

Tropical Cyclone Report
Tropical Storm Helene
(AL072012)
9-18 August 2012

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Helene had two brief periods of existence as a tropical cyclone and made landfall as a tropical depression near Tampico, Mexico.

a. Synoptic History

Helene originated from a well-defined tropical wave that moved off the west coast of Africa on 5 August. The wave moved rapidly westward accompanied by some cyclonic rotation in the middle levels of the atmosphere and a large area of thunderstorms. The amount of convection fluctuated for a couple of days, but the organization increased, and it is estimated that a tropical depression formed at 1800 UTC 9 August about midway between the Cape Verde Islands and the Lesser Antilles. Tropical Depression Seven continued moving rapidly westward, losing organization, likely the result of strong southwesterly wind shear that prevailed over the eastern Caribbean Sea and the adjacent Atlantic at that time. By the time the depression was near the Lesser Antilles, it no longer had a closed circulation and was reabsorbed into its parent tropical wave at 1200 UTC 11 August.

After slowing down a little, the wave accelerated westward across the Caribbean Sea for the next several days and reached Central America on 15 August. Once over Central America, the wave spawned a broad area of low pressure that moved northwestward into the southern Bay of Campeche late on 16 August. The shower activity increased in organization, and it is estimated that a tropical depression reformed at 1200 UTC 17 August about 200 miles southeast of Tampico, Mexico. The convection became symmetric, and data from an Air Force Hurricane Hunter plane indicated that the depression became a tropical storm with 40-kt winds and a minimum pressure of 1004 mb at 1800 UTC that day.

Helene lost organization again almost immediately as moved slowly toward the west-northwest across the Bay of Campeche, and it made landfall as a tropical depression in the vicinity of Tampico, Mexico, near 1200 UTC 18 August. The depression continued to move inland and degenerated into a broad area of low pressure accompanied by a few showers around 0000 UTC 19 August and dissipated by 0600 UTC. The “best track” chart of the tropical cyclone’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 1¹.

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

b. Meteorological Statistics

Observations in Helene (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). Observations also include flight-level, stepped frequency microwave radiometer (SFMR) observations from flights of the 53rd Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command. 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 Helene.

The estimated peak intensity of Helene was based on a 1500-ft flight-level wind of 49 kt and a SFMR biased-corrected wind of 38 knots. Helene produced 24-h rainfall totals of 144 mm (5.7 in) in Paso del Toro, Veracruz and 101.0 (4.0 in) mm in San Pedro, Tabasco, during 17 August.

c. Casualty and Damage Statistics

Helene caused no casualties as a tropical cyclone, although reports from the Associated Press indicate that two people died in Trinidad due to heavy rains and mudslides when the remnants of Tropical Depression Seven moved across the eastern Caribbean Sea.

d. Forecast and Warning Critique

The tropical wave from which Tropical Depression Seven formed was introduced in the Tropical Weather Outlook (TWO) at 0000 UTC 7 August with a low chance (20%) of development during the next 48 h. The probability was increased to high (70%) at 0600 UTC 9 August, about 12 h before genesis. Although the depression dissipated near the Lesser Antilles, a low probability of regeneration was kept in the TWO for a few days while the wave moved through the Caribbean Sea. The probability of development was increased to high at 1200 UTC 17 August when the disturbance was in the Bay of Campeche. A post-analysis suggests that the system was already a tropical depression at that time.

Helene was a short-lived cyclone and there are only a few forecasts to verify. A verification of NHC official track and intensity forecasts for Helene are given in Table 2a and 2b, respectively. Official forecast track errors were greater than the mean official errors for the previous 5-yr period while the intensity forecasts errors were lower than the mean official errors for the previous 5-yr period. As the low moved over Central America, most of the track guidance kept the disturbance well inland and moving westward over Mexico. Only after the reformation in the southern Bay of Campeche, did the models hint at a more northwestward track toward Tampico.

Watches and warnings associated with Helene are given in Table 3.

Table 1. Best track for Tropical Storm Helene, 9-18 August 2012.

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage |
|-----------------|---------------|----------------|---------------|-----------------|-----------------------------------|
| 09 / 1800 | 13.7 | 43.0 | 1010 | 30 | tropical depression |
| 10 / 0000 | 13.6 | 44.6 | 1009 | 30 | " |
| 10 / 0600 | 13.5 | 46.3 | 1008 | 30 | " |
| 10 / 1200 | 13.4 | 48.2 | 1009 | 30 | " |
| 10 / 1800 | 13.4 | 50.5 | 1009 | 30 | " |
| 11 / 0000 | 13.4 | 52.9 | 1009 | 30 | " |
| 11 / 0600 | 13.4 | 55.4 | 1009 | 30 | " |
| 11 / 1200 | 13.3 | 57.9 | 1011 | 30 | tropical wave |
| 11 / 1800 | 13.3 | 59.9 | 1011 | 30 | " |
| 12 / 0000 | 13.5 | 61.4 | 1011 | 30 | " |
| 12 / 0600 | 13.7 | 63.2 | 1011 | 30 | " |
| 12 / 1200 | 13.9 | 65.6 | 1011 | 30 | " |
| 12 / 1800 | 14.1 | 68.0 | 1010 | 30 | " |
| 13 / 0000 | 14.1 | 70.4 | 1009 | 30 | " |
| 13 / 0600 | 14.1 | 72.7 | 1009 | 30 | " |
| 13 / 1200 | 14.1 | 74.9 | 1008 | 30 | " |
| 13 / 1800 | 14.1 | 76.6 | 1008 | 30 | " |
| 14 / 0000 | 14.1 | 78.4 | 1008 | 30 | " |
| 14 / 0600 | 14.1 | 80.1 | 1009 | 30 | " |
| 14 / 1200 | 14.1 | 81.8 | 1009 | 30 | " |
| 14 / 1800 | 14.3 | 83.6 | 1009 | 30 | " |
| 15 / 0000 | 14.7 | 85.3 | 1010 | 30 | " |
| 15 / 0600 | 15.2 | 87.0 | 1010 | 30 | " |
| 15 / 1200 | 15.7 | 88.6 | 1011 | 30 | low |
| 15 / 1800 | 16.5 | 89.5 | 1011 | 25 | " |
| 16 / 0000 | 17.5 | 90.5 | 1011 | 25 | " |
| 16 / 0600 | 18.5 | 91.0 | 1011 | 25 | " |
| 16 / 1200 | 19.2 | 91.5 | 1011 | 25 | " |
| 16 / 1800 | 19.3 | 92.6 | 1011 | 25 | " |
| 17 / 0000 | 19.3 | 94.2 | 1011 | 25 | " |
| 17 / 0600 | 19.7 | 95.2 | 1011 | 25 | " |
| 17 / 1200 | 19.9 | 95.7 | 1009 | 30 | tropical depression |
| 17 / 1800 | 20.3 | 95.9 | 1004 | 40 | tropical storm |
| 18 / 0000 | 20.8 | 96.1 | 1006 | 35 | " |
| 18 / 0600 | 21.4 | 96.8 | 1007 | 30 | tropical depression |
| 18 / 1200 | 21.9 | 97.7 | 1008 | 30 | " |
| 18 / 1800 | 22.5 | 98.7 | 1009 | 25 | " |
| 19 / 0000 | 22.7 | 98.9 | 1009 | 25 | low |
| 19 / 0600 | | | | | dissipated |
| 18 / 1200 | 21.9 | 97.7 | 1008 | 30 | landfall near Tampico |
| 17 / 1800 | 20.3 | 95.9 | 1004 | 40 | Maximum wind and minimum pressure |

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Helene. Mean errors for the 5-yr period 2007-11 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 | 33.4 | 66.4 | 99.4 | | | | |
| OCD5 | 50.6 | 127.8 | 293.4 | | | | |
| Forecasts | 8 | 4 | 1 | | | | |
| OFCL (2007-11) | 30.4 | 48.4 | 65.9 | | | | |
| OCD5 (2007-11) | 46.9 | 95.2 | 151.7 | | | | |

Table 2b. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Helene. Mean errors for the 5-yr period 2007-11 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 | 6.3 | 7.5 | 10.0 | | | | |
| OCD5 | 5.6 | 8.3 | 16.0 | | | | |
| Forecasts | 8 | 4 | 1 | | | | |
| OFCL (2007-11) | 7.1 | 10.8 | 13.0 | | | | |
| OCD5 (2007-11) | 8.4 | 12.4 | 15.4 | | | | |

Table 3. Watch and warning summary for Tropical Storm Helene, 9-18 August 2012.

| Date/Time (UTC) | Action | Location |
|--------------------|-------------------------------------|--|
| 10 / 2100 | Tropical Storm Watch issued | Guadeloupe and Martinique |
| 10 / 2100 | Tropical Storm Watch issued | St. Vincent, Barbados, Grenadines, St. Lucia and Dominica. |
| 11 / 1200 | Tropical Storm Watch discontinued | All |
| 17 / 2100 | Tropical Storm Warning issued | Barra de Nautla to La Cruz |
| 18 / 1500 | Tropical Storm Warning discontinued | All |

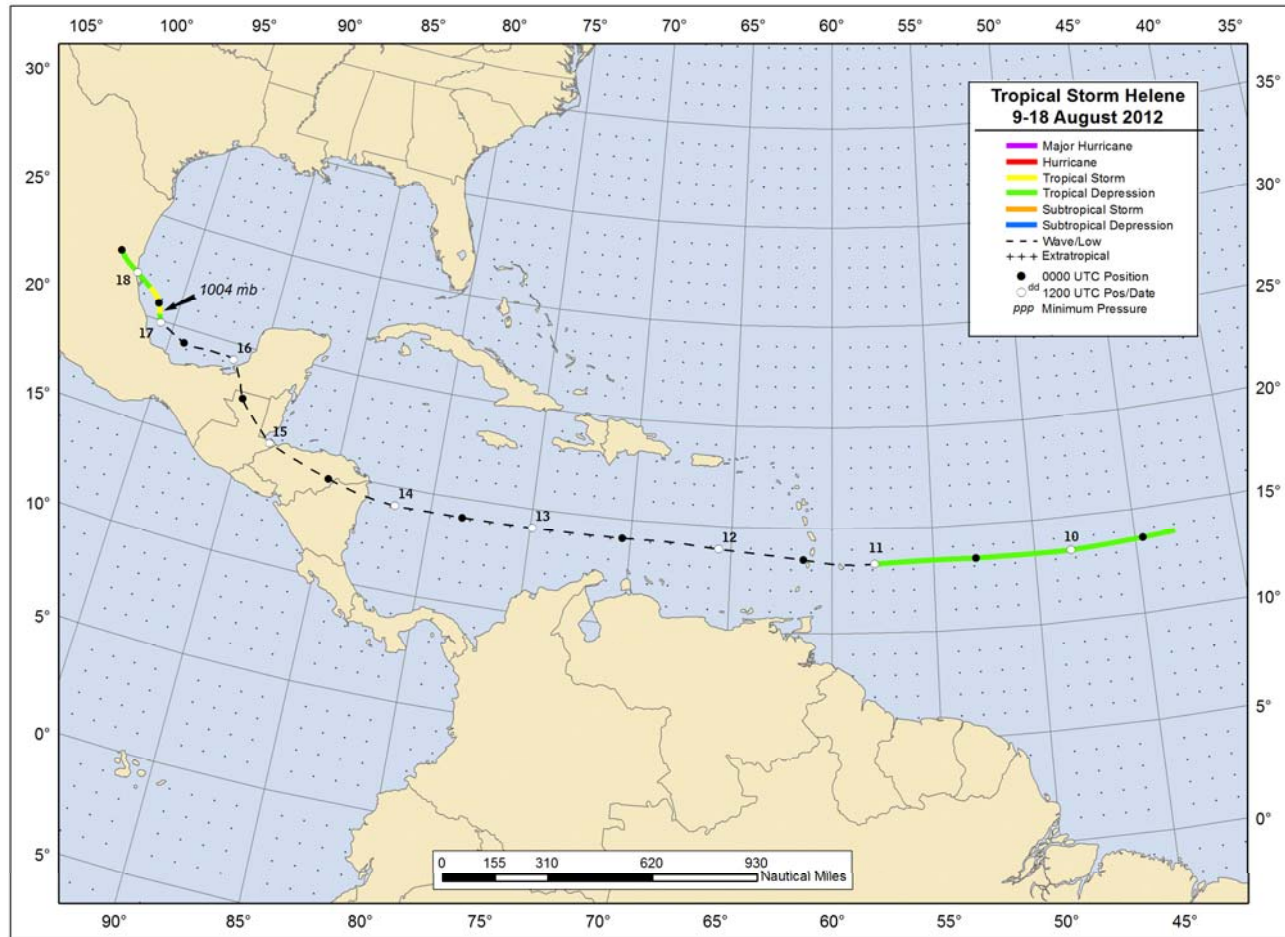


Figure 1. Best track positions for Tropical Storm Helene, 9-18 August 2012.

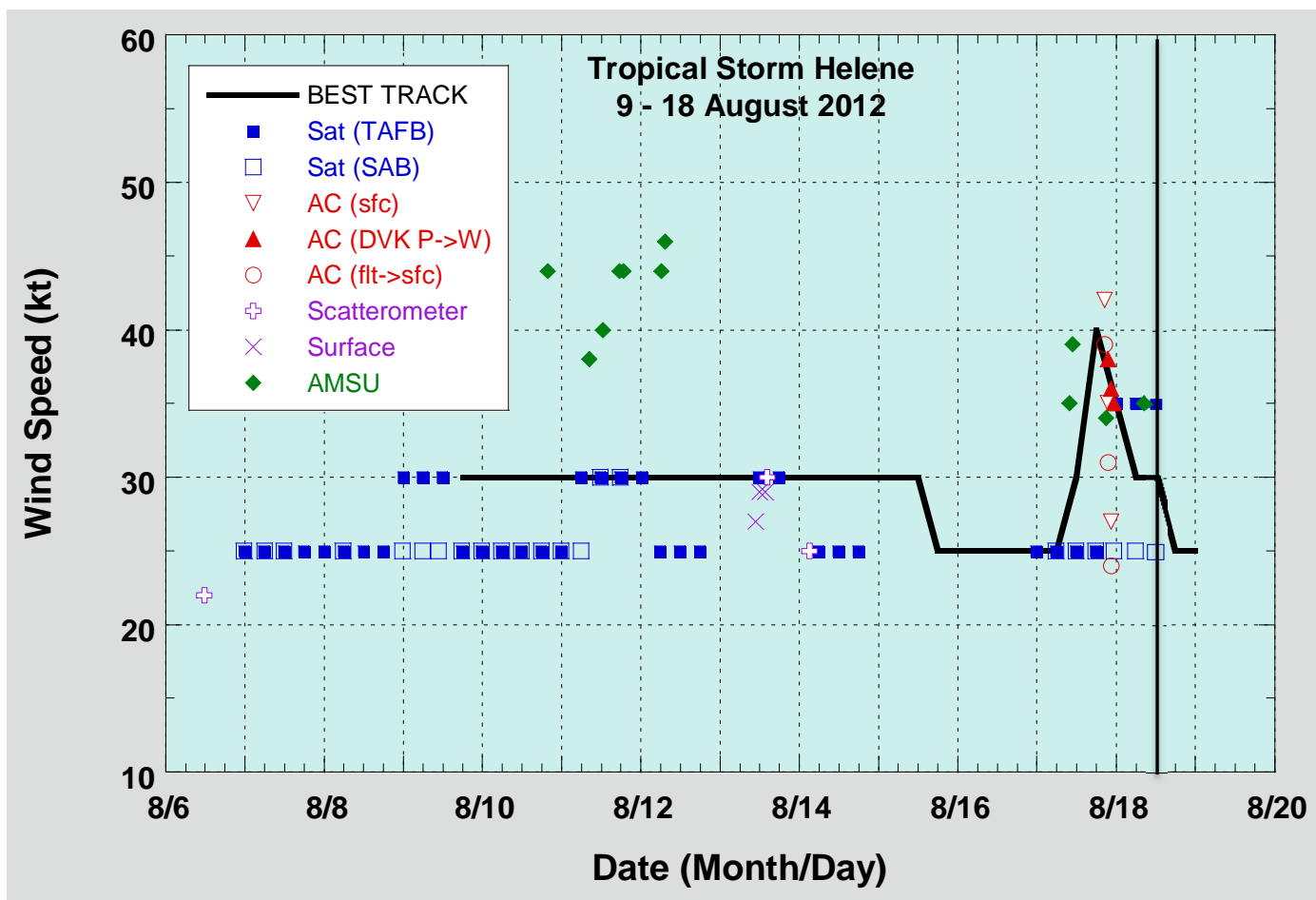


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Helene, 9-18 August 2012. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC and solid black vertical line corresponds with landfall time.

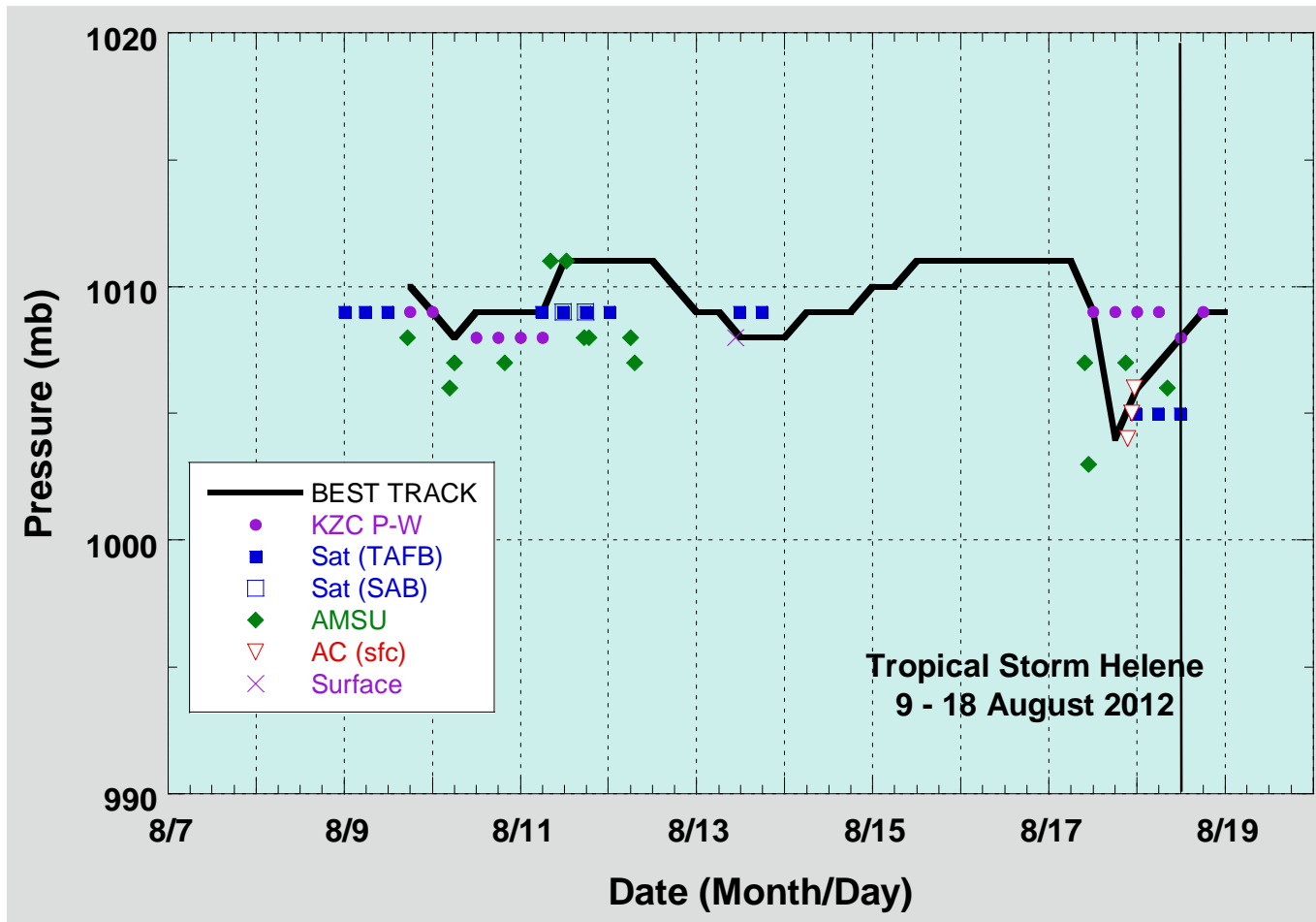


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Helene, 9-18 August 2012. Advanced Dvorak Technique estimates represent CI numbers. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. The KZC P-W values are obtained by applying the Knaff-Zehr-Courtney pressure-wind relationship to the best track wind data. Dashed vertical lines correspond to 0000 UTC and solid black vertical line corresponds with landfall time.