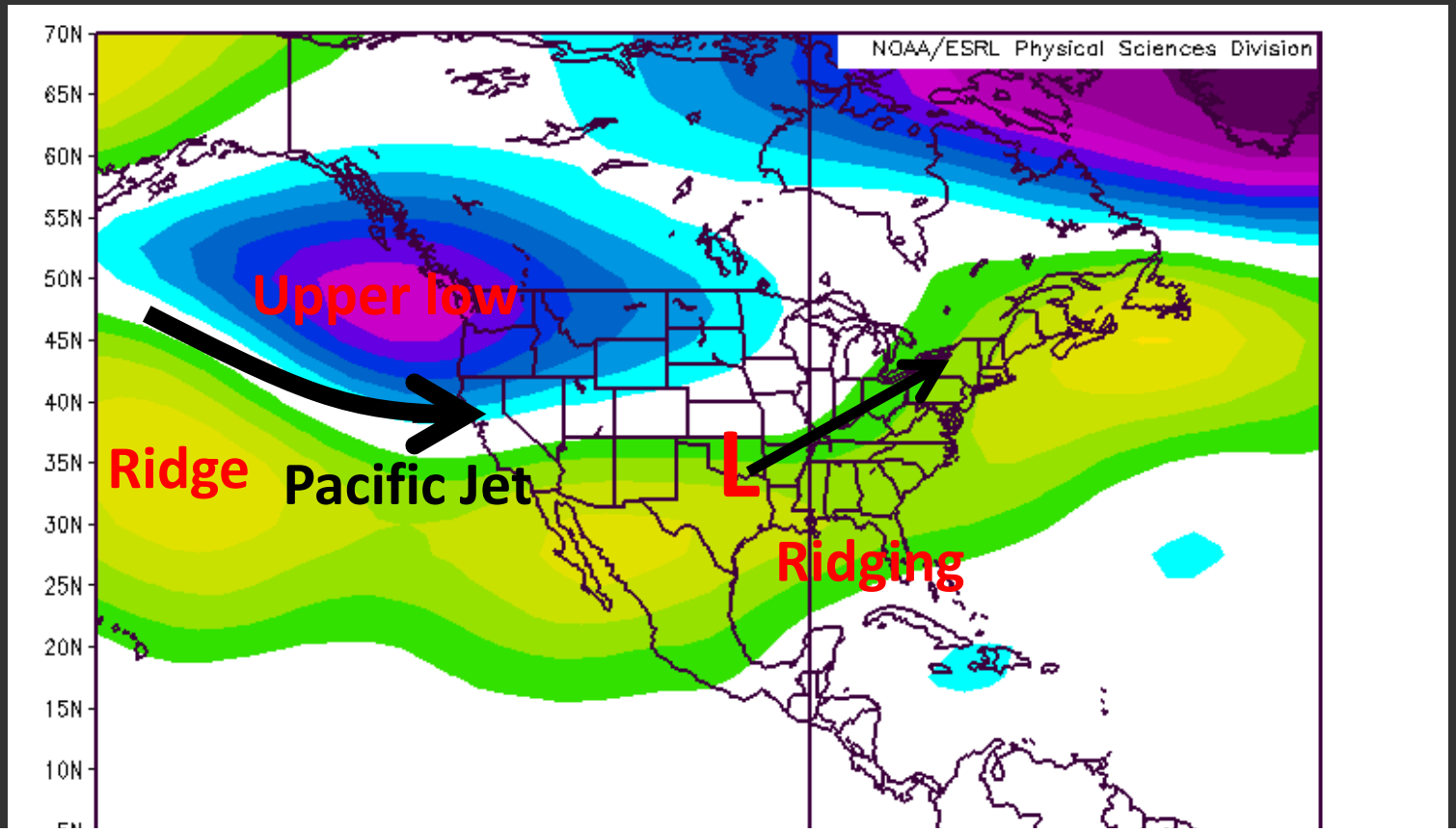
90-Day Summer Outlook

June 1 – August 30, 2011

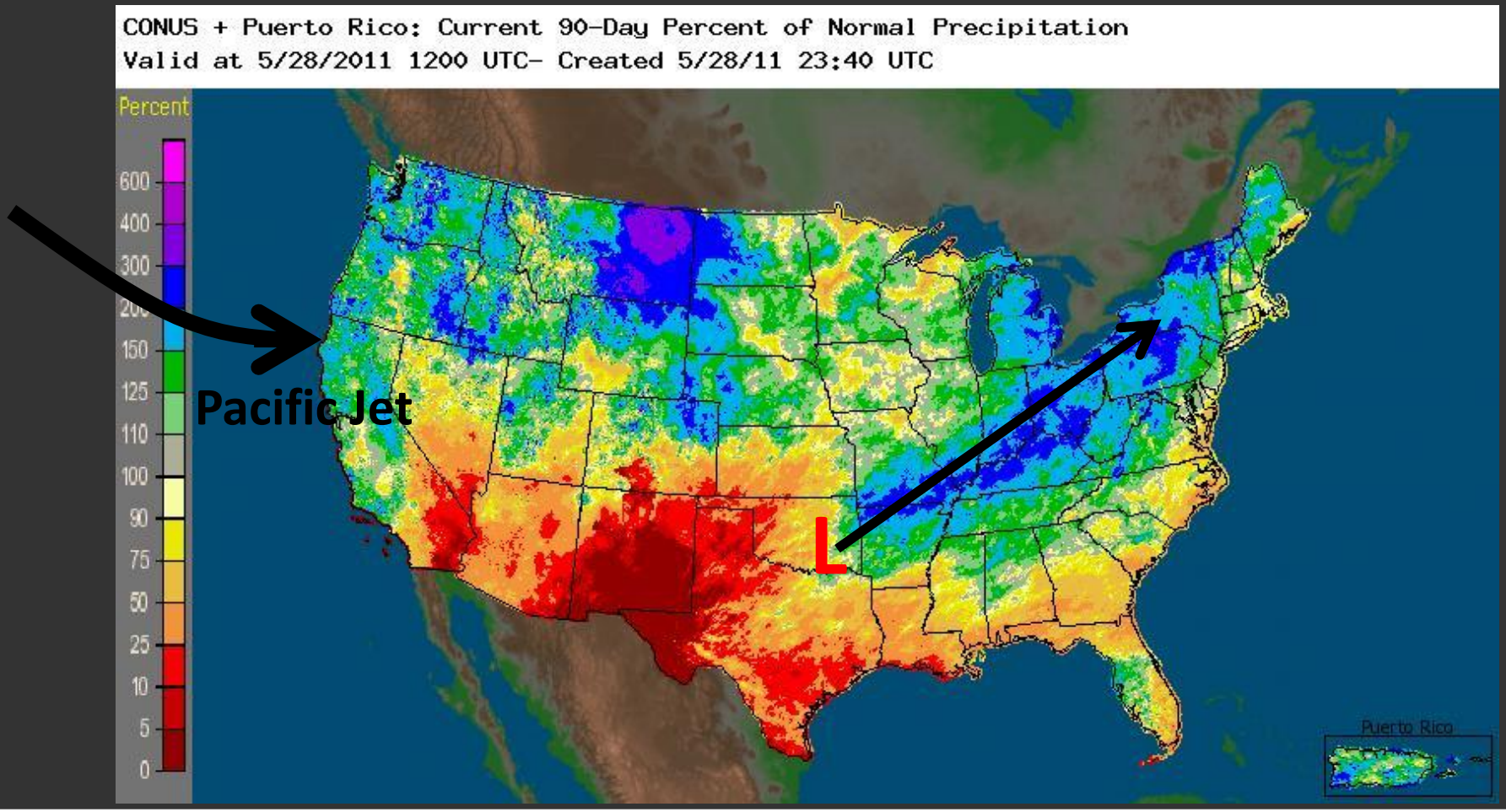
Southeast Lower Michigan

How We Got Here
Looking Back at Spring 2011



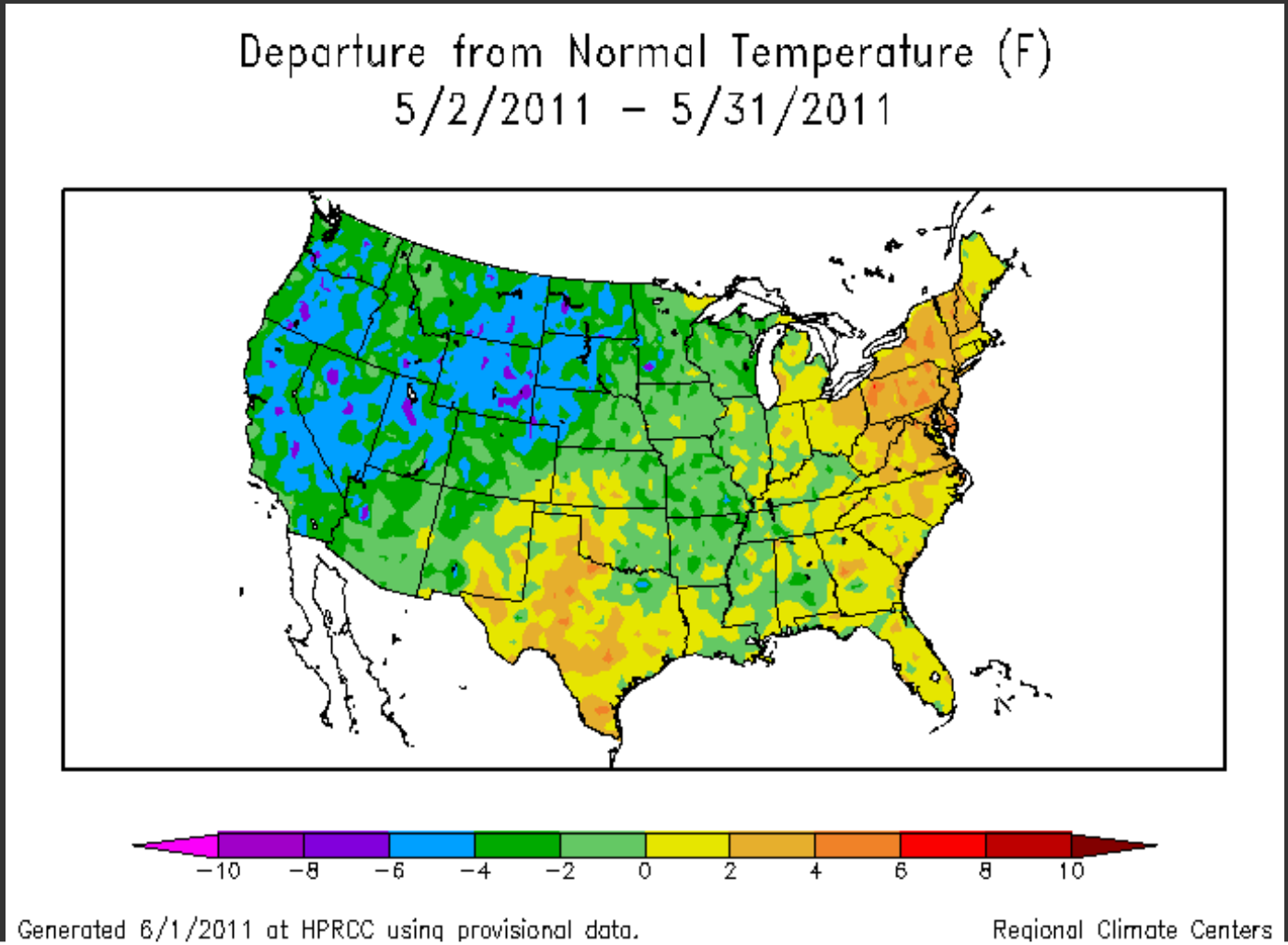
An upper low over the Pacific Northwest allowed an unusually strong Pacific jet to persist through Spring 2011. In addition to creating wet conditions across the northwest and the northern tier, it sent a continuous stream of energy east of the Rockies allowing frequent storms to track across the Lower Mississippi and Ohio Valleys. The persistent storm track was responsible for frequent high impact weather, such as record flooding and severe storms. The upper low over the northwest and ridging over the Central Pacific and the southeast are consistent with the influences of la Nina.

How We Got Here
Looking Back at Spring 2011



Signs of the persistent Pacific jet can be seen in the above normal rainfall across the north. As the persistent ridging helped to breed drought in some areas, especially west Texas and New Mexico, energy from the active jet to the north continually emerged east of the Rockies resulting in a persistent storm track and a swath of much above normal rainfall. Southeast Lower Michigan was among the areas that saw record or near-record Spring rainfall. Persistent rainfall can alter soil moisture content and impact seasonal weather patterns, especially during the summer months.

How We Got Here
Looking Back at Spring 2011



Temperatures in May (above) were similar to the overall spring pattern, with cooler (warmer) than normal temperatures roughly corresponding to areas that saw above (below) normal rainfall. Until a warm-up in late May, Michigan and some parts of the northeast were also below normal. A 90-day map that includes May is not yet available.

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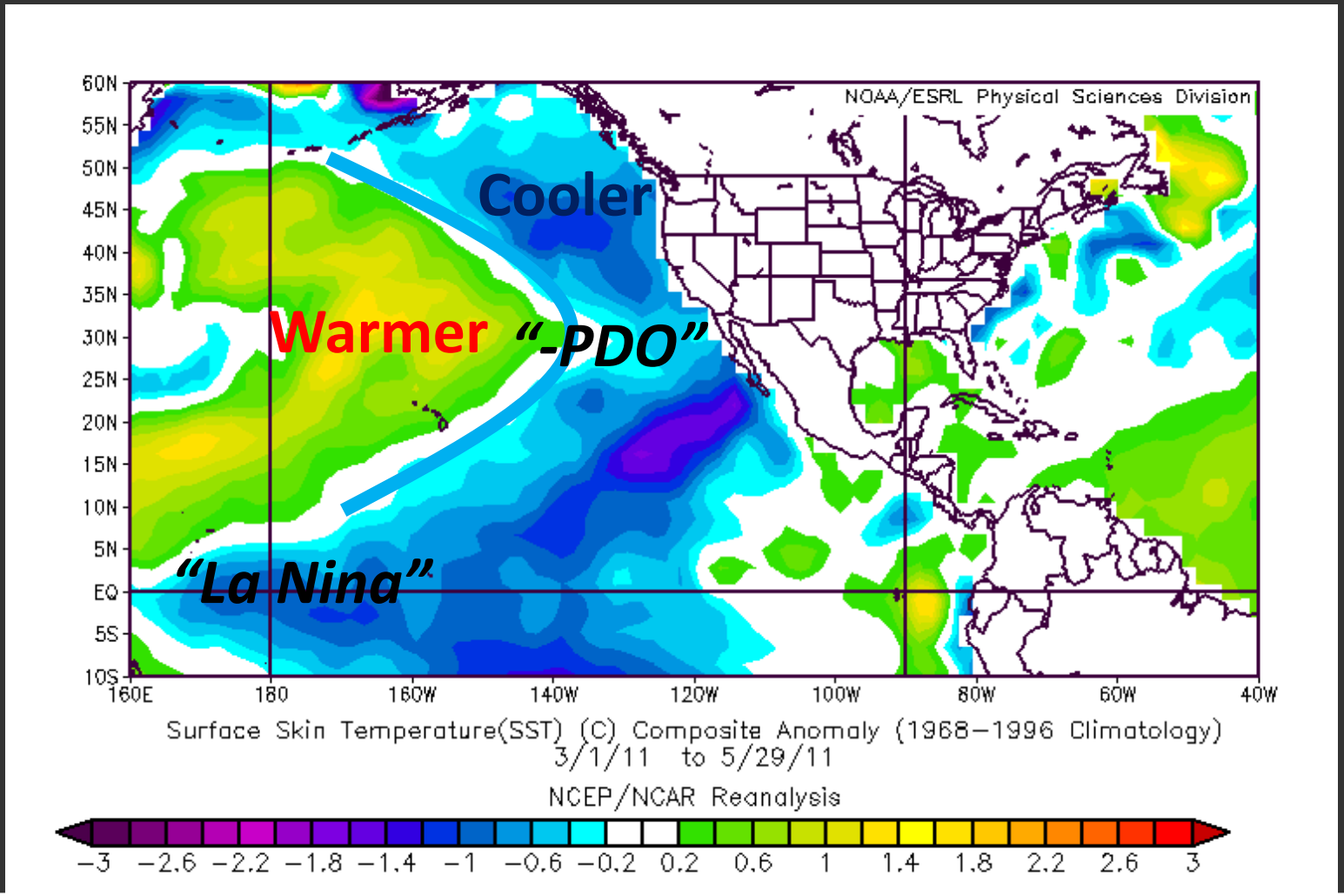
Looking Back at Spring 2011



Cooler than usual water in the tropical Pacific indicates that la Nina persisted into the Spring. In the North Pacific Basin, warm waters extending into the central Pacific are surrounded by a ring of cool water along the west coast, indicating a negative Pacific Decadal Oscillation (-PDO). La Nina and a negative PDO often reinforce each other, sometimes resulting in more pronounced or prolonged effects (see next slide).

How We Got Here
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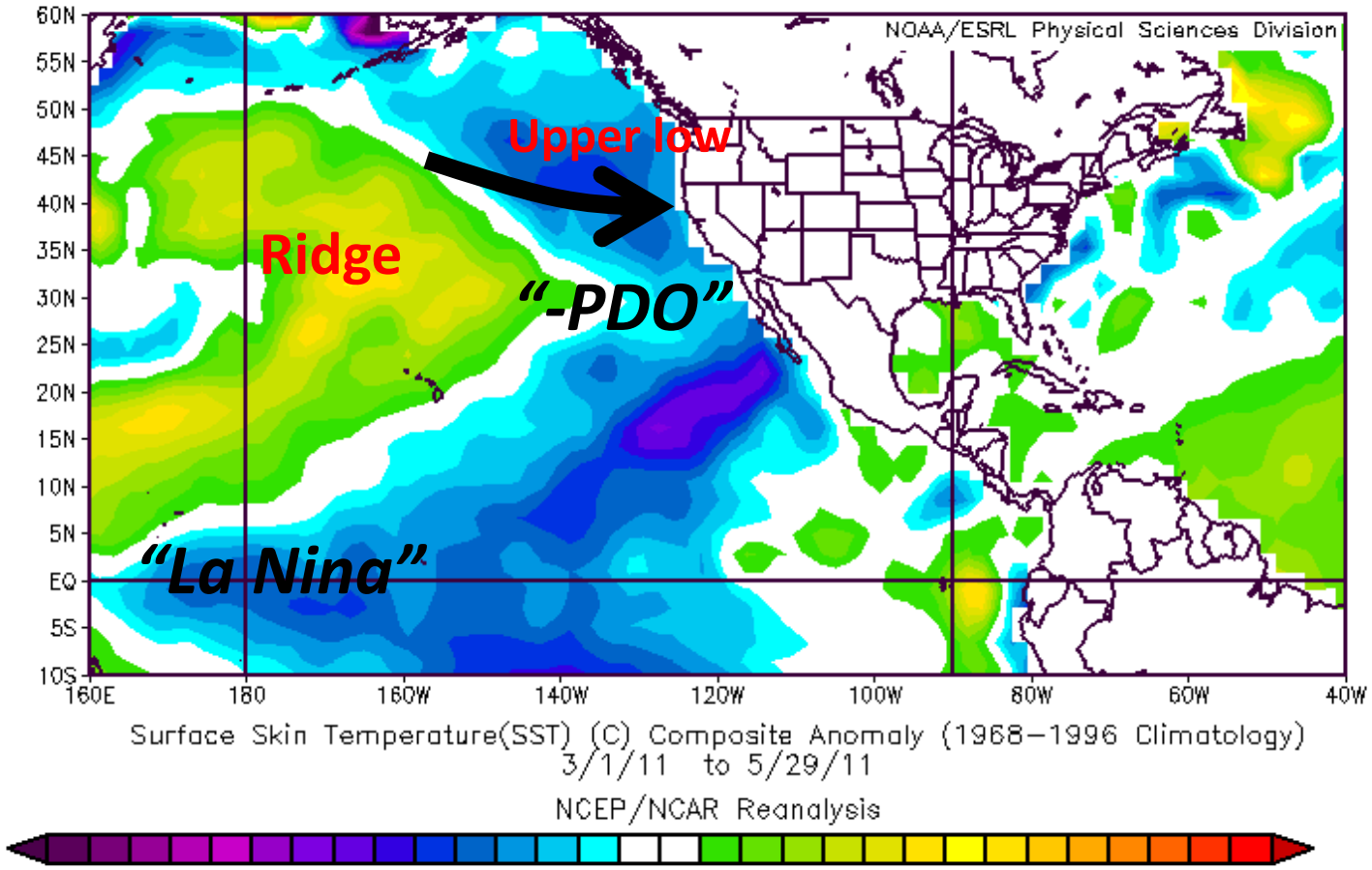
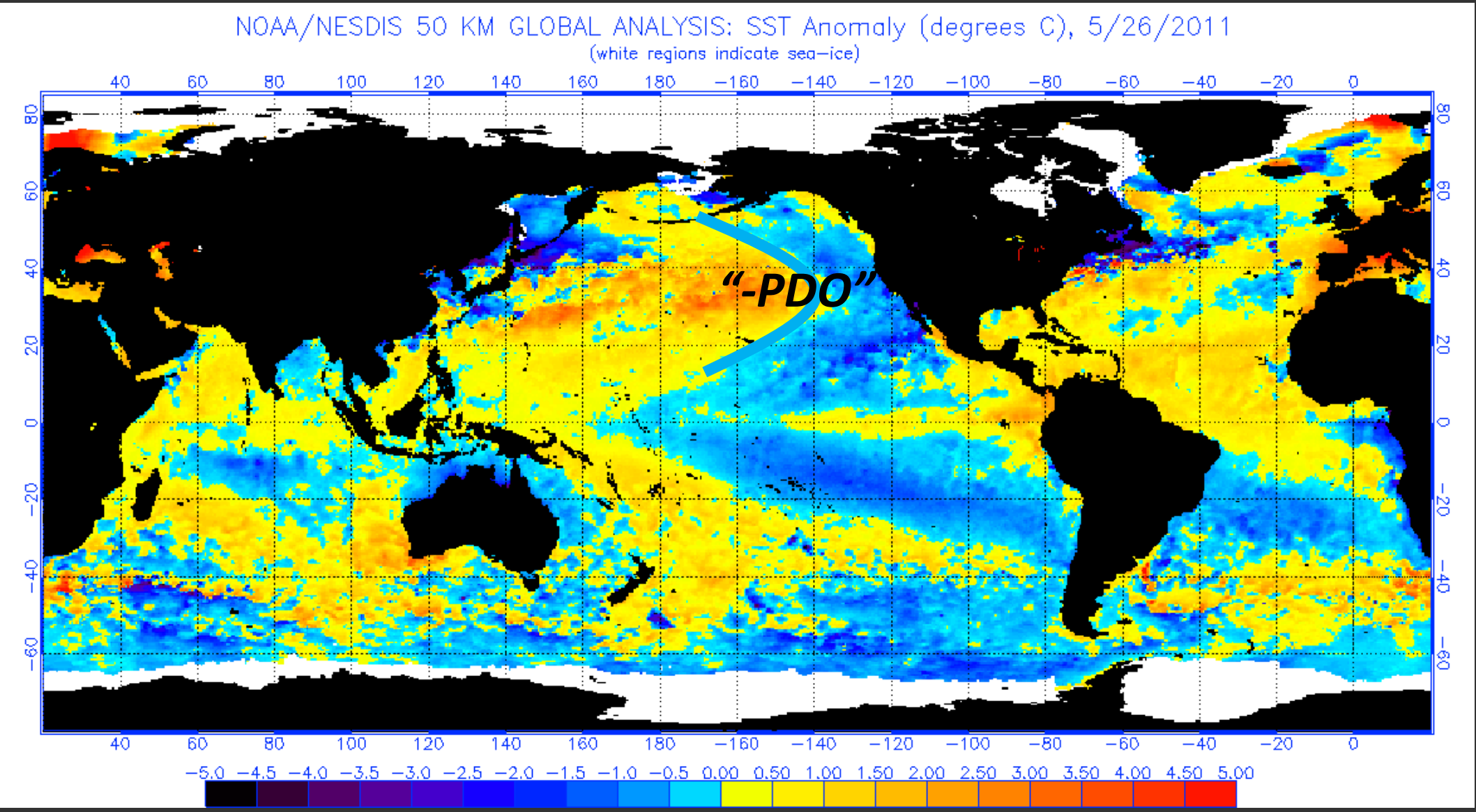


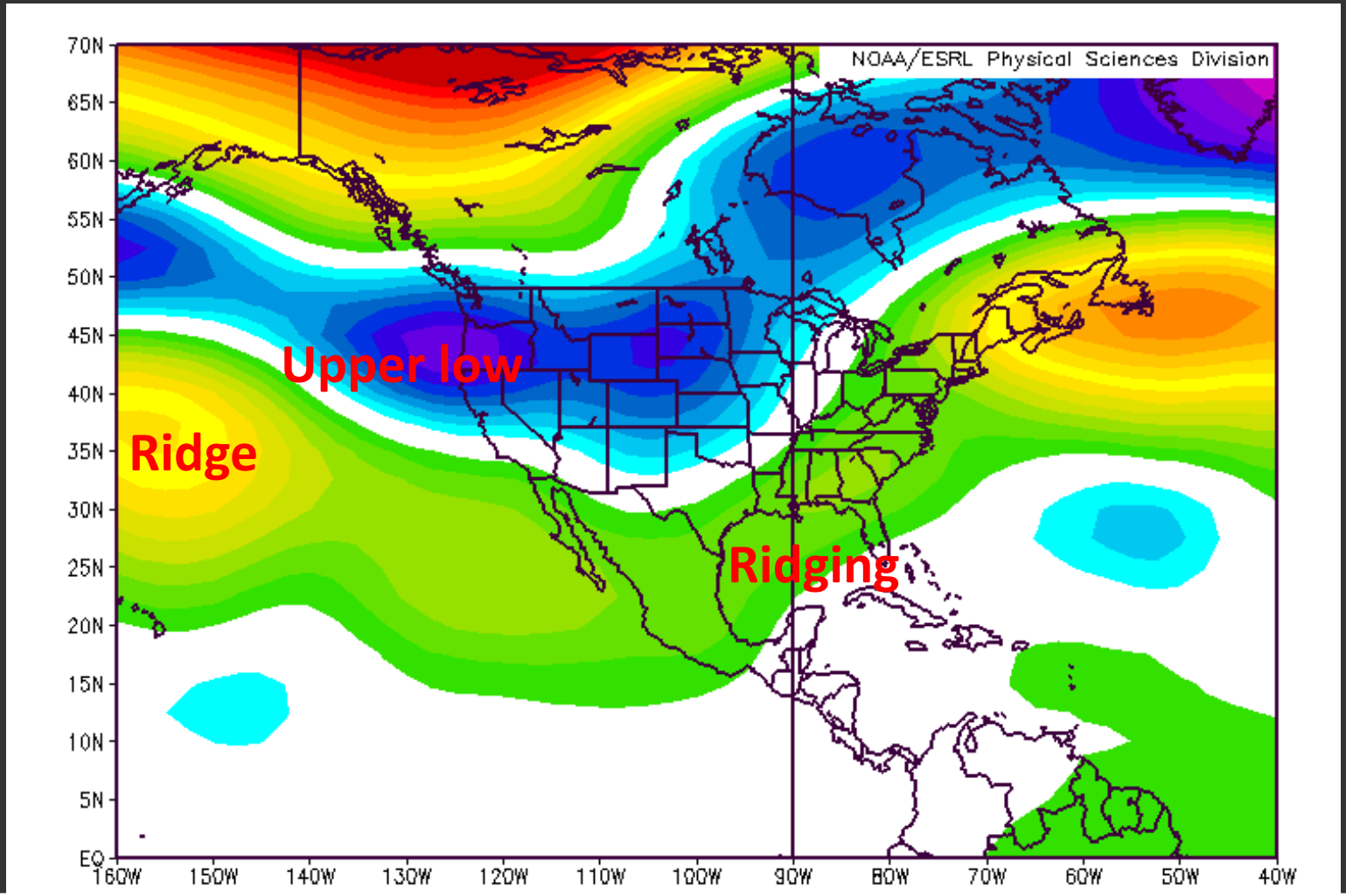
Remember from the first slide the persistent upper low over the Pacific Northwest and ridge over the central Pacific. The persistent storm track has helped to create this pattern of sea surface temperatures in the north Pacific. Once the pattern is in place, it is possible for the ocean and the atmosphere to positively feedback on each other, which can help the pattern persist. Usually, a trough over the west coast favors a ridge over parts of the eastern U.S., so to determine what may happen in Southeast Lower Michigan this summer, it is a good idea to first look to the Pacific.

Current Conditions



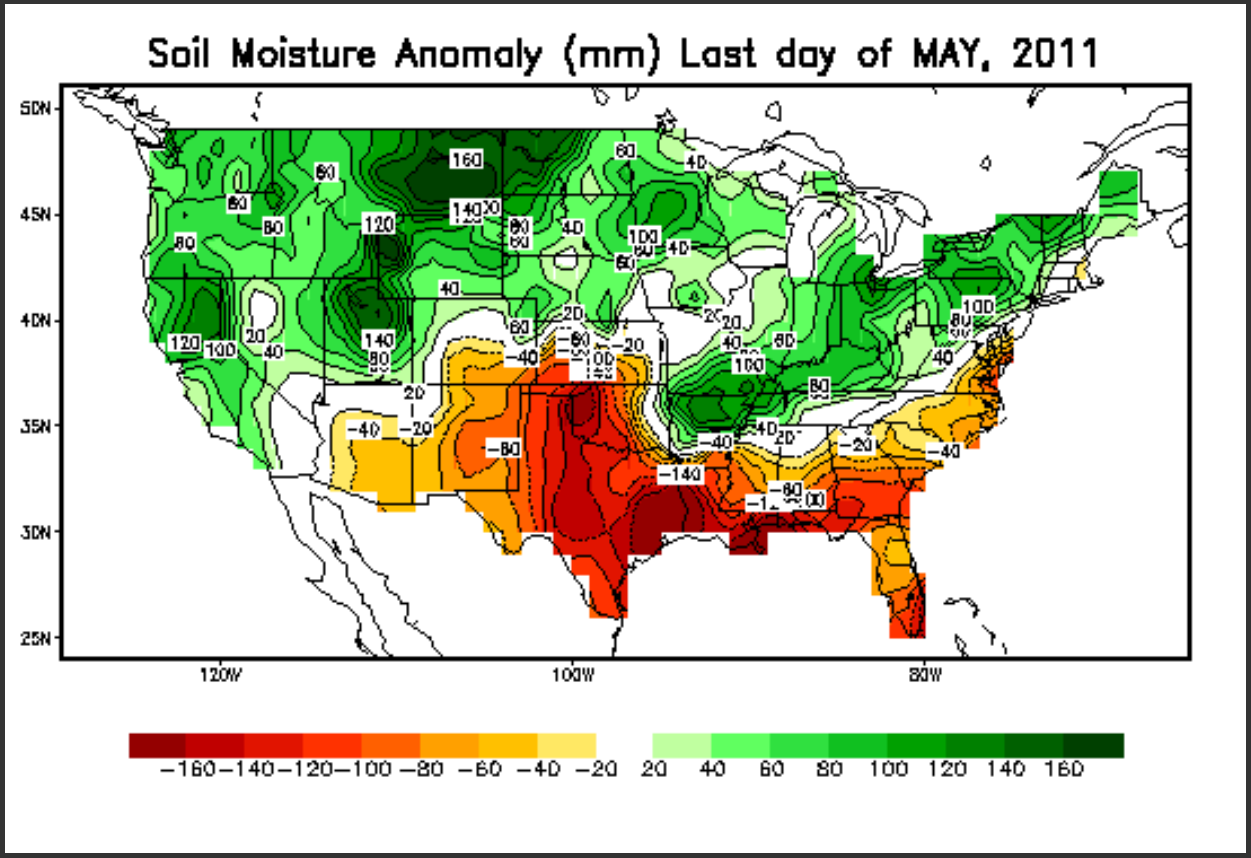
As is typical by late spring, la Nina has significantly weakened, with a return to ENSO neutral conditions expected. However, the negative PDO signature has persisted through late May and may help the pattern over the Pacific persist through at least the early part of summer.

Current Conditions



Even over the last 10 days (above), the general spring pattern has persisted, especially with respect to upstream features. Note the ridge over the central Pacific, upper low over the Pacific Northwest/active northern storm track, and the tendency for ridging across portions of the southern and eastern U.S. So far, Southeast Lower Michigan has been under the influence of both the active northern jet stream (cool, wet) and the ridging to the south and east (warm, humid).

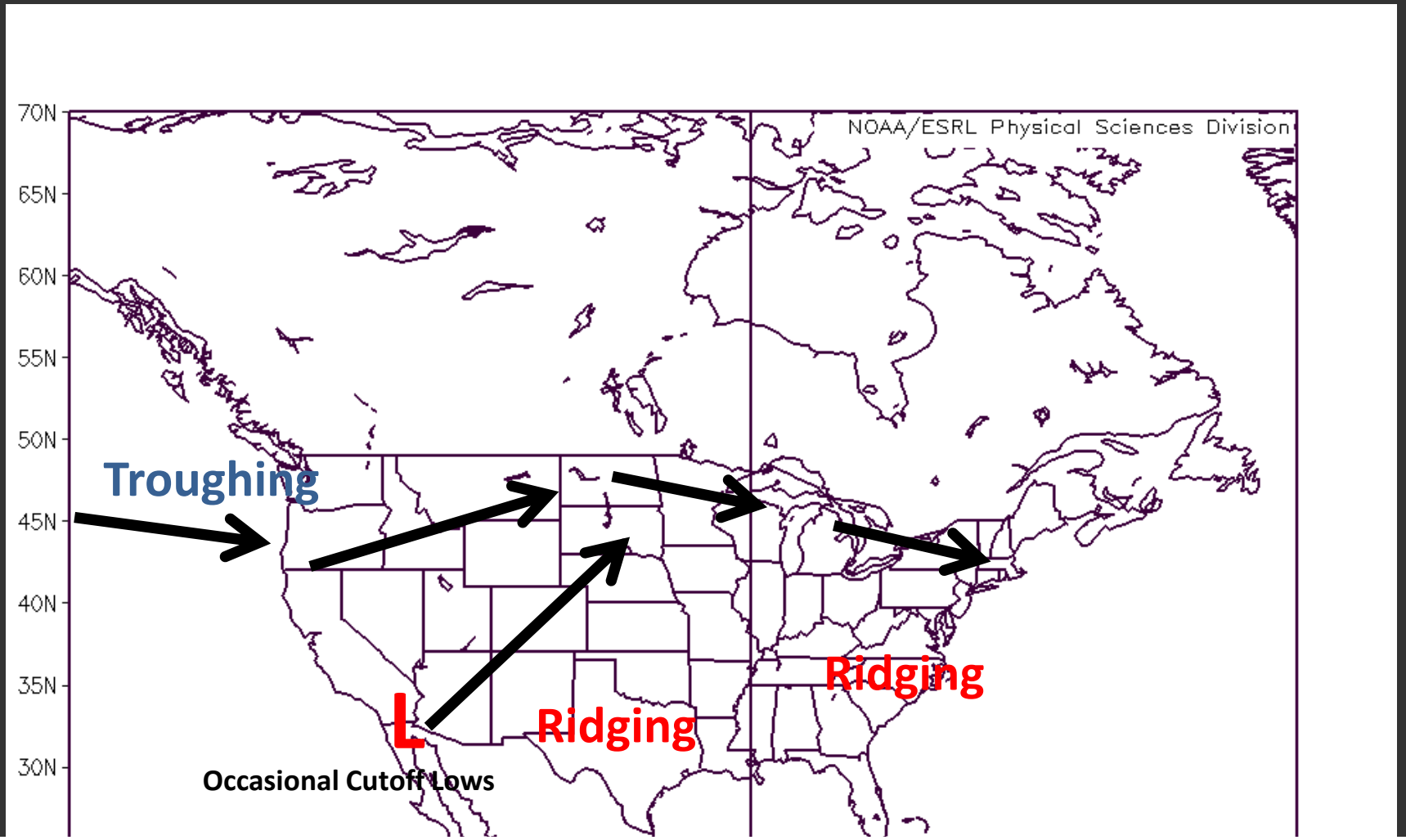
Current Conditions



The current 30-day soil moisture anomaly is similar to the spring rainfall pattern shown earlier. Just as sea surface temperatures can influence weather patterns, so can soil moisture – especially in the summer and when extremes are present. As we head into June, it is safe to say that extremes in soil moisture are in place, especially across the Lower Mississippi and the Ohio River Valleys (excess) and across the southeast and southern plains (drought).

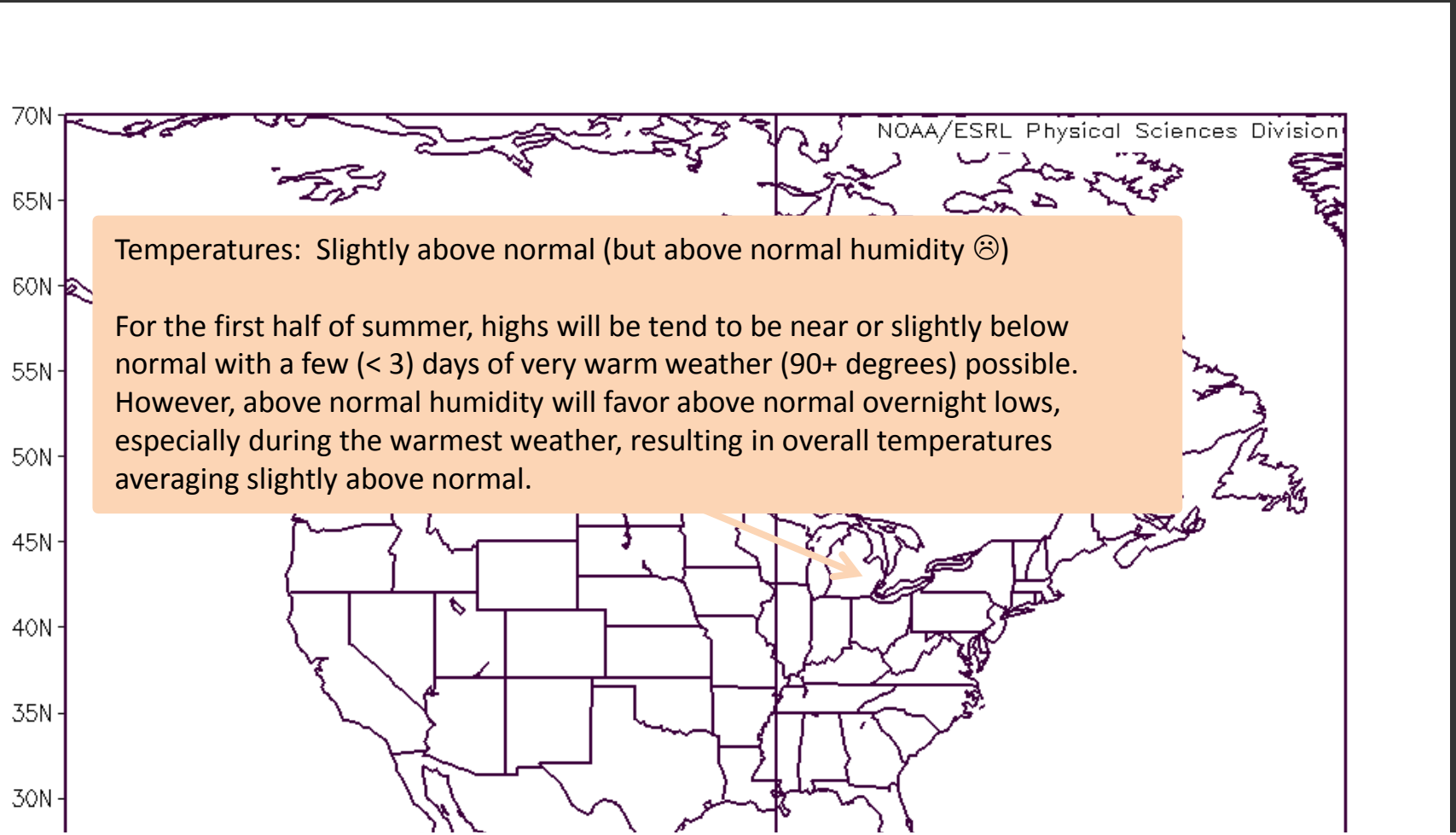
The extreme soil moisture conditions as we head into summer are ideal for using the Constructed Analog Soil Moisture Prediction Technique (CAS). The CAS output lends support to that of other climate models, such as the CPC's Climate Forecast System (CFS), which increases the level of confidence in this outlook.

June 1 – July 15
Pattern Outlook



Given that the current pattern has been in place for much of spring and has support from the negative PDO, the forecast pattern is one that features continued troughing for the Pacific Northwest, with a broad area of ridging focused over the southeast and especially the southern Plains. Cutoff lows are common springtime features, but will be continue to be favored through the first half of summer given the persistent storm track. Statistical models based on soil moisture conditions (which have been extreme this spring), support this type of pattern, as do other climate forecast models.

June 1 – July 15
Temperature Outlook



Southeast Lower Michigan will be located along the northern periphery of the persistent ridging to our south and will still be under the occasional influence of systems embedded in the northern storm track. This will support to **slightly below average highs**. However, above normal humidity will keep **overnight lows above normal**, resulting in overall temperatures finishing slightly above normal. **Rainfall will be near normal**. A few additional (< 3) days of very warm weather are possible. The warmest days will be favored ahead of cutoff lows as they come out of the 4-corners region and are forced to track to our northwest. The extremely wet spring for SE Lower Michigan and points south will ensure that hot days are also humid through the first half of summer.

June 1 – July 15
Rainfall Outlook

Rainfall: Normal

The persistent drenching that the area received through most of spring should be over. Although retreating, the active storm track will still bring regular threats for thunderstorms.

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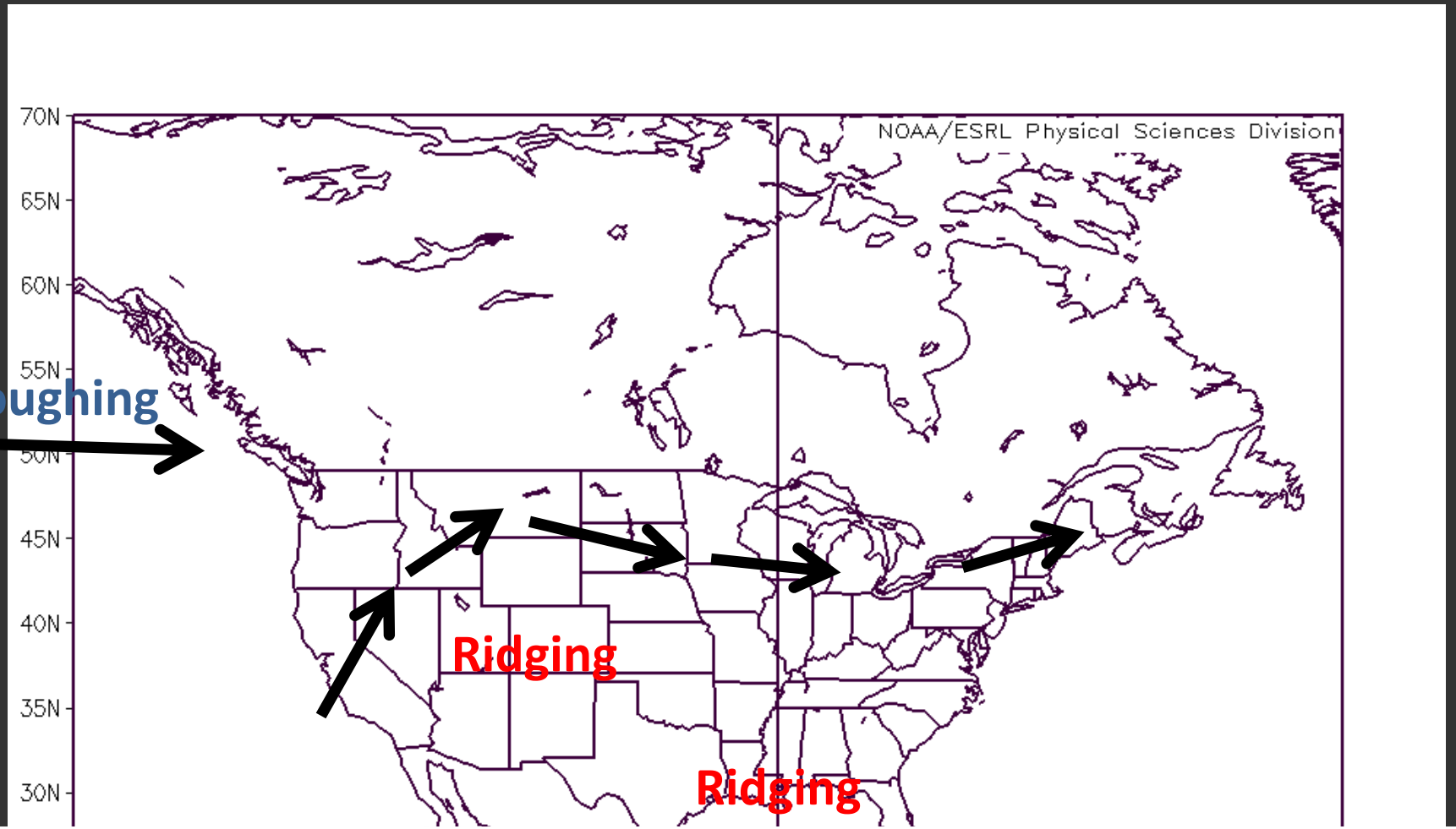
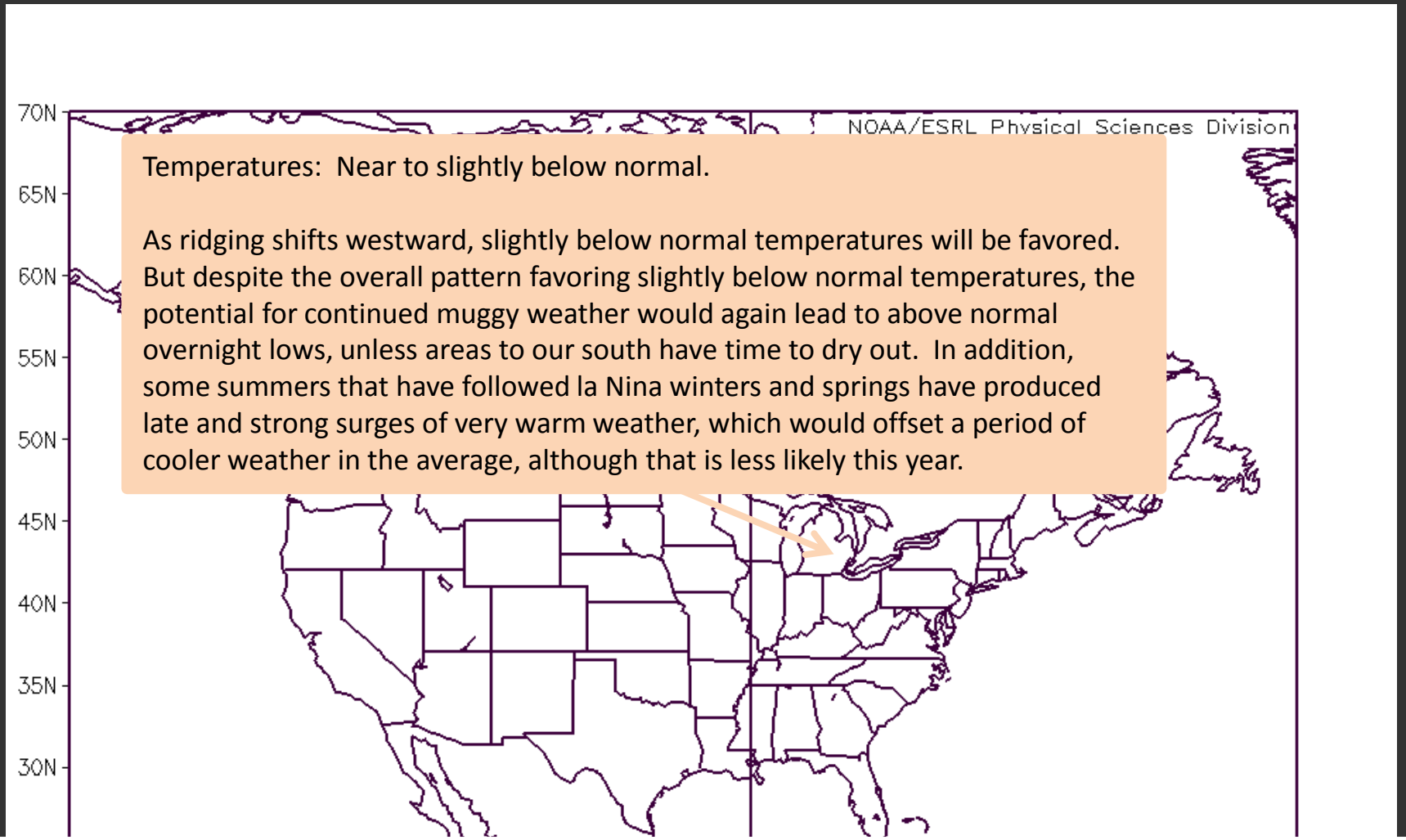
July 15 – August 31
Pattern Outlook



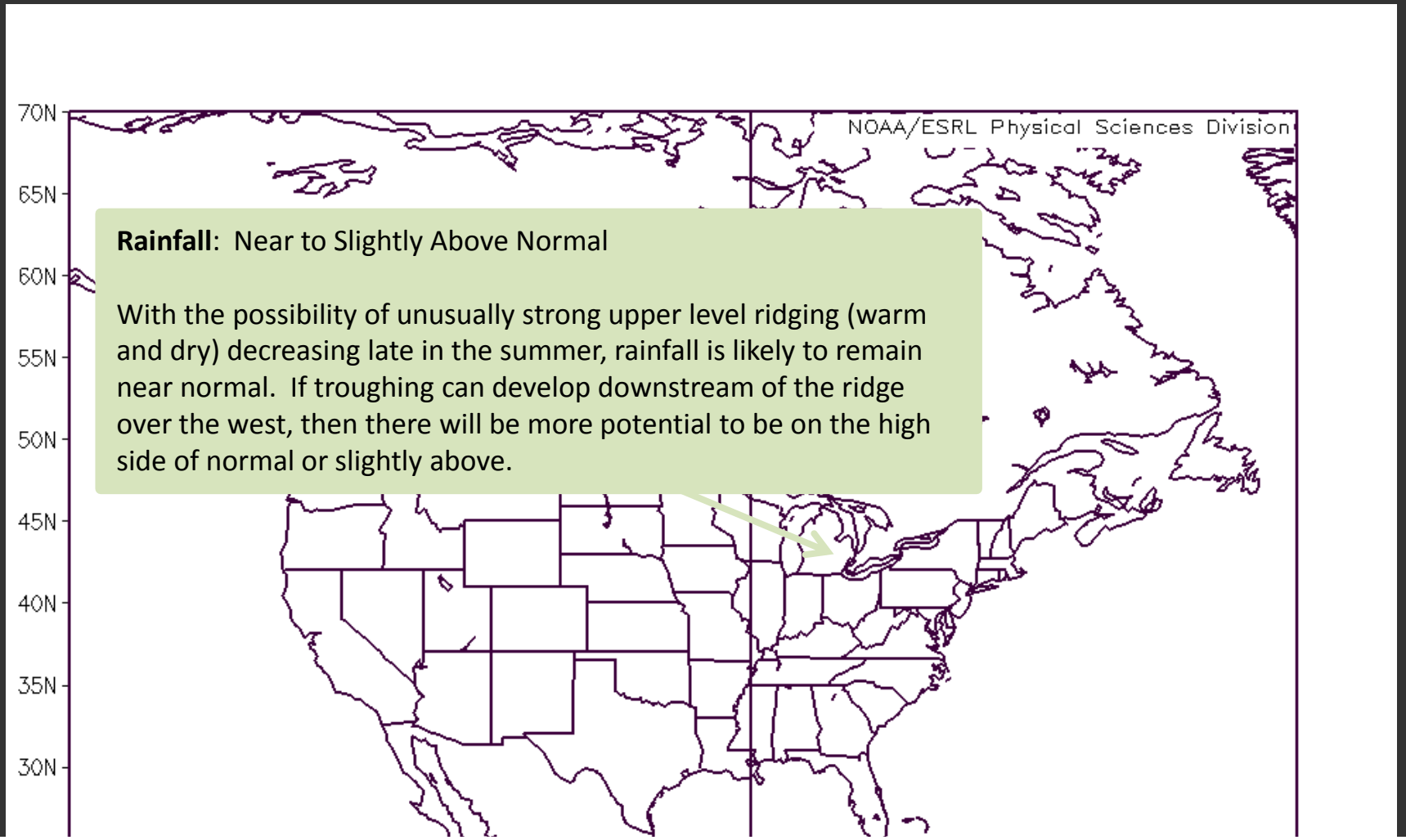
The low over the Pacific Northwest will shift northward and westward. As ridging amplifies and shifts westward, Southeast Lower Michigan should find itself removed from major features that would favor significant departures from normal. Ridging is common over the intermountain west during the summer months. If the –PDO persists, it also has a weak correlation with ridging over the west and a tendency for troughing over parts of the central U.S. during the summer. This same idea is supported by climate model output as well as CAS method results, which takes into account soil moisture effects. This pattern will support **temperatures and rainfall near normal for the latter half of summer**, **but the potential could exist for increased rainfall and lower temperatures.**

July 15 – August 31
Temperature Outlook



Ridging will increase and shift westward over the intermountain west by the middle of summer. This will leave Southeast Lower Michigan east of the greatest potential for warmer than normal weather and in a potentially favored area for occasional trough development and **slightly below normal temperatures**. However, summers following la Nina winters and springs have a history of producing **late and strong warm surges** in Southeast Lower Michigan. In addition, if above normal humidity can persist into the latter half of summer, **overnight lows could remain above normal** resulting in the average temperatures closer to normal.

July 15 – August 31
Rainfall Outlook



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Southeast Lower Michigan
Summer Outlook 2011

What residents of Southeast Lower Michigan can expect between June 1 and August 31, 2011

June 1 through July 15

High temperatures →Near to slightly below normal

Low temperatures →Above normal

Average temperatures→ Slightly above normal

Rainfall →Normal

Unusually muggy, especially during the warmest weather. The high humidity will keep low temperatures above normal, and will limit the degree of nighttime relief during the hottest weather.

July 15 through August 31

High temperatures →Near to slightly below normal

Low temperatures →Slightly above normal

Average temperatures →Near Normal

Rainfall →Normal

When a la Nina is firmly in place during the summer months, southeast lower Michigan has seen some its very hottest stretches on record (1955, 1964, and 1988). However, with the current la Nina rapidly losing its grip in the tropics, the summer of 2011 is not expected to be similar to those years. The muggy weather, on the other hand, will have the potential to persist through most or all of the summer.

References

- NOAA/NWS Climate Prediction Center (including outlooks, prognostic discussions, historical data, CFS model, and CAS output), http://www.cpc.ncep.noaa.gov
- Map compositing provided by the NOAA/ESRL Physical Sciences Division, Boulder Colorado from their web site at http://www.esrl.noaa.gov/psd/
- Blank maps adapted from NOAA/ESRL Physical Sciences Division, Boulder Colorado from their web site at http://www.esrl.noaa.gov/psd/
- Temperature Departure maps are based on data from the High Plains Regional Climate Center, University of Nebraska, Lincoln and can be accessed from their web site at http://www.hprcc.unl.edu/
- xmACIS Climate Database, hosted by the High Plains Regional Climate Center, University of Nebraska, Lincoln

Please note that this outlook was created using the current CPC outlook as a starting point with Southeast Lower Michigan in mind, where the most attention to detail was focused. For information about your area, especially if you reside outside of Southeast Lower Michigan, please visit the NOAA/NWS/CPC at their website, also listed above