Wx Watcher

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Partial Solar Eclipse on June 10

By Michael Clair, Meteorologist

Back in August 2017, Northern New England was part of a first for many people, a total solar eclipse traversing the continental United States. From the West Coast to the Southeast, millions watched as the moon completely covered the sun for several minutes. Across Northern New England we did not witness totality, but just seeing the partial eclipse was exciting for many folks. Luckily for us, another solar eclipse is fast approaching, and one of the best spots in the US to see it will be here in Northern New England.

An annular solar eclipse will occur during the morning on Thursday June 10th, and although it will not be a total solar eclipse, the sun will actually be more covered than it was in 2017 across our area. About 75% of the sun will be hidden, while about 60% was covered during the 2017 event in our area.

An annular solar eclipse occurs when the moon is positioned in front of the sun, but due to the moon's distance from earth the moon is not close enough to completely obscure the sun. When this happens, the moon will appear to have a ring of fire around it as the sun shines around its edges. This will be observed across Canada, Greenland, and parts of Russia, but across our area the moon will not appear to be completely over the center of the sun. A map of the coverage that will be visible is shown in Figure 1.

To see it, you'll have to wake up early. The eclipse will be visible beginning at sunrise on the 10th, which ranges from about 4:35AM to 5:15AM across Northern New England. It will then peak in coverage shortly after 5:30AM, and then end less than two hours after it begins.

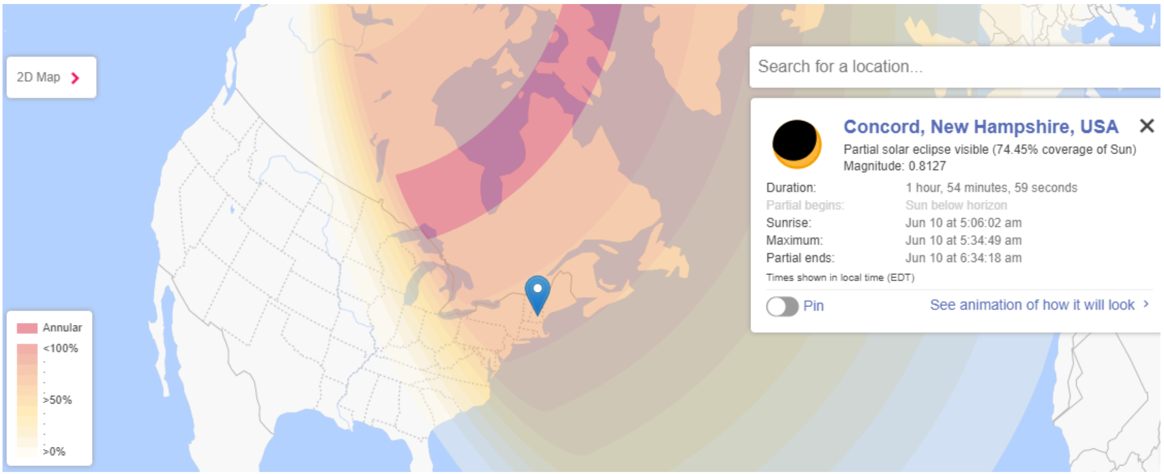


Figure 1: Map of the June 10th, 2021 annular solar eclipse coverage. Image courtesy of timeanddate.com

Finally, also keep in mind that parts of Northern New England will see a total solar eclipse on April 8, 2024. We will be sure to send out some reminders between now and then. (Image below from greatamericaneclipse.com.)

New Electronics Staff at NWS Gray

By Nikki Becker, Observation Program Leader

Over the last couple of years, the National Weather Service (NWS) in Gray has hired a completely new electronics staff. These gentlemen are an essential part of the office. They are the backbone of our office by keeping our essential equipment running so the operational meteorologist can issue daily forecasts, watches, advisories, and warnings to ensure the mission of the NWS is met.

The electronics staff maintain the radar, upper air system, Automated Surface Observing Systems, NOAA Weather Radio, and computers for the NWS Gray forecast area. NWS Gray has three staff members, an Electronic System Analyst (ESA) and two Electronics Technicians (ET).

The ESA at NWS Gray arrived in late 2019 and was promoted from NWS Albany, NY, where he was an ET for 17.5 years. Prior to working for the NWS, the ESA was an ET for the Department of Defense for 19.5 years.

Mike Belanger is one of the new NWS Gray ETs and has been here since May 2020. He came to our office from NWS Blacksburg, VA, where he spent 2 years. Prior to working for the NWS, he was in the United States Air Force (USAF) for 12 years as a combat communicator specializing in satellite and wideband communications. Mike was born and raised in southern Maine and is happy to be back home.

Jeffrey Inferrere is also a new NWS Gray ET and arrived in January 2021. He is brand new to the Weather Service coming from USAF with over 18 years of experience in the communication and electronics career fields while serving on active duty and reserve status. He is serving his final years with USAF Reserves at Tinker Air Force Base in Oklahoma where he flies on and maintains communication equipment of the Airborne Warning and Control Systems (AWACS) aircraft. Jeffrey is originally from Manchester, NH, and he is happy to be back in Northern New England after being away for the last two decades.

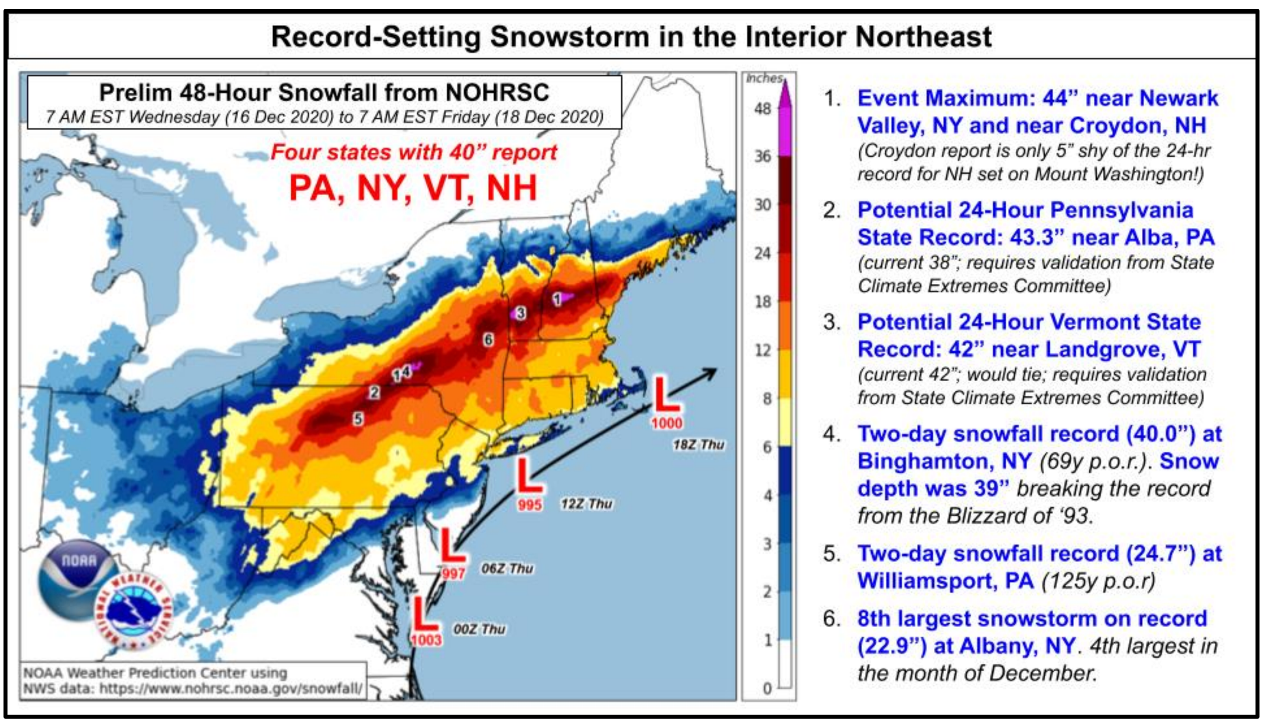
The December 17, 2020 Northeast Snowstorm

By Hunter Tubbs, Meteorologist

On December 17th, 2020 a relatively weak area of low pressure tracked south of New England and produced a band of prolific snowfall rates. This band resulted in snowfall rates approaching 6 inches per hour and led to total snowfall amounts of up to 4 feet across portions of the Lakes Region in central New Hampshire and western Maine, which shattered some daily records.

CoCoRaHS reports from the day after indicated that generally between a quarter to locally over one inch of total liquid equivalent precipitation occurred across New Hampshire and western Maine. Through these reports, it was determined that snow to liquid ratios (SLRs) were up to 25:1, thus indicating that this was a very dry and fluffy snow. The relatively light nature of the snow was likely the reason why only some isolated power outages were observed despite the heavy accumulations. It also made cleanup a little easier for both residents and local municipalities.

This was a particularly difficult storm for forecasters to forecast due to uncertainty on the placement of the heaviest snow axis. There was considerable disagreement in forecast model guidance even hours up to the onset of the snow. Forecast verification and post storm-research was significantly improved as a result of reports from local CoCoRaHS observers, which can potentially be used to improve future winter storm forecasts.



A Review of Winter 2020-2021

By Derek Schroeter, Meteorologist

The winter of 2020-2021 was a tame one by northern New England standards that was framed by exceptionally mild conditions in November and an early spring. Despite a record setting snowfall event early in the winter on December 17, 2020, western Maine and New Hampshire averaged below normal snowfall during the months from November to March. Here at the NWS Gray office total snowfall only amounted to 42.6 inches making this the least snowy winter since records began here in 1995-1996. The lack of snowfall across the area can be attributed to temperatures averaging above normal while precipitation was below normal. Looking at Figure 1 below, it can be seen that temperatures across northern New England averaged 2°F to 4°F above normal while precipitation averaged 2 to 4 inches below normal.

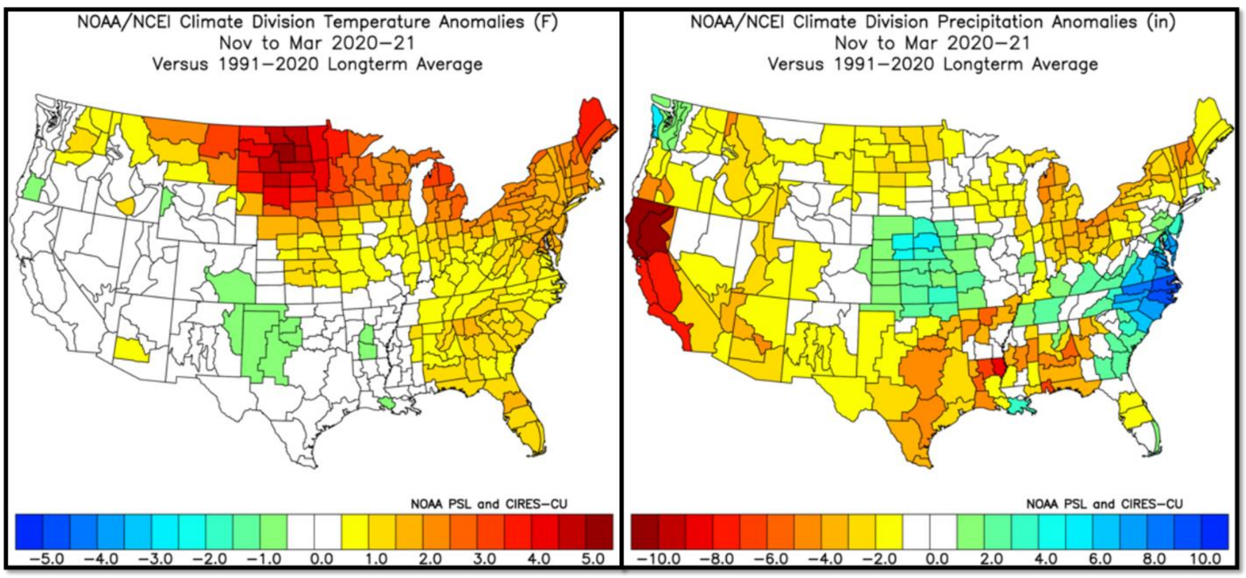
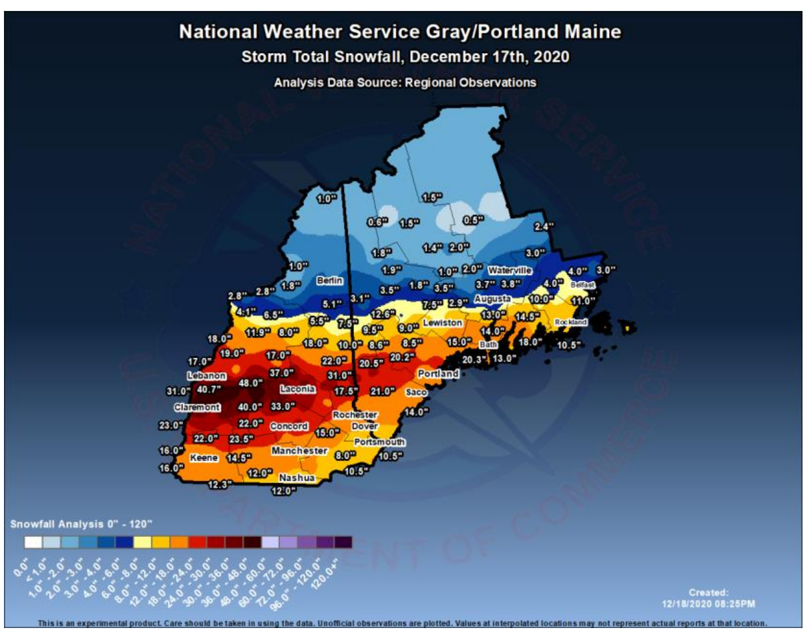


Figure 1: Temperature (left graphic) and precipitation (right graphic) anomalies during the November to March period based on NOAA/NCEI climate divisions. Much of the northern and eastern United States was above normal with northern New England about 2°F to 4°F above normal. Precipitation anomalies ran about 2 to 4 inches below normal in northern New England.

It is not uncommon for northern New England to see appreciable snowfall in November with several instances of impactful snowfall events as early as late October. Typically for areas south of the mountains November averages 2 to 3 inches of snow. This past November had an exceptionally mild stretch of weather from November 6th to 12th as an anomalous ridge remained positioned over the eastern United States. This lead to several days with highs into the 70s across the south and into the upper 60s across the north. November on the whole averaged 2°F to 4°F above normal with only a trace of snow in Concord and 0.1" of snow in Portland. Further north in the mountains, snowfall also fell well short of average with Rangeley, ME receiving 3.3” and Jefferson, NH receiving 2.7” as well as Mt Washington seeing 14.2”, below their average November snowfall of 35.6”.

December featured a roller coaster of temperature swings and was the only month this winter to average above normal precipitation. Mild weather continued into the first few days of December followed by a potent low pressure system that tracked up the East Coast December 5th. This system took an ideal track for producing double digit snowfall in northern New England with track from the Mid-Atlantic over the elbow of Cape Cod and intensified in the Gulf of Maine. However, without an antecedent cold air mass in place and sea surface temperatures in the Gulf of Maine running well above normal, areas outside of the mountains struggled to accumulate snow from this system. In Portland, ME, temperatures hovered around the freezing mark through the duration of the event with heavy wet snow falling for much of the event that only resulted in 1.4 inches of accumulation from 1.99 inches of liquid precipitation.

As discussed in the previous article, the main event in December was the record breaking snowfall that occurred on December 17th. Besides dropping upwards of four feet of snow in central New Hampshire, this system was unique in that it was not a particularly strong low pressure system. The heavy snow, at times falling at 7 inches per hour, was the result of very strong frontogenesis from warm air colliding with cold air. It was along this interface of cold air and warm air where the heaviest snow fell and as can be seen in the image below, north of this interface there was a tight gradient in snowfall. The plentiful snowpack was short lived as very mild air mass and heavy rain arrived in time for Christmas that took many areas with double digit snowfall back to bare ground.



After an active December the overall weather pattern turned dormant in January and stayed that way into spring. Precipitation averaged well below normal from January into March with only a handful of light snow events that did not exceed double digit amounts. Even Mt Washington struggled to pick up double digit snowfall events with only one occurring from January 15th to 17th for a total of 13.1 inches. February was the one month that averaged below normal for temperatures. It was during this month that a stratospheric warming event disrupted the polar vortex that lead to record cold over the central United States down into Texas. Northern New England was on the eastern periphery of this cold air mass for much of the month that allowed the snowpack to stay stable without much melting.

Depending on how one views winter in northern New England, one of the most remarkable characteristics was the lack of snow in March. Normally places like Portland and Concord receive over a foot of snow in March and this year the only measurable snow was 0.1” on March 1st in Portland and Concord did not record more than a trace. Further north in Rangeley total March snowfall only amounted to 6.4” falling well short of the average monthly snowfall of 24.4 inches. By the middle of March the meager snowpack south of the mountains melted and during the third week of March temperatures rose into the 60s, depleting the snowpack in northern areas by the end of the month.

Each winter is unique and the drivers of snowfall and temperature in respect to average can sometimes be found in analyzing jet stream patterns and mid-level atmospheric pressure patterns. Figure 3 shows mid-level atmospheric pressure patterns on the left and jet stream wind anomalies on the right. This past winter there was a strong ridge in the central Pacific and over eastern Canada towards the Arctic with a strong trough over Alaska. The combination of a strong trough north of the strong ridge in the Pacific lead to a strong North Pacific jet stream seen in the right graphic in figure 3. The ridge over eastern Canada is often considered favorable for East Coast snow storms, but this year the ridge was position a little too far south and west which often deflected low pressure systems to our south. Also seen in the right graphic of figure 3 is a weaker than normal jet stream over the Atlantic and into New England. This can be loosely correlated with suppressed storm activity near New England, which helps explain the lack of snowstorms this past winter. Another aspect of this winter was the moderate La Niña conditions present in the tropical Pacific. Typically La Niña winters tilt the odds in favor of above normal snowfall in northern New England as seen in figure 4. However, this winter will join the La Niña winters of 1988-1989 and 2011-2012 as being a very low snow year.

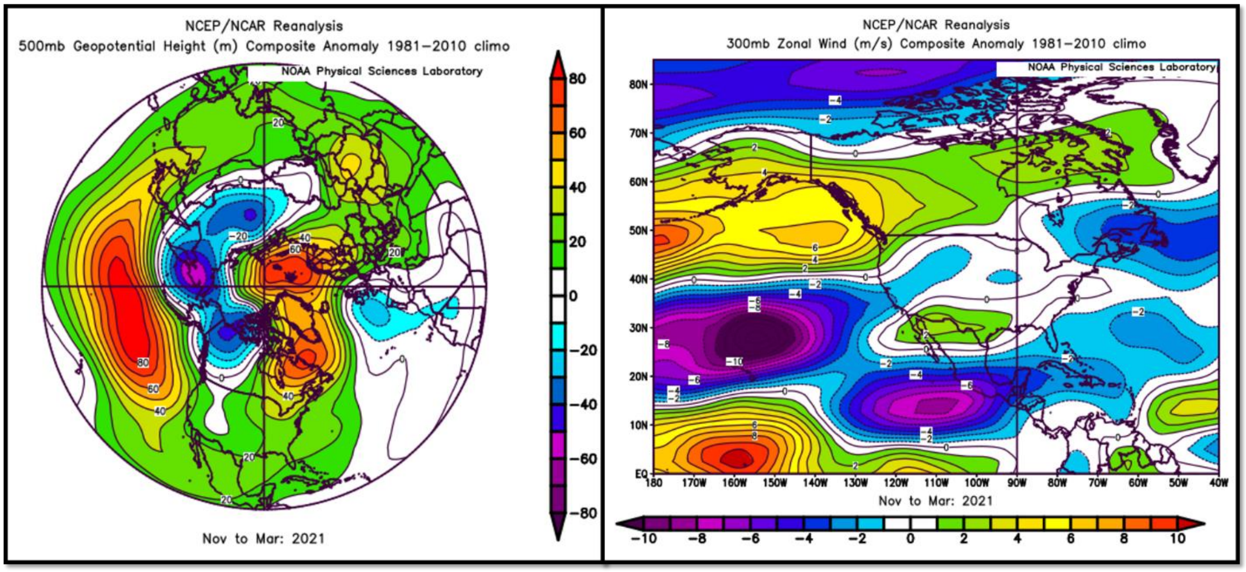


Figure 3: The graphic on the left show mid-level atmospheric pressure patterns with the warm colors denoting areas of high pressure and cool colors showing areas of low pressure. The graphic on the right shows Jet Stream wind anomalies with the warm colors across the North Pacific into western Canada showing a strong Polar Pacific Jet Stream while the cool colors over New England show a weaker than normal North Atlantic Jet Stream.

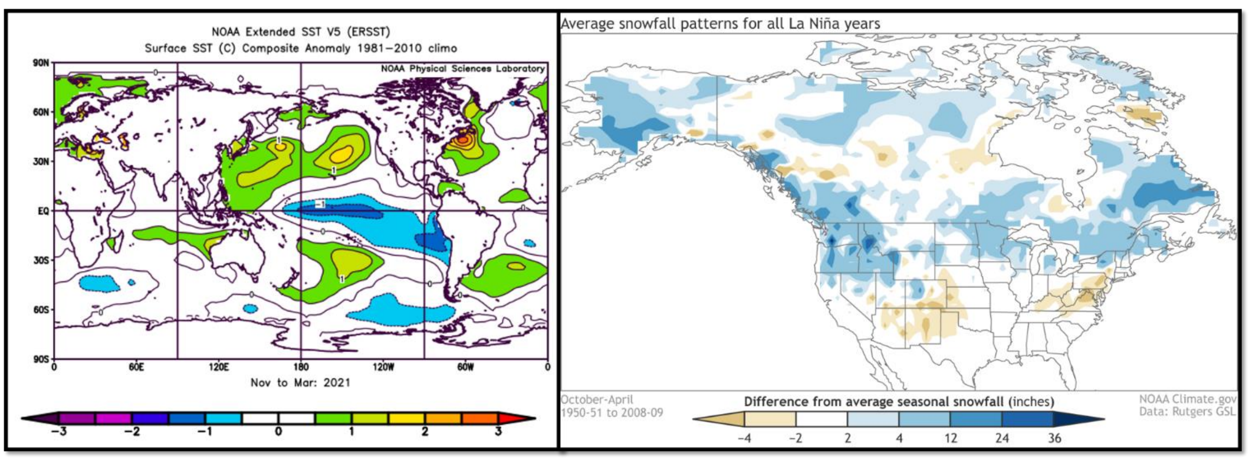


Figure 4: The graphic on the left shows sea surface temperature anomalies from this past November to March with the cool colors across the equatorial Pacific indicative of La Niña. The graphic on the right shows average snowfall patterns during La Niña winters with northern New England generally averaging above normal snowfall while the Mid-Atlantic averages below normal snowfall. This typical snowfall pattern did not occur this year in our area with much below normal snowfall this past winter.

2021 Hurricane Season and Summer Preview

By Michael Clair, Meteorologist

Hurricane Outlook: After several warm periods so far this spring, many folks may feel that summer got off to a bit of an early start this year. To meteorologists and weather enthusiasts alike an important part of the arrival of summer is the beginning of the hurricane season. Each spring there are predictions and speculation about how the season will shape up. But before discussing that, we actually need to discuss how the season has progressed so far.

The Atlantic hurricane season runs from June 1st through November 30th, but as of late May there has already been a named system in the Atlantic, Tropical Storm Ana. Ana was the first named system of the season, forming on May 22nd as a subtropical storm, and then gaining tropical characteristics the following day to the northeast of Bermuda (Fig. 1). The system remained offshore, but brought large swells to the New England shoreline, much to the delight of local surfers.

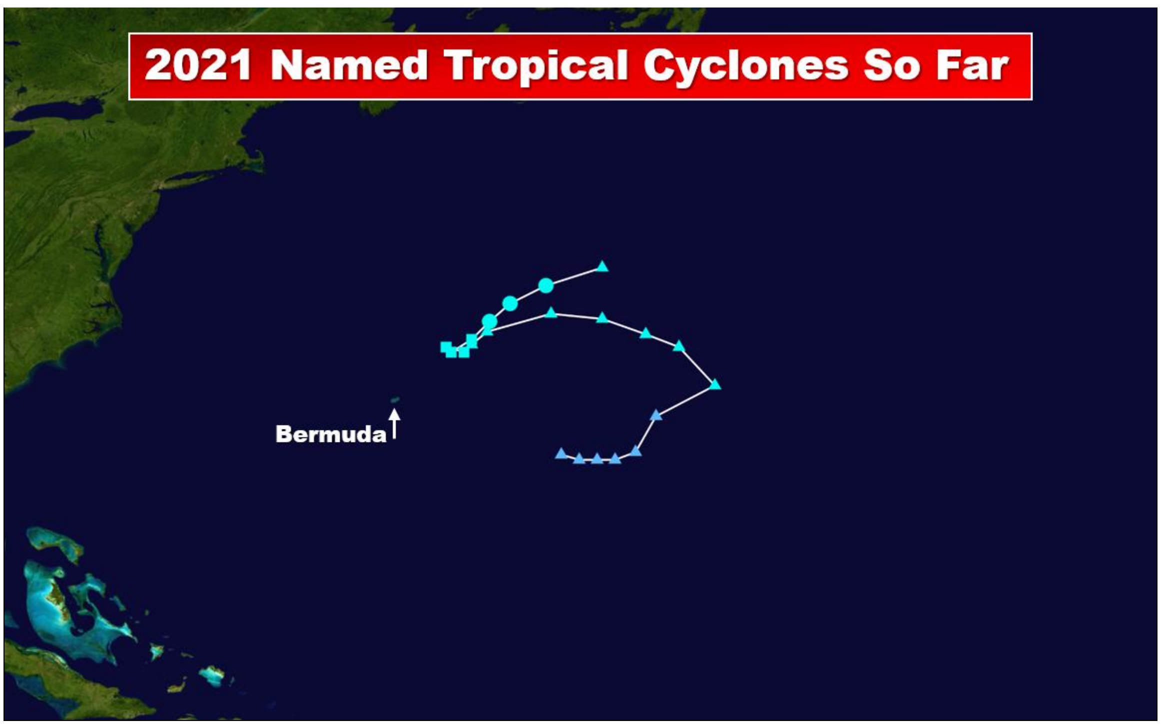


Figure 1: 2021 track of Tropical Storm Ana. Image adapted from https://en.wikipedia.org/wiki/2021_Atlantic_hurricane_season#/media/File:Ana_2021_track.png

As the season continues, the names that will be used are shown in Figure 2. The World Meteorological Organization (WMO) selects this list of names, and the selected names are meant to encompass the languages spoken by the countries that are affected by storms in the Atlantic. The list is repeated every six years, but the names of significantly impactful or historic storms can be retired and replaced with new ones. This list was last used in 2015. That year, the storms “Erika” and “Joaquin” were retired, so this year is the first year that the names Elsa and Julian have been featured.

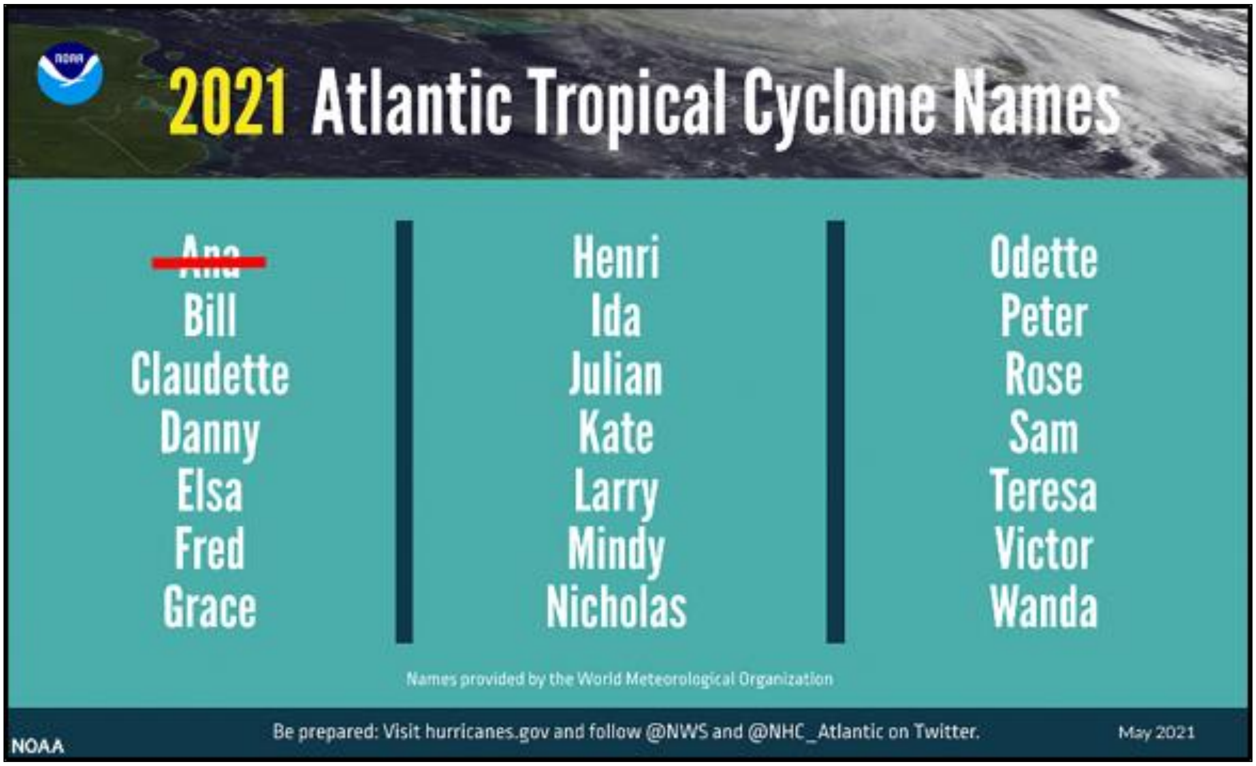


Figure 2: List of 2021 Atlantic tropical cyclone storm names.

There are a few changes in regards to the hurricane season that will begin this year. The new 1991-2020 climate averages were released this spring. These values replace the 1981-2010 averages, and accordingly, there has been an increase in the average number of storms compared to the previous period. These changes are highlighted in Figure 3 on the next page.

Another change beginning this season is the naming system. Through last year if the list of hurricane names were all used, the letters of the Greek alphabet would then be used. This had only happened once, in 2005, until last year when the first nine letters were used. Due to confusion around this naming convention, the World Meteorological Organization announced they will no longer use the Greek alphabet, and will instead use a supplemental list of names if the first 21 names get used. If we get to this point, the first system on the second list would be named Adria.

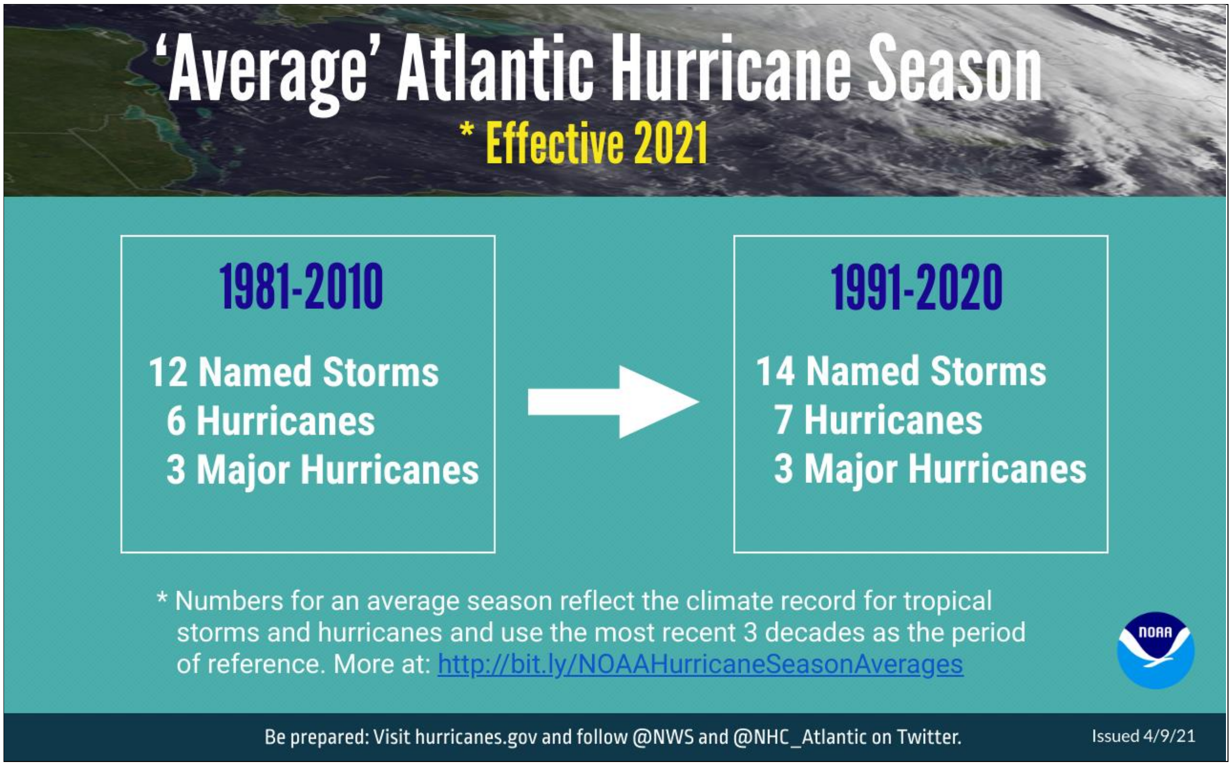


Figure 3: New seasonal averages for the Atlantic Hurricane Season.

There are many factors that influence the frequency and progression of storm development during any given Hurricane season, which can make forecasting the outcome of a hurricane season a challenging task and an imperfect science. One of the factors that influences seasonal outcomes is the El Niño Southern Oscillation (ENSO) Index. This is more commonly referred as either El Niño (positive ENSO) or La Niña (negative ENSO), but a neutral phase also has historical outcomes on the hurricane season. Historically, El Niño conditions lead to lesser hurricane seasons largely due to increased wind shear from stronger wind speeds in the mid and upper levels of the atmosphere through the tropics. La Niña conditions, being opposite of El Niño conditions, tend to bring the opposite outcome, yielding more named storms and landfalls. The current ENSO projections for the next several months are shown in Figure 4. They project generally good agreement on an ENSO index forecast to remain near neutral through the hurricane season. Historically, a neutral ENSO doesn't yield strong correlations to the hurricane season, putting more weight on other factors influencing the outcome.

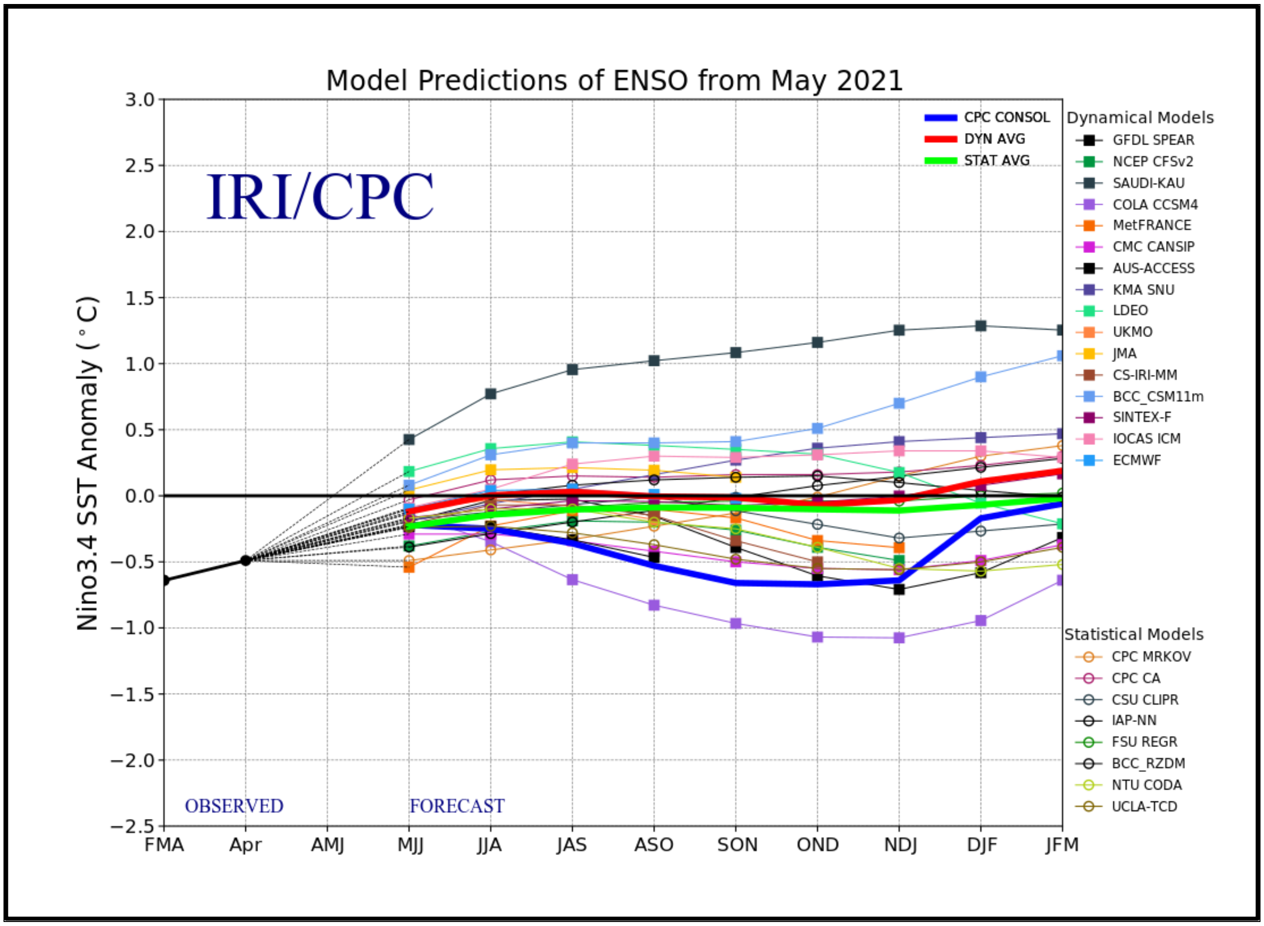


Figure 4: ENSO projections for the next several months. Image courtesy of https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table.

Another factor that can influence the outcome of a hurricane season is sea surface temperatures (SSTs). Warmer waters generally lead to the potential for stronger systems. While it's still early, and these conditions can change, SSTs are running slightly below average south of 20°N, the Main Development Region, with a larger area of above normal SST values north of this area across the Subtropics (Fig. 5).

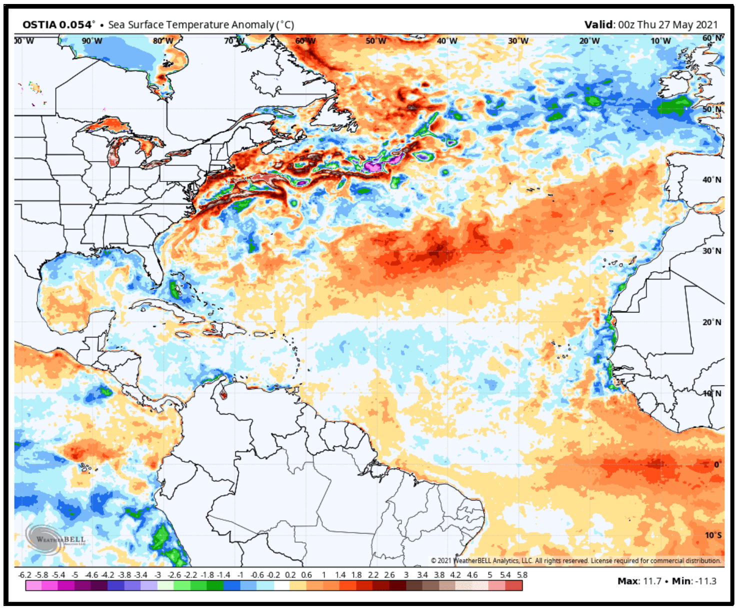


Figure 5: SST Anomalies across the Atlantic Basin. Image courtesy of Weatherbell.com.

There are many other factors that influence a hurricane season's outcome, but this article has discussed a couple of the factors that can be quantified and projected before the season's start. With that said, the National Hurricane Center (NHC) has made their preseason projection for the 2021 Atlantic Hurricane season, shown in Figure 6. They are projecting an above average season, with little chance of the season ending up below average. As mentioned before, the historical average for a season now features 14 named storms, 7 of which become hurricanes, and 3 of those that become major hurricanes, which are storms that strengthen to category 3 or stronger.

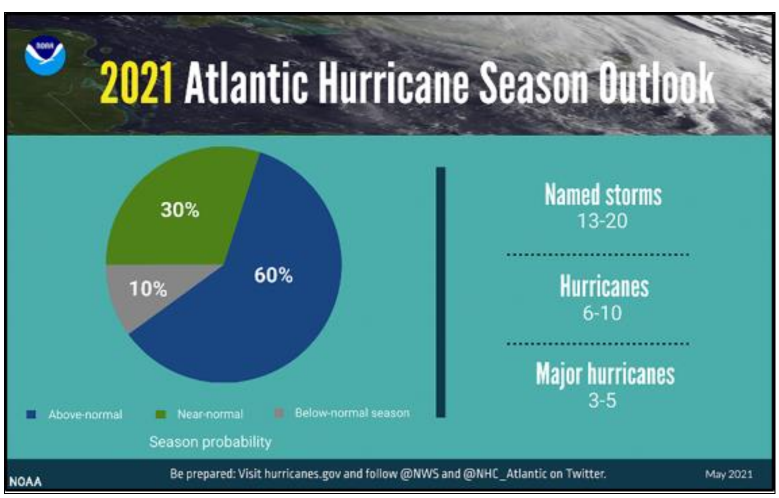


Figure 6: NOAA's NHC 2021 Atlantic Hurricane Season forecast.

Summer Outlook: Some of the same factors that influence the hurricane season also influence the outcome of observed seasonal conditions across the Northeast. For example, above normal SSTs along the East Coast of the US can lead to more moisture along the eastern seaboard, which can lead to warmer nighttime temperatures and above normal temperatures overall. This was observed last summer across New England. The Climate Prediction Center (CPC) has released their seasonal outlook of temperatures and precipitation for the months of June, July, and August (JJA) for the US (Fig. 6). They project a greater than 50% chance that temperatures will be above normal across much of New England this summer, which is a strong signal. There is also an indication that we may see some improvement to the abnormally dry conditions we've seen so far this year, with an above average summer in terms of precipitation being a more likely outcome.

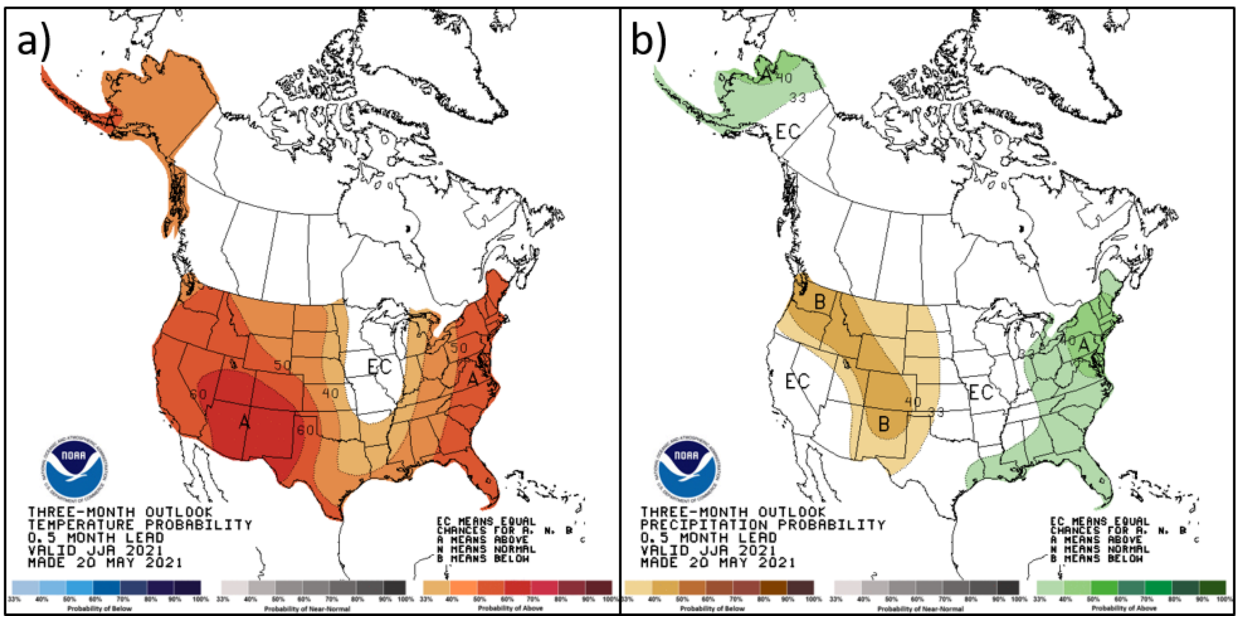


Figure 6: CPC a) temperature and b) precipitation outcome chances for JJA.

For questions, comments, or suggestions contact us at gyx.vwxobs@noaa.gov