Arctic Oscillation and Polar Vortex Analysis and Forecasts

February 17, 2025

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. In late 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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Summary

- The Arctic Oscillation (AO) is currently negative and is predicted to remain negative this week but then flip positive next week as pressure/geopotential height anomalies across the Arctic are currently mostly positive and are predicted to trend negative over the next two weeks. The North Atlantic Oscillation (NAO) is currently negative with positive pressure/geopotential height anomalies across Greenland and the NAO is predicted to trend negative the next two weeks as pressure/geopotential height anomalies are predicted to become increasingly negative across Greenland.
- This week ridging/positive geopotential height anomalies across Greenland will support troughing/negative geopotential height anomalies across Central and Eastern Europe with ridging/positive geopotential height anomalies across Western Europe. Then next week, deepening troughing/negative geopotential height anomalies across Greenland will support strengthening ridging/positive geopotential height anomalies across Northern Europe with troughing/negative geopotential height anomalies mostly across Southeastern Europe. This pattern will support mostly normal to below normal temperatures across Northern and Central Europe) with normal to above normal temperatures across Western Europe including the United Kingdom (UK). Then next week normal to above normal temperatures will become more widespread across Europe with normal to below normal temperatures lingering last in Southeastern

Europe.

- This week ridging/positive geopotential height anomalies across Greenland and the Laptev Sea will support troughing/negative geopotential height anomalies across Northwestern and Northeastern Asia with ridging/positive geopotential height anomalies across Central Asia. Then next week deepening troughing/negative geopotential height anomalies across Greenland will support increasing ridging/positive geopotential height anomalies across Asia with troughing/negative geopotential height anomalies limited to northern Siberia and Southwestern Asia. This pattern favors widespread normal to above normal temperatures across Asia, with normal to below normal temperatures across Western and Northeast Asia this week. The next week normal to above normal temperatures will spread across much of Asia with normal to below normal temperatures mostly limited to Eastern Siberia and Southwestern Asia.
- The general pattern across North America this week is ridging/positive geopotential height anomalies draped across the North American side of the Arctic and along the west coast of North America supporting troughing/negative geopotential height anomalies across much of Canada and the United States (US). The next week ridging/positive geopotential height anomalies will spread across much of western North America with troughing/negative geopotential height anomalies mostly focused in Baffin Bay but extending south. This week normal to below normal temperatures will spread across much of Canada and the US with normal to above normal temperatures limited to Alaska, Northern Canada and the Southwestern US. However next week normal to above normal temperatures will spread across much of Canada and the US from northwest to southeast with normal to below normal temperatures mostly limited to Eastern Canada.
- This winter has been all about the polar vortex (PV) alternating among three different states: strong, a Canadian warming but most of all a stretched PV. We have had stretched PVs in October, November, December, January and February. So who wants to bet that we do observe one in March?

Plain Language Summary

So far in February the cold anomalies are focused in Scandinavia, East Asia and especially Western Canada (see **Figure**). The cold is in at least partially the result of yet another stretched polar vortex (PV) that began the first week of February and is continuing into this week. This should bring more relative cold to the US east of the Rockies (see **Figures 3** and **6**). Some cold is predicted for Northeast Asia (see **Figure 3**) also from the stretched PV. But Eastern Europe should also get in on the cold (see **Figure 3**) as high-pressure blocking persists a little longer across Greenland. High latitude blocking will abate next week as a relatively strong PV exerts its influence bringing overall milder temperatures (see **Figures 6** and **9**). But with stretched PVs occurring every month since October who really believes we will go all of March with at least one more.

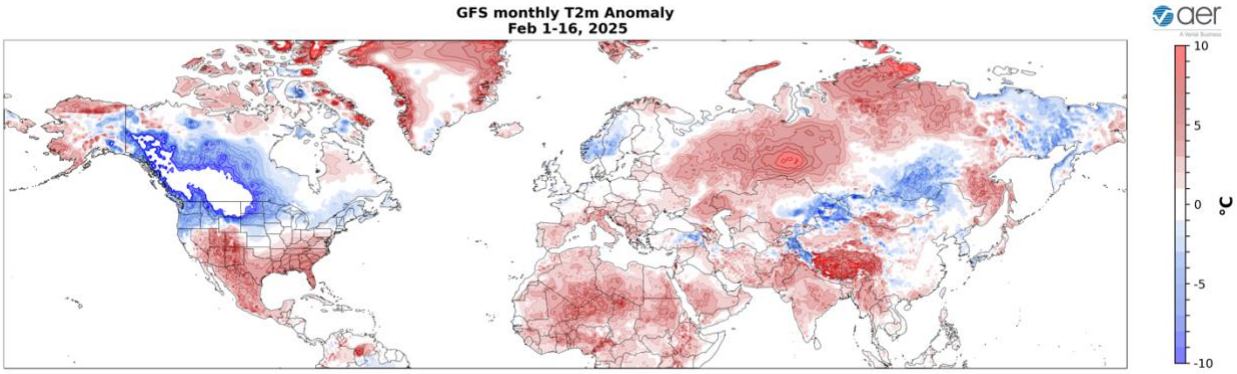

Figure. Estimate of the observed surface temperatures (°C; shading) from 01 to 16 Feb 2025 based on GFS initializations and the GFS forecast from the 17 February 2025 run.

Impacts

I haven't discussed too much Siberian snow cover/depth this winter in the blog but I did just come across this comprehensive paper on Eurasian fall snow cover and winter weather mostly related to variability in the winter Arctic Oscillation (AO) by Marshall (2025). I do think that the above normal snow cover/depth across Siberia this fall and winter and even below normal snow cover across Northwest Eurasia is related to the repeated stretched PVs and episodic negative AO this winter. So, despite a relatively strong PV all winter, snow and cold has made multiple appearances in Northeast Asia and the US. The fall Siberian snow cover and US winter temperatures relationship certainly has its skeptics. My colleague Mathew Barlow recently compared Eurasian October snow cover anomalies with US Eastern winter temperature anomalies updated through October 2023 and winter 2023/24 and found a surprisingly (his words) strong relationship. His plot showing the change in the probability distribution function of Eastern US temperature anomalies is shown in **Figure i**. I have a similar analysis for extreme cold in a manuscript in review that shows consistent results.

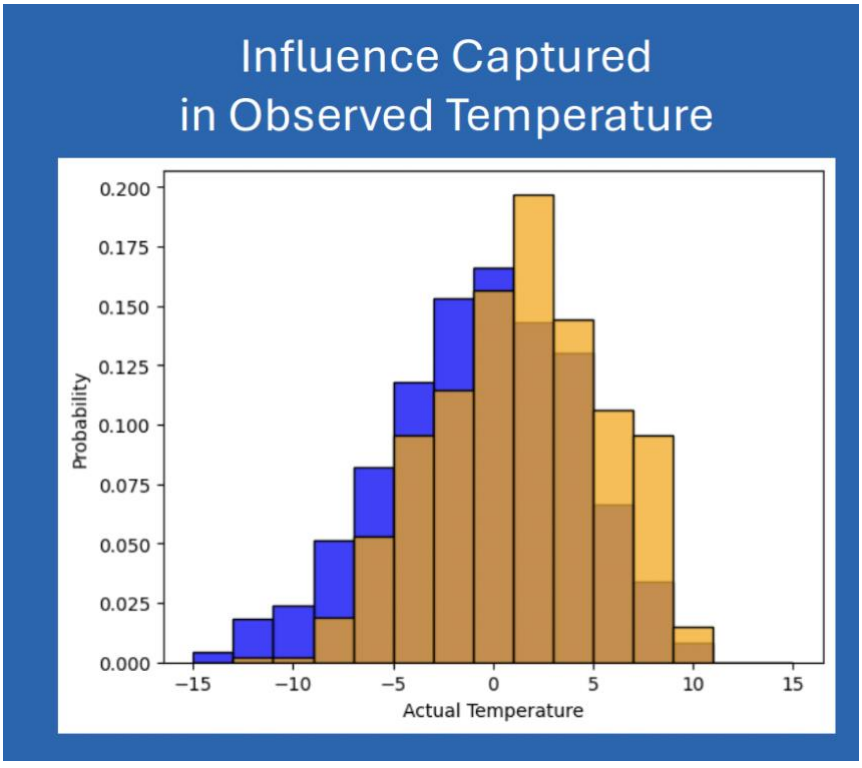

Figure i. Distribution of Eastern US winter-mean temperature anomalies when Eurasian October snow cover is above normal (blue bars) and below normal (orange bars). All the time series are detrended. Plot created by Dr. Mathew Barlow of UMass Lowell.

The seemingly infinite loop of "lather, rinse repeat," or merry go-round of stretched PV events punctuated by a more circular or strong PV and Canadian warmings isn't over just yet. We have the second stretched PV of February ongoing this week. This is bringing some cold and snow to Northeast Asia and record cold temperatures and some snow this week to the Eastern United

States (US). This is the tenth stretched PV of the winter season by my count. This next stretched PV is followed by the second Canadian warming of the winter as seen in the latest PV animation in **Figure ii**. The tenth stretched PV is 17 - 25th of February and the Canadian warming starts on the 26th of February through 3rd of March.

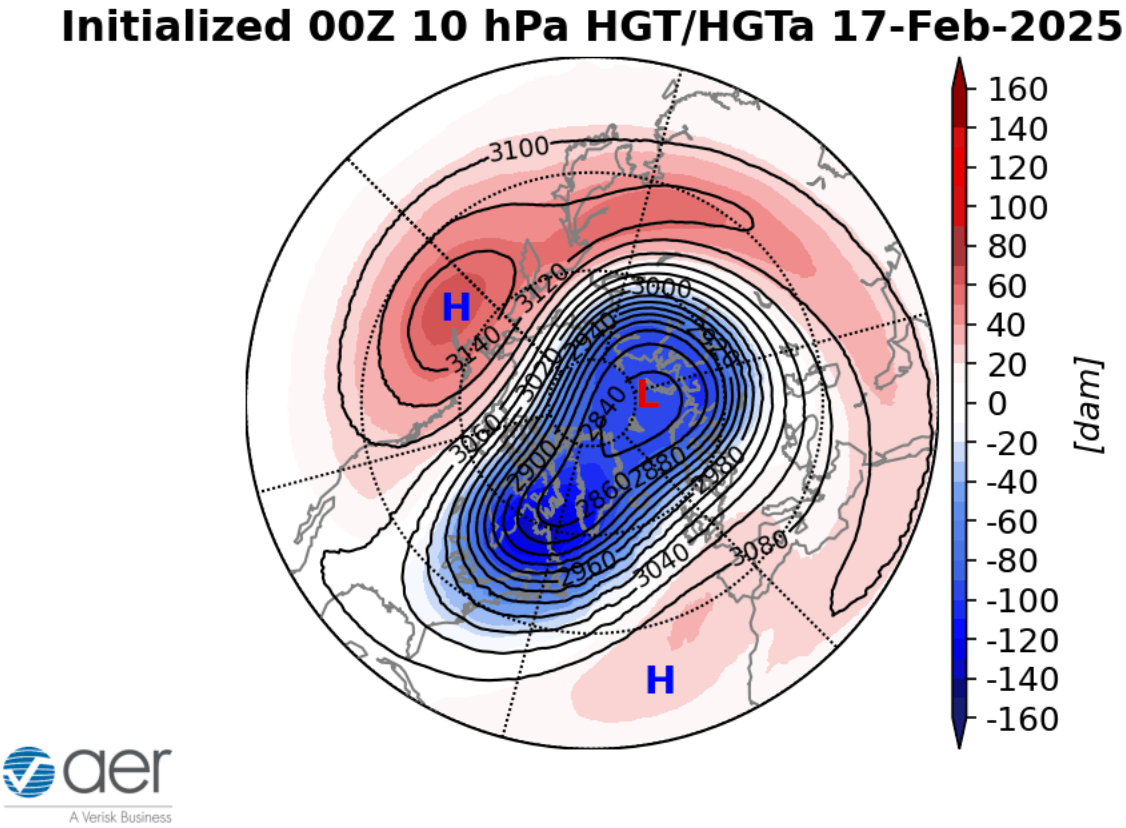

Figure ii. Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 17 February 2025 and forecasted from 18 February to 3 March 2025. The forecasts are from the 00Z 17 Feb 2025 GFS model ensemble.

Once again, I present the wave reflection diagnostics. Wave reflection is the physical underpinning of stretched PV events, and it has seemed it has occurred continuously throughout the month of January and has continued for a good part of February. During wave reflection, wave energy goes up over Asia, bouncing off the stratospheric PV and then downward over North America. The downward wave energy amplifies the ridge-trough wave over North America and determines the strength or amplitude of the North American wave and the axis or position (see **Figure iii**). Currently there is wave reflection supportive of this week's stretched PV event (see **Figure iiia**). This is also supportive of a predicted cold week for the Eastern US.

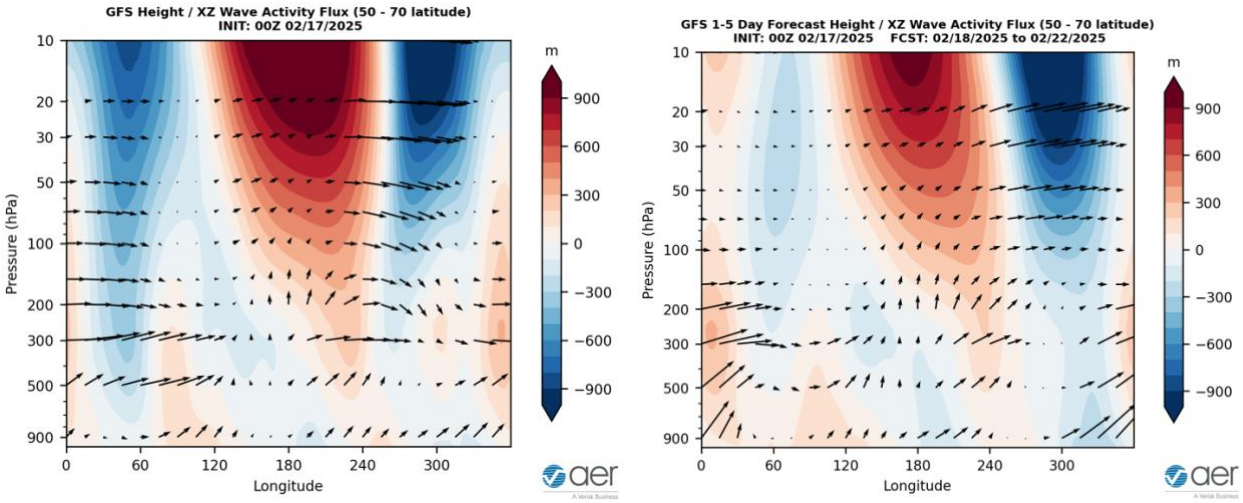

Figure iii. Longitude-height cross section of geopotential eddy height anomalies (shading) and wave activity flux (vectors) a) initialized for 17 February 2025 and b) forecasted for 18 February through 22 February 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

However, the wave reflection disappears for later this week (see **Figure iiib**). The lack of wave reflection is suggestive that the WAFz is being absorbed over Canada instead in the polar stratosphere, resulting in the upcoming Canadian warming. Canadian warmings are associated with mild temperatures across much of North America but can result in colder weather in Northern Europe and/or Asia. I don't see really see it in the weather models forecasts but could change with time.

Stretched PVs are related to severe winter weather not only to North America but also East Asia. The current stretched PV is also predicted to stretch or elongate into Asia through 23rd of February (see **Figure iii**). Ridging over Laptev Sea/Siberia helps deepen troughing over East Asia over the next week (see **Figure iv**). The troughing is associated with a cold air outbreak this week (see **Figure 3**) but is mostly over by next week (see **Figure 6**). But the return of Scandinavian and then Ural blocking could setup more cold air outbreaks for early March (see **Figure iv**).

Stretched PVs don't have a large impact on Europe. However high latitude blocking that began over the Urals, slid west to Scandinavia and is now over Greenland (see **Figure iv**). The Greenland blocking is quickly waning but will allow cold air to flow from the northeast towards Eastern Europe resulting in a cold week in Eastern Europe while Western Europe is already and remains mild (see **Figure 6**). And as I discussed in last week's blog, milder times are ahead for Europe based on the warming in the stratosphere over Europe (see **Figure 13a**) and the absence of Greenland blocking that instead morphs into Scandinavian blocking (see **Figure iv**). Canadian warming can spawn Greenland blocking. Greenland blocking is not showing up in the weather model forecasts but something to watch.

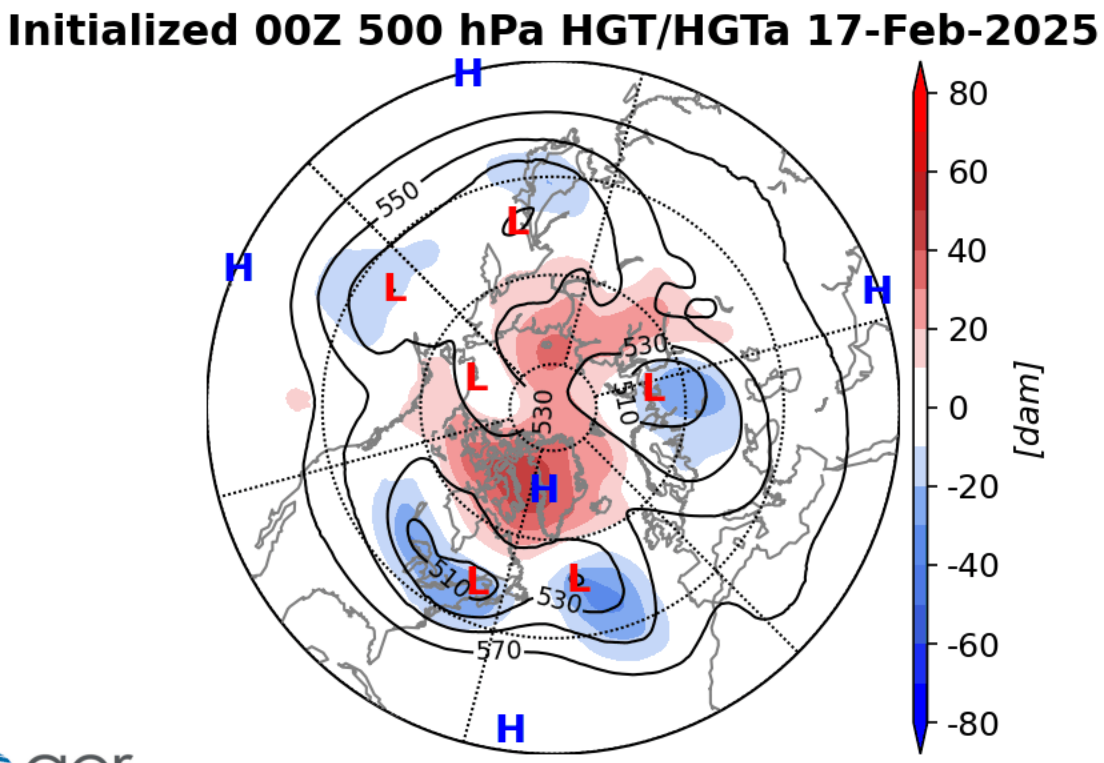

Figure iv. Initialized 500 mb geopotential heights (dam; contours) and decameter anomalies (dam; shading) across the Northern Hemisphere for 18 February 2025 and forecasted from 18 February to 3 March 2025. The forecasts are from the 00Z 17 February 2025 GFS model ensemble.

As I discussed in last week's blog, Greenland blocking is a precursor of a stretched PV in two weeks' time. The European weeklies or beyond two weeks had been advertising a weakening of the PV that first resembles a Canadian warming but then transitions to a full sudden stratospheric warming (SSW). Our research shows that Canadian warming almost always transitions to either an SSW or a stretched PV. The GFS ensembles were the first to suggest we would transition from the Canadian warming to yet another stretched PV (see **Figure v**) and not an SSW. It looked to me that the ECMWF weeklies have now come around in agreement with the GFS and in agreement with the Greenland blocking precursor. A stretched PV could transition to an SSW (or given the lateness in the season even a Final warming) and I think that is still on the table.

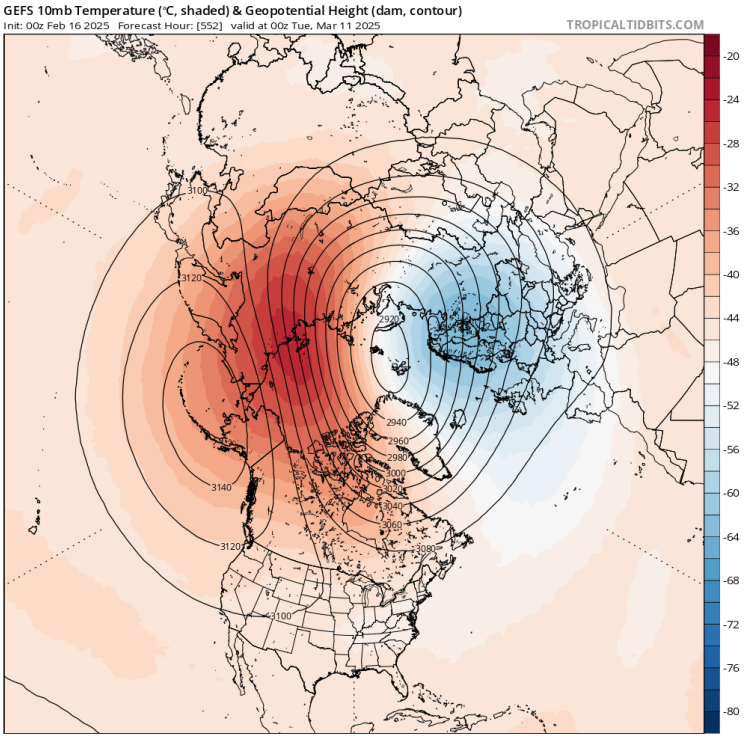

Figure v. Forecasted 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 11 Mar 2025. The forecasts are from the 0Z 16 February 2025 GFS ensembles. Plot taken from https://www.tropicaltidbits.com/analysis/models/.

I ended last week's Impact section when in doubt default to "what you see is what you get." And at least through the first half of March that looks to be working out pretty well. Looks like by the second week of March we should be under the influence of the eleventh stretched PV of the winter (for the purists March is already meteorological spring) with cold returning to East Asia and or the Eastern US. So, for those hoping for an early spring in the Eastern US, you might need at least a little more patience.

Near-Term

This week

The AO is predicted to be mostly negative this week **(Figure 1**) with mostly positive geopotential height anomalies across the Arctic and with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 2**). With predicted positive geopotential height anomalies across Greenland (**Figure 2**), the NAO is predicted to be mostly negative this week.

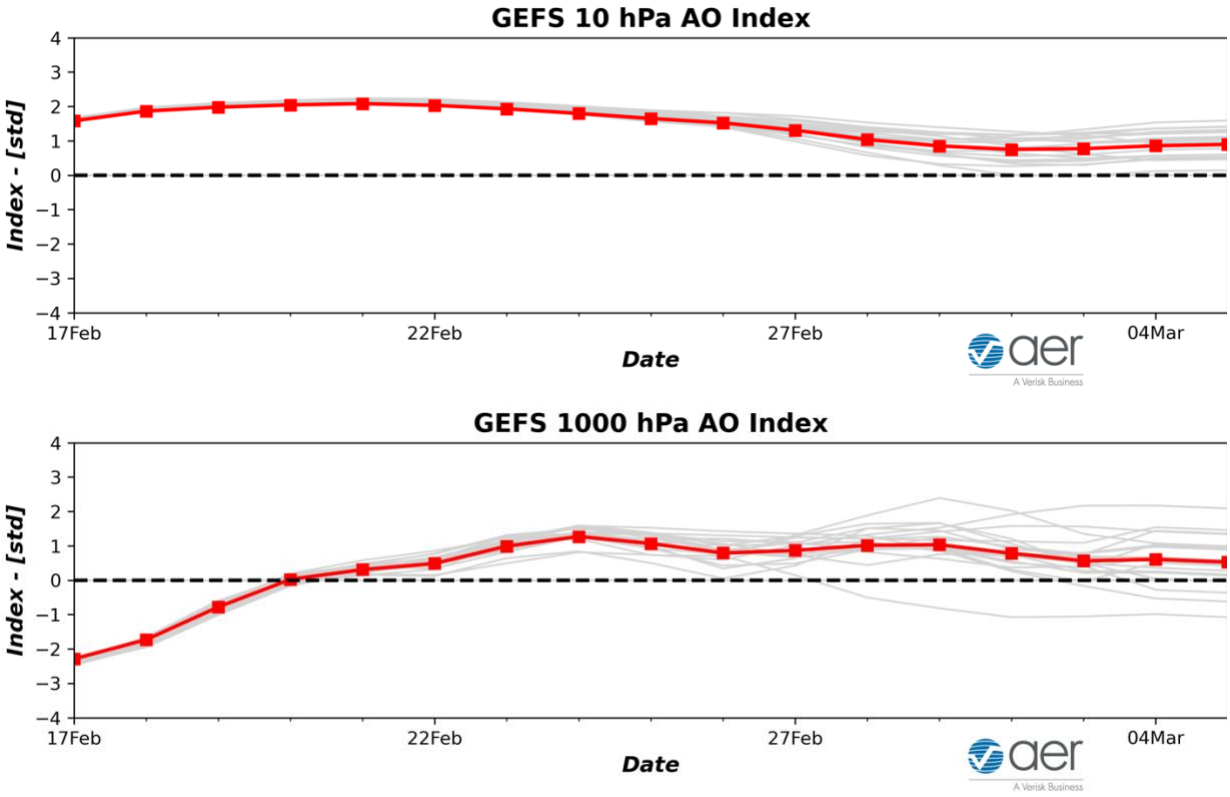

Figure 1. a) The predicted daily-mean AO at 10 hPa from the 00Z 17 February 2025 GFS ensemble. b) The predicted daily-mean AO at 1000 hPa from the 00Z 17 February 2025 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble mean AO index given by the red line with squares.

This week ridging/positive geopotential height anomalies across Greenland will support troughing/negative geopotential height anomalies across much of Europe ridging/positive geopotential height anomalies across Western Europe (**Figures 2).** This pattern will favor normal to below normal temperatures across Central and Eastern Europe with normal to above normal temperatures across Western and Northern Europe including the UK this period (**Figure 3**). This week ridging/positive geopotential height anomalies across Greenland will support troughing/negative geopotential height anomalies across Western and Northeast Asia with ridging/positive geopotential height anomalies centered in the Central Asia (**Figure 2**). This pattern favors normal to above normal temperatures widespread across much of Asia but especially Siberia with normal to below normal temperatures across Western and Northeast Asia **(Figure 3**).

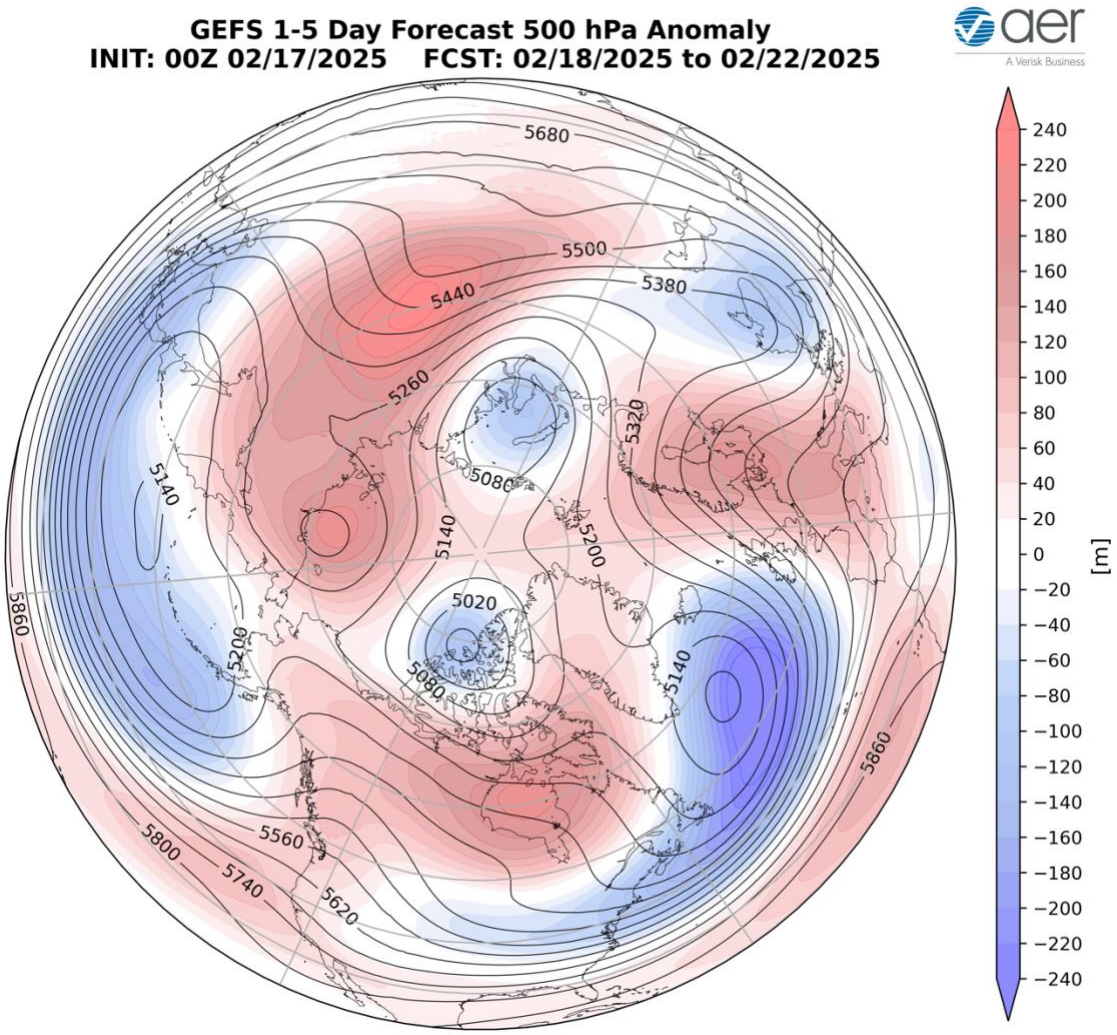

Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 18 Feb to 22 Feb 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

This week ridging/positive geopotential height anomalies in the Gulf of Alaska and draped the North American Arctic will support troughing/negative geopotential height anomalies across much of Canda and the US with more ridging in the Southwestern US. (**Figure 2**). This pattern favors normal to above normal temperatures across Alaska, Northern Canada and the Southwestern US with normal to below normal temperatures across much of Southern Canada and the US (**Figure 3**).

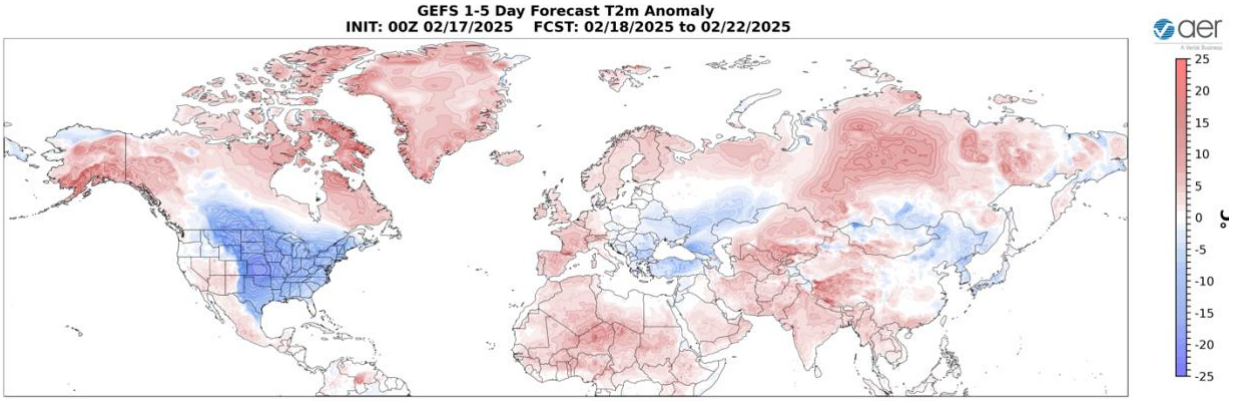

Figure 3. Forecasted surface temperature anomalies (°C; shading) from 18 Feb to 22 Feb 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall in the Caucuses, parts of Siberia, Central and Northeast Asia and the Tibetan Plateau while warm temperatures will support snowmelt in Scandinavia, the Alps and Central Siberia this week (**Figure 4**). Troughing and/or cold temperatures will support new snowfall across southern Alaska, Western Canada and from the US Plains into the Mid-Atlantic while warm temperatures will support snowmelt in central southern Alaska, Western and Southern Canada and the Western and Northeastern US this week (**Figure 4**).

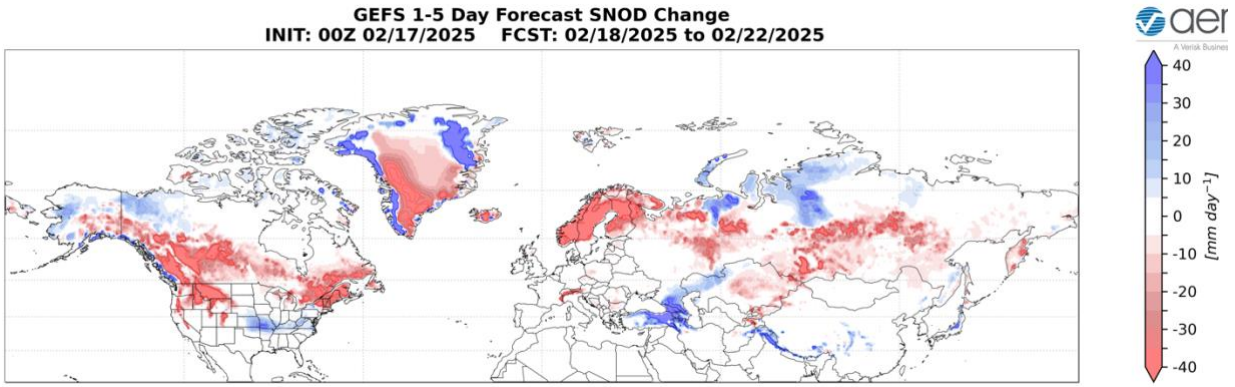

Figure 4. Forecasted snow depth changes (mm/day; shading) from 18 Feb to 22 Feb 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Near-Mid Term

Next week

With geopotential height anomalies becoming mostly negative across the Arctic and with mixed geopotential height anomalies across the mid-latitudes this period (**Figure 5**), the AO will likely be positive this period (**Figure 1**). With predicted mostly negative pressure/geopotential height anomalies across Greenland (**Figure 5**), the NAO will likely be positive this period as well.

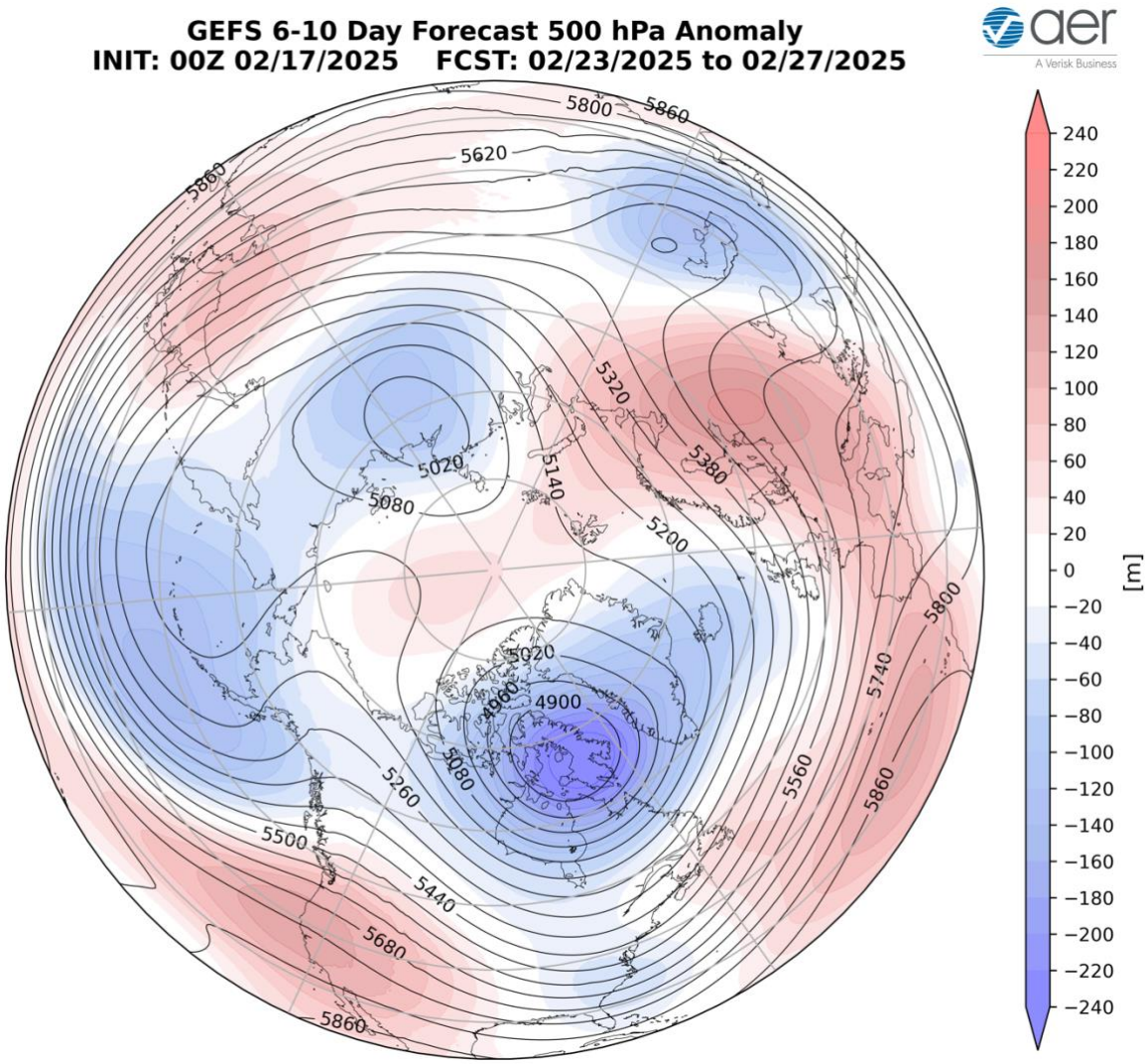

Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 23 Feb to 27 Feb 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Deepening troughing/negative geopotential height anomalies across Greenland will support strengthening ridging/positive geopotential height anomalies across Europe with residual troughing/negative geopotential height anomalies across Southeastern Europe this period

(**Figure 5**). This pattern favors widespread normal to above normal temperatures across much of Europe including the UK with normal to below normal temperatures mostly limited to Southeastern Europe including Turkey this period (**Figure 6**). Troughing/negative geopotential height anomalies across Greenland are predicted to support widespread ridging/positive geopotential height anomalies across the much of Asia with troughing/negative geopotential height anomalies mostly limited to Northern Siberia (**Figure 5**). This pattern favors widespread normal to above normal temperatures across Asia with normal to below normal temperatures limited to the Middle East and parts of far Northern and Eastern Siberia this period (**Figure 6**).

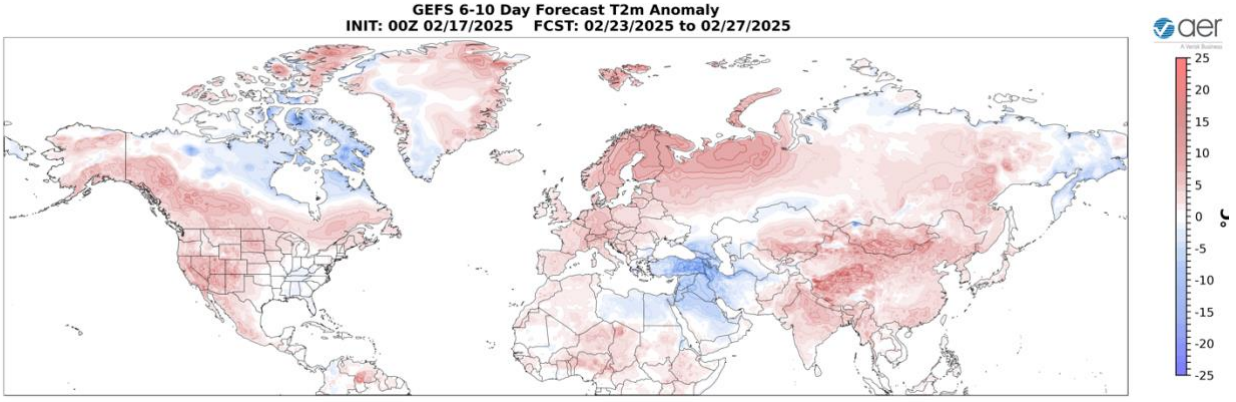

Figure 6. Forecasted surface temperature anomalies (°C; shading) from 23 Feb to 27 Feb 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Ridging/positive geopotential height anomalies predicted across the Alaska, Western Canada and the Western US will support troughing/negative geopotential height anomalies across Eastern Canada and the Eastern US this period (**Figure 5**). This pattern will favor normal to above normal temperatures across Alaska, much of Canada and the Western US with normal to below normal temperatures across Northern Canada and the Eastern US (**Figure 6**).

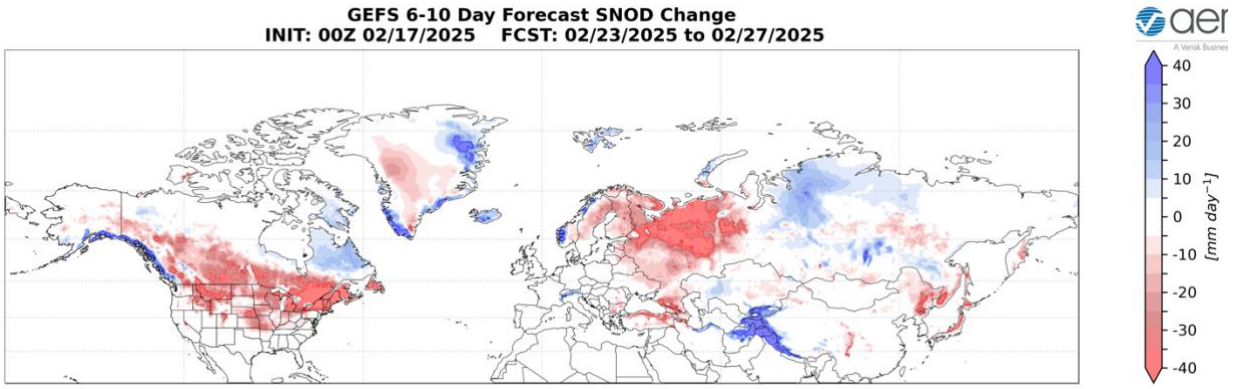

Figure 7. Forecasted snow depth changes (mm/day; shading) from 23 Feb to 207 Feb 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across the Alps, the Balkans, Northeastern Asia and the Tibetan Plateau while warm temperatures will support snowmelt in parts of Scandinavia, Western Russia, the Caucuses, Siberia and Northeast Asia this period (**Figure 7**). Troughing and/or cold temperatures will support new snowfall across southern Alaska, the West Coast mountains of Canada and Quebec while warm temperatures will support snowmelt in Western and Southern Canada, the Western and Northern US this period (**Figure 7**).

Mid Term

Week Two

With predicted persistent mostly negative geopotential height anomalies across the Arctic and mixed geopotential height anomalies across the mid-latitudes this period (**Figure 8**), the AO will likely remain positive to neutral this period (**Figure 1**). With predicted persistent negative pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will likely also be neutral to positive this period.

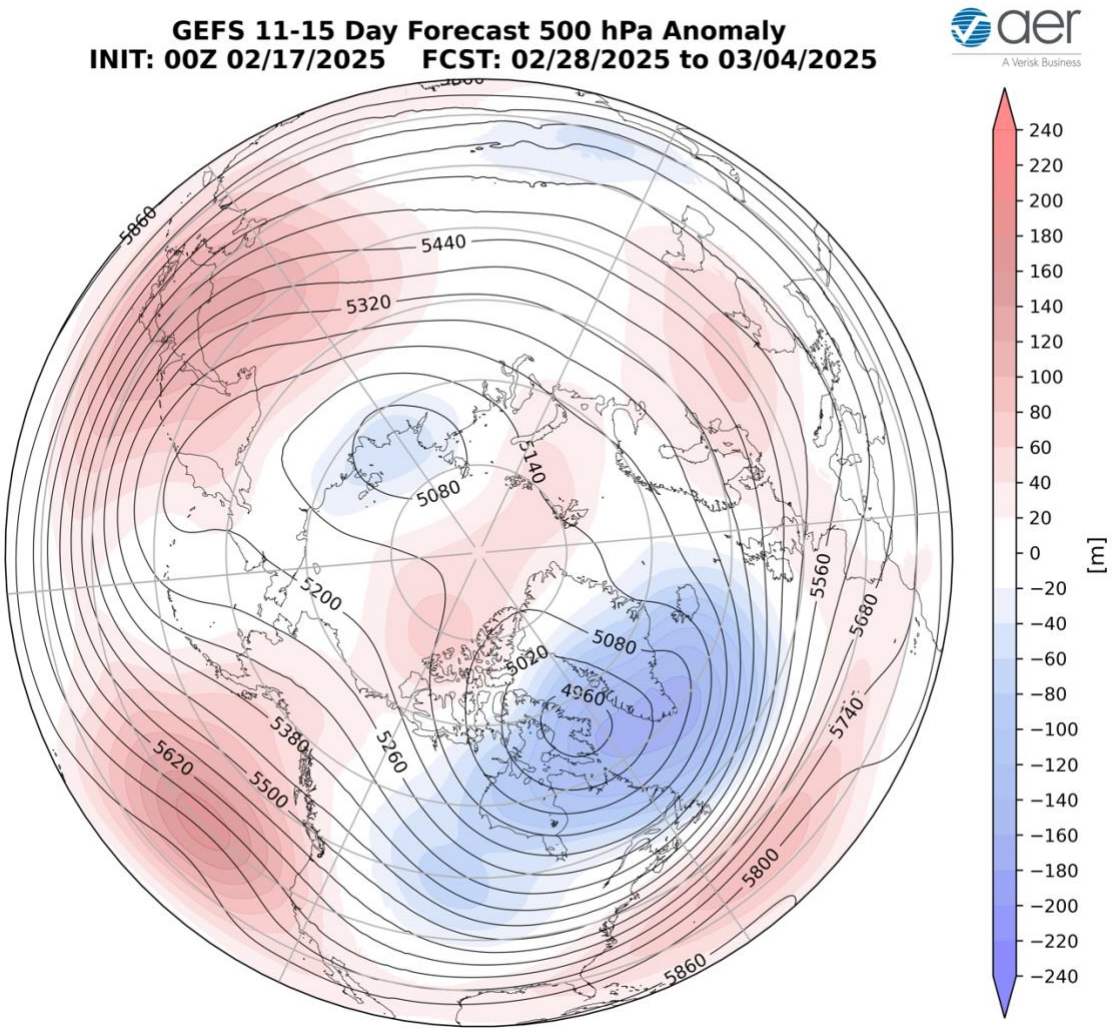

Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 28 Feb to 4 March 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Persistent troughing/negative geopotential height anomalies across Greenland are predicted to support ridging/positive geopotential height anomalies across most of Europe with lingering troughing/negative geopotential height anomalies across the Eastern Mediterranean (**Figure 8**). This pattern should favor normal to above normal temperatures across much of Europe including the UK with normal to below normal temperatures across Southeastern Europe but mostly Turkey this period (**Figures 9**). The persistent troughing/negative geopotential height anomalies across Greenland are predicted to persist supporting ridging/positive geopotential height anomalies across much of Asia with troughing/negative geopotential height anomalies across Northern Siberia and Southwestern Asia this period (**Figure 8**). The predicted pattern favors widespread normal to above normal temperatures across most of Asia and the Indian subcontinent with normal to below normal temperatures limited to Southwestern Asia this period (**Figure 9**).

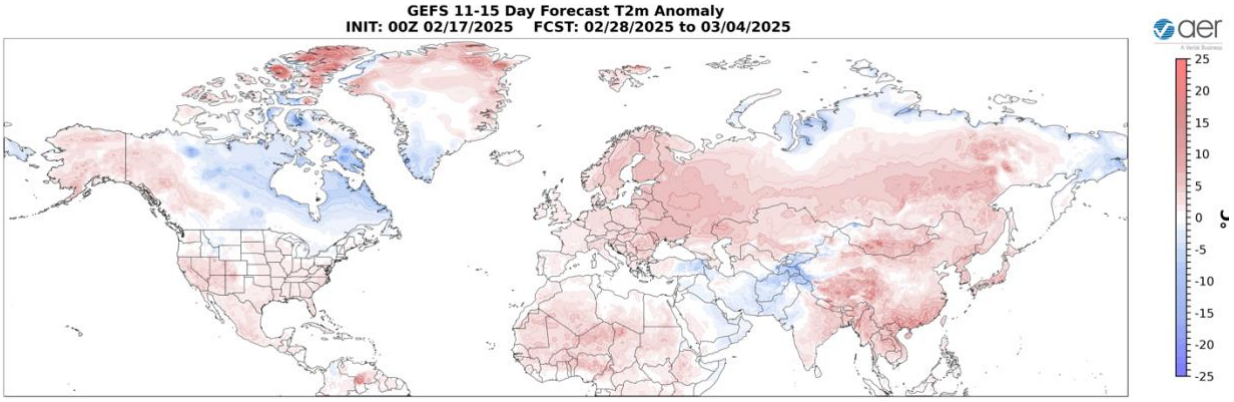

Figure 9. Forecasted surface temperature anomalies (°C; shading) from 28 Feb to 4 March 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Ridging/positive geopotential height anomalies in the Gulf of Alaska and Alaska will support troughing/negative geopotential height anomalies across Eastern Canada and the Eastern US this period (**Figure 8**). This pattern continues to support normal to above normal temperatures across Alaska, Western Canada and across much of the US with normal to below normal temperatures mostly limited to Eastern Canada this period (**Figure 9**).

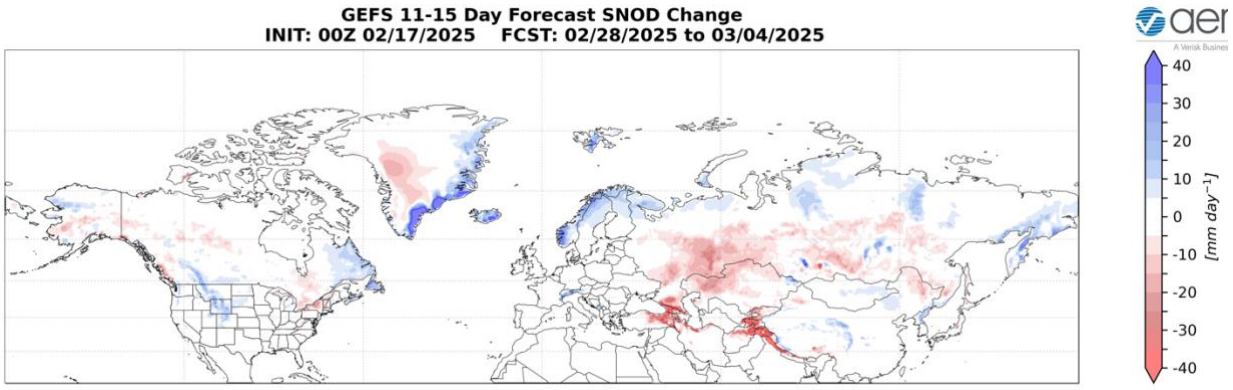

Figure 10. Forecasted snow depth changes (mm/day; shading) from 28 Feb to 4 March 2025. The forecasts are from the 00Z 17 February 2025 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Norway, the Alps and parts of Siberia while warm temperatures will support snowmelt in the Caucuses, parts of Siberia and the Tibetan Plateau this period (**Figure 10**). Troughing and/or cold temperatures will support new snowfall across western Alaska the Rockies of Canada and the US and Quebec while warm temperatures will support snowmelt in Southern Alaska, parts of Canada and the Northeastern US this period (**Figure 10**).

Longer Term

30–day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows warm/positive PCHs in the troposphere with cold/negative PCHs in the stratosphere (**Figure 11**). The cold/negative PCHs in the stratosphere are predicted to persist, then strengthen and descend into the troposphere next week. The warm/positive PCHs in the troposphere are predicted to weaken and flip cold/negative next week and possibly return to warm/positive for the following week. The cold/negative PCHs in the stratosphere representing a strong PV will finally couple with the troposphere next week forcing a positive surface AO (**Figure 11**).

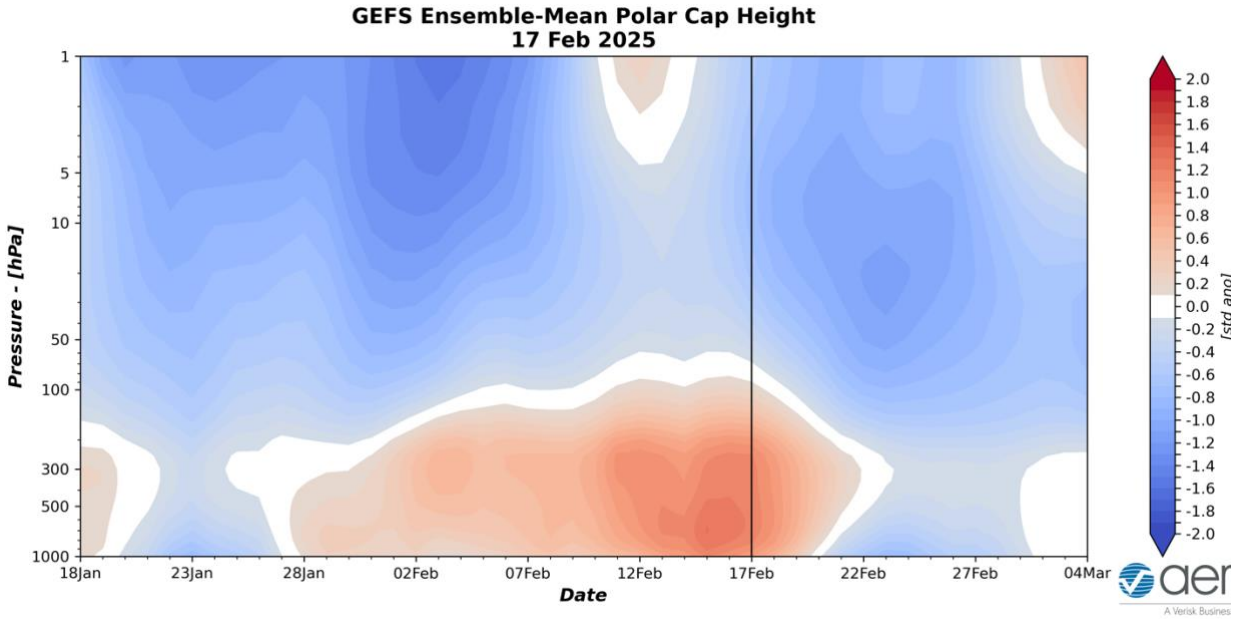

Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 17 February 2025 GFS ensemble.

The predicted warm/positive and cold/negative PCHs in the lower troposphere this week (**Figure 11**) are consistent with the predicted negative surface AO this week (**Figure 1**). Then as the cold/negative PCHs in the stratosphere descend to the surface the AO is predicted to trend positive through the end of February.

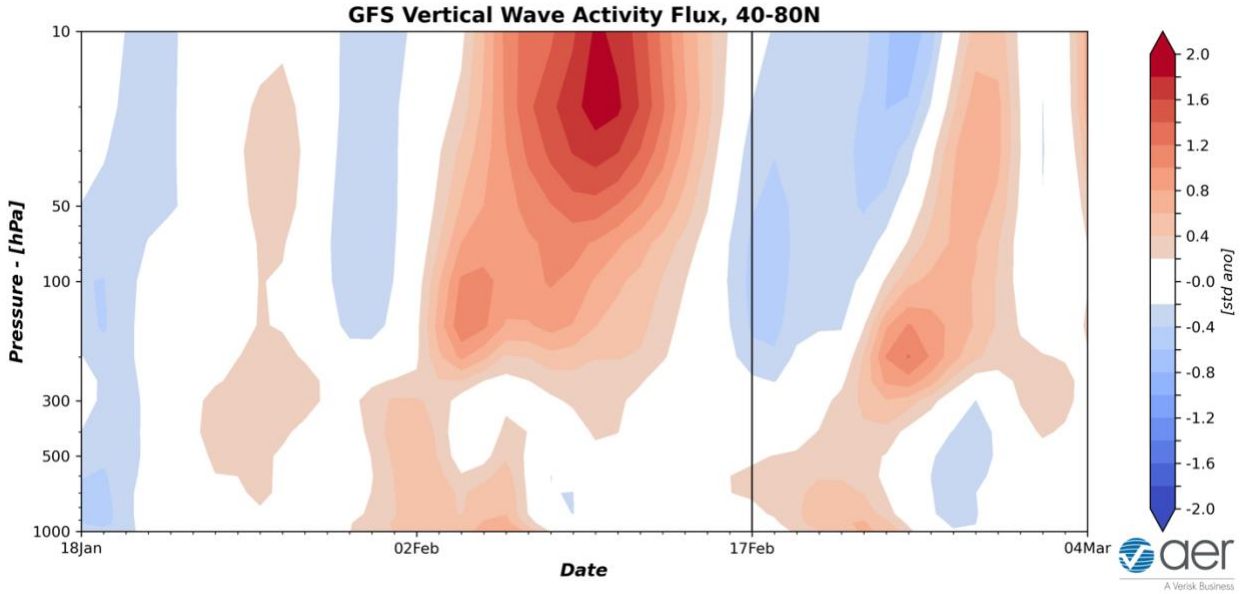

Figure 12. Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 17 February 2025 GFS ensemble.

Vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere has been relatively quiet this entire season (**Figure 12**). However, the strongest pulse of WAFz of the season ended last week (**Figure 12**). This larger pulse is followed by negative WAFz anomalies this week, characteristic of wave reflection. WAFz turns positive again next week and could yet be more wave reflection.

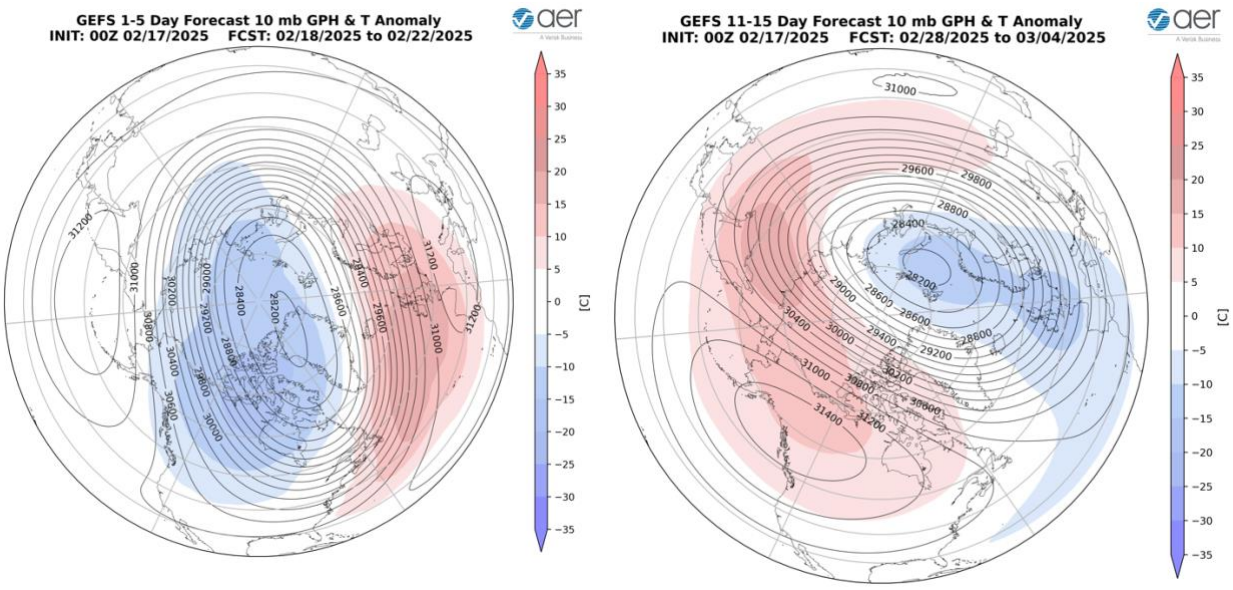

Figure 13. (a) Forecasted 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 18 Feb to 22 Feb 2025. (b)

Same as (a) except forecasted averaged from 28 Feb to 4 March 2025. The forecasts are from the 00Z 17 February 2025 GFS model ensemble.

Currently the polar vortex (PV) is centered is stretched out or elongated in shape with relatively coldest temperatures across the Central Arctic in the polar stratosphere with high-pressure ridging near Alaska and the relatively warmest temperatures across the North Atlantic and Europe (**Figure 13a**). This is consistent with a stretched PV that favors relatively cold temperatures in the Eastern US. Then at the end of February and into early March the PV is centered over the Barents-Kara Seas with ridging over Canada in the polar stratosphere. The relatively coldest temperatures of the polar stratosphere are predicted across the Northwest Eurasia in the stratosphere and the warmest temperatures across Siberia and into Canada (**Figure 13b**). This is consistent with a Canadian warming, the second of the winter. The stratospheric AO in **Figure 1** this week continues to show that despite the repeated stretched PVs and even the Canadian warmings, overall, the PV remains relatively strong.

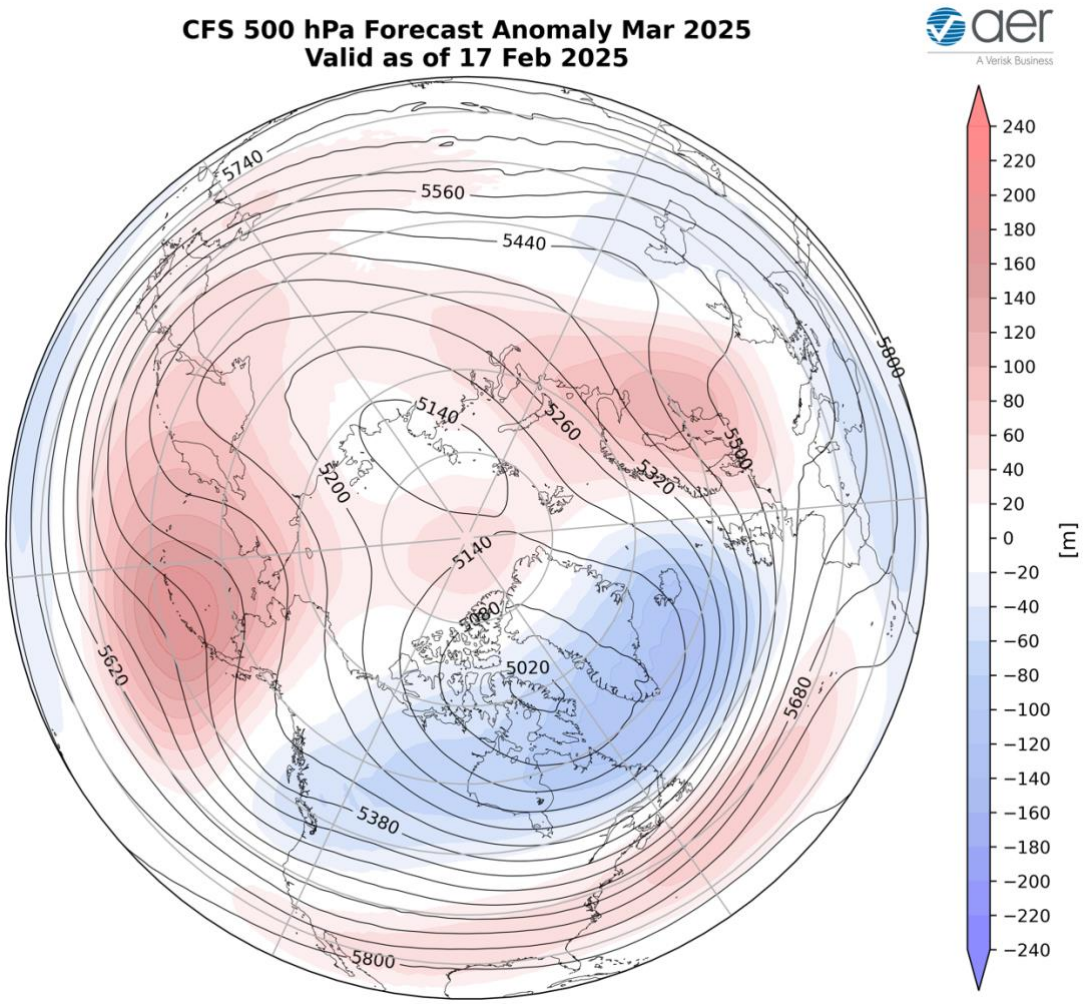

Figure 14. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for March 2025. The forecasts are from the 00Z 17 February 2025 CFS.

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 across Northern Europe, in the Barents-Kara Seas, near the Aleutians, Alaska and the Southeastern US with troughing across the Eastern Mediterranean, Northern and Eastern Asia, Alaska, Western Canada, the Western US and Baffin Bay (**Figure 14**). This pattern favors seasonable to relatively warm temperatures across Europe, much of Asia, Northern and Eastern Siberia and much of the US with seasonable to relatively cold temperatures across Southeastern Europe, the Middle East, Southern Siberia, Northeast Asia, Canada and the Western and Northern US (**Figure 15**).

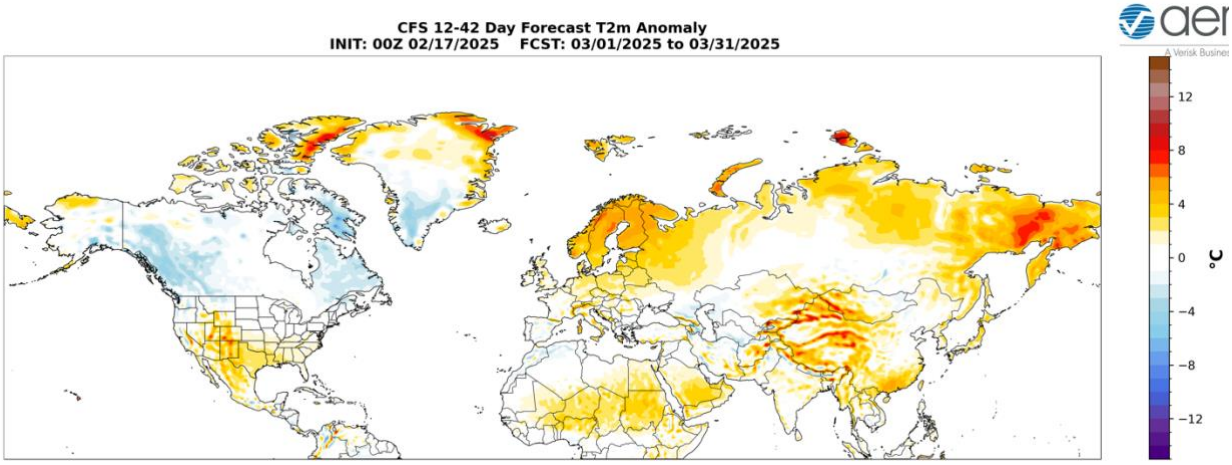

Figure 15. Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for March 2025. The forecasts are from the CFS 00Z 17 February 2025.

Boundary Forcings

Arctic Sea Ice

Sea ice growth continues relatively slowly with negative anomalies in the Barents-Kara Seas, the Sea of Okhotsk, the Bering Sea and the Labrador Sea (see **Figure 16**). The lack of sea ice in the that favors a weak PV, more high latitude blocking and colder temperatures across the interior of the NH continents. The influence of sea ice on remote weather is likely waning.

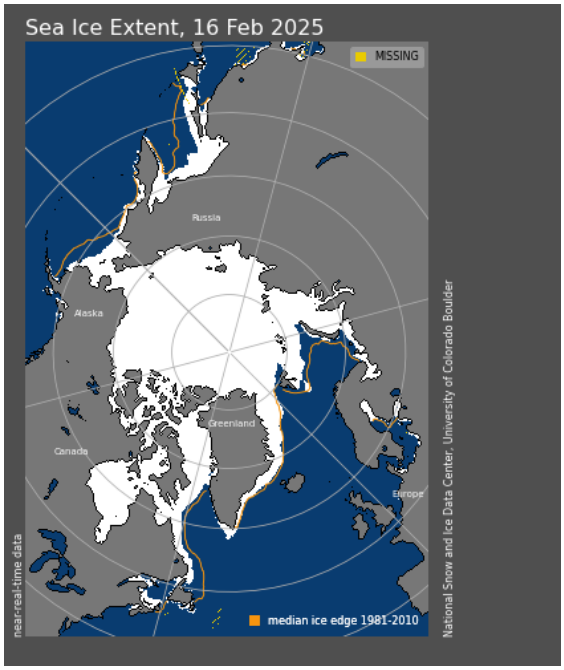

Figure 16. Observed Arctic sea ice extent on 16 February 2025 (white). Orange line shows climatological extent of sea ice based on the years 1981-2010. Image from the National Snow and Ice Data Center (NSIDC). URL: https://nsidc.org/sea-ice-today

SSTs/El Niño/Southern Oscillation

Equatorial Pacific sea surface temperatures (SSTs) anomalies are below normal, between the Dateline and the South America coast, indicating that a La Niña event has emerged but is focused more near the Dateline rather than close to the South American coast (**Figure 17**) and weak La Niña conditions are expected through the end of winter. Observed SSTs across the NH remain well above normal especially in the central North Pacific centered on the Dateline and the western North Pacific, much of the North Atlantic and offshore of the Canadian Maritimes though below normal SSTs exist regionally especially in the South Pacific. I have wondered if the warmer SSTs this year relative to recent years along the west coast of North America is favoring the cold air further to the east this winter compared to the past decade and this was certainly true in January and now also February.

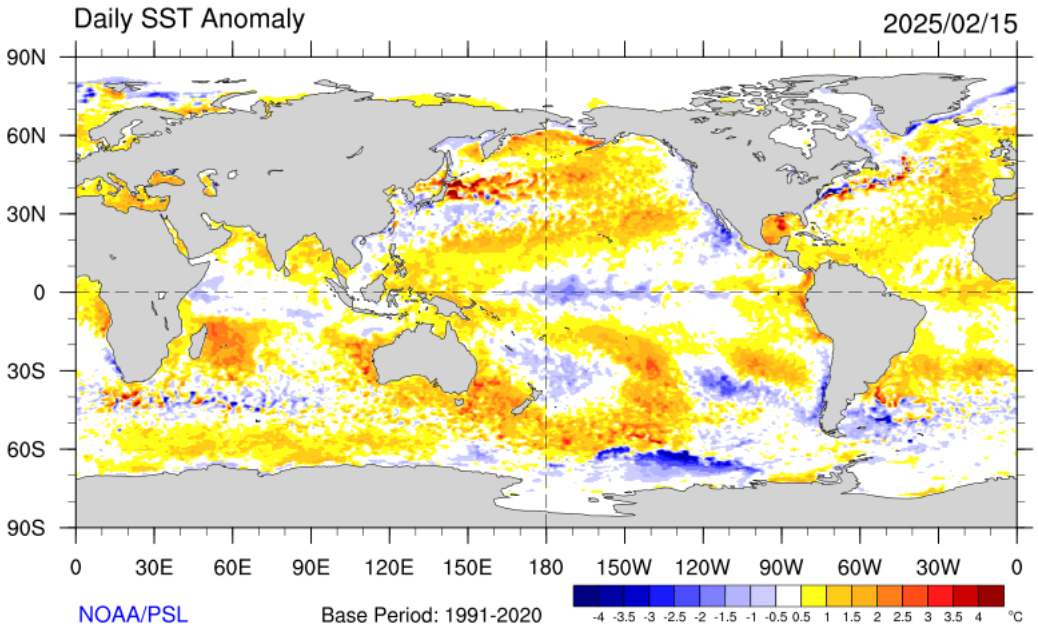

Figure 17. The latest daily-mean global SST anomalies (ending 15 Feb 2025). Data from NOAA OI High-Resolution dataset. Plot take from https://psl.noaa.gov/map/clim/sst.shtml

Madden Julian Oscillation

Currently the Madden Julian Oscillation (MJO) is in phase eight (**Figure 18**). The forecasts are for the MJO to quickly move into phase one and then weaken to where no phase is favored. Phases eight and one favor Western US ridging and Eastern US troughing. Therefore, it seems that the MJO may be having some influence on North American weather for next week. But admittedly this is outside of my expertise.

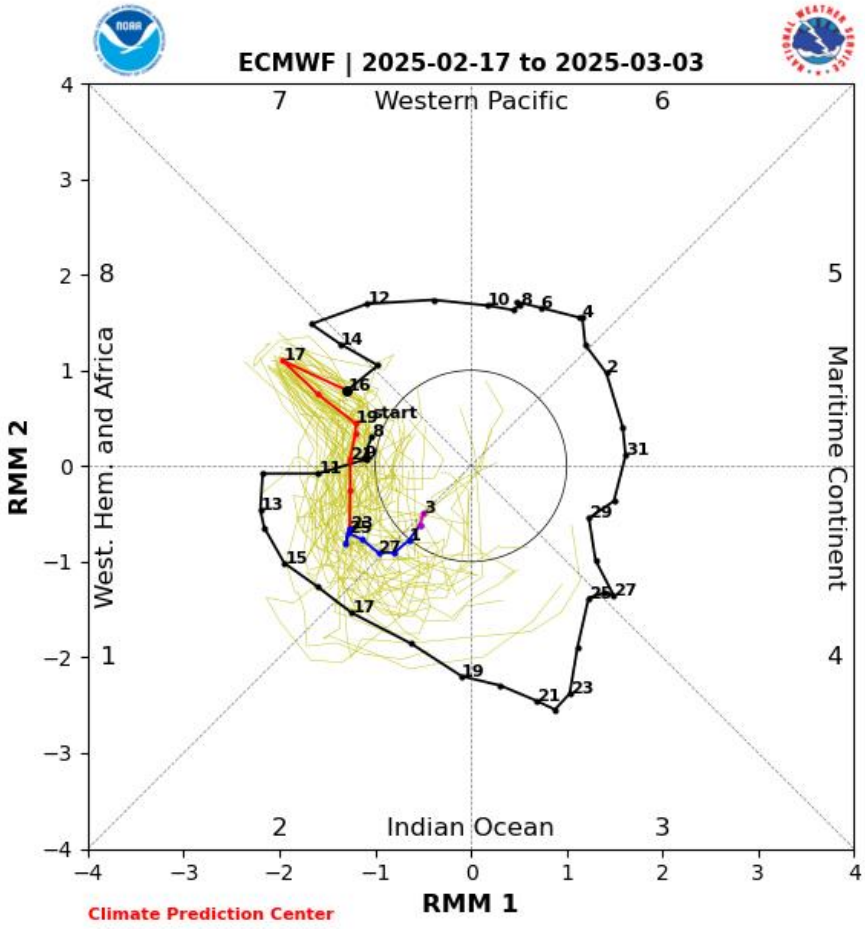

Figure 18. Past and forecast values of the MJO index. Forecast values from the 00Z 17 February 2025 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model 'spread' is denoted by the gray shading. Sector numbers indicate 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/ecmf.shtml

Atmospheric and Environmental Research

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