Tropical Cyclone Report
Tropical Storm Andres
19-25 May 2003

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Andres was the first eastern North Pacific tropical cyclone to form south of 10° N since Blas did so in 1998. Andres did not affect land.

a. Synoptic History

While most eastern North Pacific tropical cyclones develop from Atlantic easterly waves, it is often difficult to track these weak antecedent disturbances in the early part of the season. In the case of Andres, the initiating disturbance can be tracked back clearly only for a few days prior to genesis. On 15 May, an area of disturbed weather developed south of Guatemala near 10°N latitude within a broad area of low pressure. This disturbance then moved westward at about 10 kt without development for the next three days. On 18 May, the convective pattern showed enough organization to warrant an initial Dvorak classification, and the system gradually became better organized over the next day or so. By 1800 UTC 19 May it had developed a definite center of circulation and became a tropical depression about 920 n mi south-southeast of Cabo San Lucas, Mexico.

The "best track" chart of the tropical cyclone's path is given in Fig. 1, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1. South of a large mid- to upper-level anticyclone, the depression moved to the west at about 10 kt, and with good outflow in all quadrants, strengthened to a tropical storm by 0600 UTC 20 May. Later that day the circulation center became exposed to the west of the main area of convection. Nevertheless, the convective banding became more pronounced and scatterometer data suggest that Andres continued to strengthen, reaching a peak intensity of 50 kt by 1800 UTC, when the cyclone was about 830 n mi south-southeast of Cabo San Lucas.

Southwesterly shear interrupted the development process, and for the next three days Andres maintained an intensity of 45-50 kt. The mid-level anticyclone to the north of Andres shifted westward, and steered Andres on a brisk west-northwestward track at about 15-20 kt. During this period, the cyclone's low-level center remained near the western edge of intermittent convection that had a strong diurnal modulation. On 24 May, however, Andres crossed the 26°C sea-surface temperature isotherm and the southwesterly shear increased. Andres turned westward with the low-level flow and weakened to a tropical depression at 0600 UTC 25 May, about 1500 n mi west-southwest of Cabo San Lucas, and degenerated to a nonconvective remnant low 6 hours later. The remnant low dissipated about 1900 n mi west of Cabo San Lucas on 26 May.

b. Meteorological Statistics

Observations in Andres (Figs. 2 and 3) 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), as well as observations from NASA's QuikSCAT scatterometer.

The highest Dvorak intensity estimate for Andres was 45 kt, from SAB. The assigned peak intensity of 50 kt for Andres, however, is based on QuikSCAT observations. Scatterometer passes consistently depicted winds of 45 kt or higher in the convective areas of Andres from 20-24 May. Interpretation of these measurements is, unfortunately, highly subjective, as heavy rain can suppress as well as enhance the wind signal contained in the ocean surface roughness features.[1]

There were no ship reports of winds of tropical storm force associated with Andres.

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

After having made "in-house" forecasts for the 96 and 120 h periods during the 2001 and 2002 seasons, with Andres the National Hurricane Center released its first *public* official 96 and 120 h forecasts. Average official track errors for Andres were 25, 59, 108, 167, 298, 436, and 605 n mi for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively[2]. These errors are mostly larger than the average official track errors for the 10-yr period 1993-2002[3] (39, 72, 103, 131, 186, 197, and 223 n mi, respectively, [Table 4]), and in the case of the later time periods, considerably so.

The official forecasts were generally on track, but they had a consistent and significant slow bias. The Global Forecast System (formerly known as the Aviation model, AVNI) and the GFDL

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[1] The pass at 1251 UTC 20 May, for example, contains two areas with wind estimates of 50-60 kt on either side of a broader area of 40-45 kt winds. The interpretation adopted here is that the former areas represent the enhancement of relatively light winds by rain, while the latter area represents a roughly accurate depiction of winds in excess of tropical storm force. Subsequent passes, at 0123 UTC 21 May and at 1341 UTC 22 May, show 50 kt vectors in rain at a reasonable location for the cyclone's maximum wind, about 40 n mi northeast of the center.

[2] All forecast verifications in this report include the depression stage of the cyclone. National Hurricane Center verifications presented in these reports prior to 2003 did not include the depression stage.

[3] Errors given for the 96 and 120 h periods are averages over the two-years 2001-2.

models also had a systematic slow bias. Several of the guidance models were better than the official forecast, including the consensus models GUNS and GUNA, and the medium and shallow BAMs (BAMM, BAMS). At the later forecast periods, the AVNI was also better than the official forecast. The GFDL performed very poorly with Andres.

Average official intensity errors were 9, 6, 4, 6, 12, 5, and 3 kt for the 12, 24, 36, 48, 72, 96, and 120 h forecasts, respectively. For comparison, the average official intensity errors over the 10-yr period 1993-2002 are 6, 11, 15, 17, 20, 18, and 19 kt, respectively[3]. The relatively large error at 12 h is due to the difference between the operational and post-storm intensity assessment, as the operational intensity estimates tended to discount the scatterometer observations; otherwise the intensity errors were rather small.

There were no watches or warnings associated with Andres.

Table 1. Best track for Tropical Storm Andres, 19-25 May 2003.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
19 / 1800	9.6	102.2	1007	25	tropical depression
20 / 0000	9.6	103.1	1006	30	"
20 / 0600	9.7	104.0	1002	40	tropical storm
20 / 1200	9.7	105.0	1000	45	"
20 / 1800	9.7	106.1	997	50	"
21 / 0000	9.7	107.3	997	50	"
21 / 0600	9.8	108.6	997	50	"
21 / 1200	10.1	110.2	1000	45	"
21 / 1800	10.4	111.9	1000	45	"
22 / 0000	10.5	113.5	1000	45	"
22 / 0600	10.8	115.2	997	50	"
22 / 1200	11.1	117.0	997	50	"
22 / 1800	11.5	118.8	1000	45	"
23 / 0000	11.8	120.7	1000	45	"
23 / 0600	12.2	122.4	1000	45	"
23 / 1200	12.5	124.1	1000	45	"
23 / 1800	12.9	125.9	1000	45	"
24 / 0000	13.4	127.6	1000	45	"
24 / 0600	13.8	129.1	1000	45	"
24 / 1200	14.1	130.5	1000	45	"
24 / 1800	14.4	131.8	1002	40	"
25 / 0000	14.6	133.2	1005	35	"
25 / 0600	14.5	134.6	1007	30	tropical depression
25 / 1200	14.3	136.2	1009	25	remnant low
25 / 1800	14.1	137.8	1009	25	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
26 / 0000	14.1	139.2	1009	25	"
26 / 0600	14.4	140.5	1010	20	"
26 / 1200	14.7	141.9	1010	20	"
26 / 1800					dissipated
20 / 1800	9.7	106.1	997	50	minimum pressure

Table 4. Preliminary forecast evaluation (heterogeneous sample) for Tropical Storm Andres, 19-25 May 2003. Forecast errors (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type. Verification includes the depression stage, but does not include the extratropical stage, if any.

Forecast Technique	Forecast Period (h)						
	12	24	36	48	72	96	120
CLP5	30 (21)	69 (19)	129 (17)	200 (15)	301 (11)	499 (7)	693 (3)
GFDI	44 (21)	93 (19)	149 (17)	225 (15)	401 (11)	614 (7)	935 (3)
AVNI	41 (19)	78 (17)	114 (15)	**144 (13)**	**199 (9)**	**228 (5)**	**159 (1)**
AEMI	29 (3)	**46 (1)**					
BAMD	58 (21)	112 (19)	166 (17)	212 (15)	307 (11)	440 (7)	677 (3)
BAMM	30 (21)	**50 (19)**	**76 (17)**	**108 (15)**	**176 (11)**	**261 (7)**	**377 (3)**
BAMS	29 (21)	**49 (19)**	**70 (17)**	**77 (15)**	**103 (11)**	**128 (7)**	**145 (3)**
NGPI	45 (9)	80 (7)	115 (5)	**136 (3)**			
UKMI	34 (14)	74 (12)	125 (10)	186 (8)	**287 (4)**		
GUNS	27 (9)	**57 (7)**	**90 (5)**	**129 (3)**			
GUNA	26 (9)	**56 (7)**	**85 (5)**	**121 (3)**			
OFCL	25 (20)	59 (18)	108 (16)	167 (14)	298 (10)	436 (6)	605 (2)
NHC Official (1993-2002 mean)[3]	39 (2864)	72 (2595)	103 (2314)	131 (2050)	186 (1603)	197 (210)	223 (143)

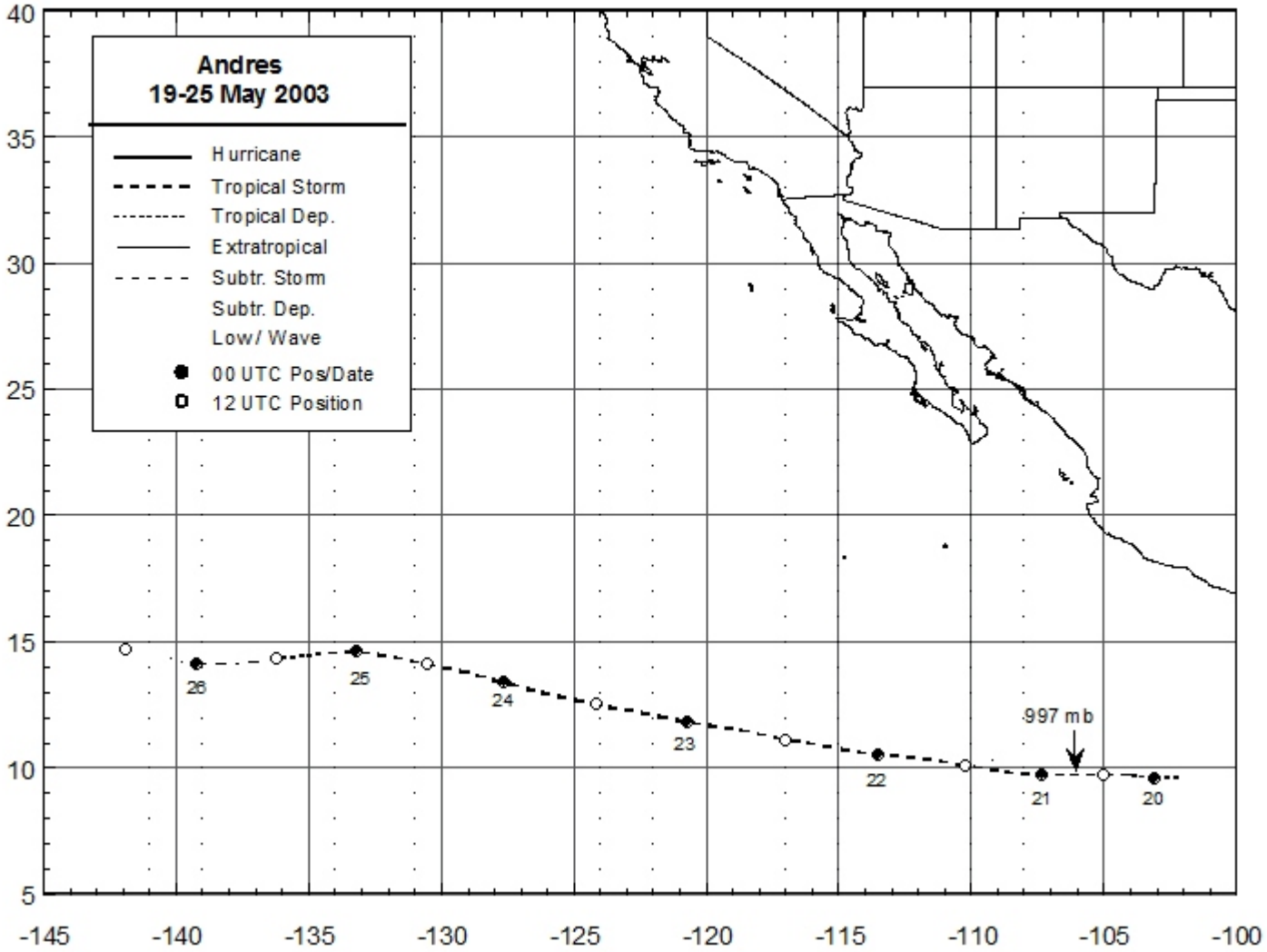

Figure 1. Best track positions for Tropical Storm Andres, 19-25 May 2003.

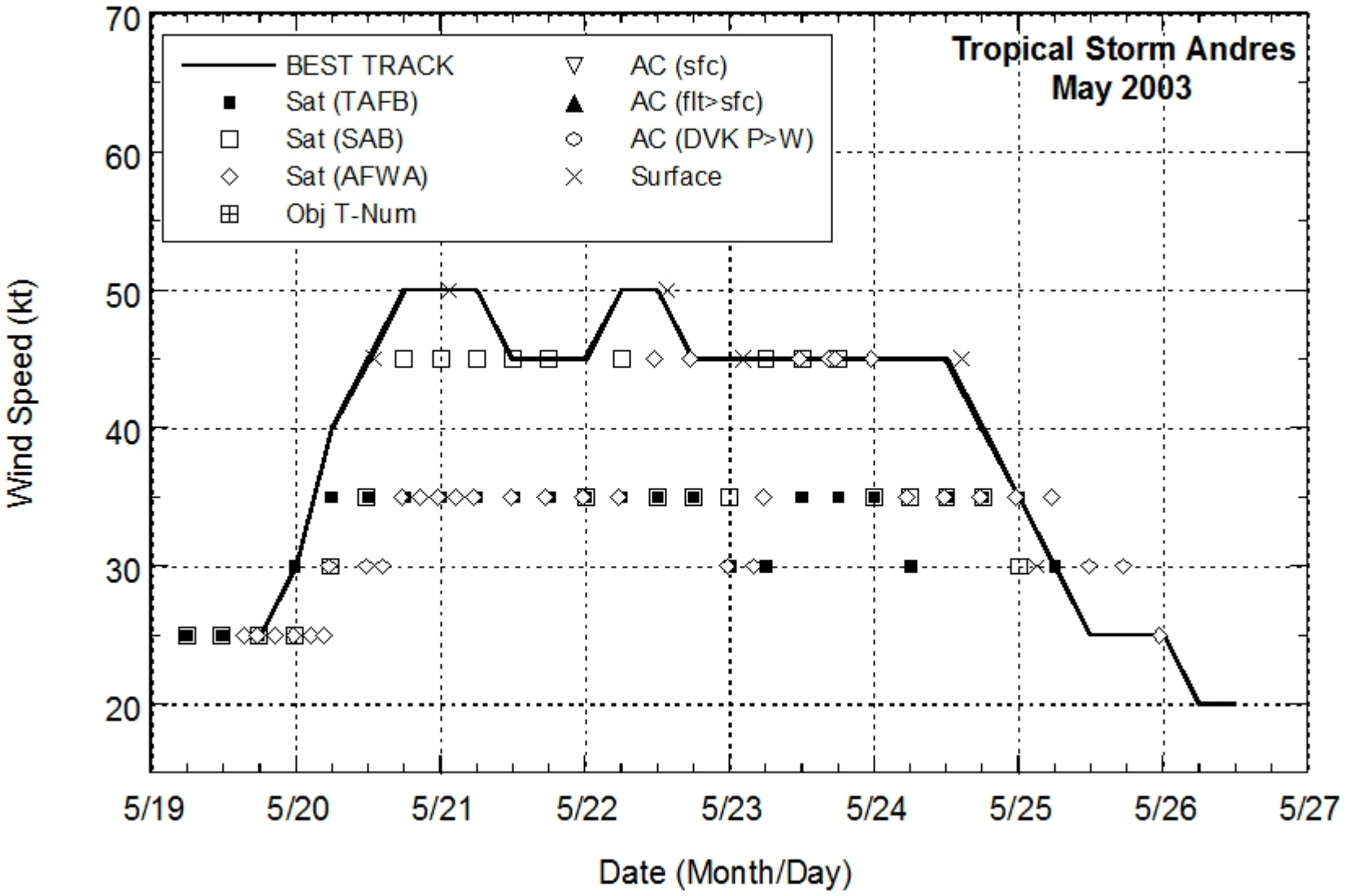

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Andres, 19-25 May 2003. Surface observations ("X") represent analyses of QuikSCAT data.

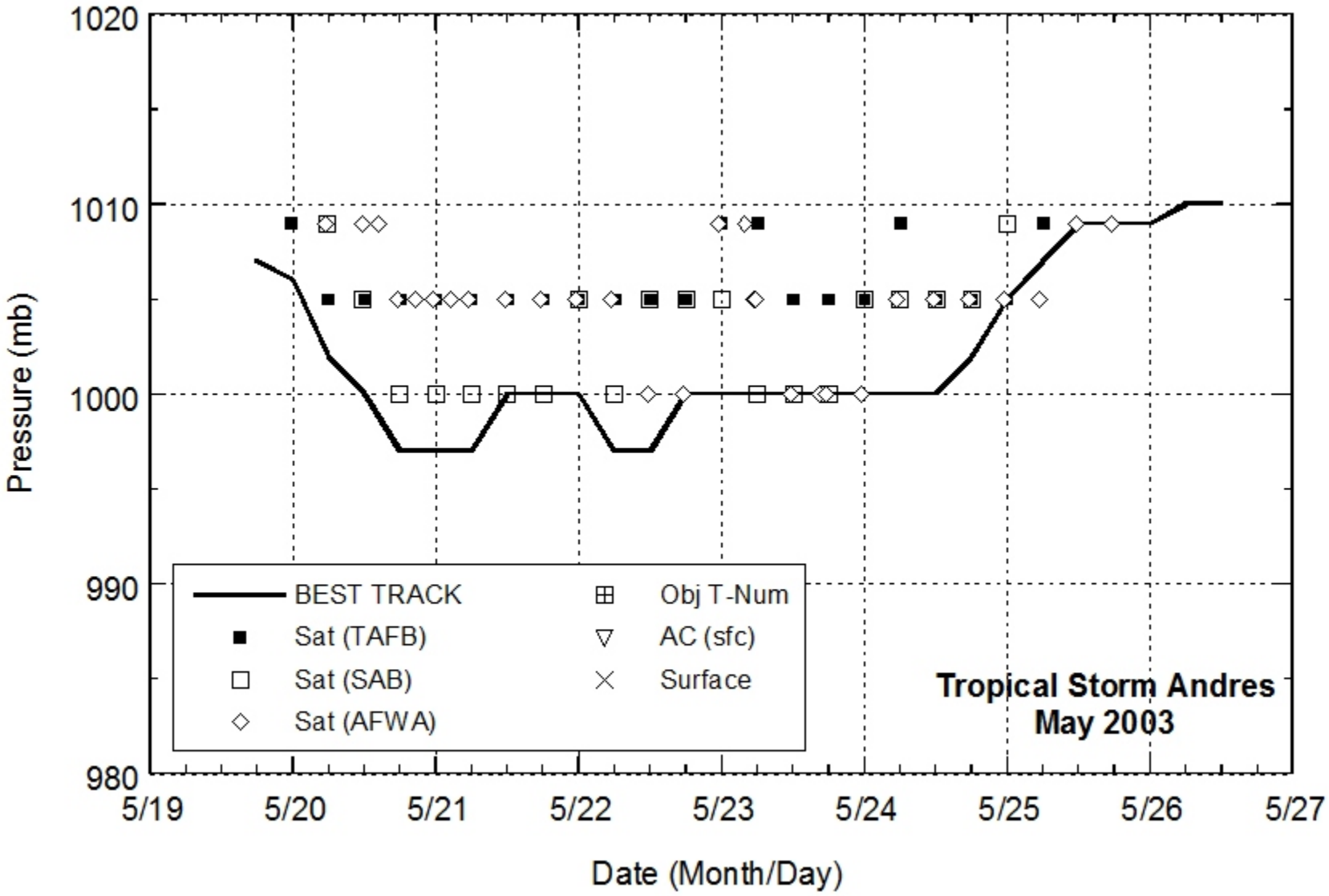

Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Andres, 19-25 May 2003.