



Covered Area Rainfall Event (13/08/2020 to 21/08/2020)

Excess Rainfall

Event Briefing

Panama

29 August 2020

1 INTRODUCTION

Panama was under the influence of a monsoon trough and several tropical waves resulting in adverse weather conditions that occurred between 13 and 21 August, 2020. During this period, adverse weather prevailed over Panama generating heavy rains and high winds over a large area of the territory.

This event briefing describes the impact of the rainfall on Panama, which is associated with a Covered Area Rainfall Event (CARE), starting on 13 August and ending on 21 August 2020. The Rainfall Index Loss (RIL) was below the attachment point of Panama's Excess Rainfall policy and therefore no payout is due to the Government of the Republic of Panama.

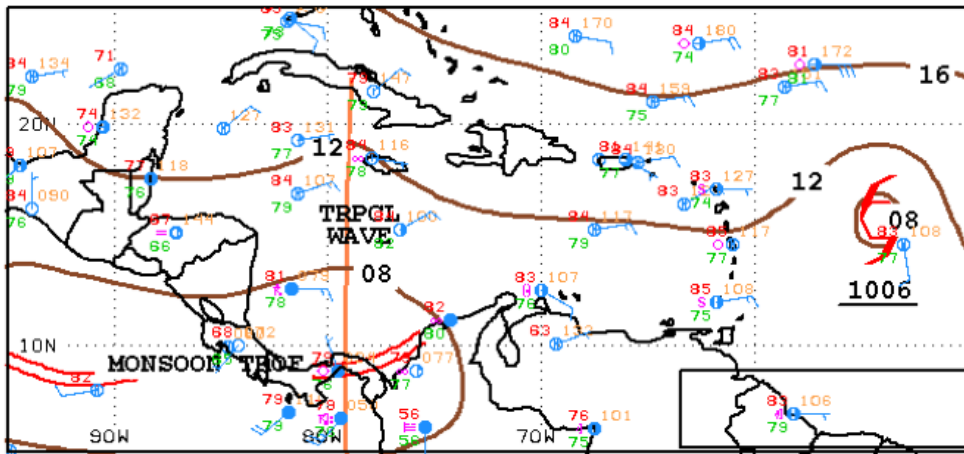
2 EVENT DESCRIPTION

From 13 to 20 August, a monsoon trough persisted over the southern countries of Central America and particularly over Panama (Figure 1). During this period, it extended from northern Colombia near 08/10N 74W to the eastern Pacific Ocean, crossing Panama along the latitude 08/09N. This almost stationary configuration led to the development of scattered showers over Panama, mainly between 2000 UTC and 0300UTC (1500 and 2200 local time).

Additionally, on 14 August stronger and more organized convection activity was observed over western Panama and the surrounding waters due to the combination of the instability caused by the monsoon trough and the westward transition of a tropical wave, as shown in Figure 1a and Figure 2. Of significance was the development of a large cluster of thunderstorms between 13 August at 1800UTC and 14 August at 0300UTC. It initially affected the Gulf of Panama, then later extended inland (Figure 2), when the associated heavy precipitation affected the territory of Panama.

On 19 and 20 August, a similar meteorological situation (Figure 1b) led to the development of scattered moderate to isolated strong thunderstorms along the Pacific coast of Panama and over the adjacent waters.

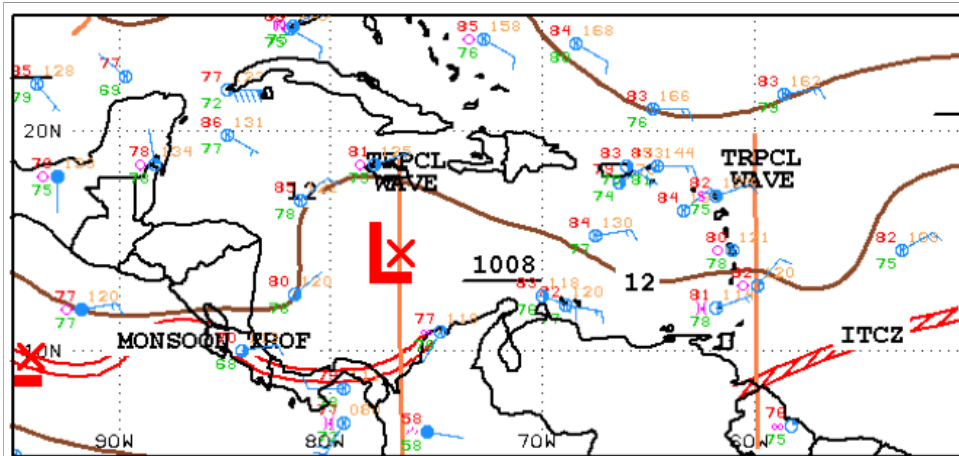
On 21 August, the northward movement of the monsoon trough led to the conclusion of the thunderstorm activity over Panama.



12Z CARIBBEAN SURFACE ANALYSIS
ISSUED:
Fri Aug 14 14:38:29 UTC 2020

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

a) 14 August at 1200UTC



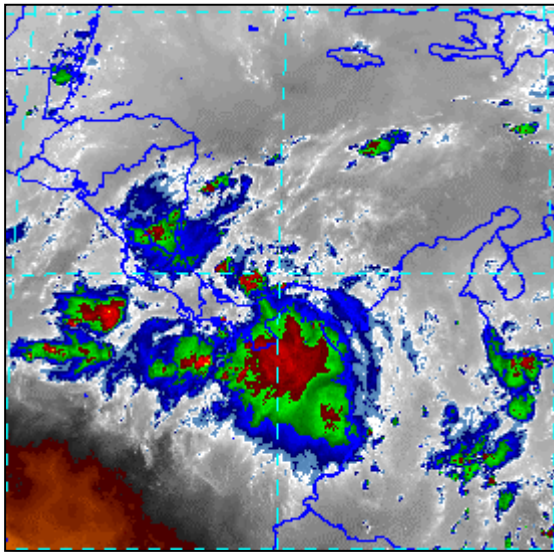
06Z CARIBBEAN SURFACE ANALYSIS
ISSUED:
Thu Aug 20 08:28:12 UTC 2020

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

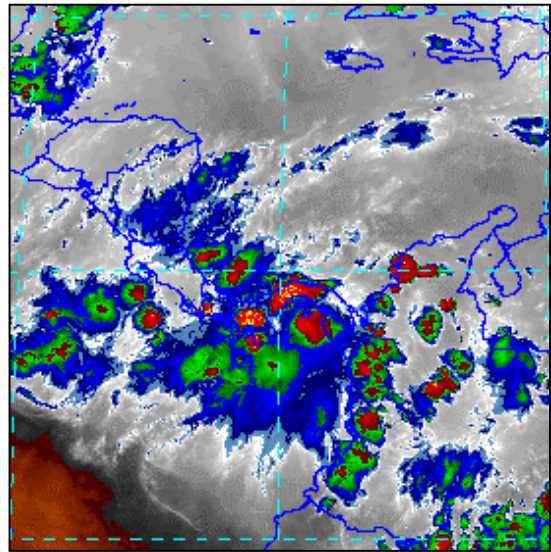
b) 20 August at 0600UTC

Figure 1 Surface analysis over the Central America and Caribbean area at different times as indicated in the label. Source: US National Hurricane Center¹

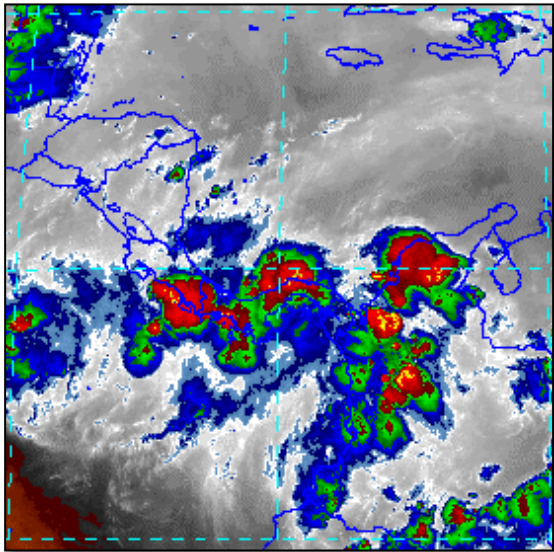
¹ National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: August 14-20, 2020, available at: https://www.nhc.noaa.gov/tafb/CAR_18Z.gif and https://www.nhc.noaa.gov/tafb/CAR_12Z.gif



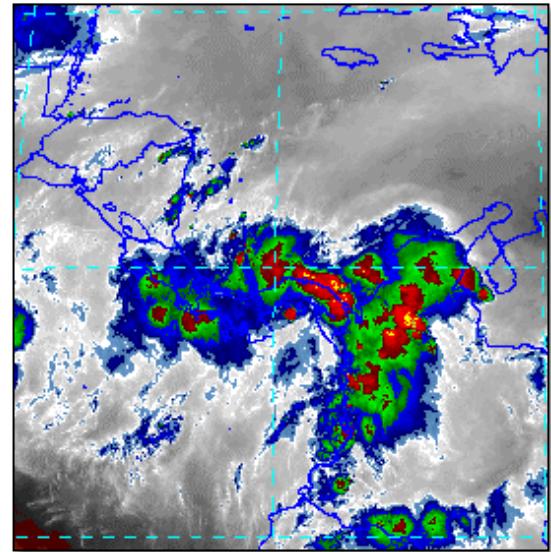
a) 13 August at 1800UTC



b) 13 August at 2100UTC



c) 14 August at 0000UTC



d) 14 August at 0300UTC

Figure 2 Satellite imagery at different times as indicated by the captions 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: Source: NOAA Satellite and Information Service²

² RAMSDIS Online Archive, NOAA Satellite and Information Service, review dates: August 13-14, 2020, available at:

http://rammb.cira.colostate.edu/ramsdiskonline/archive.asp?data_folder=tropical/tropical_ge_14km_wv&width=640&height=480

3 IMPACTS

At the time of this report and according to an evaluation from Panama’s disaster management agency (in Spanish: Sistema Nacional de Protección Civil - SINAPROC) reports indicate there was some flooding and fallen trees recorded in the District of Aguadulce (Province of Coclé) and the District and Province of Panama. The Districts of La Chorrera, Chame (Province of Panamá Oeste) and Colón (Province of Colón) indicated there were fallen trees and power poles that temporarily obstructed some roads.

The SINAPROC reported increased river levels, damaged roads and a landslide in the District of Mariato (Province of Veraguas), but there were no casualties and no houses damaged due to this adverse weather.

Figure 3 shows some of the damage caused by this adverse weather in Panama.

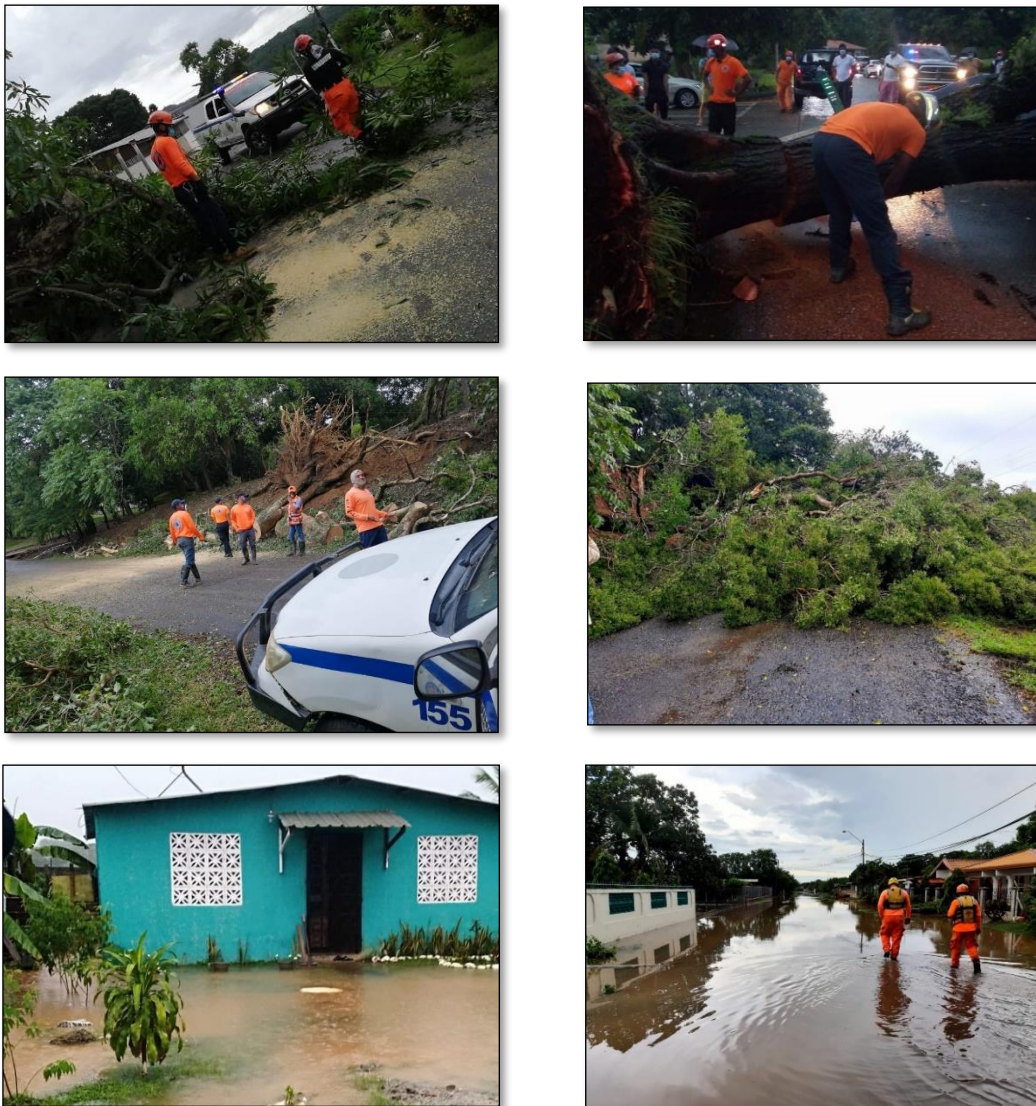




Figure 3 Damage caused by this adverse weather period in Panama – August 13-21, 2020
Source: *Sistema Nacional de Protección Civil*

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH³, WRF5 and WRF7⁴, simulated the occurrence of precipitation over Panama and the surrounding waters during the period August 13-21, 2020. However, each data source reported a specific distribution of rainfall, as discussed in the following.

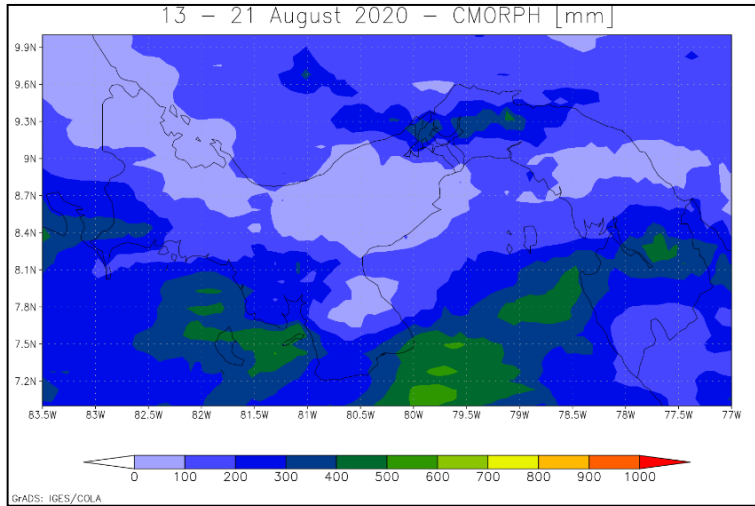
CMORPH reported total accumulated amounts of precipitation greater than 100 mm over most of Panama. The largest values of precipitation were shown over the northern portion (near Colon District, in the zone of the Panama Canal, the area with the highest exposure in the country) with values between 200 mm and 500 mm.

WRF5 simulated total accumulated amounts of rainfall with values generally larger than 100 mm over most of Panama. It reported higher peaks in localized areas where the exposure is low: along the south coast in the Mariato District (Veraguas Province) with maximum values higher than 1000 mm, and along the area on the border with Colombia, with maximum values between 500 mm and 900 mm.

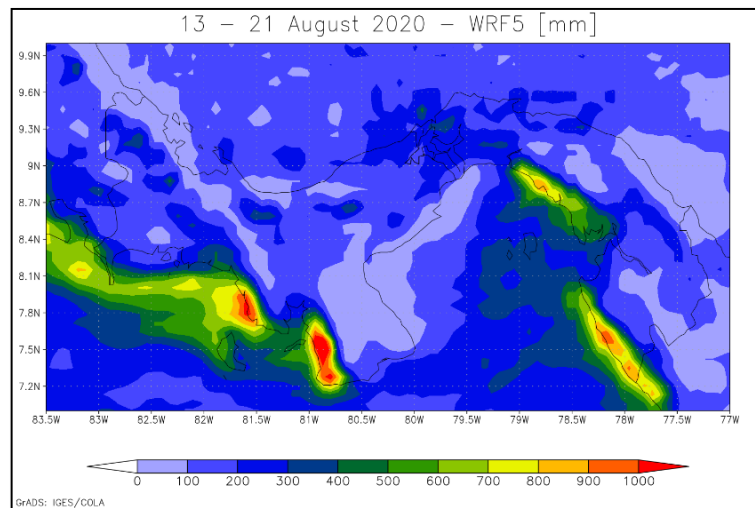
WRF7 showed total accumulated amounts of precipitation higher than 200 mm over most of Panama. The largest values of precipitation were shown over the south-west coast with values between 500 mm and 1000 mm, and over the southern area of the Panama Canal zone, where Panama City is located with values between 400 mm and 700 mm.

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 in the Definitions section of this report.

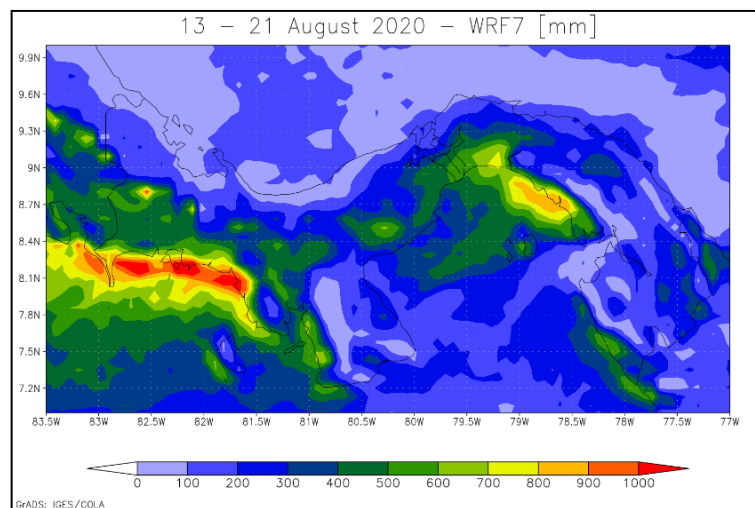
⁴ WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data <https://www.mmm.ucar.edu/weather-research-and-forecasting-model>. These data are initialised by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [<http://rda.ucar.edu/datasets/ds083.2/>]). Further details in the Definitions section of this report.



a) CMORPH



b) WRF5



c) WRF7

Figure 4 Total accumulated precipitation during the period August 13-21, 2020 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 24-hour aggregation and 72-hour aggregation respectively:

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/PAN/CARE_3_2020/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/PAN/CARE_3_2020/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Panama for all three data sources used by XSR2.5: CMORPH, WRF5 and WRF7. The RIL was highest for WRF7 due to the large amounts of accumulated precipitation presented over the southern area of the Panama Canal zone, where Panama City is located, an area characterized by high exposure.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs from the three sources (CMORPH, WRF5 and WRF7). The RIL_{FINAL} was greater than zero and therefore this CARE qualified as a loss event. However, it was below the attachment point of Panama’s Excess Rainfall policy and thus did not trigger a policy payout.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event was below the attachment point of Panama’s Excess Rainfall policy and therefore no payout is due.

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

DEFINITIONS

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

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