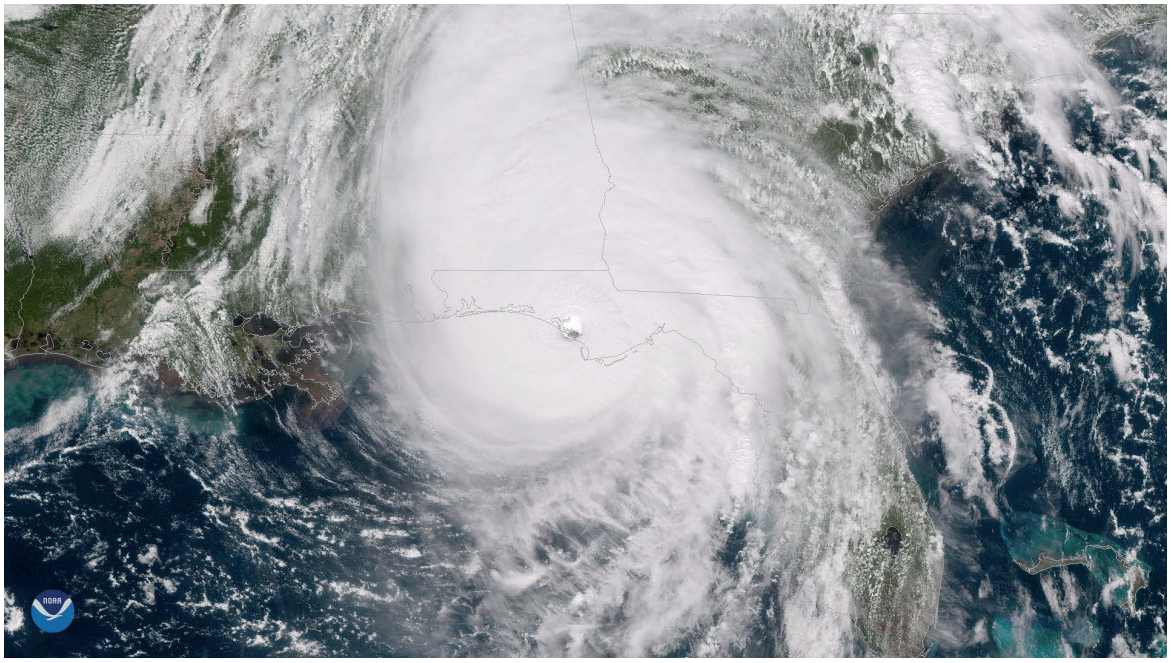
NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE MICHAEL

(AL142018)

7–11 October 2018

John L. Beven II, Robbie Berg, and Andrew Hagen
National Hurricane Center
17 May 2019[1]



GOES-16 PSEUDO-NATURAL COLOR IMAGE OF HURRICANE MICHAEL AT 1730 UTC 10 OCTOBER 2018. IMAGE COURTESY OF NOAA/NESDIS.

Michael was a category 5 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that made a catastrophic landfall near Mexico Beach and Tyndall Air Force Base, Florida, producing devastating winds and storm surge near the coast, and rain and wind inland. It was directly responsible for 16 deaths and about $25 billion in damage in the United States. Before hitting the United States, the cyclone brought hurricane-force winds to the western tip of Cuba when it was a category 2 hurricane.

[1] Original report dated 19 April 2019. This version corrects the discussion of fatalities in Virginia, includes an updated version of Figure 12, and corrects various minor typos.

Hurricane Michael

7–11 OCTOBER 2018

SYNOPTIC HISTORY

Michael had a complex origin and a prolonged genesis process. A large area of disturbed weather formed over the central and western Caribbean Sea and absorbed the remains of Tropical Storm Kirk on 1–2 October. A convective burst on 2 October, possibly associated with a tropical wave moving into the region, led to the formation of a small-scale surface low southwest of Jamaica on 3 October, and this system moved west-southwestward into northeastern Honduras the next day. By 5 October, this low became embedded within a large cyclonic gyre over Central America, with a vorticity center to the southwest over the extreme eastern Pacific Ocean. On 6 October, the Pacific vorticity moved inland over Central America and became absorbed into the larger gyre, whose mean center re-formed over the northwestern Caribbean Sea. Although the system was located in an environment of moderate westerly vertical wind shear, the circulation and convection associated with the low gradually became better organized, and it is estimated that a tropical depression formed around 0600 UTC 7 October centered about 130 n mi south of Cozumel, Mexico. 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[2].

The center of the depression re-formed to the northeast in response to convective bursts during the first 6–12 hours after genesis. After the re-formation, a north-northeastward to northward motion occurred as the cyclone moved around the west side of a mid-level ridge over the western Atlantic. Despite moderate-to-strong southwesterly wind shear caused by an upper-level trough over the central Gulf of Mexico, rapid intensification (RI) occurred, with the cyclone becoming a tropical storm 6 h after genesis and a hurricane a day later by 1200 UTC 8 October. This intensification may have been aided by diffluence caused by the trough compensating for the shear, and by outflow into a second upper-level trough to the east of Michael (Fig. 4). The maximum sustained winds reached 85 kt as the center of Michael passed just west of Cabo del San Antonio, Cuba, near 1830 UTC that day.

Decay of the eyewall convective structure (possibly from shear, dry air intrusion, and a cold water eddy) caused a pause in Michael's intensification as it reached the southeastern Gulf of Mexico late on 8 October. However, this pause was temporary, and RI resumed by 1200 UTC 9 October, and the hurricane turned north-northwestward that day due to the influence of the aforementioned mid-level ridge. A northward motion followed early on 10 October as Michael moved between the ridge and a mid-latitude shortwave trough moving through the western Gulf Coast states. This trough also created a strong outflow channel to the north, and the enhanced

[2] 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 *btk* directory, while previous years' data are located in the *archive* directory.

outflow may have aided the RI that continued until landfall. Before reaching the northern Gulf Coast, Michael turned northeastward as it encountered the southern edge of the mid-latitude westerlies. This track resulted in the eye making landfall near Tyndall Air Force Base (AFB) in the Florida Panhandle, southeast of Panama City, near 1730 UTC that day. By that time, the maximum sustained winds had increased to an estimated 140 kt – category 5 on the Saffir-Simpson Hurricane Wind Scale (SSHWS).

Michael rapidly weakened after landfall as it accelerated northeastward across the central Florida Panhandle, and the maximum winds dropped below 100 kt (the minimum threshold of category 3 intensity on the SSHWS) before the eye moved into southwestern Georgia around 2130 UTC 10 October. The center passed just west of Albany and then tracked just southeast of Macon shortly after the cyclone weakened to a tropical storm. Continuing northeastward, the center passed just west of Augusta before crossing into South Carolina near 1100 UTC 11 October. By this time, the winds in the central core had decreased below tropical-storm force. However, tropical-storm-force winds continued over the coastal areas and coastal waters of Georgia and South Carolina. The storm center continued northeastward and entered North Carolina by 1500 UTC, and three hours later it was centered just south of Greensboro.

Extratropical transition started as Michael moved into North Carolina, with the central pressure falling and the winds intensifying to the west and northwest of an increasingly elongated center. The transition was complete by 0000 UTC 12 October. While this occurred, Michael turned east-northeastward, with the center passing north of Raleigh, North Carolina, then moved across the Norfolk, Virginia, area and into the western Atlantic by 0600 UTC 12 October. Accelerating east-northeastward in the westerlies, the extratropical cyclone re-acquired hurricane-force winds on 13 October over the open ocean south of Nova Scotia and Newfoundland. A subsequent rapid eastward motion carried the system into the northeastern Atlantic the next day. After that time, the low weakened while it turned southeastward and southward around the northeast side of the subtropical ridge, and the system dissipated late on 15 October just west of northern Portugal.

METEOROLOGICAL STATISTICS

Observations in Michael (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the National Hurricane Center (NHC) Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), and objective Advanced Dvorak Technique (ADT) estimates and Satellite Consensus (SATCON) estimates from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison. Observations also include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from nine flights (31 center fixes) by the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command (USAFR) and six flights (14 center fixes) by the NOAA Aircraft Operations Center (AOC). Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA/JAXA 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 Michael. The National Weather Service WSR-88D radar network

provided data for tracking Michael across the northern Gulf of Mexico and the southeastern United States. In addition, the United States Geological Survey (USGS) deployed a large number of water height and air pressure sensors in Michael's landfall area.

Ship reports of winds of tropical storm force associated with Michael are given in Table 2, and selected surface observations from land stations and data buoys are given in Table 3.

Winds and Pressure

The Florida landfall intensity

Michael's estimated intensity at landfall in Florida is 140 kt. While the real-time operational estimate was 135 kt, the final best track intensity estimate was determined by a detailed post-storm analysis review of the available aircraft winds, surface winds, surface pressures, satellite intensity estimates, and Doppler radar velocities – including data and analyses that were not available in real time. It should be noted that the NHC best track intensities typically have an uncertainty of around ±10%.

1) The maximum flight-level wind measured in Michael near the time of landfall was 152 kt by a USAFR aircraft at 700 mb (approximately 8,000 ft) in the southeast eyewall at 1723 UTC 10 October. This flight-level wind would yield an estimated surface wind of 137 kt using the standard NHC flight-level to surface adjustments, which account for the possibility that the aircraft did not sample the maximum flight-level wind. The maximum real-time surface wind estimate from the SFMR was 138 kt in the south eyewall at 1706 UTC that day. However, there were missing SFMR data in the real-time transmission during that penetration of the eyewall. Re-construction of the instrument's raw brightness temperatures during the dropout period by the NOAA AOC indicates that the maximum 10-second SFMR wind estimate was 152 kt near 1707 UTC. The SFMR winds support an intensity greater than 135 kt, especially if the 152-kt value is correct and uncontaminated by wave shoaling in water about 89 ft deep. However, there is a significant caveat regarding the SFMR data, as experience during Hurricanes Irma, Jose, and Maria in 2017 suggests the possibility that the SFMR has a high bias at the wind speeds in question. Research to determine if this is the case is currently underway.

2) A **subjective** analysis of Eglin AFB, Florida (KEVX) WSR-88D Doppler radar velocity data was conducted for the last four hours before landfall. This analysis used the 0.5-degree tilt averaged along four consecutive 250-meter long Doppler radar velocity bins, which coincides with the approximate distance that a reconnaissance aircraft traverses during its standard 10-second sampling. An actual wind velocity was computed based on the assumption of a circular tangential wind field in or near the eyewall and using the difference in the wind direction and the radar radial azimuth, following the procedure used by the Ground-based Velocity Track Display (GBVTD) developed by the NOAA Hurricane Research Division and the National Center for Atmospheric Research (https://www.aoml.noaa.gov/hrd/project2005/gbvtd.html). The computed actual wind velocities were then adjusted to the surface using the NHC standard reconnaissance adjustments factors and the altitude of the radar beam centerline.

By emulating as best as possible the collection of reconnaissance aircraft flight-level data, the radar velocity estimates should be considered to be comparable with the aircraft winds. For the last aircraft pass through the southeastern eyewall, this radar technique yielded an estimate of 155 kt winds at 1722 UTC at approximately the location and altitude where the aircraft reported 152 kt. It is notable that the Doppler radar data indicated that stronger velocities existed just to the northeast of the aircraft's flight path, suggesting the aircraft likely did not sample the strongest winds associated with Michael.

Figure 5 shows the radar analysis results at the radius of maximum winds (RMW) in Michael's southeastern eyewall, including: (a) peak Doppler velocities and four-bin average Doppler velocities converted to actual velocities; (b) converted actual velocities to equivalent surface velocities; (c) the height of the radar bins based on the altitude of the radar beam centerline; and (d) the peak radar reflectivity value (dBZ) observed within the four bins of Doppler velocity data; rainfall rates derived from those reflectivity values using the WSR-88D tropical Z-R relation of $Z = 250R^{1.2}$ are also indicated. The reflectivity and rainfall rates aid in determining if adequate downward mixing of higher wind speeds and momentum aloft occur, as generally rainfall rates exceeding 1 inch h^{-1} (~40 dBZ) produce significant downward mixing of momentum to the surface. The results indicate that Hurricane Michael intensified right up to landfall, with a four-bin equivalent surface wind speed of 149 kt at 1725 UTC 10 October and a four-bin equivalent surface wind speed averaged over the four volume scans from 1717–1725 UTC of 144 kt. While this analysis supports a landfall intensity of approximately 145 kt, it should be noted that there is an analysis uncertainty inherent in the methodology due to the location and direction of the maximum winds relative to the radar site, as small errors in the assumed wind direction could cause errors of several kt in the calculated winds.

Data gaps in Fig. 5 marked with an "M" indicate when a significant eyewall mesovortex rotated through the southeastern quadrant of the eyewall, disturbing the flow in that area, and making the calculations of background tangential flow less reliable and/or unrepresentative. It should be noted that some of the mesovortices contained peak actual velocities aloft of 180–200 kt as they passed through the southeastern eyewall.

Eyewall wind data from the Tallahassee, Florida, WSR-88D (KTLH) during Michael were limited due to communications and other issues. However, a partial subjective analysis of these data shows results comparable to those of the KEVX analysis in the area of maximum winds in the southeastern eyewall (not shown).

An **objective** analysis of the KEVX data using the GBVTD technique (not shown) suggests maximum winds of near 160 kt at 3 km during the last few hours before landfall, which would yield surface winds of 135–140 kt using the NHC reconnaissance adjustments. However, the winds in this analysis were notably lower than the 152-kt flight-level wind and the subjectively analyzed winds from radar in the southeastern eyewall. The quality of this analysis is questionable due to apparent issues in the automated GBVTD technique properly locating the center of Michael, which is critical to the wind analysis. There is also similar uncertainty produced by the maximum wind location relative to the radar site mentioned above for the subjective analysis.

3) Limited surface observations were available in and near the eyewall from the Tyndall AFB station and two Florida Coastal Monitoring Program (FCMP) towers, one on Tyndall AFB property (T3, Table 3) and one just southeast of Mexico Beach, Florida (T2). All three stations

reported maximum sustained winds of less than 100 kt. The Tyndall AFB station reported a peak gust of 121 kt and was inside the RMW when it last reported. This station was in the left front quadrant of the eyewall, and therefore it is unclear whether it sampled the maximum wind. The T3 tower reported a peak gust of 112 kt, but it was knocked down during the eyewall passage at or just before the arrival of the RMW. It should be noted that the strongest winds at both of these stations were from the east, which had a mix of overland and over bay exposure. The T2 tower, which has a complete record, measured a gust of 110 kt, and the strongest winds occurred during straight onshore flow from the Gulf of Mexico. However, a combination of the station's data and radar data suggest it was located just outside of the RMW. While these observations are well below both the operational and final best track intensities, the observing sites were likely not optimally located to sample the maximum winds, which is typical during landfalling hurricanes.

4) Michael's minimum and landfall pressure is assessed at 919 mb based mainly on three data points: 1) a dropsonde measured pressure of 922 mb with a surface wind of 34 kt at 1558 UTC 10 October, 2) a pressure of 920.2 mb measured at the FCMP T3 tower at 1713 UTC 10 October, and 3) a pressure of 922.4 mb and simultaneous hurricane-force winds at the Tyndall AFB station at 1720 UTC 10 October. Other low pressures reported in the Florida landfall area included 923.2 mb in the northwest portion of the eye by storm chaser Josh Morgerman in Callaway and 929.7 mb in the eastern eyewall by a USGS pressure sensor in Mexico Beach. Michael's 919 mb landfall central pressure is the third lowest on record for a landfalling U.S. hurricane since reliable records began in 1900, trailing only the Labor Day Hurricane of 1935 (892 mb) and Hurricane Camille of 1969 (900 mb).

The landfall pressure of 919 mb can be used to estimate the maximum sustained winds from various wind-pressure relationships. The relationship associated with the Dvorak technique would yield an intensity of 142 kt, while the relationship used in the Atlantic Re-analysis Project for intensifying hurricanes north of 25°N (Brown et al. 2006) would yield 139 kt. Finally, the Knaff-Zehr-Courtney relationship (Courtney and Knaff 2009) using both the central pressure and other parameters yields an intensity of 140 kt. However, these relationships are averages derived from empirical statistics of past tropical cyclones, and thus contain an inherent uncertainty.

5) Various satellite intensity estimates show a spread in the peak/landfall intensity. The peak intensity estimates based on the subjective Dvorak Technique (Dvorak 1984) were 140 kt, while estimates based on the Cooperative Institute for Meteorological Satellite Studies (CIMSS) Advanced Dvorak Technique were 140–145 kt. Peak intensities estimated based on microwave satellite techniques were somewhat lower, with a range of 110–135 kt. The CIMSS SATCON, which selectively weighs several of the other techniques based on their strengths and weaknesses, had a peak intensity estimate of just over 140 kt.

While there remains uncertainty, based on the data described above NHC's post-analysis assessment of Michael's landfall intensity is 140 kt, making the hurricane category 5 on the Saffir-Simpson Hurricane Wind Scale at landfall. In terms of wind velocity, Michael is tied with the San Felipe Hurricane of 1928 as the fourth strongest hurricane to strike the United States (including Puerto Rico) since 1900, behind the Labor Day Hurricane (1935), Camille (1969), and Andrew (1992). Michael is also the strongest hurricane landfall of record in the Florida Panhandle and only the second known category 5 landfall on the northern Gulf Coast. Additionally, Michael marks the latest date of a category 5 hurricane landfall in the United States.

As seen above, Michael is joining a small group of Category 5 intensity hurricane landfalls in the United States. We note that the 5-kt increase in estimated maximum wind speed at landfall is small and well within the normal uncertainty. Additionally, these Category 5 winds were likely experienced over only a very small area at and near the coast near the landfall location, and this change in the estimated wind speed is of little practical significance in terms of the impacts associated with the storm there.

It should be noted that future revisions to the Florida landfall intensity are possible, as additional re-assessment is expected once the research on the reliability of the SFMR at these high wind speeds is complete.

The intensity near western Cuba

In Cuba, Cabo del San Antonio at the western end of the island reported 10-min mean winds of 84 kt and a gust of 92 kt at 2001 UTC 8 October as the southeast eyewall passed over the station. Based on this, Michael is assessed to have been a category 2 hurricane with 85-kt winds during its close approach to western Cuba, reaching that status shortly after 1800 UTC that day. Cabo del San Antonio also measured the lowest pressure in Cuba, 974.7 mb at 2020 UTC 8 October. The station reported a double pressure minimum, as the pressure dropped to 977.3 mb at 1835 UTC when the center made its closest approach, followed by a short-lived rise of 2–3 mb before a fall to the lowest pressure occurred. It should be noted that these data were not available in real time, and they resulted in a significant change from operational intensity estimates.

Elsewhere along the path of Michael

After landfall, Michael produced hurricane-force winds near the track of the center across the central Florida Panhandle and southwestern Georgia, with hurricane-force gusts occurring as far inland as Albany, Georgia. The most notable reports from this area were a wind gust of 100 kt at the Georgia Automated Environmental Monitoring Network station at Donaldsonville, Georgia, and a gust of 89 kt at Marianna, Florida. A large area elsewhere near and to the right of the track of the center received tropical-storm-force winds in Georgia, eastern South Carolina, and southeastern North Carolina, with sustained winds of 35–40 kt and higher gusts reported along portions of the Georgia and South Carolina coasts. Sustained winds of 40–50 kt and gusts of 60–65 kt were reported along portions of the North Carolina coast.

During Michael's extratropical transition, widespread gale- to storm-force winds occurred west and northwest of the center, particularly over the lower Chesapeake Bay and the adjacent land areas. The most significant observation from this wind band was from the National Ocean Service (NOS) station at Kiptopeke, Virginia – a sustained wind of 58 kt and a peak gust of 69 kt at 0436 UTC 12 October. Additionally, a Weatherflow station with an elevated anemometer on the Chesapeake Bay Bridge Tunnel reported sustained hurricane-force winds. Subsequently, gale-force winds spread northward along the U.S. East Coast as far north as southern New Jersey while Michael moved out to sea. While not included in Table 3, a few wind gusts to tropical-

storm/gale force also occurred over portions of the Florida Peninsula and along the Atlantic coasts of New York, Rhode Island, and Massachusetts.

Ships largely avoided the core of Michael during its tropical cyclone phase, with the result that a small number of ships reported tropical-storm force winds from the storm's periphery (Table 2). Winds of up to 60 kt were reported over the North Atlantic during Michael's transit of the shipping lanes as an extratropical low.

During a NOAA AOC flight into Michael early on 10 October, the aircraft released a Coyote Unmanned Aerial Vehicle into the eye and the eyewall. The Coyote measure a 10-sec wind of 159 kt in the northeast eyewall at a flight level of 893 mb or about 2000 ft above the surface at 0347 UTC that day. Using the standard NHC reconnaissance adjustments, this would yield a surface wind estimate of about 120 kt.

Storm Surge [3]

Storm surge inundation heights produced by Michael were estimated at 9–14 ft above ground level (AGL) along a portion of the Florida Panhandle coast from just southeast of Tyndall AFB to Port St. Joe in Bay and Gulf Counties, respectively, with the highest inundation occurring in Mexico Beach. A USGS storm tide pressure sensor installed on the Mexico Beach pier recorded a wave-filtered water elevation of 15.55 ft above the North American Vertical Datum of 1988 (NAVD88) (blue curve in Fig. 6), which converts to about 14.7 ft above Mean Higher High Water (MHHW). These data suggest that normally dry areas near the average high tide line in Mexico Beach likely experienced as much as 14 feet of inundation due to storm surge. The USGS sensor data also indicated significant wave activity in addition to the surge, which exacerbated the catastrophic damage that occurred within the first several blocks of the beach. High water mark surveys in Mexico Beach yielded similar observations. The USGS surveyed a well-preserved seed line (a type of high water mark) within a multi-unit vacation rental building on the north side of U.S. Highway 98 and determined that the water reached 11.6 ft above the base of the building (Fig. 7), which itself sits a few feet above the water line of a lagoon located behind the building. Adding these few feet to the high water mark measurement corroborates the estimated maximum inundation of 14 ft AGL in Mexico Beach. Figure 8 shows an analysis of estimated maximum storm surge inundation heights AGL along the Florida coast from Michael, and storm surge measurements are provided in Table 3.

Farther east, estimated storm surge inundation heights were 6–9 ft along the Big Bend coast from Indian Pass to Keaton Beach. Within that area, three USGS pressure sensors deployed in Franklin County—in Alligator Point, Apalachicola, and St. George Island State Park—

[3] 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 (AGL). At the coast, normally dry land is roughly defined as areas higher than the normal high tide line, or Mean Higher High Water (MHHW).

recorded water heights that convert to 7.2–7.3 ft MHHW, and the NOS gauge in Apalachicola measured a peak water level of 7.7 ft MHHW. Just to the east, a USGS survey team measured a high water mark of 7.9 ft AGL within the St. Marks National Wildlife Refuge, just southeast of Crawfordville in Wakulla County, with a water level of 7.3 ft AGL surveyed in Carrabelle in Franklin County. Since much of the Florida Big Bend coast is sparsely populated with limited structures available to preserve high water marks, a post-storm model simulation of storm surge was conducted for the area. The results suggest that the highest inundation along that portion of the coast from storm surge alone was likely about 9 ft above normally dry ground. Damage observed to trees in some exposed coastal locations suggests that wave action possibly led to instantaneous inundation greater than 9 ft in some areas, but the time-varying nature of waves is not considered a true measure of inundation purely from storm surge.

Along the coast southeast of Keaton Beach through Citrus County, Florida, maximum storm surge inundation heights were analyzed to have been 4–6 ft AGL. The NOS tide gauge in Cedar Key measured a maximum water level of 4.1 ft MHHW, and numerous USGS storm tide sensors recorded water levels of 4–6 ft MHHW between Keaton Beach and Cedar Key. From Hernando County southward to the Tampa Bay area, maximum storm surge inundation levels were 2–4 ft AGL.

Maximum storm surge inundation heights dropped off sharply west of Michael's landfall area. Observations and a post-storm simulation indicate that 6–9 ft of inundation AGL occurred near Tyndall Air Force Base in St. Andrew Sound, and 4–6 ft of inundation AGL occurred in the area around Panama City and St. Andrew Bay. The highest ground-truth observations in these areas included a measurement of 5.3 ft MHHW from the NOS tide gauge at Panama City, 3.9 ft MHHW from the NOS gauge at Panama City Beach, and 4.3 ft MHHW by a USGS storm tide sensor also on Panama City Beach. Maximum storm surge inundation is estimated to have been 2–4 ft AGL along the western part of the Florida Panhandle coast from west of Panama City to near Pensacola, where a water level of 2.4 ft MHHW was recorded by an NOS gauge.

Storm surge flooding also occurred along portions of the North Carolina and Virginia coasts while Michael underwent extratropical transition, with localized maximum inundation heights of 2–4 ft occurring in parts of the North Carolina sounds and Lower Chesapeake Bay. In North Carolina, the highest measured storm surge was 4.36 ft above normal tide levels by the NOS gauge at Oregon Inlet, which resulted in a maximum water level of 4.2 ft MHHW. In Virginia, the NOS gauge at Lewisetta recorded a storm surge of 3.27 ft above normal tide levels, which resulted in a maximum water level of 2.1 ft MHHW. A water level of 2.7 ft MHHW was also measured by the NOS gauge at Windmill Point. Storm surge measurements along the North Carolina and Virginia coasts are included in Table 3.

Rainfall and Flooding

Michael caused heavy rains in portions of western Cuba, where there were several storm total rainfall reports of 6–11 inches and a maximum storm total of 11.45 inches at Pinar del Rio (Table 3). Michael's track across the southeastern United States resulted in widespread rains of 3 to 6 inches and localized rainfall totals in excess of 10 inches (Fig. 9). The maximum storm total rainfall reported was 13.01 inches near Black Mountain, North Carolina, while Lynn Haven,

Florida, reported a storm total of 11.62 inches. These rains caused some freshwater flooding in both Cuba and the United States. In Central America, the maximum reported rainfall from Michael and its pre-cursor disturbance was 22.79 in at Atalaya, El Salvador, which fell in the period from 5–11 October. Significant freshwater flooding occurred across portions of Honduras, Nicaragua, and El Salvador as a result of these rains.

Tornadoes

Michael produced 16 known tornadoes, including 2 in Florida, 3 in Georgia, 4 in South Carolina, and 7 in Virginia. The tornadoes were all rated EF-0 or EF-1 and caused only minor damage.

CASUALTY AND DAMAGE STATISTICS

Michael's casualty[4] toll during its track across the southeastern United States includes the following best estimates from several sources:

The winds, storm surge, and rains of the hurricane directly caused 16 deaths: 7 in Florida, 5 in Virginia, 3 in North Carolina, and 1 in Georgia. In Florida, five people drowned due to storm surge - three in or near Mexico Beach (Bay County), one between Mexico Beach and Port St. Joe (Gulf County), and one near East Bay in the eastern side of the Panama City area (Bay County). The victims of the surge were all elderly with the ages ranging from 60–91 years, and all of these fatalities occurred in storm surge evacuation zones. Two people died inland in Florida due to falling trees during the storm, one in Quincy in Gadsden County and one in Alford in Jackson County. The deaths in Georgia (near Lake Seminole in Seminole County) and North Carolina (near Statesville in Iredell County) were also due to falling trees. In Virginia, five people died due to freshwater flooding, including two near Danville, two in Charlotte County, and one near Mount Hermon.

Michael is responsible for 43 currently-known indirect deaths, all in Florida. The causes of the indirect deaths included falls during the post-storm clean up, traffic accidents, and medical issues compounded by the hurricane. It should be noted that all of the casualty figures - both direct and indirect – will be revised, as needed, if new information becomes available.

The hurricane caused no known casualties in western Cuba. However, the pre-cursor disturbance associated with Michael caused a prolonged period of rainfall over portions of Central America, which in turn caused significant freshwater flooding. Media reports indicate this flooding directly caused 15 deaths – 8 in Honduras, 4 in Nicaragua, and 3 in El Salvador.

---

[4] Fatalities 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.

Michael's passage across the Florida Panhandle and the remainder of the southeastern United States left a swath of destruction in its wake. The cyclone and its precursor disturbance also caused damage in Cuba and in portions of Central America.

Most significantly, Michael's winds and storm surge caused devastating to catastrophic damage in Bay County, Florida, with the worst of the damage occurring in Mexico Beach (Fig. 10) and at the Tyndall AFB. In Mexico Beach, 1,584 buildings out of 1,692 in the town were reported damaged, with 809 of those reported destroyed. While exact numbers are not available from the Tyndall AFB, every building was reported damaged with many destroyed. The winds and surge also caused less severe, but extensive, damage elsewhere in the eastern portion of the Panama City metropolitan area. This resulted in a total of more than 45,000 structures damaged and more than 1,500 destroyed in Bay County, including severe damage to two hospitals. Widespread damage also occurred along the Florida Gulf Coast east of the Panama City area to Alligator Point. In Gulf County, over 2,000 structures suffered minor damage, while more than 1,200 received major damage and 985 structures reported as destroyed. An additional 80 structures were reported destroyed in Franklin County. Coastal highways were also washed out in several places between Panama City and Alligator Point. Relatively minor damage was reported along the coast east of Alligator Point to near Keaton Beach.

Inland, a swath of major wind damage to both structures and agriculture/forestry occurred along the track of Michael from the Florida Panhandle across extreme southeastern Alabama into southwestern and central Georgia. Jackson County, Florida, including the town of Mariana, was hard hit, with 400 buildings reportedly destroyed and 600 more suffering major damage. Farther to the northeast, Seminole County, Georgia, including the town of Donaldsonville, reported damage to 99% of the homes, along with severe damage to timber and agriculture. Also hard hit was Dougherty County, Georgia, including the town of Albany, which reported 3,000 residential structures damaged (including 49 destroyed) and significant damage to timber and agriculture. Elsewhere along the path of Michael, a combination of wind and freshwater flooding caused relatively minor damage from eastern Georgia northeastward through southeastern Virginia.

As of this writing, the NOAA National Centers for Environmental Information estimates the total damage from Michael in the United States at approximately $25 billion. Of this total, about $18.4 billion occurred in Florida (with about $3 billion of this on Tyndall AFB), $4.7 billion occurred in Georgia, and $1.1 billion occurred in southeastern Alabama, with smaller amounts of damage in South Carolina, North Carolina, and Virginia. The vast majority of this damage was to property and infrastructure. However, about $3.3 billion of the damage was agricultural and forestry losses, primarily in Florida and Georgia. Widespread power outages occurred due to the storm, especially in the Florida Panhandle, extreme southeastern Alabama, and southwestern and central Georgia.

In western Cuba, the hurricane caused some damage to property and crops in the provinces of Pinar del Rio and the Isle of Youth, as well as widespread power outages. However, no monetary damage figures are available, nor are there damage figures available for property damage caused by the pre-Michael disturbance in Central America.

FORECAST AND WARNING CRITIQUE

Genesis

The genesis of Michael was well forecast. The disturbance from which Michael developed first appeared in the Tropical Weather Outlook (TWO) 120 h prior to genesis (Table 4) with a low chance (<30%) of development in the 5-d range. This chance was raised to medium (40–60%) 54 h before genesis occurred and to high (>70%) 36 h before genesis. The system was introduced into the 2-d portion of the TWO at a low chance of development 54 h before genesis. The development probability was raised to a medium chance 36 h and a high chance 24 h before genesis, respectively. Due to the threat the system posed to the land areas of the northwestern Caribbean, Potential Tropical Cyclone advisories were issued 12 h before genesis occurred.

Track Forecast

A verification of NHC official track forecasts for Michael is given in Table 5a. The average official track forecast errors were smaller than the mean official errors for the previous 5-yr period at all forecast times. Table 5b has a similar verification for the Michael track forecasts that includes the forecasts issued before it became a tropical cyclone. Analysis of the individual NHC track forecasts (Fig. 11) indicate that they correctly and consistently forecast a generally northward motion through the eastern Gulf of Mexico, followed by recurvature into the westerlies, landfall in the Florida Panhandle, and a track across the southeastern United States. However, there were two periods where the forecasts were less skillful. The first was early in the cyclone's life, when the NHC forecasts kept the center closer to the coast of the Yucatan Peninsula of Mexico than to western Cuba. The second was when Michael moved north and west of the NHC forecast tracks as it crossed North Carolina. A homogeneous comparison of the official track errors with selected guidance models for the tropical cyclone stage is given in Table 5c. Several of the consensus models, including the fixed consensus TCON and the variable consensus TVCA, had lower errors than the official forecasts. However, the official forecasts generally had lower errors than the majority of the individual dynamical forecast models.

Intensity Forecast

A verification of NHC official intensity forecasts for Michael is given in Table 6a. Averaged official intensity forecast errors were significantly larger than the mean official errors for the previous 5-yr period. Table 6b has a similar verification for the NHC Michael intensity forecasts including the forecasts issued before it became a tropical cyclone, and the forecast errors were again significantly large. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 6c. While the official forecasts were poor compared to the 5-yr mean, they were better than almost all of the intensity guidance forecasts, trailing only the HWRF model (HWFI) at one time, 48 h. Figure 12 shows the official intensity forecasts along with the best track intensities for the forecasts through the Florida landfall. While the forecasts correctly called for intensification, there was a large low bias as the cyclone consistently

intensified faster than forecast. This bias appears to result from issues of how Michael reacted – and was forecast to react – to vertical wind shear. Early in its life, the cyclone intensified more quickly than forecast despite the apparent presence of moderate-to-strong shear. Later, shear analyses from CIMSS and forecasts from the SHIPS model appear to have been larger than what actually occurred, and this combination likely aided the low bias of the intensity forecasts. It should be noted that the various RI indices used by the NHC had mixed results in forecasting Michael, with several of them showing decreasing chances of RI before and during the RI that occurred on 9–10 October. Overall, the RI indices were less bullish on Michael than other cyclones that have undergone RI, and this may have been due to the issues with the forecast shear.

Tropical Cyclone Wind Watches and Warnings

Tropical cyclone wind watches and warnings associated with Michael are given in Table 7a. The hurricane warning for the landfall area in the Florida Panhandle was issued about 36 h before the arrival of tropical-storm-force winds (estimated at 0900 UTC 10 October), with a hurricane watch issued about 48 h before the arrival of those winds. In western Cuba, a hurricane warning was issued only about 10 h before the center passed Cabo del San Antonio. There was no hurricane watch in advance of the warning, although tropical storm warnings were in effect. The late warning for western Cuba was mainly due to the poor intensity forecasts, the expectation that Michael would not become a hurricane before passing western Cuba, and the poorly-forecast re-formation of the center that brought it close to western Cuba than originally forecast. A tropical storm warning was issued for portions of the Yucatan Peninsula of Mexico based on the early forecasts that brought the center close to that area.

Tropical cyclone watches and warnings were issued for portions of the southeastern coast of the United States based on the expectation that the outer wind field of Michael would affect these areas. However, tropical cyclone watches and warnings were not issued for the U.S. Mid-Atlantic coast north of the North Carolina/Virginia border based on the forecasts of Michael becoming extratropical before it reached this region. Instead, non-tropical cyclone wind watches and warning were issued by the local National Weather Service (NWS) forecast offices in those areas.

Storm Surge Watches and Warnings

The NWS issued a storm surge warning for the Florida Gulf Coast from the Okaloosa/Walton County Line southeastward to the Anclote River at 2100 UTC 8 October (Fig. 13 and Table 7b). In addition, a storm surge watch was in effect from the Okaloosa/Walton County Line westward to the Alabama/Florida border and south of the Anclote River to Anna Maria Island, including Tampa Bay. The NWS issued the initial storm surge watch for Michael along the Florida Gulf coast from Navarre to Anna Maria Island, including Tampa Bay, at 0900 UTC 8 October, which provided a lead time of about 48 h before the onset of tropical-storm-force winds. The initial storm surge warning provided a lead time of about 36 h before the onset of tropical-storm-force winds. Water level observations from NOS tide gauges, USGS storm tide sensors, and high water marks surveys indicate that areas which experienced at least 3 ft of inundation (which NHC uses

as a first-cut threshold for the storm surge watch/warning) occurred within the bounds of the storm surge warning area, with the exception of a measurement of 3.6 ft MHHW in the storm surge watch area at Clearwater Beach. This occurrence appears to have resulted from localized wind conditions, and it was likely not representative of the overall inundation in the watch area.

The NWS issued a storm surge watch for the North Carolina coast from Ocracoke Inlet to Duck (Fig. 14) at 1500 UTC 10 October. Based on the NOS tide gauge observation from Oregon Inlet (4.2 ft MHHW), localized storm surge inundation of 3–4 ft AGL likely occurred on the Sound side of the Outer Banks, especially on the northern side of Pamlico Sound, but the flooding was expected to be too localized to warrant the issuance of a storm surge warning over a large area of the Outer Banks.

NHC's first forecast for maximum storm surge inundation heights (coincident with the issuance of the storm surge watch at 0900 UTC 8 October) was 7–11 ft AGL between Indian Pass and Crystal River, Florida. At the time of the watch issuance, Michael was forecast to make landfall in the Florida Panhandle east of, and weaker than, what occurred. As a result, the highest inundation was initially forecast in the more vulnerable areas of Apalachee Bay, and the first inundation forecast for the area around Mexico Beach was 4–7 ft AGL. Overall inundation forecasts gradually increased over the next several forecasts, coincident with an increase in Michael's forecast intensity and a westward shift in the forecast track, with the forecast reaching 9–13 ft AGL in the area from Mexico Beach to Keaton Beach at 2100 UTC 9 October. NHC's maximum inundation forecast ultimately settled on 9–14 ft AGL between Tyndall AFB and the Aucilla River (inclusive of Mexico Beach) by 1200 UTC 10 October, the morning before landfall.

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

NHC's coordination with NWS forecast offices that were in the threat area of Michael started with the first Potential Tropical Cyclone advisory at 1800 UTC 6 October. Regular coordination calls with the affected offices continued until the system moved offshore of the southeast U.S. coast and over the Atlantic Ocean on 12 October. NHC also coordinated with the governments of Mexico and Cuba during the time that Michael posed a threat to portions of those countries.

Language in advisory products such as the Tropical Cyclone Discussion (TCD), as well as in media and emergency management briefings, began highlighting the threat to the northern Gulf Coast on the first advisory at 2100 UTC 6 October. Stronger language was used as the threat became more apparent. For example, the TCD at 2100 UTC 7 October stated that Michael was expected to be a hurricane when it reached the northern Gulf Coast, and it indicated that impacts from of winds, storm surge, and heavy rains were likely. By 0900 UTC 8 October (57 h before landfall), the TCD stated the possibility that Michael could be a "major" hurricane (category 3 on the SSHWS) before landfall, and subsequent TCDs put increasing emphasis on the likelihood of life-threatening storm surge in the landfall area. Later statements also indicated an increasing threat from winds and rainfall across other portions of the southeastern U.S.

The NHC began providing support via teleconferences to the state of Florida on 7 October when Michael was a tropical depression in the northwestern Caribbean Sea. This coordination reached its peak the day before and into the overnight hours that preceded Michael's landfall on

10 October. In addition, NHC-led federal/state video-teleconference briefings continued through landfall and into 11 October as the storm moved through the eastern U.S. This decision support included calls and briefings coordinated through the FEMA Hurricane Liaison Team (HLT), embedded at the NHC.

On 7 October, before operational storm surge products were available, the NHC Storm Surge Unit began working with the FEMA HLT to provide Florida emergency managers storm surge guidance. Direct support continued throughout the event and served as a resource to North Carolina emergency managers ahead of the storm moving across the eastern United States.

NHC's Tropical Analysis and Forecast Branch (TAFB) also began providing IDSS to Districts 7 (Miami) and 8 (New Orleans) of the U.S. Coast Guard on 8 October, when Michael was forecast to reach the districts' search and rescue regions. A total of six briefings were provided to District 7 and four briefings for District 8 through 11 October in support of their life-saving mission.

For media support, the NHC media pool began operations on 7 October and provided over 100 interviews in English or Spanish during the threat of Michael. In addition, more than 100 interviews were conducted by phone with radio and print media. NHC also maintained an active social media presence during Michael, as posts on Twitter generated 36 million impressions during the period from 6–12 October, while video and postings on Facebook generated over a million views and 6 million post engagements.

During the seven-day threat from Michael, the NHC web site had approximately 1.5 billion web hits with about 85 million page views. The majority of the page views went to the graphical products, particularly the cone graphic, the key messages, and the wind speed probabilities.

Acknowledgements

Laura Alaka contributed to the storm surge section of the report, and John Cangialosi created the track map. Stacy Stewart performed subjective the Doppler radar analysis and contributed the analysis section, while Michael Bell and Ting-Yu Cha of Colorado State University performed the GBVTD analysis. Tiffany Hersey, Dennis Feltgen, and Matt Onderlinde contributed to the IDSS section. NWS Weather Forecast Offices (WFOs) in Tallahassee, Tampa, and Jacksonville, Florida, Birmingham, Alabama, Atlanta, Georgia, Greenville, Columbia, and Charleston, South Carolina, Raleigh, Wilmington, and Morehead City, North Carolina, and Blacksburg and Wakefield, Virginia, provided data for this report. In particular, Jessica Fieux of WFO Tallahassee provided assistance in collecting fatality and damage information. Roger Edwards of the Storm Prediction Center provided the tornado information. The National Data Buoy Center and the National Ocean Service provided many of the coastal, oceanic, and tide gauge data used in the report. The United States Geological Survey provided data from its network of portable tide and pressure sensors, while Weather Flow provided data from its coastal stations and the Florida Coastal Monitoring Program portable towers. The North Carolina ECONET and the Georgia Automated Environmental Monitoring Network provided much of the data from their stations, and the Meteorological Service of Cuba provided the data for Michael's impact there.

References

Brown, D. P., J. L. Franklin, and C. Landsea, 2006: A fresh look at tropical cyclone pressure-wind relationships using recent reconnaissance-based best track data (1998–2005). Preprints, *25th Conf. on Hurricanes and Tropical Meteorology,* Monterey, CA, Amer. Meteor. Soc., 3B.5. [Available online at http://ams.confex.com/ams/pdfpapers/107190.pdf].

Courtney, J., and J. A. Knaff, 2009: Adapting the Knaff and Zehr wind pressure relationship for operational use in tropical cyclone warning centres. *Aust. Meteor. Oceanogr. J.*, **58,** 167–179.

Dvorak, V. F., 1984: Tropical cyclone intensity analysis using satellite data. NOAA Tech. Rep. 11, 45 pp

Table 1. Best track for Hurricane Michael, 7–11 October 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
06 / 1800	17.8	86.6	1006	25	low
07 / 0000	18.1	86.9	1004	25	"
07 / 0600	18.4	86.8	1004	30	tropical depression
07 / 1200	18.8	86.4	1003	35	tropical storm
07 / 1800	19.1	85.7	999	45	"
08 / 0000	19.7	85.5	996	50	"
08 / 0600	20.2	85.4	984	60	"
08 / 1200	20.9	85.1	982	65	hurricane
08 / 1800	21.7	85.1	977	75	"
09 / 0000	22.7	85.2	971	85	"
09 / 0600	23.7	85.8	973	85	"
09 / 1200	24.6	86.2	968	90	"
09 / 1800	25.6	86.4	961	100	"
10 / 0000	26.6	86.5	952	110	"
10 / 0600	27.7	86.6	945	120	"
10 / 1200	29.0	86.3	934	125	"
10 / 1800	30.2	85.4	920	135	"
11 / 0000	31.5	84.5	957	80	"
11 / 0600	32.8	83.2	979	50	tropical storm
11 / 1200	34.1	81.7	987	45	"
11 / 1800	35.6	80.0	991	45	"
12 / 0000	36.5	77.7	988	50	extratropical

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
12 / 0600	37.3	75.0	983	60	“
12 / 1200	39.1	70.6	980	60	“
12 / 1800	41.1	66.1	977	60	“
13 / 0000	43.1	61.5	975	65	“
13 / 0600	44.8	55.7	975	65	“
13 / 1200	46.4	48.2	975	65	“
13 / 1800	47.6	40.7	975	65	“
14 / 0000	48.4	33.1	975	65	“
14 / 0600	48.8	26.1	975	65	“
14 / 1200	48.6	20.7	975	60	“
14 / 1800	47.5	16.4	978	55	“
15 / 0000	45.9	13.5	982	55	“
15 / 0600	44.4	11.4	989	50	“
15 / 1200	42.8	10.3	996	35	“
15 / 1800	41.2	10.0	1001	35	“
16 / 0000					dissipated
10/1730	30.0	85.5	919	140	Maximum wind, minimum pressure, and landfall on the Florida Panhandle near Tyndall Air Force Base

Table 2. Selected ship reports with winds of at least 34 kt for Hurricane Michael, 7–11 October 2018.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
07 / 0600	C6FM8	21.4	86.1	060 / 35	1007.6
07 / 2200	J8NZ	24.6	80.7	050 / 35	1011.0
08 / 0300	C6SJ5	20.8	83.8	100 / 40	1008.0
08 / 0600	C6SJ5	20.2	82.9	120 / 39	1006.9
08 / 0600	3FPS9	20.2	82.8	090 / 45	1004.9
08 / 0600	C6FM8	24.9	80.0	120 / 40	1011.9
08 / 1800	3FPS9	18.5	82.6	140 / 45	1005.9
08 / 2100	WNFQ	24.5	84.6	090 / 37	1004.7
09 / 0300	WNFQ	24.2	83.4	120 / 44	1006.9
09 / 0500	3FOB5	26.0	82.9	090 / 45	1009.7
09 / 0700	H3VS	22.7	84.3	180 / 40	1002.1
09 / 0900	3EMB9	22.1	86.2	250 / 35	996.5
09 / 1000	H3VS	22.5	84.7	180 / 45	1002.5
09 / 1300	C6XS8	24.0	80.8	130 / 35	1011.0
09 / 1800	C6XS8	23.5	82.2	160 / 35	1008.0
09 / 2200	3FOB5	22.6	84.7	190 / 35	1005.9
11 / 1200	D5OB2	31.9	80.4	210 / 40	1002.0
11 / 1400	VRYO4	32.2	79.6	230 / 40	1004.0
12 / 0000	9V3144	36.5	75.2	160 / 35	1002.0
12 / 0600	9HA385	37.3	74.8	320 / 40	990.0
12 / 0800	9HA385	36.6	75.2	300 / 42	1001.0
12 / 1700	VRFX6	36.9	66.0	230 / 40	1003.8
12 / 2000	WARL	46.0	55.8	110 / 36	996.7
13 / 0400	C6BR3	43.4	64.8	320 / 45	1002.0
13 / 0400	VXKF	47.3	58.8	060 / 36	988.9
13 / 0600	YJQN7	46.7	48.0	110 / 35	995.1
13 / 1500	VCXF	46.4	48.4	310 / 37	989.7
13 / 1600	9HOF8	49.0	46.2	010 / 44	993.0
14 / 0000	A8XY2	46.1	31.8	230 / 50	989.0

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
14 / 0200	KABP	48.7	29.1	110 / 37	977.2
14 / 0600	A8XY2	46.7	29.5	330 / 52	994.0
14 / 0700	KABP	48.9	27.0	010 / 60	985.7
14 / 1200	TBWUK9	48.1	22.0	040 / 50	976.9
14 / 2300	VRBK6	42.1	10.7	180 / 42	992.0
15 / 0300	9HA295	41.9	10.1	240 / 40	1002.0
15 / 0500	9HA295	41.1	10.1	270 / 54	1002.7
15 / 0600	CQIT6	40.9	11.8	230 / 40	1005.0
15 / 1800	WADP	35.9	7.5	270 / 35	1011.5

Table 3. Selected surface observations for Hurricane Michael, 7–11 October 2018.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Cuba									
Cuba-Francia (78309) (21.94N 82.97W)	08/2100	1005.2	8/1630	23	39				5.48
Cabo de San Antonio (78310) (21.87N 84.95W)	08/2020	974.7	08/2001	84	92				8.78
Santa Lucia (78312) (22.67N 83.97W)	08/2300	998.2	08/1700	27	50				6.82
Isabel Rubio (78313) (22.17N 84.10W)	08/2300	998.2	08/1400	38	65				10.88
San Juan y Martinez (78314) (22.28N 83.83W)	08/2240	1001.1	08/1628	37	55				10.40
Pinar del Rio (78315) (22.42N 83.68W)	08/2100	1001.6	08/2200	36	42				11.45
La Palma (78316) (22.77N 83.55W)	08/2300	1001.9	08/2040	21	42				10.85
Paso Real de San Diego (78317) (22.55N 83.30W)	08/2055	1003.2	08/1740	22	33				10.79
La Fe (78321) (21.73N 82.77W)	08/2100	1004.6	08/2145	36	45				4.52
Punta del Este (78324) (21.55N 82.53W)	08/2100	1005.7	08/1930		55				3.97
Offshore Oil Platforms									
MP 140B (KMIS) (29.30N 88.84W)			10/0515	33 (85 m)	45				
Main Pass 289C (KVKY) (29.23N 88.44W)			10/0515	41 (115 m)	52				
Viosca Knoll (KVOA) (29.23N 87.78W)			10/0450	52	62				
Buoys									
41004 NOAA (32.50N 79.10W)	11/1830	1003.3	11/1320	39 (4 m, 1-min)	45				
41008 NOAA (31.40N 80.87W)	11/0750	1002.1	11/0750	34 (5 m, 10-min)	43				
41013 NOAA (33.44N 77.74W)	11/1920	1001.4	11/1839	37 (4 m, 1-min)	45				
41025 NOAA (35.01N 75.40W)	12/0020	998.4	12/0002	43 (4 m, 1-min)	56				
41029 CORMP (32.80N 79.62W)	11/1208	1000.8	11/1308	31 (3 m)	52[l]				
41033 CORMP (32.28N 80.41W)	11/1408	1000.6	11/0708	29 (3 m)	43[l]				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
41037 CORMP (33.99N 77.36W)	11/2108	998.4	11/2208	31 (3 m)	45				
41062 UNC (35.78N 75.10W)	12/0300	994.8	12/0300	39 (4 m)	49				
41063 UNC (34.78N 75.94W)			12/0000	33 (4 m)	47				
41064 CORMP (34.21N 76.95W)	11/2208	997.9	11/2208	31 (3 m)	47				
42003 NOAA (25.93N 85.64W)	09/2010	992.1	09/2012	52 (4 m, 1-min)	62				
42012 NOAA (30.06N 87.55W)	10/1500	999.4	10/0748	37 (4 m, 1-min)	45				
42013 COMPS (27.17N 82.92W)	10/0900	1006.9	10/0130	25 (2.8 m)	35				
42022 COMPS (27.51N 83.74W)			10/0630	33 (3.2 m)	47				
42023 COMPS (26.01N 83.09W)	09/2000	1006.1	10/0030	29 (3.2 m)	37				
42039 NOAA (28.79N 86.01W)	10/0950	977.5[l]	10/0947	54[l] (5 m, 1-min)	66[l]				
42040 NOAA (29.21N 88.23W)	10/1010	1000.2	10/0510	31 (4m)	39				
44009 NOAA (38.46N 74.70W)	12/0650	989.5							
44014 NOAA (36.61N 74.84W)	12/0550	985.2	12/0547	51 (5 m, 1-min)	62				
44017 NOAA (40.69N 72.05W)	12/1150	993.7	12/1300	32 (5 m)	41				
44020 NOAA (41.49N 70.28W)	12/1610	992.2	12/1610	35 (4 m)	45				
44025 NOAA (40.25N 73.16W)	12/0950	993.0	12/0930	36 (5 m)	46				
44042 CBIBS (38.03N 76.34N)	12/0220	990.5	12/0310	45 (3 m)	54				
44058 CBIBS (37.57N 76.26W)	12/0330	987.3	12/0400	35 (3 m)	45				
44062 CBIBS (38.56N 76.42W)	12/0640	993.0	12/0150	29 (3 m)	41				
44064 CBIBS (37.00N 76.09W)	12/0400	986.1	12/0430	45 (3 m)	58				
44065 NOAA (40.37N 73.70W)	12/0810	995.8	12/1050	31 (4 m)	39				
44066 NOAA (39.57N 72.59W)	12/0850	989.9[l]	12/1050	38[l] (5m, 10-min)	50[l]				
44069 Stony Brook (40.70N 73.09W)			12/1030	25 (3 m)	36				
44072 CBIBS (37.20N 76.27W)			12/0400	39 (3 m)	49				
44137 Canada (42.26N 62.00W)	12/2300	978.8	13/0000	37 (5 m)					

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
44150 Canada (42.50N 64.02W)	12/2100	981.3	12/2200	37 (5 m)					
62442 UKMET (49.00N 16.50W)	14/1600	988.7	14/1400	40					
United States									
Florida									
International Civil Aviation Organization (ICAO) Sites									
Holmes County Arpt. (K1J0) (30.85N 85.60W)	10/1809	984.1[l]	10/1809	31[l]	45[l]				
Quincy (K2J9) (30.59N 84.56W)	10/1755	994.6[l]	10/1715	24[l]	36[l]				
Perry-Foley (K40J) (30.07N 83.57W)	10/2135	999.6	10/1835	23	39				
Defuniak Springs (K54J) (30.73N 86.15W)	10/1715	994.3[l]	10/1655	23[l]	34[l]				
Apalachicola Muni (KAAF) (29.72N 85.03W)	10/1653	985.9[l]	10/1700	55[l]	77[l]				
Crestview (KCEW) (30.79N 86.52W)	10/1953	995.2	10/2010	26	41				2.48
Cross City (KCTY) (29.62N 83.10W)	10/2115	1003.0	10/1935	24[l]	39[l]				1.17
Destin Executive Arpt. (KDTS) (30.40N 86.47W)	10/1753	992.3	10/1802	36	52				2.01
Panama City (KECP) (30.35N 85.80W)	10/1740	973.8[l]	10/1813	54[i]	79[i]				
Elgin AFB Duke Field (KEGI) (30.65N 86.52W)	10/1956	994.5	10/1953	26	38				
Key West (KEYW) (24.56N 81.76W)	09/2205	1008.5	08/2024	39	49				2.12
Eglin AFB Hurlbert Field (KHRT) (30.42N 86.68W)	10/1929	994.0	10/1921	36	47				
Marianna (KMAI) (30.80N 85.21W)	10/1653	995.6[l]	10/1922		89[l]				
MacDill AFB (KMCF) (27.85N 82.50W)	10/0856	1007.7	10/0252	29	35				
Milton North (KNDZ) (30.70N 87.02W)	10/1856	997.0	10/1717	25	39				
Mayport (KNRB) (30.39N 81.42W)	11/0652	1005.5	10/2052	25	35				1.12
Tyndall AFB (KPAM) (30.07N 85.59W)	10/1720	922.4[i]	10/1712	75[l]	121[l]				
St. Petersburg (KPIE) (27.91N 82.69W)	10/0853	1007.2	10/1529	24	34				1.12
Pensacola (KPNS) (30.47N 87.20W)	10/1753	999.3	10/1735	26	38				0.94
Sarasota (KSRQ) (27.40N 82.55W)	10/0853	1007.1	10/1600	25	37				1.00

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Tallahassee (KTLH) (30.40N 84.35W)	10/1953	989.8[l]	10/2005	41	62[l]				3.34
Eglin AFB/Destin/Ft. Walton Beach Arpt. (KVPS) (30.48N 86.53W)	10/1901	993.7	10/1706	27	41				2.37
Coastal-Marine Automated Network (C-MAN) Sites									
Cedar Key (CDRF1) (29.14N 83.03W)	10/2100	1004.9	10/1630	30 (10-min)	46				
Keaton Beach (KTNF1) (29.82N 83.59W)	10/2100	1000.7	10/1950	36 (10-min)	50				
Pulaski Shoals (PLSF1) (24.69N 82.77W)	09/2000	1007.0	08/2300	31 (18 m)	40				
Tyndall AFB Tower C (SGOF1) (29.41N 84.86W)	10/1700	990.6	10/1610	60 (35m, 10-min)	75				
National Ocean Service (NOS) Sites									
Apalachicola (APCF1) (29.73N 84.98W)	10/1748	985.3	10/1718	56 (7 m)	73	8.52		7.72	
Cedar Key (CKYF1) (29.13N 83.03W)	10/2124	1003.3	10/1742	30	46	4.52		4.09	
Clearwater Beach (CWBF1) (27.98N 82.83W)	10/2054	1007.0	10/2130	27 (7 m)	59	3.35		3.61	
Key West (KYWF1) (24.56N 81.81W)	9/1930	1008.3	8/2024	25 (15 m)	38	0.79		1.01	
Old Port Tampa (OPTF1) (27.86N 82.55W)	10/0854	1007.5	10/2106	24 (6.7 m)	34	2.29		2.22	
Panama City (PACF1) (30.15N 85.67W)	10/1748	937.5	10/1730	78[l] (8 m)	104[l]	5.62		5.31	
Panama City Beach (PCBF1) (30.21N 85.88W)	10/1742	972.6	10/1906	53[l] (9 m)	76[l]	4.33		3.86	
Pensacola (PCLF1) (30.40N 87.21)	10/1736	998.5				3.21		2.43	
Tampa Cruise T2 (TPAF1) (27.93N 82.43W)			10/1700	24 (23 m)	35				
National Estuarine Research Reserve System Stations									
East Point (APXF1) (29.79N 84.88W)			10/1730	43[i] (5 m)	59[i]				
U. South Florida COMPS Land Stations									
Fred Howard Park (FHPF1) (28.15N 82.80W)	10/2106	1007.3	10/1800	28 (9.4 m)	36				
Shell Point (SHPF1) (30.06N 84.29W)	10/1948	993.5	10/1754	48 (5.7 m)	65				
Weatherflow									
Crystal Beach (XCBS) (30.38N 86.41W)			10/1823	24 (14 m)	44				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Egmont Channel (XEGM) (27.61N 82.76W)			10/1151	31 (13 m)	42				
Fair Point Pensacola (XFPL) (30.37N 87.21W)			10/1542	31 (4.6 m)	41				
Fort Walton Beach (XFWB) (30.40N 86.56W)			10/1753	35 (7.3 m)	46				
Gulf Breeze (XGBZ) (30.36N 87.16W)			10/1105	25 (15 m)	38				
Huguenot Park (XHUP) (30.41N 81.41W)			10/2105	27 (12 m)	41				
Key West CG (XKYW) (24.57N 81.80W)			08/2031	30 (10 m)	42				
Buck Island (XJAK) (30.40N 81.50W)	11/0725	1003.0	10/1655	25	37				
Jacksonville Beach Pier (XJAX) (30.29N 81.39W)	11/0735	1004.0	10/2045	30 (12 m)	40				
Lewis (XLWS) (29.90N 81.30W)	11/0749	1004.0	10/1659	23[l] (15 m)	34				
Okaloosa Island (XOFP) (30.39N 86.59W)			10/1725	32 (14 m)	45				
Panama City Beach (XPAN) (30.22N 85.88W)			10/1752	50 (15 m)	65				
Sanibel DB 4 (XSBI) (26.47N 82.05W)			10/0017		34 (4.9 m)				
Skyway Fishing Pier (XSKY) (27.60N 82.65W)			10/1841	28 (16 m)	38				
Smith Shoal Light (XSMS) (24.72N 81.92W)			09/2020	31 (19 m)	38				
St. Andrews Bay (XSTA) (30.13N 85.72W)			10/1652	65[i] (9 m, 5-min)	87[i]				
St. George Island- Eastpoint (XSTG) (29.66N 84.86W)			10/1714	59 (15 m)	71				
Tampa Bay Cut J (XTAM) (27.77N 82.57W)			10/1705	29 (15 m)	34				
Public/Other									
Callaway/Morgerman (30.15N 85.59W)	10/1744	923.2							
Panama City/Morgerman (30.18N 85.65W)	10/1745	939.7							
Panama City/Thompson (30.19N 85.64W)	10/1748	940.0	10/1743		73				
WeatherStem									
Apalachee Regional Park (30.42N 84.15W)	10/2135	993.6[l]	10/1944		44[l]				
Dean Bozeman School (30.39N 85.69W)	10/1722	975.9[l]	10/1602		37[l]				
Holmes County HS (30.78N 85.69W)	10/1819	985.5[l]	10/1741		38[l]				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Jefferson County EOC (30.50N 83.88W)	10/2102	992.9[I]	10/2221		42[I]				
Medart - Wakulla HS (30.10N 84.38W)	10/1819	993.6[I]	10/1536		46[I]				
Panama City (FSU) (30.18N 85.72W)	10/1721	956.6[I]	10/1716		101[I]				
Port St. Joe ES (29.79N 85.29W)	10/1506	986.3[I]	10/1637		98[I]				
Port St. Joe - Gulf Co EOC (29.81N 85.29W)	10/1721	969.8[I]	10/1641		66[I]				
St. George Island Bridge (29.65N 84.88W)	10/1616	993.6[I]	10/1612		70[I]				
St. Teresa - FSU Coastal and Marine Lab (29.91N 84.51W)	10/1721	991.8[I]	10/1745		36[I]				
Tallahassee Ballard Partners (30.44N 84.28W)	10/2135	989.4[I]	10/1911		55[I]				
Tallahassee Challenger LC (30.44N 84.28W)	10/1850	993.5[I]	10/1850		47[I]				
Tallahassee Community Col (30.44N 84.34W)	10/2116	988.0[I]			49[I]				
Tallahassee - Conley ES (30.41N 84.22W)	10/2116	988.0[I]	10/1938		46[I]				
Tallahassee (Domi) (30.43N 84.29W)	10/2131	989.4	10/2024		41				
Tallahassee (FAMU DRS) (30.41N 84.29W)	10/2115	993.6	10/1900		45				
Tallahassee (FSU) (30.43N 84.30W)	10/2116	993.5[I]	10/1825		49[I]				
Tallahassee FSU Schools (30.38N 84.22W)	10/2116	990.2[I]	10/1926		45[I]				
Florida Coastal Monitoring Program (FCMP)									
FCMP T2 Beacon Hill (29.91N 85.38W)			10/1732	94 (15 m, 5-min)	110				
FCMP T3 Tyndall AFB (30.02N 85.53W)	10/1713	920.2	10/1657	92[I] (15 m, 1-min)	112[I]				
Florida Automated Weather Network (FAWN)									
Carrabelle (29.84N 84.70W)	10/1745	990.0	10/1900	30 (10 m)	46				
Defuniak Springs (30.88N 86.21W)			10/1900		34				
Marianna (30.85N 85.17W)			10/2145	49 (10 m)	68				
Mayo (30.08N 83.23W)			10/2130		35				
Quincy (30.55N 84.60W)			10/2100	33 (10 m)	48				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Remote Automated Weather Stations (RAWS)									
Bloxham (BFSF1) (30.36N 84.61W)									4.48
St. Marks West (FRWF1) (30.01N 84.42W)			10/1946		49				2.24
Ochopee (OCOF1) (25.90N 81.32W)			09/2303		37				0.95
St. Marks East (SAMF1) (30.14N 84.14W)			10/2214		48				2.08
Sanborn (SNDF1) (30.07N 84.59W)			10/1913		31				4.71
Sumatra (SURF1) (30.02N 84.99W)			10/1704		46				4.89
Wilma (WHSF1) (30.18N 84.94W)			10/1849		61				
US Geological Survey (USGS) Storm Tide Sensors									
Mexico Beach (Bay Co.) (FLBAY03283) (29.95N 85.42W)	10/1714	929.7					15.55	14.7	
Alligator Point (Franklin Co.) (FLFRA26263) (29.89N 84.37W)							8.67	7.4	
Apalachicola (Franklin Co.) (FLFRA03276) (29.72N 84.98W)	10/1541	989.3					8.22	7.3	
East Point – St. George Island State Park (Franklin Co.) (FLFRA26257) (29.70N 84.76W)	10/1813	989.8					8.13	7.3	
Port St. Joe (Gulf Co.) (FLGUL26254) (29.73N 85.39W)							7.91	7.2	
Panacea – Ochlockonee Bay (Wakulla Co.) (FLWAL03369) (29.98N 84.38W)	10/1958	991.3					8.42	6.8	
Ecofina River (Taylor Co.) (FLTAY03362) (29.98N 84.38W)							8.75	6.8	
Dark Island (Taylor Co.) (FLTAY25003) (29.80N 83.59W)							7.73	6.1	
Keaton Beach (Taylor Co.) (FLTAY03356) (29.82N 83.59W)	10/1946	997.7					7.71	6.0	
Hagens Cove (Taylor Co.) (FLTAY03355) (29.77N 83.58W)							7.63	6.0	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Big Bend Wildlife Management Area (Taylor Co.) (FLTAY24950) (29.72N 83.49W)							7.30	5.7	
Steinhatchee River (Taylor Co.) (FLDIX03354) (29.67N 83.39W)							6.78	5.1	
Horseshoe Beach (Dixie Co.) (FLDIX03352) (29.44N 83.29W)							6.20	4.7	
Cow Creek (Dixie Co.) (FLDIX24951) (29.52N 83.37W)							5.90	4.4	
Shired Creek (Dixie Co.) (FLDIX03351) (29.40N 83.21W)	10/2105	1001.6					5.93	4.4	
Panama City Beach (Bay Co.) (FLBAY26247) (30.13N 85.74W)	10/1732	949.3					5.16	4.3	
Cedar Key (Levy Co.) (FLLEV24997) (29.21N 83.07W)							5.47	4.0	
Shalimar (Okaloosa Co.) (FLOKA03301) (30.44N 86.58W)	10/1832	992.6					3.31	2.7	
St. Marks (Wakulla Co.) (FLWAK03364) (30.15N 84.21W)	10/2002	991.7					9.38		
Aucilla River (Taylor Co.) (FLTAY17325) (30.12N 83.98W)	10/2006	995.7					9.00		
Perry – Spring Warrior Fish Camp (Taylor Co.) (FLTAY03359) (29.93N 83.67W)							8.26		
USGS High Water Marks									
Mexico Beach (Bay Co.) (FLBAY27716) (29.95N 85.41W)							18.79	11.6	
Mexico Beach (Bay Co.) (FLBAY27711) (29.95N 85.42W)							16.86	10.5	
Port St. Joe (Gulf Co.) (FLGUL27803) (29.72N 85.30W)							12.05	7.9	
Crawfordville (Wakulla Co.) (FLWAK27563) (30.07N 84.36W)							11.73	7.9	
Mexico Beach (Bay Co.) (FLBAY27706) (29.95N 85.43W)							17.91	7.8	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Carrabelle (Franklin Co.) (FLFRA27517) (29.84N 84.68W)							9.08	7.3	
Mexico Beach (Bay Co.) (FLBAY27720) (29.94N 85.40W)							16.78	6.6	
Crawfordville (Wakulla Co.) (FLWAK27570) (30.06N 84.28W)							10.29	6.5	
Porter Island (Wakulla Co.) (FLWAK27568) (30.02N 84.37W)							10.23	6.4	
Mexico Beach (Bay Co.) (FLBAY27714) (29.95N 85.42W)							16.86	6.3	
Port St. Joe (Gulf Co.) (FLGUL27729) (29.91N 85.37W)							15.79	6.3	
Crawfordville (Wakulla Co.) (FLWAK27548) (30.08N 84.33W)							10.81	6.3	
Port St. Joe (Gulf Co.) (FLGUL27682) (29.85N 85.32W)							11.01	6.1	
Crawfordville (Wakulla Co.) (FLWAK27571) (30.07N 84.31W)							10.14	6.1	
Doyle Creek (Franklin Co.) (FLFRA27537) (29.82N 84.90W)							9.59	6.0	
Mexico Beach (Bay Co.) (FLBAY27709) (29.95N 85.42W)							17.64	5.9	
Crawfordville (Wakulla Co.) (FLWAK27653) (30.06N 84.28W)							10.14	5.9	
St. Joseph Peninsula (Gulf Co.) (FLGUL27700) (29.71N 85.38W)							10.59	5.8	
Crawfordville (Wakulla Co.) (FLWAK27548) (30.08N 84.33W)							10.22	5.8	
St. Marks (Wakulla Co.) (FLWAK27683) (30.18N 84.24W)							9.07	5.8	
St. Marks (Wakulla Co.) (FLWAK27777) (30.16N 84.22W)							9.71	5.8	
Port St. Joe (Gulf Co.) (FLGUL27588) (29.79N 85.29W)							10.89	5.7	
Apalachicola (Franklin Co.) (FLFRA27666) (29.73N 84.98W)							8.41	5.6	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Crawfordville (Wakulla Co.) (FLWAK27771) (30.08N 84.33W)							10.41	5.6	
Mexico Beach (Bay Co.) (FLBAY27713) (29.95N 85.42W)							18.41	5.5	
Port St. Joe (Gulf Co.) (FLGUL27518) (29.84N 85.32W)							11.18	5.5	
Port St. Joe (Gulf Co.) (FLGUL27685) (29.69N 85.27W)								5.5	
Cape San Blas (Gulf Co.) (FLGUL27789) (29.69N 85.32W)							10.91	5.5	
Carrabelle (Franklin Co.) (FLFRA27524) (29.85N 84.67W)							9.22	5.5	
Crawfordville (Wakulla Co.) (FLWAK27645) (30.07N 84.28W)							9.00	5.5	
St. George Island (Franklin Co.) (FLFRA27605) (29.65N 84.91W)							7.96	5.4	
Panacea (Wakulla Co.) (FLWAK27736) (29.97N 84.35W)							8.90	5.4	
St. Joseph Peninsula (Gulf Co.) (FLGUL27814) (29.78N 85.40W)							10.05	5.2	
Crawfordville (Wakulla Co.) (FLWAK27554) (30.06N 84.29W)							10.71	5.1	
Panacea (Wakulla Co.) (FLWAK27737) (29.97N 84.35W)							8.72	5.0	
Port St. Joe (Gulf Co.) (FLGUL27687) (29.69N 85.25W)							11.40	4.9	
Port St. Joe (Gulf Co.) (FLGUL27690) (29.70N 85.20W)							11.44	4.9	
Mexico Beach (Bay Co.) (FLBAY27718) (29.94N 85.41W)							18.93	4.8	
St. George Island (Franklin Co.) (FLFRA27677) (29.68N 84.82W)							9.02	4.8	
Panacea (Wakulla Co.) (FLWAK27736) (29.97N 84.35W)							9.35	4.8	
Crawfordville (Wakulla Co.) (FLWAK27773) (30.11N 84.26W)							8.07	4.8	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Carrabelle (Franklin Co.) (FLFRA27527) (29.83N 84.68W)							9.75	4.7	
St. Marks (Wakulla Co.) (FLWAK03364) (30.15N 84.21W)							9.60	4.7	
Carrabelle (Franklin Co.) (FLFRA27566) (29.85N 84.66W)							9.35	4.6	
St. Marks (Wakulla Co.) (FLWAK27778) (30.16N 84.20W)							8.80	4.6	
Aucilla River (Taylor Co.) (FLTAY17325) (30.12N 83.98W)							9.15	4.6	
Carrabelle (Franklin Co.) (FLFRA27495) (29.87N 84.61W)							10.41	4.5	
Alligator Point (Franklin Co.) (FLFRA27580) (29.90N 84.42W)							9.02	4.4	
Crawfordville (Wakulla Co.) (FLWAK27774) (30.08N 84.33W)							10.38	4.4	
Mexico Beach (Bay Co.) (FLBAY27701) (29.95N 85.43W)							17.47	4.3	
St. George Island (Franklin Co.) (FLFRA27606) (29.65N 84.90W)							13.01	4.3	
Carrabelle (Franklin Co.) (FLFRA27599) (29.91N 84.55W)							10.41	4.3	
Panacea (Franklin Co.) (FLFRA27615) (29.92N 84.48W)							10.78	4.3	
Panacea (Franklin Co.) (FLFRA27610) (29.99N 84.41W)							9.38	4.3	
Panacea (Franklin Co.) (FLFRA27569) (30.03N 84.37W)							9.20	4.3	
St. Joseph Peninsula (Gulf Co.) (FLGUL27704) (29.72N 85.39W)							10.42	4.2	
Sopchoppy – Ochlockonee River (Franklin Co.) (FLFRA27719) (29.98N 84.49W)							7.53	4.2	
Crawfordville (Wakulla Co.) (FLWAK27795) (30.11N 84.26W)							7.60	4.2	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Carrabelle (Franklin Co.) (FLFRA27539) (29.79N 84.75W)							9.32	4.1	
Panacea (Wakulla Co.) (FLWAK27740) (29.98N 84.38W)							9.25	4.1	
Crawfordville (Wakulla Co.) (FLWAK27775) (30.08N 84.33W)							10.34	4.1	
St. Marks (Wakulla Co.) (FLWAK27804) (30.07N 84.18W)							9.80	4.1	
Port St. Joe (Gulf Co.) (FLGUL27611) (29.85N 85.34W)							10.68	4.0	
Port St. Joe (Gulf Co.) (FLGUL27688) (29.69N 85.23W)							10.88	4.0	
Panacea (Wakulla Co.) (FLWAK27625) (29.98N 84.39W)							9.03	4.0	
Crawfordville (Wakulla Co.) (FLWAK27559) (30.06N 84.29W)							10.02	4.0	
Carrabelle (Franklin Co.) (FLFRA27550) (29.84N 84.66W)							9.17	3.9	
Panacea (Wakulla Co.) (FLWAK27601) (29.98N 84.42W)							9.06	3.9	
Crawfordville (Wakulla Co.) (FLWAK27548) (30.08N 84.33W)							10.35	3.9	
Crawfordville (Wakulla Co.) (FLWAK27674) (30.20N 84.18W)							9.29	3.9	
Lamont (Taylor Co.) (FLTAY27813) (30.13N 83.97W)							8.72	3.9	
Port St. Joe (Gulf Co.) (FLGUL27788) (29.68N 85.31W)							11.03	3.8	
Alligator Point (Franklin Co.) (FLFRA27669) (29.89N 84.38W)							8.95	3.8	
Alligator Point (Franklin Co.) (FLFRA27631) (29.89N 84.38W)							9.01	3.8	
Crawfordville (Wakulla Co.) (FLWAK27780) (30.16N 84.20W)							9.54	3.8	
Panacea (Wakulla Co.) (FLWAK27637) (29.98N 84.39W)							9.02	3.7	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Tyndall Air Force Base (Bay Co.) (FLBAY27703) (29.97N 85.47W)							15.35	3.6	
Port St. Joe (Gulf Co.) (FLGUL27519) (29.85N 85.33W)							10.10	3.6	
Port St. Joe (Gulf Co.) (FLGUL27676) (29.69N 85.28W)							10.00	3.6	
St. George Island (Franklin Co.) (FLFRA27681) (29.67N 84.83W)							5.44	3.6	
Carrabelle (Franklin Co.) (FLFRA27526) (29.82N 84.71W)							11.82	3.6	
Carrabelle (Franklin Co.) (FLFRA27549 (29.85N 84.66W)							8.95	3.6	
Panacea (Wakulla Co.) (FLWAK27639) (29.98N 84.39W)							8.79	3.6	
Port St. Joe (Gulf Co.) (FLGUL27727) (29.90N 85.36W)							14.21	3.5	
Panacea (Wakulla Co.) (FLWAK27741) (29.98N 84.38W)							8.83	3.5	
St. George Island (Franklin Co.) (FLFRA27600) (29.64N 84.92W)							7.96	3.4	
St. Marks (Wakulla Co.) (FLWAK27776) (30.16N 84.22W)							8.05	3.4	
St. Joseph Peninsula (Gulf Co.) (FLGUL27708) (29.69N 85.37W)							10.31	3.3	
Apalachicola (Franklin Co.) (FLFRA27661) (29.73N 84.99W)							8.29	3.3	
St. George Island (Franklin Co.) (FLFRA27694) (29.69N 84.79W)							8.54	3.3	
Panacea (Wakulla Co.) (FLWAK27640) (29.98N 84.39W)							8.86	3.3	
Crawfordville (Wakulla Co.) (FLWAK27572) (30.08N 84.30W)							8.70	3.3	
Cedar Key (Levy Co.) (FLLEV03349) (29.14N 83.03W)							5.75	3.3	
Indian Pass (Gulf Co.) (FLGUL03263) (29.68N 85.22W)							9.75	3.2	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
St. George Island (Franklin Co.) (FLFRA27604) (29.64N 84.91W)							7.76	3.2	
St. George Island (Franklin Co.) (FLFRA27680) (29.68N 84.82W)							10.06	3.2	
Eastpoint (Franklin Co.) (FLFRA27546) (29.77N 84.88W)							10.15	3.2	
Sopchoppy (Franklin Co.) (FLFRA27617) (29.92N 84.48W)							9.50	3.2	
Port St. Joe (Gulf Co.) (FLGUL27613) (29.87N 85.34W)							10.85	3.1	
Panacea (Wakulla Co.) (FLWAK27644) (29.98N 84.41W)							9.19	3.1	
Port St. Joe (Gulf Co.) (FLGUL27678) (29.89N 85.36W)							11.99	3.0	
Alligator Point (Franklin Co.) (FLFRA27792) (29.95N 84.34W)							8.09	3.0	
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Chipola River (ALTF1) (30.53N 85.17W)									4.02
Chattahoochee (CHAF1) (30.70N 84.86W)									3.70
Scott's Ferry (SCTF1) (30.29N 85.14W)									5.05
Chipola River (WWCF1) (30.09N 85.18W)									3.89
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Lynn Haven 1.6 SSE (FL-BY-13) (30.22N 85.64W)									11.62
Havana (FL-GD-7) (30.56N 84.46W)									4.07
Alford 0.6 SSE (FL-JK-2) (30.69N 85.39W)									10.82
Marianna 3.9E (FL-JK-3) (30.77N 85.17W)									6.47
Hosford (FL-LB-3) (30.35N 84.82W)									5.95
Midway 6.9SW (FL-LN-18) (30.42N 84.54W)									4.05
Tallahassee 6.2E (FL-LN-60) (30.46N 84.18W)									3.79
Vernon 10.6WSW (FL-WS-1) (30.57N 85.87W)									4.66

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Sunny Hills 3.3N (FL-WS-3) (30.59N 85.58W)									10.45
Defuniak Springs 5.3 NW (FL-WT-13) (30.78N 86.18W)									3.57
Georgia									
International Civil Aviation Organization (ICAO) Sites									
Donaldsonville (K17J) (31.00N 84.88W)	10/1930	983.9[I]	10/1915	39[I]	58[I]				
Louisville (K2J3) (32.99N 82.38W)	11/0710	987.1[I]	11/0610	35[I]	48[I]				
Butler (K6A1) (32.57N 84.25W)	11/0335	988.7	11/0255	29	43				
Albany (KABY) (31.54N 84.18W)	10/2340	978.7[I]	10/2335	45[I]	64[I]				
Americus (KACJ) (32.11N 84.19W)	11/0015	987.8[I]	10/2335	26[I]	38[I]				
Augusta (KAGS) (33.38N 81.97W)	11/0953	986.5	11/0925	30	45				3.35
Bacon County (KAMG) (31.54N 82.50W)	11/0553	998.1	11/0320	30	44				0.84
Atlanta (KATL) (33.64N 84.43W)	11/0815	998.6	11/0620	25	35				3.86
Waycross (KAYS) (31.25N 82.40W)	11/0535	1000.1	11/0635	26	37				
Bainbridge (KBGE) (30.97N 84.63W)	10/1950	985.5[I]	10/1950	30[I]	43[I]				2.98
Baxley (KBHC) (31.71N 82.39W)	11/0555	997.4	11/0535	27	38				
Blakely (KBIJ) (31.39N 84.89W)	10/1955	991.0[I]	10/1955	21[I]	37[I]				
Crisp County (KCKF) (31.99N 83.77W)	11/0110	986.8[I]	11/0110	35[I]	44[I]				
Columbus (KCSG) (32.53N 84.93W)	11/0220	994.7	11/0325	25	36				3.34
Claxton (KCWV) (32.20N 81.88W)	11/0655	996.8[I]	11/0355	20[I]	36[I]				
Camilla (KCXU) (31.21N 84.24W)	10/2055	991.2[I]	10/2055	30[I]	42[I]				4.11
Dublin (KDBN) (32.56N 82.99W)	11/0435	988.5[I]	11/0435	30[I]	53[I]				
Augusta (KDNL) (33.47N 82.03W)	11/0953	985.9	11/0907	26	41				3.60
Eastman (KEZM) (32.21N 83.13W)	11/0415	987.1[I]	11/0415	36[I]	55[I]				
Atlanta Falcon Field (KFFC) (33.35N 84.57W)	11/0535	998.7	11/0728		33				3.92
Atlanta Fulton County (KFTY) (33.78N 84.52W)	11/0753	998.6	11/0853		28				6.09

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Fitzgerald (KFZG) (31.68N 83.27W)	11/0315	990.7[I]	11/0315	32[I]	40[I]				
Homerville (KHOE) (31.06N 82.77W)	11/0115	999.4	11/0055	25	40				
Thompson-McDuffie (KHQU) (33.53N 82.52W)	11/0915	985.9	11/0615	25	36				3.63
Ft. Stewart (KLHW) (31.89N 81.56W)	11/0656	999.2	11/1356	22	34				2.31
Ft. Benning-Lawson (KLSF) (32.33N 84.83W)	11/0131	993.2	11/0356	28	42				
Macon (KMCN) (32.69N 83.65W)	11/0505	983.2	11/0355	33	46				3.76
Dobbins AFB (KMGE) (33.91N 84.52W)	11/0656	999.4	11/0556		31				4.02
Moultrie (KMGR) (31.08N 83.80W)	10/2355	990.8	11/0010	28	42				
Thomaston (KOPN) (32.96N 84.26W)	11/0435	993.2	11/0755	20	34				
Perry-Houston Co (KPXE) (32.51N 83.77W)	11/0435	980.9	11/0320	32	46				
Savannah (KSAV) (32.13N 81.20W)	11/0753	999.3	11/0653	32	46				2.51
Swainsboro (KSBO) (32.61N 82.37W)	11/0655	990.5[I]	11/0555	35[I]	46[I]				
St Simons Island (KSSI) (31.15N 81.38W)	11/0753	1003.2	11/1025	25	34				1.30
Savannah (KSVN) (32.01N 81.13W)	11/0756	999.6	11/0525	23	34				2.10
Statesboro (KTBR) (32.49N 81.74W)	11/0735	995.4	11/0535	26	43				
Tifton (KTMA) (31.43N 83.49W)	11/0135	990.7	11/0115	33	51				
Thomasville (KTVI) (30.90N 83.88W)	10/2215	992.6[I]	10/2215	31[I]	42[I]				
Valdosta Moody AFB (KVAD) (30.97N 83.20W)	10/2300	996.9	11/0158	29	42				2.03
Vidalia (KVDI) (32.19N 82.37W)	11/0635	993.6	11/0635	31	42				
Valdosta (KVLD) (30.79N 83.28W)	10/2353	998.4	10/2251	30	41				1.73
Warner Robins AFB (KWRB) (32.63N 83.60W)	11/0517	981.0	11/0702	32	41				4.08
National Ocean Service (NOS) Sites									
Fort Pulaski (FPKG1) (32.03N 80.90W)	11/0812	1000.9	11/1930	25 (7 m)	38	2.29		1.78	
National Estuarine Research Reserve System Stations									
Sapelo Island (SAXG1) (31.42N 81.30W)	11/0815	1002.4	11/0500	30 (10 m)	42				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Weatherflow									
Jekyll Island (XJEK) (31.05N 81.41W)			11/0247	32 (10 m)	43				
Tybee Island N (XTYB) (32.02N 80.84W)	11/0849	999.0	11/0429	25 (10 m)	39				
Tybee Island S (XTYE) (31.99N 80.85W)	11/0902	999.0	11/0812	38 (9 m)	50				
Public/Other									
Ichauway Research Center CRN (31.31N 84.47W)									5.07
WeatherStem									
Leesburg- Lee County HS (31.73N 84.16W)	10/2102	985.5[l]	10/2305		44[l]				
Tifton (31.47N 83.53W)		990.5[l]			44[l]				
Moultrie (31.13N 83.71W)	10/2345	990.0[l]	10/2305		38[l]				
Georgia Automated Environmental Monitoring Network									
Alapaha (32.34N 83.24W)	11/0130	993.8	11/0345	22 (3 m, 15-min)	43				1.80
Albany USMC Base (31.55N 84.05W)	11/0115	976.3	11/0100	26 (3 m, 15-min)	57				4.26
Alpharetta (34.09N 84.22W)									3.41
Arabi (31.83N 83.82W)	11/0230	977.9	11/0215	40 (4 m, 15-min)	66				2.20
Arlington (31.35N 84.63W)	10/2315	956.5	11/0015	21 (3 m, 15-min)	46				5.07
Attapulgus (30.76N 84.48W)	10/2130	980.0	10/2215	26 (3 m, 15-min)	60				4.05
Ball Ground (34.29N 84.38W)									3.21
Butler (32.55N 84.19W)									4.52
Byromville (32.19N 83.88W)	11/0330	975.8	11/0145	26 (4 m, 15-min)	50				4.18
Byron (32.66N 83.74W)									5.00
Cairo (30.86N 84.23W)	10/2215	985.6	10/2230	33 (3 m, 15-min)	58				3.00
Camilla (31.28N 84.29W)	10/2330	976.7	10/2345	26 (3 m, 15-min)	64				4.16
Cordele (32.02N 83.94W)	11/0245	973.0	11/0330	21 (4 m, 15-min)	47				4.59

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Covington (33.44N 83.84W)									4.81
Dallas (33.89N 84.84W)									7.80
Dawson (31.75N 84.44W)	11/0100	970.8	10/2345	24 (3 m, 15-min)	55				7.66
Dawson HHREC (31.73N 84.39W)	11/0100	967.2	11/0000	32 (3 m, 15-min)	60				6.58
Dearing (33.37N 82.40W)									3.79
Dixie (30.79N 83.67W)	11/0015	993.4	10/2300	21 (3 m, 15-min)	41				1.89
Donalsonville Airport (31.01N 84.88W)	10/2145	947.5	10/2130	56 (3 m, 15-min)	100				4.81
Dublin 32.50N 82.92W)	11/0600	984.6	11/0615	23 (4 m, 15-min)	41				2.71
Ducker (31.53N 84.37W)	11/0030	965.6	11/0045	13 (3 m, 15-min)	39				4.68
Dunwoody (33.99N 84.36W)									3.81
Eatonton (33.40N 83.49W)									3.62
Elberton (34.02N 82.61W)									3.80
Fort Valley (32.53N 83.89W)									4.65
Georgetown (31.77N 85.06W)	10/2345	984.0	11/0045	21 (3 m, 15-min)	44				6.41
Griffin (33.26N 84.28W)									3.77
Hatley (31.92N 83.63W)	11/0300	982.0	11/0300	27 (4 m, 15-min)	55				4.45
Jeffersonville (32.68N 83.36W)	11/0545	980.8	11/0445	16 (4 m, 15-min)	41				5.33
Johns Creek (34.00N 84.19W)									3.04
Jonesboro (33.52N 84.31W)									4.26
McRae (32.08N 82.90W)	11/0500	988.8	11/0430	18 (4 m, 15-min)	46				2.66
Moultrie (31.14N 83.72W)	11/0015	990.4	10/2315	26 (3 m, 15-min)	49				2.52
Newman (31.79N 84.49W)									6.73
Newton (31.22N 84.48W)	10/2300	968.2	10/2300	17 (3 m, 15-min)	41				4.01
Pine Mountain (32.84N 84.84W)									4.97
Plains (32.05N 84.37W)	11/0130	981.1	11/0330	22 (4 m, 15-min)	39				6.26

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Roopville (33.42N 85.06W)									5.52
Sasser (31.70N 84.37W)	11/0100	966.7	10/2345	29 (3 m, 15-min)	60				6.66
Seminole State Park (30.80N 84.88W)	10/2100	958.3	10/2100	25 (3 m, 15-min)	69				4.48
Shellman (31.74N 84.61W)	11/0030	973.3	10/2330	29 (3 m, 15-min)	55				7.68
Sparta (33.28N 82.97W)									3.15
Steam Mill (30.96N 84.95W)	10/2130	949.8	10/2015	35 (3 m, 15-min)	72				5.16
Tennille (32.93N 82.80W)	11/0715	983.3	11/0600	22 (4 m, 15-min)	41				4.34
Tifton (31.49N 83.53W)	11/0200	987.7	11/0145	34 (3m, 15-min)	58				2.49
Tifton-Bowen (31.48N 83.44W)	11/0215	990.6	11/0045	23 (3m, 15-min)	46				2.40
Ty Ty (31.50N 83.65W)	11/0130	986.1	11/0030	21 (3 m, 15-min)	52				3.07
Unadilla (32.26N 83.66W)	11/0400	977.6	11/0330	29 (4 m, 15-min)	50				5.65
Vienna (32.11N 83.68W)	11/0330	977.4	11/0330	24 (4 m, 15-min)	46				4.85
Watkinsville-USDA (33.87N 83.45W)									4.17
Williamson (33.18N 84.41W)									3.74
Georgia Dept. of Transportation									
Clayton (GA328) (34.88N 83.40W)			11/1320		40				
Grovetown (GA332) (33.48N 82.21W)			11/0740		36				
Collier (GA345) (33.07N 83.97W)	11/0640	992.2	11/0640		35				
Cordele (GA346) (31.96N 83.75W)	11/0250	976.3	11/0110	34	60				
Perry (GA347) (32.47N 83.74W)	11/0420	979.0	11/0320	29	46				
Macon (GA348) (32.80N 83.57W)	11/0530	982.7	11/0440		37				
Minter (GA349) (32.45N 82.76W)	11/0610	987.8	11/0340		38				
Columbus Arpt. (GA350) (32.51N 84.95W)	11/0220	994.9	11/0330		39				
Savannah (GA354) (32.22N 81.17W)			11/1120		34				
Jesup (GA355) (31.61N 81.88W)			11/0740		40				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Remote Automated Weather Stations (RAWS)									
Adel (AELG1) (31.11N 83.43W)			11/0104		42				2.05
Watkinsville (AFRG1) (33.89N 83.42W)			11/0902		37				2.95
Baxley (BXYG1) (31.71N 82.39W)			11/0504		46				1.25
Byromville (BYRG1) (32.17N 83.97W)			11/0205	25 (10-min)	47				4.09
Camilla (CMLG1) (31.21N 84.24W)			10/2304		57				4.11
Camp Merrill (CPMG1) (34.61N 84.13W)			11/1505		37				3.38
Louisville (LOUG1) (32.99N 82.38W)			11/0703	27 (10-min)	52				3.43
McRae (MRAG1) (32.09N 82.88W)			11/0503	28 (10-min)	51				2.49
Newnan (NNAG1) (33.37N 84.86W)									5.40
Waycross (OKEG1) (31.25N 82.40W)			11/0404		39				
Oconee (ONFG1) (33.21N 83.71W)			11/1506		25				5.32
Americus/Plains (PLAG1) (32.11N 84.18W)			11/0203	23 (10-min)	47				
Tallulah (TULG1) (34.91N 83.33W)			11/1706		30				3.02
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Douglasville 8ESE (ASTG1) (33.72N 84.62W)									5.09
Attapulgus (ATPG1) (30.74N 84.50W)									3.42
Lithia Springs 3ESE (AUSG1) (33.77N 84.61W)									5.40
Kinchafoonee Creek (DSNG1) (31.76N 84.25W)									3.86
Elmodel (ELMG1) (31.35N 84.48W)									4.05
Kiokee Creek (EVNG1) (33.60N 82.23W)									3.19
Fort Stewart (FSBG1) (31.96N 81.46W)									3.56
Hoggard Mill (ICHG1) (31.22N 84.47W)									3.49
Fayetteville 5ESE (LOVG1) (33.41N 84.38W)									5.16

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Starksville (MCKG1) (31.78N 84.14W)									4.77
Morgan (MGNG1) (31.53N 84.58W)									6.30
Pataula Creek (MRSG1) (31.82N 84.97W)									6.84
Americus 2WNW (MUCG1) (32.08N 84.26W)									5.52
Flint River (OKFG1) (31.73N 84.02W)									4.56
Patchitla Creek (PCHG1) (31.55N 84.68W)									6.66
Richland 7ESE (PRSG1) (32.05N 84.55W)									5.72
Snake Creek (SNKG1) (33.53N 84.93W)									6.53
Spirit Creek (SPTG1) (33.37N 82.14W)									3.66
Ochlockonee River (TMLG1) (30.88N 84.05W)									3.21
Little River (TWCG1) (31.48N 83.58W)									3.08
Atlanta 7W (UTYG1) (33.74N 84.57W)									5.79
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Macon 5.8 NW (GA-BB-6) (32.89N 83.73W)									5.12
Powder Springs 2.5NNW (GA-CB-45) (33.90N 84.70W)									6.51
Acworth 5.5NE (GA-CE-1) (34.11N 84.60W)									4.07
Villa Rica 2.6NNW (GA-CL-15) (33.77N 84.94W)									5.92
Fort Valley 10N (GA-CR-2) (32.70N 83.87W)									5.50
Newman 2.6WS (GA-CW-9) (33.38N 84.83W)									6.16
Fort Gaines (GA-CY-2) (31.73N 84.97W)									11.24
East Point 6.3WNW (GA-FT-19) (33.70N 84.57W)									5.56
Peachtree City 1.9N (GA-FY-24) (33.42N 84.56W)									5.40
Macon 6.8ENE (GA-JN-6) (32.88N 83.55W)									5.29
Danville 3.3W (GA-TG-1) (32.60N 83.30W)									6.53
Zebulon 0.3WNW (GA-PK-2) (33.10N 84.35W)									5.21

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Sasser 0.2 WSW (GA-TL-1) (31.72N 84.35W)									6.42
Butler 8.3NNW (GA-TY-1) (32.66N 84.31W)									5.54
The Rock 1.0N (GA-UP-1) (32.98N 84.24W)									5.59
Alabama									
International Civil Aviation Organization (ICAO) Sites									
Florala (K0J4) (31.04N 86.31W)	10/1758	997.7[l]	10/1558		38[l]				
Andalusia (K79J) (31.32N 86.41W)	10/2056	996.6	10/2017	25	40				2.69
Auburn Univ. (KAUO) (32.62N 85.44W)	10/2356	1000.9	11/0218		34				3.96
Dothan (KDHN) (31.32N 85.45W)	10/2053	984.6	10/2220	43[l]	53[l]				3.88
Enterprise (KEDN) (31.29N 85.90W)	10/2135	992.1	10/2235	24	37				
Eufala (KEUF) (31.95N 85.13W)	10/2358	989.2	11/0151		35[l]				4.48[l]
Hanchey AHP (KHEY) (31.35N 85.67W)	10/2158	988.4	10/2058	30	54				3.87
Lowe/Ft. Rucker (KLOR) (31.35N 85.75W)	10/2038	988.6	10/2243	25	41				4.50
Ft. Rucker/Cairns (KOZR) (31.29N 85.72W)	10/2030	988.4	10/2003	33	52				5.64
Shell AHP (KSXS) (31.36N 85.85W)	10/2041	991.6	10/2113	31	43				2.45
Troy (KTOI) (31.86N 86.01W)	10/2140	996.8	10/2136	28	39				3.59
National Ocean Service (NOS) Sites									
Fort Morgan (FMOA1) (30.23N 88.03W)	10/1454	1002.1	10/1612	33 (36 m)	39				
Public/Other									
Troy CRN (31.79N 86.00W)									3.64
Weatherflow									
Gulf Shores/Foley (XGLF) (30.36N 87.65W)			10/1402		37				
University of South Alabama Mesonet									
Ashford (31.20N 85.26W)			10/2110		56				
Florala (31.00N 86.33W)									3.07

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Geneva (31.06N 85.82W)			10/2151		41				
Remote Automated Weather Stations (RAWS)									
Tuskegee (TKGA1) (32.48N 85.56W)									3.94
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Bleeker (BLEA1) (32.58N 85.16W)									4.26
Advanced Hydrological Prediction Service (AHPS) Sites									
Columbia 2S (COLA1) (31.26N 85.11W)									5.06
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Clayton 7.8W (AL-BR-6) (31.88N 85.58W)									5.21
Rehobeth 2.1 SSW (AL-HS-13) (31.10N 85.46W)									5.33
Kinsey 2.2E (AL-HS-16) (31.29N 85.30W)									5.35
Tuskegee 6.2W (AL-MC-3) (32.45N 85.82W)									3.90
Ramer 1.5SE (AL-MY-6) (32.03N 86.21W)									4.17
Phenix City 2.2 NW (AL-RS-1) (32.49N 85.03W)									3.96
Seale (AL-RS-3) (32.29N 85.19W)									3.38
South Carolina									
International Civil Aviation Organization (ICAO) Sites									
Aiken (KAIK) (33.65N 81.69W)	11/1055	988.3	11/0915	25	40				
Allendale County (KAQX) (32.99N 81.27W)	11/0855	994.0[l]	11/0815	24[l]	40[l]				
Beaufort County (KARW) (32.41N 80.63W)	11/0935	999.7	11/0915	27	42				
Bennettsville (KBBP) (34.60N 79.70W)	11/1835	992.9	11/1935	23	35				
Barnwell (KBNL) (33.26N 81.34W)	11/1015	991.9	11/0915	30	41				
Columbia Metro. (KCAE) (33.96N 81.12W)	11/1256	989.1	11/1125	28	40				4.98
Camden (KCDN) (34.28N 80.57W)	11/1315	991.5[l]	11/1115	21[l]	34[l]				
Charleston (KCHS) (32.90N 80.04W)	11/1056	1000.3	11/1139	40	45				1.59

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
North Myrtle Beach (KCRE) (33.81N 78.72W)	11/1918	998.0	11/1723	36	48				0.88
Columbia Owens (KCUB) (33.99N 81.00W)	11/1253	990.1	11/1220	23	36				3.59
Summerville (KDYB) (33.06N 80.28W)	11/1115	999.0	11/1055	18	37				
Newberry (KEOE) (34.31N 81.64W)	11/1215	988.9	11/1535	20	30				
Winnsboro (KFDW) (34.32N 81.11W)	11/1335	988.6	11/1035	20	34				
Florence (KFLO) (34.19N 79.72W)	11/1526	993.9	11/1325	31	42				3.31
Georgetown (KGGE) (33.31N 79.33W)	11/1835	1000.7	11/1415	27	40				
Greenwood County (KGRD) (34.25N 82.15W)	11/1056	983.9	11/1350	18	36				2.47
Greenville Spartanburg (KGSP) (34.88N 82.22W)	11/1253	994.5	11/1250	20	28				4.27
Hartsville (KHVS) (34.40N 80.10W)	11/1515	992.2	11/1415	21	36				
Hilton Head (KHXD) (32.23N 80.69W)	11/0915	1001.0	11/1150	27	40				2.67
Conway Horry County (KHYW) (33.83N 79.12W)	11/1755	998.3	11/1435	24	39				
Johns Island (KJZI) (32.70N 80.01W)	11/1135	1001.0	11/0955	30	42				
Mount Pleasant (KLRO) (32.90N 79.78W)	11/1115	1001.4	11/1115	26	46				
Marion (KMAO) (34.18N 79.33W)	11/1835	996.6	11/1455	27	37				
Moncks Corner (KMKS) (33.19N 80.04W)	11/1155	999.0	11/1415	24	36				
McEntire Columbus (KMMT) (33.93N 80.80W)	11/1256	991.2[I]	11/1136	26[I]	39[I]				
Manning (KMNI) (33.58N 80.21W)	11/1235	996.2	11/1615	25	42				
Myrtle Beach (KMYR) (33.68N 78.93W)	11/1856	999.2	11/1455	32	44				0.62
Beaufort (KNBC) (32.49N 80.70W)	11/0956	999.3	11/1252	27	42				4.88
Orangeburg (KOGB) (33.47N 80.85W)	11/1053	993.8	11/1142	27	46				1.48
Walterboro (KRBW) (32.93N 80.64W)	11/1015	998.3	11/0955	32	45				
Sumter (KSMS) (33.99N 80.36W)	11/1335	993.4	11/1435	23	44				
Sumter Shaw AFB (KSSC) (33.98N 80.47W)	11/1242	992.4	11/1356	31	42				3.04

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Darlington (KUDG) (34.44N 79.89W)	11/1520	993.2	11/1435	28	41				3.50
Rock Hill/York County (KUZA) (34.96N 81.06W)	11/1454	990.1	11/1725	25	37				2.28
Coastal-Marine Automated Network (C-MAN) Sites									
Folly Island (FBIS1) (32.69N 79.89W)	11/1200	1002.0	11/1320	39 (10m, 10-min)	48				
National Ocean Service (NOS) Sites									
Charleston (CHTS1) (32.78N 79.92W)	11/1200	1001.4	11/0624	32 (9 m)	39	2.07	1.67		
Springmaid Pier (MROS1) (33.66N 78.92W)	11/1842	1001.6				1.30	1.89		
National Estuarine Research Reserve System Stations									
Winyah Bay (NIWS1) (33.35N 79.19W)	11/1830	1000.0	11/1445	32 (4.6 m)	45				
National Weather Service (NWS) HANDAR Sites									
Strom Thurmond Dam (CHDS1) (33.66N 82.20W)			11/1230	25 (2.1m)	36				
Lake Murray (LMFS1) (34.11N 81.27W)	11.1220	987.8	11/0930	26 (9 m)	35				
Lake Wateree (WATS1) (34.34N 80.70W)			11/1140		35				
Remote Automated Weather Stations (RAWS)									
Ace Basin (ABRS1) (32.66N 80.40W)			11/0955		41				
Carolina Sandhills (JEFS1) (34.66N 80.27W)			11/1514		28				8.23
SAVRIV (LCSS1) (33.33N 81.59W)			11/1207		40				3.10
Santee NRW (SPLS1) (33.56N 80.44W)			11/1344		32				3.45
SAVRAW (SRSS1) (33.21N 81.59W)			11/1106		36				
Savannah NWR (SVNS1) (32.10N 81.08W)			11/0623		39				3.73
Weir Tower (WERS1) (34.02N 80.87W)			11/1251		36				3.39
Weatherflow									
Lake Arrowhead (XARW) (33.78N 78.77W)			11/1632		34				
Beaufort (XBUF) (32.34N 80.59W)	11/0942	997.0	11/0912	30 (10 m)	46				
Charleston/Battery Point (XCHS) (32.76N 79.95W)	11/1150	998.0	11/1100	26 (10 m)	41				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Calibogue Sound (XCLB) (32.11N 80.84W)			11/0800	37 (5.8 m)	51				
Folly Beach Pier (XFOL) (32.65N 79.94W)	11/1024	1000.0	11/1424	38 (13 m)	50				
Georgetown (XGEO) (33.36N 79.27W)	11/1519	997.2	11/1319	30 (10 m)	42				
Isle of Palms (XIOP) (32.78N 79.79W)	11/1140	1000.0	11/1345	36 (9 m)	50				
Murrells Inlet (XMUR) (33.52N 79.03W)			11/1519	39 (7.2 m)	50				
Sullivan's Island (XSUL) (32.77N 79.82W)	11/1140	999.0	11/1130	36 (13 m)	48				
Fort Sumter Light (XSUM) (32.75N 79.87W)			11/1241	42 (12 m)	50				
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Bennettsville 9W (BENS1) (34.61N 79.79W)									4.70
Lynches River (BISS1) (34.25N 80.21W)									5.55
Black Creek (CSFS1) (34.66N 80.21W)									4.13
Edgefield (EGFS1) (33.79N 81.92W)									3.42
McBee 4NE (MBES1) (34.51N 80.22W)									6.31
McTier Creek (MCTS1) (33.75N 81.60W)									3.30
Saluda River (MURS1) (34.05N 81.21W)									5.30
Newberry 4NE (NEWS1) (34.32N 81.57W)									3.52
Orangeburg (ORBS1) (33.49N 80.87W)									3.27
Pageland 3SW (PAGS1) (34.75N 80.43W)									4.96
Pelham (PELS1) (34.86N 82.23W)									4.41
Tyron 5 SW (TRYS1) (35.17N 82.29W)									6.07
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Aiken 3.5SSE (SC-AK-31) (33.49N 81.71W)									4.05
Swansea 5.7ENE (SC-CA-18) (33.78N 81.02W)									4.86
Cheraw 1.2ESE (SC-CF-8) (34.69N 79.88W)									5.91
Gaffney 3.3NNW (SC-CK-7) (35.12N 81.68W)									4.45

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Hartsville 5.4WSW (SC-DR-20) (35.35N 80.17W)									8.02
Trenton 6.5SSW (SC-ED-13) (33.66N 81.89W)									4.01
Florence 2.1SW (SC-FL-13) (34.16N 79.81W)									4.68
Simpsonville 2.7W (SC-GV-51) (34.74N 82.30W)									5.69
Fountain Inn 3.9S (SC-LR-29) (34.64N 82.20W)									4.21
West Columbia 5.9WSW (SC-LX-98) (33.95N 81.17W)									6.21
Prosperity 4.7ENE (SC-NW-12) (34.24N 81.46W)									4.13
North 5.1NE (SC-OR-35) (33.66N 81.03W)									6.51
Chapin 5ESE (SC-RC-93) (34.13N 81.27W)									6.77
Sumter 3.6SSW (SC-SM-20) (33.89N 80.41W)									4.73
Moore 4.9NW (SC-SP-10) (34.88N 82.06W)									6.11
Tega Cay 0.5NE (SC-YR-38) (35.04N 81.01W)									4.22
North Carolina									
International Civil Aviation Organization (ICAO) Sites									
Charlotte (34NC) (35.21N 80.84W)	11/1555	989.9	11/1700	26	43				
Dare Co Gunnery Range (K2DP) (35.67N 75.90W)	12/0132	992.9[I]	12/0001	33[I]	48[I]				
Hyde County Arpt. (K7W6) (35.56N 75.96W)	11/2310	995.6[I]	11/2310	27[I]	37[I]				
Anson County (KAFP) (35.02N 80.08W)	11/1620	990.5	11/1520	22[I]	32[I]				
Gastonia (KAKH) (35.20N 81.15W)	11/1454	992.1	11/1654	17	34				3.37
Ahoskie Tri-County (KASJ) (36.30N 77.17W)	12/0020	988.5	12/0200		38				
Asheville (KAVL) (35.43N 82.54W)	11/1154	999.9	11/2054	28	39				3.26
Burlington (KBUY) (36.04N 79.47W)	11/1954	990.2	11/2003	30	49				3.16
Charlotte (KCLT) (35.22N 80.96W)	11/1452	991.7	11/1710	24	40				2.89
Whiteville (KCPC) (34.30N 78.70W)	11/1915	996.6	11/1555	25	39				
Elizabeth City (KECG) (36.26N 76.17W)	12/0154	988.3	12/0330	33	45				0.41

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Edenton (KEDE) (36.03N 76.57W)	12/0100	989.2	12/0300	25	42				
Monroe Regional (KEQY) (35.01N 80.62W)	11/1453	990.5	11/1753	25	46				3.38
New Bern (KEWN) (35.09N 77.05W)	11/2230	993.9	11/2255	30	43				0.46
Davidson County (KEXX) (35.78N 80.30W)	11/1655	992.0							
Elizabethtown (KEYF) (34.60N 78.60W)	11/2020	994.6	11/1540	27	36				
Fayetteville (KFAY) (34.99N 78.88W)	11/1953	991.4	11/2053	31	43				1.04
Simmons AAF (KFBG) (35.13N 78.93W)	11/1912	991.6	11/2043	31	46				1.94
Kitty Hawk (KFFA) (36.02N 75.67W)	12/0240	990.5	12/0405	24	38				
Jefferson Ashe Cnty. (KGEV) (36.43N 81.42W)	11/1905	999.0	11/0505	26	40				
Goldsboro (KGSB) (35.34N 77.96W)	11/2156	990.7	11/2312	27	40				0.24
Greensboro (KGSO) (36.09N 79.94W)	11/1754	991.6	11/1849	22	40				4.41
Goldsboro Wayne County (KGWW) (35.46N 77.96W)	11/2200	990.9	11/2340	22	36				
Asheboro (KHBI) (35.65N 79.89W)	11/1815	991.1	11/1515	12	20				
Mackall AAF (KHFF) (35.07N 79.50W)	11/2019	996.1	11/2014	23	38				2.85
Hickory (KHKY) (35.74N 81.38W)	11/1453	996.4	11/1620	19	38				3.26
Henderson-Oxford (KHNZ) (36.36N 78.52W)	11/2105	990.9	11/2155	20	33				
Harnett County (KHRJ) (35.38N 78.73W)	11/1955	991.5	11/1955	19	33				
Hatteras (KHSE) (35.22N 75.62W)	12/0051	997.0	12/0051	34	47				0.89
Wilmington (KILM) (34.27N 77.90W)	11/2053	997.3	11/2152	36	47				0.44
Winston-Salem (KINT) (36.13N 80.22W)	11/1754	993.5	11/1807	28	48				4.84
Halifax-Northampton (KIXA) (36.32N 77.64W)	11/2340	990.9	12/0040	29	38				1.55
Johnston County (KJNX) (35.54N 78.39W)	11/2120	990.5							
Concord Regional (KJQF) (35.39N 80.71W)	11/1650	992.4	11/1750	25	37				
Lumberton (KLBT) (34.61N 79.06W)	11/1954	993.3	11/2051	27	43				1.29
Franklin County (KLHZ) (36.02N 78.33W)	11/2140	990.5							

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Laurinburg Maxton (KMEB) (34.79N 79.37W)	11/1852	992.5	11/1752	24	39				2.37
Manteo (KMQI) (35.90N 75.70W)	12/0220	991.2	12/0020	45	56				
Beaufort (KMRH) (34.72N 76.65W)	11/2242	997.3	11/2242	39	54				0.20
Jacksonville MCAS (KNCA) (34.71N 77.44W)	11/2156	995.3	11/2256	29	50				0.67
Bogue Field MCAF (KNJM) (34.69N 77.03W)	11/2213	996.9	11/1716	26[I]	41[I]				
Cherry Pt (KNKT) (34.90N 76.90W)	11/2229	995.3	11/2254	39	58				0.49
Jacksonville (KOAJ) (34.83N 77.62W)	11/2145	994.2	11/1750	31	41				0.09
Washington Warren Field (KOCW) (35.57N 77.05W)	11/2320	991.2	12/0020	30	42				
Pope AFB (KPOB) (35.17N 79.01W)	11/1956	991.2	11/2122	24	36				1.95
Richmond County (KRCZ) (34.89N 79.76W)	11/1740	991.9	11/1600	23	36				
Raleigh-Durham (KRDU) (35.88N 78.78W)	11/1951	990.0	11/2107	23	47				2.70
Rowan County (KRUQ) (35.64N 80.52W)	11/1720	991.7	11/1755	21	38				
Rocky Mt-Wilson (KRWI) (35.86N 77.89W)	11/2253	989.9	11/2309	26	53				0.80
Siler City (KSCR) (35.70N 79.50W)	11/1840	990.9	11/1955	19	36				
Southport (KSUT) (33.93N 78.08W)	11/2005	999.0	11/2125	25	39				
Statesville (KSVH) (35.76N 80.96W)	11/1600	994.1	11/1620	22	34				
Roxboro (KTDF) (36.29N 78.98W)	11/1940	991.6	11/2100		36[I]				
Watauga County (KTNB) (36.20N 81.65W)	11/1715	999.4	11/2015	29	42				
Stanley County (KVUJ) (35.42N 80.15W)	11/1655	992.5	11/1915	29	43				
Coastal-Marine Automated Network (C-MAN) Sites									
Cape Lookout (CKLN7) (34.62N 76.53W)	11/2200	998.8	11/2050	37 (10m, 10-min)	49				
National Ocean Service (NOS) Sites									
Beaufort (BFTN7) (34.72N 76.67W)	11/2230	997.4	11/2136	35 (7 m)	47	1.69		1.61	
Duck (DUKN7) (36.18N 75.75W)	12/0148	989.1	12/0430	44 (9 m)	56	1.88		2.12	
Hatteras USCG (HCGN7) (35.21N 75.70W)	12/0006	996.5	12/0312	37 (8 m)	49	2.09		2.08	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Wrightsville Beach (JMPN7) (34.21N 77.79W)	11/2006	997.4	11/1900	44 (8 m)	55	0.90		1.64	
Oregon Inlet (ORIN7) (35.80N 75.55W)	12/0224	991.8	12/0042	45 (7 m)	56	4.36		4.24	
Wilmington (WLON7) (34.23N 77.95W)	11/1954	997.5				2.91		2.39	
National Estuarine Research Reserve System Stations									
Research Creek (NOXN7) (34.16N 77.85W)			11/1900		41				
Weatherflow									
Alligator Bridge (XALI) (35.90N 76.01W)			11/2335	43 (12 m)	57				
Avon Sound (XAVN) (35.37N 75.51W)	12/0011	995.6	12/0056	42 (4.6 m)	54				
Avon Ocean (XAVO) (35.35N 75.50W)			11/2313	41 (12 m)	51				
Buxton (XBUX) (35.26N 75.52W)	12/0022	996.6	12/0127	25 (10 m)	45				
Croatan Sound (XCTN) (35.87N 75.66W)			12/0149	43 (7.9 m)	55				
Federal Point (XFED) (33.96N 77.94W)			11/2022	42 (15 m)	53				
Frisco Woods (XFRI) (35.24N 76.70W)	12/0005	995.2	12/0040	42 (6 m)	55				
Hatteras High (XHAT) (35.26N 75.55W)	12/0007	994.9	11/2312		40				
Fort Macon (XMAC) (34.70N 76.71W)	11/2248	994.3	11/2308	40 (10 m)	57				
North River (XNRV) (34.77N 76.61W)			11/2257	32 (5.5 m)	47				
Ocracoke (KOCR) (35.14N 76.01W)			12/0017	45 (7.6 m)	57				
Oak Island (XOKI) (33.91N 78.12W)			11/2002	37 (10 m)	47				
Oregon Inlet CG (XORE) (35.77N 75.53W)	12/0225	990.9	12/0315	45 (10 m)	61				
Oregon Inlet (XORI) (35.80N 75.55W)	12/0243	989.7	12/0043	44 (10 m)	57				
Pamlico Sound (XPM2) (35.43N 75.83W)	12/0047	990.9	12/0057	50 (13 m)	62				
KHK Resort (XRTH) (35.58N 75.47W)	12/0021	993.0	12/0046	52 (19 m)	64				
Roanoke Sound Channel (XRNK) (35.94N 75.66W)			12/0003	42 (5.2 m)	53				
REAL Slick (XSLK) (35.57N 75.49W)			12/0100	43 (6.1 m)	52				
Waves Nags Head (XWAV) (35.57N 75.47W)	12/0322	992.5	12/0047	47 (11 m)	63				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
North Carolina ECONET									
Pamlico Aquaculture (AURO) (35.36N 76.72W)			11/2204	25 (10 m)	40				0.34
Butner Lab (BAHA) (36.17N 78.81W)			11/2050	31 (10 m)	39				3.07
Bald Head Island (BALD) (33.85N 77.96W)	11/1914	997.9	11/1947	36 (10 m)	43				0.11
Bear Wallow Mtn. (BEAR) (35.46N 82.36W)			11/2045	44 (10 m)	54				6.13
Jordan Hall NCSU (CAMP) (35.78N 78.68W)			11/2100	29	48				
Castle Hayne (CAST) (34.32N 77.92W)	11/1914	996.9	11/2047	27 (10 m)	38				0.34
Horace Williams Arpt. (CHAP) (35.93N 79.06W			11/2017		34				0.04
Central Crops (CLAY) (35.67N 78.49W)			11/2121		41				1.85
Clinton Horticultural (CLIN) (35.02N 78.28W)			11/2126	25 (10 m)	34				0.41
Frying Pan Mtn. (FRYI) (35.39N 82.77W)			12/0703	38 (10 m)	44				6.83
Mountain Horticultural (FLET) (35.43N 82.56W)									3.24
Cherry Research (GOLD) (35.38N 78.04W)			11/2202	27 (10 m)	38				0.51
Hamlet Tower (HAML) (34.84N 79.73W)			11/1825	27 (10 m)	38				4.64
Sandhills Research (JACK) (35.19N 79.69W)			11/1851	33 (10 m)	41				3.95
Mt. Jefferson (JEFF) (36.40N 81.46W)			11/1948	32 (10 m)	43				4.11
Cunningham Research (KINS) (35.30N 77.57W)			11/2250	32 (10 m)	38				0.24
Lake Wheeler (LAKE) (35.73N 78.68W)			11/2045	27 (10 m)	35				3.15
Upper Mountain (LAUR) (36.40N 81.30W)									5.45
Peanut Belt (LEWS) (36.13N 77.18W)			12/0051	34 (10 m)	41				1.74
NCEC Anson (LILE) (34.97N 79.92W)									5.41
Mt. Mitchell (MITC) (35.76N 82.27W)			11/1826	47 (10 m)	56				8.55
NCAT SURF (NCAT) (36.07N 79.73W)			11/1807	37 (10 m)	50				3.90
North Stanly Middle School (NEWL) (35.41N 80.24W)			11/1802	29 (10 m)	39				4.12
Oxford Tobacco (OFXO) (36.30N 78.60W)			11/2055		36				3.71

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Tidewater RS (PLYM) (35.85N 76.65W)			12/0107	33 (10 m)	42				0.76
Reedy Creek (REED) (35.81N 78.74W)			11/2033	28 (10 m)	39				2.84
Upper Piedmont (REID) (36.38N 79.70W)			11/1811	27 (10 m)	43				4.72
Upper Coastal Plains (ROCK) (35.89N 77.68W)			11/2327		39				0.67
Piedmont RS (SALI) (35.70N 80.62W)			11/1705	26 (10 m)	38				4.23
Spindale Tower (SPIN) (35.33N 81.91W)									3.56
Spruce Pine (SPRU) (35.90N 82.06W)			11/1947		34				4.11
Taylorsville Tower (TAYL) (35.91N 81.19W)									5.40
Border Belt RS (WHIT) (34.41N 78.79W)	11/1839	995.0	11/1342	25 (10 m)	36				0.18
Williamsdale (WILD) (34.77N 78.10W)			11/2100	27 (10 m)	35				1.34
Williamston (WILL) (35.84N 77.09W)			12/0022	26 (10 m)	36				1.57
Sassafras Mountain (35.07N 82.78W)									3.53
Remote Automated Weather Stations (RAWS)									
Back Island (BKIN7) (34.53N 77.72W)			11/1718		41				0.32
Beaufort (BNYN7) (35.52N 76.93W)			12/0213		36				
Caswell Game (CGLN7) (36.39N 79.29W)			11/2016		46				
Sandy Run (CLJN7) (34.61N 77.49W)			11/1819		34				
Davidson River (DARN7) (35.35N 82.78W)									4.87
Duke Forest (DKFN7) (35.97N 79.09W)			11/2116		41				2.58
Elizabeth City (ELRN7) (36.34N 76.28W)			11/2313		37				
Fort Bragg (FBRN7) (35.15N 79.07W)			11/2114		44				1.53
Greens Cross (GCRN7) (36.02N 76.89W)					39				
Brevard 7E (GUIN7) (35.21N 82.59W)									4.78
Lexington (LXFN7) (35.79N 80.31W)			11/1916		37				3.07
Mt. Island Lake (MTIN7) (35.38N 80.99W)			11/1710		36				3.58

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Nature Conservancy (NATN7) (34.08N 78.30W)			11/1918		35				0.89
New Bern (NBRN7) (35.10N 77.11W)			11/1917		36				
North Cove Pinnacle (NCVN7) (35.82N 81.94W)			12/0516		25				4.76
Croatan (NPTN7) (34.76N 76.90W)			11/2305		43				
Pocosin Lakes (POCN7) (35.74N 76.51W)			11/2217		34				
Rockingham (RKGN7) (34.96N 79.69W)			11/2045		34				3.87
Rendezvous Mountain (RVZN7) (36.23N 81.30W)			12/0510		30				5.65
Dare Bomb Range (STCN7) (35.76N 75.87W)			12/0028		45				
Sunny Point (SUNN7) (34.00N 78.00W)			11/1818		40				0.38
Fairfield (TS161) (35.54N 76.22W)			12/0317		36				
Turnbull Creek (TURN7) (34.68N 78.58W)			11/2118		37				0.33
Warrenton (WANN7) (36.36N 78.10W)			12/0016		37				2.85
Lumberton (WCON7) (34.60N 79.08W)			11/2114		38				
Whiteville (WHIN7) (34.34N 78.73W)			11/1518		42				0.96
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Barber 3S (BBRN7) (35.68N 80.61W)									5.35
Banner Elk (BEKN7) (36.16N 81.89W)									4.96
Boone 2S (BONN7) (36.20N 81.67W)									8.09
Swannoa 2N IFLOWS (BTDN7) (35.64N 82.40W)									4.35
Christmount IFLOWS (CMTN7) (35.59N 82.29W)									11.31
Black Mountain 10NNE (MMTN7) (35.76N 82.27W)									7.89
Plumtree (PLMN7) (36.02N 82.02W)									4.25
Ramsey (RAMN7) (35.59N 81.57W)									4.63
Rhyne Farm IFLOWS (RRCN7) (35.25N 80.63W)									4.32

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Wilkesboro 4W (WLKN7) (36.13N 81.23W)									4.87
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Sparta 3.5 SSW (NC-AG-1) (36.46N 81.15W)									8.79
Glade Valley 3.0ENE (NC-AG-3) (36.48N 81.00W)									10.77
Fleetwood 3.1SSE (NC-AS-22) (36.27N 81.49W)									6.29
Linville 2.5ENE(NC-AV-9) (36.09N 81.84W)									10.37
Black Mtn. 2.4SE (NC-BC-76) (35.59N 82.32W)									13.01
Jonas Ridge 1.4S (NC-BK-13) (35.95N 81.89W)									9.69
Mebane 11.2N (NC-CS-2) (36.25N 79.24W)									6.90
Lawndale (NC-CV-32) (35.42N 81.56W)									10.40
Winston-Salem 8.8SE (NC-DS-24) (36.01N 80.16W)									6.06
Sheffield 1.3SW (NC-DV-1) (35.95N 80.69W)									6.63
Walkertown 3.2NW (NC-FR-5) (36.20N 80.19W)									5.81
Oak Ridge 2.3SSW (NC-GL-7) (36.14N 80.00W)									6.87
Flat Rock 1.5S (NC-HN-18) (35.25N 82.44W)									8.17
Statesville 2.9ENE (NC-IR-5) (35.80N 80.83W)									5.84
Old Fort 4.9SW (NC-MD-19) (35.59N 82.23W)									7.89
Spruce Pine 6.6SW (NC-ML-10) (35.84N 82.14W)									9.59
Saluda 0.5N (NC-PK-6) (35.25N 82.35W)									8.61
Eden 2.3ENE (NC-RG-12) (36.52N 79.70W)									6.47
Ellenboro 3.6N (NC-RT-15) (35.38N 81.77W)									5.60
Walnut Cover 1.5ENE (NC-SK-10) (36.31N 80.12W)									5.53
Cedar Mountain 1.9E (NC-TR-27) (35.15N 82.61W)									5.57
Boone 4.5SE (NC-WT-24) (36.17N 81.61W)									10.54
Burnsville 6.4S (NC-YN-12) (35.83N 82.28W)									6.90

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Virginia									
International Civil Aviation Organization (ICAO) Sites									
Brookneal (K0V4) (37.14N 79.02W)			11/2015	23[I]	41[I]				
Wakefield (KAKQ) (36.98N 77.00W)	12/0100	988.5	12/0205	21	36				2.98
South Hill (KAVC) (36.69N 78.05W)	11/2235	991.2	11/2340	25	42				
Ft. Pickett/Blackstone (KBKT) (37.08N 77.95W)	11/2255	990.9	11/2355	23	46				
Cheaspeake Mun. (KCPK) (36.67N 76.32W)	12/0155	988.1	12/0355	24	36				
Washington National (KDCA) (38.85N 77.03W)	12/0406	998.6	12/0726	30	40				1.51
Fredericksburg (KEZF) (38.27N 77.45W)	12/0235	997.3	12/0515	20	34				
Fort Eustiss (KFAF) (37.13N 76.62W)	12/0156	987.8	12/0307	33	48				
Chesterfield Cnty. Aprt. (KFCI) (37.41N 77.52W)	11/2345	993.6	12/0040	26	45				
Franklin (KFKN) (36.70N 76.90W)	12/0035	988.9	12/0435	22	37				
Hillsville (KHLX) (36.77N 80.82W)	11/1915	998.7	11/2315	27	35				
Hot Springs (KHSP) (37.95N 79.83W)	11/2121	1000.0	12/0420	29	37				
Williamsburg (KJGG) (37.24N 76.72W)	12/0115	989.2	12/0235	26	48				
Langley AFB (KLFI) (37.08N 76.35W)	12/0255	987.8	12/0421	33	54				
Lynchburg (KLYH) (37.32N 79.21W)	11/2105	996.2	11/1854	18	34				3.14
Melfa (KMFV) (37.65N 75.77W)	12/0355	987.5	12/0715	31[I]	44[I]				
Fentress NALF (KNFE) (36.70N 76.13W)	12/0256	987.9	12/0412	22	44				0.51
Norfolk NAS (KNGU) (36.93N 76.30W)	12/0312	988.0	12/0416	47	65				0.77
Oceana NAS (KNTU) (36.82N 76.03W)	12/0356	986.5	12/0444	36	55				
Quantico MCAF (KNYG) (38.50N 77.30W)	12/0356	998.5	12/0525		37				3.29
Norfolk Intl. Aprt. (KORF) (36.90N 76.19W)	12/0240	987.1	12/0425	30	58				0.45
Newport News (KPHF) (37.13N 76.49W)	12/0225	987.2	12/0350	29[I]	51[I]				2.17
Petersburg (KPTB) (37.18N 77.52W)	12/0015	990.6	12/0015	35	45				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Richmond Intl. (KRIC) (37.51N 77.32W)	12/0054	992.9	12/0054	36	49				3.69
Stafford (KRMN) (38.40N 77.46W)	12/0255	999.0	12/0515	27	40				
Suffolk Mun. (KSFQ) (36.68N 76.60W)	12/0135	988.5	12/0315	23	38				
Tangier Island (KTGI) (37.83N 76.00W)	12/0318	988.9	12/0722	40	50				
Clarksville (KW63) (36.60N 78.57W)	11/2115	990.6	11/2155	25	50				
Saluda Hummel Field (KW75) (37.60N 76.45W)	12/0235	987.8	12/0335	33[l]	46[l]				
Crewe (KW81) (37.18N 78.10W)	11/2155	993.9	11/2255	18	47				
Wallops Island (KWAL) (37.94N 75.47W)	12/0454	988.7	12/0525	25[l]	41[l]				1.00
National Ocean Service (NOS) Sites									
Chesapeake BBT (CHBV2) (37.03N 76.08W)	12/0354	984.7	12/0412	55 (6 m)	68	2.22		2.35	
Cape Henry (CHYV2) (36.93N 76.01W)	12/0254	985.2	12/0454	53 (28 m)	65				
South Craney Is. (CRYV2) (36.89N 76.34W)	12/0248	987.3	12/0418	31 (9 m)	47				
Dominion Terminal (DOMV2) (36.96N 76.42W)	12/0248	987.4	12/0400	44	56				
Kiptopeke (KPTV2) (37.17N 75.99W)			12/0436	58 (7 m)	69	1.94		1.84	
Lewisetta (LWTV2) (38.00N 76.46W)	12/0230	990.4	12/0242	37 (6 m)	54	3.27		2.07	
Money Point (MNPV2) (36.78N 76.30W)	12/0206	987.4	12/0400	30 (6 m)	60	2.43		2.29	
Dahlgren (NCDV2) (38.32N 77.04W)	12/0300	995.7	12/0848	20 (8 m)	37	2.12		1.72	
Sewells Point (SWPV2) (36.95N 76.33W)	12/0300	987.1				1.93		1.92	
Wachapreague (WAHV2) (37.61N 75.69W)	12/0354	987.2	12/0212	28 (7 m)	41	1.94		1.84	
Willoughby Degaussing (WDSV2) (36.98N 76.32W)	12/0254	986.5	12/0418	52	63				
Windmill Point (WNDV2) (37.62N 76.29W)						2.77		2.67	
York River E Range (YKRV2) (37.25N 76.33W)	12/0324	986.5	12/0354	55	73				
Yorktown USGC (YKTV2) (37.23N 76.49W)	12/0300	986.4	12/0406	46 (10 m)	64	1.99		2.13	
Weatherflow									

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Chesapeake Light Tower (XCLT) (36.90N 75.71W)			12/0516	70 (41 m)	83				
Creeds (XCRE) (36.59N 76.02W)			120401	34 (10 m)	44				
Deltaville (XDLT) (37.56N 76.31W)			12/0344	40 (6.1 m)	64				
Onancock (XHAK) (37.65N 75.88W)			12/0453	49 (14 m)	63				
Cape Henry (XHEN) (36.93N 76.01W)			12/0457	52 (23 m)	67				
Hampton Flats (XHMP) (36.98N 76.40W)			12/0426	40 (7 m)	54				
Middle Ground Lighthouse (XMGL) (36.95N 76.39W)			12/0417	50 (20 m)	74				
New Point Comfort (XNPC) (37.33N 76.27W)			12/0400	45 (13 m)	61				
Occoquan River (XOCC) (38.64N 77.22W)			12/0618		37				
Plantation Flats (XPLT) (37.26N 76.03W)			12/0451	52 (7.6 m)	73				
Poquoson (XPOQ) (37.11N 76.32W)			12/0417	41 (10 m)	57				
Poquonson River Light 11 (XPQR) (37.16N 76.38W)			12/0414	38 (6.7 m)	57				
Rudee Inlet (XRUD) (36.83N 75.97W)			12/0452	32 (8.8 m)	50				
Silver Beach (XSIL) (37.49N 75.97W)			12/0447	47 (7.6 m)	60				
Norfolk Jordan Bridge (XSNJ) (36.81N 76.29W)			12/0402	41 (59 m)	70				
Thimble Shoals (XTHM) (37.05N 76.26W)			12/0440	44 (6.1 m)	57				
Tangier Sound Light (XTSL) (37.79N 75.97W)			12/0452	48 (16 m)	61				
Wachapreague (XWAC) (37.60N 75.69W)			12/0210	36 (10 m)	46				
Wythe Creek (XWYT) (37.11N 76.39W)			12/0335		46				
Virginia Dept. of Transportation									
Appomattox (VA042) (37.23N 77.40W)			12/0101		37				
Coleman (VA049) (37.24N 76.51W)			12/0320		67				
Tasley (VA054) (37.70N 75.71W)			12/0515		39				
Site B (VA056) (38.78N 77.17W)			12/0650		36				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Fredericksburg IFLOWS (FEDV2) (38.30N 77.47W)									3.05
Galax (GAXV2) (36.65N 80.98W)									7.31
Boydton 7SE (KERV2) (36.60N 78.30W)									3.38
Konnarock (KRKV2) (36.67N 81.60W)									3.21
Salem 4N IFLOWS (MSCV2) (37.34N 80.05W)									3.68
Radford (RDFV2) (37.14N 80.57W)									3.33
Troutdale 4S (TRTV2) (36.70N 81.30W)									3.77
Willis (WLLV2) (36.86N 80.48W)									4.92
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Howland 2ENE (37.88N 76.42W)									7.89
Jetersville 3.6W (VA-AM-2) (37.30N 78.16W)									6.73
Saxe 4.3SE (VA-CH-1) (36.90N 78.59W)									6.15
Brookneal 2.9E (VA-CM-10) (37.06N 78.90W)									5.26
Galax 6.1N (VA-CR-3) (36.75N 80.92W)									6.25
Cooper Hill 6.2S (VA-FL-2) (36.99N 80.13W)									6.56
Gloucester Courthouse 9.3NNW (VA-GC-11) (37.53N 76.61W)									6.92
Hanover 5.9ESE (VA-KW-2) (37.74N 77.27W)									5.20
Victoria 0.9N (VA-LB-2) (37.01N 78.22W)									7.99
Urbana 6.2NNE (VA-LN-1) (37.72N 76.52W)									6.63
Heathsville 4.6SE (VA-ND-5) (37.87N 76.42W)									7.95
Columbia 17.2SSE (VA-PH-1) (37.53N 78.02W)									5.48
Farmville 1.0SSW (VA-PN-2) (37.28N 78.40W)									5.58
Meadows of Dan 2.3E (VA-PR-5) (36.73N 80.35W)									7.58

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Roanoke 7.3SSW (VA-RN-6) (37.18N 80.02W)									7.28
Delaware									
International Civil Aviation Organization (ICAO) Sites									
Dover (KDOV) (39.13N 75.47W)	12/0712	995.5	12/0808	25	35				
Georgetown (KGED) (38.69N 75.36W)	12/0440	993.6	12/0341	23	36				4.10
National Ocean Service (NOS) Sites									
Brandywine Shoal (BRND1) (38.99N 75.11W)	12/0800	993.5	12/0800	47 (21 m)	56				
Lewes (LWSD1) (38.78N 75.12W)	12/0500	993.2	12/0924	39 (10 m)	48	2.65		1.57	
Weatherflow									
Dewey Beach (XDEW) (38.68N 75.08W)			12/0828	37 (11 m)	51				
Lewes (XLEW) (38.79N 75.16W)			12/0817	44 (15 m)	54				
Delaware Environmental Observing System									
Bethany Beach (DE009) (38.59N 75.05)	12/0555	992.9	12/0535		35				
Laurel (DE013) (38.54N 75.59W)	12/0435	991.6	12/0410		43				
Georgetown (DE014) (38.64N 75.45W)	12/0405	993.3	12/0405	30	41				
Dewey Beach (DE020) (38.63N 75.07W)			12/0440	27	35				
Rehoboth Beach (DE021) (38.72N 75.08W)	12/0500	992.9	12/0450		34				
Lewes (DE051) (38.71N 75.15W)			12/0450		36				
Dagsboro (DE056) (38.54N 75.23W)			12/0805		42				
Delaware Dept. of Transportation									
Indian River Inlet (DEL18) (38.61N 75.06W)			12/0955	40					
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Clayton 1.5SSW (DE-KN-23) (39.30N 75.62W)									3.82
Delmar 4.3E (DE-SS-3) (38.47N 75.49W)									4.72
Selbyville 7.1E (DE-SS-15) (38.55N 75.10W)									4.10

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Dagsboro 7.1ENE (DE-SS-31) (38.58N 75.12W)									5.69
Lewes 1.5SSW (DE-SS-40) (38.76N 75.16W)									4.17
Millsboro 1.3W (DE-SS-41) (38.58N 75.32W)									4.95
Ocean View 0.7NW (DE-SS-42) (38.55N 75.10W)									4.20
Dewey Beach (DE-SS-45) (38.69N 75.08W)									4.52
Delmar (DE-SS-62) (38.46N 75.57W)									5.38
Maryland									
International Civil Aviation Organization (ICAO) Sites									
Cambridge (KCGE) (38.54N 76.03W)	12/0420	994.3	12/0800	25	41				
Easton (KESN) (38.80N 72.07W)	12/0516	997.3	12/0816	24	38				
Annapolis (KNAK) (38.99N 76.49W)	12/0540	997.6	12/0621	27	42				2.43
Pautuxent River NAS (KNHK) (38.28N 76.41W)	12/0306	993.5	12/0752	33	49				3.60
St. Inigoes (KNUI) (38.15N 76.42W)	12/0253	992.6	12/0237		39				4.47
Ocean City (KOXB) (38.31N 75.12W)	12/0505	990.6	12/0549	31	48				2.87
Salisbury (KSBY) (38.34N 75.51W)	12/0710	992.6	12/0800	29	38				7.10
Coastal-Marine Automated Network (C-MAN) Sites									
Thomas Point (TPLM2) (38.90N 76.44W)	12/0400	998.4	12/0750	31 (18m, 10-min)	42				
National Ocean Service (NOS) Sites									
Annapolis (APAM2) (38.98N 76.48W)	12/0542	997.5				1.47		1.39	
Bishops Head (BISM2) (38.22N 76.04W)	12/0318	992.2	12/0830	33 (7 m)	47	1.84		1.43	
Baltimore Fort McHenry (BLTM2) (39.27N 76.58W)	12/0412	998.0	12/1342	21 (7 m)	34	1.41		1.42	
Cambridge (CAMM2) (38.57N 76.07W)	12/0348	994.3	12/0800	35 (6 m)	42	1.47		1.32	
Cove Point (COVM2) (38.40N 76.39W)	12/0318	994.9	12/0242	42	53				
Francis Scott Key Bridge NE (FSNM2) (39.22N 76.53W)	12/0506	997.8	12/0636	39 (42 m)	45				
Ocean City Inlet (OCIM2) (38.33N 75.09W)	12/0506	990.9	12/0548	39 (9 m)	51	1.86		1.56	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Piney Point (PPTM2) (38.13N 76.53W)			12/0206	40	45				
Solomons Island (SLIM2) (38.32N 76.45W)	12/0306	993.4	12/0206	34	46	2.08		1.37	
Tolchester Beach (TCBM2) (39.21N 76.25W)	12/0500	998.2	12/0636	32 (7 m)	40	1.32		1.36	
Weatherflow									
Assateague South Pt. (XAST) (38.21N 75.20W)			12/0814	30 (4 m)	42				
Baber Point (XBAB) (38.31N 77.03W)			11/2327	28 (4.6 m)	40				
Blackwalnut Harbor (XBWH) (38.68N 76.33W)			12/0748	32 (6.7 m)	42				
Cuckold Creek (XCCK) (38.31N 76.93W)			12/0610	30 (5.5 m)	39				
Cobb Point (XCOB) (38.24N 76.83W)			12/0134	38 (14 m)	48				
Crisfield (XCRS) (37.97N 75.88W)			12/0437	39 (6.4 m)	58				
Greenbury Point (XGRN) (38.97N 76.46W)			12/0654	33 (7.6 m)	44				
Grove Point Light (XGVP) (39.40N 76.04W)			12/0822	29 (10.7 m)	37				
Herring Bay (KHEB) (38.73N 76.54W)			12/0631	26 (7.3 m)	36				
Lower Hooper Island (XHPR) (38.26N 76.18W)			12/0733	30 (8.5 m)	47				
Hart/Miller (XHRT) (39.25N 76.37W)			12/0737	30 (18.3 m)	43				
Kent Island (XKNT) (38.92N 76.36W)			12/0647	28 (4.9 m)	40				
Monroe Creek (XMON) (38.23N 76.95W)			12/0051	36 (12 m)	42				
Ocean City (XOCN) (38.33N 75.08W)			12/0615	35 (10 m)	49				
Potomac Light 33 (XP33) (38.34N 76.99W)			12/0006	37 (7.6 m)	46				
Point Lookout (XPTL) (38.04N 76.32W)			12/0259	37 (11 m)	53				
Pylons Dah (XPYL) (38.31N 77.00W)			12/0018	31 (7.6 m)	39				
Raccoon Point (XRAC) (38.14N 75.79W)			12/0419	33 (6.1 m)	44				
Tolly Point (XTOL) (38.94N 76.44W)			12/0816	31 (6.1 m)	41				
Remote Automated Weather Stations (RAWS)									
Assateague Island (ASTM2) (38.08N 75.20W)			12/0640		40				2.40

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Deale 0.9SE (MD-AA-43) (38.78N 76.54W)									4.19
Waldorf 3.3S (MD-CH-35) (38.59N 76.91W)									4.97
Dunkirk 3.2NNE (MD-CV-6) (38.76N 76.64W)									5.08
Brandywind 6.7ESE (MD-PG-37) (38.66N 76.74W)									4.58
Queen Anne 5.9NNE (MD-QA-12) (39.00N 75.93W)									5.25
Ridge 1.0N (MD-SM-1) (38.12N 76.37W)									6.86
Deal Island 0.5SSW (MD-SS-12) (38.15N 75.95W)									6.68
Easton 0.7NNW (MD-TB-11) (38.78N 76.07W)									3.91
Fruitland 1.8ENE (MD-WC-22) (38.33N 75.59W)									7.89
Berlin 0.7SW (MD-WR-9) (38.32N 75.23W)									4.14
New Jersey									
International Civil Aviation Organization (ICAO) Sites									
Ocean City (26N9) (39.26N 74.61W)			12/0915	30	39				
Atlantic City (KACY) (39.45N 74.57W)	12/0655	994.6	12/0905	31	47				2.76
Wildwood (KWWD) (39.02N 74.92W)	12/0705	993.6	12/0526		34				2.15
National Ocean Service (NOS) Sites									
Cape May (CMAN4) (38.97N 74.96W)	12/0706	992.7	12/1136	31 (10 m)	44				
Ship John Shoal (SJSN4) (39.31N 75.38W)	12/0730	995.2	12/0930	37 (15 m)	44				
Weatherflow									
Barnegat Inlet Light (XBRN) (39.76N 74.09W)			12/0732	35 (12 m)	43				
Kite Island (XKIT) (39.79N 74.17W)			12/1356	27 (6.1 m)	37				
LBI Island (XLBI) (39.64N 74.21W)			12/1002	29 (5.5 m)	37				
Ludlam Bay (XLUD) (39.18N 74.70W)			12/0833	30 (6.1 m)	41				
Cape May (XMAY) (38.97N 74.96W)			12/0947	35 (10 m)	47				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Brick (XMLK) (40.01N 74.06W)			12/1408	26 (10 m)	37				
Monmouth (XMNB) (40.34N 73.99W)			12/1354		34				
PT Point (XPTP) (39.37N 74.50W)			12/0932	27 (5.8 m)	37				
Rutgers (XRUT) (39.52N 74.32W)			12/1327	33 (12 m)	43				
Sandy Hook (XSAN) (40.42N 73.98W)			12/1355	29 (18 m)	37				
Seaside Heights (XSEA) (39.94N 74.07W)			12/1312		34				
Trixies (XTRX) (39.88N 74.14W)			12/0749	25 (9.8 m)	36				
Tuckerton (XTUK) (39.52N 74.32W)			12/1322	30 (10 m)	41				
New Jersey WeatherNet									
Harvey Cedars (NJ11) (39.70N 74.14W)			12/0850	32 (11 m)	40				3.43
West Cape May (NJ21) (38.94N 84.94W)			12/1245	29 (3 m)	35				2.76
Seaside Heights (NJ39) (39.94N 74.07W)			12/1420	31 (12 m)	39				2.72
Upper Deerfield (NJ50) (39.52N 75.20W)			12/1420	23 (10 m)	34				
Sea Girt (NJ52) (40.12N 74.03W)			12/1245	29 (10 m)	37				4.09
Woodbine (NJ55) (39.22N 74.79W)			12/0825	28 (10 m)	40				2.50
High Point Monument (NJ61) (41.32N 74.67W)			12/1325	31 (7 m)	50				2.19
Fortescue (NJ67) (39.24N 75.18W)			12/0745	26 (10 m)	37				2.56
Pennsauken (NJ71) (39.99N 75.04WS)			121320	27 (10 m)	34				1.28
Lower Alloways Creek (39.48N 75.54W)			12/0800	30 (10 m)	40				2.27
Hydrometeorological Automated Data System (HADS) Sites (NWS)									
Folsom (GEHN4) (39.59N 74.85W)									3.04
Stone Harbor (SHBN4) (39.06N 74.77W)			12/0836	30	43				
Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) Sites									
Hammonton 3.3WSW (NJ-AT-5) (39.64N 74.83W)									4.52
Southampton Twp 1.6SE (NJ-BT-68) (39.90N 74.70W)									6.52

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Bridgeton 2.2N (NJ-CD-7) (39.46N 75.23N)									3.49
Wildwood Crest 0.1WSW (NJ-CM-17) (38.97N 74.84W)									3.76
Pittman 0.1W (NJ-GL-1) (39.73N 75.13W)									4.21
Ocean Twp 2.1WSW (NJ-MN-73) (40.24N 74.07W)									3.98
Point Pleasant Beach 0.5SW (NJ-OC-13) (40.09N 74.05W)									4.04
Stafford Twp 2.2NNE (NJ-OC-51) (39.74N 74.25W)									5.57
Pittsgrove Twp 1.9S (NJ-SL-3) (39.51N 75.13W)									3.51

[a] Date/time is for sustained wind when both sustained and gust are listed.
[b] Except as noted, sustained wind averaging periods for C-MAN and land-based reports are 2 min; buoy averaging periods are 8 min. Cuban station averaging periods are 10 min.
[c] Storm surge is water height above normal astronomical tide level.
[d] For most locations, storm tide is water height above the North American Vertical Datum of 1988 (NAVD88). Storm tide is water height above Mean Lower Low Water (MLLW) for NOS stations in Puerto Rico, the U.S. Virgin Islands, and Barbados.
[e] 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.
[l] Incomplete record.

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%)	54	120
Medium (40%-60%)	36	54
High (>60%)	24	36

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for the tropical cyclone stages of Michael. 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	**20.0**	**34.5**	**47.1**	**45.9**	**64.4**	**85.2**	
OCD5	39.0	86.7	143.6	186.8	334.0	567.1	
Forecasts	17	15	13	11	7	3	
OFCL (2013-17)	24.1	37.4	50.5	66.6	98.4	137.4	
OCD5 (2013-17)	44.7	95.8	153.2	211.2	318.7	416.2	

Table 5b. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for the tropical cyclone and pre-tropical cyclone stages of Michael.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	21.1	39.1	52.5	56.1	61.7	76.1	96.9
OCD5	38.7	89.1	146.7	193.1	306.1	503.9	719.8
Forecasts	20	18	16	14	10	6	2

Table 5c. Homogeneous comparison of selected track forecast guidance models (in n mi) for the tropical cyclone stages of Michael. 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	18.3	31.6	40.6	35.5	68.8	96.4	
OCD5	36.0	83.7	139.5	176.4	337.1	573.3	
GFSI	22.5	36.6	54.0	60.3	**60.5**	**50.4**	
HWFI	19.8	**30.8**	**39.7**	46.9	79.4	195.0	
HMNI	**17.8**	**26.9**	**38.8**	39.8	73.0	358.5	
EGRI	21.0	**31.0**	47.6	61.5	106.0	136.1	
EMXI	24.0	53.0	77.8	102.5	206.7	357.2	
NVGI	28.5	57.2	83.4	83.5	76.7	158.2	
CMCI	32.8	54.1	64.5	68.8	119.0	374.2	
CTCI	20.9	**30.9**	**38.1**	**34.9**	74.3	129.9	
TCON	19.0	**26.8**	**35.3**	**29.9**	**25.9**	**55.3**	
TVCA	18.9	**28.3**	**36.5**	**31.7**	**45.9**	**92.2**	
TVDG	19.2	**30.7**	**39.7**	39.8	**63.4**	113.6	
GFEX	22.0	40.3	60.4	71.7	115.8	186.2	
HCCA	19.7	32.1	**40.0**	41.3	70.8	161.5	
AEMI	20.6	35.6	51.5	58.1	69.0	**81.4**	
TABS	57.1	129.7	182.2	197.2	212.3	303.3	
TABM	28.1	52.2	86.8	119.1	121.4	**88.7**	
TABD	22.6	35.4	54.3	89.0	211.2	388.6	
Forecasts	15	13	11	9	6	2	

Table 6a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for the tropical cyclone stages of Michael. 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	6.8	12.3	14.6	19.1	24.3	**3.3**	
OCD5	9.9	18.7	27.8	32.5	43.3	12.0	
Forecasts	17	15	13	11	7	3	
OFCL (2013-17)	5.5	8.0	10.1	11.4	12.7	14.5	
OCD5 (2013-17)	7.1	11.1	14.4	17.4	20.6	22.3	

Table 6b. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for the tropical cyclone and pre-tropical cyclone stages of Michael.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	6.6	12.6	16.0	21.9	30.0	27.0	15.0
OCD5	9.2	18.7	28.7	35.3	49.7	37.0	4.0
Forecasts	19	17	15	13	9	5	1

Table 6c. Homogeneous comparison of selected intensity forecast guidance models (in kt) for the tropical cyclone stages of Michael. 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	6.8	12.3	14.6	19.1	24.3	3.3	
OCD5	9.9	18.7	27.8	32.5	43.3	12.0	
HWFI	10.2	15.2	16.4	**15.8**	28.1	3.7	
HMNI	10.9	17.5	22.1	28.6	42.1	13.3	
DSHP	9.9	15.6	24.0	27.0	28.7	10.3	
LGEM	9.6	16.3	24.3	29.8	33.7	12.7	
ICON	9.8	14.6	20.9	24.8	32.7	9.0	
IVCN	9.9	14.5	20.3	25.0	32.9	6.7	
CTCI	11.6	14.7	18.6	26.1	33.3	11.0	
GFSI	15.4	22.9	24.0	25.9	28.3	8.7	
EMXI	16.7	28.2	31.6	32.1	35.4	17.0	
HCCA	9.3	13.1	20.1	21.7	29.7	4.0	
Forecasts	17	15	13	11	7	3	

Table 7a. Tropical cyclone wind watch and warning summary for Hurricane Michael, 7–11 October 2018.

Date/Time (UTC)	Action	Location
6 / 2100	Tropical Storm Warning issued	Cuban provinces of Pinar del Rio and Isle of Youth
6 / 2100	Tropical Storm Watch issued	Coast of Mexico from Tulum to Cabo Catoche
7 / 0900	Tropical Storm Warning issued	Coast of Mexico from Tulum to Cabo Catoche
8 / 0900	Hurricane Warning issued	Cuban province of Pinar del Rio
8 / 0900	Hurricane Watch issued	Gulf coast of Florida from the AL/FL Border to the Suwanee River
8 / 0900	Tropical Storm Watch issued	Gulf coast of Florida from Suwanee River to Anna Maria Island, including Tampa Bay
8 / 0900	Tropical Storm Watch issued	Alabama coast
8 / 2100	Hurricane Warning issued	Gulf coast of Florida from the AL/FL Border to the Suwannee River
8 / 2100	Tropical Storm Warning and Hurricane Watch issued	Alabama coast
8 / 2100	Tropical Storm Warning issued	Gulf coast of Florida from the Suwannee River to Chassahowitzka
8 / 2100	Tropical Storm Watch issued	Mississippi coast
9 / 0300	Tropical Storm Warning discontinued	Coast of Mexico from Tulum to Cabo Catoche
9 / 0900	Hurricane Warning changed to Tropical Storm Warning	Cuban province of Pinar del Rio
9 / 0900	Tropical Storm Watch issued	Atlantic coast from Fernandina Beach, FL to South Santee River, SC
9 / 0900	Tropical Storm Warning discontinued	Cuban province of Isle of Youth
9 / 1200	Tropical Storm Warning discontinued	Cuban province of Pinar del Rio
9 / 1500	Hurricane Watch discontinued	Alabama coast
9 / 2100	Tropical Storm Warning issued	Atlantic coast from Fernandina Beach, FL to South Santee River, SC

Date/Time (UTC)	Action	Location
9 / 2100	Tropical Storm Watch issued	Atlantic coast from South Santee River, SC to Duck, NC including the Pamlico and Ablemarle Sounds
10 / 0900	Tropical Storm Warning issued	Atlantic coast from South Santee River, SC to Surf City, NC
10 / 1500	Tropical Storm Warning issued	North Carolina coast from Surf City to Duck including the Pamlico and Ablemarle Sounds
10 / 1500	Tropical Storm Watch discontinued	Mississippi coast
10 / 1800	Tropical Storm Warning discontinued	Alabama coast
10 / 1800	Tropical Storm Watch discontinued	Gulf coast of Florida south of Chassahowitzka
10 / 2100	Hurricane Warning discontinued	Gulf coast of Florida west of the Okaloosa/Walton county line
10 / 2100	Tropical Storm Warning discontinued	Gulf coast of Florida south of the Suwannee River
11 / 0300	Hurricane Warning discontinued	Gulf coast of Florida
11 / 0900	Tropical Storm Warning discontinued	Atlantic coast southwest of Altamaha Sound, GA
11 / 1500	Tropical Storm Warning discontinued	Atlantic coast southwest of the Savannah River, GA
11 / 1800	Tropical Storm Warning discontinued	Atlantic coast southwest of Edisto Beach, SC
11 / 2100	Tropical Storm Warning discontinued	Atlantic coast southwest of South Santee River, SC
12 / 0300	Tropical Storm Warning discontinued	Atlantic coast southwest of Cape Lookout, NC
12 / 0900	All coastal tropical cyclone watches and warnings discontinued	All

Table 7b. Storm surge watch and warning summary for Hurricane Michael, 7–11 October 2018.

Date/Time (UTC)	Action	Location
8 / 0900	Storm Surge Watch issued	Gulf coast of Florida from Navarre to Anna Maria Island, including Tampa Bay
8 / 2100	Storm Surge Warning issued	Gulf coast of Florida from the Okaloosa/Walton county line to the Anclote River
8 / 2100	Storm Surge Watch issued	Gulf coast of Florida west of Navarre to the AL/FL Border
10 / 0900	Storm Surge Watch discontinued	Gulf coast of Florida west of the Okaloosa/Walton county line
10 / 1500	Storm Surge Watch issued	North Carolina coast from Ocracoke Inlet to Duck
10 / 2100	Storm Surge Watch discontinued	Gulf coast of Florida south of the Anclote River
11 / 0300	Storm Surge Warning discontinued	Gulf coast of Florida west of Panama City and southeast of Keaton Beach
11 / 0900	Storm Surge Warning discontinued	Gulf coast of Florida
12 / 0900	All storm surge watches and warnings discontinued	All

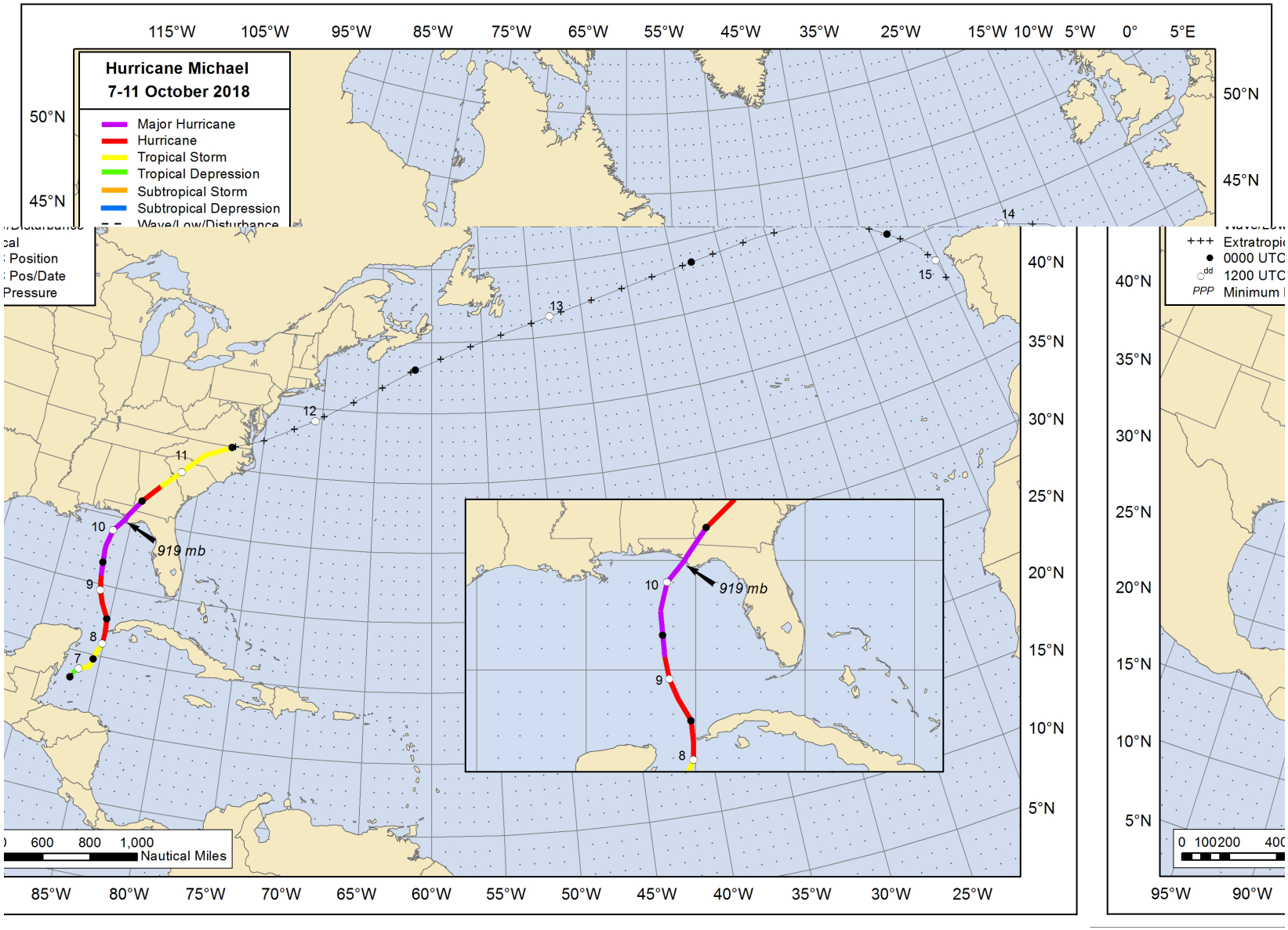


Figure 1. Best track positions for Hurricane Michael, 7–11 October 2018. The track during the extratropical stage is partially based on analyses from the NOAA Ocean Prediction Center.

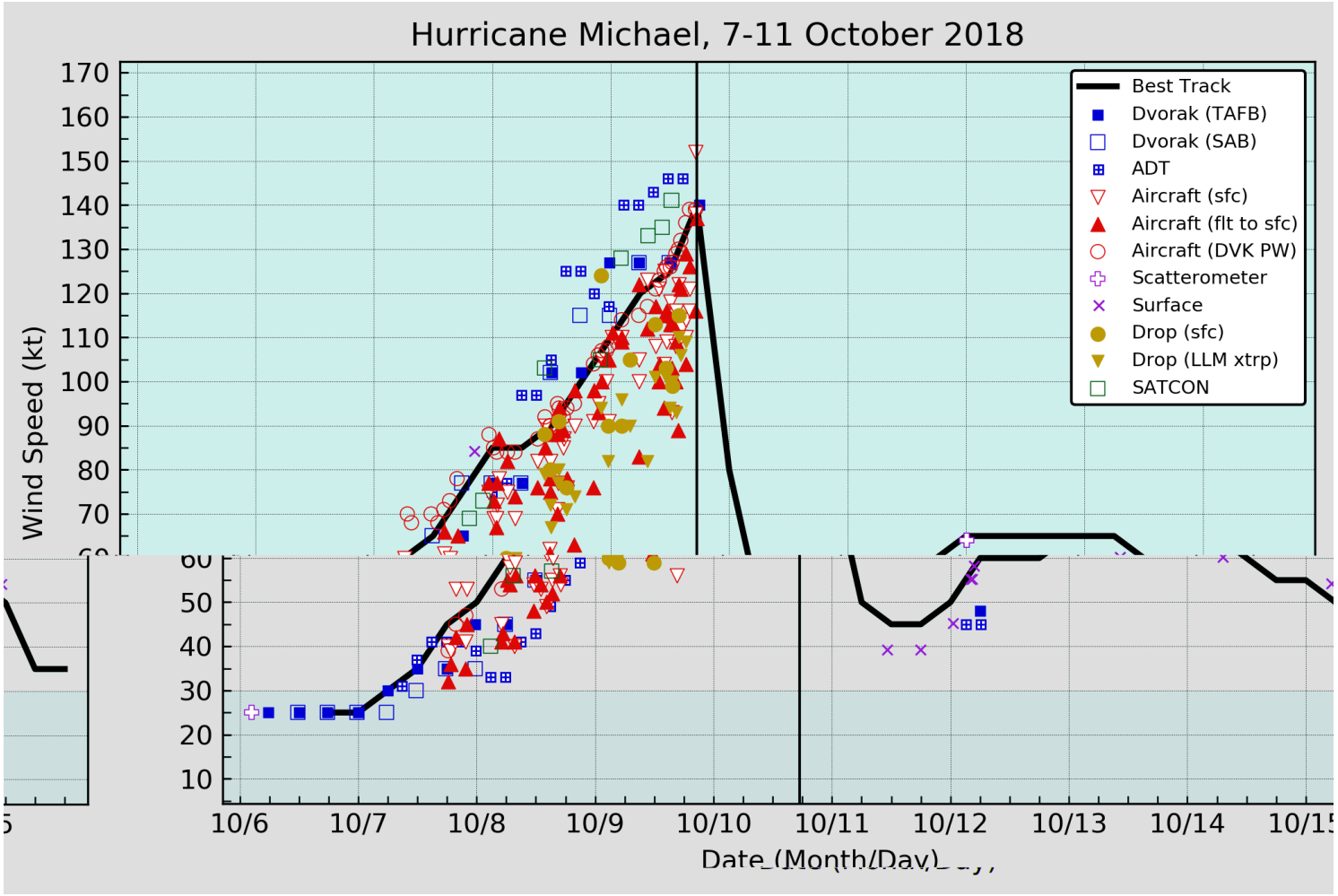


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Michael, 7–11 October 2018. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Dropwindsonde 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.

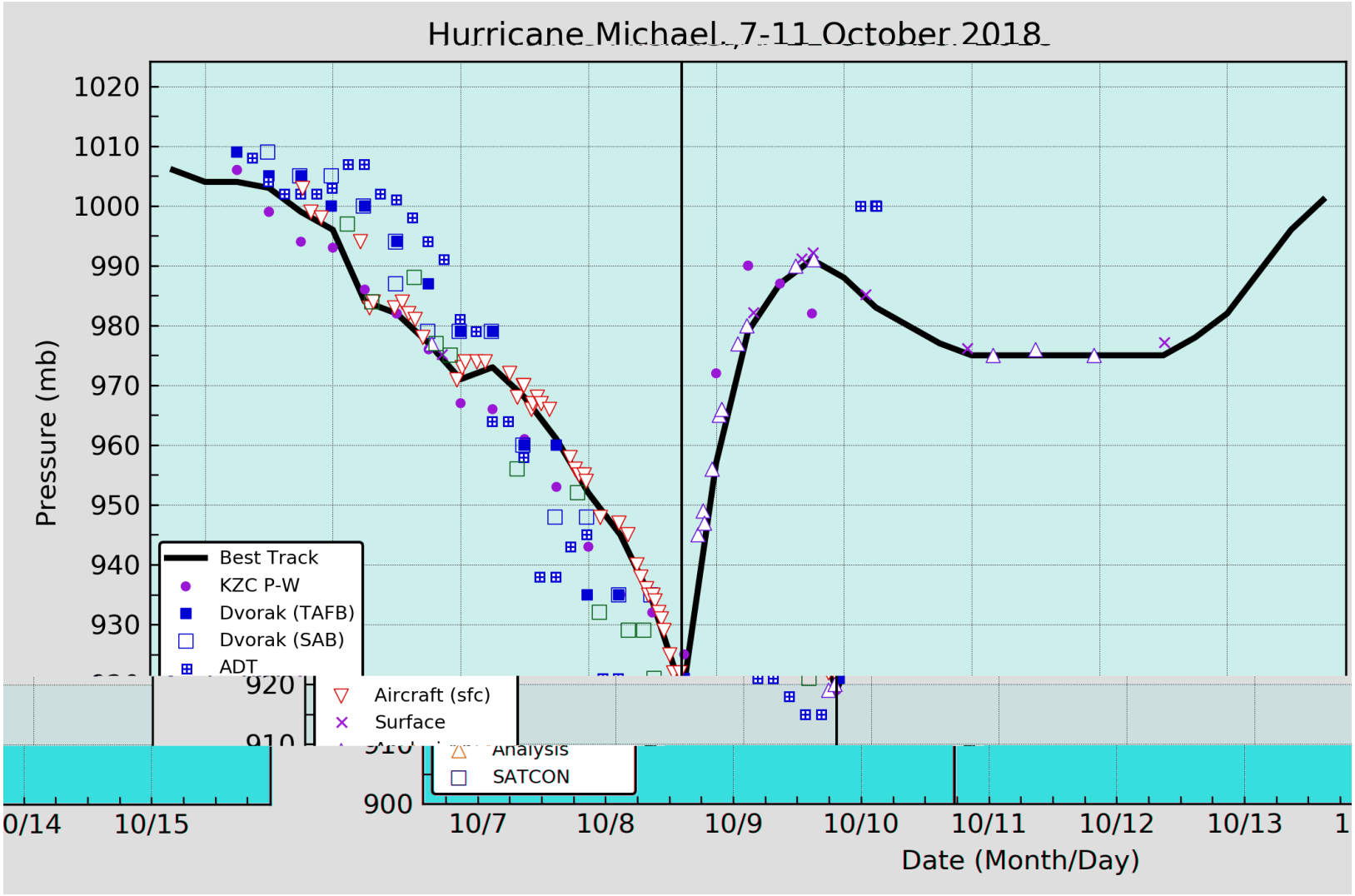


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Michael, 7–11 October 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.

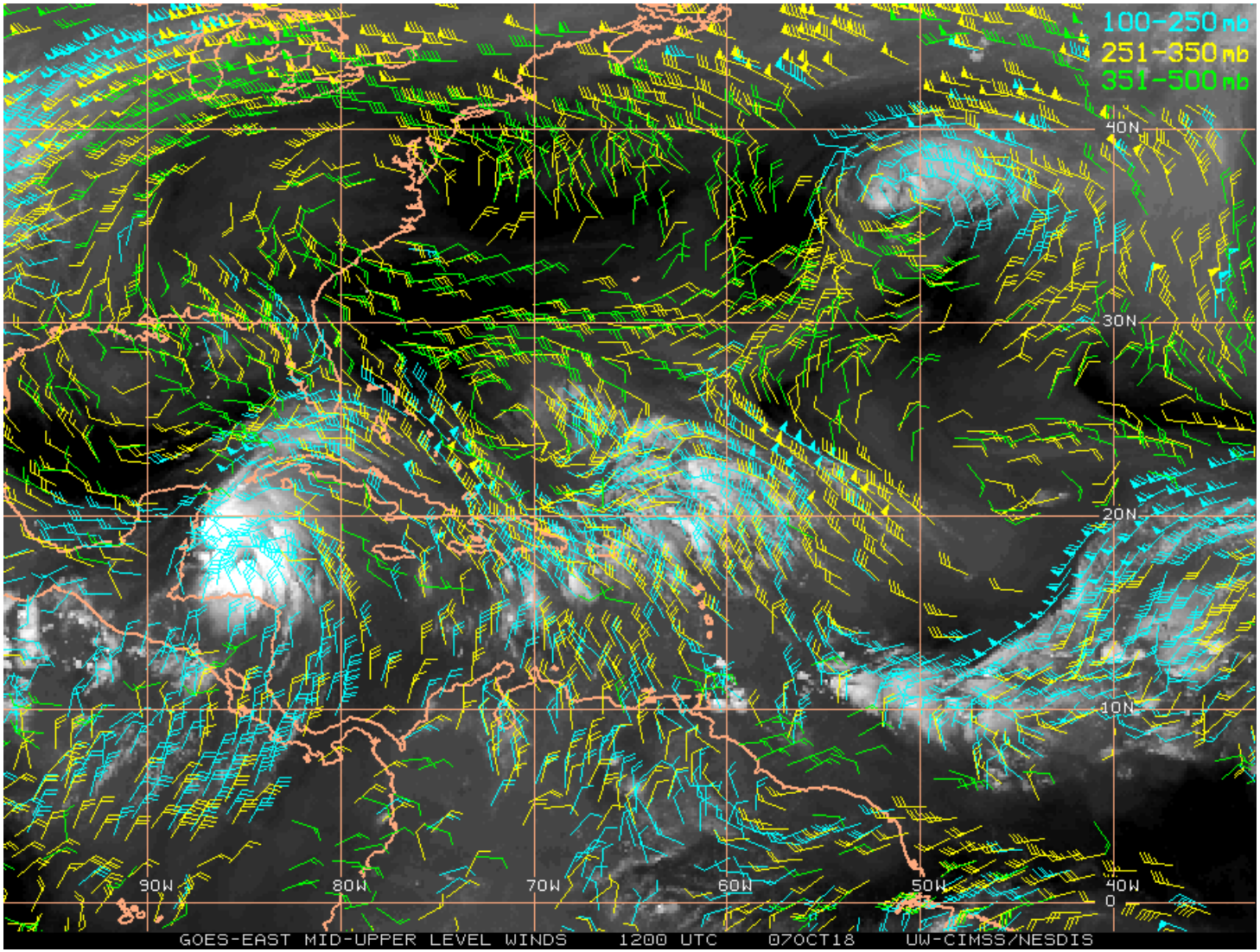


Figure 4. Mid- and upper-level atmospheric motion vectors (kt) from the GOES-16 satellite at 1200 UTC 7 October. Winds are color coded by pressure level as shown in the upper-right corner. Image courtesy of the Cooperative Institute for Meteorological Satellite Studies and the NOAA National Environmental Satellite Data and Information Service. The cloud cluster in the left center portion of the image is Tropical Storm Michael.

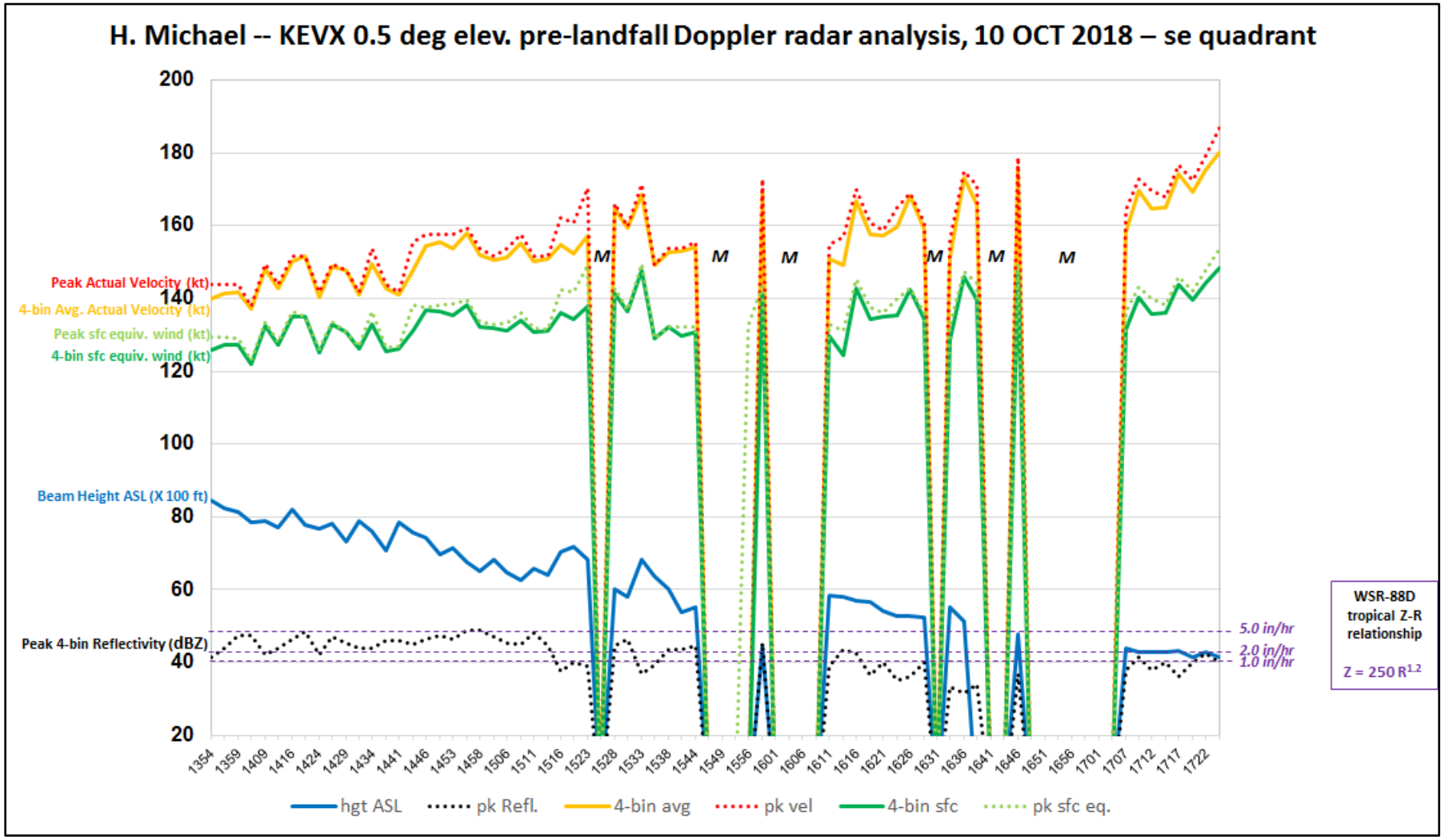


Figure 5. Analysis of Eglin AFB WSR-88D (KEVX) velocity data from 1354–1722 UTC 10 October. The blue line is the height of the 4-bin observation in feet above sea level. The dotted gray line is the peak reflectivity of the 4-bin sample. The orange line is the actual velocity from the 4-bin average, while the red dotted line is the peak velocity of the 4 bins. The green line is the 4-bin average winds reduced to the surface wind, while the dotted green line is the peak velocity of the 4 bins reduced to the surface. The dashed purple lines are the rainfall rates derived from the reflectivity. Gaps marked with M are data dropouts due to eyewall mesocyclones.

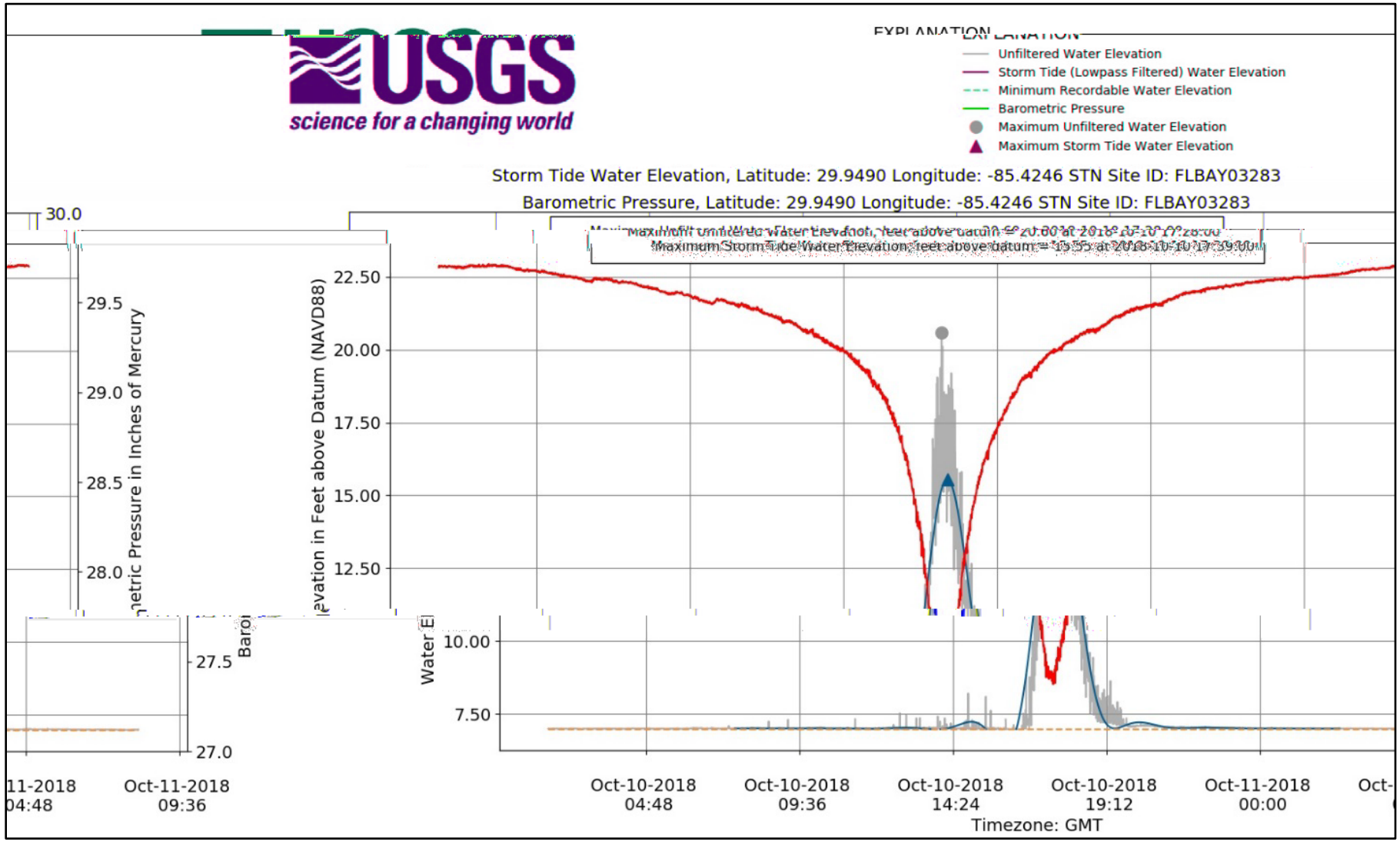


Figure 6. Instantaneous water level (gray, ft above NAVD88), wave-filtered water level (blue, ft above NAVD88) and barometric pressure (red, inches) recorded from a USGS sensor installed on the Mexico Beach pier. Image courtesy of the USGS.

Figure 7. (a) USGS high water mark survey of a seed line within the stairwell of a vacation rental building in Mexico Beach, Florida. (b) Measurement of the height of the seed line from ground level on the exterior of the building. Images courtesy of the USGS.

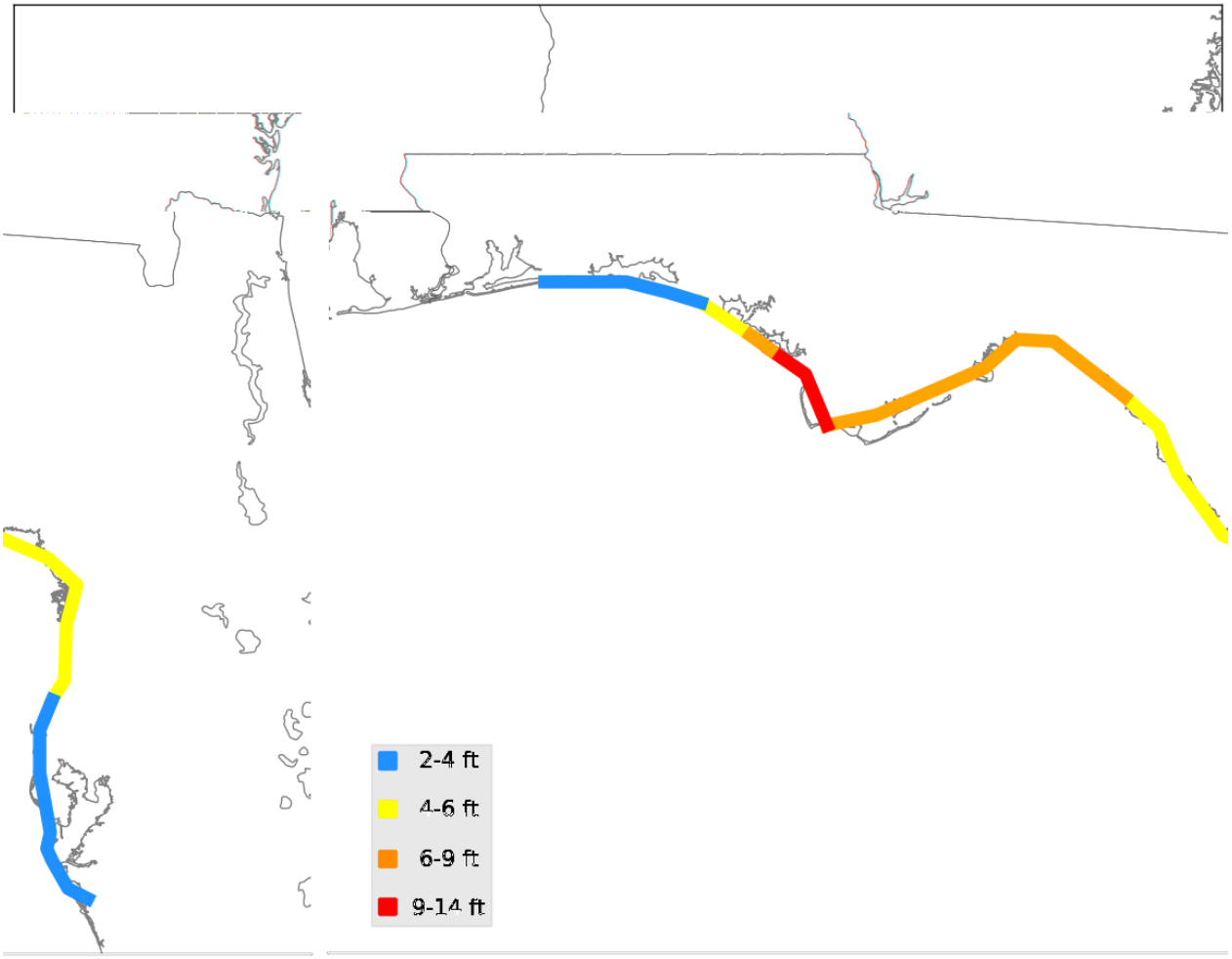


Figure 8. Estimated maximum storm surge inundation levels (ft above ground level) along the Florida coast due to Hurricane Michael. Estimates are based on USGS and NWS high water mark observations, NOS tide station observations above MHHW, USGS storm tide pressure sensors, and a hindcast from the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model. Image courtesy of the NHC Storm Surge Unit.

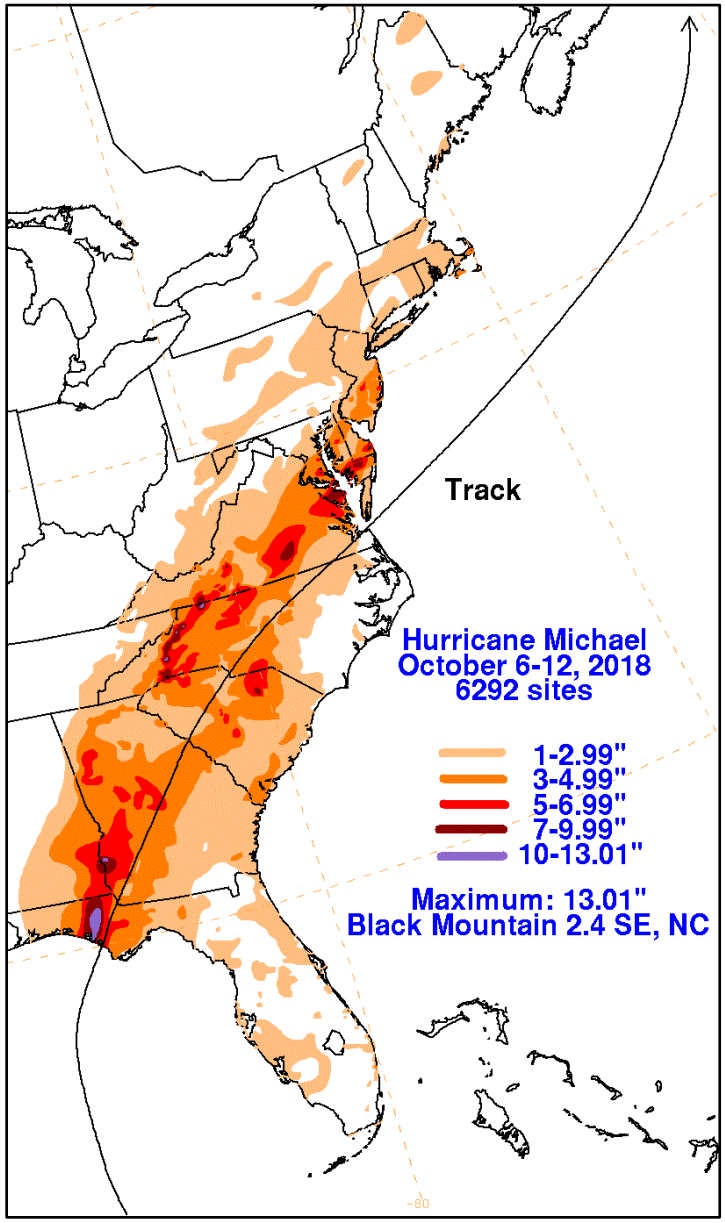


Figure 9. Analysis of storm total rainfall (inches) for Hurricane Michael courtesy of David Roth of the NOAA Weather Prediction Center.

Figure 10. Aerial image of the devastation caused by Michael in Mexico Beach, Florida. Image courtesy of the NOAA National Geodetic Survey and the NWS Weather Forecast Office in Tallahassee, Florida.

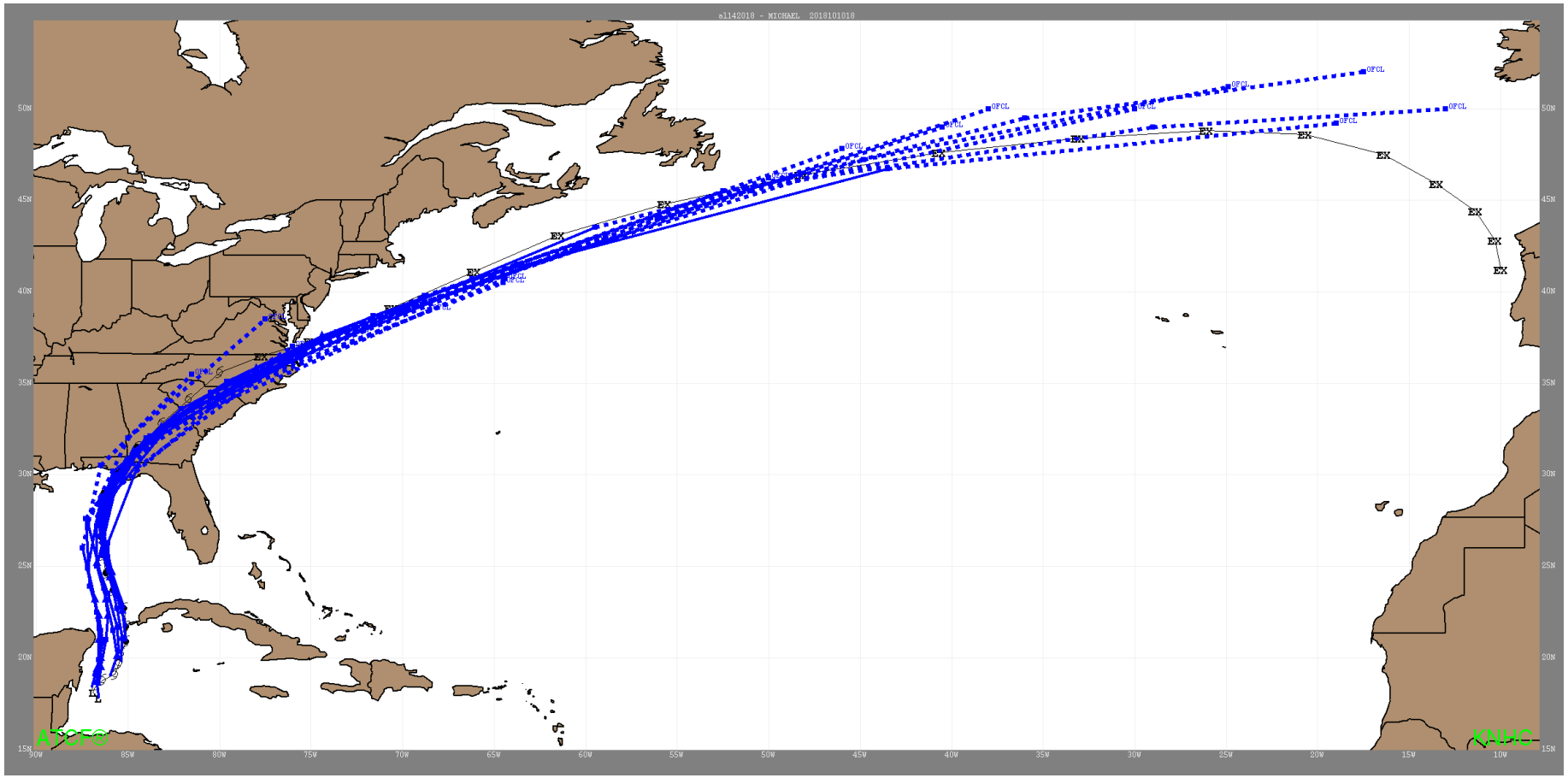


Figure 11. Selected NHC official track forecasts (blue lines) up to the time of landfall for Hurricane Michael. The best track is given by the black line with symbols at 6 h interval.

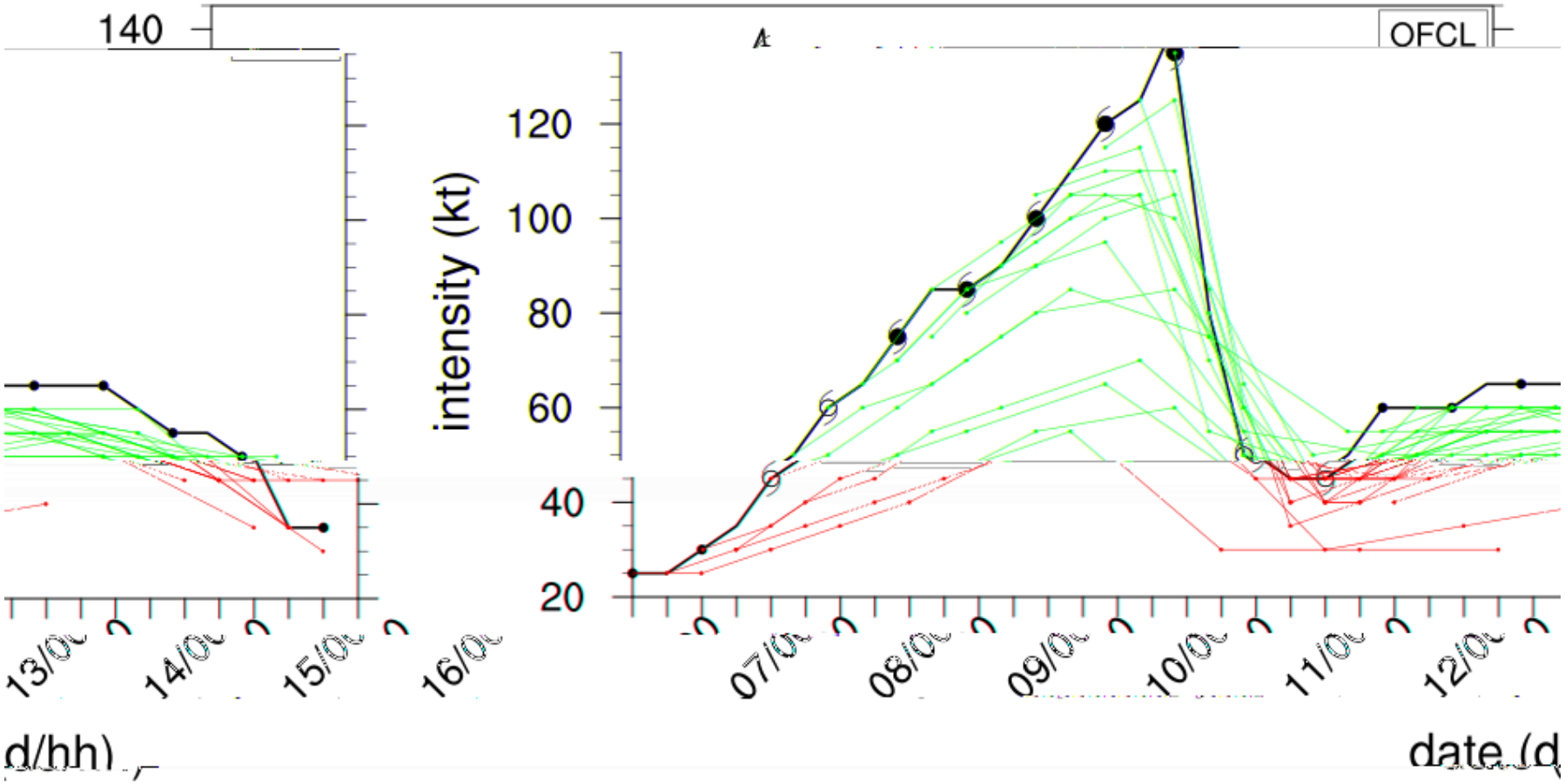


Figure 12. Selected NHC official intensity forecasts (kt, blue lines) for Hurricane Michael. The best track intensity (kt) is given by the black line with the symbols at 6 h intervals.

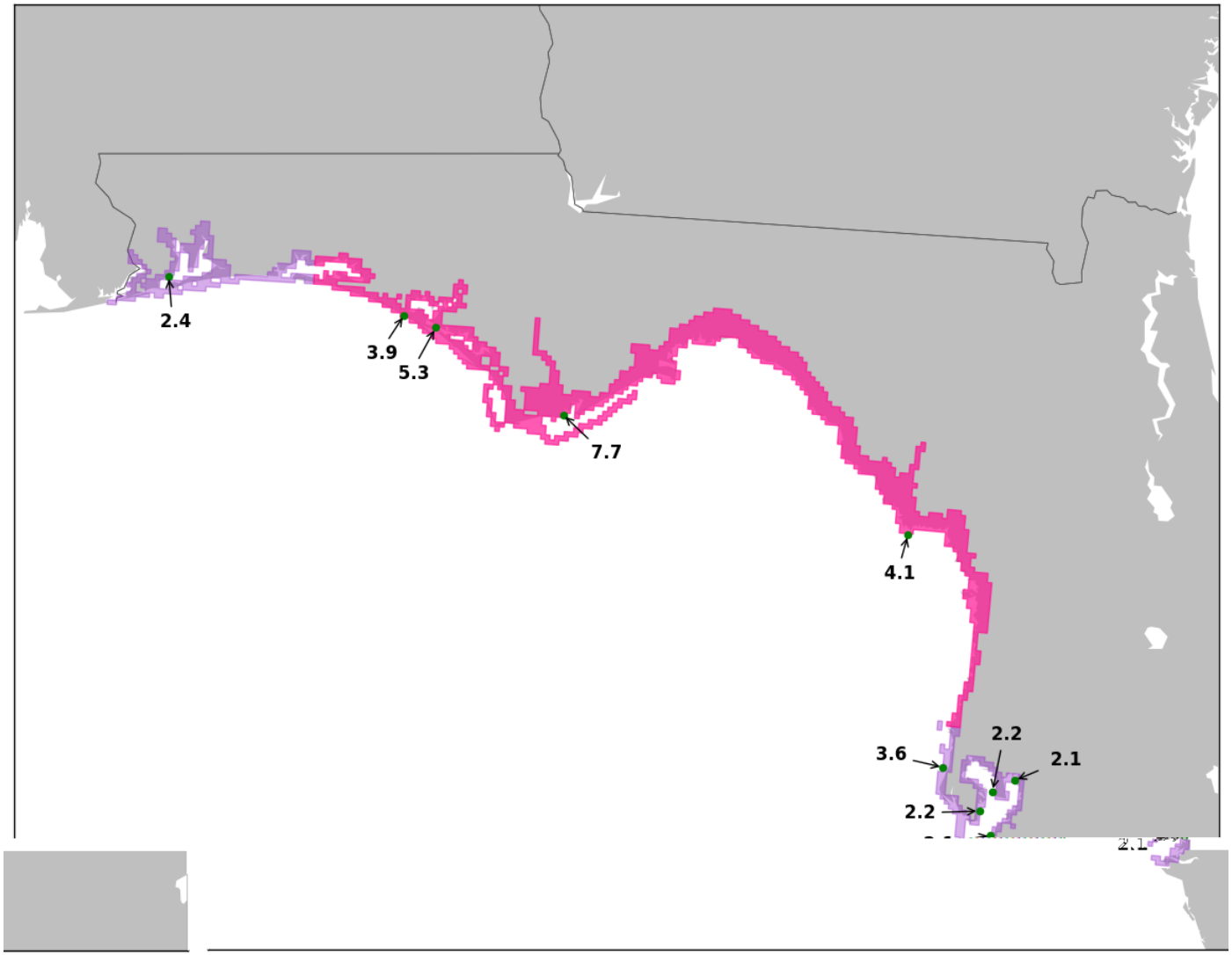


Figure 13. Areas along the Florida coast where a Storm Surge Warning (magenta) or Storm Surge Watch (lavender) was in effect at any time during Hurricane Michael, along with maximum NOS tide station observations in feet above MHHW. Note that this figure does not include water level observations from USGS storm tide pressure sensors or high water mark measurements. Image courtesy of the NHC Storm Surge Unit.

Figure 14. Areas along the North Carolina coast where a Storm Surge Watch (lavender) was in effect during Michael, along with maximum NOS tide station observations in feet above MHHW. Image courtesy of the NHC Storm Surge Unit.