

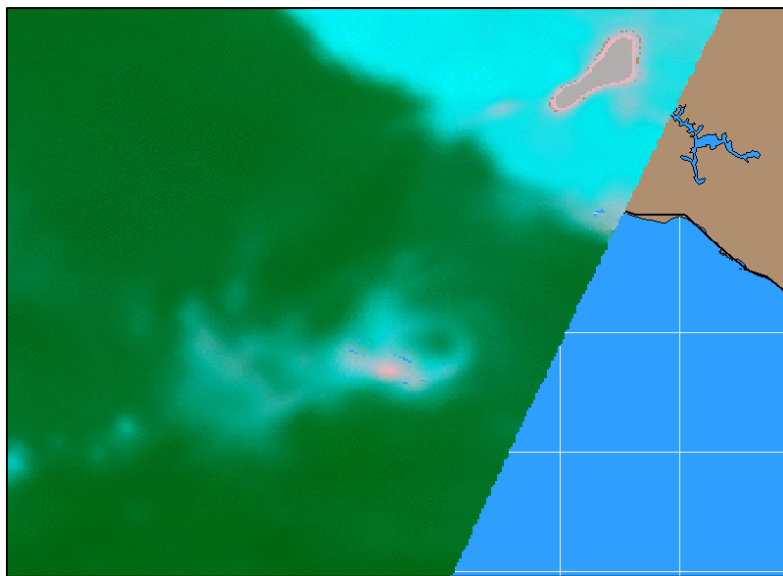


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM JULIO (EP152020)

5–7 September 2020

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37-GHZ COLOR COMPOSITE MICROWAVE IMAGE OF JULIO FROM THE NASA GLOBAL PRECIPITATION MEASUREMENT (GPM) SATELLITE AT 0030 UTC 6 SEPTEMBER, NEAR THE TIME OF THE STORM'S PEAK INTENSITY. IMAGE COURTESY OF THE NAVAL RESEARCH LABORATORY (NRL).

Julio was a small tropical storm that formed from the remnants of Atlantic Hurricane Nana, which made landfall in southern Belize. Julio moved parallel to, but just offshore of, the southern coast of Mexico before dissipating near Socorro Island.

Tropical Storm Julio

5–7 SEPTEMBER 2020

SYNOPTIC HISTORY

Julio formed from the remnants of Atlantic basin Hurricane Nana¹, which made landfall as a category 1 hurricane (on the Saffir-Simpson Hurricane Wind Scale) in southern Belize around 0600 UTC 3 September. After landfall, Nana rapidly weakened while moving inland over Guatemala. The tropical cyclone degenerated to a remnant low by 0000 UTC 4 September, and the low-level circulation dissipated a few hours later over the mountainous terrain of western Guatemala. Shortly thereafter, deep convection began to develop near the Gulf of Tehuantepec in association with the mid-level remnants of Nana. This convection led to the formation of a well-defined but small area of low pressure just south of the Gulf of Tehuantepec by 1200 UTC 4 September. While the low began moving westward to west-northwestward at about 15 kt, northeasterly shear caused the convection to quickly propagate westward away from the center of the low that morning. Late that afternoon, deep convection redeveloped over the low center, which resulted in the formation of a tropical cyclone by 0000 UTC 5 September, about 75 n mi southwest of Puerto Angel, Mexico. Scatterometer wind data shortly thereafter indicated that the system was producing tropical-storm-force winds; therefore the system is designated as a 35-kt tropical storm at the time of genesis. The “best track” chart of Julio’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 1². The scatterometer data from just after the time of genesis revealed that the area of tropical-storm-force winds only extended about 20 n mi from the center.

After formation, Julio was steered west-northwestward at an climatological 15 to 20 kt around the southern portion of a strong mid-level ridge that was centered over the southwestern United States. This motion resulted in the center of the tropical storm moving parallel to but about 90 n mi offshore of the southern coast of Mexico. A concentrated area of convection remained over the center of Julio throughout most of its existence. The convection briefly waned during the afternoon of 5 September but quickly redeveloped, and the tropical storm is estimated to have reached its peak intensity of 40 kt by 0000 UTC 6 September (cover photo) when it was located about 135 n mi south-southeast of Manzanillo, Mexico. Later that morning, moderate easterly shear caused the associated deep convection to become less organized and Julio began to gradually weaken when it was located about 180 n mi southwest of Puerto Vallarta, Mexico. Julio weakened to a tropical depression by 0000 UTC 7 September, when it was located about 35 n mi north-northeast of Socorro Island. The remaining deep convection dissipated shortly thereafter, and scatterometer wind data around that time indicated that the circulation of the small cyclone

¹ https://www.nhc.noaa.gov/data/tcr/AL162020_Nana.pdf

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 *bt* directory, while previous years’ data are located in the *archive* directory.

had opened up into a trough of low pressure. A day or so later, the remnants of Julio were absorbed into a broad area of low pressure that was located around 200 n mi to the southwest of Socorro Island.

METEOROLOGICAL STATISTICS

Observations in Julio (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 Julio.

ASCAT data during Julio's lifecycle was very helpful in assessing the intensity and size of the tropical cyclone. Although in real-time Julio was not analyzed to have formed until 1800 UTC 5 September, a post-analysis of ASCAT data and satellite imagery indicates that the system became a tropical storm by 0000 UTC 5 September. ASCAT data from 0233 UTC that day showed believable winds of tropical storm strength and a small well-defined low. ASCAT data from 0353 UTC 6 September indicated peak winds of close to 40 kt, and these data are the basis for Julio's estimated peak intensity of 40 kt at both 0000 UTC and 0600 UTC 6 September.

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

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties in association with Julio.

FORECAST AND WARNING CRITIQUE

The genesis of Julio was not well anticipated. Although some of the NHC forecasts for Atlantic basin Hurricane Nana did show a remnant low pressure area in the eastern Pacific basin, none of those forecasts called for the system to redevelop into a tropical cyclone over the eastern Pacific. When Nana was approaching Belize as a tropical storm at 0000 UTC 3 September, it was introduced into the eastern Pacific Tropical Weather Outlook with a low chance (<40%) for redevelopment in both the 48-h and 5-day forecast periods (Table 2). This was only 48 h before

Julio formed. The development potential remained in the low category until 1800 UTC 4 September, when it was raised to the medium category (40–60%). This was only 6 h before genesis in the best track. The 2- and 5-day genesis forecasts never reached the high category (>60%). The global models did a poor job of predicting the potential for development of Nana's remnants in the eastern Pacific. This was likely the result of the small size of the low pressure area that eventually developed and became Julio.

A verification of NHC official track forecasts for Julio is given in Table 3a. Official forecast track errors were much larger than the mean official errors for the previous 5-yr period, albeit for only four 12-h forecasts and two 24-h forecasts. Due to the small number of verifying forecasts, only a homogenous comparison of the official forecasts and selected guidance models for the verifying 12-h forecasts is shown in Table 3b. Although the sample size is quite small, several of the dynamical and consensus aids had lower mean errors than the NHC forecast. The larger-than-average NHC track errors were due to Julio moving much faster than anticipated, resulting in larger-than-normal along-track errors.

A verification of NHC official intensity forecasts for Julio is given in Table 4a. Official forecast intensity errors were comparable to the mean official errors for the previous 5-yr period. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The 12-h mean NHC intensity error was generally comparable to the intensity aids, except the GFSI and EMXI global models, which had the lowest mean errors, albeit for only 4 forecasts.

Despite Julio's fairly close passage to the coast of southern Mexico, no watches or warnings were needed for that portion of the coastline due to the small size of the tropical-storm-force wind field.

Table 1. Best track for Tropical Storm Julio, 5–7 September 2020.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
04 / 1200	14.3	94.7	1007	30	low
04 / 1800	14.5	96.0	1006	30	"
05 / 0000	14.8	97.4	1005	35	tropical storm
05 / 0600	15.1	99.0	1005	35	"
05 / 1200	15.5	100.6	1005	35	"
05 / 1800	16.1	102.2	1005	35	"
06 / 0000	16.8	103.9	1004	40	"
06 / 0600	17.7	105.8	1004	40	"
06 / 1200	18.6	107.6	1005	35	"
06 / 1800	19.1	109.3	1006	35	"
07 / 0000	19.3	110.7	1007	30	tropical depression
07 / 0600					dissipated
06 / 0000	16.8	103.9	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%)	6	6
High (>60%)	-	-



Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Julio, 5–7 September 2020. 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	68.3	122.5						
OCD5	90.0	159.2						
Forecasts	4	2						
OFCL (2015-19)	21.8	34.0	44.9	55.3	66.2	77.1	99.1	123.2
OCD5 (2015-19)	34.3	69.9	108.7	146.8	181.4	216.0	268.7	328.0



Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Julio, 5–7 September 2020. 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	60	72	96	120
OFCL	68.3							
OCD5	90.0							
GFSI	55.5							
HMNI	59.0							
HWFI	65.2							
EMXI	65.3							
HCCA	54.9							
TVCX	58.6							
GFEX	54.3							
TVCE	56.8							
TVDG	56.0							
TABD	73.2							
TABM	82.1							
TABS	95.4							
Forecasts	4							



Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Julio, 5–7 September 2020. 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	7.5	7.5						
OCD5	7.2	12.5						
Forecasts	4	2						
OFCL (2015-19)	6.0	9.9	12.1	13.5	14.5	15.4	15.6	16.4
OCD5 (2015-19)	7.8	13.0	16.6	18.9	20.2	21.4	22.6	22.4

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Julio, 5–7 September 2020. 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	60	72	96	120
OFCL	7.5							
OCD5	7.2							
HMNI	10.2							
HWFI	8.2							
DSHP	6.5							
LGEM	6.5							
ICON	7.0							
IVCN	6.8							
IVDR	6.0							
GFSI	2.8							
EMXI	3.2							
HCCA	6.8							
Forecasts	4							

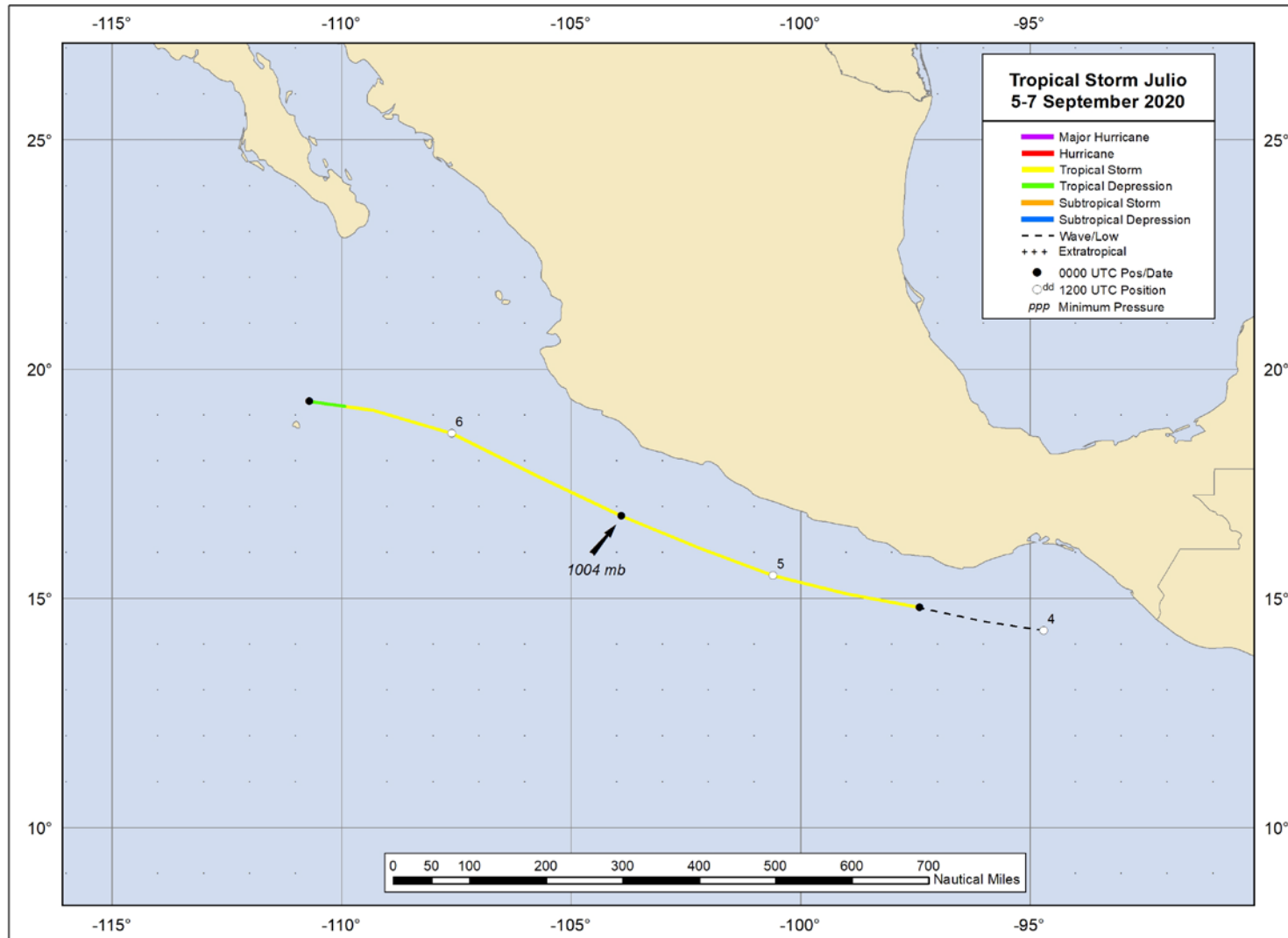


Figure 1. Best track positions for Tropical Storm Julio, 5–7 September 2020.

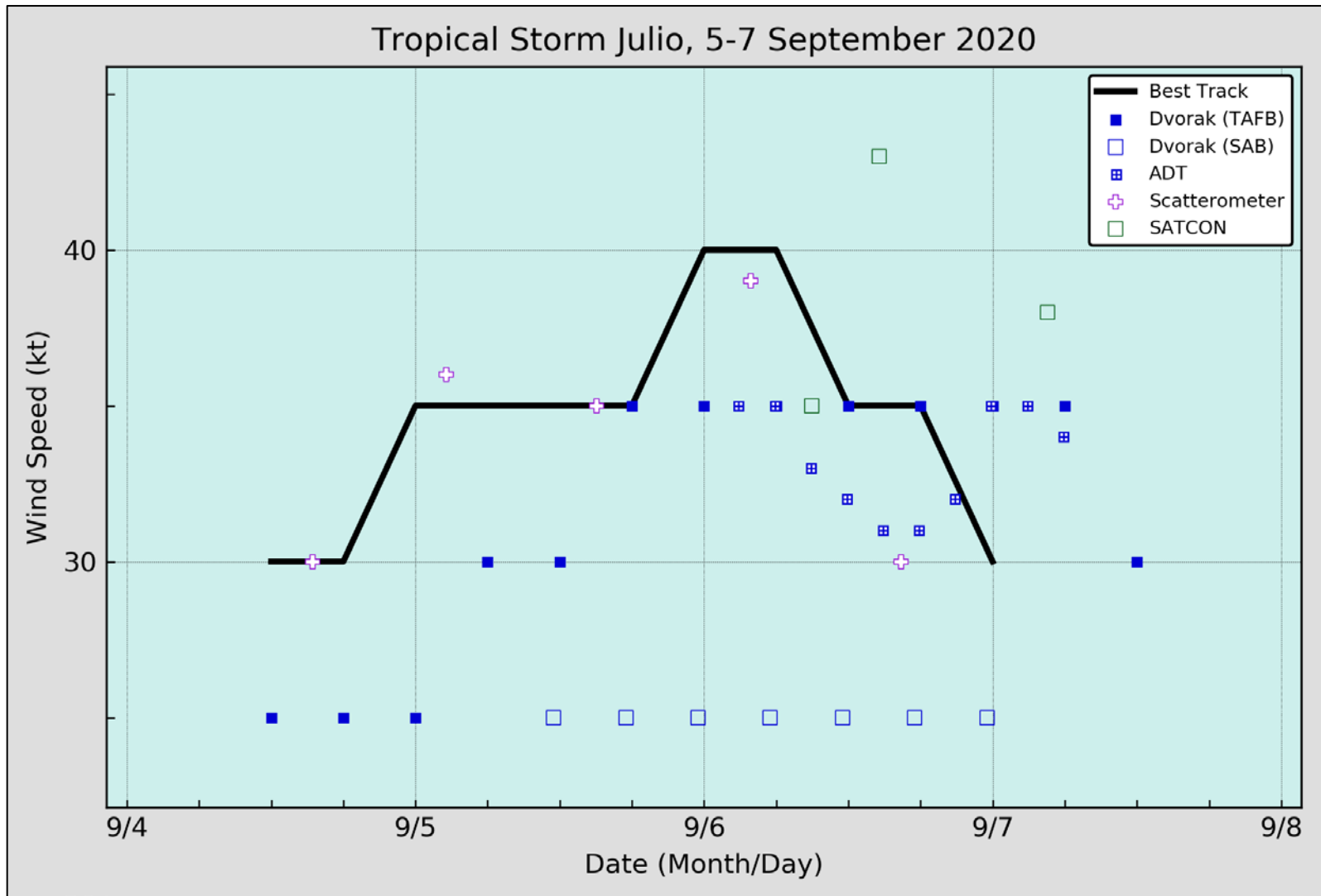


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Julio, 5–7 September 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

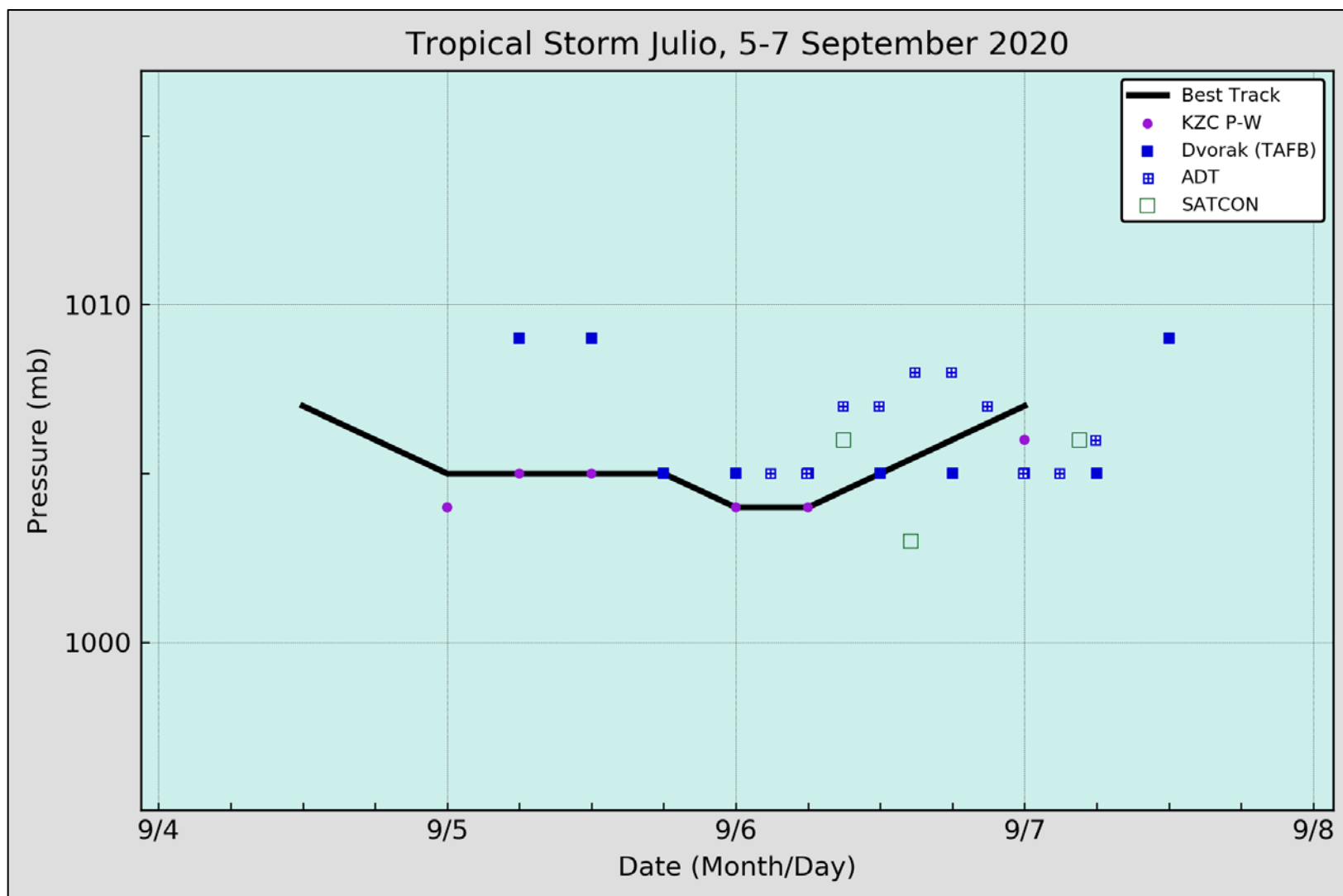


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Julio, 5–7 September 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.