

## March Climate Discussion

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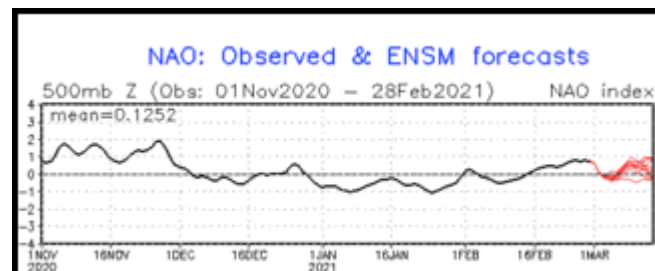
### Teleconnection Pattern Forecasts

**North Atlantic Oscillation (NAO)** – The GFS ensemble forecast (Figure 1) suggests that the NAO will mainly remain in a positive phase during the first half of March, with forecast uncertainty increasing with lead time. The NAO will likely transition to a neutral phase in early March before transitioning back to a positive regime.

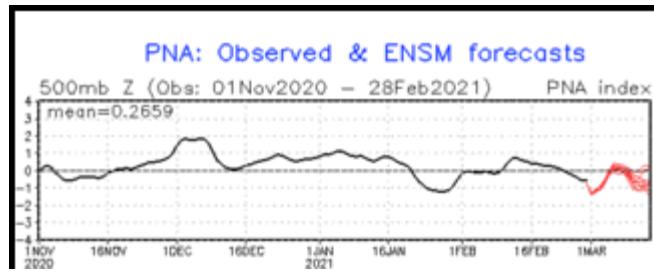
**Arctic Oscillation (AO)** – The forecast for the AO (not shown) is like the NAO forecast except that fluctuations in the index are forecast to be greater. There is a strong consensus that the AO will transition briefly into a weak negative phase in early March.

**Pacific North American Pattern (PNA)** – The GFS ensemble forecast suggests that the PNA will be in a negative phase during the inception of March before briefly switching to a positive regime. According to the GFS ensemble forecast, the PNA pattern could return to a negative phase after a short-lived positive PNA regime.

**East Pacific/North Pacific (EP/NP)** – There are currently no ensemble forecasts of the EP/NP pattern so I infer its phase and evolution from ensemble mean forecasts of 500-hPa geopotential height anomalies. The 8-day ensemble mean of forecast 500-hPa geopotential height anomalies (not shown) indicate below average heights across the Alaska and above average heights over the Midwest United States. This setup is consistent with a negative phase of the EP/NP pattern. The same anomalous height pattern is seen for the 11-day 500-hPa geopotential height anomaly forecast, with very intense negative anomalies located over Alaska and weaker – but still appreciable – positive height anomalies over the Midwest United States. It appears that the prevailing pattern for the first half of March will be an amplitude wave pattern consistent with a negative EP/NP phase. This forecast pattern is remarkably like the pattern that established itself in the record warm month of March 2012.



**Figure 1.** GFS ensemble forecasts of the NAO. Obtained from <https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml>.

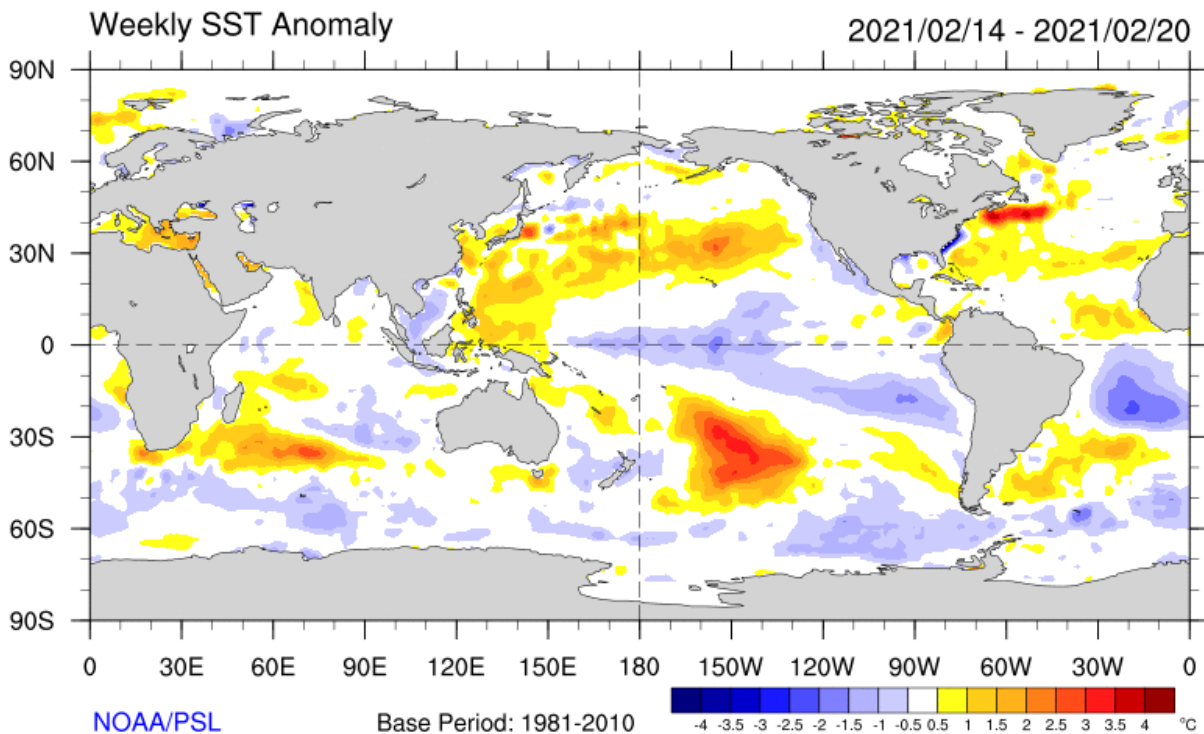


**Figure 2.** GFS ensemble forecasts of the PNA. Obtained from <https://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/pna.shtml>.

### Current and forecast sea surface temperature anomalies

The latest weekly SST anomaly map (Figure 3) shows negative SST anomalies spanning the central equatorial Pacific that are remnants of the past winter's La Nina. While SST anomalies during the winter were negative across the eastern equatorial Pacific, the anomalies are now close to zero, implying that the La Nina has weakened. Negative SST anomalies are also seen along the Gulf Coast of the United States and along the East Coast United States, reflecting the passage of Artic air masses in February. Positive SST anomalies are also seen across the central North Pacific, which is pretty common during La Nina years because North Pacific SSTs intergrate ENSO forcing.

Although SST anomalies across the eastern equatorial Pacific have weakened, CFSv2 forecasts suggest that the negative SST anomalies could re-intensify, resulting in another La Nina next year. Uncertainty in whether the La Nina will reemerge has implications for severe weather forecasts across the United States this coming spring.



**Figure 3.** SST anomalies for the past week. Obtained from <https://psl.noaa.gov/map/clim/sst.shtml>.

### **Implications for United States weather and weather-related phenomena**

**Temperature** – The propensity for a positive NAO is coming weeks means that above normal temperatures are more likely to occur across the southern United States, especially across the Southeast United States. Similarly, the tendency for the negative PNA phase will manifest as a preference for positive temperature anomalies across the Southeast United States and negative anomalies across the Pacific Northwest and even the Northern plains. However, these patterns will have to compete with the forecast negative EP/NP pattern, which will strongly favor warmer-than-normal conditions across the eastern two-thirds of the United States, especially across the Midwest United States. The warmer-than-normal conditions across the Midwest could trigger a false spring if the abnormal warmth persists long enough. If a late frost occurs in April, there could be vegetation losses like in March 2012. The forecast wave pattern looks rather amplified, so I don't expect a very progressive pattern that would prevent a false spring from occurring.

**Precipitation** - The upper-level ridge over the Midwest will very weakly favor drier-than-normal conditions across that region. The tendency for a negative PNA will also weakly favor dryness across the immediate East Coast. However, I should note that the transitions from positive PNA to negative PNA and from positive NAO to neutral NAO, as forecast by the GFS ensemble, could trigger storms. So, based on the PNA and NAO alone, it is hard to say if abnormal dryness or wetness will be favored across the United States. The current SST anomaly pattern across the equatorial Pacific does not favor an unusually active East Coast storm track, though it is worth mentioning that La Nina signatures in precipitation fields are more readily overwhelmed by noise than El Nino signatures. Nevertheless, I would say that drier-than-normal conditions will be weakly preferred along East Coast United States and moreso strongly favored across Texas and across the Gulf Coast states this March.

**Severe weather** –The current SST anomaly pattern could favor increased tornado activity across the Ohio valley, Wisconsin, Kentucky, or Texas later this Spring. Current SST anomalies forecasts suggest a re-intensification of the La Nina and such a re-intensification would focus more severe weather activity across the Ohio Valley, Wisconsin, and Kentucky. The near-normal and below normal Gulf of Mexico SSTs may reduce the risk of severe weather in the short term, but the Gulf of Mexico is shallow so that we cannot expect the present conditions to last throughout the spring. In fact, the forecast above-normal temperatures could lead to above-normal Gulf of Mexico SSTs in April and May when severe weather is more frequent than in March.

**Wildfires** – Currently, soil moisture is quite high across the Southeast United States, which will help lower the risk of wildfires in the short term. However, the abnormal wetness could lead to more vegetation growth that could prove problematic later in the spring. If the east coast storm track is not active and warmer-than-normal conditions persist, places across the Southeast US could see enhanced wild fire risk later in the spring, which would be consistent with how the Southeast US wild fire season tends to be more activity after La Nina events.