

Tropical Cyclone Report  
Hurricane Carlotta  
(EP042006)  
12-16 July 2006

James L. Franklin  
National Hurricane Center  
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Carlotta was a category 1 hurricane (on the Saffir-Simpson Hurricane Scale) that produced modest coastal rains in Mexico but otherwise did not affect land.

a. Synoptic History

Carlotta formed from a tropical wave that moved across the coast of Africa on 30 June. Convection associated with the wave, which had been minimal, increased as the wave entered the eastern Pacific basin on 9 July. By late on 10 July, the wave had developed a closed area of surface low pressure and also acquired sufficient organization to warrant Dvorak classifications. Convection increased over a broad area to the south of Acapulco the following day, and by 0000 UTC 12 July, when the low was located about 250 n mi south of Zihuatanejo, Mexico, it had enough organization to be designated a tropical depression.

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. Moving briskly west-northwestward to the south of mid-level high pressure over northwestern Mexico, the cyclone strengthened quickly under a deep burst of central convection early on 12 July, becoming a tropical storm at 0600 UTC about 230 n mi south-southwest of Zihuatanejo. It became a hurricane 24 h later, about 375 n mi south of Cabo San Lucas, Mexico. Carlotta had a large circulation initially, and its outer rainbands scraped the Mexican coast from the Gulf of Tehuantepec to Manzanillo on 12 July.

As Carlotta strengthened under light shear and warm waters, the system became more compact. On 13 July the forward motion began to slow while some northwesterly shear – in part from the outflow of Hurricane Bud located about 600 n mi to the west of Carlotta – slowed the intensification rate. Carlotta developed a banding eye and reached its peak intensity of 75 kt late on 13 July, but northwesterly mid- to upper-level shear increased and Carlotta weakened, becoming a tropical storm at 1800 UTC 14 July about 350 n mi southwest of Cabo San Lucas. With the northern portion of the circulation over cooler waters, convection began to decrease, and it appeared that Carlotta’s decay stage had begun. However, wind shear may have decreased and there was a resurgence of convection overnight; an eye re-developed and Carlotta is estimated to have regained hurricane strength near 0000 UTC 15 July.

Within a few hours of regaining hurricane strength, the center of Carlotta, continuing west-northwestward, crossed the 26°C SST isotherm and the eye disappeared. Carlotta

weakened again to a tropical storm at 1200 UTC 15 July. Decay this time was swift and uninterrupted. Carlotta weakened to a tropical depression 24 h later, about 640 n mi west-southwest of Cabo San Lucas. Unable to generate deep convection over 23°C water, Carlotta degenerated to a remnant low by 0000 UTC 17 July. The remnant low moved slowly westward for another three days before dissipating on 20 July about 1300 n mi east of the Hawaiian Islands.

b. Meteorological Statistics

Observations in Carlotta (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 Carlotta. There was considerable spread among the satellite intensity estimates early on 13 July, with the 0600 UTC estimate as high as 90 kt. Subsequent fixes suggest that the center of Carlotta was not quite co-located with the deepest convection and the 90 kt classification has been discounted. The peak intensity of 75 kt is coincident with the development of a banding eye in visible imagery.

There were no surface reports of winds of tropical storm force associated with Carlotta. Rainfall accumulations along the Pacific coast of Mexico attributable to the cyclone were less than 1 inch.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

The genesis of Carlotta was well anticipated in Tropical Weather Outlook products. The Outlook issued at 4 PM PDT 10 July was the first to mention the possibility that a depression could form during the next day or two. Genesis occurred 25 h later.

A verification of official and guidance model track forecasts is given in Table 2. Average official track errors for Carlotta were 31, 50, 59, 70, 106, and 140 n mi for the 12, 24, 36, 48, 72, and 96 h forecasts, respectively. These errors are considerably lower than the average long-term official track errors (Table 2). The number of forecasts ranged from 18 at 12 h to 4 at 96 h, and there were no verifying forecasts at 120 h. The official forecast beat nearly all the guidance models. Among the models, the UKMI performed particularly well.

Average official intensity errors were 6, 10, 11, 10, 18, and 21 kt for the 12, 24, 36, 48, 72, and 96 h forecasts, respectively. For comparison, the average long-term official intensity errors are 6, 11, 14, 17, 19, and 18 kt, respectively. By and large, the SHIPS guidance outperformed the official forecasts (Table 3), and the official forecasts were not skillful beyond 36 h. The official forecasts had a substantial high bias at longer ranges that was similar to the SHIPS bias at these time periods.

Table 1. Best track for Hurricane Carlotta, 12-16 July 2006.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
12 / 0000	13.5	102.2	1006	30	tropical depression
12 / 0600	14.2	103.4	1005	35	tropical storm
12 / 1200	14.9	104.8	1002	40	"
12 / 1800	15.5	106.1	997	50	"
13 / 0000	16.0	107.3	991	60	"
13 / 0600	16.7	108.7	987	65	hurricane
13 / 1200	17.3	109.8	984	70	"
13 / 1800	17.7	110.8	981	75	"
14 / 0000	17.9	111.7	983	70	"
14 / 0600	18.0	112.4	985	70	"
14 / 1200	18.2	113.2	987	65	"
14 / 1800	18.5	114.0	989	60	tropical storm
15 / 0000	18.8	115.0	985	70	hurricane
15 / 0600	19.0	116.0	987	65	"
15 / 1200	19.1	117.0	990	60	tropical storm
15 / 1800	19.3	118.0	993	55	"
16 / 0000	19.5	119.0	996	45	"
16 / 0600	19.8	120.0	1001	35	"
16 / 1200	20.1	121.0	1005	30	tropical depression
16 / 1800	20.4	121.9	1008	30	"
17 / 0000	20.7	122.9	1009	25	remnant low
17 / 0600	21.0	123.9	1010	25	"
17 / 1200	21.2	124.9	1010	25	"
17 / 1800	21.3	125.9	1010	25	"
18 / 0000	21.3	127.0	1010	25	"
18 / 0600	21.3	127.9	1010	25	"
18 / 1200	21.2	128.7	1010	25	"
18 / 1800	21.1	129.4	1010	25	"
19 / 0000	21.0	130.0	1010	25	"
19 / 0600	20.9	130.5	1010	25	"
19 / 1200	20.8	131.1	1010	25	"
19 / 1800	20.7	131.7	1010	25	"
20 / 0000	20.6	132.3	1010	25	"
20 / 0600					dissipated
13 / 1800	17.7	110.8	981	75	minimum pressure

Table 2. Preliminary track forecast evaluation (heterogeneous sample) for Hurricane Carlotta, 12-16 July 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.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	34 (18)	65 (16)	86 (14)	102 (12)	109 ( 8)	<b>123 ( 4)</b>	
GFNI	42 (15)	80 (13)	125 (11)	161 ( 9)	184 ( 5)	290 ( 1)	
GFDI	<b>24 (18)</b>	<b>45 (16)</b>	72 (14)	105 (12)	169 ( 8)	202 ( 4)	
GFSI	<b>26 (18)</b>	63 (15)	117 (13)	155 ( 9)	264 ( 6)	206 ( 4)	
AEMI	<b>29 (17)</b>	61 (15)	99 (13)	139 (11)	190 ( 5)	182 ( 3)	
NGPI	45 (16)	90 (14)	131 (12)	172 (10)	240 ( 6)	392 ( 2)	
UKMI	<b>30 (15)</b>	<b>47 (13)</b>	63 (11)	89 ( 9)	108 ( 1)		
BAMD	34 (16)	67 (14)	103 (12)	133 (10)	204 ( 7)	204 ( 4)	
BAMM	<b>30 (17)</b>	58 (15)	93 (13)	146 (11)	279 ( 7)	317 ( 4)	
BAMS	33 (17)	55 (15)	79 (13)	116 (11)	224 ( 7)	287 ( 4)	
CONU	<b>29 (18)</b>	56 (16)	85 (14)	109 (12)	172 ( 8)	205 ( 4)	
GUNA	<b>24 (15)</b>	<b>43 (12)</b>	68 (10)	102 ( 6)	188 ( 1)		
FSSE	31 (17)	63 (15)	94 (13)	121 (11)	213 ( 7)	266 ( 3)	
OFCL	31 (18)	50 (16)	59 (14)	70 (12)	106 ( 8)	140 ( 4)	
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 Hurricane Carlotta, 12-16 July 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.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
SHF5	8.0 (18)	12.3 (16)	11.6 (14)	<b>9.2 (12)</b>	<b>14.6 ( 8)</b>	<b>18.5 ( 4)</b>	
GFDI	7.8 (18)	11.8 (16)	13.2 (14)	12.5 (12)	<b>16.1 ( 8)</b>	<b>20.0 ( 4)</b>	
DSHP	6.6 (17)	<b>8.8 (15)</b>	<b>8.9 (13)</b>	<b>7.7 (11)</b>	<b>10.3 ( 7)</b>	22.3 ( 4)	
FSSE	<b>6.1 (16)</b>	10.4 (14)	11.7 (12)	13.8 (10)	34.5 ( 6)	45.7 ( 3)	
ICON	6.7 (17)	<b>10.2 (15)</b>	<b>10.2 (13)</b>	9.6 (11)	<b>13.0 ( 7)</b>	<b>16.3 ( 4)</b>	
OFCL	6.4 (18)	10.3 (16)	10.7 (14)	9.6 (12)	18.1 ( 8)	21.3 ( 4)	
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)

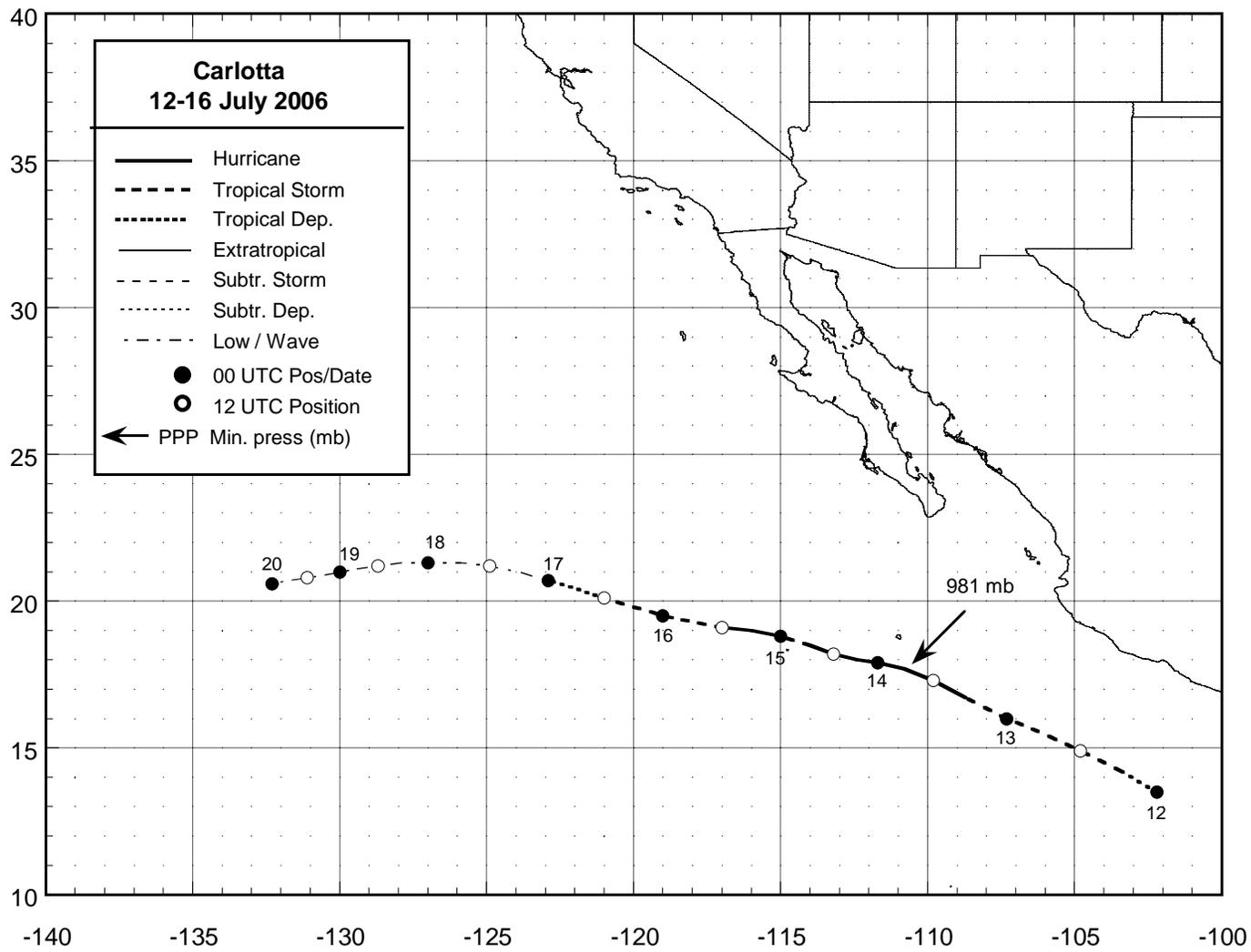


Figure 1. Best track positions for Hurricane Carlotta, 12-16 July 2006.

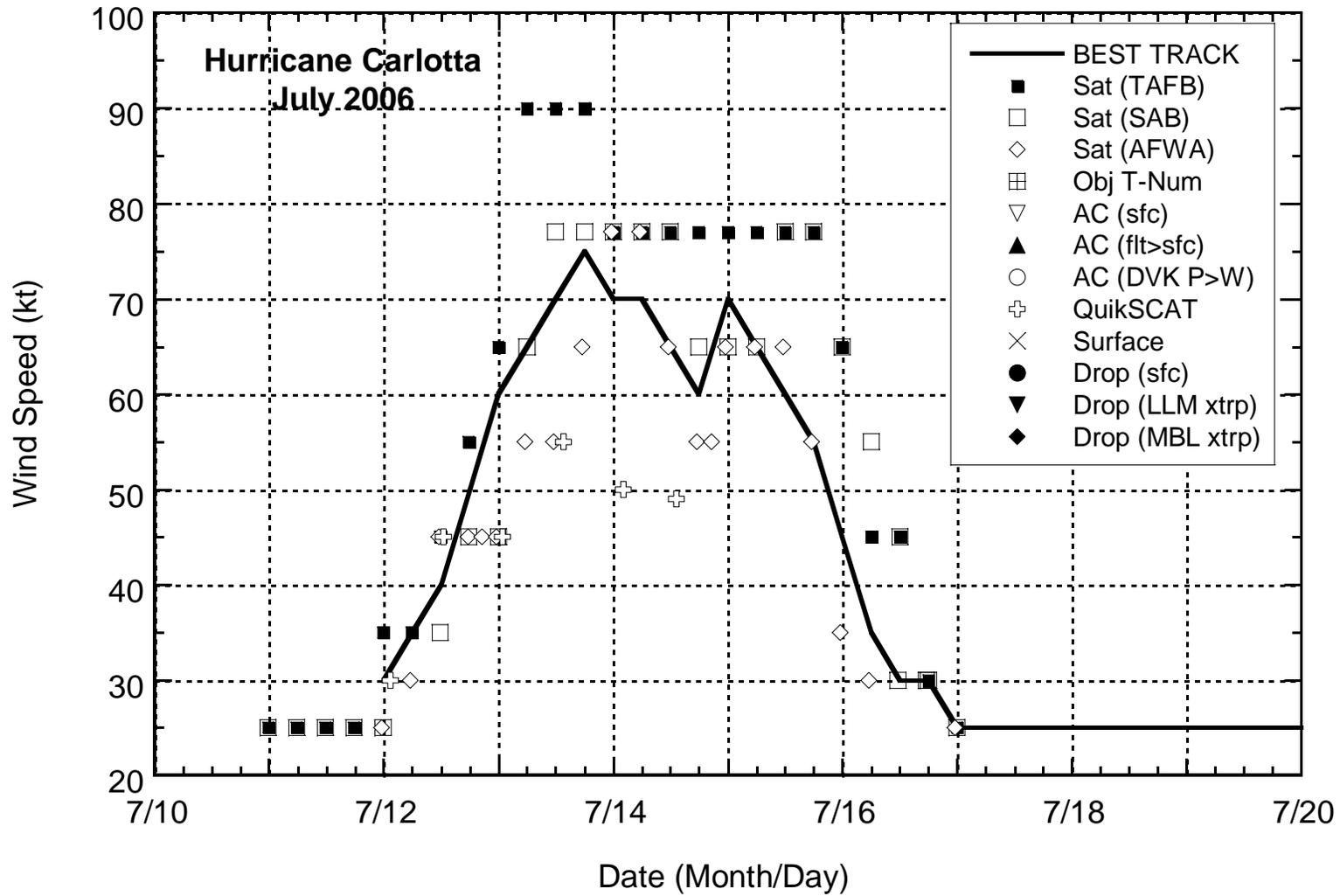


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Carlotta, 12-16 July 2006.

