Earth System Research Laboratory
Physical Sciences Division

CO WATF, 17 June 2011
Denver

CIRES

Seasonal Outlook into Summer 2011

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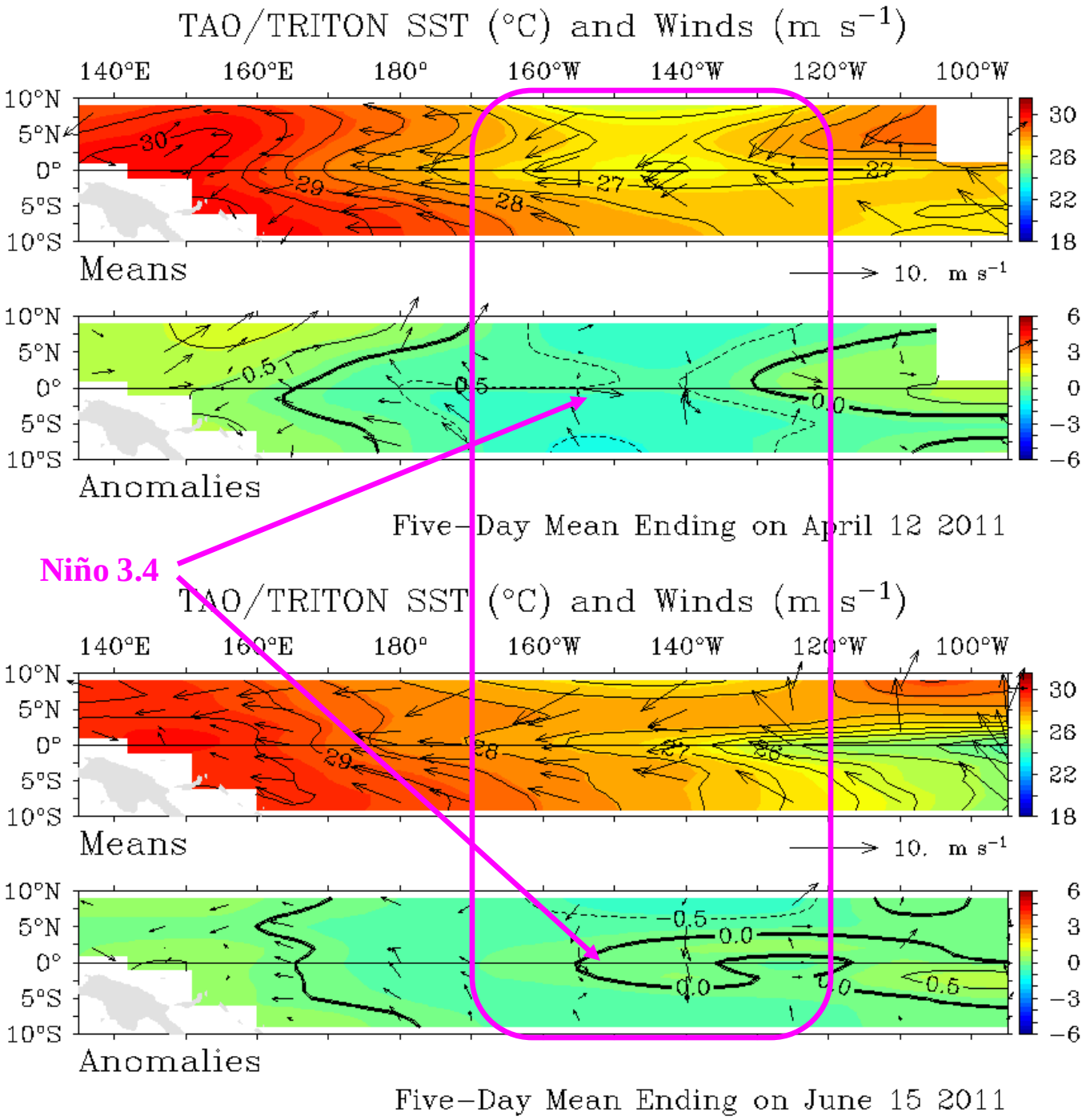
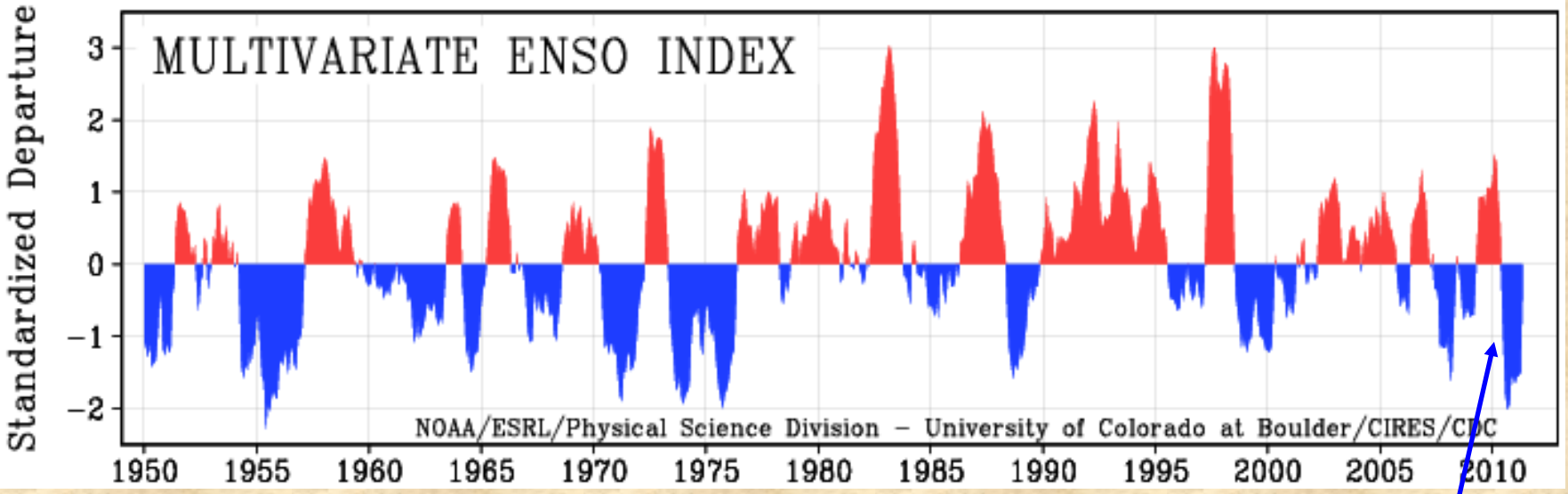
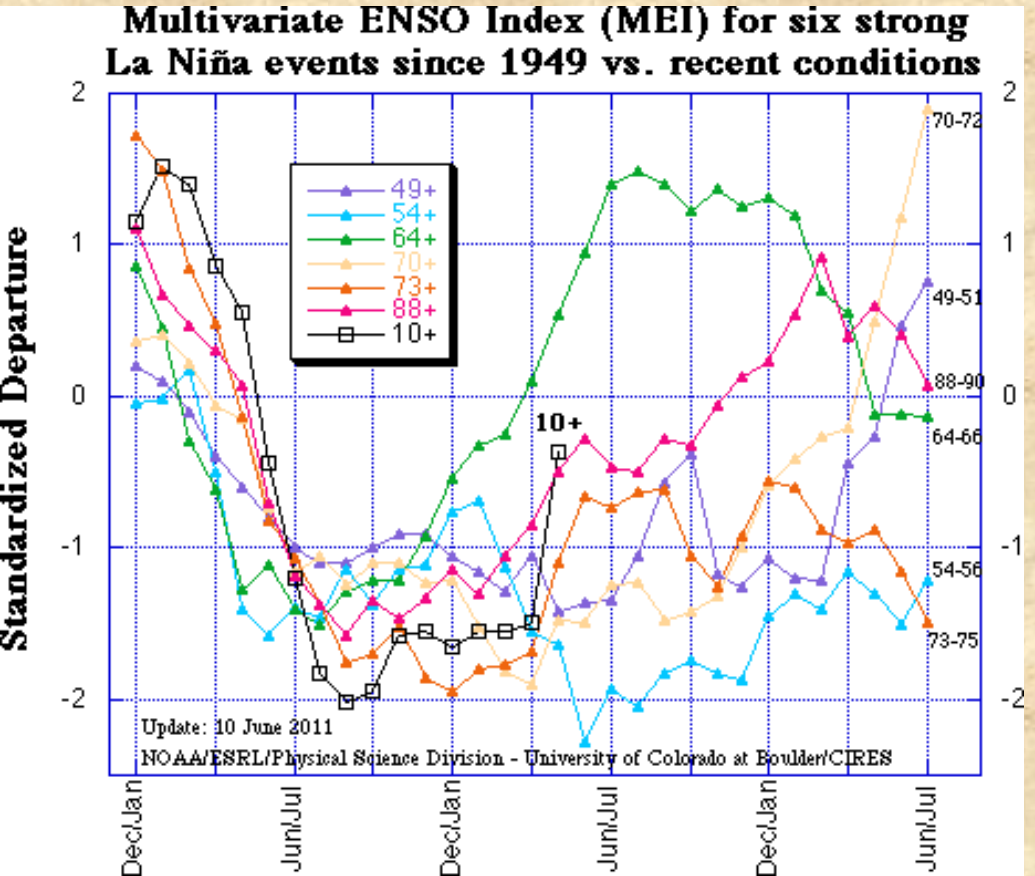
- **La Niña heading for a summer vacation√**
- **What does that mean for us?**
- **Expectations for next two weeks**
- **CPC forecasts for July through September 2011**
- **Experimental Seasonal Forecast Guidance (ditto)**
- **Executive Summary**

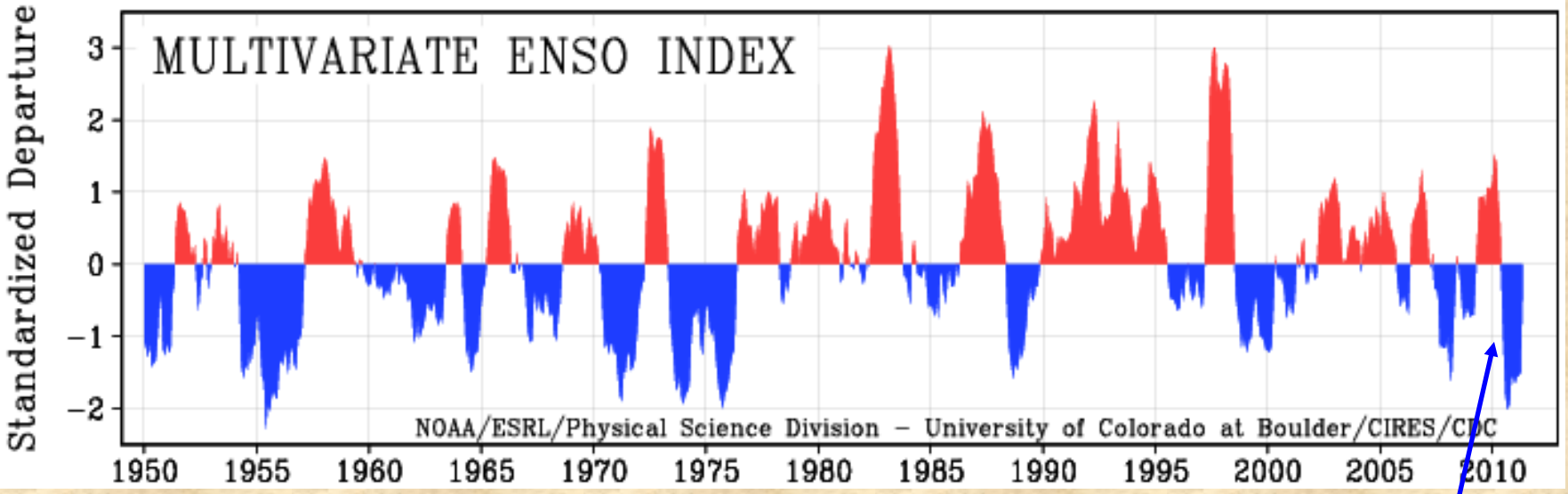
Current state of El Niño/Southern Oscillation (ENSO) phenomenon (bottom), compared to April '11(top): La Niña has clearly weakened, even if you take normalized data into account. This includes near-normal trade winds, and encroaching positive anomalies in eastern tropical Pacific. On the other hand, tropical thunderstorms are still shifted towards the Western Pacific, á la La Niña.

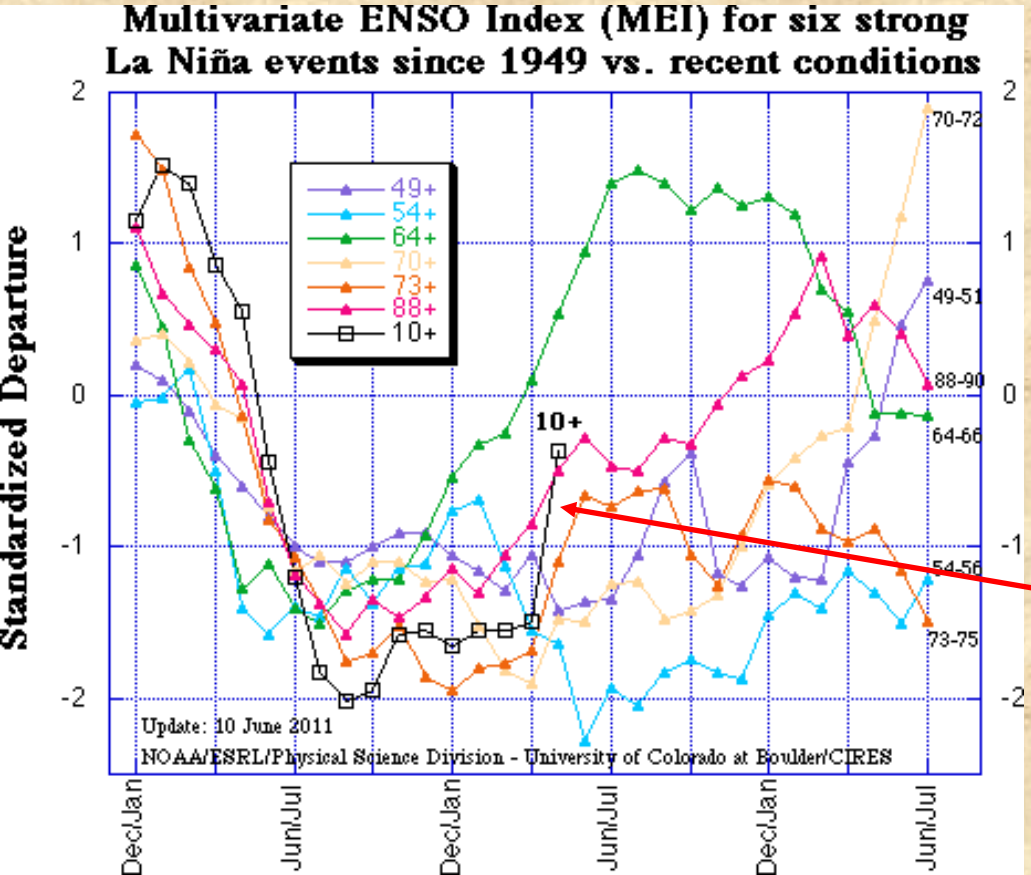




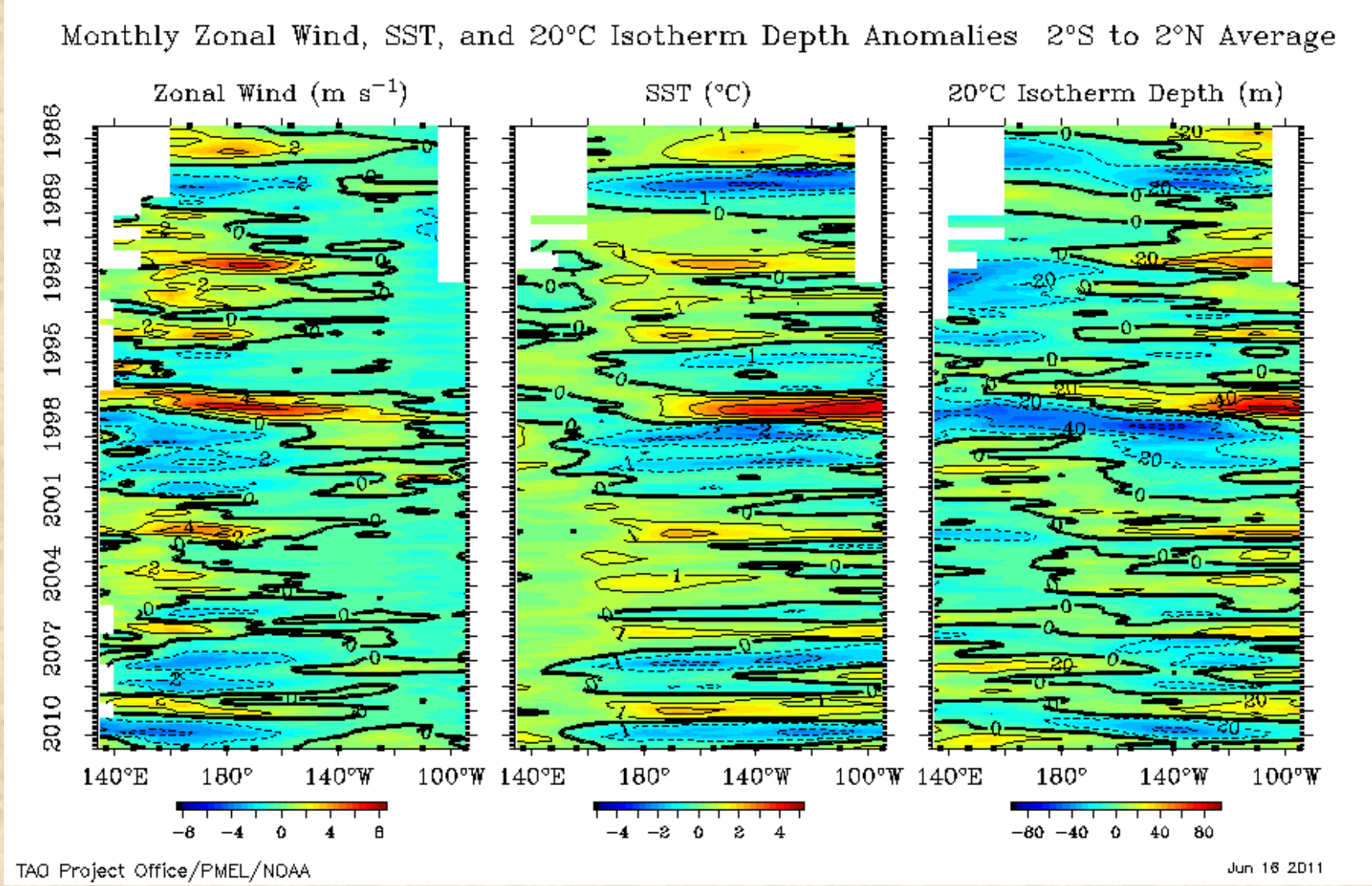


Remarkable drop in 2010 from mid-sized El Niño to biggest La Niña event in 35 years in just half a year –

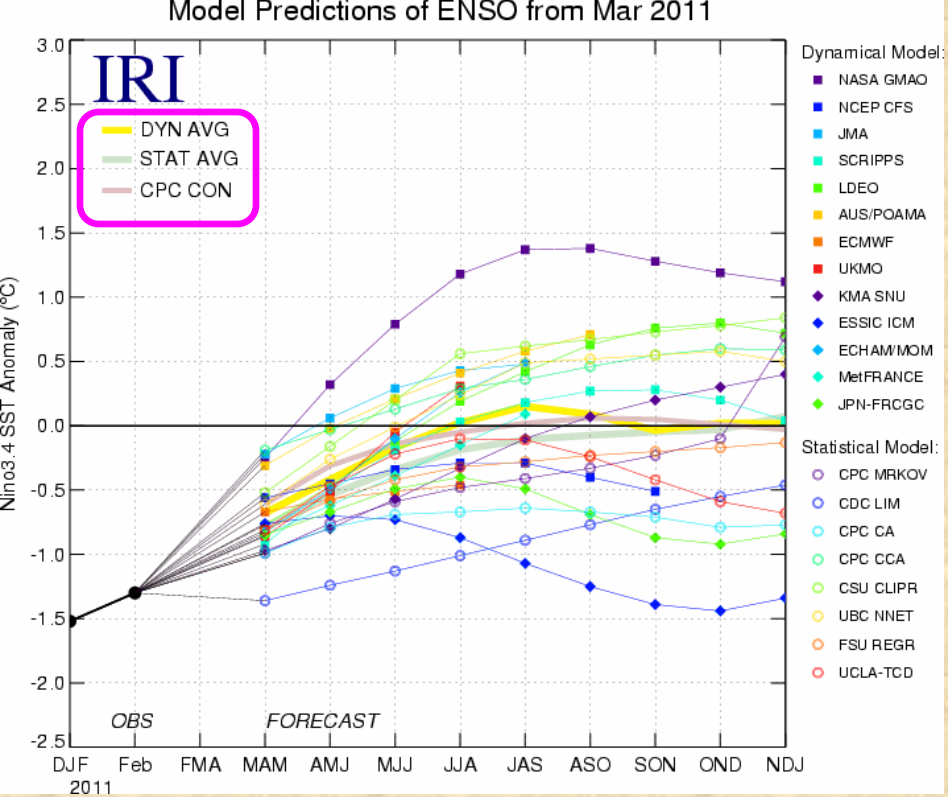




Remarkable drop in 2010 from mid-sized El Niño to biggest La Niña event in 35 years in just half a year – are we seeing a an opposite transition that rivals that speed? Not so fast…

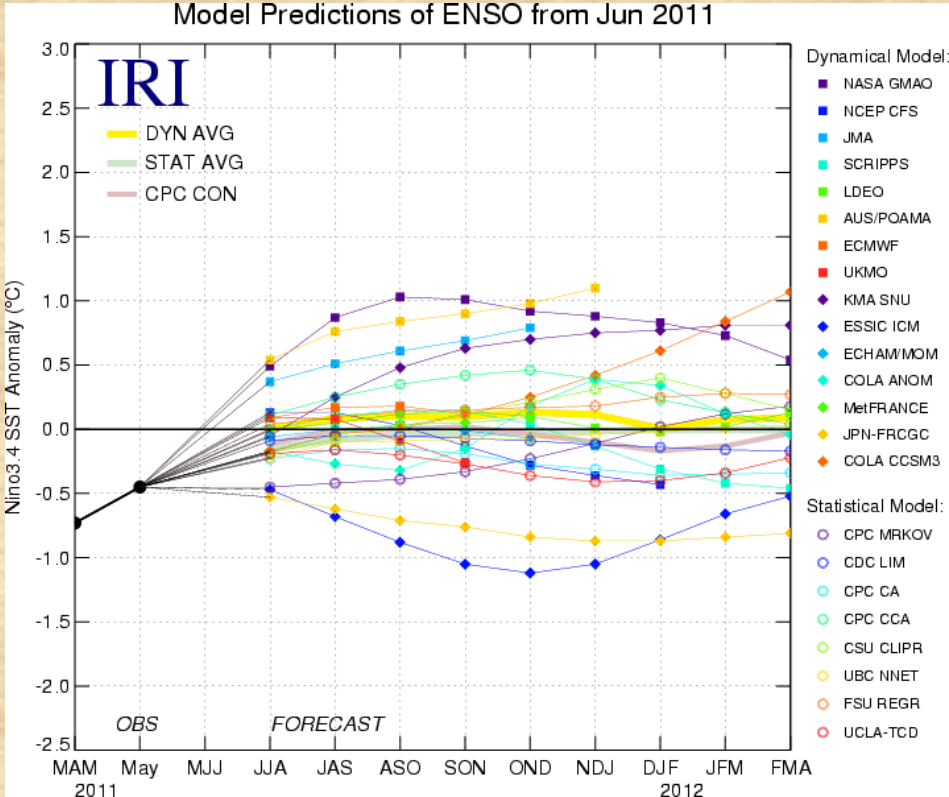


Zonal cross-section for east-west wind (left), SST (middle), and upper ocean heat content (right) shows some interesting parallels between 2010-11 and 2007-08...



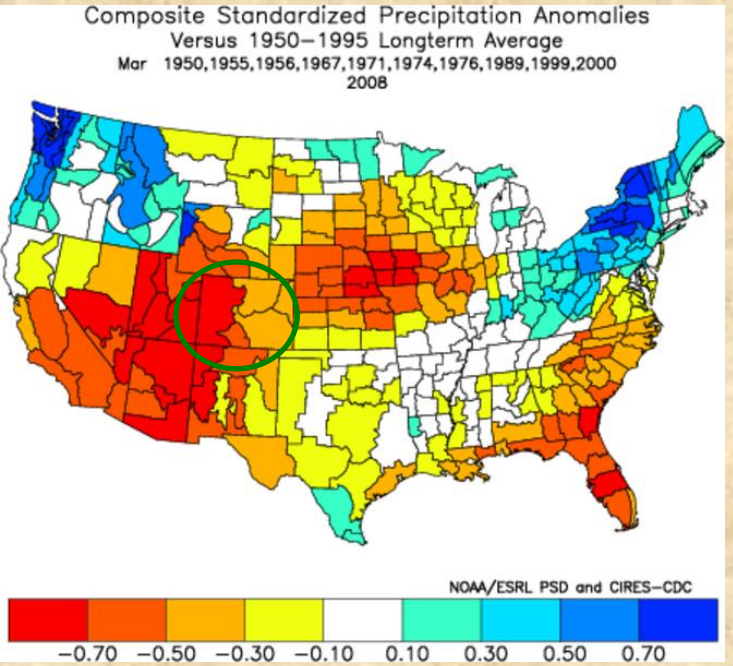
ENSO forecasts from 15 dynamical & 8 statistical forecast models in March 2011 (left): Transition to ENSO-neutral by early summer (√), then wide open outcome for rest of 2011;

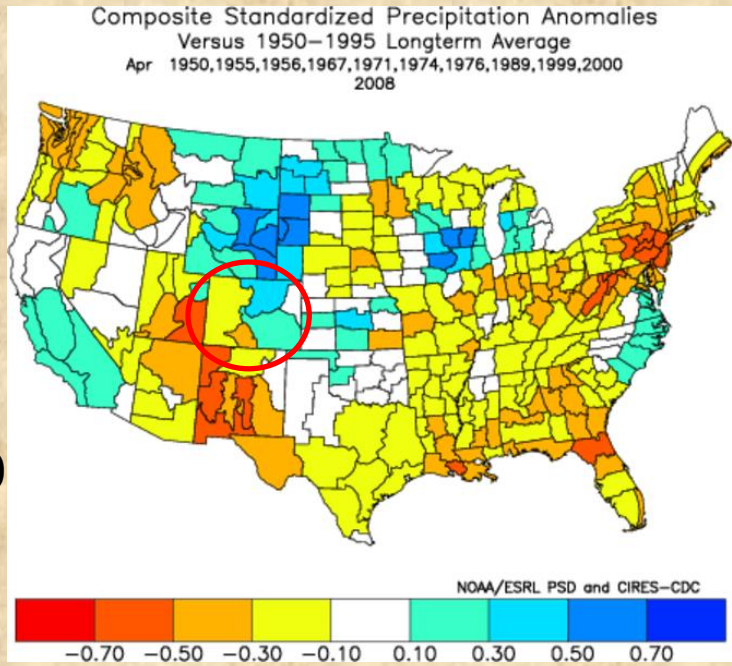
On average, dynamical models a bit warmer than statistical models, insignificant differences overall.



The most recent forecasts (right) remain near-neutral into next year, only a handful of models show transition to weak El Niño or a return to La Niña; meanwhile, the latest available PDO-value (April) remains negative, leaving the door open for La Niña to return in a few months.

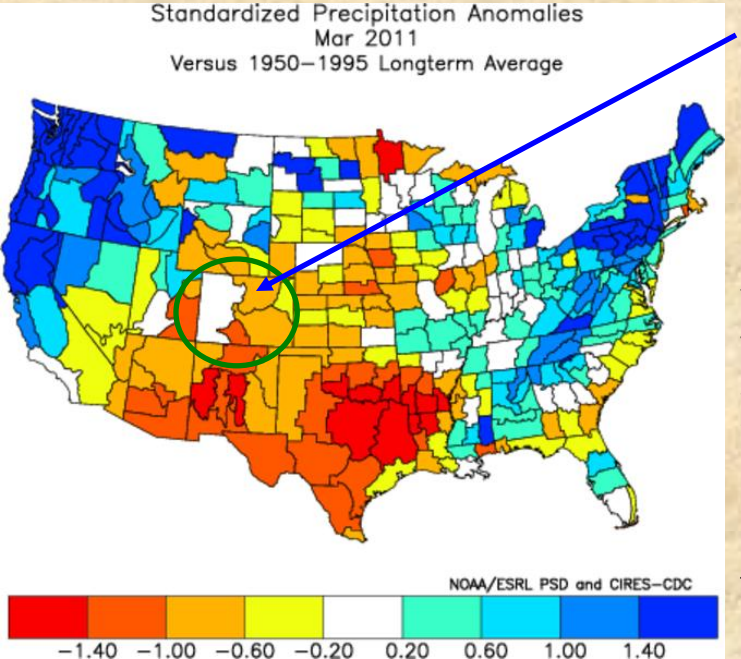
La Niña springs

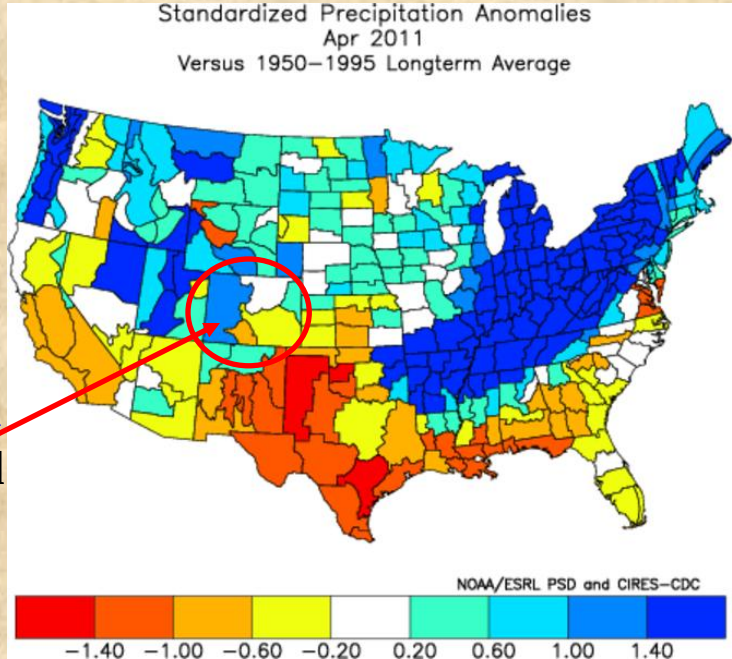




In the wake of La Niña winters, individual spring months often show dry outcomes in March (top left), while April (top right) can be wet, most recently in 1999.

In 2011, March (bottom left) was just about as dry as expected east of the divide, but wetter than expected to the West, especially at high elevations. April (bottom right) showed a similar preference for West Slope.





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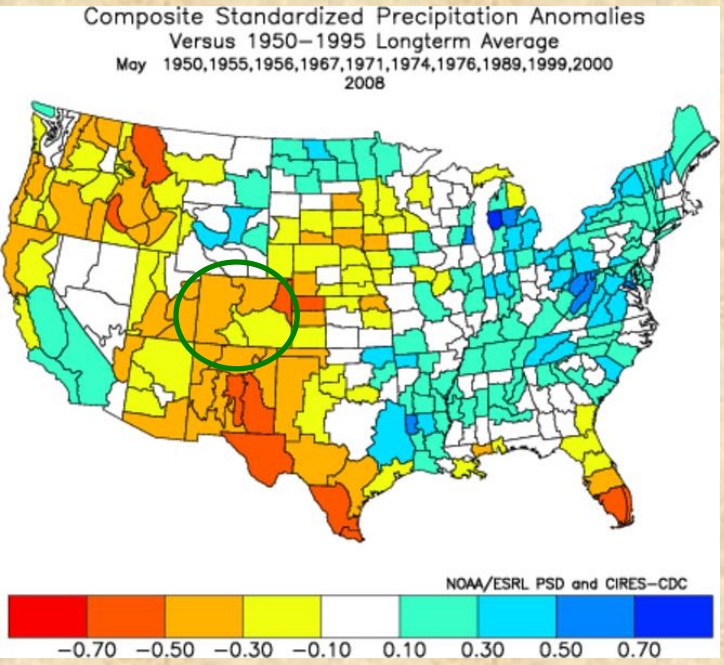
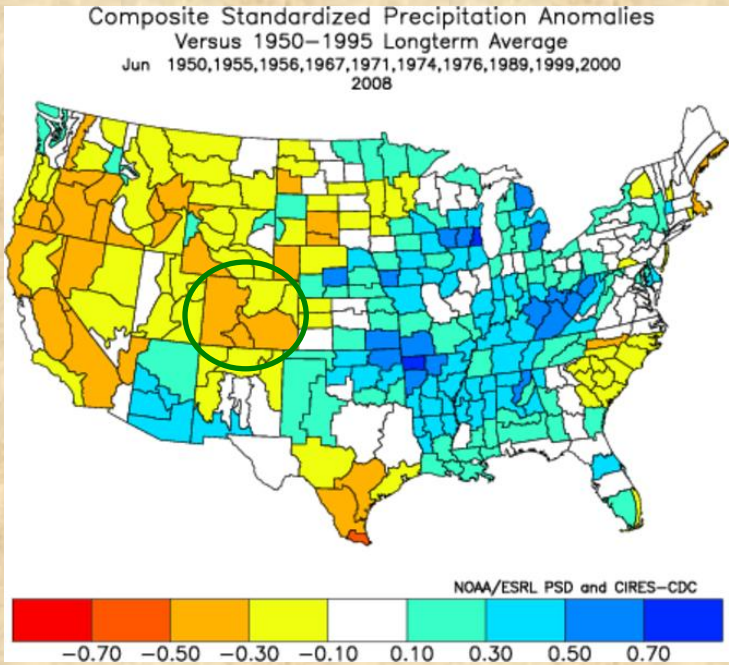
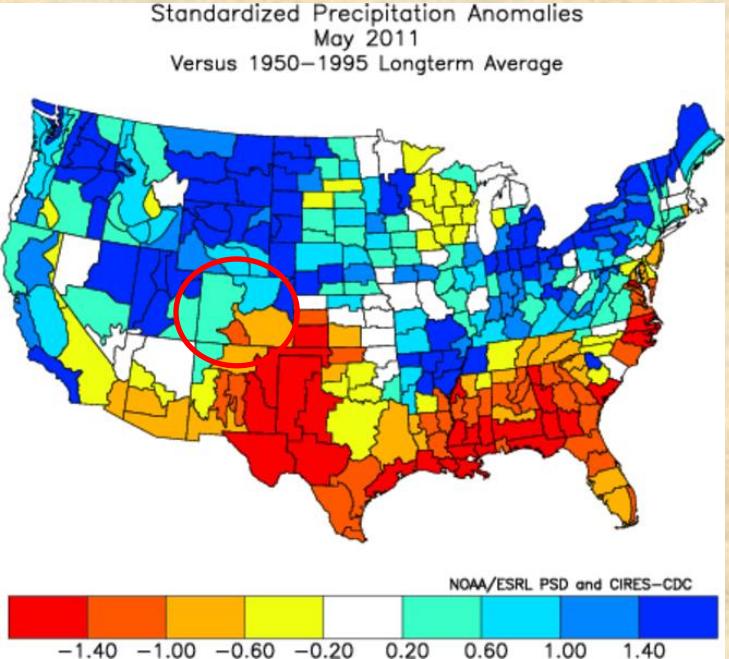
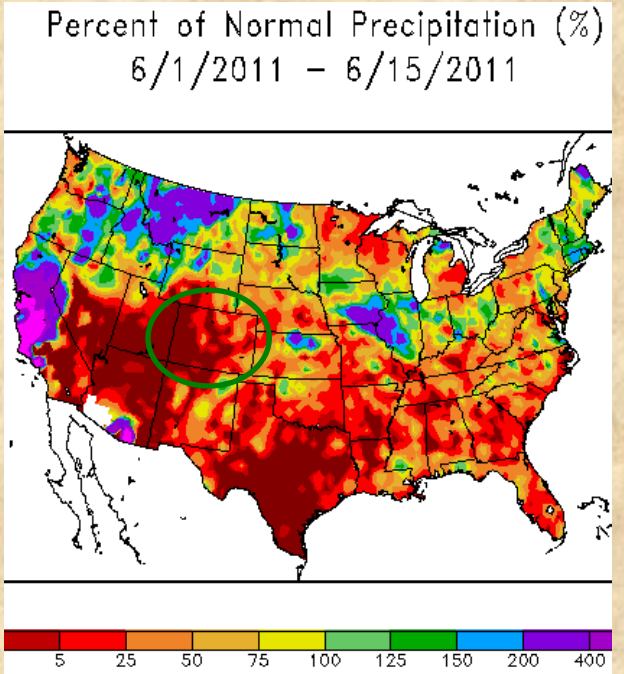




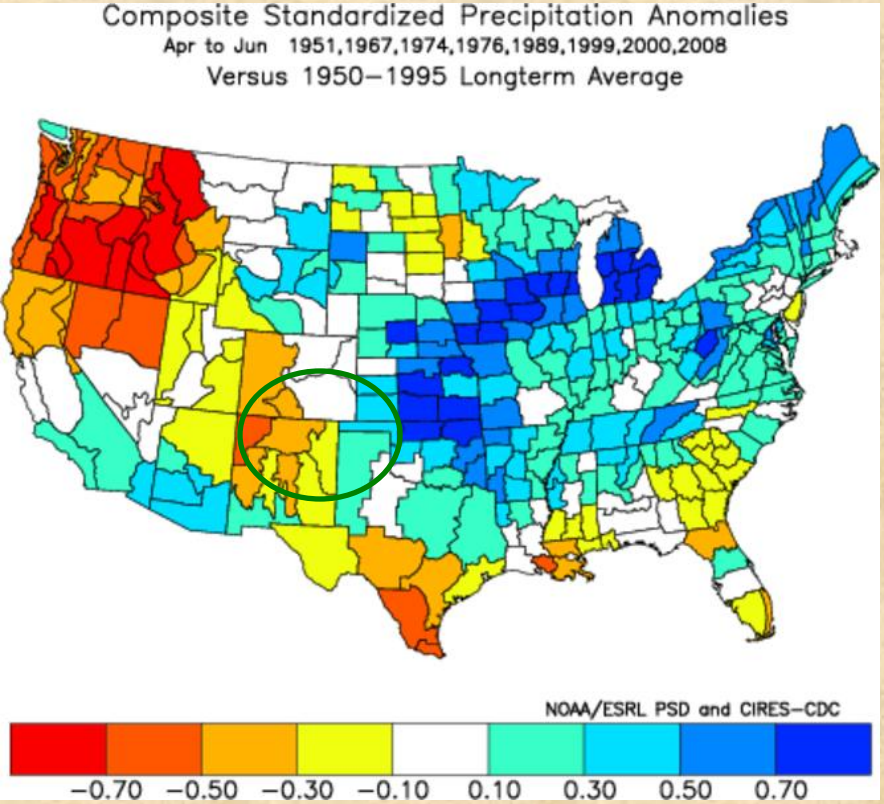
In the wake of La Niña winters, individual spring months often show dry outcomes in May(top left), and June(top right), but with less reliability than in March.

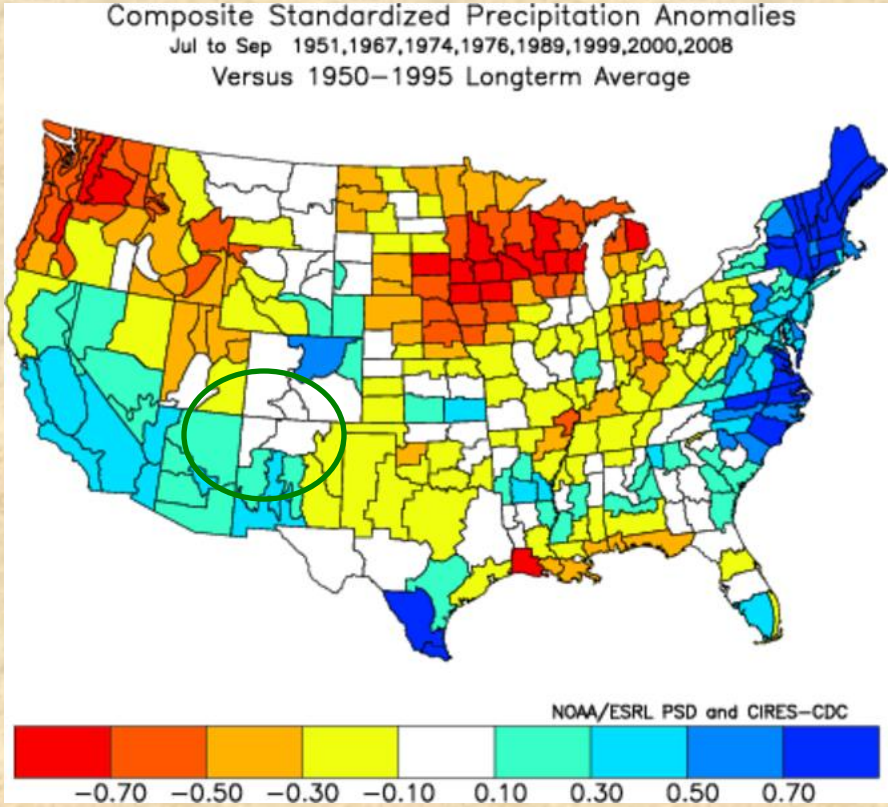


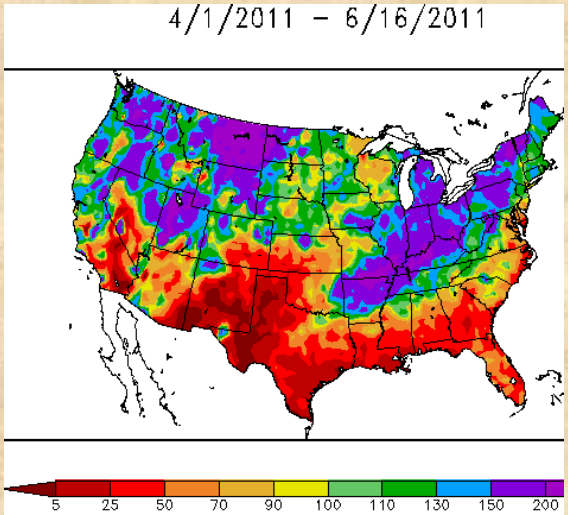
In 2011, May (bottom left) was dry only in southeastern CO, but wetter than expected to the west and north. So far, June (bottom right) has returned to form, with dry weather across much of the state.



Weakening La Niña spring into summer with PDO-

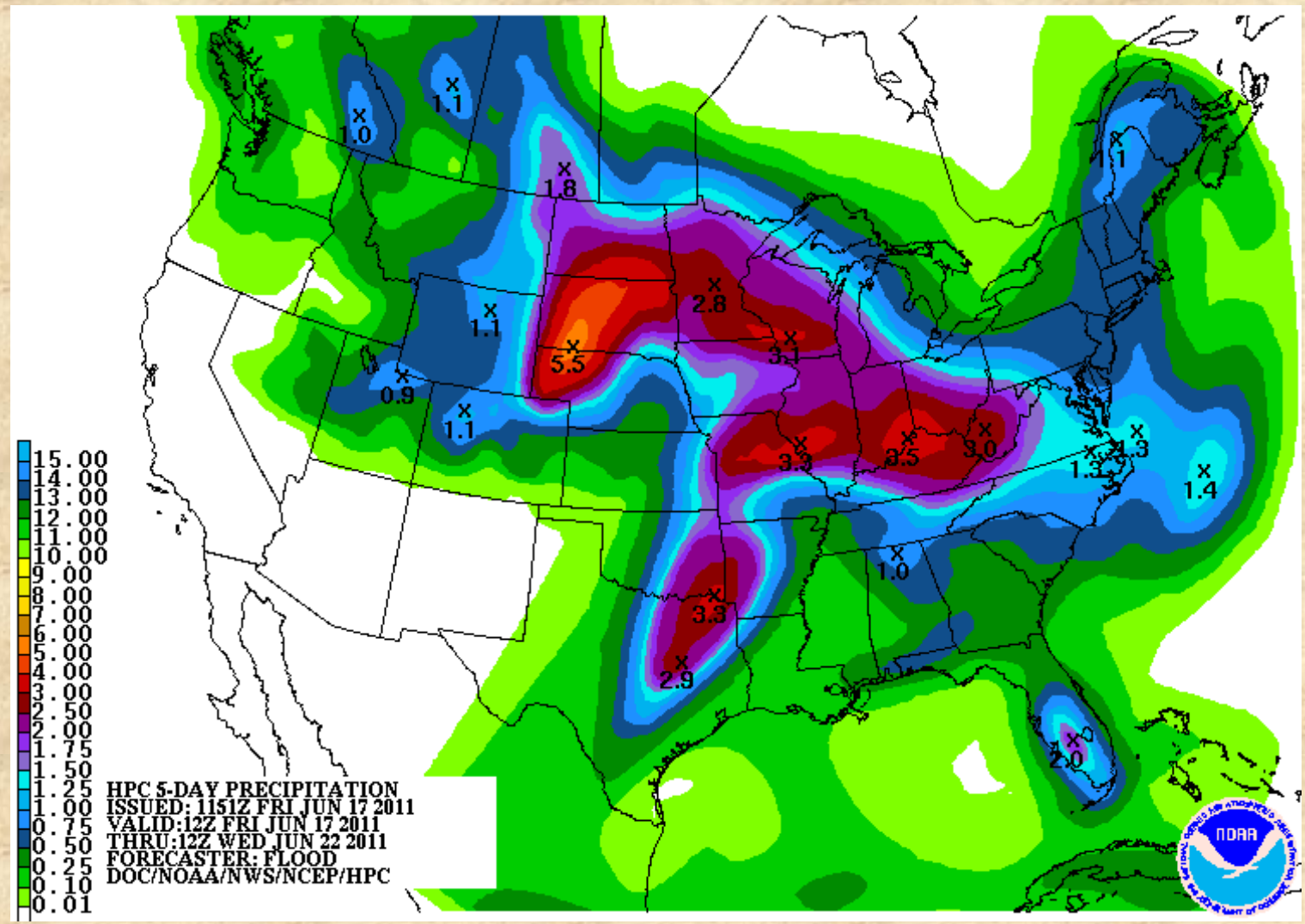






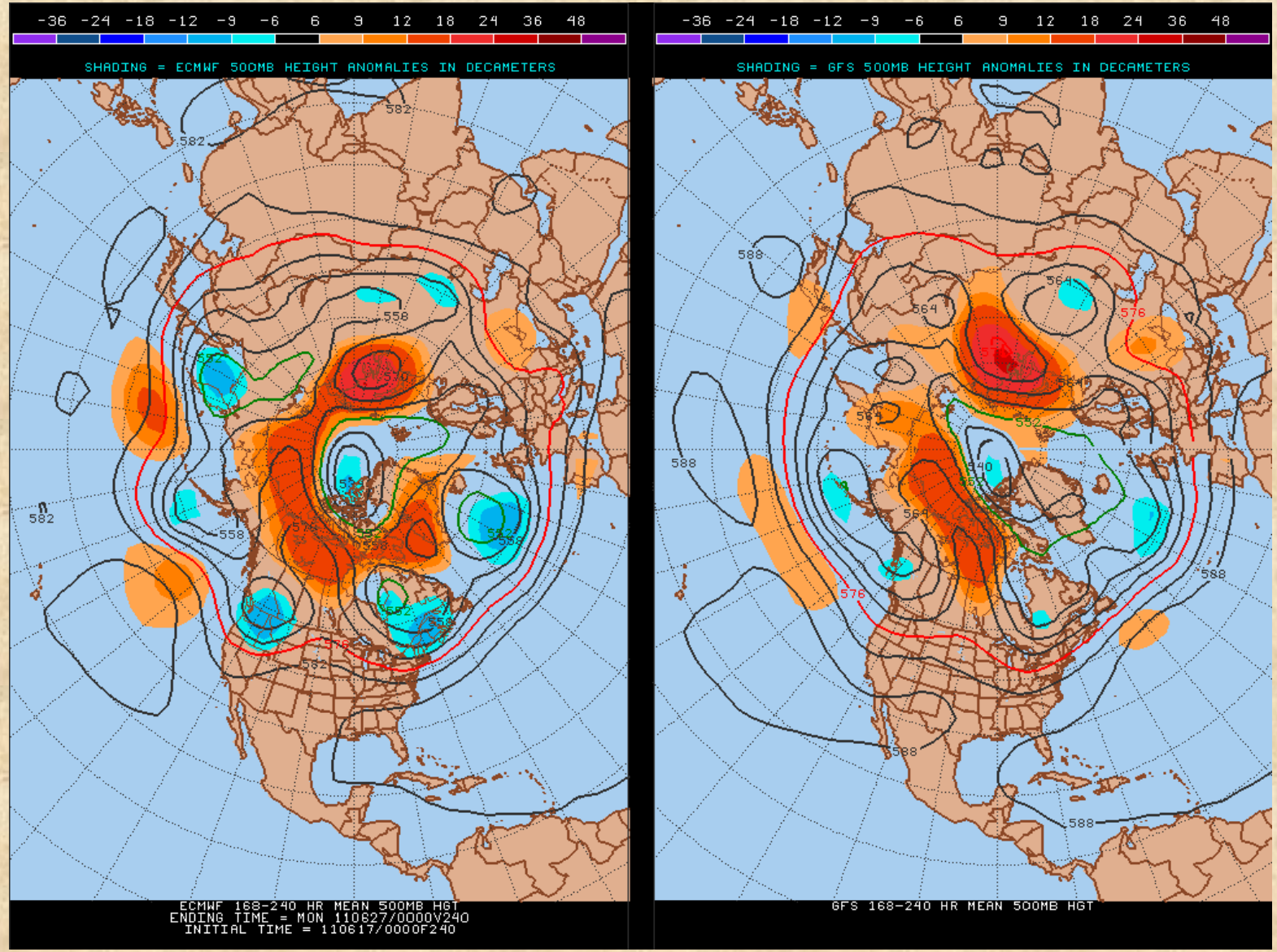
A modified look at this spring (top left) and summer (right) by requiring La Niña conditions to weaken into the summer, while also starting out with negative PDO conditions. This should have left western Colorado tending towards dry conditions in spring (2011: left) & undecided in the summer, while slightly favoring eastern Colorado, especially the South Platte basin.

What can we expect in the next five days?



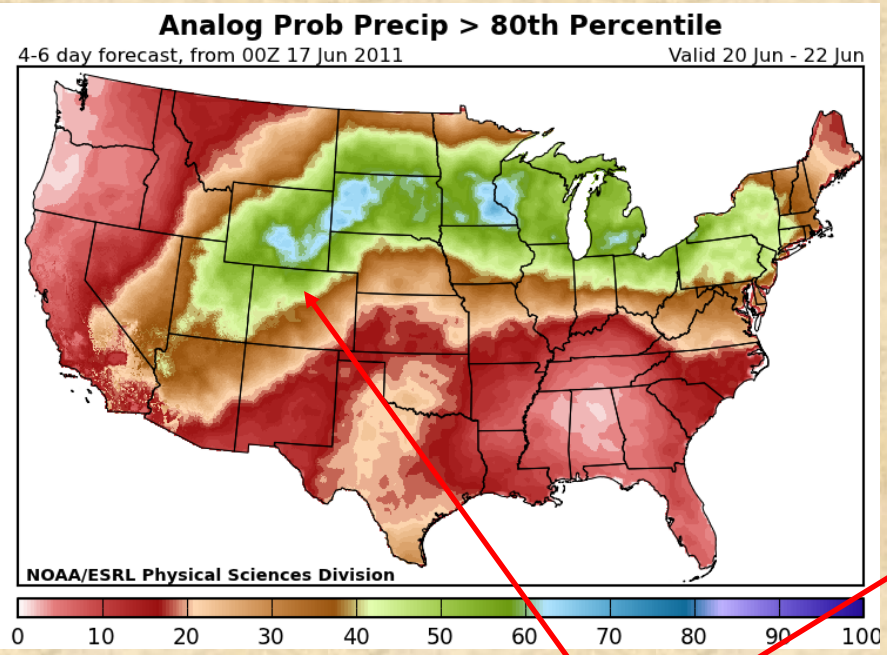
Expected total precipitation, according to Hydrological Prediction Center (NOAA-HPC) – wetter for northern Colorado than for the rest of the state – ***given the coolness of incoming storm, this will not necessarily result in extra flooding from snowmelt!***

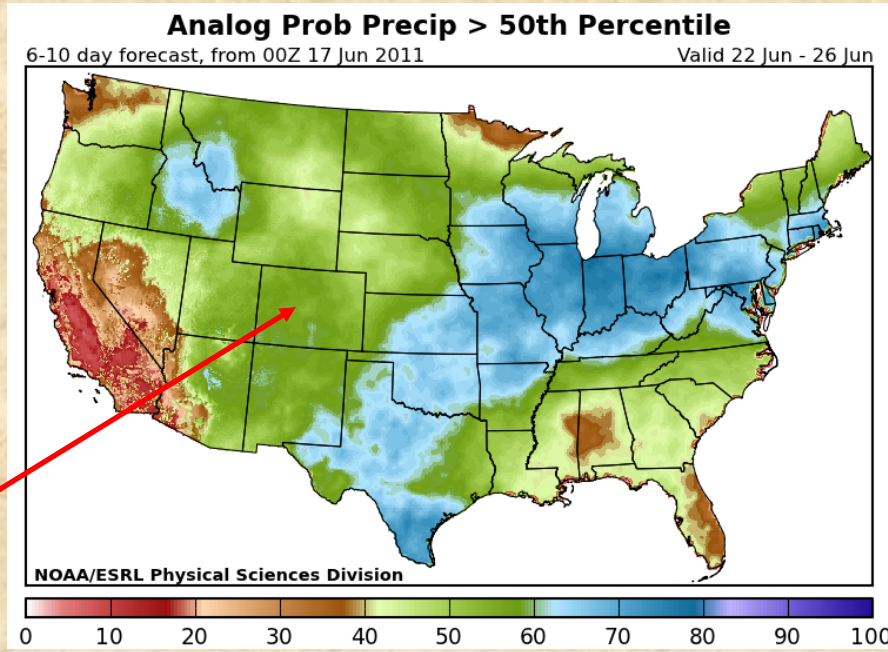
What can we expect next week and beyond?



European & U.S. models show Western U.S. trough in average circulation forecast for 8-10 days out from last night – keeping Western CO a bit unsettled and not too warm!

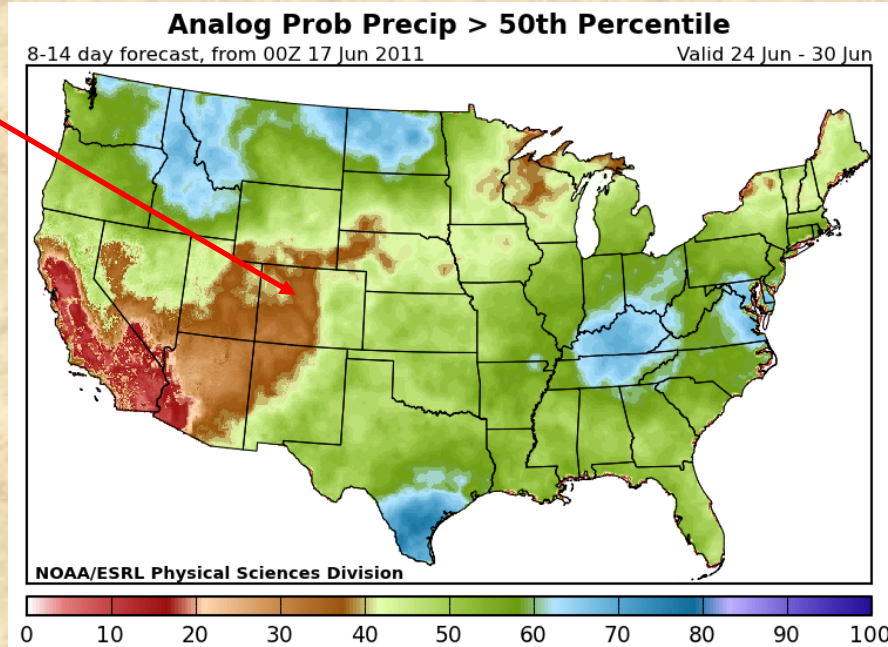
What can we expect in the next two weeks?



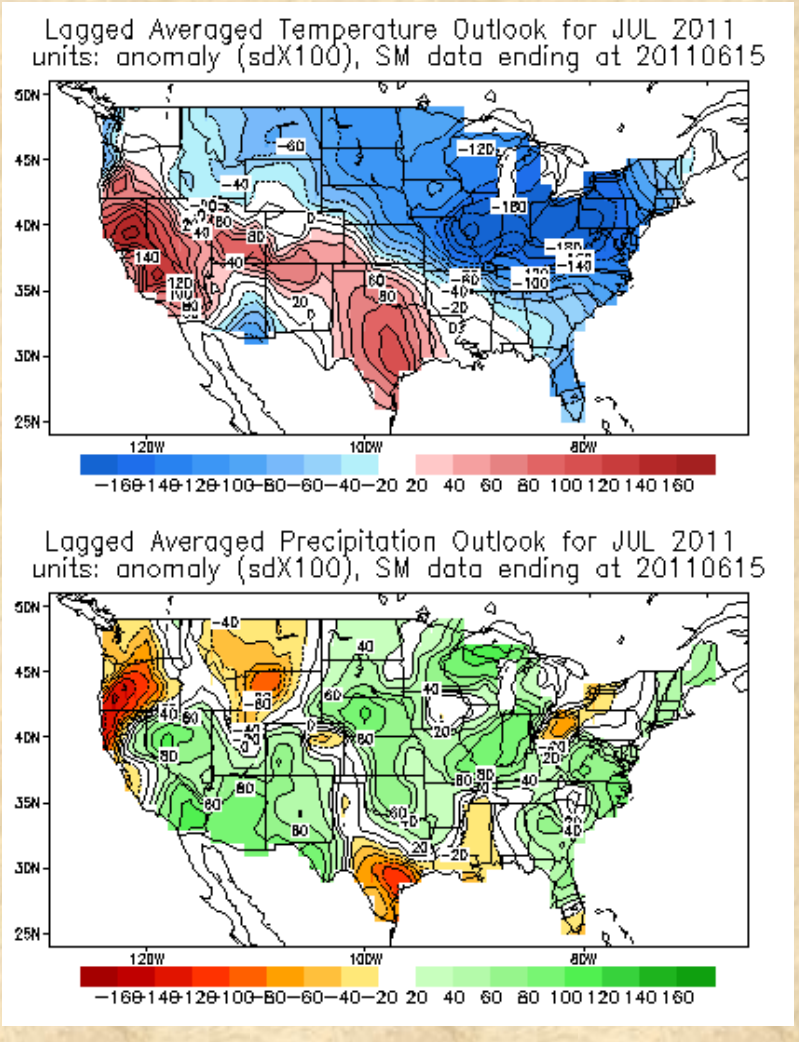


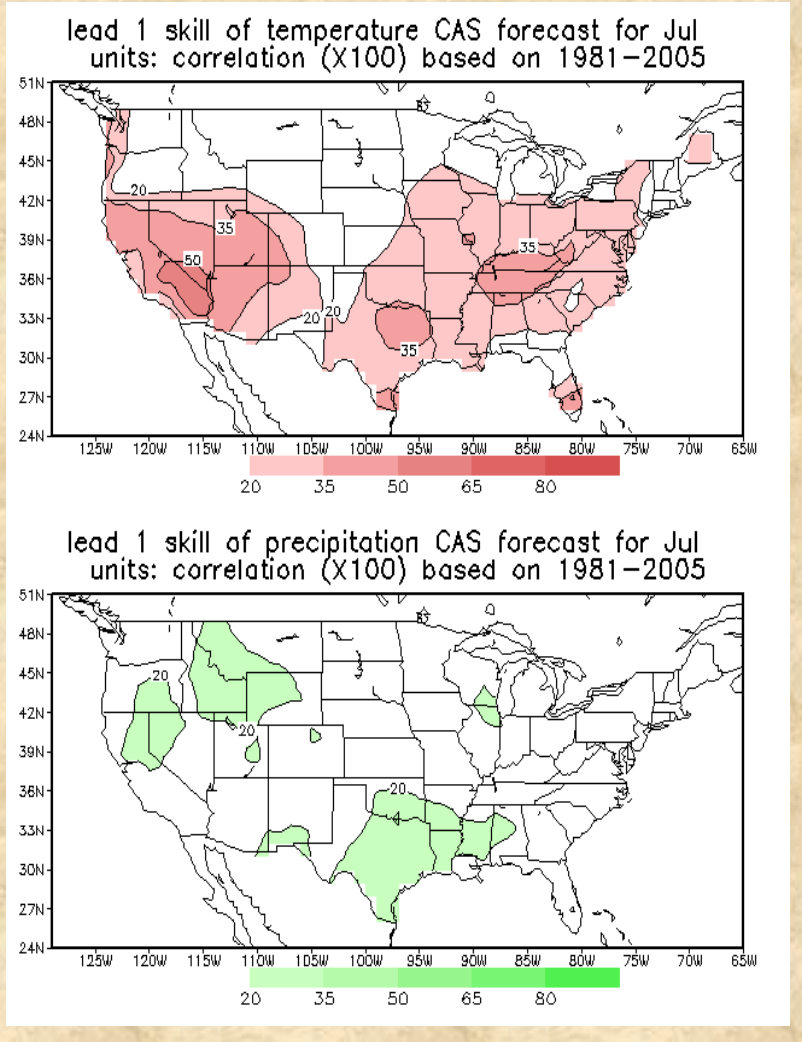
Precipitation chances for 4-6, 6-10, and 8-14 days from today show good chances for precipitation early next week (top); close to 'normal' (this is a dry time of year) for next weekend (top right), and getting drier than 'normal' by "Week 2" (right).

Temperatures are expected to drop below normal early next week (*snow above 9-10K?!*), only to return to near-normal afterwards.



Climate Prediction Center 'Analog' Forecasts





According to yesterday's soil-moisture analog forecast, much of Colorado can expect a warm and near-normal to moist July 2011 (left), reaching potentially significant wetness in SW CO. Unfortunately, typical skill at this lead-time (right) is poor for precipitation in Colorado. Source: ***http://www.cpc.ncep.noaa.gov/soilmst/cas.shtml***

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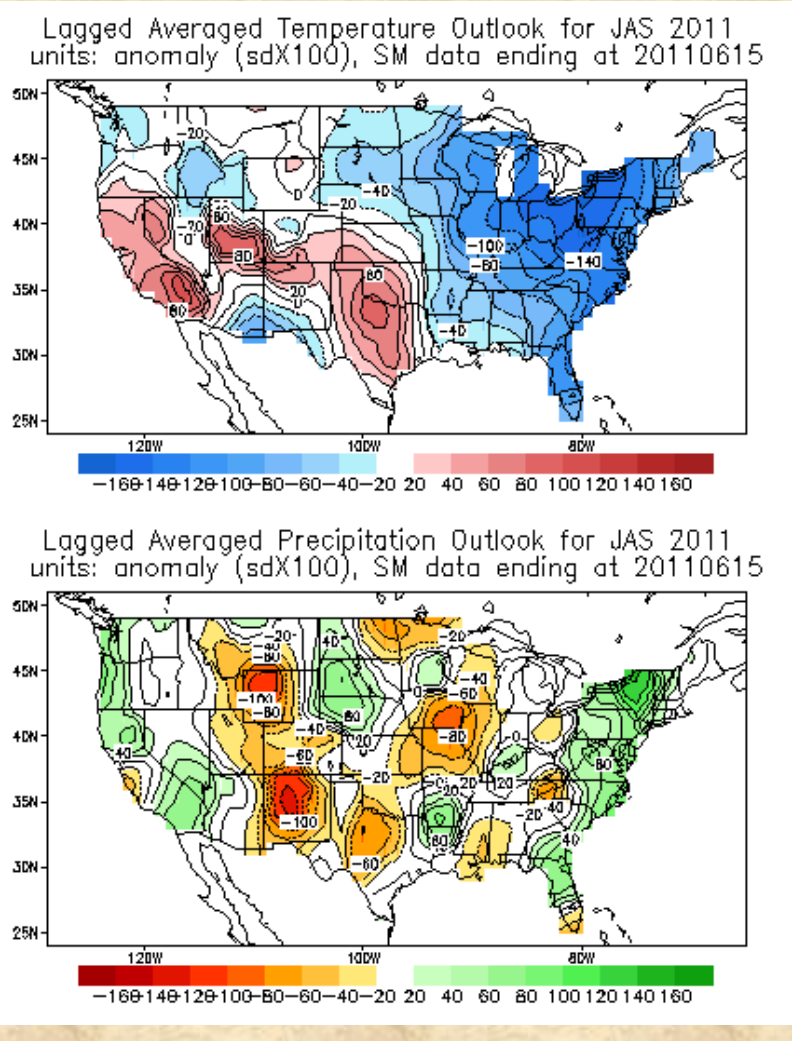
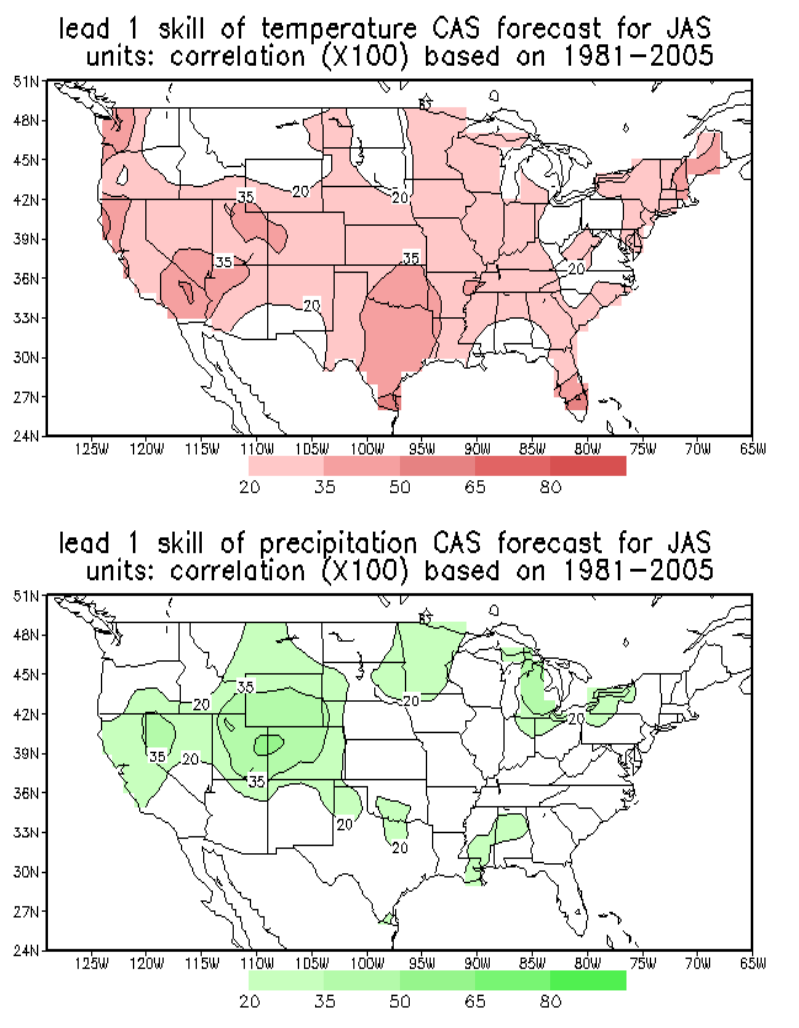
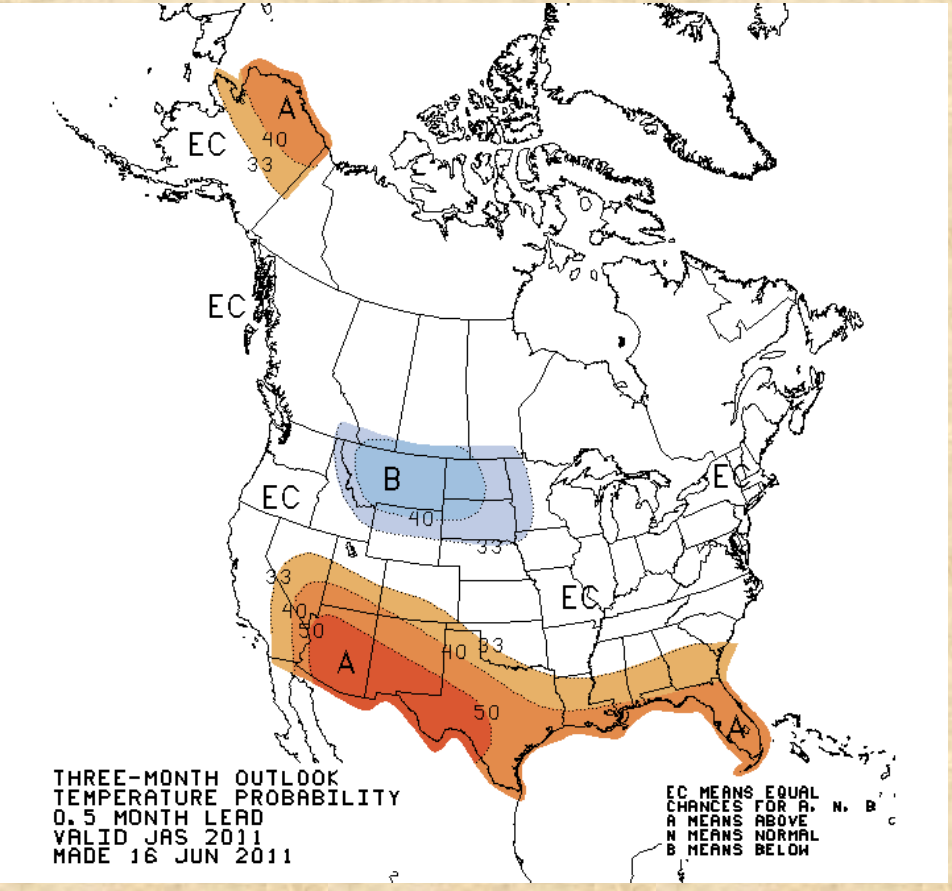


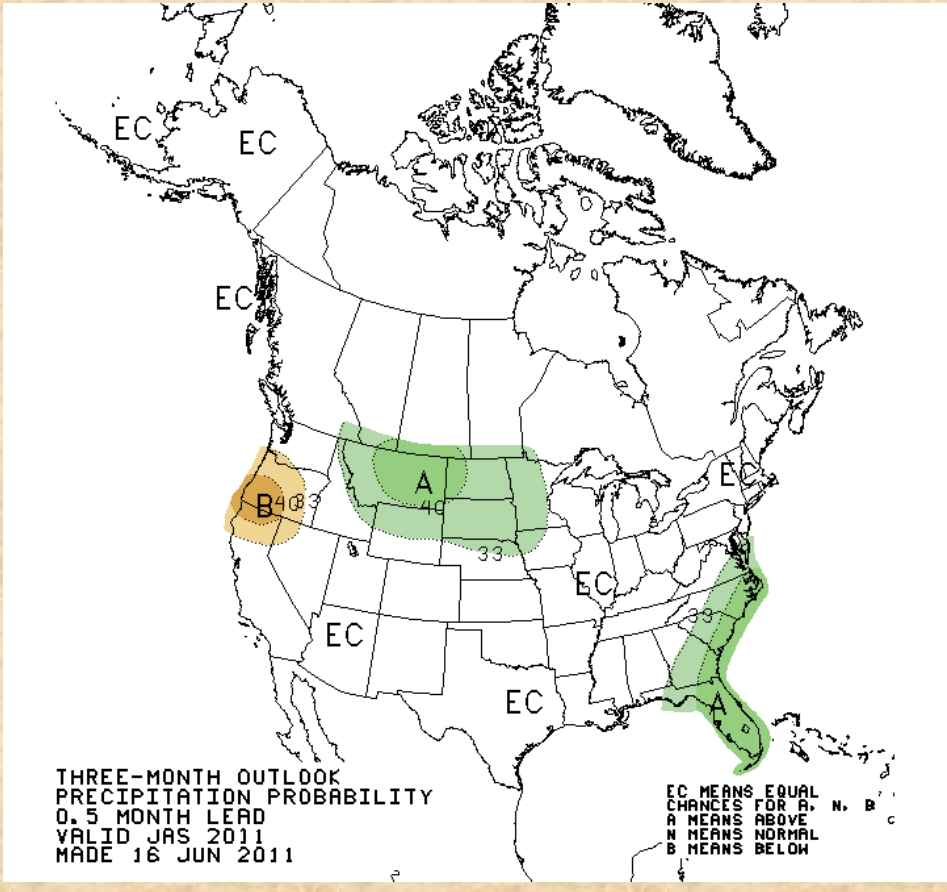


According to yesterday's soil-moisture analog forecast, most of Colorado can expect below-normal moisture in July-September 2011 (left), with a hint at above-normal temperatures in the south. Typical skill at this lead-time (right) is quite high for our state at this time of year.

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

Climate Prediction Center Forecasts

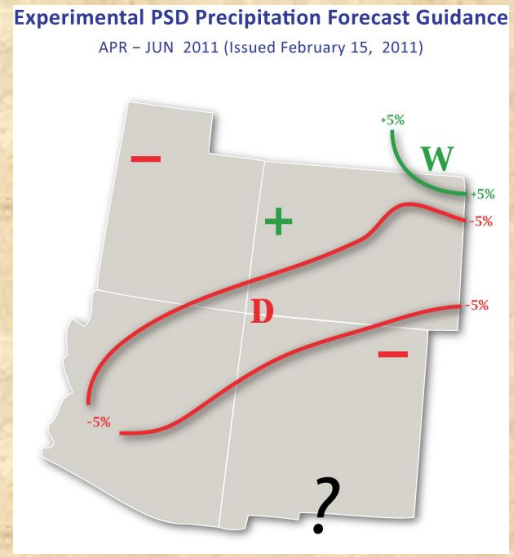


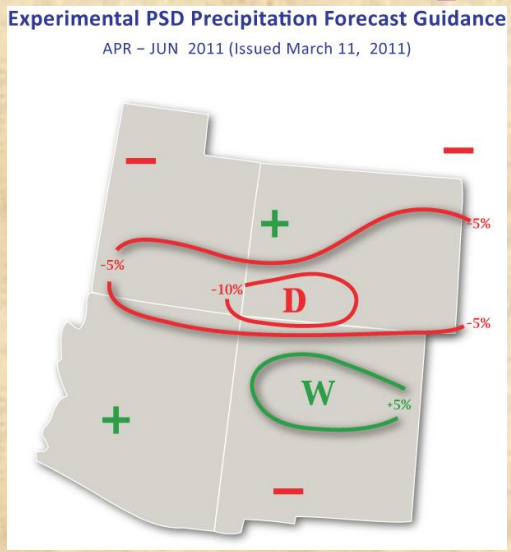


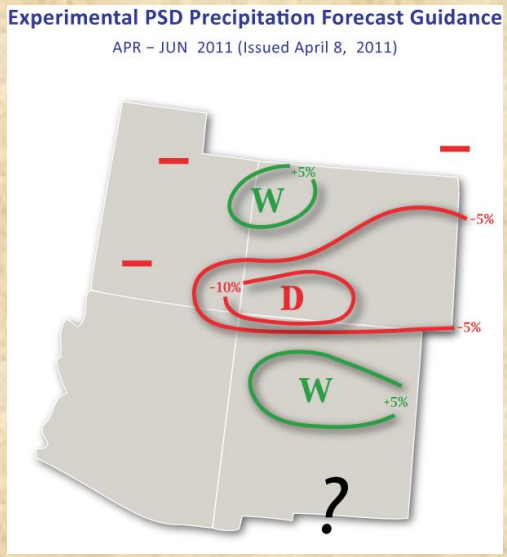
CPC's July-September (left) temperature forecast expects a cool summer to our north (*soil moisture*) and warm to our south (+*trend*), leaving Colorado mostly near-normal. Their precipitation forecast (right) keeps it wet to our north due to recycled moisture, leaving all of the southwestern U.S. 'EC'. There is no ENSO-neutral footprint (used in this forecast).

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

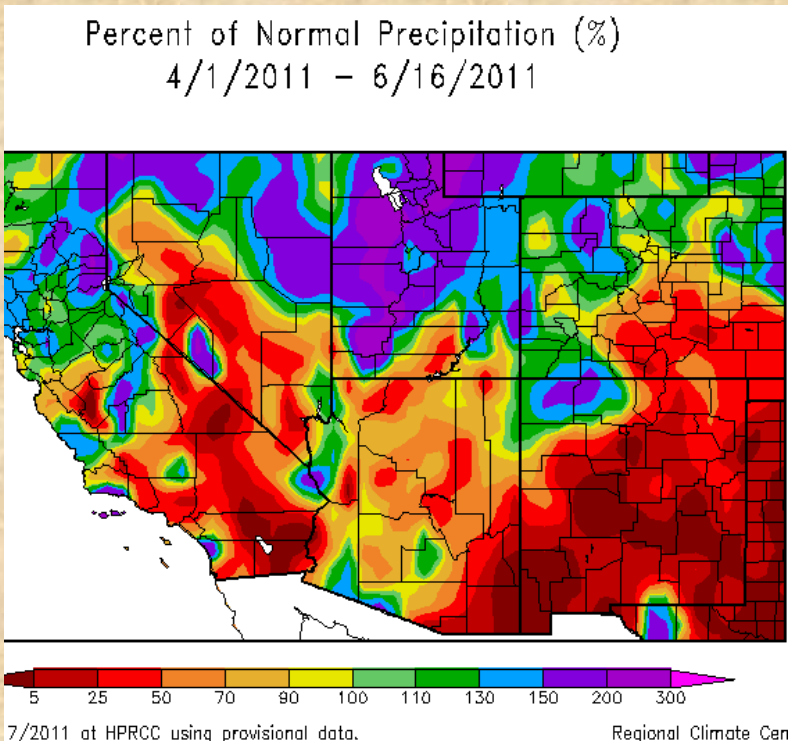
Statistical Forecast for April-June 2011





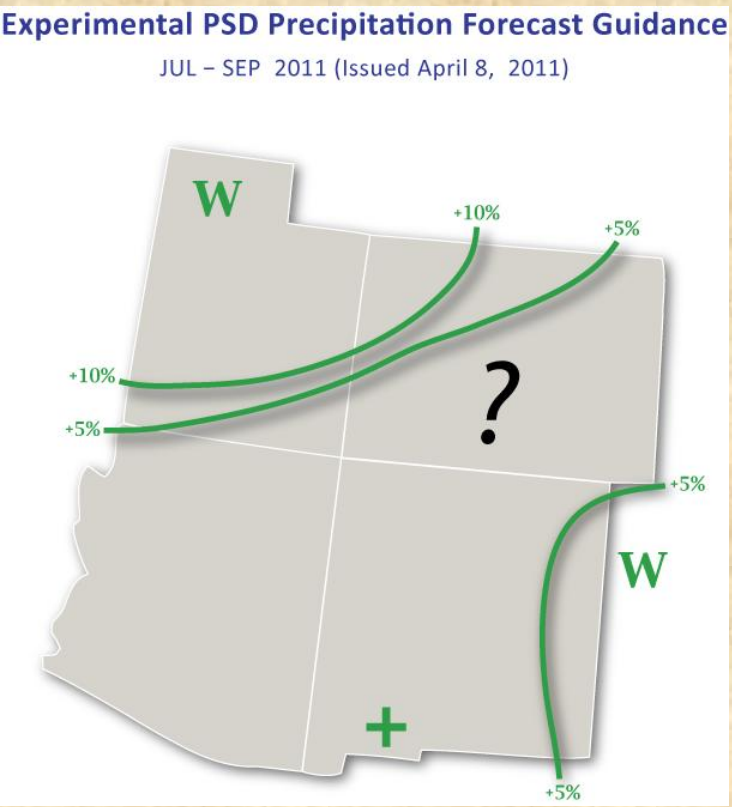


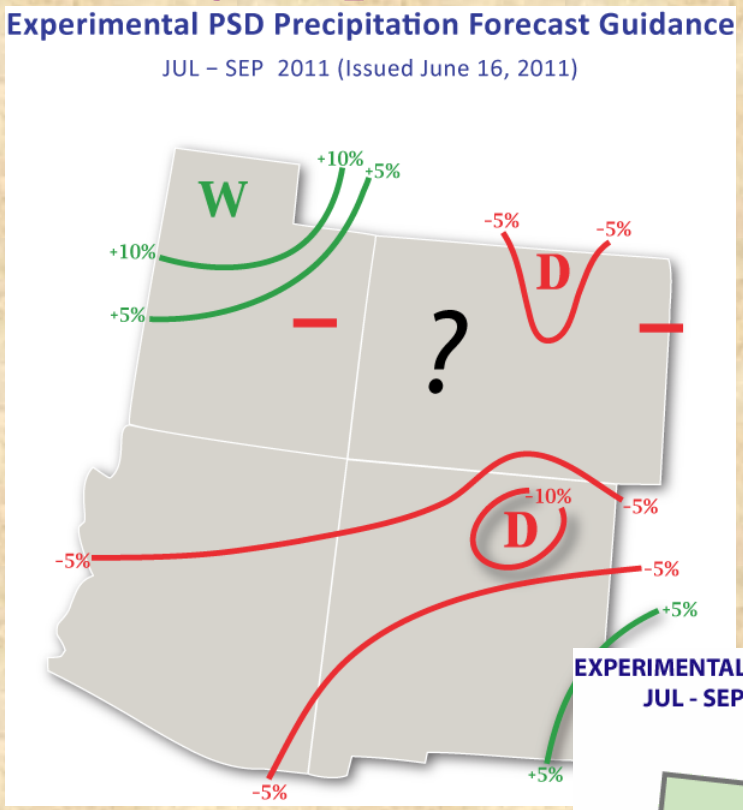
February's (top left), March's (top middle), and April's (top right) forecasts for April-June 2011 were fairly confident that southern CO would see below-normal moisture. The northwestern third of our state had slightly increased chances of being wetter-than-average.



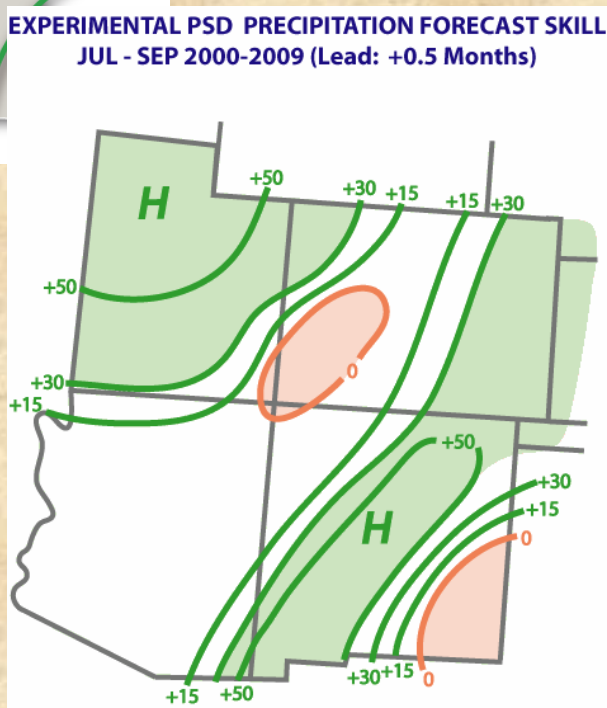
As of June 16th, southeast CO has indeed been dry, and northwest CO has been wet. On the other hand, the northeast corner of our state has been wetter than expected since March, ditto for the Four Corners region. Using this preliminary data, the February forecast panned out better than later updates!

Statistical Forecast for July-September 2011



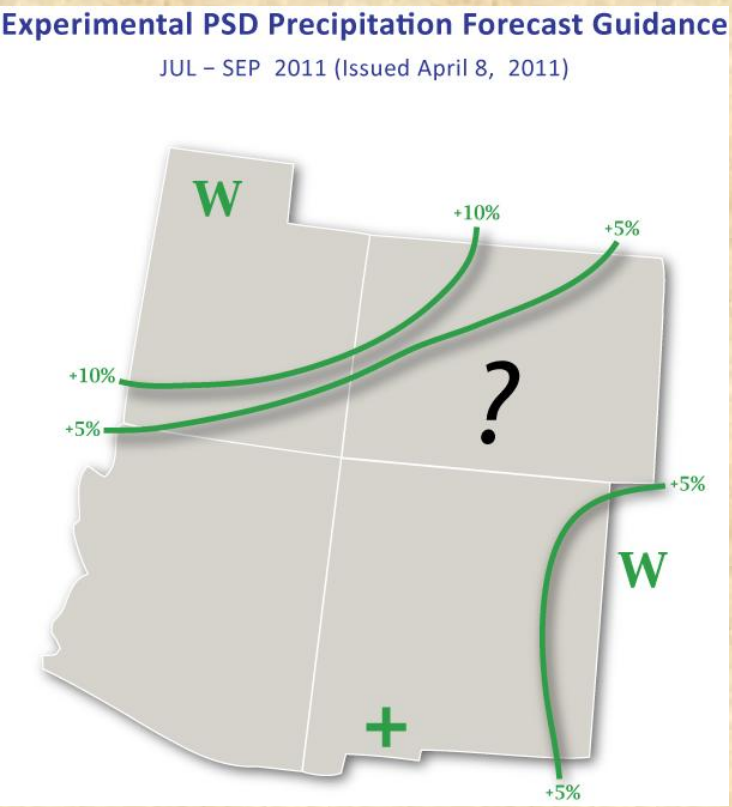


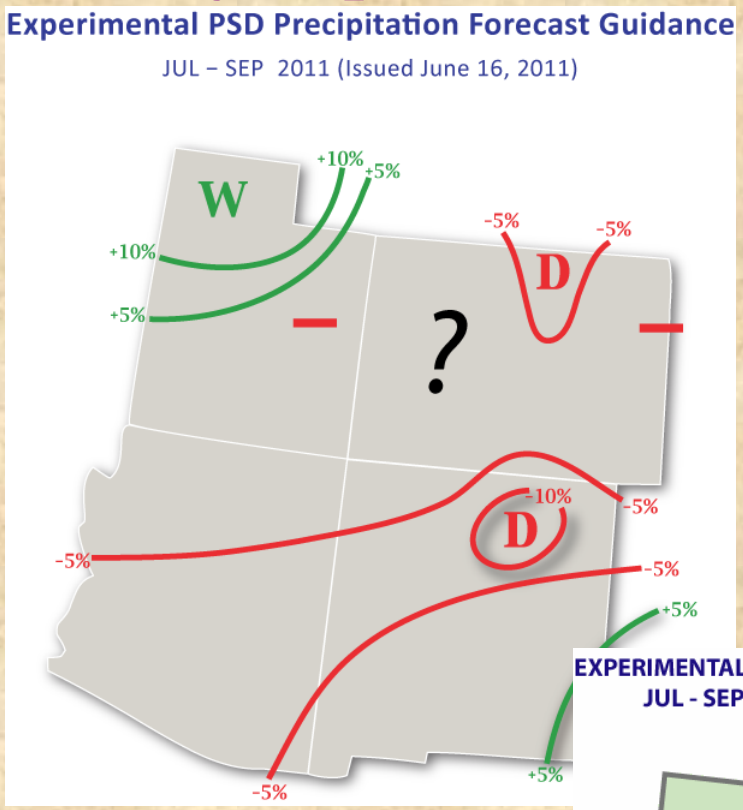
Skill map (below) shows poor skill over SW CO, but better skill over E and NW CO.



The April forecast for July-September 2011 (left) was optimistic for northwestern CO, and undecided for the rest of the state. ***Yesterday's update (top right) is significantly drier, including my first dry summer forecast for the eastern plains in more than one decade(!)***

Statistical Forecast for July-September 2011





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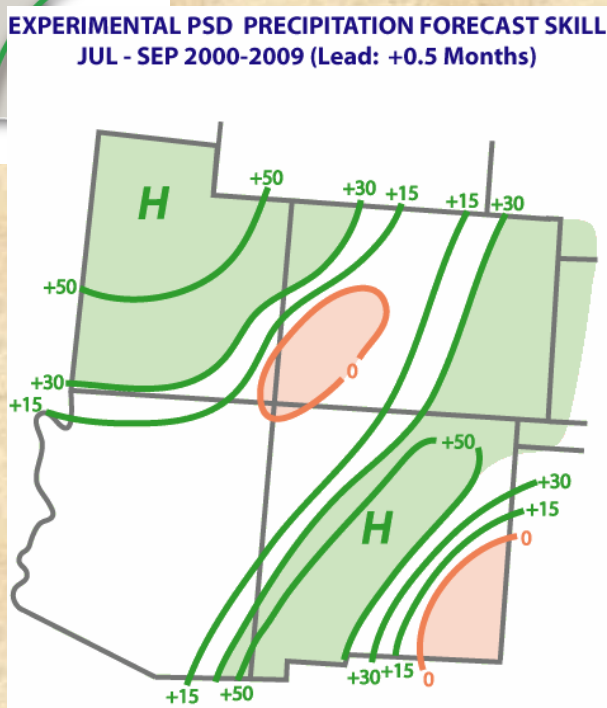

The April forecast for July-September 2011 (left) was optimistic for northwestern CO, and undecided for the rest of the state. ***Yesterday's update (top right) is significantly drier, including my first dry summer forecast for the eastern plains in more than one decade(!)***

'Wild cards' in 2011: 1. Record-snowpack (might delay monsoon); 2. Wildfires (could suppress monsoon a la 2002); 3. Rapid (re-)development of El Niño (La Niña) could increase (decrease) odds for moisture in CO.

Executive Summary (17 June 2011) – *klaus.wolter@noaa.gov*

1. **After reaching levels not seen in 35 years, La Niña is taking a 'leave of absence' this summer, but odds remain higher than 50/50 that it will return later this year.**

1. **In the Front Range, mid-April to mid-June has been wet for the northwestern half of the state and dry in the SE, worsening their drought status. The next few days will add more moisture to the northern mountains (snow above 9-10K), followed by a return to near-normal (dry and fairly warm) conditions towards the end of June.**

2. **My latest forecast for late summer (July-September) is drier than my original forecast in April. While not explicitly included here, both record-high late season snowpack over NW Colorado and increased wildfire activity over southern Colorado may reinforce my dry monsoon forecast for eastern Colorado.**

3. **All in all, this year's dust season appears to have been more benign than in last two years, which may have helped with slower snowmelt so far. Given the remaining snowpack in higher elevations of northern CO, we may see an extended runoff season with occasional 'nuisance' flooding, but the overall pattern remains not supportive of excessive flash-flooding (no early monsoon in sight, nor extreme heat waves).**

4. **Bottomline (*more or less unchanged*): Count your blessings, this La Niña season has delivered higher-than-expected amounts of snow in our mountains which is giving us a good runoff season (*and flooding in Nebraska)*. I remain much less optimistic for local conditions over the eastern plains, nor do I expect a repeat performance for our mountains next year.**