

# Arctic Oscillation and Polar Vortex Analysis and Forecasts

*May 26, 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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## Summary

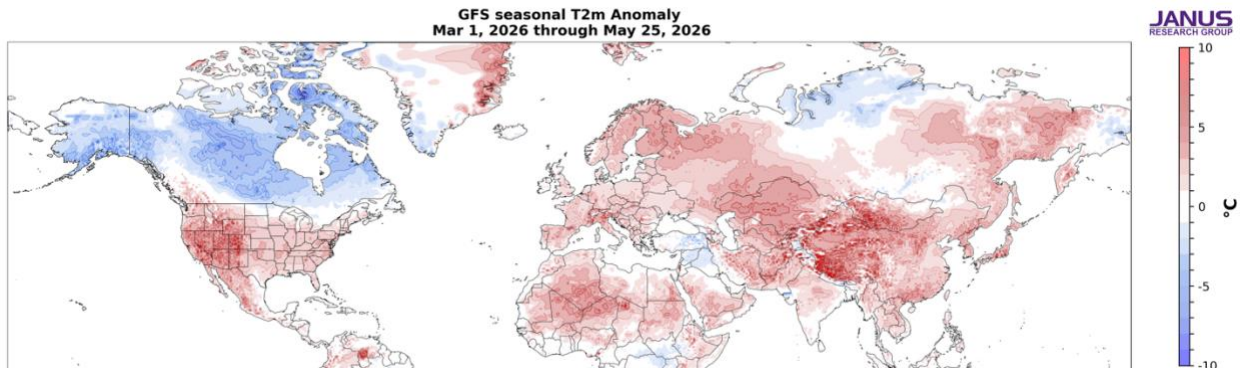
- The Arctic Oscillation (AO) is currently positive as pressure/geopotential height anomalies across the Arctic are currently mostly negative and the AO is predicted to trend towards neutral and then positive again the next two weeks as pressure/geopotential height anomalies are predicted to remain mixed to mostly negative the next two weeks. The North Atlantic Oscillation (NAO) is currently neutral with mixed pressure/geopotential height anomalies across Greenland, and the NAO is predicted to remain near neutral to positive the next two weeks as pressure/geopotential height anomalies are predicted to remain mixed to negative across Greenland the next two weeks.
- This week ridging/positive geopotential height anomalies will continue to dominate Western Europe favoring troughing/negative geopotential height anomalies across Eastern Europe however next week the pattern will transition to troughing/negative geopotential height anomalies across Northern European and ridging/positive geopotential height anomalies across Southern Europe. This pattern will favor normal to above normal temperatures across Western Europe including the United Kingdom (UK) with normal to below normal temperatures across Eastern Europe this week, however starting next week with a more zonal pattern normal to above normal temperatures will become more widespread across all of Europe.
- The predicted pattern across Asia the next two weeks is an omega block pattern with

ridging/positive geopotential height anomalies centered in Central Asia bookended by troughing/negative geopotential height anomalies across Western and Eastern Asia. This pattern favors mostly normal to above normal temperatures across much of Asia but centered on Central Asia including Kazakhstan and Western Siberia with normal to below normal temperatures across Western Russia and Northeast Asia.

- The predicted atmospheric pattern across North America next two weeks is also an omega block pattern with troughing/negative geopotential height anomalies across both the western and eastern coasts of Canada and the United States (US) with ridging/positive geopotential height anomalies across the interior of North America but centered on Central Canada. This pattern will support normal to below normal temperatures across Western Canada and the Western and Eastern US with normal to above normal temperatures across Central and Eastern Canada and the Central US the next two weeks.
- Looks like the atmosphere across the Northern Hemisphere (NH) continues to settle into its summer pattern common in recent years, which includes heat domes along the northern edges of the continents. My thoughts below.

## Plain Language Summary

With only a few days left to meteorological spring, it can be summed up as relatively cold temperatures for Northwestern Siberia, the Middle East and especially Alaska and much of Canada, nicking the US Northern Plains with mild to very mild for the mid-latitudes and across the population centers of the Northern Hemisphere including the US, Europe and East Asia (see **Figure**). The forecast for early summer can be summarized as much warmer temperatures for the those very regions that were cool in spring with relatively cool temperatures in Northeast Asia, the west coast of North America and the Eastern US (see **Figures 3, 6 and 9**).

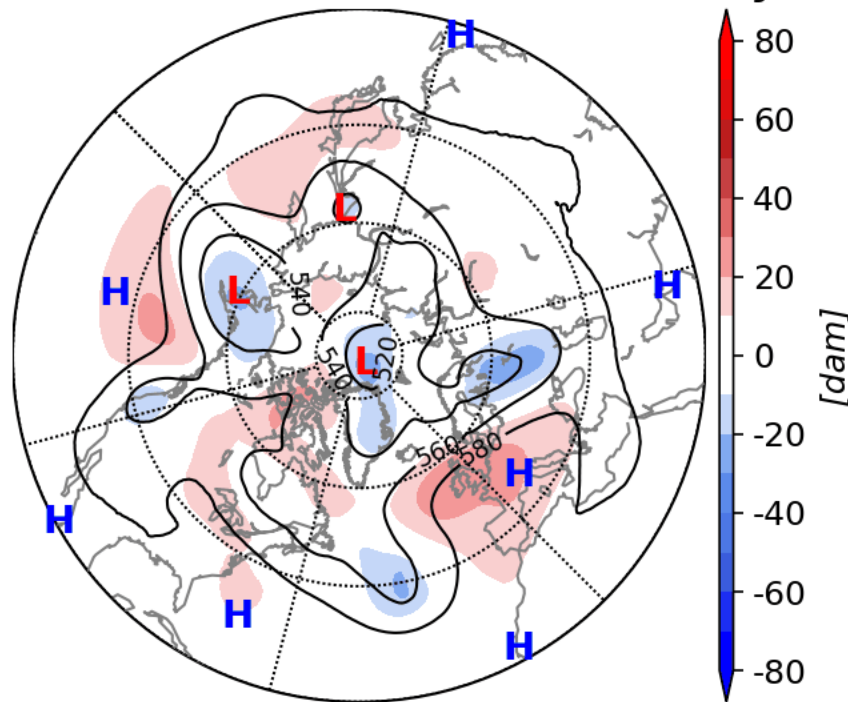


**Figure.** Estimate of the observed surface temperatures (°C; shading) from 01 Mar to 125 May 2026 based on GFS initializations and the GFS forecast from the 11 May 2026 run.

## Impacts

As usual I begin the discussion with a look at the two week forecast of the mid-tropospheric circulation animation in **Figure I**. As is often the case, we can fairly easily discern a general pattern of low pressure in the Arctic centered right over the North Pole encircled or surrounded by bubbles of high-presure ridging along the northern edges of the continents and could be described as heat domes. The main regions of high-pressure ridging are centered in the interior of the two major continents with one center over Western Siberia and the other over Central Canada. These two fetures strongly contribute to widespread warmth across the northern continents (see **Figures 3, 5** and **8**). Though these high-pressure centers do produce relatively cool temperatures downstream in Northeast Asia and the Eastern US and even upstream in Western Russia and western North America (see **Figures 3, 5** and **8**). Cooling on both sides of the high pressure centers is a feature of the omega block pattern that dominates both continents.

### Initialized 00Z 500 hPa HGT/HGTa 26-May-2026

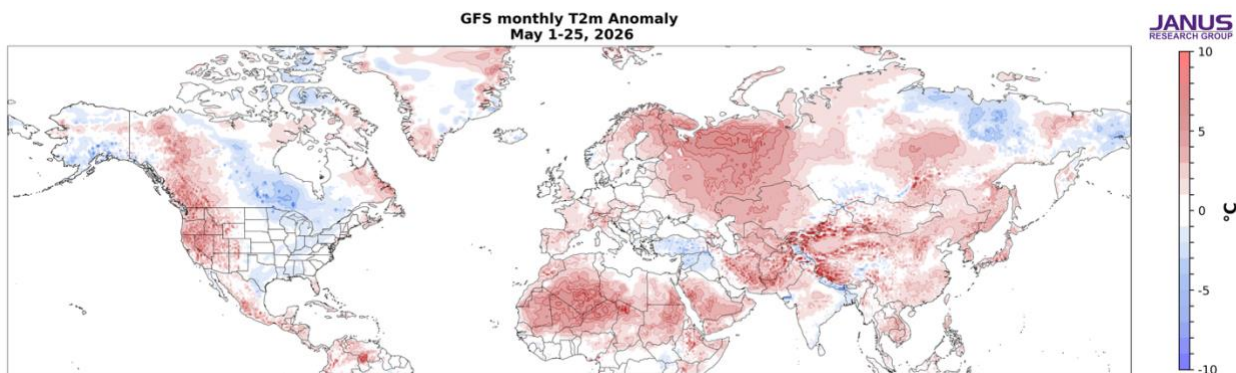


**Figure i.** Initialized 500 mb geopotential heights (dam; contours) and decameter anomalies (dam; shading) across the Northern Hemisphere for 11 May 2026 and forecasted from 11 May to 26 May 2026. The forecasts are from the 00Z 11 May 2026 GFS model.

There is a suggestion of a third high-presure ridge in the Gulf of Alaska and possibly parking itself over western North America. Since western North America heat has been common in recent

summers, this is a feature probably worth keeping an eye on first if it develops as predicted and whether it ultimately intensifies the heat in the Western US.

As I did in the last blog I also included the surface temperature anomalies for May (see **Figure ii**). We shall see but May could end up being a month of transition with the winding down of the cold pool in Canada, present for the entire winter and much of the spring. Based on the forecasts, the most impressive warm anomalies across North America are predicted in the very same region of the interior of Canada. Similarly the dipole in Asia with strong warm anomalies in Western Russia coupled with cool anomalies in Siberia for much of the spring is predicted to reverse or flip with relatively cool in Western Russia coupled with warm anomalies in Siberia. I think there is a good chance that this pattern persists for much of the summer as has been the trend of recent summers.



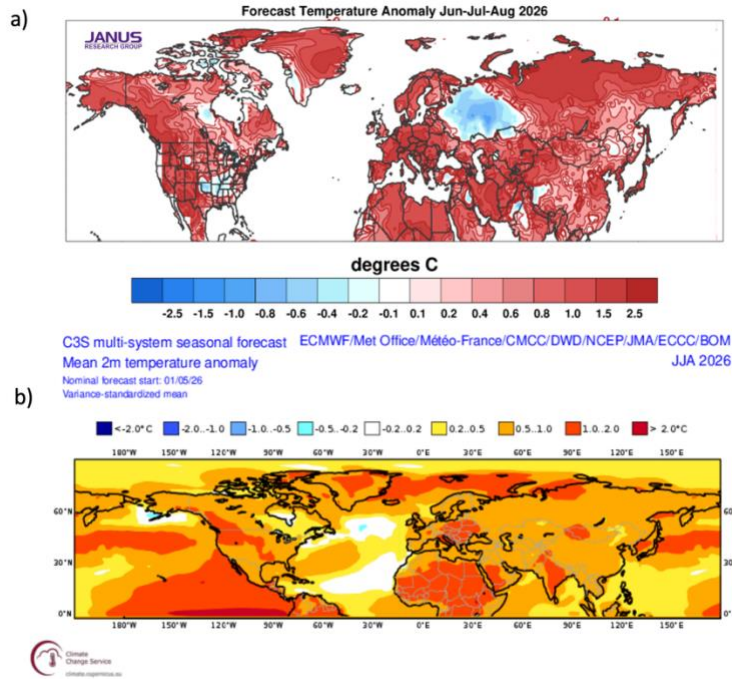
**Figure ii.** Estimate of the observed surface temperatures (°C; shading) from 01 May to 25 May 2026 based on GFS initializations and the GFS forecast from the 26May 2026 run.

Well that is a good segue to our summer forecast. There is some good news-bad news with the summer forecast. The good news is that I used ERA5 reanalysis data for the forecast rather than NCEP/NCAR, which is an important improvement. But the bad news is that I could only use two of our four normal predictors, which is unfortunate. I have heavily relied on the IRI data library for downloading atmospheric data for the seasonal forecasts and that has abruptly ended and as far as I can tell for good. At least with all the hype surrounding the predicted super El Niño, at least I was able to use it as one of the predictors.

As it so happens we were also heavily relying on the IRI data library for our subseasonal forecast model that I have shared in the blog for the past several months and that too has had an adverse impact on our forecasts for much of the spring. Not sure of the reason for the shuddering of the IRI data library but a double hit for me. If anyone knows more, feel free to share with me.

Without further ado I present our summer forecast in **Figure iii** with the C3S forecast for comparison. Both forecasts show widespread warmth and in the case of the C3S system universal warmth for the summer. Our model also has two pockets of relatively cool

temperatures on the Eastern US but mostly the Southeastern US and the other in Western Russia. I do wish I was able to use all our predictors so my confidence is not great.



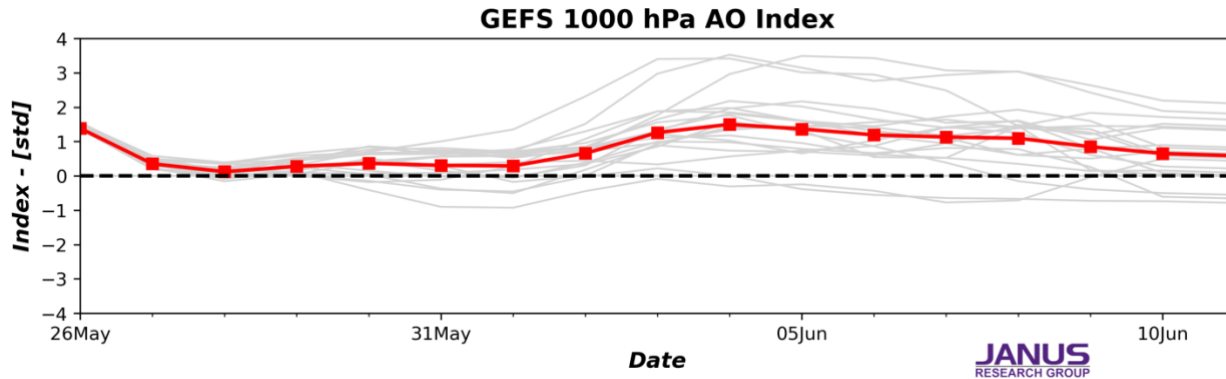
**Figure iii.** The Northern Hemisphere surface temperature anomaly forecast for June, July and August 2026 from a) the Janus model and b) the C3S ensembles.

I did mention that in the previous blog that I recently reviewed a paper that provided a dynamical explanation for the Western Asia trough/cool temperatures so interesting to see it appear both in the short term forecasts (see **Figures 3, 5 and 8**) and in our summer forecast (see **Figure iii**). The C3S forecast has the heat focused in western North America and Eastern Europe. Our model also has the heat focused in western North America but a bit further west across Europe. Our model is more confident about extreme heat in Siberia as well. Well we shall find out soon enough where this summer's heat is most oppressive.

## Near-Term

### This week

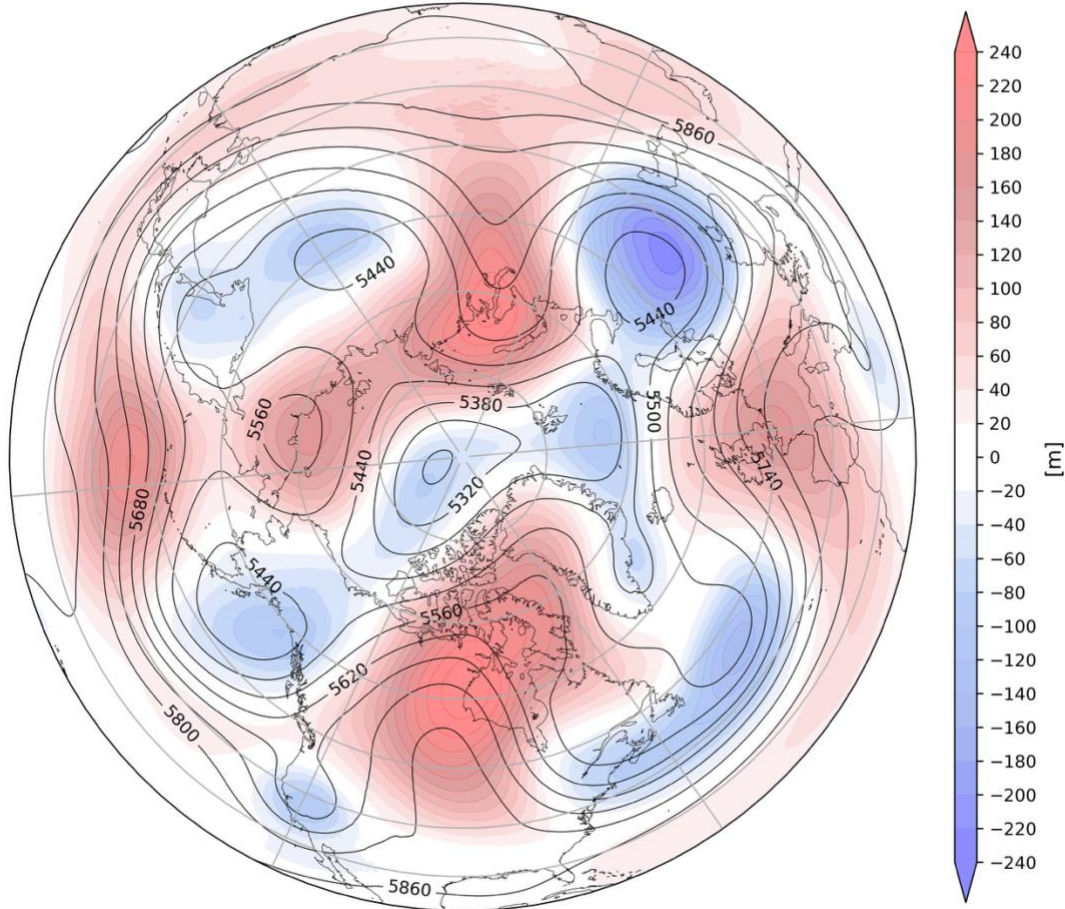
The AO is predicted to be positive to neutral this week (**Figure 1**) with mostly negative to mixed geopotential height anomalies currently across the Arctic and mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 2**). With predicted mixed geopotential height anomalies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



**Figure 1.** The predicted daily-mean AO at 1000 hPa from the 00Z 26 May 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.

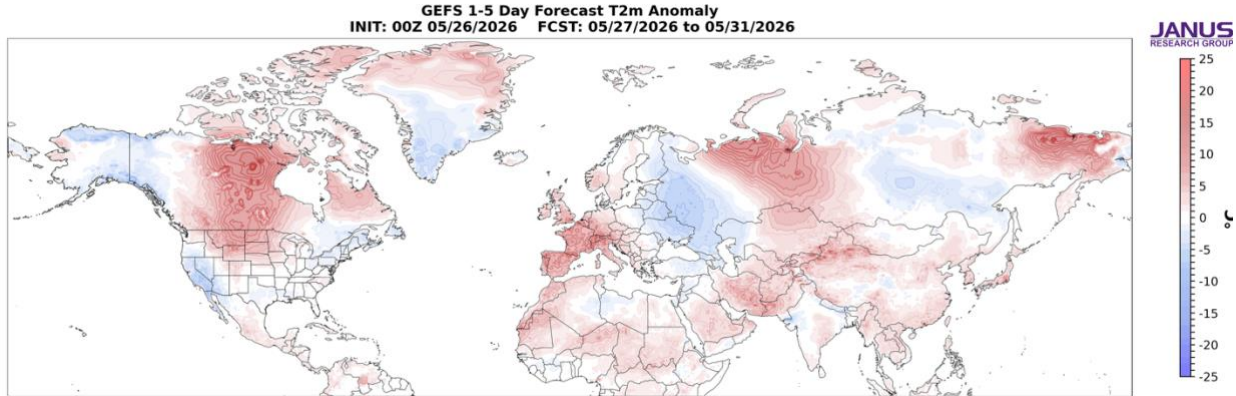
Strong ridging/positive geopotential height anomalies will continue to dominate Western Europe favoring troughing/negative geopotential height anomalies across Eastern Europe this week (**Figure 2**). This pattern will support normal to above normal temperatures across Western Europe including the UK with normal to below normal temperatures across Eastern Europe this week (**Figure 3**). This week the general pattern across Asia is an omega block pattern with ridging/positive geopotential height anomalies centered in Central Asia sandwiched by troughing/negative geopotential height anomalies across Western and Eastern Asia this week (**Figure 2**). This pattern favors widespread normal to above normal temperatures across most of Asia with normal to below normal temperatures across Central Asia with normal to below normal temperatures in Western Russia and Southeastern Siberia this week (**Figure 3**).

**GEFS 1-5 Day Forecast 500 hPa Anomaly**  
INIT: 00Z 05/26/2026 FCST: 05/27/2026 to 05/31/2026



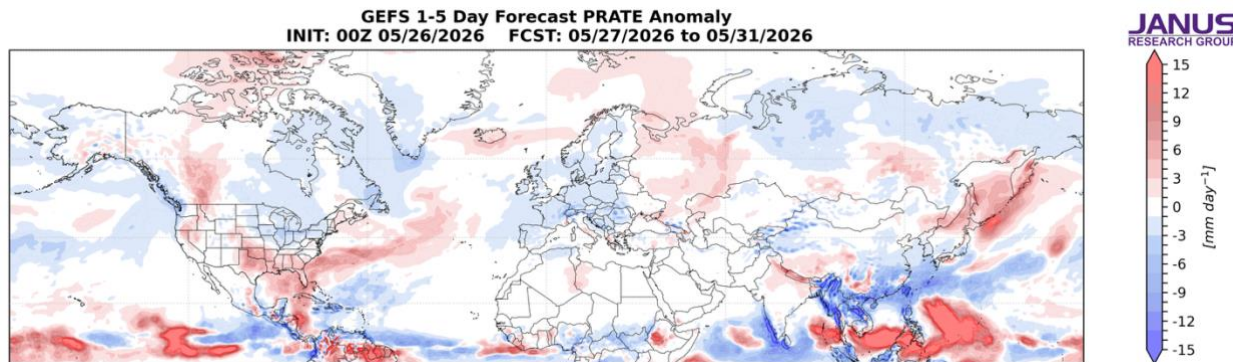
**Figure 2.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 27 May 2026 to 31 May 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

The predicted pattern across North America this week is also an omega block pattern with troughing/negative geopotential height anomalies across western and eastern North America separated by ridging/positive geopotential height anomalies centered on Central Canada this week (**Figure 2**). This pattern will favor normal to below normal temperatures across Alaska, Western and Southeastern Canada and the Western and Eastern US with normal to above normal temperatures Central and Northeastern Canada and the Central US this week (**Figure 3**).



**Figure 3.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 27 May 2026 to 31 May 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

Trouthing will support new rainfall across Western Russia, Southern Siberia and the Tibetan Plateau with mostly dry conditions across much of Europe and Asia (**Figure 4**). Trouthing will support new rainfall across southern Alaska, the Canadian Rockies and into the Western US and the Southeastern US with mostly dry conditions across much of North America this week (**Figure 4**).

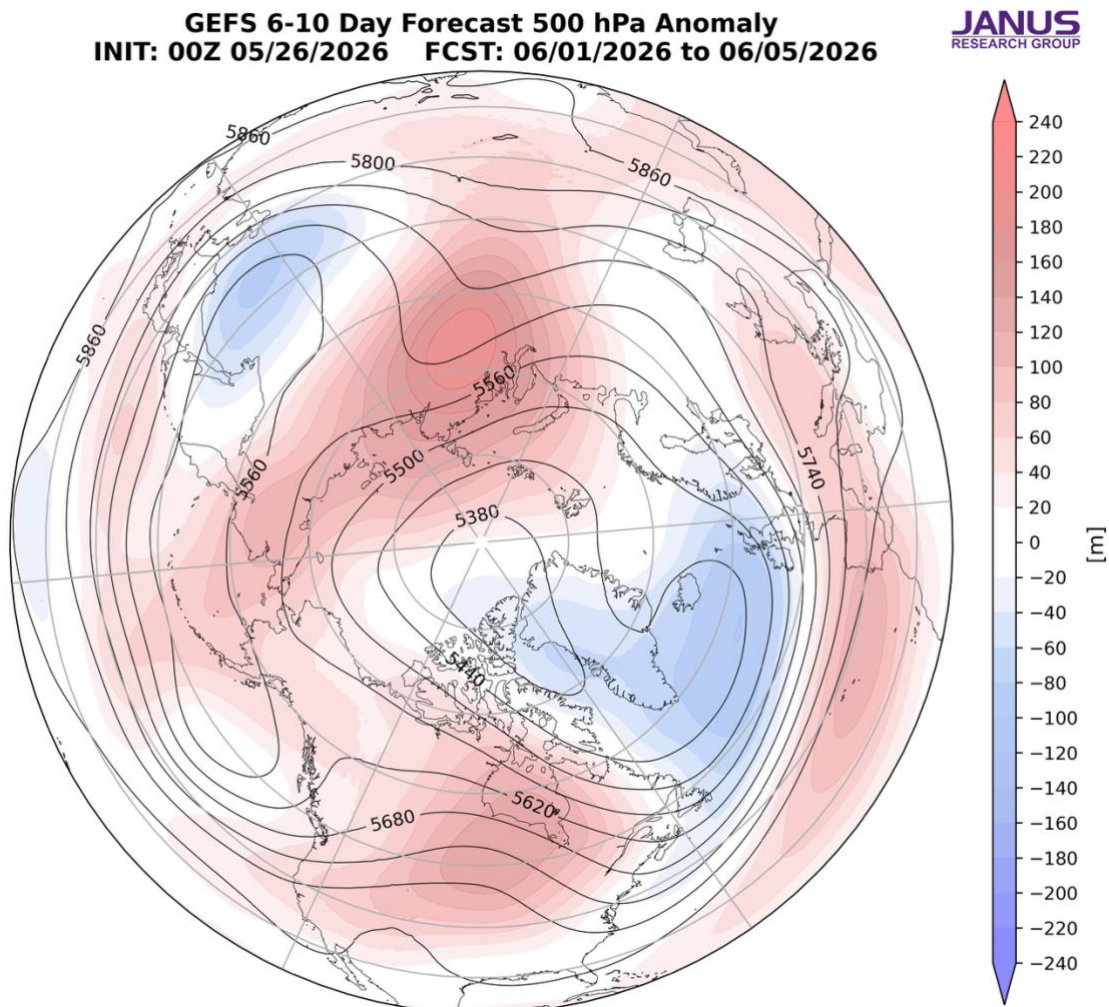


**Figure 4.** Forecasted precipitation (mm/day; shading) from 27 May 2026 to 31 May 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

## Near-Mid Term

### Next week

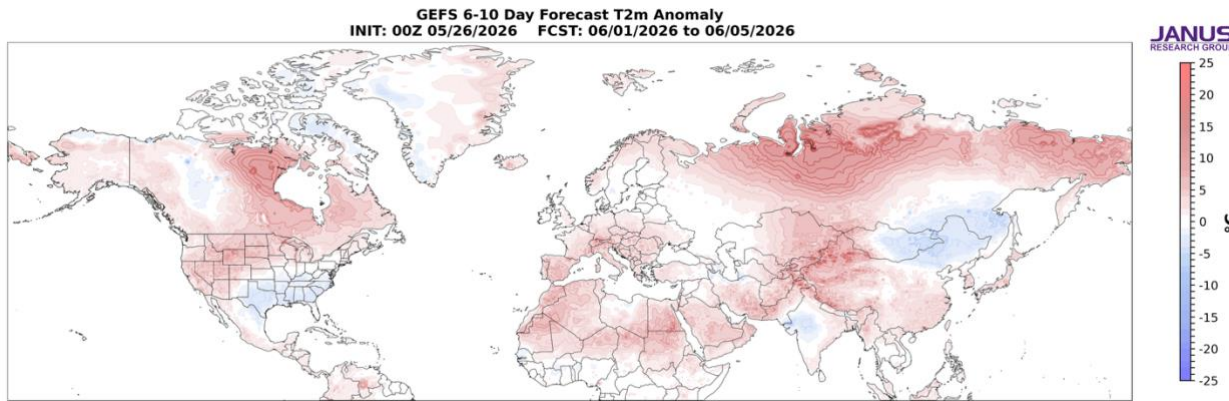
With geopotential height anomalies remaining mostly mixed to negative across the Arctic and with mixed geopotential height anomalies across the mid-latitudes this period (**Figure 5**), the AO will likely be neutral to positive this period (**Figure 1**). With mostly weak negative pressure/geopotential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



**Figure 5.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 1 June 2026 to 5 June 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

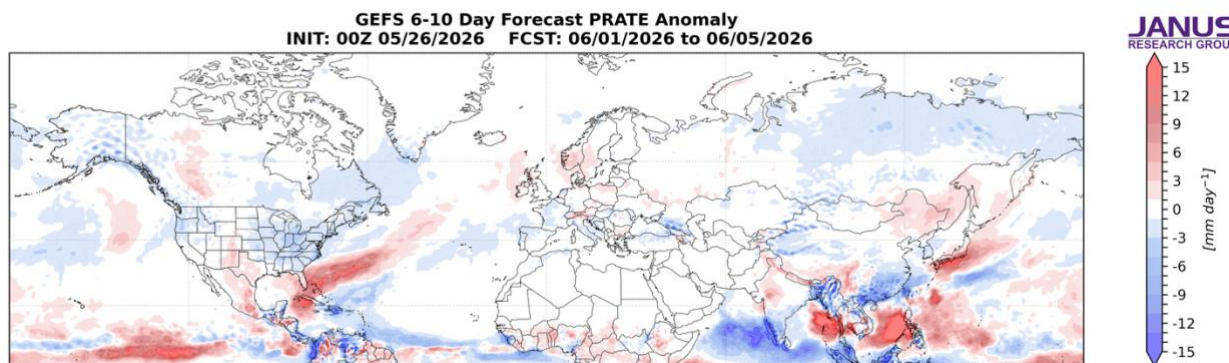
The atmospheric circulation is undergoing a transition this period across the North Atlantic and Europe that will result in troughing/negative geopotential height anomalies across Northern Europe and ridging/positive geopotential height anomalies persisting across Southern Europe (**Figure 5**). The pattern will support normal to above normal temperatures

across much of Europe including the UK this period (**Figure 6**). Across Asia the omega pattern is predicted to persist persistent with ridging/positive geopotential height anomalies across Central Asia sandwiched by troughing/negative geopotential height anomalies across Western and Eastern Asia is predicted this period (**Figure 5**). This pattern favors widespread normal to above normal temperatures widespread across much of Asia especially Central Asia with normal to below normal temperatures limited to Western Russia, Mongolia, Northeast Asia and parts of India this period (**Figure 6**).



**Figure 6.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 1 June 2026 to 5 June 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

Across North America the predicted omega pattern is also predicted to persist with ridging/positive geopotential height anomalies across Central and the Central US with weak troughing/negative geopotential height anomalies across both coasts of North America this period (**Figure 5**). This pattern will favor normal to above normal temperatures across Alaska, much of Canada and the Northern and Western US normal to below normal temperatures across the Canadian Rockies and the Southern and Eastern US this period (**Figure 6**).



**Figure 7.** Forecasted rainfall rate ( $\text{mm}/\text{day}$ ; shading) from 1 June 2026 to 5 June 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

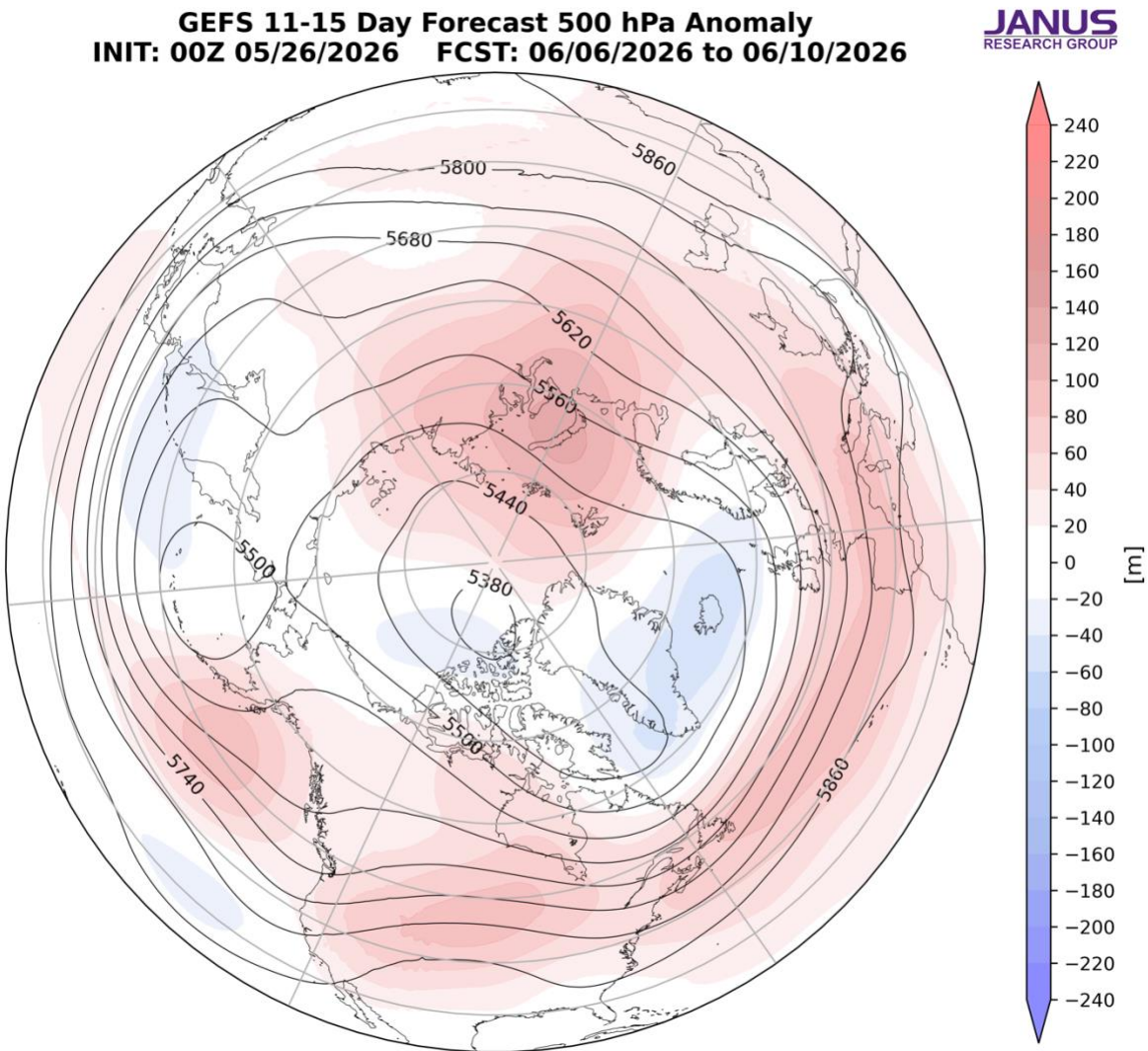
Troughing will support new rainfall across northwestern Europe, Northeastern Asia, Japan and the Tibetan Plateau with mostly dry conditions across much of Europe and Asia (**Figure 7**).

Trouging will support new rainfall across the Canadian Rockies, Florida and the US Southern Plains with mostly dry conditions across much of North America this week (**Figure 7**).

## Mid Term

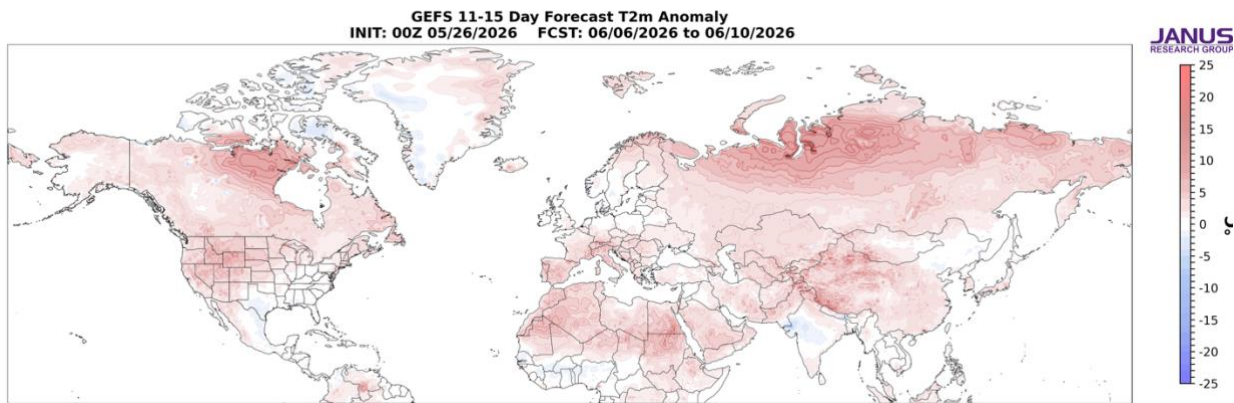
### Week Two

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 be neutral to weakly positive this period (**Figure 1**). With predicted weak and mixed pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO will likely remain near neutral this period.



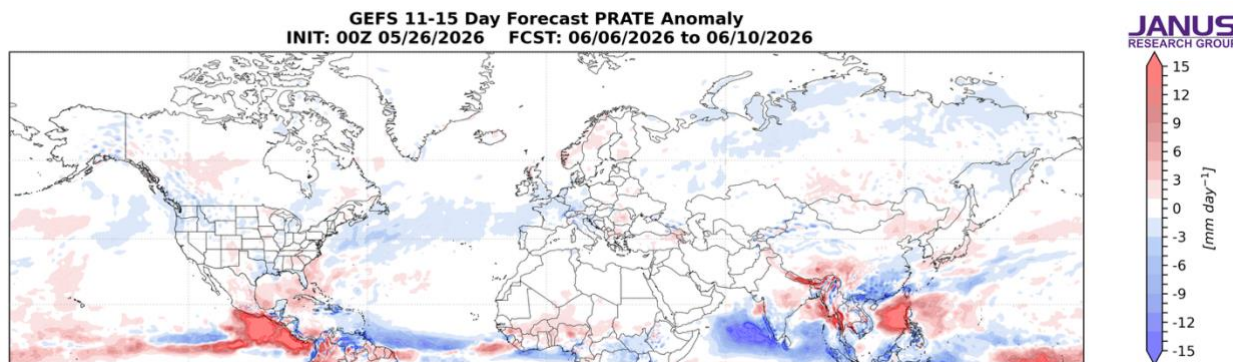
**Figure 8.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 6 June to 10 June 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

The mostly zonal pattern across Europe is predicted to persist with ridging/positive geopotential height anomalies across Southern Europe with weak troughing/negative geopotential height anomalies across Northern Europe this period (**Figure 8**). This pattern will favor widespread normal to above normal temperatures across much of Europe including the UK this period (**Figures 9**). The persistent omega block pattern is predicted to continue across Asia but weakened with ridging/positive geopotential height anomalies centered near the Urals Asia bookended by troughing/negative geopotential height anomalies across Scandinavia and East Asia this period (**Figure 8**). This pattern favors widespread normal to above normal temperatures across Asia now especially Northern Siberia and Central Asia with normal to below normal temperatures limited to parts of Northeast Asia and the parts of the Indian subcontinent this period (**Figure 9**).



**Figure 9.** Forecasted surface temperature anomalies ( $^{\circ}\text{C}$ ; shading) from 6 June to 10 June 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

Across North America the omega block pattern is also predicted to persist and weaken with ridging/positive geopotential height anomalies centered on the interior of North America sandwiched by weak troughing/negative geopotential height anomalies along both coasts this period (**Figure 8**). This pattern supports widespread normal to above normal temperatures across Alaska, Canada and much of the US with normal to below normal temperatures mostly limited to Southeastern US this period (**Figure 9**).



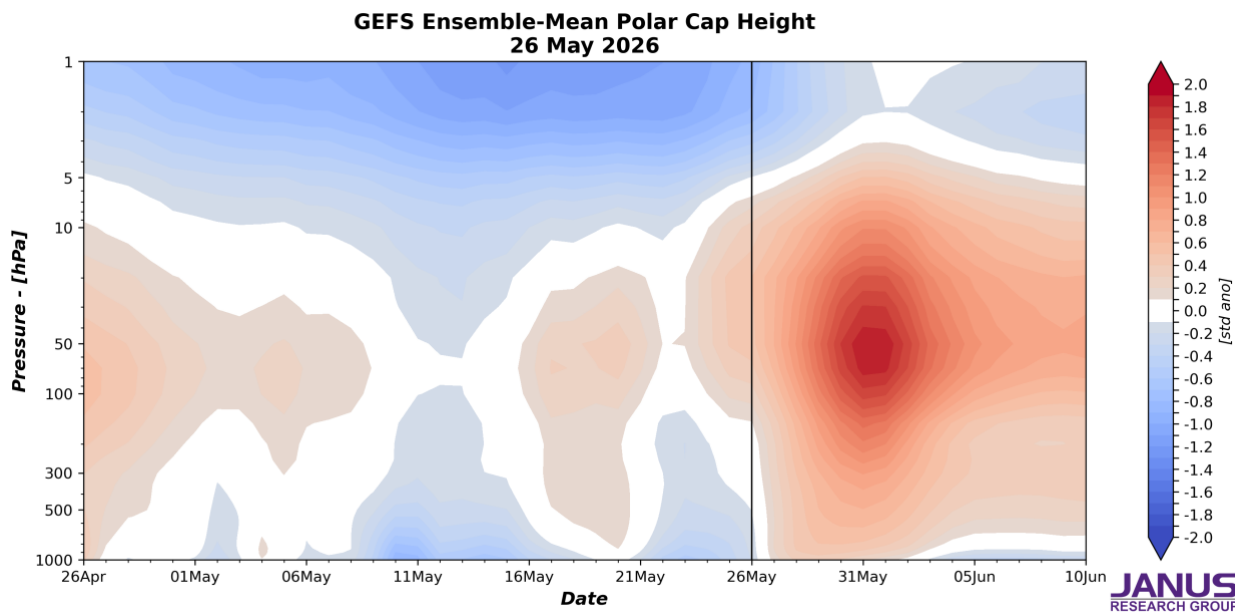
**Figure 10.** Forecasted rainfall (mm/day; shading) from 6 June to 10 June 2026. The forecasts are from the 00Z 26 May 2026 GFS ensemble.

Troughing will support new rainfall across Scandinavia, Northeast Asia, India, the Tibetan Plateau and into southwest China with mostly dry conditions across much of Europe and Asia (**Figure 10**). Troughing will support new rainfall across the Canadian Rockies, in the US Southern Plains and the Southeastern US with mostly dry conditions across much of North America this week (**Figure 10**).

## Longer Term

### 30-day

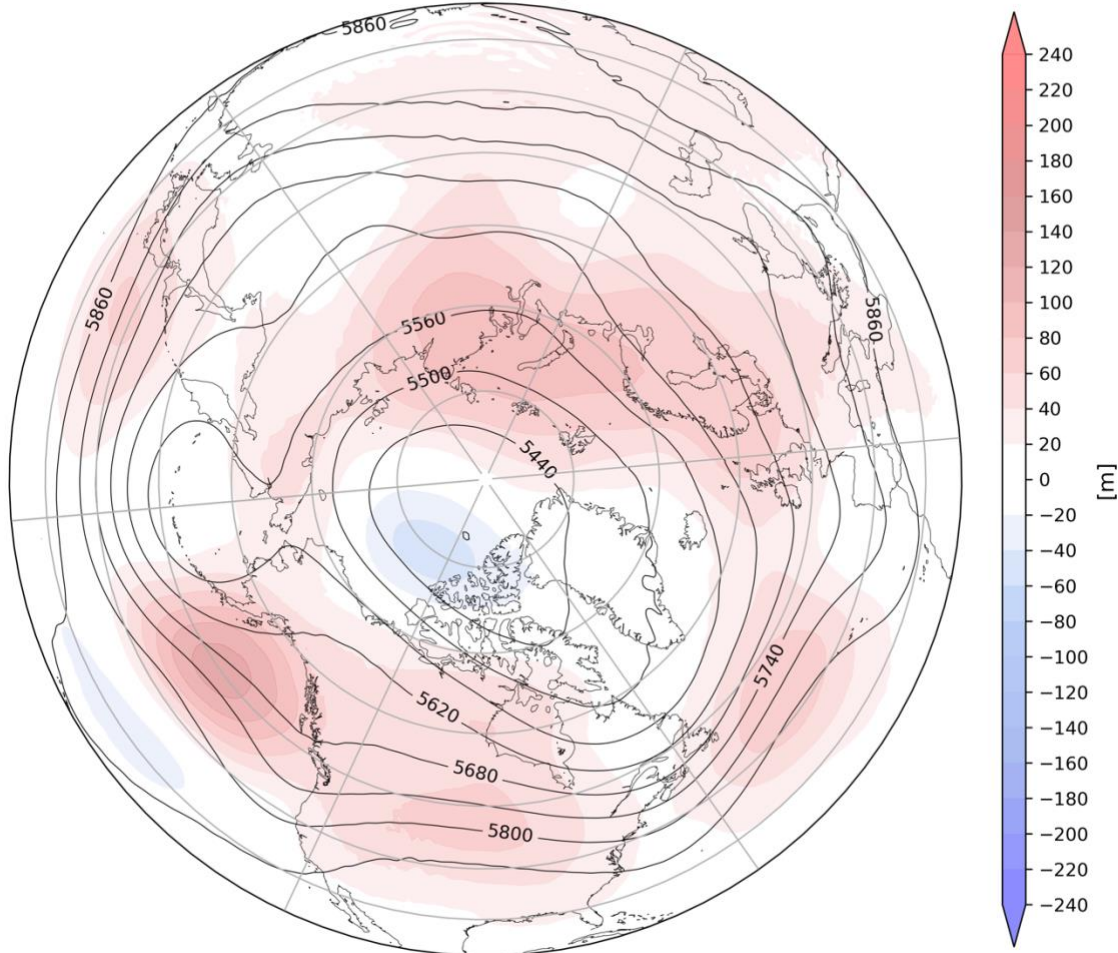
Today's polar cap geopotential height anomalies (PCHs) plot currently shows cold/negative PCHs in the the upper stratosphere and the mid to low-troposphere with warm/positive PCHs in the lower stratosphere and upper troposphere (**Figure 11**). Then next week warm/positive PCHs should make a return throughout the troposphere and possibly eventually extending into the mid- stratosphere.



**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 11 May 2026 GFS ensemble.

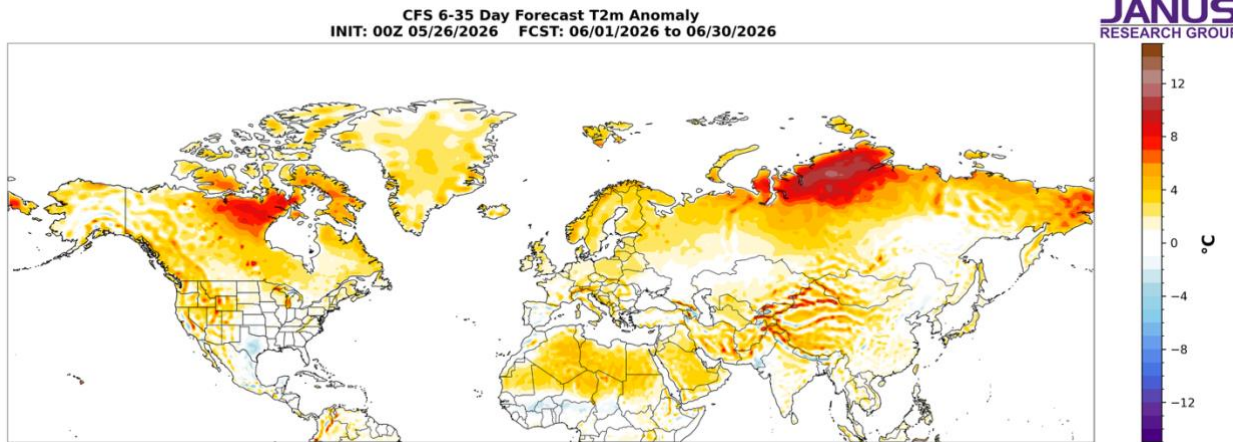
This week the predicted negative cold PCHs in the troposphere (**Figure 11**) are consistent with the predicted positive surface AO (**Figure 1**). Then next week the predicted weak and alternating PCHs in the lower troposphere (**Figure 11**) are consistent with the predicted near neutral AO heading into the first half of June (**Figure 1**).

**CFS 500 hPa Forecast Anomaly Jun 2026  
Valid as of 26 May 2026**



**Figure 12.** Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for June 2026. The forecasts are from the 00Z 26 May 2025 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 12**) and surface temperatures for June (**Figure 13**) 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 from Northern Europe to the Laptev Sea, Siberia and much of Central Asia, the Gulf of Alaska, Central Canada and the Central US with troughing across Western Europe, East Asia, the Dateline, Western and Eastern Canada and the Northeastern US (**Figure 12**). This pattern favors seasonable to relatively warm temperatures across Europe, Northern Siberia, Central Asia, the Middle East, the Tibetan Plateau, Pakistan and Afghanistan, Alaska, much of Canada and the Western US with seasonable to relatively cool temperatures across Southwestern Europe, Southwestern Russia and into Kazakhstan, Northeast Asia, Southeastern Canada and the Eastern US (**Figure 13**).

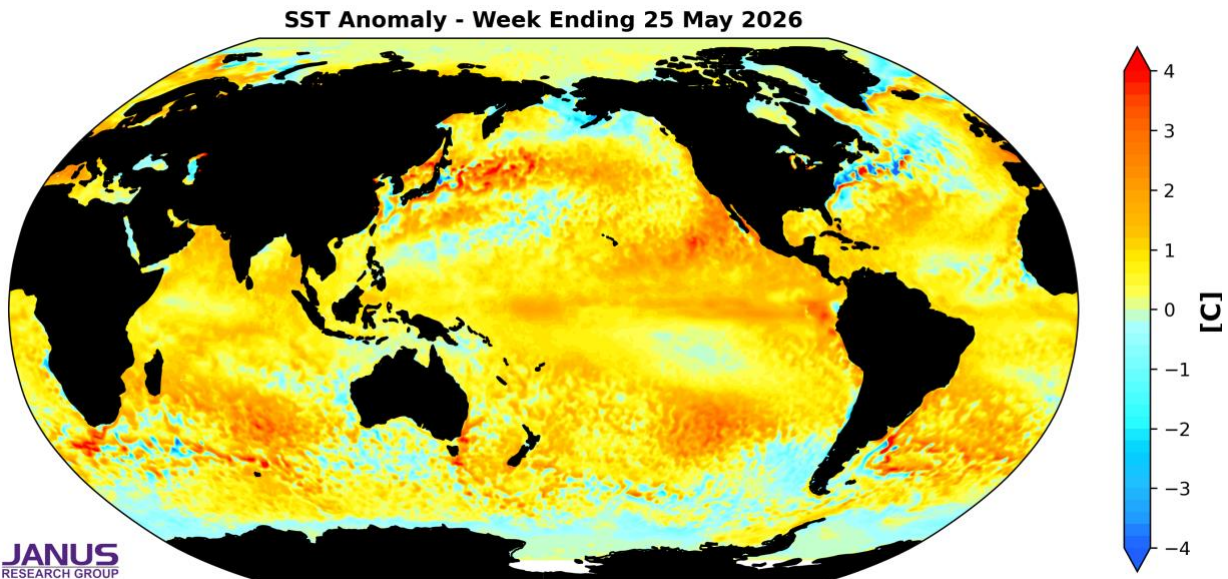


**Figure 13.** Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for June 2026. The forecasts are from the 00Z 26 May 2026 CFS.

## Boundary Forcings

### SSTs/El Niño/Southern Oscillation

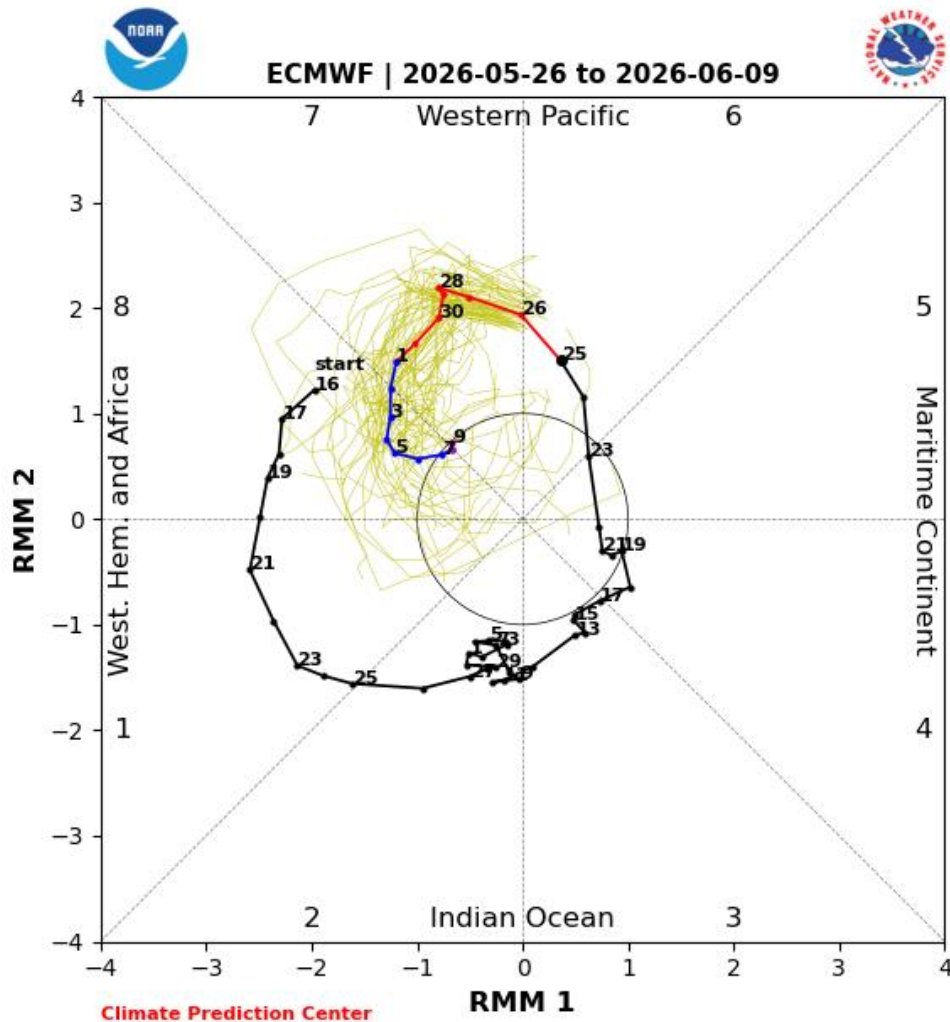
Equatorial Central Pacific sea surface temperatures (SSTs) anomalies are above normal, with the warming focused along the South American coast (see **Figure 14**), signs of developing El Niño conditions. In fact a possible “super” El Niño this fall and winter has been receiving much attention in the media. 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.



**Figure 14.** The latest daily-mean global SST anomalies for week ending 25 May 2026.

## Madden Julian Oscillation

Currently the Madden Julian Oscillation (MJO) is in phase seven (Figure 15) and the forecasts are for the MJO to slowly move into phase eight the next two weeks (Figure 15). Phase seven favors ridging across Central Canada with troughing across Western Canada and the Eastern US, consistent with forecasts next week and into the following week, it seems that the MJO is likely influencing on North American weather. But admittedly this is outside of my expertise.



**Figure 15.** Past and forecast values of the MJO index. Forecast values from the 00Z 26 May 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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We appreciate your taking the time to read the public Arctic Oscillation blog from Dr. Judah Cohen and the AER Seasonal Forecasting team.

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

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