CCRIF SPC
The Caribbean Catastrophe Risk Insurance Facility

Covered Area Rainfall Event (24/08/2020)

Excess Rainfall

Event Briefing

Jamaica

1 September 2020

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 INTRODUCTION

Jamaica was under the influence of Tropical Storm Laura resulting in adverse weather conditions that occurred between 23 August (2300UTC) and 24 August (0900UTC), 2020. During this period, Jamaica was affected by intense rainfall.

This event briefing describes the impact of rainfall on Jamaica, which was associated with a Covered Area Rainfall Event (CARE), starting and ending on 24 August 2020. The Rainfall Index Loss (RIL) was below the attachment point of Jamaica's Excess Rainfall policy and therefore no payout is due to the Government of Jamaica.

2 EVENT DESCRIPTION

On 21 August at 1305UTC, the US National Hurricane Center (NHC) reported that a tropical storm developed from the tropical depression centered east-southeast of the northern Leeward Islands. The tropical storm was named Laura. The system moved towards the west along the south periphery of the Bermuda-Azores high pressure system located over the Atlantic Ocean and, on the same day, it approached the northern Leeward Islands affecting these islands with tropical storm conditions.

On 22 August, the tropical storm left the Leeward Islands heading for the north-eastern Caribbean Sea. The system moved with slightly increased forward velocity (21 mph, 33 km/h) towards the west-northwest, heading for the island of Hispaniola.

On 23 August, the centre of Tropical Storm Laura passed over the Dominican Republic and Haiti, investing these countries with tropical storm conditions. The cloud pattern of the system appeared more organized, the estimated maximum sustained winds were slightly increased to near 50 mph (85 km/h) and the minimum central pressure decreased to 1004 mb.

The favourable environment led to a continuous intensification of the system and on 24 August at 0000UTC, the minimum central pressure further lowered to 1000 mb and the maximum sustained winds strengthened to 60 mph (95 km/h). At this time, the centre of Laura was located at 20.0N 75.6W, over south-east Cuba, about 156 mi (250 km) to the north-east of Kingston, Jamaica (Figure 1). As illustrated by the satellite data, the bulk of the deep convection was in the southern semicircle of Laura's circulation, being located over Jamaica (Figure 2). In particular, this country was affected by the intense precipitation associated with the tropical storm from 23 August at 2300UTC to 24 August at 0900UTC (Figure 2). The NHC reported heavy rainfall and flash flooding in Jamaica, the Cayman Islands, and areas of Cuba.

Approximately three hours later, the tropical storm left Jamaica, moving towards the north-northwest over inland Cuba and continued to intensify, becoming a category 1 hurricane on 25 August while it moved over the south-east waters of the Gulf of Mexico.

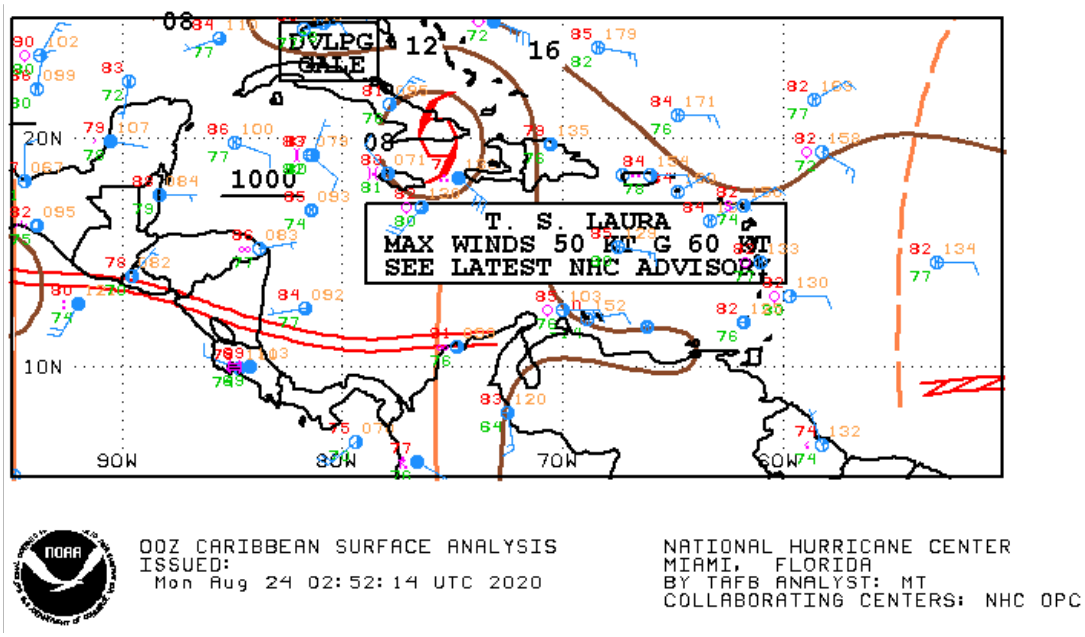
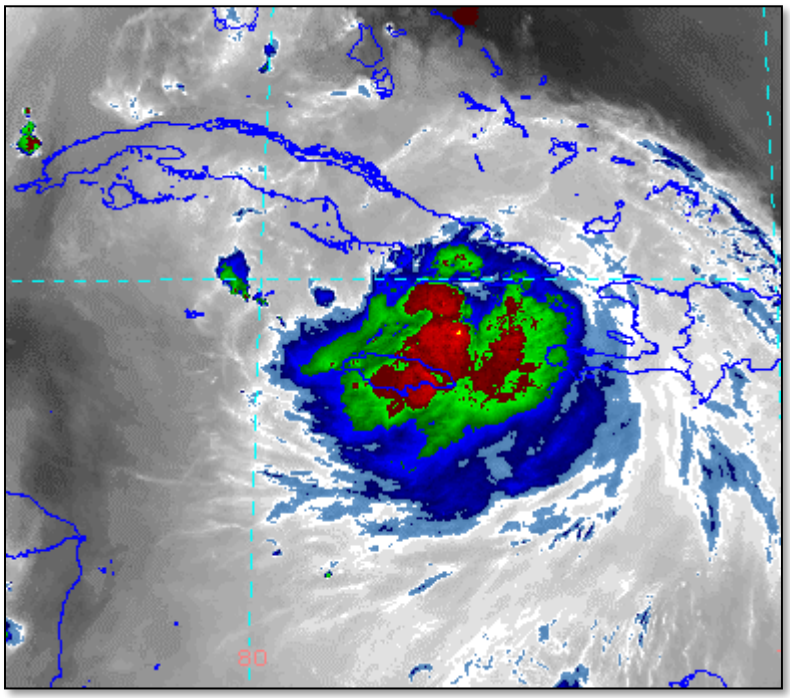
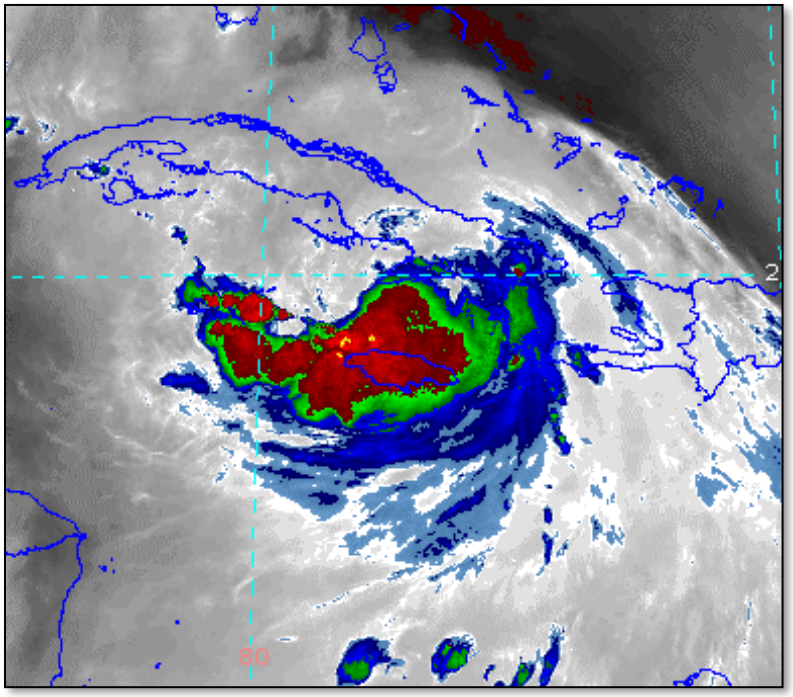


Figure 1 Surface analysis over the Central America and Caribbean area on 24 August at 0000UTC
Source: US National Hurricane Center[1]



a) 24 August at 0150UTC

[1] National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review date: 24 August 2020, available at: *https://www.nhc.noaa.gov/tafb/CAR_18Z.gif* and *https://www.nhc.noaa.gov/tafb/CAR_12Z.gif*



b) 24 August at 0510UTC

Figure 2 Satellite imagery at different times as indicated by the captions from 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: Source: NOAA Satellite and Information Service[2]

3 IMPACTS

The Manager of Communication and Customer Service of the National Works Agency (NWA) reported that the parishes of Kingston, St. Andrew, Clarendon, St. Thomas, St. Catherine, Westmoreland, Trelawny and Hanover were affected following the passage of Tropical Storm Laura. The majority of the impacts were related to flooding, landslides, and fallen trees that affected roads and infrastructure.

According to the information published in the local news[3], in St. Andrew there were landslides due to heavy rains that blocked several roads and some houses were damaged by overflowing rivers. In St. Thomas a road and a bridge were damaged by floods caused by an overflowing river, while in Clarendon, due to the heavy rains, water supply services were disrupted and the greatest damage was caused by a landslide that affected a main road.

[2] RAMSDIS Online Archive, NOAA Satellite and Information Service, review date: 30 August 2020, available at: *http://rammb.cira.colostate.edu/ramsdis/online/archive.asp?data_folder=tropical/tropical_ge_14km_wv&width=640&height=480*

[3] Jamaica Observer, review date: 31 August 2020, available at: *http://www.jamaicaobserver.com/*

According to the reports from the Meteorological Service Jamaica and the Office of Disaster Preparedness and Emergency Management (ODPEM), Tropical Storm Laura was closely monitored. Prior to the arrival of the storm, Jamaica's authorities took precautionary measures such as activating Flash Flood and Tropical Storm Warning alerts.

Figure 3 shows some of the damage caused by Tropical Storm Laura in Jamaica.

Maxfield Avenue, St Andrew

Papine to Gordon Town main road, St. Andrew

Papine to Gordon Town main road, St. Andrew

Bull Bay, St. Andrew

Gordon Town, St. Andrew

Park Hall, Clarendon

Figure 3 Damage caused by Tropical Storm Laura in Jamaica – August 24-25, 2020
Source: *Jamaica Observer*

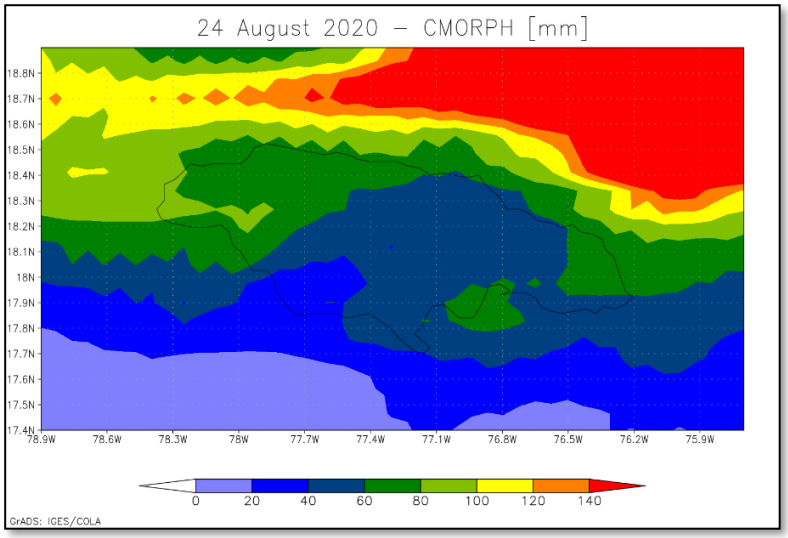
4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH[4], WRF5 and WRF7[5], simulated the occurrence of precipitation over Jamaica and the surrounding waters on 24 August 2020 associated with Tropical Storm Laura. However, each data source reported differing distributions of rainfall, as discussed below.

CMORPH reported total accumulated amounts of precipitation higher than 40 mm over most of Jamaica. The largest values of precipitation were shown over the western and eastern portions and over a small area near the capital Kingston with amounts between 60 mm and 100 mm.

WRF5 simulated total accumulated amounts of rainfall with values generally larger than 20 mm over the south coast of Jamaica. It reported higher peaks in localized areas in the east and on the south central coast (where the exposure is lower than that the Kingston area) with maximum values higher than 60 mm.

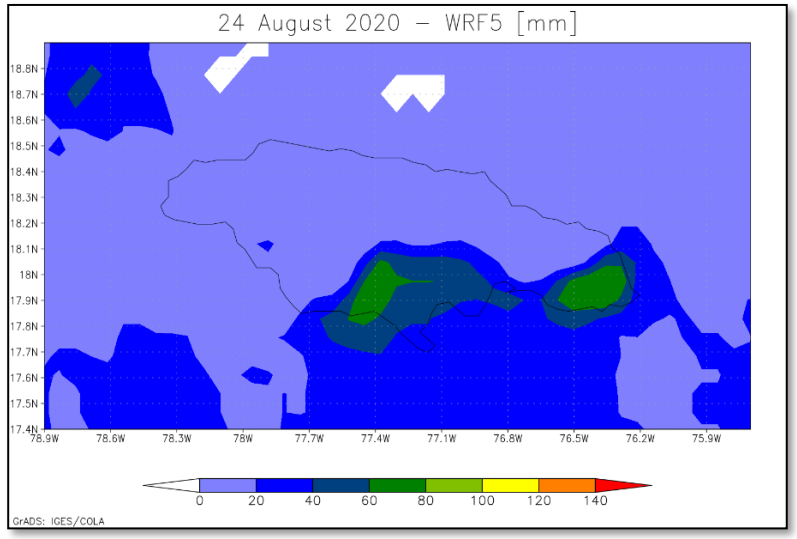
WRF7 showed total accumulated amounts of precipitation higher than 20 mm over the southern area of Jamaica. The largest values of precipitation were shown over Kingston and the areas east and west of the capital, with amounts between 60 mm and 100 mm.



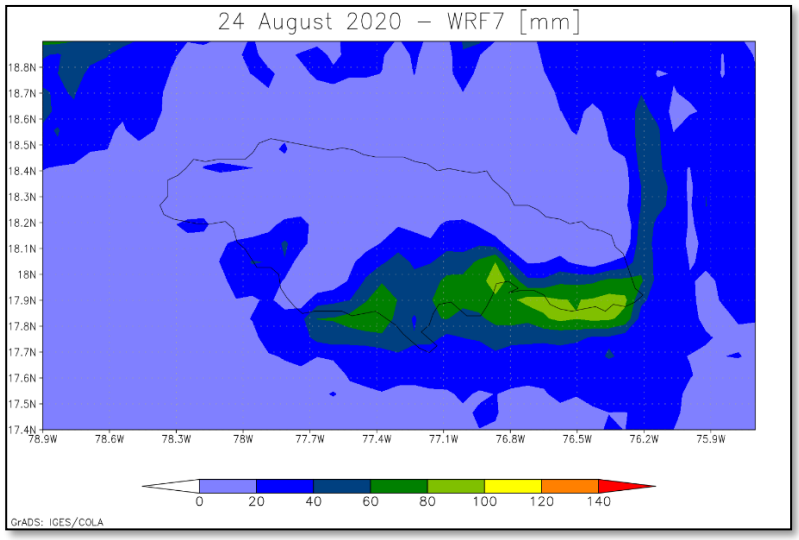
a) CMORPH

[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 on 24 August 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/JAM/CARE_1_2020/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/JAM/CARE_1_2020/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Jamaica for two of the data sources used by XSR2.5: CMORPH and WRF7. The RIL was higher for WRF7 due to the amounts of accumulated precipitation presented over the south coast, over Kingston and surrounding areas, an area characterized by high exposure.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs for the CMORPH and WRF7 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 Jamaica'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 Jamaica's Excess Rainfall policy and therefore no payout is due to the Government.

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.