

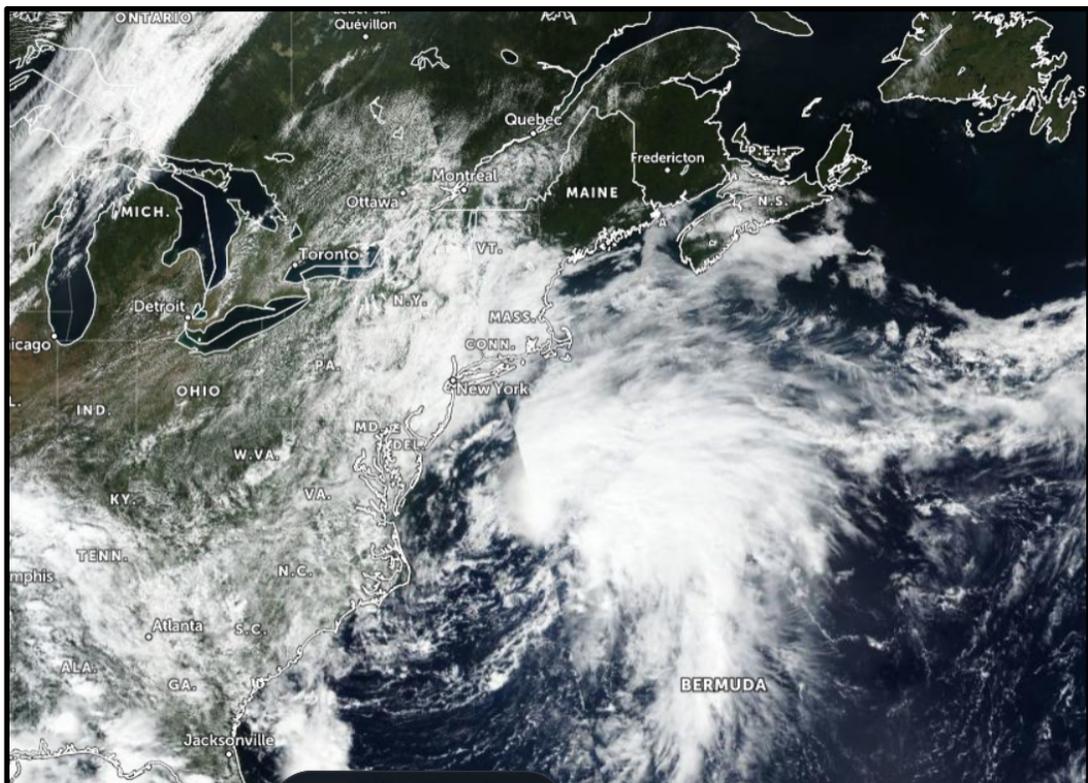


# NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

## TROPICAL STORM ODETTE (AL152021)

17–18 September 2021

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National Hurricane Center  
16 November 2021<sup>1</sup>



GOES-16 TRUE COLOR VISIBLE SATELLITE IMAGE OF TROPICAL STORM ODETTE AROUND THE TIME OF FORMATION AT 1810 UTC 17 SEPTEMBER 2021. IMAGE COURTESY NOAA/NESDIS/STAR.

Odette was a very short-lived tropical storm that formed off the Mid-Atlantic U.S. coast and moved northeastward. It reached its peak intensity as an extratropical cyclone off the coast of Newfoundland.

<sup>1</sup> Original report date 3 November. Corrected Table 2 in this version.

# Tropical Storm Odette

17–18 SEPTEMBER 2021

## SYNOPTIC HISTORY

Odette originated from a surface trough associated with a mid- to upper-level low that was first identified in satellite images and surface observations near the southeastern Bahamas on 14 September. The trough moved northwestward to north-northwestward near the Bahamas during the next day or so, and an area of low pressure formed along the trough axis by 0600 UTC 16 September about 300 n mi east of the coast of northeastern Florida (Fig. 1a). Although the circulation appeared generally well defined at that time, the thunderstorm activity was quite disorganized due to westerly shear, with most of the convection appearing ragged and well removed to the east and northeast of the center. Deep convection became better organized and developed closer to the center by 1800 UTC 17 September, marking the formation of a tropical cyclone when it was located about 150 n mi east of the North Carolina/Virginia border (cover image). The intensity at the time of genesis is estimated to be 35 kt based on scatterometer data. The “best track” chart of Odette’s path is given in Fig. 2, with the wind and pressure histories shown in Figs. 3 and 4, respectively. The best track positions and intensities are listed in Table 1<sup>2</sup>.

When Odette formed it was moving northeastward at about 13 kt within the flow between a subtropical ridge over the western Atlantic and a deep-layer trough over central Canada and the U.S. Upper Midwest. Shortly after genesis, deep convection began to separate from the low-level center as west-southwesterly shear increased. In fact, Odette was already gaining extratropical characteristic as soon as 6 h after genesis, with cooler and drier air entraining into the western half of the circulation and frontal features developing. The storm strengthened while transitioning and reached a peak intensity as a tropical storm of 40 kt at 0000 UTC 18 September (Fig. 1b), and it held that intensity and status for another 6 h. By 1200 UTC that day, frontal features became well established with cold air stratocumulus clouds advecting eastward to the south of the center (Fig. 1c), and therefore, the system is estimated to have become extratropical at that time when it was located about 250 n mi east-southeast of Atlantic City, New Jersey.

The extratropical cyclone accelerated to the east-northeast on 19 September as it became embedded in the mid-latitude westerlies. While gaining forward speed, the cyclone strengthened due to baroclinic forcing and reached its peak intensity of 55 kt by 0000 UTC 20 September when it was located about 150 n mi south-southeast of Cape Race, Canada. Later on 20 September, the storm slowed down and turned southeastward as it became cut off from the progressive flow. The weak steering currents caused the storm to meander for the next few days as it gradually weakened over the north-central Atlantic.

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<sup>2</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 *bt* directory, while previous years’ data are located in the *archive* directory.

By 24 September, Odette turned southward as a ridge amplified over the northwestern Atlantic. The cyclone lost its frontal features by 1800 UTC that day (Fig. 1d), and although the system was no longer extratropical, it was producing very little deep convection and did not meet the convective criteria of a tropical or subtropical cyclone. The low continued southward during the next few days and despite moving over warmer waters, it still lacked significant thunderstorm activity and continued to slowly weaken. Satellite images indicate that the low opened up into a trough by 0000 UTC 27 September over the central Atlantic.

## METEOROLOGICAL STATISTICS

Observations in Odette (Figs. 2 and 3) include subjective satellite-based Dvorak intensity estimates from the Tropical Analysis and Forecast Branch (TAFB) and the Satellite Analysis Branch (SAB), and 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 Odette.

The 40-kt peak intensity of Odette while it was a tropical cyclone at 0000 and 0600 UTC 18 September was based primarily on ASCAT data that showed a swath of 35–40-kt winds northeast of the center. Odette reached a peak intensity of 55 kt as an extratropical storm at 0000 and 0600 UTC 20 September, which was also primarily based on ASCAT data that showed peak winds slightly above 50 kt. The minimum central pressure of 989 mb at 0000 and 0600 UTC 20 September is based on a report from cargo ship *Maersk Patras* (9V3818), which recorded 993 mb about 100 n mi north-northeast of the center. The ship also reported peak winds of 55 kt at an elevation of 37 m, which equals approximately a 50-kt 10-m wind speed.

## CASUALTY AND DAMAGE STATISTICS

There were no reports of damage or casualties associated with Tropical Storm Odette.

## FORECAST AND WARNING CRITIQUE

The genesis of Tropical Storm Odette was well anticipated. Table 2 provides the number of hours in advance of formation associated with the first NHC Tropical Weather Outlook (TWO) forecast. The system that became Odette entered the TWO 144 h prior to the storm forming with a low chance of genesis during the next 5 days. The probabilities were raised to the medium and



high categories, 132 h and 66 h prior to the cyclone developing, respectively. Regarding the 2-day genesis probabilities, a low chance was forecast 96 h, medium chance 72 h, and high chance 48 h prior to Odette forming. After Odette became extratropical, it was being monitored for possible tropical transition. Odette was reintroduced into the TWO at 1800 UTC 19 September with a low chance of transitioning to a tropical cyclone during the next 5 days. The probabilities reached the medium category at 1200 UTC 21 September. Although the cyclone did lose its frontal features, it did not produce a sufficient amount of deep convection to be considered a tropical cyclone again, likely due to dry and stable air.

Due to Odette's short existence, there was only one verifying 12-h forecast. Thus, a comprehensive verification of official and guidance track and intensity forecast errors is not provided. The one official 12-h forecast had a track error of 56.5 n mi and an intensity error of 0.0 kt. These compare to the mean 12-h official track and intensity errors for the previous 5-yr period (2016–2020) of 23.9 n mi and 5.4 kt, respectively.

There were no coastal watches or warnings issued for Odette.



Table 1. Best track for Tropical Storm Odette, 17–18 September 2021.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
16 / 0600	30.4	74.3	1011	30	low
16 / 1200	31.4	74.8	1011	30	"
16 / 1800	32.3	75.2	1011	30	"
17 / 0000	33.3	75.3	1011	30	"
17 / 0600	34.1	74.9	1011	30	"
17 / 1200	35.0	73.9	1011	30	"
17 / 1800	35.9	72.7	1010	35	tropical storm
18 / 0000	36.8	71.4	1008	40	"
18 / 0600	37.6	70.1	1005	40	"
18 / 1200	38.3	68.3	1002	40	extratropical
18 / 1800	38.7	66.2	1001	40	"
19 / 0000	39.2	64.1	999	45	"
19 / 0600	39.9	61.9	997	45	"
19 / 1200	41.1	59.4	995	45	"
19 / 1800	42.7	56.6	992	50	"
20 / 0000	44.1	54.1	989	55	"
20 / 0600	45.0	51.6	989	55	"
20 / 1200	44.7	49.7	990	50	"
20 / 1800	44.2	48.1	993	50	"
21 / 0000	43.2	46.6	993	50	"
21 / 0600	41.8	45.4	995	50	"
21 / 1200	40.4	43.8	997	45	"
21 / 1800	39.9	41.9	997	45	"
22 / 0000	40.2	40.1	998	45	"
22 / 0600	41.3	39.9	999	45	"
22 / 1200	42.4	40.2	999	45	"
22 / 1800	43.5	40.8	1000	40	"
23 / 0000	44.1	41.2	1000	40	"
23 / 0600	44.2	41.8	1000	40	"
23 / 1200	44.1	42.4	1000	40	"
23 / 1800	43.8	42.0	1000	35	"
24 / 0000	44.1	41.4	1001	35	"



Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
24 / 0600	44.1	41.0	1001	35	"
24 / 1200	43.6	40.5	1002	35	"
24 / 1800	42.7	40.0	1003	35	low
25 / 0000	41.6	39.4	1004	35	"
25 / 0600	40.3	38.7	1005	35	"
25 / 1200	38.9	38.0	1006	35	"
25 / 1800	37.3	38.1	1007	35	"
26 / 0000	35.8	38.6	1008	35	"
26 / 0600	34.4	39.5	1009	30	"
26 / 1200	32.9	40.5	1010	30	"
26 / 1800	31.5	41.4	1010	30	"
27 / 0000					dissipated
18 / 0600	37.6	70.1	1005	40	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	120-Hour Outlook
Low (<40%)	96	144
Medium (40%-60%)	72	132
High (>60%)	48	66

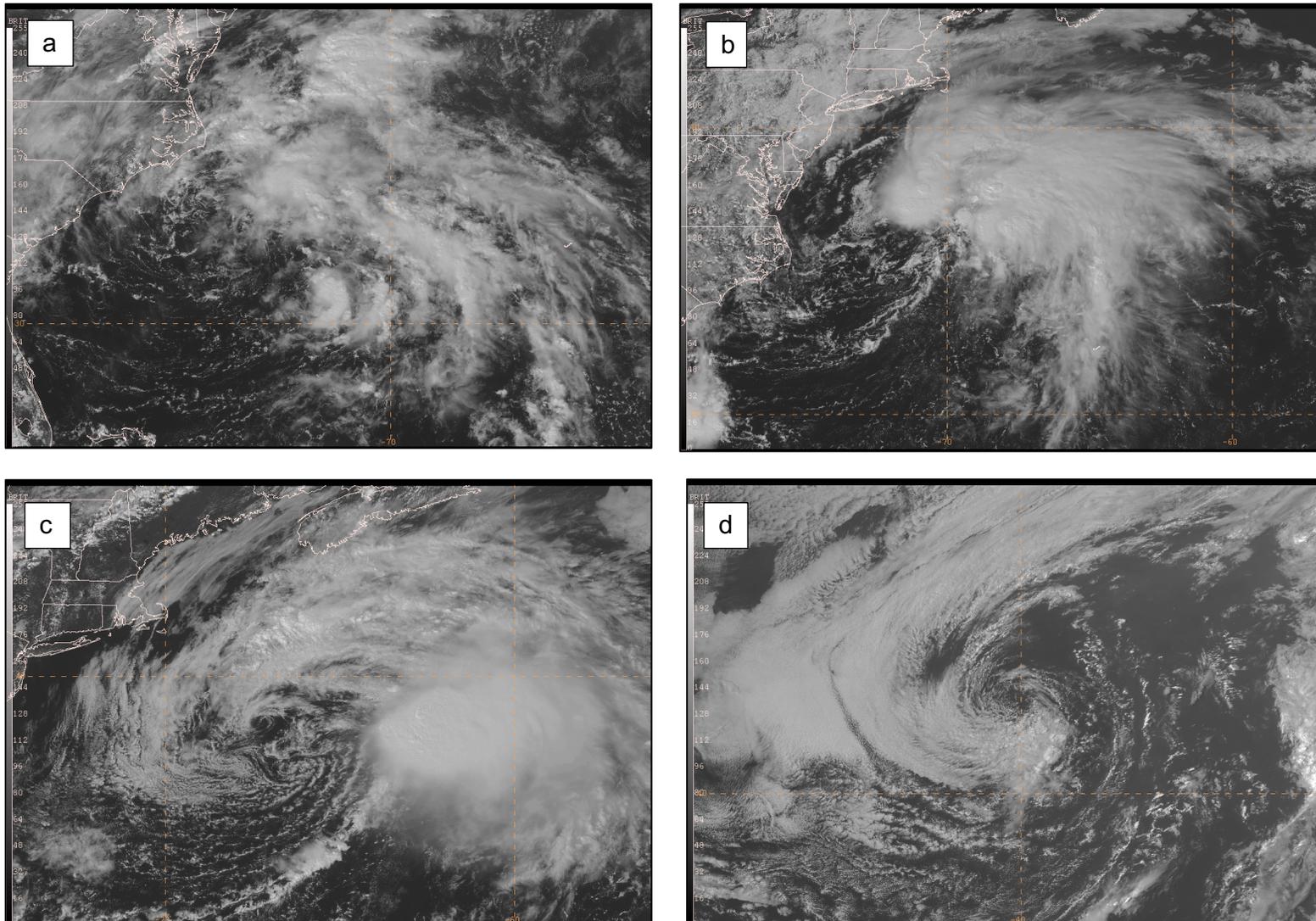


Figure 1. GOES-16 visible satellite images of Odette as a (a) low pressure area at 1800 UTC 16 September, (b) tropical storm at 1800 UTC 17 September, (c) extratropical cyclone at 1800 UTC 18 September and (d) non-frontal low at 1800 UTC 24 September.

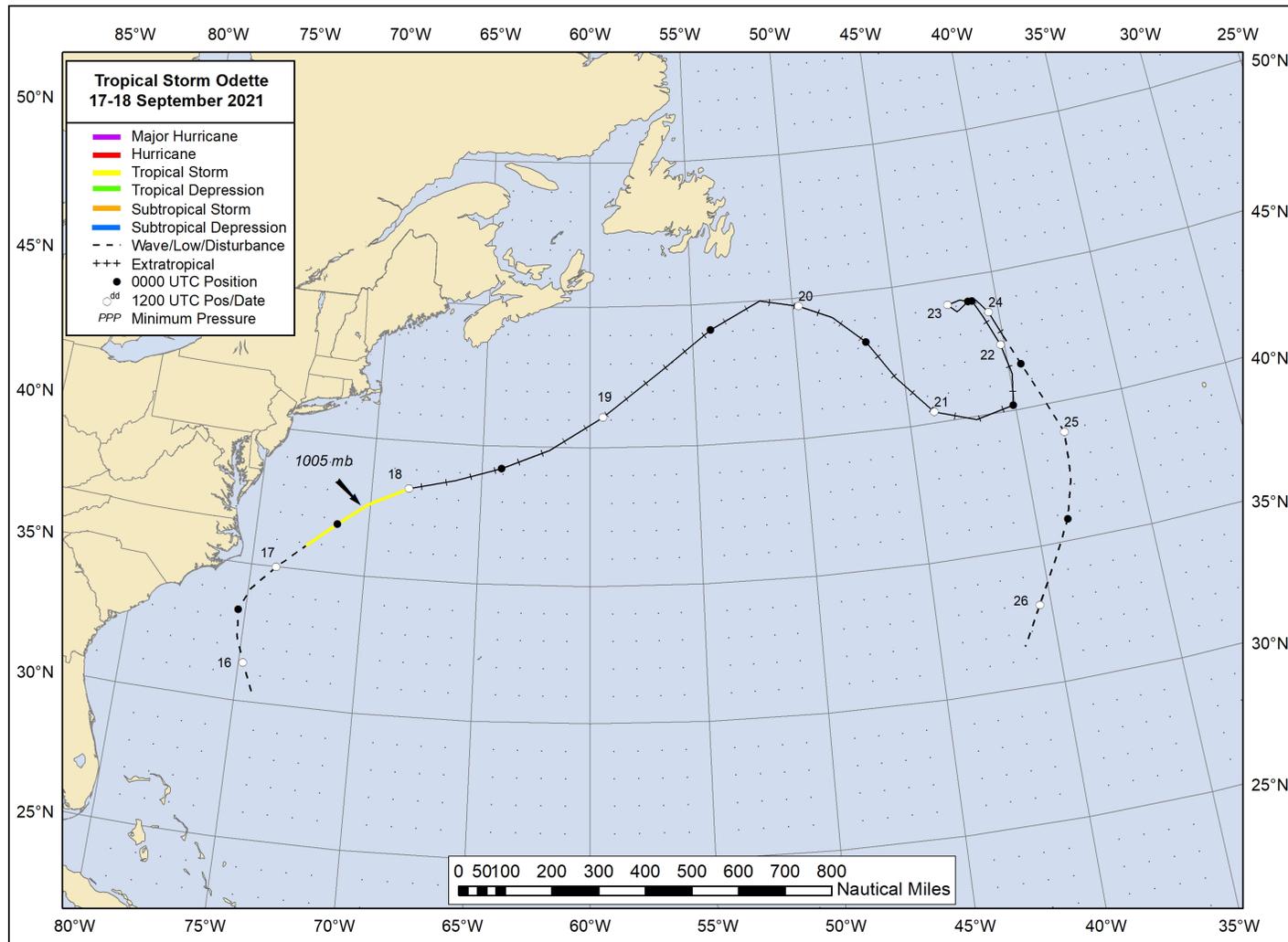


Figure 2. Best track positions for Tropical Storm Odette, 17–18 September 2021. The track during the extratropical stages is partially based on analyses from the NOAA Ocean Prediction Center.

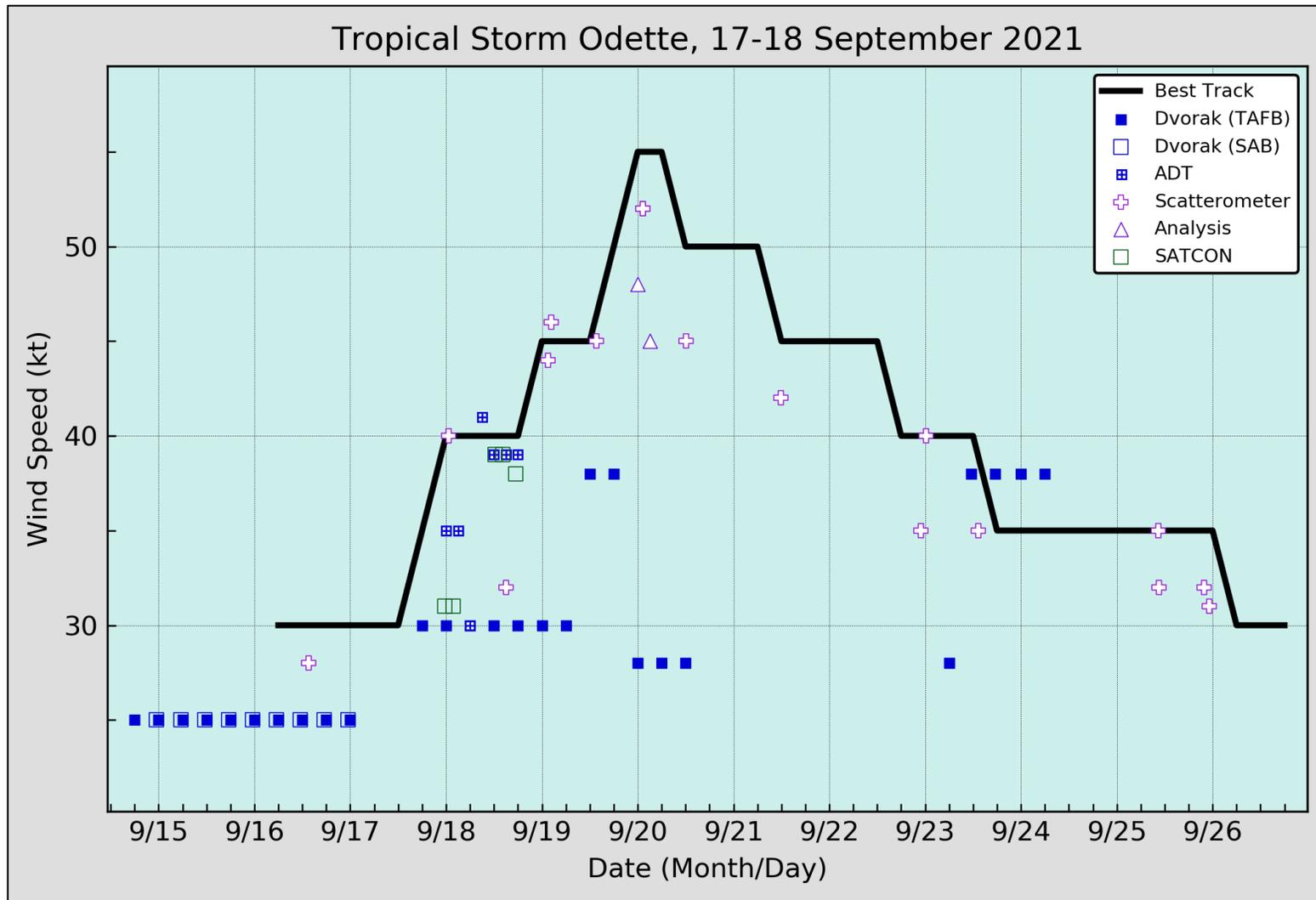


Figure 3. Selected wind observations and best track maximum sustained surface wind speed curve for Tropical Storm Odette, 17–18 September 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological Satellite Studies. Dashed vertical lines correspond to 0000 UTC.

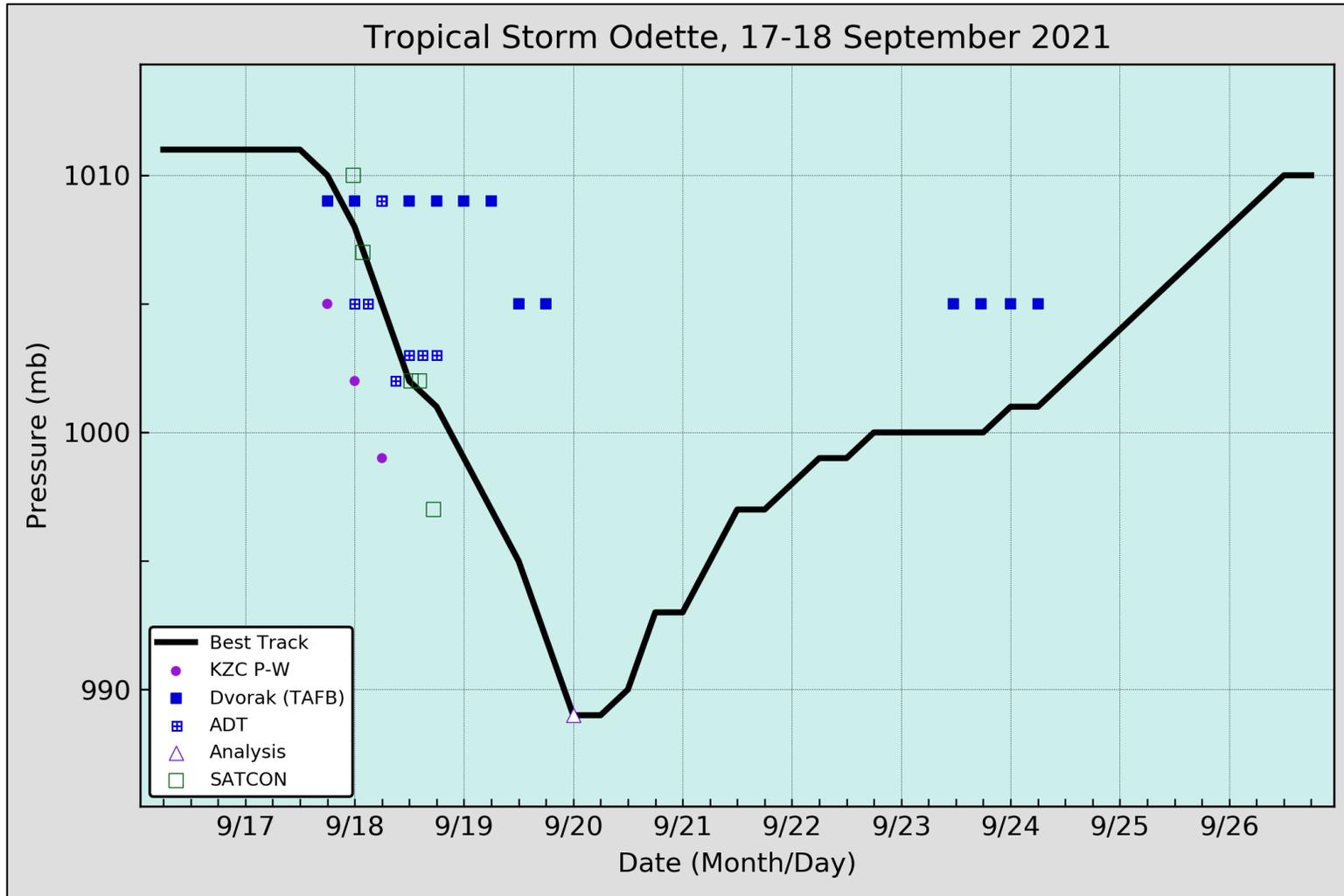


Figure 4. Selected pressure observations and best track minimum central pressure curve for Tropical Storm Odette, 17–18 September 2021. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for 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.