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Arctic Oscillation and Polar Vortex Analysis and Forecasts

November 16, 2026

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 as pressure/geopotential height anomalies across the Arctic are currently mostly negative and the AO is predicted to slowly trend negative to first neutral and then negative the next two weeks as pressure/geopotential height anomalies are predicted to slowly become more positive the next two weeks. The North Atlantic Oscillation (NAO) is currently positive with mostly negative pressure/geopotential height anomalies across Greenland, and the NAO is predicted to also slowly trend negative to neutral and then negative the next two weeks as pressure/geopotential height anomalies are predicted to become mostly positive across Greenland the next two weeks.
- The next two weeks a mostly zonal flow will dominate Europe with troughing/negative geopotential height anomalies across Northern Europe and ridging/positive geopotential height anomalies across Southern Europe. However next week as the ridging weakens across Greenland so will the troughing across Northern Europe. This pattern will favor normal to below normal temperatures across Northern Europe including the United Kingdom (UK) with normal to above normal temperatures across Southern Europe the next two weeks.
- The next two weeks predicted pattern across Asia is ridging/positive geopotential height anomalies across Western Asia that will favor troughing/negative geopotential height

anomalies across Eastern Asia. This pattern favors the next two weeks widespread normal to above normal temperatures across much of Asia with the exceptions normal to below normal temperatures across Central and Eastern Siberia and into East Asia the next two weeks.

- Over the next two weeks predicted deep troughing/negative geopotential height anomalies south of the Aleutians, the Gulf of Alaska and into West Coasts of Canada and the United States (US) will support ridging/positive geopotential height anomalies widespread across North America with the exception of troughing/negative geopotential height anomalies in the Eastern US this week and the monthly transition from November to December. This patten will support widespread normal to above normal temperatures across much of Alaska, Canada and the US with the exceptions of normal to below normal temperatures limited to the West Coasts of Canada and the US and the Eastern US this week and then the very end of November.
- The unprecedently early large polar vortex (PV) disruption/sudden stratospheric warming (SSW) is now behind us and the PV is recovering. First is a Canadian Warming and then clear strengthening of the PV. I am still expecting a stretched PV to develop. Below I discuss in more detail the relationship between El Niño and the PV how it can impact Northern Hemisphere (NH) weather in the upcoming winter.

Plain Language Summary

The widespread warmth across the Northern Hemisphere (NH) this past summer has continued through much of the fall (see **Figure**). The lone exception is Siberia and into Northeast Asia where temperatures have been more seasonable (see **Figure**). Mild temperatures have been widespread across North America with the exception of the Canadian Maritimes (see **Figure**). Those regions seeing more seasonable temperatures are a result of a series stretched PVs first result in cold temperatures in East Asia followed by a colder pattern in North America. So far, the colder weather in North America has not materialized in a meaningful way. However, I still think colder temperatures could come to North America in early December, but it remains highly uncertain. Also, I also think Greenland blocking is possible that could bring colder temperatures to Northern Europe but that also remains uncertain. In the Impacts section I spend a good bit trying to decipher the relationship between El Niño and the polar vortex (V).

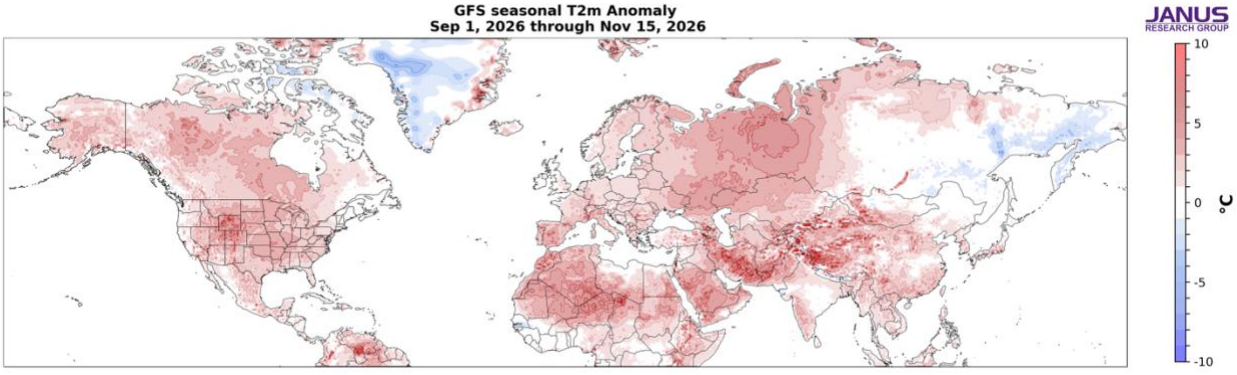
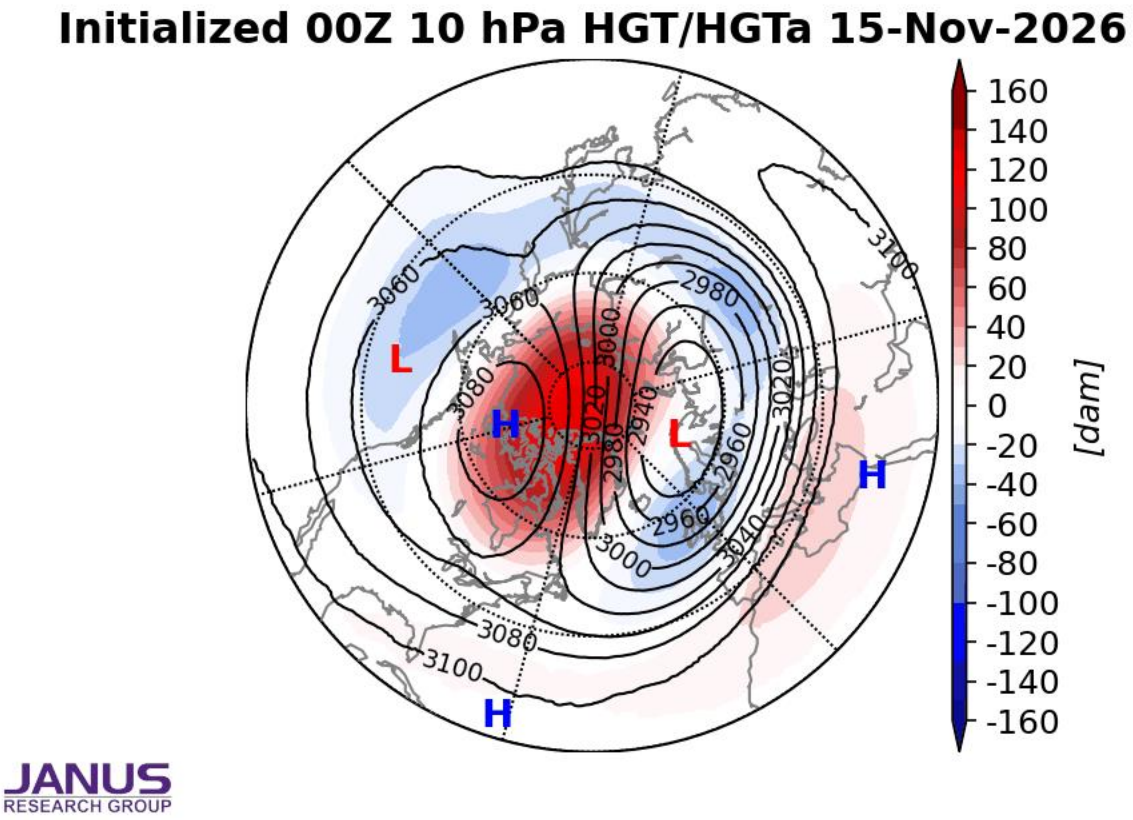


Figure. Estimate of the observed surface temperatures (°C; shading) from 01 Sep to 15 Nov 2026 based on GFS initializations and the GFS forecast from the 16 Nov 2026 run.

Impacts

The super El Niño, has sucked all the air out of the room about the upcoming winter leaving little room to discuss other factors. Maybe feeling left out or wanting to remind everyone that it still exists and can be a player, the polar vortex (PV) put on a show with the earliest major sudden stratospheric warming (SSW) on record (defined as the reversal of westerly to easterly winds at 10hP and 60°N) by two and a half weeks on 11 November 2026 (with previous record being 28 November 2025). And there has been a flurry of news articles on the record early SSW and how this might interact or couple with the super El Niño. One article that was well written from CNN shared varied opinions from PV experts that I felt was presented with little support. The nearly consensual view was that whatever the PV decides to do this winter it will make little difference as El Niño/decadal warming trend induced warmth will overwhelm any possible cooling from the PV. The one dissenting opinion was me. And in a later article published in Time, I presented more of ideas based on a sports analogy and whether the PV and El Niño can either play for the same team or opposing teams and I would like to delve into that in more detail after the usual discussion of the anticipated weather in the coming weeks.

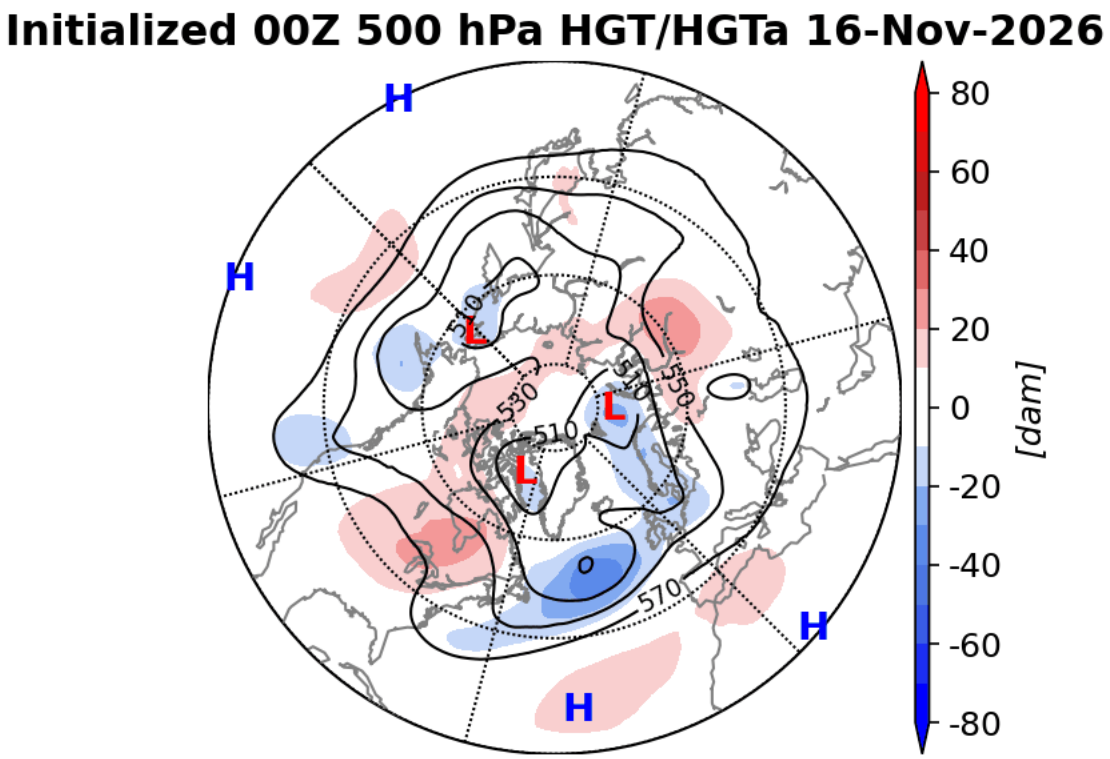
Since I brought up the SSW, you can still see the disrupted PV From the PV animation, the SSW is clearly visible early in the animation with the central Arctic covered by exceptional warming for this time of year with the PV center displaced first to Scandinavia and then Siberia. However, this week the strongest warming is over Canada into Greenland, and I would categorize the PV disruption evolving or transitioning into a Canadian Warming (this is fairly routine). Then towards the end of the animation, the PV starts to quickly recover and the orientation of the elongation pivots from west to east to more south to north or from Siberia to Canada. This is reminiscent of a stretched PV signature but not an impressive one and could simply evolve into a strong PV. I think overall the GFS is predicting a strengthening PV (see **Figure 1**).



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Figure i. Initialized 10 mb geopotential heights (dam; contours) and decameter anomalies (dam; shading) across the Northern Hemisphere for 17 Nov to 1 Dec 2026. The forecasts are from the 00Z 16 Nov 2026 GFS model.

Given the behavior of the PV what might be the tropospheric response. With my expectation of a Canadian warming this week the response is fairly straightforward with warming over eastern North America. In the mid-tropospheric circulation, we see plenty of high-pressure ridging over Eastern Canada (see **Figure ii**) consistent with a Canadian warming. Often Canadian warmings will precede Greenland blocking. And though I don't see Greenland blocking predicted in any of the models, I continue to believe that it could materialize in future model forecasts, though it is no guarantee. This would bias European forecasts colder but for now just something to watch.



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Figure ii. Initialized 500 mb geopotential heights (dam; contours) and decameter anomalies (dam; shading) across the Northern Hemisphere for 16 Nov 2026 and forecasted from 17 Nov to 1 Dec 2026. The forecasts are from the 00Z 16 Nov 2026 GFS model.

After the Canadian Warming I have been expecting a transition to a stretched PV. Consistent with this I would expect the high-pressure ridging centered over Eastern Canada, to slide westward towards Western Canada and Alaska. Some models are sort of predicting this scenario, maybe with the EPS and even more so the AIFS being the most consistent, but I have yet to see any models predicting any kind of meaningful cold. It does look like the temperatures at the very end of November eventually transition from well above normal as currently predicted to more seasonable and even slightly below normal in the Eastern US.

I think for now the PV configuration is not conducive to delivering well below normal temperatures to parts of North America. The PV center remains near the North Pole the stretching towards North America as of yet seems muted and there is a lack of a true lobe of the PV over Canada. Therefore, the typical Hudson Bay mid-tropospheric low center is way to the north closer to Baffin Bay than southern Hudson Bay where it would be better positioned to deliver true Arctic air into the US. So, despite building high-pressure ridging across Alaska and the Beaufort Sea in the mid-troposphere, the wintertime semi-permanent closed 500 hPa low near northern Hudson Bay is far north close to the stratospheric PV center. At this point the best

the models can muster is a return to seasonable temperatures at the end of November. For truly cold air we are still waiting on a better-defined PV stretch.

I wanted to include in last week's blog but simply ran out of time and didn't was that our toy polar vortex strength model (with a lead time of 30 days) did predict PV weakening peak around November 15 but then another round of weakening the very end of November into early December. Now this model has lots of flaws, but I find it useful to follow trends. The timing of the mid-November weakening was pretty close to the observed SSW, and the follow up PV disruption is in contrast to most dynamical models which have been consistently predicting a rapid strengthening of the PV. I do think the idea of further weakening of the PV is plausible in the coming weeks and not just a linear or monotonic trend upward in the strength of the PV.

I have been sharing the idea that this unprecedented PV disruption will resolve itself in the end into a stretched PV similar to what happened last November. I still believe that but this November's SSW, I believe is much more likely to spawn some Greenland blocking than last December. So maybe a blend of Novembers 2009 and 2025. The PV disruption of November 2009 preceded an incredibly negative AO/NAO in December 2010, and I do think that is a bar that will be hard to match or even come close. But the SSW in November 2025 did yield a negative AO/NAO in December 2025 but much more modest.

But to deliver the cold from a stretched PV in eastern North America, wave reflection needs to accompany the stretch. Wave reflection is where wave energy from the large Rossby or standing waves in the atmosphere generate energy that 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 (wester ridge-eastern trough) and delivering cold air from the Arctic south, east of the Rockies. Consistent with the upward wave energy over Asia but downward over North America are westward wave tilt with height over Asia and the eastward wave tilt with height over North America. More recent model runs have been trending towards wave reflection (see **Figure iii**). But it has definitely been "now you see it and now you don't" with the model forecasts. So I still wait for more consistent forecasts of wave reflection before feeling more confident in the arrival cold temperatures.

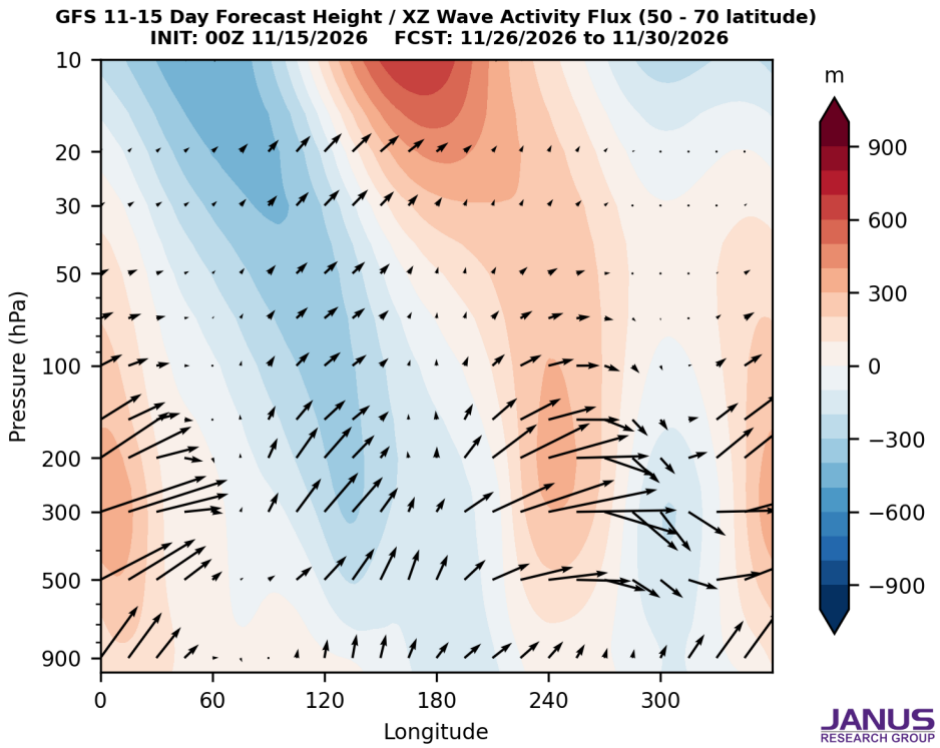


Figure iii. Longitude-height cross section of geopotential eddy height anomalies (shading) and wave activity flux (vectors) forecasted for 26 November through 30 November 2026. The forecasts are from the 00Z 15 November 2026 GFS ensemble.

Though a more robust stretched PV seems absent from the GFS forecasts, some of the ECMWF forecasts are suggestive that a North American lobe may yet develop in the stratosphere that would be more supportive of colder weather in early December (See **Figure iv**). The ECWMF is also suggestive of a weaker PV similar to what our PV forecast model suggests. But even the ECMWF is not consistent with this forecast. Through the end of November ridging near the Urals is predicted (see **Figures 2, 5**, and **8**) that can still disrupt the PV. But then most of the models are suggesting the high-pressure moves into the Central Arctic, which is not supportive of disrupting the PV. So though the jet stream configuration is conducive in the next week or so to disrupt the PV, this period may be limited.

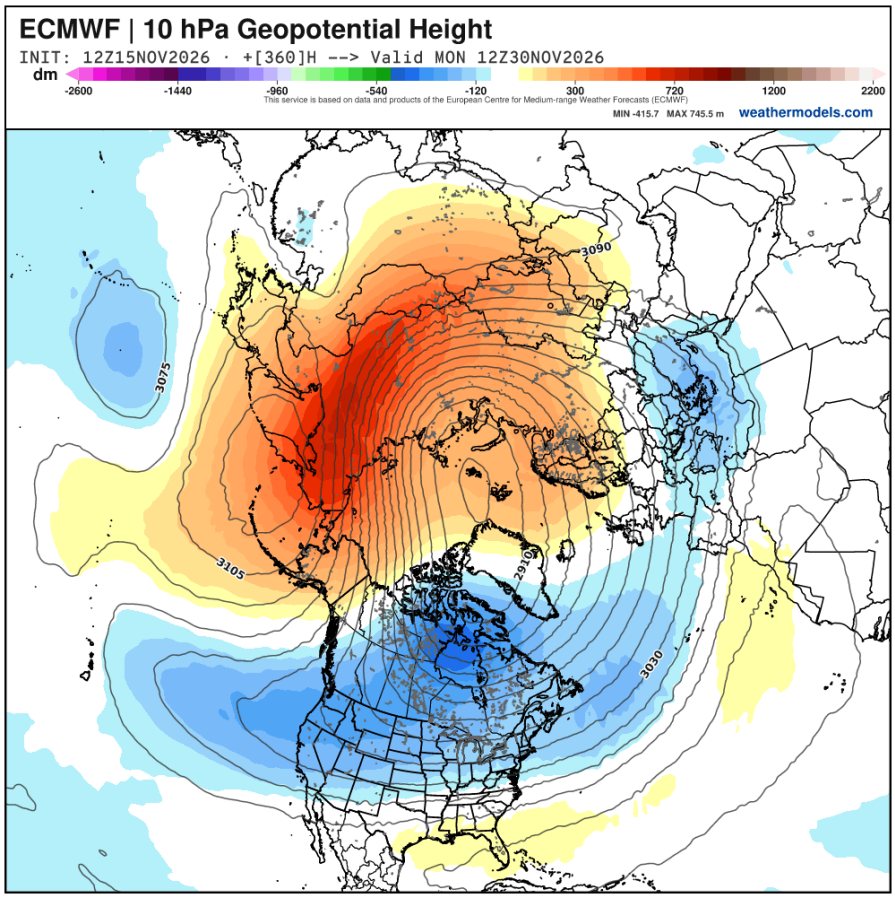


Figure iv. Forecasted average 10 mb geopotential heights (dam; contours) and geopotential height anomalies (dam; shading) across the Northern Hemisphere for 30 Nov 2026. The forecasts are from the 12Z 15 Nov 2026 ECMWF operational model. Plot taken from https://weathermodels.com/

And though no truly cold air is in sight in the weather models a repeat of the record warmth in eastern Noth America of December 2015 is becoming less likely. I believe that the biggest contributor to the divergence of December 2015 and December 2026 is the PV. The PV in November and December 2015 was strong and nearly circular in shape. This yielded a strongly positive AO and warm temperatures not only in eastern North America but also Europe and northern Asia. With the unprecedentedly early SSW, and model forecasts for a negative AO/NAO heading into December, I believe that there are legitimate cold risks for the Eastern US, Europe and Northern Asia. Though for the month as a whole mild risks remain as well, contingent on the behavior of the PV throughout the month of December.

And this brings me back to what can we reasonably can say might be the interaction of super El Niño and the PV this winter. First let me state I do think that the influence of the El Niño on our winter weather in isolation, certainly across the US, is to tilt the winter milder and wetter and maybe even very mild and very wet. The El Niño drives the subtropical jet stream across the US, and the source region of that jet is the subtropics or even tropics and therefore the air that gets

carried along the subtropical jet is warm, moist maritime air. In contrast the PV drives the polar jet stream whose source region is the Arctic and is more influential in where cold Arctic air travels across the Northern Hemisphere.

There is literature on how El Niño/Southern Oscillation (ENSO) influences the behavior of the PV. The most extensive review of the subject is from Domeisen et al. 2019. They conclude that El Niño favors more SSWs, but the signal is not very strong. I don't think they make definitive conclusions on the impact on surface temperatures but from their Figures 4 and 6, it seems reasonable that El Niño actually favors colder temperatures across the NH. However, there was an earlier study from Butler and Polvani 2011 that concluded both El Niño and La Niña favor SSWs and SSWs are less frequent during ENSO neutral winters. Finally, there is a paper from my collaborator Chaim Garfinkel (someone that I admire very much) Garfinkel et al. 2019 where they conclude based on the observations there is no robust relationship between ENSO and SSWs despite that the models show El Niño favors more SSWs. They argue that discrepancy is likely due to relationship between El Niño and deeper North Pacific troughing in the models that favors more SSWs but more critical for triggering SSWs is Ural Scandinavian blocking. Here they found the lack of a robust relationship between Ural blocking and ENSO accounts the lack of a robust relationship between ENSO and SSWs. This conclusion resonates with me as I argued similarly in Cohen et al. 2017, and is a reason why I am skeptical of the reflexive attribution of the unprecedented early SSW to the super El Niño (see Agence France Presse).

In my opinion the best way to think of how super El Niño and the PV may interact, or couple is to think of each as players in a sporting match. El Niño always plays from team "mild." When the PV is strong and circular then it too is playing for team "mild." In these situations, El Niño and the PV are playing for the same team and working together or in unison to create mild conditions and will likely reinforce each other or amplify the warming. In general, during past super El Niños, El Niño and the PV have both been on team mild with the PV relatively strong to very strong for all three super El Niños and those winters have been very mild.

However, there are times when PV plays form team "cold." This is when the PV is disrupted especially when the PV is either stretched or during an SSW. So, during these times the El Niño and the PV are playing for competing teams, and their efforts work opposite of each other, and it is a competition to which will dominate. And it just isn't obvious to me that this is a competition that a super El Niño will easily win and not just win but totally crush the PV. Winters that may have been surprisingly cold when the PV has been mostly disrupted over the course of the winter are winters 2009/10 (and November 2009 is a reasonable analog for November 2026 in my opinion) but also winter 2002/03 and you could even include winter 2018/19. Hey the three coldest consecutive North American winters of the twentieth century were 1976/77, 1977/78 and 1978/79 and the first two of those winters were El Niño winters. I am not remotely arguing that winter 2026/27 resembles any of those winters, it absolutely does not. I am just trying to make the point that we shouldn't reflexively argue El Niño equals very mild winter regardless of the behavior of the PV. Instead, the coupling and interaction of the El Niño and the PV needs to be considered.

I think all pervious ENSO PV studies exclusively focused on SSWs and not any other PV phases or flavors if you like. For the past decade, I have been trying to expand our consideration of PV behavior. It is not simply binary of being in a state of either an SSW or strong. I have been especially focused on understanding the role of stretched PVs but in the blog have also often discussed Canadian warmings. This expansion of PV behavior beyond binary is particularly enlightening for understanding the possible interactions or coupling of El Niño and the PV.

In our recent paper Agel et al. 2025 we did explore at the end of the article the relationship between different teleconnection indices including ENSO and the phase or behavior of the PV based on clustering the PV using pattern recognition see **Figure v**). We did not find that El Niño favors more SSWs (but keep in mind our definition of an SSW using clustering is more expansive than the major SSW definition). In fact, we found that SSWs are less frequent during El Niño. But we also did not find that El Niño favors a strong PV. Instead, the PV behavior most likely during an El Niño is a Canadian warming (cluster 4). To me this is consistent with the dynamical model winter forecasts. Though I have not seen the mean winter PV forecast from any model, the tropospheric pattern is clearly consistent with a Canadian Warming PV behavior and is consistent with the temperature pattern predicted across North America. And in this regard, I find the weather model winter forecasts across North America to be very reasonable.

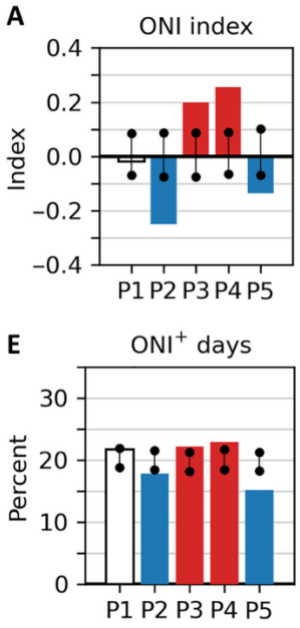


Figure v. **a)** Oceanic Niño Index (ONI) monthly index value is assigned to each PV cluster day; Percent of days within each cluster when the index value is positive (greater than 0) for the e**)** ONI. The vertical black lines show the 95th percentile confidence interval based on bootstrapping. Values that fall outside that confidence interval are shown with colored bars (red if higher than the expected range, blue if lower than the expected range, otherwise white).

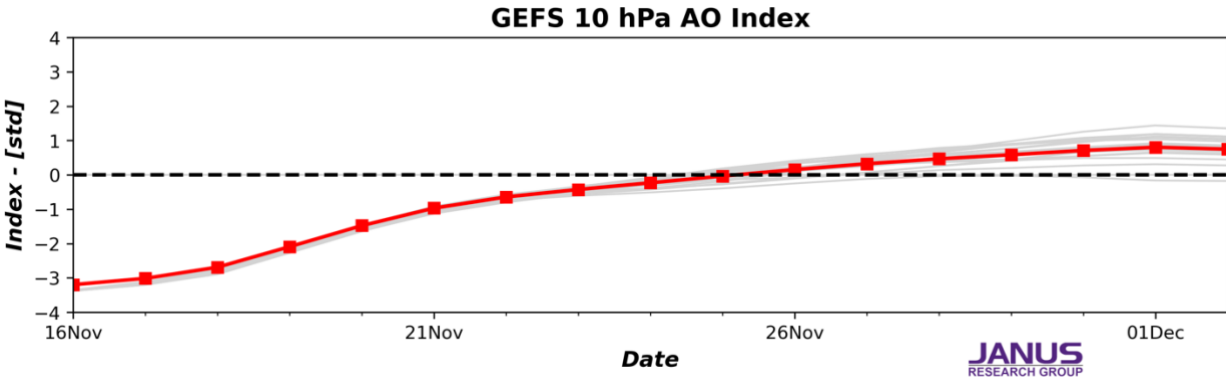
But coming in close second to Canadian warmings during El Niños, are stretched PVs that favor cold in eastern North America (cluster 3). I have been writing since October every time a Canadian warming shows up, expect it to be followed by a stretched PV. But think about this, the Canadian warming is probably the warmest surface temperature pattern of any PV phase or behavior, while the stretched PV is easily the coldest. So, it makes sense to me it is a very fine line during El Niño whether we will experience the warmest or coldest temperature pattern related to PV behavior. During El Niños and especially during super El Niños Canadian warmings and a very warm winter are most favored, but it doesn't seem to take much to slip from warmest to coldest temperature pattern and in 2002/03 and probably 2009/10 enough stretched PVs occurred to push those winters into the cold column. And though the last super El Niño winter in 2015/16 was very mild, January 2016 was a cold and snowy month in the Eastern US because of a stretched PV. Though it does seem reasonable to argue that during super El Niño winters, the El Niño modifies the cold from stretched PVs.

In conclusion I am not arguing that an overall mild winter is and should be favored, I just think that there it is not a forgone conclusion and rather than simply discounting the behavior of the PV it should absolutely be considered and how it may be coupling or interacting with (reinforcing or competing with) El Niño over the course of the winter. This seems to be best way to anticipate the temperature pattern for December 2026.

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 negative geopotential height anomalies across Greenland (**Figure 2**), the NAO is predicted to be positive this week as well.



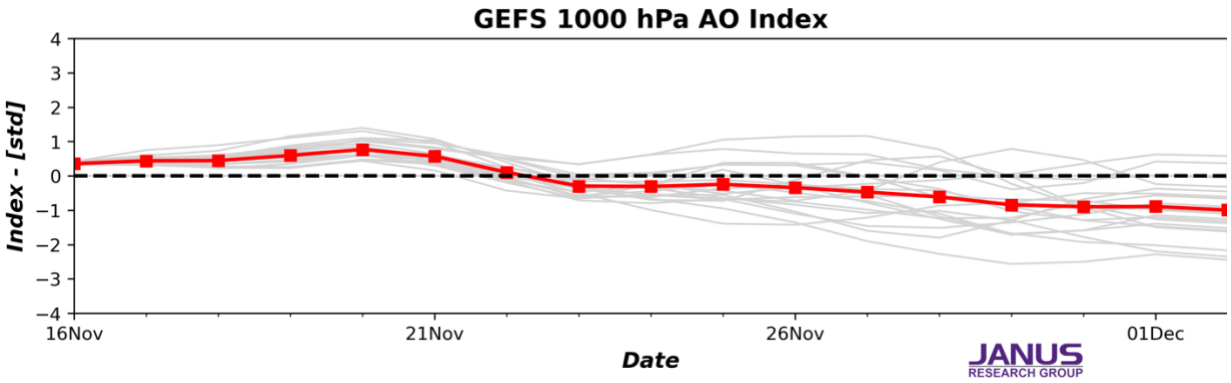


Figure 1. The predicted daily-mean AO at **a)** 10 hPa and at **b)** 1000 hPa from the 00Z 16 Nov 2026 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble mean AO index given by the red line with squares.

The general pattern predicted for Europe is troughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe this week (**Figure 2).** This pattern will support normal to below normal temperatures across Southern Europe with normal to below normal temperatures across Northern Europe including the UK this week (**Figure 3**). This week the general pattern across Asia is ridging/positive geopotential height anomalies centered across Western Asia centered near the Urals forcing troughing/negative geopotential height anomalies across Eastern Asia this week (**Figure 2**). This pattern favors widespread normal to above normal temperatures across Asia with normal to below normal temperatures limited to Central and Eastern Siberia and into East Asia this week **(Figure 3**).

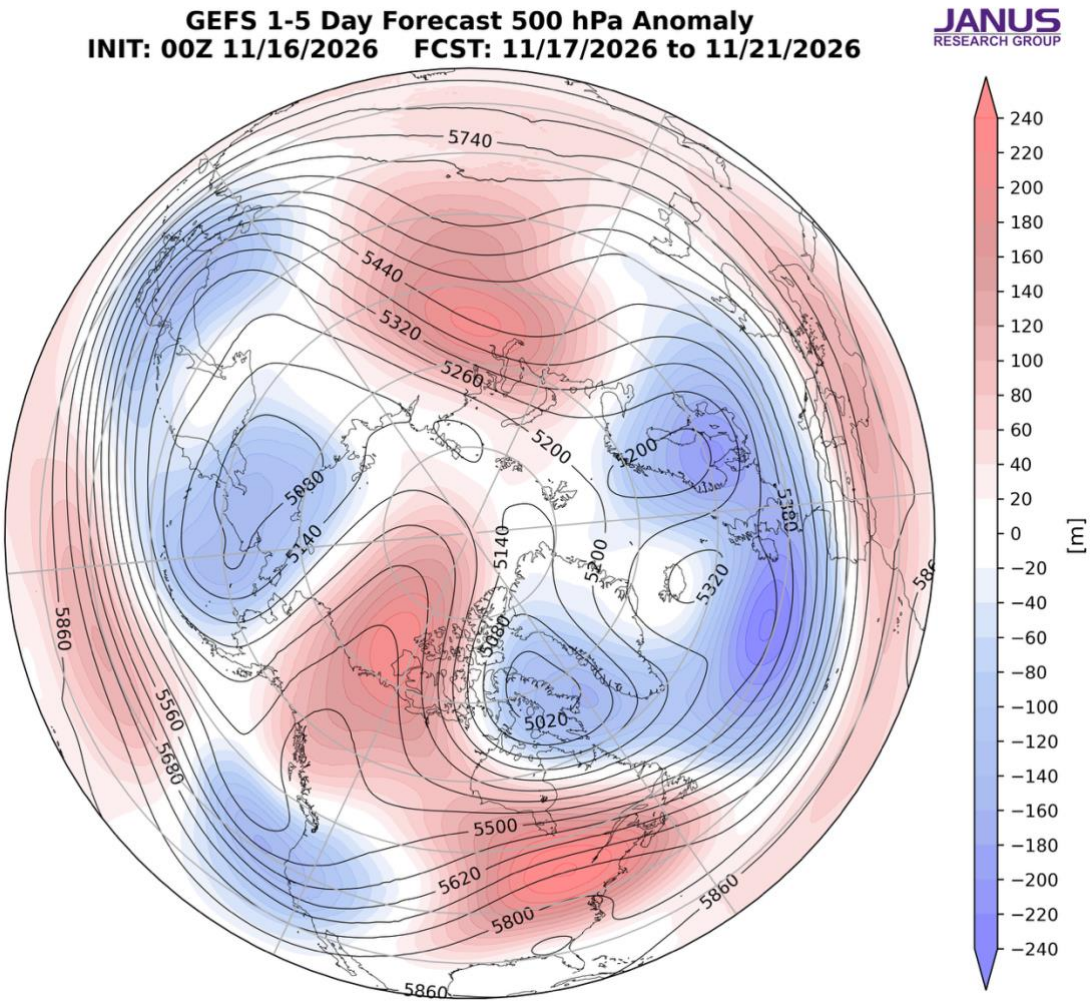


Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 17 Nov to 21 Nov 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Predicted troughing/negative geopotential height anomalies centered in the Gulf of Alaska and extending into the Western US will force downstream ridging/positive geopotential height anomalies across much of North America with the exception of troughing/negative geopotential height anomalies in Baffin Bay this week (**Figure 2**). This patten will favor normal to above normal temperatures across Alaska, Canada and the US with the exception of normal to below normal temperatures limited to the Northeast Canada, the Western US and possibly the Southeastern US this week (**Figure 3**).

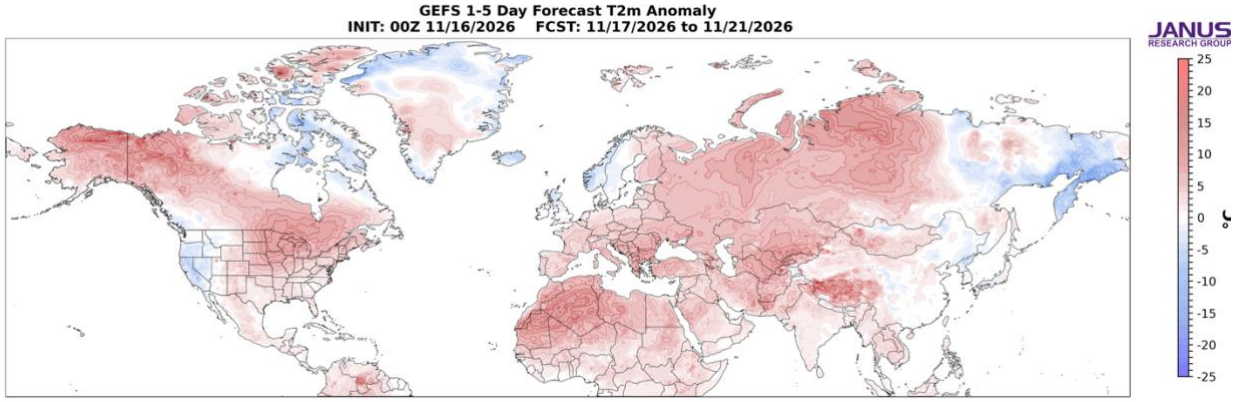


Figure 3. Forecasted surface temperature anomalies (°C; shading) from 17 Nov to 21 Nov 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Scandinavia, the Alps, Siberia into Northeast China and Hokkaido while mild temperatures will cause snowmelt in the Urals and Western Siberia this week (**Figure 4**). Troughing and/or cold temperatures will support new snowfall across the western Alaska, the west coast mountains of Canada, Central and Northern Canada and the higher elevations of the Western US while mild temperatures will cause snowmelt in the Canadian Maritimes this this week (**Figure 4**).

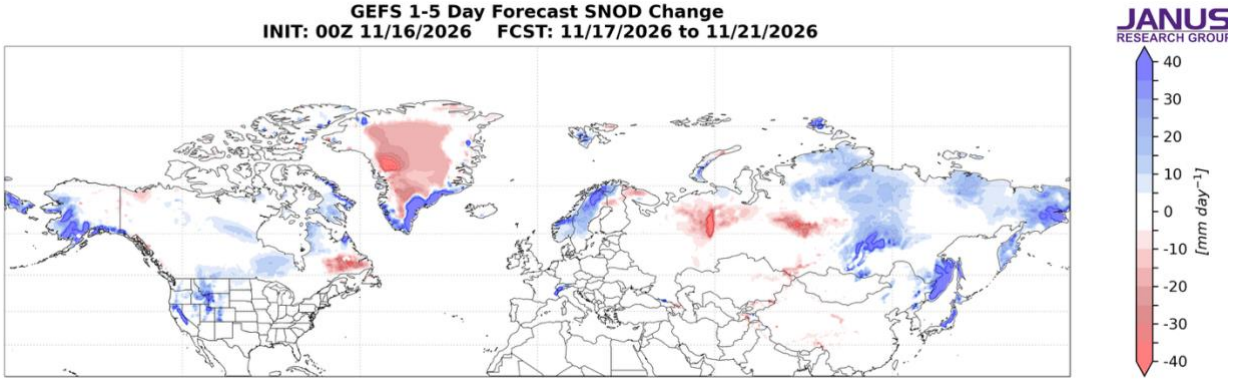


Figure 4. Forecasted snowfall (mm/day; shading) from 17 Nov to 21 Nov 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Near-Mid Term

Next week

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

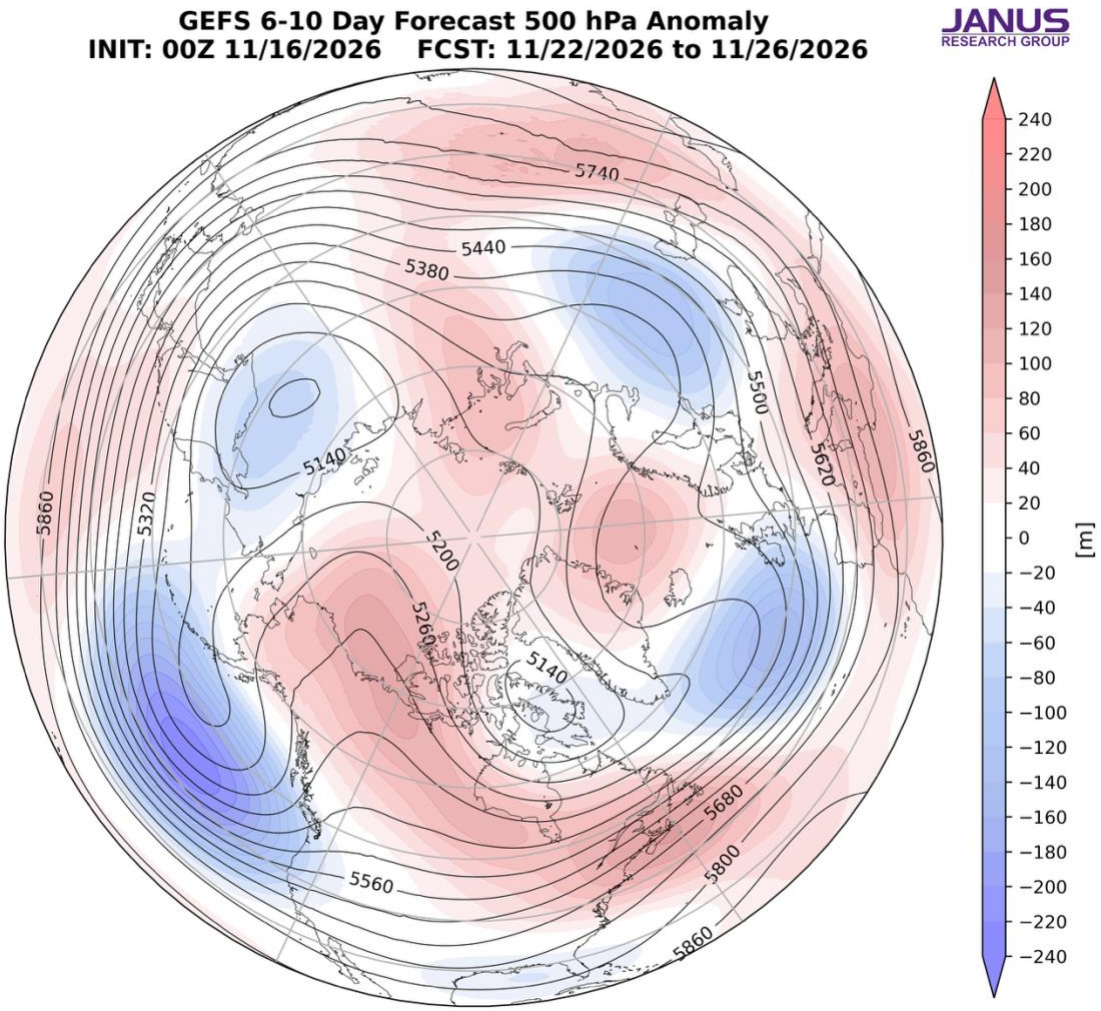


Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 22 Nov to 26 Nov 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

The mostly zonal pattern across Europe is predicted to continue with troughing/negative geopotential height anomalies across Northern Europe and ridging/positive geopotential height anomalies across Southern Europe this period (**Figure 5**). The zonal flow pattern will support normal to above normal temperatures across most of Europe with the best

exception for normal to below normal temperatures in Scandinavia and the UK this period (**Figure 6**). Ridging/positive geopotential height anomalies will dominate Western Asia centered across Western Siberia with troughing/negative geopotential height anomalies across Central and Eastern Siberia this period (**Figure 5**). This pattern favors widespread normal to above normal temperatures widespread across much of Asia but especially Central Asia with normal to below normal temperatures mostly limited to Eastern Siberia this period (**Figure 6**).

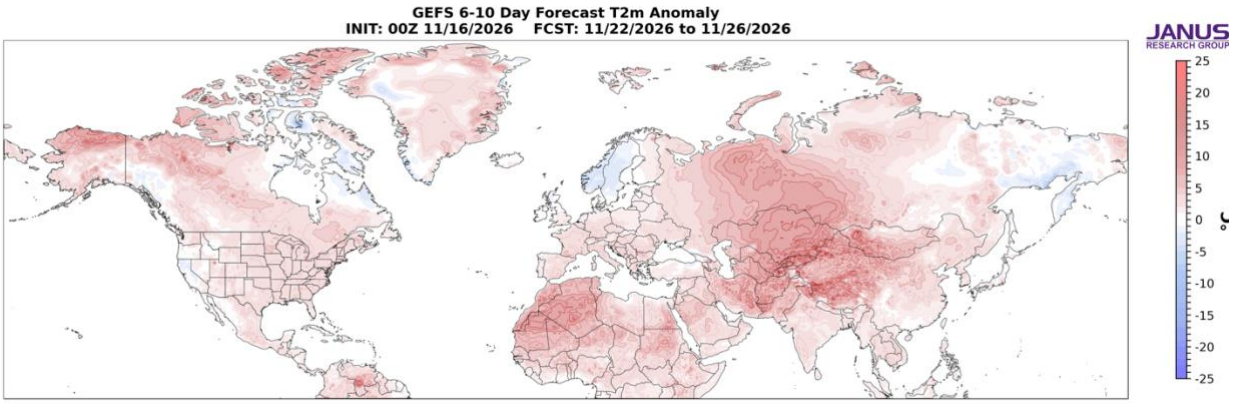


Figure 6. Forecasted surface temperature anomalies (°C; shading) from 22 Nov to 26 Nov 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Predicted persistent troughing/negative geopotential height anomalies centered in the Gulf of Alaska will push into the Western US and force downstream ridging/positive geopotential height anomalies across much of North America with the exception of exiting troughing in Eastern Canada this period (**Figure 5**). This pattern will favor widespread normal to above normal temperatures widespread across Alaska, much of Canada and the US with the possible exceptions of normal to below normal temperatures limited Northeastern Canada and the West Coasts of Canada and the US this period (**Figure 6**).

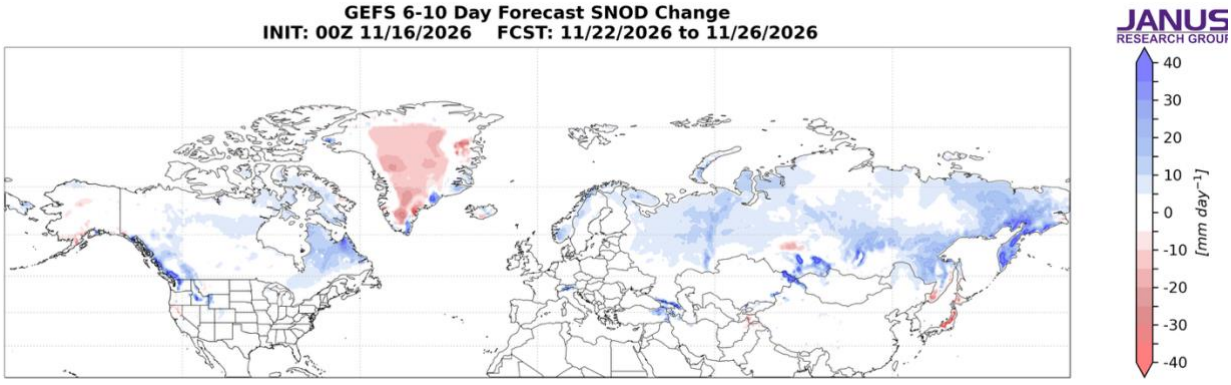


Figure 7. Forecasted snowfall rate (mm/day; shading) from 22 Nov to 26 Nov 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across the Alps, Norway, the Caucuses, the Urals and Siberia while warm temperatures will cause snowmelt in Northeast

China and Japan this period (**Figure 7**). Troughing and/or cold temperatures will support new snowfall across Western and Northern Canada, the northern US Rockies and Quebec this period (**Figure 7**).

Mid Term

Week Two

With predicted mixed to positive 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 to slightly negative this period (**Figure 1**). With predicted weak but mostly positive pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will likely also remain near neutral to slightly negative this period as well.

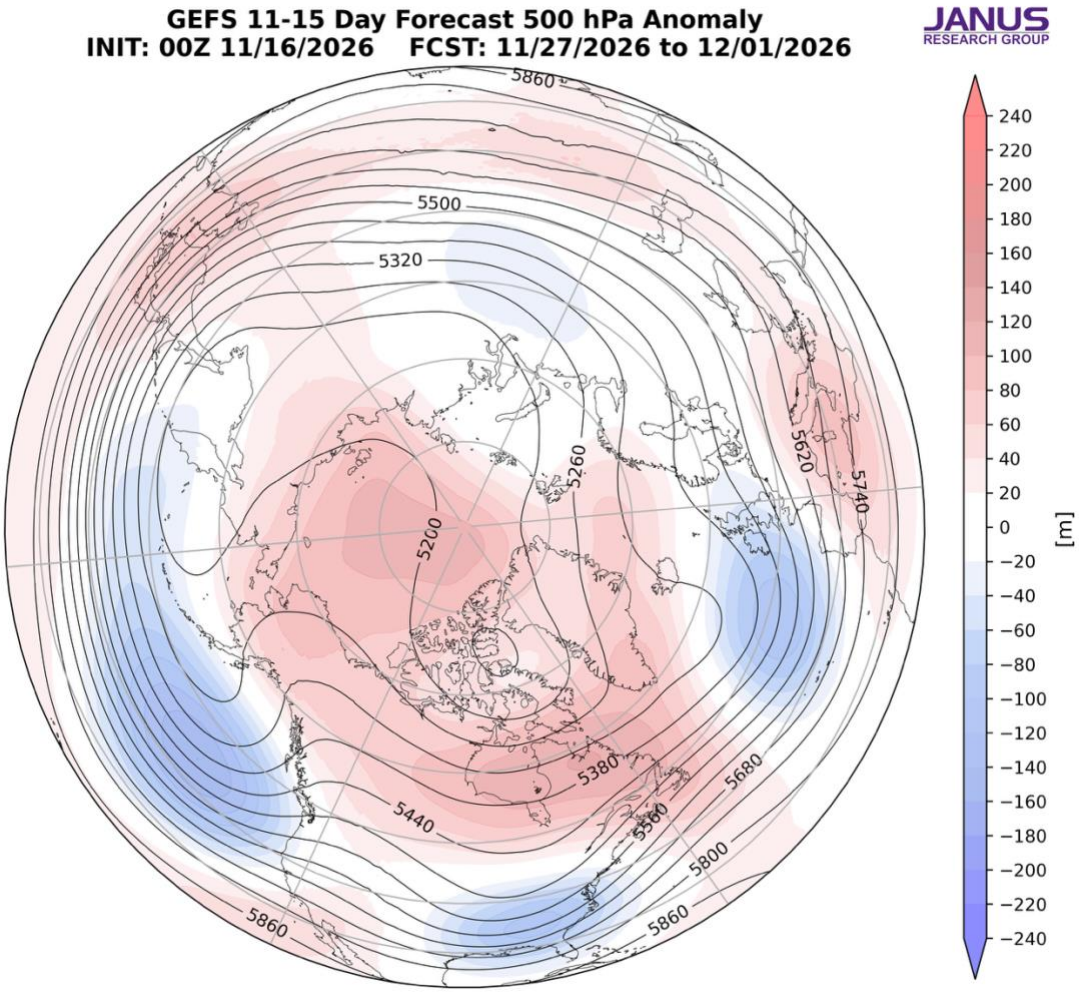


Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 27 Nov to 1 Dec 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

The mostly zonal pattern across Europe is predicted to persist with troughing/negative geopotential height anomalies across Northern Europe with ridging/positive geopotential height anomalies across Southern Europe this period (**Figure 8**). This pattern will favor widespread normal to below normal temperatures across much of Europe with the best chance of normal to below normal temperatures in Scandinavia and the UK this period (**Figures 9**). Predicted strengthening ridging/positive geopotential height anomalies across the Central Arctic will support deepening troughing/negative geopotential height anomalies across Northern Asia with ridging/positive geopotential height anomalies across Southern Asia this period (**Figure 8**). This pattern favors widespread normal to above normal temperatures across most of Asia especially Central Asia with normal to below normal temperatures limited to parts of Siberia this period (**Figure 9**).

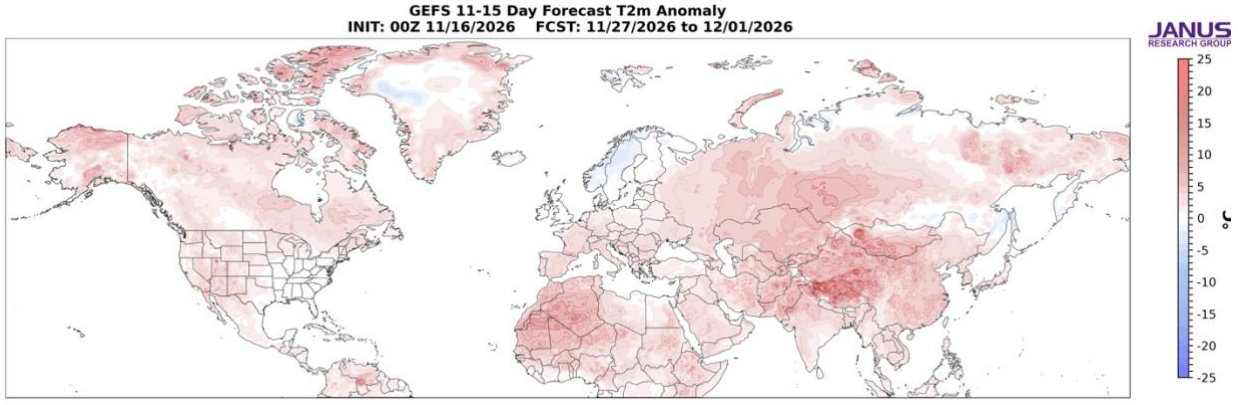


Figure 9. Forecasted surface temperature anomalies (°C; shading) from 27 Nov to 1 Dec 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Persistent troughing/negative geopotential height anomalies centered in the Gulf of Alaska is predicted to slide a bit more west towards the Aleutians allowing strengthening downstream ridging/positive geopotential height anomalies across western North America with possibly deepening troughing/negative geopotential height anomalies in Eastern Canada and especially the Eastern US this period (**Figure 8**). This pattern supports widespread normal to above normal temperatures across Alaska, much of Canada and the US, with possible best exceptions being the Eastern US this period (**Figure 9**).

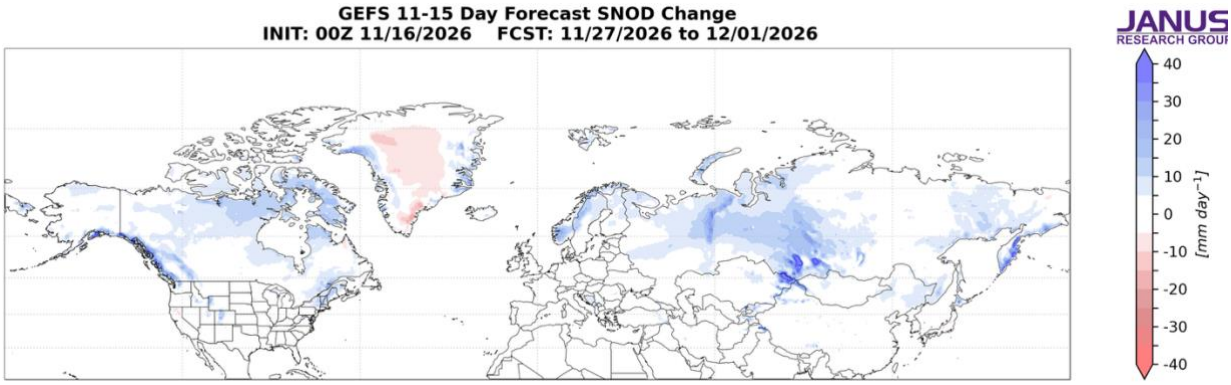


Figure 10. Forecasted snowfall (mm/day; shading) from 27 Nov to 1 Dec 2026. The forecasts are from the 00Z 16 Nov 2026 GFS ensemble.

Troughing and/or cold temperatures will support new snowfall across Scandinavia and much of Northern Asia including Siberia this period (**Figure 10**). Troughing and/or cold temperatures will support new snowfall across parts of Alaska, Western and Northern Canada and New England this period (**Figure 10**).

Longer Term

30–day

Today's polar cap geopotential height anomalies (PCHs) plot currently shows cold/negative PCHs limited to the lower troposphere with warm/positive PCHs throughout the stratosphere and upper troposphere (**Figure 11**). However, next week, the warm/positive PCHs in the stratosphere are predicted to descend into the lower troposphere. This is concurrent with cold/negative PCHs in the upper stratosphere descending through the entire stratospheric layer.

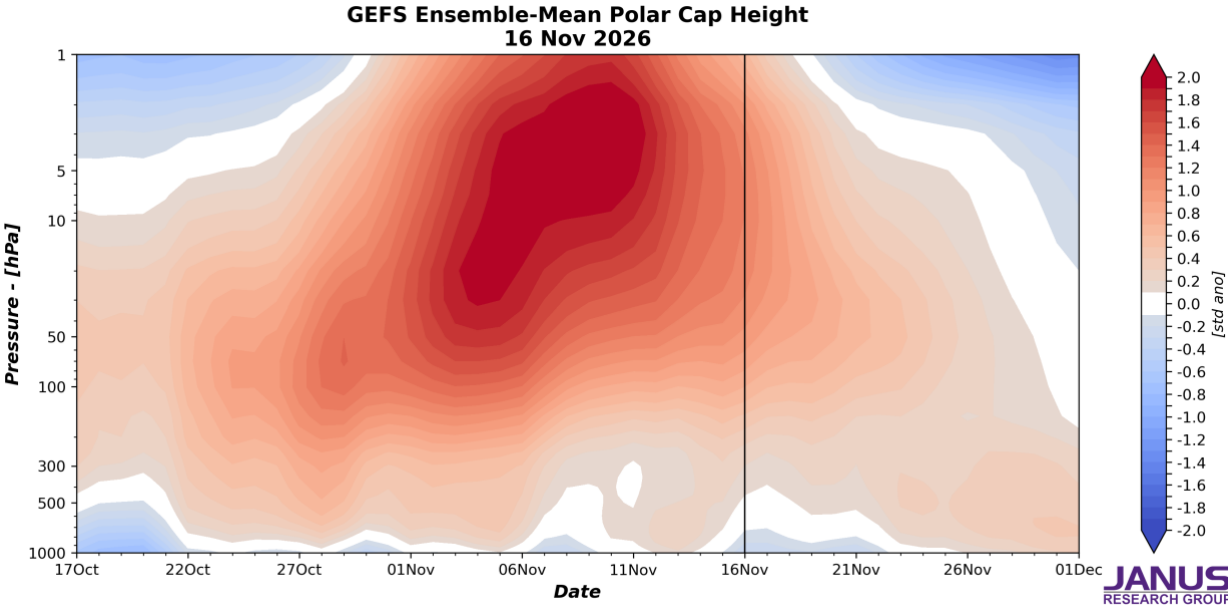


Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 16 Nov 2026 GFS ensemble.

This week the predicted positive to neutral PCHs in the lower troposphere (**Figure 11**) are consistent with the predicted negative to neutral surface AO (**Figure 1**). However as the warm/positive PCHs descend to the surface next week, the AO should become increasingly negative (**Figure 1**).

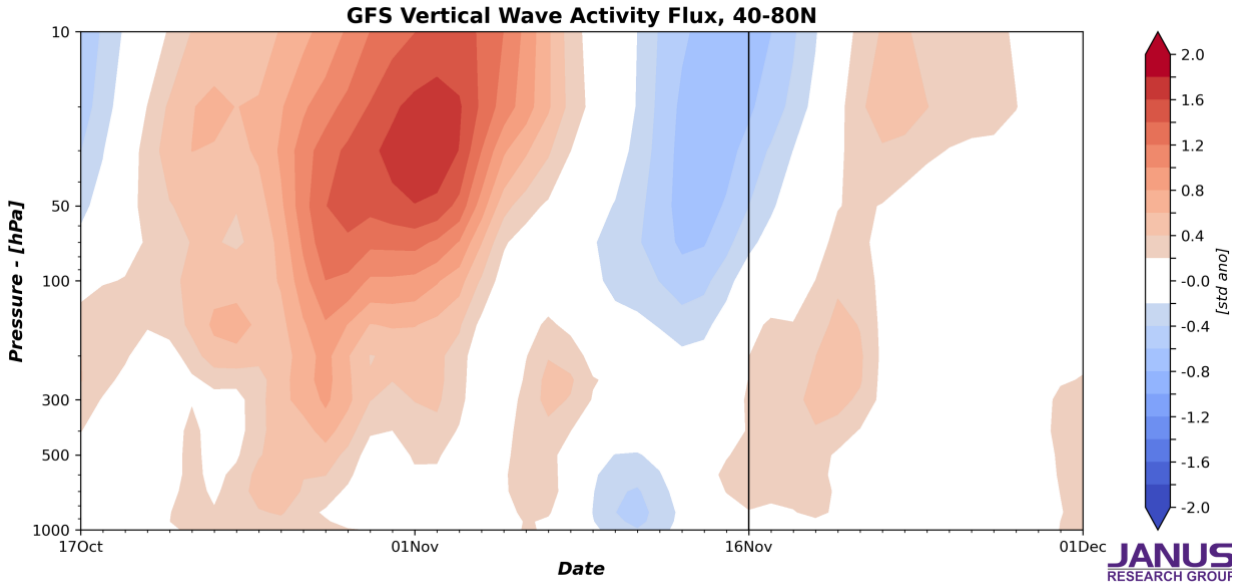


Figure 12. Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 016 Nov 2026 GFS ensemble.

The large positive (upward) pulse of vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere in late October has been replaced by negative anomalies last week and into this week (**Figure 12**). This allowed the PV to start to recover, and the recovery is clearly visible in **Figure 11**. However, as I discussed in the Impacts section, I expect more WAF activity (some is shown in **Figure 12**) that could lead to further PV disruptions.

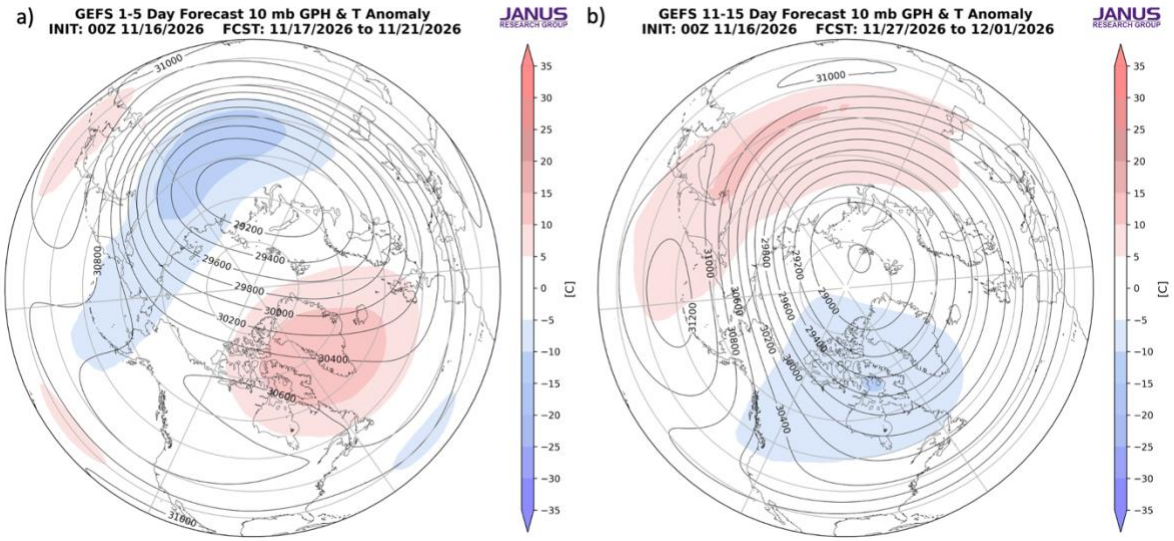


Figure 13. (a) Predicted 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 17 Nov to 21 Nov 2026. (b) Same as (a) except forecasted averaged from 27 Nov to 1 Dec 2026. The forecasts are from the 00Z 16 November 2026 GFS model ensemble.

This week polar vortex (PV) is elongated in shape, from Siberia to Northern Europe, with the PV center over the Barents-Kara Seas with relatively cold temperatures focused on Asia and with high pressure centered over Hudson Bay with warm temperatures covering Baffin Bay and Greenland in the polar stratosphere (**Figure 13a**). We observed an SSW last week and I think that we this week can best be categorized as a Canadian Warming, which does often follow an SSW. Then, during the end of November the PV center is predicted to be centered near the North Pole with some troughing extending into Northern Canada with a high-pressure center near the Dateline (**Figure 13b**). This resembles to me a strengthening PV with maybe a hint of a PV stretch. The stratospheric AO in **Figure 1** this week is predicted to strengthen from strongly negative to positive the next two weeks, a clear sign of a strengthening PV.

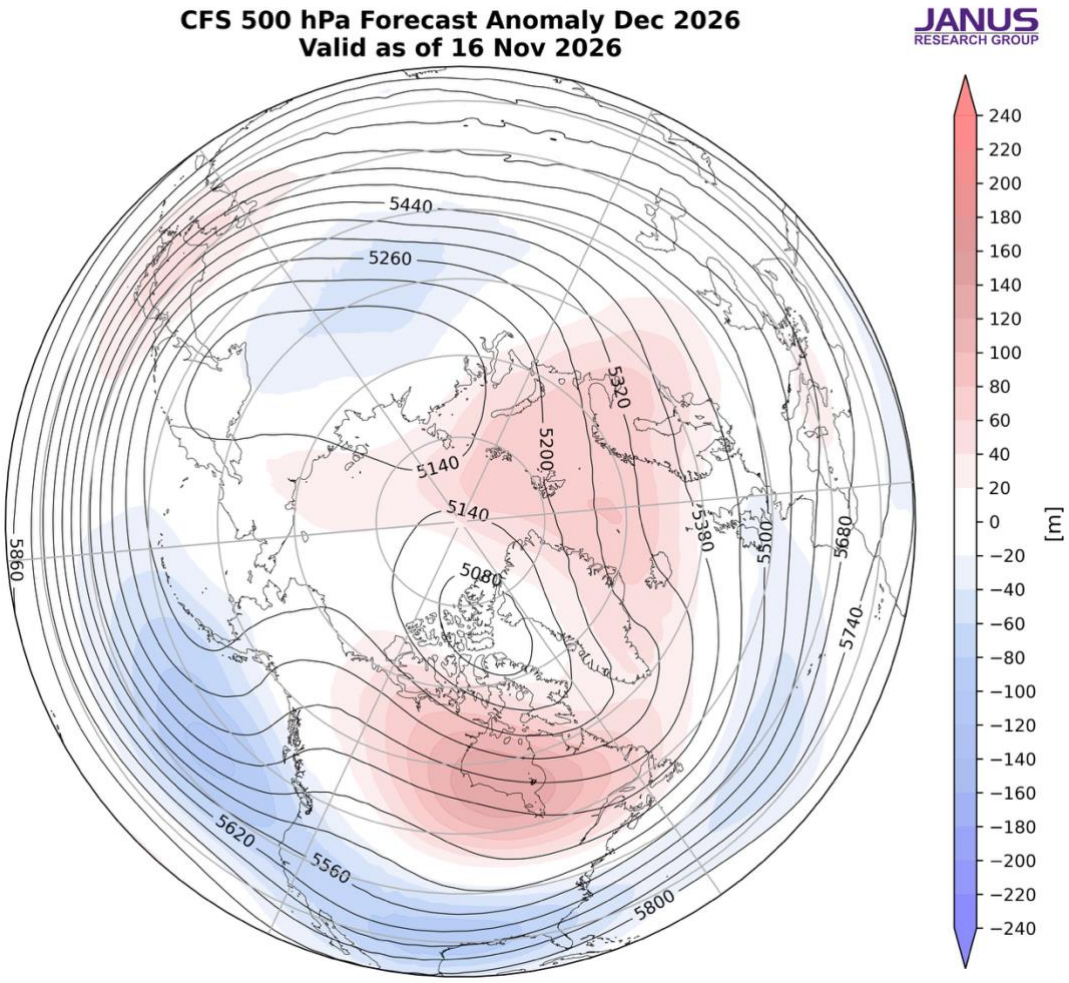


Figure 14. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for Dec 2026. The forecasts are from the 00Z 16 Nov 2026 CFS.

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). I do want to emphasize unless I say otherwise, I find the CFS forecasts of low confidence and most often don't match my own thinking. The forecast for the troposphere is ridging stretching across Hudson Bay and Greenland, across Scandinavia and into the Barents-Kara Seas with troughing across the mid-latitudes of the North Atlantic into Europe, Siberia into East Asia, the Gulf of Alaska and the Southern US (**Figure 14**). This pattern favors seasonable to relatively warm temperatures across Southern and Central Europe, the Southern half of Asia including the Arabian Peninsula, the Tibetan Plateau, Pakistan and Afghanistan, Alaska, much of Canada and the Northern US with seasonable to relatively cool temperatures across Northern Europe, much of Northern and into Northeastern Asia, and the Central and Southern US (**Figure 15**). This pattern projects onto the pattern of the negative AO, following an SSW across Eurasia but El Niño across North America.

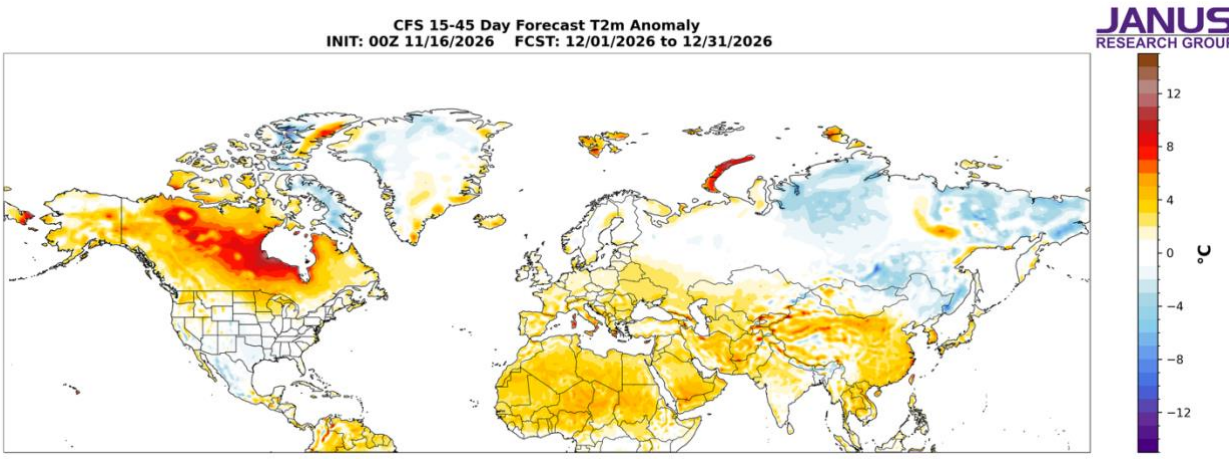


Figure 15. Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for Dec 2026. The forecasts are from the 00Z 16 Nov 2026 CFS.

Boundary Forcings

Arctic Sea Ice

I am and will continue to watch Arctic sea ice. Current conditions are shown in **Figure 16**. 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. Sea ice has been growing a decent clip, but clearly more in the North Pacific sector than the North Atlantic sector and therefore 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. In fact, with sea ice near normal in the North Pacific sector and well below normal in the North Atlantic sector looks nearly optimal for perturbing the PV. I believe that the lack of sea ice in the Barents-Kara Seas may have contributed to the record strong high-pressure Ural/Scandinavian blocking and the unprecedentedly early weak PV that so far resembles more of an SSW than the more common stretched PV this time of year.



Figure 16. Arctic sea ice cover extent for 15 November 2026. 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 Central Pacific sea surface temperatures (SSTs) anomalies are well above normal, with the warming focused along the South American coast and out to the Dateline (see **Figure 17**), clear signs of El Niño conditions. In fact, "super" El Niño has been achieved contributing to the large attention in the media. The El Niño is likely close to its peak and is expected to become the strongest El Niño on record, though some weakening has been observed of late. 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 Southern Ocean. The widespread above normal SSTs remain impressive. The SST pattern in the North Atlantic resembles the “tripole” pattern that is thought to favor a negative NAO.

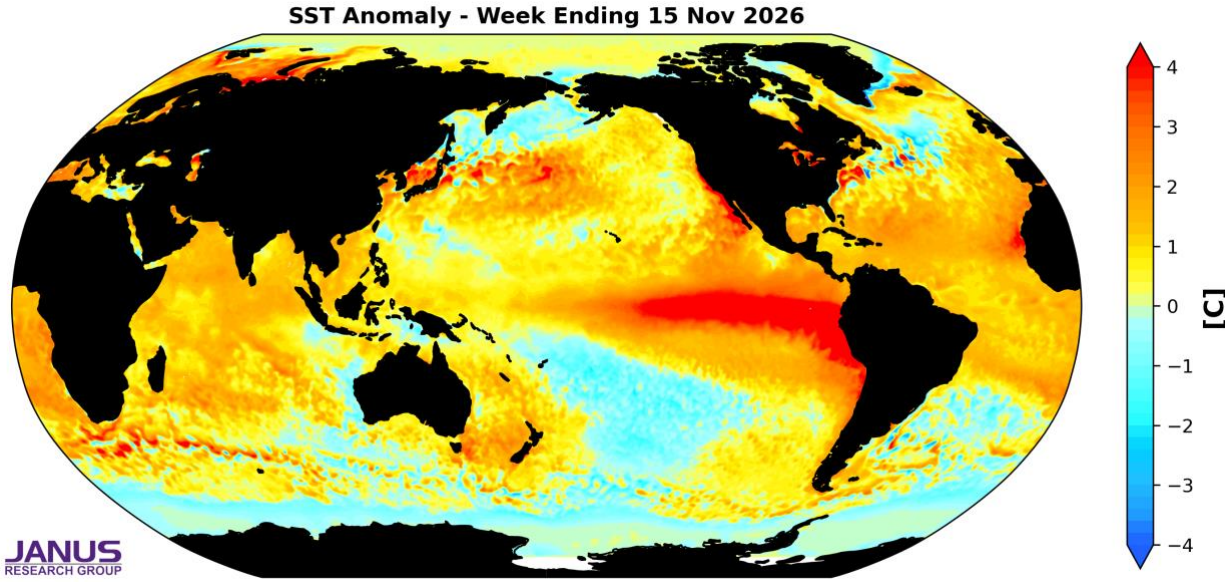


Figure 17. The latest daily-mean global SST anomalies for week ending 15 Nov 2026.

Madden Julian Oscillation

Currently the Madden Julian Oscillation (MJO) is in phase three but weak (**Figure 18**), and the forecasts are for the MJO to quickly weaken to where no phase is favored the next two weeks (**Figure 18**). Phase three mostly favors troughing in the Gulf of Alaska with ridging across Eastern Canada, therefore, it seems that the MJO is having some influence on North American weather the next two weeks but probably mostly this week. But admittedly this is outside of my expertise.

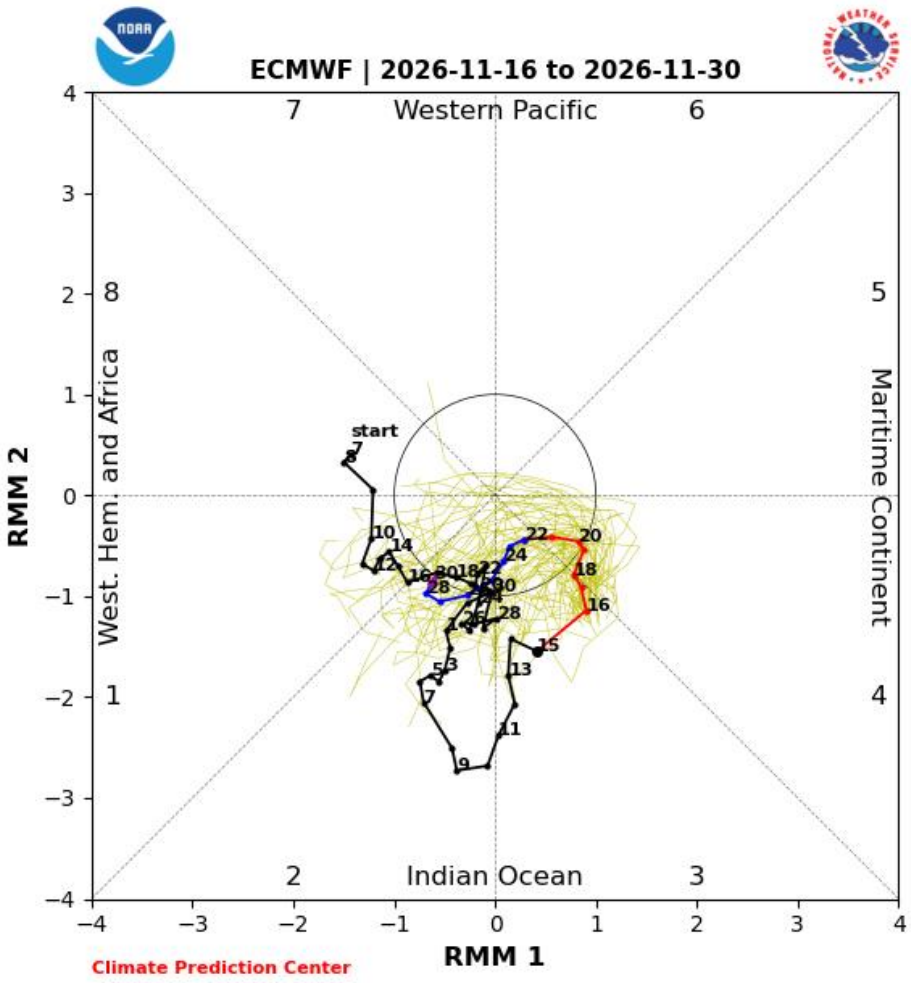


Figure 18. Past and forecast values of the MJO index. Forecast values from the 00Z 16 Nov 2026 ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model 'spread' is denoted by the gray shading. Sector numbers indicate 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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