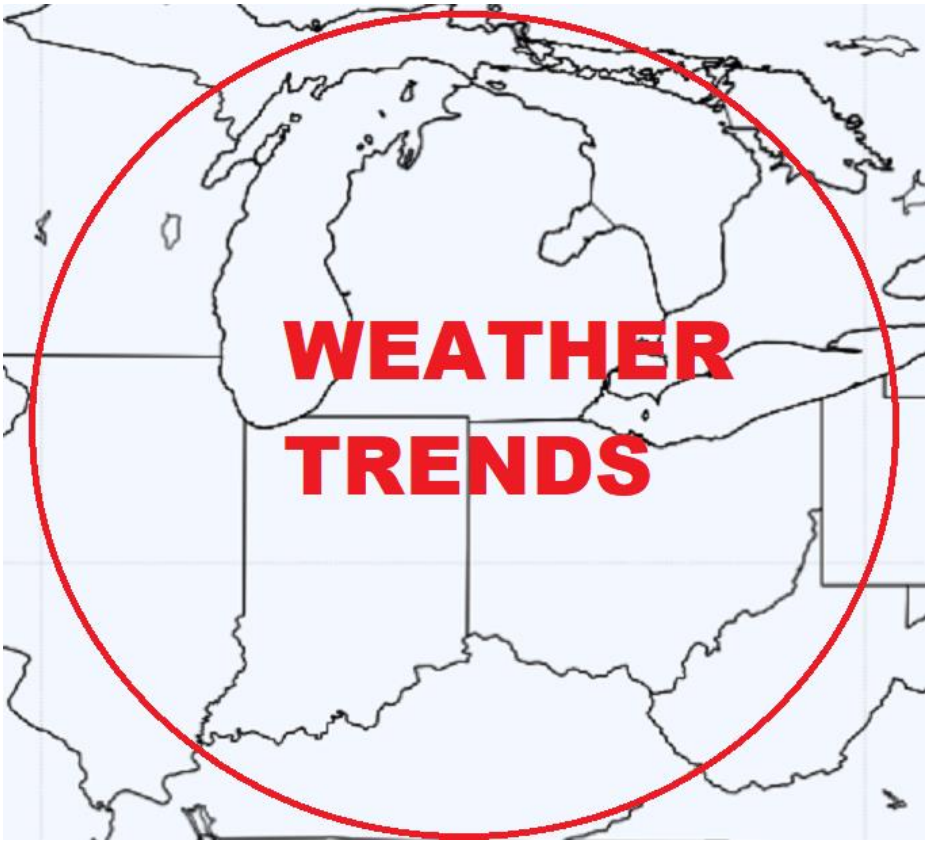


OHIO, MICHIGAN AND INDIANA PATTERN TRENDS UPDATE

ABOVE NORMAL AVERAGES WHICH HAVE DOMINATED MOST OF THE OH/IN/MI REGION DURING MARCH SEEMS LIKELY TO CONTINUE, ON AVERAGE, THROUGH APRIL AND BEYOND

1. In the short-term there is room for a period of cooler than normal conditions, but the large-scale pattern continues to signal milder than normal conditions are the way to go for at least April, and probably beyond…

2. While I am favoring a warmer than normal pattern overall, the nature of the Northern Hemispheric flow pattern is not without some cool potential. But at least right now, there does not appear to be a mechanism to lock in an extended cool period. This means cool days will come and go, but when the pattern is averaged out over 15 to 30 day periods, it should have a warm bias.

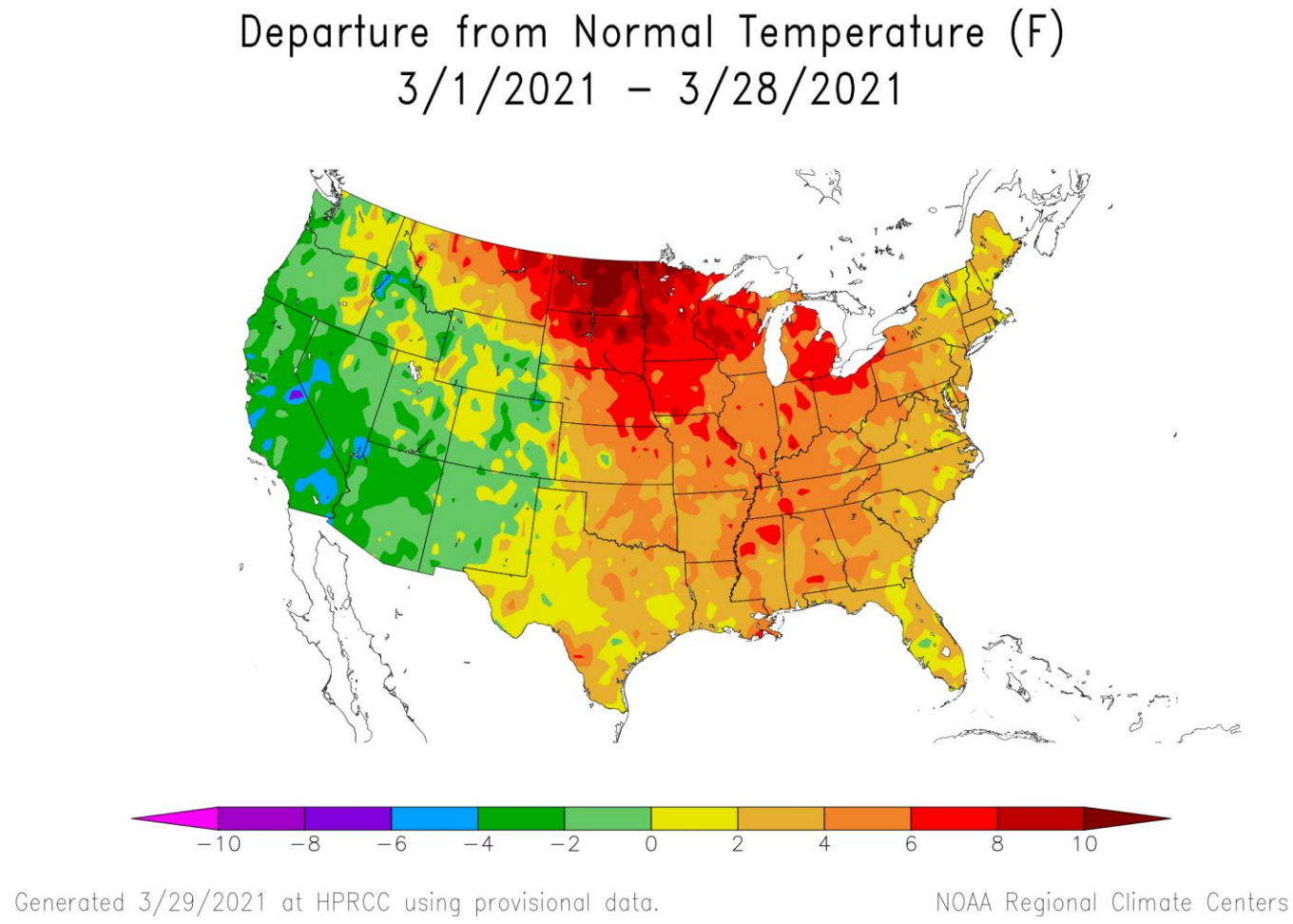
3. As for any true early summer heat, there are not any obvious signals for a hot period, just yet. In fact, there has been a tendency for the modeling to cut back on the warm anomaly projected for the May through August period. Modeling still likely the late spring and summer period running above normal, but continues to push it a bit closer to normal…

4. The takeaway from the long-range modeling is small shifts in the upper-level flow could cause major changes to the sensible temperature outcomes across the OH/IN/MI region; a slight shift to more of a southwest flow and very warm conditions overwhelm the region, while a tad more of a northwest flow would lead to a cooler outcome?

5. The rainfall outlook is trending wetter than first thought for the late spring / summer season. Whether or not that is the product of large-scale rain events or frequent clusters of instability showers & thunderstorms, or severe weather outbreaks is not clear at the moment…

OVERVIEW DISCUSSION

Here is the March anomaly map through the 28th.



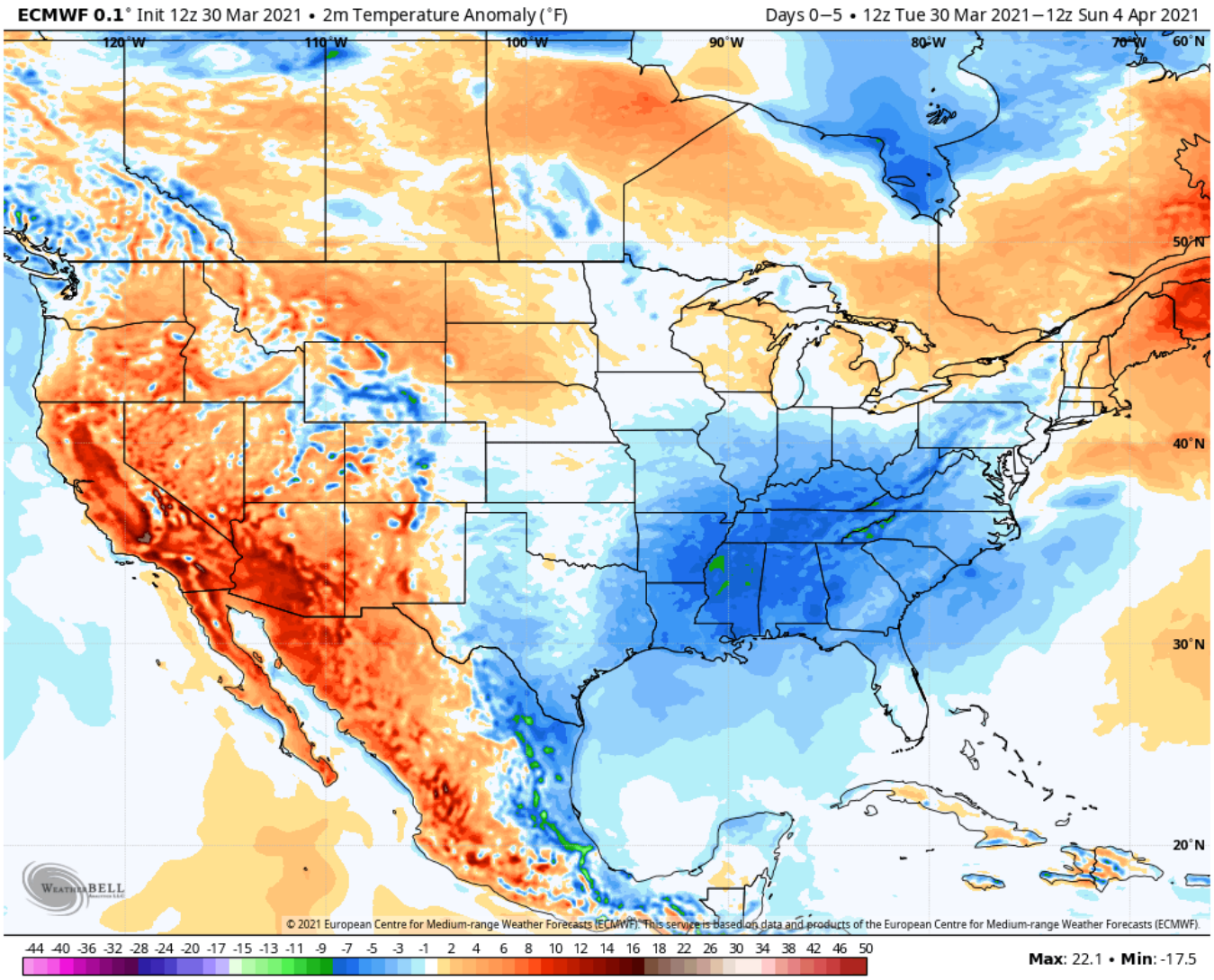
Widespread above normal temperature conditions have been noted from the Plains on eastward to the East Coast. While the core of the warmth has been across the Northern Plains (a complete reversal from the brutal cold of February), the OH/IN/MI area has been

averaging mostly in the +6 to +8 degree range, which is substantially greater than any of the extended modeling scheme were predicting.

These days it appears anytime the modeling in the extended range is going with above normal conditions, it is likely they are being under-estimated. Meanwhile, it has become common for cold predictions to be over-stated.

In the short-term, over next 5 or so, there is room for the regional temperature average to run colder than normal; again, for a 5-day average. The upper-level flow will bend strongly enough to the northwest, as a storm exits the Northeast portion of the country to allow for a solid mass of colder than to sweep into the Great Lakes and Ohio Valley regions; in fact, that is already underway. I am not looking for any unusual or record setting cold, but a freeze / frost risk will be in play and a modest spike in heating demand is expected.

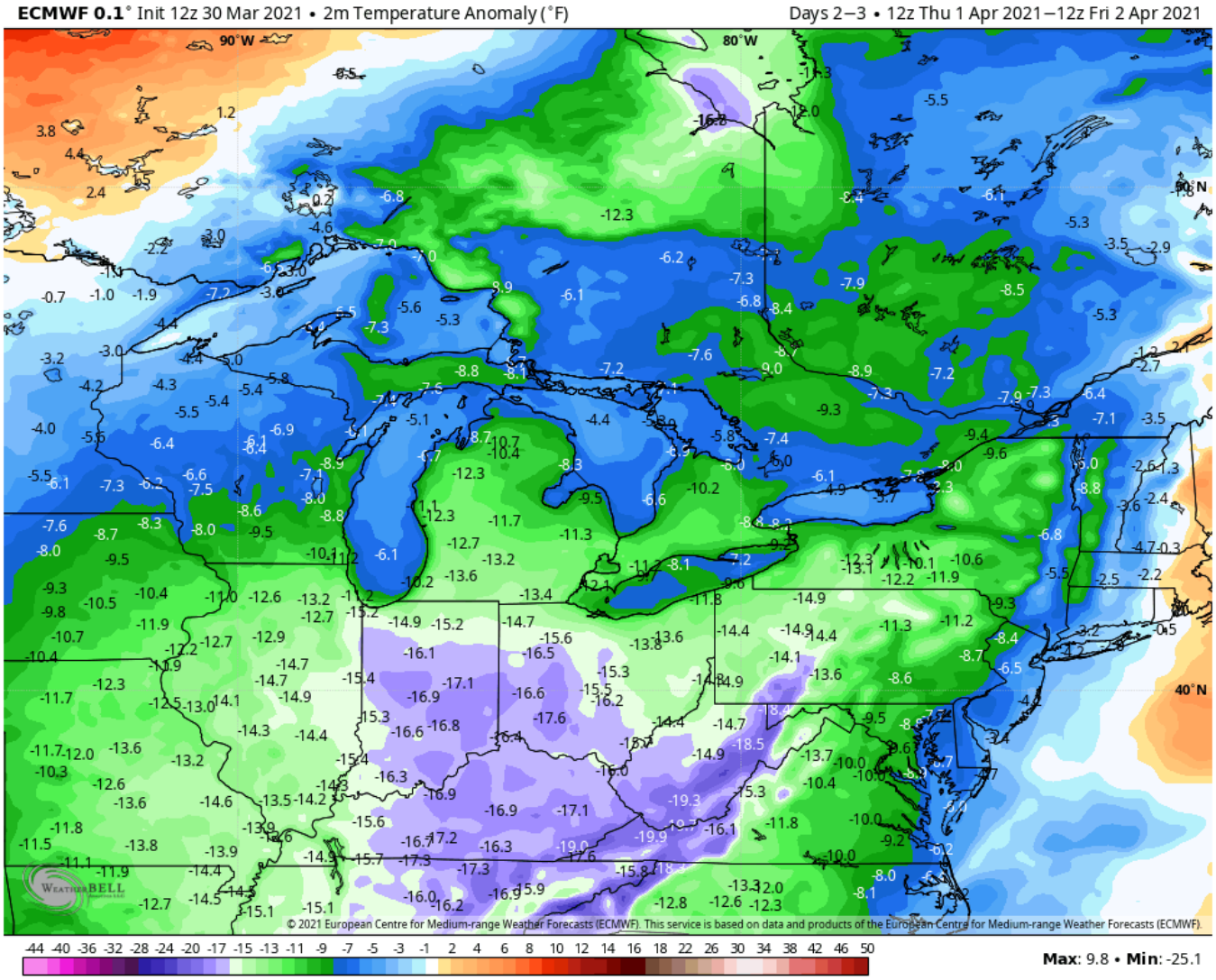
Here is the predicted 5-day mean anomaly pattern starting yesterday and ending Sunday, April 4th.



- I would actually shift the core of the coldest anomalies, now being depicted to setup across the interior Deep South, to end-up further north across the Upper Midwest and Great Lakes regions.

Again, not a major cold outbreak, but 2 or 3 days of this upcoming 5-day period will run substantially colder than normal; mainly during the Friday – Sunday period.

Here is the expected one-day anomaly projection for Thursday into Friday, April 2nd.



- Pretty impressive with widespread -10 to -19 departures showing up. This cold period will linger well into the upcoming weekend; although not nearly as cold.

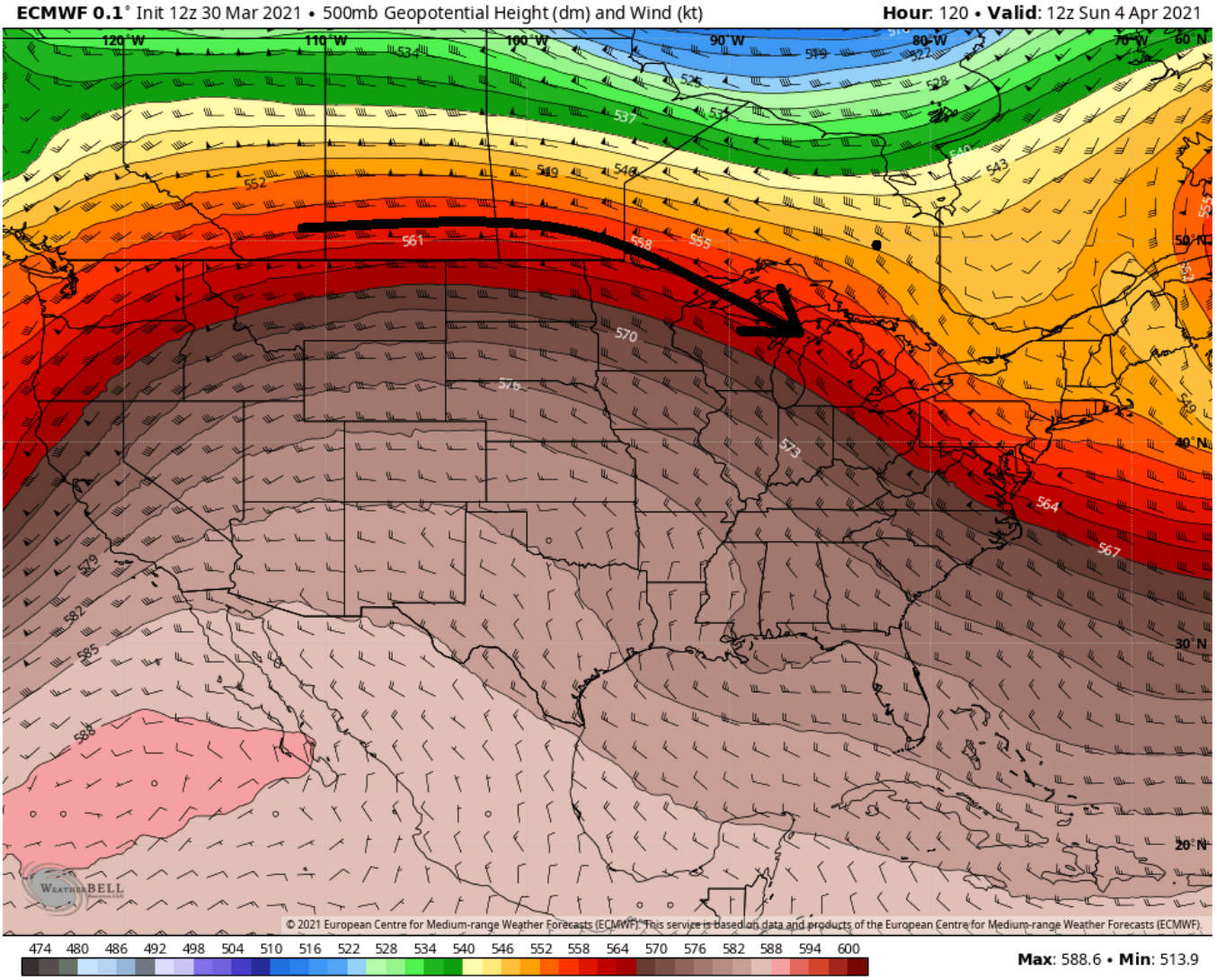
Moving forward into next week and beyond, the yoyo pattern so typical of spring, especially April, will quickly revert back to its favored mode, which means warmer than normal. As noted earlier, there has been a long-running tendency for warmer than normal

periods to over-perform. No one should be shocked if this ends up being the case once again as we move through the first full week of April, on toward the midmonth period.

The warming periods all have to do with the tendency for low-amplitude central and eastern U.S. upper-level ridging. This ridging has been common over the past month or so. Whenever it become established it forces the upper-level flow across the Midwest to become more southwesterly in nature. This in turn allow for warm air masses that have formed across the Plains to spread into the Great Lakes and Midwest areas.

A comparison of the shifting upper level flow from cool period to warm period nicely shows how this plays out.

Here is the look of the upper flow as we head from the late week period into the weekend.



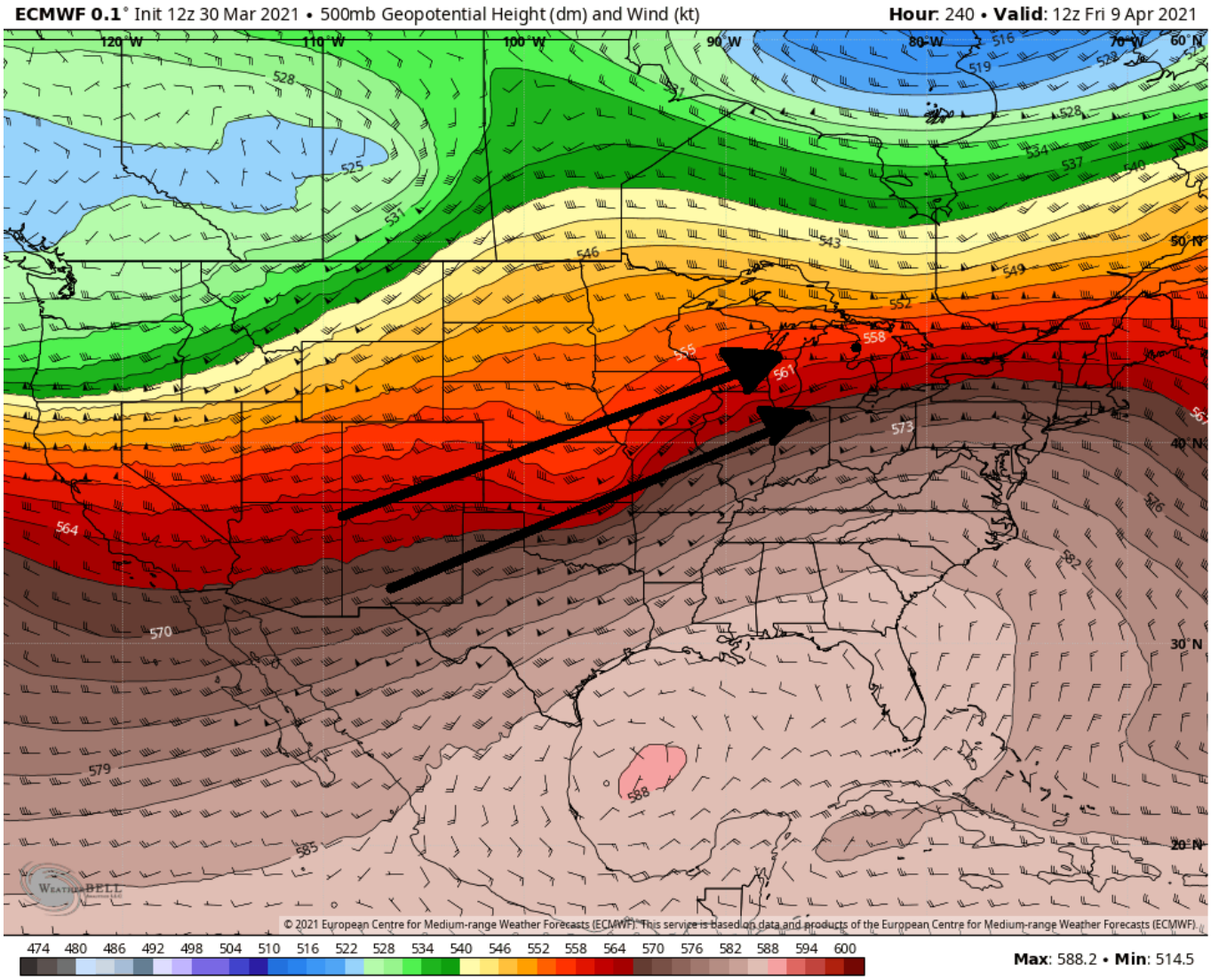
- Note that later this week a mean upper level ridge will be sitting across the eastern Rockies and western Plains.

- This further west ridge position allows for the upper level flow across the Gret Lakes and Midwest to turn more northwesterly.

- This in turn allows for colder air to come southeastward out of central Canada down into the Midwest.

- If this pattern were to stablize, we would see a prolonged period of cooler than normal conditions on into mid-April. But that is not expected to be the case.

Here is the upper flow pattern expected to develop next week!



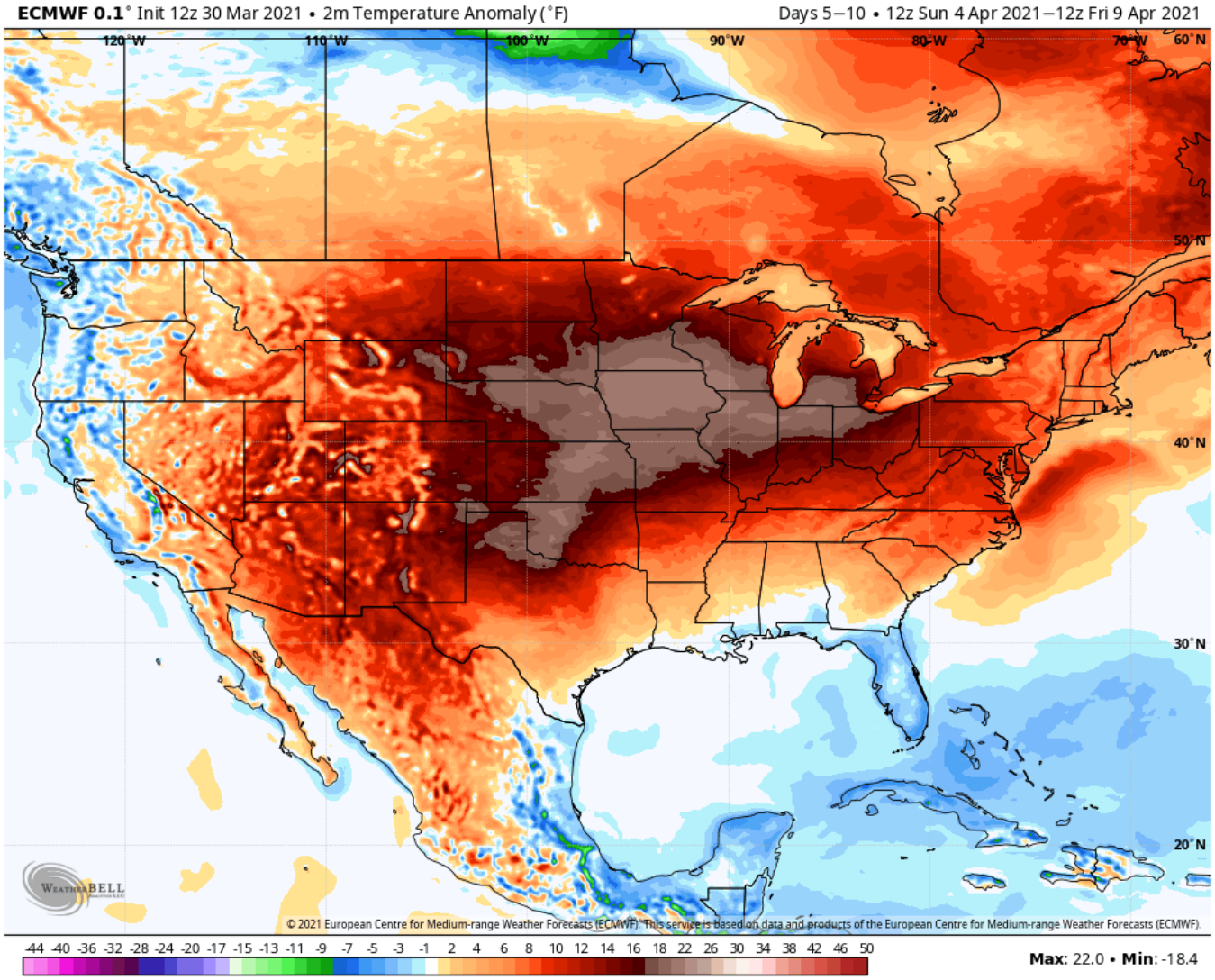
- Note the upper-level ridge is now positioned across Gulf of Mexicon and portions of the Southeast and Mid-Atlantic coastal regions.

- The combination of the ridge positions and a upper level trough sitting across the Pacific Northwest and southwestern Canada sets up a broad southwesterly flow from the Plains on north and east into the Great Lakes and Midwest.

- The flow being modeled above is a classic one to deliver warmer than normal conditions into the Great Lakes and Midwest regions. In fact, the temperature guidance usually under-estimates the amount of low-level warming. It is not uncommon for guidance to run at least 2 to 4 degrees too cool with high temperature numbers.

- This all means we are likely looking at above normal to possibly well above normal conditions devleoping next week across most of the Great Lakes and Midwest regions. I still don't think early season heat is likely, but it should get summer-like for a few days.

Here is the how the current modeling is handling the temperature anomaly prediction for next the second 5-day period of this upcoming 10-day period; Sunday, April 4th through Friday, April 9th.



- The big takeaway from the image above is the large surge of +20 degree departures sweepong eastward from the Plains into the lower Great Lakes and northern portions of the Midwest.

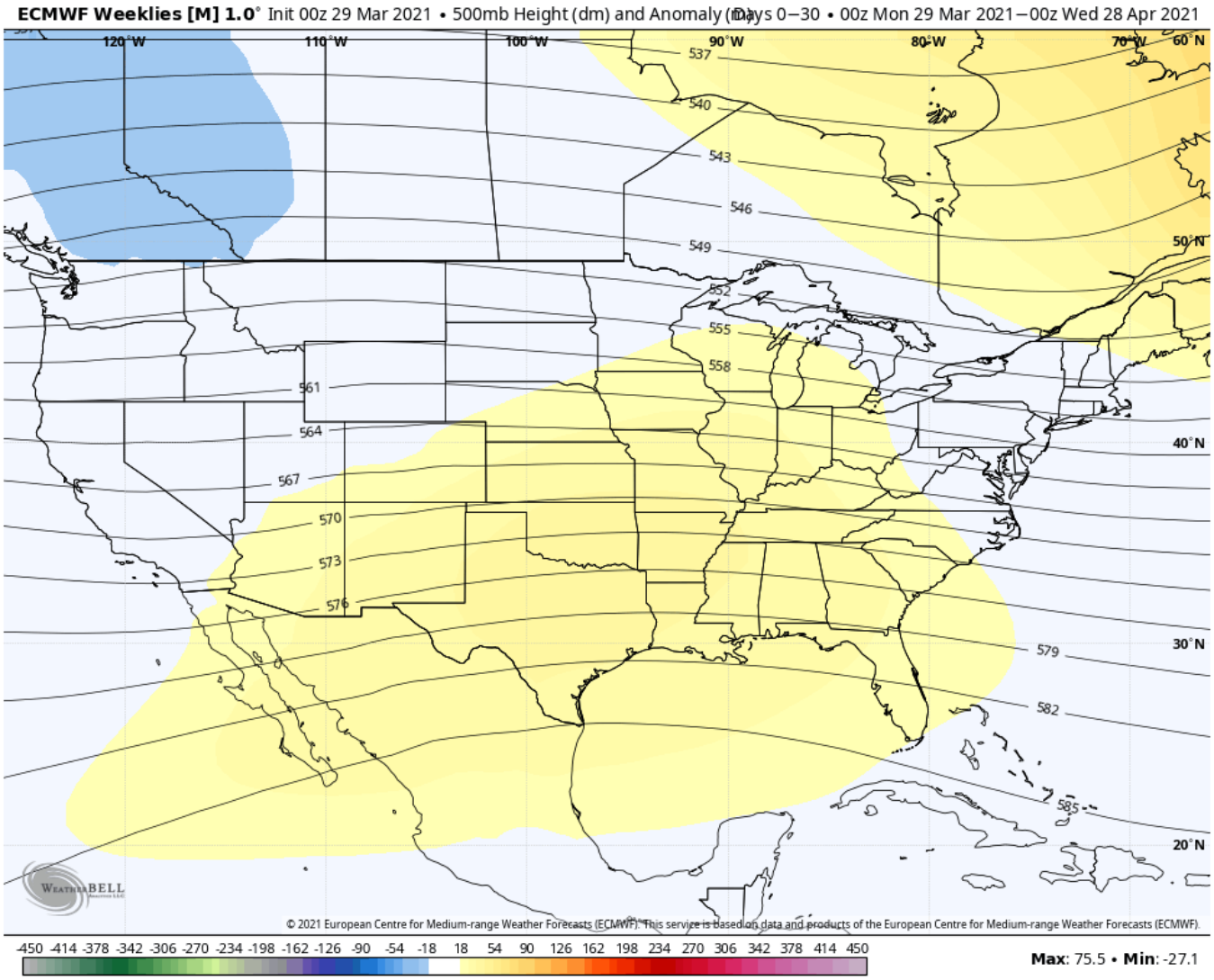
- If this verifies, we will see high temps well into the mid and upper 70's in many locations, and given the tendency for modeling to under-play the warming, I would not dismiss the chance we see some locations crack the 80 degree mark.

The question now becomes how long will this basic south and southeast ridge / Pacific Northwest trough stay in place.

The tendency for the spring to date is for the warming periods to outduel the cool periods, but the cool periods do find a way to eventually breakdown the warm pattern, if only for a few days.

The warm wins out overall, but it does get blunted from time to time.

Here is the expected mean flow pattern for the next 30 days.



- Note the low-amplitude but at least semi-permanent upper level ridge across the southern tier of the U.S. At the same time, there is a hint of a mean upper level trough sitting across offshore of the Pacific Northwest.

The interplay between these 2 features will control the temperature anomaly pattern from the central U.S. on into the Midwest and Great Lakes for the month of April.

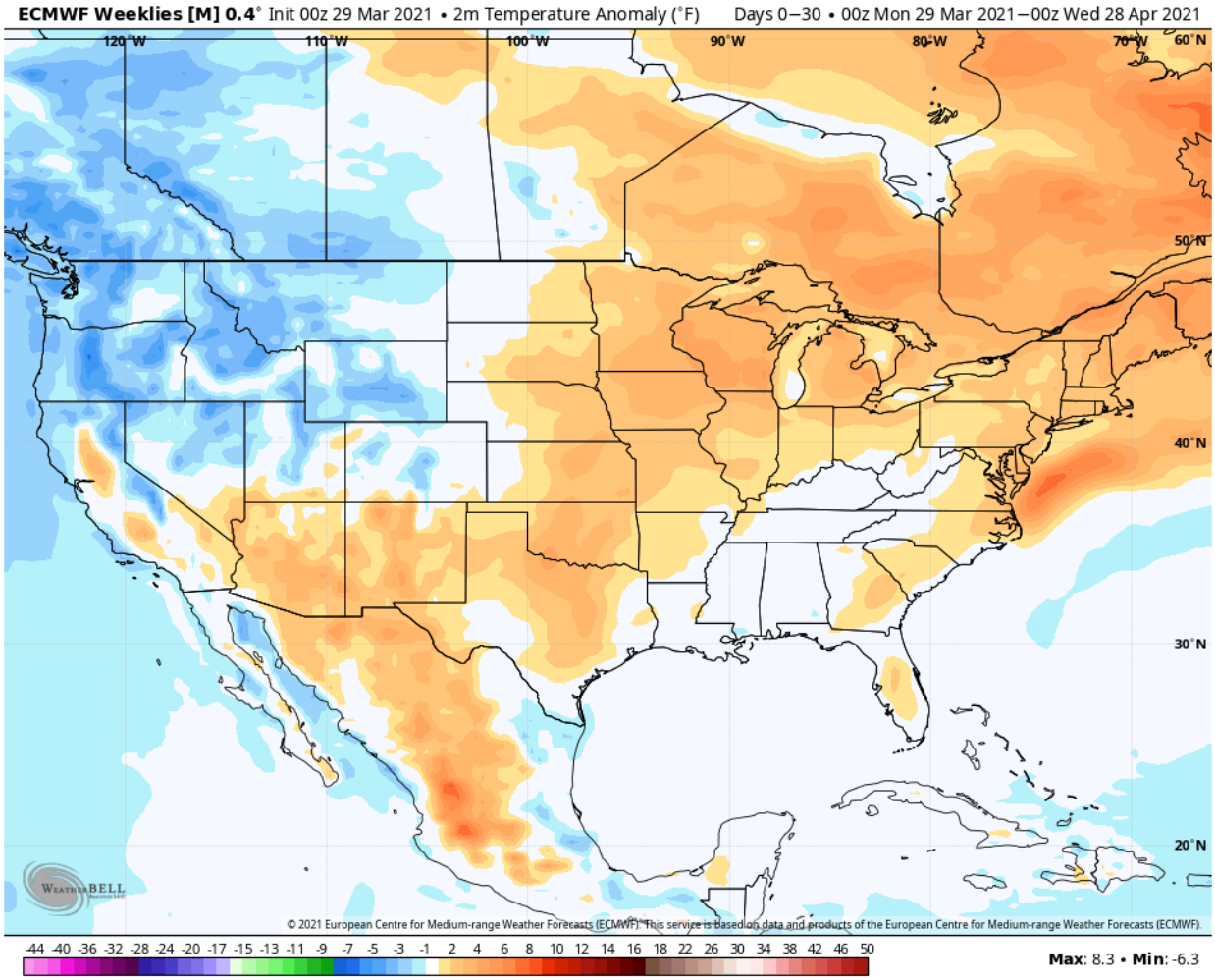
1. If it stays mostly zonal (west to east), as depicted above, temperatures will tend to average modestly milder than normal.

2. But if the either the Pacific Northwest trough or the south-central ridge amplify more than forecast, much warmer than normal conditions, similar to what is expected next week, will become common.

3. On the other hand, any tendency for the upper features to retrograde (shift westward) would allow the flow across the Northern Plains to turn more northwesterly, which in turn would open the door to cooler periods.

Right now, the modeling is basically cancelling out the 2 extemes and leaving the Great Lakes and Midwest zone in a near normal to modestly warmer than normal call.

Here is the surface temperature anomaly projection for the upcoming 30-day period.



- While we see widespread wamer than normal anomalies for the 30-day period, they do not look extreme?

- But as we have seen recently, warm periods tend to over-perform?

Given the tenuous nature of the upper level ridge position and the long running tendency for the pattern to be more progressive (not very stable), I suspect the modeling is really just averaging out the extremes.

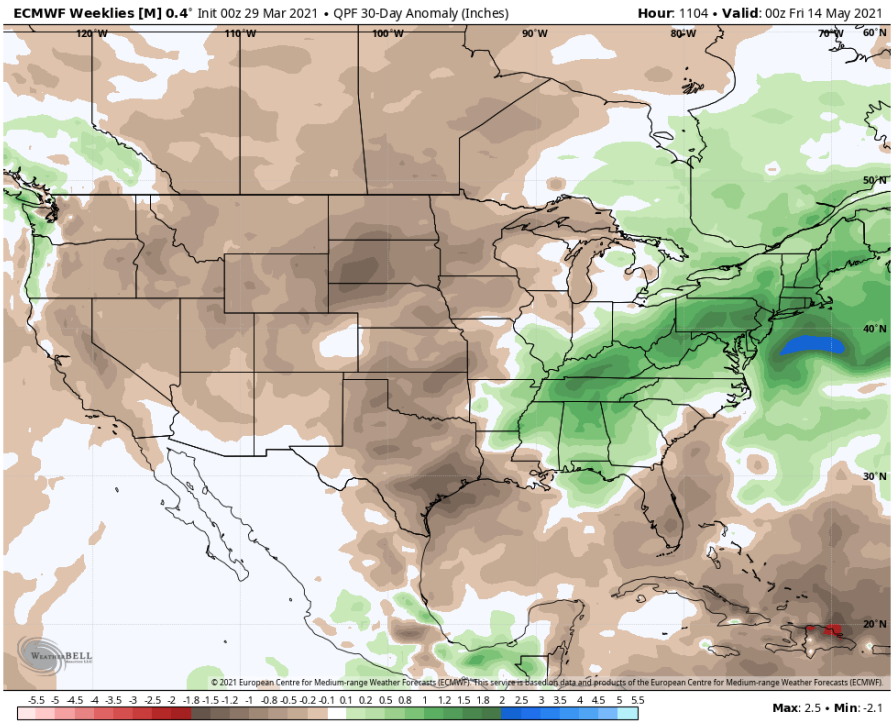
My call is for April to average warmer than normal overall; likely a bit more so than modeled above, but the upper level flow is likely to bend northwesterly from time to time, which will introduce some cool periods that offset the warming to some degree.

The most likely time frame for a meaningful period of normal to cooler than normal conditions appears to be the April 14-24 period. As we will see this week, temps can get significantly colder than normal during an overall warmer than normal pattern.

RAINFALL

Just a brief note about spring rainfall trends. Extremely wet conditions have been in play across much of the Deep South and Tennessee Valley areas this spring; mainly due to multiple severe weather outbreaks. For the most part, the main, not all, severe weather threat has stayed south of the greater OH/IN/MI areas. There are hints that the active rain / severe weather zone will try to push northward into at least southern areas of this region, as we move through April on into May.

Here is the projected rainfall anomaly for the March 29th through Thursday, May 13th period.



Note the above normal rainfall zone (green area) creeping northward into much of Ohio and parts of southern Indianna. Hopefully, any increase in rain activity comes with a minimal threat of severe thunderstorms and tornadoes.

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