Arctic Oscillation and Polar Vortex Analysis and Forecasts

December 19, 2022

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.

Subscribe to our email list or follow me on Twitter (@judah47) for notification of updates.

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

Summary

- The Arctic Oscillation (AO) is currently negative and is predicted to remain negative to weakly negative the next two weeks as pressure/geopotential height anomalies across the Arctic are predicted to remain positive especially in the North Atlantic sector. The North Atlantic Oscillation (NAO) is currently neutral and is predicted to remain neutral to negative the next two weeks as pressure/geopotential height anomalies are predicted to be mostly positive to across Greenland.

- Over the next two weeks ridging/positive geopotential height anomalies centered near Greenland will favor troughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe. This pattern will generally favor normal to below normal temperatures across Northern Europe including the United Kingdom (UK) with normal to above normal temperatures across Southern and Central Europe.
- Over the next two weeks, predicted ridging/positive geopotential height anomalies near Eastern Siberia will expand westward across Siberia with some residual troughing/negative geopotential height anomalies across East Asia. This pattern favors expanding normal to above normal temperatures across Siberia and much of Asia with normal to below normal temperatures limited to East Asia the next two weeks.
- The general pattern this week across North America is ridging/positive geopotential height anomalies centered in the Beaufort Sea that extend southward into the Gulf of Alaska forcing downstream troughing/negative geopotential height anomalies in Western Canada and the Eastern United States (US). However, next week ridging/positive geopotential height anomalies in the Beaufort Sea will drift into Siberia allowing troughing/negative geopotential height anomalies across Alaska, Western Canada and the Western US with ridging/positive geopotential height anomalies in eastern North America. This pattern favors this week widespread normal to below normal temperatures across Alaska, Northern and Western Canada and the Central and Eastern US with normal to above normal temperatures across the Southwestern Canada, New England and Eastern Canada. However, next week below normal temperatures will be confined to western North America while mild temperatures spread east of the Rockies in Canada and the US.
- I discuss what we can expect in the coming weeks with the polar vortex (PV) and hemispheric temperatures.
- I am on vacation next week. I will not be publishing a blog next Monday but may try to publish a brief update on Friday.

Plain Language Summary

The polar vortex (PV) is predicted to become stronger and more circular in shape heading into January. This pattern is supportive of mild temperatures east of the Rockies in North America, Europe and Asia and it does look like all three regions will be turning gradually milder. It is speculative on my part at this point, but I do think that the PV will not remain strong but another stretched PV that supports colder temperatures east of the Rockies across North America is probable in January.

Impacts

We have predicted severe winter weather in North America east of the Rockies this week with extreme cold and a blizzard. But longer term most of the long-range indicators are pointing to overall milder times ahead. The high latitude blocking that has been circumnavigating the Arctic has settled on Siberia. The most immediate result is relatively warm temperatures for much of Siberia. I do consider the temperature anomalies in Siberia as a precursor for temperature anomalies in East Asia, Europe and the Eastern US. But an indirect result should be a

strengthening polar vortex (PV). Stronger than normal standing or climatological atmospheric waves favor a weaker than normal PV and weaker than normal standing or climatological atmospheric waves favor a stronger than normal PV. The largest atmospheric standing wave on the planet is high-pressure ridging across northwestern Eurasia and low-pressure troughing across Northeastern Eurasia and into the North Pacific and including Siberia. A Siberian high-pressure ridge destructively interferes with the large standing waves of the North Hemisphere (NH) and therefore contributes to strengthening of the PV. A stronger than normal PV especially when it is circular in shape favors an overall mild pattern across the NH. A strong and circular PV is predicted by all the models for early January (see **Figure 13b**).

Therefore, I do think a milder period is likely in early January. In Europe the transition from a colder to a milder pattern is already underway and will accelerate this week. In the Eastern US the cold will peak this week and will slowly turn milder and then become firmly above normal at the turn of the calendar year. Just like the models were premature in predicting the transition to a colder pattern I do think that the models are likely also too quick on the timing of above normal temperatures in the Eastern US. The models are suggestive that the ridging may consolidate across Northern Canada, this is not a cold apttern but could be more favorable for snow but this si all speculative.

I will just put this out and though there is little support for my assertion, I do think that the best chance of a snowstorm in the Northeastern US, down to the coast is right before the cold pattern flips to the much warmer pattern. I see no signs of a snowstorm in any of the weather models and the orientation of the PV seems hostile to this idea, but I still think it is something to watch even if just out of curiosity.

So, what comes next? Is this a repeat of winter 2019/20 where the strong PV couples to the surface with a positive AO and very mild temperatures across much of the NH continents for the remainder of the winter? It is certainly possible but for now I don't see this as the most likely scenario just yet. The predicted high-pressure ridging in two weeks across Europe and Siberia could eventually slide towards the Urals. Ural ridging coupled with low-pressure troughing predicted between Eastern Siberia and Alaska would excite an uptick in upwelling energy from the troposphere to the stratosphere. We are a long way off from a sudden stratospheric warming but even just one pulse of vertical energy is sufficient for a stretched PV that is often accompanied by colder weather east of the Rockies in Canada and the US. Again, without much support other than "the trend is your friend," I do think probabilities are high for at least one stretched PV in January since October, November and December have all experienced a stretched PV.

I conclude with more of an academic exercise. Last week I showed how wave energy propagation resulted in high-pressure ridging centered in the northern North Pacific sector (the mechanism for this week's bout of severe winter weather in the US). I have wondered if something similar could result in high-pressure ridging in the northern Nort Atlantic sector (near Greenland). As I did last week, analysis of Wave Activity Flux (WAF) in the vertical and longitudinal directions WAF this week is predicted to be directed upward and eastward (vectors in **Figure ia**) beginning in the Eurasian sector, continue through eastern North Pacific high-pressure ridging (orange shading centered at 300°E) then on to low-pressure troughing in eastern

North America and then finally is directed downwards where it converges in weak high-pressure ridging in the North Atlantic sector (orange shading centered near 300°E in **Figure ia**). Looking to the next period in **Figure ib**, the high-pressure ridging (orange shading centered between 300-360°E) clearly strengthens.

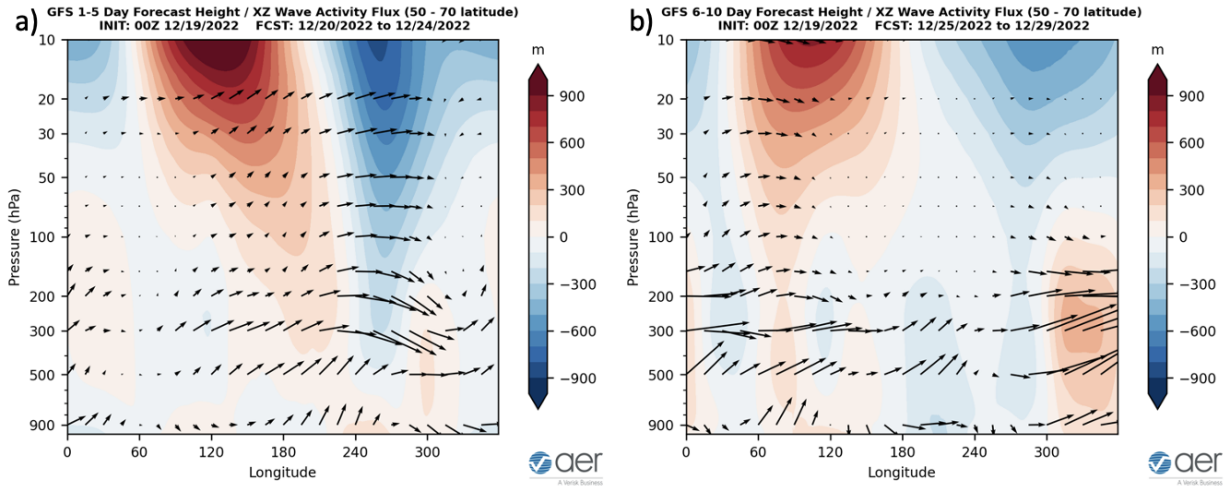

Figure i. Longitude-height cross section of geopotential eddy height anomalies (shading) and wave activity flux (vectors) a) initialized 19 December 2022 and b) forecasted for 25-29 December 2022. The forecast is from the 00Z 19 December 2022 GFS ensemble.

Unlike the North Pacific strengthening of high-pressure ridging that results in colder temperatures across eastern North America, this predicted high-pressure ridging in the North Atlantic sector is accompanied by a forecast of milder temperatures in eastern North America; at least for this one instance. Not sure what to make of all this but something that I thought to share in the blog.

Wednesday Update

The models are all consistently predicting milder weather across Asia, Europe and eastern North America to start the new year with colder than normal temperatures mostly limited to Eastern Siberia and the North American Arctic (see **Figure ii**).

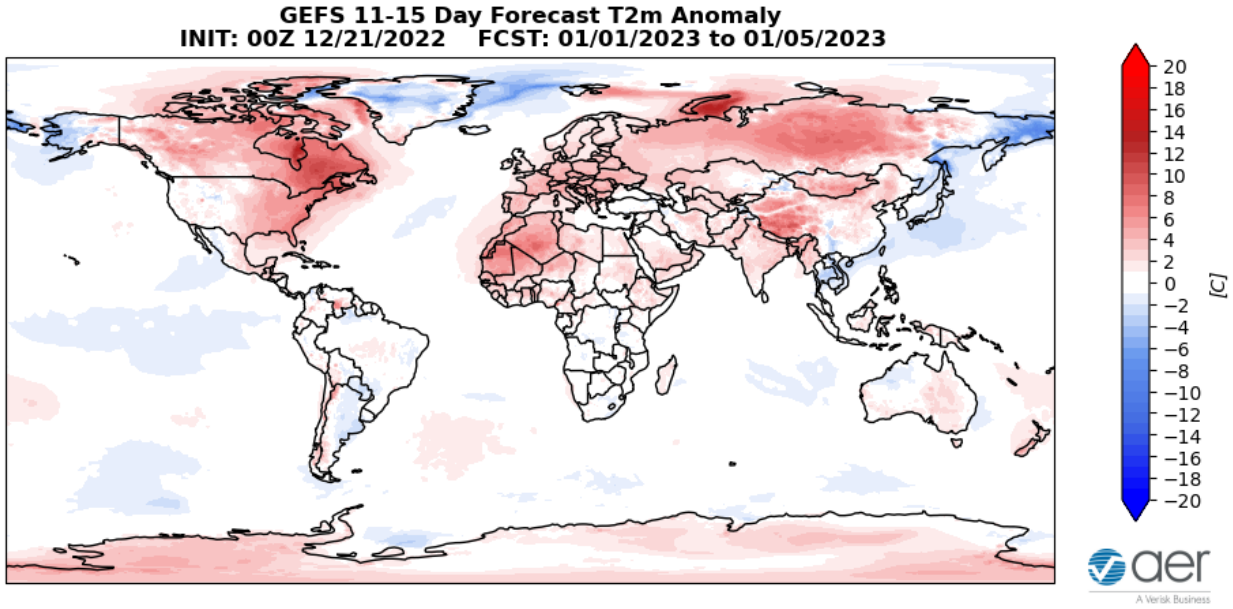

Figure ii. Forecasted surface temperature anomalies (°C; shading) from 1 – 5 January 2023. The forecast is from the 00Z 21 December 2022 GFS ensemble.

This is the temperature pattern most closely associated with a positive AO, but ironically enough, a positive AO is not predicted in the foreseeable future. But this temperature pattern is also associated with a stronger than normal PV. The models are predicting a textbook strong PV at the end of December with a nearly perfect circular round shape and with all the below normal geopotential heights concentrated in the polar stratosphere (see **Figure iii**).

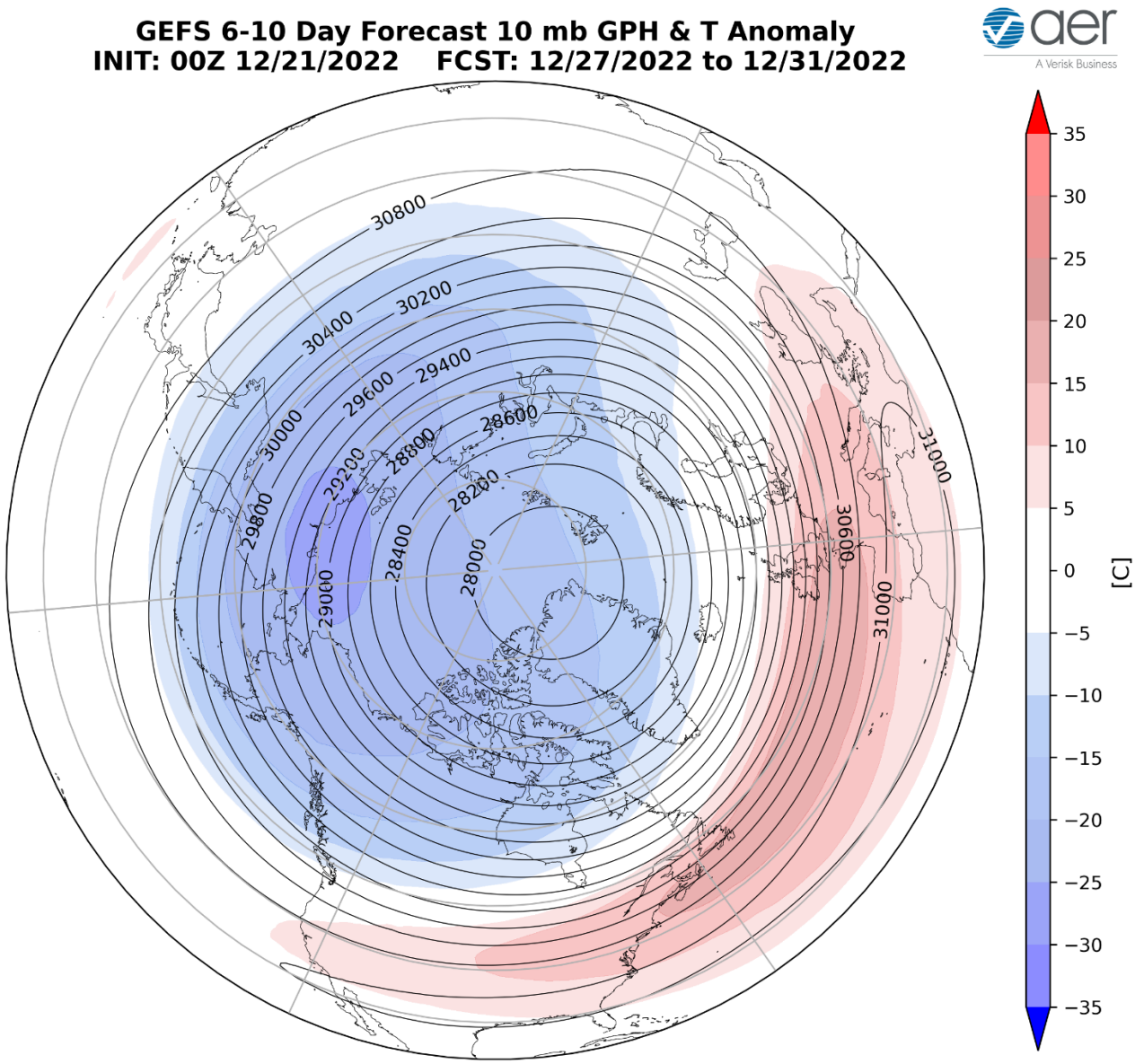

Figure iii. (a) Forecasted 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 27– 31 December 2022. The forecasts are from the 00Z 21 December 2020 GFS model ensemble.

On Monday I discussed my expectation of the predicted circulation pattern in the mid-troposphere should become more favorable for exciting more upwelling wave energy in early January. Though not perfect, high-pressure ridging seems to be converging around the Urals (but not centered on the Urals which is optimal for exciting wave energy) coupled with low-pressure troughing in the northern North Pacific sector (not shown). Consistent with the mid-tropospheric circulation forecast, last night's GFS is predicting more active WAFz in early January (not shown) and all the weather models are predicting a more disrupted look to the PV in early January. The predicted configuration does resemble a stretched PV with a trough axis

extending from Siberia to Hudson Bay coupled with warming and a high-pressure ridge centered near the Dateline (see **Figure iv**). At least the model forecasts are growing more consistent with my expectations expressed on Monday.

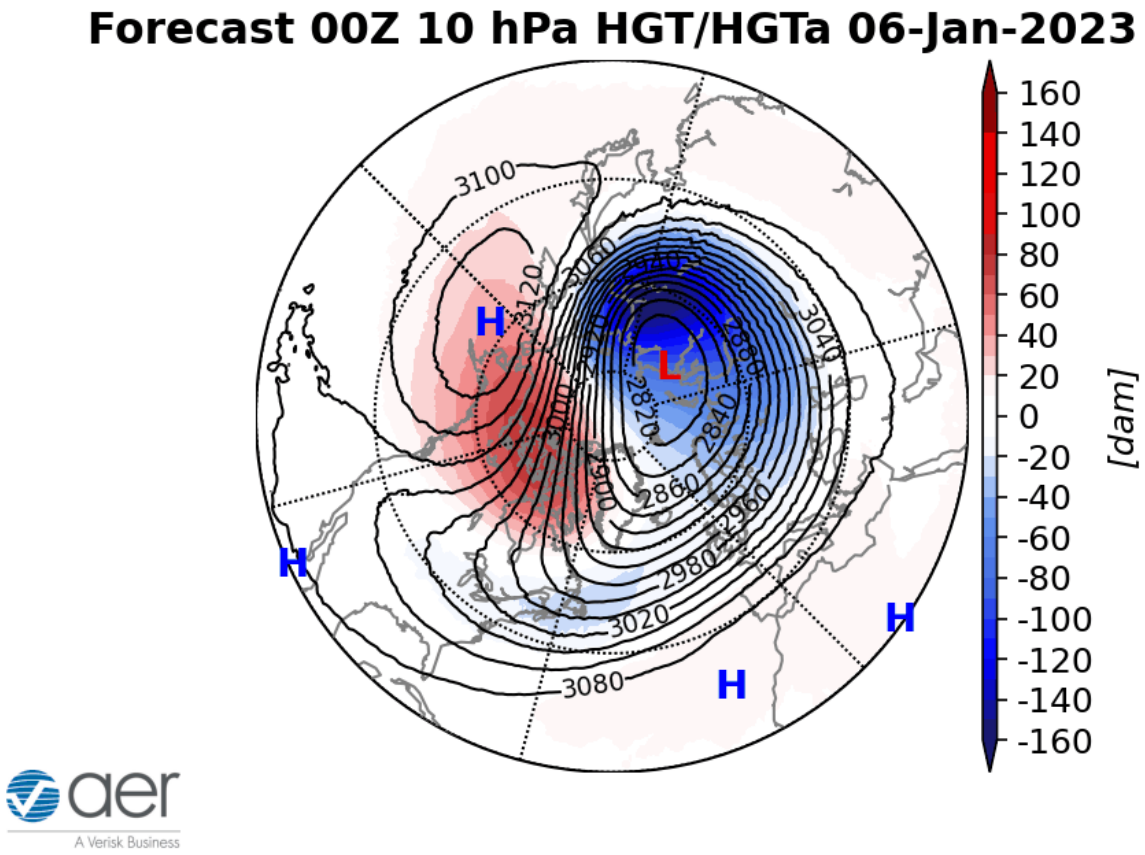

Figure iv. (a) Forecasted 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 6 January 2023. The forecasts are from the 00Z 21 December 2020 GFS operational model.

It is very early in discussing a possible PV disruption in January. Certainly, the models are not predicting a circulation pattern in the troposphere that is associated with a stretched PV, but the models tend to be slow in recognizing the coupling between the PV and the weather at the surface (and even if the PV forecasts are correct there is a lag anyway between the PV and the tropospheric circulation). We also don't even know if upwelling wave energy becomes more active, will it be absorbed in the stratosphere (favoring a sudden stratospheric warming) or reflected (favoring a stretched PV). So really much of this discussion is speculative but isn't that the reason we are all here.

Recent and Very Near Term Conditions

The AO is predicted to be negative this week **(Figure 1**) with positive geopotential height anomalies predicted across the North Pacific and North Atlantic sectors of the Arctic 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 neutral to negative this week as well (**Figure 1**).

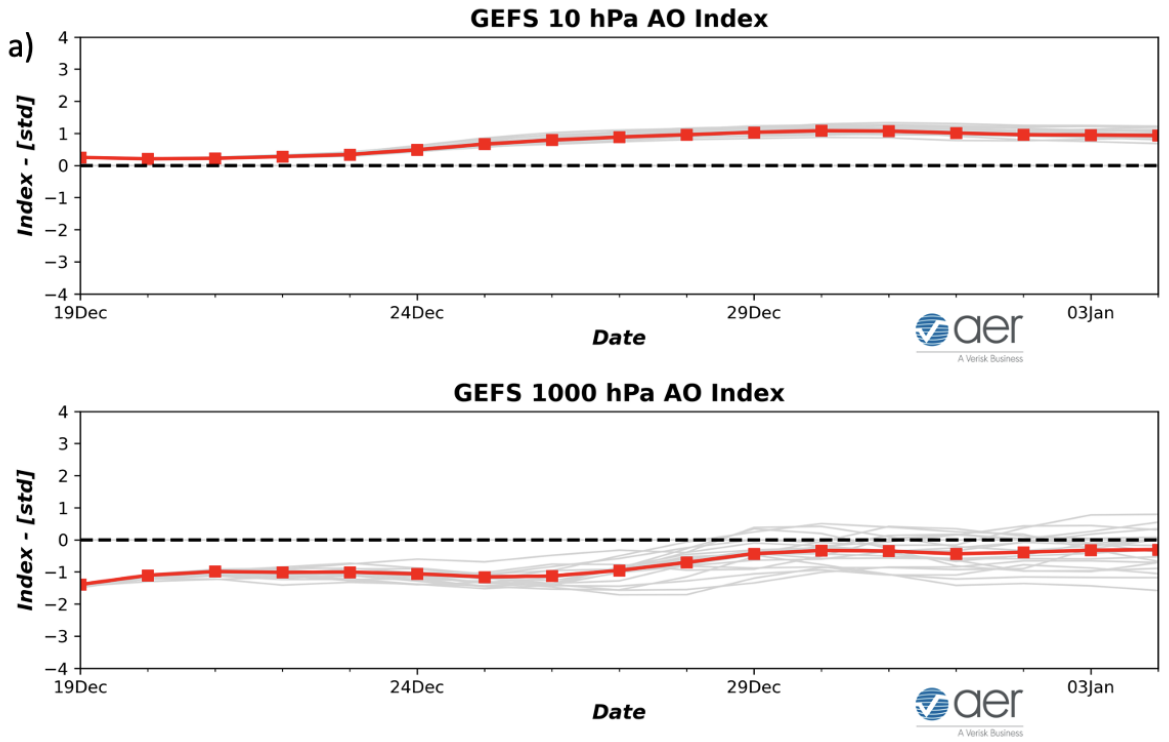

Figure 1. (a) The predicted daily-mean AO at 1000 hPa from the 00Z 19 December 2022 GFS ensemble. (b)The predicted daily-mean near-surface AO from the 00Z 19 December 2022 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.

Ridging/positive geopotential height anomalies across Greenland and Baffin Bay will favor troughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe (**Figure 2). This will favor** normal to below normal temperatures across Northern Europe with normal to above normal temperatures across much of Southern and Central Europe including the UK (**Figure 3**). Ridging/positive geopotential height anomalies in the Beaufort and Chukchi Seas will spread into Eastern Siberia with troughing/negative geopotential height anomalies across Western Siberia that extend southeastward into East Asia (**Figure 2**). This pattern favors normal to above normal temperatures across Eastern Siberia and Southern and Western Asia with normal to below normal temperatures across Western Siberia and East Asia **(Figure 3**).

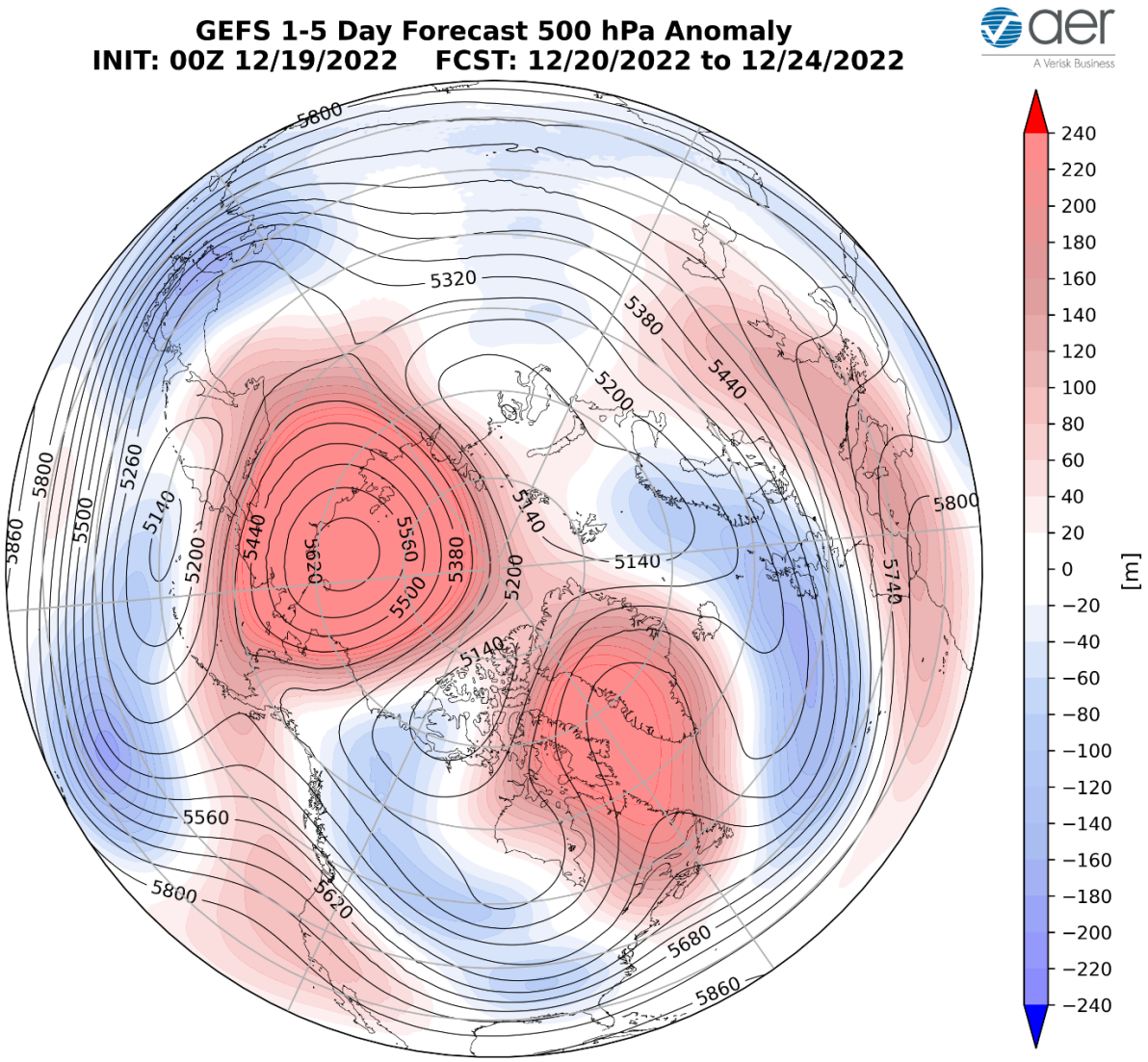

Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 20 – 24 December 2022. The forecasts are from the 00z 19 December 2022 GFS ensemble.

Ridging/positive geopotential height anomalies predicted to be centered in the Beaufort Sea will extend southward into the Gulf of Alaska will force troughing/negative geopotential height anomalies from Western Canada southeastward into the Eastern US **(Figure 2).** The pattern will favor normal to below normal temperatures across Alaska, Western Canada and the Eastern and Central US with normal to above normal temperatures across Eastern Canada and the Southwestern US **(Figure 3).**

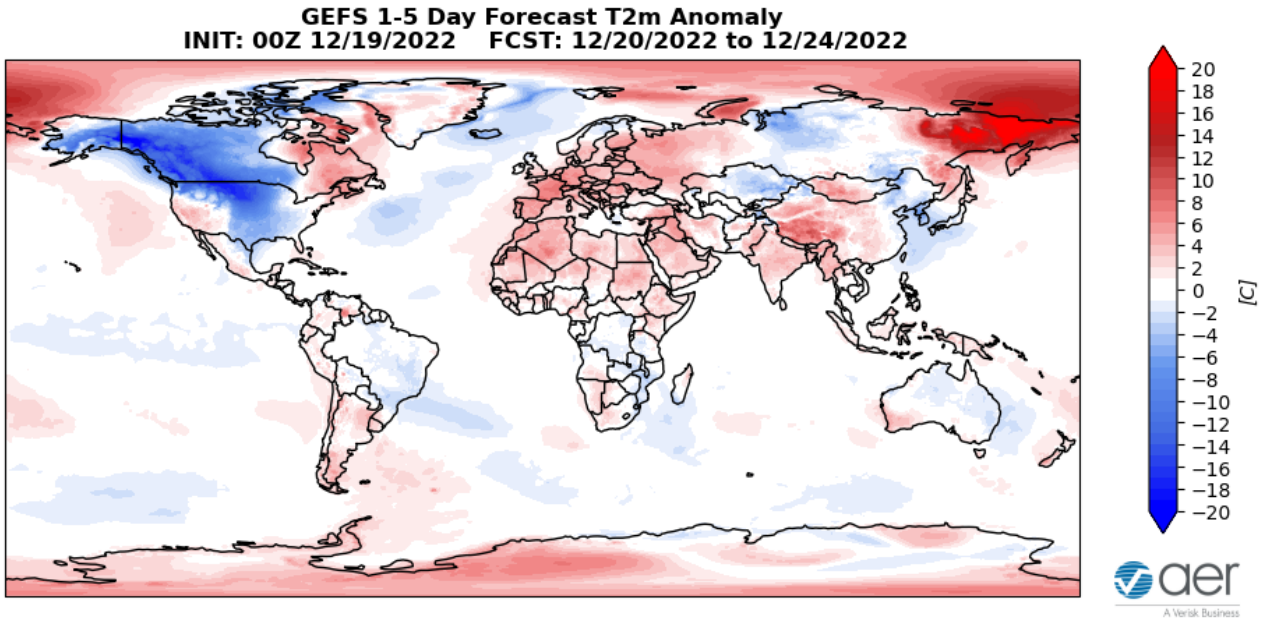

Figure 3. Forecasted surface temperature anomalies (°C; shading) from 20 – 24 December 2022. The forecast is from the 00Z 19 December 2022 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Scandinavia, Western Siberia and East Asia while mild temperatures will support snowmelt in Central and Eastern Europe (**Figure 4**). Troughing and/or cold temperatures will support new snowfall across southern Alaska, Western Canada and the Northwestern and Central US while mild temperatures will support snowmelt across the Southwestern Canada and New England (**Figure 4**).

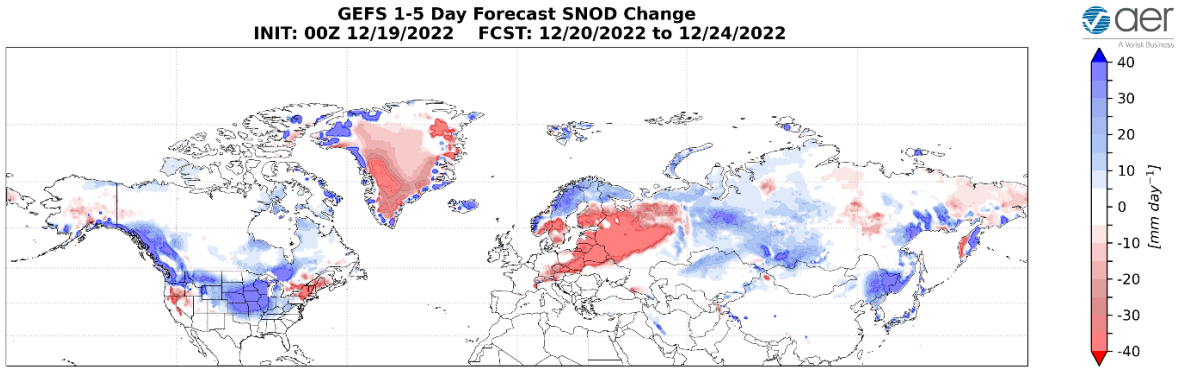

Figure 4. Forecasted snow depth changes (mm/day; shading) from 20 – 24 December 2022. The forecast is from the 00Z 19 December 2022 GFS ensemble.

Near-Term

1-2 week

The AO is predicted to remain negative this period **(Figure 1**) as geopotential height anomalies remain mostly positive across the North Pacific and North Atlantic sectors of the Arctic and mixed across the mid-latitudes (**Figure 5**). With mostly positive geopotential height anomalies across Greenland (**Figure 5**), the NAO is predicted to remain neutral to negative this period as well.

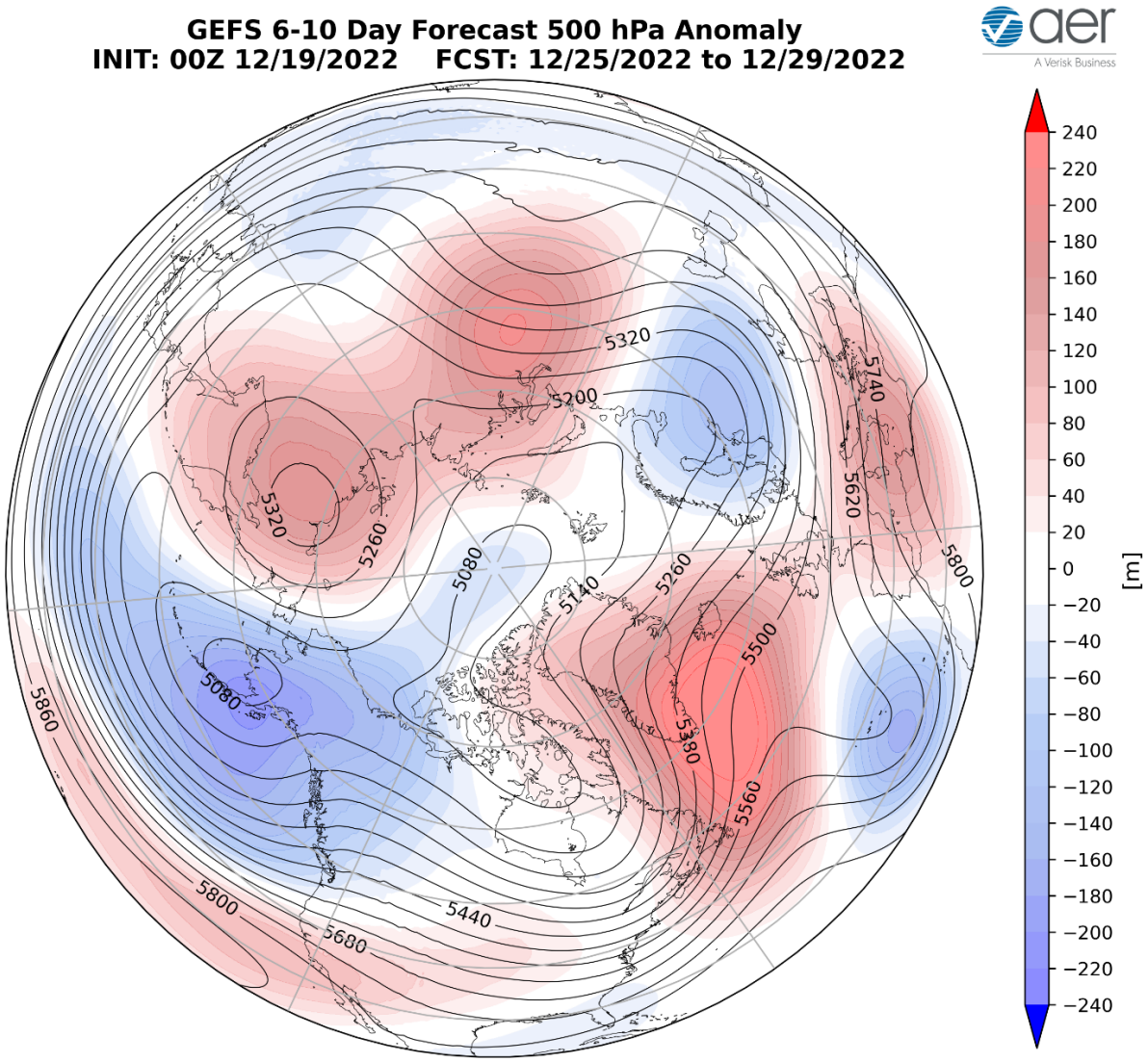

Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 25 – 29 December 2022. The forecasts are from the 00z 19 December 2022 GFS ensemble.

With ridging/positive geopotential height anomalies predicted to persist across Greenland troughing/negative geopotential height anomalies are favored across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe (**Figures 5).** Normal to below normal temperatures are predicted to persist across Northern Europe this time including

the UK with normal to above normal temperatures across Southern and Central Europe (**Figure 6**). Persistent ridging/positive geopotential height anomalies in Eastern Siberia are predicted to spread across all of Siberia forcing troughing/negative geopotential height anomalies to the south across Eastern Asia this period (**Figure 5**). This pattern favors widespread normal to above normal temperatures across Northern, Western and Southern Asia with normal to below normal temperatures predicted in pockets in Central and Eastern Asia **(Figure 6**).

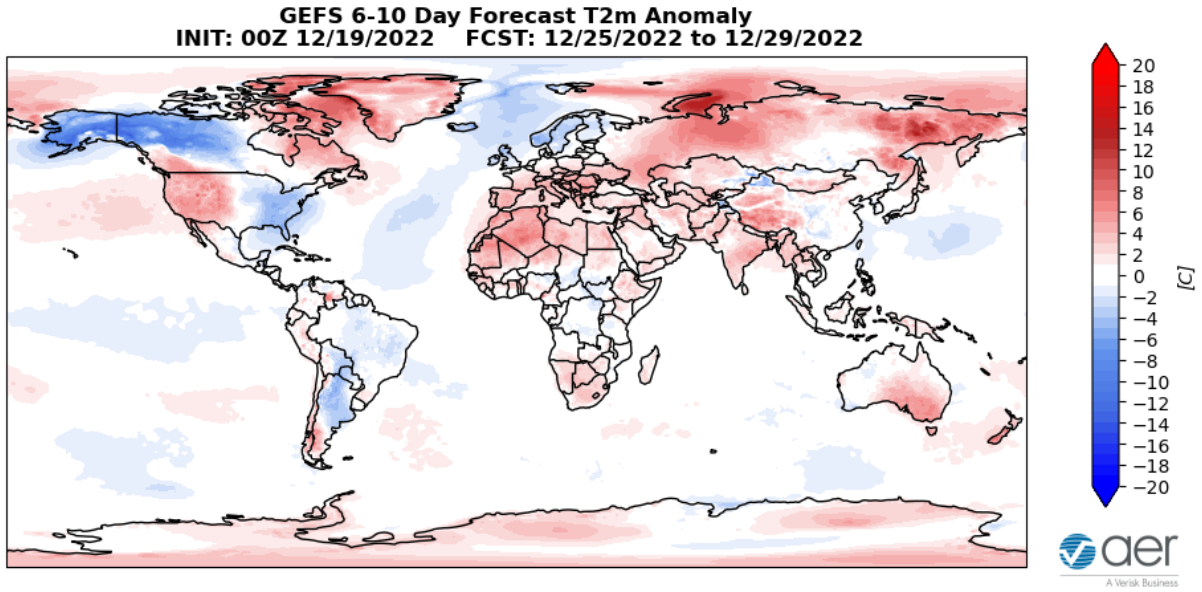

Figure 6. Forecasted surface temperature anomalies (°C; shading) from 25 – 29 December 2022. The forecast is from the 00Z 19 December 2022 GFS ensemble.

With ridging/positive geopotential height anomalies previously in the Beaufort Sea will drift into Eastern Siberia allowing troughing/negative geopotential height anomalies in Alaska and Western Canada and the Eastern US with more ridging/positive geopotential height anomalies in the Southwestern US and persisting near Baffin Bay this period **(Figure 5).** This pattern will favor normal to below normal temperatures widespread across Alaska, Western Canada and the Eastern US with normal to above normal temperatures in Eastern Canada and the Western US **(Figure 6).**

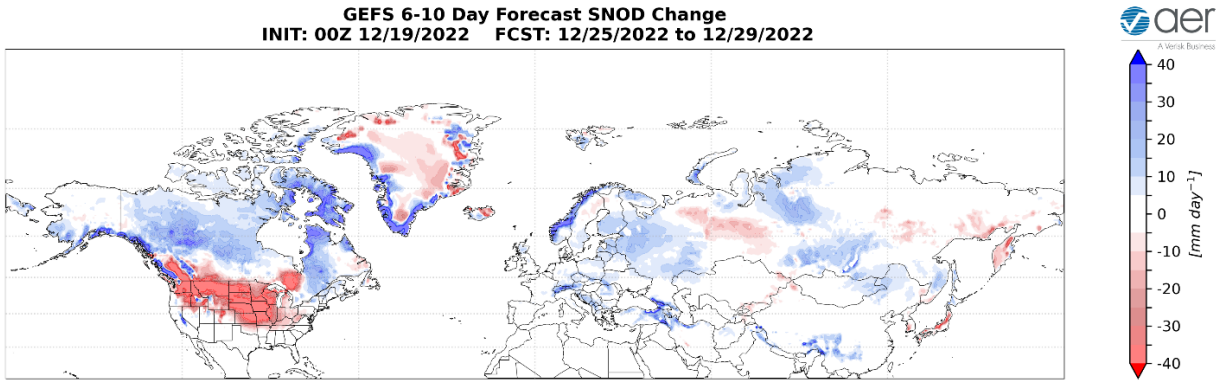

Figure 7. Forecasted snow depth changes (mm/day; shading) from 25 – 29 December 2022. The forecast is from the 00Z 19 December 2022 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Scandinavia, Eastern Europe, Western, Central and Eastern Asia while mild temperatures will support snowmelt in the Urals and Eastern Siberia (**Figure 7**). Troughing and/or cold temperatures will support new snowfall across western and southern Alaska and much of Canada while mild temperatures will support snowmelt in the Western and Central US (**Figure 7**).

3-4 week

Positive geopotential height anomalies are predicted to continue to dominate the North Atlantic sector of the Arctic with mixed geopotential height anomalies across the mid-latitudes this period (**Figure 8**), therefore the AO should remain neutral to negative this period (**Figure 1**). With weak but positive pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will also remain neutral to negative this period.

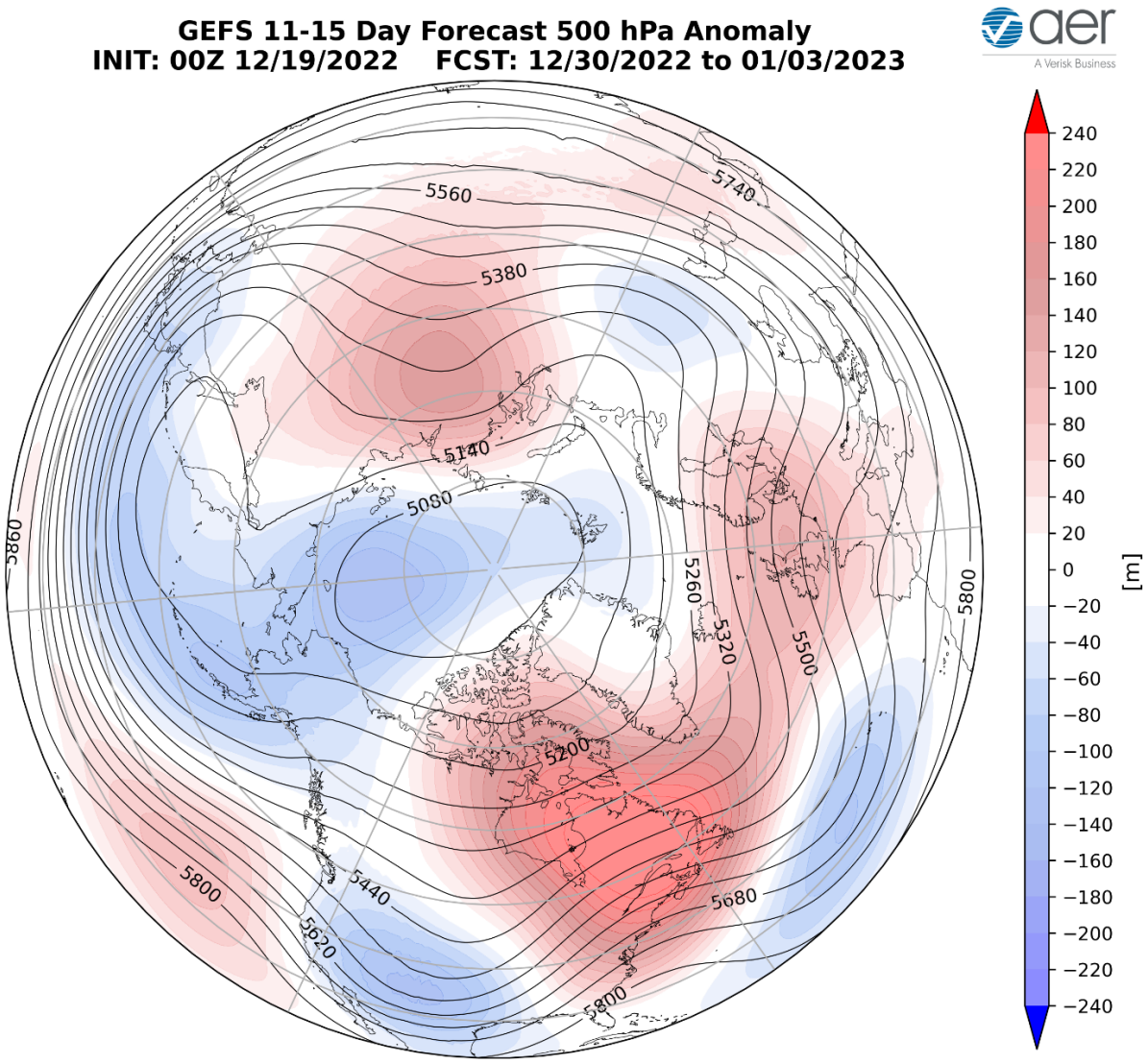

Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 30 December 2022 – 3 January 2023. The forecasts are from the 00z 19 December 2022 GFS ensemble.

With only weak ridging/positive geopotential height anomalies predicted across Greenland ridging/positive geopotential height anomalies are predicted to dominate Europe this period (**Figure 8**). This pattern favors normal to above normal temperatures across Europe however induced northerly flow will allow for normal to below normal temperatures in pockets across Northern and Eastern Europe including the UK (**Figures 9**). Predicted ridging/positive geopotential height anomalies centered Western Siberia will help to anchor troughing/negative geopotential height anomalies across far Eastern Siberia that extend southward into East Asia and across Western Asia (**Figure 8**). This pattern favors widespread normal to above normal temperatures across much of Siberia, Southern and Central Asia with normal to below normal temperatures across Eastern and Western Asia and far Eastern Siberia (**Figure 9**).

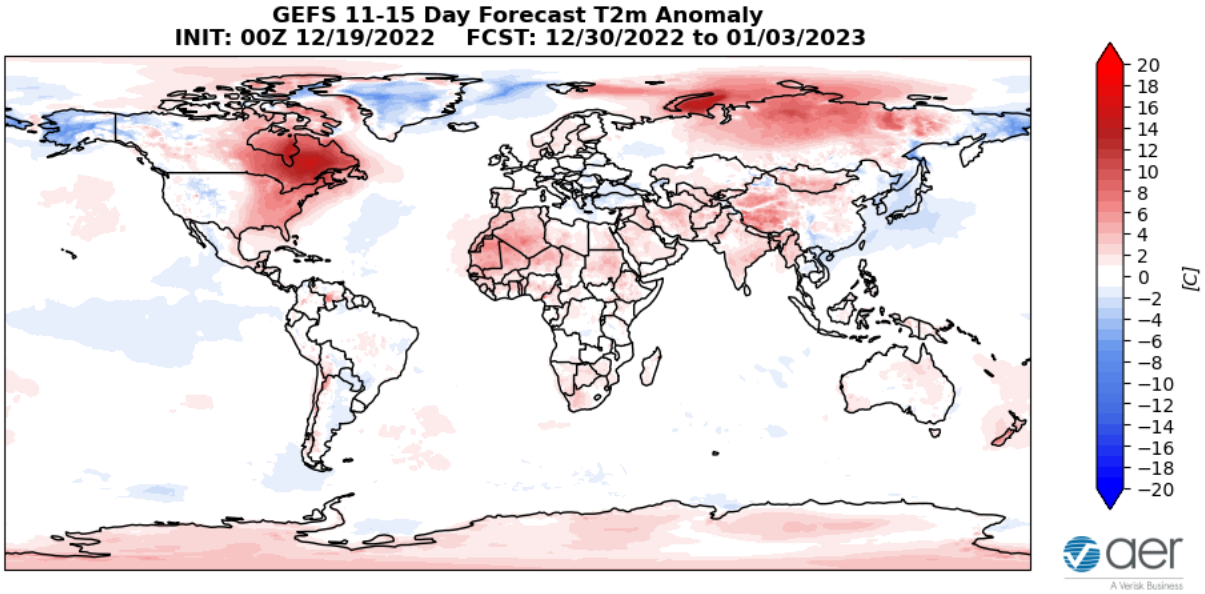

Figure 9. Forecasted surface temperature anomalies (°C; shading) from 30 December 2022 – 3 January 2023. The forecast is from the 00Z 19 December 2022 GFS ensemble.

Predicted persistent ridging/positive geopotential height anomalies in Siberia will continue to favor troughing/negative geopotential height anomalies across Alaska, Western Canada and the Western US with ridging/positive geopotential height anomalies will persist in Eastern Canada and now extends into the Eastern US this period (**Figure 8**). This pattern favors widespread normal to below normal temperatures across Alaska, Western Canada and the Western US with normal to above normal temperatures across Eastern Canada and the Eastern US (**Figure 9**).

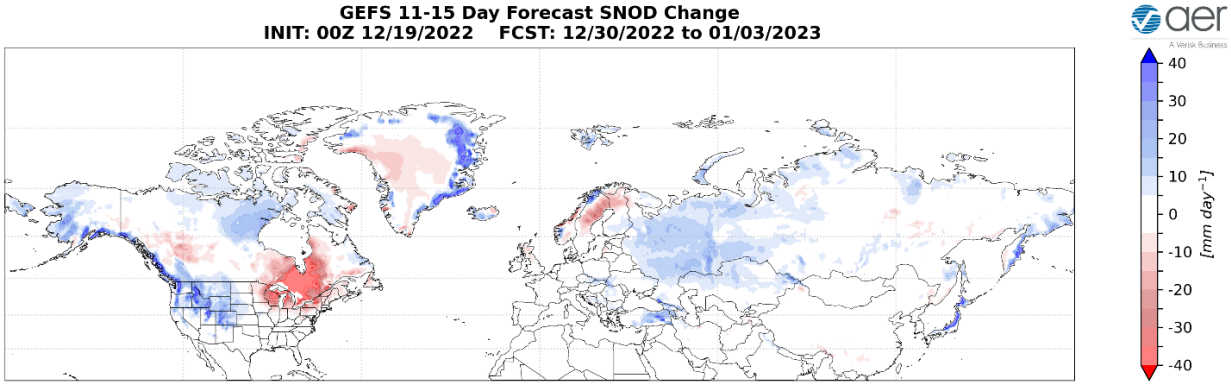

Figure 10. Forecasted snow depth changes (mm/day; shading) from 30 December 2022 – 3 January 2023. The forecast is from the 00Z 19 December 2021 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Norway, Turkey, Western and Eastern Asia while mild temperatures will support snowmelt in Sweden (**Figure 10**). Troughing and/or cold temperatures will support new snowfall across western Alaska, Northern

Canada and the Western US while mild temperatures will support snowmelt in Western Canada, the Great Lakes and southern Hudson Bay (**Figure 10**).

Longer Term

30–day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows cold/negative PCHs in the upper stratosphere with warm/positive PCHs in the lower and mid stratosphere and the troposphere (**Figure 11**). Cold/negative PCHs in the upper stratosphere are predicted to strengthen and descend into the lower stratosphere starting this week (**Figure 11**).

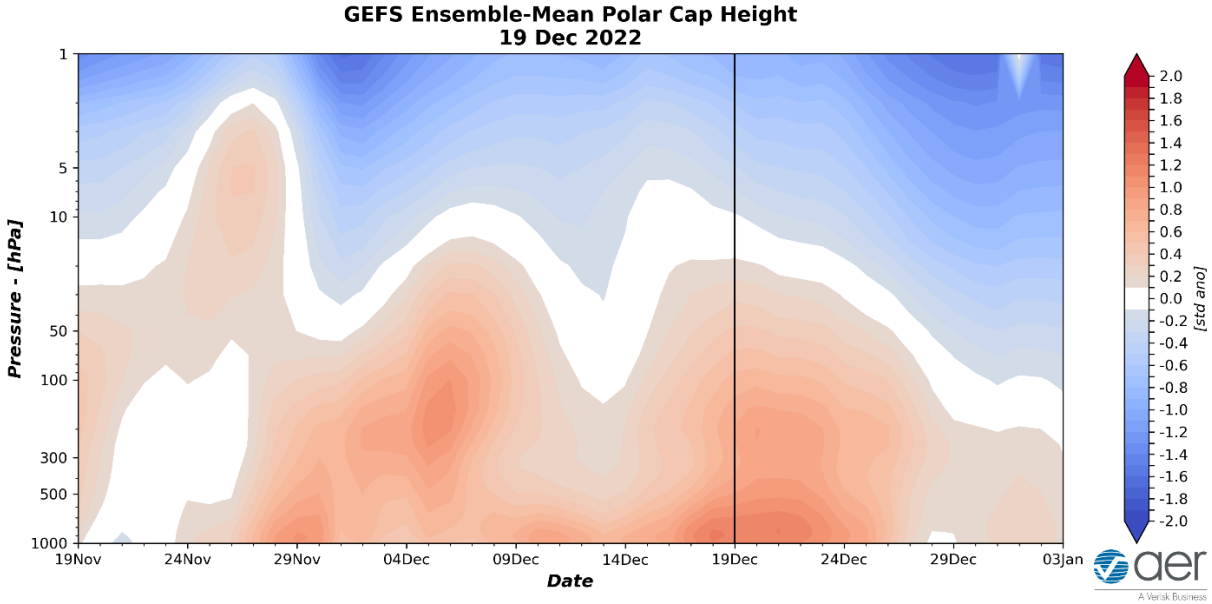

Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 19 December 2022 GFS ensemble.

The warm/positive PCHs in the lower troposphere over the next two weeks (**Figure 11**) are consistent with the predicted negative to neutral surface AO (**Figure 1**). However next week when the warm/positive PCHs in the lower troposphere are predicted to weaken (**Figure 11**), in concert with the strengthening cold/negative PCHs in the stratosphere (**Figure 1**).

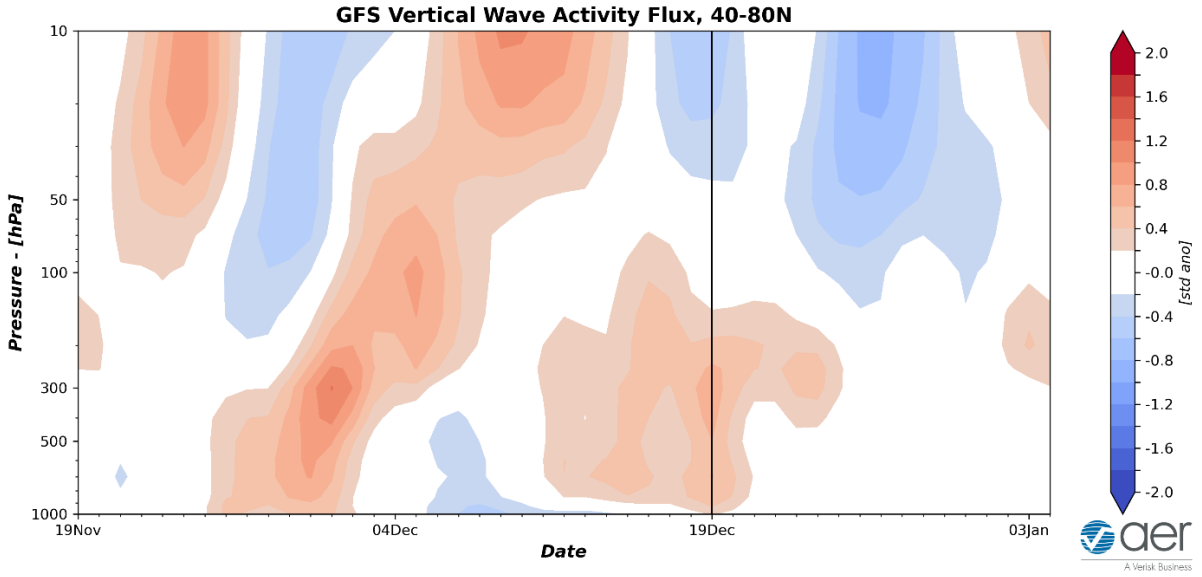

Figure 12. Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 19 December 2022 GFS ensemble.

Above normal vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere the past week (**Figure 12**) has resulted in mixed stratospheric PCHs with warm in the lower stratosphere and cold in the upper stratosphere (**Figure 11**). The GFS is predicting a mostly below normal period of WAFz in the next two weeks (**Figure 12**), resulting in overall cooling in the stratosphere heading into the holiday season (**Figure 11**).

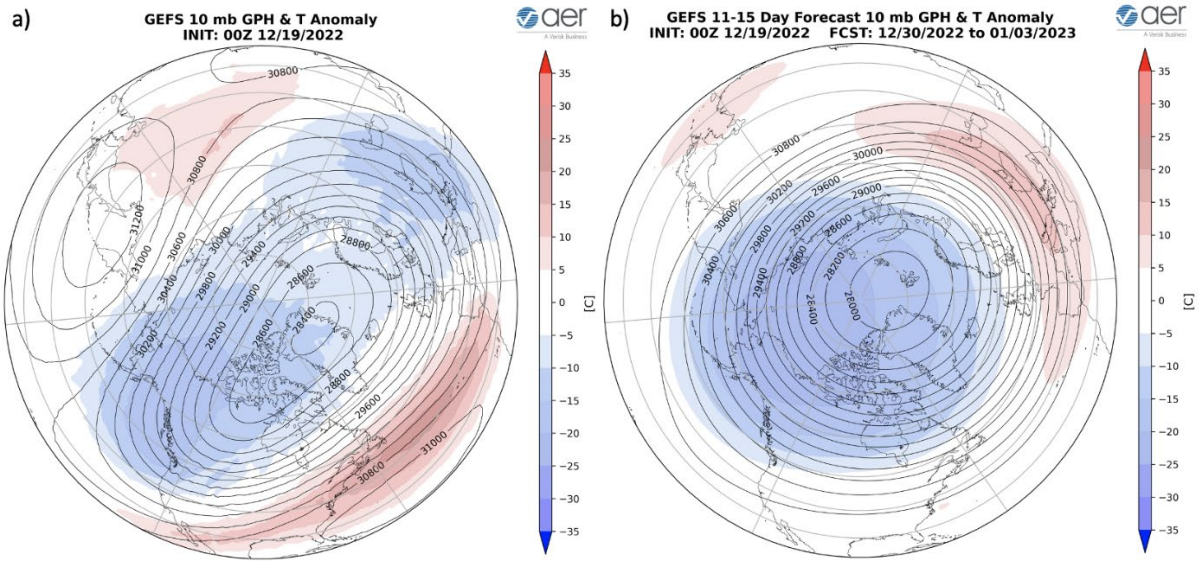

Figure 13. (a) Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 19 December 2022. (b) Same as (a) except forecasted averaged from 30 December 2022 – 3 January 2023. The forecasts are from the 00Z 19 December 2020 GFS model ensemble.

Still the recent more active WAFz has caused a minor perturbation of the stratospheric PV with the PV center shifted over to Greenland with a ridge center near Kamchatka **(Figure 13**). This configuration of the PV is it consistent with a stretched PV though the orientation of the trough axis from Scandinavia to the Gulf of Alaska is unusual (**Figure 13**). The below normal WAFz predicted for the next two weeks will allow the PV to strengthen, become circular in shape and for the polar stratosphere to cool (**Figure 13**). These are all signs of a strong PV. Therefore, the stratospheric AO is predicted to remain positive to possibly strongly positive over the next two weeks **(Figure 1**). A strong, circular PV favors an overall mild pattern.

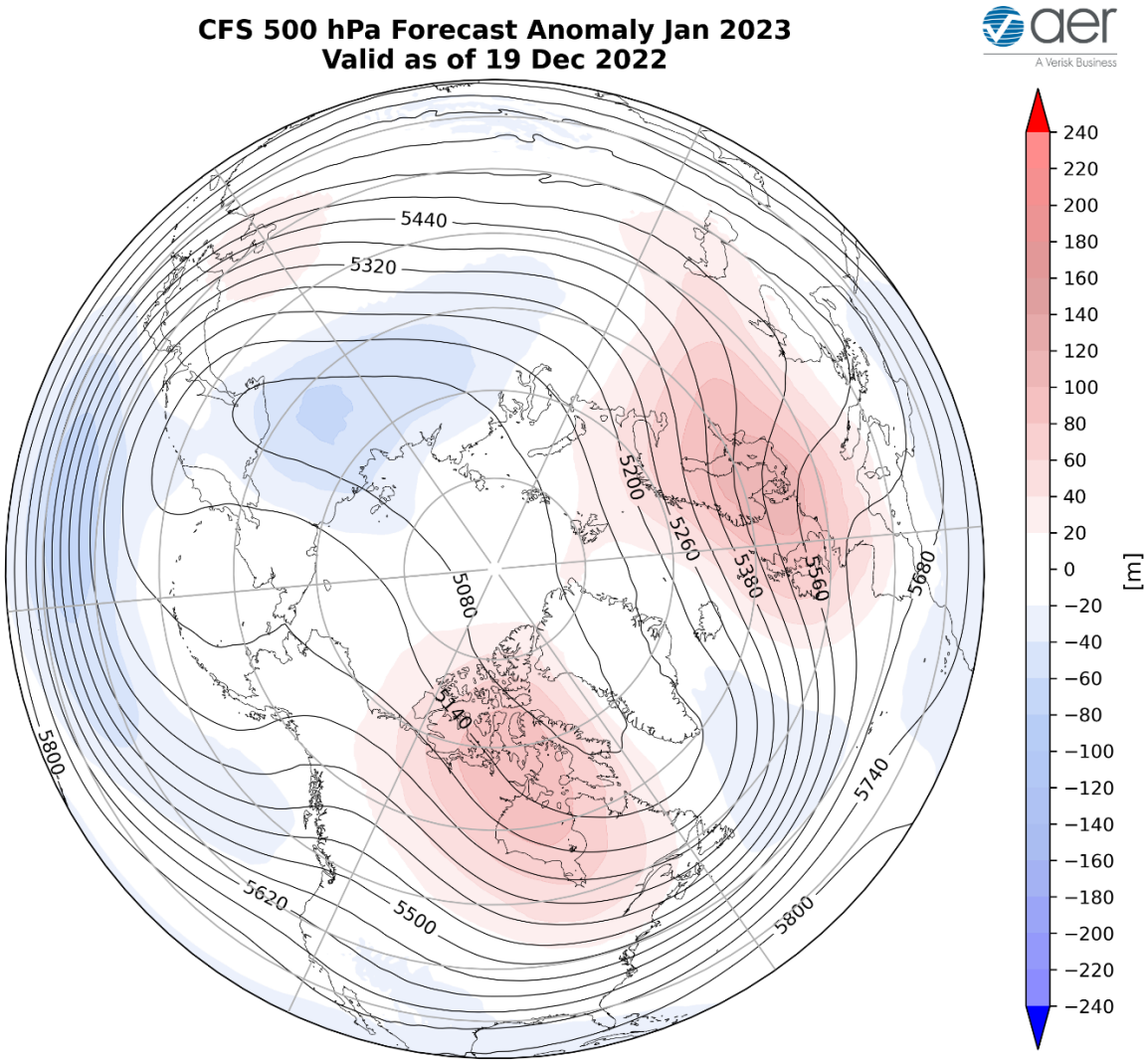

Figure 14. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for January 2022. The forecasts are from the 00Z 19 December 2022 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 14**) and surface temperatures for January (**Figure 15**) from the Climate Forecast System (CFS; the plots represent yesterday's four ensemble members). The forecast for the troposphere is ridging stretching across Northern Europe and the Canadian Arctic archipelagos with troughing across the eastern Mediterranean, Siberia, East Asia, near the Aleutians and eastern North America (**Figure 14).** This pattern favors seasonable to relatively warm temperatures across Europe, Western and Central Asia, Eastern Siberia, Western and Central Canada and the Western and Central US with seasonable to relatively cold temperatures across Western and Central Siberia, East Asia, Alaska, Eastern Canada and the Northeastern US (**Figure 15**)**.**

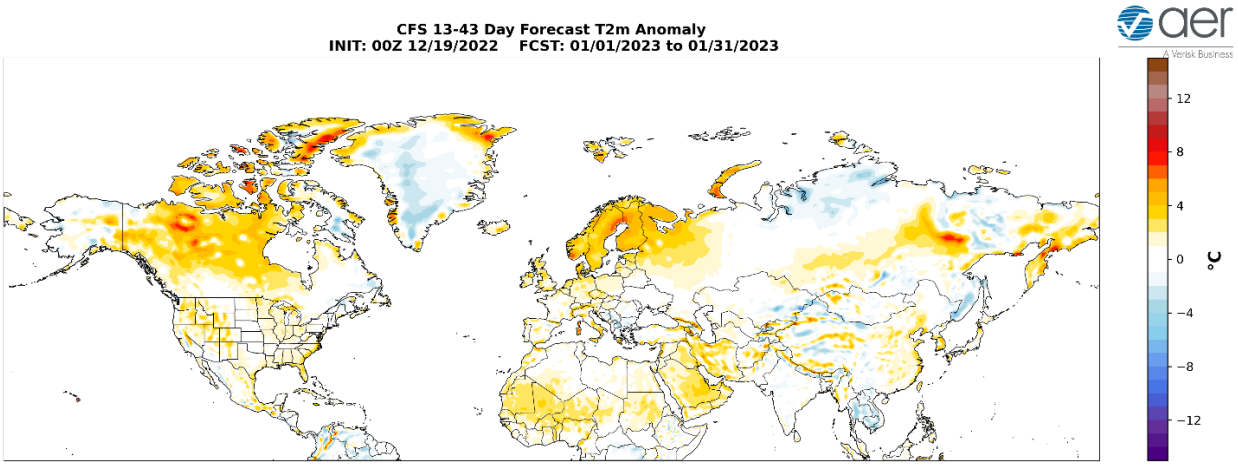

Figure 15. Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for January 2022. The forecasts are from the 00Z 19 December 2022 CFS.

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 in recent years. I believe that the realization of a cold NH winter is most dependent on high latitude blocking in the North Atlantic sector, and that is where I am focused. Sea ice extent is below normal in the Barents-Kara Seas, which I believe favors high latitude blocking. Sea ice is below normal in the Chukchi and Bering Seas, but I do think that the predicted pattern is conducive for the sea ice extent to grow. So it could be Arctic sea ice is increasingly favoring high latitude blocking in the Barents-Kara Seas region and PV disruptions.

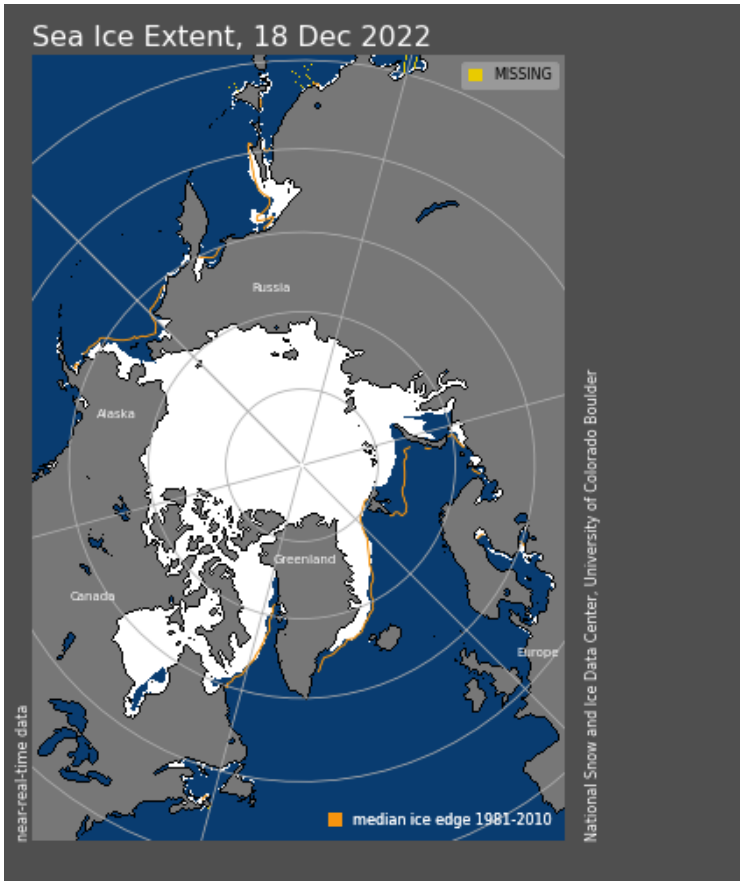

Figure 16. Observed Arctic sea ice extent on 18 December 2022 (white). Orange line shows climatological extent of sea ice based on the years 1981-2010. Image from the National Snow and Ice Data Center (NSIDC).

SSTs/El Niño/Southern Oscillation

Equatorial Pacific sea surface temperatures (SSTs) anomalies are below normal and we continue to observe weak La Niña conditions (**Figure 17)** and La Niña conditions are expected through the fall. 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.

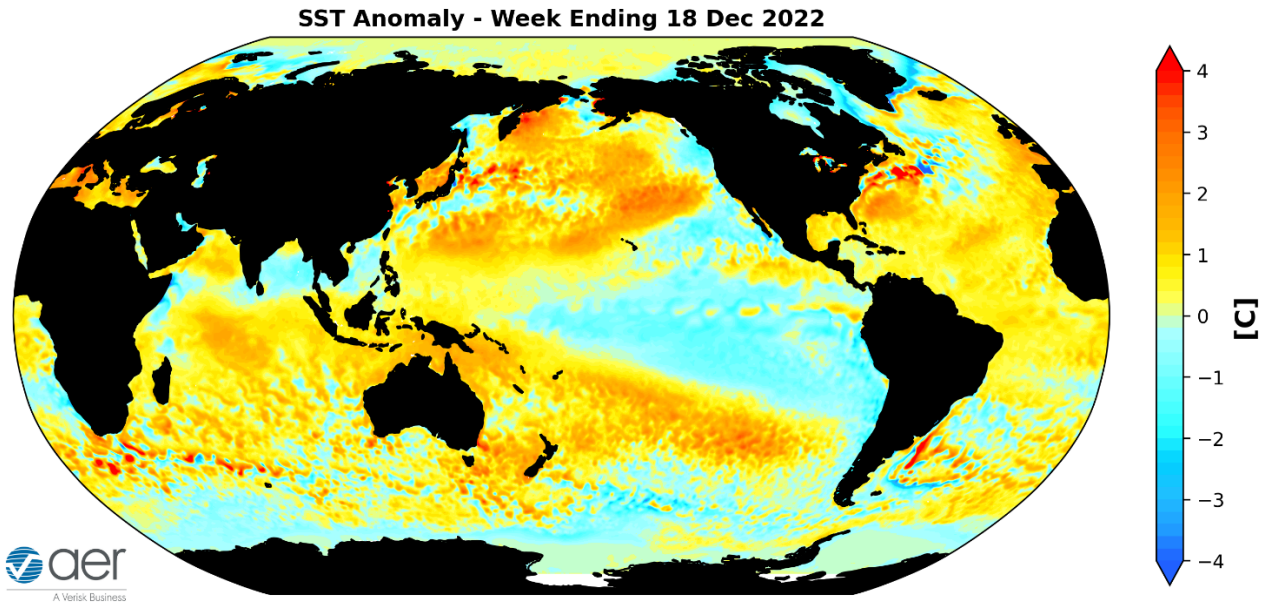

Figure 17. The latest weekly-mean global SST anomalies (ending 18 December 2022). Data from NOAA OI High-Resolution dataset.

Madden Julian Oscillation

Currently no phase of the Madden Julian Oscillation (MJO) is favored (**Figure 18**). The forecasts are for the MJO to remain weak where no phase is favored and then emerge into phase five and then six and seven next week. Phases five through seven favor first troughing over Alaska and western North America with ridging across eastern North America and then evolving into ridging over western North America with increasing troughing in eastern North America. Seems that the MJO could be having an influence on the weather across North America in the coming weeks. But admittedly this is outside of my expertise.

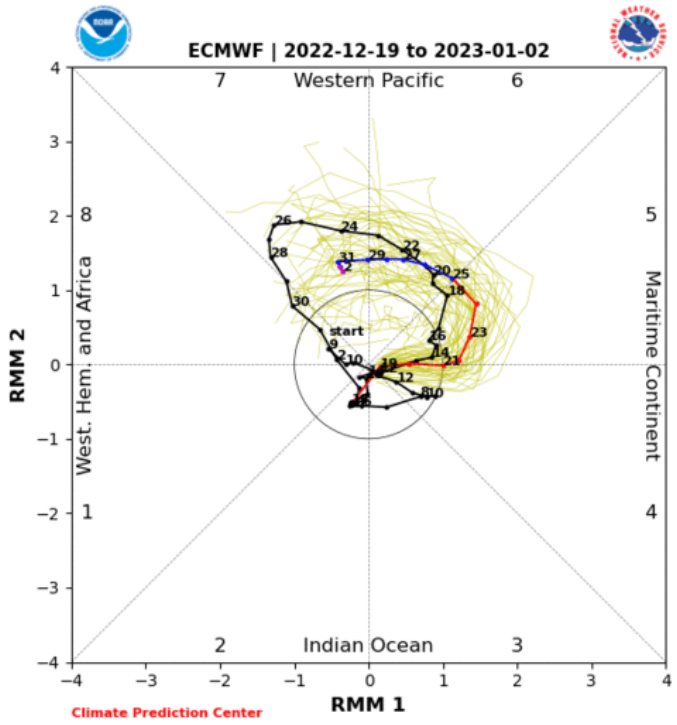

Figure 18. Past and forecast values of the MJO index. Forecast values from the 00Z 19 December 2022 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model "spread" is denoted by the gray shading. Sector numbers indicate 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

Snow Cover

Snow cover extent (SCE) across the NH has advanced again this week (see **Figure 19**). Snow cover has advanced both across North American sand Eurasia this week and therefore SCE remains near decadal means. With the predicted widespread cold across North America, I expect snow cover to advance more rapidly across North America than Eurasia this week.

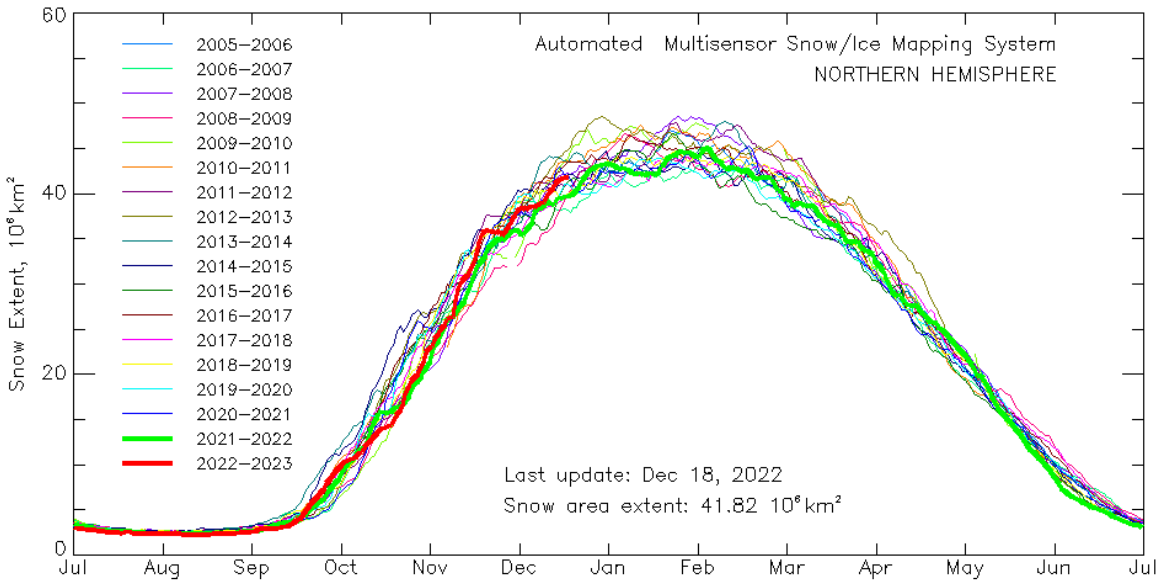

Figure 19. Observed North American snow cover extent through 18 December 2022. Plot from https://www.star.nesdis.noaa.gov/smcd/emb/snow/HTML/snow_extent_monitor.html

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!