Tropical Cyclone Report
Hurricane Douglas
20-26 July 2002

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Douglas did not strike land, which is typical of east Pacific tropical cyclones during mid-summer.

a. Synoptic History

A tropical wave exited Africa on 8 July. The system moved uneventfully across the tropical Atlantic until it approached the Caribbean Sea on the 13th, when the associated cloudiness and showers increased. Upper-tropospheric westerlies inhibited tropical cyclone development while the system continued westward across the Caribbean. The wave crossed Central America on the 16th, and by the 18th as the system was moving westward to the south of Mexico, the associated deep convection showed enough organization to prompt a Dvorak satellite classification. There was no significant increase in organization over the next day or so, as northeasterly shear prevailed over the area. By 20 July, however, the cloud bands showed increased curvature and deep convection became more concentrated near an apparent center located about 395 n mi south of Manzanillo, Mexico. It is estimated that a tropical depression (Five-E) formed near that location at 1200 UTC 20 July, as shown in Table 1. It appears that the system's genesis coincided with a relaxation of vertical shear over the area. After its formation, the cyclone quickly strengthened into a tropical storm.

Figure 1 is a plot of the tropical cyclone's track. Douglas moved northwestward to north-northwestward during the first day of its lifetime. It then turned to a west-northwestward course, and by 22 July building pressures to the north of Douglas forced the system to move on a westward track. Meanwhile, Douglas strengthened into a hurricane by 0000 UTC 22 July. It reached its peak intensity of 90 kt by 1800 UTC that day while a faint eye was discernible in visible satellite imagery. It is interesting to note that Douglas' significant strengthening episode on the 22nd coincided with a turn to the west, an event which has been observed in many previous tropical cyclones. In these situations the turn toward a more westward heading is probably associated with a deeper layer of easterlies and less vertical shear, which would promote strengthening. On the 23rd, as Douglas began to feel the influence of more stable air and cooler water, the deep convection decreased in coverage and intensity and the hurricane weakened. Also, microwave imagery from that day showed that the inner eyewall, which had collapsed into a fragment, was replaced by an outer eyewall about 80 n mi in diameter. When Douglas began to weaken, it turned to the west-northwest and accelerated somewhat. An additional increase in forward speed occurred over the next day or two, while Douglas continued to weaken. Douglas' intensity dropped below hurricane strength by the 24th, and the cyclone spun down to a tropical depression around 0000 UTC 26 July. With a strong deep-layer ridge persisting to its north, Douglas moved westward rather swiftly, and decayed into a swirl of low clouds located about 1000 n mi east of the Hawaiian Islands by 1800 UTC on the 26th. The westward-moving remnant low lost its closed circulation soon thereafter.

b. Meteorological Statistics

Figures 2 and 3 are curves of the best track maximum wind speed and minimum central pressure of Douglas, respectively. Also plotted in these figures are the observations on which the curves are based. These observations are solely satellite-derived estimates using the Dvorak technique. The maximum intensity of Douglas, 90 kt, is supported by a consensus T5.0 on the Dvorak scale from the Tropical Analysis and Forecast Branch, the Satellite Analysis Branch, and the Air Force Weather Agency.

There were no surface observations of tropical storm force or greater winds in connection with Douglas.

c. Casualty and Damage Statistics

There were no reports of damage or casualties associated with Douglas.

d. Forecast and Warning Critique

Table 2 summarizes the track forecast errors of the various objective guidance models and the official forecasts for Douglas. It can be seen that, although the mean official forecast errors were generally lower than the most recent ten-year averages, a number of the models had lower mean errors than the official forecast. This was especially true at 72 h. Also, the biases in the official track forecasts (not shown) indicate that in general the NHC forecasts for Douglas were too slow. The average absolute intensity errors for the official forecasts were 3, 7, 10, 13, and 12 kt for 12, 24, 36, 48 and 72 h respectively. The biases of the official forecasts were quite small, 2 kt or less, for all forecast times. The only available numerical guidance that had smaller average absolute intensity errors was the GFDL hurricane model (including the Navy version). That model also had a small overall bias, but in the early stages of Douglas it over-predicted the intensity, and in the late stages it under-predicted the intensity. The official forecasts did just the opposite.

No watches or warnings were required or issued for Douglas.

Table 1. Best track for Hurricane Douglas, 20-26 July 2002.

Date/Time (UTC)	Latitude (° N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	
20 / 1200	13.2	106.4	1009	30	tropical depression
20 / 1800	13.7	106.8	1002	40	tropical storm
21 / 0000	14.5	107.2	1000	45	"
21 / 0600	15.3	107.6	998	50	"
21 / 1200	16.1	108.4	994	55	"
21 / 1800	16.6	109.5	990	60	"
22 / 0000	17.0	110.3	987	65	hurricane
22 / 0600	17.1	111.1	977	75	"
22 / 1200	17.2	112.0	973	85	"
22 / 1800	17.2	112.7	970	90	"
23 / 0000	17.3	113.4	971	90	"
23 / 0600	17.4	114.0	972	90	"
23 / 1200	17.6	114.7	973	85	"
23 / 1800	18.2	115.7	979	80	"
24 / 0000	18.8	117.0	979	80	"
24 / 0600	19.4	118.4	984	70	"
24 / 1200	20.0	120.0	987	65	"
24 / 1800	20.5	121.8	994	55	tropical storm
25 / 0000	20.7	123.8	997	50	"
25 / 0600	20.9	125.7	1002	45	"
25 / 1200	20.8	127.6	1005	35	"
25 / 1800	20.8	129.4	1005	35	"
26 / 0000	21.0	131.3	1006	30	tropical depression
26 / 0600	21.2	133.4	1006	30	"
26 / 1200	21.4	135.3	1008	25	"
26 / 1800	21.6	137.3	1009	25	remnant low
27 / 0000	21.6	139.3	1010	25	"
27 / 0600					dissipated
22 / 1800	17.2	112.7	970	90	minimum pressure

Table 2. Preliminary forecast evaluation (heterogeneous sample) for Hurricane Douglas, July 2002. Forecast errors for tropical storm and hurricane stages (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type.

Forecast Technique	Forecast Period (h)				
	12	24	36	48	72
CLP5	47 (19)	107 (17)	157 (15)	198 (13)	259 (9)
GFDI	**33** (18)	60 (16)	80 (14)	83 (12)	169 (8)
GFDL	**29** (19)	**54** (17)	74 (15)	84 (13)	139 (9)
LBAR	38 (19)	70 (17)	101 (15)	139 (13)	221 (9)
AVNI	**24** (18)	**40** (16)	**55** (14)	71 (12)	127 (8)
AVNO	**31** (19)	**38** (17)	**49** (15)	**64** (13)	**115** (9)
AEMI	**28** (10)	**48** (9)	**53** (7)	69 (6)	167 (4)
BAMD	**35** (19)	61 (17)	79 (15)	81 (13)	**91** (9)
BAMM	**36** (19)	61 (17)	75 (15)	82 (13)	**96** (9)
BAMS	40 (19)	61 (17)	70 (15)	70 (13)	**100** (9)
NGPI	**34** (18)	61 (16)	74 (14)	77 (12)	**87** (8)
NGPS	41 (18)	**55** (16)	77 (14)	79 (12)	**79** (8)
UKMI	43 (18)	70 (16)	88 (14)	91 (12)	**121** (8)
UKM	42 (9)	80 (8)	84 (7)	83 (6)	**75** (4)
GUNS	**32** (17)	**56** (15)	**65** (13)	**61** (11)	**101** (7)
GUNA	**30** (17)	**49** (15)	**56** (13)	**52** (11)	**86** (7)
OFCL	37 (19)	59 (17)	69 (15)	65 (13)	125 (9)
NHC Official (1992-2001 mean)	36 (2203)	67 (1947)	97 (1700)	125 (1472)	182 (1091)

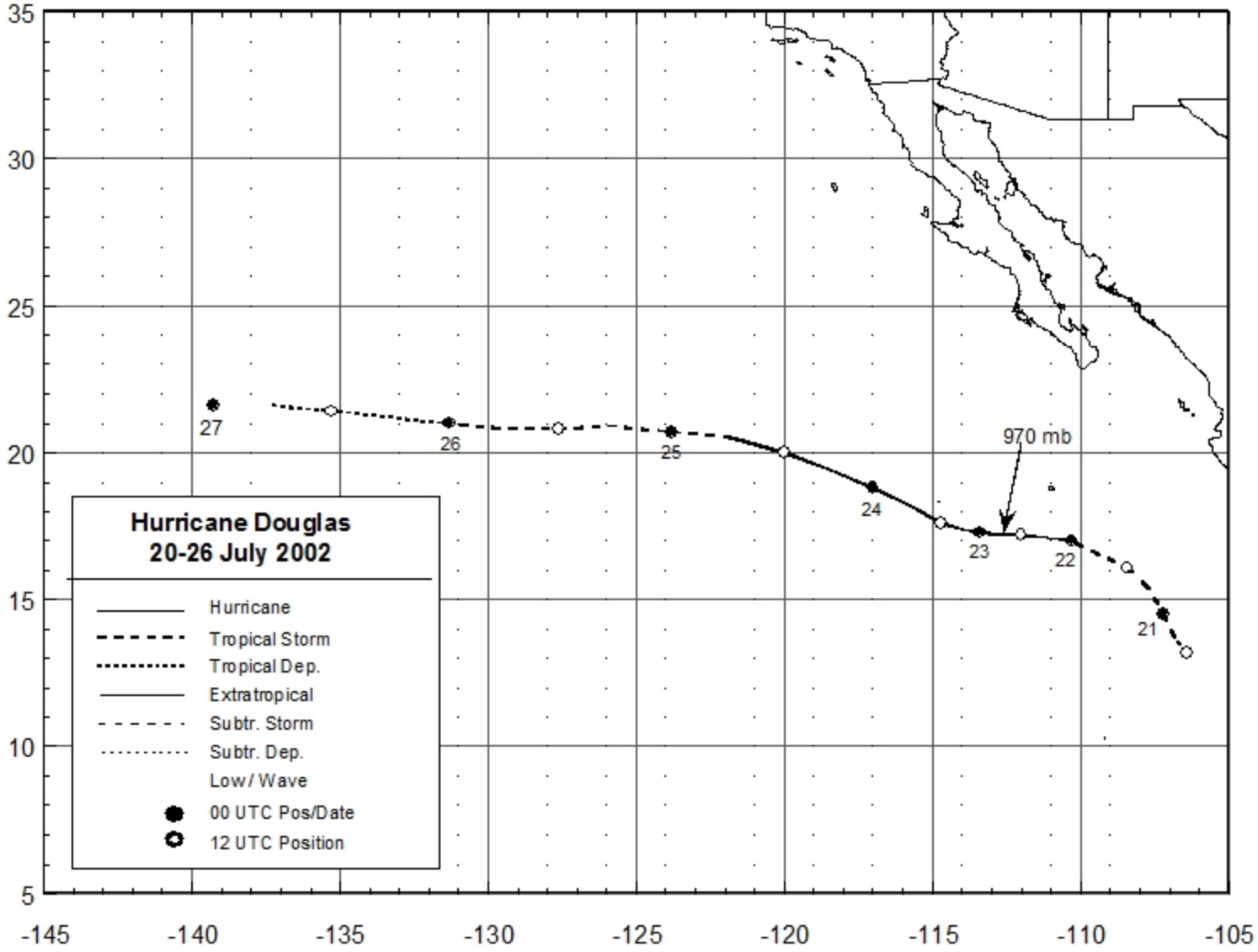

Figure 1. Best track positions for Hurricane Douglas, 20-26 July 2002.

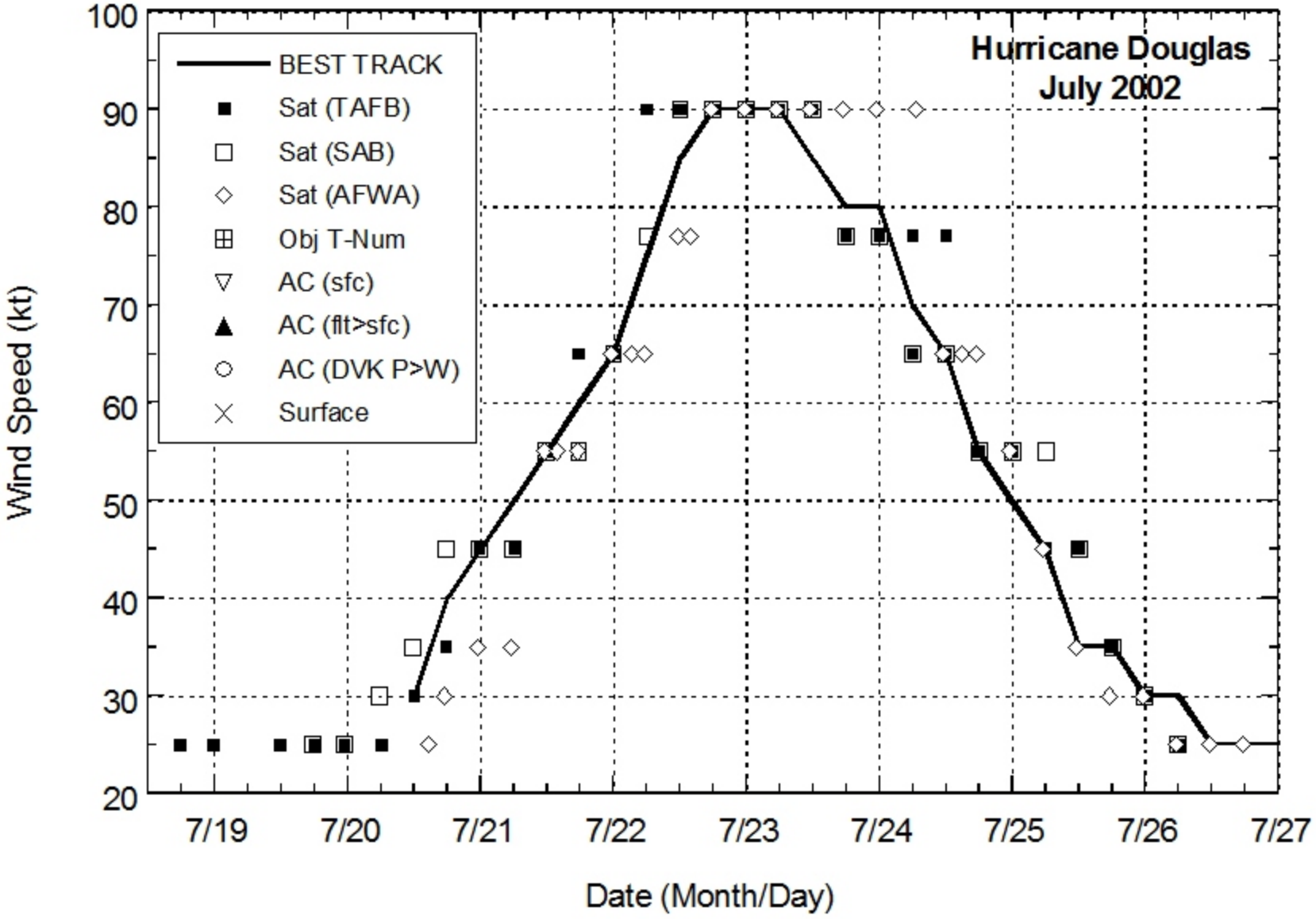

Figure 2. Best track maximum sustained wind speed curve for Hurricane Douglas, 20-26 July 2002, and the observations on which the curve is based.

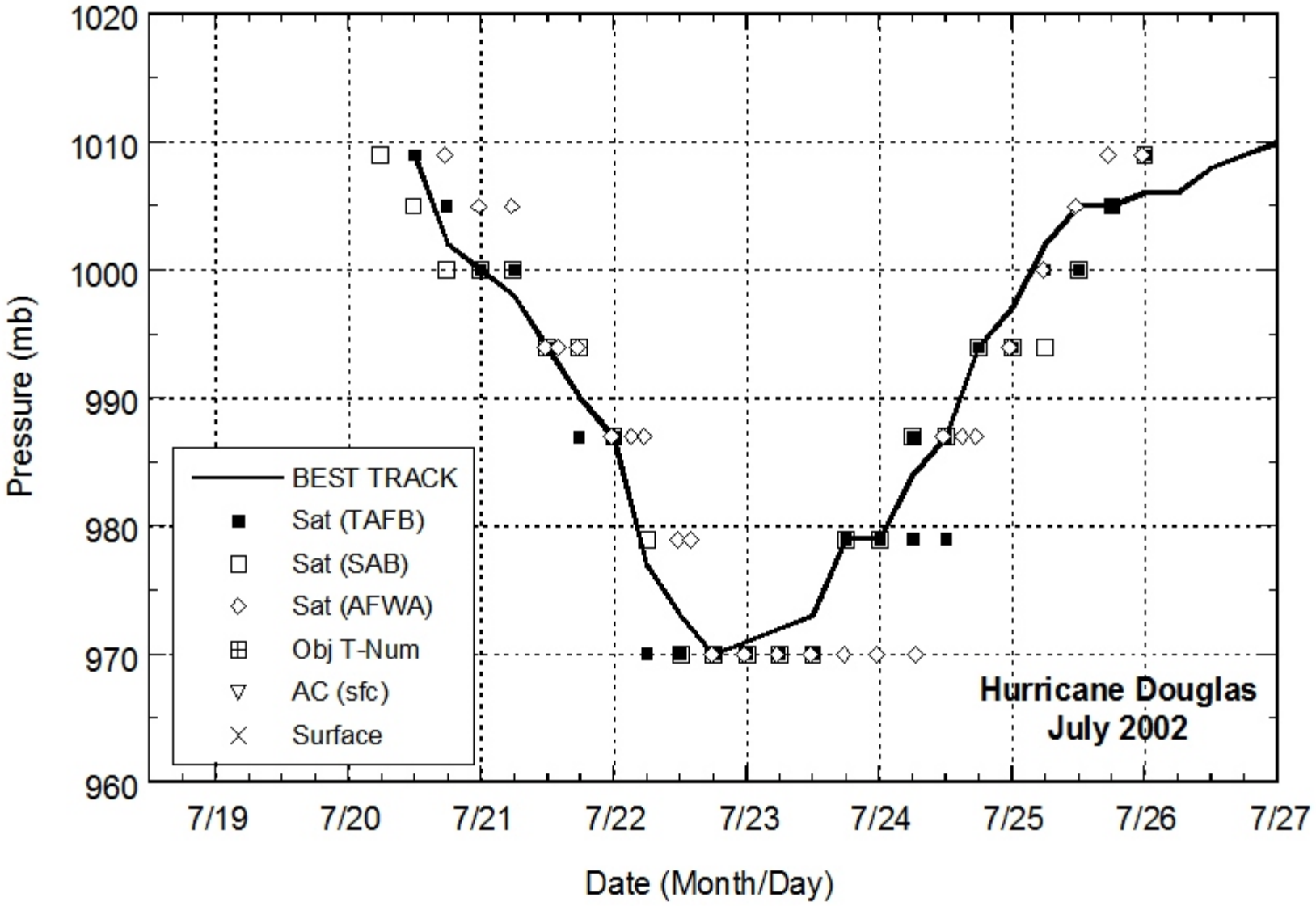

Figure 3. Best track minimum central pressure curve for Hurricane Douglas, 20-26 July 2002, and the observations on which the curve is based.