

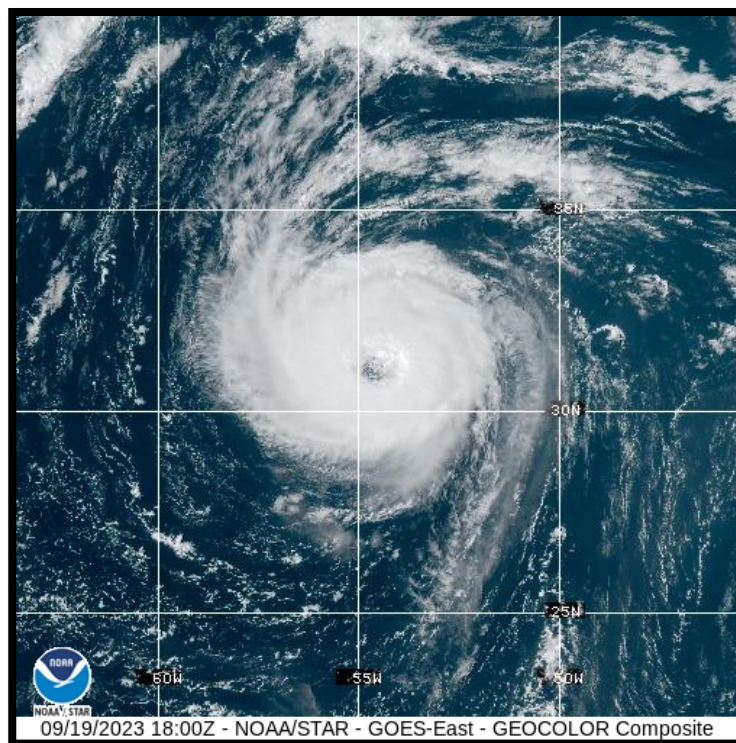


NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT¹

HURRICANE NIGEL (AL152023)

15–22 September 2023

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National Hurricane Center
19 December 2023



GOES-16 GEOCOLOR IMAGE OF HURRICANE NIGEL AT 1800 UTC 19 SEPTEMBER 2023.
IMAGE COURTESY OF NOAA/NESDIS/STAR.

Nigel was a category 2 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that formed over the tropical Atlantic and recurved northward over the central Atlantic Ocean.

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 Nigel.

Hurricane Nigel

15–22 SEPTEMBER 2023

BEST TRACK

The “best track²” positions and intensities for Hurricane Nigel are listed in Table 1. The best track chart of Nigel’s path is given in Fig. 1, with the wind and pressure histories along with available observations³ shown in Figs. 2 and 3, respectively. Observations also include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from 4 research flights of the NOAA hurricane hunters (Fig. 4).

There were no land-based or ship reports of tropical-storm-force winds associated with Nigel.

Origin

Nigel developed from a tropical wave that moved off the west coast of Africa on 8 September.

Peak Intensity and Minimum Pressure

Nigel’s estimated peak intensity of 85 kt from 1800 UTC 19 September to 0600 UTC 20 September is based on a blend of subjective Dvorak intensity estimates from TAFB and SAB, and NOAA hurricane hunter aircraft reconnaissance data.

The estimated minimum central pressure of 971 mb as a tropical cyclone is based on the Knaff-Zehr-Courtney pressure-wind relationship, and NOAA hurricane hunters aircraft reconnaissance data.

CASUALTY AND DAMAGE STATISTICS

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

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 Nigel.

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 5 shows composites of 7-day TWO genesis areas for each category prior to the formation of Nigel. Nigel's genesis location occurred within all of the potential formation areas depicted by NHC.

A verification of NHC official track forecasts for Nigel is given in Table 3a. Official track forecast errors were lower than the mean official errors for the previous 5-yr period for the 12-through 48-h forecasts. Beyond 48h the official track forecast errors were higher than the mean official errors for the previous 5-yr period, likely due to the complex steering pattern and timing of an approaching upper-level trough. 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 Nigel is given in Table 4a. Official intensity forecast errors were lower than or comparable to the mean official errors for the previous 5-yr period at all applicable forecast times. 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 Nigel.



Table 1. Best track for Hurricane Nigel, 15-22 September 2023.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
15 / 0600	13.6	42.2	1007	30	tropical depression
15 / 1200	14.3	43.2	1007	30	"
15 / 1800	15.2	44.0	1007	30	"
16 / 0000	16.1	44.8	1007	30	"
16 / 0600	17.4	45.4	1007	30	"
16 / 1200	18.7	46.0	1006	30	"
16 / 1800	20.1	46.7	1006	30	"
17 / 0000	21.4	47.6	1005	35	tropical storm
17 / 0600	22.5	48.3	1001	45	"
17 / 1200	23.5	48.8	997	50	"
17 / 1800	24.5	49.4	994	55	"
18 / 0000	25.3	50.0	992	60	"
18 / 0600	26.0	50.6	987	65	hurricane
18 / 1200	26.8	51.1	987	65	"
18 / 1800	27.5	51.7	982	70	"
19 / 0000	28.2	52.4	979	75	"
19 / 0600	29.0	53.2	979	75	"
19 / 1200	29.9	54.0	975	80	"
19 / 1800	31.1	54.7	972	85	"
20 / 0000	32.4	55.0	971	85	"
20 / 0600	33.7	55.2	971	85	"
20 / 1200	35.2	54.7	972	80	"
20 / 1800	36.7	53.6	972	80	"
21 / 0000	38.3	51.6	973	80	"
21 / 0600	40.0	49.2	975	75	"
21 / 1200	41.3	46.3	975	75	"
21 / 1800	42.8	42.8	975	70	"



Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
22 / 0000	44.3	38.7	975	65	"
22 / 0600	45.4	34.3	974	60	extratropical
22 / 1200	47.2	30.2	972	55	"
22 / 1800	48.9	26.8	971	55	"
23 / 0000	50.9	24.0	969	55	"
23 / 0600	53.3	22.2	967	55	"
23 / 1200	55.6	22.7	964	55	"
23 / 1800	57.7	23.2	961	55	"
24 / 0000	58.3	25.6	958	50	"
24 / 0600	57.4	27.4	958	50	"
24 / 1200	56.1	26.7	961	45	"
24 / 1800	56.4	23.5	964	45	"
25 / 0000	58.0	20.9	969	40	"
25 / 0600	60.1	18.6	971	40	"
25 / 1200	61.0	18.5	972	40	"
25 / 1800	61.5	19.4	974	40	"
26 / 0000	61.5	20.9	976	40	"
26 / 0600	61.5	22.5	977	40	"
26 / 1200	61.5	23.3	977	40	"
26 / 1800					dissipated
20 / 0000	32.4	55.0	971	85	minimum pressure and maximum winds

Table 2. Number of hours in advance of formation of Nigel 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%)	66	126
Medium (40%-60%)	48	108
High (>60%)	36	78

Table 3a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Nigel, 15–22 September 2023. 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	18.1	31.4	45.3	58.9	81.9	110.8	211.6	435.2
OCD5	50.2	114.2	188.3	250.1	302.8	320.4	345.1	492.8
Forecasts	25	23	21	19	17	15	11	7
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 Nigel, 15–22 September 2023. 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	14.4	22.8	31.2	40.6	62.7	90.2	197.7	447.0
OCD5	45.6	105.2	178.5	242.2	298.6	314.7	319.2	416.1
GFSI	14.5	24.5	37.3	49.9	74.5	106.9	217.0	450.9
HWFI	21.4	32.3	48.0	61.9	83.7	116.1	237.7	515.4
HMNI	19.2	31.7	48.1	62.9	82.2	109.5	163.9	303.3
HFAI	20.2	33.2	46.9	57.5	73.8	100.7	213.1	463.8
HFBI	20.6	33.3	46.7	62.2	86.0	121.6	226.5	485.9
EGRI	19.4	23.0	33.9	46.5	64.0	77.5	139.1	311.3
EMXI	14.9	20.6	29.2	44.5	76.3	125.4	279.3	570.3
CMCI	18.8	33.4	47.2	63.7	93.4	126.0	254.5	622.7
CTCI	16.2	26.1	37.7	54.4	82.8	126.6	256.9	489.0
TVCA	15.0	23.7	34.8	48.6	72.2	106.2	214.8	450.2
TVCX	14.6	23.6	34.2	49.4	73.4	109.4	219.0	458.7
GFEX	12.7	20.0	29.0	43.3	71.6	114.2	247.2	510.4
TVDG	14.4	22.1	33.0	47.1	71.9	105.1	211.5	445.2
HCCA	14.9	18.7	25.9	31.6	48.2	73.6	170.2	421.6
AEMI	14.5	23.5	34.5	44.5	62.4	95.7	223.5	477.2
TABS	37.5	73.3	94.5	104.5	112.6	137.0	268.6	529.3
TABM	22.7	39.2	53.1	60.5	69.9	80.4	168.8	275.3
TABD	21.2	32.1	58.6	88.8	119.7	155.8	237.9	311.5
Forecasts	22	20	18	16	14	12	8	4



Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Nigel, 15–22 September 2023. 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	4.6	8.5	8.6	8.2	8.5	12.7	10.9	12.1
OCD5	3.8	6.6	9.3	11.4	14.2	16.3	20.4	15.9
Forecasts	25	23	21	19	17	15	11	7
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 Nigel, 15–22 September 2023. 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	4.6	8.4	8.2	8.1	8.4	12.1	9.5	10.8
OCD5	3.8	6.4	9.1	12.0	14.8	17.0	20.4	16.5
HWFI	5.8	6.9	6.4	7.4	7.4	7.9	14.1	12.5
HMNI	4.5	6.0	6.1	5.7	8.6	9.2	6.7	10.8
HFAI	3.9	5.5	6.5	10.5	14.3	17.2	18.6	15.3
HFBI	5.1	4.9	5.6	7.8	8.4	9.8	10.8	15.0
DSHP	4.7	7.5	6.9	8.3	9.2	8.9	5.4	7.8
LGEM	4.3	6.9	7.2	7.0	6.2	6.0	3.8	2.8
ICON	3.4	5.0	4.7	4.8	4.9	5.3	4.9	5.8
IVCN	3.5	4.5	4.3	5.8	6.8	8.2	7.7	6.0
IVDR	3.4	4.4	4.0	5.3	6.2	7.4	7.3	7.0
CTCI	4.7	7.7	9.1	10.8	11.8	12.6	9.6	5.3
GFSI	4.7	7.3	8.6	7.8	5.8	5.8	7.7	7.8
EMXI	5.3	9.7	13.8	17.0	18.5	20.9	22.7	19.3
HCCA	4.0	5.4	6.2	7.1	7.6	7.5	6.0	7.5
Forecasts	24	22	20	18	16	14	10	6

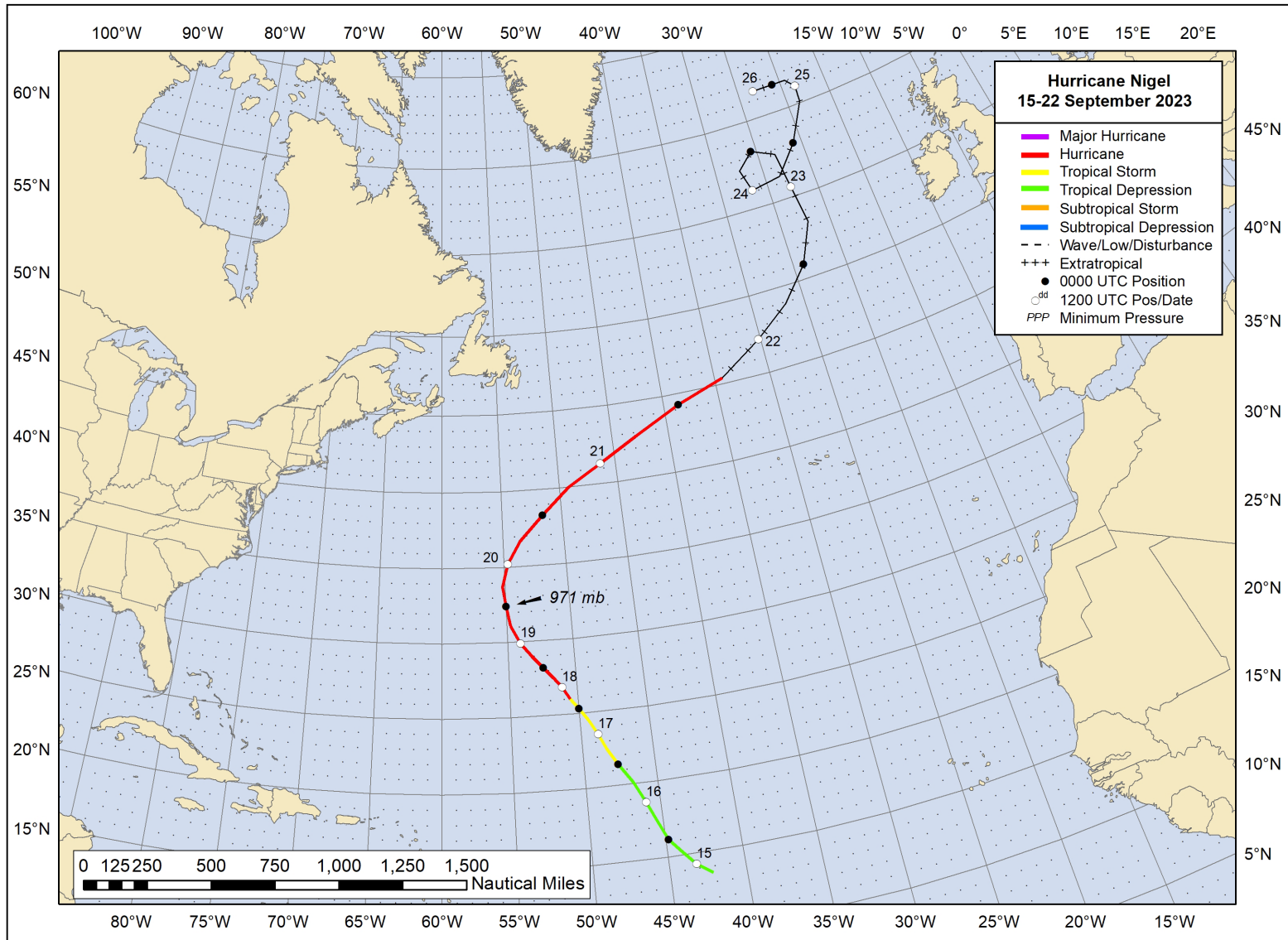


Figure 1. Best track positions for Hurricane Nigel, 15-22 September 2023.

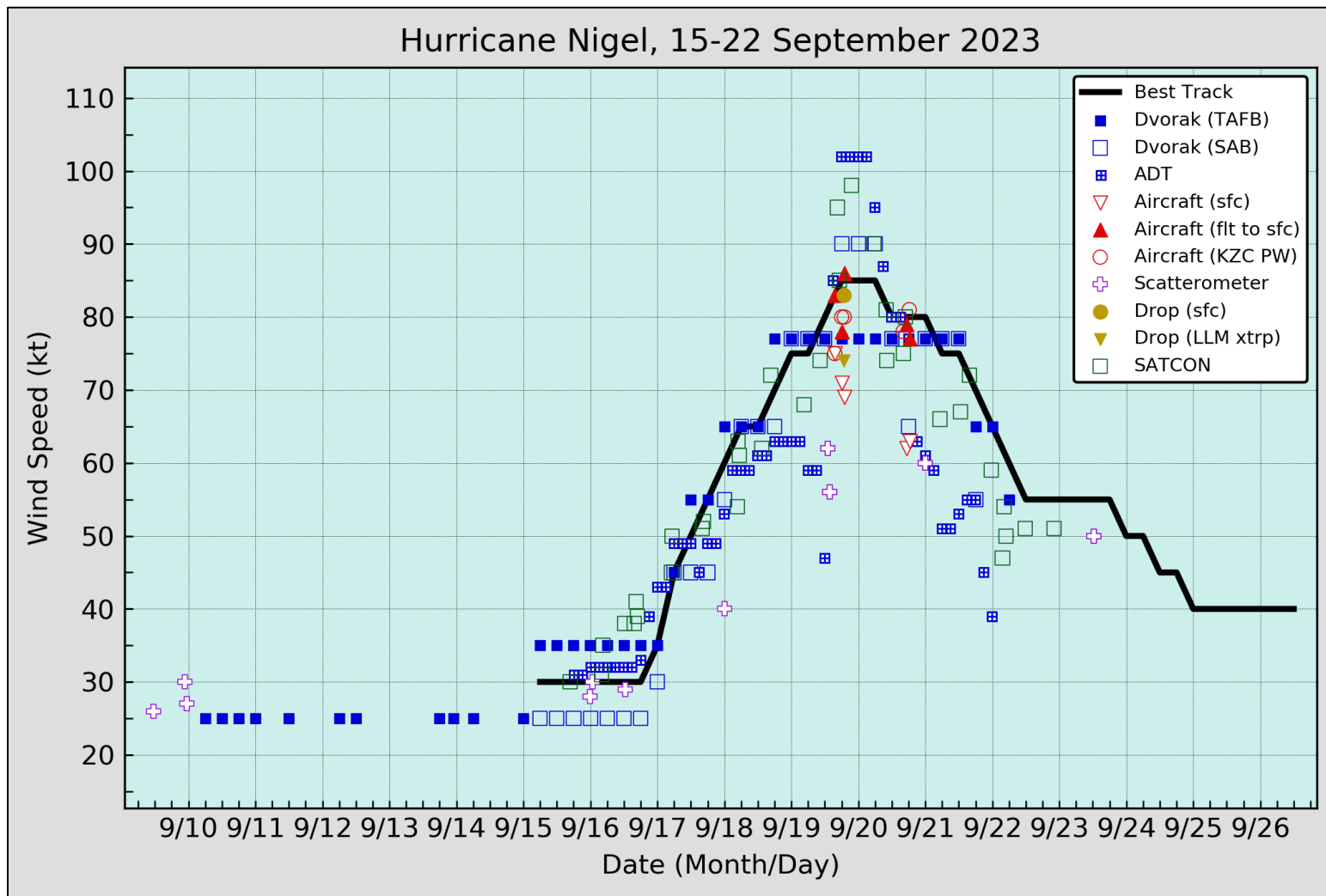


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Nigel, 15-22 September 2023. Aircraft observations have been adjusted for elevation using 90%, 80%, and 75% adjustment factors for observations from 700 mb, 850 mb, and 925 mb, respectively. Dropwindsonde observations include actual 10 m winds (sfc), as well as surface estimates derived from the mean wind over the lowest 150 m of the wind sounding (LLM). 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.

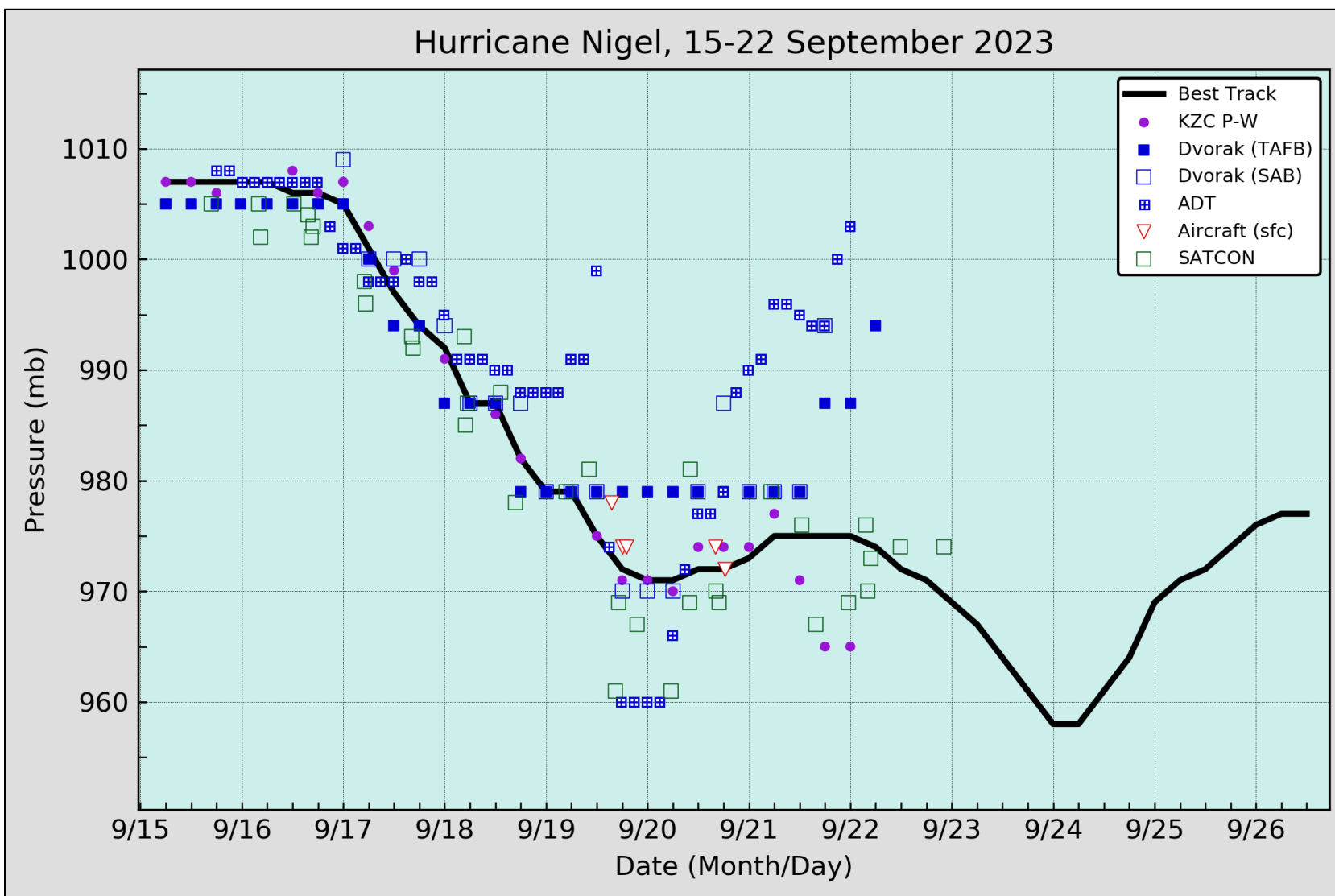


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Nigel, 15-22 September 2023. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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.

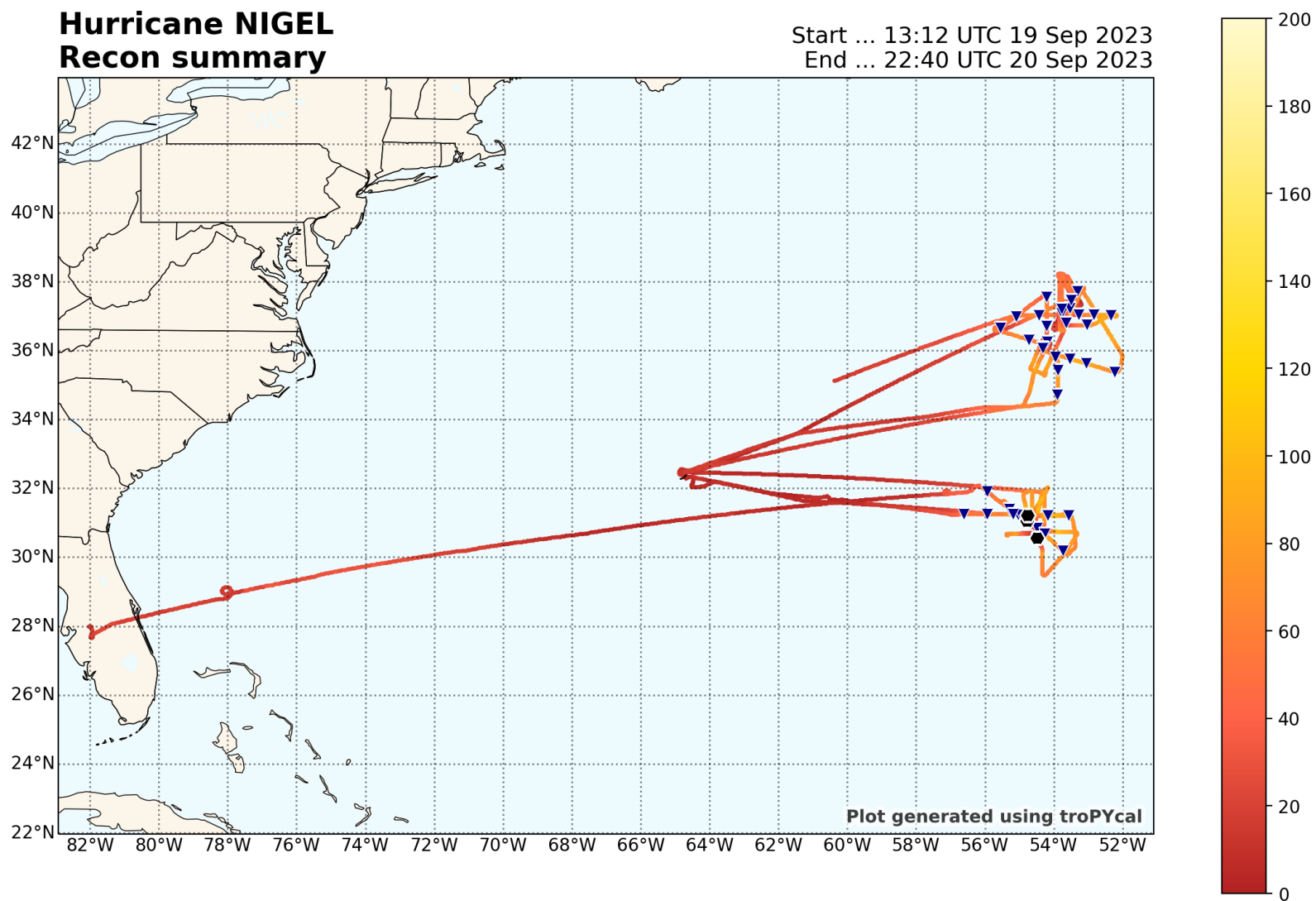


Figure 4. NOAA Hurricane Hunter aircraft flight tracks (red) from research reconnaissance missions into Nigel on 19–20 September 2023. The black markers denote center fixes, and the blue triangles indicate dropsonde locations. The color of the flight tracks is based on the observed flight-level wind speed (kt) with the color legend to the right of the map.

Nigel 7-day Tropical Weather Outlook Areas

From: 0000 UTC 10 Sep 2023 to 0600 UTC 15 Sep 2023

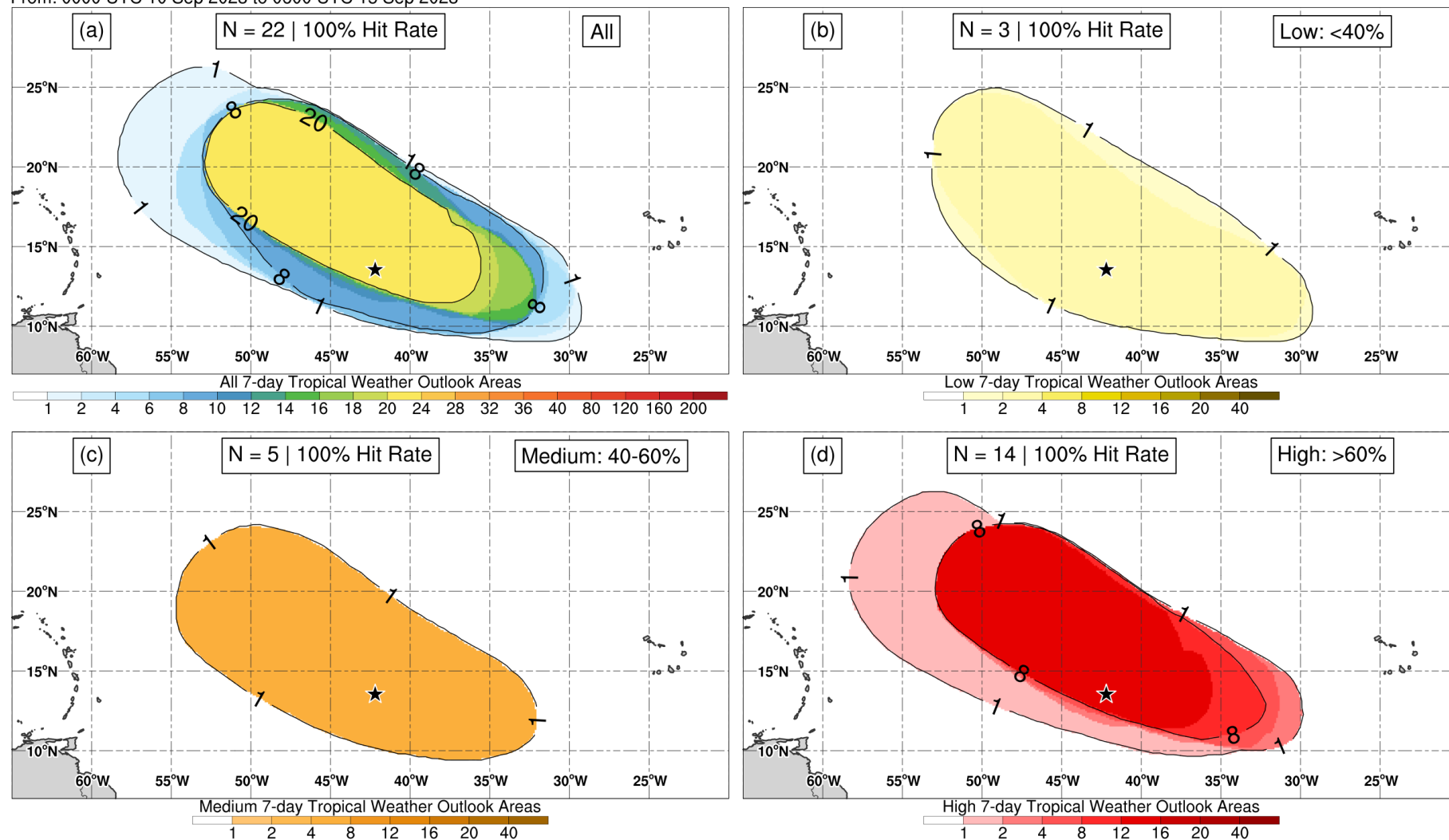


Figure 5. Composites of 7-day tropical cyclone genesis areas depicted in NHC’s Tropical Weather Outlooks prior to the formation of Hurricane Nigel for (a) all probabilistic genesis categories, (b) the low (<40%) category, (c) medium (40–60%) category, and (d) high (>60%) category. The location of genesis is indicated by the black star.