Covered Area Rainfall Event (13/06/2024 to 19/06/2024)

Excess Rainfall

Event Briefing

Guatemala

25 June 2024

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1 INTRODUCTION

This event briefing describes the impact of rainfall on Guatemala, which was associated with a Covered Area Rainfall Event (CARE) starting on 13 June and ending on 19 June , 2024. The Rainfall Index Loss (RIL) for the Covered Area Rainfall Event was above the attachment point of Guatemala's Excess Rainfall policy, and therefore a payout of US$6,376,184.00 is due.

2 EVENT DESCRIPTION

On 13 June, an elongated low pressure system was located over Florida near latitude 25°North, longitude 86°West and a surface trough extended beyond the system to the northern Yucatan Peninsula. In combination with the low pressure system and surface trough, an upper-level diffluent flow was present across the region, supporting scattered showers and thunderstorms across a large area over the Yucatan Peninsula, extending north almost to latitude 24°North between longitudes 87°West and 90°West.

The same meteorological configuration persisted on 14 June, with the surface trough trailing southwestward from the Atlantic waters northeast of Florida to the Yucatan Peninsula. In addition to this configuration, a barotropic Central American gyre started to develop over Central America (Figure 1). This gyre is a persistent broad area of low pressure that may develop during Central America's rainy season. In this case, it was related to the presence of a monsoon trough along the southern coast of Guatemala and El Salvador and over southern Nicaragua (Figure 1). The instability associated with this meteorological configuration supported scattered heavy showers in Central America over a large area including Guatemala, Belize, Honduras, El Salvador and northwestern Nicaragua.

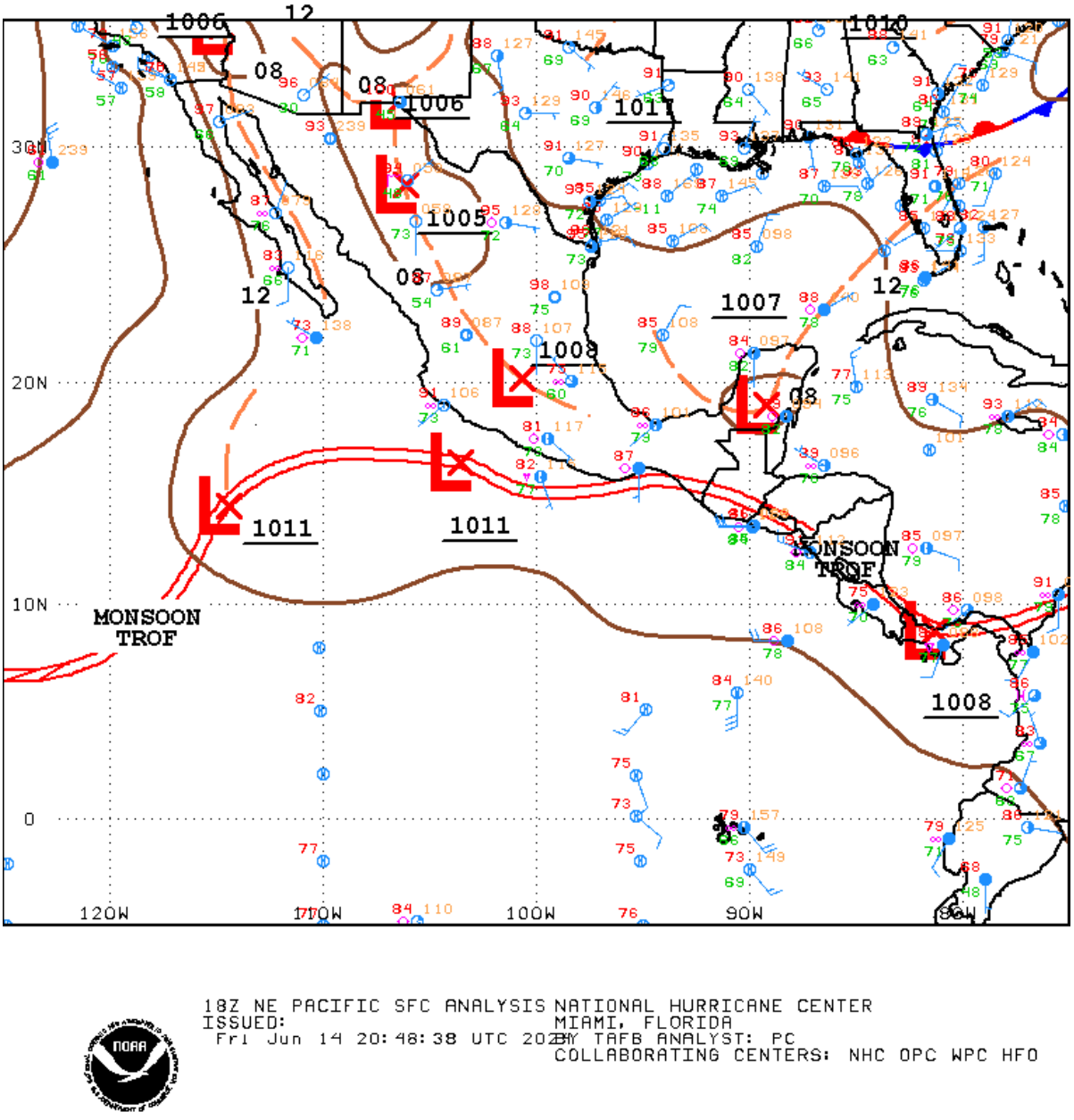


Figure 1. Surface analysis over the Central America area on 14 June at 1800UTC, 2024. Source: US National Hurricane Center[1]

The Central American gyre persisted over the aforementioned region for the following 4 days (until 18 June) causing widespread deep convection along the Pacific coast of Mexico's Chiapas state, Guatemala, Honduras, Belize, El Salvador and northwestern Nicaragua. Isolated strong

1 National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review date: 12 June 2024, available at: *https://www.nhc.noaa.gov/tafb/EPAC_18Z.gif*

thunderstorms, associated with heavy rainfall, developed over this area during this time, especially from 2100 UTC to 900UTC the following day, corresponding to the afternoon and early morning hours.

Over Guatemala, the most intense rainfall affected the entire country but with greatest impacts mainly in northern Guatemala and the region along the Pacific coast (Figure 2).

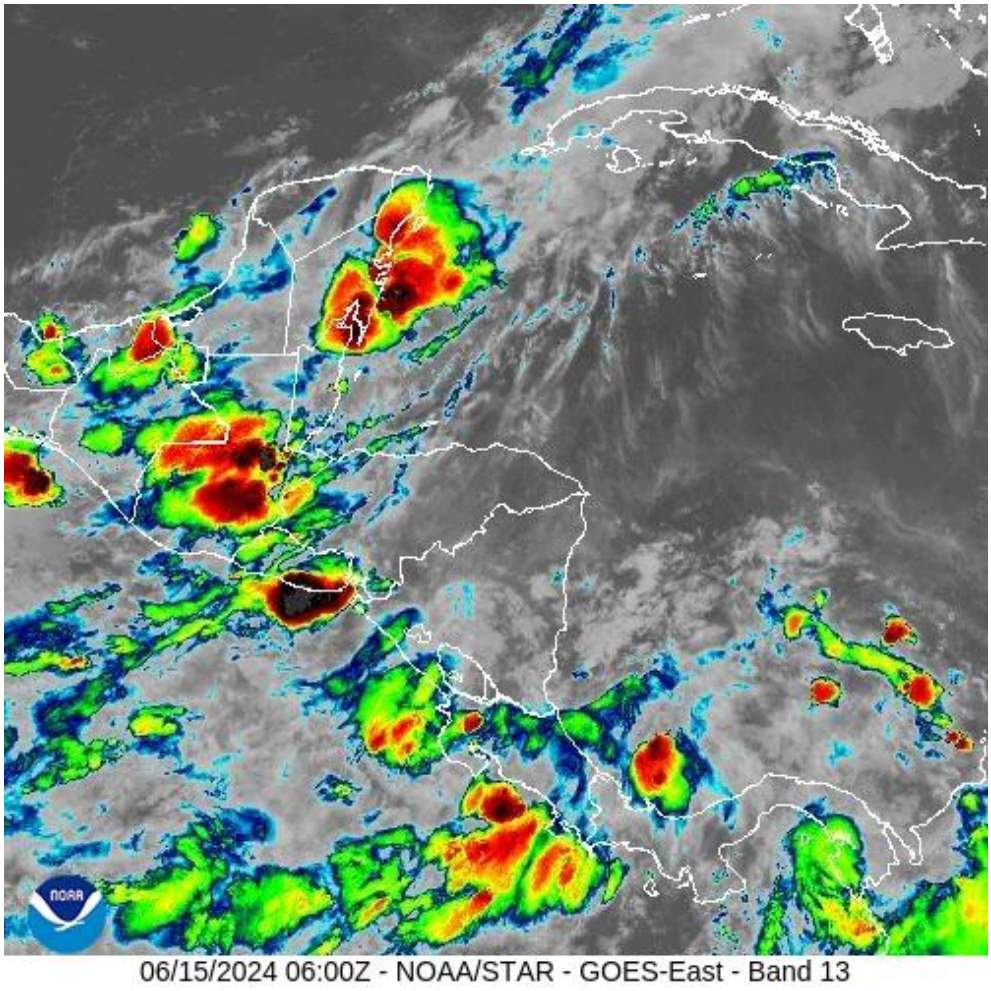


Figure 2 Satellite imagery on 15 June, 2024, at 0600UTC. Blue/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the red/yellow colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Source: NOAA, National Environmental Satellite, Data and Information Service[2].

On 18 June, the Central American gyre moved west-northwestward towards the Bay of Campeche. At 1800 UTC, it was designated as Potential Tropical Cyclone One by the National Hurricane

2 RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://cdn.star.nesdis.noaa.gov/GOES16/ABI/SECTOR/cam/13/20241670600_GOES16-ABI-car-13-500x500.jpg

Center (NHC) of the National Oceanic and Atmospheric Administration (NOAA) of the United States. On the next day, 19 June, at 1800UTC, the NHC reported that the system evolved in the first tropical storm of the 2024 Atlantic Hurricane Season and it was named Alberto. The movement of the system towards in a west-northwestward direction on 18 and 19 June gradually shifted the area of most active convection from the central part of Central America towards northern Central America and the western Gulf of Mexico. Consequently, starting from 19 June, deep convection over Guatemala weakened, with a gradual reduction in the amount of rainfall.

3 IMPACTS

At the time of writing this report, several sources of information reported damages or losses in Guatemala due to this Covered Area Rainfall Event during the indicated period.

On 19 June, the National Coordinator for Disaster Reduction (CONRED in Spanish) reported 5 injured persons and 8 deaths, caused by landslides, floods, overflowing rivers, and other incidents in the departments of Suchitepéquez, San Marcos, Guatemala Quiché, and Jalapa. [3]

CONRED reported 514 incidents nationwide due to the rains during this period, as well as 1,196 people at risk, 2,547 affected, 840 evacuated, 358 sheltered. [4]

CONRED and other organizations reported damage to 26 educational centres, 208 – 262 roads, 8 buildings and 4-10 bridges. The Ministry of Communications, Infrastructure and Housing (CIV in Spanish) confirmed that at least four bridges were destroyed, affecting residents in Quiché, Suchitepéquez, and San Marcos.

Fallen tree reported by CONRED. / Photo: CONRED

In San Vicente Pacaya, in the department of Escuintla, there was a fallen tree and mudflows, preventing the passage of vehicles on that road. However, CONRED subsequently cleared the

3 EFE: Lluvias en Guatemala dejan al menos diez muertos e inundaciones (efe.com)
4 Agencia Guatemalteca de Noticias: Lluvias han provocado 514 incidentes que han causado daños en viviendas, edificios y carreteras - Agencia Guatemalteca de Noticias (agn.gt)

road.

Clearing roads by CONRED. Credits: Dora Salpec, Department Delegate of the SE-CONRED

The Palín-Escuintla highway was damaged when a transversal pipe collapsed, causing major sinking.[5]

Repair actions on the Palín-Escuintla highway / Foto: CIV

4 RAINFALL MODEL OUTPUTS

All data sources used by the XSR 3.0 model, CMORPH, IMERG, WRF5, WRF7, WRF11 and

5 Soy 502: Carreteras y puentes destruidos en Guatemala tras fuertes lluvias (soy502.com)

WRF15[6], detected the occurrence of precipitation over Guatemala and the surrounding waters during the period 10 to 19 June 2024. Each data source reported a specific distribution and accumulation of rainfall, as discussed below and shown in Figure 3. A CARE for Guatemala was activated on 13 June and lasted until 19 June. The CARE was activated due to the use of the 24-hour and the 72-hour aggregation intervals for precipitation[7] and thus the period considered by the XSR 3.0 model for the loss estimate based on the accumulated precipitation in Guatemala was 10 to 19 June.

CMORPH reported total accumulated values of precipitation higher than 100 mm over the southern and northwestern portions of the country, with maximum values, between 400 mm and 500 mm, over a limited area in northwestern Guatemala.

IMERG reported a similar geographic distribution of the total accumulated values of precipitation to that of CMORPH, but with higher values, higher than 100 mm over most of the country and higher than 200 mm over the southern and northwestern portions. The maximum values, between 500 mm and 600 mm, were reported over an extended area in northwestern Guatemala and over two small regions in the south and centre of the country.

WRF5 showed total accumulated values of precipitation higher than 100 mm over most of the country. The highest values, between 400 mm and 900 mm, were reported over the southern part of the Sierra Madre mountain chain and to the south of the mountains, with peak values reaching between 700 mm and 900 mm along the Pacific coast and over the southeastern portion of the country. Values between 400 mm and 800 mm were shown over limited areas in western Guatemala.

WRF7 reported a similar geographic distribution of the total accumulated values of precipitation to that of WRF5, but with higher values. The maximum values, greater than 800 mm, were shown over the entire area to the south of Sierra Madre, where the capital city is located.

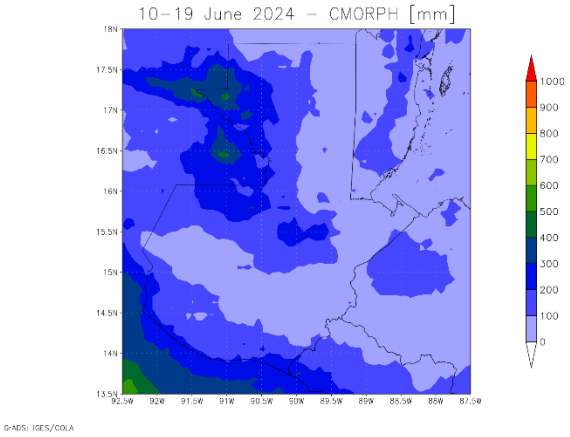
WRF11 showed total accumulated values of precipitation higher than 100 mm over most of the country. Values higher than 500 mm were reported over limited areas in the southern, northern and western areas of the country, with the maximum values, between 800 mm and 1000 mm, at the southwestern edge of the country.

WRF15 reported a similar geographic distribution of the total accumulated values of

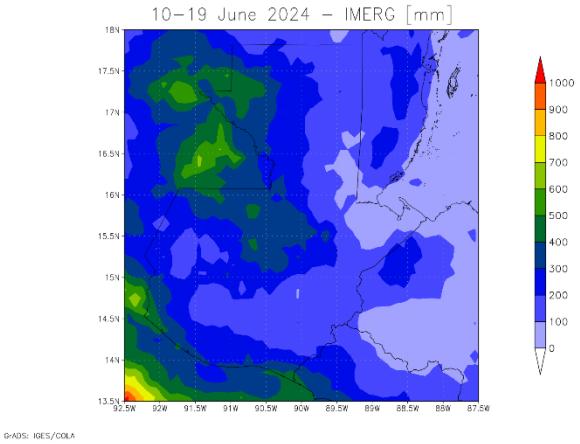
6 CMORPH Model: the satellite-based rainfall precipitation estimates provided by the NOAA Climate Prediction Center (CPC) using the so-called Morphing Technique *http://www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html*. Further details are provided in the Definitions section of this report
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, 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.

7 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.

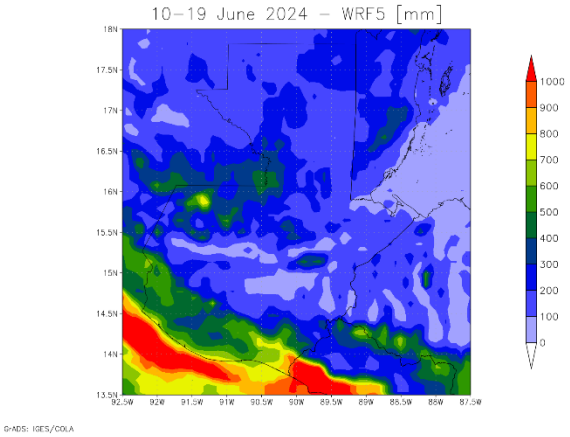
precipitation as that of WRF5 and WRF7, showing total accumulated values of precipitation higher than 400 mm over the southern portion and to the south of the Sierra Madre . The maximum values, between 900 mm and 1000mm, were reported over limited areas mostly along the Pacific coast and over the southern part of Sierra Madre.



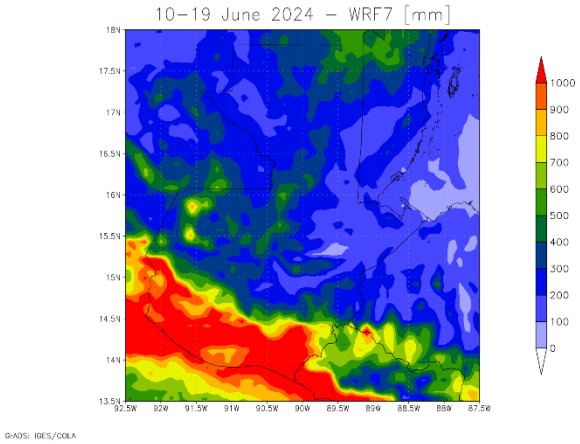
a) CMORPH



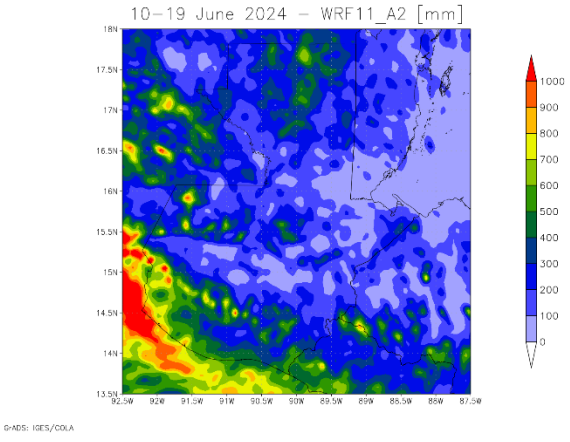
b) IMERG



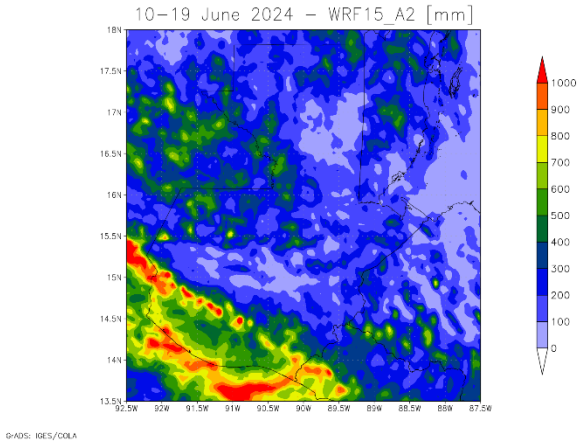
c) WRF5



d) WRF7



e) WRF11



f) WRF15

Figure 3 Total accumulated precipitation during the period 10-19 June, 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 24-hour aggregation and 72-hour aggregation respectively:

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/GTM/CARE_1_2024/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/GTM/CARE_1_2024/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Guatemala for all the data sources used by XSR3.0: CMORPH, IMERG, WRF5, WRF7, WRF11, and WRF15. The RIL was the highest for WRF7.

The final RIL (RIL_{FINAL}) was calculated as the average of all six RILs from CMORPH, IMERG, WRF5, WRF7, WRF11, and WRF15. The RIL_{FINAL} was greater than the attachment point of the Excess Rainfall policy for Guatemala and therefore the policy was triggered.

The Wet Season Trigger (WST) endorsement of the XSR3.0 model did not identify this CARE as a "Wet Season" event[8]. Therefore no payout is due under the Wet Season Trigger endorsement of Guatemala's Excess Rainfall policy.

8 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 event (WE) is any period of consecutive days, during which the Wet Index (WI) is equal or greater than 1

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for the Covered Area Rainfall Event (CARE) for Guatemala that started on 13 June and ended on 19 June 2024, produced government losses that were above the attachment point of Guatemala's Excess Rainfall policy and therefore, the policy was triggered. A payout of US$6,376,184.00 is due to the Government of Guatemala under its Excess Rainfall policy

CCRIF expresses sympathy with the Government and people of Guatemala for the loss of life and impacts on communities and infrastructure caused by this event.

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.