

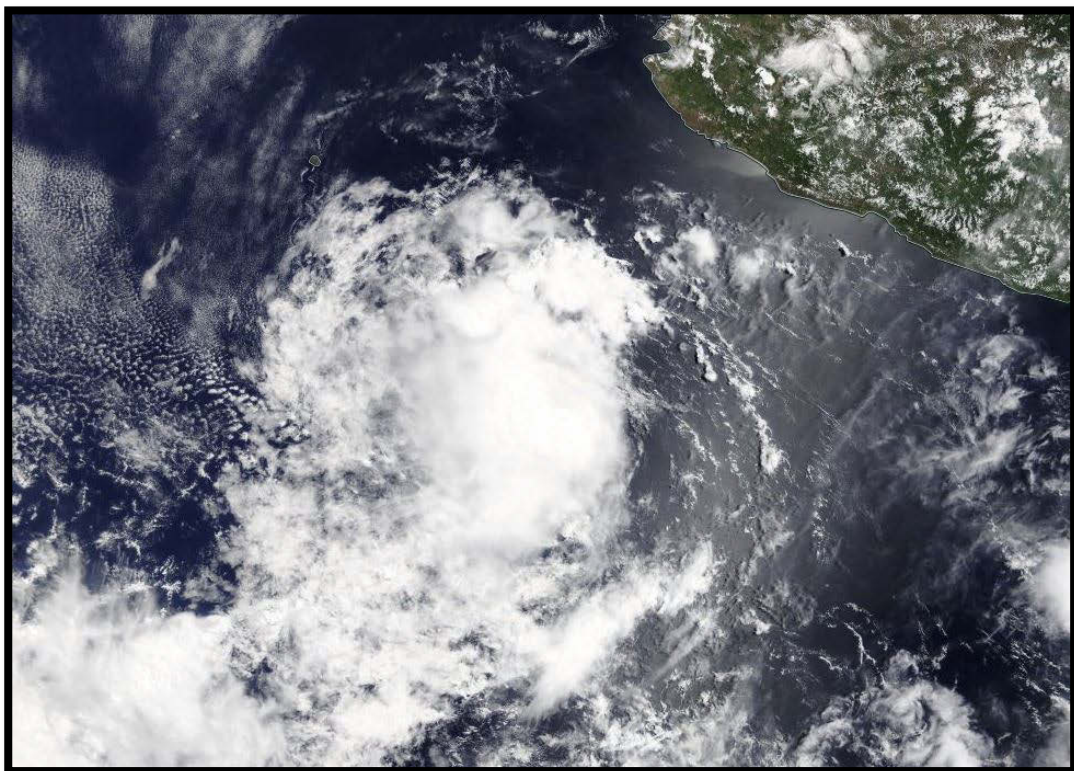


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## TROPICAL DEPRESSION FOUR-E (EP042019)

12–13 July 2019

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NASA MODIS/TERRA VISIBLE IMAGE OF TROPICAL DEPRESSION FOUR-E AT 1740 UTC 12 JULY 2019.

Tropical Depression Four-E was a short-lived tropical cyclone that moved away from the coast of Mexico.

# Tropical Depression Four-E

12–13 JULY 2019

## SYNOPTIC HISTORY

Tropical Depression Four-E originated from a tropical wave that moved off the west coast of Africa on 30 June. The wave moved westward, reaching the Lesser Antilles on 4 July and then crossing Central America on 7 July, accompanied by showers and sporadic thunderstorm activity. Deep convection increased markedly once the wave reached the far eastern Pacific Ocean on 8 July but remained disorganized while the wave moved westward to the south of the Mexican coast over the next several days. A low developed from the disturbance by 0600 UTC 12 July, but it took 6 more hours for the deep convection to become organized enough for the system to become a tropical depression, about 320 n mi southwest of Manzanillo, Mexico. The “best track” chart of the tropical depression’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<sup>1</sup>.

When it formed, the depression was located over warm waters of around 29°C, but it was being affected by about 15 kt of deep-layer shear from the east-northeast. During the next 24 h, the vertical shear increased to about 20 kt, and sea surface temperatures decreased a bit to between 27–28°C. As a result, the cyclone did not strengthen much and only reached a peak intensity of 30 kt by 1800 UTC 12 July (cover image). Organized deep convection was completely sheared away from the low-level center the next day, and the depression degenerated into a remnant low by 0000 UTC 14 July while centered about 360 n mi south-southwest of the southern tip of the Baja California peninsula. The remnant low produced a few intermittent bursts of convection while moving west-northwestward in the trade wind flow, and it ultimately dissipated soon after 0600 UTC 15 July about 530 n mi west-southwest of the southern tip of the Baja California peninsula.

## METEOROLOGICAL STATISTICS

Observations in Tropical Depression Four-E (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), 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

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<sup>1</sup> 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.

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 Tropical Depression Four-E.

The maximum intensity of the cyclone is estimated to be 30 kt based on Dvorak intensity estimates from TAFB and SAB.

## CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Tropical Depression Four-E.

## FORECAST AND WARNING CRITIQUE

The genesis of Tropical Depression Four-E was not well predicted. The incipient disturbance was first included in the TWO and given a low (<40%) chance of tropical cyclone formation during the next five days 156 h (6.5 days) before genesis occurred. The 5-day chance of genesis remained in the low category for the next 6 days, and even dropped to near 0% 42 h before formation, since environmental conditions did not appear especially conducive for development. A low chance of formation over the next 2 days was re-introduced in the TWO 36 h before genesis, but the probabilities only reached the medium (40–60%) category at the time that genesis is estimated to have occurred in the post analysis. Predicting the formation of weak, short-lived tropical cyclones like Tropical Depression Four-E is often challenging in marginal environments, and it is not surprising that genesis probabilities did not rise appreciably before the cyclone's formation. 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.

Due to the depression's short existence, there were only three verifying 12-h forecasts and one verifying 24-h forecast. Thus, a comprehensive verification of official and guidance track and intensity forecast errors is not provided. The three official 12-h forecasts had a mean track error of 17.8 n mi and a mean intensity error of 1.7 kt, while the one 24-h forecast had a track error of 31.1 n mi and no intensity error. These compare to the mean 12-h official errors for the previous 5-yr period (2014–2018) of 21.1 n mi and 6.1 kt, respectively, and the mean 24-h official errors for the previous 5-yr period of 32.2 n mi and 10.0 kt, respectively.

No watches or warnings were issued in association with Tropical Depression Four-E.



Table 1. Best track for Tropical Depression Four-E, 12–13 July 2019.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
12 / 0600	14.1	104.8	1008	20	low
12 / 1200	14.4	105.9	1007	25	tropical depression
12 / 1800	14.9	107.0	1006	30	"
13 / 0000	15.6	108.0	1006	30	"
13 / 0600	16.3	109.1	1006	30	"
13 / 1200	16.9	110.3	1006	30	"
13 / 1800	17.3	111.6	1006	30	"
14 / 0000	17.6	113.0	1006	30	low
14 / 0600	17.9	114.2	1007	25	"
14 / 1200	18.2	115.3	1008	25	"
14 / 1800	18.6	116.3	1009	25	"
15 / 0000	18.8	117.3	1010	20	"
15 / 0600	18.9	118.4	1011	15	"
15 / 1200					dissipated
12 / 1800	14.9	107.0	1006	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%)	36	156
Medium (40%-60%)	0	0
High (>60%)	-	-

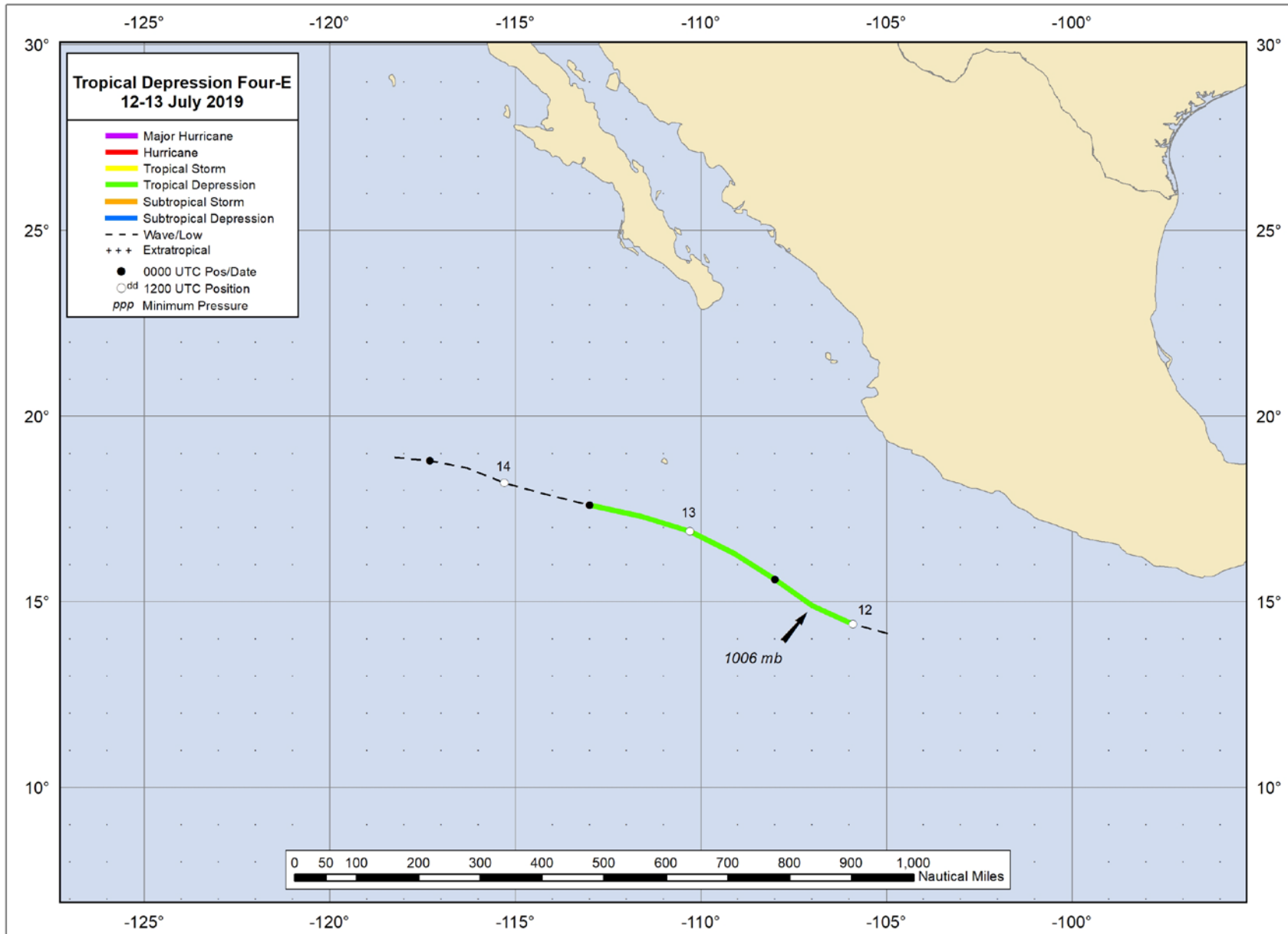


Figure 1. Best track positions for Tropical Depression Four-E, 12–13 July 2019.

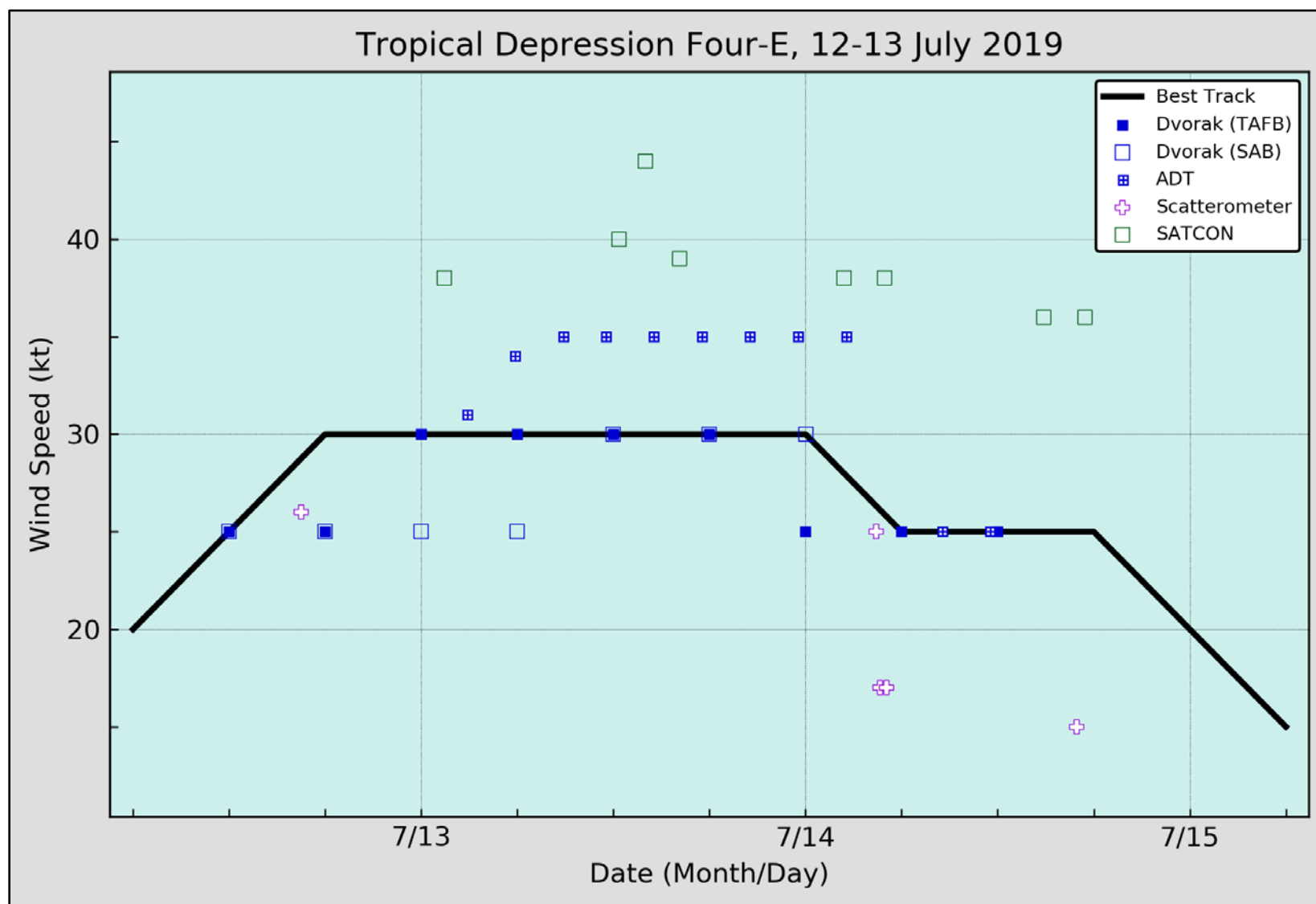


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Depression Four-E, 12-13 July 2019. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

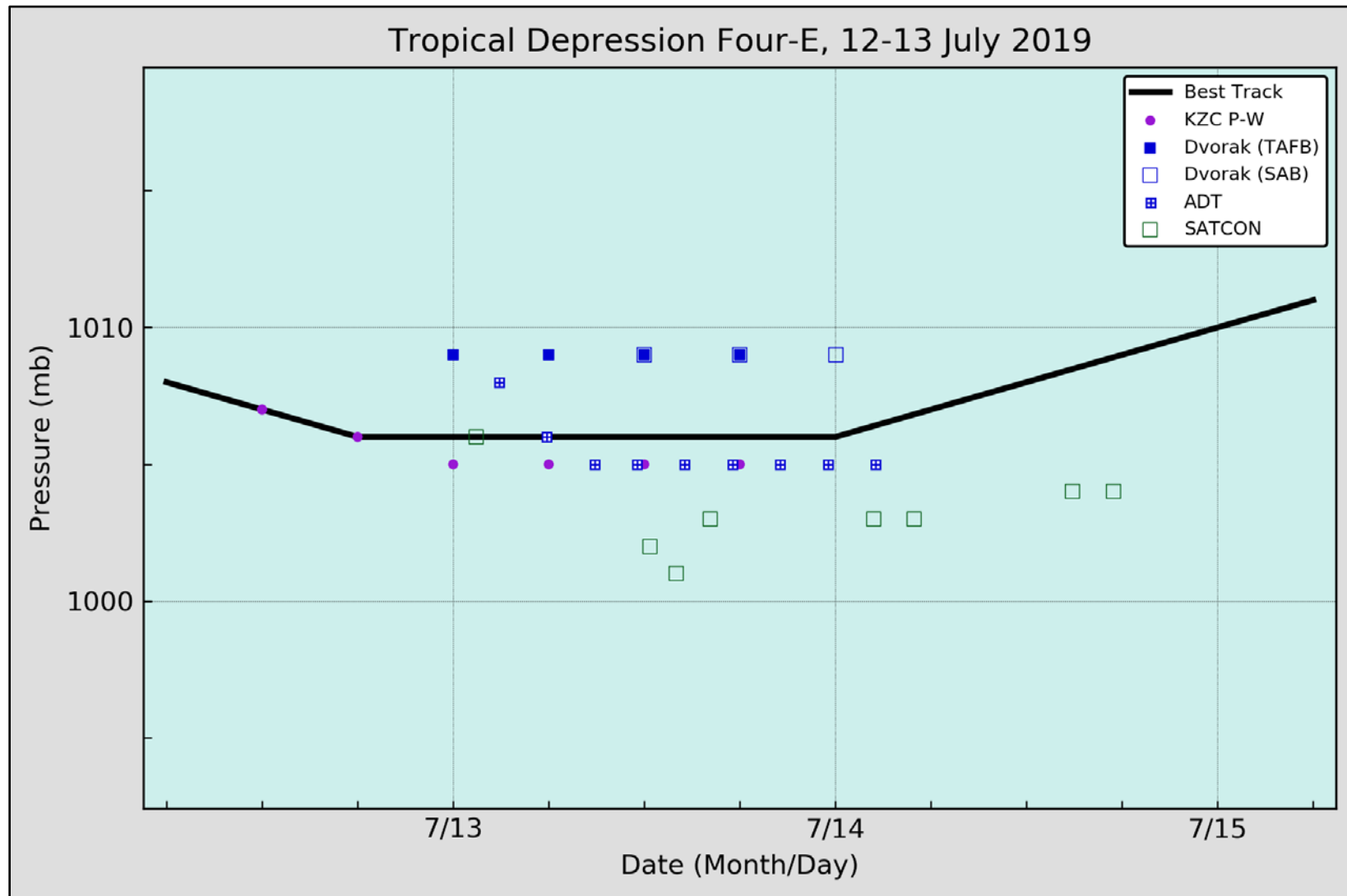


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Depression Four-E, 12–13 July 2019. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for 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.