

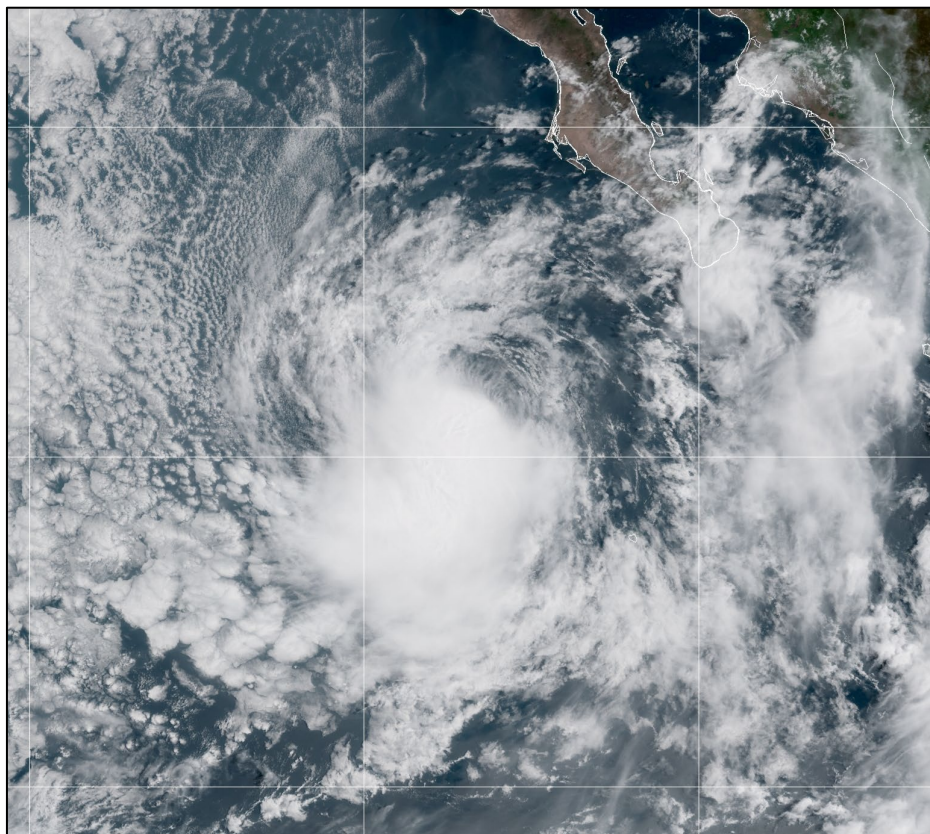


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## TROPICAL STORM MARTY (EP132021)

23–24 August 2021

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30 September 2021



GOES-16 GEOCOLOR IMAGE OF TROPICAL STORM MARTY AT 1700 UTC 23 AUGUST 2021,  
NEAR THE TIME OF MARTY'S PEAK INTENSITY.

Marty was a short-lived tropical storm that formed off the southwestern coast of Mexico. The tropical storm originated from the remnants of Atlantic basin Hurricane Grace, which made landfall along the Gulf of Mexico coast of mainland Mexico.

# Tropical Storm Marty

23–24 AUGUST 2021

## SYNOPTIC HISTORY

Marty formed from the remnants of Atlantic basin Hurricane Grace, which made landfall as a category 3 hurricane (on the Saffir-Simpson Hurricane Wind Scale) around 0600 UTC 21 August, just south of Tuxpan, along the Gulf of Mexico coast of mainland Mexico. Grace quickly weakened while moving west-southwestward over the mountainous terrain of central Mexico. Although the low-level center of Grace dissipated by late on 21 August, the mid-level circulation continued west-southwestward and reached the coast of southwestern Mexico early the next day. Subsequently, a large area of deep convection developed along the southwestern coast of Mexico early on 22 August. The cluster of convection moved westward offshore and helped spawn a broad area of surface low pressure by 1800 UTC that day. Scatterometer data from a few hours earlier indicated that the system was producing a large area of 30 to 35 kt winds around the northeastern portion of its broad circulation; however, these winds could have been topographically enhanced as they were occurring just offshore of the higher terrain of southwestern Mexico. The deep convection briefly waned that afternoon but re-developed around the western portion of the better-defined center around 0000 UTC 23 August, which marked the formation of a tropical storm a little more than 200 n mi south-southeast of the southern tip of the Baja California peninsula. The “best track” chart of Marty’s path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1<sup>1</sup>.

During the next 12 h, deep convection increased over the western portion of Marty’s circulation while the tropical storm moved west-northwestward at around 15 kt to the south of a strong mid-tropospheric ridge that extended from the south-central United States westward across northern Mexico and the eastern Pacific Ocean. The increase in convective organization early that morning led to modest strengthening, and Marty is estimated to have reached its peak intensity of 40 kt at 1200 UTC 23 August, when it was located about 180 n mi southwest of the southern tip of the Baja California peninsula. Around that time, Marty turned westward to the south of the mid-level ridge, and moderate northeasterly shear prevented further strengthening. The overall convective organization of Marty did not change much until later that afternoon when the shear caused most of the deep convection to be stripped away to the west-southwest of the low-level center. This resulted in Marty weakening to a 35-kt tropical storm by 0000 UTC 24 August. Shortly thereafter, the entrainment of a drier and more stable airmass, along with

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

decreasing sea surface temperatures, caused the remaining deep convection to dissipate, and Marty degenerated into a remnant low by 0600 UTC that day.

The remnant low moved westward at a slower forward speed over the next couple of days and gradually weakened. By late on 26 August, the low turned west-southwestward within the low-level trade wind flow. Shortly after 0600 UTC the next day, scatterometer wind data indicated that the low opened up into a trough of low pressure while it was located about 1100 n mi west-southwest of the southern tip of the Baja California peninsula.

## METEOROLOGICAL STATISTICS

Observations in Marty (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), 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 Marty.

The 40-kt peak intensity of Marty is based on data from an ASCAT-A overpass at 1521 UTC 23 August that revealed peak winds of 39 kt. Marty's peak intensity is shown to have occurred in the best track at both 1200 and 1800 UTC that day, when the satellite presentation of the storm was at its best (cover photo). Marty's estimated minimum pressure of 1002 mb is based on the Knaff-Zehr-Courtney pressure-wind relationship (Fig. 3).

There were no ship reports of winds of tropical storm force in association with Marty.

## CASUALTY AND DAMAGE STATISTICS

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

## FORECAST AND WARNING CRITIQUE

The genesis of Marty was well anticipated (Table 2). The potential for tropical cyclone formation in the eastern Pacific from the remnants of Atlantic basin Hurricane Grace was first mentioned in the Tropical Weather Outlook at 1800 UTC 18 August, about 102 h prior to formation. At that time, Grace was located over the northwestern Caribbean Sea, and the 5-day development potential over the eastern Pacific was assessed to be in the low (<40%) category.



The 5-day probabilities were raised to the medium (40-60%) category 90 h before formation, and to the high (>60%) category 72 h before genesis occurred. The short-range (0-48 h) probabilities also provided ample lead time for genesis. The system was first assigned a 48-h low probability of development 66 h before formation. The probabilities were increased to the medium and high categories 54 and 30 h before genesis, respectively. Global model guidance consistently indicated that the remnants of Grace had the potential to develop into a tropical cyclone off the southwestern coast of Mexico, which contributed to the accurate and timely genesis forecasts.

Due to Marty's short existence as a tropical cyclone, there were only 2 verifying 12-h forecasts and no verifying forecasts beyond that time. The mean official track error for those forecasts was 27.6 n mi (Table 3), which is a little above the 5-year mean. Official forecast intensity errors were lower than the mean errors for the previous 5-yr period (Table 4), albeit for the very small sample size. As a result of Marty's brief existence as a tropical cyclone, a meaningful comparison of official forecasts and track model guidance cannot be made.

**Table 1. Best track for Tropical Storm Marty, 23–24 August 2021.**

<b>Date/Time (UTC)</b>	<b>Latitude (°N)</b>	<b>Longitude (°W)</b>	<b>Pressure (mb)</b>	<b>Wind Speed (kt)</b>	<b>Stage</b>
23 / 0000	19.6	108.9	1004	35	tropical storm
23 / 0600	20.0	110.3	1003	35	"
23 / 1200	20.5	111.8	1002	40	"
23 / 1800	20.7	113.4	1002	40	"
24 / 0000	20.7	115.0	1003	35	"
24 / 0600	20.6	116.4	1005	30	low
24 / 1200	20.6	117.5	1006	30	"
24 / 1800	20.5	118.6	1006	30	"
25 / 0000	20.5	119.6	1006	30	"
25 / 0600	20.5	120.5	1006	30	"
25 / 1200	20.6	121.4	1007	25	"
25 / 1800	20.6	122.4	1007	25	"
26 / 0000	20.7	123.4	1007	25	"
26 / 0600	20.7	124.5	1007	25	"
26 / 1200	20.6	125.6	1008	25	"
26 / 1800	20.5	126.7	1008	25	"
27 / 0000	20.2	127.8	1008	25	"
27 / 0600	19.7	129.0	1008	25	"
27 / 1200					dissipated
23 / 1200	20.5	111.8	1002	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%)	66	102
Medium (40%-60%)	54	90
High (>60%)	30	72

Table 3. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Marty, 23–24 August 2021. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	27.6							
OCD5	43.2							
Forecasts	2							
OFCL (2016-20)	21.3	33.1	44.0	54.6	78.4	76.0	95.9	116.6
OCD5 (2016-20)	33.1	69.4	107.8	147.0	186.4	219.7	280.2	342.0

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Marty, 23–24 August 2021. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	<b>2.5</b>							
OCD5	2.0							
Forecasts	2							
OFCL (2016-20)	5.6	9.0	10.9	12.6	15.2	15.3	16.0	16.7
OCD5 (2016-20)	7.2	12.0	15.3	17.6	17.9	20.4	21.2	20.8

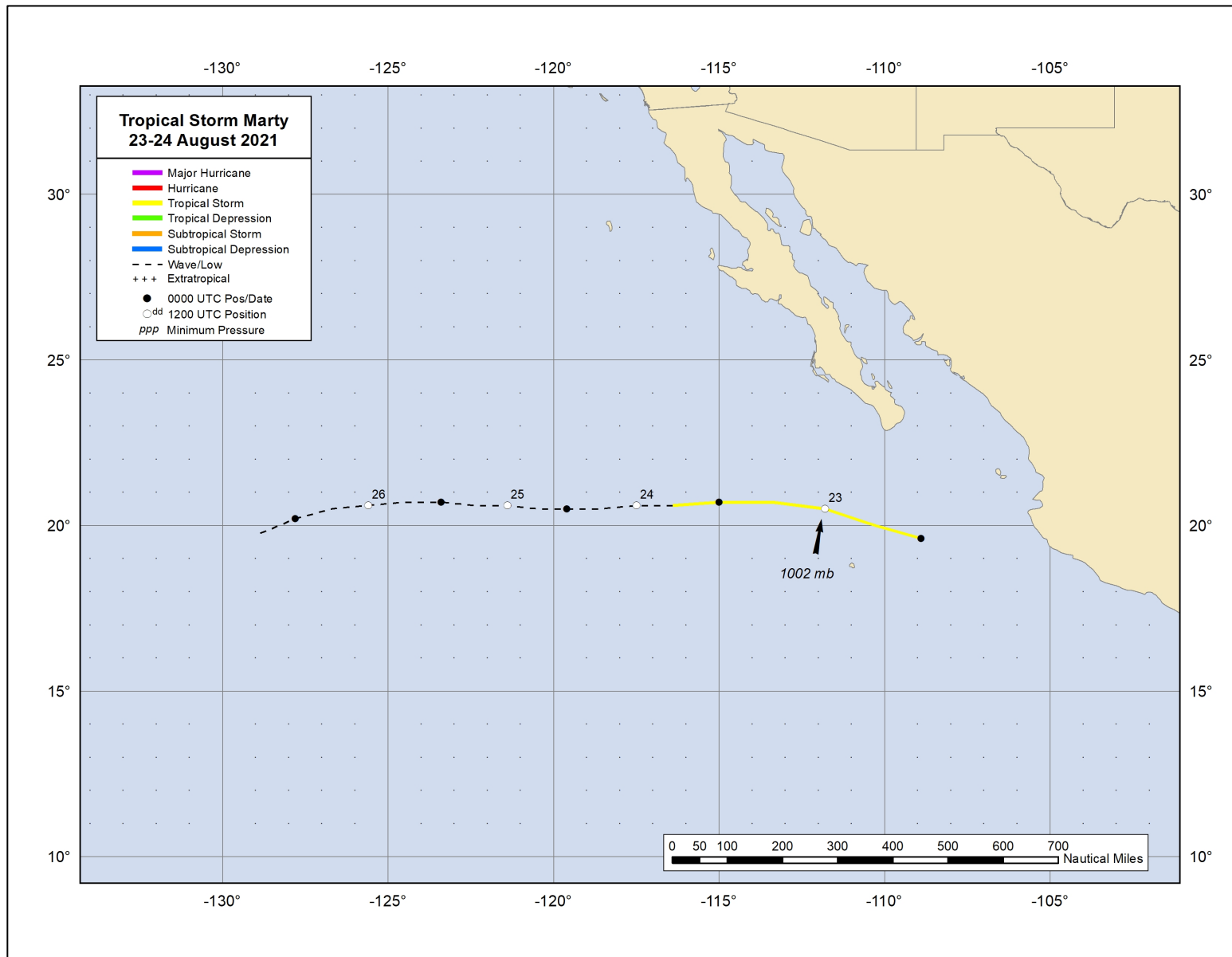


Figure 1. Best track positions for Tropical Storm Marty, 23–24 August 2021.



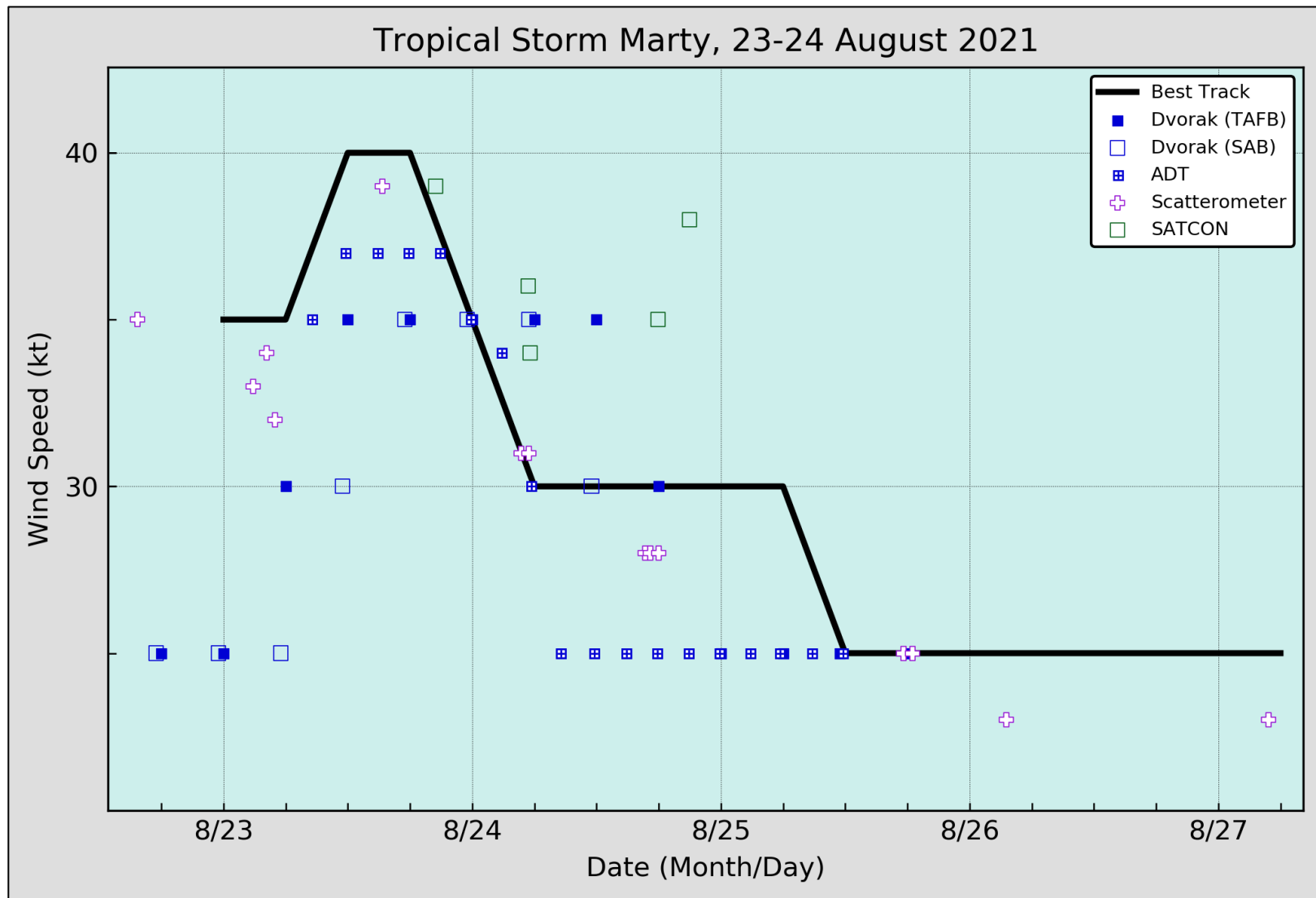


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Marty, 23–24 August 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

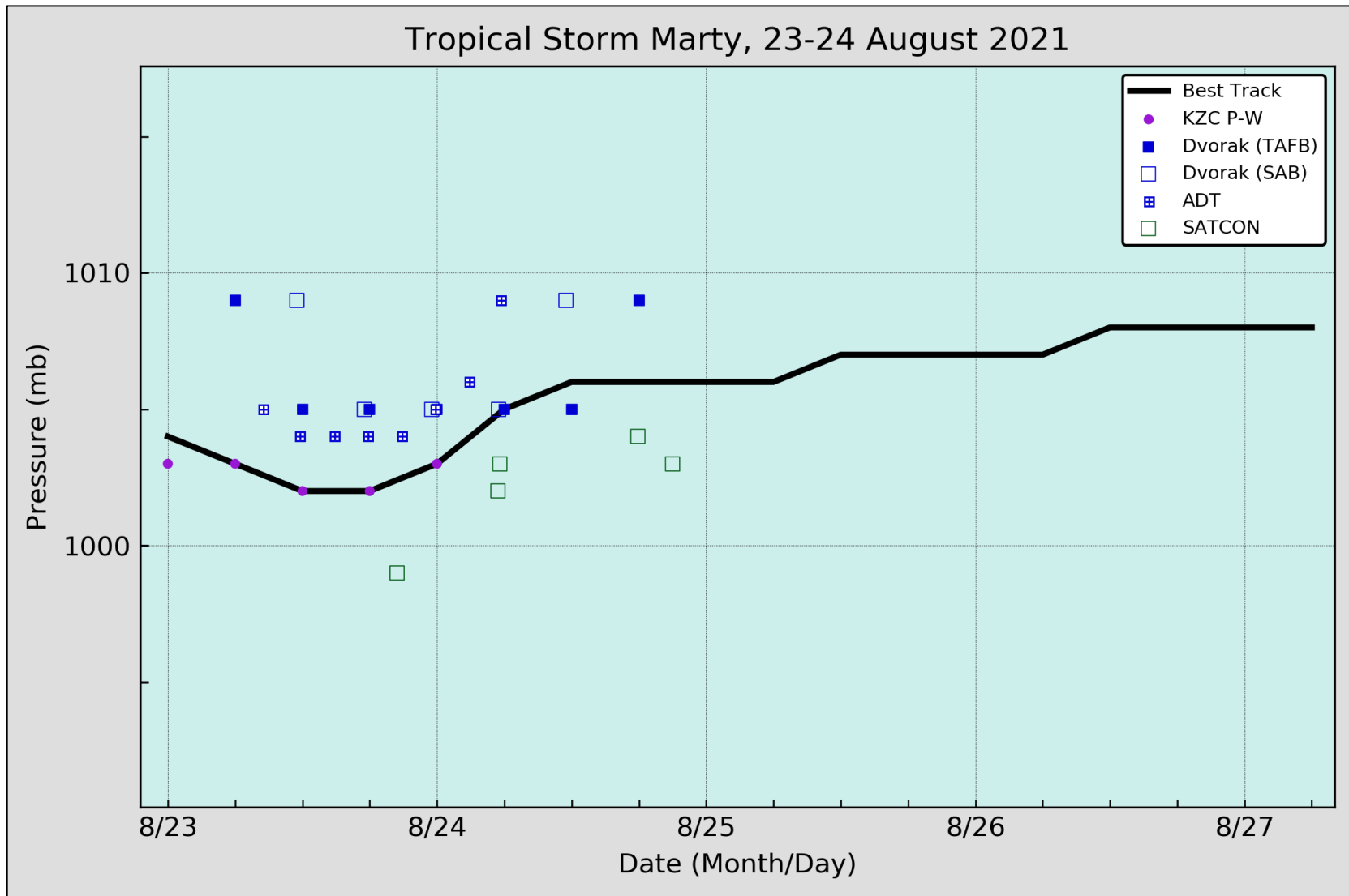


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Marty, 23–24 August 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.