

# Arctic Oscillation and Polar Vortex Analysis and Forecasts

*November 25, 2024*

Dr. Judah Cohen from Atmospheric and Environmental Research (AER) embarked on an experimental process of regular research, review, and analysis of the Arctic Oscillation (AO) and Polar Vortex (PV). This analysis is intended to provide researchers and practitioners real-time insights on one of North America's and Europe's leading drivers for extreme and persistent temperature patterns.

During the winter schedule the blog is updated once every week. Snow accumulation forecasts replace precipitation forecasts. Also, there is renewed emphasis on ice and snow boundary conditions and their influence on hemispheric weather. In late Spring, we transition to a spring/summer schedule, which is once every two weeks. Snow accumulation forecasts will be replaced by precipitation forecasts. Also, there will be less emphasis on ice and snow boundary conditions and their influence on hemispheric weather.

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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 return to neutral the following week as pressure/geopotential height anomalies across the Arctic are currently mostly negative and are predicted to turn mixed to mostly positive over the next two weeks. The North Atlantic Oscillation (NAO) is currently near neutral with mixed pressure/geopotential height anomalies across Greenland and the NAO is predicted to remain near neutral the next two weeks as pressure/geopotential height anomalies are predicted to remain mostly mixed and weak across Greenland.
- The next two weeks ridging/positive geopotential height anomalies across southern Greenland will support troughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe except for regional troughing in the eastern Mediterranean. This pattern will promote mostly zonal flow across Europe. This pattern will support mostly normal to above normal temperatures across much of Europe including much of the United Kingdom (UK) with the exceptions of far Northern Europe, including Scotland, and Turkey.
- This week two areas of ridging/positive geopotential height anomalies are predicted with one center near the Urals and a second in Eastern Siberia, however next week the ridging

will consolidate in Eastern Siberia with troughing/negative geopotential height anomalies across East Asia. This pattern favors widespread normal to above normal temperatures across much of Asia, however next week, regional normal to below normal temperatures will push southward across East Asia.

- The next two weeks ridging/positive geopotential height anomalies centered in the Gulf of Alaska and then in Western Canada and the Western United States (US) will support troughing/negative geopotential height anomalies across much of Canada and the Eastern US. This pattern favors normal to below normal temperatures extending from Alaska across much of Canada and the Eastern US normal to above normal temperatures across Northeastern Canada and the Western US.
- In the Impacts section I discuss the competing influences of a strong polar vortex (PV) and high latitude blocking on the upcoming weather in the Northern Hemisphere (NH).
- Also presented in the AER winter 2024/25 forecast.

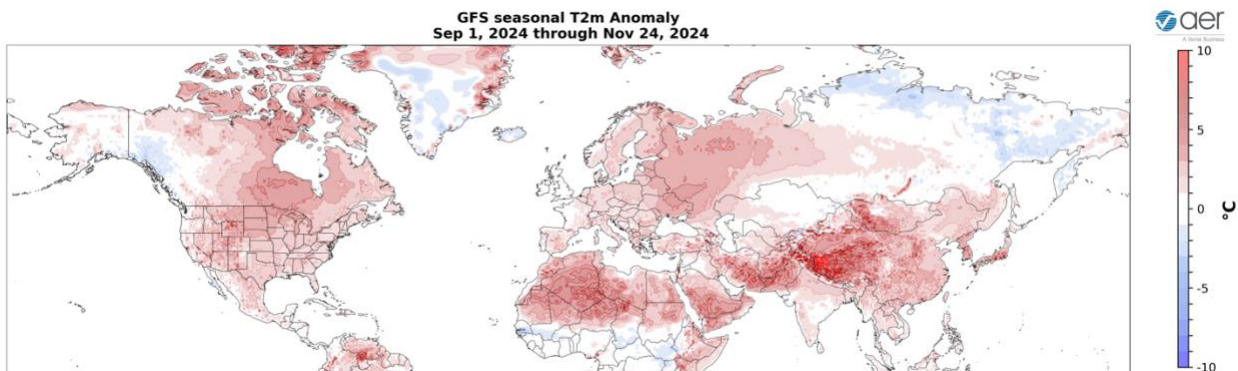
## Plain Language Summary

Not one but two stretched polar vortices are predicted in the next two weeks, and they will team to finally bring a real feel of winter to the Eastern US (see **Figures 6 & 9**). What happens next is intriguing, could there be yet a third stretched polar vortex before the end of year? A strong polar vortex favors a milder pattern, however models continue to predict high pressure dominating the high latitudes that would deliver cold to the population centers of the Northern Hemisphere. Different placement of the high-pressure center would result in varying scenarios.

Also, the AER winter temperature forecast is shown in **Figure iv**.

## Impacts

This is the time of year when I have my biggest regrets having taken the path of long-term weather forecaster. I didn't use the word "chosen" because in many ways I kind of fell into this career more so than choosing it when I was in school for example. But I do love what I do but it never seems to get easier. It has been a crazy warm fall for much of the Northern Hemisphere (NH) with the most notable exception of Siberia and also northwestern Canada (see **Figure i**). But here we are after an incredibly warm fall in Europe and especially the US we are having an impressive start to winter. But even though overall it is a very warm fall (maybe even record warm but I don't know) the fact that Western Russia was so warm, and Siberia was even slightly colder than normal, that amplifies or strengthens the west to east temperature gradient across Eurasia that is so favorable for disrupting the polar vortex (PV). This is something that I emphasize all the time in my talks and in my research. Fall 2024 and the kickoff to winter 2024/25 and its associated weather whiplash is why I am so convinced that Arctic change is contributing to more PV disruptions and the severe winter weather that ensues. And though I don't believe this necessarily translates into overall colder winters, I do think it offsets at least some of the warming and winters in the mid-latitudes have not warmed as expected or as projected by the climate models.

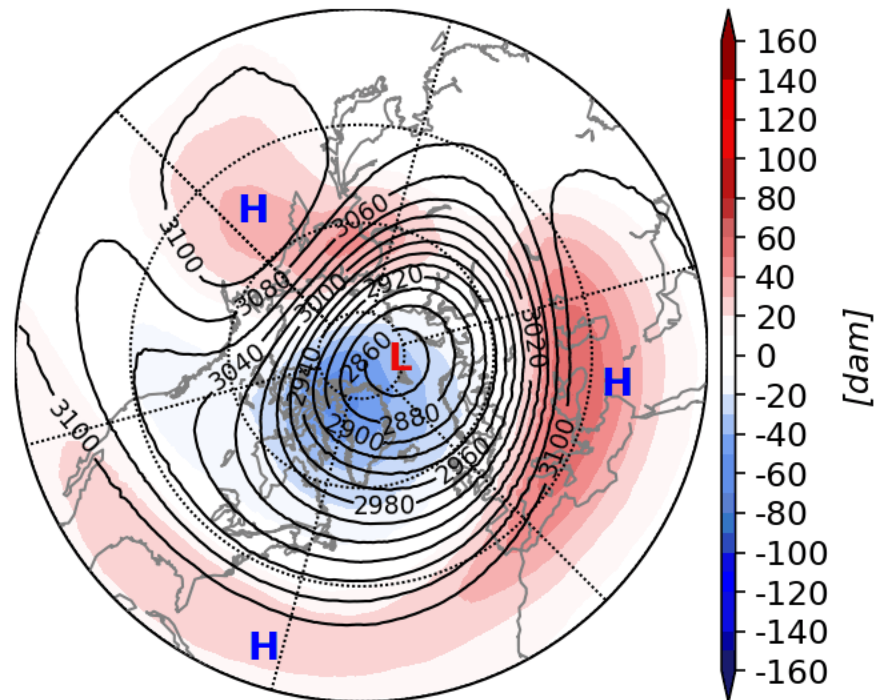


**Figure i.** Observed NH land surface temperature anomalies 1 September through 24 November 2024 (white). Climatological normal based on the years 1991-2020. Values taken from the daily initialized GFS model.

In the fall and December months, PV disruptions almost exclusively mean a stretched PV as sudden stratospheric warmings (SSWs) don't really happen until January with some notable exceptions (the last was December 2000). And here we are with two stretched PVs one in late November and the other in early December and hence the very cold first week predicted in early December for North America (see **Figures 3** and **6**). Stretched PVs bring cold and snow to East Asia and North America while the relationship to Europe is weak. That is why both China and the US will experience cold and snow in the next couple of weeks while Europe thaws out from the recent cold and snow of late November. For Europe, the biggest driver of severe winter weather is Greenland blocking. There was a strong event last week that brought the unusually early snow and cold throughout much of Western and Central Europe. But the Greenland blocking is fading (see **Figure 2**) and the weather is predicted to turn milder across Europe (see **Figure 3**).

We have one stretched PV ongoing and then an even stronger stretched PV predicted for early December (see **Figure ii**). This is bringing the colder air into the US in waves with the first wave over the Thanksgiving holiday and then another colder wave the first week of December. As I have been saying the impact from stretched PVs is relatively short on the order of days to up to two weeks, especially when the PV remains strong during the stretch, and the PV is strong (see **Figure 1**). So, the cold should abate in the Eastern US towards the end of the first week of December. The European model is predicting a reloading of the cold in the Eastern US the second week of December (a peak at the GFS and Canadian from this morning seems to show they are coming around to the European solution), which often does happen when the pattern transitions from mild to cold or cold to mild. The transition isn't abrupt but there is a back and forth before the pattern completely turns. So, whether the transition to milder temperatures is direct like the GFS or more twisted like the ECMWF, by the third week of December I would expect a mild pattern based on the strong PV and with the warm pattern predicted for Siberia (see **Figures 3** and **6**). Though the low sun angle and if snow cover can become well established in the US, that would help prolong the cold snap in the Eastern US.

## Initialized 00Z 10 hPa HGT/HGTa 25-Nov-2024



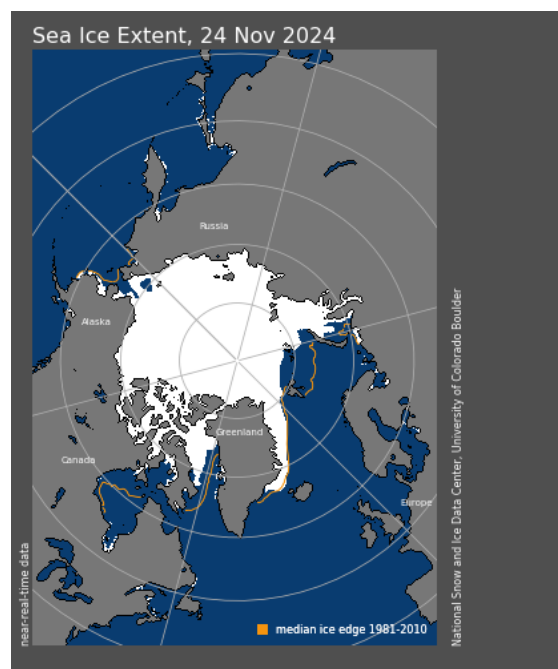
**Figure ii.** Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies ( $^{\circ}\text{C}$ ; shading) across the Northern Hemisphere for 25 November 2024 and forecasted from 26 November to 10 December 2024. The forecasts are from the 00Z 25 November 2024 GFS model ensemble.

But now here is where it gets interesting if you like intrigue but it is also giving me angina, trying to figure out the longer-term forecast. As I have been describing for weeks, there is a battle going on in the atmosphere between the strong polar vortex and high latitude blocking. They usually don't get along well together and usually one succumbs to the will or influence of the other. I have been expecting the strong polar vortex to exert its influence on the tropospheric circulation and for the high latitude blocking/negative AO to fade. Now if the high latitude blocking consisted of strong Ural blocking, I would expect the high latitude blocking to weaken the PV but so far that is not the forecast and instead Ural troughing is being predicted (see **Figures 5** and **8**). This standoff between the combatants can be seen in **Figure 11** where yet for another week the troposphere and stratosphere remain uncoupled. Not only is the high latitude blocking not fading it is predicted to strengthen in the second week of December, indicated with the pulsing of warm/positive polar cap geopotential height anomalies (PCHs) in the troposphere.

What has been especially intriguing is the possible return of Greenland blocking, which has immediate and delayed weather implications. Almost immediately this would support the return

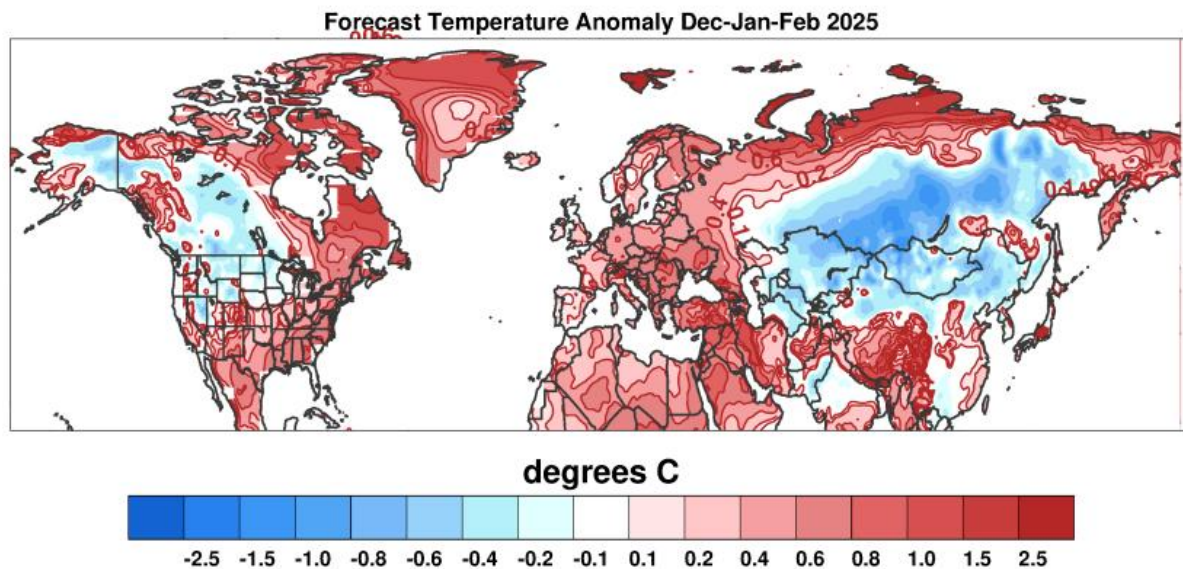
of a colder weather pattern to Europe. But as our research shows, Greenland blocking is precursor of a stretched PV and therefore colder weather in East Asia and/or the US two weeks later (i.e., [Cohen et al. 2021](#)). Maybe because Greenland blocking often transitions to Ural blocking within two weeks. The ECMWF has been the leader in predicting the possible return of Greenland blocking in mid-December. I just peaked at the latest GFS, and it is skipping the Greenland blocking and going straight to the Ural/Barents-Kara Seas blocking. That would certainly raise the prospects for yet a third stretched polar vortex as soon as the holiday season.

This is probably a good point to transition to Arctic Sea Ice Extent (SIE). I have been monitoring it very closely the past several weeks. And as I expected over the past several blogs, sea ice growth continues to occur preferentially in the North Pacific sector relative to the North Atlantic sector and the large negative anomaly in the North Atlantic sector compared to the North Pacific sector remains clearly dominant, with sea ice in the North Pacific close to normal (see **Figure iii**). This is important because it is the lack of sea ice in the Barents Kara Seas that favors a weak PV. The other region where sea ice is below normal is around Greenland and into Hudson Bay. It appears to me that sea ice anomalies are evolving that are most favorable for supporting colder weather not only across Eurasia but possibly even the US. Whether it be Ural/Barents-Kara Seas or Greenland blocking. Though a ridge centered over Hudson Bay would probably mean a very mild pattern for eastern North America (remember the Canadian warmings from last December?). I have been wondering if the low sea ice in the Barents-Kara Seas could contribute to more persistent ridging in the region. So far, any Ural blocking has been transient, enough to trigger a stretched PV but relatively weak ones. So, if Ural blocking does return later this month or even early January, could the low sea ice anchor the blocking/region overhead and force a weaker PV and even an SSW?



**Figure iii.** Observed Arctic sea ice extent on 24 November 2024 (white). Orange line show climatological extent of sea ice based on the years 1981-2010. Image from the National Snow and Ice Data Center (NSIDC). URL: <https://nsidc.org/sea-ice-today>.

It is the last blog of November so, drum roll...., it is time for the AER winter forecast. I will only show today the forecast based on the ERA5 and not the NCEP/NCAR as I have done in past years. The surface temperature anomalies for the NH continents are presented in **Figure iv**. For predictors we used Eurasian October snow cover extent, September sea ice extent, the state of the El Niño/Southern Oscillation (so for this winter a weak La Niña) and an estimate of the dominant sea level pressure anomaly across northern Eurasia in October.



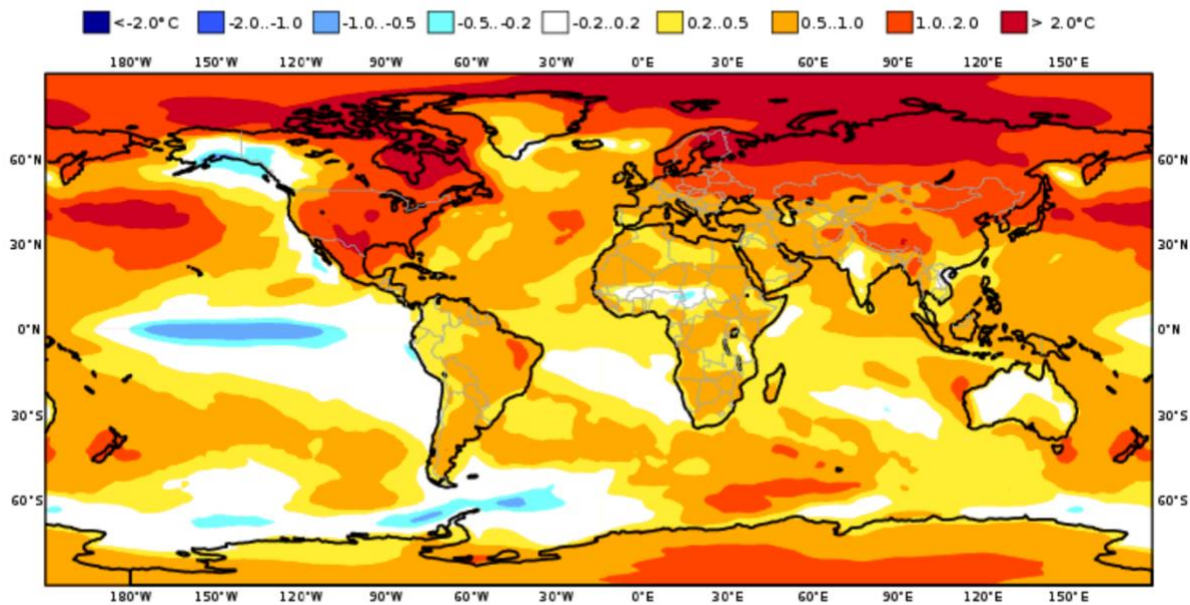
**Figure iv.** The AER winter temperature anomaly forecast for December 2024, January and February 2025 using ERA5 reanalysis data.

The general forecast is warm for Europe and the Eastern US but relatively cold in Southern Siberia and Northeast Asia, Western and Central Canada and the Northwestern US. As I argued a few weeks ago, I do wonder if the cold across the US could be shifted further east this winter. This looks to be the case in December, but I do think that December is often the odd winter month out. So, I believe that it is too early to go all in on a cold winter in the Eastern US. And if Greenland blocking comes in strong this winter, Europe would be colder as well. Also, the forecast can end up being too cold in addition to too warm. I do reserve the right to still tweak the forecast in the coming days. I do prefer using October Barents-Kara sea ice extent and I will try to run the model with that update.

I usually include a three or four panel plot including dynamical model forecasts and in **Figure v** I include the forecast from C3S, which is probably the best seasonal forecast model. No surprise here, the winter forecast is always the linear combination of global warming and ENSO, this year being La Niña. I have been in this business long enough to know not to get cocky about the

forecast or trash an alternate forecast and all scenarios are possible and as always, I will do a postmortem after the winter. Let the games begin!

C3S multi-system seasonal forecast    ECMWF/Met Office/Météo-France/CMCC/DWD/NCEP/JMA/ECCC  
 Mean 2m temperature anomaly    DJF 2024/25  
 Nominal forecast start: 01/11/24  
 Variance-standardized mean

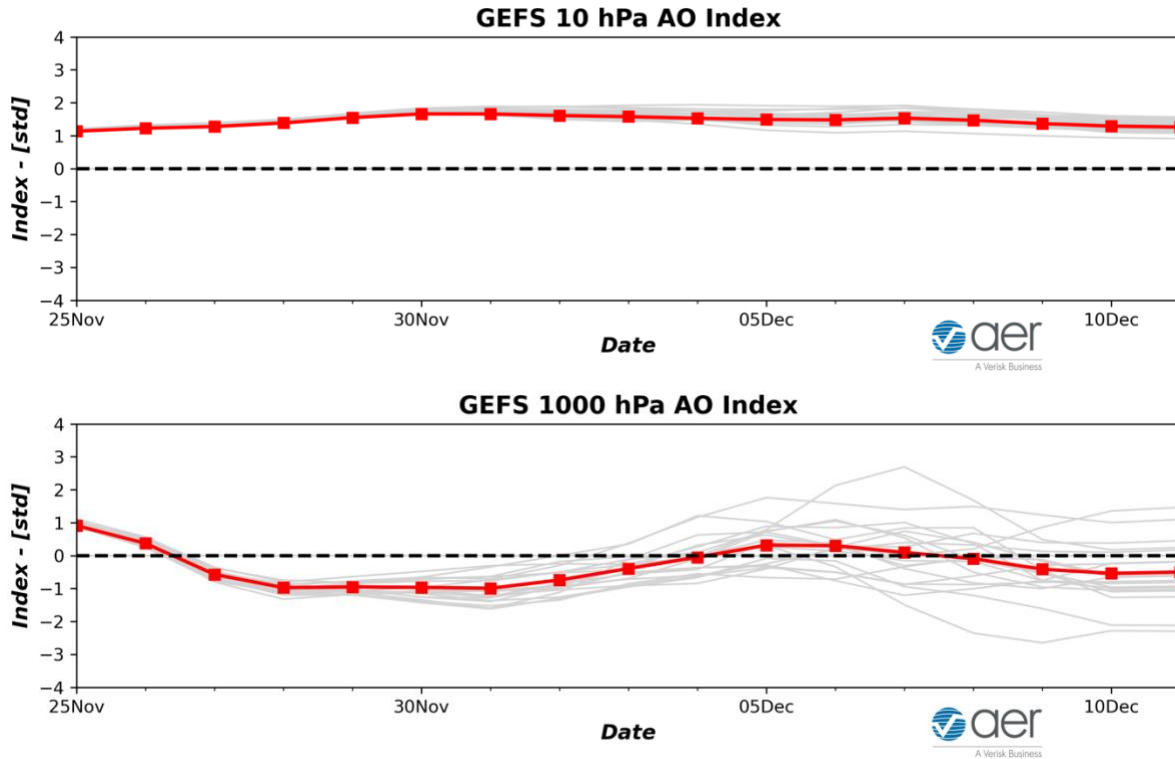


**Figure v.** The C3S winter temperature anomaly forecast for December 2024, January and February 2025 <https://climate.copernicus.eu/>

## Near-Term

### This week

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

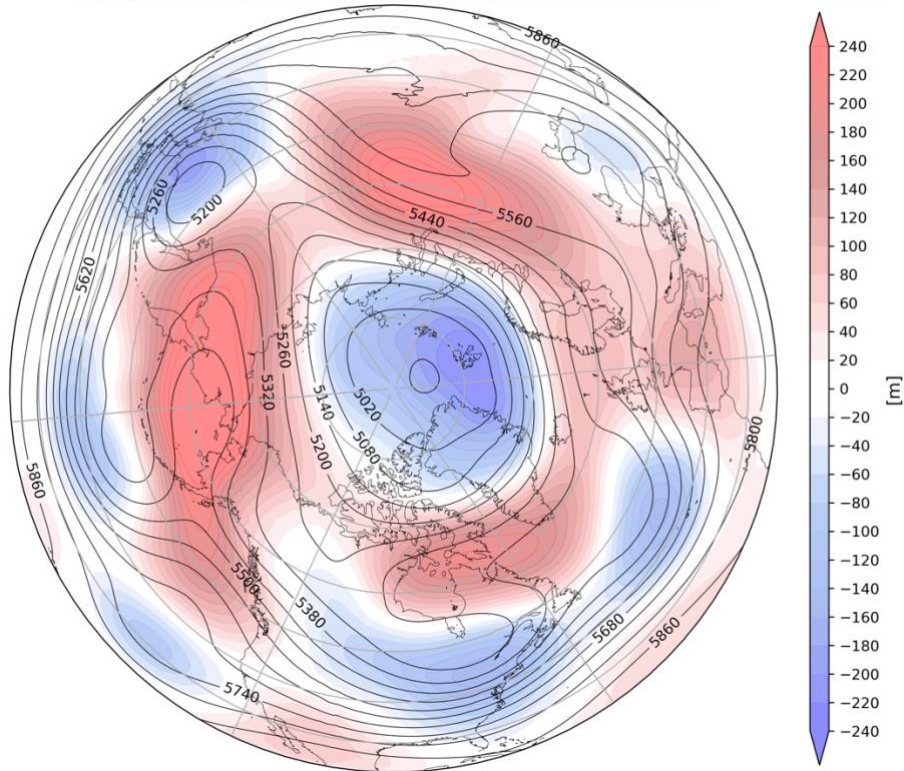


**Figure 1.** a) The predicted daily-mean AO at 10 hPa from the 00Z 25 November 2024 GFS ensemble. b) The predicted daily-mean AO at 1000 hPa from the 00Z 25 November 2024 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble mean AO index given by the red line with squares.

This week, ridging/positive geopotential height anomalies across southern Greenland will support toughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe with the exception of more troughing across the eastern Mediterranean (**Figures 2**). This pattern will favor normal to above normal temperatures across much of Europe including the southern UK with normal to below normal temperatures limited to Scotland, Norway and Turkey (**Figure 3**). This week the predicted pattern across Asia is ridging/positive geopotential height anomalies centered over the Urals and Eastern Siberia with toughing/negative geopotential height anomalies across East Asia (**Figure 2**). This pattern favors normal to above normal temperatures widespread across much of Asia with normal to below normal temperatures limited to parts of China and the Middle East (**Figure 3**).



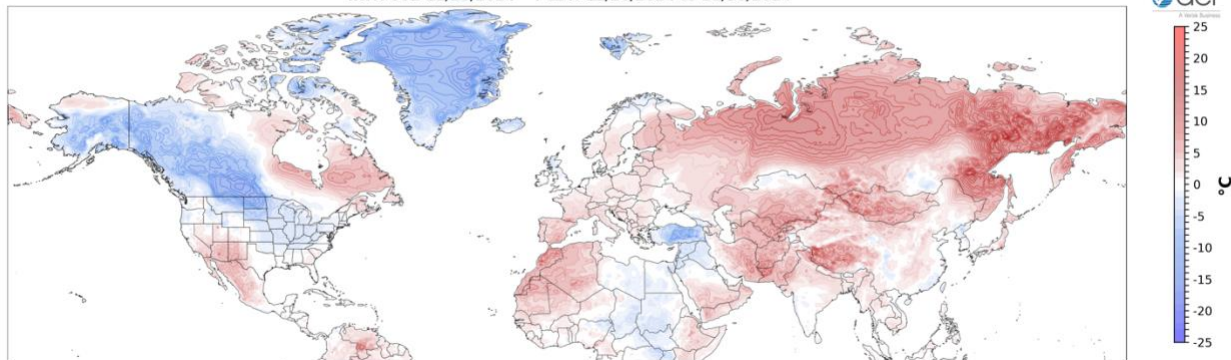
**GEFS 1-5 Day Forecast 500 hPa Anomaly**  
INIT: 00Z 11/25/2024 FCST: 11/26/2024 to 11/30/2024



**Figure 2.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 26 Nov to 30 Nov 2024. The forecasts are from the 00Z 25 November 2024 GFS ensemble.

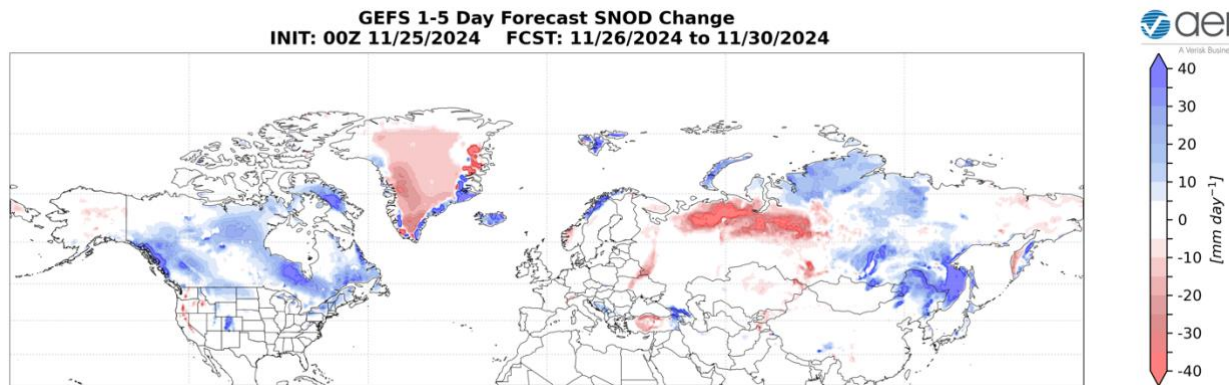
This week ridging/positive geopotential height anomalies in the Gulf of Alaska and in Baffin Bay will force troughing/negative geopotential height anomalies across Alaska, much of Canada and the Eastern US with more ridging/positive geopotential height anomalies across Northeastern Canada and the Western US. (**Figure 2**). This pattern will favor normal to below normal temperatures across Alaska, much of Canada and the Eastern US with normal to above normal temperatures across Northeastern Canada and the Western US (**Figure 3**).

**GEFS 1-5 Day Forecast T2m Anomaly**  
INIT: 00Z 11/25/2024 FCST: 11/26/2024 to 11/30/2024



**Figure 3.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 26 Nov to 30 Nov 2024. The forecast is from the 00Z 25 November 2024 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Norway, the Caucasus, parts of Siberia and Northeast China while warm temperatures will support snowmelt in Western Russia and Eastern Europe this week (**Figure 4**). Troughing and/or cold temperatures will support new snowfall across Western, Northern and Eastern Canada, and the higher elevations of the Western US while warm temperatures will support snowmelt in the US West Coast this week (**Figure 4**).



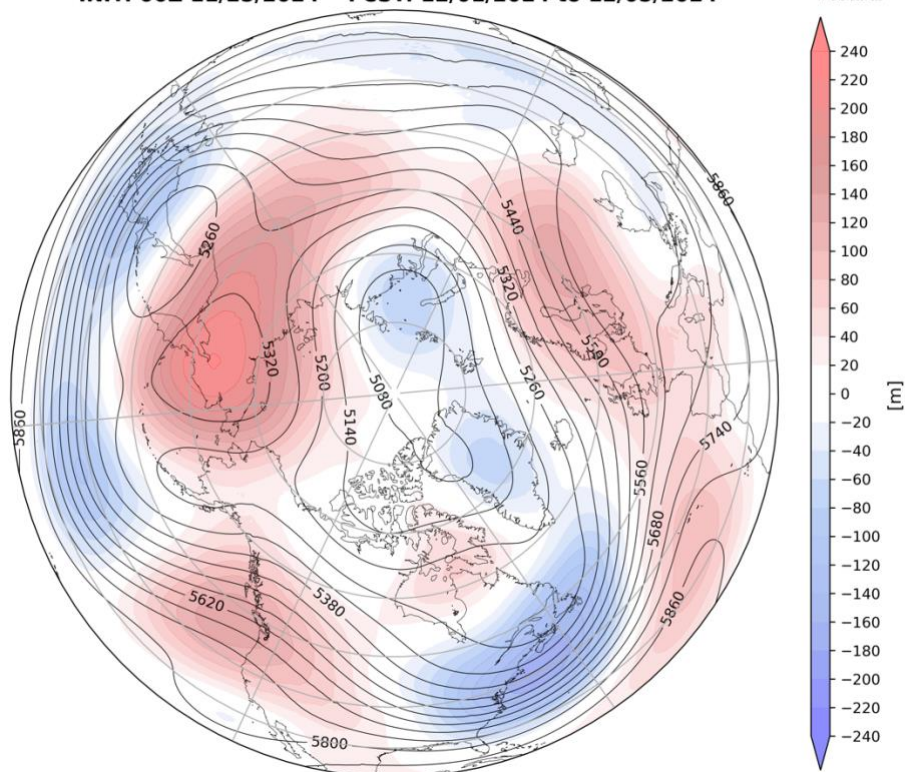
**Figure 4.** Forecasted snow depth changes ( $\text{mm}/\text{day}$ ; shading) from 26 Nov to 30 Nov 2024. The forecast is from the 00Z 25 November 2024 GFS ensemble.

## Near-Mid Term

### Next week

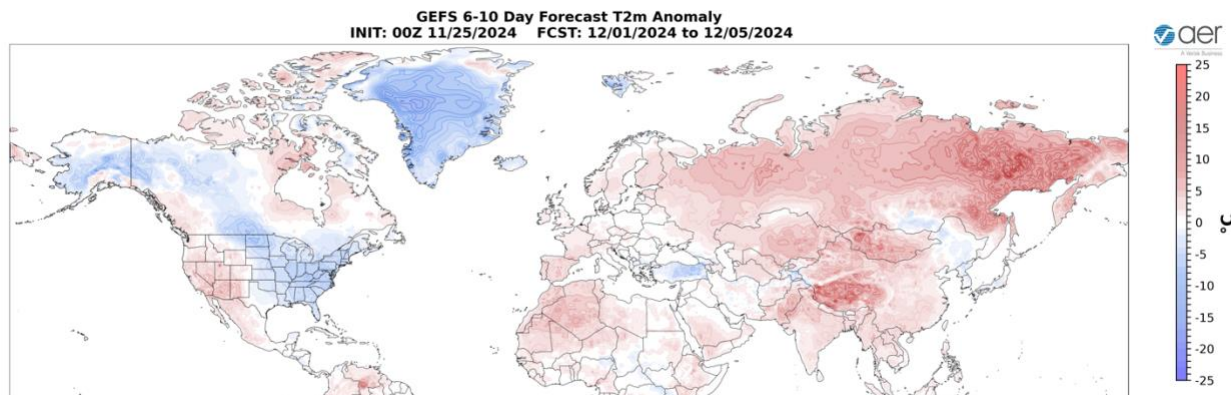
With geopotential height anomalies remaining mostly mixed across the Arctic and with mixed geopotential height anomalies across the mid-latitudes this period (**Figure 5**), the AO will likely be negative to neutral this period (**Figure 1**). With predicted persistent mixed pressure/geopotential height anomalies across Greenland (**Figure 5**), the NAO will likely remain neutral this period.

GEFS 6-10 Day Forecast 500 hPa Anomaly  
INIT: 00Z 11/25/2024 FCST: 12/01/2024 to 12/05/2024



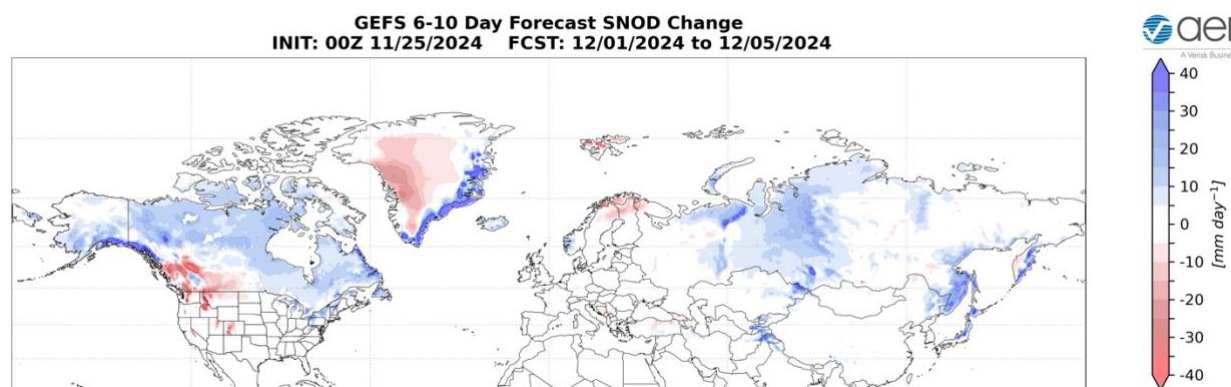
**Figure 5.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 01 Dec to 05 Dec 2024. The forecasts are from the 00Z 25 November 2024 GFS ensemble.

Persistent ridging/positive geopotential height anomalies across southern Greenland will continue to support troughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe with the exception of more troughing across the eastern Mediterranean this period (**Figure 5**). This pattern will favor normal to above normal temperatures across most of Europe including the southern UK with normal to below normal temperatures across Scotland, northern Scandinavia and Turkey (**Figure 6**). The predicted pattern across Asia is ridging/positive geopotential centered over Northern Asia but now consolidating in Eastern Siberia forcing troughing/negative geopotential height anomalies across East Asia (**Figure 5**). This pattern favors widespread normal to above normal temperatures across much of Asia with normal to below normal temperatures limited to parts of China and the Middle East (**Figure 6**).



**Figure 6.** Forecasted surface temperature anomalies (°C; shading) from 01 Dec to 05 Dec 2024. The forecast is from the 00Z 25 November 2024 GFS ensemble.

Persistent ridging/positive geopotential height anomalies in the Gulf of Alaska and Baffin Bay will continue to support troughing/negative geopotential height anomalies across Alaska, much of Canada and the Eastern US with more ridging/positive geopotential height anomalies across Northeastern Canada and the Western US this period (**Figure 5**). This pattern will favor normal to below normal temperatures across Alaska, much of Canada and the Eastern US with normal to above normal temperatures across Northeastern Canada and the Western US (**Figure 6**).



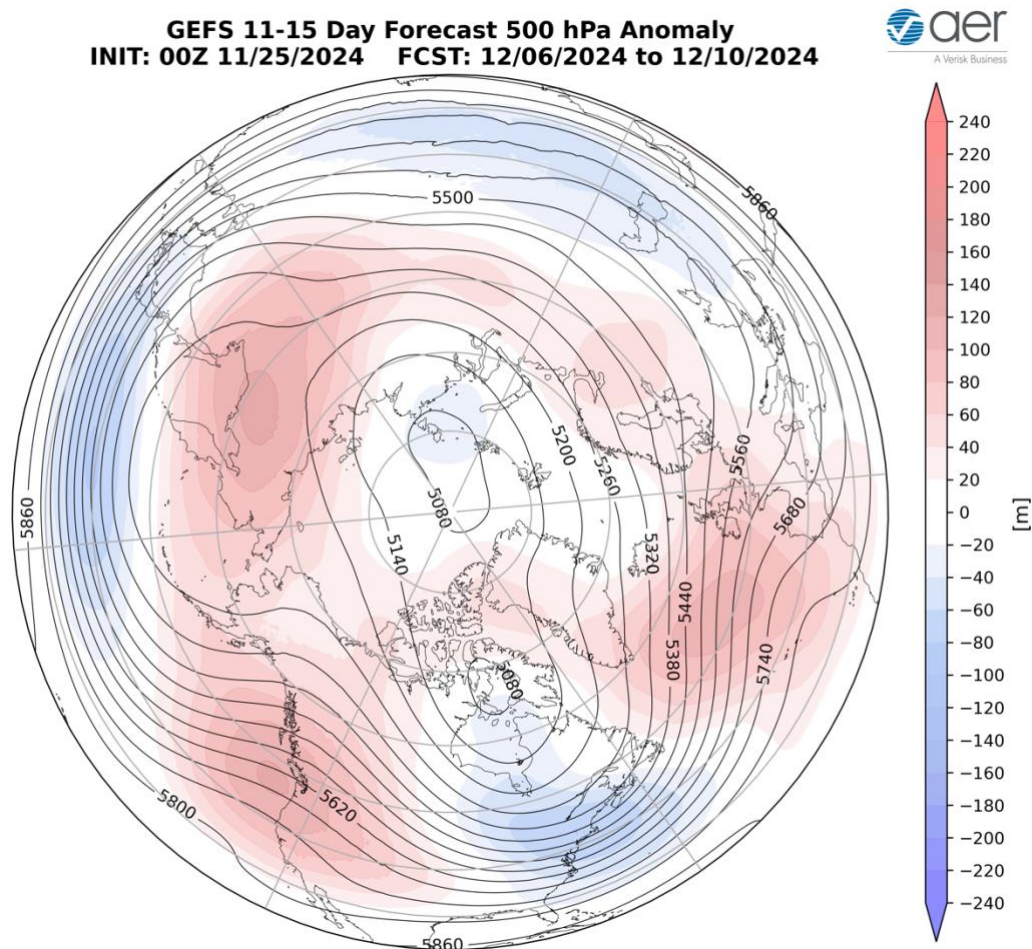
**Figure 7.** Forecasted snow depth changes (mm/day; shading) from 01 Dec to 05 Dec 2024. The forecast is from the 00Z 25 November 2024 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Norway, the Caucasus, the Urals, Siberia, the Tibetan Plateau and parts of Northeastern China while warm temperatures will support snowmelt in Scandinavia this period (**Figure 7**). Troughing and/or cold temperatures will support new snowfall across southern Alaska, much of Canada and the Northeastern US while warm temperatures will support snowmelt in Southwestern Canada, the Cascades and the US Rockies this period (**Figure 7**).

## Mid Term

### Week Two

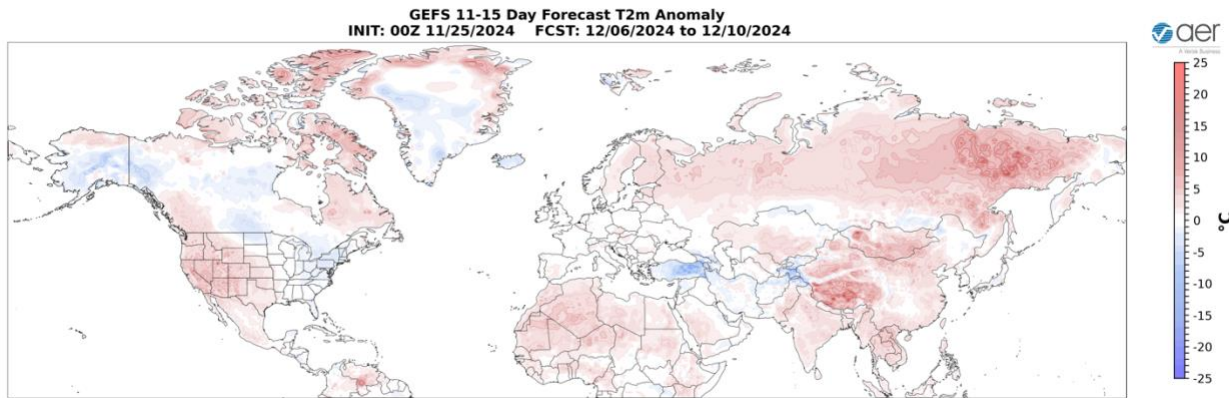
With predicted mostly mixed geopotential height anomalies across the Arctic and mixed geopotential height anomalies across the mid-latitudes this period (**Figure 8**), the AO will likely persist near neutral (**Figure 1**). With predicted weak but positive to mixed pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will likely remain relatively close to neutral this period.



**Figure 8.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 06 Dec to 10 Dec 2024. The forecasts are from the 00Z 25 November 2024 GFS ensemble.

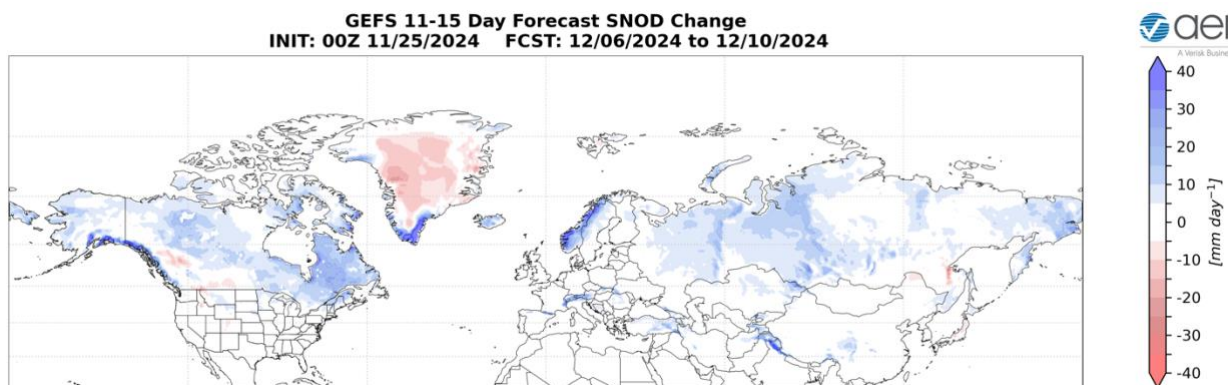
Ridging/positive geopotential height anomalies previously in the North Atlantic is predicted to slide into Western Europe this period with weak troughing/negative geopotential height anomalies persisting in the Eastern Mediterranean (**Figure 8**). This pattern should favor normal to above normal temperatures across much of Europe including the UK with normal to below normal temperatures mostly limited to Turkey this period (**Figures 9**). The predicted pattern

across Asia this period is ridging/positive geopotential height anomalies centered on Eastern Siberia forcing troughing/negative geopotential height anomalies to push further east across East Asia this period (**Figure 8**). The predicted pattern favors widespread normal to above normal temperatures across much of Asia with normal to below normal temperatures limited to the Middle East into Central Asia and parts of East Asia this period (**Figure 9**).



**Figure 9.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 06 Dec to 10 Dec 2024. The forecast is from the 00Z 25 November 2024 GFS ensemble.

Ridging/positive geopotential height anomalies are predicted to persist in the Gulf of Alaska and extending into Western Canada and the Western US supporting troughing/negative geopotential height anomalies across Eastern Canada and the Eastern US this period (**Figure 8**). This pattern will favor widespread normal to below normal temperatures across much of Alaska, Central Canada and the Eastern US with normal to above normal temperatures across Northeastern and Southwestern Canada and the Western US this period (**Figure 9**).



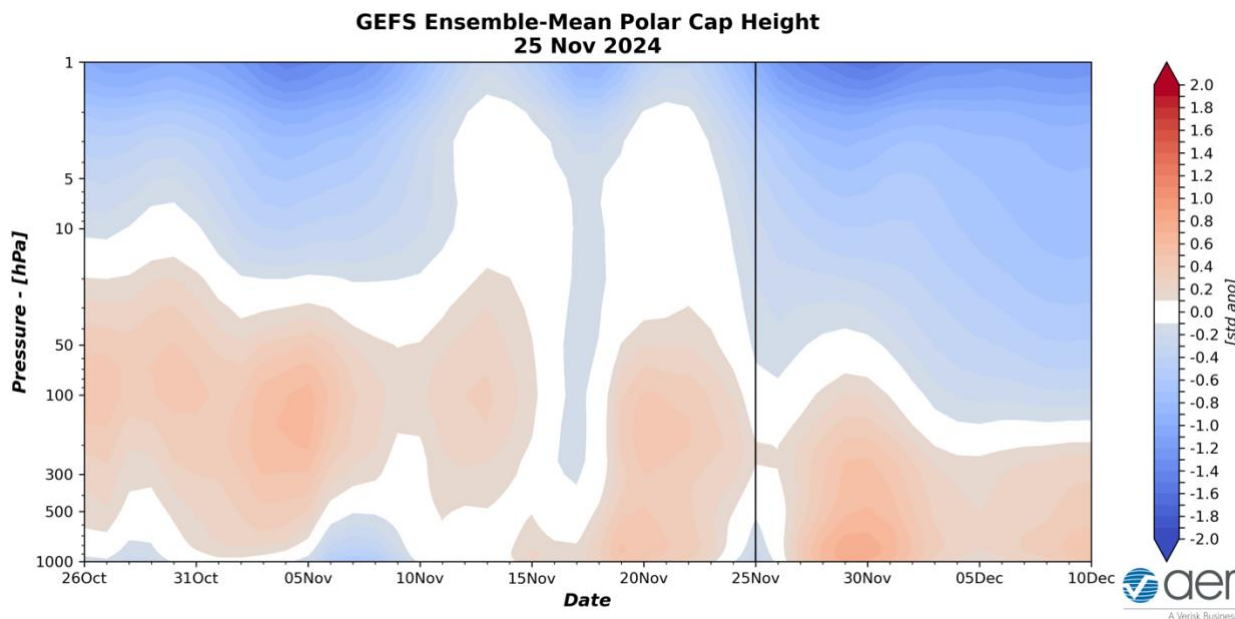
**Figure 10.** Forecasted snow depth changes ( $\text{mm}/\text{day}$ ; shading) from 06 Dec to 10 Dec 2024. The forecast is from the 00Z 25 November 2024 GFS ensemble.

Trouching and/or cold temperatures will support new snowfall across Norway, the Alps, the Urals, Western Siberia, Northeast China and the Tibetan Plateau this week (**Figure 10**). Trouching and/or cold temperatures will support new snowfall across Alaska, Northern and Eastern Canada and New England in the US this week (**Figure 10**).

## Longer Term

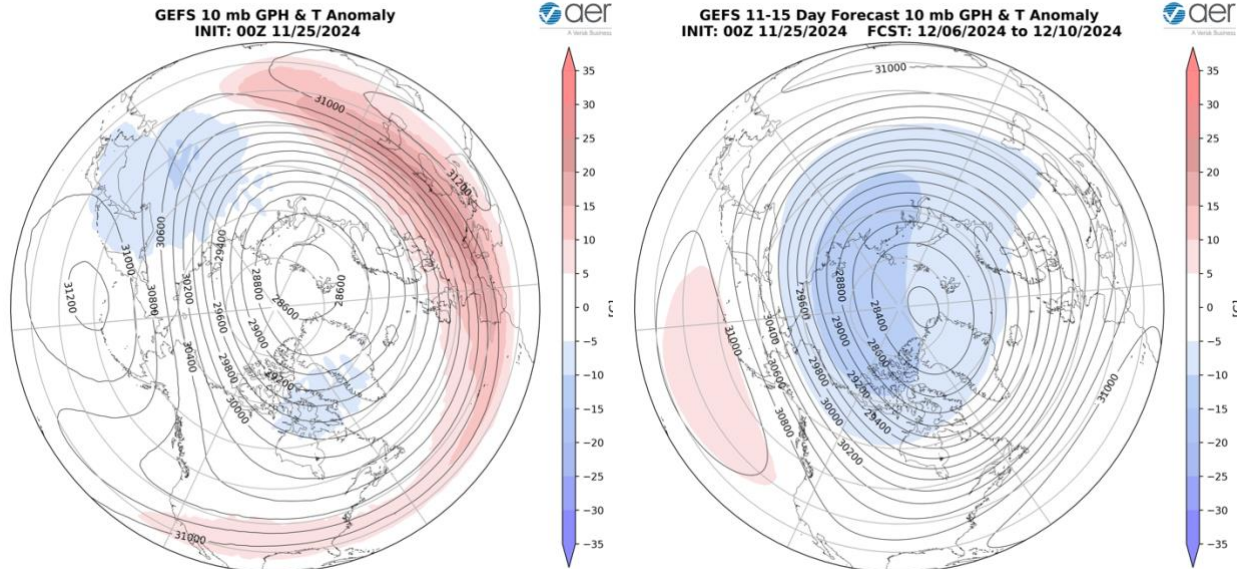
### 30-day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows normal to warm/positive PCHs in the upper troposphere with cold/negative PCHs in the stratosphere and the lower troposphere (**Figure 11**). However much of this week and into next week warm/positive mid tropospheric PCHs are predicted throughout much of the troposphere while cold/negative PCHs in the upper stratosphere are predicted to deepen and descend throughout the depth of the stratosphere (**Figure 11**). For now, this suggests that the stratosphere and troposphere are uncoupled but that could change with time.



**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 25 November 2024 GFS ensemble.

The predicted warm/positive PCHs in the lower troposphere the next two weeks (**Figure 11**) are consistent with the predicted neutral to negative surface AO the next two weeks (**Figure 1**). However, as we head into December, I believe there is much uncertainty and certainly coupling with the cold/negative stratospheric PCHs with the troposphere could force a more positive AO.

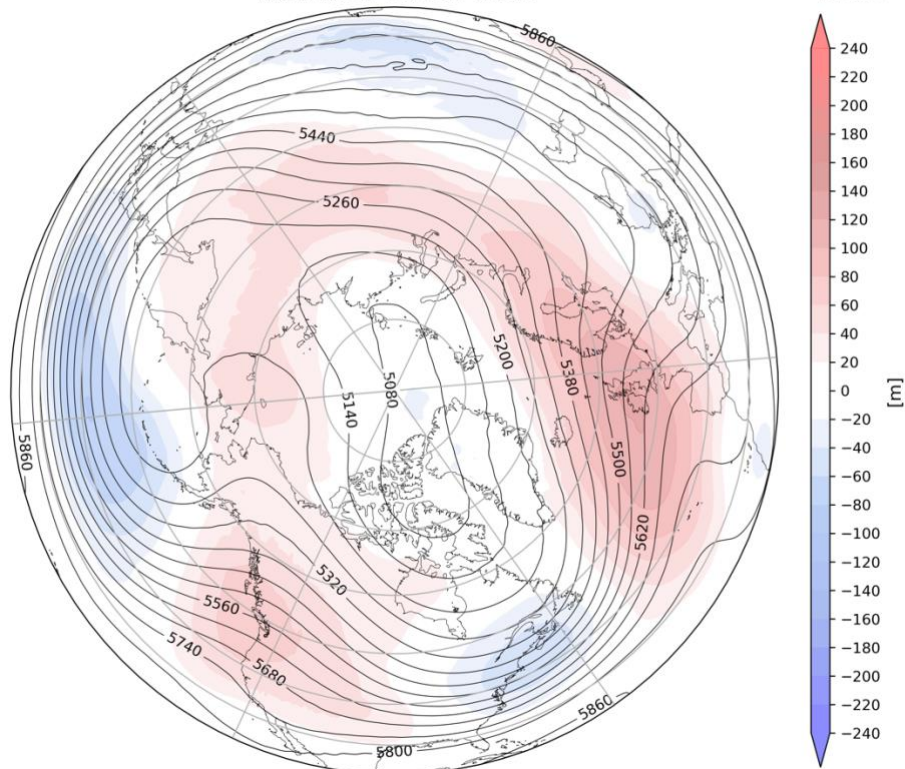


**Figure 12.** (a) Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies ( $^{\circ}\text{C}$ ; shading) across the Northern Hemisphere for 25 November 2024. (b) Same as (a) except forecasted averaged from 06 Dec to 10 Dec 2024. The forecasts are from the 00Z 25 November 2024 GFS model ensemble.

This week the polar vortex (PV) is predicted to be elongated in shape with the PV center over Svalbard with relatively cold temperatures focused in Baffin Bay with warm temperatures sweeping across Asia (**Figure 12a**). This is consistent with a stretched PV configuration. This is related to the cold air outbreak in China and the flow of cold air out of Canada to the US. Then, in early December the PV center is predicted to return to near North Pole but become more circular in shape with relatively cold temperatures concentrated in the polar stratosphere (**Figure 12b**). This is consistent with a strengthening PV. I included the stratospheric AO in **Figure 1** this week to show despite the stretched PV overall the PV remains strong, and any cold air outbreaks should remain brief.



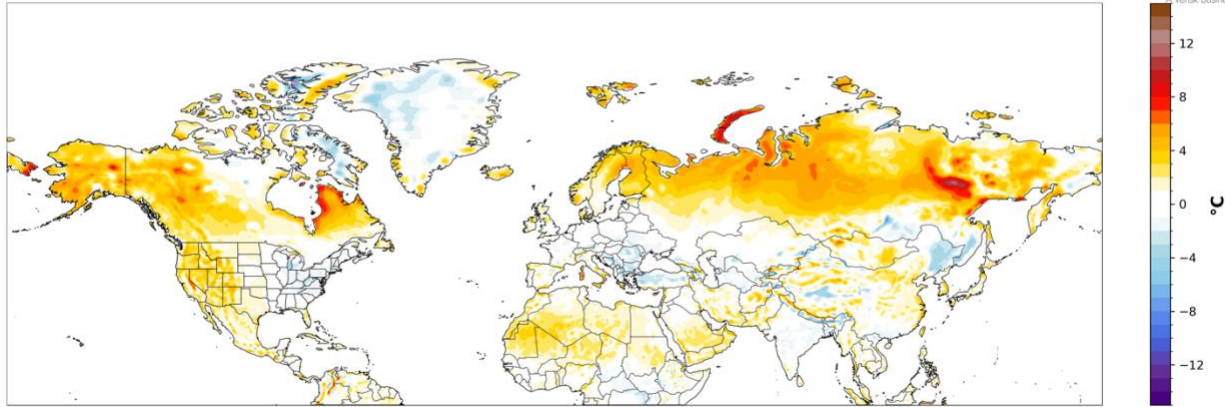
**CFS 500 hPa Forecast Anomaly Dec 2024  
Valid as of 25 Nov 2024**



**Figure 13.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for December 2024. The forecasts are from the 00Z 25 November 2024 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 13**) and surface temperatures for December (**Figure 14**) from the Climate Forecast System (CFS; the plots represent yesterday's four ensemble members). The forecast for the troposphere is ridging across Northwest Europe, centered just west of the UK, in Eastern Siberia, the Gulf of Alaska extending into Alaska, Western Canada and the Western US with troughing across Eastern Europe and Western Russia, Northeast Asia extending to the Dateline and south of the Aleutians, Eastern Canada and the Eastern US (**Figure 13**). This pattern favors seasonable to relatively warm temperatures across Western Europe, much of Northern Asia including Siberia, Alaska, Western Canada and the Western US with seasonable to relatively cold temperatures across Eastern Europe, the Middle East, Southeastern Siberia and Northeast Asia, Southeastern Canada and the Eastern US (**Figure 14**).

CFS 6-36 Day Forecast T2m Anomaly  
INIT: 00Z 11/25/2024 FCST: 12/01/2024 to 12/31/2024

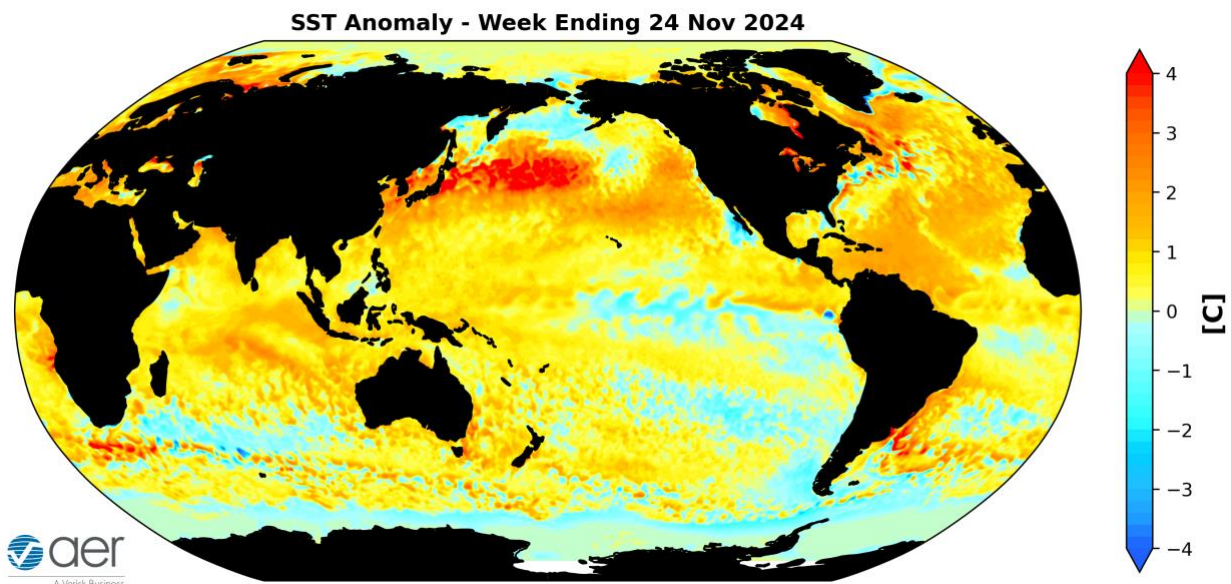


**Figure 14.** Forecasted average surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) across the Northern Hemisphere for December 2024. The forecasts are from the 00Z 25 November 2024.

## Boundary Forcings

### SSTs/El Niño/Southern Oscillation

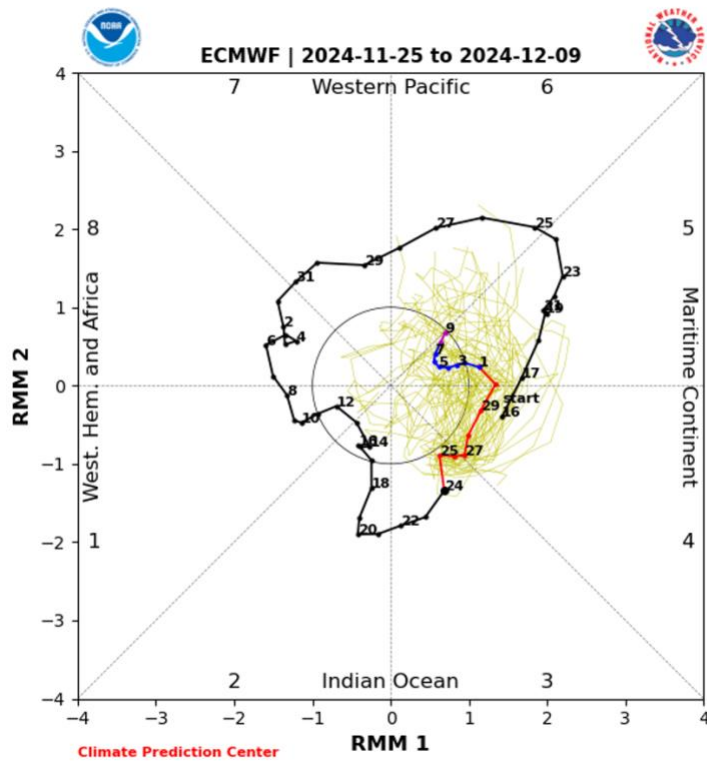
Equatorial Pacific sea surface temperatures (SSTs) anomalies are below normal, between the Dateline and the South America coast, indicating that a La Niña event is emerging (**Figure 15**) and weak La Niña conditions are expected through the winter. Observed SSTs across the NH remain well above normal especially in the central North Pacific centered on the Dateline and the western North Pacific, much of the North Atlantic and offshore of eastern North America though below normal SSTs exist regionally especially in the South Pacific. I do wonder if the warmer SSTs this year relative to recent years along the west coast of North America is favoring the cold air further to the east this winter compared to the past decade.



**Figure 15.** The latest daily-mean global SST anomalies (ending 24 November 2024). Data from NOAA OI High-Resolution dataset. Source <https://psl.noaa.gov/map/clim/sst.shtml>

### Madden Julian Oscillation

Currently the Madden Julian Oscillation (MJO) is currently in in phase three (**Figure 16**). The forecasts are for the MJO to remain mostly weak, limp into phase four and then weaken to where no overall phase is favored. Phases three and four favor ridging in the eastern North America and troughing in western North America, especially Alaska. Therefore it seems that the MJO is having little to no influence on North American weather next week. But admittedly this is outside of my expertise.



**Figure 16.** Past and forecast values of the MJO index. Forecast values from the 00Z 25 November 2024 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model 'spread' is denoted by the gray shading. Sector numbers indicate the phase of the MJO, with geographical labels indicating where anomalous convection occurs during that phase. Image source <https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/ecmf.shtml>

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

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