

Preliminary Report
Hurricane Adrian
18 - 22 June 1999

Miles B. Lawrence
National Hurricane Center
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Adrian's center remained well off shore of the Pacific coast of Mexico. However, outer rain bands associated with the hurricane brought heavy rain to portions of western Mexico. Six deaths have been attributed to Adrian.

a. Synoptic history

Adrian originated within a large area of disturbed weather associated with a broad cyclonic turning of low- and mid-level clouds, which persisted for several days while located to the south of the Gulf of Tehuantepec, Mexico. The first signs that a tropical cyclone was forming appeared on 16 June, when a low-level circulation and a banding feature was seen on visible satellite imagery. This circulation was centered about 175 n mi south of the Gulf of Tehuantepec. At the same time, a tropical wave which moved across the coast of Africa on 5 June is estimated to have moved into the area of the incipient cyclone on the 16th and 17th. This estimate is based primarily on continuity considerations, as the wave itself was rather poorly defined except while located over the eastern tropical Atlantic Ocean.

Adrian became a tropical depression early on the 18th when a convective band with tops to -85°C became more developed. The circulation center at this time was located about 225 n mi southeast of Acapulco, Mexico. The best track begins here, as seen on the map showing the track in Fig. 1. A complete listing of best track six-hour positions, wind speeds, and central pressures are given in Table 1.

The motion of the cyclone center was generally toward the west-northwest during its entire existence, roughly parallel to the coast of Mexico, and 175-225 n mi offshore. This steering was, in part, provided by a deep-layer-mean ridge of high pressure located over Mexico. The forward motion accelerated 10 kt on the 18th and to 14 kt on the 19th. It then decelerated down to about 2 kt on the 22nd, as the cyclone approached the western periphery of the ridge to the north and weaker steering currents.

Adrian became a tropical storm late on the 18th, as easterly vertical shear relaxed and an outflow pattern developed aloft. A central dense overcast formed on the 19th and Adrian became a hurricane on the 20th, while centered about 420 n mi south-southeast of the southern tip of Baja California. Maximum 1-min surface wind speeds of 85 kt were estimated late on the 19th and early on the 20th, as an eye formed briefly on satellite imagery. Then, southeasterly shear and increasingly cooler SST's resulted in a weakening trend. This system was reduced to a of low clouds on the 22nd, while

centered about 300 n mi southwest of the southern tip of Baja California.

b. Meteorological statistics

Figures 2 and 3, respectively, show best track curves of wind speed and central pressure versus time. The satellite Dvorak estimates of wind and pressure that were used to determine the best track values are plotted on these figures. In addition, the ship *L'atalante*, moving southward from Mexico, passed about 30 n mi west of the center of Adrian on the 19th, as the storm was reaching hurricane force. The ship's minimum pressure was 998.6 mb and its reported maximum wind was only 34 kt, indicating that the winds were probably weaker on the west side of the circulation.

The center of Adrian also passed about 30 n mi south of Socorro Island on the 21st, while weakening from a hurricane to a tropical storm. Reports are incomplete from this island. However, a 993 mb surface pressure was reported at 1200 UTC when the center was near its point of closest approach. Socorro Island's surface wind observation at this time was 070 degrees at 39 kt and this was the highest wind speed reported from there.

c. Casualty and damage statistics

Some of Adrian's outer rain bands produced heavy rain over portions of Mexico. According to the Associated Press, the Mexican government news agency Notimex reported minor flooding in the northern state of Coahuila and the coastal state of Colima. Reuters reported two drowning deaths and one person missing inland in the state of Chiapas from river flooding. Although Adrian's winds were only in the 30 to 40 kt range on the 18th, Reuters reported that four persons were swept away and drowned from a huge wave on the beach in Chiapas.

d. Forecast and warning critique

The official track forecast errors were generally in the normal range for the eastern Pacific basin, ranging from 11 n mi at the 0-hr forecast to 83 n mi at 24 hours to 148 n mi at 48 hours to 149 n mi at 72 hours. The number of cases ranged from 15 at the 0-hour to 3 cases at 72 hours. During the 18th and 19th, the GFDL model exhibited a right bias showing a threat to Mexico. This is believed to be related to poor initializations of the NCEP global spectral model and the official forecasts were not influenced by this bias. Official wind speed forecast errors were generally small. In the early stages, the official forecast had a negative bias, under-forecasting the peak intensity by 20 kt. Conversely, in the weakening stages, the official forecasts were too slow to weaken the storm, with one 30-kt over-forecast at 36 hours.

Table 1. Preliminary Best Track - Hurricane Adrian, 18-22 June 1999.

Date/time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
18/0600	13.5	98.2	1006	30	trop. depression
1200	13.7	99.2	1005	30	"
1800	14.1	100.4	1004	35	tropical storm
19/0000	14.6	101.8	1003	40	"
0600	15.1	103.1	1000	50	"
1200	15.6	104.5	995	55	"
1800	16.1	105.7	990	60	"
20/0000	16.7	106.8	985	65	hurricane
0600	17.2	107.8	980	70	"
1200	17.6	108.8	976	75	"
1800	17.8	109.7	973	85	"
21/0000	18.1	110.6	973	85	"
0600	18.3	111.3	977	80	"
1200	18.5	111.7	986	70	"
1800	18.6	111.9	994	60	tropical storm
22/0000	18.7	112.2	998	45	"
0600	18.7	112.6	1000	35	"
1200	18.7	112.9	1002	30	trop. depression
1800	18.8	113.1	1004	25	"
21/0000	18.1	110.6	973	85	minimum pressure

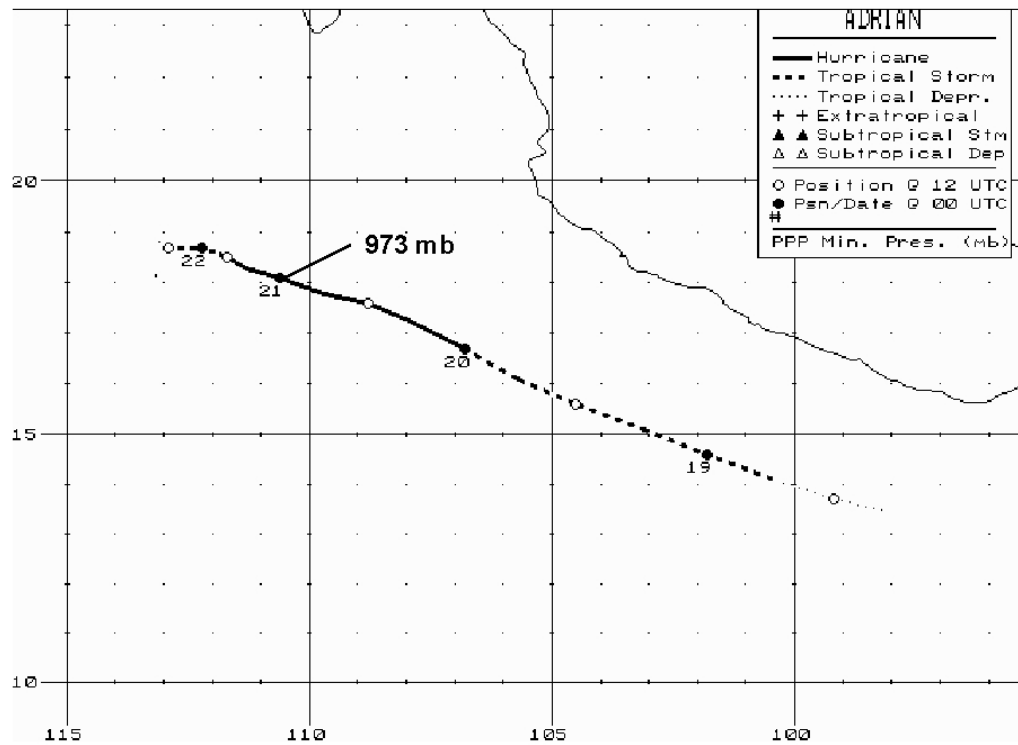


Fig. 1. Best track positions for Hurricane Adrian, June 18 - 22, 1999.

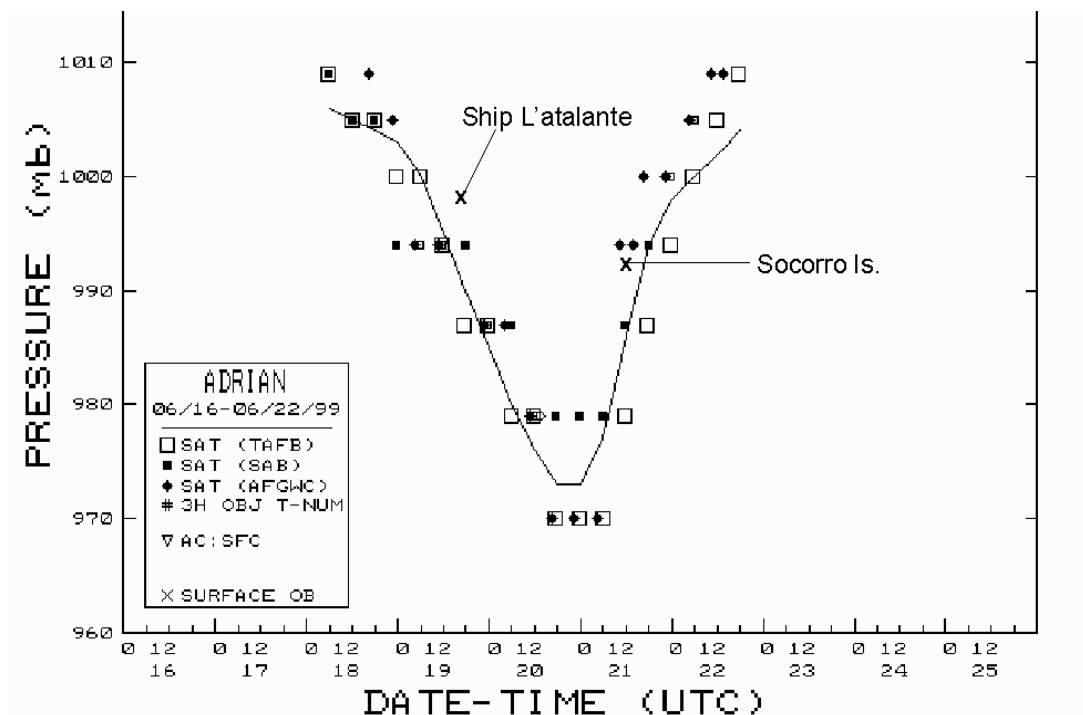


Fig. 2. Best track minimum central pressure curve for Hurricane Adrian, 18-22 June 1999.

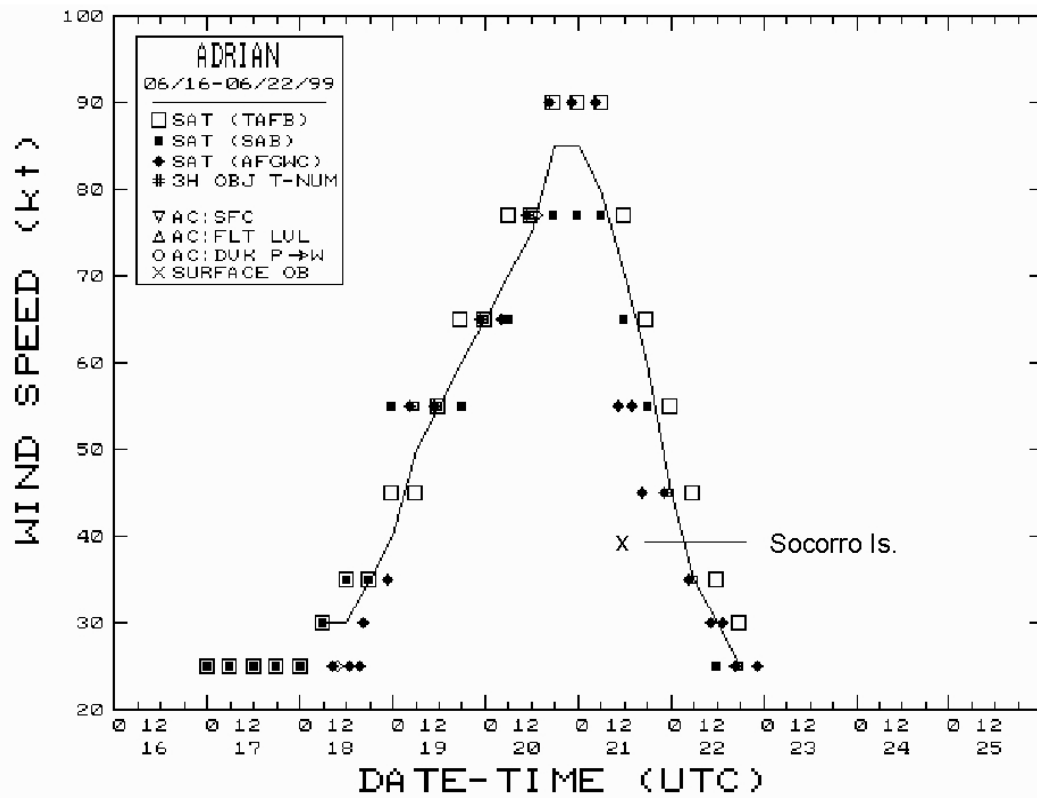


Fig.3. Best track one-minute surface wind speed curve for Hurricane Adrian, 18-22 June 1999.