

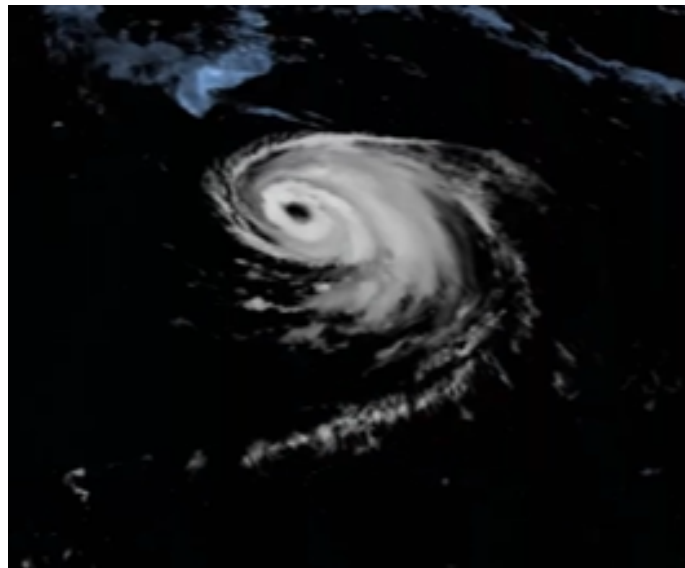


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT¹

HURRICANE DON (AL052023)

14-24 July 2023

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GEOCOLOR IMAGE OF DON FROM GOES-16 AT 2100 UTC ON 22 JULY 2023 AT THE TIME OF PEAK INTENSITY (NESDIS)

Don was a category 1 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that remained over the open Atlantic Ocean without any direct impacts on land.

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 Don.

Hurricane Don

14-24 JULY 2023

BEST TRACK

The “best track²” positions and intensities for Hurricane Don are listed in Table 1. The best track chart of Don’s path is given in Fig. 1, with the wind and pressure histories along with available observations³ shown in Figs. 2 and 3, respectively. There were no ship reports of tropical-storm-force winds in association with Don.

Origin

Don developed on 14 July from a non-tropical area of low pressure roughly midway between Bermuda and the Azores. The system was assessed at genesis as being subtropical because it was embedded within an upper-level trough and displayed a relatively large radius of maximum wind. By 17 July, Don had acquired a smaller radius of maximum wind and a more concentrated area of deep convection, which resulted in it becoming a tropical cyclone.

Peak Intensity and Minimum Pressure

Don’s peak intensity of 65 kt from 1800 UTC 22 July to 0000 UTC 23 July is supported by a blend of the TAFB and SAB subjective Dvorak estimates and the objective SATCON guidance.

The estimated minimum central pressure of 986 mb from 1800 UTC 22 July to 0000 UTC 23 July is based on applying the Knaff-Zehr-Courtney pressure-wind relationship.

CASUALTY AND DAMAGE STATISTICS

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

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 *bt*k 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) and the Satellite Analysis Branch (SAB), 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 Don.

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 for each category prior to the formation of Don. While there were no forecasts of a High chance of genesis before Don formed (based upon post-storm analyses), all of the 7-day genesis areas did correctly enclose the actual genesis location.

A verification of NHC official track forecasts for Don is given in Table 3a. Official track forecast errors were much lower than the mean official errors for the previous 5-yr period, despite the climatology/persistence errors being substantially larger than average, which suggests that this sample includes more difficult track forecasts than usual. A homogeneous comparison of the official track errors with selected guidance models is given in Table 3b.

A verification of NHC official intensity forecasts for Don is given in Table 4a. Official intensity forecast errors likewise were much lower than the mean official errors for the previous 5-yr period, though the climatology/persistence errors were also small which implies easier intensity forecasts than is typical. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 4b.

There were no coastal watches or warnings issued for Don.



Table 1. Best track for Hurricane Don, 14-24 July 2023.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
11 / 1200	36.5	55.5	1013	25	Low
11 / 1800	36.6	55.0	1013	25	"
12 / 0000	36.2	54.4	1011	25	"
12 / 0600	35.3	53.6	1009	25	"
12 / 1200	34.0	52.6	1009	25	"
12 / 1800	32.9	51.9	1008	30	"
13 / 0000	32.0	51.0	1007	30	"
13 / 0600	31.3	50.2	1006	30	"
13 / 1200	31.2	48.7	1004	35	"
13 / 1800	31.7	47.3	1003	40	"
14 / 0000	32.5	46.7	1002	45	subtropical storm
14 / 0600	32.9	46.8	1002	45	"
14 / 1200	33.4	47.0	1004	40	"
14 / 1800	33.8	47.2	1004	40	"
15 / 0000	34.3	47.2	1004	40	"
15 / 0600	35.3	47.7	1005	40	"
15 / 1200	36.2	48.4	1006	40	"
15 / 1800	37.1	48.7	1007	35	"
16 / 0000	37.8	48.8	1007	35	"
16 / 0600	38.4	48.7	1007	35	"
16 / 1200	38.9	48.5	1009	30	subtropical depression



16 / 1800	39.4	47.5	1010	30	"
17 / 0000	39.5	46.4	1010	30	"
17 / 0600	39.3	45.0	1010	30	tropical depression
17 / 1200	38.9	43.6	1010	30	"
17 / 1800	38.4	42.2	1010	30	"
18 / 0000	37.8	40.9	1008	35	tropical storm
18 / 0600	36.8	39.9	1008	35	"
18 / 1200	36.0	39.4	1008	35	"
18 / 1800	35.3	39.2	1008	35	"
19 / 0000	34.6	39.1	1008	35	"
19 / 0600	34.2	39.1	1008	35	"
19 / 1200	33.9	39.3	1008	35	"
19 / 1800	33.8	39.9	1005	40	"
20 / 0000	33.8	40.6	1001	45	"
20 / 0600	34.0	41.3	1001	45	"
20 / 1200	34.3	42.2	1004	40	"
20 / 1800	34.5	43.3	1004	40	"
21 / 0000	34.6	44.2	1004	40	"
21 / 0600	35.0	45.1	1004	40	"
21 / 1200	35.4	46.0	1001	45	"
21 / 1800	36.2	47.0	1001	45	"
22 / 0000	36.9	48.2	1001	45	"
22 / 0600	37.7	49.3	1001	45	"
22 / 1200	38.5	49.9	995	55	"
22 / 1800	39.5	50.1	986	65	hurricane



23 / 0000	40.7	49.9	986	65	"
23 / 0600	42.0	49.4	989	60	tropical storm
23 / 1200	43.3	48.5	992	55	"
23 / 1800	44.7	47.3	996	50	"
24 / 0000	45.9	45.7	1002	45	"
24 / 0600	46.7	44.1	1005	40	low
24 / 1200	47.3	41.9	1005	40	"
24 / 1800	47.8	39.7	1005	40	"
25 / 0000	48.5	36.8	1008	35	"
25 / 0600	49.1	33.7	1008	35	"
25 / 1200	49.8	29.4	1010	30	"
25 / 1800	50.4	24.5	1010	30	extratropical
26 / 0000					dissipated
22 / 1800	39.5	50.1	986	65	minimum pressure and maximum wind speed



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%)	78	114
Medium (40%-60%)	48	78
High (>60%)	0	0



Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Don. 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	16.3	24.6	34.4	48.8	64.5	71.5	70.2	59.9
OCD5	46.3	114.8	198.6	282.6	366.1	456.6	665.4	826.8
Forecasts	38	36	34	32	30	28	24	20
OFCL (2018-22)	23.8	35.7	47.8	61.4	76.1	90.5	125.7	172.1
OCD5 (2018-22)	46.4	99.2	157.4	215.0	254.9	321.2	405.1	486.6



Table 3b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Don. 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	17.0	24.0	33.0	45.9	60.4	75.4	75.9	61.3
OCD5	43.1	104.1	184.3	258.2	334.3	416.8	619.4	809.8
HFBI	15.3	24.3	30.2	42.3	61.9	84.7	101.2	136.8
HFAI	17.0	23.3	29.5	41.0	62.0	86.2	108.9	133.0
TABS	31.3	54.2	75.0	88.2	103.0	110.8	137.3	151.7
TABM	30.4	53.4	74.3	90.0	104.3	107.0	128.1	142.3
TABD	33.1	61.3	82.7	103.7	127.8	139.9	189.4	313.8
GFEX	15.8	26.7	34.4	47.2	62.4	78.6	76.5	59.0
TVDG	15.5	22.7	28.5	40.1	53.2	72.9	83.0	74.8
TVCA	15.1	22.4	28.2	40.0	53.2	72.1	83.0	79.4
TVCX	15.4	22.6	28.8	39.4	52.2	72.3	80.1	72.2
FSSE	15.3	21.8	28.4	42.1	55.0	71.0	90.2	95.5
AEMI	17.5	29.5	38.8	45.3	49.7	53.1	67.2	86.5
CTCI	17.8	29.0	41.0	53.8	69.9	91.1	138.7	196.5
NVGI	24.7	43.3	55.4	66.9	80.2	88.8	86.3	140.2
CMCI	17.3	24.4	37.1	49.3	69.6	93.1	127.2	163.1
EMXI	17.1	25.4	35.7	54.0	71.3	90.0	92.0	112.7
EGRI	17.8	24.3	33.3	50.9	70.7	99.0	132.8	126.7
HWF1	16.3	21.9	29.5	40.2	62.3	93.5	142.8	190.4
HMNI	19.7	28.4	33.9	44.3	55.3	70.1	122.5	174.9
GFSI	17.4	30.0	37.8	46.9	63.9	81.5	109.0	136.4
Forecasts	29	27	25	23	21	21	17	11

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Don. 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	2.9	3.9	4.7	6.1	7.2	6.2	5.0	8.2
OCD5	4.8	6.1	7.2	9.4	10.6	12.7	19.6	9.1
Forecasts	38	36	34	32	30	28	24	20
OFCL (2018-22)	5.1	7.6	8.9	10.1	10.7	11.5	13.3	15.5
OCD5 (2018-22)	6.8	10.7	13.9	16.5	18.3	20.2	22.9	23.4

Table 4b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Don. 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	3.2	3.8	4.8	7.0	8.0	7.4	5.6	7.7
OCD5	5.4	6.6	7.9	9.6	10.9	12.4	17.2	10.2
HFBI	4.9	5.6	5.0	5.8	8.0	8.3	5.5	5.3
HFAI	4.5	5.1	6.5	6.6	7.3	8.7	6.2	11.0
IVDR	3.6	3.8	4.8	5.9	6.7	6.3	4.3	4.8
IVCN	3.6	4.0	4.8	5.9	6.9	6.3	4.8	5.5
ICON	3.6	3.5	4.3	5.8	7.1	6.7	6.9	7.7
LGEM	4.5	4.9	5.5	7.0	7.8	8.6	11.0	11.4
DSHP	4.2	4.7	5.7	7.4	7.7	8.0	8.7	11.5
FSSE	3.7	4.0	5.1	6.5	7.3	6.9	5.2	4.8
CTCI	4.3	4.8	5.6	6.9	6.0	4.8	6.9	7.6
EMXI	3.5	4.4	5.6	8.1	9.2	10.1	11.6	16.4
HWFI	4.2	3.9	4.7	6.1	7.0	6.8	6.4	8.8
HMNI	3.5	2.8	4.1	5.5	7.2	8.2	6.3	6.1
GFSI	3.8	4.2	6.0	6.8	6.6	7.1	9.5	11.6
Forecasts	31	29	27	25	23	21	17	13

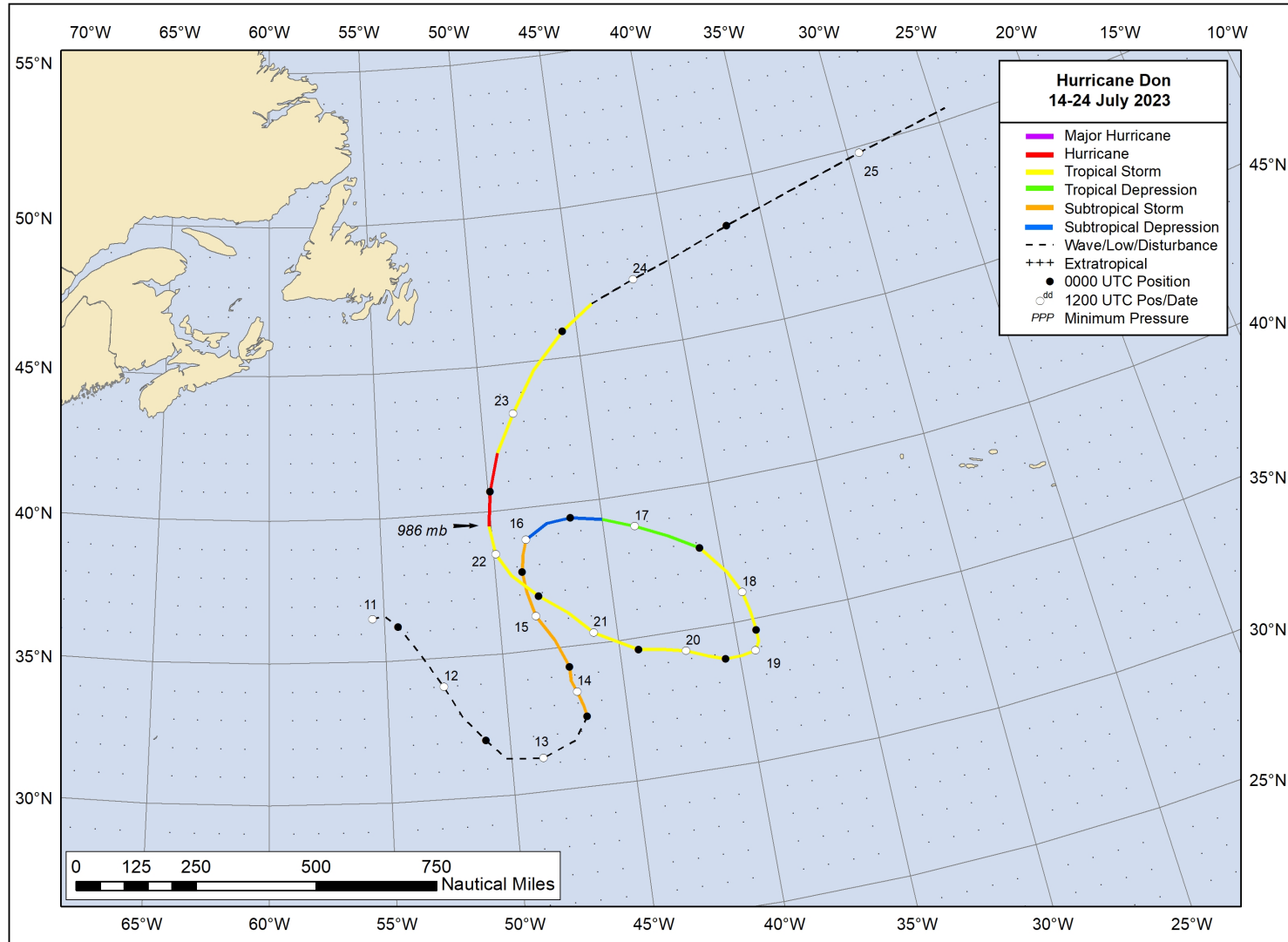


Figure 1. Best track positions for Hurricane Don, 14-24 July 2023. Tracks during the post-tropical stage are partially based on analyses from the NOAA Ocean Prediction Center.

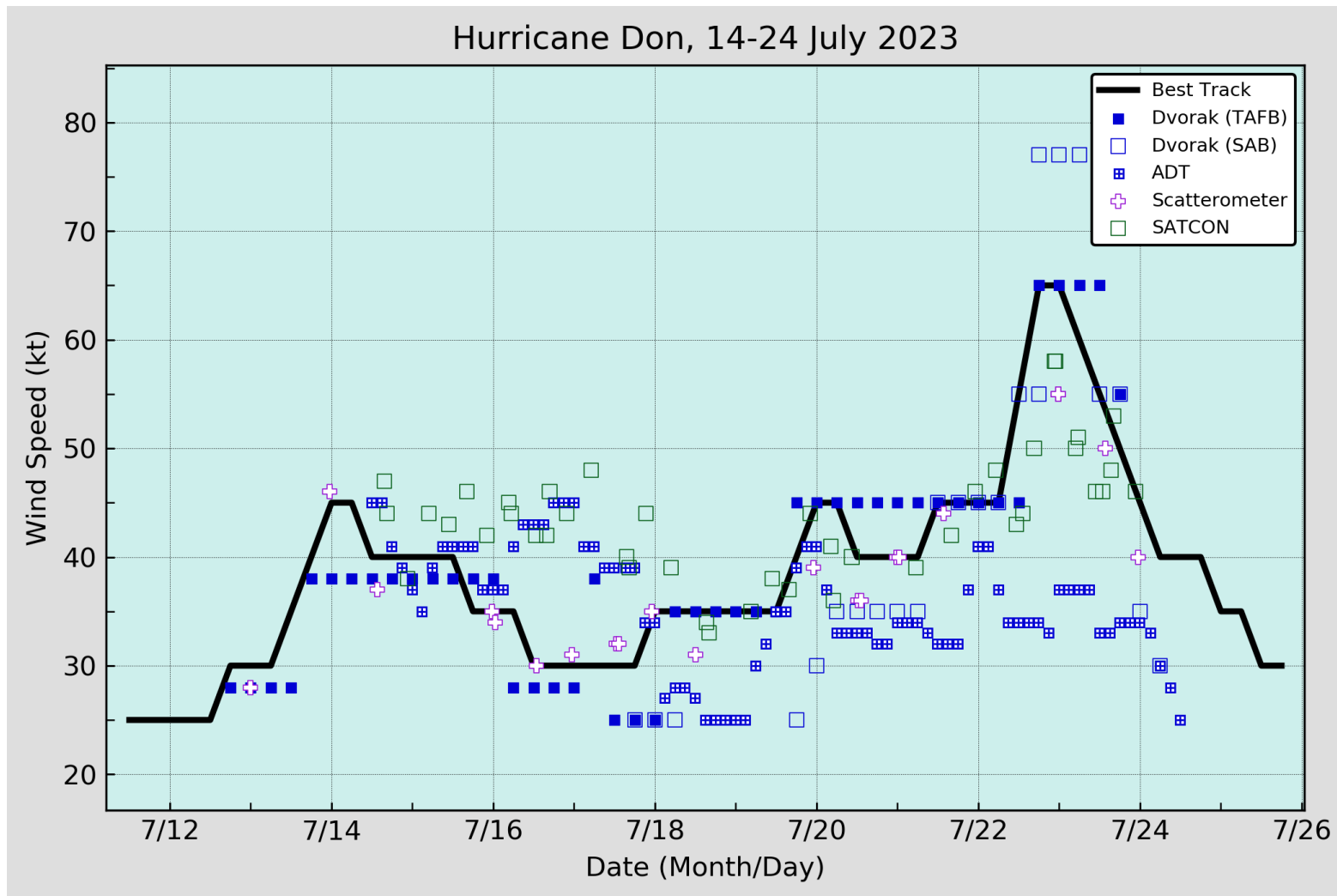


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Don, 14-24 July 2023. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

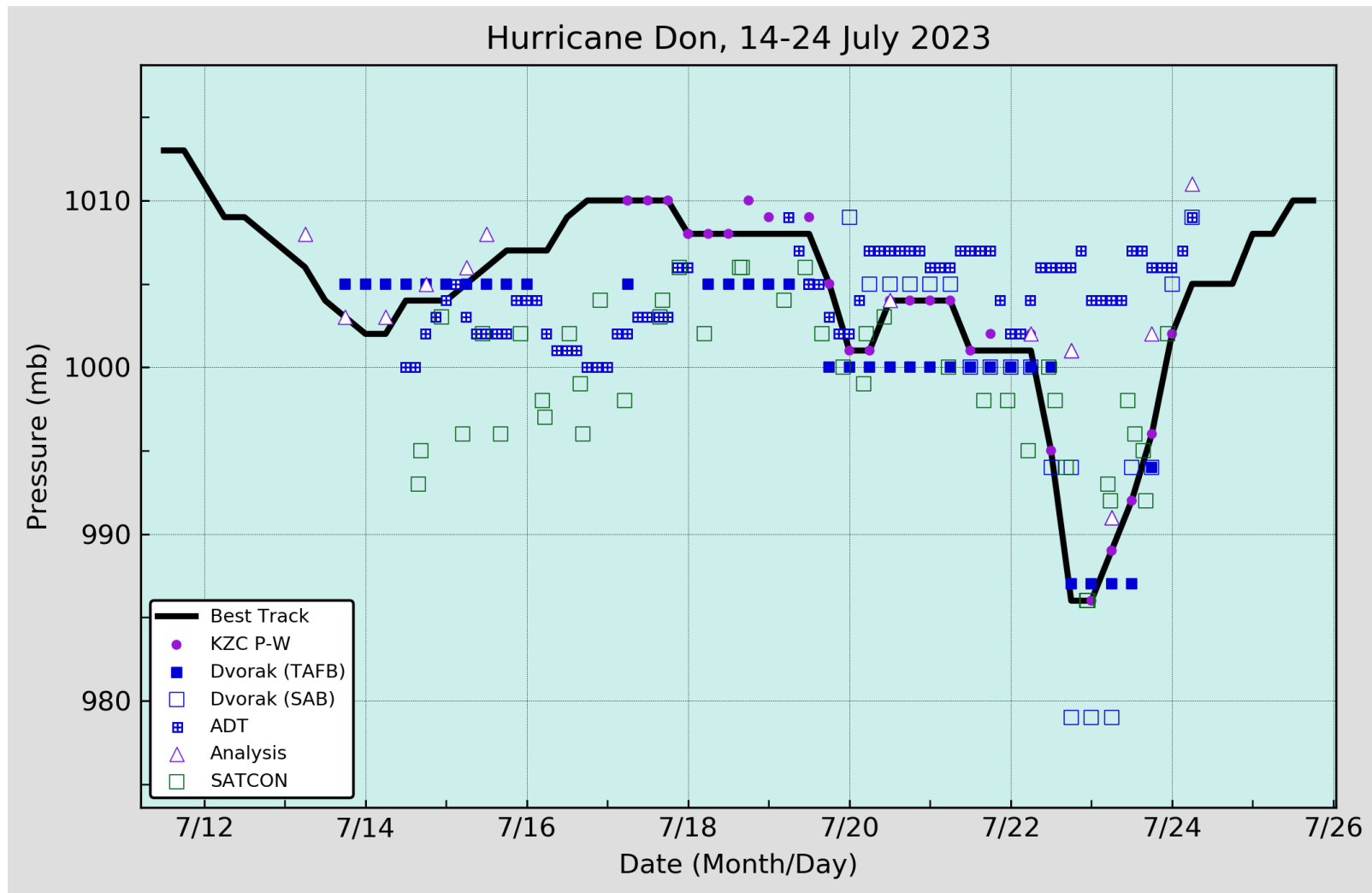


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Don, 14-24 July 2023. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.

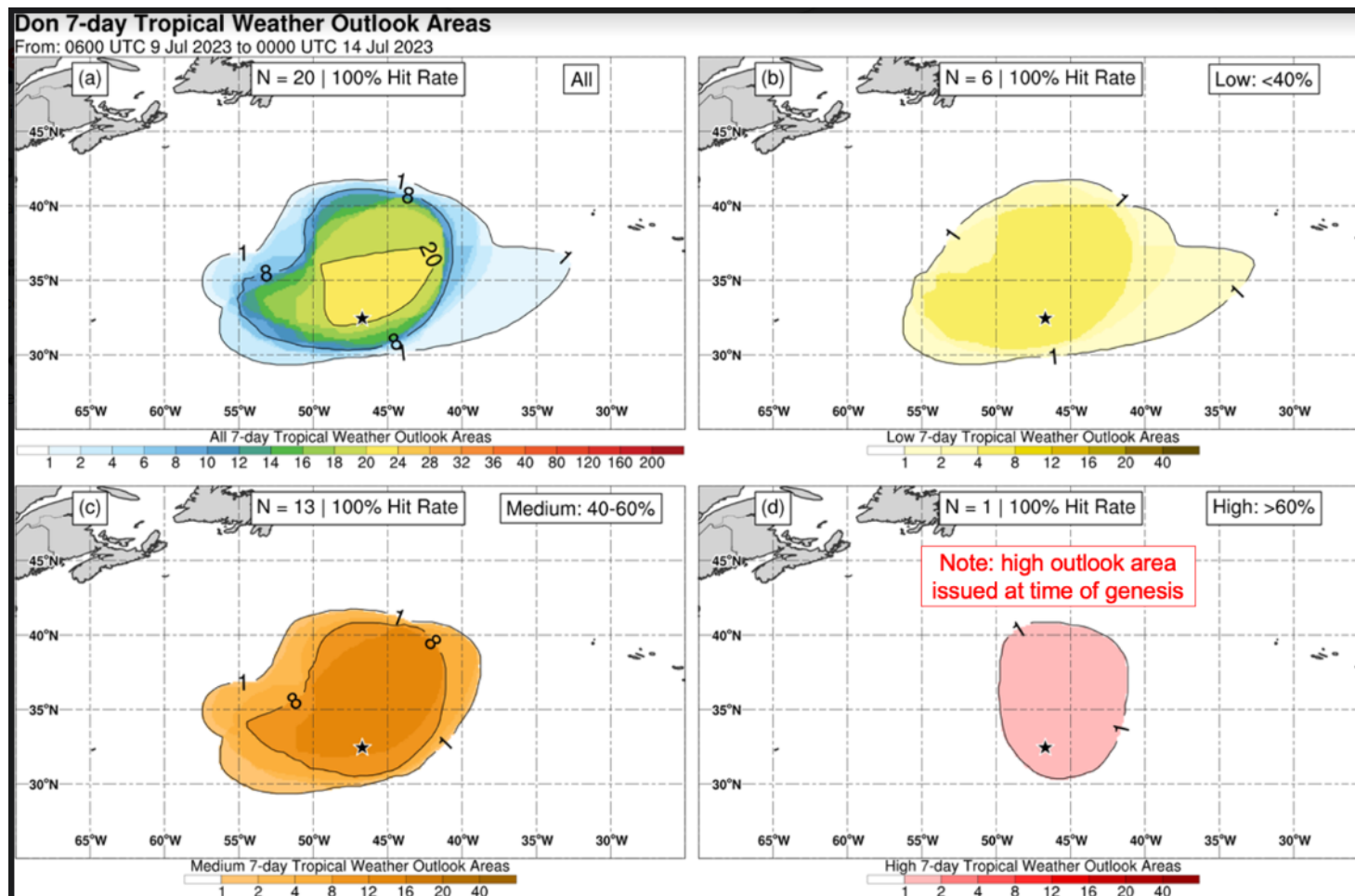


Figure 4. Composites of 7-day tropical cyclone genesis areas depicted in NHC’s Tropical Weather Outlooks prior to the formation of Hurricane Don for (a) all probabilistic genesis categories, (b) the low (<40%) category, (c) medium (40–60%) category, and (d) high (>60%) category. The location of genesis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