

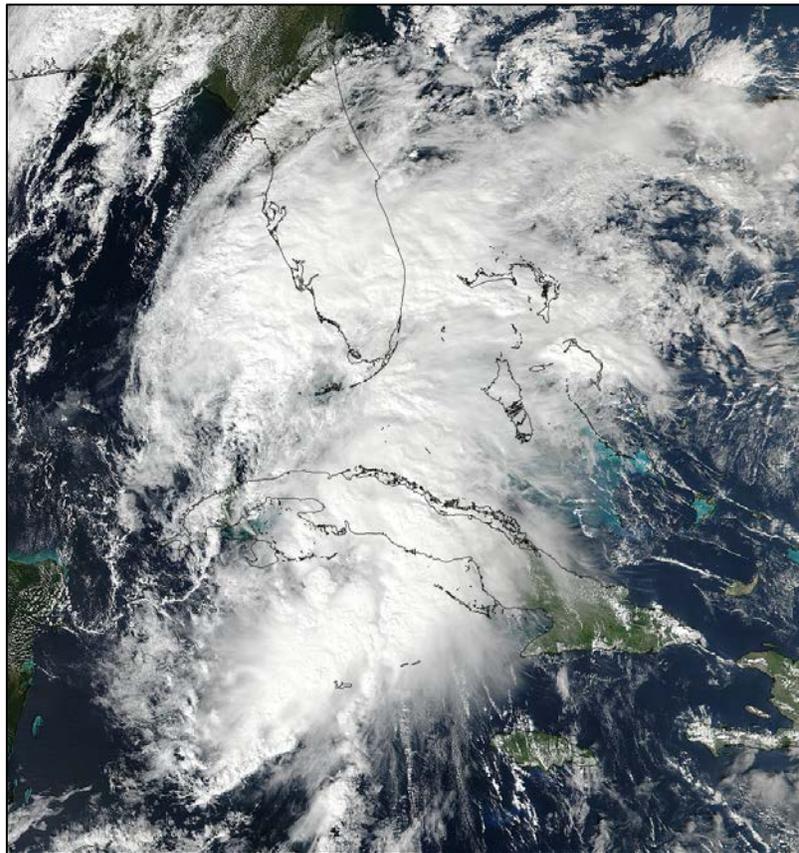


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM PHILIPPE (AL182017)

28–29 October 2017

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National Hurricane Center
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MODIS SATELLITE IMAGE OF TROPICAL STORM PHILIPPE AT 1854 UTC 28 OCTOBER 2017.

Philippe was short-lived tropical storm that in combination with a non-tropical weather system brought gusty winds and locally heavy rainfall to the Cayman Islands, Cuba, portions of southern Florida, and the central and northwestern Bahamas.

Tropical Storm Philippe

28–29 OCTOBER 2017

SYNOPTIC HISTORY

The development of Philippe appears to be associated with the interaction of a tropical wave and a Central American Gyre. The tropical wave that played a role in the development of Philippe departed the west coast of Africa on 16 October and moved westward across the tropical Atlantic Ocean over the next several days. The wave moved over the central and southwestern Caribbean Sea on 24 October where a Central American Gyre had previously formed. The combination of these features produced a broad area of low pressure near the coast of Nicaragua on 25 October. The next day, shower and thunderstorm activity associated with the system began to increase and show some signs of organization while the low began moving slowly north-northwestward. Convection increased markedly and became more concentrated on the morning of 27 October when the broad low moved near the northeastern coast of Honduras. Reconnaissance aircraft data from later that day indicated that the system was producing winds to around 30 kt, but it lacked a well-defined center. The system turned north-northeastward over the northwestern Caribbean early the next day, and the convective banding gradually increased. Visible satellite imagery and reconnaissance aircraft data from the morning of 28 October indicate that the center had become sufficiently well defined, which resulted in the formation of a tropical depression by 1200 UTC 28 October about 85 n mi south-southwest of the Isle of Youth, Cuba. 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 1¹.

The depression turned northeastward ahead of a large mid-latitude trough that was moving into the southeastern United States and western Gulf of Mexico. The system strengthened into a tropical storm by 1800 UTC 28 October (cover photo) when it was centered just southeast of the Isle of Youth. The convective structure changed little in organization as Philippe began to accelerate northeastward toward the southern coast of Cuba, and the cyclone made landfall as a 35-kt tropical storm around 2200 UTC that day along the sparsely populated southern coast of Cuba’s Zapata Peninsula, about 25 n mi west of the Bay of Pigs. Strong southwesterly shear and interaction with land caused Philippe to dissipate over west-central Cuba shortly after 0000 UTC 29 October. The remnants of Philippe continued to move quickly northeastward ahead of the aforementioned mid-latitude trough. A new non-tropical area of low pressure formed near the coast of southeastern Florida around 0600 UTC, and the system produced a brief period of gale-force winds along the immediate coast of southeastern Florida and the adjacent Atlantic waters. The new low continued northeastward where it brought strong

¹ 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.

winds to portions of the central and northwestern Bahamas before it merged with a strong cold front shortly after 1200 UTC 29 October.

METEOROLOGICAL STATISTICS

Observations in Philippe (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. The 53rd Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command flew three flights into the system. 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 Philippe.

Philippe's peak intensity of 35 kt was based on a report of a sustained wind of 35 kt on Grand Cayman Island at 1440 UTC 28 October.

Although operationally Philippe was shown to have passed over southeastern Florida, surface observations and ASCAT data from shortly after 0000 UTC 29 October indicate that Philippe's circulation lacked a well-defined center and the system degenerated into a trough of low pressure while passing over west-central Cuba. Operationally, NHC continued to issue advisories and maintained tropical storm warnings and watches for portions of southeastern Florida and the northwestern Bahamas since there was an unusually high-level of uncertainty in real-time regarding the structure of Philippe's circulation.

The remnants of Philippe in combination with the development of a new non-tropical low pressure area near the coast of southeastern Florida brought a brief period of gale-force winds to the immediate coast of southeastern Florida and the adjacent Atlantic waters. A sustained wind of 40 kt with a gust to 54 kt was reported at the Fowey Rocks Coastal Marine (CMAN) observing site at an elevation of 44 m. A sustained wind of 38 kt with a gust to 51 kt was measured at a WeatherFlow observing site near Miami at Government Cut and a wind gust to 49 kt was observed at a WeatherFlow site in Biscayne Bay. Wind gusts of 35 to 40 kt were also reported at a few land-based observing sites in southeastern Florida. Sustained winds of 55 kt with a gust to 64 kt were also reported around 0600 UTC 29 October by an anemometer on a yacht anchored at Albany Marina on New Providence Island in the northwestern Bahamas.

There were no ship reports of winds of tropical storm force in association Philippe. The ship *Sitem Leader* reported winds as high as 33 kt in the Straits of Florida late on 28 October and early on 29 October as the remnants of Philippe passed nearby.

Heavy rainfall that preceded Philippe spread northward across Cuba, the Florida Straits, and portions of southern Florida and the Bahamas on 28-29 October. Widespread rain amounts of 2 to 4 inches occurred over much of South Florida and along the east-central coast of Florida. A swath of generally 4 to 8 inches with isolated maximum amounts of 10 to 11 inches was

reported over eastern Broward and Palm Beach counties in southeastern Florida. The highest storm total amounts were 10.93 inches at Boynton Beach and 10.12 inches near Lighthouse Point (Table 3). No rainfall reports have been received from the Cayman Islands, Cuba, or the Bahamas.

Three EF-0 tornadoes occurred in southeastern Florida on 28 October. One tornado was confirmed in Miami-Dade County that caused minor roof damage at a shopping center only a few miles from the National Hurricane Center. Two tornadoes were reported in Palm Beach County, one that damaged about a dozen homes, and another that produced a wind gust to 64 kt at a South Florida Water Management District observing site at Forrest Hill High School near West Palm Beach. The latter tornado was captured on a WPEC-TV tower camera (Fig. 4).

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Philippe.

FORECAST AND WARNING CRITIQUE

The genesis of Philippe was fairly well anticipated. The potential for tropical cyclone formation was first mentioned in the Tropical Weather Outlook at 1800 UTC 22 October nearly 6 days before formation (Table 3). The chance of formation was raised to the medium category (40-60%) more than 5 days before formation and to the high category (>60%) about 18 h before development occurred. Due to the high possibility of tropical cyclone formation and the potential for the system to bring tropical storm conditions to portions of Cuba and the Bahamas, NHC initiated Potential Tropical Cyclone advisories at 2100 UTC 27 October, about 15 h before genesis.

Due to Philippe's very short time as a tropical cyclone, there is only one verifying 12-h forecast. The track error for this forecast was 37.7 n mi and the intensity error was 5 kt. The track error is somewhat higher than the long-term mean (24.9 n mi), but the intensity error is close to the 5-year average (5.5 kt).

Watches and warnings associated with Philippe are given in Table 4. The governments of Cuba and the Bahamas issued tropical storm watches and warnings at 2100 UTC 27 October when NHC initiated Potential Tropical Cyclone advisories on the pre-Philippe disturbance.

Table 1. Best track for Tropical Storm Philippe, 28–29 October 2017.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
27 / 1800	17.5	84.2	1006	30	disturbance
28 / 0000	18.2	84.5	1006	30	"
28 / 0600	19.1	84.3	1004	30	"
28 / 1200	20.1	83.5	1003	30	tropical depression
28 / 1800	21.3	82.4	1000	35	tropical storm
28 / 2200	22.2	81.6	1000	35	"
29 / 0000	22.7	81.2	1003	30	tropical depression
29 / 0600					dissipated
28 / 1800	21.3	82.4	1000	35	maximum winds and minimum pressure
28 / 2200	22.2	81.6	1000	35	landfall along the southern coast of the Zapata Peninsula, Cuba

Table 2. Selected rainfall observations from Florida for the 24-h period ending at 1200 UTC 29 October 2017.

Location	Rainfall (in)	Location	Rainfall (in)
Boynton Beach (5 WNW) 26.53°N 80.09°W	10.93	Riviera Beach (3 ENE) 26.79°N 80.03°W	5.75
Lighthouse Point (1 SW) 26.26°N 80.09°W	10.12	Pompano Beach (KPMP) 26.23°N 80.12°W	5.65
Fort Lauderdale (2 E) 26.11°N 80.12°W	9.44	Boca Raton (2 NNW) 26.38°N 80.11°W	5.63
Boca Raton (2 NE) 26.37°N 80.08°W	9.10	Jupiter (2 SW) 26.90°N 80.12°W	5.58
Boynton Beach 26.53°N 80.09°W	8.68	Florida Gardens 26.62°N 80.17°W	5.17
Delray Beach (3 SW) 26.41°N 80.09°W	8.50	Fort Lauderdale (KFXE) 26.12°N 80.15°W	5.09
Lantana 26.59°N 80.06°W	8.06	Lauderdale Lakes (1 E) 26.15°N 80.18°W	4.99
Deerfield Beach (2 WNW) 26.32°N 80.13°W	7.74	Ocean Ridge 26.53°N 80.05°W	4.78
West Palm Beach (KPBI) 26.71°N 80.06°W	6.71	Royal Palm Beach (2 E) 26.70°N 80.20°W	4.73
Lake Worth (1 NE) 26.62°N 80.06°W	6.62	The Acreage (2 ENE) 26.78°N 80.22°W	4.72
Florida Gardens (3 N) 26.66°N 80.17°W	6.45	Oakland Park 26.17°N 80.14°W	4.51
Juno Beach (1 S) 26.86°N 80.06°W	6.39	Weston (1 WNW) 26.11°N 80.41°W	4.42
Haverhill (1 ENE) 26.69°N 80.11°W	6.35	Boca Raton (12 W) 26.35°N 80.29°W	4.26
Lake Worth 26.62°N 80.07°W	6.15	Plantation (7 W) 26.11°N 80.36°W	4.09
North Palm Beach 26.82°N 80.06°W	6.04	Jupiter 26.93°N 80.10°W	4.04
Delray Beach (2 WNW) 26.472°N 80.12°W	5.90	Wellington (1 S) 26.64°N 80.26°W	3.70
Haverhill (3 NW) 26.71°N 80.16°W	5.77	Southwest Ranches (1 W) 26.05°N 80.35°W	3.58

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%)	108	136
Medium (40%-60%)	36	126
High (>60%)	18	18

Table 4. Watch and warning summary for Tropical Storm Philippe, 28–29 October 2017.

Date/Time (UTC)	Action	Location
27 / 2100	Tropical Storm Warning issued	Cuban provinces of Isla de la Juventud, La Habana, Ciudad de la Habana, Matanzas, Cienfuegos, and Villa Clara
27 / 2100	Tropical Storm Warning issued	Northwest Bahamas
27 / 2100	Tropical Storm Watch issued	Central Bahamas
28 / 1500	Tropical Storm Watch issued	Craig Key to Golden Beach
29 / 0900	Tropical Storm Watch discontinued	Craig Key to Golden Beach
29 / 0900	Tropical Storm Watch discontinued	Central Bahamas
29 / 1500	Tropical Storm Warning discontinued	All Cuban provinces
29 / 1800	Tropical Storm Warning discontinued	Northwest Bahamas

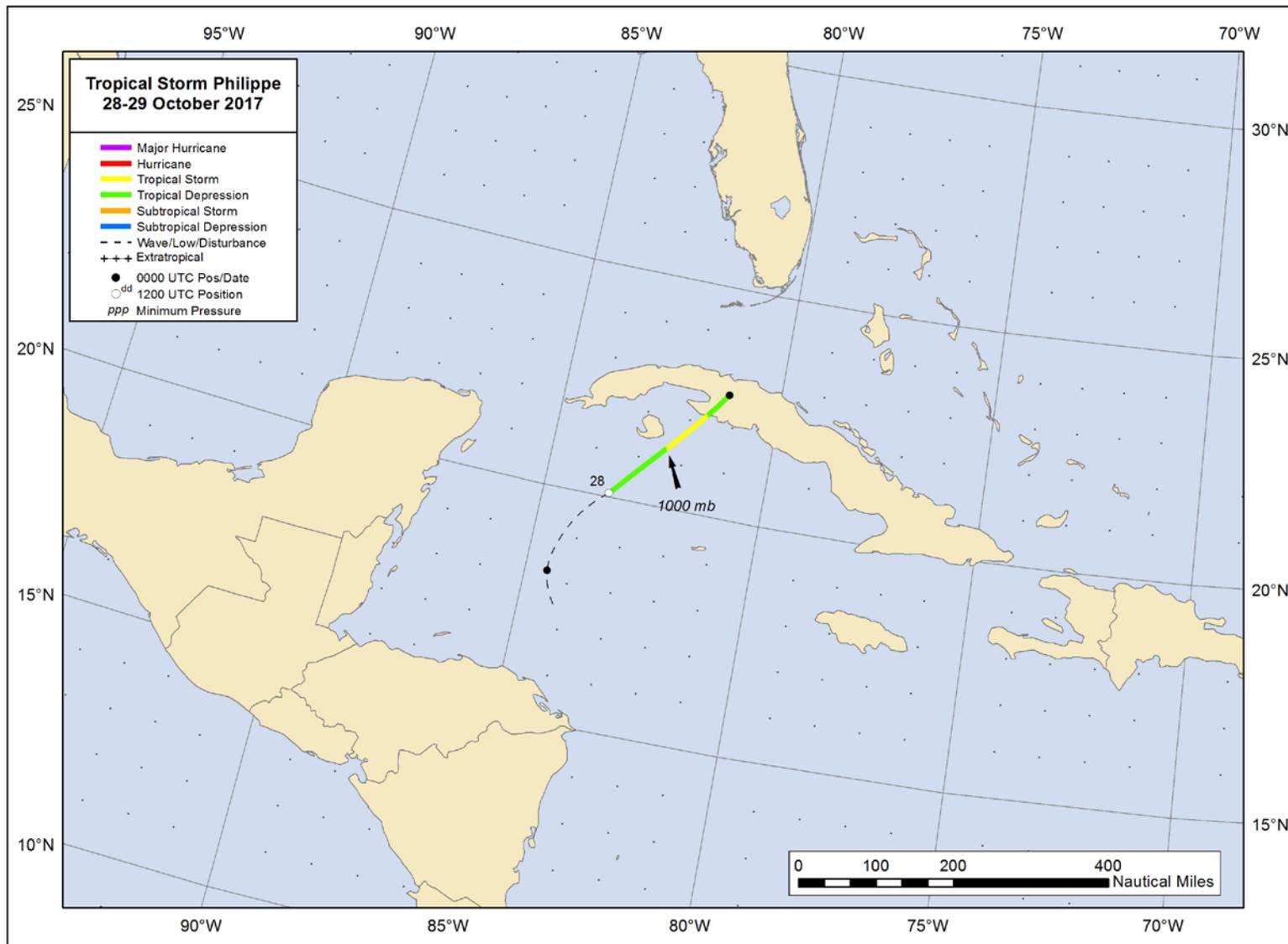


Figure 1. Best track positions for Tropical Storm Philippe, 28–29 October 2017.

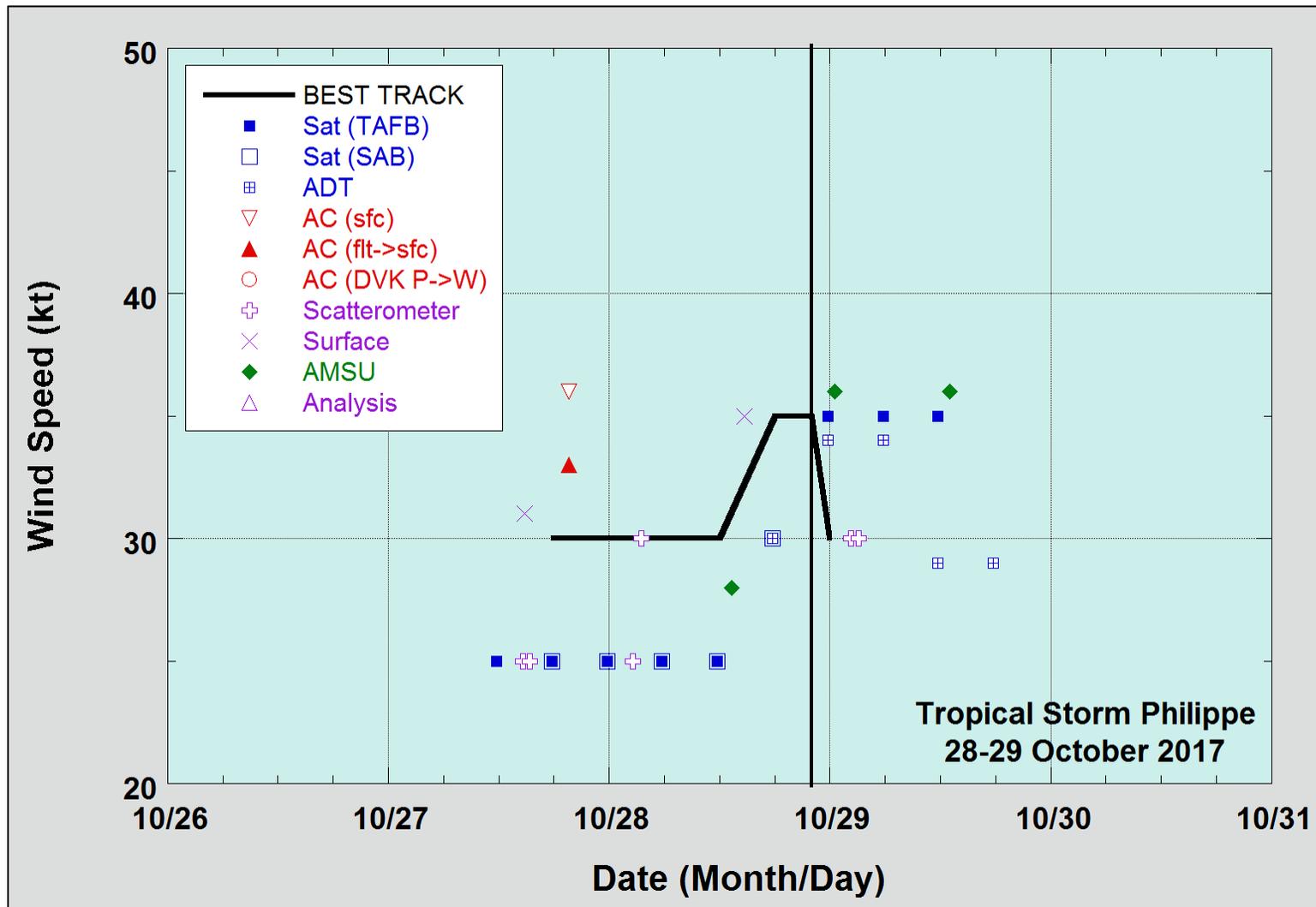


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Philippe, 28–29 October 2017. Aircraft observations have been adjusted for elevation using 80% adjustment factors for observations from 850 mb. Advanced Dvorak Technique estimates represent 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.

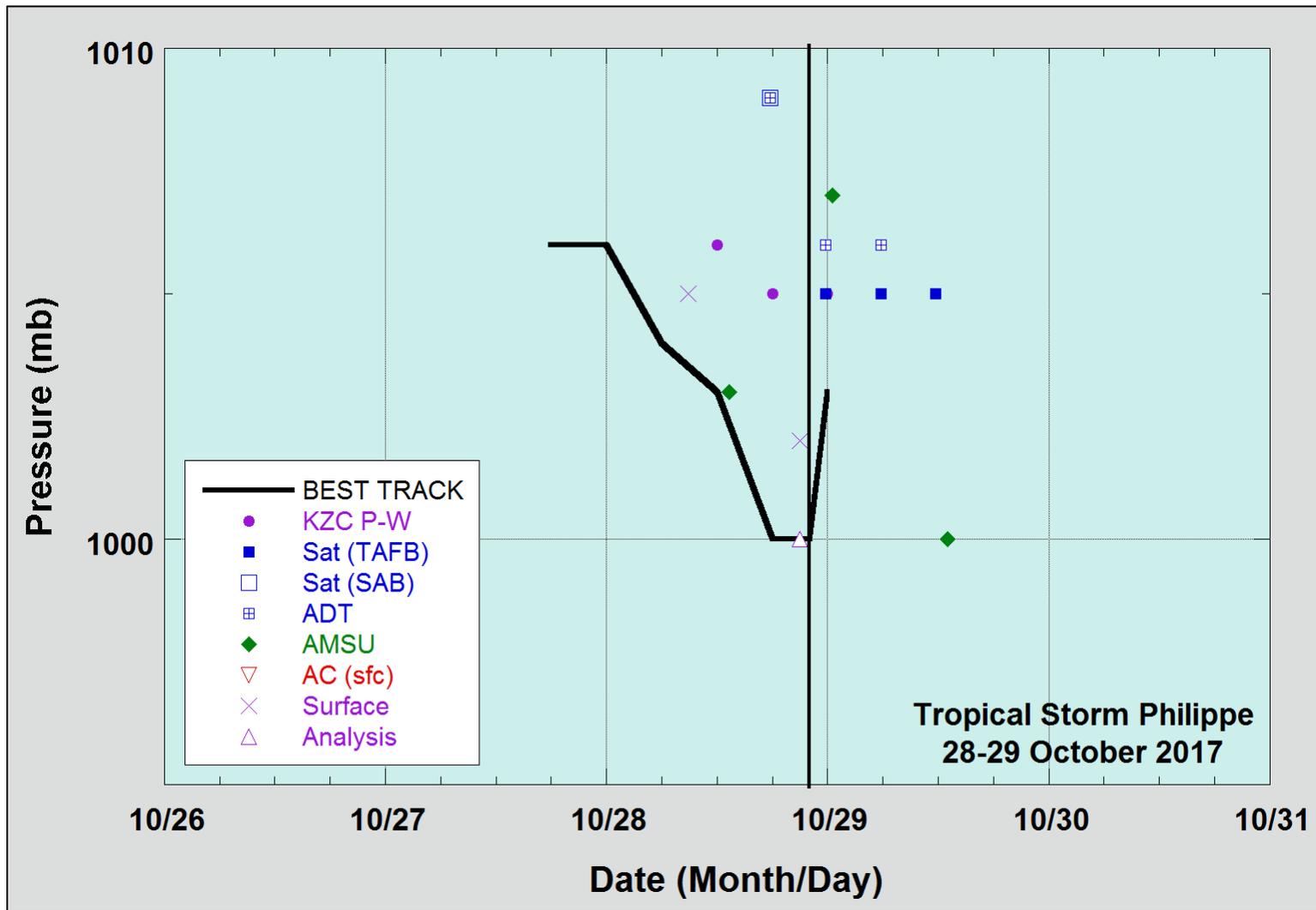


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Philippe, 28–29 October 2017. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for 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. Photo of an EF-0 tornado that was captured on a WPEC-TV tower camera near West Palm Beach, Florida, on 28 October 2017.