



NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

HURRICANE OSCAR (AL162024)

19–22 October 2024

Philippe P. Papin National Hurricane Center 11 March 2025



RADAR IMAGE FROM GUANTÁNAMO BAY OF HURRICANE OSCAR AT 1903 UTC 20 OCTOBER 2024, NEAR THE TIME OF ITS PEAK INTENSITY AS IT NEARED THE NORTH COAST OF EASTERN CUBA.

Oscar was a compact category 1 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that made landfall on Grand Turk Island and the northeast coast of Cuba. The hurricane was responsible for eight deaths, primarily due to heavy rainfall that led to flash flooding and mudslides across the eastern portion of Cuba.



Hurricane Oscar

19-22 OCTOBER 2024

SYNOPTIC HISTORY

Oscar's origins came from a tropical wave that emerged off the coast of Africa on 10 October. Initially the wave was rather potent, associated with a broad area of low pressure and disorganized showers and thunderstorms. On 11 October, scatterometer data indicated winds up to tropical storm force with surface observations in the Cabo Verde islands indicating significant pressure falls as the system moved generally westward, and the system was close to being classified as a tropical cyclone at that time. However, the associated shower and thunderstorm activity remained ragged, and the low-level circulation was not quite well-defined enough to designate the system as a tropical cyclone. Over the following few days, a combination of moderate westerly vertical wind shear and a dry mid-level air environment further eroded the convective activity, and the system continued westward or even south of due westward while steered by a large east-to-west oriented mid-level ridge across the central Atlantic. Even when the shear decreased on 14–15 October, the circulation degraded further as the occasional bursts of shower and thunderstorm activity continued to lack organization.

When the system crossed 50°W longitude on 16–17 October, convection finally began to show more signs of organization, albeit still fluctuating in a diurnal fashion. Despite the improving organization, both scatterometer and an Air Force Reserve Reconnaissance aircraft mission investigating the disturbance on 17 October indicated the system lacked a closed circulation with only 25–30 kt winds, as it approached the northern portion of the Leeward Islands. On 18 October, NWS Doppler radar data out of San Juan, Puerto Rico, indicated that the convection had spawned a well-defined mid-level vortex. However, scatterometer data that morning still suggested the system lacked a closed surface circulation, though winds had increased back to tropical storm force to the north of the surface vorticity maximum. While shear remained low over the system, dry air along the periphery may have helped focus the convection over a compact region near the mid-level vortex, amplifying the low-level vorticity underneath¹. Ultimately, it is estimated that the system developed a small, closed circulation and became a 35-kt tropical storm by 0000 UTC 19 October, while located about 155 n mi north of San Juan, Puerto Rico. The "best track" chart of Oscar'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 1².

¹ For additional information about how moisture can affect storm size, see this paper: Hill, K. A., and G. M. Lackmann, 2009: Influence of Environmental Humidity on Tropical Cyclone Size. *Mon. Wea. Rev.*, **137**, 3294–3315, https://doi.org/10.1175/2009MWR2679.1.

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.



The small size and inner core structure of Oscar made it capable of rapid intensity changes. In an environment of very warm (30°–31°C) sea-surface temperatures, light to moderate (5–15 kt) vertical wind shear, and a relatively dry mid-level airmass that maintained the storm's compact structure, Oscar immediately began a period of rapid intensification. Air Force Reserve Hurricane Hunters found that Oscar had already become a hurricane by 1800 UTC 19 October while located about 95 n mi north of Puerto Plata in the Dominican Republic. This increase in intensity was remarkable given that the system was not even a tropical cyclone the day prior. During this period, Oscar maintained a westward heading, though it slowed down markedly as the mid-level ridge that had been steering it for days eroded. Oscar reached its first peak intensity of 75 kt by 2015 UTC 19 October when the hurricane passed over Grand Turk in the Turks and Caicos Islands. In between reconnaissance missions, synthetic aperture radar (SAR) data showed the very small size of Oscar's wind field, with hurricane-force winds only extending outward an estimated 5 n mi from the center (Fig. 4a).

Modest land interaction and inner core restructuring resulted in some slight weakening as the small hurricane began to turn west-southwestward, now under the influence of a much larger low- to mid-level ridge centered over the eastern United States. Reconnaissance observations at 1200 UTC 20 October found that Oscar was a 70-kt hurricane, located just to the south of the Inagua Islands (Fig. 4b), and that it was turning southwestward towards the eastern tip of Cuba. In the hours before the storm made landfall in Cuba, satellite imagery indicated that Oscar was beginning to intensify again, and an eye was occasionally observed from reflectivity imagery from a radar based at Guantánamo Bay (cover photo). The system is estimated to have made landfall in Cuba as a 75-kt hurricane about 5 n mi east-southeast of Baracoa, Cuba in the Province of Guantánamo around 2200 UTC 20 October (Fig. 4c).

The mountainous terrain of eastern Cuba took a toll on the small hurricane, and Oscar quickly weakened into a tropical storm by 0600 UTC 21 October. In addition, the steering currents over the system collapsed as a mid- to upper-level trough amplified offshore of the southeastern United States coast. Consequently, Oscar's motion slowed to a crawl as it turned westward and then northwestward as the weakness to the north of the storm became more pronounced. While still producing tropical-storm-force winds, primarily offshore of both the northeastern and southeastern coasts of Cuba, the storm's low-level circulation became broader and more diffuse. Oscar's center also separated from convection due to a combination of continued land interaction and increasing southwesterly vertical wind shear. The center of Oscar turned north-northeastward and moved back offshore of the northern coast of Cuba as a 35-kt tropical storm by 0000 UTC 22 October. An overnight reconnaissance aircraft mission was able to identify a center, but it indicated the circulation continued to become broader and more disorganized, with most of the tropical-storm-force winds now displaced well east of the center. Oscar moved into the central Bahamas as it began to interact with a larger mid-latitude trough, and the storm opened into a trough by 1800 UTC 22 October in the central Bahamas. The remnants of Oscar were fully absorbed by a larger non-tropical area of low pressure that produced heavy rainfall over Bermuda.



METEOROLOGICAL STATISTICS

Observations in Oscar (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 3 flights of the 53rd Weather Reconnaissance Squadron of the U.S. Air Force Reserve Command (flight paths and center fixes are shown in Fig. 5). 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, and the Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) satellites, among others, were also useful in constructing the best track of Oscar.

Ship reports of winds of tropical storm force associated with Oscar are given in Table 2, and selected surface observations from land stations and data buoys are given in Table 3. Note that a couple of ship observations in Table 2 reported sustained winds up to 40 kt, even though the Oscar's best track at the time was only 35 kt. Upon further inspection, the winds observed on these ships appear elevated compared to surrounding observations, likely because their anemometer heights were between 25–30 meters, well above the standard 10-meter height.

Winds and Pressure

Oscar's first peak intensity of 75 kt at 0000 UTC 20 October is based on dropsonde observations in Oscar early in the afternoon of 19 October. A dropsonde that was launched in the northeast eyewall of the hurricane measured a 150 m boundary layer mean wind of 85 kt, a 500 m layer mean of 84 kt, and an instantaneous surface wind of 82 kt, and these observations support an intensity of around 75 kt. While not used to base the peak intensity of the storm, there were at least 3 separate dropsondes launched between 1800–2000 UTC 19 October that had instantaneous winds above 80 kt at their surface splash point in Oscar's eyewall.

At the time of the first peak, the estimated minimum pressure was 987 mb, partially based on a dropsonde launched in the eye of Oscar at 1909 UTC 19 October, which reported a minimum pressure of 990 mb with 33 kt of wind at the surface. Assuming a standard decrease in pressure of 1 mb per 10 kt of wind, this observation supports a minimum pressure of 987 mb.

Oscar moved directly over Grand Turk Island at around 2015 UTC 19 October. While there were no wind observations reported from the island as of this writing, there was a personal weather station located in Pond Breeze Plaza which reported a minimum pressure of 992.8 mb at 2034 UTC 19 October. However, pressure data from this station was missing before the lowest pressure was observed, and without any accompanying wind information, it is not known if this



station was in the eye or eyewall nor how close the observed value was to the minimum pressure of the hurricane.

Oscar is also estimated to have made landfall in the far eastern part of Cuba as a 75-kt hurricane at 2200 UTC 20 October, based primarily on satellite intensity estimates. This intensity is roughly in between the lower 1800 UTC Dvorak estimate of T4.0/65 kt from SAB and the higher T5.0/90 kt estimate from TAFB. In addition, peak intensity estimates during this period from ADT, SATCON, D-MINT, and D-PRINT were 75 kt, 76 kt, 76 kt, and 78 kt respectively³. It should be noted that there was a SAR pass available just after Oscar made landfall at 2301 UTC 20 October with much higher peak winds than assessed in the final best track (Fig. 4c). However, there remain concerns about this dataset, especially the representativeness for estimating 1-minute peak sustained winds in tropical cyclones, and this dataset continues to be investigated for its utility in estimating these tropical cyclone parameters.

Given the very small wind field associated with Oscar, there were only a limited number of surface observations that captured significant winds associated with the hurricane. Several stations in Cuba did report wind gusts exceeding hurricane force. The highest observed winds in Cuba were a sustained wind of 54 kt reported in Jamal, Baracoa, in Guantánamo with a wind gust to 86 kt at 2100 UTC 20 October, shortly before Oscar made landfall. Another weather station at Punta de Maisí measured sustained winds of 54 kt with a wind gust of 71 kt at 2145 UTC 20 October, while a third station at Valle de Caujerí just north of San Antonio del Sur reported a sustained wind of 49 kt with a wind gust of 70 kt at 0800 UTC 21 October.

The minimum pressure estimated at this second intensity peak and landfall was 984 mb, based primarily on the Knaff-Zehr-Countney (KZC) pressure-wind relationship. Unfortunately, there were no in-situ surface pressure data at the landfall location when the storm moved ashore in Cuba.

Storm Surge

A preliminary report from the Cuban Meteorology Institute (INSMET) indicated that coastal areas of eastern Cuba experienced a storm surge of 2.5–3 feet (0.78–1.00 m) along the north coast of Guantánamo, with the highest surge noted along the coast of Mata Bay and at the mouth of the Toa River. On top of this storm surge, substantial waves reaching a peak height of 13–20 feet (4–6 m) were observed in this region, causing severe coastal flooding on 20 October as Oscar's core came ashore (Fig. 6).

Rainfall and Flooding

Oscar was responsible for substantial rainfall in Cuba as the system moved inland and moved slowly over the high terrain of the eastern portion of the country. The highest rainfall report was from Valle de Caujerí in the province of Guantánamo which observed 24.80 inches (630.2 mm) from 20–21 October. More than 10 inches of that rainfall occurred in just a 3 h period, setting a historical record for that location. A total of 24.13 inches (612.9 mm) occurred at Gran Tierra, with 21.73 inches (551.9 mm) of rain falling in Guaibano. In Punta de Maisí, which is on

³ For more information about D-MINT and D-PRINT, please refer to Griffin, S. M., A. Wimmers, and C. S. Velden, 2024: Predicting Short-Term Intensity Change in Tropical Cyclones Using a Convolutional Neural Network. *Wea. Forecasting*, **39**, 177–202, https://doi.org/10.1175/WAF-D-23-0085.1.



the eastern tip of Cuba, a rainfall total of 17.04 inches (432.9 mm) was observed. Outside of Guantánamo, rainfall totals in other Cuban provinces were generally lower, with the highest rainfall total in Holquí at the Jagüeyes Reservoir reporting 7.80 inches (198.0 mm).

Rainfall totals across the Turks and Caicos Islands and the southeastern and central Bahamas were generally lower, thanks in part to Oscar's small size and faster forward motion when the system was traversing the area. In general, only 1–3 inch totals were observed from 19–21 October for these locations.

CASUALTY AND DAMAGE STATISTICS

The Cuban government indicated that Oscar was directly responsible for at least 8 deaths⁴, all in the Cuban province of Guantánamo, from excessive rainfall leading to flash flooding and mudslides across the eastern portion of Cuba. Six of the deaths were reported in San Antonio del Sur, with another person found in Imìas. In addition, as of this writing, two people were still reported missing.

Over the Turks and Caicos Islands, damage was relatively modest, possibly owing to the small size of the storm. In preparation, many of the airports across the region closed from 19–20 October, with shelters opening for residents. In Grand Turk Island, where Oscar moved directly over, there were reports of downed trees across the island, with at least one house losing its roof. Farther northwest in Providenciales, as well as North, Middle, and East Caicos, damage was more sporadic. Part of the limited damage to the island chain was likely also related to the fact the hurricane struck during low tide, without much in the way of significant surge or high seas reported.

On Inagua Island in the southeastern Bahamas, high winds and heavy rain fell as Oscar's core passed along and just south of the Island. Several homes were damaged, blowing out windows and creating roof damage. Uprooted trees and downed powerlines were also observed (Fig. 7), with most of the fencing around the Inagua International Airport being destroyed.

As Oscar slowly moved through the eastern portion of Cuba, it was responsible for substantial damage to buildings and other infrastructure, primarily in the provinces of Guantánamo and Holguin, a region with a total population of nearly 500,000 people. In preparation, 15,000 people evacuated either to higher ground or away from coastal regions experiencing the worst impacts. Beginning in Guantánamo, flooding and landslides were widespread, with the municipalities of Baracoa, Imías, Maisí, and San Antonio del Sur most heavily affected. In total, about 150,000 people were critically affected, with 14,000 homes and facilities suffering significant damage, including more than 1,000 buildings suffering partial roof collapses. In San Antonio del Sur, several roadways and bridges were washed out, cutting off residents from aid and shelter (Fig. 8, top left). In total, about 35 miles (56 km) of roadways were

⁴ 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.



damaged, including at least seven bridges in the Guantánamo province. According to media reports, Oscar made landfall in Cuba during a time in which the country was experiencing a widespread power outage that left millions without power across the country, and electricity was especially slow to be restored in eastern Cuba in the wake of the hurricane.

Strong winds also led to a significant amount of vegetation damage with many downed trees, branches, and bushes (Fig. 8, top right). Significant damage to trees and homes was also observed in Baracoa (Fig. 8, bottom right). The agricultural sector of eastern Cuba was particularly hard hit, with substantial damage to the vegetable, banana, bean, coffee, cocoa, and coconut crops. More than 50 percent of the banana plantations were damaged, with total damaged crops reaching 70–80% near landfall in Baracoa and Punta de Maisí.

The total damage related to Oscar was estimated to be upwards of \$50 million U.S. dollars, per a global catastrophe report by Aon.

FORECAST AND WARNING CRITIQUE

Genesis

The genesis forecasts of Oscar were poor. While the predecessor system was in the Tropical Weather Outlook (TWO) for a very long time, ultimately Oscar's genesis was not well predicted, especially in the short-term (Table 4). A time series of the genesis probabilities of the pre-Oscar system is also visually depicted in Figure 9. The wave from which Oscar developed was first introduced in the 7-day TWO with a low probability (<40%) at 1800 UTC 4 October, more than 14 days (342 h) prior to genesis. The 2-day TWO probabilities were also introduced in the low category 240 h before development. Both the 7-day and 2-day probabilities were increased to the medium (40–60%) category 186 h before the system became a tropical cyclone. The rationale for these early outlooks was due to initial forecasts that a tropical wave emerging off the coast of Africa could become a tropical cyclone near the Cabo Verde islands. The wave that emerged into the Atlantic Ocean was initially robust, and a special TWO was issued at 1310 UTC 11 October indicating that a short-lived tropical storm could form near the Cabo Verde Islands. However, the system struggled to produce enough organized convection for tropical cyclone classification and both the 7-day and 2-day TWO probabilities were lowered back into the low category at 1800 UTC 12 October.

While this initial attempt at tropical cyclone development failed, the model guidance suggested another opportunity of development once the system moved westward near the Leeward Islands and Puerto Rico. Thus, the 7-day probabilities were raised once again into the medium category at 1800 UTC 13 October, about 126 h before development. However, as the system approached this area on 16–17 October, the surface circulation degenerated despite gradually increasing convection, and the model guidance once again suggested less development, with the 7-day probabilities falling back into the low category at 0600 UTC 17 October. Ultimately both the 7-day and 2-day probabilities remained in the low category until the system became a tropical cyclone at 0000 UTC 19 October.



The location of Oscar's genesis was also problematic (Fig. 10), with more outlooks overall being issued near the Cabo Verde Islands where the system came close to becoming a tropical cyclone on 11 October. These early outlook areas explain the very low overall hit rate (36%). The locations of outlooks that were issued after 13 October were generally more accurate, helping to explain why the medium 7-day outlook hit rate was somewhat better (65%), though far from optimal.

Track

A verification of NHC official track forecasts for Oscar is given in Table 5a. Official track forecast (OFCL) errors were lower than the mean official errors for the previous 5-yr period at all forecast times from 12–72 h. In addition, climatology-persistence track errors (OCD5) were also larger than the long-term mean OCD5 errors from 12–48 h, suggesting that Oscar's track was harder to forecast than for a typical system. A homogeneous comparison of the official track errors with selected guidance models is given in Table 5b. OFCL outperformed most of the deterministic guidance, except for just a few spot lead times in the GFS (24 h) and ECWMF (36 h, 60 h) models. Notably, the hurricane-regional models HAFS-A, HAFS-B, and HMON were poor track performers, with errors nearly double compared to OFCL from 36–60 h. The consensus aids performed better, with comparable errors to OFCL at the early forecast lead times (12–24 h).

Intensity

A verification of NHC official intensity forecasts for Oscar is given in Table 6a. OFCL intensity forecast errors were variable, first near or slightly lower than the mean official errors at the 12–24 h and 72-h lead times, then somewhat higher errors compared to the mean at 36–60 h. In comparison, OCD5 intensity errors were much higher than the long-term mean OCD5 errors, suggesting that Oscar had particularly challenging intensity forecasts. A homogeneous comparison of the official intensity errors with selected guidance models is given in Table 6b. While the official forecast was able to outperform most of the guidance (both deterministic and consensus aids) at 12–24 h, many more aids outperformed the official forecast from 36–60 h, including all the hurricane regional models. Even though the NHC intensity forecasts showed strengthening, the initial forecast on 19 October failed to anticipate the rapid intensification that Oscar was undergoing that day. In fact, a special advisory was issued at 1800 UTC 19 October when the Air Force reconnaissance mission indicated the system had become a hurricane. However, subsequent intensity forecasts correctly indicated that Oscar would plateau in intensity before impacting Cuba as a Category 1 hurricane.

Wind Watches and Warnings

Coastal wind watches and warnings associated with Oscar are given in Table 7. In general, lead times were suboptimal for both Tropical Storm and Hurricane Watches and Warnings on 19–20 October for the Turks and Caicos and eastern coast of Cuba, with tropical storm and hurricane impacts beginning within 6 h for the Turks and Caicos Islands, and only 24 h from issuance for Cuba.



IMPACT-BASED DECISION SUPPORT SERVICES (IDSS) AND PUBLIC COMMUNICATION

NHC/TAFB provided three live briefings on Oscar to U.S. Coast Guard District 7 starting on 19 October in support of their life-saving mission.

ACKNOWLEDGEMENTS

Data in Table 3 and damage summaries were compiled from meteorological data provided by the Cuban Meteorological Service (INSMET). Dr. Lisa Bucci provided the aircraft missions figure (Fig. 5).



Table 1. Best track for Hurricane Oscar, 19–22 October 2024.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
19 / 0000	21.0	66.5	1007	35	tropical storm
19 / 0600	21.2	68.2	1005	45	"
19 / 1200	21.3	69.8	996	55	"
19 / 1800	21.4	70.6	989	70	hurricane
19 / 2015	21.5	71.1	987	75	"
20 / 0000	21.5	71.7	987	75	II
20 / 0600	21.1	72.7	988	70	II
20 / 1200	20.8	73.6	986	70	u u
20 / 1800	20.5	74.0	984	75	u u
20 / 2200	20.3	74.4	984	75	u u
21 / 0000	20.2	74.5	988	65	II
21 / 0600	20.1	75.0	996	50	tropical storm
21 / 1200	20.3	75.4	1000	40	II
21 / 1800	20.7	75.9	1003	35	"
22 / 0000	21.5	75.6	1005	35	u u
22 / 0600	22.2	75.1	1006	35	u u
22 / 1200	22.7	74.6	1007	35	II
22 / 1800					dissipated
20 / 1800	20.5	74.0	984	75	Maximum winds and minimum pressure
19 / 2015	21.5	71.1	987	75	Landfall on Grand Turk Island
20 / 2200	20.3	74.4	984	75	Landfall near Baracoa, Cuba



Table 2. Selected ship reports with winds of at least 34 kt for Hurricane Oscar, 19–22 October 2024.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/ speed (kt)	Pressure (mb)
22 / 0200	C6WK7	26.1	78.6	060 / 40	1015.0
22 / 0500	VRKX8	22.5	78.1	360 / 35	1017.0
22 / 1200	VRVP2	27.2	70.4	260 / 41	1015.8



Selected surface observations for Hurricane Oscar, 19–22 October 2024. Table 3.

	Minimum Sea Level Pressure		Maximum Surface Wind Speed						
Location	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)ª	Sustained (kt) ^b	Gust (kt)	Storm surge (ft)	Storm tide (ft)	Estimated Inundation (ft)	Total rain (in)
Turks and Caicos									
Pond Breeze Plaza Grand Turk Island (IGRAND151) (21.46N 71.15W)	19/2034	992.8 ⁱ							
GeekHo North Caicos (INORTH1126) (21.87N 72.09W)	19/2332	1004.1	20/0038	26	34				0.64
Major Hill, Bottle Creek North Caicos (INORTHCA12) (21.92N 71.92W)	19/2324	1003.0	20/0024	25	31				1.29
Bambarra Beach Caicos Island (ICAICOS17) (21.83N 71.73W)	19/2300	1006.1	19/2315	25	39				1.20
Providenciales (IPROVI36) (21.78N 72.25W)	19/2359	1010.2	20/0019	28	33				
Cuba									
Guantánamo Bay (MUGM) (19.91N 75.16W)	21/0151	1003.7	21/1751	31	40				2.99
Jamal, Baracoa			20/2100	54	86				8.80
Punta de Maisí			20/2145	54	71				17.52
Valle de Caujerí (San Antonio del Sur)			21/0800	49	70				24.80
Palenque de Yateras			21/0310	32	43				4.06
Guantánamo			20/2320	19	27				1.89
Gran Tierra (Maisí)									24.13
Guaibano (San Antonio del Sur)									21.73
Palenque (Yateras)									5.30
La Tagua (Manuel Tames)									3.94
Hatibonico									3.43

Date/time is for sustained wind when both sustained and gust are listed.
 Except as noted, sustained wind averaging periods for C-MAN and land-based reports are 2 min; buoy averaging periods are 8 min.

ⁱ Incomplete Data



Table 4. 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. Parentheses indicate the time before genesis that category was introduced a second time, with dashes indicating outlook categories that were not issued before genesis.

	Hours Before Genesis						
	48-Hour Outlook	168-Hour Outlook					
Low (<40%)	240	342					
Medium (40%-60%)	186 (126)	186					
High (>60%)	-	-					



Table 5a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) track forecast errors (n mi) for Oscar. 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	20.4	30.3	37.6	46.9	32.4	25.2			
OCD5	51.1	119.5	188.6	237.3	243.1	287.2			
Forecasts	11	9	7	5	3	1			
OFCL (2019-23)	23.9	36.5	49.3	63.4	79.2	93.4	132.9	190.4	
OCD5 (2019-23)	45.7	97.1	153.0	205.4	254.9	297.8	372.7	439.1	



Table 5b. Homogeneous comparison of selected track forecast guidance models (in n mi) for Oscar. 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.

Madal ID	Forecast Period (h)							
Model ID	12	24	36	48	60	72	96	120
OFCL	21.2	30.8	36.0	46.7	39.7			
OCD5	52.9	123.1	189.8	238.8	248.6			
GFSI	21.4	29.9	44.5	97.8	118.2			
EMXI	22.6	37.7	32.9	48.9	7.1			
CMCI	22.5	31.6	40.5	68.9	90.6			
NVGI	34.5	44.2	65.9	99.0	92.8			
HFAI	24.1	37.7	59.3	75.3	198.4			
HFBI	23.8	38.2	79.7	122.5	243.1			
HWFI	23.9	31.8	36.2	59.3	97.4			
HMNI	29.1	54.7	82.8	111.4	94.5			
HCCA	18.1	28.5	37.9	55.4	89.5			
FSSE	16.5	26.8	31.2	62.7	57.5			
TVCA	20.7	30.7	46.9	66.2	93.5			
TVDG	18.4	30.0	44.5	62.4	83.8			
TVCX	19.7	30.4	46.2	65.5	91.1			
AEMI	24.4	27.6	42.2	73.1	91.4			
GFEX	21.1	31.5	34.8	66.4	59.3			
TABS	50.5	85.1	127.7	183.8	260.6			
TABM	36.5	53.4	62.0	67.8	67.7			
TABD	45.5	86.1	126.9	160.6	190.3			
Forecasts	10	8	6	4	2			



Table 6a. NHC official (OFCL) and climatology-persistence skill baseline (OCD5) intensity forecast errors (kt) for Oscar. 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	6.8	6.7	12.1	11.0	11.7	5.0		
OCD5	9.0	13.3	25.0	35.6	47.0	26.0		
Forecasts	11	9	7	5	3	1		
OFCL (2019-23)	5.0	7.3	8.5	9.7	10.4	10.9	12.9	15.5
OCD5 (2019-23)	6.6	10.2	13.1	15.6	17.2	18.6	21.8	22.6



Table 6b. Homogeneous comparison of selected intensity forecast guidance models (in kt) for Oscar. 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 6a due to the homogeneity requirement.

Madalib	Forecast Period (h)							
Model ID	12	24	36	48	60	72	96	120
OFCL	6.8	6.7	12.1	11.0	11.7	5.0		
OCD5	9.0	13.3	25.0	35.6	47.0	26.0		
HFAI	8.1	12.9	8.3	7.6	5.0	7.0		
HFBI	10.9	14.1	11.9	7.2	7.3	11.0		
HWFI	12.0	14.8	10.1	7.0	9.3	7.0		
HMNI	9.5	7.7	9.1	6.4	10.0	7.0		
DSHP	10.1	13.2	21.3	26.2	35.3	17.0		
LGEM	11.5	14.8	24.7	30.0	37.0	10.0		
HCCA	9.6	7.0	8.9	5.8	8.3	6.0		
FSSE	8.3	6.1	8.3	7.0	6.3	2.0		
IVCN	8.7	7.7	8.4	8.0	10.7	4.0		
ICON	9.3	6.9	12.9	14.6	20.0	11.0		
IVDR	8.5	8.2	6.3	5.4	6.0	1.0		
GFSI	7.4	7.8	8.0	9.0	5.7	12.0		
EMXI	8.2	11.9	17.4	15.2	17.7	12.0		
Forecasts	11	9	7	5	3	1		



Table 7. Watch and warning summary for Hurricane Oscar, 19–22 October 2024.

Date/Time (UTC)	Action	Location		
19 / 1500	Tropical Storm Watch issued	North coast of Camagüey		
19 / 1500	Tropical Storm Warning issued	Turks & Caicos and Southeastern Bahamas		
19 / 1500	Tropical Storm Warning issued	North coast of Las Tunas to Guantánamo		
19 / 1800	Tropical Storm Warning changed to Hurricane Warning	Turks & Caicos and Southeastern Bahamas		
19 / 1800	Hurricane Watch issued	North coast of Las Tunas to Guantánamo		
20 / 0300	Hurricane Watch changed to Hurricane Warning	North coast of Holguin to Guantánamo		
20 / 0900	Hurricane Warning changed to Tropical Storm Warning	Turks & Caicos		
20 / 1200	Tropical Storm Warning discontinued	Turks & Caicos		
20 / 1500	Tropical Storm Watch issued	Central Bahamas		
20 / 1800	Hurricane Warning changed to Tropical Storm Warning	Southeastern Bahamas		
21 / 0300	Hurricane Warning changed to Tropical Storm Warning	North coast of Holguin to Guantánamo		
21 / 0300	Hurricane Watch discontinued	North coast of Las Tunas		
21 / 1500	Tropical Storm Watch discontinued	North coast of Camagüey		
21 / 2100	Tropical Storm Watch changed to Tropical Storm Warning	Central Bahamas		
22 / 0300	Tropical Storm Warning discontinued	North coast of Las Tunas to Guantánamo		
22 / 1500	Tropical Storm Warning discontinued	Central Bahamas		
22 / 1800	Tropical Storm Warning discontinued	Southeastern Bahamas		

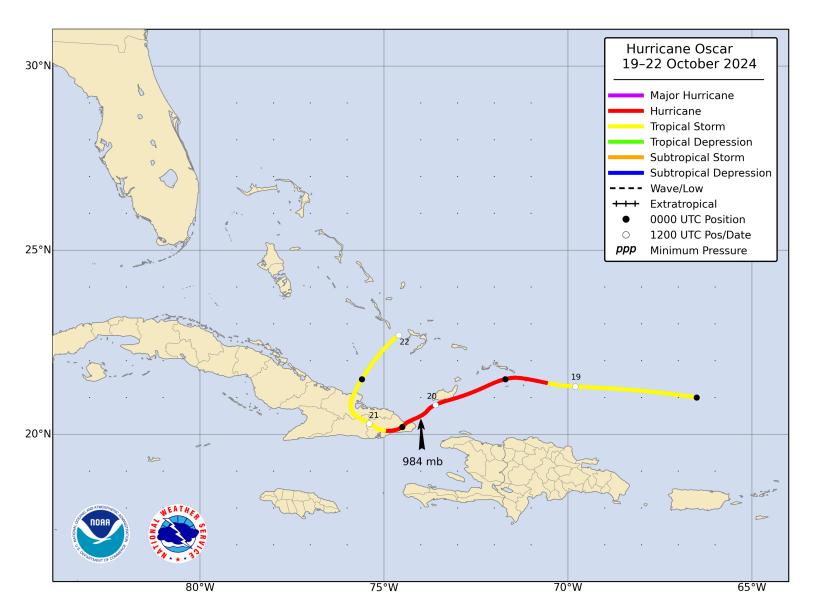
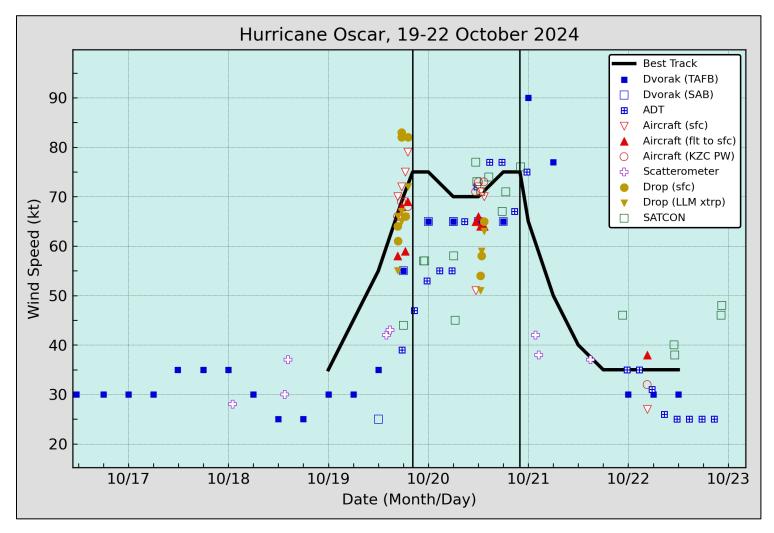


Figure 1. Best track positions for Hurricane Oscar, 19–22 October 2024.





Selected wind observations and best track maximum sustained surface wind speed curve for Hurricane Oscar, 19–22 October 2024. 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 solid vertical lines correspond to landfalls.



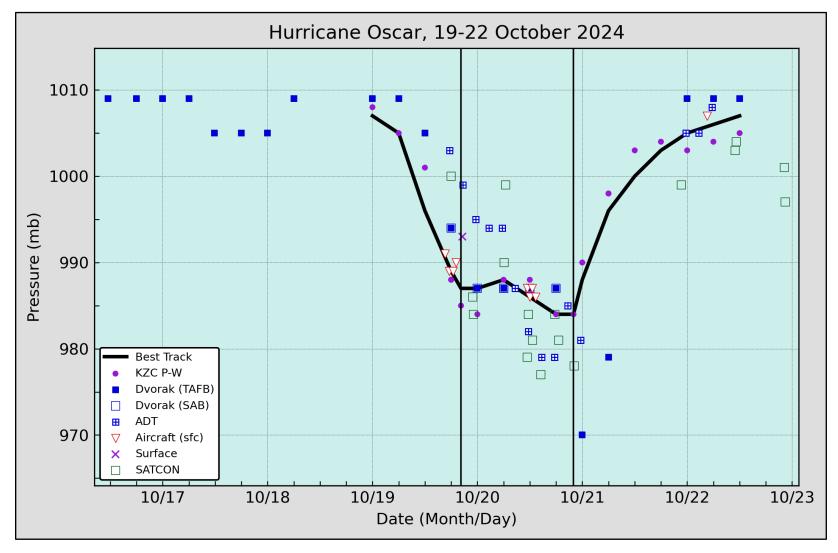


Figure 3. Selected pressure observations and best track minimum central pressure curve for Hurricane Oscar, 19–22 October 2024. Advanced Dvorak Technique estimates represent the Current Intensity at the nominal observation time. SATCON intensity estimates are from the Cooperative Institute for Meteorological 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, and solid vertical lines correspond to landfalls.



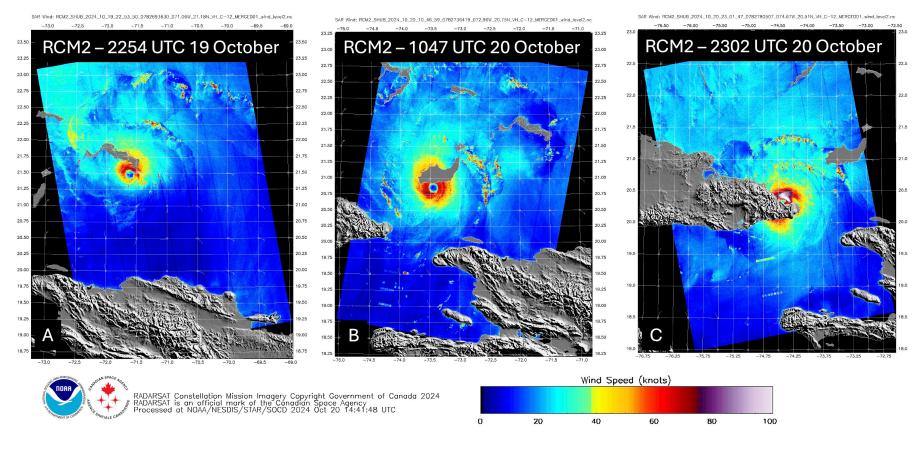


Figure 4. RCM-2 Synthetic Aperture Radar wind speed data at 500-m resolution (shaded, kt) over Oscar valid at (a) 2254 UTC 19 October, (b) 1047 UTC 20 October, and (c) 2302 UTC 20 October. Note that peak wind estimates from this instrument are still being examined for their representativeness.



Air Force Reserve and NOAA Hurricane Hunter aircraft flight tracks (red) from reconnaissance missions into Oscar. The black markers denote center fixes, and the 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 knots.







Figure 6. A snapshot of coastal flooding and high waves observed in Baracoa, Cuba in Guantánamo province on 20 October shortly before Oscar made landfall. Images courtesy of the Cuban Meteorology Institute (INSMET) in their preliminary writeup of Hurricane Oscar.





Figure 7. Images of tree and powerline damage on Inagua Island as the small core of Oscar moved near the island early on 20 October. Images courtesy of the Tribune: https://www.tribune242.com/news/2024/oct/21/oscar-spurs-evacuation-but-damages-minimal/ and Our News Bahamas.





Select photos from Cuba showing the impacts associated with Oscar when it affected the region on 20–21 October. Images courtesy of the Havana Times (https://havanatimes.org/features/update-on-damage-from-hurricane-oscar-in-guantanamo-cuba/), and Adventists Review (https://adventistreview.org/news/adventists-in-cuba-aid-victims-in-the-aftermath-of-hurricane-oscar/).

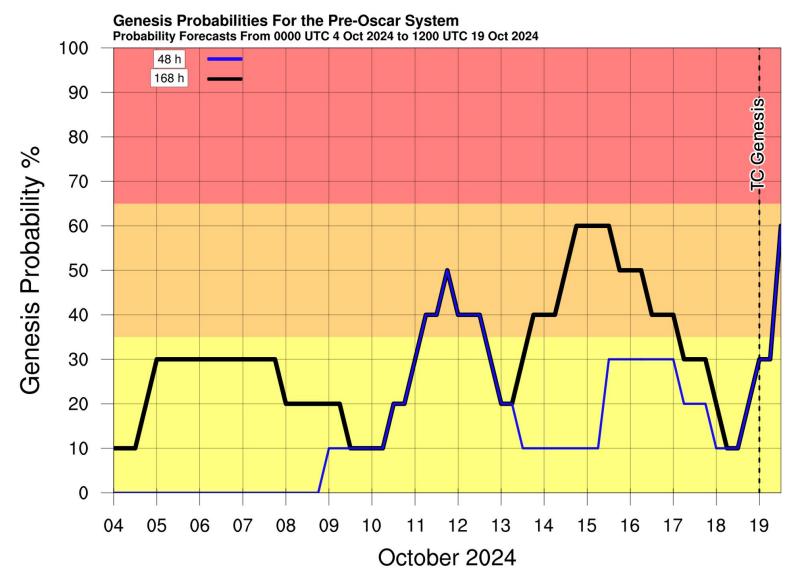
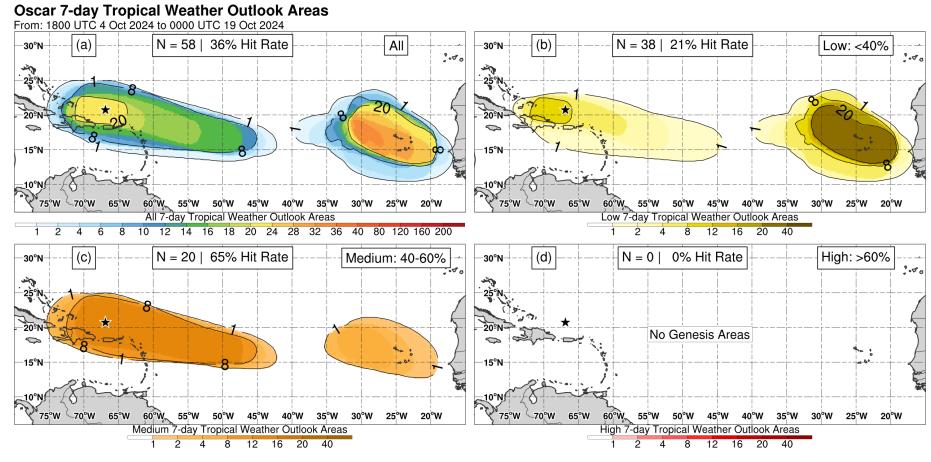


Figure 9. Time series of tropical cyclone genesis probabilities associated with the pre-Oscar system in October 2024 before it underwent development at 0000 UTC 19 October. Plotted are both the 48 h probabilities (blue line), and 168 h probabilities (black line). Probability thresholds are colorized by category of low (yellow, <40%), medium (orange, 40–60%) and high (red, >60%). Note special Tropical Weather Outlook probabilities are not depicted on this plot.





Composites of 7-day tropical cyclone genesis areas depicted in NHC's Tropical Weather Outlooks prior to the formation of Oscar 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.