

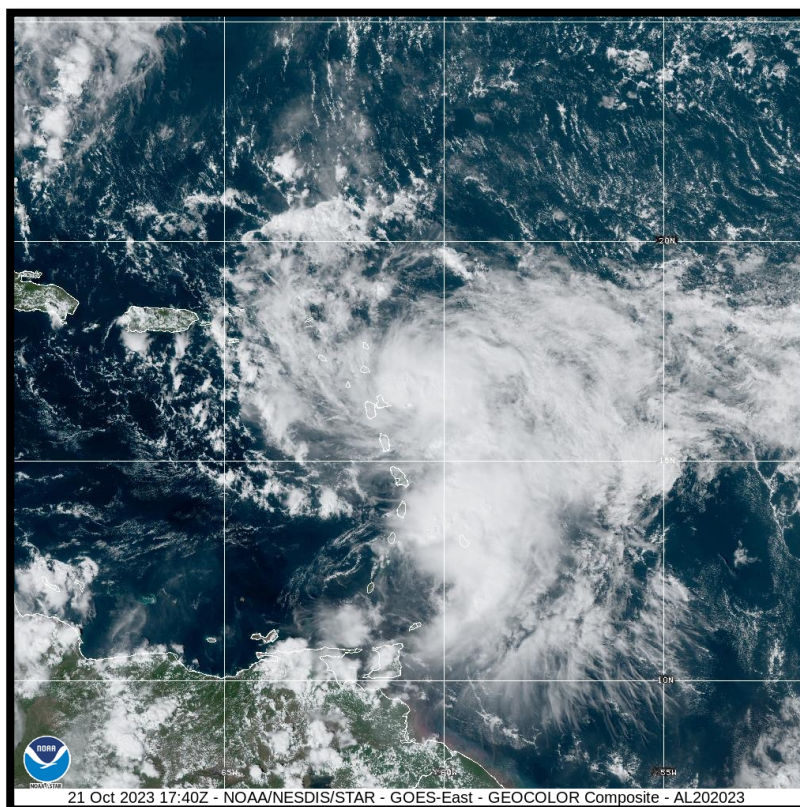


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## HURRICANE TAMMY (AL202023)

18–28 October 2023

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National Hurricane Center  
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GOES-16 GEOCOLOR IMAGE OF HURRICANE TAMMY AT 1740 UTC 21 OCTOBER 2023.  
IMAGE COURTESY OF NOAA/NESDIS/STAR.

Tammy was a category 2 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that formed over the tropical Atlantic. The cyclone brought hurricane-force winds and locally heavy rainfall to portions of the Lesser Antilles.

# Hurricane Tammy

18–28 OCTOBER 2023

## SYNOPTIC HISTORY

Tammy formed from a well-defined tropical wave that moved off the west coast of Africa late on 9 October into 10 October. A broad area of low pressure developed the following day on 11 October, as the wave moved across the Cabo Verde Islands. The system moved westward over the eastern tropical Atlantic to the south of a mid-level ridge. The broad low continued to produce disorganized shower and thunderstorm activity, however it encountered strong westerly wind shear and dry air that caused the low to become more ill-defined with a less persistent convective pattern from 14–16 October. On 17 October, convection associated with the wave began to increase and become more persistent as environmental conditions became more conducive for development, and the system's winds increased to near 35 kt. A continued increase in convective organization resulted in the formation of Tropical Storm Tammy at 1800 UTC 18 October, when it was located about 500 n mi east of the Lesser Antilles. The "best track" chart of Tammy'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<sup>1</sup>.

Tammy moved quickly westward after formation, to the south of a deep-layer ridge over the central Atlantic. Within generally favorable oceanic and atmospheric conditions, steady strengthening occurred during the next couple of days, and Tammy strengthened into a hurricane by 1800 UTC 20 October about 100 n mi east of the Lesser Antilles. A deep-layer trough moving offshore of the eastern United States pushed the steering ridge eastward and allowed Tammy to turn northwestward and then northward towards the northern Leeward Islands. As Tammy approached the islands, increasing westerly wind shear and dry air caused the system to become asymmetric with most of the convection confined to the eastern semicircle. Microwave imagery (Fig. 4) and aircraft reconnaissance data indicated that Tammy had a compact inner core and very small area of hurricane-force winds. Despite the storm's proximity to the islands, the strongest winds remained offshore of most of the Leeward Islands as the hurricane approached. Tammy continued moving northward, eventually making landfall on Barbuda at 0115 UTC 22 October, in the extreme northeastern Leeward Islands as a category 1 hurricane (on the Saffir-Simpson Hurricane Wind Scale) with estimated maximum sustained winds of 80 kt.

As the hurricane moved north-northeastward away from the islands, Tammy began to interact with an approaching upper-level trough, which improved the upper-level outflow and the hurricane strengthened, reaching a peak intensity of 95 kt at 1200 UTC 25 October. The hurricane continued northward toward a frontal boundary, and encountered a harsh environment with increased wind shear due to the upper-level trough, and a drier air mass. The system's convective

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<sup>1</sup> 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.

pattern became more comma-shaped with a long linear convective band, and convection diminished near the core of the tropical cyclone as it ingested some drier air. However, post-analysis determined that the system never fully acquired extratropical characteristics and it never fully merged with the decaying frontal boundary. Tammy maintained a deep but asymmetric warm core throughout the interaction with the boundary. However, this interaction caused Tammy to gradually weaken and the system weakened to a tropical storm by 0000 UTC 27 October.

Tammy moved eastward the next several days within the mid-level westerly flow on the north side of a subtropical ridge, with deep convection redeveloping near the center of the cyclone. Over the next few days, atmospheric and oceanic conditions would become less conducive with the system gradually weakening due to strong wind shear and dry air. As the system moved eastward and then southeastward, deep convection waned and the system degenerated into a post-tropical remnant low by 0000 UTC 29 October. The remnant low meandered southeastward and then westward before opening up into a trough over the central subtropical Atlantic.

## METEOROLOGICAL STATISTICS

Observations in Tammy (Figs. 2 and 3) 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. Observations also include flight-level, stepped frequency microwave radiometer (SFMR), and dropwindsonde observations from 14 flights of the 53<sup>rd</sup> Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command, and the NOAA Hurricane Hunters, as well as two research missions from NOAA. 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 Tammy.

There were no ship reports of winds of tropical storm force associated with Tammy. Selected surface observations from land stations and data buoys are given in Table 2.

### *Winds and Pressure*

The 95-kt estimated peak intensity of Tammy occurred at 1200 UTC 25 October, north of the Leeward Islands, and is based on a blend of subjective Dvorak intensity estimates from TAFB and SAB, and SATCON estimates. Around this time, a distinct low to mid-level eye was noted in microwave imagery (Fig. 4).

The landfall intensity of 80 kt at 0115 UTC 22 October is mainly based on an observation from Hannah Thomas Hospital located on Barbuda, which recorded a peak wind of 78 kt at 0058 UTC 22 October. NOAA Hurricane Hunter aircraft reported 750-mb flight-level winds of 75 kt with peak SFMR winds of 70 kt around 0000 UTC 22 October.

The estimated pressure of 987 mb at the time of Tammy's landfall on Barbuda is based on dropsonde data from Air Force Reserve Hurricane Hunter aircraft. The estimated minimum central pressure of 965 mb, which occurred north of the Leeward Islands, is based on a blend of the Knaff-Zehr-Courtney pressure-wind relationship and subjective Dvorak estimates.

### **Rainfall and Flooding**

Tammy produced heavy rainfall across the Lesser Antilles, with rainfall causing flooding and mudslides on some of the islands. Rainfall totals for much of the islands ranged from two to eight inches (50 to 200 mm), with locally higher amounts. Rainfall totals from Martinique, provided by MeteoFrance, are displayed in Fig. 6. Although Tammy was fairly asymmetric, training rain bands produced high rainfall totals in a short amount of time, which led to the flooding across some of the islands.

## **CASUALTY AND DAMAGE STATISTICS**

There were no reports of serious injuries or casualties<sup>2</sup> associated with Tammy. Media reports indicate that downed trees and power outages occurred, along with heavy rainfall that led to flooding and mudslides across portions of the Lesser Antilles. There have been no monetary damage estimates received.

## **FORECAST AND WARNING CRITIQUE**

### **Genesis**

The wave from which Tammy developed was introduced in the Tropical Weather Outlook (TWO) on 11 October about 180 h prior to genesis (Table 3). The genesis timing of Tammy was not forecast very well, as the system was initially predicted to develop earlier than what occurred. The wave was fairly well-defined and convectively active as it moved off the coast of Africa, with NHC raising the short-term (48 h) genesis probabilities to the high category (>60%) four days prior to formation. The genesis probabilities were lowered briefly, before they were raised again. NHC's forecast for the location of genesis was fairly accurate, and Tammy's formation location fell within 87% of the genesis areas depicted in the Graphical TWO (Fig. 7). The location fell on the western side of the genesis areas, indicating Tammy took longer to form than was expected.

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<sup>2</sup> Deaths occurring as a direct result of the forces of the tropical cyclone are referred to as "direct" deaths. These would include those persons who drowned in storm surge, rough seas, rip currents, and freshwater floods. Direct deaths also include casualties resulting from lightning and wind-related events (e.g., collapsing structures). Deaths occurring from such factors as heart attacks, house fires, electrocutions from downed power lines, vehicle accidents on wet roads, etc., are considered "indirect" deaths.

## Track

A verification of NHC official track forecasts for Hurricane Tammy is given in Table 4a. Official track forecast errors were greater than the mean official errors for the previous 5-yr period for the first 24 h, and beyond 60 h. NHC track forecast errors were lower than the mean official errors for the middle part of the forecast period from 36 h to 60 h. A homogeneous comparison of the official track errors with selected guidance models is given in Table 4b. The track forecast was fairly difficult, due to Tammy's interaction with the approaching upper-level trough and accompanying front moving off the east coast of the U.S. The timing of this feature shifting the mid-level steering ridge eastward caused for considerable long-range official forecast track errors leading up to this interaction (Fig. 8). Tammy would eventually move poleward while interacting with the aforementioned front. The global models struggled with the complex timing and interaction as well.

## Intensity

A verification of NHC official intensity forecasts for Hurricane Tammy is given in Table 5a. Official intensity forecast errors were lower than the mean official errors for the previous 5-yr period at all time ranges. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 5b. Overall the official intensity forecast had low errors, even though the track forecast was complex. Although official NHC intensity forecast errors were lower than the previous 5-yr period, the simple and corrected consensus aids including IVCN, HCCA, and the Florida State Superensemble (FSSE) had slightly lower errors compared to the NHC forecast.

## Wind Watches and Warnings

Coastal watches and warnings associated with Hurricane Tammy are given in Table 6.

## Impact-based Decision Support Services (IDSS) and Public Communication

NHC began communication with emergency managers in the United States on 19 October as Tammy was developing in the tropical Atlantic. Two decision support briefings were provided to emergency managers and coordinated through the FEMA Hurricane Liaison Team embedded at the NHC. The briefings were federal video-teleconferences with FEMA HQ and FEMA Region 2. These briefings continued through 20 October when Tammy was passing near the Lesser Antilles.

## ACKNOWLEDGEMENTS

Dr. Lisa Bucci produced the aircraft reconnaissance and forecast track graphic. Dr. Philippe Papin created the Graphical TWO verification figure. Michael Spagnolo and Matthew Green contributed to the IDSS summary.



Table 1. Best track for Hurricane Tammy, 18–28 October 2023.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
18 / 1800	12.9	51.0	1007	35	tropical storm
19 / 0000	13.0	52.5	1006	35	"
19 / 0600	13.2	54.0	1004	45	"
19 / 1200	13.4	55.3	1004	50	"
19 / 1800	13.5	56.4	1002	50	"
20 / 0000	13.6	57.2	1001	50	"
20 / 0600	13.7	57.9	1000	50	"
20 / 1200	13.9	58.4	997	60	"
20 / 1800	14.1	58.9	991	65	hurricane
21 / 0000	14.5	59.6	991	70	"
21 / 0600	14.9	60.3	991	70	"
21 / 1200	15.6	60.6	987	75	"
21 / 1800	16.6	61.0	987	75	"
22 / 0000	17.5	61.7	987	80	"
22 / 0115	17.6	61.8	987	80	"
22 / 0600	18.0	62.2	989	75	"
22 / 1200	18.7	62.8	990	75	"
22 / 1800	19.4	63.4	990	75	"
23 / 0000	20.2	63.9	992	75	"
23 / 0600	21.0	64.0	993	70	"
23 / 1200	21.6	64.0	993	70	"
23 / 1800	22.1	63.8	988	65	"



Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
24 / 0000	22.6	63.5	987	65	"
24 / 0600	23.1	63.1	987	65	"
24 / 1200	23.6	62.6	987	65	"
24 / 1800	24.0	62.0	987	65	"
25 / 0000	24.5	61.2	976	75	"
25 / 0600	25.1	60.4	969	85	"
25 / 1200	26.1	59.4	965	95	"
25 / 1800	27.5	58.3	968	85	"
26 / 0000	29.1	57.8	970	80	"
26 / 0600	30.0	58.3	972	75	"
26 / 1200	30.5	58.8	975	70	"
26 / 1800	31.0	59.5	977	65	"
27 / 0000	31.5	60.1	980	60	tropical storm
27 / 0600	31.8	60.6	985	55	"
27 / 1200	32.0	61.0	988	55	"
27 / 1800	32.3	61.4	988	55	"
28 / 0000	32.6	61.5	991	50	"
28 / 0600	32.9	61.0	994	45	"
28 / 1200	33.1	59.5	995	45	"
28 / 1800	33.3	58.0	997	40	"
29 / 0000	32.8	56.1	1000	35	low
29 / 0600	32.6	54.3	1002	35	"
29 / 1200	31.8	52.5	1002	35	"



Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
29 / 1800	30.9	50.9	1002	35	"
30 / 0000	29.6	49.6	1004	30	"
30 / 0600	28.5	49.0	1005	30	"
30 / 1200	27.5	48.5	1005	30	"
30 / 1800	26.5	48.1	1006	25	"
31 / 0000	25.6	48.5	1006	25	"
31 / 0600	25.1	49.0	1007	25	"
31 / 1200	24.9	49.9	1008	20	"
31 / 1800	24.6	50.6	1008	20	"
01 / 0000					dissipated
25 / 1200	26.1	59.4	965	95	minimum pressure and maximum winds
22 / 0115	17.6	61.8	987	80	landfall on Barbuda





Table 2. Selected surface observations for Hurricane Tammy, 18–28 October 2023.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)	Storm tide (ft)	Estimated Inundation (ft)	Total rain (in)
	Date/time (UTC)	Press. (mb)	Date/time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)				
<b>Offshore</b>									
<b>Buoys</b>									
470 NM East of Martinique (41040) (14.54°N 53.14°W)	21/1820	1010.2	21/1908	37 (3.8 m, 1 min)	43				
300 SSE East of Bermuda (41049) (27.55°N 63.01°W)	25/0820	1006.6	25/0910	33	46				
<b>Barbados</b>									
BMS Station Charnocks, Christ Church	20/1800	1006.1							4.48
<b>Barbuda</b>									
Hannah Thomas Hospital (17.63 °N, 61.83 °W)	22/0120	998.1	22/0058	78	99				4.78
<b>Martinique</b>									
Fond-Denis-Cadet (14.735°N, 61.145°W)			20/2300		35 (493 m)				4.92
Robert Pte Fort (14.679°N, 60.925°W)			22/0200		41 (16 m)				3.03
Trinite Caravelle (14.774°N, 60.875°W)			21/0300		43 (26 m)				

<sup>a</sup> Date/time is for sustained wind when both sustained and gust are listed.

<sup>b</sup> Except as noted, sustained wind averaging periods for C-MAN and land-based reports are 2 min; buoy averaging periods are 8 min.

Table 3. Number of hours in advance of formation of Hurricane Tammy in the tropical Atlantic 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%)	180	180
Medium (40%-60%)	114	144
High (>60%)	108	126

Table 4a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Hurricane Tammy, 18–28 October 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	26.4	37.6	<b>42.5</b>	<b>50.9</b>	<b>70.0</b>	91.0	146.4	242.7
OCD5	51.8	114.4	177.0	230.5	272.4	266.4	279.8	362.1
Forecasts	35	33	31	31	31	29	25	21
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 4b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Hurricane Tammy, 18–28 October 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	27.3	37.9	42.1	50.6	67.1	90.8	139.2	239.8
OCD5	51.4	110.3	169.7	222.0	261.7	263.8	272.4	360.7
GFSI	<b>27.2</b>	49.5	71.4	88.1	109.8	125.4	166.8	<b>234.3</b>
HWFI	31.6	56.8	75.7	86.5	110.1	128.6	149.4	<b>163.8</b>
HMNI	<b>23.9</b>	43.8	63.2	83.6	98.1	109.7	183.1	277.9
HFAI	<b>26.7</b>	42.9	54.4	61.6	86.1	98.7	<b>134.2</b>	<b>193.8</b>
HFBI	<b>27.0</b>	43.5	49.6	58.0	84.8	97.9	147.8	254.1
EMXI	29.3	43.1	58.7	84.5	114.7	148.0	267.9	457.1
CMCI	36.1	65.5	97.8	124.1	139.8	159.3	139.6	<b>165.5</b>
CTCI	<b>25.4</b>	<b>35.7</b>	42.1	51.7	70.2	101.3	201.1	371.1
TVCA	<b>24.1</b>	<b>37.7</b>	43.8	<b>45.5</b>	<b>49.9</b>	<b>54.7</b>	<b>77.3</b>	<b>108.4</b>
TVCX	<b>24.3</b>	<b>36.9</b>	44.1	<b>45.4</b>	<b>49.7</b>	<b>56.8</b>	<b>84.8</b>	<b>126.8</b>
GFEX	<b>26.3</b>	41.8	56.6	68.7	83.0	104.8	173.9	283.9
TVDG	<b>24.6</b>	<b>37.6</b>	44.9	<b>47.5</b>	<b>52.9</b>	<b>61.4</b>	<b>89.6</b>	<b>133.0</b>
HCCA	<b>24.3</b>	<b>36.2</b>	45.8	53.3	68.5	<b>83.9</b>	<b>136.5</b>	264.1
FSSE	<b>23.4</b>	42.0	53.2	54.4	<b>61.5</b>	<b>64.3</b>	<b>121.8</b>	<b>221.5</b>
AEMI	27.6	46.1	67.0	89.6	111.9	126.3	145.8	<b>191.6</b>
TABS	56.5	108.5	160.7	209.3	245.8	271.3	384.1	541.8
TABM	30.5	53.1	85.4	111.9	137.2	160.5	239.8	394.4
TABD	31.8	82.8	137.9	202.2	281.2	338.7	456.1	819.7
Forecasts	31	29	28	28	28	27	22	19



Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Hurricane Tammy, 18–28 October 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	<b>4.1</b>	<b>6.2</b>	<b>8.2</b>	<b>8.4</b>	<b>8.1</b>	<b>8.4</b>	<b>7.2</b>	<b>6.7</b>
OCD5	5.8	8.9	10.4	11.1	10.9	9.9	8.4	9.8
Forecasts	35	33	31	31	31	29	25	21
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 5b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Hurricane Tammy, 18–28 October 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 5a due to the homogeneity requirement.

Model ID	Forecast Period (h)							
	12	24	36	48	60	72	96	120
OFCL	4.2	6.5	8.4	8.4	8.3	8.0	7.4	7.1
OCD5	5.8	9.2	10.8	11.3	10.9	9.1	8.1	9.9
HWFI	4.8	7.5	9.5	9.2	10.9	12.0	12.4	20.5
HMNI	5.2	8.8	11.2	12.4	12.7	12.5	11.0	12.6
HFAI	8.1	9.3	10.8	12.8	13.2	11.5	10.7	16.2
HFBI	6.4	9.3	11.3	13.3	14.8	14.0	10.2	18.8
DSHP	5.0	7.3	8.4	9.2	9.4	9.5	11.4	10.9
LGEM	5.5	7.5	9.2	11.6	13.1	13.1	16.5	14.4
ICON	<b>4.0</b>	<b>5.9</b>	<b>7.6</b>	8.6	9.2	8.5	7.9	7.6
IVCN	4.2	<b>5.5</b>	<b>7.1</b>	<b>8.2</b>	8.9	8.2	<b>6.3</b>	9.4
IVDR	4.3	<b>5.3</b>	<b>6.9</b>	<b>7.9</b>	8.6	8.0	<b>6.2</b>	9.9
CTCI	4.8	8.5	11.3	12.0	10.9	11.5	10.3	15.2
GFSI	4.9	<b>5.7</b>	<b>7.0</b>	<b>8.0</b>	8.8	9.7	12.0	11.9
EMXI	6.1	10.2	14.2	16.7	17.9	19.1	21.1	25.4
HCCA	<b>4.1</b>	<b>5.6</b>	<b>6.8</b>	<b>7.4</b>	<b>7.5</b>	<b>6.6</b>	8.4	15.8
FSSE	4.2	<b>4.6</b>	<b>7.0</b>	8.9	11.2	11.1	13.3	15.6
Forecasts	32	30	29	29	29	28	23	19

Table 6. Watch and warning summary for Hurricane Tammy, 18–28 October 2023.

<b>Date/Time (UTC)</b>	<b>Action</b>	<b>Location</b>
18 / 2100	Tropical Storm Watch issued	Barbados
18 / 2100	Tropical Storm Watch issued	Dominica
18 / 2100	Tropical Storm Watch issued	Martinique/Guadeloupe
19 / 0900	Tropical Storm Watch issued	Antigua/Barbuda/St. Kitts/Nevis/Montserrat
19 / 1200	Tropical Storm Watch issued	Saba/St. Eustatius
19 / 1500	Tropical Storm Watch issued	Anguilla/St. Barthelemy
19 / 1500	Tropical Storm Watch issued	St. Maarten
19 / 1500	Tropical Storm Watch issued	St. Martin
19 / 1500	Hurricane Watch issued	Guadeloupe
19 / 1500	Tropical Storm Watch changed to Tropical Storm Warning	Guadeloupe
19 / 1800	Tropical Storm Watch changed to Tropical Storm Warning	Antigua/Barbuda/St. Kitts/Nevis/Montserrat
19 / 1800	Tropical Storm Watch changed to Hurricane Watch	Antigua/Barbuda/St. Kitts/Nevis/Montserrat
19 / 2100	Tropical Storm Watch changed to Tropical Storm Warning	Dominica
20 / 0000	Tropical Storm Watch changed to Tropical Storm Warning	St. Maarten
20 / 0000	Tropical Storm Watch changed to Tropical Storm Warning	St. Martin
20 / 0000	Tropical Storm Warning issued	Anguilla/St. Barthelemy
20 / 0000	Hurricane Watch issued	Anguilla
20 / 0300	Hurricane Watch issued	St. Maarten
20 / 0300	Hurricane Watch issued	St. Martin
20 / 0300	Hurricane Watch issued	St. Barthelemy
20 / 0300	Tropical Storm Watch changed to Tropical Storm Warning	Saba/St. Eustatius
20 / 1500	Tropical Storm Warning changed to Hurricane Warning	Guadeloupe



<b>Date/Time (UTC)</b>	<b>Action</b>	<b>Location</b>
<b>20 / 1500</b>	Tropical Storm Warning changed to Hurricane Warning	Antigua/Barbuda/St. Kitts/Nevis/Montserrat
<b>20 / 1800</b>	Tropical Storm Warning changed to Hurricane Warning	Anguilla
<b>20 / 1800</b>	Tropical Storm Warning changed to Hurricane Warning	St. Barthelemy
<b>20 / 1800</b>	Tropical Storm Warning changed to Hurricane Warning	St. Martin
<b>20 / 1800</b>	Tropical Storm Warning changed to Hurricane Warning	St. Maarten
<b>20 / 1800</b>	Hurricane Watch issued	Dominica
<b>21 / 0300</b>	Tropical Storm Watch discontinued	Barbados
<b>21 / 0600</b>	Tropical Storm Watch issued	British Virgin Islands
<b>21 / 0600</b>	Hurricane Watch issued	Saba/St. Eustatius
<b>21 / 1500</b>	Tropical Storm Warning discontinued	Dominica
<b>21 / 1500</b>	Hurricane Watch discontinued	Dominica
<b>21 / 2100</b>	Tropical Storm Watch discontinued	Martinique
<b>21 / 2100</b>	Hurricane Warning discontinued	Guadeloupe
<b>22 / 0000</b>	Hurricane Watch discontinued	Saba/St. Eustatius
<b>22 / 0000</b>	Hurricane Warning discontinued	St. Kitts/Nevis/Montserrat
<b>22 / 0300</b>	Tropical Storm Watch discontinued	All
<b>22 / 0300</b>	Hurricane Warning discontinued	Antigua
<b>22 / 0900</b>	Tropical Storm Warning discontinued	All
<b>22 / 1025</b>	Hurricane Warning discontinued	Barbuda
<b>22 / 1200</b>	Hurricane Warning discontinued	All

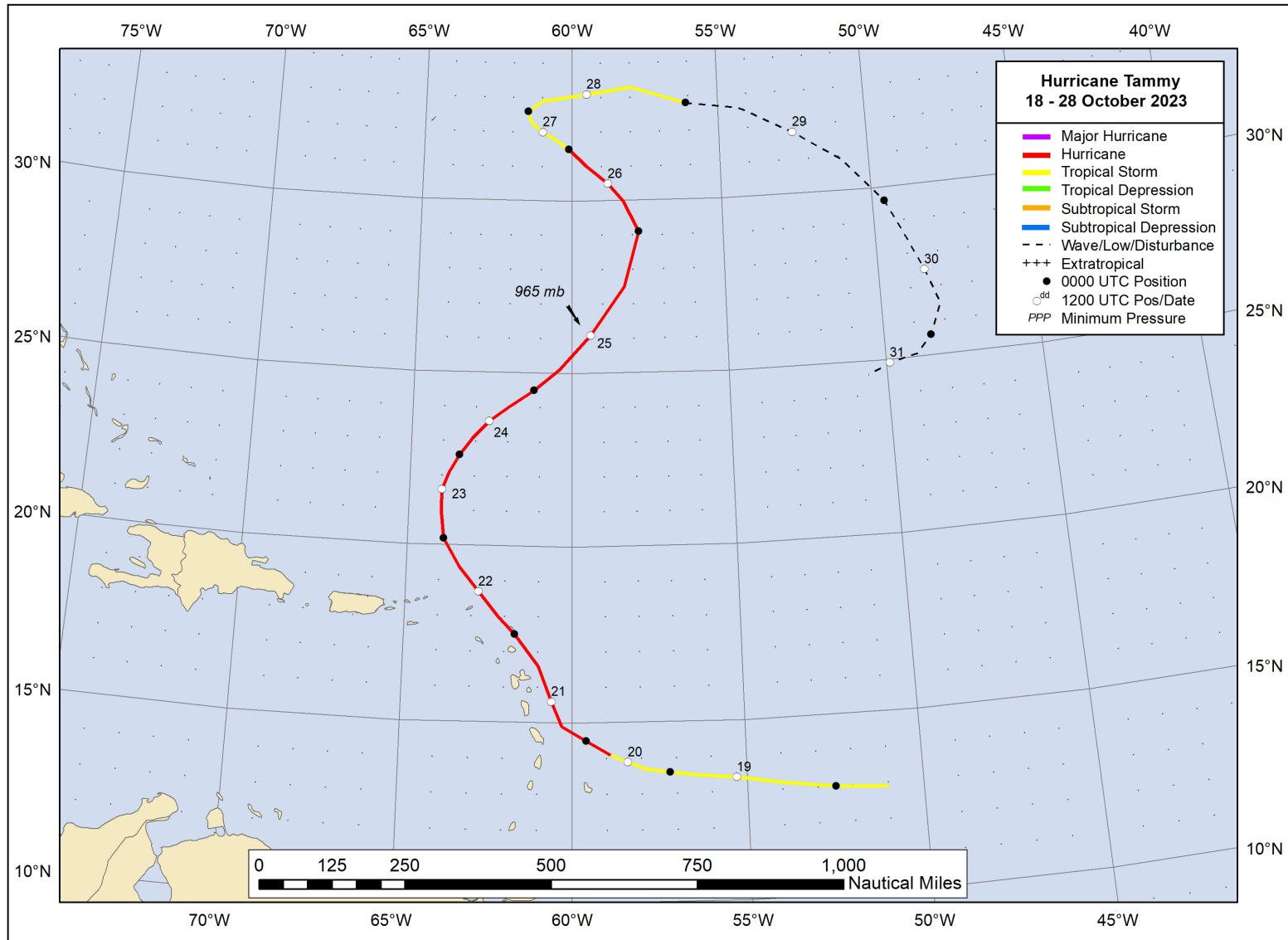


Figure 1. Best track positions for Hurricane Tammy, 18–28 October 2023.



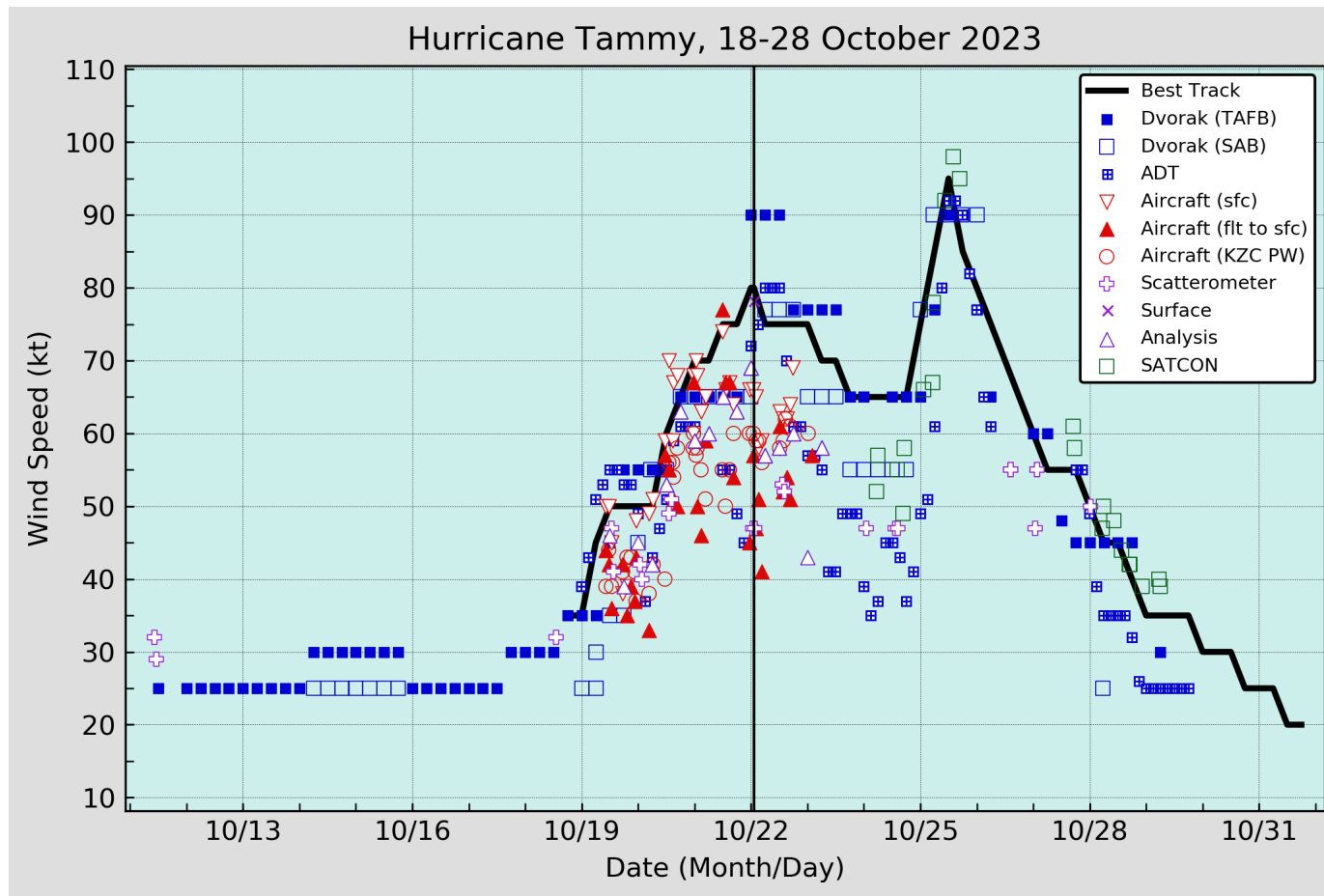


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Tammy, 18–28 October 2023. Aircraft observations have been adjusted for elevation using 90%, 80%, and 75% adjustment factors for observations from 700 mb, 850 mb, and 925 mb, respectively. Dropwindsonde 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, and the solid vertical line corresponds to landfall.

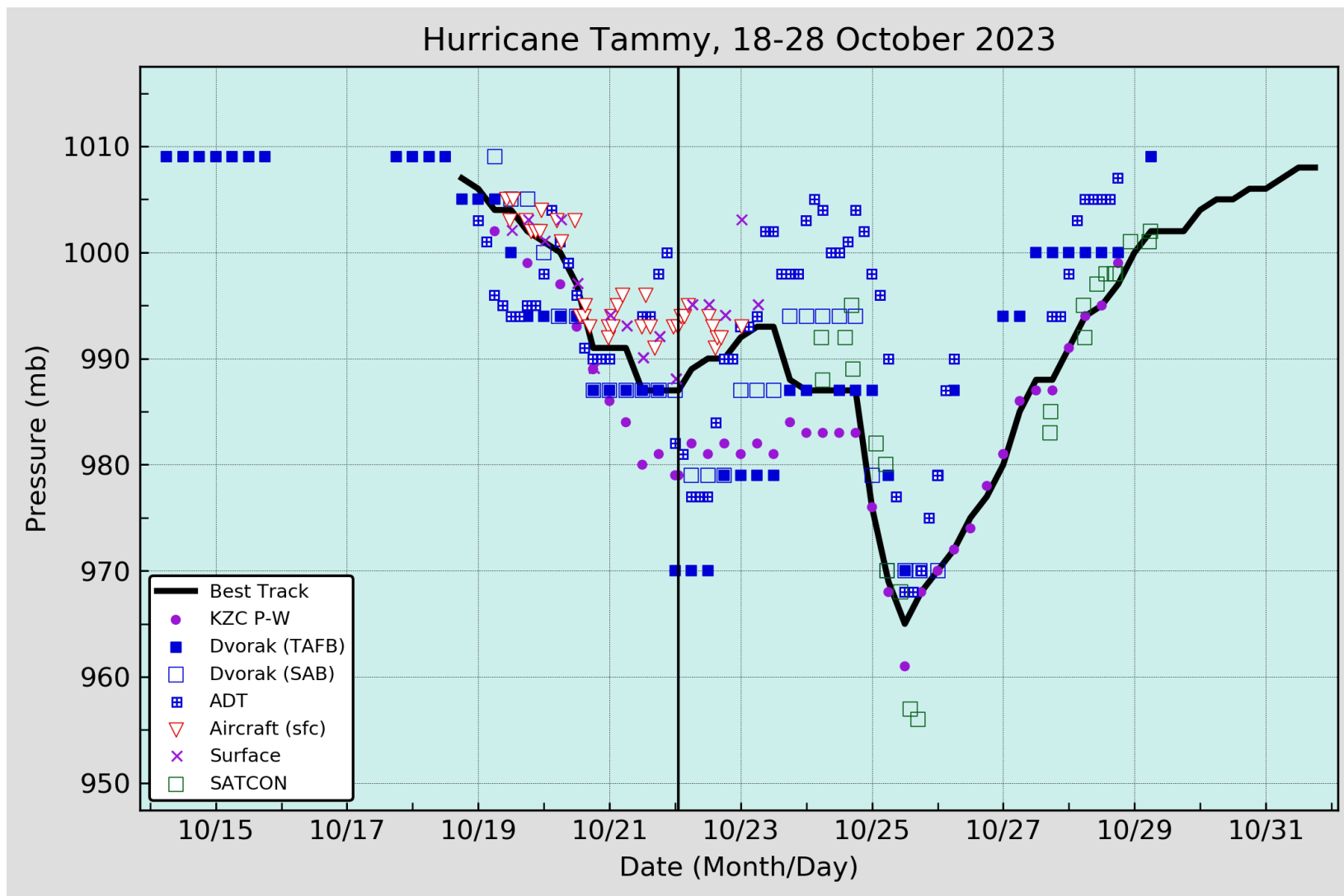


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Tammy, 18-28 October 2023. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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, and the solid vertical line corresponds to landfall.

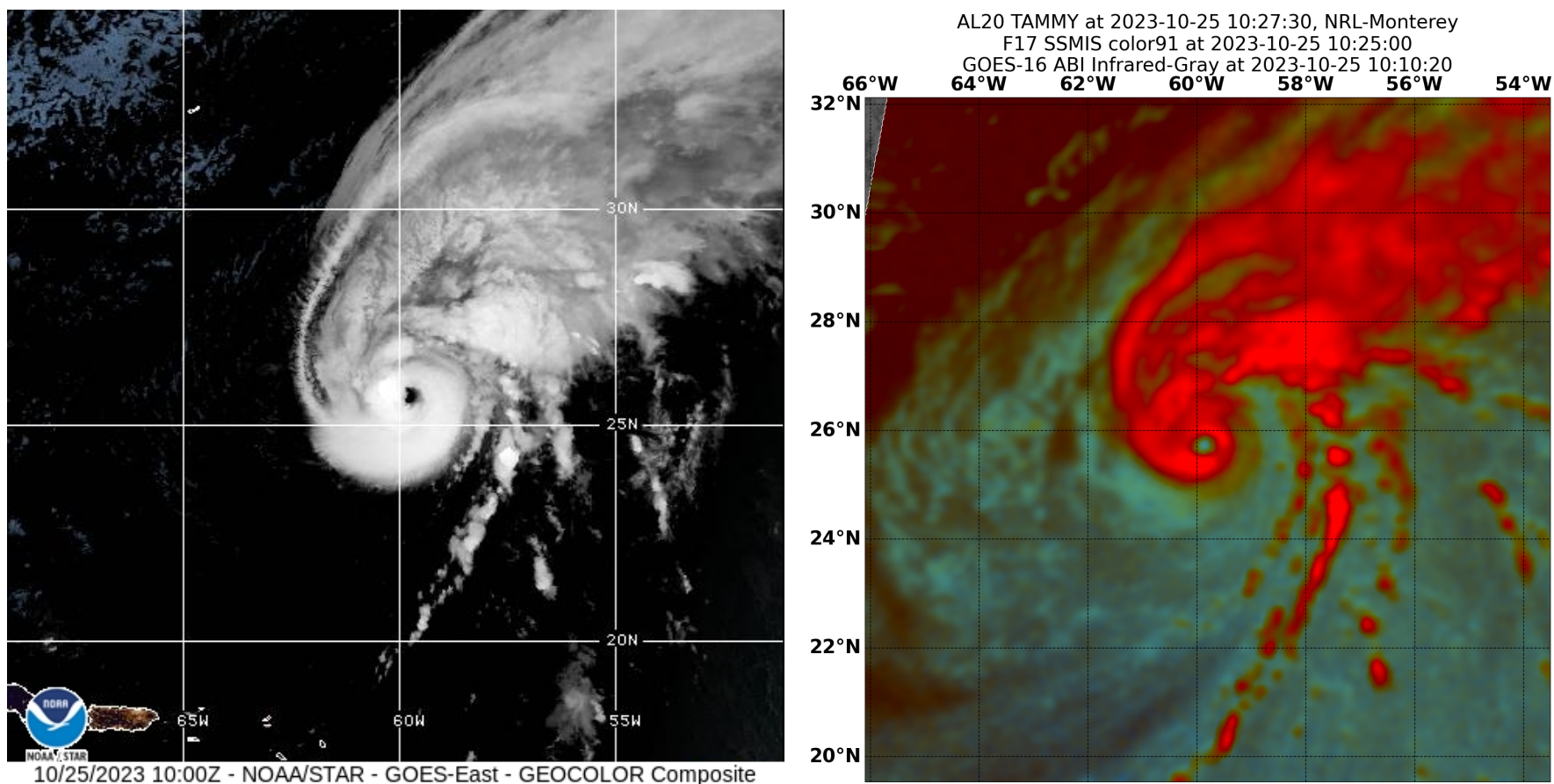


Figure 4. (Left) Geocolor composite GOES-East imagery of Tammy near peak intensity. Image courtesy of NOAA/NESDIS. (Right) Microwave imagery showing the compact mid-level eye of Tammy near peak intensity. Image courtesy of NRL-Monterey.

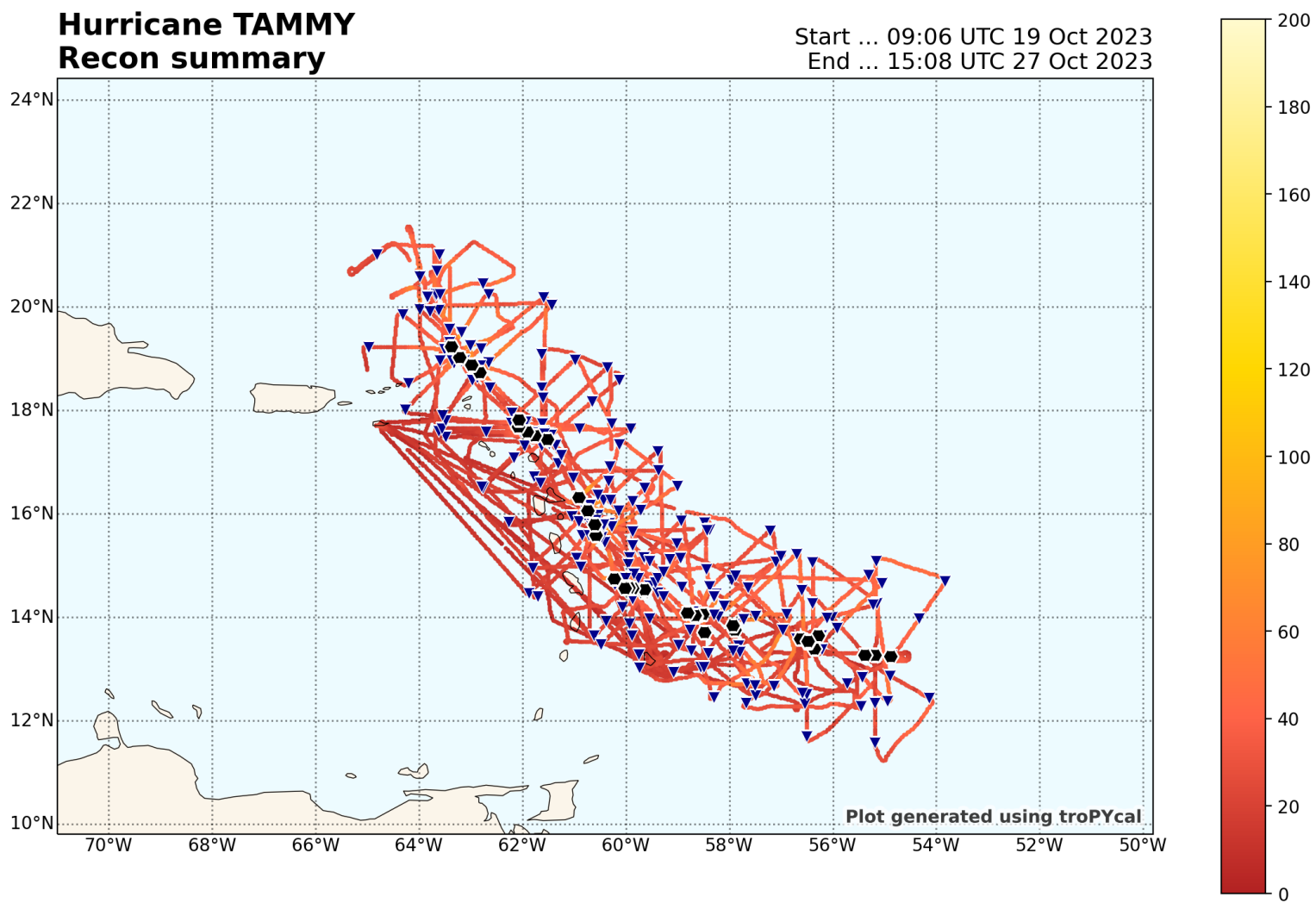


Figure 5. Air Force Reserve Hurricane Hunter and NOAA Hurricane Hunter aircraft flight tracks (red) from reconnaissance missions into Tammy on 19–22 October 2023. The black markers denote center fixes, and the blue triangles indicate dropsonde locations. The color coding of the flight tracks is based on the observed flight-level wind speed with the color legend to the right of the map representing the color associated with the various wind speeds in kt.

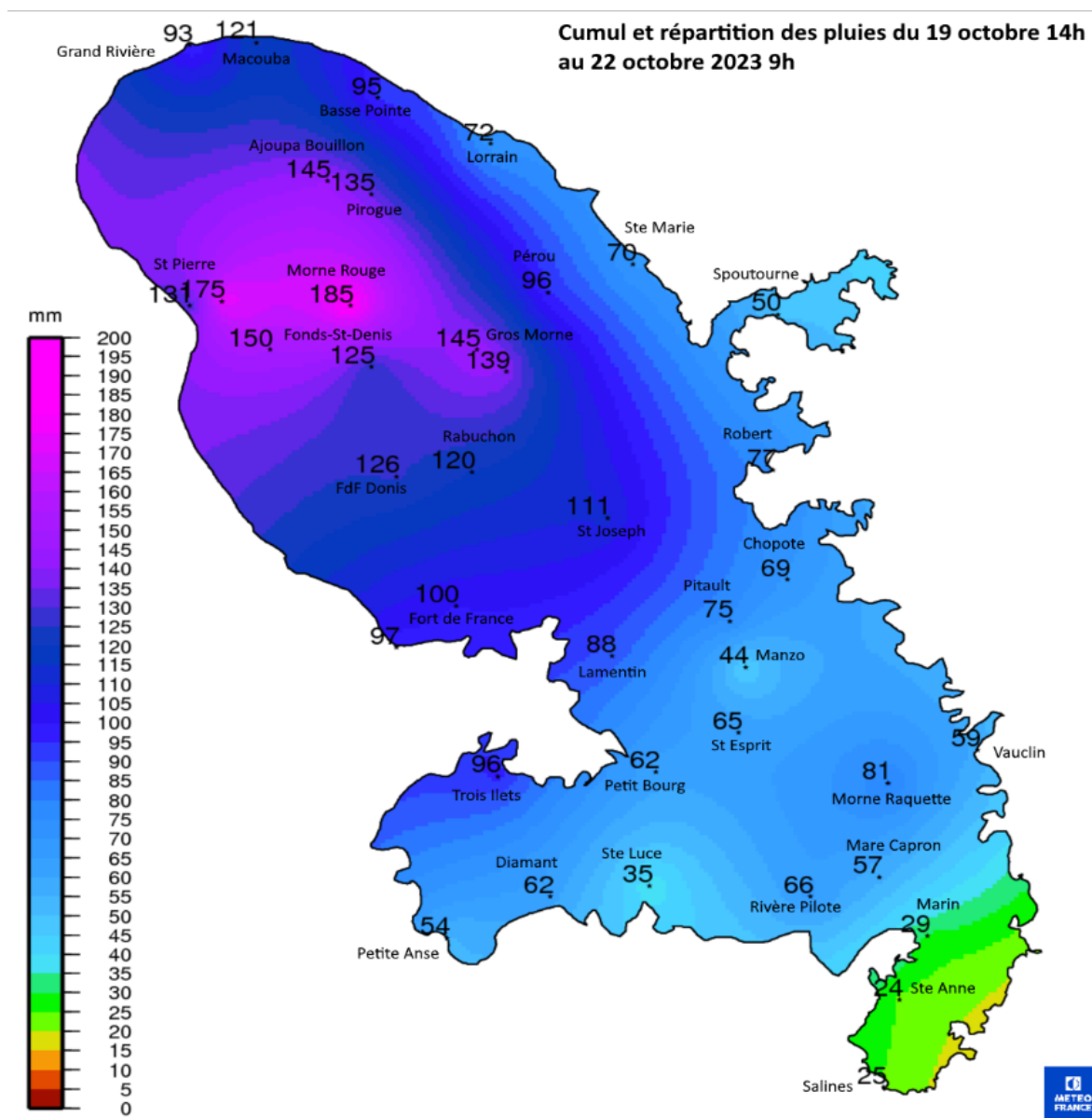


Figure 6. Selected storm total rainfall observations (in mm) from Martinique during the passage of Hurricane Tammy, 19–22 October 2023. Image courtesy of MeteoFrance.

### Tammy 7-day Tropical Weather Outlook Areas

From: 0600 UTC 11 Oct 2023 to 1800 UTC 18 Oct 2023

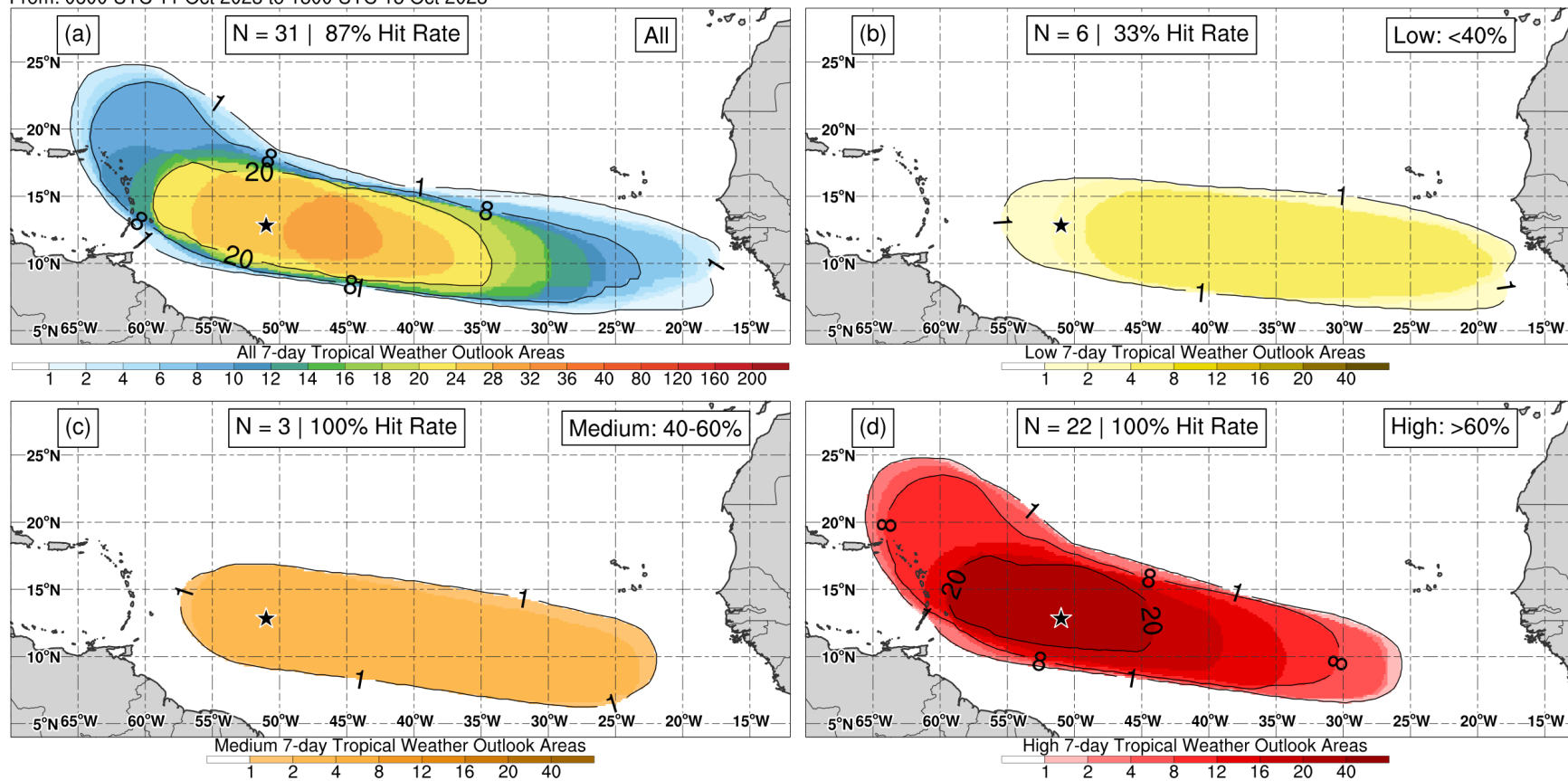


Figure 7. Composites of 7-day tropical cyclone genesis areas depicted in NHC’s Tropical Weather Outlooks prior to the formation of Hurricane Tammy in the tropical Atlantic for (a) all probabilistic genesis categories, (b) the low (<40%) category, (c) medium (40–60%) category, and (d) high (>60%) category.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

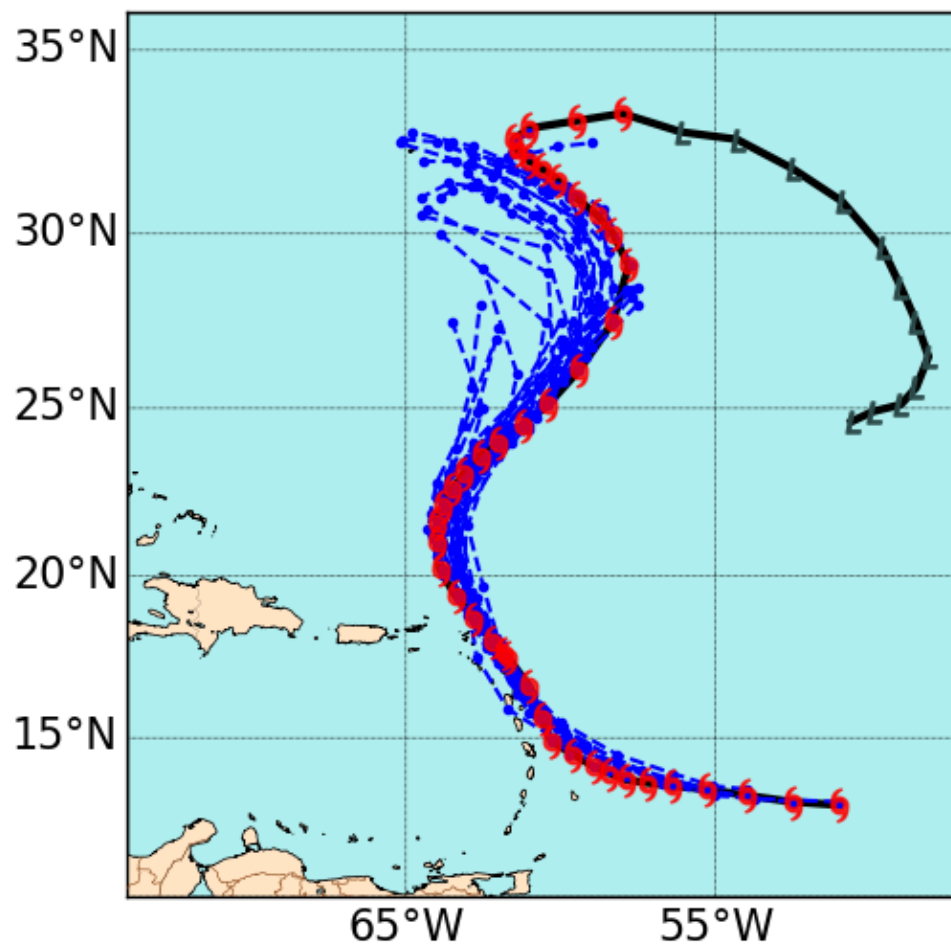


Figure 8. Selected official track forecasts (dashed blue lines, with 0, 12, 24, 36, 48, 60, 72, 96, and 120 h positions indicated) for Hurricane Tammy, 18–26 October 2023. The best track is given by the thick solid black line with positions given at 6 h interval.