2019 Fall Outlook

For the Northern Two-thirds of New Mexico

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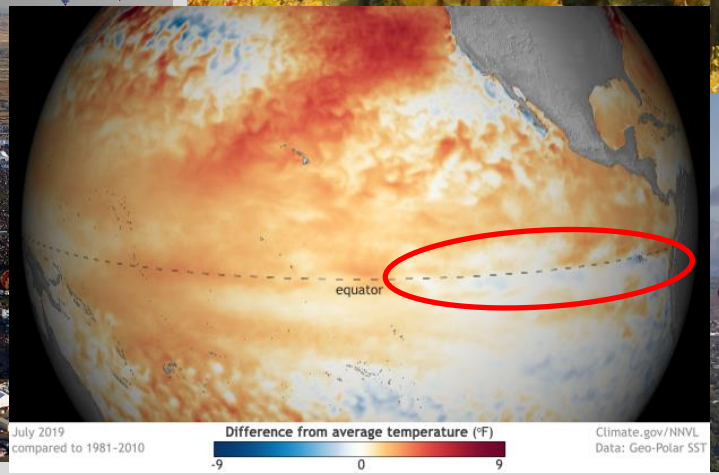
Courtesy: RedRiverOffRoad.com


Courtesy: Richard Brian Las Vegas Review


Courtesy: Angel Fire Chamber of Commerce




Courtesy: Richard Brian Las Vegas Review

What happened to North American Monsoon (NAM)? The eastern equatorial Pacific began cooling in early July, changing where tropical convection in the eastern Pacific set up. This essentially blew the 2019 NAM forecast. Sea Surface Temperatures (SSTs) in the equatorial Pacific are currently average to slightly below average or in a "neutral" state. There is a 30% chance that El Niño could re-develop in late fall or early winter but odds favor a neutral state (~55% chance) in fall 2019. That means there is around a 15% that La Niña could develop. What does that mean for fall weather in central and northern New Mexico?

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Latest Sea Surface Temperature Observations & Oscillation Index Values

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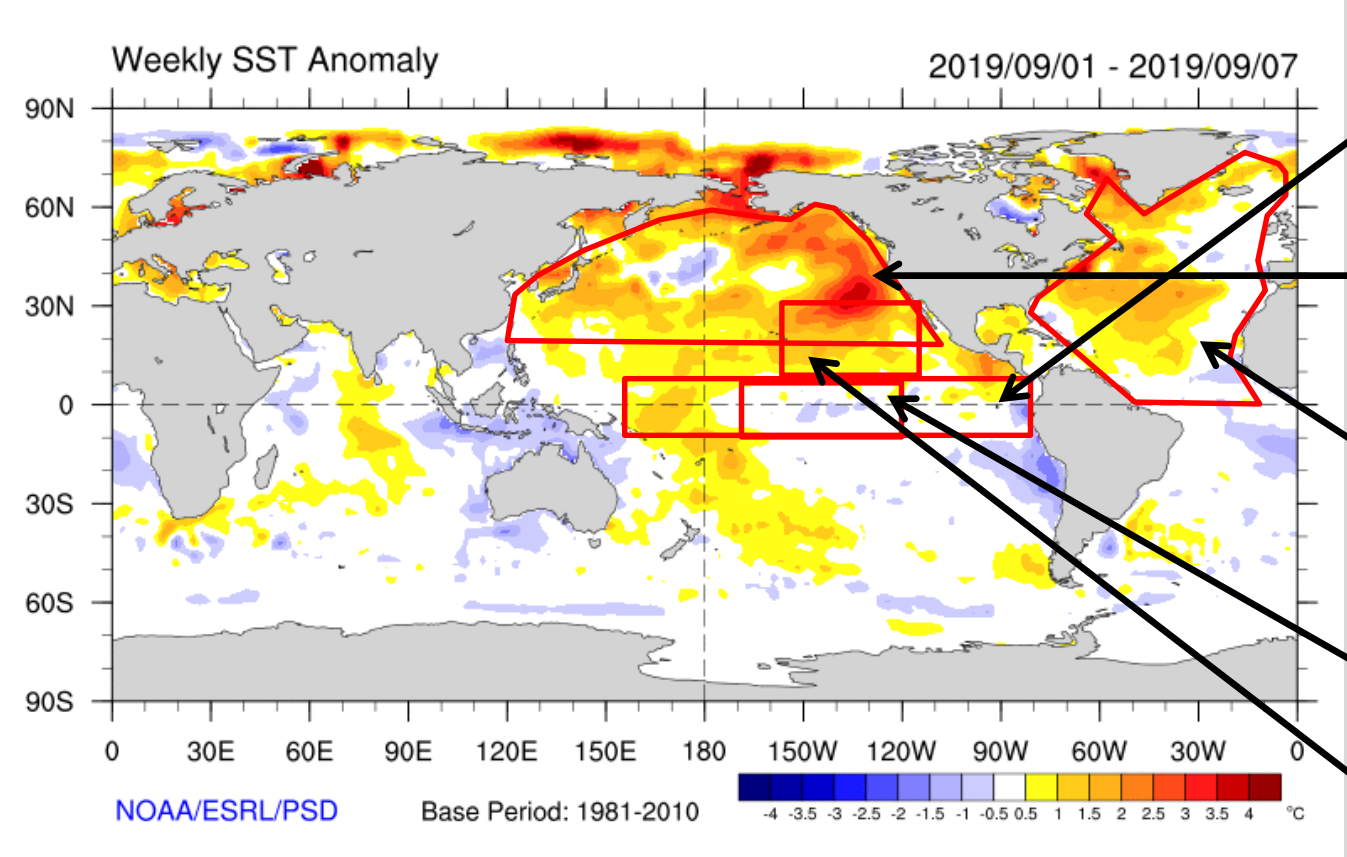
***SSTs are what drive tropical & subtropical thunderstorms. It's these thunderstorms that drive global weather patterns/climate.**



- Multivariate ENSO Index (MEI) for JUN-JUL 2019: +**0.2**
- Pacific Decadal Oscillation (PDO) for JUL 2019: +**1.03**
- Atlantic Multidecadal Oscillation (AMO) for AUG 2019: +**0.35**
- Oceanic Niño Index (ONI) (uses Niño 3.4 region - inner rectangle) for JJA 2019: +**0.3**
- Pacific Meridional Mode (PMM) for AUG 2019: **+5.24**

Figure 1. SST Anomalies in the Equatorial Pacific Ocean in early September 2019 showing neutral conditions in the equatorial Pacific.

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Sub-surface Temperatures

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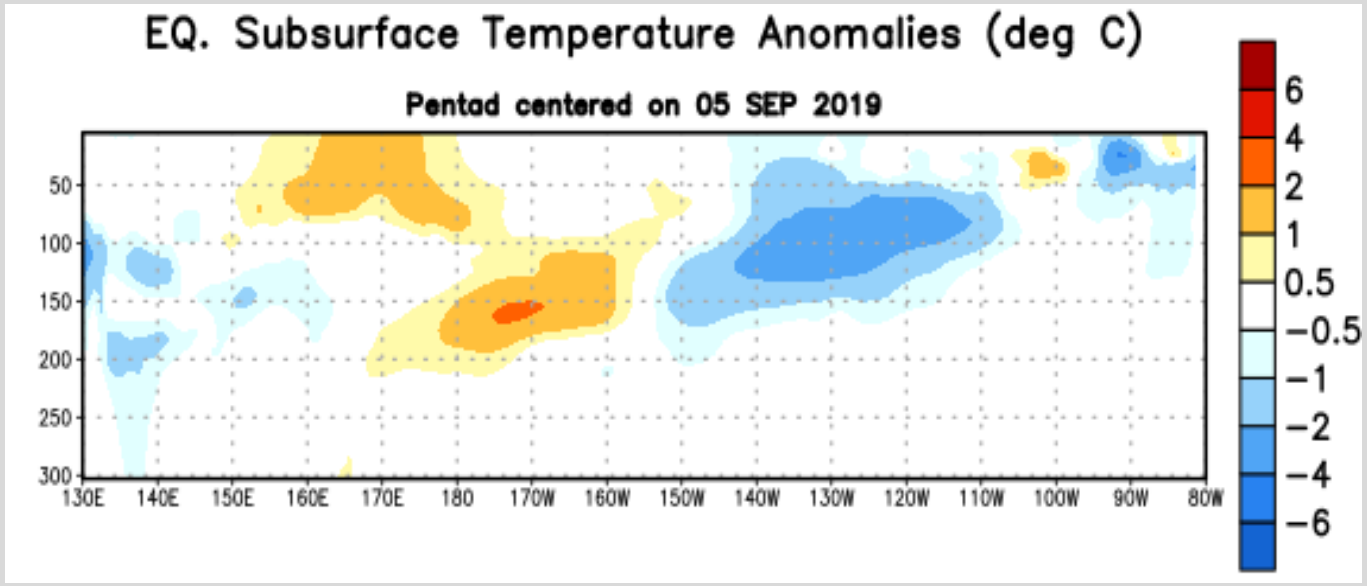

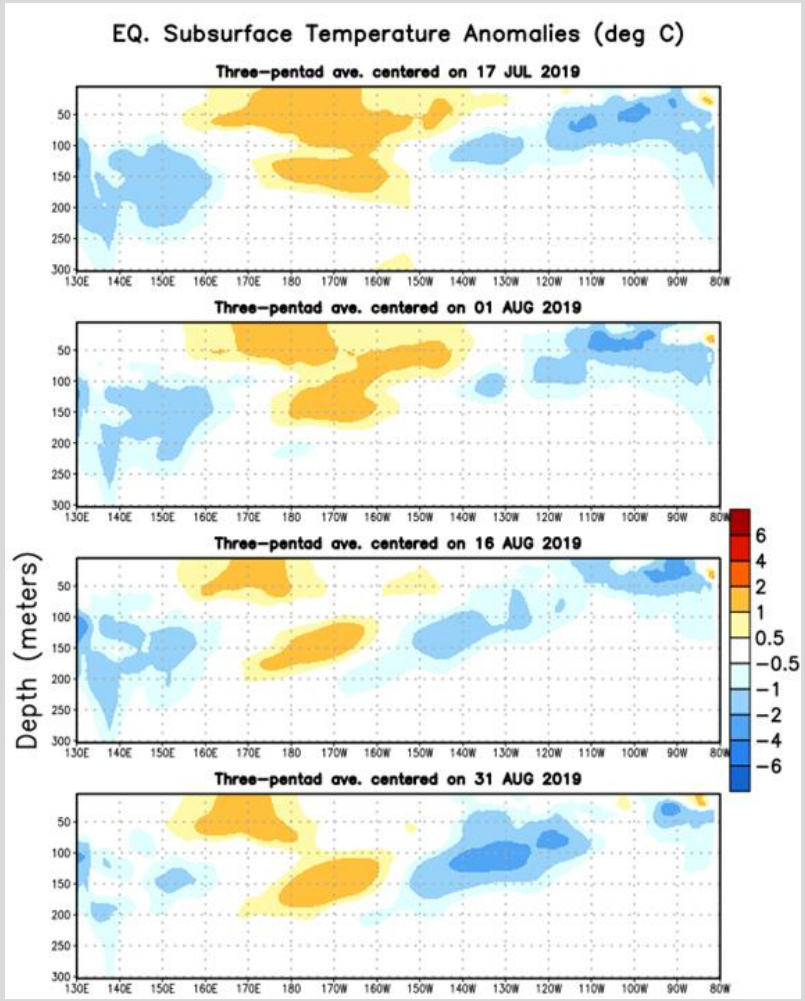

Figures 2-3. Sub-surface temperature anomalies at the equator. Sub-surface temperatures often precede surface temperatures by several months. An increasing amount of cooler than average water under the surface provides some additional confidence that in the fact climate models are on track forecasting a neutral equatorial Pacific in fall 2019.

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Where Are We Now Compared with Previous Neutral Seasons?

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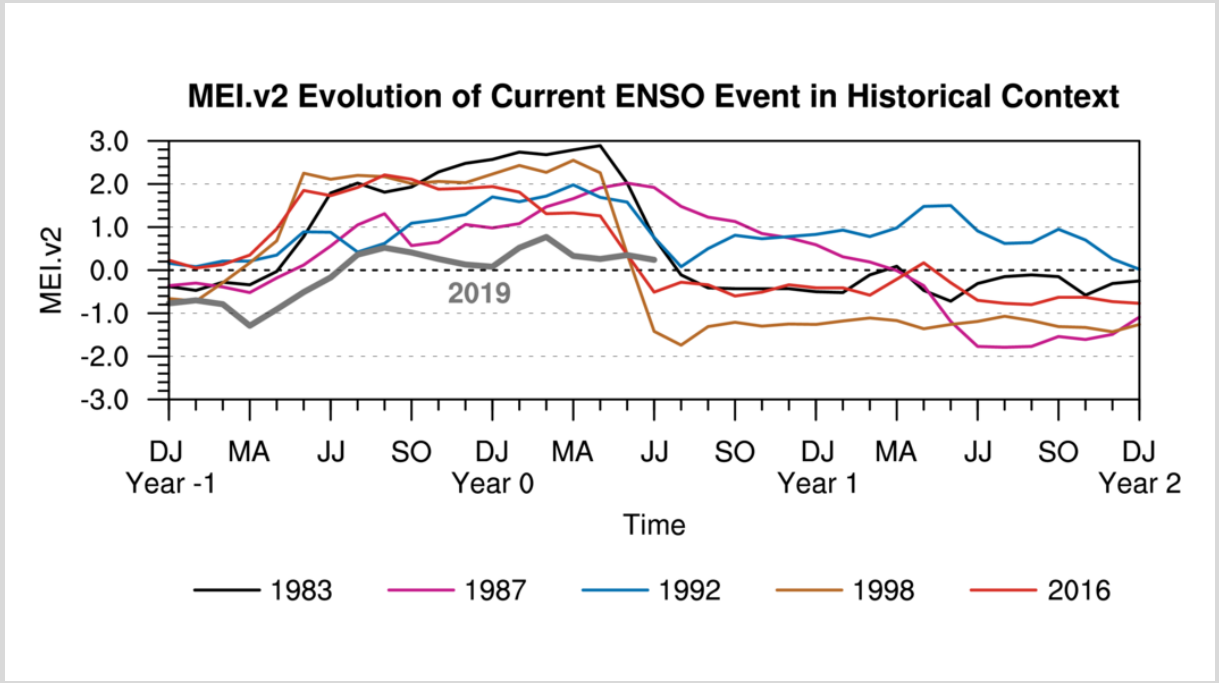

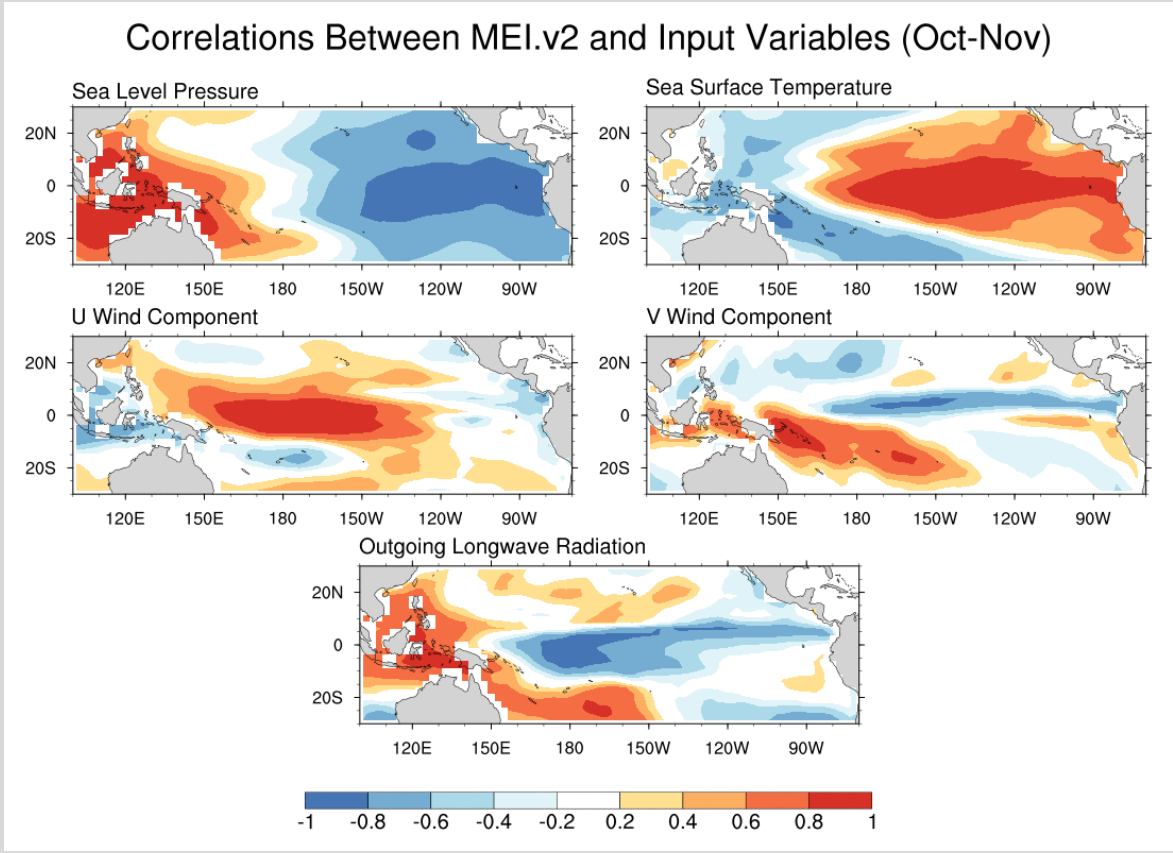

Figure 4-5. Five recent El Niño events using the Multivariate El Niño Southern Oscillation Index since 1950 (left image). One of the years became a moderate El Niño (1992) event while two remained in neutral territory and one became a moderate La Niña (1998). Maps of correlation coefficients (right image) between MEI.v2 and anomaly time-series of the variables from which the MEI is derived for October-November. **U** is the component of the horizontal wind toward the east (i.e., zonal) and **V** is the component of the horizontal wind toward the north (i.e., meridional).

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Pacific-North American Teleconnection Pattern (PNA)

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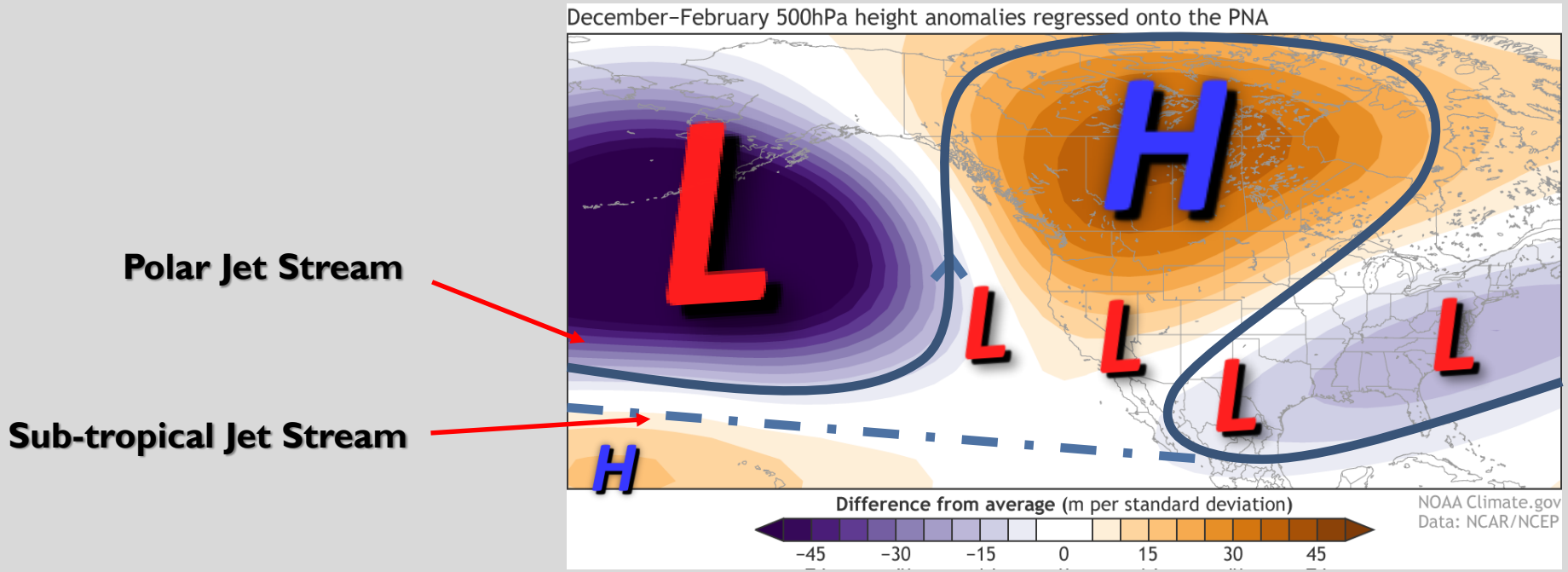

Figure 6. December-February 500-hPa geopotential height anomalies regressed onto the monthly PNA index (a sort of idealized PNA graphic for winter). Data shown for 1979-80 to 2018-19. Purple shading indicates below-average pressure and winds that flow counter-clockwise following the contours. Orange shading denotes above-average pressure and winds that flow clockwise. The Pacific/ North American teleconnection pattern (PNA) is one of the most prominent modes of low-frequency variability in the Northern Hemisphere outside of the tropics. The positive phase of the PNA pattern typically features above-average heights in the vicinity of Hawaii and over the intermountain region of North America, and below-average heights located south of the Aleutian Islands and over the southeastern United States. The PNA pattern is associated with strong fluctuations in the strength and location of the East Asian jet stream. The positive phase is associated with an enhanced East Asian jet stream and with an eastward shift in the jet exit region toward the western United States. The negative phase is associated with a westward retraction of that jet stream toward eastern Asia, blocking activity over the high latitudes of the North pacific, and a strong split-flow configuration over the central North Pacific. For New Mexico, often times the strong storms in the eastern Pacific will undercut the upper high over Canada, moving east or northeast through the southwest U.S.

2019 Fall Outlook

Positive Pacific-North American Pattern (PNA)

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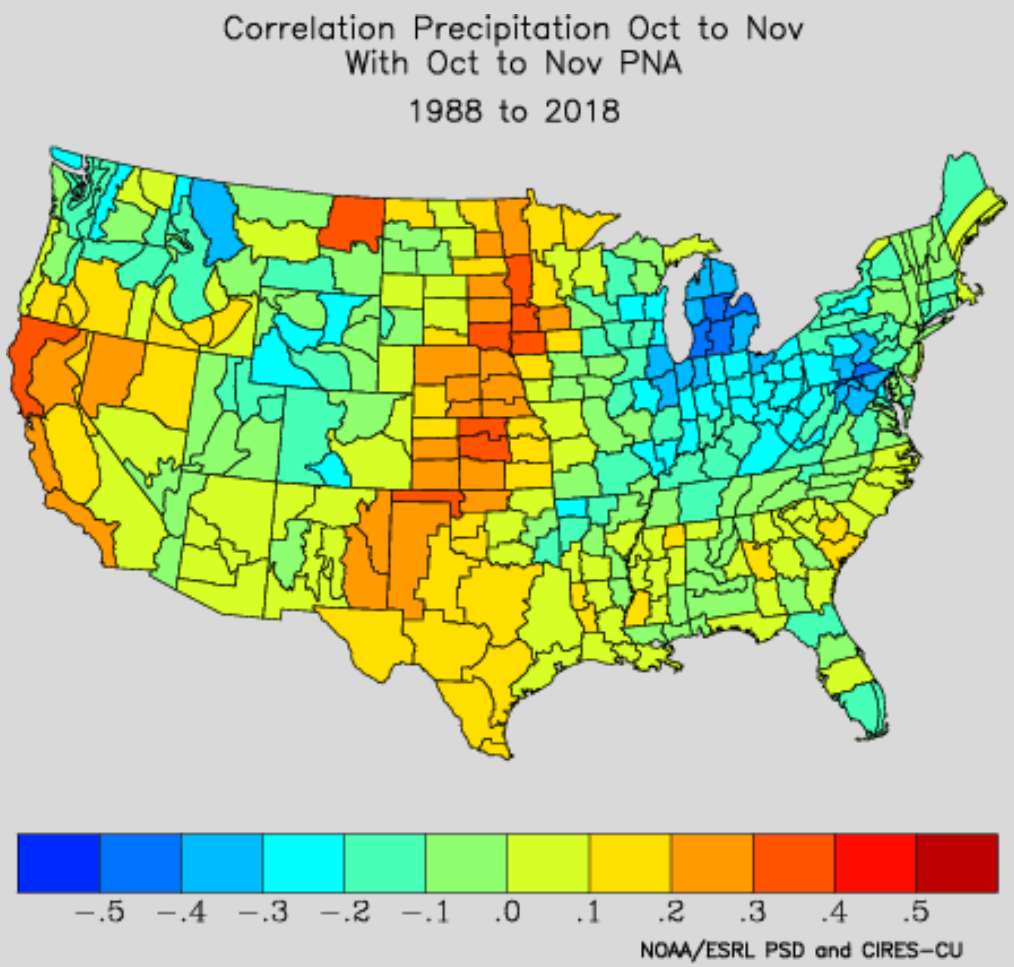

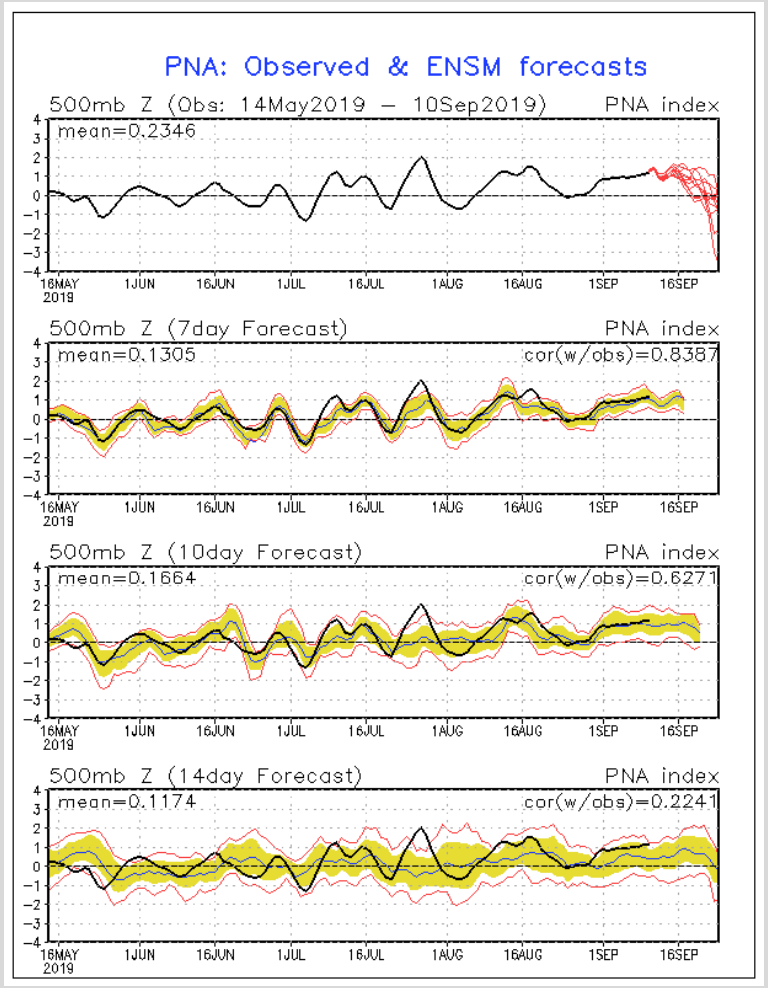

Figures 7-8. The 2018-19 weak to moderate El Niño sent the jet stream into a familiar pattern. This pattern has yet to change for an extended period and it is forecast to continue. 1988 to 2018 (left image) correlations between the PNA Index and precipitation show that the eastern plains is the most likely area in New Mexico to have above average precipitation during a positive PNA in October and November. Observed PNA index (since May 14, 2018) and ensemble forecasts keeping the index positive through 14 days.

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Madden-Julian Oscillation (MJO)

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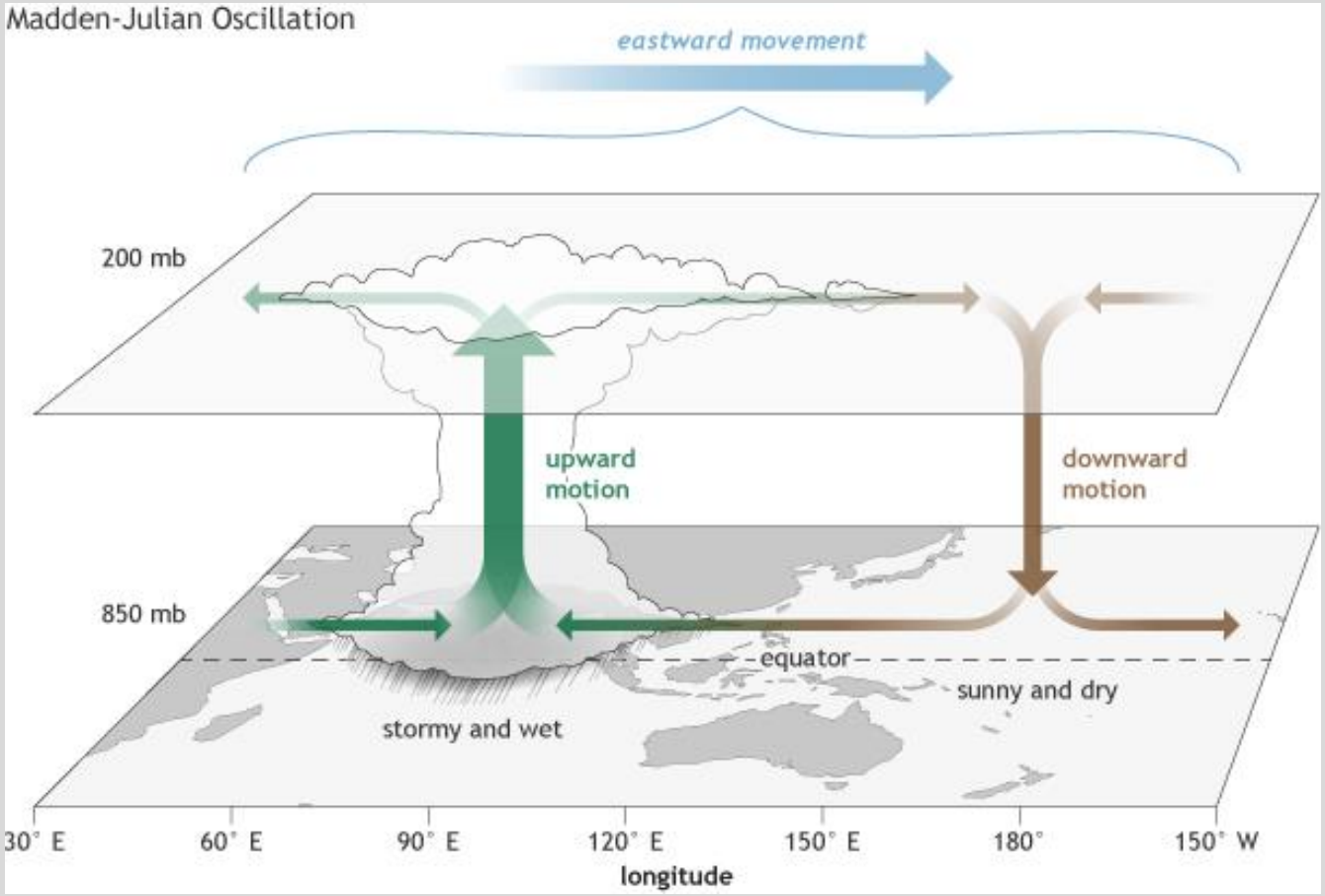

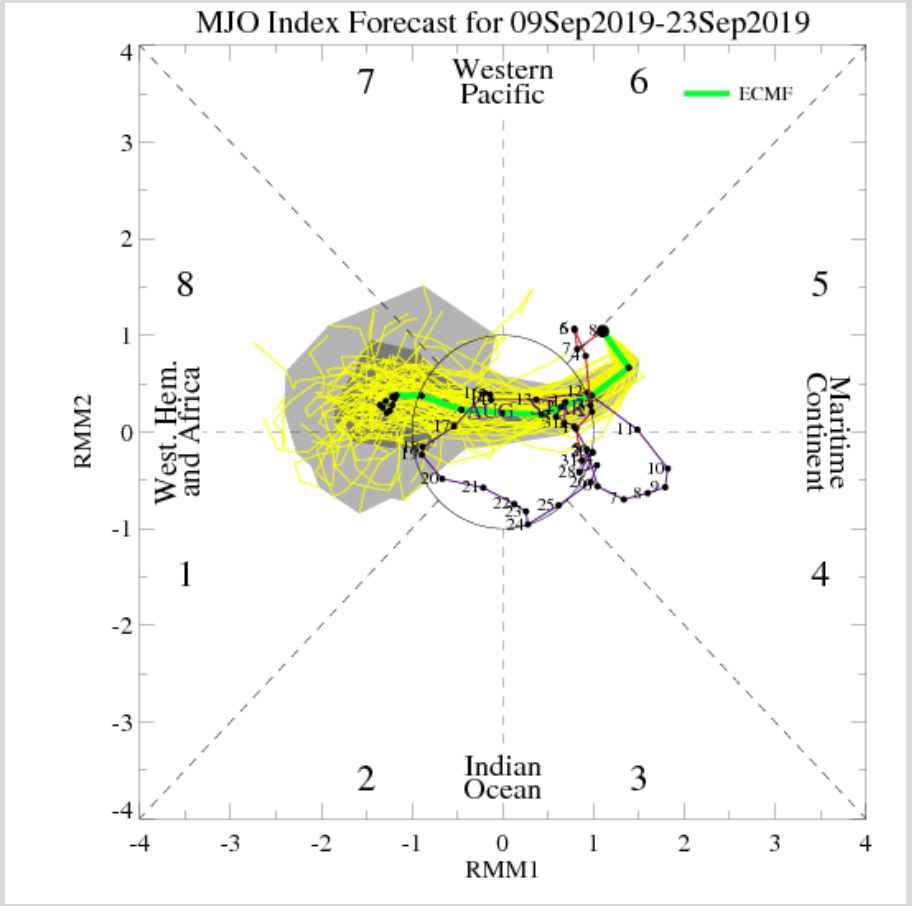

Figures 9-10. The MJO is an area of enhanced thunderstorms that travels around the world every 30 to 60 days from west to east along/near the equator. Ahead and behind the active stormy area are areas of suppressed convection and drier conditions. The MJO affects near-surface wind patterns, because the rising air in the stormy area causes surface winds to blow toward the active area. The MJO can play a role in New Mexico's weather at any time of year but it tends to have its greatest impacts during the fall. The majority of forecast models for the second week in September bring the MJO into phase 8 (right image).

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Madden-Julian Oscillation (MJO) - Phases

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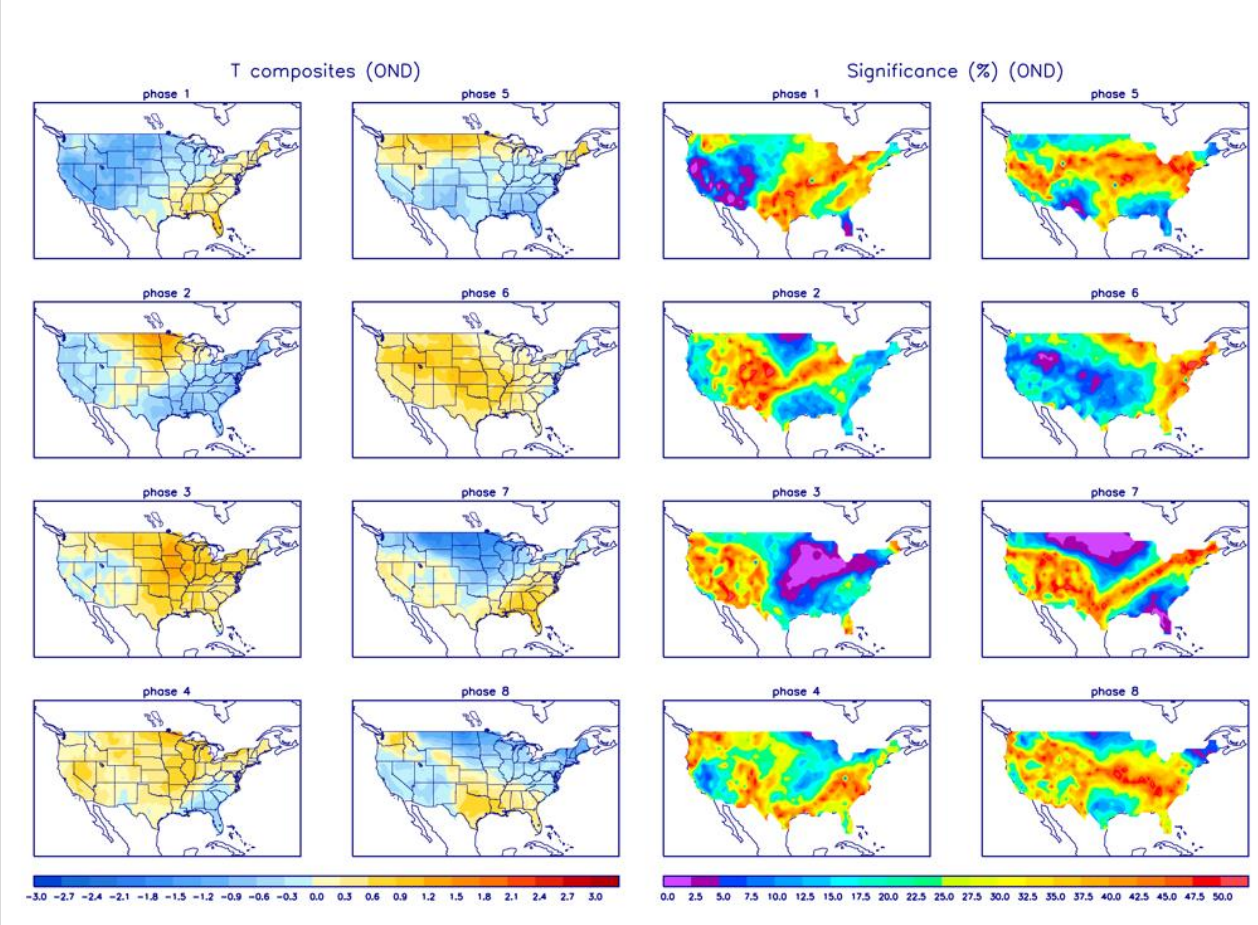

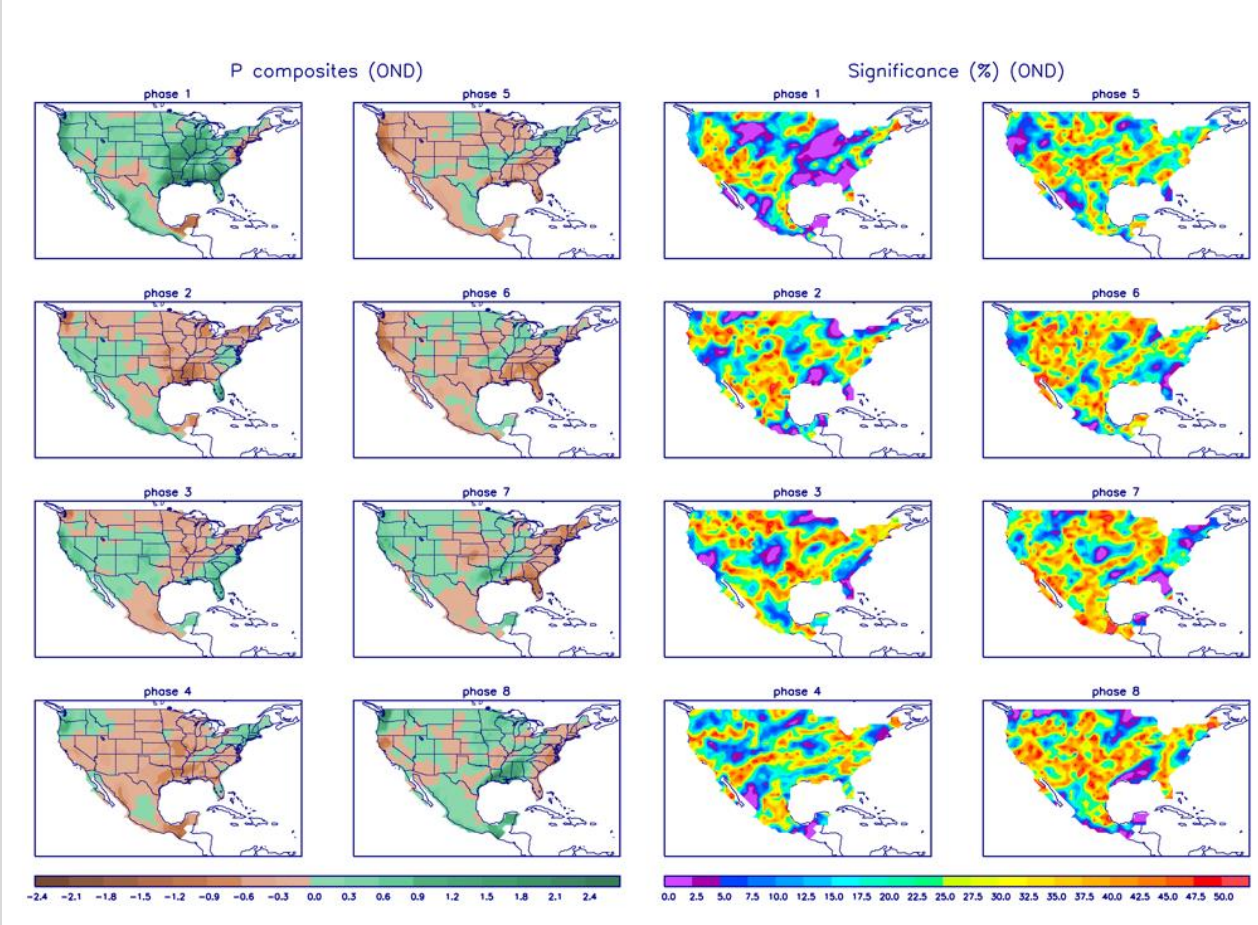

Figures 11-12. Temperature and precipitation anomalies during October, November, and December (OND) with each phase of the MJO. Note the above average precipitation across northern New Mexico during phase 1 as well as the above average precipitation over western NM during phases 8 and 2. Global models are in good agreement that the MJO will strengthen as it transitions into phase 8 during the second week of September 2019 (previous slide).

2019 Fall Outlook

"Analog" Years – 1987, 1992, 1998 & 2016

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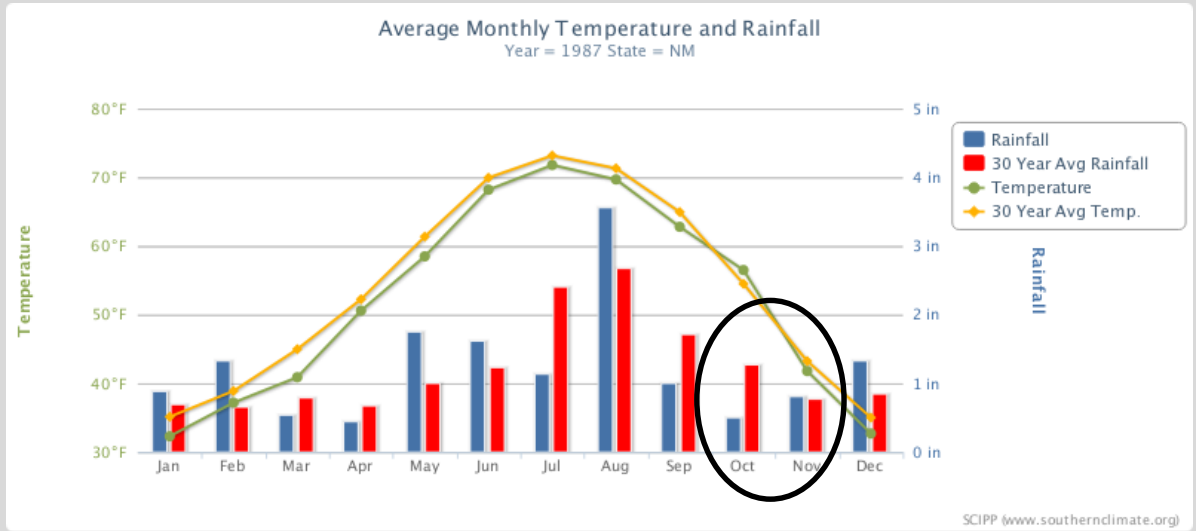

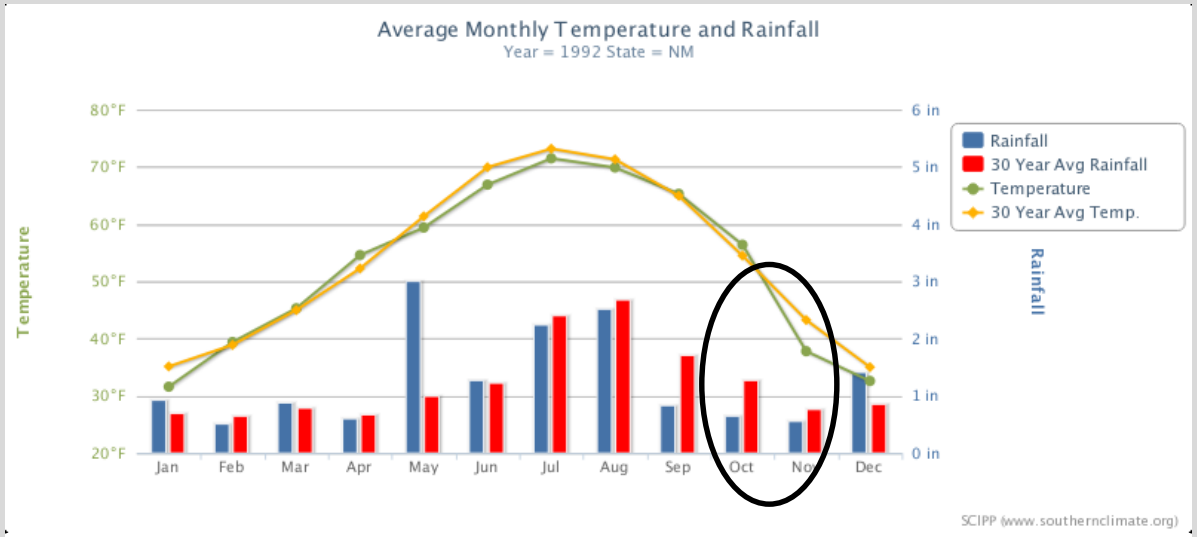

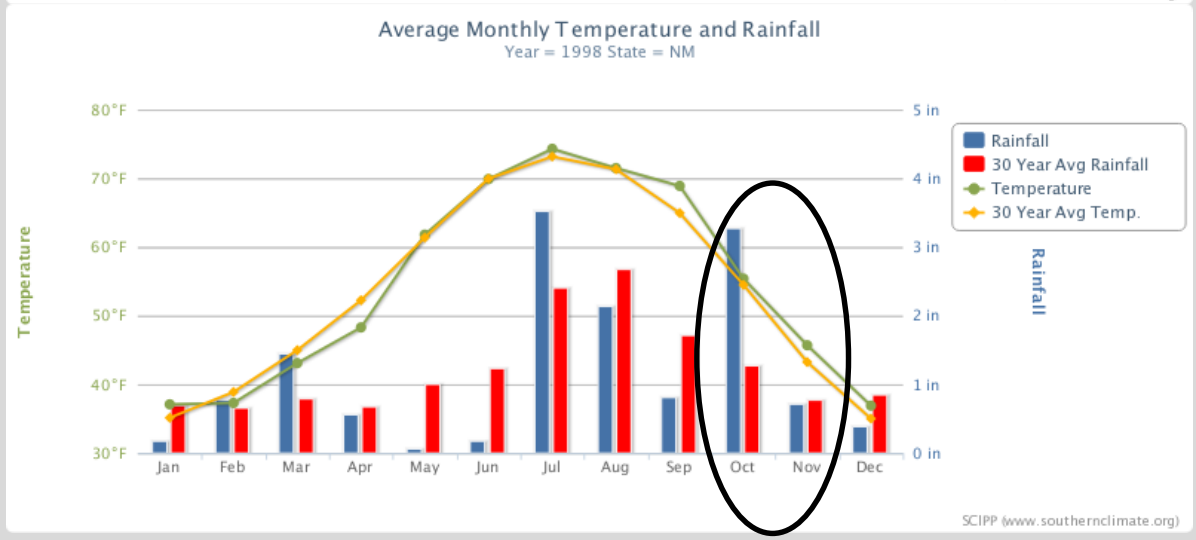

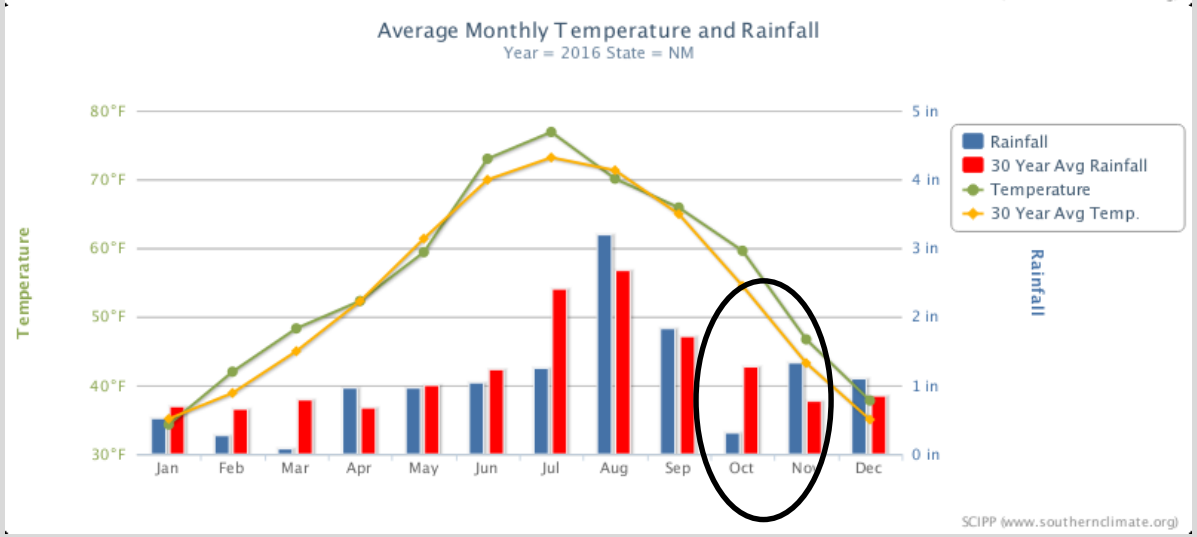

Figures 13-16. Statewide temperature and precipitation for four recent neutral falls following an El Niño since 1985. Note that fall temperatures were near average all four years while fall precipitation was below to well below average with one exception, 1998 when statewide precipitation was well above average.

2019 Fall Outlook

Most Recent "Analog" Year 2016 by Climate Division cont'd

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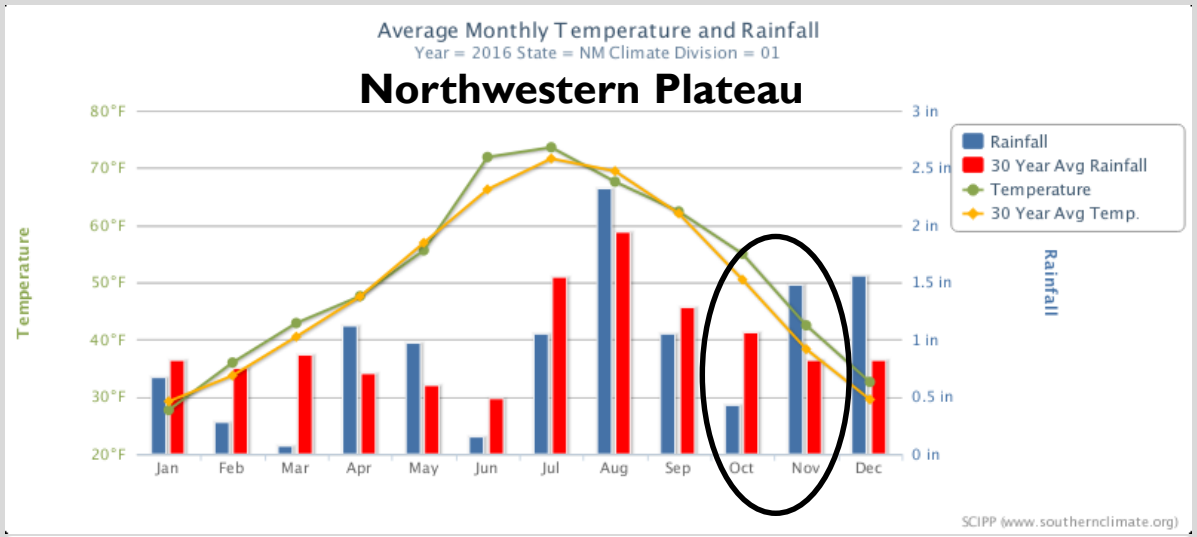

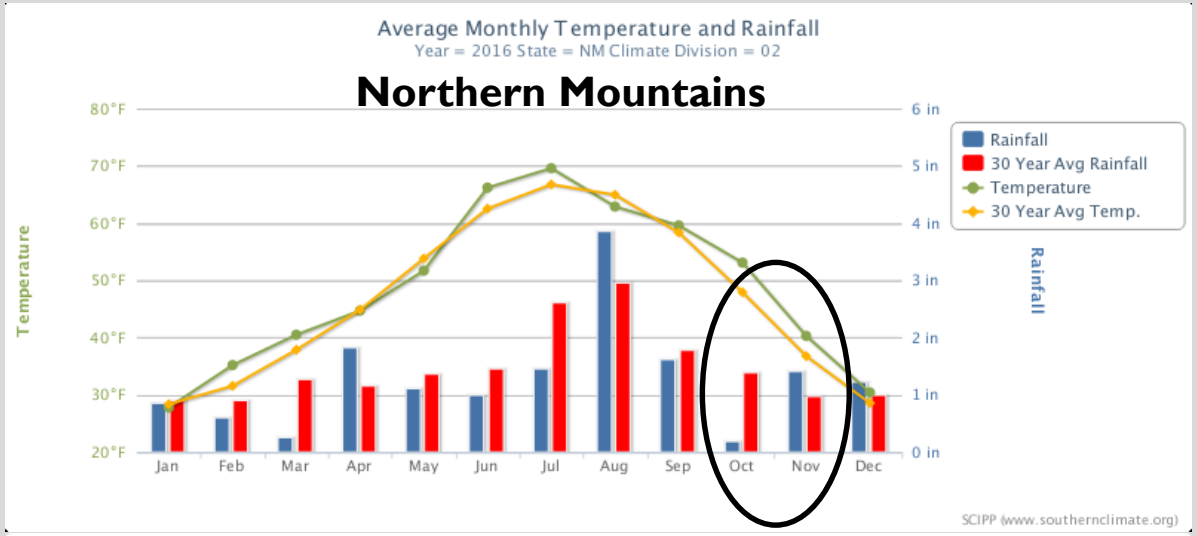

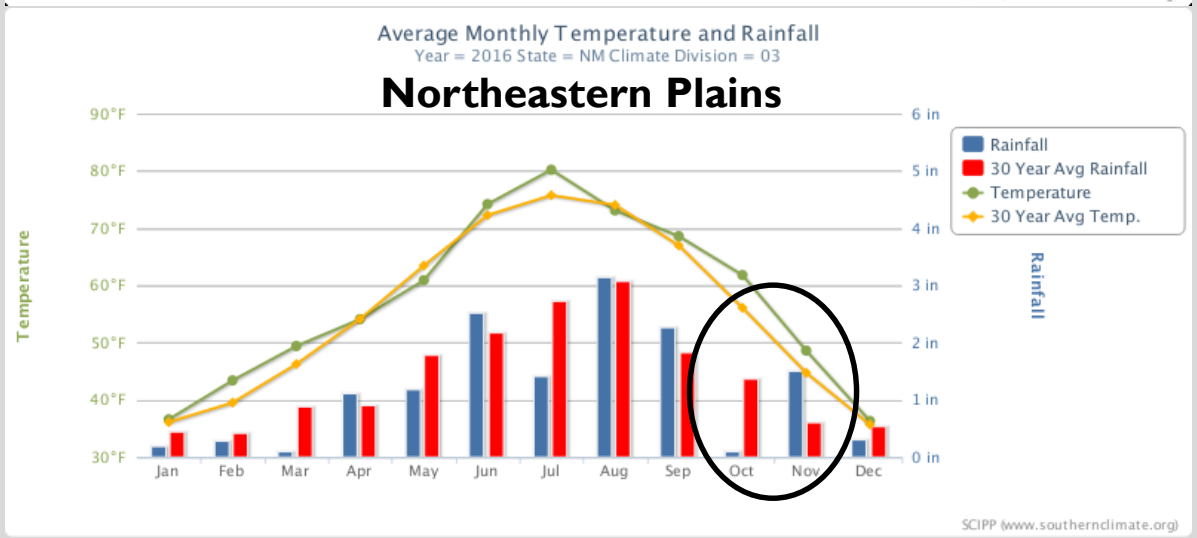

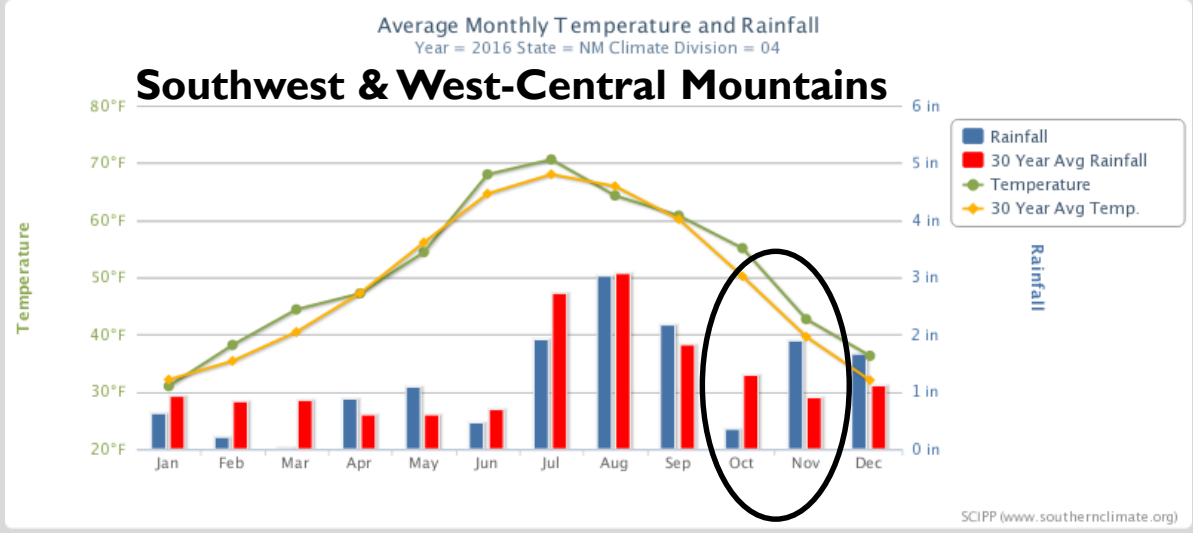

Figures 17-20. Climate Division temperature and precipitation following the 2015-16 El Niño. Note that fall temperatures were mainly above average while precipitation was below to well below average in October but above to well above average in November.

2019 Fall Outlook

Most Recent "Analog" Year 2016 by Climate Division cont'd

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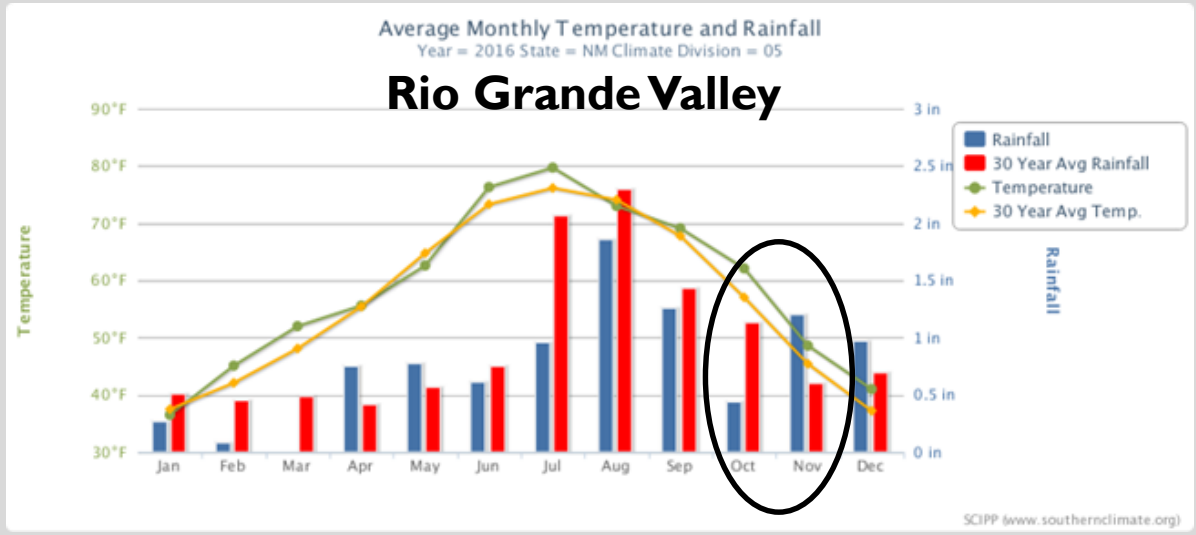

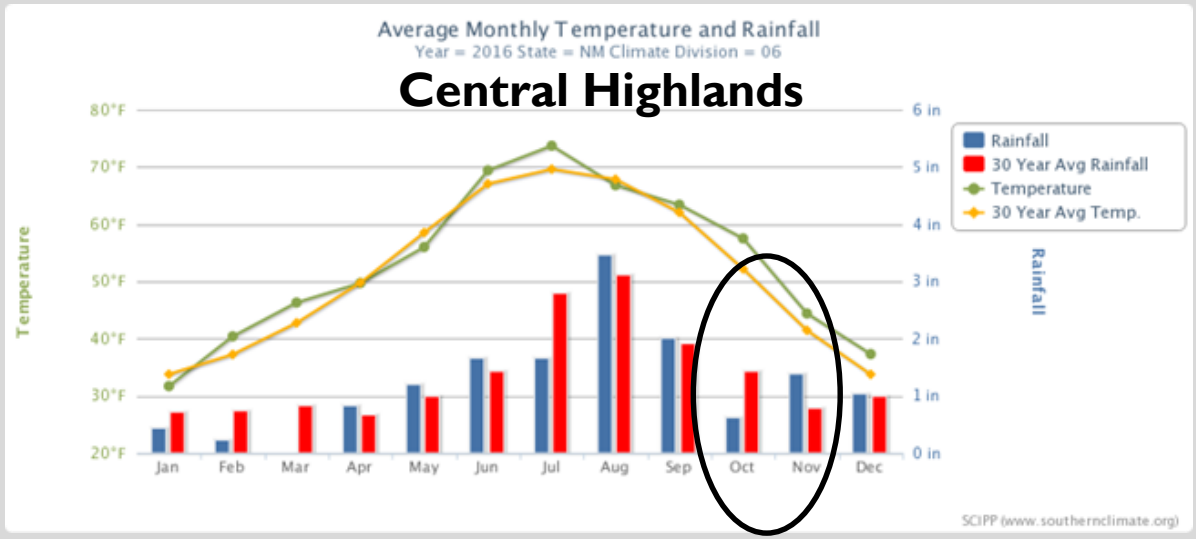

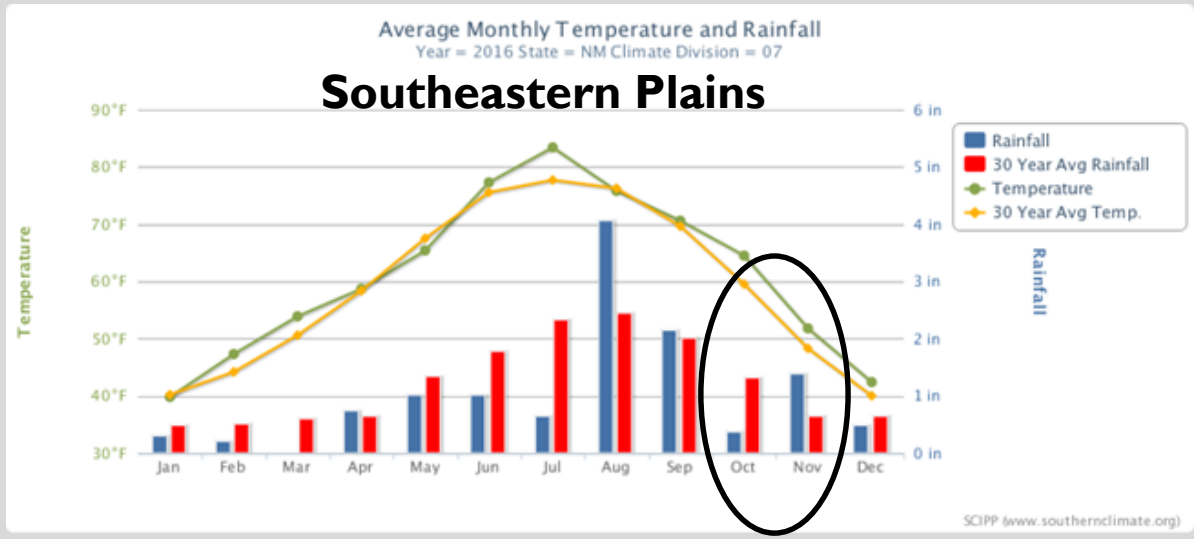

Figures 21-23. Climate Division temperature and precipitation following the 2015-16 El Niño. Note that fall temperatures were mainly above average while precipitation was below to well below average in October but above to well above average in November.

2019 Fall Outlook

ENSO SST Predictions

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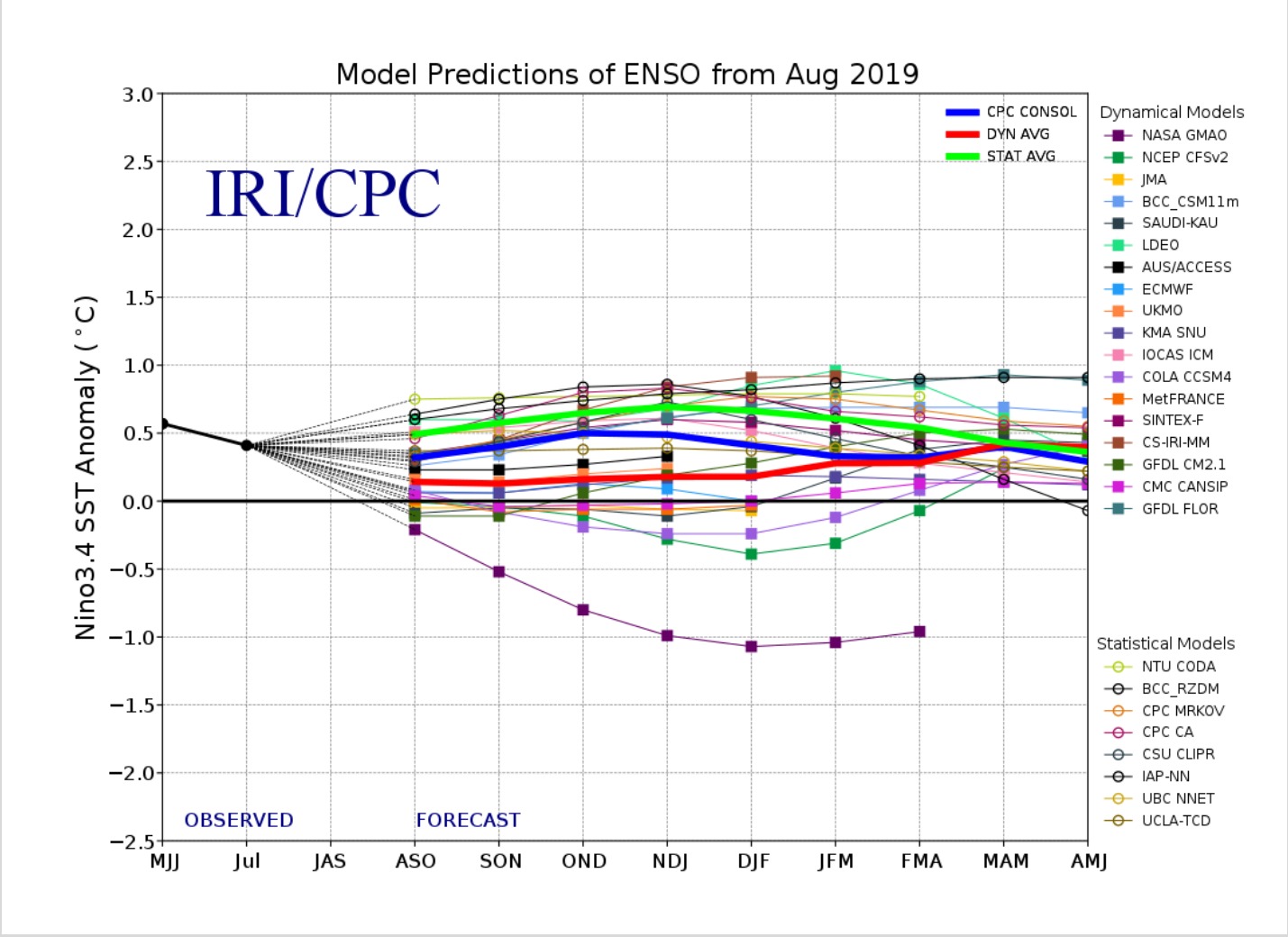

Figure 24. The vast majority of both dynamical (red line) models indicate neutral conditions in fall 2019 while the statistical models indicate a weak El Niño. (green line)

2019 Fall Outlook

Oct-Nov Climate Model Forecasts - *Precipitation*

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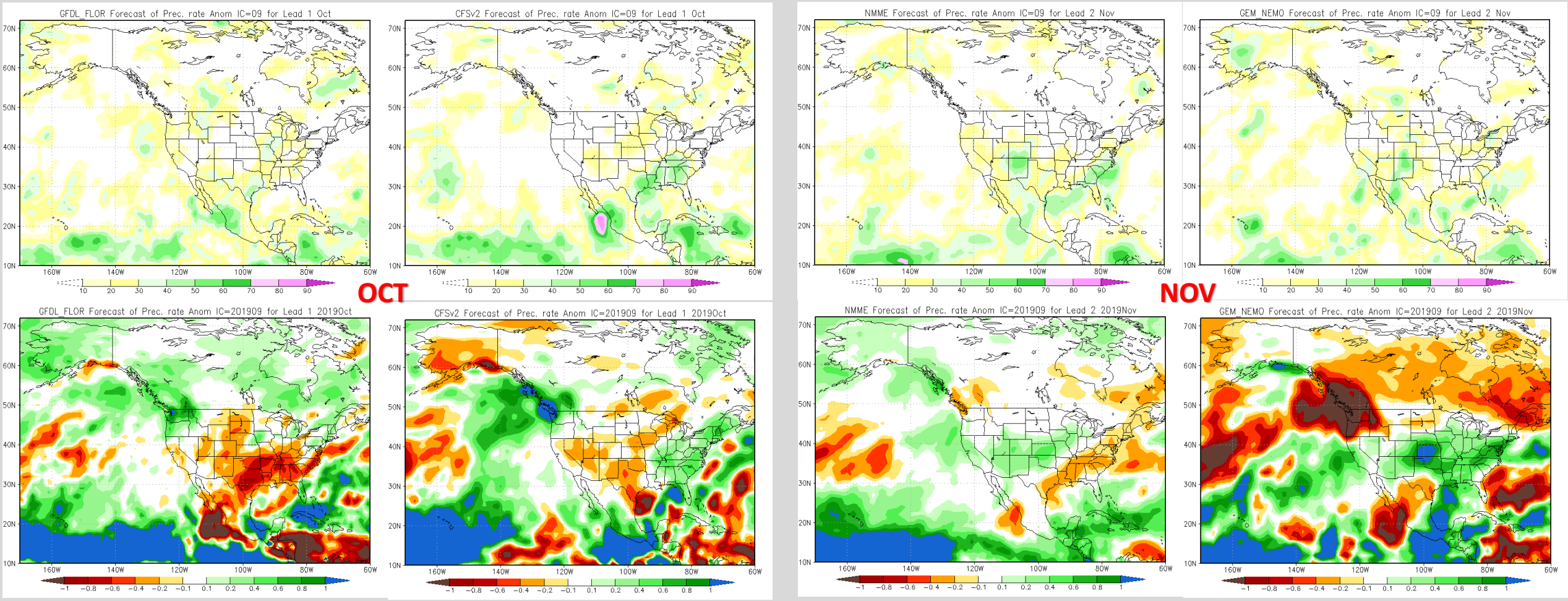

Figures 25-32. Top two climate model precipitation rate skill percentages (top row) for October and November 2019. Model forecasts (bottom row) are below average for precipitation in October and above average for November.

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Oct-Nov Climate Model Forecasts - *Temperature*

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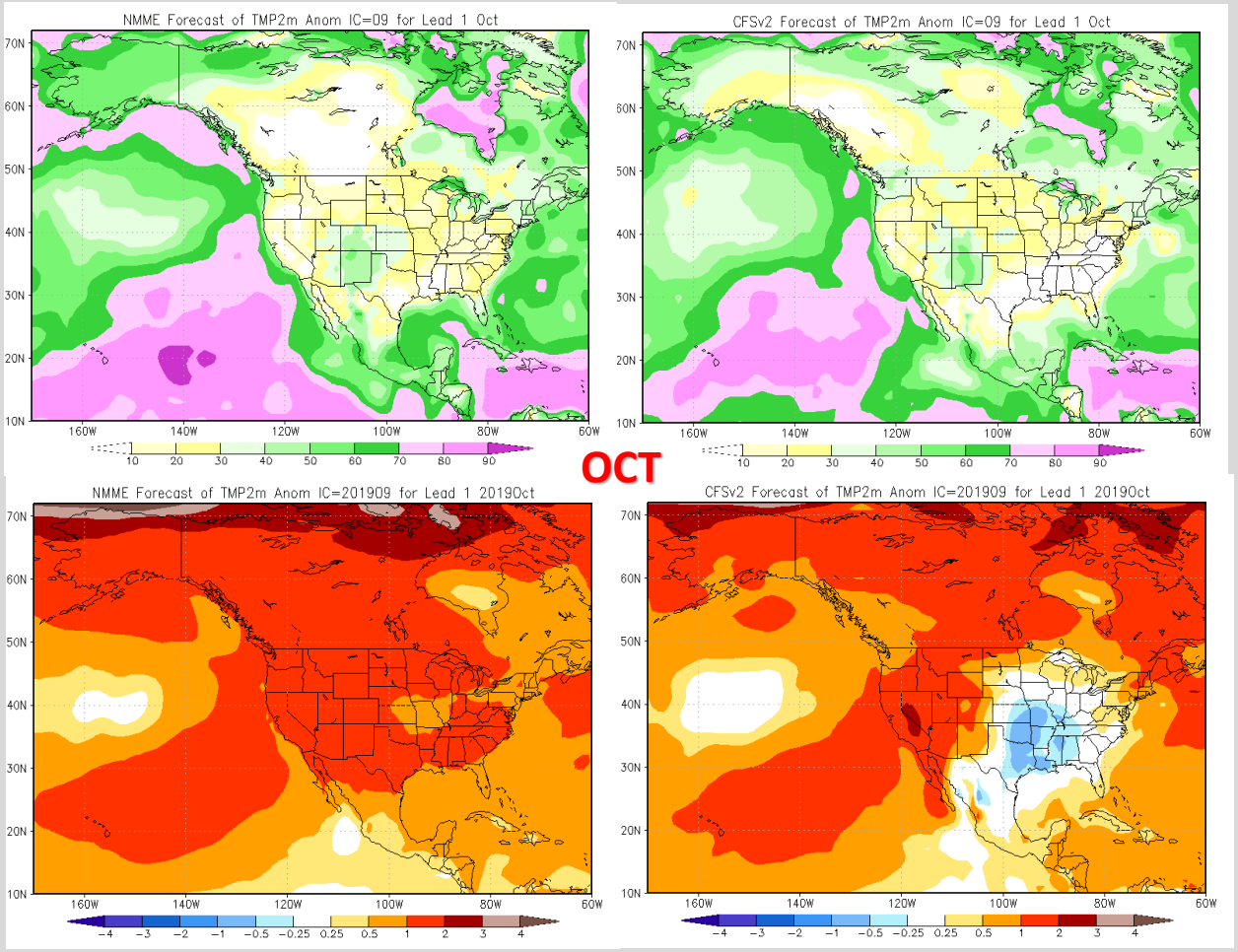

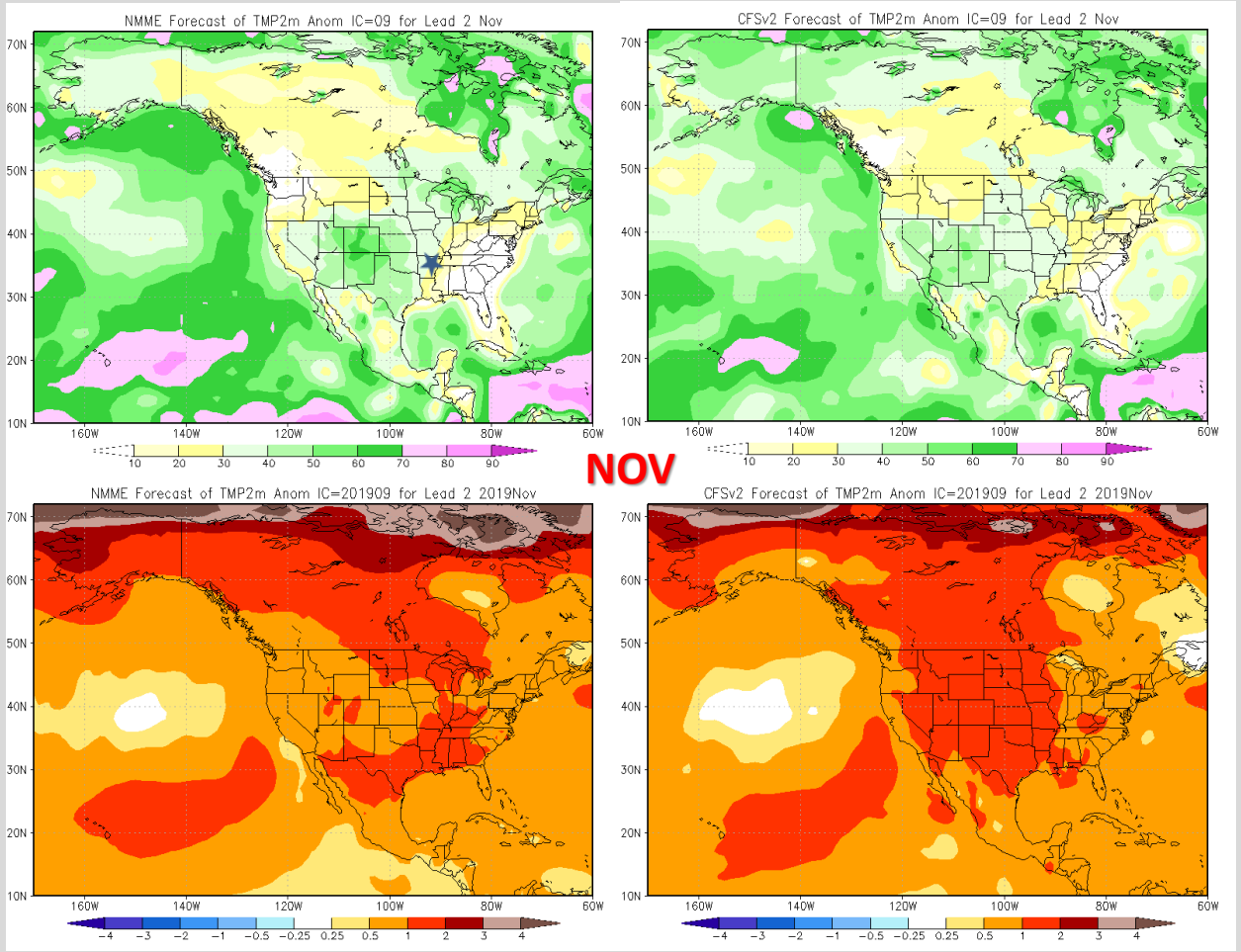

Figures 33-40. Climate model temperature anomaly plots from the two climate models which have the highest skill percentages for October and November (top four images). Model forecasts (bottom four images) indicate slightly above average to above average temperatures during both months. The temperature trend during autumn in New Mexico since around 1982 has been steadily increasing.

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Climate Prediction Center's (CPC) SON/Fall Outlook

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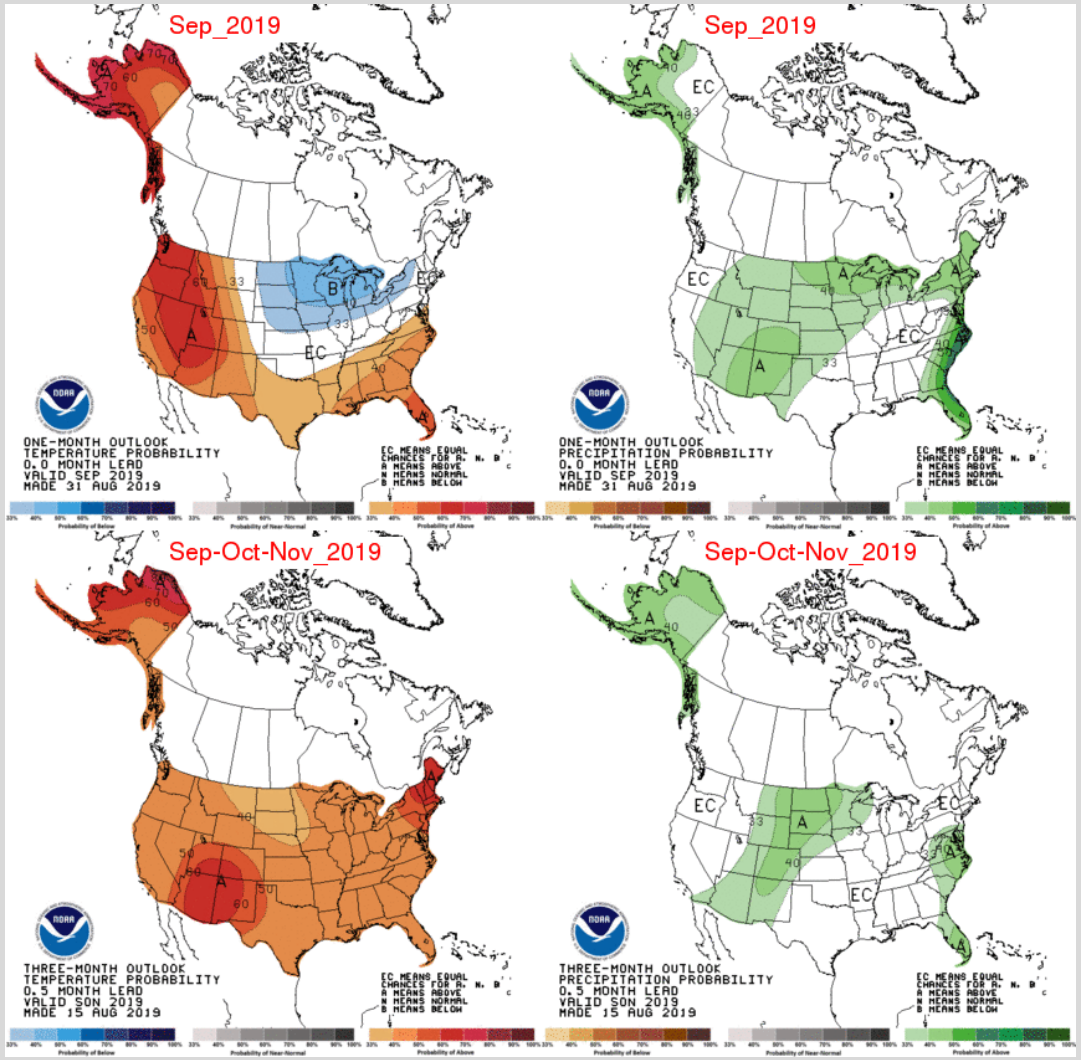

Figure 41. CPC agrees with the climate model consensus of higher than average chances for above average temperatures. The precipitation forecast is similar too if you exclude September.

2019 Fall Outlook

How About Wind and Precipitation During the First Two Weeks of October?

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Courtesy: Bennie Boss


Courtesy: Clay Anderson


Courtesy: Clay Anderson


Courtesy: Steve Larese


Courtesy: Visit Albuquerque.org

While chances for precipitation in early October will be below average, chances for strong wind events are average.

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Summary

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- Forecasts from the most highly-skilled climate forecast models combined with recent fall seasons following an El Niño event indicate that precipitation in central and northern New Mexico during October 2019 will most likely be below 1981-2010 climatological averages while odds favor slightly above to above average precipitation in November.

- Climate model forecasts along with recent temperature trends indicate that temperatures in central and northern New Mexico during October and November 2019 will most likely range from slightly above to above seasonal averages.

2019 Fall Outlook

Outlook Information

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- **Outlook provided by National Weather Service Forecast Office Albuquerque, NM.**

- **For further information contact Andrew Church: andrew.church@noaa.gov (505) 244-9150**