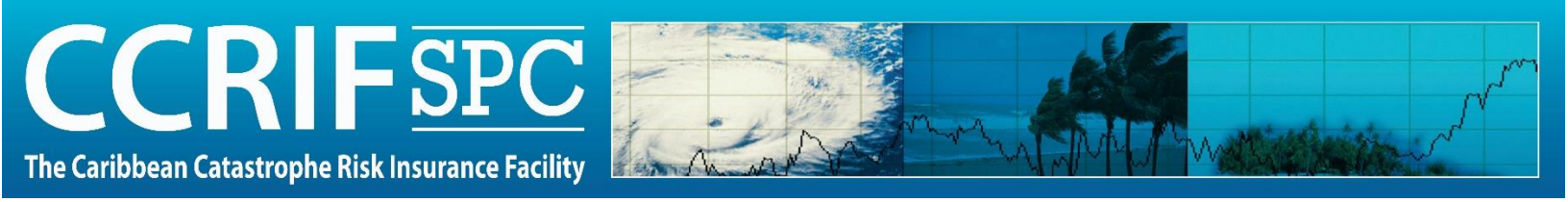

Covered Area Rainfall Event (14/11/2024 to 19/11/2024)

Excess Rainfall

Event Briefing

Honduras

28 November 2024

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1 INTRODUCTION

This event briefing describes the impact of rainfall on Honduras, which was associated with a Covered Area Rainfall Event (CARE) starting on 14 November 2024 and ending on 19 November 2024. The Rainfall Index Loss (RIL) for the Covered Area Rainfall Event was above the attachment point of Honduras' Excess Rainfall (XSR) policy, therefore a payout of US$4,665,090.47 was made to the Government of Honduras.

2 EVENT DESCRIPTION

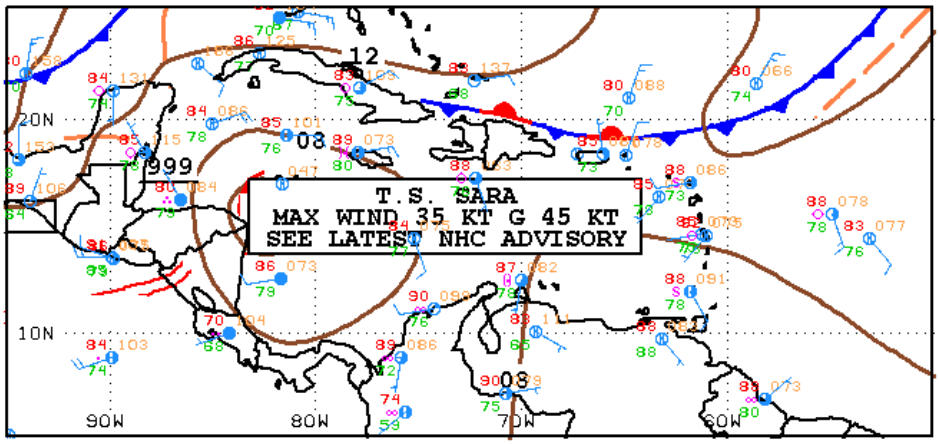
On 14 November 2024 at 1800 UTC, the National Hurricane Center (NHC) reported the formation of Tropical Storm Sara just east of Honduras. At this time, the storm centre was located near latitude 15.7° North and longitude 82.9° West, approximately 50 mi (85 km) northeast of Cabo Gracias a Dios on the Nicaragua/Honduras border (Figure 1a). Sara was steered westward by a mid-level ridge to the north with at a forward speed of 12 mph (19 km/h), heading toward Central America. Satellite imagery showed that the storm had a developing convective structure, with a large convective rainband extending westward to the centre and bursts of convection near the low-level centre of circulation. The western rainband crossed the northern Honduras from east to west, starting from 0600UTC until the end of the day, spreading moderate to locally intense precipitation over the region.

On 15 November, the forward motion of the system reduced significantly, making the tropical storm to meander near the northern coast of Honduras, with a distance to the coastline lower than 14mi (23km) during most of the day. Moreover, between 0300UTC and 0600UTC, the centre of circulation was inland over northestern Honduras near Laguna de Brus. During the early hours of the day, the satellite imagery revealed a strong burst of convection near the low-level centre, located over northeastern Honduras, which affected the coastal region with heavy precipitation (Figure 2a and 2b). During the same hours, intense convection was over the western semicircle of the tropical storm, spreading moderate to heavy rainfall over northern Honduras from east to west, particularly over the coastal area (Figure 2a, 2b and 2c). This interval corresponded to the peak of the rainfall event for Honduras.

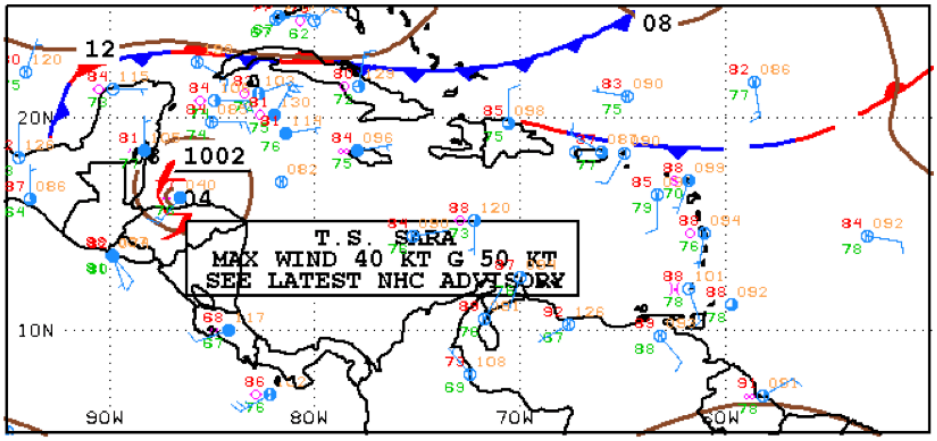
After 1200UTC and throughout the following day, 16 November, Sara experienced a gradual degradation of the convective structure, with fragmented convective rainbands and limited convection near the centre. The satellite imagery during this period indicated a reduction of convective activity over Honduras, with scattered showers of moderate intensity, apart from a large thunderstorm reported in the early hours of 16 November over western Honduras, within the western rainband of the tropical storm (Figure 2d). Despite the lost in organization of the convective structure, Sara maintained its intensity with maximum sustained winds of 45 mph (72 km/h) and a minimum central pressure of 997 mb. On 16 November at 1800 UTC, Tropical Storm Sara was centred near latitude 16.4° North and longitude 87.0° West, approximately 20 mi (30 km) WNW of Isla Roatán (Figure 1b), tracking westward at 4mph (6km/h) toward Belize.

During the early hours of 17 November, Tropical Storm Sara continued to advance west-northwest at 5 mph (7 km/h), with its centre remaining offshore. Convective activity over the southern semicircle extended over western Honduras, producing moderate to locally intense precipitation, mostly along the coastline. During the second half of 17 November and 18 November, the system

made landfall near Belize City, weakened and moved northwestward inland, dissipating over the Yucatan Peninsula. This marked the end of the rainfall event associated with TC Sara for Honduras, as in the second half of 17 November and the following two days, no significant convection was reported over Honduras, apart from local showers of moderate intensity fuelled by the residual instability.



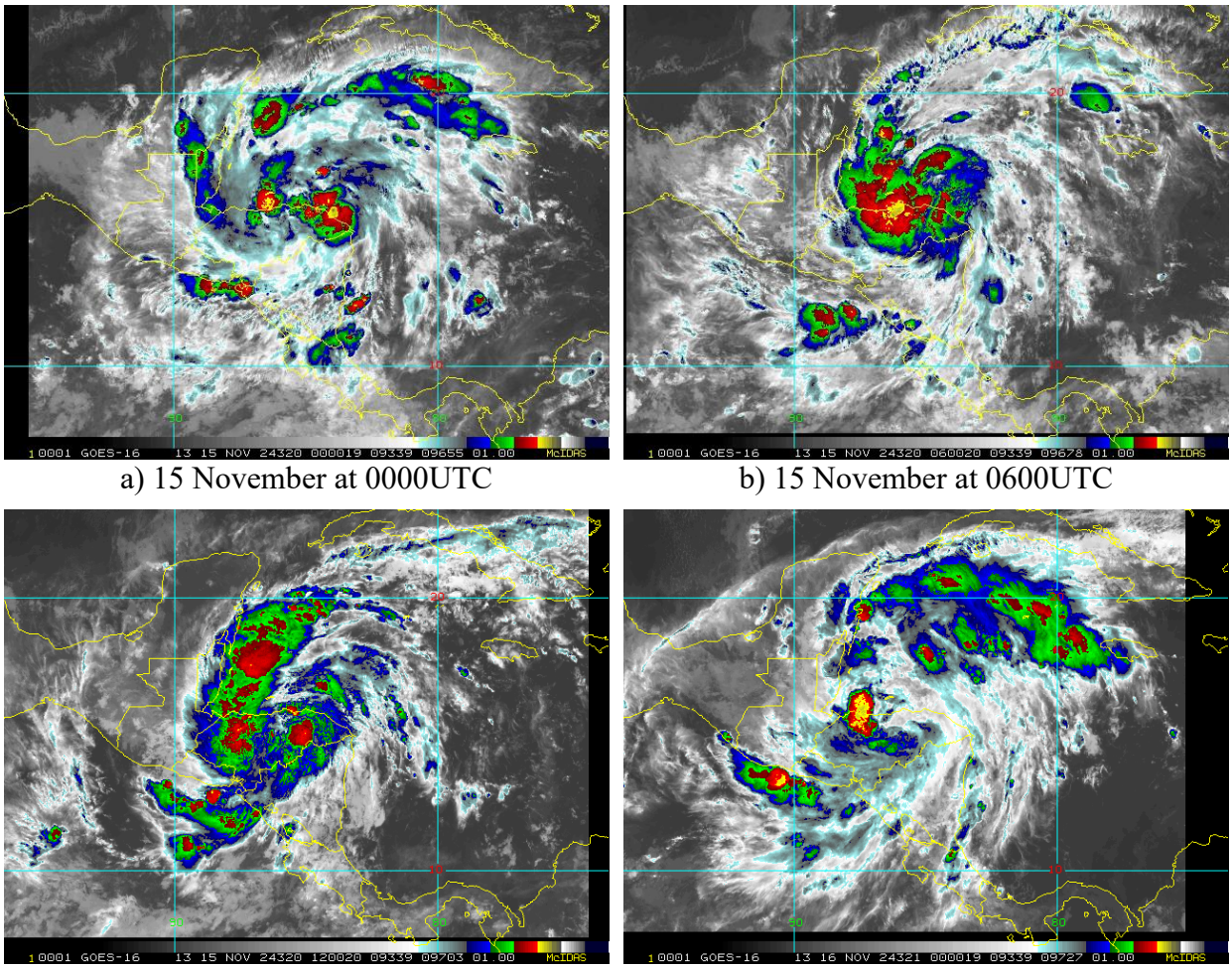
a) 14 November at 1800UTC



b) 16 November at 1800UTC

Figure 1. Surface analysis over the Caribbean Sea area on14 and 16 November 2024 at 1800 UTC, as indicated in the labels. Source: US National Hurricane Center[1]

[1] National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: 14 and 16 November 2024, available at: https://www.nhc.noaa.gov/tafb/CAR_18Z.gif



a) 15 November at 0000UTC b) 15 November at 0600UTC

c) 15 November at 1200UTC d) 16 November at 0000UTC

Figure 2. Satellite imagery from (a) 14 November 2024 at 2100 UTC, (b) 15 November 2024 at 1200 UTC, (c) 16 November 2024 at 1600 UTC. 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]

3 REPORTED IMPACTS

On November 16 in San Pedro Sula, a pedestrian bridge collapsed due to flooding, requiring residents to cross on a bridge under construction[3].

Nationwide, 41 vehicle crossings were impassable, 53 roads were damaged and 4 destroyed, 305 streets were affected and 248 destroyed, and 1,797 communities were cut off[4], according to authorities on November 18.

[2] RAMSDIS Online Archive, NOAA Satellite and Information Service, available at: https://rammb-data.cira.colostate.edu/tc_realtime/archive.asp?product=4kmirimg&storm_identifier=al192024

[3] Tropical Storm Sara drenches Honduras' northern coast with flash flooding and mudslides in forecast | AP News

[4] Central America: Tropical Storm Sara - Flash Update

On November 17, Sara caused flash flooding and mudslides in Potrerillos, Honduras, and residents were evacuated from their homes due to the weather system[5]. The Ulua River near Potrerillos overflowed causing floods in the Suyapa neighborhood.

The Permanent Contingency Commission of Honduras (COPECO) reported four deaths[6] and more than 127,000 people affected. Over 6,738 people were in 95 active shelters, 3,227 houses were damaged, 226 destroyed.

Figure 3 Pedestrian bridge collapsed due to flooding in San Pedro Sula

Figure 4 Floods in Suyapa neighborhood

On November 18 authorities reported damage in 17 of 18 departments and 85 of 298 municipalities. Road infrastructure, drinking water and sanitation systems, and electricity services sustained significant damage, particularly in Atlántida.

4 RAINFALL MODEL OUTPUTS

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

[5] Tropical Storm Sara nears landfall in Belize | AP News
[6] Copeco confirma que tormenta Sara deja cuatro muertos en su paso por Honduras

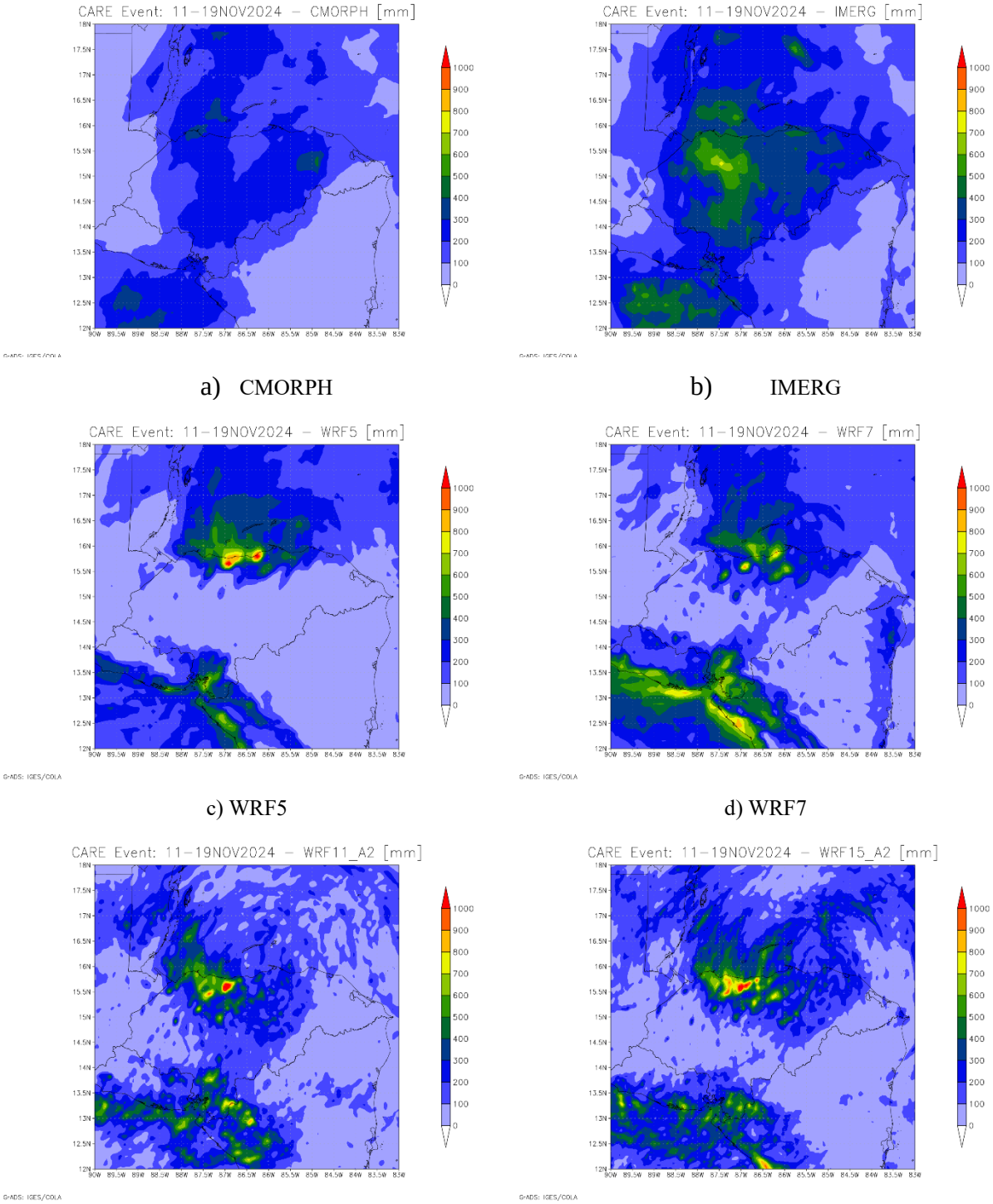
WRF15[7], detected the occurrence of precipitation over Honduras and the surrounding waters during the period 11 to 19 November 2024. Each data source reported a specific distribution and accumulation of rainfall, as discussed below and shown in Figure 5. A CARE for Honduras was activated on 14 November and lasted until 19 November. The CARE was activated due to the use of the 24-hour and the 72-hour aggregation intervals for precipitation[8] and thus the period considered by the XSR 3.0 model for the loss estimate based on the accumulated precipitation in Honduras was 11 to 19 November 2024.

CMORPH	CMORPH reported total accumulated values of precipitation between 300 mm and 400 mm over two isolated areas in the north of the country, while lower values were reported over the rest of the country.
IMERG	IMERG reported total accumulated values of precipitation between 600 mm and 800 mm over a small area over the northwestern area of Honduras, while values between 400 mm and 600 mm were reported in the surrounding area. Lower values, between 200 mm and 400 mm, were reported over the rest of the country.
WRF5	WRF5 showed total accumulated values of precipitation between 200 mm and 600 mm along the northern coast of Honduras, with local maximum values between 800 mm and1000 mm over a couple of areas. Values higher than 400 mm were reported over a small area along the south coast.
WRF7	WRF7 showed total accumulated values of precipitation with a similar geographic distribution to that of WRF5, with lower maximum values along the north coast.
WRF11	WRF11 reported accumulated values of precipitation with a similar geographic distribution and intensity to that of WRF5
WRF15	WRF15 reported accumulated values of precipitation with a similar geographic distribution and intensity to that of WRF5 and WRF11.

[7] 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.

[8] 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 11 and 19 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 24-hour aggregation and 72-hour aggregation respectively:

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/HND/CARE_3_2024/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/HND/CARE_3_2024/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Honduras for all the data sources used by XSR3.0: CMORPH, IMERG, WRF5, WRF7, WRF11 and WRF15. The RIL was the highest for WRF5. A Disaster Alert declaration named "Tropical Storm Sara - Nov 2024" (ID code: 52206) was issued by ReliefWeb for Honduras 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, IMERG, WRF5, WRF7, WRF11 and WRF15. The RIL_{FINAL} was above the attachment point of the Honduras' Excess Rainfall policy, and therefore this CARE qualified as a triggering event under this policy. Thus, a payout was made to the Government of Honduras under its Excess Rainfall policy.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) was above the attachment point of Honduras' Excess Rainfall policy, therefore a payout of US$4,665,090.47 was made to the Government of Honduras.

The Wet Season Trigger (WST) endorsement of the XSR3.0 model identified this CARE as a "Wet Season" event[9]. However, in this case, no payment is due under the Wet Season Trigger endorsement of Honduras' Excess Rainfall policy because the primary policy is already triggered, and thus the conditions are not met to have a WST payment.

The Localized Event Trigger (LET) component of the XSR3.0 model did not identify this CARE as a localized event[10]. Therefore, no payout is due under the Local Event Trigger endorsement of Honduras' Excess Rainfall policy.

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

[9] 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.

[10] The LET is designed to cover rainfall events that affect only a small portion of the country. To determine a qualifying localized event, two conditions must be met: the average precipitation in the 10% of the area with highest precipitation – known as the "Local Exposure" - from (i) either of the satellite datasets (CMORPH or IMERG) and (ii) at least three of the six WRF models must be greater than the local precipitation threshold (LPT).

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.