

# Arctic Oscillation and Polar Vortex Analysis and Forecasts

February 28, 2022

Dr. Judah Cohen from Atmospheric and Environmental Research (AER) embarked on an experimental process of regular research, review, and analysis of the Arctic Oscillation (AO) and Polar Vortex (PV). This analysis is intended to provide researchers and practitioners real-time insights on one of North America's and Europe's leading drivers for extreme and persistent temperature patterns.

During the winter schedule the blog is updated once every week. Snow accumulation forecasts replace precipitation forecasts. Also, there is renewed emphasis on ice and snow boundary conditions and their influence on hemispheric weather. With the start of spring we transition to a spring/summer schedule, which is once every two weeks. Snow accumulation forecasts will be replaced by precipitation forecasts. Also, there will be less emphasis on ice and snow boundary conditions and their influence on hemispheric weather.

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*The AO/PV blog is partially supported by NSF grant AGS: 1657748.*

## *Summary*

- The Arctic Oscillation (AO) is currently positive and is predicted to remain neutral to positive through mid-March with mixed to mostly negative pressure/geopotential height anomalies across the Arctic especially the North Atlantic side of the Arctic and mixed pressure/geopotential height anomalies across the mid-latitudes. The North Atlantic Oscillation (NAO) is also positive and is predicted to remain neutral to positive as pressure/geopotential height anomalies are predicted to remain mixed to negative across Greenland the next two weeks.
- The next two weeks, troughing/negative geopotential height anomalies across Greenland will favor ridging/positive geopotential height anomalies centered over the North Sea/Scandinavia forcing downstream troughing/negative geopotential height anomalies over Southeastern Europe. This pattern favors normal to above normal temperatures across much of Europe including the United Kingdom (UK) with normal to below normal temperatures across the Southeastern Europe and Turkey.
- The dominant pattern across Asia the next two weeks is likely related to the predicted polar vortex (PV) disruption with the main PV center settling over

Western Siberia. In the troposphere this will result in deepening troughing/negative geopotential height anomalies centered in Western Siberia and extending southwestwards across Western Asia with strengthening ridging/positive geopotential height anomalies across East Asia. This favors normal to below normal temperatures first in Western Siberia and then spreading southwards across Western Asia with normal to below normal temperatures across East Asia.

- The general pattern across North America the next two weeks is ridging/positive geopotential height anomalies in the Gulf of Alaska and Alaska anchoring troughing/negative geopotential height anomalies across Eastern Canada that extend later this week into the Northeastern United States (US) and then next week southwestward into the Western US with more ridging/positive geopotential height anomalies in the Eastern US. This pattern mostly favors normal to above normal temperatures in Alaska, Western Canada and the Western US with normal to below normal temperatures across Central and Eastern Canada and the Northeastern US this week. Then next week normal to below normal temperatures will transition into the Western US while ridging returns with normal to above normal temperatures to the Eastern US.
- In the *Impacts* section I continue to discuss my expectations of more polar vortex (PV) disruptions. Looking like another stretched PV this week but larger than previous events (at least in the stratosphere) possibly followed by yet another and the related weather of the Northern Hemisphere (NH) through mid-March.
- As a heads up, I have two big deadlines early next week that could result in a delay of the publication of the blog.

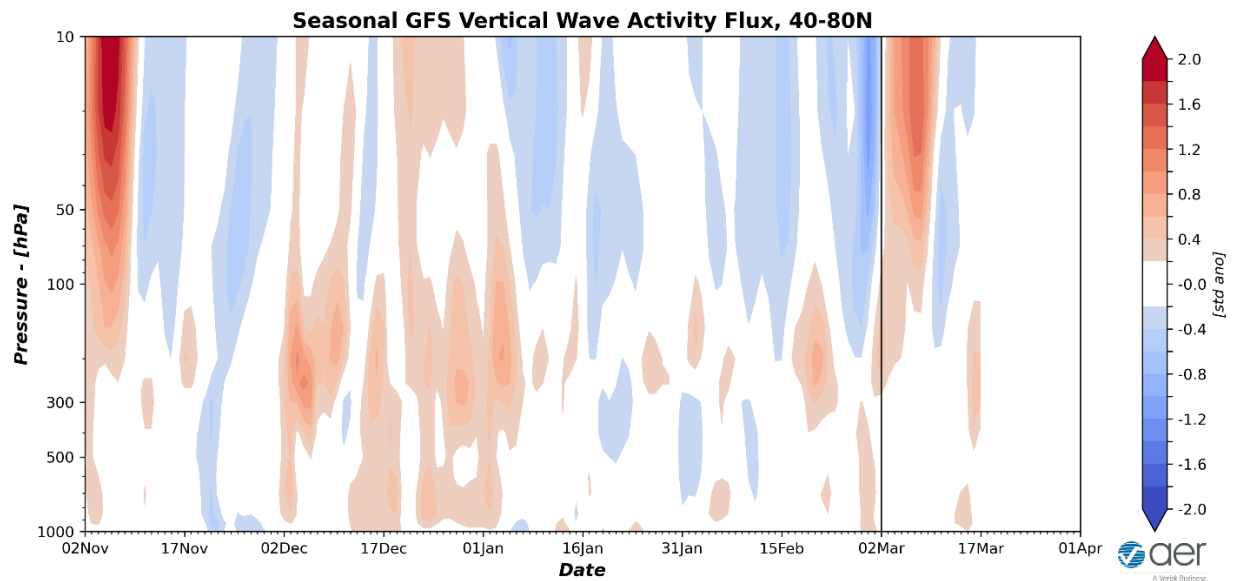
### *Plain Language Summary*

Hard to make it simpler than what you see is what you get. I think in the US we will continue to see more brief periods of stretching or elongation of the polar vortex in the first half of March that delivers cold into the Eastern US and parts of Asia punctuated by a more circular polar vortex when cold air retreats into the Western US and it turns milder in the Eastern US. High pressure will deliver mild weather to much of Europe except for low pressure bringing stormier, colder weather to Southeastern Europe, Turkey and eventually the Eastern Mediterranean.

### *Impacts*

I think the repeating loop of the first two months of 2022 will continue into March but with a twist. The Scandinavian ridging/high pressure that developed over the weekend is favorable for triggering or initiating the strongest pulse of vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere of the winter so far, predicted for this week (see **Figure i**). This in turn is predicted to result in the largest stratospheric PV disruption of the winter and for the

first time all winter, warm/positive polar cap geopotential height anomalies (PCHs) are predicted in the stratosphere (see **Figure 11**).

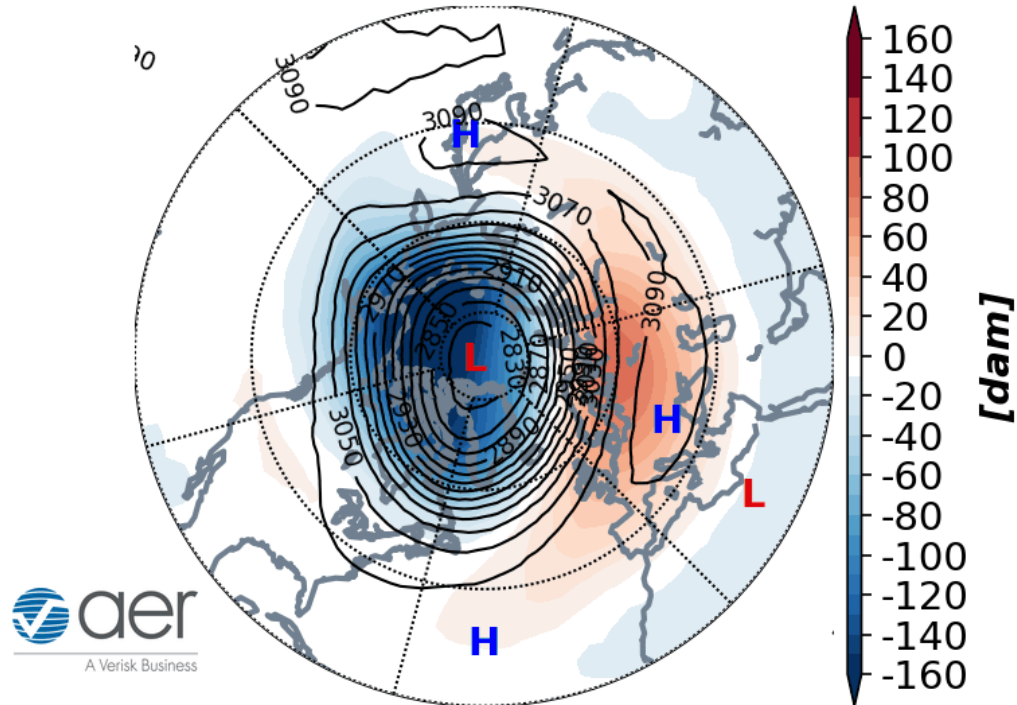


**Figure i.** Observed (since 1 November 2022) and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 28 February 2022 GFS ensemble.

As seen from the latest PV animation in **Figure ii**, there is very distinct PV split predicted this week with the major PV center forming over Western Siberia and a minor PV center forming over Labrador. Though it might appear like a large PV disruption since the PV splits into two daughter vortices, it seems to me to have less in common with the large PV disruptions referred to as sudden stratospheric warmings (SSWs where a reversal of the zonal winds at 60°N and 10hPa are observed but is not predicted for this week) and more in common with the more minor PV disruptions that have occurred repeatedly this winter – PV stretching or reflective events. I have described the larger PV disruption events as taking on a dumbbell configuration and you can see this in the forecast for 3 – 5 March 2022 for the PV but then the smaller dumbbell over Eastern Canada breaks off, i.e., a PV split. This is something that needs further research, but it seems to me the same tropospheric wave configuration wave-2 with a western ridge/eastern trough over both Eurasia and North America being conducive to both a PV split and PV stretching. This is something that is discussed in our archived manuscript on the winter of 2013/14 (see [Cohen et al. 2022](#) and the [supplementary information](#)). Our energy wave diagnostics for hemispheric WAF this week shows wave energy going up over Asia from the troposphere into the stratosphere and then bouncing or reflecting off the PV back down into the troposphere over North America. This is the classic signature in the energy propagation for PV stretching events and not SSWs. And if you are keeping score at home this would make the PV disruption at the end of this week the sixth

stretched PV since the New Year, according to my own admittedly subjective calculations.

## Initialized 00Z 10 hPa HGT/HGTa 28-Feb-2022

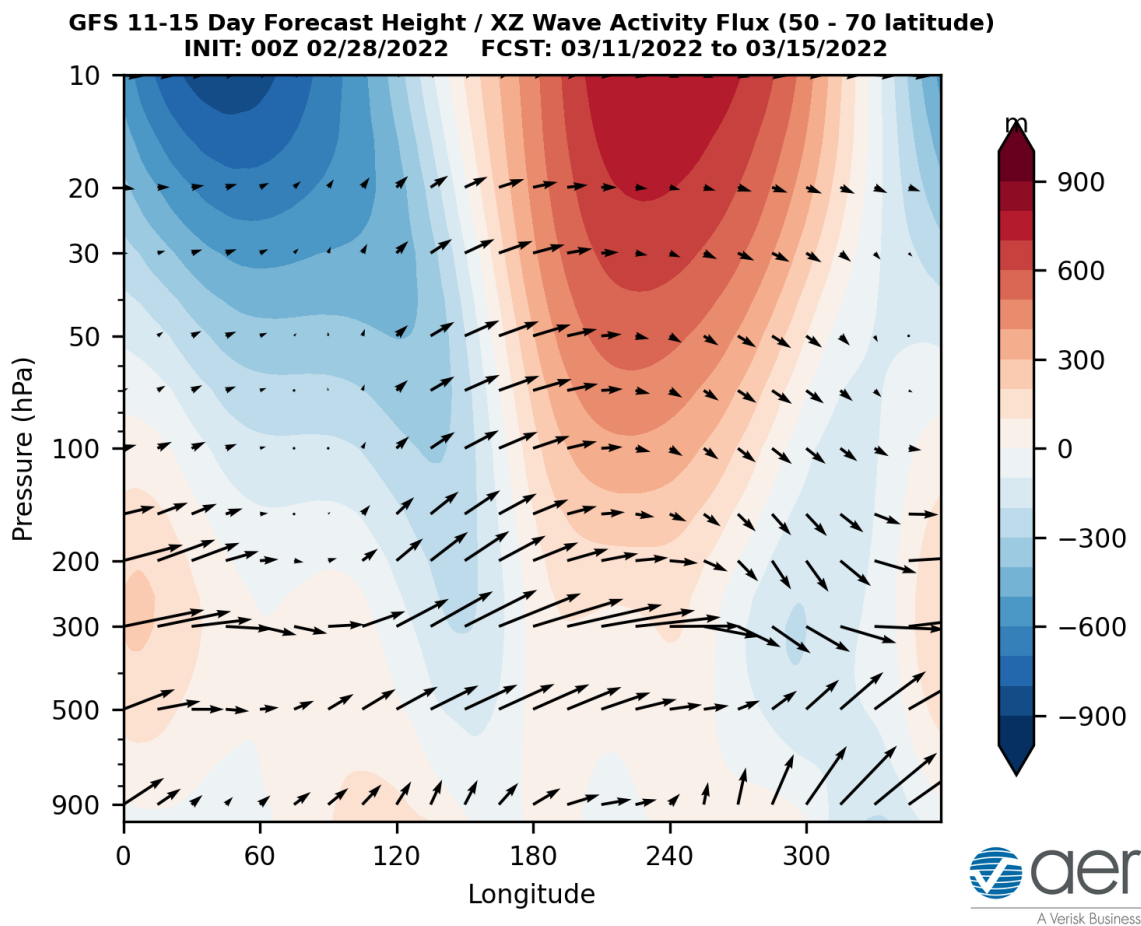


[Click for Animation](#)

**Figure ii.** Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies ( $^{\circ}\text{C}$ ; shading) across the Northern Hemisphere for 28 February 2022 and forecasted from 1 – 16 March 2022. The forecasts are from the 00Z 28 February 2022 GFS operational model.

The predicted temperature pattern for the end of the week is consistent with PV stretching events with cold temperatures associated with the event in both Asia and eastern North America and co-located with each daughter vortex with one center of the cold in Western Siberia and the other center of cold in Eastern Canada. The induced northerly flow behind the minor daughter vortex in Eastern Canada will drive some of the cold air mass south into the Northeastern US towards the end of the week and over the weekend. And as I tweeted yesterday it seems to be always cold on the weekends in the Northeastern US this year!

Next week, the WAFz is predicted to go quiet once again allowing the stratospheric PV to strengthen, become more circular and return to a position near the North Pole. All winter when the PV returns to a more circular shape or configuration, the cold weather across North America retreats back into western North America while the Eastern US turns mild even record mild, which is the forecast for next week. I might sound like an auctioneer but now that we have six stretched PVs this year, can we have a seventh? Our energy diagnostics say yes with more wave energy reflection predicted for the end of the second week of March (see **Figure iii**). This is not manifesting itself in the PV forecasts presented here (**Figure ii** and **Figure 13**) but I do believe that there is a good possibility that we will see in subsequent mode forecasts a stretched PV configuration heading into mid-March. If this assumption is correct, then I would also expect once again for the cold air in Canada and the Western US to move into the Eastern US mid-month in association with yet another stretched PV.

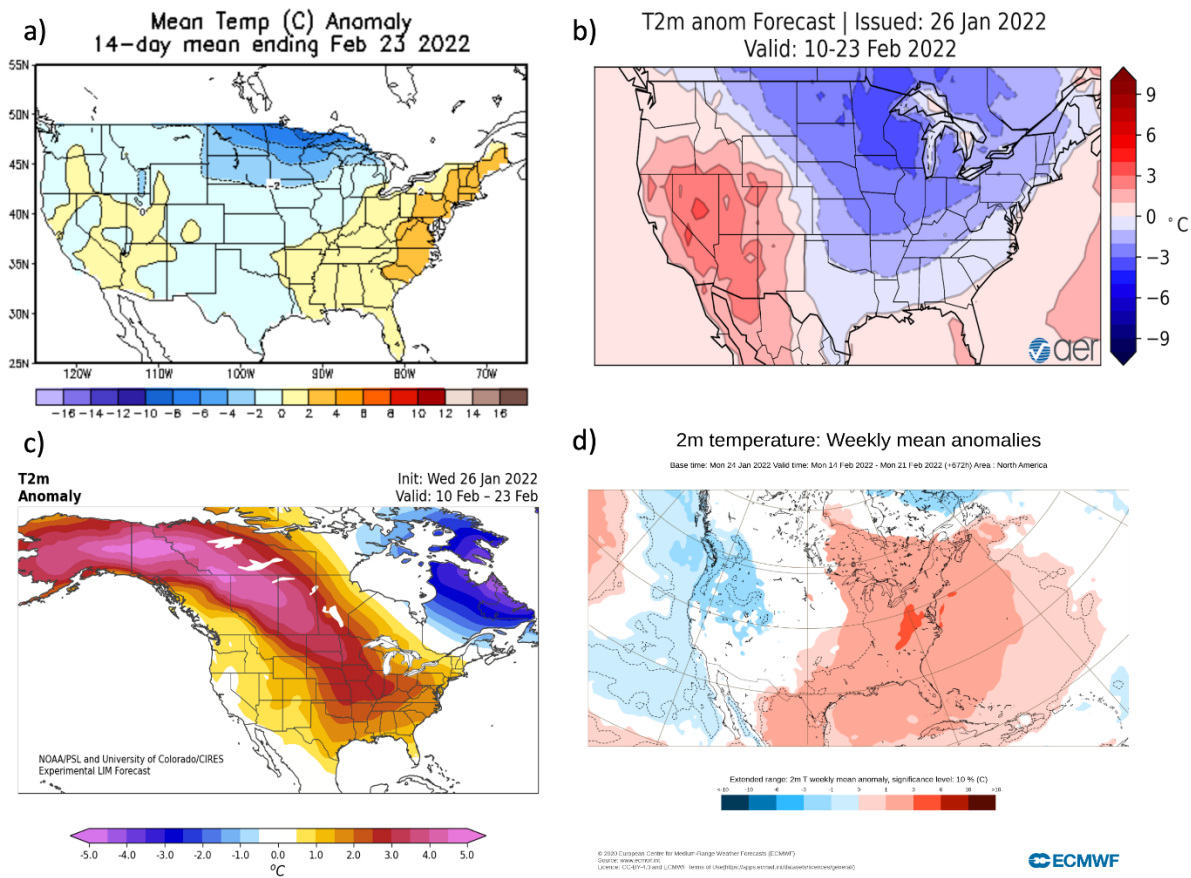


**Figure iii.** Longitude-height cross section of geopotential eddy height anomalies and wave activity flux vectors and wave activity flux vectors in the longitudinal and height directions from the surface through 10-hPa for 11 – 15 March 2022. The forecast is from the 00Z 28 February 2022 operational GFS.

Stretched PVs are not conducive to Greenland blocking as are SSWs, so once again not seeing much evidence of widespread cold across Europe in the foreseeable future. Instead, there is currently Scandinavian blocking in the mid-troposphere underneath which it is relatively warm, but it is forcing troughing/low pressure downstream across Southeastern Europe and Turkey, one of two regions in Europe that has experienced genuine winter weather this winter, the other being Scandinavia. It's speculative on my part so I don't want to get into details, but I could argue that the Scandinavian blocking is related to warming and ridging that occurred in the stratosphere last week over the same region.

Overall looks warm for Asia as well except under the major PV center over Western Siberia with a trailing trough over Western Asia. Eventually the cold in Western Siberia is predicted to spread east over the remainder of Siberia.

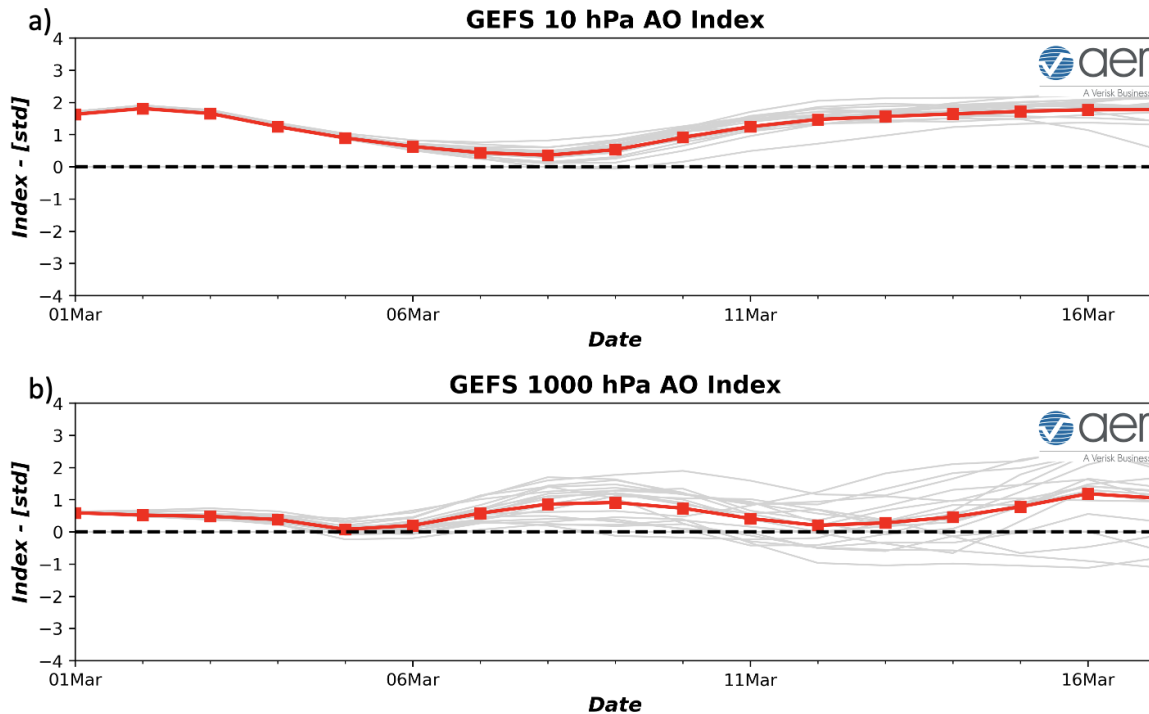
I want to end this week with verification of the machine learning model (ML) forecast generated using data from 25 January 2022 and posted in the blog from [31 January 2022](#). In **Figure iv** I present verification and some comparisons with other forecast models. The top left panel shows the observed temperature anomalies for the US, the top right shows the ML model forecast, the bottom left shows the LIM model forecast (which is derived from tropical convection) and all three plots are for the period 10 – 23 February 2022. The bottom right shows a weekly forecast for 14 – 21 February from the EPS. It is hard to make a direct comparison with the EPS forecast so I just provide the one week overlapping EPS forecast to provide some context but is not an apple-to-apple comparison. A forecast with a time horizon beyond two weeks is very challenging and overall, I think the ML model did a very good job correctly predicting the core of the cold down the center of the US especially the Upper Midwest, correctly predicting warm in the Southwestern US but was too cold for the US East Coast. And I would argue that it compares favorably with the competition. The LIM forecast speaks for itself. The EPS did better along the East Coast, but I would argue the EPS missed the overall temperature pattern.



**Figure iv.** (a) Observations for 10 – 23 February 2022 from [https://www.cpc.ncep.noaa.gov/products/tanal/temp\\_analyses.php](https://www.cpc.ncep.noaa.gov/products/tanal/temp_analyses.php). (b) AER machine learning model predicted surface temperature anomalies (°C; shading) for the US averaged 10 – 23 February 2022. (c) Forecast from the LIM model for 10 – 23 February 2022 [https://psl.noaa.gov/forecasts/lim\\_s2s/](https://psl.noaa.gov/forecasts/lim_s2s/) (d) EPS forecast shown for 14 – 21 February 2022 <https://apps.ecmwf.int/webapps/opencharts/>.

### 1-5 day

The AO is predicted to be positive this week (**Figure 1**) as geopotential height anomalies are predicted to be negative across the Arctic especially the North Atlantic side of the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 2**). And with negative geopotential height anomalies predicted across Greenland (**Figure 2**), the NAO is also predicted to be positive this week (**Figure 1**).

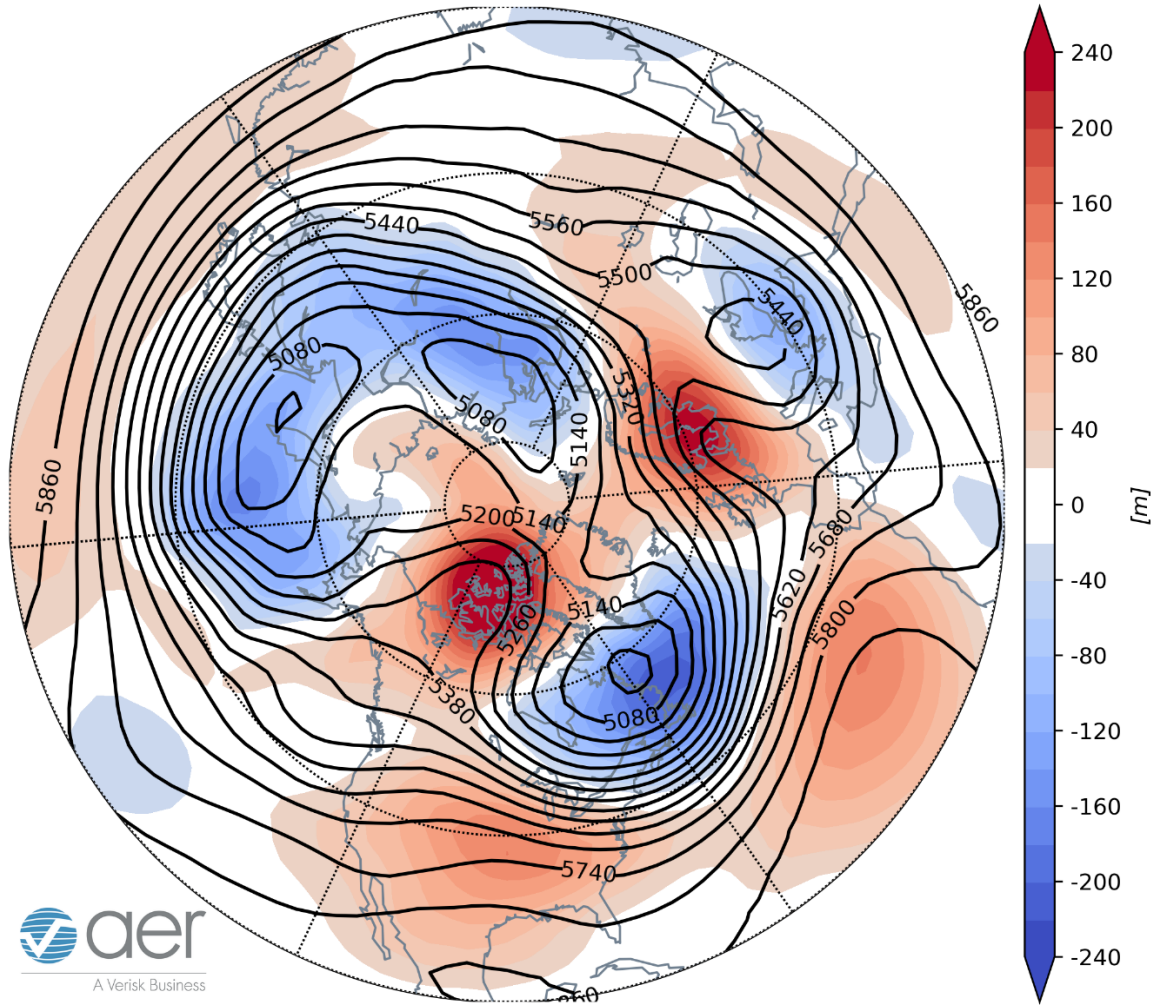


**Figure 1. (a)** The predicted daily-mean AO at 1000 hPa from the 00Z 28 February 2022 GFS ensemble. **(b)**The predicted daily-mean near-surface AO from the 00Z 28 February 2022 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.

Persistent troughing/negative geopotential height anomalies across Greenland will support ridging/positive geopotential height anomalies across Northern Europe forcing downstream troughing/negative geopotential height anomalies across Southeastern Europe (**Figures 2**). This will result in normal to above normal temperatures across much of Europe including the UK with normal to below normal temperatures limited to Southeastern Europe and Turkey due to low heights and/or northerly flow (**Figure 3**). The displacement of the main center of the stratospheric PV over Western Siberia will help to deepen troughing/negative geopotential height anomalies across Siberia with ridging/positive geopotential height anomalies widespread across Southern Asia this period (**Figure 2**). This mostly zonal flow pattern favors widespread normal to above normal temperatures across much of Asia with normal to below normal temperatures limited to Northern Siberia (**Figure 3**).



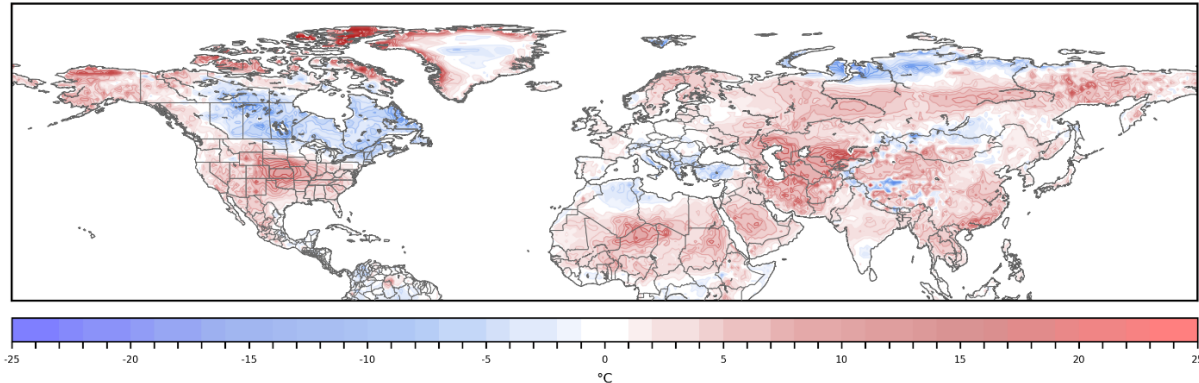
**GEFS 1-5 Day Forecast 500 mb GPH/GPH Anomaly**  
**INIT: 00Z 02/28/2022 FCST: 03/01/2022 to 03/05/2022**



**Figure 2.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 1 – 5 March 2022. The forecasts are from the 00z 28 February 2022 GFS ensemble.

Across North America again the tropospheric circulation pattern is also related to what is occurring with the stratospheric PV with ridging/positive geopotential height anomalies centered in the Gulf of Alaska, Alaska, Western Canada and the Western US in the stratosphere with a minor center of the PV over Eastern Canada coupled with troughing/negative geopotential height anomalies across Eastern Canada and the Northeastern US. These stratospheric features are mirrored in the troposphere this period (**Figure 2**). This will favor normal to above normal temperatures across Alaska, Western Canada and the Western and Southern US with normal to below normal temperatures in Eastern Canada and the Northeastern US (**Figure 3**).

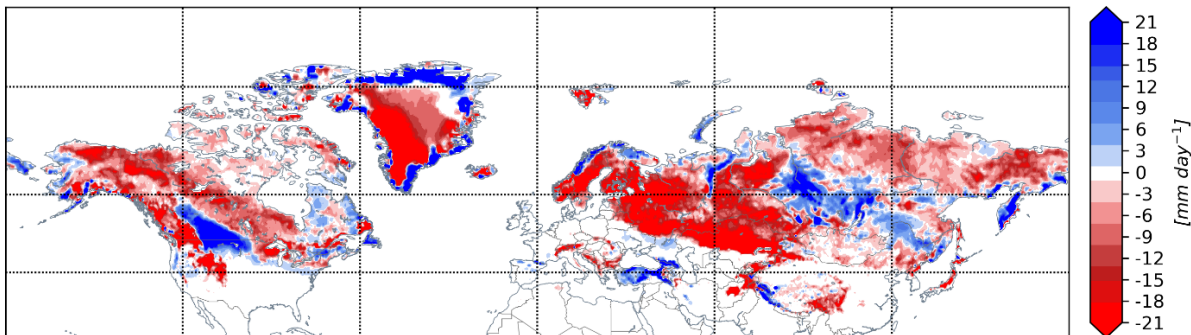
**GFS 1-5 Day Forecast T2m Anomaly**  
**INIT: 00Z 02/28/2022 FCST: 03/01/2022 to 03/05/2022**



**Figure 3.** Forecasted surface temperature anomalies (°C; shading) from 1 – 5 March 2022. The forecast is from the 00Z 28 February 2022 GFS ensemble.

As we enter March snowmelt is predicted to be widespread across Eurasia and North America with new snowfall limited to Turkey, Central Asia and the Canadian Plains (**Figure 4**).

**GEFS 1-5 Day Forecast SNOD Change**  
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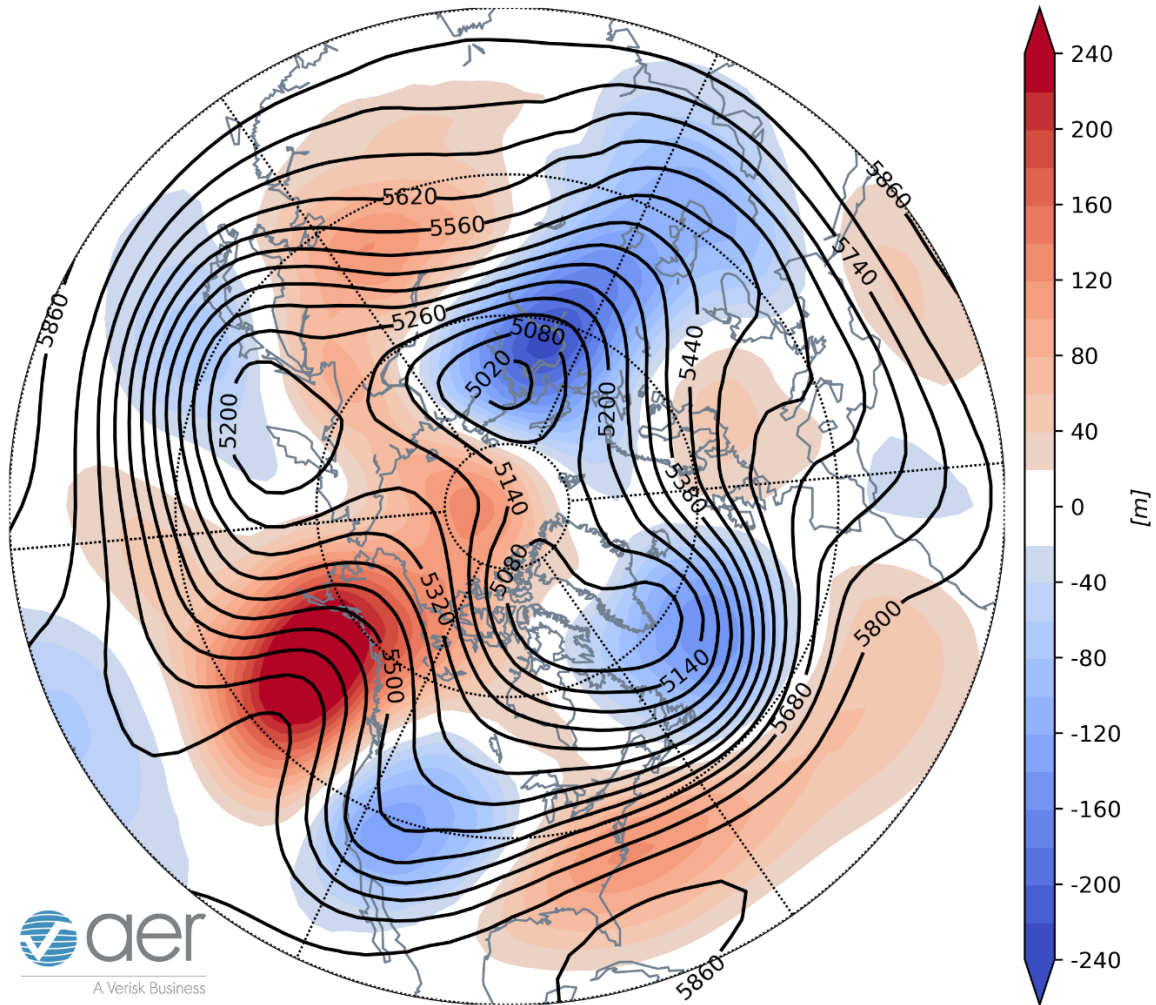
**Figure 4.** Forecasted snow depth changes (mm/day; shading) from 1 – 5 March 2022. The forecast is from the 00Z 28 February 2022 GFS ensemble.

*Mid-Term*

*6-10 day*

The AO is predicted to remain neutral to positive this period (**Figure 1**) with mostly negative geopotential height anomalies spread across the Arctic especially the North Atlantic and Asian sides of the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 5**). And with negative geopotential height anomalies across Greenland (**Figure 5**), the NAO is predicted to remain positive this period.

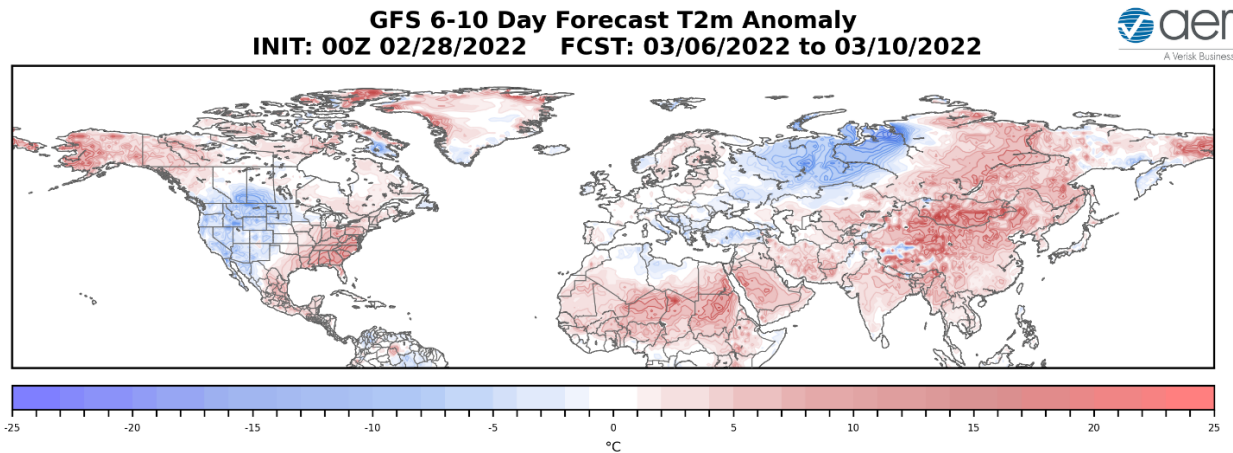
**GEFS 6-10 Day Forecast 500 mb GPH/GPH Anomaly**  
**INIT: 00Z 02/28/2022 FCST: 03/06/2022 to 03/10/2022**



**Figure 5.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 6 – 10 March 2022. The forecasts are from the 00z 28 February 2022 GFS ensemble.

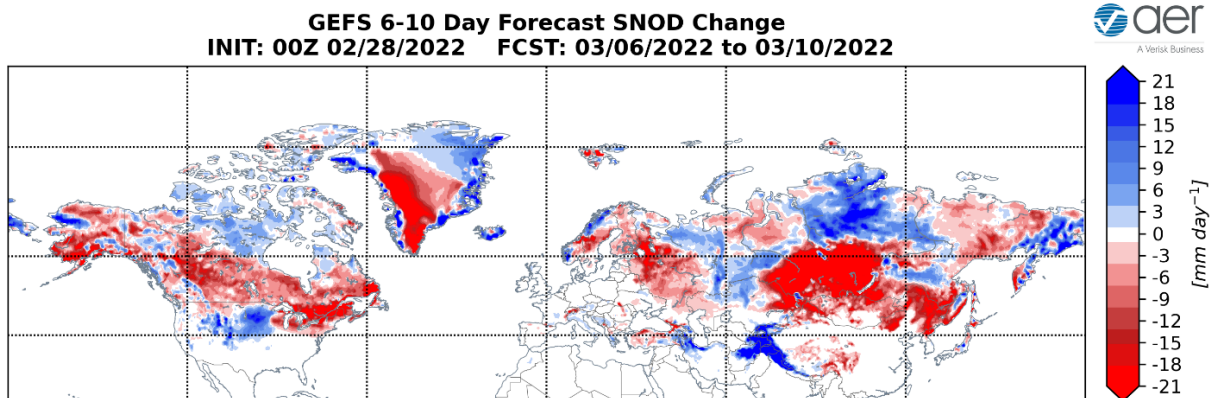
Persistent troughing/negative geopotential height anomalies across Greenland will support ridging/positive geopotential height anomalies centered over the North Sea forcing downstream troughing/negative geopotential height anomalies across Southeastern Europe (**Figures 5**). This will result in normal to above normal temperatures across much of Europe including the UK with normal to below normal temperatures limited to Southeastern Europe and Turkey due to low heights and/or northerly flow (**Figure 6**). The continued displacement of the main center of the stratospheric PV over Western Siberia will help to deepen troughing/negative geopotential height anomalies across Western Siberia and Western Asia with ridging/positive geopotential height anomalies widespread across East Asia this period (**Figure 5**). This pattern favors widespread normal to above normal temperatures

across much of Asia with normal to below normal temperatures limited to Western Siberia and Western Asia (**Figure 6**).



**Figure 6.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 6 – 10 March 2022. The forecasts are from the 00Z 28 February 2022 GFS ensemble.

Across North America persistent ridging/positive geopotential height anomalies centered in the Gulf of Alaska, Alaska and Western Canada will support troughing/negative geopotential height anomalies across Eastern Canada that extends southwestward into Western US with more ridging/positive geopotential height anomalies in the Eastern US (**Figure 5**). This will favor normal to above normal temperatures across Alaska, Western Canada and the Eastern US with normal to below normal temperatures in Central Canada and the Western US (**Figure 6**).



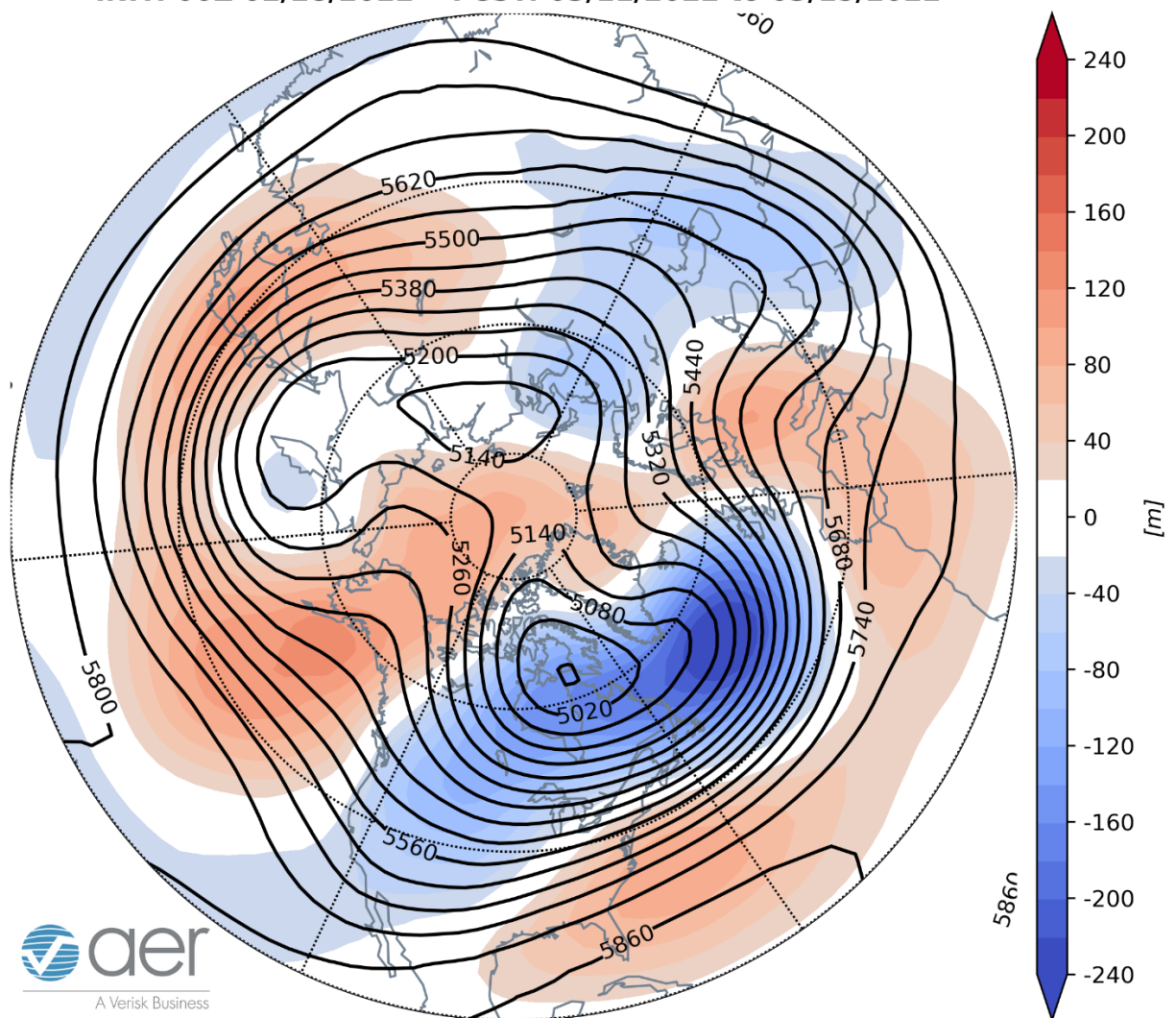
**Figure 7.** Forecasted snow depth changes (mm/day; shading) from 6 – 10 March 2022. The forecast is from the 00Z 28 February 2022 GFS ensemble.

As March unfolds snowmelt is predicted to remain widespread across Eurasia and North America with new snowfall limited to Western Siberia, Northwestern Asia, the Tibetan Plateau and the US Rockies and Upper Midwest (**Figure 7**).

11-15 day

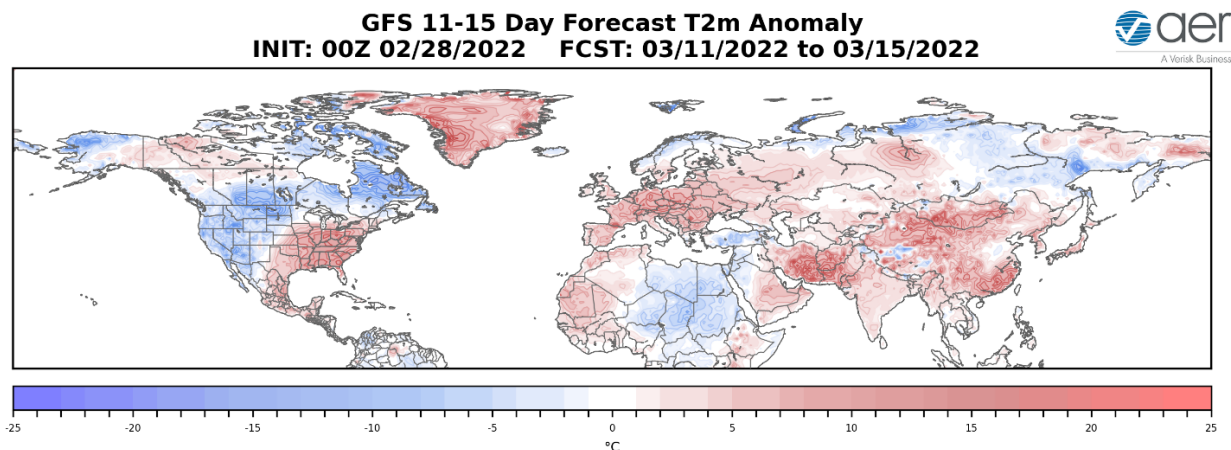
Negative geopotential height anomalies are predicted to remain widespread across the North Atlantic and Eurasian sides of the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 8**), therefore the AO should remain neutral to positive this period (**Figure 1**). With predicted mostly negative pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO is forecasted to remain neutral to positive this period.

**GEFS 11-15 Day Forecast 500 mb GPH/GPH Anomaly**  
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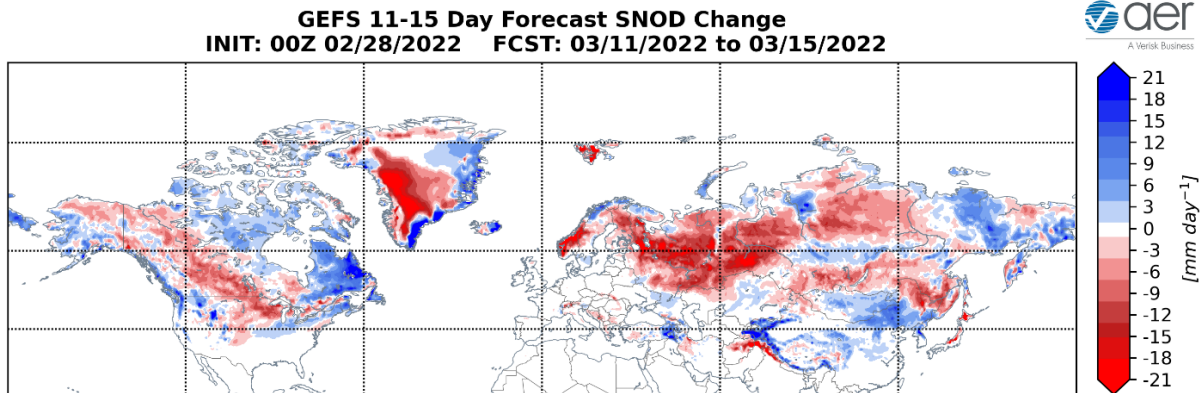
**Figure 8.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 11 – 15 March 2022. The forecasts are from the 00z 28 February 2022 GFS ensemble.

Persistent troughing/negative geopotential height anomalies across Greenland will continue to support ridging/positive geopotential height anomalies centered in the Baltic Sea and States anchoring troughing/negative geopotential height anomalies across the Eastern Mediterranean this period (**Figure 8**). This pattern favors more normal to above normal temperatures widespread across much of Europe including the UK with normal to below normal temperatures limited across Northern Scandinavia and Turkey due to low geopotential heights (**Figures 9**). The pattern of troughing/negative geopotential height anomalies across Siberia and Western Asia with ridging/positive geopotential height anomalies widespread across Eastern Asia is predicted to persist this period (**Figure 8**). This pattern favors widespread normal to above normal temperatures across much of Asia with normal to below normal temperatures limited to the north slope of Asia and Siberia due to low geopotential heights this period (**Figure 9**).



**Figure 9.** Forecasted surface temperature anomalies (°C; shading) from 11 – 15 March 2022. The forecasts are from the 00z 28 February 2022 GFS ensemble.

Ridging/positive geopotential height anomalies in the Gulf of Alaska, Alaska and Western Canada are predicted to persist and will help to anchor troughing/negative geopotential height anomalies across Eastern Canada that extends into the Western US with more ridging/positive geopotential height anomalies across the Eastern US this period (**Figure 8**). This pattern favors normal to above normal temperatures across Alaska, Western Canada and the Eastern US with normal to below normal temperatures in much of Southern and Eastern Canada and the Western US (**Figure 9**).



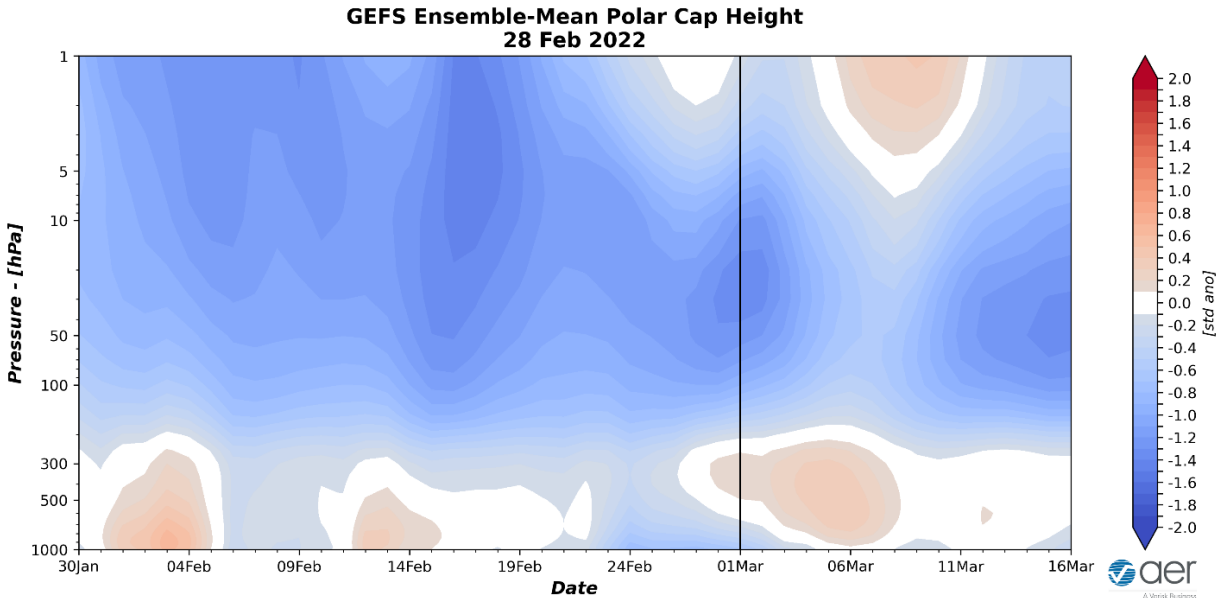
**Figure 10.** Forecasted snow depth changes (mm/day; shading) from 11 – 15 March 2022. The forecast is from the 00Z 28 February 2022 GFS ensemble.

As we get deeper into March, snowmelt is predicted to remain widespread across Eurasia and North America with new snowfall limited to Eastern Siberia, East Asia, the Tibetan Plateau, the Pacific Northwest, the US Rockies and Eastern Canada (**Figure 10**).

### *Longer Term*

#### *30-day*

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows cold/negative PCHs throughout the stratosphere and in the lower troposphere but warm/positive PCHs in the mid to upper troposphere (**Figure 11**). The negative departures in the upper stratosphere are predicted to turn positive this week into next week as the largest disruption to the PV of the winter takes place (**Figure 11**). Meanwhile the persistent cold/negative PCHs in the lower stratosphere with warm/positive PCHs in the mid troposphere show that the stratosphere and troposphere remain uncoupled the next two weeks (**Figure 11**).

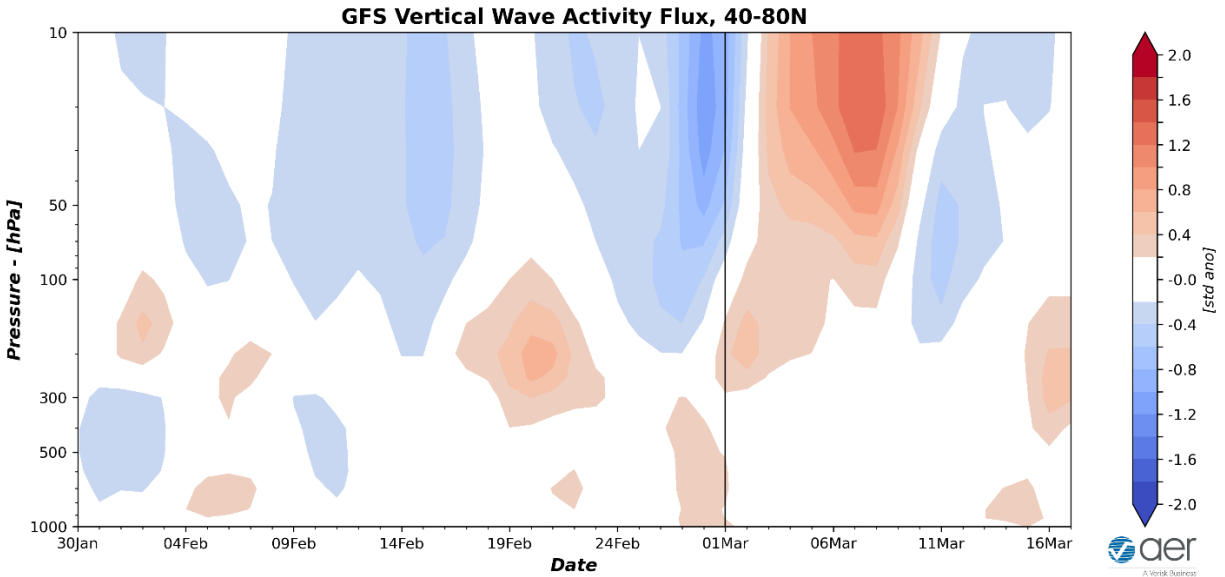


**Figure 11.** Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 28 February 2022 GFS ensemble.

The normal to below normal PCHs predicted in the lower troposphere for much of the next two weeks are consistent with the predicted positive surface AO during the same time period (**Figure 1**). Though normal to above normal PCHs in the mid-troposphere will support some relative cold weather in parts of Eurasia and especially North America.

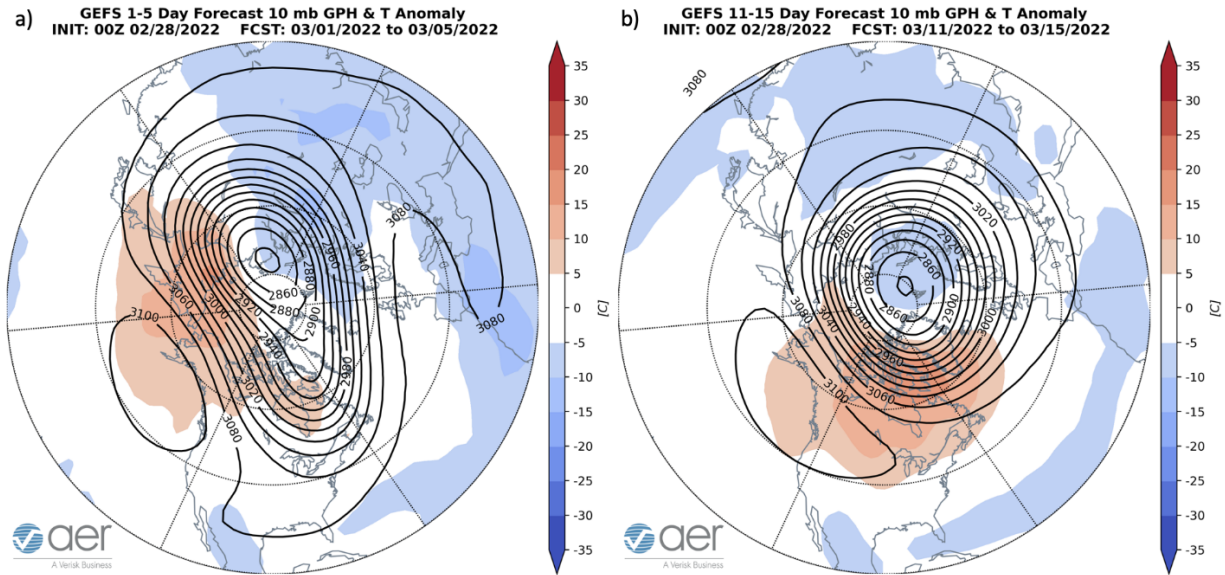
The largest pulse of the winter in vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere is predicted for this week (**Figure 12**). However negative WAFz anomalies are predicted for the second week of March and will continue to support a relatively strong PV through mid-March as suggested by the relatively cold PCHs in the lower stratosphere.





**Figure 12.** Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 28 February 2022 GFS ensemble.

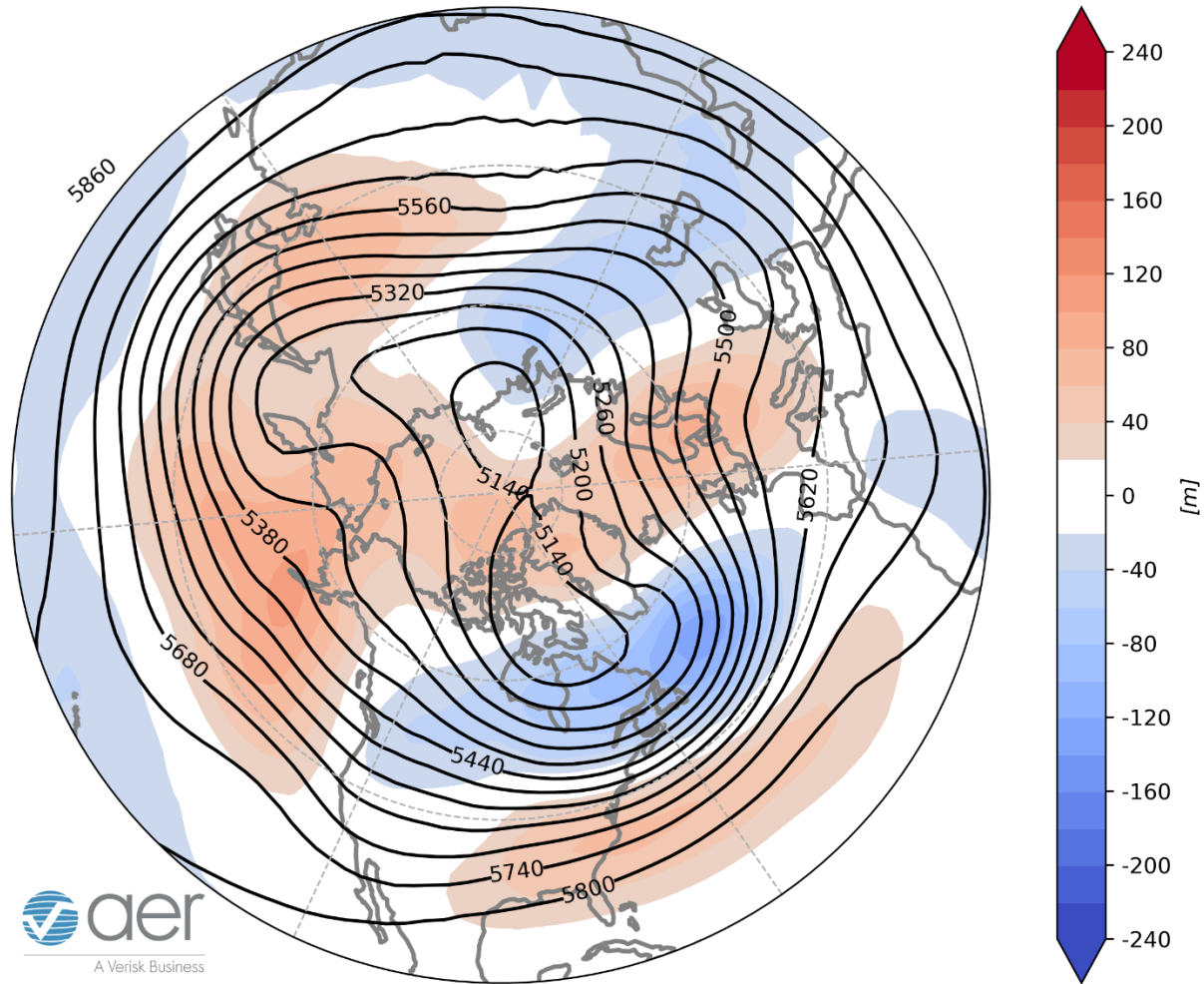
The strong pulse of WAFz predicted for this week should result in a sixth stretched stratospheric PV since early January the end of this week with the PV becoming more elongated in shape with the main PV center sliding into Western Siberia with ridging centered near in the Gulf of Alaska (**Figure 13a**). A second minor PV center will likely break off from the main PV center and settle over Eastern Canada (**Figure 13a**). The elongated circulation from Siberia to east of the Rockies across North America this week (**Figure 13a**) will help drive cold temperatures in Eastern Canada into the Northeastern US by the end of the week. However, the PV perturbation is relatively minor (no reversal of zonal winds at 60°N and 10hPa are predicted), allowing the PV to remain relatively strong resulting in a positive stratospheric AO this week (**Figure 11**).



**Figure 13.** (a) Forecasted 10 mb geopotential heights (dam; contours) and temperature anomalies ( $^{\circ}\text{C}$ ; shading) across the Northern Hemisphere averaged from 1 – 5 March 2022. (b) Same as (a) except forecasted averaged from 11 – 15 March 2022. The forecasts are from the 00Z 28 February 2022 GFS model ensemble.

The overall below normal WAFznext week is predicted to allow the PV to remain strong with the PV returning to a position close to the North Pole with a persistent positive stratospheric AO the next two weeks (**Figure 11**). However, warming coupled with ridging is predicted across northwest North America (**Figure 13b**). There are signs that there could be yet another stretched PV in mid-March that could help drag cold temperatures in the Western US further east.

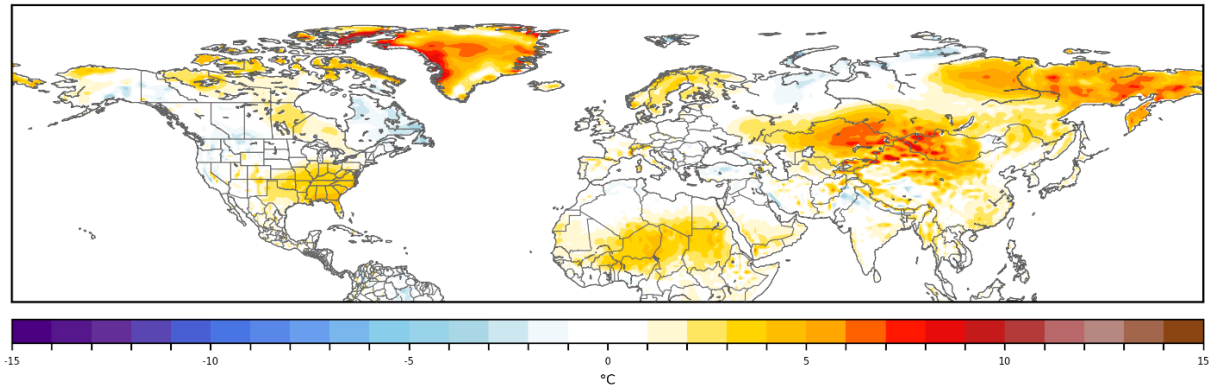
**CFS 500 hPa Forecast Anomaly Mar 2022  
Valid as of 28 Feb 2022**



**Figure 14.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for March 2022. The forecasts are from the 00Z 28 February 2022 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 14**) and surface temperatures for March (**Figure 15**) from the Climate Forecast System (CFS; the plots represent yesterday's four ensemble members). The forecast for the troposphere is ridging centered over Europe, East Asia, the Gulf of Alaska, the Central Arctic, Eastern US with troughing across Siberia, Western Asia, Eastern Canada and the Western US (**Figure 14**). This pattern favors seasonable to relatively warm temperatures across Western and Northern Europe, most of Asia, Alaska, Northwestern Canada and the Southern and Eastern US with seasonable to relatively cold temperatures across the Southeastern Europe, Turkey, Northwest Asia, much of Canada and the Northern and Western US (**Figure 15**).

**CFS 1-31 Day Forecast T2m Anomaly**  
**INIT: 00Z 02/28/2022 FCST: 03/01/2022 to 03/31/2022**

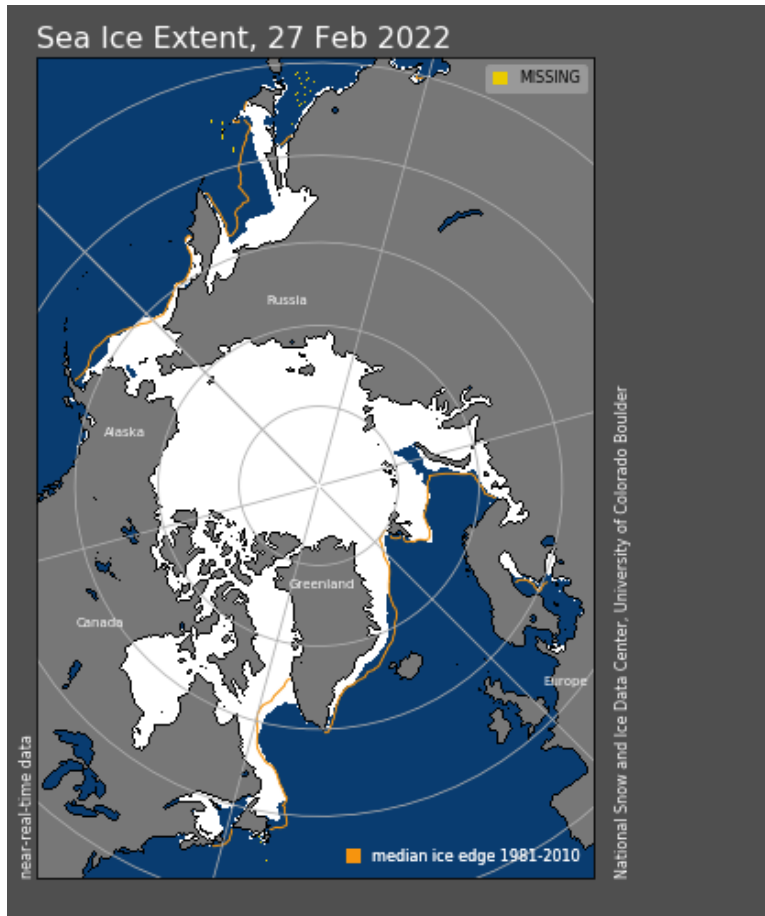


**Figure 15.** Forecasted average surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) across the Northern Hemisphere for March 2022. The forecasts are from the 00Z 28 February 2022 CFS.

### *Surface Boundary Conditions*

#### Arctic Sea ice

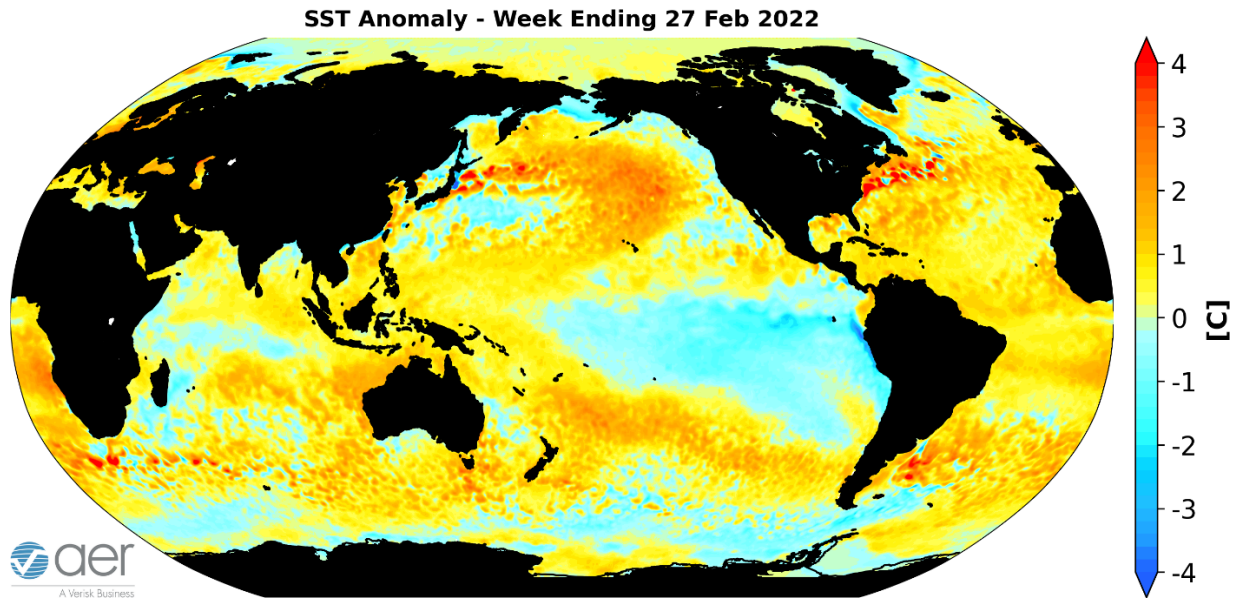
Arctic sea ice growth has stalled and remains below normal mostly in Sea of Okhotsk and recently in the Barents Sea. Overall sea ice is relatively extensive compared to recent winters, though it remains relatively thin. In the Barents-Kara Seas extent is actually above normal. Below normal sea ice in the Barents-Kara seas favors cold temperatures in Central and East Asia, however this topic remains controversial. Recent research has shown that the regional anomalies that are most highly correlated with the strength of the stratospheric PV are across the Barents-Kara seas region where low Arctic sea ice favors a weaker winter PV. Low sea ice in the Chukchi, Beaufort and Bering seas may favor colder temperatures across North America but has not been shown to weaken the PV.



**Figure 16.** Observed Arctic sea ice extent on 27 February 2022 (white). Orange line shows climatological extent of sea ice based on the years 1981-2010. Image from the National Snow and Ice Data Center (NSIDC).

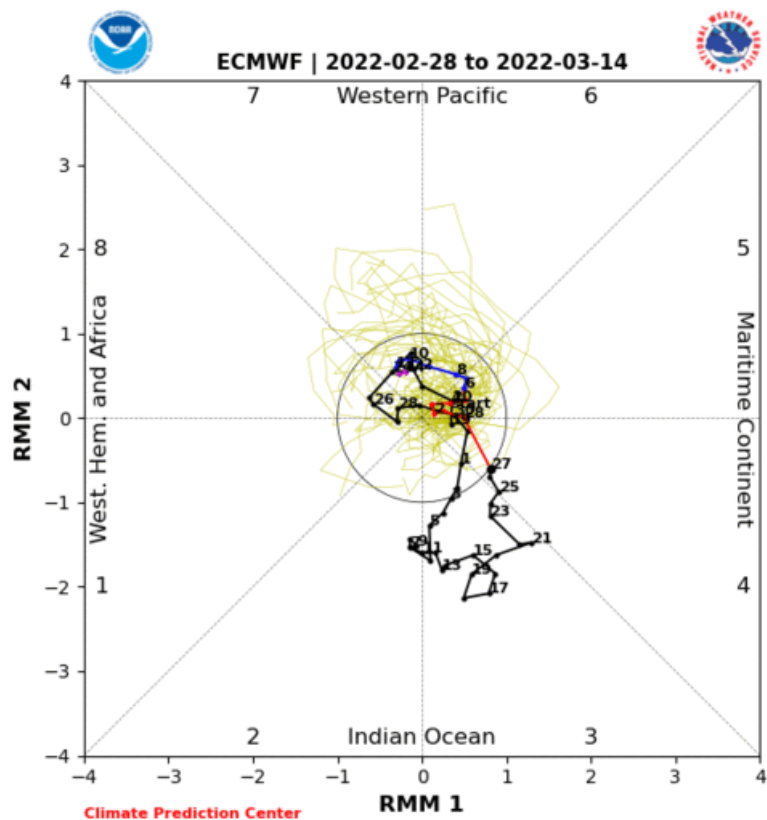
### *SSTs/El Niño/Southern Oscillation*

Equatorial Pacific sea surface temperatures (SSTs) anomalies are below normal and we continue to observe weak to possibly moderate La Niña conditions (**Figure 17**) and La Niña conditions are expected into the spring. Observed SSTs across the NH remain well above normal especially in the central North Pacific (west of recent years), the western North Pacific and offshore of eastern North America though below normal SSTs exist regionally especially in the North Pacific. Not my expertise but the SST pattern in the North Pacific are strongly resembling a negative Pacific Decadal Oscillation (PDO) pattern that favors colder temperatures across northwestern North America and milder temperatures across southeastern North America.



**Figure 17.** The latest weekly-mean global SST anomalies (ending 27 February 2022). Data from NOAA OI High-Resolution dataset.

Currently the Madden Julian Oscillation (MJO) is barely in phase four (**Figure 18**). The forecasts are for the MJO to remain weak where no phase is favored. With no phase favored hard to see that the MJO is likely influencing the weather across North America. But admittedly this is outside of my expertise.



**Figure 18.** Past and forecast values of the MJO index. Forecast values from the 00Z 28 February ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model “spread” is denoted by the gray shading. Sector numbers indicate the phase of the MJO, with geographical labels indicating where anomalous convection occurs during that phase. Image source: <http://www.atmos.albany.edu/facstaff/roundy/waves/phasediags.html>

## Get Detailed Seasonal Weather Intelligence with sCast

We appreciate your taking the time to read the public Arctic Oscillation blog from Dr. Judah Cohen and the AER Seasonal Forecasting team.

Dr. Cohen’s detailed monthly seasonal forecast, sCast, is also available for purchase. sCast provides a monthly 30-60-90-180-day outlook into temperature and precipitation, solar flux and wind anomalies across the globe, and regional population weighted cooling and heating degree forecasts for the US.

Our sCast principal engineer, [Karl Pfeiffer](#), can help you use sCast and other AER seasonal forecast products to deliver important, long-lead time weather intelligence to your business. Please reach out to Karl today!