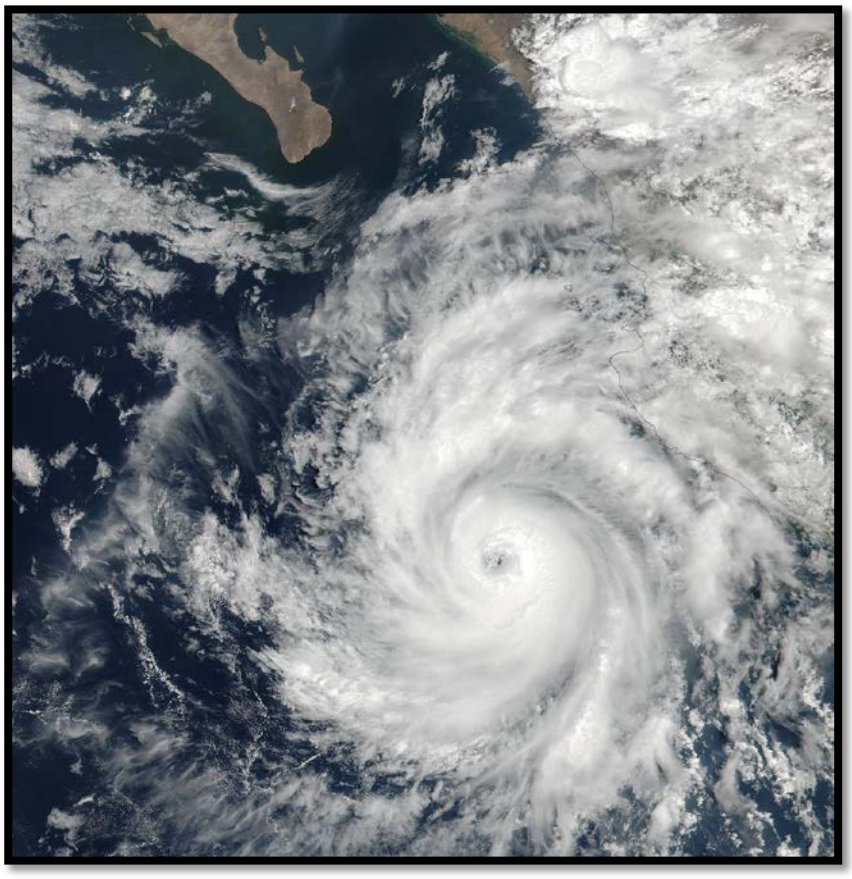
NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE DORA

(EP042017)

24 – 28 June 2017

Robbie Berg
National Hurricane Center
20 November 2017



NASA-NOAA SUOMI NPP SATELLITE IMAGE OF HURRICANE DORA AT 1936 UTC 26 JUNE 2017 WHILE AT PEAK INTENSITY

Dora was a category 2 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that moved parallel to the southwestern coast of Mexico.

Hurricane Dora

24 – 28 JUNE 2017

SYNOPTIC HISTORY

Dora developed from the combination of a large Central American gyre that formed around 15 June and a tropical wave that moved into the area by 23 June. The gyre's circulation expanded and lifted slowly northward for several days, leaving behind a trough of low pressure that extended southwestward over the far eastern Pacific Ocean through 20 June. When Atlantic Tropical Storm Cindy formed from the large circulation and moved toward the U.S. Gulf Coast, the trough over the eastern Pacific detached from the gyre and remained nearly stationary south of the Gulf of Tehuantepec from 21-23 June. A tropical wave, associated with the remnants of Atlantic Tropical Storm Bret, then approached the disturbance, leading to the formation of a closed surface low by 0000 UTC 24 June. The associated shower and thunderstorm activity gradually became better organized through the day, and a tropical depression formed by 1800 UTC while centered about 200 n mi south-southeast of Acapulco, Mexico. The depression then became a tropical storm by 0600 UTC 25 June. The "best track" chart of Dora'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].

Dora moved west-northwestward parallel to the coast of Mexico for about five days while located to the south of a mid-tropospheric ridge which extended from northern Mexico westward over the adjacent Pacific waters. Initially, the cyclone was located in an environment of light deep-layer shear (< 10 kt) and over sea surface temperatures (SSTs) of 28-29°C. These conditions allowed a period of rapid intensification (RI) to occur from 0600 UTC 25 June to 1800 UTC 26 June, with Dora becoming a hurricane about 150 n mi south of Manzanillo, Mexico, and reaching a peak intensity of 90 kt at the end of the RI phase. The strengthening phase ended once Dora reached the 26°C SST isotherm, and the intensity steadily decreased on 27 and 28 June while Dora moved over progressively colder waters. Deep convection ultimately dissipated by 0600 UTC 28 June, and Dora degenerated into a post-tropical cyclone while located about 240 n mi southwest of the southern tip of the Baja California peninsula. The remnant low continued west-northwestward on 28 and 29 June but then moved slowly south-southwestward on 30 June, steered by low-level northerly winds. The low dissipated soon after 0000 UTC 1 July about 470 n mi west-southwest of the southern tip of the Baja California peninsula.

[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.

METEOROLOGICAL STATISTICS

Observations in Dora (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 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 Dora.

Dora's estimated peak intensity of 90 kt at 1800 UTC 26 June is based on a blend of subjective satellite intensity estimates of T4.5 (77 kt) from TAFB and SAB and an objective ADT estimate of T5.7 (107 kt).

There were no reports of sustained tropical-storm-force winds from land stations in Mexico. An automated Mexican navy station on Socorro Island reported gusts to tropical storm force from 1445 UTC to 1815 UTC 27 June with a measured peak gust of 35 kt. A cargo ship, the *Chiquita Progress* (A8OF7), reported sustained winds of 39 kt at 1200 UTC 26 June about 10-15 n mi off the coast of Mexico. However, the ship was located about 150 n mi east-northeast of Dora's center, and ASCAT data before and after that time indicated that tropical-storm-force winds only extended 60-70 n mi to the northeast of the hurricane's center.

CASUALTY AND DAMAGE STATISTICS

There were no reported casualties associated with Dora. Heavy rainfall from Dora's outer rainbands occurred over portions of southwestern Mexico, and the governor of the Mexican state of Guerrero reported that some homes were flooded in the cities of Chilpancingo, Tixtla, and Ayutla de los Libres.

FORECAST AND WARNING CRITIQUE

The genesis of Dora was reasonably well forecast although the lead times were not especially long. Table 2 provides the number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in each likelihood category. The incipient disturbance was introduced in the Tropical Weather Outlook with a low (<40%) chance of genesis almost three days (66 h) before Dora formed. The 2- and 5-day genesis probabilities were raised to the high category (>60%) about a day before Dora's formation.

A verification of NHC official track forecasts for Dora is given in Table 3a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period at all forecast

times. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The HWRF (HWFI) was the only model to beat the NHC official track forecasts at all forecast times, having average track errors of less than 20 n mi through 48 h. The GFS (GFSI) and GFS ensemble mean (AEMI) also performed well and beat the official forecasts at several forecast times. The NHC track forecasts were quite skillful, however, beating the consensus models at several forecast times and the ECMWF (EMXI) and UKMET (EGRI) models at all forecast times.

A verification of NHC official intensity forecasts for Dora is given in Table 4a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period only at 48 and 72 h and were higher from 12-36 h, likely due to Dora's period of rapid intensification, which was not well forecast. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The corrected consensus techniques performed well with Dora's intensity, with the Florida State Superensemble (FSSE) and the HFIP Corrected Consensus Approach (HCCA) being the only models that outperformed the NHC official intensity forecasts at nearly all forecast times.

There were no coastal watches or warnings associated with Dora.

Table 1. Best track for Hurricane Dora, 24-28 June 2017.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
24 / 0000	12.8	96.5	1008	25	low
24 / 0600	13.0	97.2	1008	25	"
24 / 1200	13.2	97.9	1008	25	"
24 / 1800	13.6	98.7	1007	25	tropical depression
25 / 0000	14.0	99.5	1006	30	"
25 / 0600	14.4	100.4	1005	35	tropical storm
25 / 1200	14.9	101.4	1003	40	"
25 / 1800	15.5	102.6	1001	45	"
26 / 0000	16.1	103.8	999	55	"
26 / 0600	16.6	104.8	993	65	hurricane
26 / 1200	17.1	105.8	978	85	"
26 / 1800	17.6	106.8	974	90	"
27 / 0000	18.1	107.8	977	85	"
27 / 0600	18.6	108.7	984	75	"
27 / 1200	19.0	109.7	990	65	"
27 / 1800	19.3	110.7	995	55	tropical storm
28 / 0000	19.5	111.7	1000	45	"
28 / 0600	19.7	112.6	1005	35	low
28 / 1200	19.9	113.5	1007	30	"
28 / 1800	20.1	114.4	1007	25	"
29 / 0000	20.4	115.3	1007	25	"
29 / 0600	20.7	116.0	1008	20	"
29 / 1200	21.0	116.6	1008	20	"
29 / 1800	21.4	117.1	1008	20	"
30 / 0000	21.4	117.4	1009	15	"
30 / 0600	21.3	117.5	1009	15	"
30 / 1200	21.1	117.6	1009	15	"
30 / 1800	20.6	117.6	1010	15	"
01 / 0000	19.9	117.8	1010	15	"
01 / 0600					dissipated
26 / 1800	17.6	106.8	974	90	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%)	66	66
Medium (40%-60%)	30	42
High (>60%)	24	30

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Dora, 24-28 June 2017. 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	72	96	120
OFCL	**12.6**	**22.6**	**32.0**	**39.5**	**67.9**		
OCD5	19.3	34.8	55.3	85.7	200.2		
Forecasts	11	9	7	5	1		
OFCL (2012-16)	22.2	33.9	43.8	54.8	80.0	108.9	145.1
OCD5 (2012-16)	35.7	72.0	112.2	150.2	217.0	271.0	340.2

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Dora, 24-28 June 2017. 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	72	96	120
OFCL	12.9	20.9	28.9	32.6			
OCD5	18.4	25.4	40.1	59.5			
GFSI	15.9	**19.0**	**25.8**	40.6			
EMXI	21.5	46.8	89.8	99.7			
EGRI	21.3	29.0	44.7	75.1			
NVGI	26.0	39.2	56.3	53.7			
CMCI	22.5	41.7	48.4	38.7			
HWFI	**11.9**	**16.8**	**18.4**	**18.6**			
CTCI	23.7	47.7	80.4	101.8			
TCON	14.0	**17.4**	**23.2**	38.5			
TVCE	**12.8**	22.2	33.8	39.3			
TVCX	**12.2**	23.0	34.6	34.8			
GFEX	14.0	26.0	47.1	50.9			
HCCA	14.8	23.6	36.4	37.4			
FSSE	**11.7**	23.1	35.7	34.6			
AEMI	17.2	**20.0**	**27.6**	**26.0**			
TABS	17.4	30.4	48.5	61.2			
TABM	17.0	22.6	37.6	59.2			
TABD	16.1	21.2	32.6	54.6			
Forecasts	9	7	5	3			

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Dora, 24-28 June 2017. 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	72	96	120
OFCL	6.4	11.7	13.6	**10.0**	**0.0**		
OCD5	10.6	20.8	24.3	15.2	1.0		
Forecasts	11	9	7	5	1		
OFCL (2012-16)	5.8	9.4	11.8	13.2	15.0	15.7	14.9
OCD5 (2012-16)	7.6	12.2	15.7	18.1	20.6	21.8	20.0

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Dora, 24-28 June 2017. 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	72	96	120
OFCL	7.2	12.1	8.0	3.3			
OCD5	11.6	21.9	18.4	6.0			
DSHP	9.9	18.9	15.2	13.3			
LGEM	9.9	16.9	12.8	3.7			
HWFI	9.8	14.9	12.6	7.3			
CTCI	11.8	17.9	17.6	17.0			
ICON	9.2	15.4	11.2	3.3			
IVCN	8.9	14.9	11.2	**3.0**			
HCCA	7.7	**10.3**	**7.0**	**1.7**			
FSSE	**7.1**	**9.6**	**5.4**	**2.0**			
GFSI	10.0	13.3	13.0	8.3			
EMXI	13.7	23.1	23.2	10.7			
Forecasts	9	7	5	3			

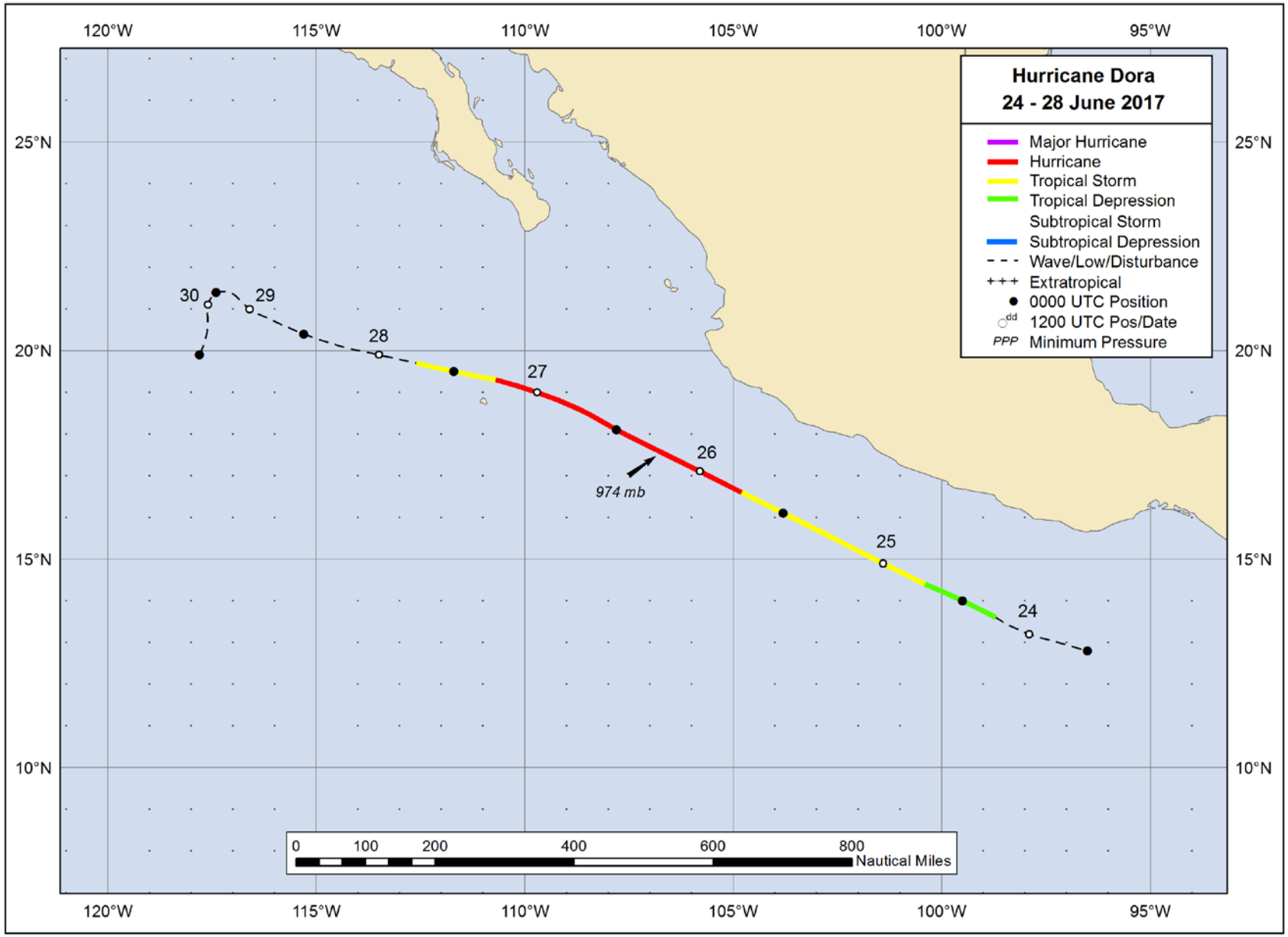


Figure 1. Best track positions for Hurricane Dora, 24-28 June 2017.

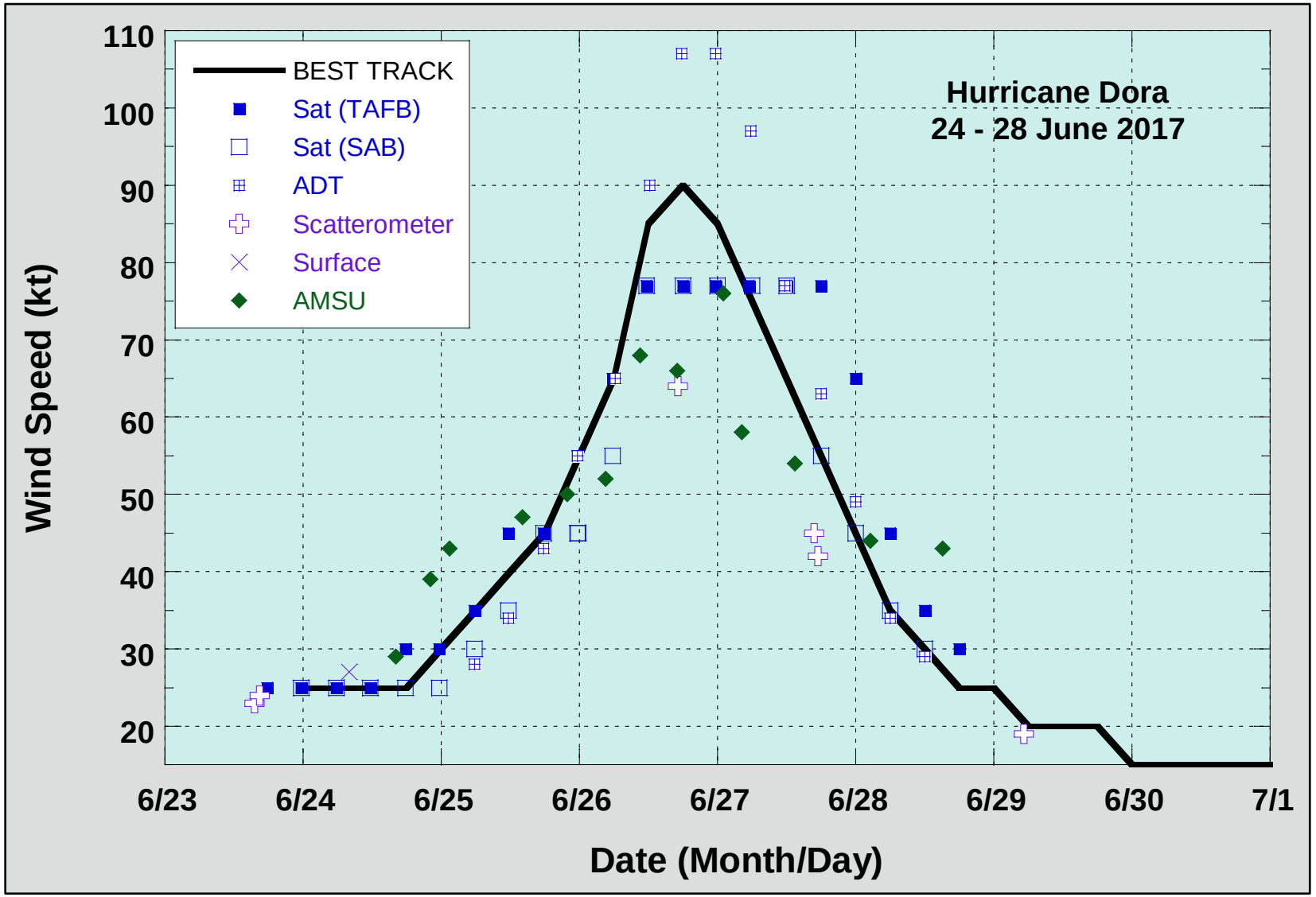


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Dora, 24-28 June 2017. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

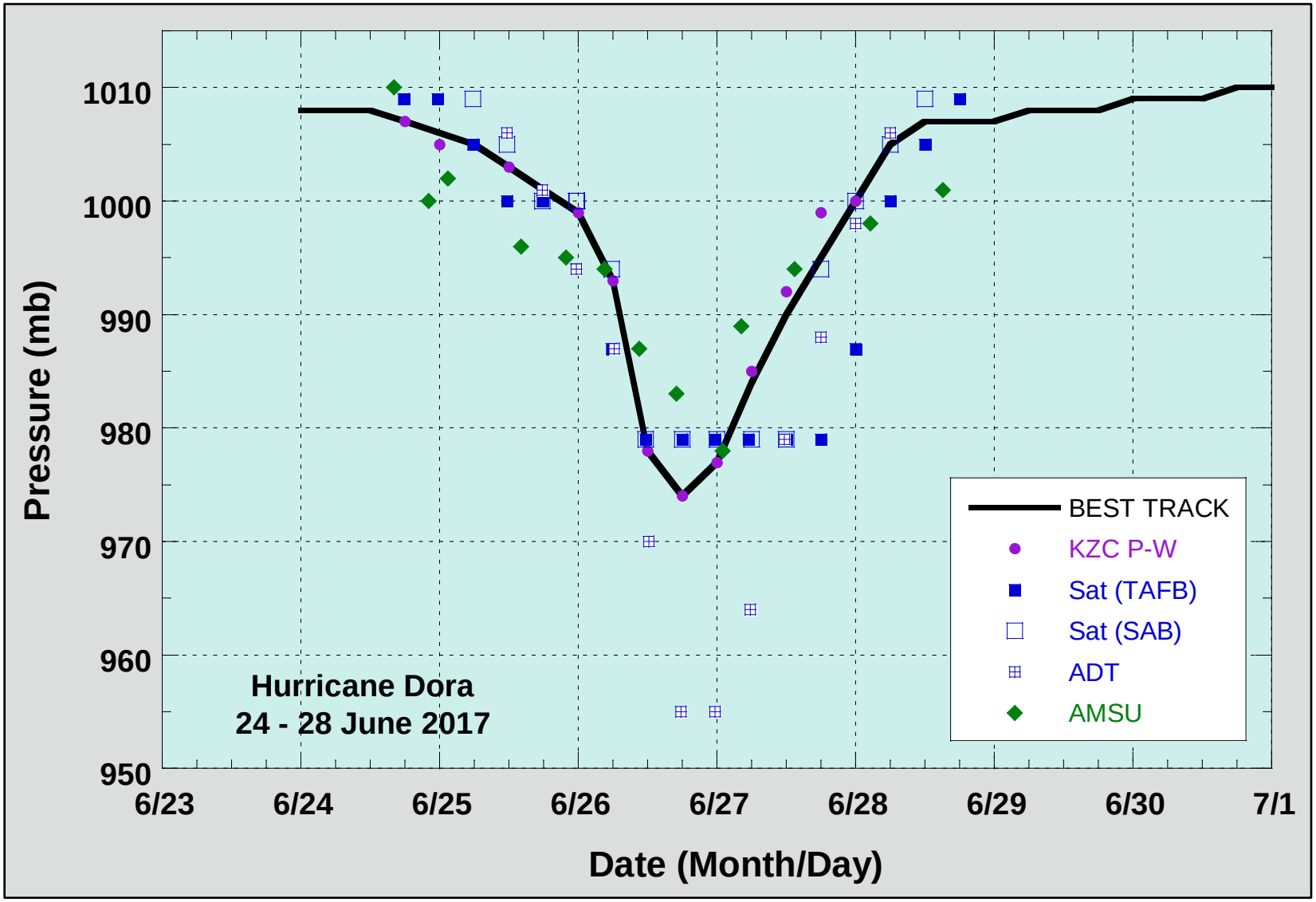


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Dora, 24-28 June 2017. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.