JANUS RESEARCH GROUP

Arctic Oscillation and Polar Vortex Analysis and Forecasts

December 15, 2025

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

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

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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 to near near neutral the next two weeks as pressure/geopotential height anomalies across the Arctic are currently mostly negative and are predicted to become mostly mixed the next two weeks. The North Atlantic Oscillation (NAO) is currently positive as negative pressure/geopotential height anomalies dominate across Greenland, and the NAO is predicted to trend negative to neutral the next two weeks as pressure/geopotential height anomalies are predicted to turn mostly mixed to weakly positive across Greenland the next two weeks.
- Troughing/negative geopotential height anomalies south of Iceland will support ridging/positive geopotential height anomalies this week however next week the European ridging will slide west into the North Atlantic and allow troughing to spread into Europe from the east over Asia. This pattern will favor normal to above normal temperatures widespread across Europe including the United Kingdom (UK) this week, however next week normal to below normal temperatures will start to bleed across Europe from the east.
- The next two weeks the general pattern across Asia is ridging/positive geopotential height anomalies across Scandinavia and near the Dateline supporting troughing/negative geopotential height anomalies across Central Asia. This pattern favors normal to above normal temperatures across Northwestern and Southeastern Asia and Eastern Siberia (this week only) with normal to below normal temperatures focused in Siberia and eventually

spreading into Southwest and Northeast Asia the next two weeks.

- The general pattern across North America the next two weeks is ridging/positive geopotential height anomalies centered near the Dateline that will support troughing/negative geopotential height anomalies across Alaska, Gulf of Alaska and across much of Canada into the Northeastern US. This patten will favor normal to below normal temperatures across Alaska and spreading across much of Canada and episodically into the Northeastern United States (US) with normal to above normal temperatures across much of the US.
- I am still on the stretched polar vortex (PV) carousel, or as I like to borrow the cliche: "rinse, lather, repeat" and its impact on our weather.

Plain Language Summary

Winter has made a quick appearance in Western and Central Siberia and Alaska, Canada and the Eastern US. (see **Figure**). In contrast it has been slow to start in Europe, Western, Central and Eastern Asia, Eastern Siberia and the Western US (see **Figure**). The forecast for the next two weeks can quickly be summarized as a contraction of the cold across North America (mostly north of 45°N) and an expansion across Asia and eventually Europe (see **Figures 3, 6** and **9**). Stretched polar vortex events have ruled December's weather, and I don't see any reason to deviate from that for the foreseeable future.

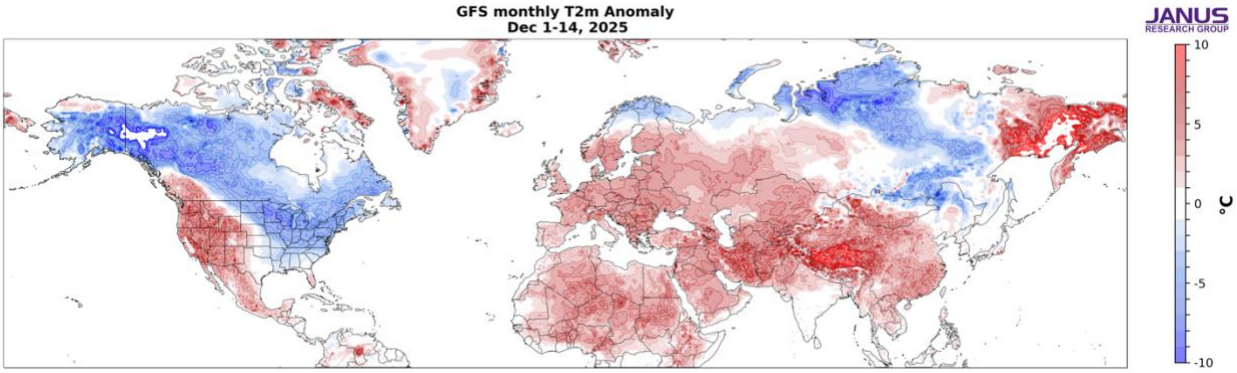


Figure. Estimate of the observed surface temperatures (°C; shading) from 01 Dec to 14 Dec 2025 based on GFS initializations and the GFS forecast from the 15 Dec 2025 run.

Impacts

As is my habit this season I first discuss the two-week forecast for the mid-tropospheric circulation, which helps set the table for what I am expecting with the polar vortex (PV) and our weather. Once again, the mid-tropospheric circulation is characterized by low pressure centered near the North Pole and high-pressure ridging kind of floating around the mid-latitudes (see **Figure i**). Initially, there is one clear dominant high latitude blocking centered near the Dateline. The other more minor region of high-latitude blocking is currently over Europe. But over the next two weeks the circulation is dominated by mid-ocean ridging in both the North Atlantic and North Pacific with mid-continent troughing mostly at the higher latitudes of both North America and Eurasia. This could be summarized as warm-ocean/cold-land pattern (a phrase not created by me). And overall, we are seeing winter conditions continue across North America (mostly from the US-Canadian border and north) and finally expanding beyond Siberia in Eurasia. But importantly for me, this seems to have a strong wave-two signature that normally supports either a PV split (I see no evidence of this given the higher threshold to achieve) or PV stretching, which has a lower trigger threshold. But this wave-2 pattern in my opinion is in quadrature to the ridge/trough axis to either force a large stretched-PV and/or a PV split. Ridging positioned simultaneously near the Dateline and the Greenwich Meridian is conducive for expansion of cold air across the continents but not for a large PV disruption. As seen in **Figure 17**, we see very warm sea surface temperatures in the both the North Pacific and North Atlantic that could be favoring ridging in the region.

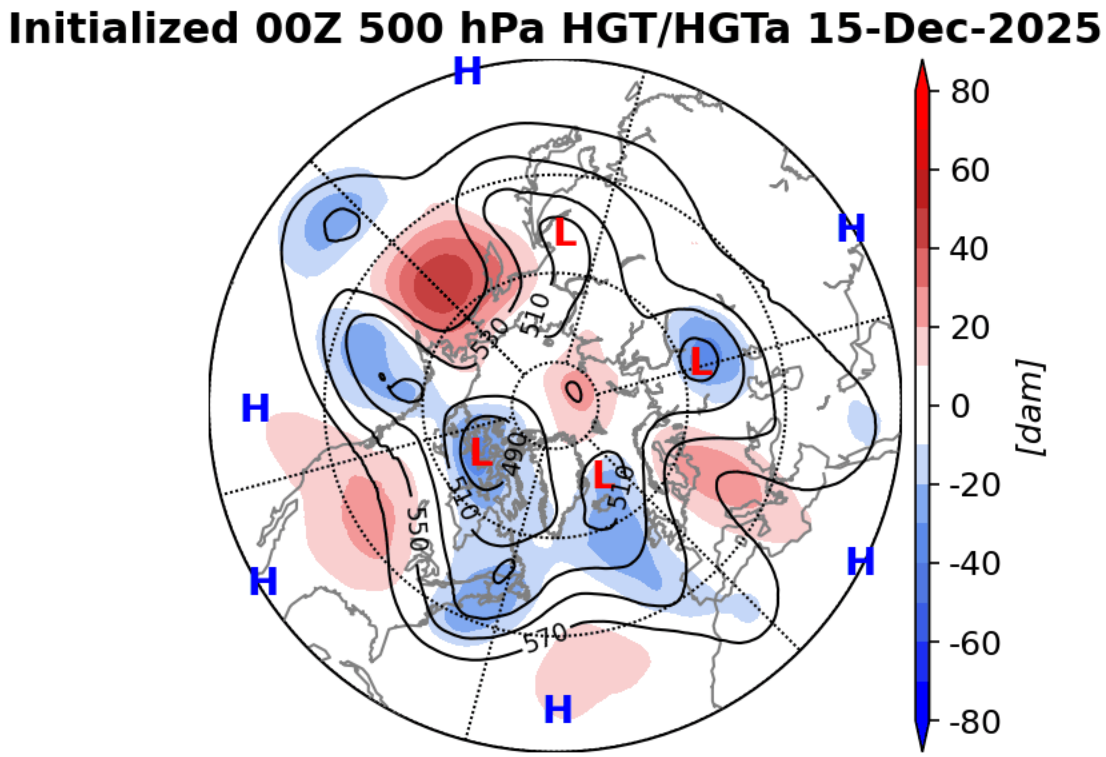


Figure i. Initialized 500 mb geopotential heights (dam; contours) and decameter anomalies (dam; shading) across the Northern Hemisphere for 15 Dec 2025 and forecasted from 16 Dec to 30 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS model ensemble.

The weather model forecasts have been showing a clear strengthening and more circular shape of the PV as its ongoing rebound from the unprecedently weak PV at the end of November that was a bit of two steps forward and one step back. As seen in **Figure ii** the PV center is predicted to recover from the most recent stretched PV that brought snow and cold to Central and Eastern US this past week. And not too surprisingly, we can see the cold air retreat across North America and be mostly confined to Canada this week (see **Figure 3**). But last week it did gnaw at me that even though the models were predicting a more circular PV, it was not perfect and still had a stretched or elongated appearance to it, even if subtle. It should have reminded me of last January when the models are having a difficult time resolving individual stretched PVs punctuated by a stronger, rounder PV. So, from **Figure ii** and from **Figure 12** we can see one stretched PV the end of this week and then again, the last few days of December. And between each individual stretched PV we have a relaxation or a more circular PV. But the stretched PVs predicted over the next two weeks are relatively minor, especially the one at the end of this week (based on current forecasts). And I think that it was two winters ago (or possibly three winters ago now) when the cold air associated with stretched PVs was shunted way to the east towards the Canadian Maritimes and out into the North Atlantic consistent with current forecasts. But we shall see how far east the cold ends up eventually.

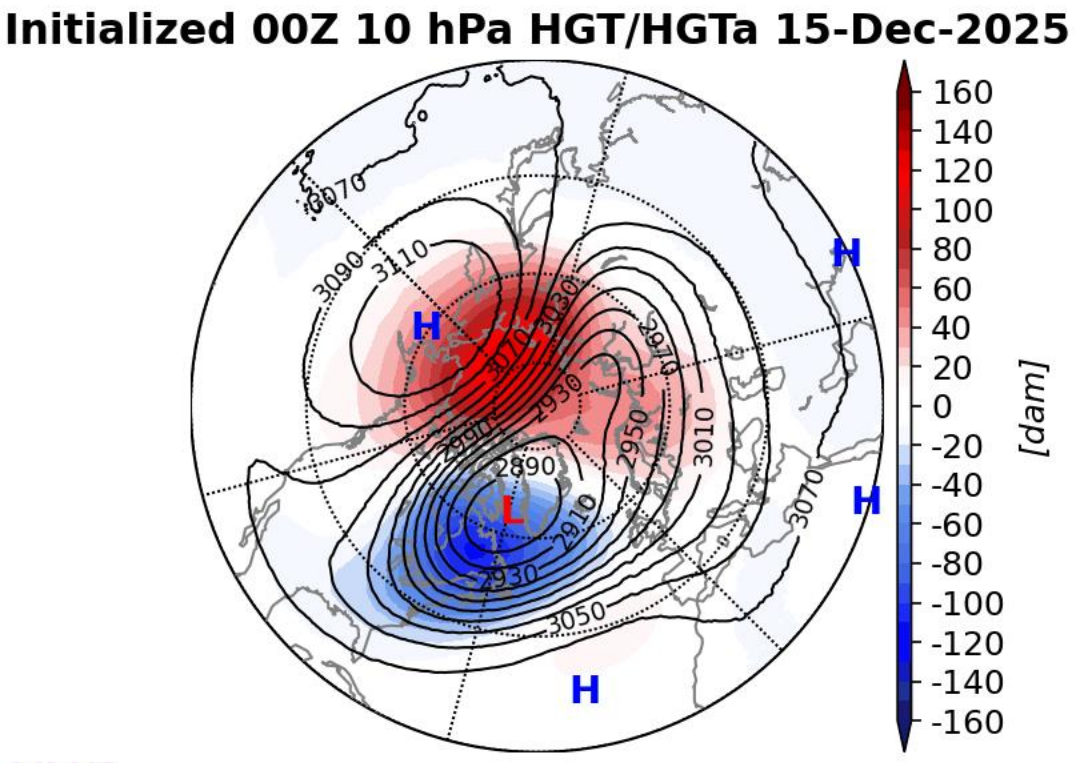
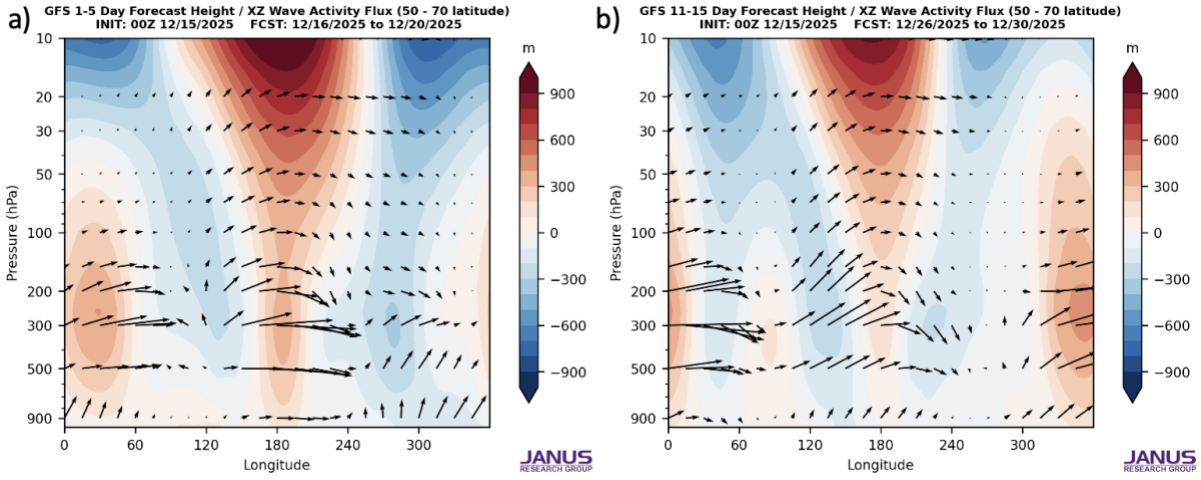


Figure ii. Forecasted average 10 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for 15 Dec 2025 and forecasted from 16 Dec to 30 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS model ensemble.

I have said this before in the blog, "if all you have is a hammer, everything looks like a nail." So, if you think my answer to any cold air outbreak is a stretched PV, I present further support that there are indeed two stretched PVs over the next two weeks in **Figure iii**. For both this week and then again the last week of December, a nearly textbook wave reflection is predicted. For both periods wave energy goes up and east over Asia, reflects off the stratospheric PV and then heads down and east over North America where the energy is re-absorbed and amplifies the standing wave over North America and delivering cold air from the Arctic south, east of the Rockies. The westward wave tilt with height over Asia and the eastward wave tilt with height over North America is also nearly textbook. But these two events are relatively minor, good enough to maintain the cold pool over Alaska and Canada but then the cold air south of the Canadian border is shunted to the east mostly limited to the East Coast over the weekend and then New England and the Canadian Maritimes for the holiday period. However, a great rule of thumb with stretched PVs is - the models are always playing catch-up. A week ago, the cold for the weekend looks like it would be a couple of degrees below normal in Maine and that was it. Now it is much colder and widespread, albeit relatively more minor than the cold air outbreak of this weekend. So, it would not surprise me if the cold air predicted for the holiday period becomes more impressive with subsequent model forecasts.



Fgure iii. **a)** Longitude-height cross section of geopotential eddy height anomalies (shading) and wave activity flux (vectors) forecasted for 05 December through 09 December 2025. **b)** same as a) but for 16 December 2019 through 31 December 2019. The forecasts are from the 00Z 24 November 2025 GFS ensemble.

There was attention given to whether a major sudden stratospheric warming (SSW - defined as a reversal of the wind from westerly to easterly at 60°N and 10 hPa) occurred in late November at the peak of the PV disruption. I of course framed it as an extreme stretched PV that I thought

provided a better framework for temperature forecasts. And now that the whole event is winding down, I feel justified. However in the 1 Dec 2025 blog I did conceded it might be a hybrid of sorts. I was under the impression that it did not meet the criteria to be defined as a major SSW. However I did come across this LinkedIn post from Simon Lee demonstrating that according to ERA5, a major SSW did occur at the end of November.

I bring this up today because normally when wave reflection occurs it tends to clear out warm/positive polar cap geopotential height anomalies (PCHs) in the atmospheric column (both stratosphere and troposphere, regardless if an SSW occurs or not. As I have been documenting in the blog, we have had multiple wave reflection events and yet warm/positive PCHs persist. In fact, looking at **Figure 11**, it gives the appearance of the more classical dripping paint plot associated with absorbing SSW events in the polar stratosphere. I can't recall something similar with wave reflecting events. This is mostly an academic exercise but something that I find curious. The latest GFS forecast suggests the warm/positive PCHs will disappear at the end of the month, but the GFS has predicted this for much of December only to reverse course. I can't blame the GFS as we clearly have multiple wave reflection events, but it shows the models are really struggling predicting the atmospheric circulation correctly.

For the past three weeks, I have been doing my best Monty Hall from "Let's Make a Deal" impression, and this week will be no different. However, I will keep it short this week. The three doors are: door number one - the reflective layer in the stratosphere that gave rise to the stretched PV also protects the PV from subsequent upwelling energy from the troposphere and allows the PV to strengthen. The second door is though there is short-term strengthening of the PV, high-latitude blocking resumes its assault on the PV and we see more stretched PVs and/or Canadian Warmings (that often transition to stretched PVs) until finally there is knockout punch and a true SSW either in January or February. And finally, the third scenario is that the stretched PVs just keep repeating for much of the winter punctuated or separated by a relatively strong PV and or Canadian warmings.

I have consistently favored door number three or what I like to call a "rinse, lather, repeat" PV and weather pattern for the foreseeable future. Basically, alternating stretched PVs and relaxation to a more circular PV and oscillating or alternating cold and mild periods for East Asia and or North America, that can feature some wild temperature swings. Eventually the pattern could transition to either door number one, persistently strong PV or door number two, a major SSW. For now, I see no evidence of either. For door number one/strong PV I would want to see a disappearance of high-latitude blocking or 180° out of phase with the pattern that favors a weak PV or for door number two/SSW a much stronger and persistent Ural/Scandinavian blocking. So for now, I am continuing to ride the "rinse, lather, repeat" carousel as we saw last winter.

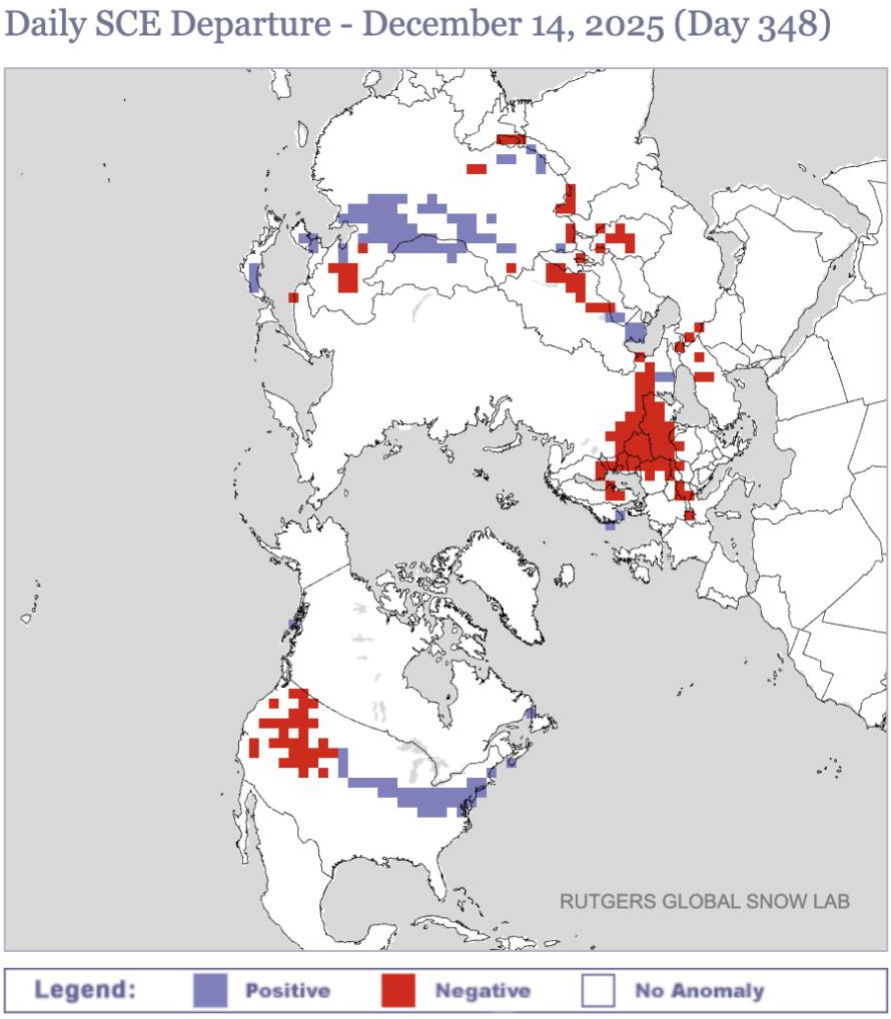


Figure iv. Daily snow cover extent across Northern Hemisphere for 14 December 2025 shown in red. Plot taken from https://climate.rutgers.edu/snowcover/index.php.

Once again. I will end with an update on Northern Hemisphere (NH) snow cover extent (SCE). I have been highlighting a dipole with above normal SCE in eastern Eurasia and below normal SCE in western Eurasia but really just a very large negative anomaly in western Eurasia (see **Figure iv**). And though Europe still exhibits well below SCE, it is above normal in East Asia with recent snow and cold in China. For the first half of December winter across Eurasia has been mostly confined to Siberia. Typically, the mid-tropospheric climatological low in winter over Asia is located between Central and Eastern Siberia. The forecasts are for the polar low to be centered further to the west over Western Siberia and should allow for a more expansive cold pool over Northern Asia than is typical. The expansion of SCE extent seems to signal winter finally breaking out of its Siberian confine and expanding more aggressively across Asia and looks like eventually to Europe as well. This could have important implications for the rest of winter not only in Eurasia but North America as well. A cold northern Eurasia is often associated with SSWs.

North America exhibits the same west to east SCE dipole anomaly with above normal SCE in the Eastern US and below normal SCE in the Western US. Funny how Eurasia and North America mirror each other. US SCE is going to take a beating this week, seems inevitable to me but I do think snow cover is a precursor of the weather pattern. So, I don't think anyone that reads the blog how SCE is currently biasing my thinking.

Of course, what I write is an oversimplification but I do think that we are soon approaching the point of no return on whether the winter is overall mild or cold. No true holiday period for a true winter-season prognosticator.

Near-Term

This week

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

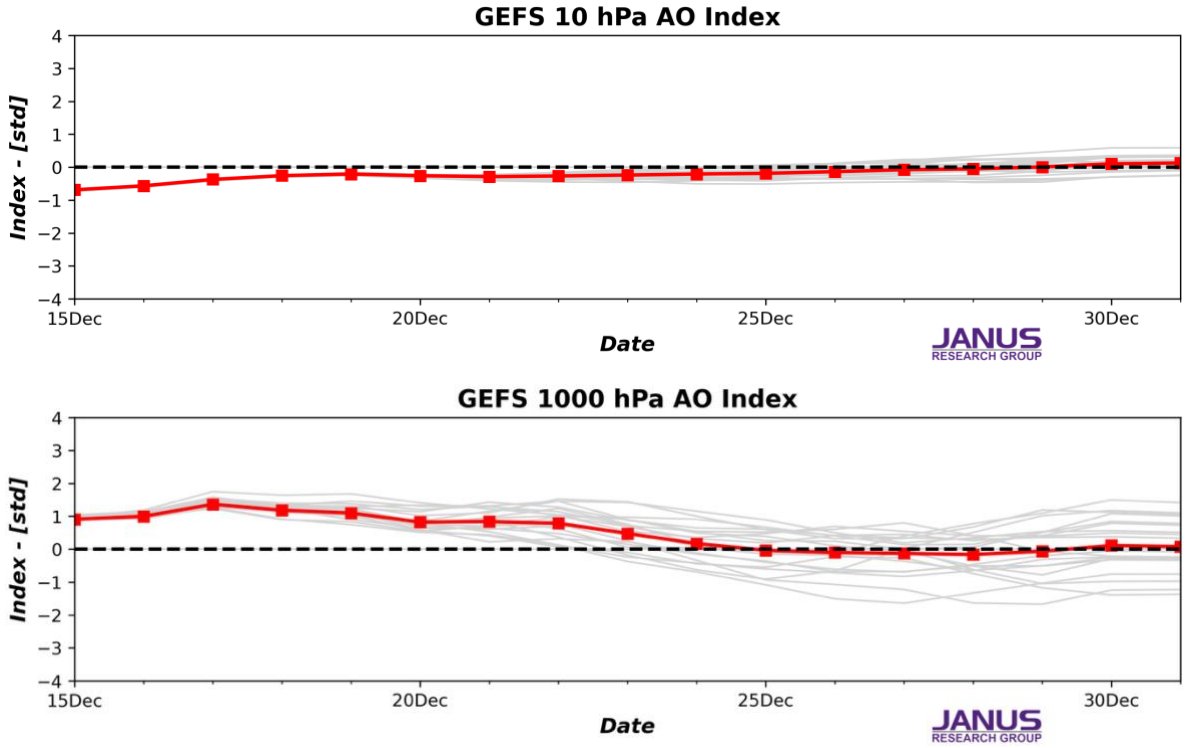


Figure 1. The predicted daily-mean AO at a) 10 hPa and b) 1000 hPa from the 00Z 15 Dec 2025 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble mean AO index given by the red line with squares.

Troughing/negative geopotential height anomalies centered south of Iceland will support widespread ridging/positive geopotential height anomalies across Europe this week (**Figure 2).** This pattern will support widespread normal to above normal temperatures across Europe including the UK but especially across Scandinavia this week (**Figure 3**). This week ridging/positive geopotential height anomalies will be focused in Western and Southern Asia as well as Eastern Siberia with troughing/negative geopotential height anomalies across Northern and Central Asia and even trailing into the Southwest corner of Asia (**Figure 2**). This pattern favors normal to above normal temperatures widespread across much of Asia but especially Western and Southern Asia and Eastern Siberia with normal to below normal temperatures across Western and Central Siberia and parts of Central and Southwest Asia including the Middle East this week **(Figure 3**).

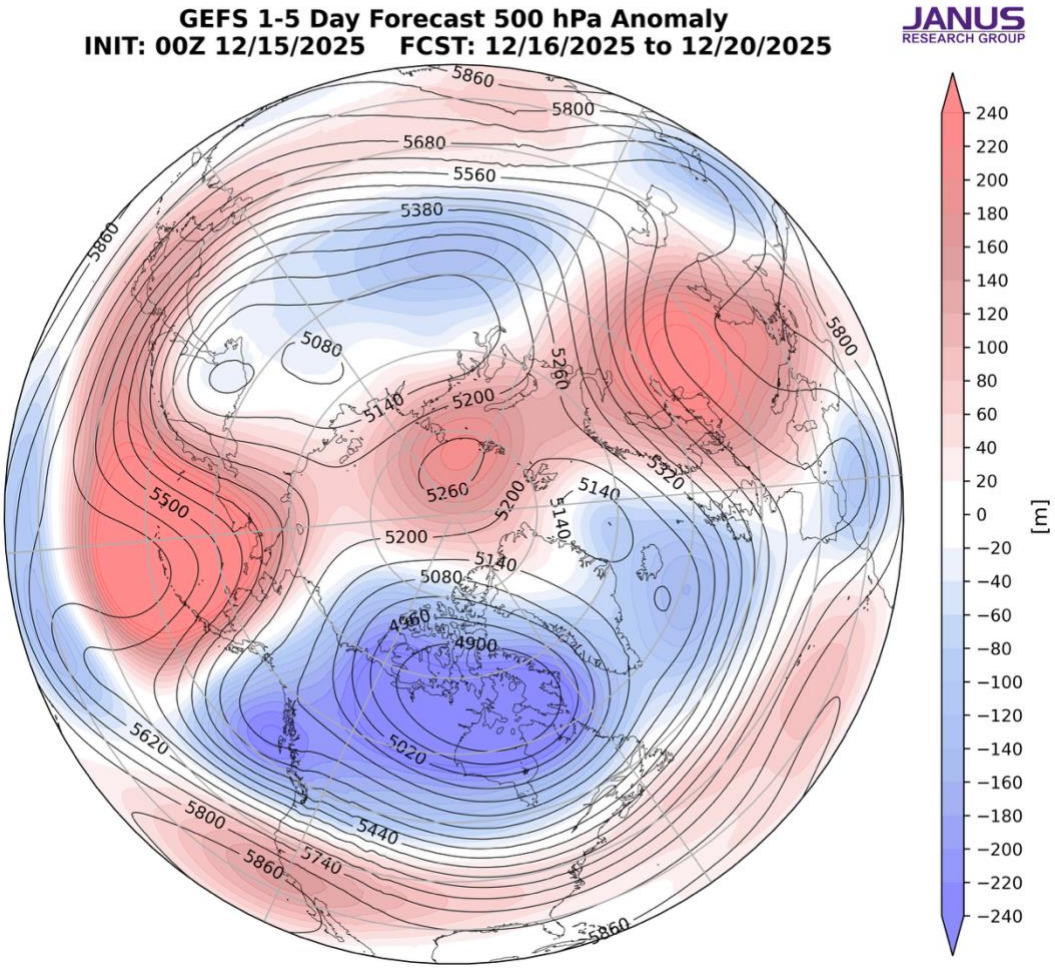


Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 16 Dec to 20 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

This week ridging/positive geopotential height anomalies centered on the Dateline supporting troughing/negative geopotential height anomalies across Alaska into the Gulf of Alaska and much of Canada and into Baffin Bay with more ridging across much of the US this week (**Figure 2**). This patten will favor widespread normal to below normal

temperatures across much of Alaska and Canada with normal to above normal temperatures across far Eastern Canada and the US this week (**Figure 3**).

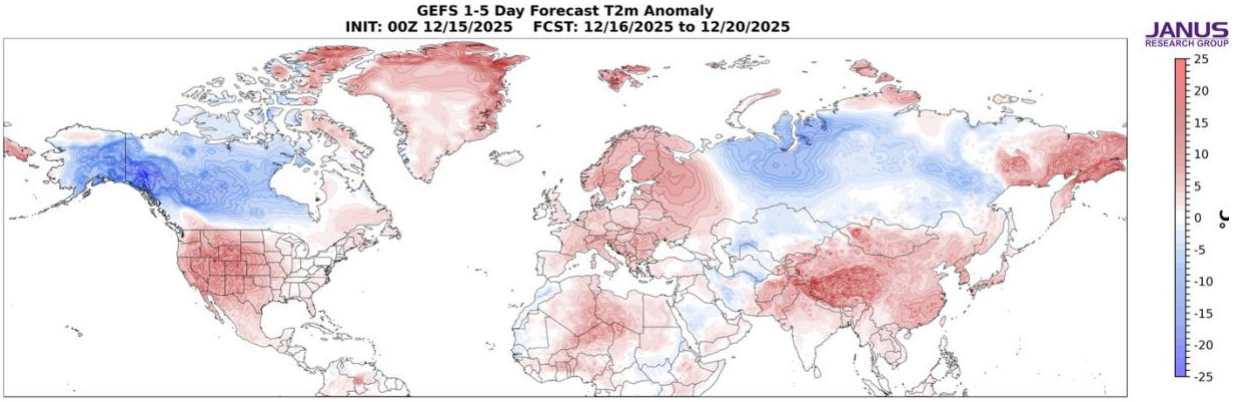


Figure 3. Forecasted surface temperature anomalies (°C; shading) from 16 Dec to 20 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Norway, parts of Siberia, Northeast and Central Asia while milder temperatures will support snowmelt across southern Scandinavia, Northwest Russia and Japan this week (**Figure 4**). Troughing and/or cold temperatures will support new snowfall across northern and western Alaska, much of Southern Canada, the US Northern Rockies, Upper Midwest and downwind of the Great Lakes and the higher elevations of the Northwestern US while milder temperatures will support snowmelt widespread across the Northeastern US and Great Lakes this week (**Figure 4**).

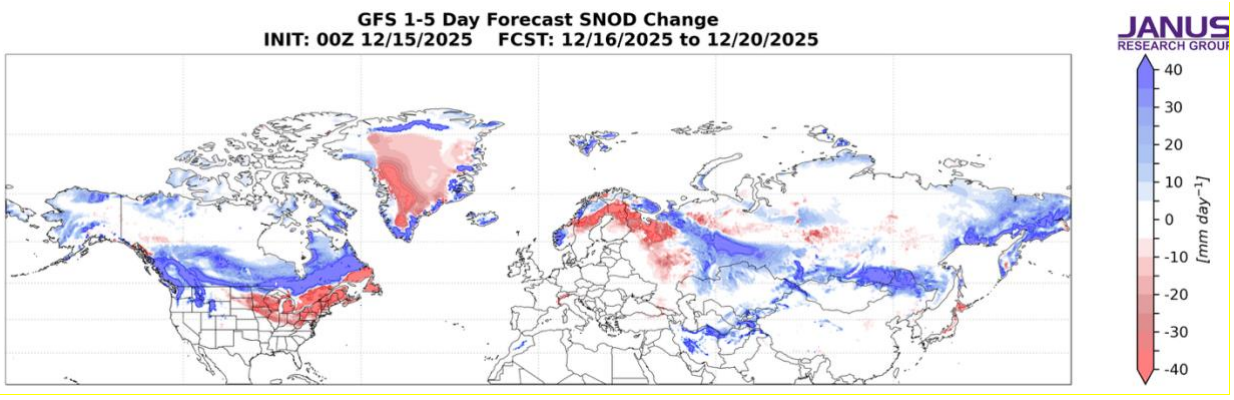


Figure 4. Forecasted snowfall (mm/day; shading) from 16 Dec to 20 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Near-Mid Term

Next week

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

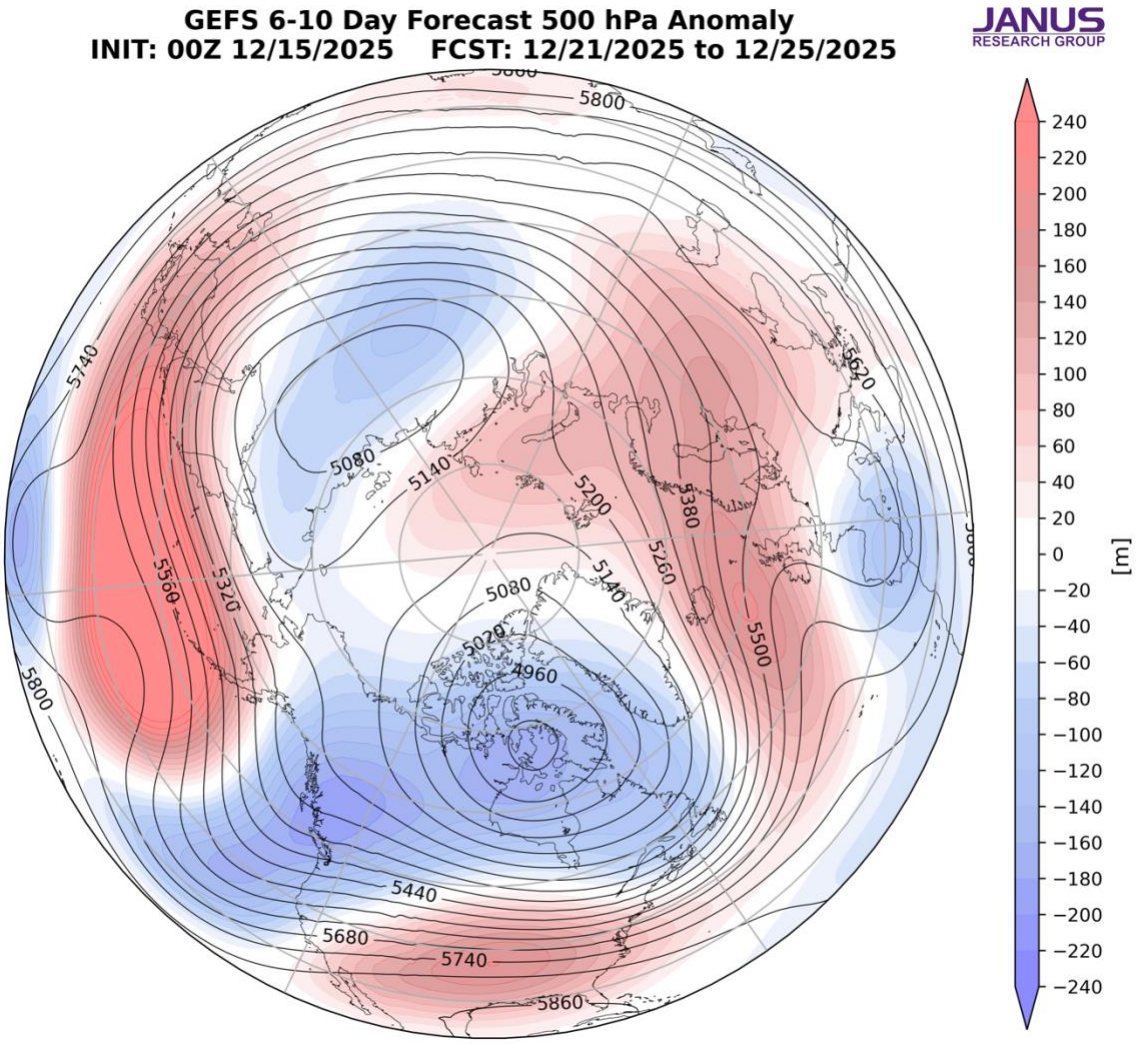


Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 21 Dec to 25 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Troughing/negative geopotential height anomalies across Greenland will continue to support widespread ridging/positive geopotential height anomalies across Europe with the exception of troughing centered on the Iberian Peninsula (**Figure 5**). The pattern will support

normal to above normal temperatures widespread across much of Europe including the UK with the exception of normal to below normal temperatures across the Iberian Peninsula this period (**Figure 6**). Once again ridging/positive geopotential height anomalies are predicted across Western Asia and near the Dateline will support troughing/negative geopotential height anomalies across Northern and Central Asia this period (**Figure 5**). This pattern favors widespread normal to above normal temperatures across Western and Southeastern Asia focused in the Tibetan Plateau but also including Israel and the Middle East, most of China and Japan with normal to below normal temperatures stretching from the Urals to Eastern Siberia and Central Asia this period (**Figure 6**).

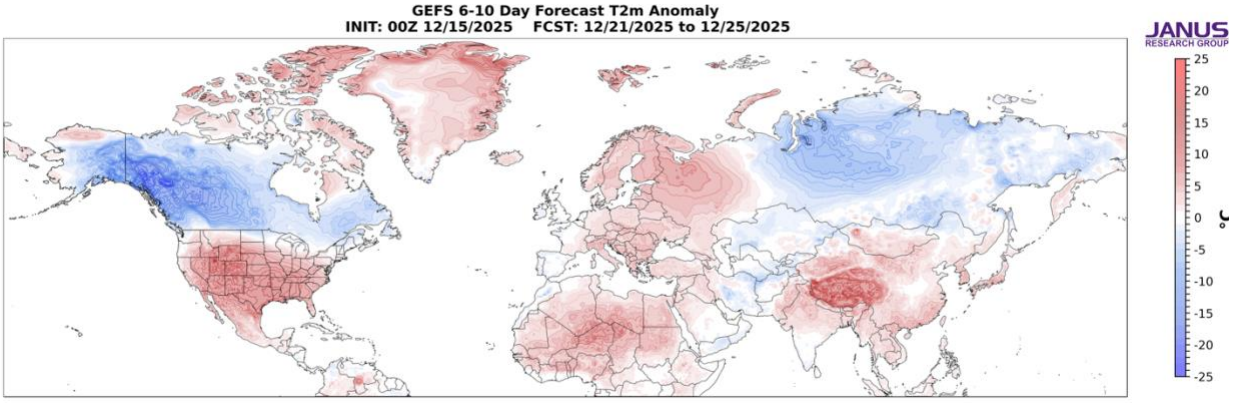


Figure 6. Forecasted surface temperature anomalies (°C; shading) from 21 Dec to 25 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Persistent ridging/positive geopotential height anomalies centered near the Dateline and in the Central US will support troughing/negative geopotential height anomalies stretching from Alaska across Canada to New England this period (**Figure 5**). This pattern will favor normal to below normal temperatures across Alaska, much of Canda and New England with normal to above normal temperatures across Northeastern Canada and much of the US (**Figure 6**).

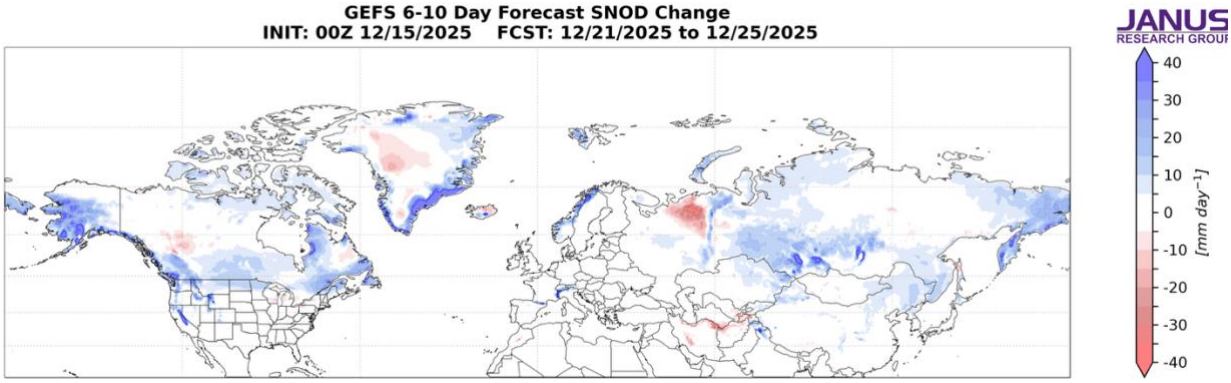


Figure 7. Forecasted snowfall rate (mm/day; shading) from 21 Dec to 25 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall in Norway, northern Kazakhstan parts of Siberia and Northeast Asia while milder temperatures will support snowmelt in parts of Northwest Russia and Central Asia this period (**Figure 7**). Troughing and/or cold temperatures will support new snowfall in western Alaska, much of Southern Canada, the higher elevation of the Western US and northern New England while milder temperatures will support snowmelt in the Canadian Plains and the US Great Lakes 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 remain near neutral this period (**Figure 1**). With predicted weak positive pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will likely remain neutral to slightly negative this period.

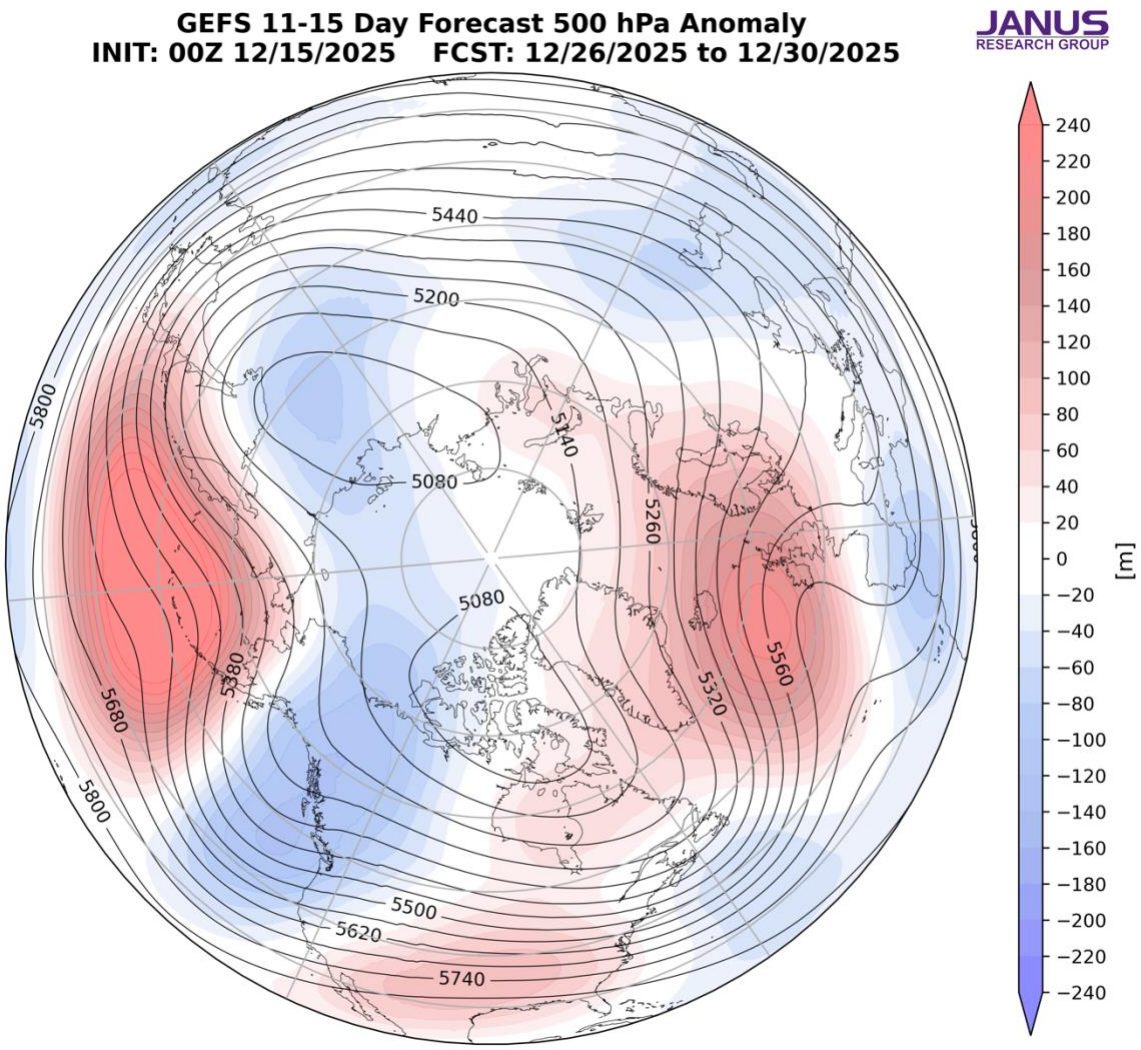


Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 26 Dec to 30 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Previous troughing south of Iceland will be replaced by ridging/positive geopotential height anomalies and extending across the UK and Scandinavia supporting troughing/negative geopotential height anomalies across Central and Southern Europe this period (**Figure 8**). This pattern should favor normal to above normal temperatures across Central and Eastern Europe while northerly flow will support normal to below normal temperatures across Western Europe including the UK this period (**Figures 9**). Ridging/positive geopotential height anomalies are predicted to persist across Scandinavia and near the Dateline will support troughing/negative geopotential height anomalies across Northern Asia this period (**Figure 8**). The predicted pattern favors widespread normal to above normal temperatures across much of Asia including stretching from the Middle East to China with normal to below normal temperatures across much of Siberia, Kazakhstan and into Northeast Asia this period (**Figure 9**).

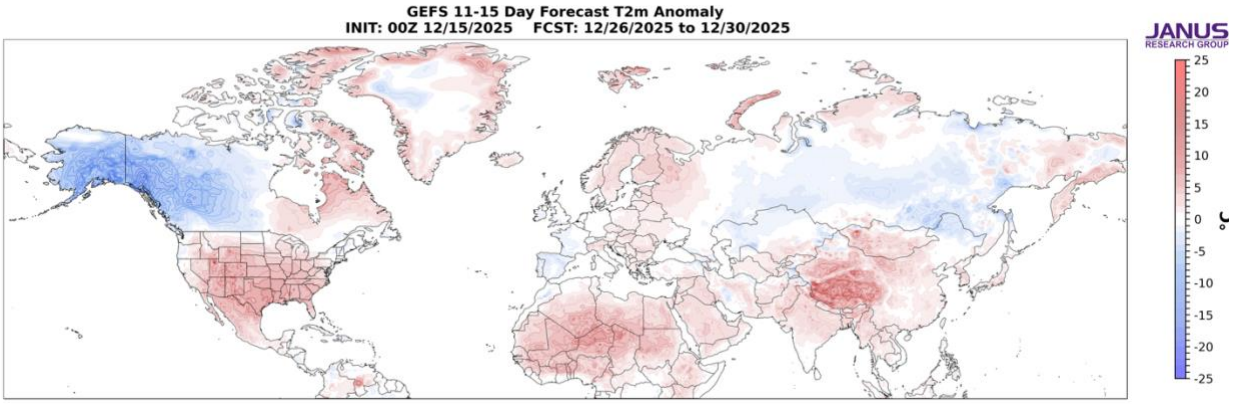


Figure 9. Forecasted surface temperature anomalies (°C; shading) from 26 Dec to 30 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Persistent ridging/positive geopotential height anomalies centered near the Dateline will support downstream troughing/negative geopotential height anomalies stretching from Alaska to Western Canada and into New England with more ridging across Northeast Canada and much of the US this period (**Figure 8**). This pattern supports widespread normal to below normal temperatures across Alaska, much of Western and Central Canada and New England with normal to above normal temperatures across Northeastern Canda and much of the US this period (**Figure 9**).

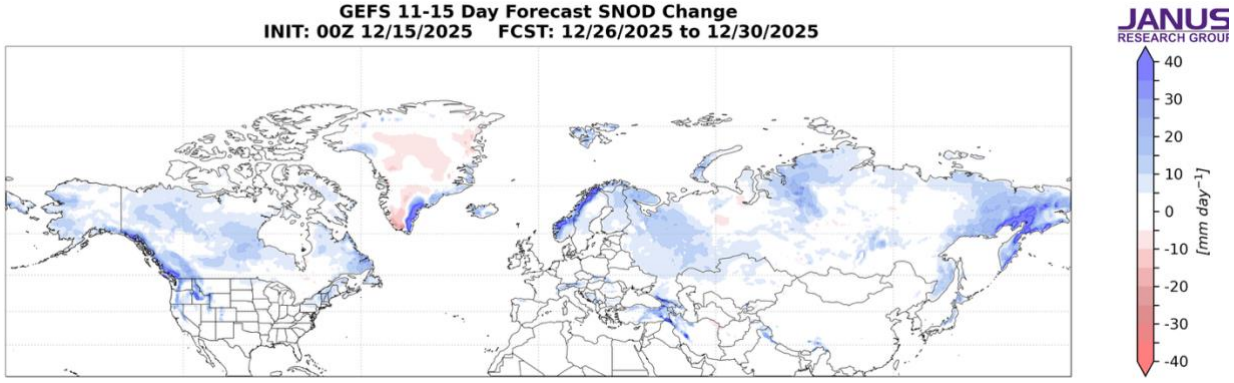


Figure 10. Forecasted snowfall (mm/day; shading) from 26 Dec to 30 Dec 2025. The forecasts are from the 00Z 15 Dec 2025 GFS ensemble.

Troughing and/or cold temperatures will support some possible new snowfall in Scandinavia, Northern Asia, the Alps, the Caucuses and the Tibetan Plateau this period (**Figure 10**). Troughing and/or cold temperatures will support new snowfall in Alaska, much of Canada, the higher elevations of the Western US and New England this period (**Figure 10**).

Longer Term

30–day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows warm/positive PCHs in the stratosphere and the upper troposphere with cold/negative PCHs in the lower troposphere (**Figure 11**). Then next week warm/positive PCHs in the stratosphere are predicted to descend throughout the troposphere while PCHs in the stratosphere are predicted to turn cold/negative.

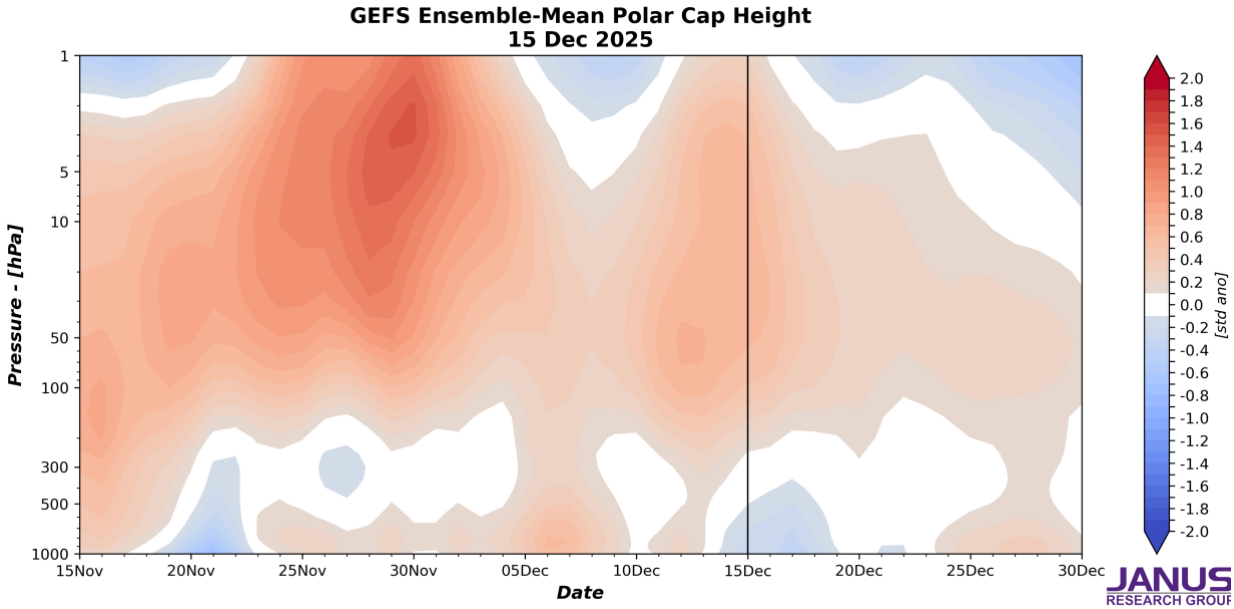


Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 15 Dec 2025 GFS ensemble.

The predicted cold/negative PCHs in the lower troposphere this week (**Figure 11**) are consistent with the predicted positive AO this week (**Figure 1**). Then next week the forecast of descending warm/positive PCHs into the lower troposphere (**Figure 11**) should favor a near neutral to even negative AO next week (**Figure 1**).

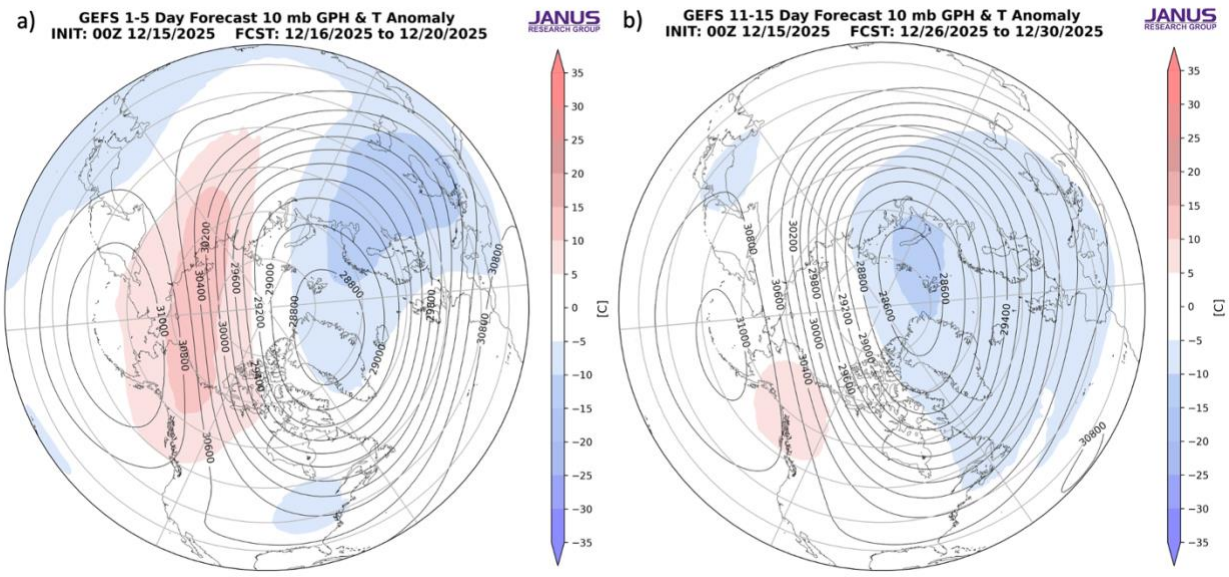


Figure 12. (a) Predicted 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere averaged for 16 Dec to 20 Dec 2025. (b) Same as (a) except forecasted averaged from 26 Dec to 30 Dec 2025. The forecasts are from the 00Z 15 December 2025 GFS model ensemble.

This week the polar vortex (PV) is predicted to be elongated in shape, from Western Asia to Hudson Bay, with the PV center near Greenland with relatively cold temperatures focused in Western Asia/Eastern Europe and with high pressure centered near the Dateline and warm temperatures stretching from Siberia to Western Canada in the polar stratosphere (**Figure 12a**). The elongated shape in appearance, signals a perturbed and stretched PV, even if minor. Then, in late December the PV center is predicted to remain stretched and centered over the Barents-Kara Seas with high pressure still near the Dateline and warming extending from Siberia to Western Canada but cold in the North Atlantic sector in the polar stratosphere (**Figure 12b**). This resembles yet another stretched PV configuration. The stratospheric AO in **Figure 1** this week is predicted to remain somewhat negative and then more neutral next week, signaling a near normal PV state.

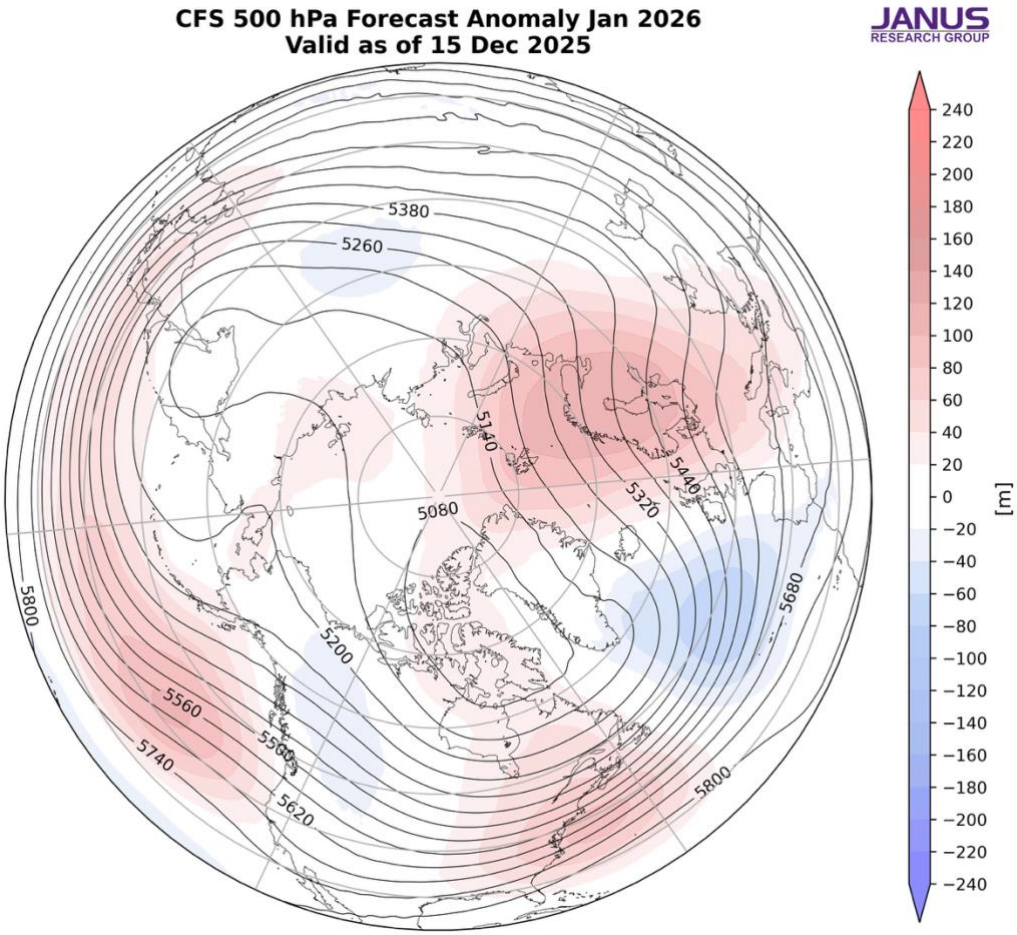


Figure 13. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for January 2025. The forecasts are from the 00Z 15 Dec 2025 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 13**) and surface temperatures for January (**Figure 14**) from the Climate Forecast System (CFS; the plots represent yesterday's four ensemble members). The forecast for the troposphere is ridging centered over Scandinavia and covering much of the Arctic, Eastern Europe, Eastern Siberia and across the Bering Strait, the Gulf of Alaska and the Eastern US with troughing south of Greenland, the western Mediterranean, Northern and Eastern Asia, Western Canada and the Western US (**Figure 13**). This pattern favors seasonable to relatively warm temperatures across Europe, Southern Asia, including the Middle East, China the Tibetan Plateau, Pakistan and Afghanistan, Eastern Siberia and much of the US with seasonable to relatively cool temperatures across Northern Asia into Northeast Asia, Alaska and much of Canada (**Figure 14**).

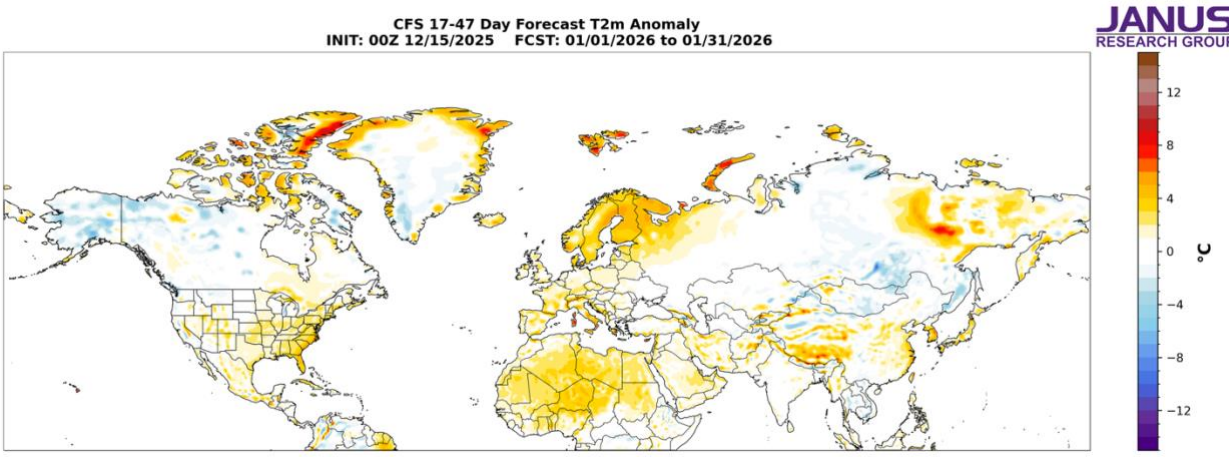


Figure 14. Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for January 2025. The forecasts are from the CFS 00Z 15 Dec 2025.

Boundary Forcings

Arctic Sea Ice

I am and will continue to watch Arctic sea ice. Current conditions are shown in **Figure 15**. It has been shown that less sea ice in the North Atlantic sector of the Arctic weakens the polar vortex while less sea ice in the North Pacific sector strengthens the polar vortex. Arctic sea ice anomalies continue to show a strong focus or weighting of negative anomalies towards the North Atlantic sector relative to the North Pacific sector and this is a robust signal of an overall weaker PV this winter. However, the negative anomalies exist both in the Eurasian sector, i.e., Barents Kara Seas and the North American sector, now mostly in Hudson Bay (see **Figure 15**). Therefore, I do think that there may be some competition where the strongest coupling to the atmosphere might be occurring - with low sea ice in the Barents-Kara Seas favoring Ural/Scandinavian blocking and low sea ice/warm temperatures in Baffin and Hudson Bays favoring Greenland/Northeastern Canada blocking. There has been some high-pressure blocking in both sectors but so far relatively weak. In my opinion, Ural/Scandinavian blocking is more favorable for weakening the PV than Greenland/Northeastern Canada blocking. The predicted ridging for late December in the North Atlantic sector could signal a stalemate for now.

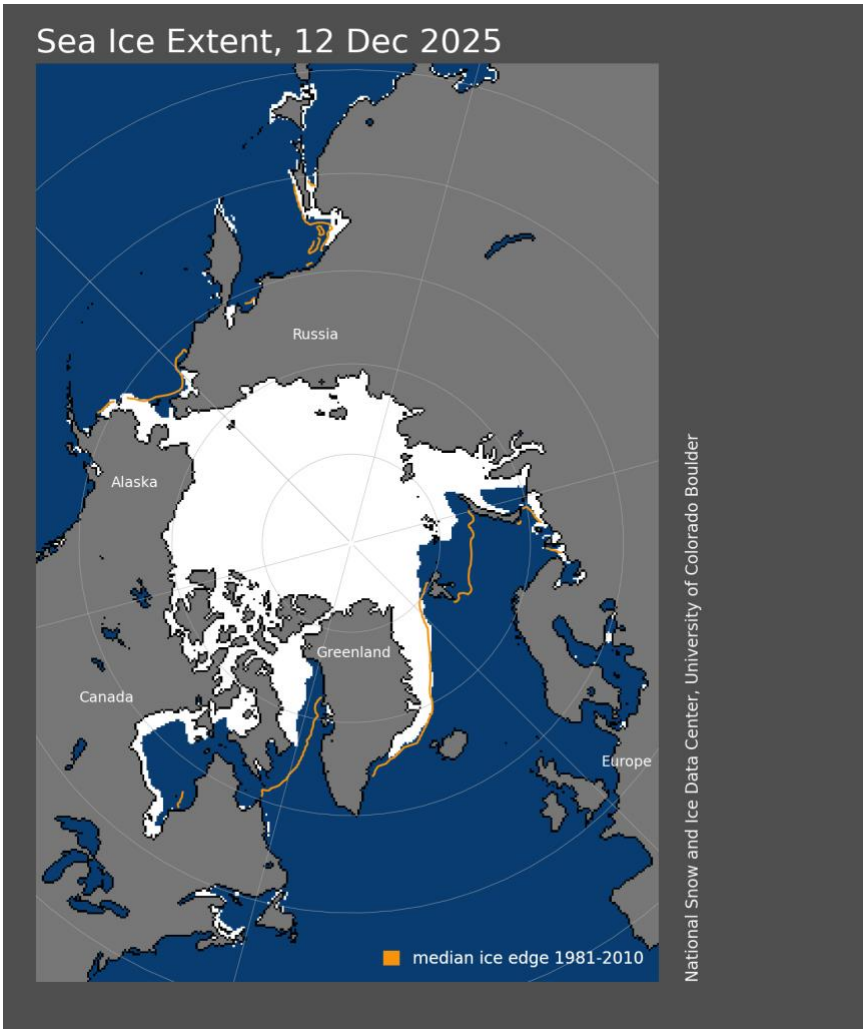


Figure 15. Arctic sea ice cover extent for 12 December 2025. White depicts ice covered areas and the orange contour the climatological extent of Arctic sea ice for the date. Plot taken from: https://nsidc.org/sea-ice-today

SSTs/El Niño/Southern Oscillation

Equatorial Pacific sea surface temperatures (SSTs) anomalies are below normal, along the equatorial Pacific (**Figure 15**) consistent with La Niña conditions for much of the winter but current forecasts show some uncertainty but for now mostly favor weak La Niña conditions this winter. Observed SSTs across the NH remain well above normal especially in the North Pacific and much of the North Atlantic, though below normal SSTs exist regionally especially in the South Pacific. The very warm SSTs in both ocean basins could be supporting the predicted mid-ocean ridging in both basins.

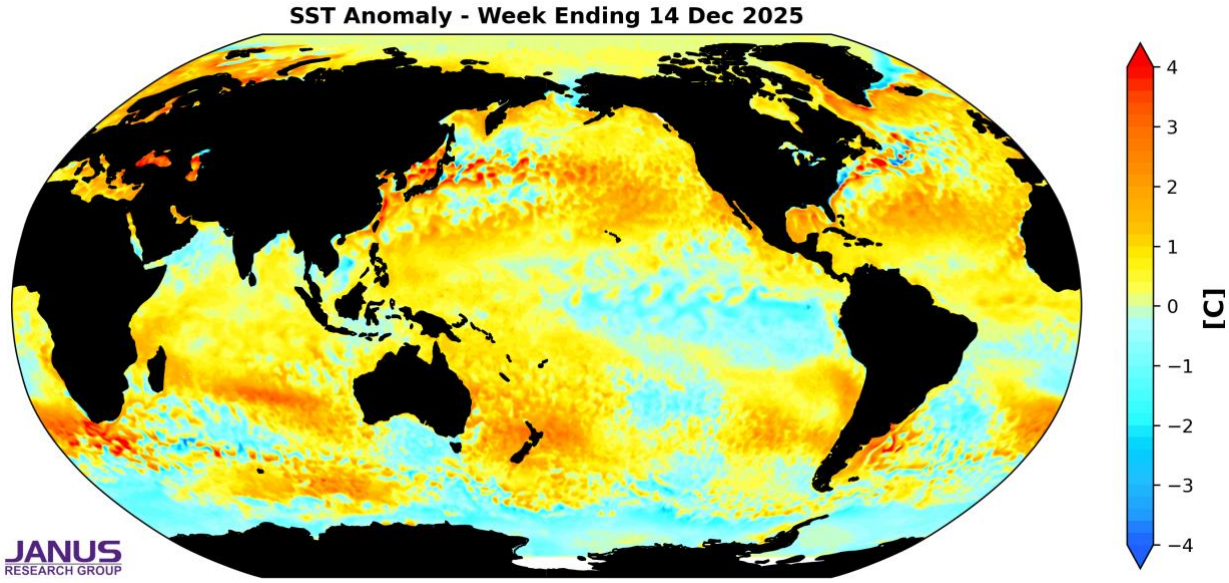


Figure 16. The latest daily-mean global SST anomalies for week ending 14 Dec 2025.

Madden Julian Oscillation

Currently the Madden Julian Oscillation (MJO) is currently weak where no phase is favored (**Figure 17**) and the forecasts are for the MJO to move limp into phase eight over the next two weeks (**Figure 17**). Phase eight favors ridging first across Greenland and then Canada with troughing over the US. Still not feeling it and therefore, it seems that the MJO is having little influence on North American weather in December. But admittedly this is outside of my expertise.

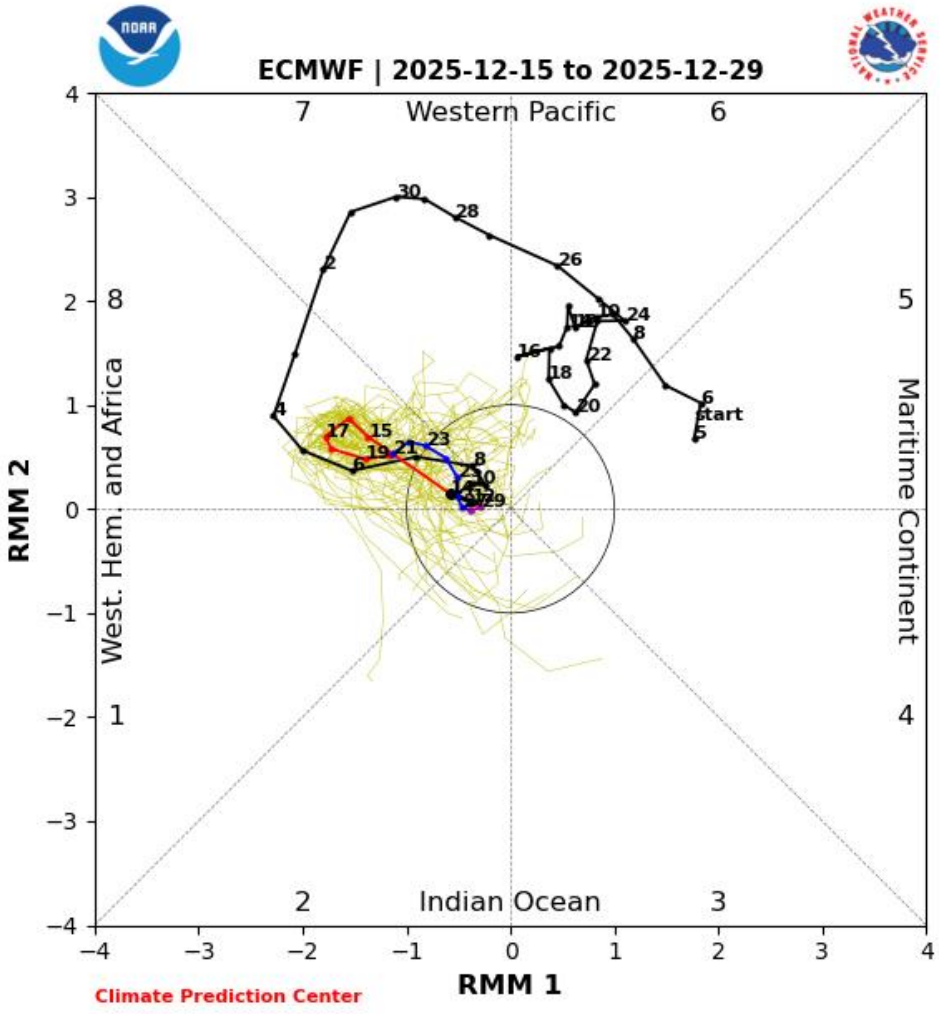


Figure 17. Past and forecast values of the MJO index. Forecast values from the 00Z 15 Dec 2025 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model 'spread' is denoted by the gray shading. Sector numbers indicate the phase of the MJO, with geographical labels indicating where anomalous convection occurs during that phase. Image source https://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/ecmf.shtml

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