

Tropical Cyclone Report
Hurricane Hernan
30 August-6 September 2002

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Hurricane Hernan attained category 5 hurricane intensity on the Saffir-Simpson Hurricane Scale. Hernan passed to the south of Socorro Island, but it is unlikely that hurricane conditions occurred there.

a. Synoptic History

Hernan became a tropical cyclone on August 30th, when a closed circulation and organized convection formed about 340 n mi south-southeast of Manzanillo, Mexico. The pre-existing intertropical convergence zone disturbance coincided with a weak tropical wave that moved over the eastern Atlantic from Africa on the 16th.

The “best track” the tropical cyclone’s path and intensity begins on the 30th. The path of the tropical cyclone center is shown in Fig. 1 and the wind and pressure histories are shown in Figs. 2 and 3. The best track positions and intensities are listed in Table 1.

Hernan’s track was basically toward the west-northwest for five days and then northwestward for three days followed by dissipation. This track follows the southwest periphery of the geopotential height contours of the mean subtropical high pressure ridge centered over Mexico.

Hernan’s wind history is equally straightforward. The 1-min, 10-m maximum wind speed (Fig. 2) increased from 30 kt on the 30th to 140 kt on September 1st, an increase of 110 kt in 54 hours. The wind then decreased back to 30 kt in the next 96 hours. Within 24 h of the peak wind of 140 kt, Hernan encountered progressively cooler waters. Two days later on the 4th, increasing vertical shear continued the weakening process. By the 6th, Hernan was devoid of significant convection and reduced to a remnant low, while located about 780 n mi west of the southern tip of Baja California. The remnant low drifted southwestward until the 9th when it dissipated.

b. Meteorological Statistics

Observations of intensity plotted in Figs. 2 and 3 include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA). Satellite subjective Dvorak estimates of 140 kt are the basis for the best-track maximum wind speed of the same value. An objective Dvorak 3-h average estimate was 135 kt at the same time. Ship reports of winds of tropical storm force associated with Hernan are given in Table 2.

The center passed about 90 n mi south of Socorro Island on September 1st, when the

intensity was near its maximum value. Although no reports have been received from the island, it is likely that hurricane conditions remained to its south.

c. Casualty and Damage Statistics

There were no reports of damages or casualties.

d. Forecast and Warning Critique

Table 4 lists the average official track errors for Hernan, with the number of cases in parentheses, along with the errors for a selection of track guidance models. Official errors averaged 27 (22), 44 (20), 72(18), 99(16), and 115(12) n mi for the 12, 24, 36, 48, and 72 h forecasts, respectively. These errors are 21 to 37 percent lower than the average official track errors for the 10-yr period 1992-2001, also listed in Table 4. Several models outperformed the official forecasts, including the NWS Global Forecast System (AVNI), the GFDL model embedded in the NOGAPS model (GFNI), the NOGAPS model (NGPI), some of the BAM models, and the GUNS and GUNA consensus forecasts.

Average official intensity errors were 10, 21, 27, 28, and 26 kt for the 12, 24, 36, 48, and 72 h forecasts, respectively. For comparison, the average official intensity errors over the 10-yr period 1992-2001 are 7, 12, 16, 18, and 21 kt, respectively. These rather large official errors are partially the result of the first few forecasts under-forecasting the rapid intensification. Also, some fairly large errors occurred from incorrectly under-forecasting the rate of weakening. The SHIPS intensity guidance model had similarly large errors.

Table 1. Best track for Hurricane Hernan, 30 August - 6 September 2002.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
30 / 0600	13.5	103.1	1006	30	tropical depression
30 / 1200	13.9	103.4	1002	40	tropical storm
30 / 1800	14.2	104.0	1000	45	"
31 / 0000	14.7	104.8	991	55	"
31 / 0600	15.1	105.8	987	65	hurricane
31 / 1200	15.3	106.9	970	85	"
31 / 1800	15.7	107.8	962	100	"
01 / 0000	16.5	108.8	948	115	"
01 / 0600	16.7	110.1	931	130	"
01 / 1200	17.2	111.1	921	140	"
01 / 1800	17.7	112.2	921	140	"
02 / 0000	17.9	113.3	927	135	"
02 / 0600	18.2	114.3	948	115	"
02 / 1200	18.4	115.4	952	110	"
02 / 1800	18.6	116.3	956	105	"
03 / 0000	18.7	117.3	965	95	"
03 / 0600	18.8	118.3	970	90	"
03 / 1200	18.9	119.3	975	85	"
03 / 1800	19.2	120.1	976	80	"
04 / 0000	19.5	120.8	983	70	"
04 / 0600	20.2	121.6	987	65	"
04 / 1200	20.7	122.1	994	55	tropical storm
04 / 1800	21.1	122.8	997	50	"
05 / 0000	21.5	123.3	1002	40	"
05 / 0600	21.8	123.7	1005	35	"
05 / 1200	22.3	124.1	1004	30	tropical depression
05 / 1800	22.8	124.4	1006	30	"
06 / 0000	23.3	124.4	1006	30	"
06 / 0600	23.7	124.5	1009	25	"

Table 1. (continued)

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
06 / 1200	24.0	124.6	1009	25	tropical depression
06 / 1800	24.5	124.7	1009	20	remnant low
01 / 1200	17.2	111.1	921	140	minimum pressure
01 / 1800	17.7	112.2	921	140	minimum pressure

Table 2. Selected ship reports with winds of at least 34 kt for Hurricane Hernan, 30 August-6 September 2002.

Date/Time (UTC)	Ship name	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
31 / 0300	Eemsgracht	18.6	104.7	120 / 37	1009.0
31 / 0600	Zim Europa	18.1	103.9	110 / 36	1009.0

Table 3. Preliminary forecast evaluation (heterogeneous sample) for Hurricane Hernan, 30 September-6 October 2002. Forecast errors for tropical storm and hurricane stages (n mi) are followed by the number of forecasts in parentheses. Models listed are operationally available as guidance for the NHC official forecast. Model errors smaller than the official forecast are shown in bold-face type.

Forecast Technique	Forecast Period (h)				
	12	24	36	48	72
CLP5	27 (22)	57 (20)	82 (18)	105 (16)	182 (12)
GFNI	26 (16)	43 (16)	58 (14)	82 (12)	122 (8)
GFDI	33 (22)	74 (20)	111 (18)	140 (16)	168 (12)
LBAR	25 (22)	46 (20)	74 (18)	107 (16)	151 (12)
AVNI	23 (21)	43 (19)	64 (17)	81 (15)	89 (11)
AEMI	31 (15)	53 (14)	75 (13)	88 (11)	79 (8)
BAMD	26 (22)	40 (20)	56 (18)	72 (16)	105 (12)
BAMM	24 (22)	37 (20)	51 (18)	67 (16)	102(12)
BAMS	41 (22)	65 (20)	87 (18)	105 (16)	139(12)
NGPI	27 (22)	45 (20)	61 (18)	77 (16)	125(12)
UKMI	33 (19)	57 (17)	83 (15)	102 (13)	121(9)
GUNS	24 (19)	45 (17)	70 (15)	91 (13)	103(9)
GUNA	23 (19)	43 (17)	64 (15)	86 (13)	94(9)
OFCL	27 (22)	44 (20)	72 (18)	99 (16)	115(12)
NHC Official (1992-2001 mean)	36 (2203)	67 (1947)	97 (1700)	125 (1472)	182(1091)

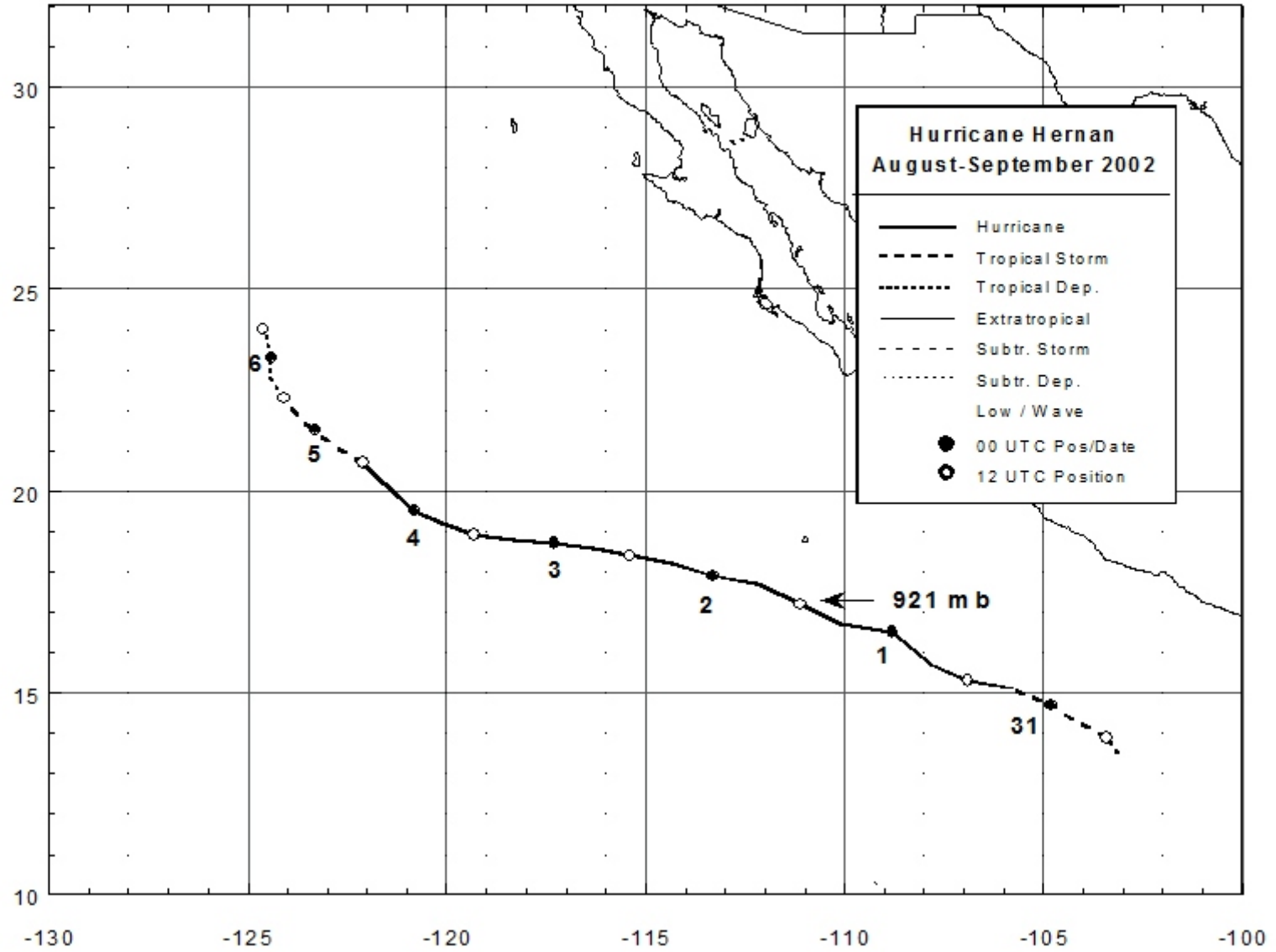


Figure 1. Best track positions and minimum pressure for Hurricane Hernan, 30 August-6 September 2002.

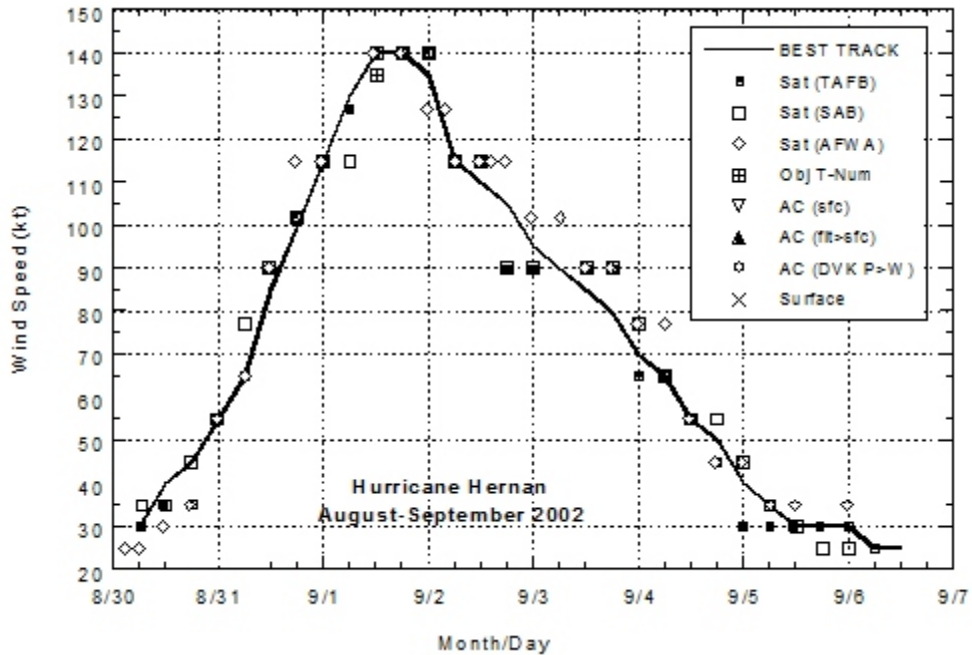


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Hernan, 30 August-6 September 2002. Objective Dvorak estimates represent linear averages over a three-hour period centered on the nominal observation time.

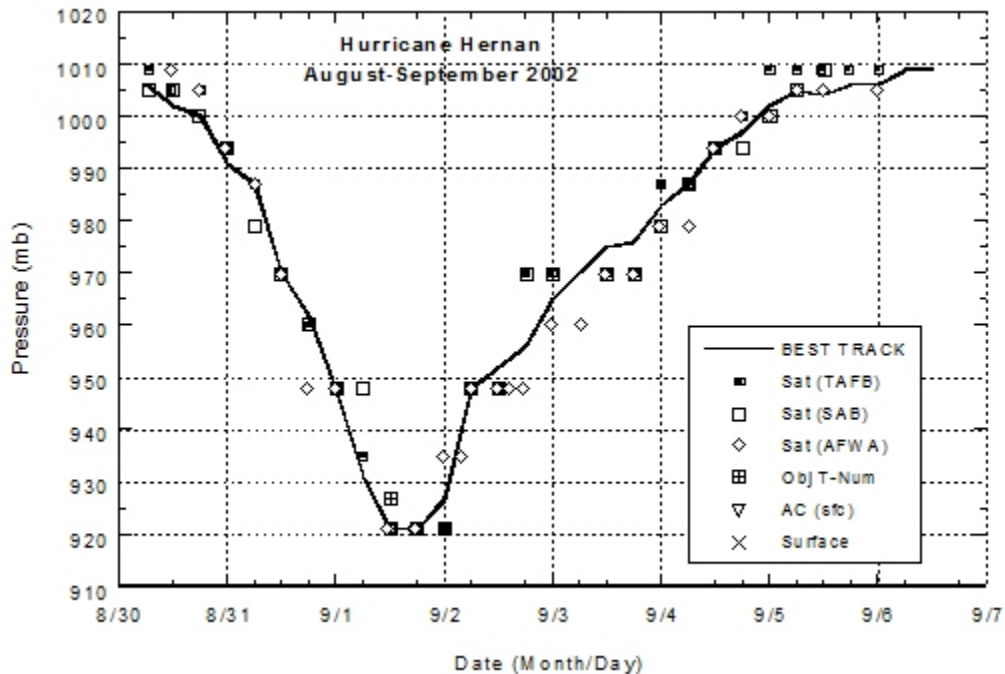


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Hernan, 30 August-6 September 2002. Objective Dvorak estimates represent linear averages over a three-hour period centered on the nominal observation time.