

Long Range Weather Forecast

Discussion



In-Depth Long Range Discussion

December 1, 2019 - January 31, 2020

A cold shot to start December delivered the East Coast's first major winter weather event of the season, with historic snow (for so early in the year) from parts of Upstate New York into interior New England, and damaging ice and accumulating snow as far south as parts of northeast PA and northern NJ. We see a brief warm-up to start the second week of December before we get another big cool-down later in the week. The rest of December is likely to feature more of these temperature ups and downs. It will be generally cool across the Upper Plains and Midwest and generally mild in the Southeast, though overall there will be a lot of fluctuations. Canada is very cold and has a lot of snow cover, which will tend to limit how long any warm-ups last. This will mean lots of fronts with chances for precipitation; there will be some wintry threat, especially across the interior Northeast and Midwest, closer to the cold air, though this is not an ideal pattern for major snow storms near the East Coast.

We still expect the core of winter to be January into February, as pattern drivers both in the tropics and stratosphere are expected to become much more favorable for persistent cold along with snow in early January. It is still just a bit early to time this transition exactly and determine where the coldest of the air goes, but right now it looks like both January and February are cold across the country as a whole, with February likely being the colder of the two months. Cold will likely be centered on the north-central U.S., but any attempts to battle back with warmth along the Gulf Coast and perhaps up into the Southeast and Mid-Atlantic will likely be overwhelmed by the cold more often than not. If a "blocking pattern" develops across the northern Atlantic Ocean in January or February, the core of the cold would shift into more of the east. There will be a distinct risk for severe, potentially record-breaking cold shots both months, though again, the exact timing and location is yet to be determined.

There will be a generally active storm track along the southern fringes of the cold in January and February, which may yield plenty of snow and some ice on the cold side of the storm track. Parts of the High Plains and eastern Rockies may also be quite active, with the West Coast generally quiet, though perhaps somewhat active into the Southwest at times. The Midwest will likely be

somewhat "drier" than normal, as bitterly cold airmasses are inherently dry. However, frequent smaller systems will likely keep snow potential going even where drier than average weather is drawn in on the maps.

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Long Range Weather Forecast

Period 1

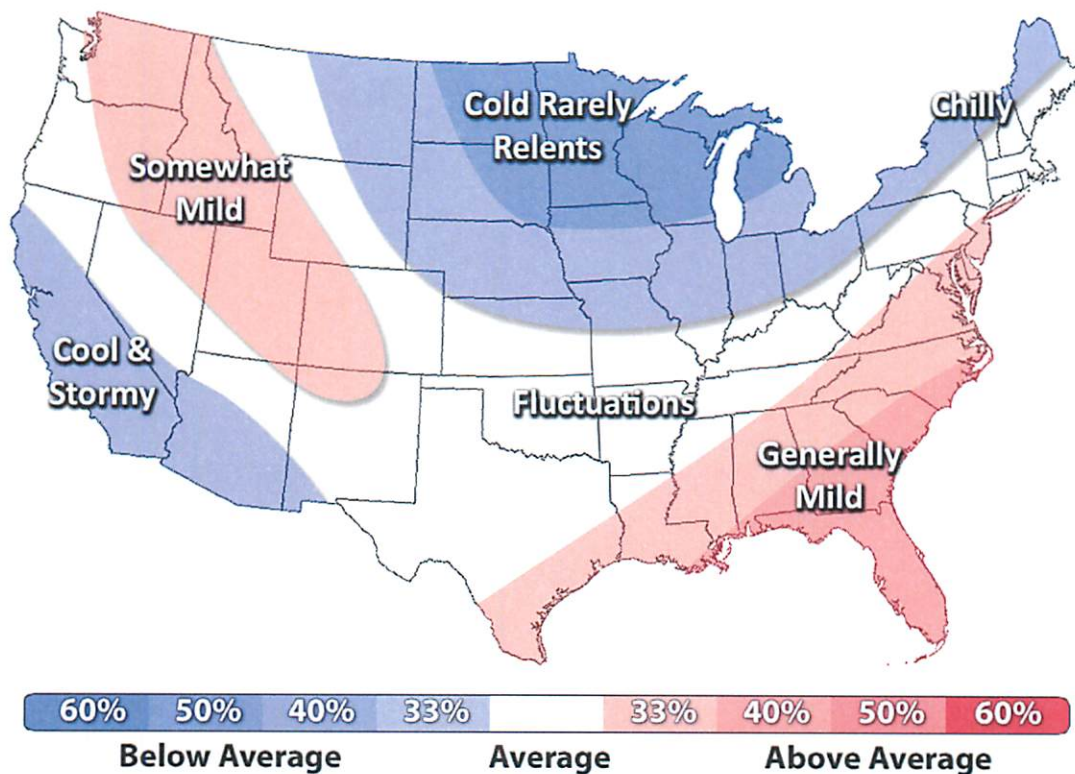
Period 1 Forecast

December 16 - 31, 2019

Temperature Trends



Temperature Outlook: December 16 - 31, 2019

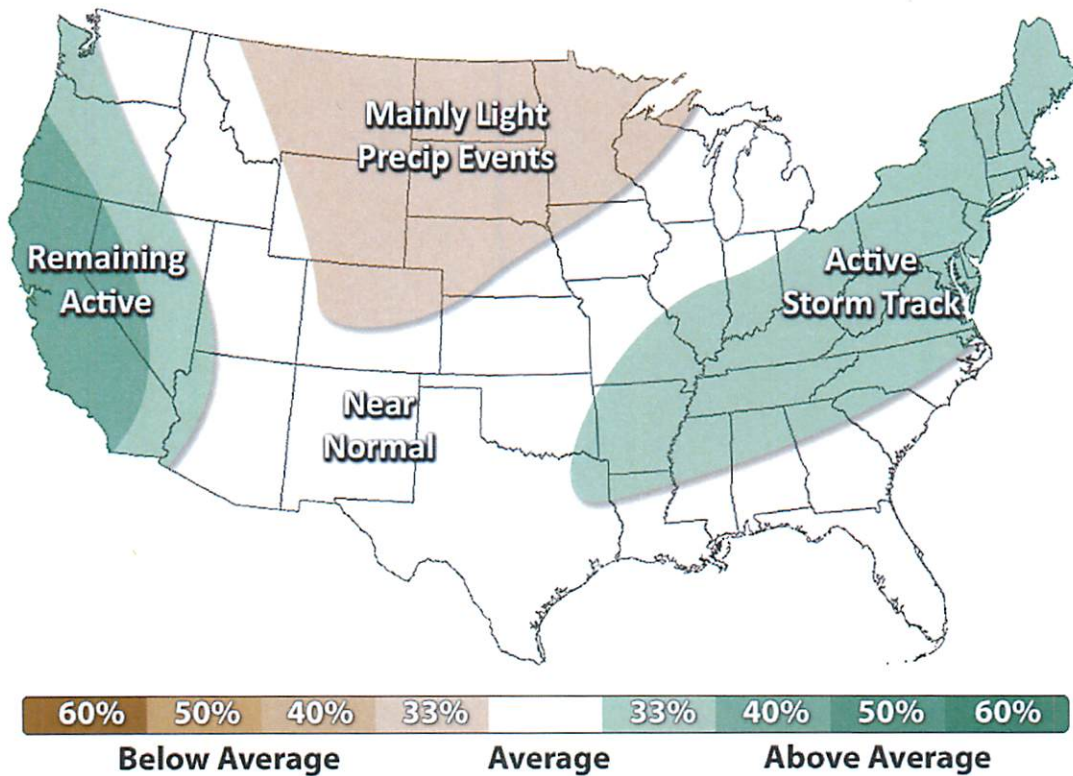


The second half of December will feature a lot of up and down weather across much of the country. The Midwest will be generally cool and the Southeast generally mild, though there will still be some fluctuations.

Weather Outlook



Precipitation Outlook: December 16 - 31, 2019



Active weather is expected to persist on the West Coast for the second half of December. The temperature fluctuations will also lead to an active storm track from the mid-Mississippi Valley across the Mid-Atlantic and Northeast. The Upper Midwest will not be completely dry, though most of their precipitation will be from lighter events.

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Long Range Weather Forecast

Period 2



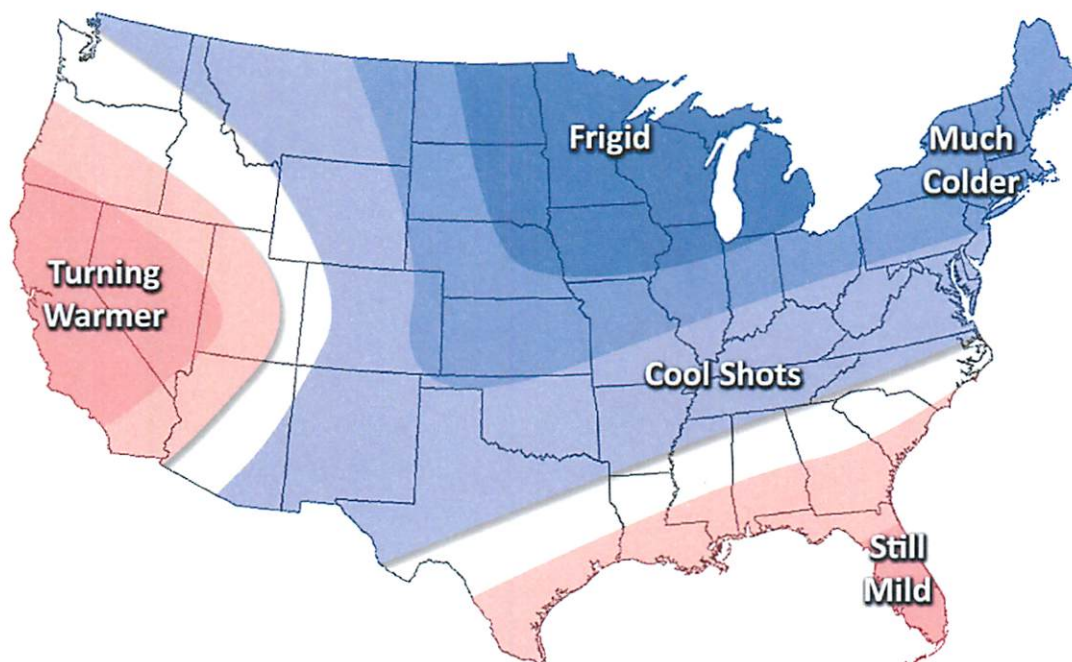
Period 2 Forecast

January 1 - 31, 2020

Temperature Trends



Temperature Outlook: January 1 - 31, 2020



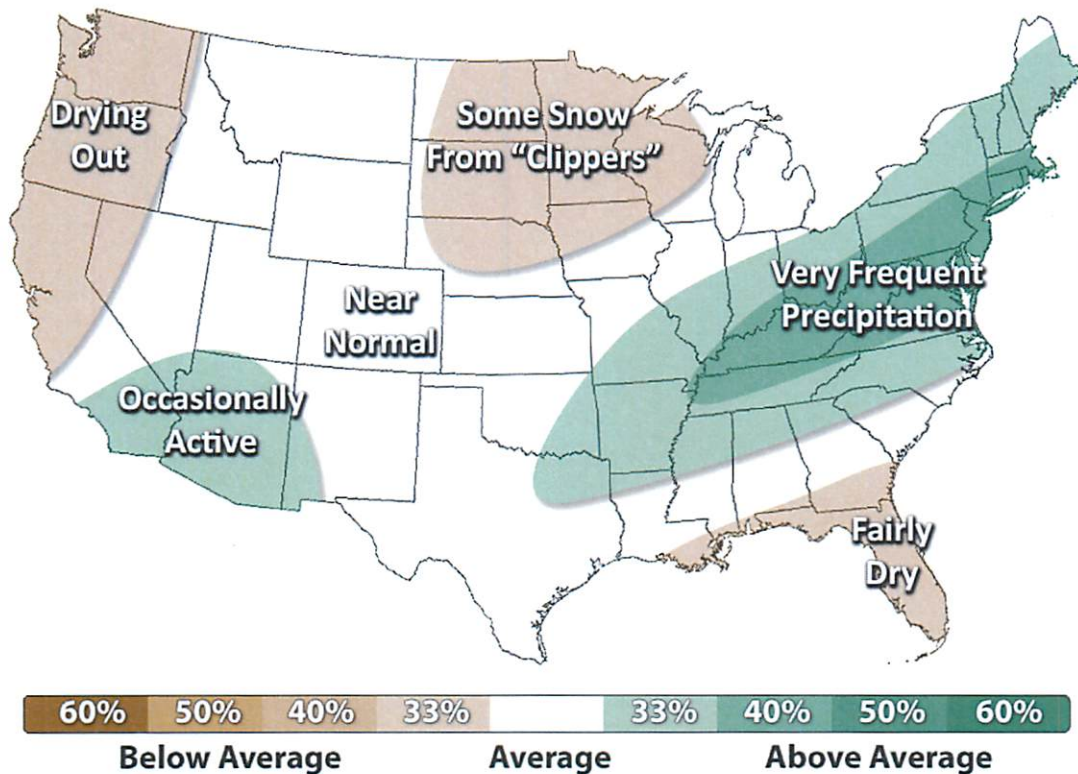
January is still expected to bring a swing back to much more widespread, persistent cold. The coldest air will be centered on the Midwest, though outside of parts of the West Coast and Gulf Coast, most areas should end up colder than average for the month. The fringes (from the

southern Plains across the Ohio Valley and Mid-Atlantic) will see some milder intrusions, but they'll be brief and out-matched by the colder air over the course of the month.

Weather Outlook



Precipitation Outlook: January 1 - 31, 2020



The big focus of precipitation will be the temperature gradient across much of the eastern United States in January. On the cold side of this gradient, a lot of snow is possible. The Pacific Northwest will turn drier while the Southwest sees occasional precipitation. While precipitation in the Upper Midwest likely ends up a bit drier than average, it will almost all fall as snow, meaning snowfall may still be near or even slightly above average.

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Long Range Weather Forecast

Period 3

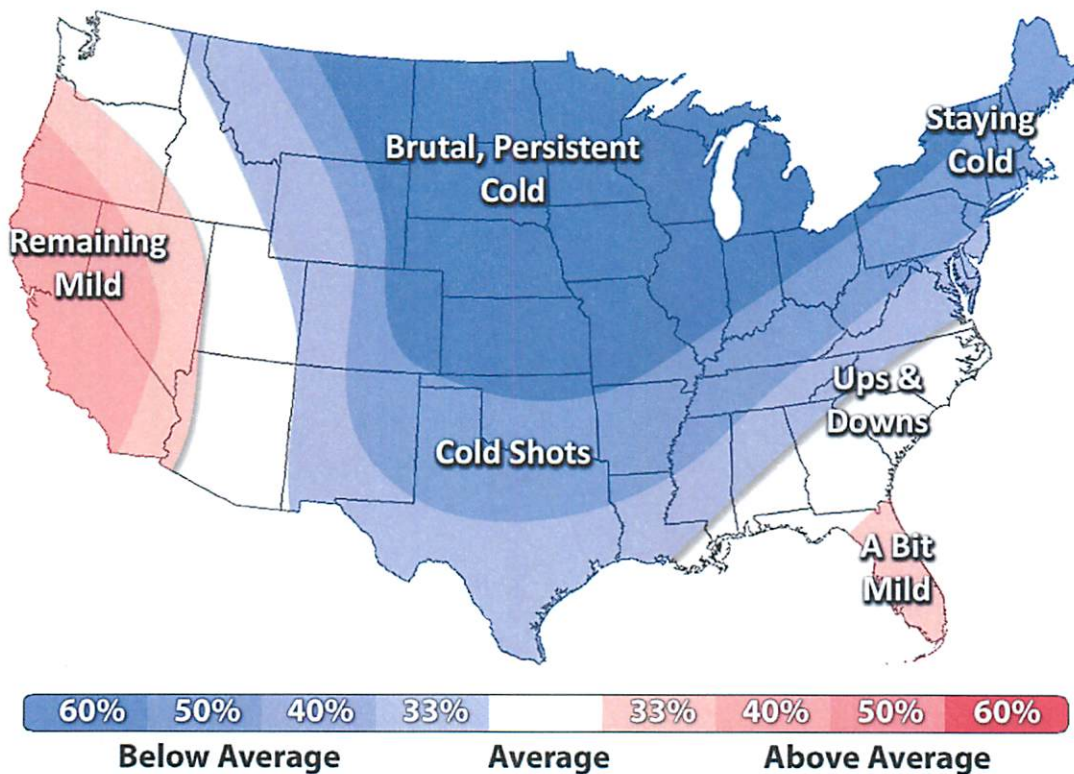
Period 3 Forecast

February 1 - 29, 2020

Temperature Trends



Temperature Outlook: February 1 - 29, 2020



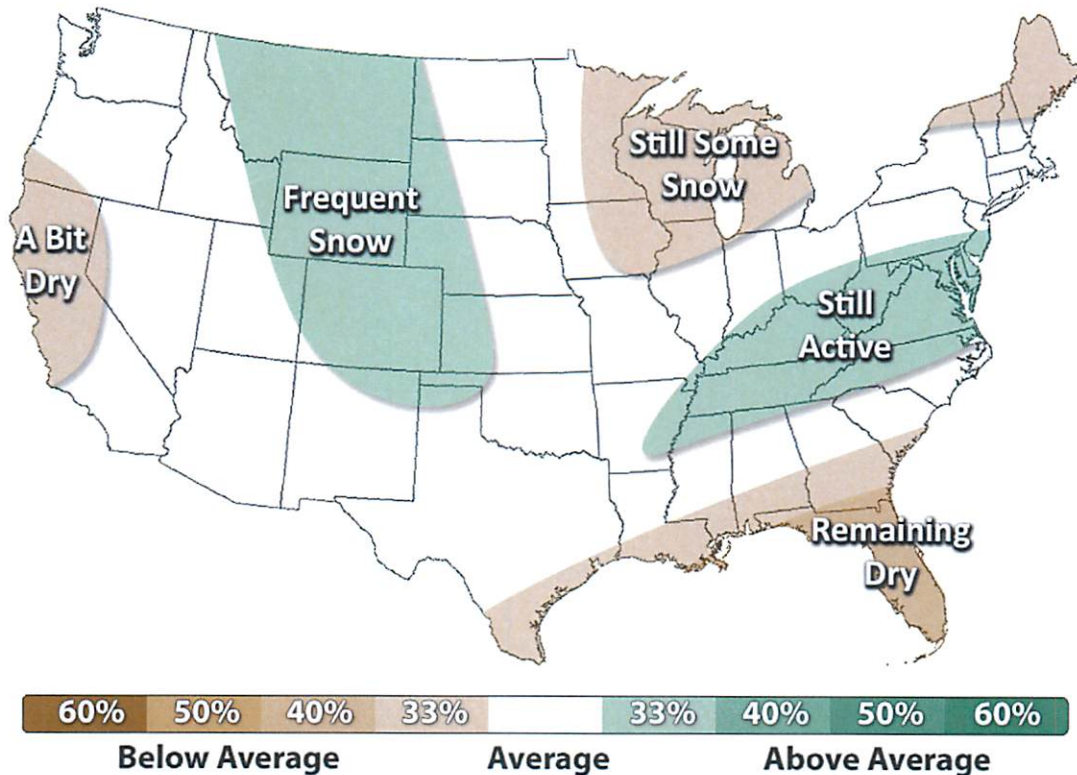
February may, from coast to coast overall, be the coldest month of what is expected to be a cold winter. While the cold will likely be centered on the Midwest, it will simply overwhelm the pattern across most of the country. The only possible exceptions look to be the West Coast and (maybe)

Florida...though even Florida could see a freeze deep into the state. One or two brief mild intrusions may work into the Mid-Atlantic, but cold is expected to out-weigh any mild weather.

Weather Outlook



Precipitation Outlook: February 1 - 29, 2020



A somewhat active storm track is still expected across the Ohio Valley and Mid-Atlantic, with a good amount of snow (and some ice) likely associated with that pattern given the expected cold temperatures. The High Plains and eastern slopes of the Rockies also look to be active and may see abundant snowfall. It should again be noted that even if precipitation is slightly drier than average in the Great Lakes and Midwest, what falls will be in the form of snow.

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Long Range Weather Forecast

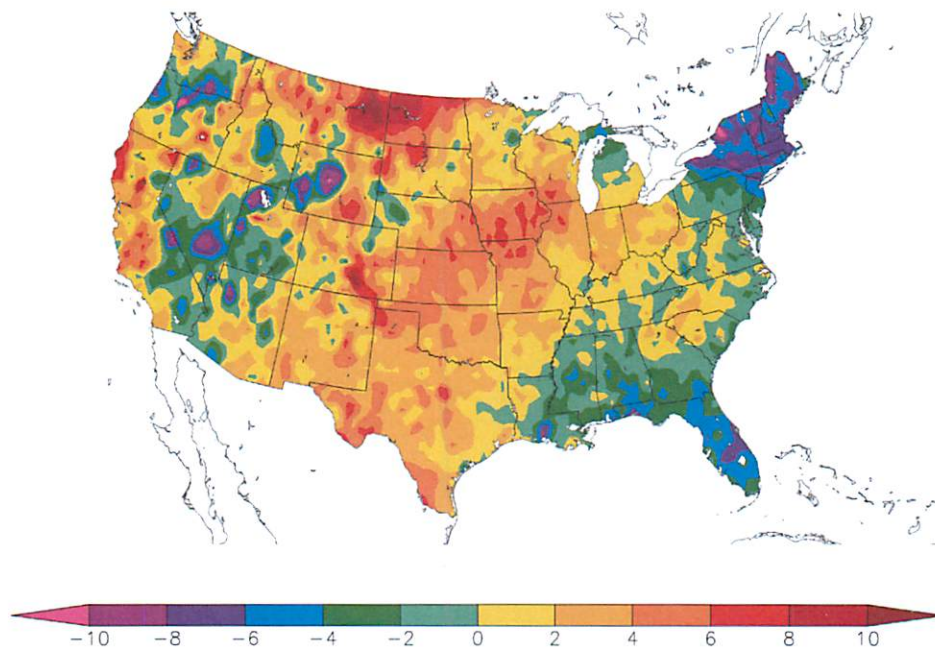
Blog



Blogs and Recent Temps / Precip

Month to Date Temperatures

Departure from Normal Temperature (F)
12/1/2019 - 12/5/2019

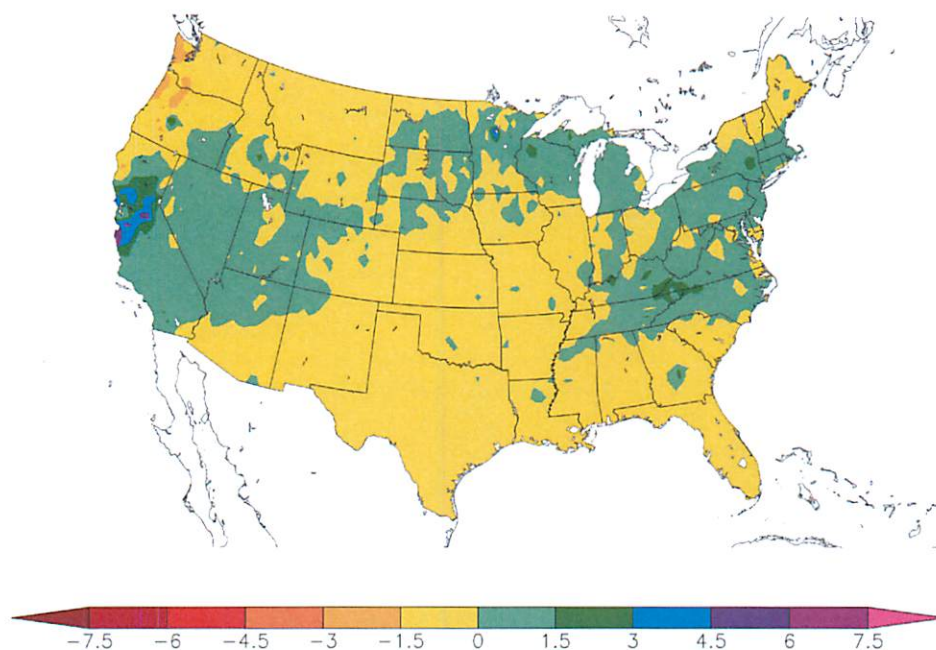


Generated 12/6/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

Month to Date Precipitation

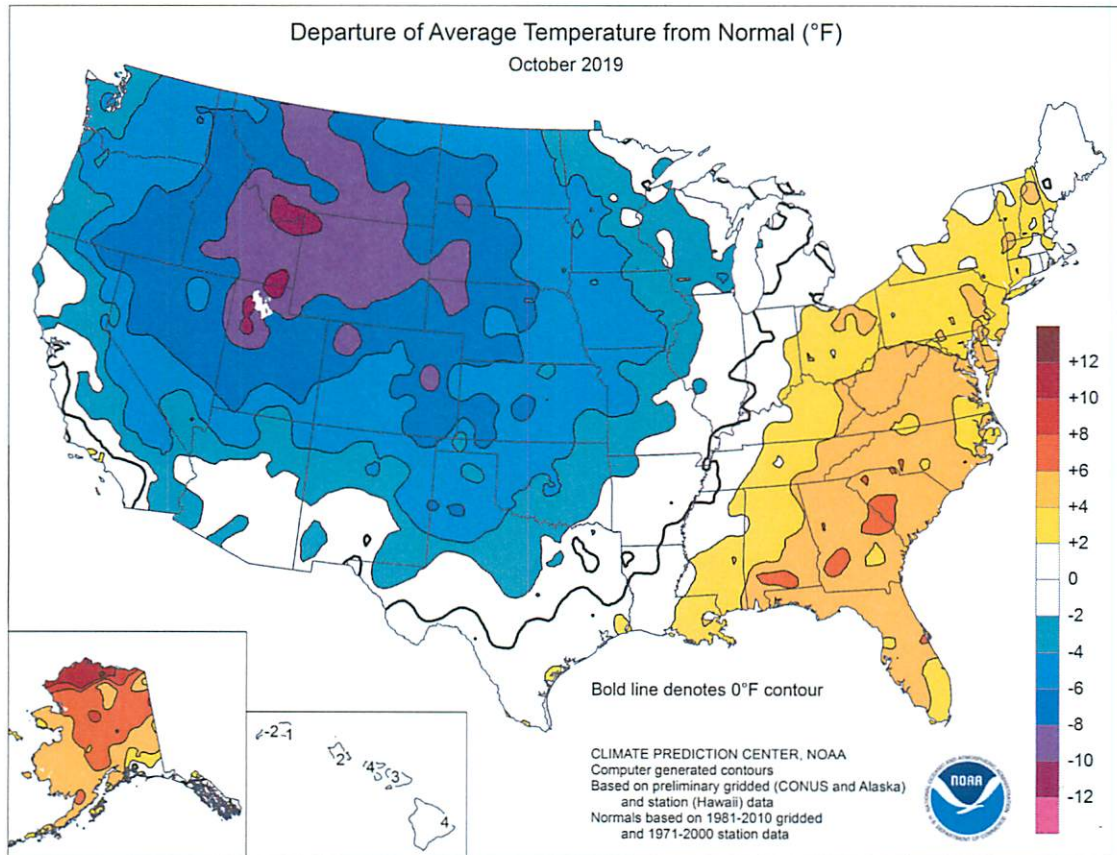
Departure from Normal Precipitation (in)
12/1/2019 – 12/5/2019



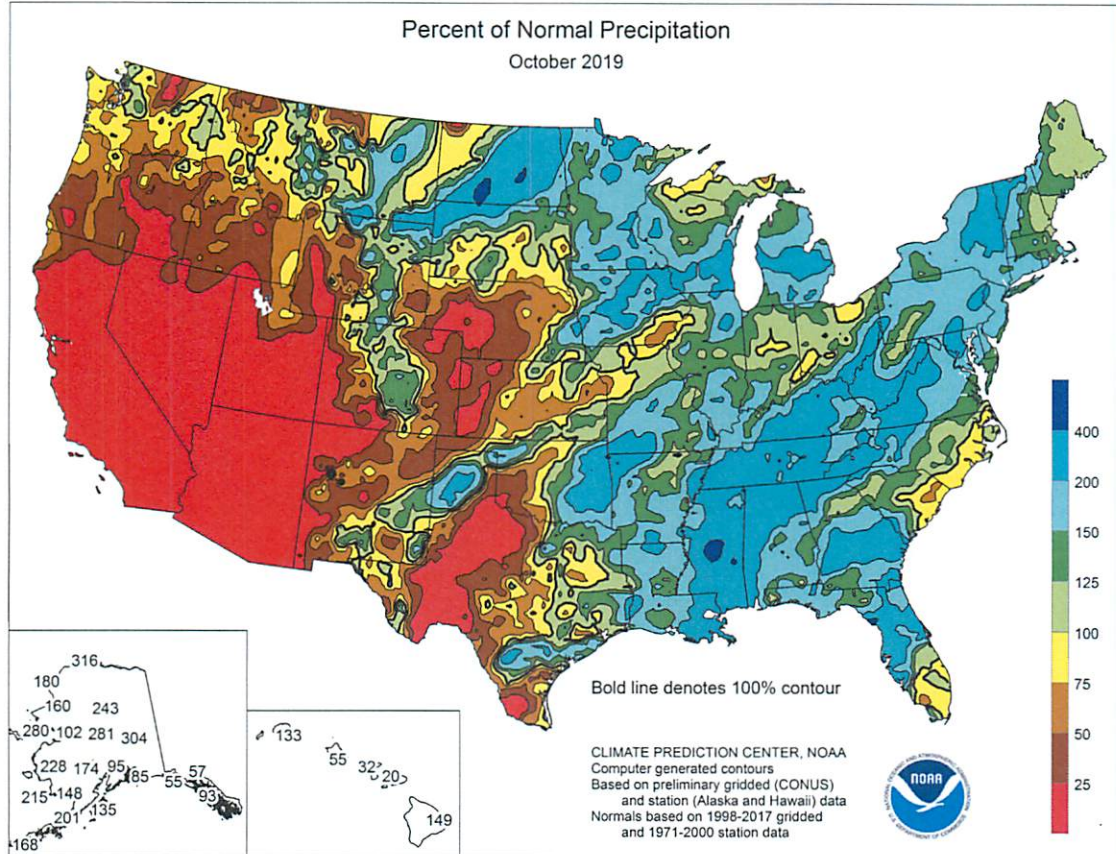
Generated 12/6/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

Last Month's Temperatures



Last Month's Precipitation



November 8, 2019: Frigid Second Week of November; Where do we go From There?

Posted on: 11/8/19, 4:50 PM

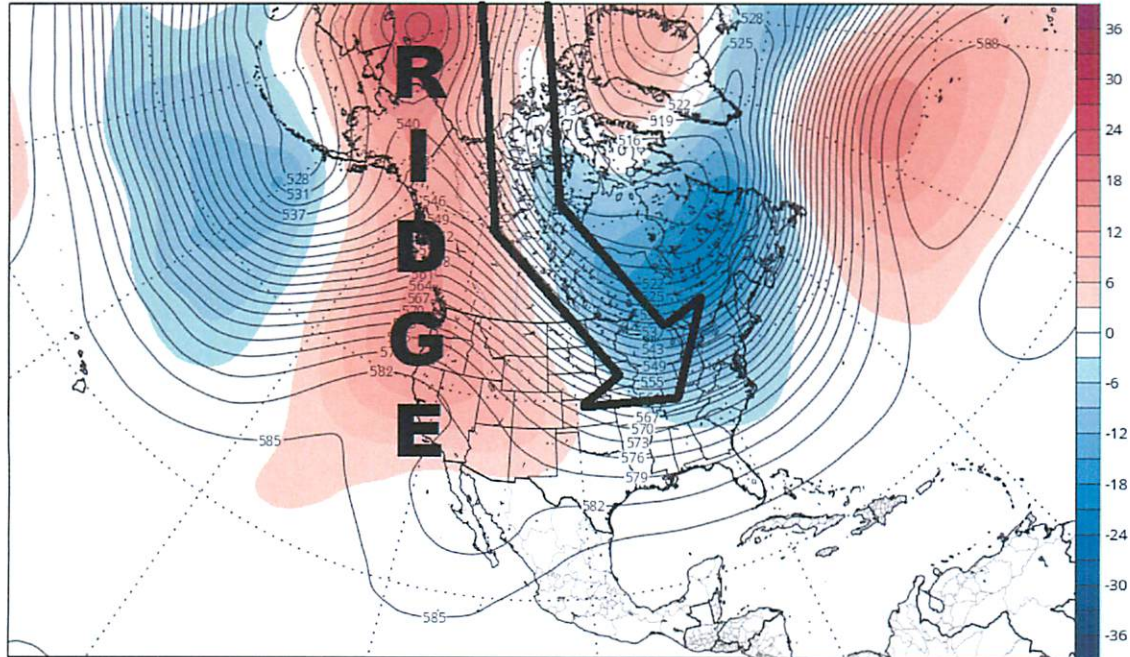
by: James Sullivan

We are seeing mid-winter cold during the second week of November, with parts of the central and eastern United States poised to break record lows. What's responsible for this?

EPS Mean 500mb GPH & Anomaly (dam) from 12z09Nov2019 to 12z14Nov2019 (Days 2-6)

Init: 12z Nov 08 2019 Forecast Hour: [144] valid at 12z Thu, Nov 14 2019

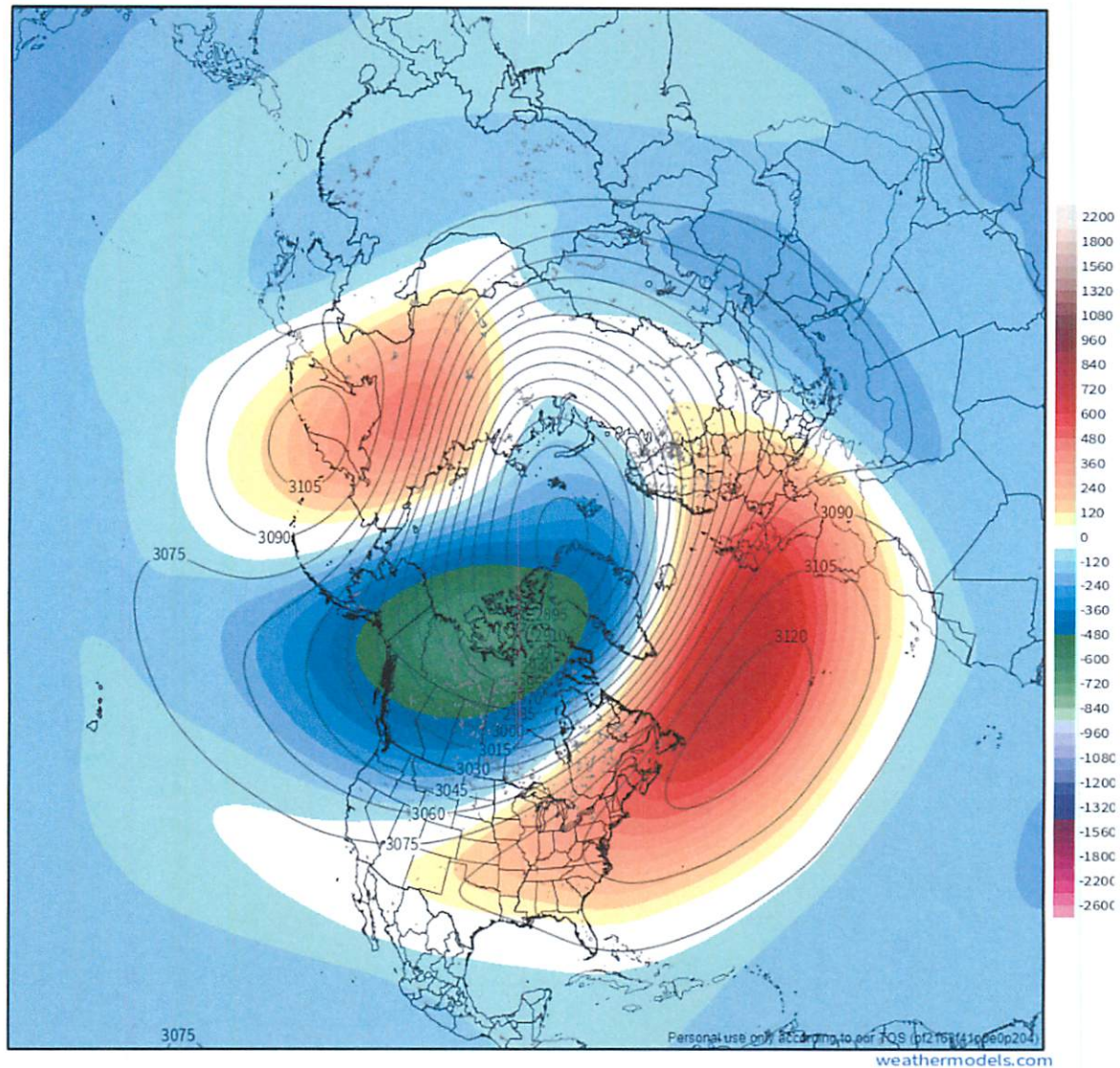
TROPICALTIDBITS.COM



(Forecast large-scale weather pattern valid November 9th through November 14th, courtesy of the European ensemble...graphic from TropicalTidbits)

A huge ridge in the jet stream on the West Coast, extending from California to north of Alaska, is sending cold air plunging in to its east, affecting much of the central and eastern U.S. with air that's straight from the Arctic Circle! Even in November, this air is quite cold.

While a "blow torch" (a term we affectionately use to describe much warmer than average temperatures in the cold season) is not anticipated anytime soon, this cold pattern will relax significantly for a week or so starting around the middle of November with a period of average or even slightly mild conditions likely. Two things point towards this relaxation...first, we look to the stratosphere!



(Forecast of the stratospheric weather pattern on Wednesday November 13th, courtesy of the GFS model ensemble...graphic from weathermodels.com)

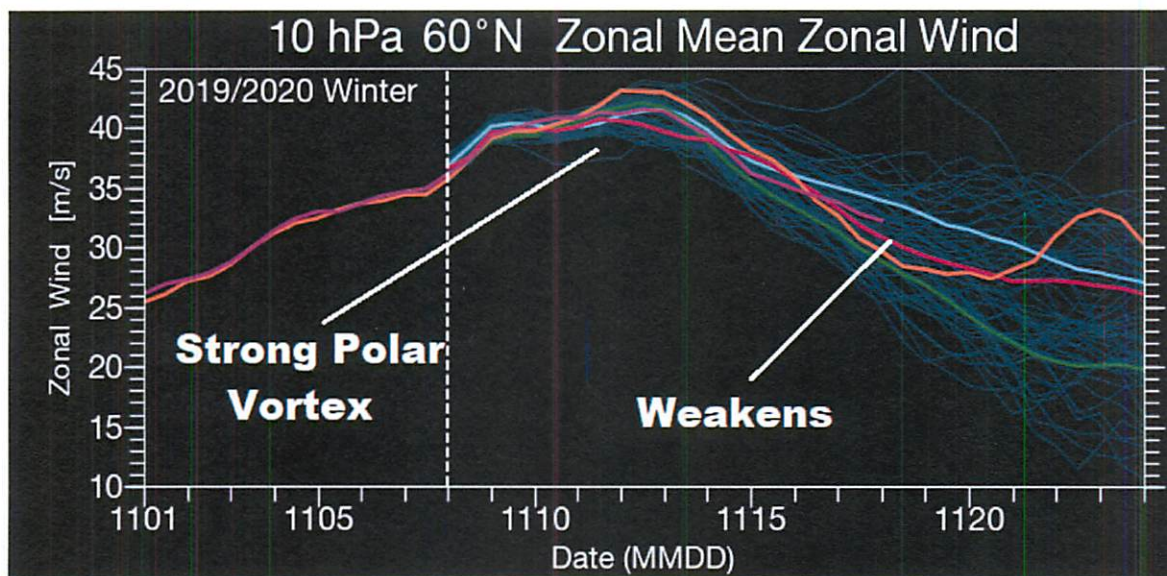
The state of the stratospheric polar vortex can clue us in to whether the tropospheric weather pattern will be generally mild or cold in the future. A strong stratospheric polar vortex that is close to the North Pole tends to correspond to a milder weather pattern at an altitude that humans live in across the mid-latitudes. And, we will have a very strong stratospheric polar vortex coming into the middle of November! The above image shows a compact and stronger than normal vortex centered very close to the North Pole. This is a milder signal starting around the middle of November.

But this is not expected to last long!



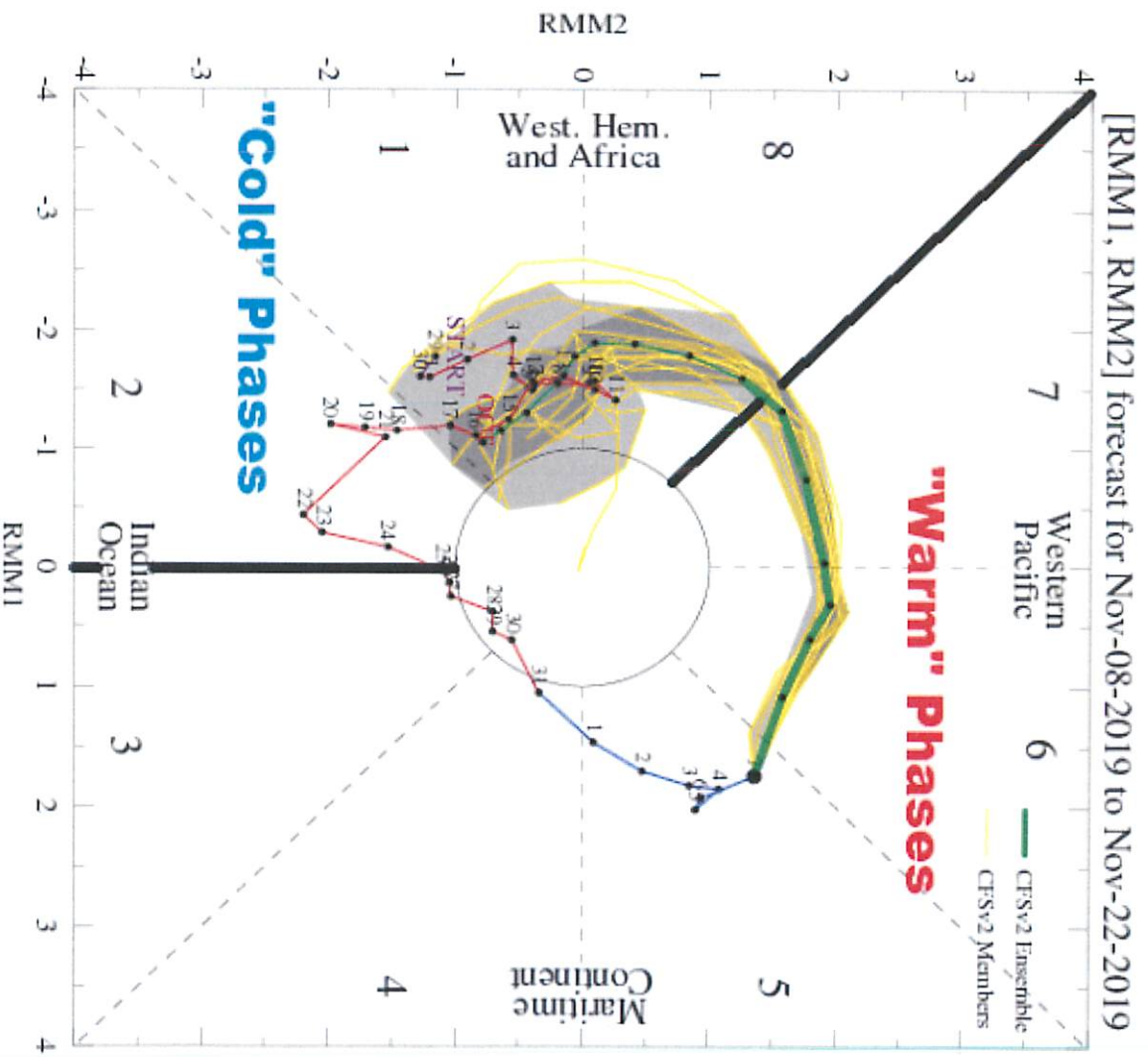
model ensemble...graphic from Weathermodels.com)

The weather pattern is becoming conducive to “disruptions” to the stratospheric polar vortex during the second week of November, and is projected to remain conducive for these disruptions for the foreseeable future. As a result, nearly all of our forecast guidance is forecasting the polar vortex to weaken and shift off of the North Pole in late November. This leads to a colder signal by early December, and is a good sign for continued cold during winter should this weakened polar vortex continue into the month of December.



(Forecast polar vortex strength from many forecast models, courtesy of
Stratobserve.com)

Another way to visualize this is above; simply, it's a plot showing the forecast strength of the polar vortex from numerous forecast models. As you can see, we get the strong polar vortex in the short term, corresponding to our expected "relaxation" of the cold pattern, but with a notable weakening towards late November with good agreement from most of our guidance.



(Forecast progression of the MJO, or Tropical thunderstorm patterns, from the CFS model)

A second signal also points towards a warmup followed by a cooldown; the MJO, or tropical thunderstorm patterns. The above graphic shows the recent MJO, and then the forecast from a set of computer models through the next two weeks in green. The MJO is beginning to pass through areas that correlate to a mild pattern over the eastern U.S. and will do so over the next week; this supports our current cold pattern relaxing around mid-November. However, it moves back into phases that support cold for late November.

Basically, we have two strong signals supporting an upcoming warmup followed by another period of potentially cold, active weather that would arrive at the very end of November or in early December. We'll monitor the progression of both of these signals, and more, over the coming weeks as we await more prolonged cold and snowy weather!

Winter Forecast Coming Out This Week!

Posted on: 10/14/19, 9:39 AM

by: Ken Elliott

Mid-October means a lot of things...football, baseball playoffs, falling leaves, cool nights, and of course the release of the final WeatherWorks Winter Forecast. This forecast will mark the end of the series of 3 previews that began in mid-August. This update will include a seasonal overview, monthly outlooks, and for the third year, probabilistic snowfall forecasts for select cities.

Our team has been working hard over the last few weeks, and is excited for the final forecast to be released. While we're not going to have any particular spoilers here, it's probably fair to say that those looking for snow east of the Mississippi will be pleased. So keep an eye on your inbox so that you can see our final and most up to date thoughts!

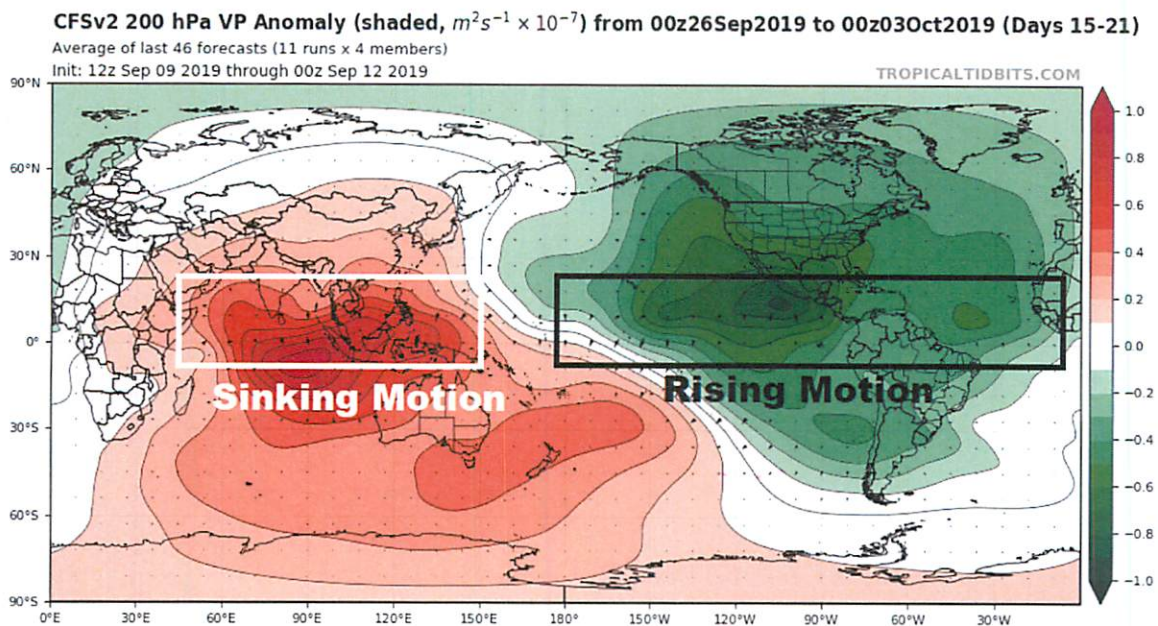
September 12, 2019: Cooler Pattern Expected to Take Hold Towards October

Posted on: 9/12/19, 1:13 PM

by: James Sullivan

Very warm weather persists across much of the eastern United States as we head into the second half of September; but our forecast for October remains similar to what it's been all along, with an expectation of cooler weather taking over a good portion of the United States. Long story short, the atmosphere will be "acting" like an El Nino in October which usually results in cooler weather.

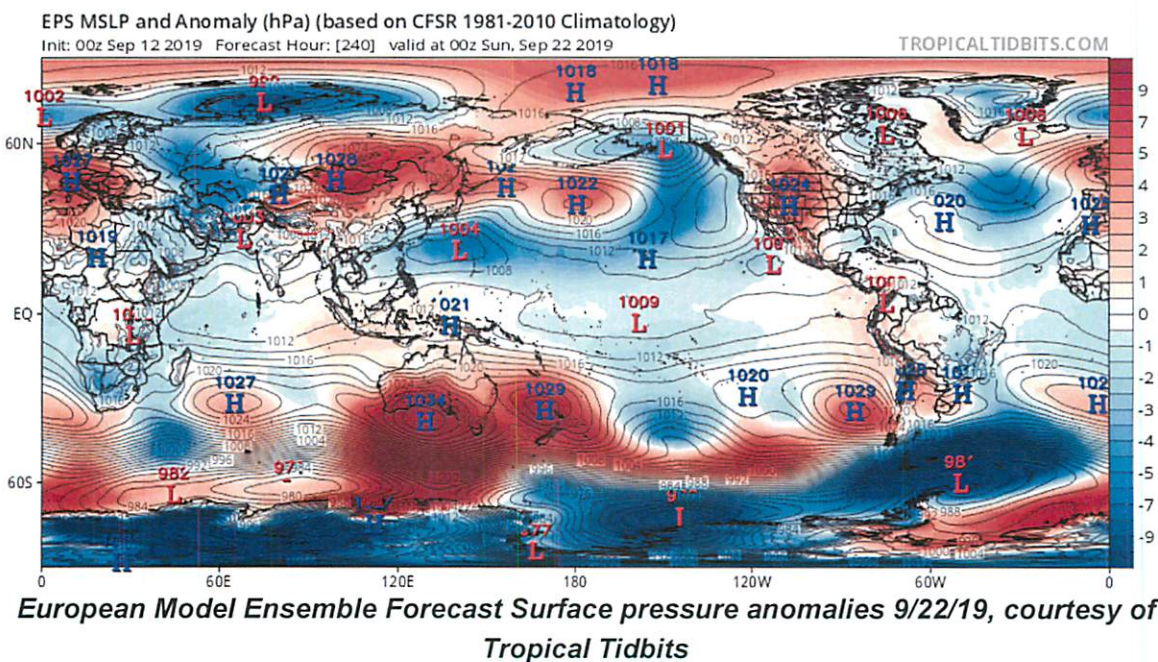
There are two major forcing mechanisms encouraging this. The first is rising motion in the tropics:



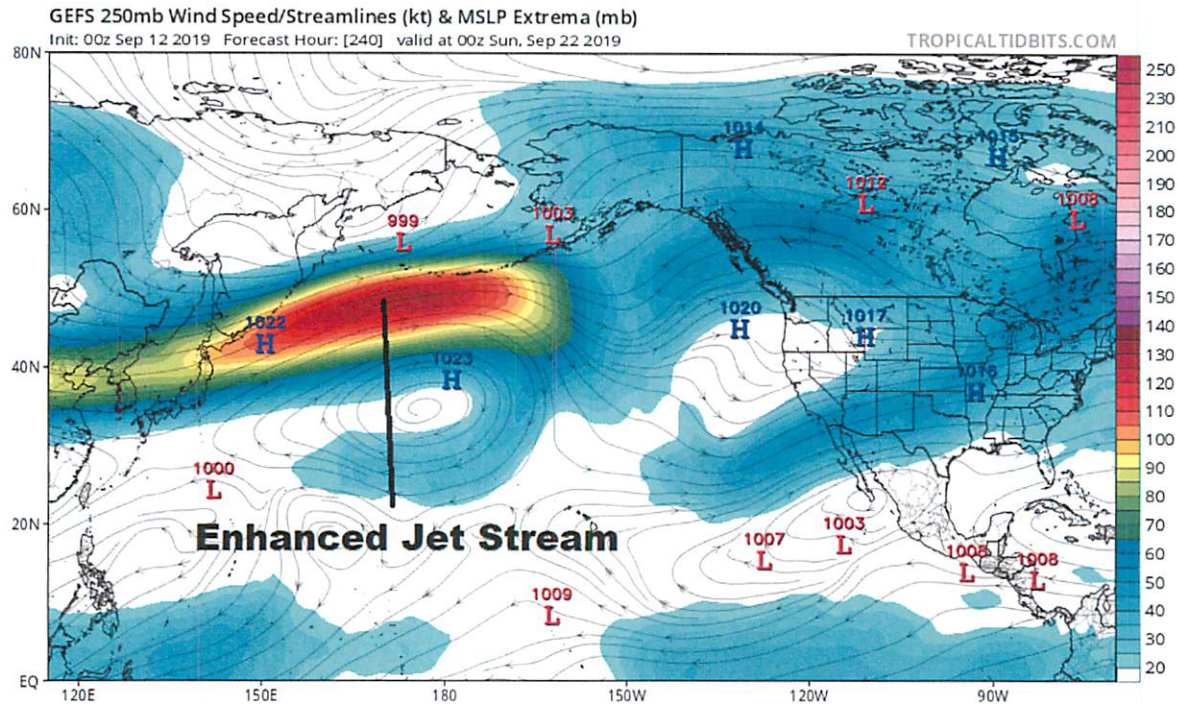
CFS Model Forecast areas of rising motion & sinking motion around Oct 1, courtesy of Tropical Tidbits

There is a strong consensus among our guidance that rising motion will become focused in the western hemisphere late September into October. Not only will this encourage tropical activity in the eastern Pacific and Atlantic basins, but it is a pattern usually associated with El Nino, when the waters in the eastern Pacific warm and favor rising motion. Thunderstorms in the tropics are essentially giant heat engines, and their location influences the jet stream and hence the pattern across the entire planet.

The second mechanism is an interaction between a high pressure, mountains in Asia, and the Pacific jet stream. This one is a little more complex:



On the above image, warm colors represent higher pressure than normal and cool colors represent lower pressure. A strong, persistent high pressure is forecast to develop east of the mountains in central Asia during the second half of September. The very tall mountains rotating into this literal wall of denser air adds torque against the planet's rotation, which is balanced out by speeding up the jet stream over the northwestern Pacific Ocean.



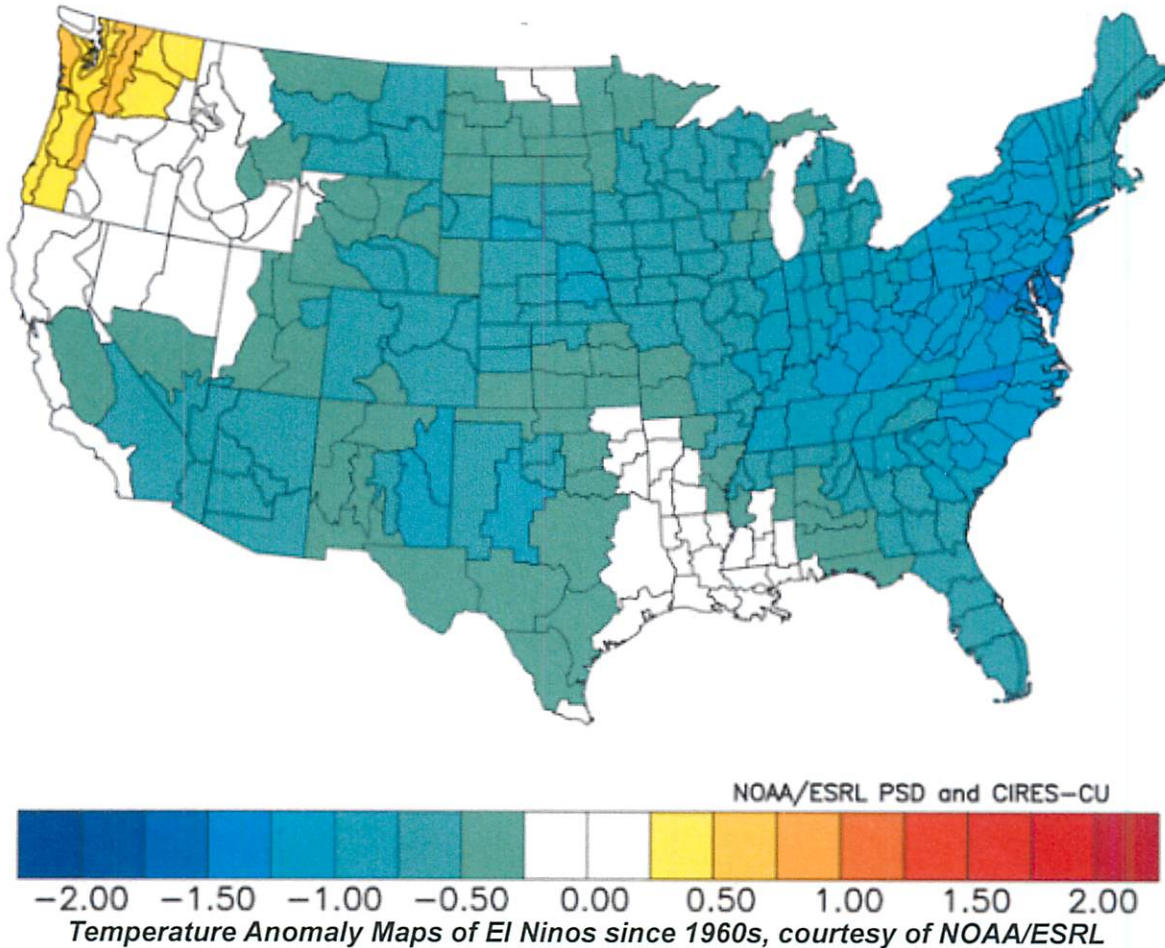
GFS Model Ensemble Forecast Pacific Ocean Jet Stream 9/22/19, courtesy of Tropical Tidbits

This jet stream is illustrated well on our forecast models heading into late September. What does this do? The region where the enhanced jet stream winds “break” (in this instance near Alaska) is usually a stormy area with low pressure. A low pressure in the north Pacific near Alaska is a hallmark feature of an El Nino. Basically, we have the tropics and higher latitudes supporting an El Nino pattern developing at the end of September and into October.

What has every El Nino October back into the 1960s looked like over the United States?

NOAA/NCEI Climate Division Composite Temperature Anomalies (F)
Versus 1981–2010 Longterm Average

Oct 2015, 2009, 2006, 2004, 2002, 1997, 1994, 1991, 1987, 1986
1982, 1977, 1976, 1972, 1969, 1965, 1963



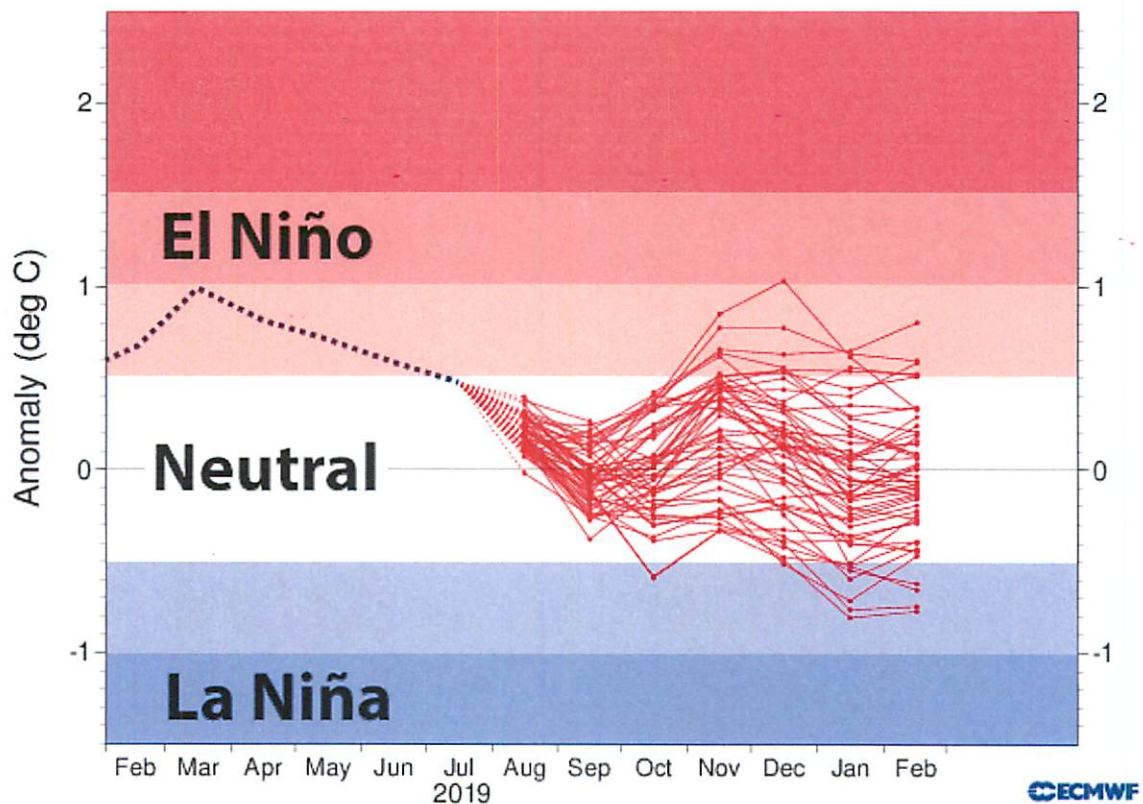
Generally cool conditions from the Rockies points east, with the coolest weather east of the Mississippi. While more goes into a long-range forecast than just copying and pasting temperature anomalies in past El Nino Octobers and our forecast does look a bit different, a number of signs point towards cooler conditions taking over the eastern U.S. to end September or start October, and this cool likely persists through most of the month.

The El Nino we had last winter and spring weakened over the summer, so this likely doesn't have any bearing on the forecast moving forward into the winter when "neutral" conditions are expected to be the rule in the tropical Pacific. However, these neutral conditions can allow for briefer interludes (on the scale of a couple to a few weeks) of El Nino or La Nina-like patterns to take over at times in the absence of a more over-powering signal.

Pacific Water Temperature Trends to Watch into the Winter

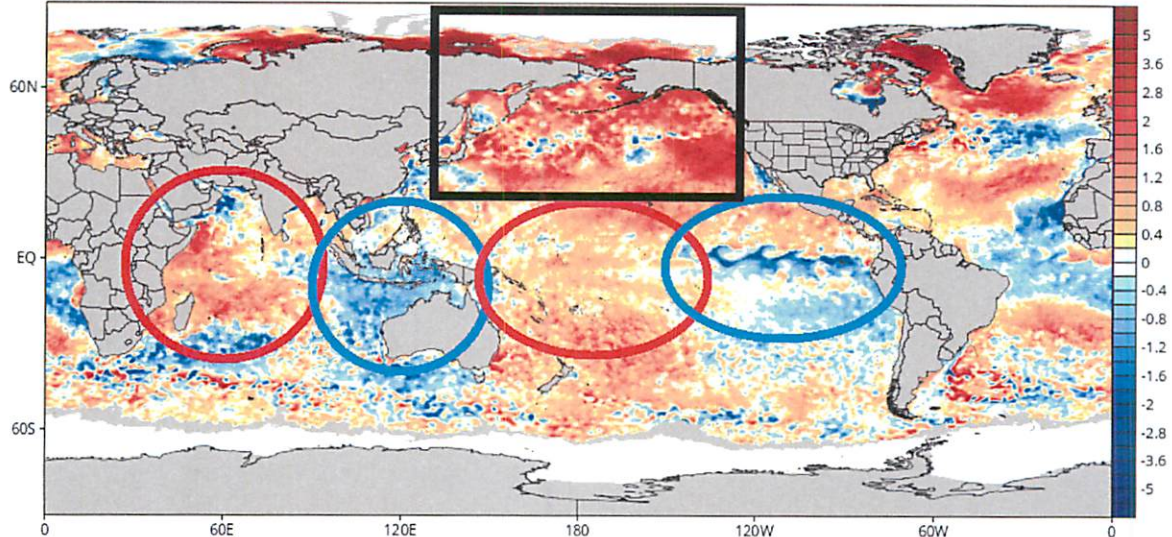
Posted on: 8/13/19, 5:35 PM

by: James Sullivan



European model El Niño/La Niña forecast thru Feb 2020, courtesy of the ECMWF

El Niño has steadily weakened through the summer, bringing us to the point now where frankly, we're not officially in an El Niño anymore. Model projections through the winter are strongly favoring neutral conditions persisting (though we can't totally rule out a weak El Niño returning, or even a weak La Niña developing). With the Equatorial Pacific water temperatures being one of our strongest predictors for seasonal forecasting, the lack of a strong El Niño or La Niña signal is not exactly ideal. However, there are other water temperature patterns we can look at as we put together our early Winter Forecast ideas:

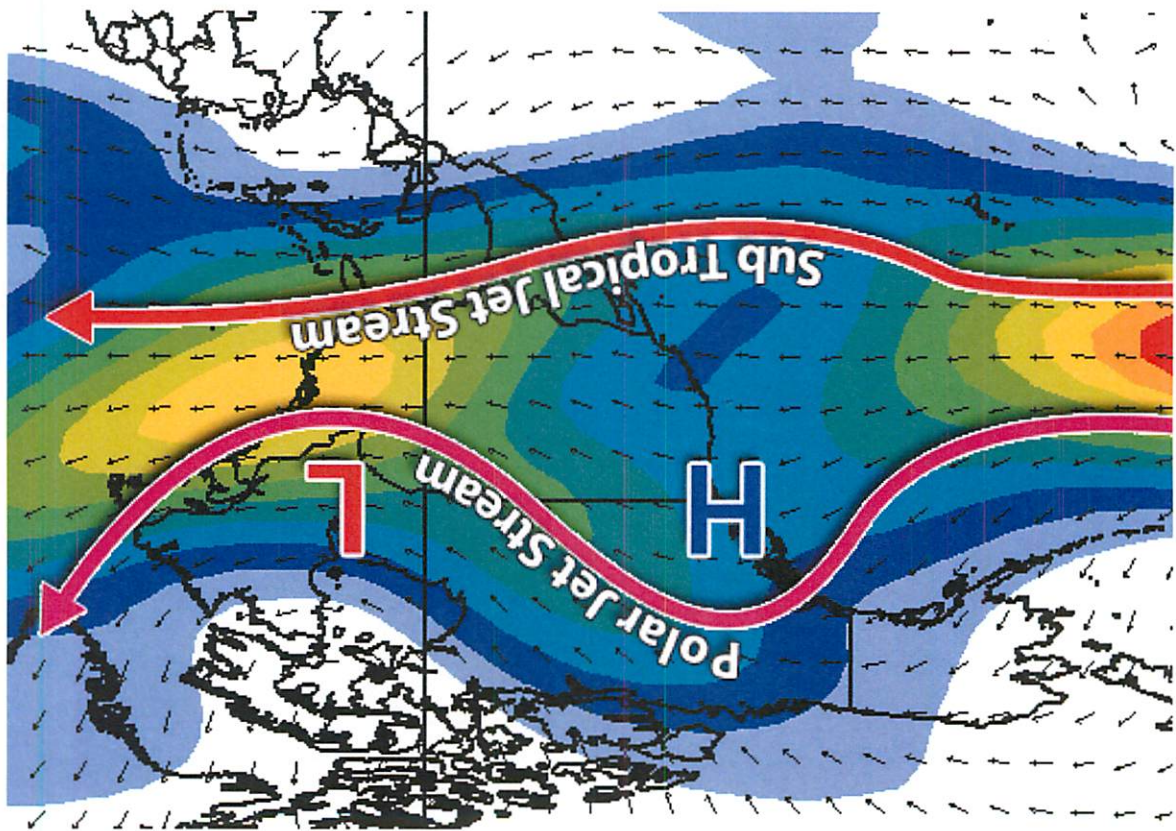


Current global water temperature anomalies, courtesy of Tropical Tidbits

- Waters have cooled significantly over the eastern Pacific, almost to the point where an La Nina is developing. This cooling is expected to slow some over the next few weeks
- The central Pacific remains quite warm, a bit of a lingering "west-based" El Nino
- The "Indian Ocean Dipole" is positive, which means warmer waters in the western Indian Ocean near the African Coast, and cooler waters to the east near Australia. This can sometimes contribute to "El Nino-like" conditions
- The North Pacific is ridiculously warm compared to average

The water temperature pattern in the tropics, if it persisted into winter, would favor strong thunderstorms (that can drive the jet stream) in the tropics near and just west of the Dateline (thunderstorms are often enhanced along the western edge of warmer pools of water). This would favor a "downstream ridge" near Alaska, and warmer waters in the north Pacific may re-enforce it.

A ridge over Alaska, if it was persistent in winter, would fill much of central and eastern Canada with cold that could leak (or flat out barge) into the U.S. at times. Many of our "analog years" (years with similar large-scale patterns to this year) have a ridge along the West Coast into Alaska into winter. This, along with current water temperature patterns, supports the idea:



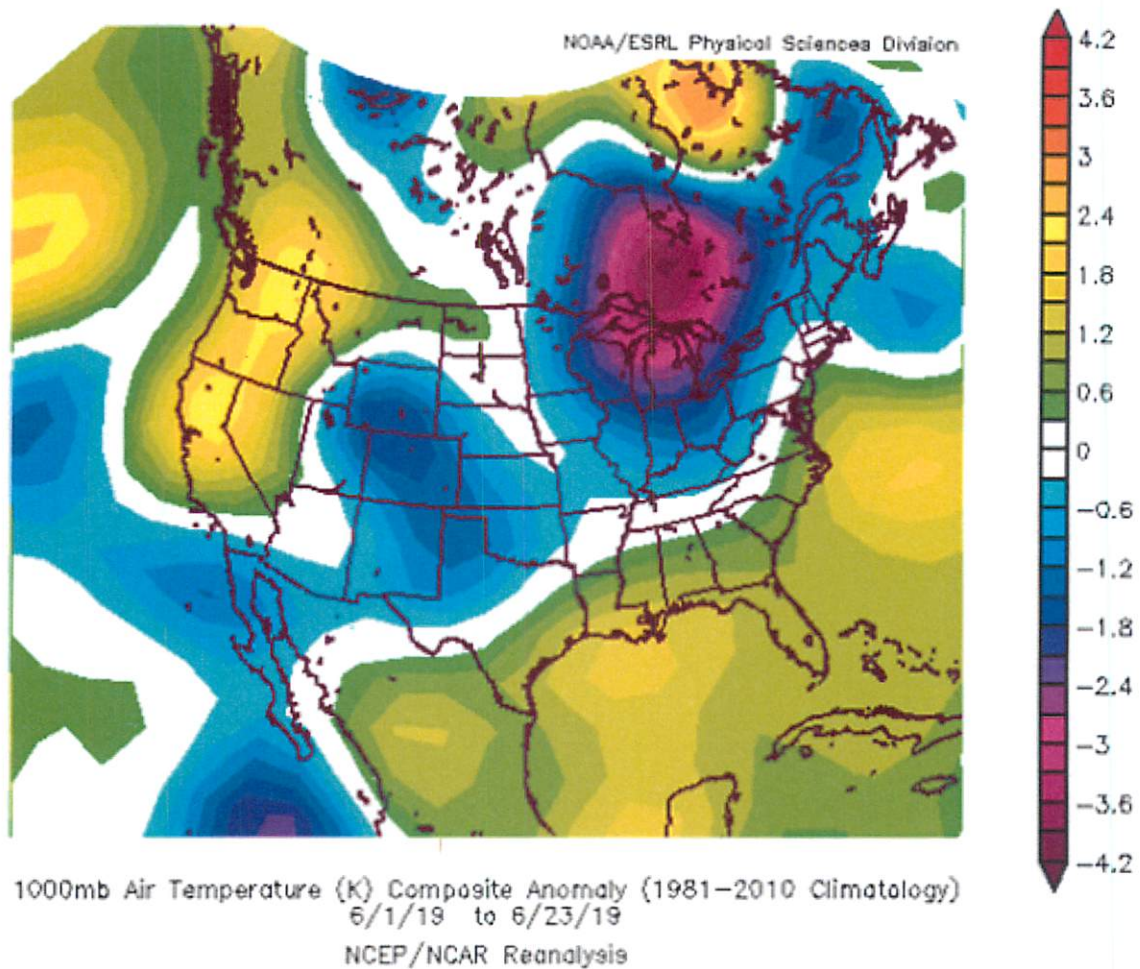
Average jet stream pattern in our "analog" winters

So, despite a lack of an El Nino or La Nina, we have a clear signal for a potential ridge in the jet stream on the West Coast and into Alaska, with support from the current water temperature anomalies and past years that may be similar to this one. This means cold will be building just north of the US/Canada border, and will be liable to come south at times. Other factors will determine how often it comes south and how far south it gets, but the pattern of a ridge into Alaska and downstream cold air into Canada will be one to closely watch for and consider this winter.

For more details, see our first Winter Preview, which will be hitting inboxes August 15th!

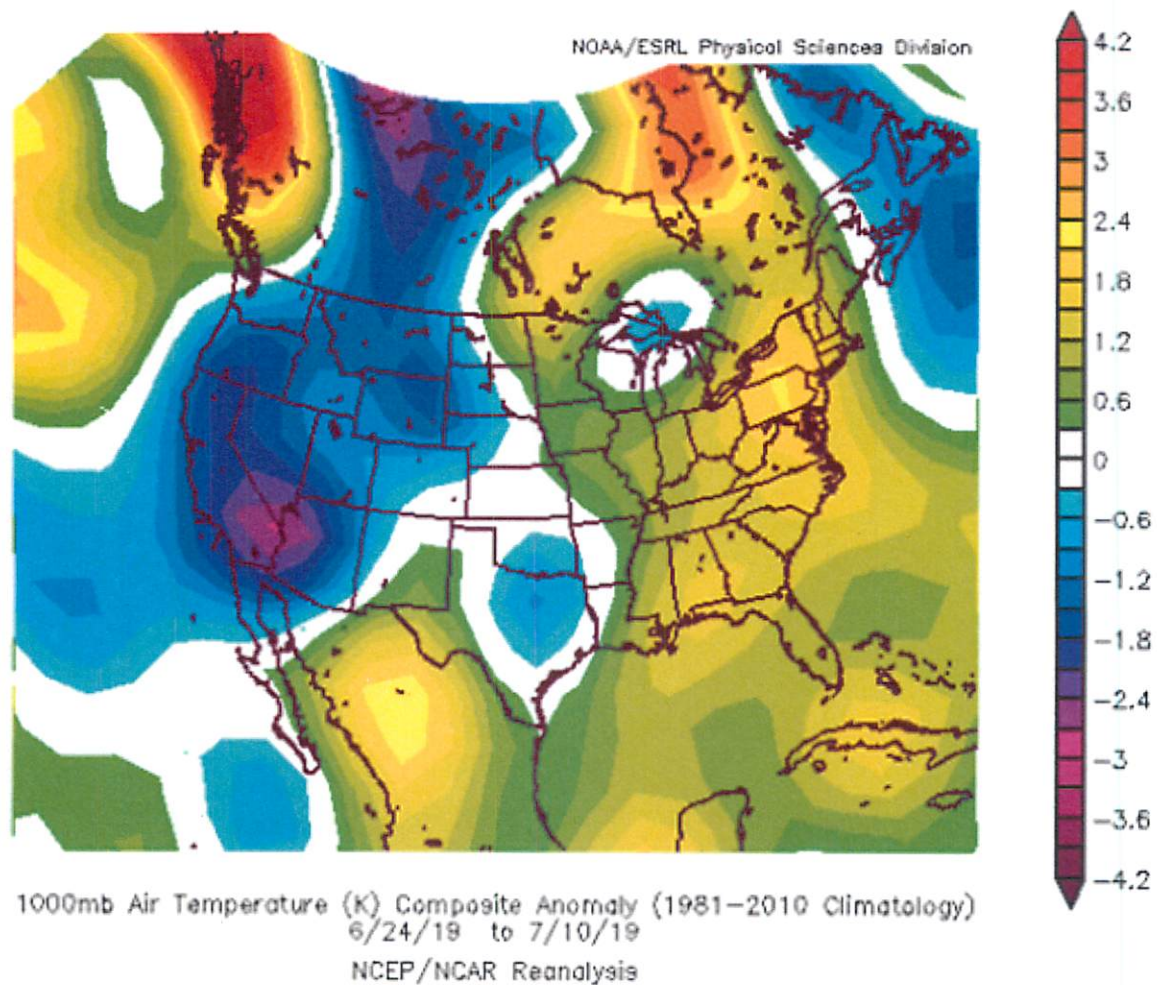
Flip from "Not Bad" to "Quite Hot" in Late June
 Posted on: 7/15/19, 9:19 AM
 by: James Sullivan

It was an active and not-too-hot start to summer from May through most of June. In fact, the first three weeks (and change) of June were cooler than normal for most of the central and eastern U.S. (save for the Gulf Coast, Southeast Coast and Mid-Atlantic Coast where it leaned slightly warm):



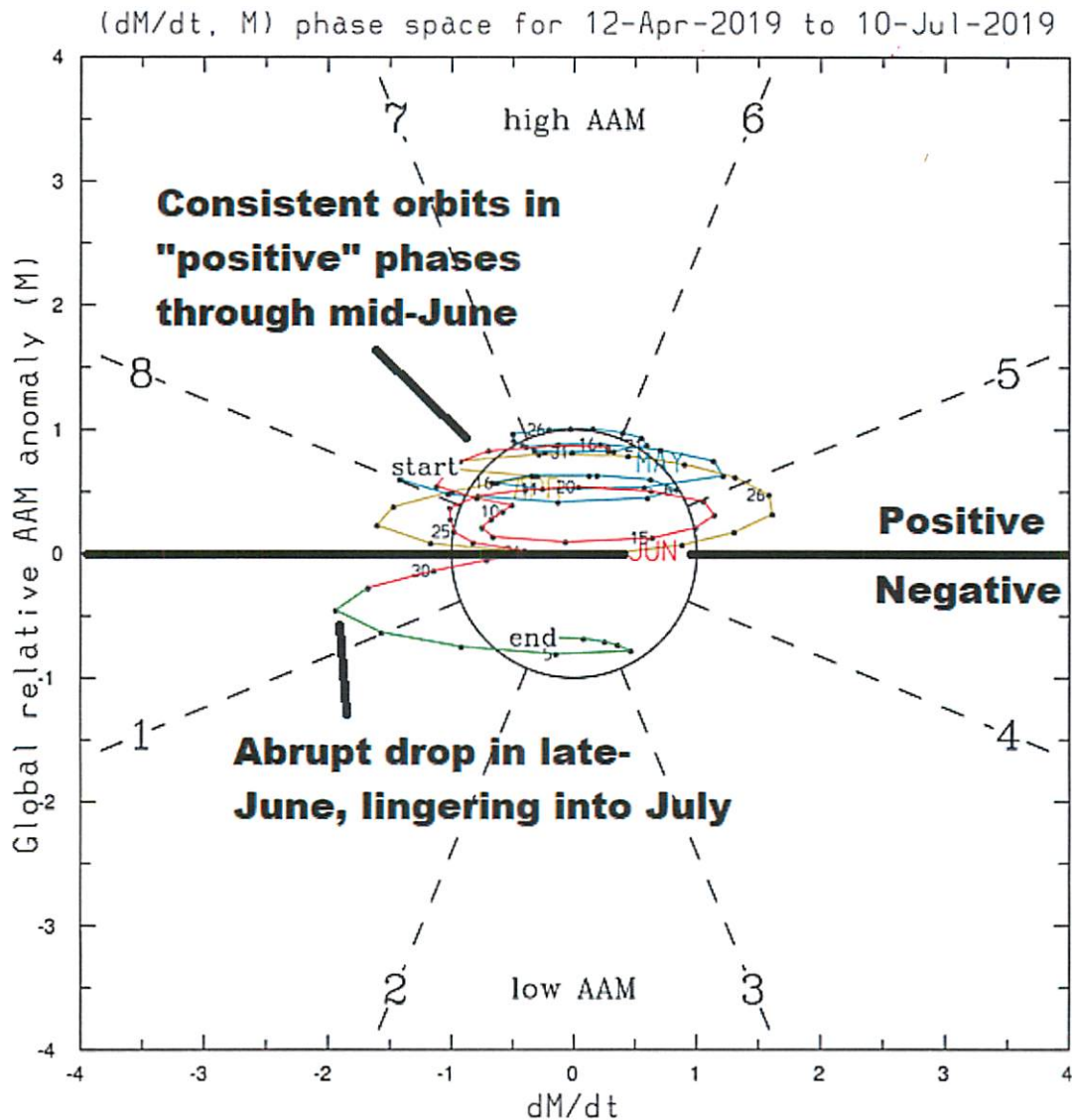
Temperature departures from normal from June 1-23, 2019

The end of June and start of July has been much warmer for the eastern, and to some extent central, portions of the U.S., and the mid-to-late July forecast looks like what we call a “blow torch” for much of the central and eastern U.S. Take a look at the temperature pattern for the end of June and start of July so far:



Temperature departure from June 24-July 10, 2019

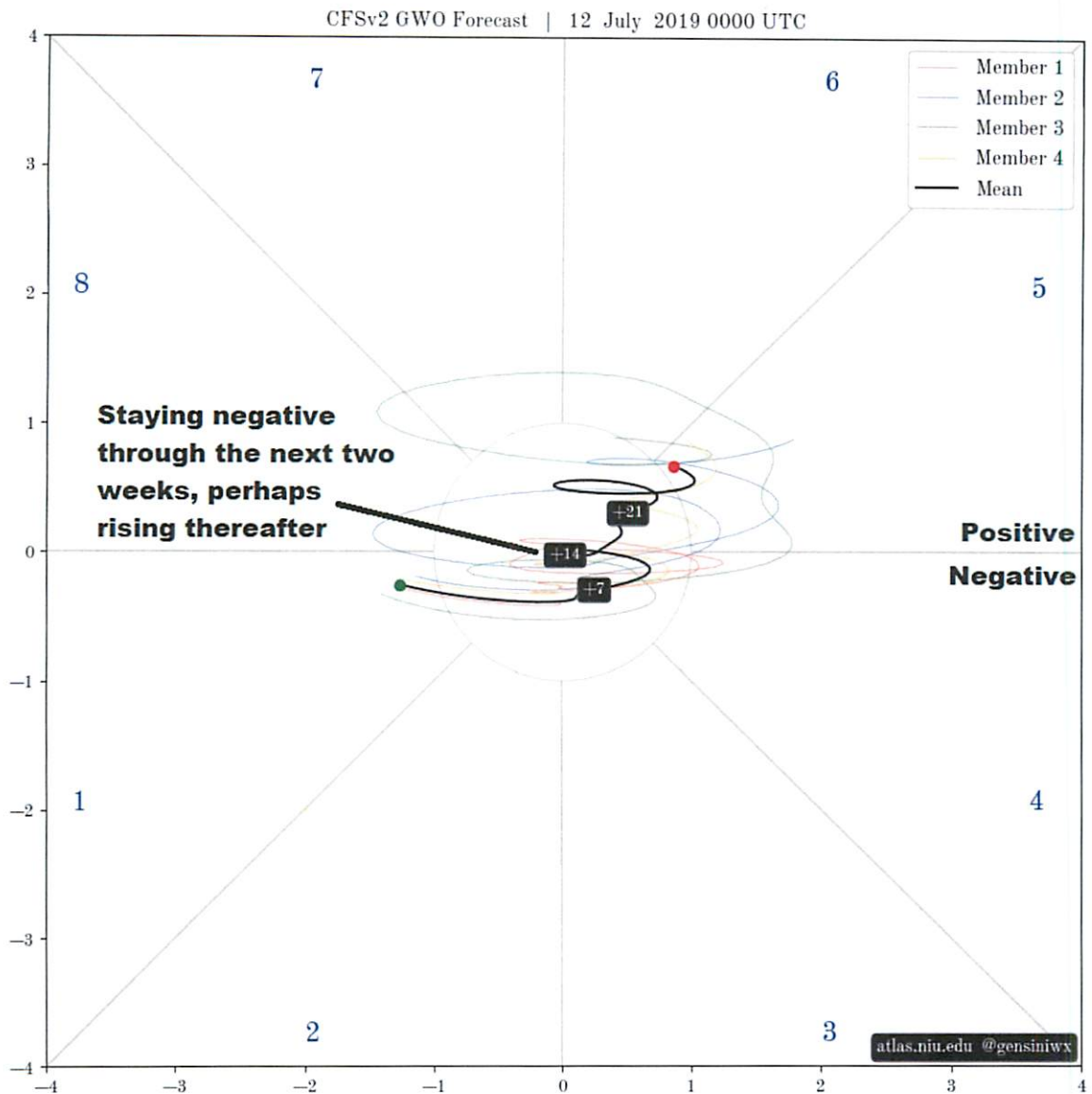
So, uh, clearly something has changed in the pattern. One way to gauge the global weather pattern is the "Global Wind Oscillation" or GWO for short, which is affected by a large number of things (we won't get into that) and has well-known impacts on the large-scale weather pattern. In extremely simple terms, a "positive" GWO is typically associated with a weather pattern we'd expect more in an El Nino, while a "negative" one is usually associated with what we'd expect more frequently in a La Nina. Here's a look at the GWO from mid-April through early-July:



(A phase diagram of the GWO for the last few months, with anything above the black line being positive, below negative)

So, as we headed through spring and early summer the GWO was consistently neutral to positive, which makes some sense as we were in a weak El Nino coming out of the winter. There were intermittent changes in the pattern as the GWO orbited around, but we kept coming back to a similar, very active, not very warm pattern, which is somewhat typical of El Nino summer months and is what we forecasted in our summer outlook.

However, an abrupt drop occurred in late June and is continuing into July, and the pattern has changed significantly to one much more favorable for heat over the central and eastern U.S. This also isn't a shock, as some recent warm summers were associated with ongoing or developing La Nina events (summers of 2011, 2012, 2016, 2017 and 2018 recent examples), and a "negative" GWO is more common during La Nina events. While it's possible this is only a temporary pattern, it's at the very least interesting that as we discussed last month in this blog, the El Nino event has been weakening this summer.



Model forecasted GWO for the next four weeks

Our long-range forecast models suggest this weakly negative GWO is likely to persist for the next two weeks, taking us through much of July and likely allowing the generally warm (if not hot) weather pattern to continue for the central and eastern U.S. The models try returning to more positive values as we head into August, perhaps suggesting this hotter, somewhat drier pattern trends back closer to normal in a couple of weeks.

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