

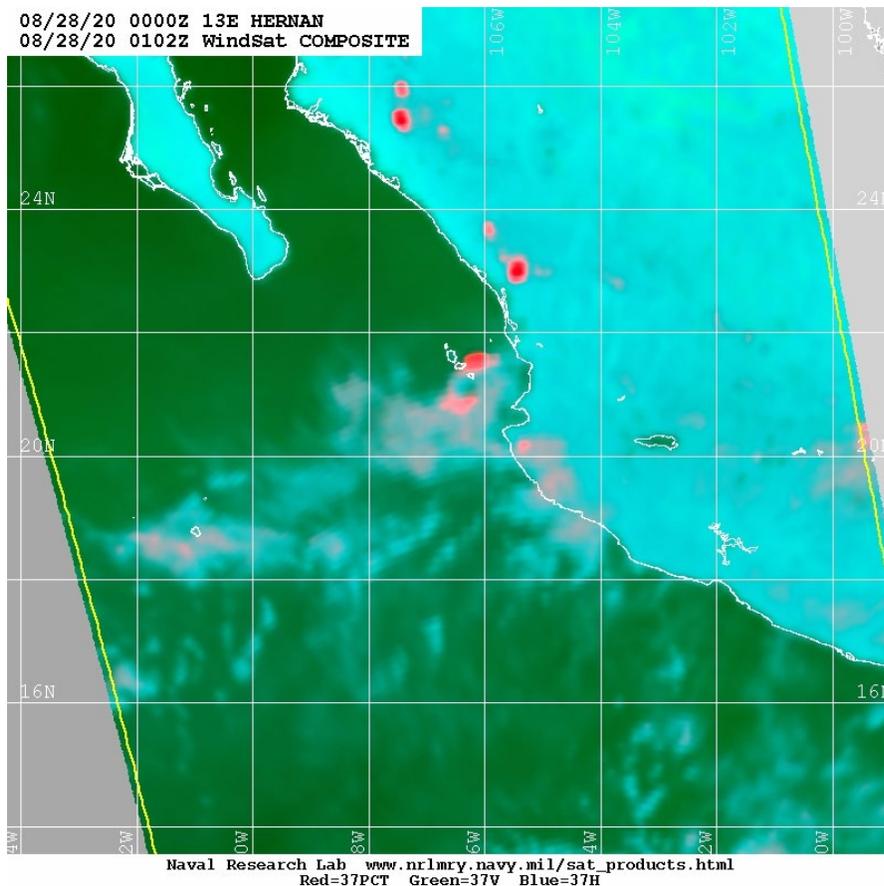


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## TROPICAL STORM HERNAN (EP132020)

26–28 August 2020

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CORIOLIS/WINDSAT 37-GHZ COMPOSITE IMAGE OF HERNAN NEAR THE ISLAS MARIAS (JUST ABOVE THE CENTER OF THE IMAGE) AT 0102 UTC 28 AUGUST. IMAGE COURTESY OF NRL MONTEREY CA.

Hernan was a short-lived tropical storm near the coast of western Mexico. The associated heavy rains caused some damage in western and southwestern Mexico.

# Tropical Storm Hernan

26–28 AUGUST 2020

## SYNOPTIC HISTORY

Hernan developed in an active portion of the monsoon trough that formed over the eastern Pacific in the wake of Hurricane Genevieve, a formation that was likely aided by the presence of the favorable phase of the Madden-Julian Oscillation. As Genevieve was weakening west of the Baja California peninsula on 20–21 August, the convection associated with the monsoon trough to the west-southwest of the hurricane increased. Three low pressure systems would wind up forming in the trough during this active period. The first system, seen initially on 21 August, would slowly move eastward and eventually become Hernan. The second system formed south of the Gulf of Tehuantepec on 23 August and moved inland over Mexico before development could occur. The third low, which formed to the west of the pre-Hernan disturbance on 25 August, eventually became Tropical Storm Iselle. It should be noted that the pre-Hernan disturbance cannot be conclusively related to any tropical wave that moved into the area from the east.

The pre-Hernan disturbance showed little development for the first few days due to the broad nature of the system and easterly vertical wind shear. The associated convection first showed signs of organization on 24 August, and the low-pressure area became better defined the next day. The strongest winds associated with the system, located mainly in the area of southwesterly monsoonal low-level flow to the southeast of the center, increased to tropical-storm force by 26 August. Thus, when the system acquired a sufficiently organized surface wind circulation near 0600 UTC that day to be considered a tropical cyclone, it became a tropical storm. At that time, Hernan was located about 295 n mi south-southwest of Cabo Corrientes, Mexico. The “best track” chart of the 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<sup>1</sup>.

Hernan was moving slowly eastward at the time of genesis in westerly flow associated with the monsoon trough, but it started a slow northward motion late on 26 August. Due to continuing easterly shear, only slight strengthening occurred, and Hernan reached a peak intensity of 40 kt early on 27 August. Later that day, a faster motion toward the north-northwest began, taking the center about 25 n mi west of Cabo Corrientes and near Las Islas Marias. Microwave imagery (cover photo) and scatterometer surface wind data (not shown) indicate that Hernan maintained a well-defined circulation with tropical-storm-force winds through about 0600 UTC 28 August, at which time it was centered north-northwest of Las Islas Marias. Thereafter, the cyclone rapidly weakened, becoming a depression by 1200 UTC that day and degenerating to a convectionless and poorly-defined remnant low 6 h later. During the weakening phase, the

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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 *bt* directory, while previous years’ data are located in the *archive* directory.

system turned westward around the northeastern end of the broad monsoon circulation that contained Tropical Storm Iselle, and that system absorbed the remnants of Hernan by 0000 UTC 29 August.

## 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), 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 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 Hernan.

Hernan's peak intensity of 40 kt is based mainly on ASCAT data at 0402 UTC 27 August. It should be noted that Hernan was quite disorganized when it accelerated north-northwestward on 27–28 August, and microwave data from the Coriolis satellite, as well as ASCAT data, were vital in tracking the system both in real time and in post-analysis.

Hernan could have brought tropical-storm conditions to portions of the coast of Mexico near Cabo Corrientes. However, no observations are currently available from this area. The storm could also have brought tropical-storm conditions to portions of Las Islas Marias, although winds at the Mexican Navy automated station in the islands stayed below tropical-storm force.

Two ships reported sustained tropical-storm-force winds in the southwesterly flow to the south and southeast of Hernan. The first, the *Koombana* Bay (call sign **VRHQ9**), reported 47-kt winds at 1300 UTC 26 August. Due to the anemometer elevation being unknown. It is unclear how representative this observation is of Hernan's intensity at the time. The second, the *Ever Liberal* (call sign **2HDG2**), reported 35-kt winds at 0000 UTC 27 August (anemometer elevation also unknown).

High surf caused by the storm and the monsoon flow impacted portions of the coast of Mexico in the Mexican state of Michoacán.

Hernan and the eastern end of the monsoon trough caused widespread heavy rains over portions of western and southwestern Mexico (Fig. 4), especially in the states of Jalisco, Colima, Michoacán, and Sinaloa. While detailed amounts are incomplete, Cihuatlán, Jalisco, reported 23.24 inches (590.2 mm) of rainfall from 26–28 August, and there are other reports of rainfall totals in excess of 15 inches (380 mm). These rains caused significant flash flooding and mudslides in the affected areas.

## CASUALTY AND DAMAGE STATISTICS

Media reports indicate there was one death in Mexico indirectly associated<sup>2</sup> with Hernan – a man in La Huerta, Jalisco, who fell off of a roof while checking for damage.

Media reports also indicate that the flash flooding and mudslides in western and southwestern Mexico caused damage to at least 630 homes, washed out roads, and knocked out power for up to 97,000 people. No monetary estimates of the damage are available at this time.

## FORECAST AND WARNING CRITIQUE

The genesis of Hernan was well anticipated, but many of the genesis forecasts were much too far in advance (Table 2). The first notice that Hernan might form was introduced into the Tropical Weather Outlook (TWO) with a low chance of development (<40%) in the 5-day forecast range more than 8 days before genesis occurred, and the system was introduced with a low chance in the 2-day range 120 h before genesis occurred. The genesis probabilities were raised to medium chance (40–60%) 168 h before genesis in the 5-day forecast range and 90 h before genesis in the 2-day forecast range. The probabilities were raised to high chance (>60%) at 108h and 60 h before genesis in the 5-day and 2-day forecast ranges respectively. The long lead times may have been related to the monsoonal nature of the disturbance, as such systems can often be slower to develop than shown by the model guidance.

A verification of NHC official track forecasts for Hernan is given in Table 3. Official forecast track errors were greater the mean official errors for the previous 5-yr period. However, average errors of the climatology-persistence model (OCD5) were also larger than the 5-yr average, indicating that Hernan was more difficult than normal to forecast. Examination of the individual track forecasts (not shown) indicates that while the NHC forecasts correctly captured the overall movement of Hernan, they did not properly show how far north the cyclone would move before turning westward. Since Hernan was a tropical cyclone for only 54 h, the number of forecasts was too small to draw any meaningful conclusions from the homogeneous verification of the track guidance models.

A verification of NHC official intensity forecasts for Hernan is given in Table 4. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period, while the OCD5 forecasts had errors comparable to the 5-yr averages. Examination of the individual NHC forecasts (not shown) indicates that they correctly captured the scenario that Hernan would not strengthen significantly and that it would weaken as it approached the southern Baja California

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<sup>2</sup> Deaths occurring as a direct result of the forces of the tropical cyclone are referred to as “direct” deaths. These would include those persons who drowned in storm surge, rough seas, rip currents, and freshwater floods. Direct deaths also include casualties resulting from lightning and wind-related events (e.g., collapsing structures). Deaths occurring from such factors as heart attacks, house fires, electrocutions from downed power lines, vehicle accidents on wet roads, etc., are considered indirect” deaths.



Peninsula. As with the track forecasts, the number of forecasts was too small to draw any meaningful conclusions from the homogeneous verification of the intensity guidance models.

There were no coastal wind watches or warnings issued for Hernan. In hindsight, given the track through Las Islas Marias and how close the center came to the Mexican coast near Cabo Corrientes, a tropical storm warning would have been appropriate for these areas. Tropical storm watches and warnings were not issued for the southern portion of the Baja California peninsula, as the forecasts for Hernan correctly assessed that the cyclone would weaken below tropical-storm strength before reaching that area.

## ACKNOWLEDGEMENTS

The Meteorological Service of Mexico provided data on Hernan in that country.



Table 1. Best track for Tropical Storm Hernan, 26–28 August 2020.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
25 / 0600	16.1	107.6	1006	25	low
25 / 1200	16.3	107.5	1006	25	"
25 / 1800	16.5	107.4	1006	30	"
26 / 0000	16.8	107.2	1006	30	"
26 / 0600	17.2	106.8	1005	35	tropical storm
26 / 1200	17.2	106.3	1005	35	"
26 / 1800	17.6	105.8	1004	35	"
27 / 0000	18.0	105.8	1004	35	"
27 / 0600	18.4	105.8	1001	40	"
27 / 1200	18.8	105.9	1001	40	"
27 / 1800	19.4	106.0	1004	35	"
28 / 0000	20.7	106.1	1004	35	"
28 / 0600	22.4	106.7	1004	35	"
28 / 1200	23.1	108.6	1006	30	tropical depression
28 / 1800	23.0	109.6	1008	25	low
29 / 0000					dissipated
27 / 0600	18.4	105.8	1001	40	minimum pressure and maximum winds

Table 2. Number of hours in advance of formation of Tropical Storm Hernan 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%)	120	204
Medium (40%-60%)	90	168
High (>60%)	60	108



Table 3. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Hernan, 26–28 August 2020. 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	60	72	96	120
OFCL	44.7	57.1	87.0	102.2				
OCD5	48.6	91.3	138.9	189.2				
Forecasts	8	6	4	2				
OFCL (2015-19)	21.8	34.0	44.9	55.3				
OCD5 (2015-19)	34.3	69.9	108.7	146.8				

Table 4. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Hernan, 26–28 August 2020. 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	60	72	96	120
OFCL	<b>4.4</b>	<b>3.3</b>	<b>1.2</b>	<b>0.0</b>				
OCD5	3.4	9.7	13.2	13.0				
Forecasts	8	6	4	2				
OFCL (2015-19)	6.0	9.9	12.1	13.5				
OCD5 (2015-19)	7.8	13.0	16.6	18.9				

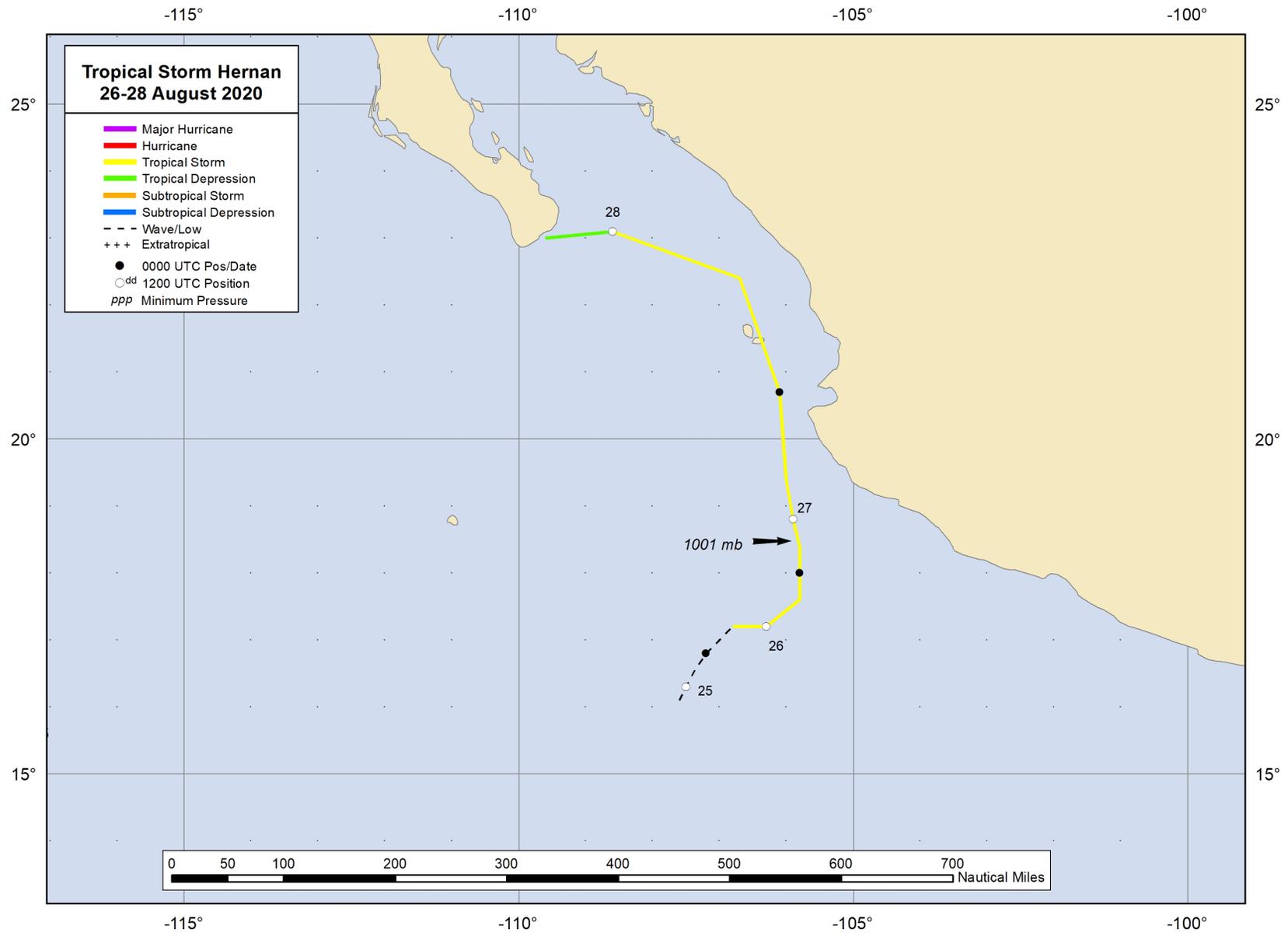


Figure 1. Best track positions for Tropical Storm Hernan, 26–28 August 2020.

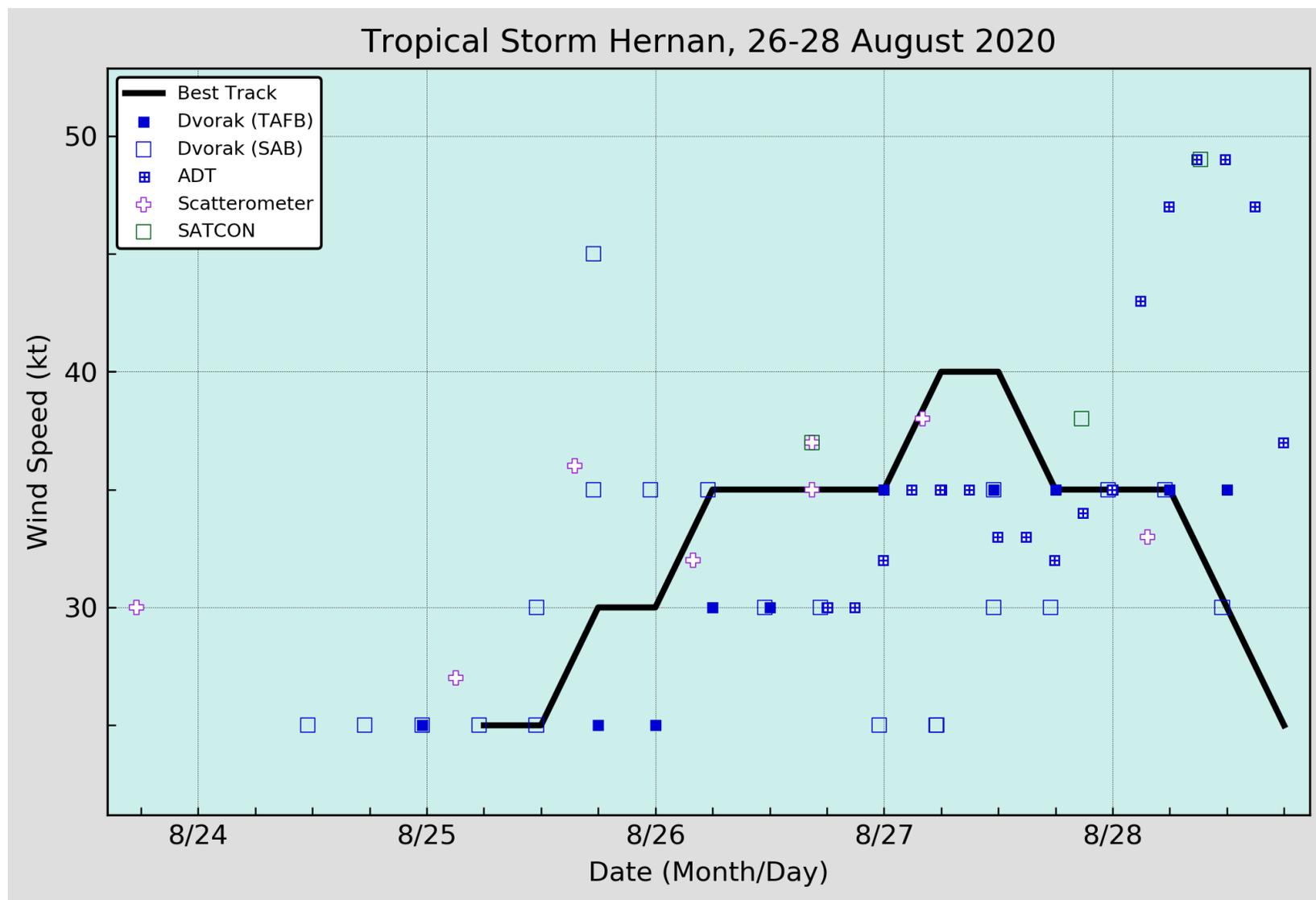


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Hernan, 26–28 August 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

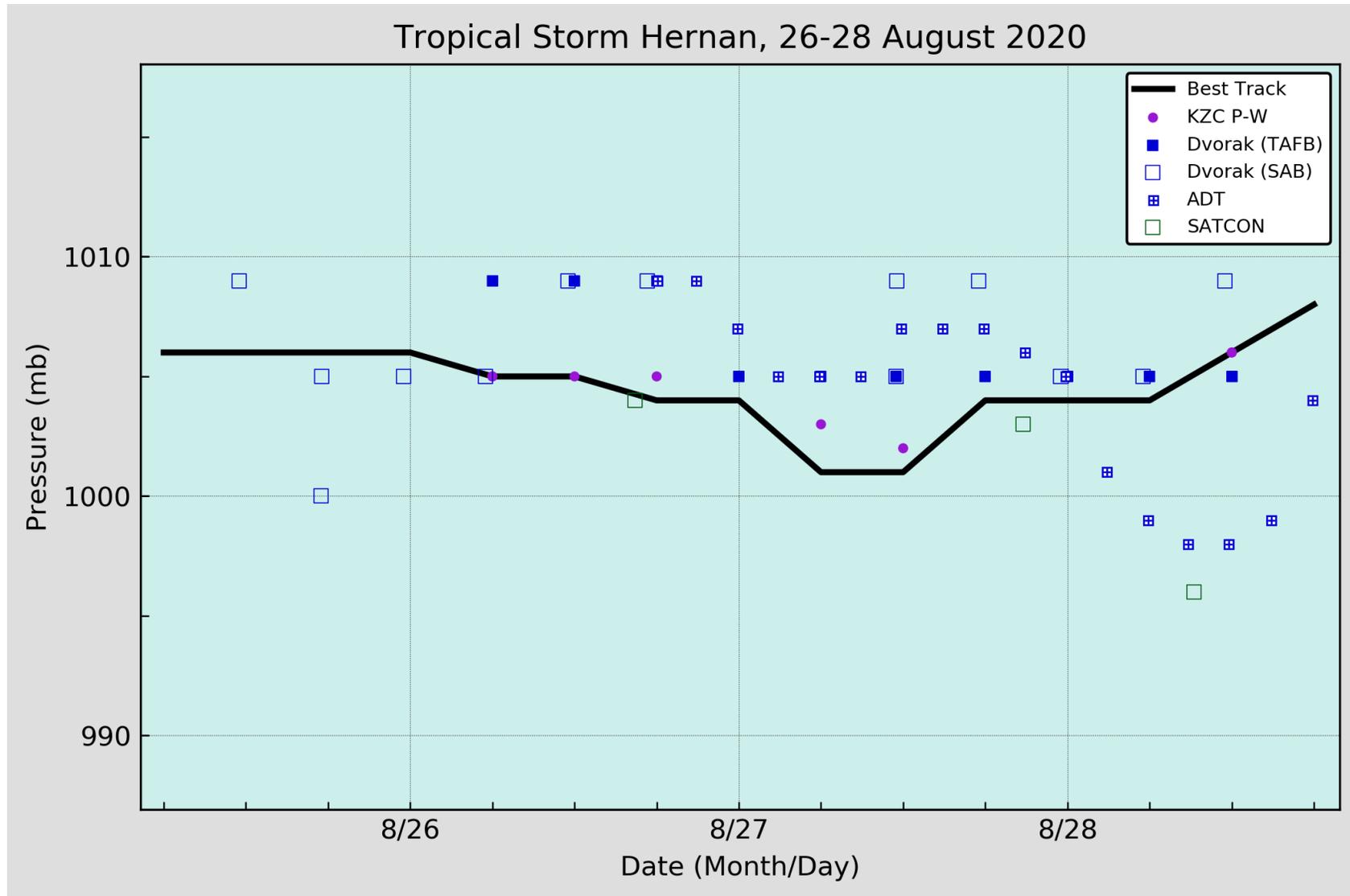


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Hernan, 26–28 August 2020. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.

### Precipitación acumulada (mm) del 26 al 28 de agosto de 2020 por la tormenta tropical Hernan

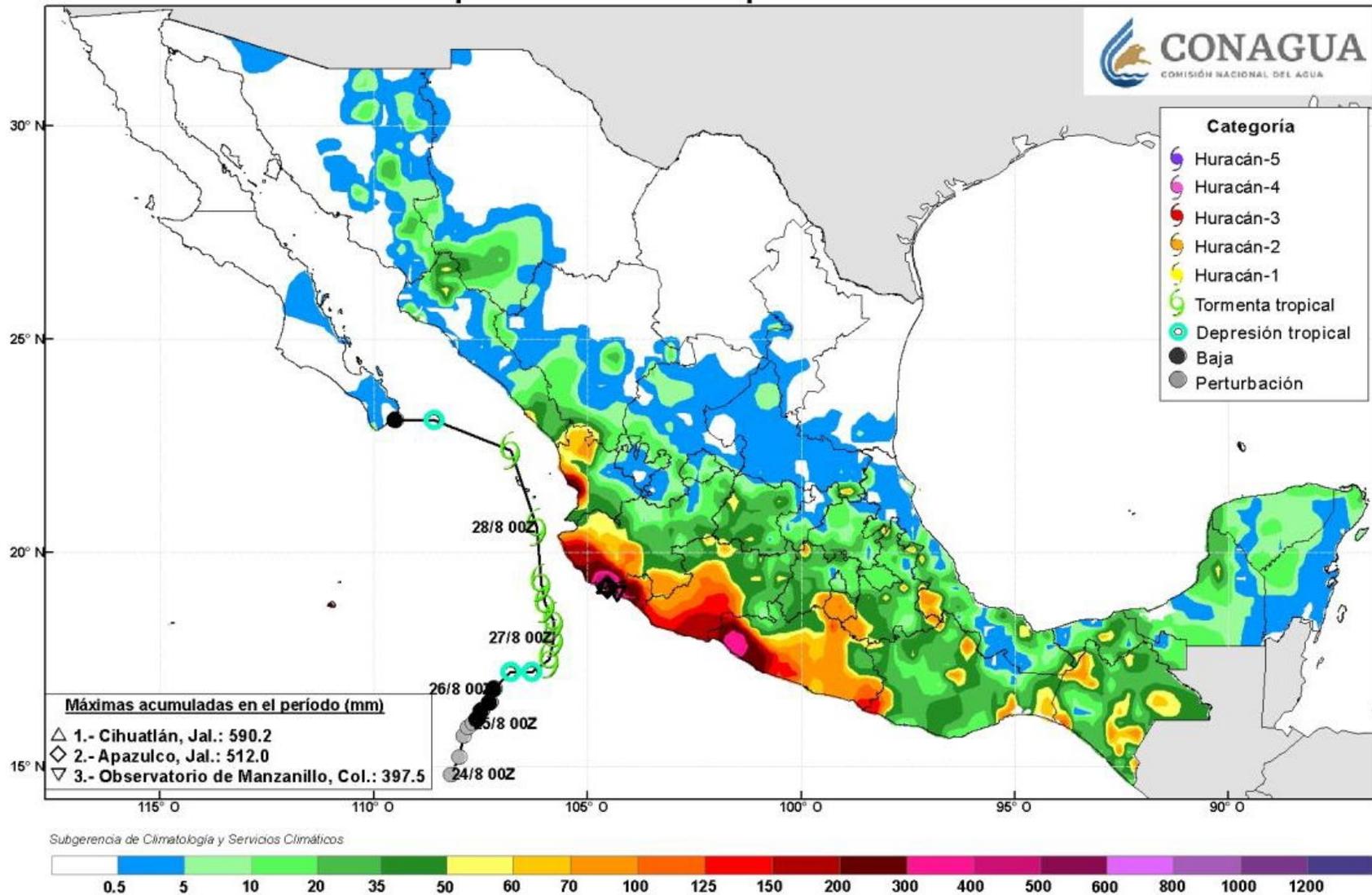


Figure 4. Rainfall totals (mm) for Mexico on 26–28 August 2020. Image courtesy of the Servicio Meteorológico Nacional of Mexico.