National Transportation Safety Board
Office of Marine Safety
Washington, DC 20594

DCA24FM001

METEOROLOGY

Specialist's Factual Report

November 1, 2023

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A. ACCIDENT

Location: Charlotte Amalie, St. Thomas, United States Virgin Islands
Date: October 4, 2023
Time: 0328 Atlantic standard time (AST)
0728 coordinated universal time (UTC)
Vessel: Roll-on/roll-off cargo vessel "Bonnie G" grounding

B. METEOROLOGY SPECIALIST

Donald Eick
Senior Meteorologist
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C. SUMMARY

On October 4, 2023, at approximately 0328 EST, the Vanuatu flagged *OSV BONNIE G* ran aground approximately one nautical mile south of St. Thomas in the U.S. Virgin Islands. All 12 persons onboard the vessel were reported to be uninjured and rescued by Boat Forces Detachment St. Thomas after abandoning ship. The weather on scene due to Tropical Storm Phillipe included 25-30 knots sustained winds and seas between 3-5 feet.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation remotely, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). All times are Atlantic standard time (AST) based upon the 24 hour clock, local time is +4 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The vessel *OSV Bonnie G* drifted *a*ground at latitude 18.324578° N and longitude 64.973855° W, near the entrance of Lindbergh Bay.

E. FACTUAL INFORMATION

1.0 Synoptic Condition

The synoptic or large scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction (NCEP) and the Ocean Prediction Center (OPC) located in College Park, Maryland, and the National Hurricane Center (NHC), located in Coral Gables, Florida. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts can be found in the NOAA Mariner's Tropical Cyclone Guide[1].

1.1 NWS Caribbean Surface Analysis Chart

The NWS Caribbean Surface Analysis Chart for 0200 AST on October 4, 2023, is included as figure 1 with the approximate grounding location marked by a red star. The chart depicted Tropical Storm[2] Philippe immediately north of the United States Virgin Islands and Puerto Rico with a central pressure of 1004-hectopascals (hPa)[3], at that time the storm had maximum winds of 40 knots gusting to 50 knots. A dissipating cold front was depicted immediately north of Philippe and extended into the southern Bahamas Islands and across northern Cuba. A tropical easterly wave[4] was approaching the Lesser Antilles near 55° W, with the Inter-Tropical Convergence Zone (ITCZ)[5] depicted near Barbados extending southeastward towards the equator. The station models surrounding the grounding location depicted a cyclonic[6] wind flow pattern with winds from the south at 10 to 20 knots, temperatures near 86° Fahrenheit (F), with a dew point temperature near 80° F.

[1] https://www.nhc.noaa.gov/marinersguide.pdf
[2] Tropical Storm – is a tropical cyclone or low pressure system in which the maximum 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph) inclusive.
[3] Hectopascals (hPa) is the standard unit for reporting pressure and is interchangeable with the former term millibar (mb) with the same units. Standard sea-level pressure is 1013.25-hPa at a temperature of 59° Fahrenheit (F) or 15° Celsius (C).
[4] Tropical Wave - A trough or cyclonic curvature maximum in the trade wind easterlies. The wave may reach maximum amplitude in the lower middle troposphere or may be the reflection of an upper tropospheric cold low or an equatorward extension of a mid-latitude trough.
[5] Intertropical Convergence Zone (ITCZ) – is the region where the northeasterly and southeasterly trade winds converge, forming an often continuous band of clouds or thunderstorms near the equator.
[6] Cyclonic refers to a counter-clockwise and inward flow pattern.

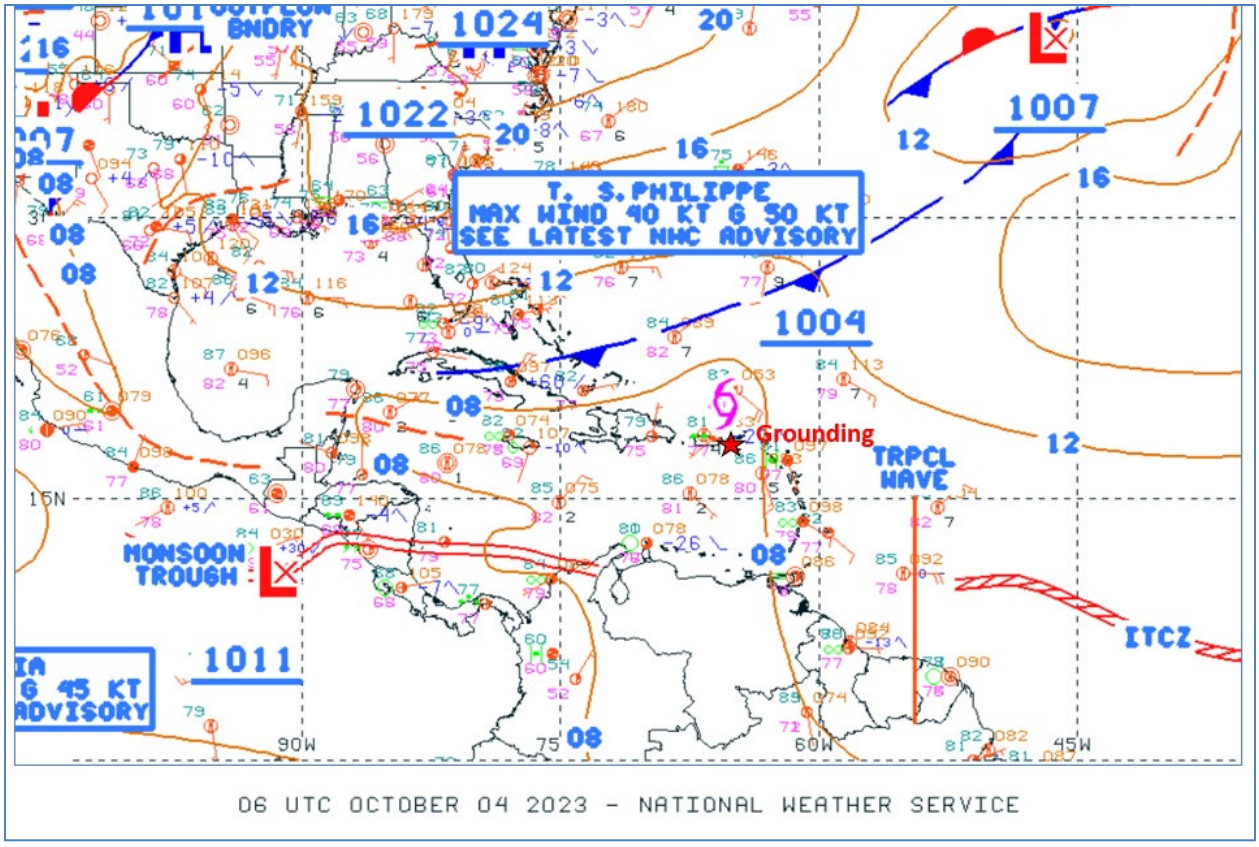

Figure 1 - NWS Caribbean Surface Analysis Chart for 0200 AST with the approximate accident site marked by the red star.

1.2 Regional Significant Wave Height Analysis

The NWS Caribbean Significant Wave Height Analysis for 2000 AST on October 3, 2023, is included as figure 2 with a red star over the approximate grounding location. The chart is issued every 12-hours (for the period of 0000Z and 1200Z) to depict the current significant wave height[7] at 3 ft contours or intervals and primary swell direction over the tropical and subtropical Atlantic water. The chart depicted significant wave heights near 6 ft over the Virgin Islands, with the maximum wave heights of 19 ft associated with Tropical Storm Philippe northeast of the Virgin Islands and the accident site.

[7] The significant wave height is defined as the average height of the highest 1/3 of the waves (individual waves may be more than twice the significant wave height).

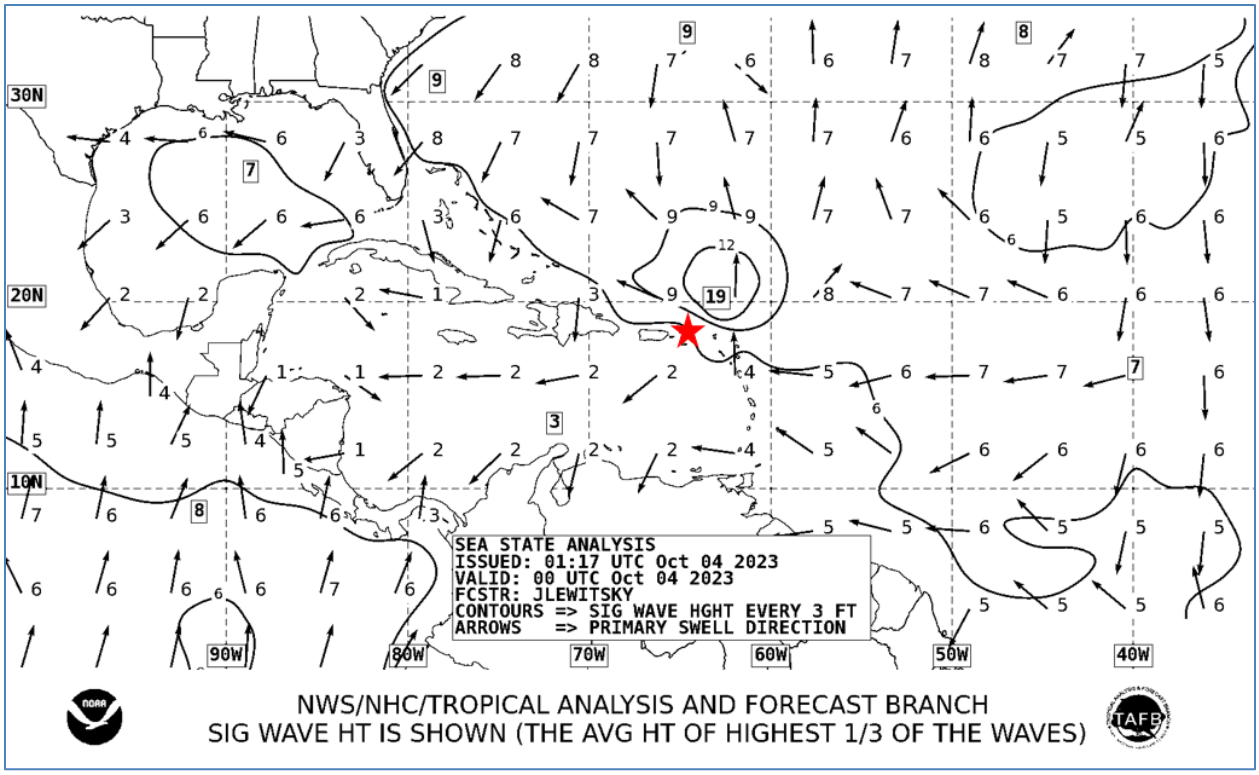

Figure 2 - NWS Significant Wave Height Analysis for 2000 AST October 3, 2023 valid at the time of the attempted docking and grounding of the *OSV Bonnie G.*

1.3 NWS National Hurricane Center Advisories

The NWS NHC Tropical Storm Philippe Advisory[8] 42 issued at 1700 AST on October 3, 2023, and current at the time the accident vessel departure from St. Croix is included as figure 3. Tropical Storm Philippe was projected to continue to move northwest to northward and remain as a tropical storm. The text advisory follows the graphic for the period as well as the NHC forecast discussion.

Figure 4 is the NWS NHC advisory 42 wind field with the extent of the tropical storm force winds of 34 to 63 knots depicted in orange around the track of Tropical Storm Philippe. Tropical storm force winds extend over the United States Virgin Islands and the accident site at the time of advisory 42.

[8] The NWS NHC chart depicts the 3-day forecast position and potential track error.

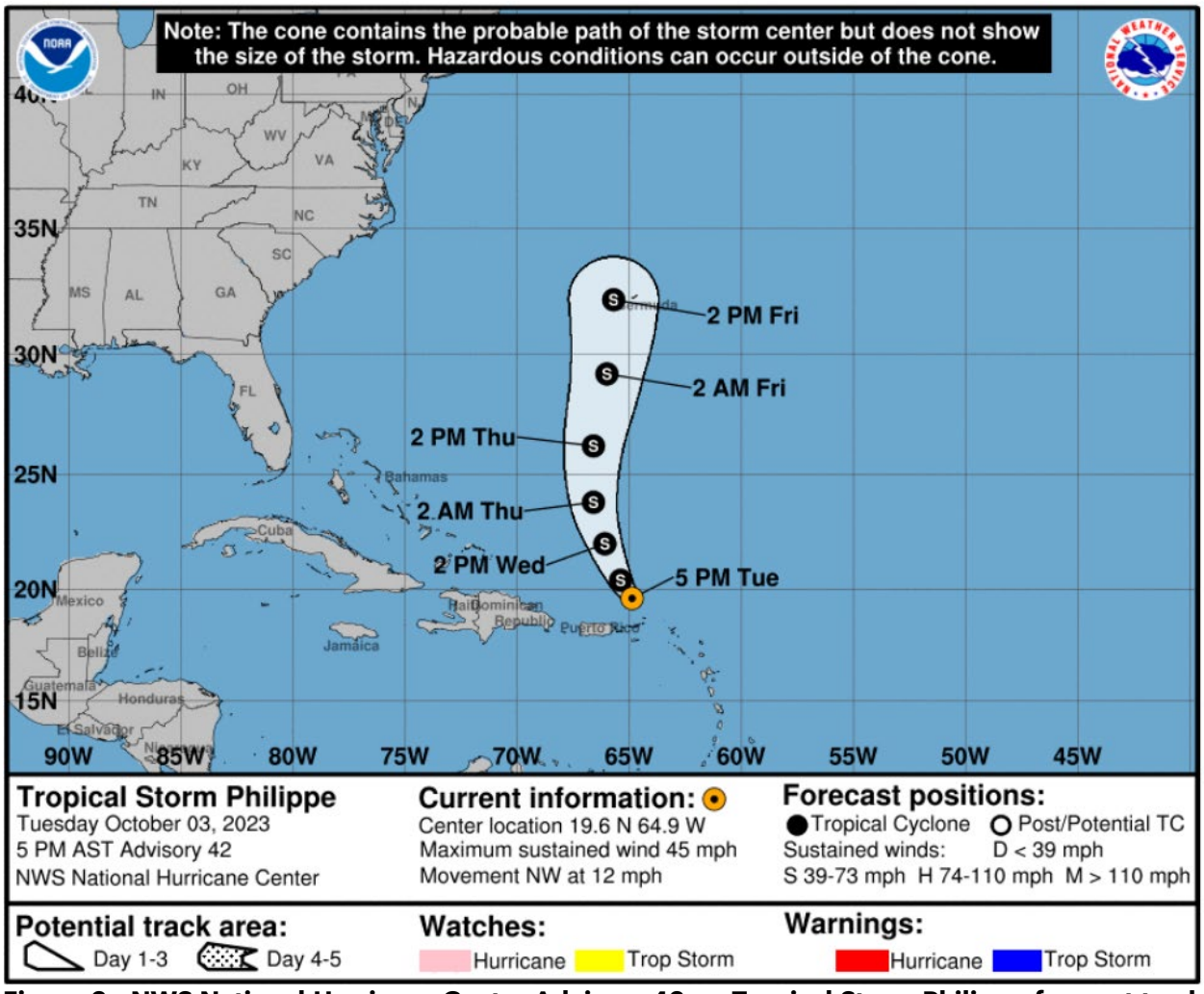

Figure 3 - NWS National Hurricane Center Advisory 42 on Tropical Storm Philippe forecast track issued at 1700 AST on October 3, 2023, with the 3-day track projection.

Tropical Storm Philippe Advisory Number 42

BULLETIN
Tropical Storm Philippe Advisory Number 42
NWS National Hurricane Center Miami FL AL172023
500 PM AST Tue Oct 03 2023

...PHILIPPE BEGINNING TO MOVE AWAY FROM THE BRITISH VIRGIN ISLANDS.....HEAVY RAINS CONTINUE ACROSS PORTIONS OF THE LEEWARD AND NORTHERN WINDWARD ISLANDS...

SUMMARY OF 500 PM AST...2100 UTC...INFORMATION
LOCATION...19.6N 64.9W
ABOUT 85 MI...135 KM N OF ST. THOMAS
ABOUT 875 MI...1410 KM S OF BERMUDA
MAXIMUM SUSTAINED WINDS...45 MPH...75 KM/H
PRESENT MOVEMENT...NW OR 310 DEGREES AT 12 MPH...19 KM/H
MINIMUM CENTRAL PRESSURE...1004 MB...29.65 INCHES

WATCHES AND WARNINGS
CHANGES WITH THIS ADVISORY:

The government of Antigua and Barbuda has discontinued the Tropical Storm Watch for the British Virgin Islands.

SUMMARY OF WATCHES AND WARNINGS IN EFFECT:

There are no coastal watches or warnings in effect.

Interests in Bermuda should monitor the progress of Philippe.

DISCUSSION AND OUTLOOK
At 500 PM AST (2100 UTC), the center of Tropical Storm Philippe was located near latitude 19.6 North, longitude 64.9 West. Philippe is moving toward the northwest near 12 mph (19 km/h), and this motion is expected to continue through tonight. A turn toward the north-northwest is forecast on Wednesday, followed by a faster motion toward the north on Thursday and Friday. On the forecast track, the center of Philippe will move away from the Virgin Islands. Philippe will then approach Bermuda Thursday night and Friday.

Maximum sustained winds are near 45 mph (75 km/h) with higher gusts. Little change in strength is forecast during the next few days.

Tropical-storm-force winds extend outward up to 160 miles (260 km) to the east of the center.

The estimated minimum central pressure is 1004 mb (29.65 inches).

HAZARDS AFFECTING LAND
Key messages for Philippe can be found in the Tropical Cyclone Discussion under AWIPS header MIATCDAT2 and WMO header WTNT42 KNHC.

RAINFALL: Philippe is forecast to produce the following rainfall amounts into early Wednesday:

Anguilla southward to Montserrat, including St. Kitts and Nevis, and the British Virgin Islands: 4 to 8 inches with maximum amounts to 12 inches.

The remainder of the Leeward Islands and northern Windward Islands: 1 to 4 inches
The U.S. Virgin Islands and northeast Puerto Rico: 2 to 4 inches
This rainfall would result in scattered flash flooding.

WIND: Gusty winds are likely to continue across portions of the northern Leeward Islands and the Virgin Islands through Wednesday.

SURF: Swells generated by Philippe will affect portions of the Atlantic coasts of the northern Leeward Islands, the Virgin Islands, and Puerto Rico through midweek. These swells are likely to cause life-threatening surf and rip current conditions. Please consult products from your local weather office.

Forecast Discussion Number 42

TROPICAL STORM PHILIPPE FORECAST/ADVISORY NUMBER 42
NWS NATIONAL HURRICANE CENTER MIAMI FL

2100 UTC TUE OCT 03 2023

NOTICE... LAND-BASED TROPICAL CYCLONE WATCHES AND WARNINGS ARE NO LONGER INCLUDED IN THE TROPICAL CYCLONE FORECAST/ADVISORY...(TCM).
CURRENT LAND-BASED COASTAL WATCHES AND WARNINGS CAN BE FOUND IN THE MOST RECENTLY ISSUED TROPICAL CYCLONE PUBLIC ADVISORY...(TCP).

TROPICAL STORM CENTER LOCATED NEAR 19.6N 64.9W AT 03/2100Z POSITION ACCURATE WITHIN 30 NM

PRESENT MOVEMENT TOWARD THE NORTHWEST OR 310 DEGREES AT 10 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 1004 MB
MAX SUSTAINED WINDS 40 KT WITH GUSTS TO 50 KT.
34 KT.....100NE 140SE 0SW 0NW.
12 FT SEAS..210NE 180SE 30SW 60NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 19.6N 64.9W AT 03/2100Z
AT 03/1800Z CENTER WAS LOCATED NEAR 19.3N 64.6W

FORECAST VALID 04/0600Z 20.4N 65.4W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 70NE 100SE 0SW 0NW.

FORECAST VALID 04/1800Z 22.0N 66.1W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 70NE 80SE 0SW 0NW.

FORECAST VALID 05/0600Z 23.8N 66.6W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 70NE 90SE 0SW 0NW.

FORECAST VALID 05/1800Z 26.2N 66.6W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 80NE 120SE 0SW 30NW.

FORECAST VALID 06/0600Z 29.2N 66.0W
MAX WIND 45 KT...GUSTS 55 KT.
34 KT...120NE 140SE 0SW 120NW.

FORECAST VALID 06/1800Z 32.2N 65.7W
MAX WIND 45 KT...GUSTS 55 KT.
34 KT...180NE 150SE 40SW 180NW.

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 125 NM ON DAY 4 AND 175 NM ON DAY 5...AND FOR INTENSITY NEAR 15 KT EACH DAY

OUTLOOK VALID 07/1800Z 38.1N 66.0W...POST-TROP/EXTRATROP
MAX WIND 50 KT...GUSTS 60 KT.

OUTLOOK VALID 08/1800Z 45.8N 66.9W...POST-TROP/EXTRATROP

MAX WIND 45 KT...GUSTS 55 KT.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 19.6N 64.9W

NEXT ADVISORY AT 04/0300Z

FORECASTER BERG

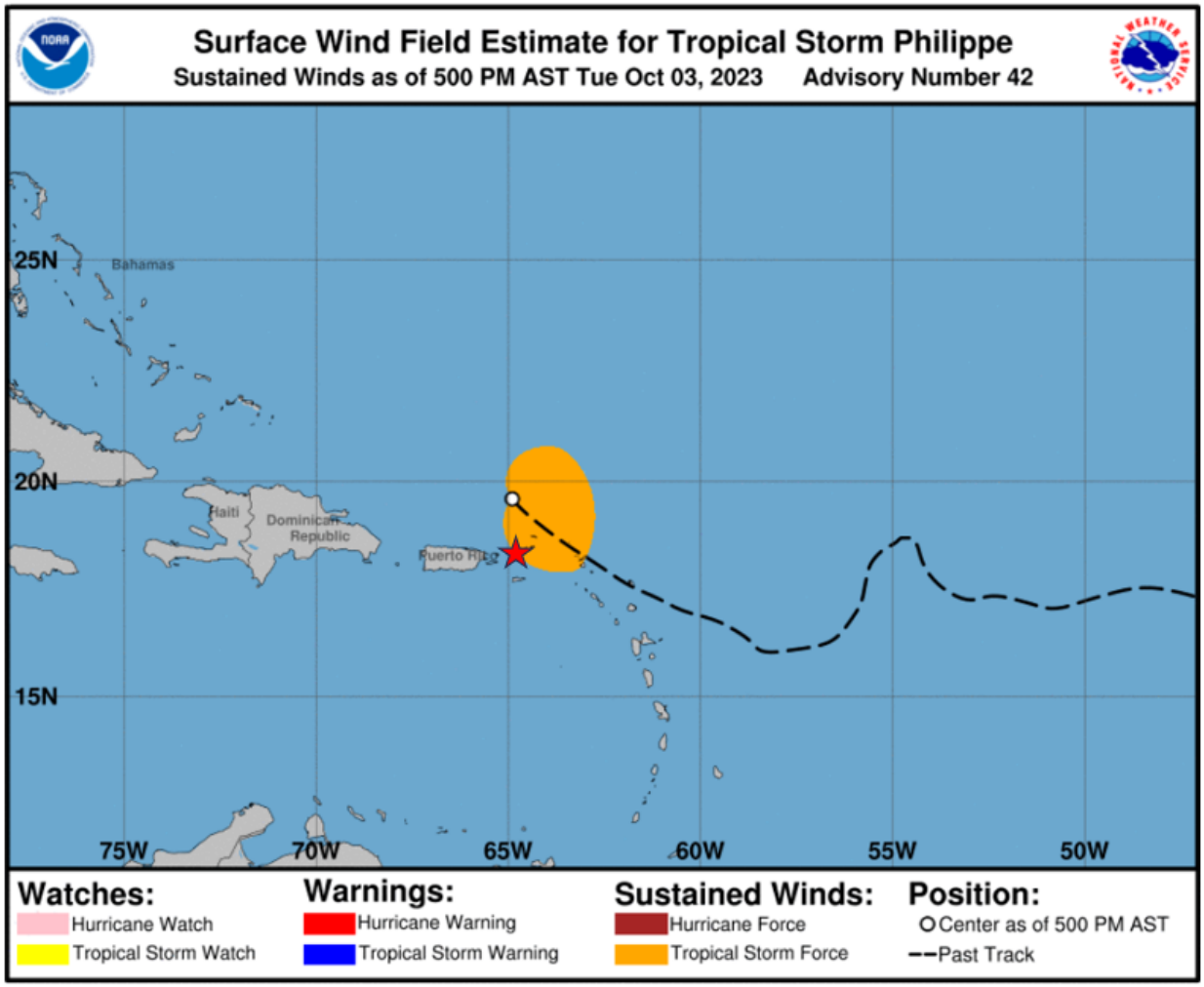

Figure 4 - NWS National Hurricane Center Tropical Storm Philippe Advisory 42 wind field with the extent of tropical force winds in orange, with the approximate accident site marked by a red star.

At 2300 AST on October 3, 2023, the NWS NHC issued advisory 43 which is included as figure 5 followed by the text bulletin and forecast discussion. Figure 6 is the Tropical Storm advisory 43 wind field analysis with the accident site marked by the red star.

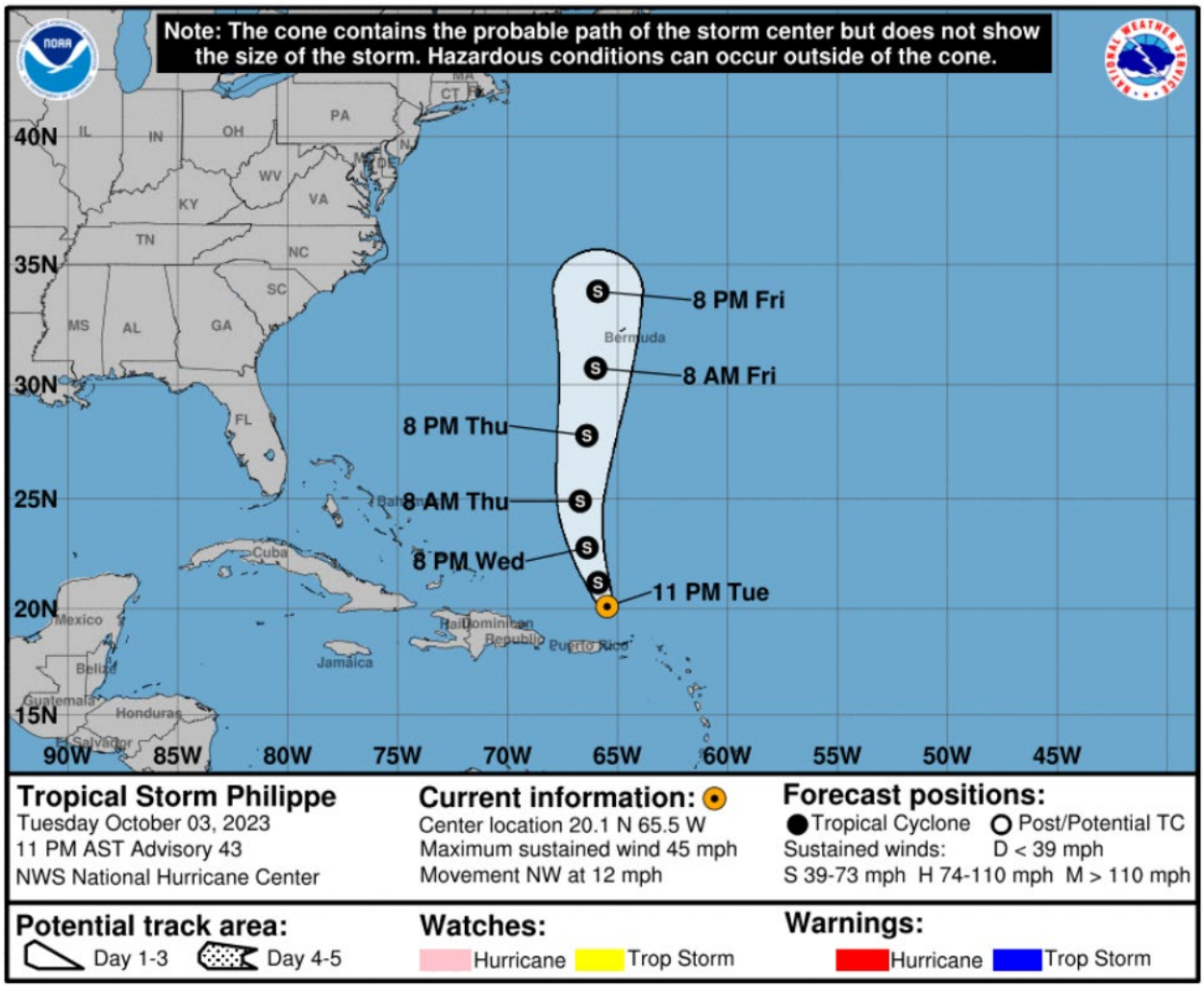

Figure 5 – NWS National Hurricane Center Advisory 43 on Tropical Storm Philippe forecast track issued at 2300 AST with the 3-day track projection.

Tropical Storm Philippe Advisory Number 43

BULLETIN
Tropical Storm Philippe Advisory Number 43
NWS National Hurricane Center Miami FL
1100 PM AST Tue Oct 03 2023

...HEAVY RAINS CONTINUE ACROSS PORTIONS OF THE VIRGIN ISLANDS AND PUERTO RICO...

SUMMARY OF 1100 PM AST...0300 UTC...INFORMATION
LOCATION...20.1N 65.5W
ABOUT 120 MI...195 KM NNW OF ST. THOMAS
ABOUT 845 MI...1355 KM S OF BERMUDA
MAXIMUM SUSTAINED WINDS...45 MPH...75 KM/H
PRESENT MOVEMENT...NW OR 310 DEGREES AT 12 MPH...19 KM/H
MINIMUM CENTRAL PRESSURE...1004 MB...29.65 INCHES

WATCHES AND WARNINGS

There are no coastal watches or warnings in effect.

Interests in Bermuda should monitor the progress of Philippe.

DISCUSSION AND OUTLOOK
At 1100 PM AST (0300 UTC), the center of Tropical Storm Philippe was located near latitude 20.1 North, longitude 65.5 West. Philippe is moving toward the northwest near 12 mph (19 km/h). A turn toward the north-northwest is forecast on Wednesday, followed by a faster motion toward the north on Thursday and Friday. On the forecast track, the center of Philippe will continue to move away from the Virgin Islands. Philippe will then approach Bermuda Thursday night and Friday.

Maximum sustained winds remain near 45 mph (75 km/h) with higher gusts. Little change in strength is forecast during the next few days.

Tropical-storm-force winds extend outward up to 160 miles (260 km) from the center.

The estimated minimum central pressure is 1004 mb (29.65 inches).

HAZARDS AFFECTING LAND
Key messages for Philippe can be found in the Tropical Cyclone Discussion under AWIPS header MIATCDAT2 and WMO header WTNT42 KNHC

RAINFALL: Philippe is forecast to produce the following rainfall amounts through Wednesday:
The United States & British Virgin Islands: 4 to 8 inches with maximum amounts to 12 inches.
Puerto Rico: 2 to 4 inches. This rainfall would result in scattered flash flooding.

WIND: Gusty winds are likely to continue across portions of the Virgin Islands through early Wednesday.

SURF: Swells generated by Philippe will affect portions of the Atlantic coasts of the northern Leeward Islands, the Virgin Islands, and Puerto Rico for another couple of days. Swells are expected to reach Bermuda by late Thursday. These conditions are likely to cause life-threatening surf and rip currents. Please consult products from your local weather office.

NEXT ADVISORY
Next complete advisory at 500 AM AST.

Forecaster Cangialosi

Forecast Discussion Number 43

TROPICAL STORM PHILIPPE FORECAST/ADVISORY NUMBER 43
NWS NATIONAL HURRICANE CENTER MIAMI FL
0300 UTC WED OCT 04 2023

NOTICE... LAND-BASED TROPICAL CYCLONE WATCHES AND WARNINGS ARE NO LONGER INCLUDED IN THE TROPICAL CYCLONE FORECAST/ADVISORY...(TCM).
CURRENT LAND-BASED COASTAL WATCHES AND WARNINGS CAN BE FOUND IN THE MOST RECENTLY ISSUED TROPICAL CYCLONE PUBLIC ADVISORY...(TCP).

TROPICAL STORM CENTER LOCATED NEAR 20.1N 65.5W AT 04/0300Z POSITION ACCURATE WITHIN 30 NM

PRESENT MOVEMENT TOWARD THE NORTHWEST OR 310 DEGREES AT 10 KT

ESTIMATED MINIMUM CENTRAL PRESSURE 1004 MB
MAX SUSTAINED WINDS 40 KT WITH GUSTS TO 50 KT.
34 KT.....100NE 140SE 0SW 0NW.
12 FT SEAS..210NE 180SE 30SW 75NW.
WINDS AND SEAS VARY GREATLY IN EACH QUADRANT. RADII IN NAUTICAL MILES ARE THE LARGEST RADII EXPECTED ANYWHERE IN THAT QUADRANT.

REPEAT...CENTER LOCATED NEAR 20.1N 65.5W AT 04/0300Z
AT 04/0000Z CENTER WAS LOCATED NEAR 19.9N 65.2W

FORECAST VALID 04/1200Z 21.2N 65.9W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 70NE 100SE 0SW 0NW.

FORECAST VALID 05/0000Z 22.8N 66.4W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 70NE 80SE 0SW 0NW.

FORECAST VALID 05/1200Z 24.9N 66.7W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 70NE 90SE 0SW 0NW.

FORECAST VALID 06/0000Z 27.8N 66.4W
MAX WIND 40 KT...GUSTS 50 KT.
34 KT... 80NE 120SE 0SW 30NW.

FORECAST VALID 06/1200Z 30.7N 66.0W
MAX WIND 45 KT...GUSTS 55 KT.
34 KT...120NE 140SE 0SW 120NW.

FORECAST VALID 07/0000Z 33.9N 65.9W
MAX WIND 50 KT...GUSTS 60 KT.
50 KT... 50NE 30SE 0SW 0NW.
34 KT...180NE 150SE 40SW 180NW.

EXTENDED OUTLOOK. NOTE...ERRORS FOR TRACK HAVE AVERAGED NEAR 125 NM ON DAY 4 AND 175 NM ON DAY 5...AND FOR INTENSITY NEAR 15 KT EACH DAY

OUTLOOK VALID 08/0000Z 40.5N 66.1W...POST-TROP/EXTRATROP
MAX WIND 50 KT...GUSTS 60 KT.

OUTLOOK VALID 09/0000Z 49.0N 69.2W...POST-TROP/EXTRATROP
MAX WIND 45 KT...GUSTS 55 KT.

REQUEST FOR 3 HOURLY SHIP REPORTS WITHIN 300 MILES OF 20.1N 65.5W

NEXT ADVISORY AT 04/0900Z

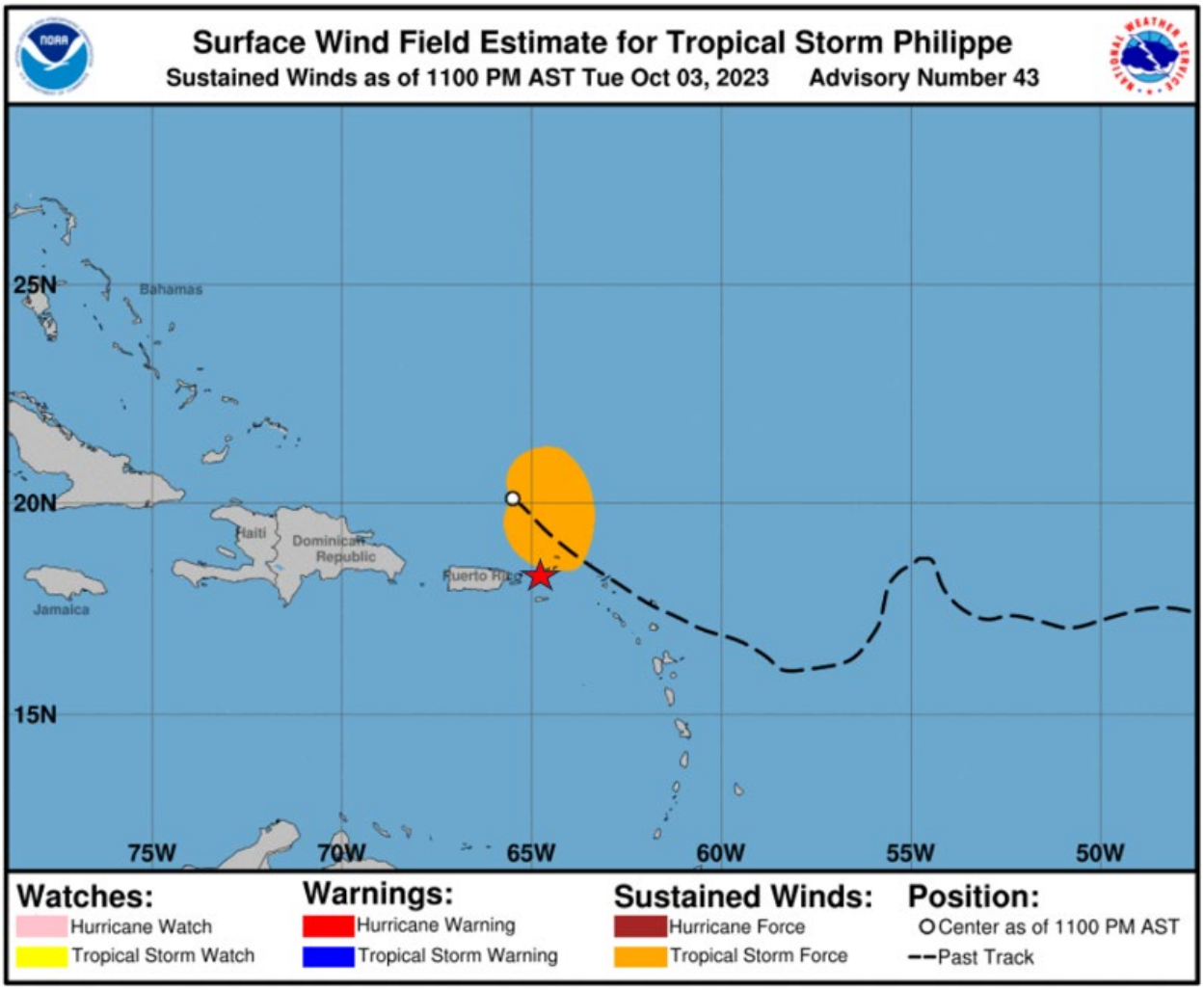

Figure 6 - Tropical Storm Philippe Advisory 43 wind field with the approximate accident site marked by the red star.

2.0 Observations

The closest weather reporting station were documented using official Aviation Routine Weather Reports (METAR[9]) and Aviation Selected Special Weather Reports (SPECI), and NOAA buoys in the immediate vicinity. Cloud heights are reported above ground level (agl) in the following section.

[9] METAR is an abbreviation of METeorological Aerodrome Report.

2.1 Charlotte Amalie, USVI

Cyril E. King Airport (TIST), Charlotte Amalie, USVI, about ½ mile north of the grounding at an elevation of 24 ft. The airport had a federally installed and maintained Automated Surface Observation System (ASOS) which was augmented by certified weather observers during the hours between 0600 to 2200 AST daily. At the approximate time the vessel attempted to dock and at the time of the grounding the following conditions were reported. Data is the decoded or plain language data from the official observations and specials issued during the period.

Attempted Docking in Harbor

TIST weather at 2329 AST October 3, 2023, automated, wind from 170° at 20 knots gusting to 27 knots, visibility 1 mile in thunderstorm and heavy rain and mist, broken clouds at 800 ft agl, overcast clouds at 1,500 ft, temperature 79°F (26°C), dew point temperature 79°F (26°C), altimeter 29.78 inches of mercury (inHg). Remarks: automated station with a precipitation discriminator, peak wind from 190° at 27 knots occurred at 2325 AST, lightning distant all quadrants, thunderstorm began at 2258 AST, temperature 26.1°C, dew point 26.1°C, precipitation sensor inoperative, maintenance indicator on.

Grounding

TIST 5-minuted weather observation at 0330 AST, automated, wind from 210° at 13 knots, visibility 9 miles in light rain, a few clouds at 1,600 ft agl, broken clouds at 6,000 ft, overcast at 11,000 ft, temperature 82°F (28°C), dew point temperature 80°F (27°C), altimeter 29.73 inHg, relative humidity 94%. Remarks: automated station with a precipitation discriminator, lightning distance south, temperature 27.8° C, dew point 26.7°C, precipitation sensor inoperative, maintenance indicator on.

A table of the hourly weather conditions[10] for TIST with time referenced to UTC surrounding the period is included below. The table does not include SPECIs that were issued surrounding the period. Only the lowest two significant cloud layers are reflected. The weather abbreviation includes the intensity (light (-), moderate ( ), and heavy (+)), followed by the obscuration cause or weather, such as rain (RA), thunderstorm (TS), and mist (BR).

STN TIME PMSL ALTM T Td RH DIR SPD GUS PEAK VIS CLOUDS Weather MIN MAX P01 PCP

[10] Obtained from the University of Wyoming archive website; http://weather.uwyo.edu/surface/meteorogram/usse.shtml

DD/HHMM (hPa)	inHg	°F	°F	%	deg	kt	kt	deg	kt	sm	ft agl		°F	°F	in	in
TIST 04/1853 1009.0	29.8	86	82	88	180	12				10.0	SCT016 BKN060					
TIST 04/1753 1009.6	29.8	85	83	94	190	12				10.0	FEW017	-RA	79	85		
TIST 04/1653 1010.3	29.8	85	80	85	200	14				10.0	FEW024 BKN100	-RA				
TIST 04/1553 1010.8	29.8	83	81	94	180	15				10.0	FEW016 OVC100	-RA				
TIST 04/1453 1010.7	29.8	83	78	85	190	16				10.0	SCT060					
TIST 04/1353 1011.8	29.9	79	78	97	220	18	G28	22029		6.0	SCT030 OVC100	-RA BR				
TIST 04/1253 1011.2	29.9	82	80	94	180	17		20026		5.0	OVC030	RA BR				
TIST 04/1153 1009.4	29.8	80	79	97	210	20	G28	22032		6.0	OVC110	-RA BR	79	84		
TIST 04/1053 1008.8	29.8	81	79	94	210	23	G30	22032		6.0	FEW020 OVC055	-RA BR				
TIST 04/0953 1008.0	29.8	82	81	97	210	24	G30	21030		6.0	BKN030 OVC055	RA BR				
TIST 04/0940	29.8	81	79	94	200	22	G27	22028		7.0	BKN026 OVC070	RA				
TIST 04/0920	29.7	81	79	94	210	19		22028		7.0	BKN037 OVC110	RA				
TIST 04/0853 1006.8	29.7	84	83	97	200	14				8.0	BKN020 OVC065	-RA				
TIST 04/0810	29.7	83	81	94	200	15				6.0	BKN020 OVC070	RA BR				
TIST 04/0753 1007.1	29.7	81	80	97	200	14				6.0	BKN055 OVC085	RA BR				
Grounding 0728Z																
TIST 04/0653 1006.9	29.7	82	81	97	220	11				10.0	BKN043 OVC075	-RA				
TIST 04/0631	29.7	80	78	94	230	12				10.0	BKN026 OVC036					
TIST 04/0614	29.7	79	79	100	230	12				8.0	BKN024 OVC039	RA				
TIST 04/0548	29.7	79	79	100	230	14				8.0	BKN021 OVC110	-RA				
TIST 04/0453 1006.6	29.7	77	77	100	270	23	G37	28037		4.0	BKN080 OVC120	TSRA BR				
TIST 04/0438	29.8	82	82	100	220	18				7.0	SCT049 BKN090	-TSRA				
TIST 04/0408	29.8	81	81	100	160	8				7.0	BKN013 OVC049	TSRA				
TIST 04/0345	29.8	81	81	100	170	18				3.0	FEW005 OVC012	TSRA BR				
TIST 04/0329	29.8	79	79	100	170	20	G27	19027		1.0	BKN008 OVC015	+RSRA BR				
TIST 04/0309	29.8	81	81	100	180	22	G27			2.5	BKN013 OVC025	+RSRABR				
TIST 04/0304	29.8	80	80	100	180	20	G25	17026		3.0	BKN015 OVC020	+RSRA BR				
TIST 04/0229	29.8	81	81	100	180	18	G26	18027		4.0	BKN014 OVC019					
TIST 04/0210	29.8	81	81	100	180	17				5.0	BKN017 OVC048	+RSRA BR				
TIST 04/0153 1007.9	29.8	82	82	100	200	17		20032		7.0	FEW019 OVC049	-TSRA			0.07	
TIST 04/0135	29.8	81	81	100	200	17	G26	20032		9.0	BKN020 OVC045				0.06	
TIST 03/2353 1006.2	29.7	82	80	94	240	13				10.0	BKN037	RA	81	89	0.00	0.04
Attempts docking Charlotte Amilie Harbor																
TIST 03/2253 1006.0	29.7	81	81	100	230	16				9.0	BKN022 OVC028	-RA			0.01	
TIST 03/2153 1005.9	29.7	81	81	100	220	20		21029		10.0	SCT011 BKN020	RA			0.00	
TIST 03/2253 1006.0	29.7	81	81	100	230	16				9.0	BKN022 OVC028	-RA			0.01	
TIST 03/2153 1005.9	29.7	81	81	100	220	20		21029		10.0	SCT011 BKN020	RA			0.00	
TIST 03/2053 1005.6	29.7	82	82	100	210	18				7.0	SCT011 BKN020	RA			0.03	0.03
TIST 03/2037	29.7	84	81	91	230	14				10.0	BKN017 BKN030					
Departs St. Croix																
TIST 03/1953 1005.0	29.7	86	80	83	260	9				10.0	SCT027					
TIST 03/1853 1004.8	29.7	88	81	80	280	10				10.0	SCT036					
TIST 03/1753 1005.5	29.7	89	81	77	260	10				10.0	CLR		84	90	0.01	
TIST 03/1653 1006.1	29.7	90	81	75	310	6				10.0	FEW037					
TIST 03/1553 1006.2	29.7	89	81	77	310	10				10.0	SCT026 BKN080					
TIST 03/1453 1006.8	29.7	87	81	82	350	7				10.0	SCT028 BKN080				0.01	
TIST 03/1353 1006.7	29.7	85	82	91	350	11				10.0	FEW020				0.00	
TIST 03/1328	29.7	87	82	85	350	8	G17			10.0	FEW020					
TIST 03/1253 1006.6	29.7	85	81	88	360	10	G18			10.0	SCT030 BKN055				0.01	
TIST 03/1153 1005.6	29.7	85	81	88	350	11	G 19			10.0	FEW020 SCT026		83	85	0.03	0.09

The total rainfall from Tropical Storm Philippe over St. Thomas ranged from 1.5 to 5.0 inches of rain, with the heaviest rains of 8 to 10 inches observed over St. John's to the east.

2.2 Charlotte Amilie Harbor

The Charlotte Amilie Harbor (CHAV2 #9751639) weather station located at latitude 18.335°N and longitude 64.92°W or approximately 3.5 miles east of the

grounding location was also documented. A 24-hour plot of the winds and tide information are included as figures 7 and 8 respectively. The first bar near the time of departure from St. Croix indicated winds from the south-southwest at 8 knots gusting to 12 knots. As the ship approached St. Thomas the period of strongest winds were noted immediately around the time of the attempted docking with winds from the south at 27 knots gusting to 31 knots. The winds began to subside while the *Bonnie G* was anchored and began to drift with winds from the south-southwest at 20 knots with gusts to 22 knots. The tide at Charlotte Amalie Harbor was near the low tide period, but due to the southerly winds and shape of the harbor, the tide ranged from 0.86 to 0.5 ft above the mean low water level during the period of docketing and anchorage.

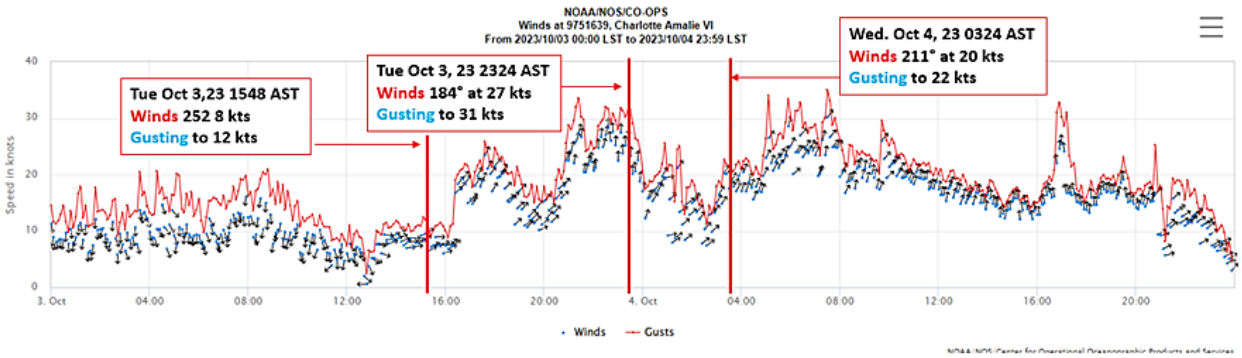

Figure 7 - Charlotte Amalie Harbor plot of winds with the approximate time of departure, docking, and the grounding noted by the red bars.

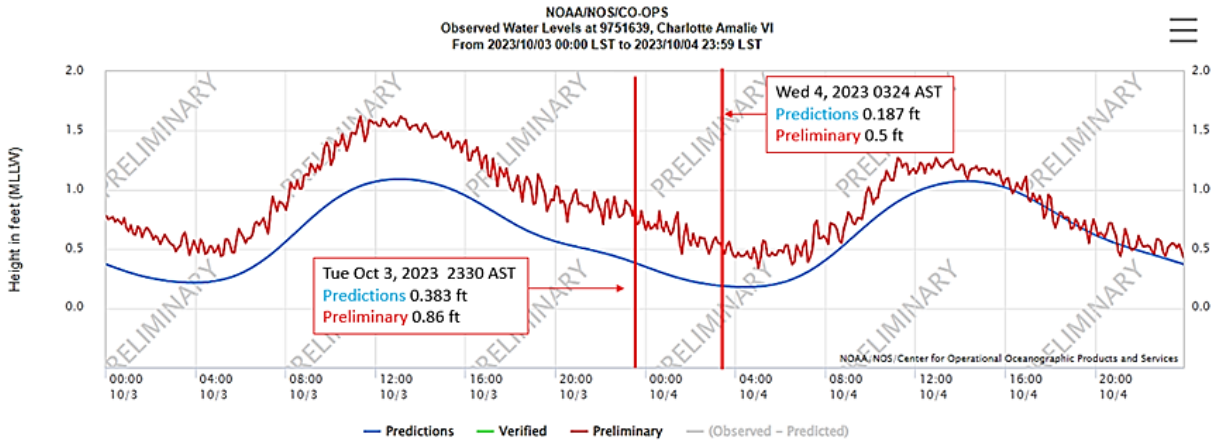

Figure 8 - Charlotte Amalie Harbor Tidal information for the 24-hour period.

A table of the meteorological data from the Charlotte Amalie Harbor station every 30 minutes from the time of departure to the grounding with time converted to local was as follows.

Time (AST)	*WDIR*	*WSPD (kts)*	*GST (kts)*	*PRES (hPa)*	*PTDY (hPa)*	*ATMP (°C)*
0500 Oct 4	*210*	*21*	*25*	*1005.5*	*-0.7*	*28.4*
0430	*200*	*16*	*19*	*1005.9*		*28.6*

0400	200	16	19	1006.1	-0.0	28.1
0330	**220**	**17**	**19**	**1006.0**		**27.8**
0300	210	14	17	1005.7	-2.0	27.6
0230	220	10	12	1006.3		27.3
0200	220	14	17	1006.2	-1.2	26.3
0130	240	12	23	1006.4		25.6
0100	260	8	19	1006.1	-1.3	25.5
0030	220	16	19	1006.8		27.7
0000 OCT 4	190	16	19	1007.7	+1.6	27.5
2330	180	21	31	1007.3		26.4
2300	180	21	27	1007.4	+1.6	26.6
2230	190	25	31	1007.2		27.3
2200	190	19	23	1007.4	+2.4	26.8
2130	190	25	29	1006.4		26.6
2100	190	21	27	1006.1	+0.7	27.5
2030	220	16	17	1006.0		28.3
2000	230	14	17	1005.8	+0.8	27.8
1930	220	12	17	1005.7		27.7
1900	220	16	19	1005.0	+0.4	27.0
1830	230	14	19	1005.3		27.0
1800	220	21	23	1005.4	+1.0	27.6
1730	200	17	19	1004.9		27.7
1700	230	16	19	1005.0	-0.0	27.7
1630	220	17	19	1004.5		28.1
1600	250	6	10	1004.6	-0.7	30.0
1530	270	6	10	1004.4		30.2
1500	240	8	10	1004.4	-1.1	30.4
1430	270	8	10	1004.4		30.8
1400 OCT 3	250	10	12	1004.8		31.0

2.3 South of St. Johns Buoy

The South of St Johns Buoy, station number 41052, moored buoy located at latitude 18.249 N and longitude 64.763 W was located about 15 miles east-southeast of the grounding location in the Caribbean Sea. The hourly buoy reported the following conditions. At the time of the accident the buoy reported a wind from 200° at 17 knots gusting to 21 knots, significant wave heights of 5.6 to 5.9 ft, with a period of 8 seconds. The mean wave direction was from 162° to 167°. The water temperature was 86°F (30.1°C).

Time (AST)	WDIR	WSPD (kts)	GST (kts)	WVHT (ft)	DPD (sec)	MWD	PRES (hPa)	PTDY (hPa)	ATMP (°C)	WTMP (°C)
0500	190	23	27	6.6	8	168	1005.2	-1.0	29.4	30.1
0430	190	16	25				1005.5		29.3	
0400	200	17	21	5.9	8	162	1005.8	-0.0	29.4	30.1
0330	200	17	21				1005.4		29.0	
0300	200	21	29	5.6	7	167	1005.1	-1.4	29.0	30.1
0230	170	19	23				1005.9		27.9	

0200	230	17	21	5.9	8	169	1006.2	-1.4	27.8	30.1
0100	200	17	21	6.2	8	163	1005.7	-1.6	29.0	30.2
0000	210	17	23	5.9	8	172	1006.5	+0.0	28.8	30.2
2300	220	23	27	6.2	5	167	1007.6	+2.2	28.0	30.1
2200	190	21	27	6.6	5	172	1007.3	+1.7	27.8	30.2
2100	200	19	23	4.9	9	165	1006.4	+1.4	29.7	30.2
2000	220	16	19	4.2	8	182	1005.4	+0.8	29.3	30.2
1900	240	19	25	4.2	8	176	1004.6	+0.4	29.0	30.2
1800	220	19	23	4.2	7	150	1005.0	+1.1	29.3	30.2
1700	230	16	21	3.9	9	123	1004.6	-0.0	29.6	30.3
1600	220	12	14	3.6	8	97	1004.2	-0.7	30.8	30.5
1500	250	12	16	2.9	8	93	1003.9	-1.2	32.2	30.6
1400	240	4	6	2.9	7	90	1004.4	-1.2	30.8	30.5

2.4 Christiansted Harbor Buoy, St. Croix

The Christiansted Harbor buoy station CHSV3, or number 9751364, located at latitude 17.748 N and longitude 64.699 W, or about 44 miles south of the grounding was also documented in the table below.

Time (AST)	WDIR	WSPD (kts)	GST (kts)	PRES (hPa)	PTDY (hPa)	ATMP (°C)
0500	170	8	17	1007.1	-0.0	30.0
0430	180	12	21	1006.8		30.0
0400	170	12	19	1006.5	+0.0	30.0
0330	170	12	19	1006.1		30.1
0300	150	6	19	1006.5	-0.9	30.1
0230	180	12	27	1006.8		30.1
0200	170	12	19	1007.1	-1.4	30.1
0130	170	8	14	1007.1		30.2
0100	160	14	19	1006.7	-2.4	30.2
0030	160	16	19	1006.8		30.1
0000	170	12	17	1007.4	+0.7	30.2
2300	190	17	23	1008.5	+2.2	30.1
2200	220	12	25	1009.1	+3.2	30.4
2100	140	8	16	1006.7	+1.0	30.5
2000	150	10	17	1006.3	+1.5	30.5
1900	190	10	17	1005.9	+1.0	30.5
1800	190	8	17	1005.7	+1.1	30.5
1700	170	10	19	1004.8	-0.4	30.6
1600	180	16	21	1004.9	-0.6	30.6
1500	210	10	14	1004.6	-1.4	30.6
1400	250	4	8	1005.2		30.5

3.0 Satellite Imagery

NOAA Geostationary Operational Environmental Satellite number 16 (GOES-16) infrared imagery were obtained from an archive at the Space Science Engineering

Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared band 13 at a wavelength of 10.3 microns (μm) provided a resolution of 2 kilometers (km) with radiative cloud top temperatures. At the time of the grounding the higher resolution visible imagery was not available.

Figure 9 is the GOES-16 infrared image for 0326 AST at 4X magnification with a standard MB temperature enhancement curve applied to highlight the higher and colder cloud tops typically associated with deep convection. The image depicted an extensive area of clouds associated with Tropical Storm Philippe over the area at the time of the grounding. The radiative cloud top temperature over the grounding was 195 kelvin or -78°C, which corresponded to cloud tops near 53,000 ft. Attachment 1 is an animation of the GOES-16 infrared image from about 2251 through 0800 AST over the Caribbean with geostationary lightning mapper (GLM) ground energy density lightning data overlaid. The imagery depicts the enhanced cloud cover associated with Tropical Storm Philippe slowly moving northwesterly during the period.

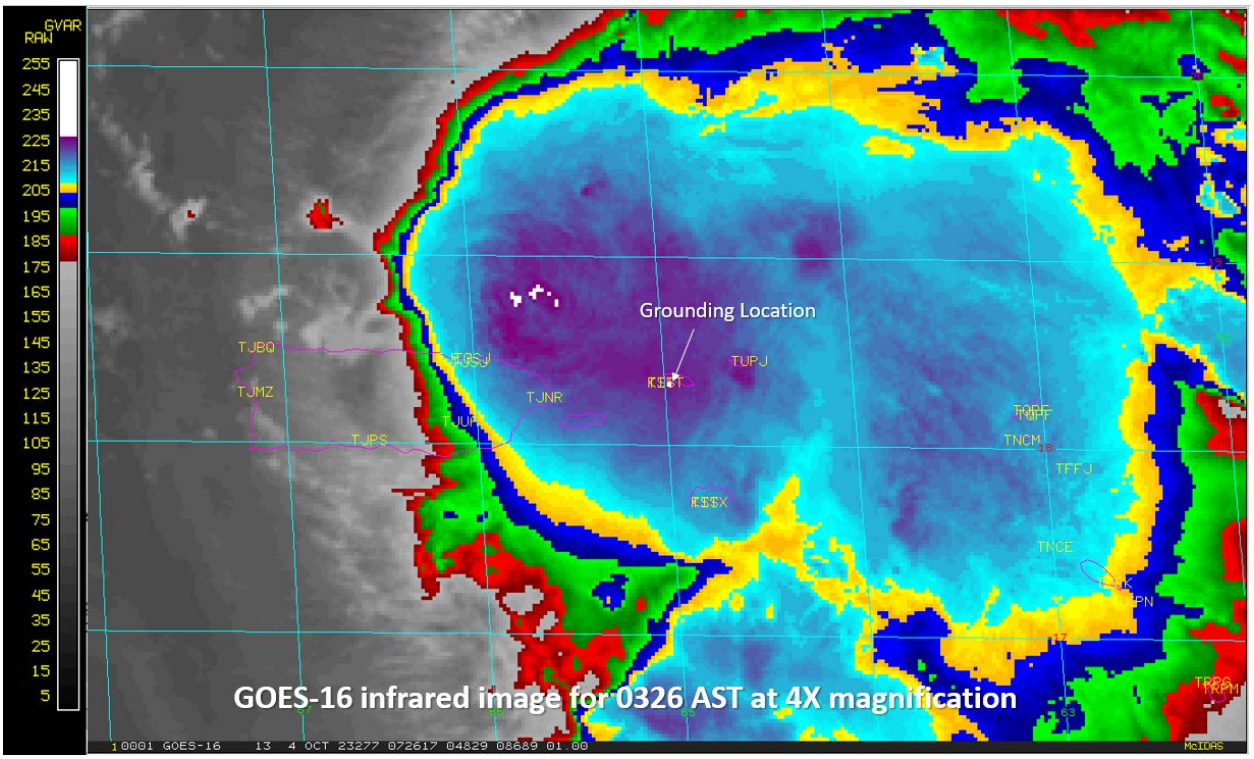

Figure 9 - GOES-16 infrared image for 0326 AST at 4X magnification with a standard MB enhancement curve. The arrow points to the approximate location of the grounding.

4.0 Weather Radar Imagery

A depiction of the NWS San Juan (TJUA) Weather Surveillance Radar 1988 Doppler (WSR-88D)[11] lowest elevation scan base reflectivity image over the surface observations and satellite imagery over the area are included below from the NWS AWC website.

Reflectivity is the measure of the efficiency of a target in intercepting and returning radio energy. With hydrometeors, it is a function of the drop size distribution, number of particles per unit volume, physical state (ice or water), shape, and aspect. Reflectivity is normally displayed in decibels (dBZ)[12] and is a general measure of echo intensity. The following table provides the general radar reflectivity and weather radar intensity levels used to describe the NWS radar imagery.

Reflectivity (dBZ) Ranges	Weather Radar Echo Intensity Terminology
< 30 dBZ	Light
30-40 dBZ	Moderate
>40-50 dBZ	Heavy
>50 dBZ	Extreme

The image for 1545 AST on October 3, 2023, representing the general time of departure from St. Croix to St. Thomas is included as figure 10 with the red dashed line depicting the general ferry ship route between St. Croix and St. Thomas. The image at 2330 AST as the ship arrived in St. Thomas and attempted to dock as figure 11, and figure 12 as the Bonnie G set anchor to wait out the weather for 0030 AST on October 4th. Figure 13 is the image for 0330 AST on October 4, 2023 as the ship ran aground.

The images show an area of convection initially west of the ship's route between the islands, with no precipitation echoes over St. Thomas and westerly winds at 10 knots at reported at TIST (figure 10). During the 7 hour trip the precipitation grows in coverage and extends over the entire route, and by 2330 AST intense to extreme intensity echoes extend of the Charlotte Amalie Harbor and TIST with winds from the south at 20 knots. Precipitation echoes continue over the area through the time of anchoring and the grounding with TIST reporting sustained southerly winds of 10 knots.

[11] The WSR-88D is a S-band 10-centimeter wavelength radar with a power output of 750,000 watts, with a 28-foot parabolic antenna concentrating the energy into a 0.95° beam width.
[12] dBZ - Nondimensional "unit" of radar reflectivity which represents a logarithmic power ratio (in decibels, or dB) with respect to radar reflectivity factor, Z.

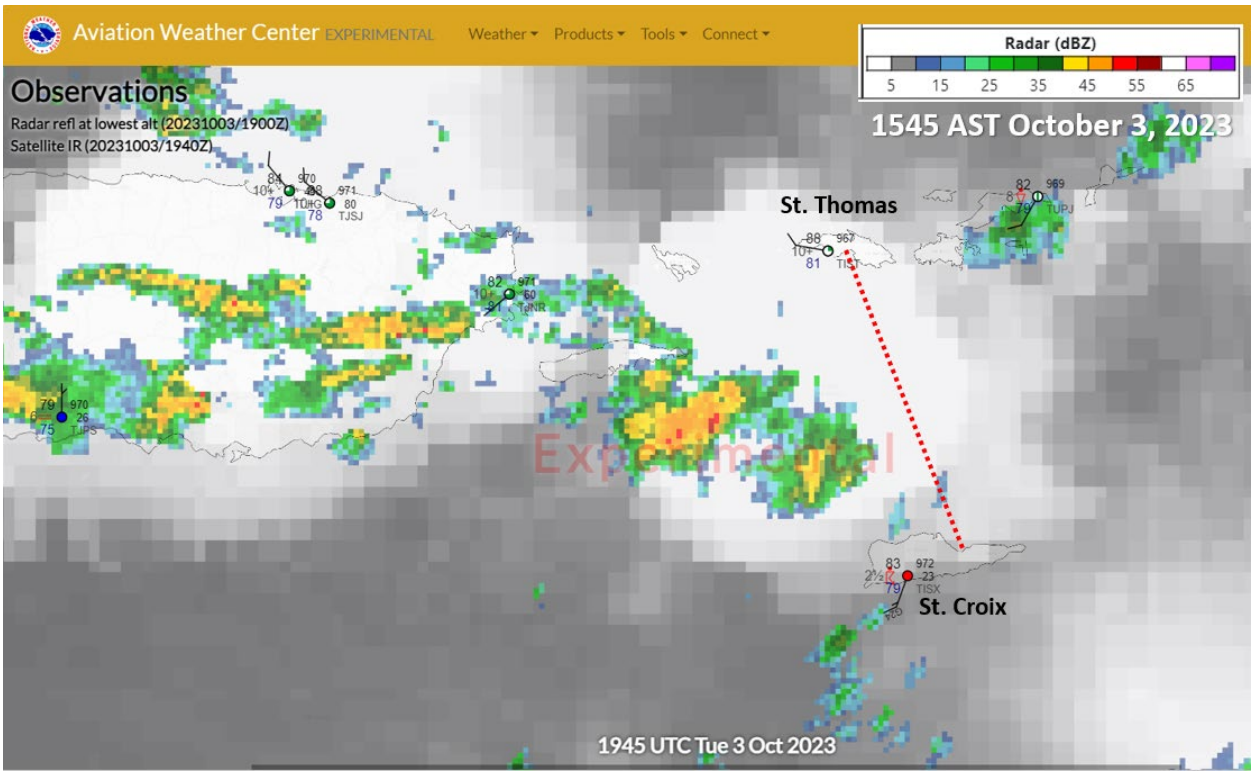

Figure 10 - TJUA WSR-88D base reflectivity image and observations at 1545 AST prior to departure.

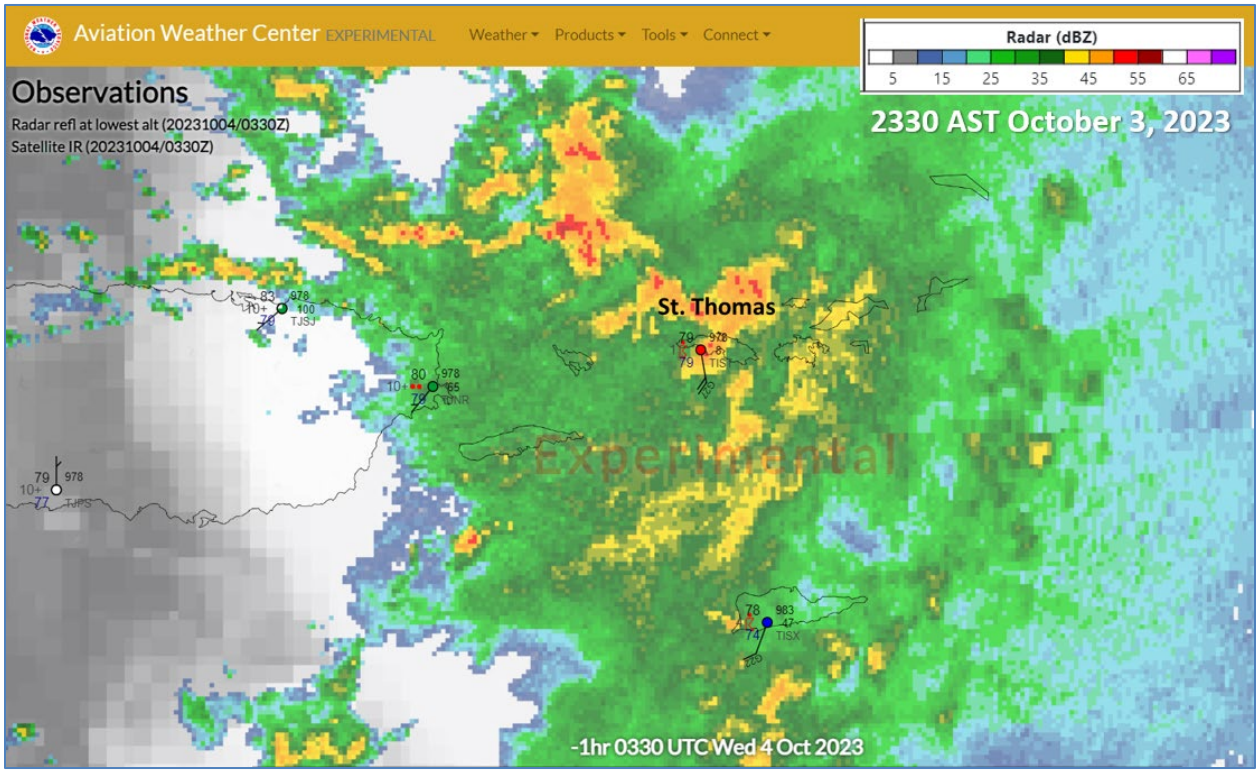

Figure 11 - TJUA WSR-88D base reflectivity image and observations for 2330 AST during attempted docking of the *OSV Bonnie G in Charlotte Amalie*.

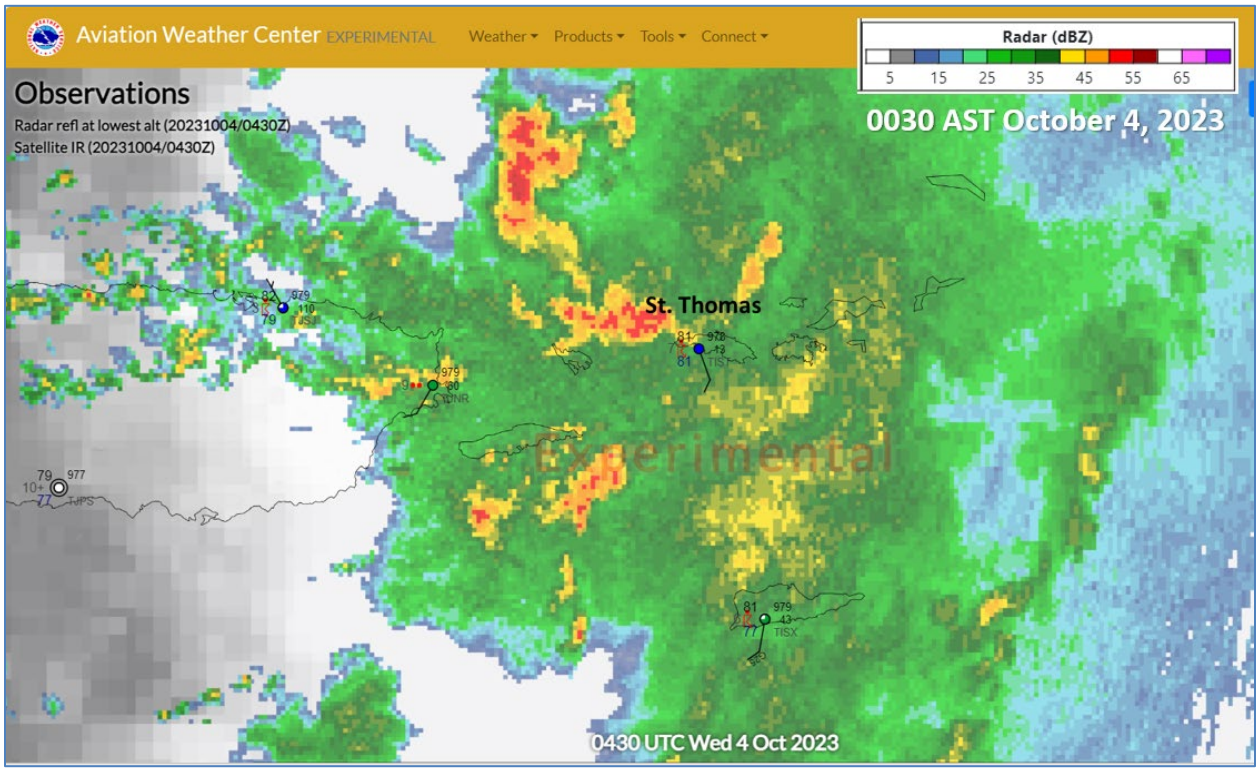

Figure 12 - TJUA WSR-88D base reflectivity image and observations at 0030 AST setting anchor.

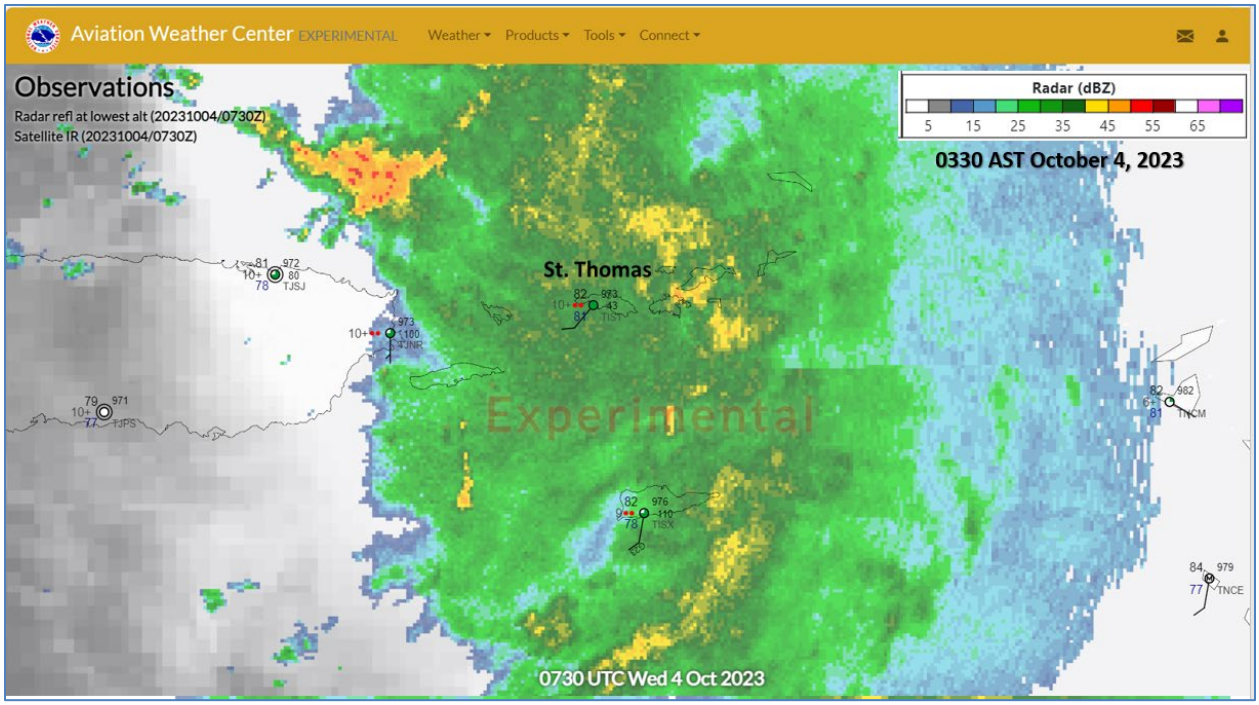

Figure 13 - TJUA WSR-88D base reflectivity image and observations for 0330 AST at the time of the grounding of *OSV Bonnie G*.

5.0 NWS Coastal Waters Forecast

The NWS Coastal Waters Forecast issued by the San Juan Weather Forecast Office (WFO) issued at 0940 AST on October 3, 2023, and current at the time of departure from St. Croix was as follows:

FZCA52 TJSJ 031340
CWFSJU

Coastal Waters Forecast
National Weather Service San Juan PR
940 AM AST Tue Oct 3 2023

Puerto Rico and the U.S. Virgin Islands Waters

Seas are provided as a range of the average height of the highest 1/3 of the Seas...Along with the occasional height of the average highest 10 percent of the Seas.

AMZ700-040215-
940 AM AST Tue Oct 3 2023

.SYNOPSIS FOR PUERTO RICO AND THE U.S. VIRGIN ISLANDS WATERS...
A weak surface high pressure ridge extending into the southwestern Atlantic and Tropical Storm Philippe located about 40 miles northwest of Anguilla and about 55 miles east of Anegada British Virgin Islands, will promote a north to northwesterly winds today. Winds are forecast to become light and southerly by Wednesday. A northeasterly swell generated by Philippe will continue to affect the Atlantic waters and Anegada Passage, resulting in hazardous seas through at least Wednesday. The outer rainbands from distant Philippe will continue to affect the local waters and passages bringing periods of showers and isolated thunderstorms with squally conditions possible across the regional waters.

AMZ711-040215-
Atlantic Waters of Puerto Rico and USVI from 10 NM to 19.5N-
940 AM AST Tue Oct 3 2023

...SMALL CRAFT ADVISORY IN EFFECT THROUGH WEDNESDAY AFTERNOON...

.REST OF TODAY...*North winds 5 to 10 knots. Seas 5 to 7 feet with occasional seas up to 9 feet. Dominant period 11 seconds. Numerous showers. Isolated thunderstorms this afternoon.*

.TONIGHT*...Northwest winds 10 to 15 knots, becoming west with gusts up to 25 knots after midnight. Seas 5 to 7 feet with occasional seas up to 9 feet. Dominant period 11 seconds. Numerous showers with isolated thunderstorms.*

*.**WEDNESDAY****...West winds 10 to 15 knots with gusts up to 25 knots. Seas 5 to 7 feet with occasional seas up to 9 feet. Dominant period 10 seconds. Numerous showers and scattered thunderstorms.*

.WEDNESDAY NIGHT...South winds 10 to 15 knots with gusts up to 25 knots. Seas 4 to 6 feet with occasional seas up to 8 feet. Dominant period 10 seconds. Scattered showers with isolated thunderstorms.

.THURSDAY...South winds 10 to 15 knots, becoming southeast. Seas 3 to 5 feet with occasional seas up to 6 feet. Dominant period 10 seconds. Scattered showers with isolated thunderstorms.

.FRIDAY...Southeast winds 5 to 10 knots. Seas 2 to 4 feet with occasional seas around 5 feet. Dominant period 10 seconds, subsiding to 8 seconds. Scattered showers with isolated thunderstorms.

.SATURDAY...Southeast winds 5 to 10 knots. Seas 3 to 5 feet with occasional seas up to 6 feet. Dominant period 11 seconds. Scattered showers.

The forecast was updated at 1714 AST after the vessel had departed and was enroute to St. Thomas. The forecast was as follows.

FZCA52 TJSJ 032114
CWFSJU

Coastal Waters Forecast
National Weather Service San Juan PR
514 PM AST Tue Oct 3 2023

Puerto Rico and the U.S. Virgin Islands Waters

Seas are provided as a range of the average height of the highest 1/3 of the Seas...Along with the occasional height of the average highest 10 percent of the Seas.

AMZ700-041015-
514 PM AST Tue Oct 3 2023

.SYNOPSIS FOR PUERTO RICO AND THE U.S. VIRGIN ISLANDS WATERS...
A weak surface high pressure ridge extending into the southwestern Atlantic and ***Tropical Storm Philippe, whose exposed center of circulation was located about 115 miles ENE of San Juan and about 48 miles NE of St. John.*** *This system is promoting north to northwesterly winds, becoming more westerly to southwesterly tonight into tomorrow. Winds are forecast to become more southerly by tomorrow. A northeasterly swell generated by Philippe will continue to affect the Atlantic waters and Anegada Passage, resulting in hazardous seas through at least Wednesday. The outer rainbands from distant Philippe will continue to affect the local waters and passages bringing periods of showers and isolated thunderstorms with squally conditions possible across the regional waters.*

AMZ711-041015-
Atlantic Waters of Puerto Rico and USVI from 10 NM to 19.5N-
514 PM AST Tue Oct 3 2023

...SMALL CRAFT ADVISORY IN EFFECT THROUGH WEDNESDAY EVENING...

.TONIGHT...*Northwest winds 10 to 15 knots with gusts up to 25 knots. Seas 5 to 7 feet with occasional seas up to 9 feet. Dominant period 11 seconds. Numerous showers with isolated thunderstorms.*

.WEDNESDAY...*Southwest winds 20 to 25 knots. Gusts up to 35 knots. Seas 5 to 7 feet with occasional seas up to 9 feet. Dominant period 10 seconds. Numerous showers with isolated thunderstorms.*

.WEDNESDAY NIGHT...Southwest winds 20 to 25 knots, becoming south after midnight. Gusts up to 35 knots. Seas 4 to 6 feet with occasional seas up to 8 feet. Dominant period 10 seconds. Numerous showers with isolated thunderstorms.

.THURSDAY...South winds 10 to 15 knots. Gusts up to 25 knots in the morning. Seas 4 to 6 feet with occasional seas up to 8 feet. Dominant period 10 seconds. Scattered showers with isolated thunderstorms.

.THURSDAY NIGHT...South winds 15 to 20 knots with gusts up to 25 knots. Seas 3 to 5 feet with occasional seas up to 6 feet. Dominant period 10 seconds. Scattered showers with isolated thunderstorms.

.FRIDAY...Southeast winds 5 to 10 knots. Seas 2 to 4 feet with occasional seas around 5 feet. Dominant period 10 seconds, subsiding to 8 seconds. Scattered showers with isolated thunderstorms.

.SATURDAY...Southeast winds 5 to 10 knots. Seas 2 to 4 feet with occasional seas around 5 feet. Dominant period 8 seconds. Scattered showers.

.SUNDAY...Southeast winds 5 to 10 knots. Seas 2 to 4 feet with occasional seas around 5 feet. Dominant period 11 seconds. Scattered showers. Isolated thunderstorms through the night.

6.0 NWS Marine Weather Warnings

The NWS TJUA Weather Forecast office (WFO) issued a series of Marine Weather Statements beginning at 2312 AST on October 2, 2023 and continued through the time of the ground. The advisory issued at 2209 AST on October 3, 2023, and current at the time of *OSV Bonnie G's* grounding was as follows.

WHCA72 TJSJ 040209
MWWSJU

URGENT - MARINE WEATHER MESSAGE
National Weather Service San Juan PR
1009 PM AST Tue Oct 3 2023

AMZ711-723-040445-
/O.CON.TJSJ.SC.Y.0037.000000T0000Z-231004T1800Z/
Atlantic Waters of Puerto Rico and USVI from 10 NM to 19.5N-Anegada Passage east of Virgin Gorda and Saint Croix south to 17N-
1009 PM AST Tue Oct 3 2023

...SMALL CRAFT ADVISORY REMAINS IN EFFECT UNTIL 8 PM AST WEDNESDAY...

** WHAT...Seas between 5 to 8 feet with occasional seas up to 10 feet.*
** WHERE...Offshore Atlantic Waters of Puerto Rico and USVI.*
** WHEN...Until 2 PM AST Wednesday.*

** IMPACTS...Dangerous conditions for small craft.*

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A Small Craft Advisory means that wave heights of 7 feet or higher and/or wind speeds of 21 to 33 knots are expected to produce hazardous wave conditions to small craft. Inexperienced mariners, especially those operating smaller vessels should avoid navigating in these conditions.

In addition, the NWS TJUA WFO also issued several Marine Weather Statements during the period. The Advisory current at the time of the grounding was as follows.

FZCA72 TJSJ 040609
MWSSJU

Marine Weather Statement
National Weather Service San Juan PR
209 AM AST Wed Oct 4 2023

AMZ711-712-716-723-726-733-735-041200-
Atlantic Waters of Puerto Rico and USVI from 10 NM to 19.5N-Coastal Waters of Northern Puerto Rico out 10 NM-Coastal Waters from Cabo San Juan to the waters between Anegada Island and Virgin Gorda and North 10 NM-Anegada Passage east of Virgin Gorda and Saint Croix south to 17N-Coastal waters east of Puerto Rico, around Vieques, and around and just north of Culebra and Saint John-Caribbean waters of Puerto Rico from 10 NM to 17N, including the coastal waters of Saint Croix-Coastal Waters of Southern Puerto Rico out 10 NM-
209 AM AST Wed Oct 4 2023

External bands from Tropical Storm Philippe will continue to impact most of the local waters. Conditions are expected to be favorable for showers and thunderstorms along the Atlantic and Caribbean waters, as well as the waters surrounding the U.S. Virgin Islands. Strong gusty winds, frequent lightning and heavy rainfall is anticipated with these thunderstorms. Waterspout will be possible as well.

Mariners can expect gusty winds to around 30 knots, locally higher waves, lightning strikes, and heavy downpours. Boaters should seek safe harbor immediately until this storm passes.

Intense lightning is occurring with this storm. If caught on the open water stay below deck if possible, keep away from ungrounded metal objects.

7.0 Astronomical Conditions

The astronomical conditions were obtained from the United States Naval Observatory Multiyear Interactive Computer Almanac (MICA) software program and provided the conditions over the grounding location.

Sun	Time (AST) October 3, 2023
Nautical morning twilight	0524
Begin civil twilight	0548

Sunrise	0610
Cumulative	1208
Sunset	1806
End civil twilight	1828
Nautical evening twilight	1854

Sun	Time (AST) October 4, 2023
Grounding	***0328***
Nautical morning twilight	0524
Begin civil twilight	0548
Sunrise	0611
Cumulative	1209
Sunset	1806
End civil twilight	1827
Nautical evening twilight	1853

Moon	Time (AST)
Moonrise	2221 October 3, 2023
Grounding	***0328* October 4, 2023**
Moonset	0422

At the time of the grounding the sun was 39° below the horizon at an azimuth of 080°. The moon was 75° above the horizon at an azimuth of 053° with the phase being a waning gibbous with 72% of the moon's visible disk illuminated.

F. ATTACHMENTS

Attachment 1 – GOES-16 infrared animation surrounding the period.

Submitted by:

Donald Eick
NTSB Senior Meteorologist