

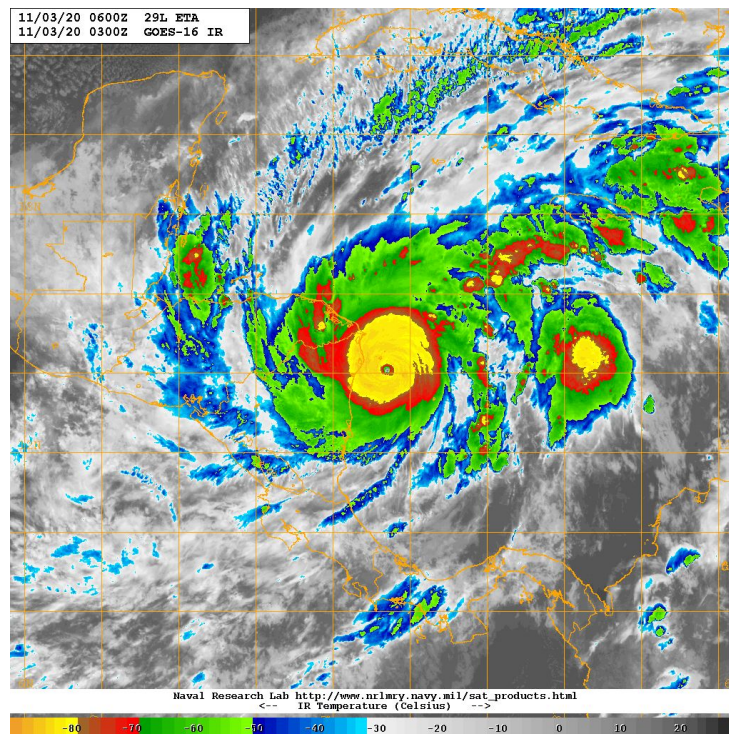


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## HURRICANE ETA (AL292020)

31 October–13 November 2020

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GOES-16 IR SATELLITE IMAGE OF HURRICANE ETA NEAR PEAK INTENSITY AT 0300 UTC 3 NOVEMBER 2020. IMAGE COURTESY OF NAVAL RESEARCH LABORATORY.

Eta struck Nicaragua as a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale), and caused severe flooding over portions of Central America. It later redeveloped over the northwestern Caribbean Sea as a tropical storm, crossed Cuba and the Florida Keys and produced torrential rains and flooding over portions of South Florida.



# Table of Contents

|   |           |
|---|-----------|
| <b>SYNOPTIC HISTORY</b> .....   | <b>3</b>  |
| <b>METEOROLOGICAL STATISTICS</b> .....  | <b>5</b>  |
| <i>Winds and Pressure</i> .....   | 5         |
| <i>Storm Surge</i> .....  | 6         |
| <i>Rainfall and Flooding</i> .....  | 6         |
| <i>Tornadoes</i> .....  | 8         |
| <b>CASUALTY AND DAMAGE STATISTICS</b> .....                                       | <b>8</b>  |
| <i>International</i> .....  | 8         |
| <i>United States</i> .....  | 9         |
| <b>FORECAST AND WARNING CRITIQUE</b> .....  | <b>10</b> |
| <i>Genesis</i> .....  | 10        |
| <i>Track</i> .....  | 10        |
| <i>Intensity</i> .....  | 10        |
| <i>Storm Surge Forecasts and Warnings</i> .....                                   | 11        |
| <i>Wind Watches and Warnings</i> .....  | 12        |
| <i>Impact-Based Decision Support Services (IDSS) and Public Communication</i> ... | 12        |
| <b>ACKNOWLEDGMENTS</b> .....  | <b>12</b> |
| <b>TABLES</b> .....   | <b>13</b> |
| <b>FIGURES</b> .....  | <b>56</b> |

# Hurricane Eta

31 OCTOBER–13 NOVEMBER 2020

## SYNOPTIC HISTORY

Eta can be traced back to a tropical wave that is estimated to have moved off the west coast of Africa on 22 October. This system moved westward across the tropical Atlantic for about a week, accompanied by a large area of disorganized cloudiness, showers, and thunderstorms. Deep convection showed signs of organization when the disturbance reached the Windward Islands on 29 October. On 30 October, the disturbance moved west-northwestward into the eastern Caribbean Sea and gradually became better organized. Early on 31 October, the system's deep convection became more consolidated over the east-central Caribbean Sea, with some evidence of banding features. By 1800 UTC that day, a low-level circulation became sufficiently well-defined to denote the formation of a tropical depression centered about 190 n mi south of Pedernales, Dominican Republic. The “best track” chart of the tropical cyclone's path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1<sup>1</sup>.

A ridge of high pressure to the north caused the cyclone to move westward over the west-central and western Caribbean Sea for a couple of days, and the depression strengthened into a tropical storm by 0000 UTC 1 November when it was centered about 260 n mi southeast of Kingston, Jamaica. In an environment of low vertical shear and high oceanic heat content, Eta quickly intensified, becoming a 70-kt hurricane by 0600 UTC 2 November while centered about 270 n mi south of Grand Cayman. The hurricane strengthened extremely rapidly on 2 November as a distinct eye became apparent on visible satellite images around 1500 UTC that day. Eta's maximum winds increased to near 115 kt, category 4 intensity, by 1800 UTC 2 November, an increase of 45 kt over just 12 h. The hurricane reached its peak intensity of about 130 kt at 0000 UTC 3 November when it was centered about 55 n mi east-southeast of Puerto Cabezas, Nicaragua. A mid-level ridge then built over the western Gulf of Mexico and Mexico, which caused Eta to turn toward the southwest with a decrease in forward speed. Eta maintained an intensity near 130 kt through 0600 UTC 3 November, by which time the central pressure had fallen to 922 mb. Some weakening then took place, likely due to an eyewall replacement, while the system's forward speed slowed even further. Upwelling of cooler shelf waters near the east coast of Nicaragua by this slow-moving system may have also contributed to the weakening. After nearly stalling just off the coast of northeastern Nicaragua later on 3 November, the hurricane turned toward the west-northwest and made landfall in that country about 15 n mi south-southwest of Puerto Cabezas around 2100 UTC that day, with a category 4 intensity of 120 kt.

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

After crossing the coast, the cyclone moved slowly westward over northern Nicaragua while steadily weakening to a tropical storm by 1200 UTC 4 November, and to a tropical depression by 0000 UTC 5 November while located well inland about 70 n mi east of Tegucigalpa, Honduras. The system's surface circulation appeared to dissipate by 0600 UTC 5 November, but an associated low- to mid-tropospheric circulation center or vorticity maximum was still present. This disturbance moved west-northwestward, northwestward, and northward over Honduras on 5 November, and then emerged over the Gulf of Honduras just before 0000 UTC 6 November. Meanwhile, the ridge over the Gulf of Mexico was replaced by a mid- to upper-level cyclone and trough which dug southeastward toward the disturbance, causing it to turn toward the east-northeast. It is estimated that the system re-acquired a surface circulation, and thus re-developed into a tropical depression, to the east of Belize around 0600 UTC 6 November. The cyclone regained tropical storm status by about 0600 UTC 7 November and briefly accelerated east-northeastward later that day. The storm strengthened to an intensity of 55 kt at 0000 UTC 8 November. Eta then moved on a counterclockwise trajectory, along the periphery of a broad deep-layer cyclonic circulation. This motion took the center of Eta across the south coast of central Cuba around 0900 UTC 8 November, and the center emerged off the north coast of Cuba and into the Straits of Florida by around 1500 UTC that day.

Eta continued to move along a counterclockwise path, turning northward, north-northwestward, and west-northwestward over the Straits through early on 9 November. The center of the tropical storm made landfall in the Florida Keys near Lower Matecumbe Key with an intensity of about 55 kt around 0400 UTC 9 November. Eta then moved westward into the southeastern Gulf of Mexico. Dry air entrainment caused some weakening, and the storm's winds decreased to 45 kt later on 9 November while the system turned west-southwestward and southwestward. The cyclone made a cyclonic loop to the north of the western tip of Cuba, with little change in strength, on 10 November. Eta moved northward on 11 November, and briefly regained hurricane intensity around 1200 UTC that day. This re-intensification may have been due to the system's interaction with the higher oceanic heat content of the Loop Current over the southeastern Gulf of Mexico. In any event, the cyclone's hurricane status was short-lived. Eta, having weakened back to a tropical storm, moved generally northward over the extreme eastern Gulf of Mexico later on 11 November, passing to the west of the southern and south-central Florida peninsula. At 0000 UTC 12 November, Eta's center passed about 40 n mi west of Clearwater, Florida. The system turned north-northeastward and made landfall near Cedar Key, Florida at about 0900 UTC that day, with its maximum winds weakening to near 45 kt due to strong west-southwesterly shear and some incursions of drier air. While continuing to weaken, Eta then moved northeastward and crossed northern Florida on 12 November, with most of the convection displaced to the east of the center due to strong shear.

The center of the cyclone emerged into the Atlantic just north of the Florida/Georgia border by 1800 UTC 12 November, having weakened further while over land. Eta re-intensified slightly once back over water and accelerated east-northeastward late that day and early on 13 November, passing offshore of the South Carolina and North Carolina coasts. By 1200 UTC 13 November, the system became embedded within a frontal zone and thus had been transformed into an extratropical cyclone. The cyclone was absorbed by another extratropical low offshore of the northeastern United States just after 0000 UTC November 14.

## METEOROLOGICAL STATISTICS

Observations in Eta (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the 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 flights of the 53<sup>rd</sup> Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command (AFRES) and WD-P3 aircraft of the NOAA Aircraft Operations Center. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), the European Space Agency's Advanced Scatterometer (ASCAT), and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Eta.

There was a total of 21 aircraft missions into and around Eta, 11 from the AFRES, and 10 from NOAA (6 center fix missions, 3 synoptic surveillance flights, and 1 tail doppler radar mission). The AFRES transmitted 21 center fixes, and NOAA transmitted 16 fixes.

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

### *Winds and Pressure*

The estimated maximum intensity of Eta, 130 kt from 0000 to 0600 UTC 3 November, is based on AFRES observations, using a blend of the highest 700 mb flight-level winds of 137 kt, which adjusts to an intensity of 123 kt, and the peak SFMR-observed surface winds of 135 kt. The 130-kt intensity is also supported by a maximum eyewall dropsonde wind speed of 129 kt averaged over the lowest 150 m of the sounding at 0306 UTC. Eta's estimated minimum central pressure of 922 mb at 0600 UTC 3 November is based on an AFRES eye dropsonde measurement of 925 mb with splash winds of 14 kt at 0358 UTC 3 November, and the possibility that the pressure was still falling at that time.

The 130-kt intensity of Eta at landfall in Nicaragua is based on a blend of Dvorak estimates and earlier aircraft observations. Sustained winds of 94 kt and a gust to 118 kt were reported at the Puerto Cabezas, Nicaragua, airport, but these observations were incomplete. Peak sustained winds of 46 kt with a gust to 49 kt were measured at Cayo Coco, Cuba. A slightly elevated WeatherFlow observing site on Carysfort Reef Light in the upper Florida Keys measured maximum sustained winds of 55 kt with a gust to 61 kt. Sites near the standard 10-m elevation in Miami-Dade and Broward Counties in south Florida reported sustained winds close to 40 kt with gusts near 50 kt. Sustained winds of 35–40 kt with gusts to around 50 kt were measured in the Tampa Bay area. A sustained wind of 35 kt with a gust to 44 kt and a minimum pressure of 997 mb was reported at Cedar Key, Florida around the landfall near that location. The lowest pressure reported in Florida was about 992 mb in the mid-upper Florida Keys while the center moved through that area.

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

The meteorological service of Nicaragua reported a storm surge of 26 to 33 ft above normal near Eta's landfall location in Nicaragua.

Eta produced storm surge inundation levels of 3 to 4 ft above ground level (AGL) in the Tampa Bay area of Florida. National Ocean Service (NOS) tide gauges in the northern part of the bay, at Old Port Tampa and Tampa-East Bay, both measured peak water levels of 3.9 ft above Mean Higher High Water (MHHW). Also, the NOS gauge in St. Petersburg recorded a peak water level of 3.5 ft MHHW. Several stream gauges from the United States Geological Survey (USGS) confirmed these heights. For example, a gauge in Pinellas County on Lake Seminole recorded a peak water level of 4.1 ft MHHW, and a gauge on the Hillsborough River in Tampa measured 3.8 ft MHHW. Figure 4 shows observations from various tide stations and water level sensors along the Florida coast.

Storm surge inundation levels along the remainder of the Florida coast were generally 1 to 3 ft AGL, but some isolated areas were between 3 and 4 ft AGL. These areas include the upper part of Florida Bay, where a USGS gauge between U.S. 1 and Card Sound Road recorded a peak water level of 3.7 ft MHHW. Along Apalachee Bay, the USGS gauge at the Aucilla River measured 3.6 ft MHHW, and along the southwest coast of Florida, a gauge on the Peace River near Charlotte Harbor registered 3.1 ft MHHW. Otherwise, all other gauges along the Florida coast measured peak water levels less than 3 ft MHHW.

## Rainfall and Flooding

### International

Abundant moisture associated with Eta and its remnants, combined with the cyclone's slow motion before and after landfall in Nicaragua, resulted in an extended period of heavy rainfall across large portions of Central America. The highest reported rainfall totals occurred along the northern coast of Honduras (Fig. 5), with 31.63 inches (803.3 mm) in Tela and 29.25 inches (743.0 mm) at Golosón International Airport in La Ceiba from 1–7 November 2020. Over 20 inches of rainfall occurred in parts of northeastern Nicaragua (Fig. 6) as well, with a peak of 26.55 inches (674.3 mm) at Puerto Corinto. However, rainfall totals in Nicaragua are likely incomplete due to damage caused by the storm. In Guatemala (Fig. 7), heavy rain fell across the eastern and central portions of the country, with 21.06 inches (534.8 mm) reported at Cobán, Alta Verapaz and 19.10 inches (485.1 mm) in Puerto Barrios, Izabal. A swath of 10+ inches of rainfall occurred across the central portion of Belize (Fig. 8), with a topographically-enhanced maximum of 21.86 inches (555.2 mm) at Baldy Beacon. A maximum of 10.84 inches (275.4 mm) occurred in the northwestern part of El Salvador (Fig. 9) near Planes de Montecristo. In Costa Rica (Fig.

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

10), topography combined with moist flow from the Pacific focused the heaviest precipitation near the southern Pacific coast, with a maximum of 24.58 inches (624.4 mm) near Arunachala. Additionally, portions of southern Mexico (Fig. 11) received heavy rainfall from Eta and its remnants from 3–7 November, with the highest totals noted in the states of Chiapas and Tabasco and a maximum of 24.90 inches (632.5 mm) reported at Tzimbac, Chiapas.

Heavy rainfall from Eta also impacted portions of the Greater Antilles. Eta passed to the south of Jamaica on 1 November, and then passed northwest of the island on 7 November before making landfall in Cuba. As a result, Jamaica received several days of heavy rain, with 10–20 inches reported across the eastern parishes from 1–8 November and a maximum of 28.89 inches (733.8 mm) measured at Moore Town. Elsewhere, Grand Cayman received 9.87 inches (250.7 mm) of rainfall from 3–7 November as Eta made a close approach to the Cayman Islands. The storm's landfall in central Cuba resulted in 3–6 inches of rain across the region with isolated totals greater than 10 inches, including 17.71 inches (449.8 mm) at Topes de Collantes and 15.24 inches (387.2 mm) at La Piedra.

Maximum reported rainfall totals by country:

|                        |   |
|------------------------|---|
| <u>Honduras:</u>       | 31.63 inches (803.3 mm) at Tela, Atlántida            |
| <u>Jamaica:</u>        | 28.89 inches (733.8 mm) at Moore Town, Portland       |
| <u>Nicaragua:</u>      | 26.55 inches (674.3 mm) at Puerto Corinto, Chinandega |
| <u>Mexico:</u>         | 24.90 inches (632.5 mm) at Tzimbac, Chiapas           |
| <u>Costa Rica:</u>     | 24.58 inches (624.4 mm) at Arunachala                 |
| <u>Belize:</u>         | 21.86 inches (555.2 mm) at Baldy Beacon, Cayo         |
| <u>Guatemala:</u>      | 21.06 inches (534.8 mm) at Cobán, Alta Verapaz        |
| <u>Cuba:</u>           | 17.71 inches (449.8 mm) at Topes de Collantes         |
| <u>El Salvador:</u>    | 10.84 inches (275.4 mm) at Planes de Montecristo      |
| <u>Cayman Islands:</u> | 9.87 inches (250.7 mm) at Grand Cayman                |

## United States

South Florida was the focus of significant rainfall from Eta in the United States (Fig. 12). The highest reported storm total rainfall of 20.74 inches occurred in Broward County in Pembroke Pines, with 16–18 inches measured at several other locations in Pembroke Pines and nearby Miramar. In Miami-Dade County, 14.12 inches of rain fell near Biscayne Park, and 13.40 inches occurred in North Miami. Numerous other locations in Broward and Miami-Dade Counties received over 10 inches of rainfall, which resulted in widespread major flooding across the area (Fig. 13).

Elsewhere, much of the Florida Keys received 4–8 inches of rainfall during the event, as Eta made two separate approaches and one landfall early on 9 November in Lower Matecumbe Key. A storm total maximum of 8.98 inches occurred near Key West. Eta also produced heavy rainfall across the greater Tampa Bay area, with several locations reporting more than 8 inches of rain during the event and a maximum of 10.64 inches noted near Sun City Center in Hillsborough County.

Once Eta crossed northern Florida and emerged into the Atlantic Ocean, its interaction with a cold front moving across the Mid-Atlantic states produced heavy rains across portions of Georgia as well as eastern South Carolina and North Carolina from 11–13 November, before and during the cyclone’s extratropical transition. Peak rainfall totals from each state, which may include some precipitation not directly related to Eta, are as follows: 5.51 inches near Washington, Georgia; 7.50 inches near Conway, South Carolina; and 12.50 inches near Rocky Mount, North Carolina.

## **Tornadoes**

There was one EF0 tornado reported in Manatee County, Florida, that caused minor damage.

# CASUALTY AND DAMAGE STATISTICS

## **International**

Eta was responsible for at least 165 direct deaths<sup>3</sup> and over 100 missing people in Central America and southern Mexico, although these counts are uncertain and likely underdone due to inconsistent media reports. The extreme rainfall associated with Eta caused catastrophic flash flooding, river flooding, and deadly landslides across the region. Flooding or landslides contributed to at least 74 deaths in Honduras, 60 in Guatemala, 27 in Mexico, and 2 in both Nicaragua and Costa Rica. Incredibly, there was no reported loss of life near the landfall location on the coast of northeastern Nicaragua, although Eta must have caused very severe damage in that area. The United Nations (UN) estimates that 4.9 million people were adversely impacted by the torrential rainfall, strong winds, and storm surge produced by Eta. There was an estimated \$6.8 billion (USD) worth of total damage from Eta in Central America, according to the Global Catastrophe Recap produced by Aon. Unfortunately, this devastation was soon to be followed by additional disastrous impacts from Hurricane Iota<sup>4</sup> just two weeks later.

UNICEF estimates that over 110,000 people displaced by Eta across Central America were evacuated to temporary shelters during the COVID-19 pandemic. Floodwaters destroyed many roads and bridges, which isolated numerous villages and communities and stranded people on roofs as they awaited rescue. Preliminary reports by the government of Nicaragua indicated that Eta damaged or destroyed at least 6,900 homes, 16 healthcare facilities, 45 schools, and 560 miles of roads and bridges across the country. In Honduras, at least 450 homes were damaged by floodwaters, and around 40 communities were isolated by washed-out roads and

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

<sup>4</sup> Stewart, Stacy. “Tropical Cyclone Report: Hurricane Iota.” National Oceanic and Atmospheric Administration / National Weather Service / National Hurricane Center, 18 May 2021, [www.nhc.noaa.gov/data/tcr/AL312020\\_lota.pdf](http://www.nhc.noaa.gov/data/tcr/AL312020_lota.pdf)



bridges. Hundreds of homes were also damaged or destroyed in Guatemala. A devastating landslide in the remote village of Quejá, Guatemala, buried numerous homes and approximately one hundred people according to media reports, many of whom remain missing but are likely not included in official death tolls since many victims were unable to be recovered. According to the UN, Guatemala lost over 119,000 hectares of crops and harvest during Eta, further contributing to the humanitarian crisis in the region. Major flooding impacts were also noted in Belize, Costa Rica, and El Salvador.

Elsewhere, floodwaters damaged infrastructure and thousands of homes in the states of Chiapas and Tabasco in southern Mexico. Jamaica experienced serious flooding that washed out roads and bridges and led to some landslides. Flash flooding was also reported in the Cayman Islands, along with some downed trees and power lines from strong winds. Cuba experienced coastal and river flooding that led to around 25,000 evacuations.

## United States

There were 7 direct fatalities due to Eta in the United States, all drownings due to flash flooding in North Carolina; these occurred as moisture ahead of Eta interacted with a cold front that was moving across the Mid-Atlantic states. In Alexander County, 5 persons ranging in age from 1 to 76 drowned at a campground, and a 64-year-old man was killed when he drove his vehicle onto a collapsed bridge. An 11-year old child drowned in flood waters in Wake County. Additionally, there were 3 indirect deaths in the U.S. Two people died in weather-related traffic accidents in North Carolina and a 65-year-old man was electrocuted in floodwaters at his home in Bradenton Beach, Florida.

According to the NOAA National Centers for Environmental Information, Eta caused an estimated \$1.5 billion worth of total damage in the United States, primarily in southern Florida. Major flooding was Eta's greatest impact in South Florida, with water entering some structures in parts of Broward County including Fort Lauderdale, Lauderhill, and Davie. Heavy rains resulted in standing water that made streets impassable in northern Miami-Dade County and portions of downtown Miami and Brickell. Floodwaters in the streets were slow to recede and lingered for several days after the storm. Over 290,000 customers in Miami-Dade, Broward, and Palm Beach Counties lost power due to downed trees and power lines. In the Florida Keys, the combination of rain and storm surge resulted in some flooding in North Key Largo and Upper Matecumbe Key. A large tree fell on and destroyed a residence in Key Largo, resulting in a minor injury. Downed trees and limbs caused about 1,000 customers to lose power, mainly in Key Largo. During Eta's passage to the west of the Keys, large wave action produced significant overwash along the Lower Keys and forced some road closures in Key West.

West-central Florida also received significant flooding impacts from storm surge and heavy rainfall. In Pinellas County, 33 people were rescued from flooded homes and stalled vehicles in Pass-a-Grille. Other areas between St. Pete Beach and Madeira Beach experienced up to a couple of feet of storm surge inundation. Several sailboats broke free of their moorings during the storm and became stuck under a bridge or were beached in Gulfport. Street flooding and road closures were also reported in coastal Hillsborough, Manatee, Sarasota, Charlotte, and Lee Counties. Wind impacts were generally minor, although a tractor-trailer crash in Hernando

County was attributed to strong wind. Over 40,000 customers lost power in the greater Tampa Bay area.

## FORECAST AND WARNING CRITIQUE

### *Genesis*

The timing and location of the genesis of Eta was not that well predicted. It was first noted in the Tropical Weather Outlook (TWO) that an area of low pressure was expected to form over the southwestern Caribbean Sea 66 h before Eta's genesis over the central Caribbean Sea, and the 5-day formation probability was set to low (<40%) at that time (Table 4). Subsequent TWOs closer to the time of genesis indicated a formation location farther east and closer to the actual genesis location. The 2-day formation probability was first set to low in the TWO 48 h before genesis. The 2- and 5-day formation probabilities were raised to medium (40%-60%) 30 and 54 h prior to genesis, respectively, and to high only 24 and 36 h before genesis, respectively.

### *Track*

A verification of NHC official track forecasts for Eta is given in Table 5a. Official track forecast errors were a little higher than the mean official errors for the previous 5-yr period, a reasonably good performance considering the erratic nature of the tropical cyclone's track. A homogeneous comparison of the official track errors with selected guidance models is given in Table 5b. Several of the guidance models had lower mean errors than the official forecasts, but in most of those cases the NHC forecasts had comparable errors. However, the COAMPS-TC (CTCI) model had substantially lower errors than most of the other track guidance at 48 h and beyond. The official forecasts consistently predicted landfall in northeastern Nicaragua (Fig. 14). It should also be noted that the NHC forecasts began calling for Eta to move into, or reform over, the northwestern Caribbean Sea about 96 h in advance of that occurrence.

### *Intensity*

A verification of NHC official intensity forecasts for Eta is given in Table 6a. Official intensity forecast errors were somewhat higher than the mean official errors for the previous 5-yr period for the 12- through 48 h-forecast intervals, and lower than the 5-yr means at 60 through 120 h. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 6b. HWFI was the best performer at the 36- and 48-h forecast intervals. In general, however, the mean official errors were comparable to or lower than those of the intensity guidance models. As is typical, forecasting Eta's rapid intensification before landfall in Nicaragua was problematic. Nonetheless, 30 h prior to Eta reaching peak intensity, the Deterministic to Probabilistic Statistical (DTOPS) model indicated a 71% chance of a 30-kt wind speed increase in 24 h, and the SHIPS Rapid Intensification Index showed a 53% chance of a 30-kt wind speed increase in 24 h one day before the hurricane's peak. The official intensity forecasts issued 30 h before the Nicaragua landfall showed significant strengthening, and indicated that the system would become a major hurricane by the time it reached the coast.

## Storm Surge Forecasts and Warnings<sup>5</sup>

Storm surge watches and warnings associated with Eta are given in Table 7 and indicated in Fig. 15. A Storm Surge Watch was first issued for the southern part of the Florida peninsula from Golden Beach to Bonita Beach, the Florida Keys, Biscayne Bay, and Florida Bay at 2100 UTC 7 November. The part of the watch covering the Florida Keys and Florida Bay was upgraded to a Storm Surge Warning at 1500 UTC 8 November. While some minor coastal flooding did occur in these areas, there was only one observation of storm surge inundation of 3 ft or greater above normally dry ground (which NHC uses as a first-cut threshold for the storm surge watch/warning) in the upper part of Florida Bay. For the most part, then, the majority of the Storm Surge Warning for the Florida Keys and Florida Bay did not verify, and all watches and warnings were discontinued by 0900 UTC 9 November.

For the southern Florida peninsula and the Florida Keys, the initial peak storm surge inundation forecast issued at 0300 UTC 7 November was 2 to 3 ft above normally dry ground somewhere between North Miami Beach and Marco Island, as well as the Florida Keys. The forecast was raised slightly to 2 to 4 ft above normally dry ground for the same general area at 2100 UTC 7 November. The highest observation within this area was 3.7 ft MHHW by the USGS gauge in the upper part of Florida Bay between Homestead and Key Largo.

A Storm Surge Watch was issued for the west coast of Florida from Bonita Beach to the Steinhatchee River, including Tampa Bay and Charlotte Harbor, at 0300 UTC 11 November. The portion of the watch from Bonita Beach to the Suwanee River, including Tampa Bay and Charlotte Harbor, was upgraded to a Storm Surge Warning at 1500 UTC 11 November. Storm surge inundation of 3 ft or higher above ground level occurred within the warning area mainly within Tampa Bay and areas of Charlotte Harbor. There was very little lead time with this warning, as sustained tropical-storm-force winds are estimated to have begun in the Tampa Bay area later in the afternoon on 11 November. There were no observations of 3 ft or greater inundation along the open coast, although a storm surge simulation hindcast produced by the NHC Storm Surge Unit (not shown) suggests that at least 3 ft could have occurred along the beaches of Sarasota, Manatee, and Pinellas Counties.

For the west coast of Florida, the initial peak storm surge inundation forecast issued at 0300 UTC 11 November was 2 to 4 ft above normally dry ground somewhere between Bonita Beach and the Steinhatchee River, including Tampa Bay and Charlotte Harbor. The forecast was increased to 3 to 5 ft above normally dry ground between Boca Grande and Anclote River, including Tampa Bay, at 1500 UTC 11 November. The highest observations in this area were about 4 ft MHHW from several NOS and USGS gauges.

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<sup>5</sup> Storm surge watches and warnings are currently only issued for the United States.

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

Wind watches and warnings associated with Eta are given in Table 8. A Hurricane Warning was issued for the northeast coast of Nicaragua about 36 h before the onset of tropical-storm-force winds over that area, and 54 h prior to landfall.

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

The NHC began communication with emergency managers on 6 November as Eta was in the northwestern Caribbean and continued through its multiple landfalls in Florida. This communication included daily briefings for Emergency Managers in Florida and Federal video-conferences with FEMA Headquarters. These decision support briefings were coordinated through the FEMA Hurricane Liaison Team, embedded at the NHC.

The Tropical Analysis and Forecast Branch of NHC provided 13 live briefings on Eta to the U.S. Coast Guard (USCG) District 7 in Miami between 5 and 12 November in support of USCG's life-saving mission.

## **ACKNOWLEDGMENTS**

Much of the observed data in this report came from Post Tropical Cyclone (PSH) Reports issued by NWS Weather Forecast Offices (WFOs) in Miami, Key West, Melbourne, Tampa, and Jacksonville, Florida. Jose Rubiera of the meteorological service of Cuba provided surface observations from that country. Select surface observations and rainfall data were provided by the meteorological services of Belize, Cayman Islands, Costa Rica, El Salvador, Jamaica, Guatemala, Honduras, Mexico, and Nicaragua.

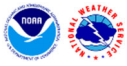
John P. Cangialosi produced the track map and assisted with the forecast verification. Zackary Taylor and David Roth of the NOAA Weather Prediction Center produced the rainfall map. Tiffany O'Connor and Matthew Green gave IDSS briefing information.

Table 1. Best track for Hurricane Eta, 31 October–13 November 2020.

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage               |
|-----------------|---------------|----------------|---------------|-----------------|---------------------|
| 31 / 1800       | 14.9          | 72.4           | 1006          | 30              | tropical depression |
| 01 / 0000       | 14.9          | 73.6           | 1005          | 35              | tropical storm      |
| 01 / 0600       | 14.9          | 75.1           | 1005          | 35              | "                   |
| 01 / 1200       | 14.9          | 76.7           | 1002          | 40              | "                   |
| 01 / 1800       | 14.9          | 78.2           | 992           | 50              | "                   |
| 02 / 0000       | 14.9          | 79.4           | 988           | 60              | "                   |
| 02 / 0600       | 14.9          | 80.4           | 982           | 70              | hurricane           |
| 02 / 1200       | 14.8          | 81.2           | 972           | 90              | "                   |
| 02 / 1800       | 14.7          | 82.0           | 948           | 115             | "                   |
| 03 / 0000       | 14.3          | 82.5           | 929           | 130             | "                   |
| 03 / 0600       | 14.0          | 82.9           | 922           | 130             | "                   |
| 03 / 1200       | 13.6          | 83.1           | 936           | 125             | "                   |
| 03 / 1800       | 13.7          | 83.3           | 940           | 120             | "                   |
| 03 / 2100       | 13.8          | 83.5           | 940           | 120             | "                   |
| 04 / 0000       | 13.8          | 83.7           | 965           | 95              | "                   |
| 04 / 0600       | 13.8          | 84.3           | 980           | 70              | "                   |
| 04 / 1200       | 13.8          | 84.9           | 993           | 50              | tropical storm      |
| 04 / 1800       | 13.9          | 85.4           | 998           | 40              | "                   |
| 05 / 0000       | 14.0          | 86.0           | 1002          | 30              | tropical depression |
| 05 / 0600       | 14.2          | 86.7           | 1006          | 25              | disturbance         |
| 05 / 1200       | 14.5          | 87.5           | 1005          | 25              | "                   |
| 05 / 1800       | 15.3          | 87.8           | 1005          | 30              | "                   |
| 06 / 0000       | 16.2          | 87.8           | 1004          | 30              | "                   |
| 06 / 0600       | 16.7          | 87.6           | 1004          | 30              | tropical depression |
| 06 / 1200       | 16.9          | 87.4           | 1004          | 30              | "                   |
| 06 / 1800       | 17.1          | 87.1           | 1004          | 30              | "                   |
| 07 / 0000       | 17.5          | 86.4           | 1002          | 30              | "                   |
| 07 / 0600       | 18.2          | 85.1           | 1001          | 35              | tropical storm      |
| 07 / 1200       | 19.1          | 83.2           | 997           | 45              | "                   |
| 07 / 1800       | 19.8          | 81.5           | 994           | 55              | "                   |



| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage                              |
|-----------------|---------------|----------------|---------------|-----------------|------------------------------------|
| 08 / 0000       | 20.4          | 80.2           | 991           | 55              | "                                  |
| 08 / 0600       | 21.1          | 79.5           | 991           | 55              | "                                  |
| 08 / 0855       | 21.5          | 79.2           | 991           | 55              | "                                  |
| 08 / 1200       | 22.2          | 79.0           | 993           | 50              | "                                  |
| 08 / 1800       | 23.5          | 79.2           | 993           | 55              | "                                  |
| 09 / 0000       | 24.5          | 80.1           | 993           | 55              | "                                  |
| 09 / 0400       | 24.9          | 80.7           | 993           | 55              | "                                  |
| 09 / 0600       | 25.0          | 81.4           | 992           | 55              | "                                  |
| 09 / 1200       | 24.9          | 82.9           | 992           | 50              | "                                  |
| 09 / 1800       | 24.2          | 84.1           | 995           | 45              | "                                  |
| 10 / 0000       | 23.4          | 85.0           | 995           | 45              | "                                  |
| 10 / 0600       | 23.0          | 85.4           | 995           | 45              | "                                  |
| 10 / 1200       | 22.6          | 85.3           | 992           | 50              | "                                  |
| 10 / 1800       | 22.9          | 85.1           | 992           | 50              | "                                  |
| 11 / 0000       | 23.5          | 84.6           | 990           | 55              | "                                  |
| 11 / 0600       | 24.5          | 84.2           | 987           | 60              | "                                  |
| 11 / 1200       | 25.8          | 83.9           | 983           | 65              | hurricane                          |
| 11 / 1800       | 26.8          | 83.7           | 990           | 60              | tropical storm                     |
| 12 / 0000       | 27.9          | 83.5           | 992           | 55              | "                                  |
| 12 / 0600       | 28.7          | 83.2           | 994           | 50              | "                                  |
| 12 / 0920       | 29.2          | 82.9           | 996           | 45              | "                                  |
| 12 / 1200       | 29.7          | 82.5           | 1001          | 40              | "                                  |
| 12 / 1800       | 30.9          | 81.3           | 1003          | 35              | "                                  |
| 13 / 0000       | 31.9          | 79.9           | 1004          | 40              | "                                  |
| 13 / 0600       | 32.7          | 78.0           | 1004          | 40              | "                                  |
| 13 / 1200       | 34.0          | 75.3           | 1004          | 40              | extratropical                      |
| 13 / 1800       | 35.1          | 72.5           | 1005          | 40              | "                                  |
| 14 / 0000       | 35.7          | 69.2           | 1006          | 35              | "                                  |
| 14 / 0600       |               |                |               |                 | absorbed                           |
| 03 / 0600       | 14.0          | 82.9           | 922           | 130             | maximum winds and minimum pressure |



| <b>Date/Time<br/>(UTC)</b> | <b>Latitude<br/>(°N)</b> | <b>Longitude<br/>(°W)</b> | <b>Pressure<br/>(mb)</b> | <b>Wind<br/>Speed (kt)</b> | <b>Stage</b>   |
|----------------------------|--------------------------|---------------------------|--------------------------|----------------------------|--|
| 03 / 2100                  | 13.8                     | 83.5                      | 940                      | 120                        | landfall 15 n mi<br>south-southwest of<br>Puerto Cabezas,<br>Nicaragua |
| 08 / 0855                  | 21.5                     | 79.2                      | 991                      | 55                         | landfall 25 n mi<br>south-southeast of<br>Sancti Spiritus,<br>Cuba     |
| 09 / 0400                  | 24.9                     | 80.7                      | 993                      | 55                         | landfall near Lower<br>Matecumbe Key, FL                               |
| 12 / 0920                  | 29.2                     | 82.9                      | 996                      | 45                         | landfall near Cedar<br>Key, FL   |

Table 2. Selected ship reports with winds of at least 34 kt for Eta, 31 October–13 November 2020.

| Date/Time (UTC) | Ship call sign | Latitude (°N) | Longitude (°W) | Wind dir/speed (kt) | Pressure (mb) |
|-----------------|----------------|---------------|----------------|---------------------|---------------|
| 03 / 0900       | 2IYH6          | 16.8          | 79.9           | 080 / 35            | 1006.6        |
| 04 / 1000       | 2IYH6          | 20.2          | 84.4           | 060 / 35            | 1010.6        |
| 04 / 1200       | 9VBP8          | 20.1          | 86.7           | 040 / 35            | 1014.1        |
| 04 / 1400       | 2IYH6          | 20.5          | 85.1           | 070 / 38            | 1012.1        |
| 04 / 1800       | 9VBP8          | 19.3          | 86.9           | 050 / 35            | 1013.1        |
| 07 / 0000       | KCHV           | 24.6          | 84.8           | 080 / 35            | 1013.2        |
| 07 / 1300       | 6YRG6          | 16.4          | 84.8           | 260 / 35            | 1007.3        |
| 07 / 1400       | KCHV           | 24.0          | 81.4           | 080 / 35            | 1013.2        |
| 07 / 1600       | 6YRG6          | 16.3          | 85.4           | 270 / 40            | 1010.0        |
| 07 / 1800       | 3FPS9          | 26.0          | 78.2           | 080 / 35            | 1011.5        |
| 07 / 1900       | 9HA463         | 25.4          | 79.2           | 100 / 42            | 1012.0        |
| 07 / 1900       | HPYE           | 25.8          | 77.3           | 070 / 35            | 1012.8        |
| 07 / 2100       | 9HA463         | 25.3          | 79.5           | 090 / 38            | 1011.0        |
| 07 / 2300       | 9HA463         | 25.4          | 79.6           | 080 / 35            | 1011.0        |
| 07 / 2300       | 3FPS9          | 25.7          | 77.3           | 070 / 40            | 1011.4        |
| 08 / 0000       | 3EBL5          | 25.9          | 78.2           | 090 / 35            | 1011.2        |
| 08 / 0200       | 9HA366         | 25.7          | 77.1           | 070 / 35            | 1013.0        |
| 08 / 0200       | C6DF6          | 26.2          | 77.7           | 090 / 38            | 1012.4        |
| 08 / 0300       | C6XS7          | 24.1          | 74.7           | 110 / 35            | 1014.4        |
| 08 / 0400       | 3FPS9          | 25.6          | 76.5           | 080 / 40            | 1012.0        |
| 08 / 0400       | 9HA366         | 25.7          | 76.9           | 090 / 35            | 1012.1        |
| 08 / 0500       | C6XS7          | 23.9          | 74.7           | 100 / 40            | 1009.1        |
| 08 / 0500       | 9HA463         | 25.6          | 79.5           | 090 / 35            | 1011.5        |
| 08 / 0600       | HPYE           | 25.3          | 75.5           | 100 / 40            | 1012.8        |
| 08 / 0700       | 9HA366         | 25.7          | 76.6           | 080 / 40            | 1010.2        |
| 08 / 0700       | 9HA463         | 25.9          | 79.5           | 090 / 55            | 1010.0        |
| 08 / 0700       | H3GR           | 26.1          | 77.8           | 090 / 40            | 1011.9        |
| 08 / 0700       | J8AZ3          | 26.2          | 78.8           | 090 / 37            | 1010.2        |
| 08 / 0700       | J8QX6          | 26.7          | 79.3           | 070 / 38            | 1011.7        |
| 08 / 0800       | 3FPS9          | 25.3          | 76.0           | 080 / 35            | 1009.0        |





| Date/Time (UTC) | Ship call sign | Latitude (°N) | Longitude (°W) | Wind dir/speed (kt) | Pressure (mb) |
|-----------------|----------------|---------------|----------------|---------------------|---------------|
| 08 / 0800       | 9HA366         | 25.6          | 76.4           | 090 / 40            | 1009.7        |
| 08 / 0900       | 9HA496         | 25.9          | 77.8           | 090 / 37            | 1009.0        |
| 08 / 0900       | 9HA463         | 26.2          | 79.3           | 090 / 50            | 1010.0        |
| 08 / 0900       | 9HA445         | 26.3          | 78.4           | 090 / 40            | 1011.0        |
| 08 / 0900       | C6FN5          | 26.4          | 77.9           | 080 / 50            | 1010.7        |
| 08 / 1100       | 3FPS9          | 25.1          | 75.7           | 060 / 45            | 1009.5        |
| 08 / 1100       | 3EBL5          | 26.1          | 78.3           | 090 / 45            | 1008.5        |
| 08 / 1100       | C6DF6          | 26.5          | 78.0           | 070 / 48            | 1010.4        |
| 08 / 1200       | 9HA496         | 25.5          | 77.5           | 090 / 43            | 1009.0        |
| 08 / 1200       | 3FZO8          | 26.5          | 78.3           | 080 / 40            | 1010.9        |
| 08 / 1300       | 9HA366         | 25.2          | 75.8           | 080 / 40            | 1010.4        |
| 08 / 1400       | 9HA366         | 25.4          | 75.7           | 080 / 45            | 1010.9        |
| 08 / 1500       | 9HA496         | 25.0          | 77.7           | 080 / 35            | 1009.0        |
| 08 / 1500       | 9HA366         | 25.0          | 75.6           | 100 / 40            | 1010.7        |
| 08 / 1500       | H3GR           | 26.2          | 77.9           | 110 / 44            | 1013.5        |
| 08 / 1500       | C6DF6          | 26.3          | 78.0           | 070 / 42            | 1010.2        |
| 08 / 1500       | 9HA463         | 26.4          | 78.3           | 080 / 38            | 1011.1        |
| 08 / 1600       | 3FPS9          | 24.8          | 75.1           | 110 / 35            | 1010.5        |
| 08 / 1600       | 9HA366         | 25.9          | 75.5           | 120 / 40            | 1010.6        |
| 08 / 1600       | H3VU           | 26.3          | 76.1           | 080 / 35            | 1007.2        |
| 08 / 1700       | 3FZO8          | 26.5          | 78.0           | 090 / 40            | 1011.9        |
| 08 / 1700       | 9HA463         | 26.5          | 78.0           | 090 / 38            | 1011.1        |
| 08 / 1700       | WGEH           | 27.5          | 84.4           | 070 / 35            | 1013.5        |
| 08 / 1800       | 9HA496         | 24.7          | 77.6           | 120 / 45            | 1005.0        |
| 08 / 1800       | 9HA366         | 24.8          | 75.3           | 120 / 35            | 1009.4        |
| 08 / 1800       | 3EBL5          | 26.3          | 78.4           | 090 / 50            | 1007.6        |
| 08 / 1800       | H3GR           | 26.3          | 77.9           | 080 / 45            | 1010.9        |
| 08 / 1900       | 3FPS9          | 24.5          | 74.8           | 110 / 35            |               |
| 08 / 1900       | 9HA366         | 24.8          | 75.3           | 110 / 35            | 1009.2        |
| 08 / 1900       | 9HA463         | 26.5          | 77.9           | 090 / 55            | 1010.0        |
| 08 / 2000       | C6XS7          | 23.9          | 74.7           | 170 / 45            | 1008.7        |
| 08 / 2000       | 9HA366         | 24.7          | 75.2           | 120 / 35            | 1009.5        |



| Date/Time (UTC) | Ship call sign | Latitude (°N) | Longitude (°W) | Wind dir/speed (kt) | Pressure (mb) |
|-----------------|----------------|---------------|----------------|---------------------|---------------|
| 08 / 2000       | H3GR           | 26.2          | 78.0           | 070 / 40            | 1009.9        |
| 08 / 2000       | C6DF6          | 26.2          | 77.8           | 080 / 36            | 1007.5        |
| 08 / 2100       | 9HA496         | 24.5          | 77.4           | 120 / 45            | 1004.0        |
| 08 / 2100       | 9HA463         | 26.5          | 78.1           | 090 / 56            | 1009.0        |
| 08 / 2200       | KCHV           | 30.4          | 79.4           | 080 / 38            | 1020.2        |
| 09 / 0000       | 9HA496         | 24.3          | 77.3           | 150 / 37            | 1007.0        |
| 09 / 0000       | C6DF6          | 26.1          | 77.7           | 090 / 35            | 1008.1        |
| 09 / 0000       | 9HA463         | 26.5          | 78.0           | 090 / 35            | 1010.0        |
| 09 / 0100       | 9HA366         | 25.0          | 75.3           | 100 / 40            | 1011.2        |
| 09 / 0100       | 3EBL5          | 26.1          | 78.3           | 090 / 46            | 1007.4        |
| 09 / 0100       | H3GR           | 26.1          | 77.8           | 080 / 46            | 1010.6        |
| 09 / 0200       | 9HA366         | 25.1          | 75.3           | 110 / 35            | 1012.0        |
| 09 / 0200       | H3GR           | 26.1          | 77.9           | 050 / 40            | 1011.9        |
| 09 / 0300       | C6XS7          | 23.9          | 74.8           | 160 / 37            | 1010.5        |
| 09 / 0300       | 9HA496         | 24.0          | 77.2           | 140 / 35            | 1009.0        |
| 09 / 0300       | 9HA366         | 25.2          | 75.3           | 120 / 35            | 1011.7        |
| 09 / 0300       | H3GR           | 26.0          | 77.9           | 080 / 38            | 1011.0        |
| 09 / 0400       | 9HA366         | 25.2          | 75.3           | 100 / 40            | 1011.0        |
| 09 / 0500       | C6XS7          | 24.1          | 74.9           | 120 / 35            | 1010.2        |
| 09 / 0500       | 3FZO8          | 26.5          | 78.2           | 090 / 42            | 1009.9        |
| 09 / 0500       | 9HA463         | 26.5          | 78.1           | 090 / 40            | 1011.1        |
| 09 / 0600       | 9HA366         | 25.4          | 75.3           | 090 / 41            | 1010.5        |
| 09 / 0600       | H3GR           | 26.1          | 78.1           | 120 / 40            | 1011.9        |
| 09 / 0700       | 9HA366         | 25.5          | 75.3           | 120 / 41            | 1011.2        |
| 09 / 0700       | 9HA463         | 26.5          | 78.0           | 090 / 42            | 1010.0        |
| 09 / 0800       | C6XS7          | 24.1          | 74.7           | 110 / 35            | 1007.8        |
| 09 / 0800       | C6SE3          | 25.6          | 76.4           | 100 / 35            | 1007.0        |
| 09 / 0800       | 9HA366         | 25.6          | 75.3           | 110 / 40            | 1011.4        |
| 09 / 0800       | H3GR           | 26.2          | 78.0           | 100 / 40            | 1010.6        |
| 09 / 0900       | 9HA463         | 26.5          | 78.1           | 090 / 45            | 1009.0        |
| 09 / 1000       | 3FZO8          | 26.5          | 78.2           | 090 / 40            | 1008.9        |
| 09 / 1100       | 3EBL5          | 26.1          | 78.6           | 090 / 45            | 1008.1        |



| <b>Date/Time<br/>(UTC)</b> | <b>Ship call<br/>sign</b> | <b>Latitude<br/>(°N)</b> | <b>Longitude<br/>(°W)</b> | <b>Wind<br/>dir/speed (kt)</b> | <b>Pressure<br/>(mb)</b> |
|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------------|--------------------------|
| 09 / 1200                  | D5WI8                     | 24.7                     | 89.4                      | 050 / 66                       | 1012.0                   |
| 09 / 1200                  | 3FZO8                     | 26.5                     | 78.4                      | 100 / 35                       | 1009.9                   |
| 09 / 1200                  | 3FZO8                     | 26.5                     | 78.3                      | 100 / 35                       | 1010.9                   |
| 09 / 1200                  | C6FN5                     | 26.5                     | 78.1                      | 100 / 35                       | 1011.3                   |
| 09 / 1500                  | 9HA463                    | 26.5                     | 78.1                      | 110 / 37                       | 1012.8                   |
| 09 / 1700                  | V7KD8                     | 26.0                     | 76.4                      | 090 / 49                       | 1011.0                   |
| 09 / 1700                  | 9HA463                    | 26.5                     | 78.0                      | 110 / 37                       | 1012.1                   |
| 09 / 1800                  | H3GR                      | 26.0                     | 78.2                      | 100 / 40                       | 1011.9                   |
| 09 / 1900                  | 9HA463                    | 26.5                     | 78.0                      | 090 / 42                       | 1012.0                   |
| 09 / 2100                  | 9HA463                    | 26.5                     | 78.0                      | 090 / 36                       | 1012.0                   |
| 10 / 0000                  | H3VU                      | 26.2                     | 77.9                      | 090 / 35                       | 1013.0                   |
| 10 / 0000                  | 3EBL5                     | 26.4                     | 78.3                      | 060 / 40                       | 1011.1                   |
| 10 / 0900                  | 9HA445                    | 26.1                     | 79.4                      | 100 / 35                       | 1012.0                   |
| 10 / 1200                  | C6FN5                     | 25.5                     | 79.6                      | 120 / 35                       | 1010.7                   |
| 10 / 1700                  | V7KD8                     | 24.6                     | 79.8                      | 130 / 49                       | 1009.0                   |
| 11 / 0500                  | 9HA366                    | 26.1                     | 78.1                      | 120 / 35                       | 1013.4                   |
| 11 / 0500                  | C6XS7                     | 26.3                     | 77.9                      | 130 / 35                       | 1014.1                   |
| 11 / 0600                  | HPYE                      | 26.3                     | 77.9                      | 140 / 35                       | 1014.8                   |
| 11 / 0700                  | 9HA463                    | 26.4                     | 78.3                      | 150 / 38                       | 1011.3                   |
| 11 / 0900                  | 9HA496                    | 26.0                     | 80.1                      | 170 / 35                       | 1012.0                   |
| 11 / 0900                  | 9HA463                    | 26.4                     | 78.2                      | 140 / 36                       | 1011.3                   |
| 11 / 1400                  | C6YT4                     | 20.5                     | 82.8                      | 230 / 38                       | 1011.3                   |
| 11 / 1800                  | V7KD8                     | 23.6                     | 82.7                      | 120 / 56                       | 1008.0                   |
| 11 / 1800                  | WLIY                      | 27.4                     | 83.9                      | 130 / 35                       | 998.9                    |
| 11 / 1800                  | WLIY                      | 27.4                     | 83.8                      | 090 / 35                       | 1002.0                   |
| 11 / 2200                  | 9HA366                    | 25.9                     | 78.2                      | 150 / 35                       | 1012.1                   |
| 11 / 2300                  | 9HA366                    | 25.9                     | 78.2                      | 140 / 35                       | 1013.0                   |
| 12 / 0100                  | 9HA366                    | 25.8                     | 78.3                      | 140 / 35                       | 1014.6                   |
| 12 / 0500                  | 9HA366                    | 25.9                     | 78.3                      | 150 / 35                       | 1014.3                   |
| 12 / 0700                  | 9HA366                    | 25.9                     | 78.3                      | 170 / 35                       | 1013.5                   |
| 12 / 0700                  | 9HA463                    | 26.3                     | 78.0                      | 150 / 36                       | 1013.3                   |
| 12 / 1300                  | WDJ659                    | 29.9                     | 80.7                      | 170 / 40                       | 1006.8                   |



| <b>Date/Time<br/>(UTC)</b> | <b>Ship call<br/>sign</b> | <b>Latitude<br/>(°N)</b> | <b>Longitude<br/>(°W)</b> | <b>Wind<br/>dir/speed (kt)</b> | <b>Pressure<br/>(mb)</b> |
|----------------------------|---------------------------|--------------------------|---------------------------|--------------------------------|--------------------------|
| <b>12 / 1400</b>           | J8QY1                     | 29.9                     | 75.1                      | 040 / 38                       | 1017.0                   |
| <b>12 / 1800</b>           | WDJ659                    | 28.7                     | 79.1                      | 200 / 40                       | 1009.4                   |
| <b>13 / 0100</b>           | WMKA                      | 32.9                     | 78.3                      | 050 / 35                       | 1012.0                   |
| <b>13 / 0500</b>           | J8QY1                     | 27.6                     | 78.7                      | 080 / 35                       | 1012.7                   |
| <b>13 / 0500</b>           | WMHA                      | 33.0                     | 76.6                      | 050 / 55                       | 1006.6                   |
| <b>13 / 0600</b>           | WMHA                      | 33.3                     | 76.4                      | 080 / 45                       | 1007.3                   |
| <b>13 / 0700</b>           | WMHA                      | 33.5                     | 76.2                      | 050 / 40                       | 1009.4                   |
| <b>13 / 0800</b>           | WMHA                      | 33.8                     | 76.0                      | 080 / 42                       | 1009.1                   |
| <b>13 / 0900</b>           | WMHA                      | 34.0                     | 75.8                      | 100 / 50                       | 1005.9                   |
| <b>13 / 1800</b>           | VRGE7                     | 35.5                     | 69.9                      | 160 / 48                       | 1011.9                   |

Table 3. Selected surface observations for Hurricane Eta, 31 October–13 November 2020.

| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| <b>Jamaica</b>   |                            |             |                              |                             |           |                               |                              |  |                              |
| Kingston – Norman Manley Intl. AP (MKJP)<br>(17.93N 76.78W)        |                            |             | 01/1325                      | 23                          | 33        |                               |                              |  | 11.09                        |
| Moore Town<br>(18.08N 76.43W)                                      |                            |             |                              |                             |           |                               |                              |  | 28.89                        |
| Comfort Castle<br>(18.05N 76.41W)                                  |                            |             |                              |                             |           |                               |                              |  | 28.15                        |
| Norris (17.92N 76.58W)   |                            |             |                              |                             |           |                               |                              |  | 23.24                        |
| Ramble (17.97N 76.61W)   |                            |             |                              |                             |           |                               |                              |  | 20.33                        |
| New Yarmouth<br>(17.88N 77.28W)                                    |                            |             |                              |                             |           |                               |                              |  | 18.58                        |
| Sherwood Forest<br>(18.15N 76.38W)                                 |                            |             |                              |                             |           |                               |                              |  | 18.41                        |
| Fruitful Vale<br>(18.14N 76.55W)                                   |                            |             |                              |                             |           |                               |                              |  | 17.44                        |
| Spring Gardens<br>(18.22N 76.63W)                                  |                            |             |                              |                             |           |                               |                              |  | 14.81                        |
| Bachelor's Hall<br>(17.95N 76.32W)                                 |                            |             |                              |                             |           |                               |                              |  | 13.37                        |
| Bois Content<br>(18.01N 77.16W)                                    |                            |             |                              |                             |           |                               |                              |  | 12.86                        |
| Caswell Hill<br>(17.87N 77.27W)                                    |                            |             |                              |                             |           |                               |                              |  | 11.81                        |
| Old Yarmouth Quarry<br>(17.87N 77.29W)                             |                            |             |                              |                             |           |                               |                              |  | 11.81                        |
| Old Yarmouth Fisher<br>(17.85N 77.29W)                             |                            |             |                              |                             |           |                               |                              |  | 11.02                        |
| Hordley Estate<br>(17.95N 76.27W)                                  |                            |             |                              |                             |           |                               |                              |  | 10.95                        |
| Bybrook<br>(18.18N 76.64W)   |                            |             |                              |                             |           |                               |                              |  | 10.34                        |
| <b>Colombia</b>  |                            |             |                              |                             |           |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b>      |                            |             |                              |                             |           |                               |                              |  |                              |
| San Andrés – Gustavo Rojas Pinilla Intl. AP (SKSP) (12.58N 81.72W) |                            | 1001        | 03/0900                      | 19                          | 40        |                               |                              |  |                              |
| <b>Nicaragua</b>   |                            |             |                              |                             |           |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b>      |                            |             |                              |                             |           |                               |                              |  |                              |









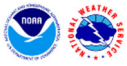


| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                              |
| Pichualco<br>(17.51N 93.11W)                                  |                            |             |                              |                             |                 |                               |                              |  | 12.24                        |
| Teapa (17.57N 92.97W)   |                            |             |                              |                             |                 |                               |                              |  | 11.11                        |
| Nezahualcōyotl<br>(17.18N 93.60W)                             |                            |             |                              |                             |                 |                               |                              |  | 9.71                         |
| Malpaso (17.20N 93.61W)                                       |                            |             |                              |                             |                 |                               |                              |  | 9.71                         |
| <b>Cayman Islands</b>   |                            |             |                              |                             |                 |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b> |                            |             |                              |                             |                 |                               |                              |  |                              |
| Grand Cayman – Owen Roberts Intl. AP (MWCR) (19.29N 81.36W)   |                            |             | 07/1337                      | 35 <sup>1</sup>             |                 |                               |                              |  | 9.87                         |
| Cayman Brac – Kirkconnell Intl. AP (MWCB) (19.69N 79.88W)     |                            |             | 07/1700                      | 24 <sup>1</sup>             | 36 <sup>1</sup> |                               |                              |  |                              |
| <b>Other Sites</b>  |                            |             |                              |                             |                 |                               |                              |  |                              |
| North Side (FW5906) (19.37N 81.27W)                           |                            |             | 07/1301                      | 37                          | 53              |                               |                              |  |                              |
| Cayman Brac – Bliss Beach House (19.72N 79.76W)               | 08/0126                    | 998.9       | 08/0156                      | 25                          | 32              |                               |                              |  |                              |
| West Bay – Lalique Pt. (19.35N 81.37W)                        | 07/1400                    | 999.3       | 07/1410                      | 22                          | 34              |                               |                              |  |                              |
| <b>Cuba</b>   |                            |             |                              |                             |                 |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b> |                            |             |                              |                             |                 |                               |                              |  |                              |
| Venezuela (MUCA – 78346) (22.03N 78.79W)                      | 08/1058                    | 994.0       | 08/0955                      | 26                          | 37              |                               |                              |  | 6.16                         |
| Trinidad (MUTD – 78337) (21.78N 79.98W)                       | 08/0950                    | 997.5       |                              | 14                          | 29              |                               |                              |  | 8.17                         |
| <b>Other Sites</b>  |                            |             |                              |                             |                 |                               |                              |  |                              |
| Cayo Coco (78339) (22.52N 78.45W)                             | 08/1330                    | 998.2       | 08/1308                      | 46                          | 49              |                               |                              |  | 4.79                         |
| El Jíbaro (78341) (21.72N 79.22W)                             | 08/0940                    | 994.3       | 08/0945                      | 35                          | 40              |                               |                              |  | 10.63                        |
| Florida (78350) (21.52N 78.23W)                               | 08/1200                    | 994.0       | 08/1100                      | 30                          | 42              |                               |                              |  | 2.63                         |
| Sancti Spíritus (78349) (21.93N 79.45W)                       | 08/0950                    | 997.2       | 08/0725                      | 28                          | 33              |                               |                              |  | 3.57                         |
| Camilo Cienfuegos (78347) (22.15N 78.75W)                     | 08/1130                    | 991.0       | 08/1155                      | 25                          | 32              |                               |                              |  | 6.02                         |
| Santa Cruz del Sur (78351) (20.72N 78.00W)                    | 08/1200                    | 1002.6      | 08/1205                      | 23                          | 40              |                               |                              |  | 3.62                         |

| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                              |
| Camagüey (78355)<br>(21.40N 77.85W)                                   | 08/1200                    | 988.1       | 08/1100                      | 22                          | 36              |                               |                              |  | 3.22                         |
| El Yabú (78343)<br>(22.43N 79.98W)                                    | 08/2100                    | 1002.7      | 10/0910                      | 21                          | 32              |                               |                              |  | 4.54                         |
| Esmeralda (78352)<br>(21.85N 78.12W)                                  | 08/1200                    | 996.8       | 08/1200                      | 19                          | 31              |                               |                              |  | 2.15                         |
| Nuevitas (78353)<br>(21.53N 77.25W)                                   | 08/1200                    | 1002.7      | 08/1055                      | 19                          | 32              |                               |                              |  | 0.83                         |
| Topes de Collantes<br>(78342) (21.92N 80.02W)                         |                            |             |                              | 18                          | 26              |                               |                              |  | 17.71                        |
| Júcaro (78345)<br>(21.62N 78.85W)                                     | 08/1100                    | 996.0       | 08/1015                      | 16                          | 33              |                               |                              |  | 6.42                         |
| Caibarién (78348)<br>(22.52N 79.45W)                                  | 08/1200                    | 1001.8      | 08/0600                      | 16                          | 39              |                               |                              |  | 4.27                         |
| La Piedra (78308)   | 08/0500                    | 1003.5      |                              |                             |                 |                               |                              |  | 15.24                        |
| <b>The Bahamas</b>  |                            |             |                              |                             |                 |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b>         |                            |             |                              |                             |                 |                               |                              |  |                              |
| San Salvador Intl. AP<br>(MYSM) (24.07N 74.52W)                       |                            |             | 08/0001                      |                             | 35              |                               |                              |  |                              |
| Nassau – Lynden<br>Pindling Intl. AP<br>(MYNN) (25.05N 77.47W)        |                            |             | 07/2103                      |                             | 34              |                               |                              |  |                              |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>                 |                            |             |                              |                             |                 |                               |                              |  |                              |
| Settlement Point, GBI<br>(SPGF1) (26.70N 79.00W)                      | 08/2200                    | 1007.6      | 08/2300                      | 33<br>(7 m, 10 min)         | 42              |                               |                              |  |                              |
| <b>Florida</b>  |                            |             |                              |                             |                 |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b>         |                            |             |                              |                             |                 |                               |                              |  |                              |
| Boca Raton Airport<br>(KBCT) (26.37N 80.11W)                          |                            |             | 08/1953                      | 38 <sup>l</sup>             | 48 <sup>l</sup> |                               |                              |  |                              |
| St. Petersburg – Albert<br>Whitted Airport (KSPG)<br>(27.77N 82.63W)  | 11/2253                    | 1001.2      | 12/0153                      | 36                          | 50              |                               |                              |  | 5.76                         |
| Pompano Beach Air<br>Park (KMP) (26.25N 80.12W)                       | 09/0753                    | 1004.7      | 09/0113                      | 36                          | 49              |                               |                              |  | 8.53                         |
| Ft. Lauderdale –<br>Hollywood Intl. Airport<br>(KFLL) (26.07N 80.15W) | 09/0653                    | 1003.5      | 08/2312                      | 35                          | 44              |                               |                              |  | 9.73                         |
| Miami Intl. Airport<br>(KMIA) (25.80N 80.29W)                         | 09/0353                    | 1003.0      | 09/0433                      | 35                          | 44              |                               |                              |  | 7.56                         |
| Hollywood North Perry<br>Airport (KHWO)<br>(26.00N 80.24W)            | 09/0848                    | 1004.3      | 09/0158                      | 34                          | 46              |                               |                              |  | 8.30                         |



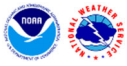
| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| West Palm Beach Intl. Airport (KPBI)<br>(26.68N 80.09W)          | 09/0753                    | 1006.0      | 09/0108                      | 34                          | 46        |                               |                              |  | 6.57                         |
| St. Pete – Clearwater Intl. Airport (KPIE)<br>(27.91N 82.69W)    | 11/2253                    | 1002.1      | 12/0133                      | 33                          | 50        |                               |                              |  | 6.41                         |
| Sarasota – Bradenton Intl. Airport (KSRQ)<br>(27.40N 82.55W)     | 11/2053                    | 1002.1      | 11/2121                      | 33                          | 47        |                               |                              |  | 7.38                         |
| Miami Executive Airport (KTMB)<br>(25.65N 80.43W)                | 09/0453                    | 1001.7      | 08/2224                      | 33                          | 45        |                               |                              |  |                              |
| Opa Locka Airport (KOPF) (25.91N 80.28W)                         | 09/0628                    | 1003.9      | 09/0526                      | 33                          | 43        |                               |                              |  |                              |
| Naples Municipal Airport (KAPF)<br>(26.15N 81.77W)               | 09/0826                    | 1001.6      | 09/0705                      | 32                          | 48        |                               |                              |  | 2.29                         |
| Ft. Lauderdale Executive Airport (KFXE) (26.20N 80.17W)          | 09/0705                    | 1004.3      | 08/2356                      | 32                          | 45        |                               |                              |  | 6.84                         |
| Key West Intl. Airport (KEYW) (24.56N 81.76W)                    | 09/0653                    | 998.3       | 11/1303                      | 32                          | 39        |                               |                              |  | 5.13                         |
| North Palm Beach County Airport (KF45)<br>(26.84N 80.22W)        | 09/0850                    | 1007.1      | 09/0410                      | 31                          | 42        |                               |                              |  |                              |
| Jacksonville – Mayport Naval Station (KNRB)<br>(30.39N 81.42W)   | 12/1552                    | 1005.5      | 12/1312                      | 31                          | 40        |                               |                              |  | 0.76                         |
| Key West Naval Air Station (KNQX)<br>(24.58N 81.68W)             | 09/0653                    | 997.8       | 11/1259                      | 31                          | 38        |                               |                              |  | 6.87                         |
| Melbourne Intl. Airport (KMLB) (28.10N 80.64W)                   | 09/0758                    | 1007.8      | 09/0510                      | 30                          | 36        |                               |                              |  | 1.61                         |
| Ft. Pierce – Treasure Coast Intl. Airport (KFPR) (27.50N 80.38W) | 09/0909                    | 1007.8      | 09/0408                      | 29                          | 43        |                               |                              |  | 5.13                         |
| Stuart – Witham Field Airport (KSUA)<br>(27.18N 80.22W)          | 09/0815                    | 1007.8      | 08/2348                      | 29                          | 42        |                               |                              |  |                              |
| Vero Beach Regional Airport (KVRB)<br>(27.65N 80.41W)            | 09/0928                    | 1008.1      | 09/0334                      | 29                          | 41        |                               |                              |  | 1.80                         |
| Florida Keys/Marathon Intl. Airport (KMTH)<br>(24.73N 81.05W)    | 09/0453                    | 993.4       | 09/2012                      | 28                          | 46        |                               |                              |  | 4.14                         |
| Palm Beach County Park Airport (KLNA)<br>(26.59N 80.08W)         | 09/0735                    | 1006.1      | 09/0415                      | 28                          | 38        |                               |                              |  |                              |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                              |
| Immokalee Regional Airport (KIMM)<br>(26.43N 81.40W)                  | 09/0755                    | 1003.4      | 09/0215                      | 27                          | 38              |                               |                              |  |                              |
| Leesburg Intl. Airport (KLEE)<br>(28.82N 81.80W)                      | 12/0914                    | 1006.1      | 12/1032                      | 27                          | 38              |                               |                              |  | 3.61                         |
| Airglades Airport (K2IS)<br>(26.73N 81.05W)                           | 09/0855                    | 1005.4      | 09/0455                      | 27                          | 35              |                               |                              |  |                              |
| Punta Gorda Airport (KPGD)<br>(26.92N 81.99W)                         | 11/1953                    | 1005.9      | 11/2019                      | 26                          | 52              |                               |                              |  | 3.62                         |
| Homestead Air Reserve Base (KHST)<br>(25.48N 80.38W)                  | 09/0500                    | 1001.3      | 09/0332                      | 26                          | 41              |                               |                              |  | 4.37                         |
| Cape Canaveral AFS Skid Strip (KXMR)<br>(28.46N 80.56W)               | 12/1856                    | 1009.4      | 09/1156                      | 26                          | 41              |                               |                              |  | 2.40                         |
| Tampa Intl. Airport (KTPA)<br>(27.97N 82.53W)                         | 11/2253                    | 1003.6      | 12/0501                      | 26                          | 39              |                               |                              |  | 4.99                         |
| Patrick Air Force Base (KCOF)<br>(28.23N 80.59W)                      | 12/1857                    | 1010.2      | 09/0239                      | 26                          | 38              |                               |                              |  | 1.80                         |
| Ft. Myers – SW Florida Intl. Airport (KRSW)<br>(26.54N 81.76W)        | 11/1953                    | 1006.6      | 11/1710                      | 25                          | 46              |                               |                              |  | 4.86                         |
| Ft. Myers – Page Field Airport (KFMY)<br>(26.58N 81.87W)              | 11/1953                    | 1006.3      | 11/1722                      | 23                          | 43              |                               |                              |  | 3.97                         |
| Lakeland Regional Airport (KLAL)<br>(27.99N 82.02W)                   |                            |             | 12/0635                      | 23                          | 38              |                               |                              |  |                              |
| Gainesville Regional Airport (KGNV)<br>(29.68N 82.27W)                | 12/1140                    | 1003.4      | 12/0753                      | 23                          | 37              |                               |                              |  | 1.60                         |
| Jacksonville Executive at Craig Airport (KCRG)<br>(30.33N 81.52W)     | 12/1553                    | 1005.8      | 12/1253                      | 22                          | 40              |                               |                              |  | 1.25                         |
| St. Augustine – NE Florida Regional Airport (KSGJ)<br>(29.97N 81.33W) | 12/1156                    | 1007.0      | 12/1154                      | 22                          | 35              |                               |                              |  | 0.85                         |
| Jacksonville Naval Air Station (KNIP)<br>(30.24N 81.68W)              | 12/1353                    | 1005.1      | 12/1153                      | 21                          | 34              |                               |                              |  | 1.23                         |
| DeLand Municipal Airport (KDED)<br>(29.07N 81.28W)                    | 12/1035                    | 1008.0      | 12/1255                      | 21                          | 34              |                               |                              |  | 2.57                         |
| Winter Haven Regional Airport (KGIF)<br>(28.06N 81.75W)               |                            |             | 11/1735                      | 19 <sup>l</sup>             | 36 <sup>l</sup> |                               |                              |  | 1.89                         |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>                 |                            |             |                              |                             |                 |                               |                              |  |                              |



| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Fowey Rock (FWYF1)<br>(25.59N 80.10W)                | 09/0200                    | 1002.4      | 09/0420                      | 44<br>(44 m, 10 min)        | 55        |                               |                              |  |                              |
| Venice (VENF1)<br>(27.07N 82.45W)                    | 11/2000                    | 1003.4      | 11/2100                      | 40<br>(12 m, 10 min)        | 52        |                               |                              |  |                              |
| Sand Key (SANF1)<br>(24.46N 81.88W)                  | 09/0720                    | 999.2       | 07/1136                      | 39<br>(16 m, 1 min)         | 43        |                               |                              |  |                              |
| St. Augustine (SAUF1)<br>(29.86N 81.27W)             | 12/1200                    | 1006.9      | 12/1240                      | 35<br>(8 m, 10 min)         | 47        |                               |                              |  |                              |
| Cedar Key (CDRF1)<br>(29.14N 83.03W)                 | 12/0900                    | 998.2       | 12/0650                      | 32<br>(10 m, 10 min)        | 43        |                               |                              |  |                              |
| <b>National Ocean Service (NOS) Sites</b>            |                            |             |                              |                             |           |                               |                              |  |                              |
| South Port Everglades (PEGF1) (26.08N 80.12W)        | 09/0618                    | 1004.3      | 08/1930                      | 47<br>(45 m)                | 61        | 1.90                          | 2.10                         | 1.5                                    |                              |
| Lake Worth Pier (LKWF1) (26.61N 80.03W)              | 09/0800                    | 1005.1      | 08/2042                      | 38<br>(12 m)                | 48        | 1.21                          | 1.70                         | 1.1                                    |                              |
| Clearwater Beach (CWBF1)<br>(27.98N 82.83W)          | 11/2336                    | 1000.9      | 12/0424                      | 35<br>(8 m)                 | 45        | 3.20                          | 3.63                         | 2.7                                    |                              |
| Cedar Key (CKYF1)<br>(29.13N 83.03W)                 | 12/0836                    | 997.2       | 12/0724                      | 35<br>(12 m)                | 44        | 2.94                          | 3.65                         | 2.1                                    |                              |
| Middle Tampa Bay (MTBF1) (27.66N 82.59W)             | 11/2200                    | 1001.8      | 12/0206                      | 35<br>(7 m)                 | 47        |                               |                              |  |                              |
| St. Petersburg (SAPF1)<br>(27.76N 82.63W)            | 11/2218                    | 1002.8      | 12/0000                      | 33<br>(9 m)                 | 42        | 3.69                          | 4.26                         | 3.5                                    |                              |
| Virginia Key (VAKF1)<br>(25.73N 80.16W)              | 09/0412                    | 1002.8      | 08/2212                      | 31<br>(12 m)                | 41        | 2.25                          | 2.16                         | 1.9                                    |                              |
| Old Port Tampa (OPTF1) (27.86N 82.55W)               | 11/2254                    | 1002.9      | 12/0706                      | 28<br>(18 m)                | 41        | 4.19                          | 4.65                         | 3.9                                    |                              |
| Sparkman Channel Entrance (SKCF1)<br>(27.92N 82.45W) |                            |             | 12/0654                      | 28<br>(15 m)                | 37        |                               |                              |  |                              |
| East Bay Causeway (TSHF1) (27.93N 82.43W)            |                            |             | 12/0736                      | 28<br>(13 m)                | 35        |                               |                              |  |                              |
| Key West (KYWF1)<br>(24.55N 81.81W)                  | 09/0718                    | 998.4       | 11/1448                      | 25<br>(17 m)                | 36        | 1.41                          | 1.54                         | 1.5                                    |                              |
| Trident Pier (TRDF1)<br>(28.42N 80.59W)              | 11/2130                    | 1010.5      | 09/1524                      | 25<br>(10 m)                | 41        | 1.98                          | 2.58                         | 1.5                                    |                              |
| Vaca Key (VCAF1)<br>(24.71N 81.11W)                  | 09/0442                    | 993.9       | 09/0354                      | 25<br>(10 m)                | 33        | 1.64                          | 1.30                         | 1.7                                    |                              |
| TPA Cruise Terminal 2 (TPAF1) (27.93N 82.43W)        |                            |             | 12/0518                      | 25<br>(23 m)                | 38        |                               |                              |  |                              |
| Mayport - Bar Pilots Dock (MYPF1)<br>(30.40N 81.43W) | 12/1548                    | 1006.0      | 09/0348                      | 23<br>(11 m)                | 31        | 1.96                          | 3.40                         | 1.4                                    |                              |
| Naples (NPSF1)<br>(26.13N 81.81W)                    | 09/0800                    | 1002.4      | 11/2112                      | 23<br>(10 m)                | 36        | 3.39                          | 2.90                         | 2.3                                    |                              |



| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Blount Island Command (BLIF1)<br>(30.39N 81.52W)           | 12/1542                    | 1006.4      | 12/1254                      | 22<br>(10 m)                | 33        |                               |                              |  |                              |
| Apalachicola (APCF1)<br>(29.73N 84.98W)                    | 12/0912                    | 1007.9      | 09/1712                      | 20<br>(9 m)                 | 29        | 2.19                          | 2.67                         | 1.8                                    |                              |
| Panama City Beach (PCBF1)<br>(30.21N 85.88W)               | 11/2036                    | 1009.1      | 09/1612                      | 20<br>(16 m)                | 26        | 1.72                          | 2.22                         | 1.4                                    |                              |
| Fernandina Beach (FRDF1) (30.68N 81.47W)                   | 12/1624                    | 1005.3      | 12/1336                      | 19<br>(9 m)                 | 33        | 2.29                          | 3.81                         | 1.1                                    |                              |
| Fort Myers (FMRF1)<br>(26.65N 81.87W)                      | 09/0830                    | 1004.1      | 11/1706                      | 19<br>(8 m)                 | 33        | 3.64                          | 3.01                         | 2.7                                    |                              |
| Panama City (PACF1)<br>(30.15N 85.67W)                     |                            |             | 09/1536                      | 15<br>(10 m)                | 27        | 1.74                          | 2.15                         | 1.4                                    |                              |
| Pensacola (PCLF1)<br>(30.40N 87.21W)                       | 11/1954                    | 1009.8      | 12/0830                      | 12<br>(10 m)                | 18        | 1.65                          | 2.33                         | 1.4                                    |                              |
| Port Manatee (PMAF1)<br>(27.64N 82.56W)                    | 11/2142                    | 1002.9      |                              |                             |           | 3.30                          | 3.62                         | 3.0                                    |                              |
| Tampa - East Bay (EBEF1)<br>(27.92N 82.42W)                | 11/2230                    | 1003.6      |                              |                             |           | 4.29                          | 4.70                         | 3.9                                    |                              |
| Jacksonville – Dames Point (DMSF1)<br>(30.39N 81.56W)      |                            |             |                              |                             |           | 1.55                          | 2.91                         | 1.5                                    |                              |
| Jacksonville – Southbank Riverwalk (MSBF1) (30.32N 81.66W) |                            |             |                              |                             |           | 1.36                          | 2.41                         | 1.8                                    |                              |
| <b>WeatherFlow Sites</b>                                   |                            |             |                              |                             |           |                               |                              |  |                              |
| Carysfort Reef Light (XCFL) (25.23N 80.21W)                | 08/2313                    | 1000.8      | 09/0241                      | 55<br>(15 m, 1 min)         | 61        |                               |                              |  |                              |
| Port Everglades (XPEG) (26.08N 80.12W)                     | 09/0105                    | 997.2       | 08/2245                      | 51<br>(41 m, 1 min)         | 59        |                               |                              |  |                              |
| Government Cut (XGVT) (25.75N 80.10W)                      | 09/0649                    | 998.6       | 09/1046                      | 49<br>(23 m, 1 min)         | 54        |                               |                              |  |                              |
| St. Lucie Plant (XSTL)<br>(27.35N 80.24W)                  | 09/0852                    | 1005.4      | 08/2342                      | 46<br>(10 m, 1 min)         | 52        |                               |                              |  |                              |
| Skyway Fishing Pier (XSKY) (27.60N 82.65W)                 | 11/2121                    | 1000.1      | 12/0152                      | 44<br>(16 m, 1 min)         | 51        |                               |                              |  |                              |
| Melbourne Beach (XMBI) (27.90N 80.47W)                     | 09/0734                    | 1004.9      | 09/0613                      | 44<br>(10 m, 1 min)         | 48        |                               |                              |  |                              |
| Boynton Beach (XBOY)<br>(26.55N 80.05W)                    | 09/0515                    | 1003.9      | 09/0205                      | 43<br>(10 m, 1 min)         | 51        |                               |                              |  |                              |
| Alligator Reef Light (XALG) (24.85N 80.62W)                | 09/0321                    | 992.1       | 09/0145                      | 42<br>(8 m, 1 min)          | 50        |                               |                              |  |                              |
| Morningside Park (XMSP) (25.82N 80.18W)                    | 09/0622                    | 1000.7      | 09/0454                      | 42<br>(10 m, 1 min)         | 47        |                               |                              |  |                              |
| Smith Shoal Light (XSMS) (24.72N 81.92W)                   | 09/0756                    | 994.3       | 11/1134                      | 41<br>(19 m, 1 min)         | 46        |                               |                              |  |                              |



| Location  | Minimum Sea Level Pressure |                     | Maximum Surface Wind Speed   |                                 |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|---------------------|------------------------------|---------------------------------|-----------------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb)         | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup>     | Gust (kt)       |                               |                              |  |                              |
| Dinner Key Light 1 (XDIN) (25.71N 80.21W)         | 09/0448                    | 1001.4              | 08/2216                      | 40<br>(5 m, 1 min)              | 48              |                               |                              |  |                              |
| Huguenot Park (XHUP) (30.42N 81.41W)              | 12/1557                    | 1004.3              | 09/0152                      | 40<br>(12 m, 1 min)             | 45              |                               |                              |  |                              |
| Biscayne Bay Harbor Pilots (XBBH) (25.77N 80.15W) | 09/0429                    | 999.8               | 09/0437                      | 40<br>(12 m, 1 min)             | 45              |                               |                              |  |                              |
| Tampa Bay Cut J (XTAM) (27.77N 82.57W)            | 11/2246                    | 1002.4              | 12/0216                      | 39<br>(15 m, 5 min)             | 51              |                               |                              |  |                              |
| Sarasota Bay Marker 17 (XSRB) (27.34N 82.57W)     | 11/2153                    | 1001.1              | 11/2130                      | 39<br>(5 m, 1 min)              | 48              |                               |                              |  |                              |
| Juno Beach Pier (XJUP) (26.89N 80.06W)            | 09/0758                    | 1005.6              | 09/0102                      | 39<br>(6 m, 1 min)              | 47              |                               |                              |  |                              |
| New Pass Shoal Light (XLID) (27.32N 82.60W)       | 11/2110                    | 999.5               | 11/2003                      | 39<br>(5 m, 1 min)              | 47              |                               |                              |  |                              |
| Turkey Point (XTKY) (25.43N 80.35W)               | 09/0243                    | 998.6               | 11/0539                      | 39<br>(20 m, 1 min)             | 45              |                               |                              |  |                              |
| Crandon (XCRN) (25.72N 80.15W)                    | 08/2349                    | 1001.2              | 08/2211                      | 39<br>(8 m, 1 min)              | 44              |                               |                              |  |                              |
| North Miami (XNMI) (25.91N 80.16W)                | 09/0613                    | 1000.7              | 08/2214                      | 37<br>(17 m, 1 min)             | 47              |                               |                              |  |                              |
| Clam Bayou Nature Park (XCBN) (27.74N 82.69W)     | 11/2130                    | 1000.4              | 12/0106                      | 37<br>(10 m, 1 min)             | 45              |                               |                              |  |                              |
| Hillsboro Inlet L1 (XHBI) (26.25N 80.08W)         | 08/1755                    | 1003.6 <sup>1</sup> | 08/1315                      | 36 <sup>1</sup><br>(5 m, 5 min) | 45 <sup>1</sup> |                               |                              |  |                              |
| Dania Pier (XDAN) (26.06N 80.11W)                 | 09/0652                    | 1002.5              | 08/2022                      | 36<br>(9 m, 5 min)              | 49              |                               |                              |  |                              |
| Boca Raton (XBOC) (26.37N 80.09W)                 | 09/0042                    | 1001.2              | 09/0113                      | 36<br>(21 m, 1 min)             | 49              |                               |                              |  |                              |
| Boca Grande (XBCG) (26.72N 82.26W)                |                            |                     | 11/1529                      | 36<br>(10 m, 1 min)             | 43              |                               |                              |  |                              |
| Biscayne Bay Light 20 (XKBS) (25.66N 80.19W)      | 09/0423                    | 1002.6              | 09/0420                      | 36<br>(6 m, 1 min)              | 42              |                               |                              |  |                              |
| Oakes Substation (XOAK) (26.91N 80.07W)           | 09/0823                    | 1004.9              | 08/2224                      | 35<br>(15 m, 1 min)             | 47              |                               |                              |  |                              |
| Tarpon Point (XTRP) (26.54N 82.00W)               |                            |                     | 11/1618                      | 35<br>(10 m, 1 min)             | 43              |                               |                              |  |                              |
| Terminal Channel (XTRM) (30.34N 81.63W)           | 12/1451                    | 1004.9              | 12/0110                      | 35<br>(9 m, 1 min)              | 43              |                               |                              |  |                              |
| Jacksonville (XJAK) (30.39N 81.48W)               | 12/1535                    | 1003.8              | 12/1247                      | 35<br>(10 m, 1 min)             | 41              |                               |                              |  |                              |
| New Smyrna Beach (XNSB) (29.05N 80.90W)           | 12/1712                    | 1006.0              | 09/0948                      | 35<br>(10 m, 1 min)             | 39              |                               |                              |  |                              |
| Port Everglades South (XPES) (26.06N 80.13W)      | 09/0646                    | 1002.3              | 09/0113                      | 34<br>(10 m, 1 min)             | 44              |                               |                              |  |                              |





| Location                                    | Minimum Sea Level Pressure |                     | Maximum Surface Wind Speed   |                                 |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|---------------------|------------------------------|---------------------------------|-----------------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb)         | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup>     | Gust (kt)       |                               |                              |  |                              |
| Charlotte Harbor YC (XCHL) (26.96N 82.08W)  | 09/0923                    | 1003.2              | 11/2012                      | 34<br>(10 m, 1 min)             | 41              |                               |                              |  |                              |
| Sanibel DB 4 (XSBI) (26.47N 82.05W)         | 09/0821                    | 1002.6 <sup>l</sup> | 11/1546                      | 33 <sup>l</sup><br>(5 m, 1 min) | 42 <sup>l</sup> |                               |                              |  |                              |
| Sarasota (XSAR) (27.35N 82.52W)             | 11/2232                    | 998.0               | 12/0200                      | 33<br>(20 m, 1 min)             | 42              |                               |                              |  |                              |
| Weeki Wachee (XWKI) (28.52N 82.57W)         | 12/0449                    | 998.0               | 12/0423                      | 33<br>(23 m, 1 min)             | 42              |                               |                              |  |                              |
| South Miami (XSOM) (25.63N 80.30W)          | 09/0433                    | 1001.1              | 09/0401                      | 33<br>(10 m, 1 min)             | 41              |                               |                              |  |                              |
| Rocky Point (XRPT) (27.98N 80.55W)          | 09/0923                    | 1008.3              | 09/0503                      | 33<br>(6 m, 1 min)              | 40              |                               |                              |  |                              |
| Indian River DB27 (XIND) (27.96N 80.53W)    | 09/0811                    | 1008.8              | 09/0241                      | 33<br>(5 m, 1 min)              | 40              |                               |                              |  |                              |
| Mangonia Park (XMGN) (26.76N 80.07W)        | 09/0819                    | 1000.7              | 09/0102                      | 32<br>(23 m, 1 min)             | 43              |                               |                              |  |                              |
| Cocoa Beach Club (XCOA) (28.31N 80.63W)     | 09/0937                    | 1007.5              | 09/1126                      | 32<br>(10 m, 1 min)             | 41              |                               |                              |  |                              |
| Banana River – 520 (XCCB) (28.36N 80.65W)   | 09/0953                    | 1008.8              | 09/0545                      | 32<br>(5 m, 1 min)              | 40              |                               |                              |  |                              |
| Cocoa Beach Pier (XCCO) (28.37N 80.60W)     | 09/1658                    | 1007.6              | 09/0644                      | 32<br>(12 m, 1 min)             | 38              |                               |                              |  |                              |
| Jewish Substation (XJFS) (25.17N 80.38W)    | 09/0309                    | 996.2               | 09/0407                      | 31<br>(11 m, 1 min)             | 46              |                               |                              |  |                              |
| Hobe (XHOB) (27.05N 80.17W)                 | 09/0812                    | 1004.4              | 08/2231                      | 31<br>(15 m, 1 min)             | 41              |                               |                              |  |                              |
| Lewis (XLWS) (29.92N 81.33W)                | 12/1148                    | 1004.3              | 12/1201                      | 31<br>(15 m, 1 min)             | 39              |                               |                              |  |                              |
| Parrish Park North (XPAR) (28.63N 80.81W)   | 12/0903                    | 1008.5              | 09/1110                      | 30<br>(5 m, 1 min)              | 38              |                               |                              |  |                              |
| Capri (XCAP) (26.04N 81.70W)                | 09/0749                    | 999.3               | 11/1701                      | 30<br>(15 m, 1 min)             | 37              |                               |                              |  |                              |
| Grove City (XGRV) (26.90N 82.32W)           | 11/1844                    | 1001.2              | 11/1619                      | 29<br>(20 m, 1 min)             | 41              |                               |                              |  |                              |
| Marathon Key (XKEY) (24.74N 80.98W)         | 09/0451                    | 992.0               | 09/0308                      | 29<br>(13 m, 1 min)             | 38              |                               |                              |  |                              |
| Bellaire (XBLA) (27.94N 82.80W)             | 11/2315                    | 996.7               | 12/0430                      | 28<br>(21 m, 1 min)             | 39              |                               |                              |  |                              |
| Flamingo – Miramar (XFLM) (25.97N 80.31W)   | 09/0741                    | 1000.7              | 09/0534                      | 28<br>(15 m, 1 min)             | 38              |                               |                              |  |                              |
| Dairy (XDAI) (28.04N 80.64W)                | 09/0830                    | 1005.4              | 09/0942                      | 28<br>(15 m, 1 min)             | 37              |                               |                              |  |                              |
| Key West CG (XKYW) (24.57N 81.80W)          | 09/0730                    | 996.0               | 08/1650                      | 28<br>(10 m, 1 min)             | 36              |                               |                              |  |                              |
| Tavernier Substation (XTVS) (25.01N 80.52W) | 09/0322                    | 992.8               | 09/0446                      | 26<br>(12 m, 1 min)             | 42              |                               |                              |  |                              |
| Doral (XURB) (25.85N 80.37W)                | 09/0420                    | 1000.7              | 09/0503                      | 26<br>(15 m, 1 min)             | 37              |                               |                              |  |                              |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |                 | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt)       |                               |                              |  |                              |
| Conservation (XCVN)<br>(26.19N 80.30W)                                  | 09/0715                    | 1002.5      | 09/0144                      | 26<br>(10 m, 1 min)         | 36              |                               |                              |  |                              |
| Rock Harbor Substation (XRHS)<br>(25.08N 80.45W)                        | 09/0304                    | 992.9       | 09/0423                      | 25<br>(11 m, 1 min)         | 41              |                               |                              |  |                              |
| Vero City (XVER)<br>(27.63N 80.39W)                                     | 09/0816                    | 1006.9      | 09/0047                      | 24<br>(10 m, 1 min)         | 37              |                               |                              |  |                              |
| Grove City (XGRV)<br>(26.90N 82.31W)                                    | 11/1844                    | 1001.2      | 09/0353                      | 24<br>(20 m, 1 min)         | 36              |                               |                              |  |                              |
| Islamorada Substation (XISS) (24.91N 80.65W)                            | 09/0343                    | 991.6       | 09/0504                      | 24<br>(11 m, 1 min)         | 34              |                               |                              |  |                              |
| West Palm Beach (XWPB) (26.66N 80.14W)                                  | 09/0758                    | 1003.6      | 08/2359                      | 23<br>(10 m, 1 min)         | 37              |                               |                              |  |                              |
| <b>Remote Automated Weather Stations (RAWS)</b>                         |                            |             |                              |                             |                 |                               |                              |  |                              |
| Cache/Everglades NP (LPIF1) (25.39N 80.68W)                             |                            |             | 09/0523                      | 30<br>(6 m, 10 min)         | 53              |                               |                              |  |                              |
| Loxahatchee (LOHF1) (26.48N 80.43W)                                     |                            |             | 09/0232                      | 23<br>(6 m, 10 min)         | 35              |                               |                              |  |                              |
| Ochopee (OCOF1) (25.89N 81.32W)   |                            |             | 11/1932                      |                             | 46<br>(6 m)     |                               |                              |  |                              |
| <b>Florida Automated Weather Network (FAWN)</b>                         |                            |             |                              |                             |                 |                               |                              |  |                              |
| Homestead (STDF1) (25.51N 80.50W)                                       |                            |             | 09/0345                      | 27<br>(6 m, 15 min)         | 37              |                               |                              |  |                              |
| Alachua (ALHF1) (29.81N 82.41W)   | 12/1045                    | 995         | 12/0900                      | 18<br>(6 m, 15 min)         | 37              |                               |                              |  |                              |
| Immokalee (IMKF1) (26.46N 81.44W)                                       |                            |             | 11/1830                      |                             | 41<br>(6 m)     |                               |                              |  |                              |
| <b>USF Coastal Ocean Monitoring and Prediction System (COMPS) Sites</b> |                            |             |                              |                             |                 |                               |                              |  |                              |
| Tarpon Springs – Fred Howard Park (FHFP1) (28.15N 82.80W)               | 12/0312                    | 1002.3      | 12/0206                      | 36<br>(9 m)                 | 45              |                               |                              |  |                              |
| Big Carlos Pass (BGCF1) (26.40N 81.88W)                                 |                            |             | 11/1648                      | 33<br>(17 m)                | 48              |                               |                              |  |                              |
| Clam Bayou (CLBF1) (27.74N 82.69W)                                      | 11/2242                    | 1001.5      | 12/0630                      | 21<br>(11 m)                | 36              |                               |                              |  |                              |
| <b>WeatherSTEM Sites</b>  |                            |             |                              |                             |                 |                               |                              |  |                              |
| House of Refuge (27.20N 80.17W)   | 09/0705                    | 1007.1      | 09/0239                      |                             | 56 <sup>l</sup> |                               |                              |  |                              |
| Jensen Beach Oceanfront (27.25N 80.20W)                                 | 09/0831                    | 1007.4      | 09/0244                      |                             | 40 <sup>l</sup> |                               |                              |  |                              |
| <b>United States Geological Survey (USGS) Stream Gauges</b>             |                            |             |                              |                             |                 |                               |                              |  |                              |
| Seminole – Lake Seminole (27.84N 82.78W)                                |                            |             |                              |                             |                 |                               | 4.84                         | 4.1                                    |                              |



| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Hillsborough River at Tampa (HPLF1)<br>(27.94N 82.46W)     |                            |             |                              |                             |           |                               | 4.90                         | 3.8                                    |                              |
| Alafia River at Gibsonton (GBSF1)<br>(27.86N 82.38W)       |                            |             |                              |                             |           |                               | 4.67                         | 3.7                                    |                              |
| Manatee Bay Creek near U.S. 1<br>(25.26N 80.42W)           |                            |             |                              |                             |           |                               | 3.07                         | 3.7                                    |                              |
| Aucilla River at Nutall Rise (NUTF1)<br>(30.11N 83.98W)    |                            |             |                              |                             |           |                               | 5.47                         | 3.6                                    |                              |
| Peace River at Harbor Heights (26.99N 81.99W)              |                            |             |                              |                             |           |                               | 3.58                         | 3.1                                    |                              |
| Venice Inlet (CNMF1)<br>(27.11N 82.47W)                    |                            |             |                              |                             |           |                               | 3.02                         | 2.5                                    |                              |
| Loxahatchee River at Jupiter (26.95N 80.09W)               |                            |             |                              |                             |           |                               | 2.31                         | 2.2                                    |                              |
| Spring Creek (SBIF1)<br>(30.07N 84.33W)                    |                            |             |                              |                             |           |                               | 3.44                         | 1.8                                    |                              |
| Yankeetown (WCIF1)<br>(29.00N 82.76W)                      |                            |             |                              |                             |           |                               | 3.29                         | 1.8                                    |                              |
| Homosassa River<br>(28.77N 82.70W)                         |                            |             |                              |                             |           |                               | 2.76                         | 1.8                                    |                              |
| Suwannee River (SUWF1) (29.34N 83.09W)                     |                            |             |                              |                             |           |                               | 3.33                         | 1.7                                    |                              |
| Crystal River (SISF1)<br>(28.93N 82.69W)                   |                            |             |                              |                             |           |                               | 3.03                         | 1.7                                    |                              |
| Chassahowitzka River (CHMF1) (28.69N 82.64W)               |                            |             |                              |                             |           |                               | 2.80                         | 1.5                                    |                              |
| Everglades NP – Garfield Bight (ACNF1)<br>(25.18N 80.79W)  |                            |             |                              |                             |           |                               | 1.27                         | 1.5                                    |                              |
| Bayport<br>(28.53N 82.65W)                                 |                            |             |                              |                             |           |                               | 2.77                         | 1.4                                    |                              |
| Chatham River near Watson Place (CHTF1)<br>(25.71N 81.25W) |                            |             |                              |                             |           |                               | 1.87                         | 1.3                                    |                              |
| Everglades NP – Lake Ingraham<br>(25.14N 81.06W)           |                            |             |                              |                             |           |                               | 1.44                         | 1.0                                    |                              |
| <b>Everglades Depth Estimation Network (EDEN)</b>          |                            |             |                              |                             |           |                               |                              |  |                              |
| Mud Creek at Alligator Bay (25.20N 80.58W)                 |                            |             |                              |                             |           |                               | 1.20                         | 2.1                                    |                              |
| Taylor River at Little Madeira Bay<br>(25.19N 80.64W)      |                            |             |                              |                             |           |                               | 1.12                         | 2.0                                    |                              |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Trout Creek at Trout Cove (25.21N 80.53W)                     |                            |             |                              |                             |           |                               | 1.11                         | 2.0                                    |                              |
| East Creek at Little Madeira Bay (25.20N 80.62W)              |                            |             |                              |                             |           |                               | 1.00                         | 1.9                                    |                              |
| <b>South Florida Water Management District (SFWMD) Gauges</b> |                            |             |                              |                             |           |                               |                              |  |                              |
| St. Lucie River at Stuart (SLRF1) (27.20N 80.26W)             |                            |             |                              |                             |           |                               | 2.46                         | 2.8                                    |                              |
| St. Lucie River at Steele Point (SPTF1) (27.20N 80.21W)       |                            |             |                              |                             |           |                               | 2.12                         | 2.6                                    |                              |
| Plantation 7 W (WSTF1) (26.13N 80.37W)                        |                            |             |                              |                             |           |                               |                              |  | 12.31                        |
| EI Portal (ELPF1) (25.85N 80.19W)                             |                            |             |                              |                             |           |                               |                              |  | 11.95                        |
| Carol City 2 NW (LLUF1) (25.97N 80.30W)                       |                            |             |                              |                             |           |                               |                              |  | 11.46                        |
| Davie 1 SE (DVIF1) (26.07N 80.21W)                            |                            |             |                              |                             |           |                               |                              |  | 11.20                        |
| Lauderdale Lakes 1 E (LDF1) (26.17N 80.18W)                   |                            |             |                              |                             |           |                               |                              |  | 10.68                        |
| Miramar 10 W (NWDF1) (25.96N 80.43W)                          |                            |             |                              |                             |           |                               |                              |  | 10.54                        |
| Miami Springs 2 ESE (MINF1) (25.81N 80.26W)                   |                            |             |                              |                             |           |                               |                              |  | 10.50                        |
| Miami Lakes (MMLF1) (25.91N 80.32W)                           |                            |             |                              |                             |           |                               |                              |  | 10.45                        |
| Ft. Lauderdale 4 W (FTDF1) (26.14N 80.19W)                    |                            |             |                              |                             |           |                               |                              |  | 10.42                        |
| Sunrise (SNRF1) (26.16N 80.30W)                               |                            |             |                              |                             |           |                               |                              |  | 10.37                        |
| Plantation 2 SE (PLAF1) (26.09N 80.23W)                       |                            |             |                              |                             |           |                               |                              |  | 10.14                        |
| Coral Springs 3 SW (CSGF1) (26.23N 80.30W)                    |                            |             |                              |                             |           |                               |                              |  | 8.99                         |
| Boca Raton 12 W (WBCF1) (26.36N 80.30W)                       |                            |             |                              |                             |           |                               |                              |  | 8.73                         |
| Leisure City 2 WNW (LSCF1) (25.50N 80.47W)                    |                            |             |                              |                             |           |                               |                              |  | 8.67                         |
| North Miami Beach (NOMF1) (25.93N 80.15W)                     |                            |             |                              |                             |           |                               |                              |  | 8.50                         |
| <b>St. Johns River Water Management District Gauges</b>       |                            |             |                              |                             |           |                               |                              |  |                              |
| Haulover Canal at Mims (28.74N 80.76W)                        |                            |             |                              |                             |           |                               | 1.18                         | 1.8                                    |                              |
| Indian River at Wabasso (IRWF1) (27.75N 80.43W)               |                            |             |                              |                             |           |                               | 1.00                         | 1.7                                    |                              |



| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| <b>Suwannee River Water Management District Gauges</b>        |                            |             |                              |                             |           |                               |                              |  |                              |
| Steinhatchee (STIF1)<br>(29.67N 83.38W)                       |                            |             |                              |                             |           |                               |                              | 1.5                                    |                              |
| <b>Everglades National Park Water Quality Stations</b>        |                            |             |                              |                             |           |                               |                              |  |                              |
| Thursday Point (THRF1) (25.20N 80.37W)                        |                            |             |                              |                             |           |                               | 2.00                         | 2.6                                    |                              |
| Blackwater Sound (BWSF1) (25.18N 80.44W)                      |                            |             |                              |                             |           |                               | 1.91 <sup>l</sup>            |  |                              |
| Long Sound (LSNF1) (25.24N 80.46W)                            |                            |             |                              |                             |           |                               | 1.32                         |  |                              |
| <b>NWS Cooperative Observer Program (COOP) Sites</b>          |                            |             |                              |                             |           |                               |                              |  |                              |
| Ft. Lauderdale (FTLF1) (26.10N 80.20W)                        |                            |             |                              |                             |           |                               |                              |  | 14.04                        |
| N Miami Beach #2 (NMBF1) (25.95N 80.22W)                      |                            |             |                              |                             |           |                               |                              |  | 11.96                        |
| Ft. Lauderdale Beach (FLBF1) (26.14N 80.11W)                  |                            |             |                              |                             |           |                               |                              |  | 11.05                        |
| Homestead 5 WNW (HAPF1) (25.50N 80.55W)                       |                            |             |                              |                             |           |                               |                              |  | 10.74                        |
| <b>Hydrometeorological Automated Data System (HADS) Sites</b> |                            |             |                              |                             |           |                               |                              |  |                              |
| Site 63 near Andytown (ADYF1) (26.18N 80.53W)                 |                            |             |                              |                             |           |                               |                              |  | 15.83                        |
| North Archie Creek near Tampa (NACF1) (27.90N 82.35W)         |                            |             |                              |                             |           |                               |                              |  | 9.47                         |
| Delaney Creek near Tampa (DLNF1) (27.93N 82.36W)              |                            |             |                              |                             |           |                               |                              |  | 9.37                         |
| Little Manatee River near Wimauma (WIMF1) (27.67N 82.35W)     |                            |             |                              |                             |           |                               |                              |  | 8.52                         |
| <b>Citizen Weather Observing Program (CWOP)</b>               |                            |             |                              |                             |           |                               |                              |  |                              |
| Islamorada Fire Station 20 (DW1872) (24.92N 80.64W)           |                            |             | 09/0545                      | 21<br>(15 m)                | 38        |                               |                              |  |                              |
| Marathon – Stirrup Key (FW8363) (24.74N 81.04W)               |                            |             | 08/1620                      | 29                          | 37        |                               |                              |  |                              |
| Cudjoe Key (CW0925) (24.65N 81.48W)                           |                            |             | 09/0333                      | 27<br>(16 m)                | 37        |                               |                              |  |                              |
| <b>Public/Other</b>   |                            |             |                              |                             |           |                               |                              |  |                              |
| Islamorada/Theiss   | 09/0345                    | 991.5       |                              |                             |           |                               |                              |  |                              |
| Indian River Shores – S Camelia Court (27.69N 80.37W)         | 09/0822                    | 1010.6      | 09/0051                      | 36<br>(2 m)                 | 51        |                               |                              |  |                              |











| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Key West 0.5 SW<br>(FL-MN-24)<br>(24.56N 81.78W)              |                            |             |                              |                             |           |                               |                              |  | 8.98                         |
| Valrico 1.6 NNW<br>(FL-HB-160)<br>(27.97N 82.25W)             |                            |             |                              |                             |           |                               |                              |  | 8.90                         |
| Brandon 2.8 SW<br>(FL-HB-136)<br>(27.90N 82.33W)              |                            |             |                              |                             |           |                               |                              |  | 8.77                         |
| Riverview 2.1 W<br>(FL-HB-69)<br>(27.87N 82.35W)              |                            |             |                              |                             |           |                               |                              |  | 8.77                         |
| Riverview 4.8 SSW<br>(FL-HB-98)<br>(27.80N 82.34W)            |                            |             |                              |                             |           |                               |                              |  | 8.76                         |
| Ruskin 1.8 ESE<br>(FL-HB-44)<br>(27.71N 82.40W)               |                            |             |                              |                             |           |                               |                              |  | 8.72                         |
| Riverview 0.9 ENE<br>(FL-HB-114)<br>(27.87N 82.30W)           |                            |             |                              |                             |           |                               |                              |  | 8.67                         |
| Buckingham 1.7 SE<br>(FL-LE-6)<br>(26.66N 81.71W)             |                            |             |                              |                             |           |                               |                              |  | 8.13                         |
| Sunset 2.4 SW<br>(FL-MD-7)<br>(25.68N 80.38W)                 |                            |             |                              |                             |           |                               |                              |  | 8.05                         |
| Miami NWS<br>(FL-MD-28)<br>(25.76N 80.38W)                    |                            |             |                              |                             |           |                               |                              |  | 8.01                         |
| Palm City 4.0 SW<br>(FL-MT-1)<br>(27.12N 80.32W)              |                            |             |                              |                             |           |                               |                              |  | 8.00                         |
| <b>Georgia</b>  |                            |             |                              |                             |           |                               |                              |  |                              |
| <b>International Civil Aviation Organization (ICAO) Sites</b> |                            |             |                              |                             |           |                               |                              |  |                              |
| St. Simons Island Airport (KSSI)<br>(31.15N 81.38W)           | 12/1853                    | 1004.8      | 12/1453                      | 15                          | 29        |                               |                              |  | 0.31                         |
| <b>WeatherFlow Sites</b>                                      |                            |             |                              |                             |           |                               |                              |  |                              |
| Jekyll Island (XJEK)<br>(31.05N 81.41W)                       | 12/1758                    | 1002.6      | 12/1433                      | 35<br>(10 m, 1 min)         | 39        |                               |                              |  |                              |
| <b>Remote Automated Weather Stations (RAWS)</b>               |                            |             |                              |                             |           |                               |                              |  |                              |
| Helen 7 N (BRSG1)<br>(34.80N 83.71W)                          |                            |             |                              |                             |           |                               |                              |  | 5.26                         |
| <b>NWS Cooperative Observer Program (COOP) Sites</b>          |                            |             |                              |                             |           |                               |                              |  |                              |

| Location   | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|--|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|  | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Washington 2 ESE<br>(WSHG1) (33.73N 82.71W)                                    |                            |             |                              |                             |           |                               |                              |  | 4.79                         |
| <b>Hydrometeorological Automated Data System (HADS) Sites</b>                  |                            |             |                              |                             |           |                               |                              |  |                              |
| Little River near Washington (WTNG1)<br>(33.59N 82.73W)                        |                            |             |                              |                             |           |                               |                              |  | 5.51                         |
| Oconee River at Lake Sinclair (SNCG1)<br>(33.14N 83.20W)                       |                            |             |                              |                             |           |                               |                              |  | 4.29                         |
| Oconee River at Milledgeville (MLGG1)<br>(33.09N 83.22W)                       |                            |             |                              |                             |           |                               |                              |  | 4.24                         |
| <b>Community Collaborative Rain, Hail, &amp; Snow Network (CoCoRaHS) Sites</b> |                            |             |                              |                             |           |                               |                              |  |                              |
| Milledgeville 6.5 SSE (GA-BD-1)<br>(33.00N 83.20W)                             |                            |             |                              |                             |           |                               |                              |  | 5.49                         |
| Rabun Gap 2.1 SW (GA-RB-4)<br>(34.94N 83.42W)                                  |                            |             |                              |                             |           |                               |                              |  | 4.67                         |
| Kathleen 2.5 NW (GA-HS-16)<br>(32.53N 83.63W)                                  |                            |             |                              |                             |           |                               |                              |  | 4.08                         |
| Hiawassee 4.8 SE (GA-TW-1)<br>(34.89N 83.71W)                                  |                            |             |                              |                             |           |                               |                              |  | 4.08                         |
| <b>South Carolina</b>  |                            |             |                              |                             |           |                               |                              |  |                              |
| <b>Coastal-Marine Automated Network (C-MAN) Sites</b>                          |                            |             |                              |                             |           |                               |                              |  |                              |
| Folly Island (FBIS1)<br>(32.69N 79.89W)  | 12/2300                    | 1008.7      | 13/0010                      | 40<br>(10 m, 10 min)        | 49        |                               |                              |  |                              |
| <b>WeatherFlow Sites</b>   |                            |             |                              |                             |           |                               |                              |  |                              |
| Folly Beach Pier (XFOL) (32.65N 79.94W)  | 12/2240                    | 1006.8      | 13/0017                      | 45<br>(11 m, 1 min)         | 54        |                               |                              |  |                              |
| Fort Sumter Range Front Light (XSUM)<br>(32.75N 79.87W)                        | 12/2239                    | 1005.1      | 12/2354                      | 42<br>(12 m, 1 min)         | 48        |                               |                              |  |                              |
| Isle of Palms Pier (XIOP) (32.78N 79.79W)                                      | 12/2350                    | 1007.3      | 12/2359                      | 40<br>(8 m, 1 min)          | 47        |                               |                              |  |                              |
| Shutes Folly (XSHF)<br>(32.77N 79.91W)   | 12/2320                    | 1002.6      | 13/0009                      | 37<br>(13 m, 1 min)         | 46        |                               |                              |  |                              |
| Murrells Inlet (XMUR)<br>(33.52N 79.03W)                                       | 13/0035                    | 1008.2      | 13/0020                      | 35<br>(7 m, 5 min)          | 43        |                               |                              |  |                              |
| Sullivan's Island 28.5 (XSUL) (32.77N 79.82W)                                  | 12/2218                    | 1006.1      | 13/0004                      | 32<br>(13 m, 1 min)         | 43        |                               |                              |  |                              |
| Georgetown (XGEO)<br>(33.37N 79.27W)   | 12/2152                    | 1003.5      | 13/0015                      | 31<br>(10 m, 1 min)         | 37        |                               |                              |  |                              |





| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| Rocky Mount 5.9 SW<br>(NC-NS-10)<br>(35.90N 77.88W)   |                            |             |                              |                             |           |                               |                              |  | 10.10                        |
| Taylorsville 3.4 SSE<br>(NC-AX-11)<br>(35.87N 81.16W) |                            |             |                              |                             |           |                               |                              |  | 9.84                         |
| Tabor City 3.5 NE<br>(NC-CL-26)<br>(34.19N 78.84W)    |                            |             |                              |                             |           |                               |                              |  | 9.67                         |
| Millersville 1.2 SW<br>(NC-AX-9)<br>(35.84N 81.20W)   |                            |             |                              |                             |           |                               |                              |  | 9.17                         |
| Sims 4.0 SW<br>(NC-WN-6)<br>(35.72N 78.11W)           |                            |             |                              |                             |           |                               |                              |  | 9.07                         |
| Tarboro 0.7 S<br>(NC-ED-15)<br>(35.90N 77.55W)        |                            |             |                              |                             |           |                               |                              |  | 8.41                         |
| Yadkinville 0.2 E<br>(NC-YD-4)<br>(36.13N 80.66W)     |                            |             |                              |                             |           |                               |                              |  | 8.32                         |
| Hiddenite 1.5 SE<br>(NC-AX-6)<br>(35.89N 81.07W)      |                            |             |                              |                             |           |                               |                              |  | 8.20                         |
| Hickory 5.3 NE<br>(NC-CT-27)<br>(35.79N 81.25W)       |                            |             |                              |                             |           |                               |                              |  | 8.20                         |
| Roseboro 6.5 SW<br>(NC-CM-93)<br>(34.89N 78.59W)      |                            |             |                              |                             |           |                               |                              |  | 8.10                         |
| Winston-Salem 5.9 W<br>(NC-FR-27)<br>(36.11N 80.37W)  |                            |             |                              |                             |           |                               |                              |  | 8.04                         |

**Offshore**

**NOAA Buoys**

|  |         |        |         |                    |    |  |  |  |  |
|--|---------|--------|---------|--------------------|----|--|--|--|--|
| 41004 – Edisto<br>(32.50N 79.10W)            | 12/2320 | 1006.3 | 13/0043 | 45<br>(4 m, 1 min) | 49 |  |  |  |  |
| 42056 – Yucatan Basin<br>(19.82N 84.95W)     | 07/0830 | 1005.0 | 04/0542 | 37<br>(4 m, 1 min) | 43 |  |  |  |  |
| 41013 – Frying Pan Shoals<br>(33.44N 77.76W) | 13/0450 | 1007.7 | 12/2228 | 35<br>(4 m, 1 min) | 41 |  |  |  |  |
| 41009 – Canaveral<br>(28.51N 80.19W)         | 09/0850 | 1009.9 | 09/1610 | 33<br>(4 m, 1 min) | 44 |  |  |  |  |
| 42003 – East Gulf<br>(25.93N 85.62W)         | 10/1940 | 1003.9 | 10/0307 | 33<br>(4 m, 1 min) | 41 |  |  |  |  |
| 41010 – Canaveral East<br>(28.91N 78.47W)    | 09/0830 | 1012.9 | 09/0730 | 31<br>(4 m, 1 min) | 42 |  |  |  |  |

| Location  | Minimum Sea Level Pressure |             | Maximum Surface Wind Speed   |                             |           | Storm surge (ft) <sup>c</sup> | Storm tide (ft) <sup>d</sup> | Estimated Inundation (ft) <sup>e</sup> | Total rain (in) <sup>f</sup> |
|---|----------------------------|-------------|------------------------------|-----------------------------|-----------|-------------------------------|------------------------------|--|------------------------------|
|   | Date/time (UTC)            | Press. (mb) | Date/time (UTC) <sup>a</sup> | Sustained (kt) <sup>b</sup> | Gust (kt) |                               |                              |  |                              |
| 41008 – Grays Reef<br>(31.40N 80.87W)                                   | 12/1950                    | 1004.4      | 12/1646                      | 29<br>(5 m, 1 min)          | 33        |                               |                              |  |                              |
| 42036 – West Tampa<br>(28.50N 84.52W)                                   | 11/2250                    | 1004.5      | 11/1732                      | 25<br>(4 m, 1 min)          | 29        |                               |                              |  |                              |
| <b>USF Coastal Ocean Monitoring and Prediction System (COMPS) Buoys</b> |                            |             |                              |                             |           |                               |                              |  |                              |
| 42023 – C13 South Buoy<br>(26.01N 83.09W)                               | 11/1130                    | 1000.6      | 11/1000                      | 44<br>(3 m)                 | 57        |                               |                              |  |                              |
| 42026 – C22 Loop Current<br>(25.17N 83.48W)                             | 11/0930                    | 993.4       | 11/0930                      | 43<br>(3 m)                 | 56        |                               |                              |  |                              |
| 42013 – C10 Central Buoy<br>(27.17N 82.92W)                             | 11/2030                    | 999.6       | 12/0100                      | 37<br>(3 m)                 | 51        |                               |                              |  |                              |
| 42022 – C12 Central Buoy<br>(27.51N 83.74W)                             | 11/2200                    | 992.8       | 11/1330                      | 28<br>(3 m)                 | 38        |                               |                              |  |                              |
| <b>UNCW Coastal Ocean Research and Monitoring Program (CORMP) Buoys</b> |                            |             |                              |                             |           |                               |                              |  |                              |
| 41029 – Capers Nearshore<br>(32.80N 79.62W)                             | 12/2308                    | 1008.6      | 13/0008                      | 34<br>(3 m)                 | 48        |                               |                              |  |                              |
| 41033 – Fripp Nearshore<br>(32.28N 80.41W)                              | 12/2208                    | 1006.7      | 13/0108                      | 26<br>(3 m)                 | 39        |                               |                              |  |                              |

<sup>a</sup> Date/time is for sustained wind when both sustained and gust are listed.  
<sup>b</sup> Except as noted, sustained wind averaging periods for C-MAN and land-based reports are 2 min; buoy averaging periods are 8 min.  
<sup>c</sup> Storm surge is water height above normal astronomical tide level.  
<sup>d</sup> Storm tide is water height above the North American Vertical Datum of 1988 (NAVD88).  
<sup>e</sup> Estimated inundation is the maximum height of water above ground. For NOS tide gauges and USGS water level sensors, the height of the water above Mean Higher High Water (MHHW) is used as a proxy for inundation. Values marked with two asterisks (\*\*) are from non-tidal stations, and the water level is referenced above Mean Sea Level (MSL).  
<sup>f</sup> Estimated  
<sup>g</sup> Incomplete  
\* International rainfall totals cover the following periods:  
Belize: 1 to 6 November 2020, Cayman Islands: 3 to 7 November 2020, Costa Rica: 1 to 6 November 2020, El Salvador: 3 to 11 November 2020, Jamaica: 1 to 8 November 2020, Guatemala: 2 to 8 November 2020, Honduras: 1 to 7 November 2020, Mexico: 3 to 7 November 2020, Nicaragua: 1 to 5 November 2020

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%)       | 48                   | 66               |
| Medium (40%-60%) | 30                   | 54               |
| High (>60%)      | 24                   | 36               |

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Eta, 31 October–13 November 2020. 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    | 60    | 72    | 96    | 120   |
| OFCL           | 25.2                | 42.2  | 64.3  | 91.0  | 104.8 | 123.9 | 142.0 | 171.9 |
| OCD5           | 59.0                | 146.7 | 242.1 | 327.0 | 385.8 | 412.9 | 426.2 | 402.7 |
| Forecasts      | 43                  | 39    | 37    | 35    | 33    | 31    | 27    | 25    |
| OFCL (2015-19) | 24.1                | 36.9  | 49.6  | 65.1  | 80.7  | 96.3  | 133.2 | 171.6 |
| OCD5 (2015-19) | 44.7                | 96.1  | 156.3 | 217.4 | 273.9 | 330.3 | 431.5 | 511.9 |

Table 5b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Eta, 31 October–13 November 2020. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here is smaller than that shown in Table 5a due to the homogeneity requirement.

| Model ID  | Forecast Period (h) |             |             |             |              |              |              |              |
|-----------|---------------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
|           | 12                  | 24          | 36          | 48          | 60           | 72           | 96           | 120          |
| OFCL      | 26.1                | 43.6        | 65.0        | 93.5        | 110.7        | 128.5        | 149.5        | 144.5        |
| OCD5      | 58.7                | 142.2       | 230.1       | 317.6       | 370.8        | 385.8        | 415.2        | 404.7        |
| GFSI      | 29.7                | 47.6        | <b>63.6</b> | <b>81.2</b> | 112.2        | 148.0        | 198.4        | 171.9        |
| EMXI      | 30.1                | 49.9        | 67.8        | <b>89.8</b> | <b>109.1</b> | 131.1        | <b>143.7</b> | 181.3        |
| CMCI      | 36.5                | 66.7        | 86.0        | 109.3       | 113.2        | <b>119.2</b> | 156.1        | 213.5        |
| NVGI      | 37.4                | 65.2        | 90.6        | 116.8       | 129.9        | 138.0        | 164.9        | 211.1        |
| HWFI      | 28.3                | 50.8        | 73.3        | 95.1        | 131.6        | 150.3        | 197.6        | 202.4        |
| HMNI      | 32.8                | 56.1        | 78.0        | 114.3       | 152.2        | 187.0        | 247.0        | 202.9        |
| CTCI      | 30.2                | 47.0        | <b>62.4</b> | <b>60.6</b> | <b>76.7</b>  | <b>95.6</b>  | <b>136.5</b> | <b>112.2</b> |
| HCCA      | <b>25.1</b>         | <b>36.7</b> | <b>56.3</b> | <b>80.7</b> | 115.1        | 141.7        | 166.7        | <b>133.3</b> |
| AEMI      | 30.9                | 53.0        | 80.3        | 101.4       | 123.1        | 157.7        | 204.9        | 144.7        |
| GFEX      | 27.2                | <b>43.4</b> | <b>62.2</b> | <b>79.7</b> | <b>101.0</b> | <b>122.5</b> | <b>144.1</b> | 146.7        |
| TVCA      | 27.0                | <b>42.3</b> | <b>63.4</b> | <b>86.1</b> | <b>106.0</b> | 132.3        | 164.7        | <b>142.5</b> |
| TVCX      | 26.3                | <b>42.0</b> | <b>61.8</b> | <b>84.7</b> | <b>103.6</b> | <b>128.2</b> | 154.8        | <b>138.0</b> |
| TVDG      | 27.3                | <b>42.7</b> | <b>64.5</b> | <b>90.5</b> | <b>108.4</b> | 137.3        | 165.8        | 148.5        |
| TABS      | 50.0                | 100.5       | 141.3       | 202.1       | 267.3        | 325.9        | 446.6        | 590.2        |
| TABM      | 43.4                | 82.9        | 117.2       | 172.3       | 237.0        | 288.8        | 405.5        | 630.5        |
| TABD      | 47.5                | 87.3        | 128.0       | 190.6       | 249.8        | 292.0        | 437.5        | 862.1        |
| Forecasts | 39                  | 36          | 34          | 30          | 28           | 26           | 19           | 15           |

Table 6a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Eta, 31 October–13 November 2020. 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   | 60          | 72         | 96         | 120        |
| OFCL           | 6.0                 | 11.2 | 13.9 | 14.7 | <b>10.0</b> | <b>6.6</b> | <b>8.7</b> | <b>9.4</b> |
| OCD5           | 9.0                 | 16.6 | 21.2 | 19.7 | 15.9        | 13.7       | 16.2       | 19.1       |
| Forecasts      | 43                  | 39   | 37   | 35   | 33          | 31         | 27         | 25         |
| OFCL (2015-19) | 5.2                 | 7.7  | 9.4  | 10.7 | 11.9        | 13.0       | 14.4       | 15.5       |
| OCD5 (2015-19) | 6.8                 | 10.8 | 14.1 | 17.0 | 18.8        | 20.6       | 22.5       | 24.6       |



Table 6b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Eta, 31 October–13 November 2020. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here is smaller than that shown in Table 6a due to the homogeneity requirement.

| Model ID  | Forecast Period (h) |      |             |             |             |            |            |      |
|-----------|---------------------|------|-------------|-------------|-------------|------------|------------|------|
|           | 12                  | 24   | 36          | 48          | 60          | 72         | 96         | 120  |
| OFCL      | 6.2                 | 10.4 | 13.7        | 14.5        | 10.5        | 7.2        | 8.3        | 8.5  |
| OCD5      | 9.3                 | 16.1 | 20.3        | 19.9        | 16.6        | 13.4       | 16.3       | 18.2 |
| HWFI      | 7.8                 | 10.8 | <b>11.6</b> | <b>11.8</b> | 11.2        | 10.2       | 8.6        | 15.9 |
| HMNI      | 10.9                | 18.7 | 20.4        | 20.4        | 18.1        | 15.0       | 11.4       | 15.5 |
| CTCI      | 9.5                 | 13.8 | 15.6        | 17.0        | 16.9        | 14.3       | 8.6        | 16.9 |
| DSHP      | 7.1                 | 10.6 | 13.7        | <b>13.5</b> | <b>10.1</b> | <b>6.7</b> | 12.1       | 18.1 |
| LGEM      | 7.4                 | 12.4 | 16.9        | 18.0        | 13.1        | 11.1       | 13.4       | 17.1 |
| ICON      | 7.6                 | 11.6 | 13.8        | 14.5        | 11.5        | 9.1        | 10.6       | 15.1 |
| IVCN      | 7.8                 | 11.9 | <b>13.6</b> | <b>14.3</b> | 12.4        | 9.1        | 8.5        | 12.8 |
| IVDR      | 8.4                 | 12.8 | 14.2        | 14.9        | 13.6        | 10.1       | <b>8.2</b> | 12.5 |
| HCCA      | 7.9                 | 11.9 | 14.1        | <b>13.3</b> | 11.0        | 9.3        | 8.6        | 9.1  |
| GFSI      | 10.7                | 16.1 | 18.9        | 19.9        | 19.3        | 16.4       | 11.9       | 18.1 |
| EMXI      | 11.5                | 19.2 | 22.9        | 23.2        | 20.6        | 17.4       | 9.2        | 13.2 |
| Forecasts | 39                  | 36   | 34          | 31          | 29          | 27         | 21         | 17   |

Table 7. Storm surge watch and warning summary for Hurricane Eta.

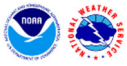
| Date/Time (UTC) | Action                           | Location   |
|-----------------|----------------------------------|--|
| 7 / 2100        | Storm Surge Watch issued         | Golden Beach to Bonita Beach, FL, including Biscayne Bay                             |
| 7 / 2100        | Storm Surge Watch issued         | Florida Keys from Ocean Reef to Dry Tortugas, FL, including Florida Bay              |
| 8 / 1500        | Storm Surge Warning issued       | Florida Keys from Ocean Reef to Dry Tortugas, FL, including Florida Bay              |
| 8 / 2100        | Storm Surge Watch discontinued   | Card Sound Bridge to Golden Beach, FL, including Biscayne Bay                        |
| 9 / 0900        | Storm Surge Warning discontinued | All  |
| 9 / 0900        | Storm Surge Watch discontinued   | All  |
| 11 / 0300       | Storm Surge Watch issued         | Bonita Beach to the Steinhatchee River, FL, including Tampa Bay and Charlotte Harbor |
| 11 / 1500       | Storm Surge Warning issued       | Bonita Beach to the Suwannee River, FL, including Tampa Bay and Charlotte Harbor     |
| 12 / 0900       | Storm Surge Warning discontinued | Bonita Beach to Middle of Longboat Key, FL, including Charlotte Harbor               |
| 12 / 1200       | Storm Surge Warning discontinued | All  |

Table 8. Wind watch and warning summary for Hurricane Eta, 31 October–13 November 2020.

| <b>Date/Time (UTC)</b> | <b>Action</b>  | <b>Location</b>                     |
|------------------------|--|-------------------------------------|
| <b>1 / 0300</b>        | Hurricane Watch issued                                 | Puerto Cabezas to Punta Patuca      |
| <b>1 / 1500</b>        | Tropical Storm Warning issued                          | Hon/Nic Border to Punta Patuca      |
| <b>1 / 1500</b>        | Hurricane Watch modified to                            | Hon/Nic Border to Punta Patuca      |
| <b>1 / 1500</b>        | Hurricane Warning issued                               | Sandy Bay Sirpi to Hon/Nic Border   |
| <b>1 / 2100</b>        | Tropical Storm Watch issued                            | Punta Patuca to Punta Castilla      |
| <b>3 / 1500</b>        | Tropical Storm Warning issued                          | Laguna de Perlas to Sandy Bay Sirpi |
| <b>3 / 2100</b>        | Hurricane Watch changed to Tropical Storm Warning      | Hon/Nic Border to Punta Patuca      |
| <b>3 / 2100</b>        | Tropical Storm Watch discontinued                      | All                                 |
| <b>4 / 1200</b>        | Tropical Storm Warning modified to                     | Laguna de Perlas to Punta Patuca    |
| <b>4 / 1200</b>        | Tropical Storm Warning modified to                     | Laguna de Perlas to Punta Patuca    |
| <b>4 / 1200</b>        | Hurricane Warning discontinued                         | All                                 |
| <b>4 / 1800</b>        | Tropical Storm Warning discontinued                    | All                                 |
| <b>5 / 2100</b>        | Tropical Storm Watch issued                            | Cayman Islands                      |
| <b>6 / 1500</b>        | Tropical Storm Watch changed to Tropical Storm Warning | Cayman Islands                      |
| <b>6 / 1500</b>        | Tropical Storm Watch issued                            | Pinar del Rio to Camaguey           |



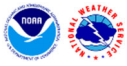
| <b>Date/Time<br/>(UTC)</b> | <b>Action</b>   | <b>Location</b>                     |
|----------------------------|---|-------------------------------------|
| <b>6 / 1500</b>            | Tropical Storm Watch issued                               | Isle of Youth                       |
| <b>6 / 2100</b>            | Tropical Storm Watch modified to                          | Pinar del Rio to Mayabeque          |
| <b>6 / 2100</b>            | Tropical Storm Warning issued                             | Matanzas to Camaguey                |
| <b>7 / 0300</b>            | Tropical Storm Watch issued                               | Bonita Beach to Jupiter Inlet       |
| <b>7 / 0300</b>            | Tropical Storm Watch issued                               | Northwestern Bahamas                |
| <b>7 / 0900</b>            | Tropical Storm Watch changed to<br>Tropical Storm Warning | Northwestern Bahamas                |
| <b>7 / 0900</b>            | Tropical Storm Watch modified to                          | Bonita Beach to Sebastian Inlet     |
| <b>7 / 1500</b>            | Tropical Storm Watch issued                               | Golden Beach to Volusia/Brevard CL  |
| <b>7 / 1500</b>            | Tropical Storm Watch issued                               | Englewood to Chokoloskee            |
| <b>7 / 1500</b>            | Tropical Storm Warning issued                             | Chokoloskee to Golden Beach         |
| <b>7 / 2100</b>            | Tropical Storm Watch modified to                          | Jupiter Inlet to Volusia/Brevard CL |
| <b>7 / 2100</b>            | Tropical Storm Watch modified to                          | Englewood to Bonita Beach           |
| <b>7 / 2100</b>            | Tropical Storm Watch modified to                          | Englewood to Bonita Beach           |
| <b>7 / 2100</b>            | Tropical Storm Warning<br>discontinued                    | Chokoloskee to Golden Beach         |
| <b>7 / 2100</b>            | Tropical Storm Warning issued                             | Bonita Beach to Jupiter Inlet       |
| <b>7 / 2100</b>            | Hurricane Watch issued                                    | Bonita Beach to Deerfield Beach     |
| <b>8 / 0000</b>            | Tropical Storm Warning<br>discontinued                    | Cayman Islands                      |



| Date/Time (UTC) | Action                              | Location                                |
|-----------------|-------------------------------------|---|
| 8 / 0300        | Tropical Storm Watch discontinued   | Jupiter Inlet to Volusia/Brevard CL     |
| 8 / 0300        | Tropical Storm Watch modified to    | Anna Maria Island to Englewood          |
| 8 / 0300        | Tropical Storm Warning discontinued | Bonita Beach to Jupiter Inlet           |
| 8 / 0300        | Tropical Storm Warning issued       | Englewood to Volusia/Brevard CL         |
| 8 / 1500        | Tropical Storm Warning modified to  | Englewood to Blackwater Sound           |
| 8 / 1500        | Hurricane Watch modified to         | Bonita Beach to Blackwater Sound        |
| 8 / 1500        | Hurricane Warning issued            | Dry Tortugas to Ocean Reef              |
| 8 / 2100        | Tropical Storm Warning discontinued | Matanzas to Camaguey                    |
| 8 / 2100        | Hurricane Watch modified to         | Ocean Reef to Golden Beach              |
| 9 / 0900        | Tropical Storm Watch discontinued   | Anna Maria Island to Englewood          |
| 9 / 0900        | Tropical Storm Warning discontinued | Englewood to Blackwater Sound           |
| 9 / 0900        | Tropical Storm Warning modified to  | Anna Maria Island to Volusia/Brevard CL |
| 9 / 0900        | Hurricane Watch discontinued        | All                                     |
| 9 / 0900        | Hurricane Warning discontinued      | All                                     |
| 9 / 1200        | Tropical Storm Warning discontinued | Northwestern Bahamas                    |



| <b>Date/Time (UTC)</b> | <b>Action</b>                       | <b>Location</b>                           |
|------------------------|-------------------------------------|---|
| <b>9 / 1500</b>        | Tropical Storm Warning discontinued | Anna Maria Island to Volusia/Brevard CL   |
| <b>9 / 1500</b>        | Tropical Storm Warning issued       | Dry Tortugas                              |
| <b>9 / 1800</b>        | Tropical Storm Warning discontinued | All                                       |
| <b>10 / 2100</b>       | Tropical Storm Watch issued         | Suwannee River to Englewood               |
| <b>10 / 2100</b>       | Tropical Storm Warning issued       | Dry Tortugas                              |
| <b>11 / 0300</b>       | Tropical Storm Watch modified to    | Aucilla River to Suwannee River           |
| <b>11 / 0300</b>       | Tropical Storm Warning issued       | Suwannee River to Bonita Beach            |
| <b>11 / 0900</b>       | Hurricane Watch issued              | Yankeetown to Anna Maria Island           |
| <b>11 / 1500</b>       | Tropical Storm Watch discontinued   | Pinar del Rio to Mayabeque                |
| <b>11 / 1500</b>       | Tropical Storm Watch discontinued   | Isle of Youth                             |
| <b>11 / 2100</b>       | Tropical Storm Warning discontinued | Dry Tortugas                              |
| <b>11 / 2100</b>       | Hurricane Watch discontinued        | All                                       |
| <b>12 / 0300</b>       | Tropical Storm Warning modified to  | Suwannee River to Boca Grande             |
| <b>12 / 0300</b>       | Tropical Storm Warning issued       | Flagler/Volusia CL to Saint Andrews Sound |
| <b>12 / 0600</b>       | Tropical Storm Warning modified to  | Suwannee River to Englewood               |



| <b>Date/Time<br/>(UTC)</b> | <b>Action</b>                          | <b>Location</b>                |
|----------------------------|--|--------------------------------|
| <b>12 / 0900</b>           | Tropical Storm Warning modified<br>to  | Suwannee River to Longboat Key |
| <b>12 / 1200</b>           | Tropical Storm Watch<br>discontinued   | All                            |
| <b>12 / 1200</b>           | Tropical Storm Warning<br>discontinued | Suwannee River to Longboat Key |
| <b>12 / 1800</b>           | Tropical Storm Warning<br>discontinued | All                            |

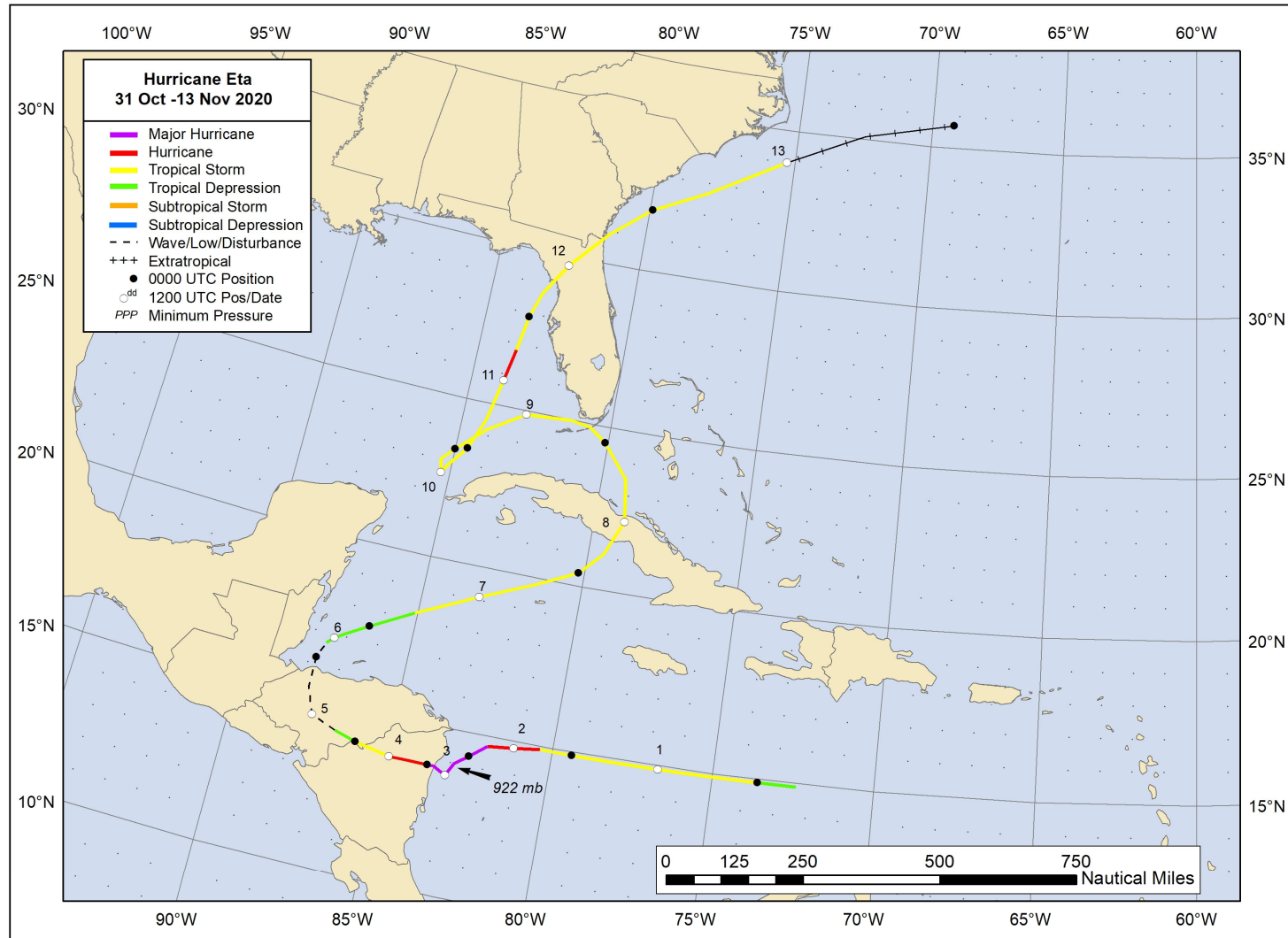


Figure 1. Best track positions for Hurricane Eta, 31 October–13 November 2020.



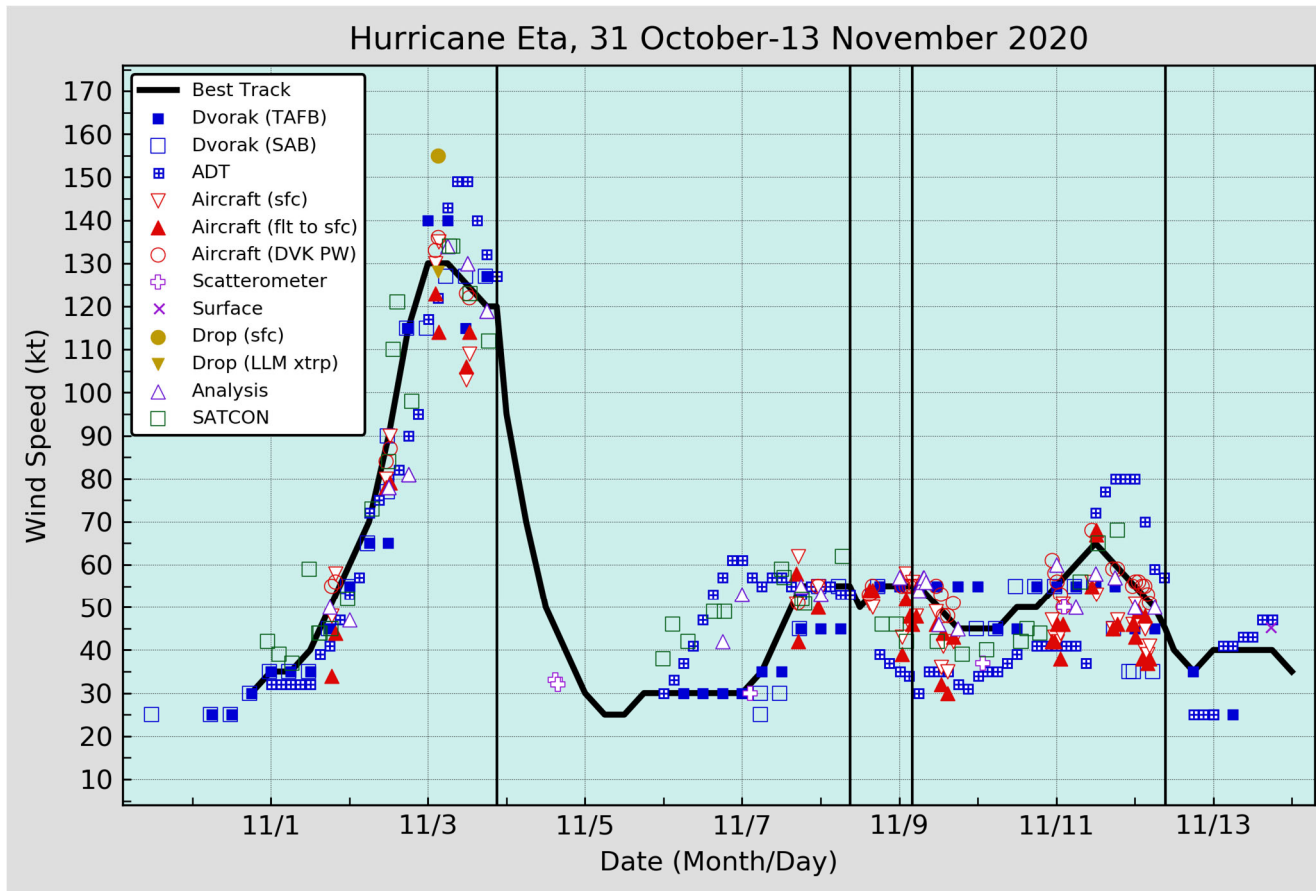


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Eta, 31 October–13 November 2020. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. 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.

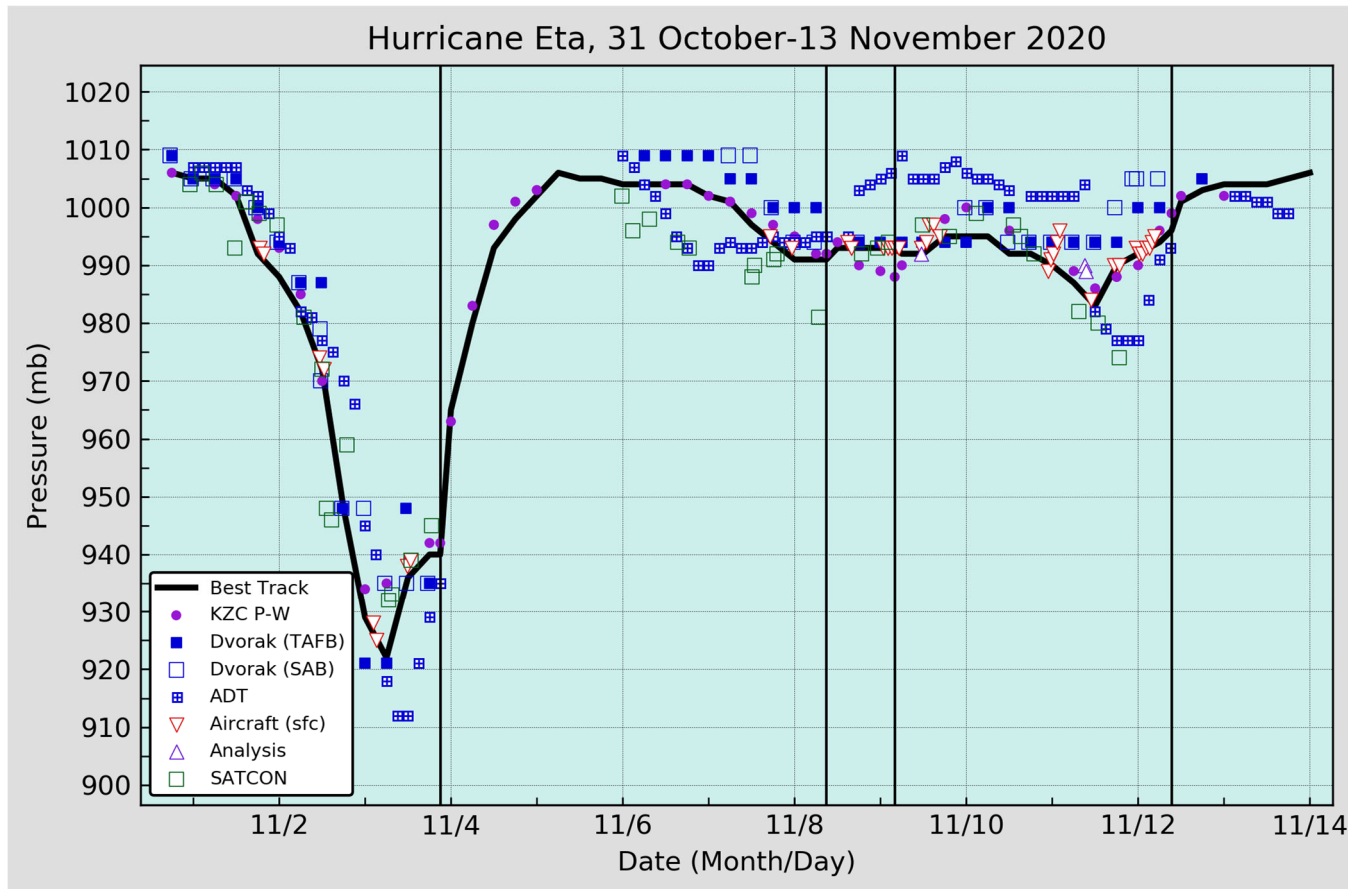


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Eta, 31 October–13 November 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for 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.

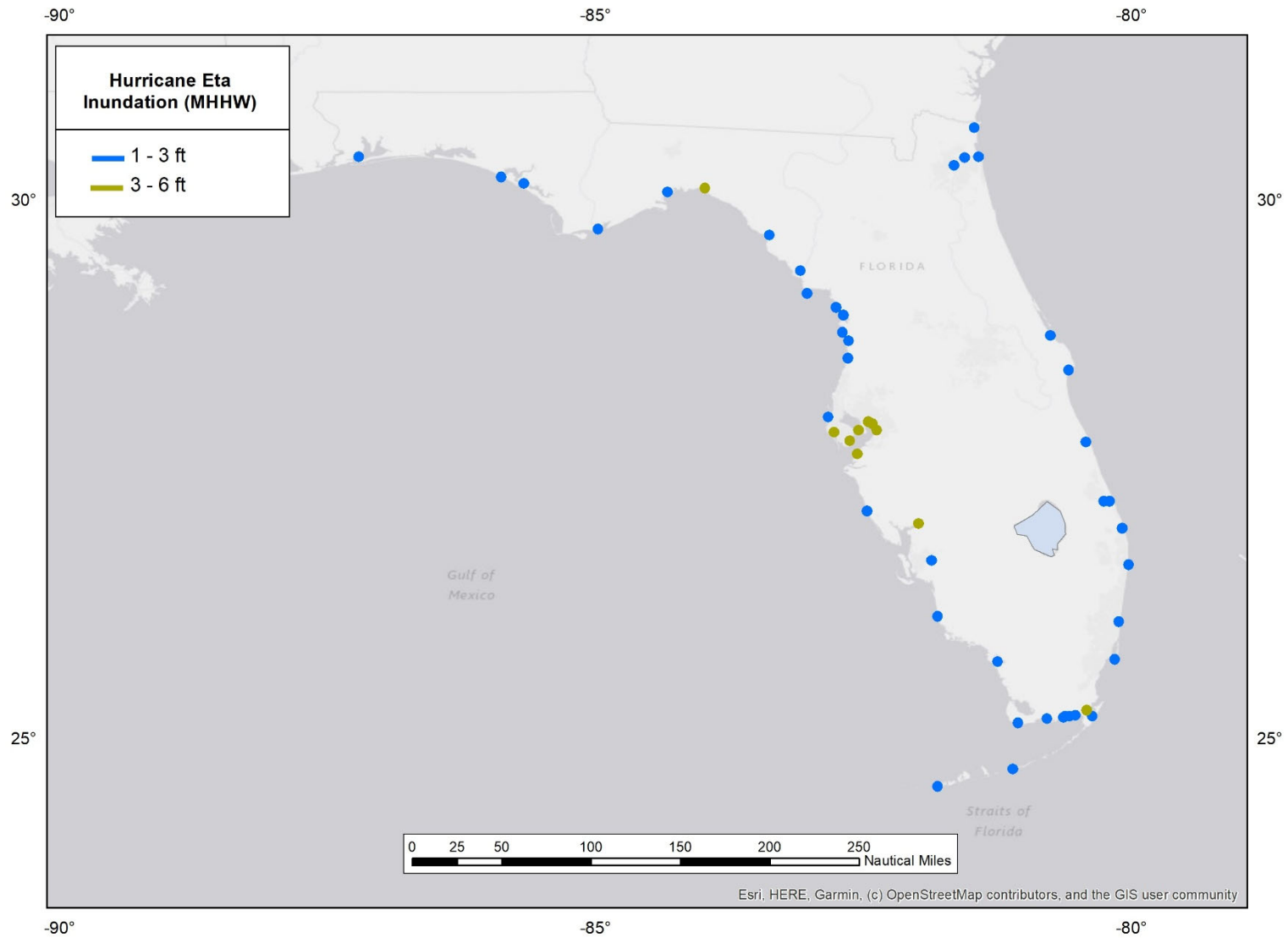


Figure 4. Maximum water levels measured from tide and stream gauges (circles) from Hurricane Eta. Water levels are referenced as feet above Mean Higher High Water (MHHW), which is used as a proxy for inundation (above ground level) on normally dry ground along the immediate coastline.

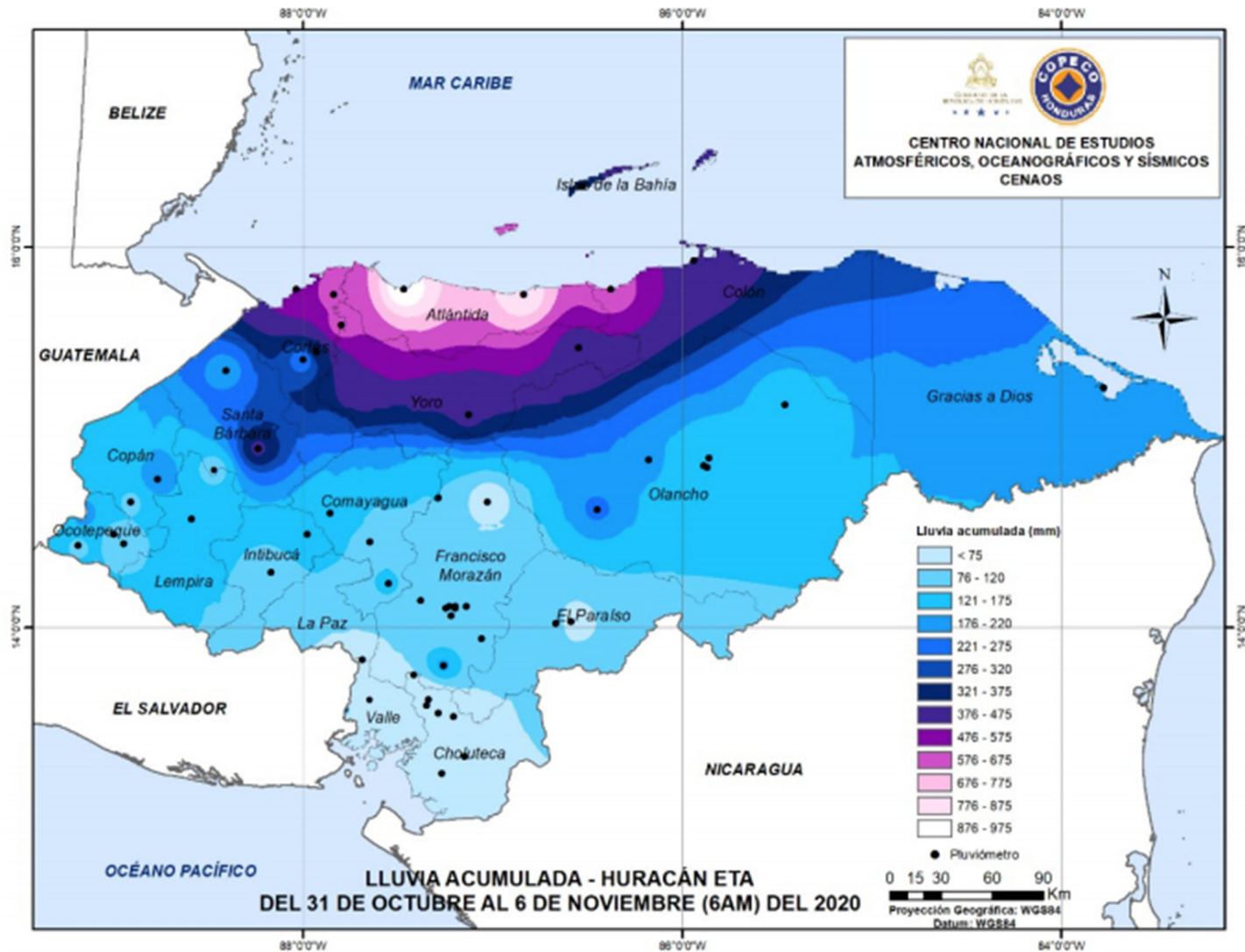


Figure 5. Honduras rainfall totals (mm) associated with Eta during the period 31 October–6 November 2020. Graphic courtesy of the Centro Nacional de Estudios Atmosféricos, Oceanográficos y Sísmicos (CENAOS).

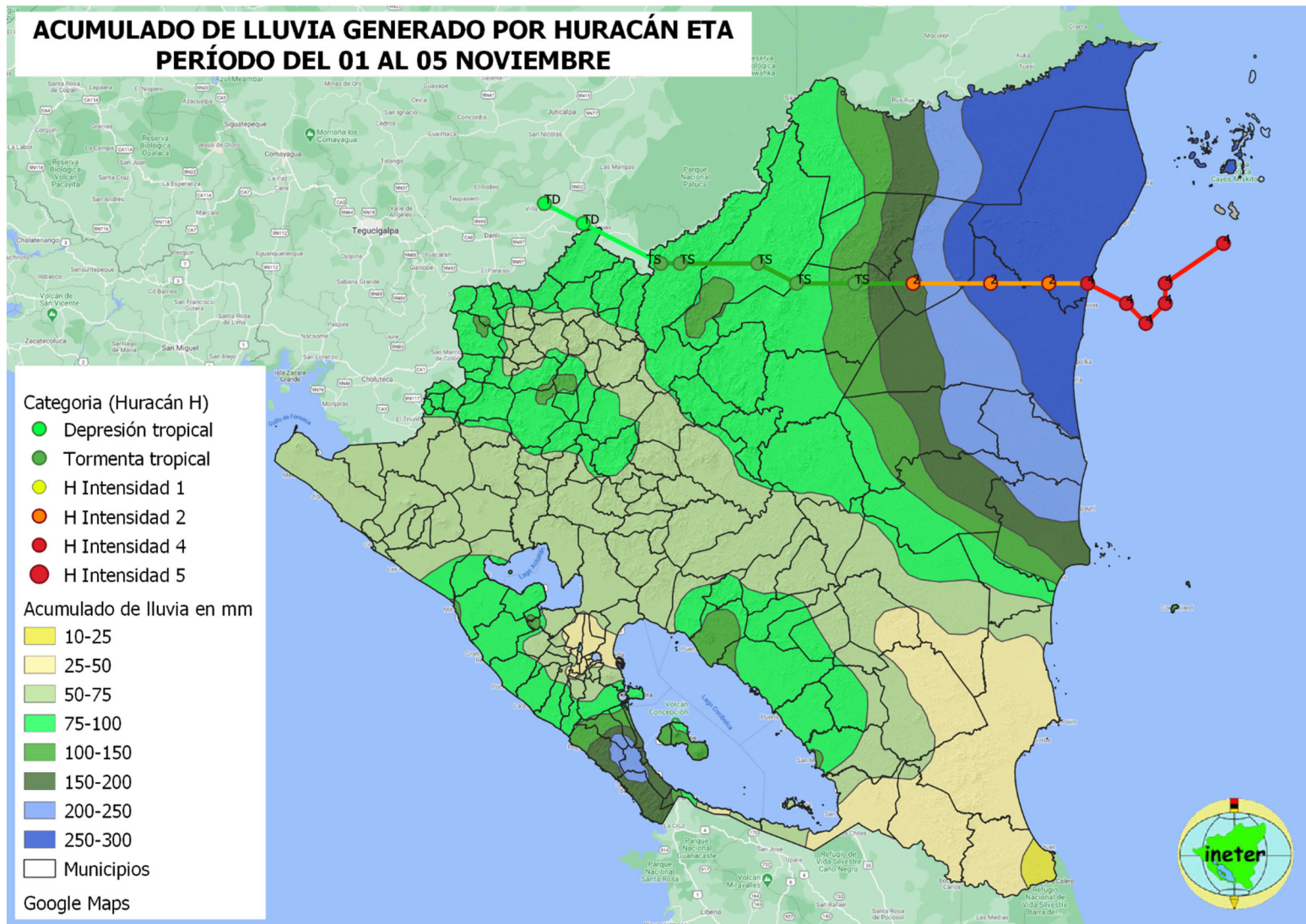


Figure 6. Nicaragua rainfall totals (mm) associated with Eta during the period 1–5 November 2020. Graphic courtesy of the Instituto Nicaraguense de Estudios Territoriales (INETER).

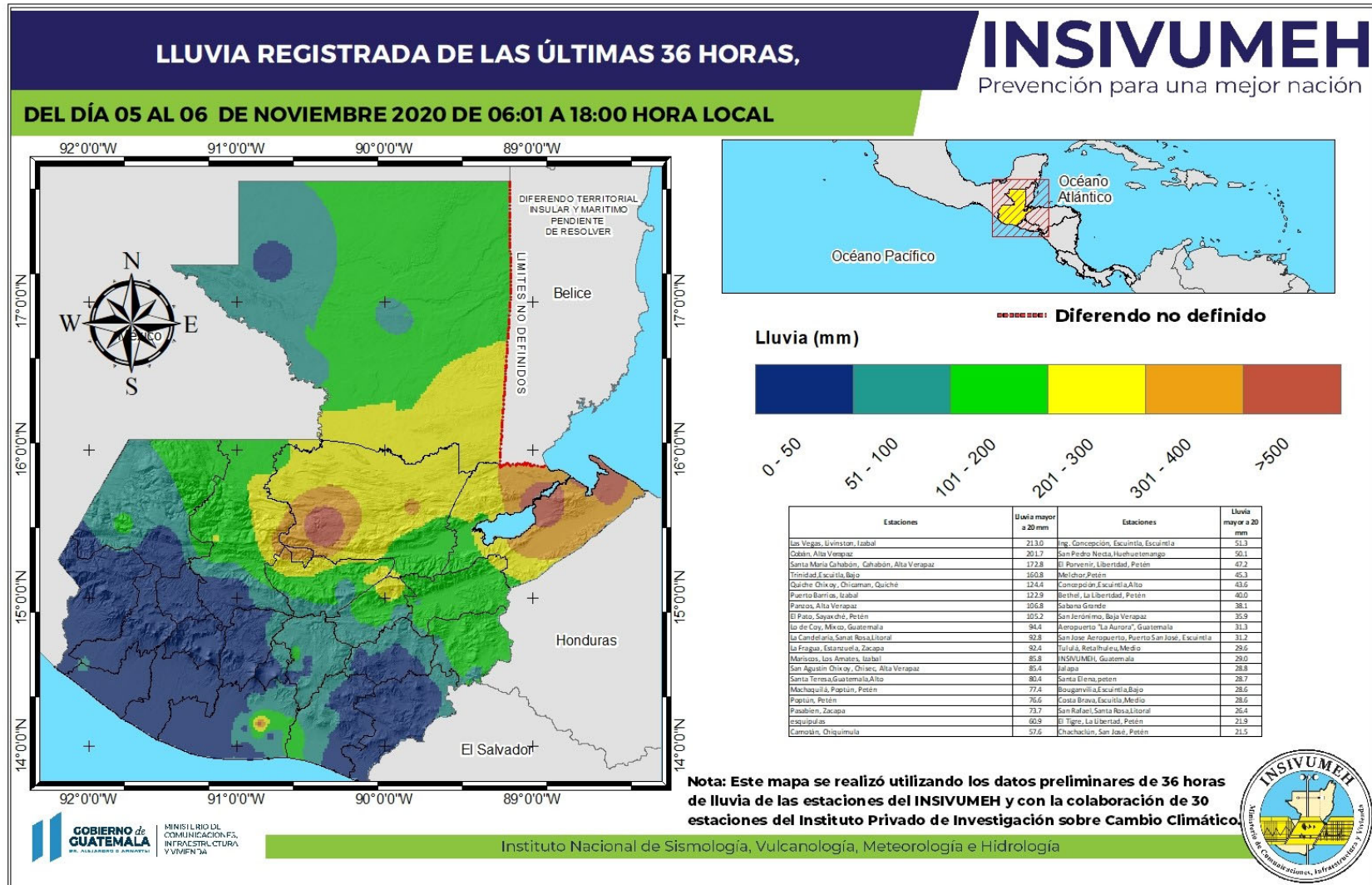


Figure 7. Guatemala rainfall totals (mm) associated with Eta during the period 5–6 November 2020. Graphic courtesy of the Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH).

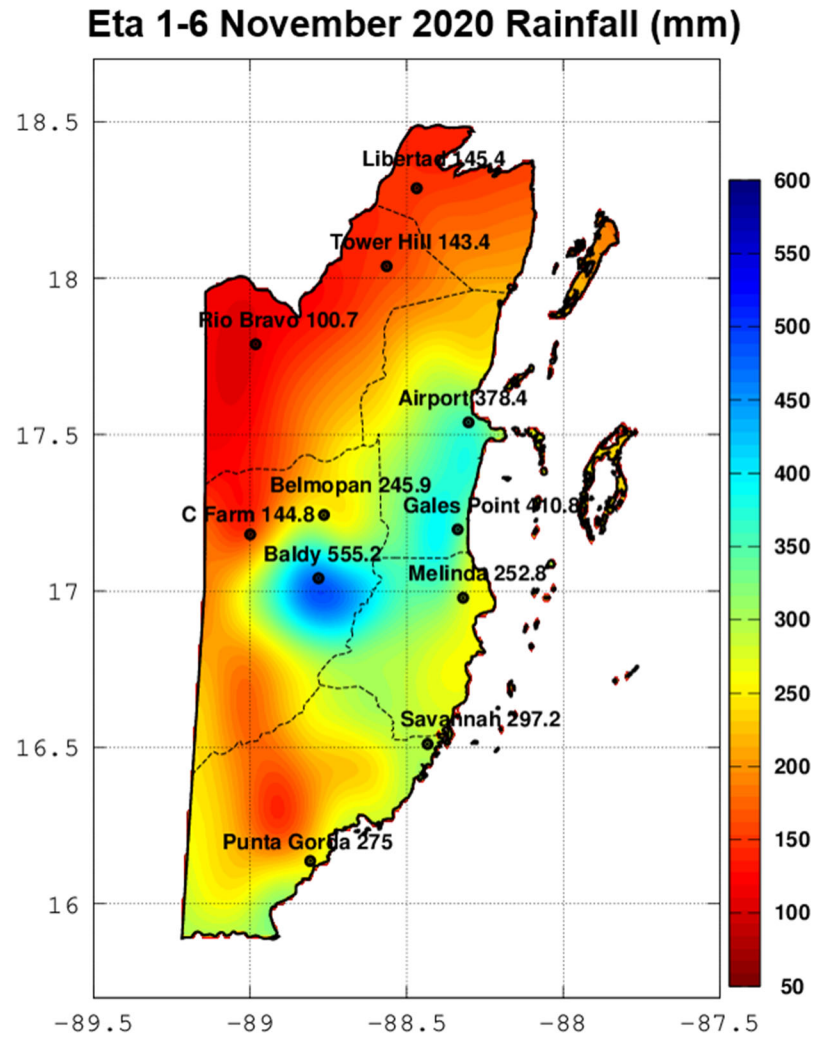


Figure 8. Belize rainfall totals (mm) associated with Eta during the period 1–6 November 2020. Graphic courtesy of the National Meteorological Service of Belize.

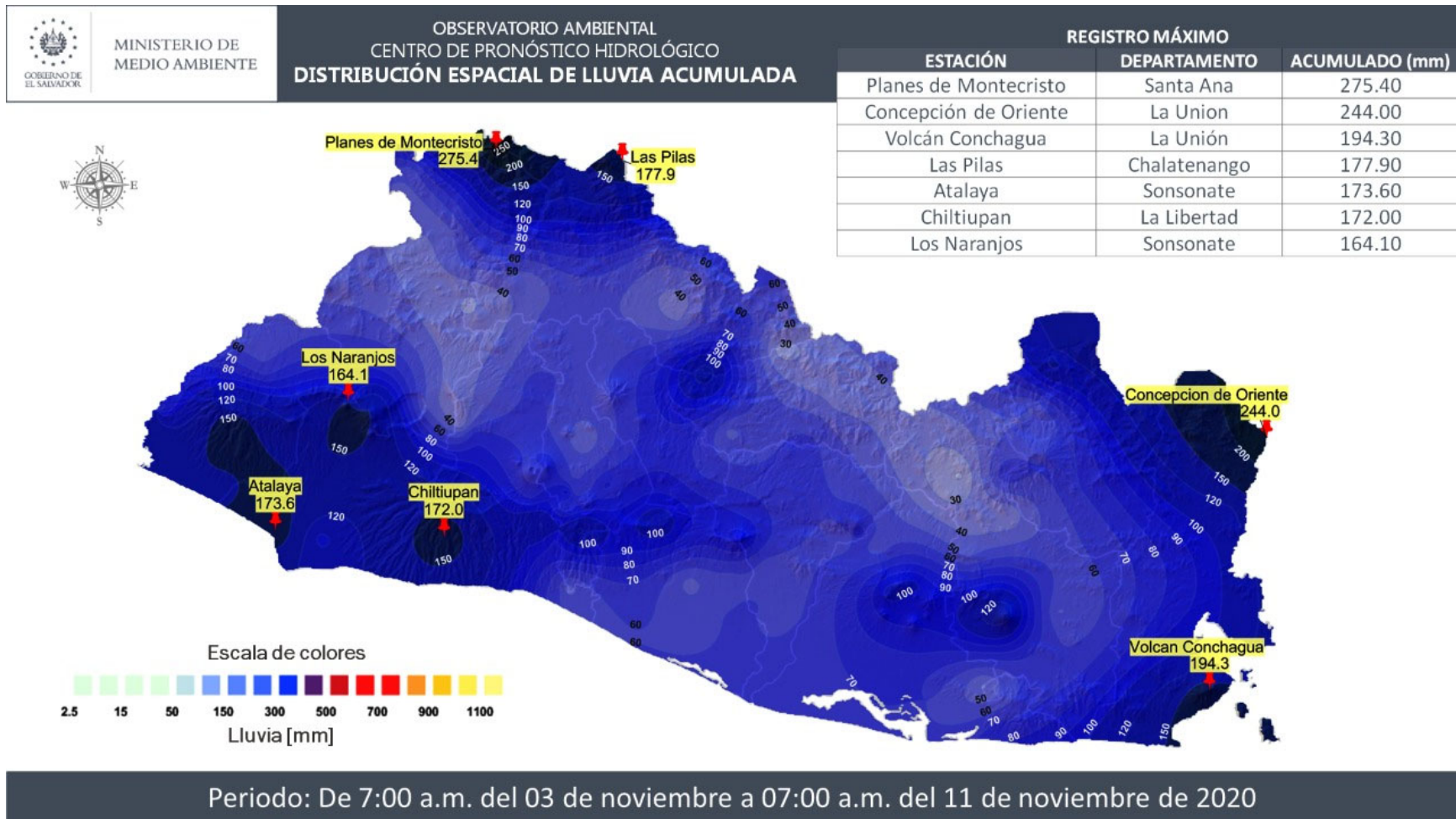


Figure 9. El Salvador rainfall totals (mm) associated with Eta during the period 3–11 November 2020. Graphic courtesy of the Centro de Pronóstico Hidrológico de El Salvador.



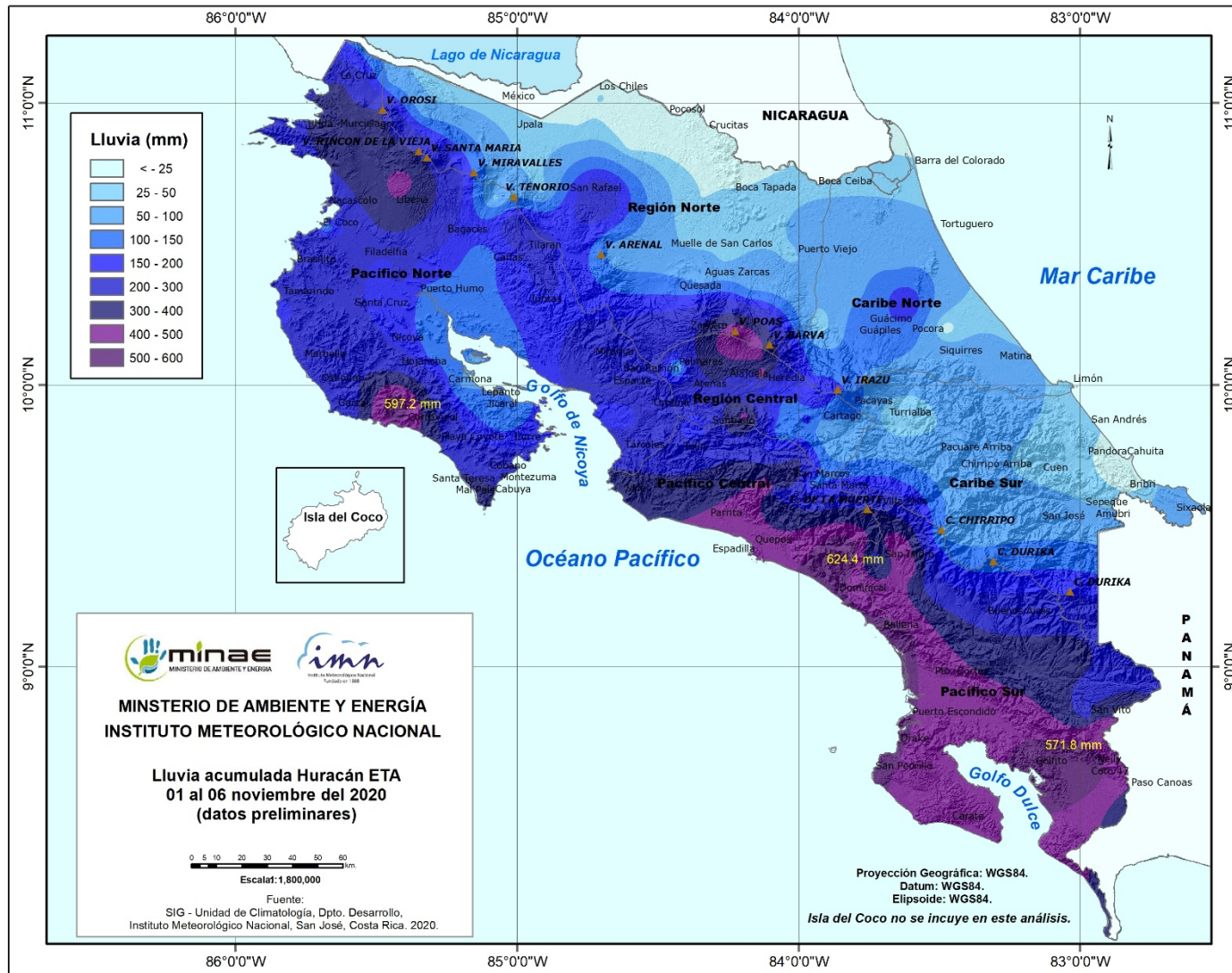


Figure 10. Costa Rica rainfall totals (mm) associated with Eta during the period 1–6 November 2020. Graphic courtesy of Ministerio de Ambiente y Energía Instituto Meteorológico Nacional (MINAE/IMN).

### Precipitación acumulada (mm) del 3 al 7 de noviembre de 2020

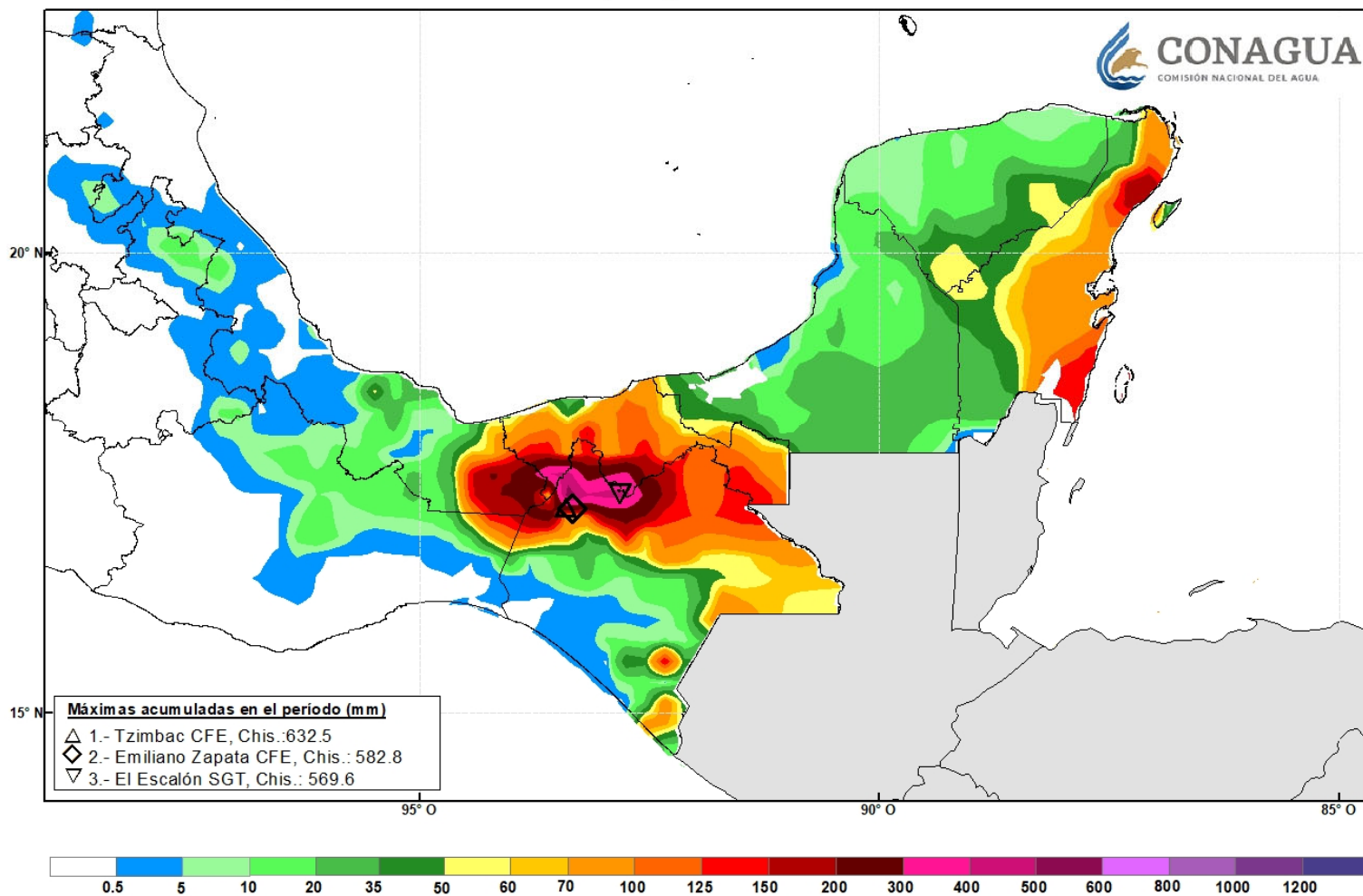


Figure 11. Southern Mexico rainfall totals (mm) associated with Eta during the period 3–7 November 2020. Graphic courtesy of Comisión Nacional del Agua (CONAGUA).

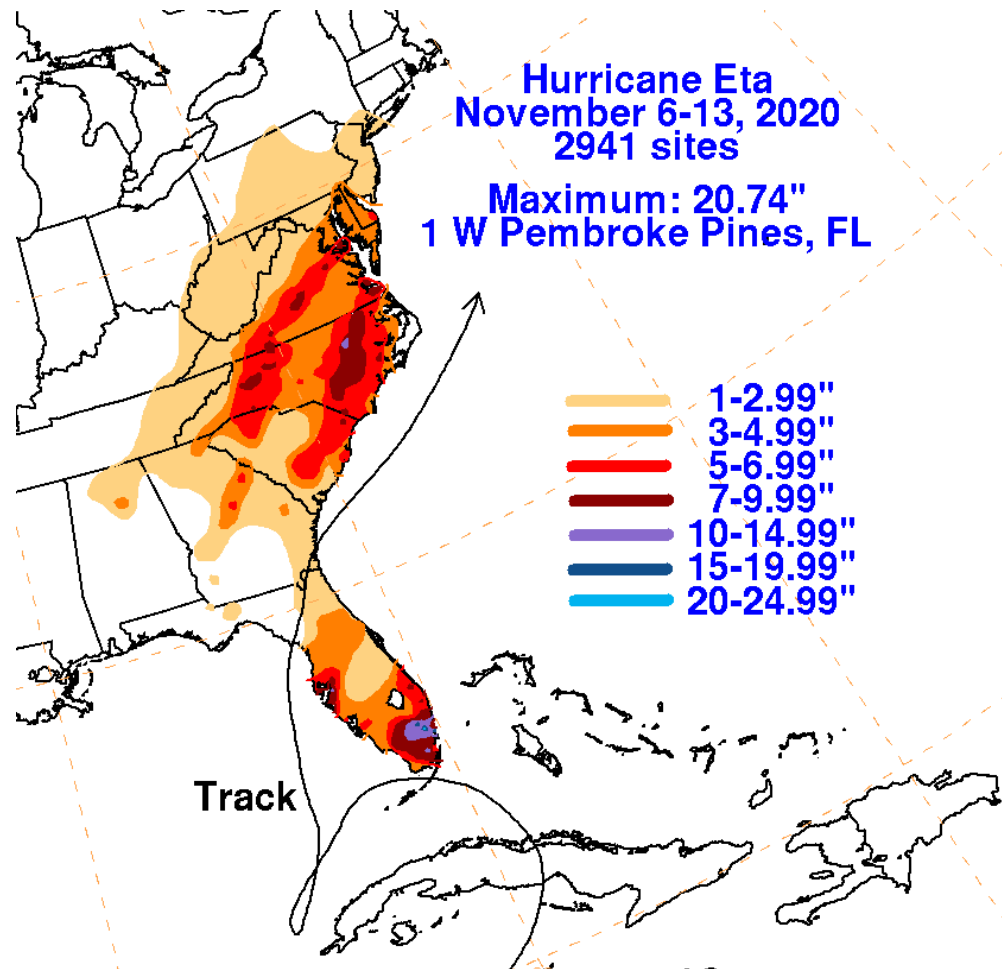


Figure 12. United States rainfall totals (inches) associated with Eta during the period 6–13 November 2020. Figure courtesy of Zackary Taylor and David Roth of the NOAA Weather Prediction Center.



Figure 13. Flooding from Eta in Southwest Ranches, Florida, in Broward County. Image courtesy of Daniel P. Brown, National Hurricane Center.

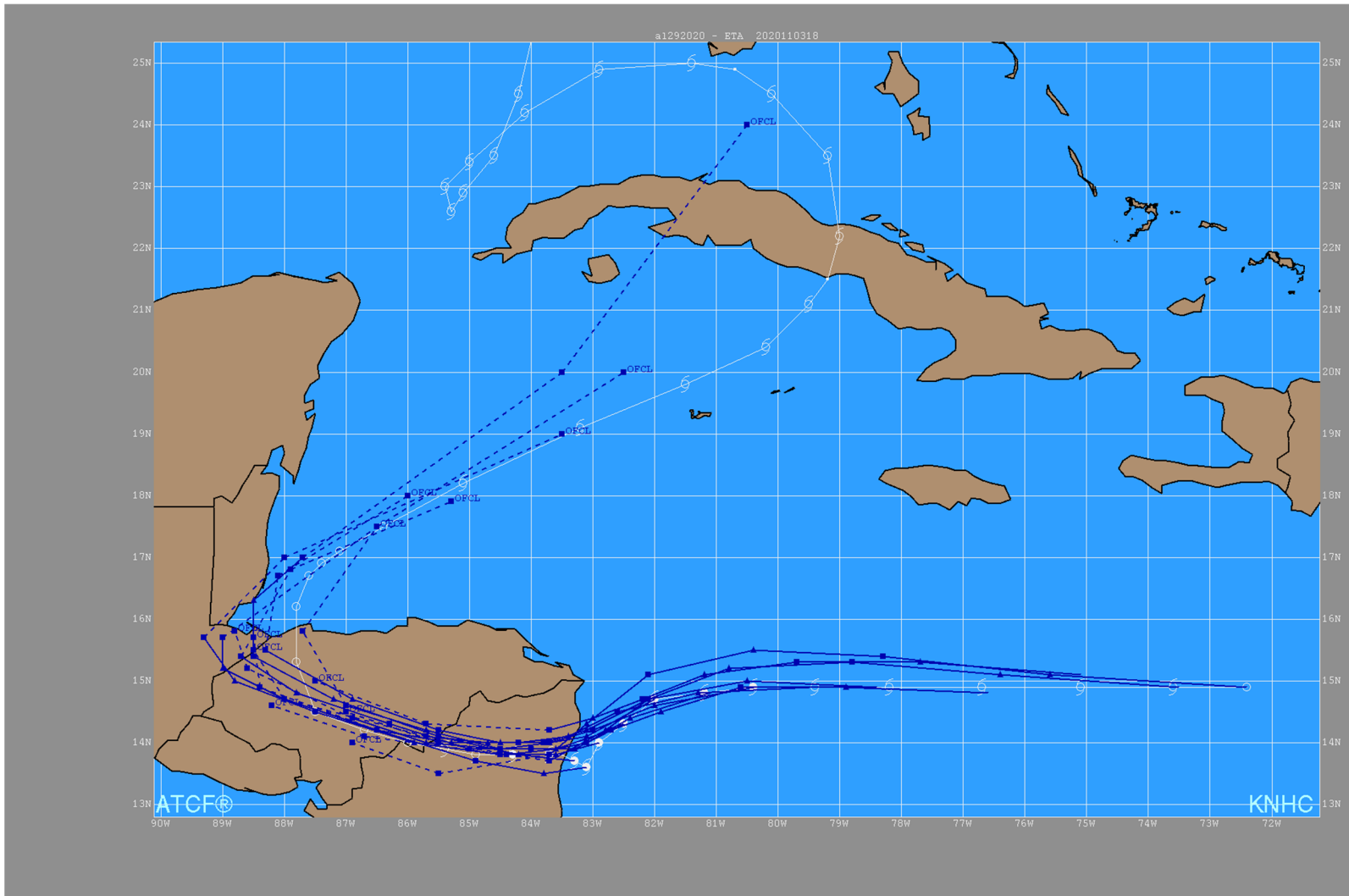


Figure 14. Official track forecasts for Hurricane Eta, 31 October 1800 UTC to 3 November 1800 UTC 2020. The best track is shown by the white curve.

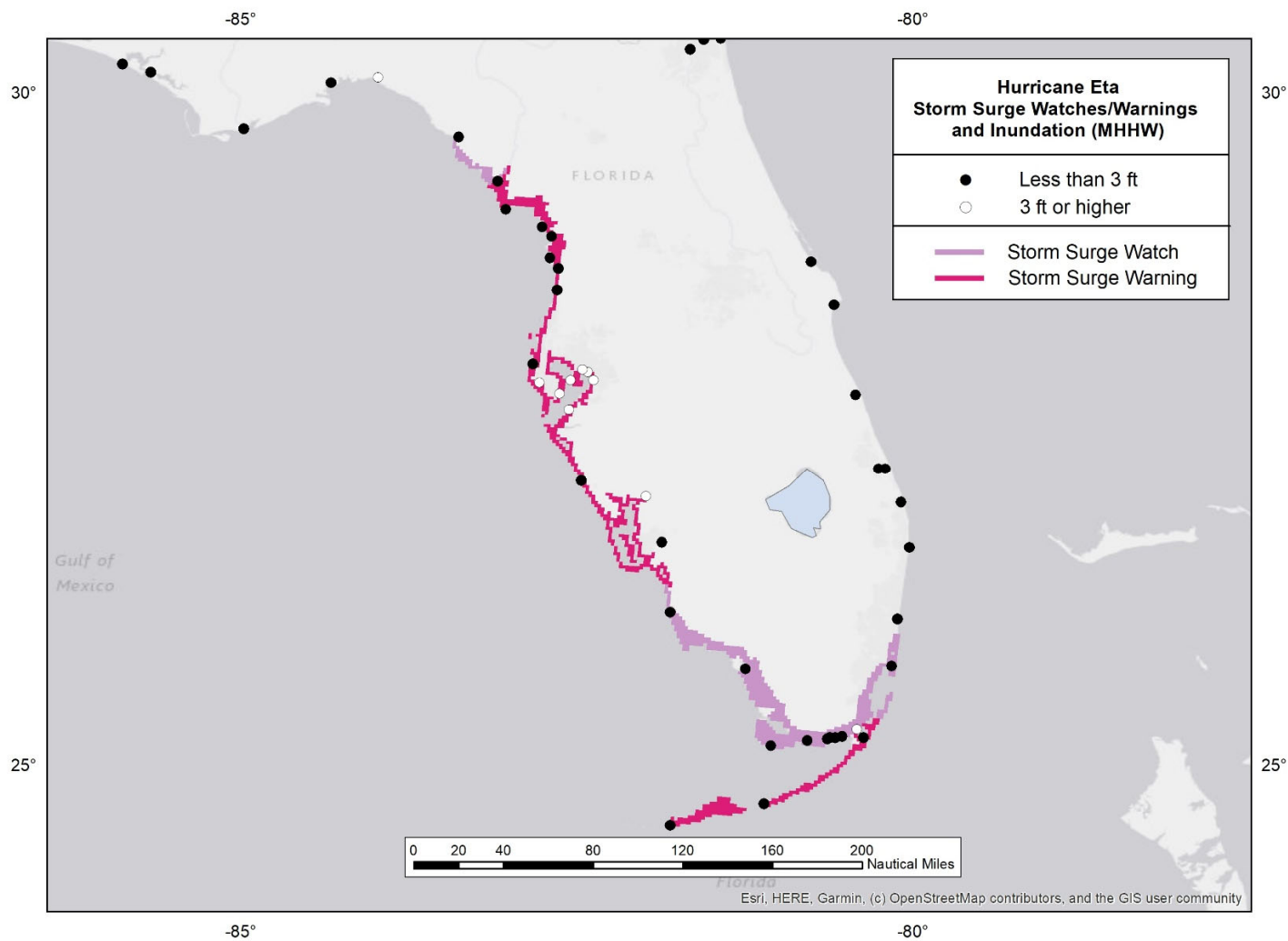


Figure 15. Maximum water levels measured during Hurricane Eta from tide and stream gauges (circles), as well as areas covered by storm surge watches (lavender) and warnings (magenta). Water levels are referenced as feet above Mean Higher High Water (MHHW), which is used as a proxy for inundation (above ground level) on normally dry ground along the immediate coastline. Black markers denote water levels less than 3 ft above ground level, and white markers denote water levels 3 ft or higher above ground level.