Covered Area Rainfall Event (31/08/2020 to 02/09/2020)

Excess Rainfall

Event Briefing

Trinidad and Tobago - Tobago

10 September 2020

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1 INTRODUCTION

The interaction of a tropical wave, a broad area of low pressure and an upper level low pressure area produced periods of showers and thunderstorm activity over the southeastern Caribbean Sea, Trinidad and Tobago and the surrounding areas between August 30 and 31, 2020. Tobago was affected by persistent and intense rainfall between 0800UTC and 1700UTC on 31 August.

The Government of Trinidad and Tobago has two separate Excess Rainfall policies – one for Trinidad and one for Tobago.

This event briefing describes the impact of rainfall on the island of Tobago, which was associated with a Covered Area Rainfall Event (CARE), starting on 31 August and ending on 2 September 2020. The Rainfall Index Loss (RIL) indicated government losses above the attachment point of Tobago's Excess Rainfall policy. Final calculations show that a payout of US$176,146.00 is due to the Government.

The Excess Rainfall policy for Trinidad was not triggered by this event and therefore no payout is due on this policy.

2 EVENT DESCRIPTION

On 30 August, a tropical wave accompanied by a broad area of low pressure was located over the southeastern Caribbean Sea along 64W (Figure 1). The associated shower and thunderstorms were active south of 15N between 61W-67W. Showers were also present over the Windward Islands.

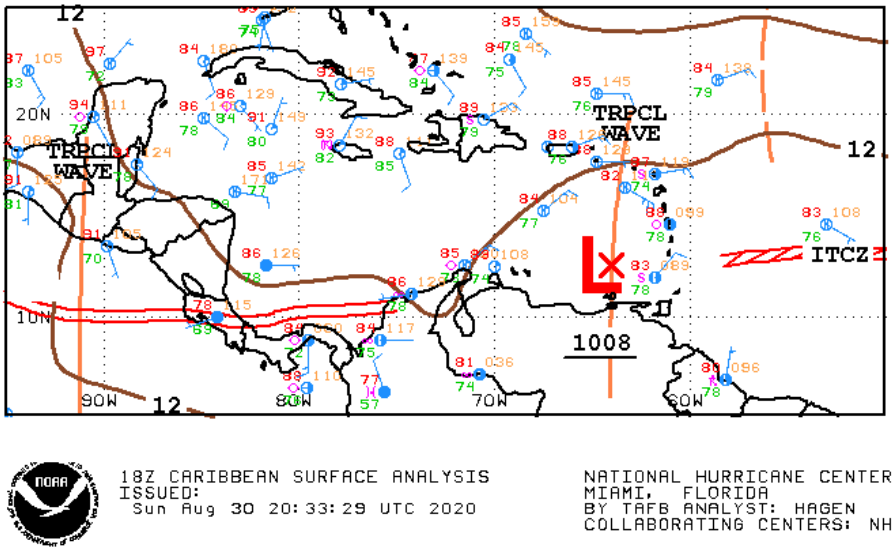


Figure 1 Surface analysis over the Central America and Caribbean area on 30 August at 1800UTC
Source: US National Hurricane Center[1]

1 National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review date: 30 August 2020, available at: *https://www.nhc.noaa.gov/tafb/CAR_12Z.gif*

On the following day, on 31 August, the tropical wave and associated low pressure at the surface level moved over the central Caribbean Sea, leaving some residual instability and air moisture over the area.

On 31 August, an upper level low pressure area developed over northern Venezuela, in the vicinity of Trinidad and Tobago (Figure 1), while at the lower level an area of cyclonic circulation built up over Trinidad and Tobago. The combination of the instability created by this pressure configuration and the availability of humid air over Trinidad and Tobago and the surrounding areas (Figure 1) led to development of a row of thunderstorms with axis near 12N from 57W to 63W. The thunderstorms caused heavy precipitation over Tobago, the southern Windward Islands and the surrounding waters (Figure 2). Tobago was affected by persistent and intense rainfall on 31 August from 0800UTC to 1700UTC, due to the passage of several active thunderstorms over the island (Figure 2).

On 1 and 2 September, the environment was less favourable for the development of any convection activity and very little precipitation was experienced over Tobago.

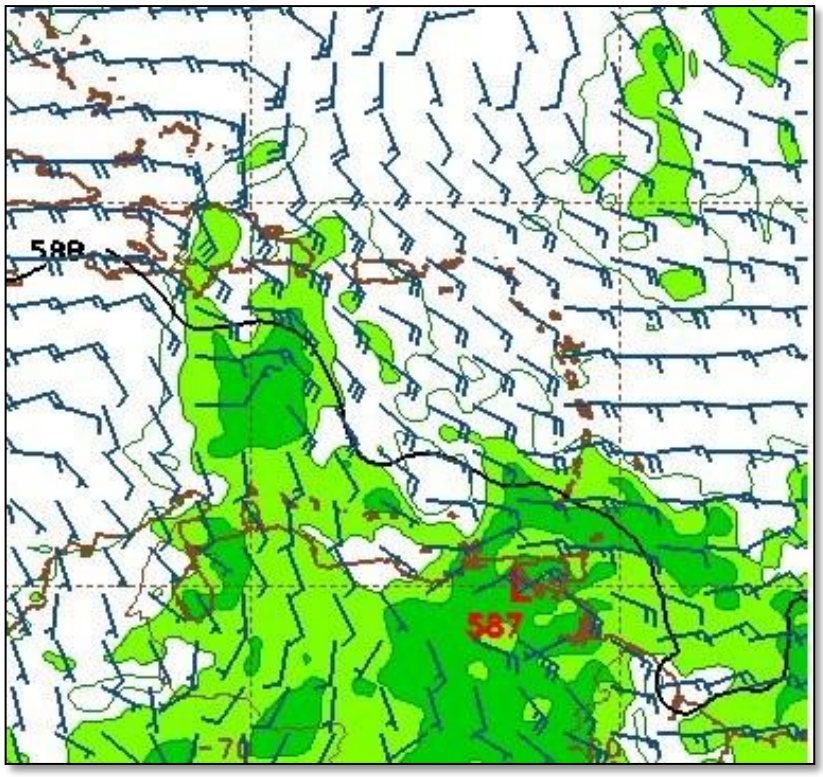


Figure 1 Upper level analysis (at 500mb) simulated by the model GFS over the Caribbean area on 31 August at 1200UTC. The low pressure centered to the west of Trinidad is indicated by the letter 'L'.
Source: Source: US National Oceanic and Atmospheric Administration Center[2]

2 National Oceanic and Atmospheric Administration - FTP, review date: 31 August 2020, available at: *https://mag.ncep.noaa.gov/data/gfs/12/west-atl/500_rh_ht/gfs_west-atl_000_500_rh_ht.gif*

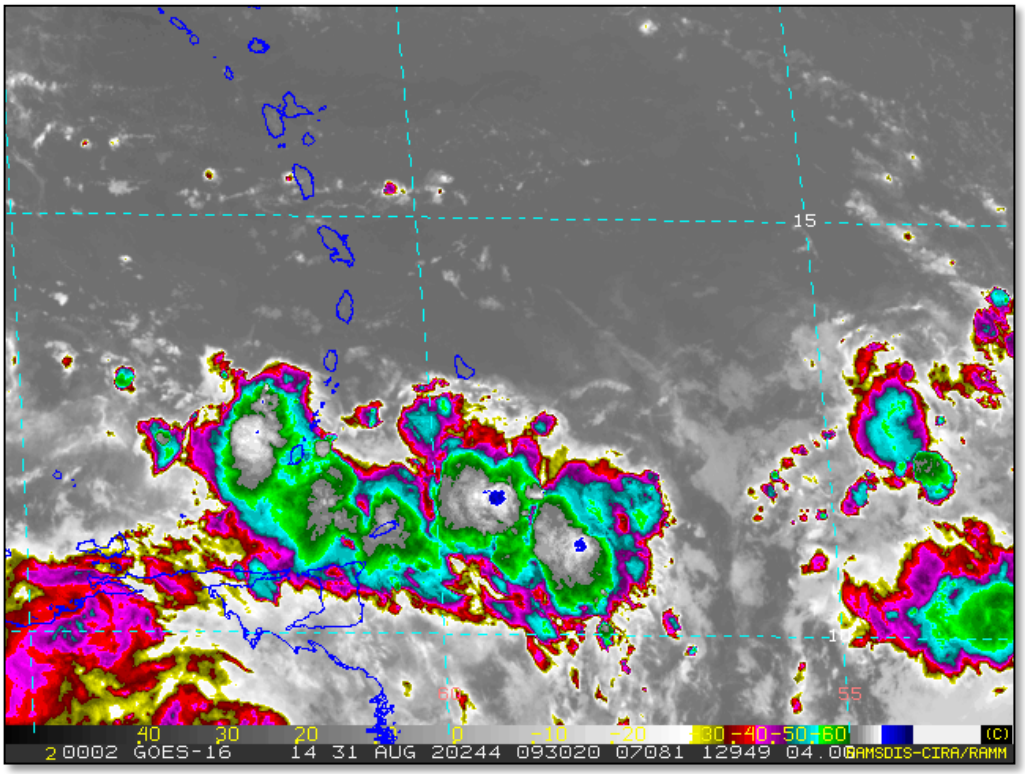


Figure 3 Satellite imagery on 31 August at 0820UTC from thermal infrared channel enhanced with colour. Cyan/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the white/blue colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National Environmental Satellite, Data and Information Service[3]

3 IMPACTS

At the time of this event brief, no information was available related to damage or loss in Tobago due to this CARE. According to the weather reports from the Trinidad and Tobago Meteorological Service, an Active Atlantic Tropical Wave was closely monitored and an Adverse Weather Alert was put into effect on Tuesday 1 September.

A subsequent version of this report may be updated with information contained in official reports or communications that may be issued by the Government of the Trinidad and Tobago.

3 RAMSDIS Online Archive, NOAA Satellite and Information Service, review date: 31 August 2020, available at: *http://rammb.cira.colostate.edu/ramsdis/online/archive.asp?data_folder=tropical/tropical_ge_14km_wv&width=640&height=480*

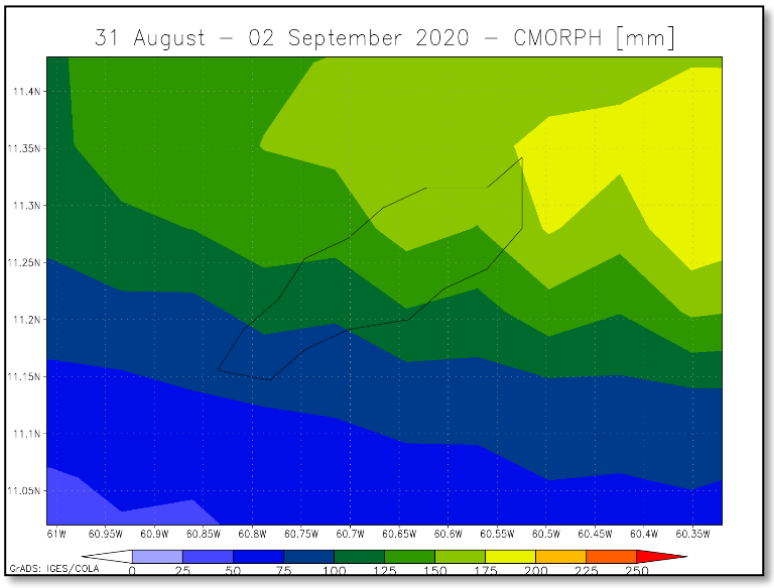
4 RAINFALL MODEL OUTPUTS

Two of the three data sources used by the XSR 2.5 model, CMORPH[4] and WRF5[5], detected the occurrence of precipitation over Tobago and the surrounding waters during the period 31 August - 02 September 2020. However, each data source reported differing distributions of rainfall, as discussed below.

CMORPH reported total accumulated amounts of precipitation higher than 100 mm over most of Tobago. The largest values of precipitation were shown over the northern portion with values between 150 mm and 175 mm.

WRF5 presented total accumulated amounts of rainfall with values greater than 25 mm over the entire island of Tobago. However, it reported a peak in a localized area in the central area of the south coast of the island (between Mount St George and Goodwood) with amounts between 50 mm and 75 mm.

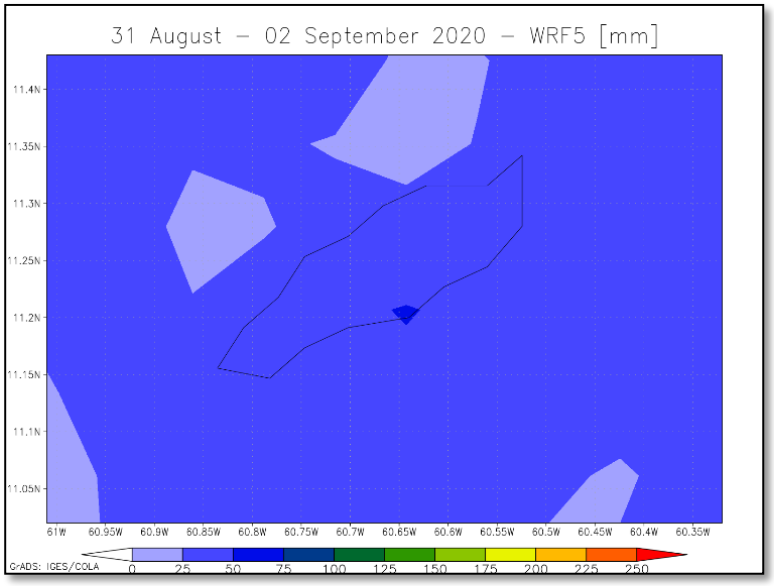
WRF7 did not show precipitation over Tobago during the period 31 August – 02 September.



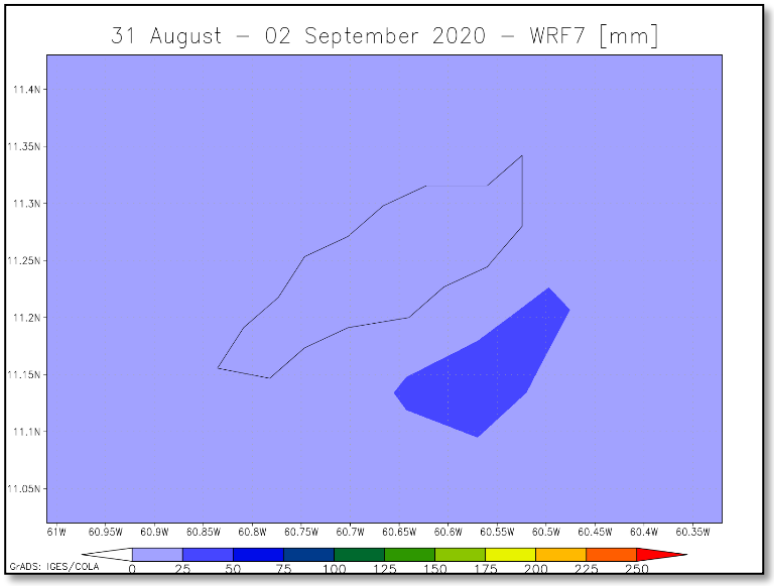
a) CMORPH

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.



b) WRF5



c) WRF7

Figure 4 Total accumulated precipitation during 31 August - 02 September 2020 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_TOB/CARE_4_2020/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/TTO/TTO_TOB/CARE_4_2020/daily_prec_long.mp4

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

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs for the CMORPH and WRF5 data sources. The RIL_{FINAL} was higher than the attachment point of Tobago's Excess Rainfall policy. Therefore, a policy payout is triggered and a payment is due under the Excess Rainfall policy for Tobago.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) that started on 31 August and ended on 2 September 2020, produced government losses which were above the attachment point of Tobago's Excess Rainfall policy. Final calculations show that a payout of US$176,146.00 is due to the Government of Trinidad and Tobago.

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.