NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM EMILY

(AL062017)

30 July–1 August 2017

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National Hurricane Center
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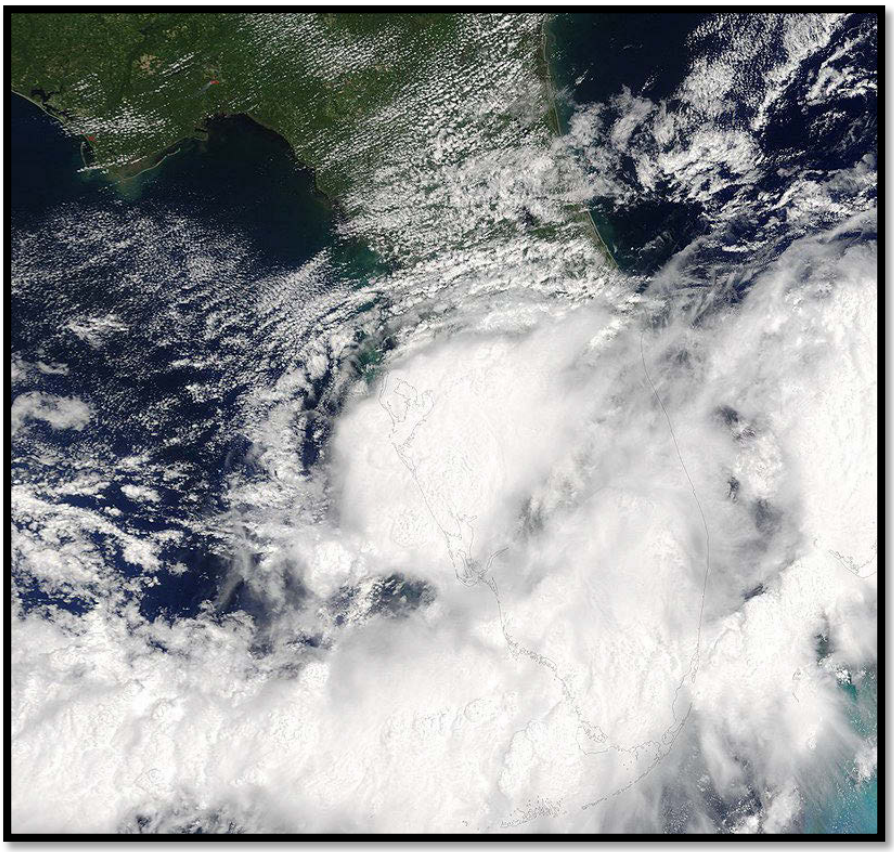

NASA TERRA SATELLITE IMAGE OF TROPICAL STORM EMILY AT 1555 UTC 31 JULY, SHORTLY AFTER LANDFALL.

Emily was a short-lived tropical storm that developed unexpectedly and made landfall just south of Tampa Bay, Florida.

[1] Original report date 2 April 2018. This version corrects best track latitude values listed in Table 1 at 1445 UTC 31 July 2017, 1800 UTC 31 July 2017, and 0000 UTC 1 August 2017.

Tropical Storm Emily

30 JULY–1 AUGUST 2017

SYNOPTIC HISTORY

Early on 30 July, a decaying frontal zone moved southward from the southeastern United States into the northeastern Gulf of Mexico. Later that day, while the temperature contrast across the front became negligible, a surface low formed within the post-frontal trough and had enough organized deep convection to designate the formation of a tropical depression at 1800 UTC, centered about 145 n mi west-northwest of St. Petersburg, 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, and the best track positions and intensities are listed in Table 1[2].

Deep convection increased near the center of the system, and the cyclone strengthened into a tropical storm around 0000 UTC 31 July. Steered by the flow on the southern side of a mid-level trough over the southeastern United States, the small cyclone moved east-southeastward to eastward toward the west coast of Florida. Emily strengthened to its maximum intensity of 50 kt while making landfall around 1445 UTC 31 July near Longboat Key, Florida. Figure 4 is a radar image of the tropical storm at landfall. After moving inland, the system weakened to a tropical depression by 0000 UTC 1 August over central Florida. Later that day, the cyclone turned toward the east and northeast, emerging over the Atlantic. By that time, the center of Emily became completely exposed, and although the system produced sporadic bursts of deep convection later on 1 August, it failed to re-strengthen. By 0000 UTC 2 August, the cyclone no longer had a warm core and had become post tropical. Shortly thereafter, the system dissipated over the Atlantic off the southeast United States coast.

METEOROLOGICAL STATISTICS

Observations in Emily (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 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

[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.

Advanced Scatterometer (ASCAT), and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Emily.

Emily was operationally assessed to be a tropical storm with 40-kt winds when its center crossed the west-central Florida coast near Longboat Key around 1445 UTC 31 July. However, in post-analysis, Doppler velocity data from the Tampa Bay WSR-88D radar indicated velocity values of 55-62 kt at elevations of 4,000–5,000 ft above sea level prior to landfall, with a mean value of approximately 60 kt. Using a standard reconnaissance flight-level adjustment factor of 80% at 5,000 ft yields an equivalent 1-minute sustained wind speed of 45 to 50 kt. However, the radar viewing angle likely resulted in some under-sampling of the strongest winds that were probably located on the south side of the eastward-moving circulation. Therefore the estimated maximum intensity of Emily is 50 kt.

The estimated minimum pressure of Emily is 1001 mb, based on a pressure observation of 1001.7 mb at Bradenton, Florida.

Selected surface observations associated with Emily are shown in Table 2. The highest sustained wind, 43 kt, was reported at the Skyway Fishing Pier at the mouth of Tampa Bay.

An EF-0 tornado occurred near Cortez in Manatee County, Florida that destroyed 2 barns and multiple greenhouses, and toppled an engineered wall.

Figure 5 is a map of the total rainfall associated with Emily.

CASUALTY AND DAMAGE STATISTICS

There were no reports of casualties associated with Emily. Widespread flooding occurred in Polk and Pinellas Counties, causing road closures and some evacuations of homes. Heavy rains and flooding in Miami Beach on 1 August were not directly attributable to Emily, which at that time was losing tropical characteristics.

Coastal flooding was reported in Hillsborough, Manatee, and Sarasota Counties resulting in some road closures.

The total damage estimate is near $10 million.

FORECAST AND WARNING CRITIQUE

Emily's genesis was rather unexpected. Only 6 h prior to tropical cyclone formation, it was first mentioned in the Tropical Weather Outlook that an area of low pressure was forecast to develop along a dissipating frontal boundary over the northeastern Gulf of Mexico. At that time the probabilities of genesis in 2 days and 5 days were set to low, 10% and 20% respectively (Table 3). Among the reasons for the very short lead time were the small size of the system, and doubts about how tropical in nature it would become even if a low were to form.

A verification of NHC official track forecasts for Emily is given in Table 4, and a verification of NHC official intensity forecasts for Emily is given in Table 5. Both the mean official track and intensity errors were below the most recent 5-year averages. However, the sample size is too small to draw meaningful conclusions from these numbers.

Coastal watches or warnings associated with Emily are shown in Table 6. The Tropical Storm Warning for the west coast of Florida was issued just 4.75 h before landfall, and the Tropical Storm Warning was issued only 2.75 h before landfall.

ACKNOWLEDGEMENTS

Some of the information in this report was provided by the Tampa Bay National Weather Service Forecast Office, Ruskin, Florida. Stacy Stewart of NHC analyzed of the Tampa WSR-88D radar velocity data. David Roth of WPC produced the rainfall map.

Table 1. Best track for Tropical Storm Emily, 30 July–1 August 2017.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
30 / 1800	28.4	85.4	1009	30	tropical depression
31 / 0000	28.0	84.6	1008	35	tropical storm
31 / 0600	27.7	83.9	1006	40	"
31 / 1200	27.5	83.1	1003	45	"
31 / 1445	27.5	82.7	1001	50	"
31 / 1800	27.5	82.2	1005	35	"
01 / 0000	27.5	81.3	1006	30	tropical depression
01 / 0600	27.8	80.4	1008	30	"
01 / 1200	28.7	79.5	1010	30	"
01 / 1800	29.7	78.6	1010	30	"
02 / 0000	30.7	78.1	1011	30	low
02 / 0600					dissipated
31 / 1445	27.5	82.7	1001	50	maximum wind/minimum pressure and landfall near Longboat Key, FL

Table 2. Selected surface observations for Tropical Storm Emily, 30 July–1 August 2017.

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)				
United States									
Florida									
International Civil Aviation Organization (ICAO) Sites									
Albert Whitted Airport (KSPG) (27.77N 82.63W)	31/1553	1010.7	31/1524	30 (2 min, 10 m)	34				
Sarasota (KSRQ) (27.40N 82.55W)	31/1453	1006.1	31/1440	34 (2 min, 10 m)	43				
Southwest FL Intl (KRSW) (26.54N 81.76W)	31/2253	1012.0	31/1306	22 (2 min, 10 m)	38				
Florida Automated Weather Network (FAWN) Sites									
Balm (27.76N 82.22W)	31/2030	1006.0							
Frostproof (27.76N 81.54W)	31/2230	1005.0							
Coastal Ocean Monitoring and Prediction System (COMPS) Buoys									
C10 Comps Buoy (27.17N 82.93W)	31/1305	1008.0	31/1235	28	35				
Coastal-Marine Automated Network (C-MAN) Sites									
Middle Tampa Bay Buoy (MTBF1) (27.66N 82.62W)	31/1448	1008.9	31/1542	35	40				
Weatherflow Sites									
Boca Grande (XBCG) (26.72N 82.26W)	31/1509	1010.0	31/1704	30 (1min, 10 m)	40				
Charlotte Harbor (XCHL) (26.93N 82.07W)	31/1145	1008.0	31/1750	33 (1min, 10 m)	37				
Egmont Channel (XEGM) (27.61N 82.76W)			31/1426	37 (5 min, 13 m)	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)				
Naples Zoo (XNPZ) (26.17N 81.79W)	31/0900	1010.0	31/0932	24 (1 min, 10 m)	43				
Sanibel DB 4 (XSBI) (26.47N 82.05W)	31/0921	1008.0	31/1452	20 (5 min, 5 m)	35				
Sarasota (XSAR) (27.35N 82.52W)			31/1452	30 (1 min, 20 m)	43				
Sarasota Bay Marker 17 (XSRB) (27.34N 81.81W)	31/0900	1011.0	31/1112	37 (1 min, 5 m)	42				
Skyway Fishing Pier (XSKY) (27.60N 82.56W)	31/1535	1006.0	31/1450	43 (1 min, 16 m)	49				
Tampa Bay Cut (XTAM) (27.77N 82.57W)	31/0153	1009.0	31/1530	30 (5 min, 15 m)	34				
National Ocean Service (NOS) Sites									
Key West (KYWF1) (24.56N 81.81W)	31/0848	1012.4	31/1948	35 (17 m)	41	0.76	0.32	0.3	
Naples (NPSF1) (26.13N 81.81W)	31/0900	1011.2	31/1118	37 (10 m)	48	1.75	2.12	1.5	
Fort Myers (FMRF1) (26.65N 81.87W)	31/0748	1011.1	31/1118	18 (7 m)	24	1.41	1.55	1.3	
Port Manatee (PMAF1) (27.64N 82.56W)	31/1524	1007.3	31/1118			1.12	1.41	0.8	
St. Petersburg, Tampa Bay (SAPF1) (27.76N 82.63W)	31/1442	1010.6	31/1512	29 (9 m)	33	1.14	1.68	0.9	
Old Port Tampa (OPTF1) (27.86N 82.55W)						1.13		0.8	
Mckay Bay Entrance (MCYF1) (27.91N 82.43W)						1.45	1.83	0.8	
Clearwater Beach (CWBF1) (27.98N 82.83W)						1.22	1.61	0.6	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[C]	Storm tide (ft)[D]	Estimated Inundation (ft)[E]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[A]	Sustained (kt)[B]	Gust (kt)				
Sanibel-Captiva Conservation Foundation Site									
Gulf of Mexico SCCF (26.45N 81.98W)	31/0745	1010.0	31/0915	26	40				
Other Observations									
Bradenton (KFLBRADE88) (27.51N 82.66W)	31/1439	1001.7	31/1455	37	46				
Lake Okeechobee N (27.13N 80.79W)			31/1430	27 (10 m)	36				

[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.

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%)	6	6
Medium (40%-60%)	-	-
High (>60%)	-	-

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Emily, 30 July–1 August 2017. 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	**21.5**	**23.0**	**6.0**				
OCD5	48.3	62.2	130.7				
Forecasts	5	3	1				
OFCL (2012-16)	24.9	39.6	54.0	71.3	105.8	155.4	208.9
OCD5 (2012-16)	47.3	103.9	167.8	230.3	343.1	442.6	531.0

Table 5. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Emily, 30 July–1 August 2017. 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	**2.0**	**3.3**	**0.0**				
OCD5	4.6	3.7	2.0				
Forecasts	5	3	1				
OFCL (2012-16)	5.5	8.2	10.5	12.0	13.4	14.0	14.5
OCD5 (2012-16)	7.1	10.5	13.0	15.1	17.4	18.2	20.6

Table 6. Watch and warning summary for Tropical Storm Emily, 31 July–1 August 2017.

Date/Time (UTC)	Action	Location
31 / 1000	Tropical Storm Watch issued	Anclote River to Englewood
31 / 1200	Tropical Storm Watch discontinued	All
31 / 1200	Tropical Storm Warning issued	Anclote River to Bonita Beach
31 / 1800	Tropical Storm Warning modified to	Englewood to Bonita Beach
31 / 2100	Tropical Storm Warning discontinued	All

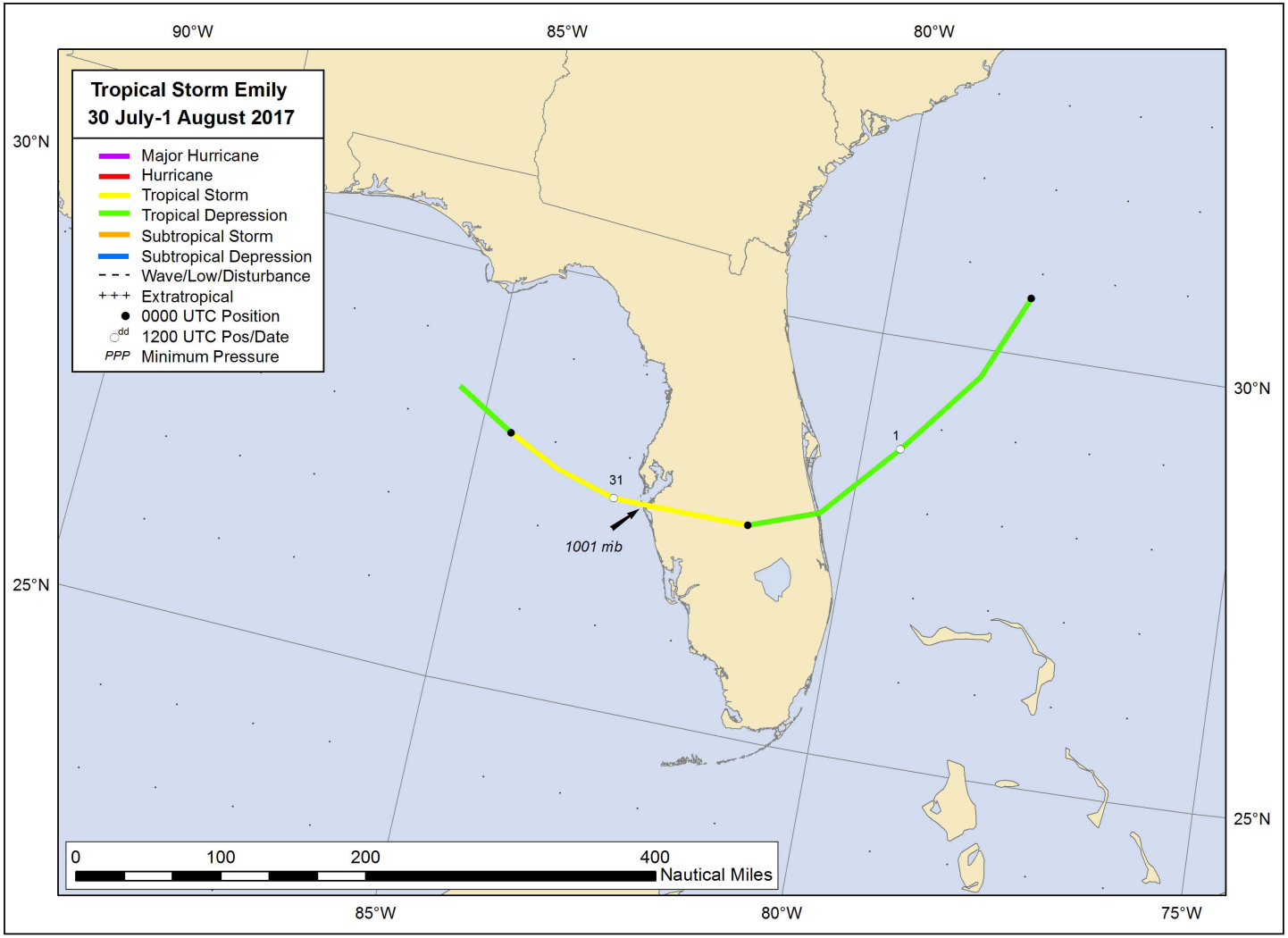

Figure 1. Best track positions for Tropical Storm Emily, 31 July–1 August 2017.

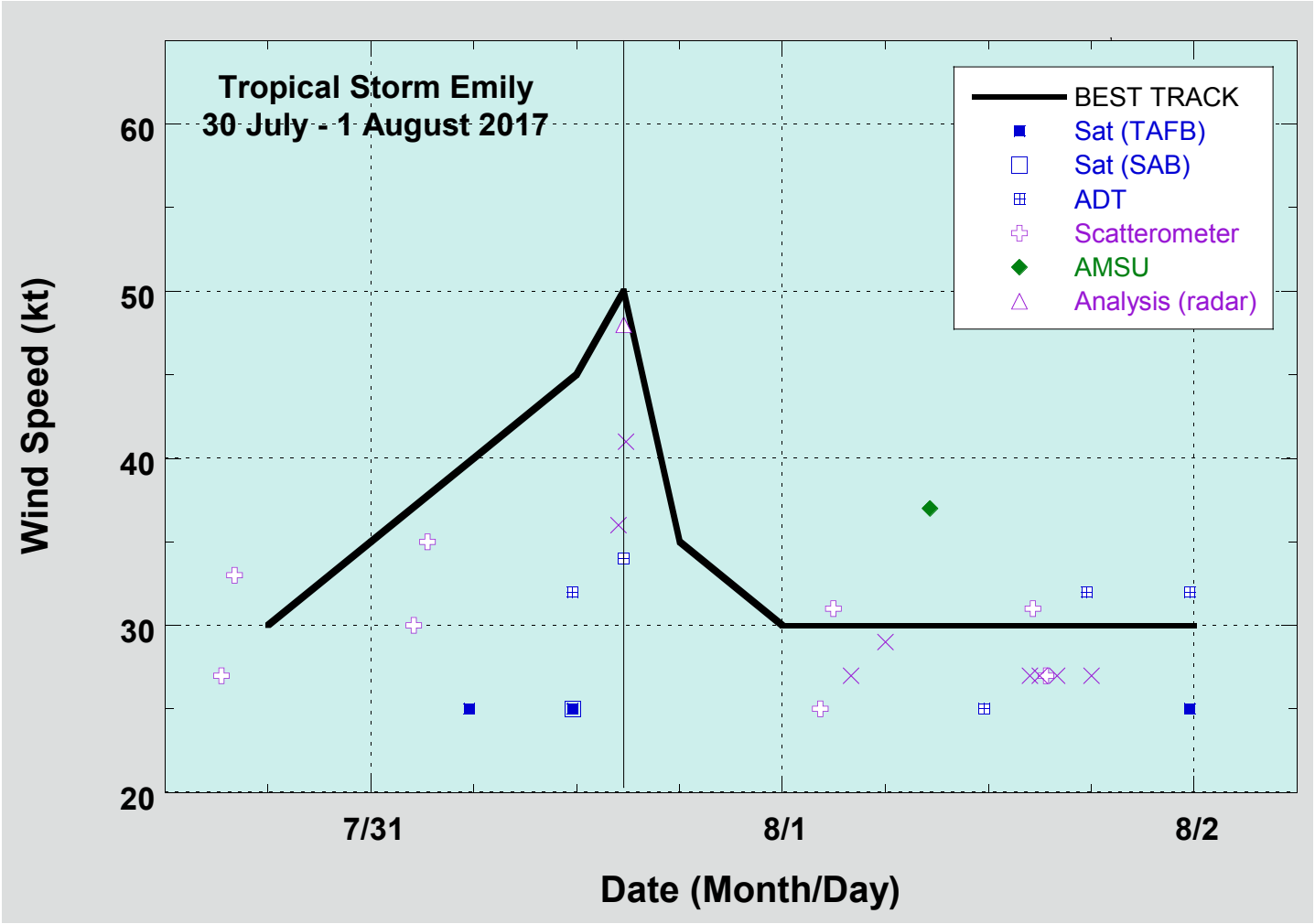

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Emily, 31 July–1 August 2017. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC, and solid vertical line corresponds to landfall.

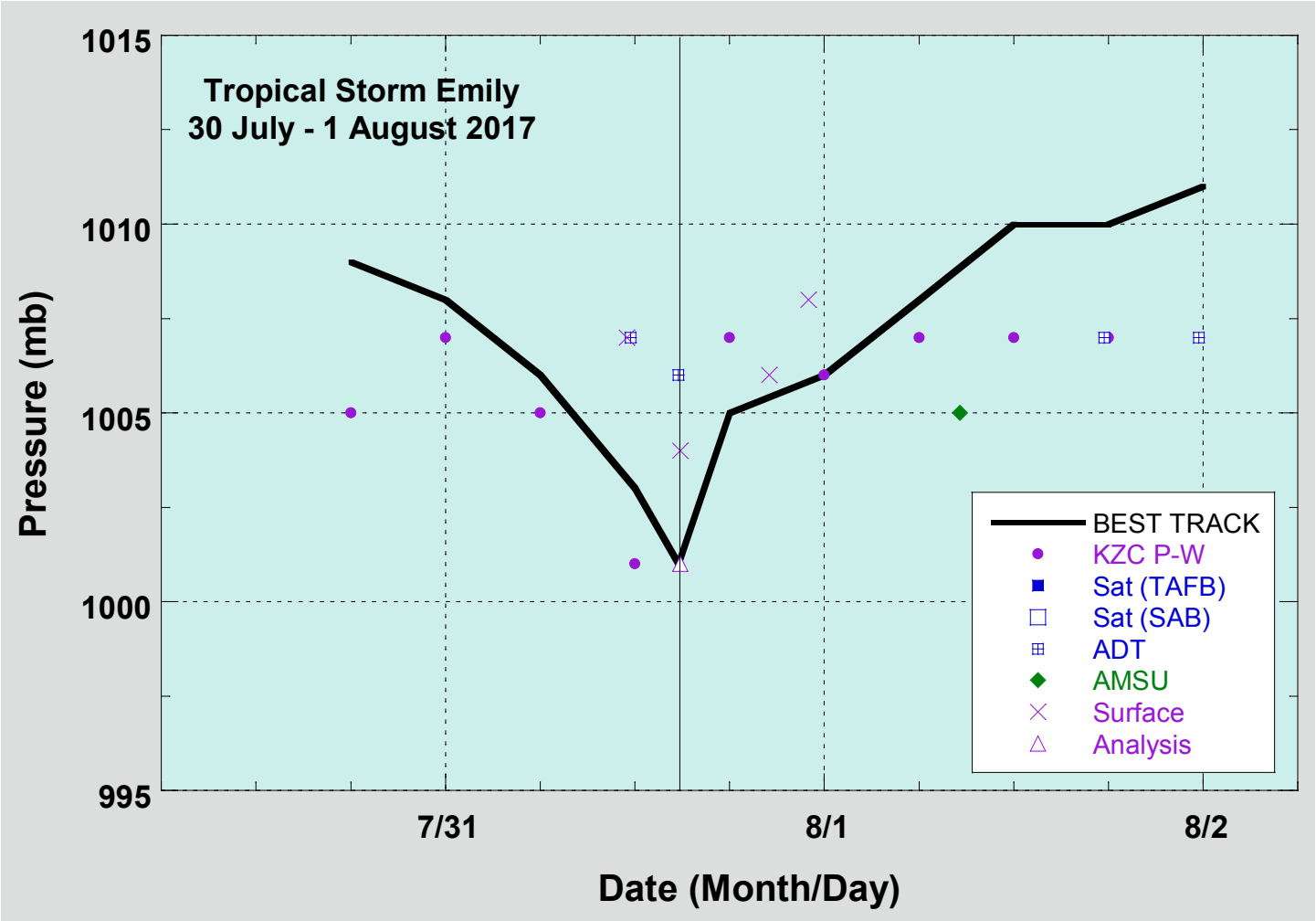

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Emily, 31 July–1 August 2017. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. 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 line corresponds to landfall.

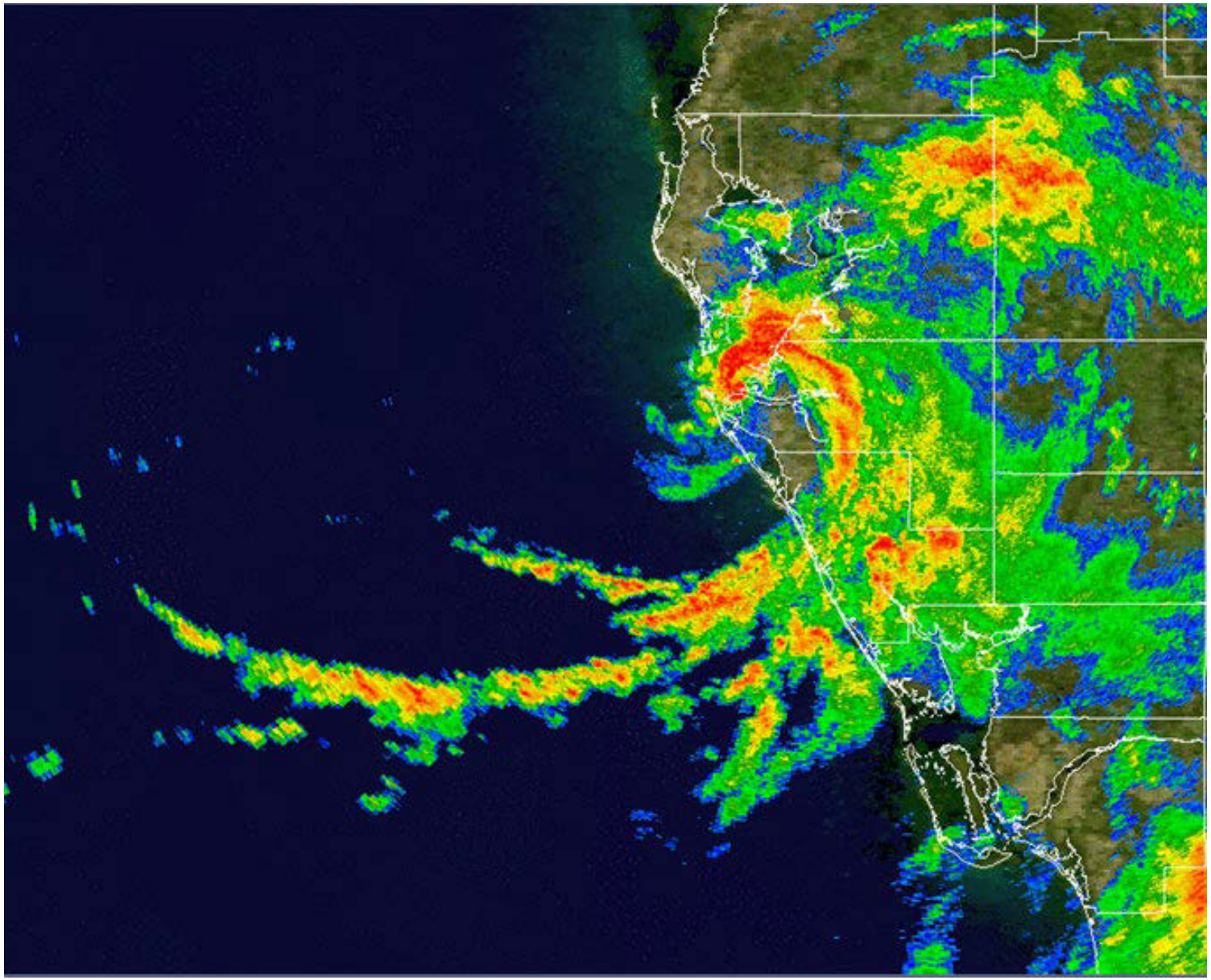

Figure 4. WSR-88D Doppler radar reflectivity image from Tampa, Florida, at 1445 UTC 31 July.

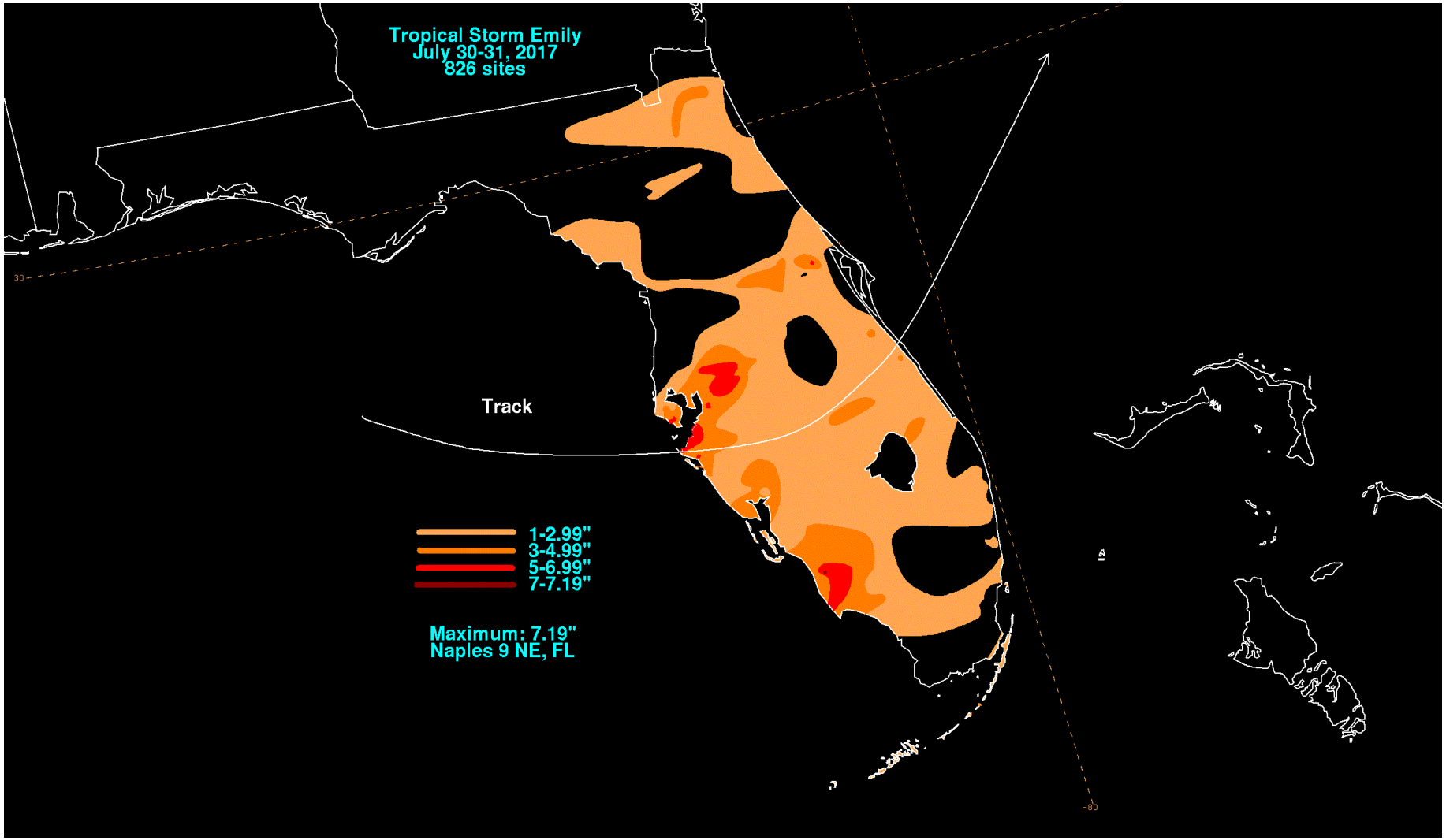

Figure 5. Rainfall totals (inches) associated with Tropical Storm Emily. Figure courtesy of David Roth, WPC.