

# Arctic Oscillation and Polar Vortex Analysis and Forecasts

March 6, 2023

Dear AO/PV blog readers:

We have shifted the public release of the Arctic Oscillation/Polar Vortex blog to Wednesday through the winter season.

For those who would like an early look on Mondays, we will be offering at a nominal price (US \$50) a PDF version of the upcoming blog, and we will be rolling out access to the datasets used in the production of this blog. At present we plan to make available in comma-separated values the timeseries of the Polar Cap Height and the timeseries of the Wave Activity Flux (vertical component), though we would appreciate to hear your suggestions for additional data of interest to you all.

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 strongly negative and is predicted to remain negative but slowly trend towards neutral the next two weeks as pressure/geopotential height anomalies across the Arctic are currently strongly

positive and are predicted to remain mostly positive the next two weeks. The North Atlantic Oscillation (NAO) is currently negative and is predicted to remain negative but slowly trend towards neutral the next two weeks as pressure/geopotential height anomalies are currently positive and are predicted to remain positive across Greenland the next two weeks.

- The next two weeks predicted ridging/positive geopotential height anomalies centered near Greenland will favor troughing/negative geopotential height anomalies across Europe with ridging/positive geopotential height anomalies across the Mediterranean. This pattern favors the next two weeks normal to below normal temperatures across Northern Europe including the United Kingdom (UK) with normal to above normal temperatures across Southern Europe.
- The predicted general pattern across Asia the next two weeks is troughing/negative geopotential height anomalies across Northern Asia with ridging/positive geopotential height anomalies centered across Central and Southern Asia. The induced strong zonal or westerly flow the next two weeks favors normal to above normal temperatures across much of Asia with normal to below normal temperatures limited across far Northwestern Asia and far Northern Siberia.
- The pattern predicted across North America this week is ridging/positive geopotential height anomalies across the North American Arctic forcing troughing/negative geopotential height anomalies across the Northwestern and Northeastern United States (US) with more ridging/positive geopotential height anomalies across the Southeastern US. However, next week the ridging/positive geopotential height anomalies across Greenland will begin to slide into Northeastern Canada and weaken while the ridging across the Aleutians and Alaska gives way to troughing instead, with troughing expanding across much of the US. This pattern generally favors this week normal to below normal temperatures Western Canada and the Western US with normal to above normal temperatures across Alaska, Eastern Canada and the Eastern US. However, next week Alaska will transition to mostly below normal temperatures as well as the Eastern US while above normal temperatures persist in Eastern Canada and the Southwestern to Southcentral US.
- It does look like the influence of the large polar vortex (PV) disruption on Northern Hemisphere (NH) surface temperatures could be winding down with winter entering its final stages.

### **Plain Language Summary**

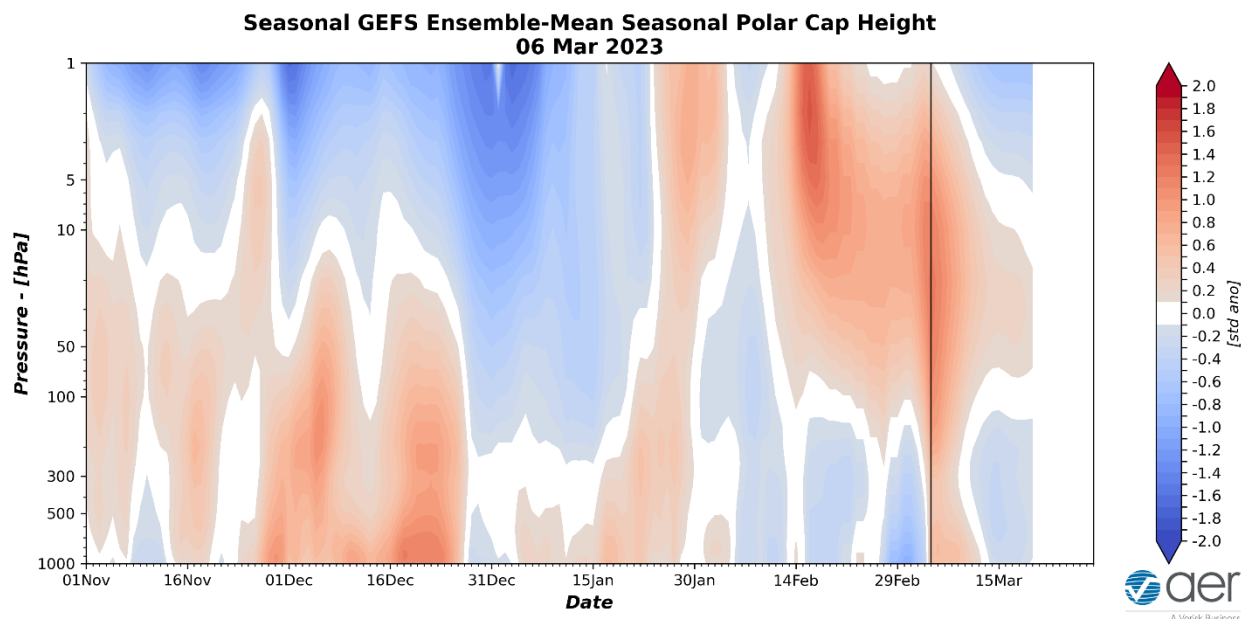
A major disruption of the polar vortex (PV) is ongoing is referred to as a major sudden stratospheric warming (SSW; see **Figure 13**). Often following SSWs, more severe wintry weather becomes more widespread across Northern Europe and Asia. Though Europe is trending colder much of Asia is quite mild with colder temperatures spreading across

North America (see **Figures 3 and 6**). But overall, so far I am underwhelmed by the weather response to the major SSW.

### **Impacts**

By classical standards the influence from the large stratospheric polar vortex (PV) disruption or major sudden stratospheric warming (SSW) has arrived to the surface with the warm/positive polar cap geopotential height anomalies (PCHs) “dripping” from the stratosphere to the surface (see **Figure 11**) and with a negative NAO or AO (see **Figure 1**). This has resulted in a classic looking response in the tropospheric circulation including ridging/positive geopotential height anomalies across the Arctic but especially Greenland with troughing/negative geopotential height anomalies across Northern Europe, Northern Asia and the US. These changes to the circulation could bring some wintry weather to regions where it has been lacking so far, Northern Europe and the Eastern US.

Looking at the PCHs over the entire season (see **Figure i**), it is the first time that the PCHs have been warm/positive since late January, a period that coincided with extreme cold over Siberia and Northern China. And before that the only period when the PCHs were warm/positive was in early to mid-December when Europe was relatively cold, and an historic cold wave swept across the US.

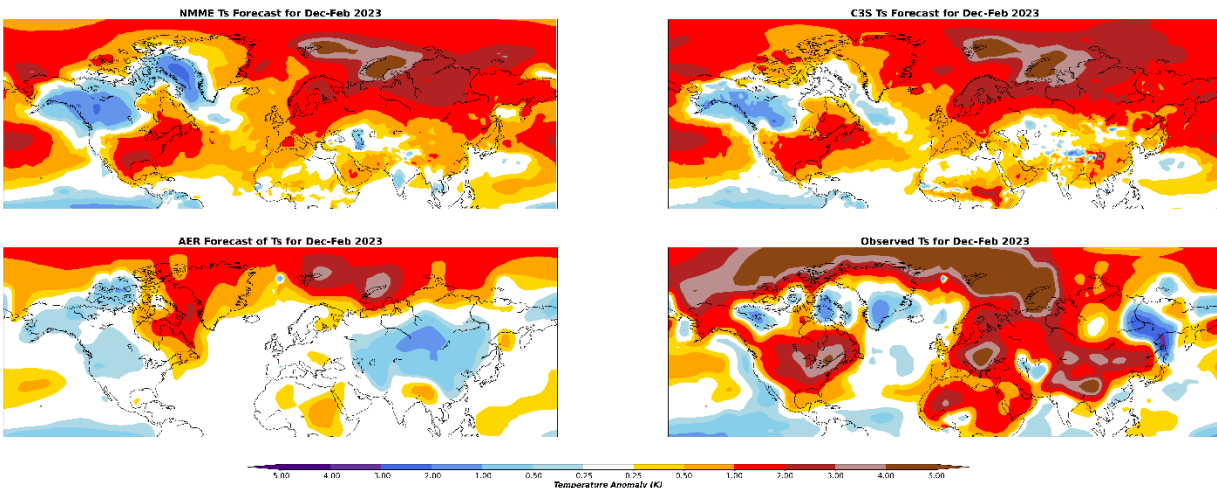


**Figure i.** Observed since 1 November 2022 and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 6 March 2023 GFS ensemble.

However, the current period of warm/positive PCHs is not predicted to be of long duration with tropospheric PCHs predicted to transition to cold/negative by next week. This is not unexpected as the PCHs are described as dripping and not a gush or a waterfall. And often following a major SSW alternating warm/positive and cold/negative PCHs will be observed. But looking at the predicted PCHs in the lower stratosphere they are predicted to significantly weaken and whether there will be subsequent “drips” of warm/positive PCHs from the lower stratosphere to the surface seems to me to be in doubt. But even if it does it looks to be weak and won't arrive until after astronomical spring with much of its potency weakened by the sun. I have to admit to being underwhelmed by the tropospheric or weather response to the major SSW so far.

I feel confident that the downward Vertical Wave Activity Flux (WAFz) that I showed in last week's blog is contributing to the strengthening PV. But whether it is also contributing to the less than impressive response in the weather to the SSW that I am conflicted by. And clearly for that understanding I need to study additional events.

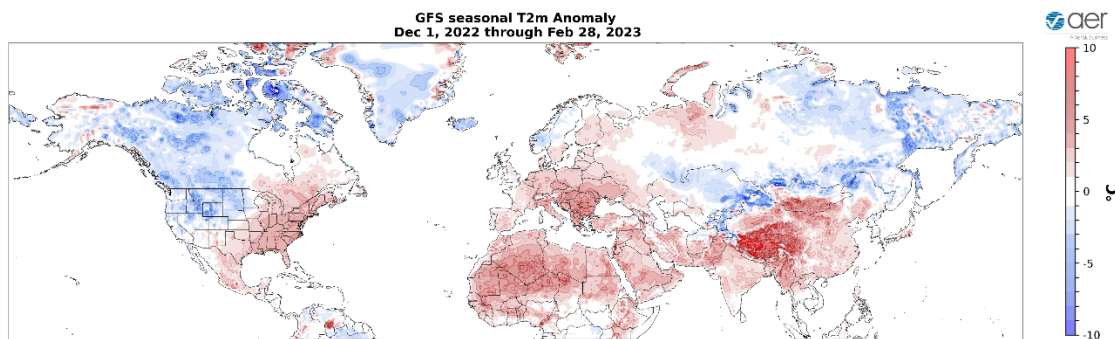
Since meteorological winter ended last week I wanted to present the observed surface temperature anomalies for December 2022 through February 2023 and compare with the three forecasts that I included in the blog of [28 November 2022](#) in **Figure ii**. I use NCEP/NCAR reanalysis to generate the forecast, so it seems appropriate to compare with the observed values in the NCEP/NCAR reanalysis. According to the NCEP/NCAR reanalysis, above normal temperatures were widespread across Eurasia and North America with only pockets of below normal temperatures more consistent with the dynamical model forecasts of the NNME and C3S suite of models. However, from what I can tell the NCEP/NCAR reanalysis could be more fiction than fact.



**Figure ii.** The NMME winter temperature anomaly forecast for December, January and February 2023 from <https://www.cpc.ncep.noaa.gov/products/NMME/> (top left). The C3S winter

temperature anomaly forecast for December, January and February 2023 from <https://www.copernicus.eu/en> (top right). c) The AER winter temperature anomaly forecast for December, January and February 2023 (bottom left). Observed winter temperature anomaly for December, January and February 2023 (bottom right). The observed temperatures are based on the NCEP/NCAR reanalysis which I have good reason to believe contain large errors.

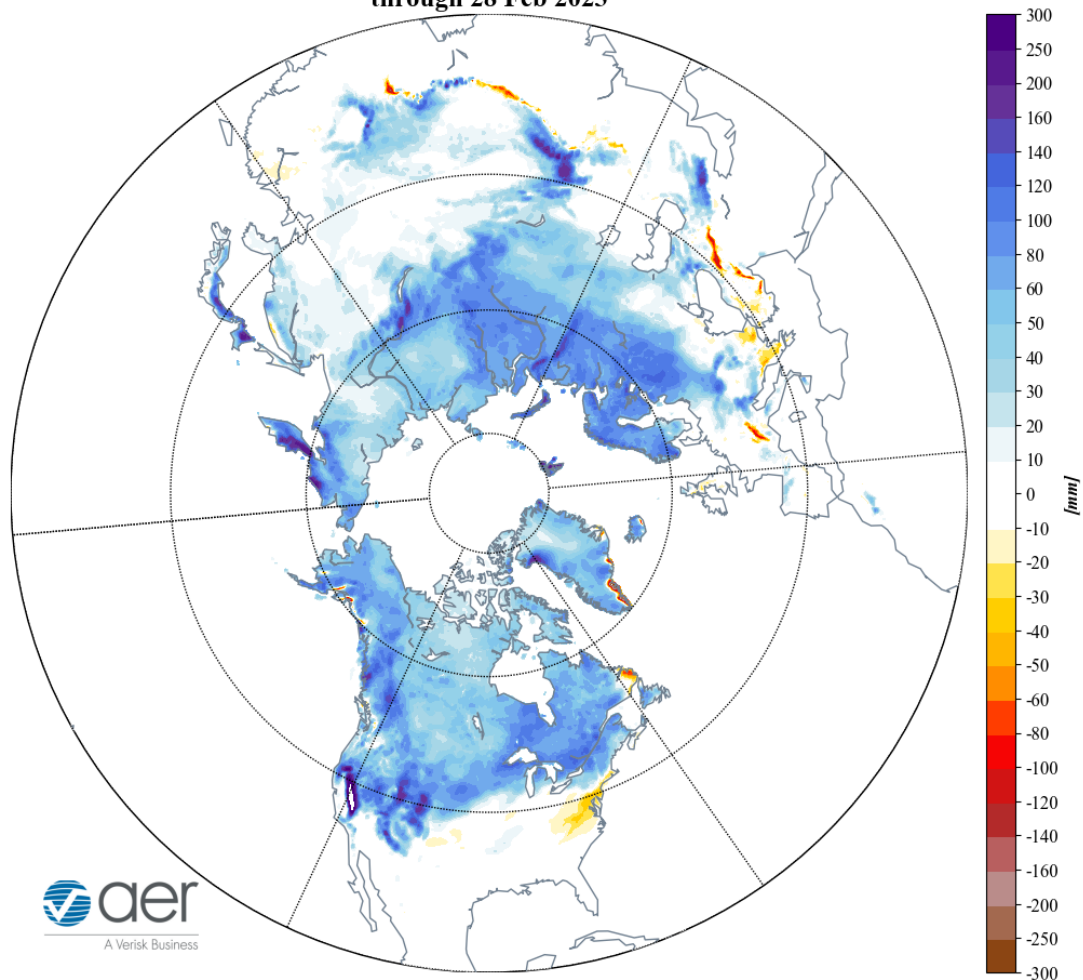
I will need to look into this more, but our same temperature anomaly plot based on the GFS analysis is shown in **Figure iii**. In contrast that plot shows below normal temperatures in Siberia, Central Asia, much of Alaska, Western and Central Canada and the US west of the Mississippi River. This to me seems to be more accurate and compares more favorably with the AER winter forecast.



**Figure iii.** Observed winter surface temperature anomaly for December, January and February 2023. The data is taken from the daily initialized GFS.

Finally I updated the winter snowfall anomaly plot that I posted earlier in the blog of [20 February 2023](#) in **Figure iv**, which now covers the entire winter. Snowfall was abundant around the North Pacific sector and at higher latitudes with the biggest snowfall deficits in the I95 corridor between Washington DC and Boston, the Alps, Southeastern Europe and Turkey.

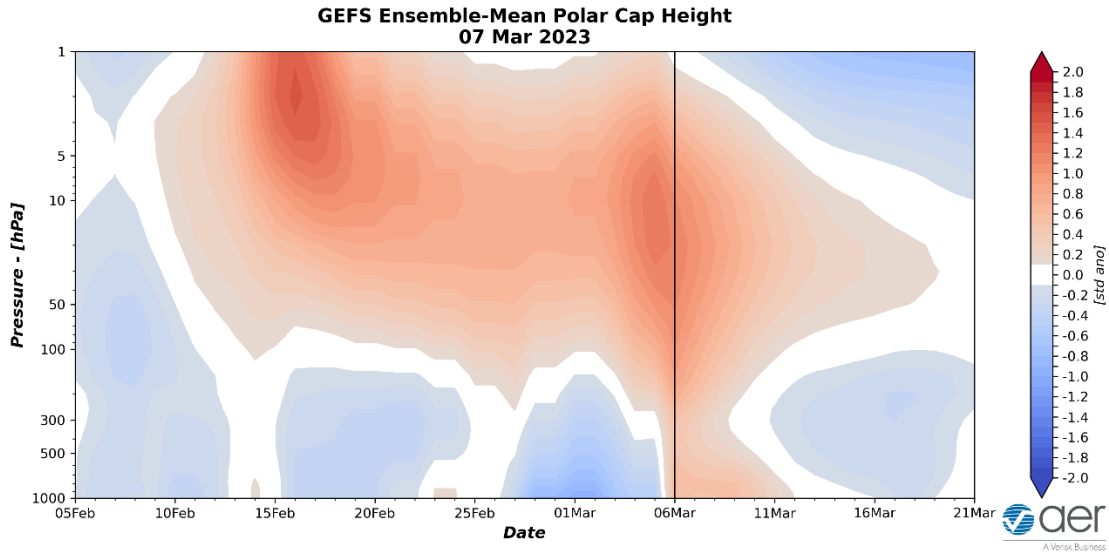
ERA5 Dec-Jan-Feb 2023 Cumulative Snowfall Anomaly  
through 28 Feb 2023



**Figure iv.** Observed winter snowfall anomalies shaded as snow water equivalent (mm) from ERA5.

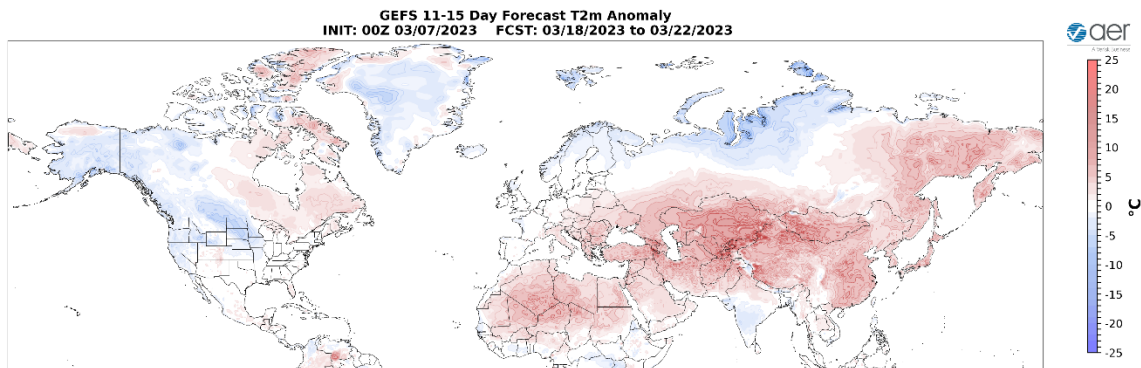
### **Wednesday Update**

This winter has been punishing for a snow lover like me. But the major SSW has brought some good snows to Northern New England over the past several weeks. So, I took a mental health day to ski in New Hampshire. So, no real-time Wednesday update. If something looks very interesting, I might post on Thursday.



**Figure v.** 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 7 March 2023 GFS ensemble.

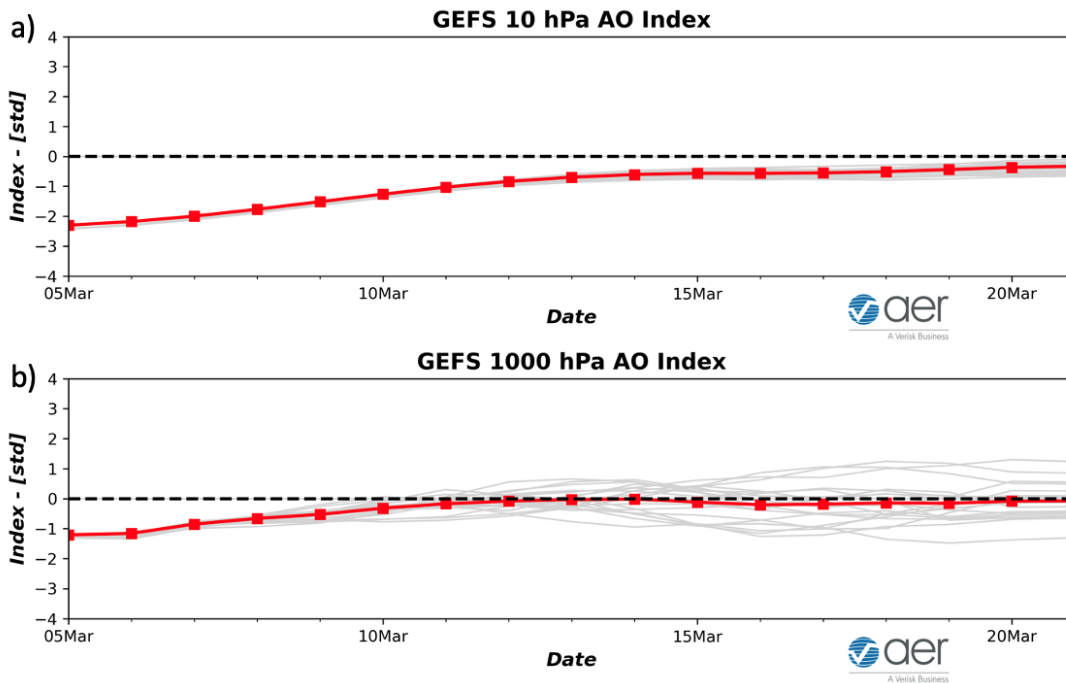
I did tweet the PCHs forecast from Tuesday (see **Figure v**). What caught my attention is the total disappearance of warm/positive PCHs not only in the upper stratosphere and mid to lower troposphere, which is expected but also in the lower stratosphere, which is a new development. It is suggestive that the influence from the major SSW will end after this week. These forecasts can be very volatile so before I would be confident in this forecast, I would like to see consistency over several days. This forecast even suggests potential coupling between a relatively strong PV, a positive surface AO and lack of high latitude blocking. This would support an overall milder pattern across the mid-latitudes of the Northern Hemisphere including the Eastern US and Northern Europe where it is predicted to be relatively cold through the first day of astronomical spring. But for now, no sign of a milder pattern in these regions (see **Figure vi**).



**Figure 3.** Forecasted surface temperature anomalies (°C; shading) from 18 – 22 March 2023. The forecast is from the 00Z 7 March 2023 GFS ensemble.

**Recent and Very Near-Term Conditions**

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

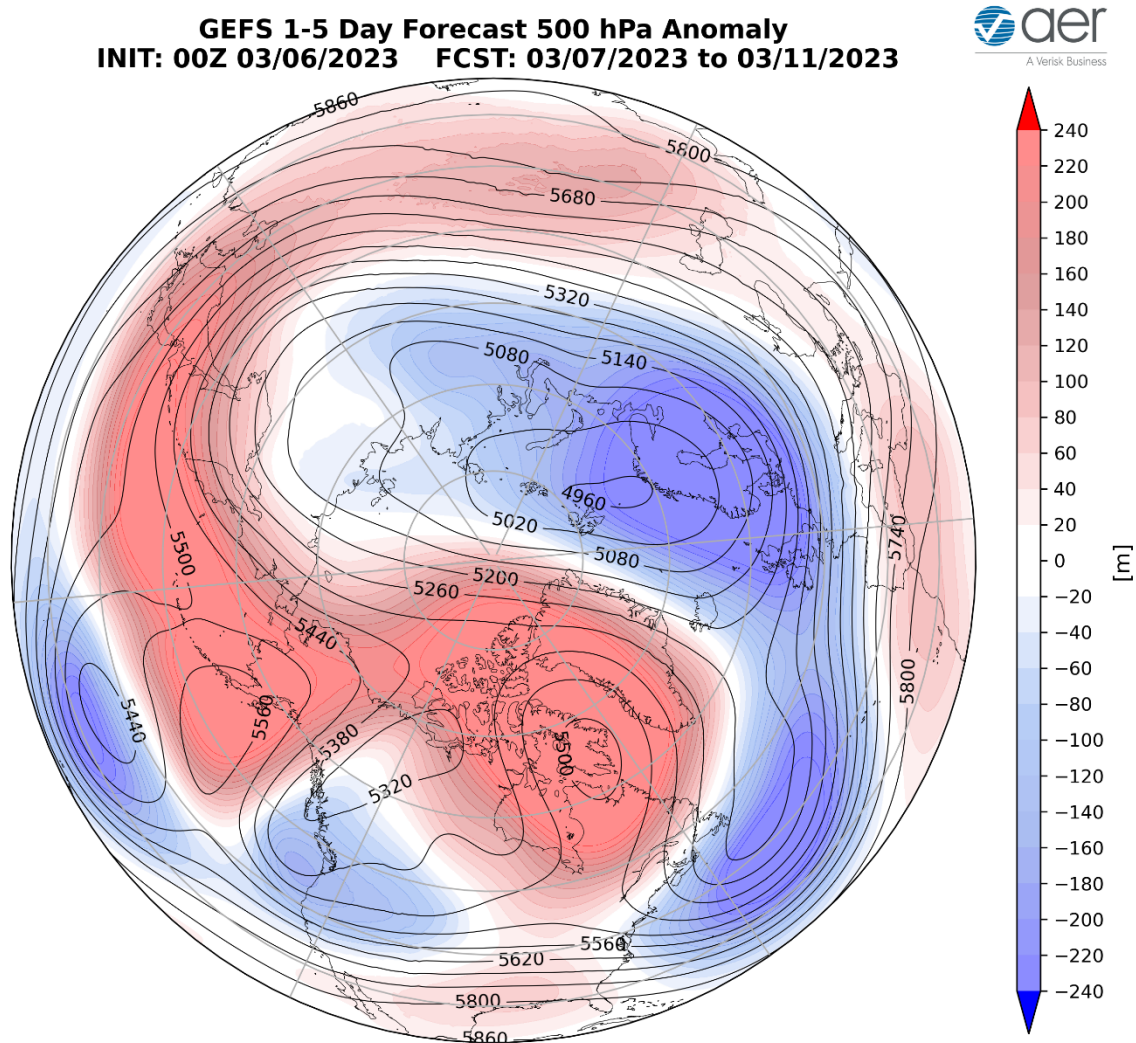


**Figure 1.** (a) The predicted daily-mean AO at 1000 hPa from the 00Z 6 March 2023 GFS ensemble. (b) The predicted daily-mean near-surface AO from the 00Z 6 March 2023 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.

Predicted ridging/positive geopotential height anomalies centered near Greenland will favor troughing/negative geopotential height anomalies across Europe with more ridging/positive geopotential height anomalies across the Mediterranean this period (**Figure 2**). This favors a classical negative NAO pattern with normal to below normal temperatures across Northern Europe including the UK with normal to above normal temperatures across Southern European (**Figure 3**). Predicted ridging/positive geopotential height anomalies centered near Greenland will favor troughing/negative geopotential height anomalies across Northern Asia with ridging/positive geopotential



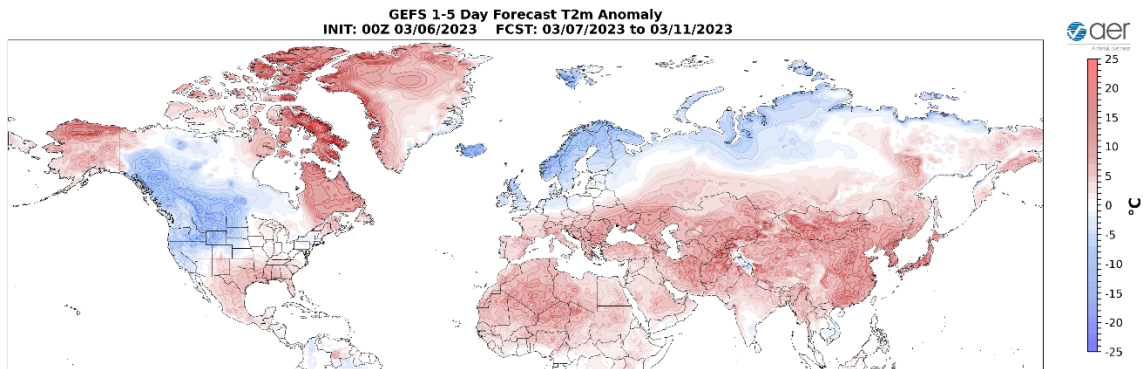
height anomalies across Southern Asia centered in Central Asia (**Figure 2**). This pattern favors normal to below normal temperatures limited to far Northwestern Asia and Northern Siberia with normal to above normal temperatures widespread across much of Asia and focused in Central Asia (**Figure 3**).



**Figure 2.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 7 – 11 March 2023. The forecasts are from the 00z 6 March 2023 GFS ensemble.

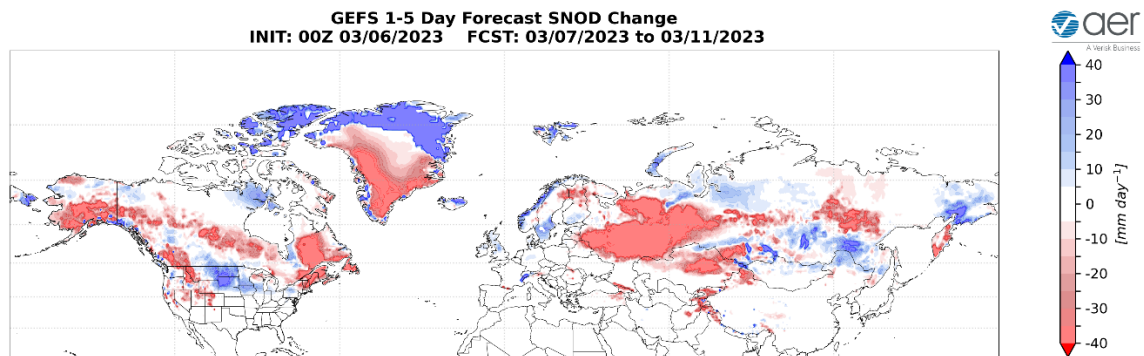
Predicted ridging/positive geopotential height anomalies across the North American Arctic will favor troughing/negative geopotential height anomalies across the Northwestern and the Northeastern US with more ridging/positive geopotential height anomalies across the Southeastern US (**Figure 2**). The pattern will favor normal to below normal temperatures across Western Canada and the Western US with normal to

above normal temperatures across Alaska, Eastern Canada and the Eastern US (**Figure 3**).



**Figure 3.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 7 – 11 March 2023. The forecast is from the 00Z 6 March 2023 GFS ensemble.

Trouging and/or cold temperatures will support new snowfall to the UK, Scandinavia, the Alps and Siberia while mild temperatures will support snowmelt across Eastern Europe, Western Russia and Central Asia (**Figure 4**). Trouging and/or cold temperatures will support new snowfall across Northern Canada, the US Plains and the Great Lakes while mild temperatures will support snowmelt across Alaska, Southern Canada, the Northwestern US and New England (**Figure 4**).



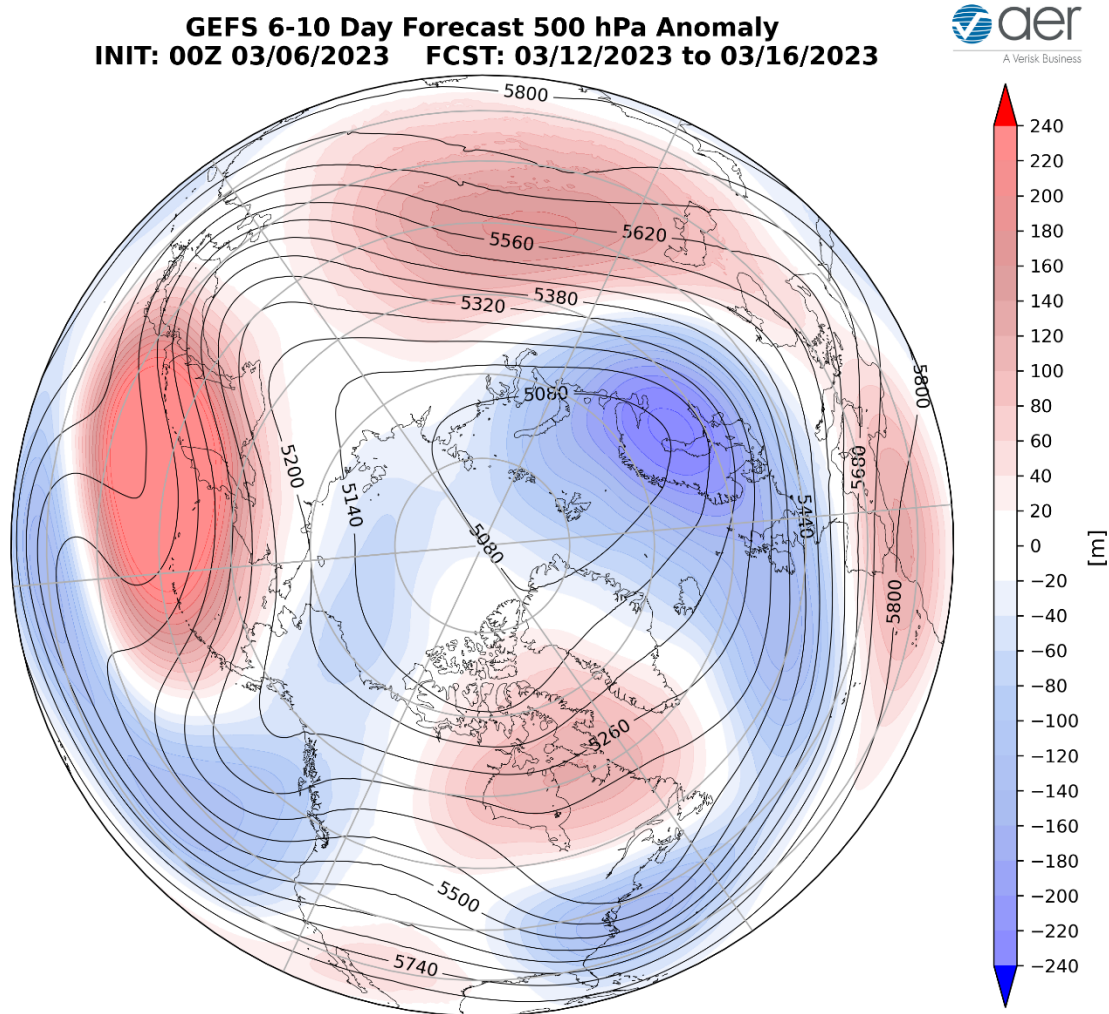
**Figure 4.** Forecasted snow depth changes ( $\text{mm}/\text{day}$ ; shading) from 7 – 11 March 2023. The forecast is from the 00Z 6 March 2023 GFS ensemble.

### Near-Term

1-2 week

The AO is predicted to trend towards neutral this period (**Figure 1**) as geopotential height anomalies become increasingly mixed across the Arctic with mixed geopotential

height anomalies across the mid-latitudes of the NH (**Figure 5**). With positive geopotential height anomalies across Greenland (**Figure 5**), the NAO is predicted to remain negative this period.



**Figure 5.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 12 – 16 March 2023. The forecasts are from the 00z 6 March 2023 GFS ensemble.

Persistent ridging/positive geopotential height anomalies across Greenland will support troughing/negative geopotential height anomalies across much of Europe (**Figures 5**). This continues to favor a classical negative NAO pattern with normal to below normal temperatures across Northern Europe including the UK with normal to above normal temperatures across Southern Europe (**Figure 6**). Ridging/positive geopotential height anomalies across Greenland will continue to favor troughing/negative geopotential height anomalies across Northern Asia with ridging/positive geopotential height anomalies across Southern Asia but centered in Central Asia this period

(Figure 5). The resultant strong zonal or westerly flow pattern still favors widespread normal to above normal temperatures across Asia but focused in Central Asia with normal to below normal temperatures mostly limited to Northwest Russia (Figure 6).

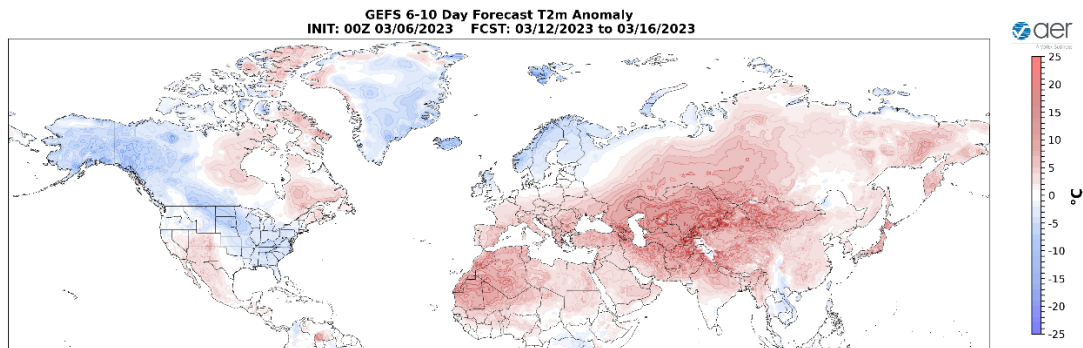


Figure 6. Forecasted surface temperature anomalies (°C; shading) from 12 – 16 March 2023. The forecast is from the 00Z 6 March 2023 GFS ensemble.

Ridging/positive geopotential height anomalies previously near the Aleutians will slide west towards Kamchatka allowing troughing/negative geopotential height anomalies across Alaska, the Gulf of Alaska, Western Canada and the Western US with more ridging/positive geopotential height anomalies centered in Eastern Canada forcing more troughing in the Eastern US this period (Figure 5). This pattern will favor normal to below normal temperatures across Alaska, Western Canada, the Eastern US with normal to above normal temperatures across Eastern Canada and the Southwestern US (Figure 6).

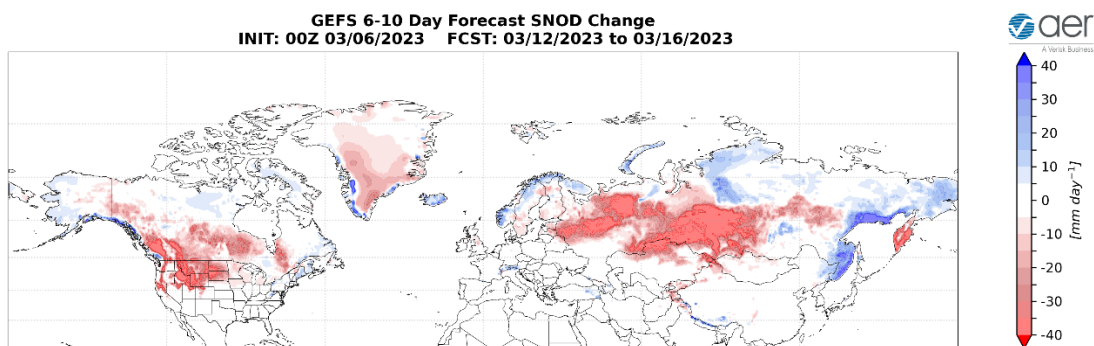


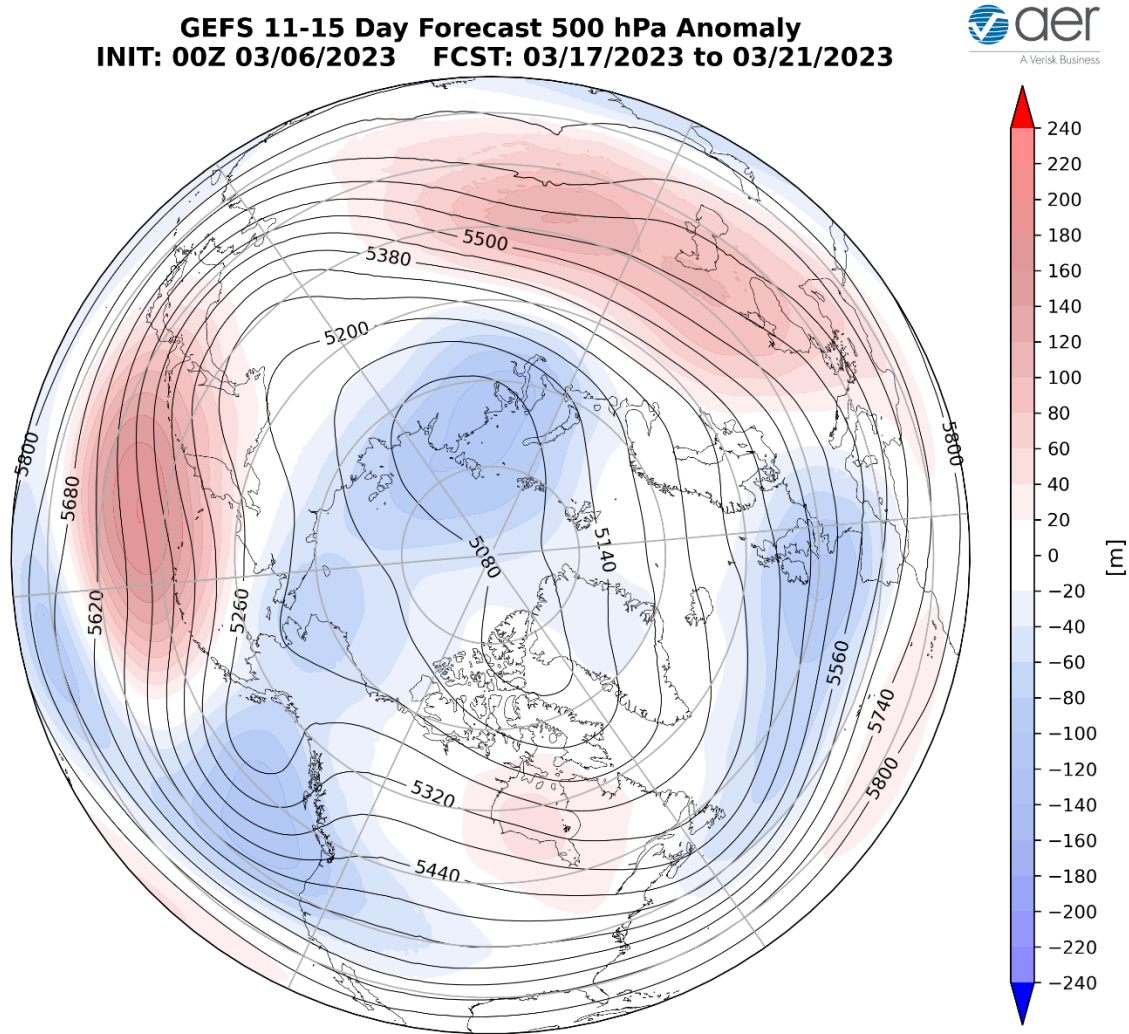
Figure 7. Forecasted snow depth changes (mm/day; shading) from 12 – 16 March 2023. The forecast is from the 00Z 6 March 2023 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Norway, Siberia and Northeastern Asia while mild temperatures will support snowmelt in the Baltics, Northwestern Russia and Central Asia (Figure 7). Troughing and/or cold temperatures will support new snowfall across parts of Alaska and Northern Canada while mild

temperatures will support snowmelt in Southern Canada, Southeastern Canada and the Northern US (**Figure 7**). There is a possibility of new snowfall in the Northeastern US during this time period not shown in the plot.

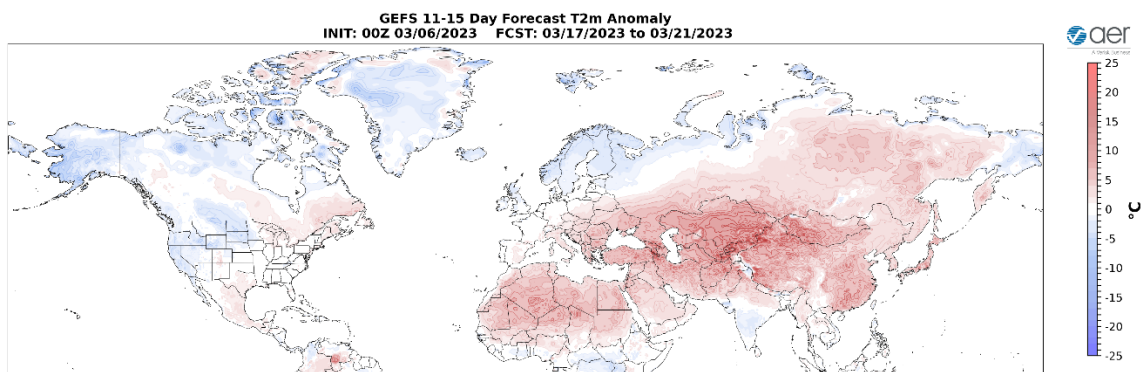
3-4 week

With mixed geopotential height anomalies across the Arctic and with mixed geopotential height anomalies across the mid-latitudes this period (**Figure 8**), the AO should remain near neutral this period (**Figure 1**). With mixed and weak pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will likely be neutral this period.



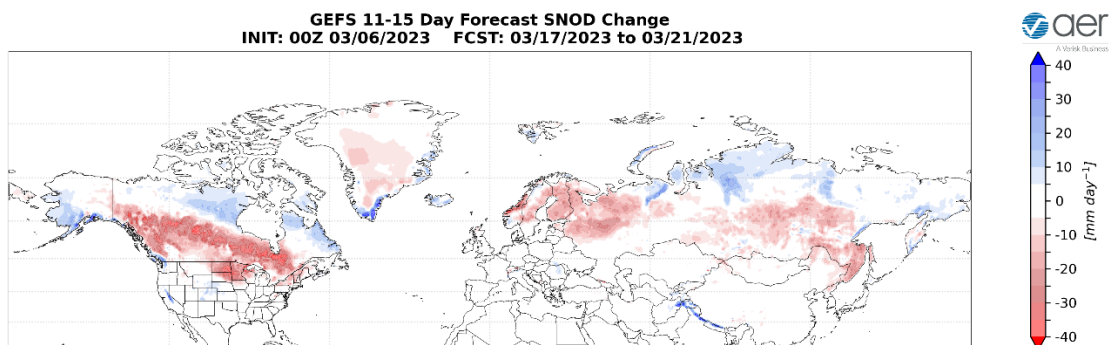
**Figure 8.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 17 – 21 March 2023. The forecasts are from the 00z 6 March 2023 GFS ensemble.

Ridging/positive geopotential height anomalies centered across Greenland albeit very weak will continue to support troughing/negative geopotential height anomalies across Europe with the exception of ridging/positive geopotential height anomalies across Southeastern Europe this period (**Figure 8**). This pattern should continue to favor normal to below normal temperatures across Northern Europe including the UK with normal to above normal temperatures across Southern Europe (**Figures 9**). Troughing/negative geopotential height anomalies is predicted to persist over Northern Asia with widespread ridging/positive geopotential height anomalies spread across Southern Asia this period (**Figure 8**). This pattern favors widespread normal to above normal temperatures across much of Asia with normal to below normal temperatures mostly limited to Northwestern Asia and far Eastern Siberia this period (**Figure 9**).



**Figure 9.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 17 – 21 March 2023. The forecast is from the 00Z 6 March 2023 GFS ensemble.

Ridging/positive geopotential height anomalies centered near Kamchatka will continue to anchor troughing/negative geopotential height anomalies across Alaska, the Gulf of Alaska, Western Canada and the Western US with more ridging/positive geopotential height anomalies centered near Hudson Bay this period (**Figure 8**). This pattern favors widespread normal to below normal temperatures across Alaska, Northern and Western Canada and much of the US with normal to above normal temperatures limited to Eastern Canada and the Southcentral US (**Figure 9**).



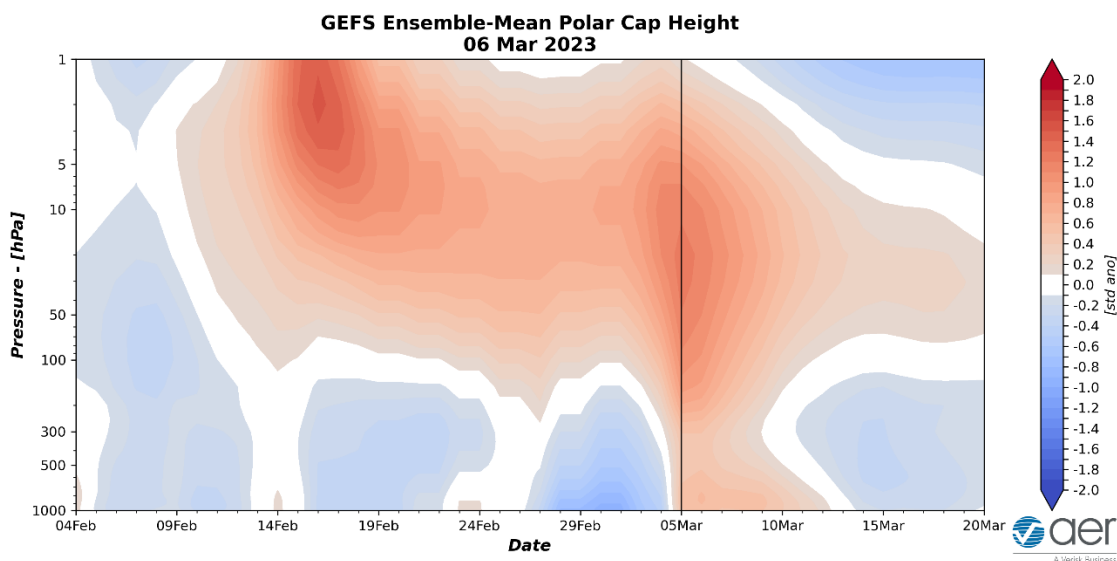
**Figure 10.** Forecasted snow depth changes (mm/day; shading) from 17 – 21 March 2023. The forecast is from the 00Z 6 March 2023 GFS ensemble.

Trouthing and/or cold temperatures will support new snowfall across Northern Siberia and the Tibetan Plateau while mild temperatures will support snowmelt across Scandinavia, Northeastern Europe, Northwestern Asia and Southern Siberia (**Figure 10**). Trouthing and/or cold temperatures will support new snowfall across Alaska, Northern and Eastern Canada while mild temperatures will support snowmelt across Western and Southern Canada and the Northern US (**Figure 10**).

### Longer Term

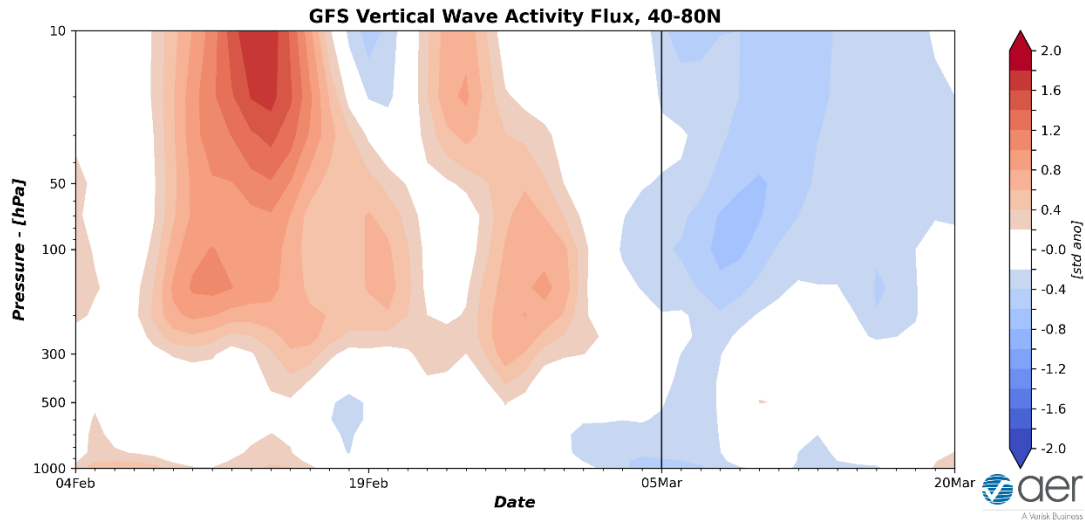
30-day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows normal to warm/positive PCHs throughout the stratosphere and troposphere (**Figure 11**). However, the warm/positive PCHs in the mid to upper stratosphere are predicted to weaken this week and turn cold/negative next week but remain warm/positive in the lower stratosphere the next two weeks (**Figure 11**). Meanwhile the warm/positive PCHs in the troposphere are predicted to turn mostly cold/negative next week as the warm/positive PCHs that “dripped” down from the stratosphere into the troposphere commonly observed following a major sudden stratospheric warming (SSW) abates (see **Figure 11**). As long as warm/positive PCHs persist in the lower stratosphere more “drips” into the troposphere are possible in the coming weeks.



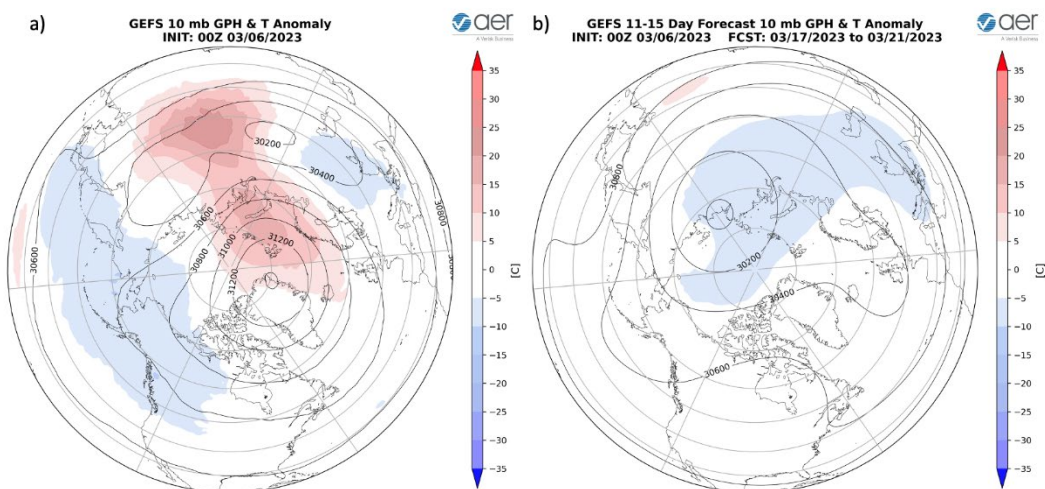
**Figure 11.** Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 6 March 2023 GFS ensemble.

The warm/positive PCHs in the lower troposphere this week (**Figure 11**) are consistent with the predicted negative surface AO (**Figure 1**). However, the AO is predicted to become more neutral next week (**Figure 1**) coinciding when the warm/positive PCHs in the troposphere are predicted to transition to cold/negative (**Figure 11**).



**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 6 March 2023 GFS ensemble.

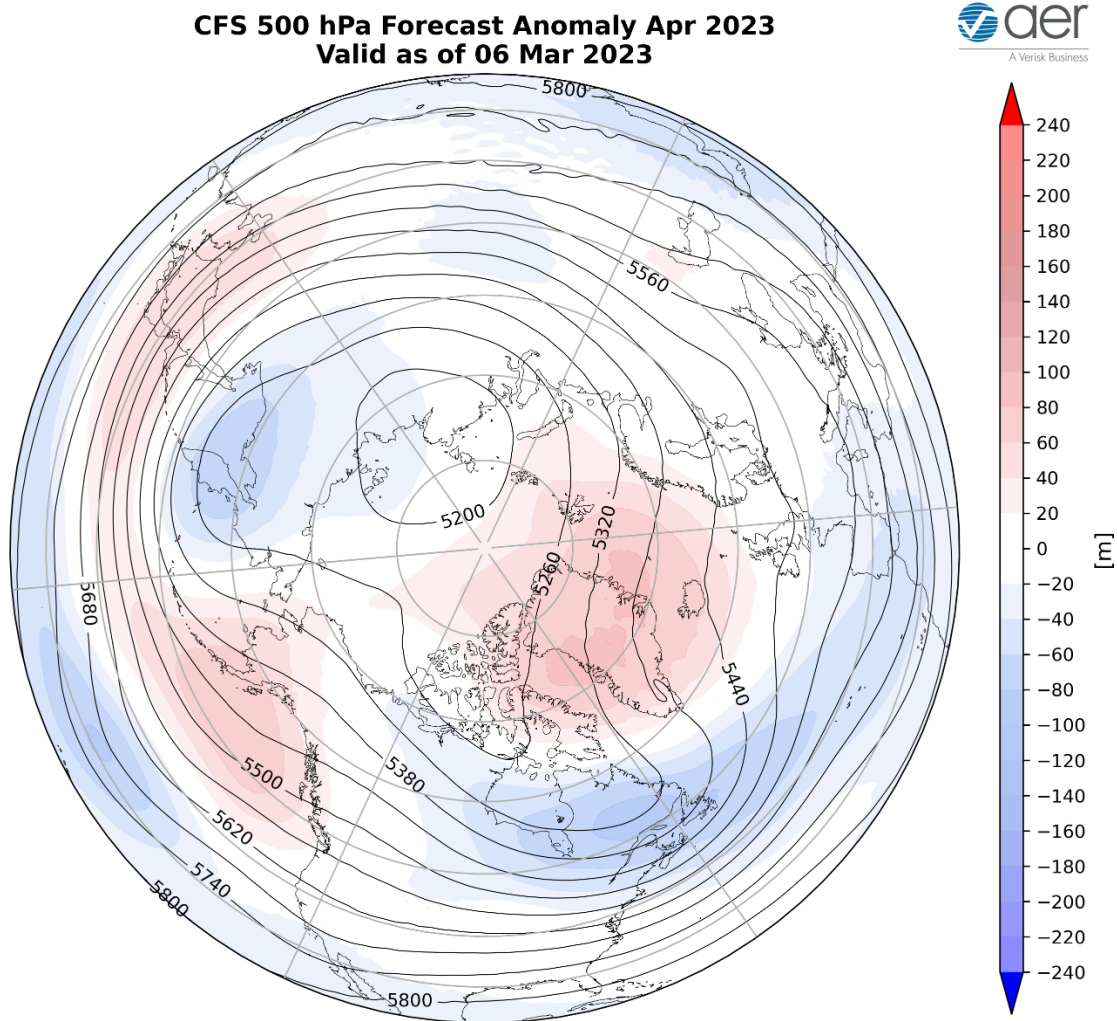
The active Vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere since the beginning of the year is predicted to cease with below normal WAFz predicted for the next two weeks (**Figure 12**). Below normal WAFz will allow the highly disrupted stratospheric PV to strengthen represented by predicted cold/negative mid to upper-stratospheric PCHs for next week (**Figure 12**).





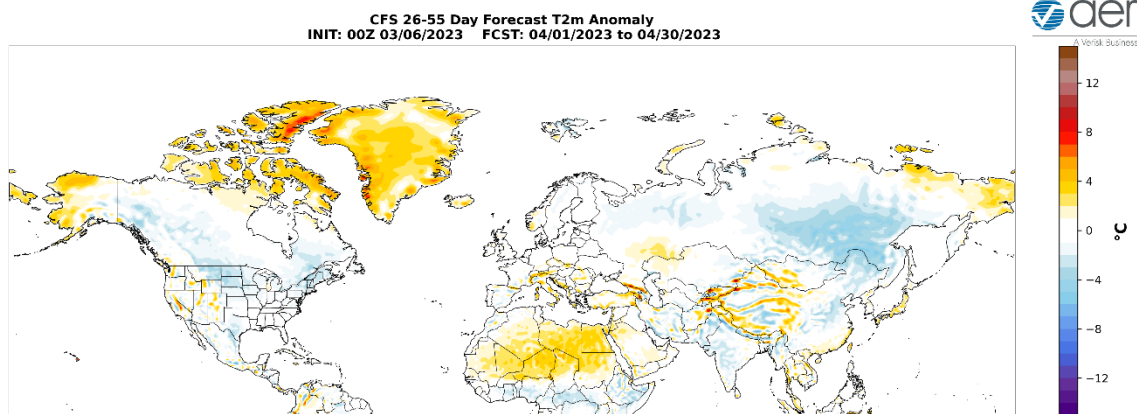
**Figure 13.** (a) Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 6 March 2023. (b) Same as (a) except forecasted averaged from 17 – 21 March 2023. The forecasts are from the 00Z 6 March 2023 GFS model ensemble.

The previously active WAFz has weakened the stratospheric PV with a band of relatively low geopotential heights stretched across the mid-latitudes but with a nominal center over Central Asia (**Figure 13a**) with the relatively coldest temperature anomalies across the North Pacific sector. Meanwhile ridging is spread across the Arctic with the relatively warmest temperatures centered over the Barents Kara Seas and Central Asia in the polar stratosphere (see **Figure 13a**). The less active WAFz predicted the next two weeks will allow the PV to strengthen, with the PV center sliding north to a position over the Laptev Sea (see **Figure 13b**). Meanwhile ridging and warming will persist across Greenland (see **Figure 13b**). With the ongoing relatively weak PV, the stratospheric AO is predicted to remain negative the next two weeks (**Figure 13**).



**Figure 14.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for April 2023. The forecasts are from the 00Z 6 March 2023 CFS.

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

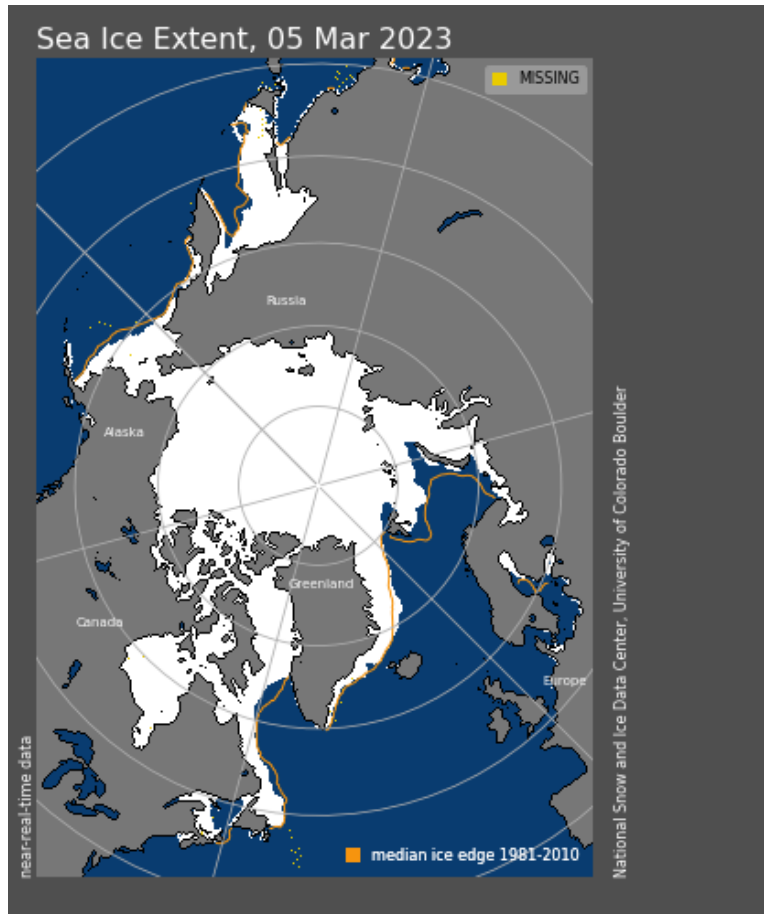


**Figure 15.** Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for April 2023. The forecasts are from the 00Z 6 March 2023 CFS.

### **Boundary Forcings**

#### *Arctic Sea Ice*

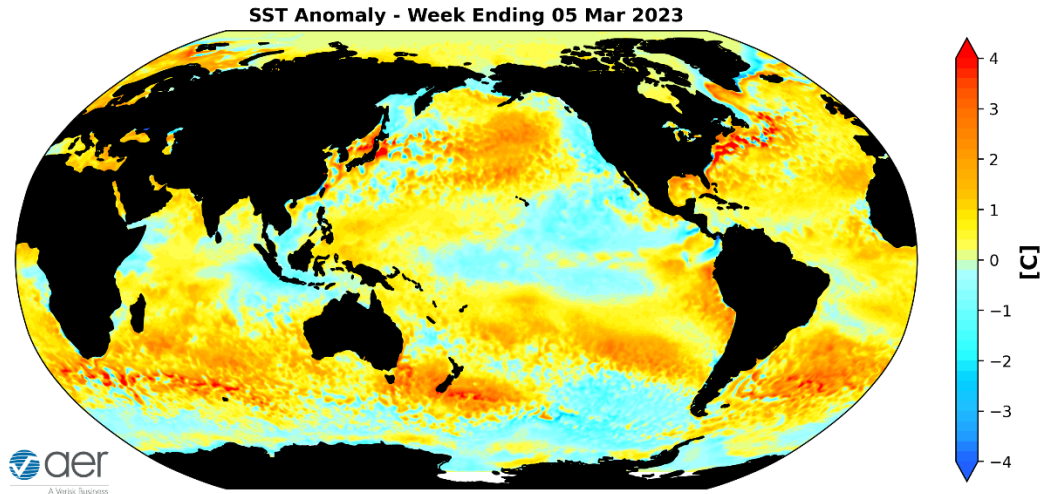
Arctic sea ice, which as expected is below normal (see **Figure 16**) but the regional anomalies have been more extensive than in recent years. The greatest concentration of below normal remains in the Barents-Kara Seas, which I believe favors high latitude blocking. So it could be Arctic sea ice is increasingly favoring high latitude blocking in the Barents-Kara Seas region and PV disruptions. Certainly, the PV has been unusually disrupted in January and February.



**Figure 16.** Observed Arctic sea ice extent on 5 March 2023 (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*

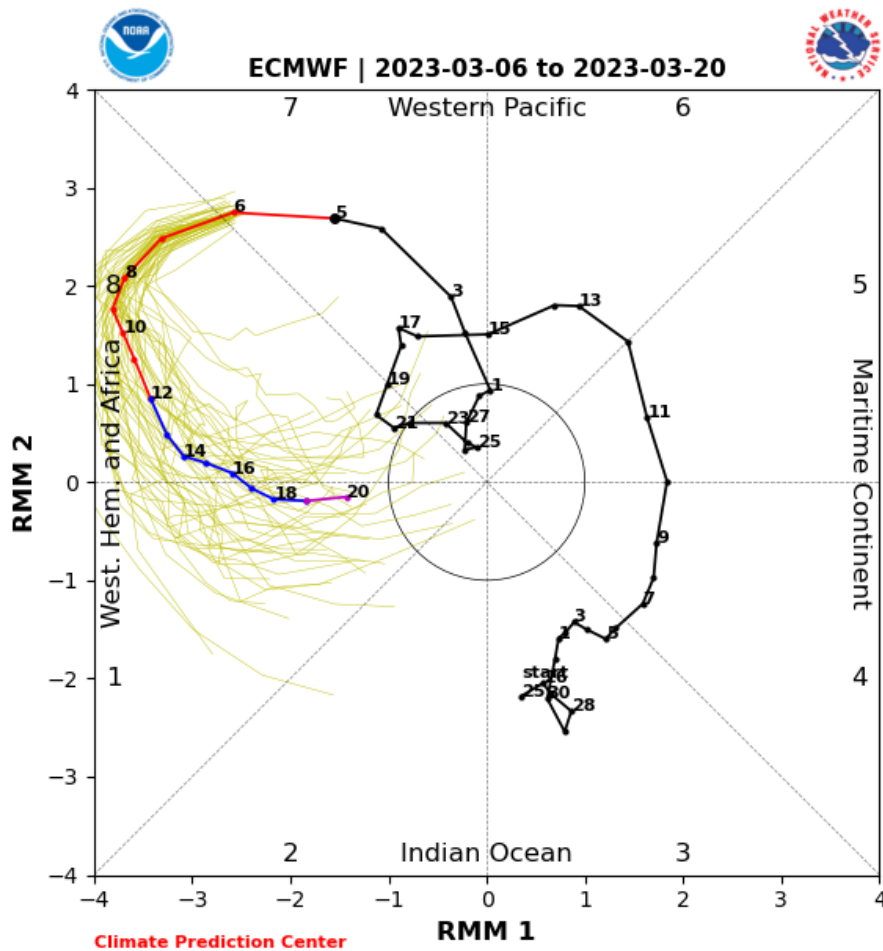
Equatorial Pacific sea surface temperatures (SSTs) anomalies are below normal and we continue to observe weak La Niña conditions (**Figure 17**) and La Niña conditions are expected through the spring. Observed SSTs across the NH remain well above normal especially in the central North Pacific (west of recent years), the western North Pacific and offshore of eastern North America though below normal SSTs exist regionally especially in the South Pacific.



**Figure 17.** The latest weekly-mean global SST anomalies (ending 5 March 2023). Data from NOAA OI High-Resolution dataset.

### *Madden Julian Oscillation*

Currently the Madden Julian Oscillation (MJO) is in phase seven (**Figure 18**). The forecasts are for the MJO to transition into phases 8 and 1. Phases 7, 8 and 1 favor high latitude blocking with troughing over the US. Seems that the MJO is having some influence on the weather across North America in the short term but there are also large-scale atmospheric features such as ridging near the Aleutians that is not consistent with MJO phases 7 and 8. But admittedly this is outside of my expertise.



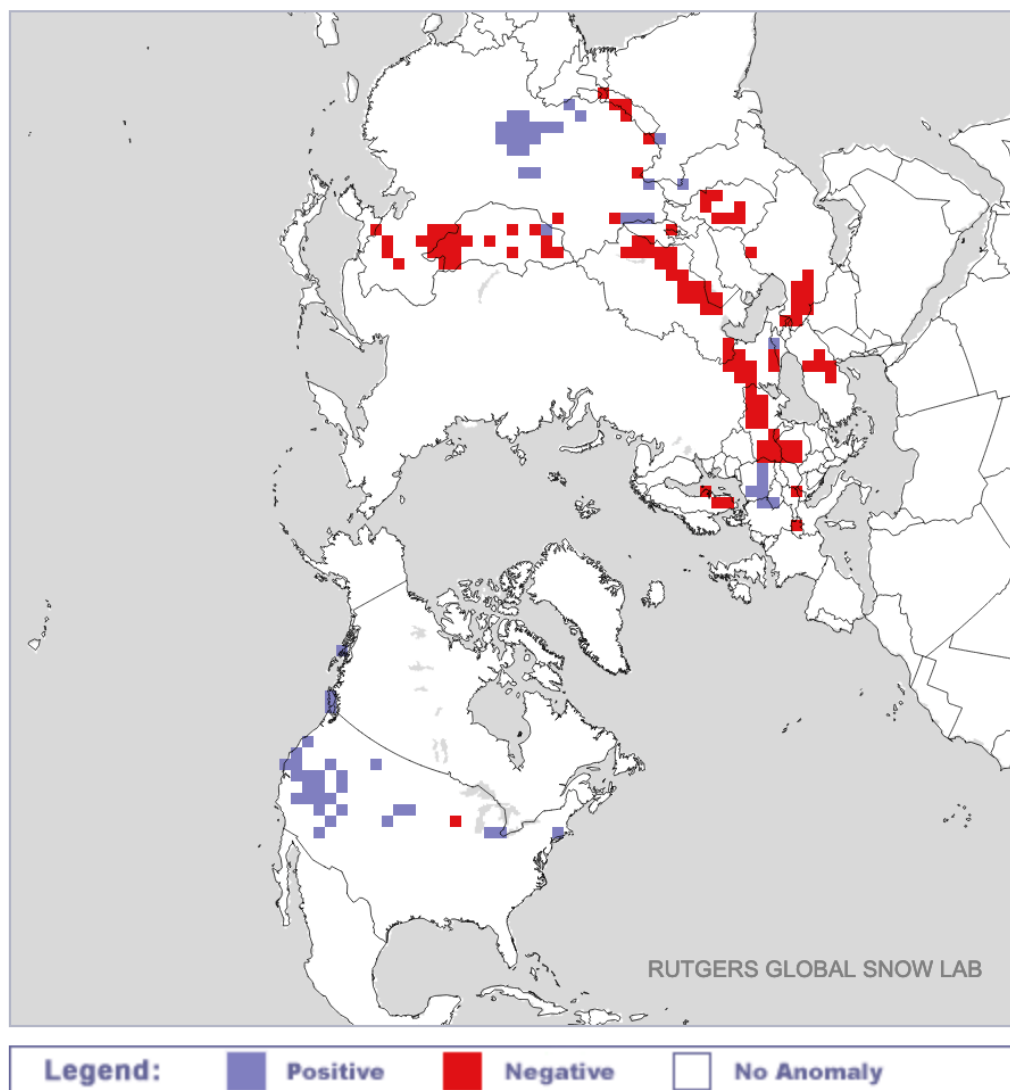
**Figure 18.** Past and forecast values of the MJO index. Forecast values from the 00Z 13 February 2023 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model “spread” is denoted by the gray shading. Sector numbers indicate the phase of the MJO, with geographical labels indicating where anomalous convection occurs during that phase. Image source:

[https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar\\_wh.shtml](https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar_wh.shtml)

### Snow Cover

Snow cover extent (SCE) anomalies across the NH has decreased slightly this past week mostly across Eurasia with above normal snow cover focused in China and the Western US. Meanwhile Eurasian snow cover is now below normal (see **Figure 19**). Snow cover is below normal in Eastern Europe and much of Asia. Snow cover is above normal in North America. I expect snow cover to decrease in the coming weeks, but more slowly across the US with predicted colder weather.

## Daily SCE Departure - March 5, 2023 (Day 64)



**Figure 19.** Observed North Hemisphere snow cover anomalies on 5 March 2023. Plot from <http://climate.rutgers.edu/snowcover/index.php>

## 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!