Wx Watcher

Spring 2020

Volume I-1

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New Employee Profile

By Hunter Tubbs & William Watson, Meteorologists

Welcome to the first edition of our new office newsletter! Several new employees have joined the office in the last couple of years and we would like to begin by introducing one of our new meteorologists. Hunter Tubbs grew up in Clarksburg, New Jersey which is about 30 miles away from the Atlantic Ocean with a lifelong passion for meteorology and storm chasing. He spent most of his time at Long Beach Island, NJ out on his family's boat during the summer and skiing in the Pocono Mountains during the winter while always tracking the weather. Hunter has his bachelor's degree in Meteorology from Rutgers University and was an active member of the Rutgers Meteorology Club. While finishing school he worked as a weather consultant and forecaster for Spot-On Weather LLC, which provides detailed weather reports to television and movie productions. Hunter continued with graduate studies at Rutgers before moving to Maine in September of 2018 where he went to the University of Maine in Orono to pursue a master's degree through the Climate Change Institute. His research is on the impacts of coupled climate model sea surface temperature biases on tropical cyclone environmental conditions. The study utilized the output

from two atmospheric general circulation models and various tropical cyclone indices.

During the summer of 2019, Hunter worked as a volunteer intern at WFO Gray. He learned about the day-to-day shift duties of the office as well as the proper procedures to follow during severe summertime weather. He was ecstatic at the opportunity to remain in Maine and work at the National Weather Service when he joined our office in December 2019. Hunter is excited about having the opportunity to work with all of you!

A Review of Winter 2019-2020

By Derek Schroeter, Meteorologist

This past winter was a mild one, flanked with cold and significant snow in late fall and again deep into spring. November was abnormally cold followed by a multi-day snowstorm that dropped over 30 inches across southern New Hampshire to start December. The heart of winter did not pack much of a punch with limited stretches of frigid temperatures that New England is accustomed to. We also did not get into a particularly snowy pattern mid-winter with most of our winter storms involving snow transitioning to mixed precipitation and rain. After the vernal equinox we did enter a more winter like snowy pattern with a cooler and wetter than normal April and appreciable snowfall into the second week of May.

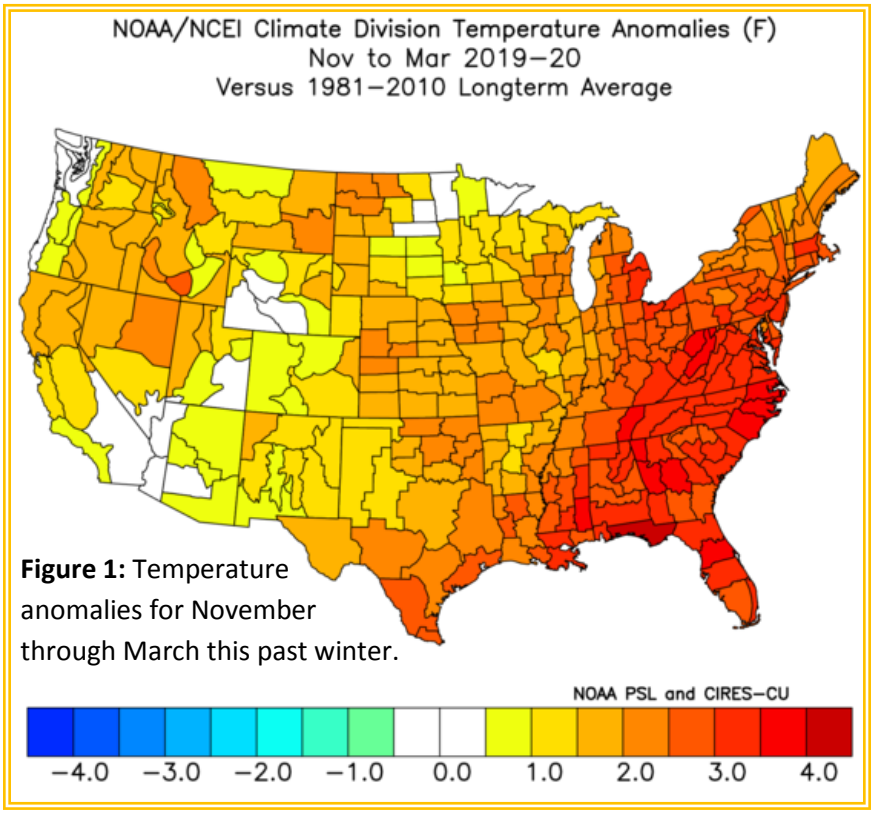


Figure 1: Temperature anomalies for November through March this past winter.

Every winter, northern New England experiences a multitude of weather patterns that bring a

variety of conditions. While we generally do not go a winter without experiencing a cold and dry pattern, or a mild and stormy pattern, or a cold and snowy pattern, it is generally the frequency and duration of these patterns that leaves the observer with a sense as to how harsh or mild a winter has been. This past winter was certainly a mild one with above normal temperatures from November through March for the contiguous United States (Figure 1). Even after a November that was well below normal for northern New England, much of the area ended the period 1.5°F to 2°F above normal with even higher temperature anomalies across the eastern third of the U.S.

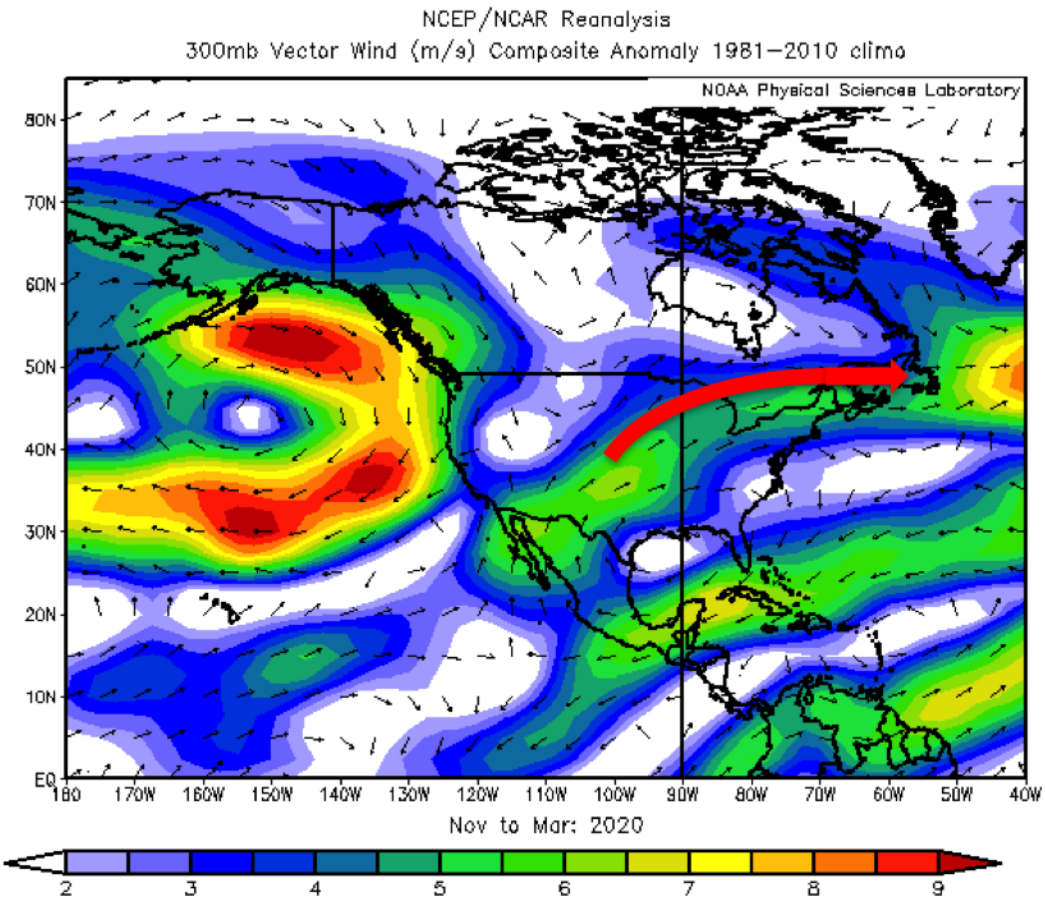


Figure 2. Jet stream wind anomalies with the red arrow showing that the jet stream was displaced to the north through northern Maine.

Meteorologists and climatologists use a variety of means to describe seasonal and intra-seasonal patterns. One of these means is the position and strength of the jet stream. A jet stream is a narrow, fast flowing current of air that generally traverses from east to west around the globe. In New England, our weather is

primarily influenced by the polar jet stream and by the subtropical jet stream that can interact with the polar jet stream. Figure 2 shows wind anomalies at the jet stream level and the red arrow highlights where the jet stream was displaced to the north over northern Maine. This helps explain our mild winter as mild air is generally found to the south of the jet stream.

Another means of explaining weather patterns are teleconnection patterns. These patterns are defined by a correlation or connection between atmospheric or environmental phenomena that occur over large distances from each other.

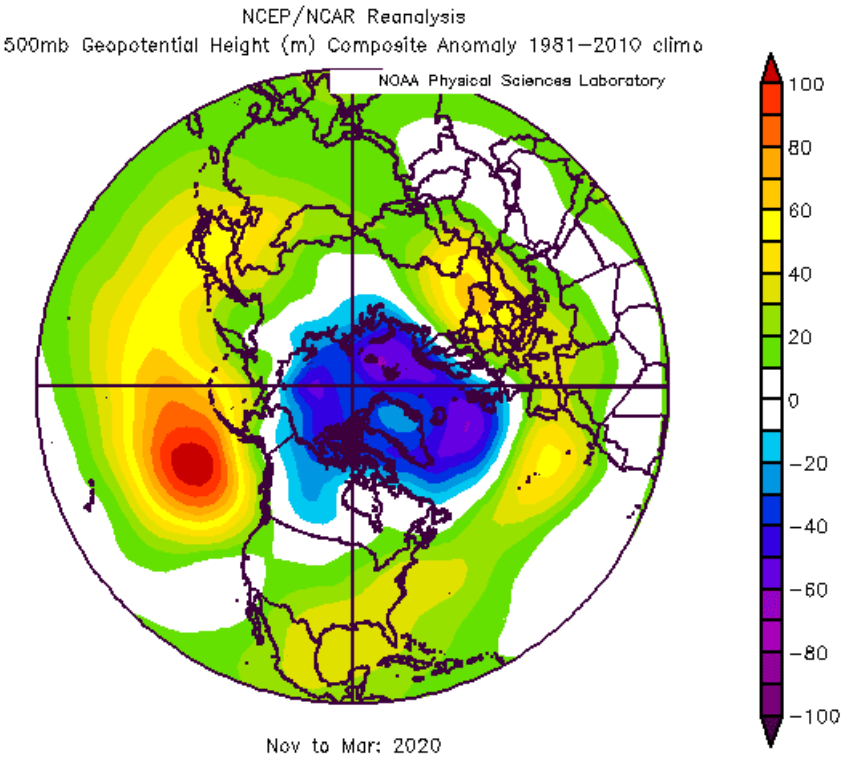


Figure 3. Atmospheric pressure anomalies this past November through March. This pattern of negative anomalies over the Arctic and positive anomalies over the mid-latitudes corresponds with the positive phase of the Arctic Oscillation.

One teleconnection pattern that helps explain our mild winter is the Arctic Oscillation (AO). The AO corresponds to atmospheric pressure patterns over the Arctic versus those over the mid-latitudes in the northern hemisphere. The positive phase of the AO corresponds to lower than normal pressure over the Arctic and above normal pressure over the mid-latitudes. Figure 3 shows the pressure patterns over the northern hemisphere which corresponds to the positive phase of the AO with cool colors showing negative pressure anomalies and warm colors showing positive pressure anomalies. When the AO is in the

positive phase, Arctic air tends to be locked up well to our north leading to less Arctic air outbreaks over mid-latitudes, which was the case this year. In February 2020, the AO set a new record for the strongest positive daily anomaly.

This past winter was a mild one, although with the early cold and snow and winter-like pattern into spring, it probably felt like a long one. Overall, precipitation amounts were near average for the region from November to March. Compared to previous winters, this winter generally ranked in the bottom third for snowiest winters across the area. Even though we had a mild winter, we still had plenty of winter storms and snowfall, especially when compared to places to our south such as Philadelphia where only 0.3" fell for winter, making it the least snowy winter on record there.

2020 Hurricane Season and Summer Outlooks

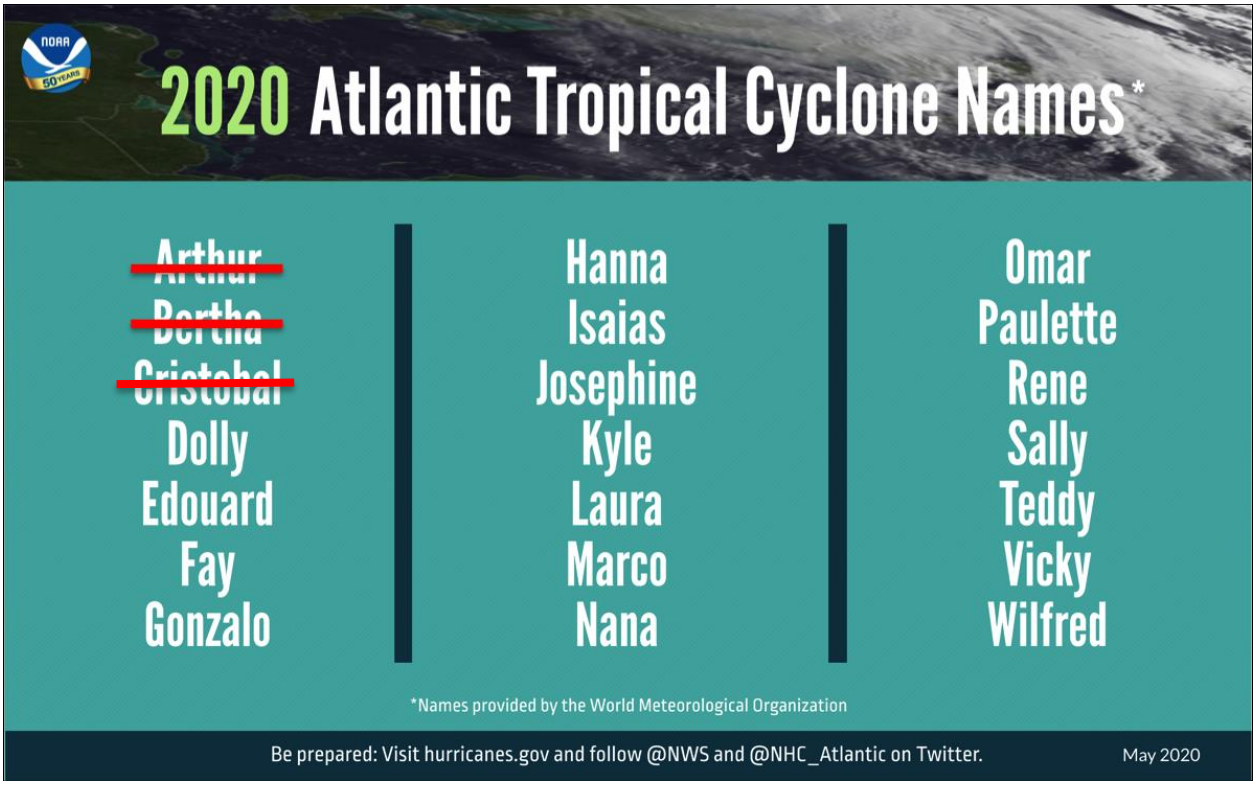
By Michael Clair, Meteorologist

As the snow appears to finally be gone for the season and warm weather makes its return, it is apparent that summer is rapidly approaching in northern New England. To meteorologists and weather enthusiasts alike, summer suggests warm days, afternoon thunderstorms, and hurricane season. Each spring there is speculation and predictions made about how the season will shape up. But before discussing that, we need to discuss how the season has shaped up so far.

Figure 1: 2020 tracks of tropical storms Arthur and Bertha (Cristobal not shown). Image adapted from https://upload.wikimedia.org/wikipedia/commons/3/3c/2020_Atlantic_hurricane_season_summary_map.png.

The Atlantic hurricane season officially runs from June 1 through November 30, but as of early June, there have already been three named tropical storms in the Atlantic basin. Arthur was the first named system of the season, forming on May 16 and brushing the North Carolina coast the week before Memorial Day weekend. Tropical Storm Bertha developed and was named shortly before making landfall along the South Carolina coast just after the Memorial Day holiday weekend. Tropical Storm Cristobal made landfall on the Louisiana coast on June 7 after traversing the Gulf of Mexico (Figure 1).

As the season continues, the names that will be used are shown below. The World Meteorological Organization 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 2014, and with no storms being retired that season, the list remains unchanged from the last time it was used.



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. Two of ENSO's phases are more commonly referred to as El Niño or La Niña, but its 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 2. They project generally good agreement on an ENSO index forecast to remain near neutral through the hurricane season. Historically, a neutral ENSO does not yield strong correlations to the hurricane season, putting more weight on other factors influencing the outcome.

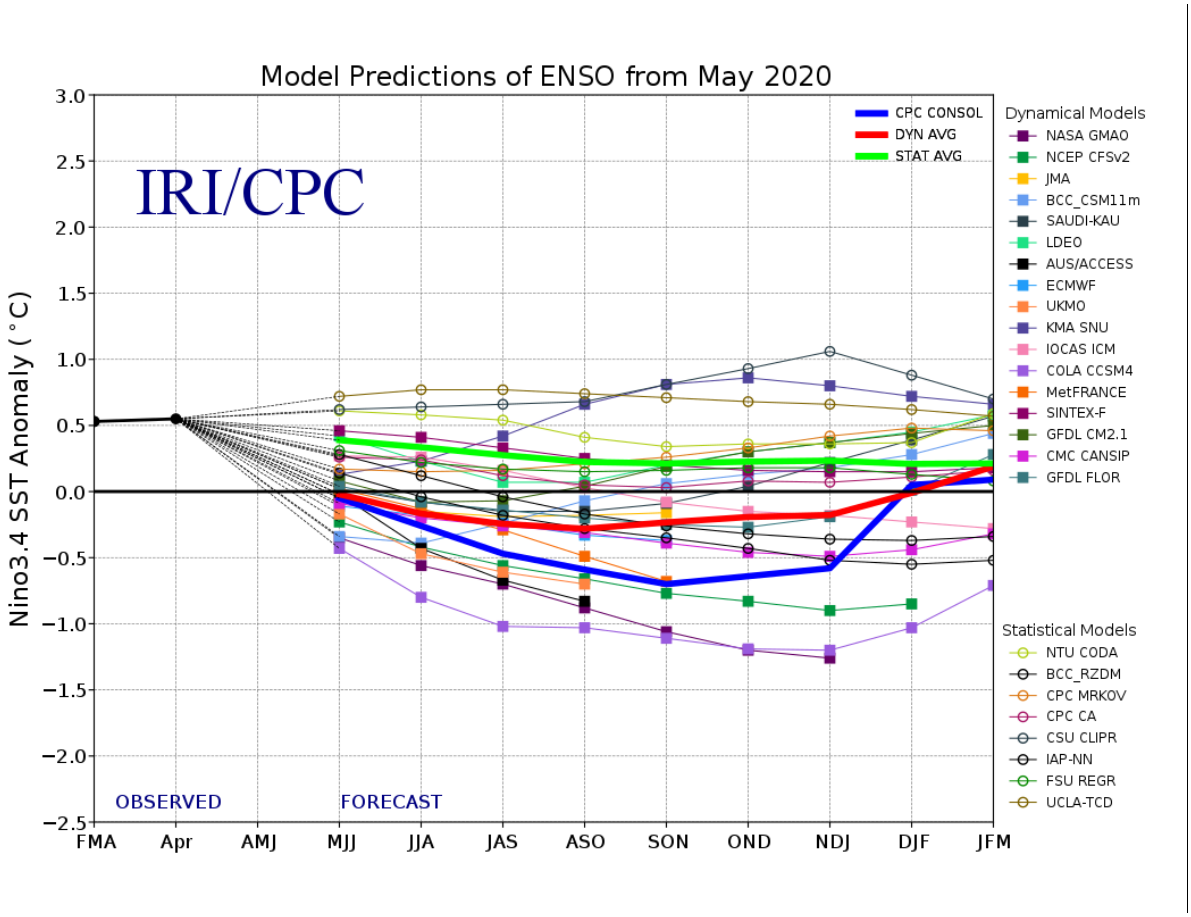


Figure 2: ENSO projections for the next several months. Image courtesy of https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-sst_table.

Another factor that can influence the outcome of a hurricane season is sea surface temperatures (SSTs). Warmer SSTs generally lead to the potential for stronger systems. While it is still early, and these conditions can change, SSTs are running above average across much of the Atlantic (Figure 3).

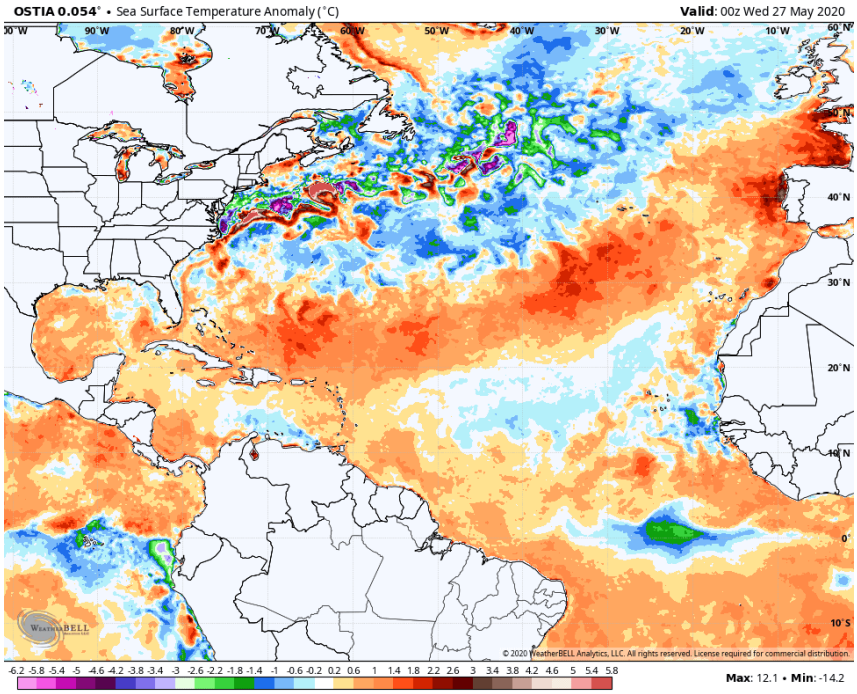
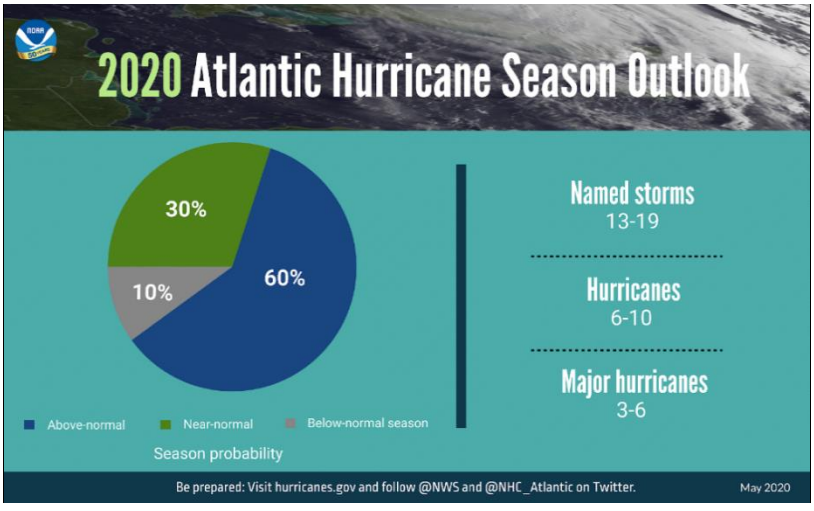


Figure 3: SST Anomalies across the Atlantic Basin. Image courtesy of Weatherbell.com.

There are many other factors that influence a hurricane season's outcome, but this article has discussed only a couple of the factors that can be quantified. The National Hurricane Center has made their pre-season projection for the 2020 Atlantic hurricane season. They are projecting an above average season, with little chance of the season ending up below average. The historical average for a season features 12 named storms, 6 of which become hurricanes, and 3 of those that become major hurricanes, which are storms that strengthen to category 3 or stronger.



Some of the same factors that influence the hurricane season also influence the outcome of observed seasonal conditions across the Northeast, so let us talk for a minute about the outlook for summer. 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. The Climate Prediction Center has released their seasonal outlook of temperatures and precipitation for the months of June, July, and August (JJA) for the US (Figure 4). They project a greater than 60% chance that temperatures will be above normal across much of New England this summer, which is a strong signal. There is a weaker indication on how much precipitation will fall, with Northern New England being placed in the "equal chances" category, indicating there is not a strong signal in either direction compared to normal how much precipitation will fall.

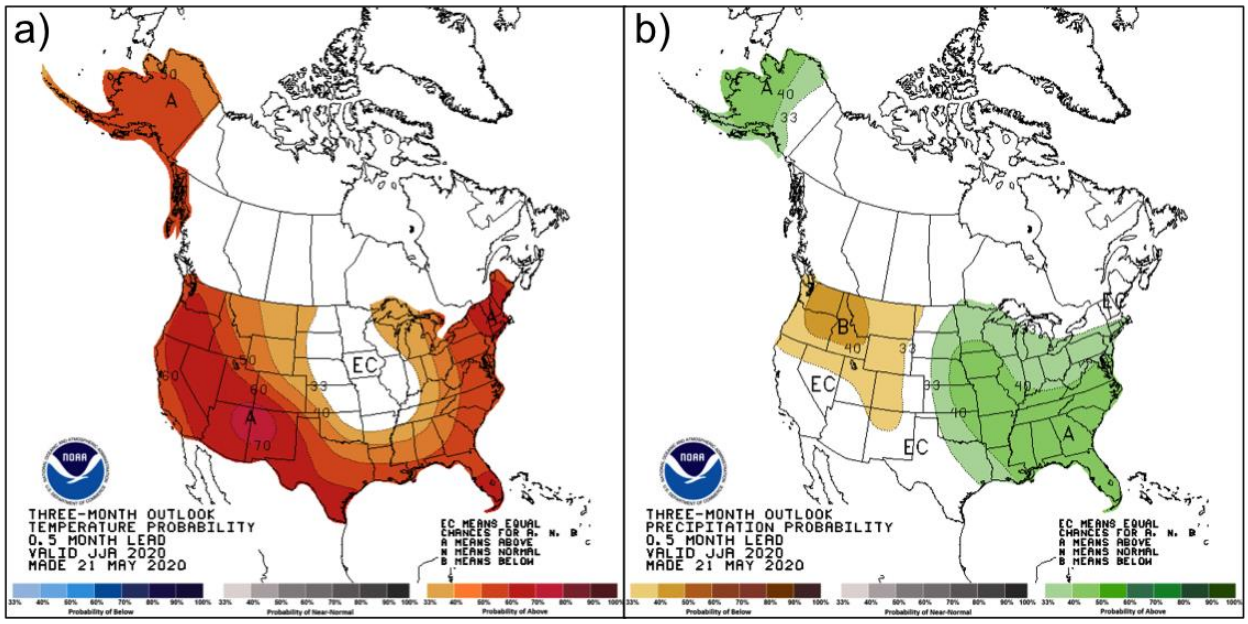


Figure 4: CPC a) temperature and b) precipitation outcome chances for JJA.

Your Observations Matter!

By Hunter Tubbs, Meteorologist

According to the World Meteorological Organization (WMO), there are increasing concerns regarding the impact of a lack of weather observations being fed into weather modeling as a result of the ongoing worldwide pandemic. This includes aircraft measurements which have decreased between 75-80% and surface-based observations especially across parts of Central and South America and Africa (Nullis 2020). This lack of data can result in a decrease in accuracy across weather prediction models that we depend upon to forecast the weather across our area. The good news is that you can help fill these unforeseen gaps in available data by sending us your daily precipitation reports. With your help we can both verify the accuracy in our forecasts and assist vital weather forecast models to make better predictions. Figure 1 below is a map that was provided by the WMO showing the change in availability of ground-based weather observations with countries shown in black representing those who are not currently reporting any data.

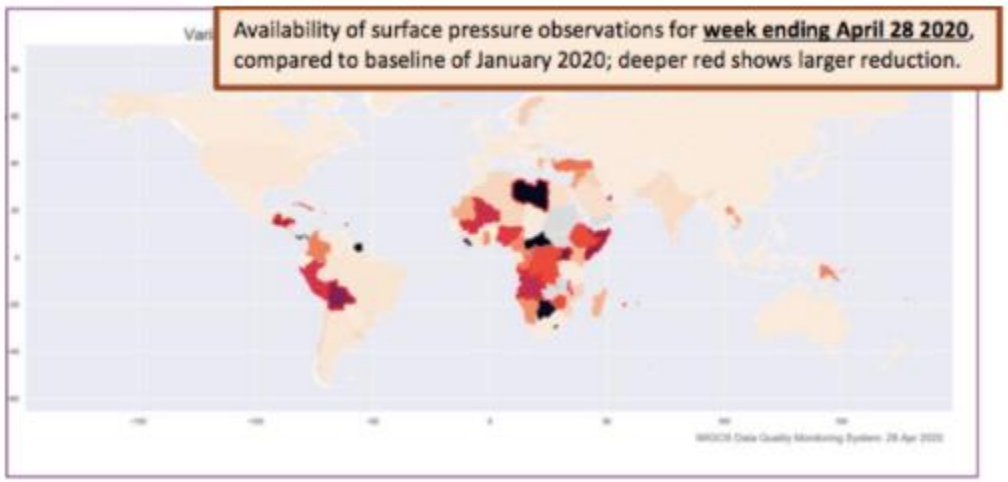


Figure 1: Map produced by the WMO showing changes in number of atmospheric pressure observations from January to April 2020. https://public.wmo.int/en/media/press-release/covid-19-impacts-observing-system

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