NATIONAL HURRICANE CENTER
CENTRAL PACIFIC HURRICANE CENTER
TROPICAL CYCLONE REPORT

HURRICANE HECTOR

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31 July–16 August 2018

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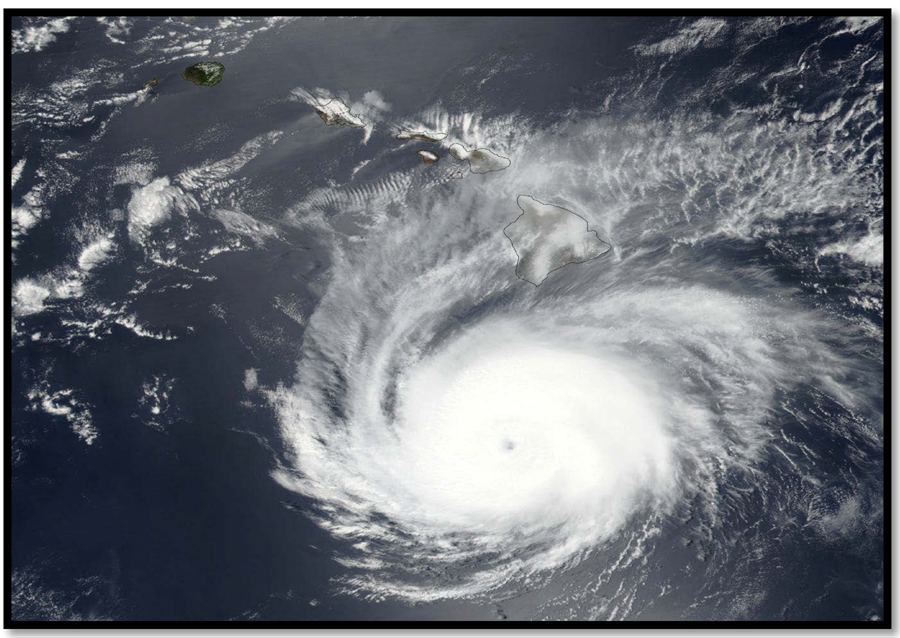

NASA TERRA MODIS VISIBLE SATELLITE IMAGE OF HURRICANE HECTOR ON THE AFTERNOON OF 8 AUGUST 2018, WHEN IT MADE ITS CLOSEST APPROACH TO THE BIG ISLAND OF HAWAII

Hector was a long-lived hurricane that reached category 4 intensity (on the Saffir-Simpson Hurricane Wind Scale) over the eastern and central North Pacific Ocean and passed south of the Big Island of Hawaii. Hector crossed the International Date Line and moved into the western North Pacific Ocean as a tropical storm.

[1] Original NHC report released 26 October 2018. Updated 1 July 2019 to include best track analysis, summary, verification, impacts, and damages from the Central Pacific Hurricane Center, and best track analysis from the Joint Typhoon Warning Center.

Hurricane Hector

31 JULY–16 AUGUST 2018

SYNOPTIC HISTORY

Hector's origin is not entirely clear. A low-latitude disturbance can be traced back to around 22 July, located at the time just north of French Guiana and Suriname. Before 22 July, convective activity over the tropical Atlantic Ocean was notably suppressed due to a large plume of dry Saharan air, and the Intertropical Convergence Zone (ITCZ) was pushed well to the south, extending from French Guiana and Brazil to the west coast of Africa. With little to no convection and no inflection in the ITCZ, it is nearly impossible to link the disturbance to a specific tropical wave that moved off the coast of Africa. Nonetheless, the disturbance began producing some deep convection after 22 July once it moved westward across northern South America, and it emerged over the eastern Pacific waters on 25 July. A trough of low pressure formed by 26 July south of Central America and southern Mexico and continued westward over the next several days.

In the meantime, the active phase of the Madden-Julian Oscillation and a convectively coupled Kelvin wave simultaneously propagated eastward across the eastern Pacific Ocean, priming the environment for an increased chance of tropical cyclone formation. Deep convection associated with the trough gradually became more organized, and a tropical depression is estimated to have formed by 1200 UTC 31 July about 700 n mi south-southwest of the southern tip of the Baja California peninsula. The depression gradually strengthened and became a tropical storm by 0000 UTC 1 August. The "best track" chart of Hector'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].

A large mid-tropospheric high centered over the southwestern United States on 1 August migrated southward over northwestern Mexico and expanded westward over the Pacific waters during the next several days, causing Hector to move steadily westward while it was within the eastern Pacific basin. The storm continued to strengthen over 27–28°C waters, and a 30-h period of rapid intensification occurred from 1200 UTC 1 August through 1800 UTC 2 August, with Hector becoming a hurricane and its intensity increasing from 40 kt to 90 kt. The hurricane weakened for a short time on 3 August, with microwave images showing an erosion of its northern eyewall, possibly due to some northerly shear (not shown). However, restrengthening ensued later that day, and Hector became a major hurricane by 0000 UTC 4 August while centered about 1460 n mi west-southwest of the southern tip of the Baja California peninsula. For the next two days, Hector gradually strengthened further, becoming a category 4 hurricane and reaching an intensity

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[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.

of 125 kt, as well as beginning to take on some annular characteristics, before it crossed 140°W into the Central Pacific Hurricane Center's area of responsibility soon after 0600 UTC 6 August.

After crossing 140°W, Hector, which had a distinct eye surrounded by a large ring of deep convection with very cold cloud tops, was steered by a subtropical ridge located just to the northeast of the main Hawaiian Islands. Vertical wind shear was relatively low, and the tropical cyclone was moving across sea surface temperature (SST) values of around 27^{o}C. In addition, there were some pockets of moderate Ocean Heat Content (OHC) values along Hector's track according to the real-time analyses of this parameter provided by the Cooperative Institute for Research in the Atmosphere (CIRA). About 6 h after crossing into the north central Pacific, an aircraft from the U.S. Air Force Reserve's 53rd Weather Reconnaissance Squadron (53WRS) conducted the first mission into Hector. Surface wind speeds up to 137 kt were observed based on the Stepped Frequency Microwave Radiometer (SFMR) instrument as the aircraft traversed the tropical cyclone.

Hector initially moved toward the west-northwest at slightly less than 15 kt after it entered the north central Pacific. During the next few days, the subtropical ridge to the north of Hector gradually strengthened, which eventually steered the tropical cyclone almost due west. Even though vertical wind shear in the vicinity of Hector remained low, very dry mid-level air and marginal SSTs and OHC values resulted in slight weakening of the tropical cyclone to 120 kt on 7 August. Hector continued to gradually weaken through 8 August as it was passing well south of the eastern end of the main Hawaiian Island chain. Based on reflectivity data from the South Point WSR-88D radar on the Big Island of Hawaii, as well as microwave (Fig. 4a) and conventional satellite imagery, it appeared that Hector went through an eyewall replacement cycle during the late 8 August to early 9 August time period. Soon after this episode, the tropical cyclone's eye began to become better defined (Fig. 4b). This intensification process, which was in part due to warmer SSTs of around 28^{o}C and improving OHC values combined with low vertical wind shear and a well-developed outflow structure, continued through 10 August. At the same time, Hector was beginning to pass to the west of the subtropical ridge located to the north-northeast, so it was starting to move toward the west-northwest.

The flow aloft associated with an upper-level low developing just east of the International Date Line began to impact Hector as the cyclone continued moving west-northwest on 11 August. This feature was not only producing southerly vertical wind shear near Hector, it was causing the steering flow to be more northwestward. In addition, SSTs were gradually decreasing along the track as the tropical cyclone gained latitude. By 1500 UTC 11 August, satellite imagery indicated Hector's eye was less distinct and the outflow had become increasingly restricted in the southern semicircle. Hector's eye was becoming ill-defined by 0300 UTC 12 August, and later that same day, the low-level circulation center appeared to be displaced just to the south of the remaining area of deep convection. Hector weakened to a tropical storm by 0000 UTC 13 August as it was approaching the International Date Line. Hector crossed into the northwest Pacific as a weakening tropical storm, which was devoid of deep convection, soon after 1500 UTC 15 August.

METEOROLOGICAL STATISTICS

Observations in Hector (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 (CPHC), 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 Hector. The tropical cyclone was also observed with the South Point WSR-88D radar on the Big Island of Hawaii.

Observations also include flight-level, SFMR, and dropwindsonde observations obtained by the 53WRS during five reconnaissance missions into Hector. There were also three synoptic surveillance missions conducted by the NOAA G-IV aircraft to sample the environment around Hector, which improved the initial fields used in the forecast models as Hector was approaching Hawaii.

Within NHC's area of responsibility, Hector's estimated maximum intensity of 125 kt at 0600 UTC 6 August, just before the hurricane crossed 140°W, is based on a blend of subjective satellite intensity estimates of T6.0 (115 kt) from TAFB and SAB, objective ADT estimates as high as 130 kt, and a SATCON estimate of around 125 kt. The estimated minimum pressure of 944 mb is based on the Knaff-Zehr-Courtney pressure-wind relationship.

There were no land-based or ship reports of winds of tropical storm force in association with Hector within NHC's area of responsibility.

Within CPHC's area of responsibility, the reconnaissance missions conducted by the 53WRS into Hector at the 700-mb level were during 6 to 8 August when the hurricane was located east-southeast and southeast of the Big Island. These missions resulted in 15 center fixes. Maximum flight-level winds of 146 kt were observed in the initial mission at 1739 UTC 6 August, while the strongest SFMR-derived surface wind of 137 kt was also measured on this mission. The lowest surface pressure measured in the eye of Hector by a dropwindsonde was 938 mb. However, the dropwindsonde also reported a surface wind speed of 27 kt, so the minimum central pressure at that time was estimated to be 936 mb. Hector's estimated peak intensity of 135 kt and minimum central pressure of 936 mb in the north central Pacific around 1800 UTC 6 August were based on the data from the first mission.

There were no land-based surface observations of sustained tropical-storm-force winds from Hector in the north central Pacific. However, according to Table 2, the peak wind gust observed at South Point on the Big Island of Hawaii during Hector's passage when it was about 200 n mi (230 st mi) to the southeast was 34 kt at 1200 UTC 8 August. In addition, National Data Buoy Center buoys 51002 and 51004 located over the open ocean southwest and southeast, respectively, of the main Hawaiian Islands, measured sustained winds (8-min averages) in excess of 34 kt.

CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Hector. A series of swells generated by Hector produced surf of 10 to 20 feet along east- and south-facing shores of most Hawaiian Islands, but there were no reports of significant injuries or property damage due to these large waves.

FORECAST AND WARNING CRITIQUE

Hector's genesis was noted as a possibility well in advance, but there was always substantial uncertainty as to how soon genesis would occur. Table 3 provides the number of hours in advance of formation associated with the first NHC Tropical Weather Outlook (TWO) forecast in each likelihood category. Tropical cyclone formation was first cited with a low (<40%) chance of formation within 5 days in the TWO 114 h (4.75 days) before genesis occurred. However, the 5-day genesis probabilities were raised to the medium (40–60%) and high (>60%) categories only 60 h (2.5 days) and 6 h (0.25 days) before genesis, respectively. The precursor disturbance was given a 2-day genesis probability in the low category 72 h (3 days) before formation and in the medium category 18 h (0.75 days) before formation. The 2-day genesis probability was never raised to the high category before formation occurred.

A verification of NHC official track forecasts for Hector is given in Table 4a. Official track forecast errors were significantly lower than the mean official errors for the previous 5-yr period at all forecast times. For example, the official 5-day track errors were less than 60 n mi and were about 40% of the mean 5-day track errors for the previous 5-yr period. A homogeneous comparison of the official track errors with selected guidance models is given in Table 4b. The Global Forecast System model (GFS) was the best-performing individual model, having lower errors than the NHC official track forecasts between 12 and 72 h. The HWRF model and the various model consensus aids performed well during the first 24 h, and GFEX (average of the GFS and ECMWF) had lower errors than the official forecasts from 12 to 96 h.

A verification of NHC official intensity forecasts for Hector is given in Table 5a. Official intensity forecast errors were higher than the mean official errors for the previous 5-yr period at all forecast times. NHC's intensity forecasts had a significant low bias, not anticipating Hector's period of rapid intensification soon after genesis, and not expecting the storm to reach category 4 intensity before it crossed 140°W. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 5b. Despite the large official intensity errors, NHC's intensity forecasts performed better than all the available intensity guidance overall. Only the HMON (HMNI), the intensity consensus aids, HCCA, and Florida State Superensemble performed better in the first 12 h.

A verification of CPHC official track forecasts for Hector is given in Table 6a [note that the track errors west of the International Date Line are based on JTWC's final best track, and these errors were only computed when Hector was classified as a tropical storm or tropical depression prior to its designation as a subtropical storm by JTWC at 0000 UTC 15 August]. Official track forecast errors were lower than the mean official errors for the most recent 5-yr period (2013-17) for all forecast times. This is indicative of the rather well-behaved motion that Hector exhibited as it tracked through the north central Pacific. A homogeneous comparison of the official track errors with selected guidance models is given in Table 6b. The official track forecast errors were similar to, or better than, the model guidance errors. The ECMWF had lower errors during the 72- to 120-h forecast periods, while the GFEX had lower errors for the 24-h, and the 96- to 120-h forecast periods. The variable consensus model, TVCE, had lower track errors during the 12- to 24-h forecast periods.

A verification of CPHC official intensity forecasts for Hector is shown in Table 7a. Official intensity forecast errors were larger than the mean official errors for the most recent 5-yr period for all forecast times from 36 to 120 h. This likely reflects the difficulty in forecasting the period of intensification that occurred as Hector moved across the north central Pacific far south of the main Hawaiian Islands. A homogeneous comparison of the official intensity errors with selected models is provided in Table 7b. The HWRF and HMON had lower errors compared with the official intensity forecasts during the 24- to 120-h forecast periods, while the ECMWF and FSSE had lower errors during the 36- to 120-h forecast periods. The variable consensus model, IVCN, had lower intensity errors for the 24- to 120-h forecast periods, while the ICON had lower errors during the 24- to 48-h and the 96- to 120-h forecast periods.

A Tropical Storm Watch was issued by CPHC for the Big Island of Hawaii at 2100 UTC 6 August (Table 8) when Hector's center was about 745 n mi (860 st mi) east-southeast of Hilo. This was followed by the issuance of a Tropical Storm Warning for that same island at 0300 UTC 8 August. The Tropical Storm Warning was discontinued for the Big Island of Hawaii at 2100 UTC 8 August once the westward motion of the tropical cyclone was certain. As Hurricane Hector continued to track toward the west-northwest at about 15 kt, its outer circulation was forecast to pass near Johnston Atoll. As a result, a Tropical Storm Watch was issued for that isolated land area at 1500 UTC 8 August. The Tropical Storm Watch was discontinued for Johnston Atoll at 1500 UTC 10 August when it was obvious Hector would pass well to the north. After that, Hector was still a major hurricane, and it was becoming a potential threat to portions of the Papahanaumokuakea Marine National Monument. As a result, a Tropical Storm Watch was issued for Lisianski Island to Pearl and Hermes Atolls at 0300 UTC 11 August, and then for Midway Atoll and Kure Atoll 24 h later. After it became clear Hector was weakening and its outer circulation would remain well away from the area, the Tropical Storm Watch was discontinued for Lisianski Island to Pearl and Hermes Atolls at 2100 UTC 12 August, and for Midway Atoll and Kure Atoll at 0900 UTC 13 August.

Table 1. Best track for Hurricane Hector, 31 July–16 August 2018.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
31 / 1200	12.3	115.1	1007	30	tropical depression
31 / 1800	12.7	116.4	1007	30	"
01 / 0000	13.0	117.6	1006	35	tropical storm
01 / 0600	13.3	118.7	1006	35	"
01 / 1200	13.5	119.7	1004	40	"
01 / 1800	13.7	120.7	1002	45	"
02 / 0000	13.9	121.7	1000	50	"
02 / 0600	14.1	122.8	995	60	"
02 / 1200	14.2	123.9	987	75	hurricane
02 / 1800	14.2	125.1	975	90	"
03 / 0000	14.1	126.2	976	90	"
03 / 0600	14.1	127.3	980	85	"
03 / 1200	14.1	128.3	983	80	"
03 / 1800	14.1	129.3	975	90	"
04 / 0000	14.2	130.3	967	100	"
04 / 0600	14.2	131.3	962	105	"
04 / 1200	14.2	132.2	961	105	"
04 / 1800	14.2	133.1	957	110	"
05 / 0000	14.3	134.1	957	110	"
05 / 0600	14.3	135.2	957	110	"
05 / 1200	14.3	136.3	956	110	"
05 / 1800	14.3	137.4	951	115	"
06 / 0000	14.5	138.6	947	120	"
06 / 0600	14.7	139.9	944	125	"
06 / 1200	14.9	141.3	939	130	"
06 / 1800	15.1	142.5	936	135	"
07 / 0000	15.5	144.0	936	135	"
07 / 0600	15.7	145.6	939	130	"
07 / 1200	16.0	147.0	948	120	"
07 / 1800	16.2	148.4	948	120	"
08 / 0000	16.4	150.0	952	115	"
08 / 0600	16.4	151.6	952	115	"
08 / 1200	16.4	153.2	956	110	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
08 / 1800	16.4	154.6	959	100	"
09 / 0000	16.5	156.1	959	100	"
09 / 0600	16.6	157.7	959	100	"
09 / 1200	16.6	159.3	957	105	"
09 / 1800	16.7	160.8	957	105	"
10 / 0000	16.9	162.3	956	110	"
10 / 0600	17.2	163.7	951	115	"
10 / 1200	17.5	165.2	951	115	"
10 / 1800	17.7	166.6	947	120	"
11 / 0000	18.1	167.8	951	115	"
11 / 0600	18.5	168.8	957	105	"
11 / 1200	19.0	169.7	961	100	"
11 / 1800	19.6	170.4	965	95	"
12 / 0000	20.7	171.3	969	90	"
12 / 0600	21.6	172.4	973	85	"
12 / 1200	22.4	173.6	982	75	"
12 / 1800	23.2	175.1	988	65	"
13 / 0000	24.2	176.4	991	60	tropical storm
13 / 0600	24.7	178.0	995	55	"
13 / 1200	25.1	179.5	1001	45	"
13 / 1800	25.4	178.7E	1005	40	"
14 / 0000	25.8	177.2E	1008	35	"
14 / 0600	26.3	175.9E	1011	30	tropical depression
14 / 1200	27.1	174.2E	1010	30	"
14 / 1800	27.9	172.6E	1004	40	tropical storm
15 / 0000	28.7	170.8E	1004	40	subtropical storm
15 / 0600	29.3	168.9E	1007	35	"
15 / 1200	29.8	167.9E	1009	30	subtropical depression
15 / 1800	30.5	167.2E	1009	25	"
16 / 0000	31.5	166.4E	1008	25	"
16 / 0600					dissipated
06 / 1800	15.1	142.5	936	135	maximum winds and minimum pressure

Table 2. Selected surface observations for Hurricane Hector, 6–13 August 2018.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[c]	Storm tide (ft)[d]	Estimated Inundation (ft)[e]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[b]	Gust (kt)				
Hawaii									
International Civil Aviation Organization (ICAO) Sites									
Hilo International Airport (PHTO) (19.72N 155.06W)	08/1255	1012.5	08/1330	9					0.17
Keahole Airport (Kona) (PHKO) (19.74N 156.05W)	08/1353	1009.8	08/1215	8					
Bradshaw Army Air Field (PHSF) (19.78N 155.55W)			08/1856	18					
Hydrology-Surface Observing Instrumentation System (H-SOIS) Site									
South Point (SOPH1) (18.99N 155.67W)	08/1700	1011.8	08/1200	23	34				
Offshore									
NOAA Buoys									
Southwest Hawaii (51002) (17.04N 157.70W)	09/0620	996.7	09/0620	58 (4 m, 10 min)	76				
Southeast Hawaii (51004) (17.60N 152.40W)	08/1030	1007.1	08/0840	38 (4 m, 10 min)	49				
Western Hawaii (51003) (19.29N 160.57W)	10/0150	1009.1	09/1850	25 (5 m, 8 min)	29				

[a] Date/time is for sustained wind when both sustained and gust are listed.
[b] Except as noted, sustained wind averaging periods for land-based reports are 2 min; buoy averaging periods are 8 min.

Table 3. 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%)	72	114
Medium (40%-60%)	18	60
High (>60%)	-	6

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Hector, 31 July – 6 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.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**12.7**	**19.2**	**24.9**	**30.8**	**44.8**	**49.9**	**59.7**
OCD5	19.7	40.6	66.6	97.3	157.5	237.6	337.0
Forecasts	23	23	23	23	23	23	23
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 4b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Hector, 31 July – 6 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.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	12.2	19.3	25.8	32.3	47.1	49.2	59.1
OCD5	19.1	40.5	67.8	96.6	154.2	237.3	348.7
GFSI	**9.4**	**16.8**	**25.4**	**31.8**	**39.0**	49.2	72.6
EMXI	17.6	27.5	38.3	49.1	74.1	94.7	131.8
EGRI	22.9	42.5	60.9	76.0	106.0	129.4	142.3
NVGI	29.1	52.5	73.2	94.8	140.0	178.5	205.9
CMCI	35.1	60.2	81.9	93.7	117.5	176.3	232.7
HWFI	**10.6**	**17.2**	29.1	34.2	57.5	81.5	99.0
HMNI	12.8	**18.3**	29.9	41.4	69.8	92.2	110.0
TCON	**11.0**	19.5	29.8	35.6	54.0	67.8	71.9
TVCE	**10.9**	**17.7**	27.5	35.3	53.9	60.5	59.3
TVCX	**11.8**	**18.8**	27.7	33.0	48.4	50.7	58.9
GFEX	12.3	**18.6**	**24.9**	**29.6**	**38.4**	**47.0**	73.2
HCCA	**10.7**	**17.8**	27.1	33.9	52.6	57.4	66.1
FSSE	**12.1**	**15.8**	**22.5**	**30.5**	50.4	58.7	77.3
AEMI	**10.9**	20.2	29.5	36.3	53.5	72.2	94.5
TABS	20.9	41.5	64.2	80.8	110.5	135.3	161.8
TABM	15.6	28.5	42.4	52.9	56.3	51.2	66.0
TABD	16.9	31.0	44.9	50.8	60.0	61.2	61.7
Forecasts	20	20	20	20	20	18	18

Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Hector, 31 July – 6 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.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	8.7	13.3	15.9	19.1	21.3	25.2	29.8
OCD5	10.3	19.3	26.6	35.0	46.6	56.2	59.1
Forecasts	23	23	23	23	23	23	23
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 5b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Hector, 31 July – 6 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 5a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	8.8	13.6	16.0	18.3	21.2	23.8	29.3
OCD5	10.1	19.9	27.2	35.0	47.6	55.8	59.4
DSHP	9.4	17.5	24.0	29.3	37.1	39.8	42.6
LGEM	10.7	20.0	26.4	30.1	33.6	35.5	38.9
HWFI	8.9	15.6	20.9	21.6	21.2	24.3	31.7
HMNI	**8.3**	13.7	18.3	20.1	**19.9**	26.0	32.8
ICON	**7.8**	15.3	21.8	24.6	27.5	31.1	36.3
IVCN	**7.7**	15.0	21.0	23.7	25.1	26.6	32.1
HCCA	**8.4**	14.4	20.0	19.7	21.3	**23.1**	30.5
FSSE	**7.7**	14.2	20.1	23.0	29.6	35.7	44.5
GFSI	11.8	21.0	29.4	33.9	38.6	43.7	48.8
EMXI	10.3	19.4	28.0	33.2	42.7	47.6	54.7
Forecasts	21	21	21	21	21	21	21

Table 6a. CPHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Hector, 6-13 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.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**15.0**	**25.9**	**29.2**	**31.5**	**55.3**	**101.8**	**127.3**
OCD5	38.1	98.7	149.1	179.7	237.6	318.4	337.3
Forecasts	29	29	28	26	22	18	14
OFCL (2013-17)	28.2	43.2	58.0	75.6	121.0	163.2	208.4

Table 6b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Hector, 6-13 August 2018. Errors smaller than the CPHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 6a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	15.0	25.9	29.2	31.5	55.3	101.8	127.3
OCD5	38.1	98.7	149.1	179.7	237.6	318.4	337.3
GFSI	18.9	29.9	39.0	46.3	70.3	119.8	152.8
EMXI	17.0	26.5	32.1	36.5	**53.4**	**77.8**	**110.4**
EGRI	17.1	30.0	38.1	43.2	67.6	155.3	227.2
NVGI	30.8	51.5	75.6	101.4	150.7	209.1	202.3
CMCI	19.6	36.8	53.2	67.9	98.5	**94.6**	147.0
HWFI	22.3	36.0	46.4	52.0	85.0	123.3	129.8
HMNI	18.3	29.5	38.3	41.9	70.5	101.8	**111.7**
TCON	16.9	**25.7**	34.4	37.6	60.1	120.8	153.1
TVCE	**14.9**	**24.0**	30.2	32.1	55.5	104.6	131.6
TVCX	15.2	**25.0**	30.0	33.2	55.8	104.5	133.8
GFEX	15.6	**24.3**	29.9	33.1	58.6	**94.8**	**122.1**
FSSE	17.6	48.8	101.9	123.6	210.3	258.9	280.2
AEMI	15.9	27.1	35.2	40.3	**53.4**	106.8	136.5
TABS	24.2	50.1	75.5	98.3	92.7	168.7	206.0
TABM	29.9	59.2	83.0	95.6	86.7	152.0	156.6
TABD	28.8	55.8	76.7	97.2	120.1	167.5	178.7
Forecasts	29	29	28	26	22	18	14

Table 7a. CPHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Hector, 6-13 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.

	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	**5.3**	**8.6**	11.8	14.0	16.1	18.9	25.4
OCD5	8.3	12.9	18.5	26.7	42.0	39.4	20.3
Forecasts	29	29	28	26	22	18	14
OFCL (2013-17)	5.6	9.0	11.3	12.9	15.7	17.4	18.9

Table 7b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Hector, 6-13 August 2018. Errors smaller than the CPHC official forecast are shown in boldface type. The number of official forecasts shown here will generally be smaller than that shown in Table 7a due to the homogeneity requirement.

Model ID	Forecast Period (h)						
	12	24	36	48	72	96	120
OFCL	5.3	8.6	11.8	14.0	16.1	18.9	25.4
OCD5	8.3	12.9	18.5	26.7	42.0	39.4	**20.3**
DSHP	7.7	11.0	15.5	19.2	25.4	26.4	25.9
LGEM	7.8	12.4	16.5	19.0	20.9	19.5	**22.4**
HWFI	5.7	**8.0**	**8.5**	**9.5**	**12.8**	**13.1**	**12.6**
HMNI	5.6	**7.9**	**8.7**	**8.3**	**11.9**	**10.9**	**12.8**
ICON	5.7	**8.4**	**10.3**	**12.3**	16.8	**14.1**	**14.4**
IVCN	5.5	**8.1**	**9.8**	**12.1**	**15.3**	**12.4**	**15.9**
FSSE	5.8	9.1	**11.2**	**12.9**	**15.4**	**15.8**	**15.4**
GFSI	7.0	9.3	13.2	17.3	20.3	21.1	**19.6**
EMXI	7.0	10.1	**11.3**	**12.0**	**13.5**	**16.2**	**16.6**
Forecasts	29	29	28	26	22	18	14

Table 8. Wind watch and warning summary for Hurricane Hector, 6-13 August 2018.

Date/Time (UTC)	Action	Location
06 / 2100	Tropical Storm Watch issued	Big Island of Hawaii
08 / 0300	Tropical Storm Warning issued	Big Island of Hawaii
08 / 2100	Tropical Storm Warning discontinued	Big Island of Hawaii
09 / 1500	Tropical Storm Watch issued	Johnston Atoll
10 / 1500	Tropical Storm Watch discontinued	Johnston Atoll
11 / 0300	Tropical Storm Watch issued	Lisianski Island to Pearl and Hermes Atoll
12 / 0300	Tropical Storm Watch issued	Midway Atoll and Kure Atoll
12 / 2100	Tropical Storm Watch discontinued	Lisianski Island to Pearl and Hermes Atoll
13 / 0900	Tropical Storm Watch discontinued	Midway Atoll and Kure Atoll

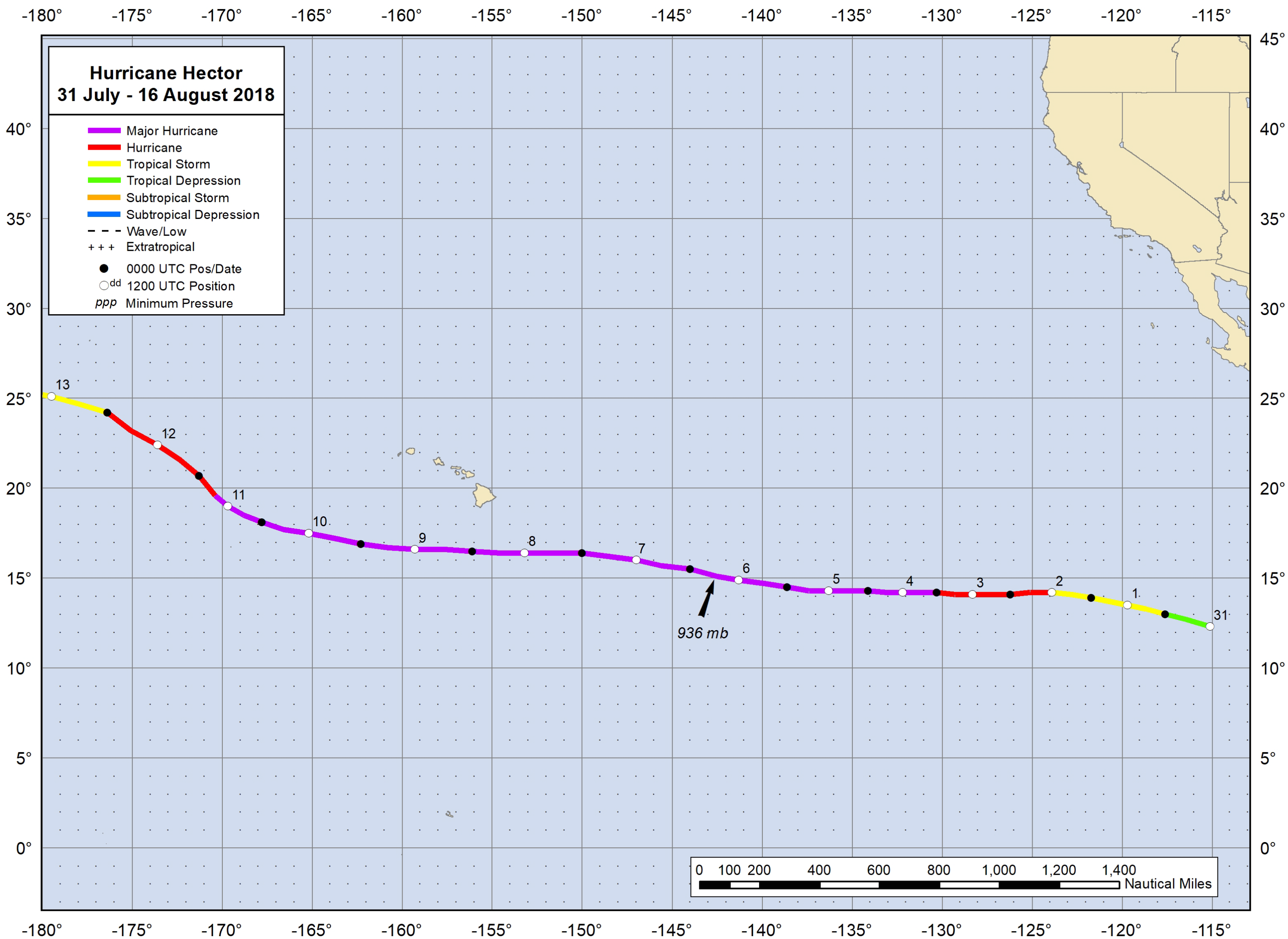

Figure 1. Best track positions for Hurricane Hector, 31 July–16 August 2018, while it was within NHC and CPHC's areas of responsibility.

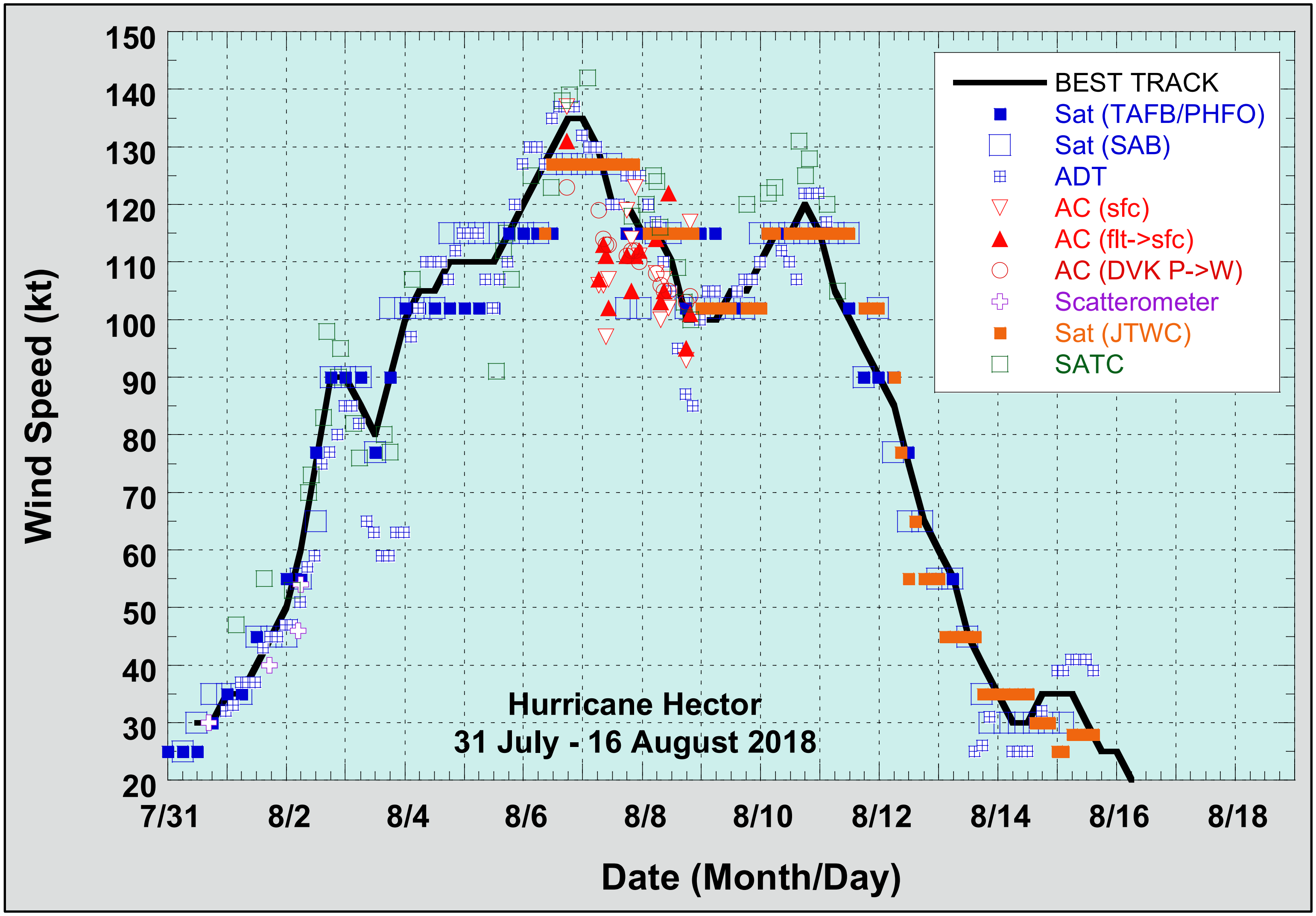

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Hector, 31 July–16 August 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

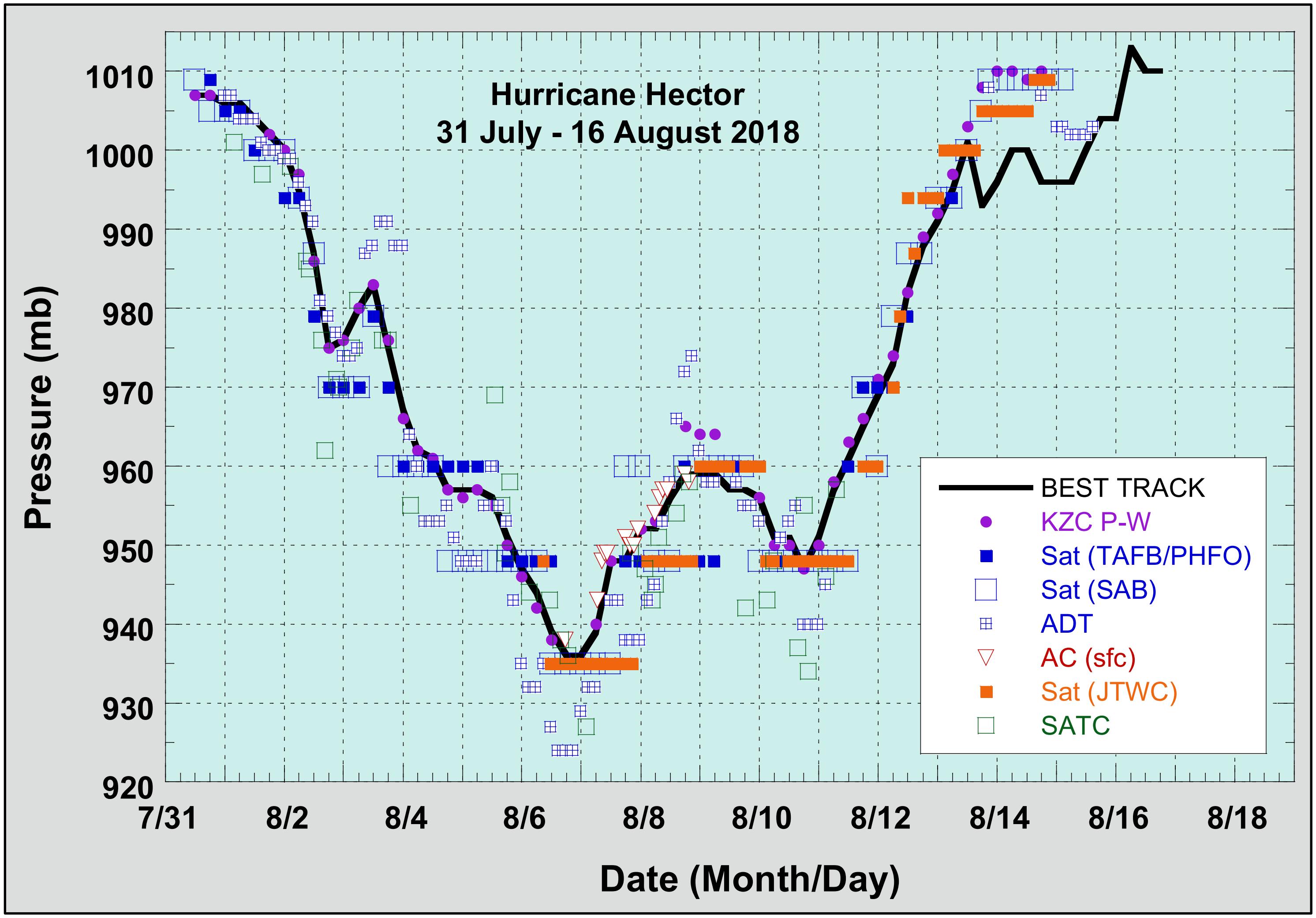

Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Hector, 31 July – 16 August 2018. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for 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.

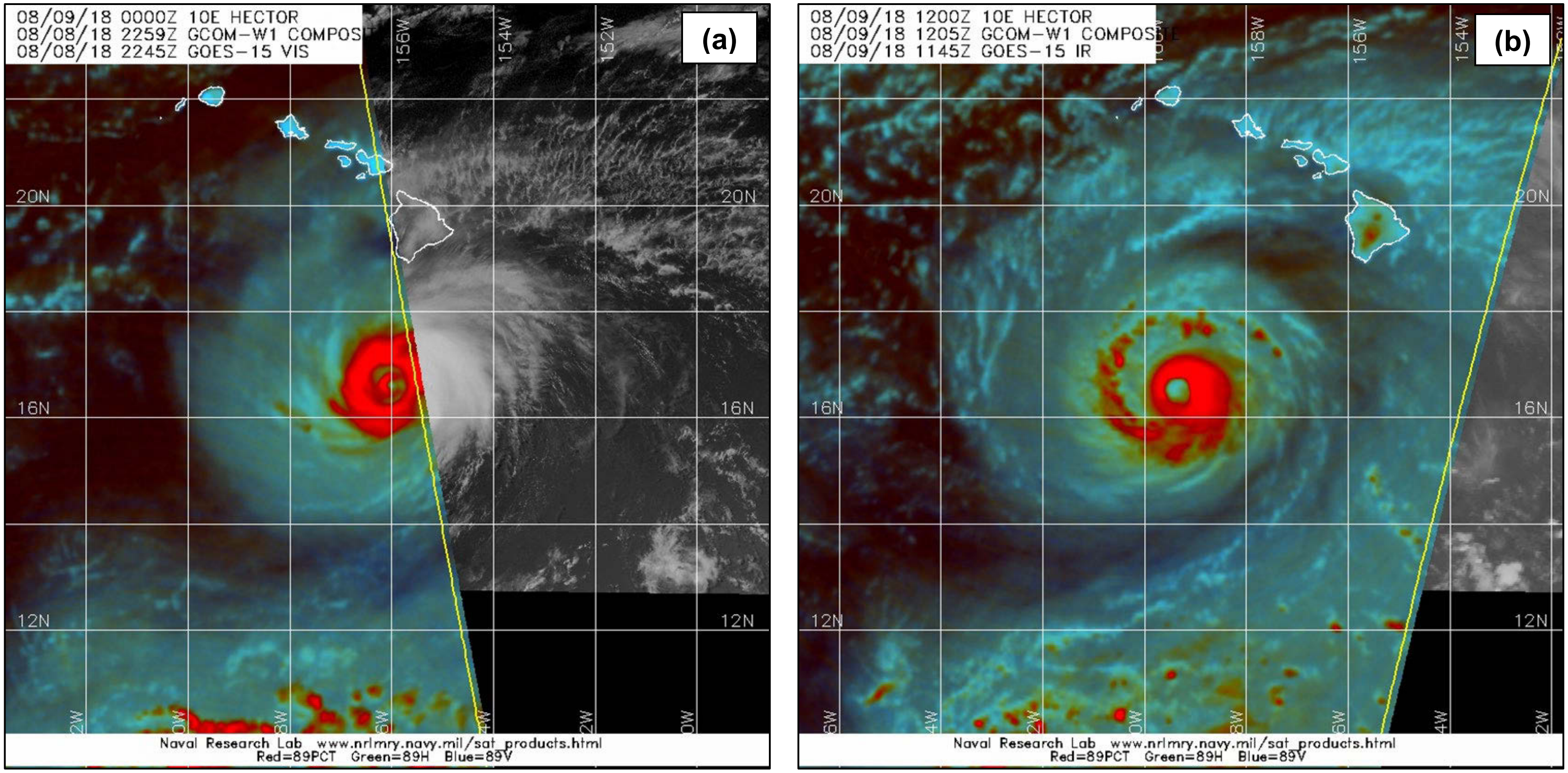

Figure 4. Global Precipitation Measurement Microwave Imager views of Hector (a) at 2259 UTC 8 August 2018 showing evidence of concentric eyewalls when the system was south-southwest of the Big Island of Hawaii, and (b) at 1205 UTC 9 August after the eyewall replacement cycle ended far south of Oahu and Kauai [Images courtesy of the Naval Research Laboratory].