

Arctic Oscillation and Polar Vortex Analysis and Forecasts

January 17, 2022

Dear AO/PV blog readers:

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

For those who would like an early look on Mondays, we will be offering at a nominal price (US \$25) a PDF version of the upcoming blog, and we will be rolling out in the coming weeks 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 positive and is predicted to straddle neutral the next two weeks with mixed pressure/geopotential height anomalies across the Arctic and mixed pressure/geopotential height anomalies across the mid-latitudes. The North Atlantic Oscillation (NAO) is also near neutral and is predicted to straddle mostly neutral as pressure/geopotential height anomalies

are predicted to remain weak and transitory across Greenland the next two weeks.

- This week into next week, ridging/positive geopotential height anomalies centered just west of the United Kingdom (UK) will force northerly flow across Western Europe and troughing/negative geopotential height anomalies across Eastern Europe. This will favor normal to below normal temperatures across Western and Southern Europe including the UK with normal to above normal temperatures across Northern and Eastern Europe this week. However, next week as North Atlantic ridging/positive geopotential height anomalies retrogrades westward into the central North Atlantic, troughing/negative geopotential height anomalies coupled with normal to below normal temperatures will become more widespread across Europe.
- The dominant pattern across Asia the next two weeks is a quasi-omega block pattern with troughing/negative geopotential height anomalies coupled with normal to below normal temperatures across far Western and Eastern Asia with ridging/positive geopotential height anomalies coupled with normal to above normal temperatures dominating much of the interior of Asia. However normal to below normal temperatures are predicted to remain localized across Asia.
- The dominant pattern across North America the next weeks is amplified ridging/positive geopotential height anomalies coupled with normal to above normal temperatures in the Gulf of Alaska and along the west coast of North America with deep troughing/negative geopotential height anomalies coupled with normal to below normal temperatures across Eastern Canada and the Eastern United States (US).
- In the *Impacts* section I continue to discuss my expectations for the polar vortex (PV) and the weather of the Northern Hemisphere (NH) as we transition into February.

Plain Language Summary

We just had one stretched polar vortex event, and another is ongoing. These two events will contribute to a colder and snowier pattern in the Eastern US for much of January. I think what happens in early February depends on whether we get a third stretched polar vortex event right at the end of the month. If one occurs early February could be cold and if not, it will likely be mild. Europe will turn colder due to high pressure/ridging in the central North Atlantic that will induce a colder northerly flow across much of the continent. Still, lots of uncertainty heading into early February as the current pattern is highly anomalous.

Impacts

Happy first day of not meteorological or astronomical but Cohen winter (at least in the Eastern US) – Martin Luther King Day! The Eastern US experienced its biggest snowstorm of the season so far over the past two days, though not in the 195

megalopolis cities of the Northeastern US. The pattern looks active for the foreseeable future with cold and possibly snow, though based on our snow ensemble plots no big signals this morning.

I hate to be a broken record but all I can think about again today is how this remains a challenging forecast period. The pattern so far this winter in the Eastern US has been - relatively warm October, cold November, warm December and now likely a cold January. So based on that calendar friendly monthly checkered pattern, February will be relatively warm and finally March will be cold. Ah if it were only that easy.

I mentioned on Twitter that our experimental machine learning model is predicting a warmup in the Eastern US in early February. So far, I am very encouraged by the performance of the machine learning model and that the model is predicting a pattern flip deserves to be considered. But I know from benchmarking its accuracy based on historical forecasts or hindcasts that the model is not perfect.

And as far as I can tell the machine learning model is consistent with long range forecasts from the dynamical models (GFS, Canadian and EPS). It seems that the models are predicting that the entire mid-tropospheric circulation in the Western Hemisphere will retrograde or rotate to the west. This would bring the ridging currently near Western Europe into the Eastern US, the troughing in eastern North America back into western North America and the ridging in the Gulf of Alaska closer to the Aleutians. And in a broad sense the circulation of February would resemble that of December. Though for what it's worth, the current CFS is predicting a cold February for the Eastern US (see **Figure 15**).

But I remain wary of this simple by straightforward forecast. As I have been discussing all winter the polar cap geopotential height anomalies (PCHs) continue to show cold/negative PCHs in the stratosphere but warm/positive PCHs in the troposphere continuously from mid-December and predicted right into early February. This is an exceptionally long time for the troposphere and stratosphere to remain uncoupled (at least in the classical sense of either a strong or weak PV are coupled with a positive or negative surface AO respectively). I did check my historical PCHs to find something analogous and the only winter that exhibited something similar over the reanalysis period is the winter of 2013/14 (see **Figure i**). For much of the winter from December through February the stratosphere and troposphere remained uncoupled with some brief exceptions (e.g., second week of January and second week of February).

2013/14 – October to March Polar Cap Height

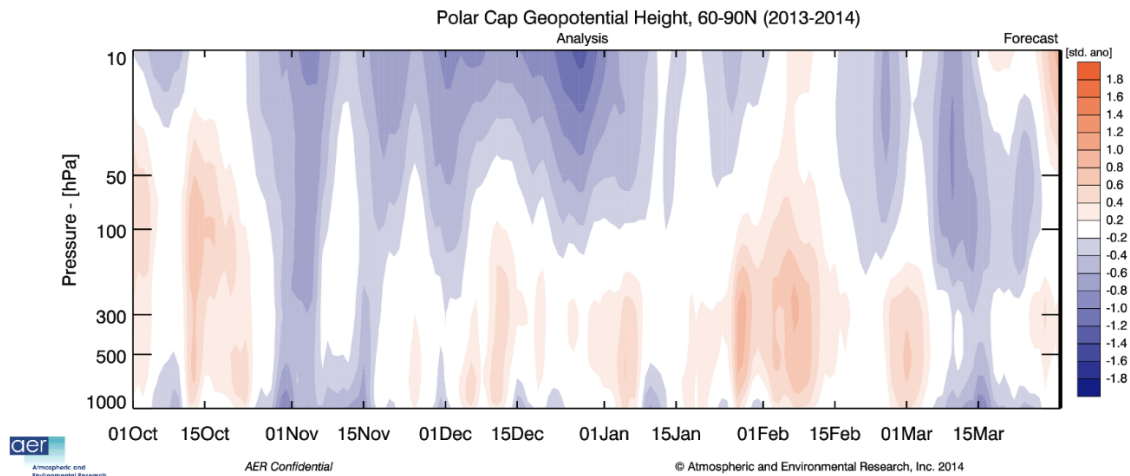
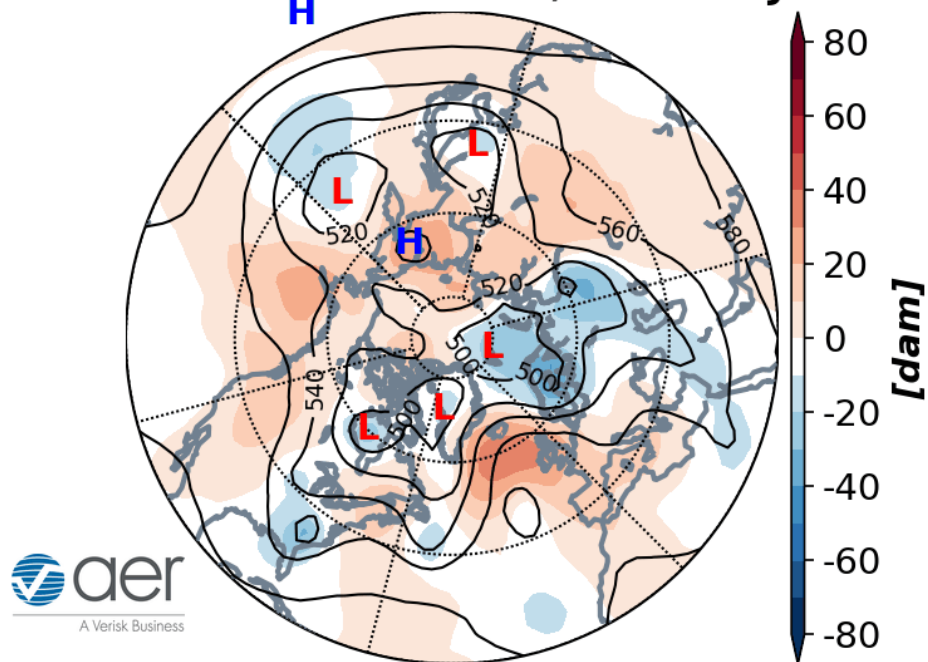


Figure i. Observed daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies from 1 October 2013 through 31 March 2014.

That winter experienced repeated stretched PV events throughout the winter that combined to produce a harsh winter in the Eastern US especially around the Great Lakes. I don't see anything matching the magnitude of cold (and it was quite snowy as well) from that winter but could the stretched PVs from January continue into February that would favor cold in the Eastern US?

Looking at the dynamical model forecasts episodic Ural ridging/high pressure is predicted over the next two weeks. I include an animation of the 500 hPa geopotential heights over the next two weeks from this morning's operational GFS (**Figure ii**). I think that it is consistent with ensemble forecasts predicting high heights near the Urals, though each event is brief and likely not persistent enough to initiate a sudden stratospheric warming (SSW). My research shows that Ural ridging/high pressure is the source of energy that initiates stretched PV events. In addition, our recent paper, [Cohen et al. 2021](#), suggests that blocking in the North Atlantic is a precursor to stretched PV events, which is predicted over the next two weeks.

Initialized 00Z 500 hPa HGT/HGTa 17-Jan-2022



[Figure ii, CLICK for Loop](#)

Figure ii. (a) Initialized 500 mb geopotential heights (dam; contours) and temperature anomalies ($^{\circ}\text{C}$; shading) across the Northern Hemisphere for 17 January 2022 and forecasted from 18 January – 2 February 2022. The forecasts are from the 00Z 17 January 2022 GFS model ensemble.

Our now operational diagnostics to anticipate stretched PV events are playing a game of hide and seek or peek-a-boo one, day indicating another stretched PV at the end of January just to take it away the next day. So in summary, I believe that the atmospheric conditions remain favorable for subsequent stretched PV events in addition to the two so far this month but not certain.

I would be very content to simply throw up my hands and say cold Eastern US for the remainder of January with anything possible for February but then what is the purpose of the blog? Even in winter 2013/14, where I believe the forcing for stretched PVs was more robust, the cold in the Eastern US was not continuous but episodic, though some of those cold episodes were unusually long in duration for stretched PV events. One particularly long stretch followed a stretched PV event in early February when the stratospheric PCHs turned briefly warm (see **Figure i**). I don't see anything similar in the foreseeable future, but if that were to happen, then I would be more confident of a

longer duration cold spell in the Eastern US. So, I think at least a relaxation of the cold for the Eastern US in early February makes a lot of sense even if it doesn't mean a complete breakdown of the cold pattern. But I do think conditions remain favorable for stretched PV events and I don't think the two observed this winter are the only events of the winter and I would expect more. A brief turn to milder weather would likely include a brief coupling of the cold/negative PCHs from the stratosphere to the surface. A complete breakdown of the colder pattern would be a more extended coupling of the cold/negative PCHs from the stratosphere to the surface. This latter scenario would pretty much put an end to meaningful winter weather in the Eastern US until next year, unless there was very early Final Warming or an early exit of the PV.

I realize that I have been focused on the Eastern US and not Europe or East Asia but that is where I think the forecast is most interesting. I really think for widespread significant winter weather to occur in Europe a larger disruption of the PV needs to occur, preferably a PV split. Hard for me to convince myself that a large PV disruption is likely anytime soon, though some GFS forecasts have been suggestive. Besides repeated stretched PV events we have also observed repeated North Atlantic ridging that has kept Europe close to seasonable as opposed to seasonable or even unseasonably warm. I believe this atmospheric feature to be transient and would expect it to move on in early February. Though there has been some regional high impact winter weather like this past week in Southeastern Europe.

Central and East Asia should also be cold during stretched PV events, but I have been underwhelmed by the temperature anomalies in Asia and relative cold seems to be mostly localized. Though enough to produce some spectacular snowfalls in Japan. If Ural blocking could become more persistent then East Asia and the Eastern US could turn colder.

1-5 day

The AO is predicted to be neutral this week (**Figure 1**) as geopotential height anomalies are predicted to be mixed across the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 2**). And with weak and mixed geopotential height anomalies predicted across Greenland (**Figure 2**), the NAO is also predicted to be neutral this week as well (**Figure 1**).

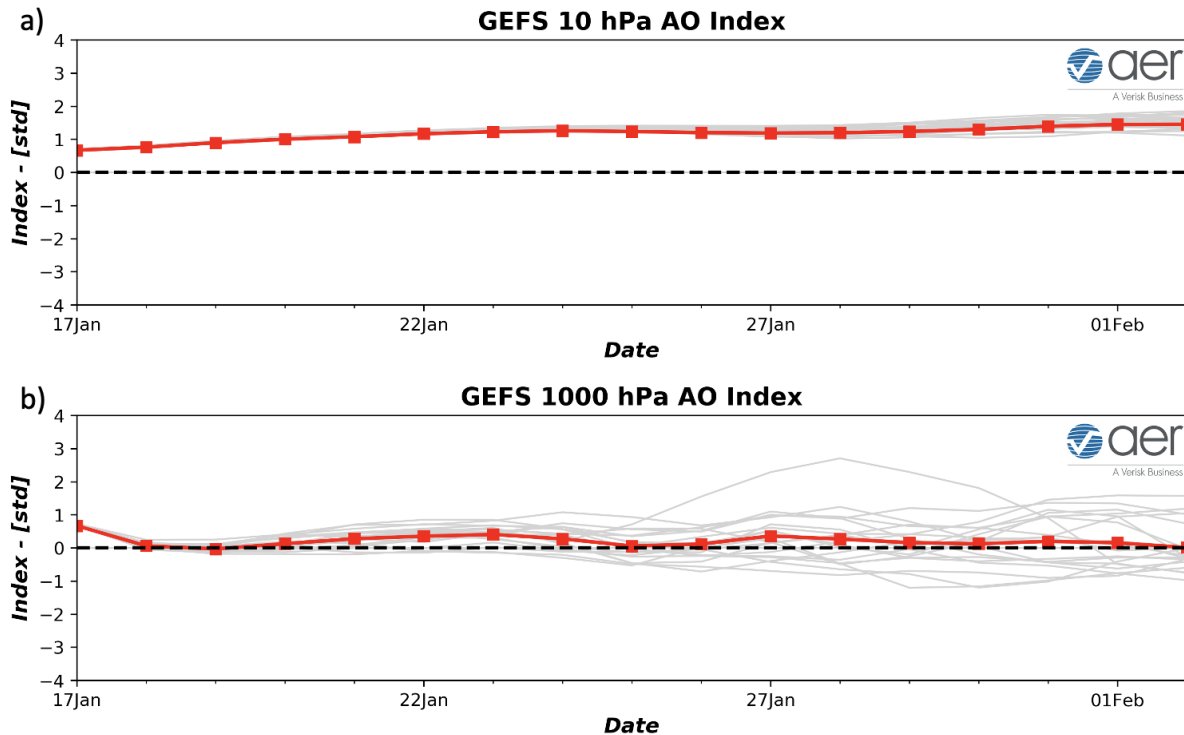


Figure 1. (a) The predicted daily-mean AO at 1000 hPa from the 00Z 17 January 2022 GFS ensemble. (b) The predicted daily-mean near-surface AO from the 00Z 17 January 2022 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.

This week, ridging/positive geopotential height anomalies centered just west of the UK will promote northerly flow across Western Europe and troughing/negative geopotential height anomalies in Eastern Europe this period (**Figure 2**). The resultant northerly flow and/or low heights will result in normal to below normal temperatures across Western and Southern Europe with normal to above normal temperatures across Northern and Eastern Europe (**Figure 3**). This week, ridging/positive geopotential height anomalies will dominate much of Central Asia with troughing/negative geopotential height anomalies limited to Western Asia and Far East Asia (**Figure 2**). This pattern favors widespread normal to above normal temperatures across much of Asia with normal to below normal temperatures confined to parts of Western and Far East Asia including Eastern Siberia (**Figure 3**).

GEFS 1-5 Day Forecast 500 mb GPH/GPH Anomaly
INIT: 00Z 01/17/2022 FCST: 01/18/2022 to 01/22/2022

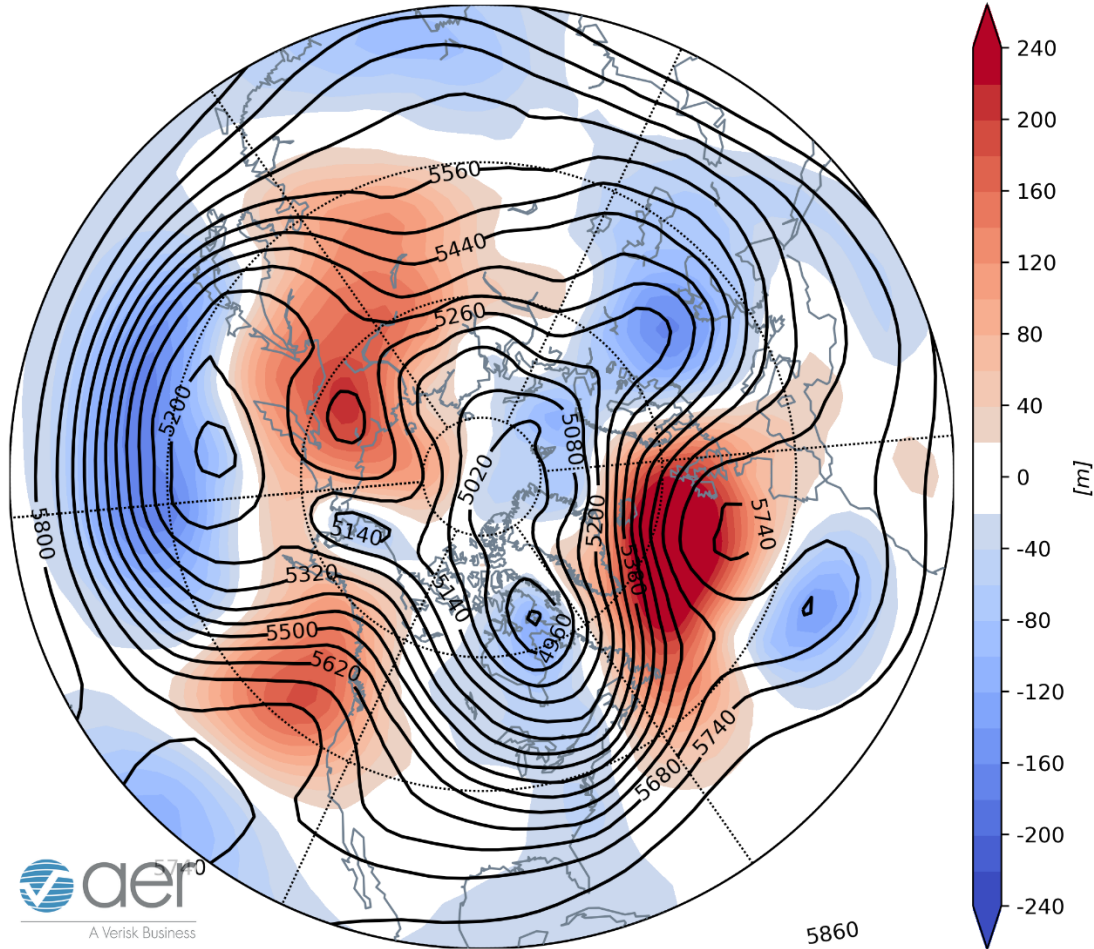


Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 18 – 22 January 2022. The forecasts are from the 00z 17 January 2022 GFS ensemble.

This week, the predicted pattern across North America is ridging/positive geopotential height anomalies across Alaska, Western Canada and the Western US which will contribute to deepening troughing/negative geopotential height anomalies across Eastern Canada and the Eastern US this period (**Figure 2**). This will favor normal to above normal temperatures across eastern Alaska, Western Canada and the Western US with normal to below normal temperatures in western Alaska, Central and Eastern Canada and the Central and Eastern US (**Figure 3**).

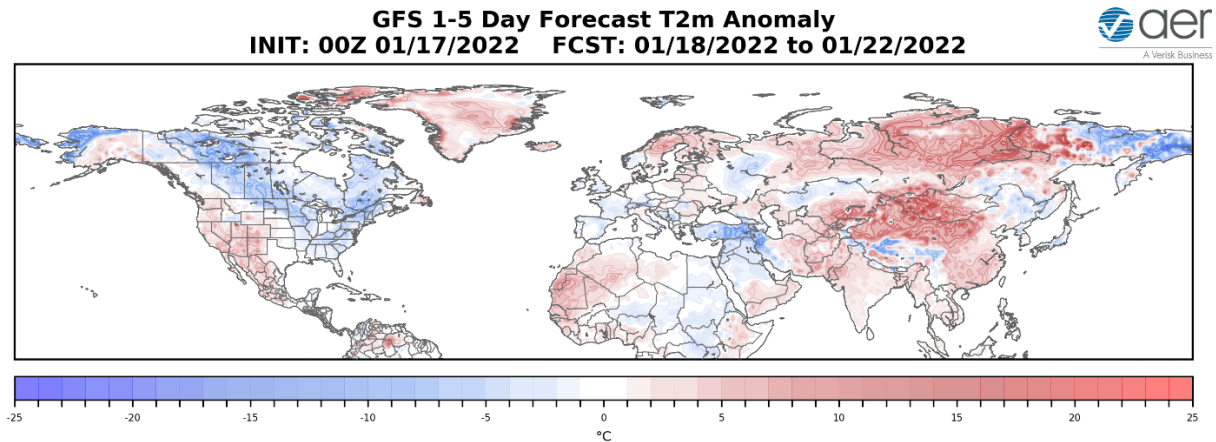


Figure 3. Forecasted surface temperature anomalies (°C; shading) from 18 – 22 January 2022. The forecast is from the 00Z 17 January 2022 GFS ensemble.

Trouching and/or cold temperatures are predicted to support new snowfall across Norway, Southeastern Europe including Turkey, Central Asia and the Tibetan Plateau while mild temperatures promote snowmelt in and around the Baltic Sea, Western Asia and the Far East (**Figure 4**). Trouching and/or cold temperatures are predicted to support new snowfall across Southern and Eastern Canada and possibly the Deep South while mild temperatures promote snowmelt in Western Canada, the Western US and the Northeastern US (**Figure 4**).

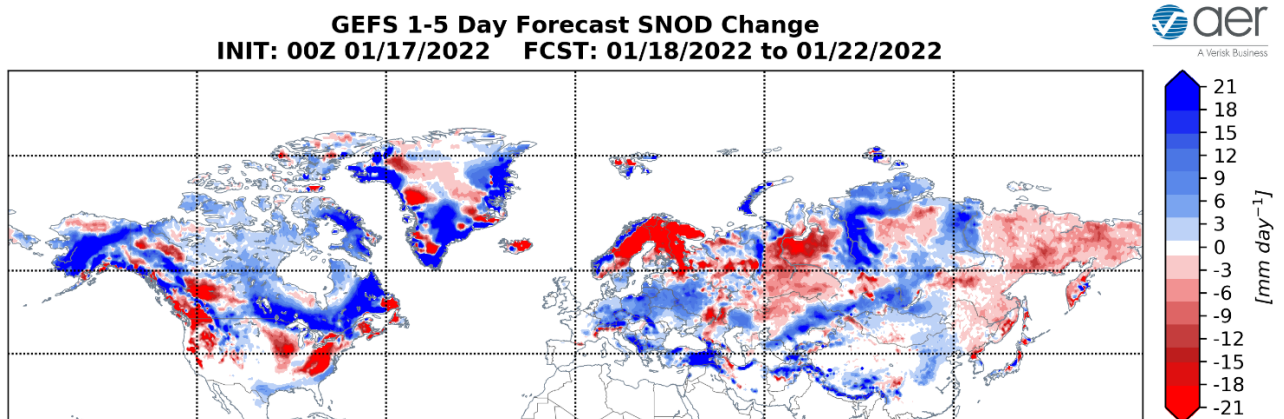


Figure 4. Forecasted snow depth changes (mm/day; shading) from 18 – 22 January 2022. The forecast is from the 00Z 17 January 2022 GFS ensemble.

Mid-Term

6-10 day

The AO is predicted to remain close to neutral or slightly positive this period (**Figure 1**) as geopotential height anomalies remain mixed to mostly negative across the central Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 5**). And with weak and mixed geopotential height anomalies across Greenland (**Figure 5**), the NAO is predicted to remain near neutral this period.

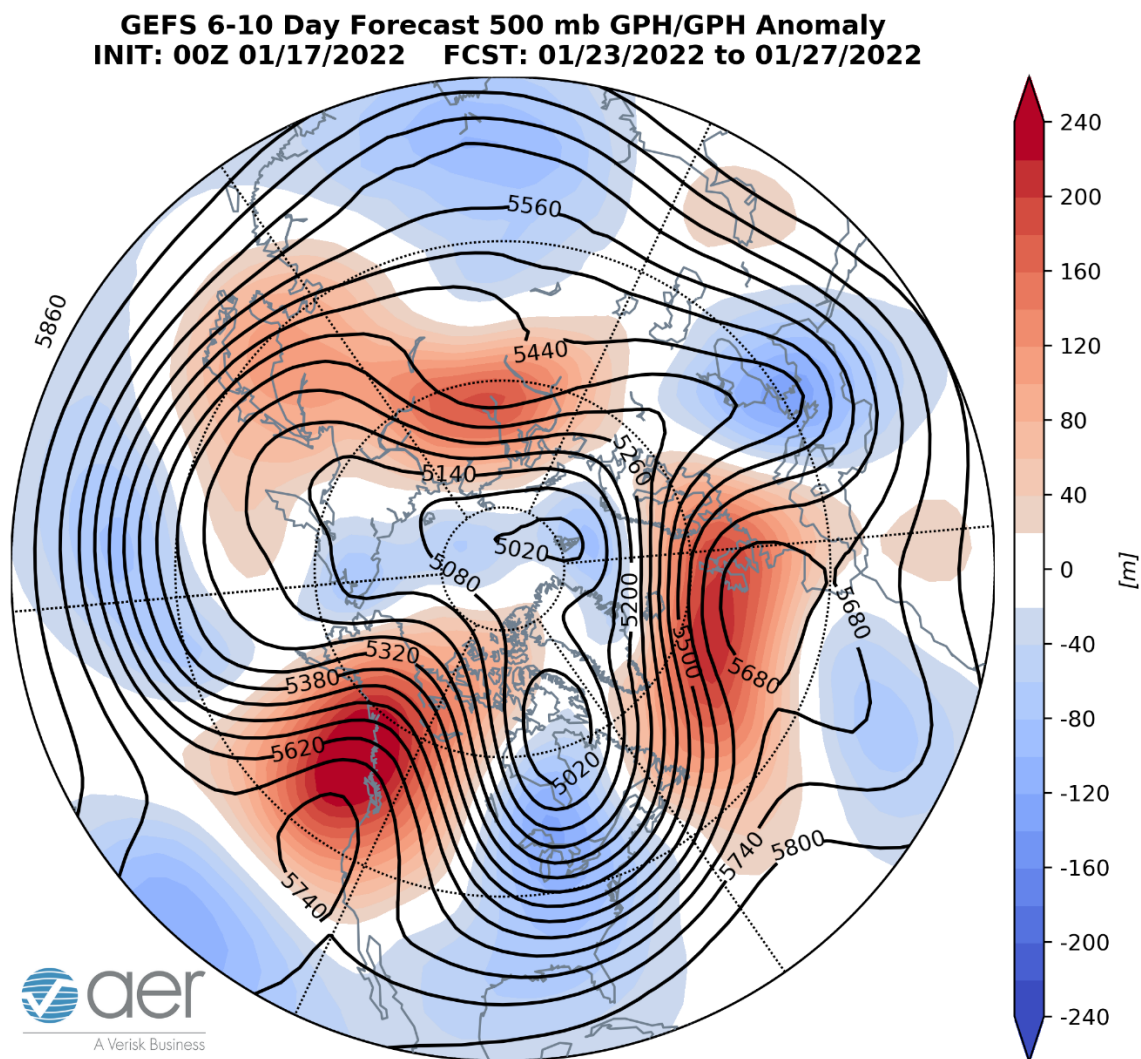


Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 23 – 27 January 2022. The forecasts are from the 00z 17 January 2022 GFS ensemble.

Persistent ridging/positive geopotential height anomalies in the North Atlantic just west of the UK will support northerly flow across Western Europe and troughing/negative geopotential height anomalies across Eastern Europe (**Figures 5**). **This will result in** normal to below normal temperatures across Western and Southern Europe including the UK with normal to above normal temperatures across Northern and Eastern Europe

(Figure 6). Ridging/positive geopotential height anomalies are still predicted dominate much of Asia except for troughing/negative geopotential height anomalies in far Western and Southern Asia and Eastern Siberia this period (Figure 5). This pattern favors normal to above normal temperatures across much of Asia with normal to below normal temperatures limited to parts of Western and Southern Asia and Eastern Siberia (Figure 6).

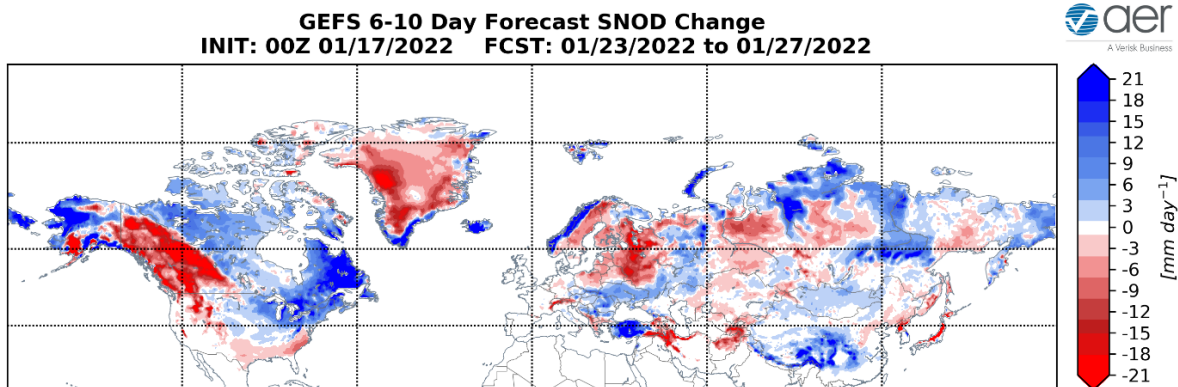


Figure 6. Forecasted surface temperature anomalies (°C; shading) from 23 – 27 January 2022. The forecasts are from the 00Z 17 January 2022 GFS ensemble.

Ridging/positive geopotential height anomalies are predicted to persist across Alaska, Western Canada and the Western US this period helping to anchor troughing/negative geopotential height anomalies across Eastern Canada and the Eastern US (Figure 5). This will favor normal to below normal temperatures across far western Alaska, much of Eastern Canada and the Eastern US with normal to above normal temperatures in much of Alaska, Western Canada and the Western US (Figure 6).

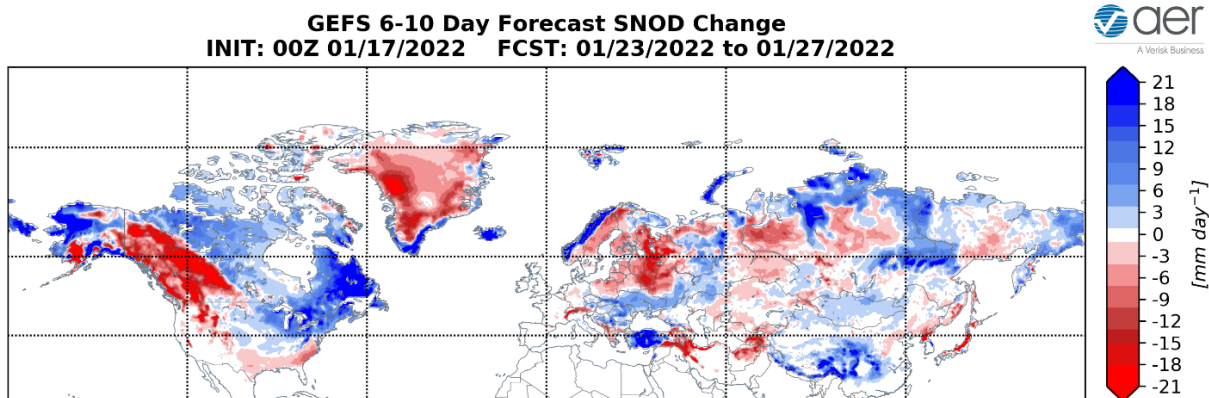


Figure 7. Forecasted snow depth changes (mm/day; shading) from 23 – 27 January 2022. The forecast is from the 00Z 17 January 2022 GFS ensemble.

Trouching and/or cold temperatures are predicted to support new snowfall across Norway, Southeastern Europe including Turkey, Central Asia, the Tibetan Plateau and Eastern Siberia while milder temperatures promote snowmelt across Northeastern Europe, Western and Eastern Asia (**Figure 7**). Trouching and/or cold temperatures are predicted to support new snowfall across western Alaska, Northern and Eastern Canada, and the Northeastern US while milder temperatures promote snowmelt across Southern Alaska, Western Canada and the Western US (**Figure 7**).

11-15 day

With geopotential height anomalies predicted to be positive across the North Pacific side of the Arctic but neutral across the Central and North Atlantic side of the Arctic and mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 8**), the AO should remain close to neutral this period (**Figure 1**). With predicted mostly positive but weak pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO is forecasted to remain near neutral this period.

GEFS 11-15 Day Forecast 500 mb GPH/GPH Anomaly
INIT: 00Z 01/17/2022 FCST: 01/28/2022 to 02/01/2022

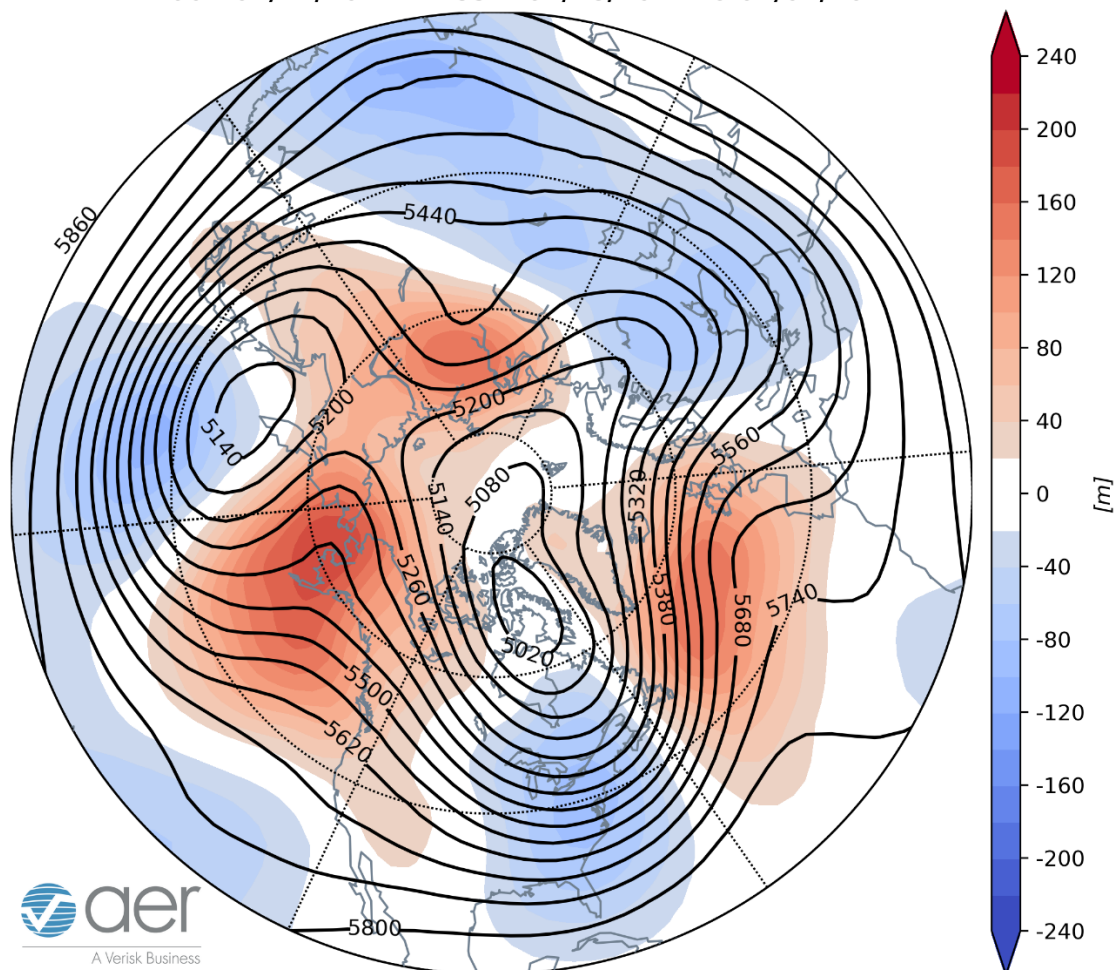


Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 28 January – 2 February 2022. The forecasts are from the 00z 17 January 2022 GFS ensemble.

Persistent ridging/positive geopotential height anomalies in the central North Atlantic are predicted to continue to support northerly flow across Western Europe and troughing/negative geopotential height anomalies across Central and Eastern Europe with any ridging mostly confined to far Western Europe including the UK this period (**Figure 8**). This pattern favors more normal to below normal temperatures across much of Europe with normal to above normal temperatures across far Northern and Eastern this period (**Figures 9**). Troughing/negative geopotential height anomalies are predicted in Northwestern, Northeastern and Southern Asia with ridging/positive geopotential height anomalies across much of Siberia this period (**Figure 8**). This pattern favors more widespread normal to below normal temperatures across Southern Asia and parts of Western and Northeastern Asia with normal to above normal temperatures widespread across much of Northern and Central Asia this period (**Figure 9**).

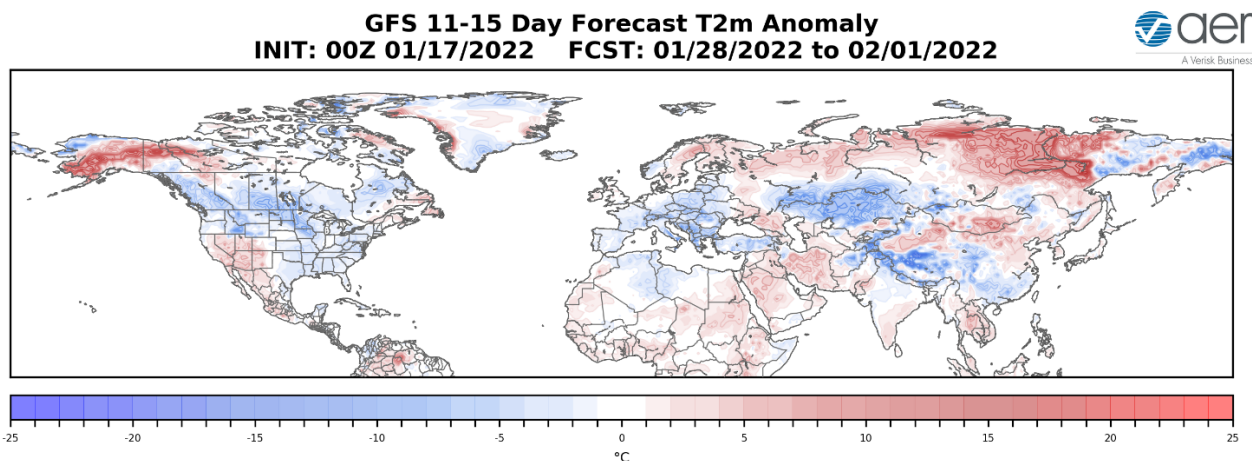


Figure 9. Forecasted surface temperature anomalies ($^{\circ}\text{C}$; shading) from 28 January – 2 February 2022. The forecasts are from the 00z 17 January 2022 GFS ensemble.

Ridging/positive geopotential height anomalies are predicted to persist across western North America and centered near the Aleutians contributing to anchoring troughing/negative geopotential height anomalies in eastern North America this period (**Figure 8**). This pattern favors normal to above normal temperatures across Alaska, Northern Canada and the Western US with normal to below normal temperatures in Southern and Eastern Canada and the Central and Eastern US (**Figure 9**).

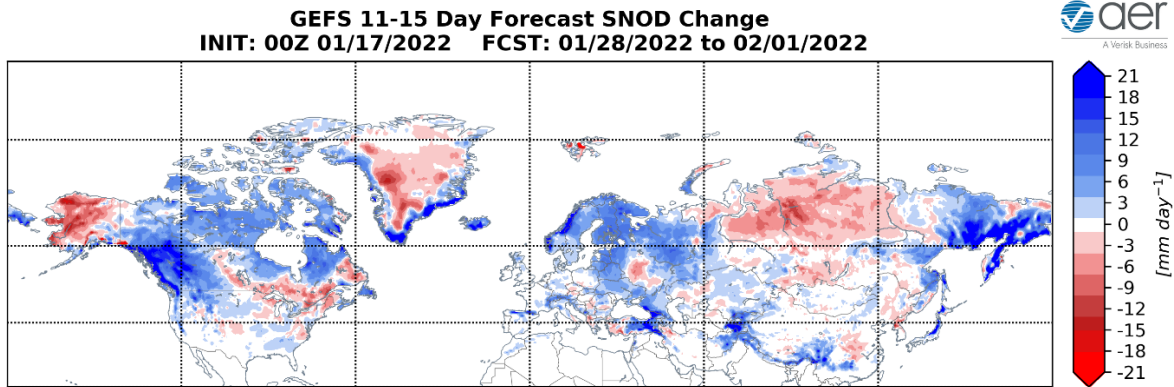


Figure 10. Forecasted snow depth changes (mm/day; shading) from 28 January – 2 February 2022. The forecast is from the 00Z 17 January 2022 GFS ensemble.

Trouging and/or cold temperatures are predicted to support possible new snowfall across the higher elevations of Southern Europe, Central and Eastern Europe including Turkey, Western and Eastern Asia and the higher elevations of Southern Asia while milder temperatures promote snowmelt across Western and Central Siberia (**Figure 10**). Trouging and/or cold temperatures are predicted to support possible new snowfall across Northern and Western Canada and the Western US while milder temperatures promote snowmelt across Alaska, Southern Canada and the Northeastern US (**Figure 10**).

Longer Term

30-day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows cold/negative PCHs throughout the stratosphere and lower troposphere with warm/positive PCHs in the mid to upper troposphere (**Figure 11**). The negative departures are predicted to deepen in the upper stratosphere over the next two weeks (**Figure 11**). Currently the stratosphere and troposphere are decoupled and waiting for coupling to resume, though exactly how remains an open question to me. This extended stretch of decoupled PCHs is highly unusual.

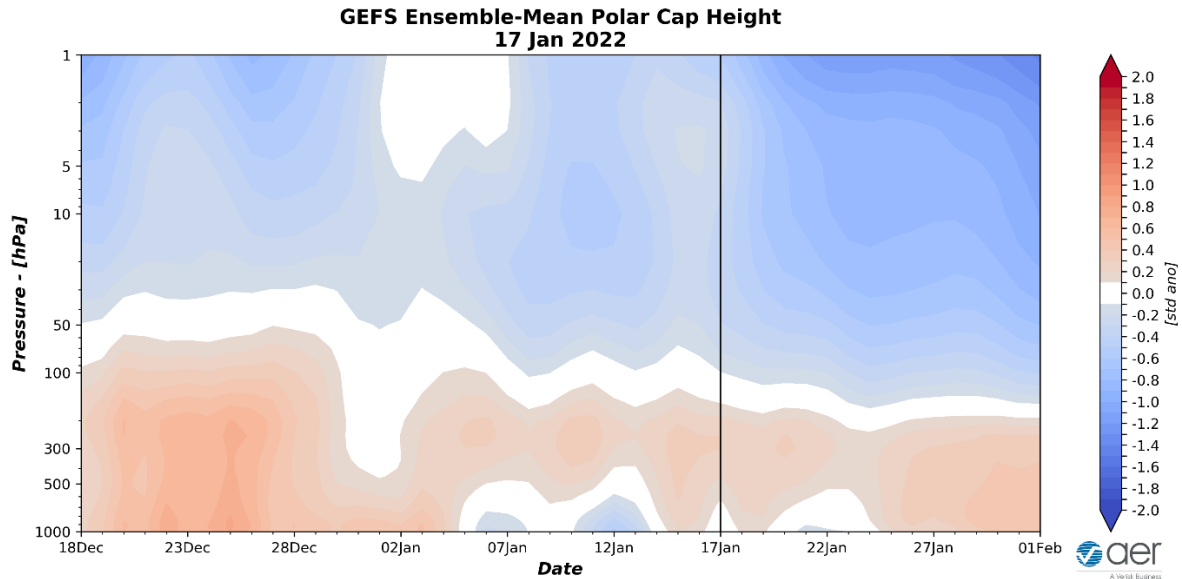


Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 17 January 2022 GFS ensemble.

The normal to below normal PCHs predicted early this week in the lower troposphere are consistent with the predicted positive surface AO early this week (**Figure 1**). The PCH forecast continues to look strange today and suggests repetitive troposphere-(very) low stratosphere-troposphere coupling events that are quite shallow and condensed in time. Regardless I believe that a stretched PV is the best way to understand stratosphere-troposphere coupling this month.

The vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere is predicted to remain mostly below normal (**Figure 12**). A more active period is possible towards the end of the month. The negative WAFz anomalies predicted over the next two weeks will continue to support a relatively strong PV through mid- to late-January as suggested by the relatively cold stratospheric PCHs. Though again not all strong PVs are created equal, and I think a stretched polar vortex is what is most critical right now.

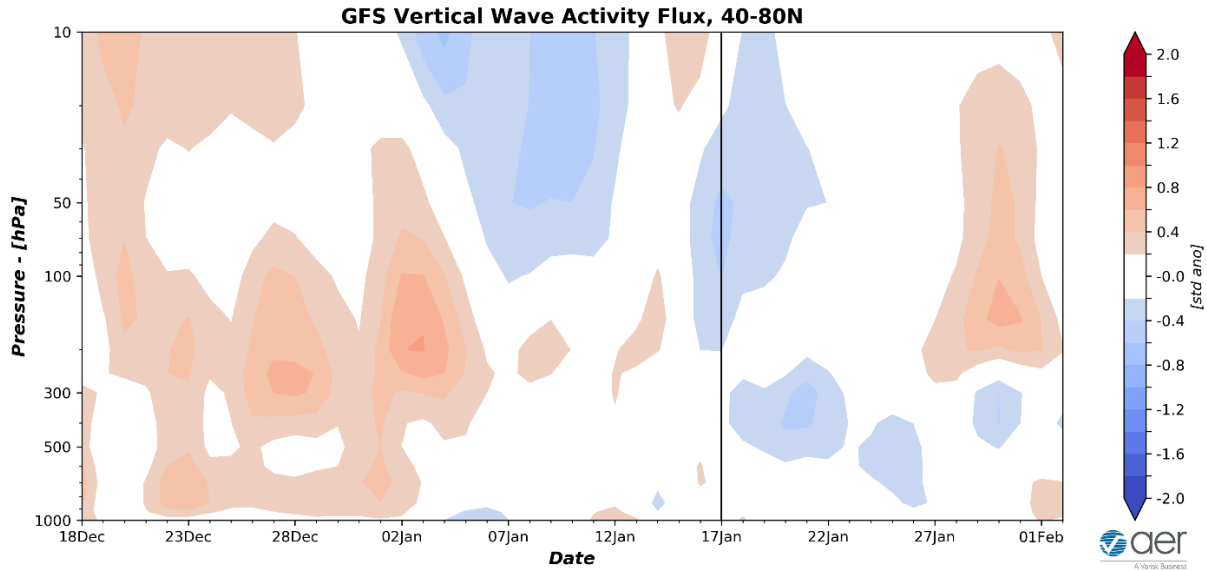


Figure 12. Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 17 January 2022 GFS ensemble.

Though zonally averaged WAFz is weak, another stretched stratospheric PV and second of this month seems to be occurring with the PV centered near Svalbard with ridging centered on the Aleutians and polar stratospheric warming across the Beaufort Sea, Alaska and Northwest Canada. In addition, the PV exhibits a stretched configuration from the Urals to Eastern Canada and not circular (**Figure 13**). However, the perturbation is relatively minor, and the PV is relatively strong resulting in a current positive stratospheric AO (**Figure 11**).

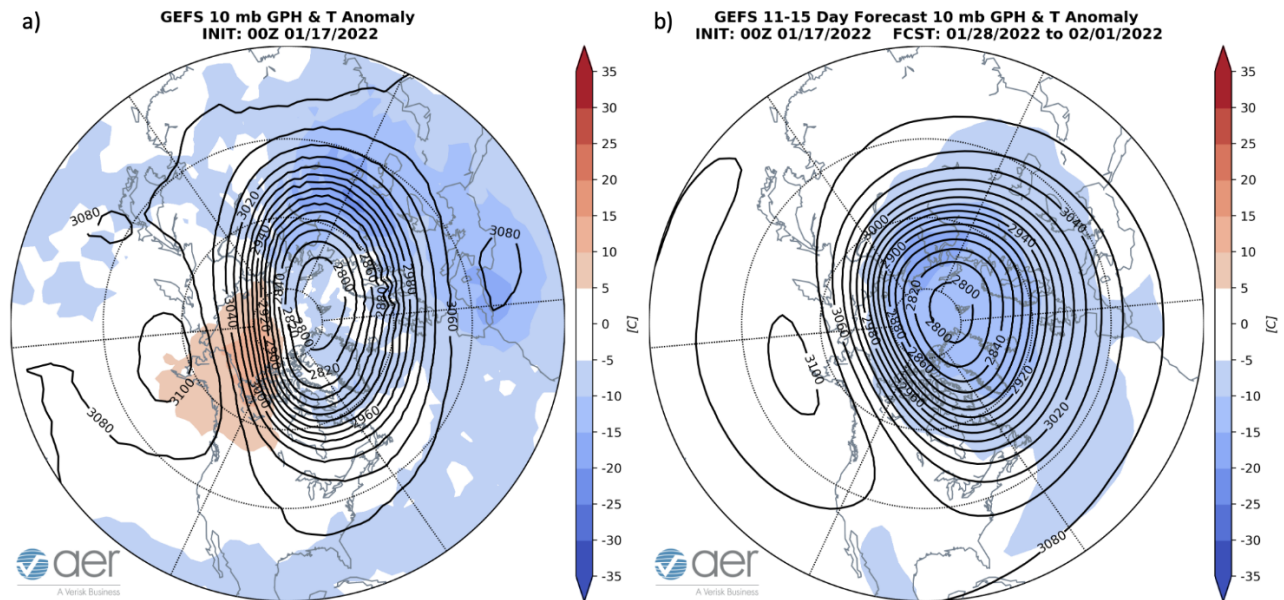


Figure 13. (a) Intialized 10 mb geopotential heights (dam; contours) and temperature anomalies ($^{\circ}\text{C}$; shading) across the Northern Hemisphere for 17 January 2022. (b) Same as (a) except forecasted averaged from 28 January – 2 February 2022. The forecasts are from the 00Z 17 January 2022 GFS model ensemble.

The below normal WAFz is predicted to allow the PV to strengthen and become quite strong with the PV remaining centered between the North Pole and Svalbard at the end of January (**Figure 13**) with a persistent positive stratospheric AO the next two weeks (**Figure 11**). The strengthening stratospheric PV could couple with the surface commencing a relatively mild period across the US and Europe, sometime in February.

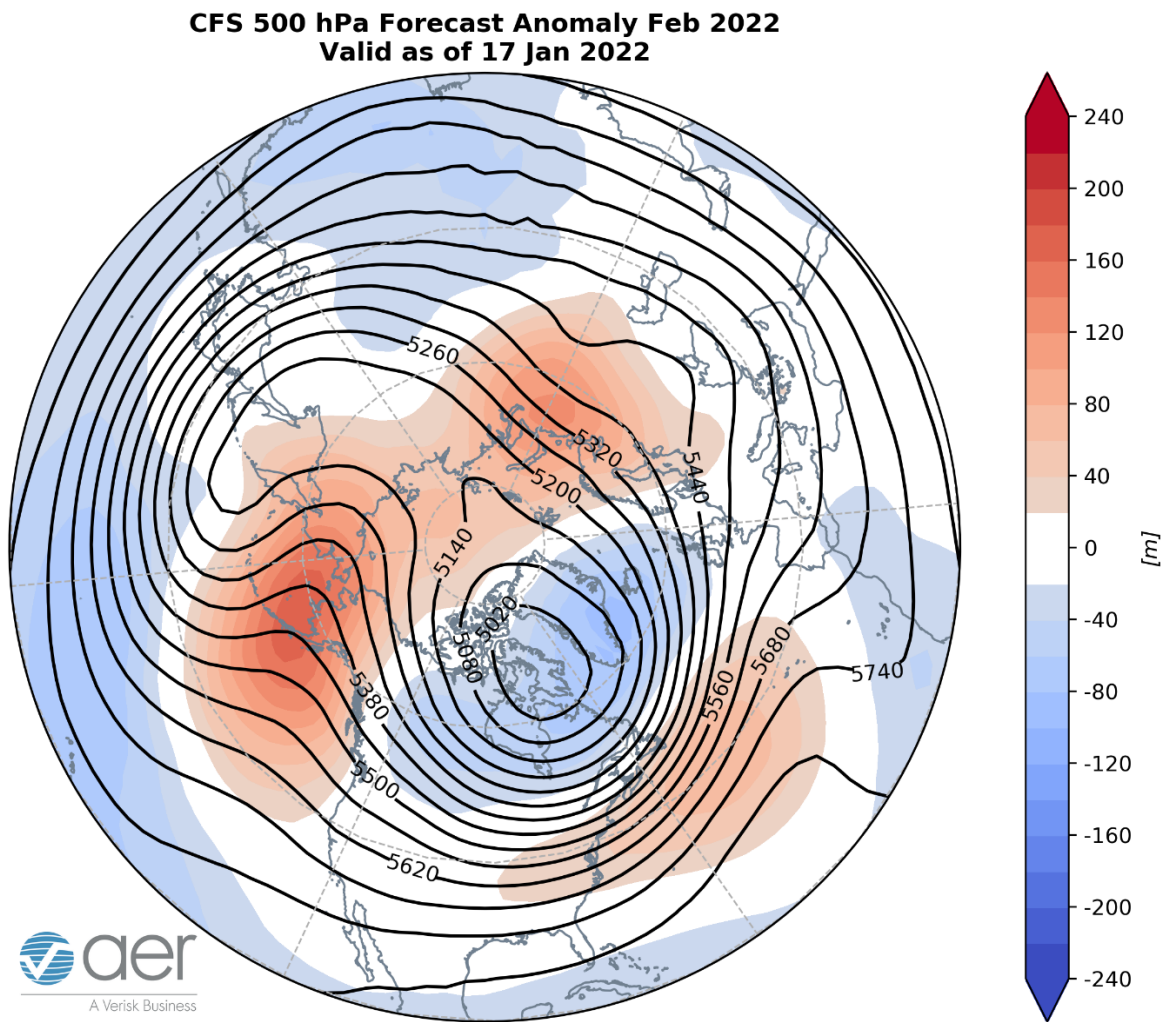


Figure 14. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for February 2022. The forecasts are from the 00Z 17 January 2022 CFS.

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

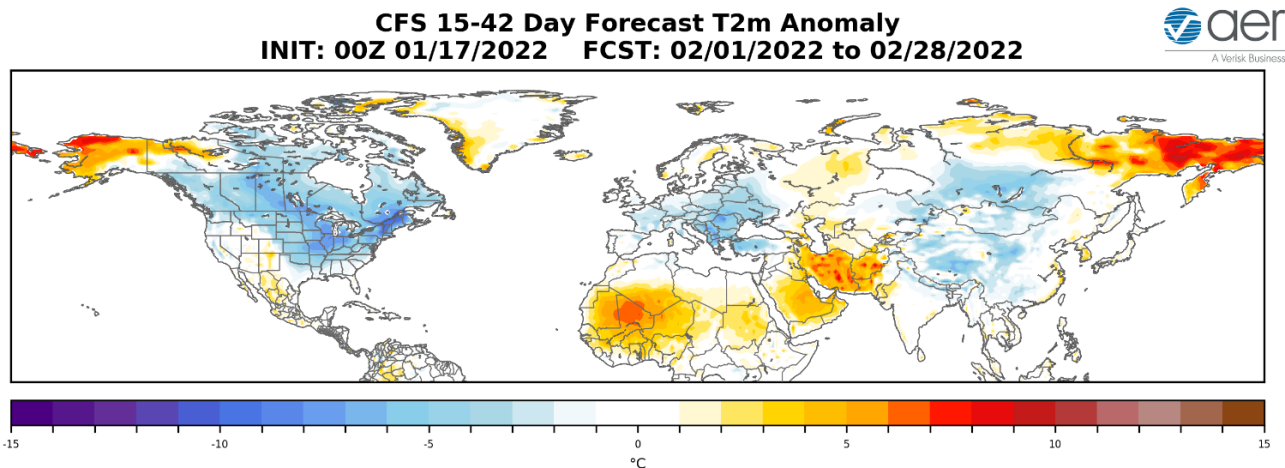


Figure 15. Forecasted average surface temperature anomalies ($^{\circ}\text{C}$; shading) across the Northern Hemisphere for February 2022. The forecasts are from the 00Z 17 January 2022 CFS.

Surface Boundary Conditions

Arctic Sea ice

Arctic sea ice is growing but remains below normal mostly in Baffin Bay and is above normal in the Bering Sea. Overall sea ice is relatively extensive compared to recent winters, though it remains relatively thin. In the Barents-Kara Seas extent is close to normal. Below normal sea ice in the Barents-Kara seas favors cold temperatures in Central and East Asia, while below normal sea ice in Baffin Bay favors cold temperatures in the Eastern and Northern Europe however this topic remains controversial. Recent research has shown that the regional anomalies that are most highly correlated with the strength of the stratospheric PV are across the Barents-Kara seas region where low Arctic Sea ice favors a weaker winter PV. Low sea ice in the

Chukchi, Beaufort and Bering seas may favor colder temperatures across North America but has not been shown to weaken the PV.

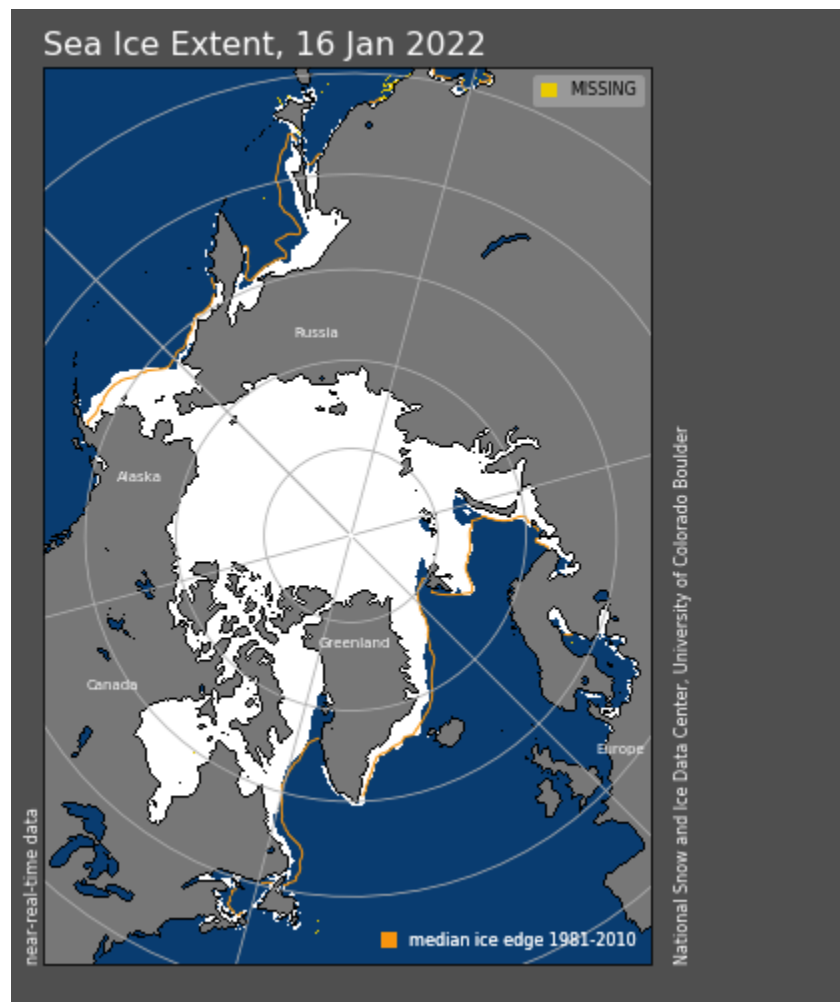


Figure 16. Observed Arctic Sea ice extent on 16 January 2022 (white). Orange line shows climatological extent of sea ice based on the years 1981-2010. Image from the National Snow and Ice Data Center (NSIDC).

SSTs/El Niño/Southern Oscillation

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

Oscillation (PDO) pattern that favors colder temperatures across northwestern North America and milder temperatures across southeastern North America.

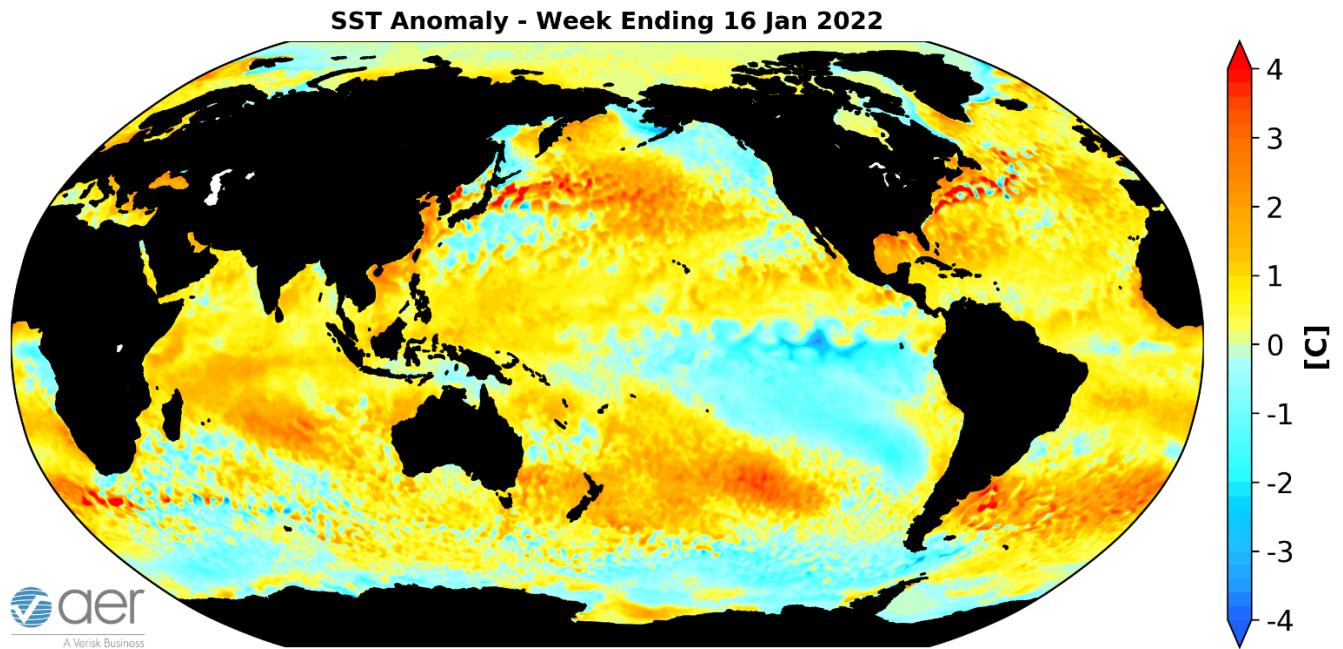


Figure 17. The latest weekly-mean global SST anomalies (ending 16 January 2022). Data from NOAA OI High-Resolution dataset.

Currently no phase of the Madden Julian Oscillation (MJO) is favored (**Figure 18**). The forecasts are for the MJO to remain weak but could briefly pop into phase seven before weakening again to where no phase is favored. MJO phase seven favors high latitude blocking including Alaska. Initially phase seven favors troughing and cold temperatures in the Western US and ridging and mild temperatures in the Eastern US but then reverses. To be honest not sure what to make of the MJO forcing this month but doesn't seem to be much of a factor currently but admittedly this is outside of my expertise.

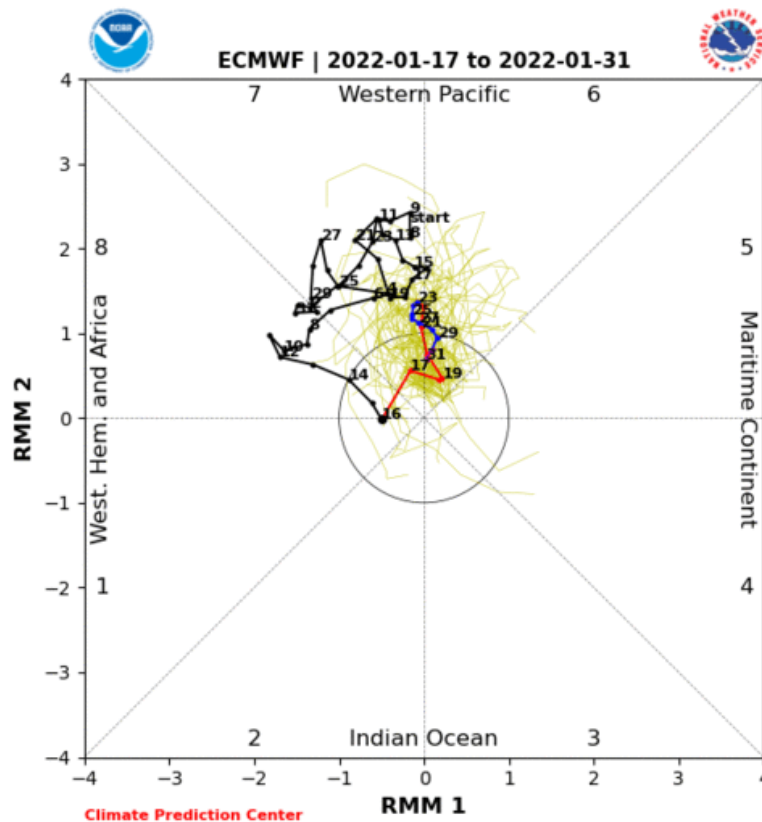


Figure 18. Past and forecast values of the MJO index. Forecast values from the 00Z 17 January ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model “spread” is denoted by the gray shading. Sector numbers indicate the phase of the MJO, with geographical labels indicating where anomalous convection occurs during that phase. Image source: <http://www.atmos.albany.edu/facstaff/roundy/waves/phasediags.html>

Get Detailed Seasonal Weather Intelligence with sCast

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

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

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