



# Covered Area Rainfall Event (12/11/2024 to 18/11/2024)

## Excess Rainfall

### Event Briefing

## Panama Panama-FAP

**27 November 2024**

## 1 INTRODUCTION

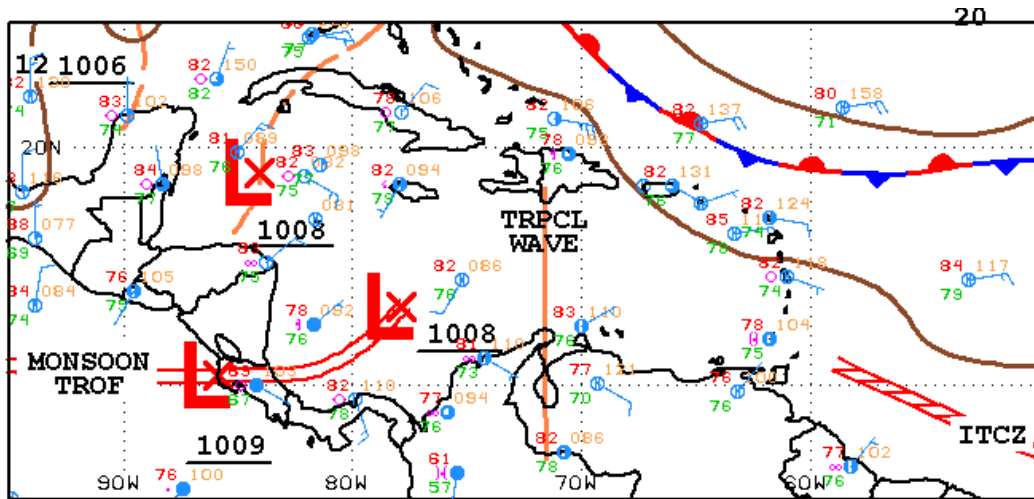
This event briefing describes the impact of rainfall on Panama, which was associated with a Covered Area Rainfall Event (CARE) starting on 12 November 2024 and ending on 18 November 2024. The Rainfall Index Loss (RIL) for the Covered Area Rainfall Event was below the attachment point of Panama’s Excess Rainfall policy and the Panama-FAP Excess Rainfall policy, and therefore no payouts are due to the Government.

## 2 EVENT DESCRIPTION

Between 10 and 13 November 2024, the eastern end of the East Pacific monsoon trough was over Costa Rica and extended to the southwest Caribbean Sea (Figure 1a). This weather configuration supported a persistent south-westerly flow in the eastern Pacific region that brought abundant tropical moisture across southern Central America. Moreover, the monsoon trough created a diffluent wind pattern in the upper level over Costa Rica and western Panama, which supported the atmospheric instability. Additionally, on 12 and 13 November, the atmospheric instability was further enhanced by the development of a Central America Gyre (CAG), a broad and persistent area of low pressure over Central America. The combination of these factors created ideal conditions for strong convective activity over southern Central America during this period. Isolated thunderstorms were reported across Costa Rica, Panama and northwestern Colombia and nearby waters, spreading heavy rainfall over the region. The most significant rainfall affected the western portions of Costa Rica and Panama.

On 14 November, the influence of the CAG and monsoon trough began to weaken over the southern Central America, as both these elements drifted northwards and the monsoon trough retired over the Pacific waters, away from the southwestern Caribbean Sea. This marked the end of the period of the heaviest precipitation over Panama and Costa Rica.

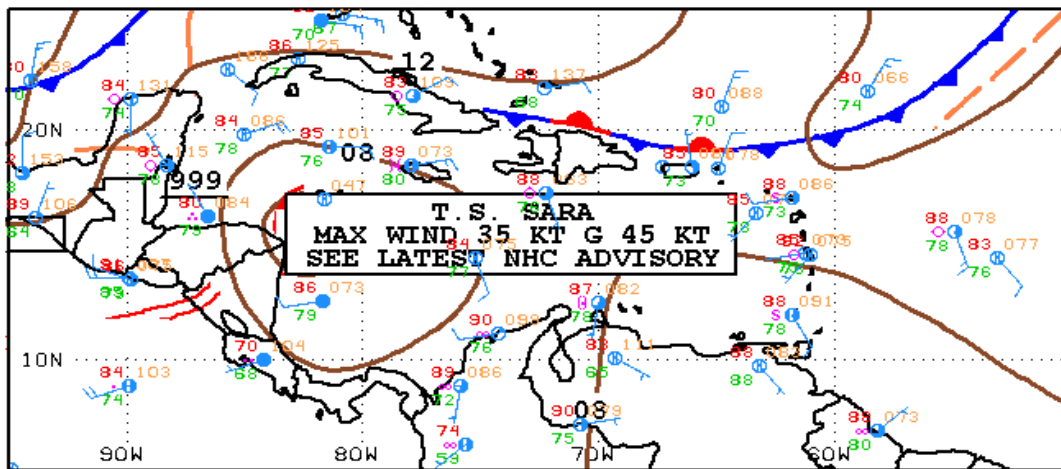
In the following days, from 14 to 18 November, moderate scattered convection developed over southern Central America, although less intense than the earlier systems, associated to the circulation of the Tropical Cyclone Sara (TC Sara). Sara developed on 14 November over the western Caribbean Sea near latitude 17° North and longitude 81° West, from an intense tropical wave (Figure 1b). From 16 to 18, 2024, TC Sara tracked north-westward crossing the Gulf of Honduras and moving inland over Belize and Guatemala. The southern outer rainbands of the cyclone extended to the southwestern Caribbean Sea and brought intermittent showers of moderated intensity over northwestern Panama. On November 18, as TC Sara dissipated over the Yucatan peninsula, the conditions stabilized, marking the end of the rainfall event over the southern Central America.



00Z CARIBBEAN SURFACE ANALYSIS  
ISSUED:  
Tue Nov 12 02:45:37 UTC 2024

NATIONAL HURRICANE CENTER  
MIAMI, FLORIDA  
BY TAFB ANALYST: PC  
COLLABORATING CENTERS: NHC OPC

a) 12 November at 0000UTC



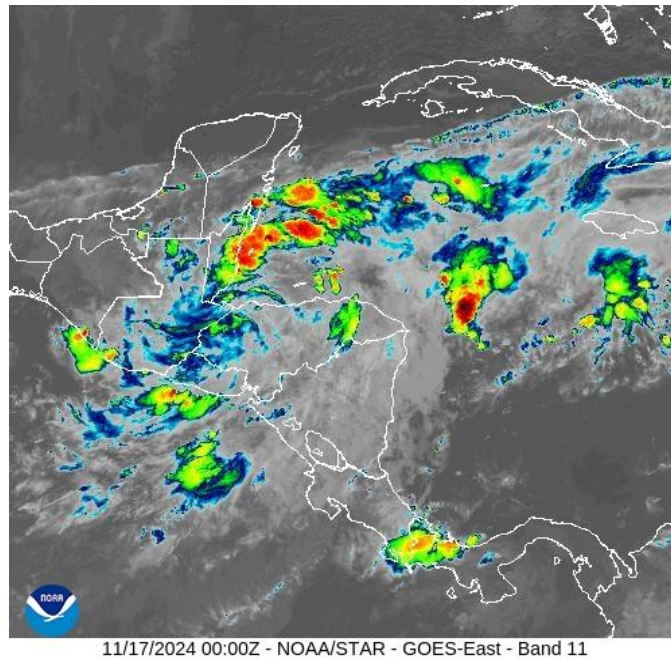
18Z CARIBBEAN SURFACE ANALYSIS  
ISSUED:  
Thu Nov 14 20:42:51 UTC 2024

NATIONAL HURRICANE CENTER  
MIAMI, FLORIDA  
BY TAFB ANALYST: KRV  
COLLABORATING CENTERS: NHC OPC

b) 14 November at 1800UTC

Figure 1. Surface analysis over the Caribbean Sea area on (a) 12 November 2024 at 0000 UTC, (b) 14 November 2024 at 1800 UT. Source: US National Hurricane Center<sup>1</sup>

<sup>1</sup> National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: 31 October 2024, available at: [https://www.nhc.noaa.gov/tafb/CAR\\_00Z.gif](https://www.nhc.noaa.gov/tafb/CAR_00Z.gif)



a) 17 November at 0000 UTC

Figure 2. Satellite imagery from 17 November 2024 at 0000 UTC. Blue/green colours represent high altitude clouds (top cloud temperature between  $-50^{\circ}\text{C}$  and  $-70^{\circ}\text{C}$ ), while the red/yellow colours represent very high-altitude clouds (top cloud lower than  $-70^{\circ}\text{C}$ ). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National Environmental Satellite, Data and Information Service<sup>2</sup>.

### 3 REPORTED IMPACTS

At the time of writing this report, the information about damage in Panama due to this Covered Area Rainfall Event during the indicated period is shown below.

On November 14, President José Raúl Mulino announced he would declare a State of National Emergency due to the heavy rains and flooding. A preliminary damage report included 659 homes, 16 schools, 2 health infrastructure and 10 collapsed road structures, including a stretch of the Inter-American Highway.<sup>3</sup>

<sup>2</sup> RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: <https://cdn.star.nesdis.noaa.gov/GOES16/ABI/SECTOR/car/11/>

<sup>3</sup> TVN: [Estado de emergencia: Gobierno declara estado de emergencia nacional](#)

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Figure 3 Landslides in Tierras Altas, Chiriquí, Panamá. Photo: Sinaproc<sup>45</sup>

The agricultural sector has been affected by the heavy rainfalls. According to the Ministry of Agricultural Development (MIDA in Spanish) a preliminary report stated a total of 1,934 hectares damaged by the rainfalls, the most damaged were rice crops. These rice hectares will not cause a shortage of the product but the state of the production roads and flooded highways, with sinkholes, have caused the closure of the main roads leading to Chiriquí.<sup>6</sup>

## 4 RAINFALL MODEL OUTPUTS

All data sources used by the XSR 3.0 model, CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15<sup>7</sup>, detected the occurrence of precipitation over Panama and the surrounding waters during the period 10 to 18 November 2024. Each data source reported a specific distribution and accumulation of rainfall, as discussed below and shown in Figure 5. A CARE for Panama was activated on 12 November and lasted until 18 November. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation<sup>8</sup> and thus the period considered by the XSR 3.0 model for the loss estimate based on the accumulated precipitation in Panama was 10 to 18 November 2024.

<sup>4</sup> TVN: [Sinaproc declara alerta roja en Chiriquí, Veraguas y comarca Ngäbe Buglé](#)

<sup>5</sup> La Prensa: [Lluvias en Panamá se extenderán hasta el 17 de noviembre](#)

<sup>6</sup> La Estrella: [Casi 2.000 hectáreas de cultivos han dañado las lluvias](#)

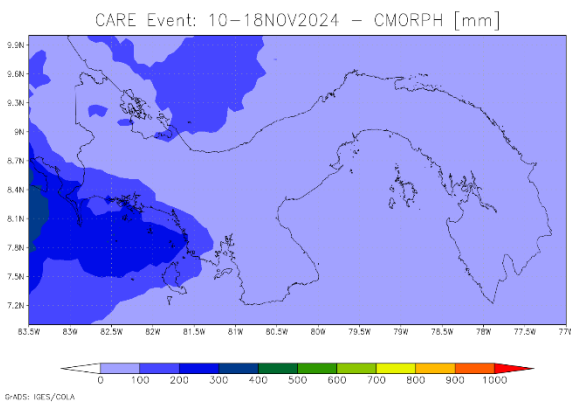
<sup>7</sup> CMORPH Model: the satellite-based rainfall precipitation estimates provided by the NOAA Climate Prediction Center (CPC) using the so-called Morphing Technique [http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph\\_description.html](http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html). 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.

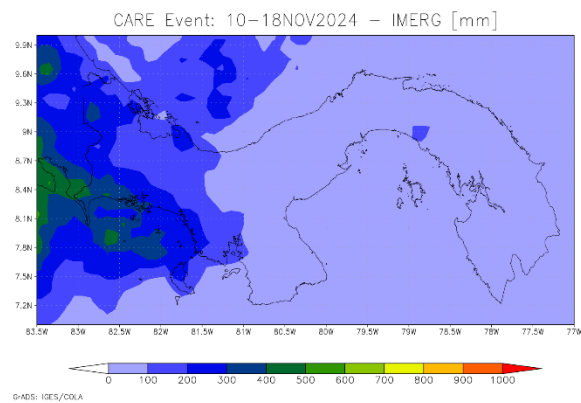
<sup>8</sup> The two aggregation periods correspond to the Rainfall Aggregation Period #1 and Rainfall Aggregation Period #2, as indicated in the Schedule. Further details in the Definitions section of this report.



- CMORPH** CMORPH reported total accumulated values of precipitation between 100 mm and 200 mm over the western part of Panama, while lower values were reported over the rest of the country.
- IMERG** IMERG reported total accumulated values of precipitation between 100mm and 300 mm over most of western Panama, with localized maximum between 300 mm and 400 mm. Value lower than 100 mm were reported over the rest of the country.
- WRF5** WRF5 showed total accumulated values of precipitation higher than 400 mm over the southwestern Panama, in the provinces of Chiriquí and Veraguas, with maximum values, higher than 900 mm, along the south coast. Values between 400 mm and 800 mm were reported also along the southern coast in Panama province. Lower values were reported over the rest of Panama.
- WRF7** WRF7 showed total accumulated values of precipitation with a similar geographic distribution to that of WRF5, but with reduced maximum values, not exceeding 700 mm along the southwest coast in the Chiriquí province.
- WRF11** WRF11 showed total accumulated values of precipitation higher than 400 mm over the southwestern Panama, in the provinces of Chiriquí and Veraguas, with maximum values, higher than 900 mm, at the southwestern edge of the country. Values lower than 100 mm were showed over the rest of Panama.
- WRF15** WRF15 showed total accumulated values of precipitation with a similar geographic distribution to that of WRF11, but with maximum values, between 900mm and 1000mm over more extended areas in the provinces of Veraguas and Chiriquí.



a) CMORPH



b) IMERG

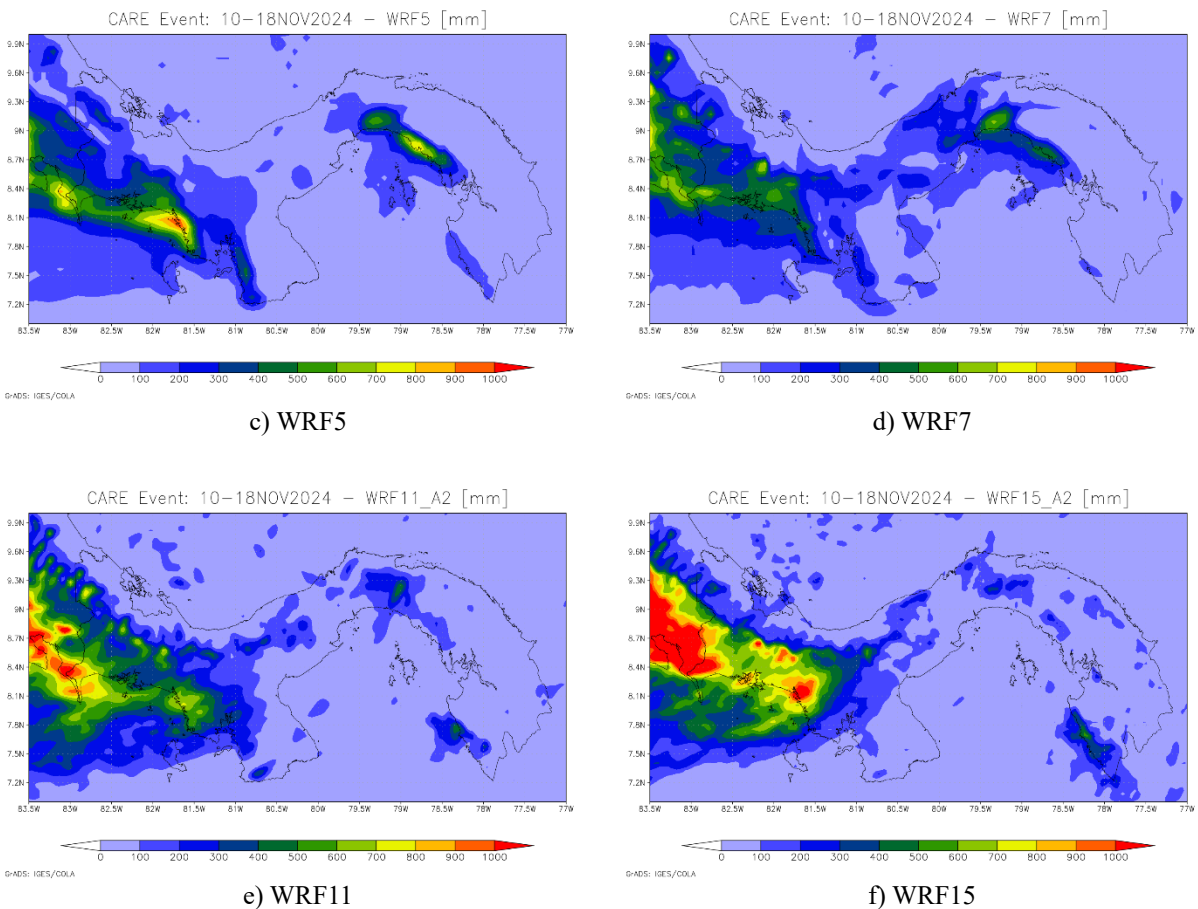


Figure 4 Total accumulated precipitation during the period 04 and 08 November, 2024 estimated by CMORPH (a), IMERG (b), WRF5 (c), WRF7 (d), WRF11 (e), WRF15 (f). Source: CCRIF SPC

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/PAN/CARE\\_6\\_2024/daily\\_prec\\_short.mp4](https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/PAN/CARE_6_2024/daily_prec_short.mp4)

[https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/PAN/CARE\\_6\\_2024/daily\\_prec\\_long.mp4](https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/PAN/CARE_6_2024/daily_prec_long.mp4)

The Rainfall Index Loss (RIL) was above the loss threshold for Panama for four of the data sources used by XSR3.0: IMERG, WRF5, WRF7 and WRF11. The RIL was the highest for WRF5. A Disaster Alert declaration named "Tropical Storm Sara - Nov 2024" (ID code: TC-2024-000211-HND) was issued by ReliefWeb for Panama related to the rainfall event during this period.

The final RIL ( $RIL_{FINAL}$ ) was calculated as the average of the RILs above the threshold: CMORPH, WRF5 and WRF7. The  $RIL_{FINAL}$  was below the attachment point of the Excess Rainfall policy of Panama and Panama FAP and therefore these policies were not triggered. Therefore, a payout is not due to the Government of Panama under the Excess Rainfall policies of Panama and Panama FAP.

## **5 TRIGGER POTENTIAL**

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) was below the attachment point of Panama’s Excess Rainfall policy and the Panama-FAP Excess Rainfall policy, and therefore no payouts are due.

For additional information, please contact CCRIF SPC at: [pr@ccrif.org](mailto:pr@ccrif.org)



## DEFINITIONS

<b><i>Active Exposure Cell Percentage Threshold</i></b>	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.
<b><i>Active Exposure Grid Cells</i></b>	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.
<b><i>Aggregate Rainfall #1</i></b>	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.
<b><i>Aggregate Rainfall #2</i></b>	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.
<b><i>Calculation Agent</i></b>	Entity charged with undertaking the primary calculation of the Rainfall Index Loss.
<b><i>CMORPH-based Maximum Aggregate Rainfall #1</i></b>	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.
<b><i>CMORPH-based Maximum Aggregate Rainfall #2</i></b>	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.
<b><i>CMORPH-based Covered Area Rainfall Parameters</i></b>	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>
<b><i>CMORPH Model</i></b>	<p>The satellite-based rainfall estimation model provided by NOAA CPC as described in the Rainfall Estimation Models section of the Policy.</p>
<b><i>Covered Area</i></b>	<p>The territory of the Insured as represented in the XSR Rainfall Model.</p>
<b><i>Covered Area Rainfall Event</i></b>	<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>
<b><i>Country Disaster Alert</i></b>	<p>An official disaster alert issued by ReliefWeb (<a href="http://reliefweb.int/">http://reliefweb.int/</a>) 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>
<b><i>Maximum Aggregate Rainfall #1</i></b>	<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>
<b><i>Maximum Aggregate Rainfall #2</i></b>	<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>
<b><i>Rainfall Event Threshold #1</i></b>	<p>Aggregate Rainfall #1 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.</p>
<b><i>Rainfall Event Threshold #2</i></b>	<p>Aggregate Rainfall #2 level as defined in the Schedule which should be exceeded to trigger an Active Exposure Cell.</p>

<b><i>Rainfall Aggregation Period #1</i></b>	The number of hours over which the Aggregate Rainfall #1 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
<b><i>Rainfall Aggregation Period #2</i></b>	The number of hours over which the Aggregate Rainfall #2 is computed for all XSR Exposure Grid Cells during a Covered Area Rainfall Event.
<b><i>Rainfall Index Loss</i></b>	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.
<b><i>WRF5 Model</i></b>	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.
<b><i>WRF7 Model</i></b>	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.
<b><i>XSR Rainfall Model</i></b>	The computer model used to calculate the Rainfall Index Loss, as described in the Attachment entitled ‘Calculation of Rainfall Index Loss and Policy Payment’.
<b><i>XSR Exposure Grid Cells</i></b>	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.
<b><i>XSR Grid Cell Exposure Value</i></b>	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.