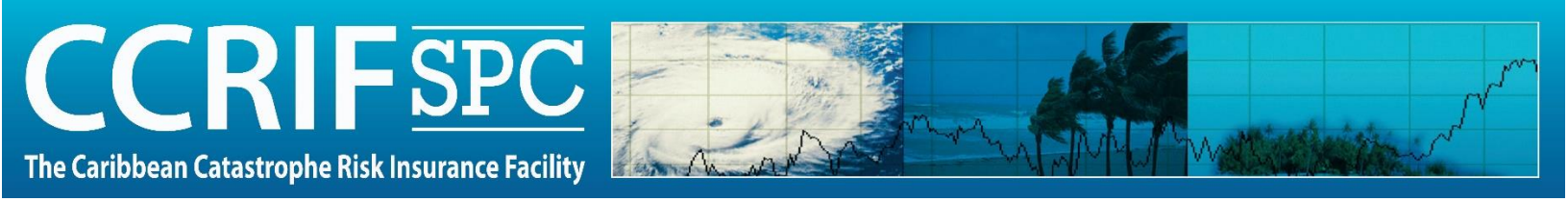

Covered Area Rainfall Event (06/11/2022 – 07/11/2022)

Excess Rainfall

Event Briefing

Anguilla

16 November 2022

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1 INTRODUCTION

This event briefing describes the impact of rainfall in Anguilla, which was associated with a Covered Area Rainfall Event (CARE), starting on 6 November and ending on 7 November 2022. The Rainfall Index Loss (RIL) was below the attachment point of Anguilla's excess rainfall policy and therefore no payout is due.

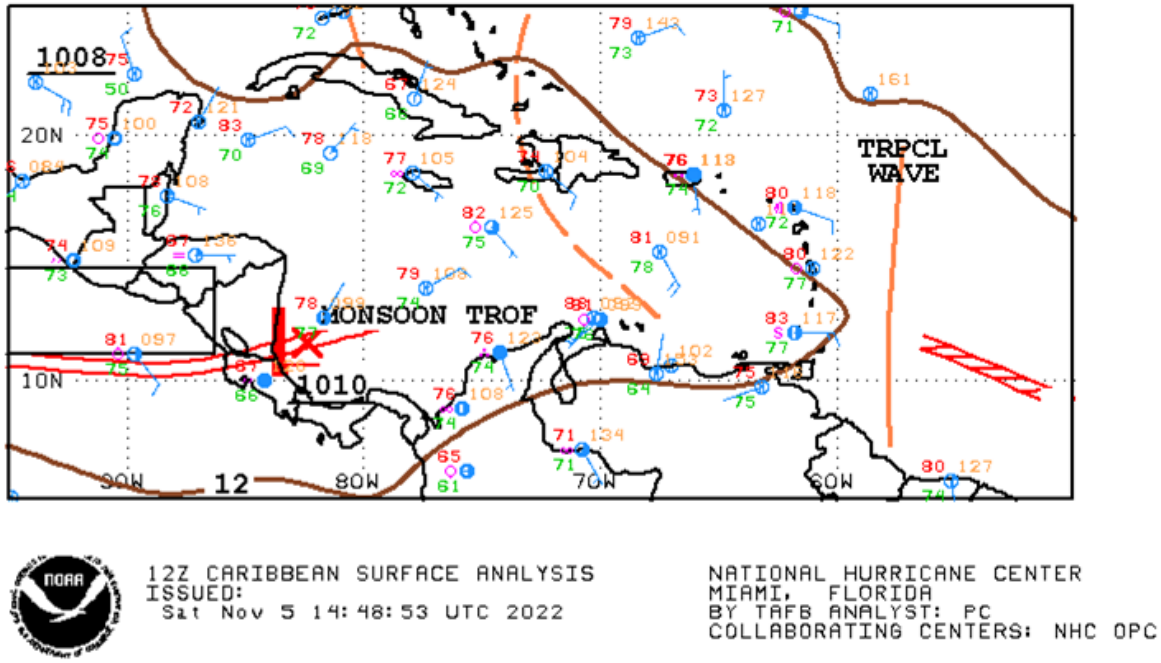
2 EVENT DESCRIPTION

On 5 November, a surface trough extended from the southeastern Bahamas across Hispaniola into the Caribbean Sea to near latitude 12° North and longitude 68° West (Figure 1a). Moreover, the presence of wind divergence in the upper levels resulted in a large area of scattered showers and isolated thunderstorms east of the trough axis, which extended from latitude 15° to 20° North, between longitude 63° and 70° West. On the same day at 1800UTC, under the effect of the wind divergence, a low pressure system developed within the surface trough. This yielded to an intensification of the convection activity in the same broad area, and in particular over Puerto Rico and the Leeward Islands, where thunderstorms and heavy rainfall were observed starting from 1800UTC for 12 hours (Figure 2a and Figure 3).

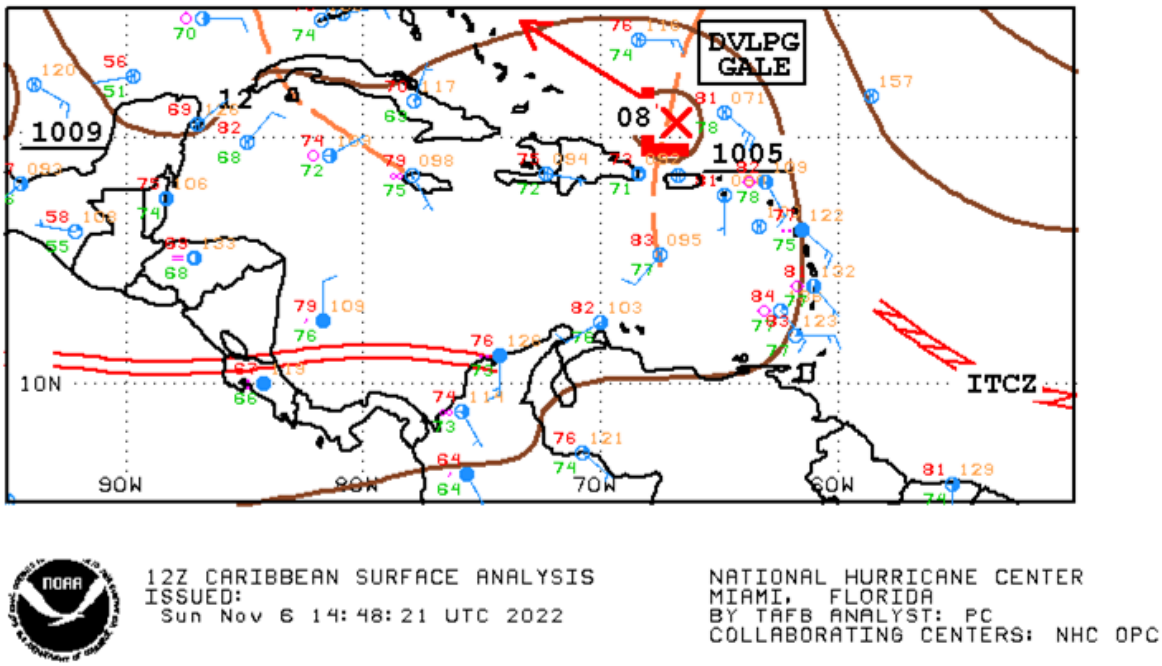
On 6 November, the low pressure system that was initially located SE of Hispaniola moved north-northeastward, crossing the Mona Passage and at 1800UTC, it was sited about 160 mi (257 km) N of Puerto Rico (Figure 1b). It presented an estimated minimum pressure of 1005 mb. During the first six hours of 6 November, heavy precipitation was still ongoing over the Leeward Islands (Figure 2b), which then ceased, due to the shift of the low pressure system into the southwestern Atlantic Ocean.

On 7 November, the low pressure system became gradually better organized, developing into a subtropical storm and it was named Nicole. At 0900UTC, the National Hurricane Center (NHC) started to monitor the stormt, since it had the potential to acquire tropical characteristics and to transform into a tropical storm. With the development of Nicole over the southwestern north Atlantic Ocean, a broad low pressure system prevailed over the northern Caribbean, without any significant precipitation event over the Leeward Islands during the first half of the day. Afterwards, starting from 1200UTC, the activation of convergent southerly winds toward Subtropical Storm Nicole produced scattered showers and isolated thunderstorms over the northeastern Caribbean basin in a large band, including Puerto Rico, the Virgin Islands and the Leeward Islands. Moderate to locally heavy precipitation affected the British Virgin Islands and the northern Leeward Islands from 1200UTC to 8 November at 0000UTC (Figure 2c).

On the next day, 8 November, Nicole transformed into a tropical storm and moved toward the northwestern Bahamas, while the area of disturbed weather moved out of the northeastern Caribbean basin.



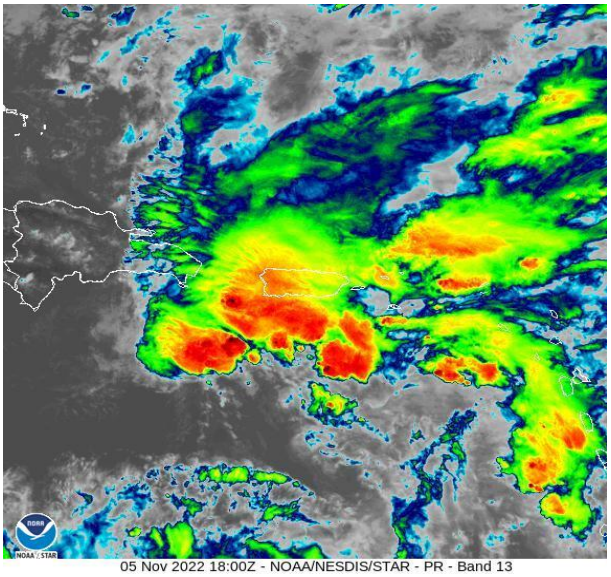
a) 5 November at 1200UTC



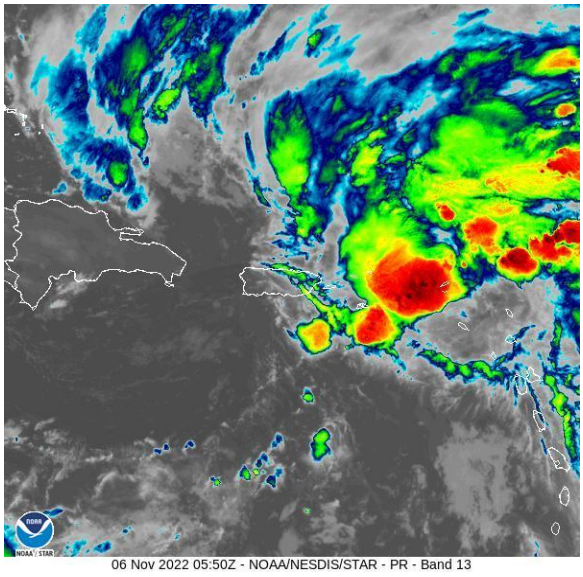
b) 6 November at 1200UTC

Figure 1 Surface analysis over the Caribbean Sea on 5 and 6 November 2022 at 1200UTC as indicated in the label. Source: US National Hurricane Center[1]

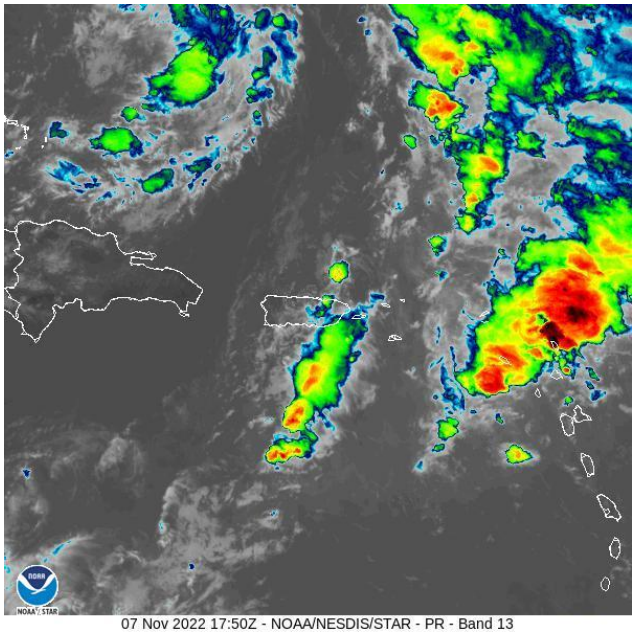
[1] National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, available on 5-6-7 November 2022 at: https://www.nhc.noaa.gov/tafb/CAR_12Z.gif



a) 5 November at 1800UTC



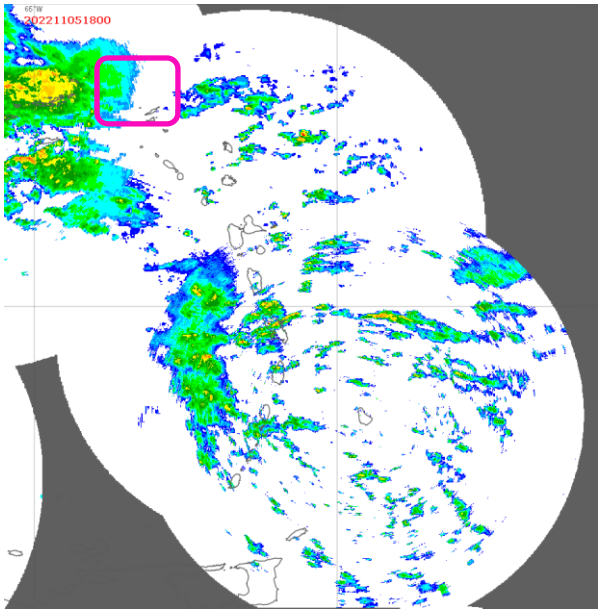
b) 6 November at 0600UTC



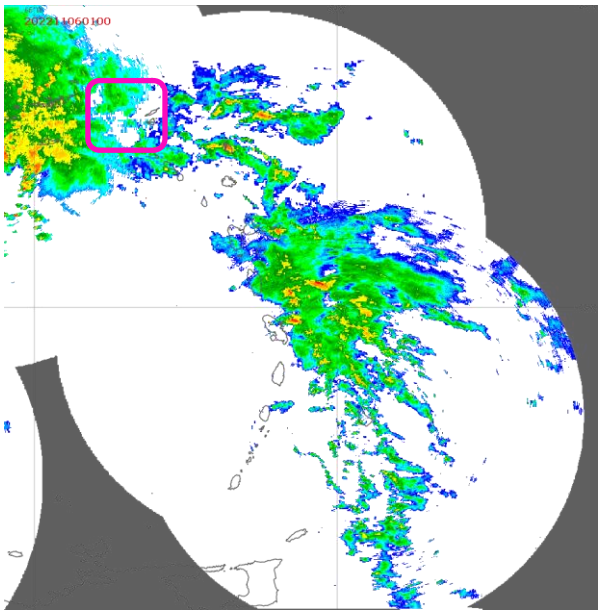
c) 7 November at 1800UTC

Figure 2 Satellite imagery at different times 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, National Environmental Satellite, GOES Image View2.

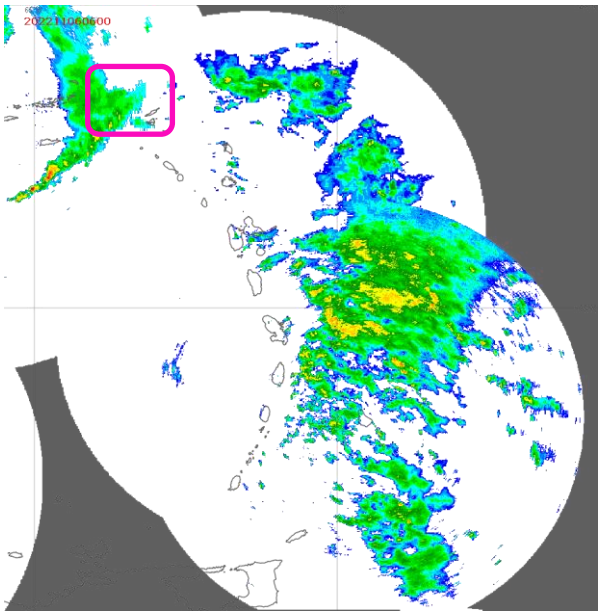
[2] NESDIS Online Archive, NOAA National Environmental Satellite, GOES Image View, available at: https://www.star.nesdis.noaa.gov/GOES/sector.php?sat=G16&sector=cam



a) 5 November at 1800UTC



|b) 6 November at 0000UTC



c) 6 November at 0600UTC

Figure 3 Radar imagery on 5 and 6 November at different times as indicated in the labels, from the radar composite over the Caribbean region. Blue/green colours represent low to moderate rainfall, while the yellow/red colours represent intense and very intense precipitation. The purple square highlights the location of Anguilla. Source: Barbados Radar Composite[3].

[3]Barbados Radar Composite, available on 5 and 6 November at: *https://www.barbadosweather.org/BMS_Radar_Composite_Resp.php#*

3 IMPACTS

At the time of writing this event brief, no information was available related to damage or loss in Anguilla due to this Covered Area Rainfall Event.

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH[4], WRF5 and WRF7[5], detected the occurrence of precipitation over Anguilla and the surrounding waters during the period of 4 to 7 November 2022. However, each data source reported a specific distribution and accumulation of rainfall, as discussed below. The CARE for Anguilla was activated on 6 November and lasted for the period 6 - 7 November. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation[6] and thus the period considered by the XSR 2.5 model for the loss estimate based on the accumulated precipitation in Anguilla was 4 - 7 November.

CMORPH reported total accumulated values of precipitation between 100 mm and 120 mm over most of Anguilla. Higher values, between 120 mm and 140 mm, were shown over the small islands to the west of Anguilla.

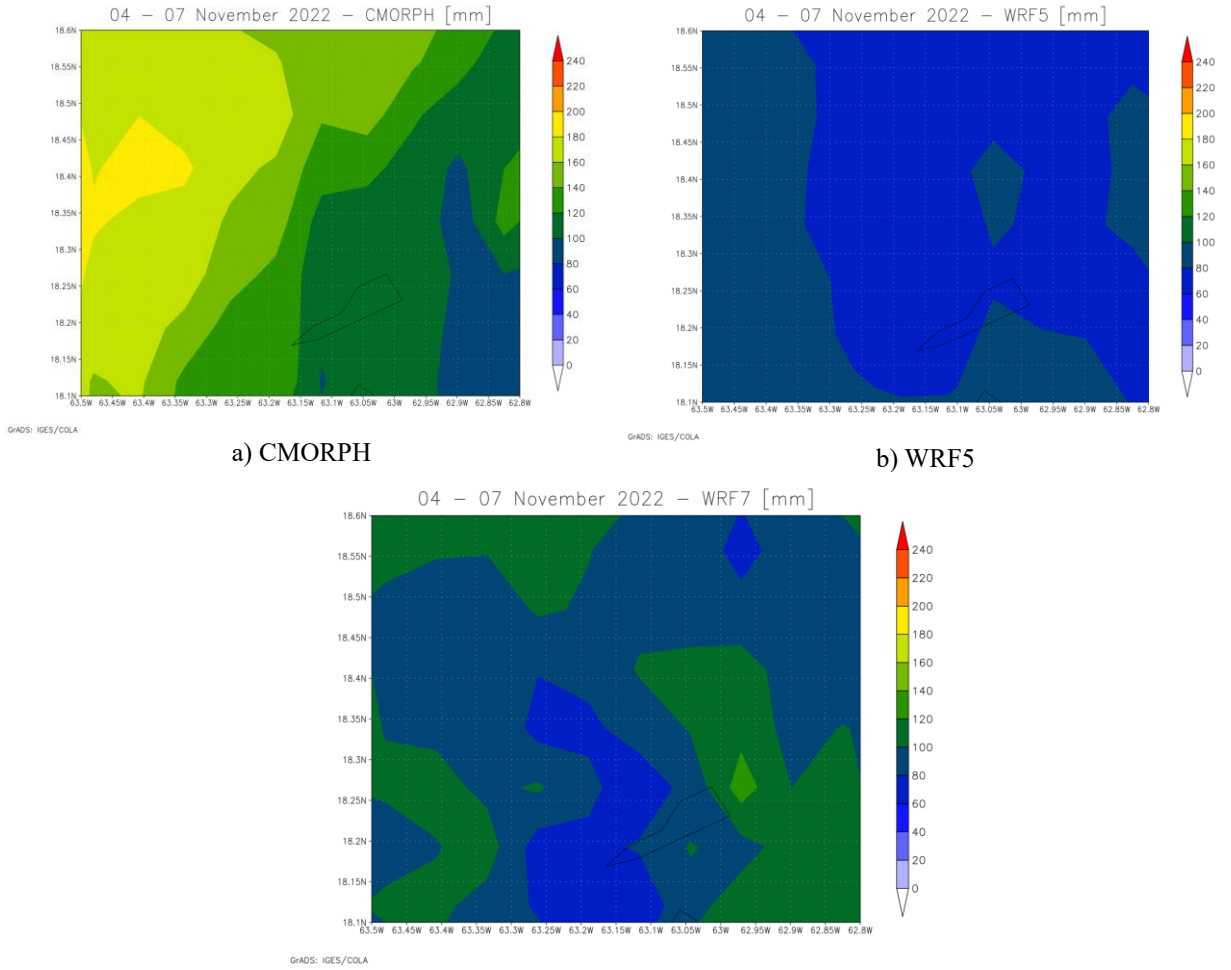
WRF5 showed total accumulated values of precipitation ranging between 60 mm and 80 mm over most of Anguilla. The maximum values, between 80 mm and 100 mm, were shown along the central southern coast of Anguilla.

WRF7 simulated total accumulated values of rainfall higher than 80 mm over most of Anguilla. The maximum values, between 100 mm and 120mm, were reported over the eastern coast of Anguilla.

[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.

[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.



a) CMORPH

b) WRF5

c) WRF7

Figure 4 Total accumulated precipitation during the period 4 -7 November, 2022 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/AIA/CARE_2_2022/daily_prec_short.mp4
https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/AIA/CARE_2_2022/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Anguilla for two of data sources used by XSR2.5: CMORPH and WRF7, with similar RILs for the two data sources.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs from CMORPH and WRF7. 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 Anguilla's excess rainfall policy and therefore it did not trigger a policy payout.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) for Anguilla was below the attachment point of the country's 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.