

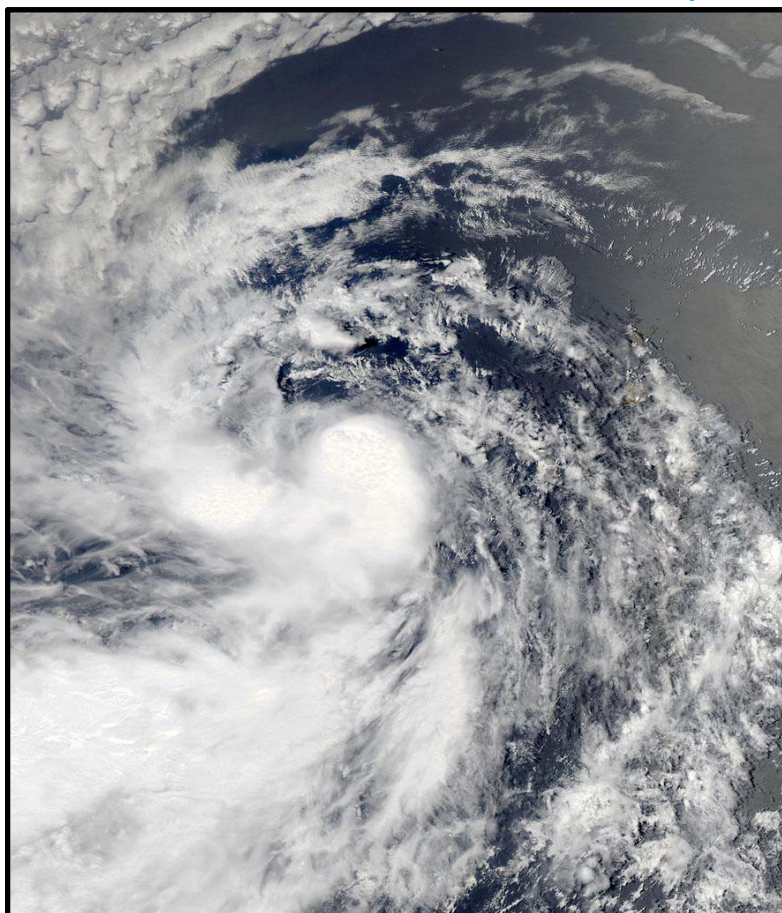


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

TROPICAL STORM ERIN (AL052013)

15 – 18 August 2013

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National Hurricane Center
23 September 2013



MODIS SATELLITE IMAGE OF TROPICAL STORM ERIN AT 1440 UTC 15 AUGUST. IMAGE COURTESY OF NASA.

Erin was a weak tropical storm that moved south of the Cape Verde Islands and dissipated over the central Atlantic.

Tropical Storm Erin

15 – 18 AUGUST 2013

SYNOPTIC HISTORY

The genesis of Erin was associated with a tropical wave that departed the west coast of Africa on 13 August. The wave had a large area of disorganized showers and thunderstorms and an elongated low-level circulation when it emerged off the coast. The circulation became better defined the next day, and by 0000 UTC 15 August the system developed a well-defined center and sufficiently organized deep convection to be classified a tropical depression, when it was located about 60 n mi south of Praia in the southern Cape Verde Islands. Deep convection consolidated near the center and the depression strengthened to a tropical storm 6 h later. The “best track” chart of Erin’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 1¹.

Shortly after obtaining tropical storm status, deep convection began to weaken and by early 16 August the cyclone only had a few patches of shower and thunderstorm activity remaining. An examination of imagery from the GOES-R proving ground suggests that dry air became well entrained into the circulation and was likely the main culprit for the loss of the convection. During this time, Erin was moving on a steady west-northwestward path to the south of a deep-layer subtropical ridge. Deep convection returned late on 16 August, and it is estimated that Erin reached its peak intensity of 40 kt around 0000 UTC 17 August. Around that time, the storm turned northwestward toward a weakness in the ridge caused by a low pressure system south of the Azores. Later that day, southwesterly shear began to affect the storm, displacing the deep convection to the north and northeast of the center. The shear steadily increased and by 0600 UTC 18 August Erin degenerated to a remnant low about midway between the west coast of Africa and the northern Leeward Islands, when the remaining shower activity was displaced over 150 n mi from the center.

The remnant low moved westward within the low-level trade wind flow and weakened over the next day or two. The weak low opened into a trough just before 0000 UTC 20 August, about 1100 n mi east of the northern Leeward Islands. The trough dissipated over the northern Leeward Islands a few days later.

METEOROLOGICAL STATISTICS

Observations in Erin (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite

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.

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 Erin.

The estimated maximum wind speed of 40 kt at 0000 UTC 17 August is based on a 38-kt wind report from the ship *British Cygnet* (MGSG6) at 2200 UTC 16 August.

Although operationally Erin was assessed to have weakened to a tropical depression on 16 August, a post-analysis review of scatterometer and ship data suggests that the storm likely maintained some tropical-storm-force winds.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING CRITIQUE

The genesis of Erin was not particularly well anticipated. The tropical wave that developed into Erin was introduced in the Tropical Weather Outlook with a low chance of formation during the next 48 h and next five days at 1800 UTC 13 August, about 30 h before genesis. The probability was increased to the medium category about 6 h later and to the high category at 1200 UTC 14 August, about 12 h before Erin formed.

A verification of NHC official track forecasts for Erin is given in Table 2a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period at the 12- and 24-h forecast times, but greater than the mean at the 36-, 48-, and 72-h forecast periods. A homogeneous comparison of the official track errors with selected guidance models is given in Table 2b. The best track forecast model for Erin was the United Kingdom Meteorological Office (EGRI), which was the only model that consistently beat the official forecast. The simpler medium-layer Beta Advection Model (BAMM), and deep-layer (BAMD), and the Limited Area Barotropic (LBAR) model were also among the best performers.

A verification of NHC official intensity forecasts for Erin is given in Table 3a. Official forecast intensity errors were lower than the mean errors for the previous 5-yr period at all times. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 3b. The Florida State Superensemble (FSSE) and Hurricane Weather Research and Forecast model (HWFI) were the best performers for Erin; the HWFI had average



errors lower than 3 kt at all forecast times. The Logistic Growth Equation Model (LGEM) was the worst performer, and suffered from a substantial high bias.

Watches and warnings associated with Erin are given in Table 4.

Table 1. Best track for Tropical Storm Erin, 15-18 August 2013.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 0000	13.9	23.3	1008	30	tropical depression
15 / 0600	14.1	24.6	1007	35	tropical storm
15 / 1200	14.3	25.9	1007	35	"
15 / 1800	14.7	27.2	1007	35	"
16 / 0000	15.3	28.6	1007	35	"
16 / 0600	15.9	30.0	1007	35	"
16 / 1200	16.5	31.4	1007	35	"
16 / 1800	17.3	32.7	1007	35	"
17 / 0000	18.0	33.8	1006	40	"
17 / 0600	18.8	34.7	1006	40	"
17 / 1200	19.6	35.5	1007	35	"
17 / 1800	20.3	36.2	1007	35	"
18 / 0000	20.6	37.2	1007	35	"
18 / 0600	20.6	38.0	1008	30	low
18 / 1200	20.5	38.8	1008	30	"
18 / 1800	20.4	39.6	1009	25	"
19 / 0000	20.3	40.4	1009	25	"
19 / 0600	20.2	41.2	1009	25	"
19 / 1200	20.1	42.0	1010	20	"
19 / 1800	20.0	42.8	1010	20	"
20 / 0000					dissipated
17 / 0000	18.0	33.8	1006	40	maximum wind and minimum pressure



Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Erin. 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	25.3	41.3	66.4	103.1	186.3		
OCD5	36.9	64.8	80.8	91.8	66.2		
Forecasts	11	9	7	5	1		
OFCL (2008-12)	28.6	45.8	62.2	78.6	116.6	160.0	206.4
OCD5 (2008-12)	47.5	99.7	161.4	224.0	329.7	417.5	493.1



Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Erin. 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	25.1	40.5	68.7	104.8			
OCD5	36.5	62.8	90.0	112.7			
GFSI	22.2	49.8	75.0	83.4			
GHMI	36.4	54.7	85.2	86.4			
HWFI	28.9	45.2	75.2	113.3			
EGRI	24.2	18.4	22.4	32.9			
EMXI	32.2	50.2	42.8	51.3			
CMCI	46.2	87.5	105.7	148.7			
AEMI	28.0	54.2	78.6	99.6			
FSSE	24.9	42.2	47.5	57.1			
TVCE	26.0	36.3	51.4	64.5			
LBAR	29.2	31.9	32.0	35.0			
BAMS	27.9	34.3	68.9	96.6			
BAMM	28.6	29.8	41.5	52.4			
BAMD	31.1	35.0	36.6	36.9			
Forecasts	8	5	5	3			

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Erin. 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	2.7	4.4	7.1	12.0	15.0		
OCD5	3.4	4.9	7.3	10.8	16.0		
Forecasts	11	9	7	5	1		
OFCL (2008-12)	6.6	10.1	12.2	14.1	15.4	15.1	16.1
OCD5 (2008-12)	7.8	11.6	14.0	15.6	17.9	18.0	17.9

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Erin. 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	4.2	6.0	13.3			
OCD5	3.0	5.2	7.2	13.7			
HWFI	2.9	2.2	2.4	2.0			
GHMI	2.6	7.7	9.6	5.3			
DSHP	4.1	6.5	9.2	17.7			
LGEM	3.5	6.8	12.0	23.7			
ICON	2.6	3.7	4.2	10.3			
IVCN	2.6	3.7	4.2	10.3			
FSSE	2.4	2.7	1.4	5.7			
Forecasts	8	6	5	3			



Table 4. Watch and warning summary for Tropical Storm Erin, 15-18 August 2013.

Date/Time (UTC)	Action	Location
15 / 0300	Tropical Storm Warning issued	Southern Cape Verde Islands
15 / 1500	Tropical Storm Warning discontinued	Southern Cape Verde Islands

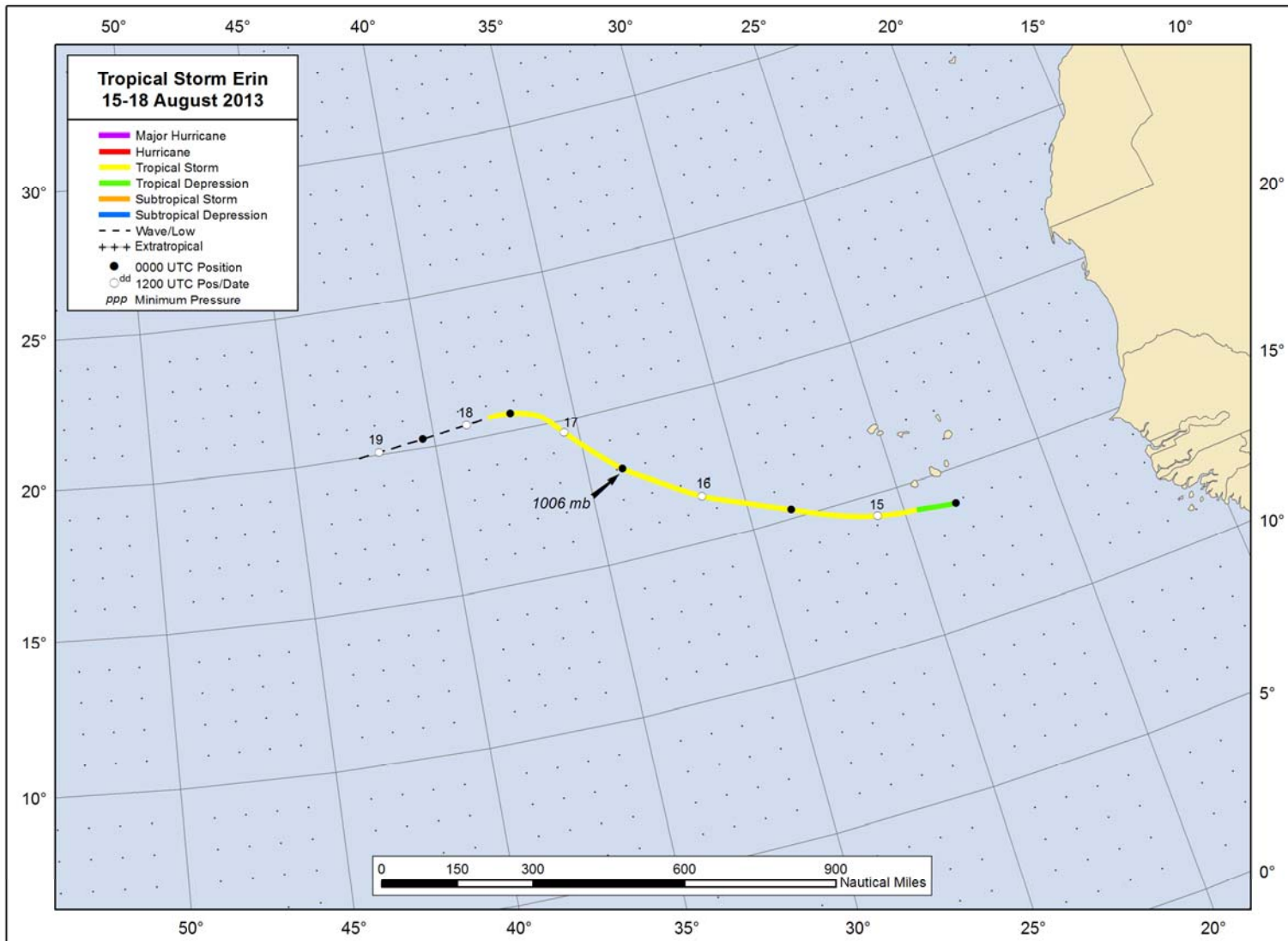


Figure 1. Best track positions for Tropical Storm Erin, 15-18 August 2013.

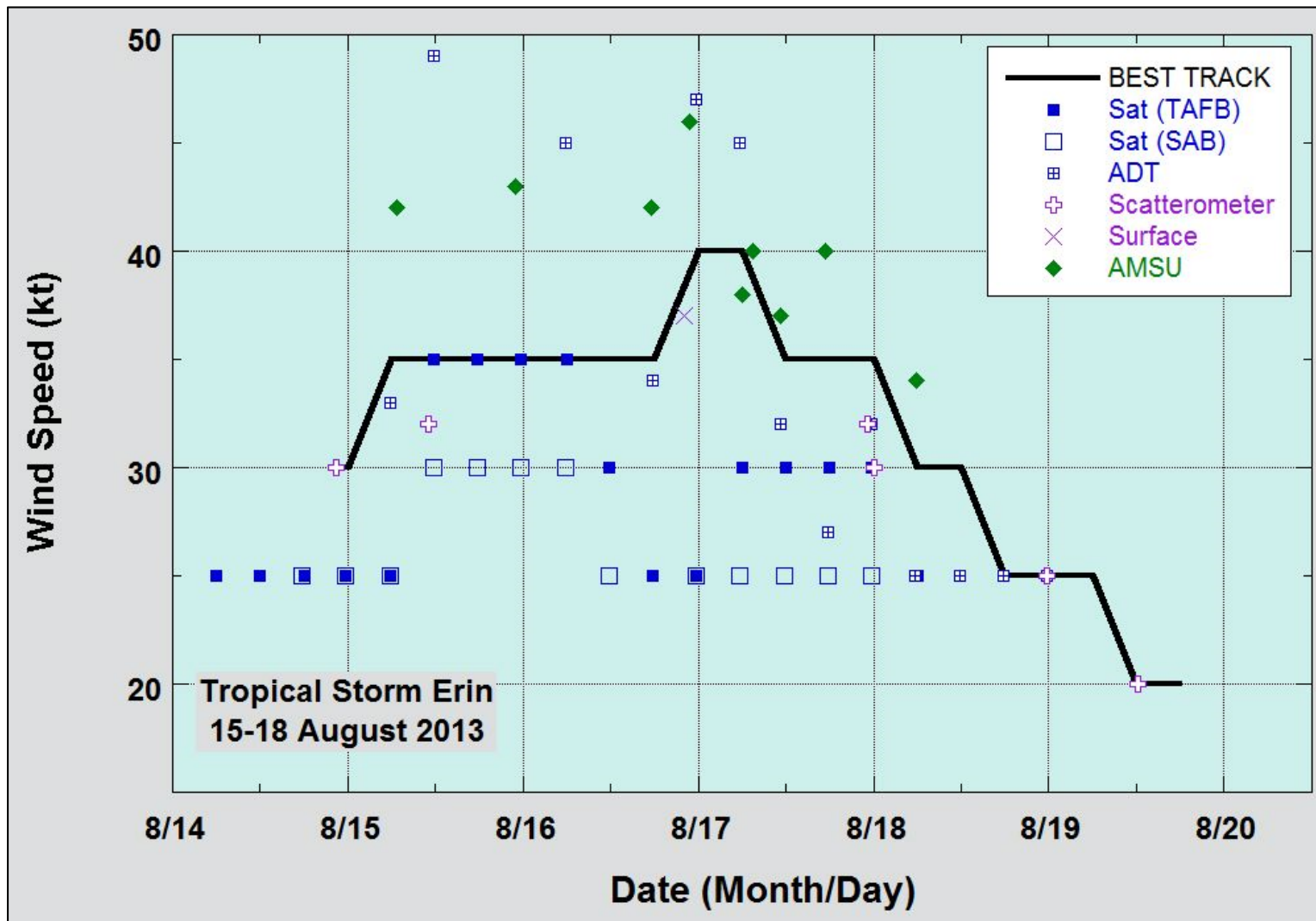


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Erin, 15-18 August 2013. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

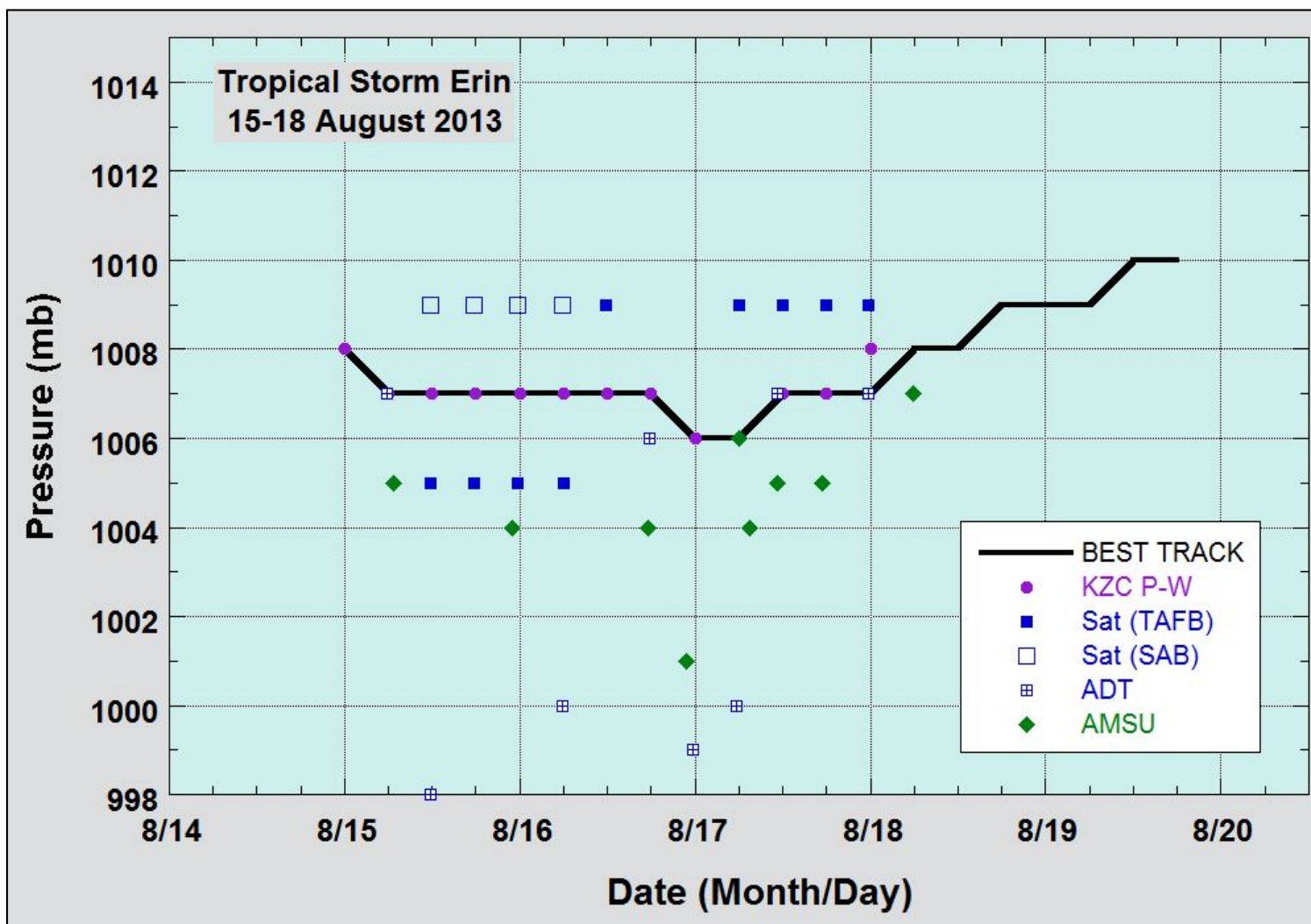


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Erin, 15-18 August 2013. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. AMSU intensity estimates are from the Cooperative Institute for Meteorological 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.