

Tropical Cyclone Report
Tropical Storm Manuel
10-18 October 2001

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Tropical Storm Manuel was a weak and generally disorganized eastern North Pacific tropical cyclone that formed from the remnants of Atlantic Hurricane Iris.

a. Synoptic History

Manuel formed from the remnants of Atlantic Hurricane Iris, which struck southern Belize as a Category Four hurricane (on the Saffir-Simpson Hurricane Scale) early on 9 October. By 1800 UTC, the core circulation of Iris had dissipated over the mountains of eastern Mexico, while new convection was developing a short distance away over the waters of the Pacific. This area became better organized over the next 18 hours and became Tropical Depression Fifteen-E at 1200 UTC 10 October, about 175 n mi south-southeast of Acapulco, Mexico. (Note: current operational policy is that *tropical cyclones* crossing into another basin retain their original name; since Iris had dissipated as a tropical cyclone prior to entering the eastern North Pacific basin, the new depression was properly named Fifteen-E, rather than Iris.)

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 1. The depression moved at 13-14 kt, first westward and then west-northwestward. An upper-level anticyclone centered over southern Mexico was producing some easterly shear in the environment of the depression, but when this shear lessened the system became Tropical Storm Manuel at 0600 UTC 11 October, about 200 n mi south-southwest of Zihuatanejo, Mexico. An estimated initial peak intensity of 45 kt was reached at 1800 UTC that day when the first clear banding features developed. However, the banding was short-lived, deep convection diminished, and satellite microwave imagery early on 12 October suggested that the circulation was becoming elongated. Wind shear returned, this time from the northwest, and Manuel turned to a west-southwesterly track and slowed. By 1200 UTC 12 October, Manuel had weakened to a tropical depression.

Manuel remained a disorganized depression for the next two and a half days. It continued moving to the west-southwest, but slowed to a drift as a mid-level ridge to the north of the cyclone gradually weakened. An upper-level trough dug southward to the west of Manuel early on 15 October, and Manuel began to move to the north-northwest. Convection redeveloped near the center and Manuel regained tropical storm strength at 0600 UTC 15 October about 520 n mi south-southwest of Cabo San Lucas, Mexico. Wind shear decreased and Manuel strengthened, reaching its peak intensity of 50 kt near 1200 UTC 16 October about 540 n mi southwest of Cabo San Lucas. By this point, water temperatures under the cyclone were decreasing and shear, this time from the

southwest, was increasing. Manuel began to weaken while moving to the west-northwest and northwest. It became a depression at 1800 UTC 17 October about 660 n mi west-southwest of Cabo San Lucas, and dissipated to a non-convective low shortly after 0000 UTC 18 October. The remnant low moved slowly westward for a couple of days over cool waters before its circulation dissipated completely.

b. Meteorological Statistics

Observations in Manuel (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). A number of QuikSCAT scatterometer passes were influential in the construction of the best track intensities; some of these were at odds with the Dvorak estimates. A pass near 1300 UTC 12 October did not support the tropical storm status then indicated by the Dvorak classifications. Neither did the pass near 0100 UTC 14 October, and the best track at this time is consistent with the scatterometer, rather than with the Dvorak estimates or the operational best track. Manuel is judged to have regained tropical storm status near 0600 UTC 15 October, based on an increase in deep convection that resulted in the Dvorak T number to increase from 2.5 to 3.0. Microwave imagery near 1200 UTC 16 October showed a ring of core convection that suggests that Manuel was best organized near this time.

There were no ship reports of winds of tropical storm force associated with Manuel.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

The genesis of Tropical Depression Fifteen-E was correctly anticipated in Tropical Weather Outlooks. Manuel was a tropical storm for two short intervals, the first one lasting 30 h and the second lasting 60 h. There are too few verifying forecasts to conduct a meaningful evaluation. Most of the intensity forecasts were overestimates.

Table 1. Best track for Tropical Storm Manuel, 10-18 October 2001.

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage |
|-----------------|---------------|----------------|---------------|-----------------|---------------------|
| 10 / 1200 | 14.1 | 99.2 | 1007 | 30 | tropical depression |
| 10 / 1800 | 14.0 | 100.6 | 1006 | 30 | " |
| 11 / 0000 | 14.4 | 102.0 | 1006 | 30 | " |
| 11 / 0600 | 14.7 | 103.3 | 1005 | 35 | tropical storm |
| 11 / 1200 | 15.2 | 104.7 | 1003 | 40 | " |
| 11 / 1800 | 15.7 | 105.9 | 1000 | 45 | " |
| 12 / 0000 | 15.9 | 107.3 | 1000 | 45 | " |
| 12 / 0600 | 15.7 | 108.4 | 1003 | 40 | " |
| 12 / 1200 | 15.4 | 109.5 | 1005 | 30 | tropical depression |
| 12 / 1800 | 14.9 | 110.5 | 1005 | 30 | " |
| 13 / 0000 | 14.8 | 111.2 | 1005 | 30 | " |
| 13 / 0600 | 14.6 | 111.9 | 1005 | 30 | " |
| 13 / 1200 | 14.3 | 112.6 | 1005 | 30 | " |
| 13 / 1800 | 14.1 | 113.0 | 1005 | 30 | " |
| 14 / 0000 | 13.9 | 113.3 | 1005 | 30 | " |
| 14 / 0600 | 13.9 | 113.6 | 1005 | 30 | " |
| 14 / 1200 | 14.0 | 113.8 | 1005 | 30 | " |
| 14 / 1800 | 14.3 | 113.9 | 1005 | 30 | " |
| 15 / 0000 | 14.7 | 114.1 | 1005 | 30 | " |
| 15 / 0600 | 15.3 | 114.4 | 1004 | 35 | tropical storm |
| 15 / 1200 | 15.9 | 114.8 | 1004 | 35 | " |
| 15 / 1800 | 16.5 | 115.3 | 1004 | 35 | " |
| 16 / 0000 | 17.1 | 115.9 | 1002 | 40 | " |
| 16 / 0600 | 17.5 | 116.9 | 1000 | 45 | " |
| 16 / 1200 | 18.0 | 118.1 | 997 | 50 | " |

| Date/Time (UTC) | Latitude (°N) | Longitude (°W) | Pressure (mb) | Wind Speed (kt) | Stage |
|-----------------|---------------|----------------|---------------|-----------------|---------------------|
| 16 / 1800 | 18.6 | 119.3 | 1000 | 45 | " |
| 17 / 0000 | 19.2 | 120.2 | 1000 | 45 | " |
| 17 / 0600 | 19.8 | 120.8 | 1003 | 40 | " |
| 17 / 1200 | 20.5 | 121.3 | 1005 | 35 | " |
| 17 / 1800 | 21.1 | 121.6 | 1007 | 30 | tropical depression |
| 18 / 0000 | 21.8 | 121.8 | 1009 | 25 | " |
| 18 / 0600 | | | | | dissipated to low |
| 16 / 1200 | 18.0 | 118.1 | 997 | 50 | minimum pressure |

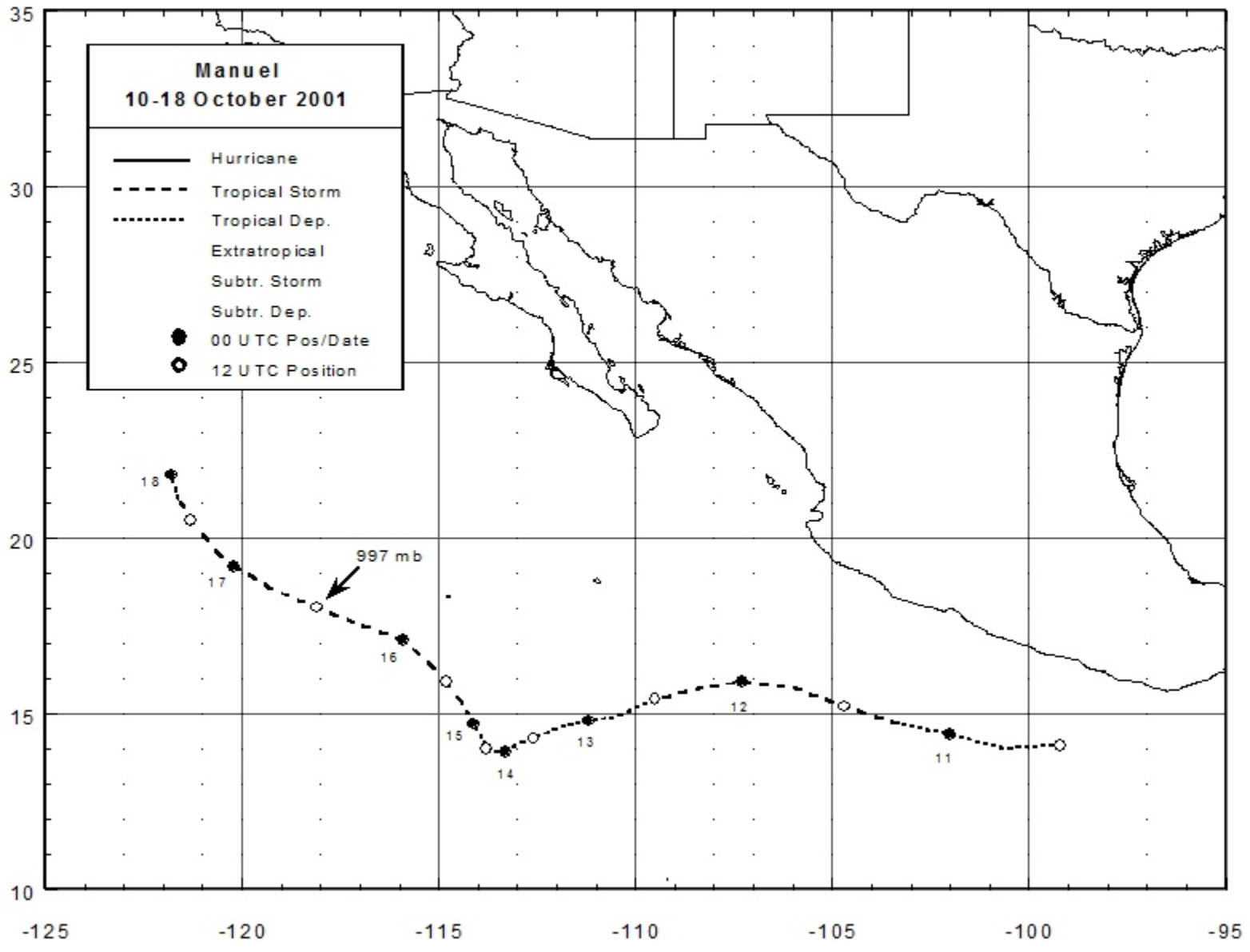


Figure 1. Best track positions for Tropical Storm Manuel, 10-18 October 2001.

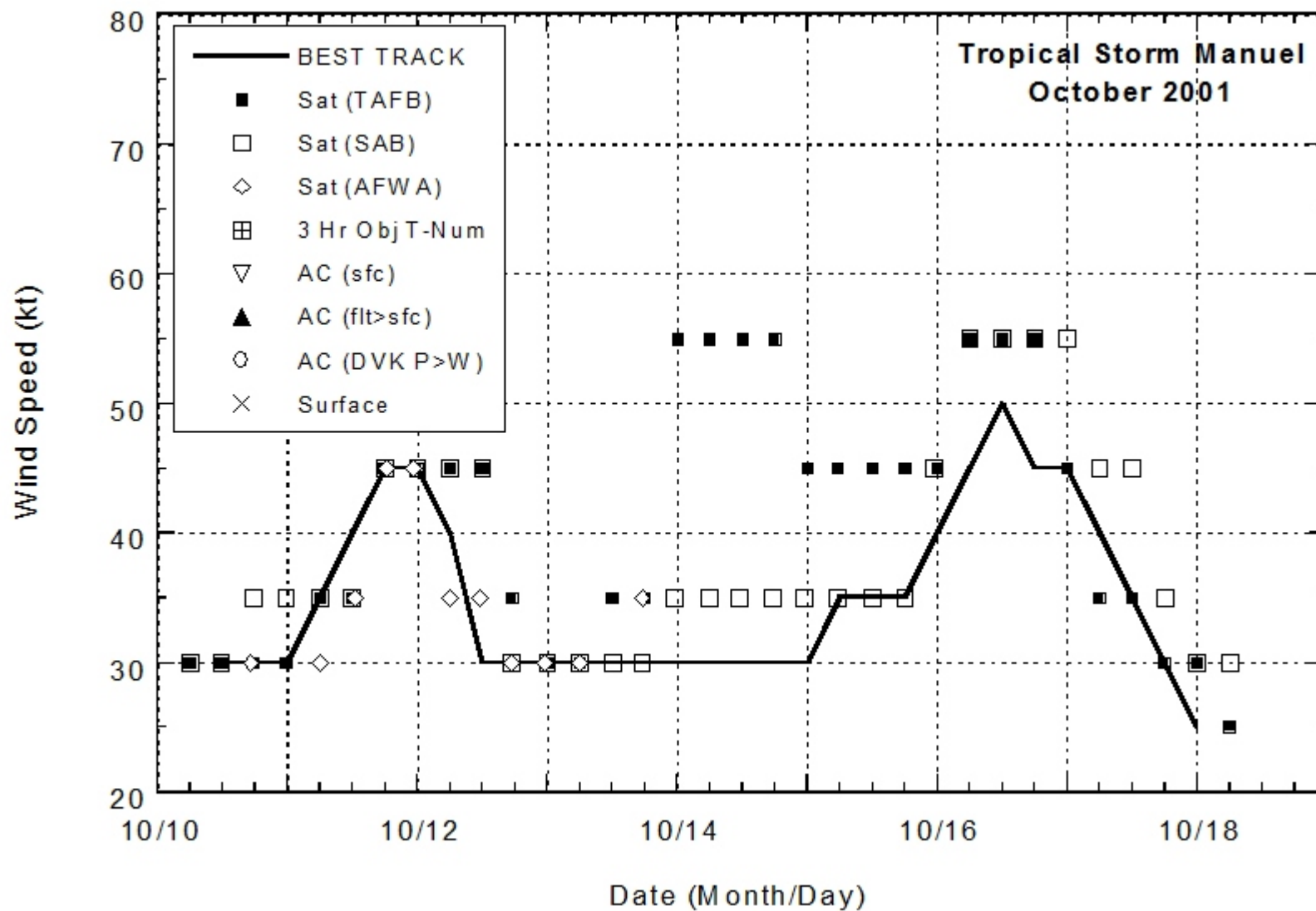


Figure 2. Best track maximum sustained surface wind speed curve for Tropical Storm Manuel, 10-18 October 2001, and the observations (excluding QuikSCAT) on which the best track curve is based.

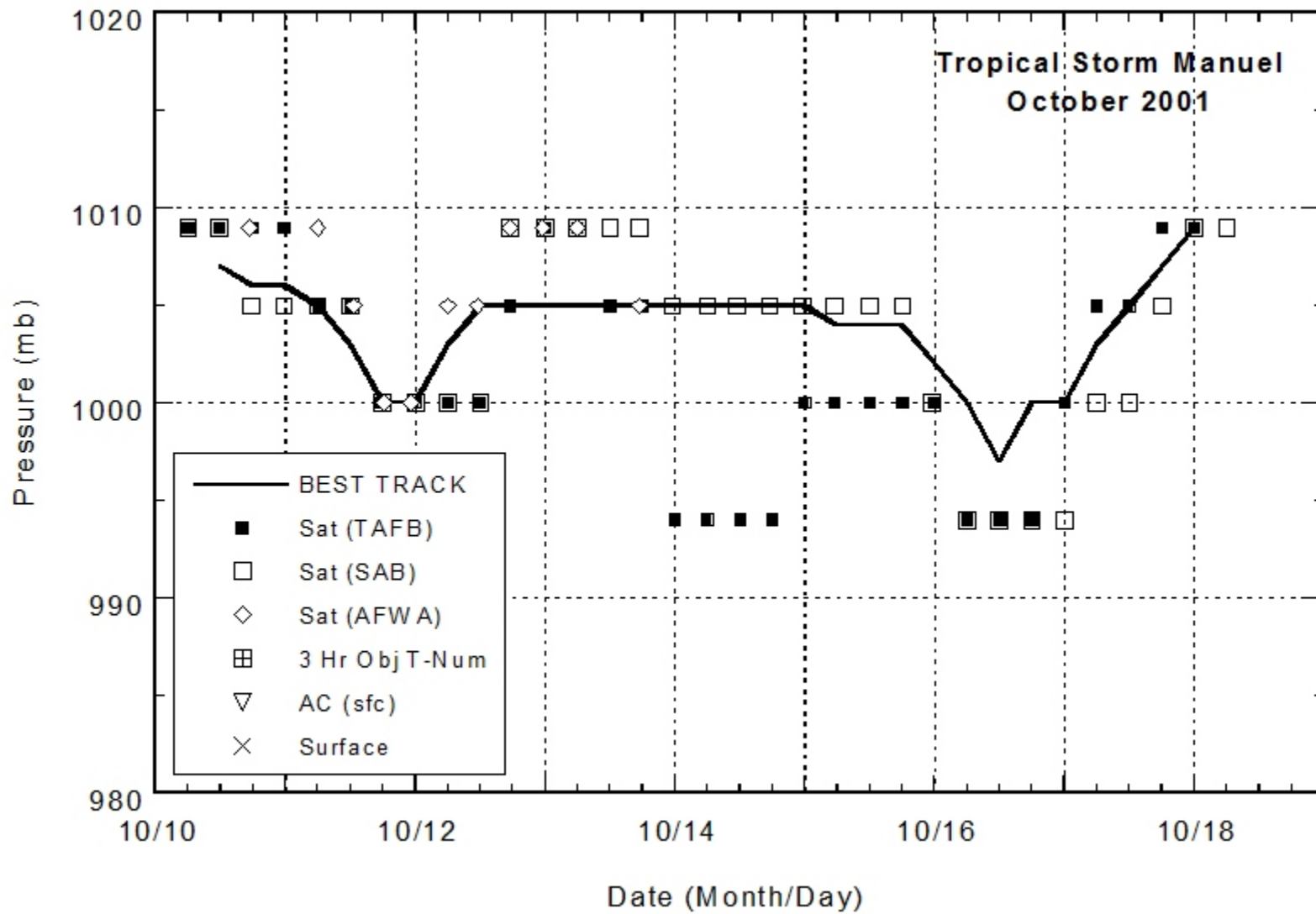


Figure 3. Best track minimum central pressure curve for Tropical Storm Manuel, 10-18 October 2001, and the observations on which the best track curve is based.