NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE JOHN

(EP122018)

5–10 August 2018

Eric S. Blake
National Hurricane Center
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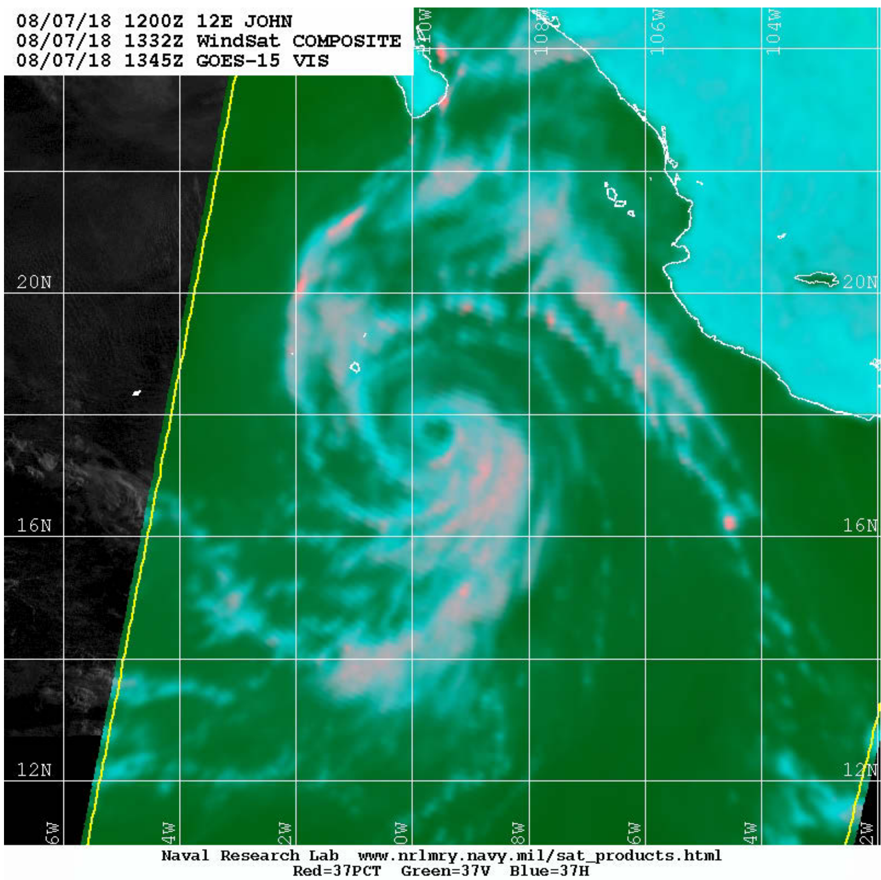

WINDSAT 37-GHZ COLOR COMPOSITE IMAGE OF JOHN NEARING PEAK INTENSITY AT 1332 UTC 7 AUGUST 2018. IMAGE COURTESY OF THE NAVAL RESEARCH LABORATORY.

John rapidly intensified into a strong category two (on the Saffir-Simpson Hurricane Wind Scale) hurricane over the eastern Pacific Ocean, passing close to Socorro Island before dissipating a few days later.

Hurricane John

5–10 AUGUST 2018

SYNOPTIC HISTORY

The origins of John can be traced to a weak tropical wave that left the coast of west Africa on 25 July and moved quickly westward. Convection associated with the low-latitude wave was confined to the Intertropical Convergence Zone until the wave moved over South America on 30 July. Two days later the wave tracked into the eastern Pacific, and thunderstorm activity greatly increased, likely enhanced by the positive phase of the Madden-Julian Oscillation. The convective activity led to the formation of a broad low pressure area on 4 August, and a well-defined low pressure center was observed by 1200 UTC 5 August, denoting the formation of a tropical depression about 290 n mi south-southwest of Manzanillo, Mexico. The depression became a tropical storm 12 h after genesis, moving generally to the northwest around a mid-level ridge over Mexico. The "best track" chart of John'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].

John began to rapidly intensify shortly after genesis in an environment of low shear, high mid-level moisture and very warm sea-surface temperatures. The system reached hurricane strength 30 h after formation and continued to quickly intensify. The hurricane attained a peak intensity of 95 kt around 1800 UTC 7 August, passing close to Socorro Island about 6 h later. Increasing northwesterly shear, however, caused the cyclone to gradually weaken on 8 August. John continued to lose strength due to the cyclone moving across cooler waters, and its sustained winds fell below hurricane force on 9 August. Deep convection ceased near the center early on 10 August, and John degenerated into a post-tropical cyclone by 1200 UTC that day about 300 n mi west-southwest of Punta Eugenia, Mexico. The low weakened while it moved northwestward before gradually turning northeastward and eastward in the low-level flow late on 11 August. The remnant low continued eastward for the next couple of days before opening up into a trough shortly after 1800 UTC 13 August about 350 n mi west of Punta Eugenia.

METEOROLOGICAL STATISTICS

Observations in John (Figs. 2 and 3) include subjective satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB), and the objective Advanced Dvorak Technique (ADT) estimates and Satellite Consensus (SATCON) estimates from CIMSS at the University of Wisconsin. Data and imagery

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[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.

from NOAA polar-orbiting satellites including the Advanced Microwave Sounding Unit (AMSU), the NASA Global Precipitation Mission (GPM), 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.

John's estimated peak intensity of 95 kt at 1800 UTC 7 August is based on a blend of lower TAFB/SAB subjective Dvorak estimates and higher ADT/SATCON estimates from UW-CIMSS.

John passed close to Socorro Island early on 8 August. While the island was outside of the radius of maximum winds, sustained winds of 48 kt were recorded at the Mexican Navy observation site, with a gust to 70 kt at 0200 UTC. The minimum reported pressure was 970 mb at 0015 UTC, although this value appears to be 4 or 5 mb too low based on quality control.

CASUALTY AND DAMAGE STATISTICS

No damage or deaths occurred in association with John.

FORECAST AND WARNING CRITIQUE

The genesis forecasts for John (Table 2) were better than average, with long lead times. The system was introduced into the Tropical Weather Outlook 162 h before genesis occurred with a low (< 40%) chance of genesis within 5 days, and probabilities reached the high (> 60%) category 72 h before genesis occurred. For the 2-day predictions, the system was given a medium (40–60%) chance 42 h before it formed, with a high probability 30 h before formation. The bulk of the model guidance had good genesis predictions for John, and this contributed to the high quality of the NHC forecasts.

A verification of NHC official track forecasts for John is given in Table 3a. Official forecast track errors were lower than the 5-yr mean official errors at all time periods except for 12 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The official forecast (OFCL) was competitive with the model guidance, among which the consensus aids GFEX (GFS/ECMWF) and the Florida State Superensemble (FSSE) had the best forecasts. Among the other normally reliable aids, the UKMET (EGRI) model had a poor performance for this cyclone.

A verification of NHC official intensity forecasts for John is presented in Table 4a. Official forecast intensity errors were generally near or above the mean official errors for the previous 5-yr period. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The NHC intensity forecast had a high bias, following the SHIPS, LGEM and GFS models more closely than the other models (Fig. 4). In addition, the timing of the peak intensity was about 12–24 h too slow, leading to a high bias in the weakening phase (Fig.

5). Consequently, the OFCL errors were quite large beyond 12 h, leading to much of the guidance besting the official forecast. Notably in the other guidance, the HWRF had an outstanding performance, while the Decay-SHIPS (DSHP) model had exceptionally large errors for John. These DSHP errors were similar to the large, high-biased errors noted in Hurricane Fabio. The combination of the GFS over-deepening John and the very high values of the SHIPS RI index likely led to the very large high bias in DSHP.

There were no land-based watches or warnings required for John.

Table 1. Best track for Hurricane John, 5–10 August 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
05 / 1200	13.7	105.0	1006	30	tropical depression
05 / 1800	14.2	105.5	1006	30	"
06 / 0000	14.5	106.3	1004	35	tropical storm
06 / 0600	14.8	107.0	1001	45	"
06 / 1200	15.3	107.5	996	55	"
06 / 1800	15.9	107.9	990	65	hurricane
07 / 0000	16.5	108.4	984	70	"
07 / 0600	17.1	109.0	977	80	"
07 / 1200	17.7	109.5	969	90	"
07 / 1800	18.3	110.1	964	95	"
08 / 0000	18.9	110.8	968	90	"
08 / 0600	19.6	111.5	975	80	"
08 / 1200	20.5	112.2	979	75	"
08 / 1800	21.5	113.0	979	75	"
09 / 0000	22.5	114.1	982	70	"
09 / 0600	23.3	115.3	986	65	"
09 / 1200	23.9	116.7	989	60	tropical storm
09 / 1800	24.4	117.8	992	55	"
10 / 0000	25.0	118.7	996	50	"
10 / 0600	25.6	119.5	999	45	"
10 / 1200	26.3	120.3	1002	35	low
10 / 1800	26.9	121.2	1003	30	"
11 / 0000	27.2	122.0	1003	30	"
11 / 0600	27.4	122.7	1003	30	"
11 / 1200	27.7	123.3	1003	30	"

11 / 1800	28.0	123.6	1006	30	"
12 / 0000	28.1	123.8	1008	25	"
12 / 0600	28.2	124.0	1009	20	"
12 / 1200	28.3	124.2	1009	20	"
12 / 1800	28.5	124.0	1009	20	"
13 / 0000	28.4	123.6	1009	20	"
13 / 0600	28.4	123.0	1009	20	"
13 / 1200	28.4	122.3	1009	20	"
13 / 1800	28.4	121.6	1009	20	"
14 / 0000					dissipated
07 / 1800	18.3	110.1	964	95	minimum pressure and maximum winds

Table 2. Number of hours in advance of the formation of John 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%)	72	162
Medium (40%-60%)	42	108
High (>60%)	30	72

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for John. 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	25.6	**30.1**	**31.6**	**35.1**	**53.2**	**73.2**	
OCD5	39.2	72.4	119.9	161.7	269.2	343.1	
Forecasts	17	15	13	11	7	3	
OFCL (2013-17)	21.8	33.2	43.0	53.9	80.7	111.1	
OCD5 (2013-17)	34.9	70.7	109.1	146.1	213.8	269.0	

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for John. 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	24.2	30.1	29.7	34.6	48.5	66.0	
OCD5	39.5	80.0	135.1	184.0	295.8	343.6	
GFSI	26.9	39.3	35.7	**32.1**	49.7	100.1	
HMNI	27.2	39.7	37.2	40.7	79.4	158.6	
HWFI	28.0	38.4	33.4	**31.9**	48.8	108.9	
EGRI	34.5	53.7	65.1	78.3	128.0	171.2	
EMXI	**17.9**	**24.6**	**27.5**	38.9	50.4	67.5	
CMCI	36.0	53.4	50.8	59.7	126.0	80.5	
NVGI	32.3	47.6	47.7	52.1	50.3	72.8	
AEMI	24.9	36.1	35.3	36.5	51.8	**42.0**	
HCCA	24.2	31.7	33.1	**33.8**	55.8	**56.4**	
FSSE	**22.3**	31.4	**28.7**	**27.4**	**39.0**	68.0	
TVCN	**22.1**	32.0	33.6	34.8	54.1	79.7	
TVCE	**23.3**	31.0	**29.5**	**30.3**	48.5	84.2	
TVCX	**21.5**	**29.4**	30.1	35.2	51.7	66.2	
GFEX	**21.4**	**28.1**	**26.7**	**31.8**	**44.5**	**48.3**	
TABD	37.7	59.7	57.1	50.6	56.3	85.6	
TABM	35.0	51.0	48.7	57.8	83.6	173.6	
TABS	32.1	55.4	59.7	74.3	114.6	181.7	
Forecasts	15	13	11	9	5	1	

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for John. 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	5.9	9.7	15.8	19.5	20.0	**15.0**	
OCD5	7.7	12.6	14.3	15.4	14.0	7.7	
Forecasts	17	15	13	11	7	3	
OFCL (2013-17)	5.8	9.6	11.8	13.2	15.1	15.1	
OCD5 (2013-17)	7.6	12.4	15.6	17.7	19.8	20.8	

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for John. 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	5.9	9.3	15.8	19.5	20.8	17.5	
OCD5	7.7	12.1	**13.0**	**12.8**	**13.2**	**10.5**	
GFSI	7.2	11.9	15.9	**18.3**	**19.2**	20.0	
EMXI	9.6	14.9	16.0	**13.1**	**4.3**	**10.5**	
HMNI	7.7	11.0	**12.8**	**11.7**	**10.5**	**7.0**	
HWFI	**5.4**	**5.9**	**6.5**	**3.7**	**2.8**	**7.0**	
DSHP	6.1	10.9	21.6	33.9	43.3	41.0	
LGEM	6.2	**7.8**	**10.7**	**15.2**	**19.7**	**15.5**	
ICON	**4.9**	**6.3**	**6.7**	**9.7**	**15.0**	**17.0**	
IVCN	**4.8**	**5.9**	**6.3**	**7.0**	**12.2**	**16.0**	
HCCA	**4.6**	**7.6**	**10.9**	**13.0**	**13.7**	**10.5**	
FSSE	**4.7**	**5.6**	**9.3**	**14.1**	**20.3**	22.0	
Forecasts	16	14	12	10	6	2	

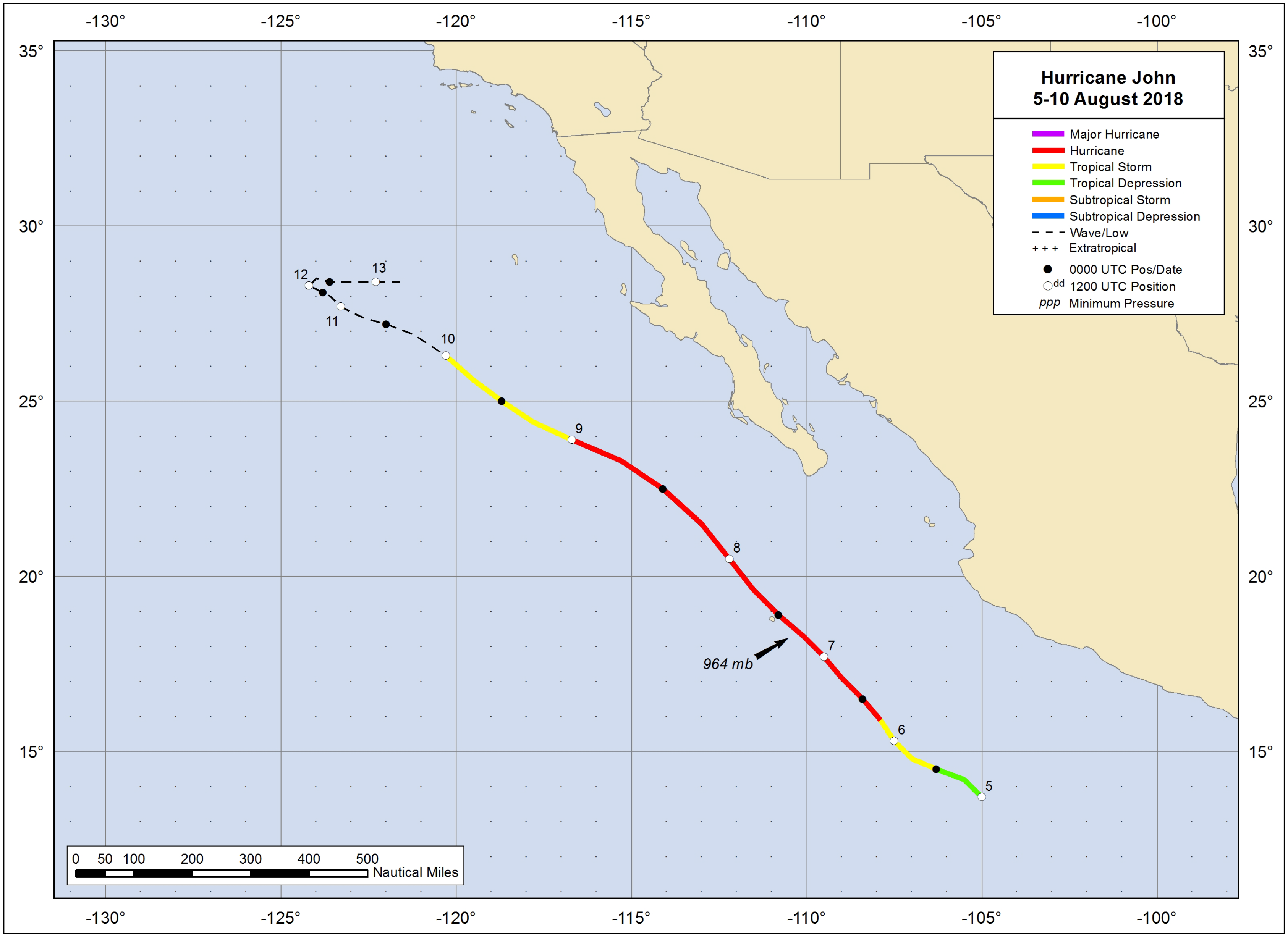

Figure 1. Best track positions for Hurricane John, 5–10 August 2018.

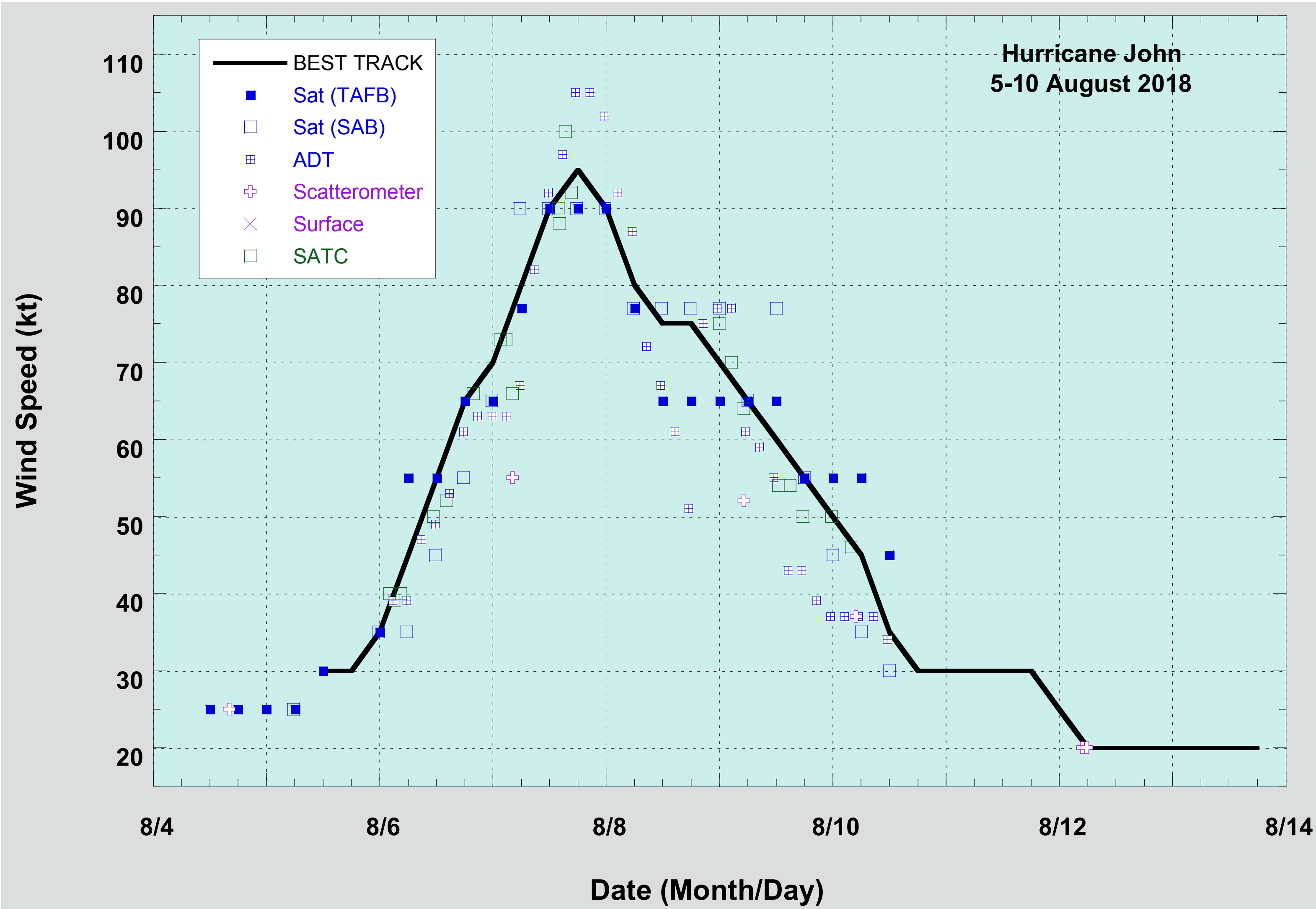

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for John. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATC intensity estimates are the satellite consensus estimates from the Cooperative Institute for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

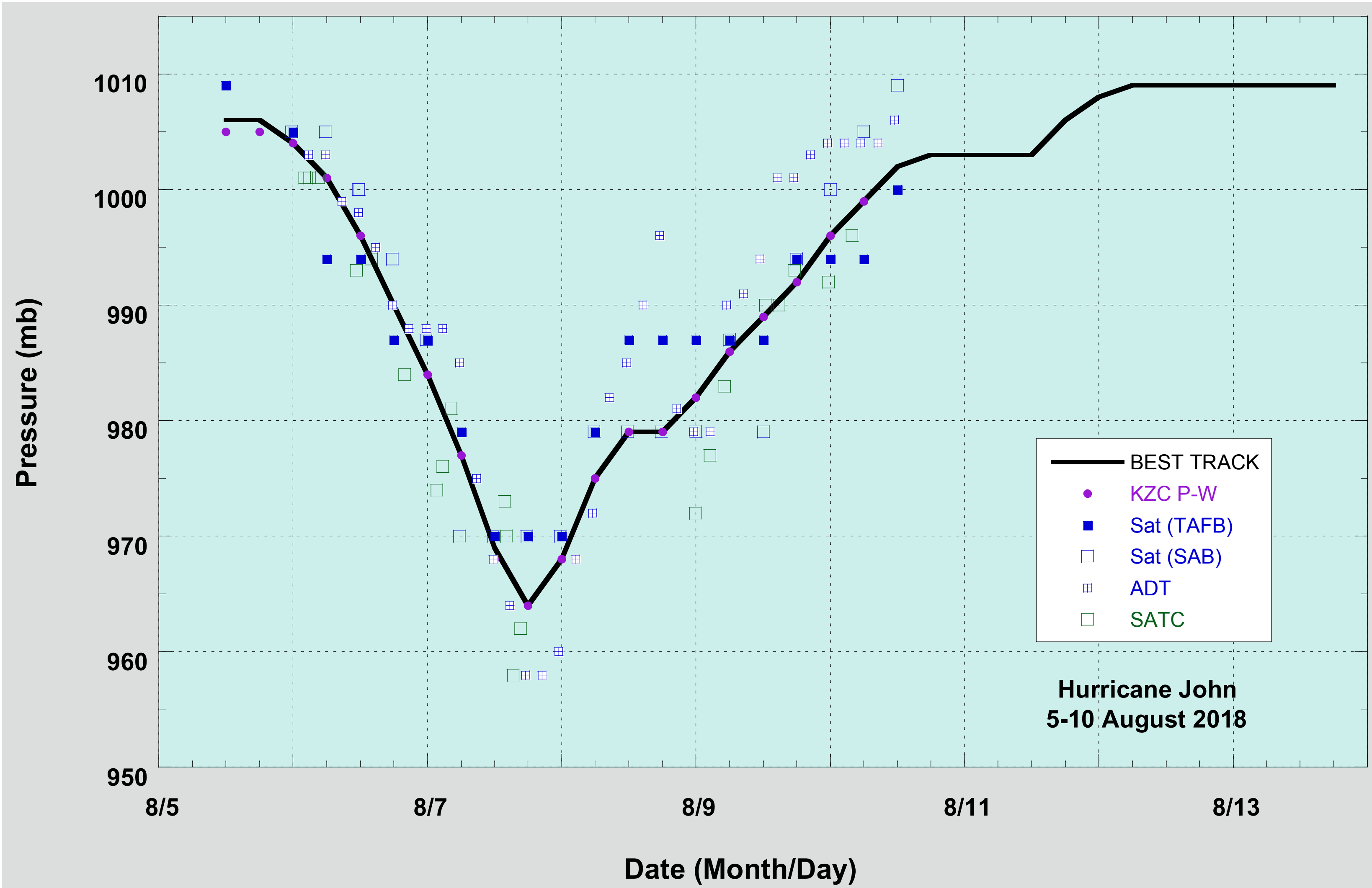

Figure 3. Selected pressure observations and best track minimum central pressure curve for John. Advanced Dvorak Technique estimates represent the pressure from the Current Intensity at the nominal observation time. SATC pressures estimates are the satellite consensus estimates from the Cooperative Institute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

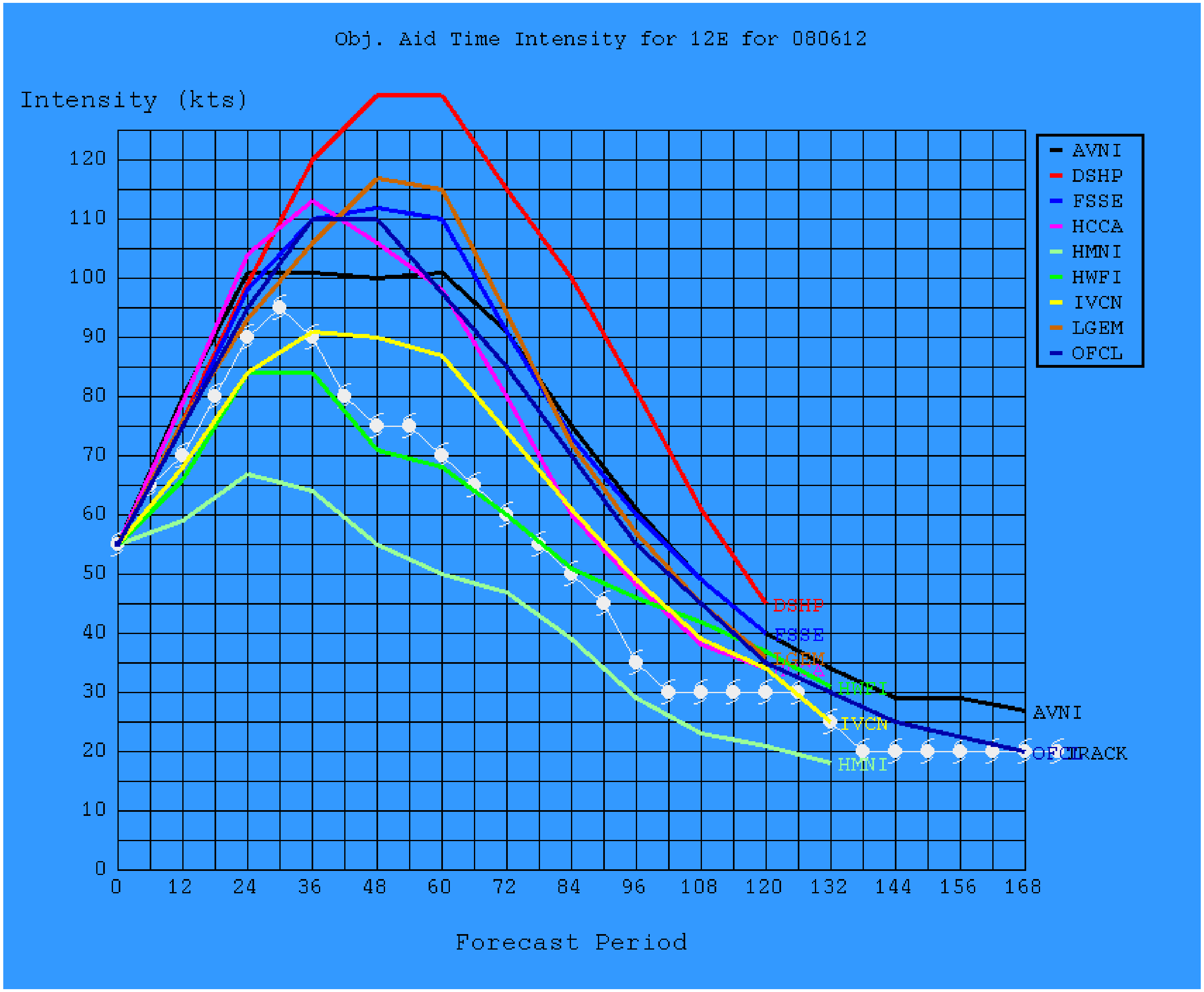

Figure 4. NHC intensity aids (kt, colored lines) for the 1200 UTC 6 August 2018 John forecast (verifying intensity in white).

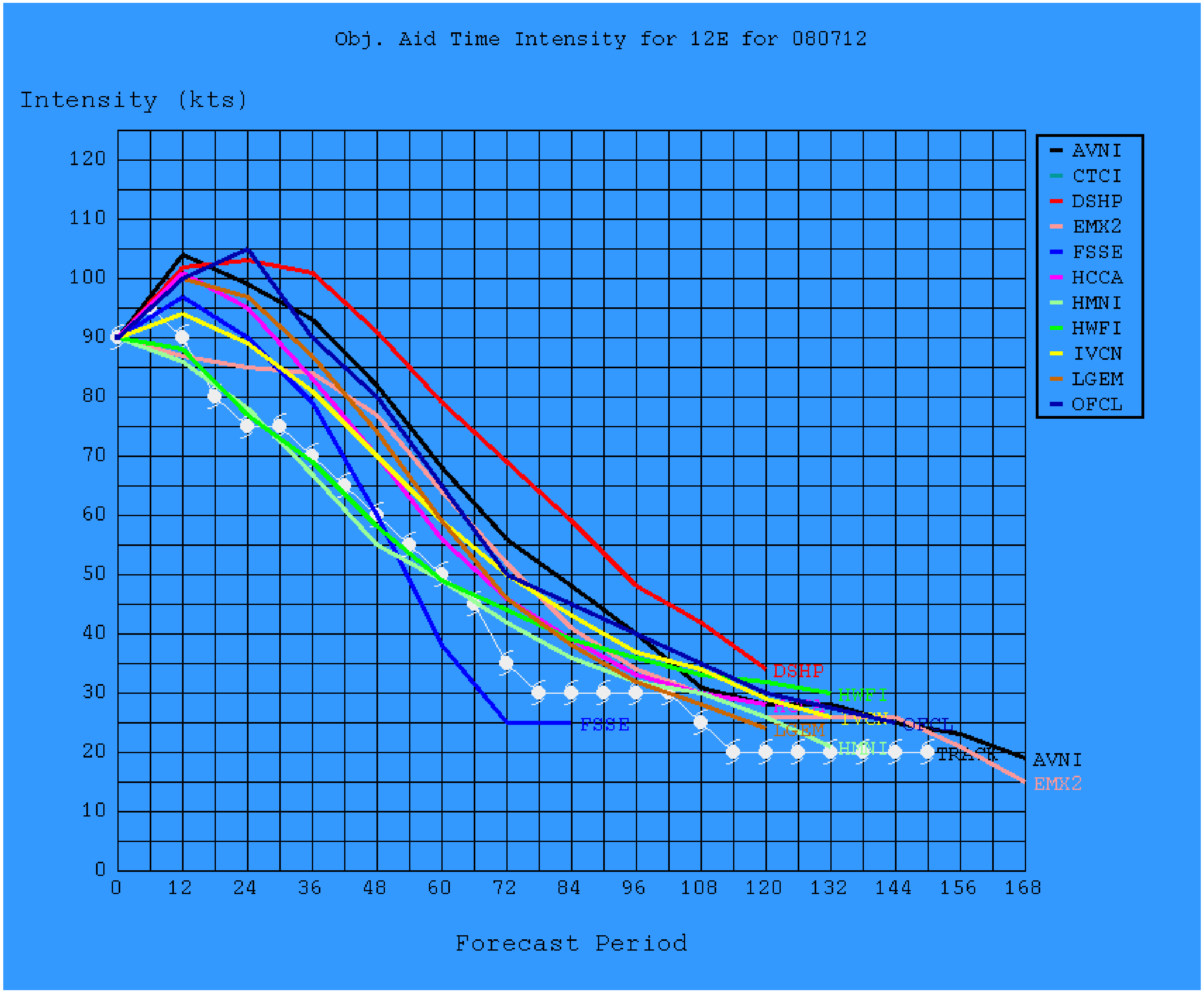

Figure 5. NHC intensity aids (kt, colored lines) for the 1200 UTC 7 August 2018 John forecast (verifying intensity in white).