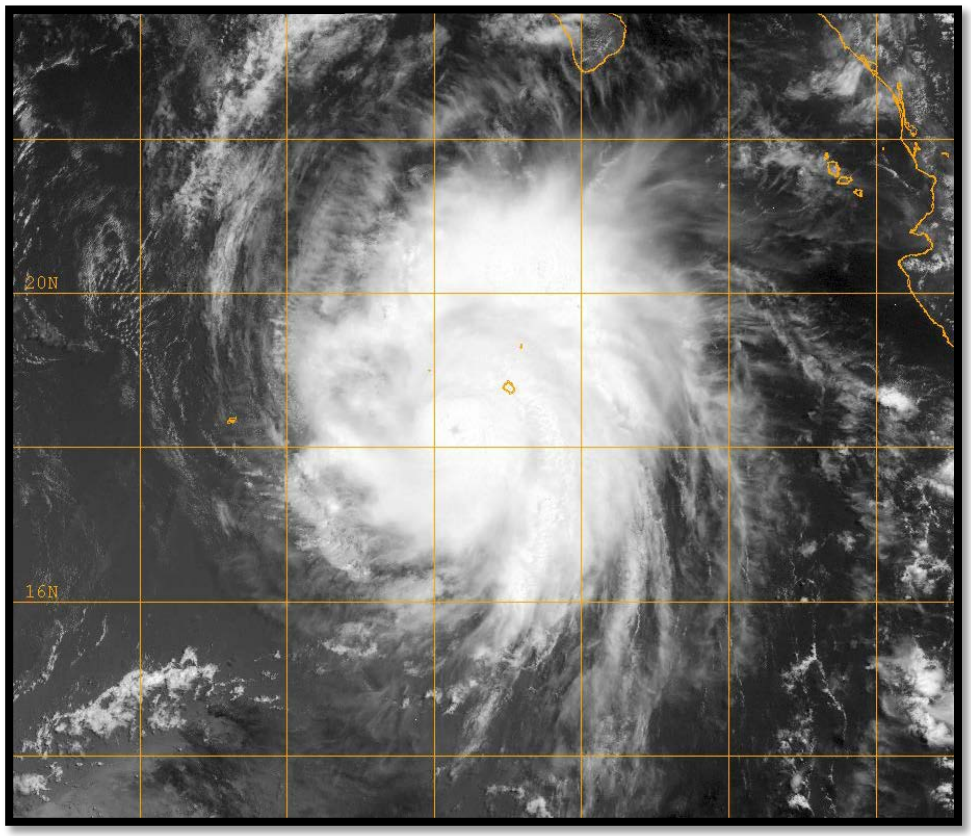
NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

HURRICANE HERNAN

(EP082014)

26 – 29 July 2014

Robbie Berg
National Hurricane Center
7 October 2014



GOES-WEST VISIBLE IMAGE OF HURRICANE HERNAN AT 1830 UTC 27 JULY 2014, NEAR THE TIME OF ITS PEAK INTENSITY. IMAGE COURTESTY OF THE NAVAL RESEARCH LABORATORY.

Hernan was a category one hurricane (on the Saffir-Simpson Hurricane Wind Scale) that stayed well southwest of the coast of Mexico.

Hurricane Hernan

26 – 29 JULY 2014

SYNOPTIC HISTORY

Hernan originated from a tropical wave that moved off the west coast of Africa on 12 July. A cluster of showers and thunderstorms accompanied the wave while it moved westward across the tropical Atlantic and reached the Windward Islands on 18 July. Deep convection near the wave diminished for a few days over the Caribbean Sea but then redeveloped once the wave moved west of Central America on 21 July. The showers and thunderstorms began to gradually become organized on 24 and 25 July, possibly enhanced by a convectively coupled Kelvin wave, and a closed area of low pressure developed around 0000 UTC 26 July. The convection was organized enough for the low to be designated as a tropical depression at 0600 UTC that day when it was located 350 n mi southwest of Zihuatanejo, Mexico, and the depression strengthened to a tropical storm by 1800 UTC about 300 n mi southwest of Manzanillo, Mexico. The "best track" chart of Hernan'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*.

A large mid-level ridge centered over the south-central United States and extending southward across Mexico steered Hernan west-northwestward to northwestward for the next few days. A relatively short period of rapid intensification had begun when Hernan became a tropical depression on 26 July, and the cyclone strengthened to a hurricane by 1800 UTC 27 July when located about 290 n mi south-southwest of the southern tip of the Baja California peninsula. Its time as a hurricane was short lived, however, and Hernan weakened to a tropical storm at 0600 UTC 28 July due to increasing westerly shear. Weakening continued as Hernan reached water colder than 26°C later that day, and the cyclone degenerated into a post-tropical remnant low by 1200 UTC 29 July about 575 n mi west of the southern tip of the Baja California peninsula. The remnant low slowed down and turned westward in the low-level trade winds and dissipated by 1200 UTC 31 July.

METEOROLOGICAL STATISTICS

Observations in Hernan (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-

* 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.

Madison. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Tropical Rainfall Measuring Mission (TRMM), 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 Hernan.

Hernan's estimated peak intensity of 65 kt is based on a blend of subjective Dvorak satellite intensity estimates of T4.0 (65 kt) from TAFB and T3.5 (55 kt) from SAB, and an objective ADT estimate of T4.2 (70 kt) at 1800 UTC 27 July. Although the subjective estimates increased 6 h later, Hernan had lost its eye by that time, and the raw ADT numbers had already begun to decrease. Therefore, Hernan's peak intensity is estimated to be 65 kt based on the 1800 UTC satellite data.

An automated Mexican Navy station on Socorro Island measured a peak sustained wind of 32 kt at 1500 UTC 27 July and a gust to 51 kt at 1545 UTC.

There were no ship reports of winds of tropical storm force in association with Hernan.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Hernan was somewhat well forecast. The possibility of Hernan's genesis was first indicated in the Tropical Weather Outlook almost 5 days before it happened, but there was difficulty in pinpointing the exact time of genesis. Tropical cyclone formation was expected (increased to a "high" chance) during the ensuing 5 days only 36 h before genesis, and was expected during the ensuing 48 h only 6 h before genesis. Table 2 shows the number of hours in advance of formation that the Tropical Weather Outlook first included each likelihood category.

A verification of NHC official track forecasts for Hernan 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 official track forecasts had lower errors than all of the individual models at all forecast times. However, the Florida State Superensemble (FSSE) and the GFS ensemble mean (AEMI) generally outperformed the official forecasts. The multi-model consensus TVCE had lower errors than the official forecasts only at 48 h. The UKMET model (EGRI), NAVGEM (NVGI), and the Navy version of the GFDL (GFNI) were not included in the track verification since they did not have enough forecasts to satisfy the homogeneity requirement.

A verification of NHC official intensity forecasts for Hernan is given in Table 4a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period at all forecast times. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The official intensity forecasts performed well against the statistical-dynamical SHIPS and LGEM models. However, the regional hurricane models had the lowest errors, with the HWRF model outperforming the official forecasts at all times between 12 and 48 h and the GFDL having lower errors at 24 and 36 h. An inspection of individual forecasts indicates that the HWRF and GFDL models accurately predicted Hernan's rate of weakening after it reached its peak intensity. The SHIPS and LGEM models predicted further intensification after Hernan reached its peak and then a slower rate of weakening, which did not verify. The Navy version of the GFDL (GFNI) was not included in the intensity verification since it did not have enough forecasts to satisfy the homogeneity requirement.

There were no coastal watches or warnings in association with Hernan.

Table 1. Best track for Hurricane Hernan, 26 – 29 July 2014.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
26 / 0000	12.3	104.9	1007	30	low
26 / 0600	13.3	105.6	1007	30	tropical depression
26 / 1200	14.3	106.6	1007	30	"
26 / 1800	15.1	107.6	1005	35	tropical storm
27 / 0000	15.8	108.5	1001	45	"
27 / 0600	16.6	109.5	997	55	"
27 / 1200	17.5	110.6	994	60	"
27 / 1800	18.3	111.7	992	65	hurricane
28 / 0000	19.0	112.8	992	65	"
28 / 0600	19.6	114.0	994	60	tropical storm
28 / 1200	20.3	115.3	996	55	"
28 / 1800	21.0	116.7	1000	45	"
29 / 0000	21.8	118.0	1004	40	"
29 / 0600	22.5	119.3	1006	35	"
29 / 1200	23.2	120.4	1008	30	low
29 / 1800	23.8	121.4	1008	25	"
30 / 0000	24.1	122.4	1009	25	"
30 / 0600	24.3	123.2	1009	25	"
30 / 1200	24.7	123.9	1010	25	"
30 / 1800	25.1	124.5	1011	25	"
31 / 0000	25.3	125.2	1012	20	"
31 / 0600	25.3	125.9	1012	20	"
31 / 1200					dissipated
27 / 1800	18.3	111.7	992	65	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 (<30%)	42	114
Medium (30%-50%)	12	96
High (>50%)	6	36

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Hernan, 26 – 29 July 2014. 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	**17.9**	**34.5**	**42.5**	**54.4**	**82.8**		
OCD5	39.7	85.7	138.0	204.3	377.5		
Forecasts	11	9	7	5	1		
OFCL (2009-13)	25.7	41.4	55.0	68.6	97.8	134.2	167.1
OCD5 (2009-13)	37.2	74.8	118.0	162.5	249.4	332.6	413.3

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Hernan, 26 – 29 July 2014. 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	12.5	23.6	23.3	30.7			
OCD5	36.6	83.8	135.7	212.1			
GFSI	19.5	31.3	29.6	32.4			
GHMI	18.3	33.4	33.8	37.1			
HWFI	14.6	24.7	28.9	42.1			
EMXI	12.7	24.3	27.6	36.2			
CMCI	23.3	29.5	41.1	75.2			
TVCE	13.2	24.2	25.1	**27.9**			
FSSE	**10.7**	**22.5**	24.3	**21.1**			
AEMI	15.2	**21.4**	**16.8**	**24.6**			
BAMS	14.5	24.6	27.4	52.4			
BAMM	18.6	34.8	53.6	77.8			
BAMD	31.7	65.7	101.6	151.1			
Forecasts	9	7	5	3			

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Hernan, 26 – 29 July 2014. 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	**5.0**	**10.0**	**10.7**	**4.0**	**5.0**		
OCD5	7.0	16.9	19.6	12.6	17.0		
Forecasts	11	9	7	5	1		
OFCL (2009-13)	6.1	10.4	13.4	14.5	15.0	16.4	16.1
OCD5 (2009-13)	7.7	12.7	16.4	18.8	20.5	20.3	20.8

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Hernan, 26 – 29 July 2014. 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	5.0	9.3	10.0	5.0			
OCD5	7.3	17.0	18.6	13.7			
HWFI	**4.0**	**5.1**	**5.6**	**4.3**			
GHMI	5.3	**6.7**	**8.6**	5.0			
DSHP	7.9	16.3	17.2	12.0			
LGEM	8.2	16.4	16.6	9.3			
ICON	5.7	11.1	12.0	6.7			
IVCN	5.7	11.1	12.0	6.7			
FSSE	5.4	10.1	**9.8**	7.3			
Forecasts	9	7	5	3			

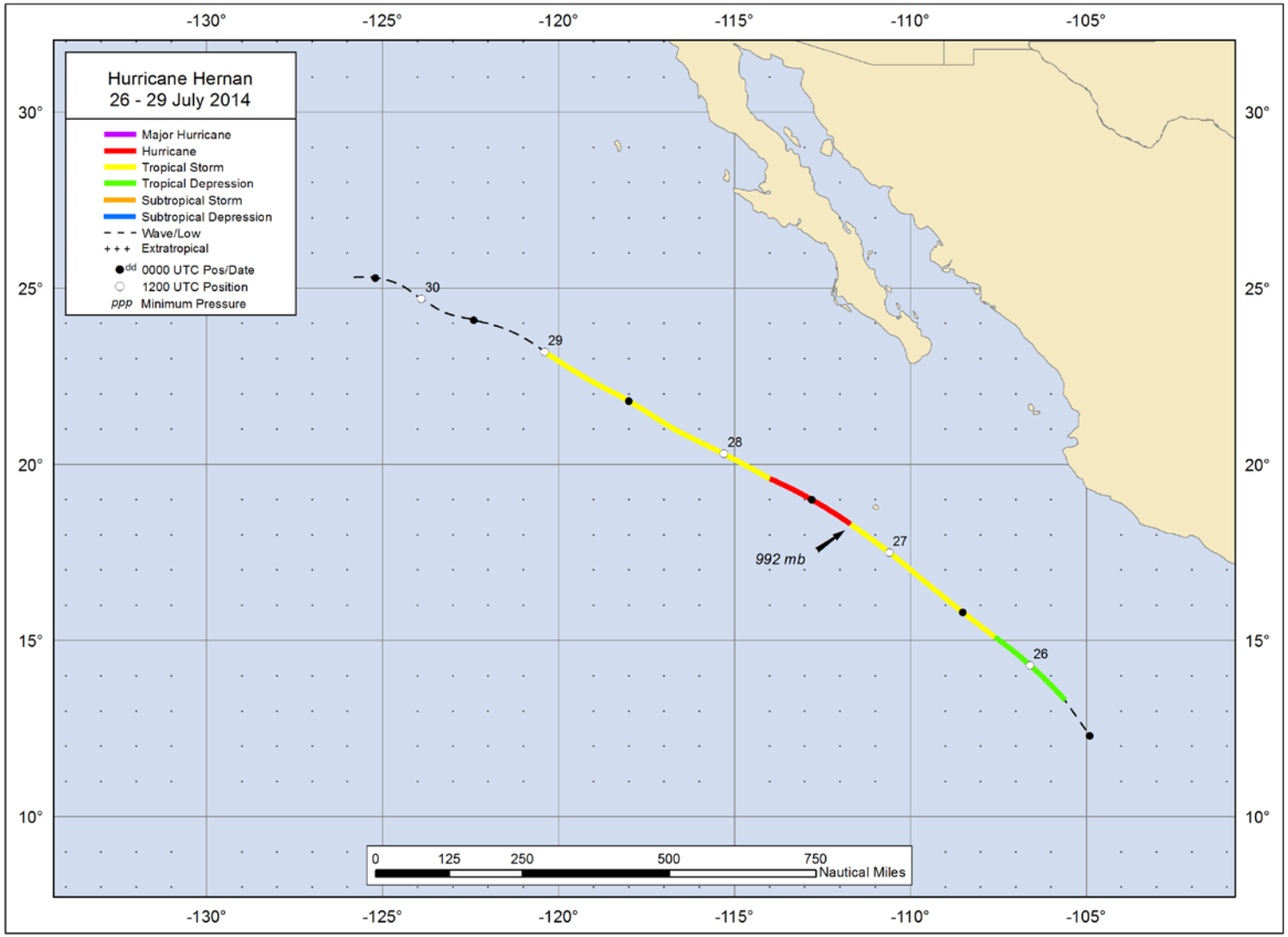


Figure 1. Best track positions for Hurricane Hernan, 26 – 29 July 2014.

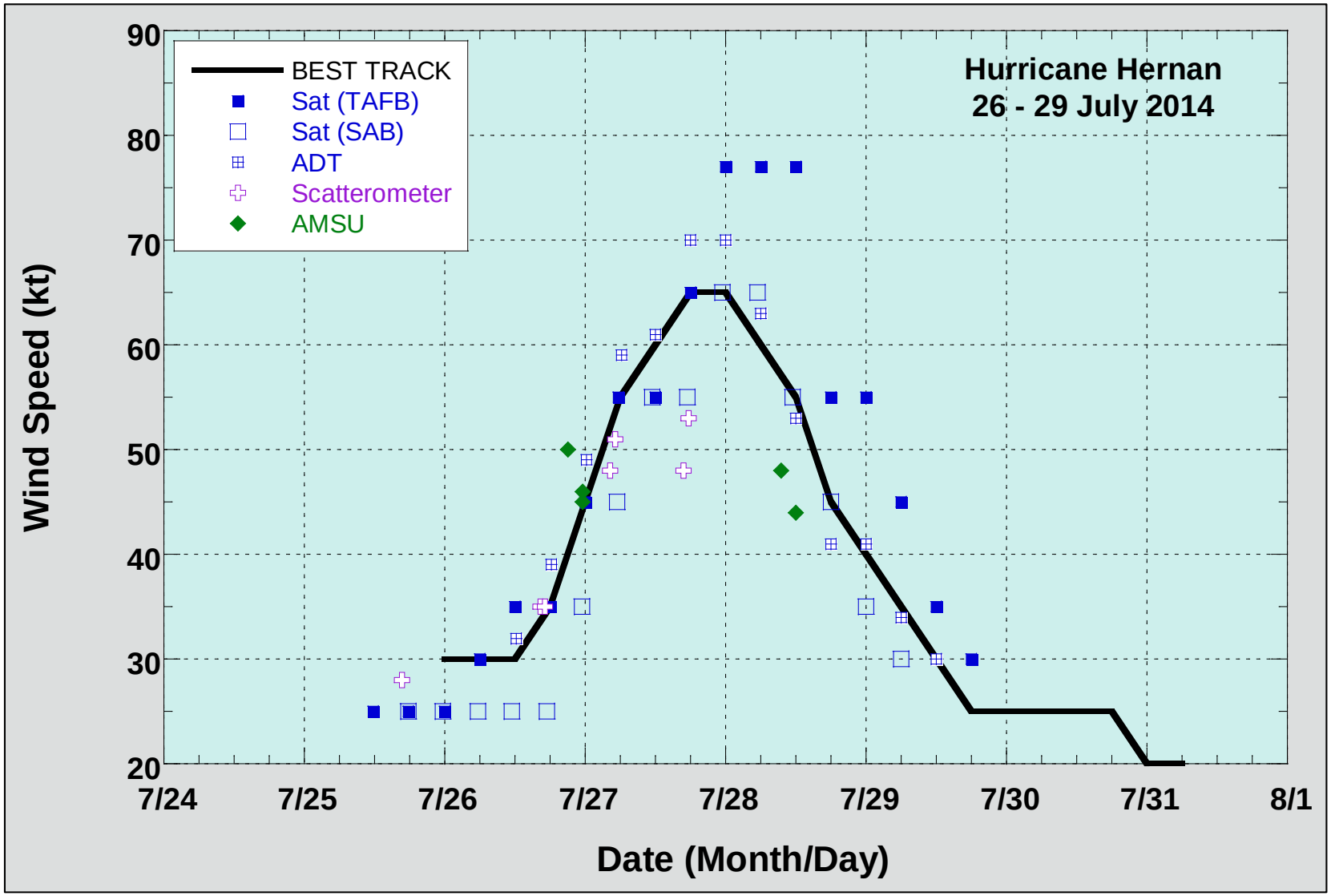


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Hernan, 26 – 29 July 2014. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

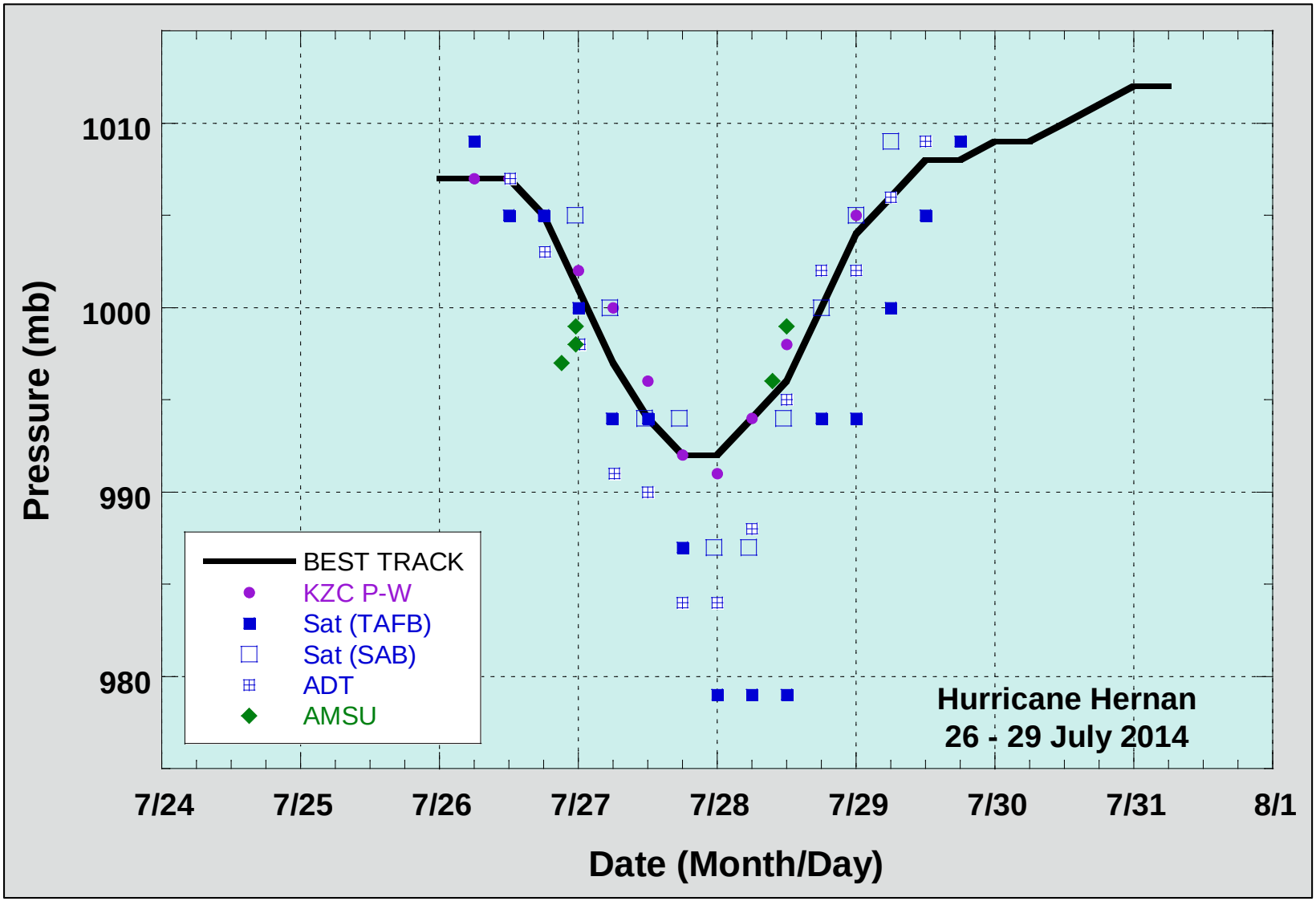


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Hernan, 26 – 29 July 2014. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological 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.