NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT[1]

HURRICANE LANE

(EP142018)

15–28 August 2018

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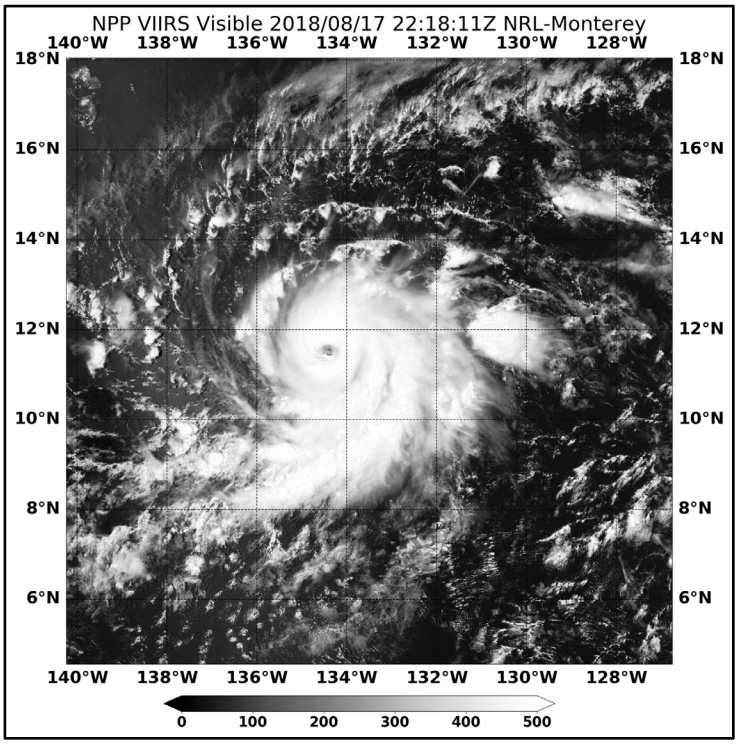
National Hurricane Center
2 April 2019



VIIRS VISIBLE IMAGE OF LANE AT 2218 UTC 17 AUGUST. IMAGE COURTESY OF NAVAL RESEARCH LABORATORY MONTEREY CA.

Lane was a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) in the western portion of the eastern Pacific basin. It had significant impacts on the Hawaiian Islands after moving into the central Pacific basin.

[1] This version of the Tropical Cyclone Report covers Hurricane Lane's history and a post-analysis of data associated with Lane within the National Hurricane Center's area of responsibility (east of 140°W). The report will be updated once the Central Pacific Hurricane Center (CPHC) completes its analyses of Lane within its respective area of responsibility.

Hurricane Lane

15–28 AUGUST 2018

SYNOPTIC HISTORY

Lane was spawned by a tropical wave that emerged from the coast of Africa on 31 July. The wave moved steadily westward across the Atlantic with little or no convection for the next several days, and eventually reached the eastern Pacific on 8 August. Once over the Pacific, the associated convection gradually increased, and the system first showed signs of organized convection on 11 August. Thereafter, the convection became intermittent for the next few days, which slowed development. Despite the lack of persistent convection, a low pressure area formed in association with the disturbance on 13 August about 765 n mi south-southwest of the southern tip of the Baja California Peninsula. Convective banding gradually increased over the western semicircle of the low as the system moved generally westward, and this led to the formation of a tropical depression by 0000 UTC 15 August about 935 n mi southwest of the southern tip of the Baja California peninsula. 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[2].

The cyclone was moving just south of west at the time of genesis, steered by a large subtropical ridge to the north. The ridge weakened slightly during the next 2 to 3 days, which caused the system to turn westward and then west-northwestward. Gradual strengthening occurred during the first 36 h or so after genesis, and the depression became a tropical storm around 1200 UTC 15 August. As Lane moved over warm sea surface temperatures in an environment of light shear and high atmospheric moisture, rapid intensification began late on 16 August, with Lane becoming a hurricane near 0000 UTC 17 August and a major hurricane 24 h later while centered about 1575 n mi west-southwest of the southern tip of the Baja California peninsula. It reached a first estimated peak intensity of 120 kt at 1200 UTC 18 August, just under 12 h before it crossed 140°W into the central Pacific hurricane basin.

Lane weakened somewhat after crossing into the central Pacific. However, it re-intensified starting on 20 August and reached an operational peak intensity of 140 kt on 22 August. The hurricane passed close to the Hawaiian Islands on 23–26 August where it caused widespread heavy rains and gusty winds. Lane eventually decayed to a remnant low pressure area on 28 August well west of the Hawaiian Islands. The portion of this report will be updated once the Central Pacific Hurricane Center (CPHC) complete its analyses of Lane in the central Pacific.

[2] 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.

METEOROLOGICAL STATISTICS

Observations in Lane (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), the Central Pacific Hurricane Center (PHFO), and the Joint Typhoon Warning Center (JTWC), as well as objective Advanced Dvorak Technique (ADT) estimates and Satellite Consensus (SATCON) 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 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 of Lane. In the central Pacific, observations also include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from flights of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command.

The estimated peak intensity of 120 kt in the eastern Pacific basin was based on a blend of various subjective and objective satellite intensity estimates. There were no surface observations of tropical-storm-force or greater winds associated with Lane in the eastern Pacific basin.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Lane in the eastern Pacific. However, the cyclone caused damage in portions of the Hawaiian Islands due to freshwater flooding and gusty winds, and more information will be provided when the report is updated.

FORECAST AND WARNING CRITIQUE

The genesis of Lane was adequately forecast at long range, but had some issues in the short range. In the 5 day development period, the disturbance from which Lane developed was introduced in the Tropical Weather Outlook 96 h prior to genesis (Table 2) with a low chance of development (<40%). The probability was raised to medium (40–60%) 78 h and high chances (>60%) 24 h before genesis, respectively. In the 2-day development period, the disturbance was introduced with a low chance of development 84 h before genesis. The probability was raised to medium 24 h before genesis and high 6 h before genesis. One issue with the 2-day genesis forecasts was the slow development that occurred after the initial organization on 11 August, which was not well anticipated.

A verification of NHC official track forecasts for Lane is given in Table 3a. Official forecast track errors were lower than the mean official errors for the previous 5-yr period. A homogeneous

comparison of the official track errors with selected guidance models is given in Table 3b. The NHC track forecasts were better than the vast majority of the guidance, but were beaten by the HCCA and Florida State Superensemble (FSSE) consensus models at several forecast times and the European Center model (EMXI) from 48–96 h.

A verification of NHC official intensity forecasts for Lane is given in Table 4a. Official forecast intensity errors were lower than the mean official errors for the previous 5-yr period through 48 h and significantly higher than the mean official errors for the previous 5-yr period at 72–120 h. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. The official intensity forecasts were better than all of the guidance at all forecast times. Examination of the individual forecasts (Figure 4) shows that the NHC forecasts correctly anticipated Lane's rapid intensification into a major hurricane over the eastern Pacific, followed by some weakening as the hurricane entered the central Pacific. However, the NHC forecasts did not at all anticipate Lane's re-intensification in the central Pacific. This may have been due to track forecasts that were a little to the north of where the hurricane tracked, which led to an expectation of stronger shear and cooler water temperatures than what Lane actually encountered.

There were no watches or warnings issued for Lane in the eastern Pacific basin.

Table 1. Best track for Hurricane Lane, 15–28 August 2018. The portion of the track west of 140°W is based on operational data from the Central Pacific Hurricane Center.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
13 / 1200	10.9	114.7	1009	20	low
13 / 1800	11.0	115.7	1009	20	"
14 / 0000	11.1	116.6	1009	25	"
14 / 0600	11.1	117.4	1009	25	"
14 / 1200	11.1	118.4	1009	25	"
14 / 1800	11.1	119.4	1009	25	"
15 / 0000	11.0	120.6	1008	30	tropical depression
15 / 0600	10.8	121.7	1007	30	"
15 / 1200	10.7	122.8	1006	35	tropical storm
15 / 1800	10.5	123.9	1005	40	"
16 / 0000	10.4	124.9	1003	45	"
16 / 0600	10.4	125.9	1003	45	"
16 / 1200	10.4	126.9	1001	50	"
16 / 1800	10.5	127.9	999	55	"
17 / 0000	11.0	129.2	992	65	hurricane
17 / 0600	11.2	130.7	990	70	"
17 / 1200	11.2	132.1	982	85	"
17 / 1800	11.3	133.6	977	90	"
18 / 0000	11.6	134.9	969	100	"
18 / 0600	11.9	136.2	956	115	"
18 / 1200	12.1	137.5	950	120	"
18 / 1800	12.4	138.9	950	120	"
19 / 0000	12.6	140.3	952	115	"
19 / 0600	12.8	141.6	956	110	"
19 / 1200	13.1	142.9	961	105	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
19 / 1800	13.4	144.1	956	110	"
20 / 0000	13.6	145.3	960	105	"
20 / 0600	13.7	146.5	961	110	"
20 / 1200	13.7	147.7	961	110	"
20 / 1800	13.5	148.6	964	115	"
21 / 0000	13.8	149.8	964	115	"
21 / 0600	13.9	150.8	950	130	"
21 / 1200	14.0	151.8	950	130	"
21 / 1800	14.2	152.7	941	135	"
22 / 0000	14.4	153.6	929	140	"
22 / 0600	14.5	154.2	926	140	"
22 / 1200	14.9	155.0	935	135	"
22 / 1800	15.2	155.6	935	135	"
23 / 0000	15.6	156.3	939	125	"
23 / 0600	16.0	156.7	939	125	"
23 / 1200	16.6	157.2	949	115	"
23 / 1800	17.0	157.5	949	115	"
24 / 0000	17.5	157.8	956	105	"
24 / 0600	18.0	157.9	956	105	"
24 / 1200	18.4	158.0	959	100	"
24 / 1800	18.8	158.0	966	85	"
25 / 0000	19.1	158.1	985	60	tropical storm
25 / 0600	19.3	158.2	992	55	"
25 / 1200	19.5	158.5	997	45	"
25 / 1800	19.6	159.1	998	45	"
26 / 0000	19.5	159.9	1000	40	"
26 / 0600	19.4	160.7	1004	35	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
26 / 1200	19.3	161.6	1006	30	tropical depression
26 / 1800	19.1	162.4	1006	30	"
27 / 0000	18.9	163.3	1006	30	"
27 / 0600	18.9	164.3	1006	30	"
27 / 1200	18.9	165.0	1004	35	tropical storm
27 / 1800	18.5	166.0	1007	35	"
28 / 0000	18.4	166.4	1007	30	tropical depression
28 / 0600	18.4	167.1	1007	30	"
28 / 1200	18.6	168.1	1007	30	"
28 / 1800	18.6	168.1	1007	30	"
29 / 0000	19.1	168.3	1007	25	remnant low
29 / 0600	19.5	168.3	1007	20	"
29 / 1200					dissipated
22 / 0600	14.5	154.2	926	140	Maximum winds and minimum pressure

Table 2. For Hurricane Lane, number of hours in advance of 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 (<40%)	84	96
Medium (40%-60%)	24	78
High (>60%)	6	24

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Lane, 15–28 August 2018. 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. Verification of track forecasts west of 140°W is based on CPHC's operational assessments.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**18.9**	**25.0**	**26.6**	**27.8**	**49.4**	**70.6**	**83.2**
OCD5	23.8	43.8	61.9	81.6	130.8	183.7	234.4
Forecasts	17	17	17	17	17	17	17
OFCL (2013-17)	21.8	33.2	43.0	53.9	80.7	111.1	150.5
OCD5 (2013-17)	34.9	70.7	109.1	146.1	213.8	269.0	339.7

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Lane, 15–28 August 2018. 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. Verification of track forecasts west of 140°W is based on CPHC's operational assessments.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	18.3	22.7	25.3	32.9	52.7	64.1	60.6
OCD5	22.0	37.4	57.7	81.4	128.7	175.5	218.6
GFSI	20.7	33.2	47.9	71.4	125.6	151.6	139.1
HWFI	21.9	37.1	51.2	70.9	118.7	134.7	122.7
HMNI	**17.8**	26.9	35.5	54.6	96.1	107.3	130.2
EGRI	26.3	46.7	68.1	93.1	124.5	133.4	117.4
EMXI	19.8	26.8	26.1	**29.9**	**41.7**	**61.7**	118.5
NVGI	23.7	32.8	46.0	65.2	108.3	141.0	147.9
CMCI	27.7	39.2	50.3	65.4	88.3	100.0	140.2
CTCI	20.8	28.8	33.9	50.9	86.0	93.5	86.8
TCON	19.3	27.7	34.5	42.6	71.0	89.6	82.4
TVCE	**17.9**	23.7	26.9	34.8	58.9	64.6	66.9
HCCA	**17.2**	24.5	27.2	**32.2**	**50.0**	**54.7**	64.7
FSSE	19.0	**20.4**	**21.9**	**29.4**	60.0	77.4	92.5
AEMI	18.9	27.8	26.9	36.6	76.9	95.6	92.4
TABS	32.2	59.1	81.4	90.4	93.2	95.3	113.4
TABM	**17.7**	22.9	36.9	55.8	113.2	133.0	115.5
TABD	18.8	38.0	66.3	102.5	182.3	215.2	196.5
Forecasts	12	12	12	12	12	12	12

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Lane, 15–28 August 2018. 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. Verification of intensity forecasts west of 140°W is based on CPHC's operational assessments.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**3.2**	**6.5**	**7.6**	**8.2**	19.4	30.3	38.2
OCD5	6.7	10.6	14.1	19.0	32.6	51.4	57.2
Forecasts	17	17	17	17	17	17	17
OFCL (2013-17)	5.8	9.6	11.8	13.2	15.1	15.1	14.6
OCD5 (2013-17)	7.6	12.4	15.6	17.7	19.8	20.8	19.6

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Lane, 15–28 August 2018. 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. Verification of intensity forecasts west of 140°W is based on CPHC's operational assessments.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	4.2	7.1	8.8	8.8	15.4	33.3	46.7
OCD5	8.2	14.3	18.5	21.6	30.1	54.8	63.0
HWFI	8.7	14.8	16.4	17.2	20.0	41.1	57.1
HMNI	7.9	9.8	8.9	11.8	20.4	52.9	62.0
DSHP	6.9	13.1	19.7	26.2	33.7	46.4	55.0
LGEM	7.7	15.7	23.2	27.8	33.4	49.8	64.1
ICON	7.4	11.5	15.5	19.2	26.1	46.9	59.1
IVCN	7.4	11.9	15.7	18.9	24.8	44.2	56.9
CTCI	9.2	15.1	17.9	18.1	19.2	37.3	48.9
GFSI	10.8	18.3	24.7	27.7	32.3	47.6	58.8
EMXI	13.5	24.9	34.8	43.1	53.7	70.8	81.1
HCCA	7.0	12.7	15.7	15.1	19.7	38.5	54.4
FSSE	6.9	11.3	13.2	15.5	26.0	48.3	63.6
Forecasts	12	12	12	12	12	12	12

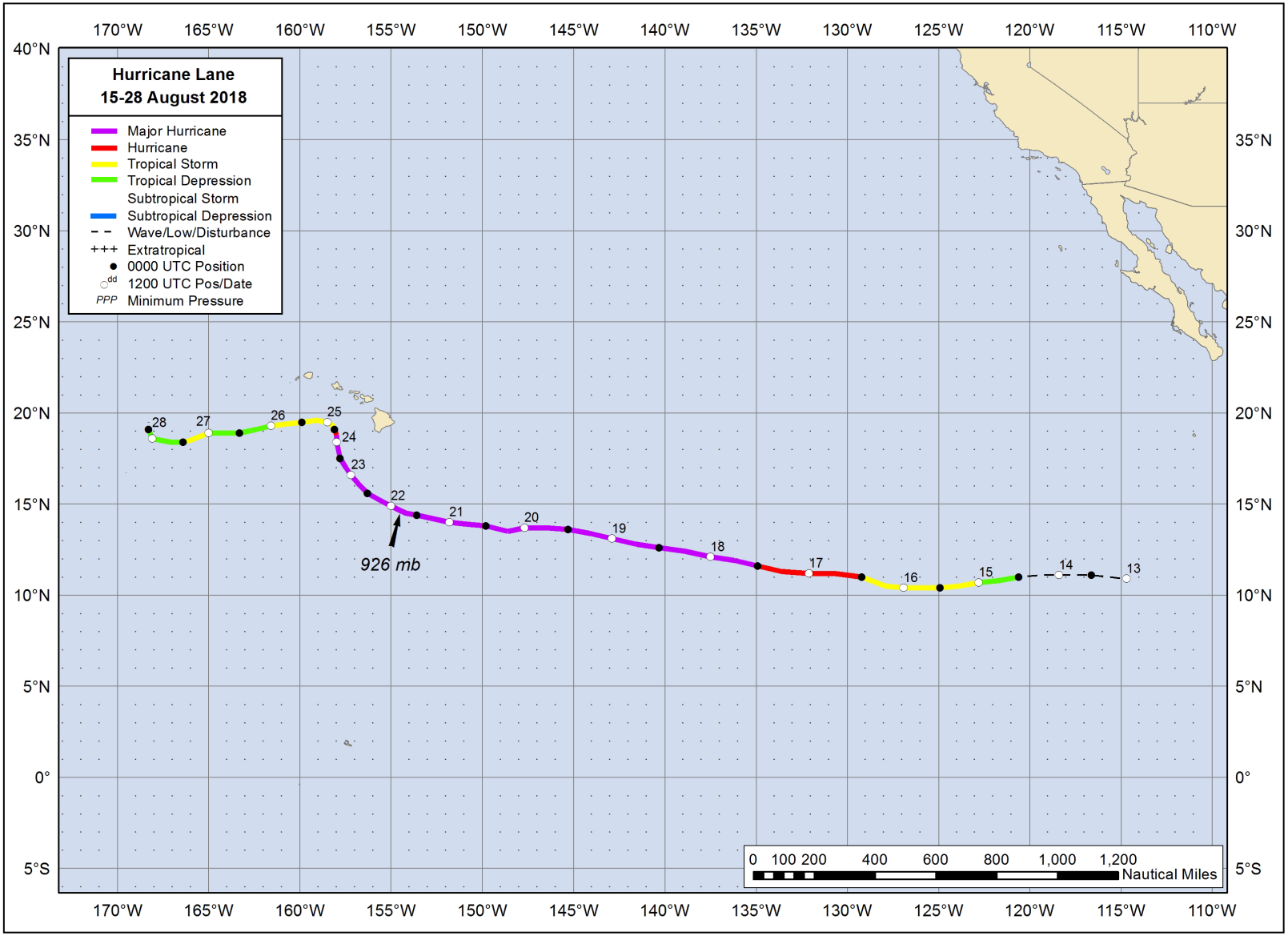


Figure 1. Best track positions for Hurricane Lane, 15–28 August 2018. Note that the best track after 1800 UTC 18 August is based on operational assessments from the Central Pacific Hurricane Center.

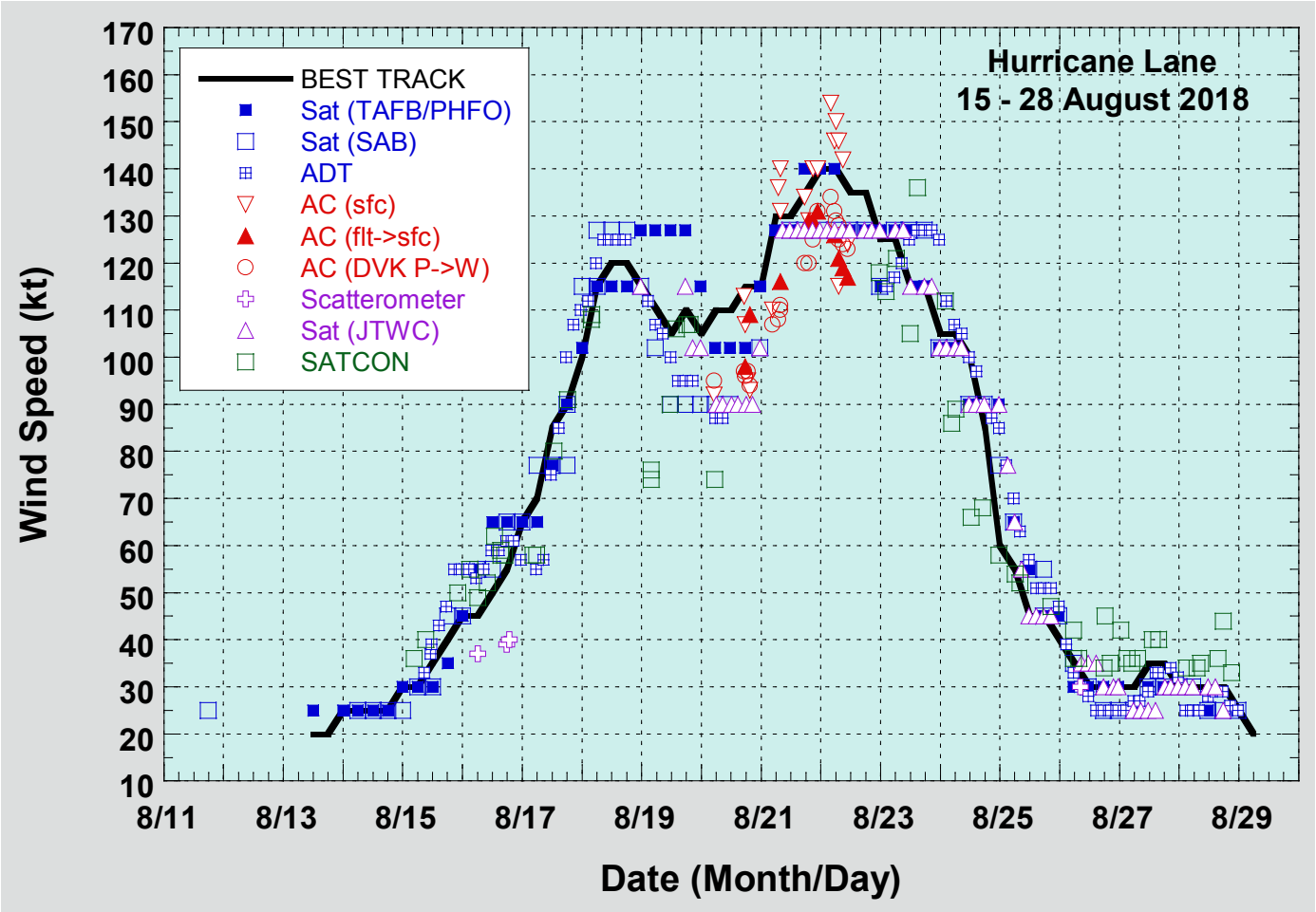


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Lane, 15 – 28 August 2018. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% adjustment factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC. Note that the best track intensity after 1800 UTC 18 August is based on operational assessments from the Central Pacific Hurricane Center.

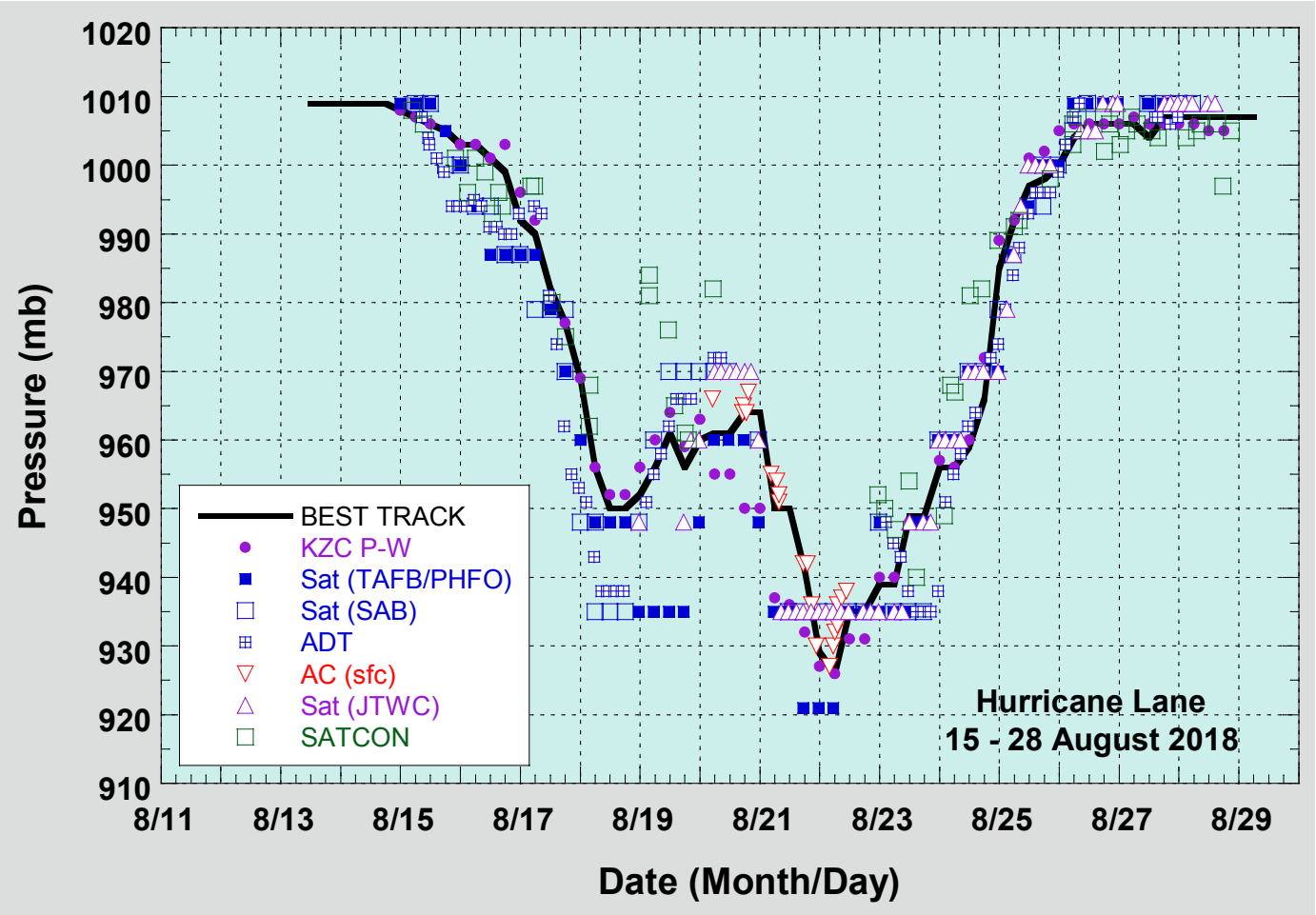


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Lane, 15 – 28 August 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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. Note that the best track intensity after 1800 UTC 18 August is based on operational assessments from the Central Pacific Hurricane Center.

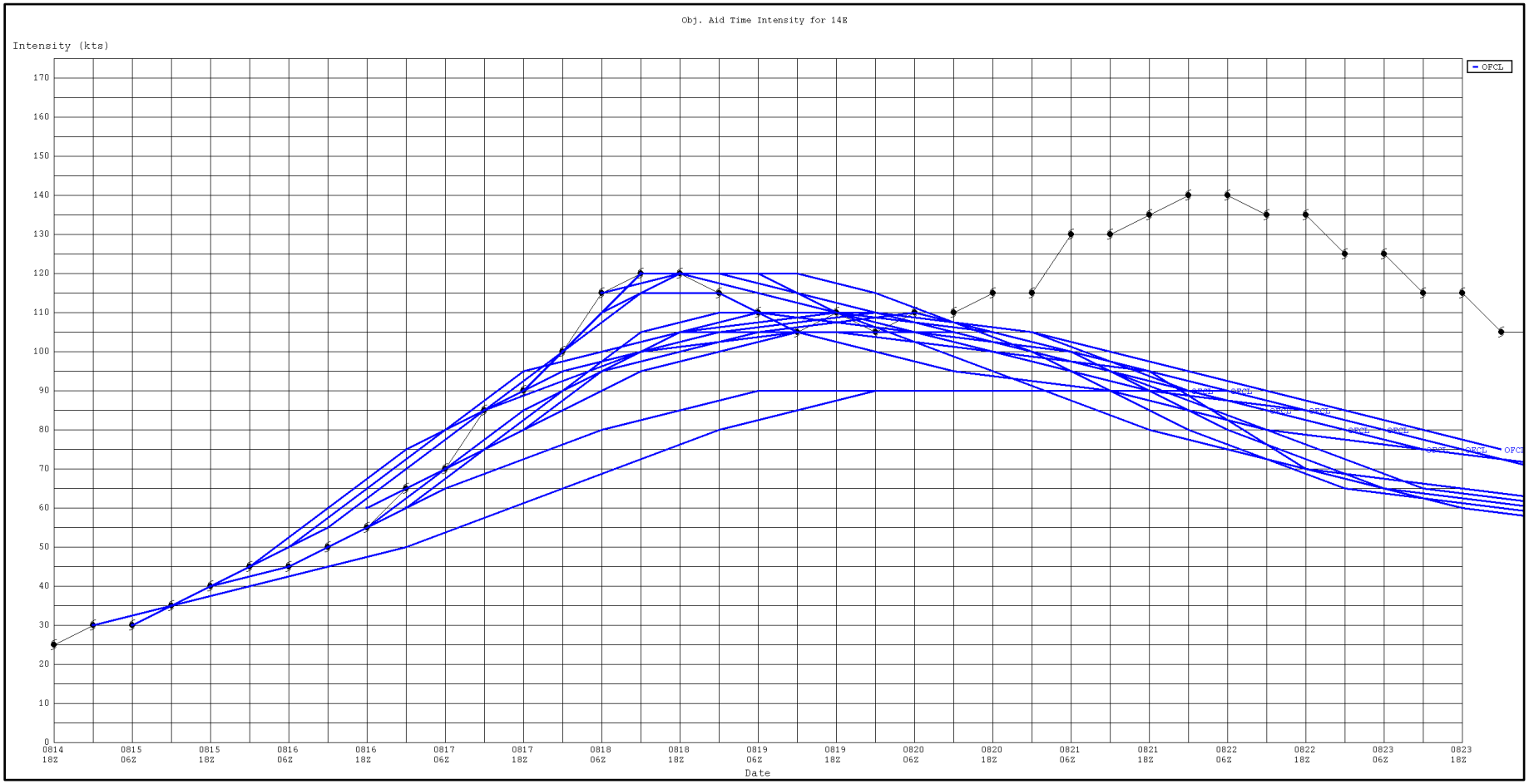


Figure 4. Selected NHC official intensity forecasts (blue lines, kt) for Hurricane Lane 15–28 August 2018. The best track intensity (kt) is given by the black line with intensities given at 6 h interval. Best track intensities after 1800 UTC 28 August are based on operational assessments from the Central Pacific Hurricane Center.