



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

Excess Rainfall

Event Briefing

Grenada

10 September 2020

1 INTRODUCTION

The interaction of a tropical wave, a broad area low pressure and an upper level low pressure produced periods of showers and thunderstorm activity over the south-eastern Caribbean Sea, Trinidad and Tobago and the surrounding areas between August 30 and 31, 2020. Grenada was affected by intense rainfall on 31 August from 0730UTC to 1130UTC.

This event briefing describes the impact of rainfall on Grenada, 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) was below the attachment point of Grenada’s Excess Rainfall policy and therefore no payout is due to the Government of Grenada.

2 EVENT DESCRIPTION

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

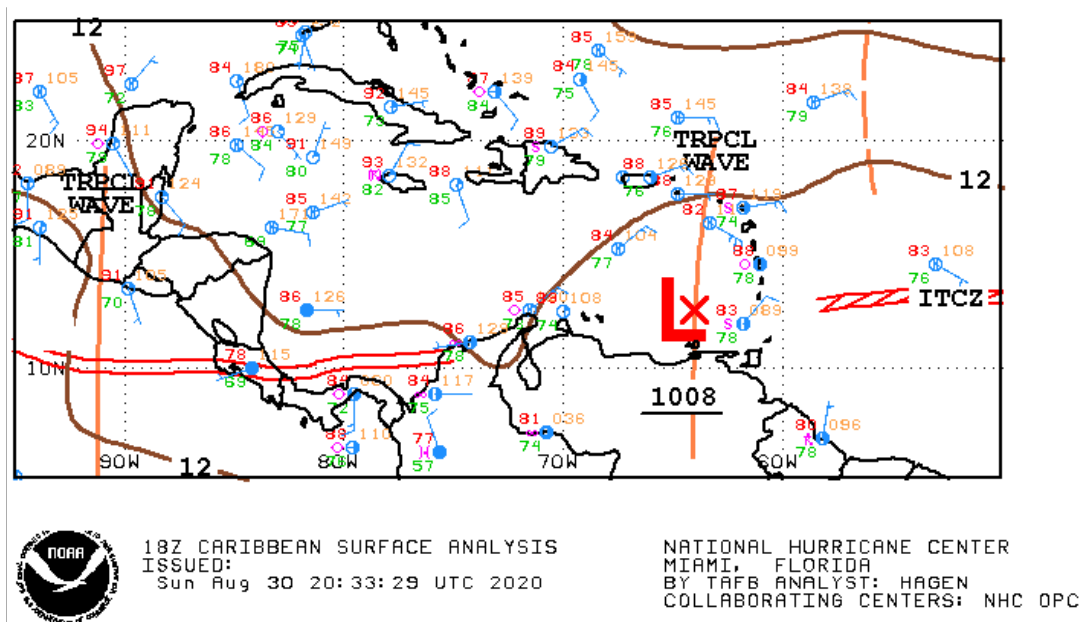


Figure 1 Surface analysis over the Central America and Caribbean area on 30 August at 1800UTC
Source: US National Hurricane Center¹

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 31 August, the tropical wave and the associated low pressure at the surface level moved over the central Caribbean Sea, leaving the Windward Islands. However, on the same day, an upper level low pressure area developed over northern Venezuela, in the vicinity of Trinidad and Tobago (Figure 2), 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 presence of humid air over Trinidad and Tobago and the surrounding areas (Figure 2) led to the development of a row of thunderstorms with axis near 12N from 57W to 63W. The thunderstorms affected Tobago, the southern Windward Islands and surrounding waters with heavy precipitation (Figure 3). Grenada was affected by intense rainfall on 31 August from 0730UTC to 1130UTC, due to the passage of some active thunderstorms over the island (Figure 3).

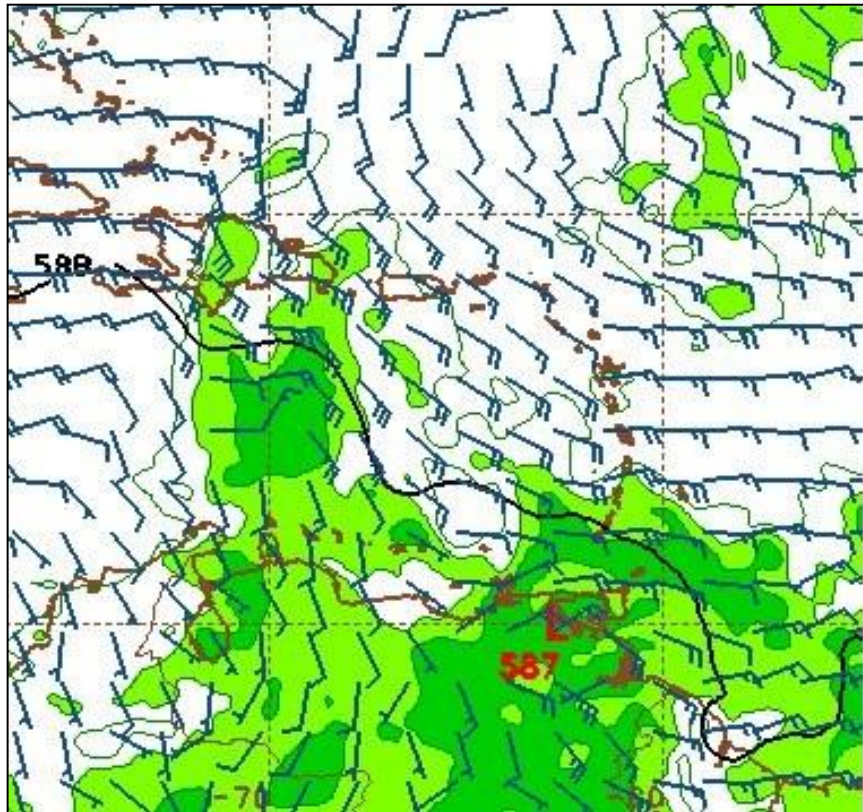


Figure 2 Upper level analysis (at 500mb) simulated by the model GFS over the Caribbean area on 31 August at 1200UTC. The low pressure centered to the west of Trinidad is indicated by the letter 'L'.

Source: Source: US National Oceanic and Atmospheric Administration Center²

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

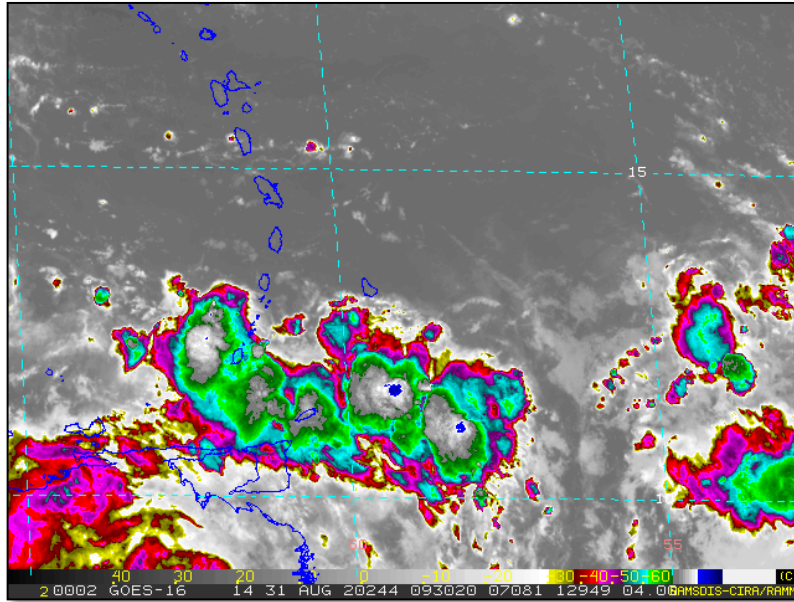


Figure 3 Satellite imagery on 31 August at 0820UTC from thermal infrared channel enhanced with colour. Cyan/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the white/blue colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National Environmental Satellite, Data and Information Service³

3 IMPACTS

At the time of this event brief, no information was available related to damage or loss in Grenada due to this CARE. However, 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 Grenada.

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH⁴, WRF5 and WRF7⁵, detected the occurrence of precipitation over Grenada and the surrounding waters during the period 31

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 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.

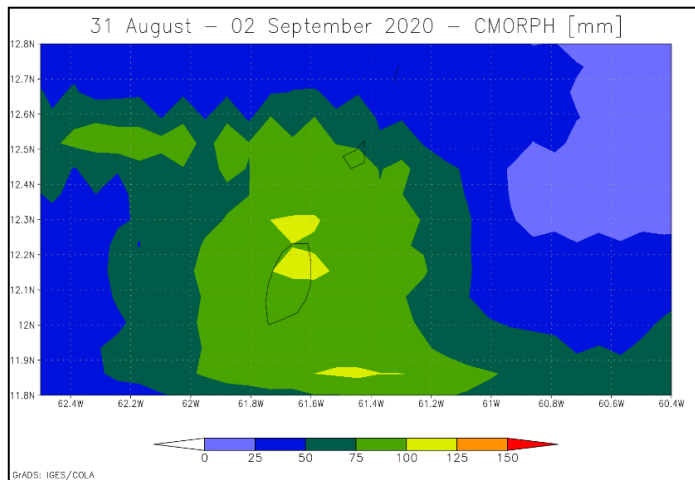
⁵ WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data <https://www.mmm.ucar.edu/weather-research-and-forecasting-model>. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [<http://rda.ucar.edu/datasets/ds083.2/>]).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

August - 02 September 2020. However, each data source reported differing distributions of rainfall, as discussed below.

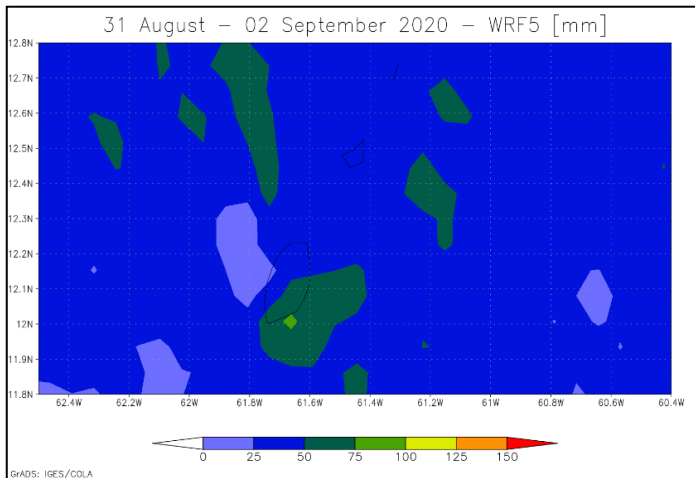
CMORPH reported total accumulated amounts of precipitation higher than 75 mm over most of Grenada. The largest values of precipitation were shown over the northern portion of the main island⁶ with values between 100 mm and 125 mm.

WRF5 presented total accumulated amounts of rainfall with values greater than 25 mm over the main island of Grenada. However, it reported a peak in the south-east quarter of the island (Saint David parish, part of Saint Andrew parish and the southern area of Saint George parish) with amounts between 50 mm and 75 mm.

WRF7 showed total accumulated amounts of precipitation higher than 25 mm over the northern and southeastern areas of the main island of Grenada.

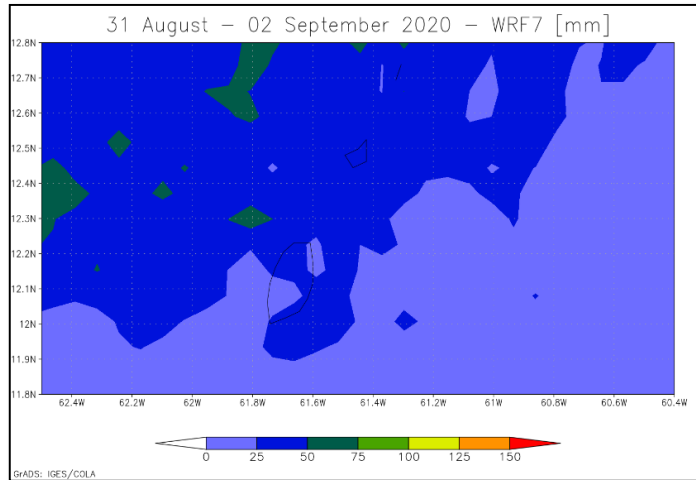


a) CMORPH



b) WRF5

⁶ Grenada Island: the largest island of Grenada country. Other smaller islands that belong to Grenada country are Carriacou and Petite Martinique, located to the north-northeast of Grenada Island.



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/GRD/CARE_2_2020/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/GRD/CARE_2_2020/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Grenada for two of the 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 of Grenada.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs for the CMORPH and WRF5 data sources. 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 Grenada's Excess Rainfall policy and thus did not trigger a policy payout.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event was below the attachment point of Grenada's Excess Rainfall policy 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

	<p>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’.</p>
<i>CMORPH Model</i>	<p>The satellite-based rainfall estimation model provided by NOAA CPC as described in the Rainfall Estimation Models section of the Policy.</p>
<i>Covered Area</i>	<p>The territory of the Insured as represented in the XSR Rainfall Model.</p>
<i>Covered Area Rainfall Event</i>	<p>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.</p>
<i>Country Disaster Alert</i>	<p>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.</p>
<i>Maximum Aggregate Rainfall #1</i>	<p>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.</p>
<i>Maximum Aggregate Rainfall #2</i>	<p>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.</p>
<i>Rainfall Event Threshold #1</i>	<p>Aggregate Rainfall #1 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.</p>
<i>Rainfall Event Threshold #2</i>	<p>Aggregate Rainfall #2 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.</p>

<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.