

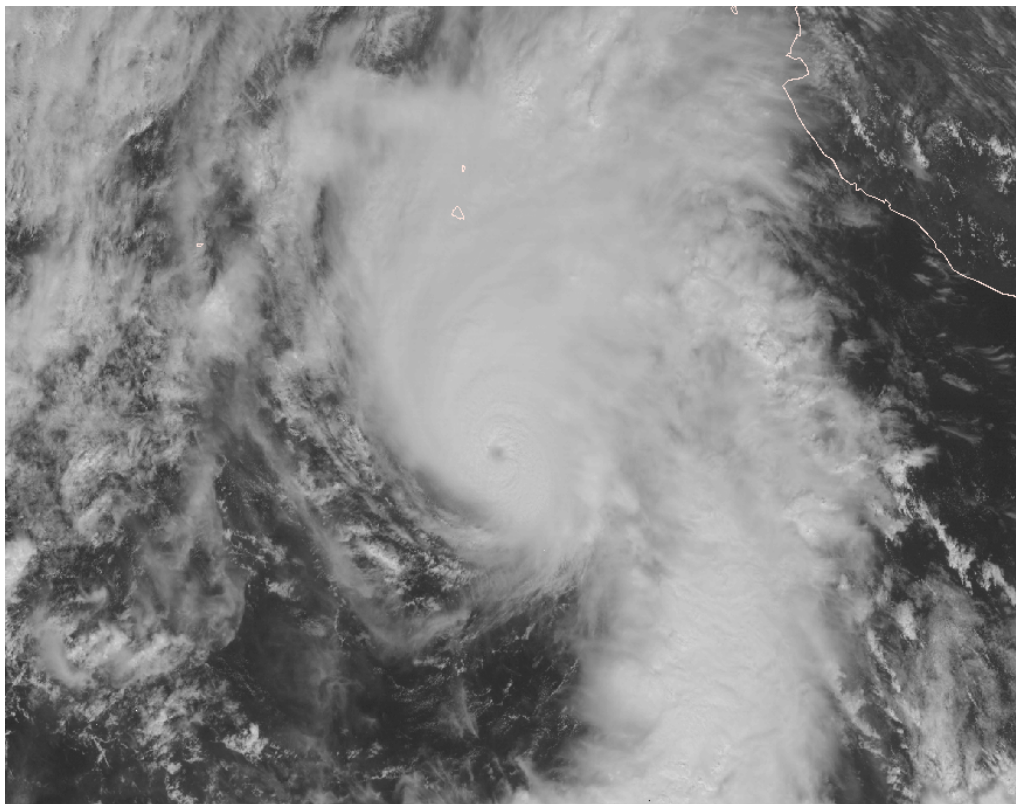


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## HURRICANE VANCE (EP212014)

30 October – 5 November 2014

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27 January 2015



GOES-15 VISIBLE IMAGERY OF VANCE NEAR PEAK INTENSITY AT 1830 UTC 3 NOVEMBER

Vance was a rare November category 2 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that dissipated before reaching southwestern Mexico.

# Hurricane Vance

30 OCTOBER – 5 NOVEMBER 2014

## SYNOPTIC HISTORY

Vance originated from a trough of low pressure that extended from the southern side of Atlantic Tropical Storm Hanna across the Isthmus of Tehuantepec and into the eastern Pacific. A weak low was first noted a couple of hundred miles south-southeast of the Gulf of Tehuantepec on 25 October. The low produced disorganized showers and thunderstorms during the next several days while it drifted south-southwestward as a result of northerly low-level winds related to a Tehuantepec gap wind event<sup>1</sup>. Although the shear was not strong, the system was ingesting drier air related to the gap wind event, which slowed significant development. The low became better defined late on 27 October, and early the next day an increase in deep convection nearly resulted in the formation of a tropical cyclone. However, scatterometer data indicated the system lacked a well-defined center of circulation, and the system became less organized by late on 28 October. The low drifted west-northwestward, still producing some deep convection, and the circulation only gradually became better defined. The low became well defined late on 29 October, and by 0600 UTC 30 October, it was producing enough organized deep convection to be considered a tropical depression about 400 n mi south of Acapulco, Mexico. 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>2</sup>.

The depression became a tropical storm 12 h after formation, and strengthened slightly in a low-shear, warm-water environment. Vance did not move much on 31 October, drifting to the south and southwest while a mid-level ridge built over the far eastern Pacific. Although most other environmental factors seemed conducive, Vance weakened later that day due to the entrainment of low- to middle-level dry air into the core of the tropical storm. The ridge then strengthened north of the cyclone, causing Vance to accelerate westward and west-northwestward over the next couple of days. On 1 November, Vance entered a higher-moisture environment and was able to produce more significant convection, causing the storm to restrengthen. A developing eye was noted on microwave images late that day, and the formation of this inner-core structure within a low-shear environment likely contributed to the rapid intensification of Vance on 2 November. The storm became a hurricane at about 1200 UTC and continued to strengthen, with the eye becoming apparent on visible satellite images later on 2 November. Vance turned northwestward while it was steered around the southwestern periphery of the ridge, followed by a northward turn late the next day. The hurricane maintained its sustained winds on 3 November despite

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<sup>1</sup> A Tehuantepec gap wind event is an acceleration of the wind through the Chivela Pass, a gap between two mountain ranges, in the Isthmus of Tehuantepec. It commonly occurs when there are large differences in pressure between the southern Gulf of Mexico and the far eastern Pacific Ocean, and usually leads to enhanced northerly flow over the Gulf of Tehuantepec that is much stronger than in nearby areas.

<sup>2</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 *bt*k directory, while previous years’ data are located in the *archive* directory.

increasing wind shear, reaching a peak intensity of 95 kt at 1800 UTC while it was centered about 410 n mi west-southwest of Manzanillo (cover image).

Early on 4 November, Vance turned northeastward and the cloud pattern of the cyclone became elongated due to increasing vertical wind shear from an approaching mid-latitude trough. This shear became quite strong by midday, causing Vance to weaken extremely quickly from category 2 hurricane strength to a tropical depression over a period of 30 h, and fortunately so since the system was only about 35 n mi west of the Islas Marias, Mexico at the end of the period. The very strong shear caused Vance to degenerate into a trough of low pressure during the next few hours before sunrise on 5 November, with only a small area of thunderstorms noted along the northern end of the trough when it moved onshore and dissipated over the Mexican states of southeastern Sinaloa and Nayarit several hours later.

## METEOROLOGICAL STATISTICS

Observations in Vance (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 Vance.

The estimated peak 95-kt intensity of Vance is based on a blend of satellite intensity estimates from TAFB, SAB and ADT estimates from CIMSS. Hurricanes of this strength are quite unusual in the eastern Pacific so late in the year. In fact, Vance is tied with Sergio (2006) for being the second-strongest hurricane on record for the eastern Pacific in November.

The center of Vance was becoming increasingly difficult to track in the overnight hours early on 5 November. Operationally, Vance was maintained as a tropical depression through landfall in the interest of public safety. A post-storm review suggests that Vance most likely lost its closed circulation (and tropical cyclone status) prior to landfall.

There were no ship reports of winds of tropical storm force associated with Vance.

## CASUALTY AND DAMAGE STATISTICS

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

## FORECAST AND WARNING CRITIQUE

The genesis forecasts for Vance were of mixed quality (Table 2). The lead time in the Tropical Weather Outlook product was quite high, reflecting the confidence of the NHC forecasters that Vance would eventually form. However, Vance formed about two days later than expected, leading to the inflated lead times at all forecast periods.

A verification of NHC official track forecasts for Vance is given in Table 3a. Official forecast track errors were a little higher than the mean official errors for the previous 5-yr period through 24 h, and generally well below the mean after 48 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The NHC forecast (OFCL) was superior to much of the guidance, with only the track consensus (TVCN) and the ECMWF (EMXI) model beating the official forecast at more than one time period. The GFS had a relatively good performance for this storm through 96 h, while the HWRF had one of its poorer verifications for the season.

A verification of NHC official intensity forecasts for Vance is given in Table 4a. Official forecast intensity errors were generally close to the mean official errors for the previous 5-yr period, except higher at 72 and 96 h. The relatively high OCD5 errors suggest that Vance was a difficult storm to forecast, which is consistent with past hurricanes that have rapid intensification and weakening periods. Since the NHC forecasts were close to the long-term average errors, the NHC intensity predictions can be regarded as skillful. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. Although the official intensity forecasts (OFCL) did not have particularly low errors, the predictions bested almost all of the guidance. While OFCL had a notable low bias beyond 24 h, there was a consistent message in anticipating that Vance would eventually become a hurricane, with almost all of the other guidance having a larger low bias. The DSHP and GFDL models were the best of the rest of the guidance, and the LGEM, in particular, struggled with Vance.

The government of Mexico issued a tropical storm watch from Mazatlán to Topolobampo at 0300 UTC 4 November, and the watch was discontinued at 0900 UTC 5 November. No tropical-storm-force winds were reported in Mexico.

Table 1. Best track for Hurricane Vance, 30 October – 5 November 2014.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
29 / 1800	10.7	99.1	1007	30	low
30 / 0000	10.8	99.6	1007	30	"
30 / 0600	11.0	100.0	1006	30	tropical depression
30 / 1200	11.2	100.3	1006	30	"
30 / 1800	11.1	100.6	1005	35	tropical storm
31 / 0000	10.8	100.5	1004	40	"
31 / 0600	10.4	100.4	1002	45	"
31 / 1200	9.9	100.7	1002	45	"
31 / 1800	9.6	101.2	1004	40	"
01 / 0000	9.4	101.7	1004	40	"
01 / 0600	9.4	102.3	1005	35	"
01 / 1200	9.6	103.0	1005	35	"
01 / 1800	9.8	103.8	1004	40	"
02 / 0000	10.2	104.8	1001	45	"
02 / 0600	10.7	106.0	998	55	"
02 / 1200	11.4	107.1	994	65	hurricane
02 / 1800	12.2	108.2	986	75	"
03 / 0000	13.1	109.2	973	90	"
03 / 0600	14.0	110.0	971	90	"
03 / 1200	14.9	110.6	969	90	"
03 / 1800	15.9	110.9	964	95	"
04 / 0000	16.9	110.8	964	95	"
04 / 0600	17.9	110.3	968	90	"
04 / 1200	18.9	109.5	972	85	"
04 / 1800	19.9	108.7	990	60	tropical storm
05 / 0000	20.7	108.0	1002	40	"
05 / 0600	21.5	107.3	1004	30	tropical depression
05 / 1200					dissipated
03 / 1800	15.9	110.9	964	95	minimum pressure and max winds

Table 2. Number of hours in advance of tropical cyclone formation 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 (<30%)	102	168
Medium (30%-50%)	96	162
High (>50%)	60	132

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Vance. 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	26.9	43.4	<b>53.8</b>	<b>67.6</b>	<b>79.7</b>	<b>48.8</b>	<b>63.8</b>
OCD5	51.3	120.0	205.7	269.1	341.2	330.4	195.4
Forecasts	23	21	19	17	13	9	5
OFCL (2009-13)	25.7	41.4	55.0	68.6	97.8	134.2	167.1
OCD5 (2009-13)	37.2	74.8	118.0	162.5	249.4	332.6	413.3

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Vance. 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	22.9	40.3	50.9	64.0	79.4	51.9	76.6
OCD5	50.3	117.1	205.5	272.0	353.4	345.7	198.2
GFSI	27.3	45.7	54.9	<b>62.7</b>	95.4	93.2	203.3
GHMI	29.1	53.7	74.5	87.8	83.8	105.5	252.6
HWFI	31.2	58.3	70.7	81.3	129.7	118.8	196.6
EMXI	24.9	40.7	<b>49.0</b>	<b>60.7</b>	123.5	73.9	123.6
AEMI	28.4	52.7	64.6	75.3	105.3	81.1	<b>71.6</b>
TVCN	<b>21.9</b>	40.4	53.1	67.2	96.9	<b>43.2</b>	<b>58.3</b>
LBAR	38.5	84.1	117.0	141.7	197.0	266.3	481.4
BAMD	48.6	102.9	152.9	167.9	143.4	209.4	401.2
BAMM	39.7	74.5	93.1	101.3	84.5	122.0	162.5
BAMS	57.2	107.9	154.4	188.2	252.4	261.5	317.5
CMCI	58.2	99.8	124.9	138.8	125.9	196.0	397.0
NVGI	28.6	54.9	80.0	104.6	195.2	164.8	302.2
GFNI	30.0	56.7	80.9	112.5	132.0	117.3	105.0
Forecasts	20	19	18	16	12	8	4

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Vance. 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	6.5	<b>10.0</b>	<b>13.2</b>	15.3	16.9	18.3	<b>10.0</b>
OCD5	8.3	14.7	19.9	23.2	21.8	26.6	23.8
Forecasts	23	21	19	17	13	9	5
OFCL (2009-13)	6.1	10.4	13.4	14.5	15.0	16.4	16.1
OCD5 (2009-13)	7.7	12.7	16.4	18.8	20.5	20.3	20.8

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Vance. 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	6.6	10.0	13.3	15.6	17.5	17.5	12.5
OCD5	8.6	13.3	19.6	22.8	22.9	26.1	29.5
GFSI	10.0	16.9	19.9	20.8	<b>16.8</b>	17.5	21.5
EMXI	11.5	18.1	26.1	30.6	34.0	26.5	28.0
GHMI	7.1	10.6	16.8	16.6	21.9	22.6	21.0
GFNI	10.4	14.6	17.1	<b>13.3</b>	<b>12.3</b>	19.9	32.5
HWFI	8.0	16.3	18.3	16.3	<b>16.8</b>	27.8	30.0
IVCN	7.4	12.4	15.4	16.1	22.6	23.9	24.5
DSHP	7.3	12.0	14.4	17.4	17.8	18.4	20.3
LGEM	8.0	13.8	17.4	24.0	36.0	34.1	27.8
Forecasts	22	19	18	16	12	8	4



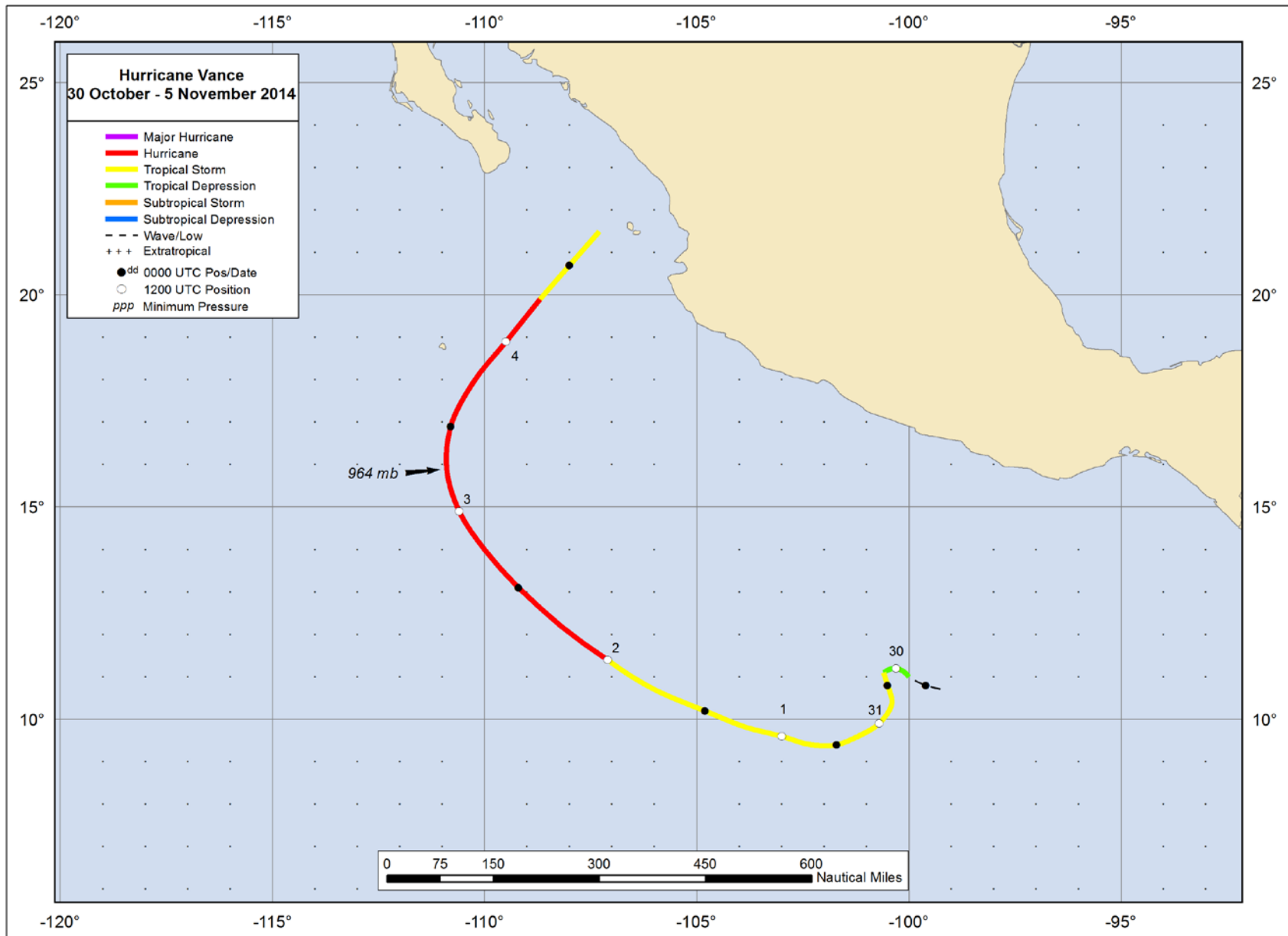


Figure 1. Best track positions for Hurricane Vance, 30 October – 5 November 2014.

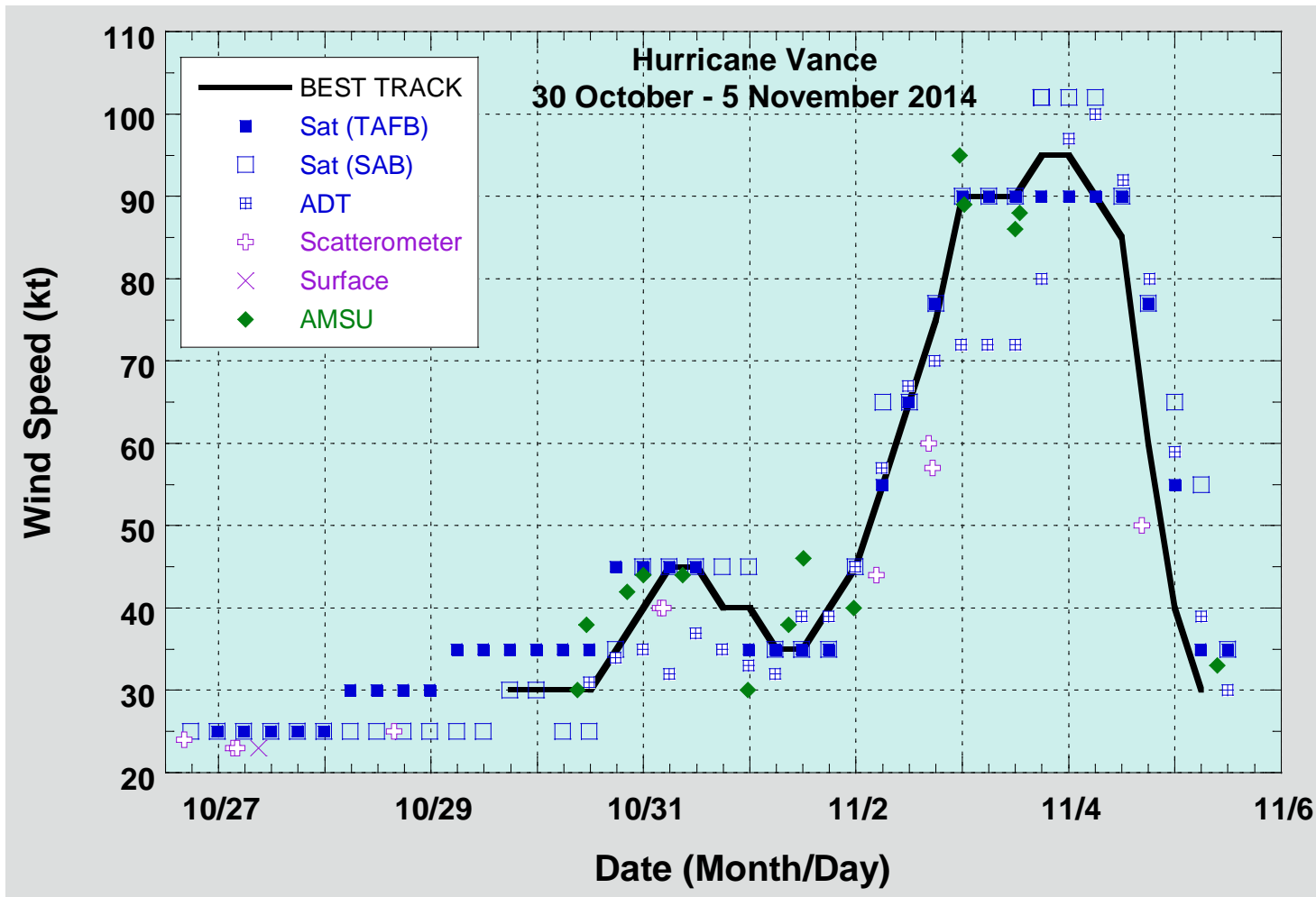


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Vance, 30 October – 5 November 2014. AMSU/ADT intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. Dashed vertical lines correspond to 0000 UTC.

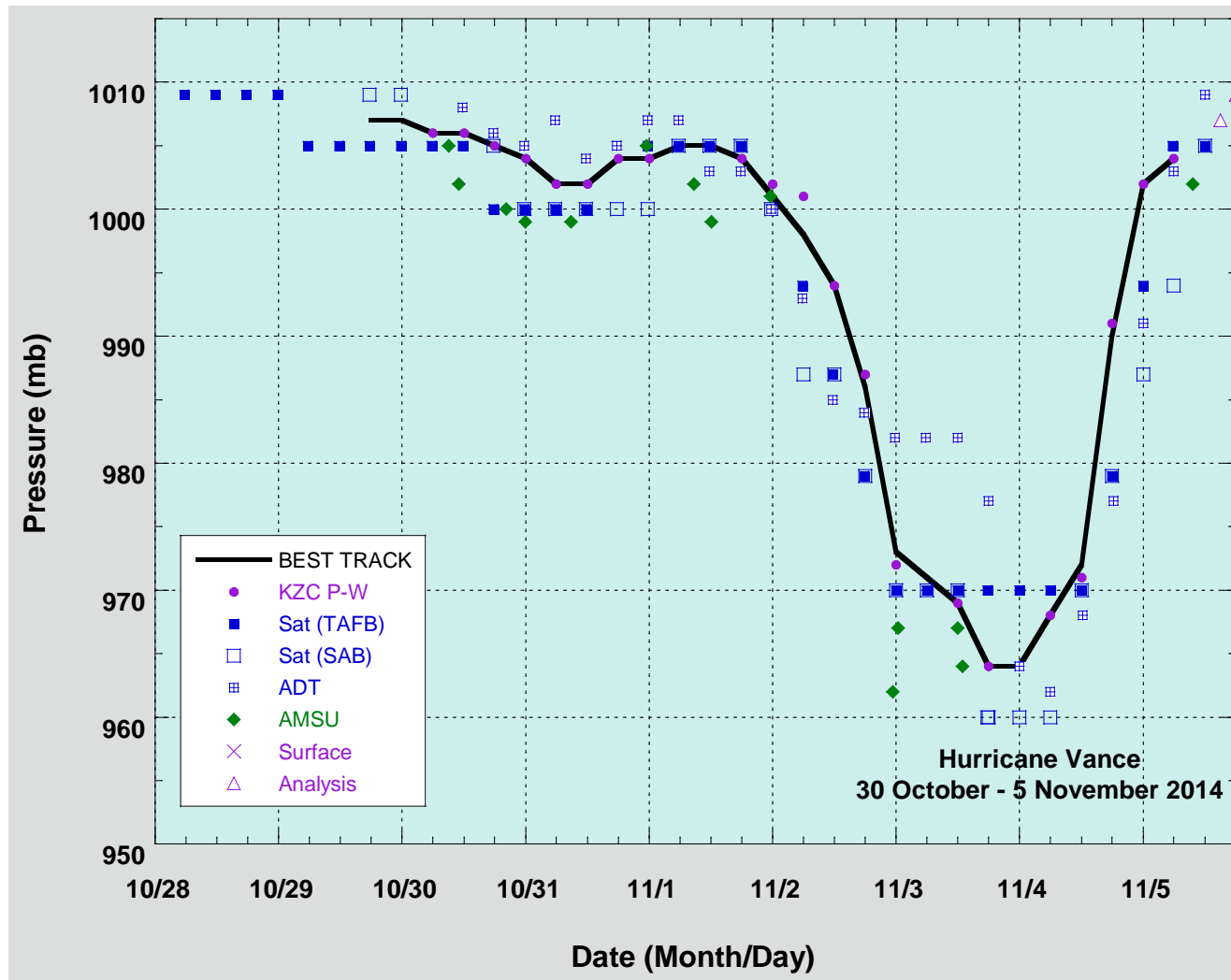


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Vance, 30 October – 5 November 2014. AMSU/ADT intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies technique. KZC P-W refers to pressure estimates derived using the Knaff-Zehr-Courtney pressure-wind relationship. Dashed vertical lines correspond to 0000 UTC.