NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

TROPICAL DEPRESSION THREE

(AL032019)

22–23 July 2019

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National Hurricane Center
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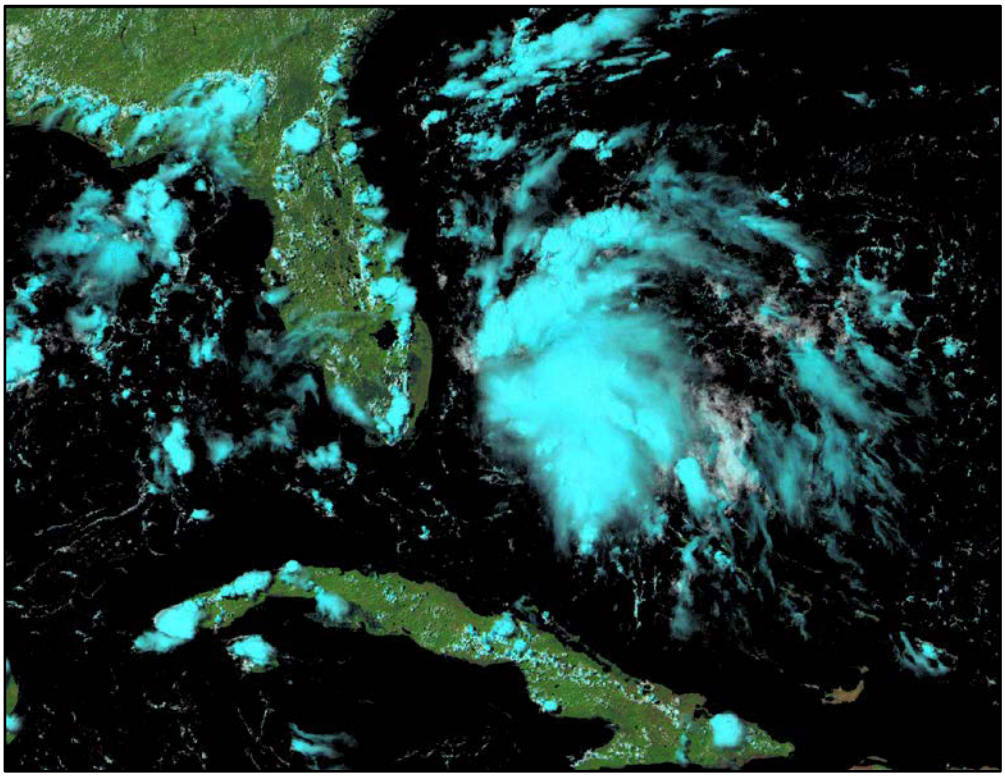

GOES-16 DAY LAND CLOUD RGB IMAGE AT 1900 UTC 22 JULY 2019. COLD (HIGH) CLOUDS APPEAR AS CYAN WHILE WARM (LOW) CLOUDS APPEAR WHITE.

Tropical Depression Three was a short-lived tropical cyclone that developed over the northwestern Bahamas and dissipated off the east coast of Florida a day later.

Tropical Depression Three

22–23 JULY 2019

SYNOPTIC HISTORY

The origins of Tropical Depression Three can be traced to a tropical wave that moved off the west coast of Africa on 12 July. The wave produced minimal convection while it moved westward across the eastern and central Atlantic for several days thereafter. As the wave approached the Lesser Antilles on 18 July, the northern portion of the wave split off, and the resulting trough turned northwestward. The southern portion of the wave continued steadily westward across the Caribbean Sea while the northern trough, then located about 450 n mi northeast of Puerto Rico, slowed and turned back toward the west on 19 July. The trough generated intermittent disorganized convection while it continued westward, and it reached the southeastern Bahamas on 21 July. Early on 22 July, a large concentrated area of convection developed near the trough axis, resulting in the formation of a closed low pressure system, and it is estimated that a tropical depression formed by 1200 UTC 22 July, about 35 n mi east of Andros Island. 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].

A passing convectively coupled Kelvin Wave and upper-level difluence associated with a deep-layer mid-latitude trough over the eastern United States may have contributed to the increase of convection associated with the depression on 22 July. However, the cyclone was surrounded by dry air, and its convection decreased substantially only 12 h after formation. Meanwhile, the center of the depression moved across Andros Island and then accelerated northward, just east of the coast of Florida. A small area of convection redeveloped southeast of the cyclone's center on 23 July, however it was insufficient to maintain the depression. The lack of substantial convection and the increase in forward speed caused the depression to open into a trough and dissipate shortly after 1200 UTC 23 July when it was centered about 30 n mi east-northeast of Cape Canaveral, Florida.

METEOROLOGICAL STATISTICS

Observations in Tropical Depression Three (Figs. 2 and 3) include subjective satellite-based Dvorak 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

[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.

of Wisconsin-Madison. Observations also include flight-level and stepped frequency microwave radiometer (SFMR) from a flight of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command. 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 the depression.

The peak intensity of 30 kt is based on data from the reconnaissance flight into the depression on 23 July. The maximum flight-level winds observed during the flight were 40 kt at 925 mb, which corresponds to 30 kt surface winds with a standard 75% reduction factor from that level.

Although the highest winds directly associated with the cyclone are estimated to have been 30 kt, stronger winds were observed in the vicinity of the depression on 22 and 23 July that were assessed to be unrepresentative of its intensity. The SFMR measured a small area of 30–35 kt surface winds in light rain about 80 n mi east of the cyclone's center shortly before it dissipated. The flight-level winds at that location were oriented away from the center of the depression and nearby convection, indicative of a convective boundary. NOAA buoy 41010 measured a maximum 1-minute wind of 31 kt with a gust of 39 kt at a height of 4 m around 0930 UTC 23 July. The strongest wind observed by the buoy was associated with a 90 degree shift in wind direction, and the wind speed observed immediately before and after the peak was much lower, suggesting that these winds were associated with an outflow boundary. Finally, an unofficial observing site on Elbow Cay in the Bahamas (IABACOEL1) reported a gust of 38 kt at 1654 UTC 22 July in a thunderstorm. The winds at that site were also much lower before and after the thunderstorm.

The depression produced periodic heavy rainfall across portions the central and northern Bahamas. Freeport (MYGF) reported 1.53 in of rain on 22 July.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Tropical Depression Three.

FORECAST AND WARNING CRITIQUE

The genesis of short-lived tropical depressions is often poorly forecast and Tropical Depression Three was no exception. Table 2 provides the number of hours in advance of formation associated with the first NHC Tropical Weather Outlook (TWO) forecast in each likelihood category. The wave from which the depression developed was introduced in the Tropical Weather Outlook only 30 h prior to genesis and was given a low (<40%) chance of

formation in both the 2-day and 5-day forecasts. The 2-day and 5-day probabilities were increased to the medium category 6 h after genesis was determined to have occurred in post-analysis and never reached the high category.

Due to the depression's short existence, there were only two verifying 12-h forecasts. Therefore a comprehensive verification of official and guidance track and intensity forecast errors is not provided. The few NHC track and intensity forecasts were quite good, and correctly anticipated that the depression would remain weak and move generally northward to the east of Florida. Although the system ultimately dissipated sooner than forecast, the two verifying 12-h NHC intensity forecasts had an average error of only 3 kt, while the NHC track forecasts had an average error of 17.4 n mi. Both of those values are lower than the previous 5-yr means (5.3 kt, 23.6 n mi).

There were no coastal watches or warnings associated with Tropical Depression Three since the system was not expected to reach tropical storm intensity.

Table 1. Best track for Tropical Depression Three, 22–23 July 2019.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
22 / 1200	24.6	77.4	1013	25	tropical depression
22 / 1800	25.0	78.4	1013	25	"
23 / 0000	25.7	79.3	1013	25	"
23 / 0600	26.9	79.6	1013	30	"
23 / 1200	28.6	80.0	1014	30	"
23 / 1800					dissipated
23 / 0600	26.9	79.6	1013	30	maximum winds 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%)	30	30
Medium (40%-60%)	–	–
High (>60%)	–	–

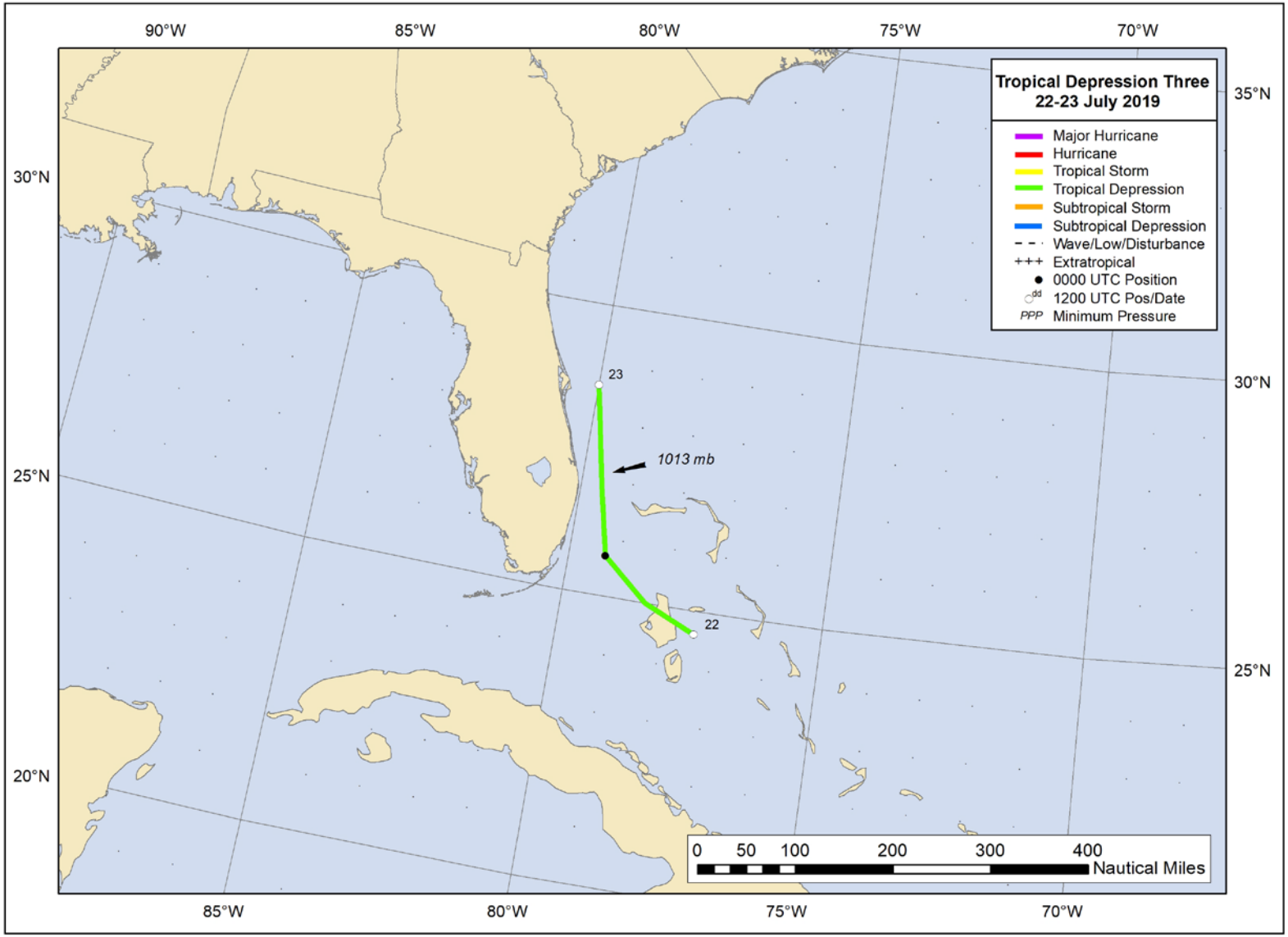

Figure 1. Best track positions for Tropical Depression Three, 22–23 July 2019.

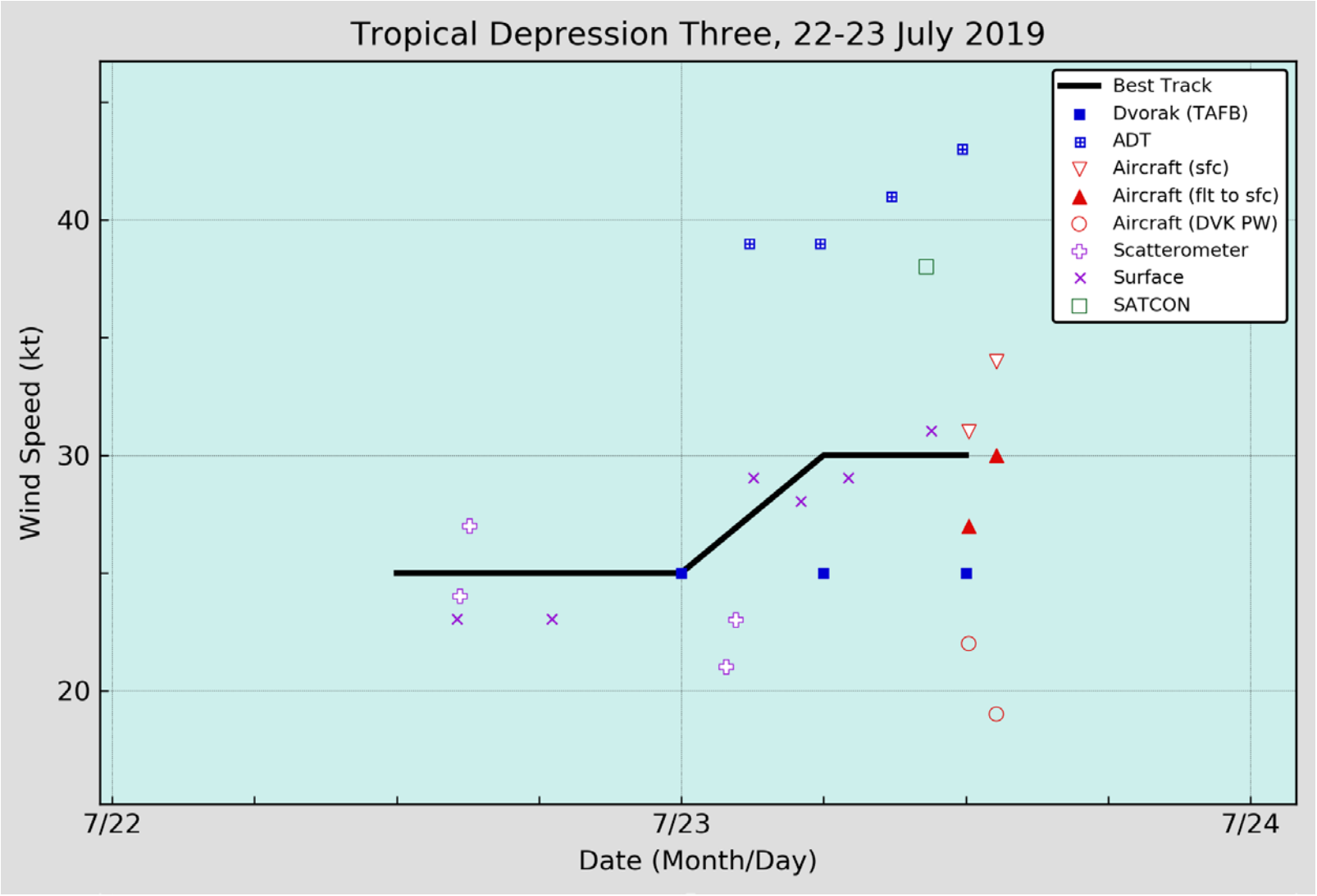

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Depression Three. Aircraft observations have been adjusted for elevation using a 75% adjustment factor for observations from 925 mb. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. The one SATCON intensity estimate is from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

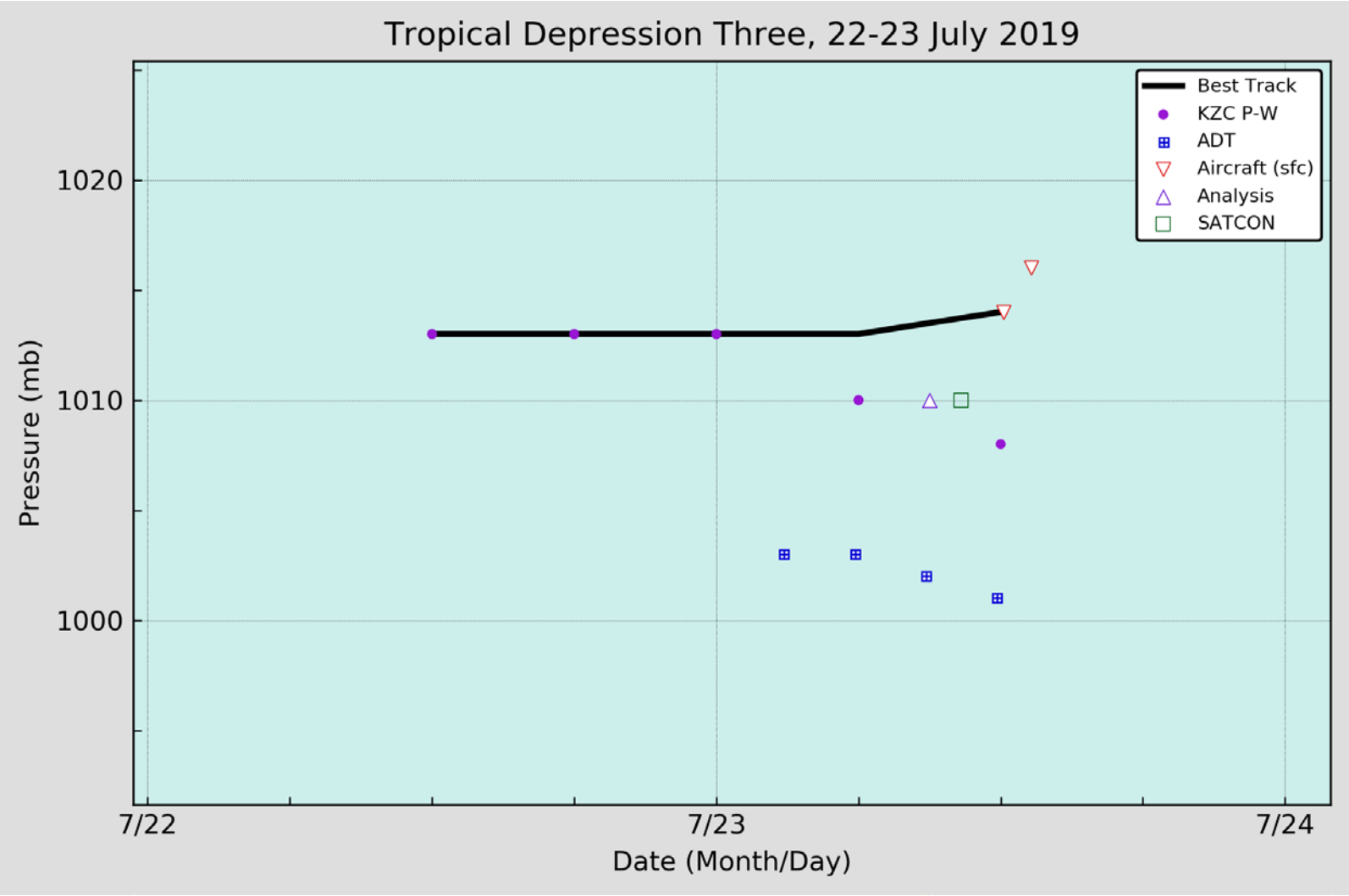

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Depression Three. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. The one SATCON intensity estimate is from the Cooperative Institute for Meteorological 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.