CCRIF SPC
The Caribbean Catastrophe Risk Insurance Facility

Tropical Cyclone Tammy (AAL202023)

Wind and Storm Surge

Final Event Briefing

Leeward and Windward Islands

1 November 2023

Registered Office: CCRIF SPC c/o Sagicor Insurance Managers Ltd., 198 North Church Street
2nd Floor Sagicor House, P.O. Box 1087, Grand Cayman KY1-1102, Cayman Islands
Email: ccrif@ccrif.org | Website: ccrif.org | Twitter: @ccrif_pr | Facebook: CCRIF SPC

1 SUMMARY

Tropical Cyclone Tammy was the nineteenth named cyclone and the seventh hurricane of the 2023 Atlantic Hurricane Season. On 20 October at 1400UTC, Tammy became a Category 1 hurricane, while approaching the Windward Islands. During the next two days, it passed north of Barbados, turned northwestward and passed just east of the northern Windward Islands and the Leeward Islands. Hurricane Tammy was characterized by a tight and well-organized inner core, with hurricane-force winds confined to that region. Therefore, despite the proximity of the hurricane centre to the Windward and Leeward Islands, in general they were not affected by hurricane-force winds, but only by tropical-storm-force winds. Among them, only the island of Barbuda (Antigua and Barbuda) experienced hurricane-force winds for a few hours around 22 October at 0000UTC, just before and after Tammy's landfall on Barbuda. On 23 October, TC Tammy moved away from the northern Leeward Islands, towards the north Atlantic Ocean.

The final runs of the CCRIF tropical cyclone loss model for wind and storm surge produced government losses for Saint Lucia, Dominica, Montserrat, Antigua and Barbuda, Saint Kitts and Nevis, Sint Maarten, and Anguilla. However, the government losses for all seven countries were below the Attachment Point of the respective countries' Tropical Cyclone policy. Therefore, no payouts under these policies are due. The final runs of the CCRIF loss model for wind and storm surge did not produce any government losses for Barbados and the British Virgin Islands, although tropical-storm-winds were shown over portions of these countries. Therefore, no payouts under the Tropical Cyclone policies of these countries are due.

The Aggregated Deductible Cover (ADC) feature for the Tropical Cyclone policy for Antigua and Barbuda was activated because the modelled losses were above 50% of the Attachment Point of the country's Tropical Cyclone policy. Therefore, a payout of $US139.703.96 is due under the ADC feature for Antigua and Barbuda. For Dominica, Saint Kitts and Nevis, Anguilla, and Sint Maarten, the modelled loss values were between 10% of the Minimum Payment and 50% of the Attachment Point of the respective countries' Tropical Cyclone policy. However, at the time of issuing this final event briefing, a Disaster Alert had not been reported by ReliefWeb for any of these countries due to this tropical cyclone[1]. Therefore, no payments under the ADC feature are due for Dominica, Saint Kitts and Nevis, Anguilla or Sint Maarten. The ADC feature for the Tropical Cyclone policies for Saint Lucia and Montserrat were not activated because the modelled losses were below 10% of the Minimum Payment of the respective countries' Tropical Cyclone policy. Therefore, no payments under the ADC feature are due for Saint Lucia or Montserrat.

This event briefing is designed to review the modelled losses due to wind and storm surge calculated by CCRIF's tropical cyclone model for affected CCRIF member countries, to be

1 The ADC would be activated if the modelled loss value is between 10% of the Minimum Payment and 50% of a country's policy Attachment Point and a Disaster Alert is issued by ReliefWeb within 7 days after the event.

analyzed with respect to members' Tropical Cyclone policies. Saint Lucia, Dominica, Montserrat, Antigua and Barbuda, Saint Kitts and Nevis, Sint Maarten, and Anguilla were the only CCRIF member countries for which the CCRIF loss model for wind and storm surge produced government losses due to Tropical Cyclone Tammy. A separate report on rainfall impacts on affected CCRIF member countries will be issued if applicable.

2 INTRODUCTION

On 18 October at 2100UTC, the US National Hurricane Center (NHC) reported that a tropical storm (TS) formed in the central tropical Atlantic Ocean, about 625 mi (1005km) E of the Windward Islands, and it was named Tammy. The system proceeded with estimated forward velocity of 23 mph (37 km/h) towards the west. The minimum central pressure was 1007 mb and the maximum sustained winds were estimated at 40 mph (65 km/h).

During the next two days, the tropical storm proceeded westward over the tropical Atlantic Ocean with progressively slower forward velocity. Tammy was embedded in an environment of high oceanic heat content, due to the warm sea surface temperature. However, the moderate vertical wind shear allowed only a modest strengthening of the storm.

On 20 October at 1400UTC, NHC upgraded Tammy to a Category 1 hurricane, with estimated maximum sustained winds at 75mph (120 km/h) and minimum central pressure of 992mb. At this time, the centre of Tammy was located near latitude 14.1° North, longitude 58.5° West, about 90 mi (150 km) NE of Barbados (Figure 1a). Hurricane Tammy presented a closed eye and a large curved band that wrapped around the eastern and southern portions of the circulation (Figure 2a). Hurricane-force winds extended outward up to 25 miles (35 km) from the circulation centre, while tropical-storm-force winds extended outward up to 140 miles (220 km). Starting from this time tropical-storm-force winds spread over Barbados (Figure 3a).

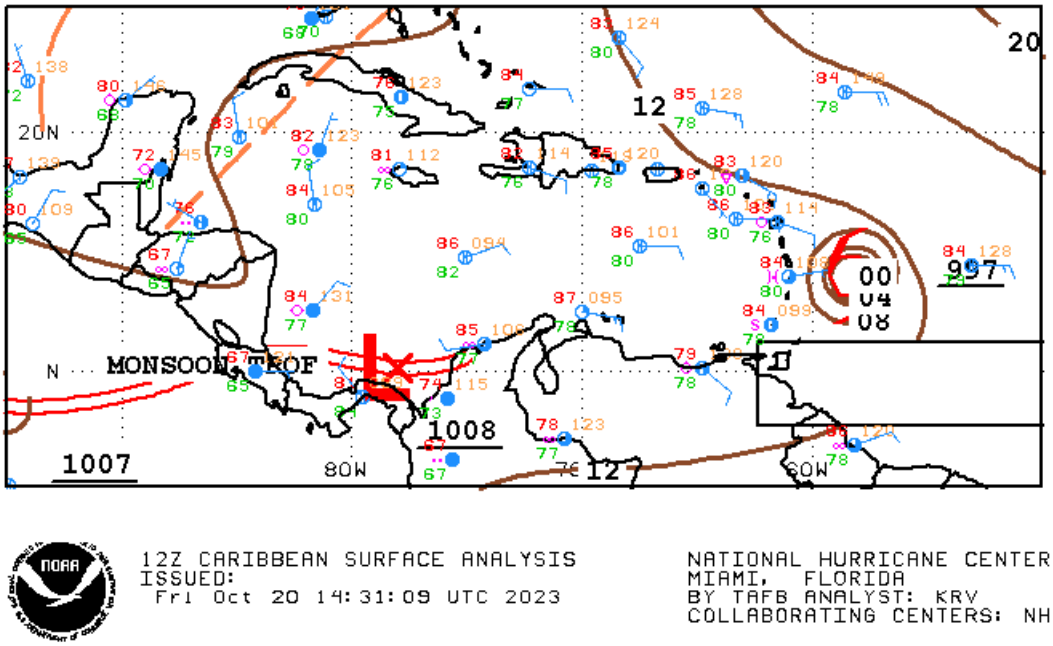
During the next 12 hours, Tammy moved west-northwest at almost 7 mph (11 km/h), heading toward the southern Leeward Islands. On 21 October at 0000UTC, the centre of Tammy was located near latitude 14.5° North, longitude 59.7° West, about 90 mi (140 km) E of Martinique, about 95 mi (150 km) NE of Saint Lucia and about 124 mi (200 km) SE of Dominica. Hurricane-force winds extended outward up to 25 miles (35 km) from the circulation centre and tropical-storm-force winds extended outward up to 125 miles (205 km). Thus, Saint Lucia and Dominica began to experience tropical-storm-force winds, while strong winds were still affecting Barbados (Figure 3b).

After 12 hours, on 21 October at 1200UTC, Hurricane Tammy slightly strengthened, due to the inflow of more humid air. The estimated maximum sustained winds increased to 80 mph (130 km/h) and the minimum central pressure decreased to 988 mb. The infrared satellite imagery showed that the hurricane had a relatively small central area of thunderstorms surrounding the circulation centre and a prominent trailing convective band to the south, but no evidence of an eye (Figure 2b). Moreover, the eyewall had become more pronounced although it was open on the south side (Figure 3c). At this time, Tammy was at its minimum distance from Dominica, as the

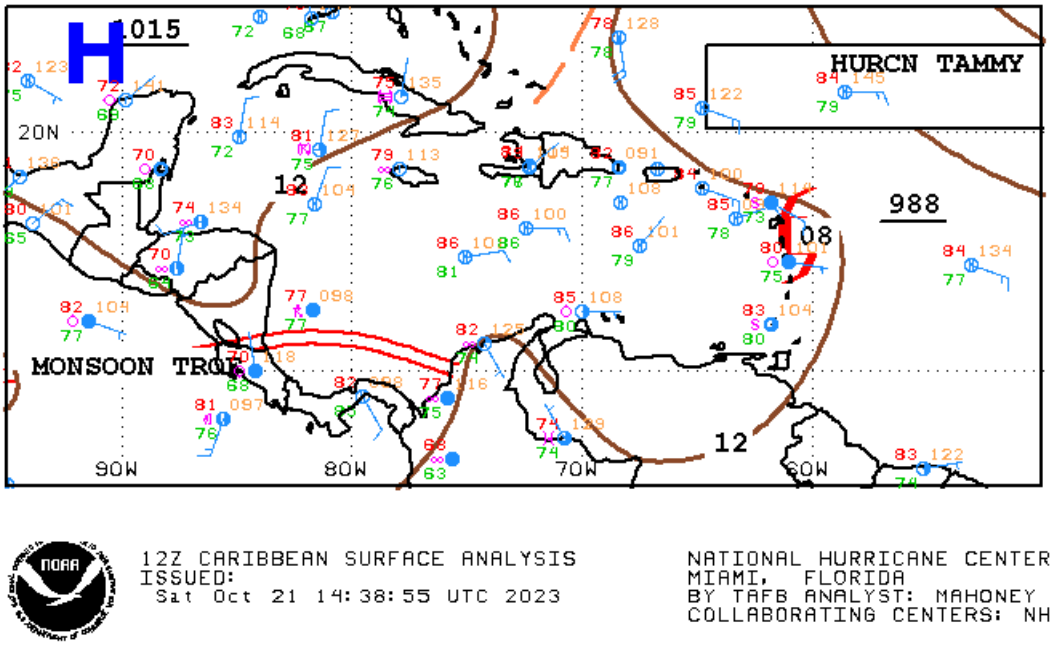
centre of circulation was sited near latitude 15.7° North, longitude 60.6° West, about 50 mi (80 km) E of this country (Figure 1b). Tropical-storm-force winds were still affecting Dominica, while they ceased over Barbados and Saint Lucia (Figure 3c). Tammy turned northwest with nearly the same forward velocity (9 mph, 15 km/h) and during the next 12 hours it crossed the waters just east of the Leeward Islands. On 22 October at 0000UTC, Tammy's centre of circulation was sited near latitude 17.5° North, longitude 61.6° West, about 15 mi (25 km) ESE of Barbuda (Antigua and Barbuda) and about 30 mi (50 km) NNE of Antigua. The NHC reported a slight intensification of the hurricane, with the estimated maximum sustained winds increasing to 85 mph (140 km/h) and unvaried minimum central pressure. Tammy maintained a tight and well-organized inner core, and the aircraft data indicated that the hurricane-force winds were confined to that region (Figure 3d). For this reason, only the island of Barbuda started to experience hurricane-force winds, while Antigua and the other countries in a radius of 125 mi (205 km) from the hurricane centre, i.e. Montserrat and Saint Kitts and Nevis, were affected by tropical-storm-force winds (Figure 3d). One hour later, at 0115UTC, Tammy made landfall on Barbuda, passing along the eastern coast of the island, and continued to affect it with hurricane-force winds.

Afterwards, Hurricane Tammy proceeded north-northwestward at an almost unchanged forward velocity (10 mph, 17 km/h) and at 1200UTC, its centre was located near latitude 18.9° North, longitude 62.5° West, about 60 mi (25 km) NE of Anguilla. The shape and intensity of the hurricane was unvaried. Hurricane-force winds extended outward up to 25 miles (35 km) from the circulation centre and tropical-storm-force winds extended outward up to 125 miles (205 km). Thus, tropical-storm-force winds affected Anguilla and began to affect portions of the British Virgin Islands (Figure 3e). Strong winds were still active in Antigua and Barbuda and Saint Kitts and Nevis, while they ceased in Montserrat (Figure 3e).

In the following hours, Tammy moved away from the northern Leeward Islands, proceeding at almost unvaried forward velocity (9 mph, 15 km/h) towards northwest over the northern Atlantic Ocean. On 23 October at 0300UTC, the centre of Tammy was located near latitude 20.8° North, longitude 64.0° West, about 190 mi (305 km) NNW of Anguilla. The strong winds associated with the hurricane ceased in Anguilla and the other northern Leeward Islands.



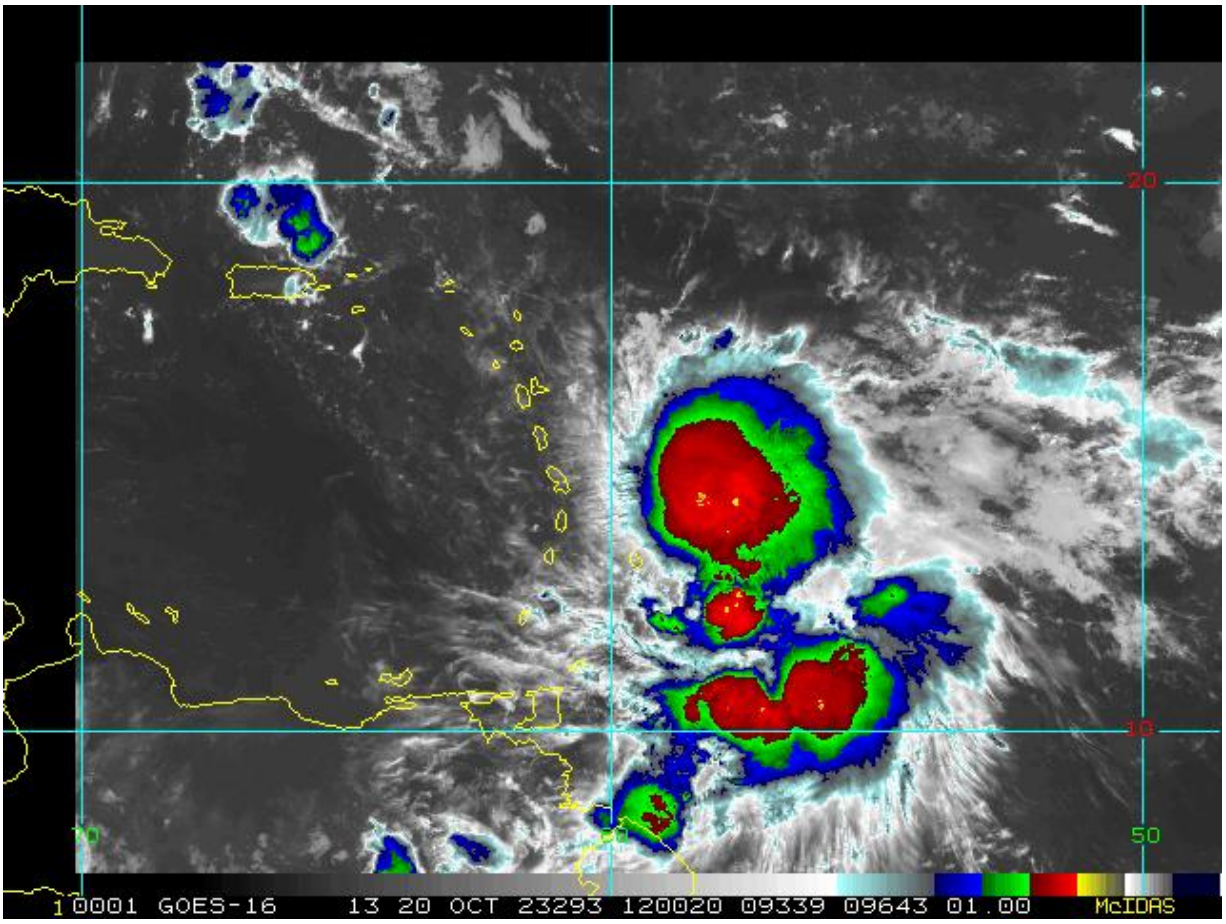
a) 20 October at 1200UTC



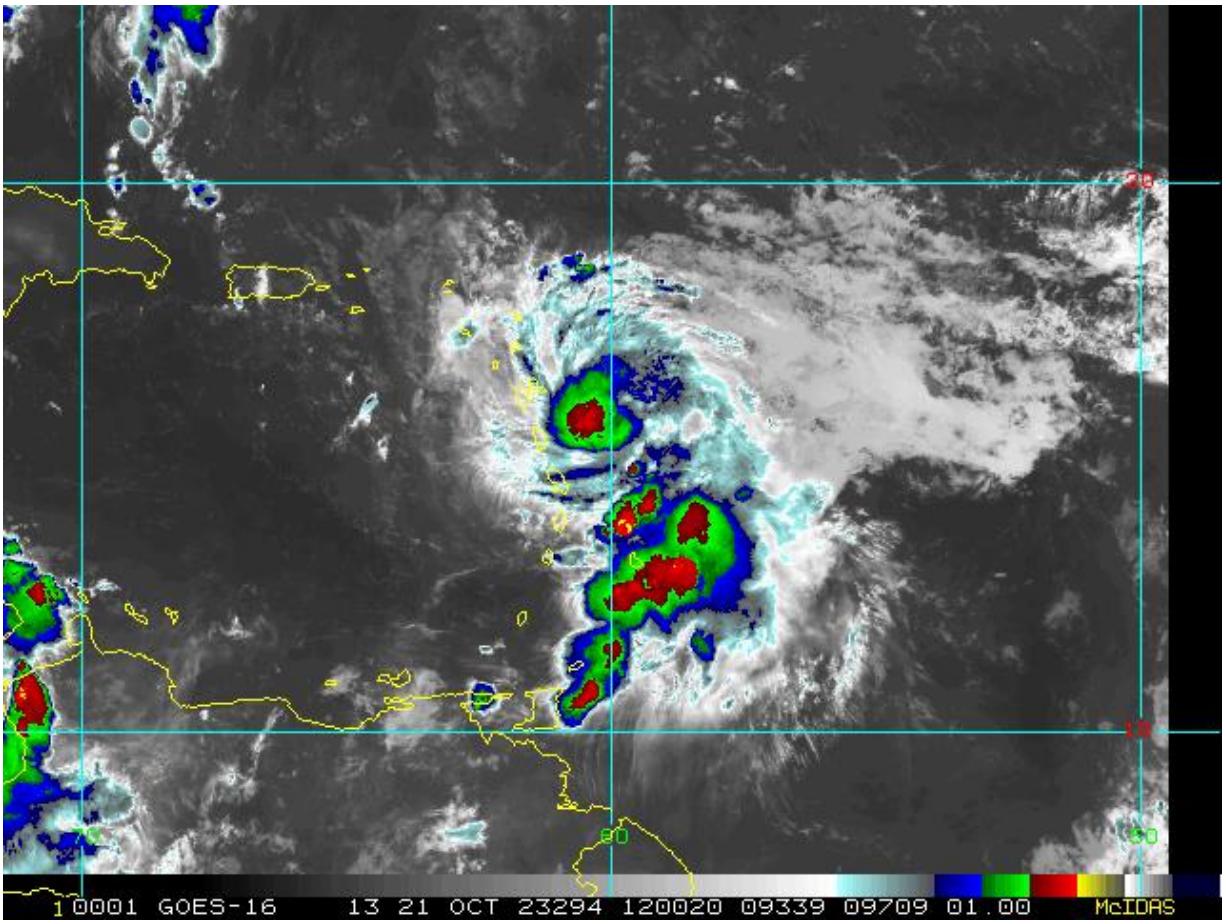
b) 21 October at 1200UTC

Figure 1 Surface analysis over the Caribbean area on 20 and 21 October, 2023 at 1200UTC. Source: US National Hurricane Center[2]

2 National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review date: 20 and 21 October 2023, available at: https://www.nhc.noaa.gov/tafb/CAR_12Z.gif



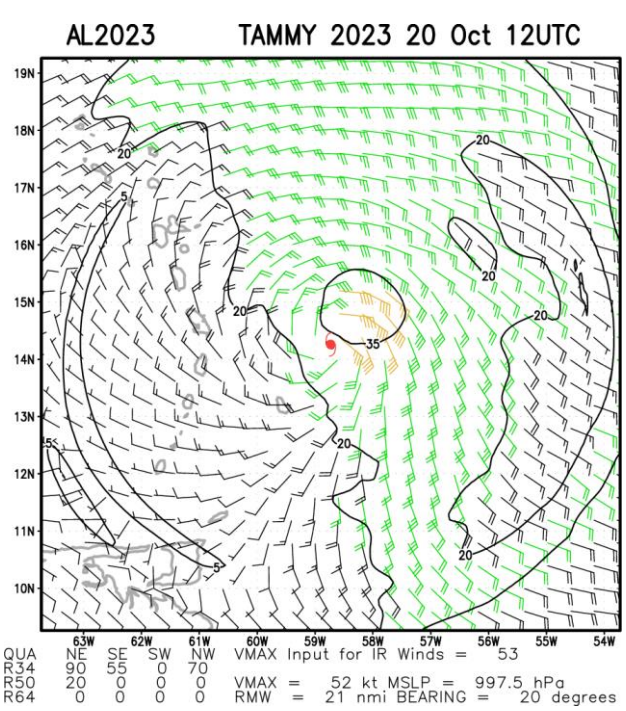
a) 20 October at 1200UTC



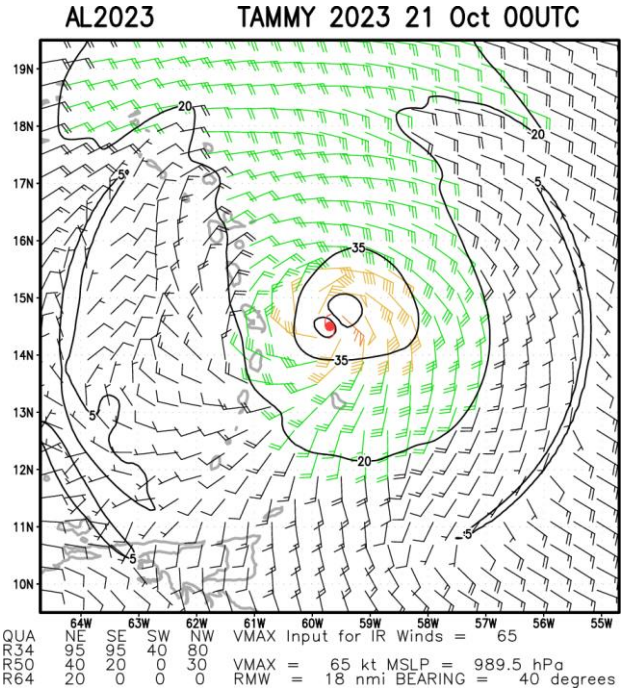
b) 21 October at 1200UTC

Figure 2 Satellite imagery on 20 and 21 October, 2023 at 1200UTC from the thermal infrared channel enhanced with colour. Blue/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the red/yellow colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National Environmental Satellite, Data and Information Service[3].

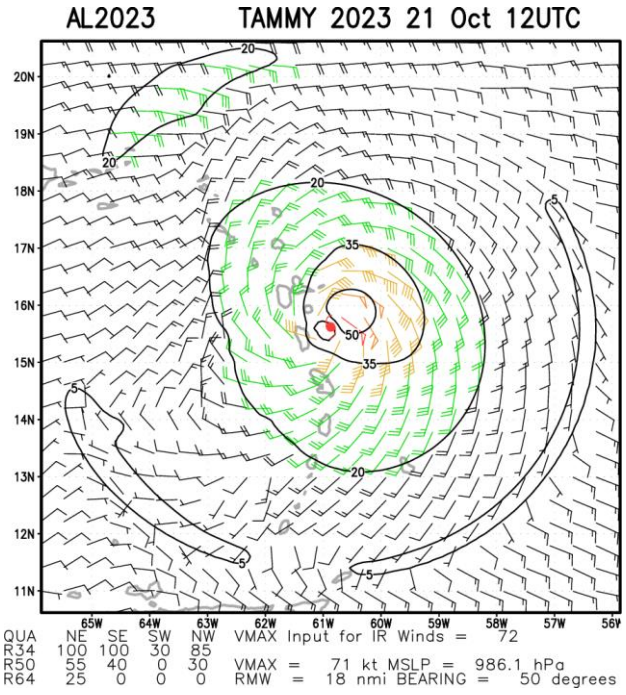
3 RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/storm.asp?storm_identifier=al202023



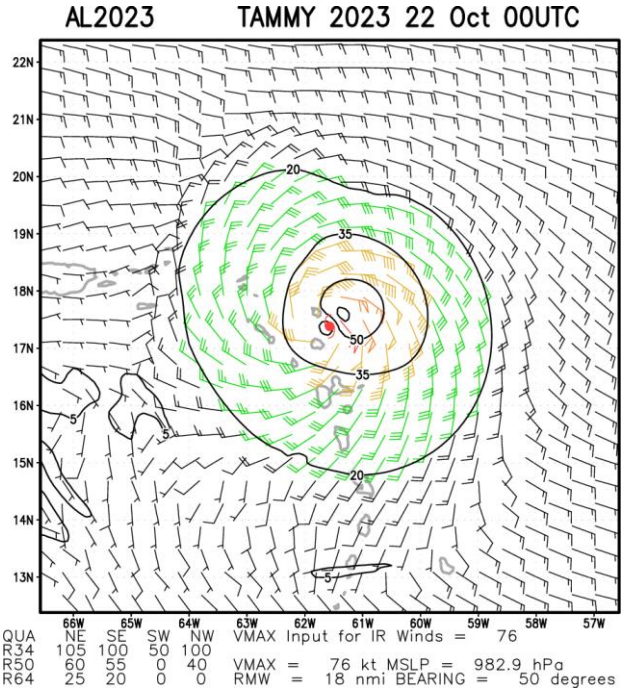
a) 20 October at 1200UTC



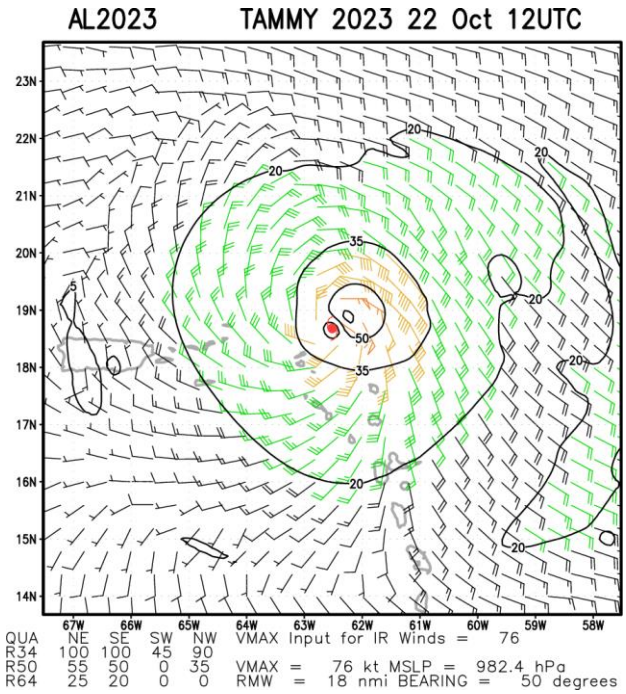
b) 21 October at 0000UTC



c) 21 October at 1200UTC



d) 22 October at 0000UTC



e) 22 October at 1200UTC

Figure 3 Multi-platform satellite based tropical cyclone surface wind analysis estimated on 20-22 October, 2023 at different times as indicated by the labels. Contouring indicates wind intensity at 20 kn (23 mph, 37 km/h), at 35 kn (40 mph, 65 km/h) and at 50 kn (57 mph, 92 km/h). Source: NOAA, National Environmental Satellite, Data and Information Service[4]

3 CCRIF SPC MODEL OUTPUTS

Under CCRIF's loss calculation protocol, a CCRIF System for Probabilistic Hazard Evaluation and Risk Assessment (SPHERA) report is required for any tropical cyclone affecting at least one member country with winds greater than 39 mph (62.7 km/h). Several countries were affected by Tropical Cyclone Tammy. For Antigua and Barbuda, Tammy qualified as a Triggering Event by Aggregated Deductible Cover (ADC) [5]; for Anguilla, Dominica, Montserrat, Saint Kitts and Nevis, Saint Lucia, and Sint Maarten, Tammy qualified as Loss Event[6] and for Barbados and the British Virgin Islands, it qualified as a Reportable Event[7].

The wind footprint is one of the outputs from CCRIF´s model. Figure 4 shows the wind footprint for the regions affected by Tropical Cyclone Tammy.

4 RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/storm.asp?storm_identifier=al202023

5 The Aggregated Deductible Cover (ADC) is a special feature of CCRIF's tropical cyclone (TC) and earthquake (EQ) parametric insurance policies. The ADC is designed to potentially provide a payment for TC and EQ events that are objectively not sufficient to trigger the country's main policy because the modelled loss is below the Underlying Policy Attachment Point.

6 Any Tropical Cyclone event which produces a modelled loss greater than zero in one or more policyholder countries.

7 Any Tropical Cyclone event which produces modelled winds of at least 39 mph in one or more grid cells of at least one CCRIF policyholder country but does not generate a modelled loss greater than zero.

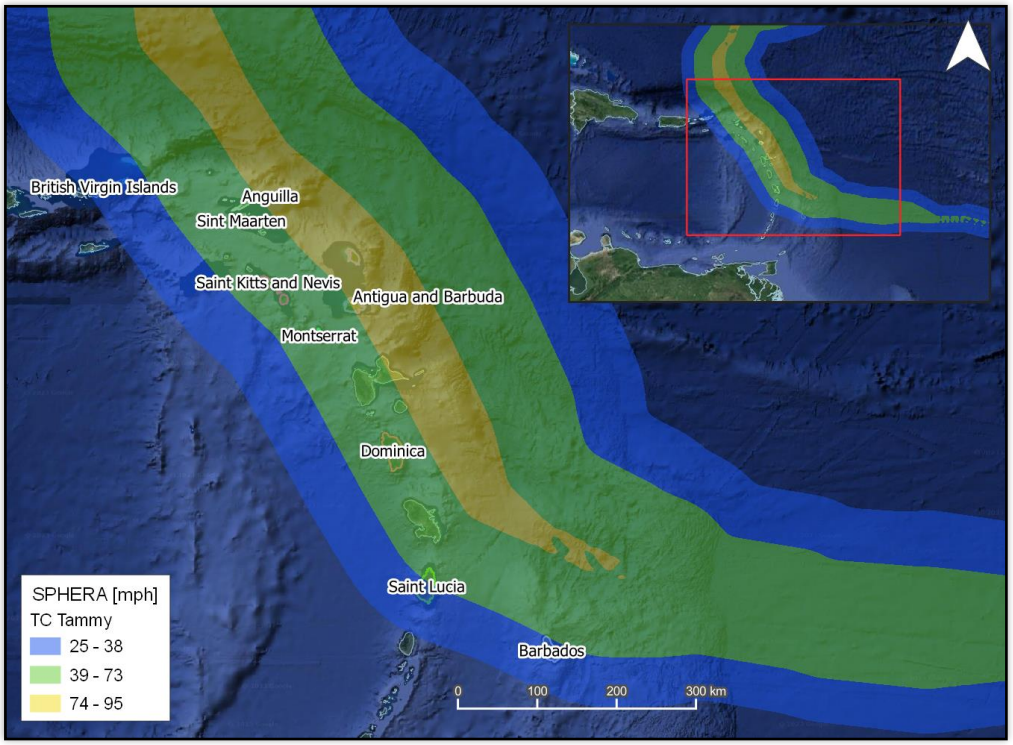


Figure 4 Map showing the wind field associated with Tropical Cyclone Tammy around the Leeward Islands. Source: NHC & CCRIF/SPHERA

4 IMPACTS

At the time of writing this report, the available information on damage in Caribbean countries due to Hurricane Tammy was limited. In Barbados there were reported more than 20 incidents, which included property damage, flooding, and impassable roads. [8]

In Antigua and Barbuda, Prime Minister Gaston Browne reported to The Associated Press that there was no significant damage. In Barbuda (the only territory where Tammy made landfall) no major infrastructure damage was reported. Tammy caused minor damage to a few homes, and affected some power lines, causing power outages. In Antigua there were reports of a few broken branches and utility lines affected.[9]

[8] Prensa Latina: Reportan daños en Barbados tras paso de huracán Tammy - Prensa Latina (prensa-latina.cu)
[9] CBS News: Storm Norma weakens after dropping heavy rain on Mexico, as Hurricane Tammy makes landfall in Barbuda - CBS News

Figure 5 Impacts in Antigua and Barbuda due to TC Tammy[10]

No additional information on damage or impacts due to wind and storm surge for TC Tammy in other Caribbean countries was found at the time of writing this report.

5 CCRIF LOSS MODEL

The final runs of the CCRIF tropical cyclone loss model for wind and storm surge produced government losses for Saint Lucia, Dominica, Montserrat, Antigua and Barbuda, Saint Kitts and Nevis, Sint Maarten, and Anguilla. However, the government losses for all seven countries were below the Attachment Point of the respective countries' Tropical Cyclone policy. Therefore, no payouts under these policies are due. The final runs of the CCRIF loss model for wind and storm surge did not produce any government losses for Barbados and the British Virgin Islands, although tropical-storm-winds were shown over portions of these countries. Therefore, no payouts under the Tropical Cyclone policies of these countries are due.

The Aggregated Deductible Cover (ADC) feature for the Tropical Cyclone policy for Antigua and Barbuda was activated because the modelled losses were above 50% of the Attachment Point of the country's Tropical Cyclone policy. Therefore, a payout of $US139.703.96 is due under the ADC feature for Antigua and Barbuda. For Dominica, Saint Kitts and Nevis, Anguilla, and Sint Maarten, the modelled loss values were between 10% of the Minimum Payment and 50% of the Attachment Point of the respective countries' Tropical Cyclone policy. However, at the time of issuing this final event briefing, a Disaster Alert had not been reported

[10] Dominica News Online: Hurricane Tammy causes little damage after making landfall on Barbuda - Dominica News Online

by ReliefWeb for any of these countries due to this tropical cyclone[11]. Therefore, no payments under the ADC feature are due for Dominica, Saint Kitts and Nevis, Anguilla or Sint Maarten. The ADC feature for the Tropical Cyclone policies for Saint Lucia and Montserrat were not activated because the modelled losses were below 10% of the Minimum Payment of the respective countries' Tropical Cyclone policy. Therefore, no payments under the ADC feature are due for Saint Lucia or Montserrat.

For additional information, please contact CCRIF SPC at: pr@ccrif.org

11 The ADC would be activated if the modelled loss value is between 10% of the Minimum Payment and 50% of a country's policy Attachment Point and a Disaster Alert is issued by ReliefWeb within 7 days after the event.