Tropical Cyclone Report
Tropical Depression Sixteen-E
25-26 October 2004

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18 November 2004

Tropical Depression Sixteen-E was a short-lived tropical cyclone in the eastern Pacific Ocean that made landfall along the northwest coast of Mexico.

a. Synoptic History

The depression developed from a tropical wave that moved off the west coast of Africa on 8 October. The wave moved westward and at relatively low latitude across the tropical Atlantic, which is typical of late-season tropical waves. After emerging over the eastern North Pacific on 18 October, thunderstorm activity developed near the wave axis. A low pressure area formed on 19 October when the system was located south of Guatemala. The wave moved slowly westward and little additional organization occurred for the next several days until the system reached a position about 450 n mi south of the southern tip of Baja California on 23 October. This was the same general area where two previous tropical waves had attempted to develop but were sheared apart by strong upper-level southwesterly winds. However, those waves helped to produce a persistent yet disorganized area of disturbed weather, accompanied by lower than average surface pressures.

As the wave that eventually produced Tropical Depression Sixteen-E slowed its forward motion and became nearly stationary within the broad area of disturbed weather, deep convection increased and became organized into curved bands early on 24 October. Dvorak satellite classifications were initiated at 1800 UTC later that day. Over the next 24 hours, the disturbance moved slowly northward and gradually became better organized, and it is estimated that a tropical depression formed around 0000 UTC 25 October about 275 n mi south-southeast of the southern tip of Baja California. 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.

As a depression, the large cyclone (Fig. 4) began moving northward around the western periphery of the Mexican subtropical ridge at a faster forward speed of about 15 kt. Strong convection, suggested by a large area of satellite cloud top temperatures below -80^{o} C, developed near and to the east of the center around 2000 UTC and continued for the next 6 h. It is possible that the upward vertical motion field and convective development was enhanced by an approaching upper-level trough. However, this same trough gradually increased the vertical shear across the cyclone and prevented it from strengthening into a tropical storm before it made landfall. The depression continued its northward motion and crossed the extreme southeastern portion of the Sea of Cortez, before moving inland along the northwestern coast of Mexico midway between Guasave and Topolobampo at about 1000 UTC 26 October. After moving

inland, the high terrain of the Sierra Madres quickly disrupted the circulation and the cyclone dissipated by 1800 UTC. However, over the next 2 days the remnant mid-level circulation and its associated moisture moved northeastward across northern Mexico and into the southwestern United States, where it interacted with a frontal system and triggered strong thunderstorms and locally rainfall across portions of eastern New Mexico, western and central Texas, and much of Oklahoma.

b. Meteorological Statistics

Observations in Tropical Depression Sixteen-E (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). Surface observations from ships and land stations in Mexico, data from the radar at Guasave, Mexico, and microwave imagery from NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT program, and the Defense Meteorological Satellite Program (DMSP) were also useful in tracking the depression.

While there were no reports of sustained tropical storm force winds associated with the depression, a wind gust to 70 kt was observed at the Culiacan, Mexico airport (MMCL; location 29^{o} 41' N 107^{o} 24' W) at 0227 UTC 26 October, when the center was passing just west of the area. Spanish news media also reported that a possible tornado may have occurred near Culiacan. Ship ZCDF8 (**Diamond Princess**), located in rain-free regions in the western and southern quadrants of the depression, reported 29-kt surface winds at 0000 UTC and 0300 UTC on 26 October. This suggests that higher sustained winds, possibly to near tropical storm force, may have occurred in the strong convection in the eastern semicircle at those times.

Locally heavy rain (amounts unknown) fell along the coastal and mountain regions of west-central and northwestern Mexico causing some localized flooding.

c. Casualty and Damage Statistics

No reports of damage or casualties associated with Tropical Depression Sixteen-E were received.

d. Forecast and Warning Critique

Tropical Depression Sixteen-E was a tropical cyclone for only 36 hours, so there are too few forecasts to produce meaningful verification statistics.

The Government of Mexico issued a tropical storm warning for the western coast of Mexico from El Roblito northward to Topolobampo at 2200 UTC 25 October. The warning was discontinued at 0900 UTC 26 October.

Table 1. Best track for Tropical Depression Sixteen-E, 25-26 October 2004.

Date/Time (UTC)	Latitude (EN)	Longitude (EW)	Pressure (mb)	Wind Speed (kt)	Stage
25 / 0000	18.3	109.2	1006	25	tropical depression
25 / 0600	19.3	109.1	1005	30	"
25 / 1200	20.7	109.0	1005	30	"
25 / 1800	22.2	108.8	1005	30	"
26 / 0000	23.6	108.6	1004	30	"
26 / 0600	24.4	108.6	1005	30	"
26 / 1200	25.8	108.8	1005	25	"
26 / 1800					dissipated inland
26 / 1000	25.4	108.8	1005	30	landfall midway between Guasave and Topolobampo, Mexico
26 / 0000	23.6	108.6	1004	30	minimum pressure

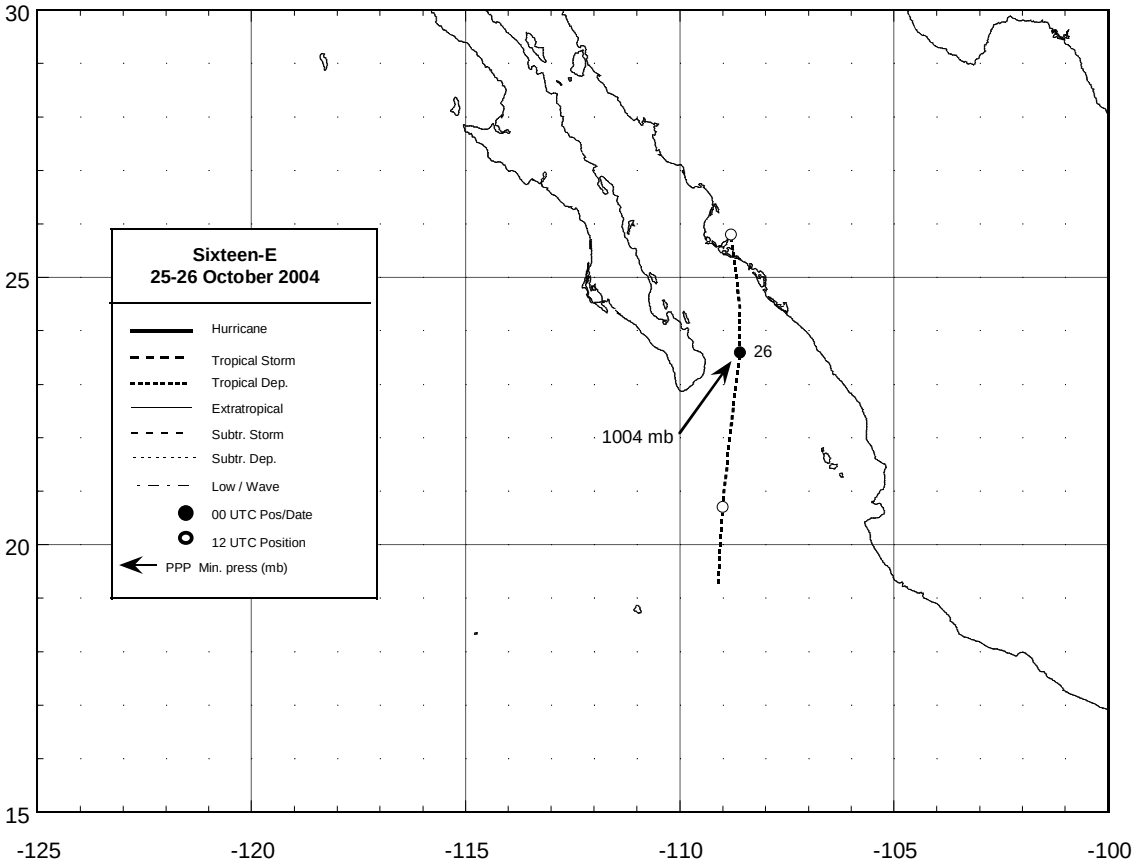

Figure 1. Best track positions for Tropical Depression Sixteen-E, 25-26 October 2004.

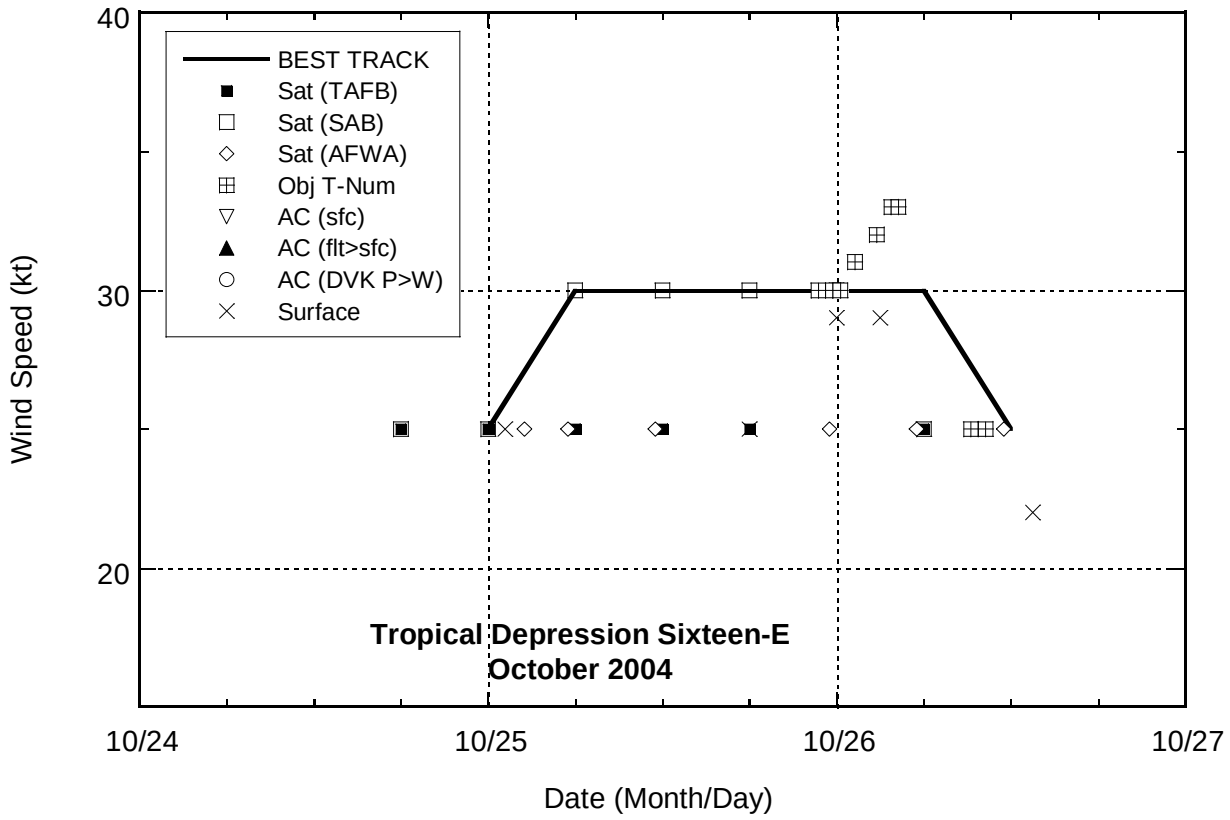

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Depression Sixteen-E, 25-26 October 2004.

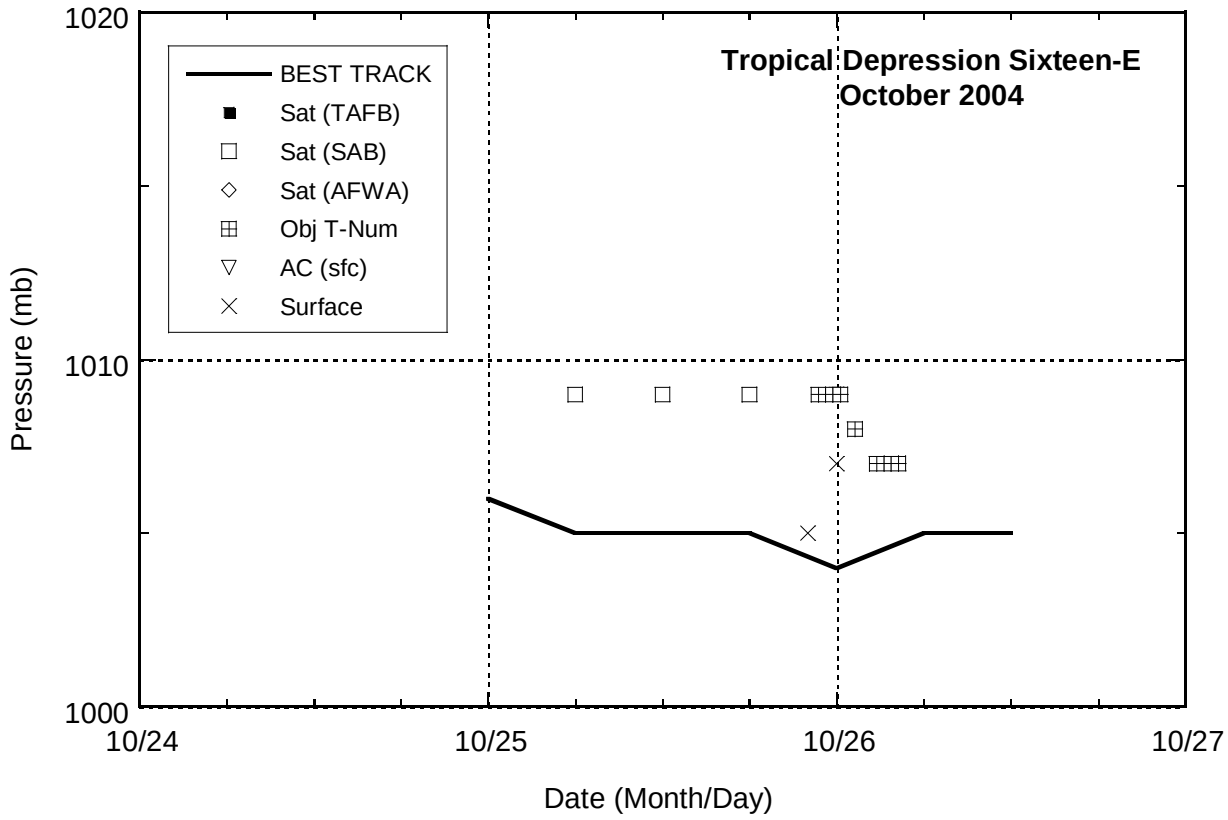

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Depression Sixteen-E, 25-26 October 2004.

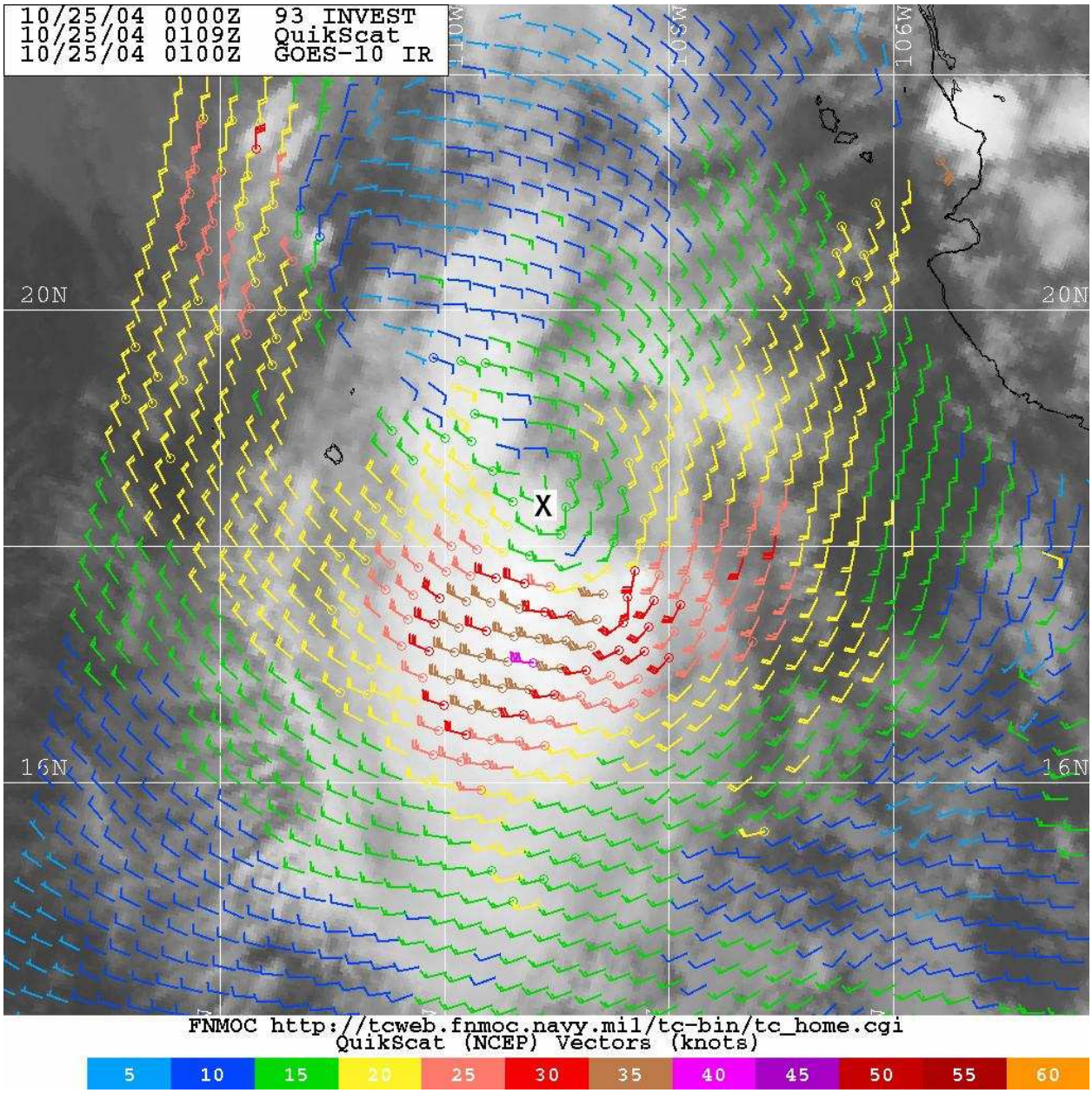

Figure 4. 0109 UTC 25 October 2004 NASA QuikSCAT overpass showing the large but well-defined low-level wind field (center indicated by **X**) during the early stage of Tropical Depression 16-E. The intensity of the depression was estimated to be about 25 kt at this time; higher wind speeds suggesting possible tropical storm strength in the southern semicircle are due to rain enhancement and are not considered to be representative of the surface wind (image courtesy of the U.S. Navy Fleet Numerical Meteorology and Oceanography Center, Monterey, CA).