

PRELIMINARY REPORT  
UNNAMED TROPICAL STORM  
9 TO 17 AUGUST 1987

by

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SYNOPTIC HISTORY

The tropical wave that spawned the unnamed tropical storm moved off the coast of Africa on 29 July 1987. The system progressed westward across the tropical Atlantic along the southern perimeter of an extensive swath of dust that extended from Africa to the Bahamas. The wave had very little deep convection associated with it until just prior to crossing the Lesser Antilles. There was some evidence of a mid-level and possibly a low-level circulation while in the Caribbean. That center moved inland over Central America on 7 August 1987. The northern portion of the wave came under the influence of an upper cold low centered in the southwest Gulf of Mexico on 8 August 1987 with the cloudiness taking on a cyclonically curved pattern around the cold low. A low-level circulation in the vicinity of that cold low was evident in the southwest Gulf of Mexico at 0000 UTC on 9 August but could not be found on infrared satellite imagery during the night. The history of the cold low aloft is shown in Figure 1.

The first visible satellite pictures on the morning of 9 August revealed that another low-level circulation had developed in the northwestern Gulf of Mexico just north of NDBC buoy #42002 (26.0N 93.5W), well north of the low-level circulation noted the previous night. Moreover, an upper-level anticyclone formed over the new surface center producing substantial outflow for the system (see Figure 1). The system, with its distinctive tropical cloud pattern, began developing during the morning over the 30C Gulf water. A special tropical disturbance statement was issued at 1500 UTC (10 AM CDT) on 9 August indicating that a tropical depression may be forming, and the first depression advisory was issued at 1700 UTC (noon CDT). At that time, there were isolated reports from oil rigs indicating sustained winds of tropical storm force, but they appeared to be related to convection rather than the circulation since the direction was from the west southwest in advance of the low pressure center.

Because of the rather close proximity of the system to the Texas coast and the favorable environment for development, tropical storm warnings were issued with the first depression advisory (see Table 1). A tropical storm watch was not issued because landfall was expected within 24 hours. This is the first time that a tropical storm warning has been issued for the United States. Effective, beginning in the 1987 hurricane season tropical storm watches and warnings replace gale watches and warnings with tropical cyclones.

During the afternoon of 9 August, it became increasingly difficult to locate the low-level center on satellite pictures and it appeared that the system may be weakening to a tropical wave. However, reports from oil rigs indicated that the winds were gradually increasing. The first Air Force reconnaissance flight arrived in the area at 2313 UTC (1813 CDT) and located a broad 1008 mb center with a flat pressure pattern. The highest winds at 1500 ft were 30 knots, and the maximum surface wind was estimated to be 30 knots. At the same time, Mobil oil rig P30, located a little over 60 n.mi. northeast of the reconnaissance fix reported a pressure of 1003 mb. Meanwhile a Conoco rig, WC 459A, in the immediate vicinity of P30 was reporting 1010.3 mb. A neighboring Conoco rig, VR 242A, had 1010 mb. Examination of other pressure reports from P30 revealed that those pressures were consistently lower than nearby reports. The pressure observations at P30, therefore, were considered to be incorrect. Even though reconnaissance reports indicated that the surface winds near the center were only 30 knots, several oil rigs by then had sustained winds of tropical storm force. It is estimated that the system reached tropical storm status near 1800 UTC (1300 CDT) on 9 August with a marginal pressure of 1008 mb.

The decision to upgrade the system to a tropical storm rather than a subtropical storm after-the-fact was based partially on the tropical type cloud pattern and the tendency for the system to maintain itself after landfall with a spiral, band-like structure persisting along the Louisiana coast for several days. Even though the available rig reports indicated a broad wind field common to subtropical systems, subsequent vortex messages revealed a double wind maximum; one 35 n.mi. east of the center and one 95 n.mi. east. The location of the rigs were such that the inner wind maximum was not observed until that reconnaissance report at 0700 UTC on 10 August. The vertical profile of the horizontal wind in this system was most atypical since reconnaissance reports never observed tropical storm force winds at 1500 feet prior to landfall. After landfall, there were two reports of that wind strength at 850 mb; one of 40 knots and one of 34 knots. Thus, the system affected primarily the lowest portion of the marine boundary layer.

The tropical storm moved in a north northwesterly direction about 10 knots with the center crossing the Texas coast between Galveston and Beaumont near 0600 UTC (0100 CDT) on 10 August with a pressure estimated at 1009 mb. The lowest pressure reported at Beaumont was 1009.8 mb. The wind shifted from 150/12 knots to 240/06 knots between 0700 and 0800 UTC there.

The system moved northward in extreme east Texas and weakened to a tropical depression near the Louisiana border. The center then curved eastward over northern Louisiana and southern Mississippi and southeastward toward the Florida panhandle and the Gulf of Mexico. It actually emerged over the Gulf of Mexico again on 15 August, skirting the coast around Cape San Blas, and reentered the panhandle on 16 August near St. Marks, Florida. It gradually lost identity in eastern Georgia on 17 August. (See Figures 2-4 and Table 2.)

## METEOROLOGICAL STATISTICS

The tropical storm produced gusty winds in the coastal areas of the northwest Gulf of Mexico. A summary of maximum winds observed at oil rigs is presented in Table 3. The highest sustained wind at an oil rig was 43 knots (50 mph), and the highest gust was 57 knots (66 mph). The sustained wind speeds were adjusted to the standard elevation of 10 meters using the 1/7 power law (Hellman's formula), and also using a boundary layer model developed by Liu, Katsaros, and Businger (1979). In both cases, the adjusted wind speeds at several rigs reached tropical storm force. Although there were some gaps in the data, it appeared that VR 242A and VR 119G had tropical storm force winds for at least 8 hours. (See Figure 5.)

The remnants of the tropical storm produced 4 to 9 inches of rainfall inland with the highest amounts being observed in east central Louisiana, southern Mississippi and southeast Georgia (see Table 4). A little over 12 inches fell at Columbia, Mississippi. This led to major flooding of the Biloxi and Tchoutacabouffa Rivers and flash flooding in Jackson County, Mississippi. A record stage of 16.8 feet occurred on the Tchoutacabouffa River on 16 August, breaking the previous high stage of 15.9 feet established in 1980.

## CASUALTY AND DAMAGE STATISTICS

Many stores in the business district of Columbia, Mississippi received water damage due to major flooding. Twenty-five families were evacuated in residential areas, and many roads were inundated there. The flooding on the Biloxi and Tchoutacabouffa Rivers forced the evacuation of 357 people. Flash flooding was severe in Jackson County, Mississippi where numerous homes were flooded and roads inundated with 2 to 4 feet of water.

## FORECAST AND WARNING TECHNIQUE

The 1200 UTC 8 August 1987 Nested Grid Model (NGM) package had a 500 mb vorticity maximum near the Yucatan Peninsula at the initial time. That center tracked northwestward to the Galveston, Texas area in 48 hours (1200 UTC 10 August 1987). There was some question of the likelihood of that happening because of the presence of the large cold low in the Gulf of Mexico, but it did focus attention on the area, and the forecast appears to have verified in a general way even though different vorticity maxima may have been involved.

The main forecast and warning difficulty centered around: (1) the rather rapid development near the coast, (2) limitations in interpreting conditions and detecting changes on both visible and infrared satellite imagery, and (3) the fact that reconnaissance flights failed to document wind conditions consistent with winds observed at oil rigs. This storm vividly illustrated limitations which are of major concern at the National Hurricane Center.

The strike probabilities were largest over the upper Texas coast for the three forecast periods. Initially, the maximum value was for Freeport, Texas, but later shifted to Galveston, Texas. However, values were greater than 25 percent from Port O'Conner through Port Arthur, Texas for all periods (see Table 5). Most of the weather was to the right of the center.

HPG  
11/18/87

#### REFERENCE

Liu, W.T., K.B. Katsaros and J.A. Businger, 1979: Bulk parameterization of air-sea exchanges of heat and water vapor including the molecular constraints at the interface. J. Atmos. Sci., 36, 1722-1735.

TABLE 1.      WARNINGS

<u>Location</u>	<u>Type</u>	<u>Effective</u>	<u>Discontinued</u>
Matagorda, TX to Morgan City LA	Tropical Storm Warning for Winds to 45 mph	9/1700Z	9/2200Z
Matagorda, TX to Morgan City LA	Tropical Storm Warning for Winds to 50 mph	9/2200Z	10/1000Z

TABLE 2.    PRELIMINARY BEST TRACK, UNNAMED TROPICAL STORM, 9-17 AUGUST, 1987

<u>Date</u>	<u>Time</u> (UTC)	<u>Position</u>		<u>Pressure</u> (mb)	<u>Wind</u> (kt)	<u>Stage</u>
		<u>Latitude</u>	<u>Longitude</u>			
8/09	1200	26.3	93.6	1010	30	Trop. Depression
	1800	27.3	94.0	1008	35	Trop. Storm
8/10	0000	28.4	94.4	1008	40	" "
	0600	29.5	94.5	1009	40	" "
	1200	30.5	94.5	1009	40	" "
	1800	31.3	94.1	1009	30	Trop. Depression
8/11	0000	31.8	93.5	1009	25	" "
	0600	32.3	92.7	1009	25	" "
	1200	32.3	91.8	1008	25	" "
	1800	32.2	91.2	1008	25	" "
8/12	0000	32.1	90.6	1007	25	" "
	0600	32.0	90.2	1007	25	" "
	1200	32.0	89.7	1007	25	" "
	1800	32.0	89.3	1007	20	" "
8/13	0000	31.9	88.8	1008	20	" "
	0600	31.8	88.4	1008	20	" "
	1200	31.7	88.0	1009	20	" "
	1800	31.5	87.7	1009	15	" "
8/14	0000	31.3	87.4	1010	15	" "
	0600	31.1	87.1	1010	15	" "
	1200	30.8	86.8	1010	15	" "
	1800	30.6	86.6	1011	15	" "
8/15	0000	30.3	86.3	1011	15	" "
	0600	30.0	86.0	1011	15	" "
	1200	29.8	85.6	1012	15	" "
	1800	29.7	85.0	1012	15	" "
8/16	0000	29.8	84.5	1013	15	" "
	0600	30.2	84.0	1014	15	" "
	1200	30.5	83.7	1014	15	" "
	1800	30.9	83.2	1014	10	" "
8/17	0000	31.4	82.9	1015	10	" "
	0600	31.8	82.3	1015	10	" "
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8/12	0000	32.1	90.6	1007	25	Minimum Pressure
8/10	0600	29.6	94.5	1009	40	Landfall Between Galveston & Beaumont TX

TABLE 3.

MAXIMUM WINDS OBSERVED AT OIL RIGS IN THE NORTHWEST  
GULF OF MEXICO, 9-17 AUGUST 1987.

IDENTIFICATION	LOCATION		ELEVATION (ft)	DIR (deg)	SPD (kt)	GUST (kt)	DATE	TIME (UTC)	ADJ	ADJ
	Lat.	Lon.							SPD*	SPD**
P30 (WC533) MOBIL	28.3N	93.0W	100	240	41	—	9	1211	35	37
P26 (GI94) MOBIL	28.5N	90.1W	100	207	35	—	9	2311	30	32
SM 108G CONOCO	28.4N	92.0W	80	180	31	37	9	1744	27	29
WC 459A CONOCO	28.3N	93.0W	80	180	34	35	10	0408	30	31
VR 242A CONOCO	28.6N	92.6W	90	180	36	41	10	0514	31	33
WC 66C CONOCO	29.7N	93.1W	70	135	39	47	10	0408	35	37
EC 42B CONOCO	29.5N	92.8W	70	090	43	49	10	0408	39	40
VR 119G CONOCO	29.1N	92.5W	80	200	41	57	10	1208	36	38
EC 97A CONOCO	29.2N	92.8W	80	160	33	41	10	0408	29	31
S.TIMBIA- LIER 151 GULF	28.6N	90.3W	125	225	37	—	9	1805	31	33

\* Speed adjusted to 10-meter level using 1/7 power law.

\*\* Speed adjusted to 10-meter level using the Liu, Katsaros, Businger Model (1979).

TABLE 4.

HEAVY RAINFALLS ASSOCIATED WITH THE UNNAMED TROPICAL STORM,  
9-17 AUGUST 1987.

LOCATION	RAIN AMOUNT	
	24-HR (INCHES)	STORM (INCHES)
Steinhagen, TX	3.50	---
Covington #3, LA	3.65	4.89
Baker, LA	8.70	8.70
BTR Central, LA	5.83	6.50
BTR Concord, LA	3.86	4.54
BTR Sherwood, LA	4.67	4.90
Greenwell Springs, LA	6.85	7.19
New Roads, LA	6.22	6.22
Oaknolia, LA	5.54	5.92
Port Allen, LA	3.73	3.73
St. Francisville, LA	6.03	7.25
Watson 3 ENE, LA	7.02	7.32
Zachary, LA	4.11	4.57
LSU Dean Lee Res Stn, LA	4.50	5.05
Winnfield, LA	3.77	6.19
Hammond 5 E, LA	4.50	4.50
Columbia, MS	---	12.20
Brunswick, GA	5.99	8.75

TABLE 5. CHANCES OF THE CENTER OF THE UNNAMED TROPICAL STORM PASSING WITHIN 65 MILES OF THE LISTED LOCATION BY DATE AND TIME (CDT) INDICATED. PROBABILITIES IN PERCENT.

<u>Advisory Date/Time</u> <u>Probability Time</u>	<u>9/Noon</u> <u>12/7 AM</u>	<u>9/5 PM</u> <u>12/1 PM</u>	<u>9/11 PM</u> <u>12/7 PM</u>
New Iberia, LA	6	3	
Port Arthur, TX	28	27	44
Galveston, TX	40	44	83
Freeport, TX	44	55	78
Port O Connor, TX	37	49	34
Corpus Christi, TX	16	21	
Brownsville, TX	3	2	
28 N 93 W	30	27	45
28 N 95 W	64	78	89
27 N 96 W	43	51	3

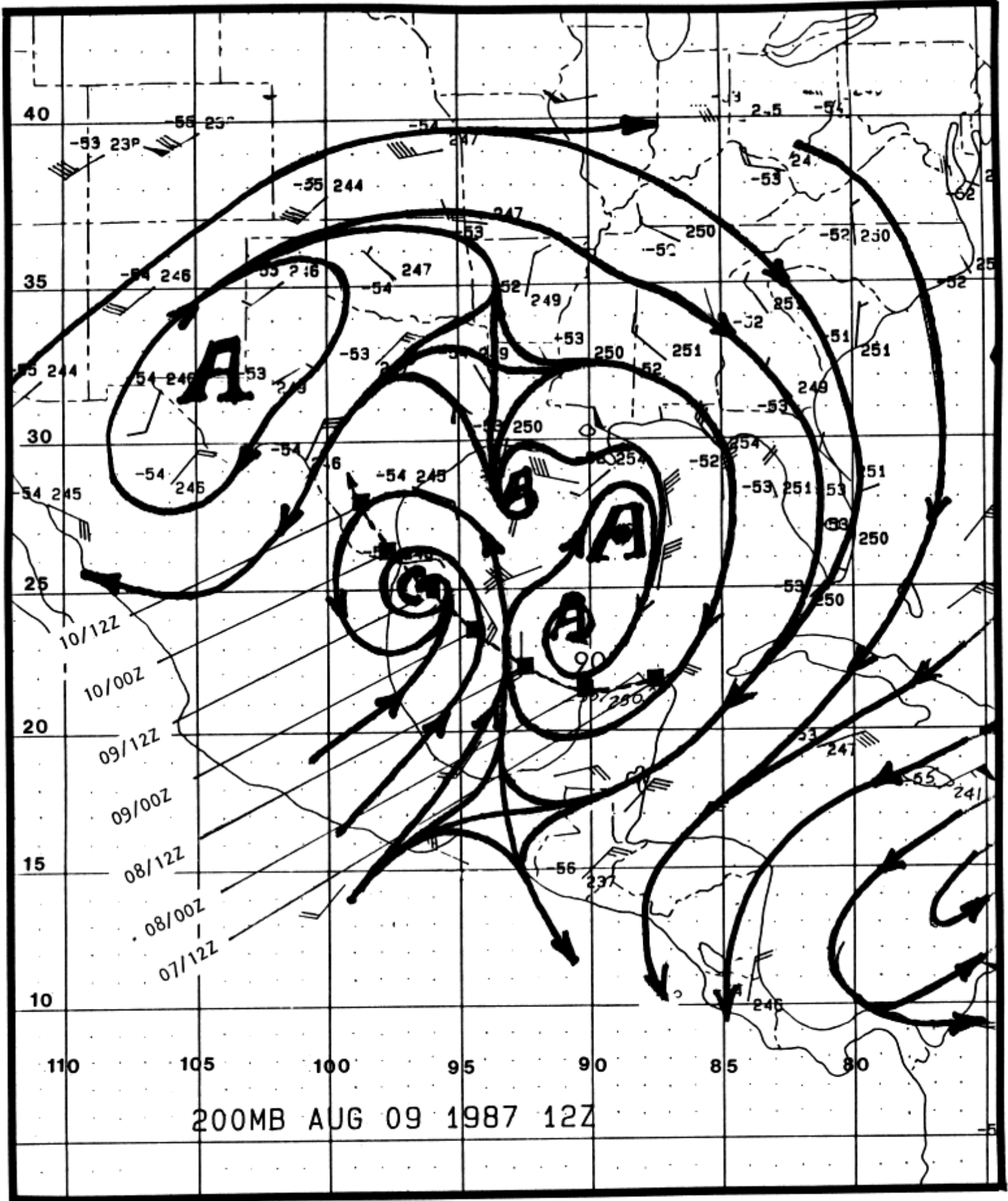


FIG. 1. 200 mb streamlines, 9 August 1987, 1200 UTC.



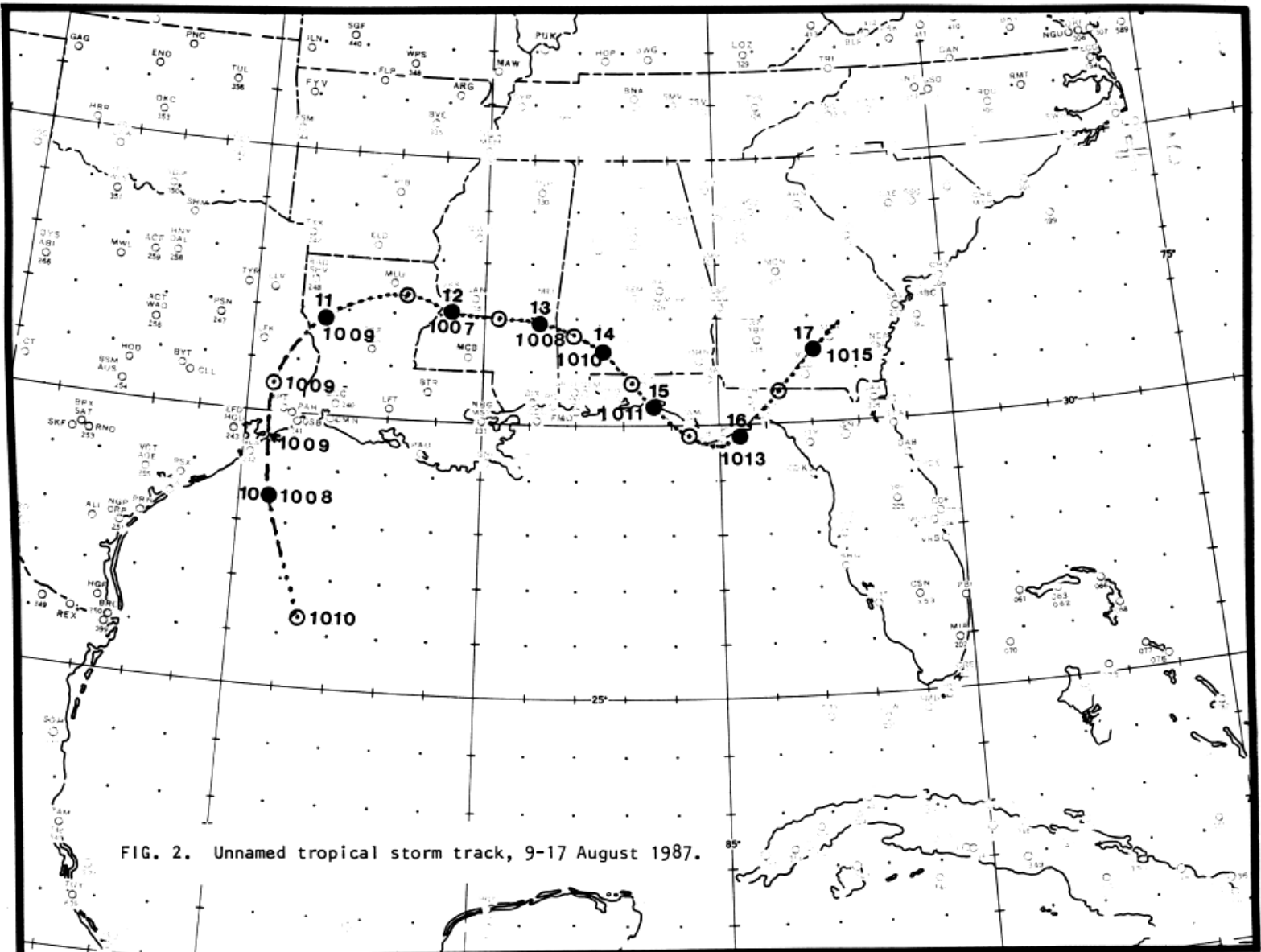


FIG. 2. Unnamed tropical storm track, 9-17 August 1987.

FIG. 3. "Best track" minimum pressure curve for the unnamed tropical storm, 9-17 August 1987.

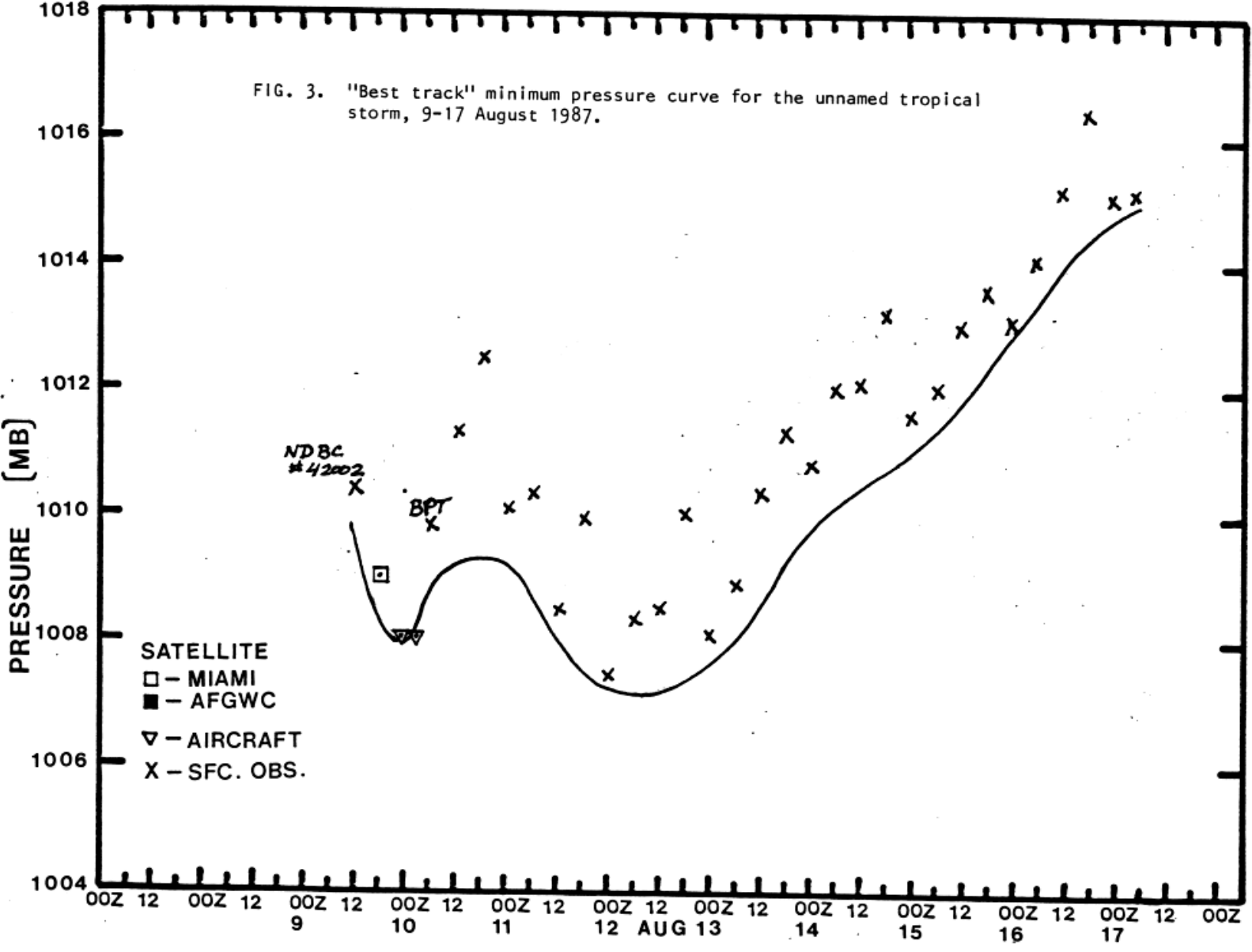
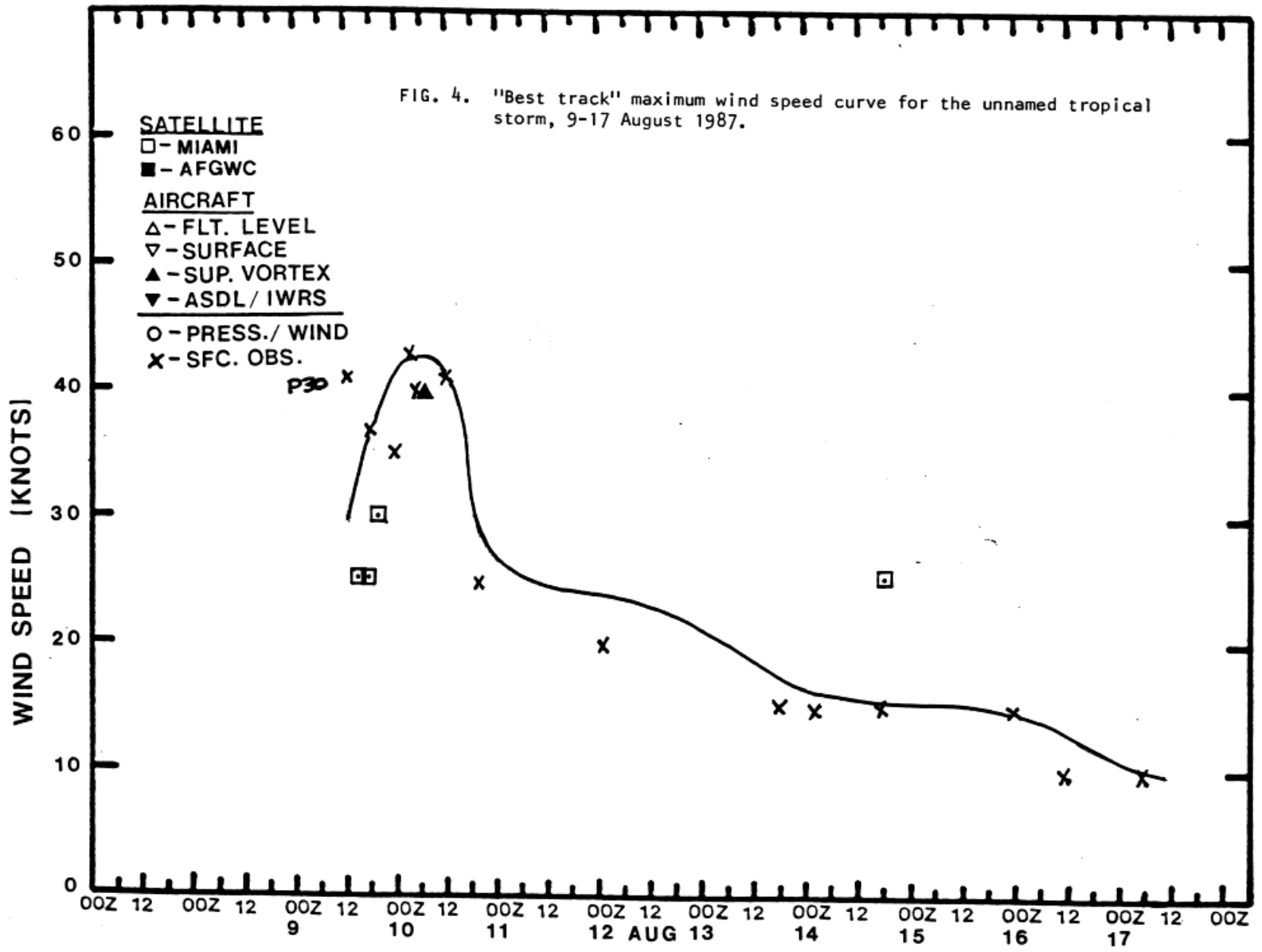


FIG. 4. "Best track" maximum wind speed curve for the unnamed tropical storm, 9-17 August 1987.



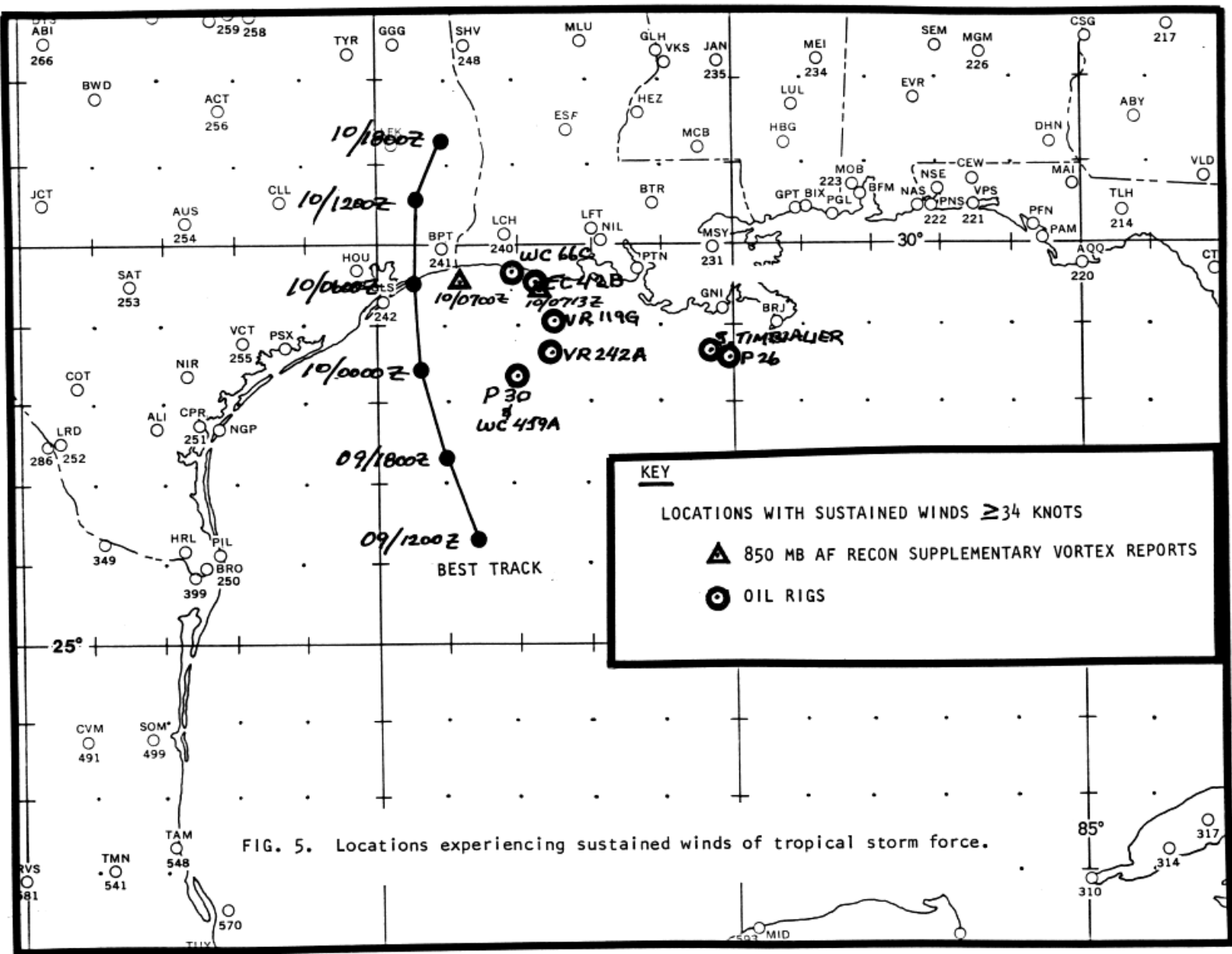


FIG. 5. Locations experiencing sustained winds of tropical storm force.