Arctic Oscillation and Polar Vortex Analysis and Forecasts

February 7, 2022

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

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

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Summary

- The Arctic Oscillation (AO) is currently positive and is predicted to remain positive through late-February with mostly negative pressure/geopotential height anomalies across the Arctic and mixed pressure/geopotential height anomalies across the mid-latitudes. The North Atlantic Oscillation (NAO) is also positive and is predicted to remain positive as pressure/geopotential height anomalies are predicted to remain negative across Greenland the next two weeks.

- The next two weeks, troughing/negative geopotential height anomalies across Greenland will favor ridging/positive geopotential height anomalies and/or zonal flow coupled with normal to above normal temperatures across much of Europe including the United Kingdom (UK) with the possible exception of troughing/negative geopotential height anomalies coupled with normal to below normal temperatures across Scandinavia.

- The dominant pattern across Asia the next two weeks is a quasi-omega block pattern across Northern Asia with troughing/negative geopotential height anomalies coupled with normal to below normal temperatures across Western and Eastern Asia with ridging/positive geopotential height anomalies coupled with normal to above normal temperatures across Western Siberia and to the

south troughing/negative geopotential height anomalies coupled with normal to below normal temperatures across Southcentral Asia.

- The dominant pattern across North America the next two weeks is ridging/positive geopotential height anomalies in the Gulf of Alaska amplifying and eventually pushing north into Alaska forcing deepening troughing/negative geopotential height anomalies in eastern North America. This pattern initially favors normal to below normal temperatures in Alaska and Northern Canada with normal to above normal temperatures across Southern Canada and much of the United States (US). However next week temperatures are predicted to warm with expanding normal to below normal temperatures across Southern Canada and the Northern US.

- In the *Impacts* section I continue to discuss my expectations of one and possibly two stretched polar vortex (PV) events in midst of an overall raging PV and the related weather of the Northern Hemisphere (NH) for the remainder of February.

Plain Language Summary

I believe that the repetitive stretched polar vortex events (PV; where the polar vortex becomes stretched like a rubber band or taffy) that began in January are likely to continue through February. These events contribute to a colder and snowier pattern in the Eastern US and Central and East Asia but not Europe. There are signs that after a brief warmup this coming week a new stretched PV will allow the cold to return to the Eastern US next week. Yet another stretched PV the end of the third week of February could deliver yet more cold. In contrast, European weather seems more sensitive to the strength of the PV, which despite being stretched is strong (as measured by the circulating winds around the PV center). I think the possibility of harsh winter weather across Europe is just about over.

Impacts

The big soap opera of the winter of if and when will the stratosphere-troposphere couple, has finally been answered affirmatively. The cold/negative polar cap geopotential height anomalies (PCHs) that have been omnipresent in the stratosphere have finally landed, descending all the way to the surface. The strong polar vortex and positive stratospheric AO have translated to the surface beginning the end of last week as we observe a consistently positive AO and a predicted mild week across much of the US and Europe. The one exception this week is Central and East Asia. And as I have said earlier this winter, look towards Asia for hints of future atmospheric circulation and weather changes.

As I have been discussing in recent blogs the GFS was suggesting the fourth stretched PV of the winter and first for February during the second week of February and based on today's GFS analysis and forecasts, it looks to be underway (you can see the stretched configuration to the PV in **Figure 13a**). As I have been doing of late in the blog, I also include the polar vortex animation (see **Figure i**) which shows what I believe is a stretched PV this week with cross polar flow from Siberia towards the Great Lakes and the Northeastern US. So though this will be a mild week in the Eastern US, in part related to the coupling of the cold/negative PCHs in the stratosphere to the surface, I do expect that the stretched PV this week will start to influence the temperatures in the Eastern US. And as is typical of stretched PV events, cold temperatures begin in Central and East Asia but finish in eastern North America. Therefore, the cold temperatures of East Asia this week are likely foreshadowing cold temperatures in Eastern Canada and the Eastern US next week.
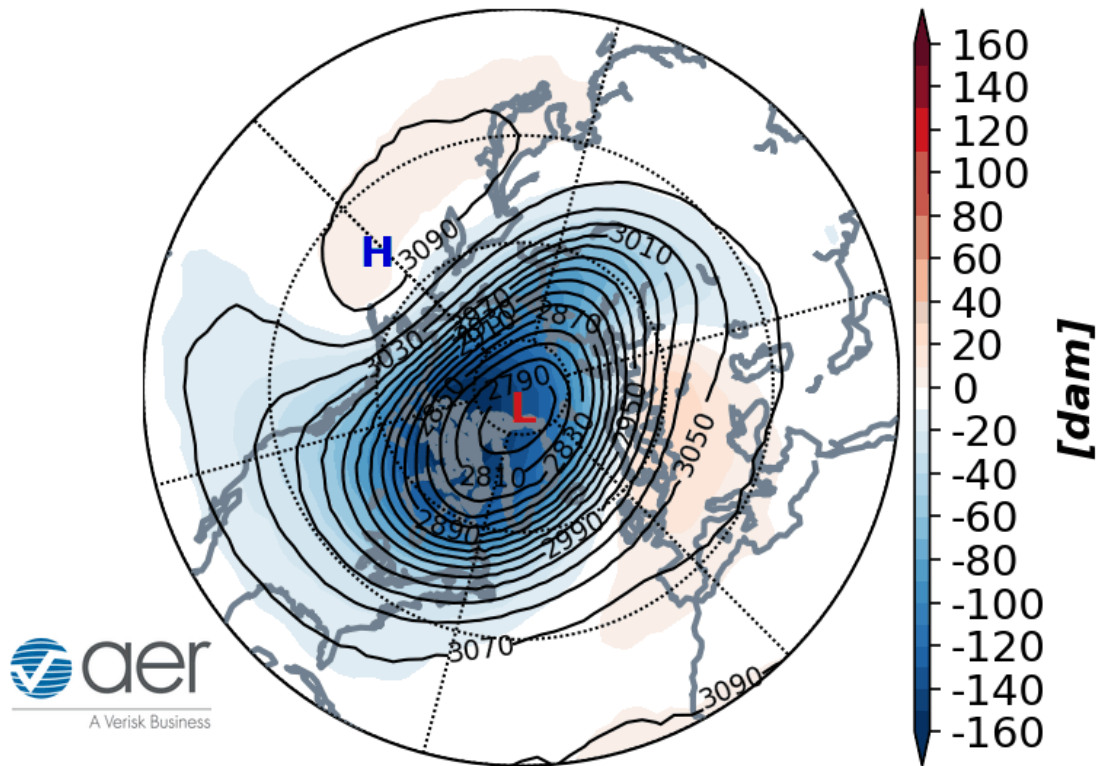
CLICK for Loop

Figure i. (a) Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 7 February 2022 and forecasted from 8 – 23 February 2022. The forecasts are from the 00Z 7 February 2022 GFS model ensemble.

But like January one good stretch deserves another or like the old Lays commercial, you can't just have one and a second stretched PV is suggested by the GFS for the end of the third week of February and into the fourth week (see **Figure i** and **Figure 13b**). The second stretched PV of February would likely help to reinforce cold temperatures in eastern North America. However, the PV is predicted to become circular in between the two stretched PVs of the month (see 14-15 February in the PV animation shown in **Figure i**) therefore I think there is good probability that the temperature anomalies across the Eastern US, and probably Southeastern Canada, will be on a roller coaster ride for much of the month or lots of variability.

First a warning to the reader this is paragraph is highly technical. As I have said many times in the blog predicting this winter has been especially challenging and has been anything but "textbook." As we showed in our archived manuscript Cohen et al. 2022 and the supplementary information the energy for stretched PV events seems to typically originate from ridging/high pressure over the Urals. From Figures **3, 5** and **8** there is no ridging/high pressure over the Urals predicted over the Urals but instead over Western Siberia for much of the upcoming two weeks. I believe that the thinking in the climate dynamics community has converged around the idea that to disrupt the stratospheric PV requires ridging/high pressure over the Urals with downstream troughing/low pressure over East Asia into the North Pacific. If you look at Figures 4, 6, and 8 from our manuscript, the origin of the energy that stretches the PV and amplifies the North American standing wave in winter 2013/14 originates from ridging/high pressure over the Urals (centered near 60°E). But it seems that the energy for the possible stretched PV beginning the end of third week of February originates over Western Siberia (centered near 120°E, see **Figure ii**). The energy then travels eastward and upward into an almost non-existent or very weak East Asian trough then strong Alaskan ridging and is reflected downward into an amplifying North American and North Atlantic troughing. The eastward and first upward and then downward Rossby wave propagation or reflection is the signature of stretched PV events. Those that are excited by what is shown in **Figure ii** might be a select few or even exactly one (me). But I do think that it is a result not shown before and expands the realm of what is possible, i.e., Western Siberian ridging can also disrupt the PV, albeit relatively minor.
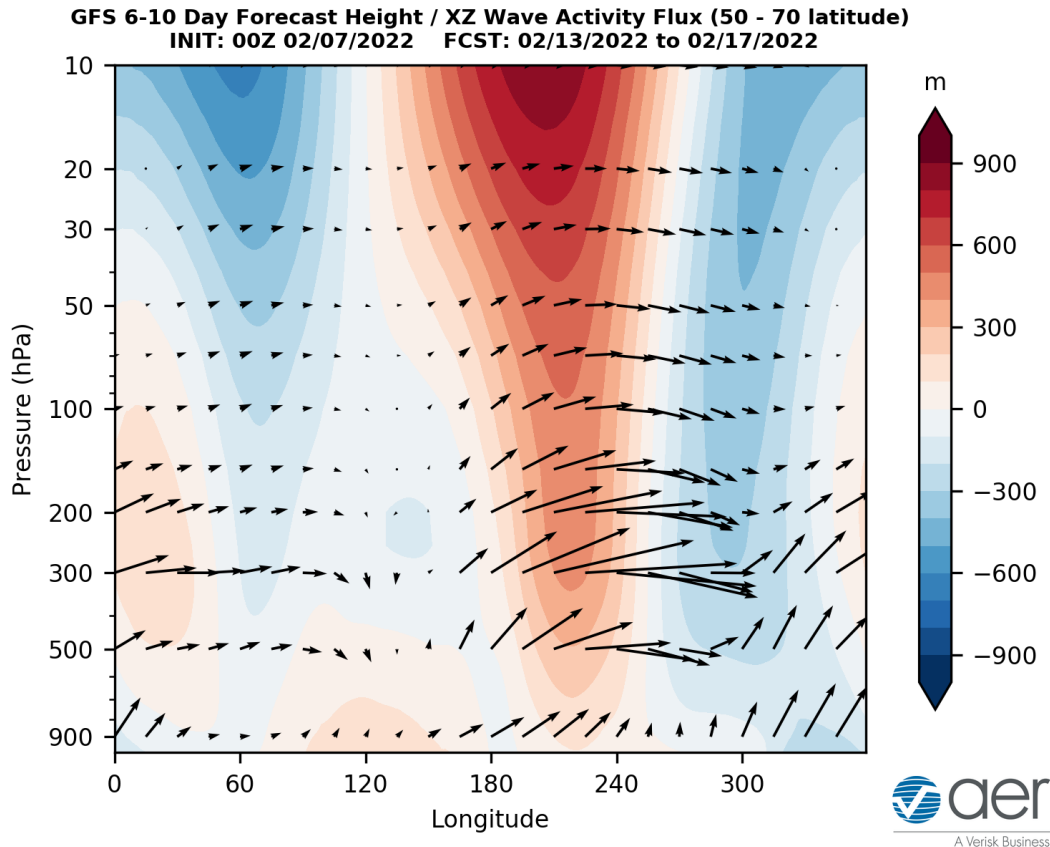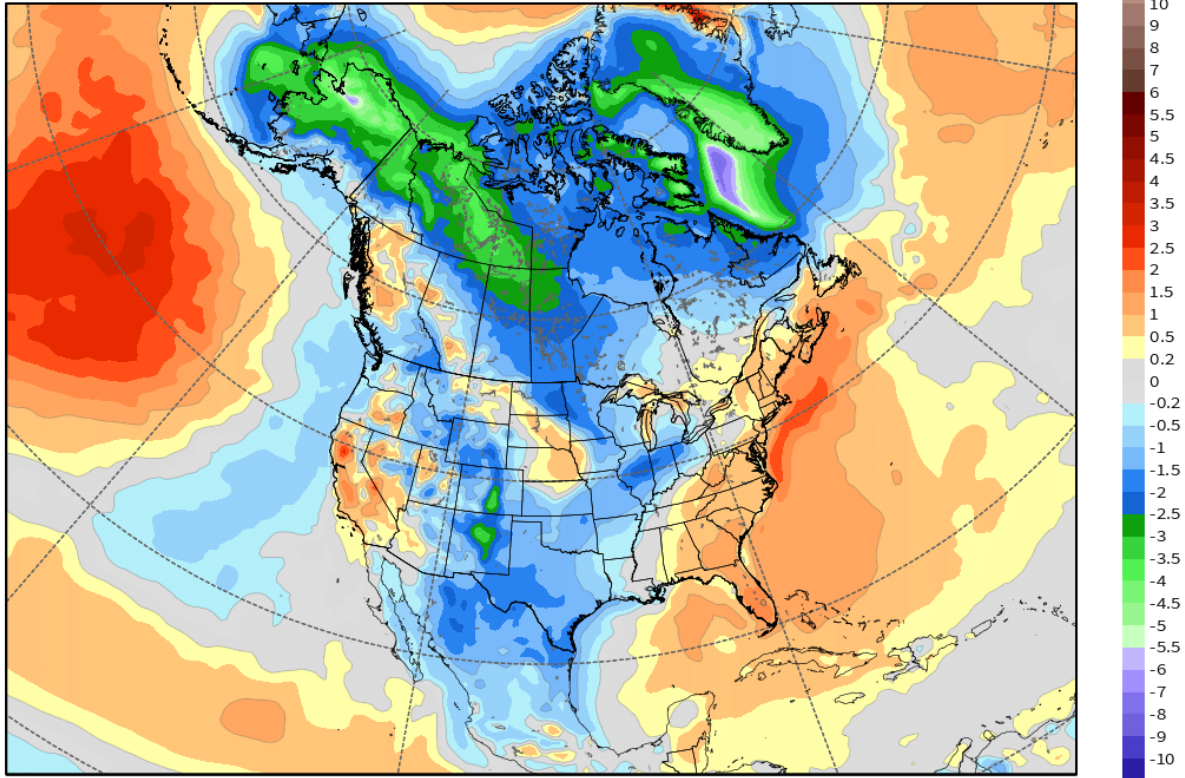
GFS 6-10 Day Forecast Height / XZ Wave Activity Flux (50 - 70 latitude)
INIT: 00Z 02/07/2022   FCST: 02/13/2022 to 02/17/2022

Figure ii. Longitude-height cross section of geopotential eddy height anomalies and wave activity flux vectors and wave activity flux vectors in the longitudinal and height directions from the surface through 10-hPa for 13 – 17 February 2022. The forecast is from the 00Z 7 February 2022 operational GFS.

Enough of the academic and the theoretical and I will try to bottom line it. Our machine learning model predicted for the Eastern US a cold start but quickly turning milder then colder again and probably a mild end to the month of February. So consistent with this idea of high variability and rapid swings discussed earlier with the circular, stretched circular, stretched PV. I am not a big fan of the ECMWF model beyond two weeks or using a monthly forecast initialized once the forecast period has begun, but the ECMWF North American forecast for February seems reasonable to me shown in **Figure iii**, which I pulled off of Twitter.

ECMWF SEAS-5 | 2-meter Temperature Anomaly [°C] | Monthly Ensemble Mean FEB_2022
Forecast Init: 20220201   1993-2016 Climatology | 51 Ensembles

MIN|MAX: -8.0° | 5.5°C

This service is based on data and products of the European Centre for Medium-range Weather Forecasts (ECMWF)   weathermodels.com

Figure iii. ECMWF ensembles predicted surface temperature anomalies (°C; shading) for the US averaged 1 – 28 February 2022. Forecast based on initialized data from 1 February 2022.

As far as March, my gut is telling me mild and the coupling of cold/negative PCHs from the stratosphere to the surface this week could be a preview of March. But the stretched PVs have been like the Energizer Bunny, they keep going and going and going. But it does seem to me that we are getting deep into the stretched PV season and not sure how common they are in March. But this winter has taught me to expect the unexpected.

As far as Europe, I think as long as the PV remains strong and the only disruptions are stretching events, hard for me to see any meaningful relative cold weather through the end of the winter. I think there could be some late cold with a dynamic Final Warming, which could be as early as March but so far, I see no signs of such a Final Warming in the foreseeable future.

Asia, I think has been surprisingly cold given a hostile circulation including the strong PV and lots of ridging. But again, I would attribute the cold mostly to the repeated

stretched events. The predicted ridging/high pressure over Western Siberia is predicted by the GFS to drift north into the Arctic Ocean and if that forecast is correct, would likely allow the cold in Asia to become more expansive. But the trend has been no matter how cold the winter is across Asia; spring comes on very aggressively and I try not to bet against the trend.

Finally, I did tweet out on Friday more verification from our experimental machine learning model, and I feel that it is worth posting on the blog as well (see **Figure iv**). I can't say that I am objective and without bias, but I do feel that it has performed exceptionally well and exceeded my own expectations this winter. It is a week 3-4 forecast so not perfect but seemed to have anticipated the temperature swings all winter long and better than the dynamical models. Besides including the closest forecast from the EPS though an exact match I don't have, I also include the LIM forecast (https://psl.noaa.gov/forecasts/lim_s2s/). I think that it is interesting to compare as I am trying to argue that the Arctic can influence the behavior of the PV and others argue that the tropics are most influential in the behavior of the PV. The LIM forecast is exclusively derived from tropical convection and comparison of the different forecasts, I would argue is revelatory as to the ultimate source of energy or attribution that drives the atmospheric circulation and the weather on subseasonal timescales. Don't misunderstand me, I am not negating tropical influence, just that I don't believe it to be a monopoly.
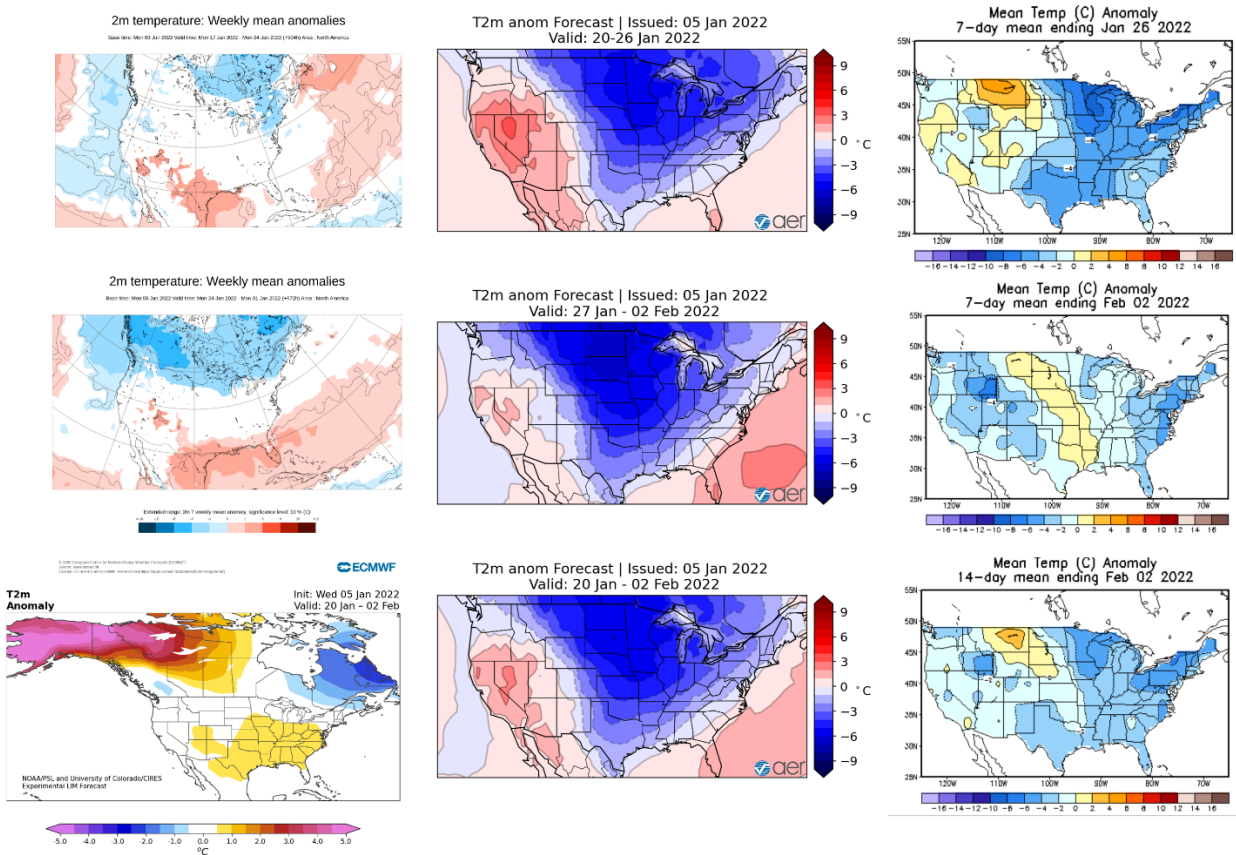
Forecast Issue Date: 05 Jan 2022

Figure iv. AER machine learning model predicted surface temperature anomalies (°C; shading) for the US averaged 10 – 23 February 2022. Forecast based on observed data through 20 – 26 January 2022 (top), 27 January – 2 February 2022 (middle) and 20 January – 2 February 2022 (bottom) all in middle row. Observations for those periods shown in right column from https://www.cpc.ncep.noaa.gov/products/tanal/temp_analyses.php. Comparable EPS forecasts shown in top two rows and from the LIM model on bottom row all in the left column.

1-5 day

The AO is predicted to be positive and deep briefly negative this week (**Figure 1**) as geopotential height anomalies are predicted to be negative across the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 2**). And with negative geopotential height anomalies predicted across Greenland (**Figure 2**), the NAO is also predicted to be positive this week (**Figure 1**).
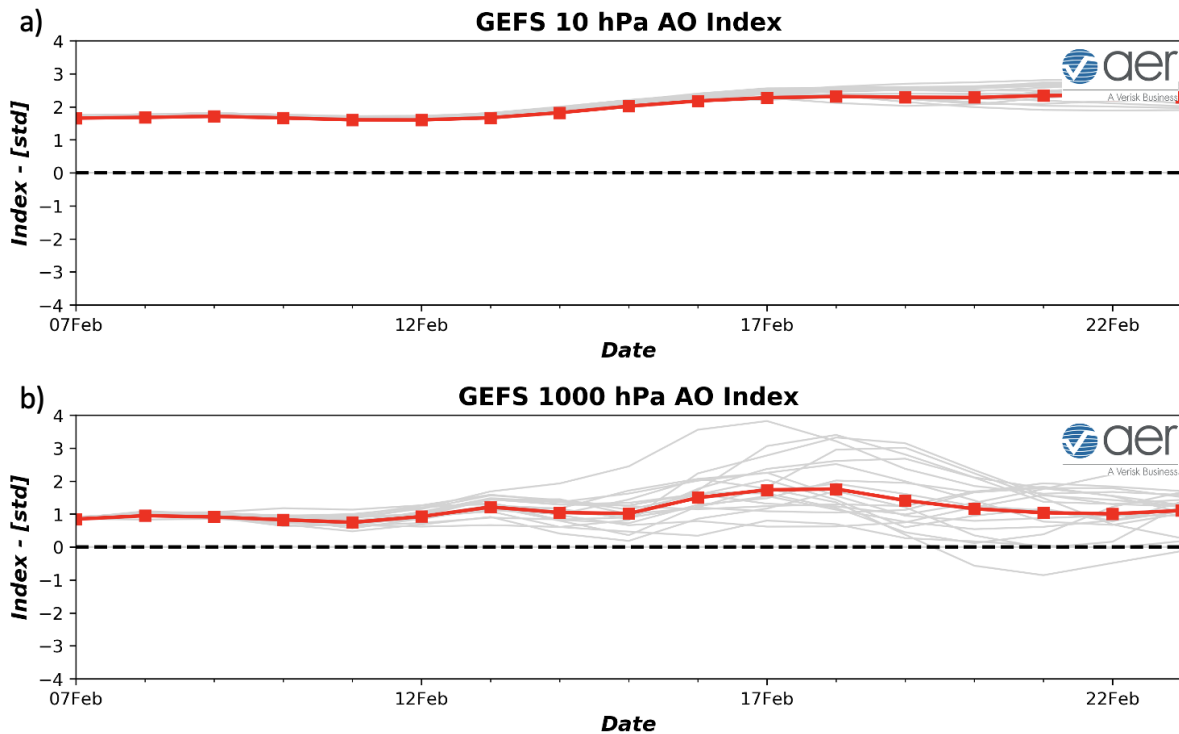
Figure 1. (a) The predicted daily-mean AO at 1000 hPa from the 00Z 7 February 2022 GFS ensemble. (b)The predicted daily-mean near-surface AO from the 00Z 7 February 2022 GFS ensemble. Gray lines indicate the AO index from each individual ensemble member, with the ensemble-mean AO index given by the red line with squares.

This week, troughing/negative geopotential height anomalies across Greenland will contribute to ridging/positive geopotential height anomalies across Central and Southern Europe with troughing/negative geopotential height anomalies across Northern Europe this period (**Figures 2).** This pattern will result in normal to above normal temperatures across most of Europe with normal to above normal temperatures limited to northern Scandinavia and Turkey (**Figure 3**). This week, a quasi-omega block pattern is predicted across Asia with ridging/positive geopotential height anomalies dominating Western Siberia sandwiched by troughing/negative geopotential height anomalies in Western Asia and Eastern Asia (**Figure 2**). This pattern favors widespread normal to above normal temperatures across much of Western and Northern Asia with normal to below normal temperatures across Central and Eastern Asia **(Figure 3**).

GEFS 1-5 Day Forecast 500 mb GPH/GPH Anomaly
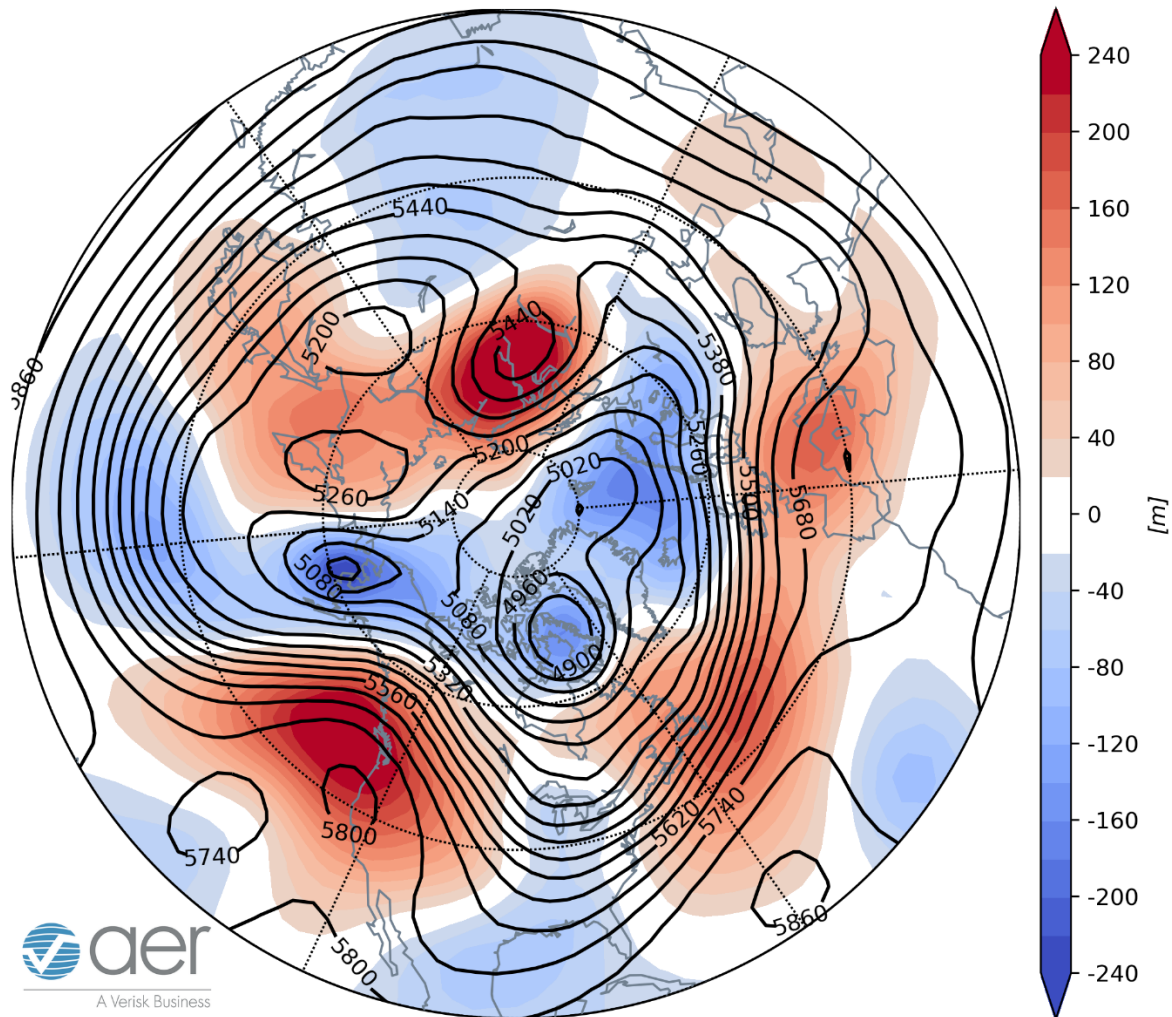**INIT: 00Z 02/07/2022   FCST: 02/08/2022 to 02/12/2022**

Figure 2. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 7 – 12 February 2022. The forecasts are from the 00z 7 February 2022 GFS ensemble.

This week, the predicted pattern across North America is ridging/positive geopotential height anomalies in the Gulf of Alaska with weak troughing/negative geopotential height anomalies across the interior of Canada and the US **(Figure 2).** This will favor normal to below normal temperatures across Alaska, much of Northern Canada and Hudson Bay with normal to above normal temperatures across Southern Canada and much of the US **(Figure 3).**

Figure 3. Forecasted surface temperature anomalies (°C; shading) from 7 – 12 February 2022. The forecast is from the 00Z 7 February 2022 GFS ensemble.

Troughing and/or cold temperatures are predicted to support new snowfall across Norway, Western, Central and Eastern Asia and the Tibetan Plateau while mild temperatures promote snowmelt in Southeastern Europe and Western Siberia (**Figure 4**). Troughing and/or cold temperatures are predicted to support new snowfall across Alaska, Northern and Eastern Canada while mild temperatures promote snowmelt in Western and Southern Canada, the Western US and the Northeastern US (**Figure 4**).

Figure 4. Forecasted snow depth changes (mm/day; shading) from 7 – 12 February 2022. The forecast is from the 00Z 7 February 2022 GFS ensemble.

Mid-Term

6-10 day

The AO is predicted to remain positive this period (**Figure 1**) with mostly negative geopotential height anomalies spread across the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 5**). And with negative geopotential height anomalies across Greenland (**Figure 5**), the NAO is predicted to remain positive this period.

GEFS 6-10 Day Forecast 500 mb GPH/GPH Anomaly
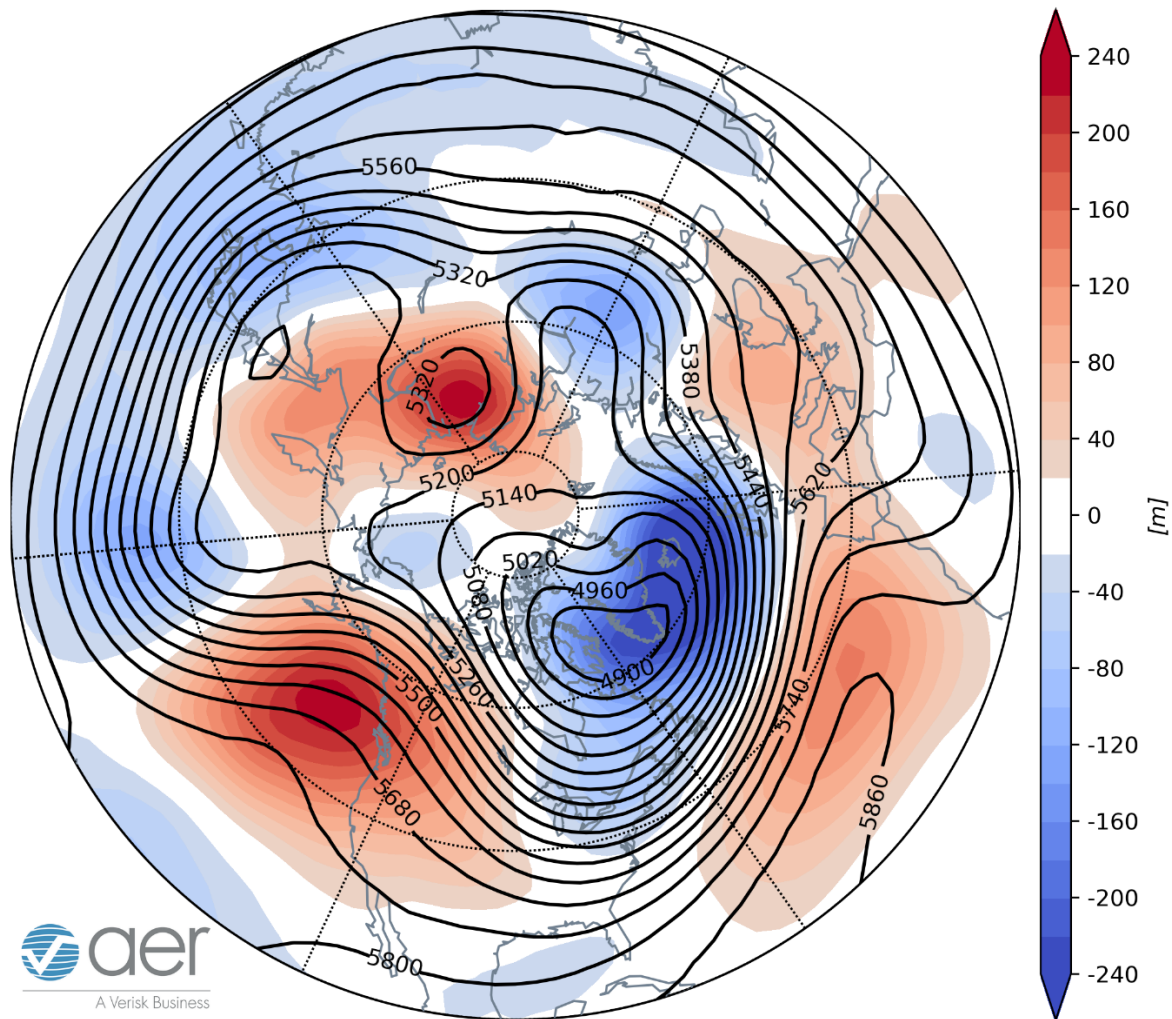**INIT: 00Z 02/07/2022   FCST: 02/13/2022 to 02/17/2022**

Figure 5. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 13 – 17 February 2022. The forecasts are from the 00z 7 February 2022 GFS ensemble.

Persistent troughing/negative geopotential height anomalies across Greenland will support widespread ridging/positive geopotential height anomalies across Europe (**Figures 5**). This will result in normal to above normal temperatures across almost all of Europe including the UK with normal to below normal temperatures limited to Turkey

due to northerly flow (**Figure 6**). Ridging/positive geopotential height anomalies are predicted to remain centered over Western Siberia with troughing/negative geopotential height anomalies on either side across Western and Eastern Asia this period (**Figure 5**). This pattern favors widespread normal to above normal temperatures across Asia with normal to below normal temperatures limited to Northwestern, parts of Central and Eastern Asia **(Figure 6)**.
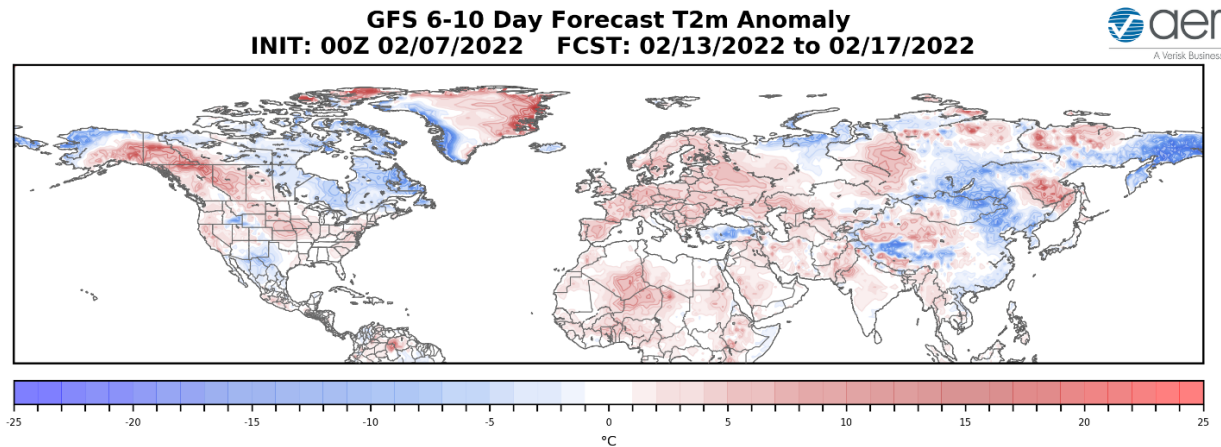

Figure 6. Forecasted surface temperature anomalies (°C; shading) from 13 – 17 February 2022. The forecasts are from the 00Z 7 February 2022 GFS ensemble.

Ridging/positive geopotential height anomalies are predicted to persist in the Gulf of Alaska and begin to expand northward into Alaska and eastward into western North America this period helping to deepen troughing/negative geopotential height anomalies across Eastern Canada and the Eastern US **(Figure 5).** This will favor normal to above normal temperatures across Alaska, Western Canada and the Western and Central US with normal to below normal temperatures in Central and Eastern Canada and the Eastern US except Florida **(Figure 6).**
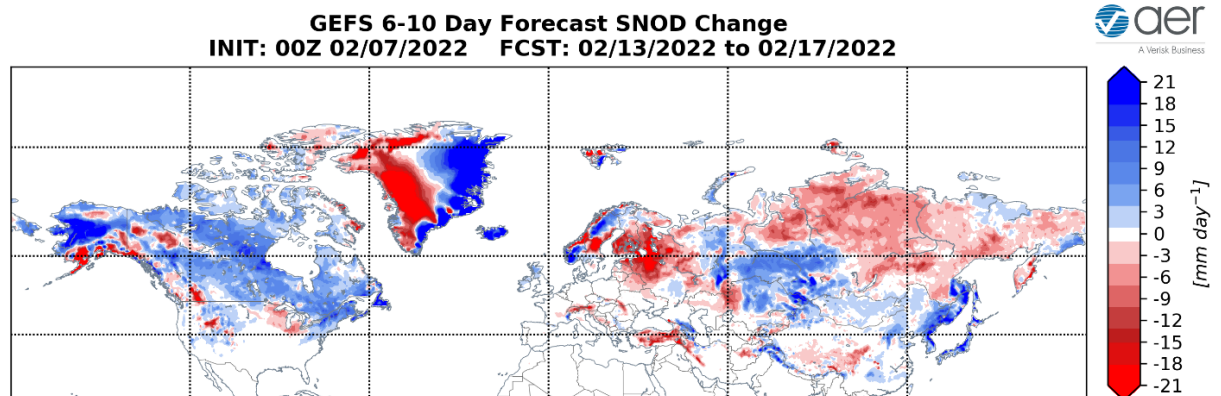
Figure 7. Forecasted snow depth changes (mm/day; shading) from 13 – 17 February 2022. The forecast is from the 00Z 7 February 2022 GFS ensemble.

Troughing and/or cold temperatures are predicted to support new snowfall across Scandinavia, Central and Eastern Asia and the Tibetan Plateau while milder temperatures promote snowmelt across Eastern Europe and Northern Asia (**Figure 7**). Troughing and/or cold temperatures are predicted to support new snowfall across Alaska, Northern and Eastern Canada and possibly the Northeastern US while milder temperatures promote snowmelt across Southern Alaska, Western Canada and the western Great Lakes (**Figure 7**).

11-15 day

Negative geopotential height anomalies are predicted to remain widespread across the North Atlantic side of the Arctic, but positive geopotential height anomalies are predicted to spread across the North Pacific side of the Arctic with mixed geopotential height anomalies across the mid-latitudes of the NH (**Figure 8**), therefore the AO should remain positive this period (**Figure 1**). With predicted mostly negative pressure/geopotential height anomalies across Greenland (**Figure 8**), the NAO is forecasted to remain positive this period.
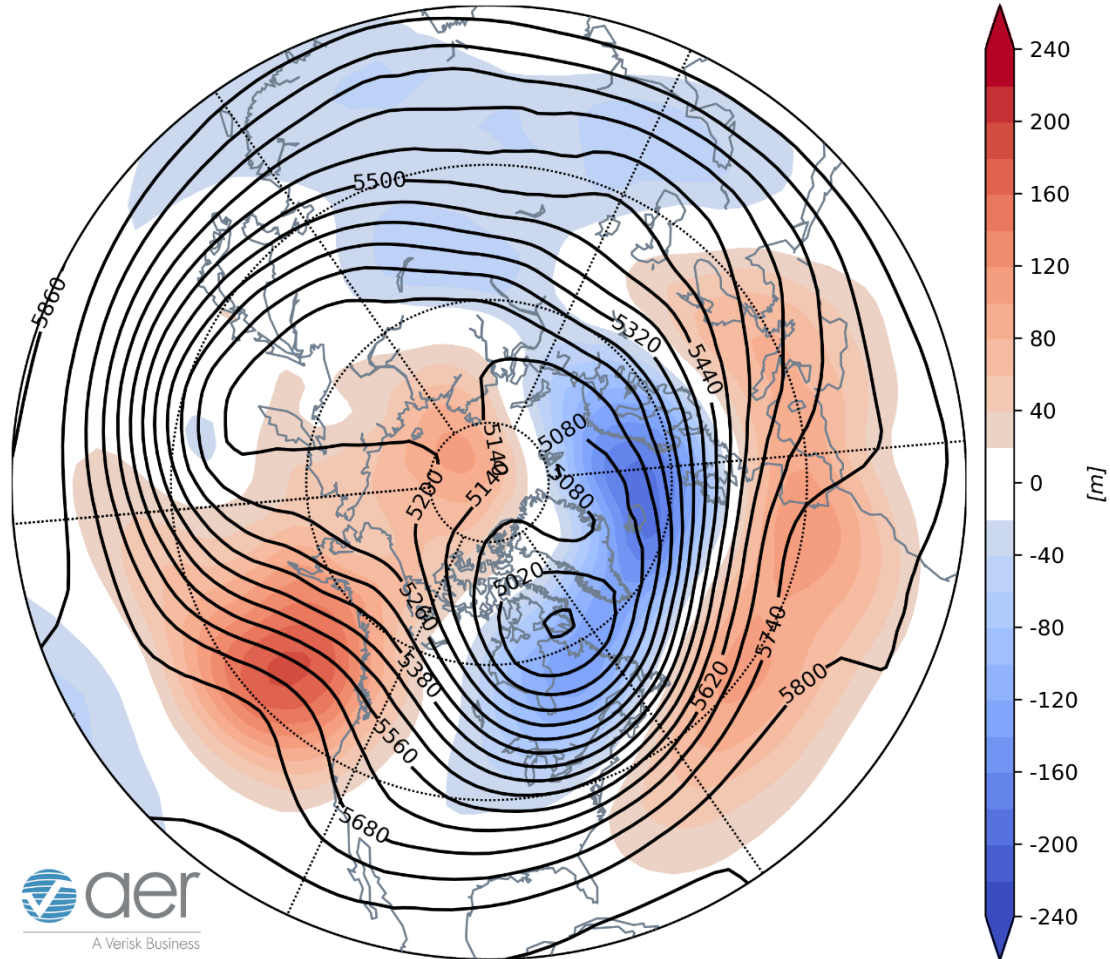
Figure 8. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere from 18 – 22 February2022. The forecasts are from the 00z 7 February 2022 GFS ensemble.

Persistent troughing/negative geopotential height anomalies across Greenland will continue to support ridging/positive geopotential height anomalies across much of Central and Southern Europe with troughing/negative geopotential height anomalies across Northern Europe this period (**Figure 8**). This pattern favors more normal to above normal temperatures across much of Europe including the UK with normal to below normal temperatures limited across Scandinavia due to low geopotential heights (**Figures 9**). With previous ridging/positive geopotential height anomalies centered over Western Siberia predicted to push north into the Arctic, will favor more expansive troughing/negative geopotential height anomalies across Central and Eastern Asia this period (**Figure 8**). This pattern favors normal to above normal temperatures across Western Asia with normal to below normal temperatures becoming more widespread across Central and Eastern Asia this period (**Figure 9**).

GFS 11-15 Day Forecast T2m Anomaly
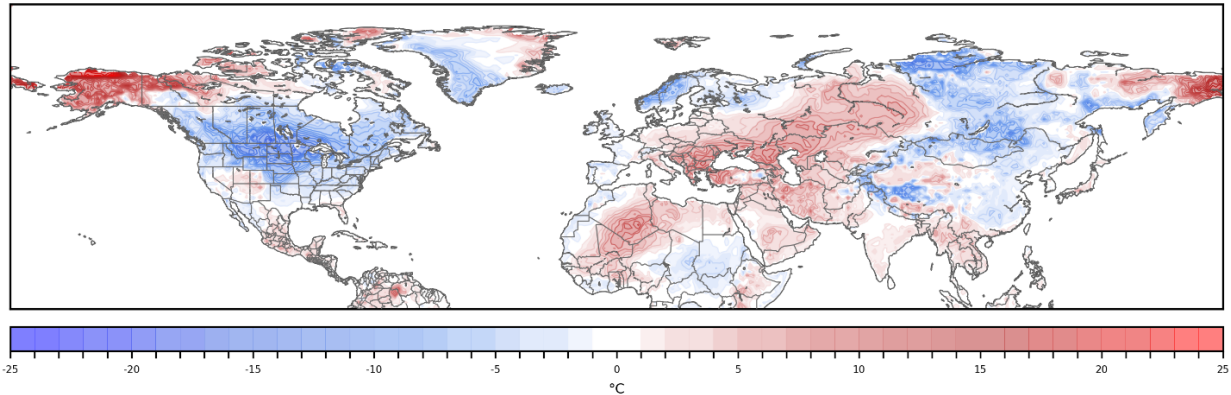**INIT: 00Z 02/07/2022   FCST: 02/18/2022 to 02/22/2022**

Figure 9. Forecasted surface temperature anomalies (°C; shading) from 18 – 22 February 2022. The forecasts are from the 00z 7 February 2022 GFS ensemble.

Ridging/positive geopotential height anomalies in the Gulf of Alaska are predicted to continue spreading north into Alaska and the Beaufort Sea anchoring troughing/negative geopotential height anomalies in eastern North America this period (**Figure 8**).   This pattern favors normal to above normal temperatures across Alaska, Northern Canada and the Southwestern US with normal to below normal temperatures in Central and Southern Canada and the Northern and Eastern US except for Florida (**Figure 9**).

GEFS 11-15 Day Forecast SNOD Change
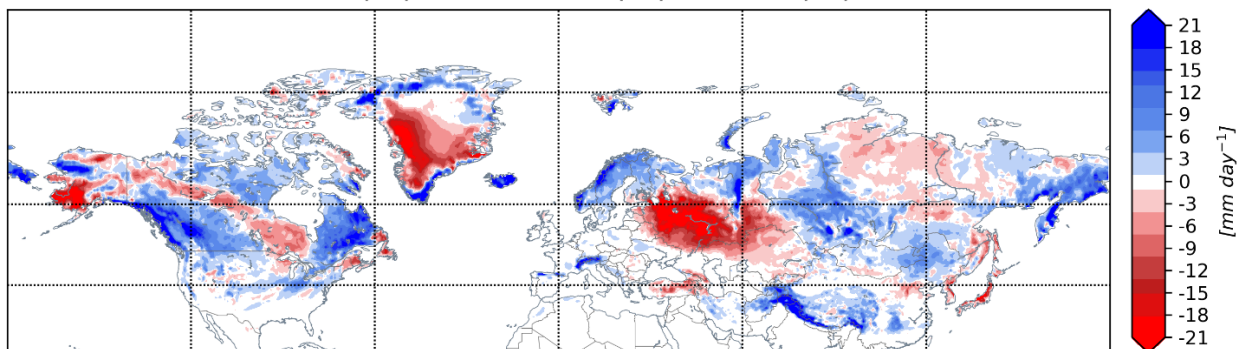**INIT: 00Z 02/07/2022   FCST: 02/18/2022 to 02/22/2022**

Figure 10. Forecasted snow depth changes (mm/day; shading) from 18 – 22 February 2022. The forecast is from the 00Z 7 February 2022 GFS ensemble.

Troughing and/or cold temperatures are predicted to support possible new snowfall across northern Eurasia, the higher elevations of Southern Europe, Central and East Asia and the higher elevations of Central Asia while milder temperatures promote snowmelt across Eastern Europe and Western Asia (**Figure 10**). Troughing and/or cold

temperatures are predicted to support possible new snowfall across much of Western and Eastern Canada and the Northern US while milder temperatures promote snowmelt across the Southwestern Alaska, Central Canada and Labrador (**Figure 10**).

Longer Term

30–day

The latest plot of the polar cap geopotential height anomalies (PCHs) currently shows cold/negative PCHs throughout the stratosphere and the troposphere (**Figure 11**). The negative departures are predicted to deepen in the upper stratosphere next week while normal to slightly warm/positive PCHs are predicted to return to the mid-troposphere (**Figure 11**). This week the cold stratospheric PCHs finally coupled with the troposphere but the GFS is predicting that it will be brief with a possible another coupling to end the month of February. I will add though that the GFS has backed off on the duration of stratosphere troposphere coupling of cold/negative PCHs that I tweeted out yesterday.
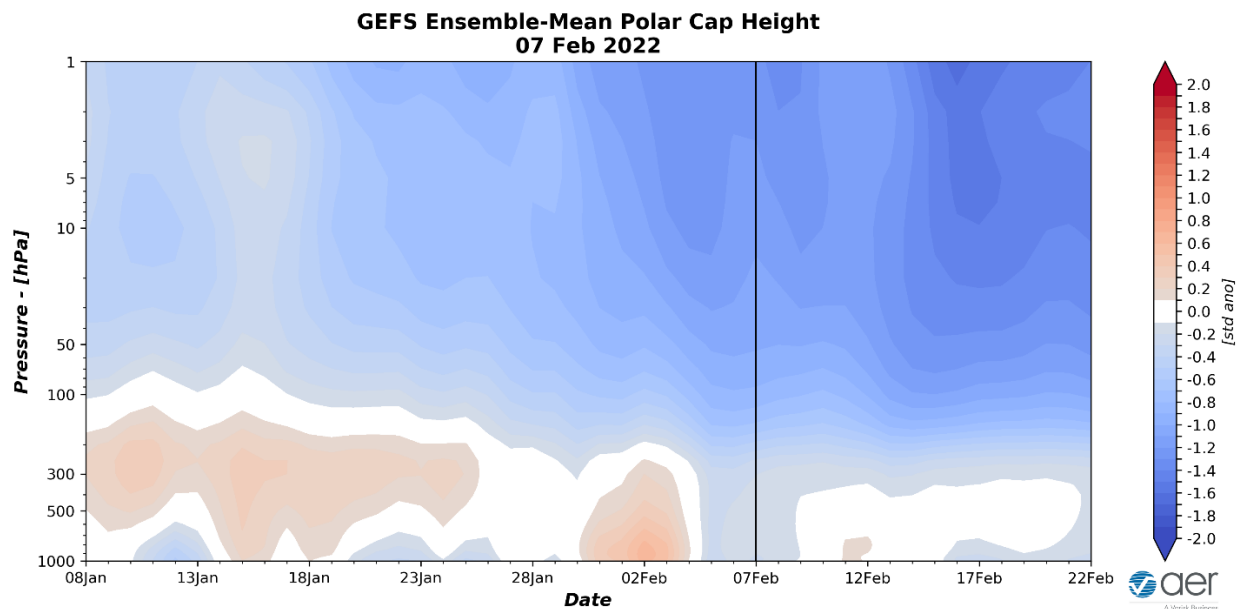

Figure 11. Observed and predicted daily polar cap height (i.e., area-averaged geopotential heights poleward of 60°N) standardized anomalies. The forecast is from the 00Z 7 February 2022 GFS ensemble.

The normal to below normal PCHs predicted in the lower troposphere for much of the next two weeks are consistent with the predicted positive surface AO this week (**Figure 1**). Overall, the PCHs are not indicating much stratosphere-troposphere coupling. Though as I discussed in the Impacts section, I believe that stratosphere-troposphere coupling is occurring through one or two stretched PVs this month.

The vertical Wave Activity Flux (WAFz) from the troposphere to the stratosphere or poleward heat transport in the stratosphere is predicted to remain mostly below normal through late-February (**Figure 12**). The negative WAFz anomalies predicted the next two weeks will continue to support a relatively strong PV through mid-February as suggested by the relatively cold stratospheric PCHs. Though again not all strong PVs are created equal, and I think a stretched polar vortex is important as well.
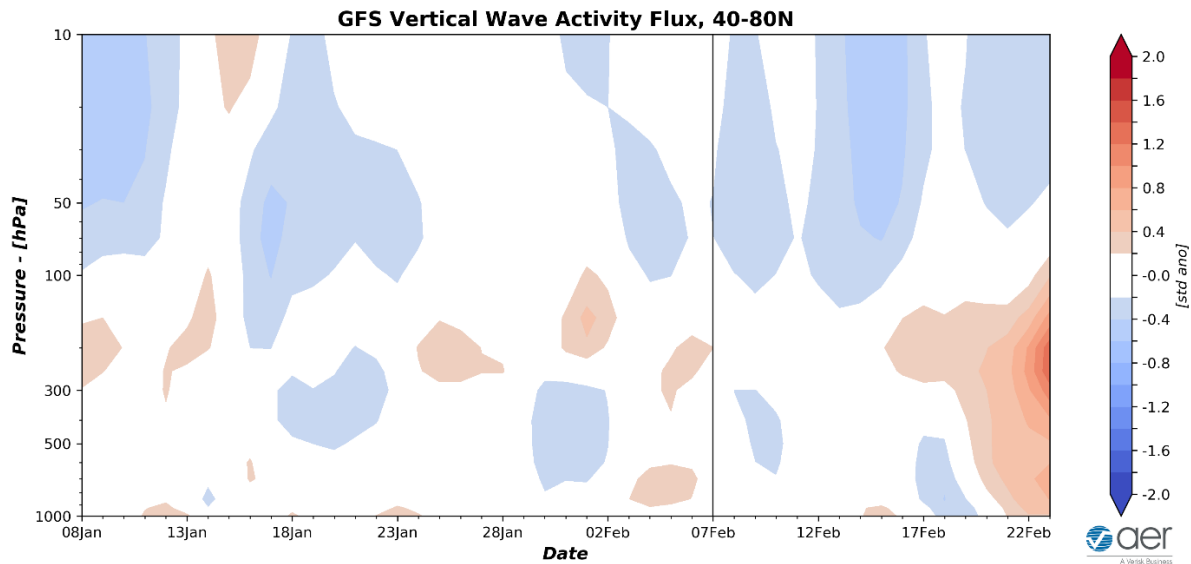

Figure 12. Observed and predicted daily vertical component of the wave activity flux (WAFz) standardized anomalies, averaged poleward of 40-80°N. The forecast is from the 00Z 7 February 2022 GFS ensemble.

Though zonally averaged WAFz has remained weak, a fourth stretched stratospheric PV since early January is currently underway with the PV centered between the North Pole and Greenland with ridging centered between the Aleutians and the Dateline. The previously more circular configuration of the PV is becoming more stretched (**Figure 13**). However, the PV perturbation is relatively minor, allowing the PV to remain relatively strong resulting in a current positive stratospheric AO (**Figure 11**).
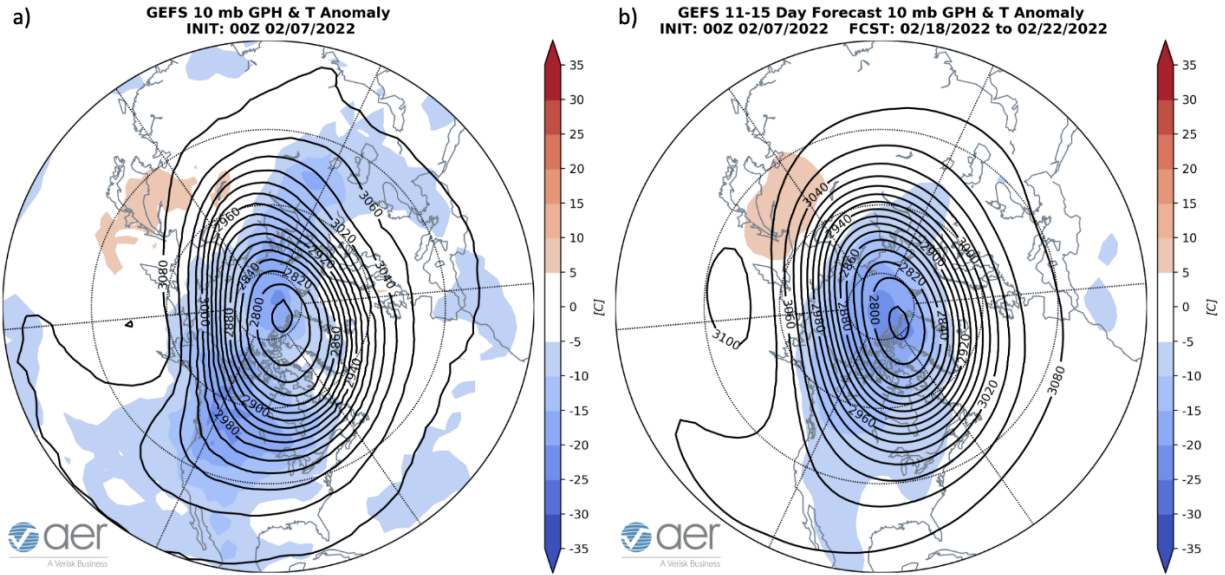
Figure 13. (a) Initialized 10 mb geopotential heights (dam; contours) and temperature anomalies (°C; shading) across the Northern Hemisphere for 7 February 2022. (b) Same as (a) except forecasted averaged from 18 – 22 February 2022. The forecasts are from the 00Z 7 February 2022 GFS model ensemble.

The below normal WAFz is predicted to allow the PV to strengthen and become quite strong with the PV remaining centered close to the North Pole with a persistent positive stratospheric AO the next two weeks (**Figure 11**). However, the GFS is predicting yet another (and if you are keeping count - fifth) stretched PV event the third week of February with cross polar flow from Siberia to eastern North America with new warming and ridging propagating from Eastern Siberia towards Alaska (**Figure 13**). The strengthening stratospheric PV could couple again with the surface commencing a relatively mild period across the US towards the end of February.

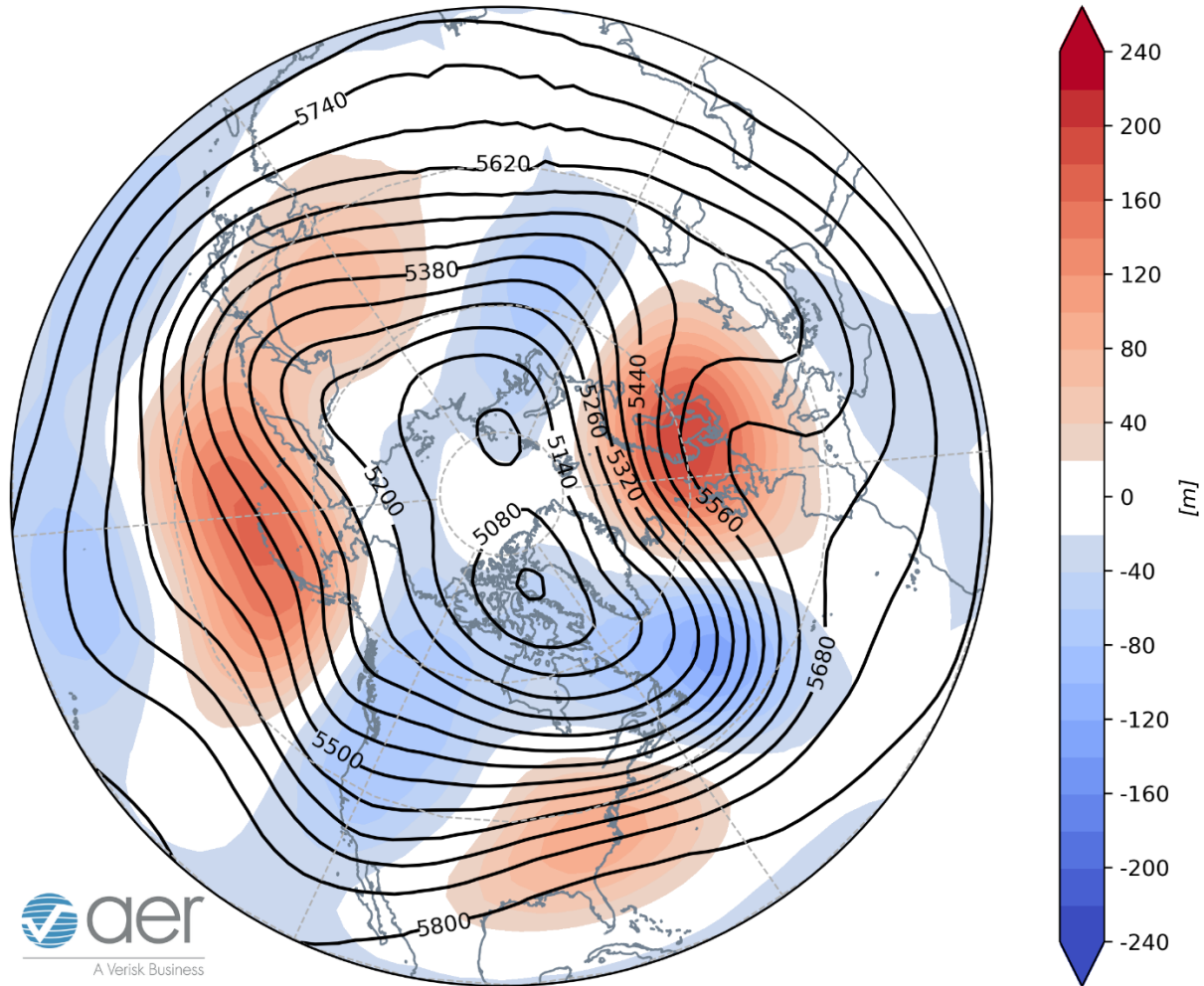**CFS 500 hPa Forecast Anomaly Mar 2022
Valid as of 07 Feb 2022**

Figure 14. Forecasted average 500 mb geopotential heights (dam; contours) and geopotential height anomalies (m; shading) across the Northern Hemisphere for March 2022. The forecasts are from the 00Z 7 February 2022 CFS.

I include in this week's blog the monthly 500 hPa geopotential heights (**Figure 14**) and surface temperatures for March (**Figure 15**) from the Climate Forecast System (CFS; the plots represent yesterday's four ensemble members). The forecast for the troposphere is centered over Northern Europe, East Asia, west of the Aleutians and the Eastern US with troughing across Southern Europe, Western Asia and western North America (**Figure 14**).   This pattern favors seasonable to relatively warm temperatures across Northern Europe, Western Asia, Alaska, much of Canada and the Western US with seasonable to relatively cold temperatures across Southern Europe, Eastern Asia, the Southern and Eastern US (**Figure 15**).
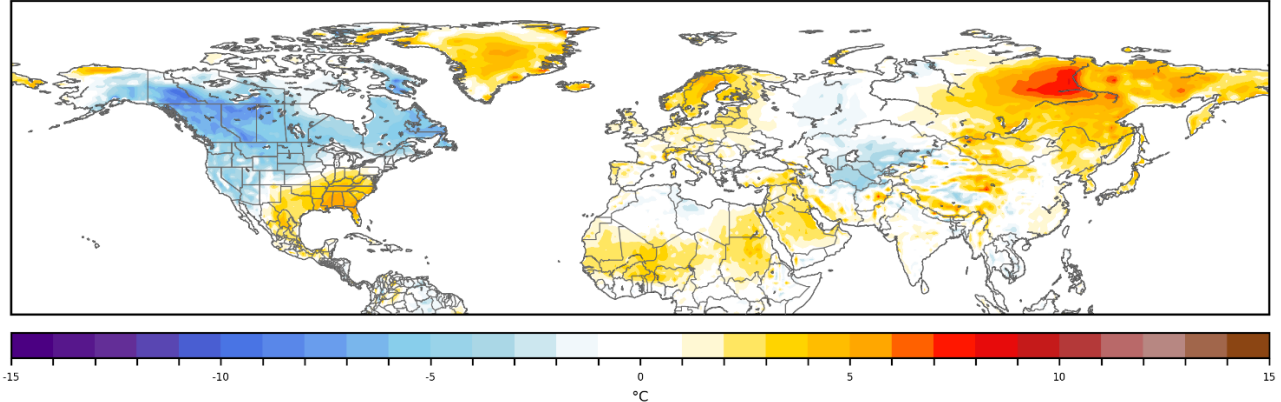
Figure 15. Forecasted average surface temperature anomalies (°C; shading) across the Northern Hemisphere for March 2022. The forecasts are from the 00Z 7 February 2022 CFS.

Surface Boundary Conditions

Arctic Sea ice

Arctic sea ice is growing but remains below normal mostly in Sea of Okhotsk and recently in the Barents Sea. Overall sea ice is relatively extensive compared to recent winters, though it remains relatively thin. In the Barents-Kara Seas extent is close to normal. Below normal sea ice in the Barents-Kara seas favors cold temperatures in Central and East Asia, however this topic remains controversial. Recent research has shown that the regional anomalies that are most highly correlated with the strength of the stratospheric PV are across the Barents-Kara seas region where low Arctic Sea ice favors a weaker winter PV. Low sea ice in the Chukchi, Beaufort and Bering seas may favor colder temperatures across North America but has not been shown to weaken the PV.
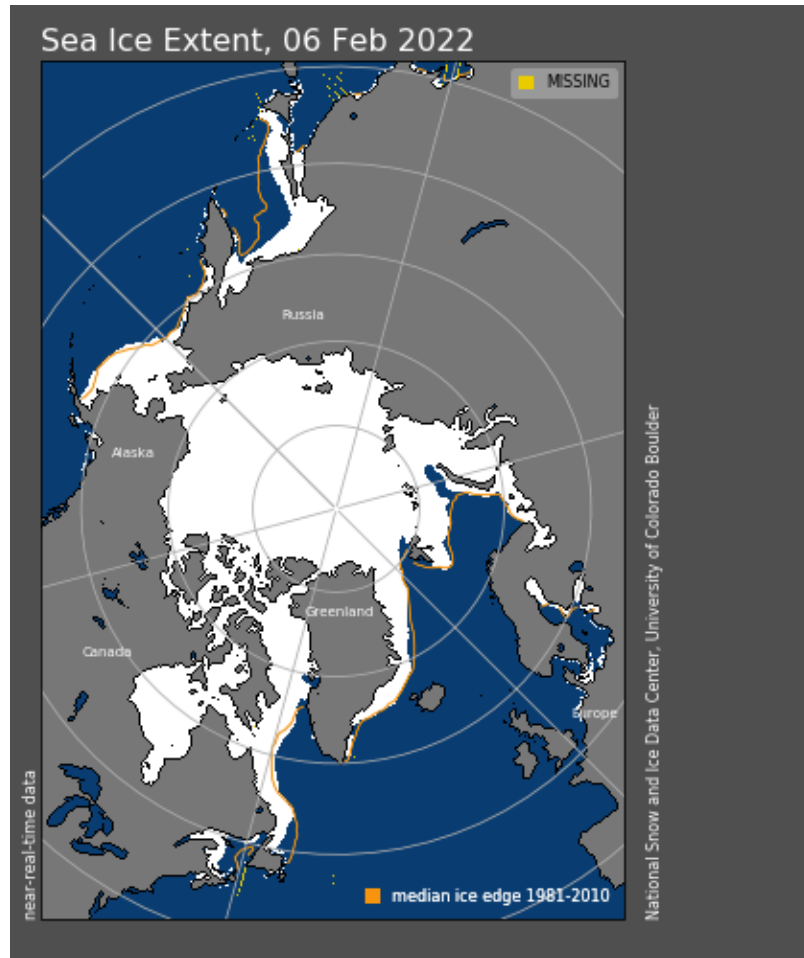
Figure 16. Observed Arctic Sea ice extent on 6 February 2022 (white). Orange line shows climatological extent of sea ice based on the years 1981-2010. Image from the National Snow and Ice Data Center (NSIDC).

SSTs/El Niño/Southern Oscillation

Equatorial Pacific Sea surface temperatures (SSTs) anomalies are below normal, and we continue to observe weak to possibly moderate La Niña conditions (**Figure 17**) and La Niña conditions are expected through the winter. Observed SSTs across the NH remain well above normal especially in the central North Pacific (west of recent years), the western North Pacific and offshore of eastern North America though below normal SSTs exist regionally especially in the North Pacific. Not my expertise but the SST pattern in the North Pacific is strongly resembling a negative Pacific Decadal Oscillation (PDO) pattern that favors colder temperatures across northwestern North America and milder temperatures across southeastern North America.
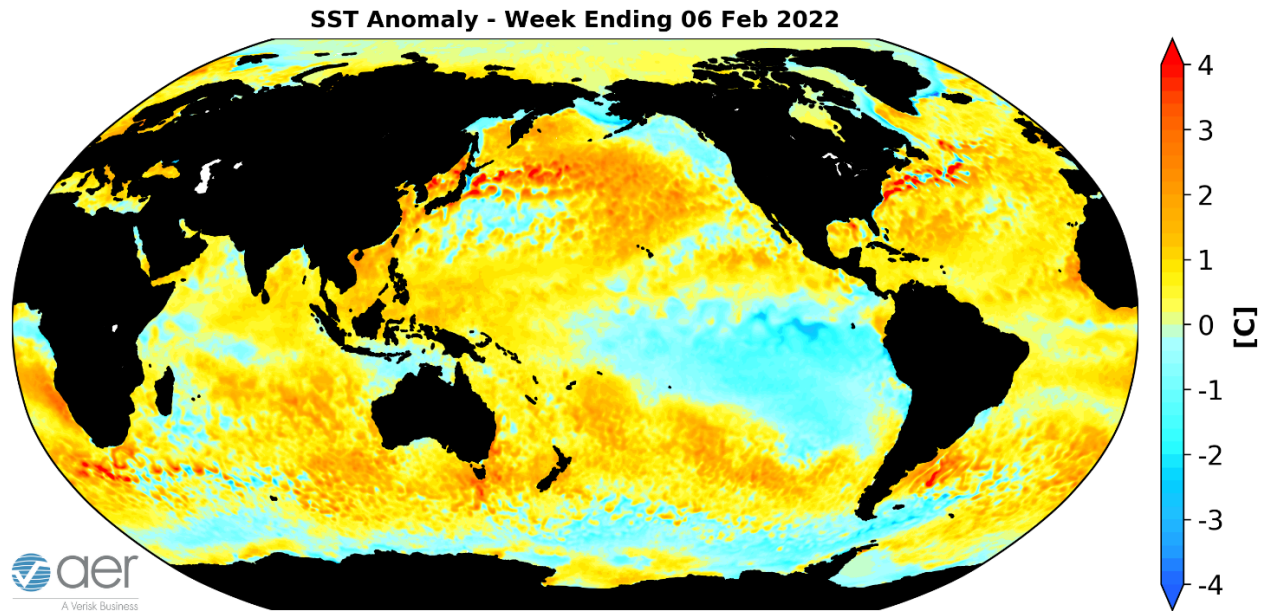
SST Anomaly - Week Ending 06 Feb 2022

Figure 17. The latest weekly-mean global SST anomalies (ending 6 February 2022). Data from NOAA OI High-Resolution dataset.

Currently the Madden Julian Oscillation (MJO) is on the border of phases two and three (**Figure 18**). The forecasts are for the MJO to weaken where either no phase is favored or weak phases three and four. MJO phases two and three favor ridging in the Gulf of Alaska with downstream troughing across the interior of North America. But admittedly this is outside of my expertise.
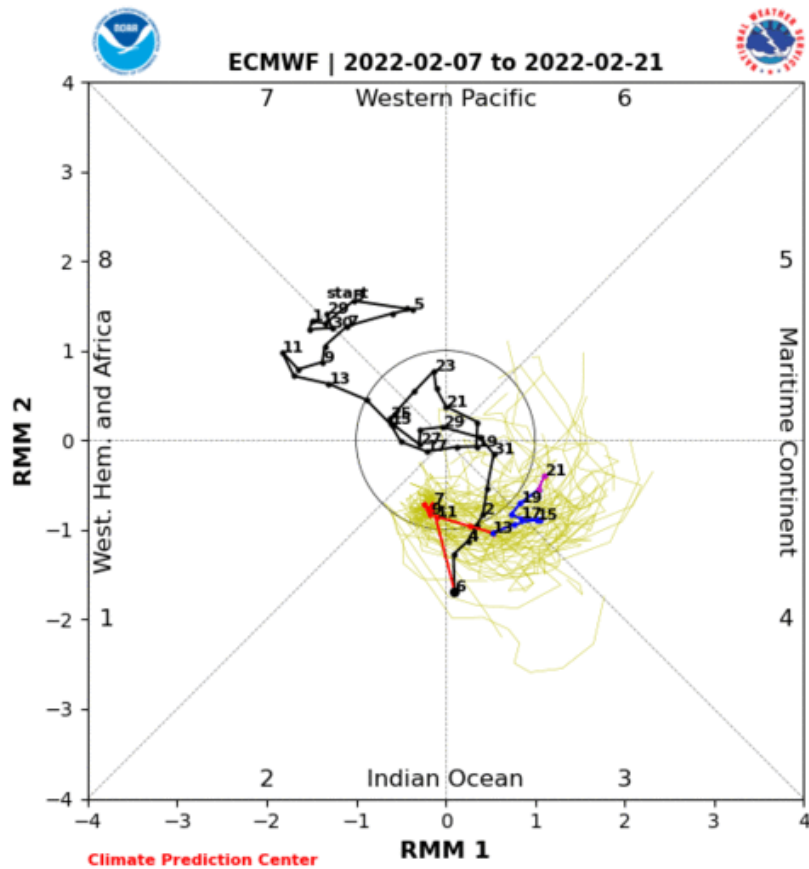
Figure 18. Past and forecast values of the MJO index. Forecast values from the 00Z 7 February ECMWF model. Yellow lines indicate individual ensemble-member forecasts, with the green line showing the ensemble-mean. A measure of the model "spread" is denoted by the gray shading. Sector numbers indicate the phase of the MJO, with geographical labels indicating where anomalous convection occurs during that phase. Image source: http://www.atmos.albany.edu/facstaff/roundy/waves/phasediags.html

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

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