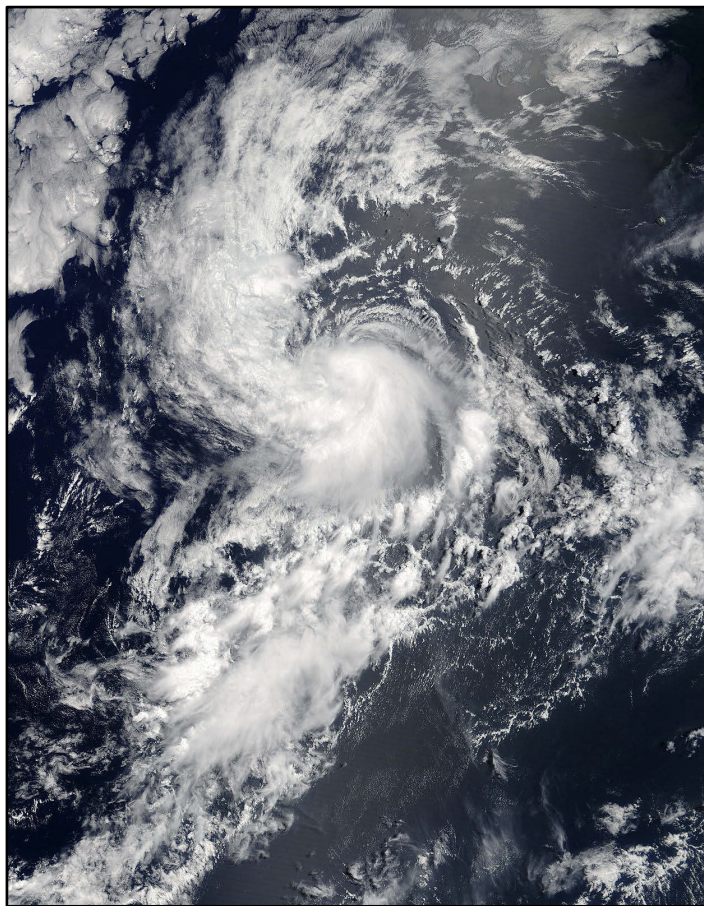# NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL STORM DANIEL
(EP052018)
24–26 June 2018

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National Hurricane Center
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MODIS VISIBLE SATELLITE IMAGE OF TROPICAL STORM DANIEL FROM THE AQUA SATELLITE AT 1825 UTC 24 JUNE 2018. IMAGE COURTESY OF NASA.

Daniel was a short-lived tropical storm that passed west-southwest of Clarion Island.

Tropical Storm Daniel

24–26 JUNE 2018

SYNOPTIC HISTORY

Daniel appears to have formed from a persistent cloud cluster along the Intertropical Convergence Zone (ITCZ). As Tropical Storm Carlotta dissipated near the coast of Mexico on 18 June, it drew a portion of the ITCZ northward around the decaying circulation. The pre-Daniel cluster formed on this date in the southwestern portion of the perturbed ITCZ near 10°N 120°W. The cluster moved little during the next few days, and little development occurred until 21 June when a weak low pressure area formed – possibly in response to a tropical wave moving westward into the disturbance. The low moved slowly northeastward during the next couple of days, and on 23 June it became better defined about 710 n mi south-southwest of the southern tip of the Baja California peninsula. Satellite data subsequently indicated increasing circulation and convection, and it is estimated that a tropical depression formed near 0000 UTC 24 June about 630 n mi south-southwest of the southern tip of the Baja California peninsula. 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[1].

The cyclone was moving toward the north at the time of genesis, and a faster northward motion occurred later on 24 June as it was steered by a mid- to upper-level low to the west. Warm sea surface temperatures and an environment of light vertical wind shear allowed the cyclone to strengthen, and it became a tropical storm near 1200 UTC 24 June. This was followed by a peak intensity of 40 kt late that day and early on 25 June. Daniel turned northwestward and slowed its forward speed on 25 June, with the center passing about 100 n mi west-southwest of Clarion Island. This motion brought Daniel over decreasing sea surface temperatures, which caused the cyclone to weaken. The associated convection dissipated early on 26 June, and Daniel degenerated to a remnant low pressure area near 0600 UTC that day about 535 n mi west-southwest of the southern tip of the Baja California peninsula.

The remnant low of Daniel turned westward and west-southwestward during the next couple of days as it was steered by the low-level trade winds. The low decayed to a trough on 28 June.

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

METEOROLOGICAL STATISTICS

Observations in Daniel (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 Daniel.

The 40-kt peak intensity is based mainly on ASCAT data from an overpass at 1654 UTC 24 June. The only significant surface observation during Daniel was from the Mexican automated station on Clarion Island, which reported a sustained wind of 27 kt and a gust to 35 kt at 2345 UTC 24 June.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Daniel was adequately forecast in the short-range (2-day) forecasts (Table 2). The system was first introduced into the Tropical Weather Outlook (TWO) 48 h before genesis with a low (<40%) chance of development, which was increased to a medium (40–60%) chance 30 h before genesis, and to a high (>60%) chance 12 h before genesis. However, the overall 5-day genesis forecasts were less good, as the system was not introduced into the TWO until 48 h before genesis. Several days in advance, the global forecast models showed good agreement that a low pressure area would develop where Daniel formed. However, there was poor agreement between the models that the low would become a tropical cyclone, and this contributed to the poor medium range genesis forecasts.

A verification of NHC official track forecasts for Daniel is given in Table 3a. While the official forecast track errors were generally much lower than the mean official errors for the previous 5-yr period, the number of forecasts is very small.   A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. Some of the guidance models had lower errors than the official forecast. However, the number of forecasts is too small to draw meaningful conclusions.

A verification of NHC official intensity forecasts for Daniel is given in Table 4a. Official forecast intensity errors were also much lower than the mean official errors for the previous 5-yr period except at the 36-h time. The number of forecasts, though, is again very small. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. As seen with the track forecasts, some guidance models had lower errors than the official forecast. No meaningful conclusions can be drawn, though, due to the small number of forecasts.

There were no coastal watches or warning associated with Daniel.

Table 1.   Best track for Tropical Storm Daniel, 24–26 June 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
23 / 0000	12.4	115.9	1009	20	low
23 / 0600	12.6	115.7	1009	25	"
23 / 1200	12.8	115.5	1008	25	"
23 / 1800	13.1	115.5	1008	25	"
24 / 0000	13.7	115.5	1007	30	tropical depression
24 / 0600	14.6	115.6	1007	30	"
24 / 1200	15.5	115.8	1006	35	tropical storm
24 / 1800	16.6	116.0	1004	40	"
25 / 0000	17.6	116.3	1004	40	"
25 / 0600	18.4	116.6	1004	40	"
25 / 1200	18.8	117.3	1005	35	"
25 / 1800	19.2	117.8	1006	30	tropical depression
26 / 0000	19.6	118.4	1007	30	"
26 / 0600	19.8	119.0	1007	25	remnant low
26 / 1200	19.9	119.7	1008	25	"
26 / 1800	20.0	120.3	1008	25	"
27 / 0000	19.9	121.0	1009	25	"
27 / 0600	19.7	121.7	1009	20	"
27 / 1200	19.6	122.5	1010	20	"
27 / 1800	19.5	123.5	1010	20	"
28 / 0000	19.4	124.4	1010	20	"
28 / 0600	19.3	125.3	1010	20	"
28 / 1200					dissipated
24 / 1800	16.6	116.0	1004	40	maximum wind and minimum pressure

Table 2.   Number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the "Low" category do not include forecasts of a 0% chance of genesis.

	Hours Before Genesis	
	48-Hour Outlook	120-Hour Outlook
Low (<40%)	48	48
Medium (40%-60%)	30	30
High (>60%)	12	12

Table 3a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Daniel, 24–26 June 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	**18.9**	**21.5**	**10.7**	**6.0**			
OCD5	30.5	48.7	74.9	116.2			
Forecasts	7	5	3	1			
OFCL (2013-17)	21.8	33.2	43.0	53.9	80.7	111.1	150.5
OCD5 (2013-17)	34.9	70.7	109.1	146.1	213.8	269.0	339.7

Table 3b.   Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Daniel, 24–26 June 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 3a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	11.4	22.0	9.6	6.0			
OCD5	33.5	66.9	93.1	116.2			
GFSI	16.6	22.3	20.2	8.2			
HWFI	15.4	41.0	47.5	52.2			
HMNI	16.6	28.6	27.9	32.1			
EMXI	23.9	43.9	35.1	33.5			
NVGI	21.1	24.3	10.1	24.7			
CMCI	27.4	41.1	63.4	125.5			
CTCI	12.2	**17.1**	9.8	13.3			
TVCE	**10.4**	**17.5**	**9.5**	8.2			
HCCA	12.2	**18.6**	**6.4**	17.0			
AEMI	12.5	24.0	43.8	34.4			
TABS	35.2	62.6	90.6	96.0			
TABM	26.4	35.2	19.6	62.4			
TABD	19.4	28.9	21.1	24.7			
Forecasts	4	3	2	1			

Table 4a.   NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Daniel, 24–26 June 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	**2.1**	**2.0**	**5.0**	**5.0**			
OCD5	4.9	6.8	4.0	8.0			
Forecasts	7	5	3	1			
OFCL (2013-17)	5.8	9.6	11.8	13.2	15.1	15.1	14.6
OCD5 (2013-17)	7.6	12.4	15.6	17.7	19.8	20.8	19.6

Table 4b.   Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Daniel, 24–26 June 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.

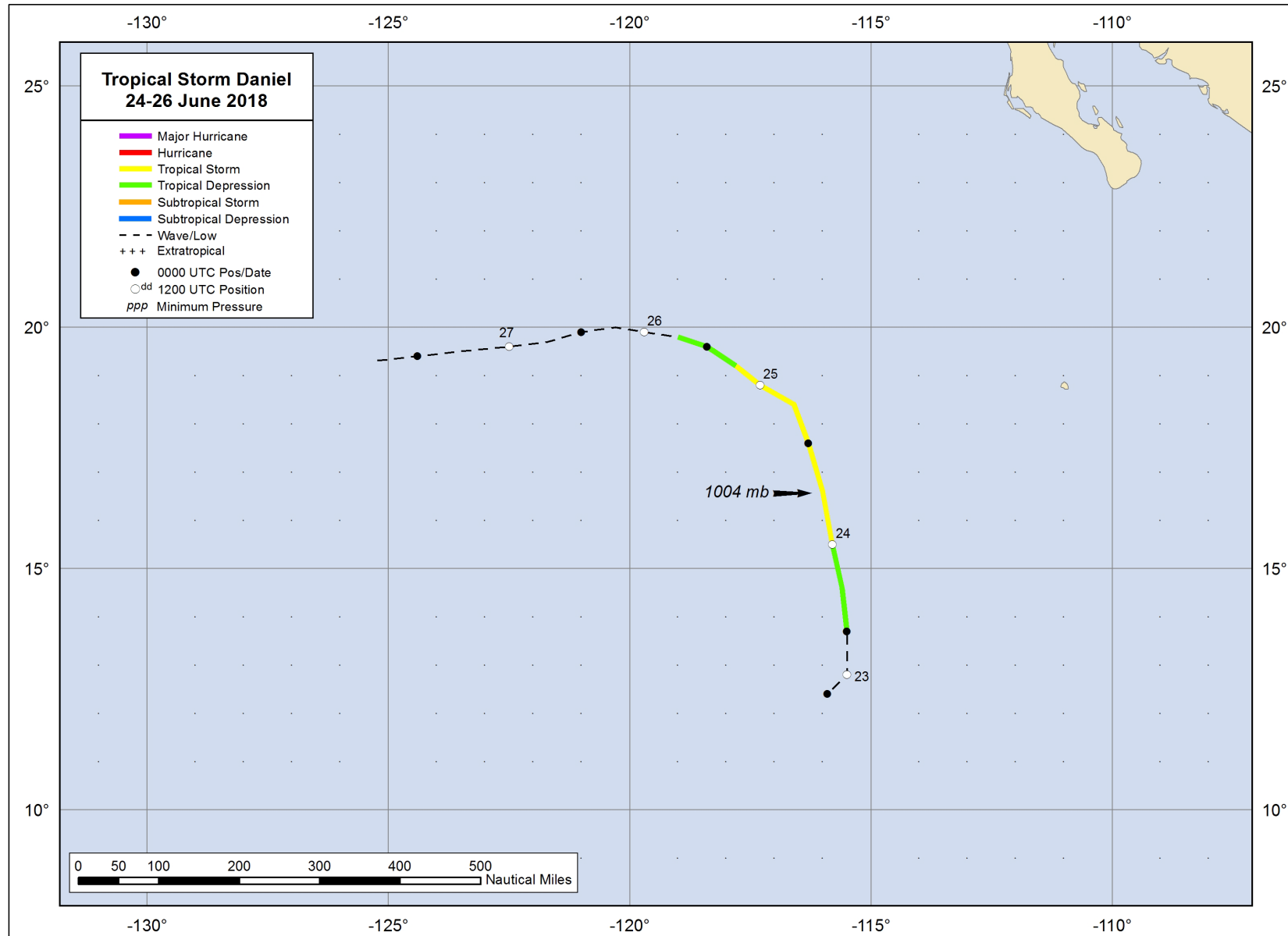| Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	2.5	0.0	5.0	5.0			
OCD5	5.0	5.0	**4.0**	8.0			
HWFI	4.0	5.3	5.0	**4.0**			
HMNI	6.5	10.3	12.5	10.0			
DSHP	4.8	4.0	6.5	8.0			
LGEM	5.8	6.7	**2.0**	**2.0**			
ICON	4.8	4.0	**4.5**	**3.0**			
IVCN	4.5	3.0	5.0	5.0			
CTCI	5.2	3.7	6.0	11.0			
GFSI	5.0	4.0	7.5	8.0			
EMXI	5.5	6.7	**4.0**	9.0			
HCCA	4.8	2.7	**4.5**	**1.0**			
Forecasts	4	3	2	1			

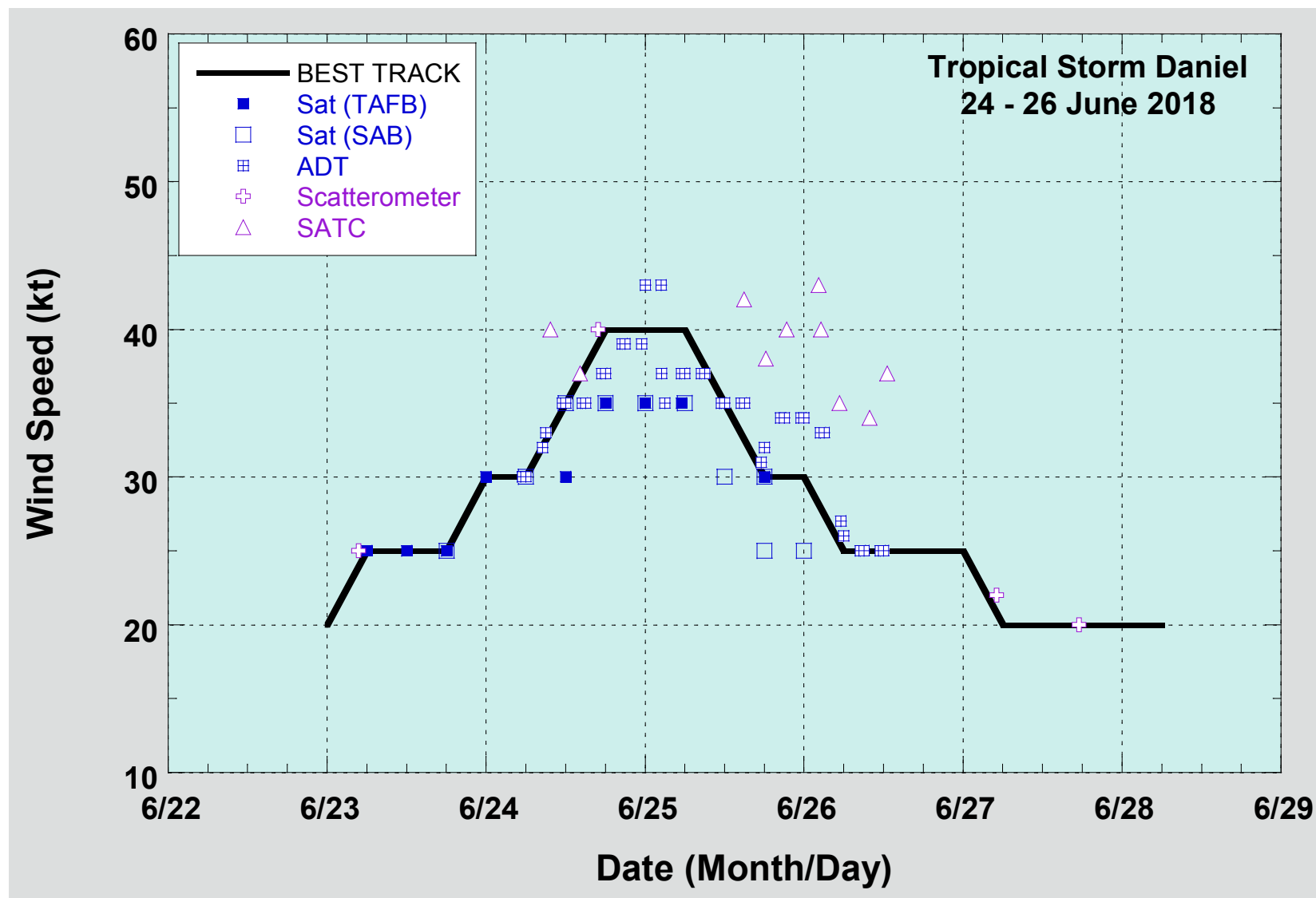Figure 1.   Best track positions for Tropical Storm Daniel, 24–26 June 2018.

Figure 2.   Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Daniel, 24–26 June 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. Dashed vertical lines correspond to 0000 UTC.
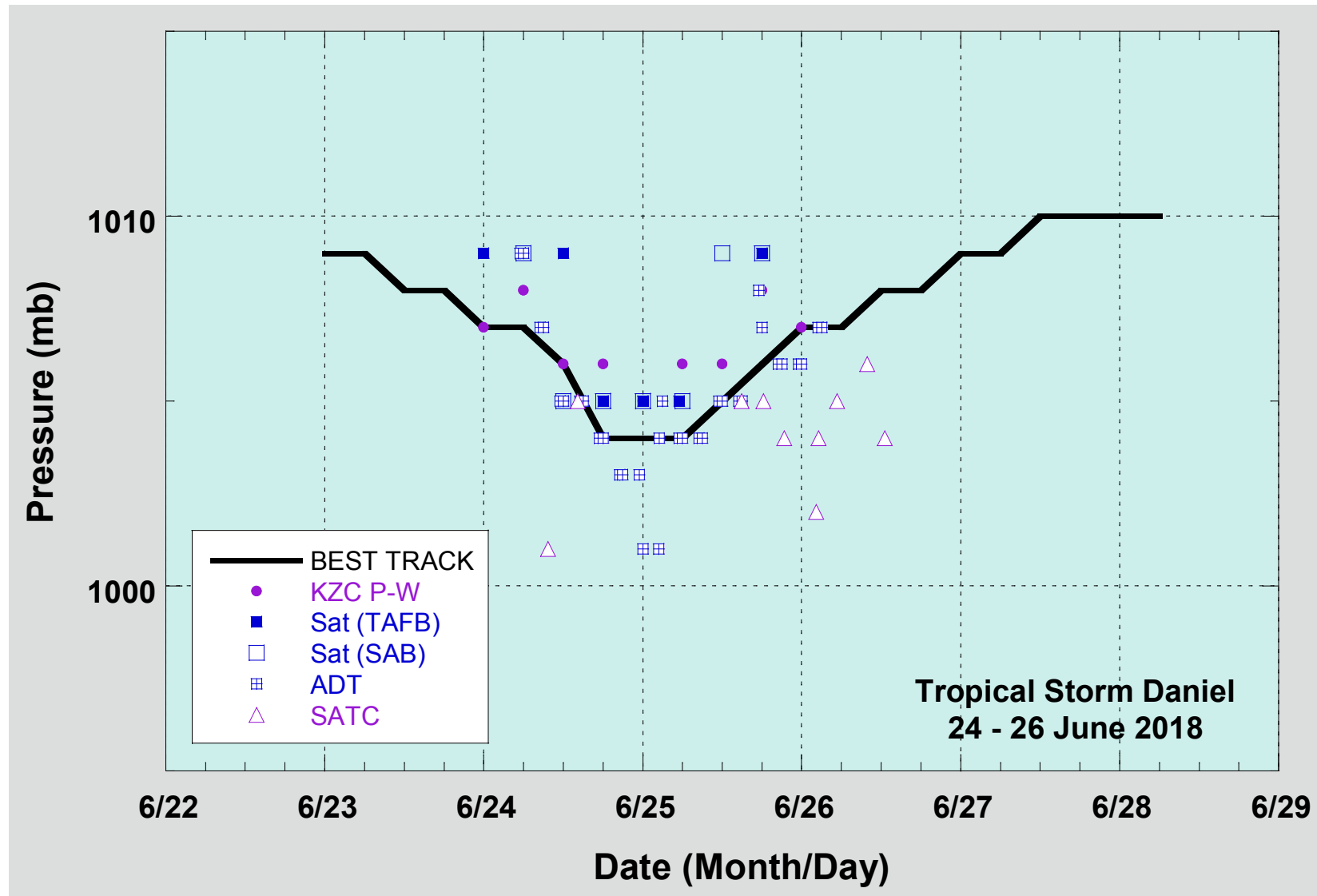
Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Daniel, 24–26 June 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.