NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT

HURRICANE COSME

(EP032013)

23 – 27 June 2013

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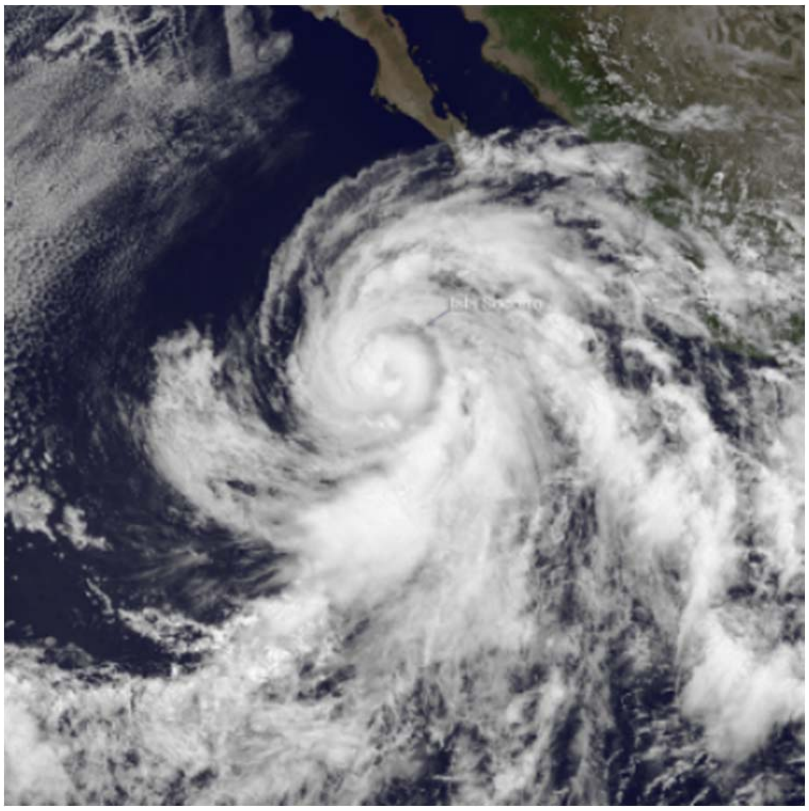

COSME NEAR SOCORRO ISLAND (25 JUN 1740 UTC) – NASA

Cosme was a large category 1 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that brought tropical storm conditions to Socorro and Clarion Islands, but stayed offshore of southwestern Mexico.

Hurricane COSME

23 – 27 JUNE 2013

SYNOPTIC HISTORY

Cosme can be traced back to the same tropical wave that spawned Tropical Storm Barry in the Gulf of Mexico. The southern end of the wave moved very slowly across the eastern Pacific due to enhanced southwesterly flow associated with an active ITCZ. A broad low pressure area formed from the wave on 21 June several hundred miles south of Acapulco, Mexico. The large system was not well organized initially, probably due to northwesterly shear from an upper-level trough over the western Caribbean Sea. The shear gradually relaxed during the next two days while an upper-level high built eastward across the low. Convection increased near the ill-defined center and within large banding features early on 23 June, likely aided by the passage of an eastward-moving atmospheric Kelvin wave through the area. Visible satellite images and microwave data suggest the center became well defined by 1200 UTC 23 June, marking the formation of a tropical depression about 435 n mi south of Manzanillo, Mexico. The system became a tropical storm 12 h later. The "best track" chart of Cosme'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[1].

Cosme moved little initially as it was caught between the strong low-level southwesterly flow associated with the enhanced eastern Pacific ITCZ, and more easterly mid-level flow from a ridge over Mexico. The cyclone started to move steadily to the northwest on 24 June when the ridge became the dominant steering mechanism, perhaps due to the vortex becoming deeper in the atmosphere. The large storm steadily strengthened in an environment of low shear and warm waters. Cosme became a hurricane early on 25 June, with an eye feature appearing on visible satellite images. During that day, the hurricane turned toward the west-northwest and accelerated while the ridge over Mexico strengthened and shifted westward. Cosme reached its peak intensity of 75 kt around 0000 UTC 26 June when it was located about 345 n mi south-southwest of Cabo San Lucas, Mexico. The cyclone then moved across much cooler waters and into more stable air, and weakened steadily. Cosme lost all deep convection by 1200 UTC 27 June, marking its dissipation as tropical cyclone about 600 n mi west-southwest of Cabo San Lucas. The remnants of the hurricane moved westward for the next several days until the low opened up into a trough about 1400 n mi east-southeast of the Hawaiian Islands.

[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.

METEOROLOGICAL STATISTICS

Observations in Cosme (Figs. 2 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 Tropical Rainfall Measuring Mission (TRMM), the European Space Agency's Advanced Scatterometer (ASCAT), and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Cosme. The estimated peak intensity of 75 kt is based on Dvorak satellite intensity estimates from TAFB and SAB.

There were no reliable ship reports of winds of tropical storm force associated with Cosme. A wind gust of 40 kt was reported at Socorro Island on the afternoon of 25 June from a Mexican Navy surface station (exact time unknown). Clarion Island reported a minimum pressure of 982.4 mb on 26 June at 1100 UTC, although other observations from this station suggest this report could be low by about 5-7 mb.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Cosme was well forecast. A high chance of formation (60% or greater chance of genesis within 48 h) was issued 36 h prior to genesis, a rather large lead time for such a high confidence forecast. Many of the global models also showed Cosme's formation for about a week prior to genesis, and these models provided very good guidance to NHC forecasters.

A verification of NHC official track forecasts is given in Table 2a. Official forecast track errors were much less than the mean official errors for the previous 5-yr period, even though the CLIPER errors were much larger than normal. A homogeneous comparison of the official track errors with selected guidance models is given in Table 2b. The eastern Pacific consensus model TVCE provided some of the best overall guidance. Among the individual models, the ECMWF model (EMXI), the GEFS ensemble (AEMI) mean, and the BAMS model had quite low errors.

A verification of NHC official intensity forecasts is given in Table 3a. Official forecast intensity errors were much lower than the mean official errors for the previous 5-yr period, about 50% less than the long-term mean. Even though the CLIPER errors were lower than average,

this small set of forecasts was highly skillful. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 3b. The official forecast bested all of the guidance at all time periods, a rather rare feat. The decay-SHIPS model provided the best overall model forecast.

No watches or warnings were issued for Cosme.

Table 1. Best track for Hurricane Cosme, 23-27 June 2013.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
23 / 1200	11.8	103.6	1005	30	tropical depression
23 / 1800	12.0	103.7	1005	30	"
24 / 0000	12.2	104.1	1003	35	tropical storm
24 / 0600	12.7	104.7	1000	40	"
24 / 1200	13.8	105.5	997	45	"
24 / 1800	14.7	106.5	995	50	"
25 / 0000	15.6	107.5	992	55	"
25 / 0600	16.5	108.9	990	60	"
25 / 1200	17.2	110.2	988	65	hurricane
25 / 1800	17.5	111.5	984	70	"
26 / 0000	17.8	112.8	980	75	"
26 / 0600	18.2	113.9	980	70	"
26 / 1200	18.7	114.9	985	65	"
26 / 1800	19.1	115.9	988	60	tropical storm
27 / 0000	19.5	117.1	993	50	"
27 / 0600	19.9	118.6	1000	45	"
27 / 1200	20.3	120.2	1003	35	low
27 / 1800	20.7	121.8	1004	30	"
28 / 0000	21.0	123.4	1004	30	"
28 / 0600	21.4	125.0	1004	30	"
28 / 1200	21.7	126.5	1006	30	"
28 / 1800	21.9	128.0	1006	25	"
29 / 0000	22.0	129.5	1006	25	"
29 / 0600	22.1	131.0	1006	25	"
29 / 1200	22.3	132.6	1006	20	"
29 / 1800	22.5	134.2	1006	20	"
30 / 0000	22.7	135.5	1007	20	"
30 / 0600	22.9	136.7	1008	20	"
30 / 1200	23.0	137.8	1008	20	"
30 / 1800	23.1	138.8	1010	20	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
31 / 0000	-	-	-	-	dissipated
26 / 0000	17.8	112.8	980	75	minimum pressure and maximum winds

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Cosme. 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	**25.7**	**38.5**	**48.8**	**62.0**	**70.3**		
OCD5	44.4	98.9	156.1	234.6	449.4		
Forecasts	14	12	10	8	4		
OFCL (2008-12)	27.0	43.1	57.8	71.9	101.7		
OCD5 (2008-12)	37.4	73.0	114.9	158.3	238.4		

Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Cosme. 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 2a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	27.7	35.1	47.0	60.9	73.9		
OCD5	46.4	89.0	138.6	211.5	481.8		
GFSI	**25.4**	35.8	49.6	**54.8**	82.5		
EGRI	**27.4**	36.2	**41.0**	66.7	**32.1**		
EMXI	**20.3**	**26.0**	**40.3**	60.9	79.7		
CMCI	32.8	55.1	65.4	63.2	**70.7**		
GHMI	**26.1**	43.9	64.2	85.2	159.7		
HWFI	31.1	45.5	55.6	69.9	90.1		
AEMI	**22.8**	**31.6**	**42.9**	**48.1**	**51.0**		
TVCE	**20.0**	**28.4**	**37.8**	**51.2**	**72.7**		
BAMS	**21.6**	**26.0**	**28.2**	**48.8**	**47.5**		
BAMM	38.6	57.5	71.0	83.5	**68.6**		
BAMD	42.0	69.6	95.4	115.8	85.8		
LBAR	41.8	88.9	137.6	144.9	93.6		
Forecasts	13	10	8	6	2		

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Cosme. 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	**2.5**	**5.0**	**6.0**	**6.3**	**3.8**		
OCD5	6.3	10.9	10.3	8.9	7.8		
Forecasts	14	12	10	8	4		
OFCL (2008-12)	6.3	10.5	13.4	14.5	15.3		
OCD5 (2008-12)	7.6	12.5	16.5	18.8	20.4		

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Cosme. 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	2.5	4.1	5.0	6.4	3.3		
OCD5	6.3	10.9	9.8	8.7	5.7		
GHMI	6.9	12.9	17.0	17.9	12.7		
HWFI	6.6	10.6	9.6	9.3	17.7		
IVCN	5.4	8.4	7.8	8.4	11.3		
DSHP	5.6	6.6	7.7	9.7	7.3		
LGEM	6.7	10.4	11.3	17.7	22.3		
GFSI	7.4	12.5	12.7	13.0	8.7		
EMXI	10.4	17.5	18.9	19.6	22.0		
Forecasts	14	11	9	7	3		

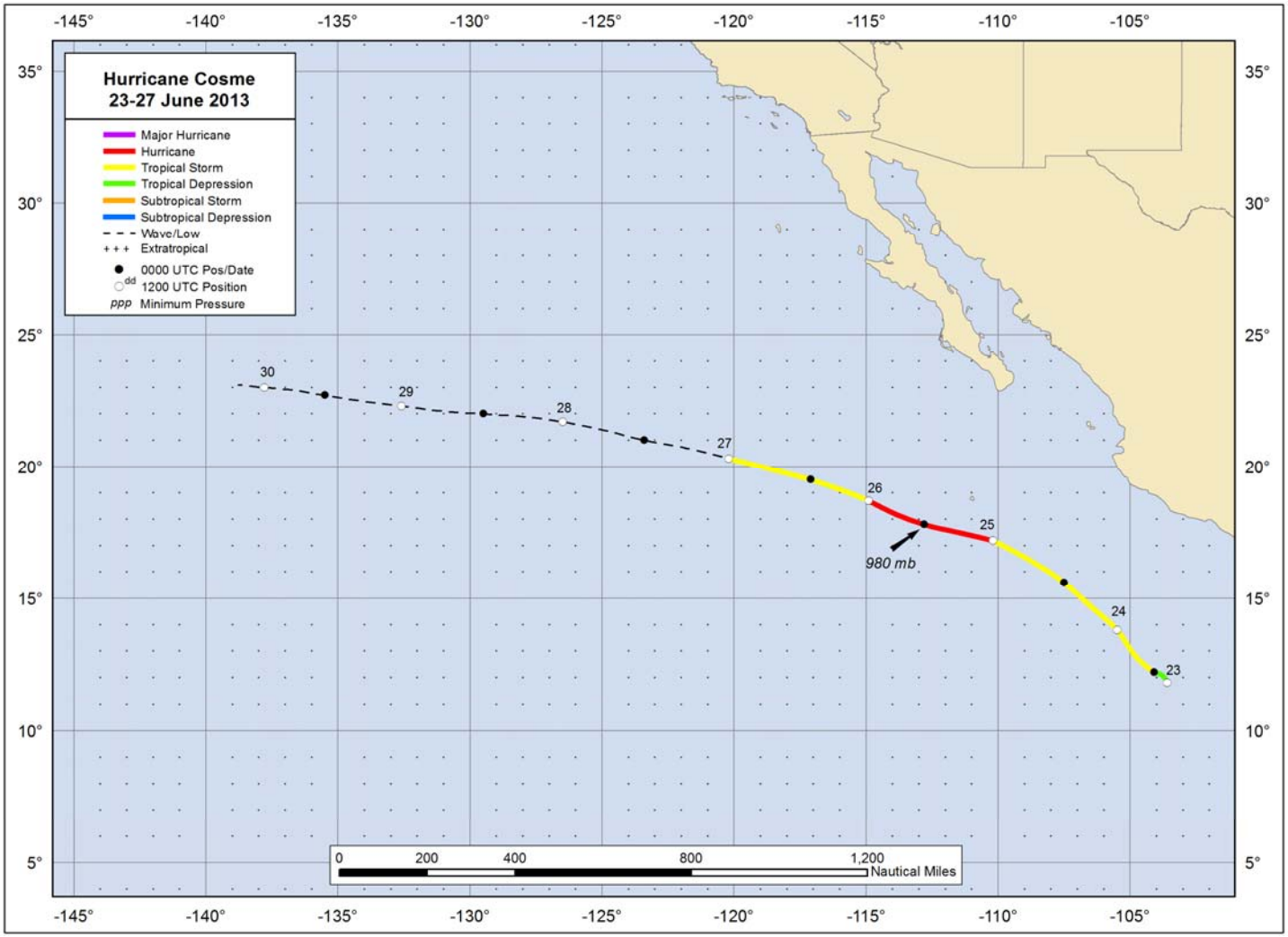

Figure 1. Best track positions for Hurricane Cosme, 23-27 June 2013.

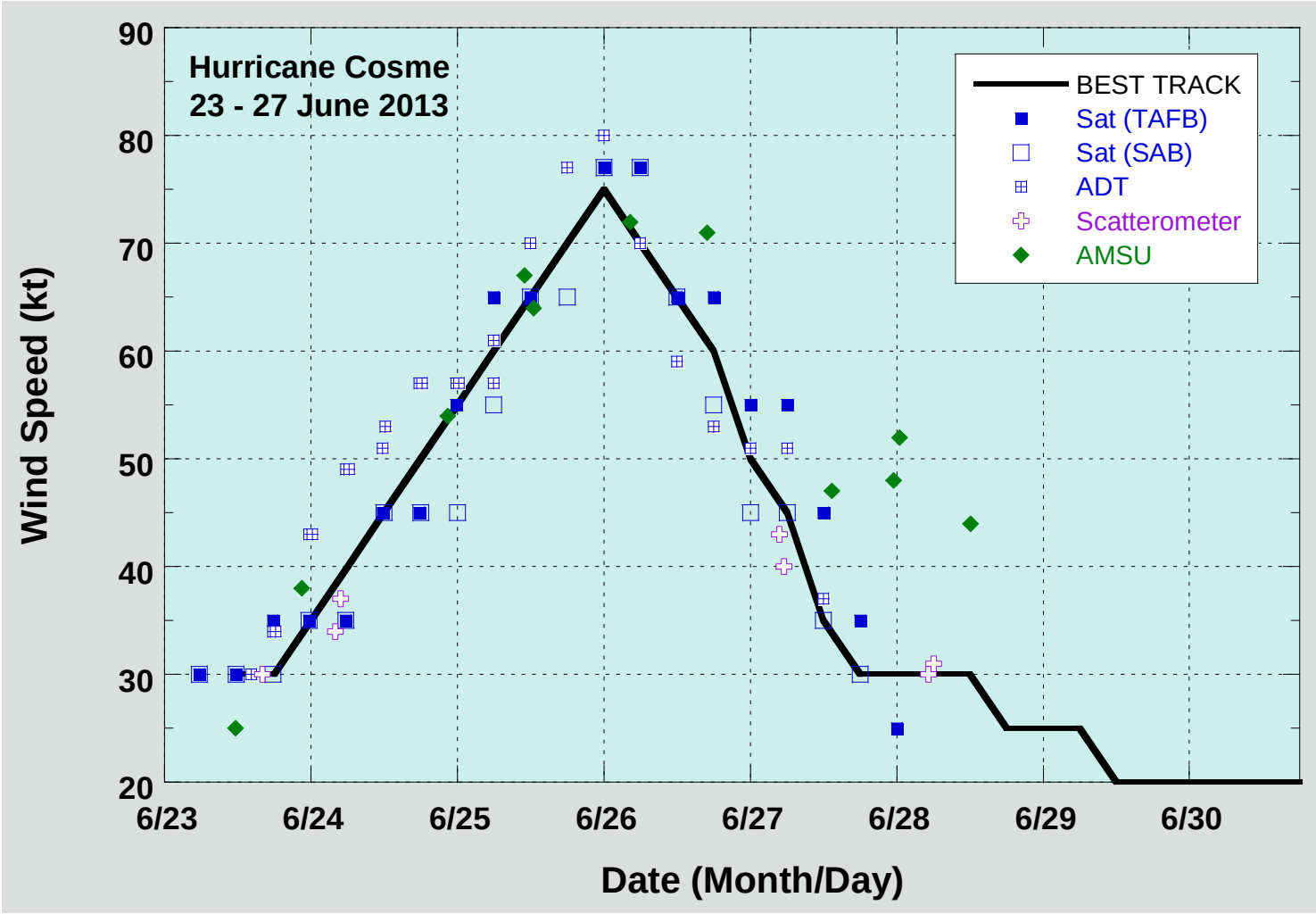

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Cosme. Advanced Dvorak Technique estimates represent the current intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

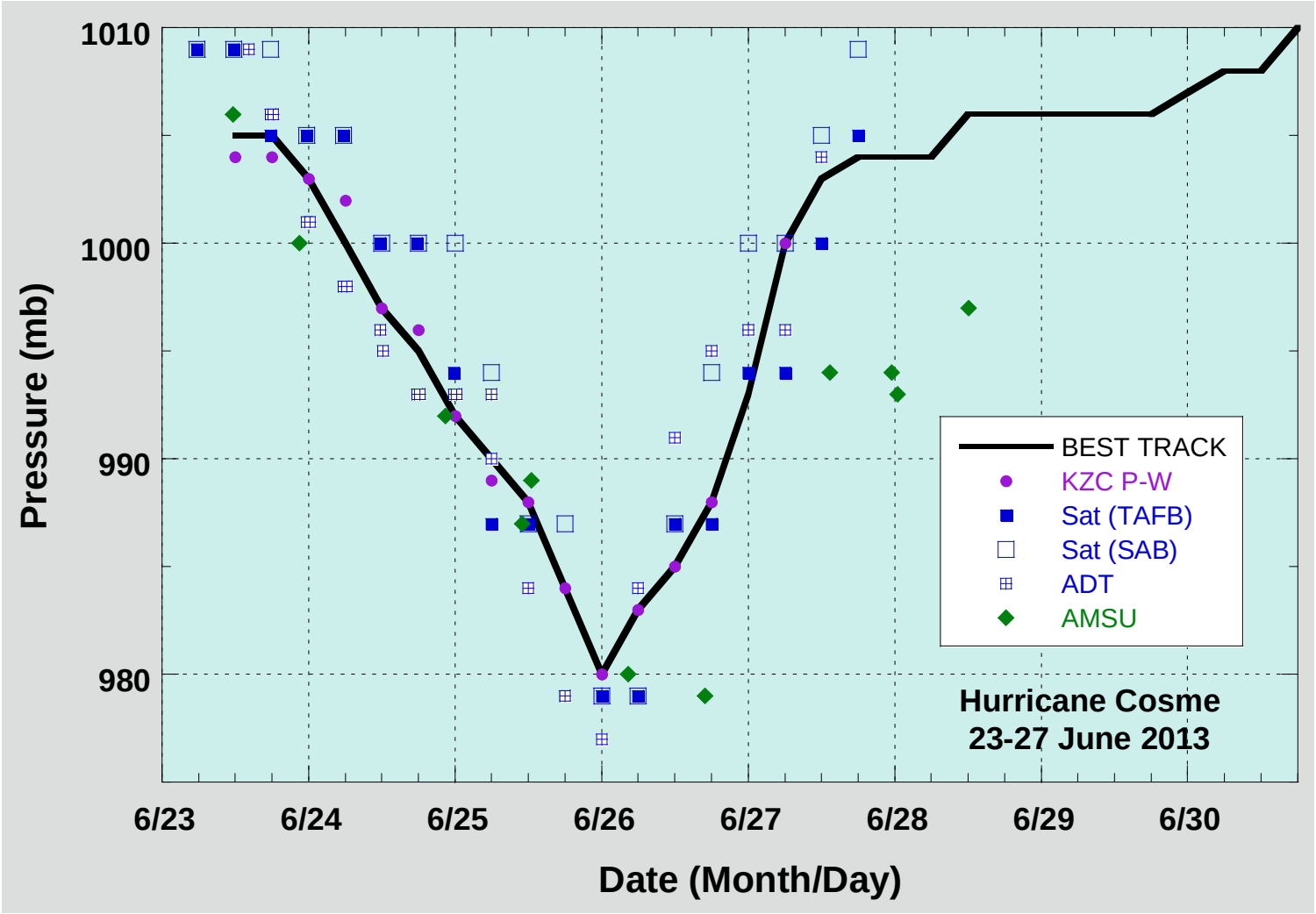

Figure 3. Selected pressure observations and best track minimum central pressure curve for Cosme. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.