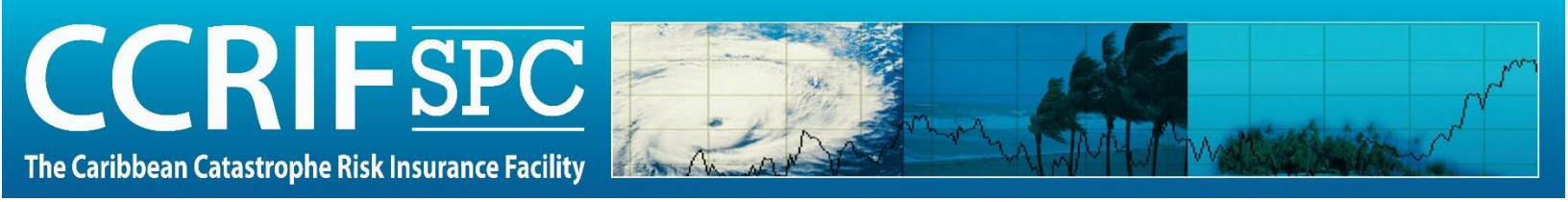


Covered Area Rainfall Event (22/09/2022 to 24/09/2022)

Excess Rainfall

Event Briefing

Trinidad and Tobago - Tobago

03 October 2022

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: ccrif.org | Twitter: @ccrif_pr | Facebook: CCRIF SPC

1 INTRODUCTION

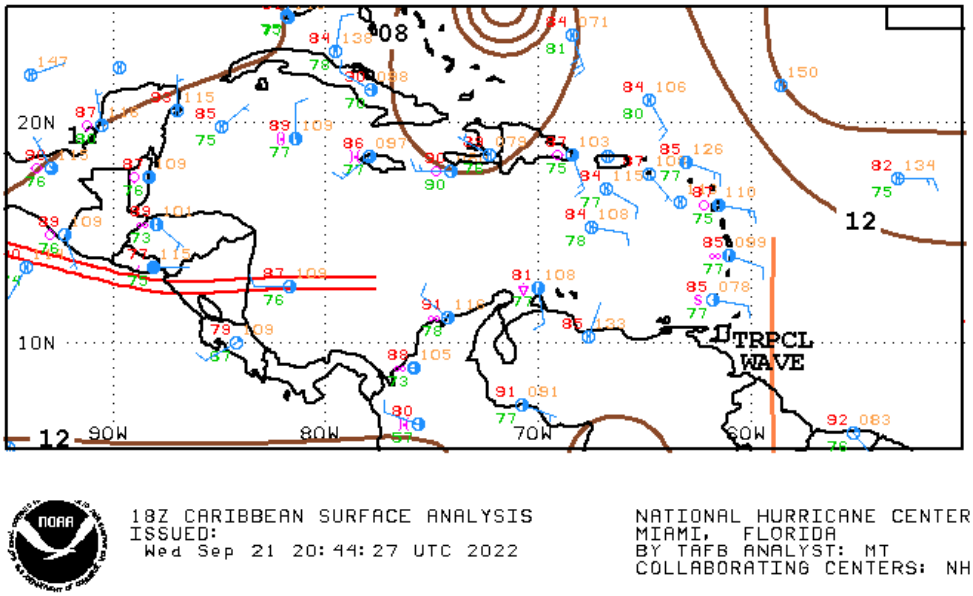
This event briefing describes the impact of rainfall in Trinidad and Tobago, which was associated with a Covered Area Rainfall Event (CARE), starting on 22 September and ending on 24 September 2022. The Rainfall Index Loss (RIL) was below the attachment point of Trinidad and Tobago's excess rainfall policy for Tobago and therefore no payout is due.

2 EVENT DESCRIPTION

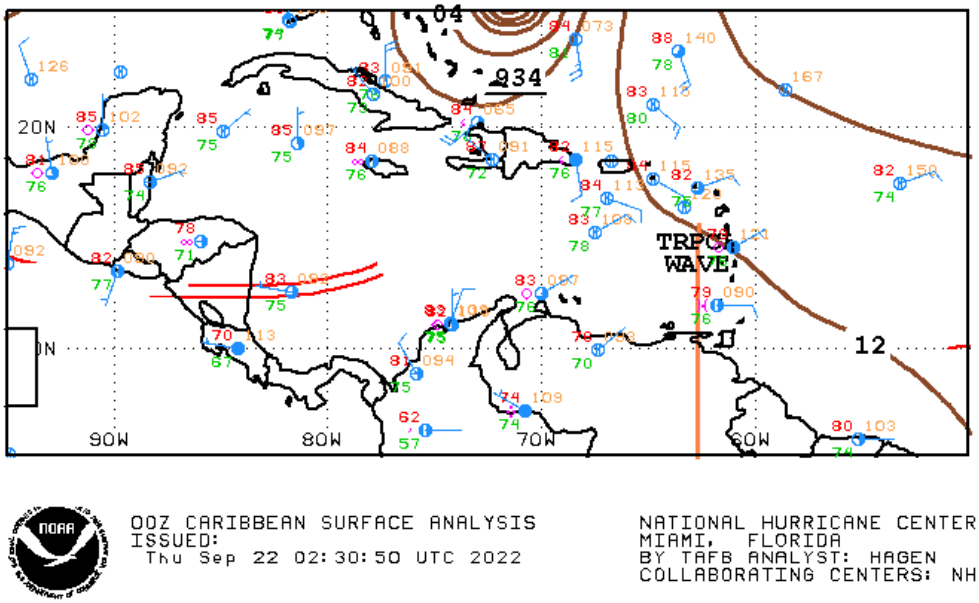
On 21 September at 1800UTC, an Atlantic Ocean tropical wave was along longitude 59° W, from latitude 15° N extending southward, located approximately 130mi (200km) E of the southern Windward Islands. It was moving westward at 11 to 17 mph (18 to 27km/h), towards Trinidad and Tobago (Figure 1a). It caused scattered moderate to widely scattered strong convection over a large area, from latitude 7° N to 14°N between 55°W and 68°W. This area covered parts of the Atlantic Ocean, inland areas and the coastal plains of Guyana and Venezuela, and the southeastern Caribbean Sea (Figure 2). The associated moderate to locally intense precipitation affected Trinidad and Tobago and the surrounding waters from 21 September at 0600UTC until 2200UTC, as shown by the radar imagery (Figure 3). In Tobago, the heaviest rainfall was observed from 1800UTC until 2100UTC.

On 22 September at 0000UTC, the tropical wave was along longitude 63° W, from latitude 15° N southward, about 100 mi (150km) W of Trinidad and Tobago (Figure 2b). Thunderstorm activity was still ongoing near the southern Windward Islands and over the extreme southeastern Caribbean Sea, but over Trinidad and Tobago it had already ceased.

The next day, the tropical wave crossed the Caribbean Sea and on 23 September it became a tropical storm and it was named Ian when it was over the Central Caribbean Sea.Ian continued to strengthen and on 26 September it developed into a hurricane, when it was in the vicinity of the Cayman Islands.



a) 21 September at 1800 UTC



b) 22 September at 0000 UTC

Figure 1 Surface analysis over the Caribbean area on 21 September at 1800UTC (a) and 22 September at 0000UTC (b). Source: US National Hurricane Center[1]

1 National Oceanic and Atmospheric Administration - FTP, National Hurricane Center, review date: 21-22 September 2022, available at: *https://www.nhc.noaa.gov/tafb/CAR_18Z.gif*, *https://www.nhc.noaa.gov/tafb/CAR_00Z.gif*

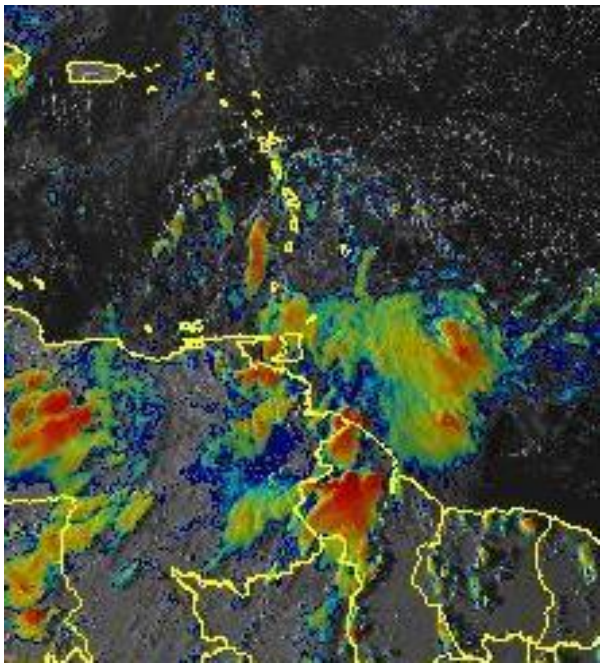
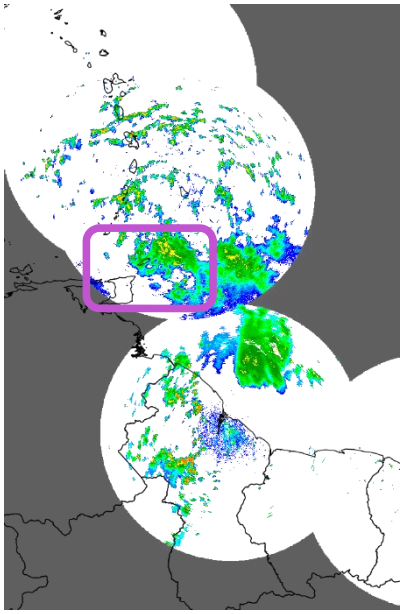
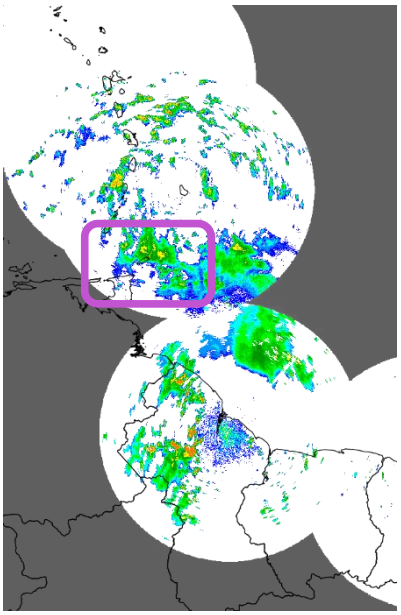


Figure 2 Satellite imagery on 21 September at 2040UTC from thermal infrared channel enhanced with colour. Blue/green colours represent high altitude clouds (top cloud temperature between -50°C and -70°C), while the red/yellow colours represent very high altitude clouds (top cloud lower than -70°C). High altitude clouds indicate strong convection associated with intense precipitation. Tobago Island is surrounded by a violet square. Source: NOAA, National Environmental Satellite, NESDIS[2]

a) 21 September at 1800 UTC

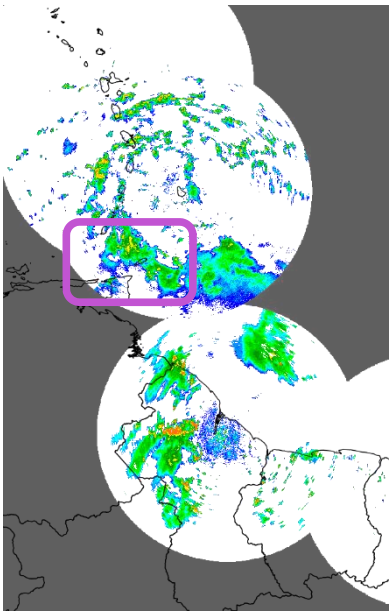


b) 21 September at 1900 UTC



2 NEDSDIS Online Archive, NOAA Satellite and Information Service, available at: https://www.star.nesdis.noaa.gov/GOES/sector.php?sat=G16&sector=nsa

c) 21 September at 2000 UTC



d) 21 September at 2100 UTC

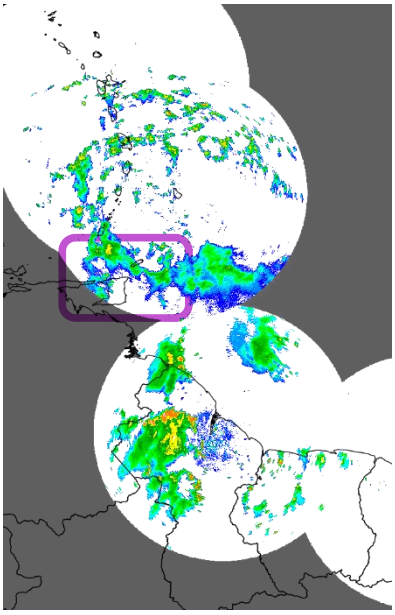


Figure 3 Radar imagery on 21 September at 1800 UTC (a), 1900 UTC (b) at 2000 UTC (c) and at 2100 UTC (d) as indicated in the labels, from the radar composite over the Caribbean and Central America region. Blue/green colours represent low to moderate rainfall, while the yellow/red colours represent intense and very intense precipitation. The violet square highlights the location of Tobago Island. Source: Barbados Radar Composite[3].

3 IMPACTS

At the time of writing this event brief, no information was available related to damage or loss in Trinidad and Tobago due to this Covered Area Rainfall Event. Riverine flood alerts were released by the Trinidad and Tobago Meteorological Service.

4 RAINFALL MODEL OUTPUTS

All three data sources used by the XSR 2.5 model, CMORPH[4], WRF5 and WRF7[5], detected the occurrence of precipitation over Tobago and the surrounding waters during the period 20-

3 Barbados Radar Composite, available on 21 September at: https://www.barbadosweather.org/BMS_Radar_Composite_Resp.php#

4 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.

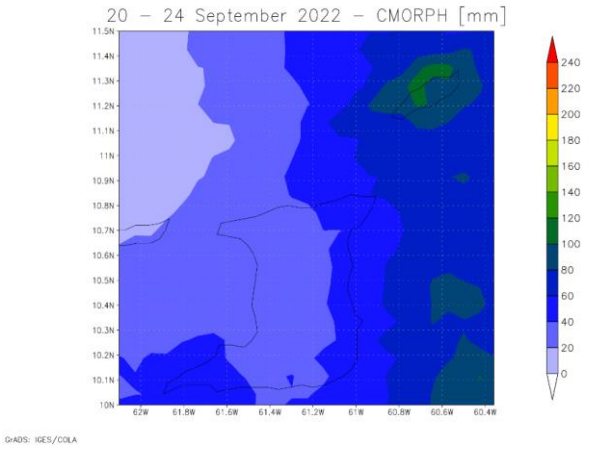
5 WRF5 and WRF7 Models: the Weather Research and Forecasting Model weather model-based Configuration #1 and #2 data https://www.mmm.ucar.edu/weather-research-and-forecasting-model. These data are initialized by the NCEP FNL dataset. (NCEP FNL Operational Model Global Tropospheric Analyses [http://rda.ucar.edu/datasets/ds083.2/]).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

24 September 2022. However, each data source reported a specific distribution and accumulation of rainfall, as discussed below. The CARE for Tobago was activated on 22 September and lasted for the period 22-24 September. The CARE was activated due to the use of the 12-hour and the 48-hour aggregation intervals for precipitation[6], thus the period considered by the XSR 2.5 model for the loss estimate based on the accumulated precipitation in Tobago was 20-24 September.

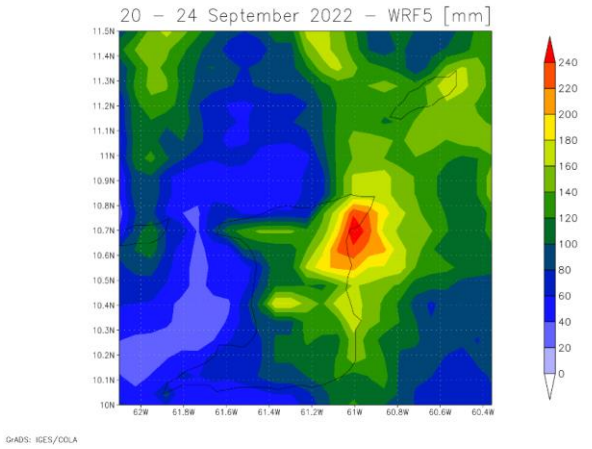
CMORPH reported total accumulated amounts of precipitation higher than 80 mm over most of Tobago, with the highest values, between 100mm and 120mm, in the central area of the island.

WRF5 showed total accumulated values of precipitation higher than 120 mm over Tobago, with the maximum amounts, between 160 mm and 180 mm, over the northern area of the island.

WRF7 simulated total accumulated values of rainfall lower than 60 mm over Tobago. The maximum amounts, between 40 mm and 60 mm, were reported along the southeastern coast of the island.

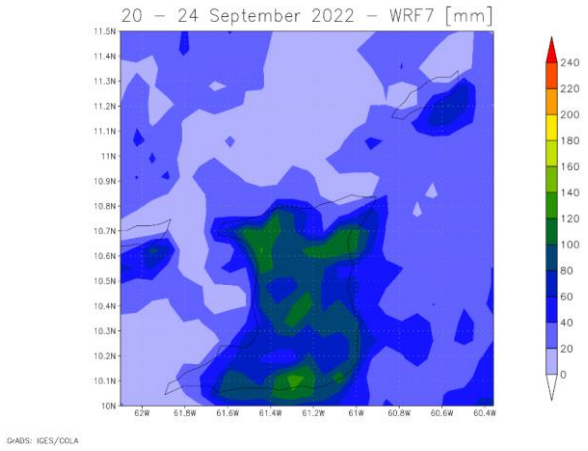


a) CMORPH



b) WRF5

6 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.



c) WRF7

Figure 5 Total accumulated precipitation during the period 20-24 September, 2022 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 12-hour aggregation and 48-hour aggregation respectively:

https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/TTO/TTO_TOB/CARE_5_2022/daily_prec_short.mp4
https://wemap.ccrif.org/OUTPUT/CCRIF/XSR/Events/TTO/TTO_TOB/CARE_5_2022/daily_prec_long.mp4

The Rainfall Index Loss (RIL) was above the loss threshold for Tobago for two of data sources used by XSR2.5: CMORPH and WRF5. The RIL was the highest for WRF5, due to the larger amount of accumulated precipitation presented over the island.

The final RIL (RIL_{FINAL}) was calculated as the average of the RILs from CMORPH and WRF5. 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 Tobago's, excess rainfall policy and therefore it did not trigger a policy payout.

5 TRIGGER POTENTIAL

The Rainfall Index Loss calculated for this Covered Area Rainfall Event (CARE) for Tobago was below the attachment point of Trinidad and Tobago's excess rainfall policy for Tobago 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.