

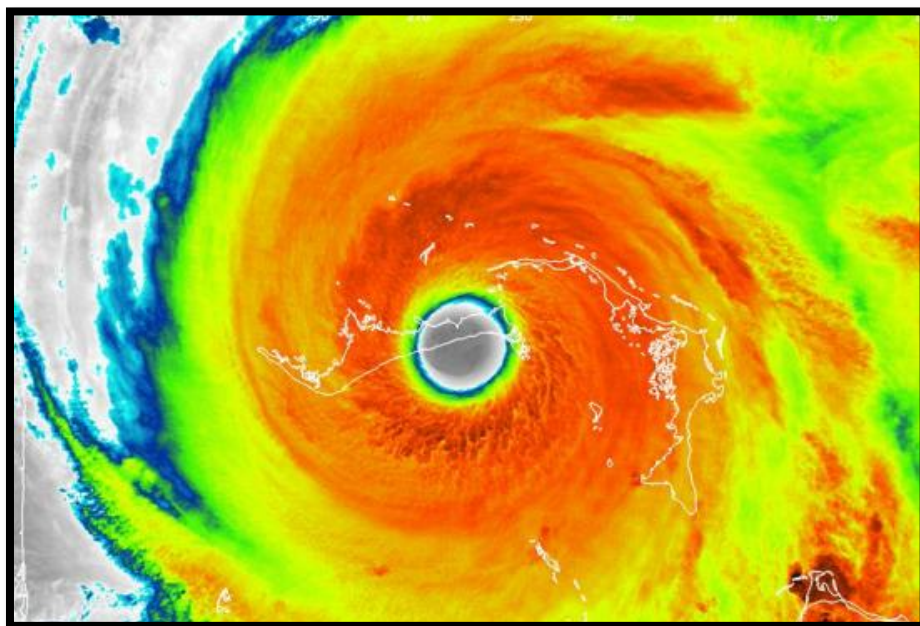


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## HURRICANE DORIAN (AL052019)

24 August – 7 September 2019

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VIIRS-S-NPP SATELLITE IMAGE OF HURRICANE DORIAN AT 0703 UTC 2 SEPTEMBER 2019 SHOWING THE WELL-DEFINED EYE OF THE CATEGORY 5 HURRICANE OVER EASTERN GRAND BAHAMA ISLAND.

Dorian was the strongest hurricane to hit the northwestern Bahamas in modern records, resulting in numerous deaths and causing devastation on Great Abaco and Grand Bahama Islands. Dorian also affected a large portion of the United States eastern seaboard as a hurricane and reached Nova Scotia as a very strong post-tropical cyclone.

# Hurricane Dorian

24 AUGUST – 7 SEPTEMBER 2019

## SYNOPTIC HISTORY

A large tropical wave moved off the west coast of Africa on 19 August. The wave moved westward across the tropical Atlantic while losing most of its associated thunderstorm activity. On 22 August, however, a small area of convection with some signs of organization developed near the axis of the wave along 40°W. Visible satellite animations during the day showed a cyclonic circulation in the low clouds, suggesting that a small low pressure area had developed. The low moved toward the west at about 10 kt, gaining convective organization despite the influence of southeasterly deep tropospheric vertical wind shear of about 15 kt. It is estimated that the disturbance became a tropical depression at 0600 UTC 24 August while centered about 700 n mi east-southeast of Barbados in the Windward Islands. The “best track” chart of the tropical cyclone’s path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1<sup>1</sup>.

Once the system became a tropical depression the cloud pattern became better organized. Microwave data showed the development of a curved convective band wrapping around an eye-like feature in the mid-levels, and the system became Tropical Storm Dorian at 1800 UTC 24 August. After a few hours of that upward trend, the cyclone became surrounded by dry air, and the cloud pattern changed very little in organization during the next 24 h. On 25 August, the cloud pattern gained some organization and developed a central dense overcast (CDO), but by the time Dorian reached the Windward Islands early on 27 August, an Air Force reconnaissance plane investigating the cyclone found that Dorian was not a very well-organized cyclone, having peak winds of 45 kt. Continuous intrusions of dry air might have contributed to the ragged structure of the cyclone during that period.

Dorian made landfall over Barbados as a very compact cyclone around 0130 UTC 27 August with 45-kt winds. It then moved across the remainder of the Windward Islands, with its center passing directly over St. Lucia around 1100 UTC that day. The high mountains of that island disrupted the organization of the cyclone’s low-level circulation, and the center then re-formed to the north. The re-formation process was noted in radar data from Martinique and Guadeloupe. After the re-formation, the system continued to move toward the west-northwest and northwest at about 10 kt. While convective banding features became established in the northern half of the circulation, the central surface pressure gradually dropped, and a partial eyewall formed. Dorian was on an upward intensity trend and developed an inner core, becoming a 65-kt hurricane while its center moved over the eastern tip of St. Croix in the U.S. Virgin Islands around 1530 UTC. The center of the hurricane then moved across the western tip of St. Thomas

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<sup>1</sup> A digital record of the complete best track, including wind radii, can be found on line at <ftp://ftp.nhc.noaa.gov/atcf>. Data for the current year’s storms are located in the *bt* directory, while previous years’ data are located in the *archive* directory.

in the U.S. Virgin Islands with 70-kt winds at 1800 UTC that day, and an eye was observed then on satellite imagery.

A strengthening Dorian then moved into the Atlantic, away from the Virgin Islands and Puerto Rico, propelled northwestward by the flow between an upper-level low over the Straits of Florida and the Atlantic subtropical ridge. As the upper-low dropped southward and the subtropical ridge expanded westward, the resulting steering flow forced Dorian to take a west-northwest to west path through a region of low shear, abundant atmospheric moisture and over a very warm ocean. These conditions favored significant strengthening, and Dorian became a category 3 hurricane on the Saffir-Simpson Hurricane Wind Scale at 1800 UTC 30 August while centered about 385 n mi east of the northwestern Bahamas. After that time, the eye became quite impressive in satellite images, surrounded by a ring of very deep convection, with the estimated surface winds reaching 115 kt at 0000 UTC 31 August. The rapid intensification process continued, and the eye of 12 n mi in diameter became even more distinct, displaying a “stadium effect” sometimes observed in intense hurricanes. Dorian became a category 5 hurricane and then made landfall at Elbow Cay, Great Abaco, in the northwestern Bahamas (Fig. 4), at 1640 UTC 1 September with estimated winds of 160 kt and a minimum central pressure of 910 mb. Dorian was the strongest hurricane in modern records to make landfall in the Bahamas.

As the high pressure to the north of Dorian weakened, the steering currents collapsed, and the hurricane moved very slowly westward, pounding Great Abaco for several hours with its greatest fury. In fact, the island experienced at least tropical-storm-force winds for about 3 days. The hurricane’s forward speed decreased even more, and Dorian began to crawl westward and west-northwestward toward Grand Bahama Island. The eye made landfall near South Riding Point on Grand Bahama near 0215 UTC 2 September with 155-kt winds. It exited along the north coast of the island 6 h later (cover figure). By then, the eye became larger, and the winds had decreased to 140 kt, likely due to the interaction with land and ocean cooling beneath the intense hurricane.

A large mid-level trough over the eastern United States swung eastward, and contributed to a flow pattern that favored Dorian turning north-northwestward and northward at about 5 to 10 kt. This kept the intense core of the hurricane east of Florida during the period from 3–5 September. The hurricane then weakened as it moved northward toward an environment of high shear and cooler waters. But, as its core moved over the Gulf Stream, Dorian re-strengthened back to category 3 status offshore of the coasts of Georgia and South Carolina. Dorian’s large eye passed directly over a NOAA buoy just offshore of the coast of South Carolina around 1600 UTC 5 September where a pressure of 959.2 mb was recorded (Fig. 5). Dorian continued its northeastward motion, its eye passing near the Outer Banks of North Carolina for several hours and making landfall over Cape Hatteras at 1230 UTC 6 September (Fig. 6) with 85-kt winds. These category 2 winds occurred mostly over water in the eastern semicircle, and it is analyzed that North Carolina experienced category 1 winds. After clearing the Outer Banks, the hurricane accelerated northeastward, embedded within the mid-latitude flow.

Dorian became a strong post-tropical cyclone at 1800 UTC 7 September before it reached Nova Scotia, Canada. The cyclone’s winds increased, and the circulation expanded due to baroclinic effects. The broad central circulation of the post-tropical cyclone moved rapidly across Sambro Creek, Nova Scotia, around 2200 UTC 7 September, bringing hurricane-force wind gusts to a large portion of Atlantic Canada. Dorian then became fully extratropical over the Gulf of St.

Lawrence at 0600 UTC 8 September and was finally absorbed by a larger extratropical low by 0600 UTC 9 September over the far northern Atlantic Ocean.

## METEOROLOGICAL STATISTICS

Observations in Dorian (Figs. 2 and 3) included subjective satellite-based Dvorak technique intensity estimates from NOAA's Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), and objective Advanced Dvorak Technique (ADT) estimates from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), the European Space Agency's Advanced Scatterometer (ASCAT), and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Dorian. Aircraft observations include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from 23 flights (including 103 center fixes) of the 53<sup>rd</sup> Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command and 16 missions (including 30 center fixes) from the NOAA Hurricane Hunters of the NOAA Aircraft Operations Center (AOC). In addition, the NOAA AOC G-IV aircraft flew nine synoptic surveillance flights around Dorian, collecting valuable data on the surrounding steering currents and other environmental conditions.

Data from Météo-France radars on Guadeloupe and Martinique, international radars on the Bahamas and other Caribbean islands, NOAA-National Weather Service WSR-88D radars from San Juan, Puerto Rico, and along the United States east coast were extremely beneficial in tracking Dorian. While Dorian was near the U.S. east coast, Doppler velocity data was useful in estimating the hurricane's intensity along with the extent and strength of the outer wind field. Surface observations from the Caribbean weather stations and data received from HAM radio operators and local observers were included in the analysis of Dorian.

Ship reports of tropical-storm-force winds associated with Dorian are given in Table 2, and selected surface observations along the entire track of Dorian from land stations, data buoys, tide gauges, barometric storm tide sensors, and high water marks are given in Table 3.

### ***Winds and Pressure***

#### ***The Bahamas***

Dorian's estimated peak intensity of 160 kt at 1640 UTC 1 September, which is also the landfall intensity at Elbow Cay in the Abacos, is based on a blend of flight-level winds, dropwindsonde WL150 winds (average wind speed over the lowest 150 m), and multiple SFMR surface wind speed measurements made by both the Air Force Reserve and NOAA Hurricane Hunters during that time period. This estimate integrates the highest SFMR wind value of 178 kt, a 700-mb flight-level peak wind measurement of 161 kt (which is equivalent to an intensity of 145 kt), and a 1325 UTC WL150 wind speed of 177 kt (which is equivalent to a 10-m wind speed of

147 kt) (Fig. 2). It is important to note that the relationship between the SFMR wind values and the flight-level winds was quite consistent for wind speeds of 120 kt or less in Dorian, but not so for equivalent surface wind speeds exceeding 120 kt. As has been noted for other recent intense hurricanes, the discrepancy between surface winds estimated from historical relationships with the peak flight-level winds and SFMR-derived surface winds leads to greater-than-normal uncertainty in Dorian's peak intensity estimate. The estimated peak intensity may be revised if SFMR data at high winds are recalibrated.

The estimated minimum central pressure of 910 mb is based on a reconnaissance dropwindsonde instrument that measured a pressure of 912 mb in the eye just prior to landfall. That pressure observation was accompanied by a 23-kt surface wind, which indicates that the central pressure was approximately 910 mb. There were also several *in situ* observations provided by local observers that supported this minimum pressure value. There was a pressure observation of 909 mb measured with a smartphone at Marsh Harbor by Mr. Jimmy Ge, a visitor there, but the value has not been calibrated at the time of this report.

### ***Caribbean Islands***

Around 0130 UTC 27 August, as its center passed over or just south of Barbados, Dorian produced sustained winds of 33 kt with a gust to 48 kt. Data from an Air Force reconnaissance aircraft during that time indicated that the estimated intensity associated with Dorian was 45 kt. These winds occurred mainly over waters near the island. Dorian moved over St. Lucia around 1100 UTC that day with the same intensity. It appears that the high terrain there was partially responsible for the disruption of Dorian's circulation, causing the center to re-form to the north of that island.

The center of an intensifying Dorian crossed the eastern portion of St. Croix around 1530 UTC 28 August, when it became a hurricane. The sustained winds reached 71 kt with gusts to 96 kt at Buck Island. These winds, however, could have been somewhat enhanced by topography.

### ***United States***

#### ***Florida and Georgia***

Although Dorian's center remained offshore the coasts of eastern Florida and Georgia, tropical-storm-force winds occurred over the coastal sections of these two states, primarily north of Broward County, Florida, because the hurricane's wind field had expanded considerably by then. The highest observed surface wind speed in those states was a 60-kt gust measured at New Smyrna Beach, Florida, around 0640 UTC 4 September. Some higher gusts were observed, but those occurred at elevated stations.

#### ***South Carolina, North Carolina, and Virginia***

In South Carolina, most of the coastal observation sites reported northwesterly sustained winds ranging from 45 to 55 kt. A wind gust of 77 kt was measured at Winyah Bay Range at 1827 UTC 5 September. Stronger winds were reported in coastal North Carolina, primarily along the Outer Banks as the core of Dorian moved by the area. Reconnaissance data indicate that the winds were 85 kt at that time, but these winds occurred mainly over water in the eastern portion

of the circulation. Nags Head, North Carolina, reported sustained winds of 72 kt with a gust to 85 kt at 1618 UTC 6 September. The strongest wind gust measured was 96 kt at 0920 UTC 6 September at Cedar Island in the Outer Banks. As Dorian's eye moved very near Cape Hatteras, North Carolina, the winds reached 80 kt in gusts and the pressure dropped to 959.7 mb at a NOAA National Ocean Service site there. As the hurricane turned northeastward away from the U. S. east coast, tropical-storm-force winds reached as far west as coastal Virginia due to Dorian's expansive outer wind field. A peak wind gust of 72 kt was measured at 1501 UTC 6 September at Chesapeake Light. However, this is an elevated observing station.

### **Canada**

Dorian was already a post-tropical cyclone by the time it moved over Atlantic Canada. However, the wind field had continued to expand, and most of Nova Scotia was affected by sustained tropical-storm-force winds, with hurricane-force wind gusts confined primarily to some coastal sections. Most areas within a few hundred miles of the center of Dorian experienced winds gusts up to 54 kt, impacting Nova Scotia, eastern New Brunswick, Prince Edward Island, the Magdalen Islands, western and northeastern Newfoundland, and the Lower North Shore of Quebec. The highest winds were experienced just east of the storm track from Osborne Head to Sheet Harbour. The highest wind speed reported was from Wreckhouse, Newfoundland, where a gust to 85 kt was observed. This was likely enhanced due to topographical effects. Other notable wind gusts included 78 kt from Beaver Island and 76 kt at Osbourne Head in the approaches of Halifax Harbour.

### **Storm Surge<sup>2</sup>**

Catastrophic storm surge flooding occurred on the Abaco Islands and Grand Bahama Island located in the northwestern Bahamas. A University of Hawaii Sea Level Center (UHSLC) tide gauge at Settlement Point on the western tip of Grand Bahama Island measured a water level of 6.4 ft above Mean Higher High Water (MHHW). This observation suggests that inundation levels were 6–7 ft above ground level on the western end of Grand Bahama Island. Higher water levels occurred farther east on Grand Bahama Island and on the Abaco Islands. No tide gauge measurements are available from those areas, but eyewitness accounts suggest that water levels reached more than 20 ft above ground level in some areas. For example, Bahamas Minister of Agriculture, Michael Pintard, shared a video on Twitter of seawater entering his house in the Marco City area of Freeport, reaching his kitchen windows which he estimated to be a minimum of 20 ft above ground level.

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<sup>2</sup> Several terms are used to describe water levels due to a storm. **Storm surge** is defined as the abnormal rise of water generated by a storm, over and above the predicted astronomical tide, and is expressed in terms of height above normal tide levels. Because storm surge represents the deviation from normal water levels, it is not referenced to a vertical datum. **Storm tide** is defined as the water level due to the combination of storm surge and the astronomical tide, and is expressed in terms of height above a vertical datum, i.e. the North American Vertical Datum of 1988 (NAVD88) or Mean Lower Low Water (MLLW). **Inundation** is the total water level that occurs on normally dry ground as a result of the storm tide, and is expressed in terms of height above ground level. At the coast, normally dry land is roughly defined as areas higher than the normal high tide line, or Mean Higher High Water (MHHW).

Storm surge flooding also occurred along portions of the southeastern United States coast from Florida to the Hampton Roads area of Virginia, with the most significant inundation occurring on portions of the North Carolina Outer Banks (Fig. 7). The highest measured storm surge from Dorian in the U.S. was 5.55 ft above normal tide levels at a NOAA National Ocean Service gauge at the U.S. Coast Guard Station Hatteras on the Pamlico Sound side of the Outer Banks. The combined effect of the surge and tide produced inundation levels of 5 to 7 ft above ground level on parts of Hatteras Island, including within the communities of Buxton, Avon, Hatteras, and Frisco. A United States Geological Survey (USGS) storm tide pressure sensor in Buxton recorded a peak wave-filtered water level of 6.92 ft above the North American Vertical Datum of 1988 (NAVD88), which converts to 6.7 ft MHHW (Fig. 8). Several other USGS sensors measured water levels around 6 ft MHHW, while the NOS tide gauge at the U.S. Coast Guard Station in Hatteras recorded a peak water level of 5.4 ft MHHW.

Inundation levels of 3 to 5 ft above ground level occurred elsewhere on the Outer Banks, as well as along some portions of Pamlico and Albemarle Sounds (including the Neuse and Pamlico Rivers). USGS pressure sensors in the Kitty Hawk and Kill Devil Hills areas measured peak water levels of 5.2 ft MHHW, while a sensor on the Neuse River at Havelock recorded a water level of 5.3 ft MHHW. Elsewhere along the North Carolina coast, inundation levels were generally 3 ft or less from Cape Lookout southwestward to the South Carolina border, and only a few isolated USGS sensors measured water levels of 3–4 ft MHHW.

Farther south, inundation heights of 2 to 4 ft above ground level occurred along the South Carolina coast, with the highest values being measured in the Grand Strand area near Myrtle Beach. An NOS gauge at Oyster Landing near Georgetown recorded a storm surge of 4.08 ft above normal tide levels, which led to a peak water level of 3.5 ft MHHW. In addition, a USGS sensor at Surfside Beach (just south of Myrtle Beach) measured a peak water level of 3.9 ft MHHW.

In Georgia and Florida, inundation heights of 1 to 3 ft above ground level were observed, although a few USGS sensors along the northeastern coast of Florida measured peak water levels slightly over 3 ft MHHW (Fig. 9). A sensor at Jacksonville Beach, Florida, measured a wave-filtered water level of 3.6 ft MHHW, while a sensor on Sea Island, Georgia, recorded a water level of 2.9 ft MHHW. The highest levels sampled by a tide gauge were at Fernandina Beach, Florida, where the NOS instrument measured a storm surge of 4.25 ft above normal tide levels and a storm tide of 2.6 ft MHHW.

North of North Carolina, inundation levels of 2 to 3 ft above ground level occurred in the Hampton Roads area of Virginia. The NOS tide gauge at the mouth of Chesapeake Bay measured a peak water level of 3.6 ft MHHW, and a gauge at Sewells Point in Norfolk, Virginia, recorded a peak water level of 3.1 ft MHHW. Every other tide gauge within Chesapeake Bay and along the mid-Atlantic coast as far north as Massachusetts measured peak water levels less than 3 ft MHHW, with the highest being 2.8 ft MHHW at Kiptopeke on the Eastern Shore of Virginia.

As a post-tropical cyclone, Dorian also caused storm surge flooding along parts of the Atlantic Canada coastline, including along the shores of the Gulf of St. Lawrence and Northumberland Strait. The highest storm surge measured by a tide gauge in Canada was

6.50 ft above normal tide levels at Shediac, New Brunswick, which resulted in a peak water level of 4.9 ft above Higher High Water Large Tide (HHWLT -- a tidal datum similar to MHHW used in the United States). A peak water level of 2.9 ft HHWLT was measured in Lower Escuminac, New Brunswick, which was a record for that location. In Nova Scotia, a storm surge of 4.66 ft above normal tide levels was measured at Halifax, resulting in a peak water level of 2.8 ft HHWLT, near the all-time record for that location. Elsewhere, peak storm surges of 4.95 ft above normal tide levels were measured at Charlottetown, Prince Edward Island; 4.13 ft at Port-aux-Basques, Newfoundland; and 4.13 ft on the Magdalen Islands, Quebec.

In the U.S. Virgin Islands and Puerto Rico, the highest measured storm surge was 1.21 ft above normal tide levels at a NOS gauge at Charlotte Amalie on St. Thomas. Observations on these islands suggest that the combined effect of the surge and tide produced little to no coastal flooding, with inundation levels less than a foot above ground level.

### **Rainfall and Flooding**

Since Dorian was moving relatively quickly when it crossed the islands of the eastern Caribbean, and associated thunderstorm activity was limited, the cyclone did not produce significant rainfall amounts in that area. However, the hurricane slowed down to a crawl over the northwestern Bahamas, resulting in a storm-total rainfall of 22.84 inches at Hope Town in the Bahamas. While Dorian moved near the coasts of South Carolina and North Carolina, the hurricane produced significant rainfall, with a peak of 15.21 inches measured at Pawleys Island, South Carolina (Fig. 10). In Atlantic Canada, rainfall accumulations of 5 to 6 inches were observed across Nova Scotia, with a maximum of 6.45 inches measured at Mahone Bay.

### **Tornadoes**

A total of 21 tornadoes – 19 across eastern North Carolina and 2 in northeastern South Carolina – were spawned by Dorian during the period from 4–6 September. Of the 21 tornadoes that formed, 17 were EF0 strength, 2 were rated EF1, and 2 reached EF2 intensity on the Enhanced Fujita scale. The most significant tornado damage occurred in Brunswick County and Emerald Island in North Carolina (Figs. 11 and 12).

## **CASUALTY AND DAMAGE STATISTICS**

### **Bahamas**

The Health Minister in the Bahamas estimated that more than 200 people lost their lives in Dorian. The Bahamas Weather Service estimated the total at 74, with 63 these occurring in Abaco, and 11 in Grand Bahama. The Bahamas Weather Service also reported that there were 245 people missing at the time of their report.



Dorian caused catastrophic damage mainly in Abaco and eastern Grand Bahama Islands with total damage estimated at \$3.4 billion (USD). The Inter-American Development Bank (IDB), an agency which the government of the Bahamas asked to conduct a study following Dorian's trail of destruction, stated that the hurricane left 29,500 people homeless and/or jobless. The island of Abaco was hardest hit, suffering 87 percent of the damage. More than 75 percent of all homes on the island were damaged (Fig. 13).

### ***United States***

There were no direct<sup>3</sup> fatalities from Dorian in the United States. However, the hurricane caused four indirect deaths in the United States: three in Florida and one in North Carolina. A Florida landscaper was electrocuted while trimming trees at a hotel in Naples. Two other men in Florida died while preparing their homes for the storm. In North Carolina, an 85-year-old man in Columbus County was killed when he fell from a ladder while preparing his home for the storm.

In coastal South Carolina near Charleston, strong wind gusts felled numerous trees and powerlines. That resulted in widespread power outages affecting more than 160,000 buildings in the state. This type of damage extended northward over coastal North Carolina, where more than 190,000 people lost power.

Several people on Ocracoke Island were trapped in their attics caused by saltwater flooding from the storm surge inundation, and required rescue on boats. Some people were airlifted off the island while food and water were brought in for residents remaining there. North Carolina Highway 12 along Ocracoke Island suffered damage from the storm surge flooding and inundation. In Charleston, South Carolina, the city was especially hit hard due to flooding. The National Park Service Incident Management Team also reported that wave erosion caused by Dorian reshaped parts of the barrier islands in the Outer Banks. High waves also swept away a herd of cows from Cedar Island; three cows survived after being carried four miles away to Core Banks. Waves from the hurricane caused erosion to the beaches in Delaware. In Bethany Beach, the waves narrowed the beaches and also damaged dune fencing. The New Jersey shore experienced gusty winds and rough waves from the storm.

The NOAA National Centers for Environmental Information (NCEI) estimated total damage in the United States at \$1.6 billion (USD).

### ***Canada***

The effects of Dorian were felt over a large area due to the storm's expansive wind field and rain shield to the left of Dorian's track. There were large uprooted trees, downed power lines, damage to roofs and sidings of buildings, as well as major flooding from heavy rainfall across parts of the Canadian Maritimes. Coastal impacts included widespread storm surge and waves,

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<sup>3</sup> Deaths occurring as a direct result of the forces of the tropical cyclone are referred to as "direct" deaths. These would include those persons who drowned in storm surge, rough seas, rip currents, and freshwater floods. Direct deaths also include casualties resulting from lightning and wind-related events (e.g., collapsing structures). Deaths occurring from such factors as heart attacks, house fires, electrocutions from downed power lines, vehicle accidents on wet roads, etc., are considered "indirect" deaths.

often combining with flooding due to rain along parts of the Atlantic Coast. Many coastal communities had damage to docks and other structures, and wave overwash onto the roads. Coastal erosion due to waves and surge was widespread, but particularly devastating for the north coast of Prince Edward Island where 7–10 feet of erosion occurred, as well as to parts of the Magdalene Islands. The tree damage in Cavendish Provincial Park in Prince Edward Island was so severe that the park was closed down for the rest of the season. There was also extensive damage in the provincial parks on the north shore (Fig. 14).

## FORECAST AND WARNING CRITIQUE

### ***Genesis***

The genesis of Dorian was not very well forecast. The disturbance from which Dorian developed was first introduced in the Tropical Weather Outlook with a low probability (<40%) of formation within 48 h only 18 h prior to genesis. The probabilities were raised to the medium category (40%–60%) in both the 2-day and 5-day periods only 12 h before Dorian formed. (Table 4). The poor genesis forecasts were likely due to the small size of the incipient disturbance and the abundance of very dry mid-level air (relative humidity values <50%) surrounding the cyclone. The ECMWF global model did not even have a hint of genesis 48 h in advance; the GFS model showed genesis, but much farther east than where it actually occurred.

### ***Track***

A verification of NHC official track forecasts for Dorian is given in Table 5a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period. A homogeneous comparison of the official track errors with selected guidance models is given in Table 5b. Although the average NHC official track forecast errors were quite low, some models performed much better than NHC at some time periods. The TVDG consensus model, which doubles the weight of three global models (GFS, ECMWF and UK) and places less weight on the solutions of the HWRF and HMON models, performed better than the official forecast as well as the other guidance at all times.

It is interesting to point out that during the early stages of Dorian, while it was located in the southeastern Caribbean Sea, the re-formation of the center after crossing St. Lucia resulted in a significant shift in track. Prior to crossing St. Lucia, most of the models incorrectly brought Dorian's center over eastern Hispaniola, and the cyclone instead moved east of Puerto Rico (Fig. 15). These errors resulted in the lack of adequate warning for some of the islands of the northeastern Caribbean Sea and also a low bias for the intensity forecast.

While some of the models and the official forecast indicated Dorian's forward speed would decrease near the Northwestern Bahamas, none of them indicated that Dorian was going to stall there.

Several NHC forecasts issued on 28–30 August brought the center of Dorian over the Florida peninsula. However, subsequent NHC forecasts turned Dorian northward east of Florida (Fig. 16). This resulted in low track forecast errors during a time when many models still indicated

a landfall in Florida. This forecasted northward turn east of Florida was the basis for not issuing a hurricane warning for Miami-Dade and Broward Counties in South Florida.

### ***Intensity***

A verification of NHC official intensity forecasts for Dorian is given in Table 6a. The official 1- to 3-day forecast intensity errors were larger than the mean official errors for the previous 5-yr period. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 6b. With the exception of the Corrected Consensus model HCCA and the Florida State Super Ensemble (FSSE), which both performed better than the NHC forecast at various times, the rest of the models produced errors larger than the official forecast. Most of the large errors are related to the fact that Dorian's center did not move over Hispaniola, and the failure in forecasting rapid intensification when Dorian was near the Bahamas. It is important to note that none of the intensity models were able to capture the intensity trend of Dorian five days prior to the hurricane reaching its peak intensity of 160 kt (Fig. 17).

### ***Wind Watches and Warnings***

Tropical Storm and Hurricane wind watches and warnings associated with Dorian are given in Table 7. Advisories on Tropical Depression Five, which later became Dorian, were initiated at 1500 UTC 24 August when the cyclone was centered a little more than 750 n mi east-southeast of Barbados. The first Tropical Storm Watch was then issued by the government of Barbados for Barbados at 0900 UTC 25 August and was upgraded to a Tropical Storm Warning 9 h later. Watches and warnings were gradually extended westward and northwestward across the eastern Caribbean, including Puerto Rico and adjacent islands. A portion of these islands, including Puerto Rico, were under a Tropical Storm Warning and a Hurricane Watch since 0900 UTC 27 August, or 33 h before Dorian reached the area. However, since the intensification of Dorian occurred sooner than anticipated, the Tropical Storm Warning for the British and U.S. Virgin Islands was upgraded to a Hurricane Warning while Dorian was already producing hurricane conditions in the U.S. Virgin Islands.

The government of the Bahamas issued a Hurricane Watch for the northwestern Bahamas at 0900 UTC 30 August, and it was upgraded to a Hurricane Warning 12 h later. The hurricane made its first landfall in the northwestern Bahamas at Elbow Cay 43 h after the issuance of the hurricane warning. However, tropical-storm-force winds started a few hours earlier.

Since Dorian took a track parallel to and not far from the southeastern U.S. seaboard, most of the United States East Coast from Florida to Virginia was under a watch or warning for wind and storm surge as indicated in Table 7 and Table 8, respectively. Although at one point Dorian was forecast by the models and NHC to reach the Florida coast, subsequent NHC forecasts shifted offshore, and it was not necessary to issue a Hurricane Watch or Warning for Miami-Dade or Broward counties in South Florida. Historically, it has been uncommon to issue Hurricane Watches or Warnings for the northwestern Bahamas and not issue them for South Florida, particularly for a westward-moving hurricane.

Tropical storm watches and warnings were also issued for portions of southeastern Massachusetts and eastern Maine. While the strongest winds associated with Dorian remained offshore, sustained tropical-storm-force winds were observed in Cape Cod and eastern Maine.

### ***Storm Surge Forecasts and Warnings***

NHC issued its first storm surge forecast for the Bahamas at 1200 UTC 30 August, anticipating that water levels would rise by as much as 10 to 15 ft above normal tide levels in areas of onshore winds. Once it became increasingly likely that Dorian would be a powerful major hurricane and slow down while near and over the northwestern Bahamas, the storm surge forecast was raised to 15 to 20 ft above normal tide levels at 0300 UTC 1 September and then 18 to 23 ft above normal tide levels at 1500 UTC 1 September, specifically for the Abaco Islands and Grand Bahama Island. While no gauge measurements are available from the hardest-hit areas, eyewitness accounts indicate that at least 20 ft of inundation occurred on those islands.

Due to Dorian's forecast track parallel to the southeastern U.S. coastline, storm surge watches and warnings were in effect at various times along an extended, continuous segment of that coast (Table 8). Storm surge warnings ultimately extended from Lantana, Florida (central Palm Beach County), northward to Poquoson, Virginia (Fig. 18). These warnings included land areas bordering Pamlico and Albemarle Sounds in North Carolina, as well as the southern portion of Chesapeake Bay. In addition, a Storm Surge Watch was issued, but never upgraded to a warning, for a small segment of the Florida coast north of Deerfield Beach to Lantana (the southern Palm Beach County coast). Based on NOS tide gauge and USGS pressure sensor data, at least 3 ft of inundation (which NHC uses as a first-cut threshold for the storm surge watch/warning) occurred within some parts of the warning area, particularly portions of northeastern Florida, the Grand Strand of South Carolina, eastern North Carolina, and southeastern Virginia. Other portions of the warning area did not verify, with inundation being less than 3 ft above ground level along the east-central Florida coast, the Georgia coast, the South Carolina Low Country coast, and much of the North Carolina coast between Cape Fear and Cape Lookout.

Although a sizeable portion of the Storm Surge Warning area did not verify, the issuance of the watch and warning was justified given that a slight westward deviation of Dorian's track, or an expansion of its wind field, would have caused significant storm surge flooding to occur along a larger proportion of the coast. This dilemma is illustrated by NWS Probabilistic Storm Surge (P-Surge) ensemble tracks from the NHC forecast released at 1500 UTC 1 September, when the storm surge watch was first issued for a portion of the Florida east coast (Fig. 19). Given typical uncertainties in tropical cyclone track forecasts, there was the potential for Dorian to move closer to, or even over the Florida peninsula, which would have caused significant storm surge flooding along the east-central coast of Florida. The solid black line in the figure is Dorian's actual track, which shows that the hurricane ultimately moved on the eastern side of the ensemble spread and consequently lowered the threat of significant storm surge along the east-central Florida coast.

The first storm surge forecast for a portion of the U.S. east coast was issued at 1500 UTC 1 September and called for maximum inundation heights of 4 to 7 ft above ground level between Jupiter Inlet and the Volusia/Brevard County Line in Florida. That same inundation forecast was extended northward along the southeastern U.S. coast, eventually reaching as far north as Cape Lookout, North Carolina, by 2100 UTC 3 September. Forecast inundation amounts were also increased as high as 5 to 8 ft above ground level from Isle of Palms to Myrtle Beach in South Carolina at 0900 UTC 4 September. Maximum water levels along the southeastern U.S. coast

south of Cape Lookout were around 4 ft above ground level, which was at the lower bound of the storm surge forecast. Because Dorian stayed far enough offshore to prevent significant storm surge flooding along the coast, the range of forecast inundation heights in that area ended up being a few feet too high.

In eastern North Carolina between Cape Lookout and Duck, including the Pamlico and Albemarle Sounds, the initial storm surge forecasts were 3 to 5 ft above ground level at 2100 UTC 3 September. This forecast was gradually raised over time, ultimately peaking at 4 to 7 ft above ground level for the forecast issued at 1200 UTC 5 September. The storm surge forecast for this area proved to be accurate, as maximum water levels of 5 to 7 ft above ground level were observed on parts of Hatteras Island, and 4 to 6 ft above ground level was measured on other parts of the Outer Banks and the western side of Pamlico Sound. Farther north, maximum inundation heights of 2 to 4 ft above ground level were forecast north of Duck to Poquoson, Virginia, including the Hampton Roads area. Maximum observed water levels in that region were 2 to 3 ft above ground level.

### ***Impact-Based Decision Support Services (IDSS) and Public Communication***

NHC coordinated extensively with the meteorological services of numerous countries in the eastern Caribbean Sea beginning on 25 August, as they issued various tropical storm and hurricane watches and warnings for their respective areas of responsibility. Coordination and discussion of the issuance of watches and warnings with the Bahamas Meteorological Service began on 29 August.

NHC began providing decision support to emergency managers on 24 August when Dorian formed east of the Lesser Antilles. These initial briefings were in support of Puerto Rico and the U.S. Virgin Islands and included FEMA headquarters and FEMA Region 2. As the threat expanded to the continental U.S., NHC briefings included FEMA Region 3, FEMA Region 4, and the states of Florida, Georgia, South Carolina, North Carolina, and Virginia. These briefings were coordinated through the FEMA Hurricane Liaison Team, embedded at NHC, and included telephone briefings and Federal/State video-teleconferences. The coordination of information and briefings continued through September 7 when the impacts associated with Dorian wound down across the far northeastern U.S.

The Tropical Analysis and Forecast Branch of NHC provided 25 live briefings on Hurricane Dorian to the U.S. Coast Guard Districts 7 and 8 between 26 August and 6 September, in support of their life-saving mission.

A limited media pool was initiated on 27 August, operating from 0700–0930 EDT (1100–1330 UTC), and again from 1700–1830 EDT (2100–2230 UTC). For three days while the storm was in the Caribbean Sea and not yet a direct threat to the mainland United States, live interviews were offered to network pool members and to South Florida media affiliates.

The media pool was expanded to continuous operations on 30 August, operating from 0700–2330 EDT (1100–0330 UTC). A Spanish-language media pool was also initiated to address a high Spanish media demand. With the threat to South Florida over on 3 September, a change

from a local media pool to a network pool was made. This provided a high priority to networks and more availability to those local stations elsewhere in the potential path of the storm. In total during the pool for Dorian, NHC provided 241 network interviews, 124 local station interviews, and 52 Spanish language interviews through the media pool, in addition to 105 generic updates made available to all pool members.

In addition, NHC provided 32 Facebook Live broadcasts via its Facebook page during the 11-day span of the media pool (0830, 1130, and 1730 EDT/1230, 1530, 2130 UTC). NHC experienced 6 million views, with a single peak live view of 456,000 on the 1130 EDT (1530 UTC) 1 September broadcast as Dorian neared landfall in the northwestern Bahamas.

NHC provided Key Messages in the Tropical Cyclone Discussion and in graphical format on the NHC webpage and through social media posts from 25 August through 8 September.

NHC web pages were accessed approximately 340 million times between 24 August and 8 September resulting in approximately 6.5 billion hits. Products specific to Dorian were viewed 186 million times during this period, with a majority of the views going to graphical products such as the key messages, cone graphic, and the wind speed probabilities.

## ACKNOWLEDGMENTS

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Table 1. Best track for Hurricane Dorian, 24 August–7 September 2019.

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage               |
|-----------------|---------------|----------------|---------------|-----------------|---------------------|
| 24 / 0600       | 10.3          | 46.4           | 1011          | 25              | tropical depression |
| 24 / 1200       | 10.4          | 47.5           | 1010          | 30              | "                   |
| 24 / 1800       | 10.6          | 48.7           | 1008          | 35              | tropical storm      |
| 25 / 0000       | 10.8          | 49.9           | 1008          | 35              | "                   |
| 25 / 0600       | 11.0          | 51.0           | 1008          | 35              | "                   |
| 25 / 1200       | 11.2          | 52.3           | 1007          | 40              | "                   |
| 25 / 1800       | 11.4          | 53.5           | 1007          | 45              | "                   |
| 26 / 0000       | 11.6          | 54.7           | 1007          | 45              | "                   |
| 26 / 0600       | 11.9          | 56.0           | 1006          | 45              | "                   |
| 26 / 1200       | 12.2          | 57.2           | 1006          | 45              | "                   |
| 26 / 1800       | 12.6          | 58.3           | 1006          | 45              | "                   |
| 27 / 0000       | 13.0          | 59.2           | 1005          | 45              | "                   |
| 27 / 0130       | 13.1          | 59.4           | 1005          | 45              | "                   |
| 27 / 0600       | 13.5          | 60.2           | 1005          | 45              | "                   |
| 27 / 1100       | 14.0          | 60.9           | 1005          | 45              | "                   |
| 27 / 1200       | 14.2          | 61.2           | 1005          | 45              | "                   |
| 27 / 1800       | 15.0          | 62.0           | 1004          | 45              | "                   |
| 28 / 0000       | 15.7          | 62.8           | 1003          | 50              | "                   |
| 28 / 0600       | 16.4          | 63.5           | 1001          | 55              | "                   |
| 28 / 1200       | 17.3          | 64.2           | 999           | 60              | "                   |
| 28 / 1530       | 17.8          | 64.6           | 995           | 65              | hurricane           |
| 28 / 1800       | 18.4          | 65.1           | 993           | 70              | "                   |
| 29 / 0000       | 19.2          | 65.7           | 989           | 75              | "                   |
| 29 / 0600       | 20.0          | 66.3           | 988           | 75              | "                   |
| 29 / 1200       | 21.0          | 66.9           | 986           | 75              | "                   |
| 29 / 1800       | 22.0          | 67.4           | 983           | 75              | "                   |
| 30 / 0000       | 22.8          | 68.0           | 978           | 80              | "                   |
| 30 / 0600       | 23.5          | 68.8           | 978           | 90              | "                   |
| 30 / 1200       | 24.3          | 69.5           | 972           | 95              | "                   |



| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage |
|-----------------|---------------|----------------|---------------|-----------------|-------|
| 30 / 1800       | 24.8          | 70.3           | 968           | 100             | "     |
| 31 / 0000       | 25.3          | 71.1           | 949           | 115             | "     |
| 31 / 0600       | 25.6          | 72.1           | 947           | 120             | "     |
| 31 / 1200       | 25.9          | 73.0           | 944           | 125             | "     |
| 31 / 1800       | 26.1          | 74.0           | 942           | 130             | "     |
| 01 / 0000       | 26.3          | 74.7           | 939           | 135             | "     |
| 01 / 0600       | 26.4          | 75.6           | 934           | 145             | "     |
| 01 / 1200       | 26.5          | 76.5           | 927           | 155             | "     |
| 01 / 1640       | 26.5          | 77.0           | 910           | 160             | "     |
| 01 / 1800       | 26.5          | 77.1           | 910           | 160             | "     |
| 02 / 0000       | 26.6          | 77.7           | 914           | 155             | "     |
| 02 / 0215       | 26.6          | 77.8           | 914           | 155             | "     |
| 02 / 0600       | 26.6          | 78.0           | 916           | 145             | "     |
| 02 / 1200       | 26.7          | 78.3           | 927           | 135             | "     |
| 02 / 1800       | 26.8          | 78.4           | 938           | 125             | "     |
| 03 / 0000       | 26.9          | 78.5           | 944           | 115             | "     |
| 03 / 0600       | 27.0          | 78.5           | 950           | 105             | "     |
| 03 / 1200       | 27.1          | 78.5           | 954           | 100             | "     |
| 03 / 1800       | 27.6          | 78.6           | 959           | 95              | "     |
| 04 / 0000       | 28.1          | 78.8           | 959           | 90              | "     |
| 04 / 0600       | 28.8          | 79.2           | 964           | 90              | "     |
| 04 / 1200       | 29.5          | 79.6           | 963           | 90              | "     |
| 04 / 1800       | 30.1          | 79.7           | 960           | 95              | "     |
| 05 / 0000       | 30.7          | 79.7           | 955           | 100             | "     |
| 05 / 0600       | 31.4          | 79.6           | 958           | 100             | "     |
| 05 / 1200       | 32.1          | 79.2           | 958           | 100             | "     |
| 05 / 1800       | 32.7          | 78.9           | 958           | 95              | "     |
| 06 / 0000       | 33.4          | 77.9           | 956           | 90              | "     |
| 06 / 0600       | 34.1          | 76.9           | 956           | 90              | "     |
| 06 / 1200       | 35.1          | 75.7           | 956           | 85              | "     |
| 06 / 1230       | 35.2          | 75.6           | 956           | 85              | "     |





| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage  |
|-----------------|---------------|----------------|---------------|-----------------|--|
| 06 / 1800       | 36.2          | 73.7           | 956           | 85              | "  |
| 07 / 0000       | 37.4          | 71.2           | 956           | 85              | "  |
| 07 / 0600       | 38.9          | 68.9           | 955           | 85              | "  |
| 07 / 1200       | 40.8          | 66.9           | 954           | 85              | "  |
| 07 / 1800       | 42.8          | 64.6           | 954           | 80              | low  |
| 08 / 0000       | 45.2          | 62.9           | 956           | 80              | "  |
| 08 / 0600       | 47.6          | 61.9           | 960           | 75              | extratropical                                |
| 08 / 1200       | 49.4          | 60.4           | 962           | 70              | "  |
| 08 / 1800       | 50.8          | 57.9           | 966           | 60              | "  |
| 09 / 0000       | 51.6          | 54.8           | 980           | 50              | "  |
| 09 / 0600       |               |                |               |                 | dissipated                                   |
| 01 / 1640       | 26.5          | 77.0           | 910           | 160             | maximum winds<br>minimum pressure            |
| 27 / 0130       | 13.1          | 59.4           | 1005          | 45              | landfall at Barbados                         |
| 27 / 1100       | 14.0          | 60.9           | 1005          | 45              | landfall at St. Lucia                        |
| 28 / 1530       | 17.8          | 64.6           | 995           | 65              | landfall at St. Croix                        |
| 28 / 1800       | 18.4          | 65.1           | 993           | 70              | landfall at St. Thomas                       |
| 01 / 1640       | 26.5          | 77.0           | 910           | 160             | landfall Elbow Cay, Abacos                   |
| 02 / 0215       | 26.6          | 77.8           | 914           | 155             | landfall at South Riding Point, Grand Bahama |
| 06 / 1230       | 35.3          | 75.5           | 956           | 85              | landfall at Cape Hatteras, NC                |



Table 2. Selected ship reports with winds of at least 34 kt for Hurricane Dorian, 24 August–7 September 2019.

| Date/Time (UTC) | Ship call sign | Latitude (°N) | Longitude (°W) | Wind dir/speed (kt) | Pressure (mb) |
|-----------------|----------------|---------------|----------------|---------------------|---------------|
| 28 / 1500       | J8PB           | 18.2          | 63.8           | 110 / 35            | 1012.0        |
| 03 / 1800       | DGZL           | 25.9          | 76.5           | 180 / 35            | 1005.8        |
| 04 / 0900       | J8QX6          | 25.8          | 77.2           | 230 / 35            | 1008.6        |
| 05 / 0700       | WHED           | 28.6          | 76.5           | 190 / 37            | 1012.3        |
| 05 / 0800       | C6BX8          | 28.1          | 80.3           | 230 / 38            | 1008.9        |
| 05 / 0800       | CQIV4          | 28.9          | 76.3           | 190 / 35            | 1012.0        |
| 05 / 1000       | HPYE           | 27.5          | 79.5           | 220 / 36            | 1012.1        |
| 05 / 1800       | VRLZ4          | 30.2          | 76.0           | 200 / 41            | 1010.8        |
| 05 / 2100       | DFDG2          | 30.6          | 79.5           | 220 / 40            | 1005.7        |
| 06 / 0700       | WNTL           | 31.9          | 72.9           | 320 / 50            | 1009.0        |
| 06 / 1200       | FMEK           | 32.6          | 73.5           | 200 / 45            | 1005.0        |
| 06 / 1300       | 9V6210         | 39.4          | 74.0           | 080 / 35            | 1010.0        |
| 06 / 1600       | VRNY4          | 30.8          | 75.5           | 260 / 35            | 1010.0        |
| 07 / 0000       | WAIU           | 33.1          | 67.4           | 210 / 37            | 1011.8        |
| 07 / 0200       | C6BR3          | 33.3          | 66.7           | 230 / 35            | 1016.0        |
| 07 / 0400       | VRID5          | 38.3          | 74.3           | 010 / 35            | 1006.1        |
| 07 / 0500       | 9HJC9          | 32.6          | 67.7           | 230 / 36            | 1007.0        |
| 07 / 0600       | C6BR3          | 32.2          | 67.9           | 240 / 40            | 1014.0        |
| 07 / 1100       | KABL           | 35.4          | 64.2           | 020 / 40            | 1009.7        |

Table 3. Selected surface observations for Hurricane Dorian, 24 August–7 September 2019.

| Location  | Minimum Sea Level Pressure |                     | Maximum Surface Wind Speed   |                             |                   | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|---------------------|------------------------------|-----------------------------|-------------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb)         | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)         |                               |                              |  |                 |
| <b>Barbados</b>   |                            |                     |                              |                             |                   |                               |                              |  |                 |
| Barbados Grantley Adams (TBPB) (13.08N 59.49W)                | 27/0200                    | 1007.1              | 27/0100                      | 33                          | 48                |                               |                              |  |                 |
| <b>U.S. Virgin Islands and Puerto Rico</b>                    |                            |                     |                              |                             |                   |                               |                              |  |                 |
| <b>International Civil Aviation Organization (ICAO) Sites</b> |                            |                     |                              |                             |                   |                               |                              |  |                 |
| St. Thomas (TIST) (18.33N 64.97W)                             | 28/1800                    | 1000.0              |                              | 46                          | 65                |                               |                              |  |                 |
| <b>Weatherflow</b>  |                            |                     |                              |                             |                   |                               |                              |  |                 |
| Buck Island (XBUK) (18.28N 64.89W)                            | 28/1720                    | 993                 | 28/1720                      | 71                          | 96                |                               |                              |  |                 |
| Culebra Is, PR (XCUL) (18.31N 65.23W)                         | 28/1914                    | 993                 | 28/1914                      | 48                          | 58                |                               |                              |  |                 |
| Rupert Rock, VI (XRUP) (18.33N 64.93W)                        | 28/1827                    | 1000                | 28/1827                      | 44                          | 57                |                               |                              |  |                 |
| Two Brothers, VI (XBRO) (18.34N 64.82W)                       | 28/1753                    | 1003                | 28/1753                      | 51                          | 65                |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                     |                            |                     |                              |                             |                   |                               |                              |  |                 |
| St. Croix (CHSV3) (17.75N 64.71W)                             | 28/1524                    | 1006.3              | 28/1500                      | 30                          | 38                |                               |                              |  |                 |
| St. Thomas Charlotte Amalie (CHAV3) (18.34N 64.92W)           | 28/1806                    | 1000.3              |                              |                             |                   |                               |                              |  |                 |
| Culebra, PR (CLBP4) (18.30N 65.30W)                           | 28/1930                    | 1005.9              |                              |                             |                   |                               |                              |  |                 |
| <b>Public/Other</b>   |                            |                     |                              |                             |                   |                               |                              |  |                 |
| St. Thomas – Estate Bovoni (AU730) (18.32N 64.89W)            | 28/1807                    | 999.7               | 28/1717                      | 63<br>(70 m)                | 84                |                               |                              |  |                 |
| <b>Bahamas</b>  |                            |                     |                              |                             |                   |                               |                              |  |                 |
| Dunmore Town, Eleuthera (25.50N 76.64W)                       | 01/1214                    | 1006.1 <sup>l</sup> | 01/1214                      | 25 <sup>l</sup>             | 37 <sup>l</sup>   |                               |                              |  |                 |
| Great Cuana Cay (26.67N 77.12W)                               | 01/1149                    | 1004.1 <sup>l</sup> | 01/1149                      | 25 <sup>l</sup>             | 42 <sup>l</sup>   |                               |                              |  |                 |
| Hopetown, Abaco (26.54N 76.96W)                               |                            |                     | 01/1444                      |                             | 87 <sup>l e</sup> |                               |                              |  |                 |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>         |                            |                     |                              |                             |                   |                               |                              |  |                 |
| Settlement Point (SPGF1) (26.70N 79.00W)                      | 03/0500                    | 983.7               | 03/0500                      | 55<br>(8 m, 10-min)         | 77                |                               |                              | 6.4                                    |                 |
| <b>Public/Other</b>   |                            |                     |                              |                             |                   |                               |                              |  |                 |
| Hopetown, Abaco (Edds) (26.54N 76.96W)                        | 01/1654                    | 912.0               |                              |                             |                   |                               |                              |  |                 |
| Marsh Harbour, Great Abaco (ICyclone) (26.54N 77.08W)         | 01/1750                    | 913.4               |                              |                             |                   |                               |                              |  |                 |



| Location                          | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|-----------------------------------|----------------------------|--------------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|                                   | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| <b>Buoys</b>                      |                            |                    |                              |                             |                 |                               |                              |  |                 |
| 41001 NOAA<br>(34.50N 72.52W)     | 06/1850                    | 998.1              | 06/1829                      | 52<br>(4 m, 1-min)          | 63              |                               |                              |  |                 |
| 41002 NOAA<br>(31.89N 74.93W)     | 06/0720                    | 1005.7             | 06/0433                      | 44<br>(4 m, 1-min)          | 54              |                               |                              |  |                 |
| 41004 NOAA<br>(32.50N 79.10W)     | 05/1600                    | 959.2              | 05/1801                      | 74<br>(4 m, 1-min)          | 86              |                               |                              |  |                 |
| 41008 NOAA<br>(31.40N 80.87W)     | 05/0550                    | 994.1              | 04/2312                      | 52<br>(5 m, 1-min)          | 64              |                               |                              |  |                 |
| 41009 NOAA<br>(28.50N 80.18W)     | 04/0710                    | 988.1              | 04/0700                      | 52<br>(4 m, 8-min)          | 70              |                               |                              |  |                 |
| 41010 NOAA<br>(28.91N 78.47W)     | 04/0440                    | 983.1              | 04/0056                      | 61<br>(4 m, 1-min)          | 78              |                               |                              |  |                 |
| 41013 NOAA<br>(33.44N 77.73W)     | 06/0120                    | 958.5              | 06/0244                      | 66<br>(4 m, 1-min)          | 78              |                               |                              |  |                 |
| 41024 CORMP<br>(33.85N 78.48W)    | 06/0038                    | 985.4              | 06/0223                      | 37<br>(3 m)                 | 56              |                               |                              |  |                 |
| 41025 NOAA<br>(35.01N 75.40W)     | 06/1220                    | 959.2              | 06/1335                      | 64<br>(4 m, 1-min)          | 78              |                               |                              |  |                 |
| 41029 CORMP<br>(32.81N 79.63W)    | 05/1553                    | 983.7              | 05/1523                      | 49<br>(3 m, 8-min)          | 80              |                               |                              |  |                 |
| 41033 CORMP<br>(32.28N 80.41W)    | 05/1008                    | 992.0              | 05/1208                      | 53<br>(3 m, 8-min)          | 80              |                               |                              |  |                 |
| 41033 CORMP<br>(32.28N 80.41W)    | 05/1208                    | 992.6 <sup>l</sup> | 05/1208                      | 62<br>(10 m)                |                 |                               |                              |  |                 |
| 41037 CORMP<br>(33.99N 77.36W)    | 06/0408                    | 959.2              | 06/0308                      | 49<br>(3 m)                 | 68              |                               |                              |  |                 |
| 41038 CORMP<br>(34.10N 77.70W)    | 06/0408                    | 976.4              | 06/0253                      | 39<br>(3 m)                 | 58              |                               |                              |  |                 |
| 41046 NOAA<br>(23.82N 68.38W)     | 30/0610                    | 1002.9             | 30/0614                      | 46<br>(4 m)                 | 54              |                               |                              |  |                 |
| 41052 CarICOOS<br>(18.25N 64.76W) | 28/1750                    | 1004.2             | 28/1700                      | 37 <sup>l</sup><br>(4 m)    | 47 <sup>l</sup> |                               |                              |  |                 |
| 41064 CORMP<br>(34.21N 76.95W)    | 06/0608                    | 959.1              | 06/0708                      | 45<br>(3 m)                 | 68              |                               |                              |  |                 |
| 44008 NOAA<br>(40.50N 69.25W)     | 07/0840                    | 982.9              | 07/1011                      | 56<br>(5 m, 1-min)          | 70              |                               |                              |  |                 |
| 44011 NOAA<br>(41.07N 66.59W)     | 07/1300                    | 955.3              | 07/1547                      | 63<br>(4 m, 1-min)          | 81              |                               |                              |  |                 |
| 44014 NOAA<br>(36.61N 74.84W)     | 06/1750                    | 984.5              | 06/1805                      | 62<br>(5 m, 1-min)          | 71              |                               |                              |  |                 |
| 44020 NOAA<br>(41.49N 70.28W)     | 07/0800                    | 997.6              | 07/0804                      | 37<br>(4 m, 1-min)          | 45              |                               |                              |  |                 |
| 44027 NOAA<br>(44.27N 67.31W)     | 07/1950                    | 994.7              | 07/1949                      | 37<br>(5 m, 1-min)          | 43              |                               |                              |  |                 |
| 44037 NRACOOS<br>(43.50N 67.88W)  | 07/1704                    | 994.0 <sup>l</sup> | 07/1704                      | 35 <sup>l</sup><br>(4 m)    |                 |                               |                              |  |                 |
| 44064 CBIBS<br>(37.00N 76.09W)    | 06/1440                    | 998.4              | 06/1440                      | 38<br>(3 m)                 | 52              |                               |                              |  |                 |
| 44137 E&CCC<br>(42.26N 62.00W)    |                            |                    |                              | 51<br>(5 m)                 | 58              |                               |                              |  |                 |
| 44150 E&CCC<br>(42.50N 64.02W)    | 07/1800                    | 964.8              | 07/2000                      | 53<br>(5 m)                 | 65              |                               |                              |  |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| 44258 E&CCC<br>(44.50N 63.40W)                                | 07/2300                    | 965.3       | 07/1900                      | 49<br>(5 m)                 | 61              |                               |                              |  |                 |
| <b>United States Mainland</b>                                 |                            |             |                              |                             |                 |                               |                              |  |                 |
| <b>Florida</b>  |                            |             |                              |                             |                 |                               |                              |  |                 |
| <b>International Civil Aviation Organization (ICAO) Sites</b> |                            |             |                              |                             |                 |                               |                              |  |                 |
| Cape Canaveral (KXMR)<br>(28.46N 80.56W)                      | 04/0856                    | 996.9       | 04/0706                      |                             | 52              |                               |                              |  |                 |
| Cape Canaveral (KTTS)<br>(28.61N 80.69W)                      | 04/0856                    | 997.7       | 04/0451                      | 27                          | 53              |                               |                              |  |                 |
| Cocoa Beach (KCOF)<br>(28.23N 80.59W)                         | 04/0555                    | 998.1       | 03/2250                      | 33                          | 46              |                               |                              |  |                 |
| Melbourne (KMLB)<br>(28.10N 80.64W)                           | 04/0653                    | 999.3       | 03/2305                      | 33                          | 44              |                               |                              |  | 1.83            |
| Pompano Beach Airpark (KPMP)<br>(26.25N 80.12W)               | 03/0935                    | 1001.3      | 03/1825                      | 32                          | 42              |                               |                              |  |                 |
| St. Augustine (KSGJ)<br>(29.97N 81.33W)                       | 04/1656                    | 1001.8      | 04/0546                      | 33 <sup>l</sup>             | 41 <sup>l</sup> |                               |                              |  |                 |
| West Palm Beach (KPBI)<br>(26.68N 80.12W)                     | 03/0820                    | 1000.3      |                              | 30                          | 38              |                               |                              |  |                 |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>         |                            |             |                              |                             |                 |                               |                              |  |                 |
| St. Augustine (SAUF1)<br>(29.86N 81.26W)                      | 04/1300                    | 1001.3      | 04/1300                      | 44<br>(16 m)                | 54              |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                     |                            |             |                              |                             |                 |                               |                              |  |                 |
| Blount Island Command (BLIF1)<br>(30.39N 81.52W)              | 04/1906                    | 1004.0      | 04/1742                      |                             | 36<br>(11 m)    |                               |                              |  |                 |
| Dames Point (DMSF1)<br>(30.39N 81.56W)                        |                            |             |                              |                             |                 | 2.39                          | 3.18                         | 1.8                                    |                 |
| Fernandina Beach (FRDF1)<br>(30.67N 81.47W)                   | 04/2012                    | 1003.5      | 04/1618                      |                             | 41<br>(9 m)     | 4.25                          | 5.29                         | 2.6                                    |                 |
| Key West (KYWF1)<br>(24.55N 81.81W)                           | 03/0730                    | 1007.0      |                              |                             |                 | 0.77                          | 0.98                         | 0.9                                    |                 |
| Lake Worth Pier (LKWF1)<br>(26.61N 80.03W)                    | 03/0818                    | 1001.4      | 02/1906                      |                             | 40<br>(12 m)    | 2.00                          | 2.70                         | 2.2                                    |                 |
| Mayport (Bar Pilots Dock) (MYPF1)<br>(30.40N 81.43W)          | 04/2030                    | 1002.3      | 04/1648                      |                             | 40<br>(11 m)    | 3.09                          | 4.09                         | 2.1                                    |                 |
| Southbank Riverwalk St. John River (MSBF1)<br>(30.32N 81.66W) |                            |             |                              |                             |                 | 1.91                          | 2.29                         | 1.7                                    |                 |
| S Port Everglades (PEGF1)<br>(26.08N 80.12W)                  | 03/0918                    | 1001.7      | 03/1900                      |                             | 37<br>(44 m)    | 1.68                          | 2.54                         | 2.0                                    |                 |
| Trident Pier, Port Canaveral (TRDF1)<br>(28.42N 80.59W)       | 04/0636                    | 999.1       | 04/0230                      |                             | 45<br>(10 m)    | 2.11                          | 3.34                         | 2.2                                    |                 |
| Vaca Key, Florida Bay (VCAF1)<br>(24.71N 81.11W)              | 03/0712                    | 1006.0      |                              |                             |                 | 1.09                          | 0.71                         | 1.1                                    |                 |
| Virginia Key, Biscayne Bay (VAKF1)<br>(25.73N 80.16W)         | 03/0742                    | 1002.5      |                              |                             |                 | 1.55                          | 2.05                         | 1.9                                    |                 |
| <b>Weatherflow</b>  |                            |             |                              |                             |                 |                               |                              |  |                 |
| Banana River at 520 (XCCB)<br>(28.36N 80.66W)                 | 04/0717                    | 998.6       | 03/2247                      | 36<br>(5 m)                 | 52              |                               |                              |  |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                 |
| Buck Island (XJAK)<br>(30.39N 81.48W)                                 | 04/1918                    | 998         | 04/1623                      | 37<br>(10 m)                | 48        |                               |                              |  |                 |
| Crescent Beach (XHSE)<br>(29.72N 81.23W)                              | 04/1648                    | 1000        | 04/1048                      | 34                          | 50        |                               |                              |  |                 |
| Government Cut (XGVT)<br>(25.75N 80.10W)                              |                            |             | 02/1945                      | 30<br>(23 m)                | 45        |                               |                              |  |                 |
| Grant Indian River (XIND)<br>(27.96N 80.53W)                          | 04/0704                    | 999.3       | 03/2234                      | 35<br>(5 m)                 | 53        |                               |                              |  |                 |
| Huguenot Park (XHUP)<br>(30.42N 81.41W)                               | 04/2030                    | 1001        | 04/1805                      | 36<br>(12 m)                | 47        |                               |                              |  |                 |
| Jacksonville Beach Pier (XJAX)<br>(30.29N 81.39W)                     | 04/2030                    | 1000        | 04/1215                      | 38<br>(10 m)                | 48        |                               |                              |  |                 |
| Juno Beach Pier (XJUP)<br>(26.89N 80.06W)                             | 03/1949                    | 999.9       | 03/0459                      | 43<br>(6 m)                 | 53        |                               |                              |  |                 |
| Malabar Indian River (XRPT)<br>(27.98N 80.55W)                        | 04/0642                    | 1000.1      | 04/0037                      | 36<br>(6 m)                 | 48        |                               |                              |  |                 |
| Melbourne Beach (XMBI)<br>(27.90N 80.47W)                             | 04/0740                    | 996.8       | 03/2220                      | 42<br>(10 m)                | 52        |                               |                              |  |                 |
| New Smyrna Beach (XNSB)<br>(29.05N 80.90W)                            | 04/0849                    | 996.3       | 04/0644                      | 41<br>(10 m)                | 60        |                               |                              |  |                 |
| <b>Florida Institute of Technology Weather Stations</b>               |                            |             |                              |                             |           |                               |                              |  |                 |
| Sebastian Inlet Pier (SIPF1)<br>(27.86N 80.44W)                       | 04/0811                    | 999.3       | 03/2221                      | 42<br>(11 m)                | 53        |                               |                              |  |                 |
| <b>United States Geological Survey (USGS) High Water Marks</b>        |                            |             |                              |                             |           |                               |                              |  |                 |
| Jacksonville – Sawpit Creek (FLDUV03108)<br>(30.51N 81.46W)           |                            |             |                              |                             |           |                               | 5.42                         | 2.7                                    |                 |
| <b>USGS Storm Tide Sensors</b>  |                            |             |                              |                             |           |                               |                              |  |                 |
| Cocoa Beach – Atlantic Ocean (FLBRE03167)<br>(28.37N 80.60W)          |                            |             |                              |                             |           |                               | 3.81                         | 2.6                                    |                 |
| Crescent Beach – Matanzas River (FLSTJ03125)<br>(29.76N 81.25W)       |                            |             |                              |                             |           |                               | 5.06                         | 3.2                                    |                 |
| Daytona Beach Shores – Atlantic Ocean (FLVOL03141)<br>(29.15N 80.96W) |                            |             |                              |                             |           |                               | 4.44                         | 2.9                                    |                 |
| Fernandina Beach – Atlantic Ocean (FLNAS21014)<br>(30.62N 81.44W)     |                            |             |                              |                             |           |                               | 5.65                         | 3.0                                    |                 |
| Fort Matanzas – Atlantic Ocean (FLSTJ03126)<br>(29.72N 81.23W)        |                            |             |                              |                             |           |                               | 5.39                         | 3.4                                    |                 |
| Grant-Valkaria Indian River (FLBRE03160)<br>(27.92N 80.52W)           |                            |             |                              |                             |           |                               | 1.70                         | 2.5                                    |                 |
| Jacksonville – Ft. George River (FLSTJ03125)<br>(30.42N 81.42W)       |                            |             |                              |                             |           |                               | 5.61                         | 3.1                                    |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |             | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)   |                               |                              |  |                 |
| Jacksonville – Pablo Creek (FLDUV03114)<br>(30.29N 81.42W)                  |                            |             |                              |                             |             |                               | 3.72                         | 2.2                                    |                 |
| Jacksonville – Sawpit Creek (FLDUV03108)<br>(30.51N 81.46W)                 |                            |             |                              |                             |             |                               | 5.09                         | 2.7                                    |                 |
| Jacksonville Beach – Atlantic Ocean (FLDUV21045)<br>(30.29N 81.39W)         |                            |             |                              |                             |             |                               | 6.03                         | 3.6                                    |                 |
| New Smyrna Beach – Atlantic Ocean (FLVOL03146)<br>(29.01N 80.88W)           |                            |             |                              |                             |             |                               | 4.34                         | 2.9                                    |                 |
| Ormond Beach – Halifax River (FLVOL03138)<br>(29.29N 81.05W)                |                            |             |                              |                             |             |                               | 2.23                         | 2.3                                    |                 |
| Palm Bay – Indian River (FLBRE03158)<br>(28.04N 80.58W)                     |                            |             |                              |                             |             |                               | 1.55                         | 2.4                                    |                 |
| Palm Coast – Intracoastal Waterway (FLFLA03131)<br>(29.56N 81.18W)          |                            |             |                              |                             |             |                               | 2.89                         | 2.7                                    |                 |
| Palm Valley Landing – Intracoastal Waterway (FLSTJ03117)<br>(30.13N 81.38W) |                            |             |                              |                             |             |                               | 4.19                         | 2.2                                    |                 |
| Ponce Inlet Beach – Atlantic Ocean (FLVOL03143)<br>(29.08N 80.92W)          |                            |             |                              |                             |             |                               | 4.31                         | 2.8                                    |                 |
| Ponte Vedra Beach – Intracoastal Waterway (FLSTJ03117)<br>(30.21N 81.41W)   |                            |             |                              |                             |             |                               | 4.06                         | 2.2                                    |                 |
| Sebastian Inlet Intracoastal (FLIND03149)<br>(27.86N 80.45W)                |                            |             |                              |                             |             |                               | 2.13                         | 2.8                                    |                 |
| St. Augustine – Salt Run (FLSTJ17848)<br>(29.89N 81.29W)                    |                            |             |                              |                             |             |                               | 5.21                         | 3.2                                    |                 |
| Usina Beach – Tolomato River (FLSTJ03118)<br>(29.95N 81.31W)                |                            |             |                              |                             |             |                               | 4.68                         | 2.7                                    |                 |
| <b>Other</b>  |                            |             |                              |                             |             |                               |                              |  |                 |
| USAF Tower 3 (KSC0003)<br>Kennedy Space Center<br>(28.46N 80.53W)           |                            |             | 04/0305                      | 42<br>(16 m, 1-min)         | 60          |                               |                              |  |                 |
| USAF Tower 311 (KSC0311)<br>(28.60N 80.64W)                                 |                            |             | 04/0600                      | 34<br>(16 m, 1-min)         | 55          |                               |                              |  |                 |
| USAF Tower 313 (KSC0313)<br>(28.63N 80.66W)                                 |                            |             | 04/0657                      | 44<br>(16 m, 1-min)         | 62          |                               |                              |  |                 |
| USAF Tower 313 (KSC0313)<br>(28.63N 80.66W)                                 |                            |             |                              | 60<br>(90 m, 1-min)         | 70          |                               |                              |  |                 |
| USAF Tower 415 (KSC0415)<br>(28.66N 80.70W)                                 |                            |             | 04/0405                      |                             | 61<br>(2 m) |                               |                              |  |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| <b>Georgia</b>  |                            |             |                              |                             |                 |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                               |                            |             |                              |                             |                 |                               |                              |  |                 |
| Fort Pulaski (FPKG1)<br>(32.04N 80.90W)                                 | 05/0800                    | 998.1       | 05/0542                      | 38<br>(7 m, 2-min)          | 50              | 4.00                          | 5.97                         | 2.5                                    |                 |
| <b>Weatherflow</b>  |                            |             |                              |                             |                 |                               |                              |  |                 |
| Tybee Island North (XTYB)<br>(32.03N 80.84W)                            | 05/0804                    | 993.5       | 05/0539                      | 33<br>(10 m, 5-min)         | 52              |                               |                              |  |                 |
| Tybee Island South (XTYE)<br>(31.99N 80.84W)                            | 05/0812                    | 995.1       | 05/1247                      | 36<br>(9 m, 5-min)          | 48              |                               |                              |  |                 |
| <b>USGS Storm Tide Sensors</b>  |                            |             |                              |                             |                 |                               |                              |  |                 |
| Brunswick – Brunswick River (GAGLY17821)<br>(31.15N 81.50W)             |                            |             |                              |                             |                 |                               | 5.60                         | 2.4                                    |                 |
| Cumberland Island – St. Marys River (GACAM17823)<br>(30.72N 81.55W)     |                            |             |                              |                             |                 |                               | 4.93                         | 2.2                                    |                 |
| Jekyll Island State Park – Jekyll Sound (GAGLY17790)<br>(31.02N 81.43W) |                            |             |                              |                             |                 |                               | 5.32                         | 2.3                                    |                 |
| Sea Island – Atlantic Ocean (GAGLY17903)<br>(31.17N 81.35W)             |                            |             |                              |                             |                 |                               | 5.90                         | 2.9                                    |                 |
| St. Simons – Brunswick River (GAGLY18414)<br>(31.13N 81.40W)            |                            |             |                              |                             |                 |                               | 5.18                         | 2.2                                    |                 |
| St. Simons – Mackay River (GAGLY17810)<br>(31.17N 81.43W)               |                            |             |                              |                             |                 |                               | 5.21                         | 2.1                                    |                 |
| Skidaway Island – Wilmington River (GACHA17861)<br>(31.96N 81.01W)      |                            |             |                              |                             |                 |                               | 5.79                         | 2.2                                    |                 |
| <b>South Carolina</b>   |                            |             |                              |                             |                 |                               |                              |  |                 |
| <b>International Civil Aviation Organization (ICAO) Sites</b>           |                            |             |                              |                             |                 |                               |                              |  |                 |
| Beaufort County Airport (KARW) (32.41N 80.63W)                          |                            | 999.7       | 05/0615                      | 35 <sup>l</sup>             | 45 <sup>l</sup> |                               |                              |  |                 |
| Charleston Intl (KCHS)<br>(32.90N 80.04W)                               | 05/1456                    | 993.2       | 05/1549                      | 45                          | 60              |                               |                              |  | 5.54            |
| Georgetown (KGGE)<br>(33.31N 79.32W)                                    | 05/1855                    | 988.5       | 05/1815                      | 35                          | 48              |                               |                              |  | 6.11            |
| Hilton Head (KHXD)<br>(32.22N 80.70W)                                   | 05/0855                    | 996.3       | 05/0535                      | 46                          | 58              |                               |                              |  |                 |
| Mount Pleasant Regional (KLRO) (32.90N 79.78W)                          | 05/1515                    | 988.5       | 05/1655                      | 31                          | 51              |                               |                              |  |                 |
| Myrtle Beach AFB (KMYR)<br>(33.69N 78.93W)                              | 05/2128                    | 989.4       | 05/2300                      | 40                          | 48              |                               |                              |  | 8.87            |
| North Myrtle Beach (KCRE)<br>(33.81N 78.72W)                            | 05/2214                    | 989.5       | 05/1224                      | 34                          | 53              |                               |                              |  | 10.74           |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>                   |                            |             |                              |                             |                 |                               |                              |  |                 |





| Location   | Minimum Sea Level Pressure |                  | Maximum Surface Wind Speed   |                             |              | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|--|----------------------------|------------------|------------------------------|-----------------------------|--------------|-------------------------------|------------------------------|--|-----------------|
|  | Date/time (UTC)            | Press. (mb)      | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)    |                               |                              |  |                 |
| Folly Beach (FBIS1)<br>(32.69N 79.89W)                             | 05/1400                    | 988.5            | 05/0510                      | 43<br>(10 m, 2-min)         | 58           |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                          |                            |                  |                              |                             |              |                               |                              |  |                 |
| Charleston (CHTS1)<br>(32.78N 79.93W)                              | 05/1506                    | 990.0            | 05/0342                      | 36<br>(9 m, 2-min)          | 51           | 3.54                          | 4.78                         | 2.2                                    |                 |
| Oyster Landing (N Inlet Estuary) (NITS1)<br>(33.35N 79.19W)        |                            |                  |                              |                             |              | 4.08                          | 5.87                         | 3.5                                    |                 |
| Springmaid Pier (MROS1)<br>(33.66N 78.92W)                         | 05/2130                    | 993.2            |                              |                             |              | 3.14                          | 4.96                         | 2.5                                    |                 |
| <b>National Estuarine Research Reserve System Stations</b>         |                            |                  |                              |                             |              |                               |                              |  |                 |
| Winyah Bay (NIWS1)<br>(33.35N 79.19W)                              | 05/1945                    | 987              | 05/1545                      | 43<br>(5 m)                 |              |                               |                              |  | 10.49           |
| <b>Weatherflow</b>   |                            |                  |                              |                             |              |                               |                              |  |                 |
| Beaufort (XBUF)<br>(32.35N 80.59W)                                 | 05/0902                    | 993.1            | 05/0902                      | 30<br>(10 m, 5-min)         | 53           |                               |                              |  |                 |
| Calibogue Sound (XCLB)<br>(32.11N 80.83W)                          | 05/0755                    | 994.3            | 05/0615                      | 35<br>(6 m, 5-min)          | 51           |                               |                              |  |                 |
| Charleston Battery Point (XCHA) (32.76N 79.95W)                    | 05/1528                    | 986.4            | 05/1548                      | 44<br>(10 m, 5-min)         | 58           |                               |                              |  |                 |
| Folly Beach Pier (XFOL)<br>(32.65N 79.94W)                         | 05/1327                    | 987.9            | 05/0417                      | 42<br>(13 m, 5-min)         | 59           |                               |                              |  |                 |
| Ft. Sumter (XSUM)<br>(32.75N 79.87W)                               | 05/1516                    | 985.3            | 05/1606                      | 54<br>(12 m, 5-min)         | 70           |                               |                              |  |                 |
| Georgetown<br>(33.37N 79.27W)                                      | 06/1850                    | 987              | 05/1840                      |                             | 55<br>(10 m) |                               |                              |  |                 |
| Isle of Palms (XIOP)<br>(32.78N 79.79W)                            | 05/1511                    | 986.2            | 05/0441                      | 36<br>(9 m, 5-min)          | 53           |                               |                              |  |                 |
| Murrells Inlet<br>(33.52N 79.03W)                                  | 05/2030                    | 987              | 05/1845                      |                             | 56<br>(7 m)  |                               |                              |  |                 |
| Shutes Folly (XSHF)<br>(32.77N 79.91W)                             | 05/1528                    | 986.0            | 05/1538                      | 53<br>(13 m, 5-min)         | 70           |                               |                              |  |                 |
| Sullivan's Island (XSUL)<br>(32.77N 79.82W)                        | 05/1513                    | 985.0            | 05/1548                      | 34<br>(13 m, 5-min)         | 57           |                               |                              |  |                 |
| Winyah Bay Range<br>(33.19N 79.18W)                                | 05/1822                    | 982 <sup>l</sup> | 05/1827                      | 59<br>(15 m)                | 77           |                               |                              |  |                 |
| <b>RAWS</b>  |                            |                  |                              |                             |              |                               |                              |  |                 |
| Ace Basin (ABRS1)<br>(32.66N 80.40W)                               |                            |                  | 05/1255                      | 27 <sup>l</sup>             | 52           |                               |                              |  |                 |
| <b>USGS Storm Tide Sensors</b>                                     |                            |                  |                              |                             |              |                               |                              |  |                 |
| Bluffton – May River (SCBEA14284)<br>(32.23N 80.86W)               |                            |                  |                              |                             |              |                               | 6.53                         | 2.6                                    |                 |
| Briarcliff Acres – Singleton Swash (SCHOR17780)<br>(33.76N 78.79W) |                            |                  |                              |                             |              |                               | 5.18                         | 2.8                                    |                 |
| Forest Brook (SCHOR17780)<br>(33.70N 78.94W)                       |                            |                  |                              |                             |              |                               | 4.59                         | 2.8                                    |                 |



| Location   | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|--|----------------------------|--------------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|-----------------|
|  | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                 |
| Garden City – Intracoastal Waterway (SCHOR14327)<br>(33.58N 79.00W)    |                            |                    |                              |                             |           |                               | 5.53                         | 3.4                                    |                 |
| Georgetown – Pee Dee River (SCGEO14315)<br>(33.37N 79.27W)             |                            |                    |                              |                             |           |                               | 4.25                         | 2.1                                    |                 |
| Georgetown – Sampit River (SCGEO14322)<br>(33.36N 79.38W)              |                            |                    |                              |                             |           |                               | 4.56                         | 2.4                                    |                 |
| Huntington State Park – Murrells Inlet (SCGEO14321)<br>(33.53N 79.03W) |                            |                    |                              |                             |           |                               | 5.35                         | 3.0                                    |                 |
| James Island – Seaside Creek (SCCHA14312)<br>(32.71N 79.95W)           |                            |                    |                              |                             |           |                               | 4.68                         | 2.0                                    |                 |
| Murrells Inlet – Parsonage Creek (SCGEO14320)<br>(33.55N 79.03W)       |                            |                    |                              |                             |           |                               | 5.10                         | 3.0                                    |                 |
| Myrtle Beach – Intracoastal Waterway (SCHOR14332)<br>(33.76N 78.82W)   |                            |                    |                              |                             |           |                               | 4.77                         | 3.0                                    |                 |
| Myrtle Beach – Withers Swash (SCHOR00003)<br>(33.68N 78.89W)           |                            |                    |                              |                             |           |                               | 5.62                         | 3.3                                    |                 |
| North Myrtle Beach – Whitepoint Swash (SCHOR14333)<br>(33.79N 78.74W)  |                            |                    |                              |                             |           |                               | 4.98                         | 2.5                                    |                 |
| North Myrtle Beach – Williams Creek (SCHOR14329)<br>(33.84N 78.62W)    |                            |                    |                              |                             |           |                               | 4.79                         | 2.4                                    |                 |
| Pawleys Island Creek (SCGEO14316)<br>(33.44N 79.12W)                   |                            |                    |                              |                             |           |                               | 5.77                         | 3.1                                    |                 |
| Springmaid Beach – Midway Swash (SCHOR17779)<br>(33.66N 78.92W)        |                            |                    |                              |                             |           |                               | 5.74                         | 3.3                                    |                 |
| Surfside Beach Swash (SCHOR14328)<br>(33.60N 78.97W)                   |                            |                    |                              |                             |           |                               | 6.34                         | 3.9                                    |                 |
| <b>Public/Other</b>  |                            |                    |                              |                             |           |                               |                              |  |                 |
| Charleston (KXCM)<br>(32.78N 79.93W)                                   | 05/1540                    | 984.4              | 05/0840                      | 37<br>(10 m, 10-min)        | 49        |                               |                              |  |                 |
| Litchfield by the Sea (KSCPAWLE20)<br>(33.48N 79.09W)                  |                            |                    |                              |                             |           |                               |                              |  | 13.44           |
| Mount Pleasant<br>(32.87N 79.82W)                                      | 05/1455                    | 989.8 <sup>l</sup> |                              |                             |           |                               |                              |  |                 |
| Myrtle Beach KSCMYRTL2<br>(33.65N 78.94W)                              | 05/2134                    | 987.8              | 05/2329                      |                             | 55        |                               |                              |  |                 |
| Socastee 3 NE<br>KSCMYRTL78 (33.71N 78.96W)                            |                            |                    |                              |                             | 48        |                               |                              |  | 10.18           |



| Location  | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|--------------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| Summerville   |                            |                    | 05/1018                      | 30                          | 53              |                               |                              |  |                 |
| <b>COOP Sites (NWS)</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Georgetown Co Apt (GEOS1)<br>(33.32N 79.32W)                                |                            |                    |                              |                             |                 |                               |                              |  | 13.38           |
| McClellanville 7 NE (SRES1)<br>(33.15N 79.36W)                              |                            |                    |                              |                             |                 |                               |                              |  | 11.79           |
| Myrtle Beach (MYBS1)<br>(33.75N 78.82W)                                     |                            |                    |                              |                             |                 |                               |                              |  | 10.00           |
| <b>Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites</b> |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Georgetown 11.2 SW (SC-GT-38) (33.23N 79.41W)                               |                            |                    |                              |                             |                 |                               |                              |  | 12.10           |
| McClellanville (SC-CR-10)<br>(33.08N 79.46W)                                |                            |                    |                              |                             |                 |                               |                              |  | 10.70           |
| McClellanville 1 ESE (SC-CR-33) (33.08N 79.46W)                             |                            |                    |                              |                             |                 |                               |                              |  | 10.12           |
| Mount Pleasant 4 NE (SC-CR-158) (32.87N 79.82W)                             |                            |                    |                              |                             |                 |                               |                              |  | 10.12           |
| Murrells Inlet 0.9 NNE (SC-GT-19) (33.57N 79.05W)                           |                            |                    |                              |                             |                 |                               |                              |  | 10.13           |
| Myrtle Beach 5.2 SW (SC-HR-73) (33.65N 78.96W)                              |                            |                    |                              |                             |                 |                               |                              |  | 12.77           |
| Myrtle Beach 9.2 WSW (SC-HR-66) (33.62N 79.03W)                             |                            |                    |                              |                             |                 |                               |                              |  | 11.63           |
| Myrtle Beach 2.4 ENE (SC-HR-64) (33.72N 78.86W)                             |                            |                    |                              |                             |                 |                               |                              |  | 10.62           |
| Pawley's Island 5.6 NNE (SC-GT-9) (33.49N 79.08W)                           |                            |                    |                              |                             |                 |                               |                              |  | 15.21           |
| Pawley's Island 2.6 N (SC-GT-24) (33.46N 79.12W)                            |                            |                    |                              |                             |                 |                               |                              |  | 14.80           |
| Pawley's Island 2.7 W (SC-GT-18) (33.43N 79.17W)                            |                            |                    |                              |                             |                 |                               |                              |  | 12.00           |
| Pawley's Island 0.8 WNW (SC-GT-26) (33.43N 79.14W)                          |                            |                    |                              |                             |                 |                               |                              |  | 10.20           |
| Surfside Beach 1.0 NE (SC-HR-39) (33.62N 78.97W)                            |                            |                    |                              |                             |                 |                               |                              |  | 10.25           |
| <b>North Carolina</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| <b>International Civil Aviation Organization (ICAO) Sites</b>               |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Bouge Field (KNJM)<br>(34.69N 77.04W)                                       | 06/0743                    | 980.4 <sup>l</sup> | 06/0647                      | 31 <sup>l</sup>             | 46 <sup>l</sup> |                               |                              |  |                 |
| Beaufort (KMRH)<br>(34.73N 76.66W)  | 06/0820                    | 969.5 <sup>l</sup> | 06/0845                      | 43 <sup>l</sup>             | 59 <sup>l</sup> |                               |                              |  |                 |
| Cherry Pt (KNKT)<br>(34.90N 76.88W)   | 06/0854                    | 981.8              | 06/0954                      | 46                          | 63              |                               |                              |  | 4.57            |
| Edenton (KEDE)<br>(36.03N 76.56W)   | 06/1400                    | 996                | 06/1400                      | 27                          | 51              |                               |                              |  |                 |
| Elizabeth City (KECG)<br>(36.26N 76.17W)                                    | 06/1254                    | 994.0              | 06/1144                      | 47                          | 61              |                               |                              |  |                 |
| Hatteras (KHSE)<br>(35.22N 75.62W)  | 06/1151                    | 960.7 <sup>l</sup> | 06/1040                      | 45 <sup>l</sup>             | 68 <sup>l</sup> |                               |                              |  |                 |



| Location   | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|--|----------------------------|--------------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|  | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| Kill Devil Hills (KFFA)<br>(36.02N 75.67W)                   | 06/1340                    | 986.8              | 06/1500                      | 26 <sup>l</sup>             | 51 <sup>l</sup> |                               |                              |  |                 |
| Kinston/Stallings Fld (KISO)<br>(35.33N 77.61W)              | 06/0840                    | 993.2              | 06/0740                      | 35 <sup>l</sup>             | 47 <sup>l</sup> |                               |                              |  | 3.39            |
| Manteo (KMQL)<br>(35.92N 75.70W)                             | 06/1355                    | 985.4              | 06/1455                      | 39 <sup>l</sup>             | 53 <sup>l</sup> |                               |                              |  |                 |
| New River (KNCA)<br>(34.71N 77.43W)                          | 06/0656                    | 986.5              | 06/1004                      | 37                          | 54              |                               |                              |  | 5.12            |
| Stumpy Point (K2DP)<br>(35.69N 75.90W)                       | 06/1306                    | 983.7              | 06/1451                      | 45                          | 63              |                               |                              |  | 3.93            |
| Wilmington (KILM)<br>(34.28N 77.92W)                         | 06/0417                    | 986.5              | 06/0445                      | 37                          | 49              |                               |                              |  | 10.05           |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>        |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Cape Lookout (CLKN7)<br>(34.60N 76.52W)                      | 06/0800                    | 960.1              | 06/1000                      | 59<br>(10 m)                | 82              |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                    |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Beaufort (BFTN7)<br>(34.72N 76.67W)                          | 06/0818                    | 970.5              | 06/0842                      | 52<br>(7 m)                 | 64              | 2.08                          | 2.90                         | 1.4                                    |                 |
| Duck (DUKN7)<br>(36.18N 75.75W)                              | 06/1448                    | 987.3              | 06/1512                      | 65<br>(9 m)                 | 79              | 3.89                          | 5.01                         | 3.5                                    |                 |
| Hatteras (HCGN7)<br>(35.21N 75.70W)                          | 06/1212                    | 959.7              | 06/1300                      | 65<br>(8 m)                 | 80              | 5.55                          | 5.56                         | 5.4                                    |                 |
| Oregon Inlet (ORIN7)<br>(35.78N 75.53W)                      | 06/1347                    | 981.8              | 06/1630                      | 48<br>(7 m)                 | 69              | 3.15                          | 3.65                         | 3.2                                    |                 |
| Wilmington (WLO7)  | 06/0400                    | 986.5              |                              |                             |                 | 2.01                          | 3.64                         | 1.6                                    |                 |
| Wrightsville Beach (JMPN7)<br>(34.21N 77.79W)                | 06/0412                    | 983.6              | 06/0248                      | 48<br>(8 m)                 | 60              | 2.05                          | 3.77                         | 2.0                                    |                 |
| <b>Advanced Hydrological Prediction Service (AHPS) Sites</b> |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Carolina Beach (CBCN7)<br>(34.04N 77.89W)                    |                            |                    | 06/0256                      |                             | 53              |                               |                              |  |                 |
| Southport (STHN7)<br>(33.92N 78.02W)                         |                            |                    | 05/2243                      | 44                          | 61              |                               |                              |  |                 |
| Surf City (SRFN7)<br>(34.42N 77.54W)                         |                            |                    | 06/0435                      |                             | 61              |                               |                              |  |                 |
| <b>Weatherflow</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Alligator River Bridge<br>(35.90N 76.01W)                    | 06/1108                    | 990.4 <sup>l</sup> | 06/1408                      | 67 <sup>l</sup><br>(12 m)   | 82 <sup>l</sup> |                               |                              |  |                 |
| Avon Sound<br>(35.34N 75.50W)                                | 06/1307                    | 959.5 <sup>l</sup> | 06/1342                      | 68 <sup>l</sup><br>(5 m)    | 85 <sup>l</sup> |                               |                              |  |                 |
| Avon<br>(35.35N 75.50W)                                      | 06/1238                    | 959.2 <sup>l</sup> | 06/1208                      | 73 <sup>l</sup><br>(12 m)   | 86              |                               |                              |  |                 |
| Buxton<br>(35.26N 75.59W)                                    | 06/1249                    | 957.3 <sup>l</sup> | 06/1139                      | 59 <sup>l</sup><br>(10 m)   | 79 <sup>l</sup> |                               |                              |  |                 |
| Carolina Beach<br>(34.04N 77.90W)                            | 06/0252                    | 982                | 06/0152                      |                             | 52<br>(10 m)    |                               |                              |  |                 |
| Federal Point<br>(33.96N 77.94W)                             | 06/0245                    | 979                | 06/0145                      |                             | 65<br>(15 m)    |                               |                              |  |                 |
| Fort Fisher<br>(33.97N 77.92W)                               | 06/0245                    | 980                | 06/0010                      |                             | 65<br>(10 m)    |                               |                              |  |                 |



| Location   | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|--|----------------------------|--------------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|  | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| Fort Macon<br>(34.70N 76.71W)  | 06/0816                    | 963.7              | 06/0806                      | 61<br>(10 m)                | 78              |                               |                              |  |                 |
| Frisco Woods<br>(35.24N 75.60W)  | 06/1250                    | 958.6 <sup>l</sup> | 06/1310                      | 62 <sup>l</sup><br>(6 m)    | 77 <sup>l</sup> |                               |                              |  |                 |
| Hatteras High<br>(35.26N 75.55W)   | 06/1248                    | 956.7 <sup>l</sup> | 06/1328                      | 67 <sup>l</sup><br>(10 m)   | 87 <sup>l</sup> |                               |                              |  |                 |
| Kites Resort<br>(35.58N 75.47W)  | 06/1329                    | 967.8 <sup>l</sup> | 06/1619                      | 62 <sup>l</sup><br>(16 m)   | 96 <sup>l</sup> |                               |                              |  |                 |
| Nags Head<br>(35.91N 75.59W)   | 06/1403                    | 983.7 <sup>l</sup> | 06/1618                      | 72 <sup>l</sup><br>(18 m)   | 85 <sup>l</sup> |                               |                              |  |                 |
| Oak Island<br>(33.91N 78.12W)  | 06/0111                    | 980                | 06/0236                      |                             | 53<br>(10 m)    |                               |                              |  |                 |
| Ocracoke Sound<br>(35.14N 76.00W)  | 06/1119                    | 960.8 <sup>l</sup> | 06/1044                      | 60 <sup>l</sup><br>(8 m)    | 77 <sup>l</sup> |                               |                              |  |                 |
| Oregon Inlet CG<br>(35.77N 75.53W)                                       | 06/1335                    | 978.2              | 06/1620                      | 69<br>(10 m)                | 86              |                               |                              |  |                 |
| Pamlico Sound<br>(35.42N 75.83W)   | 06/1218                    | 969.9              | 06/1453                      | 64<br>(13 m)                | 82              |                               |                              |  |                 |
| Waves<br>(35.57N 75.49W)   | 06/1314                    | 970.1              | 06/1659                      | 58<br>(10 m)                | 75              |                               |                              |  |                 |
| <b>North Carolina ECONET</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Bald Head Island<br>(33.85N 77.97W)                                      | 06/0018                    | 976.7              | 05/2257                      | 36<br>(10 m)                | 49              |                               |                              |  |                 |
| <b>RAWS</b>  |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Sunny Point (NSUN)<br>(34.00N 77.96W)                                    |                            |                    | 06/0400                      |                             | 55<br>(6 m)     |                               |                              |  | 4.58            |
| <b>USGS High Water Marks</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Aurora – Pamlico River<br>(NCBEA11728)<br>(35.38N 76.75W)                |                            |                    |                              |                             |                 |                               | 4.37                         | 2.0                                    |                 |
| Avon – Pamlico Sound<br>(NCDAR00004)<br>(35.35N 75.51W)                  |                            |                    |                              |                             |                 |                               | 6.14                         | 2.0                                    |                 |
| Avon – Pamlico Sound<br>(NCDAR06914)<br>(35.35N 75.51W)                  |                            |                    |                              |                             |                 |                               | 6.26                         | 3.5                                    |                 |
| Buxton – Atlantic Ocean<br>(NCDAR12790)<br>(35.27N 75.52W)               |                            |                    |                              |                             |                 |                               | 8.07                         | 2.6                                    |                 |
| Buxton – Pamlico Sound<br>(NCDAR00002)<br>(35.27N 75.56W)                |                            |                    |                              |                             |                 |                               | 7.84                         | 4.0                                    |                 |
| Hatteras – The Slash to Pamlico Sound<br>(NCDAR12749)<br>(35.22N 75.69W) |                            |                    |                              |                             |                 |                               | 6.00                         | 2.7                                    |                 |
| <b>USGS Storm Tide Sensors</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Atlantic Beach – Atlantic Ocean (NCCAR12328)<br>(34.70N 76.73W)          |                            |                    |                              |                             |                 |                               | 4.96                         | 3.2                                    |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                 |
| Aurora – Pamlico River (NCBEA11728)<br>(35.38N 76.75W)                            |                            |             |                              |                             |           |                               | 3.34                         | 3.2                                    |                 |
| Avon – Atlantic Ocean (NCDAR00003)<br>(35.35N 75.50W)                             |                            |             |                              |                             |           |                               | 5.83                         | 4.4                                    |                 |
| Avon – Pamlico Sound (NCDAR00004)<br>(35.35N 75.51W)                              |                            |             |                              |                             |           |                               | 6.32                         | 6.1                                    |                 |
| Belhaven – Pantego Creek, Pungo River (NCBEA13648)<br>(35.53N 76.61W)             |                            |             |                              |                             |           |                               | 2.35                         | 2.2                                    |                 |
| Buxton – Atlantic Ocean (NCDAR12790)<br>(35.27N 75.52W)                           |                            |             |                              |                             |           |                               | 7.83                         | 6.4                                    |                 |
| Buxton – Pamlico Sound (NCDAR00002)<br>(35.27N 75.56W)                            |                            |             |                              |                             |           |                               | 6.92                         | 6.7                                    |                 |
| Carolina Beach – Atlantic Ocean (NCNEW00004)<br>(34.06N 77.88W)                   |                            |             |                              |                             |           |                               | 4.53                         | 2.6                                    |                 |
| Chocowinity Bay (NCBEA11788)<br>(35.50N 77.05W)                                   |                            |             |                              |                             |           |                               | 3.22                         | 3.1                                    |                 |
| Columbia – Albemarle Sound (NCTYR13548)<br>(35.99N 76.18W)                        |                            |             |                              |                             |           |                               | 2.70                         | 2.7                                    |                 |
| Columbia – Alligator River (NCTYR13568)<br>(35.91N 76.03W)                        |                            |             |                              |                             |           |                               | 3.31                         | 3.4                                    |                 |
| Davis – Core Sound (NCCAR12128)<br>(34.80N 76.46W)                                |                            |             |                              |                             |           |                               | 2.42                         | 2.0                                    |                 |
| Edenton – Chowan River (NCCHO12448)<br>(36.06N 76.68W)                            |                            |             |                              |                             |           |                               | 2.98                         | 2.9                                    |                 |
| Frisco – Pamlico Sound (NCDAR18739)<br>(35.22N 75.64W)                            |                            |             |                              |                             |           |                               | 6.75                         | 5.3                                    |                 |
| Hampstead – Intracoastal Waterway near Rich Inlet (NCPEN00001)<br>(34.31N 77.73W) |                            |             |                              |                             |           |                               | 4.26                         | 2.3                                    |                 |
| Harkers Island – Back Sound (NCCAR00001)<br>(34.68N 76.53W)                       |                            |             |                              |                             |           |                               | 3.50                         | 2.8                                    |                 |
| Hatteras – Pamlico Sound (NCDAR00001)<br>(35.21N 75.70W)                          |                            |             |                              |                             |           |                               | 5.68                         | 5.6                                    |                 |
| Havelock – Neuse River (NCCRA00003)<br>(34.94N 76.81W)                            |                            |             |                              |                             |           |                               | 5.02                         | 5.3                                    |                 |
| Hobucken – Pamlico Sound (NCPAM13270)<br>(35.24N 76.59W)                          |                            |             |                              |                             |           |                               | 3.15                         | 3.4                                    |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                 |
| Kill Devil Hills – Albemarle Sound at Kitty Hawk Bay (NCDAR12668)<br><small>(36.02N 75.73W)</small> |                            |             |                              |                             |           |                               | 2.37                         | 2.4                                    |                 |
| Kill Devil Hills – Atlantic Ocean (NCDAR13668)<br><small>(36.04N 75.67W)</small>                    |                            |             |                              |                             |           |                               | 6.73                         | 5.2                                    |                 |
| Kitty Hawk – Atlantic Ocean (NCDAR12669)<br><small>(36.10N 75.71W)</small>                          |                            |             |                              |                             |           |                               | 6.74                         | 5.2                                    |                 |
| Kure Beach – Cape Fear River (NCNEW00002)<br><small>(33.96N 77.94W)</small>                         |                            |             |                              |                             |           |                               | 3.74                         | 2.0                                    |                 |
| Leonards Point – Albemarle Sound (NCWAS13588)<br><small>(35.96N 76.49W)</small>                     |                            |             |                              |                             |           |                               | 3.07                         | 3.1                                    |                 |
| Manns Harbor – Croatan Sound (NCDAR00011)<br><small>(35.91N 75.77W)</small>                         |                            |             |                              |                             |           |                               | 2.60                         | 2.6                                    |                 |
| Nags Head – Motts Creek at Pamlico Sound (NCDAR00005)<br><small>(35.80N 75.55W)</small>             |                            |             |                              |                             |           |                               | 3.51                         | 3.0                                    |                 |
| New Bern – Trent River (NCCRA12488)<br><small>(35.10N 77.04W)</small>                               |                            |             |                              |                             |           |                               | 3.27                         | 3.5                                    |                 |
| North Topsail Beach – Atlantic Ocean (NCONS00002)<br><small>(34.50N 77.40W)</small>                 |                            |             |                              |                             |           |                               | 5.55                         | 3.5                                    |                 |
| North Topsail Beach – Intracoastal Waterway (NCONS13189)<br><small>(34.52N 77.37W)</small>          |                            |             |                              |                             |           |                               | 2.48                         | 2.3                                    |                 |
| Oak Island – Atlantic Ocean (NCBRU11888)<br><small>(33.91N 78.15W)</small>                          |                            |             |                              |                             |           |                               | 5.31                         | 3.0                                    |                 |
| Oak Island – Atlantic Ocean (NCBRU11891)<br><small>(33.90N 78.08W)</small>                          |                            |             |                              |                             |           |                               | 4.74                         | 2.6                                    |                 |
| Oak Island – Intracoastal Waterway (NCBRU11890)<br><small>(33.93N 78.14W)</small>                   |                            |             |                              |                             |           |                               | 4.22                         | 2.1                                    |                 |
| Ocean Isle Beach – Atlantic Ocean (NCBRU00012)<br><small>(33.89N 78.44W)</small>                    |                            |             |                              |                             |           |                               | 5.98                         | 3.6                                    |                 |
| Ocean Isle Beach – Intracoastal Waterway (NCBRU00014)<br><small>(33.90N 78.44W)</small>             |                            |             |                              |                             |           |                               | 4.63                         | 2.2                                    |                 |
| Oriental – Neuse River (NCPAM13231)<br><small>(35.02N 76.70W)</small>                               |                            |             |                              |                             |           |                               | 4.60                         | 4.9                                    |                 |



| Location  | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|--------------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| Pond Island – Roanoke Sound (NCDAR12629)<br>(35.90N 75.62W)                                 |                            |                    |                              |                             |                 |                               | 3.36                         | 3.2                                    |                 |
| Rodanthe – Atlantic Ocean (NCDAR12788)<br>(35.59N 75.46W)                                   |                            |                    |                              |                             |                 |                               | 6.26                         | 4.8                                    |                 |
| Rodanthe – Pamlico Sound (NCDAR12709)<br>(35.58N 75.47W)                                    |                            |                    |                              |                             |                 |                               | 4.71                         | 4.2                                    |                 |
| Shalotte – Intracoastal Waterway (NCBRU11908)<br>(33.91N 78.37W)                            |                            |                    |                              |                             |                 |                               | 4.74                         | 2.4                                    |                 |
| Sneads Ferry – New River (NCONS13128)<br>(34.58N 77.40W)                                    |                            |                    |                              |                             |                 |                               | 2.36                         | 2.2                                    |                 |
| Straits – North River (NCCAR12428)<br>(34.72N 76.58W)                                       |                            |                    |                              |                             |                 |                               | 2.64                         | 2.0                                    |                 |
| Stumpy Point Bay, Pamlico Sound (NCDAR00010)<br>(35.70N 75.77W)                             |                            |                    |                              |                             |                 |                               | 2.53                         | 2.3                                    |                 |
| Sunset Beach – Bull Creek, Intracoastal Waterway (NCBRU11850)<br>(33.87N 78.52W)            |                            |                    |                              |                             |                 |                               | 4.55                         | 2.1                                    |                 |
| Sunset Beach – Intracoastal Waterway (NCBRU11893)<br>(33.88N 78.51W)                        |                            |                    |                              |                             |                 |                               | 4.53                         | 2.2                                    |                 |
| Supply – Intracoastal Waterway (NCBRU12008)<br>(33.92N 78.27W)                              |                            |                    |                              |                             |                 |                               | 4.38                         | 2.2                                    |                 |
| Swan Quarter Bay, Pamlico Sound (NCHYD00001)<br>(35.39N 76.33W)                             |                            |                    |                              |                             |                 |                               | 2.00                         | 2.2                                    |                 |
| Swansboro – White Oak River (NCONS00001)<br>(34.69N 77.12W)                                 |                            |                    |                              |                             |                 |                               | 2.69                         | 2.2                                    |                 |
| Varnamtown – Intracoastal Waterway at Lockwoods Folly Inlet (NCBRU11909)<br>(33.92N 78.24W) |                            |                    |                              |                             |                 |                               | 4.49                         | 2.2                                    |                 |
| <b>Public/Other</b>   |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Beaufort<br>(34.76N 76.55W)   | 06/0724                    | 979.0 <sup>l</sup> |                              |                             |                 |                               |                              |  |                 |
| Carolina Beach KNCAROL11<br>(34.05N 77.89W)   | 06/0245                    | 982.1              | 06/0200                      |                             | 47              |                               |                              |  |                 |
| Castle Hayne<br>(34.32N 77.92W)   |                            |                    |                              |                             |                 |                               |                              |  | 11.40           |
| Caswell Bch KNCCASWE3<br>(33.91N 78.06W)  | 06/0115                    | 982.4              | 06/0200                      |                             | 53              |                               |                              |  |                 |
| Cedar Island<br>(35.02N 76.32W)   | 06/0950                    | 974.0 <sup>l</sup> | 06/0920                      | 65 <sup>l</sup><br>(10 m)   | 96 <sup>l</sup> |                               |                              |  |                 |
| Jacksonville<br>(34.76N 77.46W)   | 06/0228                    | 990.5 <sup>l</sup> |                              |                             |                 |                               |                              |  |                 |





| Location  | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |              | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|--------------------|------------------------------|-----------------------------|--------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)    |                               |                              |  |                 |
| Jacksonville<br>(34.80N 77.39W)   | 06/0254                    | 987.0 <sup>l</sup> |                              |                             |              |                               |                              |  |                 |
| Kure Beach KNCKUREB10<br>(34.00N 77.91W)                                    | 06/0109                    | 982.7              | 06/0109                      |                             | 53           |                               |                              |  |                 |
| Southport KNCSOUTH1<br>(33.92N 78.02W)                                      | 05/2339                    | 981.7              | 05/2249                      |                             | 60<br>(20 m) |                               |                              |  |                 |
| Southport KG4RGN  | 06/0012                    | 983.1 <sup>l</sup> | 06/0012                      | 61 <sup>l</sup>             |              |                               |                              |  |                 |
| Sunset Beach KNCSUNSE6<br>(33.87N 78.51W)                                   | 05/2339                    | 986.8              | 05/2329                      |                             | 57           |                               |                              |  |                 |
| Wilmington KNCWILMI3<br>(34.26N 77.87W)                                     |                            | 985.8              |                              |                             |              |                               |                              |  | 10.24           |
| <b>COOP Sites (NWS)</b>   |                            |                    |                              |                             |              |                               |                              |  |                 |
| NWS Wilmington Office<br>(34.28N 77.91W)                                    |                            |                    |                              |                             |              |                               |                              |  | 10.80           |
| <b>Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites</b> |                            |                    |                              |                             |              |                               |                              |  |                 |
| Kinston 5 ESE (NC-LR-7)<br>(35.25N 77.51W)                                  |                            |                    |                              |                             |              |                               |                              |  | 8.77            |
| Smith Creek 0.8 E (NC-NH-63)<br>(34.26N 77.85W)                             |                            |                    |                              |                             |              |                               |                              |  | 11.36           |
| Wilmington 7.3 NE (NC-NH-83)<br>(34.29N 77.83W)                             |                            |                    |                              |                             |              |                               |                              |  | 13.07           |
| Wilmington 8.0 ENE (NC-NH-10)<br>(34.25N 77.81W)                            |                            |                    |                              |                             |              |                               |                              |  | 12.25           |
| Wilmington 6.7 NE (NC-NH-81)<br>(34.27N 77.81W)                             |                            |                    |                              |                             |              |                               |                              |  | 12.13           |
| Wilmington 7.3 NE (NC-NH-68)<br>(34.28N 77.81W)                             |                            |                    |                              |                             |              |                               |                              |  | 11.78           |
| <b>Virginia</b>   |                            |                    |                              |                             |              |                               |                              |  |                 |
| <b>International Civil Aviation Organization (ICAO) Sites</b>               |                            |                    |                              |                             |              |                               |                              |  |                 |
| Norfolk (KORF)<br>(36.91N 76.20W)   | 06/1451                    | 999.8              | 06/1516                      | 37                          | 56           |                               |                              |  |                 |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>                       |                            |                    |                              |                             |              |                               |                              |  |                 |
| Chesapeake Light (CHLV2)<br>(36.91N 75.70W)                                 |                            |                    | 06/1501                      | 61<br>(37 m)                | 72           |                               |                              |  |                 |
| Rappahannock Light Tower (RPLV2)<br>(37.54N 76.02W)                         | 06/1712                    | 1001.7             | 06/1806                      | 41<br>(17 m)                | 49           |                               |                              |  |                 |
| S Craney Island (CRYV2)<br>(36.89N 76.34W)                                  | 06/1336                    | 999.4              | 06/1148                      | 34<br>(8 m)                 | 45           |                               |                              |  |                 |
| Willoughby (WDSV2)<br>(36.98N 76.32W)                                       | 06/1536                    | 1000.1             | 06/1318                      | 41<br>(4 m)                 | 49           |                               |                              |  |                 |
| York River (YKRV2)<br>(37.25N 76.33W)                                       | 06/1518                    | 1001.3             | 06/1536                      | 38<br>(16 m)                | 45           |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                                   |                            |                    |                              |                             |              |                               |                              |  |                 |
| Cape Henry (CHYV2)<br>(36.91N 75.78W)                                       | 06/1542                    | 998.4              | 06/1436                      | 50<br>(23 m)                | 61           |                               |                              |  |                 |
| Cape Henry (CHYV2)<br>(36.91N 75.78W)                                       | 06/1542                    | 998.4              | 06/1239                      | 36<br>(6 m)                 | 45           |                               |                              |  |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |              | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|--------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)    |                               |                              |  |                 |
| Chesapeake Channel BBT (CHBV2) (37.03N 76.08W)                    | 06/1506                    | 997.0       | 06/1500                      | 46<br>(14 m)                | 58           | 3.63                          |                              | 3.6                                    |                 |
| Dahlgren (NCDV2) (38.32N 77.04W)                                  | 06/1948                    | 1006.1      |                              |                             |              | 2.03                          | 2.89                         | 2.0                                    |                 |
| Dominion Terminal (DOMV2) (36.96N 76.42W)                         | 06/1412                    | 1000.8      | 06/1206                      |                             | 36<br>(9 m)  |                               |                              |  |                 |
| Kiptopeke (KPTV2) (37.17N 75.99W)                                 |                            |             | 06/1542                      |                             | 42<br>(7 m)  | 2.95                          | 3.86                         | 2.8                                    |                 |
| Lewisetta (LWTV2) (38.00N 76.46W)                                 | 06/1736                    | 1005.0      |                              |                             |              | 2.03                          | 2.80                         | 2.1                                    |                 |
| Money Point (MNPV2) (36.78N 76.30W)                               | 06/1324                    | 998.8       | 06/1336                      |                             | 35<br>(6 m)  | 3.69                          |                              | 3.0                                    |                 |
| Sewells Point (SWPV2) (36.95N 76.33W)                             | 06/1336                    | 1000.4      |                              |                             |              | 3.60                          | 4.26                         | 3.1                                    |                 |
| Wachapreague (WAHV2) (37.61N 75.69W)                              | 06/1624                    | 1000.0      | 06/1548                      |                             | 43<br>(7 m)  | 2.87                          | 4.53                         | 2.7                                    |                 |
| Windmill Point (WNDV2) (37.62N 76.29W)                            |                            |             |                              |                             |              | 2.03                          | 2.32                         | 2.1                                    |                 |
| Yorktown USCG Training Center (YKTV2) (37.23N 76.48W)             | 06/1418                    | 1001.4      | 06/1348                      |                             | 37<br>(10 m) | 2.79                          | 3.60                         | 2.5                                    |                 |
| <b>Weatherflow</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Hampton (36.98N 76.34W)   |                            |             | 06/1247                      | 36<br>(7 m)                 | 47           |                               |                              |  |                 |
| 3 <sup>rd</sup> Island Chesapeake Bay Brdg Tunnel (37.03N 76.08W) |                            |             | 06/1454                      | 46<br>(16 m)                | 59           |                               |                              |  |                 |
| Tangier Island (37.78N 75.98W)                                    |                            |             | 06/1741                      | 40<br>(16 m)                | 46           |                               |                              |  |                 |
| <b>District of Columbia</b>                                       |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Washington (WASD2) (38.87N 77.02W)                                | 06/2000                    | 1007.6      |                              |                             |              | 2.24                          | 3.65                         | 1.9                                    |                 |
| <b>Maryland</b>   |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Annapolis (APAM2) (38.98N 76.48W)                                 | 06/1924                    | 1006.8      |                              |                             |              | 2.08                          | 2.70                         | 2.0                                    |                 |
| Baltimore, Fort McHenry (BLTM2) (39.27N 76.58W)                   | 06/1942                    | 1007.3      |                              |                             |              | 2.00                          | 2.69                         | 1.9                                    |                 |
| Bishops Head (BISM2) (38.22N 76.04W)                              | 06/1742                    | 1004.6      |                              |                             |              | 1.98                          | 2.91                         | 2.1                                    |                 |
| Cambridge (CAMM2) (38.57N 76.07W)                                 | 06/1848                    | 1005.2      |                              |                             |              | 2.13                          | 2.92                         | 2.0                                    |                 |
| Chesapeake City (CHCM2) (39.53N 75.81W)                           | 06/1924                    | 1007.8      |                              |                             |              | 2.11                          |                              | 1.5                                    |                 |
| Cove Point LNG Pier (COVM2) (38.40N 76.39W)                       | 06/1754                    | 1006.5      | 06/2042                      |                             | 36<br>(28 m) |                               |                              |  |                 |
| Ocean City Inlet (OCIM2) (38.33N 75.09W)                          | 06/1912                    | 1001.7      | 06/1948                      |                             | 39<br>(11 m) | 2.05                          | 2.69                         | 1.9                                    |                 |
| Solomons Island (SLIM2) (38.32N 76.45W)                           | 06/1842                    | 1005.4      |                              |                             |              | 1.98                          | 2.71                         | 2.1                                    |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |              | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|--------------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)    |                               |                              |  |                 |
| Tolchester Beach (TCBM2)<br>(39.21N 76.25W)                   | 06/1918                    | 1007.6      |                              |                             |              | 1.90                          |                              | 2.0                                    |                 |
| <b>Delaware</b>   |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Lewes (LWSD1)<br>(38.78N 75.12W)                              | 06/1912                    | 1003.8      | 06/1500                      | 34<br>(12 m)                | 42           | 2.68                          | 4.10                         | 2.1                                    |                 |
| <b>New Jersey</b>   |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Atlantic City (ACYN4)<br>(39.36N 74.42W)                      | 06/2048                    | 1004.6      |                              |                             |              | 2.27                          | 3.67                         | 1.7                                    |                 |
| Cape May (CMAN4)<br>(38.97N 74.96W)                           | 06/1954                    | 1003.3      |                              |                             |              | 2.41                          | 4.02                         | 1.6                                    |                 |
| <b>New York</b>   |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Kings Point (KPTN6)<br>(40.81N 73.77W)                        | 07/0742                    | 1007.2      |                              |                             |              | 2.36                          | 5.71                         | 2.1                                    |                 |
| Montauk (MTKN6)<br>(41.05N 71.96W)                            | 07/0706                    | 1002.4      |                              |                             |              | 1.74                          | 2.44                         | 1.5                                    |                 |
| <b>Connecticut</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| New London (NLNC3)<br>(41.36N 72.09W)                         | 07/0712                    | 1003.1      |                              |                             |              | 1.58                          | 2.67                         | 1.5                                    |                 |
| <b>Rhode Island</b>   |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Conimicut Light (CPTR1)<br>(41.72N 71.34W)                    | 07/0800                    | 1002.7      | 07/0930                      |                             | 37<br>(21 m) | 1.57                          |                              |  |                 |
| Newport (NWPR1)<br>(41.51N 71.33W)                            | 07/0724                    | 1001.9      | 07/0942                      |                             | 34<br>(11 m) | 1.53                          | 3.28                         |  |                 |
| Quonset Point (QPTR1)<br>(41.59N 71.41W)                      | 07/0754                    | 1002.3      | 07/0930                      |                             | 34<br>(9 m)  | 1.46                          |                              |  |                 |
| <b>Massachusetts</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| <b>International Civil Aviation Organization (ICAO) Sites</b> |                            |             |                              |                             |              |                               |                              |  |                 |
| Nantucket (KACK)<br>(41.25N 70.06W)                           | 07/0853                    | 996.2       | 07/0953                      | 33                          | 44           |                               |                              |  |                 |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>         |                            |             |                              |                             |              |                               |                              |  |                 |
| Buzzards Bay (BUZM3)<br>(41.40N 71.03W)                       | 07/0800                    | 999.8       | 07/0900                      | 34<br>(25 m, 8-min)         | 38           |                               |                              |  |                 |
| <b>NOS Sites</b>  |                            |             |                              |                             |              |                               |                              |  |                 |
| Nantucket Island (NTKM3)<br>(41.29N 70.10W)                   | 07/0824                    | 996.4       | 07/0912                      |                             | 37<br>(11 m) | 2.06                          |                              | 1.5                                    |                 |
| Woods Hole (BZBM3)<br>(41.52N 70.67W)                         | 07/0812                    | 999.4       |                              |                             |              | 1.61                          | 2.26                         | 1.4                                    |                 |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|-----------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                 |
| <b>Weatherflow</b>  |                            |             |                              |                             |           |                               |                              |  |                 |
| Duxbury (XDUX)<br>(42.06N 70.65W)   | 07/0925                    | 999.9       | 07/1030                      | 35<br>(12 m, 1-min)         | 43        |                               |                              |  |                 |
| Sagamore Beach (XSAG)<br>(41.79N 70.52W)                                    | 07/0650                    | 999.3       | 07/1100                      | 35<br>(8 m, 1-min)          | 44        |                               |                              |  |                 |
| Wellfleet (XWEL)<br>(41.93N 69.98W)   | 07/0941                    | 994.4       | 07/0946                      | 33<br>(6 m, 1-min)          | 43        |                               |                              |  |                 |
| <b>Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites</b> |                            |             |                              |                             |           |                               |                              |  |                 |
| Nantucket 4 WNW (MA-NT-1)<br>(41.29N 70.17W)                                |                            |             |                              |                             |           |                               |                              |  | 3.15            |
| <b>Maine</b>  |                            |             |                              |                             |           |                               |                              |  |                 |
| <b>National Ocean Service (NOS) Sites</b>                                   |                            |             |                              |                             |           |                               |                              |  |                 |
| Eastport (PSBM1)<br>(44.90N 66.98W)   | 07/2100                    | 995.8       | 07/1906                      | 31<br>(14 m)                | 40        | 2.25                          |                              |  |                 |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>                       |                            |             |                              |                             |           |                               |                              |  |                 |
| Desert Rock (MDRM1)<br>(43.97N 68.22W)                                      | 07/1700                    | 997.3       | 07/1620                      | 39<br>(22 m)                | 45        |                               |                              |  |                 |
| <b>Hydrometeorological Automated Data System (HADS)</b>                     |                            |             |                              |                             |           |                               |                              |  |                 |
| Eastport 1 WNW (EPOM1)<br>(44.91N 67.01W)                                   |                            |             |                              |                             |           |                               |                              |  | 3.37            |
| <b>Canada</b>   |                            |             |                              |                             |           |                               |                              |  |                 |
| <b>Meteorological Service of Canada</b>                                     |                            |             |                              |                             |           |                               |                              |  |                 |
| Baccaro Point, NS<br>(43.45N 65.47W)  |                            |             | 07/1600                      | 50                          | 66        |                               |                              |  | 5.17            |
| Beaver Island, NS<br>(44.82N 62.33W)  |                            |             | 07/2100                      | 57                          | 78        |                               |                              |  |                 |
| Belledune, NB<br>(47.90N 65.85W)  |                            |             |                              |                             |           | 2.72                          | 9.22                         |  |                 |
| Brier Island, NS<br>(44.25N 66.39W)   |                            |             |                              |                             | 57        |                               |                              |  |                 |
| Cap-au-Meules, Magdalen Islands, Quebec<br>(47.38N 61.86W)                  |                            |             |                              |                             |           | 4.13                          | 7.71                         |  |                 |
| Caribou Point, NS<br>(45.76N 62.68W)  |                            |             |                              |                             | 64        |                               |                              |  |                 |
| Charlottetown, PEI<br>(46.23N 63.12W)                                       |                            |             |                              |                             |           | 4.95                          | 10.79                        |  |                 |
| Eastpoint, PEI<br>(46.46N 61.99W)   |                            |             | 07/2300                      | 51                          | 65        |                               |                              |  |                 |
| Eskasoni, NS<br>(45.95N 60.6W)  |                            |             |                              |                             | 55        |                               |                              |  |                 |
| Grand Etang, NS<br>(46.55N 61.05W)  |                            |             | 08/0700                      | 43                          | 74        |                               |                              |  |                 |
| Halifax, NS<br>(44.67N 63.58W)  |                            |             |                              |                             |           | 4.66                          | 9.48                         | 2.8                                    |                 |
| Halifax Dockyard, NS<br>(44.66N 63.58W)                                     |                            |             |                              |                             | 58        |                               |                              |  |                 |



| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|-----------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                 |
| Halifax Kootenay, NS<br>(44.59N 63.55W)              |                            |             | 07/1800                      | 50                          | 65        |                               |                              |  |                 |
| Hart Island, NS<br>(45.35N 60.98W)                   |                            |             | 07/2300                      | 48                          | 68        |                               |                              |  |                 |
| Lower Escuminac, NB<br>(47.08N 64.88W)               |                            |             |                              |                             |           | 4.69                          | 8.46                         | 2.9                                    |                 |
| Lunenburg, NS<br>(44.38N 64.32W)                     |                            |             |                              |                             | 55        |                               |                              |  |                 |
| McNabs Island, NS<br>(44.62N 63.54W)                 |                            |             |                              |                             | 54        |                               |                              |  |                 |
| Miscou Island, NB<br>(48.01N 64.49W)                 |                            |             | 08/0300                      | 43                          | 57        |                               |                              |  |                 |
| North Cape, PEI<br>(47.06N 64.00W)                   |                            |             | 08/0100                      | 49                          | 66        |                               |                              |  |                 |
| North Lake, PEI<br>(46.47N 62.07W)                   |                            |             |                              |                             |           | 2.62                          | 11.91                        |  |                 |
| North Mountain, NS<br>(45.10N 64.75W)                |                            |             |                              |                             | 58        |                               |                              |  |                 |
| North Sydney, NS<br>(46.22N 60.25W)                  |                            |             |                              |                             |           | 1.71                          | 5.25                         |  |                 |
| Oxford, NS<br>(45.74N 63.87W)                        |                            |             |                              |                             |           |                               |                              |  | 5.43            |
| Port Hawkesbury, NS<br>(45.62N 61.37W)               |                            |             |                              |                             |           | 3.48                          | 7.28                         |  |                 |
| Saint John, NB<br>(45.32N 65.89W)                    |                            |             | 08/0000                      | 32                          | 55        |                               |                              |  | 3.23            |
| Shearwater Jetty, NS<br>(44.64N 63.51W)              |                            |             |                              |                             | 55        |                               |                              |  |                 |
| Shediac, NB<br>(46.22N 64.55W)                       |                            |             |                              |                             |           | 6.50                          | 10.53                        | 4.9                                    |                 |
| Sluce Point, NS<br>(43.79N 65.97W)                   |                            |             |                              |                             | 77        |                               |                              |  |                 |
| Stanhope, PEI<br>(46.42N 63.08W)                     |                            |             | 07/2200                      | 30                          | 50        |                               |                              |  |                 |
| St. Peters, PEI<br>(46.45N 62.58W)                   |                            |             |                              | 31                          | 53        |                               |                              |  |                 |
| Summerside, PEI<br>(46.44N 63.84W)                   |                            |             | 08/0000                      | 46                          | 63        |                               |                              |  | 3.54            |
| Summerside, PEI<br>(46.39N 63.79W)                   |                            |             |                              |                             |           | 2.76                          | 12.47                        |  |                 |
| Tignish, PEI<br>(46.95N 64.00W)                      |                            |             |                              |                             |           | 3.94                          | 17.16                        |  |                 |
| Tracadie, NS<br>(45.63N 61.66W)                      |                            |             |                              |                             | 51        |                               |                              |  |                 |
| Yarmouth, NS<br>(43.83N 66.12W)                      |                            |             | 07/1900                      | 40                          | 70        | 2.00                          | 14.90                        |  |                 |
| <b>Nav Canada</b>                                    |                            |             |                              |                             |           |                               |                              |  |                 |
| Charlottetown Airport, PEI<br>(CYYG) (46.29N 63.12W) |                            |             | 07/2100                      | 37                          | 55        |                               |                              |  |                 |
| Greenwood, NS (CZXX)<br>(44.98N 64.92W)              |                            |             |                              |                             | 50        |                               |                              |  | 3.23            |
| Halifax International Airport,<br>NS (44.88N 63.51W) |                            |             |                              |                             | 54        |                               |                              |  |                 |



| Location                                   | Minimum Sea Level Pressure |                    | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) |
|--|----------------------------|--------------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|-----------------|
|  | Date/time (UTC)            | Press. (mb)        | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                 |
| Moncton, NB (CYQM)<br>(46.11N 64.68W)      |                            |                    | 07/2300                      | 38                          | 54              |                               |                              |  | 4.76            |
| Sydney Airport, NS<br>(46.17N 60.05W)      |                            |                    |                              |                             | 56              |                               |                              |  |                 |
| <b>Other/Public</b>                        |                            |                    |                              |                             |                 |                               |                              |  |                 |
| Colpitts Selltement, NB<br>(45.98N 64.97W) |                            |                    | 08/0003                      | 42 <sup>l</sup>             |                 |                               |                              |  |                 |
| Grand Etang, NS<br>(46.55N 61.05W)         | 07/1950                    | 991.9 <sup>l</sup> | 07/1850                      | 44 <sup>l</sup>             | 72 <sup>l</sup> |                               |                              |  |                 |
| Henry Island, NS<br>(45.98N 61.60W)        | 07/1858                    | 990.2 <sup>l</sup> | 07/1858                      | 43 <sup>l</sup>             | 65 <sup>l</sup> |                               |                              |  |                 |
| Lower Sackville, NS<br>(44.8N 63.7W)       | 08/0018                    | 973 <sup>l</sup>   | 08/0018                      | 54 <sup>l</sup><br>(7 m)    |                 |                               |                              |  | 5.43            |
| St. Joseph du Moine, NS<br>(46.53N 61.05W) | 07/1915                    | 994.6 <sup>l</sup> | 07/1915                      | 45                          | 71              |                               |                              |  |                 |

- <sup>a</sup> Date/time is for sustained wind when both sustained and gust are listed.
- <sup>b</sup> Except as noted, sustained wind averaging periods for C-MAN and land-based reports are 2 min; buoy averaging periods are 8 min.
- <sup>c</sup> Storm surge is water height above normal astronomical tide level.
- <sup>d</sup> For most locations, storm tide is water height above the North American Vertical Datum of 1988 (NAVD88). Storm tide is water height above Lower Low Water Large Tide (LLWLT) for Canadian stations.
- <sup>e</sup> Estimated inundation is the maximum height of water above ground. For some USGS storm tide pressure sensors, inundation is estimated by subtracting the elevation of the sensor from the recorded storm tide. For other USGS storm tide sensors and USGS high-water marks, inundation is estimated by subtracting the elevation of the land derived from a Digital Elevation Model (DEM) from the recorded and measured storm tide. For NOS tide gauges, The height of the water above Mean Higher High Water (MHHW) is used as a proxy for inundation for NOS tide gauges, and Higher High Water Large Tide (HHWLT) for Canadian gauges.

Table 4. Number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the “Low” category do not include forecasts of a 0% chance of genesis.

|                  | Hours Before Genesis |                  |
|------------------|----------------------|------------------|
|                  | 48-Hour Outlook      | 120-Hour Outlook |
| Low (<40%)       | 18                   | 18               |
| Medium (40%-60%) | 12                   | 12               |
| High (>60%)      | 0                    | 6                |

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Dorian. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

|                | Forecast Period (h) |             |             |             |             |              |              |
|----------------|---------------------|-------------|-------------|-------------|-------------|--------------|--------------|
|                | 12                  | 24          | 36          | 48          | 72          | 96           | 120          |
| OFCL           | <b>14.3</b>         | <b>27.0</b> | <b>38.9</b> | <b>49.5</b> | <b>70.6</b> | <b>109.4</b> | <b>159.7</b> |
| OCD5           | 28.0                | 67.8        | 116.8       | 164.1       | 269.4       | 386.3        | 471.2        |
| Forecasts      | 55                  | 53          | 51          | 49          | 45          | 41           | 37           |
| OFCL (2014-18) | 23.6                | 35.5        | 47.0        | 61.8        | 96.0        | 136.0        | 179.6        |
| OCD5 (2014-18) | 44.8                | 97.6        | 157.4       | 220.1       | 340.7       | 446.6        | 536.6        |

Table 5b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Dorian. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 5a due to the homogeneity requirement.

| Model ID  | Forecast Period (h) |             |             |             |             |             |              |
|-----------|---------------------|-------------|-------------|-------------|-------------|-------------|--------------|
|           | 12                  | 24          | 36          | 48          | 72          | 96          | 120          |
| OFCL      | 14.8                | 27.1        | 38.4        | 48.8        | 66.5        | 71.3        | 102.2        |
| OCD5      | 28.8                | 68.9        | 120.1       | 170.2       | 284.0       | 402.2       | 548.4        |
| GFSI      | 16.7                | 31.2        | 47.9        | 63.3        | 86.2        | 117.7       | 172.9        |
| HMNI      | 23.5                | 42.7        | 61.2        | 80.8        | 113.8       | 91.3        | 130.8        |
| HWFI      | 19.2                | 36.0        | 50.9        | 65.8        | 95.6        | 135.1       | 212.8        |
| EGRI      | 16.2                | 29.8        | <b>38.1</b> | <b>42.7</b> | <b>48.9</b> | 71.4        | 121.8        |
| EMXI      | 16.7                | 28.1        | 41.2        | 54.3        | 69.2        | <b>63.8</b> | <b>93.5</b>  |
| CMCI      | 19.9                | 35.8        | 53.3        | 72.2        | 109.1       | 94.3        | 172.0        |
| NVGI      | 20.4                | 36.5        | 47.3        | 57.9        | 85.7        | 110.5       | 175.0        |
| CTCI      | 17.1                | 31.3        | 46.8        | 57.4        | 79.6        | 82.4        | 115.7        |
| AEMI      | 17.4                | 33.0        | 49.5        | 65.7        | 95.7        | 120.1       | 164.1        |
| HCCA      | 16.0                | 27.6        | 39.2        | 49.3        | 66.9        | <b>67.9</b> | <b>101.5</b> |
| FSSE      | 15.2                | <b>26.2</b> | <b>37.7</b> | <b>45.7</b> | <b>60.3</b> | 82.5        | 123.2        |
| TVCX      | 15.0                | 27.1        | <b>38.0</b> | <b>48.2</b> | <b>63.9</b> | <b>60.5</b> | <b>94.6</b>  |
| GFEX      | 15.0                | 27.7        | 41.4        | 54.4        | 70.5        | 78.3        | 115.0        |
| TVCA      | 14.8                | 27.5        | 38.7        | <b>48.4</b> | <b>64.2</b> | <b>62.9</b> | <b>98.8</b>  |
| TVDG      | <b>14.5</b>         | <b>26.6</b> | <b>37.3</b> | <b>45.5</b> | <b>60.9</b> | <b>63.3</b> | <b>97.6</b>  |
| TABD      | 19.2                | 39.2        | 65.6        | 94.8        | 172.7       | 265.1       | 345.6        |
| TABM      | 22.5                | 43.0        | 59.9        | 74.3        | 106.2       | 158.6       | 264.1        |
| TABS      | 30.4                | 63.8        | 92.1        | 115.4       | 180.7       | 244.2       | 348.8        |
| Forecasts | 41                  | 41          | 40          | 39          | 34          | 25          | 20           |





Table 6a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Dorian. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

|                | Forecast Period (h) |      |      |      |      |      |      |
|----------------|---------------------|------|------|------|------|------|------|
|                | 12                  | 24   | 36   | 48   | 72   | 96   | 120  |
| OFCL           | 6.6                 | 10.7 | 13.1 | 14.3 | 17.8 | 25.7 | 38.9 |
| OCD5           | 8.7                 | 15.3 | 21.7 | 25.4 | 30.4 | 45.0 | 54.1 |
| Forecasts      | 55                  | 53   | 51   | 49   | 45   | 41   | 37   |
| OFCL (2014-18) | 5.3                 | 7.9  | 9.9  | 11.2 | 13.3 | 14.4 | 14.2 |
| OCD5 (2014-18) | 6.9                 | 10.9 | 14.3 | 17.4 | 20.9 | 22.0 | 22.8 |



Table 6b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Dorian. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 6a due to the homogeneity requirement.

| Model ID  | Forecast Period (h) |      |             |             |             |             |             |
|-----------|---------------------|------|-------------|-------------|-------------|-------------|-------------|
|           | 12                  | 24   | 36          | 48          | 72          | 96          | 120         |
| OFCL      | 7.0                 | 11.7 | 14.2        | 15.2        | 18.6        | 22.1        | 28.5        |
| OCD5      | 9.4                 | 15.9 | 22.0        | 24.9        | 32.5        | 48.5        | 55.2        |
| DSHP      | 9.4                 | 14.2 | 16.9        | 18.7        | 21.9        | 23.6        | 41.4        |
| LGEM      | 9.2                 | 14.3 | 16.8        | 18.6        | 19.8        | <b>17.1</b> | 35.8        |
| ICON      | 8.5                 | 12.8 | 15.5        | 17.0        | 19.2        | 23.3        | 37.0        |
| IVCN      | 8.7                 | 13.1 | 15.5        | 16.4        | 18.7        | 22.4        | 32.9        |
| IVDR      | 8.6                 | 13.1 | 16.2        | 18.1        | 20.8        | 25.0        | 33.9        |
| EMXI      | 11.1                | 16.8 | 21.3        | 24.0        | 30.6        | 32.5        | 41.6        |
| CTCI      | 9.9                 | 15.8 | 17.3        | 17.1        | 19.7        | <b>19.7</b> | <b>19.3</b> |
| FSSE      | 8.4                 | 12.1 | <b>14.0</b> | <b>14.7</b> | <b>15.9</b> | <b>19.7</b> | <b>24.2</b> |
| HMNI      | 8.9                 | 13.9 | 17.5        | 21.0        | 30.4        | 40.4        | 46.2        |
| HWFI      | 9.8                 | 14.5 | 18.4        | 20.4        | 21.9        | 30.1        | 35.4        |
| HCCA      | 8.2                 | 12.5 | 14.4        | <b>14.7</b> | <b>18.5</b> | 23.7        | 30.2        |
| GFSI      | 10.3                | 15.9 | 22.7        | 27.3        | 34.0        | 33.4        | 45.5        |
| Forecasts | 44                  | 44   | 42          | 41          | 36          | 29          | 24          |

Table 7. Wind watch and warning summary for 24 August–7 September 2019.

| <b>Date/Time (UTC)</b> | <b>Action</b>  | <b>Location</b>              |
|------------------------|--|------------------------------|
| 25 / 0900              | Tropical Storm Watch issued                            | Barbados                     |
| 25 / 1500              | Tropical Storm Watch changed to Tropical Storm Warning | Barbados                     |
| 25 / 1500              | Tropical Storm Watch issued                            | St. Vincent, Grenadines      |
| 25 / 1500              | Tropical Storm Watch issued                            | St. Lucia                    |
| 25 / 2100              | Tropical Storm Watch changed to Tropical Storm Warning | St. Vincent, Grenadines      |
| 25 / 2100              | Tropical Storm Watch changed to Tropical Storm Warning | St. Lucia                    |
| 25 / 2100              | Tropical Storm Watch issued                            | Martinique                   |
| 25 / 2100              | Tropical Storm Watch issued                            | Grenada and its dependencies |
| 26 / 0300              | Tropical Storm Watch issued                            | Dominica                     |
| 26 / 0900              | Tropical Storm Watch issued                            | Saba and St. Eustatius       |
| 26 / 1500              | Tropical Storm Watch changed to Tropical Storm Warning | Martinique                   |
| 26 / 1500              | Hurricane Watch issued                                 | St. Lucia                    |
| 26 / 2100              | Tropical Storm Watch issued                            | Puerto Rico                  |
| 27 / 0300              | Hurricane Watch changed to Tropical Storm Warning      | St. Lucia                    |
| 27 / 0600              | Tropical Storm Warning discontinued                    | Barbados                     |
| 27 / 0900              | Tropical Storm Watch changed to Tropical Storm Warning | Puerto Rico                  |



| <b>Date/Time (UTC)</b> | <b>Action</b>                                   | <b>Location</b>  |
|------------------------|---|--|
| <b>27 / 0900</b>       | Tropical Storm Watch changed to Hurricane Watch | Puerto Rico  |
| <b>27 / 0900</b>       | Tropical Storm Watch issued                     | Punta Palenque to Isla Saona and from Samana to Puerto Plata |
| <b>27 / 0900</b>       | Hurricane Watch issued                          | Isla Saona to Samana   |
| <b>27 / 1200</b>       | Tropical Storm Warning discontinued             | St. Lucia  |
| <b>27 / 1500</b>       | Tropical Storm Watch discontinued               | Grenada and its dependencies                                 |
| <b>27 / 1500</b>       | Tropical Storm Warning discontinued             | St. Vincent and Grenadines                                   |
| <b>27 / 1500</b>       | Tropical Storm Warning issued                   | Isla Saona to Samana   |
| <b>27 / 1800</b>       | Tropical Storm Watch discontinued               | Dominica   |
| <b>27 / 1800</b>       | Tropical Storm Warning discontinued             | Martinique   |
| <b>27 / 2100</b>       | Tropical Storm Watch discontinued               | Saba and St. Eustatius                                       |
| <b>27 / 2100</b>       | Tropical Storm Warning issued                   | United States Virgin Islands                                 |
| <b>28 / 0000</b>       | Tropical Storm Watch discontinued               | Punta Palenque to Isla Saona                                 |
| <b>28 / 0000</b>       | Hurricane Watch discontinued                    | Isla Saona to Samana   |
| <b>28 / 0300</b>       | Tropical Storm Watch modified to                | Isla Saona to Puerto Plata                                   |
| <b>28 / 0300</b>       | Tropical Storm Warning discontinued             | Isla Saona to Samana   |



| <b>Date/Time (UTC)</b> | <b>Action</b>  | <b>Location</b>                       |
|------------------------|--|---------------------------------------|
| <b>28 / 0300</b>       | Tropical Storm Warning issued                          | British Virgin Islands                |
| <b>28 / 0900</b>       | Tropical Storm Warning changed to Hurricane Watch      | U.S. Virgin Islands                   |
| <b>28 / 1200</b>       | Tropical Storm Watch modified to                       | Isla Saona to Samana                  |
| <b>28 / 1500</b>       | Tropical Storm Warning changed to Hurricane Warning    | British Virgin Islands                |
| <b>28 / 1500</b>       | Hurricane Watch changed to Hurricane Warning           | British Virgin Islands                |
| <b>28 / 1800</b>       | Tropical Storm Watch discontinued                      | All                                   |
| <b>29 / 0000</b>       | Tropical Storm Warning discontinued                    | All                                   |
| <b>29 / 0000</b>       | Hurricane Watch discontinued                           | All                                   |
| <b>29 / 0000</b>       | Hurricane Warning discontinued                         | All                                   |
| <b>30 / 0900</b>       | Hurricane Watch issued                                 | Northwestern Bahamas                  |
| <b>30 / 2100</b>       | Hurricane Watch changed to Hurricane Warning           | Northwestern Bahamas                  |
| <b>30 / 2100</b>       | Hurricane Watch issued                                 | Andros                                |
| <b>31 / 2100</b>       | Tropical Storm Watch issued                            | Deerfield Beach to Sebastian Inlet    |
| <b>01 / 0900</b>       | Tropical Storm Watch changed to Tropical Storm Warning | Deerfield Beach to Sebastian Inlet    |
| <b>01 / 0900</b>       | Tropical Storm Watch issued                            | Golden Beach to Deerfield Beach       |
| <b>01 / 1500</b>       | Hurricane Watch issued                                 | Deerfield Beach to Volusia/Brevard CL |



| Date/Time (UTC) | Action  | Location                                |
|-----------------|---|---|
| 01 / 2100       | Tropical Storm Warning modified to                | Deerfield Beach to Jupiter Inlet        |
| 01 / 2100       | Hurricane Watch modified to                       | Deerfield Beach to Jupiter Inlet        |
| 01 / 2100       | Hurricane Warning issued                          | Jupiter Inlet to Volusia/Brevard CL     |
| 02 / 0300       | Hurricane Watch modified to                       | Volusia/Brevard CL to FL/GA border      |
| 02 / 0900       | Hurricane Watch discontinued                      | Andros                                  |
| 02 / 0900       | Hurricane Warning discontinued                    | Northwestern Bahamas                    |
| 02 / 0900       | Hurricane Warning issued                          | Grand Bahama and Abacos                 |
| 02 / 1500       | Hurricane Watch discontinued                      | Volusia/Brevard CL to FL/GA border      |
| 02 / 1500       | Hurricane Watch issued                            | Flagler/Volusia CL to Altamaha Sound    |
| 02 / 1500       | Hurricane Warning modified to                     | Jupiter Inlet to Flagler/Volusia CL     |
| 02 / 2100       | Hurricane Watch discontinued                      | Flagler/Volusia CL to Altamaha Sound    |
| 02 / 2100       | Hurricane Watch issued                            | Ponte Vedra Beach to South Santee River |
| 02 / 2100       | Hurricane Warning modified to                     | Jupiter Inlet to Ponte Vedra Beach      |
| 03 / 0900       | Tropical Storm Warning issued                     | Ponte Vedra Beach to Altamaha Sound     |
| 03 / 1500       | Hurricane Watch changed to Tropical Storm Warning | Deerfield Beach to Jupiter Inlet        |
| 03 / 1500       | Tropical Storm Watch discontinued                 | All                                     |
| 03 / 1500       | Tropical Storm Warning modified to                | Ponte Vedra Beach to Edisto Beach       |
| 03 / 1500       | Hurricane Watch modified to                       | Ponte Vedra Beach to Edisto Beach       |



| <b>Date/Time (UTC)</b> | <b>Action</b>                                       | <b>Location</b>                         |
|------------------------|---|---|
| <b>03 / 1500</b>       | Hurricane Warning issued                            | Edisto Beach to South Santee River      |
| <b>03 / 1800</b>       | Hurricane Warning changed to Tropical Storm Warning | Grand Bahamas and Abaco                 |
| <b>03 / 2100</b>       | Tropical Storm Watch issued                         | NC/VA border to Chincoteague            |
| <b>03 / 2100</b>       | Tropical Storm Warning modified to                  | Jupiter Inlet to Sebastian Inlet        |
| <b>03 / 2100</b>       | Tropical Storm Warning modified to                  | Ponte Vedra Beach to Savannah River     |
| <b>03 / 2100</b>       | Hurricane Watch modified to                         | Ponte Vedra Beach to Savannah River     |
| <b>03 / 2100</b>       | Hurricane Watch discontinued                        | South Santee River to Duck              |
| <b>03 / 2100</b>       | Hurricane Watch issued                              | Surf City to NC/VA border               |
| <b>03 / 2100</b>       | Hurricane Warning modified to                       | Sebastian Inlet to Ponte Vedra Beach    |
| <b>03 / 2100</b>       | Hurricane Warning discontinued                      | Edisto Beach to South Santee River      |
| <b>03 / 2100</b>       | Hurricane Warning issued                            | Savannah River to Surf City             |
| <b>04 / 0900</b>       | Tropical Storm Warning modified to                  | Sebastian Inlet to Volusia/Brevard CL   |
| <b>04 / 0900</b>       | Tropical Storm Warning discontinued                 | Grand Bahama and Abaco                  |
| <b>04 / 0900</b>       | Hurricane Warning modified to                       | Volusia/Brevard CL to Ponte Vedra Beach |
| <b>04 / 1500</b>       | Tropical Storm Warning changed to Hurricane Watch   | Ponte Vedra Beach to Savannah River     |
| <b>04 / 1500</b>       | Tropical Storm Warning modified to                  | Volusia/Brevard CL to Savannah River    |



| Date/Time (UTC) | Action   | Location                                |
|-----------------|--|---|
| 04 / 1500       | Hurricane Watch discontinued                           | Surf City to NC/VA border               |
| 04 / 1500       | Hurricane Warning discontinued                         | Volusia/Brevard CL to Ponte Vedra Beach |
| 04 / 1500       | Hurricane Warning modified to                          | Savannah River to NC/VA border          |
| 04 / 2100       | Tropical Storm Watch changed to Tropical Storm Warning | NC/VA border to Chincoteague            |
| 04 / 2100       | Tropical Storm Watch issued                            | Chincoteague to Fenwick Island          |
| 04 / 2100       | Tropical Storm Warning modified to                     | Flagler/Volusia CL to Savannah River    |
| 05 / 0300       | Tropical Storm Warning modified to                     | FL/GA border to Savannah River          |
| 05 / 0300       | Hurricane Watch modified to                            | FL/GA border to Savannah River          |
| 05 / 0900       | Tropical Storm Watch issued                            | Woods Hole to Sagamore Beach            |
| 05 / 0900       | Tropical Storm Watch issued                            | Martha's Vineyard                       |
| 05 / 0900       | Tropical Storm Watch issued                            | Nantucket                               |
| 05 / 0900       | Tropical Storm Warning modified to                     | Altamaha Sound to Savannah River        |
| 05 / 0900       | Hurricane Watch discontinued                           | All                                     |
| 05 / 1500       | Tropical Storm Watch discontinued                      | Chincoteague to Fenwick Island          |
| 05 / 1500       | Tropical Storm Warning modified to                     | NC/VA border to Fenwick Island          |
| 05 / 1800       | Tropical Storm Warning discontinued                    | Altamaha Sound to Savannah River        |





| <b>Date/Time (UTC)</b> | <b>Action</b>  | <b>Location</b>                          |
|------------------------|--|--|
| <b>05 / 2100</b>       | Tropical Storm Watch changed to Tropical Storm Warning | Woods Hole to Sagamore Beach             |
| <b>05 / 2100</b>       | Tropical Storm Watch changed to Tropical Storm Warning | Martha's Vineyard                        |
| <b>05 / 2100</b>       | Tropical Storm Watch changed to Tropical Storm Warning | Nantucket                                |
| <b>05 / 2100</b>       | Tropical Storm Warning issued                          | Savannah River to Edisto Beach           |
| <b>05 / 2100</b>       | Hurricane Warning modified to                          | Edisto Beach to NC/VA border             |
| <b>06 / 0000</b>       | Tropical Storm Warning modified to                     | Edisto Beach to South Santee River       |
| <b>06 / 0000</b>       | Hurricane Warning modified to                          | South Santee River to NC/VA border       |
| <b>06 / 0300</b>       | Tropical Storm Watch issued                            | Prince Edward Island                     |
| <b>06 / 0300</b>       | Tropical Storm Watch issued                            | Magdalen Islands                         |
| <b>06 / 0300</b>       | Tropical Storm Watch issued                            | Fundy National Park to Shediac           |
| <b>06 / 0300</b>       | Tropical Storm Watch issued                            | Francois to Boat Harbour                 |
| <b>06 / 0300</b>       | Tropical Storm Warning discontinued                    | Edisto Beach to South Santee River       |
| <b>06 / 0300</b>       | Hurricane Watch issued                                 | Nova Scotia                              |
| <b>06 / 0900</b>       | Tropical Storm Warning issued                          | South Santee River to Little River Inlet |
| <b>06 / 0900</b>       | Hurricane Warning modified to                          | Little River Inlet to NC/VA border       |
| <b>06 / 1200</b>       | Tropical Storm Warning discontinued                    | South Santee River to Little River Inlet |
| <b>06 / 1200</b>       | Hurricane Warning modified to                          | Surf City to NC/VA border                |



| <b>Date/Time (UTC)</b> | <b>Action</b>  | <b>Location</b>                            |
|------------------------|--|--|
| <b>06 / 1500</b>       | Tropical Storm Warning issued                          | Bar Harbor to Eastport                     |
| <b>06 / 1500</b>       | Hurricane Warning modified to                          | Bogue Inlet to NC/VA border                |
| <b>06 / 1800</b>       | Tropical Storm Watch changed to Tropical Storm Warning | Prince Edward Island                       |
| <b>06 / 1800</b>       | Tropical Storm Watch changed to Hurricane Watch        | Prince Edward Island                       |
| <b>06 / 1800</b>       | Tropical Storm Watch changed to Hurricane Watch        | Magdalen Islands                           |
| <b>06 / 1800</b>       | Tropical Storm Watch modified to                       | Parson's Pond to Boat Harbour              |
| <b>06 / 1800</b>       | Tropical Storm Watch issued                            | Indian Harbour to Stone's Cove             |
| <b>06 / 1800</b>       | Tropical Storm Warning issued                          | Western Nova Scotia to Western Nova Scotia |
| <b>06 / 1800</b>       | Hurricane Watch discontinued                           | Nova Scotia                                |
| <b>06 / 1800</b>       | Hurricane Watch issued                                 | Western Nova Scotia to Western Nova Scotia |
| <b>06 / 1800</b>       | Hurricane Watch issued                                 | Parson's Pond to Indian Harbour            |
| <b>06 / 1800</b>       | Hurricane Warning issued                               | Eastern Nova Scotia                        |
| <b>06 / 2100</b>       | Tropical Storm Watch modified to                       | Parson's Pond to Triton                    |
| <b>06 / 2100</b>       | Hurricane Warning discontinued                         | Bogue Inlet to NC/VA border                |
| <b>07 / 0000</b>       | Tropical Storm Warning discontinued                    | NC/VA border to Fenwick Island             |
| <b>07 / 0300</b>       | Tropical Storm Watch changed to Tropical Storm Warning | Fundy National Park to Shediac             |



| Date/Time (UTC) | Action   | Location                                   |
|-----------------|--|--|
| 07 / 0900       | Tropical Storm Watch changed to Tropical Storm Warning | Indian Harbour to Stone's Cove             |
| 07 / 0900       | Hurricane Watch changed to Tropical Storm Warning      | Western Nova Scotia to Western Nova Scotia |
| 07 / 0900       | Tropical Storm Watch discontinued                      | All  |
| 07 / 0900       | Tropical Storm Warning issued                          | Magdalen Islands                           |
| 07 / 0900       | Tropical Storm Warning issued                          | Hawke's Bay to Fogo Island                 |
| 07 / 0900       | Tropical Storm Warning issued                          | Mutton Bay to Mary's Harbour               |
| 07 / 0900       | Hurricane Watch discontinued                           | Parson's Pond to Indian Harbour            |
| 07 / 0900       | Hurricane Warning issued                               | Indian Harbour to Hawke's Bay              |
| 07 / 1500       | Tropical Storm Warning discontinued                    | Woods Hole to Sagamore Beach               |
| 07 / 1500       | Tropical Storm Warning discontinued                    | Martha's Vineyard                          |
| 07 / 1500       | Tropical Storm Warning discontinued                    | Nantucket                                  |
| 08 / 0000       | Tropical Storm Warning discontinued                    | Bar Harbor to Eastport                     |
| 08 / 0900       | Hurricane Watch changed to Tropical Storm Warning      | Prince Edward Island                       |
| 08 / 0900       | Tropical Storm Warning discontinued                    | Western Nova Scotia to Western Nova Scotia |
| 08 / 0900       | Tropical Storm Warning discontinued                    | Fundy National Park to Shediac             |



| <b>Date/Time (UTC)</b> | <b>Action</b>                       | <b>Location</b>                |
|------------------------|-------------------------------------|--------------------------------|
| <b>08 / 1500</b>       | Tropical Storm Warning discontinued | Prince Edward Island           |
| <b>08 / 1500</b>       | Tropical Storm Warning discontinued | Magdalen Islands               |
| <b>08 / 1500</b>       | Hurricane Watch discontinued        | All                            |
| <b>08 / 1500</b>       | Hurricane Warning discontinued      | Eastern Nova Scotia            |
| <b>08 / 2100</b>       | Tropical Storm Warning discontinued | Indian Harbour to Stone's Cove |
| <b>08 / 2100</b>       | Tropical Storm Warning modified to  | Cape Anguille to Fogo Island   |
| <b>08 / 2100</b>       | Hurricane Warning discontinued      | All                            |
| <b>09 / 0300</b>       | Tropical Storm Warning discontinued | All                            |

Table 8. Storm Surge watch and warning summary for Hurricane Dorian, 24 August–7 September 2019.

| <b>Date/Time (UTC)</b> | <b>Action</b>                             | <b>Location</b>   |
|------------------------|---|---|
| <b>01 / 1500</b>       | Storm Surge Watch issued                  | North of Deerfield Beach to Volusia/Brevard County Line               |
| <b>01 / 2100</b>       | Storm Surge Warning issued                | Lantana to Volusia/Brevard County Line                                |
| <b>01 / 2100</b>       | Storm Surge Watch issued                  | Lantana to Volusia/Brevard County Line to Flagler/Volusia County Line |
| <b>02 / 0300</b>       | Storm Surge Watch extended northward      | Flagler/Volusia County Line to Mouth of St. Mary's river              |
| <b>02 / 1500</b>       | Storm Surge Warning extended northward to | Flagler/Volusia County Line   |
| <b>02 / 1500</b>       | Storm Surge Watch extended northward to   | Savannah River  |
| <b>02 / 2100</b>       | Storm Surge Warning extended northward to | Altamaha Sound Georgia  |
| <b>02 / 2100</b>       | Storm Surge Watch extended northward to   | South Santee River SC   |
| <b>03 / 0300</b>       | Storm Surge Warning extended northward to | Savannah River  |
| <b>03 / 1500</b>       | Storm Surge Warning extended northward to | South Santee River SC   |
| <b>03 / 1500</b>       | Storm Surge Watch extended northward to   | Cape Lookout NC   |
| <b>03 / 1500</b>       | Storm Surge Watch discontinued            | South of Lantana FL   |
| <b>03 / 2100</b>       | Storm Surge Warning extended northward to | Surf City NC  |



| Date/Time (UTC) | Action                                    | Location  |
|-----------------|---|---|
| 03 / 2100       | Storm Surge Watch extended northward to   | Duck NC, including the Pamlico and Albemarle Sounds and the Neuse and Pamlico Rivers  |
| 04 / 0300       | Storm Surge Warning extended northward    | from Duck NC to Poquoson VA, including Hampton Roads                                  |
| 04 / 0600       | Storm Surge discontinued                  | South of Sebastien Inlet  |
| 04 / 1500       | Storm Surge Warning extended northward to | NC/VA border, including Albemarle and Pamlico Sounds and the Neuse and Pamlico Rivers |
| 04 / 1500       | Storm Surge discontinued from             | Port Canaveral, Florida southward   |
| 04/ 2100        | Storm Surge Warning extended northward to | Poquoson, Virginia, including Hampton Roads   |
| 05 / 0900       | Storm Surge Warning discontinued south of | Poquoson, Virginia, including Hampton Roads   |
| 05 / 0900       | Storm Surge Warning discontinued          | South of Savannah River   |
| 05 / 1500       | Storm Surge Warning discontinued          | South of Edisto Beach SC  |
| 05 / 1500       | Storm Surge Warning discontinued          | South of South Santee River SC  |
| 05 / 2100       | Storm Surge Warning discontinued          | South of Little River Inlet   |
| 06 / 0000       | Storm Surge Warning discontinued          | West of Cape Fear   |
| 06 / 0600       | Storm Surge Warning discontinued          | South of Wrightsville Beach NC  |
| 06 / 0900       | Storm Surge Warning discontinued          | South of Surf City NC   |
| 06 / 1200       | Storm Surge Warning discontinued          | South of Salter Path NC   |
| 06/1800         | Storm Surge Warning discontinued          | Pamlico and Neuse Rivers  |



| <b>Date/Time<br/>(UTC)</b> | <b>Action</b>                    | <b>Location</b>       |
|----------------------------|----------------------------------|-----------------------|
| <b>06 / 2100</b>           | Storm Surge Warning discontinued | North of NC/VA border |
| <b>07 / 0000</b>           | Storm Surge Warning discontinued | All                   |

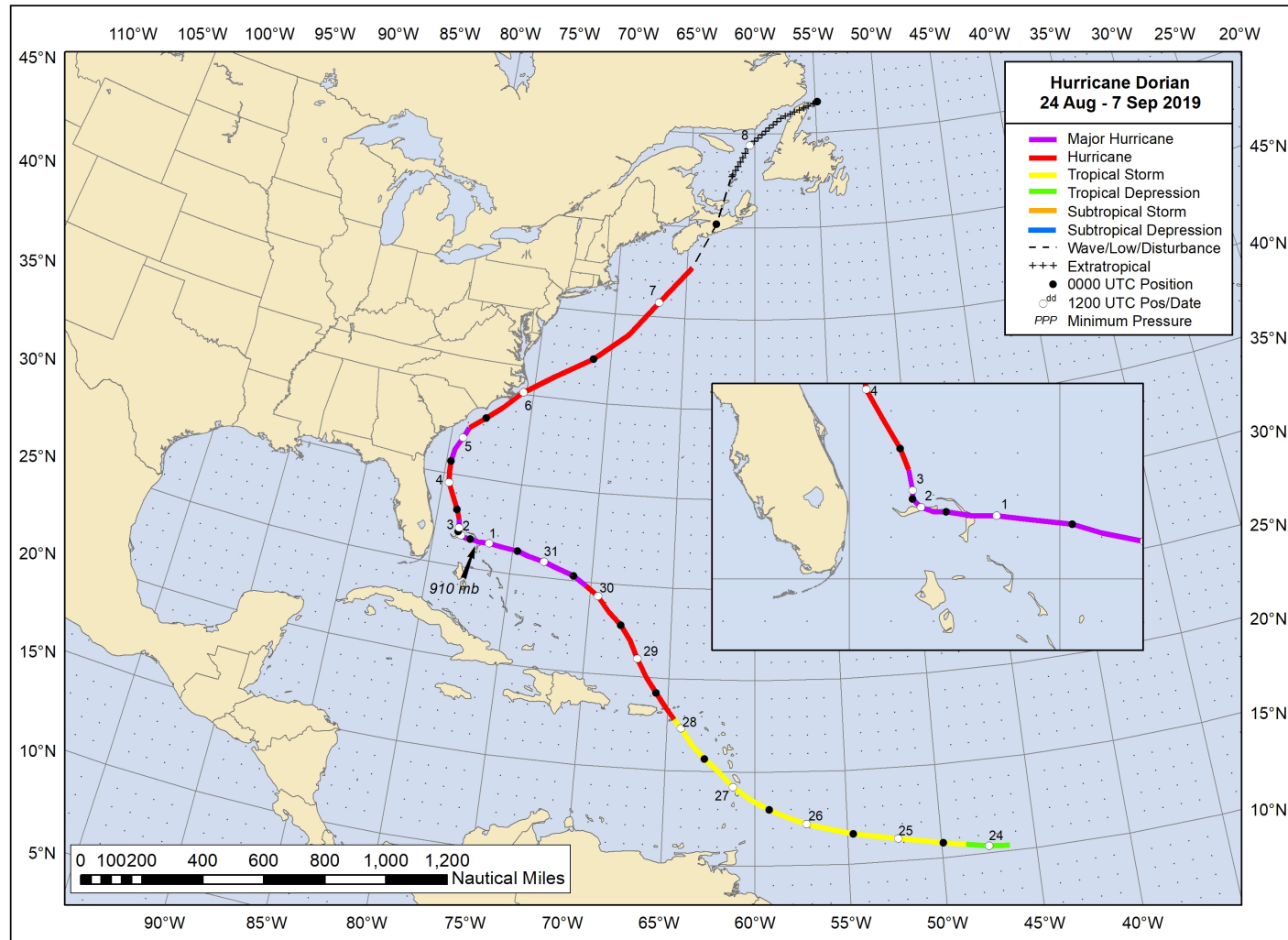


Figure 1. Best track positions for Hurricane Dorian, 24 August–7 September 2019.



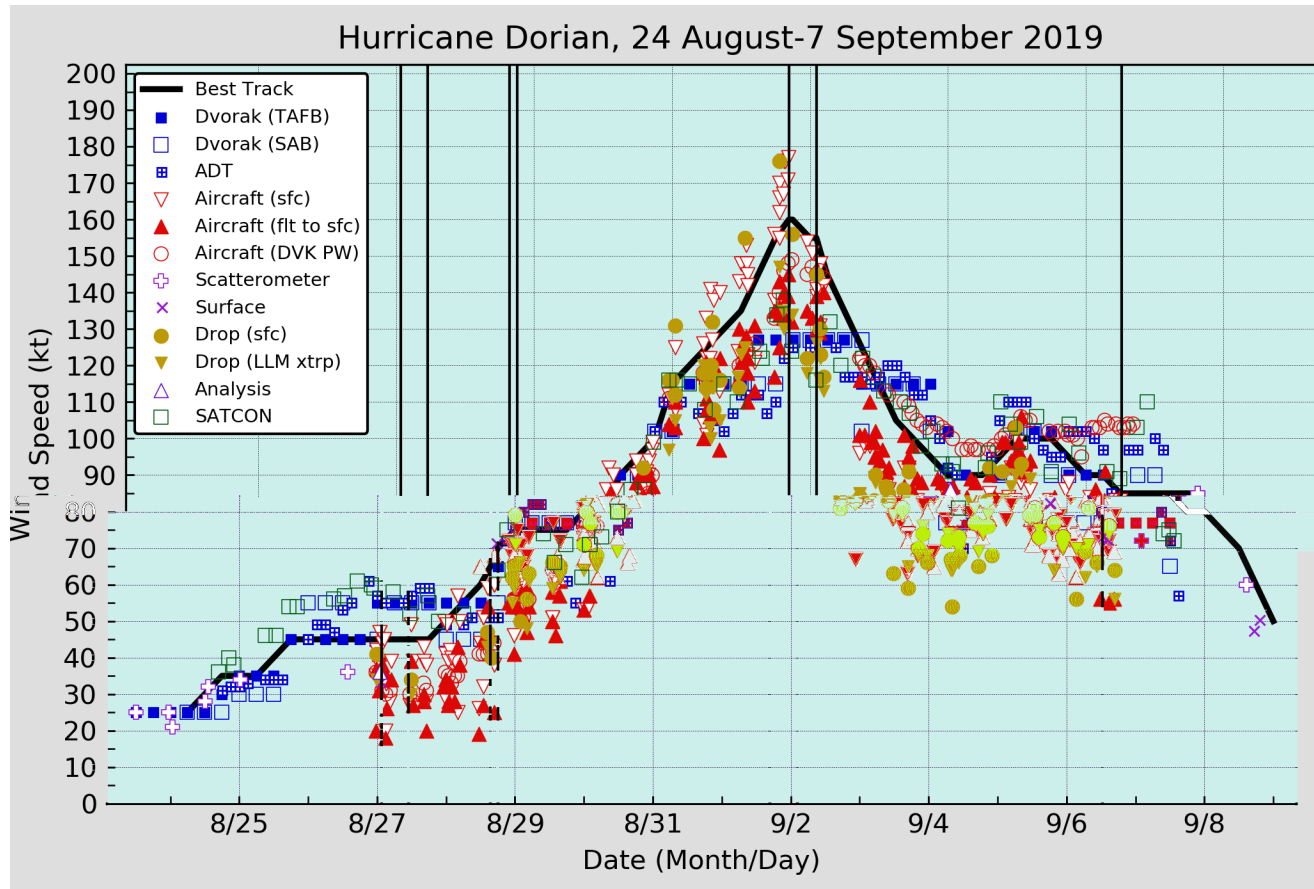


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Dorian 24 August–7 September 2019. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Dropwindsonde observations include actual 10 m winds (sfc), as well as surface estimates derived from the mean wind over the lowest 150 m of the wind sounding (LLM). Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC, and solid vertical lines correspond to landfalls.

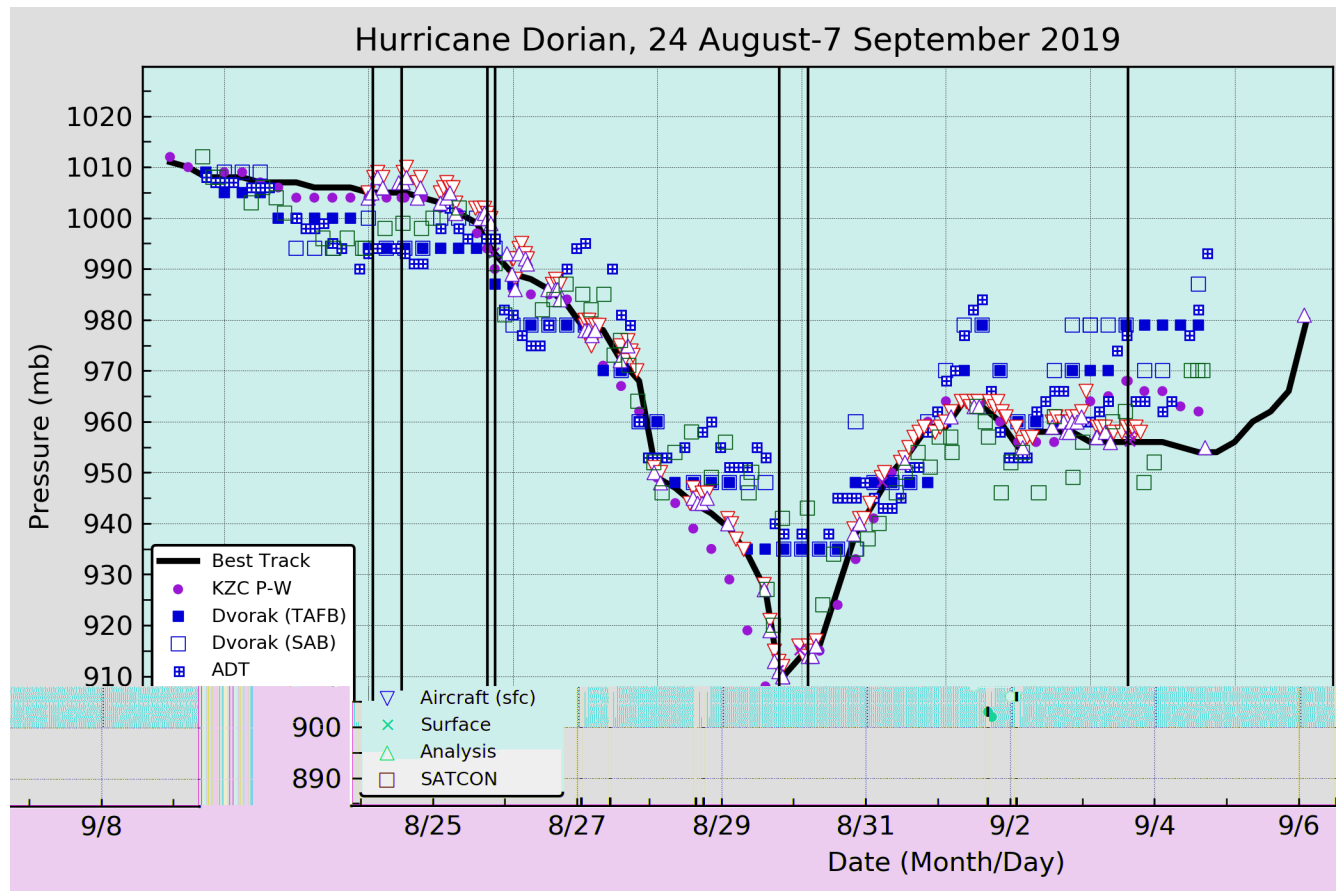


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Dorian 24 August–7 September 2019. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC, and solid vertical lines correspond to landfalls.

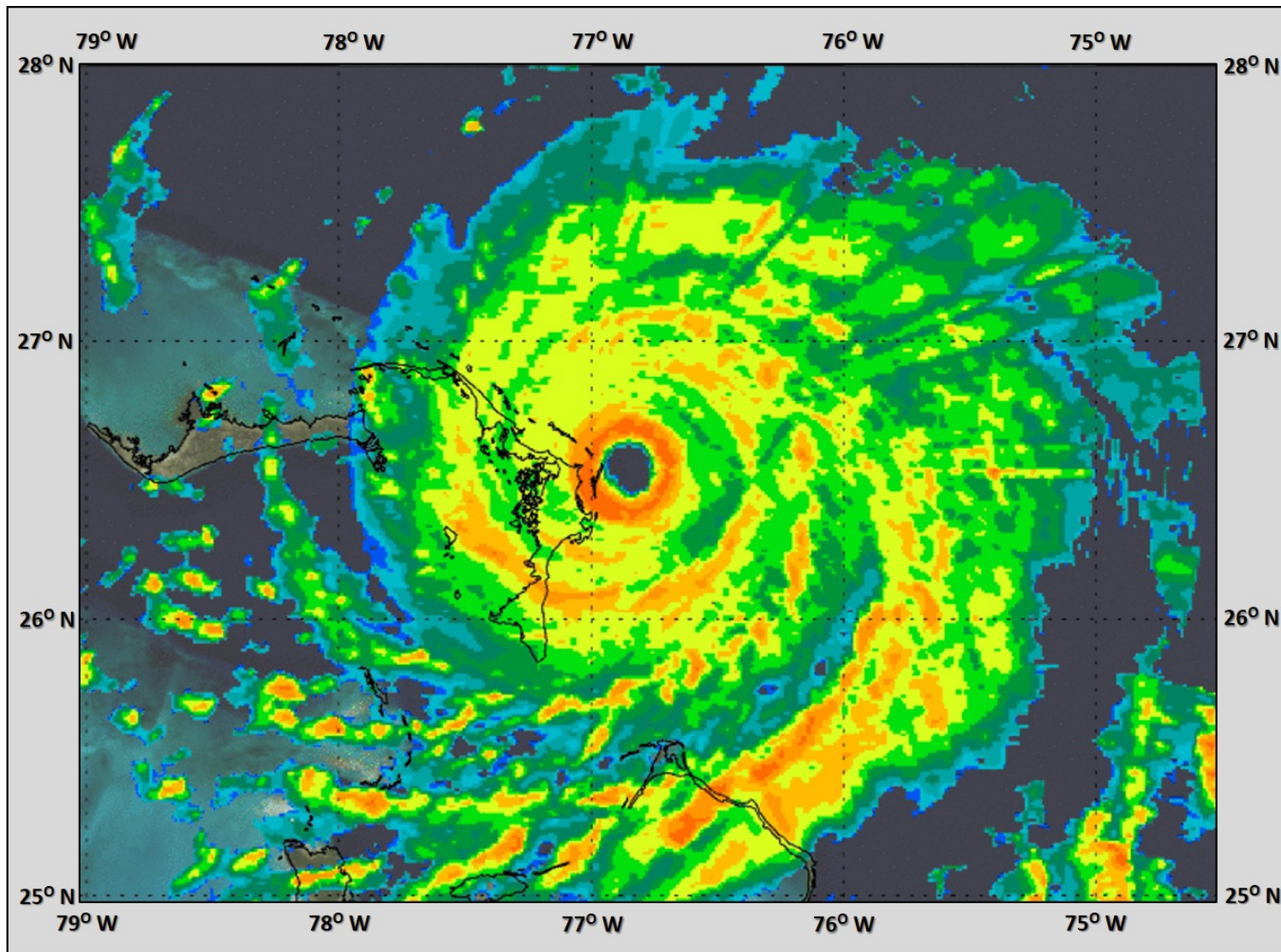


Figure 4. Radar reflectivity display of Category 5 Hurricane Dorian approaching Great Abaco Island in the northwestern Bahamas at 1545 UTC 1 September. Radar data courtesy of the Bahamas Department of Meteorology, and image courtesy of Brian McNoldy, RSMAS, Univ. of Miami.

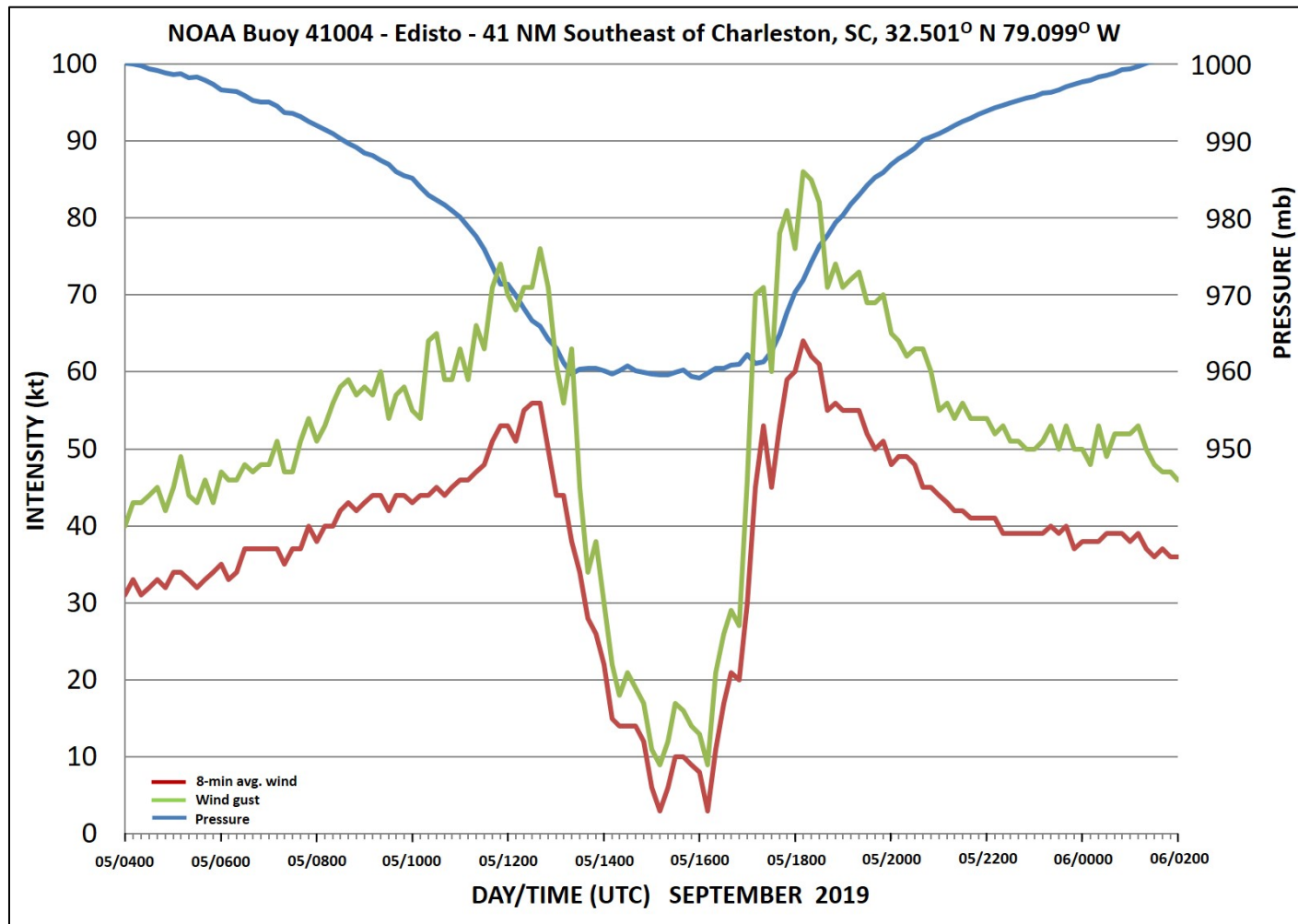


Figure 5. NOAA buoy 41004 plot of sea-level pressure (mb), 8-min-average wind (kt), and wind gusts (kt) on 5–6 September 2019. The center of Dorian’s eye passed over the buoy at 1600 UTC 5 September when a pressure of 959.2 mb was measured.

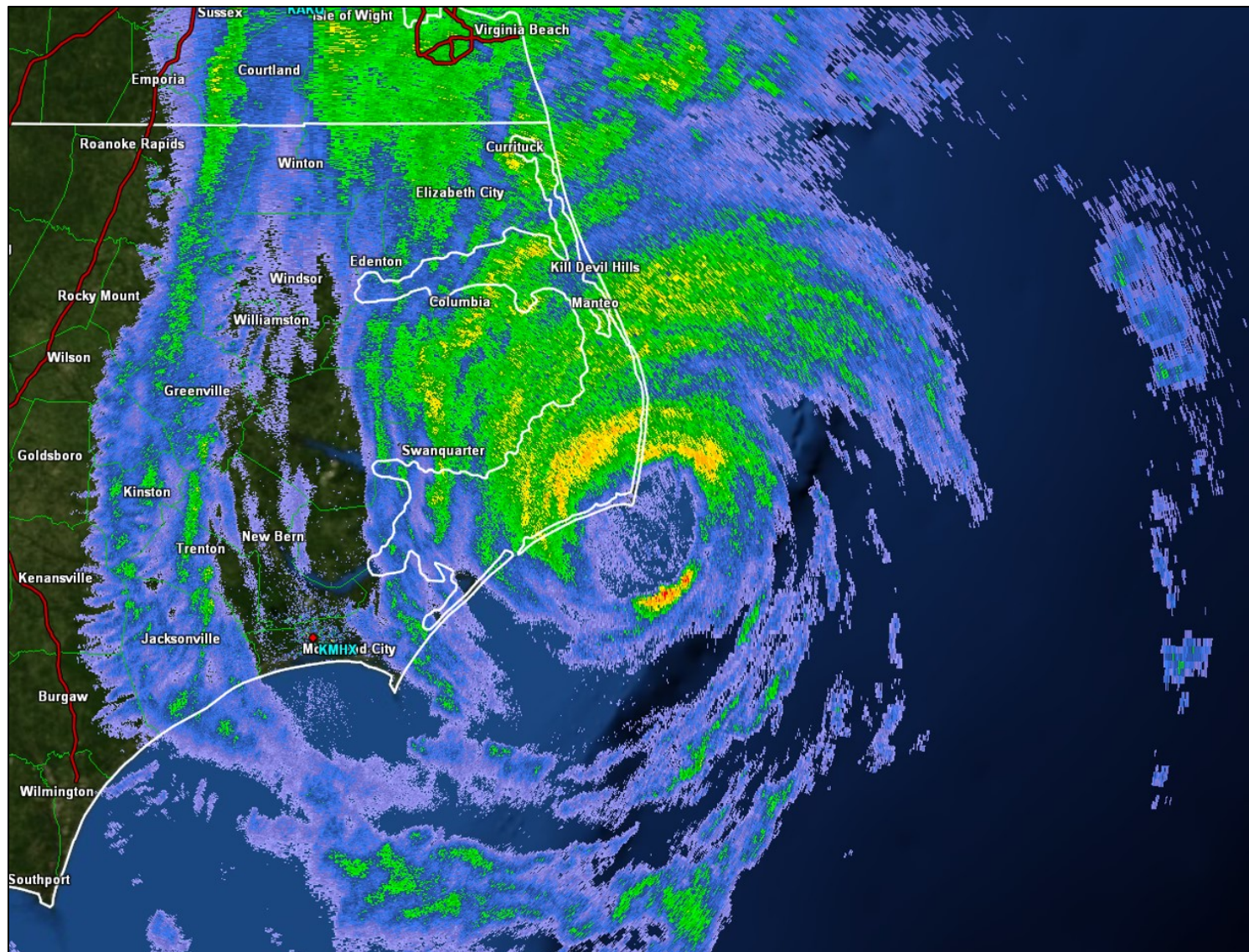


Figure 6. NOAA WSR-88D Doppler radar reflectivity data at 1230 UTC 6 September showing Dorian's elliptical-shaped eye passing over Cape Hatteras, North Carolina. Image courtesy of GR2Analyst software.

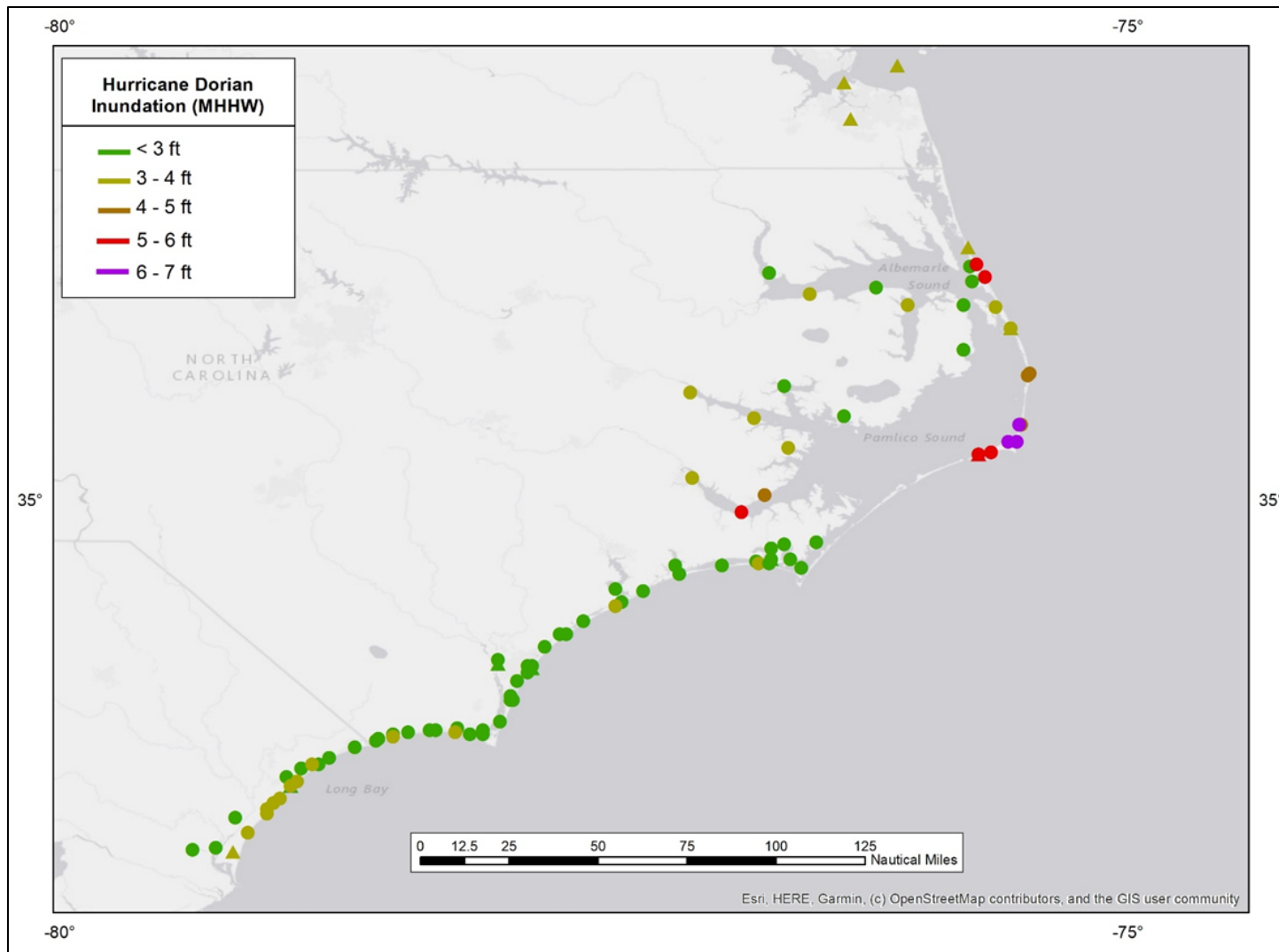


Figure 7. NOS tide gauge observations and USGS storm tide pressure sensor measurements (circles) from portions of the Carolinas and southeastern Virginia from Hurricane Dorian, converted to feet above Mean Higher High Water, which is used as a proxy for inundation.

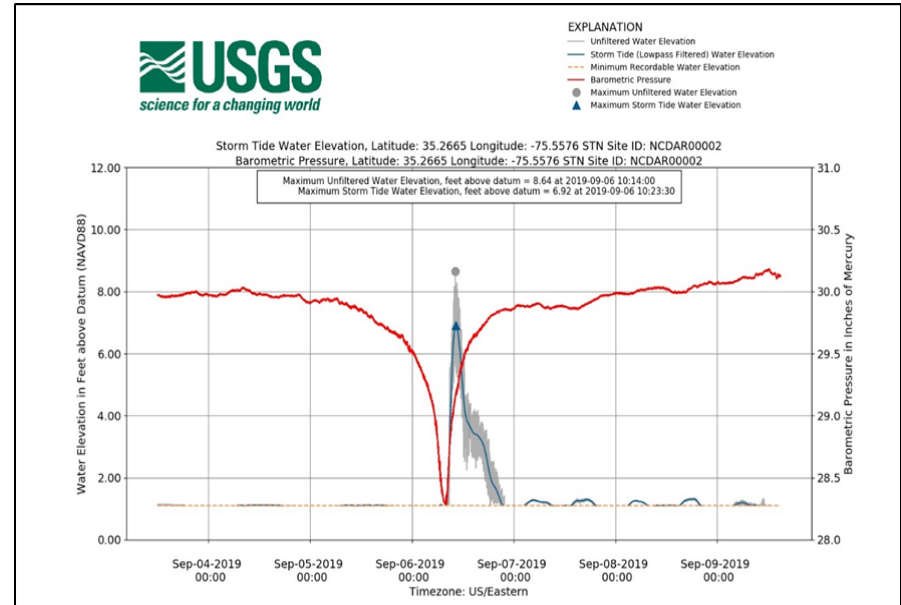


Figure 8. (a) A USGS pressure sensor installed on a bulkhead on Pamlico Sound in Buxton, NC (highlighted by the white ellipse). (b) Instantaneous water level (gray, ft above NAVD88), wave-filtered water level (blue, ft above NAVD88) and barometric pressure (red, in Hg) recorded from the sensor. Images courtesy of the USGS.

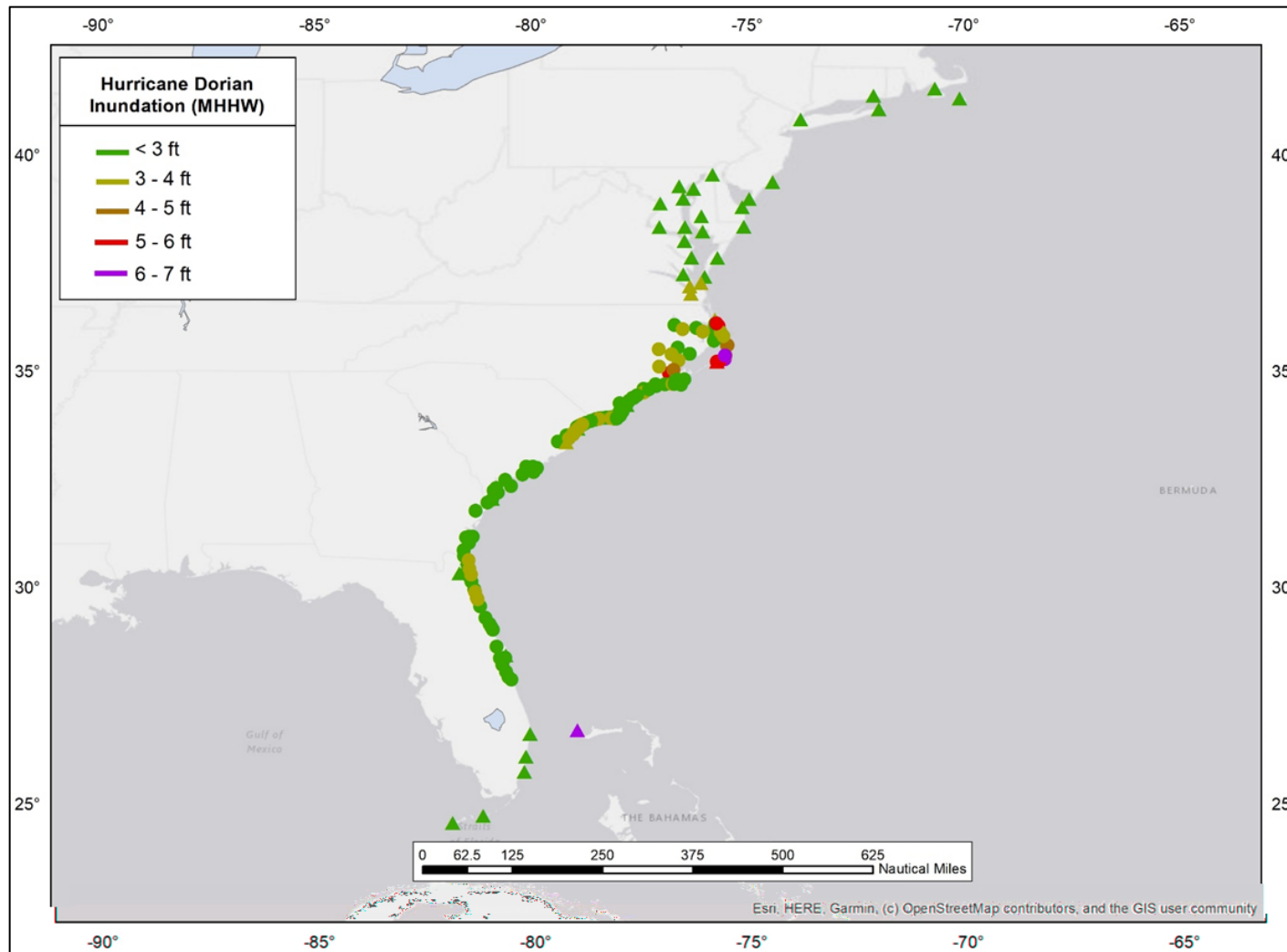


Figure 9. Tide gauge and USGS storm tide pressure sensor measurements from the east coast of the United States and the Bahamas from Hurricane Dorian, converted to feet above Mean Higher High Water, which is used as a proxy for inundation.



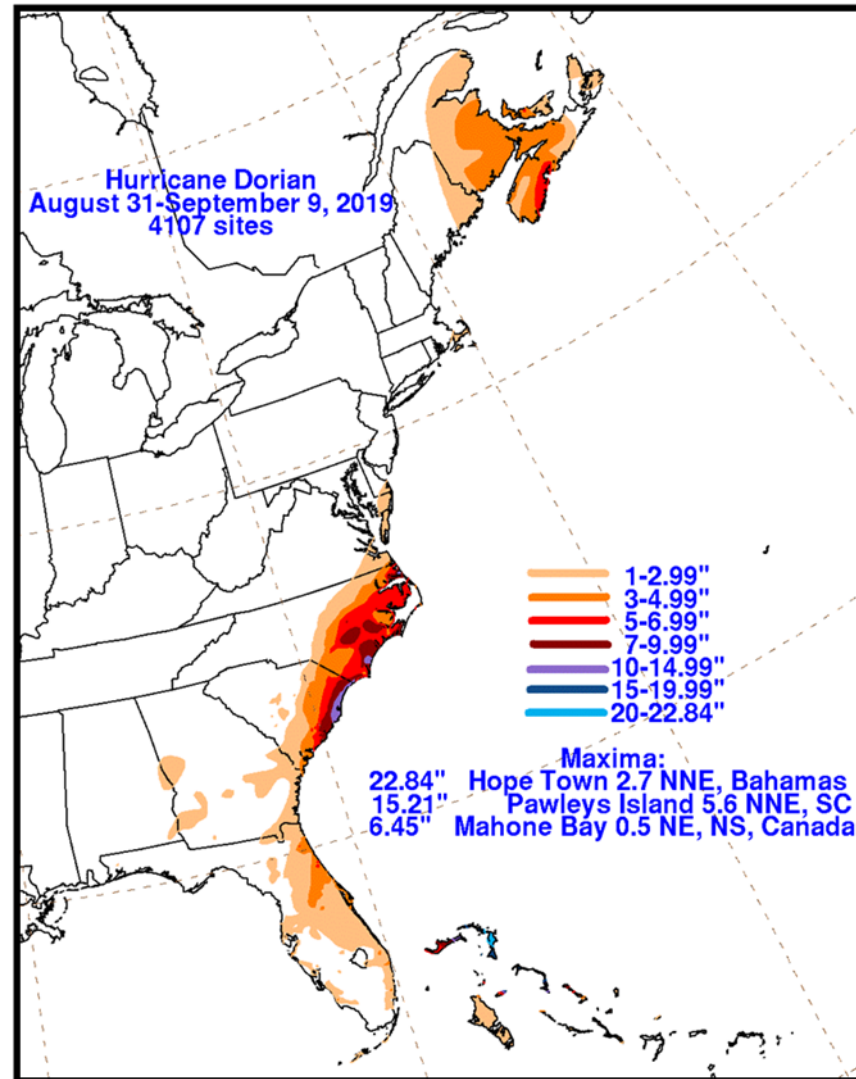


Figure 10. Hurricane Dorian rainfall analysis (inches) during the period 31 August to 9 September 2019, which includes the extratropical phase. Graphic courtesy of the NOAA Weather Prediction Center.



Figure 11. Roof damage to homes in Brunswick County, North Carolina, caused by an EF2 tornado on 5 September 2019. Picture courtesy of Brunswick County Sheriff's Office.



Figure 12. Significant damage to RV-type homes in Emerald Island, North Carolina, caused by an EF2 tornado on 5 September 2019 as Hurricane Dorian was moving northward toward the Outer Banks. Picture courtesy of WCTI-TV12, New Bern.



Figure 13. Extensive damage to residential areas on the northwestern Bahamas due to damaging wind, storm surge, and waves associated with the passage of Hurricane Dorian.



Figure 14. Drone footage of the tree damage to the Cavendish area. Photo provided by the Canadian Hurricane Center.

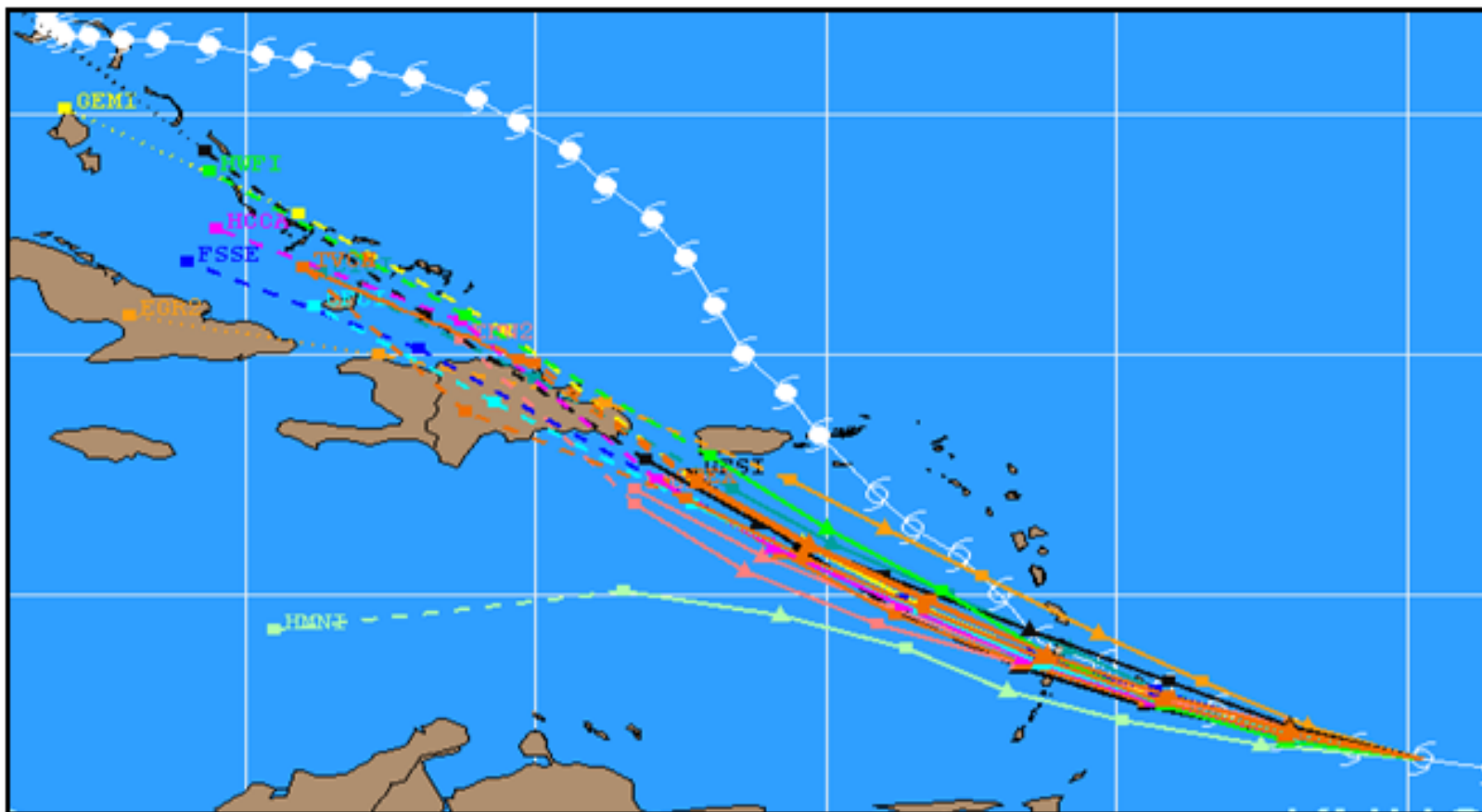


Figure 15. Selected model track forecasts for Dorian at 0000 UTC 26 August 2019. The best track is given by the solid white line with positions marked with a cyclone symbol at 6 h interval.

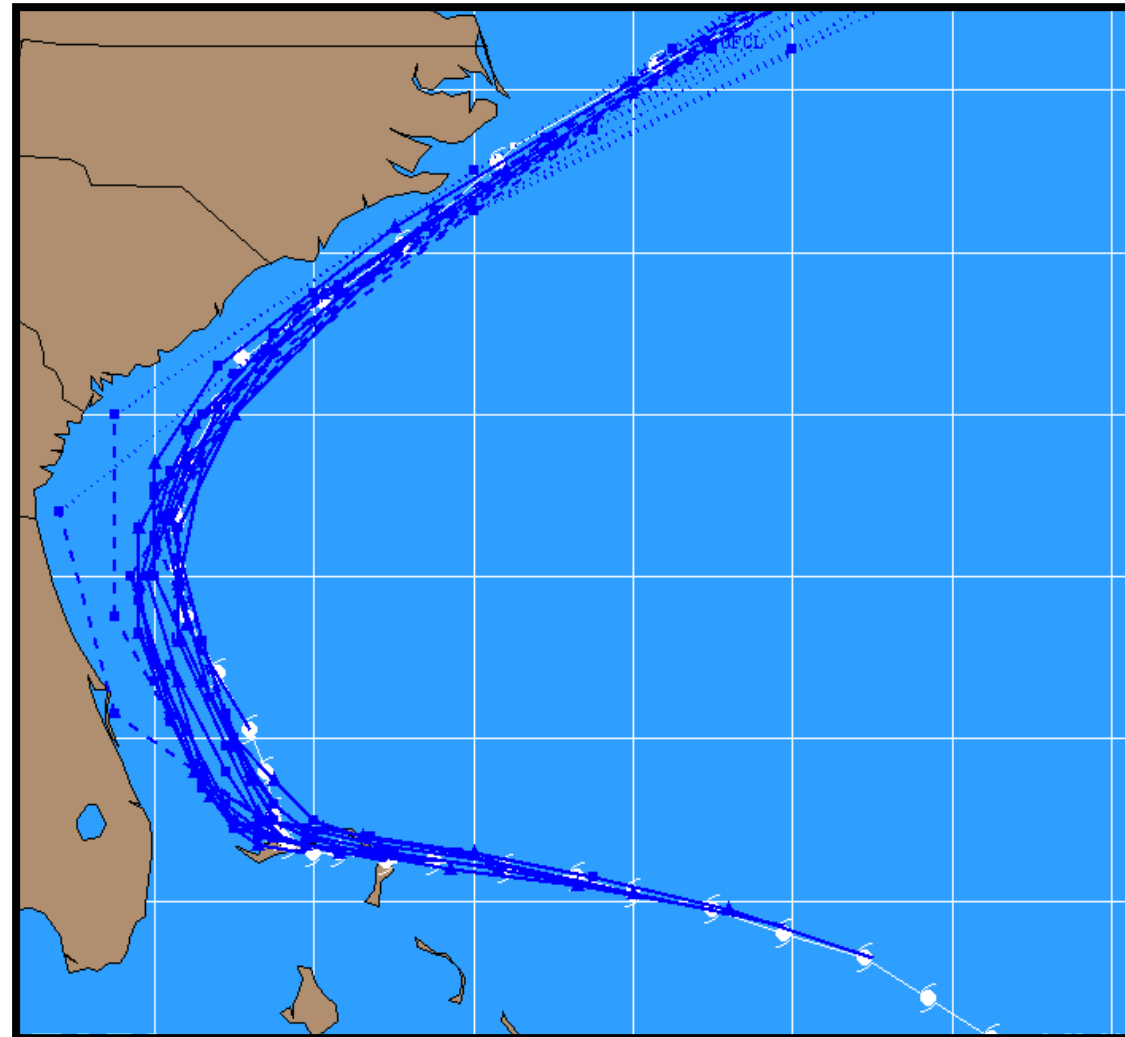


Figure 16. Selected official track forecasts (blue lines, with 0, 12, 24, 36, 48, 72, 96, and 120 h positions indicated) for Hurricane Dorian from 0000 UTC 31 August to 0000 UTC 4 September 2019. The best track is given by the white line with positions shown at 6 h intervals.

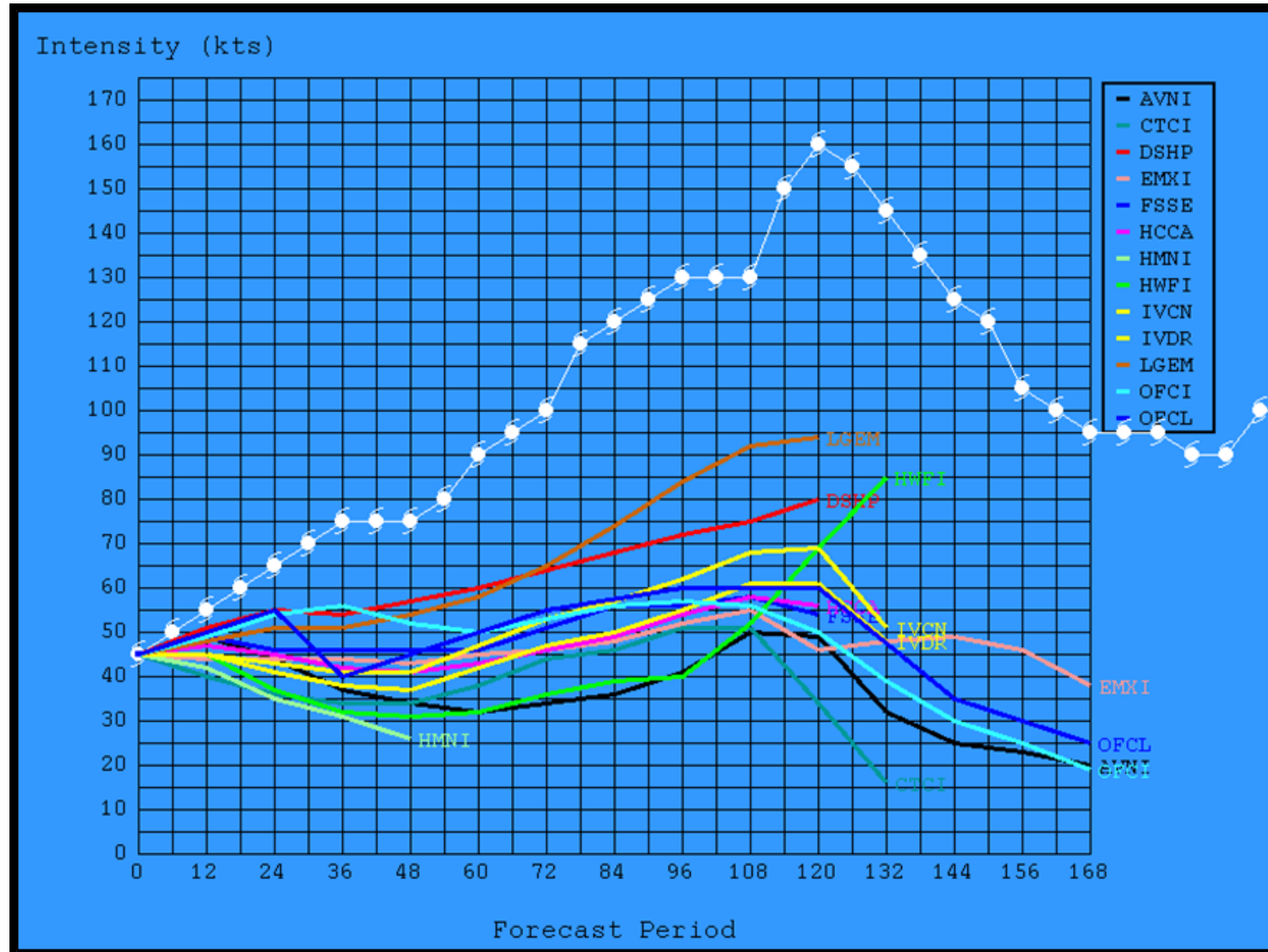


Figure 17. Selected intensity model forecasts (kt) for Dorian at 1800 UTC 27 August 2019. The best track intensity (kt) is given by the solid white line, with intensity values marked with a cyclone symbol at 6 h interval.



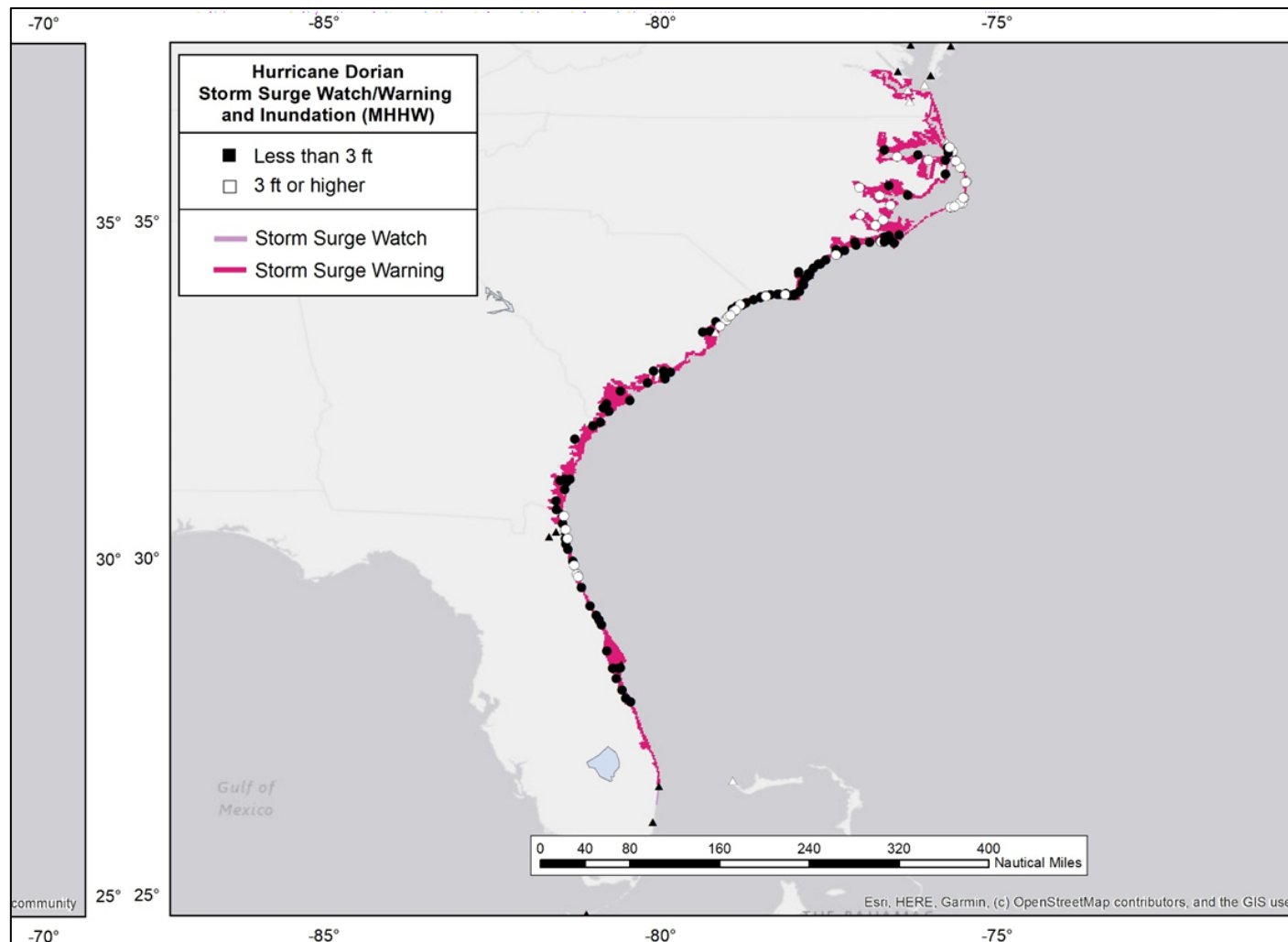


Figure 18. Maximum water levels measured from tide gauges (triangles) and pressure sensors (circles) along the southeastern United States coast during Hurricane Dorian and areas covered by storm surge watches (lavender) and warnings (magenta). Water levels are referenced as feet above Mean Higher High Water (MHHW), which is used as a proxy for inundation (above ground level) on normally dry ground along the immediate coastline. Black markers denote water levels less than 3 ft above ground level, and white markers denote water levels 3 ft or higher above ground level.

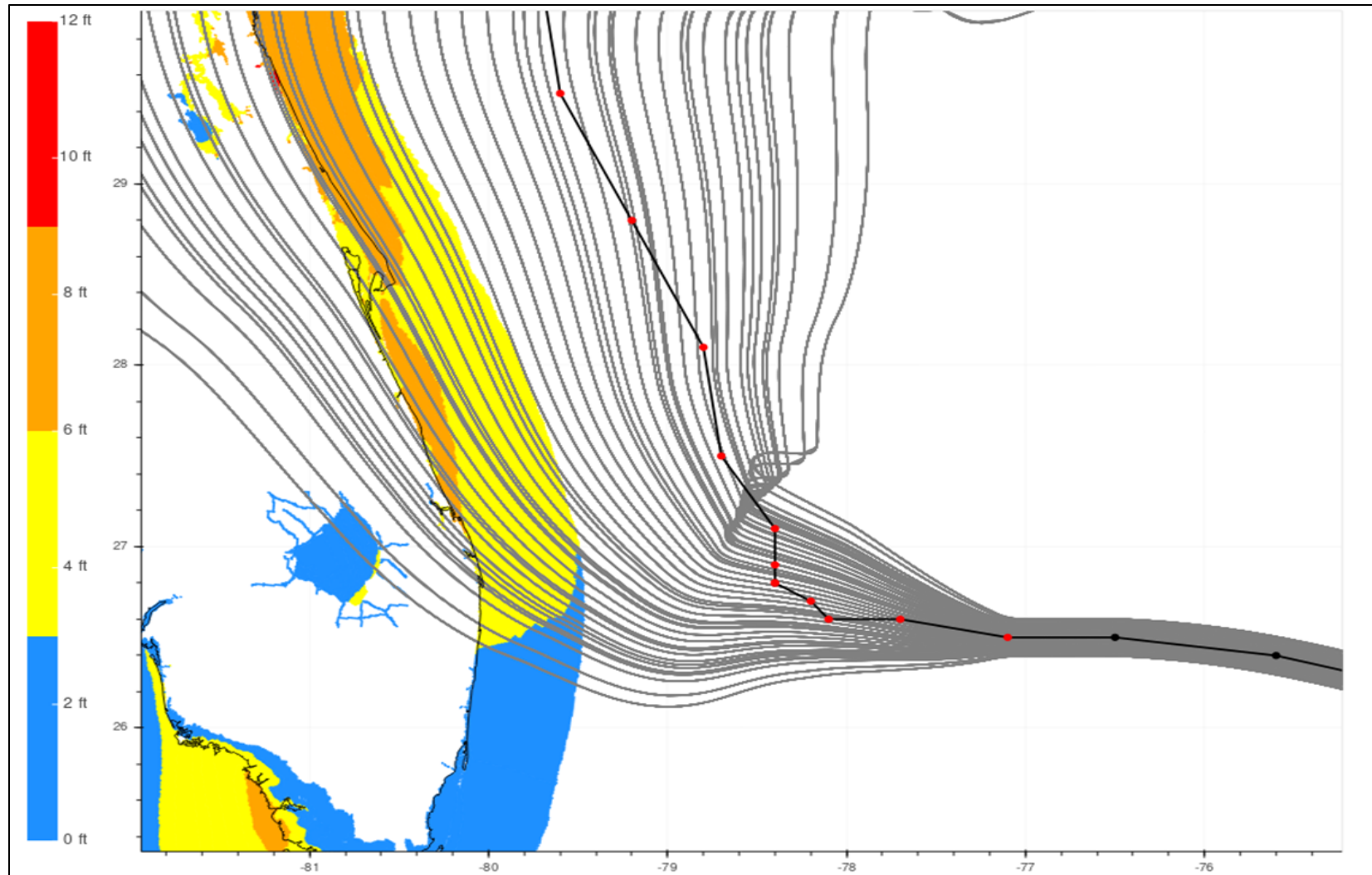


Figure 19. NWS Probabilistic Storm Surge (P-Surge) model ensemble members (gray lines) and 10% exceedance heights in feet above NAVD88 (colors) from the 1500 UTC 1 September forecast for Hurricane Dorian when a storm surge watch was first issued for a portion of the east coast of Florida. The black solid line depicts Dorian's best track.