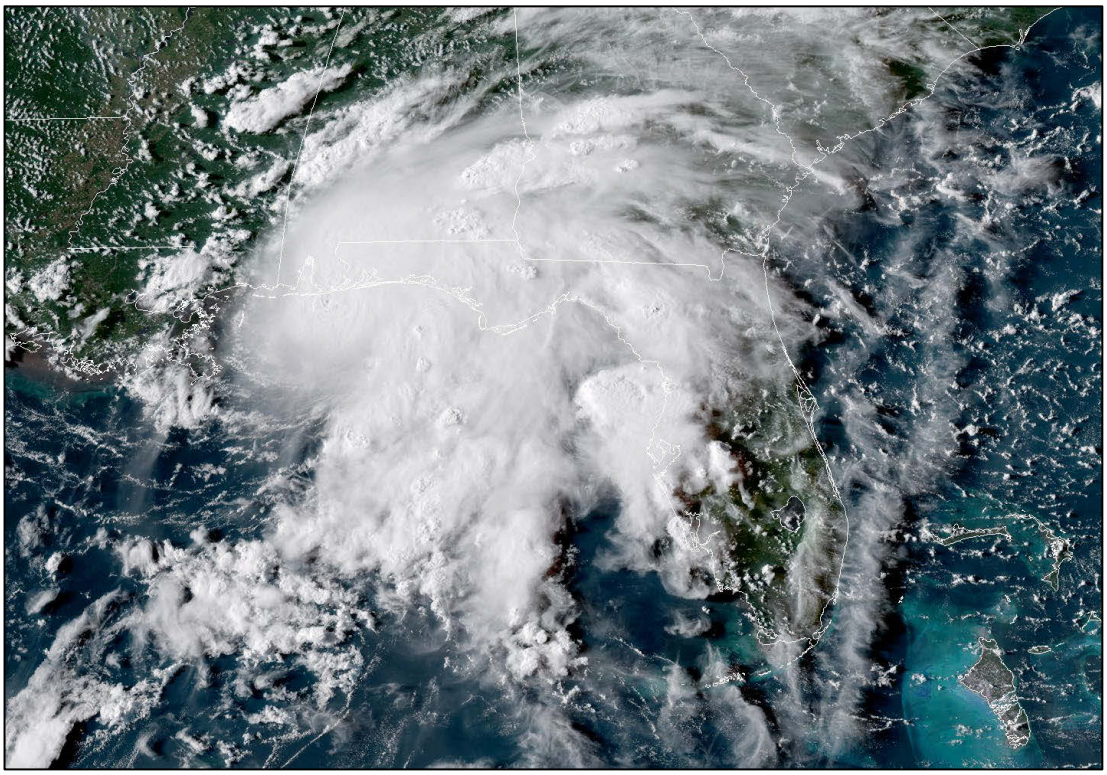
NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM GORDON

(AL072018)

3–6 September 2018

Daniel P. Brown, Andrew Latto, and Robbie Berg
National Hurricane Center
16 May 2019[1]



GOES-16 GEOCOLOR IMAGE OF TROPICAL STORM GORDON AT 2200 UTC 5 SEPTEMBER 2018. IMAGE COURTESY OF THE COOPERATIVE INSTITUTE FOR RESEARCH IN THE ATMOSPHERE (CIRA).

Gordon formed near the southeastern coast of Florida, moved across the Florida Keys and extreme southwestern Florida, and made a final landfall as a strong tropical storm along the north-central Gulf of Mexico coast just west of the Mississippi-Alabama border.

[1] Original report date 19 February 2019. Updated 16 May 2019 to correct omission of second landfall location at the bottom of Table 1.

Tropical Storm Gordon

3–6 SEPTEMBER 2018

SYNOPTIC HISTORY

The origin of Gordon can be traced back to a tropical wave that departed the west coast of Africa on 26 August. The wave moved quickly westward across the eastern tropical Atlantic with only an enhancement of deep convection noted within the Intertropical Convergence Zone. Beginning on 30 August there was an increase in cloudiness and showers over the northern Lesser Antilles as the wave approached the eastern Caribbean Sea. By 1 September, the southern portion of the wave continued westward across the Caribbean Sea, while the northern portion of the wave spawned a surface trough that extended from eastern Hispaniola over the adjacent Atlantic waters. Although there was a gradual increase in the associated shower and thunderstorm activity during the next couple of days as the surface trough interacted with an upper-level trough, unfavorable upper-level winds prevented significant development of the system. On 2 September, the upper-level wind pattern gradually became more conducive for development, and deep convection associated with the disturbance began to show signs of organization when the system was located between eastern Cuba and the Central Bahamas. Around that time however, satellite wind data indicated that the system had not yet acquired a closed surface circulation. After the convection briefly waned late on 2 September, a significant increase in convection occurred early the next day, which resulted in the development of a small, but well-defined surface circulation. It is estimated that the system became a tropical depression by 0600 UTC 3 September when it was centered about 80 n mi southeast of Key Largo, Florida. The "best track" chart of the tropical cyclone's path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1[2]. After formation, the depression moved west-northwestward to northwestward around the southwestern portion of a strong subtropical ridge that was centered near the U.S. Mid-Atlantic Coast.

Deep convection continued to organize, and the depression strengthened into a tropical storm just 3 h after formation, while it moved west-northwestward to northwestward around the aforementioned subtropical ridge. Gordon continued to quickly strengthen during the next couple of hours and it made landfall around 1115 UTC 3 September near Tavernier in the Florida Keys with an estimated intensity of 45 kt. After crossing Florida Bay, Gordon made a second landfall near Flamingo on the southern tip of the Florida peninsula around 1315 UTC that day. The center of Gordon emerged over the extreme eastern Gulf of Mexico an hour or so later, and the convective structure of the tropical storm continued to improve. Gordon strengthened into a 50-kt tropical storm as an eye-like feature became apparent in National Weather Service (NWS) Doppler radar imagery shortly before 1800 UTC 3 September when it

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

was centered just off the coast of Marco Island, Florida (Fig. 4). The small eye-like feature only persisted for an hour or two, but the tropical storm still slowly strengthened while it moved west-northwestward to northwestward over the eastern Gulf of Mexico.

Gordon reached its peak intensity of 60 kt at 1800 UTC the next day while centered over the north-central Gulf of Mexico about 115 n mi south-southeast of Pascagoula, Mississippi. The tropical storm turned northwestward, and although the convective structure improved somewhat in the few hours before the center reached the coast, surface and radar data indicate that Gordon remained a 60-kt tropical storm when it made landfall between the Alabama/Mississippi border and Pascagoula around 0315 UTC 5 September (cover photo). After landfall, Gordon quickly weakened and became a tropical depression by 1200 UTC when it was located about 30 n mi southeast of Jackson, Mississippi. The depression slowed down but continued on a northwestward heading while it moved over southeastern Arkansas shortly after 0000 UTC 6 September. Gordon continued to weaken while moving farther inland, and it became a remnant low by 1800 UTC that day near Pine Bluff, Arkansas. The remnant low moved slowly north-northwestward, then northward on 7 September before it degenerated into a trough of low pressure over north-central Arkansas by 0000 UTC 8 September. The remnants of Gordon merged with a developing extratropical low later on 8 September, and the new low moved slowly east-northeastward across western Kentucky and the Ohio Valley, where it produced flooding rains over the next few days before it dissipated.

METEOROLOGICAL STATISTICS

Observations in Gordon (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. 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 Gordon.

Aircraft observations include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from three flights of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command and three flights of the NOAA WD-P3 aircraft. A total of 24 center fixes were provided by reconnaissance aircraft during Gordon's lifecycle, including seven from the NOAA aircraft in the 4 h before Gordon's final landfall along the northern Gulf coast. NWS WSR-88D Doppler Radar data from Miami, Florida; Key West, Florida; Tampa, Florida; and Mobile, Alabama were used to make center fixes and obtain velocity data while Gordon was near the U.S. Coast.

Selected surface observations from land stations and data buoys are given in Table 2.

Winds and Pressure

Gordon's estimated peak intensity of 60 kt from 1800 UTC 4 September through landfall at 0315 UTC 5 September is primarily based on a peak 700-mb flight-level wind of 63 kt recorded at 0103 UTC 5 September from a NOAA Hurricane Hunter aircraft. There were also several believable SFMR winds of 53–56 kt reported by the aircraft earlier on 4 September. The NWS WSR-88D radar from Mobile, Alabama, also measured winds of around 75 kt at about 2500 ft around the time of landfall, which equates to a surface wind estimate of 55–60 kt after applying a standard wind reduction.

The strongest winds reported over land during Gordon's landfall along the northern Gulf coast were at Fort Morgan, Alabama, where a National Ocean Service (NOS) observing station reported sustained winds of 60 kt at a 38-m elevation at 0218 UTC 5 September (Table 2). The site also recorded a peak wind gust of 69 kt. Reducing the sustained winds to a standard 10-m observing height yields an estimated surface wind of 52 kt. A 10–minute sustained wind of 54 kt was also reported at Dauphin Island Coastal Marine Observing (C-MAN) site at an elevation of 13.5 m (Table 2). Adjusting this observation to a 1–minute surface (10 m) wind yields 58 kt, which also supports the estimated 60-kt peak intensity of Gordon (Fig. 2). A wind gust to 64 kt was observed at the Dauphin Island CMAN site. A wind gust to 60 kt was reported at the Katrina Cut C-MAN site. Wind gusts to 50 and 49 kt were also measured at the Mobile Regional Airport and the Pascagoula Airport, respectively.

Although Gordon was not operationally assessed to have become a tropical storm until around 1200 UTC 3 September when it was moving across Florida Bay, the ship *Polar Costa Rica* (call sign 9V9325) reported 35-kt winds at 1000 UTC and 40-kt winds at 1200 UTC to the northeast of the center of the tropical cyclone. Based on these data and the rapid improvement of Gordon's organization that day, the best track indicates that Gordon became a tropical storm by 0900 UTC 3 September and reached an intensity of 45 kt by the time the center made landfall in the Florida Keys. The 45-kt intensity at landfall near Tavernier is based on a sustained wind of 49 kt at a 14.5–m elevation from a WeatherFlow observing site. This observation reduces to an estimated surface (10-m) wind speed of 47 kt. Tropical-storm-force wind gusts were recorded at many observing sites across southeastern Florida. An elevated observing site at Port Everglades near Fort Lauderdale measured a wind gust to 49 kt. Wind gusts to 44 kt were reported at both the Opa Locka and Fort Lauderdale airports.

Gordon's estimated minimum pressure of 996 mb at landfall along the north-central Gulf of Mexico coast is supported by a dropwindsonde that reported a surface pressure of 998 mb with 10 kt of wind around 0219 UTC, and an extrapolated pressure of 996 mb that was recorded during the final aircraft center fix at 0313 UTC. There were no dropwindsonde data available from the final aircraft fix.

Storm Surge[3]

The highest measured storm surge from Gordon was 3.66 ft above normal tide levels at an NOS gauge at Coast Guard Sector Mobile in Mobile Bay, Alabama. The combined effect of the surge and tide produced inundation levels of 1 to 3 ft above ground level along the Gulf Coast from the Tampa Bay area to southeastern Louisiana, with the highest water levels occurring along Mobile Bay. The NOS gauge at Coast Guard Sector Mobile recorded a maximum water level of 3.0 ft above Mean Higher High Water (MHHW), and other NOS gauges within Mobile Bay (including Weeks Bay, Dog River Bridge, and Mobile State Docks) all recorded maximum water levels of 2.5 to 2.6 ft above MHHW. Figure 5 shows storm tide observations above MHHW from NOS gauges, which provide rough approximations of inundation above normally dry ground at those locations.

Outside of Alabama, the maximum water levels measured by tide gauges in adjacent states were 2.2 ft above MHHW at Pensacola, Florida; 2.1 ft above MHHW at the Pascagoula NOAA Lab, Mississippi; and 2.6 ft above MHHW at the I-10 Bonnet Carre Floodway, Louisiana (Table 2).

Rainfall and Flooding

Gordon produced a swath of heavy rainfall along and to the right of its path across southern Florida, and over portions of the western Florida panhandle, southwestern Alabama, and eastern Mississippi (Fig. 6). An area of 4 to 6 inches of rainfall occurred over the southern portion of the Florida peninsula and the Upper Keys on 3 September, with a maximum storm total of 6.98 inches near Homestead. A narrow area of 6 to 12 inches of rainfall occurred from the western Florida panhandle through west-central Alabama where the tropical storm made its final landfall along the north-central Gulf coast. Within this area, a maximum storm total of 12.73 inches was recorded at an observing site near Pensacola, Florida (Table 2). The highest rainfall amount measured in Alabama was 9.59 inches near Fairhope, and 10.15 inches was recorded near Brandon, Mississippi, which was that state's maximum total. A gauge near Pine Bluff, Arkansas, recorded 8.78 inches, which was the highest rainfall total recorded in Arkansas.

The remnants of Gordon combined with an extratropical low to produce a swath of 4 to 8 inches of rain that extended from extreme eastern Missouri east-northeastward across southern Illinois, southern Indiana, and portions of Ohio, West Virginia, and Pennsylvania. Peak rainfall totals in these areas are also provided in Table 2.

---

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

Tornadoes

There was one tornado reported in association with Gordon when it was a tropical cyclone. This EF-0 tornado occurred during the afternoon of 5 September in a wooded area near the town of Kilmichael in north-central Mississippi. There were 6 tornadoes reported in association with the remnants of Gordon in northwestern Kentucky and extreme southern Indiana during the afternoon of 8 September. Tornadoes occurred near the Kentucky towns of Lewisport, Stanley, Sorgho, and Maceo, and near the Indiana towns of Tell City and Newtonville. The tornadoes near Stanley and Maceo were rated as EF-1, while the remainder of the tornadoes were EF-0.

CASUALTY AND DAMAGE STATISTICS

According to media reports, Gordon was responsible for one direct death[4] while it was a tropical cyclone. A 2-year-old girl perished when strong winds caused a tree to fall on a mobile home that she was in near Pensacola, Florida. Heavy rainfall in Missouri and Kentucky produced by an extratropical low that included the remnant moisture from Gordon caused flash flooding that was responsible for three deaths. A 40-year-old man drowned when his vehicle stalled in flood waters beneath a railroad overpass in Louisville, Kentucky, and a 9-year-old boy drowned after he was swept away by floodwaters in Morehead, Kentucky. In Greene County, Missouri, a Sheriff's deputy died after his patrol car was washed off a road into a nearby river.

Gordon produced moderate damage across portions of the northern Gulf coast. In Alabama, some homes on Dauphin Island experienced roof and siding damage. In Pensacola, Florida, a pier sustained minor damage, and numerous trees were downed across portions of southern Mississippi, Alabama, and the western Florida panhandle. Some of these falling trees caused damage to homes and other property. Beach erosion was reported in the Fort Pickens area in Escambia County, Florida. At one point 27,000 customers were without power, mainly in southern Alabama and the western portion of the Florida Panhandle. Flooding from heavy rainfall resulted in two high-water rescues in a neighborhood in the town of Cantonment, Florida. In South Florida and the Keys, only minor damage was reported. There were a few downed power lines in Broward and Miami-Dade counties, which resulted in the loss of power to about 8,000 customers in those counties.

There were no reports of damage associated with the tornado that occurred while Gordon was a tropical cyclone. However, there was damage associated with the tornadoes that occurred in Kentucky and in Indiana in association with the remnants of the tropical cyclone. The two EF-1 tornadoes both caused roof and tree damage, including roofs that were torn off a few homes and a home that experienced a wall collapse in the Stanley, Kentucky, tornado.

---

[4] 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.

Gordon's remnants also produced flash flooding in parts of Missouri and Kentucky, with low-lying roads reported underwater in portions of those areas. There were some water rescues in Kentucky due to vehicles that became stranded in floodwaters. Minor flooding was also reported in portions of Arkansas, Ohio, Indiana, Illinois, and Pennsylvania.

Preliminary monetary damage associated with Gordon is estimated by NOAA to be 200 to 250 million dollars.

FORECAST AND WARNING CRITIQUE

Genesis

The genesis of Gordon was not well anticipated. The disturbance from which Gordon developed was introduced into the Tropical Weather Outlook at 1800 UTC 30 August (84 h prior to genesis) with a low chance (<40%) of formation during the next 5 days (Table 3). The 5-day formation chance was raised to the medium category (40–60%) 42 h before genesis, and to the high category only 18 h before formation occurred. The 2-day probabilities of formation also did not adequately anticipate Gordon's development. The system did not reach the medium or high categories of development in the 2-day probabilities until 18 and 12 h before formation, respectively. Although the global models suggested that the wave would amplify while it moved over the eastern Gulf of Mexico, they generally did not forecast genesis until a day or so before it occurred. The global model ensemble guidance did indicate that there was some possibility of development, however, the overall confidence was low due to the lack of significant support from the deterministic runs. This led to the fairly low probabilities of development before Gordon formed. NHC did issue Potential Tropical Cyclone advisories beginning at 2100 UTC 2 September in order to issue a tropical storm watch for a portion of the northern Gulf Coast (additional details below).

Track

A verification of NHC official track forecasts for Gordon is given in Table 4a. Official track forecast errors were lower than the mean official errors for the previous 5-yr period. In fact, the NHC mean track errors were up to 50 percent lower than the long-term average errors, with the lowest mean errors compared to the 5-yr mean at 24 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 4b. The FSSE, GFEX, and TVCA consensus aids had lower mean errors than the official forecast at most verifying lead times, but the number of forecasts is too small to draw meaningful conclusions. Although the NHC forecasts for Gordon had lower mean errors than the long-term mean, these forecasts exhibited a left-of-track bias. The first two NHC forecasts that were issued before Gordon became a tropical cyclone (issued as Potential Tropical Cyclone Advisories) predicted a landfall in southeastern Louisiana (Fig. 7). Subsequent forecasts shifted eastward, with most of the forecasts indicating that landfall would likely occur along the central or western Mississippi coast whereas the actual landfall occurred farther east, closer to the Alabama/Mississippi border (Fig. 7).

Intensity

A verification of NHC official intensity forecasts for Gordon is given in Table 5a. Official intensity forecast errors were generally comparable to the mean official errors for the previous 5-yr period, except at 48 h where it was lower than the long-term mean. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 5b. The dynamical model HMON (HMNI) had lower errors than the NHC forecast at 36 h and beyond, and the consensus aids HCCA, FSSE, ICON, ICVN, and IVDR exhibited lower errors than the official forecasts at most lead times through 48 h. The possibility of Gordon becoming a hurricane was mentioned in NHC products issued with the 1500 UTC 3 September advisory, and Gordon was explicitly forecast to become a 65-kt hurricane in several subsequent advisories.

Watches and Warnings

Potential Tropical Cyclone advisories were issued for the disturbance that became Gordon at 2100 UTC 2 September, in order to issue a tropical storm watch for a portion of the north-central Gulf of Mexico coastline (Table 6). It was incorrectly anticipated that Gordon would not become a tropical storm until after passing southeastern Florida, and no tropical storm watches or warnings were issued for that area until development occurred on the morning of 3 September. The watch along the northern Gulf coast was issued a little more than 48 h before the arrival of tropical-storm-force winds along that section of coastline. A tropical storm warning was issued with a little more than 36 h of lead time. NHC forecasts began mentioning the possibility that Gordon could become a hurricane before landfall along the northern Gulf coast at 1500 UTC 3 September, and a hurricane watch was issued at that time. A hurricane warning was issued for a portion of the north-central Gulf coast 6 h later, but this warning did not verify as sustained hurricane-force winds did not occur.

At various points in time, storm surge warnings were issued for portions of the coasts of Alabama, Mississippi, and Louisiana from Dauphin Island, Alabama, to Shell Beach, Louisiana. Storm surge watches were issued south of Shell Beach to the mouth of the Mississippi River and east of Dauphin Island to Navarre, Florida, including Mobile Bay (Table 7). The initial storm surge watch from the Mississippi-Alabama border to the mouth of the Mississippi River was issued at 0300 UTC 3 September, before Gordon became a tropical cyclone. The initial storm surge warning was issued from the Mississippi-Alabama border to Shell Beach at 1500 UTC 3 September. Water level observations indicate that up to 3 ft of inundation (which NHC uses as a first-cut threshold for the storm surge watch/warning) occurred within Mobile Bay, which was within the bounds of the storm surge watch area (Fig. 5). Inundation levels did not reach 3 ft within the storm surge warning area, thus the warning did not verify.

NHC's first forecast for maximum storm surge heights (at 0300 UTC 3 September) was 2 to 4 ft above ground level within the storm surge watch area, and that forecast was raised to 3 to 5 ft above ground level within the storm surge warning area at 1500 UTC 3 September. These forecasts were too high which was primarily the result of the NHC intensity forecasts that predicted Gordon would become a hurricane before landfall.

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

The NHC began providing direct support to emergency managers on 3 September when Gordon was a potential tropical cyclone and continued through 5 September, when Gordon was a tropical depression inland over Mississippi. These impact-based decision support services (IDSS) included calls and briefings coordinated through the FEMA Hurricane Liaison Team, embedded at the NHC. The briefings included the states of Florida, Alabama, and Mississippi; FEMA Headquarters; FEMA Regions 4 and 6; as well as other federal/state teleconferences. In addition, the NHC director maintained direct communications with senior state emergency management officials to discuss the evolving threat to the Gulf Coast. NHC's Tropical Analysis and Forecast Branch provided briefings to officials at United States Coast Guard Districts 7 and 8.

An NHC media pool was in operation from 4 September until shortly after landfall. More than two dozen live briefings to national and local television outlets were performed, including about a half-dozen Spanish language interviews. NHC also conducted eight Facebook Live broadcasts as each new advisory was issued on 3–4 September (Fig. 8). These Facebook Live broadcasts received more than 300,000 views. Approximately 2.6 million users accessed the NHC website between 2 September and 5 September. Products specific to Gordon were viewed 6.4 million times during the four days that NHC issued advisories on the system, with a majority of the views going to graphical products such as the cone graphic, the wind speed probabilities, and the key messages.

ACKNOWLEDGMENTS

Data in Table 2 were compiled from Post Tropical Cyclone (PSH) Reports issued by the NWS Weather Forecast Offices (WFOs) in Key West, Miami, Mobile, and New Orleans. Additional data were used from reports sent by the National Data Buoy Center and the NOS Center for Oceanographic Products and Services. Reports from NWS WFOs in Paducah and Louisville, Kentucky, provided information on inland flooding and tornadoes produced by Gordon's remnants. Roger Edwards of the NOAA Storm Prediction Center also provided information on tornadoes, and David Roth of the NOAA Weather Prediction Center provided rainfall reports and analysis. Laura Alaka of the NHC Storm Surge Unit created the storm surge figure and Stacy Stewart assisted with radar and surface data analysis.

Table 1. Best track for Tropical Storm Gordon, 3–6 September 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
02 / 1800	22.4	77.0	1012	25	disturbance
03 / 0000	23.3	78.2	1011	25	"
03 / 0600	24.2	79.4	1009	30	tropical depression
03 / 0900	24.6	80.0	1008	35	tropical storm
03 / 1115	25.0	80.5	1006	45	"
03 / 1200	25.1	80.7	1006	45	"
03 / 1315	25.2	80.9	1006	45	"
03 / 1800	25.8	81.9	1004	50	"
04 / 0000	26.6	83.3	1003	55	"
04 / 0600	27.2	84.9	1002	55	"
04 / 1200	28.1	86.2	1001	55	"
04 / 1800	28.9	87.2	1000	60	"
05 / 0000	29.8	88.0	999	60	"
05 / 0315	30.4	88.5	996	60	"
05 / 0600	30.9	88.9	1002	45	"
05 / 1200	31.9	89.8	1007	30	tropical depression
05 / 1800	32.5	90.4	1012	25	"
06 / 0000	33.0	90.9	1013	20	"
06 / 0600	33.5	91.4	1014	20	"
06 / 1200	33.9	91.7	1014	15	"
06 / 1800	34.2	91.9	1014	15	low
07 / 0000	34.4	92.0	1014	15	"
07 / 0600	34.6	92.1	1014	15	"
07 / 1200	35.0	92.2	1014	15	"
07 / 1800	35.5	92.3	1014	15	"
08 / 0000					dissipated
05 / 0315	30.4	88.5	996	60	minimum pressure and maximum wind

03 / 1115	25.0	80.5	1006	45	landfall near Tavernier in the Florida Keys
03 / 1315	25.2	80.9	1006	45	landfall near Flamingo at the southern tip of the Florida peninsula
05 / 0315	30.4	88.5	996	60	landfall just west of the Alabama/Mississippi border

Table 2. Selected surface observations for Tropical Storm Gordon and its remnants, 3–6 September 2018.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Florida									
International Civil Aviation Organization (ICAO) Sites									
Albert Whitted AP (KSPG) (27.77N 82.63W)	03/1727	1015.6	03/1715	33 (10 m, 2 min)	43				
Ft. Lauderdale Executive AP (KFXE) (26.20N 80.17W)	03/0953	1014.9	03/1231	31 (10 m, 2 min)	39				
Ft. Lauderdale Intl AP (KFLL) (26.07N 80.15W)	03/0953	1013.9	03/0359	36 (10 m, 2 min)	44				
Hollywood North Perry AP (KHWO) (26.00N 80.24W)	03/0922	1013.8	03/1218	34 (10 m, 2 min)	43				
Homestead Air Reserve (KHST) (25.48N 80.38W)	03/1156	1013.2	03/1156	23 (10 m, 2 min)	36				
Key West Intl AP (KEYW) (24.56N 81.76W)	03/0853	1013.0	03/2310	25 (10 m, 2 min)	38				
Miami Intl AP (KMIA) (25.80N 80.29W)	03/0953	1013.8	03/1556	26 (10 m, 2 min)	37				
Naples Municipal AP (KAPF) (26.15N 81.77W)	03/1915	1012.2	03/1856	23 (10 m, 2 min)	35				
Naval Air Station Key West (KNQX) (24.58N 81.68W)	03/0853	1012.9	04/0138	31 (10 m, 2 min)	39				
Opa Locka Airport (KOPF) (25.91N 80.28W)	03/0920	1013.2	03/1213	34 (10 m, 2 min)	44				
Pensacola Regional (KPNS) (30.47N 87.20W)	05/0053	1013.7	05/0312	30 (10 m, 2 min)	45				12.13

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Pensacola NAS (KNPA) (30.36N 87.32W)	05/0002	1012.1	05/0244	34 (10 m, 2 min)	53				
Pompano Beach Air Park (KPMP) (26.25N 80.12W)	03/1015	1015.0	03/1455	23 (10 m, 2 min)	43				
Sarasota-Bradenton Intl AP (KSRQ) (27.40N 82.56W)	03/2025	1012.9	03/1753	28 (10 m, 2 min)	39				
Tamiami/West Kendall AP (KTMB) (25.65N 80.43W)	03/0954	1013.2	03/1331	28 (10 m, 2 min)	37				4.89
West Palm Beach Intl AP (KPBI) (26.68N 80.09W)	03/0853	1015.3	03/1432	28 (10 m, 2 min)	37				
Whiting Field (KNSE) (30.72N 87.02W)									4.88
Non-METAR Sites									
Bal Harbour (MDFR4) (25.90N 80.12W)			03/1240	30 (2 min)	49				
BSO Port Everglades (26.08N 80.11W)			03/1355	32 (2 min)	41				
Coral Gables (MAMIA) (25.72N 80.24W)			03/1549	25 (2 min)	36				
Downtown Miami (PPFMS) (25.75N 80.21W)			03/1230		36 (17 m)				
Hollywood (MCNICOL) (26.00N 80.16W)			03/1210		41				
Isles of Capri (NPLCP) (25.98N 81.73W)			03/2045	24 (2 min)	37				
Kendall (MDFR6) (25.71N 80.33W)			03/1629	15 (2 min)	36				
Lauderdale By The Sea (PMPSC) (26.21N 80.10W)			03/1226		35				
Lauderhill (FRBCS) (26.12N 80.18W)			03/1224	25 (2 min)	43				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Long Pine Key (LPIF1) (25.39N 80.68W)			03/1223	20 (6 m, 10 min)	40				
Marco Island (MRCSC) (25.92N 81.73W)			03/1808		42				
Miami Beach (MCMBP) (25.78N 80.13W)			03/1154	30 (18 m, 2 min)	37				
Miramar (XFLM) (25.96N 80.31W)			03/1317	19 (15 m, 5 min)	36				
Miramar High School (XFLM) (25.97N 80.26W)			03/1315	23 (2 min)	37				
Naples AP (NPLMP) (26.15N 81.77W)			03/1944		40				
Ocean Reef Club (25.32N 80.28W)			03/1332	23	35				4.80
Perrine (MMRMS) (25.59N 80.39W)			03/1139	26 (2 min)	35				
Pompano Beach (PMPHS) (26.42N 80.09W)			03/0902		34				
South Key Largo (KSKL) (25.10N 80.43W)			03/1757	20 (18.3 m)	34				
Sunrise (FTDST) (26.16N 80.25W)			03/1225	28 (2 min)	34				
Vanderbilt Beach (KBNPS) (26.30N 81.82W)			03/1959		39				
Weston (WSTNN) (26.07N 80.39W)			03/1245	24 (2 min)	39				
West Homestead (DO479) (25.47N 80.52W)			03/1249	16	35				
Coastal-Marine Automated Network (C-MAN) and National Ocean Service (NOS) Sites									

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Apalachicola (APCF1) (29.73N 84.98W)						2.19	2.97	2.1	
Cedar Key (CKYF1) (29.13N 83.03W)	02/0000	1016.2	03/1842	32	37	1.73	2.44	0.9	
Clearwater Beach (CWBF1) (27.98N 82.83W)	03/2112	1016.1	02/1942	22	35	1.19	2.02	1.0	
Fort Myers (FMRF1) (26.65N 81.87W)						0.95	1.22	0.9	
Fowey Rocks Light (FWYF1) (25.59N 80.10W)	03/0900	1013.9	03/1150	42 (44 m, 10 min)	54				
Key West (KYWF1) (24.56N 81.81W)						0.65	0.81	0.8	
Lake Worth (LKWF1) (26.61N 80.03W)	03/0836	1016.2	03/1624	32 (6 m, 2 min)	41	0.79	1.27	0.7	
McKay Bay Entrance (MCYF1) (27.91N 82.43W)						0.92	2.10	1.1	
Middle Tampa Bay (MTBF1) (27.66N 82.60W)	03/2054	1015.7	04/1806	32	37				
Naples, Gulf of Mexico (NPSF1) (26.13N 81.81W)						1.10	1.45	0.8	
Panama City (PACF1) (30.15N 85.67W)						1.57	2.19	1.4	
Panama City Beach (PCBF1) (30.21N 85.88W)	04/2136	1016.4	MM	25	36				
Pensacola (PCLF1) (30.40N 87.21W)	05/1324	1012.6	04/2318	22	47	2.53	3.17	2.2	
Port Everglades Channel (PVGF1) (26.09N 80.11W)	03/0924	1014.0	03/1218	25 (4 m, 2 min)	38				
Port Manatee (PMAF1) (27.64N 82.56W)						0.77	1.62	1.0	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Saint Petersburg, Tampa Bay (SAPF1) (27.76N 82.63W)						0.84	1.87	1.1	
South Port Everglades (PEGF1) (26.08N 80.12W)	03/0912	1013.9	03/1212	42 (30 m, 2 min)	49	0.87	1.26	0.7	
Vaca Key (VCAF1) (24.71N 81.11W)						0.83	0.58	0.9	
Venice, FL (VENF1) (27.07N 82.45W)			03/2040	22 (12 m, 10 min)	37				
Virginia Key (VAKF1) (25.73N 80.16W)	03/0930	1013.0	03/1154	28 (10 m, 2 min)	35	1.26	1.06	0.9	
Weatherflow Sites									
Alligator Reef Light (XALG) (24.85N 80.62W)	03/1712	1009.1	03/1907	28 (7.5 m)	34				
Biscayne Bay Light (XKBS) (25.65N 80.19W)	03/1139	1012.0	03/1149	36 (6 m, 5 min)	48				
Carysfort Reef Light (XCFL) (25.23N 80.21W)	03/1110	1009.0	03/1120	49 (14.5 m)	56				
Crandon Park Beach (XCRN) (25.71N 80.15W)	03/0845	1013.0	03/1155	25 (8 m, 5 min)	34				
Dania Beach Pier (XDAN) (26.05N 80.11W)	03/0916	1013.0	03/1351	32 (9 m, 5 min)	44				
Dinner Key Light (XDIN) (25.71N 80.21W)	03/0941	1012.0	03/1151	31 (5 m, 5 min)	41				
Dodge Island Harbor Pilot (XDGE) (25.76N 80.14W)			03/1225	27 (12 m, 5 min)	40				
Government Cut (XGVT) (25.74N 80.10W)			03/1221	37 (23 m, 5 min)	55				
Gulf Breeze (XGBZ) (30.36N 87.16W)	04/2305	1010.4	05/0030	26 (15 m, 5 min)	46				
Juno Beach Pier (XJUP) (26.89N 80.06W)			03/1504	31 (6 m, 5 min)	38				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Morningside Park Miami (XMSP) (25.82N 80.18W)			03/1234	30 (10 m, 5 min)	38				
Okaloosa Pier (XOFP) (30.39N 86.59W)	04/2310	1012.8	05/0350	31 (14 m, 5 min)	38				
Palmetto Bay (XSOM) (25.63N 80.29W)			03/1215	27 (10 m, 5 min)	37				
Pensacola Bay (XFLP) (30.36N 87.21W)	04/2312	1010.4	05/0237	33 (5 m, 5 min)	53				
Port Everglades (XPEG) (26.08N 80.11W)			03/1215	39 (41 m, 5 min)	47				
Port Everglades South (XPES) (26.06N 80.13W)			03/1222	(10 m)	39				
Turkey Point (XTKY) (25.43N 80.34W)			03/1330	33 (20 m, 5 min)	42				
CoCoRaHS Sites									
5.5 NNW Pensacola (FL-ES-51) (30.51N 87.24W)									12.73
7 ENE Gulf Breeze (FL-SR-19) (30.35N 87.20W)									12.45
7 WNW Pensacola (FL-ES-45) (30.53N 87.24W)									12.12
2 WSW Ferry Pass (FL-ES-51) (30.51N 87.24W)									12.00
1 ESE Beulah (FL-ES-35) (30.53N 87.39W)									11.92
2.5 NNW Gonzalez (FL-ES-4) (30.53N 87.31W)									11.26
3.8 ENE Pensacola Beach (FL-ES-49) (30.34N 87.08W)									10.88
2 E Gonzalez (FL-ES-15) (30.57N 87.25W)									10.85

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
2.4 SW Pensacola (FL-ES-48) (30.42N 87.22W)									10.45
2 SW Pensacola (FL-ES-15) (30.39N 87.22W)									10.45
1.9 NE Pensacola (FL-ES-26) (30.47N 87.17W)									9.35
0.8 WSW Milton (FL-SR-22) (30.61N 87.04W)									9.29
9.2 NW Pensacola (FL-ES-38) (30.61N 87.04W)									9.29
18.9 WSW Pensacola (FL-ES-24) (30.31N 87.47W)									7.46
12.5 SW Pensacola (FL-ES-41) (30.33N 87.35W)									7.25
3 NW Homestead (FL-MD-69) (25.49N 80.49W)									6.98
1.5 SSW Cutler Ridge (FL-MD-51) (25.56N 80.35W)									6.78
2.1 WNW Navarre (FL-SR-12) (30.42N 86.90W)									6.53
12 W Century (FL-ES-39) (30.97N 87.46W)									6.34
2 S Cutler Ridge (FL-MD-51) (25.56N 80.35W)									6.33
2 NNE Country Walk (FL-MD-3) (25.66N 80.41W)									6.30
2 E Goulds (FL-MD-49) (25.56N 80.36W)									6.03
2 SSW Westwood Lakes (FL-MD-7) (25.68N 80.38W)									5.86

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
2 NNE Country Walk (FL-MD-41) (25.66N 80.41W)									5.53
1 SE South Miami (FL-MD-42) (25.69N 80.29W)									5.40
1 SE Howard (FL-MD-67) (25.62N 80.33W)									5.09
4.5 NE Key Largo (FL-MN-35) (25.15N 80.39W)									5.03
5.3 NW DeFuniak Springs (FL-WT-13) (30.78N 86.18W)									4.83
0.8 W Sun Valley (FL-PB-7) (26.52N 80.15W)									4.69
17.9 NE Key Largo (FL-MN-37) (25.32N 80.28W)									4.39
1 SW Inlikita (FL-MD-59) (25.58N 80.49W)									4.38
1.4 NW Eastpoint (FL-FR-3) (29.76N 84.89W)									4.34
6.2 E Navarre (FL-SR-21) (30.41N 86.81W)									4.08
NWS Cooperative Observer Program (COOP) Sites									
Homestead General Aviation (HAPF1) (25.50N 80.55W)									5.86
5 WSW Perrine (PRRF1) (25.58N 80.44W)									5.64
2 SSE Redland (STDF1) (25.49N 80.50W)									5.54
5 SW Florida City (EVGF1) (25.40N 80.56W)									5.33
5 E Leisure City (BHMF1) (25.48N 80.35W)									5.16

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
University Park (NWS-MFL) (25.75N 80.38W)									5.10
3 SSE Cutler Ridge (BCPF1) (25.54N 80.33W)									4.75
Princeton (PRNF1) (25.54N 80.41W)									4.68
7 W Sweetwater (TTRF1) (25.77N 80.48W)									4.68
7 ESE Milton (MLYF1) (30.57N 86.92W)									4.14
Other Sites									
1 SE McIntosh (31.25N 88.02W)									7.84
Leisure City (25.50N 80.42W)									6.86
2 E Cutler Ridge (25.60N 80.33W)									6.65
4 W FIU S Campus (25.76N 80.44W)									6.38
3 N Metro Zoo (25.67N 80.39W)									6.37
2 WNW Florida City (D0479) (25.46N 80.52W)									6.08
1 S Country Walk (25.61N 80.43W)									5.94
3 S Princeton (25.48N 80.38W)									5.90
2 NNE Kendale Lakes (25.73N 80.41W)									5.86
2 N University of Miami (25.74N 80.29W)									5.60
4 W Kendall (25.68N 80.38W)									5.58
1 N Princeton (25.55N 80.39W)									5.38
2 NE Metro Zoo (25.64N 80.37W)									4.98
Zoo Miami (25.61N 80.40W)									4.95

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
2 NE Coral Gables (25.75N 80.25W)									4.65
2 NNW Country Walk (C4495) (25.66N 80.44W)									4.61
1 E University of Miami (25.71N 80.28W)									4.51
1 NNW Kendall (C1733) (25.70N 80.33W)									4.46
Walnut Hill (30.88N 87.51W)									4.45
1 E Perrine (25.62N 80.33W)									4.41
Kendall (25.67N 80.32W)									4.30
Alabama									
International Civil Aviation Organization (ICAO) Sites									
Mobile Regional Airport (KMOB) (30.67N 88.24W)	05/0356	1009.6	05/0427	34 (10 m, 2 min)	50				
Gulf Shores (KJKA) (30.29N 87.67W)	05/0035	1011.1	05/0215	28 (10 m, 2 min)	42				4.23
Mobile Brookley (KBFM) (30.64N 88.07W)	05/0353	1010.5	05/0245	31 (10 m, 2 min)	45				
Non-METAR Sites									
Grand Bay (30.51N 88.37W)			05/0414	37 (10 m)	44				
USA Campus (30.69N 88.20W)			05/0309	33 (10 m)	36				
Foley (30.37N 87.65W)			05/0335	26 (10 m)	37				
Coastal-Marine Automated Network (C-MAN) and National Ocean Service (NOS) Sites									
Bayou La Batre Bridge (BLBA1) (30.41N 88.25W)						3.01	3.45	2.5	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Cedar Point (CRTA1) (30.31N 88.14W)	05/0510	1003.7	05/0210		49 (12 m)				
Chickasaw Creek (CIKA1) (30.78N 88.07W)						2.58		2.4	
Dauphin Island (DILA1) (30.25N 88.08W)	05/0224	1004.7	05/0224	51	60	2.87	2.96	2.3	
Dauphin Island, AL (DPIA1) (30.25N 88.08W)	05/0200	1006.4	05/0230	54 (13.5 m, 10 min)	64				
Dog River Bridge (BYSA1) (30.57N 88.09W)						2.08		2.6	
East Fowl River Bridge (EFRA1) (30.44N 88.11W)						2.63	3.24	2.4	
Coast Guard Sector Mobile (MCGA1) (30.65N 88.06W)	05/0412	1010.8	05/0312	31	46	3.66	4.11	3.0	
Fort Morgan (FMOA1) (30.23N 88.03W)	05/0218	1005.7	05/0218	60 (38 m, 2 min)	69				
Katrina Cut (KATA1) (30.25N 88.21W)	05/0306	1000.0	05/0200		60				
Middle Bay (MLBA1) (30.44N 88.01W)			05/1039		39				
Mobile State Docks (OBLA1) (30.71N 88.04W)						2.54	3.75	2.6	
Weeks Bay, Mobile (WBYA1) (30.42N 87.83W)						2.52		2.5	
W Fowl River Bridge (WFRA1) (30.38N 88.16W)						2.35	3.08	2.2	
Weatherflow Sites									
Buccaneer Yacht Club (XBUC) (30.58N 88.07W)	05/0342	1008.1	05/0232	39 (10 m)	50				
Gulf Shores/Foley (XGLF) (30.36N 87.65W)	04/2349	1008.4	05/0324	23	37				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
CoCoRAHS Sites									
2.2 E Fairhope (AL-BW-71) (30.52N 87.85W)									9.59
10.9 N Bay Minnette (AL-BW-59) (31.03N 87.77W)									8.76
6.1 SW Grove Hill (AL-CL-3) (31.64N 87.85W)									8.52
4.2 NE Daphne (AL-BW-36) (30.64N 87.85W)									8.67
0.4 SSW Loxley (AL-BW-26) (30.62N 87.76W)									8.65
4.3 WSW Jackson (AL-WS-1) (30.51N 87.96W)									8.17
1.2 NE Spanish Fort (AL-BW-58) (30.69N 87.87W)									8.14
0.4 SW Daphne (AL-BW-4) (30.62N 87.90W)									8.10
3.7 NNW Fairhope (AL-BW-13) (30.57N 87.90W)									7.87
0.6 ENE Loxley (AL-BW-84) (30.62N 87.74W)									7.60
8.1 W Uriah (AL-MN-3) (31.30N 87.64W)									7.34
3.1 NNW Fairhope (AL-BW-32) (30.56N 87.90W)									7.33
3 WNW Summerdale (AL-BW-85) (31.50N 87.74W)									7.26
1.2 NNW Daphne (AL-BW-3) (30.64N 87.91W)									6.95
2.3 N Fairhope (AL-BW-1) (30.55N 87.89W)									6.90

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
5 WSW Frisco City (AL-MN-6) (31.40N 87.48W)									6.80
4.9 SE Daphne (AL-BW-79) (30.57N 87.84W)									6.67
1.5 NNE Daphne (AL-BW-80) (30.65N 87.89W)									6.62
3.6 WSW Pine Hill (AL-WX-1) (31.96N 87.64W)									6.58
3.1 SSW Elberta (AL-BW-53) (30.37N 87.61W)									6.52
0.8 N Fairhope (AL-BW-83) (30.53N 87.88W)									6.50
1.5 WSW Fairhope (AL-BW-40) (30.51N 87.91W)									6.18
1.5 SSW Daphne (AL-BW-60) (30.61N 87.91W)									6.17
0.5 ESE Foley (AL-BW-9) (30.40N 87.68W)									5.91
2.1 NE Orange Beach (AL-BW-27) (30.32N 87.55W)									5.86
6.3 NW Atmore (AL-ES-3) (31.08N 87.57W)									5.91
0.6 SW Point Clear (AL-BW-86) (30.48N 87.91W)									5.59
7.4 SW Foley (AL-BW-8) (30.34N 87.78W)									5.26
5.1 S Mobile (AL-MB-50) (30.60N 88.10W)									4.82
4.3 WSW Summerdale (AL-BW-20) (30.46N 87.77W)									4.37

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
2 SSW Foley (AL-BW-31) (30.38N 87.70W)									4.30
3.1 N Gulf Shores (AL-BW-66) (31.31N 87.71W)									4.15
NWS Cooperative Observer Program (COOP) Sites									
3W Silverhill (FSHA1) (30.55N 87.80W)									6.97
12N Atmore (ATMA1) (31.17N 87.44W)									6.61
5 NE Robertsdale (30.60N 87.65W)									6.28
1 NE Gainesville (GNSA1) (32.83N 88.13W)									6.19
Other Sites									
Silverhill (30.54N 87.75W)									6.96
Pennington (32.20N 88.06W)									6.50
3 SW Lillian (30.38N 87.47W)									4.67
2 S Thomasville (31.88N 87.74W)									4.25
Mississippi									
International Civil Aviation Organization (ICAO) Sites									
Greenwood/Leflore Airport (KGWO) (33.50N 90.09W)									6.56
Pascagoula Airport (KPQL) (30.46N 88.53W)	04/2206	1000.3	05/0247	33 (10 m, 2 min)	49				
Non-METAR Sites									
Main Pass 140B (KMIS) (29.30N 88.84W)			04/1835	30 (85 m)	35				

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Main Pass 289C (KVKY) (29.25N 88.44W)			04/1835	32 (115 m)	35				
Pascagoula (FCMP T2) (30.34N 88.56W)	05/0346	1002.6	05/0316	38	52				
Coastal-Marine Automated Network (C-MAN), National Estuarian Research Reserve (NERRS) Sites, and National Ocean Service (NOS) Sites									
Bay Waveland Yacht Club (WYCM6) (30.33N 89.33W)	05/0454	1012.1	04/1724	26	34	2.01	2.93	1.9	
Pascagoula NOAA Lab (PNLM6) (30.37N 88.56W)						1.87	2.95	2.1	
Petit Bois Island (PTBM6) (30.21N 88.51W)	05/0254	1002.0	05/0242	51 (4.6 m)	64				
Grand Bay (30.36N 88.42W)	05/0330	1001.0	05/0315	34 (4.5 m)					
Ship Island (GDXM6) (30.23N 88.98W)	05/0259	1009.5	05/0259	27 (12 m)	34				
Weatherflow Sites									
Other Sites									
Greenwood 7 NE (YWGM6) (33.63N 90.10W)									7.00
Coastal-Marine Automated Network (C-MAN) and National Ocean Service (NOS) Sites									
New Canal Station (PNLM6) (30.03N 90.11W)						2.12		2.4	
Shell Beach (PNLM6) (29.87N 89.67W)						2.9	3.14	2.4	
Louisiana									
Coastal-Marine Automated Network (C-MAN) and National Ocean Service (NOS) Sites									

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
I-10 Bonnet Carre Floodway (BCFL1) (30.07N 90.39W)						2.28		2.6	
Grand Isle (GISL1) (29.26N 89.96W)						0.91		1.3	
Pilottown (PILL1) (29.18N 89.26W)						1.18		1.1	
Pilots Station East (PSTL1) (28.93N 89.41W)						1.54		1.9	
Port Fourchon (PTFL1) (29.11N 90.20W)						1.09		1.4	
CoCoRAHS Sites									
8.8 NE Brandon (MS-RN-44) (32.40N 89.94W)									10.15
4.8 WNW Vaiden (MS-CR-1) (33.36N 89.83W)									8.85
3.5 SW Charleston (MS-TL-1) (33.97N 90.01W)									8.50
5.3 S Starkville (MS-OK-6) (33.38N 88.81W)									7.04
4.7 SE Starkville (MS-OK-15) (33.40N 88.77W)									6.81
7.6 NNW Carrollton (MS-CR-4) (33.61N 89.98W)									6.49
13.1 NNW Biloxi (MS-HR-34) (30.57N 89.05W)									6.10
6.3 SSE Starkville (MS-OK-14) (33.37N 88.80W)									5.62
2.5 SSW Grenada (MS-GD-3) (33.74N 89.80W)									5.52
4.3 N West Point (MS-CY-3) (33.67N 88.63W)									5.14

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
1.2 ESE Scooba (MS-KM-7) (32.83N 88.46W)									4.37
0.4 ENE Starkville (MS-OK-28) (33.46N 88.82W)									4.34
2.6 NNE Brandon (MS-RN-1) (32.31N 89.98W)									4.25
7.9 NNW Grenada (MS-GD-9) (33.89N 89.84W)									4.20
5.3 N Columbus (MS-LW-2) (33.58N 88.40W)									4.18
9 N Brandon (MS-RN-28) (32.40N 89.97W)									4.07
2.9 SW Meridian (MS-LD-9) (32.35N 88.75W)									4.05
Arkansas									
International Civil Aviation Organization (ICAO) Sites									
Pine Bluff/ Grider Field (KPBF) (34.18N 91.93W)									5.43
CoCoRAHS Sites									
2.0 SW Pine Bluff (AR-JF-4) (34.19N 92.04W)									8.78
4.3 SW Star City (AR-LN-4) (33.89N 91.89W)									4.97
7.9 E Pine Bluff (AR-JF-10) (34.21N 91.88W)									4.75
Illinois									
CoCoRAHS Sites									
1.4 W Lawrenceville (IL-LW-3) (33.89N 91.89W)									8.31

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
1.7 NNE Belle Rive (IL-JF-9) (38.26N 88.73W)									7.80
Other Sites									
Venedy (VDYI2) (38.47N 89.62W)									8.84
Red Bud (REDI2) (38.16N 89.93W)									8.26
Casey Fork Near Mt. Vernon (CFMI2) (38.29N 88.87W)									7.80
Indiana									
CoCoRAHS Sites									
0.4 SSW Huntingburg (IN-DB-1) (38.29N 86.96W)									9.51
7.9 SSW English (IN-CW-9) (38.23N 86.53W)									7.81
4.0 E Shoals (IN-MT-3) (38.66N 86.72W)									7.20
2.2 N Oolitic (IN-LW-22) (38.92N 86.53W)									7.07
Other Sites									
2 NW Leavenworth (LVWI2) (38.22N 86.37W)									7.41
Kentucky									
CoCoRAHS Sites									
2 ENE Independence (KY-KN-11) (38.96N 84.51W)									7.60
2.4 W Mt. Sterling (KY-MM-3) (38.07N 83.99W)									7.54

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
1.3 SSW Cold Spring (KY-CB-7) (39.01N 84.45W)									7.54
7.6 NNW Carlisle (KY-NC-1) (38.42N 84.07W)									7.37
4.2 NNW Bedford (KY-TB-1) (38.65N 85.36W)									7.02
3.0 W Independence (KY-KN-16) (38.96N 84.60W)									6.92
6.4 SE Winchester (KY-CK-3) (37.94N 84.10W)									6.80
0.4 ESE Isonville (KY-EL-3) (38.06N 83.05W)									6.73
2.5 NW Walton (KY-BN-13) (38.90N 84.64W)									6.68
2.4 SW Covington (KY-KN-12) (39.06N 84.55W)									6.34
5.2 NW California (KY-CB-4) (38.97N 84.34W)									6.30
2.8 E Lewisport (KY-HN-1) (37.93N 86.85W)									6.22
6.8 SSE Maysville (KY-MS-2) (38.53N 83.75W)									6.00
Missouri									
CoCoRAHS Sites									
7.7 SE St. James (MO-CF-8) (37.92N 91.52W)									6.05
Other Sites									
2 NW Festus (FESM7) (38.25N 90.42W)									6.20

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
3 S Menfro (RRLM7) (37.73N 89.65W)									6.19
Ohio									
CoCoRAHS Sites									
1.5 SE Covedale (OH-HM-17) (39.11N 84.62W)									9.79
0.6 ESE Brookville (OH-MY-19) (39.83N 84.41W)									7.16
2.0 WNW Steubenville (OH-JF-6) (40.38N 80.68W)									6.73
3.3 NE Batavia (OH-CM-14) (39.11N 84.15W)									6.38
0.9 ENE Lucasville (OH-SC-8) (38.88N 82.98W)									6.36
Pennsylvania									
CoCoRAHS Sites									
1.0 NNE Altoona (PA-BL-10) (40.52N 78.39W)									10.47
0.1 S Wood (PA-HN-2) (40.17N 78.14W)									8.67
1.4 SW Bridgeville (PA-AL-1) (40.34N 80.12W)									7.60
1.4 SW Leechburg (PA-WT-19) (40.62N 79.62W)									7.55
0.3 ENE Hidden Valley (PA-SM-1) (40.06N 79.26W)									7.47
Tennessee									
NWS Cooperative Observer Program (COOP) Sites									

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Memphis NWS WFO (MEGT1) (35.13N 89.80W)									4.38
Bruceton (BRUT1) (36.04N 88.26W)									4.28
Millington (MLLT1) (35.33N 89.92W)									4.07
3 N Germantown (GERT1) (35.12N 89.80W)									4.00
CoCoRAHS Sites									
7.1 WNW Arlington (TN-SH-36) (35.31N 89.79W)									7.08
0.8 WSW Atwood (TN-CR-6) (35.97N 88.68W)									4.69
14.4 WSW Clarksville (TN-MT-73) (36.46N 87.57W)									4.46
4.2 S Jackson (TN-MD-29) (35.57N 88.82W)									4.11
0.2 E Bruceton (TN-CR-7) (36.03N 88.24W)									4.08
West Virginia									
CoCoRAHS Sites									
2.0 SSW Keyser (WV-ML-3) (39.41N 79.00W)									6.28
1.3 SSE Rockport (WV-WD-6) (39.06N 81.55W)									5.89
8.2 NE West Union (WV-DD-2) (39.29N 80.68W)									5.64
5.8 S Ripley (WV-JC-3) (38.74N 81.69W)									5.51

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
11.7 NE Keyser (WV-ML-5) (39.55N 78.81W)									5.30
Offshore									
NOAA Buoys									
Pensacola, FL (42039) (28.79N 86.01W)			04/1041	37 (5 m, 1 min)	43				
Luke Offshore Test Platform, AL (42040) (29.21N 88.23W)	04/2230	1010.5	04/1421	29 (4 m, 1 min)	35				
Orange Beach, AL (42012) (30.06N 87.55W)	04/2340	1008.4	04/2123	47 (4 m, 1 min)	52				

[A] Date/time is for sustained wind when both sustained and gust are listed.
[B] Except as noted, sustained wind averaging periods for C-MAN and land-based reports are 2 min; buoy averaging periods are 8 min.
[C] Storm surge is water height above normal astronomical tide level.
[D] For most locations, storm tide is water height above the North American Vertical Datum of 1988 (NAVD88).
[E] Estimated inundation is the maximum height of water above ground. For NOS tide gauges, the height of the water above Mean Higher High Water (MHHW) is used as a proxy for inundation.
[F] Last of several occurrences.
[G] Wind speed data missing 0510-0650 UTC 3 October 2016.
[H] All wind data missing 0800-1000 UTC 6 October 2016.
[I] Record water level.
[J] Sensor damaged or destroyed and likely did not record maximum water level.
[K] All wind data missing 1300 UTC 9 October – 0200 10 October 2016.

Table 3. 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%)	42	84
Medium (40%–60%)	18	42
High (>60%)	12	18

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Gordon, 3–6 September 2018. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**16.6**	**19.7**	**28.0**	**45.1**	**73.2**		
OCD5	32.2	74.1	119.0	189.2	393.7		
Forecasts	12	10	8	6	2		
OFCL (2013-17)	24.1	37.4	50.5	66.6	98.4	137.4	180.7
OCD5 (2013-17)	44.7	95.8	153.2	211.2	318.7	416.2	490.6

Table 4b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Gordon, 3–6 September 2018. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 4a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	17.1	22.3	31.7	43.8			
OCD5	30.7	63.0	105.1	160.1			
GFSI	**15.7**	22.6	**24.7**	51.8			
HMNI	21.2	24.7	**26.3**	**34.6**			
HWFI	**16.0**	26.9	43.5	76.4			
EGRI	**16.2**	30.8	56.7	74.3			
EMXI	19.0	22.4	**28.9**	**27.6**			
CMCI	24.0	38.4	42.6	44.3			
AEMI	22.5	33.9	47.8	60.9			
HCCA	**17.0**	22.6	36.0	52.0			
FSSE	**14.8**	**20.4**	34.2	**43.2**			
TVCX	**13.7**	**17.4**	**27.5**	**33.6**			
GFEX	**15.4**	**19.5**	**24.4**	**33.5**			
TCON	**14.3**	**21.1**	35.2	52.7			
TVCA	**13.7**	**16.4**	**27.1**	**35.4**			
TABD	23.5	37.3	42.7	44.4			
TABM	23.7	36.0	34.4	**26.0**			
TABS	36.8	70.9	90.0	121.2			
Forecasts	7	7	6	4			

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Gordon, 3–6 September 2018. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	5.8	**6.5**	**10.0**	**6.7**	**10.0**		
OCD5	7.8	12.8	15.8	14.2	12.0		
Forecasts	12	10	8	6	2		
OFCL (2013-17)	5.5	8.0	10.1	11.4	12.7	14.5	15.0
OCD5 (2013-17)	7.1	11.1	14.4	17.4	20.6	22.3	23.7

Table 5b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Gordon, 3–6 September 2018. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 5a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	5.0	5.0	8.6	7.0	10.0		
OCD5	6.0	12.0	15.7	16.2	13.0		
GFSI	6.5	8.4	9.6	**5.0**	**2.0**		
HWFI	5.4	7.1	**4.3**	**4.8**	10.0		
HMNI	6.6	6.2	**6.1**	**2.4**	**4.0**		
EMXI	8.0	10.0	10.9	7.4	**2.0**		
HCCA	**3.4**	**2.9**	**2.6**	**5.2**	11.0		
FSSE	**3.5**	**3.4**	**6.9**	8.8	10.0		
DSHP	**4.2**	6.6	9.7	11.4	13.0		
LGEM	5.2	8.6	12.0	13.2	14.0		
ICON	**3.9**	**4.1**	**6.3**	7.6	11.0		
IVCN	**3.9**	**3.6**	**5.3**	**6.8**	11.0		
IVDR	**4.6**	**3.6**	**4.6**	**5.6**	**9.0**		
Forecasts	8	8	7	5	1		

Table 6. Coastal wind watch and warning summary for Tropical Storm Gordon, 3–6 September 2018.

Date/Time (UTC)	Action	Location
2 / 2100	Tropical Storm Watch issued	Alabama-Florida border to Morgan City, LA
2 / 2100	Tropical Storm Watch issued	Lake Pontchartrain and Lake Maurepas
3 / 0900	Tropical Storm Warning issued	Alabama-Florida border to Morgan City, LA
3 / 0900	Tropical Storm Warning issued	Lake Pontchartrain and Lake Maurepas
3 / 1230	Tropical Storm Warning issued	Golden Beach to Bonita Beach, Florida
3 / 1230	Tropical Storm Warning issued	Florida Keys from Craig Key to Ocean Reef, including Florida Bay
3 / 1500	Hurricane Watch issued	Mouth of the Pearl River to the Alabama-Florida border
3 / 1500	Tropical Storm Warning issued	Alabama-Florida border to Okaloosa-Walton county line
3 / 2100	Hurricane Warning replaced Tropical Storm Warning and Hurricane Watch	Mouth of the Pearl River to the Alabama-Florida border
3 / 2100	Tropical Storm Warning discontinued	Golden Beach to Chokoloskee
3 / 2100	Tropical Storm Warning discontinued	Florida Keys from Craig Key to Ocean Reef, including Florida Bay
4 / 0000	Tropical Storm Warning discontinued	Chokoloskee to Bonita Beach

Date/Time (UTC)	Action	Location
4 / 1500	Tropical Storm Warning discontinued	Morgan City to Grand Isle, Louisiana
4 / 2100	Tropical Storm Warning discontinued	Grand Isle to the Mouth of the Mississippi River
4 / 2100	Tropical Storm Warning discontinued	Lake Maurepas
5 / 0300	Tropical Storm Warning discontinued	Mouth of the Pearl River to the Mouth of the Mississippi River
5 / 0300	Tropical Storm Warning discontinued	Lake Pontchartrain
5 / 0600	Hurricane Warning changed to Tropical Storm Warning	Mouth of the Pearl River to the Alabama-Florida border
5 / 0900	Tropical Storm Warning discontinued	All

Table 7. Storm surge watch and warning summary for Tropical Storm Gordon, 3–6 September 2018.

Date/Time (UTC)	Action	Location
3 / 0300	Storm Surge Watch issued	Mount of the Mississippi River to the Mississippi-Alabama border
3 / 1500	Storm Surge Warning issued	Shell Beach, Louisiana to Mississippi-Alabama border
3 / 1500	Storm Surge Watch issued	Mississippi-Alabama border to Navarre, Florida
3 / 2100	Storm Surge Warning issued	Mississippi-Alabama border to Dauphin Island, Alabama
5 / 0300	Storm Surge Warning discontinued	Shell Beach, Louisiana to Biloxi, Mississippi
5 / 0600	Storm Surge Warning discontinued	Biloxi to Pascagoula, Mississippi
5 / 0900	Storm Surge Warning discontinued	All
5 / 0900	Storm Surge Watch discontinued	All

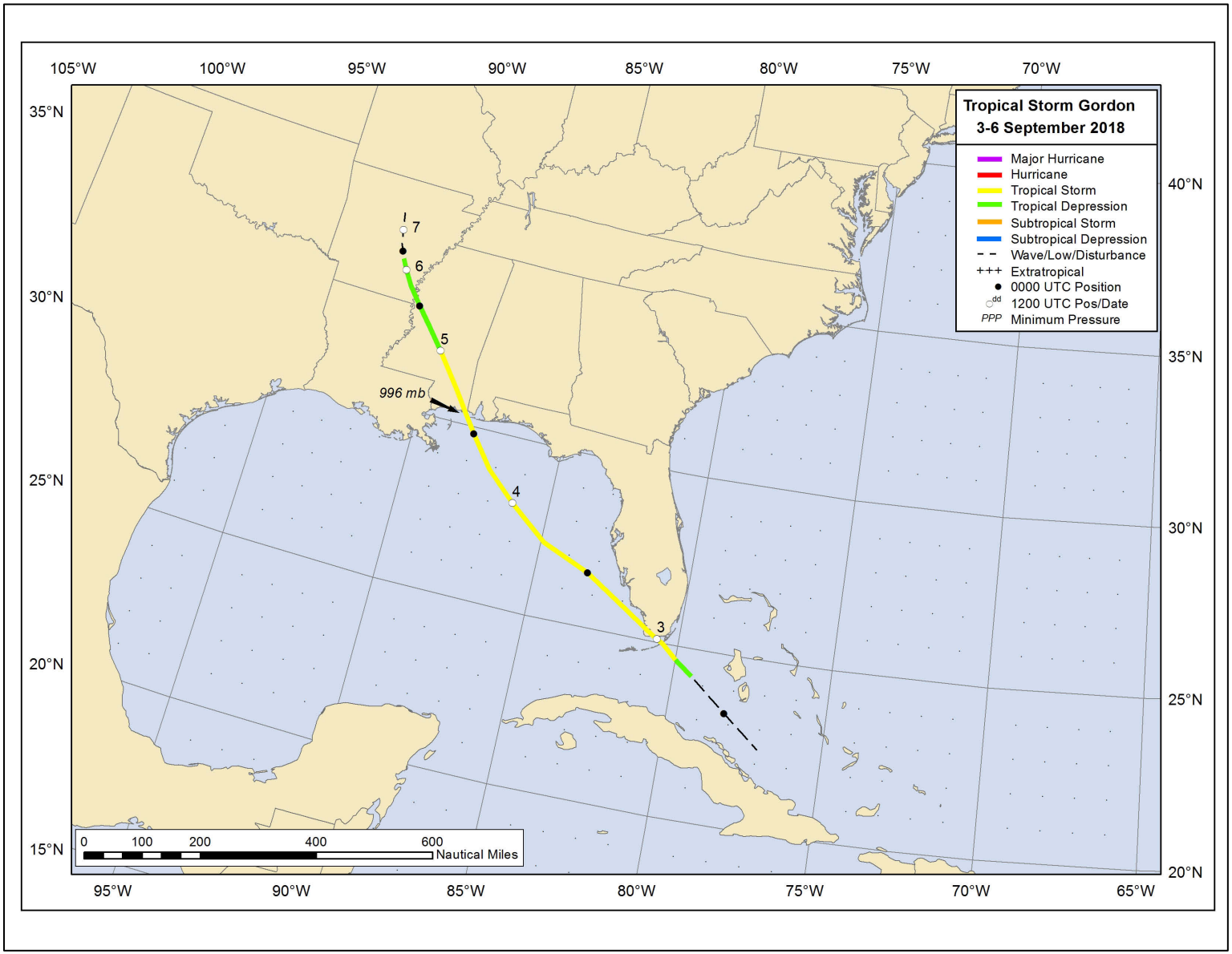


Figure 1. Best track positions for Tropical Storm Gordon, 3–6 September 2018. The track over the United States is partially based on analyses from the NOAA Weather Prediction Center.

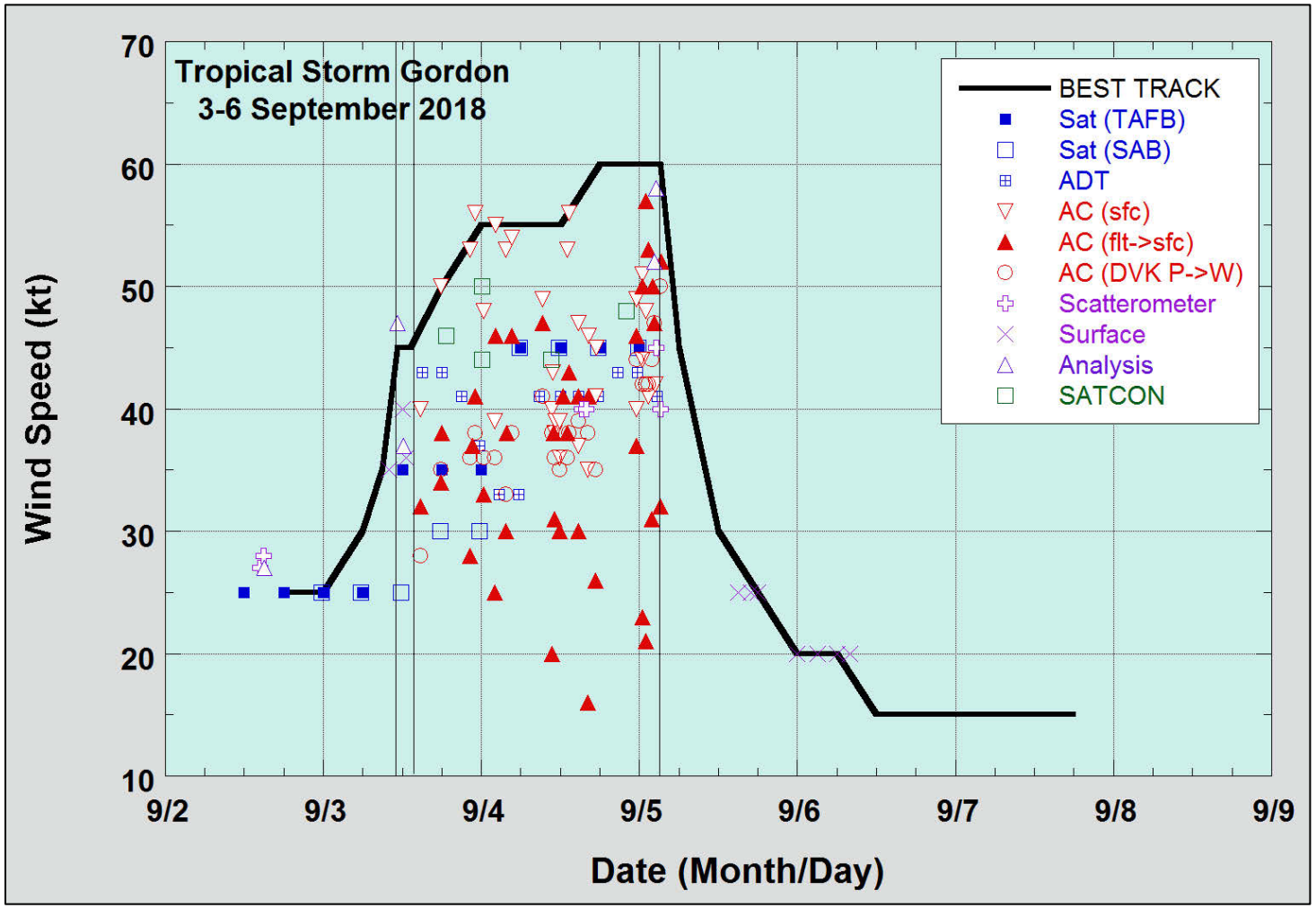


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Gordon, 3–6 September 2018. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. 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.

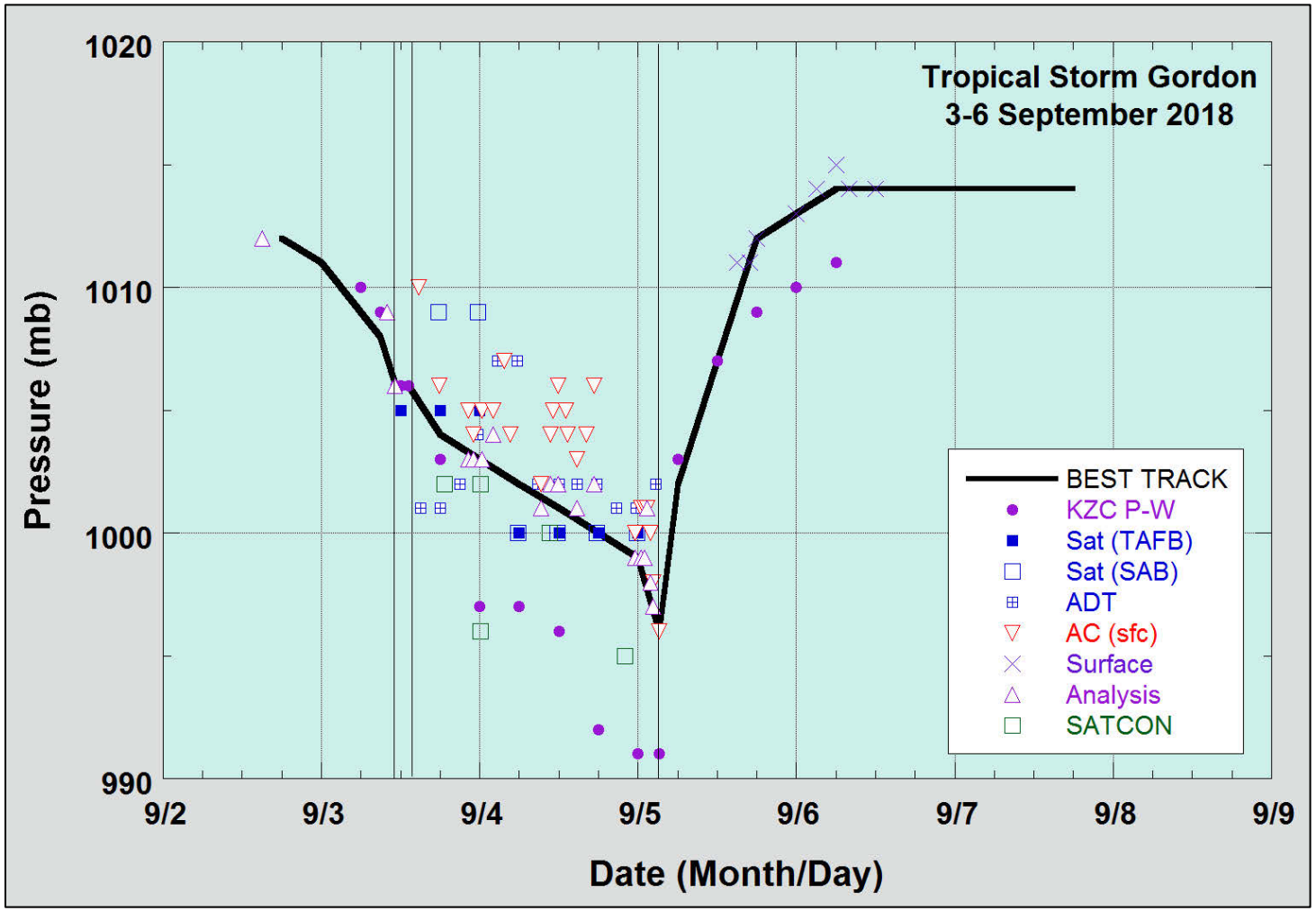


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Gordon, 3–6 September 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC, and solid vertical lines correspond to landfalls.

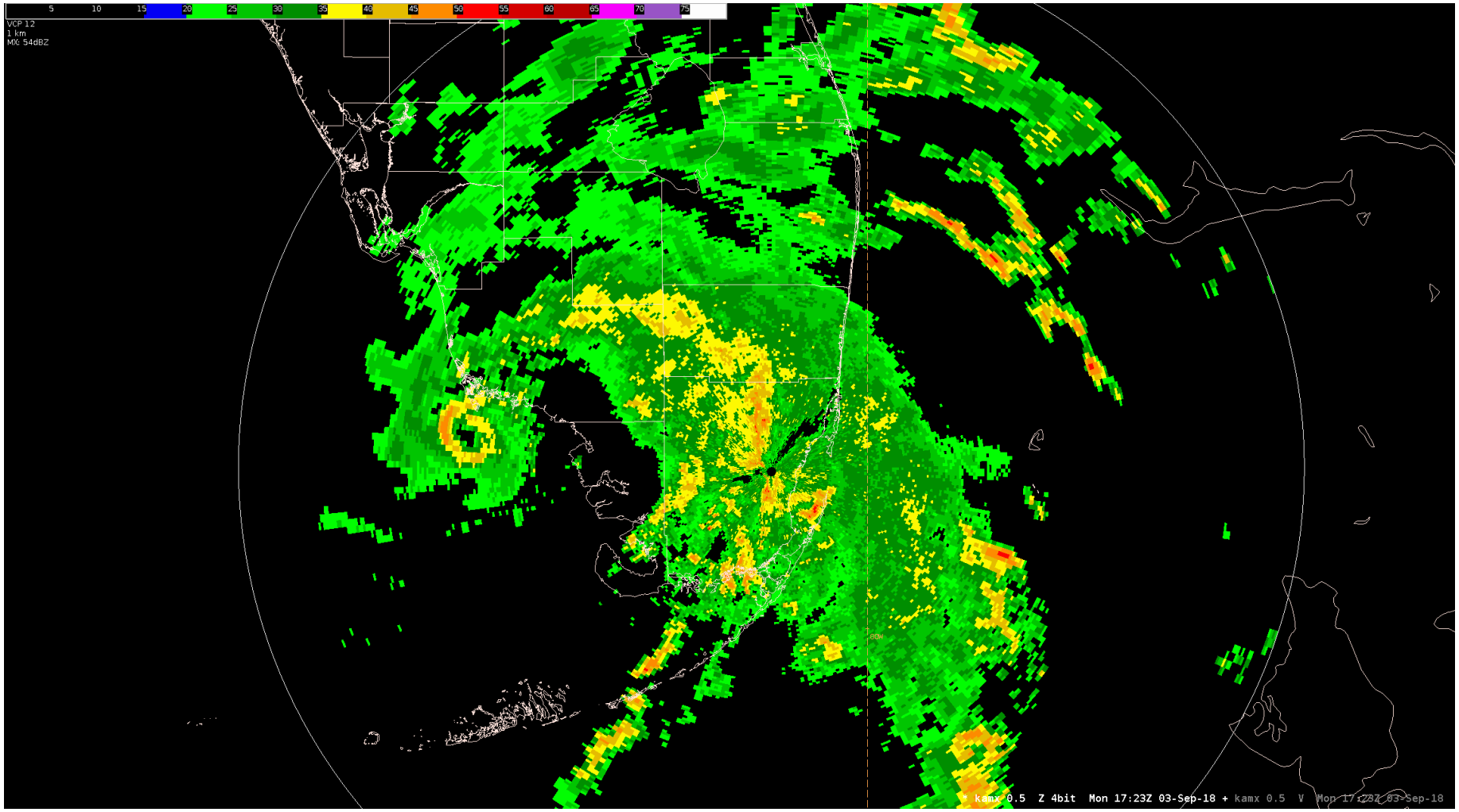


Figure 4. NWS Miami, Florida, WSR-88D Doppler radar image of Tropical Storm Gordon at 1723 UTC 3 September when the center of Gordon was located just off the southwest coast of Florida. Note the development of an eye-like feature.

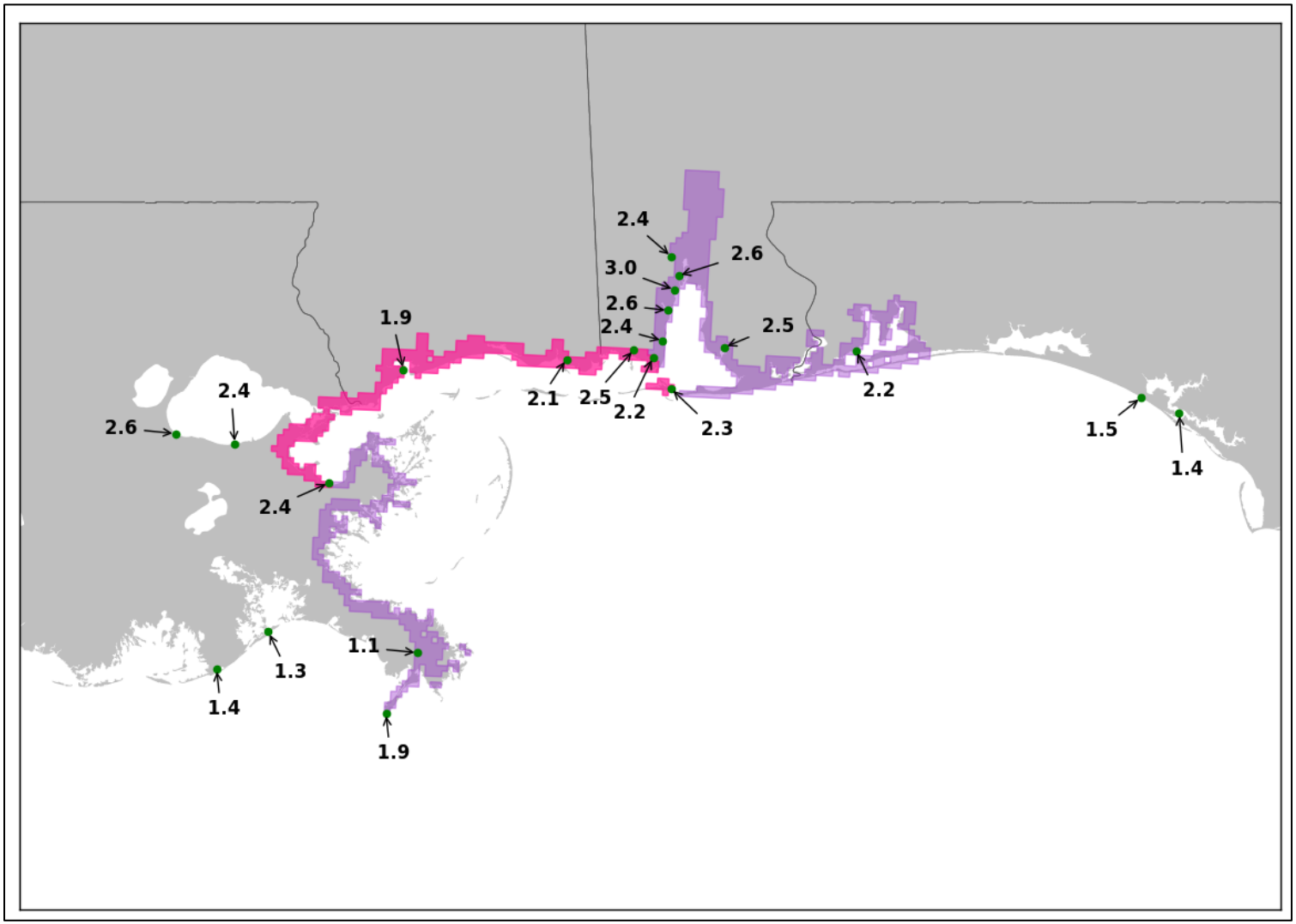


Figure 5. Maximum water levels (feet) measured from tide gauges along the Gulf Coast during Tropical Storm Gordon and areas covered by storm surge warnings (magenta) and watches (lavender). Water levels are referenced above mean higher high water (MHHW), which is used as a proxy for inundation (above ground level) on normally dry ground along the immediate coastline. Image courtesy of the NHC Storm Surge Unit.

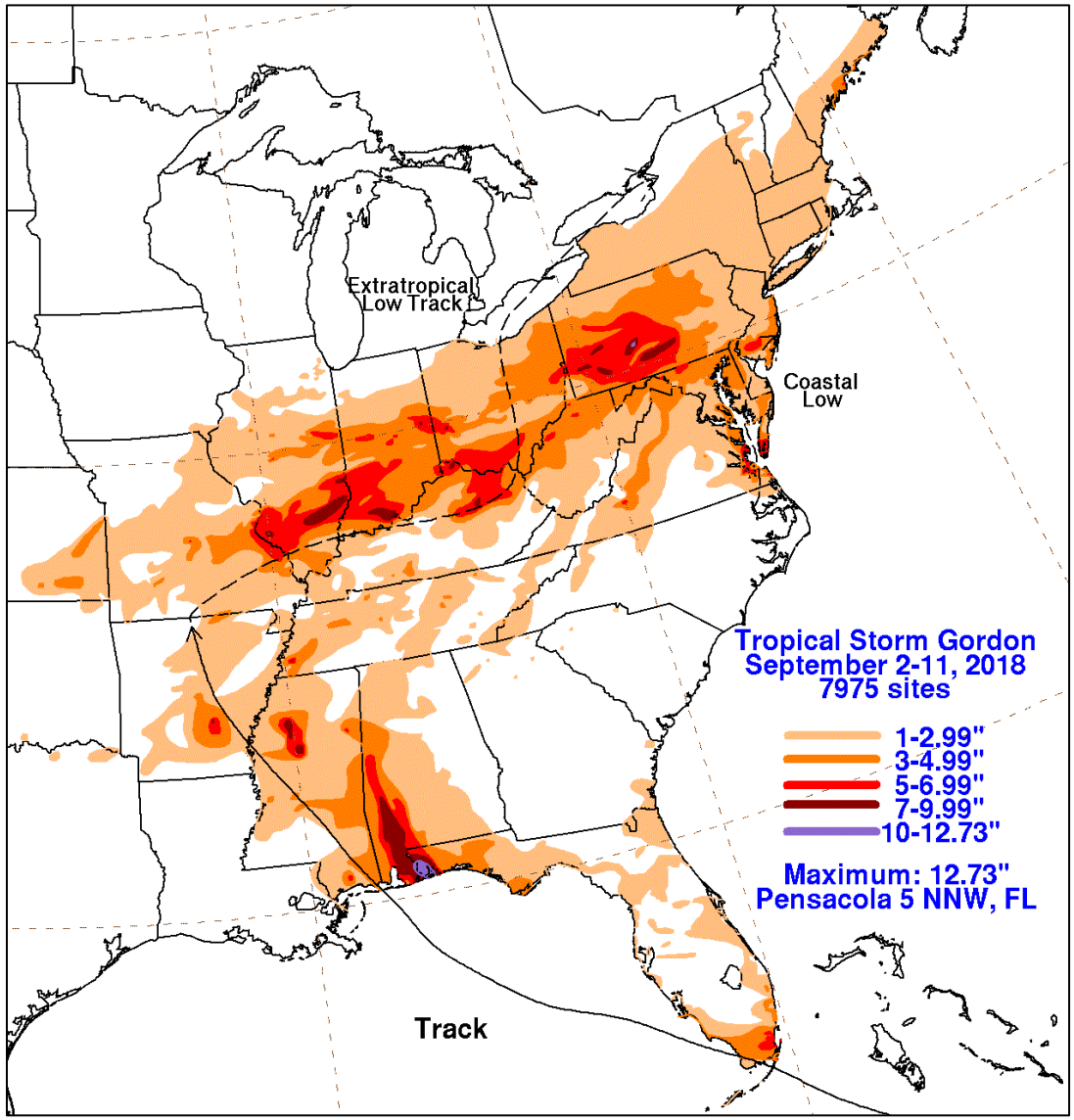


Figure 6. Observed rainfall (inches) from Tropical Storm Gordon and its remnants over the eastern United States. Note that the extratropical low track shown here was a separate low pressure system and not directly associated with Gordon. Courtesy of David Roth from NOAA's Weather Prediction Center.

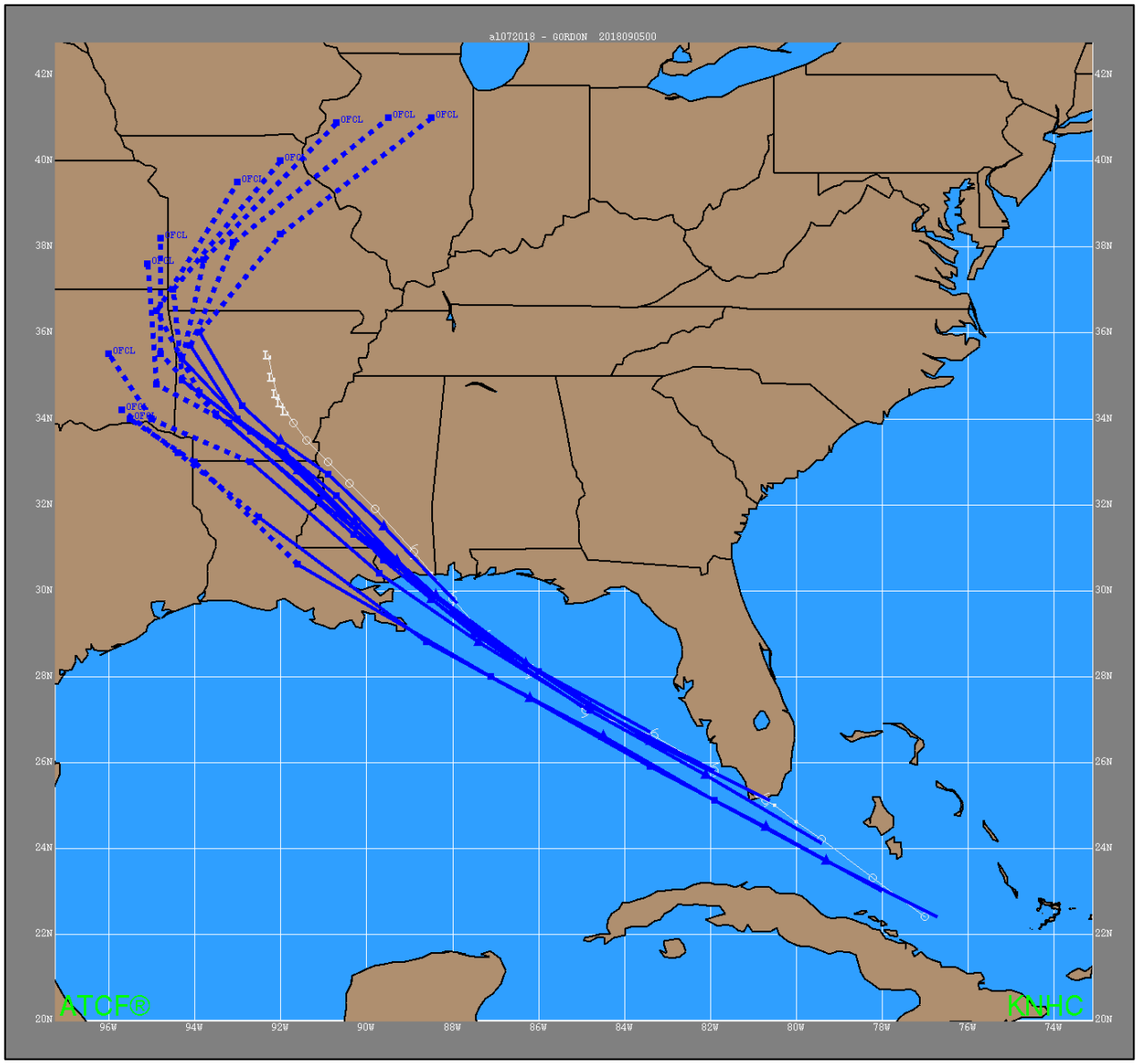


Figure 7. NHC track forecasts for Tropical Storm Gordon between 1800 UTC 2 September and 0000 UTC 5 September. The best track is indicated by the white line with positions shown at 6 h intervals. Note the leftward bias of the NHC forecasts.

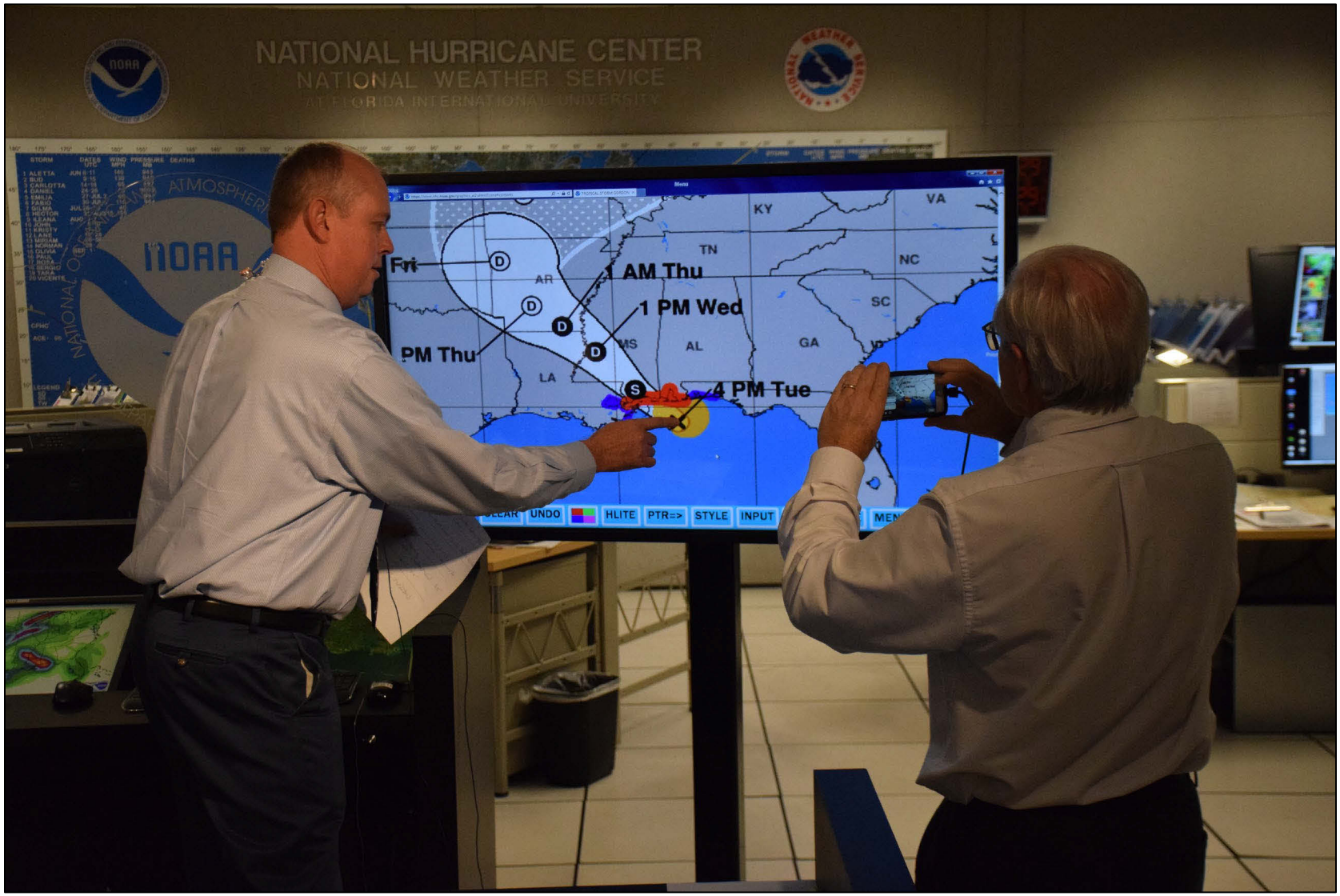


Figure 8. NHC Director Ken Graham (left) conducting a Facebook Live broadcast before the landfall of Tropical Storm Gordon along the north-central Gulf coast.