NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

HURRICANE ANDRES

(EP012015)

28 May – 4 June 2015

Michael J. Brennan
National Hurricane Center
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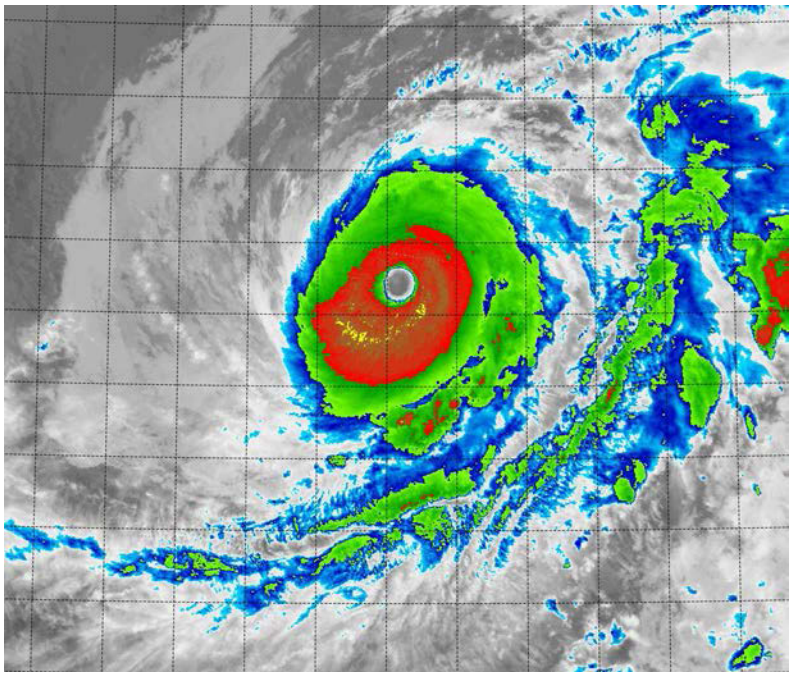

AQUA MODIS INFRARED IMAGE OF ANDRES AT 0940 UTC 1 JUNE 2015, AT THE TIME OF PEAK INTENSITY. IMAGE COURTESY OF NRL TC WEBPAGE.

Andres was a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that remained over the open waters of the eastern North Pacific basin during its life span. Andres is only the fifth major hurricane to form in May in the basin since reliable records began in 1971.

Hurricane Andres

28 MAY – 4 JUNE 2015

SYNOPTIC HISTORY

Andres originated from a tropical wave that moved off of the west coast of Africa on 11 May. The wave moved uneventfully westward across the Atlantic basin and emerged into the eastern North Pacific on 23 May. Shower and thunderstorm activity began to increase in association with the wave south of the Gulf of Tehuantepec on 24 May, and a broad surface low formed on 26 May while the area of disturbed weather moved generally west-northwestward. Shower and thunderstorm activity gradually became better organized on 27 May and an Advanced Scatterometer (ASCAT) overpass early on 28 May showed that the center had become well defined, marking the formation of a tropical depression around 0600 UTC about 720 n mi south of the southern tip of the Baja California peninsula. The depression quickly strengthened and reached tropical storm intensity 6 h later. The "best track" chart of the Andres' 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[1].

Andres was situated to the south of the subtropical ridge and moved west-northwestward on 28 May and turned toward the northwest the next day into a weakness in the ridge. During this time, Andres quickly strengthened to a 60-kt tropical storm by 0000 UTC 29 May, and reached hurricane strength about 18 h later, while centered about 675 n mi south-southwest of the southern tip of the Baja California peninsula. A period of rapid intensification then began while the hurricane moved northwestward to north-northwestward around the ridge. By 1800 UTC 30 May, Andres had intensified to 95 kt, a 30-kt increase in 24 h. The intensification rate of Andres then slowed, likely due to moderate westerly shear, and microwave imagery showed the eyewall shrinking and opening on the west side late on 30 May, possibly due to the beginning stages of an eyewall replacement cycle (Fig. 2). Andres reached major hurricane intensity around 0000 UTC 31 May while the cyclone turned back toward the west-northwest while a ridge rebuilt to the north. Another round of intensification began later that day as the shear decreased and the eye became more distinct while Andres turned westward (Fig. 2d), and the hurricane reached a peak intensity of 125 kt from 0600 UTC to 1200 UTC 1 June, while centered about 705 n mi southwest of the southern tip of the Baja California peninsula.

After reaching peak intensity, Andres began to weaken quickly as the cyclone moved west-northwestward over cooler waters and into a drier air mass. Andres fell below major hurricane strength at 0600 UTC 2 June and weakened to a tropical storm 24 h later. Deep convection dissipated around 1200 UTC 4 June, marking the transition of Andres to a post-tropical cyclone about 845 n mi west of the southern tip of the Baja California peninsula. The post-tropical

[1] A digital record of the complete best track, including wind radii, can be found on line at ftp://ftp.nhc.noaa.gov/atcf. Data for the current year's storms are located in the *btk* directory, while previous years' data are located in the *archive* directory.

cyclone slowly weakened while moving generally eastward to east-southeastward in the low-level flow over the next couple of days, and it dissipated shortly after 0000 UTC 7 June about 625 n mi west-southwest of the southern tip of the Baja California peninsula.

METEOROLOGICAL STATISTICS

Observations in Andres (Figs. and 3) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), and objective Advanced Dvorak Technique (ADT) estimates from the Cooperative Institute for Meteorological Satellite Studies/University of Wisconsin-Madison. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), the European Space Agency's ASCAT, and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Andres.

The 125-kt estimated peak intensity of Andres from 0600 to 1200 UTC 1 June is based on a blend of subjective Dvorak estimates of 115 kt from SAB and 127 kt from TAFB and UW-CIMSS ADT estimates of 127 kt at 0600 UTC and 132 kt at 1200 UTC.

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

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Andres was generally well forecast, especially at longer time ranges. The system was first given a low (< 40% chance of formation) probability of formation in the next 5 days 132 h prior to genesis. The 5-day genesis probability reached the high category (> 60%) 60 h prior to genesis. However, the 48-h genesis probability only reached the medium (40-60%) category 24 h prior to genesis and did not reach the high category until 12 h before the system formed. All of the genesis forecast lead times are given in Table 2.

A verification of NHC official track forecasts for Andres is given in Table 3a. Official forecast track errors were a little lower than the mean official errors for the previous 5-yr period through 72 h, but above the 5-yr means at 96 and 120 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The NHC forecast (OFCL) bested all of the guidance through 24 h, with the exception of the TVCE multi-model consensus at 12 h. The best performing track guidance overall was the GFS/ECMWF consensus (GFEX),

which beat OFCL from 36 through 96 h. At days 4 and 5 OFCL was beaten by several models, including the HWRF (HWFI), the GFS (GFSI), the GEFS ensemble mean (AEMI), FSSE, and the shallow BAM model (BAMS). The BAMS had the smallest forecast errors at day 5. Much of the track model guidance and OFCL had a southwestward bias in the track of Andres at days 4 and 5.A verification of NHC official intensity forecasts for Andres is given in Table 4a. Official forecast intensity errors (OFCL) were well above the mean official errors for the previous 5-yr period at all forecast lead times, as OFCL did not capture the early rapid intensification from 30 kt to 95 kt from 28–30 May or the later period of strengthening to category 4 intensity on 31 May and 1 June when several OFCL forecasts showed weakening and a very large low bias (Fig. 5). A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. Despite the large OFCL errors, the NHC forecast beat much of the intensity guidance with the exception of the HWFI from 24 through 120 h, GFSI at days 3 through 5, and the climatology-persistence model OCD5 at days 4 and 5.

No watches or warnings were issued in association with Andres.

Table 1. Best track for Hurricane Andres, 28 May–4 June 2015.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
28 / 0600	10.8	109.9	1005	30	tropical depression
28 / 1200	11.1	111.0	1002	40	tropical storm
28 / 1800	11.4	112.1	998	50	"
29 / 0000	11.6	112.9	997	60	"
29 / 0600	11.9	113.6	994	60	"
29 / 1200	12.2	114.1	994	60	"
29 / 1800	12.6	114.6	990	65	hurricane
30 / 0000	13.2	115.0	986	75	"
30 / 0600	13.6	115.3	978	80	"
30 / 1200	14.1	115.7	973	85	"
30 / 1800	14.6	116.1	964	95	"
31 / 0000	15.0	116.6	959	100	"
31 / 0600	15.2	117.1	959	100	"
31 / 1200	15.3	117.8	959	100	"
31 / 1800	15.3	118.5	951	110	"
01 / 0000	15.3	119.0	943	120	"
01 / 0600	15.4	119.5	937	125	"
01 / 1200	15.5	120.0	937	125	"
01 / 1800	15.8	120.6	952	115	"
02 / 0000	16.3	121.2	960	100	"
02 / 0600	16.9	121.9	969	90	"
02 / 1200	17.4	122.7	976	80	"
02 / 1800	18.0	123.5	980	75	"
03 / 0000	18.5	124.2	984	70	"
03 / 0600	18.9	124.7	990	60	tropical storm
03 / 1200	19.3	125.1	992	55	"
03 / 1800	19.8	125.3	996	50	"
04 / 0000	20.0	125.3	998	45	"
04 / 0600	20.2	125.1	1000	45	"
04 / 1200	20.2	124.8	1003	35	low

04 / 1800	20.1	124.4	1005	35	"
05 / 0000	19.9	123.9	1006	30	"
05 / 0600	19.8	123.4	1006	30	"
05 / 1200	19.6	122.9	1006	30	"
05 / 1800	19.4	122.4	1006	25	"
06 / 0000	19.0	121.9	1007	25	"
06 / 0600	18.8	121.4	1007	25	"
06 / 1200	18.6	120.8	1007	25	"
06 / 1800	18.4	120.4	1007	25	"
07 / 0000	18.3	119.9	1007	25	"
07 / 0600					dissipated
01 / 0600	15.4	119.5	937	125	minimum pressure and maximum wind

Table 2. Number of hours in advance of formation associated with the first NHC Tropical Weather Outlook forecast in the indicated likelihood category. Note that the timings for the "Low" category do not include forecasts of a 0% chance of genesis.

	Hours Before Genesis	
	48-Hour Outlook	**120-Hour Outlook**
Low (<40%)	60	132
Medium (40%-60%)	24	84
High (>60%)	12	60

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Andres. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**20.3**	**32.1**	**41.2**	**51.2**	**85.5**	127.3	173.4
OCD5	33.0	74.4	116.2	141.8	192.7	235.4	401.4
Forecasts	27	25	23	21	17	13	9
OFCL (2010-14)	23.4	36.4	47.2	59.4	89.0	123.6	159.5
OCD5 (2010-14)	36.6	74.2	116.5	159.7	245.6	331.1	427.4

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Andres. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 3a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	18.3	29.2	38.0	48.2	78.1	108.1	138.4
OCD5	32.9	74.3	114.0	134.4	173.9	200.4	361.0
GFSI	20.2	32.1	40.8	56.8	100.1	**103.9**	**109.0**
GHMI	20.6	35.3	54.5	78.3	127.6	144.9	**133.3**
HWFI	24.3	42.5	55.5	65.8	79.9	**77.5**	146.4
EGRI	19.5	41.2	62.6	83.4	124.7	212.2	332.6
EMXI	20.6	34.0	47.1	56.7	93.7	144.0	206.6
CMCI	27.8	41.9	52.7	69.1	114.5	158.6	185.4
AEMI	21.5	38.7	55.4	71.6	98.8	**99.8**	**114.2**
FSSE	18.5	29.8	39.9	50.0	**75.5**	**103.8**	**135.2**
TCON	18.9	30.5	43.7	54.7	80.1	**99.0**	148.1
TVCE	**17.8**	29.4	41.6	52.5	**77.5**	**101.8**	150.2
GFEX	18.7	29.3	**37.7**	**42.9**	**60.2**	**74.8**	146.0
LBAR	29.1	68.5	114.4	162.7	268.2	406.6	514.3
BAMS	56.5	94.5	123.2	141.1	122.4	**71.1**	**91.9**
BAMM	51.1	89.9	117.2	138.0	149.3	124.6	**107.2**
BAMD	37.3	69.5	96.1	116.5	122.2	134.5	172.6
Forecasts	25	23	21	19	15	11	7

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Andres. Mean errors for the previous 5-yr period are shown for comparison. Official errors that are smaller than the 5-yr means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	8.7	13.8	17.8	20.7	26.8	28.1	18.9
OCD5	9.9	16.3	21.5	26.0	30.9	28.8	15.6
Forecasts	27	25	23	21	17	13	9
OFCL (2010-14)	5.9	9.8	12.5	14.0	15.5	16.3	14.9
OCD5 (2010-14)	7.7	12.8	16.4	18.8	21.1	20.9	19.7

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Andres. Errors smaller than the NHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 4a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	8.7	14.0	18.4	21.3	27.2	25.8	17.5
OCD5	9.8	16.3	21.6	26.0	29.9	**25.0**	**12.4**
HWFI	8.7	**13.6**	**17.6**	**20.7**	**24.2**	**22.8**	**14.1**
GHMI	11.2	19.2	28.4	30.1	30.8	28.5	21.3
DSHP	9.0	14.5	19.5	23.5	31.9	30.8	19.1
LGEM	10.0	16.8	22.3	26.8	35.2	35.7	27.5
IVCN	9.2	14.8	20.0	23.8	28.8	27.9	20.0
ICON	9.2	14.8	20.0	23.8	28.8	27.9	20.0
FSSE	9.4	16.8	23.0	27.0	34.3	35.2	29.4
GFSI	9.8	15.3	19.6	21.6	**24.3**	**19.2**	**12.6**
EMXI	11.5	20.3	28.5	36.8	41.6	32.6	20.8
Forecasts	26	24	22	20	16	12	8

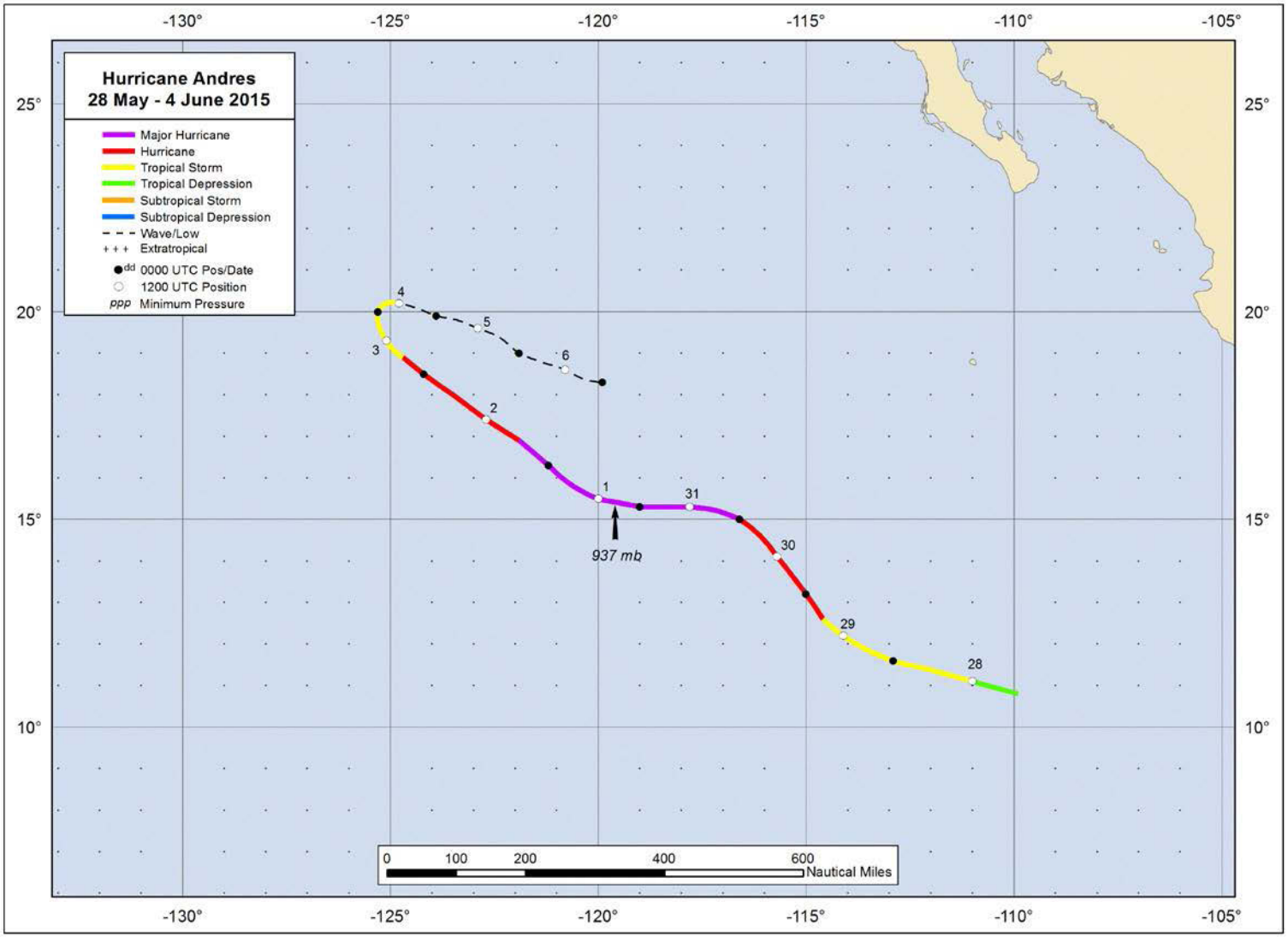

Figure 1. Best track positions for Hurricane Andres, 28 May–4 June 2015.

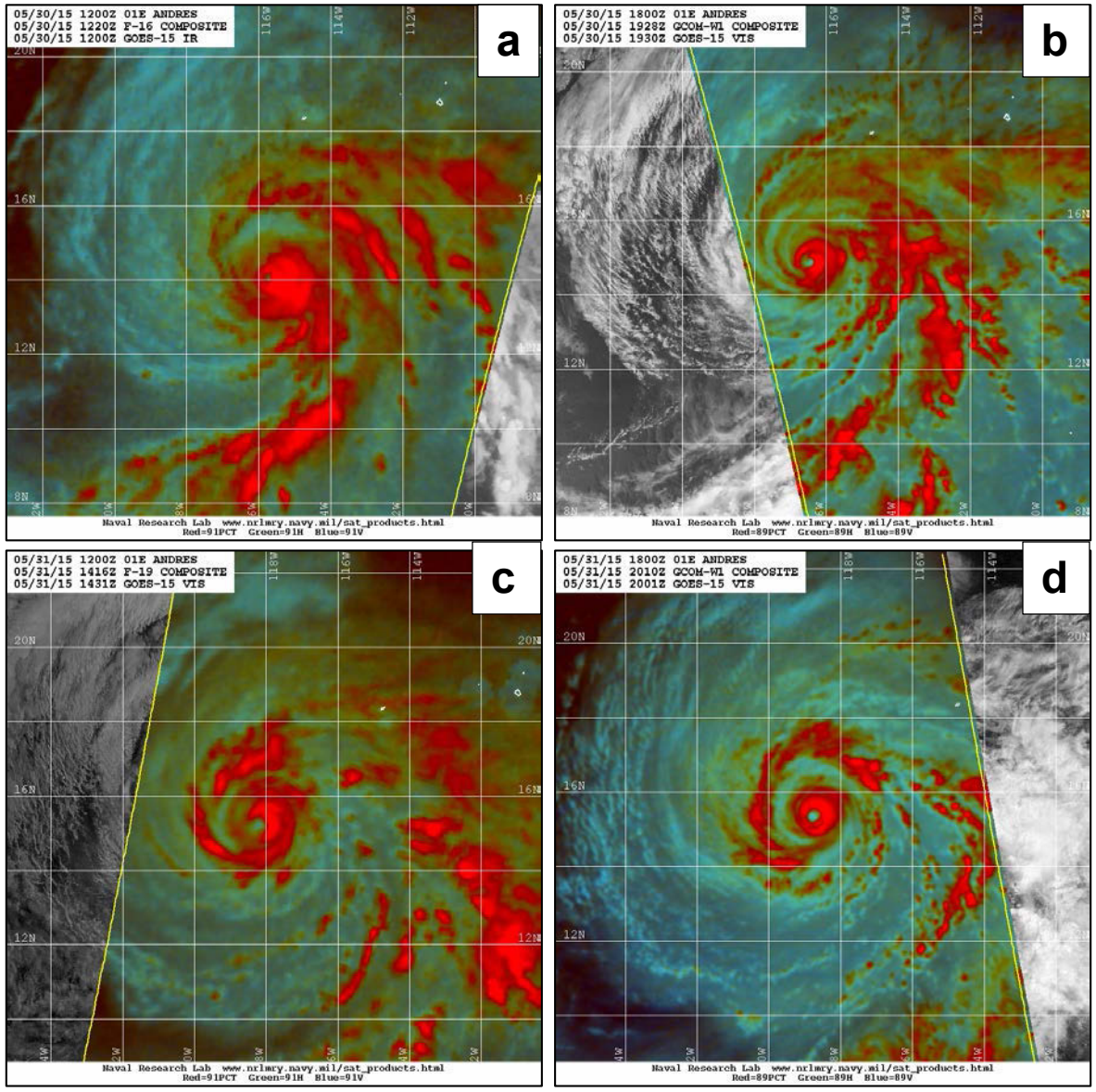

Figure 2. 89-91 GHz color composite microwave images of Hurricane Andres at (a) 1220 UTC 30 May, (b) 1928 UTC 30 May, (c) 1416 UTC 31 May, and (d) 2010 UTC 31 May. Images courtesy of U.S. Naval Research Laboratory tropical cyclone webpage.

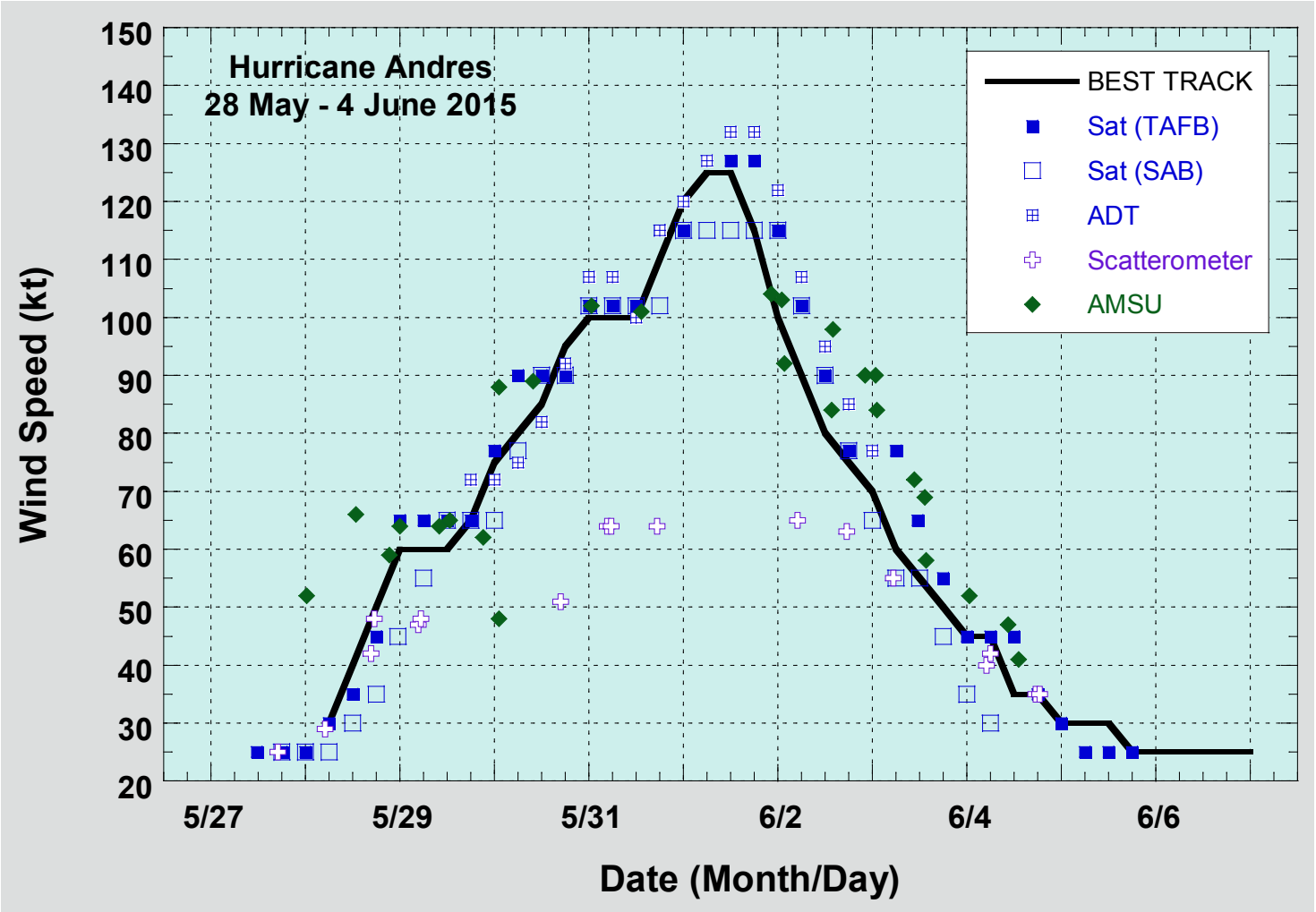

Figure 3. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Andres, 28 May–4 June 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

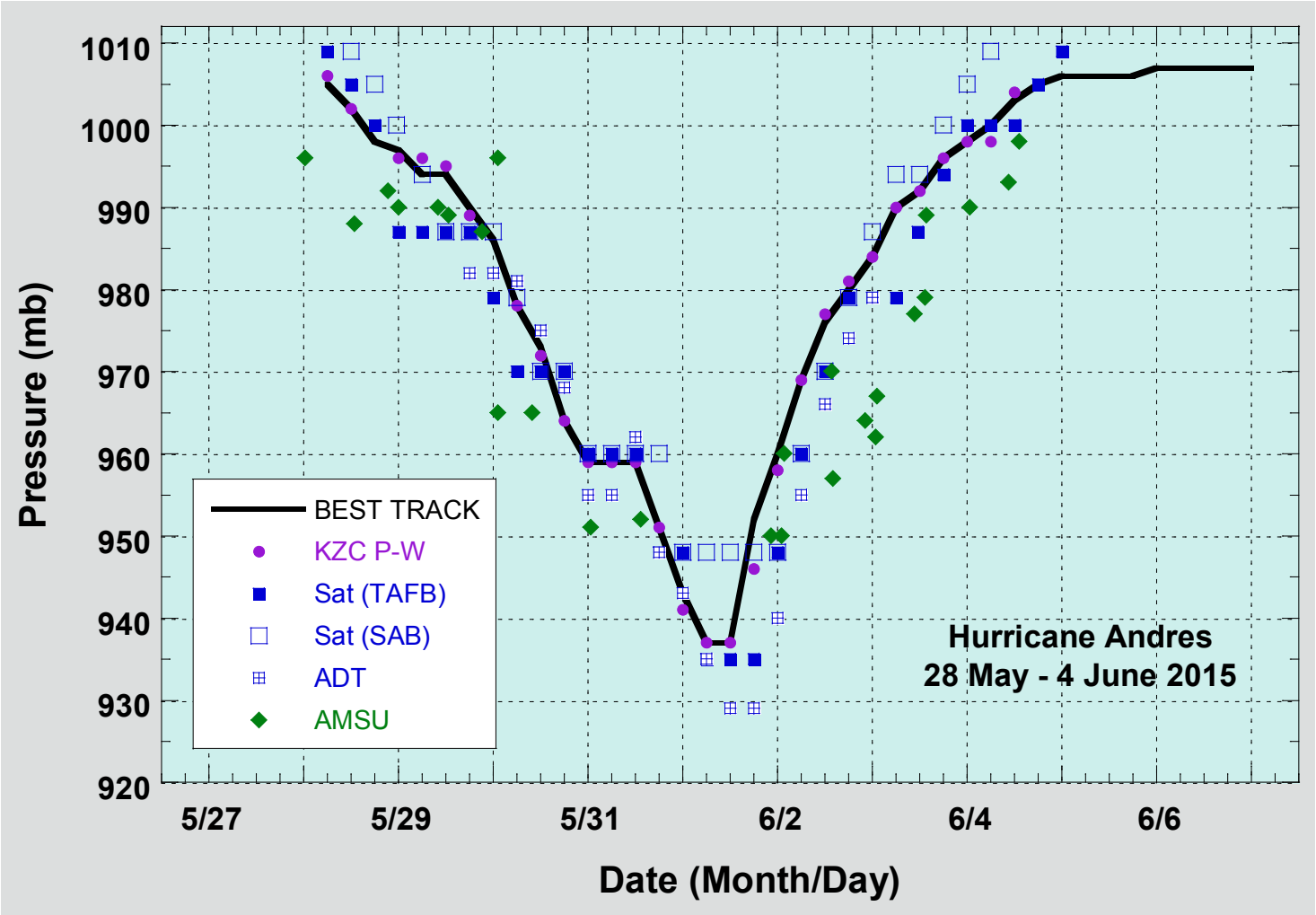

Figure 4. Selected pressure observations and best track minimum central pressure curve for Hurricane Andres, 28 May–4 June 2015. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.

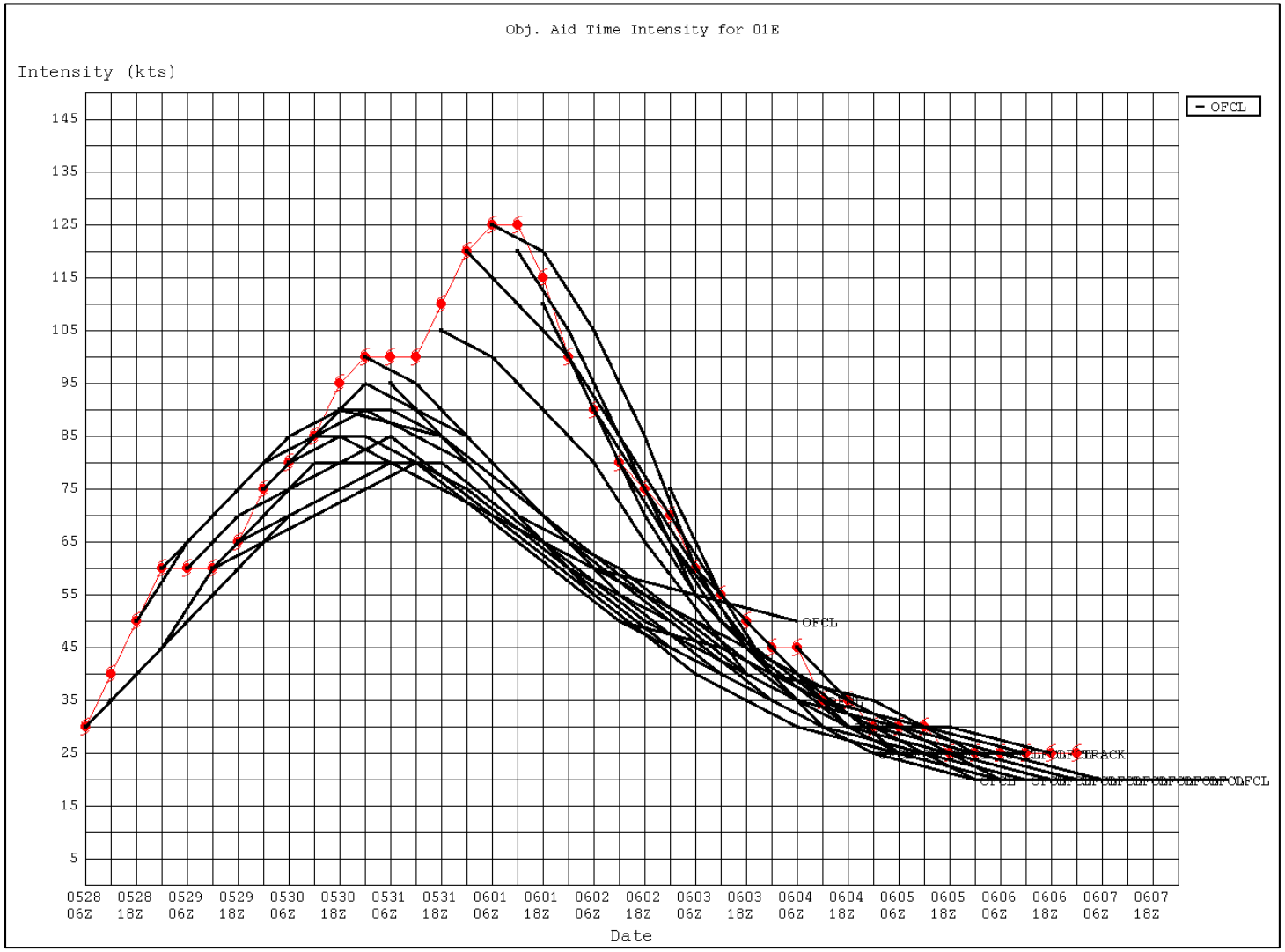

Figure 5. Official intensity forecasts (black lines) and best track intensity (red hurricane symbols) for Hurricane Andres, 28 May–4 June 2015.