NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT[1]

HURRICANE GILMA

(EP072024)

18–29 August 2024

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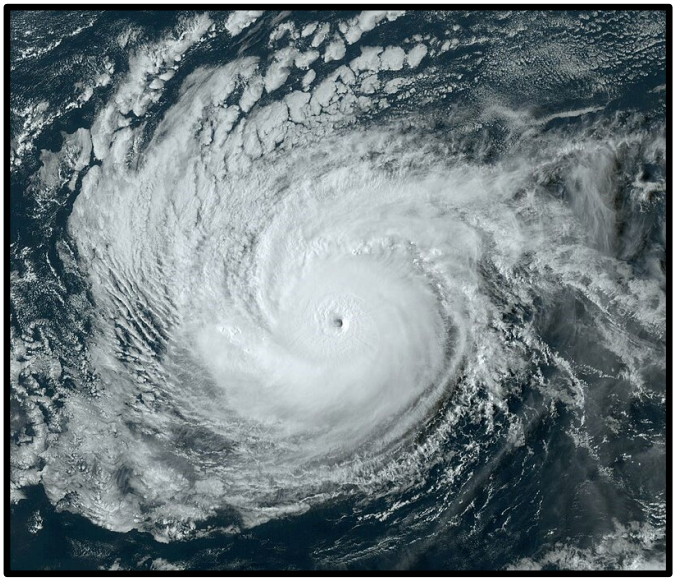

GOES-18 GEOCOLOR SATELLITE IMAGE OF HURRICANE GILMA AROUND THE TIME OF ITS PEAK INTENSITY AT 0040 UTC 25 AUGUST 2024.

Gilma was a long-lived major hurricane that remained over water throughout its lifetime. Gilma formed over the central portion of the eastern Pacific basin and reached category 4 status on the Saffir-Simpson Hurricane Wind Scale. It crossed into the central Pacific basin before dissipating well east of the Hawaiian Islands.

[1] This is an abbreviated Tropical Cyclone Report since there were no coastal watches or warnings issued and no direct fatalities reported in association with Gilma. Original report released on 7 November 2024. Updated 11 March 2025 to include best track analysis and verification statistics from the Central Pacific Hurricane Center.

Hurricane Gilma

18–29 AUGUST 2024

BEST TRACK

The "best track[2]" positions and intensities for Hurricane Gilma are listed in Table 1. The best track chart of Gilma's path is given in Fig. 1, with the wind and pressure histories along with available observations[3] shown in Figs. 2 and 3, respectively.

Origin

Gilma's origins were likely related to a tropical wave that departed the west coast of Africa on 3 August. When this wave approached Central America on 13 August, its southern end began to interact with the monsoon trough over the far eastern Pacific. The combined feature moved west-northwestward over the next several days, and showers and thunderstorms began to organize several hundred n mi off the coast of southwestern Mexico on 17 August. Satellite data indicate that a well-defined low-level circulation formed with sufficiently organized deep convection by 0600 UTC 18 August, marking the formation of a tropical depression about 500 n mi south of the southern tip of the Baja California peninsula.

Peak Intensity and Minimum Pressure

Gilma's peak intensity of 115 kt at 0000 and 0600 UTC 25 August is based on T6.0/115 kt Dvorak classifications from TAFB and SAB at those time periods. A slightly lower peak of 110 kt at 1200 and 1800 UTC 22 August is based on a blend of satellite intensity estimates from TAFB, SAB, and CIMSS ADT.

The estimated minimum pressure of 950 mb at 0000 and 0600 UTC 25 August is based on the Knaff-Zehr-Courtney (KZC) pressure-wind relationship.

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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.

[3] Observations 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 Joint Typhoon Warning Center (JTWC), 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 Gilma.

CASUALTY AND DAMAGE STATISTICS

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

FORECAST AND WARNING VERIFICATION

Table 2 provides the number of hours in advance of formation with the first NHC Tropical Weather Outlook (TWO) forecast in each likelihood category. Figure 4 shows composites of 7-day TWO genesis areas prior to the formation of Gilma. The genesis forecasts for Gilma were fairly good. The system that became Gilma was first mentioned in the TWO 114 h prior to genesis with a low chance (<40%) of development within 7 days. Likewise, the 2-day formation probabilities were introduced 54 h prior to genesis. The probabilities in the 7-day TWO reached the medium and high categories 78 h and 54 h before formation, respectively. The lead times for the 2-day TWO were 36 h and 12 h for the medium and high categories, respectively. Regarding the 7-day graphical TWO, all of the areas correctly captured the tropical cyclone's genesis location (Fig. 4).

A verification of NHC official track forecasts for Gilma is given in Table 3a. Official track forecast errors were lower than the mean official errors for the previous 5-yr period at all forecast times and had little bias overall. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b. The only models that outperformed the official forecasts at most forecast time periods were some of the consensus aids.

A verification of NHC official intensity forecasts for Gilma is given in Table 4a. Official intensity forecast errors were higher than the mean official errors for the previous 5-yr period for all forecast hours. These large errors were due to NHC's predictions not anticipating the magnitude of the storm's two rapid intensification episodes, especially the latter one. An inspection of the NHC's forecasts indicates that a sizeable low bias was present overall. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b. Of the available guidance, the hurricane regional models, especially HFAI and HFBI, and the consensus aids (HCCA, IVCN, FSSE) generally performed best. These models slightly outperformed the official forecasts at some time periods and captured the rapid intensification and weakening periods better than the other models. On the other hand, the dynamical-statistical models (LGEM and DSHP) were the worst performers and had very large errors for Gilma.

A verification of CPHC official track forecasts for Gilma is given in Table 5a. A homogeneous comparison of the official track errors with selected guidance models is given in Table 5b. A verification of CPHC official intensity forecasts for Gilma is given in Table 6a. A homogeneous comparison of the official intensity errors with selected guidance models is presented in Table 6b.

There were no coastal watches or warnings issued for Gilma.

Table 1. Best track for Hurricane Gilma, 18–29 August 2024.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
18 / 0600	14.1	109.3	1007	25	tropical depression
18 / 1200	14.4	110.4	1006	30	"
18 / 1800	14.6	111.7	1004	35	tropical storm
19 / 0000	14.8	113.0	1003	40	"
19 / 0600	15.0	114.3	1001	45	"
19 / 1200	14.9	115.4	1001	45	"
19 / 1800	15.0	116.4	1001	45	"
20 / 0000	15.3	117.2	1001	45	"
20 / 0600	15.6	118.0	1001	45	"
20 / 1200	15.9	119.0	1000	50	"
20 / 1800	15.9	120.0	996	55	"
21 / 0000	15.9	121.0	993	60	"
21 / 0600	15.9	121.9	990	65	hurricane
21 / 1200	16.0	122.6	983	75	"
21 / 1800	16.2	123.1	972	90	"
22 / 0000	16.4	123.6	963	100	"
22 / 0600	16.6	124.0	960	105	"
22 / 1200	16.8	124.4	954	110	"
22 / 1800	17.0	124.9	954	110	"
23 / 0000	17.3	125.4	955	110	"
23 / 0600	17.4	125.9	958	105	"
23 / 1200	17.4	126.5	961	100	"
23 / 1800	17.4	127.2	965	95	"
24 / 0000	17.4	128.0	970	90	"
24 / 0600	17.4	128.8	970	90	"
24 / 1200	17.5	129.7	970	90	"
24 / 1800	17.6	130.5	965	100	"
25 / 0000	17.7	131.4	950	115	"
25 / 0600	17.8	132.3	950	115	"
25 / 1200	17.9	133.2	955	110	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
25 / 1800	17.9	134.1	965	100	"
26 / 0000	18.0	134.9	972	90	"
26 / 0600	18.1	135.6	974	90	"
26 / 1200	18.2	136.3	974	90	"
26 / 1800	18.4	137.1	969	95	"
27 / 0000	18.5	138.0	969	95	"
27 / 0600	18.5	139.0	973	90	"
27 / 1200	18.4	140.1	983	75	"
27 / 1800	18.4	141.5	996	55	tropical storm
28 / 0000	18.4	142.7	1001	45	"
28 / 0600	18.4	143.9	1001	45	"
28 / 1200	18.6	145.1	1003	40	"
28 / 1800	18.9	146.4	1003	40	"
29 / 0000	19.1	147.6	1006	35	"
29 / 0600	19.3	148.8	1007	35	"
29 / 1200	19.8	150.1	1009	30	tropical depression
29 / 1800	20.1	151.1	1010	30	"
30 / 0000					dissipated
25 / 0000	17.7	131.4	950	115	maximum wind and minimum pressure

Table 2. 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	**168-Hour Outlook**
Low (<40%)	54	114
Medium (40%-60%)	36	78
High (>60%)	12	54

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Gilma. 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	60	72	96	120
OFCL	**14.0**	**24.0**	**32.3**	**43.5**	**55.5**	**66.0**	**82.6**	**108.6**
OCD5	25.1	47.7	70.6	98.5	128.1	153.9	201.4	257.9
Forecasts	36	36	36	36	36	34	30	26
OFCL (2019-23)	22.6	34.4	46.0	57.6	69.6	83.5	112.4	137.2
OCD5 (2019-23)	38.2	75.5	117.0	160.0	203.5	247.6	329.5	404.4

Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Gilma. 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	60	72	96	120
OFCL	12.9	22.8	31.8	43.6	54.9	66.0	87.5	111.0
OCD5	23.7	45.3	67.9	95.6	125.0	151.6	198.6	259.9
GFSI	15.0	27.0	44.7	62.6	69.3	**64.3**	92.8	**109.6**
HMNI	17.7	32.4	49.5	69.9	92.0	104.7	117.5	139.6
HWFI	14.9	23.6	41.9	60.0	72.1	71.0	94.7	131.4
HFAI	14.9	25.9	42.6	62.0	80.1	91.1	121.5	173.7
HFBI	19.0	32.5	44.4	58.6	69.9	82.3	112.7	160.8
EGRI	20.9	46.1	67.6	88.6	100.4	100.1	136.8	182.2
EMXI	14.3	24.9	34.4	43.9	55.1	66.6	112.2	155.5
CMCI	18.1	36.1	51.6	60.1	60.9	66.6	119.2	172.0
NVGI	20.4	35.9	53.5	72.1	84.3	100.3	154.9	241.1
AEMI	14.7	24.7	37.8	52.9	58.8	**63.5**	93.5	131.4
TVCE	**12.8**	**22.5**	33.8	46.5	57.4	66.9	93.8	119.0
TVCX	**12.1**	**21.9**	32.7	44.5	57.2	67.2	92.6	115.5
TVDG	13.2	**22.4**	33.9	47.1	58.4	68.2	94.8	117.8
HCCA	**12.2**	**19.7**	**29.4**	**39.2**	**49.6**	**62.7**	98.1	133.5
FSSE	13.9	**21.2**	**30.0**	**41.4**	**48.5**	**54.7**	**82.1**	**94.0**
GFEX	13.3	23.5	35.8	48.8	57.0	**58.9**	90.2	111.2
Forecasts	34	34	34	34	32	28	24	20

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Gilma. 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	60	72	96	120
OFCL	8.3	12.6	14.0	17.4	19.3	21.9	23.3	24.2
OCD5	11.3	18.4	20.9	22.3	25.3	28.6	31.1	31.1
Forecasts	36	36	36	36	36	34	30	26
OFCL (2019-23)	5.5	8.7	10.8	12.7	14.5	15.6	17.1	18.0
OCD5 (2019-23)	7.2	12.2	15.9	18.6	19.9	20.0	19.6	18.7

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Gilma. 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	60	72	96	120
OFCL	8.3	12.7	14.3	17.6	19.4	21.8	22.2	23.6
OCD5	11.6	18.9	21.3	22.8	26.0	29.0	30.3	30.5
HWFI	11.1	14.6	14.9	**15.8**	19.9	22.7	24.1	**21.3**
HMNI	8.5	12.9	15.2	**17.3**	21.1	22.7	**20.6**	**16.2**
HFAI	9.7	13.2	**13.2**	**16.1**	21.1	24.1	25.1	**20.3**
HFBI	9.9	**10.9**	**8.8**	**13.7**	**17.9**	22.3	27.1	**15.8**
DSHP	11.0	17.0	20.3	24.0	26.6	28.3	28.8	28.6
LGEM	11.6	19.2	24.3	28.7	32.4	35.6	37.8	37.8
HCCA	8.7	**11.6**	**11.9**	**14.1**	**17.9**	**21.7**	23.6	**20.5**
FSSE	8.5	**11.8**	**12.2**	**14.4**	**18.1**	**20.7**	22.7	24.3
IVCN	8.8	**12.5**	**13.8**	17.7	21.9	25.1	25.8	**22.2**
GFSI	10.1	14.6	15.0	**17.5**	22.1	25.3	26.5	26.4
EMXI	10.4	15.3	17.9	22.1	26.3	30.4	33.4	34.2
Forecasts	35	35	35	35	35	33	29	25

Table 5a. CPHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Gilma. 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.

Model ID		Forecast Period (h)						
	12	24	36	48	60	72	96	120
OFCL	**12.4**	**21.7**	**40.4**	**46.3**				
OCD5	14.6	32.9	54.8	71.5				
Forecasts	8	6	4	2				
OFCL (2019-2023)	21.8	34.3	41.2	46.4				
OCD5 (2019-2023)	31.2	60.0	85.3	110.1				

Table 5b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Gilma. Errors smaller than the CPHC official forecast are shown in boldface type.

Model ID		Forecast Period (h)						
	12	24	36	48	60	72	96	120
OFCL	12.4	21.7	40.4	46.3				
OCD5	14.6	32.9	54.8	71.5				
HFAI	15.4	**21.1**	**37.3**	68.0				
HFBI	13.7	**17.7**	**28.8**	48.2				
TVDG	13.3	21.9	**40.2**	58.2				
TVCE	**11.3**	**20.4**	**37.5**	55.3				
GFEX	13.6	**21.5**	**35.6**	46.4				
TVCX	13.3	**20.2**	**34.7**	52.7				
FSSE	13.2	24.2	**38.7**	50.2				
HCCA	**10.8**	**19.9**	**29.7**	**38.5**				
AEMI	15.4	21.9	**33.5**	**32.5**				
NVGI	18.9	39.2	51.5	66.4				
CMCI	14.5	26.7	**36.7**	**44.3**				
EMXI	13.0	**13.5**	**18.5**	**12.6**				
EGRI	13.0	28.9	63.5	90.4				
HWFI	17.8	30.9	**34.9**	47.8				
HMNI	14.1	24.0	47.6	64.7				
GFSI	15.9	34.2	61.0	**33.8**				
Forecasts	8	6	4	2				

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

Model ID								
	12	24	36	48	60	72	96	120
OFCL	**2.5**	**2.5**	**2.5**	**5.0**				
OCD5	5.5	7.8	8.5	11.0				
Forecasts	8	6	4	2				
OFCL (2019-2023)	4.5	6.4	8.7	10.3				
OCD5 (2019-2023)	6.2	9.4	14.5	19.0				

Table 6b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Gilma. Errors smaller than the CPHC official forecast are shown in boldface type.

Model ID	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	2.5	2.5	2.5	5.0				
OCD5	5.5	7.8	8.5	11.0				
HFAI	4.6	5.8	6.8	7.5				
IVCN	4.1	4.7	3.5	**3.5**				
HFBI	3.5	3.8	3.5	**3.0**				
LGEM	5.0	6.3	6.8	8.0				
DSHP	4,4	5.8	5.0	6.5				
FSSE	3.9	4.0	2.5	**2.5**				
HCCA	4.1	4.3	3.3	**3.5**				
EMXI	4.4	6.3	7.0	10.5				
HWFI	4.4	2.5	3.8	**1.0**				
HMNI	4.3	4.0	5.5	5.0				
GFSI	3.0	3.5	3.5	5.0				
Forecasts	8	6	4	2				

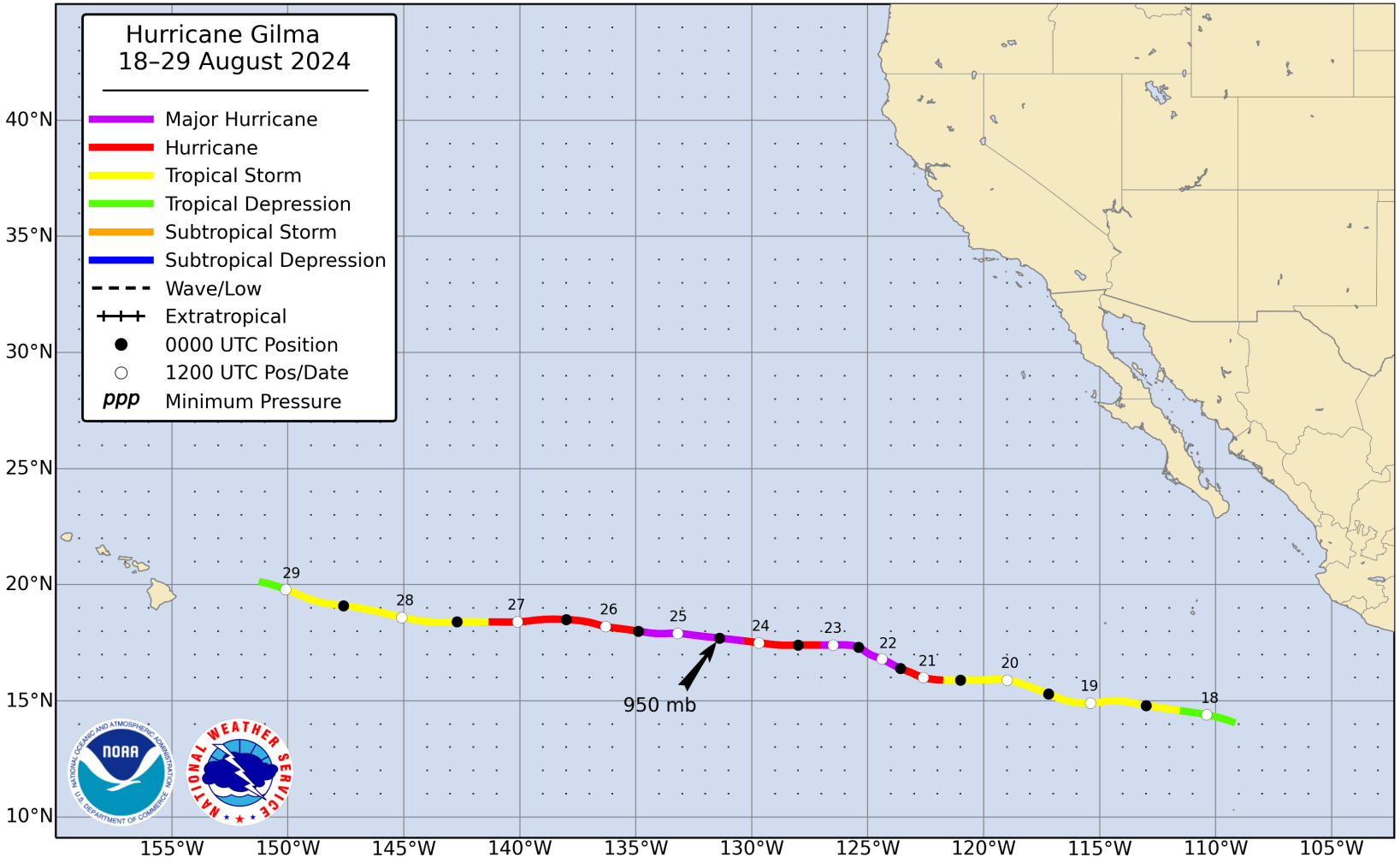

Figure 1. Best track positions for Hurricane Gilma, 18–29 August 2024.

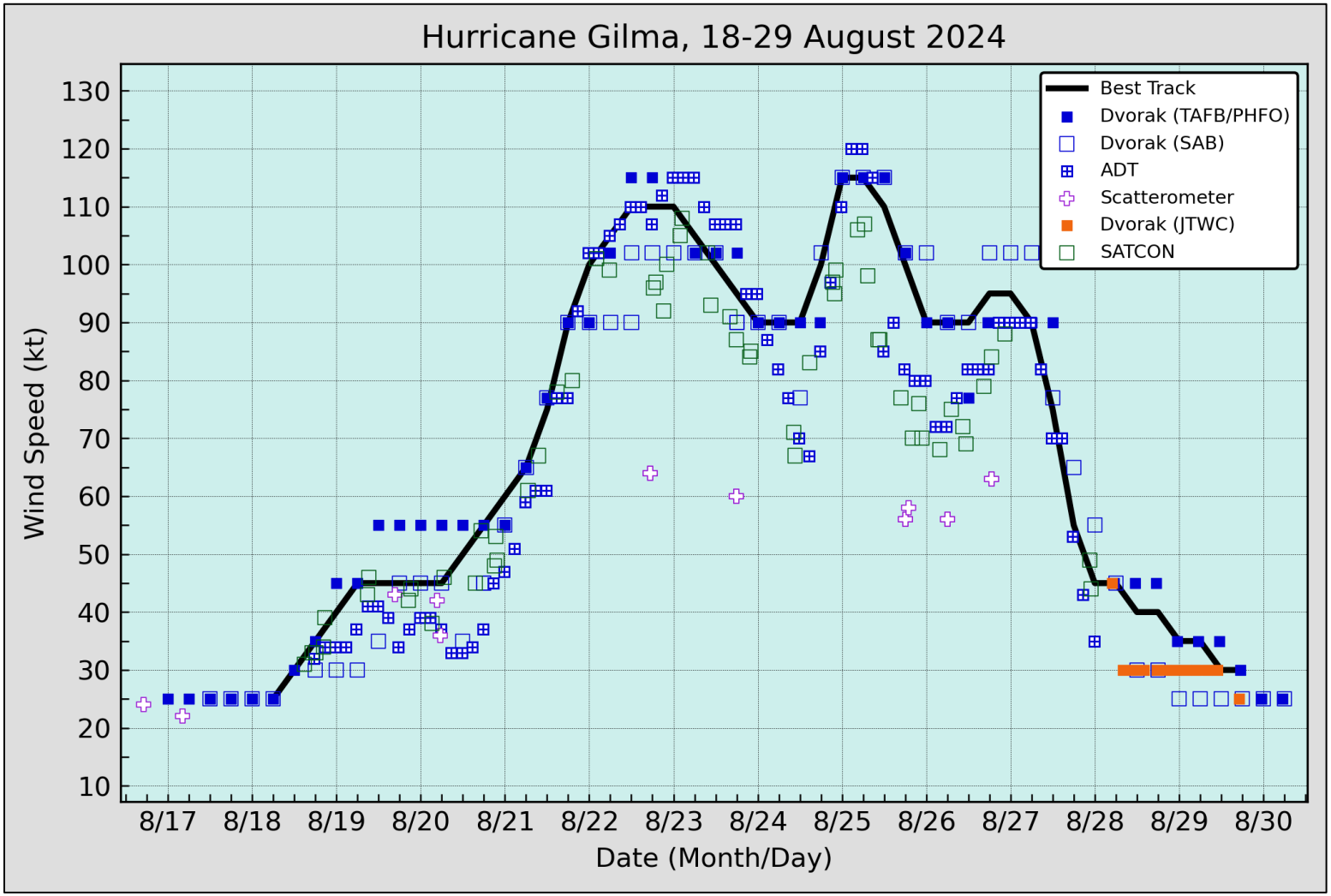

Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Gilma, 18–29 August 2024. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

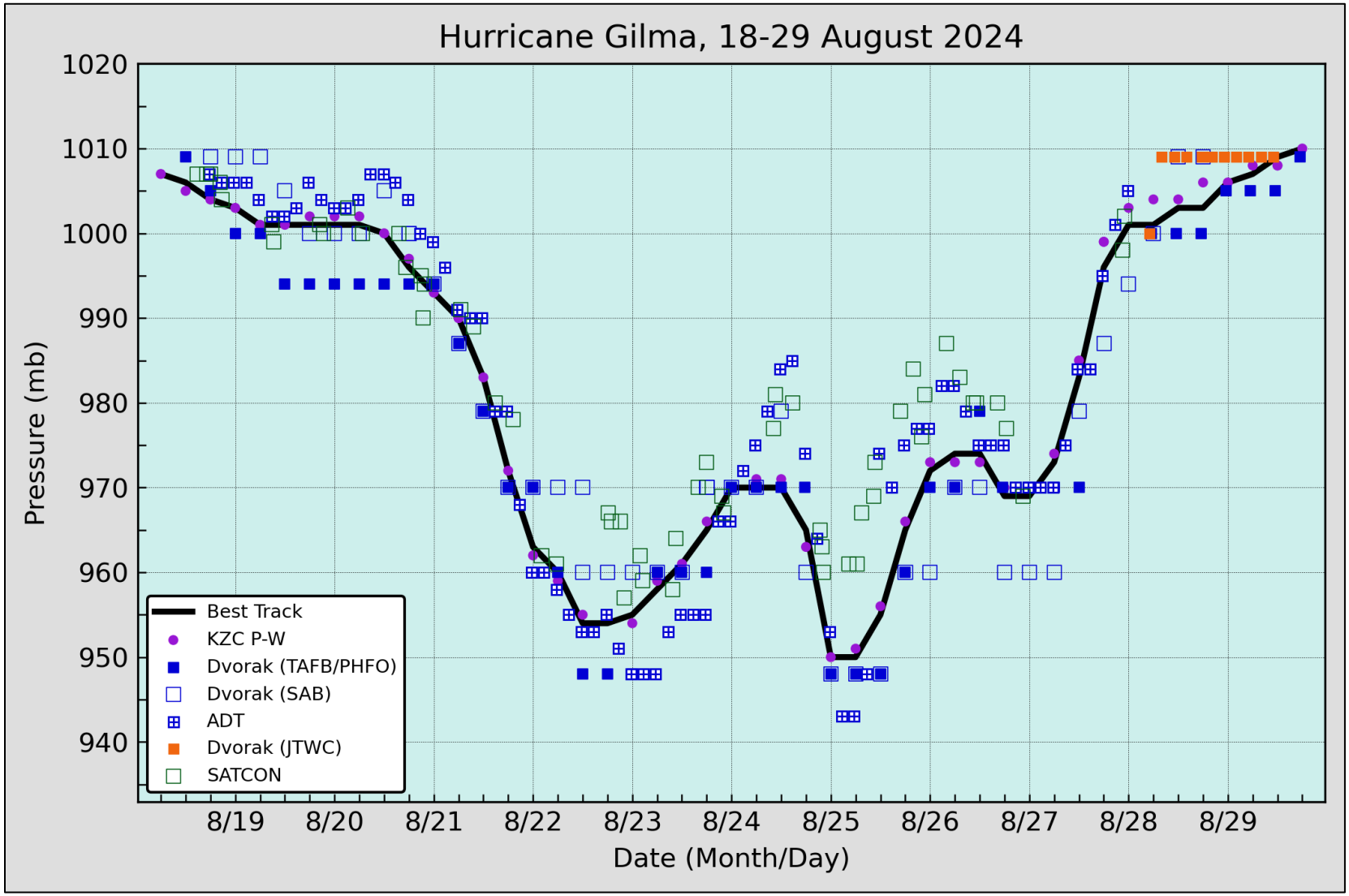

Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Gilma, 18–29 August 2024. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.

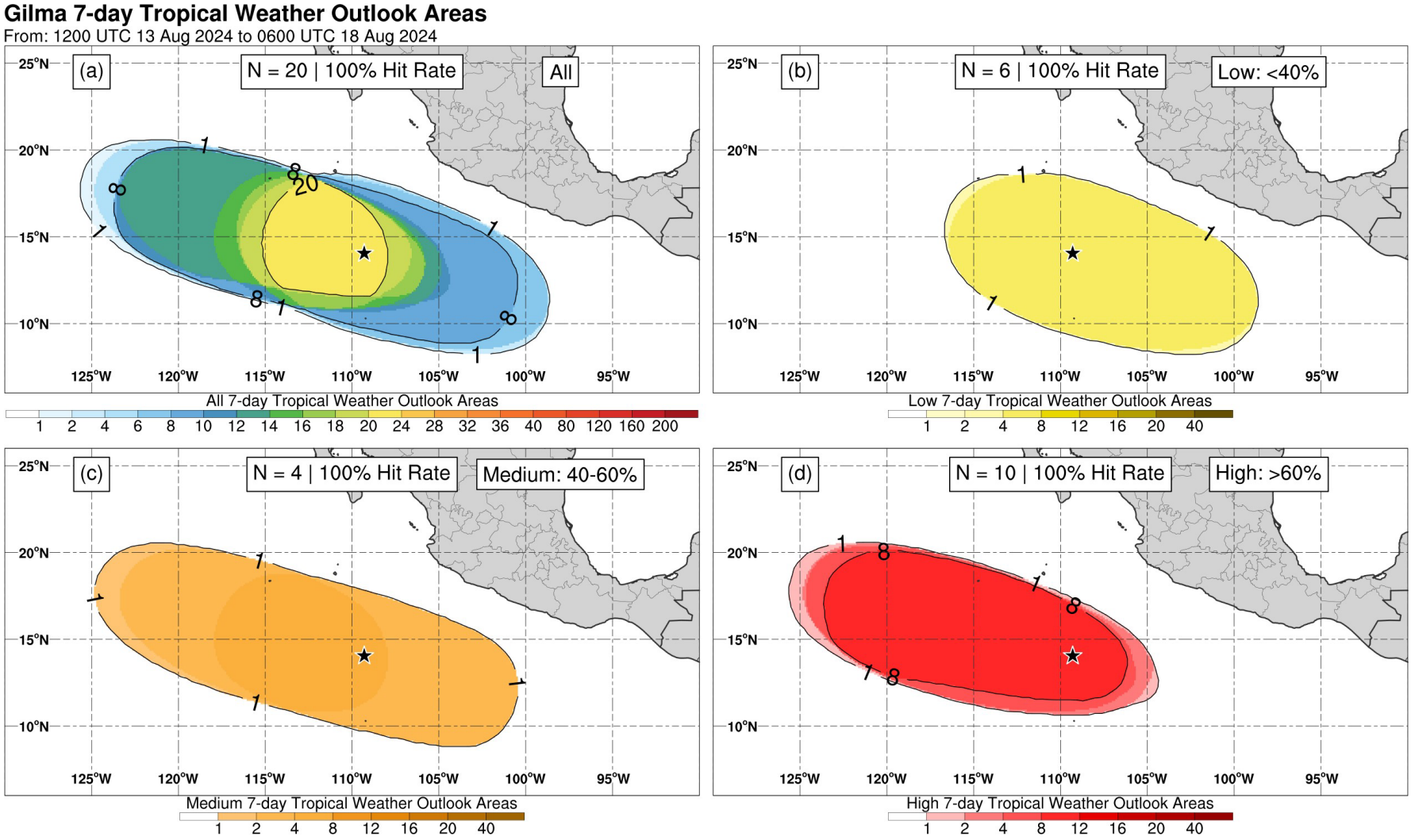

Figure 4. Composites of 7-day tropical cyclone genesis areas depicted in NHC's Tropical Weather Outlooks prior to the formation of Gilma for (a) all probabilistic genesis categories, (b) the low (<40%) category, (c) medium (40–60%) category, and (d) high (>60%) category. The location of genesis is indicated by the black star.