Covered Area Rainfall Event (17/05/2020 to 19/05/2020)

Excess Rainfall

Event Briefing

The Bahamas - NorthWest

26 May 2020

Registered Office: CCRIF SPC c/o Sagicor Insurance Managers Ltd., 198 North Church Street
2nd Floor Sagicor House, P.O. Box 1087, Grand Cayman KY1-1102, Cayman Islands
Email: ccrif@ccrif.org | Website: www.ccrif.org | Twitter: @ccrif_pr | Facebook: CCRIF SPC

1 INTRODUCTION

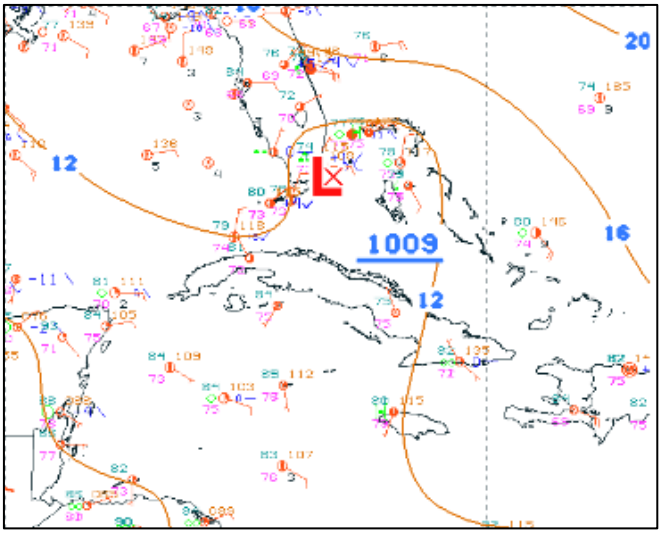
In mid-May 2020, The Bahamas Department of Meteorology indicated that weather conditions in The Bahamas were under the influence of a tropical depression system resulting in an adverse weather conditions that occurred from 16 to 17 May. The Department anticipated heavy rains and high winds for the central and northern Bahamas islands.

This event briefing describes the impact of the precipitation on The Bahamas North West[1] region, which is associated with a Covered Area Rainfall Event (CARE), starting on 17 May and ending on 19 May 2020. The Rainfall Index Loss (RIL) was below the attachment point of the Excess Rainfall policy for The Bahamas North West and therefore no payout is due to the Government of The Bahamas. For The Bahamas Central and The Bahamas South East the XSR model did not trigger a CARE and therefore did not register a Rainfall Index Loss.

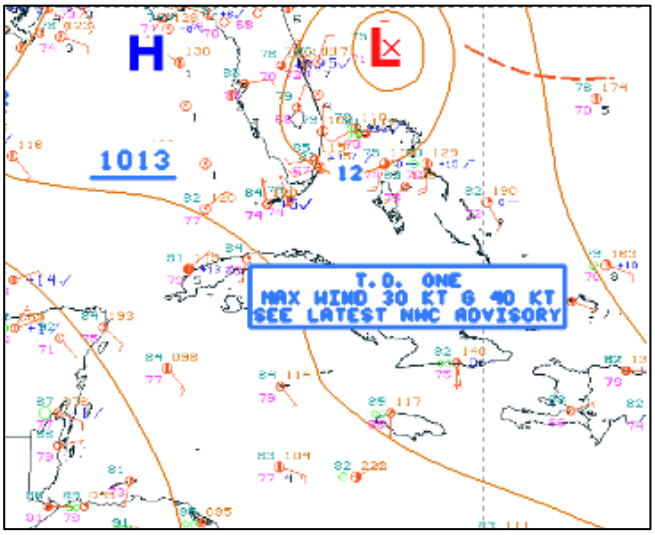
2 EVENT DESCRIPTION

On 15 May 2020 at 1800UTC, an area of low pressure with a minimum of 1009 mb was located over the Straits of Florida near 25N 80W, as reported in Figure 1a. It produced disorganized shower activity and gusty winds across the Florida Keys, portions of south-east Florida, and the north-western region of The Bahamas (hereafter referred to as The Bahamas North-West). In the following 30 hours the low pressure system moved toward the NNW at 12 mph (20 km/h) and the associated convection activity intensified. This caused scattered moderate to strong thunderstorms over the same area especially over The Bahamas North-West (Figure 2a). On 17 May at 0000UTC, the United States National Hurricane Center (NHC) identified the system as a tropical depression (Figure 1a). At this time, the more intense convection activity was affecting the Atlantic waters within a distance of 170 km from the centre (sited near 28.4N 78.6W), while scattered moderate showers extended up to 300 km from the centre and were still observed over The Bahamas North-West. After 6 hours, on 17 May at 0600UTC, the NHC upgraded the depression to a Tropical Storm, which was the first named system of the 2020 Atlantic Season, Tropical Storm Arthur. While the rain bands of Tropical Storm Arthur were not directly affecting The Bahamas, scattered moderate rain showers persisted over and near The Bahamas North-West, from 23N to 28N between 73W and 79W (Figure 2b), due to the formation of a weak surface trough extending from Tropical Storm Arthur (Figure 1c). On 18 May, Tropical Storm Arthur continued to move towards the NW and the precipitation over The Bahamas North-West ceased. On 19 May, abundant moisture and upper-level divergence were over Florida and The Bahamas North-West, ahead of a cold frontal system situated over the south-east U.S. and east-central Gulf of Mexico (Figure 1d). As a result, pre-frontal precipitation was observed offshore of South Florida and over The Bahamas North-West. The radar maps showed some scattered moderate to isolated strong rain showers over The Bahamas North-West on 19 May from 0000UTC to 0900UTC, as shown in Figure 3.

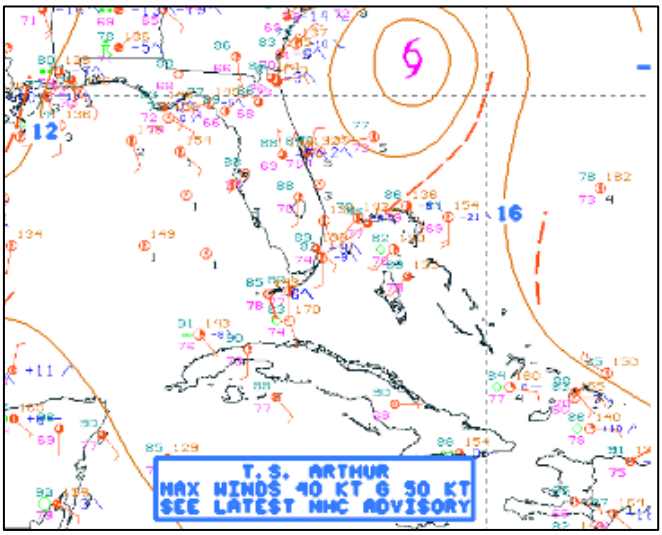
[1] The Bahamas Department of Meteorology defines geographic zones within The Bahamas for giving hurricane and severe weather alerts: North West, Central and South East. The Bahamas has a separate excess rainfall policy for each zone.



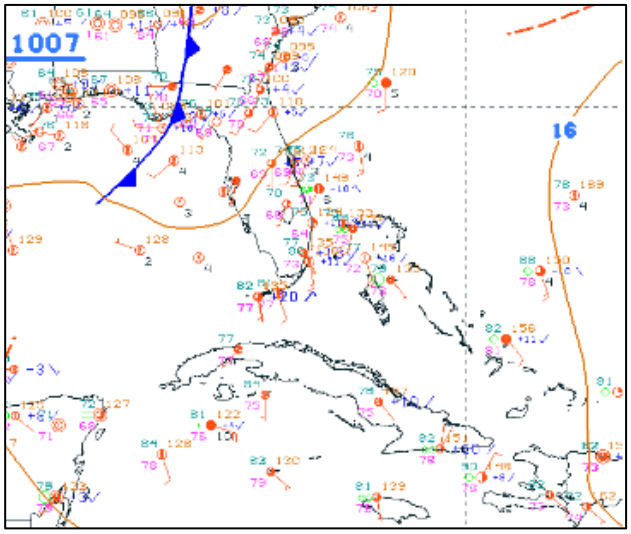
a) 16 May at 0000UTC



b) 17 May at 0000UTC

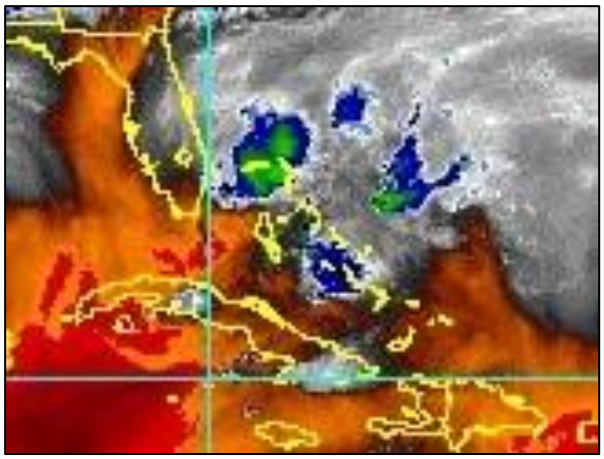


c) 17 May at 1800UTC

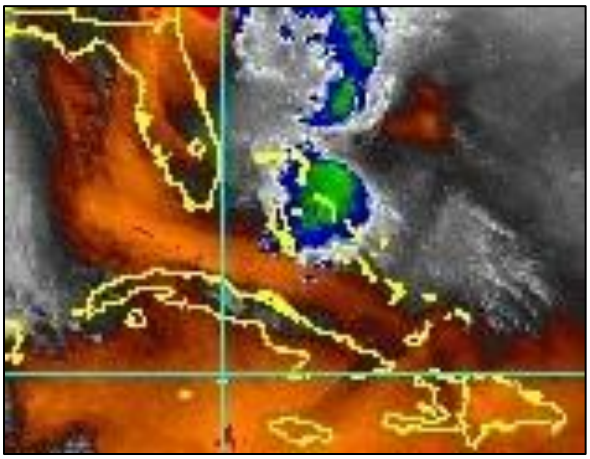


d) 19 May at 1200UTC

Figure 1 Surface analysis over the Central America area at different times as indicated in the caption.
Source: US National Hurricane Center[2]



a) 16 May at 0600UTC

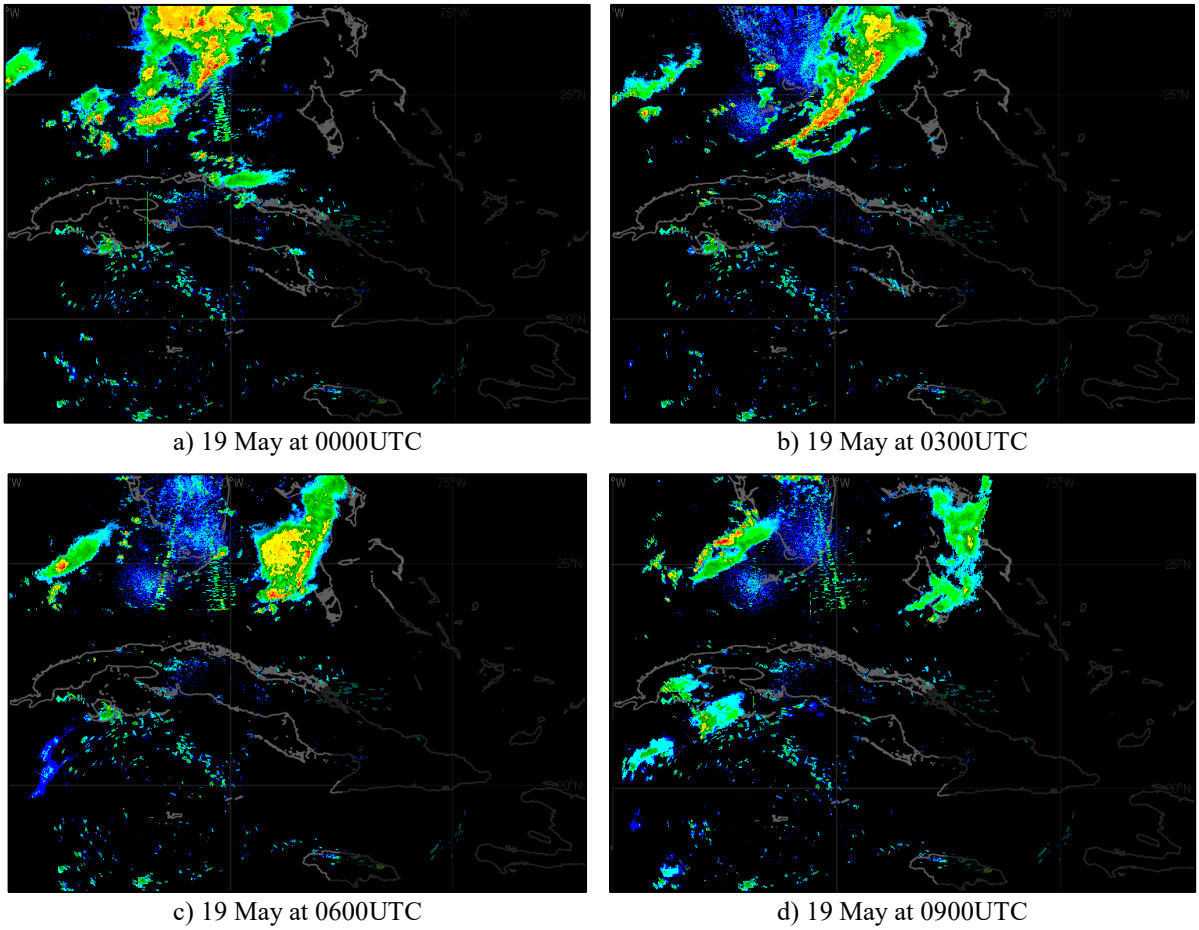


b) 17 May at 1200UTC

Figure 2 Satellite imagery at different times (indicated in the captions) from thermal infrared channel enhanced with color. 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. Dry environment is shaded with orange to dark red colours. Source: NOAA Satellite and Information. Source: NOAA Satellite and Information[3].

[2] National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review dates: from 16 May to 19 May 2020, available at: *https://www.nhc.noaa.gov/tafb/GULF_00Z.gif*

[3] RAMSDIS Online Archive, NOAA Satellite and Information, review date: 22 May 2020, available at: *http://rammb.cira.colostate.edu/ramsdis/online/archive.asp?data_folder=tropical/tropical_ge_14km_wv&width=640&height=480*



a) 19 May at 0000UTC

b) 19 May at 0300UTC

c) 19 May at 0600UTC

d) 19 May at 0900UTC

Figure 3 Reflectivity maps from the radar located in Florida (United State of America) at different times as indicated in the labels. Colours indicate the reflectivity, which depends on the intensity of precipitation (green represents moderate precipitation, while yellow/red represent intense precipitation). Source: Barbados Weather[4]

3 IMPACTS

At the time of this event brief, no information was available related to damage or loss in The Bahamas North-West due to this CARE.

Prior to the arrival of the tropical depression system (days later reorganized as Tropical Storm Arthur), the authorities in The Bahamas carried out precautionary measures such as issuing a Severe Thunderstorm Warning.

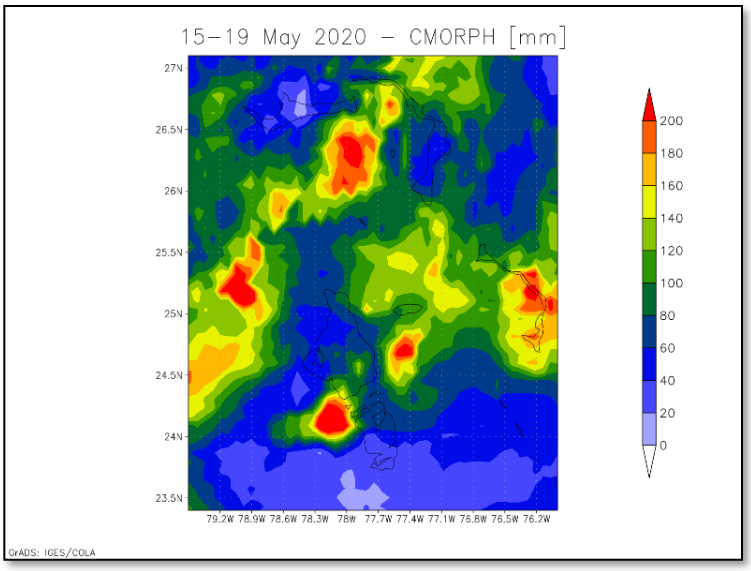
[4] BMS Radar Composite - Kidbuu & PixelGobbler (NW Caribbean), Barbados Weather, review date: 19 May 2020, available at: *http://www.barbadosweather.org/BMS_radar_Composite_Lionel.php*

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH[5], WRF5 and WRF7[6], simulated the occurrence of precipitation over The Bahamas North-West during the period 15-19 May 2020.

CMORPH reported total accumulated amounts of precipitation greater than 40 mm over the majority of The Bahamas North-West, with maximum values of 200 mm to 220 mm over Eleuthera Island. Both WRF simulations produced a different precipitation pattern compared with CMORPH, with maximum values over Andros Island and secondary maximum values over the southern edge of Abaco Island. WRF5 reported peaks of 140 mm to 160 mm over Andros Island and of 120 mm to 140 mm over Abaco Island, while WRF7 estimated higher maximum accumulated amounts of 200 mm – 220 mm over Andros Island and secondary maximum values of 180 mm to 200 mm over Abaco Island.

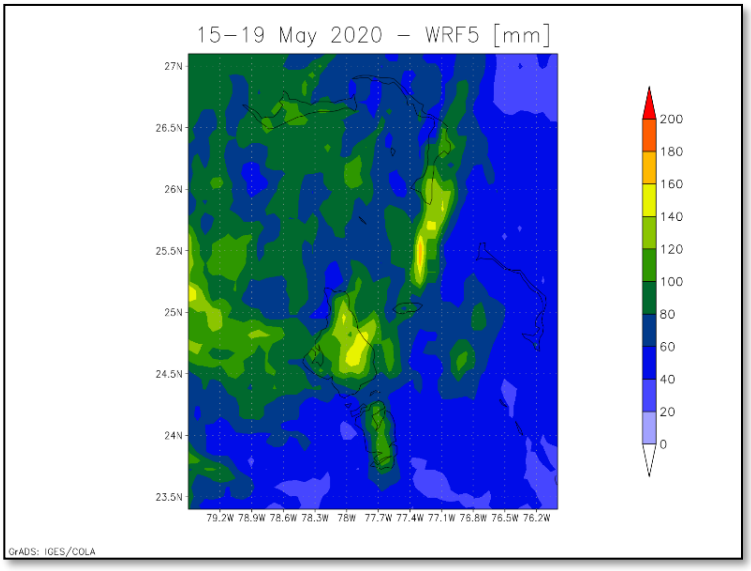
WRF5 reported lower amounts of accumulated precipitation with respect to the other XSR2.5 data sources (CMORPH and WRF7) over The Bahamas North-West and surrounding seas because it simulated the peaks of precipitation 150 km westward, closer to Florida.



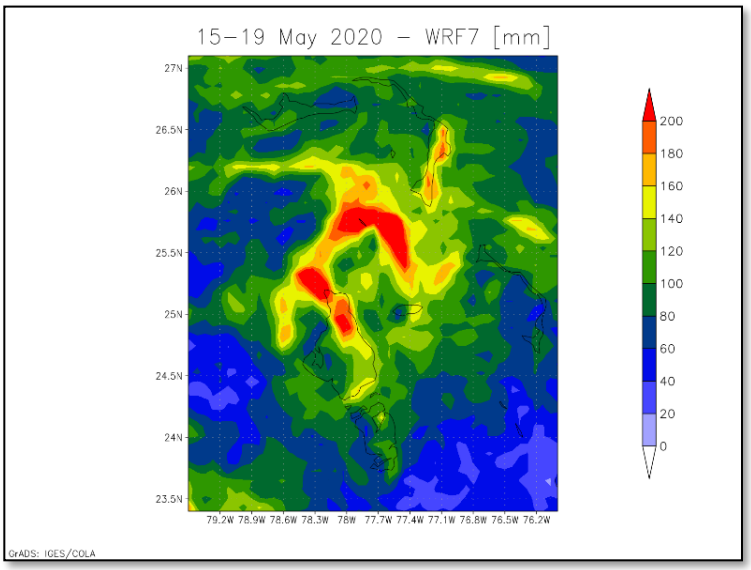
a) CMORPH

[5] 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.

[6] 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.



b) WRF5



c) WRF7

Figure 5 Total accumulated precipitation during the period 15-19 May 2020 over The Bahamas North-West 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; 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/BHS/BHS_NW/CARE_10_2019/daily_prec_short.mp4

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/BHS/BHS_NW/CARE_10_2019/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for The Bahamas North-West for two of the data sources used by XSR2.5: CMORPH and WRF7. The associated RIL was similar for these data source, given that the average accumulated precipitation was comparable in the two cases over New Providence Island (i.e. the island characterized by the largest exposure for The Bahamas North-West).

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs from these two data sources. 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 the Excess Rainfall policy for The Bahamas North-West 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 the Excess Rainfall policy for The Bahamas North-West 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.