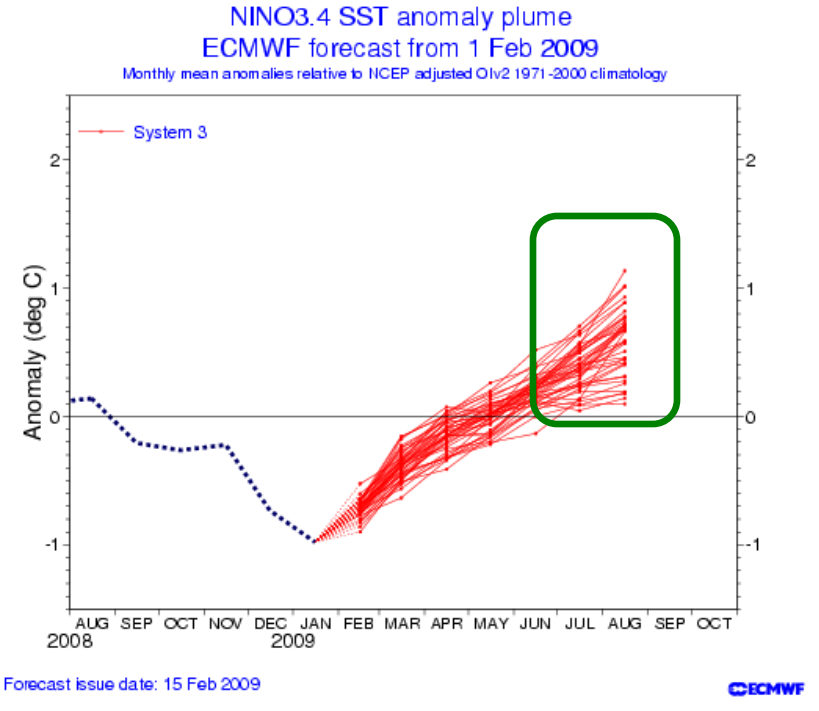




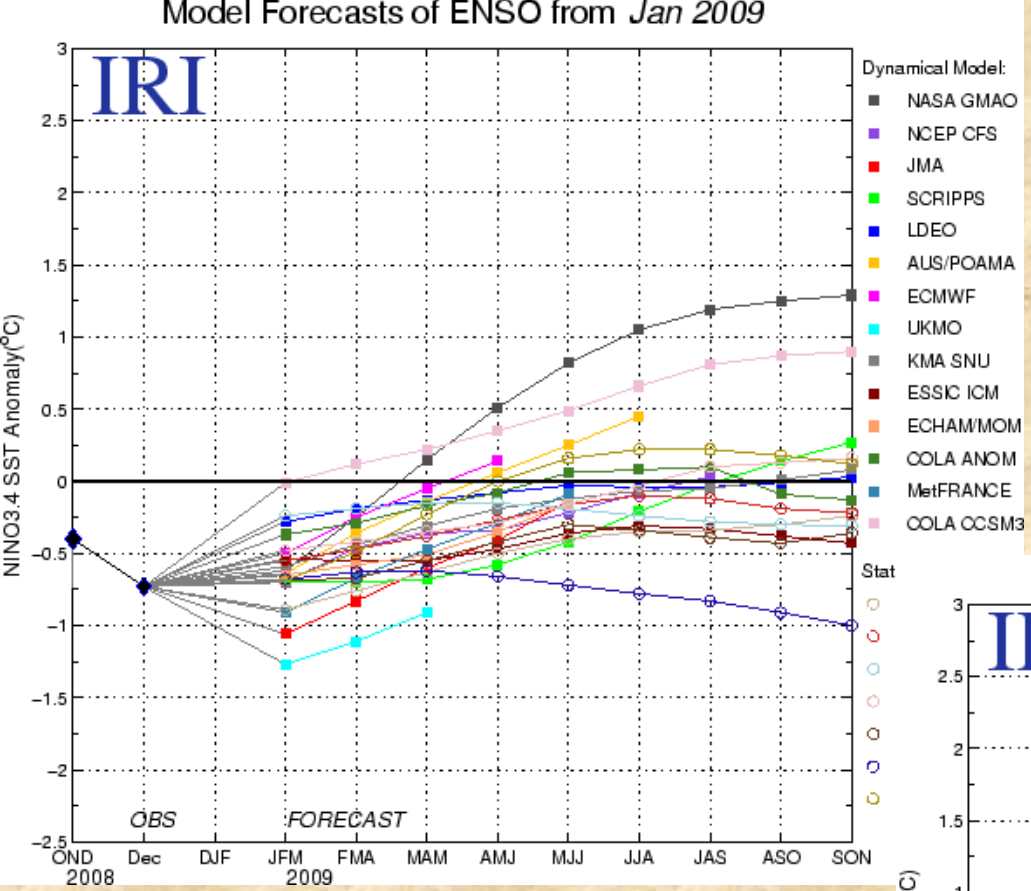
The European model's August forecast (left) anticipated weak El Niño conditions thru rest of 2008, while the observed SST dropped below the forecast range by *September* - highly unusual!;



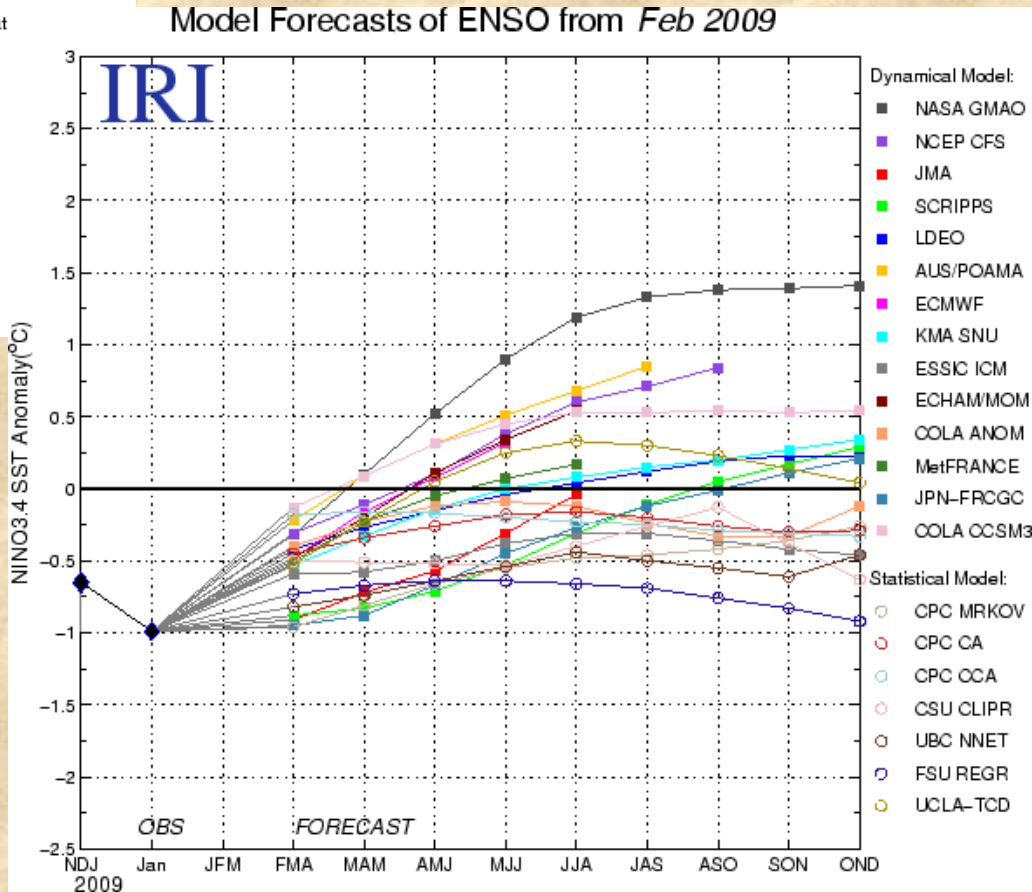
A more serious temperature drop occurred by late '08 (left), peaking near -1°C (moderate La Niña) in January. This is the forecast I showed last month.



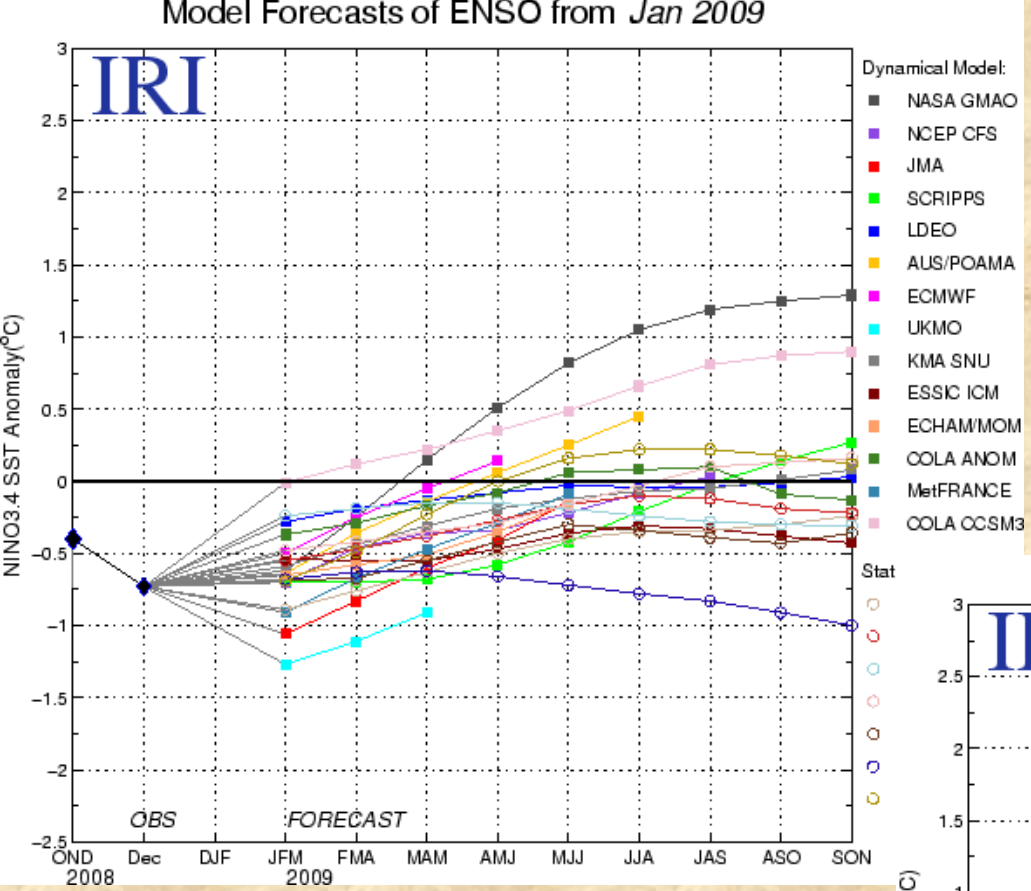
The latest forecast (right) has a pretty clear trend towards at least neutral (if not El Niño) conditions by late spring (summer). The forecast range of less than 1°C thru July is comparatively small.



Latest ENSO forecasts from almost two dozen dynamical & statistical forecast models (below) vs. last month (left). Most models now 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)... There is a widening gap between dynamical & statistical models!



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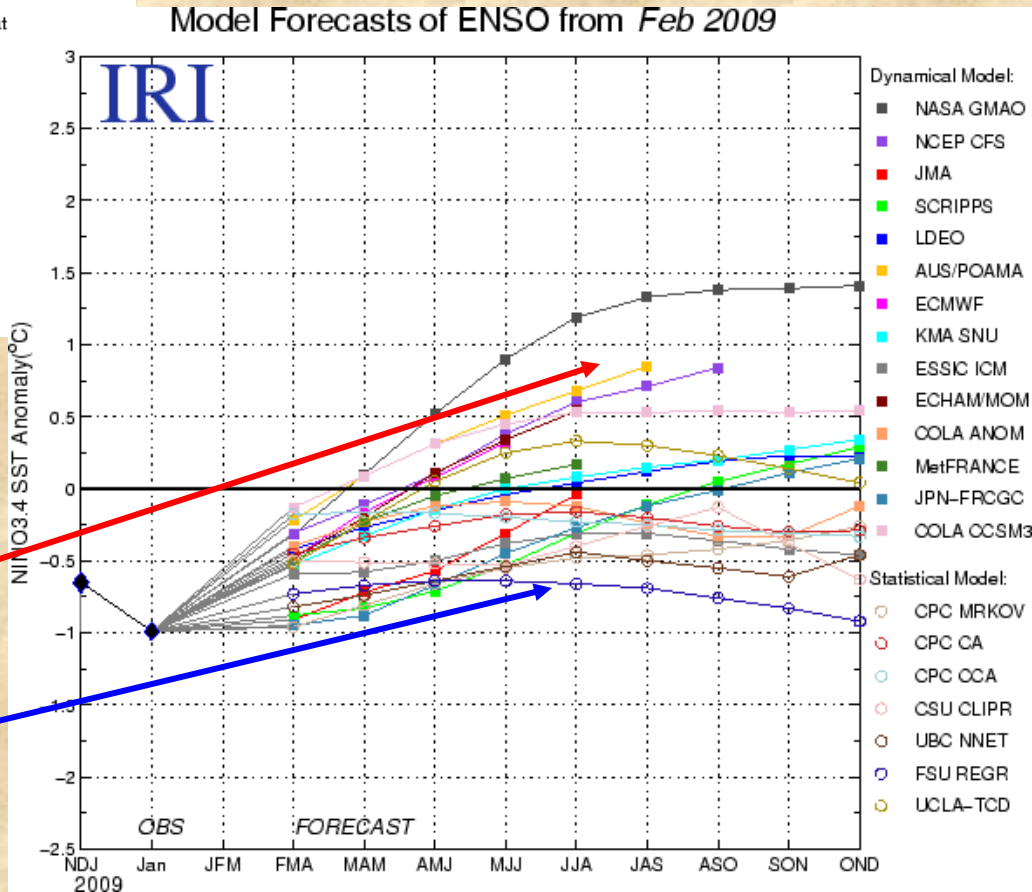

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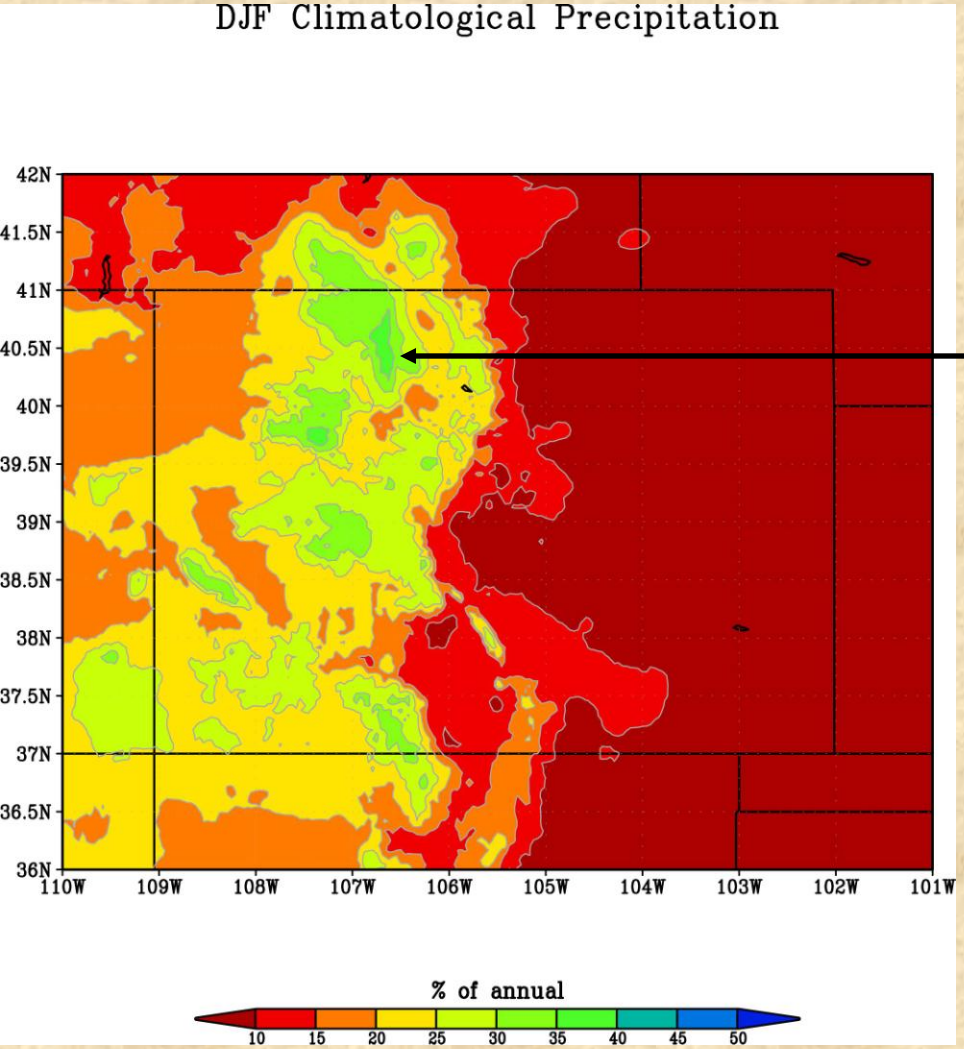
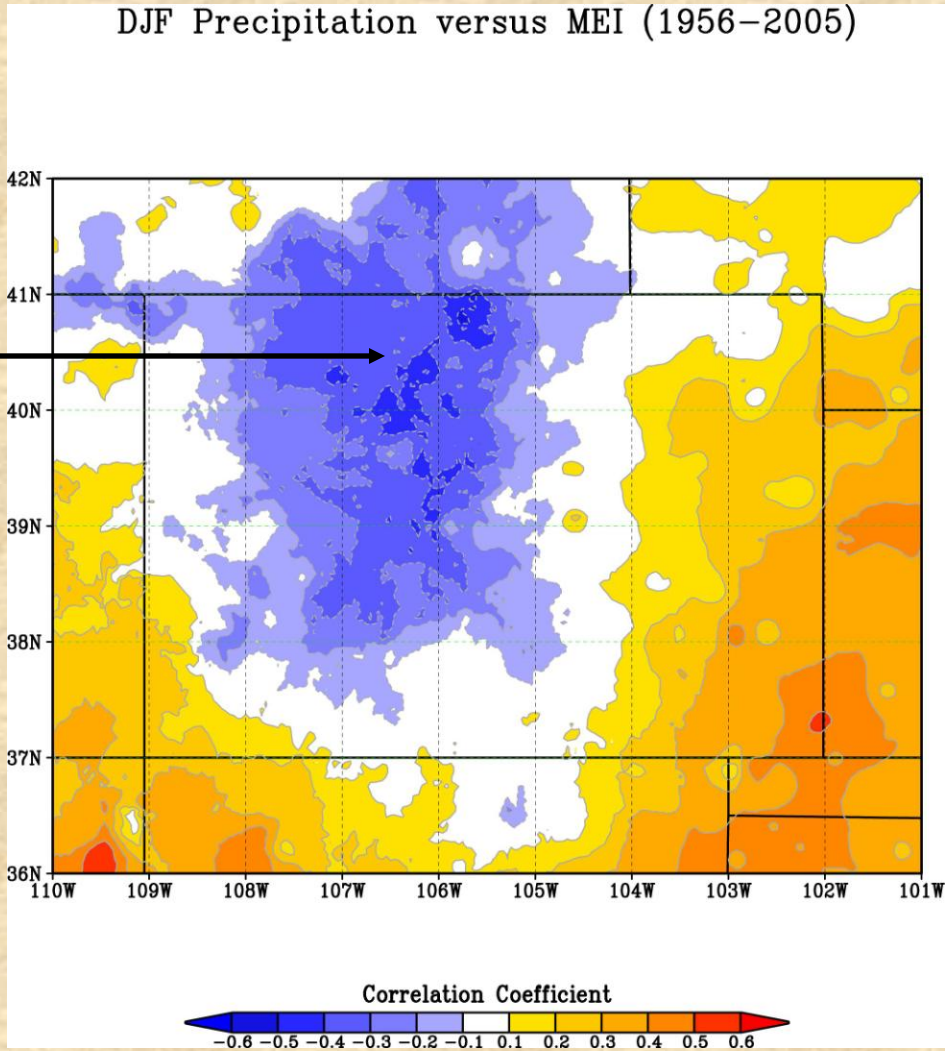
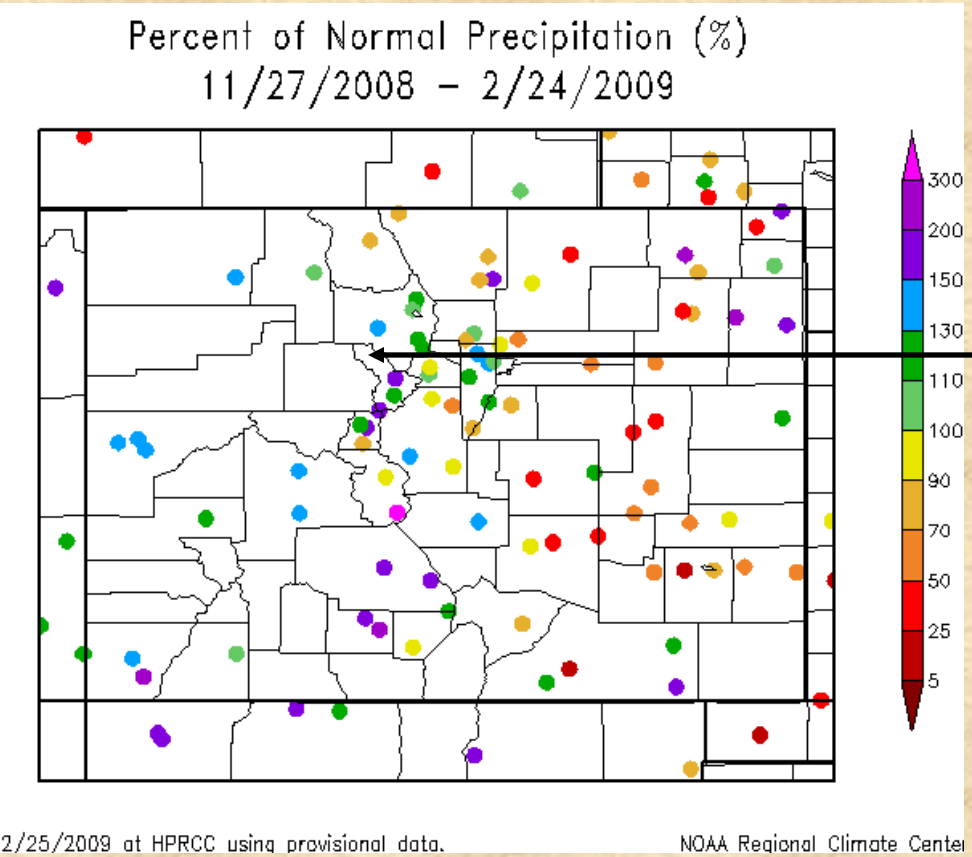
What are typical La Niña impacts in the winter?

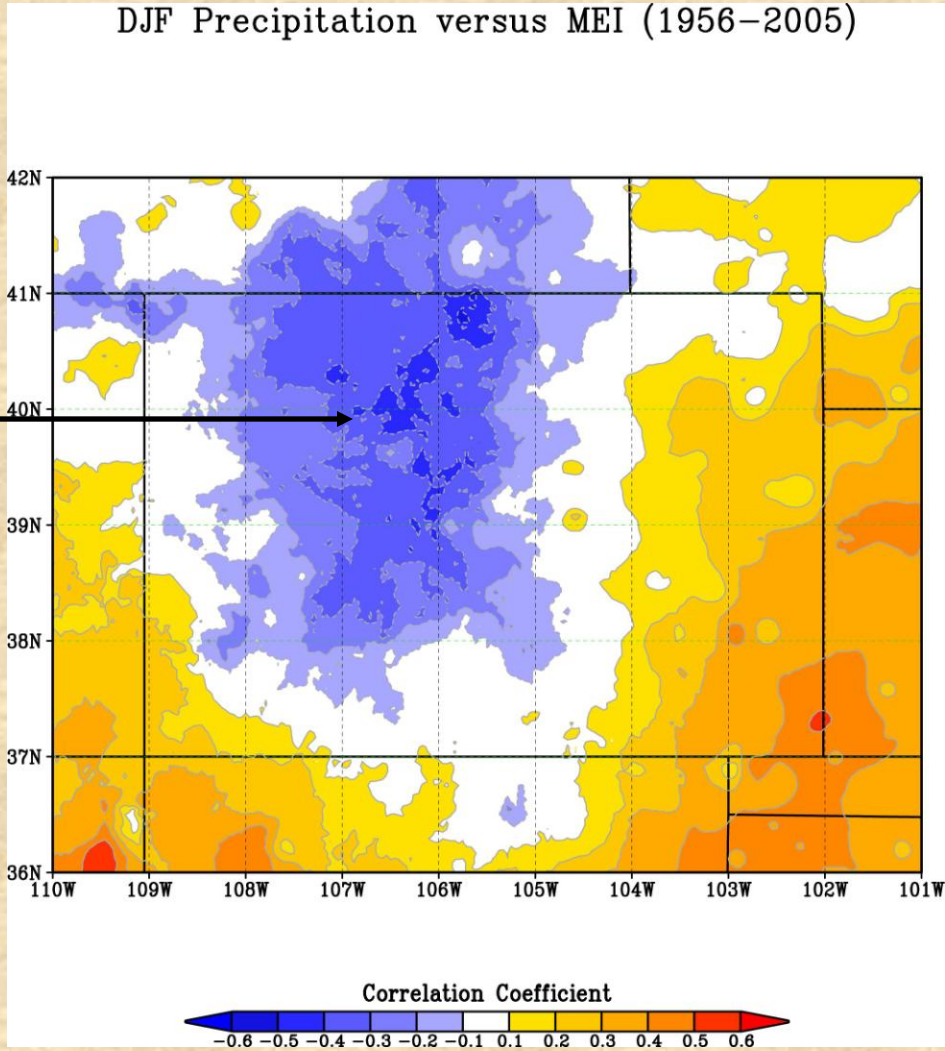




Northwest Colorado benefits the most from average winter seasons (left), even more so during La Niña conditions (negative correlations; right).

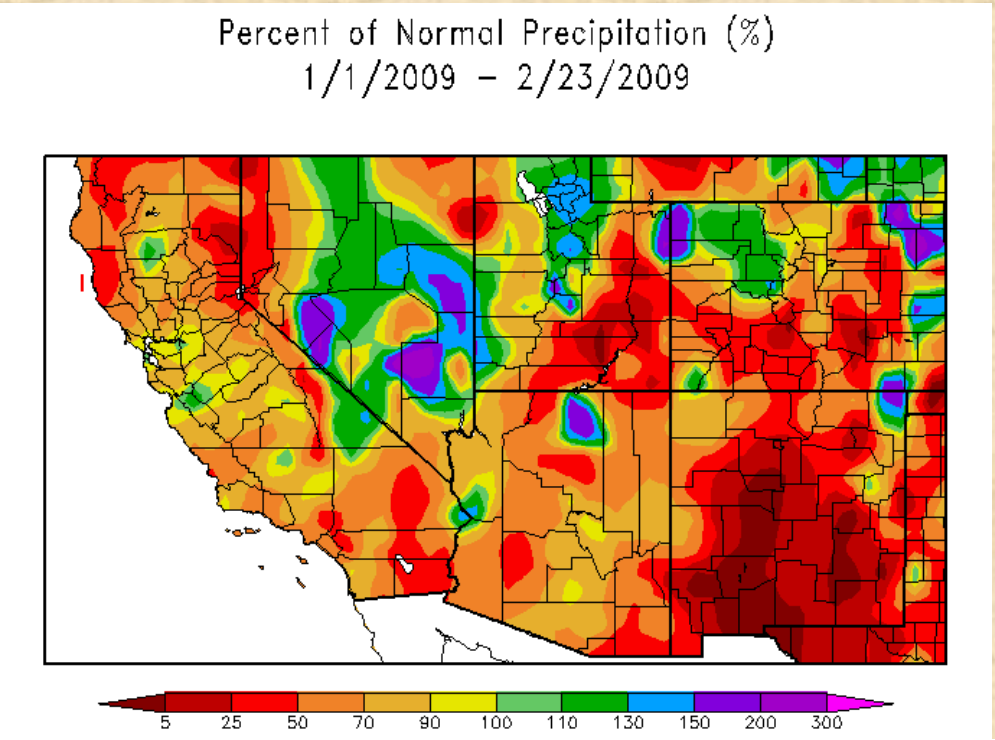
What about this winter?



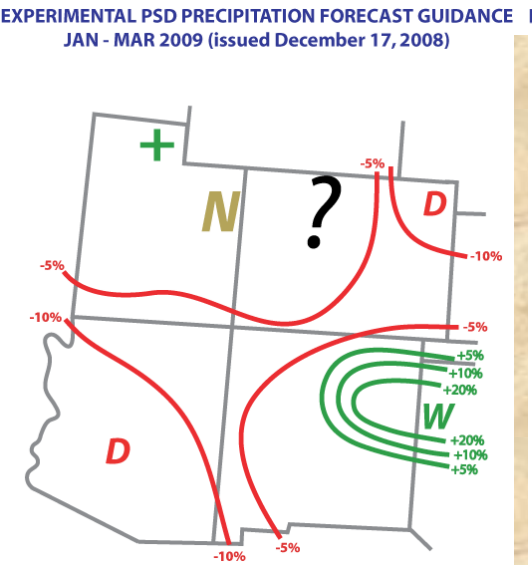


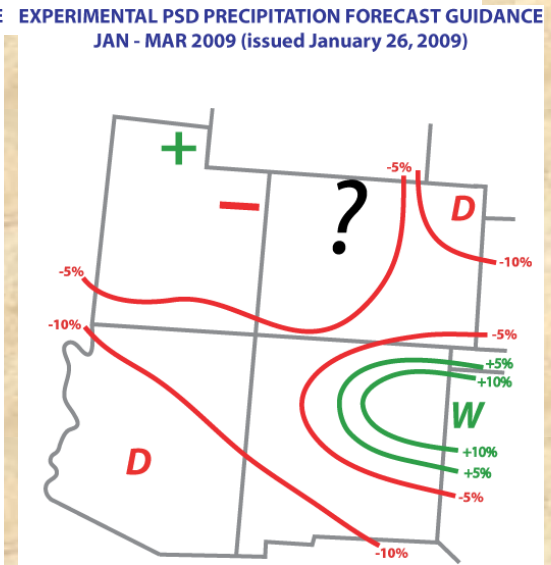
This winter has brought snow amounts pretty close to La Niña-based expectations - above normal in most mountain locations, below normal on most of the eastern plains!

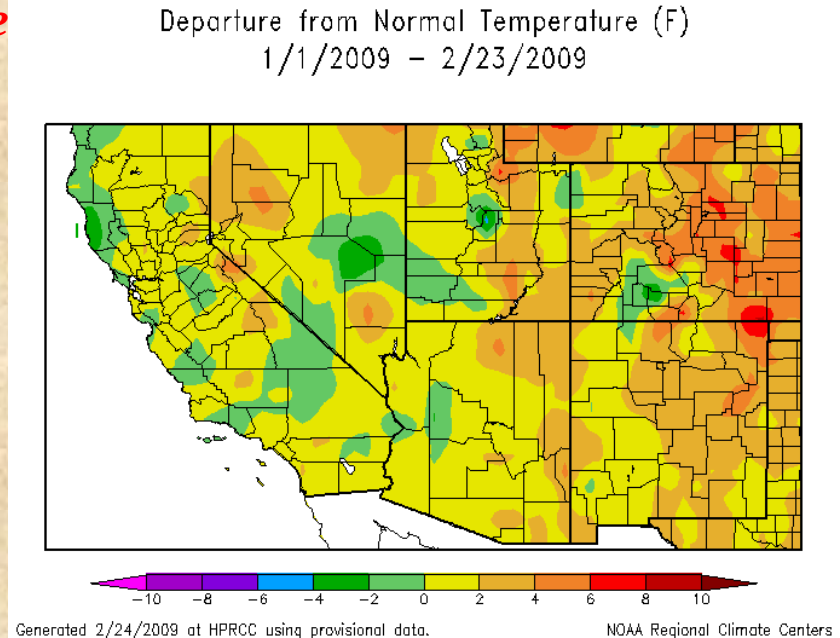
What has happened so far in 2009?



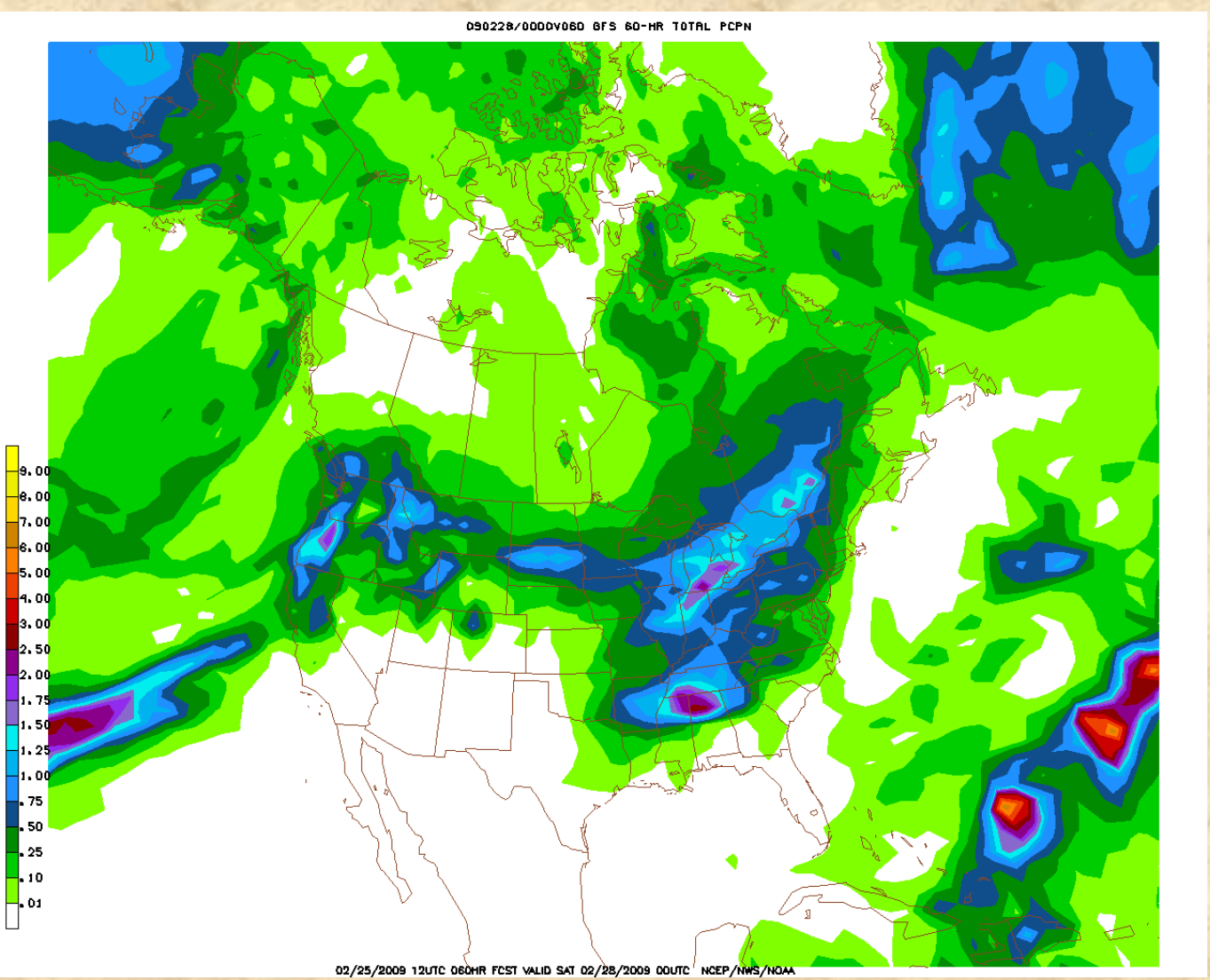
Our northern mountains (and northern Utah) have received decent moisture for the year so far (left), while the southern mountains have taken a 'break'. Dry conditions have covered southern Utah, most of Arizona, New Mexico, and most of our eastern plains. Except for NM, this is fairly consistent with my forecasts (bottom left). ***This winter has not been as cold as last year's (below), with frequent Chinooks to keep us 'warm' in the Front Range and wiping out our snowcover be***



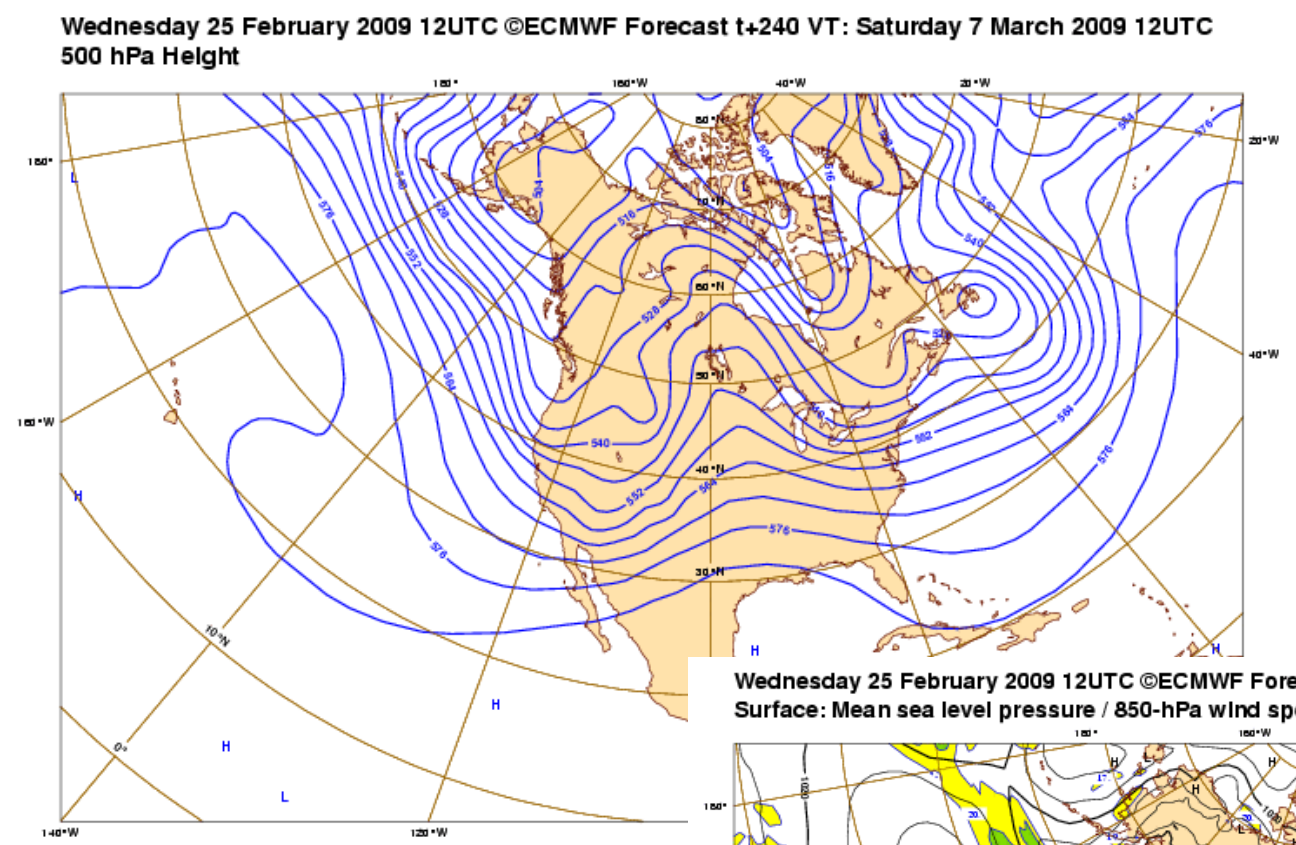




What can we expect in the near-term?

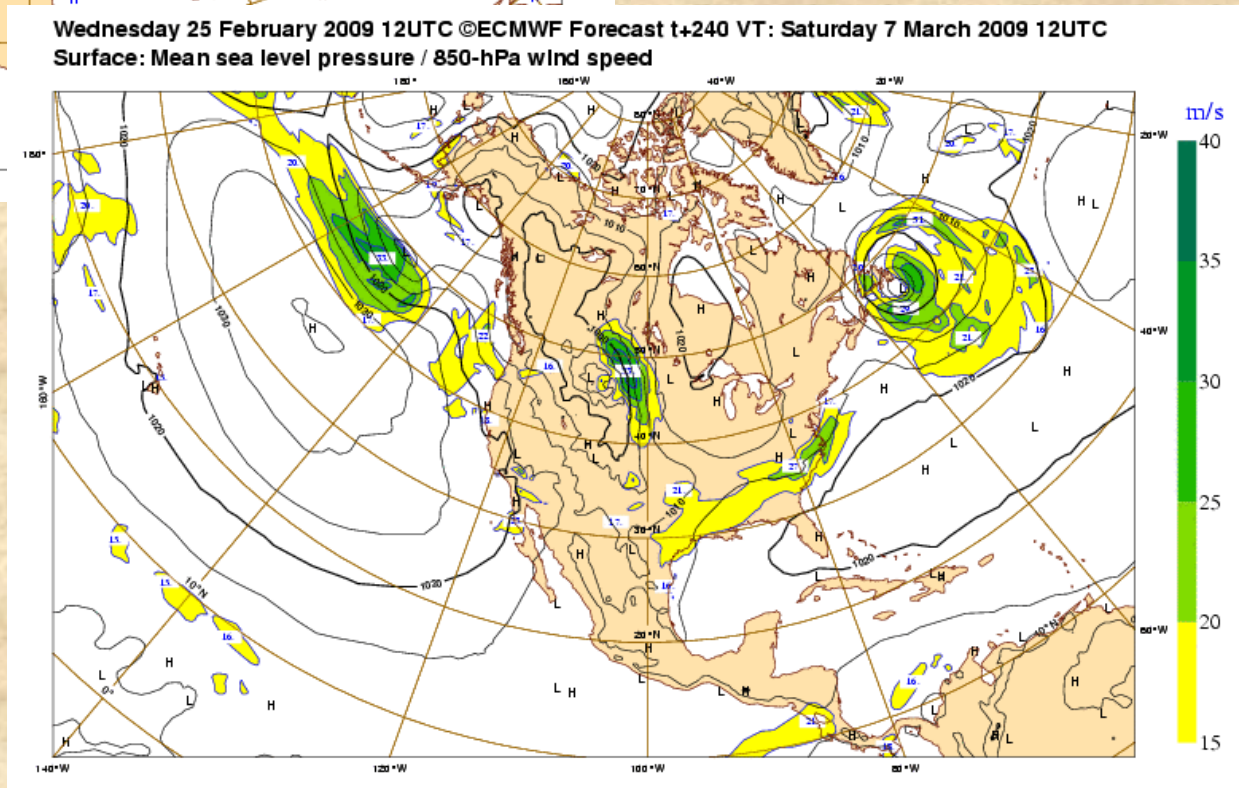


Another storm will hit our mountains before the weekend. Map (left) shows total precipitation thru Friday 5PM: up to 3/4” for our central & northern mountains, and a flurry for eastern CO (arctic air tries to return, but only ‘backdoors’ in by Friday, keeping the more interesting weather over Upper Midwest). This model (GFS) is wetter than NAM for this run.



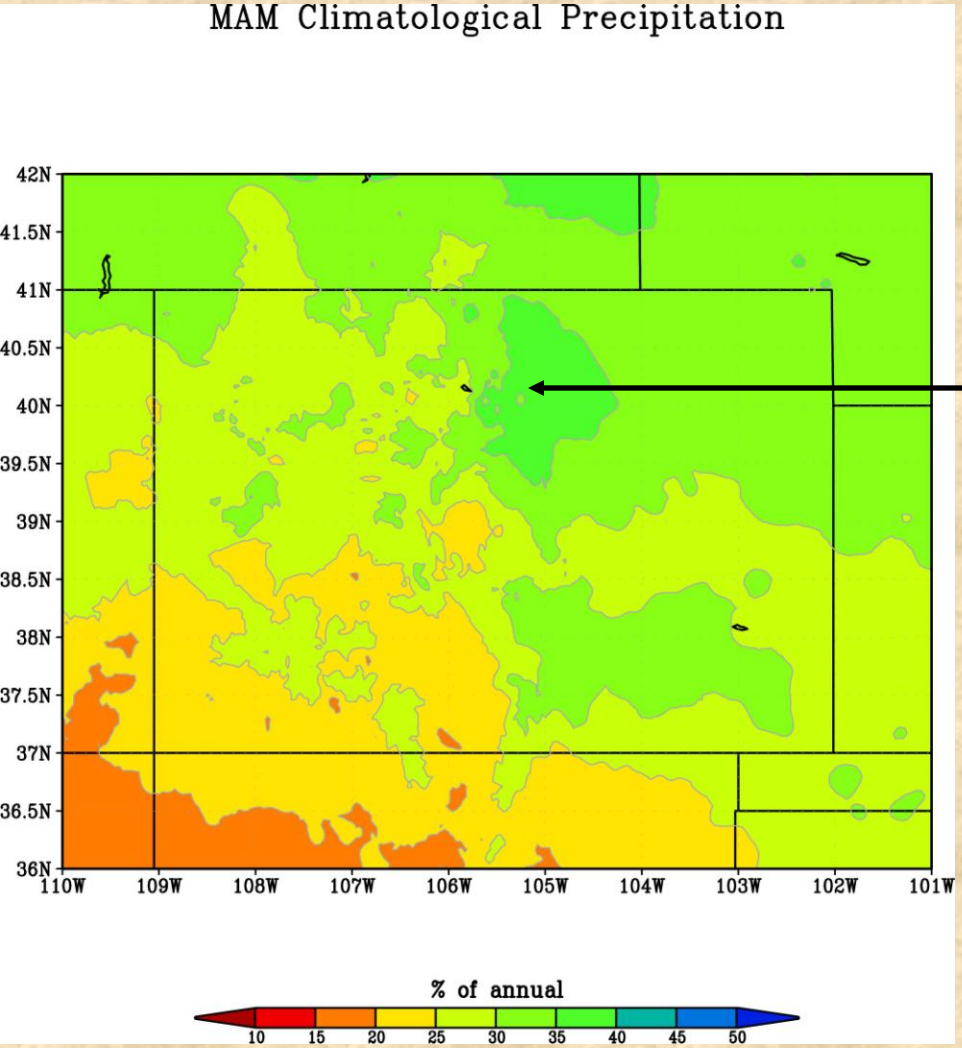
Mid-term?

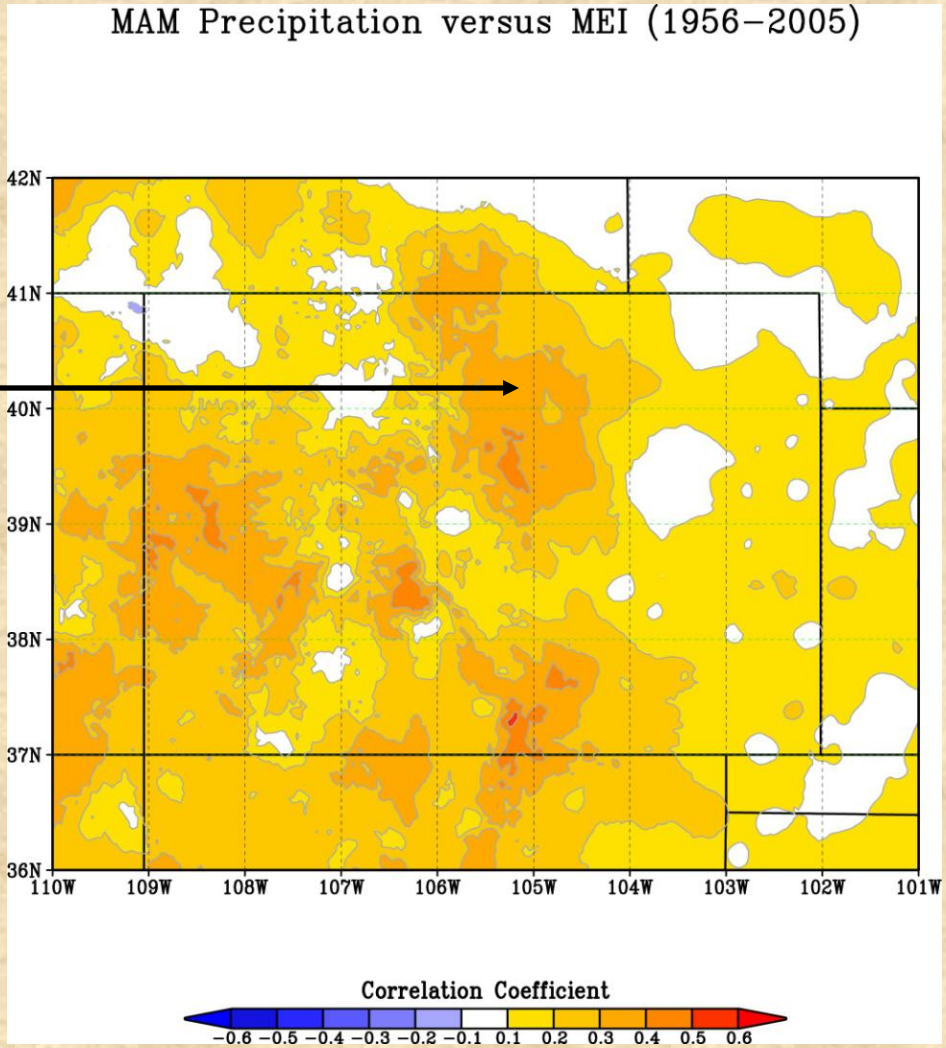
After another dry mid-continental high pressure ridge episode, we can look forward to stormier weather by the end of next week. Some model runs even give eastern Colorado a fair shot at moisture (rain/snow mix!) by then.



There should be just enough moisture trapped in the flow to give the mountains a shot at occasional snow through next week, probably not enough to maintain our current 113% statewide average.

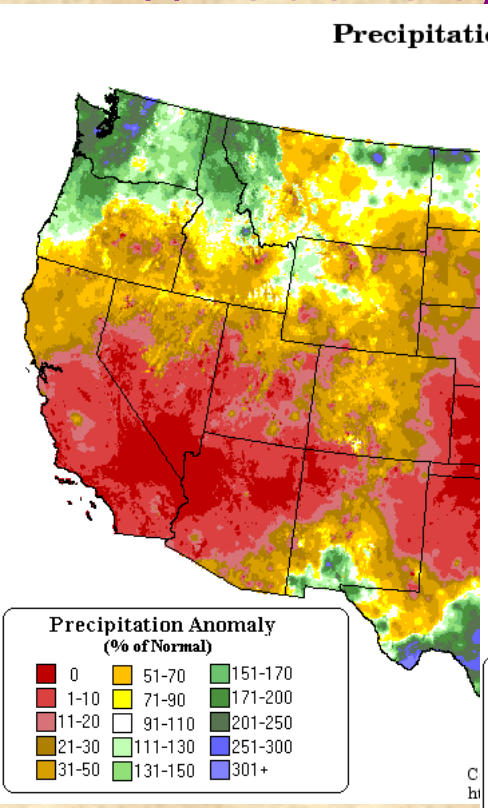
What are typical La Niña impacts in the spring?

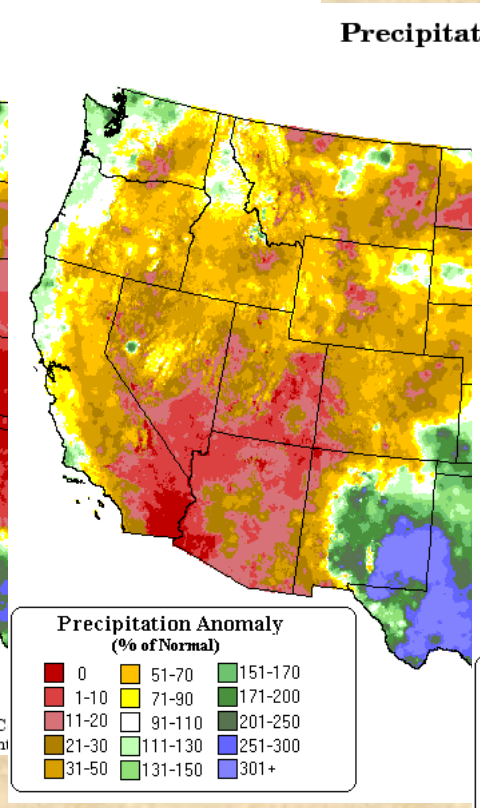


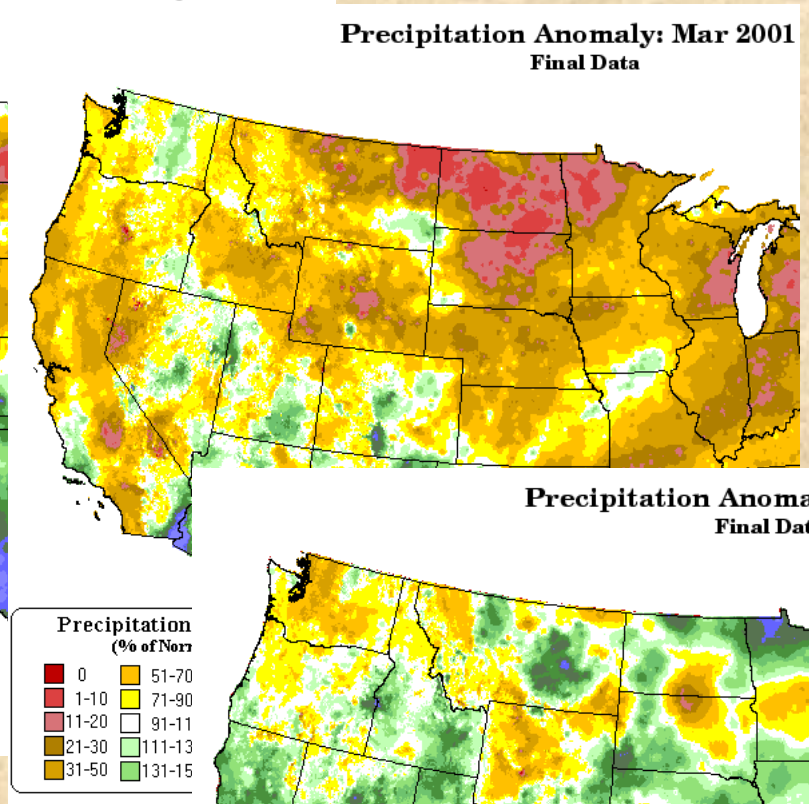


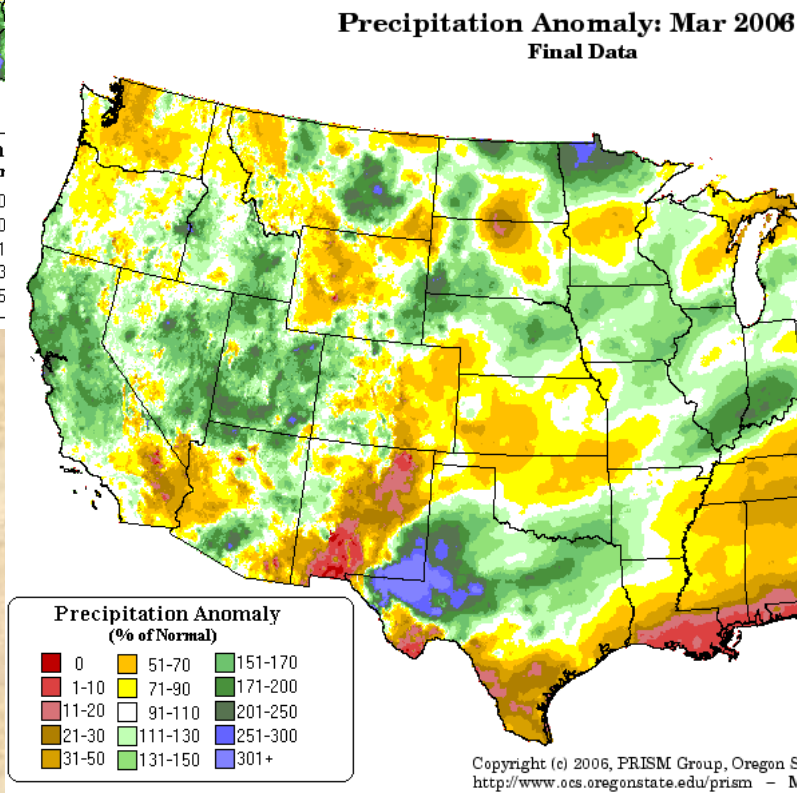
Northeast Colorado benefits the most from average spring seasons (left), but less so during La Niña conditions (positive correlations; right). Best case scenario: a switch from La Niña to El Niño early in year (such as 1957; 1997).

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



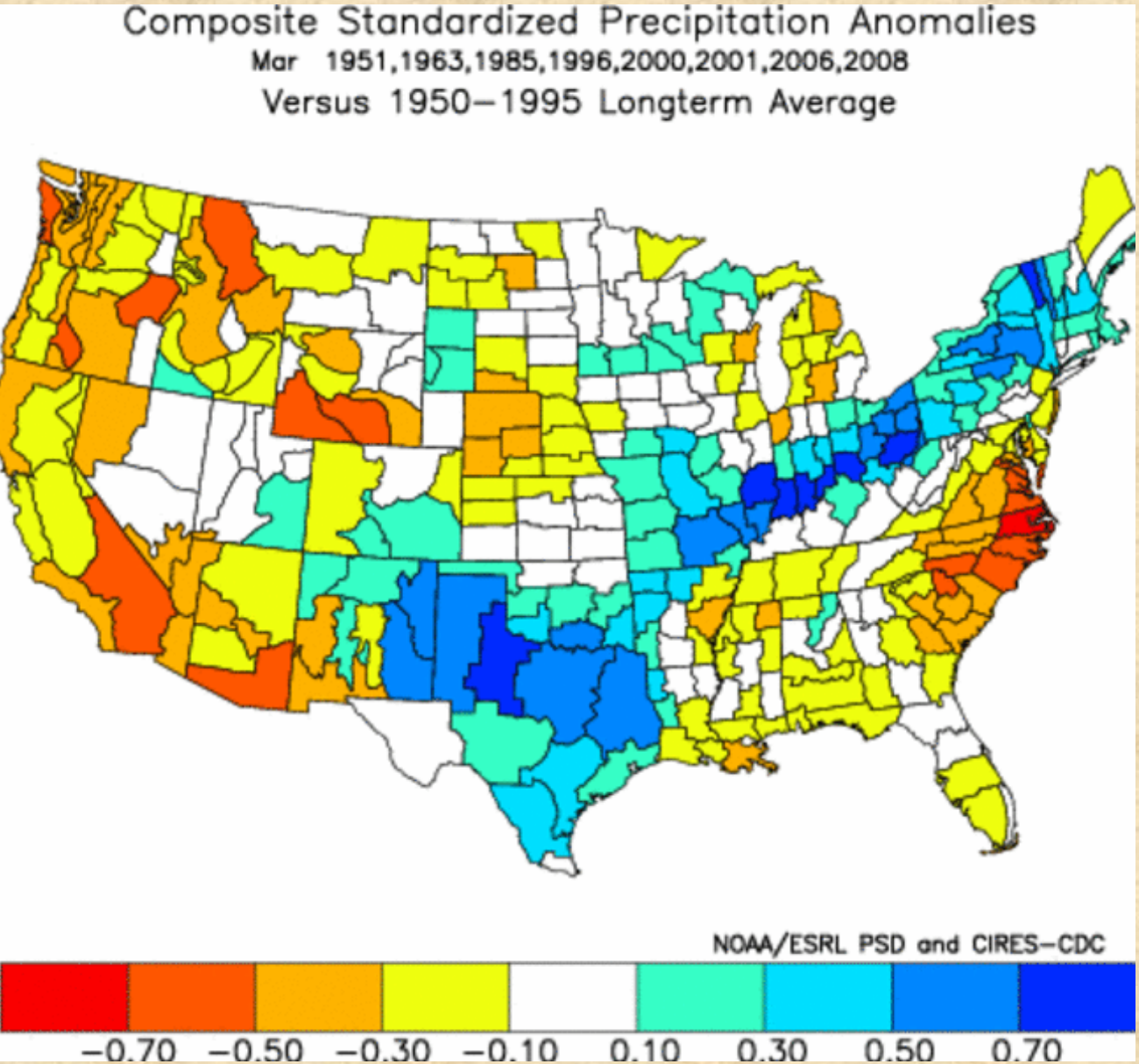






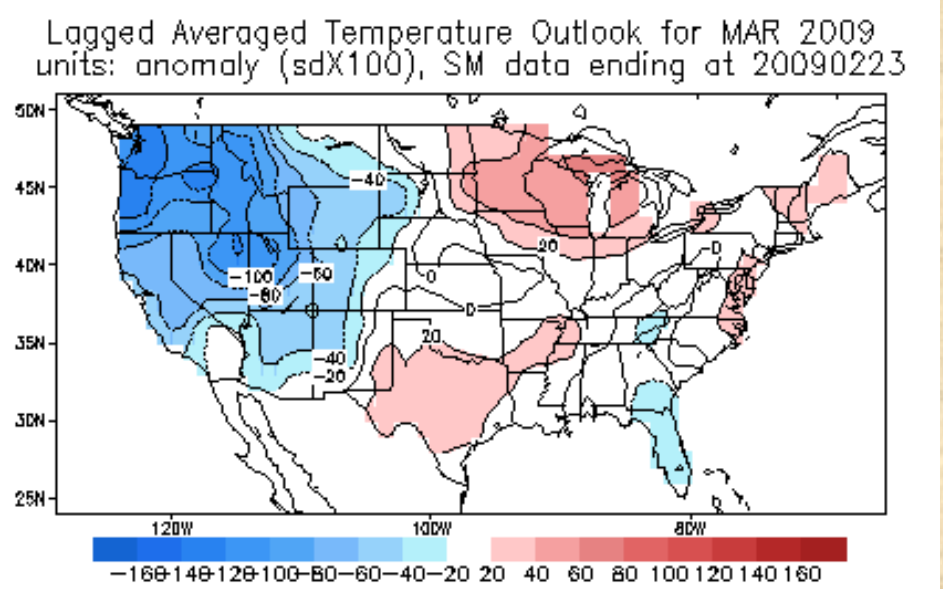
Last four weak March La Niña cases confirmed dry tendency for CO in this situation (1997, 99, 01, and 06). The last case, March ‘06 was actually the wettest of the four in our mountains, while March ‘01 was the wettest along the Front Range.

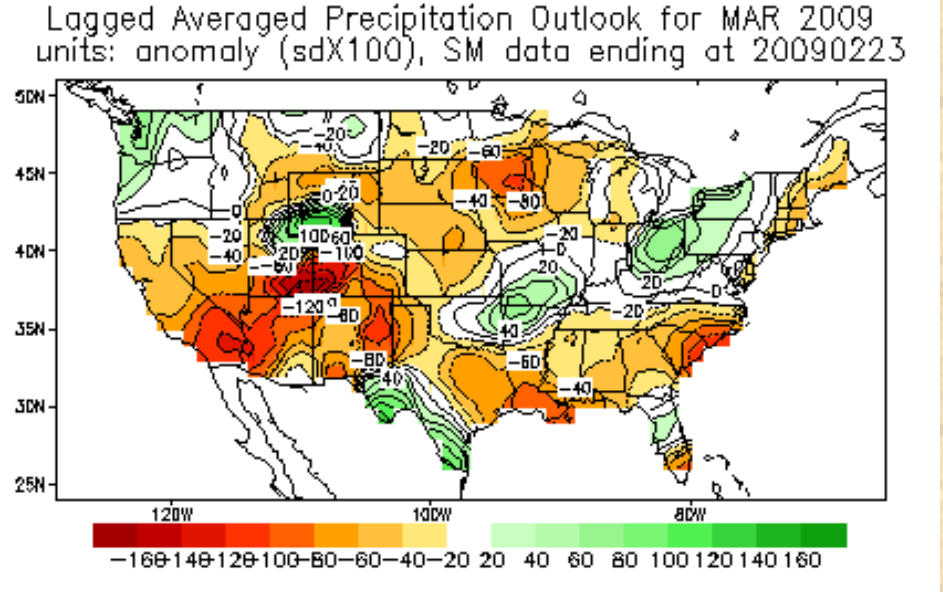
What are typical precipitation patterns in March after La Niña (going into ENSO-Neutral)?

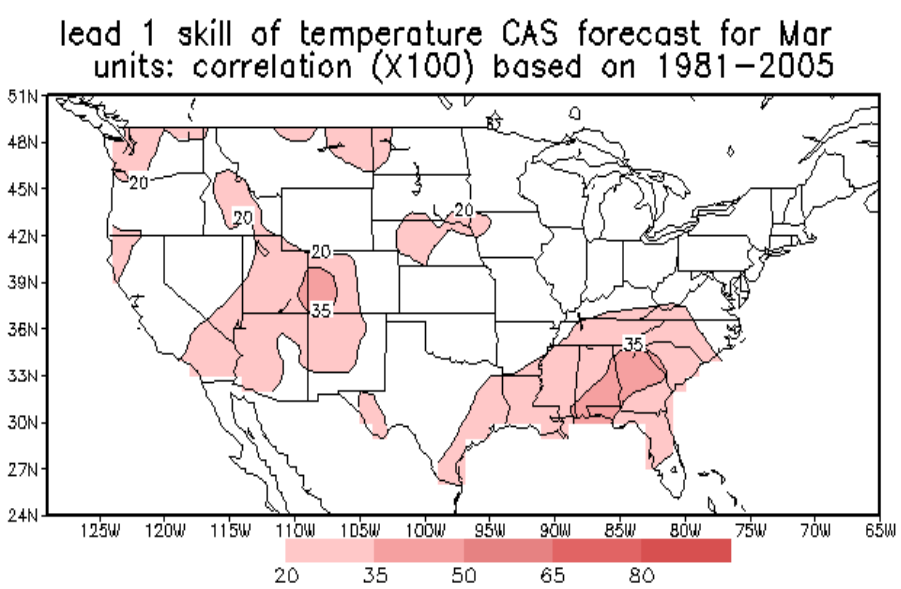


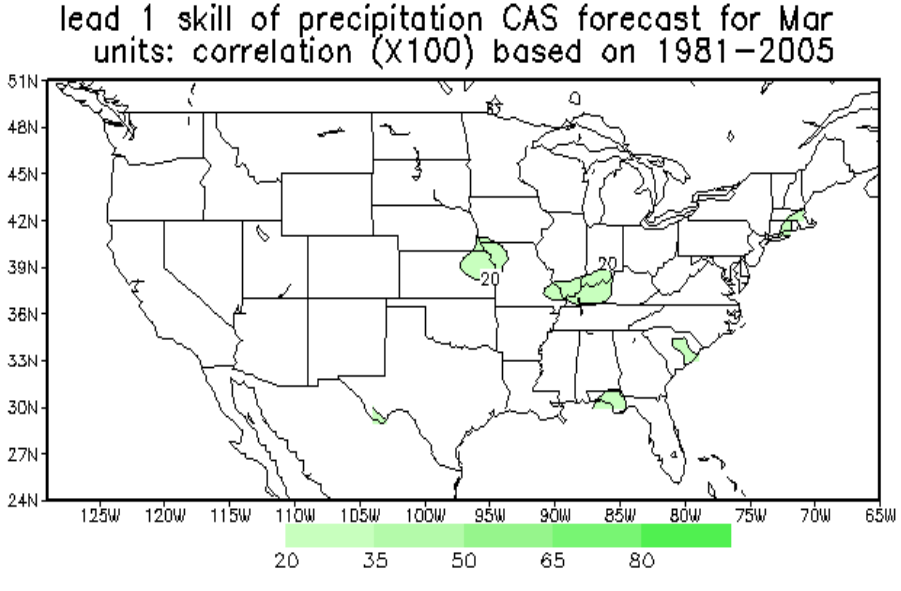
La Niña winters going into ENSO-neutral by the summer have been more common lately than early in the record. Colorado has faired reasonably well east of the mountains, but average anomalies are quite small, indicating a fair scatter / no guarantee of near-normal precipitation!

What about 'Constructed Analog' Forecasts?









Dry March forecasts near 4corners have shown little skill, while cold forecast is better supported!

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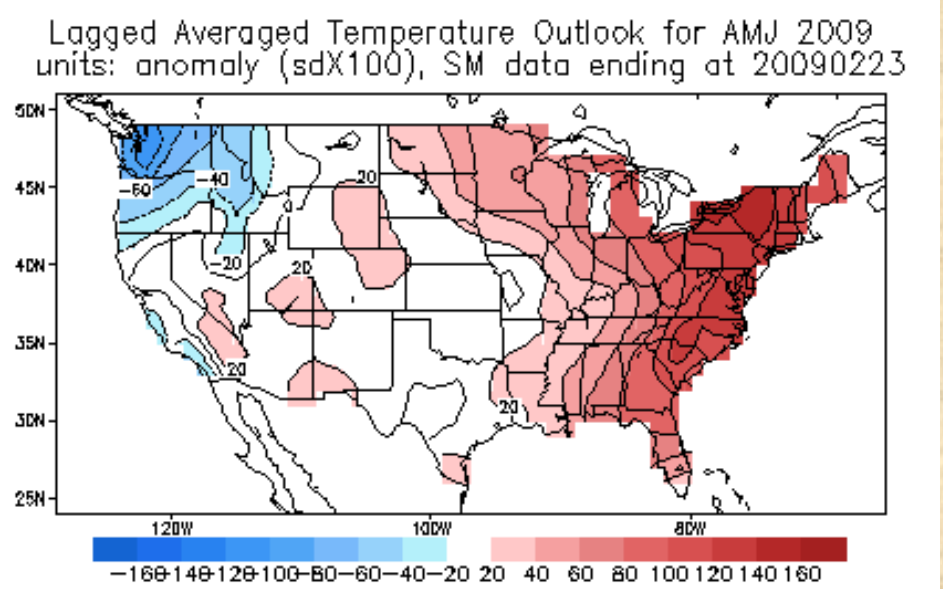
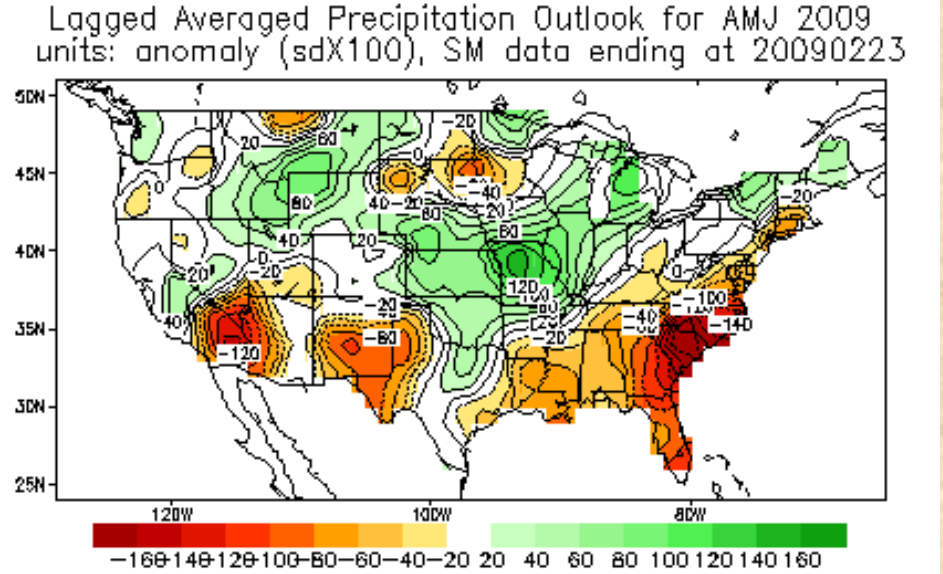
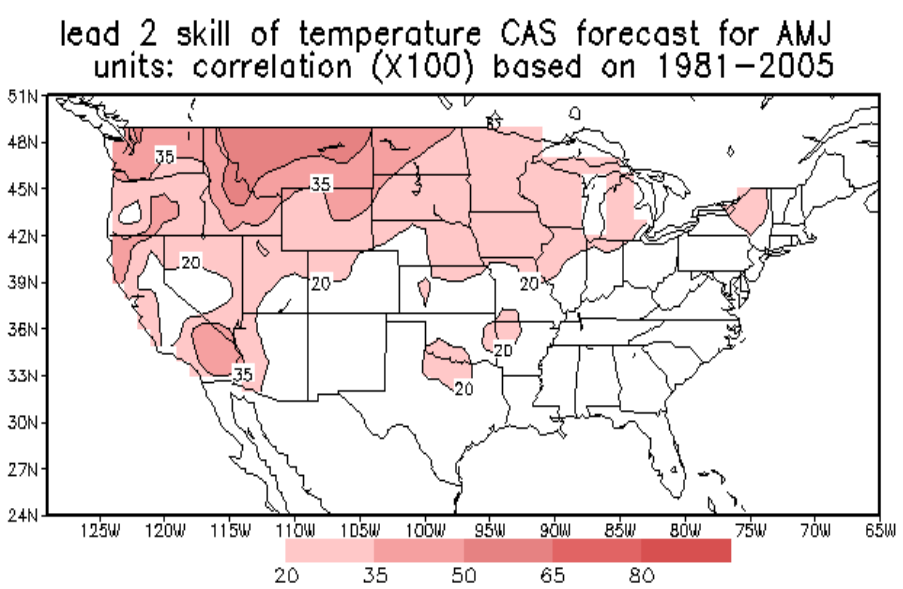
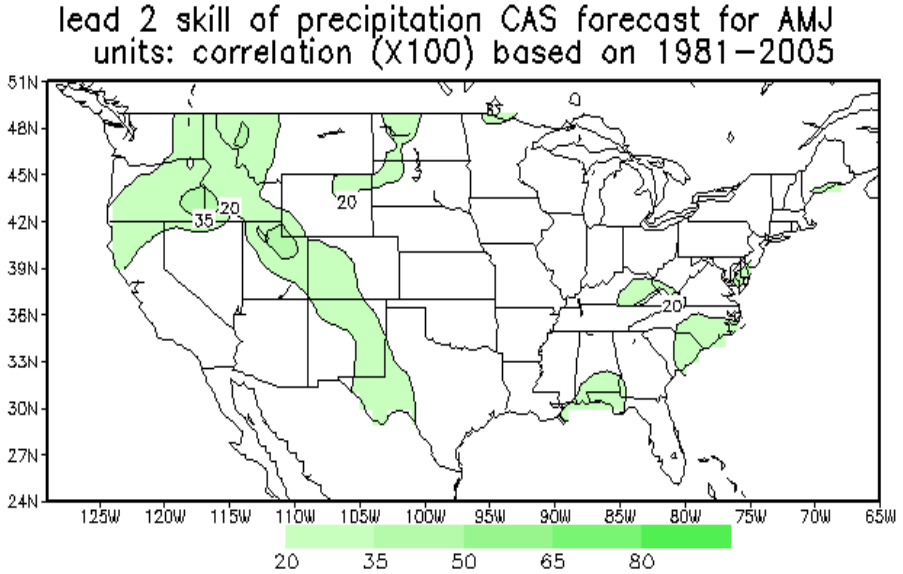


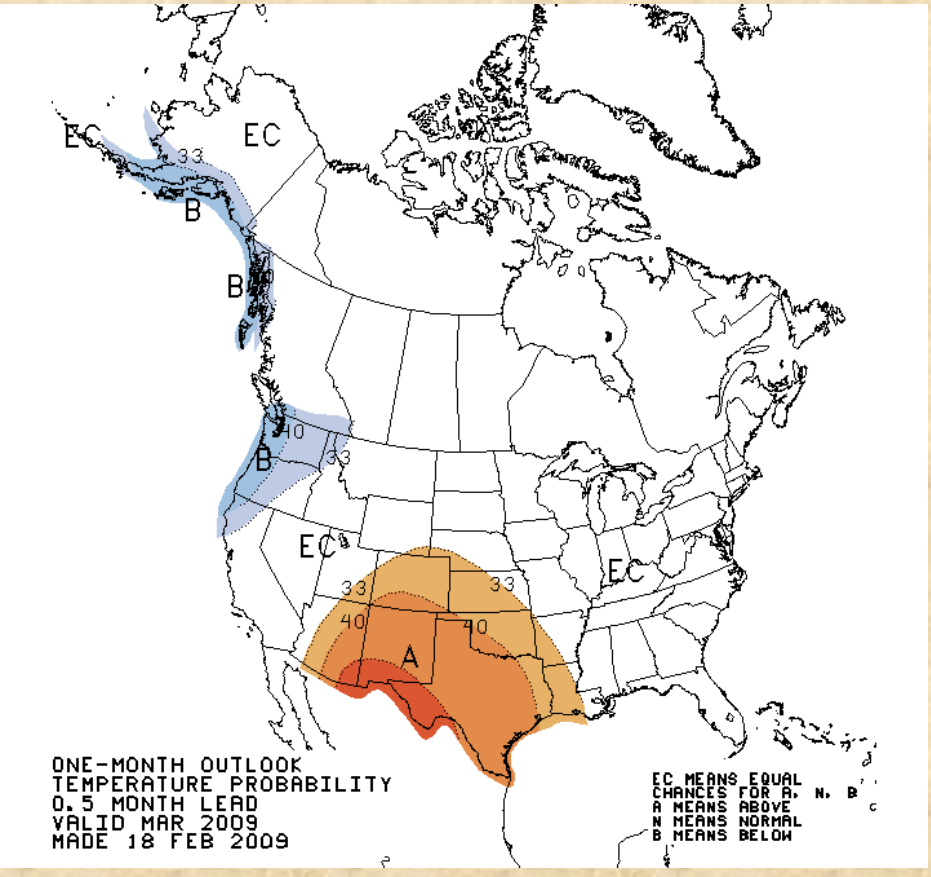


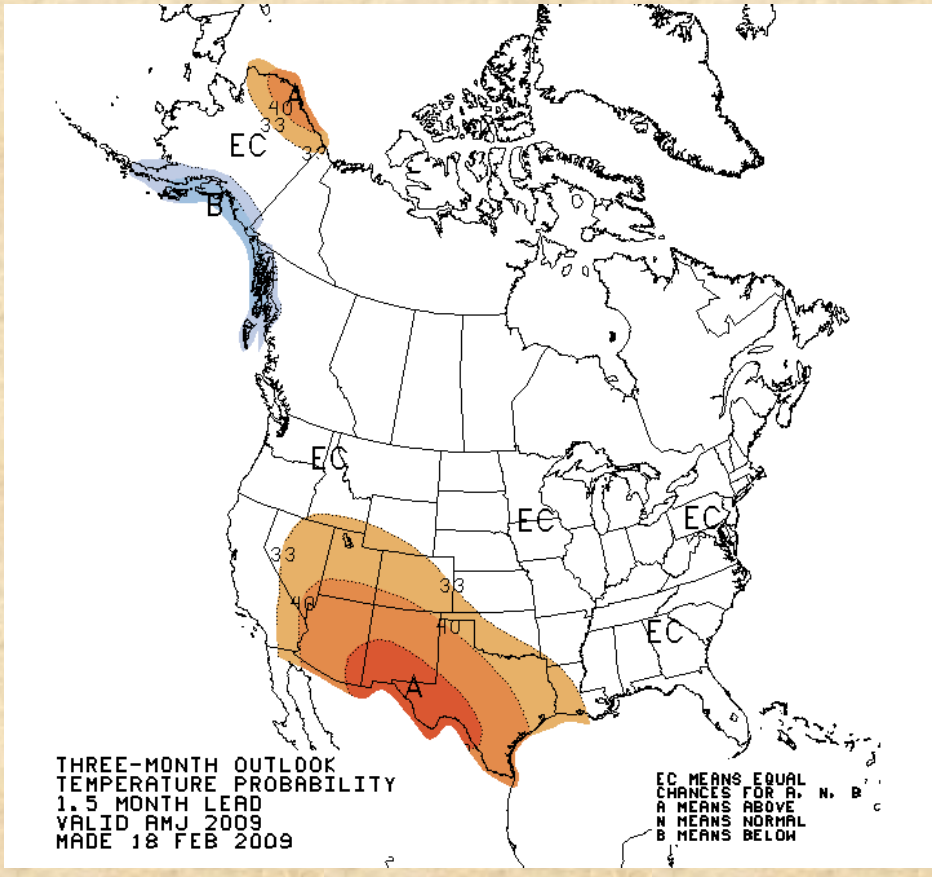




Dry April-June forecasts in New Mexico have skill! Little confidence for near-neutral outcome near us!

CPC Temperature Forecasts

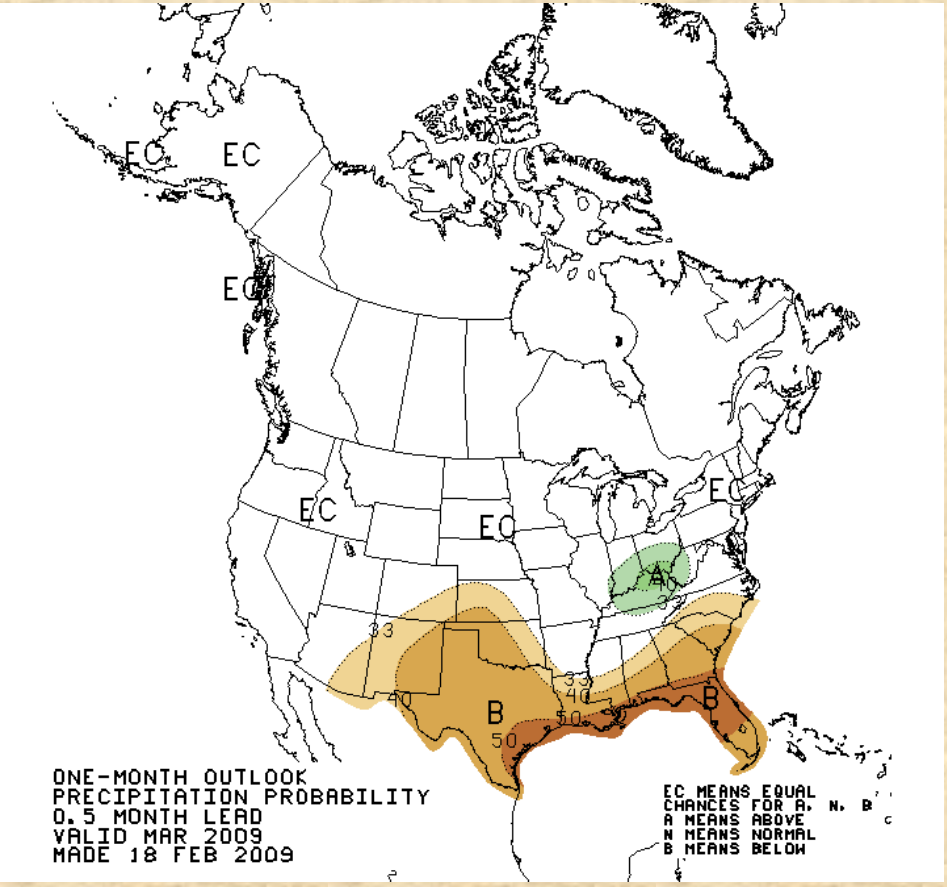


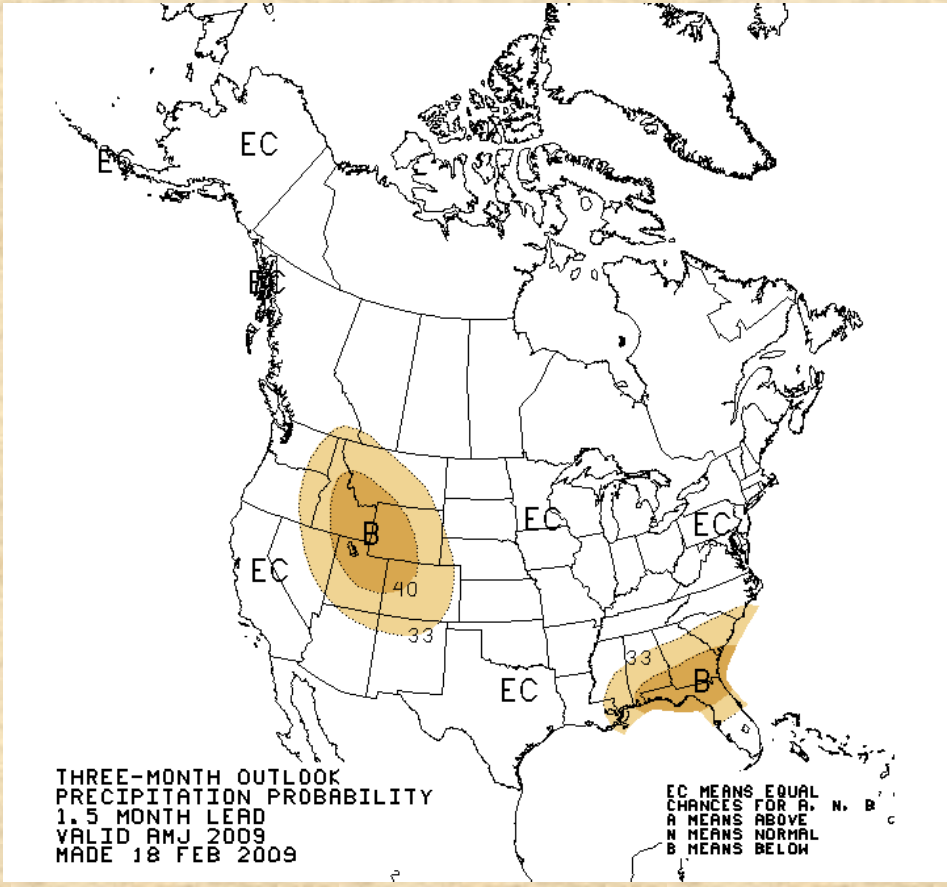


According to CPC's official forecasts from last week, March (left) and April-June (right) temperature forecasts anticipate warmer-than-average conditions this spring in Colorado, consistent with the long-term trend and lingering La Niña influences for this season and region.

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

CPC Precipitation Forecasts

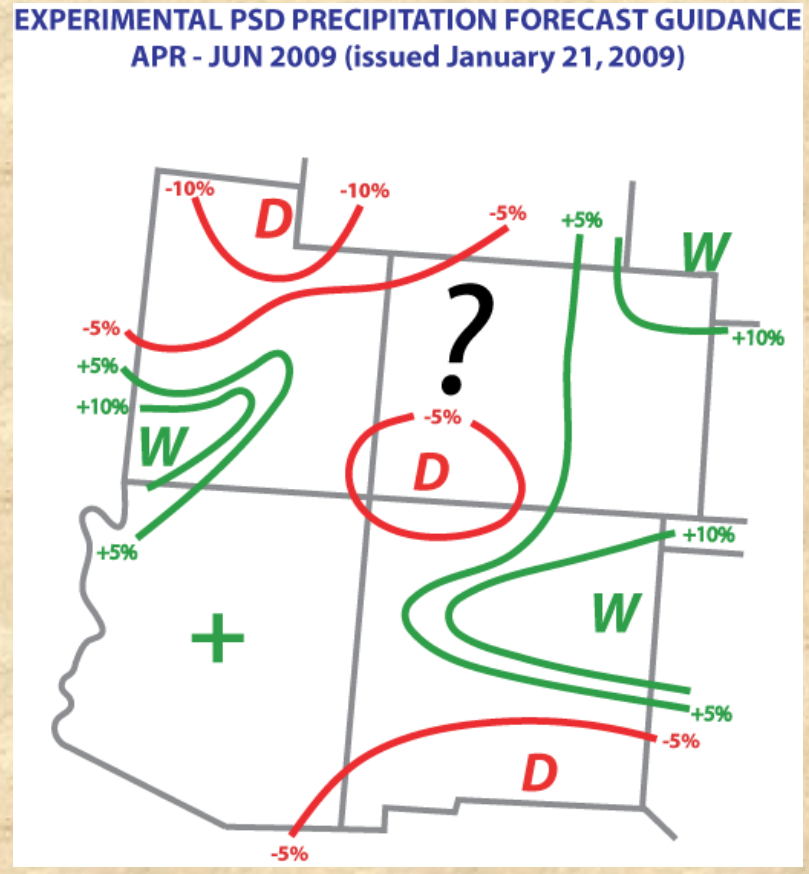


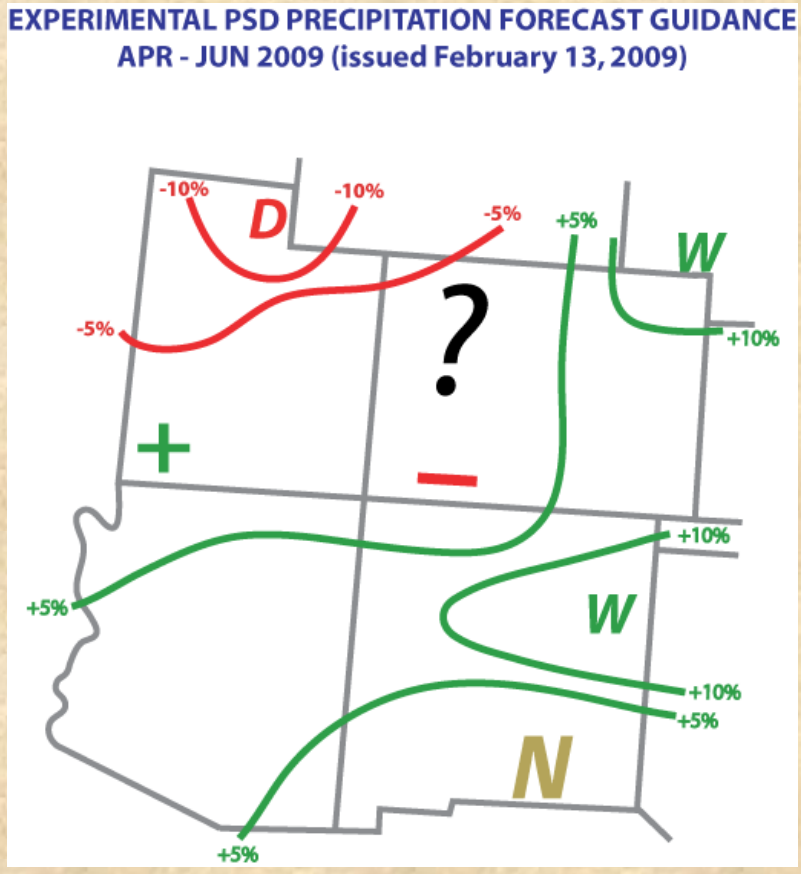


According to CPC's official official forecasts from last week, March (left) and April-June (right) precipitation forecasts are dryish to our south at the beginning, and lean towards dry conditions in late spring. The latter can be attributed to lingering La Niña effects in at least some forecast models.

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

Experimental CDC "Forecast Guidance"





January's (left) and February's Apr-Jun forecast (right) are fairly consistent with each other, anticipating a wet spring over Colorado's eastern plains, an undecided outcome over our northern mountains, and a dry spring over the San Juans. ***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. Next month will be less handicapped in terms of a priori skill levels over Colorado!***

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

Executive Summary (25feb09)

"Official" version at: ***http://www.cdc.noaa.gov/people/klaus.wolter/SWcasts/***

- **While the 2007-08 La Niña event almost disappeared during the middle of 2008, global atmospheric circulation anomalies retained La Niña-like features right through this period, such as a wet "dry season" in Indonesia and mostly stronger-than-normal trade winds over the tropical Pacific. During December 2008, weak-to-moderate La Niña conditions returned as measured in equatorial Pacific SST anomalies, so that all ENSO indicators are now more or less in sync, and should persist at least another month or two.**
- **After a mostly dry fall, a La Niña-influenced stormtrack brought above-normal snowfall to our mountains, rescuing our snowpack from a weak start. This active stormtrack became a bit more intermittent during January and February. The next two weeks promise a similar potpourri of wet and dry spells that should be sufficient to keep snowpack numbers at least near-normal for the duration.**
- **My experimental forecast guidance for the late spring season (April-June 2009) reflects both lingering La Niña impacts (a dry forecast for northern Utah and southwestern 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 all the way to the Nebraska panhandle, including eastern Colorado. Unfortunately, most of the wetter-than-average forecasts are not backed by good verification skill in the last decade, while the drier-than-average forecasts have indeed been more reliable for the regions thus labeled.**
- **Bottomline: La Niña has returned for an encore performance, consistent with its proven tendency to last longer than one year. While this has helped our mountains with above-average moisture during the winter months, spring looks less favorable, if La Niña were to stick around. Next month's update will be interesting for eastern Colorado in particular since my forecast skill has been much better for spring forecasts issued in March than in February.**