

Tropical Cyclone Report  
Tropical Storm Erika  
(AL062009)  
1-3 September 2009

Daniel P. Brown  
National Hurricane Center  
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Erika was a weak tropical storm that moved through the Lesser Antilles before dissipating over the eastern Caribbean Sea.

a. Synoptic History

Erika formed from a tropical wave that crossed the west coast of Africa on 25 August. The system moved quickly westward and generated a broad low pressure area late on 27 August about 340 n mi southwest of the southernmost Cape Verde Islands. Shower and thunderstorm activity associated with the low showed some signs of organization during the next day or so, but then diminished early on 29 August. The next day, convection redeveloped as the low moved over warmer waters about 950 miles east-southeast of the Leeward Islands. The system continued to produce deep convection during the next 24 to 36 h, and although scatterometer data showed that the system was producing winds to around tropical storm strength, it lacked a well-defined low-level center of circulation. On 1 September, microwave and conventional satellite imagery showed that the center had become better defined. Around 1800 UTC that day, a U.S. Air Force Reserve reconnaissance aircraft investigating the area of disturbed weather found a broad closed circulation that was sufficiently well defined for the system to be classified as a tropical cyclone. At that time, Erika was located about 250 n mi east of Guadeloupe and aircraft data suggest that the maximum winds were 45 kt. 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<sup>1</sup>.

The center was exposed to the west of a large cluster of deep convection at the time of formation. Several hours later, aircraft observations showed that a new center formed closer to the deep convection. The new center, however, appears to have been short-lived, since the next reconnaissance flight around 0600 UTC fixed the center well to the southwest of that position. During the following 36 h, Erika moved generally westward. Despite a seemingly favorable 200 mb wind pattern, westerly winds below this level produced strong vertical wind shear that resulted in the low-level center becoming exposed well to the west of most of the thunderstorm activity. This led to weakening and Erika is estimated to have diminished to a 35-kt tropical storm when the center crossed near or over Guadeloupe around 1800 UTC 2 September. At that time, the westerly vertical shear kept the convection and strongest winds well east of the Lesser Antilles. Thunderstorm activity briefly redeveloped near the center of the Erika early on 3

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<sup>1</sup> 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 *brk* directory, while previous years’ data are located in the *archive* directory.

September and aircraft data indicate that the cyclone re-intensified slightly during that time. The strengthening was short-lived as thunderstorm activity weakened and became further removed from the center later that day. Erika weakened to a tropical depression by 1800 UTC, while located about 70 n mi south-southeast of St. Croix. Six hours later Erika degenerated to a remnant low. The low moved west-northwestward and dissipated shortly after 0600 UTC 4 September as it passed about 70 n mi south of the southwestern tip of Puerto Rico.

b. Meteorological Statistics

Observations in Erika (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), as well as flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from flights of the 53<sup>rd</sup> Weather Reconnaissance Squadron of the United States Air Force Reserve Command. Data and imagery from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU) instrument, the NASA Tropical Rainfall Measuring Mission (TRMM), the NASA QuikSCAT, and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of Erika.

The estimated 45-kt peak intensity of Erika is based on a blend of an SFMR surface wind of 46 kt and a peak 1500 ft flight-level wind measurement of 52 kt. There were a few SFMR wind observations between 50 and 56 kt reported by the Air Force reconnaissance flight into Erika on the afternoon 1 September. These observations, however, were made in heavy rainfall and at a time when the SFMR instrument experienced numerous data dropouts. As a consequence, these measurements are unreliable.

During most of Erika's life, center fixes from the aircraft were located well to the northeast of a swirl of low clouds seen in satellite imagery. The final best track represents a compromise of the satellite and aircraft center estimates. At times it is somewhat unclear whether or not Erika had the well-defined circulation center that is required of a tropical cyclone. In deference to the real-time assessments, Erika has been maintained as a tropical cyclone in the final best track for nearly the same time period that it was operationally considered to have been one.

The ship **Canelo Arrow** (call sign C6OM8) reported 35 kt winds at 0300 UTC 3 September. A second ship (name unknown) located well northeast of the center of Erika at 0000 UTC 3 September, reported 39 kt winds, however, these winds are likely too high.

There were no reports received of sustained tropical storm force winds at land stations in association with Erika. Antigua reported a peak 1-min sustained wind of 30 kt with a gust to 38 kt at 0706 UTC 3 September. Antigua also measured a storm-total rainfall of 1.94 inches (49.2 mm).

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

The genesis of Erika was well forecast. The tropical wave from which Erika developed was introduced into the Tropical Weather Outlook at 1800 UTC 26 August, six days before genesis. The chance of development was assessed to be in the “high” category (greater than 50%) beginning at 1200 UTC 30 August, 54 h prior to formation.

A verification of NHC official track forecasts for Erika is given in Table 2a. Official forecast track errors were nearly double the size of the mean official errors for the previous five-year period, albeit for relatively few forecasts. A homogeneous comparison of the official track errors with selected guidance models is given in Table 2b. All of the available track models exhibited unusually large errors and a strong northward bias. This was likely the result of the models’ tracking a more vertically deep system northwestward around the southwestern portion of the mid-tropospheric ridge over the central and western Atlantic.

A verification of NHC official intensity forecasts for Erika is given in Table 3a. Official forecast intensity errors were much larger than the long-term mean official errors at the 24, 36, and 48 h forecast periods, although the official forecast errors were generally lower than those of the guidance models. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 3b. During Erika’s first 24 h, nearly all of the intensity guidance indicated that Erika would become a hurricane within a couple of days (Fig. 4). Although the NHC forecasts over-predicted Erika’s future intensity as well, the official forecasts remained below nearly all of the guidance and never forecast the cyclone to reach hurricane strength.

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

Table 1. Best track for Tropical Storm Erika, 1-3 September 2009.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
01 / 1800	16.7	57.3	1007	45	tropical storm
02 / 0000	16.8	58.0	1004	45	"
02 / 0600	16.5	58.9	1005	45	"
02 / 1200	16.4	59.9	1008	35	"
02 / 1800	16.3	61.0	1008	35	"
03 / 0000	16.3	61.9	1009	35	"
03 / 0600	16.4	62.7	1008	40	"
03 / 1200	16.5	63.5	1008	40	"
03 / 1800	16.6	64.5	1008	30	tropical depression
04 / 0000	16.8	65.5	1009	25	low
04 / 0600	17.0	66.5	1010	25	"
04 / 1200					dissipated
02 / 0000	16.8	58.0	1004	45	minimum pressure
02/ 1830	16.3	61.3	1008	35	Landfall on east coast of Guadeloupe

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm Erika. Mean errors for the five-year period 2004-8 are shown for comparison. Official errors that are smaller than the five-year means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	57.9	104.1	162.4	196.1			
OCD5	68.1	124.9	234.9	279.7			
Forecasts	7	5	3	1			
OFCL (2004-8)	32.1	54.9	77.1	99.0	147.0	200.3	263.6
OCD5 (2004-8)	45.8	95.7	152.8	208.6	306.2	393.6	472.9

Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm Erika. 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	55.7	102.7	154.2	196.1			
OCD5	57.3	108.5	203.6	279.7			
GFSI	88.2	131.7	<b>152.6</b>	202.0			
GHMI	66.9	129.5	201.1	280.1			
HWFI	69.8	150.3	219.0	266.1			
NGPI	68.7	129.6	206.3	299.9			
UKMI	<b>47.6</b>	<b>72.7</b>	<b>103.2</b>	<b>121.2</b>			
EMXI	<b>49.0</b>	<b>93.0</b>	<b>144.8</b>	<b>179.2</b>			
AEMI	<b>50.3</b>	<b>89.9</b>	<b>123.4</b>	<b>152.9</b>			
TVCN	60.8	121.0	173.2	217.0			
TVCC	59.4	120.6	172.9	207.2			
LBAR	<b>52.0</b>	<b>98.8</b>	<b>138.5</b>	<b>156.8</b>			
BAMD	<b>54.1</b>	112.4	169.2	235.8			
BAMM	<b>47.8</b>	<b>94.3</b>	<b>140.0</b>	<b>194.9</b>			
BAMS	56.0	<b>100.0</b>	<b>143.9</b>	<b>184.4</b>			
Forecasts	4	3	2	1			

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm Erika. Mean errors for the five-year period 2004-8 are shown for comparison. Official errors that are smaller than the five-year means are shown in boldface type.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	7.1	12.0	20.0	30.0			
OCD5	11.0	17.2	30.7	41.0			
Forecasts	7	5	3	1			
OFCL (2004-8)	7.1	10.5	12.8	14.7	18.1	19.0	20.9
OCD5 (2004-8)	8.5	12.3	15.3	17.7	20.8	23.1	23.2

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm Erika. 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 5a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	7.1	12.0	20.0	30.0			
OCD5	11.0	17.2	30.7	41.0			
HWFI	14.6	21.4	26.3	44.0			
GHMI	8.1	13.8	<b>19.7</b>	<b>22.0</b>			
DSHP	12.4	20.6	33.7	44.0			
LGEM	11.9	17.4	32.3	43.0			
ICON	10.7	18.6	28.3	38.0			
Forecasts	7	5	3	1			

Table 4. Watch and warning summary for Tropical Storm Erika, 1-3 September 2009.

Date/Time (UTC)	Action	Location
1/2100	Tropical Storm Watch issued	St. Maarten, Antigua, Barbuda, St. Kitts, Nevis, Anguilla, St. Martin, and St. Barthelemy
2/0900	Tropical Storm Warning issued	St. Maarten, Antigua, Barbuda, St. Kitts, Montserrat, Nevis, Anguilla, Saba, and St. Eustatius
2/1500	Tropical Storm Warning issued	Guadeloupe, St. Martin, and St. Barthelemy
2/2100	Tropical Storm Warning issued	Dominica
2/2100	Tropical Storm Watch issued	Puerto Rico and the U.S. and British Virgin Islands
3/1500	Tropical Storm Warning issued	Puerto Rico and the U.S. and British Virgin Islands
3/1800	Tropical Storm Warning discontinued	Dominica and Guadeloupe
3/2100	Tropical Storm Warning discontinued	All



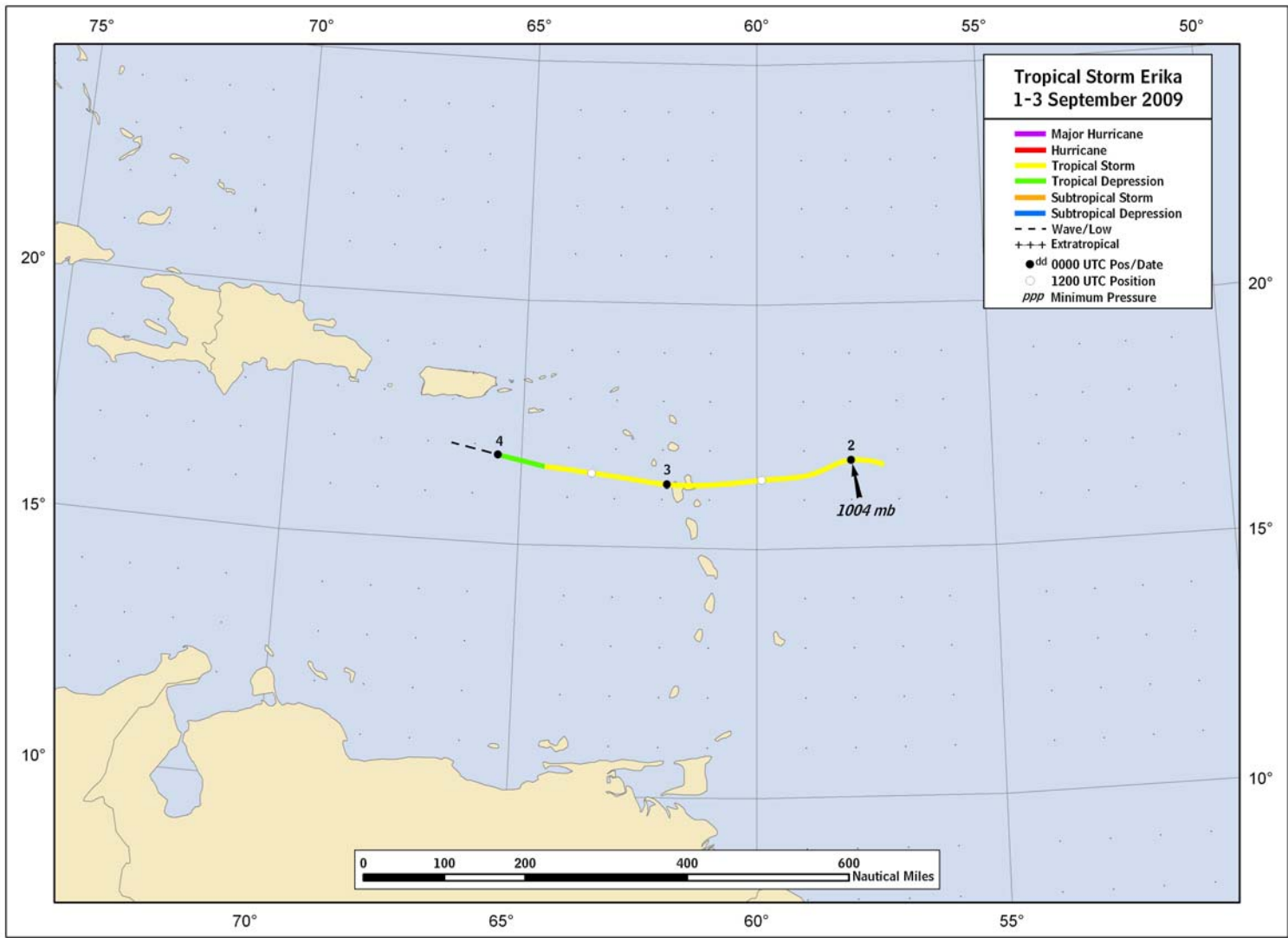


Figure 1. Best track positions for Tropical Storm Erika, 1-3 September 2009.

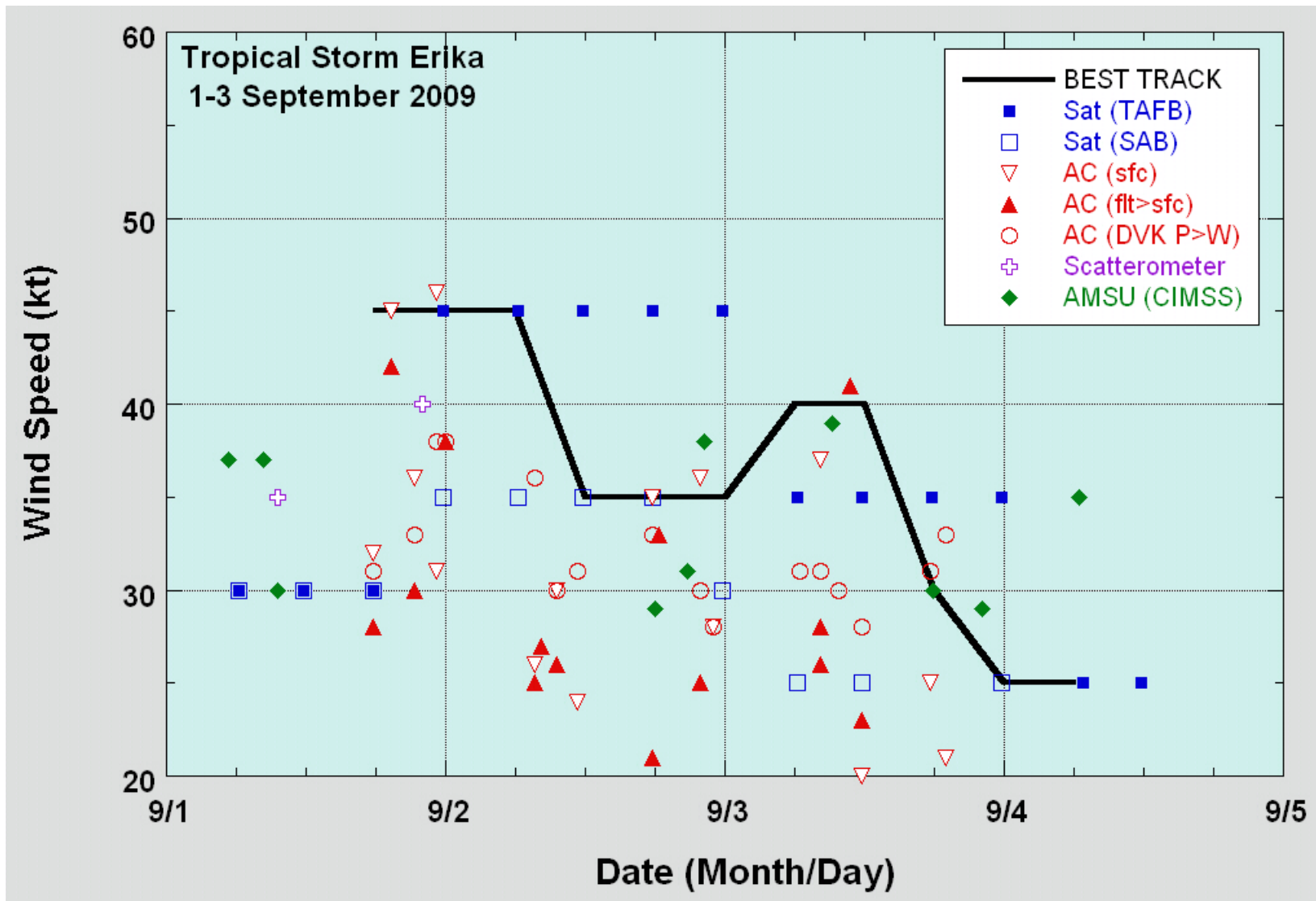


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Erika, 1-3 September 2009. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Dashed vertical lines correspond to 0000 UTC.

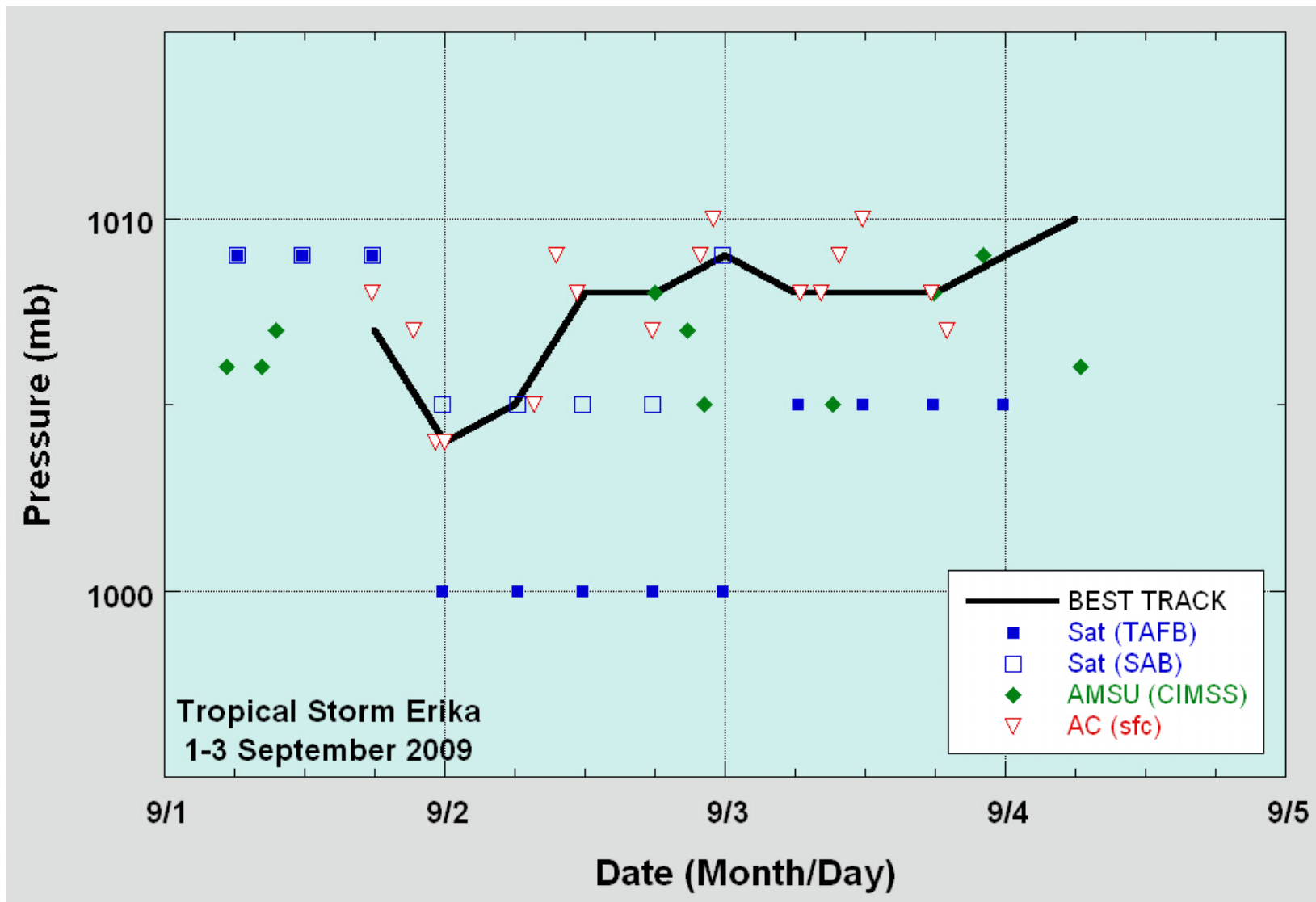


Figure 3. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Erika, 1-3 September 2009. Dashed vertical lines correspond to 0000 UTC.

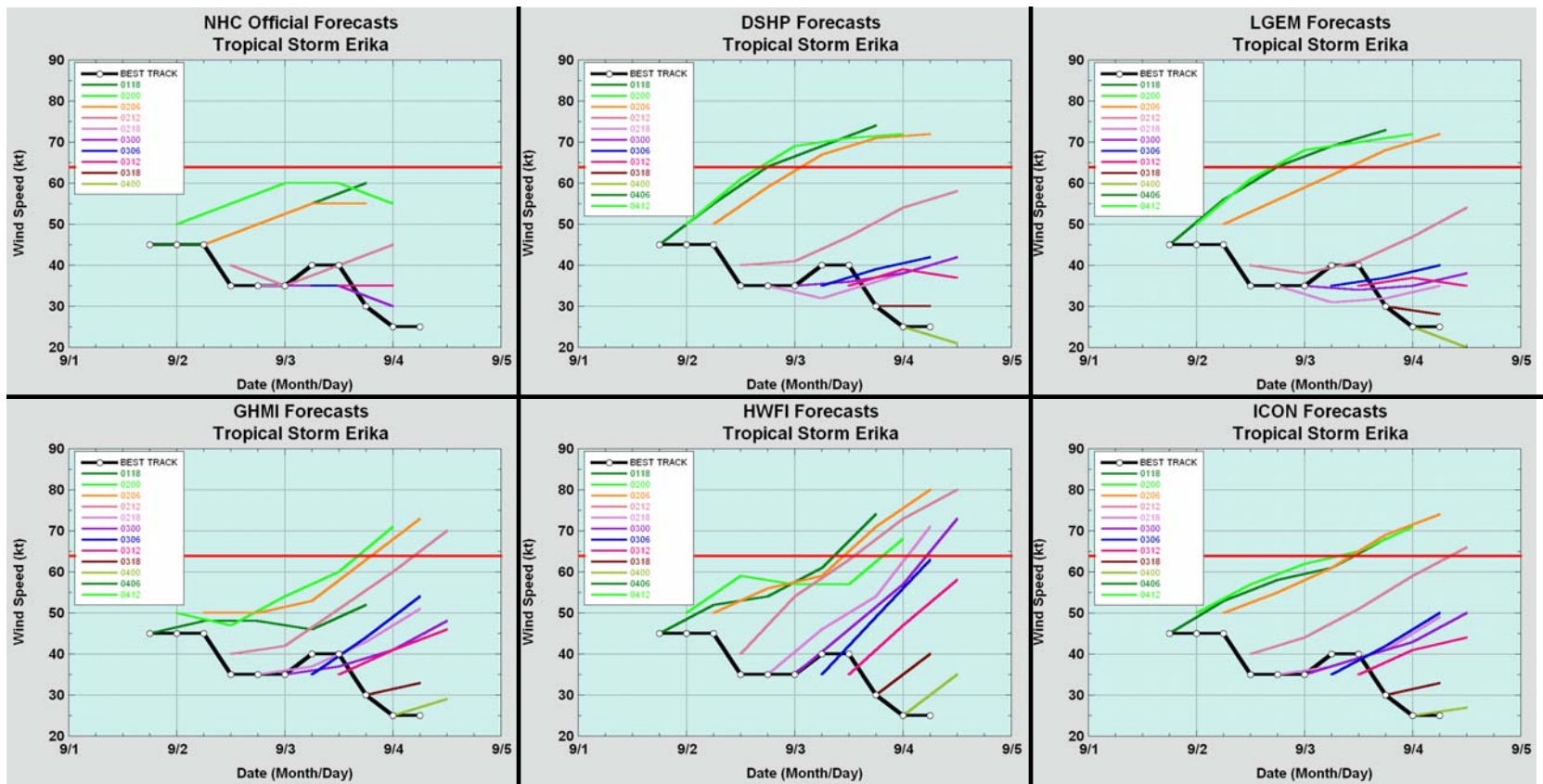


Figure 4. Selected official intensity forecasts (colored lines) for Tropical Storm Erika, 1-3 September 2009. The best track intensity is given by the thick solid line. Red horizontal lines denotes hurricane threshold.