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NIDIS
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM

Colorado WATF, 4-18-16, Denver

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Seasonal Outlook for Colorado

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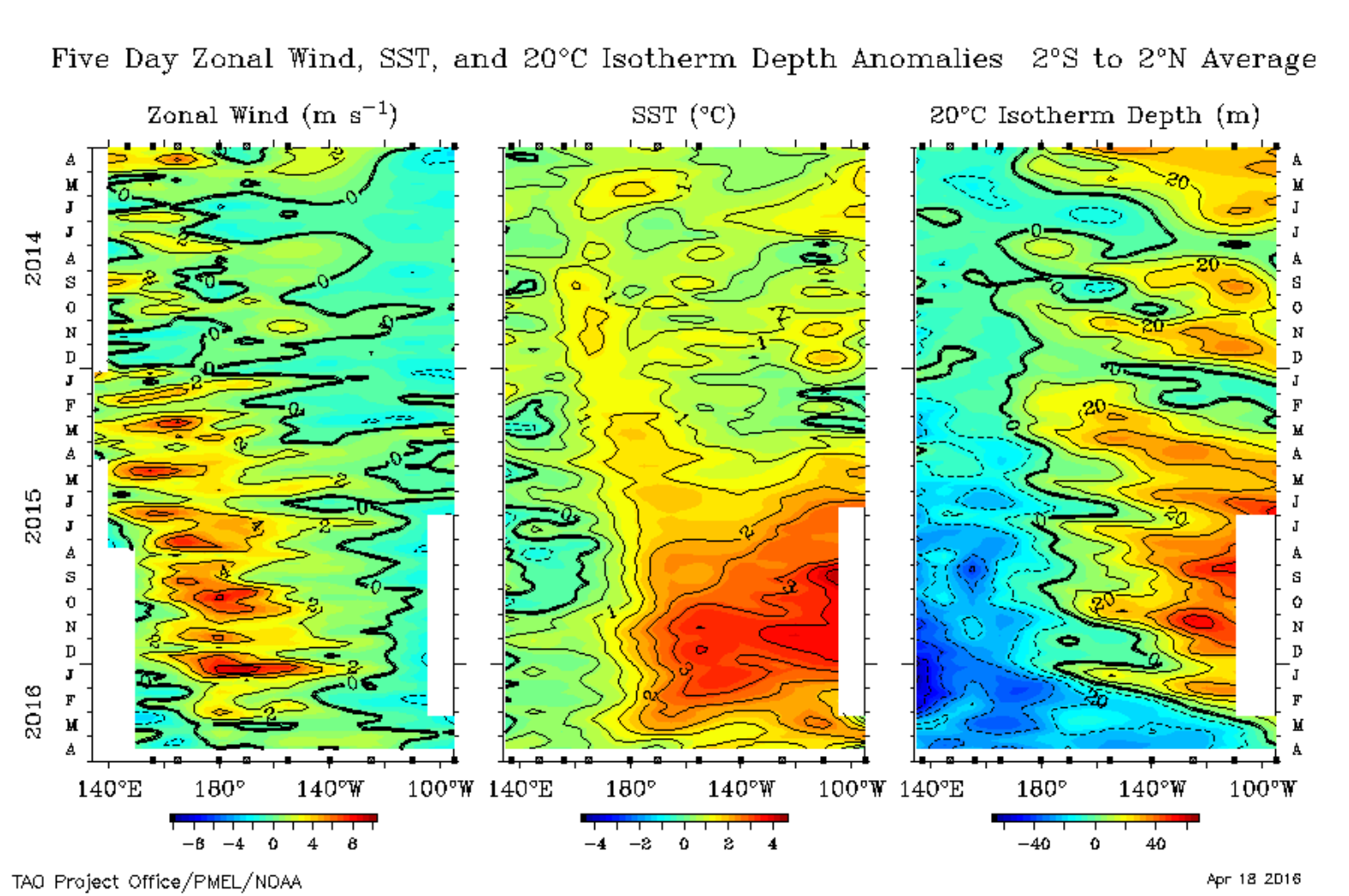
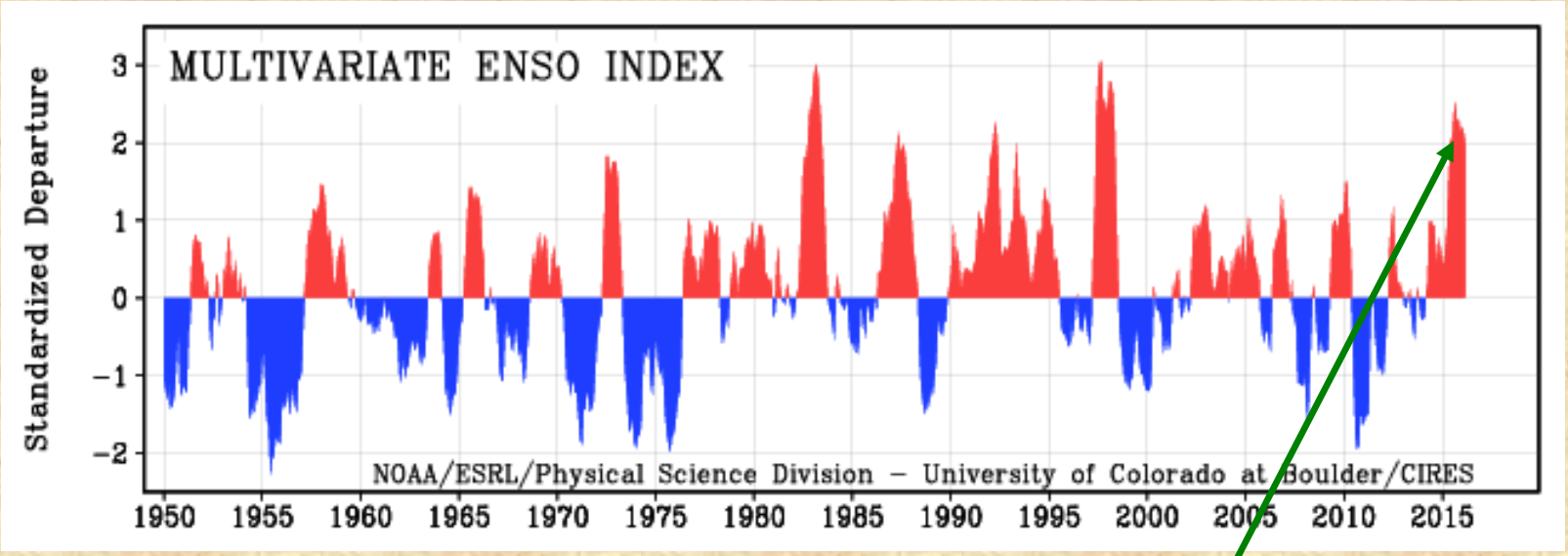
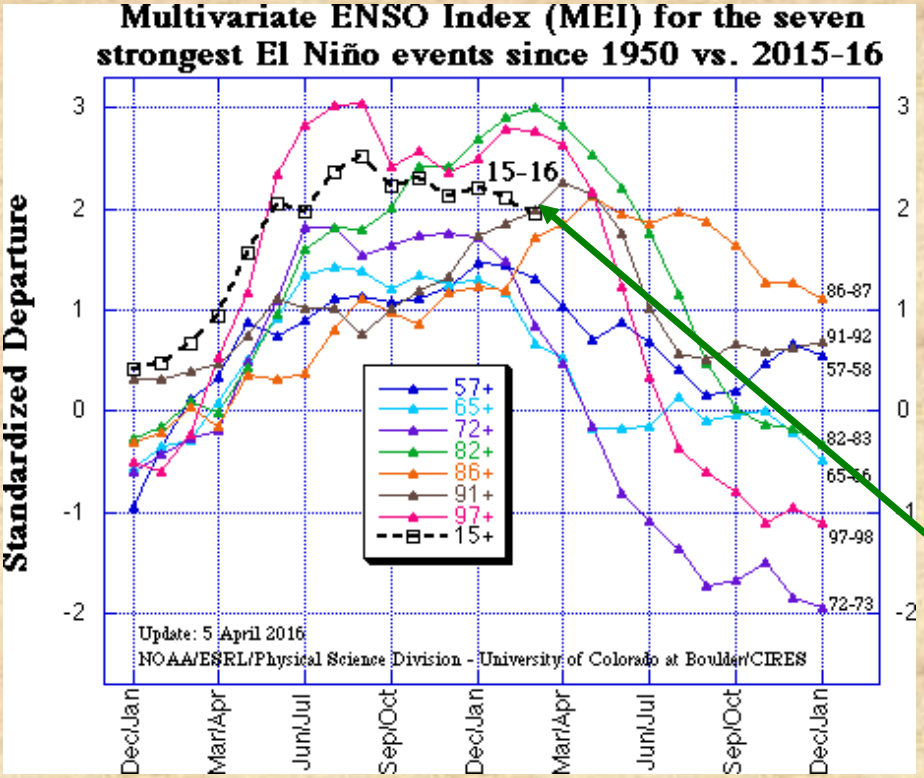
- ***Our Big Boy El Ninõ is not quite done yet…***
- ***Impacts in 2016 so far, and expected for spring (precip)***
- ***(Last month's) CPC forecasts into late summer 2016***
- ***Seasonal late spring forecast guidance for precipitation and 1junSWE***
- ***Next two weeks***
- ***Executive Summary (18 April)***



El Niño is winding down, no real wind support (left) since one last flare-up in early March, although SST anomalies have stabilized a bit (middle), and the subsurface cold push is at an uneasy truce (right), with cold water lurking right beneath a shallow warm layer at the surface.

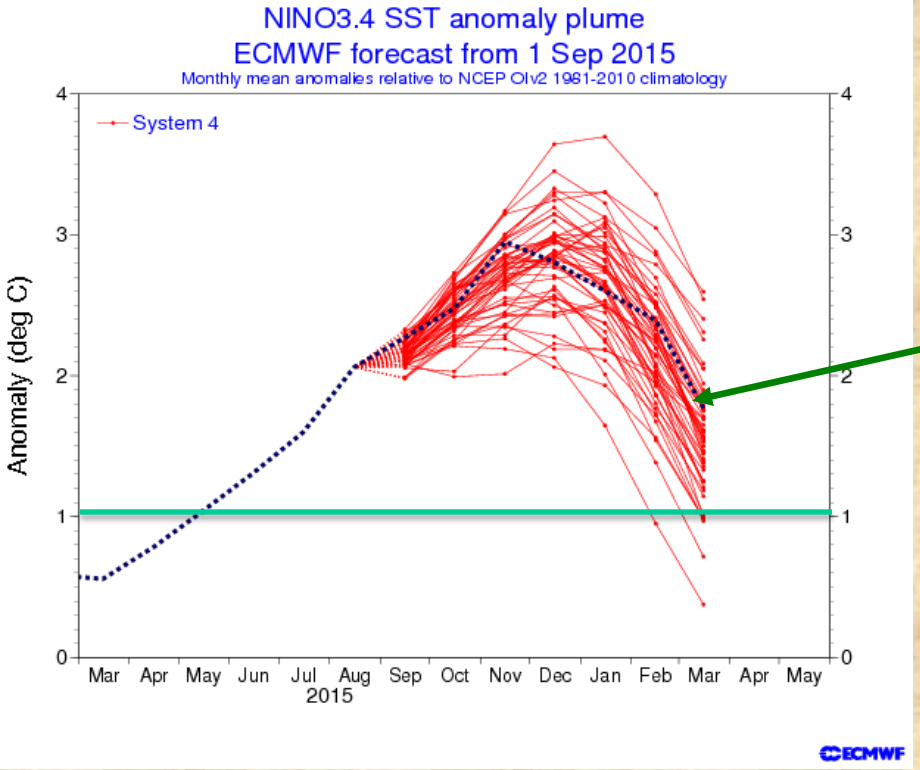
http://www.pmel.noaa.gov/tao/jsdisplay/index.html





The **MEI** monitors ENSO based on all observed fields over the tropical Pacific (pressure, wind, temperatures, cloudiness). It is the 1st combined Principal Component, normalized with respect to the season. **The current El Niño peaked in Aug/Sep at +2.53, the largest MEI value since 1998**. The latest update has dropped to 4th rank since 1950 for the first time in nine months.

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

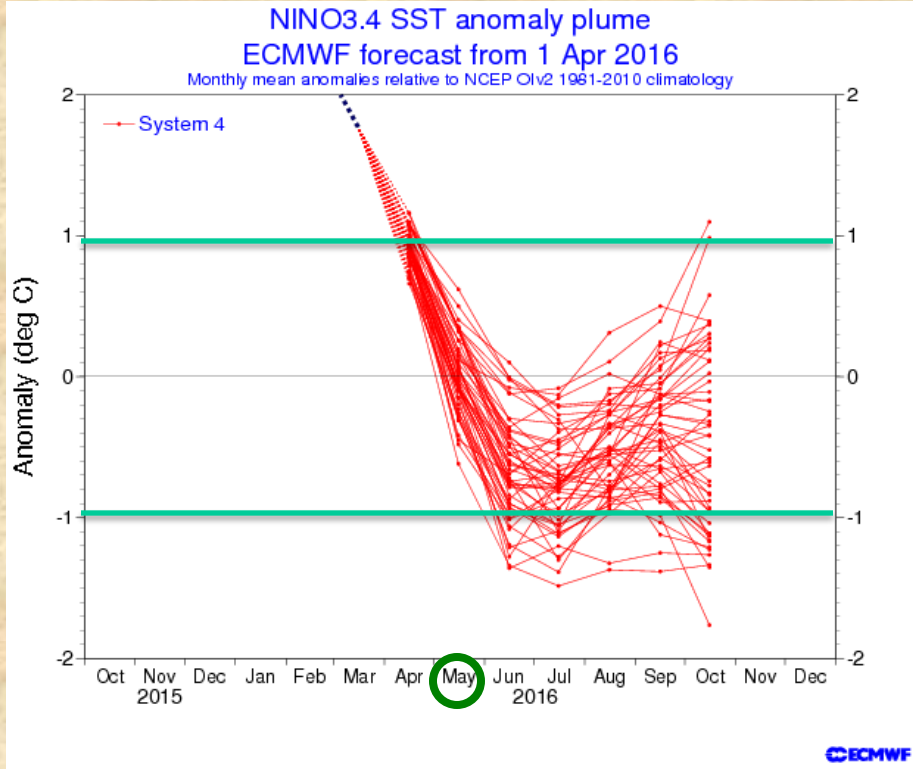


The ECMWF September 2015 forecast (left) showed a fairly compact plume, with a peak perhaps close to +3C which verified nicely a bit early (in November). While the observed trace (in stippled blue) was a bit higher than the median expectation, this was a very successful forecast thru March 2016.

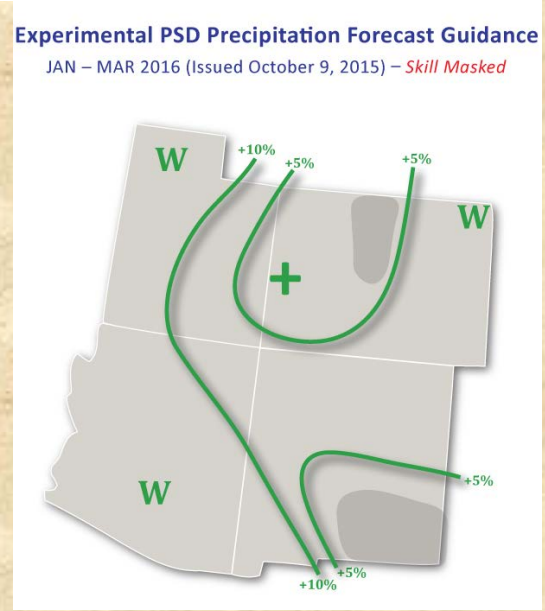
http://www.ecmwf.int/products/forecasts/d/charts/seasonal/forecast/seasonal_range_forecast/

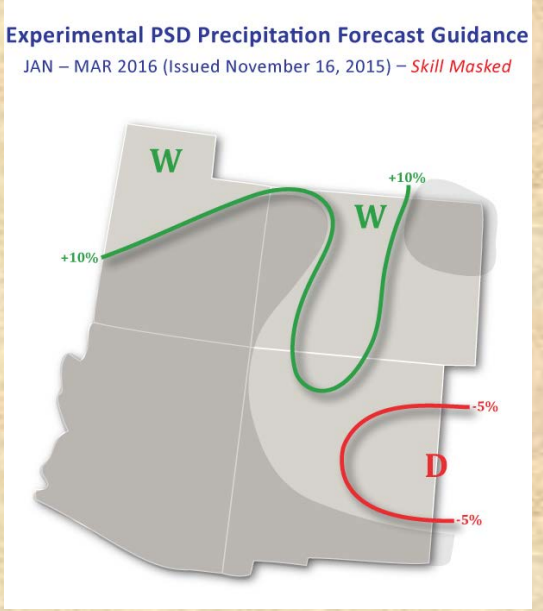
The latest ECMWF forecast (right) shows a swift decline of our El Niño to neutral status by May, a brief dip into La Niña (-0.5C) conditions during boreal summer, and a relaxation towards neutral afterwards.

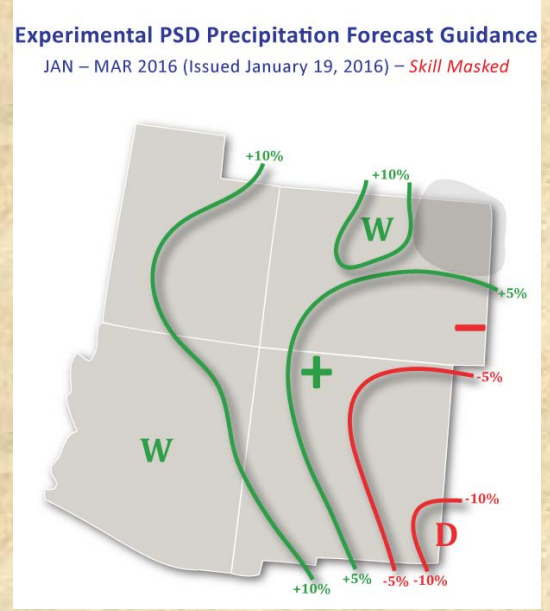
It is perhaps noteworthy that the PDO hit +2.4 in March, very close to a record high. That record was set in 1941, right in the middle of a multi-Niño event ('39-'42). Bears watching!



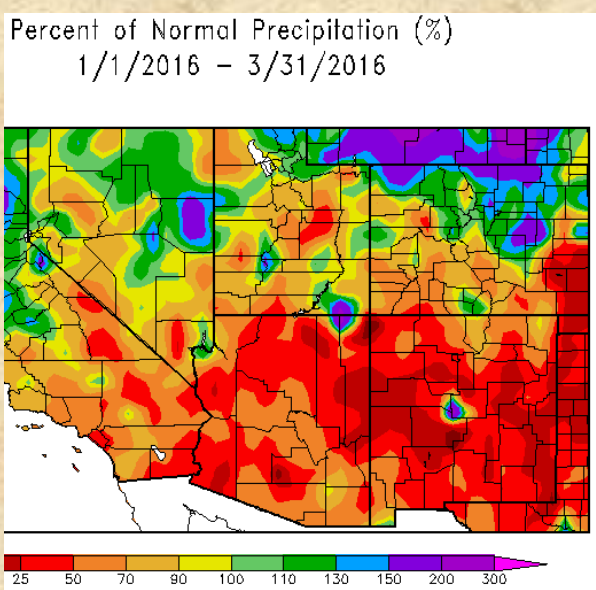
Postmortem Jan-Mar 2016



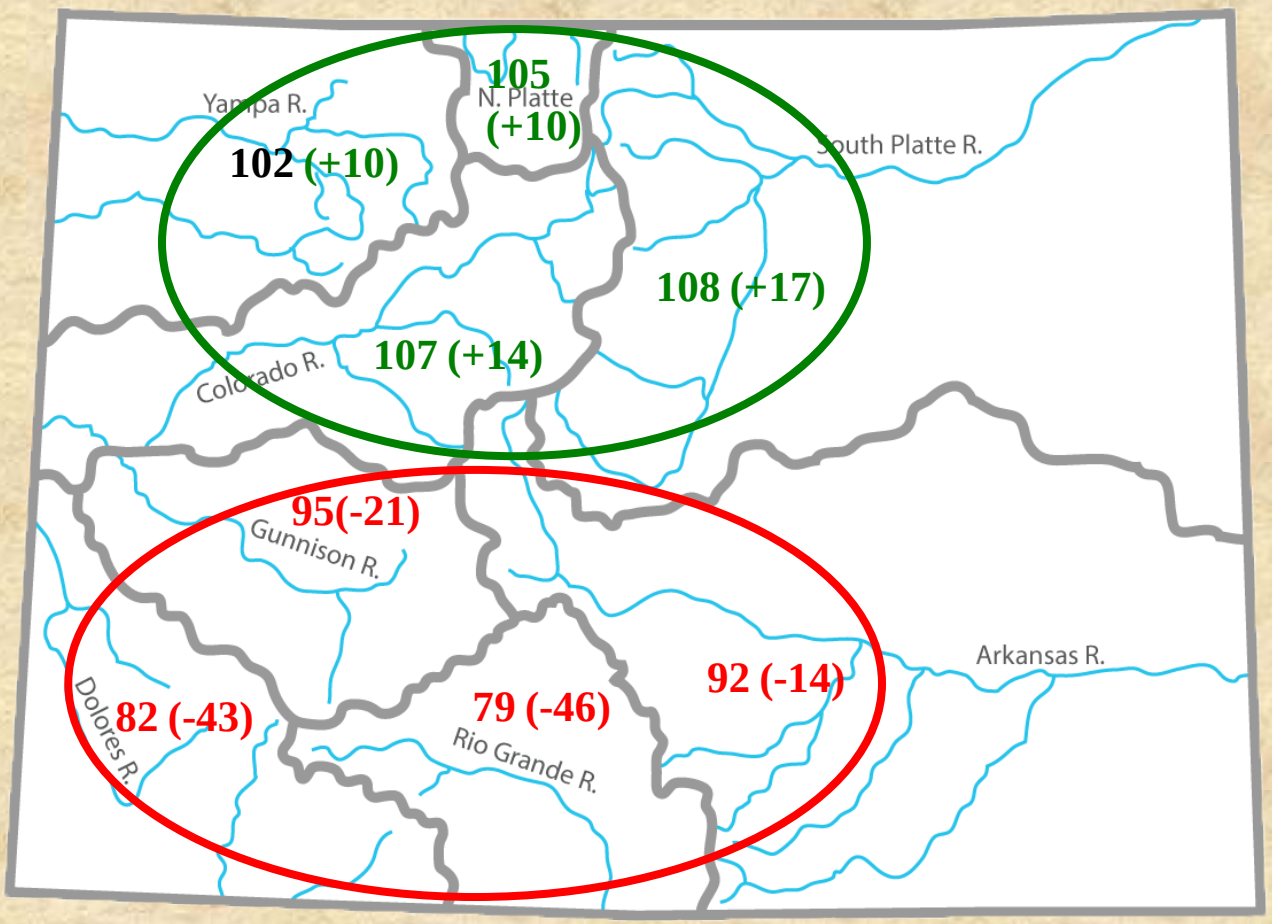




My late winter forecasts were fairly bullish for most of Colorado since September. The dry forecasts verified better than the wet ones, i.e., in NM and SE CO. The wet forecast for north-central CO worked out, but the San Juans got short-changed, similar to AZ in particular. ***Thank goodness for December…***

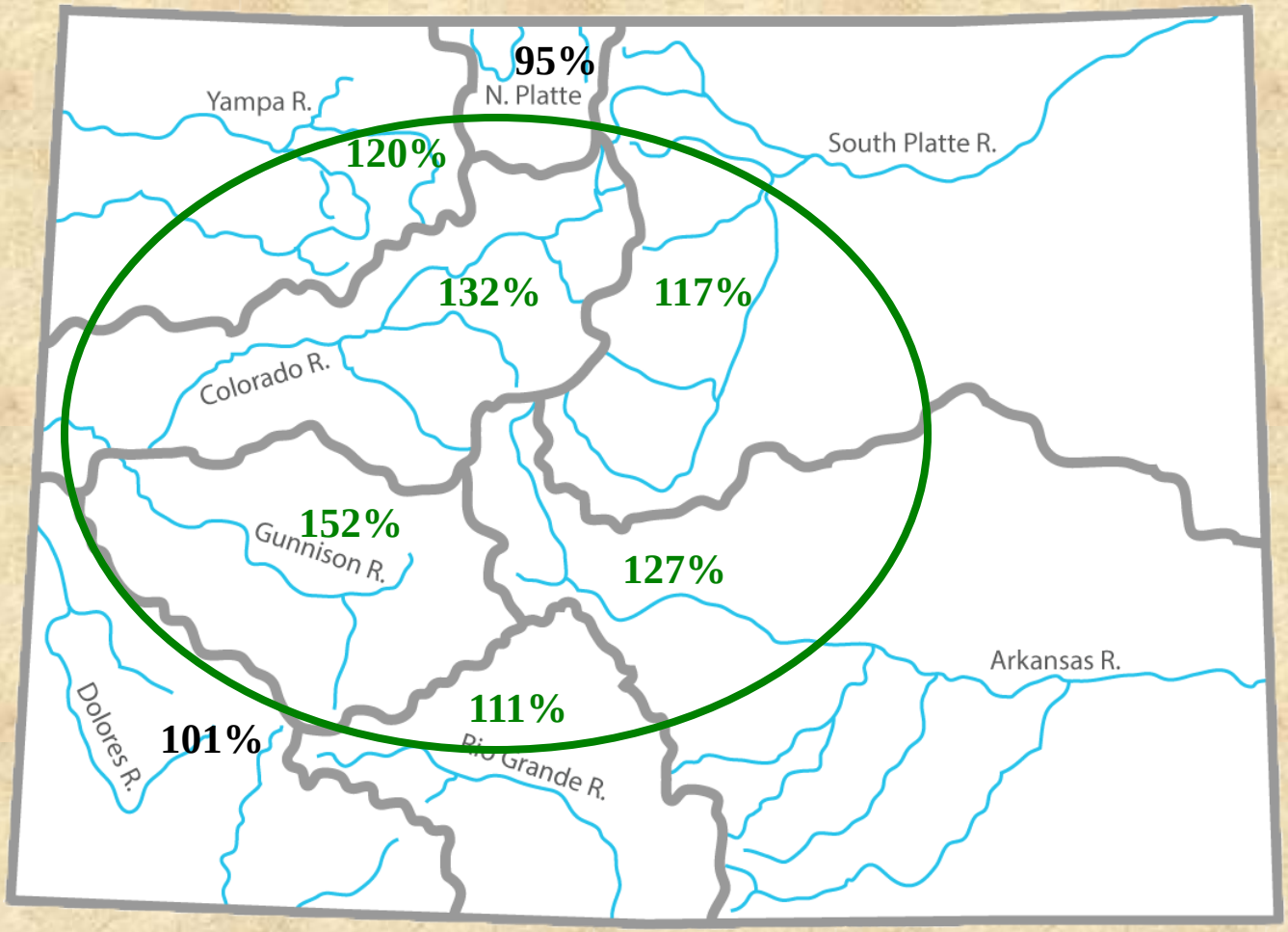


1apr16 SWE compared to fall El Niño composite (in % of median)



The northern mountains did better than expected, and the southern worse, especially in the San Juans.

Based on Fall El Niño composites for 1may SWE (*encore*)

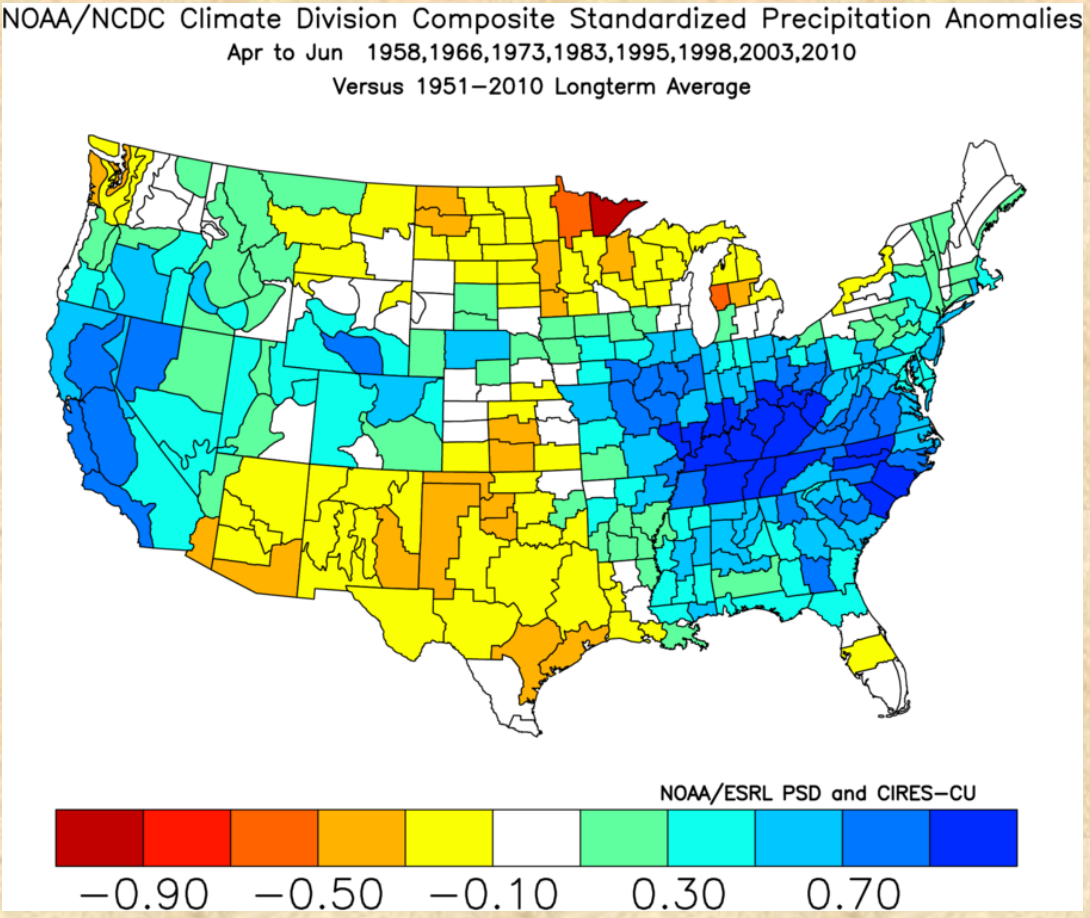


Median outcome for strong Los Niños since 1968 – not a slam-dunk, but only 1 in 5 cases 'failed' (1988)

(after fall seasons: '72, '82, '87, '94, '97)

Have not seen updated numbers, but I think the South Platte is doing alright…

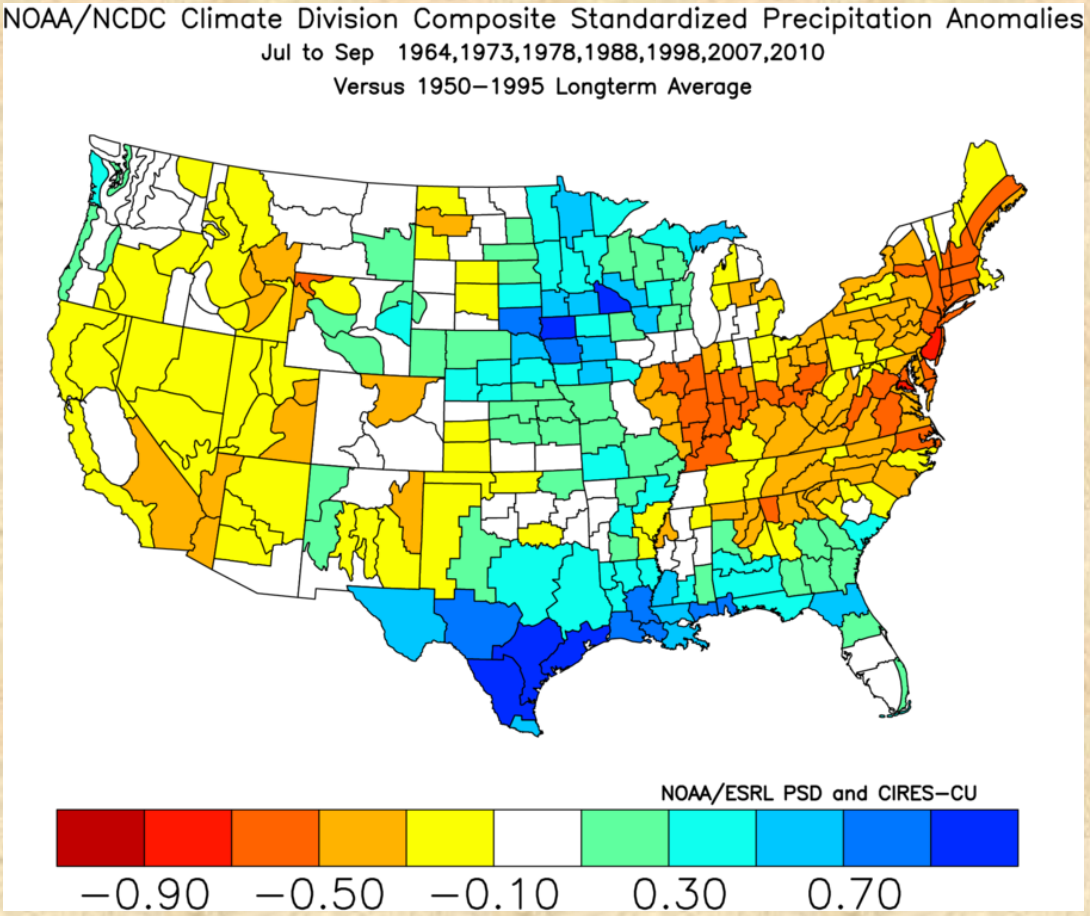
Typical late spring precipitation AFTER strong El Niño during winter (that is not growing during spring)



Most strong winter Niños were followed by a near-normal or wet spring for our state, with the South Platte Basin being the most favored, and the Arkansas as well as Upper Rio Grande being the least favored.

Encore map

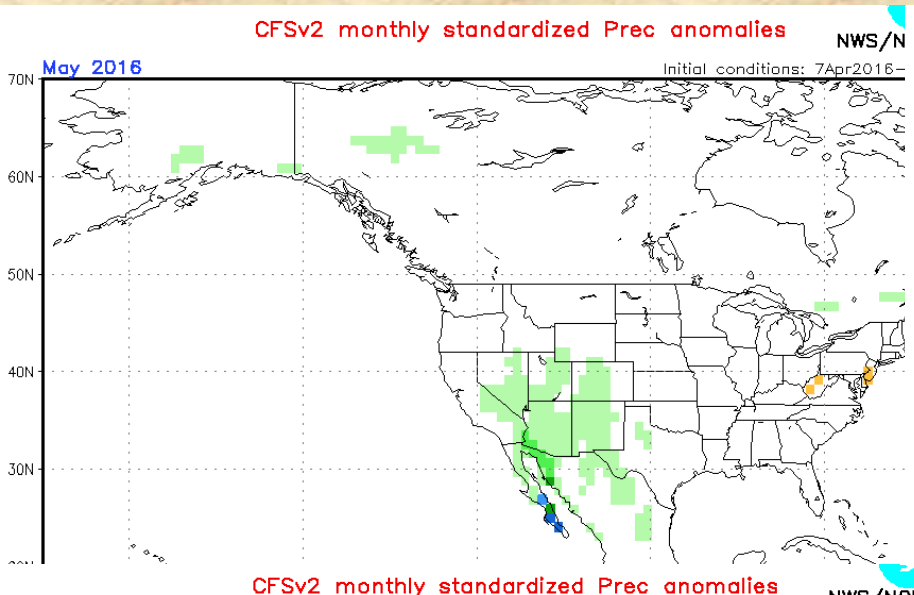
Typical late summer precipitation during at least weak La Niña AFTER El Niño winter

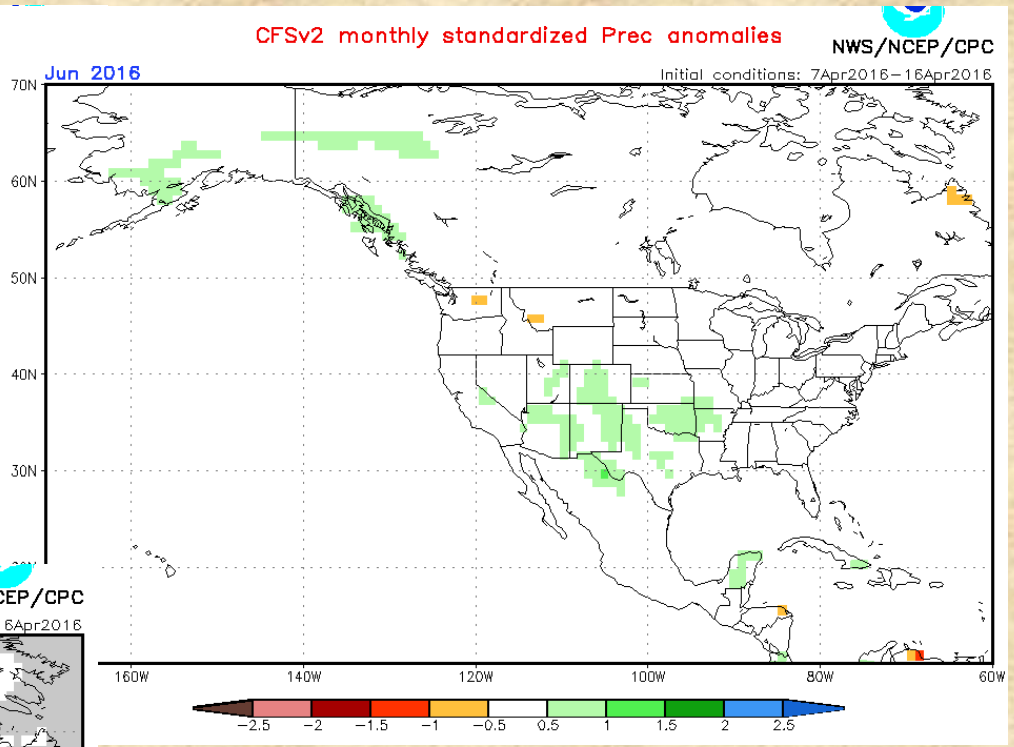


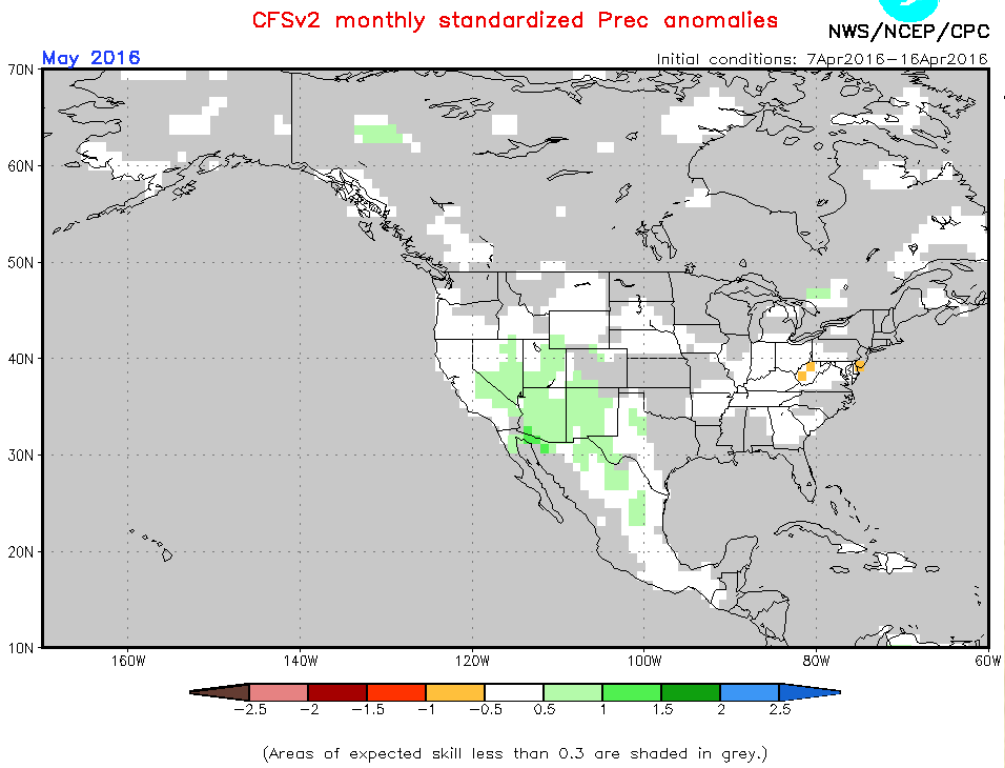
If we were to experience a transition to La Niña this summer, historical analogues don't give much preference for wet or dry conditions (none of these color shadings are statistically significant over CO/UT/NM/AZ).

New SWcast for July-September will be presented at next week's NIDIS Upper Colorado basin discussion.

CFSv2 forecasts for May and June 2016



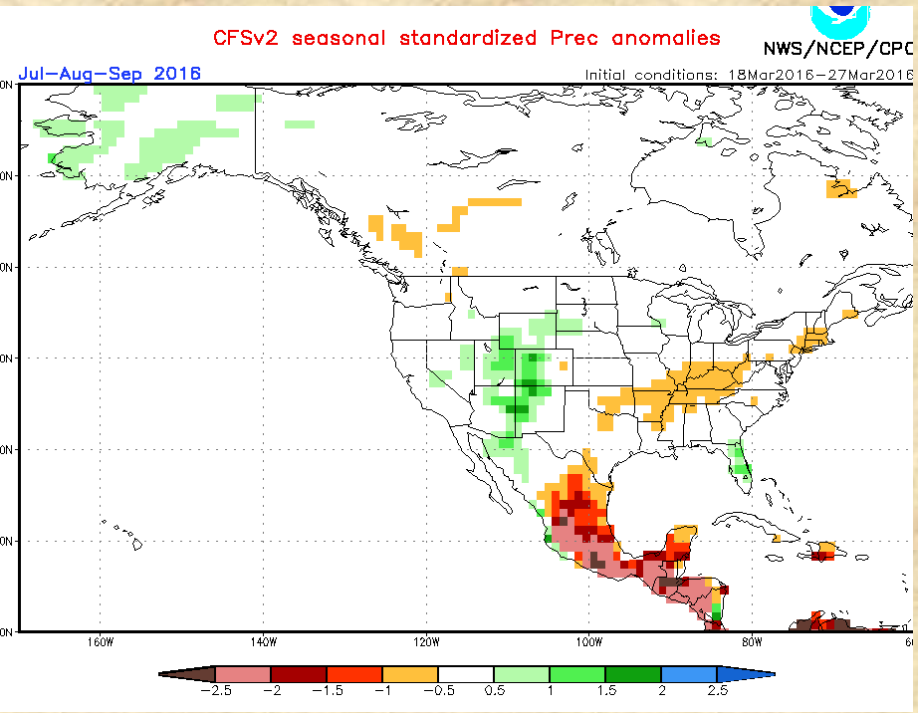


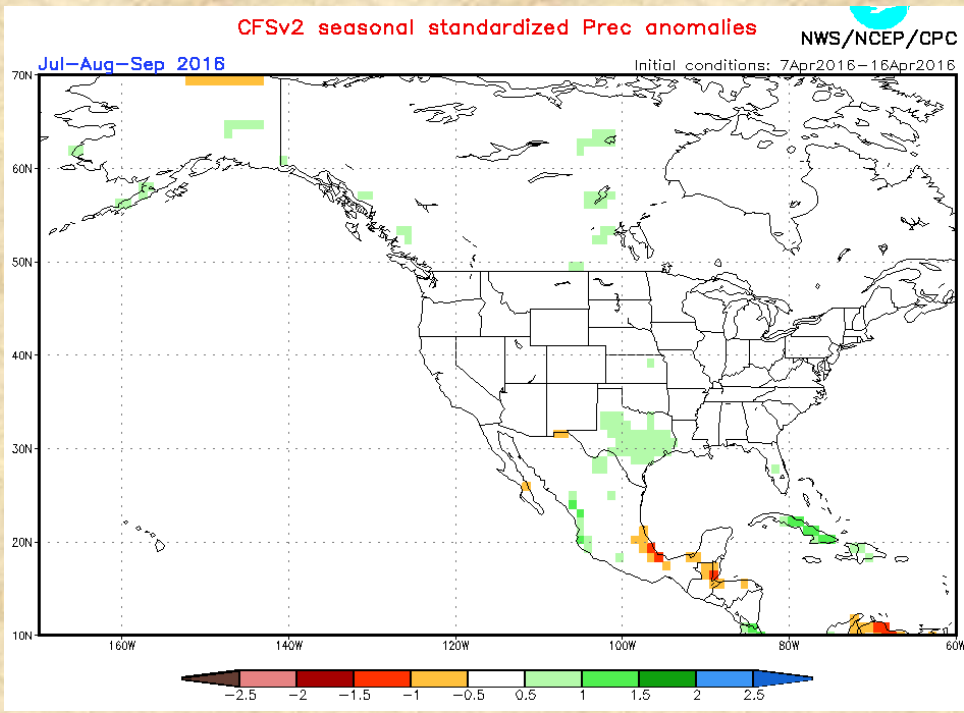


May (top left) and June (top right) look modestly wet in CFSv2. Unfortunately, this is only partially supported by skill for May (left) and does make it thru the skill mask at all for June (not shown).

http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/

CFSv2 forecasts for JAS 2016

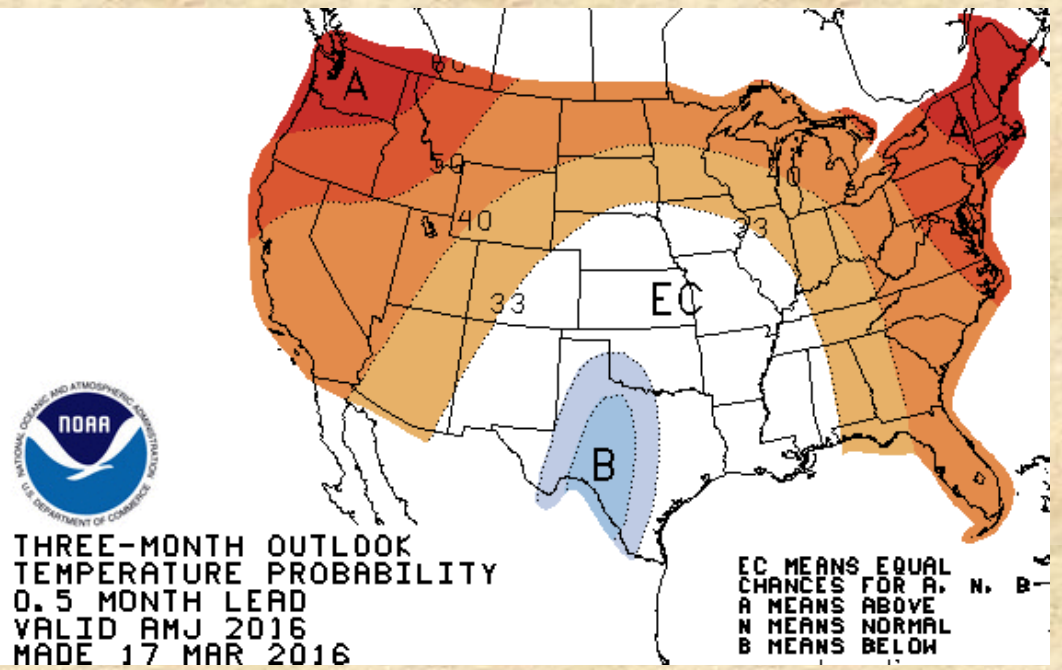




Talk about unintended consequences: the CFSv2 underwent a change in late March to fix a problem with ATLANTIC SST. The monsoon forecast before (left) and after (right) that change is quite different. ***Perhaps it is good that the skill mask would have not let the wet monsoon tilt get through.***

http://www.cpc.ncep.noaa.gov/products/predictions/90day/tools/briefing/

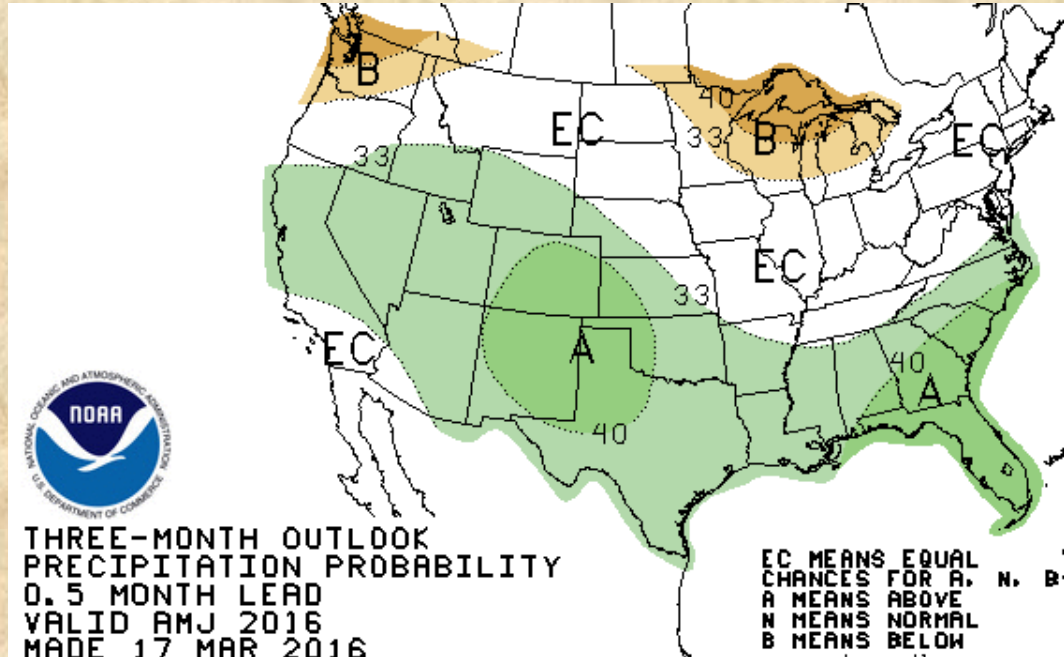
Climate Prediction Center Forecasts: AMJ



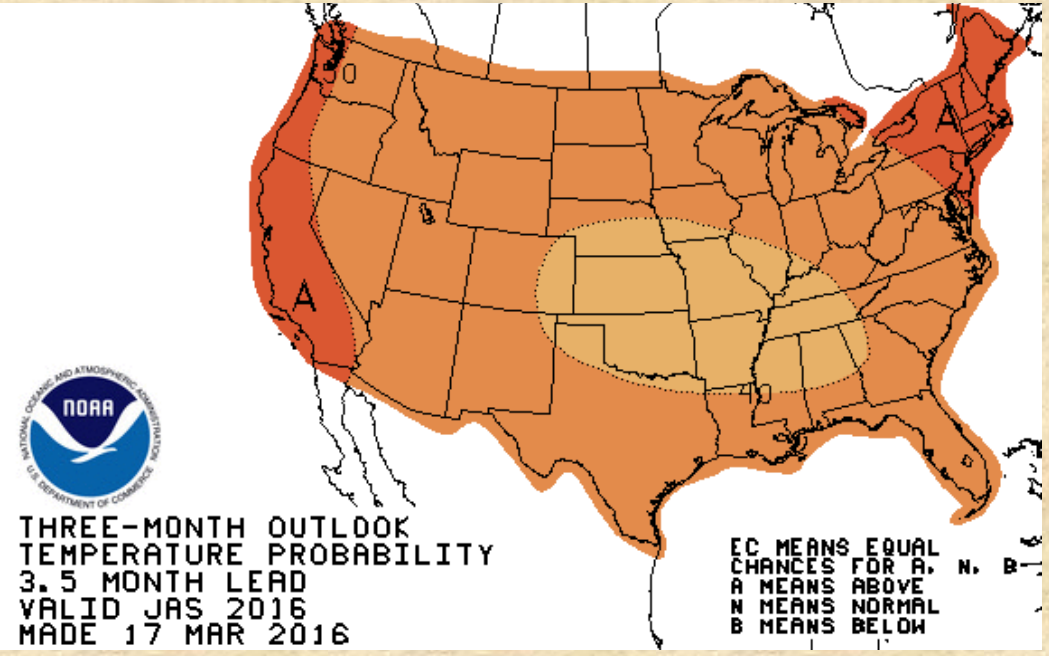
Encore maps – will be updated on Thursday

The CPC late spring temperature forecast (top left) is undecided for eastern CO, and warmish on the west slope, while the precipitation forecast continues wet (right) – *this is more or less the last season where El Niño is expected to play a major role for us.*

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

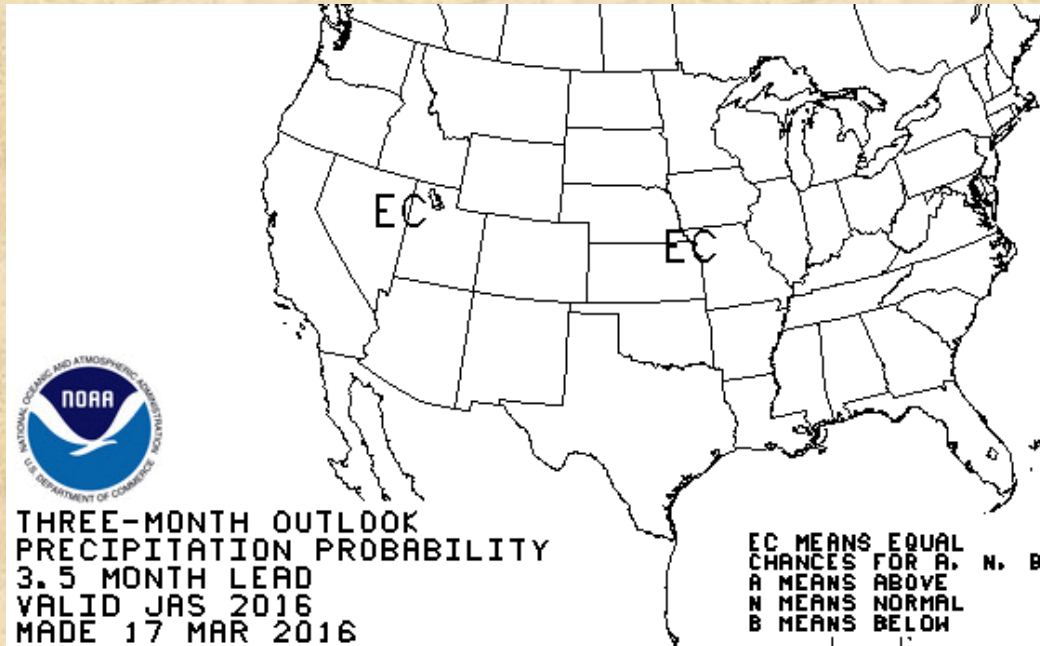


Climate Prediction Center Forecasts: JAS

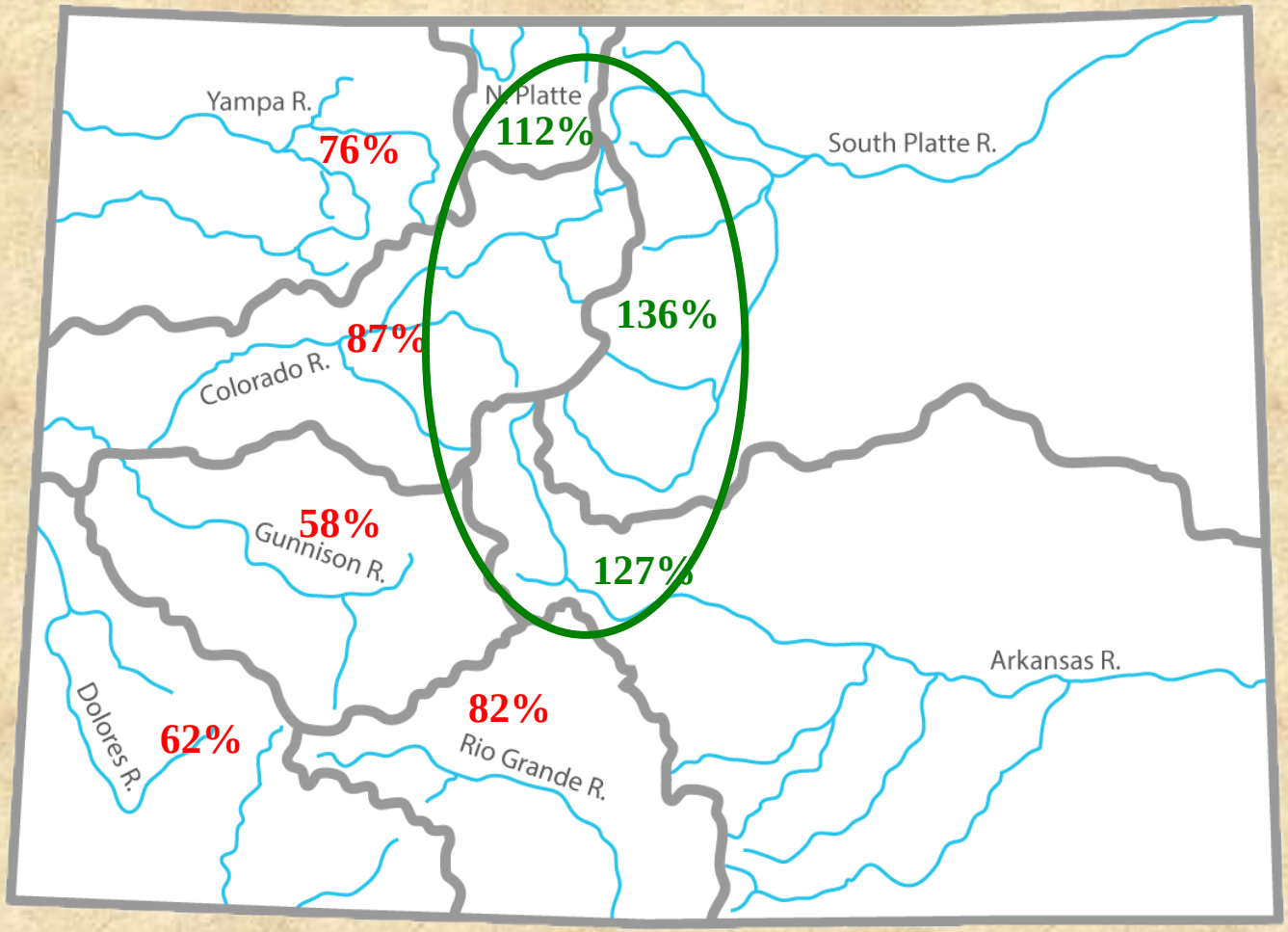


The CPC late summer temperature forecast (top left) is warmer than normal EVERYWHERE, least from eastern CO eastward to Georgia. The precipitation forecast is 'EC' (right) – ***they did not buy into a rapid onset of La Niña.***

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

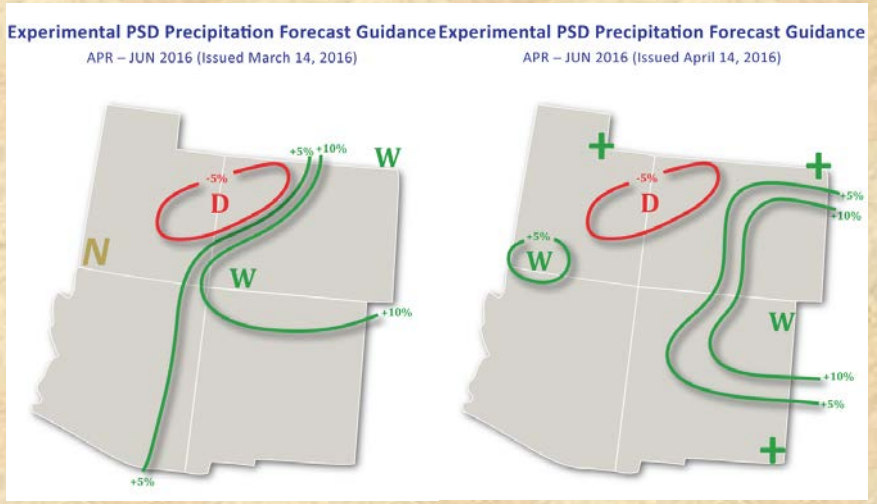


Forecast for 1june SWE

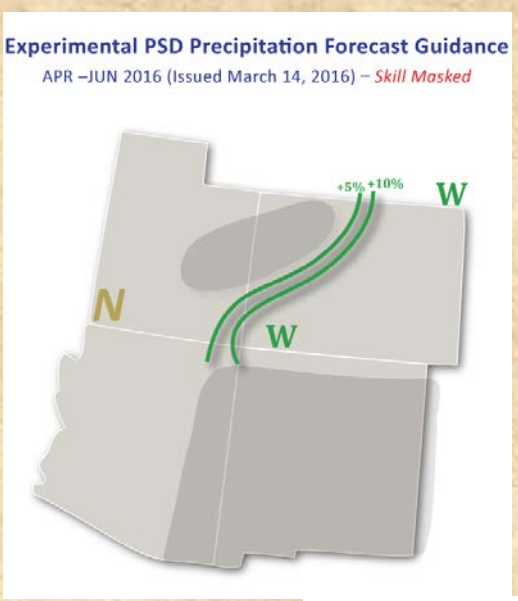


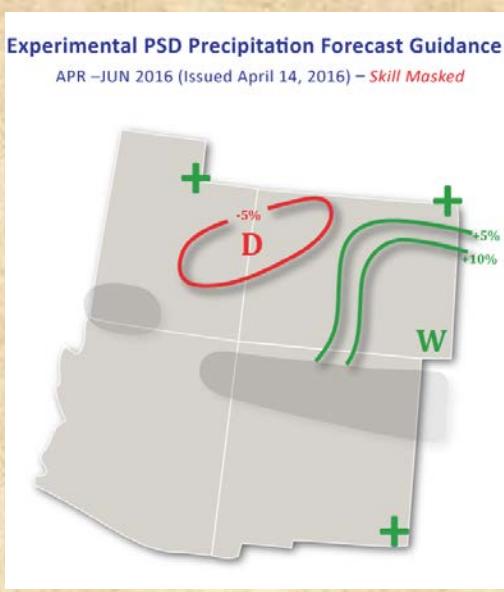
This is based on statistical forecast system that gives a lot of weight to 1apr conditions, so it is perhaps no surprise that the San Juans are a 'lost cause'. ***Best chances for high percentiles east of the Continental Divide.***

Forecasts for April-June 2016



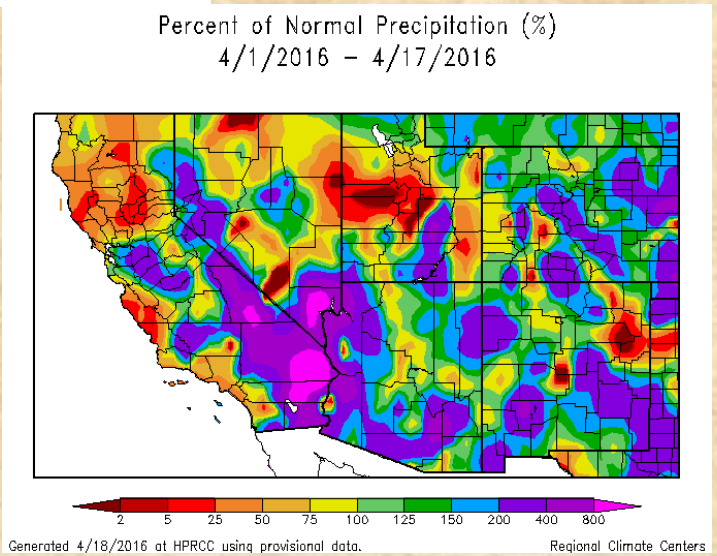
Skill-masked maps



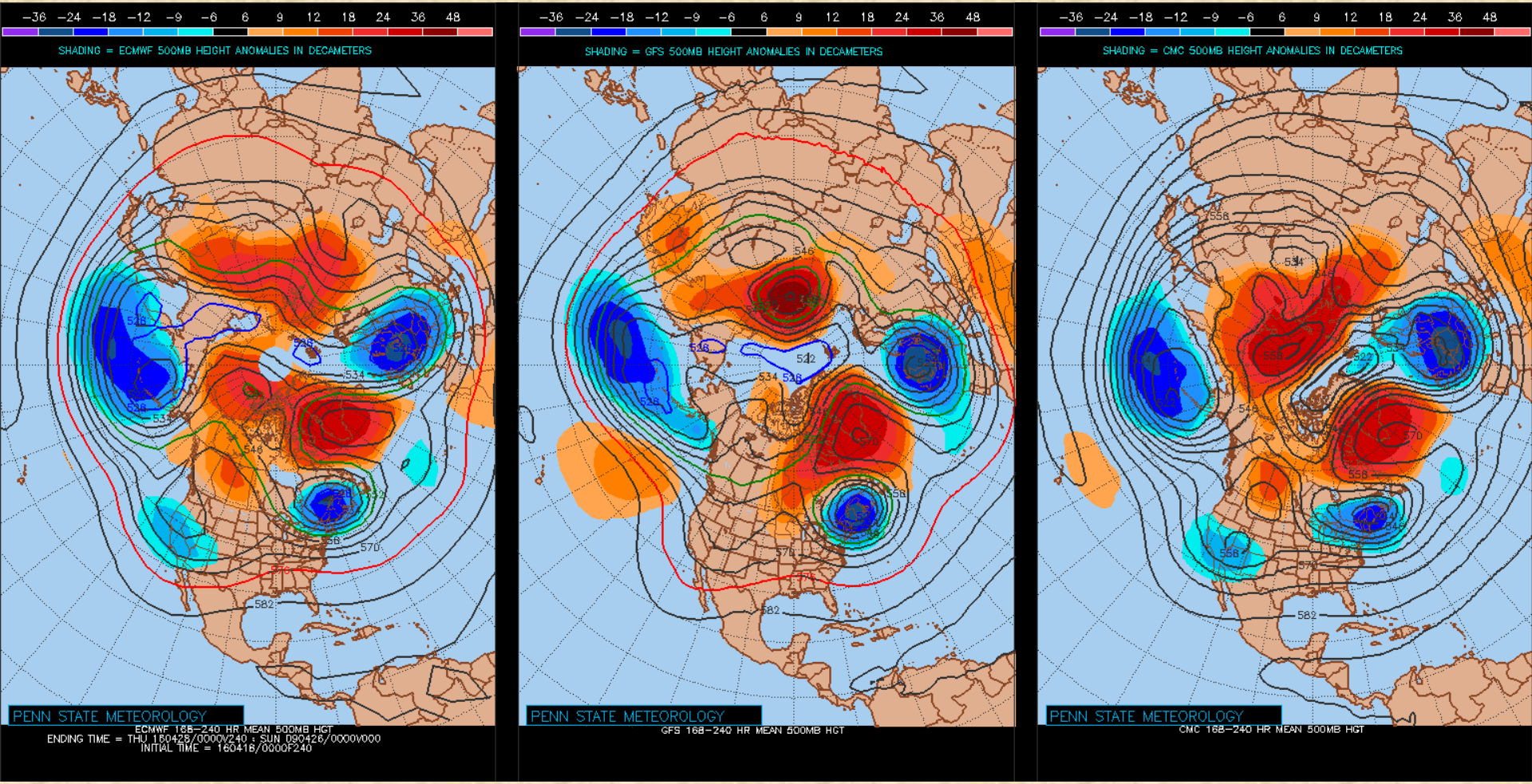


The late spring precipitation forecasts have been bullish for eastern CO, less so over northwestern CO (left). ***The latter is not supported by any operational skill in the March initialization (2nd from right), but makes it thru the skill mask in April (top right).***

The weekend storm (bottom right) did not contradict my seasonal forecast…

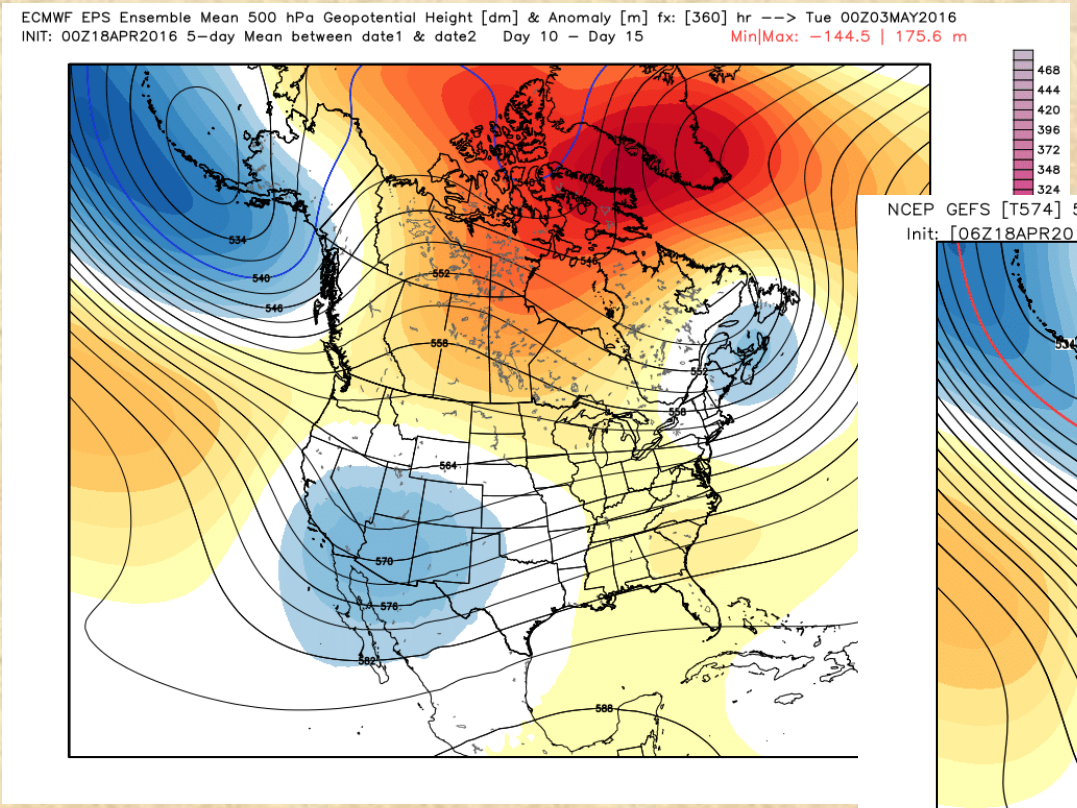


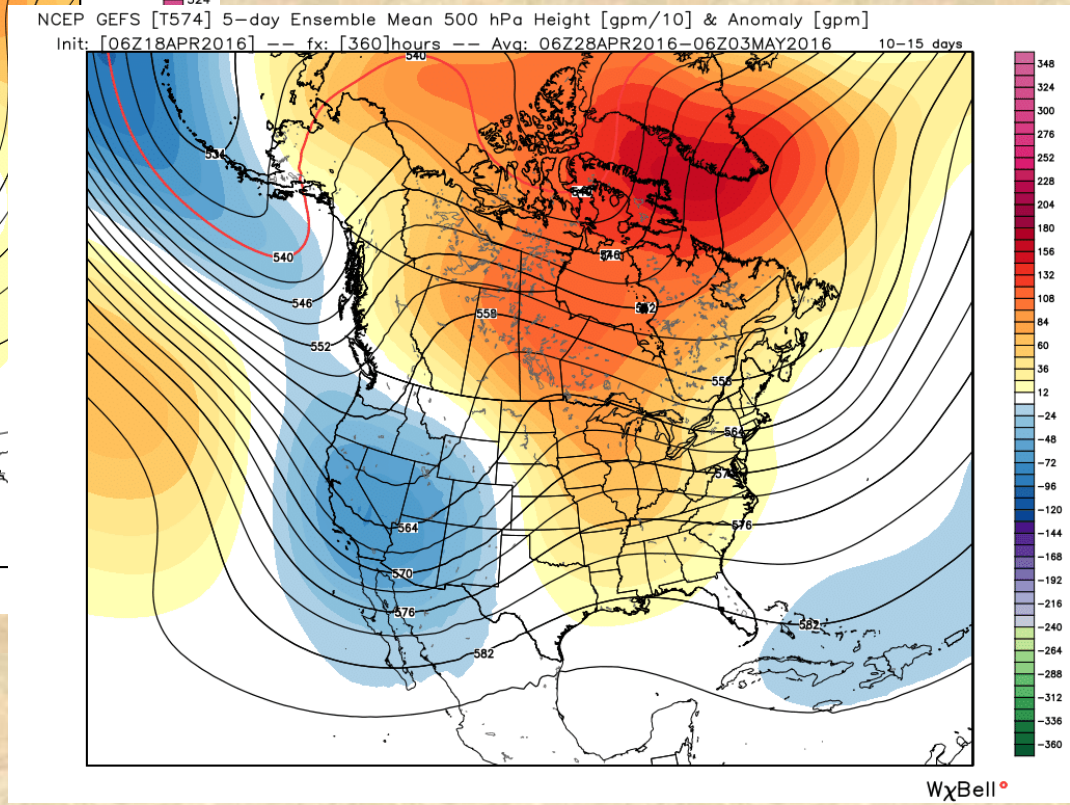
What can we expect next week?



ECMWF (left), GFS (middle,) and CMC (right) show our next storm approaching from the southwest in both the EC and CMC, and weaker in GFS.

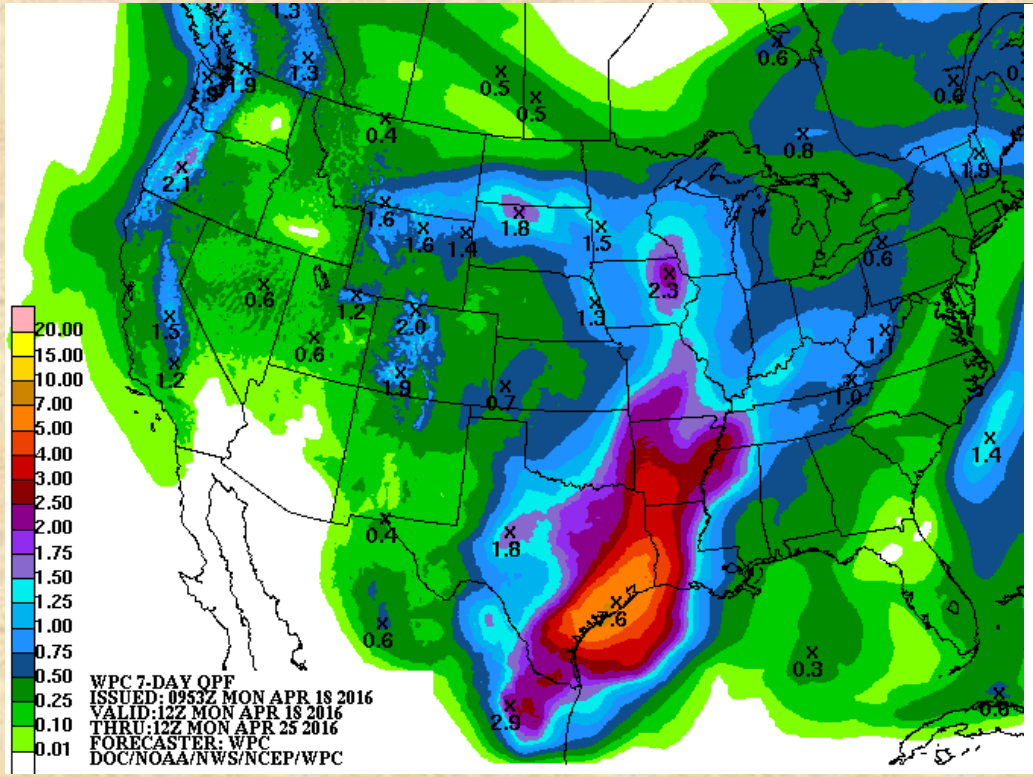
What can we expect beyond Day 10?

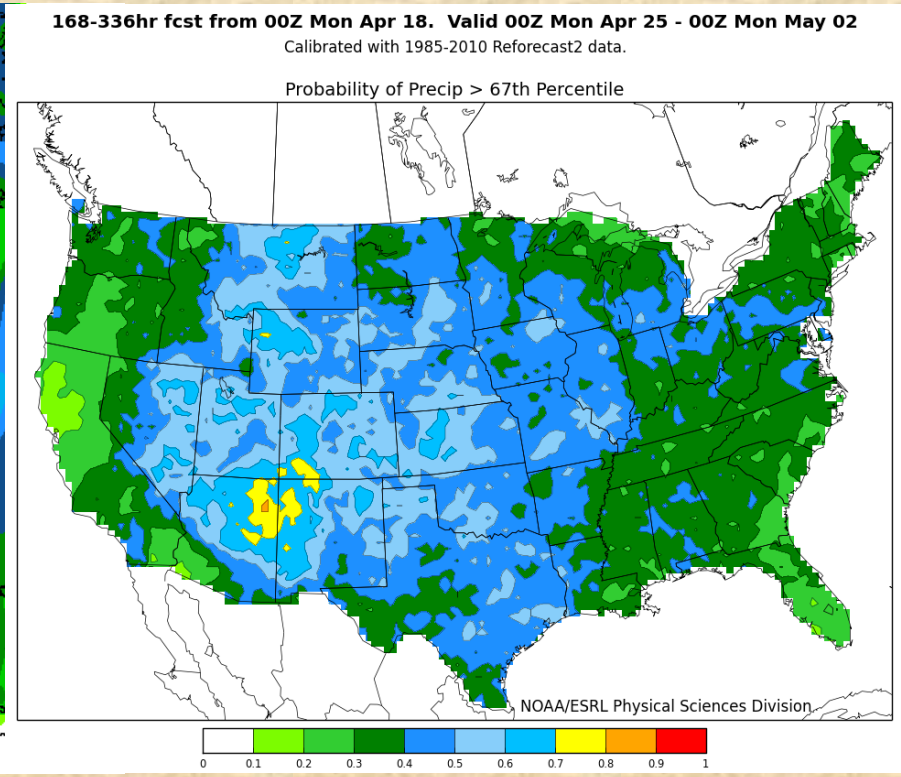




European (left) and GFS ensembles (right) agree that we see troughing in the southwestern U.S., holding out the promise for wetness across Colorado for days 10-15.

What can we expect for next two weeks?





WPC forecast for the 1st week (left) shows decent moisture totals for the mountain, but only 1/4-1/2" at lower elevations, while the extended reforecast for Week 2 (right) gives all of CO a 50/50 chance of ending up in the highest 1/3 of typical moisture for this time of year.

The pattern is somewhat reminiscent of last spring, let's hope it carries into May…

Executive Summary (18 April 2016)

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- **El Niño is still around, still at strong levels, and should impact the U.S through spring. In my book, this has been the 3rd strongest event of the last century.**

- **Perhaps the most baffling footprint of this event has been the weakness of the storm track to our south that should have boosted the snowpack in the San Juans compared to normal. This has been somewhat compensated by excessive moisture in the northern mountains and along the northern Front Range, thus curbing demand.**

- **CPC's forecasts favor our state during spring, consistent with my own expectations. However, my experimental forecast guidance for April through June gives better odds for the eastern half of our state than the western half, backed up by better real-world skill since 2000.**

- **The rest of April promises an active storm track to affect our state, with the potential for another cutoff low to vex forecasters next week. With rising temperatures, we are now transitioning into mostly rainstorms in lower elevations.**

- **While it is not guaranteed that we will transition into La Niña this year, its return would not necessarily foretell re-emerging drought conditions right away. *Most recently, 2010-11 was an exceptionally wet year in this region despite being a very strong La Niña after a strong El Niño event.***