NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM DOLLY

(AL042020)

22–24 June 2020

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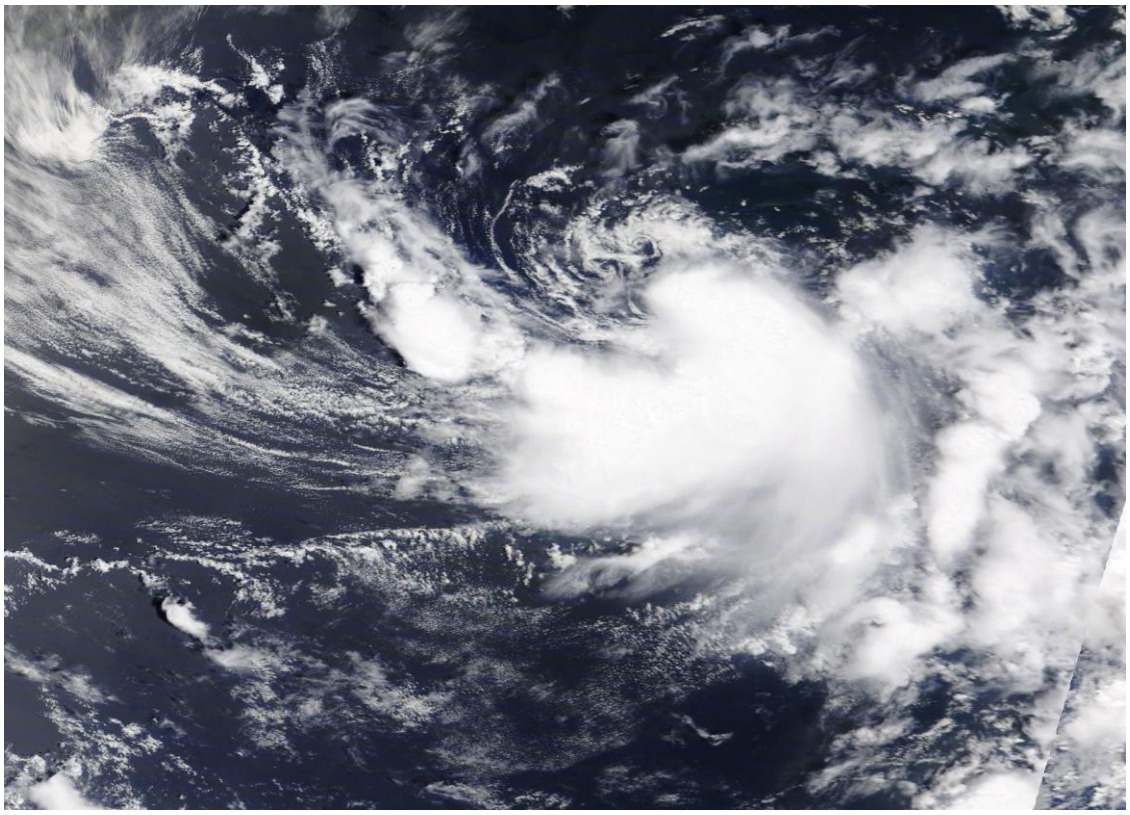

NASA TERRA VISIBLE SATELLITE IMAGE OF DOLLY AT 1730 UTC 23 JUNE 2020 NEAR PEAK INTENSITY.

Dolly was a short-lived tropical storm that originated in the northwestern Atlantic as a subtropical cyclone. Dolly only lasted a couple of days before dissipating a couple of hundred miles south of Newfoundland.

Tropical Storm Dolly

22–24 JUNE 2020

SYNOPTIC HISTORY

An area of disturbed weather near the northern Bahamas on 17 June was the first precursor of Dolly. This feature formed from the interaction of the northern end of a tropical wave and an upper-level trough a couple of days earlier. The disturbance drifted to the north and was located a couple of hundred miles east-southeast of the Carolinas on 20 June when a mid- to upper-level low moved offshore. This low caused a large increase in shower and thunderstorm activity over the western Atlantic Ocean and the disturbance while they moved slowly east-northeastward. A broad and disorganized surface low pressure area formed early on 21 June from the large combined disturbance, with satellite images showing a decidedly non-tropical appearance with a large comma cloud. However, the low pressure area became better defined overnight underneath the upper-level low, with a well-defined center apparent early on 22 June. When thunderstorm activity became better organized later that morning, a subtropical depression formed near 1200 UTC 22 June about 350 n mi east-southeast of Cape Cod, Massachusetts. 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 depression initially struggled to organize due to entrainment of mid-level dry air and marginal water temperatures, resulting in a lack of strengthening on 22 June. This changed overnight, however, with deep convection increasing while the system moved east-northeastward away from the upper low, and the depression became a subtropical storm around 0600 UTC on 23 June. The increase in convection was followed by a decrease in the radius of maximum winds, and Dolly transitioned into a 40-kt tropical storm 6 h later. Early the next day, all significant thunderstorm activity ceased as Dolly moved north of the Gulf Stream within a dry environment, and the cyclone decayed into a remnant low by 0600 UTC 24 June a few hundred miles southeast of Nova Scotia. The weakening low began moving a little faster toward the northeast ahead of a mid-latitude trough, and opened up into a surface trough early on 25 June a couple of hundred miles south of Newfoundland.

METEOROLOGICAL STATISTICS

Observations in Dolly (Figs. 2 and 3) include subjective satellite-based Dvorak and intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and objective

[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.

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 Dolly.

The 40-kt peak intensity of Dolly was based on ASCAT data of 35–40 kt. There were no ship reports of winds of tropical storm force associated with Dolly.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Dolly was poorly anticipated. The precursor system was initially mentioned in the Tropical Weather Outlook (TWO) 60 h prior to genesis, introducing a low (<40%) chance of formation in the 2- and 5-day time periods (Table 2). The probabilities were raised to a medium (40–60%) 2-day chance only 18 h prior to formation, and did not reach the high category before genesis. In fact, the TWO probabilities were actually decreasing just before genesis occurred. Inconsistent model guidance, a marginal environment close to cold water, and a potential non-tropical low all led to the NHC genesis probabilities being generally low.

A preliminary verification of NHC official track and intensity forecasts for Dolly is given in Tables 3 and 4, respectively. Official track and intensity forecast errors were slightly below the mean official errors for the previous 5-yr period for all available time periods in a small sample (only 2 cases at 24 h). No meaningful comparisons can be made with the other models since the sample size is so small. NHC forecasts captured the general idea of little overall strengthening, but the wind speed forecasts were a bit too low.

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

Table 1. Best track for Tropical Storm Dolly, 22–24 June 2020.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
22 / 0600	38.6	67.1	1010	30	low
22 / 1200	38.4	66.9	1009	30	subtropical depression
22 / 1800	38.1	66.2	1008	30	"
23 / 0000	38.5	65.1	1007	30	"
23 / 0600	39.0	63.9	1003	35	subtropical storm
23 / 1200	39.4	62.7	1000	40	tropical storm
23 / 1800	39.8	61.6	1000	40	"
24 / 0000	40.2	60.6	1002	35	"
24 / 0600	41.0	59.6	1005	30	low
24 / 1200	42.0	58.5	1007	30	"
24 / 1800	43.0	57.1	1008	25	"
25 / 0000	44.1	55.6	1009	25	"
25 / 0600	-	-	-	-	dissipated
23 / 1200	39.4	62.7	1000	40	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%)	60	60
Medium (40%-60%)	18	18
High (>60%)	-	-

Table 3. Preliminary NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Dolly. 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	**21.5**	**28.7**						
OCD5	35.7	66.5						
Forecasts	4	2						
OFCL (2015-19)	24.1	36.9						
OCD5 (2015-19)	44.7	96.1						

Table 4. Preliminary NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Dolly. 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	**5.0**	**7.5**						
OCD5	5.5	4.5						
Forecasts	4	2						
OFCL (2015-19)	5.2	7.7						
OCD5 (2015-19)	6.8	10.8						

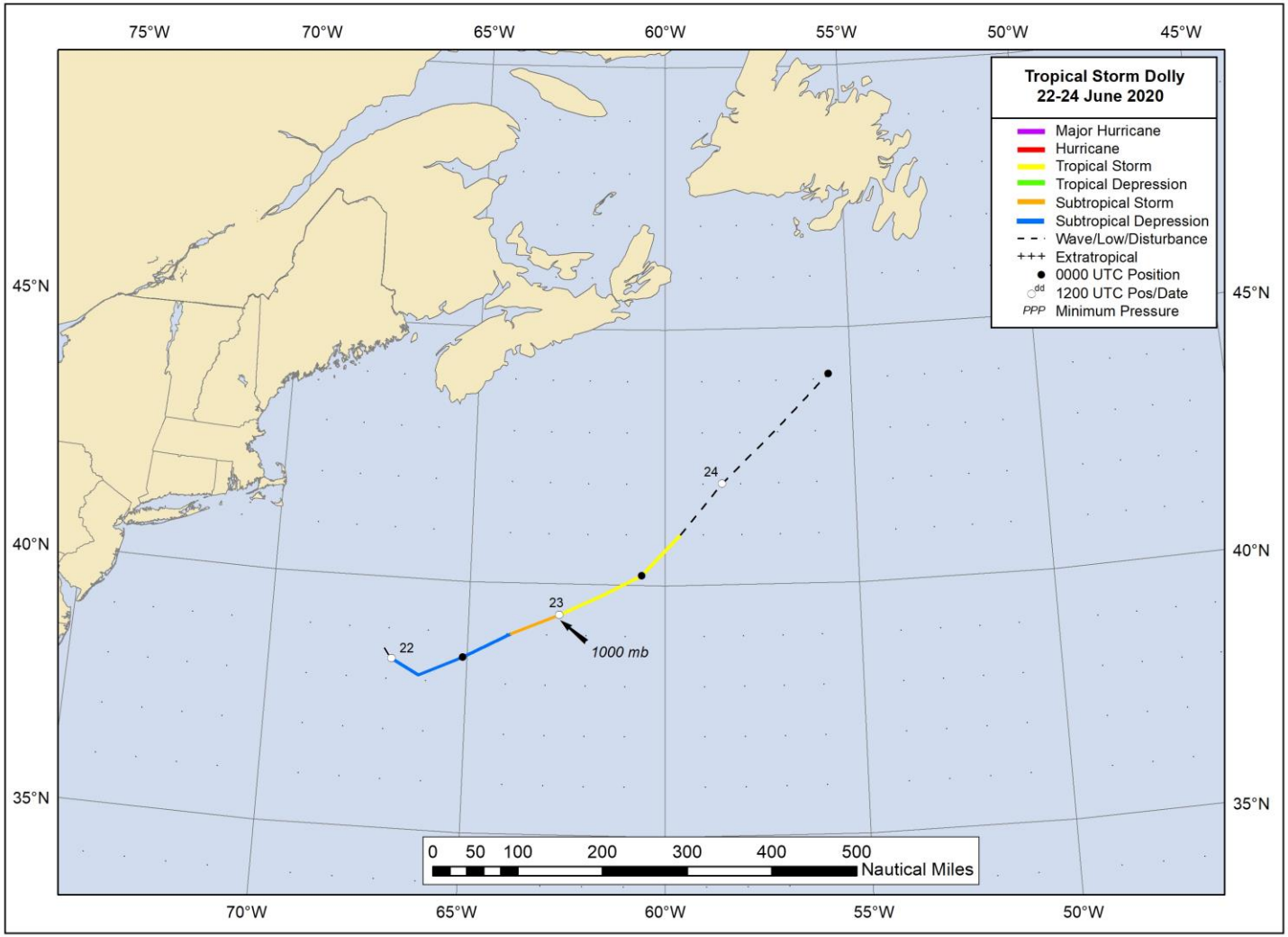

Figure 1. Best track positions for Dolly, 22–24 June 2020. Center positions during the low phases are partially based on analyses from the NOAA Ocean Prediction Center.

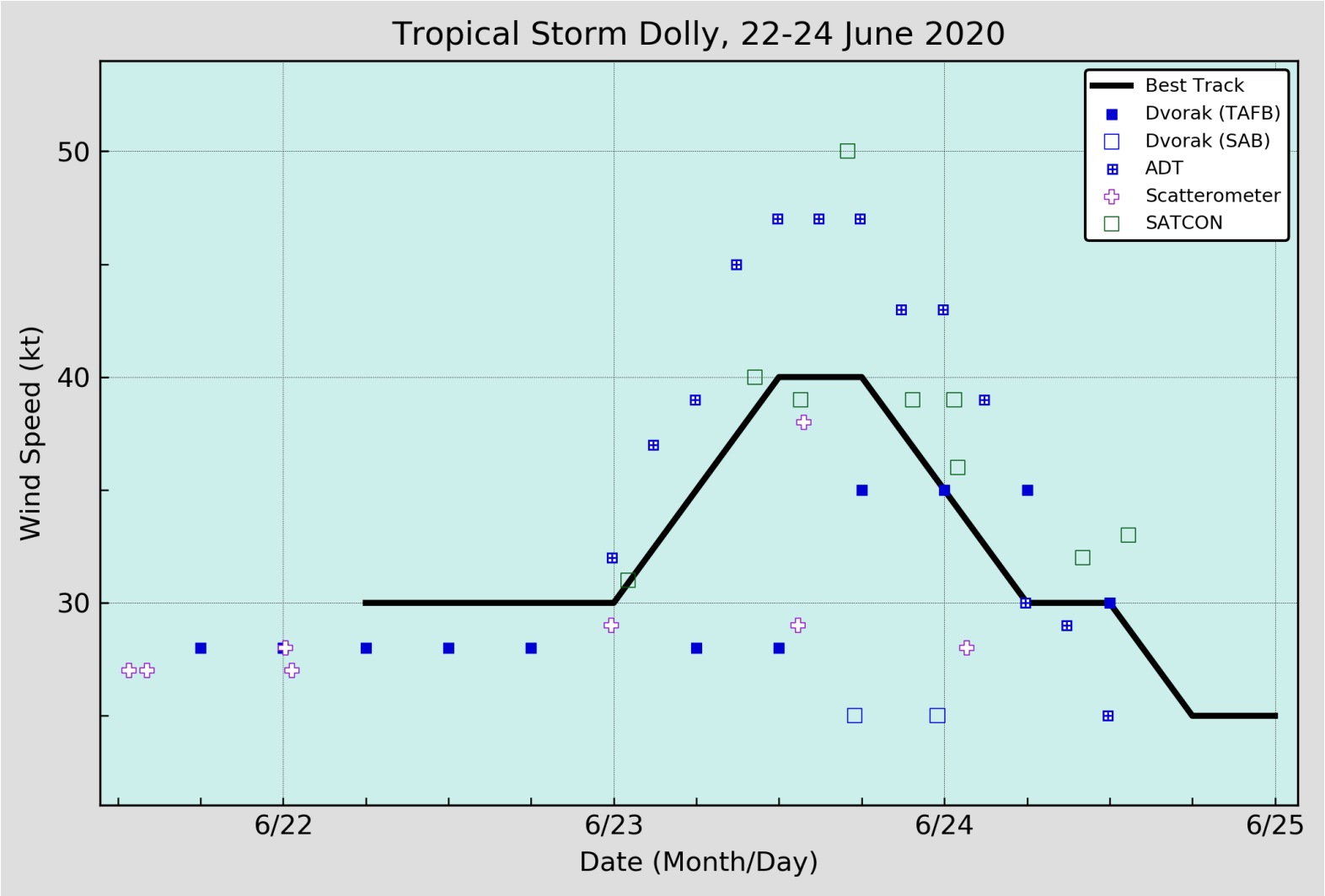

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Dolly, 22–24 June 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

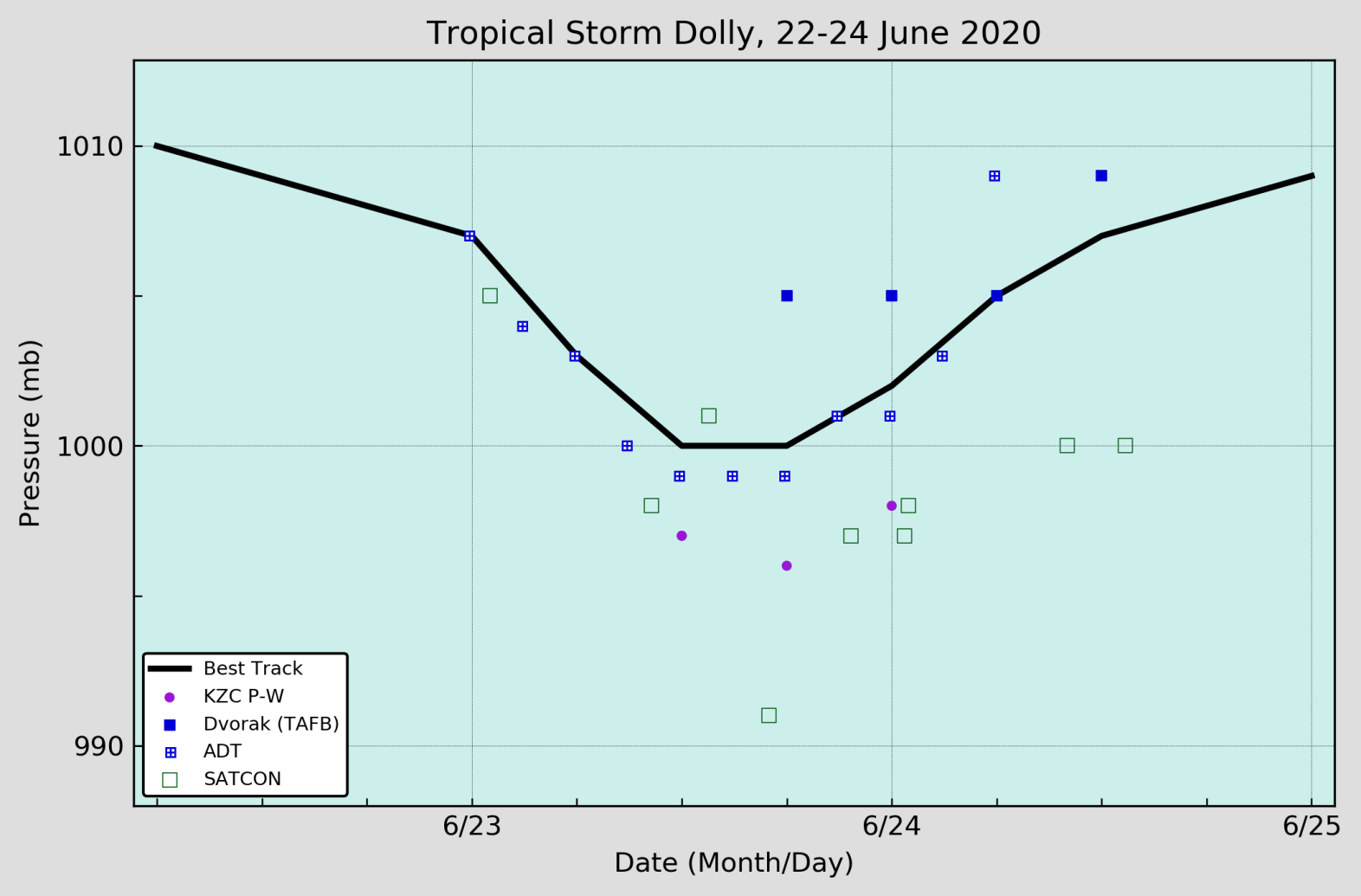

Figure 3. Selected pressure observations and best track minimum central pressure curve for Dolly, 22–24 June 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.