Tropical Cyclone Report
Hurricane Lane
5-14 September 2000

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Lane was a large hurricane whose track included a loop, which is quite rare in the eastern Pacific. It passed directly over Socorro Island and dissipated unusually far to the north at 32°N.

a. Synoptic history

A tropical wave moved westward off the African coast on 20 August. This system caused little in the way of significant weather while crossing the Atlantic and Caribbean, finally moving across Central America and into the Pacific on 29 August. The first signs of an organized circulation appeared south of the Gulf of Tehuantepec on 1 September when the initial Dvorak satellite intensity estimate was made. Further increases in organization were slow, with steady development beginning on 4 September. The system became a tropical depression about 140 n mi south-southwest of Manzanillo, Mexico near 0000 UTC 5 September (Figure 1 and Table 1). The depression moved westward and became Tropical Storm Lane later that day.

Up to this time, Lane had evolved as an average-sized tropical cyclone. However, over the next three days Lane either evolved into a much large cyclone (as indicated in the best track) or merged with a developing monsoon-type circulation. There were three notable results in either case: 1) The cyclonic envelope became quite large; 2) The center made a loop that lasted from 6-8 September; and 3) After reaching a 50 kt intensity on the 6th, the storm temporarily weakened. Once the loop was finished, Lane strengthened to a hurricane and moved generally northwestward, passing over Socorro Island on the 9th. A 50-60 n mi wide eye was seen and a peak intensity of 85 kt was estimated on the 10th. This coincided with a turn to the west-northwest, with that motion continuing into the 11th. This took the cyclone over cooler water, and Lane weakened to a tropical storm late on the 11th.

A large deep layer trough located off the U. S. west coast allowed the storm to turn northwestward on 12 September and northward the next day. Lane moved over 20°C water on the 13th, which caused it to weaken to a depression. The cyclone dissipated about 250 n mi west of San Diego, California on the 14th.

b. Meteorological statistics

Table 1 shows the best track positions and intensities for Lane, with the track plotted in Figure 1. Figures 2 and 3 depict the curves of minimum central sea-level pressure and maximum sustained one-minute average "surface" (10 m above ground level) winds, respectively, as a function of time. These figures also contain the data on which the curves are based: satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite

Analysis Branch (SAB) of the National Environmental Satellite Data and Information Service (NESDIS), and the Air Force Weather Agency (AFWA), and surface observations from Socorro Island.

The eye of Lane passed directly over Socorro Island. While the maximum observed winds are not available, the island reported a minimum pressure of 973.7 mb at 1500 UTC 9 September. Although Lane otherwise remained well offshore, rainbands and gusty winds affected portions of the Mexican mainland and Baja California. San Jose del Cabo, Mexico, reported sustained winds of 30 kt with gusts to 40 kt at 1850 UTC 9 September, and Manzanillo reported 28 kt sustained winds at 2145 UTC 8 September.

Several ships encountered the northeastern semicircle of Lane. Table 2 shows selected ship reports of tropical storm-force winds.

c. Damage and casualty statistics

Although Lane's large circulation affected the Mexican mainland and Baja California, no reports of damage or casualties have been received at the National Hurricane Center.

d. Forecast and warning critique

Table 3 shows the average track forecast errors during Lane, including the official forecast error, the 10-year average forecast error, and the track guidance errors. The official forecast errors were significantly worse than the 10-year average at all times, but were better than the Climatology-Persistence (CLIPER) forecasts and, thus, had skill. Several of the numerical forecast models outperformed the official forecasts, with the best forecasts coming from the global AVN and UKMET models, and the GFDL model. All three of these had average 72 h forecast errors of less than 150 n mi. The largest errors, with four consecutive forecast errors of 400 n mi or more, occurred on the first four forecasts where the loop was not anticipated. The AVN, UKM, and GFDL all showed either a loop or an erratic motion that was more accurate than the officially-forecast westward track. It is notable that later official forecasts were better, with two 72-h forecasts having errors as low as 18 and 24 n mi.

The average official intensity forecast errors were 6, 11, 14, 14, and 14 kt at 12, 24, 36, 48 and 72 h respectively. These errors are below the 10-year averages of 7, 12, 16, 19, and 21 kt. These errors are also mostly below that of the SHIPS model, which had errors of 7.9, 11.7, 15.0, 15.4, and 12.0 kt at 12, 24, 36, 48, and 72 h respectively. Some early official forecast intensities were too high, as Lane weakened during its loop instead of a forecast strengthening. Some later forecasts underestimated the amount of intensification as Lane became a hurricane.

Watches and warnings were not issued for Lane.

Table 1. Best track, Hurricane Lane, 5-14 September 2000.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
05/ 0000	15.4	102.2	1007	25	tropical depression
05 / 0600	15.7	103.6	1007	30	"
05 / 1200	15.9	105.1	1004	35	tropical storm
05 / 1800	16.0	106.3	1002	40	"
06 / 0000	15.8	107.1	1000	45	"
06 / 0600	15.4	107.9	1000	45	"
06 / 1200	14.8	108.3	997	50	"
06 / 1800	14.3	108.5	998	50	"
07 / 0000	13.8	108.3	1000	45	"
07 / 0600	13.5	108.0	1000	40	"
07 / 1200	13.9	107.8	1000	40	"
07 / 1800	14.5	107.7	999	45	"
08 / 0000	15.1	108.0	998	45	"
08 / 0600	15.5	108.3	994	50	"
08 / 1200	15.9	108.6	991	55	"
08 / 1800	16.4	108.9	987	60	"
09 / 0000	17.1	109.4	983	65	hurricane
09 / 0600	17.9	110.0	978	70	"
09 / 1200	18.6	110.6	974	75	"
09 / 1800	19.5	111.4	970	80	"
10 / 0000	20.2	112.5	968	85	"
10 / 0600	20.5	113.5	967	85	"
10 / 1200	20.9	114.4	968	85	"
10 / 1800	21.3	115.1	969	85	"
11 / 0000	21.7	115.8	971	80	"
11 / 0600	22.2	116.9	975	75	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
11 / 1200	22.6	117.9	983	65	"
11 / 1800	23.0	119.0	987	60	tropical storm
12 / 0000	23.5	120.0	991	55	"
12 / 0600	24.2	120.9	994	50	"
12 / 1200	25.0	121.7	996	45	"
12 / 1800	25.8	122.4	998	45	"
13 / 0000	26.7	123.0	1000	40	"
13 / 0600	27.8	123.1	1002	35	"
13 / 1200	29.1	122.9	1004	30	tropical depression
13 / 1800	30.7	122.8	1005	25	"
14 / 0000	32.2	122.2	1006	25	"
14 / 0600					dissipated
10 / 0600	20.5	113.5	967	85	minimum pressure

Table 2. Selected ship observations of tropical storm or greater winds associated with Hurricane Lane, 5-14 September 2000.

Ship (Name or ID)	Date/Time (UTC)	Lat. (°N)	Lon. (°W)	Wind dir/speed (deg/kt)	Pressure (mb)
ELXZ7	06/1500	13.8	109.4	310/34	1005.5
1st Lt Baldomero Lopez	08/1800	20.1	107.1	130/38	1006.0
St. Lucia	09/0600	20.0	107.2	130/42	1006.0
Sealand Voyager	09/1500	21.0	108.1	130/38	1003.9
Choyang Zenith	09/1500	22.6	110.5	080/43	1005.5
Ursula Rickmers	10/0900	23.2	112.0	100/37	1003.5

Table 3. Preliminary track forecast evaluation for Hurricane Lane - heterogeneous sample. Errors in nautical miles for tropical storm and hurricane stages with number of forecasts in parentheses. Numbers in bold italics represent forecast which were better than the official forecast.

Forecast Technique	**Period (hours)**				
	12	**24**	**36**	**48**	**72**
CLIP	44 (30)	101 (28)	159 (26)	211 (24)	307 (20)
GFDI	43 (30)	***74*** (28)	***99*** (26)	***117*** (24)	***160*** (20)
GFDL*	48 (30)	***73*** (28)	***89*** (26)	***104*** (24)	***145*** (30)
AVNI	***29*** (27)	***45*** (25)	***67*** (23)	***94*** (21)	***145*** (17)
AVNO*	49 (28)	***46*** (26)	***61*** (24)	***84*** (22)	***140*** (18)
BAMD	44 (30)	93 (28)	142 (26)	188 (24)	287 (20)
BAMM	43 (30)	***80*** (28)	***120*** (26)	***160*** (24)	***234*** (20)
BAMS	46 (30)	89 (28)	134 (26)	***176*** (24)	***255*** (20)
UKMI	***40*** (25)	***74*** (23)	***104*** (21)	***130*** (19)	***150*** (15)
UKM*	***38*** (13)	***64*** (12)	***96*** (11)	***120*** (10)	***133*** (8)
P91E	42 (30)	88 (28)	137 (26)	183 (24)	305 (20)
P9UK	42 (14)	96 (13)	144 (12)	187 (11)	294 (9)
LBAR	***40*** (30)	92 (28)	149 (26)	204 (24)	303 (20)
NHC Official	42 (30)	84 (28)	128 (26)	177 (24)	277 (20)
NHC Official 10-Year Average (1990-1999)	37 (2494)	69 (2245)	101 (1993)	132 (1760)	189 (1353)

* Output from these models was unavailable at time of forecast issuance.

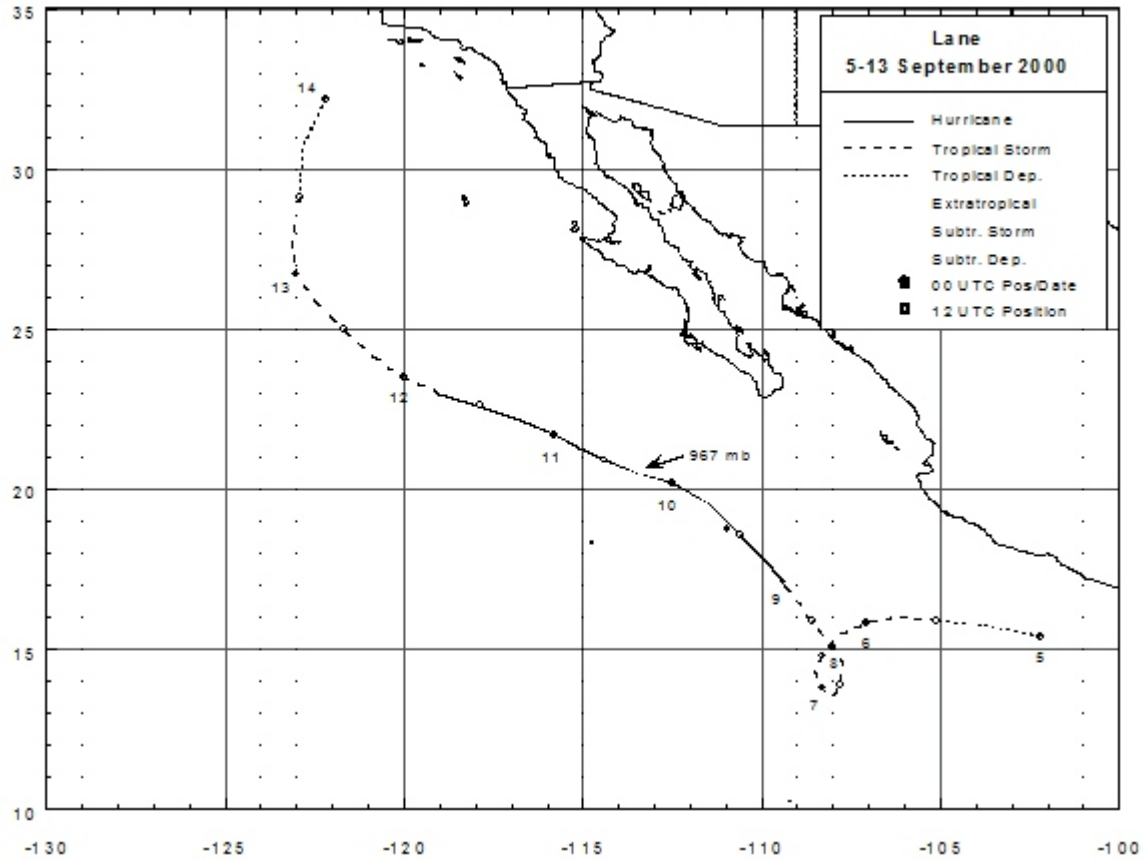

Figure 1. Best track of Hurricane Lane, 5 - 14 September 2000.

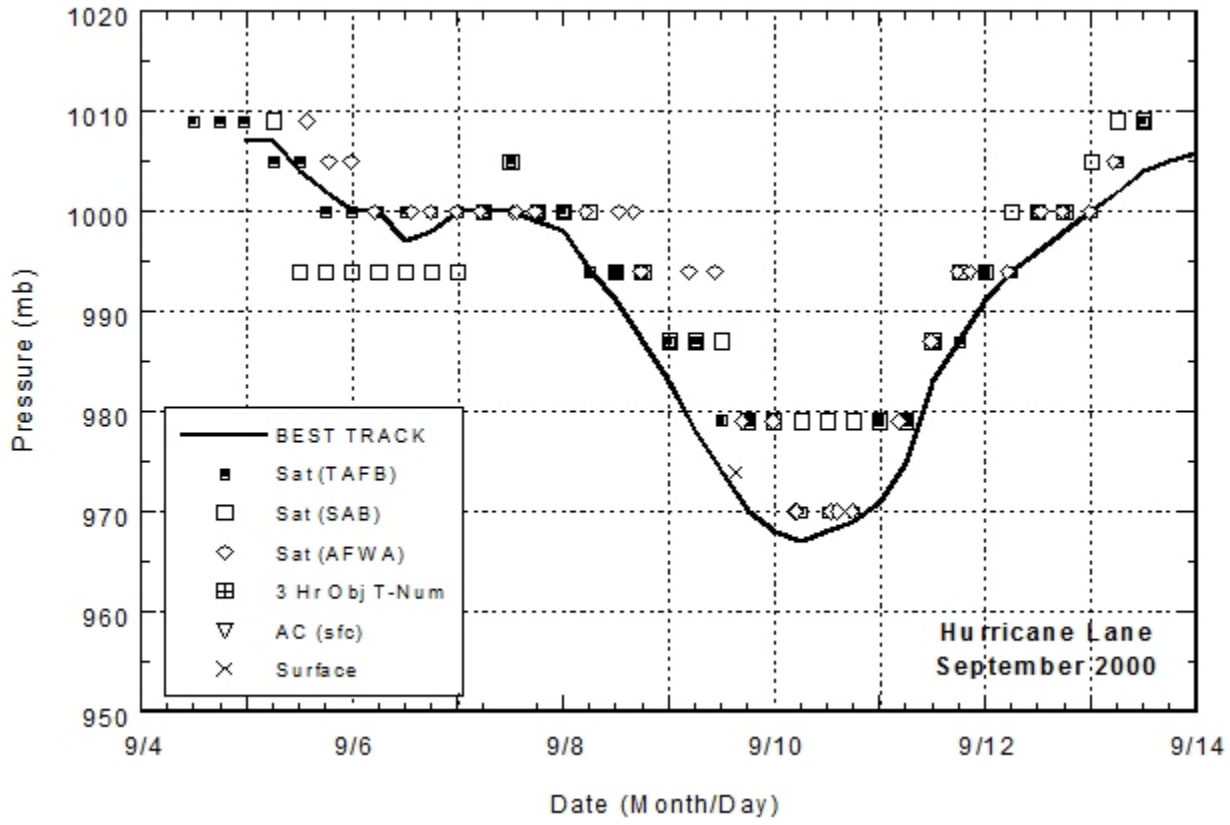

Figure 2. Best track minimum central pressure curve for Hurricane Lane, 5 - 14 September 2000.

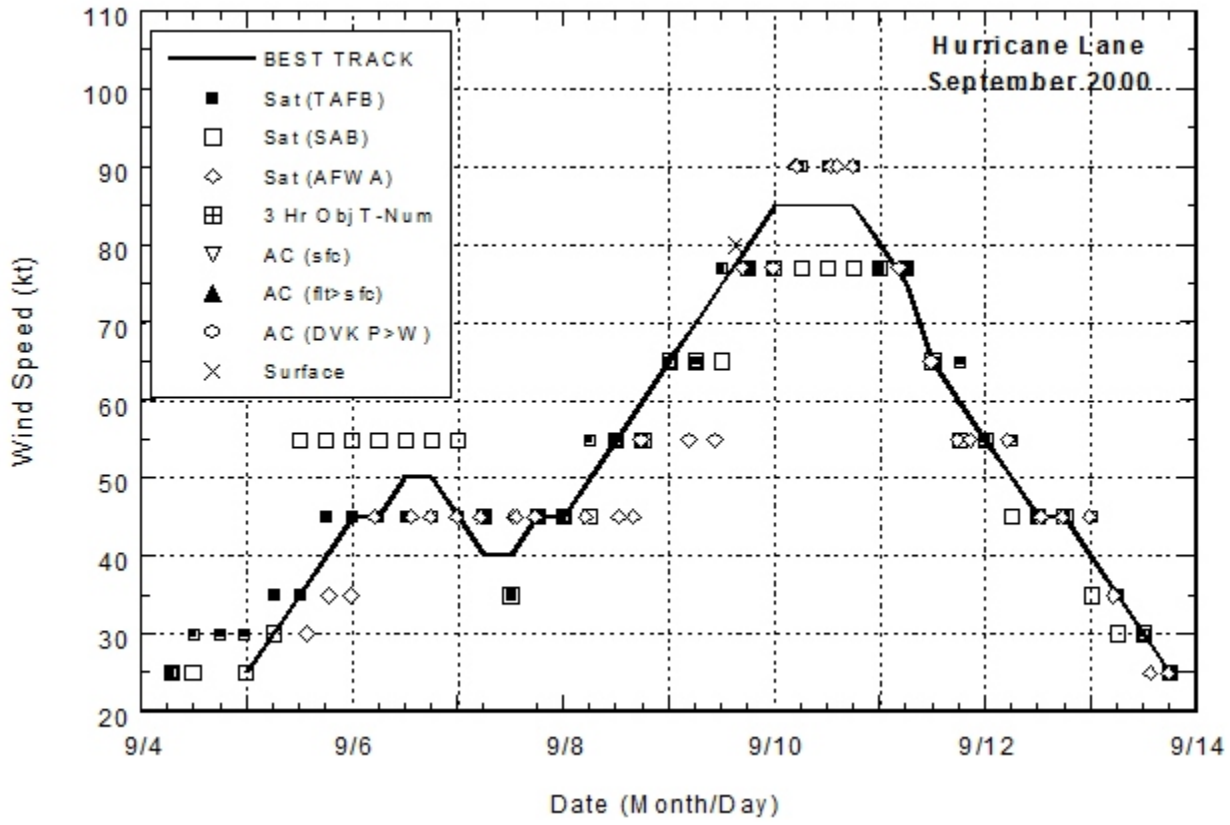

Figure 3. Best track maximum sustained 1-minute 10 meter wind speed curve for Hurricane Lane, 5 - 14 September 2000.