Covered Area Rainfall Event (29/06/2022 to 30/06/2022)

Excess Rainfall

Event Briefing

Trinidad and Tobago - Tobago

7 July 2022

1   INTRODUCTION

Trinidad and Tobago was under the influence of potential tropical cyclone #2, which was later named Bonnie by the US National Hurricane Center (NHC), resulting in adverse weather conditions from June 29 to 30, 2022. During this period, while rainfall occurred in both islands, the heaviest rainfall occurred in Tobago.

This event briefing describes the impact of rainfall in Tobago, which was associated with a Covered Area Rainfall Event (CARE), starting on 29 June and ending on 30 June 2022. The Rainfall Index Loss (RIL) was below the attachment point of Trinidad and Tobago's excess rainfall policy for Tobago and therefore no payout is due. There was no CARE in Trinidad associated with Bonnie.

2   EVENT DESCRIPTION

On 28 June at 2100 UTC, the NHC reported that a tropical disturbance was located about 200 km (124 miles) east of Trinidad near latitude 10.1° North, longitude 59.5 West, heading west at 24 mph (39 km/h), with estimated maximum sustained winds of 40 mph (65 km/h) and minimum central pressure of 1009 mb. The disturbance presented strong convection with some banding features over the northern portion of the system. However, the system lacked a closed circulation.

On 29 June at 0000 UTC, the potential tropical cyclone was located near latitude 10.4° North, longitude 61.0° West, about 15 km (9 miles) east of Trinidad (Figure 1) with estimated maximum sustained winds of 40 mph (65 km/h) and the minimum central pressure of 1009 mb. Tropical-storm-force winds extended outward up to 95 km (59 miles) from the centre. At 0300 UTC, satellite imagery suggested that the tropical disturbance was slowly getting better organized, with gradually increasing convective banding in the northern semicircle. However, surface observations from Trinidad, Tobago, and Grenada indicated that the system had not yet developed a closed circulation. The potential tropical cyclone was located 175 km (109 miles) west-northwest of Trinidad at latitude 10.9° North and longitude 62.8° West, with unchanged maximum sustained winds and the minimum central pressure slightly increased (1011 mb).

On July 1 at 1315 UTC, the NHC reported that the potential tropical cyclone became a tropical storm, with the name of Bonnie. Well-organized deep convection persisted on July 1 and an Air Force Reserve Hurricane Hunter mission found a well-defined circulation centre located about 100 mi (185 km) east of the Nicaragua coast.
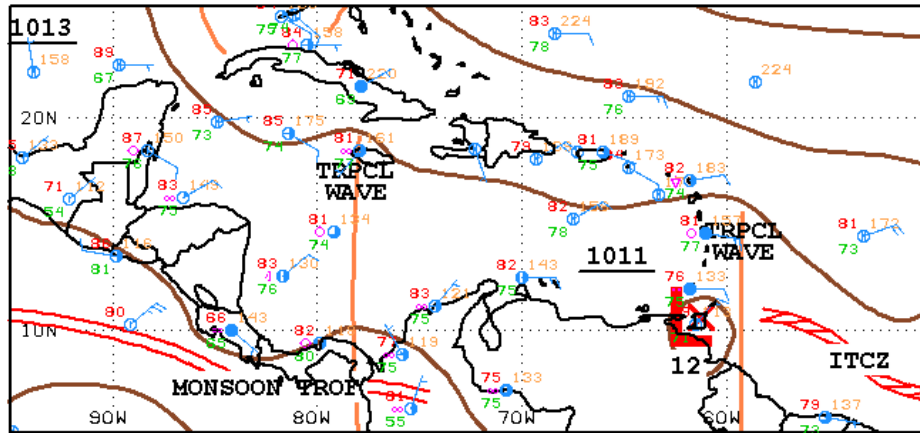
Figure 1 Surface analysis over the Caribbean area on 29 June at 0000 UTC. Source: US National Hurricane Center[1]
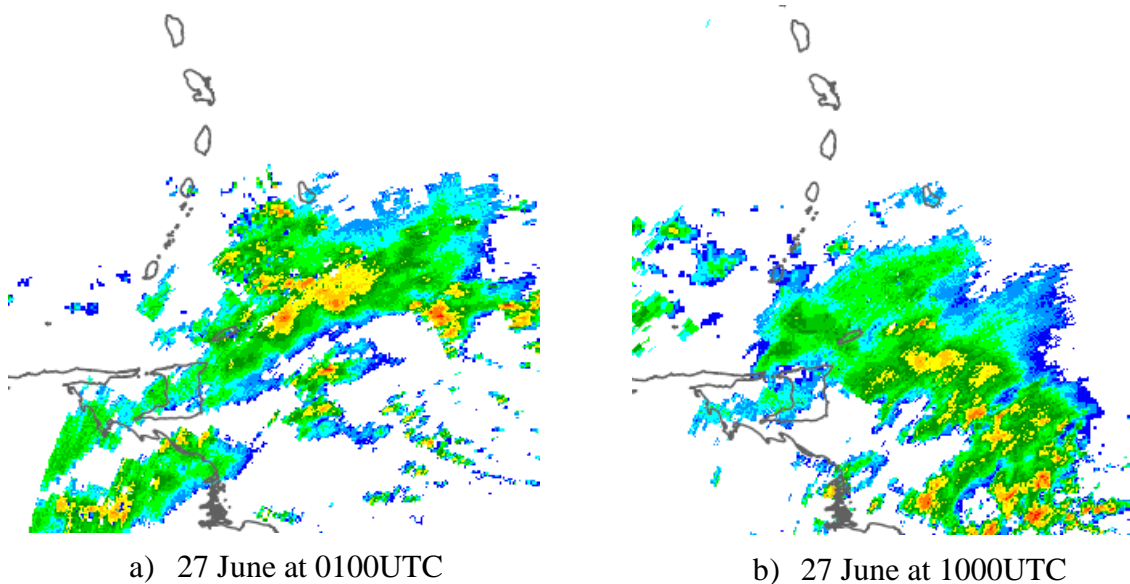

| a) 27 June at 0100UTC | b) 27 June at 1000UTC |

Figure 2 Radar imagery on 27 June at 0100 UTC (a) and at 1000 UTC (b) as indicated in the label from the radar composite over the Caribbean and Central America region. Blue/green colours represent low to moderate rainfall, while the yellow/red colours represent intense and very intense precipitation. Source: Barbados Radar Composite[2].

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[1] National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, available on 29th June 2022 at: *https://www.nhc.noaa.gov/tafb/CAR_00Z.gif*

[2]Barbados Radar Composite, available on 05 July at:
https://www.barbadosweather.org/BMS_Radar_Composite_Resp.php#

3   IMPACTS

According to Trinidad and Tobago´s Weather Center, due to heavy rainfall the Paria main road in Tobago was impassable at several points due to multiple landslides. The residents of Matelot Village attempted to clear one of the many landslides that occurred on the Paria main road[3]. The Tompire River, Matura River and Grande Riviere River overtopped their banks.

During this period of heavy rainfall, a tropical storm warning was issued at the orange level for Trinidad and Tobago, and the main hazards associated with the heavy rains were flooding and landslides.

Figure 3 Damages in Tobago due to heavy rainfall. Source: Ttweathercenter

4   RAINFALL MODEL OUTPUTS

This report describes a Covered Area Rainfall Event (CARE), which occurred during the period of June 29 to 30, 2022, in Tobago. All three data sources used by the XSR 2.5 model, CMORPH[4], WRF5 and WRF7[5], detected the occurrence of precipitation over Tobago and the surrounding waters during this period. However, each data source reported a specific distribution and accumulation of rainfall, as discussed below, and displayed in Figure 4. The XSR 2.5 model

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[3] Trinidad and Tobago Weather Center Twitter. Publication date 29&30 June 2022

[4] CMORPH Model: the satellite-based rainfall precipitation estimates provided by the NOAA Climate Prediction Center (CPC) using the so-called Morphing Technique *http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html*. Further details in the Definitions section of this report.

[5] WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data *https://www.mmm.ucar.edu/weather-research-and-forecasting-model*. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [*http://rda.ucar.edu/datasets/ds083.2/*]). Further details in the Definitions section of this report.

didn´t detected a Covered Area Rainfall Event (CARE) for Trinidad in this period of time.

The CARE was activated for the island of Tobago, on 29 June and lasted for the period 29 to 30 June. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation[6], and thus the period considered by the XSR2.5 model for the loss estimate based on the accumulated precipitation in Tobago was 27 to 30 June.

CMORPH reported a total amount of precipitation accumulated in the period 27 to 30 June between 60 mm and 90 mm in Tobago.

WRF5 simulated total accumulated values of rainfall that were generally higher than CMORPH. In the period 27 to 30 June, the simulated amounts were higher than 60 mm in all of Tobago, with the highest values of precipitation, between 180 mm and 210 mm, in the eastern area of Tobago.

WRF7 showed total accumulated values of precipitation lower than CMORPH and WRF5. In the period 27 to 30 June, the simulated amounts were between 60 mm and 90 mm in the southern and southeast areas of Tobago. The simulated amounts were lower in the other areas of Tobago.
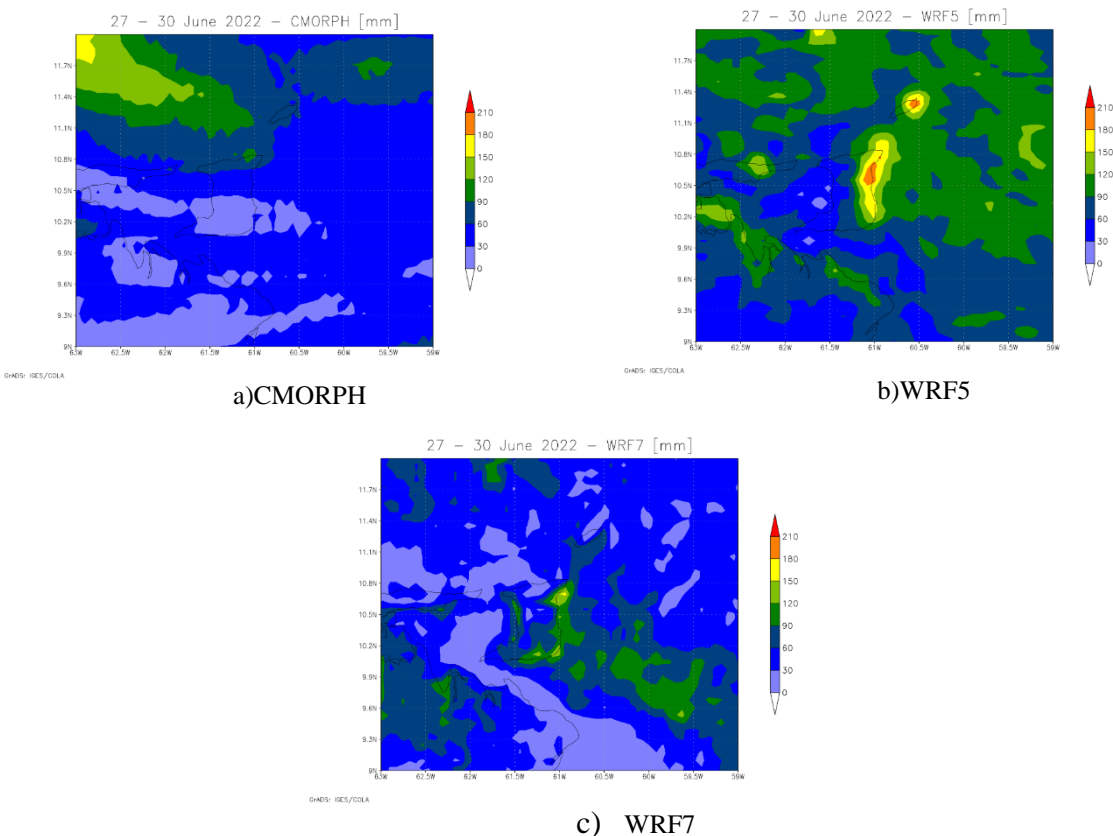

a)CMORPH

b)WRF5

c) WRF7

Figure 4 Total accumulated precipitation during the period 27 to 30 June, 2022 estimated by CMORPH (a), WRF5 (b) and WRF7 (c). Source: CCRIF SPC

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[6] The two aggregation periods correspond to the Rainfall Aggregation Period #1 and Rainfall Aggregation Period #2, as indicated in the Schedule. Further details in the Definitions section of this report.

Daily rainfall maps by CMORPH, WRF5 and WRF7 over the exposure map of XSR 2.5 are not included in this report and they can be downloaded at the following links for 12-hour aggregation and 48- hour aggregation respectively:

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/TTO/TTO_TOB/CARE_1_2022/daily_prec_short.mp4
https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/TTO/TTO_TOB/CARE_1_2022/daily_prec_long.mp4

For the CARE that occurred in Tobago, the Rainfall Index Loss (RIL) was above the loss threshold for this island for two of data sources used by XSR2.5: CMORPH and WRF5. The RIL was the highest for WRF5, due to the higher amounts of accumulated precipitation presented over the entire territory.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs from CMORPH and WRF5. The RIL_{FINAL} was greater than zero and therefore this CARE qualified as a loss event for Tobago. However, the RIL_{FINAL} was below the attachment point of Trinidad and Tobago's excess rainfall policy for Tobago and therefore the CARE did not trigger a policy payment.

5   TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) for Tobago was below the attachment point of the Excess Rainfall policy for Tobago and therefore no payout is due. A CARE was not activated for the Excess Rainfall policy for Trinidad and therefore no payout is due.

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

DEFINITIONS

Active Exposure Cell Percentage Threshold	The percentage of the total number of XSR Exposure Grid Cells within the Covered Area of the Insured, that must be exceeded to trigger a Covered Area Rainfall Event.
Active Exposure Grid Cells	The XSR Exposure Grid Cells for which in the same single day the Aggregate Rainfall #1 value computed using the CMORPH-based Rainfall Estimate equals or exceeds the Rainfall Event Threshold #1 or the Aggregate Rainfall #2 value computed using the CMORPH-based Rainfall Estimate equals or exceeds the Rainfall Event Threshold #2.
Aggregate Rainfall #1	The rainfall amount accumulated over the Rainfall Aggregation Period #1 (as defined in the Schedule) measured in millimeters (mm) in any of the XSR Exposure Grid Cells in the Covered Area of the Insured. For a given day and a Rainfall Aggregation Period #1 of n hours, the Aggregate Rainfall #1 is the maximum amount of rainfall accumulated over any of the n-hour windows that intersect the day itself considering a time interval of 3 hours.
Aggregate Rainfall #2	The rainfall amount accumulated over the Rainfall Aggregation Period #2 (as defined in the Schedule) measured in millimeters (mm) in any of the XSR Exposure Grid Cells in the Covered Area of the Insured. For a given day and a Rainfall Aggregation Period #2 of n hours, the Aggregate Rainfall #2 is the maximum amount of rainfall accumulated over any of the n-hour windows that intersect the day itself considering a time interval of 3 hours
Calculation Agent	Entity charged with undertaking the primary calculation of the Rainfall Index Loss.
CMORPH-based Maximum Aggregate Rainfall #1	The maximum value during the Covered Area Rainfall Event of the Aggregate Rainfall #1 computed using the CMORPH-based Rainfall Estimates in any given XSR Exposure Grid Cell over the Covered Area of the Insured.
CMORPH-based Maximum Aggregate Rainfall #2	The maximum value during the Covered Area Rainfall Event of the Aggregate Rainfall #2 computed using the CMORPH-based Rainfall Estimates in any given XSR Exposure Grid Cell over the Covered Area of the Insured.
CMORPH-based Covered Area Rainfall Parameters	The CMORPH Model information provided on a continuous basis by the XSR Model Data Reporting Agency used by the Calculation Agent to obtain the CMORPH-based Rainfall

	Estimates using the XSR Rainfall Model. Parameters are drawn from XSR Exposure Grid Cells within the Covered Area of the Insured, by their respective latitude and longitude. Measurement units and precision of data ingested by the XSR Rainfall Model are identical to those provided by the XSR Model Data Reporting Agency and are further elaborated in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'.
CMORPH Model	The satellite-based rainfall estimation model provided by NOAA CPC as described in the Rainfall Estimation Models section of the Policy.
Covered Area	The territory of the Insured as represented in the XSR Rainfall Model.
Covered Area Rainfall Event	Any period of days, with an interruption less than or equals to the Event Tolerance Period, during which the number of Active Exposure Grid Cells is greater than or equal to the product of (a) Active Exposure Cell Percentage Threshold multiplied by (b) the total number of XSR Exposure Grid Cells within the Covered Area.
Country Disaster Alert	An official disaster alert issued by ReliefWeb (*http://reliefweb.int/*) for the country in question for one of the following types of events: tropical cyclone, flood, flash flood and severe local storm. Any disaster alert issued later than seven (7) days after the completion of the Covered Area Rainfall Event (CARE) event will not be considered. The Disaster Alert description issued by ReliefWeb and/or its attached documentation must include specific reference to the CARE dates with a tolerance period of 2 calendar days.
Maximum Aggregate Rainfall #1	The highest value during a Covered Area Rainfall Event of the Aggregate Rainfall #1 amount in any of the XSR Exposure Grid Cells in the Covered Area of the Insured computed.
Maximum Aggregate Rainfall #2	The highest value during a Covered Area Rainfall Event of the Aggregate Rainfall #2 amount in any of the XSR Exposure Grid Cells in the Covered Area of the Insured computed.
Rainfall Event Threshold #1	Aggregate Rainfall #1 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.
Rainfall Event Threshold #2	Aggregate Rainfall #2 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.

Rainfall Aggregation Period #1	The number of hours over which the Aggregate Rainfall #1 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
Rainfall Aggregation Period #2	The number of hours over which the Aggregate Rainfall #2 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
Rainfall Index Loss	For any Covered Area Rainfall Event affecting the Insured, the US Dollar loss calculated by the Calculation Agent using the XSR Rainfall Model, as described in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'. The Rainfall Index Loss can only be calculated once the Covered Area Rainfall Event is completed.
WRF5 Model	The weather research and forecasting rainfall model by NOAA with Configuration #5 data initialized with and assimilating the data provided by the National Center for Environmental Prediction as described in the Rainfall Estimation Models and in the Input Data to the Rainfall Estimation Models sections of this Attachment.
WRF7 Model	The weather research and forecasting rainfall model by NOAA with Configuration #7 data initialized with and assimilating the data provided by the National Center for Environmental Prediction as described in the Rainfall Estimation Models and in the Input Data to the Rainfall Estimation Models sections of this Attachment.
XSR Rainfall Model	The computer model used to calculate the Rainfall Index Loss, as described in the Attachment entitled 'Calculation of Rainfall Index Loss and Policy Payment'.
XSR Exposure Grid Cells	The 30 arc-second by 30 arc-second grid of cells each of which is attributed with an XSR Grid Cell Exposure Value greater than zero.
XSR Grid Cell Exposure Value	The value, used to calculate the CMORPH-based Exposure Grid Cell Loss, the WRF5-based Exposure Grid Cell Loss, and the WRF7-based Exposure Grid Cell Loss.