

Tropical Cyclone Report
Hurricane Alma
24 May - 1 June 2002

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As in the two previous years, the 2002 Northeast Pacific hurricane season began with a quick start with major Hurricane Alma developing in May. Alma remained well offshore the west coast of Mexico.

a. Synoptic History

Alma originated from a tropical wave that moved off the west coast of Africa on 8 May. The wave propagated westward across the tropical Atlantic and into the Caribbean Sea for the next 10 days with little or no associated thunderstorm activity. However, upon reaching the extreme eastern Pacific Ocean on 18 May, convection began to increase and QuikSCAT satellite wind data (not shown) indicated a surface cyclonic circulation had developed along the wave axis south of Guatemala on 19 May.

The associated broad low pressure area tracked slowly westward for next 5 days. QuikSCAT data (Fig. 1) indicated that some of the northeasterly wind flow from a gale area in the Gulf of Tehuantepec began to interact with the low pressure area by 20 May, and this interaction may have helped to strengthen the system. Dvorak satellite classifications were initiated by the Tropical Prediction Center's Tropical Analysis and Forecast Branch (TAFB) on 22 May and it is estimated that the system slowly developed into Tropical Depression One-E by 1800 UTC 24 May about 485 n mi south-southeast of Manzanillo, Mexico.

The "best track" map of the tropical cyclone's path is shown in Fig. 2. Wind and pressure plots are shown in Figs. 3 and 4, respectively. The best track positions and intensities are listed in Table 1. The depression moved slowly westward for the next 2 days with little development. It strengthened into Tropical Storm Alma about 570 n mi south of Manzanillo on 26 May, after which Alma turned west-northwestward and a more steady rate of intensification occurred. Alma became a hurricane on 28 May about 680 n mi southwest of Manzanillo and began moving northwestward around the western periphery of a subtropical ridge centered over Mexico. Steady intensification continued for the next 2 days while the hurricane moved northward. It is estimated that Alma peaked in intensity as a major hurricane with 100 kt winds on 30 May when it was located about 470 n mi southwest of Cabo San Lucas, Mexico.

Almost immediately after reaching peak strength, Alma began to steadily weaken when the hurricane started moving over cooler water and encountering southwesterly shear. Alma rapidly weakened to a tropical storm by 1200 UTC 31 May and to a tropical depression by 0600 UTC 1 June. Weakening continued on 1 June and by 1800 UTC, Alma had become stationary about 450 n mi southwest of Cabo San Lucas and dissipated into a weak low pressure area devoid of any deep

convection.

b. Meteorological Statistics

Intensity estimates of Alma (Figs. 3 and 4) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA). Alma's peak intensity of 100 kt at 0600 and 1200 UTC on 30 May is based on Dvorak satellite classifications of 102 kt (T5.5) from the TAFB, SAB, and AFWA.

There were no ship or surface reports of sustained tropical storm force winds associated with Alma.

c. Casualty and Damage Statistics

There were no reports received of casualties or damages.

d. Forecast and Warning Critique

Average official track errors for Alma were 37, 57, 68, 77, and 110 n mi for the 12, 24, 36, 48, and 72 h forecasts, respectively (Table 2). The number of cases ranged from 30 at 12 h to 20 at 72 h. These errors are all lower than the average official track errors for the 10-yr period 1992-2001 (36, 67, 97, 125, and 182 n mi, respectively), except at 12 h. The best performing NHC track forecast guidance was the AVNI and the 10-member AVN ensemble (AEMI) models.

Average official intensity errors were 6, 10, 12, 14, and 15 kt for the 12, 24, 36, 48, and 72 h forecasts, respectively. This is slightly better at all times than the average official intensity errors over the 10-yr period 1992-2001 (7, 11, 14, 16, and 19 kt, respectively). These errors were also slightly better than the SHIPS intensity model forecasts (6, 10, 14, 17, 17 kt, respectively).

There were no watches or warnings associated with Alma.

Table 1. Best track for Hurricane Alma, 24 May - 1 June 2002.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
24 / 1800	11.2	101.2	1007	30	tropical depression
25 / 0000	11.4	101.4	1004	30	"
25 / 0600	11.4	101.7	1004	30	"
25 / 1200	11.4	102.3	1003	30	"
25 / 1800	10.9	103.2	1004	30	"
26 / 0000	10.8	103.7	1004	30	"
26 / 0600	10.7	104.2	1006	30	"
26 / 1200	10.7	104.9	1004	35	tropical storm
26 / 1800	10.7	105.7	1004	35	"
27 / 0000	10.7	106.5	1004	35	"
27 / 0600	10.8	107.7	1004	35	"
27 / 1200	10.9	108.6	1002	40	"
27 / 1800	11.2	109.5	1000	45	"
28 / 0000	11.4	110.4	997	50	"
28 / 0600	11.6	111.2	994	55	"
28 / 1200	11.8	112.5	990	60	"
28 / 1800	12.1	113.5	987	65	hurricane
29 / 0000	12.4	113.9	984	70	"
29 / 0600	13.0	114.5	981	75	"
29 / 1200	13.5	115.0	979	80	"
29 / 1800	13.9	115.4	974	85	"
30 / 0000	14.6	115.4	970	90	"
30 / 0600	15.3	115.4	960	100	"
30 / 1200	16.1	115.3	962	100	"
30 / 1800	16.9	115.2	965	95	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
31 / 0000	17.6	115.1	974	85	"
31 / 0600	18.0	115.4	981	75	"
31 / 1200	18.0	115.7	990	60	tropical storm
31 / 1800	17.9	115.8	997	50	"
01 / 0000	17.7	115.8	1001	35	"
01 / 0600	17.8	115.7	1005	30	tropical depression
01 / 1200	17.8	115.7	1009	25	"
01 / 1800					dissipated
30 / 0600	15.3	115.4	960	100	minimum pressure

Table 2. Preliminary forecast evaluation (heterogeneous sample) for Hurricane Alma, 24 May - 1 June 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. *Note: GUNS is the GFDI-UKMI-NGPI model ensemble average; GUNA is the GFDI-UKMI-NGPI-AVNI model ensemble average; AEMI is the AVN 10-member ensemble average.

Forecast Technique	Forecast Period (h)				
	12	24	36	48	72
CLIP	46 (30)	93 (28)	137 (26)	179 (24)	284 (20)
GFDI	44 (29)	75 (27)	96 (25)	117 (23)	166 (19)
GFNI	43 (20)	84 (18)	128 (16)	172 (14)	292 (10)
LBAR	43 (30)	75 (28)	108 (26)	146 (24)	208 (20)
AVNI	41 (29)	58 (27)	69 (25)	69 (23)	76 (19)
AEMI	40 (21)	64 (19)	74 (18)	87 (16)	97 (13)
BAMD	53 (30)	99 (28)	137 (26)	165 (24)	192 (20)
BAMM	44 (30)	79 (28)	107 (26)	128 (24)	128 (20)
BAMS	54 (30)	89 (28)	114 (26)	126 (24)	127 (20)
NGPI	54 (28)	100 (26)	140 (24)	171 (22)	214 (18)
UKMI	48 (28)	89 (26)	135 (24)	188 (22)	291 (18)
GUNS*	42 (28)	79 (26)	116 (24)	151 (22)	207 (18)
GUNA*	40 (28)	67 (26)	93 (24)	118 (22)	149 (18)
NHC Official	37 (30)	57 (28)	68 (26)	77 (24)	110 (20)
NHC Official (1992-2001 mean)	36 (2203)	67 (1947)	97 (1700)	125 (1472)	182 (1091)

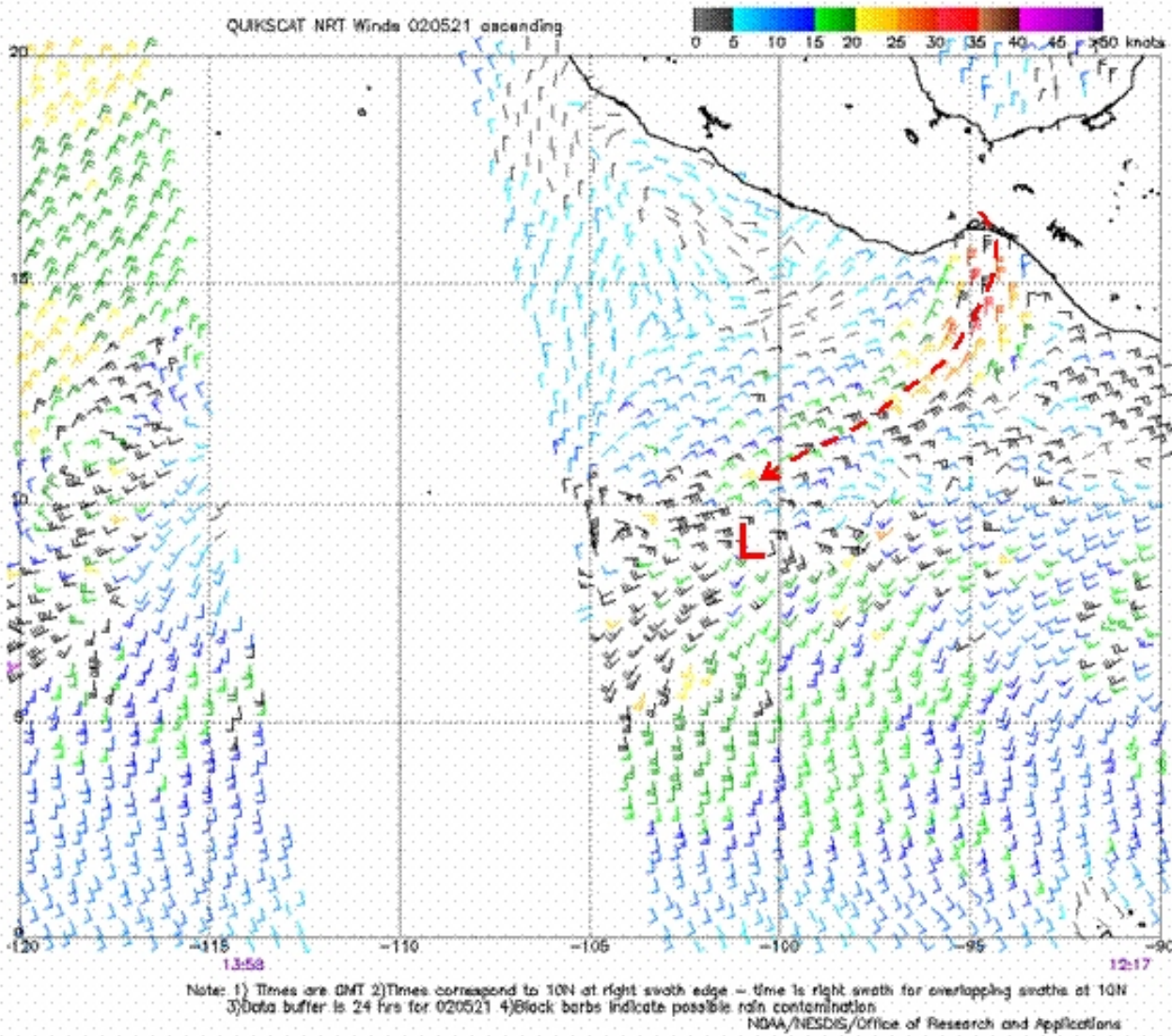


Figure 1. NASA QuikSCAT satellite wind image from 1217 UTC 21 May 2002 indicating northeasterly low-level flow from Gulf of Tehuantepec gale area being drawn into developing pre-Alma low pressure system.

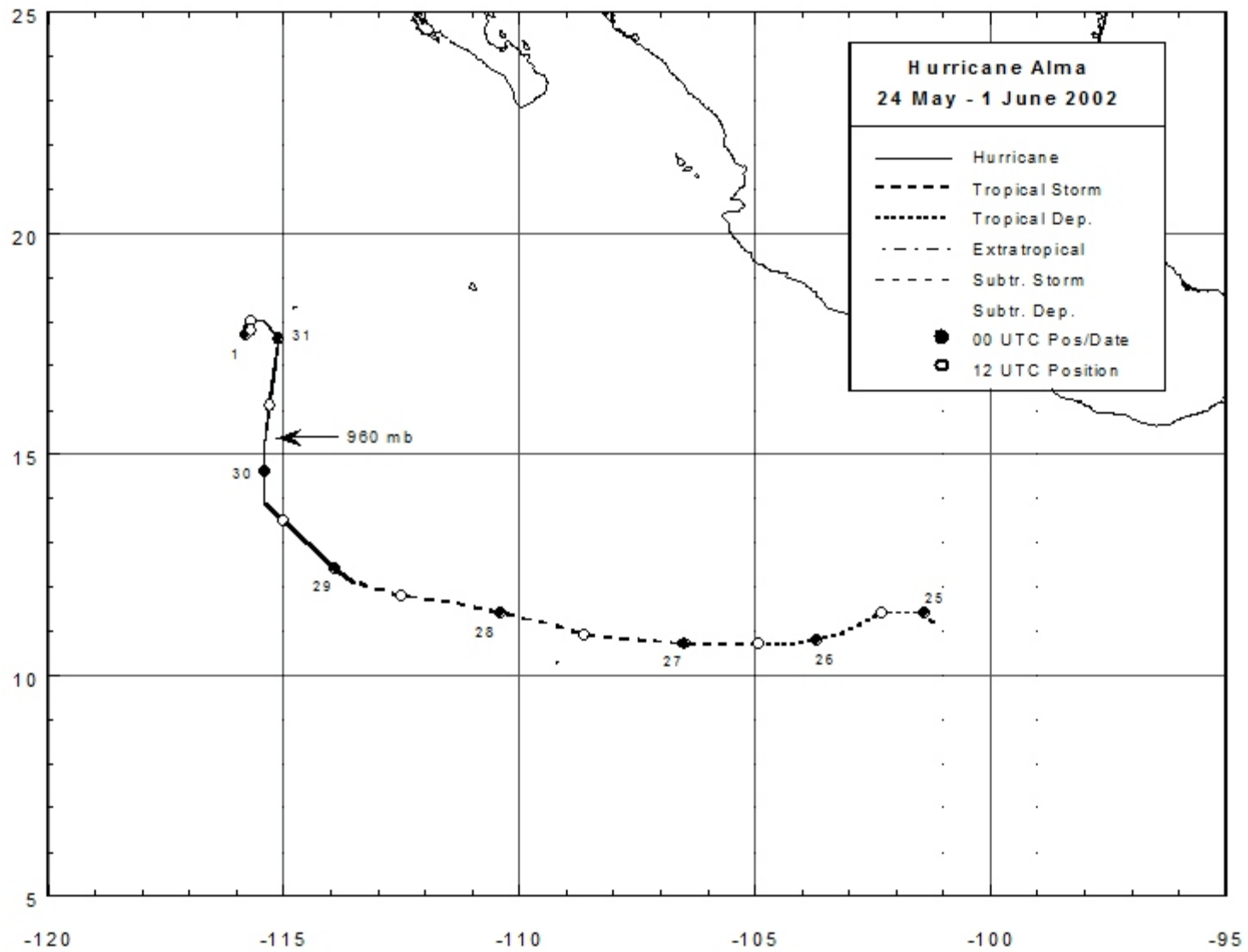


Figure 2. Best track positions for Hurricane Alma, 24 May - 1 June 2002.

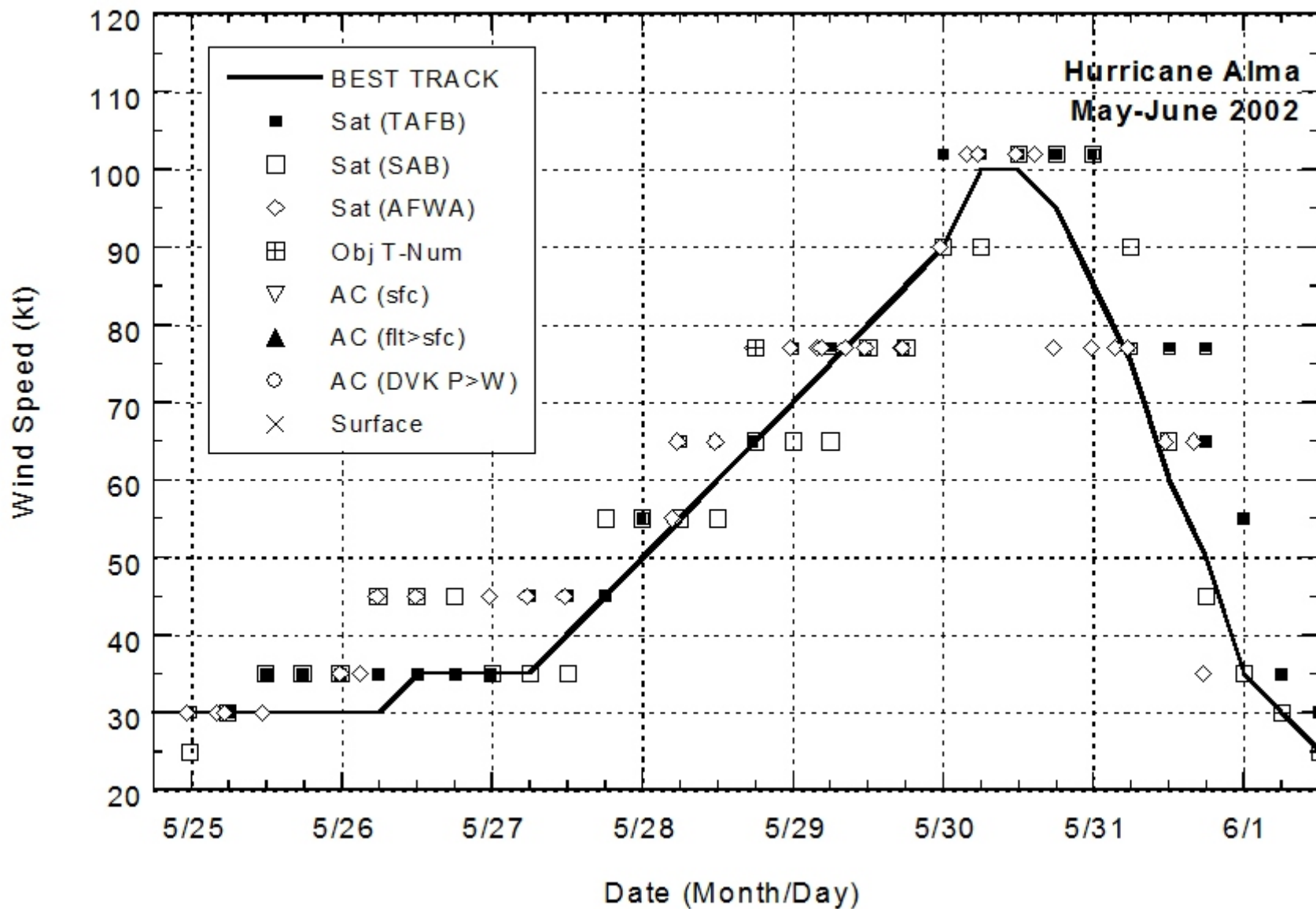


Figure 3. Best track maximum sustained surface wind speed curve for Hurricane Alma, 24 May - 1 June 2002, and the observations on which the best track curve is based.

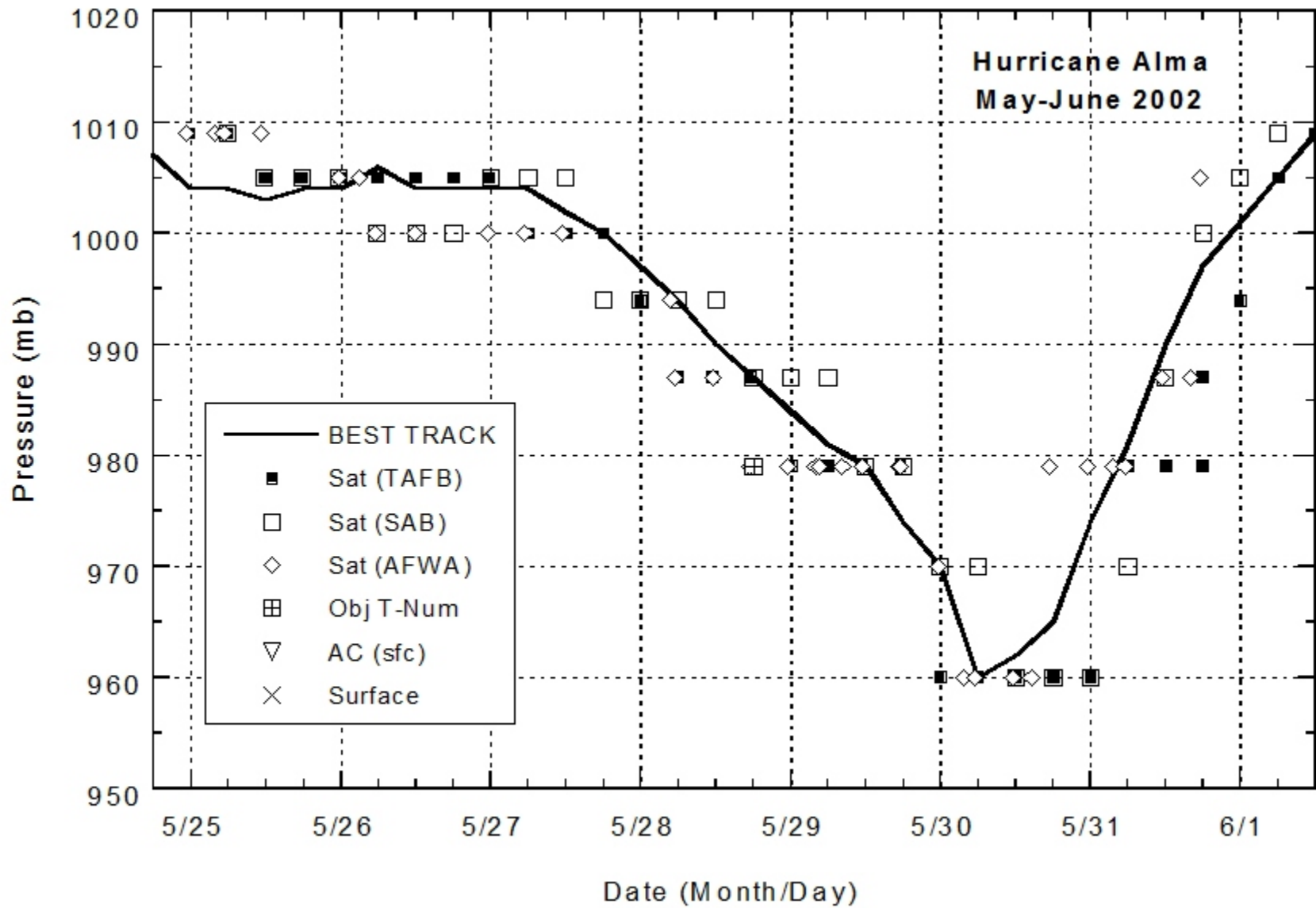


Figure 4. Best track minimum central pressure curve for Hurricane Alma, 24 May - 1 June 2002, and the observations on which the best track curve is based.