Covered Area Rainfall Event (02/07/2021 to 03/07/2021)

Excess Rainfall

Event Briefing

St. Vincent and the Grenadines

11 July 2021

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1 INTRODUCTION

St. Vincent and the Grenadines was affected by Tropical Cyclone Elsa, which caused adverse weather conditions that occurred between 2 July and 3 July, 2021. During this period, St. Vincent and the Grenadines was affected by heavy rainfall.

This event briefing describes the impact of rainfall on St. Vincent and the Grenadines, which was associated with a Covered Area Rainfall Event (CARE), starting on 2 July and ending on 3 July 2021. The Rainfall Index Loss (RIL) was below the attachment point of the excess rainfall policy for St. Vincent and the Grenadines and therefore no payout is due.

As reported in a separate tropical cyclone event briefing, "TC Elsa: Windward Islands" dated 4 July 2021, St. Vincent and the Grenadines experienced heavy rains and strong winds from the system. The final runs of the CCRIF loss model produced losses below the attachment point of St. Vincent and the Grenadines' tropical cyclone policy and no payout under the policy is due. However, the Aggregate Deductible Cover[1] (ADC – Endorsement) was activated and a payment of US$48,988.03 is 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. This tropical disturbance had a disorganized character, producing a large area of showers and thunderstorms and these circumstances continued through the next several hours as the system approached the Windward Islands.

The following day, on 1 July, this tropical disturbance, previously named Potential Tropical Cyclone Five, was upgraded to Tropical Storm Elsa. Over the next several hours the system strengthened, with ever increasing velocity and maximum sustained winds. Locally heavy rains were expected.

On 2 July, Tropical Storm Elsa intensified and became Hurricane Elsa. At 1500 UTC the centre of Hurricane Elsa was reported to be passing near St. Vincent and the Grenadines (about 5 mi (10 km) N of St. Vincent). Maximum sustained winds were 75 mph (120 km/h) and minimum central pressure was 995 mb. As expected, Hurricane Elsa brought heavy rainfall to the country (Figure 2).

Hurricane Elsa continued moving to the west-northwest leaving the area and heading toward the eastern Caribbean Sea (Figure 1), resulting in the end of heavy rainfall activity over St. Vincent and the Grenadines.

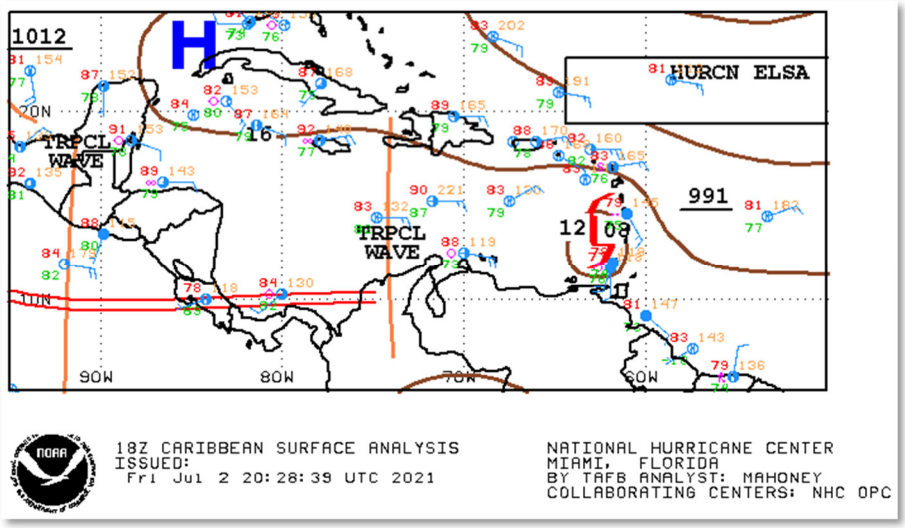
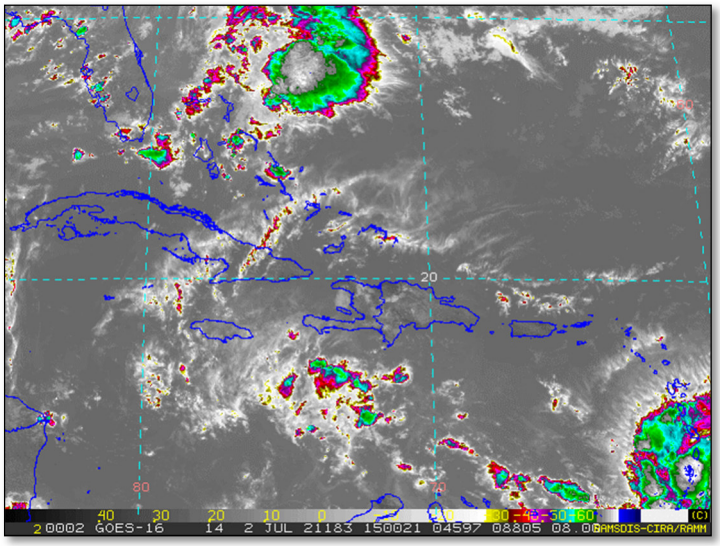
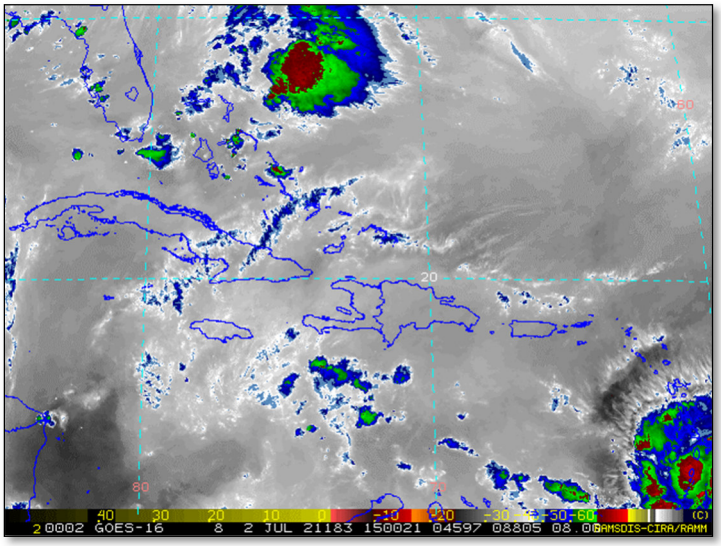


Figure 1 Surface analysis over the Caribbean area on 2 July at 20:28:39 UTC.
Source: US National Hurricane Center[2]

[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 1500UTC

Figure 2 Satellite imagery at different times as indicated in 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 Service[3]

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

3 IMPACTS

According to information published in the news[4], as a result of Tropical Storm Elsa, several towns in St. Vincent and the Grenadines were affected by wind and rainfall with the main impacts due to wind; about 40 homes and three police stations were damaged. The storm also resulted in fallen power poles, which affected roads and other infrastructure.

Prior to the arrival of Tropical Storm Elsa, St. Vincent and the Grenadines' authorities took precautionary measures such as activating a Hurricane Warning.

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH[5], WRF5 and WRF7[6], detected the occurrence of precipitation over Saint Vincent and the Grenadines and the surrounding waters during the period 2 July – 3 July 2021. However, each data source reported a specific distribution of rainfall, as discussed below and shown in Figure 3.

CMORPH reported total accumulated amounts of precipitation of about 120 mm over the entire country. Smaller amounts of precipitation were presented in the far west of the country with values of around 80 mm.

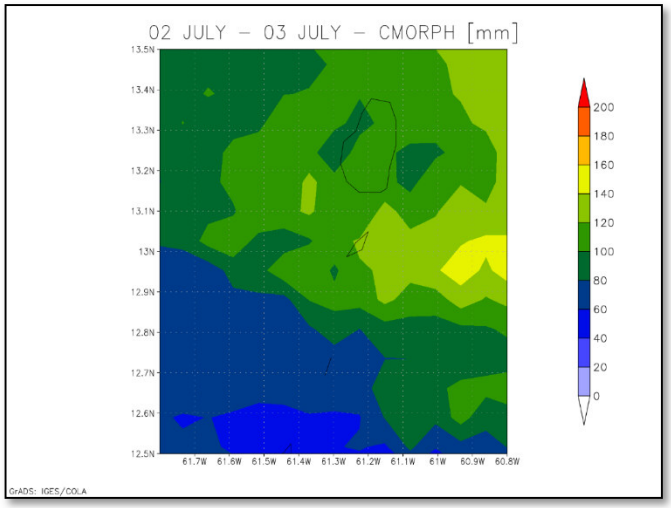
WRF5 simulated total accumulated amounts of rainfall with different values over the whole country. The values increased gradually from western to eastern areas of St. Vincent and the Grenadines, with the lowest values of 40 mm to 60 mm on the west. Values in the eastern part of the country varied from 80 mm to 140 mm, with the highest value of 160 mm in the most eastern areas of the country.

WRF7, like WRF5, showed different values of the precipitation over the whole country. Again, lower values of precipitation were shown in the western parts of the country with the values of around 60 mm, except on the southwest were the precipitation reached 80 mm. In the middle area of the country the precipitation values were between 80 mm and 100 mm, while the highest values were shown in the eastern areas of the country reaching 120 mm. On the south-eastern part of the country the precipitation was around 140 mm, near the Bequia and Mustique islands.

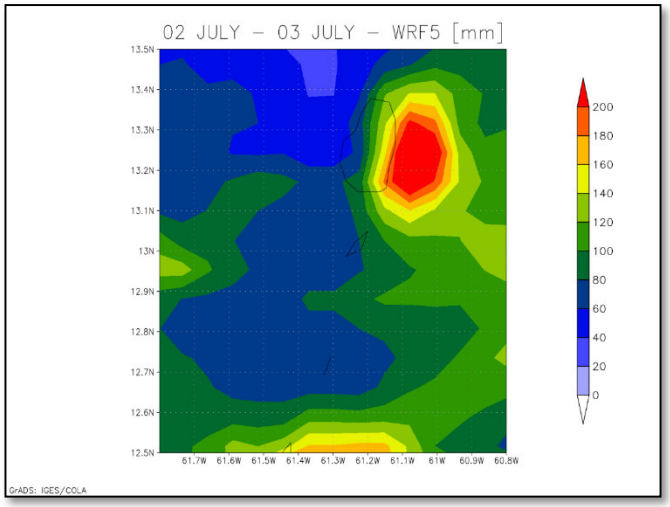
[4] CBC Radio-Canada, review date: 4 July 2021, available at: '*Tropical storm Elsa leaves at least 3 dead in Caribbean, heads toward Cuba, Florida*'

[5] 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.

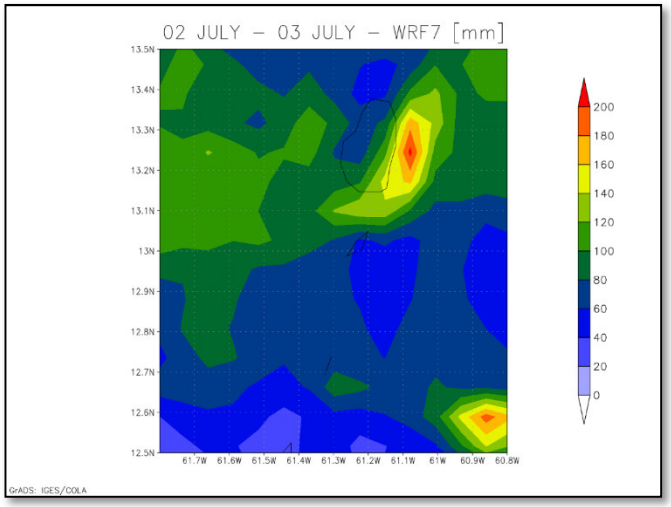
[6] WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data *https://www.mmm.ucar.edu/weather-research-and-forecasting-model*. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [*http://rda.ucar.edu/datasets/ds083.2/*]).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



a) CMORPH



b) WRF5



c) WRF7

Figure 3 Total accumulated precipitation during the period 2 July – 3 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/VCT/CARE_2_2021/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/VCT/CARE_2_2021/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for St. Vincent and the Grenadines for two of the data sources used by XSR2.5: WRF5 and WRF7. The RIL was higher for WRF7 due to the higher amounts of accumulated precipitation.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs for the WRF5 and WRF7 data sources. The RIL_{FINAL} was greater than zero and a Disaster Alert for Hurricane Elsa was issued for St. Vincent and the Grenadines. Therefore, this CARE qualified as a loss event. However, the RIL_{FINAL} was below the attachment point of the excess rainfall policy of St. Vincent and the Grenadines 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 St. Vincent and the Grenadines' excess rainfall policy and therefore no payout is due.

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.