



Covered Area Rainfall Event (02/07/2021 to 04/07/2021)

Excess Rainfall

Event Briefing

Saint Lucia

13 July 2021

1 INTRODUCTION

Saint Lucia was affected by Tropical Cyclone Elsa, which caused adverse weather conditions that occurred between 2 July and 3 July, 2021. During this period, Saint Lucia was affected by intense rainfall.

This event briefing describes the impact of rainfall on Saint Lucia, which was associated with a Covered Area Rainfall Event (CARE), starting on 2 July and ending on 4 July 2021. The Rainfall Index Loss (RIL) was below the attachment point of the excess rainfall policy for Saint Lucia and therefore no payout is due.

As reported in a separate tropical cyclone event briefing, “TC Elsa: Windward Islands” dated 4 July 2021, Saint Lucia experienced heavy rains and strong winds from the system. The final runs of the CCRIF loss model for tropical cyclone produced losses below the attachment point of Saint Lucia’s tropical cyclone policy and no payout under the policy is due. However, the Aggregate Deductible Cover¹ (ADC – Endorsement) was activated and a payment of US\$136,468.80 was due under that endorsement to the tropical cyclone policy.

¹ The Aggregated Deductible Cover (ADC) is a special feature of CCRIF’s tropical cyclone (TC) and earthquake (EQ) parametric insurance policies. The ADC is designed to potentially provide a payment for TC and EQ events that are objectively not sufficient to trigger the country’s main policy because the modelled loss is below the Underlying Policy Attachment Point

2 EVENT DESCRIPTION

On 30 June, 2021, a tropical disturbance in the Atlantic was reported by the US National Hurricane Center (NHC). A broad area of low pressure, associated with a tropical wave was reported to be moving to the west over the Atlantic. The disturbance was called Potential Tropical Cyclone Five, its structure was disorganized and it produced a large area of showers and thunderstorms. Despite its poor organization, it gradually strengthened becoming Tropical Storm Elsa on 1 July. Tropical Storm Elsa continued moving to the west at a velocity of near 25 mph (41 km/h), with maximum sustained winds near 40 mph (65 km/h) with higher gusts and minimum central pressure of 1006 mb, progressively intensifying as it approached the Windward Islands. Locally heavy rains were expected.

On 2 July, at 1145 UTC, NHC reported that Tropical Storm Elsa was upgraded to Hurricane Elsa. At 1500 UTC the centre of Hurricane Elsa passed near Saint Lucia at a velocity near 29 mph (46 km/h), with maximum sustained winds of 75 mph (120 km/h) and minimum central pressure of 995 mb (Figure 2a). Hurricane-force winds extended outward up to 25 miles (35 km) from the centre and tropical-storm-force winds extended outward up to 140 miles (220 km). As expected, Hurricane Elsa brought intense precipitation to the country (Figure 2). Over the next several hours it continued moving quickly to the west-northwest heading toward the eastern Caribbean Sea (Figure 1), which led to the end of intense precipitation in Saint Lucia.

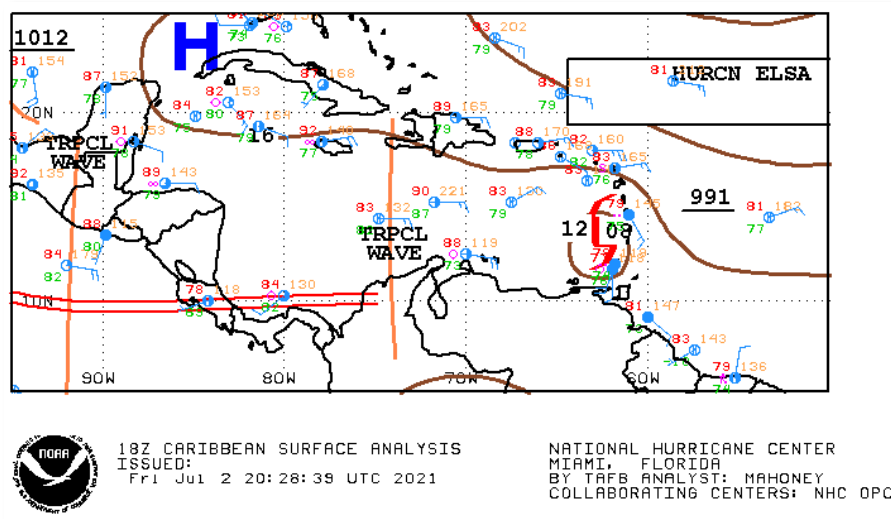
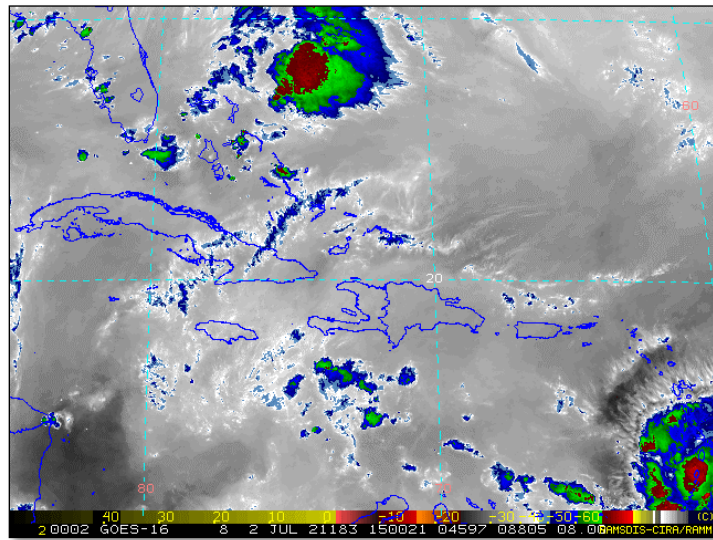
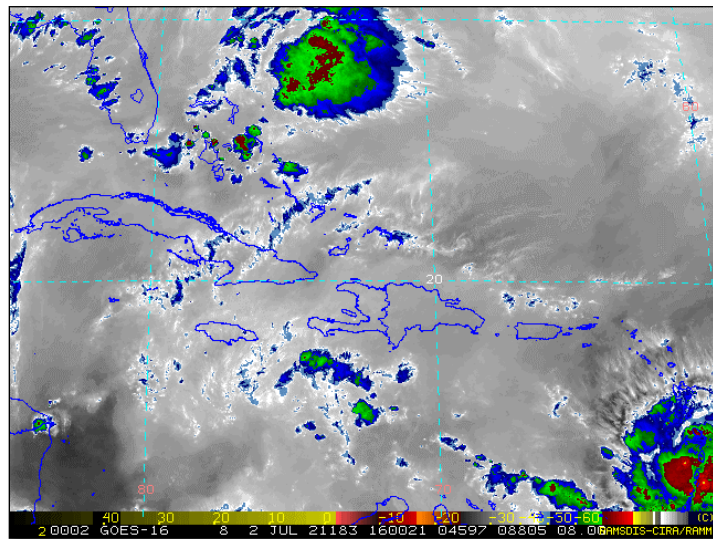


Figure 1 Surface analysis over the Caribbean area on 2 July at 20:28:39 UTC.
Source: US National Hurricane Center²

² National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review date: 3 July 2021, available at: https://www.nhc.noaa.gov/tafb/CAR_18Z.gif



a) 2 July 2021 at 1500UTC



b) 2 July 2021 at 1600UTC

Figure 2 Satellite imagery at the time as indicated by the labels 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: NOAA Satellite and Information Service³

³ RAMSDIS Online Archive, NOAA Satellite and Information Service, available at:
https://rammb.cira.colostate.edu/ramsdiskonline/images/rmtc/rmtcsasec4ir404/rmtcsasec4ir404_20210702150021.gif
https://rammb.cira.colostate.edu/ramsdiskonline/images/rmtc/rmtcsasec4ir304/rmtcsasec4ir304_20210702150021.gif

3 IMPACTS

According to the Caribbean Disaster Emergency Management Agency (CDEMA) and with information published in the news⁴, following the passage of Tropical Cyclone Elsa across Saint Lucia; one person died in Soufrière⁵. The major physical impact was from wind damage: roofs, three government buildings and a secondary school were damaged. Telecommunications and water infrastructure were damaged. Falling trees damaged power lines and homes, leaving 30% of the population without service. Impacts were observed across the agriculture and fisheries sectors.

Saint Lucia's Prime Minister, Allen Chastanet, reported that the greatest amount of damage was in agriculture. Several houses including the state-owned housing project in the heart of the capital, Castries, were damaged by Hurricane Elsa.

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH⁶, WRF5 and WRF7⁷, detected the occurrence of precipitation over Saint Lucia and the surrounding waters during the period 2 July – 4 July, 2021. However, each data source reported a specific distribution of rainfall, as discussed below and shown in Figure 3.

CMORPH presented total accumulated amounts of precipitation of about 100 mm over the entire country.

WRF5 simulated total accumulated amounts of rainfall with different values over the whole country. The lowest values were shown on the western part of Saint Lucia with amounts of 40 mm to 60 mm and the highest values were in the eastern part of the country, ranging between 120 mm and 160 mm. The amounts of precipitation increased gradually going from west to east in the country. In central areas of the country the amounts of rainfall were between 80 mm and 120 mm.

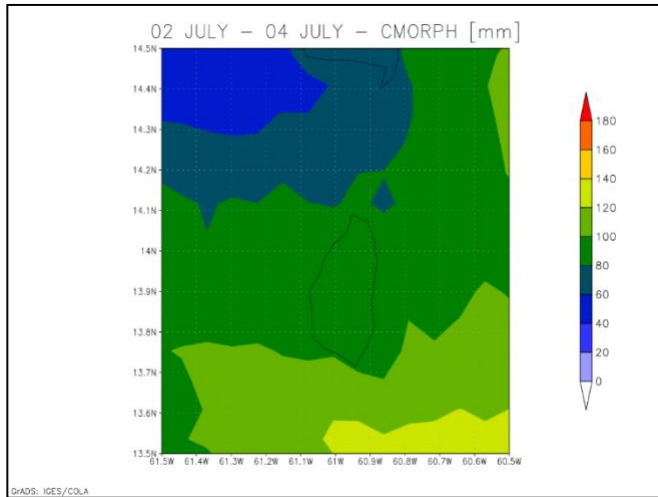
WRF7, like WRF5, showed different values of the precipitation over the country. However, in most parts of the country values were between 60 mm (in the north and south) and 80 mm. The eastern parts of the country again showed higher precipitation values, in the range between 100 mm and 140 mm.

⁴ CBC Radio-Canada, review date: 4 July 2021, available at: '[Tropical storm Elsa leaves at least 3 dead in Caribbean, heads toward Cuba, Florida](#)'

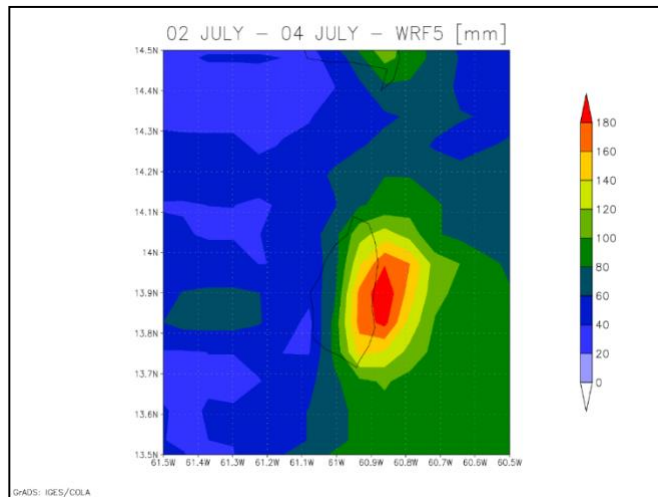
⁵ Caribbean Disaster Emergency Management Agency (CDEMA), Situation Report No. 3 (As of 4:00 PM on July 6, 2021), review date: 6 July 2020, available at: '[Tropical Storm Elsa](#)'

⁶ 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.

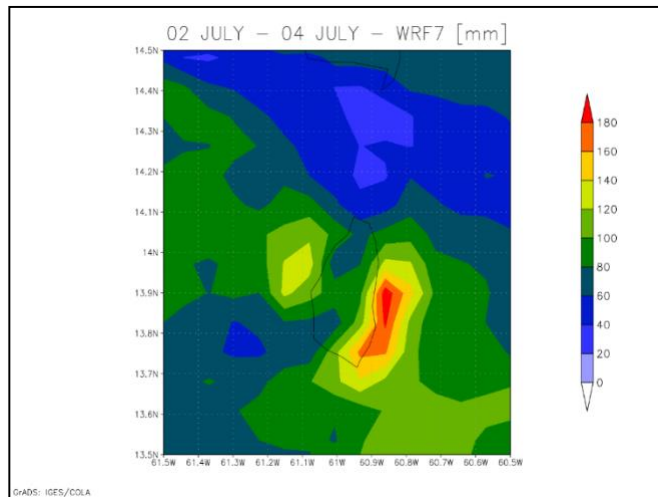
⁷ WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data <https://www.mmm.ucar.edu/weather-research-and-forecasting-model>. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [<http://rda.ucar.edu/datasets/ds083.2/>]). Further details in the Definitions section of this report.



a) CMORPH



b) WRF5



c) WRF7

Figure 1 Total accumulated precipitation during the period 2 July – 4 July, 2021 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/LCA/CARE_1_2021/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/LCA/CARE_1_2021/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was just above the loss threshold for Saint Lucia for one of data sources used by XSR2.5: CMORPH, while the RIL was below the loss threshold for this country for both WRF5 and WRF7.

Consequently, the final RIL (RIL_{FINAL}) was equal to the RIL from CMORPH (since it was the only data source with an RIL above the loss threshold). The RIL_{FINAL} was greater than zero and a Disaster Alert for Hurricane Elsa was issued for Saint Lucia by Relief Web. Therefore, this CARE qualified as a loss event. However, the RIL_{FINAL} was below the attachment point of the excess rainfall policy of Saint Lucia and thus did not trigger a policy payment.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event was below the attachment point of Saint Lucia'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.