Tropical Cyclone Report
Tropical Storm John
(EP102012)
2-4 September 2012

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John was a weak tropical storm that formed off the southwestern coast of Mexico, passed just north of Socorro Island, and weakened over the cool waters west of the Baja Peninsula.

a. Synoptic History

The development of John was complex. A tropical wave that departed the coast of Africa on 16 August, and which was responsible for the formation of Atlantic Hurricane Isaac, appears to have played a role in the formation of John. The wave crossed Central America on 26 August and passed south of the Gulf of Tehuantepec a couple of days later. As the wave continued westward over the next day or two, it caused an elongated trough of low pressure to form several hundred nautical miles south of the coast of southern Mexico. Early on 31 August, a broad cyclonic circulation formed from the trough a couple hundred nautical miles south-southwest of Acapulco, Mexico. Around this time, another easterly wave approached the broad cyclonic circulation. On 1 September, a low- to mid-level vorticity maximum associated with the second wave produced a new area of concentrated thunderstorms just southeast of Acapulco. Advanced Scatterometer (ASCAT) data indicate that this disturbance was producing winds to tropical-storm-force as it moved west-northwestward around the northeastern portion of the broad low. As this area of thunderstorms moved parallel to the southern coast of Mexico early on 2 September the low-level circulation associated with this feature gradually became better defined (Fig. 1). By 1200 UTC, a well-defined center of circulation formed and the system became a tropical storm while located about 200 n mi southwest of Mazanillo, Mexico. The "best track" chart of the John's path is given in Fig. 2, with the wind and pressure histories shown in Figs. 3 and 4, respectively. The best track positions and intensities are listed in Table 1[1].

During its existence, John moved steadily northwestward around the southwestern flank of a mid-level ridge centered over the south-central United States. John strengthened slightly and reached a peak intensity of 40 kt 6 h after formation. Shortly before 0600 UTC 3 September, the center of John passed just north of Socorro Island. Moderate to strong easterly shear prevented additional strengthening, and John reached cooler waters and began ingesting drier, more stable air later that day. This resulted in a reduction in thunderstorm activity and gradual weakening. The deep convection dissipated, and John became a remnant low at 1200 UTC 4 September, while centered about 340 n mi west of the southern tip of the Baja Peninsula. The

[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.

remnant low slowed down while moving west-northwestward to northwestward during the next couple of days, and dissipated several hundred nautical miles west of the west-central coast of the Baja Peninsula on 7 September.

b. Meteorological Statistics

Observations in John (Figs. 3 and 4) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB). 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 ASCAT, and Defense Meteorological Satellite Program (DMSP) satellites, among others, were also useful in constructing the best track of John.

Microwave and scatterometer data were extremely crucial in analyzing the complex development of John. The data showed the interaction of the two disturbances, with the second smaller vortex becoming the dominant circulation from which John developed. The 40-kt estimated maximum intensity of the tropical cyclone is based on typically low-biased ASCAT data that showed a large area of winds of 30 to 35 kt at 1726 UTC 2 September.

There were no reports of winds of tropical storm force in association with John. Surface wind and pressure observations from Soccoro Island were incomplete during the passage of John. Surface pressures, however, were atypically low at Soccoro Island the day before John's passage and the estimated minimum central pressure of the John is somewhat lower than the standard Dvorak pressure-wind relationship, but are closer to the Knaff-Zehr pressure-wind relationship using the best-track data (Fig. 3).

c. Casualty and Damage Statistics

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

d. Forecast and Warning Critique

Tropical cyclone formation south of Mexico was generally well forecast, although the details of this complex development were not. The initial disturbance was introduced into the Tropical Weather Outlook at 0000 UTC 30 August, with a low (<30%) of formation. The forecast was raised to the medium (30-50%) category 24 h later, and to the high category at 1800 UTC 1 September. The second area of disturbed weather, the one from which John developed, was first mentioned in a Special Tropical Weather Outlook issued at 1940 UTC 1 September and assigned a medium chance of formation. The chance of formation of this disturbance never increased, since it was thought that it would merge with the larger, leading disturbance. The two areas were merged in the TWO and assigned a 90% chance of formation at the time of genesis.

A verification of NHC official track forecasts for John is given in Table 2a and a homogeneous comparison of the official track errors with selected guidance models is given in Table 2b. Due to the small number of forecasts, a meaningful comparison of the official forecast with the various track models is not possible. That said, official forecast track errors were lower than the mean official errors for the previous 5-yr period.

A verification of NHC official intensity forecasts for John is given in Table 3a and a homogenous comparison of the official intensity errors with selected guidance models is given in Table 3b.

There were no watches or warnings issued in association with John.

Table 1. Best track for Tropical Storm John, 2-4 September 2012.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
02 / 1200	17.5	107.6	1004	35	tropical storm
02 / 1800	18.0	108.9	1001	40	"
03 / 0000	18.7	110.1	1000	40	"
03 / 0600	19.3	111.2	1001	35	"
03 / 1200	20.0	112.3	1003	35	"
03 / 1800	20.8	113.4	1003	35	"
04 / 0000	21.4	114.2	1004	30	tropical depression
04 / 0600	22.2	115.1	1004	30	"
04 / 1200	23.1	116.1	1005	30	low
04 / 1800	24.0	117.3	1006	30	"
05 / 0000	24.5	118.6	1006	30	"
05 / 0600	24.8	119.5	1006	25	"
05 / 1200	25.2	120.2	1007	20	"
05 / 1800	25.6	120.7	1007	20	"
06 / 0000	26.0	121.1	1007	20	"
06 / 0600	26.2	121.4	1007	20	"
06 / 1200	26.4	121.8	1008	15	"
06 / 1800	26.5	122.0	1008	15	"
07 / 0000	26.6	122.1	1008	15	"
07 / 0600	26.7	122.2	1008	15	"
07 / 1200					dissipated
03 / 0000	18.7	110.1	1000	40	Maximum winds and minimum pressure

Table 2a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Tropical Storm John, 2-4 September 2012. Mean errors for the 5-yr period 2007-11 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	**22.9**	**20.4**	**21.2**				
OCD5	36.2	79.1	138.3				
Forecasts	5	3	1				
OFCL (2007-11)	28.6	46.3	62.7				
OCD5 (2007-11)	38.5	74.8	116.0				

Table 2b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Tropical Storm John, 2-4 September 2012. 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	22.9	20.4	21.2				
OCD5	36.2	79.1	138.3				
GFSI	**21.7**	26.1	39.4				
GHMI	23.4	60.4	88.6				
HWFI	**18.1**	21.7	34.3				
EMXI	25.7	21.4	32.7				
NAMI	23.1	25.5	49.1				
AEMI	23.8	**18.1**	25.3				
TVCE	**18.1**	**16.0**	24.0				
LBAR	28.9	81.4	136.1				
BAMS	**13.4**	**17.5**	42.9				
BAMM	**17.3**	31.6	60.6				
BAMD	29.1	55.3	91.6				
Forecasts	5	3	1				

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Tropical Storm John, 2-4 September 2012. Mean errors for the 5-yr period 2007-11 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	**1.0**	**5.0**	**10.0**				
OCD5	3.8	3.0	8.0				
Forecasts	5	3	1				
OFCL (2007-11)	6.4	10.6	13.7				
OCD5 (2007-11)	7.5	12.4	16.1				

Table 3b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Tropical Storm John, 2-4 September 2012. 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	1.0	5.0	10.0				
OCD5	3.8	**3.0**	**8.0**				
GHMI	4.4	8.3	11.0				
HWFI	3.0	**1.7**	**6.0**				
DSHP	2.0	**4.3**	**6.0**				
LGEM	3.8	**2.7**	**0.0**				
ICON	3.2	**3.3**	**1.0**				
IVCN	3.2	**3.3**	**1.0**				
Forecasts	5	3	1				

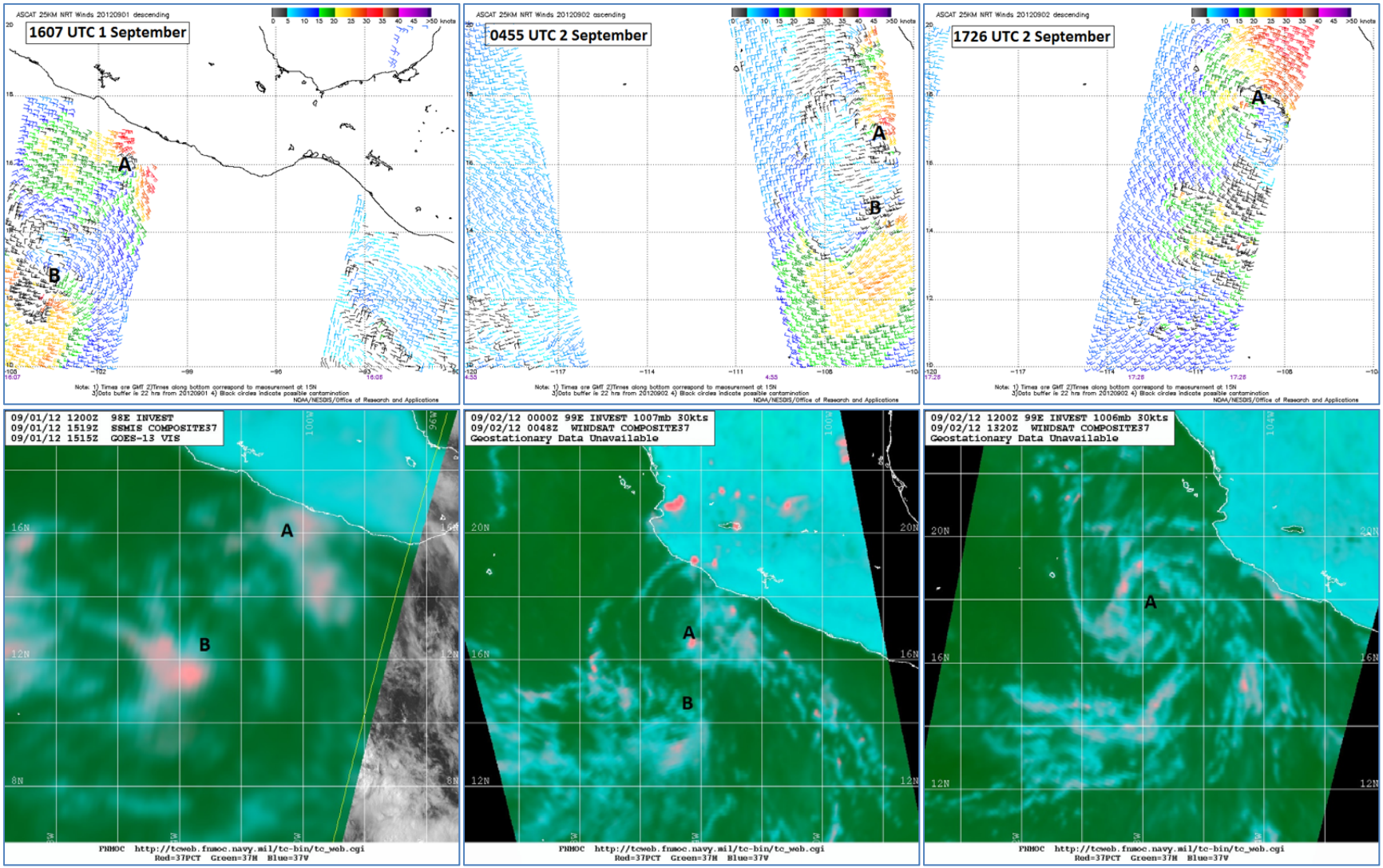

Figure 1. Series of ASCAT passes (top) and 37-GHz microwave images (bottom) from 1-2 September that show the evolution of the disturbance that became John (A). The leading broad low pressure area (B) moved eastward and weakened as the northern disturbance (A) became dominant and developed into Tropical Storm John by 1800 UTC 2 September. Note that the times of the ASCAT and microwave images are not coincident, but are within a few hours of one another.

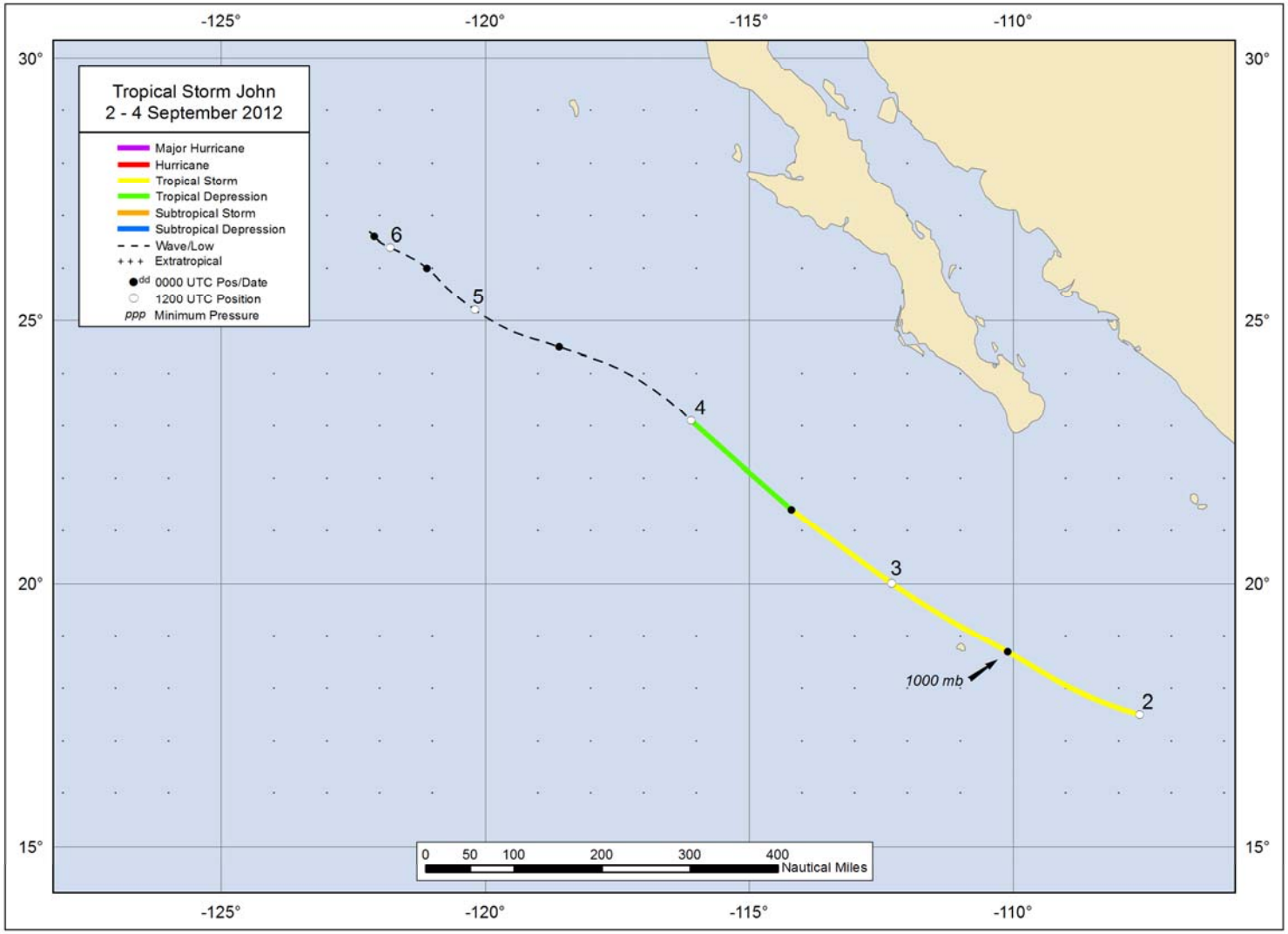

Figure 2. Best track positions for Tropical Storm John, 2-4 September 2012.

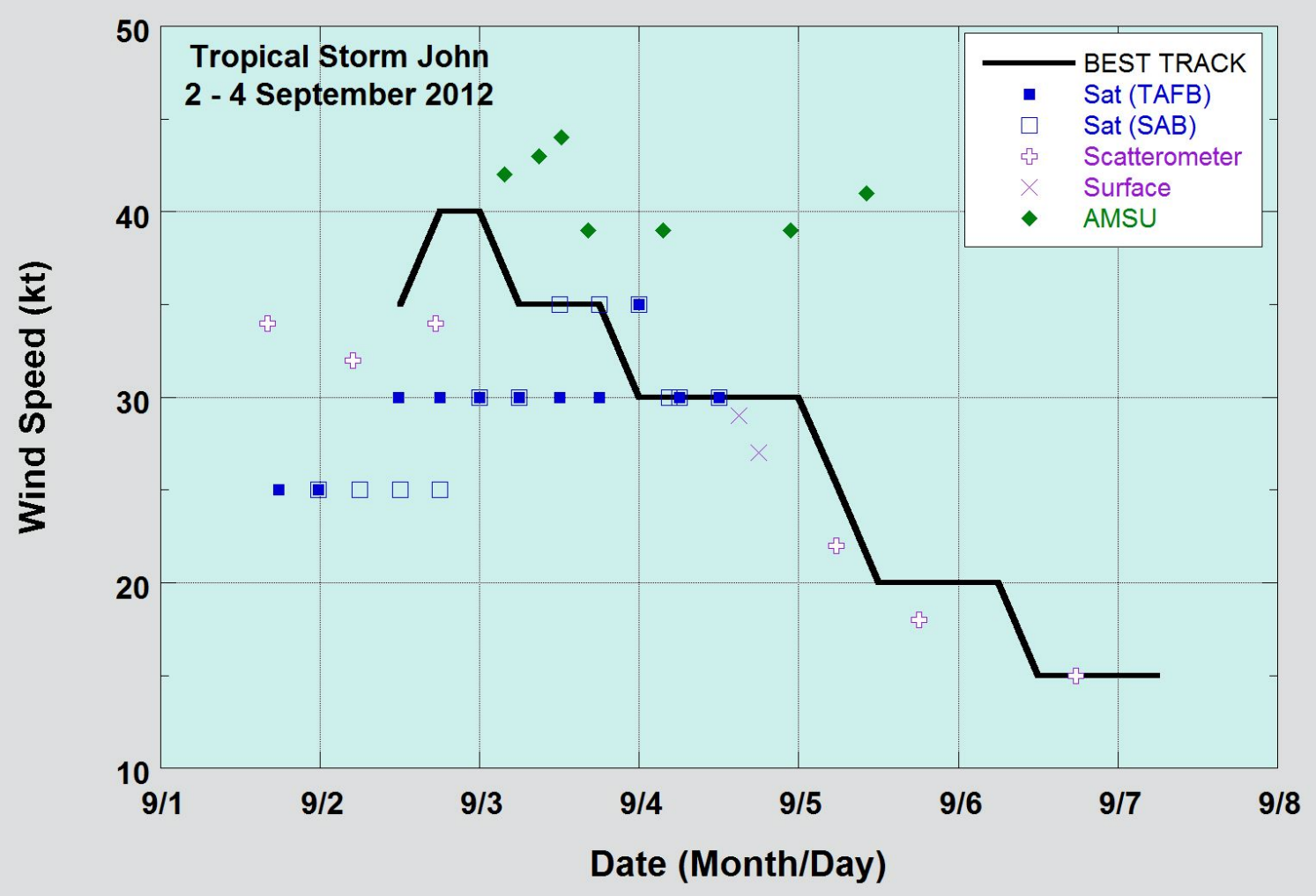

Figure 3. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm John, 2-4 September 2012. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

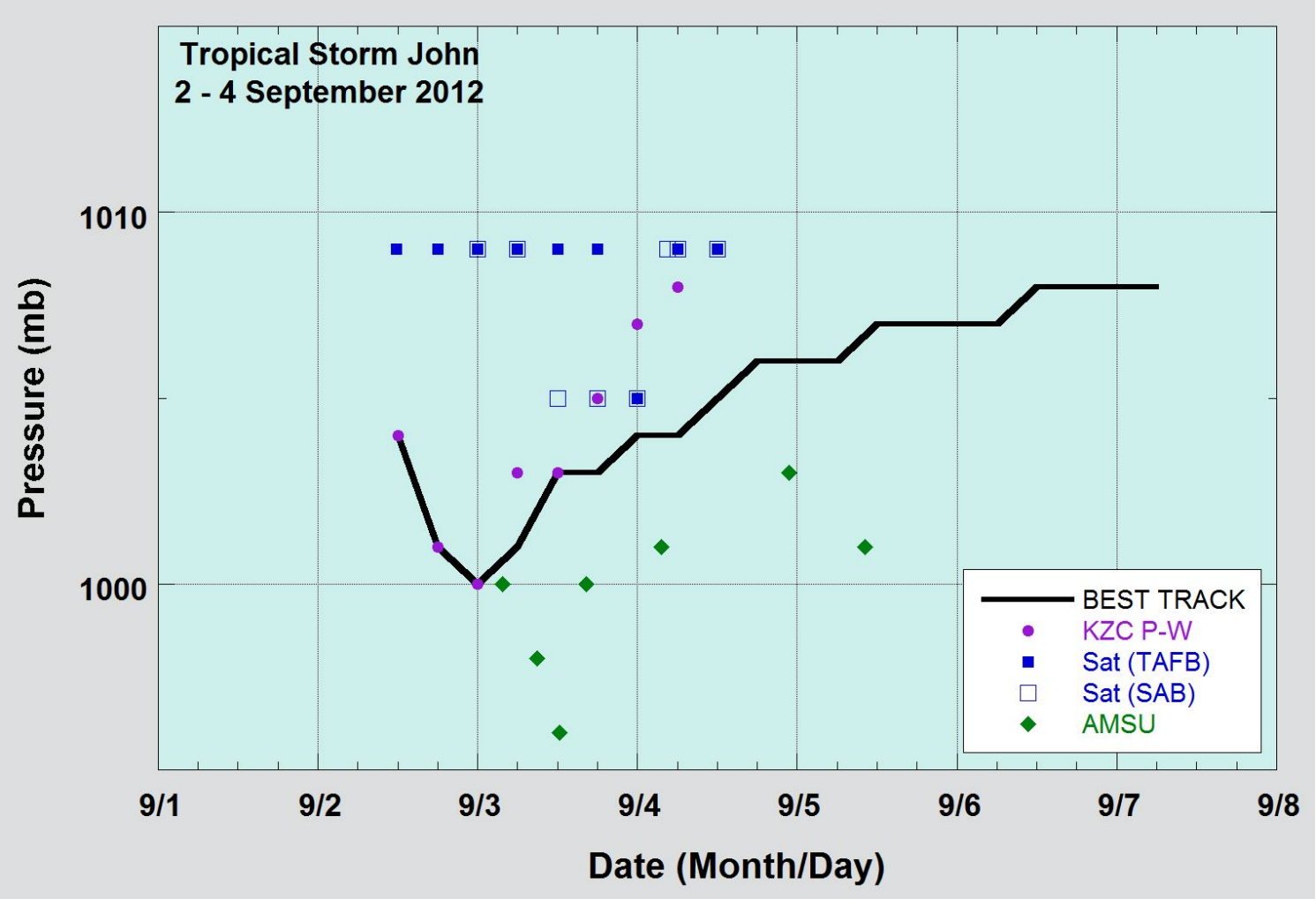

Figure 4. Selected pressure observations and best track minimum central pressure curve for Tropical Storm John, 2-4 September 2012. AMSU intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. The KZC P-W values are obtained by applying the Knaff-Zehr-Courtney pressure-wind relationship to the best track wind data. Dashed vertical lines correspond to 0000 UTC.