Covered Area Rainfall Event (01/11/2024 to 02/11/2024)

Excess Rainfall

Event Briefing

Sint Maarten

11 November 2024

1   INTRODUCTION

This event briefing describes the impact of rainfall on Sint Maarten, which was associated with a Covered Area Rainfall Event (CARE) starting on 01 November 2024 and ending on 02 November 2024. The Rainfall Index Loss (RIL) for the Covered Area Rainfall Event was below the attachment point of Sint Maarten's Excess Rainfall policy, therefore no payout is due to the Government of Sint Maarten.

2   EVENT DESCRIPTION

On 31 October 2024, a large area of showers and thunderstorms affected the Atlantic waters north of the Leeward Islands, Virgin Islands, Puerto Rico and Hispaniola, from latitude 18°North to 23.5°North between longitude 48°West and 69°West. This convective activity was ahead of an upper-level trough that crossed Hispaniola and that during the day moved eastward. The abundant tropical moisture in place and the presence of the upper-level trough supported the development of the mentioned intense convective activity. Portions of the Leeward Islands were affected by heavy precipitation mainly between 0600UTC and 1200UTC, as shown from radar imagery (Figure 1a).

On the next day, 1 November, the trough moved over the Atlantic waters to the north of the Leeward Islands (Figure 2a), together with the region characterized by abundant tropical moisture. This generated numerous moderate to scattered strong thunderstorms over approximately the same area that was affected the previous day, including the Virgin Islands and the Leeward Islands. Moderate to locally intense rainfall spread intermittently over the northern Leeward Islands in the first hours of the day, as reported by radar imagery (Figure 1b).

On 2 November, the upper-level trough persisted approximately over the same region, i.e. to the north of the Leeward Islands, and extended eastward (Figure 2b). The combination of the trough with the high humidity content in the upper troposphere yielded to the development of scattered moderate to isolated strong thunderstorms over a broad area, from latitude 15°North to 23°North between longitude 50°West and 72°West. In particular, the most intense and dense thunderstorms were observed over a region east of the area affected the previous day, in particular over the Atlantic waters just east of the Leeward Islands, from latitude 18°North to 21°North between longitude 52°West and 61°West. The Leeward Islands were not affected (or marginally affected) by the associated heavy rainfall (Figure 1c).

a) 31 October at 0606UTC | b) 1 November at 0606 UTC
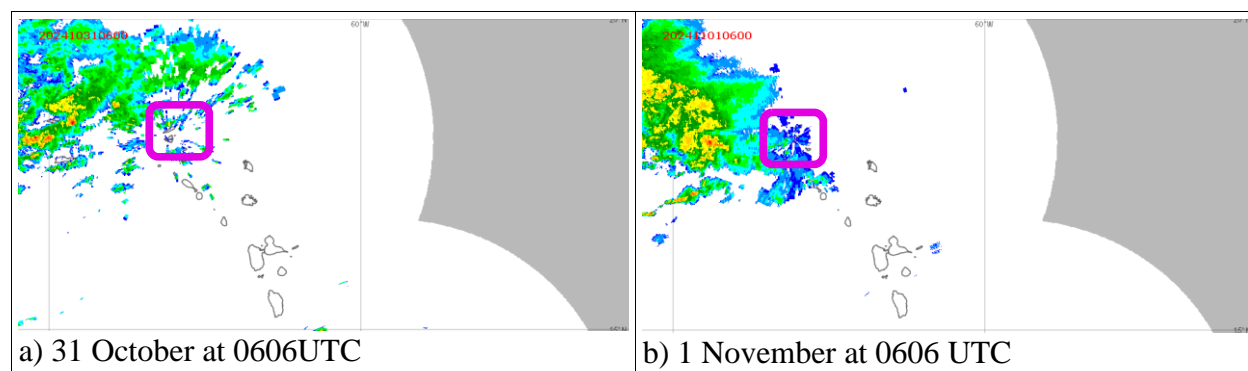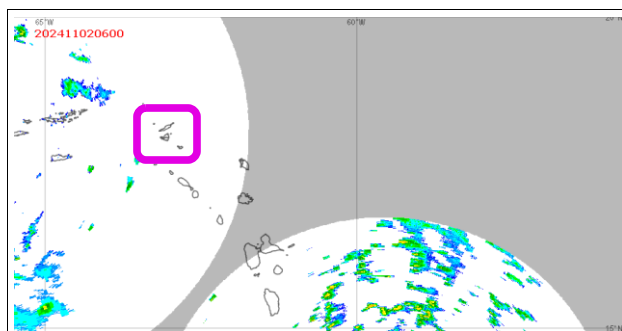
c) 2 November at 0606UTC

Figure 1. Radar imagery on 31 October, 1 and 2 November, 2024, at 0606UTC 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. Source: Barbados Radar Composite[1]. The violet square indicates Sint Maarten location
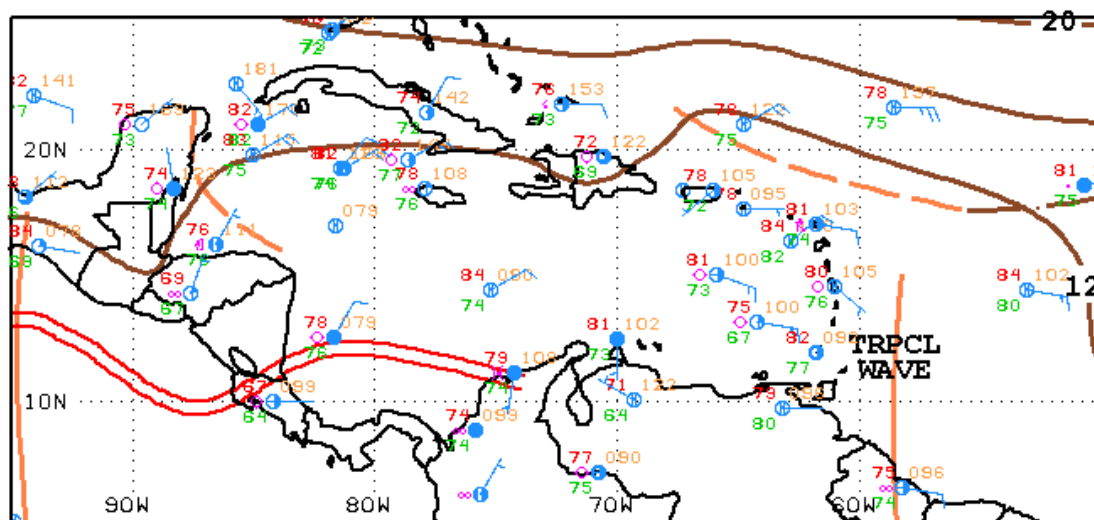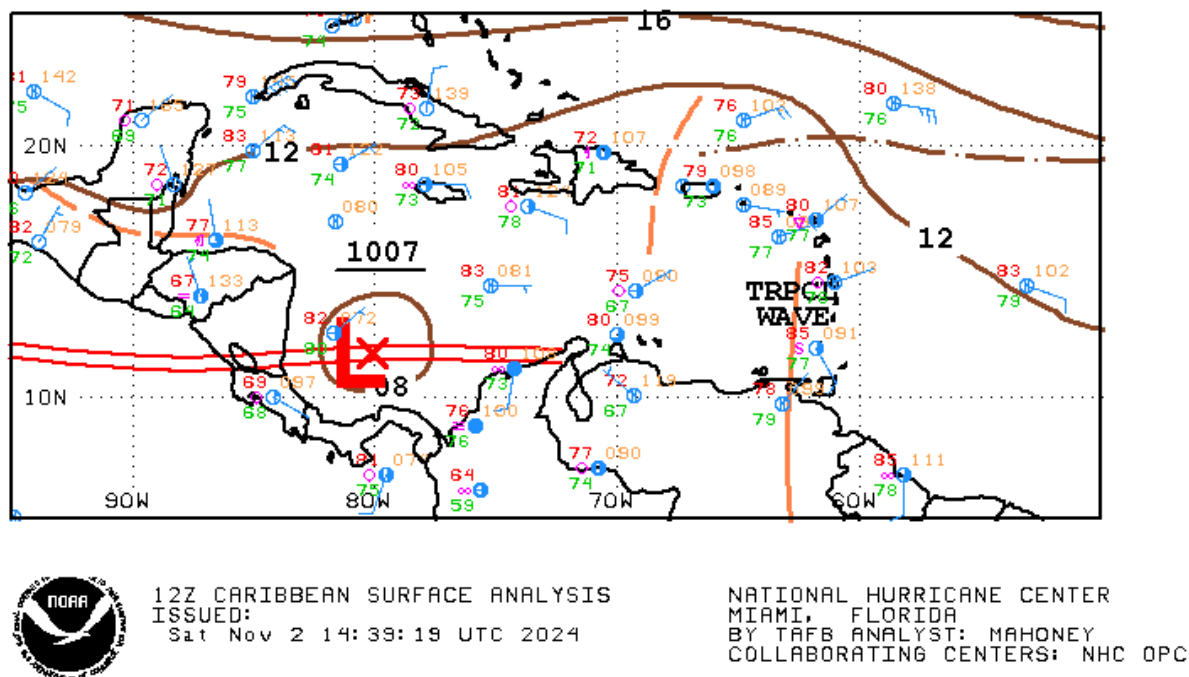

a) 1 November at 1200 UTC

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1 Barbados Radar Composite, available on 31 October, 1 and 2 November at:
https://www.barbadosweather.org/BMS_Radar_Composite_Resp.php#

b) 2 November at 1200UTC

Figure 2. Surface analysis over the Caribbean Sea area on 1 and 2 November 2024 at 1200 UTC. Source: US National Hurricane Center[2]

3   REPORTED IMPACTS

At the time of writing this report, there is no information about damage in Sint Maarten due to this Covered Area Rainfall Event during the indicated period.

4   RAINFALL MODEL OUTPUTS

All data sources used by the XSR 3.0 model, CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15[3], detected the occurrence of precipitation over Sint Maarten and the surrounding

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2 National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: 1 and 2 November 2024, available at: https://www.nhc.noaa.gov/tafb/CAR_12Z.gif

3 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 reportWRF5,

waters during the period 30 October to 02 November 2024. Each data source reported a specific distribution and accumulation of rainfall, as discussed below and shown in Figure 5. A CARE for Sint Maarten was activated on 01 November and lasted until 02 November. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation[4] and thus the period considered by the XSR 3.0 model for the loss estimate based on the accumulated precipitation in Sint Maarten was 30 October to 02 November 2024.

CMORPH	CMORPH reported total accumulated values of precipitation between 90 mm and 120 mm for almost the entire territory of Sint Maarten.
IMERG	IMERG reported total accumulated values of precipitation between 90 mm and 120 mm over the western part of the Sint Maarten, while lower values in the range of 60 mm and 90 mm were reported over the eastern part of the country.
WRF5	WRF5 showed total accumulated values of precipitation between 90 and 120 mm over all of Sint Maarten.
WRF7	WRF7 showed total accumulated values of precipitation between 180 mm and 210 mm over most of the country, while higher values between 210 mm and 240 mm were reported over the southeastern part of the country in the area of Pint Blanche. Lower values were reported between 150 mm and 180 mm over the western part of Sint Maarten in the area of Les Terres Basses.
WRF11	WRF11 reported accumulated values of precipitation higher than all the other models. Values were higher than 300 mm over southern Sint Maarten, in the area of Pelican Key and Clay Hill, and decreased moving northward to the minimum values, between 150 mm and 180 mm, over the area of Anse Marcel.
WRF15	WRF15 reported accumulated values of precipitation between 60 mm and 90 mm for most of the country, while lower values between 30 mm and 60 mm were reported over western Sint Maarten.

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.

4   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.

a) CMORPH

b) IMERG

c) WRF5
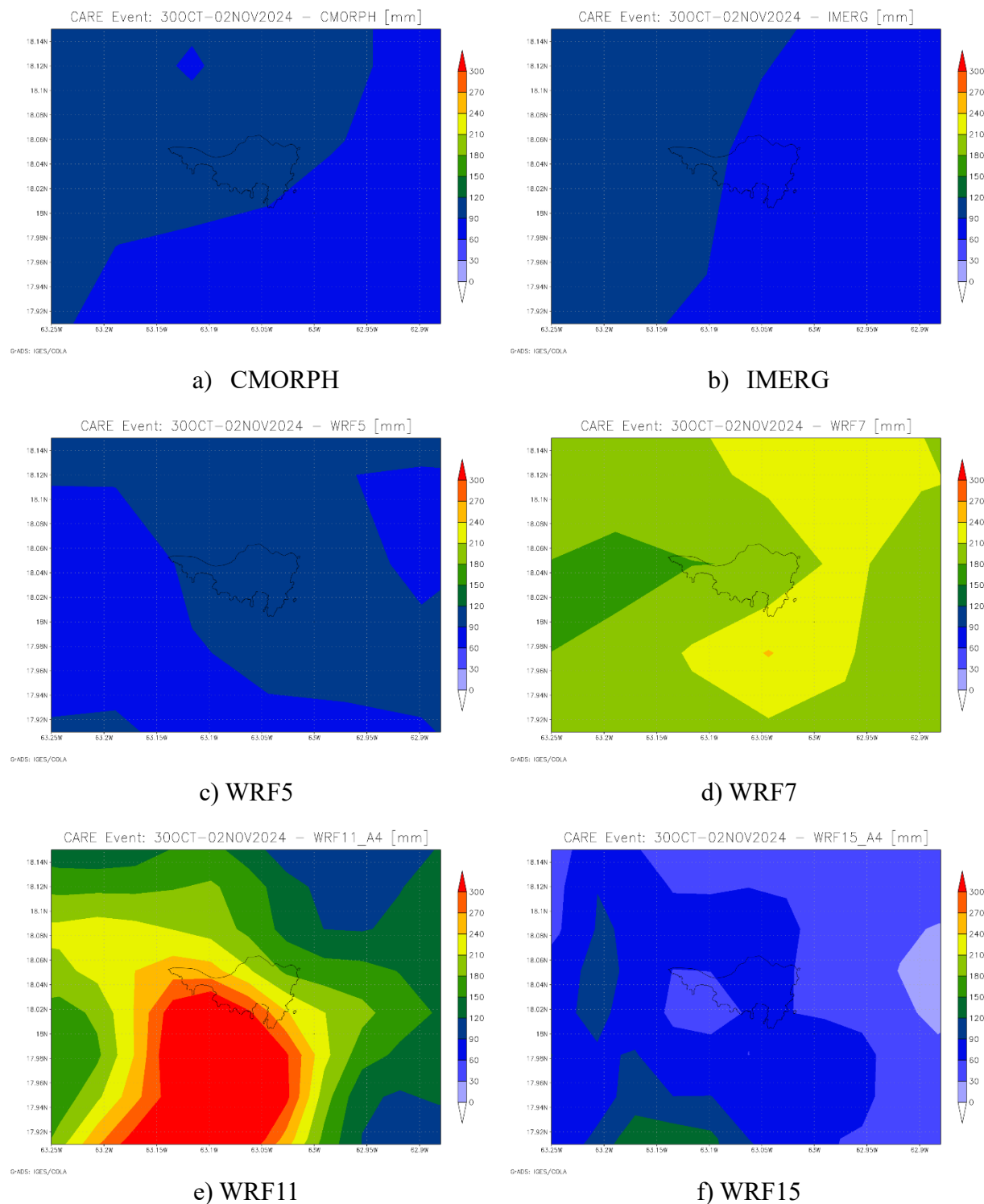
d) WRF7

e) WRF11

f) WRF15

Figure 5 Total accumulated precipitation during the period 30 October and 02 November, 2024 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/SXM/CARE_2_2024/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/SXM/CARE_2_2024/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Sint Maarten for four of the data sources used by XSR3.0: CMORPH, WRF5, WRF7 and WRF11. The RIL was the highest for WRF11. No Disaster Alert declaration was issued by ReliefWeb for Sint Maarten related to the rain events during this period.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs above the threshold: CMORPH, WRF5, WRF7 and WRF11. The RIL_{FINAL} was below the attachment point of Sint Maarten's Excess Rainfall policy and therefore the policy was not triggered. Therefore, a payout is not due to the Government of Sint Maarten under its Excess Rainfall policy.

The Wet Season Trigger (WST) endorsement of the XSR3.0 model did not identify this CARE as a "Wet Season" event[5]. Therefore, no payment is due under the Wet Season Trigger endorsement of Sint Maarten's Excess Rainfall policy.

5   TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) was below the attachment point of Sint Maarten's Excess Rainfall policy and therefore no payout is due.

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

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5   The WST endorsement is designed to provide a predetermined payout for rainfall events occurring amidst already saturated soil conditions, effectively capturing the heightened risk of flooding and landslides. It 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. Wet season event (WE). Any period of consecutive days, during which the Wet Index (WI) is equal or greater than 1.

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.