

Preliminary Report
Hurricane Diana
4-9 August 1990

a. Synoptic History

Diana formed from a classical tropical wave which moved off Africa on 27 July and represented a typical example of developing disturbances over the Atlantic basin. The wave moved through the southern Windward Islands with a marked wind shift and a concentrated area of about 3.5 mb 24-hour pressure change. The wave had its maximum amplitude at the mid-levels and was accompanied by a strong upper level anticyclone reflected in the upper air data from the Lesser Antilles.

The first Air Force reconnaissance plane flew into the area when the wave was in the extreme southeastern Caribbean and found squalls but no low-level circulation. Satellite pictures suggested that the system continued to be accompanied by a large area of thunderstorms. Surface and satellite observations indicated that the most active area was moving along the South American coast directly over the Netherland Antilles. On 4 August, high resolution satellite images indicated cyclonic rotation in the low clouds and deep convection covering a large portion of the western Caribbean, suggesting that a tropical depression was forming near the eastern tip of Honduras. That was confirmed by limited surface observations and by an Air Force plane which indeed found an incipient 1008 mb center later that day.

The depression rapidly reached tropical storm intensity while moving northwestward, under the influence of a middle level pressure trough in the Gulf of Mexico. Diana crossed the Yucatan peninsula and then took a more westerly track as the trough of low pressure in the Gulf weakened. Diana continued to intensify and reached category two hurricane status on 7 August near 95W prior to landfall near Tuxpan, Mexico. After moving inland, Diana was declared dissipated by 1200 UTC on 8 August over western Mexico. However, a post-storm analysis indicated that a low pressure area with some convection persisted until 1200 UTC 9 August over the eastern Pacific northwest and near Puerto Vallarta.

The best track positions, the central pressure, and maximum sustained wind speeds every six hours are summarized in Figure 1 and Table 1.

b. Meteorological Statistics

Figures 2 and 3 show the best track pressure and wind curves as a function of time along with the plot of the satellite, aircraft reconnaissance and surface data used to construct those curves.

In addition to the constant satellite surveillance, there were

four Air Force reconnaissance missions after the system was declared a tropical depression. Daily checks were performed while the system traveled over the Caribbean as a strong tropical wave. The first Air Force plane center fix was on 5 August when the system was in the Gulf of Honduras. The plane reported 1003 mb and a maximum flight level wind of 46 kt northeast of the center. Ship observations over the northwest Caribbean indicated that Diana was becoming better organized and that the storm had a large circulation. Ship H9UM traveling from Puerto Cortes, Honduras to Las Minas, Panama reported 30 to 35 knots, 8-foot swells from the east southeast and numerous showers and thunderstorms on 5 August when Diana was in developing stage. Merida, on the northwest tip of Yucatan, reported sustained winds of 30 kt with gusts to 35 knots, and heavy rain for several hours on 6 August, as the storm passed south of that location.

Diana strengthened rapidly after moving away from the Yucatan peninsula into the Bay of Campeche. Reports from the reconnaissance aircraft indicated that the surface pressure dropped to 986mb at 1905 UTC 7 August and there were various reports of flight level winds reaching 111 knots over open waters. Those winds were stronger than would be expected for a system with such minimum pressure. Those winds were probably related to the surrounding orography and the funneling effect which occurs in that area. Tuxpan, near the point of landfall, reported a minimum pressure of 994.5 mb and heavy rain.

c. Casualty and Damage Statistics

According to an unofficial report from an amateur radio operator, the total number of deaths associated with Diana is estimated at 96. There were more than 100 people missing and 100,000 affected. The hurricane caused extensive damage to property, agriculture and roads in mountainous areas in the states of Hidalgo and northern Veracruz. The coastal town of Tamiahua was directly hit by the hurricane. Most of the damage was produced by torrential rains which triggered mudslides and flooding.

d. Warning and Forecast Critique

Diana's strength was forecast correctly including the temporary weakening over the Yucatan peninsula and the re-intensification thereafter. Most forecasts indicated that Diana should reach the Mexican coast as a hurricane, and that forecast verified.

The initial track toward the northwest was clearly predicted by both the official forecast and the NHC guidance. That track seemed reasonable since a mid-level trough covered the Gulf of Mexico. However, the trough pulled out faster than expected and neither of the guidance or the official forecast indicated the westerly track until Diana actually began turning to the left.

See Table 2 for a summary of watches and warnings associated

with Diana, and see Table 3 for a list of probabilities on the hurricane.

Lixion Avila

Figure Captions:

Fig. 1. Best track positions for Hurricane Diana, 4-9 August 1990.

Fig. 2. Best track one-minute surface wind speed curve for Hurricane Diana, 4-9 August 1990.

Fig. 3. Best track minimum central pressure curve for Hurricane Diana, 4-9 August 1990.

Table 1. Preliminary best track, Hurricane Diana,
4-9 August 1990

Date/Time (UTC)	Position		Pressure (mb)	Wind Speed (kt)	Stage
	LAT. (°N)	LON. (°W)			
04/0000	13.2	79.5	1009	25	Tropical Depression
0600	13.9	80.8	1008	25	" "
1200	14.8	81.8	1007	25	" "
1800	15.7	82.6	1006	30	" "
05/0000	16.6	83.6	1005	35	Tropical Storm
0600	17.4	84.8	1003	40	" "
1200	18.3	86.3	1000	45	" "
1800	19.1	87.6	994	55	" "
06/0000	19.7	88.7	1000	45	" "
0600	20.2	90.0	1000	45	" "
1200	20.5	91.1	1000	45	" "
1800	20.6	92.3	1000	50	" "
07/0000	20.6	93.6	998	60	" "
0600	20.7	94.7	990	65	Hurricane
1200	20.8	95.8	986	75	" "
1800	20.9	96.8	980	85	" "
08/0000	20.8	98.1	1000	55	Tropical Storm
0600	20.7	99.4	1005	50	" "
1200	20.8	100.8	1009	30	Tropical Depression
1800	21.1	102.2	1010	25	" "
09/0000	21.6	103.4	1010	25	" "
0600	22.0	104.9	1010	20	" "
1200	22.5	107.0	1010	20	" "
1800					Dissipated

07/1800 20.9 96.8 980 85 Minimum Pressure

Landfall:

Near Felipe Carrillo Puerto (Yucatan, Mexico)

05/2000 19.0 87.6 994 55 Tropical Storm

Tamiahua (near Tuxpan, Mexico)

07/1900 20.9 97.0 980 85 Hurricane

Table 2. Warning summary, Hurricane Diana, August 1990.

date/time(UTC) action	location
5/0900 tropical storm warning	Cancun southward to Belize City, offshore islands
5/2100 tropical storm warning	Yucatan peninsula from Chetumal to Carmen, offshore islands
5/2100 tropical storm warning discount.	Belize
6/0600 tropical storm warning discount.	Cancun southward
6/1200 tropical storm warning discount.	Yucatan
6/2100 hurricane watch	Mexican coast from Boca de Jesus Maria to Tuxpan
7/0130 hurricane warning	Mexican coast from Nautla to La Pesca
7/0130 tropical storm warning	La Pesca to Boca de Jesus Maria
7/0600 hurricane warning	Nautla to Lerdo de Tejada
8/0000 hurricane warning discount.	Nautla to Lerdo de Tejada
8/0000 tropical storm warning discount.	La Pesca to Boca de Jesus Maria

Table 3a.

72-hour probability, in percent, of center of Hurricane Diana passing within 65 miles of listed locations.

ADVISORY ISSUANCE TIME:	4/6PM	4/1030	5/6AM	5/NOON	5/6PM
PROBABILITY END TIME:	<u>7/2PM</u>	<u>7/8PM</u>	<u>8/2AM</u>	<u>8/8AM</u>	<u>8/2PM</u>
MUSN 216N 826W	4	4	2	X	X
MUHA 230N 824W	4	4	2	X	X
MUAN 219N 850W	11	12	8	4	X
MMCZ 205N 869W	23	28	35	76	39
MZBZ 175N 883W	23	21	21	5	X
MGPB 157N 886W	8	6	3	X	X
MHNJ 165N 859W	40	26	17	X	X
MMSO 238N 982W	6	5	7	9	11
MMTM 222N 979W	7	6	8	9	12
MMTX 210N 974W	7	7	9	10	12
MMVR 192N 961W	8	8	9	10	11
MMFR 185N 926W	12	12	13	12	9
MMMD 210N 897W	18	19	25	48	65
KEY WEST FL	3	3	2	X	X
MARCO ISLAND	3	3	2	2	X
FORT MYERS	3	3	2	2	X
VENICE	3	3	3	2	X
TAMPA	3	3	3	2	X
CEDAR KEY	3	3	3	2	X
ST MARKS	3	2	3	2	2
APALACHICOLA	3	3	3	3	2
PANAMA CITY	3	3	3	3	2
PENSACOLA	3	3	3	3	3
MOBILE AL	3	3	3	3	3
GULFPORT MS	3	3	4	4	4
BURAS AL	3	4	5	5	5
NEW ORLEANS	X	3	4	4	4
MARATHON FL	X	3	2	4	X
NEW IBERIA LA	X	3	4	4	5
PORT ARTHUR TX	X	2	4	4	4
GALVESTON	X	3	4	4	5
FREEPORT	X	3	4	5	6
PORT O'CONNOR TX	X	3	4	5	6
CORPUS CHRISTI TX	X	3	4	5	6
BROWNSVILL TX	X	5	6	7	10
MIAMI FL	X	2	X	X	X
W PALM BEACH	X	2	X	X	X
FORT PIERCE	X	2	2	6	6
COCOA BEACH	X	2	6	5	5
DAYTONA BEACH	X	2	4	3	3
JAXSONVILLE	X	2	2	2	2
ST CROIX VI	X	X	9	3	3
ST THOMAS VI	X	X	8	3	2
SAN JUAN PR	X	X	9	4	3
PONCE PR	X	X	10	5	4

Table 3b.

72-hour probability, in percent, of center of Hurricane Diana passing within 65 miles of listed locations.

ADVISORY ISSUANCE TIME:	5/11PM	6/5AM	6/11AM	6/5PM	6/11PM
PROBABILITY END TIME:	<u>7/7PM</u>	<u>8/1AM</u>	<u>8/7AM</u>	<u>8/1PM</u>	<u>8/7PM</u>
MUSN 216N 826W	4	X	X	X	X
MMCZ 205N 869W	23	2	X	X	X
MMSO 238N 982W	16	20	20	15	5
MMTM 222N 979W	15	17	22	25	42
MMTX 210N 974W	13	13	18	28	60
MMVR 192N 961W	7	5	7	15	25
MMFR 185N 926W	2	X	X	X	X
MMMD 210N 897W	99	99	5	X	X
KEY WEST FL	X	4	X	X	X
MARCO ISLAND	X	4	X	X	X
FORT MYERS	X	4	X	X	X
VENICE	X	3	X	X	X
TAMPA	X	3	X	X	X
CEDAR KEY	X	2	X	X	X
APALACHICOLA	X	2	X	X	X
PENSACOLA	2	X	X	X	X
MOBILE AL	3	X	X	X	X
GULFPORT MS	3	2	X	X	X
BURAS AL	4	3	X	X	X
NEW ORLEANS	5	2	X	X	X
COCOA BEACH FL	X	3	X	X	X
MARATHON FL	X	4	X	X	X
NEW IBERIA LA	6	3	X	X	X
PORT ARTHUR TX	6	2	X	X	X
GALVESTON	8	4	2	X	X
FREEPORT	9	5	3	X	X
PORT O'CONNOR TX	10	7	4	X	X
CORPUS CHRISTI TX	11	9	5	X	X
BROWNSVILL TX	15	18	13	4	X
MIAMI FL	X	4	X	X	X
W PALM BEACH	X	3	X	X	X
DAYTONA BEACH FL	X	2	X	X	X

Table 3c. 72-hour probability, in percent, of center of Hurricane Diana passing within 65 miles of listed locations.

ADVISORY ISSUANCE TIME: 7/ 5AM 7/11AM

PROBABILITY END TIME: 10/1AM 10/7AM

MMTM 222N 979W	8	18
MMTX 210N 974W	55	65
MMVR 192N 961W	13	23

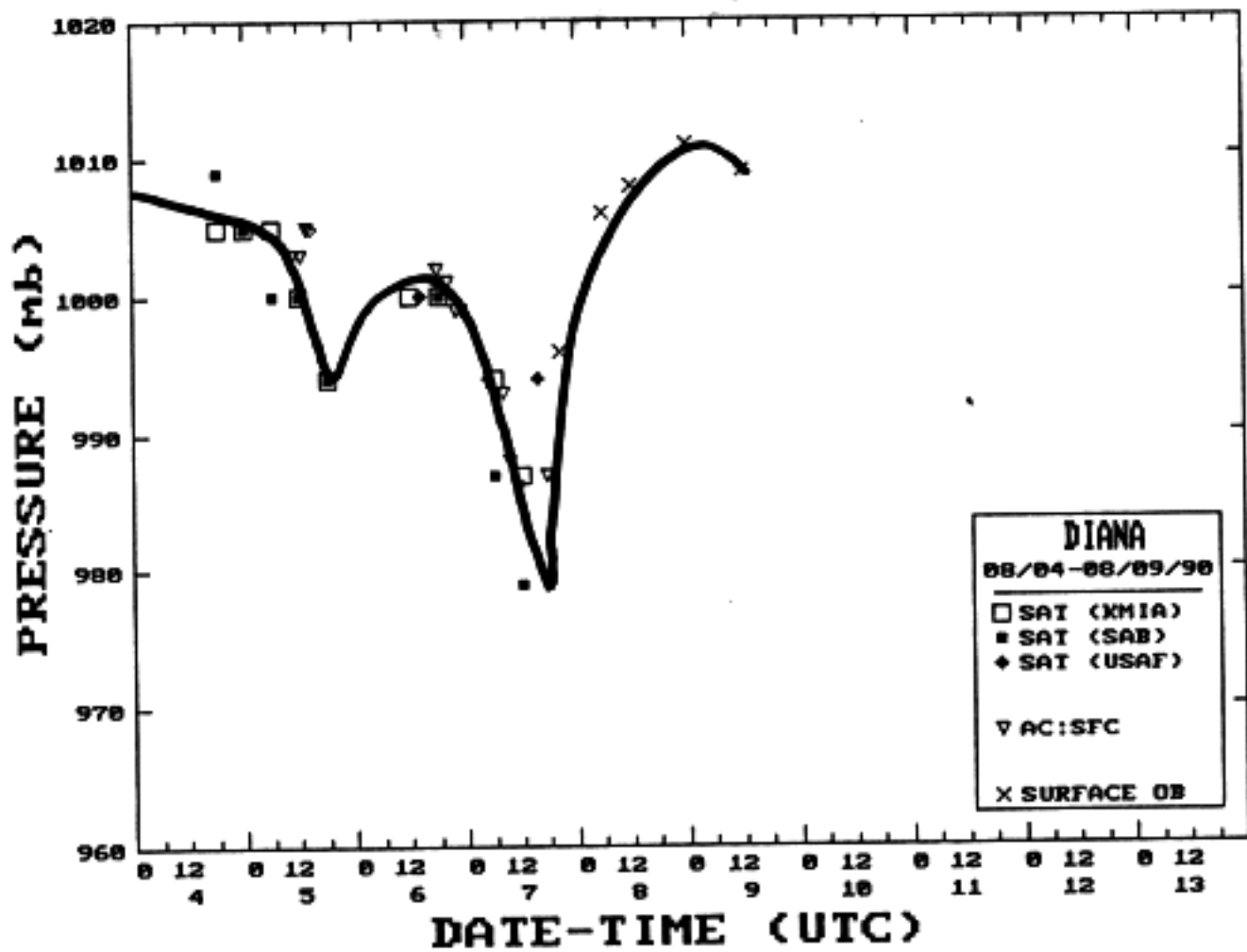


Fig. 2. Best-track one-minute surface wind speed curve for Hurricane Diana, 4-9 August 1990.

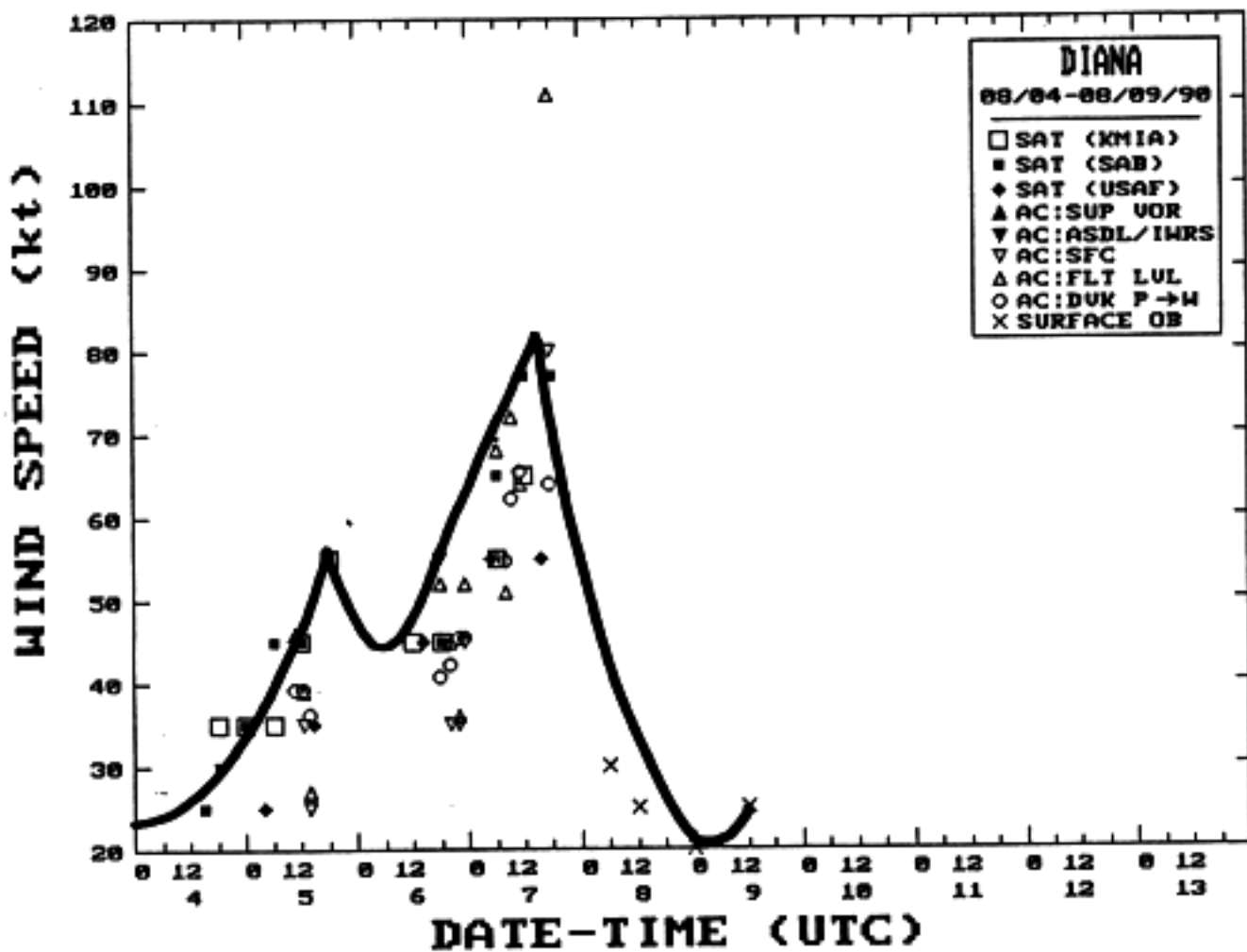


Fig. 3. Best-track minimum central pressure curve for Hurricane Diana, 4-9 August 1990.

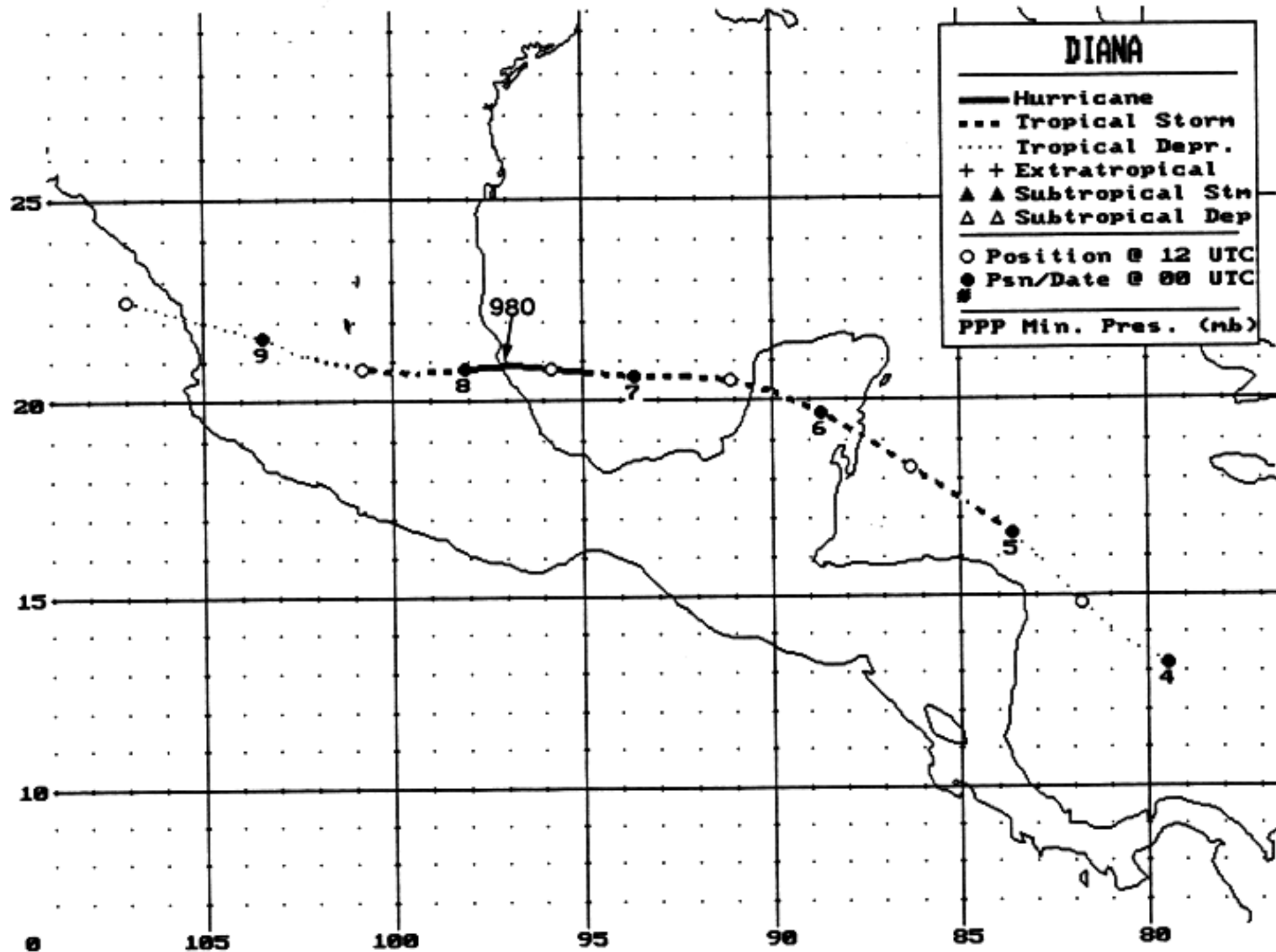


Fig. 1. Best track positions for Hurricane Diana, 4-9 August 1990.