

Preliminary Report
Tropical Storm Karen
26 August - 3 September 1995

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Karen was a minimal tropical storm that did not affect land. However, it occurred during a very active period for tropical cyclones and proved to be noteworthy for its interaction with nearby Hurricane Iris.

a. Synoptic History

Karen originated from a tropical wave that moved off the west coast of Africa to the eastern tropical Atlantic on 23 August. This was a very active day in the tropics with Hurricane Humberto midway between Africa and the Lesser Antilles, Hurricane Iris about 500 n mi east of the Lesser Antilles, Tropical Storm Jerry near southeast Florida and Tropical Storm Gil in the eastern North Pacific. Based on ship and island reports, NHC surface analyses indicated a broad area of low pressure just off the west coast of Africa in association with the tropical wave. Dvorak classifications were initiated by the NESDIS Synoptic Analysis Branch (SAB) and the NHC Tropical Analysis and Forecast Branch (TAFB) on the 23rd and 24th, respectively. The organization of the cloud pattern fluctuated for a couple of days, and the system could have become a tropical depression as early as on the 24th when the center appeared to be southwest of the Cape Verde Islands. Some reorganization occurred and satellite analysts from SAB, NHC and the Air Force Global Weather Central (AFGWC) all agreed on a T1.5 classification for the first time near 1200 UTC 26 August, when satellite imagery showed a well-defined low-level cloud center exposed to the east of a cluster of deep convection. The post-analysis "best track" begins Tropical Depression Twelve at that time (Table 1 and Fig. 1) about 500 n mi west of the Cape Verde Islands. In relation to Tropical Depression Twelve, Hurricane Humberto was centered about 900 n mi west-northwest and Iris, which had weakened to a tropical storm, was centered over the Lesser Antilles about 1500 n mi west. The depression was moving generally toward the west-northwest at 10 to 14 knots with the low- to mid-level flow.

Deep convection increased and, based on satellite classifications, Tropical Depression Twelve strengthened into Tropical Storm Karen at 0600 UTC 28 August. Hurricane Humberto had moved northward by this time and was centered about 750 n mi to the northwest of Karen. Tropical Storm Iris had also moved northward to a position just north of the Leeward Islands, about 1100 n mi to the west of Karen.

Humberto continued moving northward and then northeastward away from Karen. The steering flow weakened somewhat in the wake of Humberto, and Karen slowed its west-northwestward motion from 10 to about 4 knots between 28 and 31 August. Karen gradually approached the even slower moving Iris, which had again strengthened to a hurricane by late on the 28th. The upper-level outflow from the stronger Iris resulted in northerly shear over Karen, and the low-level center of Karen was exposed to the north of the accompanying convective activity from 28 to 31 August. During this period, Karen's maximum sustained winds of 45 knots were estimated to have occurred. Karen was centered about 600 n mi east-southeast of Iris on the 31st, and began moving more toward the northwest, caught in Iris' stronger circulation.

Convective activity associated with Karen became disorganized on 1 September as the tropical storm accelerated and moved cyclonically around the east side of Iris. Karen weakened to a tropical depression on 2 September. However, a tightly wrapped swirl of low- to mid-level clouds could still be seen in satellite imagery moving to the north of Iris late on the 2nd. The remnant vortex of Karen was finally absorbed into the stronger circulation of Hurricane Iris on 3 September when located approximately 175 n mi to the northwest of the center of Iris.

b. Meteorological Statistics

Figures 2 and 3 show the curves of minimum central pressure and maximum one-minute wind speed, respectively, as a function of time. The observations on which the curves are based are also plotted and consist primarily of Dvorak-technique estimates using satellite imagery from SAB, TAFB (formerly TSAF, as in the figures) and the AFGWC. One tropical storm force wind measurement reported from a ship at 2100 UTC 31 August is plotted in addition to the satellite estimates.

Karen was not a threat to land, and therefore, did not require aircraft reconnaissance. However, after flying nearby Hurricane Iris on 2 September, U.S. Air Force Reserve aircraft provided one operational center fix on Karen.

c. Casualty and Damage Statistics

There were no casualties or damages reported in association with Karen.

d. Forecast and Warning Critique

During the time when Karen was of tropical storm strength, the mean official track forecast errors were 55 (19 cases), 100 (17 cases), 113 (15 cases), 147 (13 cases) and 252 (9 cases) n mi at 12, 24, 36, 48 and 72 hours respectively. These errors were about

the same as the long-term averages from the previous ten years at 12 and 24 hours and somewhat lower at the longer time periods. However, the track was not well forecast late in the period of interaction with Iris.

The intensity forecasts were generally within 5 to 10 knots of the verifying best track intensities.

Table 1. Preliminary best track, Tropical Storm Karen, 26 August - 3 September 1995.

Date/Time (UTC)	Position		Pressure (mb)	Wind Speed (kt)	Stage
	Lat. (°N)	Lon. (°W)			
26/1200	15.4	32.7	1009	30	Trop. Depression
1800	15.5	34.0	1008	30	" "
27/0000	15.6	35.4	1008	30	" "
0600	15.8	36.7	1007	30	" "
1200	16.1	38.0	1007	30	" "
1800	16.3	39.3	1006	30	" "
28/0000	16.5	40.4	1006	30	" "
0600	16.6	41.5	1005	35	Tropical Storm
1200	16.9	42.6	1003	40	" "
1800	17.4	43.6	1001	45	" "
29/0000	17.7	44.6	1000	45	" "
0600	17.8	45.5	1000	45	" "
1200	18.1	46.4	1000	45	" "
1800	18.5	47.3	1001	45	" "
30/0000	19.0	48.2	1002	45	" "
0600	19.2	49.1	1003	40	" "
1200	19.4	49.9	1003	40	" "
1800	19.6	50.6	1004	40	" "
31/0000	20.0	51.1	1004	40	" "
0600	20.3	51.6	1003	40	" "
1200	20.4	51.9	1002	40	" "
1800	20.8	52.1	1001	40	" "
01/0000	21.6	52.3	1001	40	" "
0600	22.9	52.7	1001	40	" "
1200	24.6	53.3	1001	35	" "
1800	26.6	54.3	1001	35	" "
02/0000	28.4	55.6	1001	35	" "
0600	29.9	57.1	1001	35	" "
1200	31.2	59.2	1001	30	Trop. Depression
1800	32.4	61.9	1001	30	" "
03/0000	33.0	61.5	1002	30	" "
0600					Absorbed by Iris
<hr/>					
29/0600	17.8	45.5	1000	45	Minimum Pressure

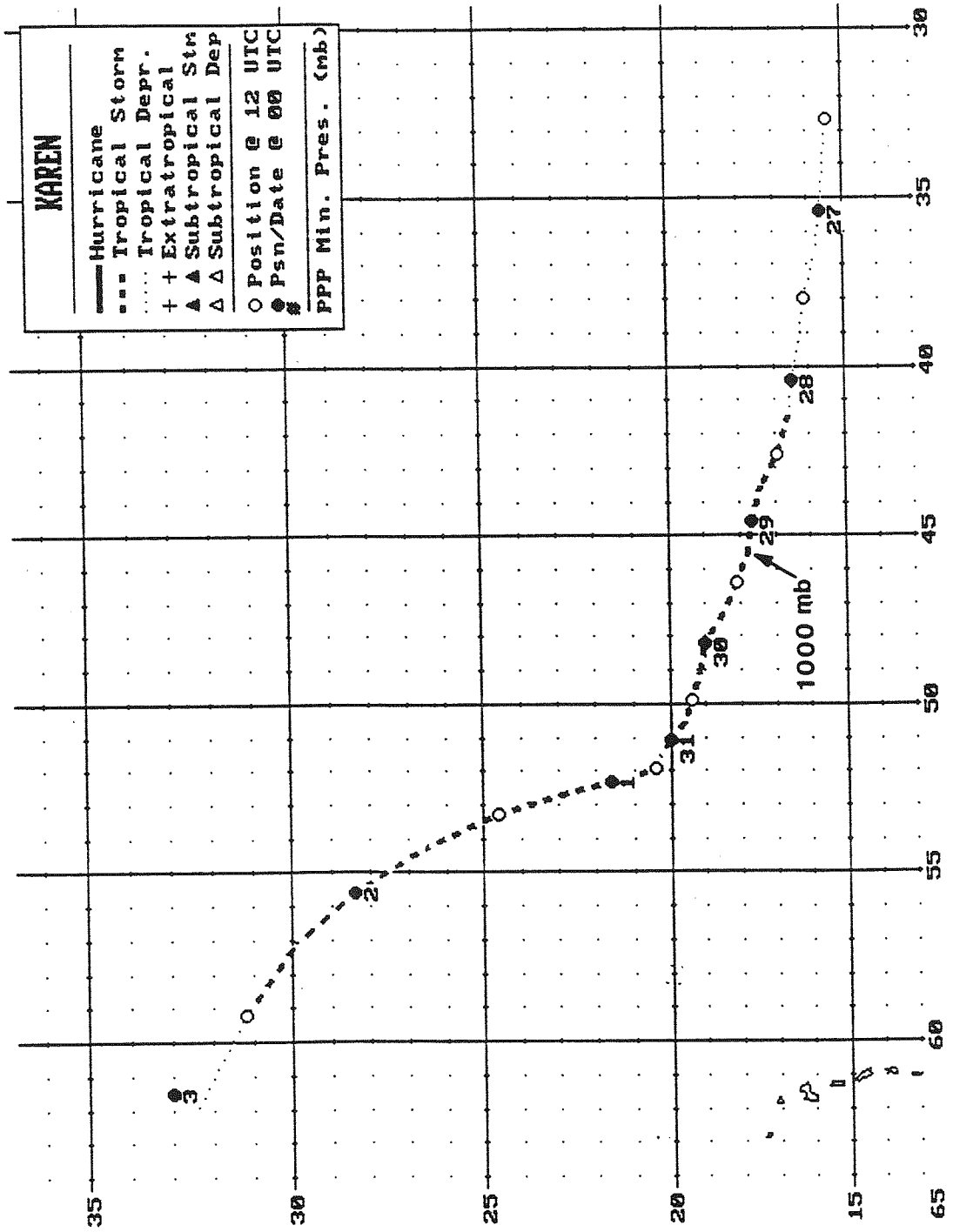


Fig. 1. Best track positions for Tropical Storm Karen, 26 August - 3 September 1995.

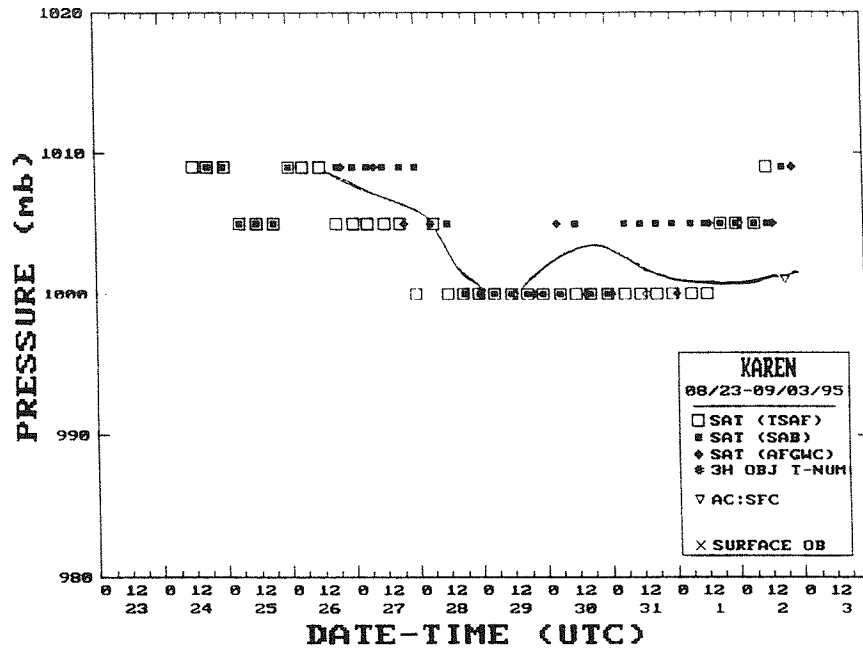


Figure 2. Best track minimum central pressure curve for Tropical Storm Karen.

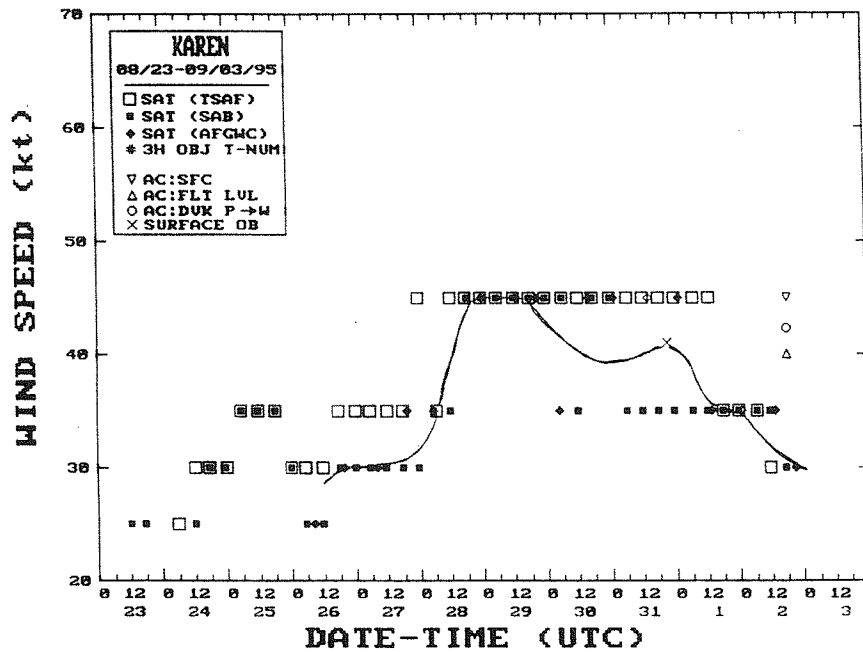


Figure 3. Best track maximum sustained wind speed curve for Tropical Storm Karen.