Tropical Cyclone Report
Tropical Storm Rosa
(EP192006)
8-10 November 2006

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Rosa was the first eastern North Pacific tropical storm to develop during the month of November since 2000. This late season tropical cyclone did not affect land.

a.   Synoptic History

The development of Rosa appears to have been associated with a tropical wave that departed the west coast of Africa on 22 October. While traversing the Atlantic Ocean and Caribbean Sea the wave remained relatively weak and somewhat difficult to track. On 3 November, the tropical wave crossed Central America and entered the eastern North Pacific Ocean. Shortly thereafter, shower and thunderstorm activity began to increase in association with the wave, and a broad low pressure area developed several hundred miles south of the Gulf of Tehuantepec on 5 November. The convection remained disorganized the next day, but gradually increased in organization on 7 November and Dvorak classifications were initiated. Shortly after 0000 UTC 8 November convection significantly increased near the center of the low, which led to the formation of a tropical depression at 0600 UTC 8 November about 385 n mi south of Manzanillo, Mexico. 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 tropical cyclone moved slowly northwestward throughout its existence. Six hours after formation, satellite intensity estimates suggest that the depression was near tropical storm strength. Soon thereafter, however, the satellite appearance of the tropical cyclone degenerated somewhat due to southwesterly wind shear. Despite the shear, convection re-formed near the center early on 9 November which allowed the depression to strengthen to a minimal tropical storm by 0600 UTC, while centered about 260 n mi south-southwest of Manzanillo. The strong shear halted further intensification and Rosa remained a tropical storm for only 18 h. Rosa weakened to a tropical depression at 0000 UTC 10 November and the circulation gradually degenerated, becoming an open trough later that day while located about 215 n mi southwest of Manzanillo.

b.   Meteorological Statistics

Observations in Rosa (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). Microwave satellite imagery from

NOAA polar-orbiting satellites, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT, and Defense Meteorological Satellite Program (DMSP) satellites were also useful in tracking Rosa.

Although a QuikSCAT overpass from 1239 UTC 8 November indicated tropical storm force winds within the tropical cyclone's circulation, analysis of these data suggest that these winds were inflated due to rain contamination. A subsequent QuikSCAT overpass at 0109 UTC 9 November also showed an area of tropical storm force winds in the system. These winds appear reliable since they were located just outside the area of deep convection. Shortly before the QuikSCAT overpass, Dvorak data T-numbers decreased from all agencies at 0000 UTC. It is believed that the system reached tropical storm strength shortly after 0000 UTC when convection redeveloped near the center of circulation which was near the time of the QuikSCAT overpass.

The 35 kt estimated peak intensity of Rosa is supported by the QuikSCAT data and subjective Dvorak intensity estimates. There were no ship observations of winds of tropical storm force in association with Rosa.

c.   Casualty and Damage Statistics

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

d.   Forecast and Warning Critique

The formation of Rosa was well anticipated. The Tropical Weather Outlooks (TWO) issued by the National Hurricane Center began describing the area of disturbed weather from which Rosa formed about 42 h prior to tropical cyclone development. About 12 h before tropical cyclogenesis the TWO began explicitly discussing the potential for tropical depression development.

A verification of official and guidance model track forecasts is given in Table 2. Average official track errors for Rosa were 30, 47, 58, and 81 n mi for the 12, 24, 36, and 48 h forecasts, respectively. The number of forecasts ranged from 9 at 12 h to 3 at 48 h. There were no official forecasts that verified at 72 hours or beyond. These errors are lower than the average long-term official track errors (Table 2). The official track forecasts were better than virtually all of the dynamical model guidance. The GUNA model consensus and the Florida State Superensemble (FSSE) had smaller errors than the NHC forecast at 36 and 48 h, however only 1 forecast from each of these track predictors was verified at 48 h.

Average official intensity errors were 4, 6, 9, and 15 kt for the 12, 24, 36, and 48 h forecasts, respectively (Table 3). These errors are slightly lower than the long-term average intensity errors through 36 h, but the official errors are a little higher than the long-term average for the limited number of cases that verified at 48 h. The GFDI (interpolated GFDL model) intensity forecasts were much better than NHC forecasts and the remainder of the intensity guidance. At the time of initial development all of the intensity guidance except the GFDI over-predicted the peak intensity of Rosa.

Table 1.   Best track for Tropical Storm Rosa, 8-10 November 2006.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
08 / 0600	12.7	103.7	1006	30	tropical depression
08 / 1200	13.3	104.1	1004	30	"
08 / 1800	13.8	104.5	1004	30	"
09 / 0000	14.3	104.9	1004	30	"
09 / 0600	14.8	105.2	1002	35	tropical storm
09 / 1200	15.1	105.4	1002	35	"
09 / 1800	15.3	105.5	1002	35	"
10 / 0000	15.5	105.6	1004	30	tropical depression
10 / 0600	15.7	105.7	1005	25	"
10 / 1200	15.9	105.9	1006	25	"
10 / 1800	16.0	106.3	1007	25	"
11 / 0000					dissipated
09 / 0600	14.8	105.2	1002	35	minimum pressure

Table 2.   Preliminary track forecast evaluation (heterogeneous sample) for Tropical Storm Rosa, 8-10 November 2006. Forecast errors (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	39 (9)	69 (7)	88 (5)	109 (3)			
GFNI	57 (7)	115 (5)	173 (3)	277 (1)			
GFDI	34 (9)	53 (7)	63 (5)	86 (3)			
GFSI	64 (9)	113 (7)	170 (5)	208 (2)			
AEMI	58 (9)	97 (6)	146 (4)	203 (2)			
NGPI	43 (9)	58 (7)	67 (5)	**69 (3)**			
UKMI	43 (7)	73 (5)	86 (3)	139 (1)			
BAMD	98 (9)	215 (7)	337 (5)	511 (3)			
BAMM	54 (9)	107 (7)	144 (5)	195 (3)			
BAMS	69 (9)	127 (7)	197 (5)	245 (3)			
CONU	39 (9)	59 (7)	65 (5)	85 (3)			
GUNA	34 (7)	54 (5)	**47 (3)**	**33 (1)**			
FSSE	34 (5)	48 (3)	**54 (1)**	**44 (1)**			
OFCL	30 (9)	47 (7)	58 (5)	81 (3)			
NHC Official (2001-2005 mean)	35 (1300)	60 (1152)	83 (1009)	103 (877)	145 (652)	192 (465)	231 (313)

Table 3. Preliminary intensity forecast evaluation (heterogeneous sample) for Tropical Storm Rosa, 8-10 November 2006. Forecast errors (kt) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage.

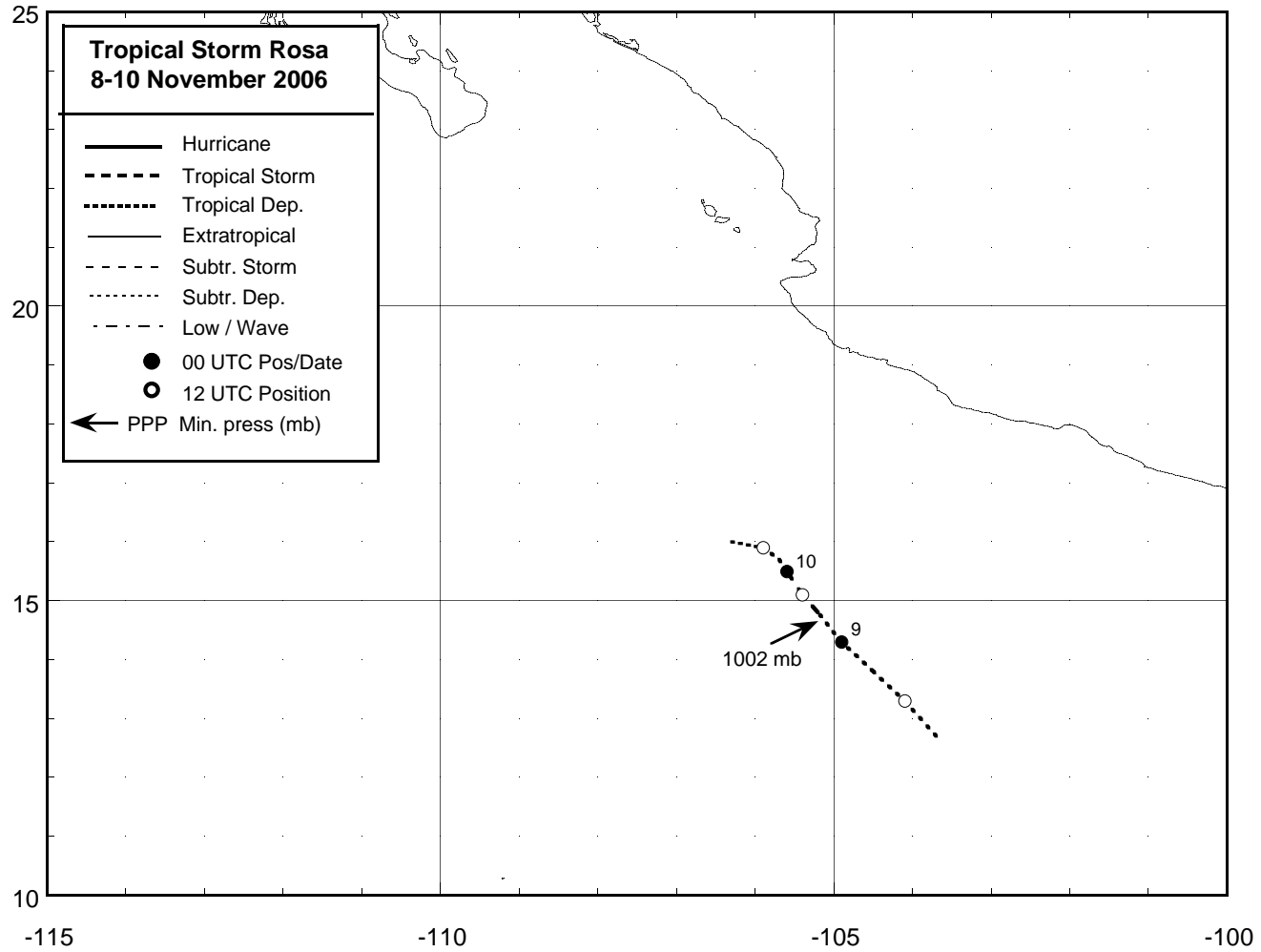| Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
SHF5	5.1 (9)	8.9 (7)	13.0 (5)	21.3 (3)			
GFDI	**3.6 (9)**	**4.4 (7)**	**4.8 (5)**	**3.3 (3)**			
SHIP	5.4 (9)	9.3 (7)	14.4 (5)	20.7 (3)			
DSHP	5.4 (9)	9.3 (7)	14.4 (5)	20.7 (3)			
FSSE	4.8 (5)	8.0 (3)	16.0 (1)	15.0 (1)			
ICON	4.1 (9)	7.3 (7)	10.4 (5)	15.3 (3)			
OFCL	3.9 (9)	5.7 (7)	9.0 (5)	15.0 (3)			
NHC Official (2001-2005 mean)	6.2 (1300)	10.8 (1152)	14.3 (1009)	16.5 (876)	18.7 (652)	18.3 (465)	19.3 (313)

Figure 1.   Best track positions for Tropical Storm Rosa, 8-10 November 2006.
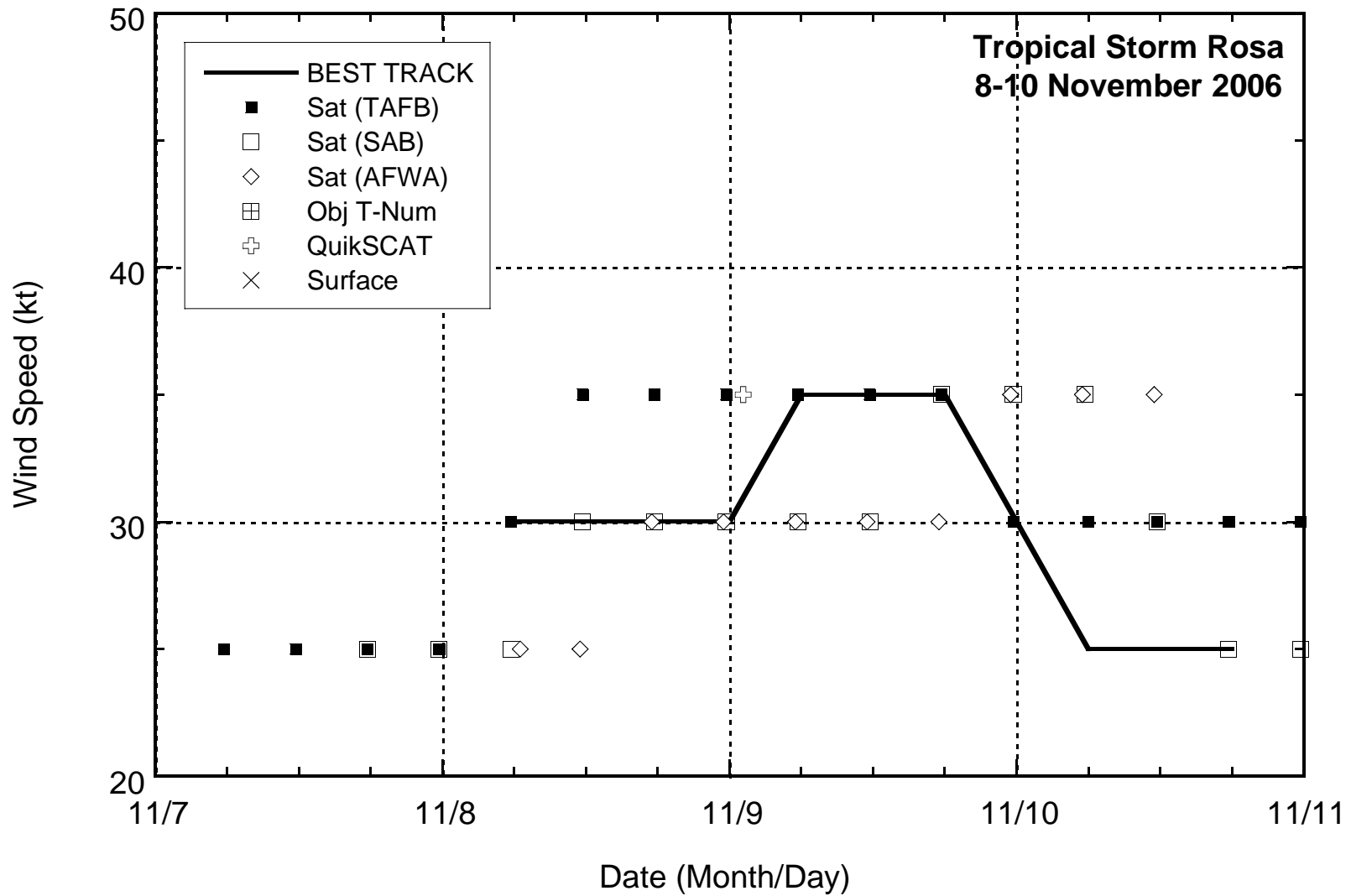
Figure 2.   Selected wind estimates and best track maximum sustained surface wind speed curve for Tropical Storm Rosa, 8-10 November 2006.
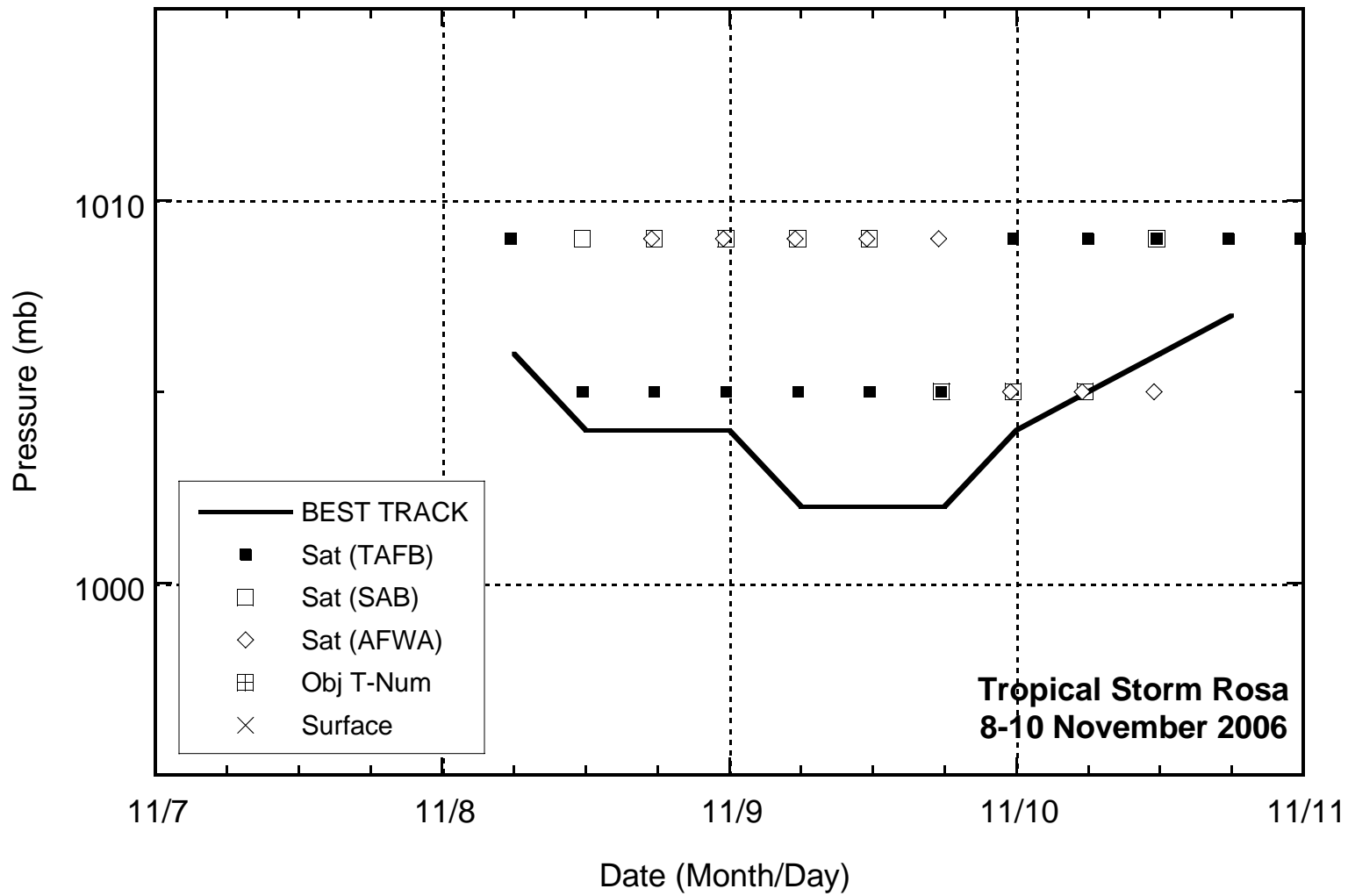
Figure 3.   Selected pressure estimates and best track minimum central pressure curve for Tropical Storm Rosa, 8-10 November 2006.