Earth System Research Laboratory
Physical Sciences Division

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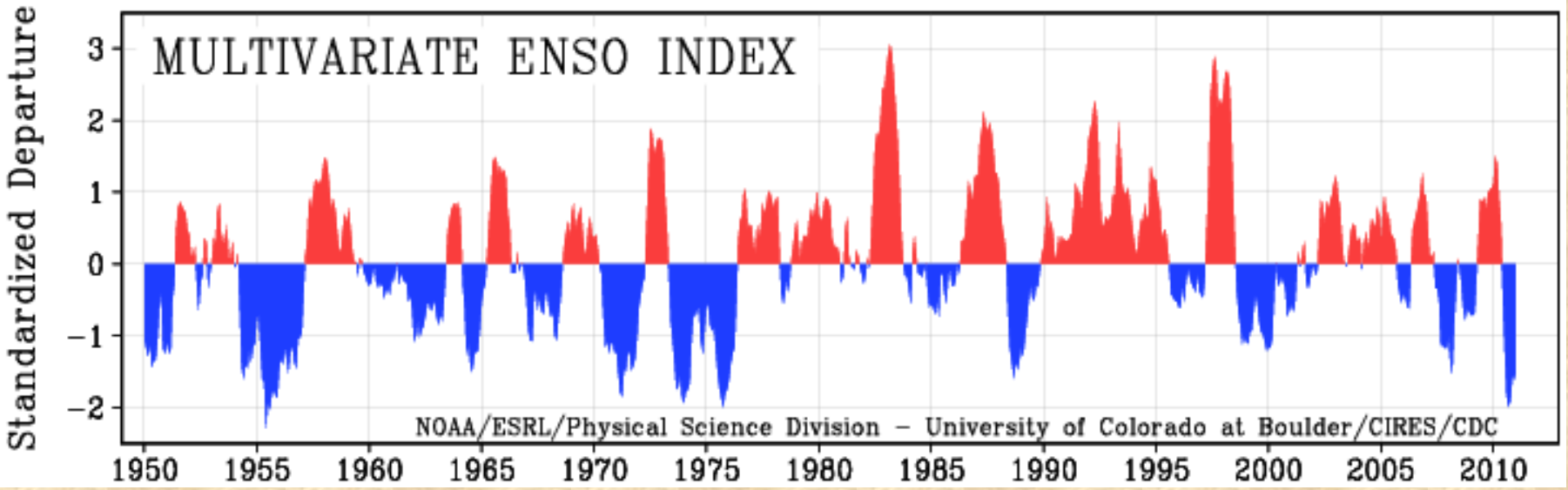
Denver

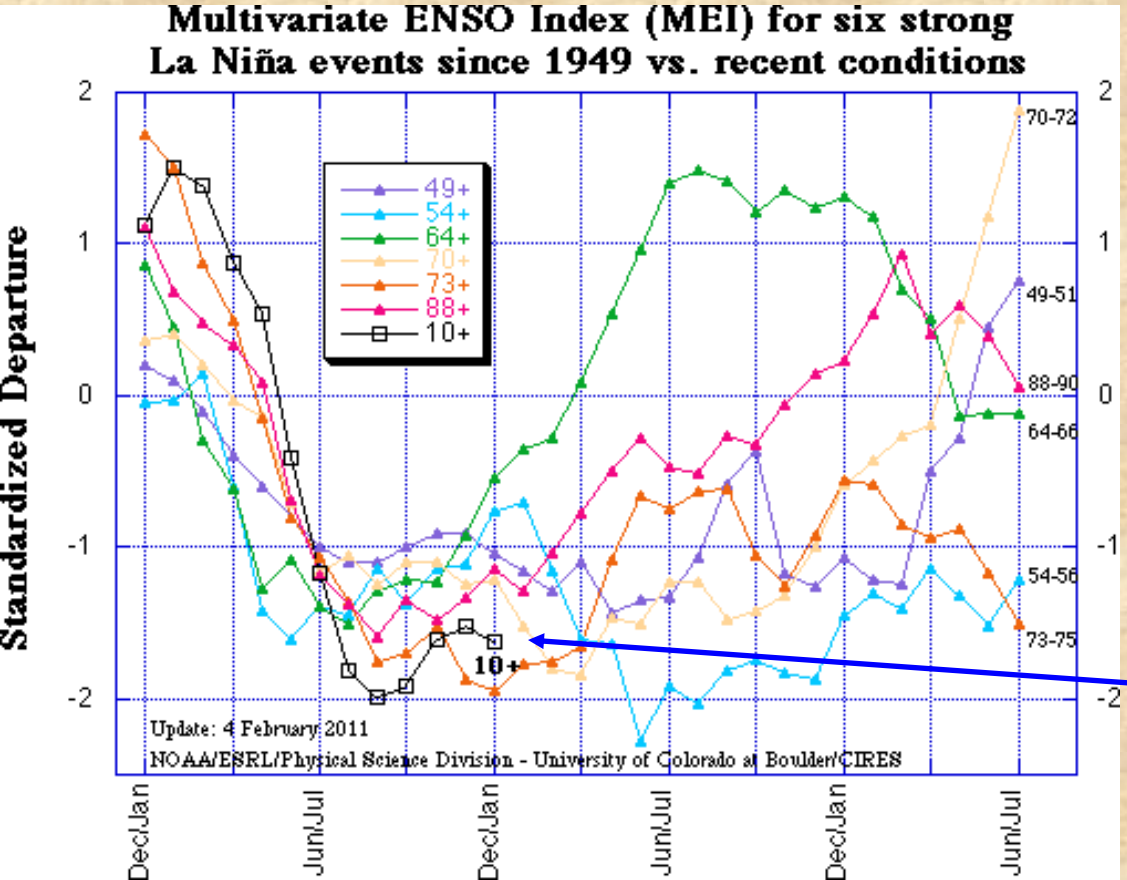
CIRES

Seasonal Outlook through June 2011

Klaus Wolter
University of Colorado, CIRES & NOAA-ESRL PSD 1, Climate Analysis Branch
klaus.wolter@noaa.gov

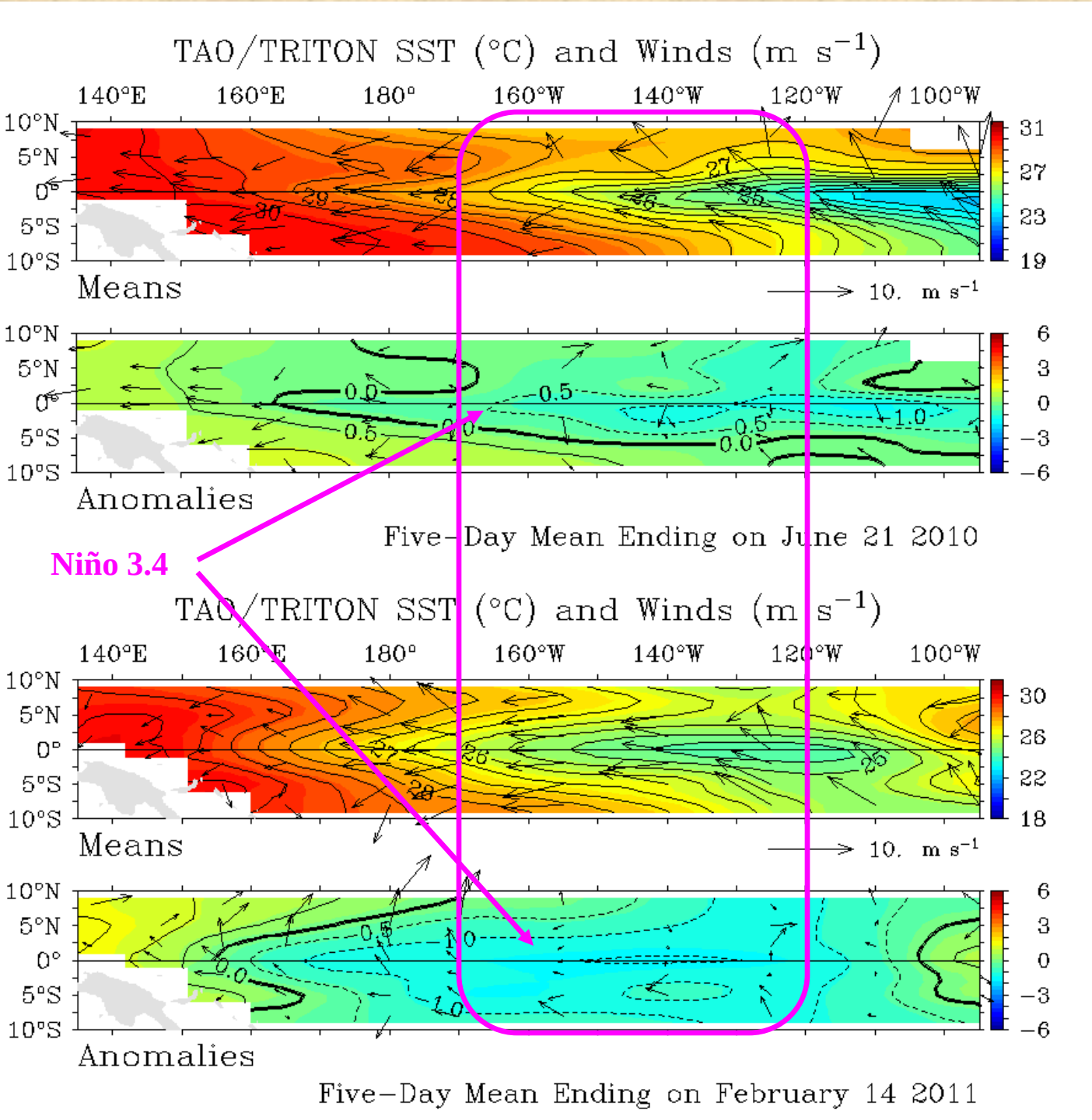
- **La Niña still in control**
- **What will happen next with La Niña, and what does that mean for us?**
- **Expectations for next few weeks**
- **CPC forecasts for February through June 2011**
- **Experimental Seasonal Forecast Guidance**
- **Executive Summary**

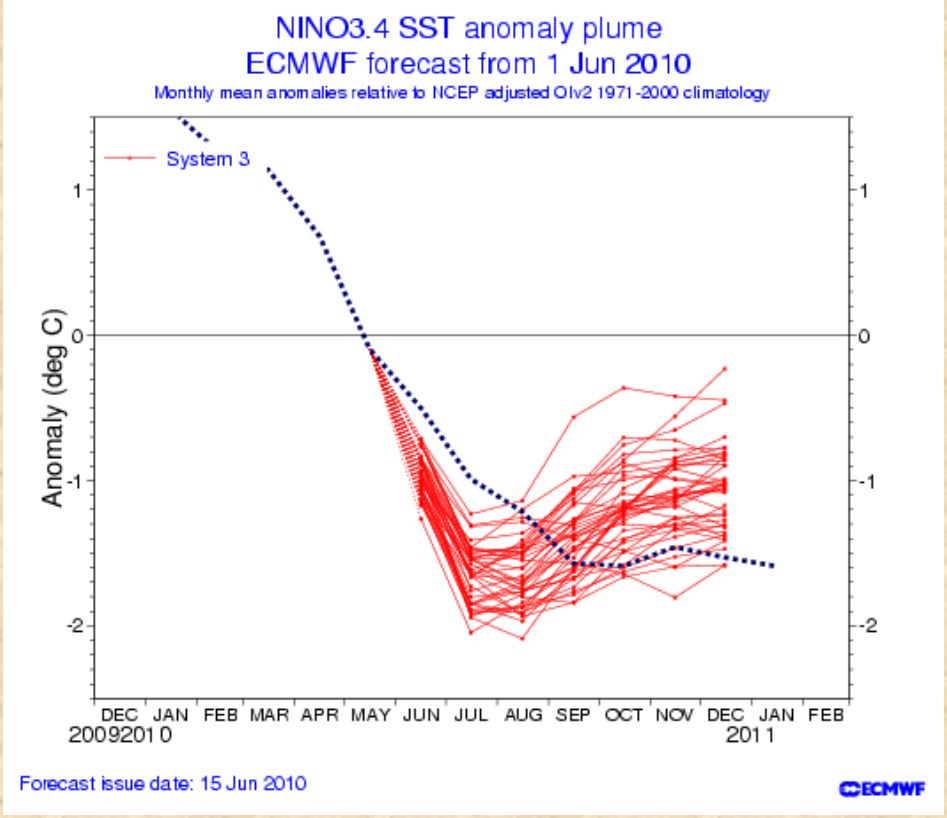




Exciting roller-coaster ride last year from good-sized El Niño to near-record La Niña in just about six months, continuing at high levels.

Current state of ENSO (bottom) compared to last JUNE (top): a fledgling La Niña got established eight months ago, with SST anomalies reaching not quite the historic proportions as the atmospheric circulation anomalies later in 2010. Meanwhile, La Niña conditions are still in place in February (bottom), slowly weakening.

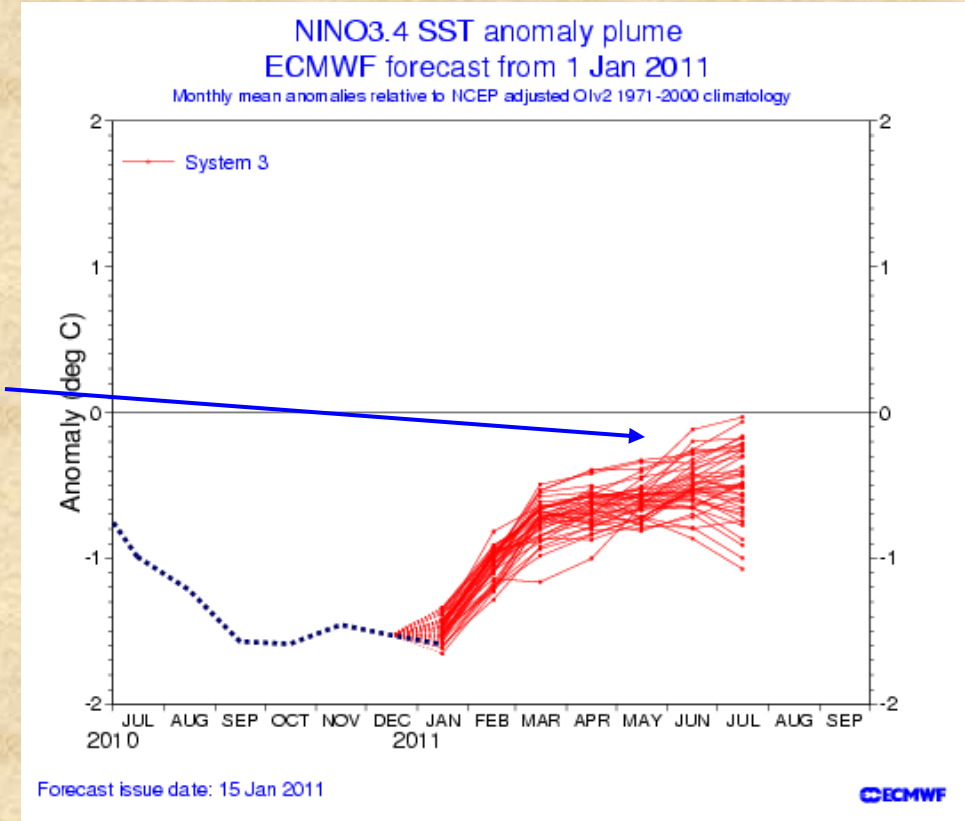


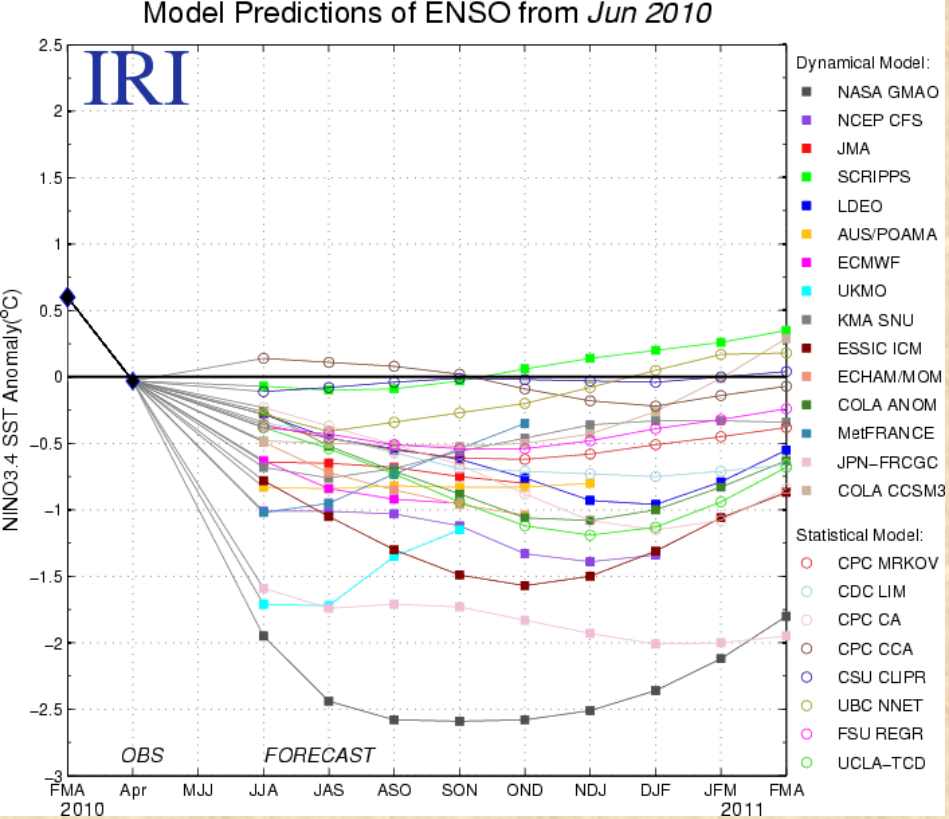


The European model's June 2010 forecast (left) was a little bit too eager to establish extreme La Niña conditions, but had the right idea overall;

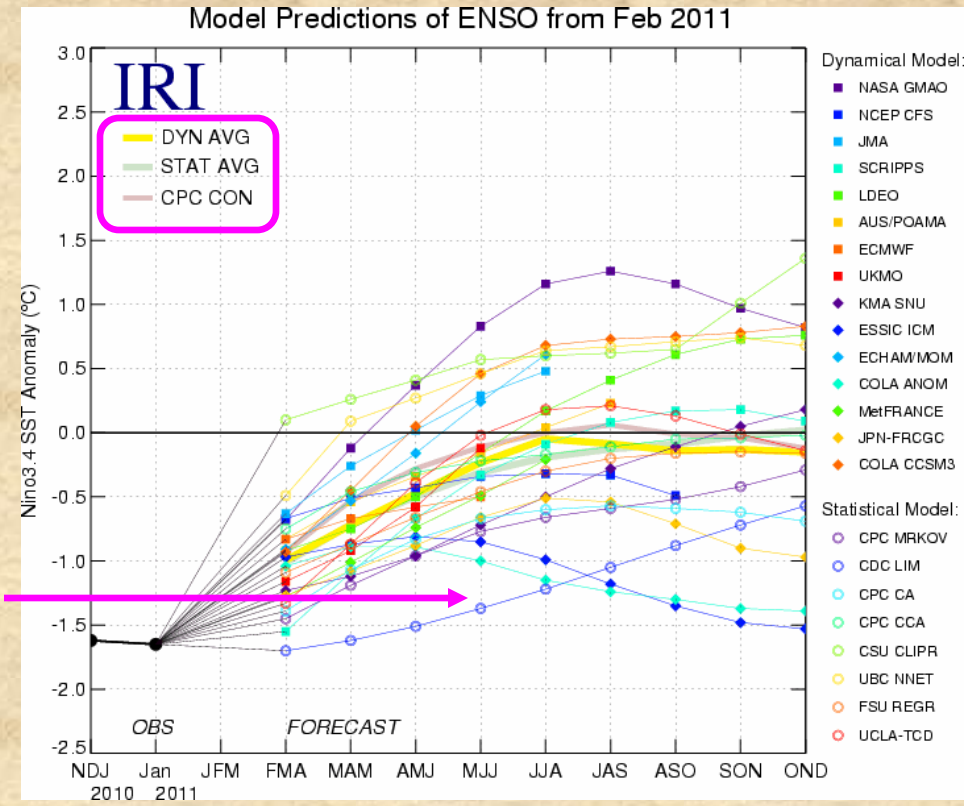
The most recent model (from last month, right) continues La Niña into the northern summer season, albeit weakened. None of the ensemble members crosses over into positive territory!

Once a La Niña gets as big as the current one, the odds are increased that it ends up being a two-year event, even if it weakens during the summer.



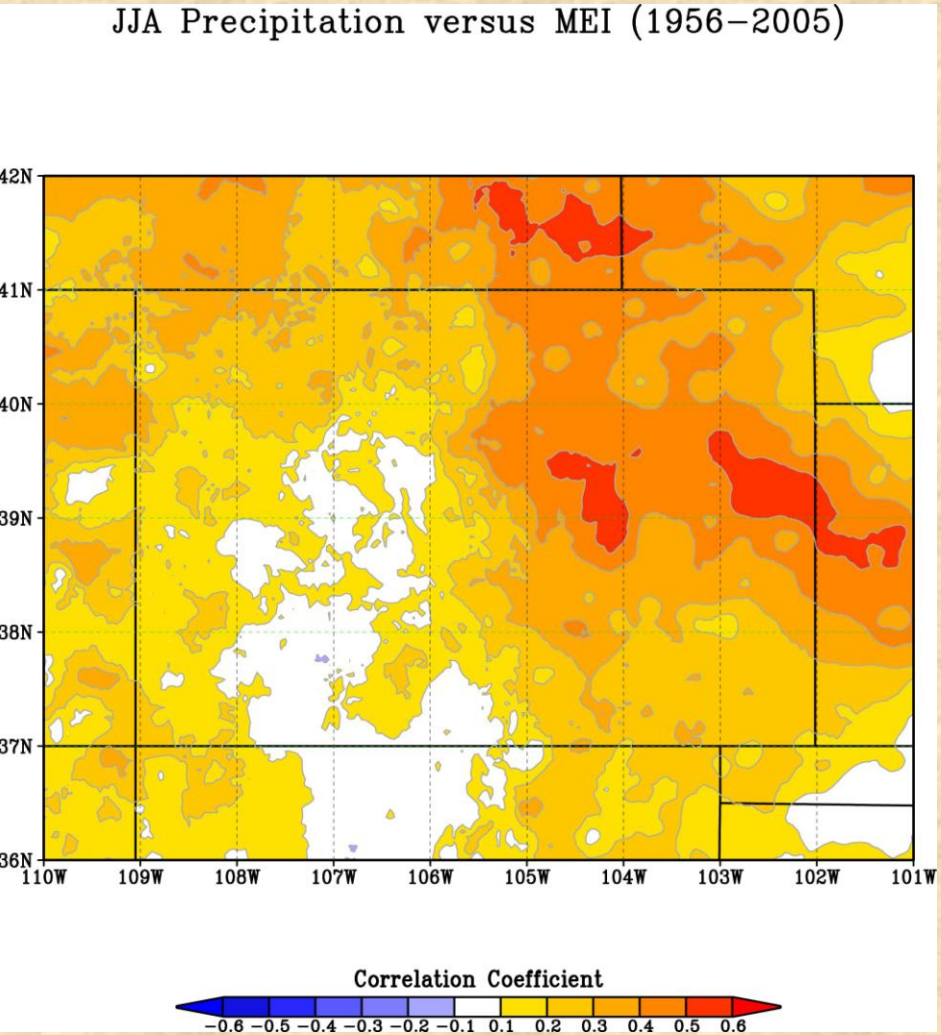


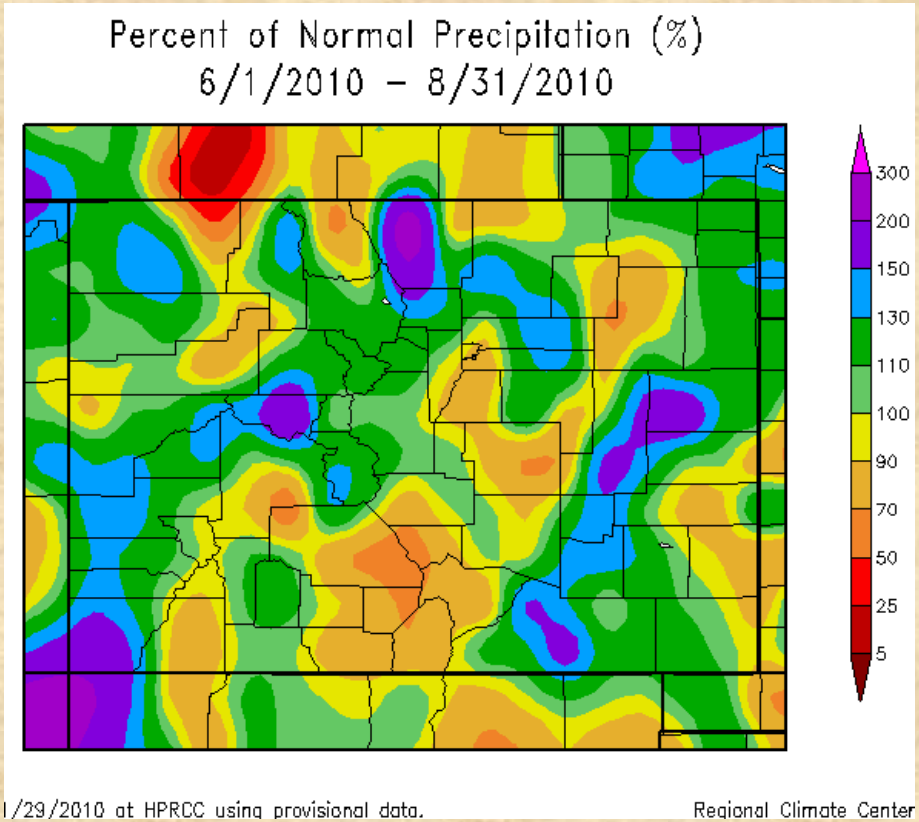
ENSO forecasts from over 20 dynamical & statistical forecast models from last June (left). Interesting range of forecasts back in June, although none of them went for El Niño. This was the 2nd year in a row that most of the dynamical models were better (more pronounced La Niña) than most of the statistical models (closer to ENSO-neutral).



The most recent forecasts (right, 'hot off the press') shows a wide range of forecasts, weakening the current La Niña event in the next few months. Compared to last June, the dynamical and statistical models show little difference, on average. Interesting tidbit: our in house model (CDC LIM) shows roughly the same forecast for 2011 as back in 1974 (when we ended up staying in La Niña mode for another two years…).

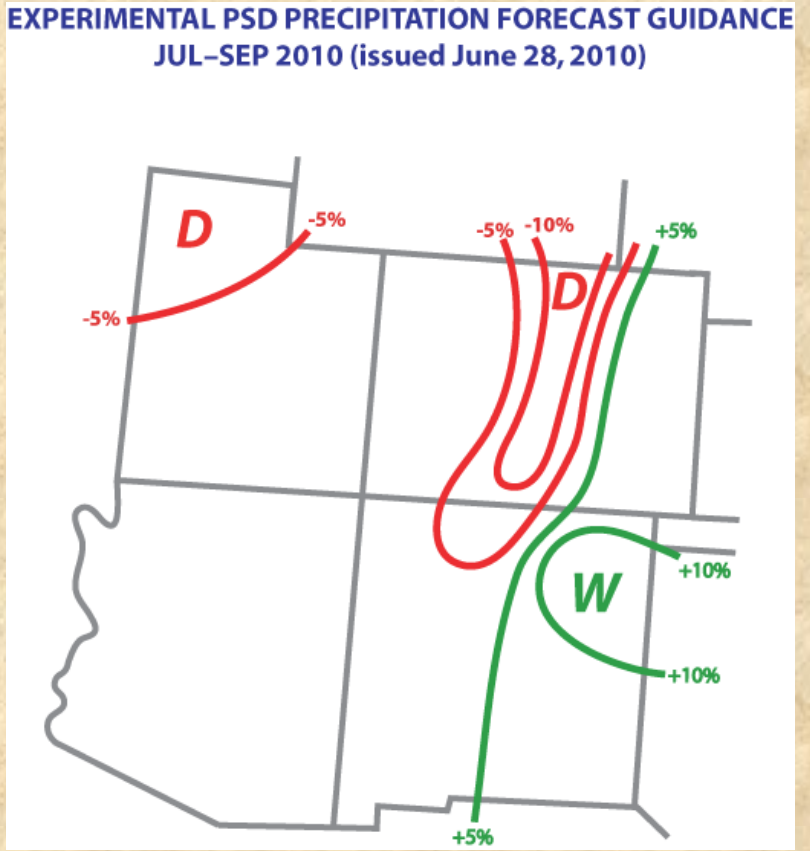
La Niña summers

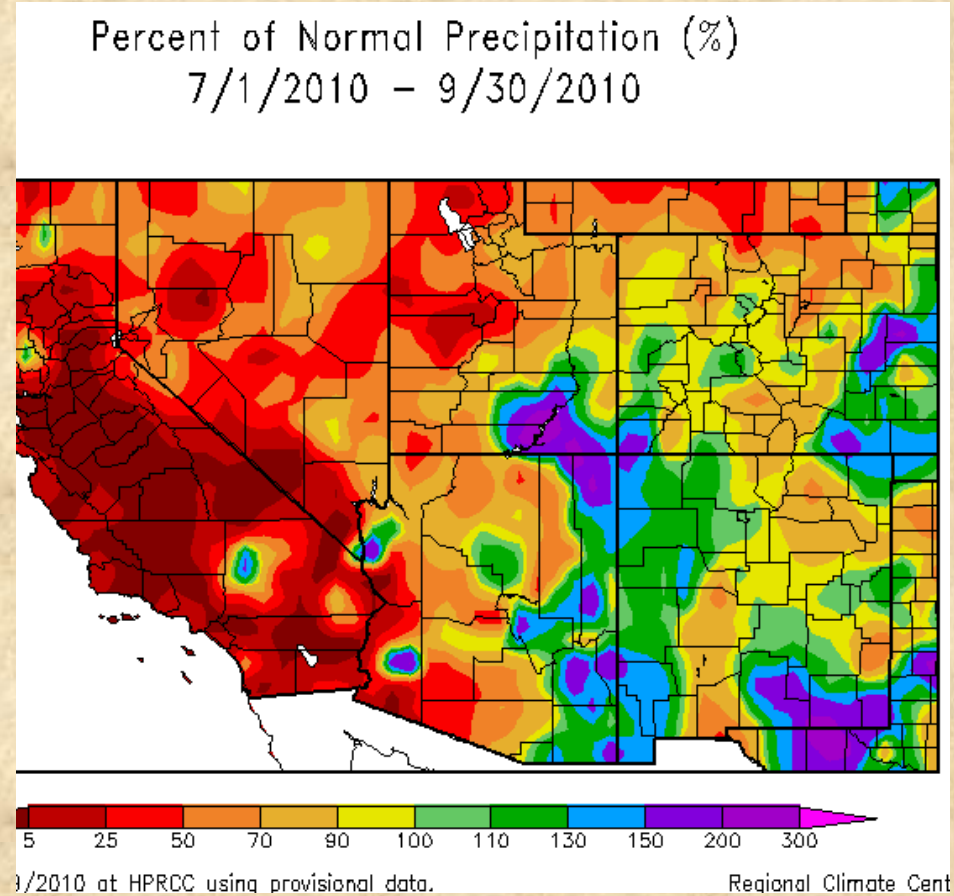




In Colorado, each season has a different *ENSO* footprint: the summer monsoon tends to be weaker with La Niña over the eastern plains; in 2010, last summer was wetter than anticipated based on La Niña, although a lot of the rain happened in June…

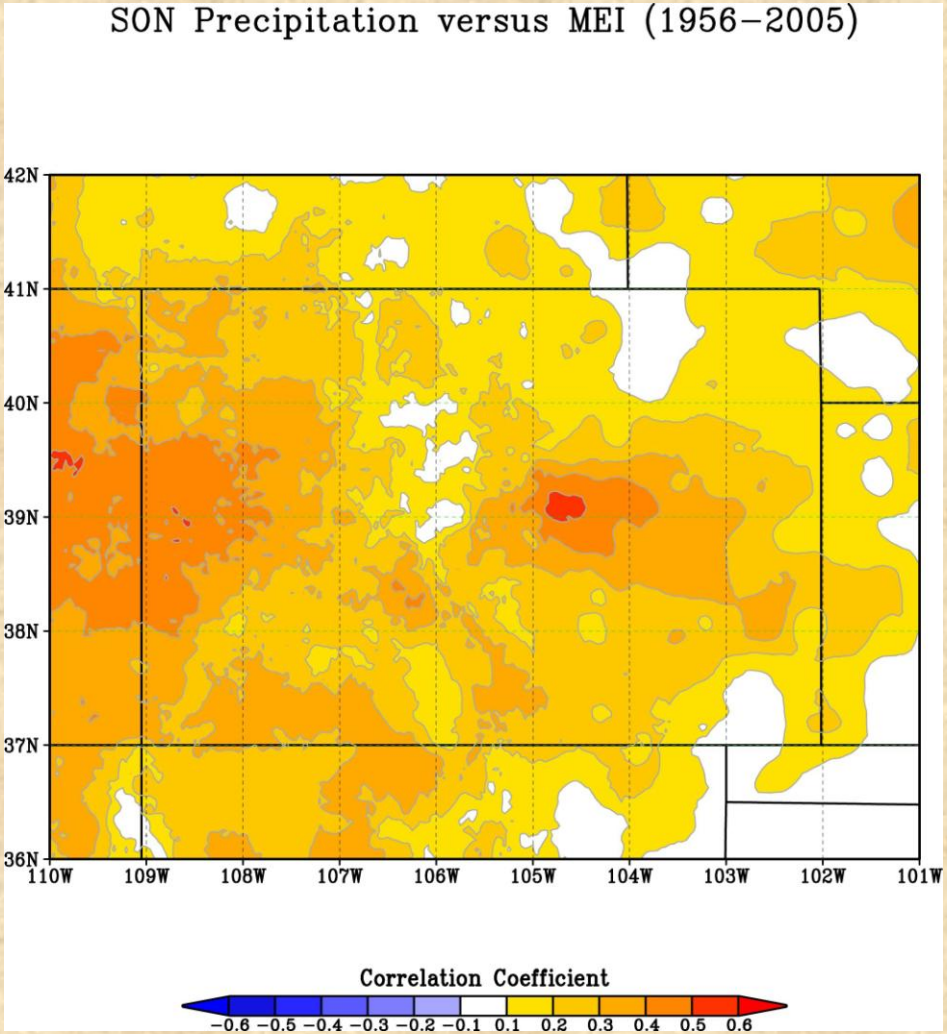
Monsoon season 2010

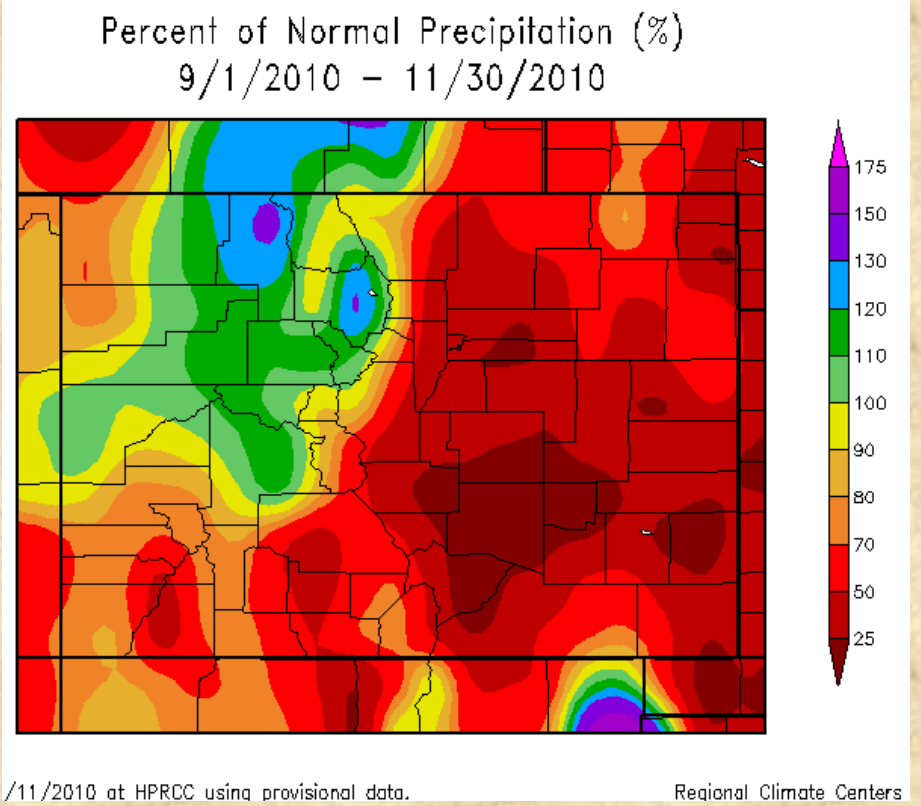




My last forecast (top left) anticipated a dry monsoon season for the Front Range and Northwest Utah, juxtaposed with wet conditions to our east and south. This pattern verified quite well for Colorado (top right).

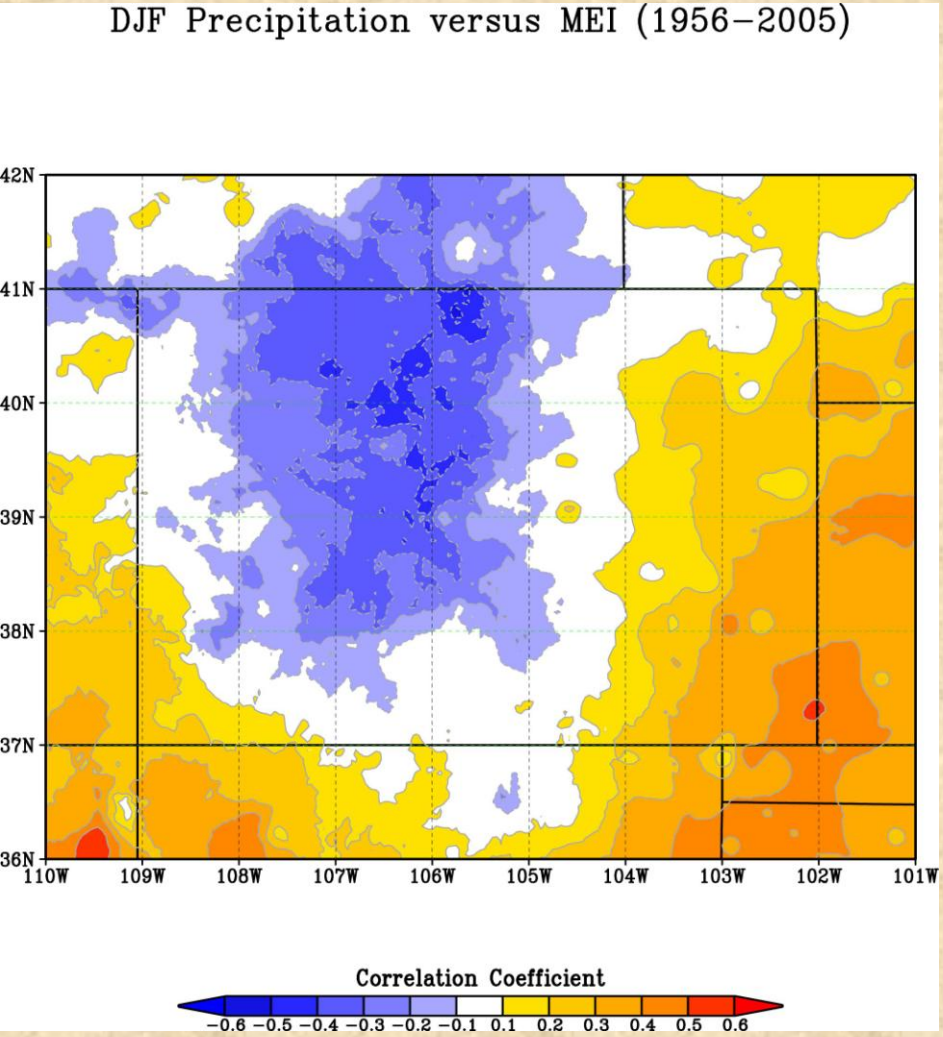
La Niña falls

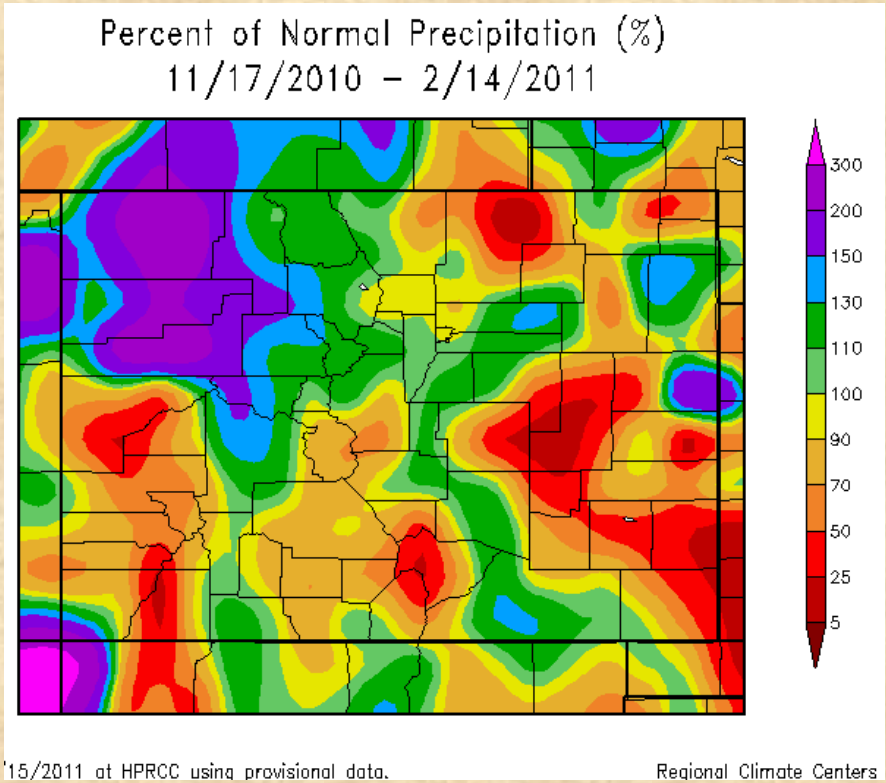




La Niña fall seasons typically look similar to summer (dry for much of the state), which verified for the eastern plains and San Juans, but not for the northern and central mountains.

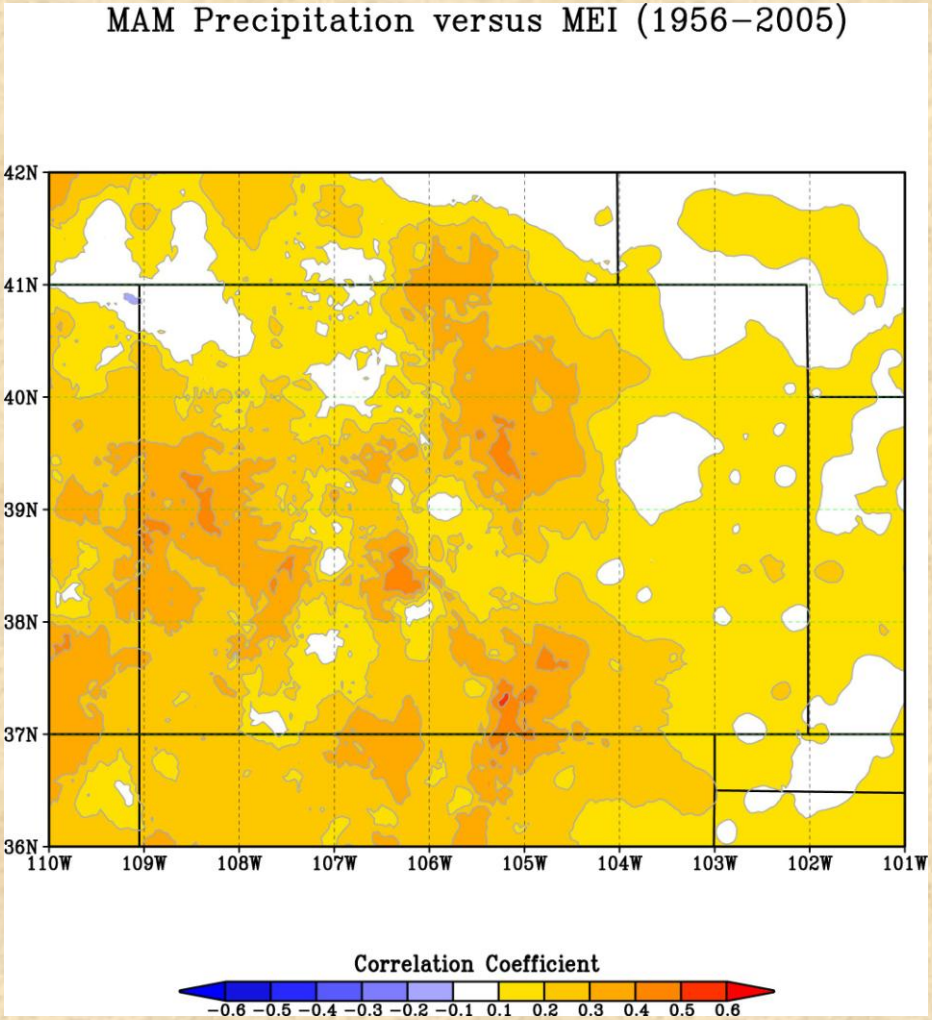
La Niña winters

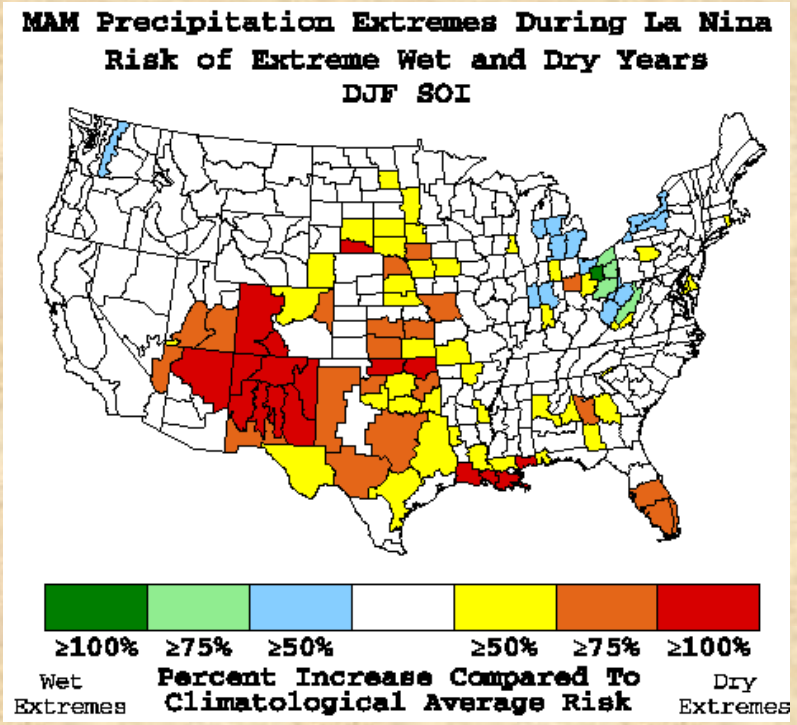


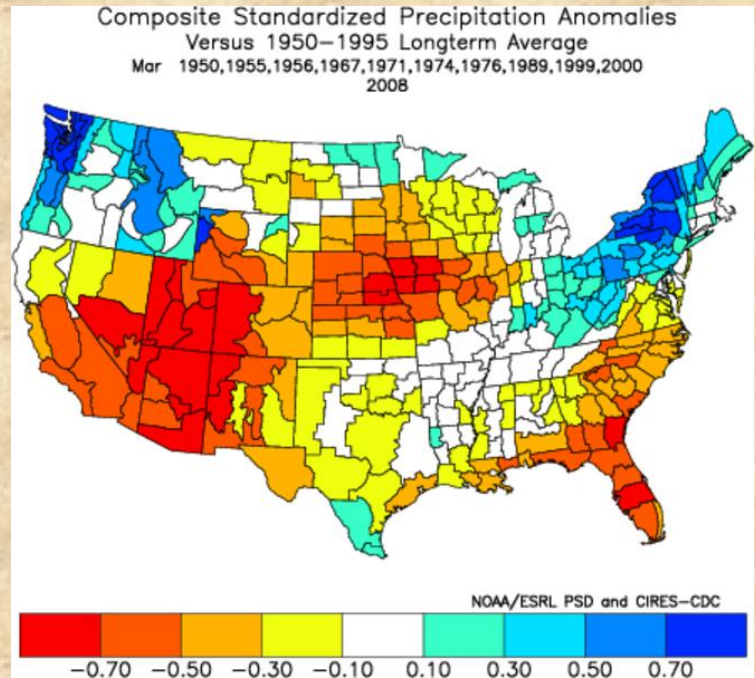


The biggest change in terms of seasonal ENSO impacts occurs during the winter: our mountains tend to be WET with La Niña, reversing the typical footprint during the rest of the year; the last three months have been quite wet over the northern and central mountains, dry over SE Colorado in particular, pretty good fit so far…

La Niña springs

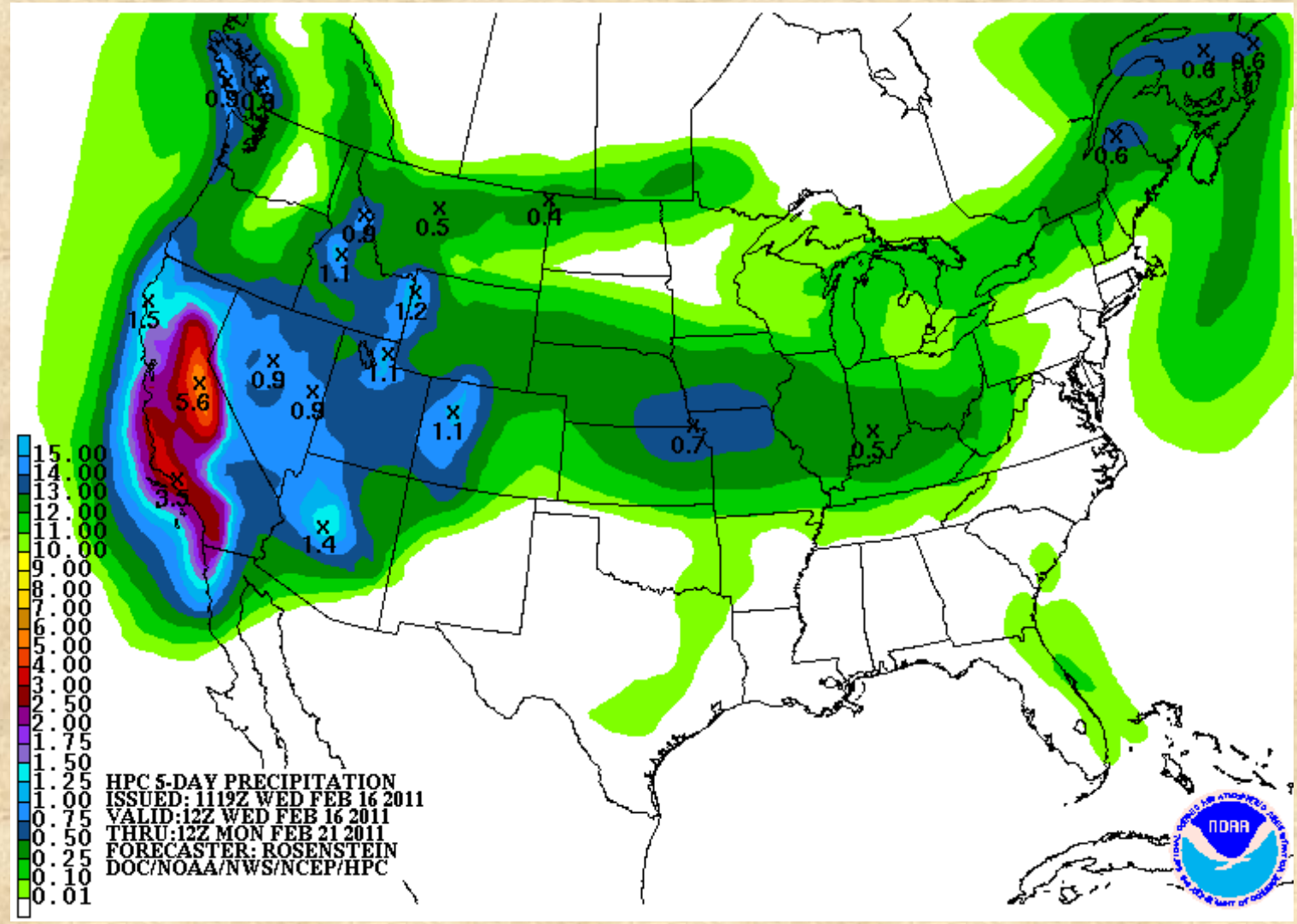






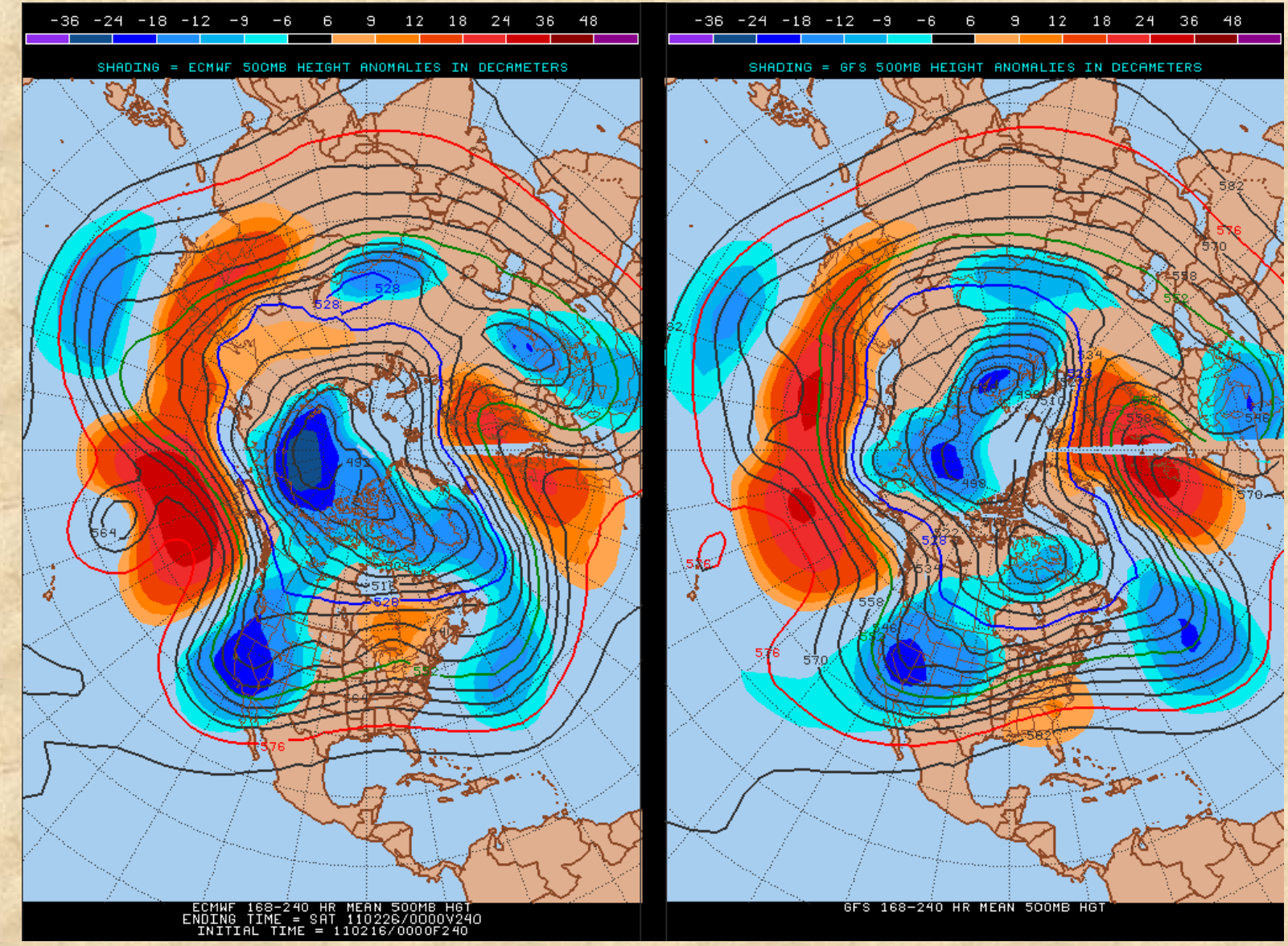
Spring often goes back to being dry with La Niña – with the best chance for a wet break in April (1999!). Both risk analysis (top right) and March composites (bottom right) highlight a stronger tendency for dry springs over the western half of our state.

What can we expect in the next week?



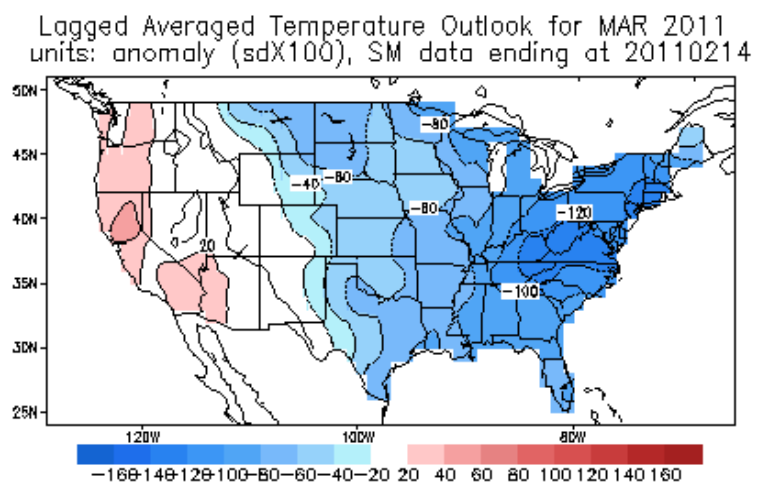
Expected total precipitation thru Monday morning, according to the Hydrological Prediction Center (HPC): return of moisture to Western Colorado, once California gets its fill in the next few days…

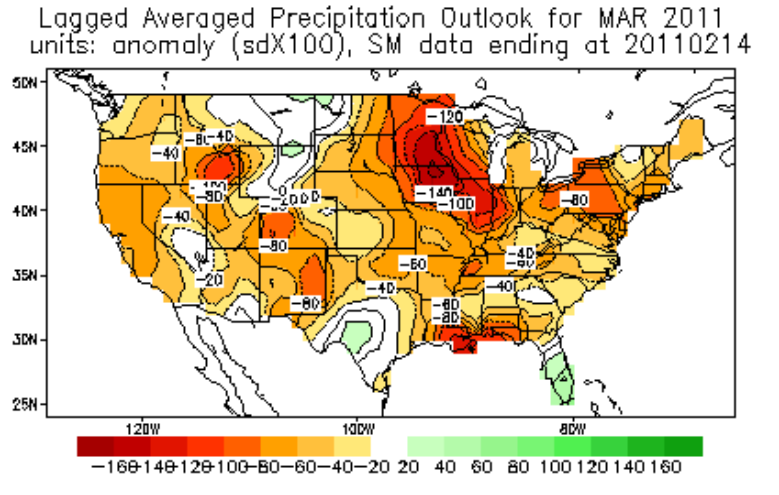
What can we expect in the next two weeks?

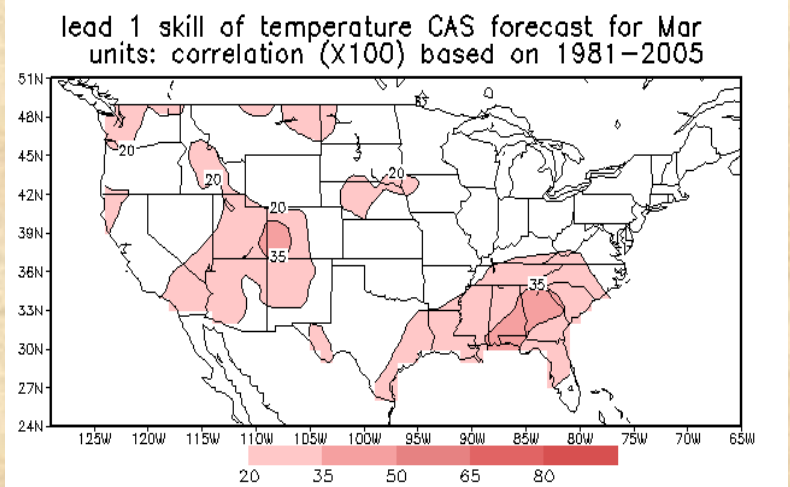


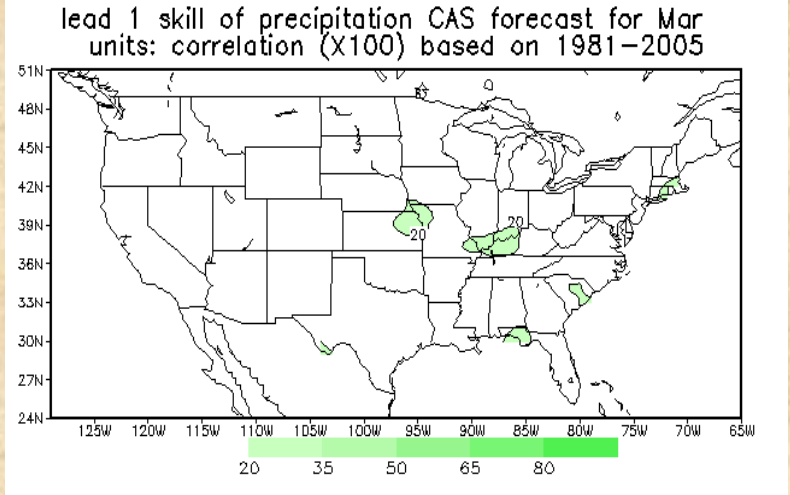
European and U.S. models agree on unsettled Western U.S. for middle of next week!

CPC Analog Forecasts



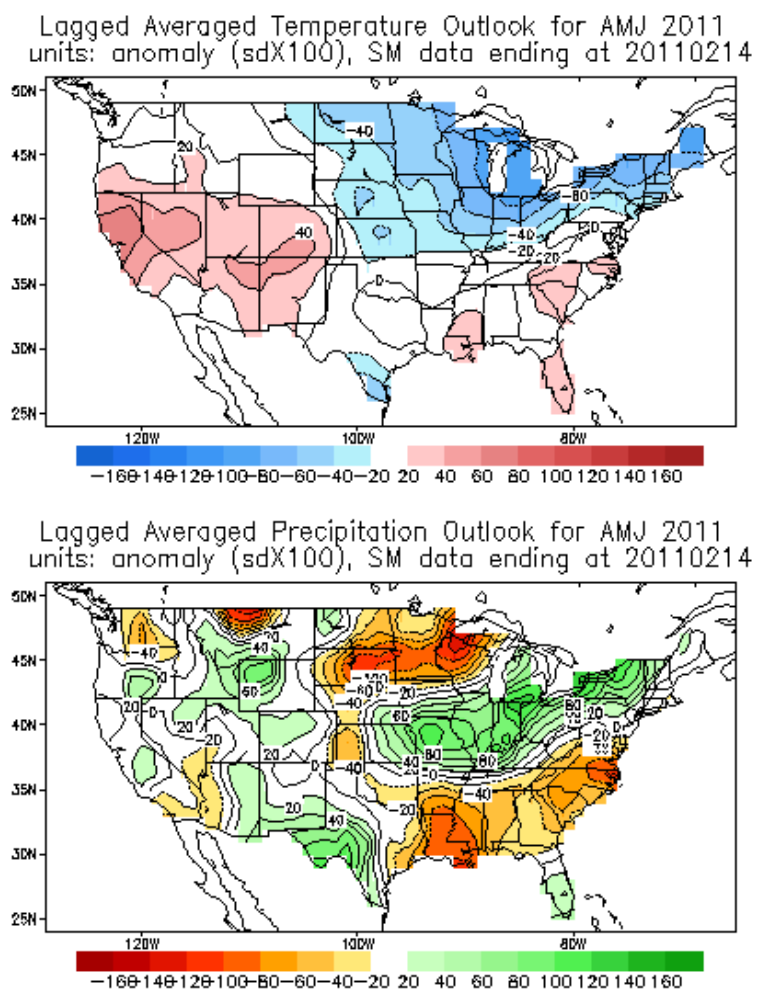


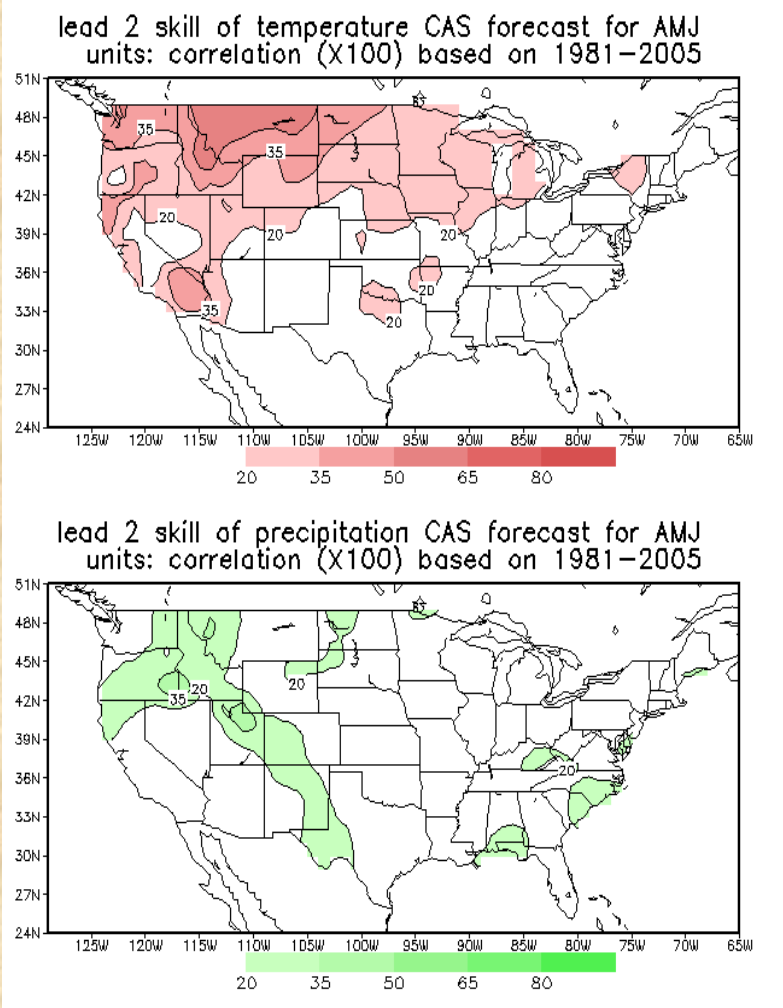




According to the latest soil-moisture analog forecast, March '11 (left) looks to be on the dry side, along with near-normal temperatures. Skill level at this lead-time is essentially non-existent for precipitation (right) and decent for temperatures over Western Colorado where the forecast is for near-normal. **Source**: ***http://www.cpc.ncep.noaa.gov/soilmst/cas.shtml***

CPC Analog Forecasts

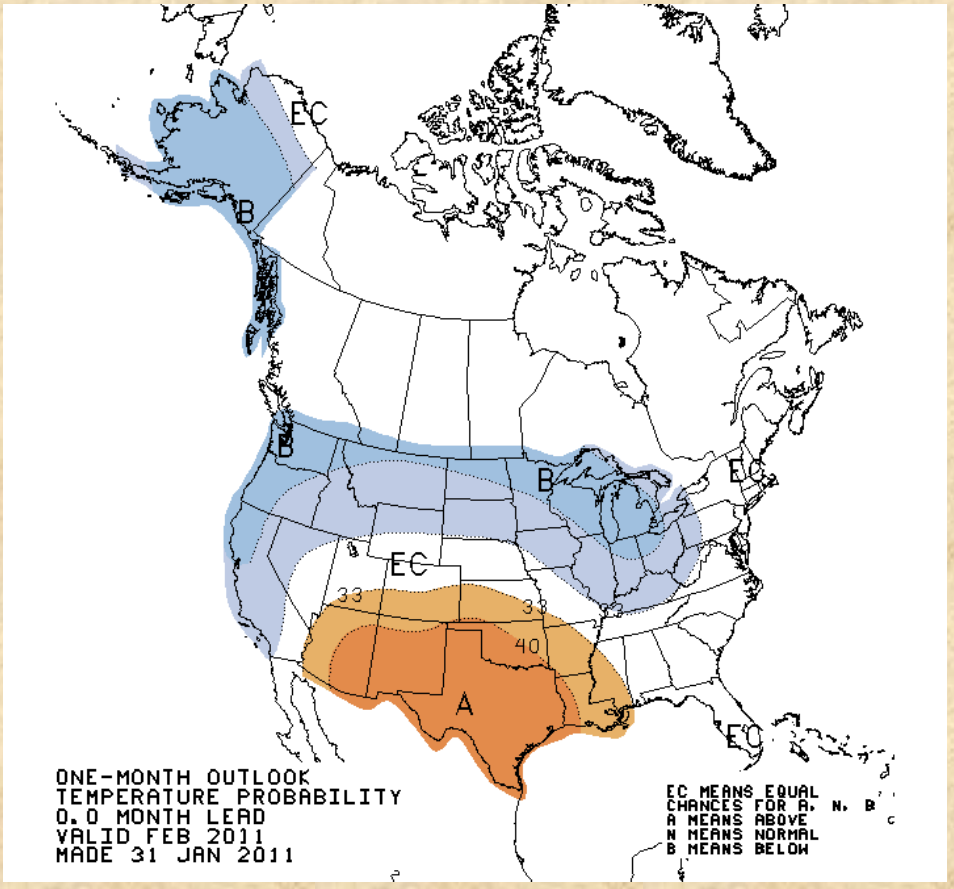


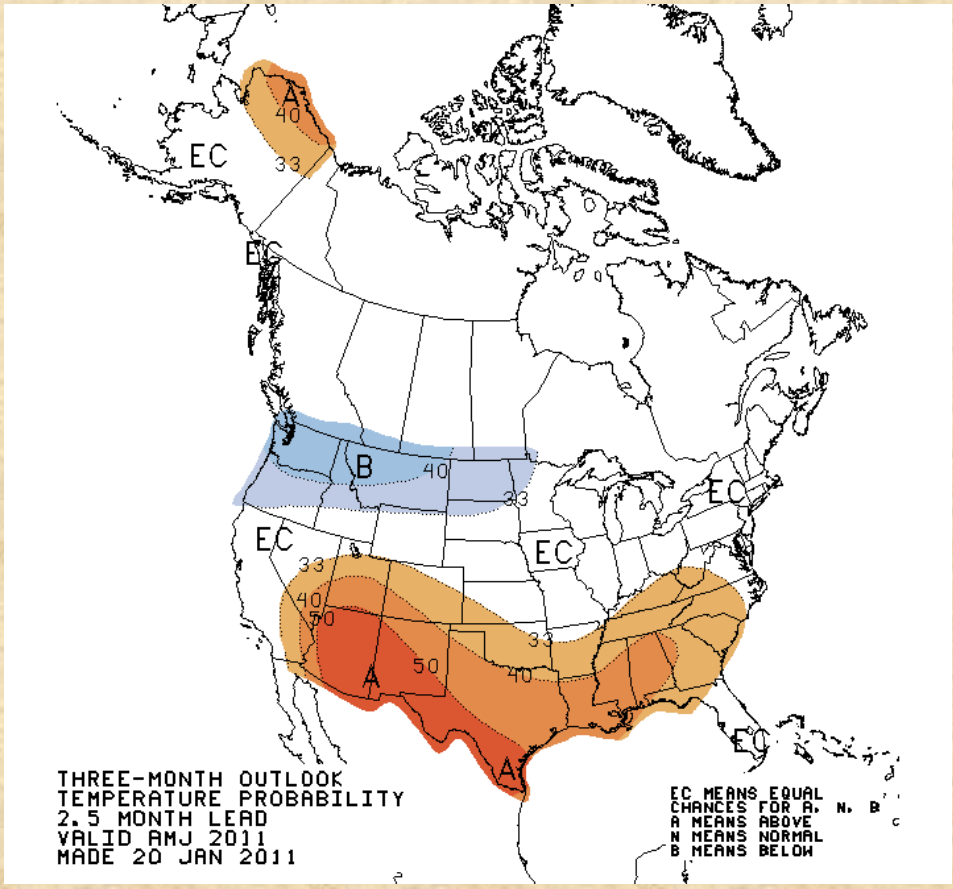


According to the latest soil-moisture analog forecast, April-June '11 (left) may end up close to normal for Colorado, along with slightly above-normal temperatures. Skill level at this lead-time is marginal for precipitation (right) and temperatures.

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

CPC Temperature Forecasts

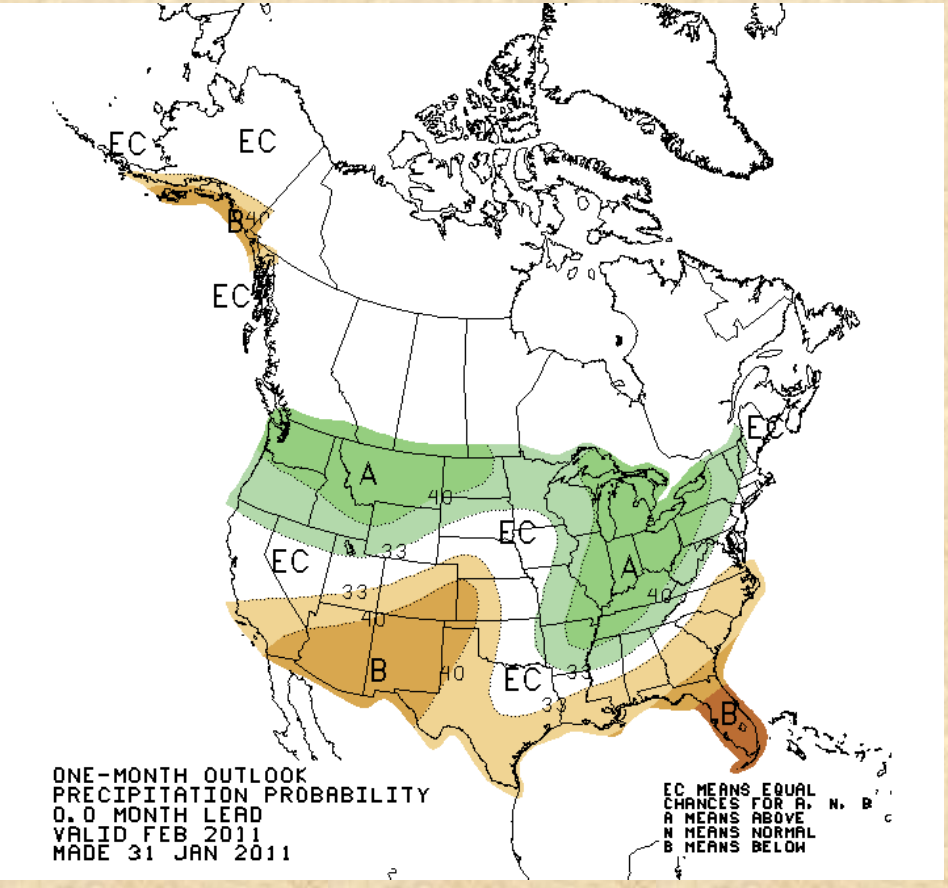


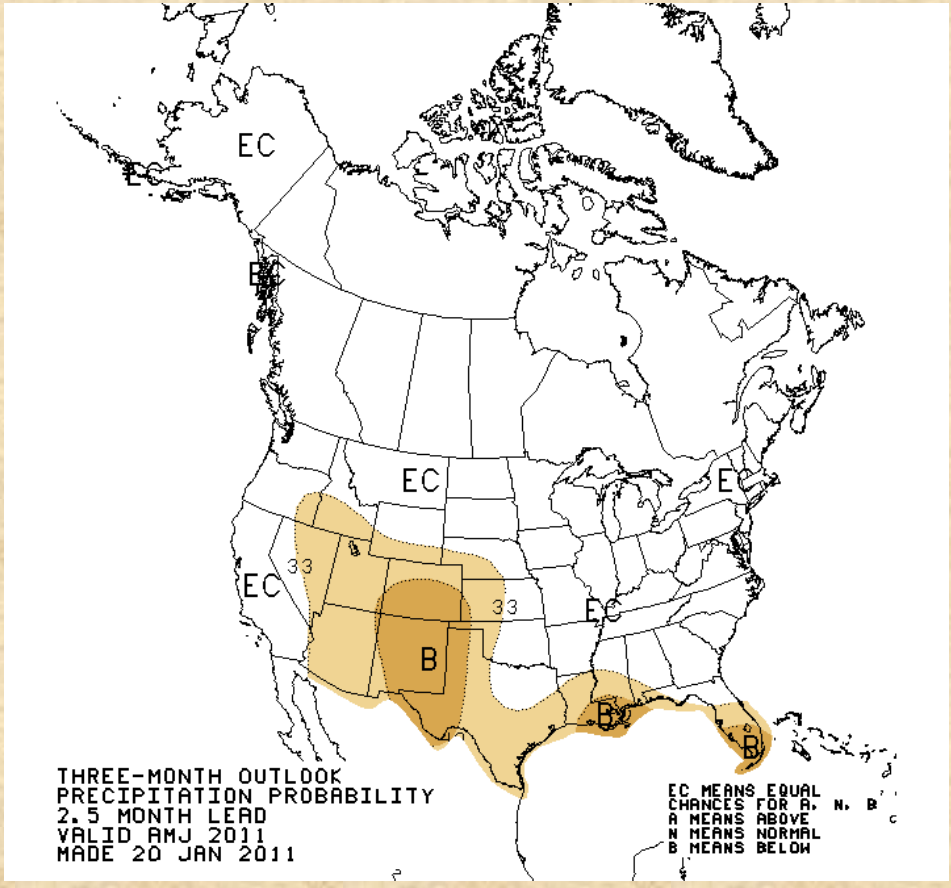


According to last month's CPC release, February (left) and April-June (right) temperature forecasts show typical La Niña-based expectations, tweaked at the end of January to reflect the expected cold spell of early February in much of the northern U.S.

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

CPC Precipitation Forecasts

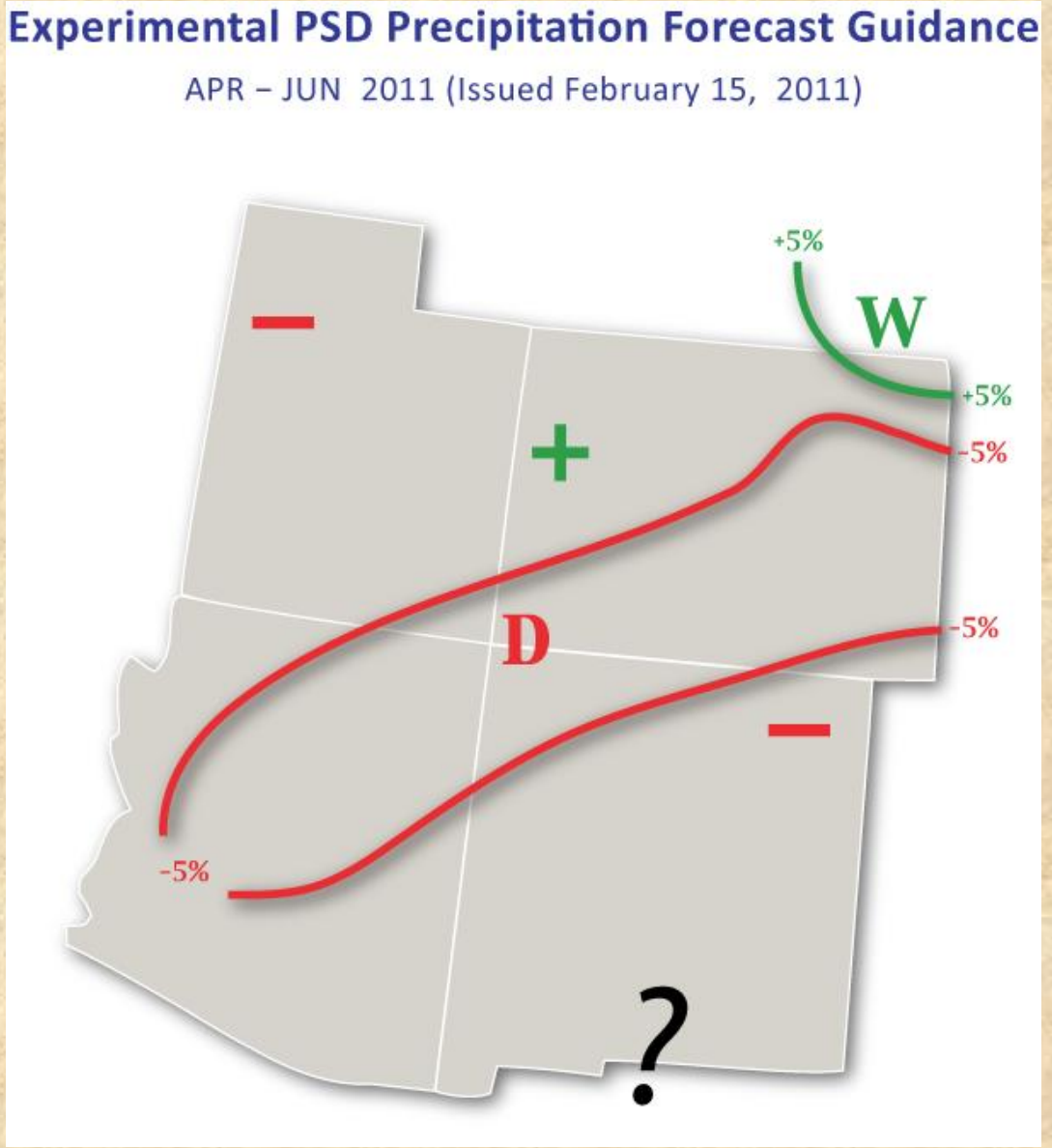




According to last month's CPC release, February (left) and April-June (right) precipitation forecasts show typical La Niña-based expectations, including a mostly dry state of Colorado.

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

Experimental Forecast Guidance for April-June 2011



Forecast for April-June 2011 (left) shows a good chance for below-normal moisture from Arizona into the southeastern half of Colorado. The northwestern half of our state has neutral to even slightly positive chances of being wetter-than-average. However, historical skill over the last decade of experimental forecasts has been better for the dry forecast regions than the wetter ones (in Colorado). IOW, enjoy this month's moisture while you can…

Executive Summary (16 February 2011)

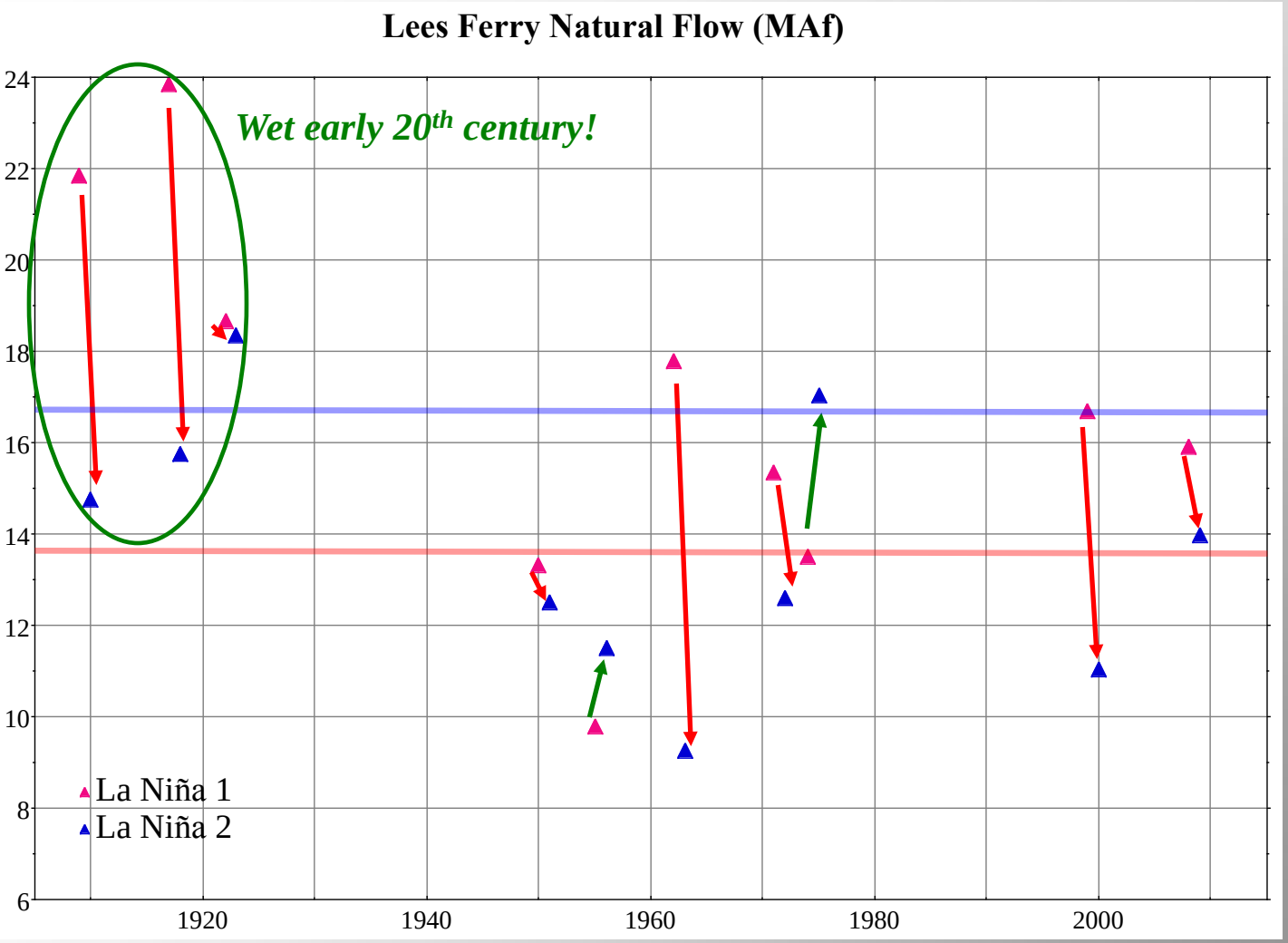
1. **La Niña has been with us for more than half a year now, reaching strong intensity in the fall, and continuing until further notice.**

2. **Between a windy winter, wild swings in temperature (record warmth in late January, lowest temperatures since December 1990 in early February, back to record highs this week), and a snowy winter in the northern and central mountains, as opposed to mostly dry conditions on the plains, La Niña has already delivered typical impacts.**

3. **My experimental forecast guidance for late spring (April-June) continues more or less in the same vein as recent conditions, with a tilt towards dryness covering the southern and eastern parts of our state, while near-normal or even wetter-than-normal conditions MIGHT linger over northwestern Colorado. Since historical La Niña springs have tended to be dry in Western Colorado, I would discount the latter forecast, and prepare for a dry spring all across the state.**

4. **Bottomline: Count your blessings, this La Niña winter has delivered decent amounts of snow in our mountains, let's see how much longer this can continue. Since I expect La Niña-like conditions to linger into the summer, if not even next winter, we will need every bit of moisture we can get, since the moisture odds are tilted against us right through the growing season. As some of you know from my October presentation, I am pessimistic about repeating this winter's wet performance in 2011-12, given the historical record 2nd winter La Niña events…**

What is difference for Year 1 vs. Year 2 Las Niñas?



Mean flow for Year 1: 16.75 MAf (Δ= +1.7MAf)

Mean flow for Year 2: 13.64 MAf (Δ= -1.4MAf)

Difference is significant with more than 0.7 standard deviations!

A drier outcome has been typical (8 of 10 cases) for 2nd year runoff for the Colorado River. Six of the first year runoff totals were clearly above the long-term mean, while seven of the second year runoff totals were clearly below that.


Nice to be back in from the cold…