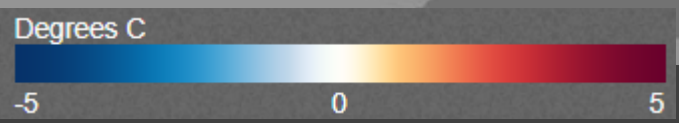
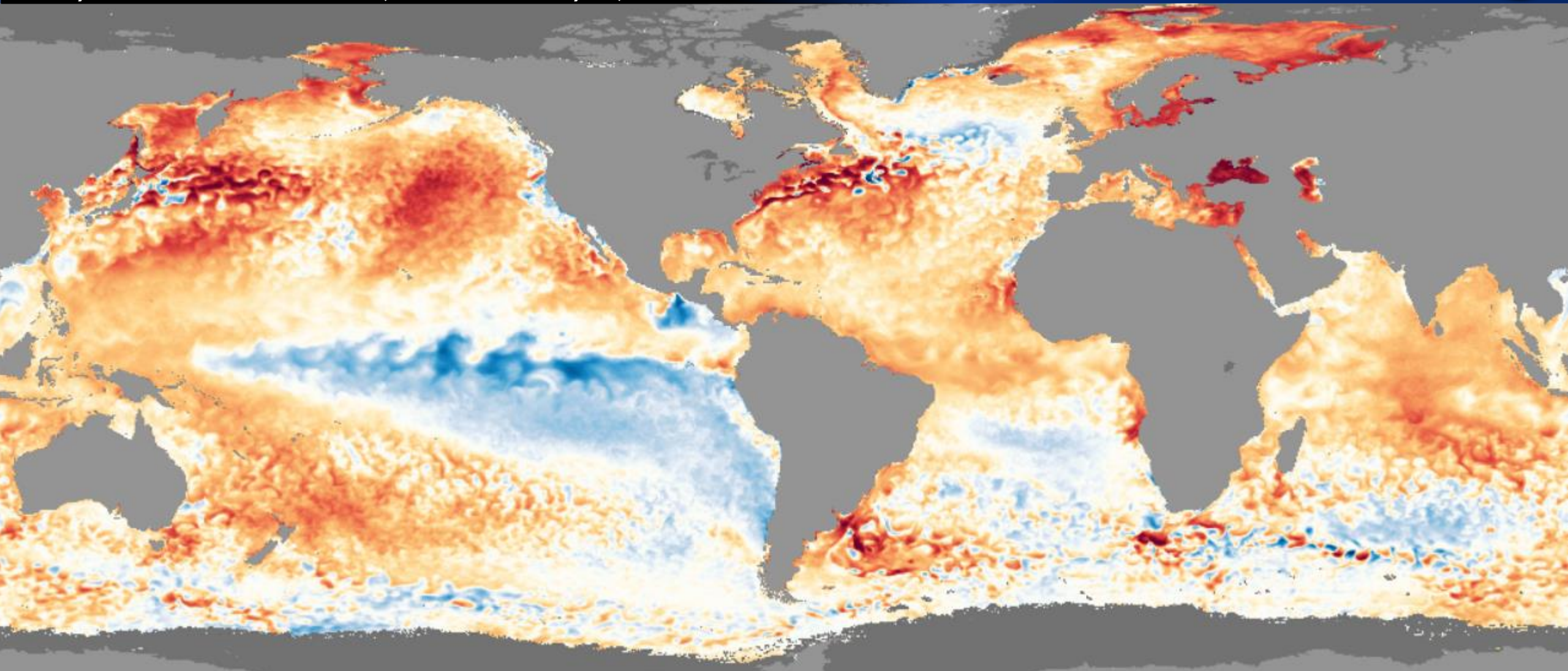


2020-2021 Winter Outlook for Southeast Michigan

90 Day Outlook Valid December 1, 2020 to February 28, 2021

Weather Forecast Office
Detroit, MI



Sea Surface Temperature Anomaly - November 9-15, 2020

Image Courtesy NOAA View



December

- Temperatures: Slightly above normal
- Snowfall: Above normal precip; near normal snowfall

January

- Temperatures: Near normal
- Snowfall: Above normal precip; near to above normal snowfall

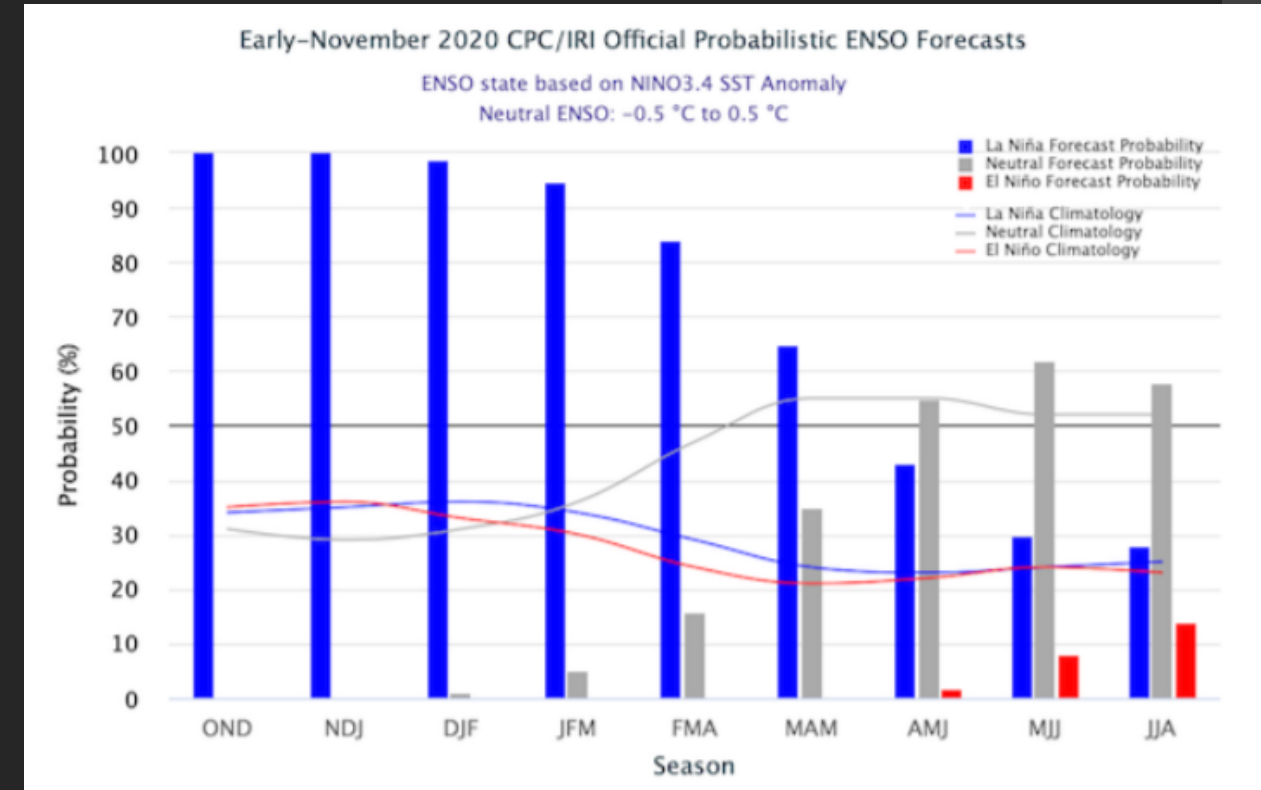
February

- Temperatures: Near normal
- Snowfall: Above normal precip; near to above normal snowfall



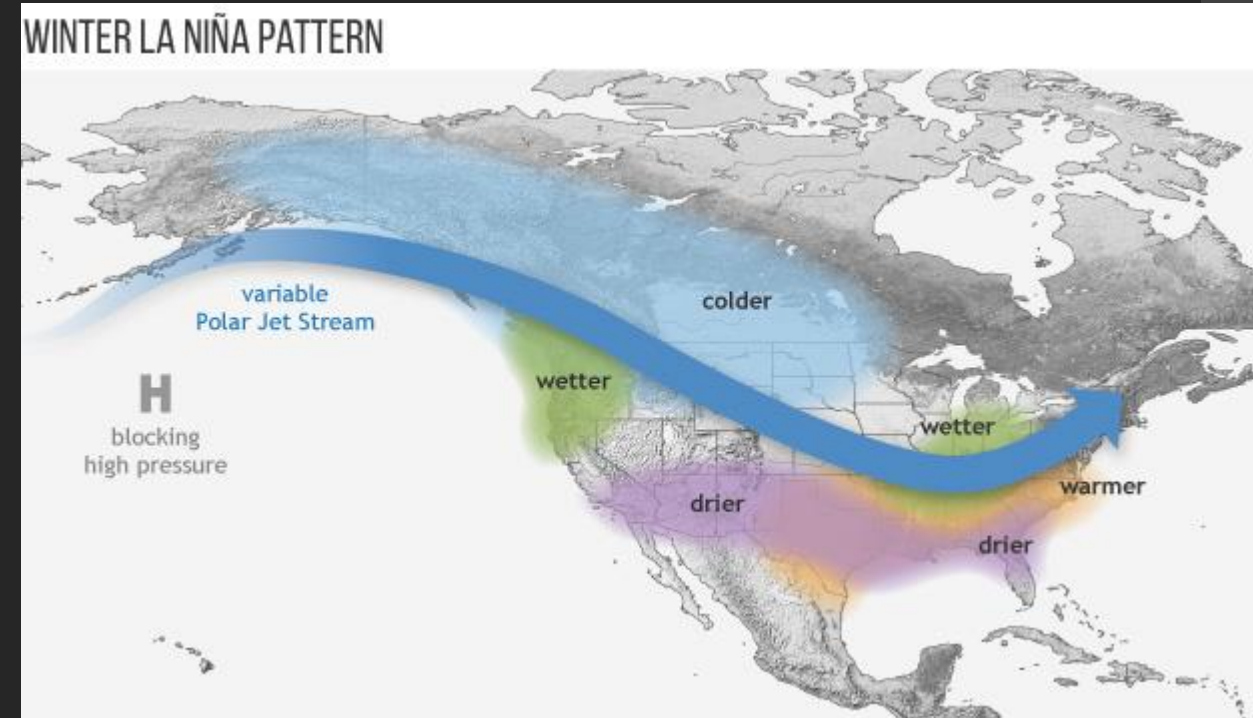
La Niña is ongoing heading into this winter with cool anomalies noted in the sea surface temperature in the central and eastern equatorial Pacific (see first page of this PDF). The typical coupled atmospheric processes have been observed as well.

The Climate Prediction Center gives high likelihood for La Niña to continue through the winter and into spring 2021. Read more about the La Niña Advisory and the latest forecast from CPC [here](#) (updated weekly).





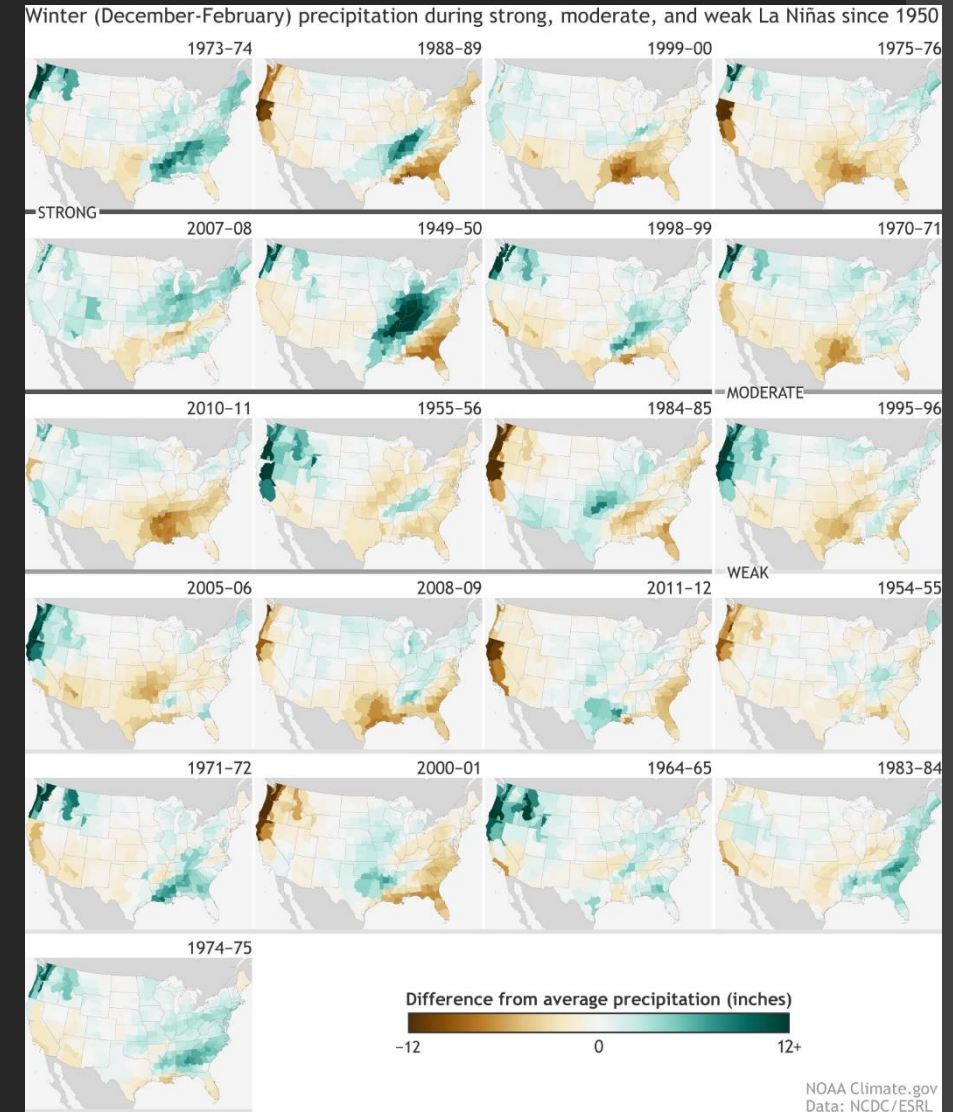
As a result, La Niña will be a key driver for the wintertime atmospheric circulation pattern, with implications on the local conditions for the Great Lakes. In the "typical" La Niña wintertime setup, blocking high pressure develops over the northern Pacific Ocean which sets up a ridge over the eastern Pacific and western United States. Downstream of this, a longwave troughing pattern is typically favored over the eastern US. This would point to a more active winter for the Great Lakes with the jet stream helping to direct numerous storm systems through the region.





Composites of historical La Niña winters (that also account for climate trends in recent decades) show that approximately 50 to 60% of them had higher than normal precipitation across SE Michigan and about 40 to 50% of them saw higher than normal snowfall. Signal is not particularly strong for either above or below normal temperatures for La Niña winters, but recent data do suggest a warming trend regardless of ENSO state.

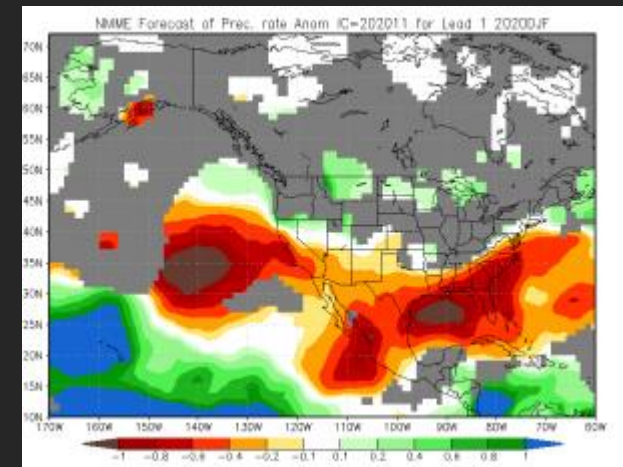
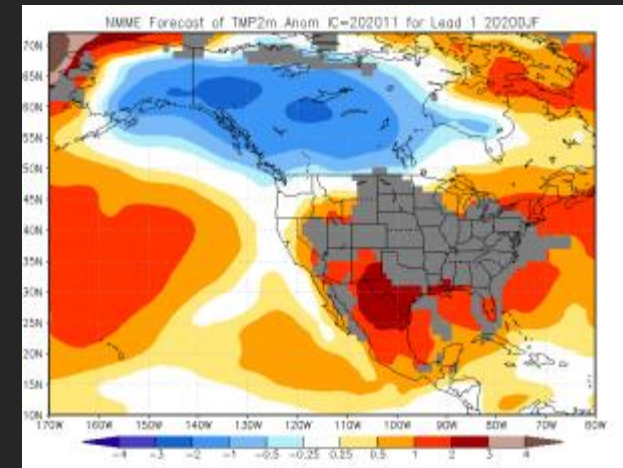
These composites show us what has occurred most often in the past, but are not enough to predict how this specific winter will unfold. Our sample of past La Niñas is relatively small and there are other climate processes that are not accounted for.





Climate models and ensembles can help resolve some of the uncertainty from using ENSO pattern recognition and composites/analogues alone. The latest North American Multi-Model Ensemble (NMME) runs do support the general trends suggested by composites of past La Niñas. That is, the signal is stronger for above normal precipitation this winter than it is for temperatures in one direction or another. However, signal exists in the NMME members that suggest a warm winter would be possible, likely due in part to the warming trend mentioned on the previous page. It should be noted however, that skill in this setup is generally limited over the Great Lakes with the models that go into the ensemble system.

NMME Ensemble Forecasts of Winter 2020-2021
Temp & Precip Anomalies w/ Skill Mask Applied





Long-range dynamic models and ensembles can provide additional hints to the early winter. Recent runs suggest ridging over the Great Lakes and a warmer start to the season. This may be a result of the downstream wavetrain effects of the MJO crossing the Indian Ocean. However, the evolution of the MJO over the next few weeks remains uncertain at this point.

After December, signal for temperatures in one direction or another is lost with oscillations like AO and NAO likely dominating the shorter timescales. Given the La Niña background, there will be chances for stretches of above normal and below normal temperatures throughout the winter as jet stream amplification varies within the active pattern.



- La Niña is expected to be a primary driver of the upper air pattern this winter.
- This setup favors an active storm track over the Great Lakes, with above normal precipitation likely for Southeast Michigan. Snowfall will likely be near or above normal.
- Dynamic models and trends suggest a better chance for above-normal temps in December.
- The nature of the pattern will allow for shorter-term oscillations like AO and NAO to then dominate periodically which increases the chance for temporary warm and cold spells throughout winter. This does not bring high confidence to above- or below-normal temperatures for the season as a whole. Thus, the outlook will call for near-normal temperatures for Jan and Feb.

CPC 90 Day Outlook Valid DJF 2020-2021,
Issued Nov 19, 2020

