2020 Spring Outlook

For Northern & Central New Mexico

Albuquerque
WEATHER FORECAST OFFICE

*Updated 3/10/2020

*based on new (March) climate model forecasts

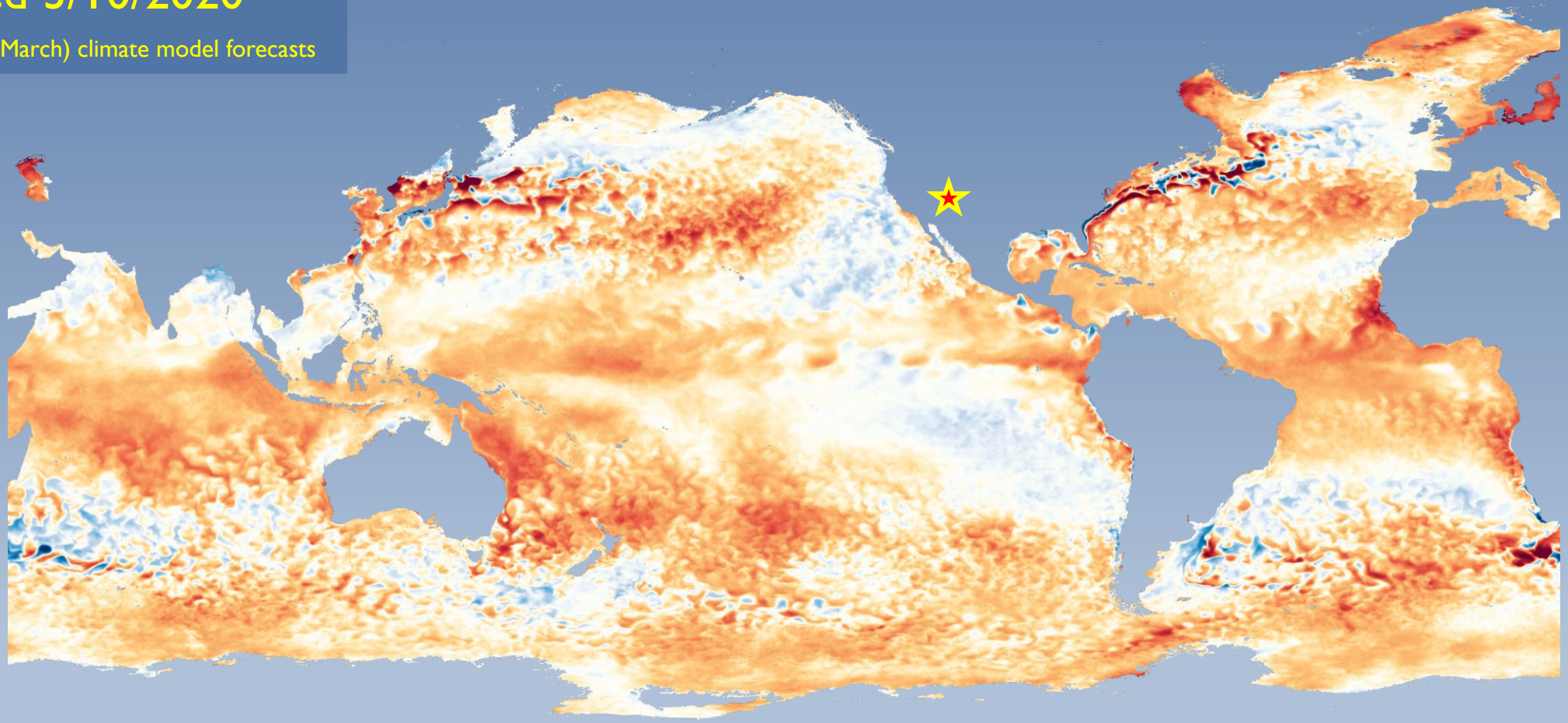

Figure 1. Sea Surface Temperature Anomalies from late February 2020. The Pacific Ocean remains warmer than average but it does not meet El Niño criteria and is considered neutral. There is a 60% chance that ENSO-neutral conditions will continue through the spring, with a 50% chance of neutral through the summer. (ENSO = El Niño/Southern Oscillation, the whole ocean/atmosphere El Niño/La Niña system.)

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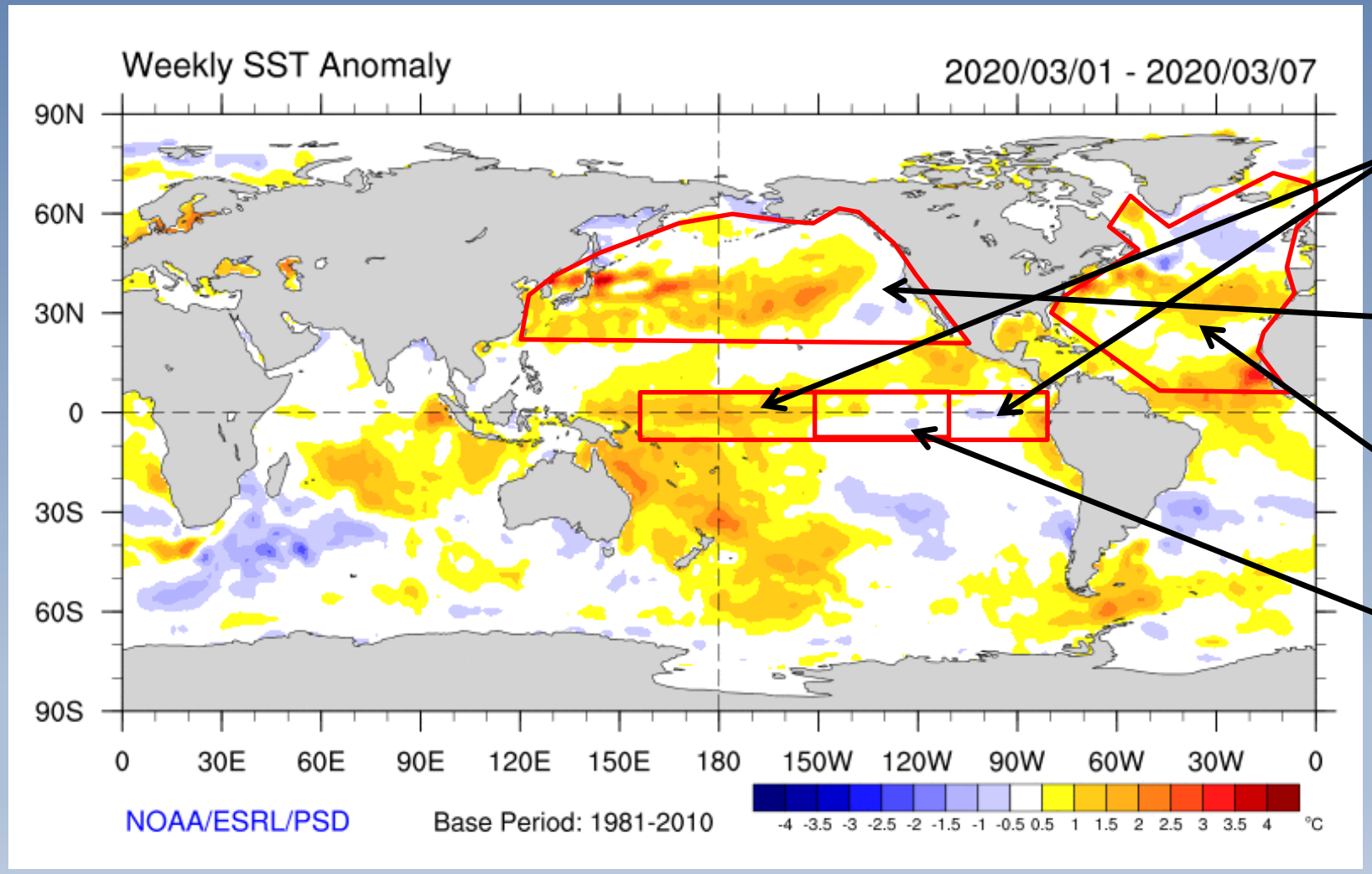

- Multivariate ENSO Index (**MEI**) for DEC_JAN 2019-20: **+0.3**
- Pacific Decadal Oscillation (**PDO**) for JAN 2020: **-0.23**
- Atlantic Multidecadal Oscillation (**AMO**) for DEC 2019: **+0.16**
- Oceanic Niño Index (**ONI**) (uses Niño 3.4 region - inner rectangle) for NDJ 2019-20: **+0.6**

Figure 2. Latest weekly global SST anomalies showing warmer than average temperatures in portions of the eastern equatorial Pacific Ocean.

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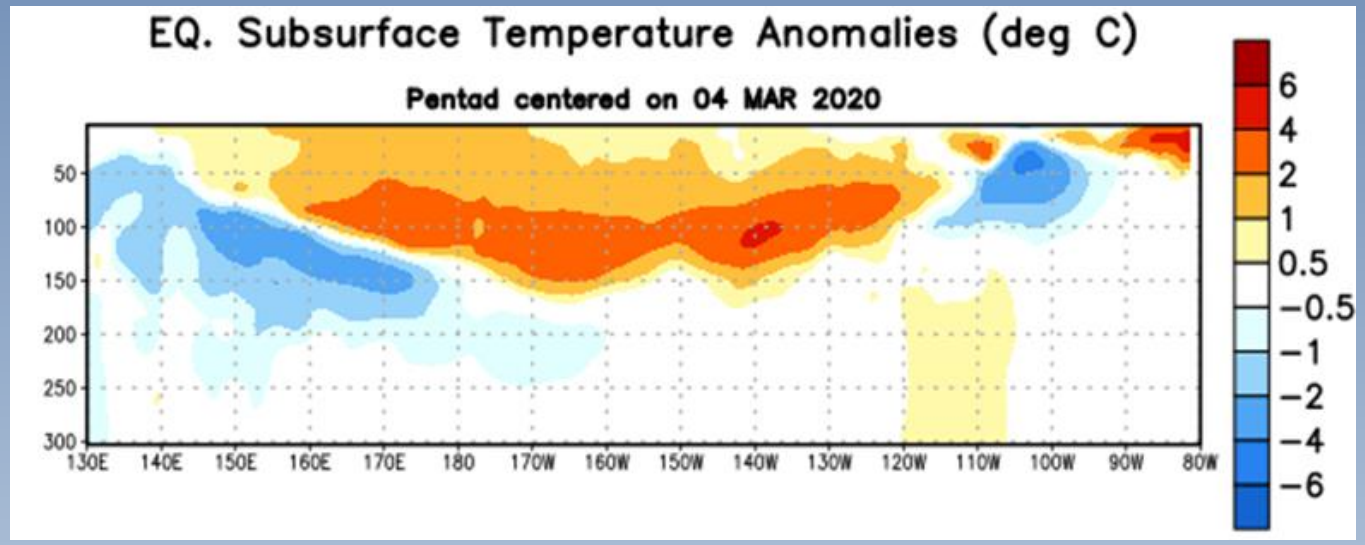

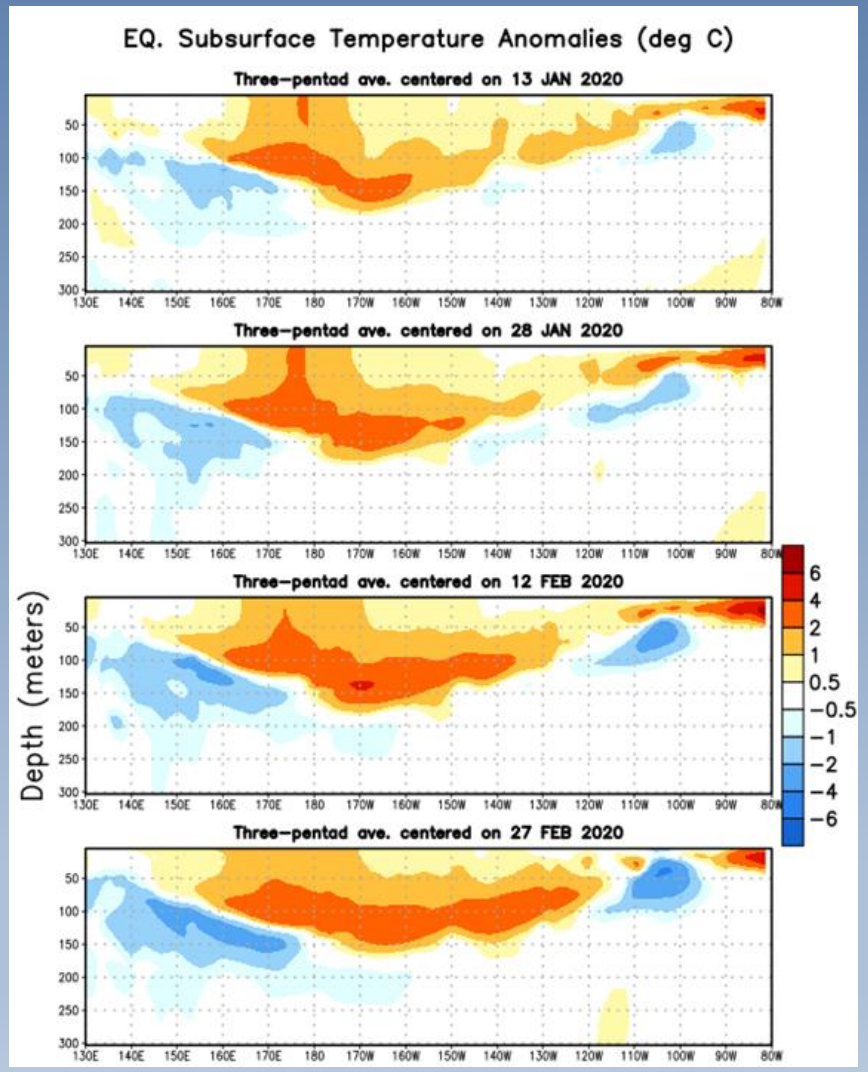

Figures 3 and 4. Since January, negative sub-surface temperature anomalies have strengthened in the western and eastern Pacific, mainly at depth.

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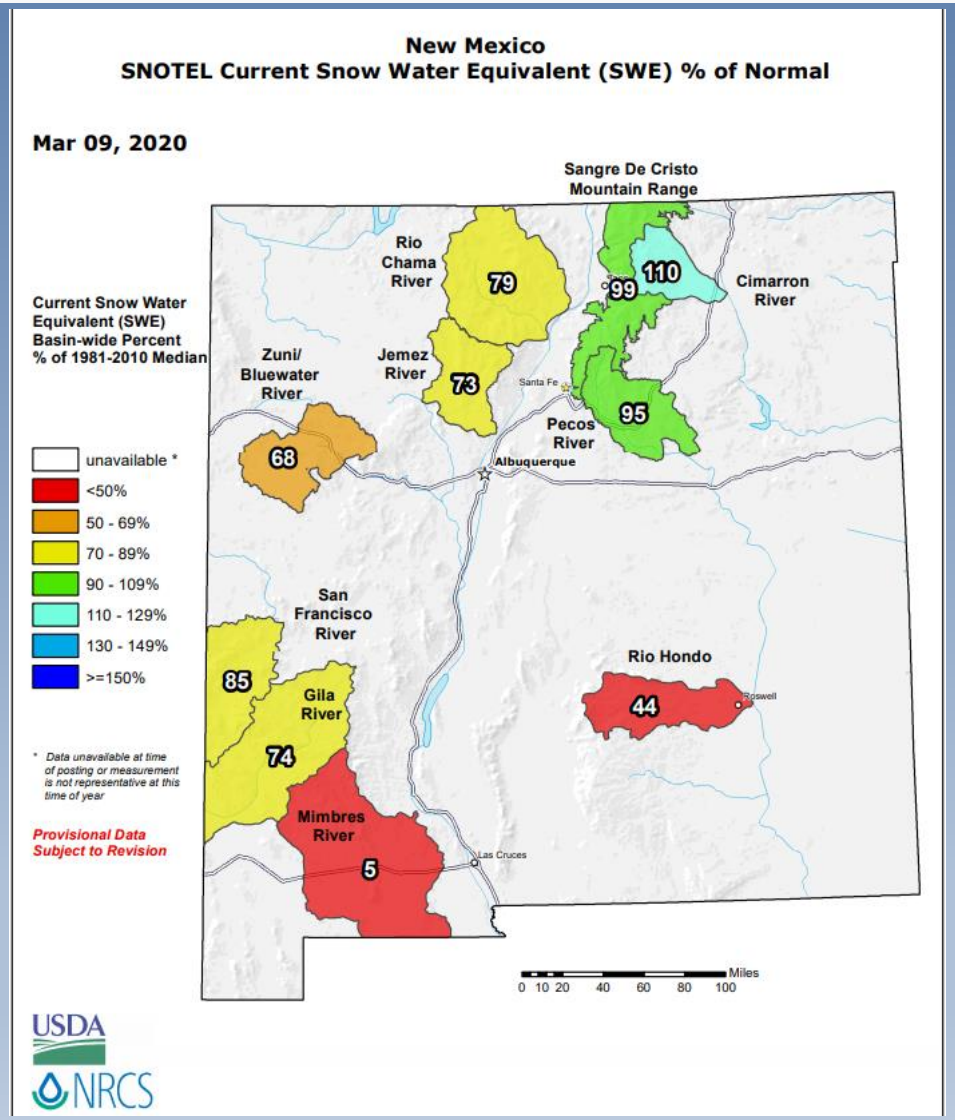

Figure 5. Snow-water equivalent anomaly (% of average) as of 3/9/2020. The majority of watersheds in NM are near to slightly below 1981-2010 averages.

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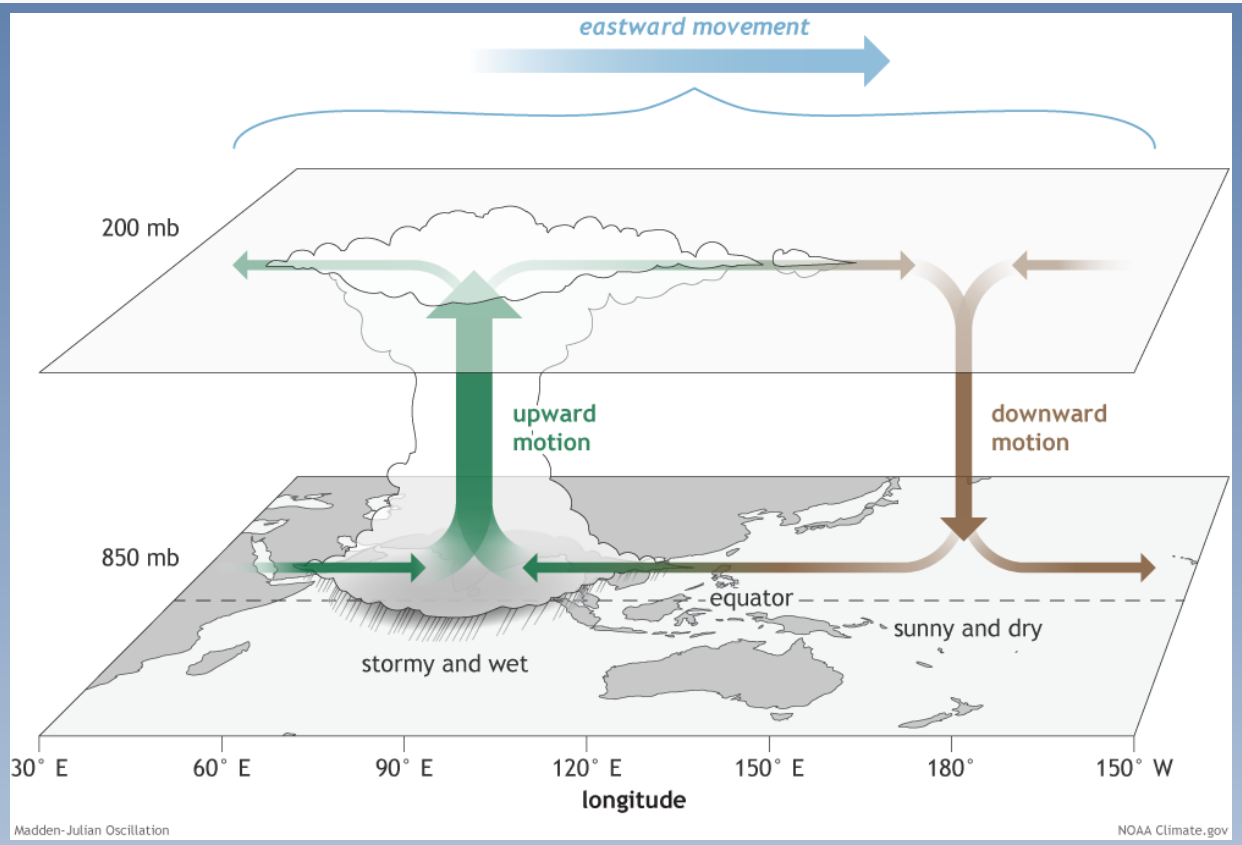

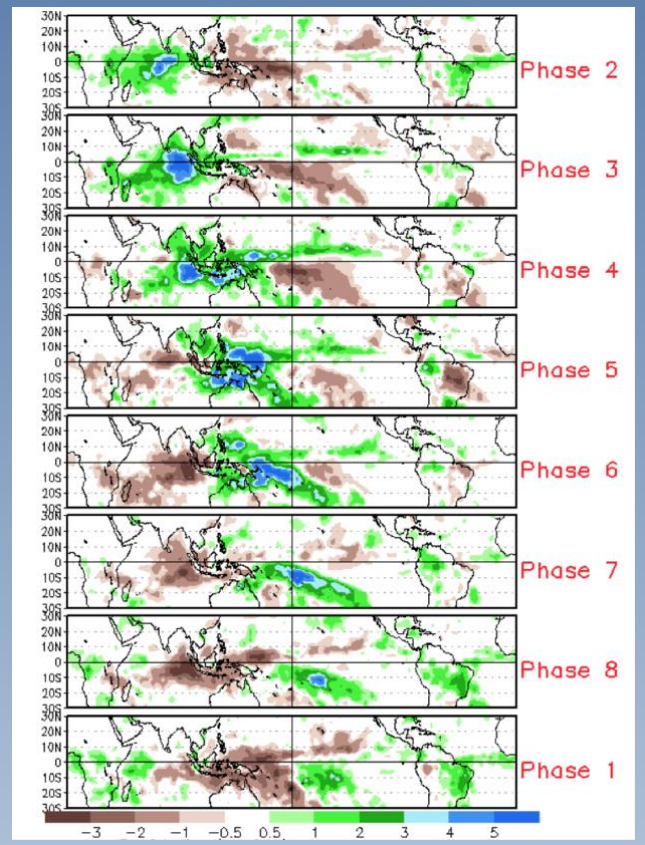

Figures 6 and 7. The Madden-Julian Oscillation (MJO) is an area of enhanced thunderstorms that travels around the world every 30 to 60 days from west to east along/near the equator. An active MJO's importance on the weather/climate impacts for the Southwest U.S. cannot be overstated. Ahead and behind 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 this area. During El Niño, the trade winds are weaker than average, allowing surface waters to warm (vice versa during La Niña). If the MJO is active, it typically changes the wind patterns temporarily. During February 2020, the MJO was quite active and stalled in phases 7/8 for much of the month.

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Albuquerque
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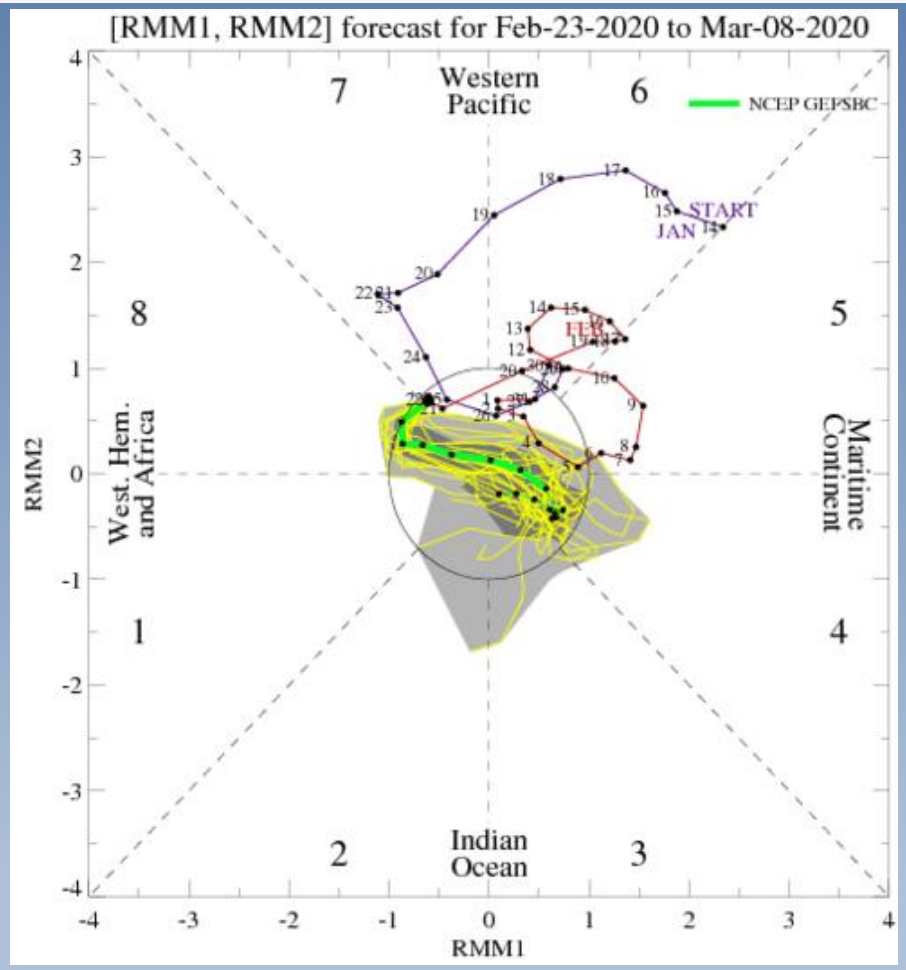

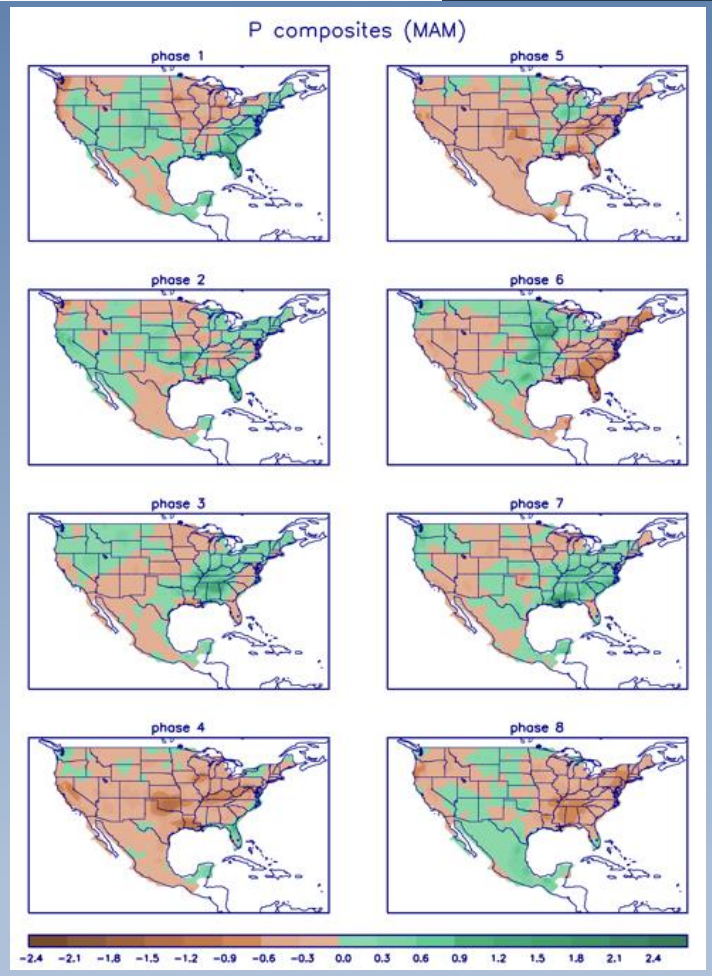

Figures 8 and 9. Phase diagram showing the evolution of the last 40 days of observations (left) along with the 15 day ensemble GFS forecast. The yellow lines are the twenty ensemble members and the green line is the ensemble mean (thick-week 1, thin-week 2). The dark gray shading depicts 90% of the members fall in this area and the light gray shading indicates 50% of the members.(green signifies anomalous convection in the Pacific during the past two weeks or an MJO stuck in phases 7 & 8). Precipitation composites in MAM on the right (green means above average precipitation) during each MJO phase.

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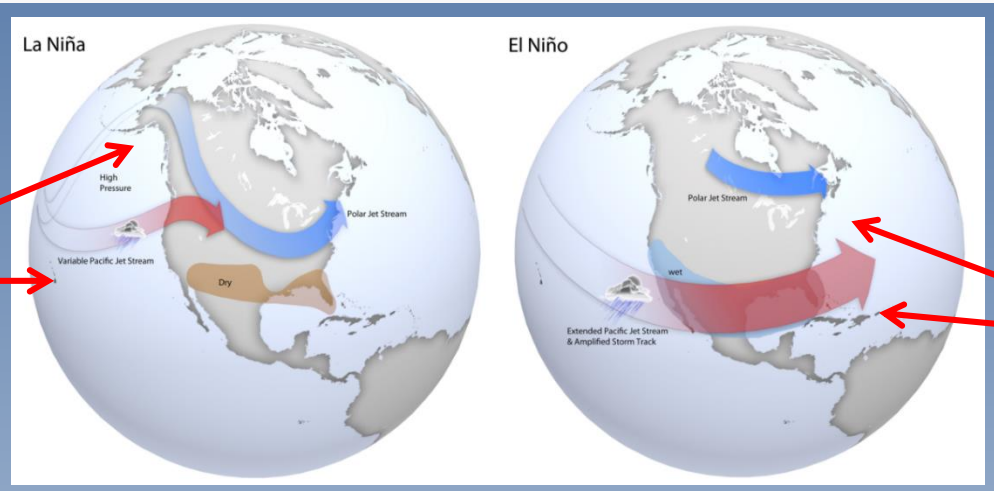
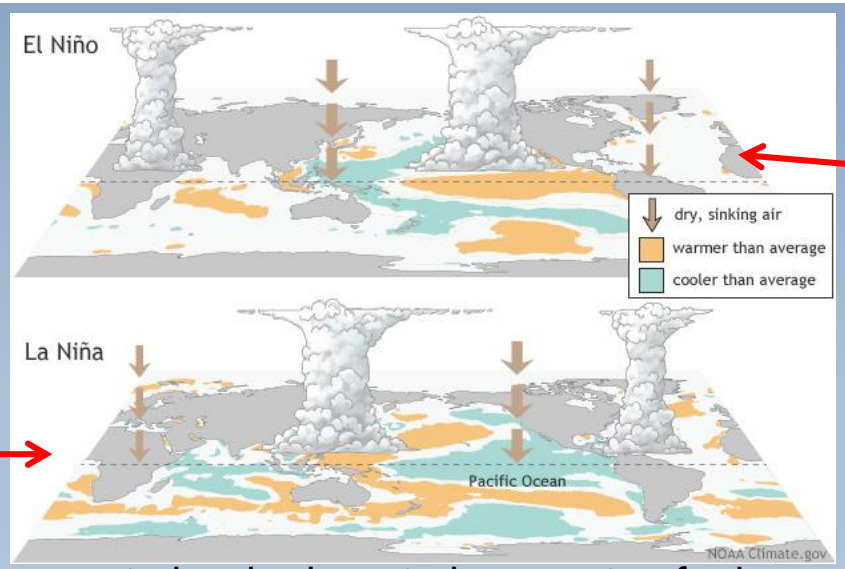
Typical Jet Stream Pattern during La Niña



Typical Jet Stream Pattern during El Niño



Typical Tropical circulations during El Niño

Typical Tropical circulations during La Niña

Figures 10 and 11. Warmer SSTs support deep tropical and subtropical convection farther east than average. This deep convection draws the jet stream farther south into the far eastern Pacific Ocean and southwestern United States during El Niño. The opposite is true during moderate to strong La Niñas and the polar jet stream generally remains north of New Mexico. Weak La Niñas are sometimes wetter and cooler than average.

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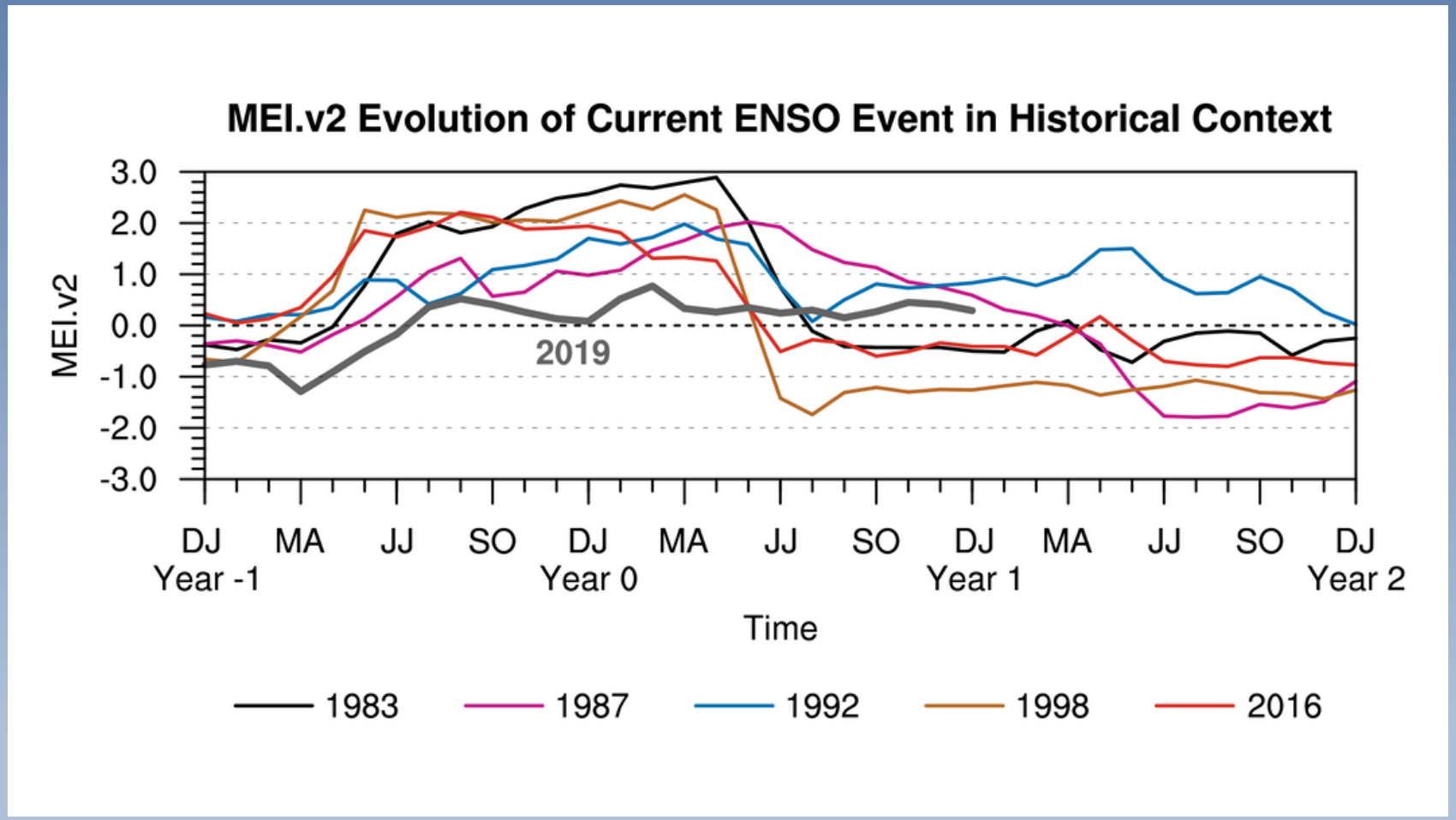

Figure 12. Multivariate ENSO Index (MEI) with five relatively recent late winter seasons similar to 2020. While analog years are getting harder to come by given a changing global climate system, there are two more recent spring seasons where SSTAs were somewhat similar to current conditions, 1998 and 2016.

2020 Spring Outlook

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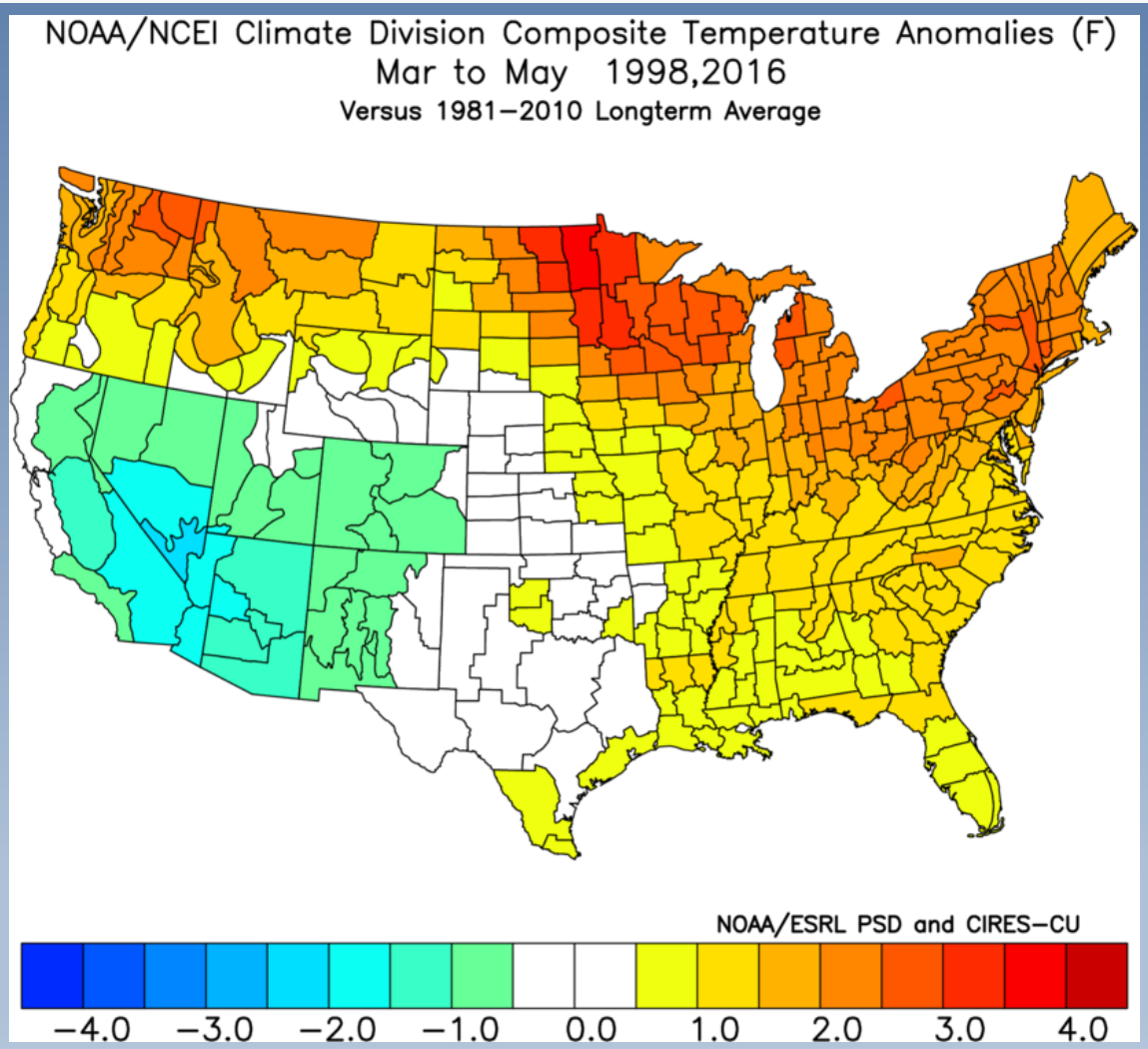

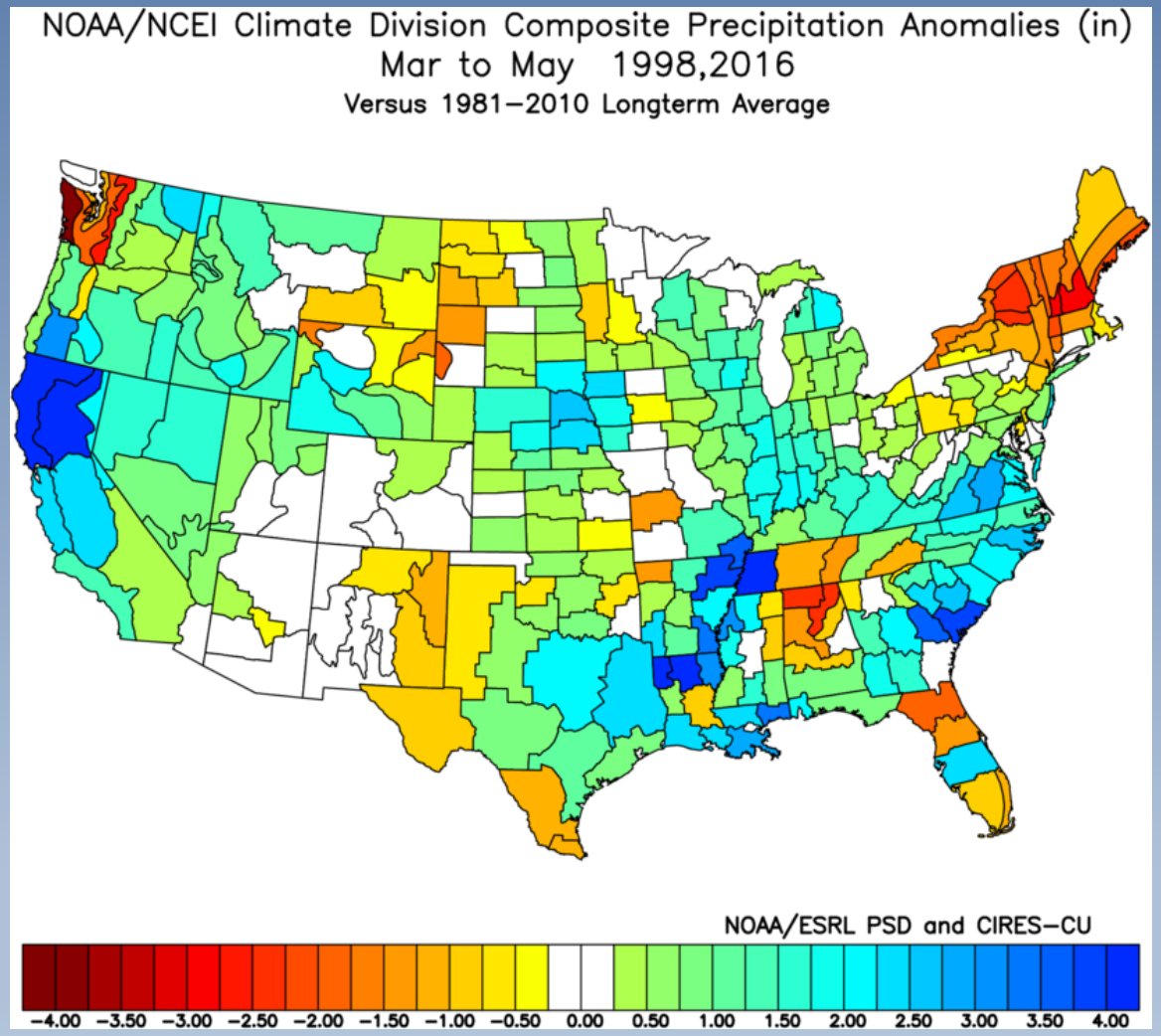

Figures 13 and 14. During two recent analog years, 1998 and 2016, temperatures were near to slightly below 1981-2010 averages (left) for central and western NM while precipitation was slightly below to below average east and north.

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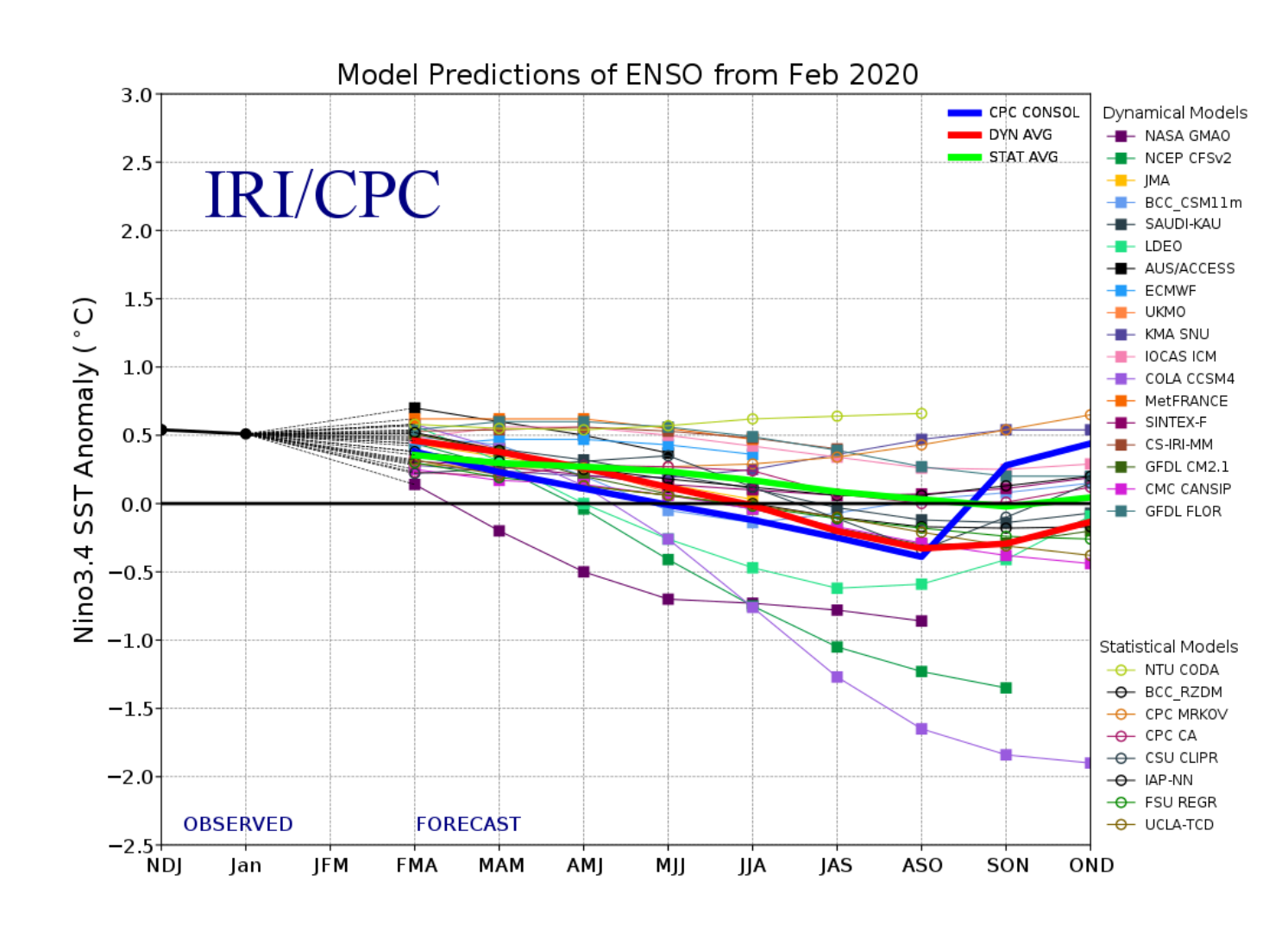

Figure 15. A vast majority of climate model forecasts keep SSTAs in the eastern equatorial Pacific in neutral to weak La Niña territory (between -0.5°C and +0.5°C) during the northern hemisphere spring (MAM) 2020.

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Albuquerque
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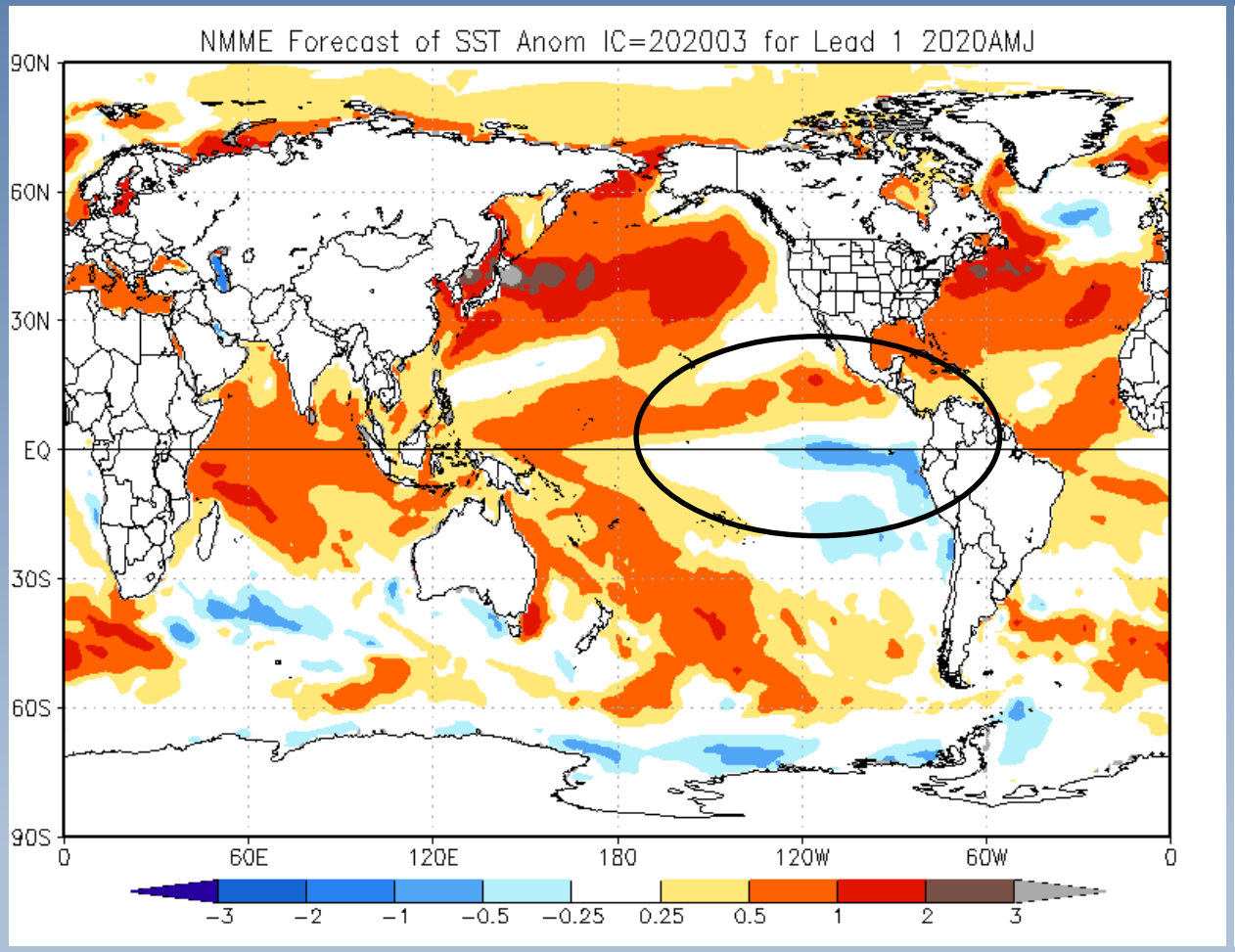

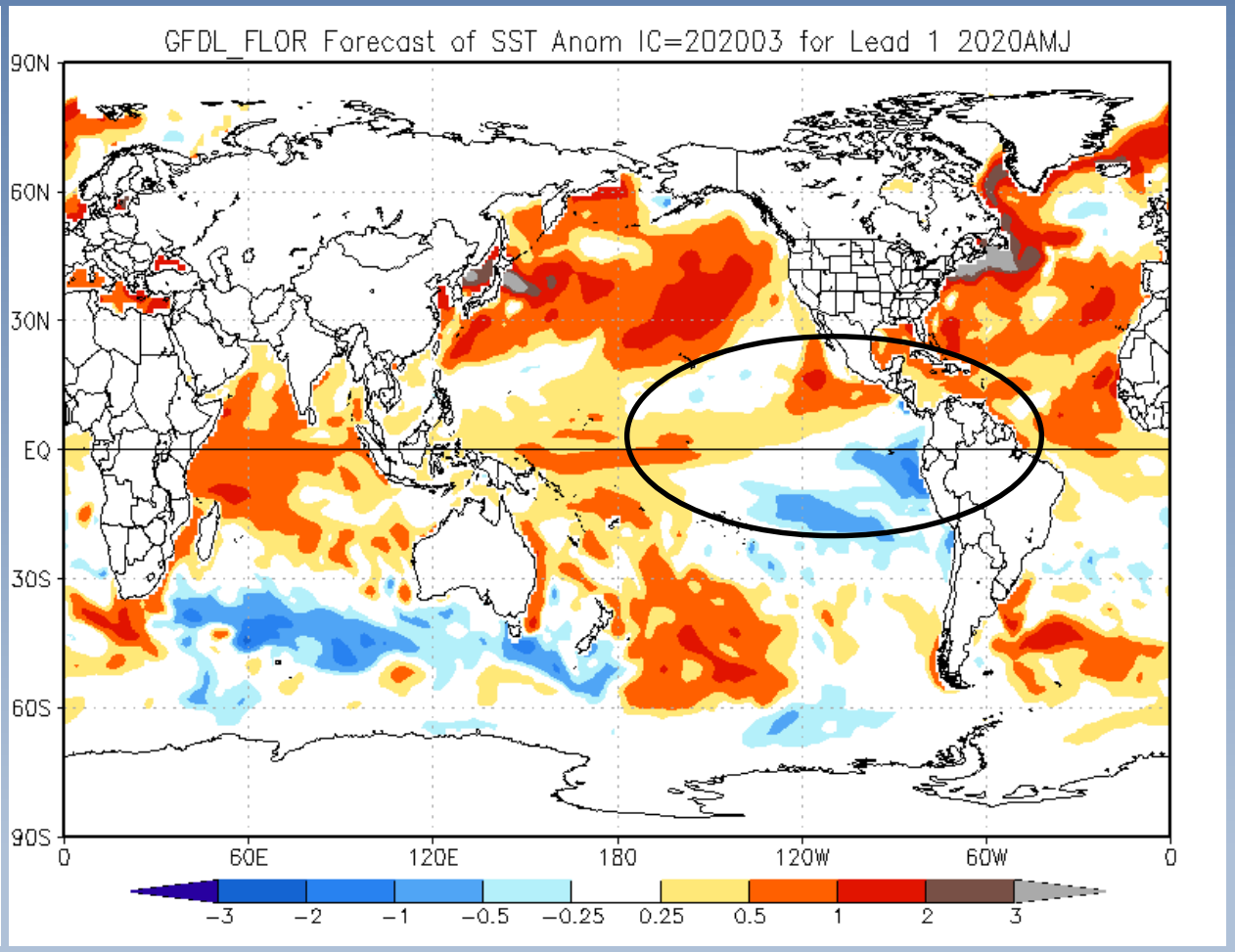

Figures 16 and 17. What matters in climate forecasting? It's mainly about where sea surface temperature (SST) gradient set up in the Pacific Ocean. Climate models with the highest skill score for Pacific Ocean SSTs forecast a favorable location (ovals) for near to slightly above average precipitation in NM.

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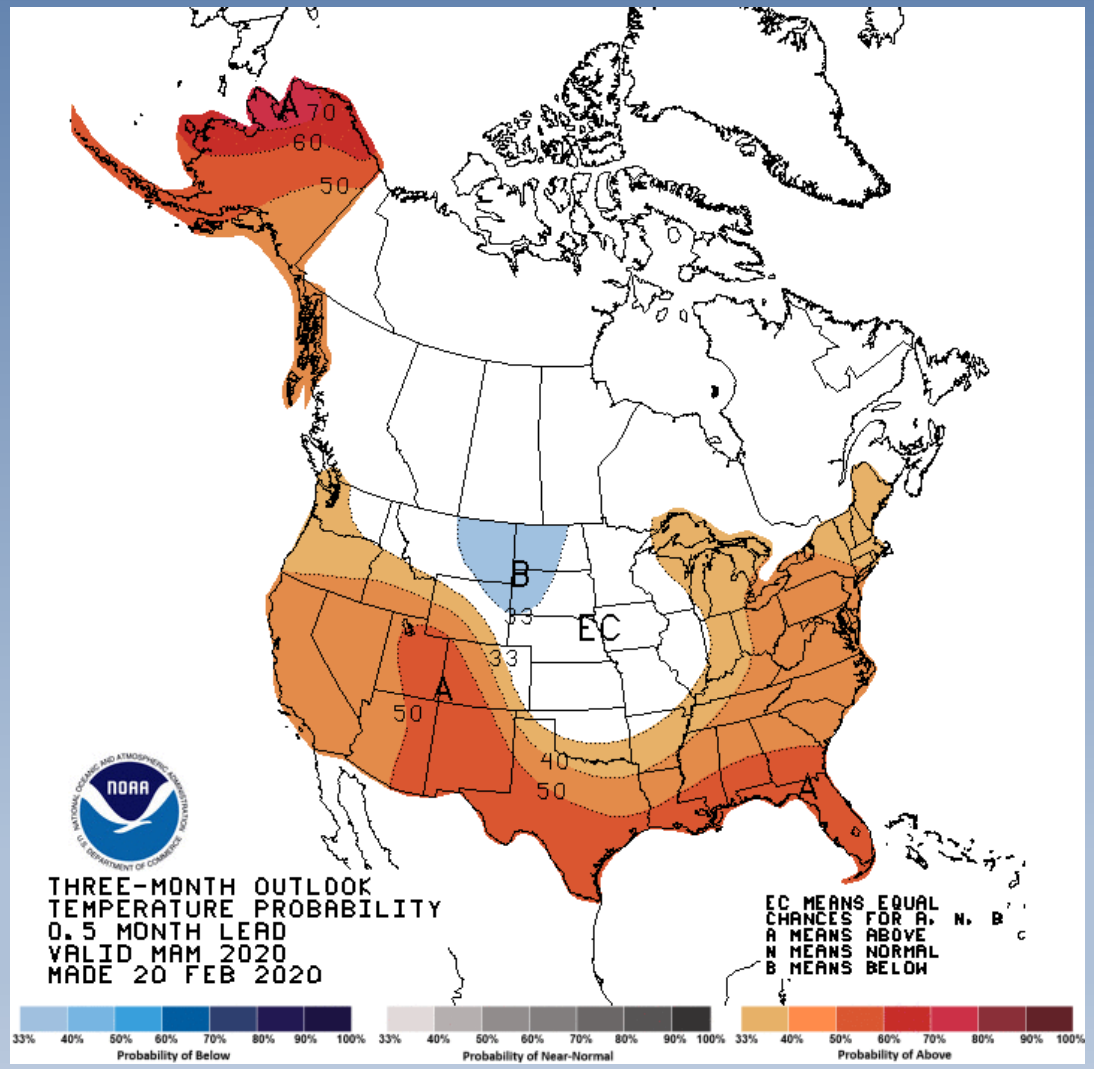

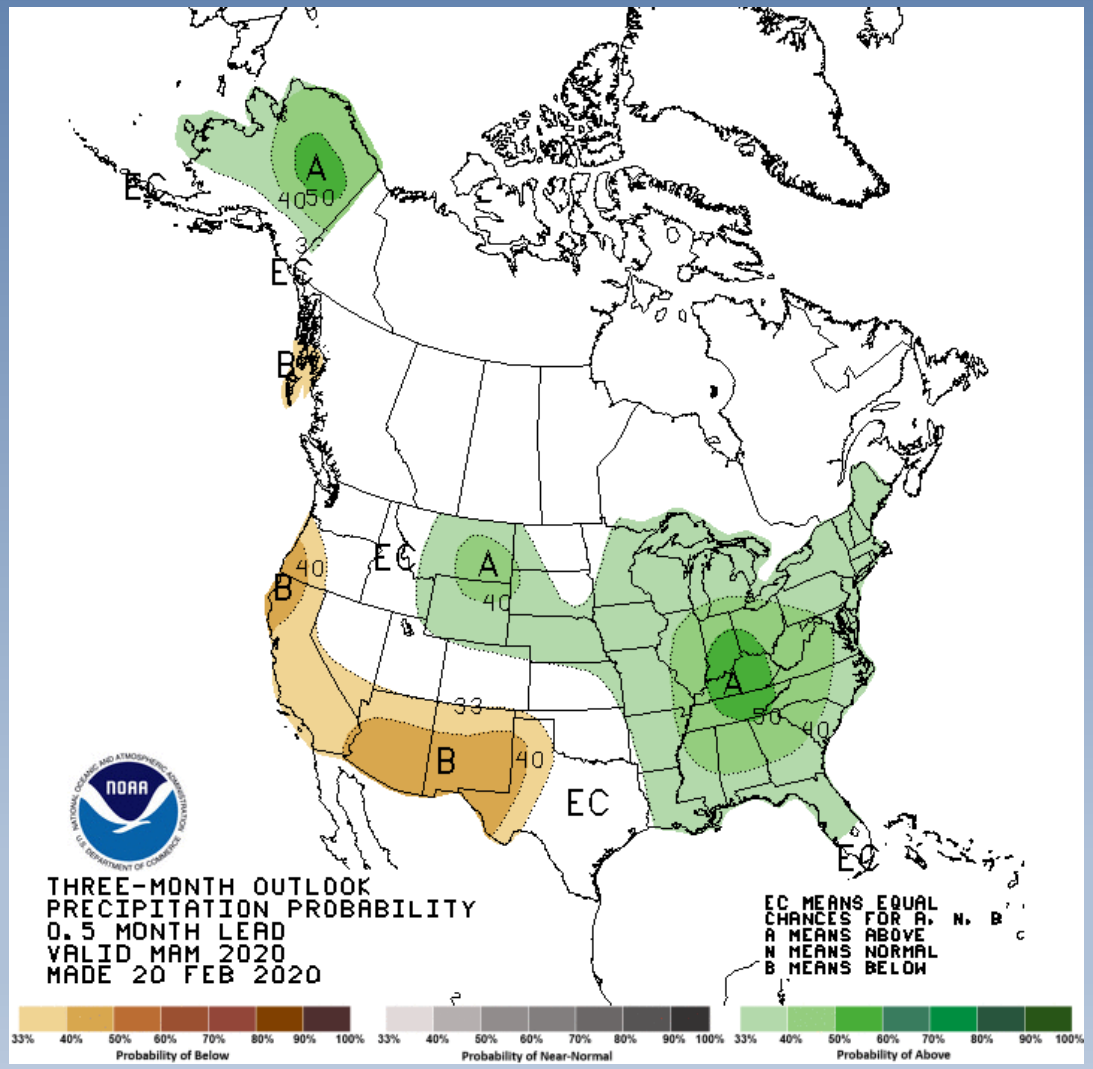

Figures 18 and 19. Climate Prediction Center's Official meteorological spring (MAM) 2020 Outlook favoring above average temperatures and slightly below to below average precipitation.

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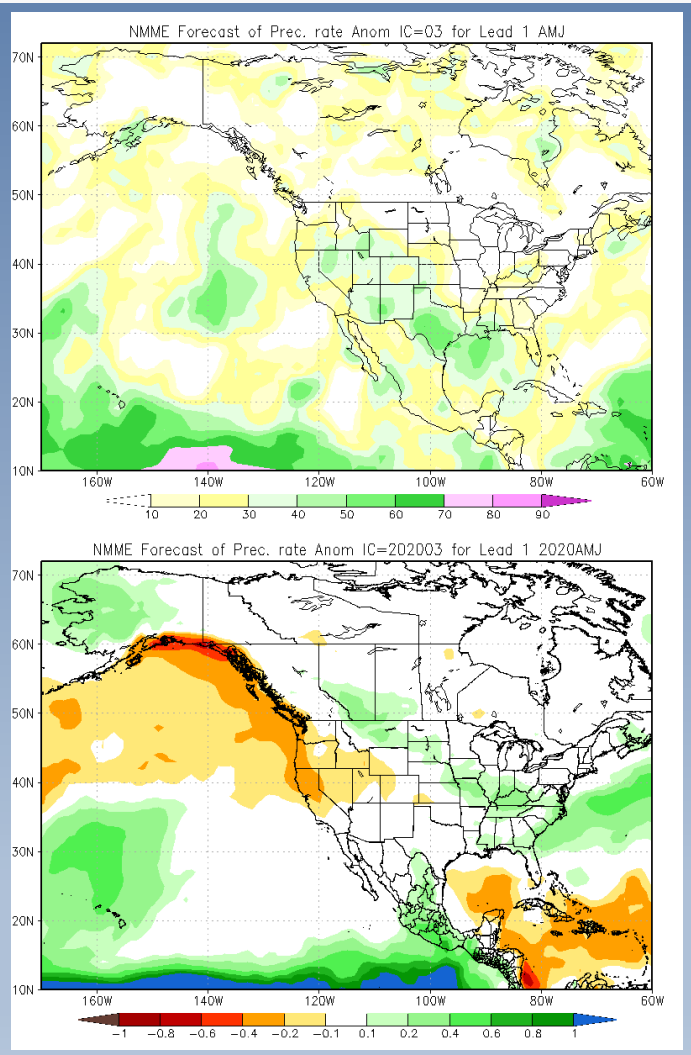

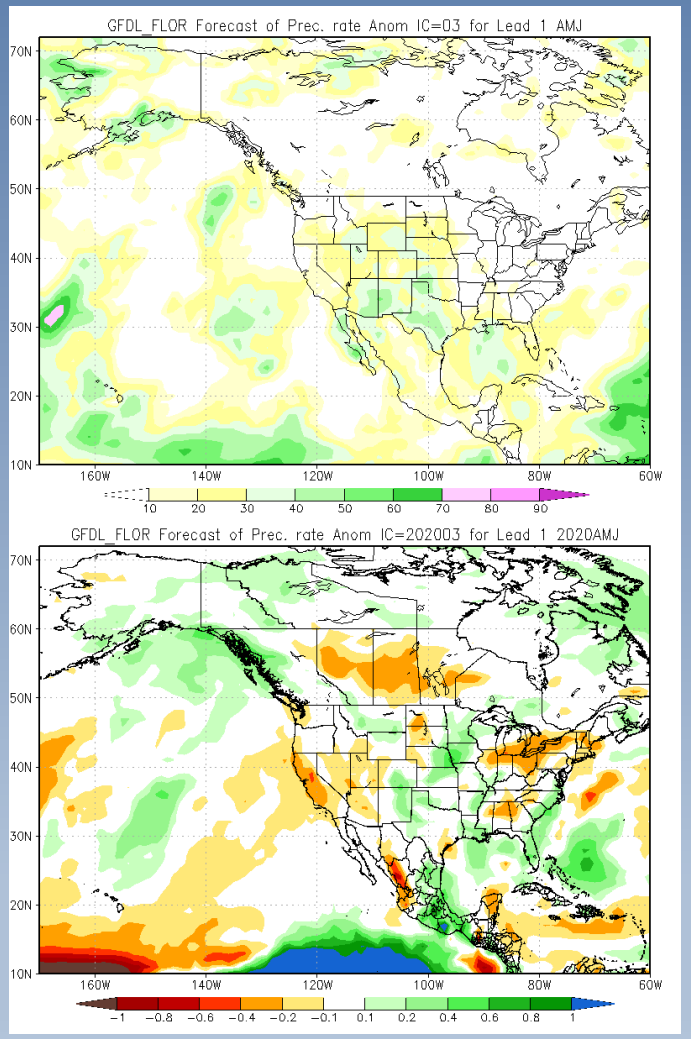

Figures 20-23. Model precipitation rate anomaly from the two climate models that have the highest forecast skill percentages (top two images), the North American Multi-Model Ensemble (NMME) and the Geophysical Fluid Dynamics Laboratory (GFDL FLOR) model. Both model forecasts are predicting near to slightly above average precipitation for MAM 2020.

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Albuquerque
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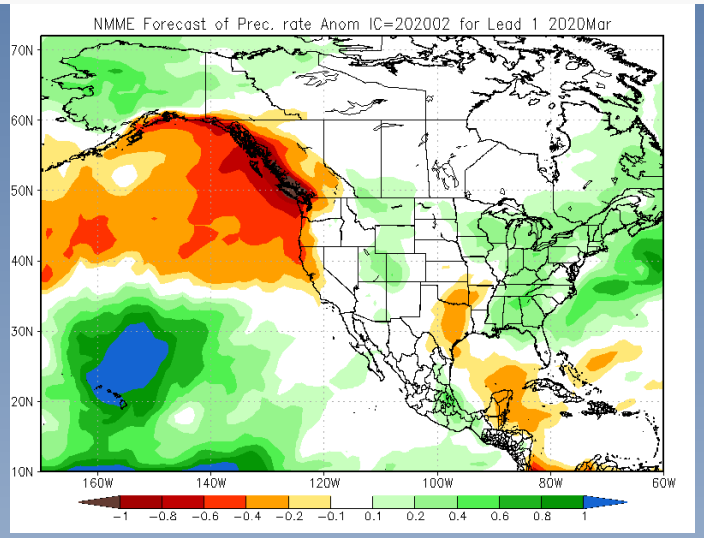
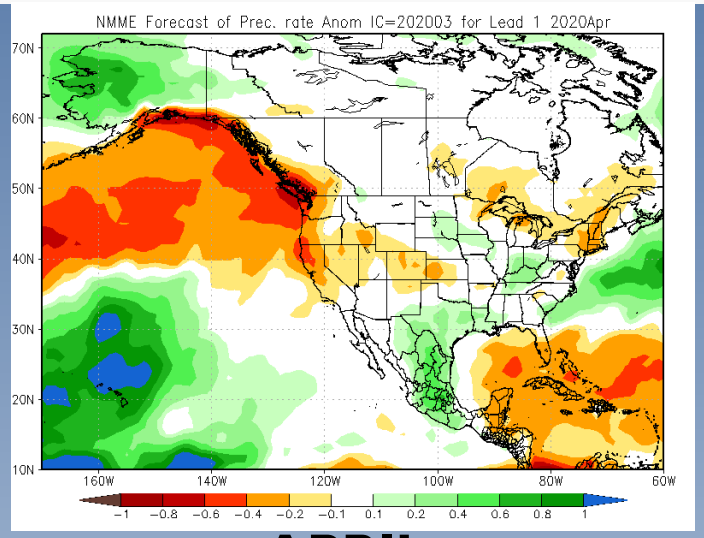
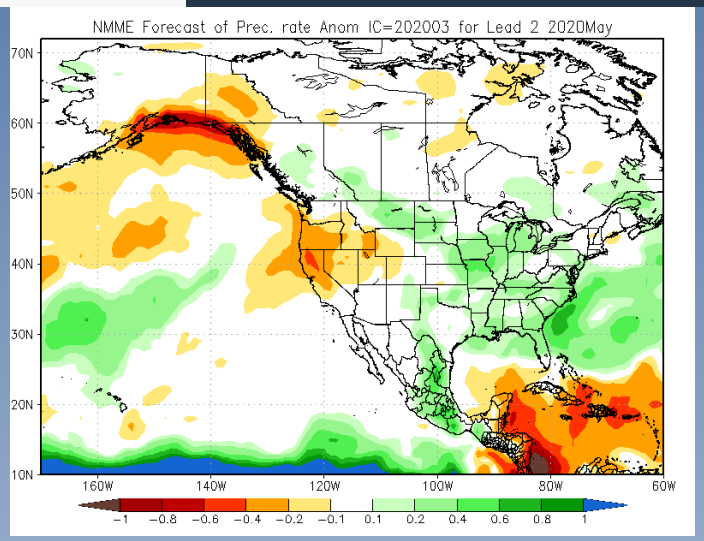
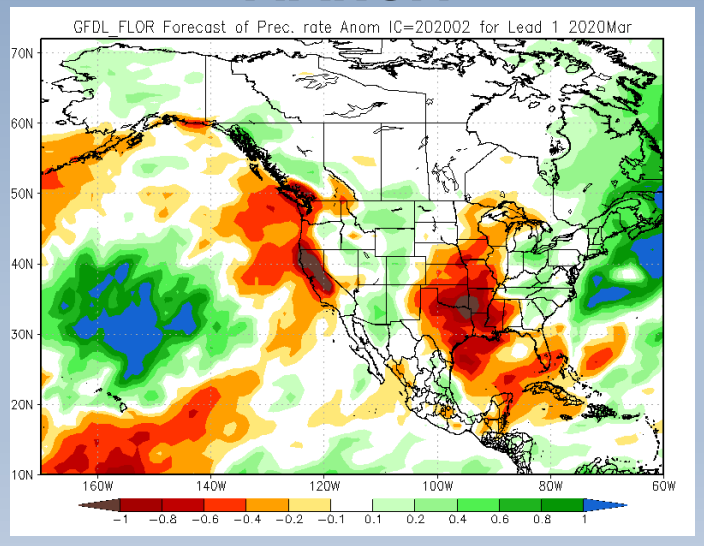
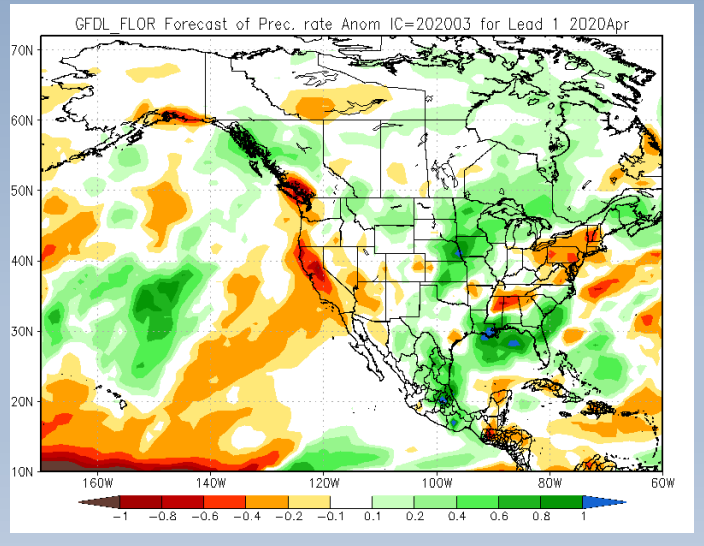






MARCH **APRIL** **MAY**





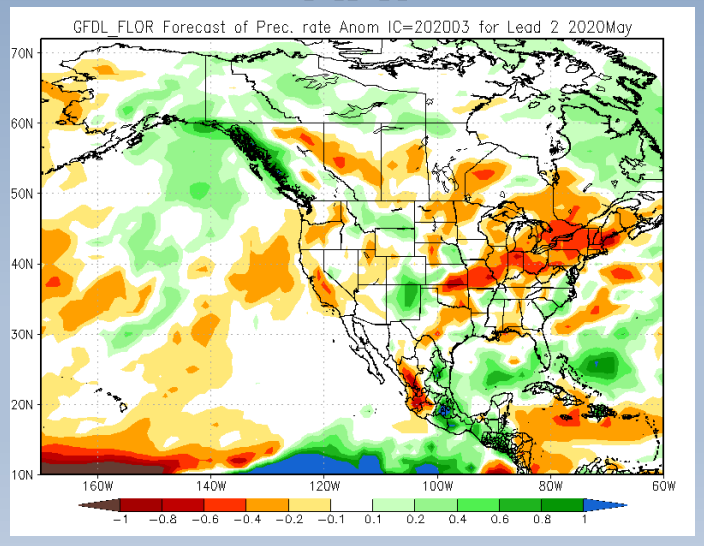


Figure 24-29. NMME and GFDL_FLOR model precipitation forecasts by month. Both the NMME and GFDL_FLOR models have trended wetter during April and especially May in New Mexico, supporting near to slightly above average precipitation amounts this spring (MAM).

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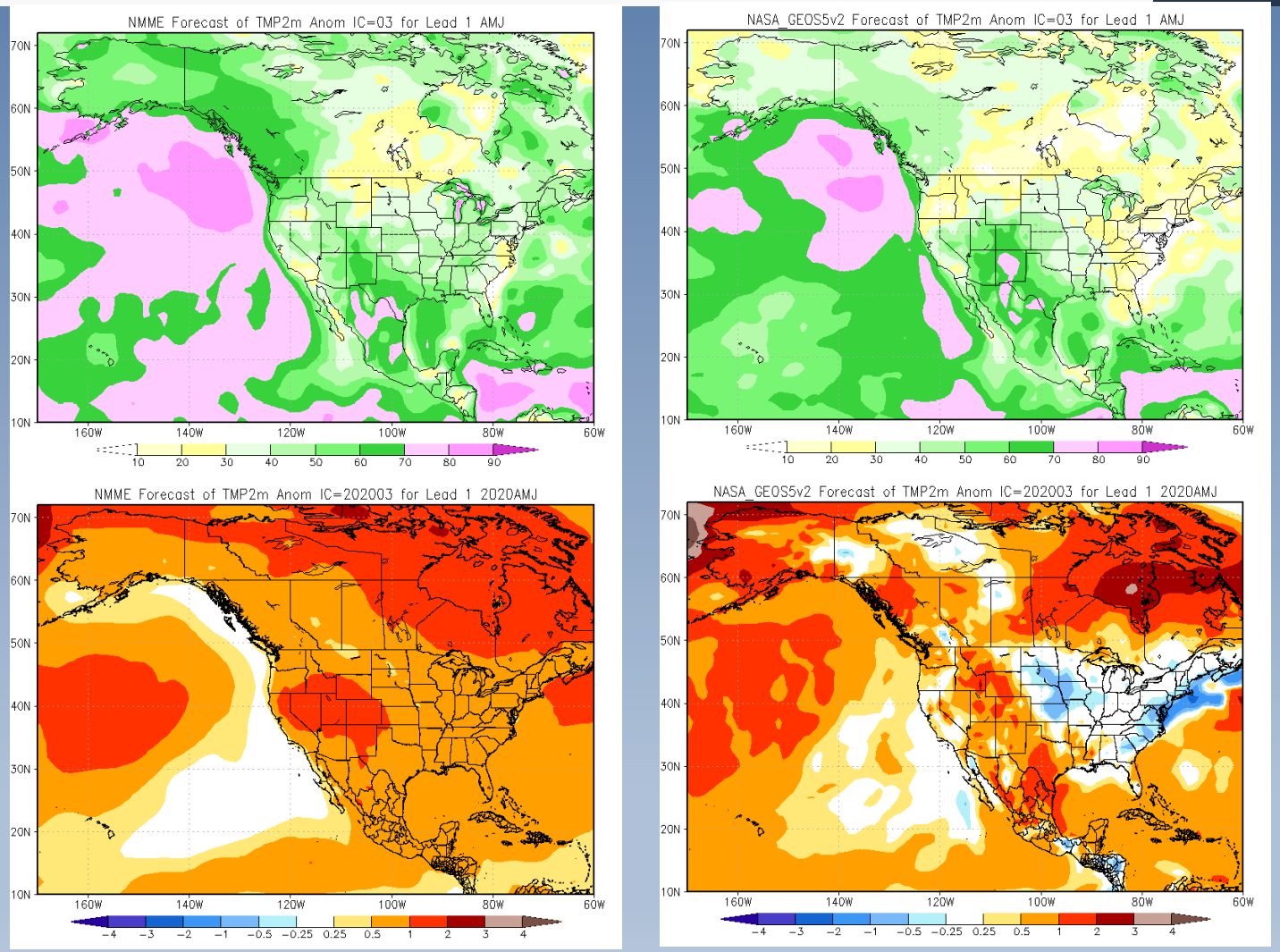

Figures 30-33. Model temperature anomaly from the two climate models which have the highest forecast skill percentages (top two images), the North American Multi-Model Ensemble (NMME) and the National Aeronautics and Space Administration (NASA GEOS5v2) models. Both models are predicting from slightly above to above average temperatures for MAM 2020 in NM.

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- Forecasts from the most highly skilled climate forecast models indicate that precipitation in central and northern New Mexico during March, April and May (MAM) 2020 will most likely range from near to slightly above1981-2010 climatological averages.
- Forecasts from the most highly skilled climate models suggest temperatures will range from slightly above to above average in MAM 2020.

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

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