



Covered Area Rainfall Event (25/04/2023 - 27/04/2023)

Excess Rainfall

Event Briefing

Trinidad and Tobago - Trinidad

6 April 2022

1 INTRODUCTION

This event briefing describes the impact of rainfall in Trinidad, which was associated with a Covered Area Rainfall Event (CARE), starting on 25 April and ending on 27 April 2023. The Rainfall Index Loss (RIL) was below the attachment point of Trinidad and Tobago's excess rainfall policy for Trinidad¹ and therefore no payout is due.

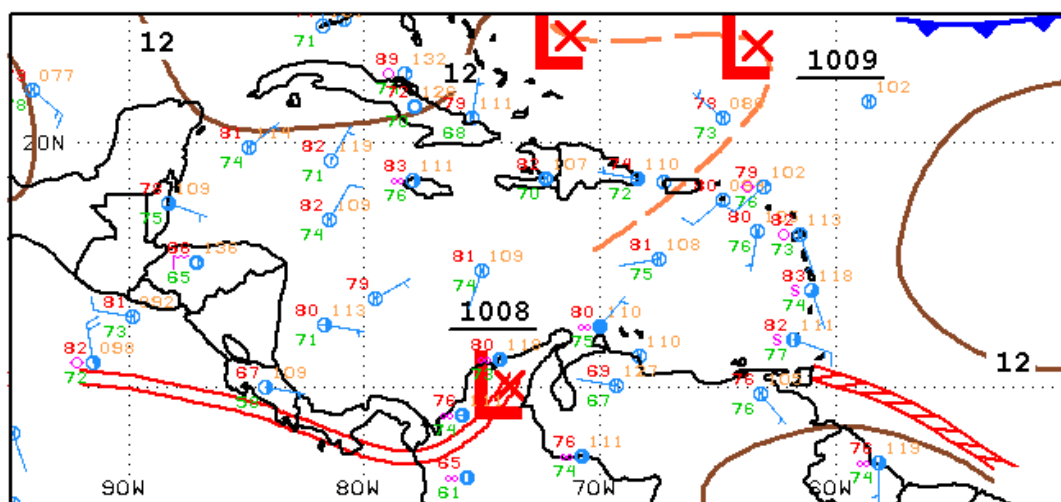
2 EVENT DESCRIPTION

On 23 April at 1800 UTC, a weak pressure pattern across the Caribbean Sea resulted in light to gentle variable winds, except for moderate easterly breezes in the Gulf of Honduras. Slight seas (based on the Douglas sea scale about wave height) were prevalent across the Caribbean waters, except for moderate seas (based on the Douglas sea scale) in the Gulf of Honduras. A few showers and isolated thunderstorms affected the Windward Islands and the extreme SE Caribbean, while no significant deep convection occurred in the rest of the basin.

On 24 April at 0000UTC the ITCZ (Inter-Tropical Convergence Zone) extended from 01N24W to 10N61W. Scattered moderate convection was noted within 120 nm on either side of the ITCZ west of 30W. During the same day, isolated showers were over the eastern Caribbean, including the area near the Windward Islands.

On 27 April at 0000UTC a surface trough was visible along 63W and S of 18N. Satellite imagery depicted scattered clouds along with high clouds that were streaming northeastward south of 17N and east of about 68W. Scattered showers and isolated thunderstorms occurred east of the trough. The trough slowly moved toward the west northwest throughout 27 April while it weakened.

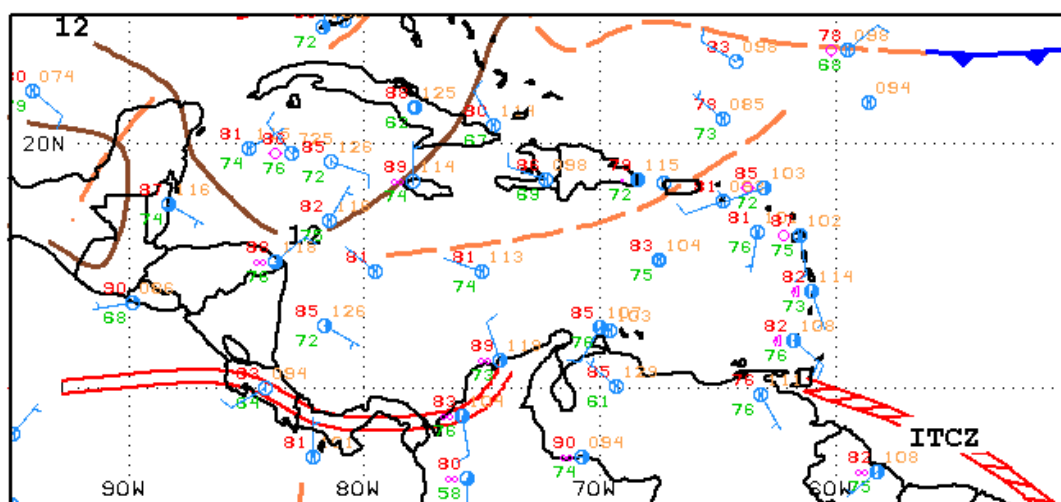
¹ The Government of Trinidad and Tobago also has an XSR policy for Tobago. In this rainfall event Tobago was not affected.



12Z CARIBBEAN SURFACE ANALYSIS
ISSUED:
Sun Apr 23 14:39:25 UTC 2023

NATIONAL HURRICANE CENTER
MIAMI, FLORIDA
BY TAFB ANALYST: DELGADO
COLLABORATING CENTERS: NHC OPC

a) 23 April at 1200UTC



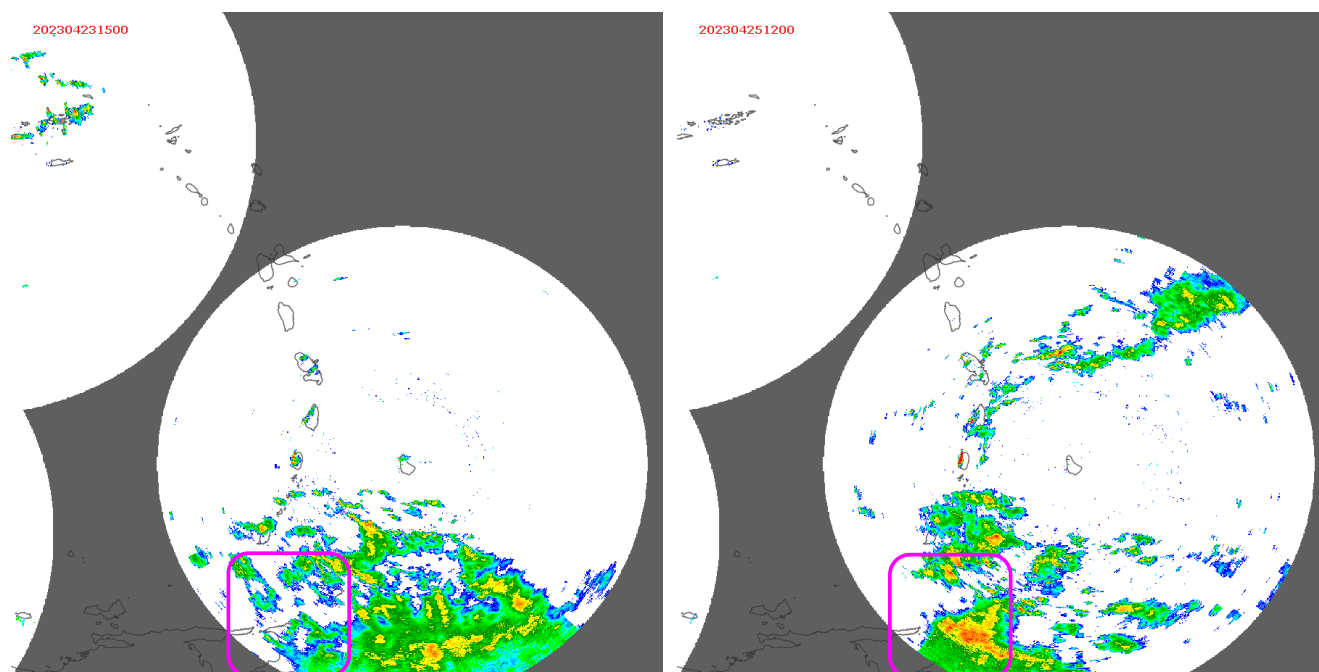
18Z CARIBBEAN SURFACE ANALYSIS
ISSUED:
Sun Apr 23 20:37:15 UTC 2023

NATIONAL HURRICANE CENTER
MIAMI, FLORIDA
BY TAFB ANALYST: DELGADO
COLLABORATING CENTERS: NHC OPC

b) 23 April at 1800UTC

Figure 1 Surface analysis over the Caribbean Sea on 23 April 2023 at 1200 and 1800UTC as indicated in the label.
Source: US National Hurricane Center²

² National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, available on 23 April 2023 at:
https://www.nhc.noaa.gov/tafb/CAR_18Z.gif



a) 23 April at 1500UTC

b) 25 April at 1200UTC

Figure 3 Radar imagery on 23 and 25 April at different times as indicated in the labels, from the radar composite over the Caribbean region. Blue/green colours represent low to moderate rainfall, while the yellow/red colours represent intense and very intense precipitation. The purple square highlights the location of Trinidad and Tobago. Source: Barbados Radar Composite³.

3 IMPACTS

At the time of writing this event briefing, and according to local news⁴, the heavy rains caused flash floods in South Trinidad; in Rio Claro, homes and commercial buildings were inundated. Floods caused the collapse of three culverts and rising levels of watercourses in the area.

Flooding of houses was reported in Santa Flora and Siparia. Several roads in Princes Town such as Penal Rock Road and Main Road were affected by flood waters.

³ Barbados Radar Composite, available on 23 and 25 April at:
https://www.barbadosweather.org/BMS_Radar_Composite_Resp.php#

⁴ [South reels after rains | News Extra | trinidadexpress.com](#)



Figure 4 Floodwaters along the SS Erin Road in Trinidad due to heavy rainfall. Source: Trinidadexpress.com

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH⁵, WRF5 and WRF7⁶, detected the occurrence of precipitation over Trinidad and Tobago and the surrounding waters during the period of 23 to 27 April 2023. However, each data source reported a specific distribution and accumulation of rainfall, as discussed below. The CARE for Trinidad was activated on 25 April and lasted for the period 25-27 April. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation⁷ and thus the period considered by the XSR 2.5 model for the loss estimate based on the accumulated precipitation in Trinidad was 23-27 April.

CMORPH reported total accumulated amounts of precipitation higher than 60 mm over most of Trinidad. The maximum values, between 120 mm and 140 mm, were shown in the north east area of the island.

WRF5 showed total accumulated values of precipitation higher than 80 mm over the eastern portion of Trinidad, with a maximum value between 100mm and 120mm in the vicinity of Matura. Over the rest of the island, the accumulated rainfall amount ranged between 20 mm and 80 mm.

WRF7 simulated total accumulated values of rainfall higher than 80 mm over the northwest portion of Trinidad, with maximum amounts, between 200 mm and 220 mm, in the vicinity of

⁵ 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.

⁶ 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.

⁷ 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.

Cunupia. Lower values were reported over the rest of the island.

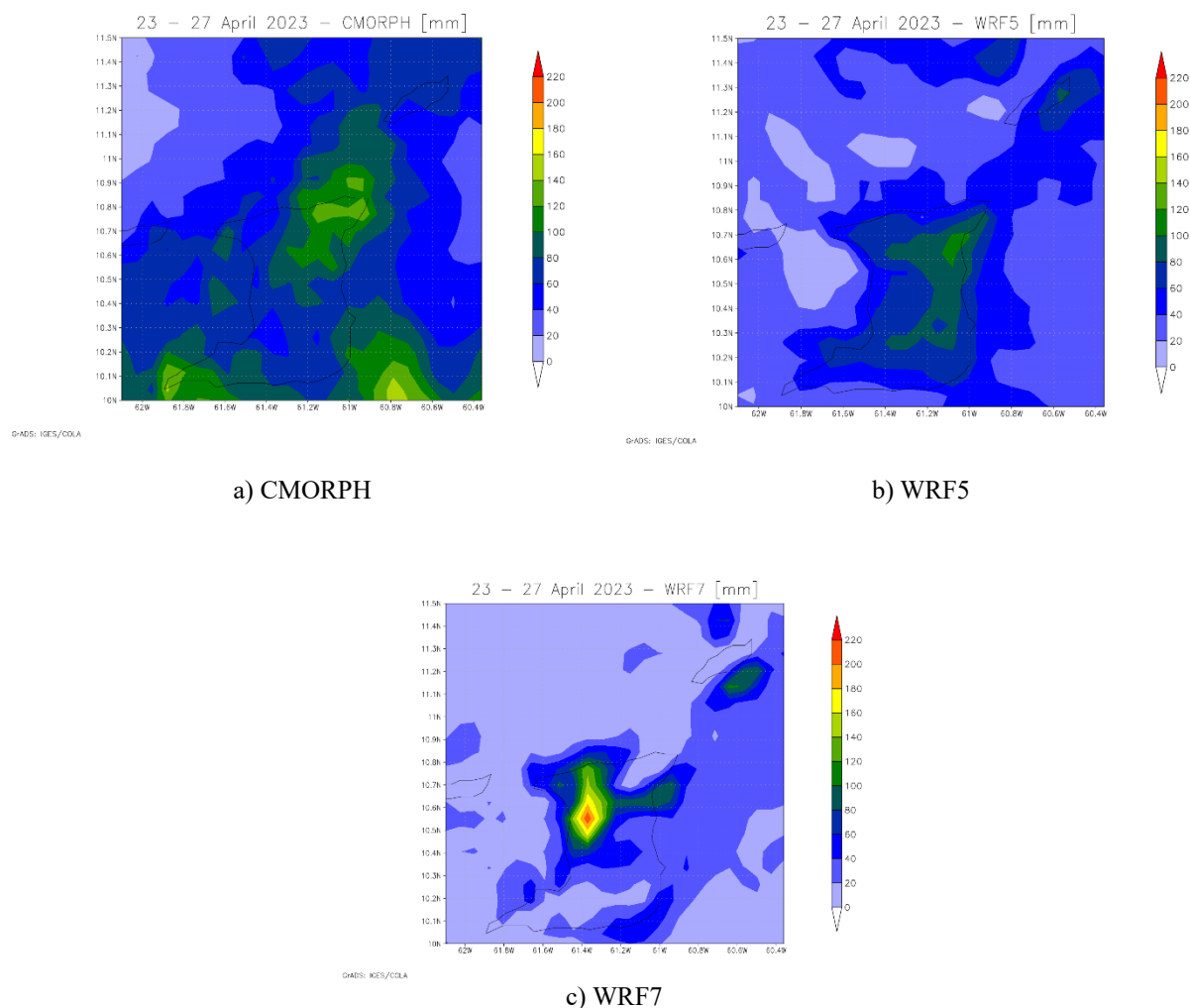


Figure 5 Total accumulated precipitation during the period 23-27 April, 2023 estimated by CMORPH (a), WRF5 (b) and WRF7 (c). Source: CCRIF SPC

Daily rainfall maps by CMORPH, WRF5 and WRF7 over the exposure map of XSR 2.5 are not included here 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_TRI/CARE_8_2022/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/TTO/TTO_TRI/CARE_8_2022/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Trinidad for all the three data sources used by XSR2.5: CMORPH, WRF5 and WRF7. The RIL was the highest for WRF7, due to the larger value of accumulated precipitation estimated over the western coast, the areas

characterized by the highest exposure for Trinidad.

The final RIL (RIL_{FINAL}) was calculated as the average of the three RILs from CMORPH, WRF5 and WRF7. The RIL_{FINAL} was greater than zero and therefore this CARE qualified as a loss event. However, the RIL_{FINAL} was below the attachment point of the excess rainfall policy for Trinidad and therefore it did not trigger a policy payout.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) for Trinidad, was below the attachment point of Trinidad and Tobago's Excess Rainfall policy for Trinidad and therefore no payout is due.

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

DEFINITIONS

<i>Active Exposure Cell Percentage Threshold</i>	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.
<i>Active Exposure Grid Cells</i>	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.
<i>Aggregate Rainfall #1</i>	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.
<i>Aggregate Rainfall #2</i>	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.
<i>Calculation Agent</i>	Entity charged with undertaking the primary calculation of the Rainfall Index Loss.
<i>CMORPH-based Maximum Aggregate Rainfall #1</i>	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.
<i>CMORPH-based Maximum Aggregate Rainfall #2</i>	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.
<i>CMORPH-based Covered Area Rainfall Parameters</i>	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'.
<i>CMORPH Model</i>	The satellite-based rainfall estimation model provided by NOAA CPC as described in the Rainfall Estimation Models section of the Policy.
<i>Covered Area</i>	The territory of the Insured as represented in the XSR Rainfall Model.
<i>Covered Area Rainfall Event</i>	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.
<i>Country Disaster Alert</i>	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.
<i>Maximum Aggregate Rainfall #1</i>	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.
<i>Maximum Aggregate Rainfall #2</i>	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.
<i>Rainfall Event Threshold #1</i>	Aggregate Rainfall #1 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.
<i>Rainfall Event Threshold #2</i>	Aggregate Rainfall #2 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.

<i>Rainfall Aggregation Period #1</i>	The number of hours over which the Aggregate Rainfall #1 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
<i>Rainfall Aggregation Period #2</i>	The number of hours over which the Aggregate Rainfall #2 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
<i>Rainfall Index Loss</i>	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.
<i>WRF5 Model</i>	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.
<i>WRF7 Model</i>	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.
<i>XSR Rainfall Model</i>	The computer model used to calculate the Rainfall Index Loss, as described in the Attachment entitled ‘Calculation of Rainfall Index Loss and Policy Payment’.
<i>XSR Exposure Grid Cells</i>	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.
<i>XSR Grid Cell Exposure Value</i>	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.