NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

SUBTROPICAL STORM TERESA

(AL192021)

24–25 September 2021

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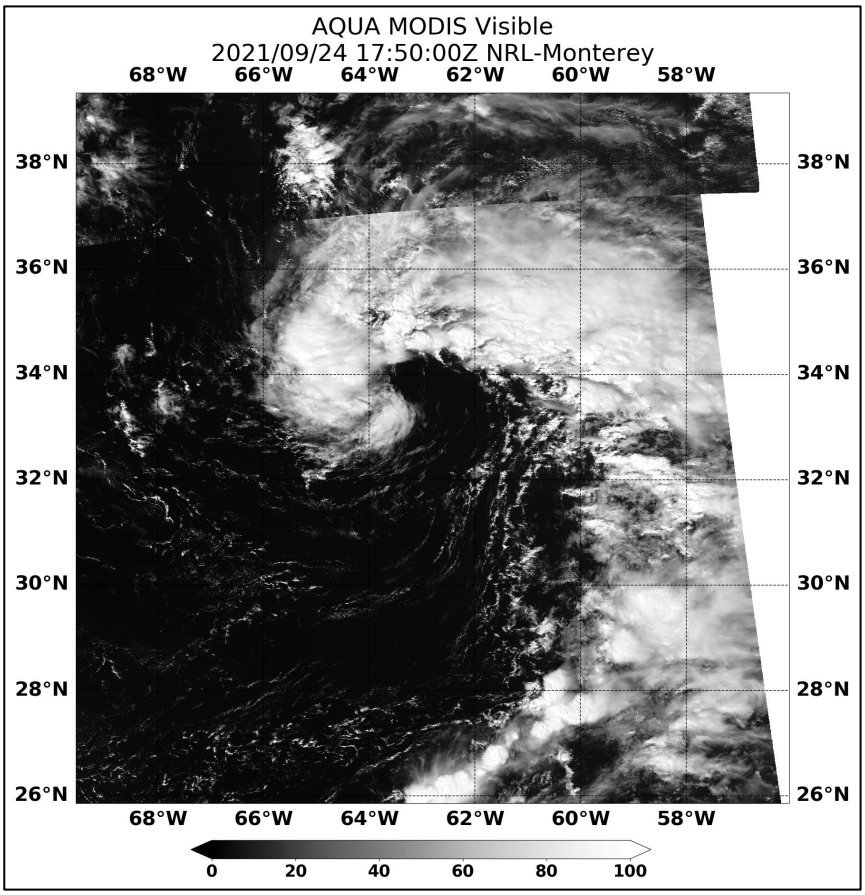
National Hurricane Center
13 January 2022



AQUA MODIS VISIBLE IMAGE OF TERESA AT 1750 UTC 24 SEPTEMBER. IMAGE COURTESY OF NASA AND NRL MONTEREY.

Teresa was a short-lived subtropical storm that occurred over the western Atlantic northeast of Bermuda.

Subtropical Storm Teresa

24–25 SEPTEMBER 2021

SYNOPTIC HISTORY

Teresa had a non-tropical origin. A weak cold front moved into the central and western Atlantic on 19–20 September, and by 22 September an area of enhanced cloudiness was occurring between latitudes 28–30°N and longitudes 50–65°W. This area of disturbed weather was located to the north and northeast of the remnants of Tropical Storm Peter. On 23 September, an upper-level trough moved into the area from the west, resulting in the development of a more concentrated area of convection about 300 n mi east-southeast of Bermuda. A low-level circulation developed around 0600 UTC 24 September about 150 n mi east-southeast of Bermuda, and it is estimated that a subtropical depression formed at that time. The "best track" chart of the subtropical 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 subtropical depression moved northwestward after genesis, and it strengthened into a subtropical storm by 1200 UTC 24 September. Additional strengthening led to a peak intensity of 40 kt 6 h later. Subsequently, increasing westerly vertical wind shear and dry air entrainment caused the associated convection to dissipate while the cyclone tuned west-northwestward and slowed its forward speed. The lack of convection caused Teresa to weaken back to a subtropical depression by 1200 UTC 25 September. By this time, a second area of low pressure developing to the north of Teresa cause the cyclone to move slowly eastward. A turn toward the east-northeast at a faster forward speed occurred later that day, during which Teresa decayed to a convection-free remnant low. The low weakened to a trough on 26 September about 250 n mi northeast of Bermuda, and the trough was subsequently absorbed by a frontal system the next day.

METEOROLOGICAL STATISTICS

Observations in Teresa (Figs. 2 and 3) include subjective satellite-based Hebert-Poteat technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), 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

[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.

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 Teresa.

There were no surface observations of gale-force winds associated with Teresa. The peak intensity of 40 kt is based on ASCAT surface wind data from the Metop-C satellite at 1439 UTC 24 September. Although the cyclone passed close to Bermuda, the impacts on the island were minimal.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Teresa was poorly forecast. The disturbance that Teresa formed from was first introduced in the Tropical Weather Outlook 12 h prior to the best track time of genesis, at which time it was given a low (<40%) chance of development in both the short (0-2 day) and medium (2-5 day) time ranges (Table 2). The probabilities did not reach the medium (40-60%) and high categories (>60%) until after the best track genesis time. The main factor in the poor forecasts was the lack of support for genesis in the global models, which only forecast a relatively weak low-pressure area to develop instead of a subtropical or tropical cyclone.

A verification of NHC official track forecasts for Teresa is given in Table 3. Official forecast track errors were greater than the mean official errors for the previous 5-yr period at 12 h, which, with two forecasts, was the only verifying time.

A verification of NHC official intensity forecasts for Teresa is given in Table 4. Official forecast intensity errors were greater than the mean official errors for the previous 5-yr period at 12 h, which, with two forecasts, was the only verifying time. Due to Teresa's brief existence as a subtropical storm, no meaningful comparisons can be made with the models.

No coastal watches or warnings were issued for Teresa.

Table 1. Best track for Subtropical Storm Teresa, 24–25 September 2021.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage*
24 / 0600	31.4	62.0	1011	30	subtropical depression
24 / 1200	32.8	62.9	1010	35	subtropical storm
24 / 1800	33.6	64.1	1008	40	"
25 / 0000	34.1	65.0	1008	40	"
25 / 0600	34.3	65.5	1009	35	"
25 / 1200	34.3	65.2	1010	30	subtropical depression
25 / 1800	34.3	64.5	1010	30	remnant low
26 / 0000	34.7	63.9	1010	30	"
26 / 0600	35.2	63.2	1010	30	"
26 / 1200	35.6	61.8	1011	25	"
26 / 1800					dissipated
24 / 1800	33.6	64.1	1008	40	minimum pressure and maximum winds

Table 2. Number of hours in advance of formation for Subtropical Storm Teresa 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%)	12	12
Medium (40%-60%)	N/A	N/A
High (>60%)	N/A	N/A

Table 3. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Subtropical Storm Teresa, 24–25 September 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	61.0							
OCD5	125.7							
Forecasts	2							
OFCL (2016-20)	23.9	36.3	49.1	63.9	83.7	94.1	128.1	169.7
OCD5 (2016-20)	45.1	97.2	157.2	216.7	257.6	325.4	414.4	490.0

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Subtropical Storm Teresa, 24–25 September 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	10.0							
OCD5	15.0							
Forecasts	2							
OFCL (2016-20)	5.4	8.0	9.6	10.9	11.5	12.1	13.3	14.5
OCD5 (2016-20)	7.0	11.0	14.3	16.8	18.5	19.7	21.7	23.0

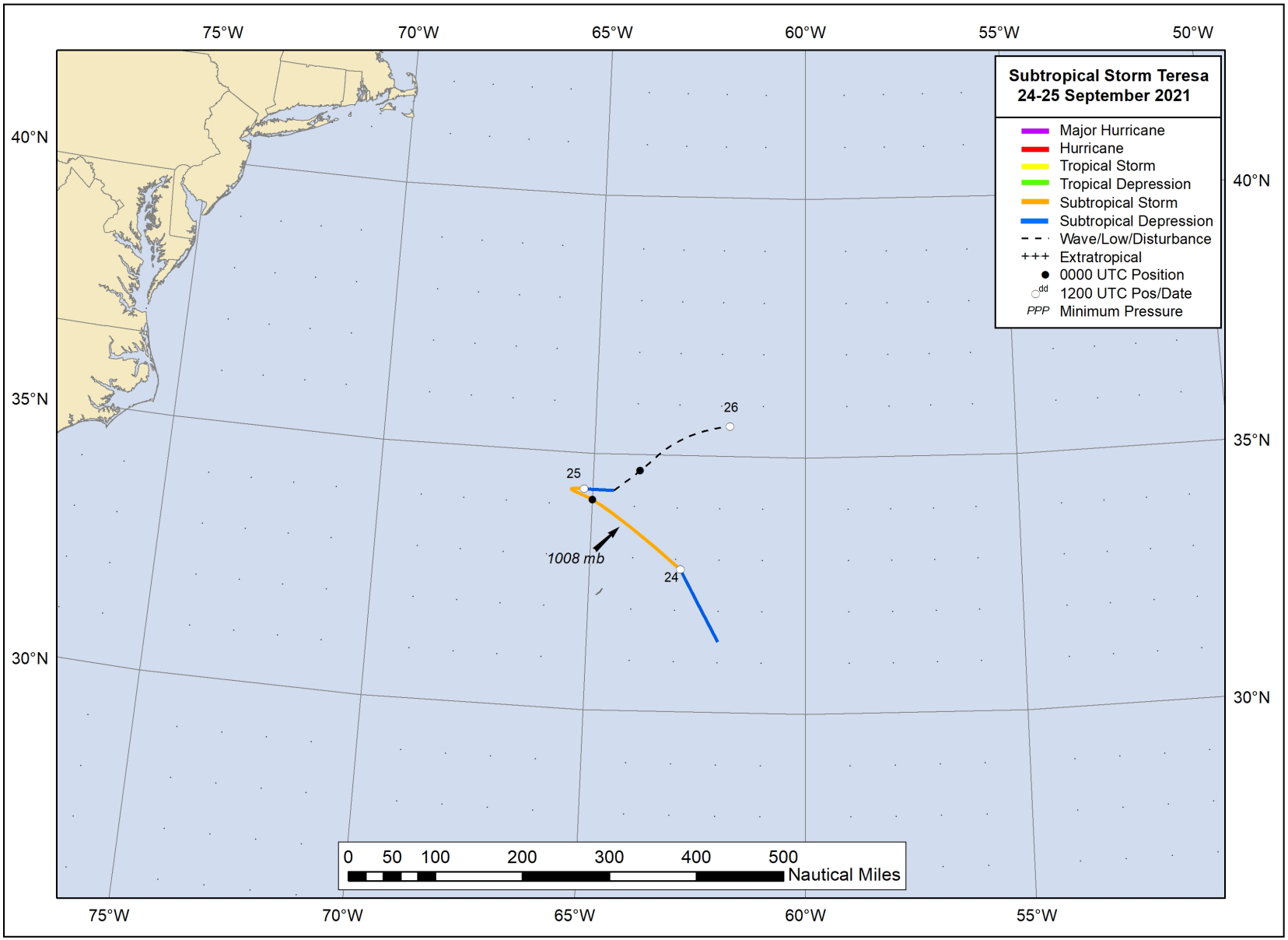


Figure 1. Best track positions for Subtropical Storm Teresa, 24 – 25 September 2021.

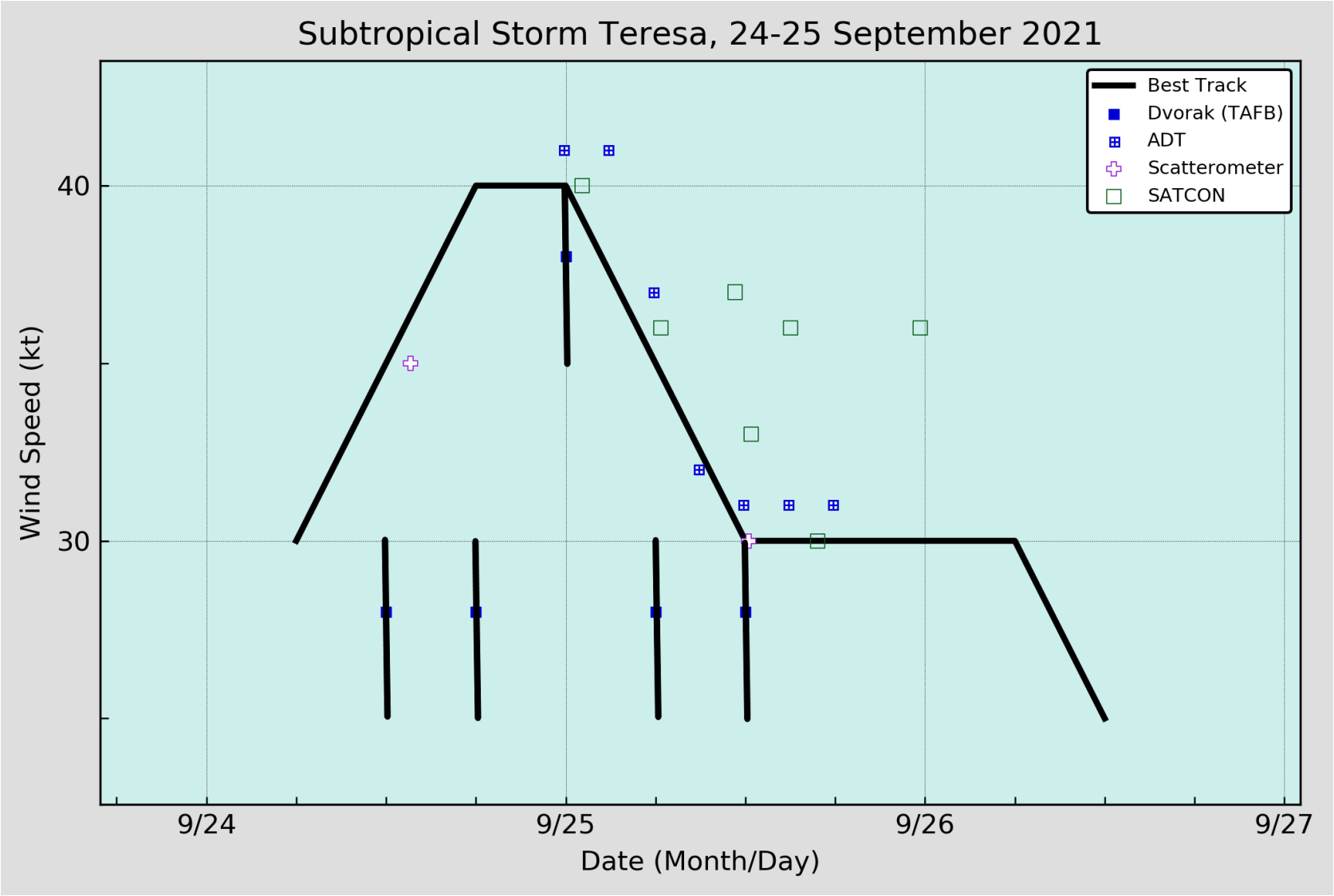


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Subtropical Storm Teresa, 24–25 September 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC. Vertical black lines are intensity ranges for Hebert-Poteat subtropical intensity estimates.

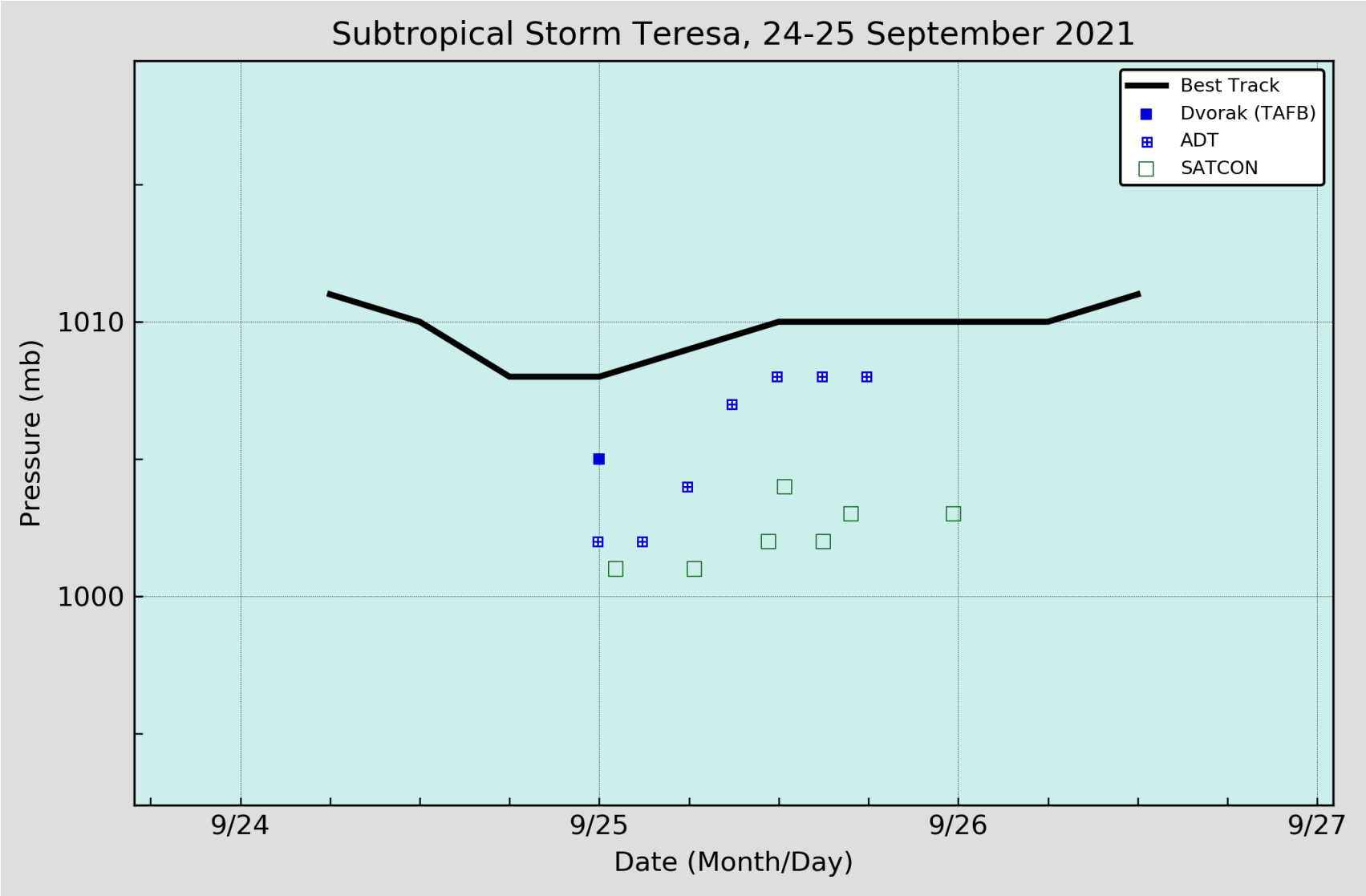


Figure 3. Selected pressure observations and best track minimum central pressure curve for Subtropical Storm Teresa, 24–25 September 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute 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.