NATIONAL HURRICANE CENTER
CENTRAL PACIFIC HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL STORM BORIS

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24–27 June 2020

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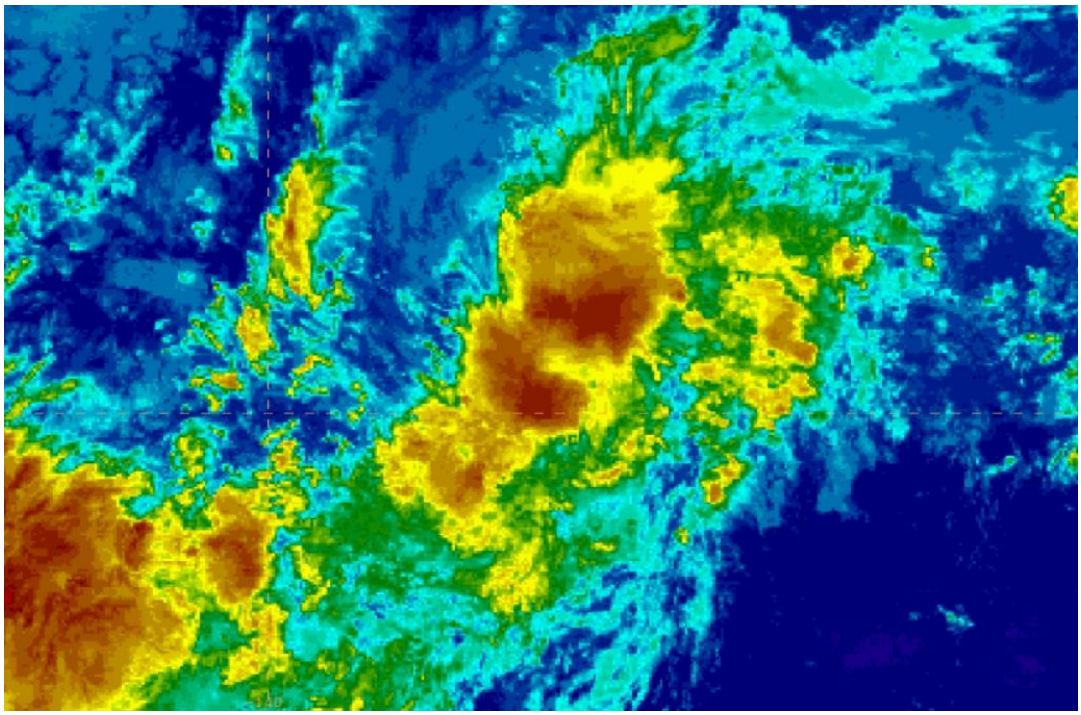

GOES-17 10.3-μM INFRARED SATELLITE IMAGE OF TROPICAL STORM BORIS NEAR ITS PEAK INTENSITY AT 2100 UTC 25 JUNE 2020.

Boris was a short-lived tropical storm that formed in the southwestern part of the eastern Pacific basin. The system moved into the central Pacific as a tropical depression and dissipated shortly thereafter.

Tropical Storm Boris

24–27 JUNE 2020

SYNOPTIC HISTORY

The origin of Boris is not particularly clear. A tropical wave crossing Central America on 15 June moved westward for several days, eventually merging with an area of disturbed weather on 20 June between 125–130°W. Just after the merger, the positive phase of the Madden-Julian Oscillation moved through that region, causing a large increase in the overall deep convection within the nearly stationary disturbance during the next few days. A mid-level vortex was noted early on 23 June near the Intertropical Convergence Zone/Monsoon Trough, and a small surface low formed later that day. Deep convection increased near the low that night, leading to the formation of a tropical depression at 0600 UTC 24 June about 1485 n mi southwest of the southern tip of Baja California. 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 struggled to produce sustained deep convection during its short life, likely due to nearby dry air and some wind shear while it moved westward to west-northwestward under the subtropical ridge. A burst of convection on 25 June led to the cyclone becoming a tropical storm near 1800 UTC that day. Boris did not maintain tropical storm status for long due to an increase in southwesterly shear, and the system decayed back to a tropical depression 12 h later. The depression briefly turned northwestward on 26 June, then moved more westward due to it becoming a shallower cyclone with little deep convection. All significant thunderstorm activity ceased the next day, and the cyclone decayed into a remnant low just after 1800 UTC 27 June about 900 n mi east-southeast of Hilo, Hawaii. The low turned toward the west-southwest for a few days before dissipating well south-southeast of the Hawaiian Islands.

METEOROLOGICAL STATISTICS

Observations in Boris (Figs. 2 and 3) include subjective satellite-based Dvorak and intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB), the Central Pacific Hurricane Center (PHFO), and the Joint Typhoon Warning Center (JTWC), 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

[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.

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 Boris.

The 35-kt peak intensity of Boris was primarily based on ASCAT data, and the scatterometer values were also similar to concurrent TAFB Dvorak estimates and University of Wisconsin CIMSS SATCON data. There were no ship reports of winds of tropical storm force associated with Boris.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Boris was anticipated fairly well in the long range, but not as well in the short term. The system that became Boris was initially mentioned in the Tropical Weather Outlook (TWO) 84 h prior to genesis, introducing a low (<40%) chance of formation in the 5-day time period (Table 2). The probabilities were raised to a medium (40–60%) 5-day chance 60 h prior to formation, and reached the medium category in the 2-day probabilities almost 48 h before formation. However, likely because of a marginal environment and decreasing model support as the time of genesis approached, the 2-day genesis probabilities didn't reach the high category (>60%) before genesis.

A preliminary verification of NHC official track forecasts for Boris is given in Table 3a (there were no verifying forecasts for CPHC). Official track forecast errors were above the mean official errors for the previous 5-yr period for through 36 h, then below the mean at 48 h and beyond. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. Many of the models were a bit better than the NHC forecast through 24 h, but the NHC forecast was better than just about every model after that time. The HMON (HMNI) and GFS ensemble mean (AEMI) had very skillful forecasts overall, but the ECMWF model (EMXI) generally struggled with Boris, admittedly for a small sample.

A preliminary verification of NHC official intensity forecasts for Boris is given in Table 4a. Official intensity forecast errors were below the mean official errors for the previous 5-yr period at all times. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. NHC forecasts, and much of the guidance, correctly anticipated little overall change with the intensity of Boris. The ECMWF model had the lowest intensity errors, while the HMON model overall had the highest intensity errors, which interestingly is the exact opposite of the track performance of these models.

No coastal watches or warnings were issued in association with Boris.

Table 1. Best track for Tropical Storm Boris, 24–27 June 2020.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
24 / 0600	10.0	131.9	1008	25	tropical depression
24 / 1200	10.2	132.7	1007	30	"
24 / 1800	10.4	133.6	1007	30	"
25 / 0000	10.5	134.4	1007	30	"
25 / 0600	10.5	135.1	1007	30	"
25 / 1200	10.7	135.9	1007	30	"
25 / 1800	11.0	136.8	1005	35	tropical storm
26 / 0000	11.3	137.6	1005	35	"
26 / 0600	11.6	138.1	1006	30	tropical depression
26 / 1200	11.9	138.5	1006	30	"
26 / 1800	12.2	138.9	1006	30	"
27 / 0000	12.4	139.4	1006	30	"
27 / 0600	12.4	139.9	1007	30	"
27 / 1200	12.4	140.4	1007	30	"
27 / 1800	12.3	141.0	1007	30	"
28 / 0000	12.2	141.7	1008	25	low
28 / 0600	11.9	142.5	1008	25	"
28 / 1200	11.5	143.4	1008	25	"
28 / 1800	11.2	144.4	1008	25	"
29 / 0000	11.0	145.5	1008	25	"
29 / 0600	10.7	146.6	1008	25	"
29 / 1200	10.3	147.8	1008	25	"
29 / 1800	9.8	148.8	1008	25	"
30 / 0000	9.4	149.7	1008	25	"
30 / 0600	9.0	150.6	1009	25	"
30 / 1200					dissipated
25 / 1800	11.0	136.8	1005	35	minimum pressure and maximum winds

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%)	72	84
Medium (40%-60%)	42	60
High (>60%)	0	24

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Boris. 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	24.1	38.3	51.1	**50.5**	**52.7**	**74.9**		
OCD5	38.3	64.3	97.8	119.8	150.3	161.9		
Forecasts	12	10	8	6	4	2	0	0
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 Boris. 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	24.1	38.3	51.1	50.5	52.7	74.9		
OCD5	38.3	64.3	97.8	119.8	150.3	161.9		
GFSI	24.4	40.1	53.6	74.9	89.0	88.1		
HMNI	**16.2**	**29.7**	**41.8**	56.6	59.4	94.8		
HWFI	**21.5**	**34.6**	**50.4**	64.2	59.2	107.4		
EMXI	29.4	56.7	73.6	72.8	83.9	97.5		
CMCI	**23.7**	41.4	55.1	66.0	76.5	83.6		
NVGI	38.7	65.9	95.1	115.7	117.6	150.0		
AEMI	**18.6**	**29.8**	**42.4**	51.5	**43.4**	87.4		
GFEX	**23.3**	41.4	53.7	55.3	65.8	82.1		
TVCE	**20.8**	**37.9**	51.5	56.8	62.1	81.5		
TVCN	**22.7**	40.6	54.3	58.9	62.8	78.7		
HCCA	**23.4**	39.5	57.2	59.0	61.0	**71.0**		
TVDG	**23.4**	40.6	54.0	60.9	70.5	83.3		
TABD	43.0	86.6	132.4	175.5	215.4	297.3		
TABM	34.0	50.0	63.9	74.4	94.0	138.7		
TABS	33.5	54.9	82.4	103.9	109.6	101.4		
Forecasts	12	10	8	6	4	2	0	0

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Boris. 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	**2.1**	**3.5**	**5.0**	**5.8**	**3.8**	**0.0**		
OCD5	3.9	6.0	10.4	11.2	23.5	27.5		
Forecasts	12	10	8	6	4	2	0	0
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 Boris. 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	2.1	3.5	5.0	5.8	3.8	0.0		
OCD5	3.9	6.0	10.4	11.2	23.5	27.5		
GFSI	2.7	3.5	**4.6**	6.0	**3.5**	4.5		
EMXI	**1.5**	**2.1**	**1.4**	**3.0**	**2.2**	3.5		
HMNI	3.6	7.2	8.8	6.8	4.8	2.0		
HWFI	2.2	4.4	6.8	6.3	**2.2**	2.0		
DSHP	3.2	5.1	**3.5**	**5.7**	6.2	4.5		
CMCI	2.5	5.0	**4.0**	**3.7**	**3.0**	4.5		
HCCA	2.6	4.9	5.9	**5.5**	**2.5**	3.5		
IVCN	2.6	3.8	**3.4**	**4.3**	4.0	3.0		
IVDR	2.4	3.9	**4.0**	**4.7**	**3.0**	2.5		
LGEM	3.2	4.6	**3.4**	6.8	7.8	6.0		
Forecasts	12	10	8	6	4	2	0	0

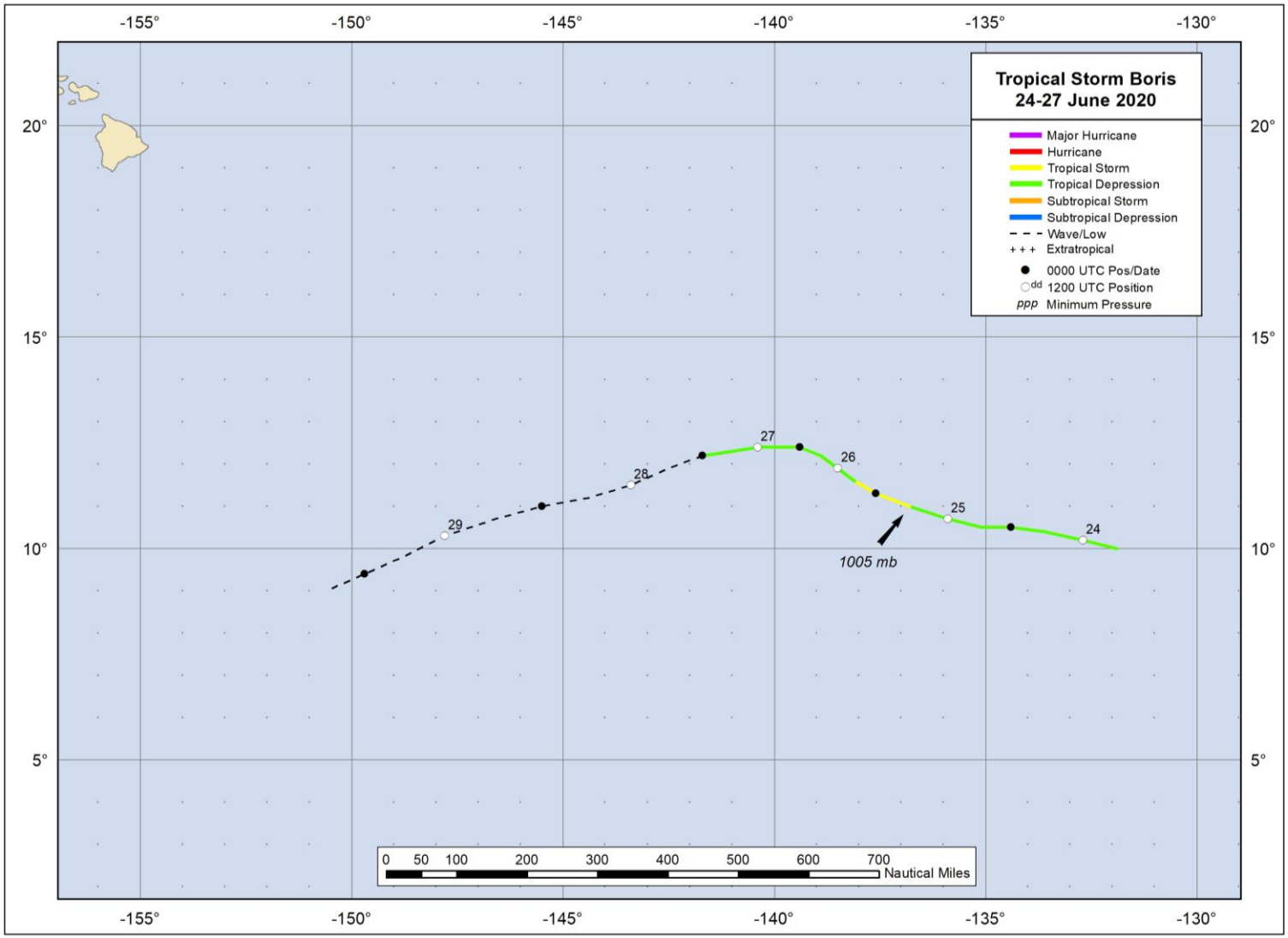

Figure 1. Best track positions for Tropical Storm Boris, 24–27 June 2020.

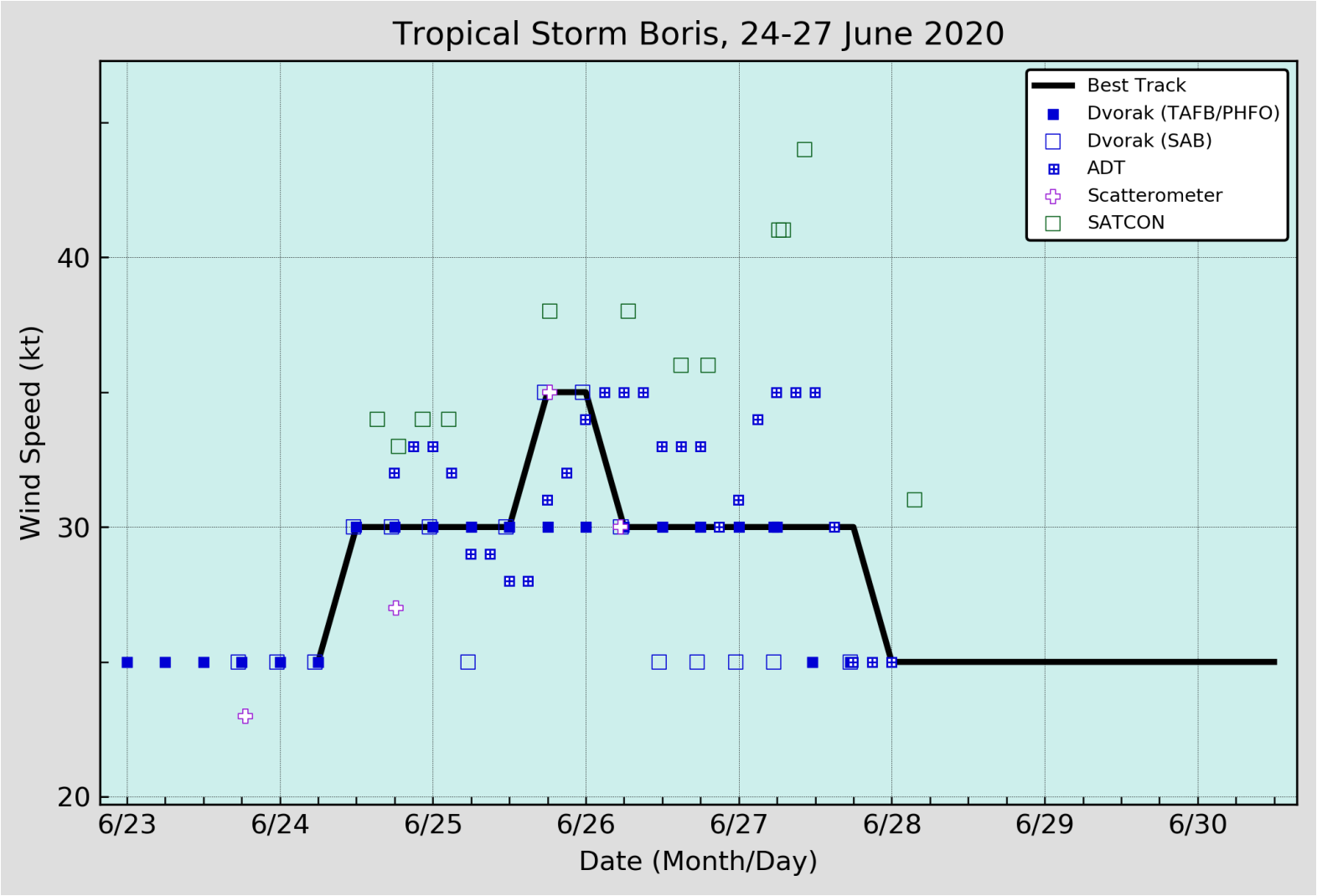

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Boris, 24-27 June 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

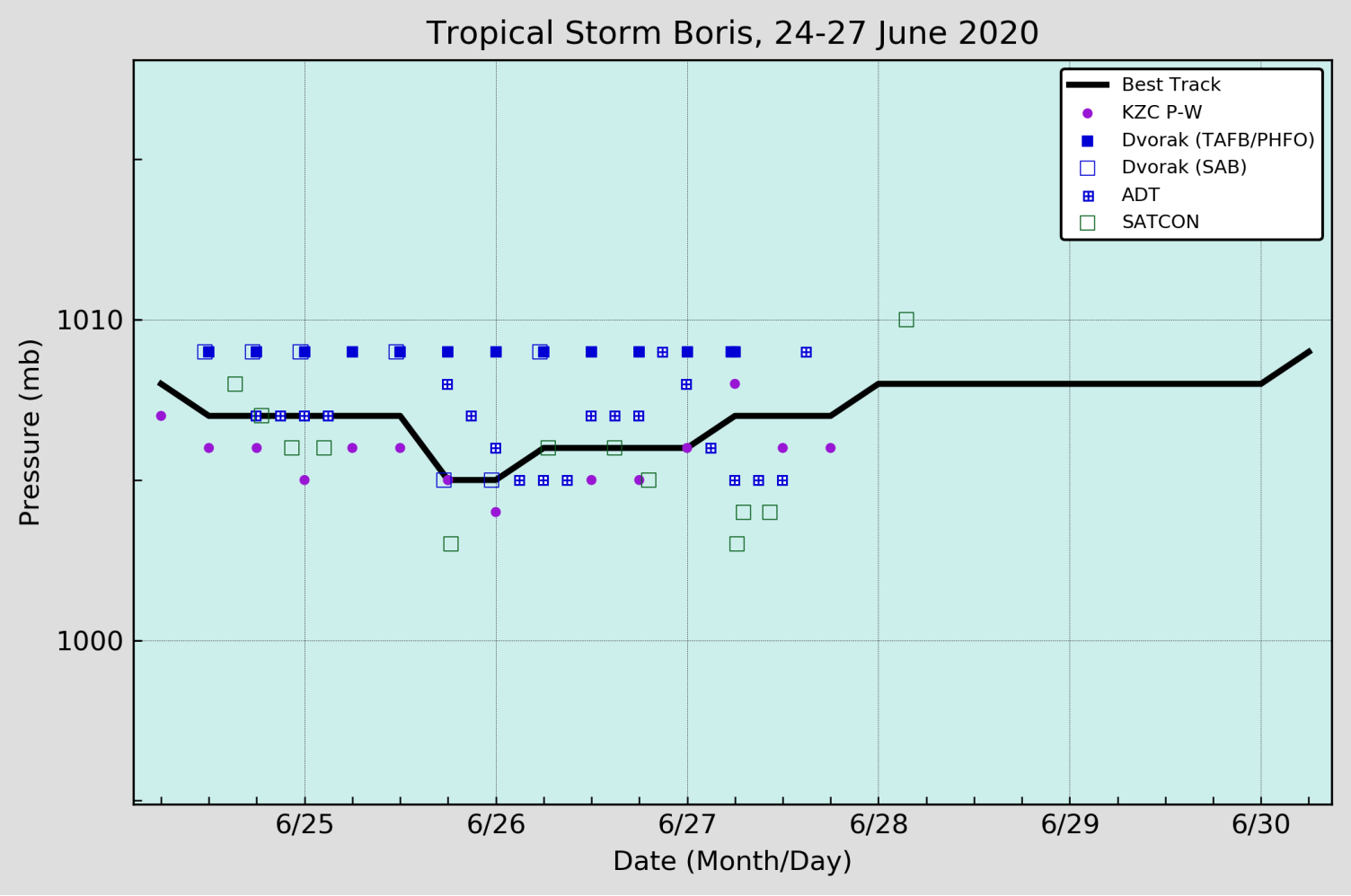

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Boris, 24–27 June 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.