Covered Area Rainfall Event (11/11/2023 to 11/11/2023)

# Excess Rainfall

Event Briefing

Grenada

17 November 2023

1   INTRODUCTION

This event briefing describes the impact of rainfall on Grenada, which was associated with a Covered Area Rainfall Event (CARE), on November 11, 2023. The Rainfall Index Loss (RIL) for the Covered Area Rainfall Event was below the attachment point of the Grenada's Excess Rainfall policy, and therefore no payout is due to the Government of Grenada.

2   EVENT DESCRIPTION

On 11 November, a surface trough approached the southeastern Caribbean Basin. At 1200UTC, it extended along longitude 55°West, from latitude 7°North to 12°North, and was moving westward (Figure 1). Scattered moderate convection was present over a large area to the west and in the vicinity of the trough, from 8°North to 13°North, between 54°West and 62°West (Figure 2). The associated moderate to locally intense precipitation started to affect the southern Windward Islands, and in particular Grenada, at 1200UTC and lasted for 12 hours (Figure 3). After the passage of the trough, the shower activity gradually ceased over the region.
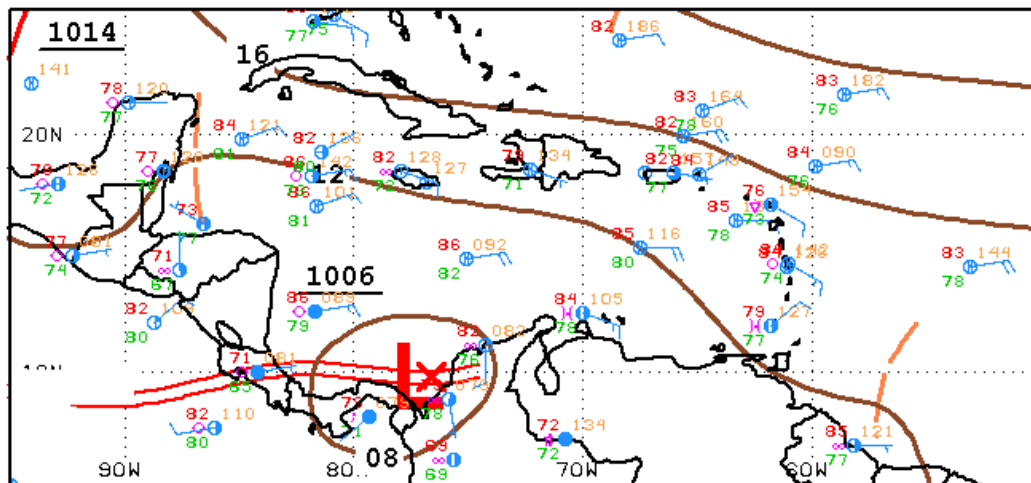
11 November at 1200UTC
Figure 1 Surface analysis over the Caribbean Basin on 11 November 2023 at 1200 UTC. Source: US National Hurricane Center[1]

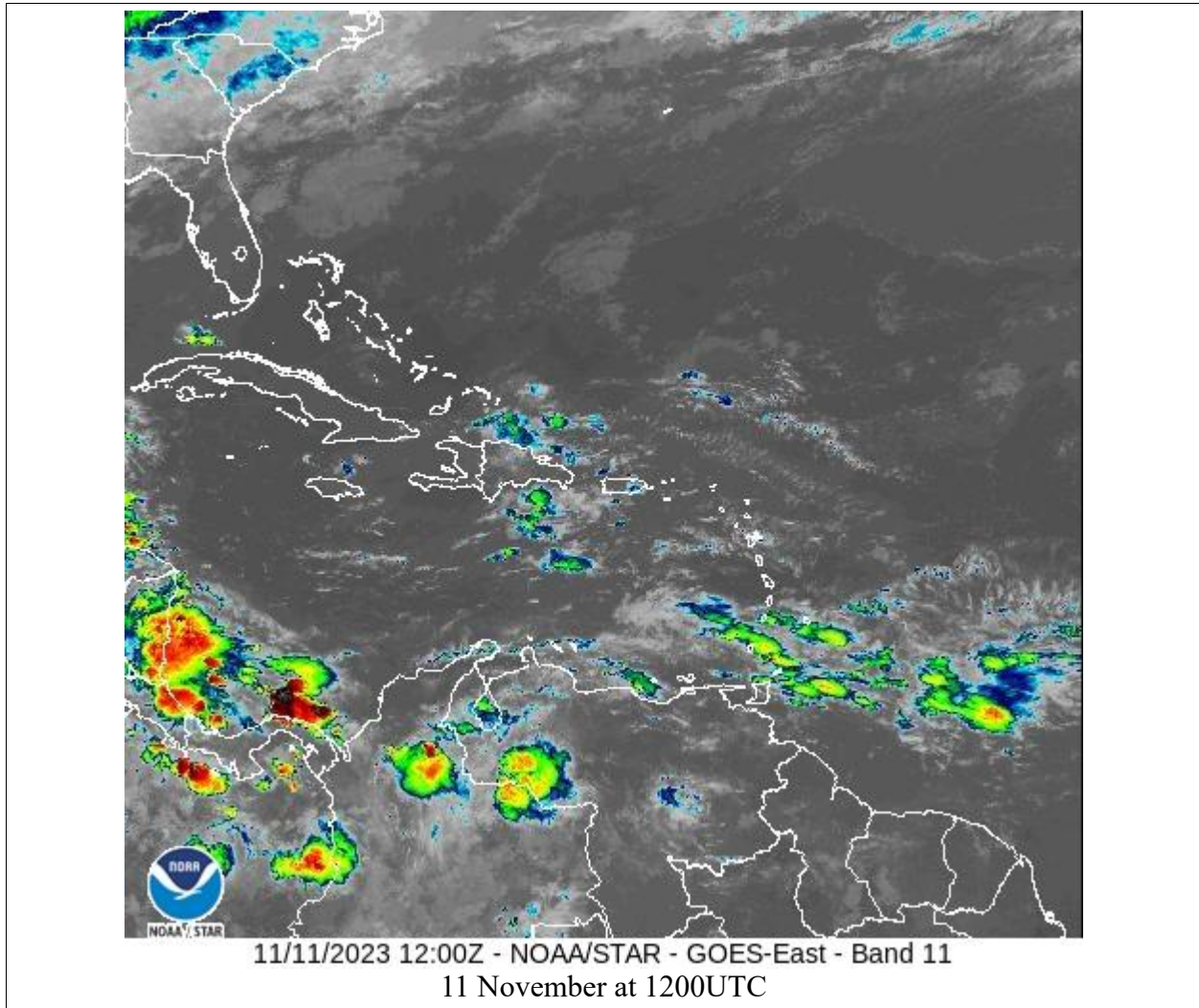11/11/2023 12:00Z - NOAA/STAR - GOES-East - Band 11
11 November at 1200UTC

Figure 2 Satellite imagery on 11 November, 2023 at 1200UTC from the 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, National Environmental Satellite, GOES Image View[2]. The violet square indicates the area of disturbed weather associated to the surface trough.

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2   NESDIS Online Archive, NOAA National Environmental Satellite, GOES Image View, available at: https://www.star.nesdis.noaa.gov/GOES/sector.php?sat=G16&sector=cam
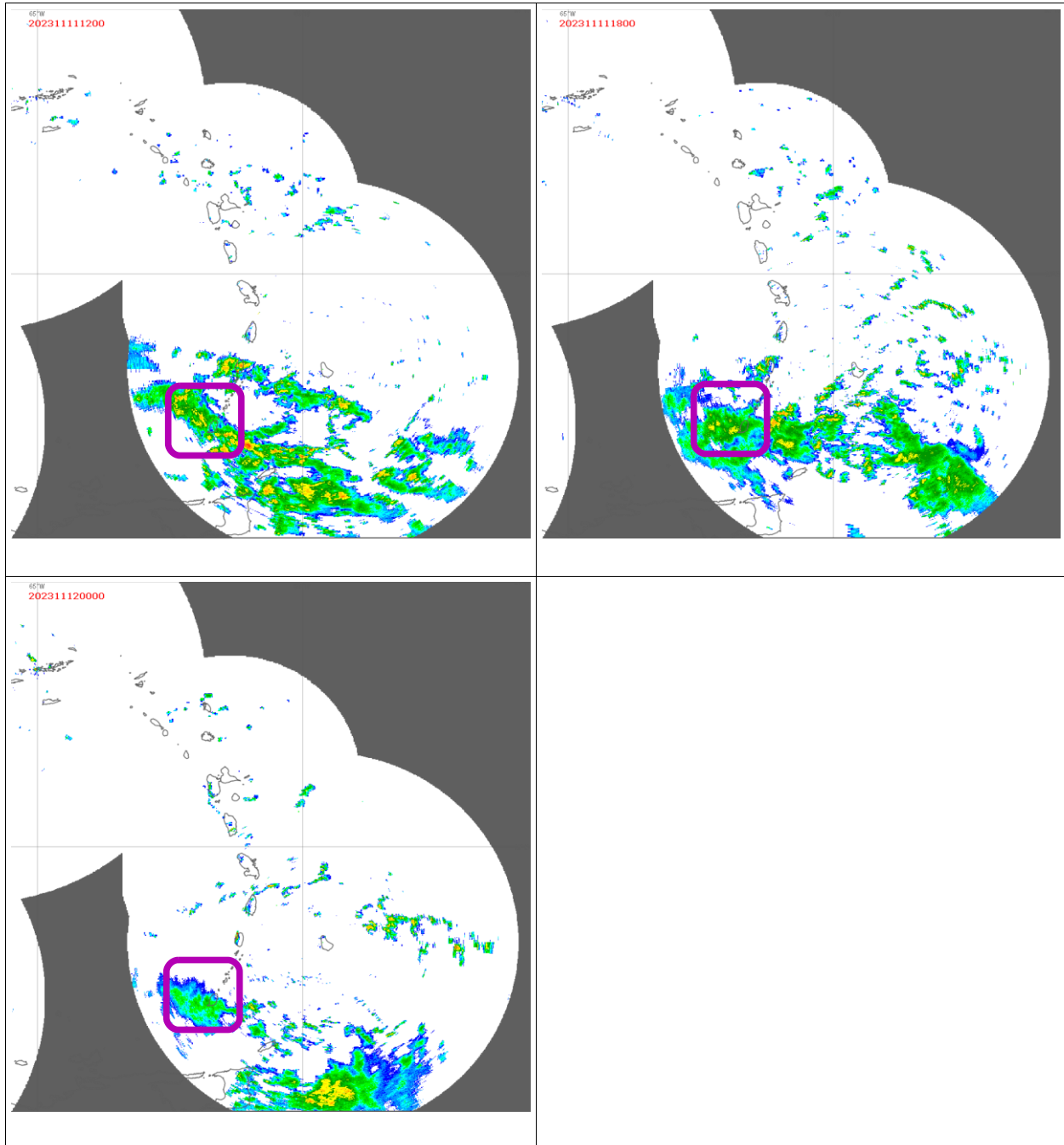
Figure 3 Radar imagery on 11 November, 2023 at different times as indicated by the labels from the radar composite over the Caribbean and Central America region. Blue/green colours represent low to moderate rainfall, while the yellow/red colours represent intense and very intense precipitation. Dominica is surrounded by a purple square. Source: Barbados Radar Composite[3]. The violet square indicates the position of Grenada.

3   Barbados Radar Composite, available on 11 November 2023 at:
https://www.barbadosweather.org/BMS_Radar_Composite_Resp.php#

3   IMPACTS

At the time of writing this report, information related to damage or loss in Grenada due to this Covered Area Rainfall Event during the indicated period was limited. On November 12 local news reported a fallen tree directly on a family´s home. There was no reported loss of life and there were no serious injuries reported. Ron Redhead, MP for St George Northeast, reported on social media the occurrence of landslides and downed trees. [4]

Figure 4 Tempe Main Road partially blocked by a fallen tree on Sunday 12. (Photo via: Minister Ronhead/Facebook)

4   RAINFALL MODEL OUTPUTS

All data sources used by the XSR 3.0 model, CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15[5], detected the occurrence of precipitation over Grenada and the surrounding waters during the period 9 to 11 November 2023. However, each data source reported a specific distribution and accumulation of rainfall, as discussed below and shown in Figure 4. A CARE for Grenada was activated on 11 November and lasted for one day. The CARE was activated due to the use of the

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4   Loop News: Moderate rainfall affects Grenada and SVG | Loop Caribbean News (loopnews.com)

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 are provided in the Definitions section of this report

IMERG Model: The satellite-based rainfall estimation model developed by NASA, expressed in mm, derived by aggregating the IMERG 30-minute Rainfall Data at 10km spatial resolution and available at *https://jsimpsonhttps.pps.eosdis.nasa.gov/imerg/late*. Further details in the Definitions section of this report

WRF5, WRF7, WRF11 and WRF15 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 are provided in the Definitions section of this report.

12-hour and the 48-hour aggregation intervals for precipitation[6] and thus the period considered by the XSR 3.0 model for the loss estimate based on the accumulated precipitation in Grenada was 9-11 November.

CMORPH reported total accumulated values of precipitation between 60 mm and 90 mm over the southern portion of Grenada, mostly over Saint George and Saint David parishes. Lower values were shown over the remainder of the country.

IMERG reported total accumulated values of precipitation between 30 mm and 60 mm over Grenada, while lower values were shown over the smaller islands to the north.

WRF5 showed total accumulated values of precipitation higher than 60 mm over most of Grenada, increasing from west to east. The maximum values, between 120 mm and 150 mm, were reported over a small area in Saint Andrew parish.

WRF7 showed total accumulated values of precipitation lower than 30 mm over the entire country.

WRF11 showed total accumulated values of precipitation higher than 60 mm over the central part of Grenada, in the vicinity of Saint Catherine Mount, and over most of the Grenadines. Lower values were shown over the remainder of Grenada.

WRF15 showed total accumulated values of precipitation between 60 mm and 90 mm over Saint Andrew parish and over most of the Grenadines. Lower values were shown over the remainder of the Grenada.
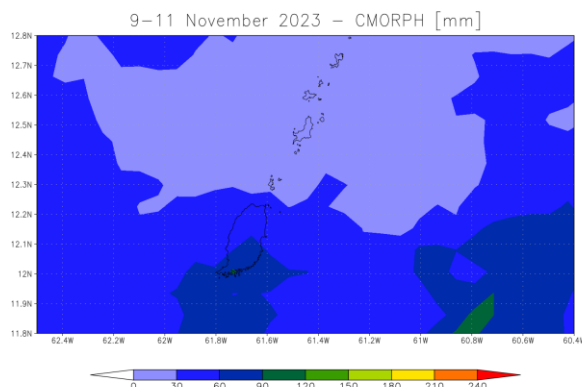
a) CMORPH
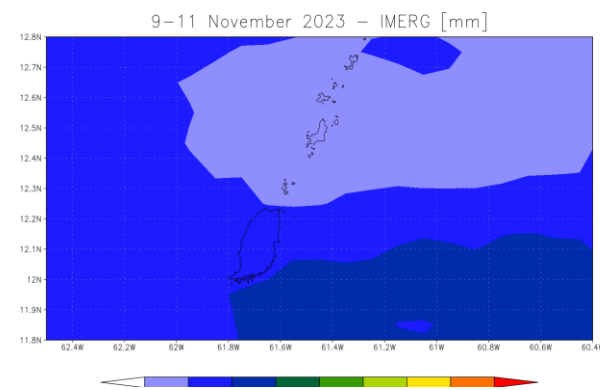
a) IMERG

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6   The two aggregation periods correspond to the Rainfall Aggregation Period #1 and Rainfall Aggregation Period #2, as indicated in the Schedule. Further details in the Definitions section of this report.
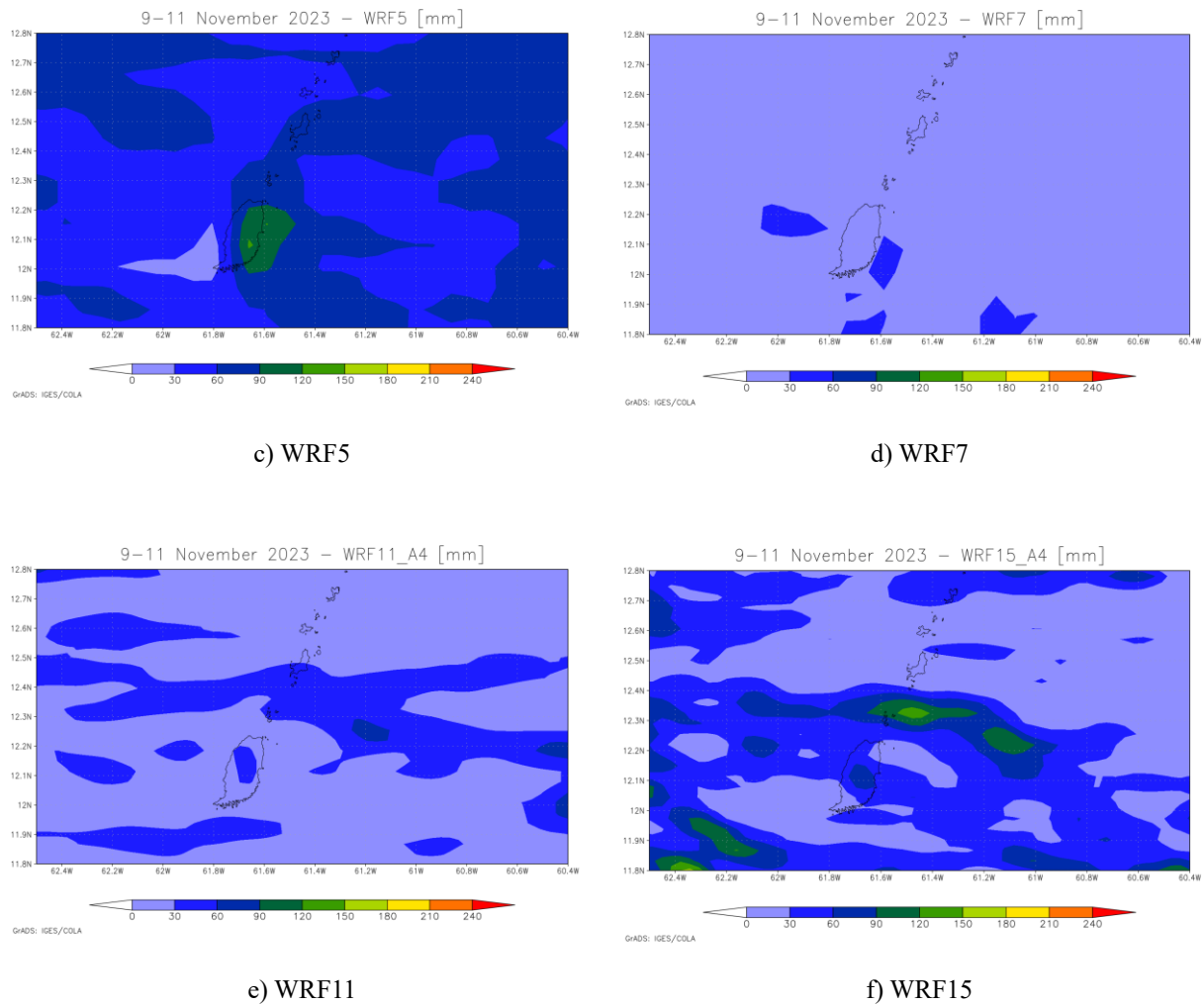
c) WRF5

d) WRF7

e) WRF11

f) WRF15

Figure 4 Total accumulated precipitation during the period 9-11 November, 2023
estimated by CMORPH (a), IMERG (b), WRF5 (c), WRF7 (d), WRF11 (e), WRF15 (f). Source: CCRIF SPC

Daily rainfall maps by CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15 over the exposure map of XSR 3.0 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_2023/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/GRD/CARE_2_2023/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Grenada for three data sources used by XSR3.0: CMORPH, IMERG and WRF5. The RIL was the highest for WRF5.

The final RIL (RIL$_{FINAL}$) was calculated as the average of the three RILs from CMORPH,

IMERG and WRF5. 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 therefore the policy was not triggered. Therefore, no payout is due under this Excess Rainfall policy to the Government of Grenada.

The Wet Season Trigger (WST) component of the XSR3.0 model did not identify this CARE as a "Wet Season" event[7]. Therefore no payout is due under the Wet Season Trigger endorsement of the Excess Rainfall policy of Grenada.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for the Covered Area Rainfall Event (CARE) for Grenada was below the attachment point of the Excess Rainfall policy for this country, and therefore no payout is due. This CARE did not activate the Wet Season Trigger endorsement of the Excess Rainfall policy and therefore no payout under this endorsement is due.

For additional information, please contact CCRIF SPC at: pr@ccrif.org

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[7] The WST endorsement provides a fixed payout for rainfall events that happen when the soil is already saturated and has limited absorption ability. The WST endorsement is activated based on two factors: the Wet Index (the average 1-month Standardized Precipitation Index for all grid cells in the country) and Wet Periods (the period of time where the Wet Index exceeds 1, which indicates that the soil is wetter than its long-term average and serves as an indicator of soil saturation). The WST policy endorsement provides a payment when one or more CAREs with a modelled loss greater than zero occur within a Wet Period and the corresponding value of the Wet Index during the Wet Period exceeds a predetermined threshold.

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.