

Arctic Oscillation and Polar Vortex Analysis and Forecasts

November 08, 2021

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.

Special blog on winter 2018/2019 retrospective can be found here - <http://www.aer.com/winter2019>

Special blog on winter 2017/2018 retrospective can be found here - <http://www.aer.com/winter2018>

Special blog on winter 2016/2017 retrospective can be found here - <http://www.aer.com/winter2017>

Special blog on winter 2015/2016 retrospective can be found here - <http://www.aer.com/winter2016>

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 trend negative this week and then straddle neutral later this week and next week 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 currently positive and is predicted to also straddle neutral as pressure/geopotential height anomalies are currently negative across Greenland but are predicted to remain mostly weak and mixed across Greenland the next two weeks.
- This week troughing/negative geopotential height anomalies across Greenland will favor ridging/positive geopotential height anomalies coupled with normal to above temperatures across much of Europe including the United Kingdom (UK). However next week strengthening ridging/positive geopotential height anomalies south of Iceland will promote troughing/negative geopotential height anomalies and northerly flow coupled with normal to below normal temperatures across Western and Northern Europe including the UK and then Central Europe.
- This week the predicted pattern across Asia is ridging/positive geopotential height anomalies coupled with normal to above normal temperatures in Western and Northern Asia with troughing/negative geopotential height anomalies coupled with normal to below temperatures in East Asia. Next week troughing/negative geopotential height anomalies coupled with normal to below temperatures are predicted to swing deepen in Central Asia while ridging/positive geopotential height anomalies coupled with normal to above normal temperatures strengthen across Eastern Siberia.
- The pattern across North America this week is troughing/negative geopotential height anomalies coupled with normal to below normal temperatures in Alaska and Western Canada forcing downstream ridging/positive geopotential height anomalies coupled with normal to above temperatures in Eastern Canada and the Eastern United States (US). However, next week strengthening ridging/positive geopotential height anomalies coupled with normal to above temperatures across the Western US will favor troughing/negative geopotential height anomalies coupled with normal to below temperatures in the Eastern US.
- In the *Impacts* section I present a preliminary winter forecast and throw in some thoughts about Arctic influence.

Plain Language Summary

I use October Eurasian snow cover extent (SCE) as one of our main predictors for winter temperature anomalies across the Northern Hemisphere (NH). Eurasian SCE was slightly above normal for the month of October coupled with La Niña is biasing the AER winter forecast on the cold side of normal for western and central North America, Northern Europe. The winter forecasts from the government centers are much warmer (at least in extent). One wild card could be the water temperatures in the North Pacific, if strong enough they can favor the core of cold temperatures further to west across North America.

Impacts

I have been promising a preliminary winter forecast for surface temperature anomalies for the Northern Hemisphere and today I deliver. The forecast was generated the last week of October

using my estimate of October Eurasian snow cover extent (SCE), the dominant sea level pressure anomaly across Northern Eurasia for October, the September Arctic sea ice extent anomaly and the predicted winter (December-February) Niño 3.4 index (a common indicator for El Niño/Southern Oscillation (ENSO)). Also I included in this winter's forecast my own very rough estimate for the winter Pacific Decadal Oscillation (PDO) index. Typically, I don't include the PDO index in my winter forecasts, but the strong negative PDO pattern has emerged, and it could very well be a factor. In **Figure i**, I present a preliminary AER winter forecast that was shared with clients at the end of October. I will share an update to the winter forecast on the blog at the end of the month. Please keep in mind since the forecast was generated the observed values for October SCE and SLP are now known and will be used in updated forecasts. Also, I used as my climatology the values from 1991-2020.

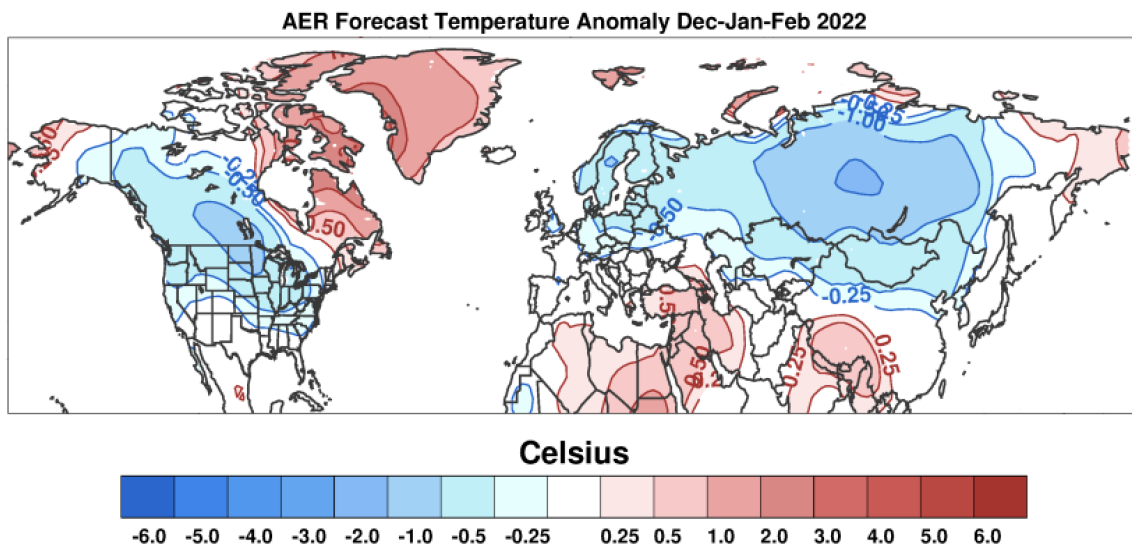


Figure i. Forecasted surface temperature anomalies for December 2021 - February 2022 from the AER model.

I have to say when the forecast was first generated, I was surprised by how cold the forecast appears. At this point I don't have a lot of confidence in the forecast, and it will certainly be revised. But just to emphasize how cold the forecast appears, at least visually (and to be honest the anomalies are not large), all I need to do is present in **Figure ii** a consensus of the dynamical model temperature anomaly forecast from the North American Model Ensemble (NNME). The dynamical models are predicting almost universal relative warmth across the Northern Hemisphere continents except for Alaska and Western Canada. Across North America it is a canonical La Niña pattern and across Eurasia is it a global warming signal. To be fair there is probably some global warming influence included in the North American forecast as well.

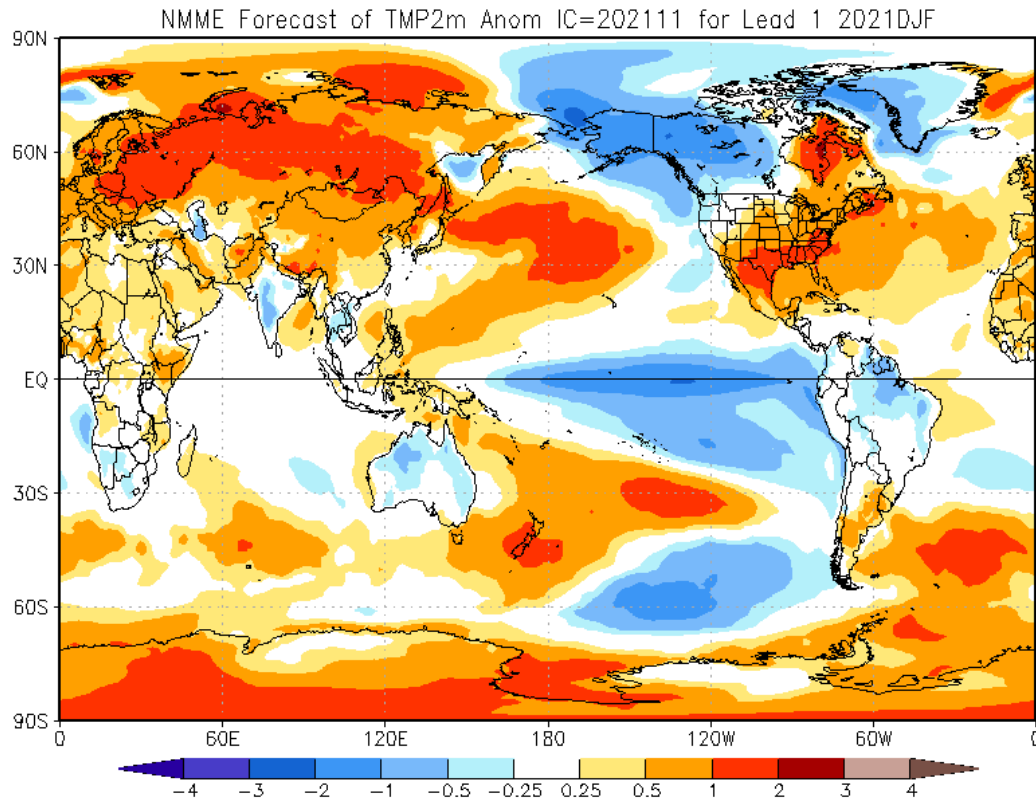


Figure ii. Forecasted surface temperature anomalies for December 2021 - February 2022 from the NMME models.

I have discussed this before, but the lack of variability among the model forecasts is noteworthy and one should look at all the NMME more forecasts to see just how much they all resemble each other (see [NMME winter forecasts](#)). The European C3S ensemble also looks similar but has not been updated for November yet (see [C3S winter forecast](#)). In my opinion observational analysis between ENSO and NH winter temperatures does not support such a high degree of confidence in the forecast from the dynamical models. I have argued in my papers that the dynamical models are insensitive to Arctic forcing and overly sensitive to tropical forcing (e.g. [Cohen et al. 2016](#)). The large amount of variability or noise in the climate system is used to criticize arguments of Arctic influence (including my own), i.e., the large amount of noise makes it impossible to distinguish or identify the signal of Arctic influence, i.e., all noise and no signal. Yet when it comes to tropical influence it is all signal and no noise? Anyway, enough of my griping.

But as I have argued many times before even if the AER winter forecast is completely wrong, I strongly believe that it provides value in at least it is an alternative forecast and not a herd forecast. And all we need to do is look to last winter to see how wrong the herd forecast can be (see the blog post from [March 8, 2021](#)). But I readily admit if the polar vortex remains strong this winter, the dynamical models will look like champs in March 2022, which is one takeaway from winter 2019/20.

I do think that Arctic surface conditions, especially with the recent snow blitz across Asia are well suited for disrupting the polar vortex. Negative sea anomalies heading into the winter are focused in two regions. The first is the Barents-Kara Seas and low sea ice in this region is thought to be most favorable for disrupting the polar vortex. The other region is Baffin Bay. As I showed last week, negative sea ice anomalies in this region are associated with relatively cold temperatures in the Eastern US and Northern Europe. Whether sea ice anomalies in this region can force anything I don't know, and they could just be a lagging indicator (they indicate recent Greenland blocking that favors relatively cold temperatures in the Eastern US and Northern Europe but warm temperatures in Baffin Bay, which inhibits sea ice formation).

Though October SCE was not impressive and only slightly above normal but so far November SCE is very impressive. But for full disclosure, I have not shown any analysis that November SCE has any influence on winter weather, but other studies have (see blog from [October 25, 2021](#)). Also, there are three weeks left and SCE could still change dramatically.

But snow and sea ice can remain very favorable for disrupting the polar vortex from now until March, but they alone are not sufficient to force a polar vortex disruption. Whatever signal they provide will never make it to the polar vortex without blocking/high pressure in the Barents-Kara Seas/Ural/Scandinavia region. Right now, there are no signs of a meaningful return of blocking/high pressure to this region. Based on the model forecasts I believe you have to bias the probability of a relatively strong polar vortex and a relatively mild pattern across the NH including the Eastern US and Northern Europe heading into December. The best possibility of resulting in meaningful cold, especially to the Eastern US, in my opinion would be another stretched polar vortex in December as is occurring now. A larger polar vortex disruption that is associated with a sudden stratospheric warming takes longer to occur and without dramatic changes I don't see one occurring in December.

But it is early, and I do believe that Arctic snow and ice favor a return of Barents-Kara Seas/Ural/Scandinavia region more so than its continuous absence. But also in my opinion, the blocking needs to be persistent and not transitory to have enough influence to impact the winter means. Early in my career all I wanted to see was Greenland blocking but now I am much more fixated on Ural blocking. I see little evidence that Greenland blocking can perturb the polar vortex, instead Ural blocking is critical. And I am more and more convinced that without some type of disruption to the polar vortex notable (or from my perspective memorable) winter weather is nearly impossible. But to be fair to Greenland blocking it may be an early precursor to polar vortex stretching as we showed in [Cohen et al. 2021](#). And I don't intend to diminish that Greenland blocking is strong signal for a Northeastern US snowstorm and certainly cold and snow for Northern Europe. Whether the new obsession is warranted is still an open question.

Finally, I did see the October value for the PDO and it was deep into negative territory; seems to me that it has been a while since we have observed a number that negative and my PDO index used as a predictor in the winter forecast may be too conservative. A more negative PDO would favor pulling the cold temperatures across North America further west with more warming in the Eastern US. I wish that I could be as confident as the dynamical models but as I see it, there are many mixed signals so far and therefore lots of uncertainty.

1-5 day

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

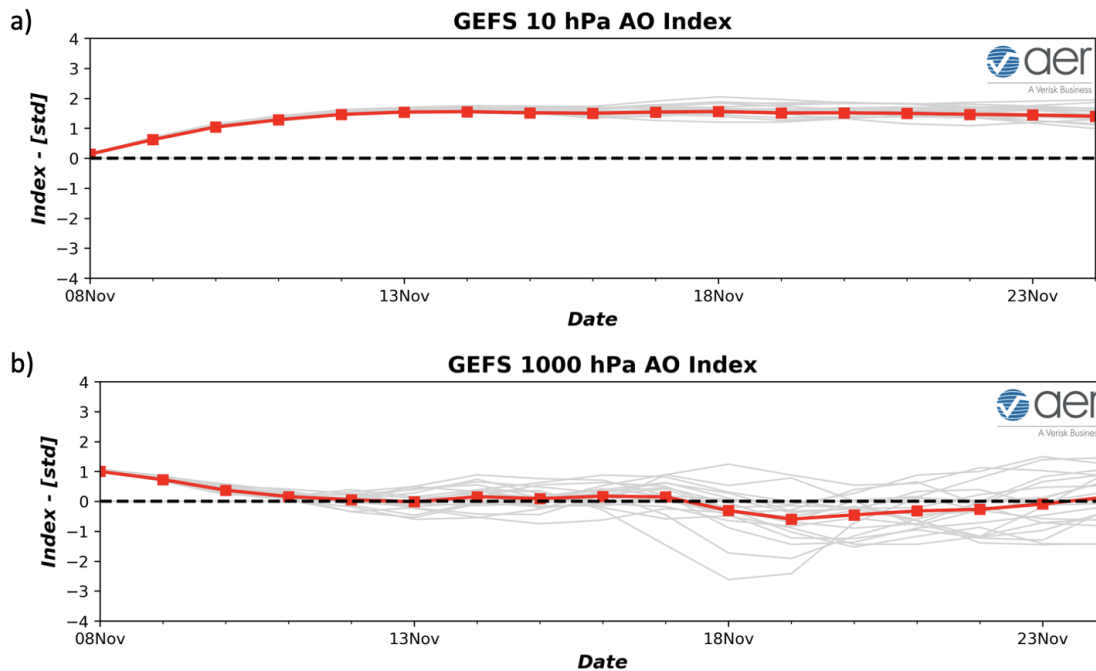


Figure 1. (a) The predicted daily-mean AO at 1000 hPa from the 00Z 8 November 2021 GFS ensemble. (b) The predicted daily-mean near-surface AO from the 00Z 8 November 2021 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.

This week, troughing/negative geopotential height anomalies across Greenland will force ridging/positive geopotential height anomalies across much of Europe including the UK with troughing/negative geopotential height anomalies limited to the western Mediterranean associated with northerly flow in Southwestern Europe this period (**Figures 2**). This will result in normal to above normal temperatures across most of Europe including the UK with normal to below normal temperatures across Southwestern Europe (**Figure 3**). The general pattern across Asia this period is ridging/positive geopotential height anomalies centered over Central Asia and Eastern Siberia with troughing/negative geopotential height anomalies in Eastern Asia (**Figure 2**). This pattern favors normal to above normal temperatures in Western and Northern Asia with normal to below normal temperatures in Eastern Asia (**Figure 3**).

GEFS 1-5 Day Forecast 500 mb GPH/GPH Anomaly
INIT: 00Z 11/08/2021 FCST: 11/09/2021 to 11/13/2021

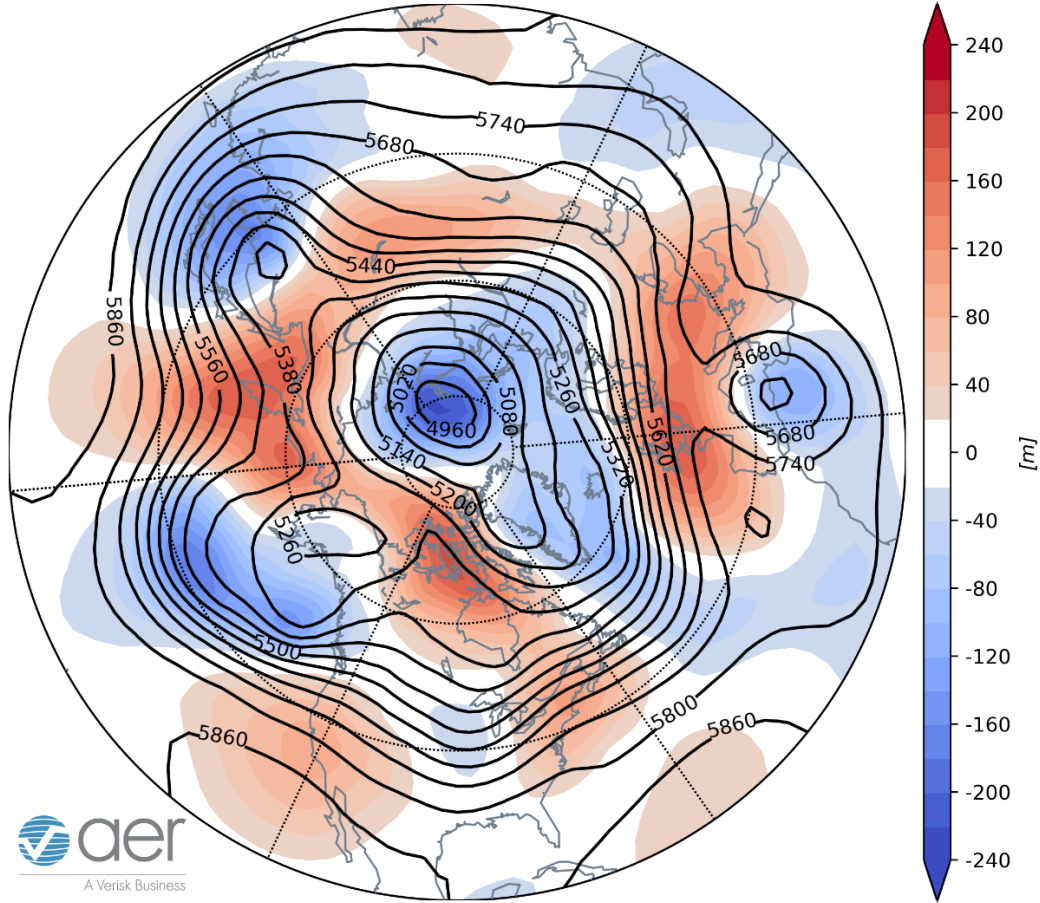


Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 9 – 13 November 2021. The forecasts are from the 00z 8 November 2021 GFS ensemble.

The general pattern this week across North America is troughing/negative geopotential height anomalies Alaska and Western Canada with ridging/positive geopotential height anomalies across Eastern Canada and the Western and Eastern US (**Figure 2**). This pattern is predicted to bring normal to below normal temperatures across Alaska and Western Canada with normal to above normal temperatures across much of Eastern Canada and the Western and Eastern US (**Figure 3**).

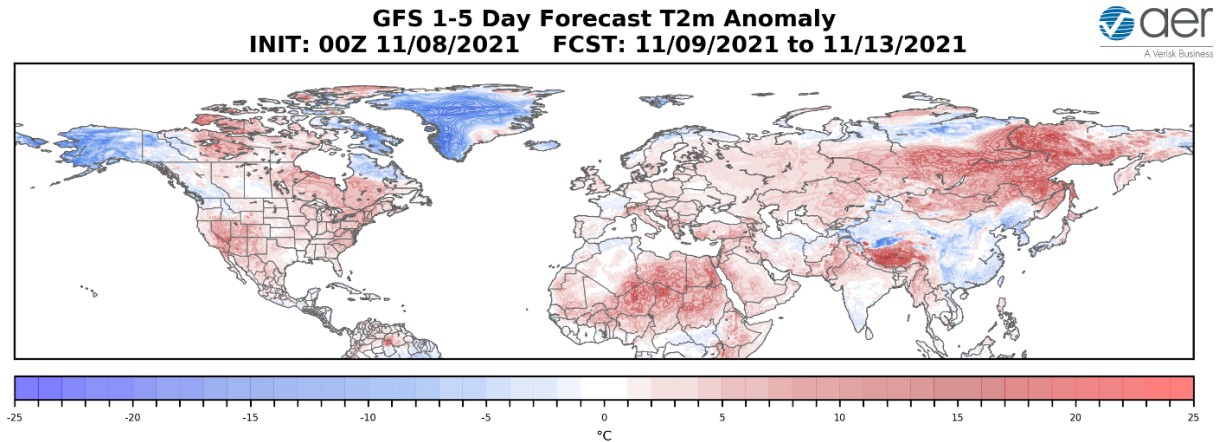


Figure 3. Forecasted surface temperature anomalies ($^{\circ}\text{C}$; shading) from 9 – 13 November 2021. The forecast is from the 00Z 8 November 2021 GFS ensemble.

Trouthing and/or cold temperatures are predicted to support new snowfall across Norway, Northern and Eastern Asia while mild temperatures promote snowmelt in Central Asia (**Figure 4**). Trouthing and/or cold temperatures are predicted to support new snowfall across Southern Alaska and Western and Central Canada (**Figure 4**).

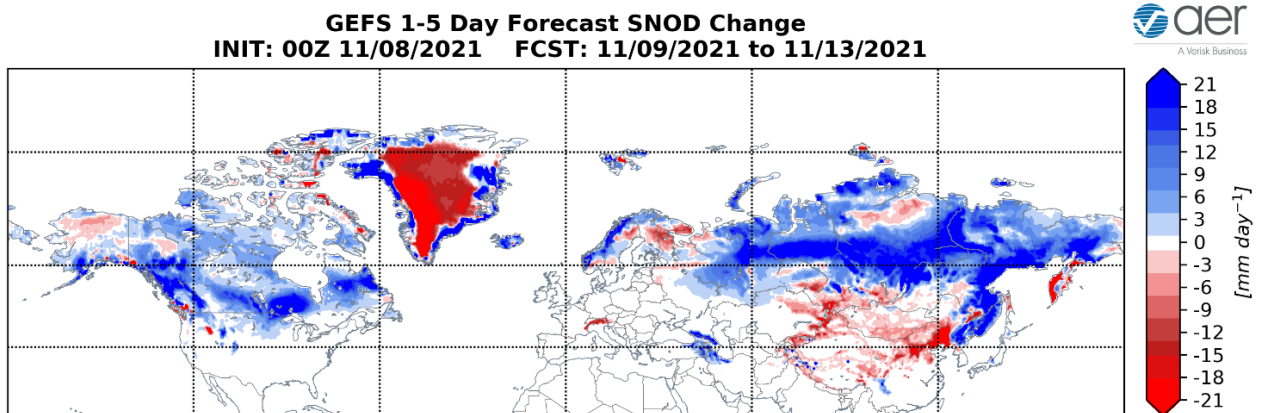


Figure 4. Forecasted snow depth changes (mm/day ; shading) from 9 – 13 November 2021. The forecast is from the 00Z 8 November 2021 GFS ensemble.

Mid-Term

6-10 day

The AO is predicted to straddle neutral this period (**Figure 1**) as geopotential height anomalies remain mixed across the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 5**). And with weak geopotential height anomalies continuing across Greenland (**Figure 5**), the NAO is predicted to also stay tethered to neutral this period.

GEFS 6-10 Day Forecast 500 mb GPH/GPH Anomaly
INIT: 00Z 11/08/2021 FCST: 11/14/2021 to 11/18/2021

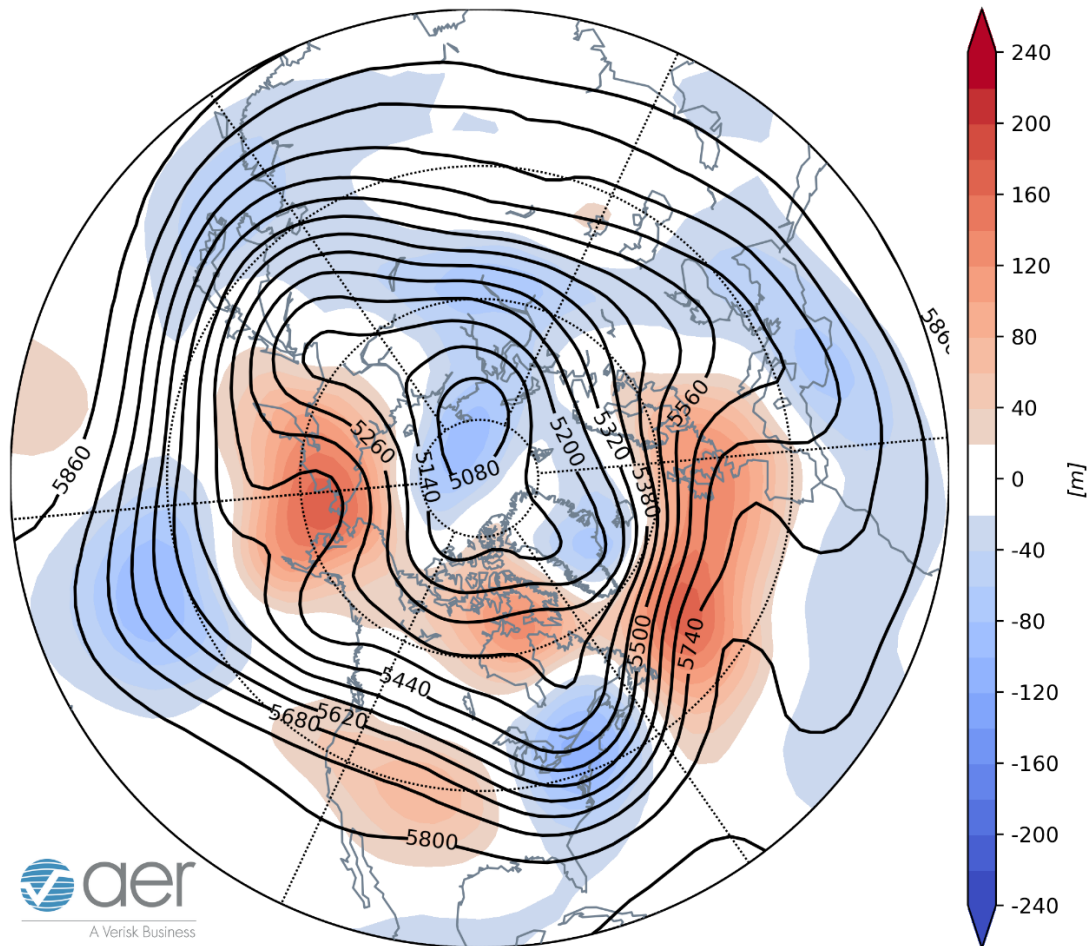


Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 14 – 18 November 2021. The forecasts are from the 00z 8 November 2021 GFS ensemble.

Developing ridging/positive troughing/negative geopotential height anomalies south of Greenland and Iceland will contribute to troughing/negative geopotential height anomalies and northerly flow across Western Europe with southwesterly flow across Eastern Europe this period (**Figure 5**). This will result in normal to below normal temperatures across much of Western and Northern Europe including the UK with normal to above normal temperatures across Eastern Europe (**Figure 6**). Strengthening ridging/positive geopotential height anomalies near the Dateline and the eastern North Atlantic will contribute to troughing/negative geopotential height anomalies in Western and Central Asia with developing southwesterly flow across East Asia this period (**Figure 5**). This pattern favors normal to below normal temperatures across Western and Central Asia with normal to below normal temperatures in Eastern and Southern Asia (**Figure 6**).

GFS 6-10 Day Forecast T2m Anomaly
INIT: 00Z 11/08/2021 FCST: 11/14/2021 to 11/18/2021

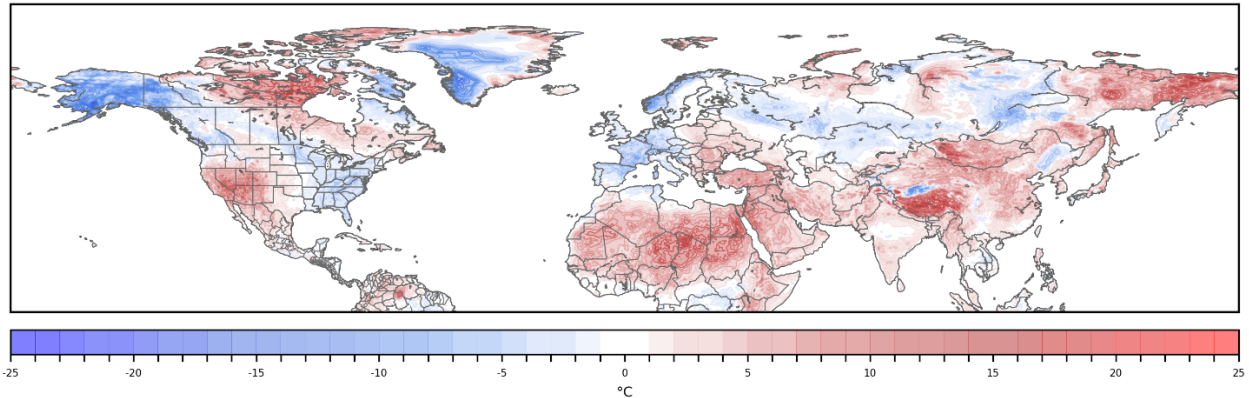


Figure 6. Forecasted surface temperature anomalies (°C; shading) from 14 – 18 November 2021. The forecasts are from the 00Z 8 November 2021 GFS ensemble.

A weak trough/negative geopotential height anomalies previously in the Central US are predicted to slide into the Eastern US and deepen with help from ridging/positive geopotential height anomalies across the Western US while troughing/negative geopotential height anomalies persist across Alaska (**Figure 5**). But the overall widespread ridging is predicted to bring normal to above normal temperatures across much of Canada and the Western US with normal to below normal temperatures in Alaska, the West Coast of Canada and the Eastern US (**Figure 6**).

GEFS 6-10 Day Forecast SNOD Change
INIT: 00Z 11/08/2021 FCST: 11/14/2021 to 11/18/2021

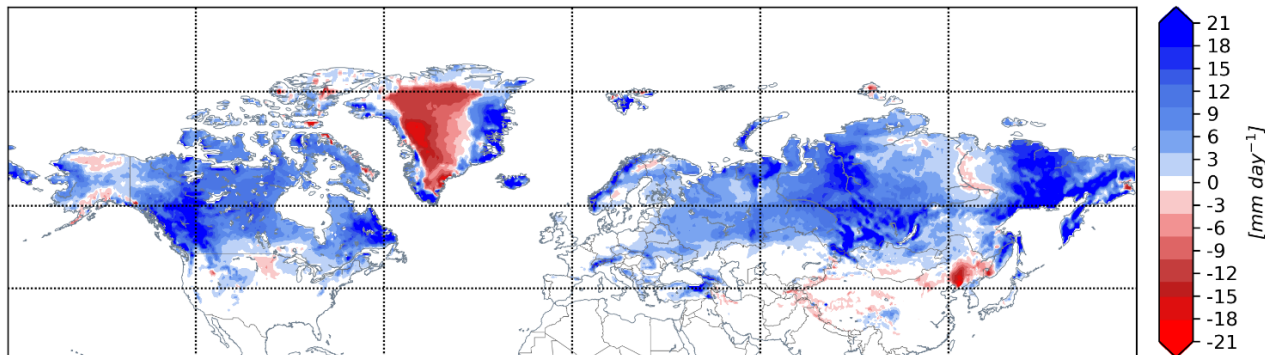


Figure 7. Forecasted snow depth changes (mm/day; shading) from 14 – 18 November 2021. The forecast is from the 00Z 8 November 2021 GFS ensemble.

Troughing and/or cold temperatures are predicted to support new snowfall across Scandinavia, the Alps and Northern Asia while milder temperatures promote snowmelt across Northeast China (**Figure 7**). Troughing and/or cold temperatures are predicted to support new snowfall across Alaska, much of Canada and the US Rockies (**Figure 7**).

11-15 day

With mixed geopotential height anomalies predicted across the Arctic and mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 8**), the AO should remain near neutral this period (**Figure 1**). With predicted weak pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO is forecasted to remain near neutral this period as well.

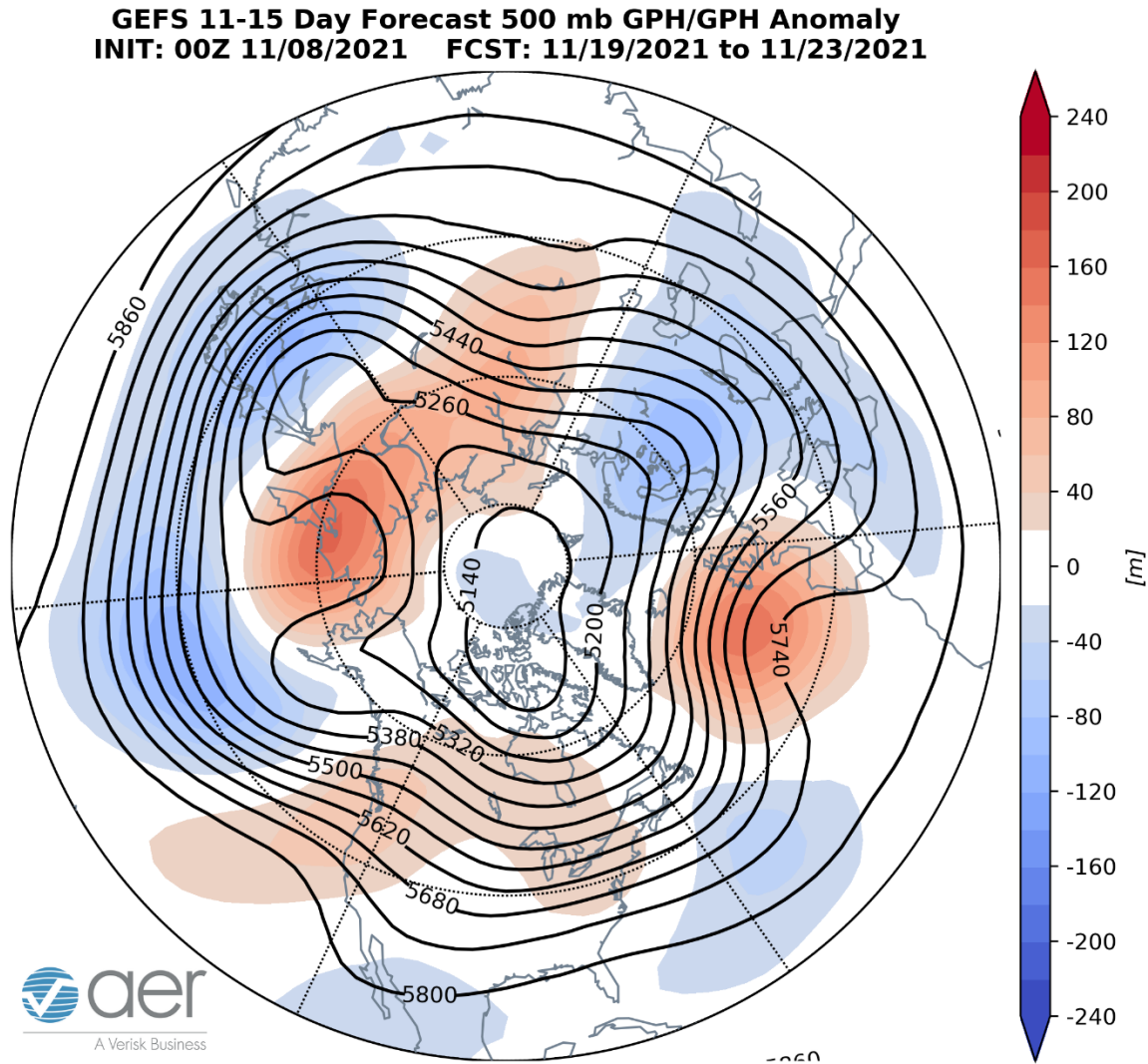


Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 19 – 23 November 2021. The forecasts are from the 00z 8 November 2021 GFS ensemble.

Strengthening ridging/positive geopotential height anomalies south of Iceland will help anchor troughing/negative geopotential height anomalies and northerly flow across Western Europe this period (**Figure 8**). This pattern favors widespread normal to below normal temperatures across much of Western and Central Europe including the UK with normal to above normal temperatures confined to Eastern Europe this period (**Figures 9**). Ridging/positive geopotential height anomalies are predicted to be focused in Eastern Siberia with troughing/negative geopotential height anomalies in West and East Asia this period (**Figure 8**). This pattern favors

normal to below normal temperatures across of Western, Central and Eastern Asia with normal to above normal temperatures in much of Siberia and Southeast Asia this period (**Figure 9**).

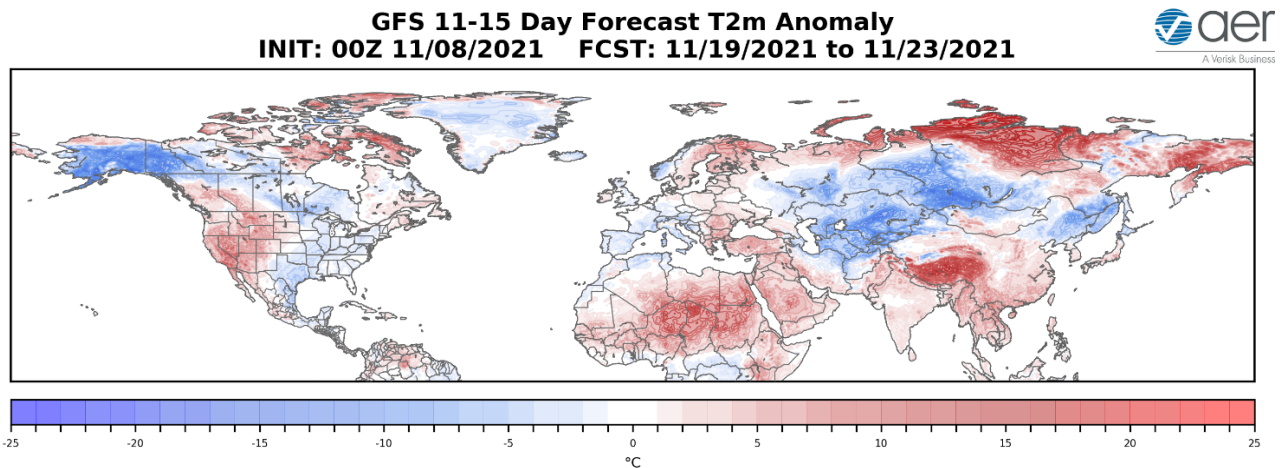


Figure 9. Forecasted surface temperature anomalies ($^{\circ}\text{C}$; shading) from 9 – 23 November 2021. The forecasts are from the 00z 8 November 2021 GFS ensemble.

Persistent ridging/positive geopotential height anomalies in the Western US will continue to favor downstream troughing/negative geopotential height anomalies across the Central and Eastern US with residual troughing/negative geopotential height anomalies in Alaska this period (**Figure 8**). This pattern favors normal to below normal temperatures widespread across Alaska, Canada and the Eastern US with normal to above normal temperatures in far Northern Canada and the Western US (**Figure 9**).

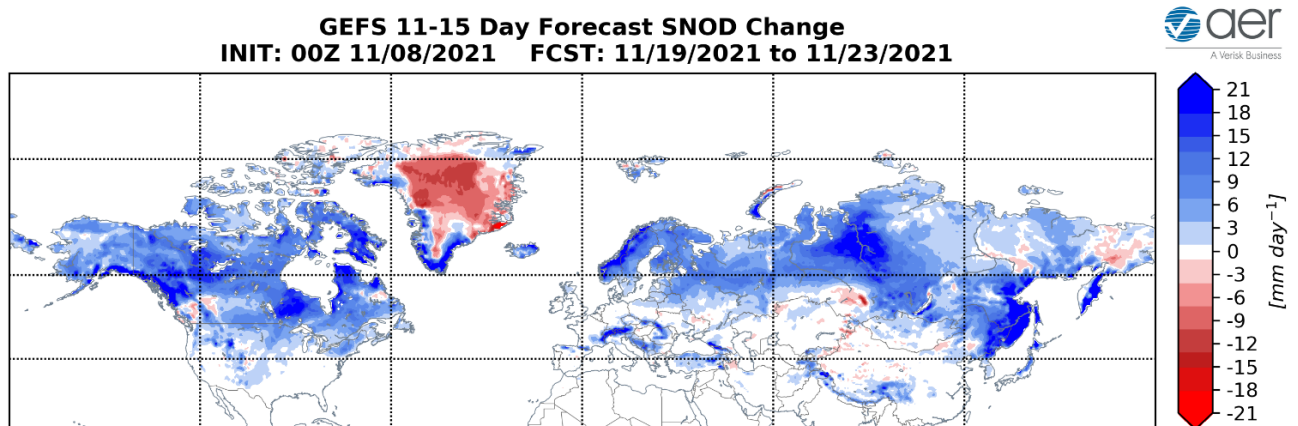


Figure 10. Forecasted snow depth changes (mm/day ; shading) from 9 – 23 November 2021. The forecast is from the 00Z 8 November 2021 GFS ensemble.

Troughing and/or cold temperatures are predicted to support possible new snowfall across Scandinavia, the Alps and Northern and Eastern Asia (**Figure 10**). Troughing and/or cold

temperatures are predicted to support possible new snowfall across Alaska, much of Canada, the US Rockies and the Northeastern US (**Figure 10**).

Longer Term

30-day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows normal to warm/positive PCHs in the stratosphere (**Figure 11**). However, PCHs in the troposphere and especially the lower troposphere, are cold/negative this week while warm/positive PCHs in the stratosphere are predicted to turn cold/negative this week as well (**Figure 11**). Cold/negative PCHs in the lower troposphere next week are predicted to turn warm/positive once again next week (**Figure 11**). So unusual variability in the PCHs are predicted over the next two weeks with little sign of stratosphere-troposphere coupling (though PCHs don't necessarily show coupling related to polar vortex stretching).

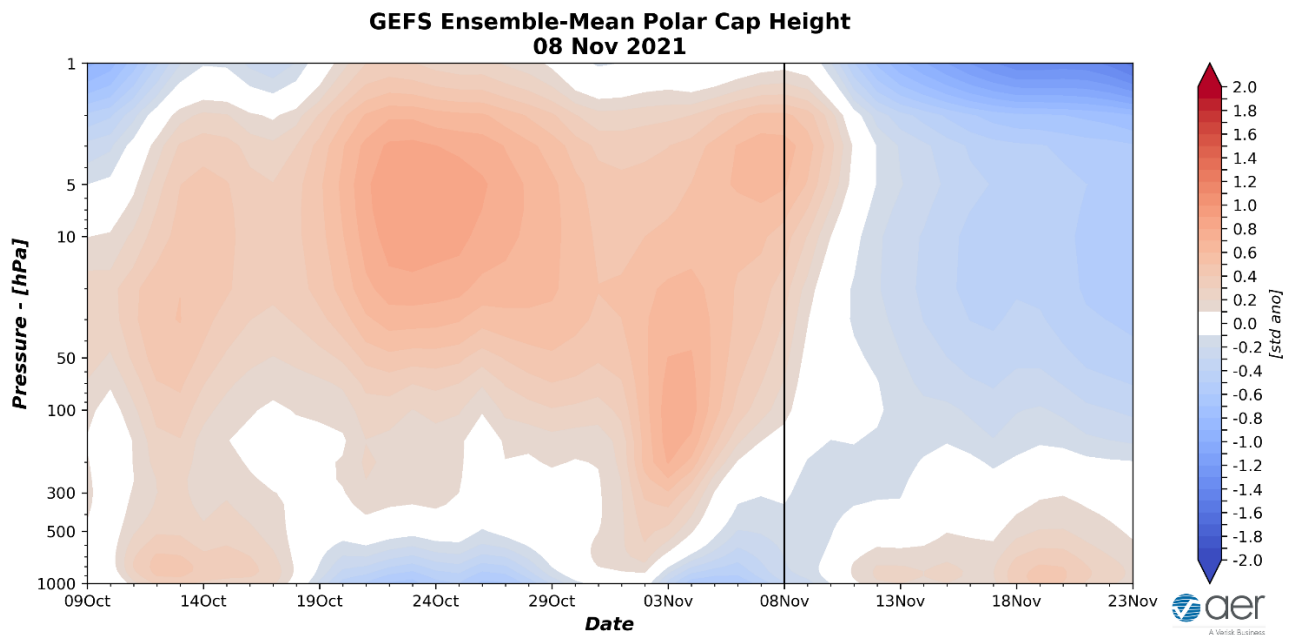


Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 8 November 2021 GFS ensemble.

The current cold/negative PCHs in the lower tropospheric PCHs are consistent with the predicted positive surface AO this week (**Figure 1**). However, as PCHs transition to warm/positive in the lower troposphere next week, the surface AO will be closer to neutral next week (**Figure 1**).

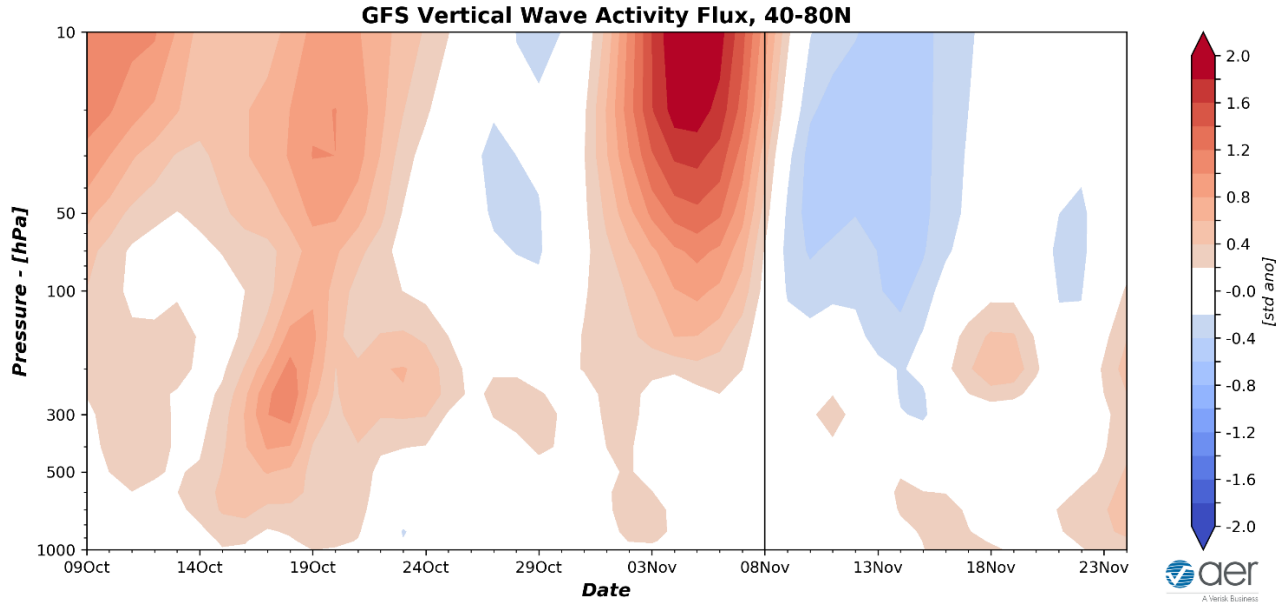


Figure 12. Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 8 November 2021 GFS ensemble.

The current warm PCHs in the stratosphere are a result of strong vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere that has been observed last week and winding down currently (**Figure 12**). Negative or downward WAFz is predicted for the remainder of this week (**Figure 12**). Positive WAFz anomalies quickly followed by negative WAFz anomalies is one sign of polar vortex stretching.

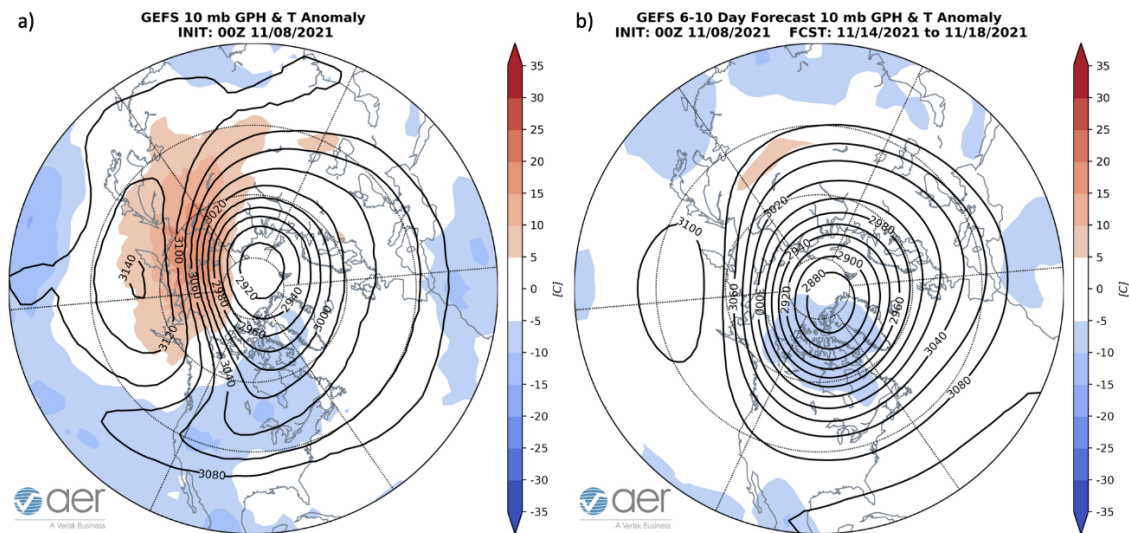


Figure 13. (a) Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 8 November 2021. (b) Same as (a) except

forecasted averaged from 14 – 18 November 2021. The forecasts are from the 00Z 8 November 2021 GFS model ensemble.

The positive WAFz this past week has slightly perturbed the stratospheric PV, with the PV currently displaced towards the Barents-Kara Seas and with warming over Eastern Siberia in the polar stratosphere (**Figure 13**). The only slightly perturbed PV is resulting in a near neutral stratospheric AO (**Figure 11**). The positive WAFz will contribute to weak ridging centered near the Dateline in the polar stratosphere though the PV is predicted to recover and return to being centered near the North Pole (**Figure 13**) coupled with a return to a positive stratospheric AO this week into next week (**Figure 11**).

It does appear to me that the ridging in the polar stratosphere centered near the Dateline and warming stretching from East Asia towards Alaska with below normal geopotential heights over Eastern Canada (**Figure 13**) is suggestive of an ongoing stretched polar vortex event. A stretched polar vortex is associated with cold temperatures first in Central and East Asia and then across Canada and the US east of the Rockies. We have already observed some cold air into Central and East Asia accompanied by an impressive snow advance or “blitz.” I expect that there is a good chance the stretched polar vortex will result in a period of below normal temperatures and an expansion of snow cover across central and eastern North America including the Eastern US. The dynamical models have been waffling on the magnitude of any cold or snow in the coming week or two. Following stretched polar vortex events, the PV can recover quickly, and some model runs are suggestive of a stronger PV the remainder of the month.

**CFS 500 hPa Forecast Anomaly Dec 2021
Valid as of 08 Nov 2021**

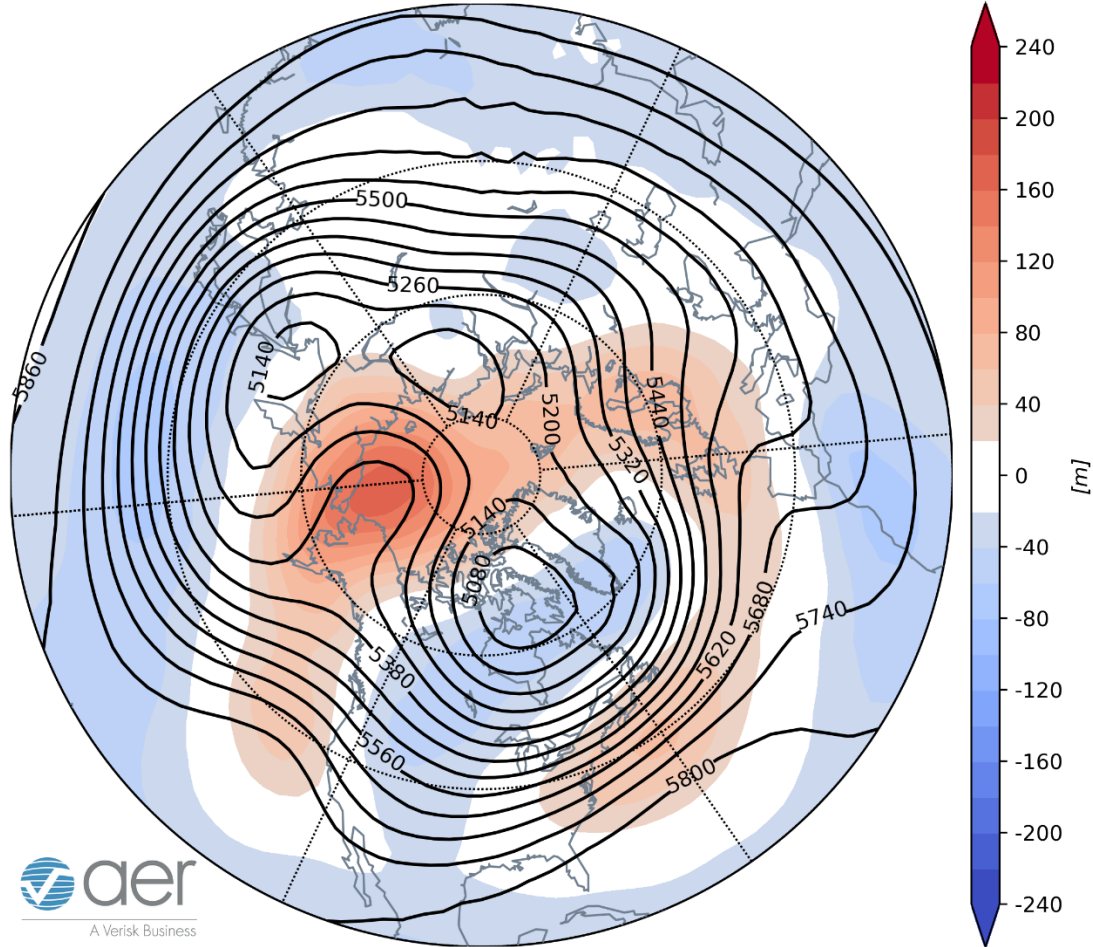


Figure 14. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for December 2021. The forecasts are from the 00Z 8 November 2021 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 14**) and surface temperatures for December (**Figure 15**) from the Climate Forecast System (CFS; the plots represent yesterday's four ensemble members). The forecast for the troposphere is ridging over much of the Central Arctic, Western and Northern Europe and especially the Chukchi Sea including Eastern Siberia over to Alaska with troughing in Eastern Europe, East Asia and central North America (**Figure 14**). This pattern favors seasonable to relatively warm temperatures widespread across Western Europe, Western and Southern Asia, Eastern Siberia, Alaska and Northeast Canada with seasonable to relatively cold across Northern and Eastern Europe, Northern and Eastern Asia, much of Canada and the US, especially the Central (**Figure 15**). I am very skeptical of this forecast especially the deep cold in the Central US.

CFS 23-53 Day Forecast T2m Anomaly
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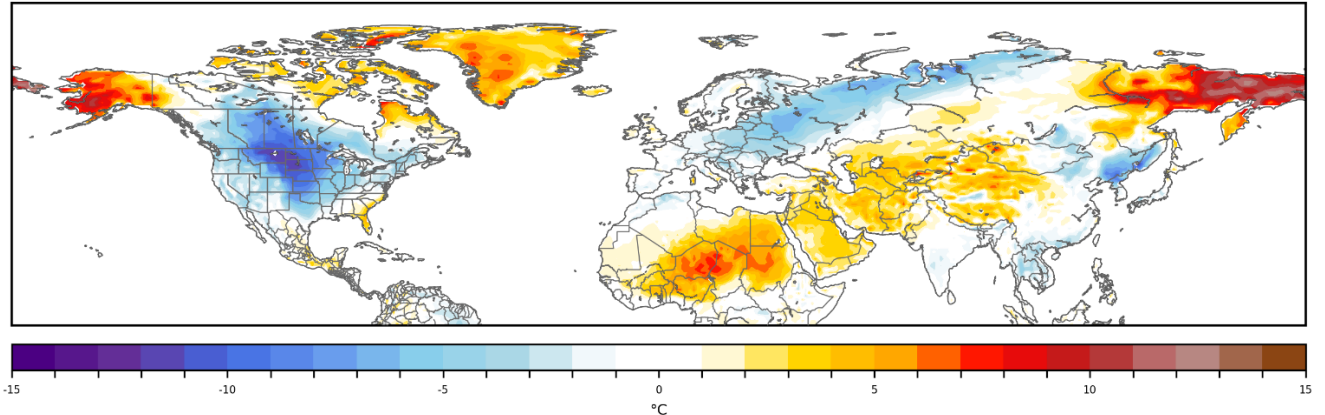


Figure 15. Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for December 2021. The forecasts are from the 00Z 8 November 2021 CFS.

Surface Boundary Conditions

Arctic Sea ice

Arctic sea ice is growing but remains well below normal east of Greenland but especially in Baffin Bay and in the Barents-Kara Seas. Sea ice is close to normal in the Canadian Archipelagos and in the Chukchi Sea. 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 Europe 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.

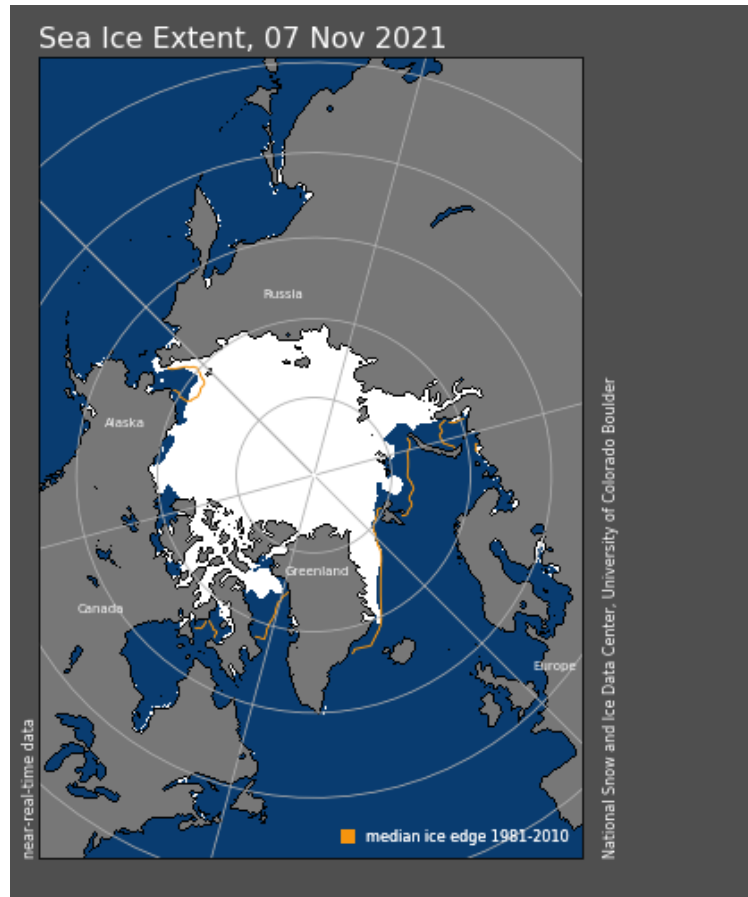


Figure 16. Observed Arctic sea ice extent on 7 November 2021 (white). Orange line shows climatological extent of sea ice based on the years 1981-2010. Image courtesy of National Snow and Ice Data Center (NSIDC). Snow and Ice Data Center (NSIDC).

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 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.

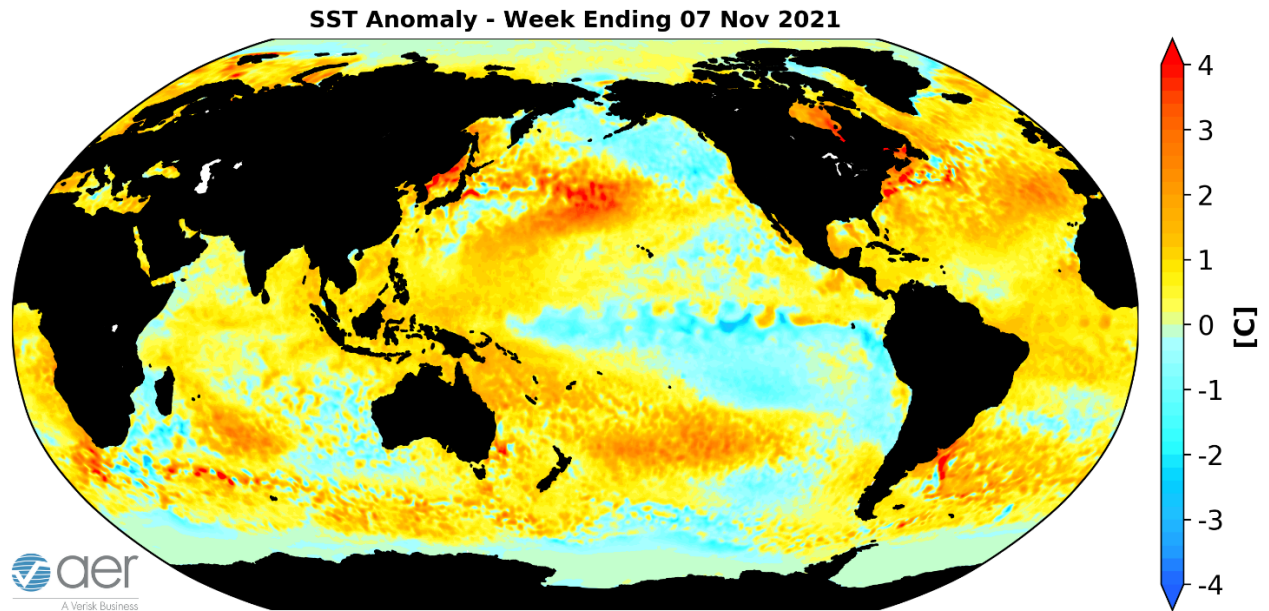


Figure 17. The latest weekly-mean global SST anomalies (ending 7 November 2021). Data from NOAA OI High-Resolution dataset.

Currently no phase of the Madden Julian Oscillation (MJO) is favored (**Figure 18**). The forecasts are for the MJO to remain weak where no phase is favored for the next two weeks. Therefore it seems unlikely that the MJO is contributing significantly to the predicted weather pattern across North America over the next two weeks but admittedly this is outside of my expertise.

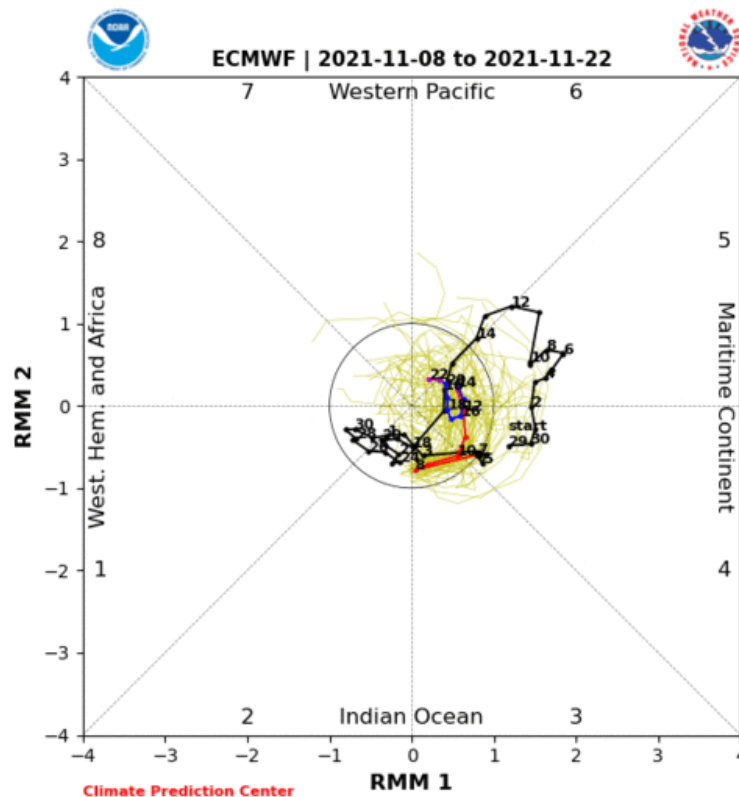


Figure 18. Past and forecast values of the MJO index. Forecast values from the 00Z 8 November 2021 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model “spread” is denoted by the gray shading. Sector numbers indicate 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!