

Preliminary Report
Hurricane Estelle
29 July - 8 August 1998

John L. Guiney
National Hurricane Center
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Hurricane Estelle was the third major hurricane in the eastern North Pacific basin during the 1998 season. Estelle moved over the open waters of the east Pacific Ocean and crossed 140°W into the Central Pacific Hurricane Centers' area of responsibility before dissipating.

a. Synoptic History

Estelle can be traced back to a tropical wave which moved off the west Africa coast on 18 July. Its trek across the Atlantic was uneventful with sporadic convective activity but no signs of development. Rawinsonde data from St. Martin showed that the wave passed through the eastern Caribbean on the 24th. Subsequent upper-air observations from Grand Cayman and Key West, Florida showed the wave passage through the western Caribbean and the southeast Gulf of Mexico on 26 July. After moving across Central America, the wave emerged into the eastern Pacific on the 27th/28th. Early on the 29th, meteorologists in the Tropical Analysis and Forecast Branch (TAFB) of the Tropical Prediction Center, and the Satellite Analysis Branch (SAB) of the National Environmental Satellite Data Information Service initiated Dvorak classifications on the system which was located a couple of hundred miles south-southeast of Acapulco, Mexico. By the afternoon of 29 July, visible satellite imagery showed distinct banding features with TAFB and SAB meteorologists assigning a Dvorak T-number of 2.0, i.e. 30 knots, to the disturbance. On this basis, the system is estimated to have become a tropical depression at 1800 UTC 29 July about 150 n mi southeast of Manzanillo, Mexico (see Figure 1 and Table 1). The depression continued to become better organized through the evening with increasing convection and distinct upper-level outflow. The system was upgraded to tropical storm Estelle at 0600 UTC 30 July.

Estelle continued to intensify on the 30th, and reached hurricane strength at 0600 UTC 31 July while located about 480 n mi south-southeast of the southern tip of Baja California. For the next seven days, Estelle moved on a general west-northwestward course under the influence of a large mid-tropospheric anticyclone. Intensification continued, with a well-defined eye, 20 to 30 n mi in diameter, becoming evident in both visible satellite imagery and SSM/I 85 GHz channel data during the afternoon of 1 August. Estelle is estimated to have reached a peak intensity of 115 knots at 0600 UTC 2 August. Estelle began to weaken and by the afternoon of the 2nd, the eye was no longer discernable in satellite imagery and the extent of deep convection had diminished. Over the next several days, the system continued to weaken while moving on a general west-northwest course over progressively cooler waters. Estelle weakened to a tropical storm early on 4 August. By 1200 UTC 5 August, after being devoid of deep convection for 12 to 18 hours, the system degenerated to a tropical depression while located about 1350 n mi west-southwest of the southern tip of Baja California. Some limited deep convection temporarily returned early on the 6th, mainly over the northern semicircle, but the activity waned by mid day. Estelle crossed 140°W by the

afternoon of the 6th. The depression moved on a general west-northwestward course for the next few days while maintaining a well-defined low-level circulation center. Upper-level southwesterly vertical wind shear, induced by an upper-level trough near the Hawaiian Islands, hampered deep convective development, and the system dissipated on the evening of the 8th while located about 350 n mi east-northeast of the Hawaiian Islands.

b. Meteorological Statistics

As is usually the case for eastern Pacific tropical cyclones, satellite images were the sole data source for position and intensity estimates. Figures 2 and 3 are the curves of minimum central sea-level pressure and maximum one-minute sustained 1-minute "surface" (10 meters above ground level) wind speed, respectively, as functions of time. Also plotted are the observations on which the curves are based, including Dvorak-technique estimates (from the TAFB, SAB, and the U.S. Air Force Weather Agency (AFGWC in figures). Subjective-based Dvorak T-numbers peaked at 6.0, 115 knots, at 0600 UTC 2 August while the objective-based Dvorak estimates of T-6.0 held from late afternoon on the 1st until early morning on the 2nd.

Besides the standard satellite-based Dvorak intensity estimates derived from the GOES and DMSP satellites, the ERS polar-orbiting satellite made a partial pass over Estelle on 4 August. The ERS scatterometer winds were used, on occasion, to adjust the 34-knot wind radii.

c. Casualty and Damage Statistics

No reports of casualties or damage associated with Estelle have been received at the National Hurricane Center.

d. Forecast and Warning Critique

The official NHC average track forecast errors (excluding tropical depression stage) were 33 (23 cases), 83 (21 cases), 71 (19 cases), 70 (17 cases), and 90 n mi (13 cases), respectively, for the 12-, 24-, 36-, 48-, and 72-hour forecast periods. These are considerably below the most recent 10-year average forecast errors (1988-1997). With the exception of the 24-hour period, the NHC average official track forecast errors for Estelle were lower than the averages from all of the operationally available track prediction models.

The official average absolute intensity errors were 6 (16 cases), 10 (14 cases), 14 (12 cases), 18 (10 cases), and 17 (6 cases) knots, respectively, for the 12-, 24-, 36-, 48-, and 72-hour forecast periods. The average absolute intensity forecasts errors from *SHIFOR* are comparable while the Statistical Hurricane Prediction Scheme *SHIPS* errors were lower for all forecast periods.

No watches or warnings were required for Estelle.

Acknowledgments:

The data west of 140°W in Table 1 and all figures was provided by the Central Pacific Hurricane Center.

Table 1.

Preliminary Best Track - Hurricane Estelle, 29 July - 08 August 1998.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
29/1800	14.6	100.9	1004	30	Tropical Depression
30/0000	14.6	102.0	1004	30	" "
0600	14.7	103.0	1002	35	Tropical Storm
1200	14.7	103.9	1000	45	" "
1800	14.7	104.8	994	55	" "
31/0000	14.9	105.8	990	60	" "
0600	15.1	107.1	987	65	Hurricane
1200	15.3	108.4	983	70	" "
1800	15.5	109.6	980	75	" "
01/0000	15.7	110.8	980	75	" "
0600	15.8	112.1	975	80	" "
1200	15.9	113.5	970	90	" "
1800	16.1	115.0	960	100	" "
02/0000	16.4	116.3	960	100	" "
0600	16.8	117.5	948	115	" "
1200	17.2	118.6	954	110	" "
1800	17.7	119.8	960	100	" "
03/0000	18.1	121.1	965	95	" "
0600	18.6	122.2	970	90	" "
1200	18.9	123.5	975	80	" "
1800	19.1	125.0	980	75	" "
04/0000	18.8	126.5	983	70	" "
0600	18.6	127.8	990	60	Tropical Storm
1200	18.5	128.9	994	55	" "
1800	18.6	129.8	1000	45	" "
05/0000	18.7	130.8	1000	45	" "
0600	18.9	132.0	1005	35	" "
05/1200	19.4	133.3	1006	30	Tropical Depression
1800	19.6	134.6	1006	30	" "

Table 1 (continued).

Preliminary Best Track - Hurricane Estelle, 29 July - 08 August 1998.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
06/0000	19.8	136.1	1006	30	Tropical Depression
0600	20.1	137.5	1006	30	" "
1200	20.4	139.0	1006	30	" "
1800	20.6	140.3	1006	30	" "
07/0000	20.8	141.7	1006	30	" "
0600	21.0	142.9	1006	30	" "
1200	21.3	144.0	1010	25	" "
1800	21.6	144.9	1010	25	" "
08/0000	21.9	145.7	1010	25	" "
0600	22.2	146.6	1010	25	" "
1200	22.5	147.6	1010	25	" "
1800	22.7	148.7	1010	25	" "
09/0000					Dissipated
02/0600	16.8	117.5	948	115	Minimum Pressure

(Best track data west of 140°W provided by the Central Pacific Hurricane Center in Honolulu, Hawaii)

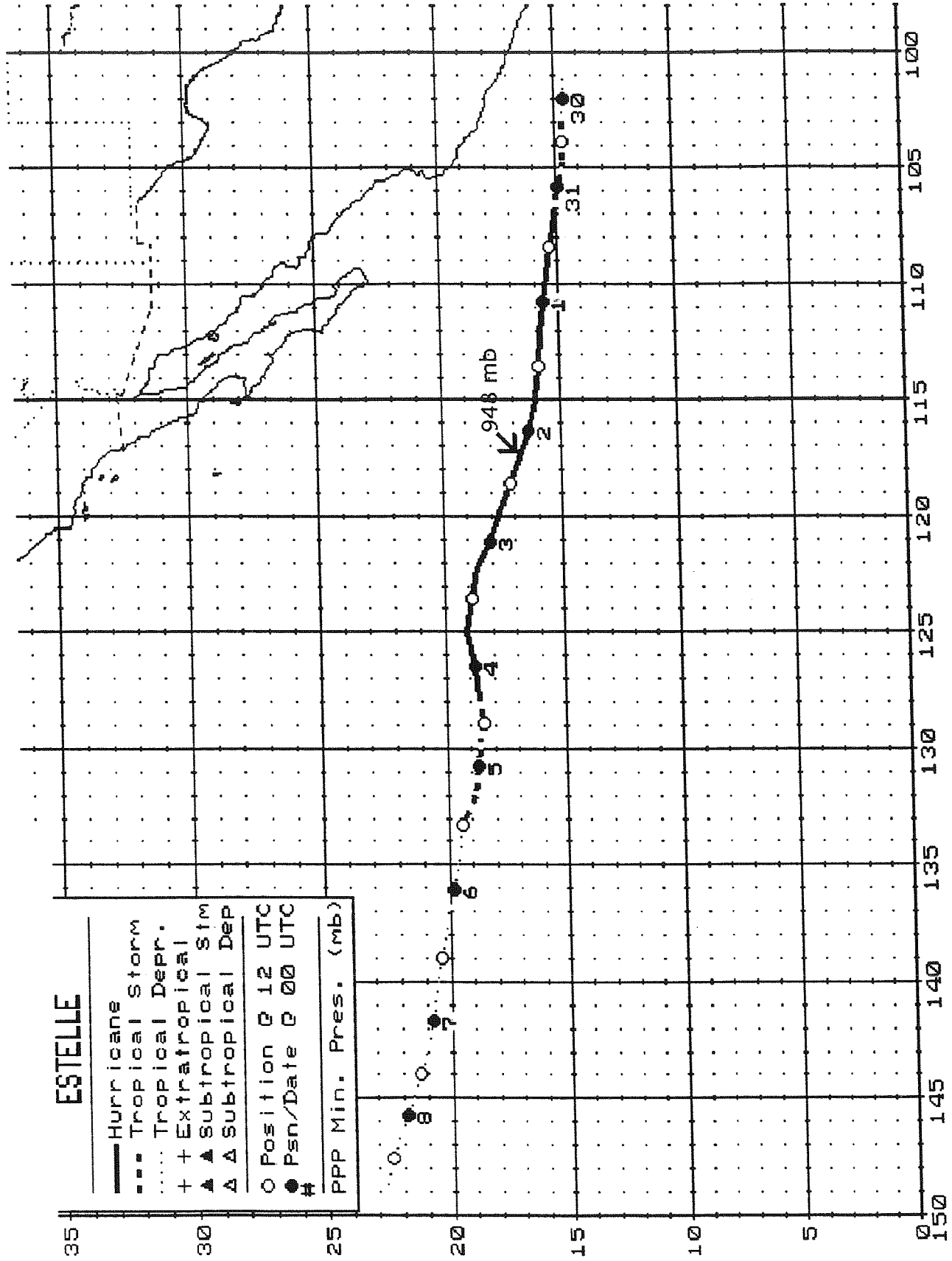


Figure 1. Best Track of Hurricane Estelle, 29 July - 08 August 1998.
 Best Track after 1200 UTC 7 August provided by the Central Pacific Hurricane Center.

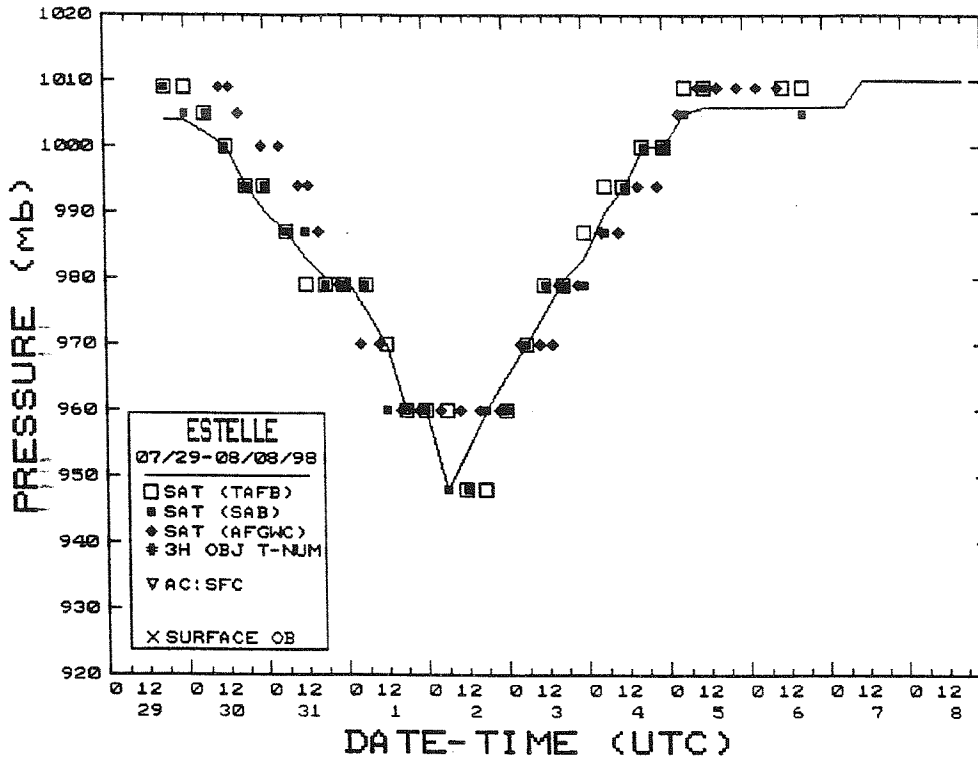


Figure 2. Best track minimum central pressure curve for Hurricane Estelle, 29 July - 08 August 1998. Curve after 1200 UTC 7 August provided by the Central Pacific Hurricane Center.

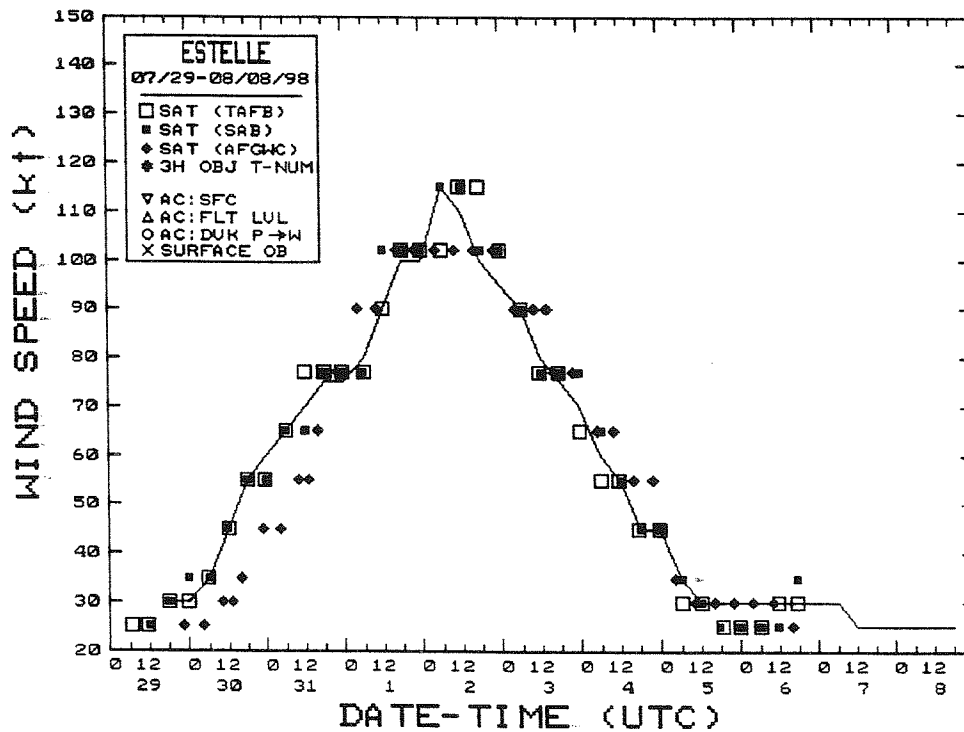


Figure 3. Best track maximum sustained one-minute 10 meter wind speed curve for Hurricane Estelle, 29 July - 8 August 1998. Curve after 1200 UTC 7 August provided by the Central Pacific Hurricane Center.