



Tropical Cyclone Joaquin (AL112015)

Excess Rainfall

Event Briefing

10 October 2015

1 SUMMARY

Tropical Cyclone (TC) Joaquin affected the Caribbean region between 30 September and 6 October 2015 with strong winds, rainfall and storm surge. According to the CCRIF Caribbean Rainfall Model, the CCRIF member countries with Excess Rainfall (XSR) policies where a Covered Area Rainfall Event (CARE) was activated were: Haiti, Jamaica and The Bahamas. As a result, this briefing describes the reported losses and damage in Haiti, Jamaica and The Bahamas due to extreme rainfall as a result of the passage of TC Joaquin. The only country affected by the direct impact of Joaquin was The Bahamas.

The Caribbean Rainfall Model indicated that the following Covered Area Rainfall Events were generated:

Country	CARE	
	Start	End
Haiti	27 September 2015	02 October 2015
Jamaica	29 September 2015	03 October 2015
The Bahamas	30 September 2015	02 October 2015

2 INTRODUCTION

On 30 September 2015 Hurricane Joaquin became the tenth named hurricane of the 2015 Atlantic Hurricane Season.

By 2:00 PM AST (1800 UTC) on 1 October 2015, Joaquin became a category 4 hurricane, the centre of the storm was located near latitude 23.0° North and longitude 74.2° West (about 70 mi (115 km) SSE of San Salvador, Bahamas) with maximum sustained winds of 130 mph (210 km/h). At that time the central Bahamas experienced hurricane force winds, storm surge and heavy rain.

At 8:00 AM AST (1200 UTC) on 3 October 2015, the eye of Hurricane Joaquin was located near latitude 25.6° North and longitude 72.5° West (165 mi (270 km) NE of San Salvador and about 660 mi (1060 km) SW of Bermuda). Joaquin was moving toward the northeast at almost 13 mph (20 km/h), moving away from The Bahamas with maximum sustained winds of 125 mph (205 km/h).

Joaquin continued this trajectory as a category 1 hurricane over the Atlantic Ocean until 7 October 2015, when it was located 1030 mi (1660 km) NE of Bermuda. Joaquin disappeared over the Atlantic Ocean as a post-tropical cyclone at 11:00 PM AST (0300 UTC) on 7 October 2015.

3 IMPACTS

According to the initial reports and assessments provided by the Caribbean Disaster Emergency Management Agency (CDEMA) as well as press briefings, the following impacts occurred:

The Bahamas

Hurricane Joaquin affected the southern and central islands of The Bahamas.

Acklins Island:

- Roads were reported flooded in areas and difficult to pass.
- The island's main road was compromised in 2 areas - at Lovely Bay (sections of the road were damaged) and south of the high school in Pompey Bay (impassable due to flood waters, and accessible only by trucks).
- No deaths or injuries were reported in Acklins Island.

Crooked Island:

- Movement from the east to the west of the island was constrained by a wide settlement of water 3-4 feet deep, passable by large trucks only.
- There were no reported deaths on Crooked Island.

Long Island:

- From Sand Pond to Clarence Town the impact was most significant. The main cause of damage to buildings were high winds. In flooded low-lying areas, several houses were damaged due to the high water level.
- From Stella Maris to Salt Pond there was minor damage to housing, roads and power poles.

The following islands suffered no major impacts: Abaco, Andros, Eleuthera, Ragged Island, Bimini, Berry Islands, Mayaguana.

There were no major impacts on the major tourist, economic and administrative centres on New Providence (Nassau), Paradise Island and Grand Bahama (Freeport).

Haiti

Haiti was not affected by the major portion of the TC Joaquin system, however outlying rain bands affected some areas in the country (mainly west and north areas). Initial reports and assessments indicated the following impacts:

Upper Artibonite:

- Three hundred and thirty-two affected families were identified in three towns: Gonaives, Anse-Rouge, and Gros Morne. Their homes were flooded and / or damaged by the waves that penetrated about 500 meters from the coast in places.
- The main road leading to Anse-Rouge was impassable.

Nippes:

- Three hundred and fifty-four families were reported affected, of which 277 were impacted by flooding. Loss of 11 livestock was reported.

Anse-à-veau

- Flooding was reported in the lower city. Ninety people were housed in shelters.

The Azile

- Several sections of the road were damaged namely, Nan Paul Nan Bannann, Changeux, Sanai, Tournade, and Saline. Seven people were evacuated in downtown areas and accommodated in shelters.

Anse-à-Foleur, Port-de-Paix, Turtle Island and North St. Louis

- Moderate flooding occurred near the Three Rivers River.
- There was flooding in coastal areas (High Furnace, Djerilon, Nan hoist Detipodpe) due to high waves.
- Householders were evacuated from their houses due to flooding in Nan hoist and Djerilon neighborhoods.

Jamaica

Hurricane Joaquin was not a direct threat to Jamaica, however the rain bands of the system, caused the development of a trough over the island and generated showers and thunderstorms in some parts of the country. At the time of writing there was no report of damage.

4 DAILY MODEL RAINFALL DATA

The Bahamas

The maximum accumulated precipitation produced by the CCRIF Caribbean Rainfall Model was 1241 mm which fell on Acklins, Crooked Island, Long Island, Rum Cay and San Salvador.

Haiti

The maximum accumulated precipitation produced by the model was 1087 mm which fell in the departments of Nord-Ouest and Artibonite (north of the country) and in the departments of Grande-Anse and Sud (south of the country).

Jamaica

The maximum accumulated precipitation produced by the CCRIF Caribbean Rainfall Model was 972 mm which fell on the parishes of Westmoreland, St. Elizabeth, St. James, Trelawny, Manchester, St. Thomas and St. Andrew.

Figure 1 shows the accumulated rainfall over the affected area by TC Joaquin on 2 October 2015, as interpolated WRFXSR¹ values.

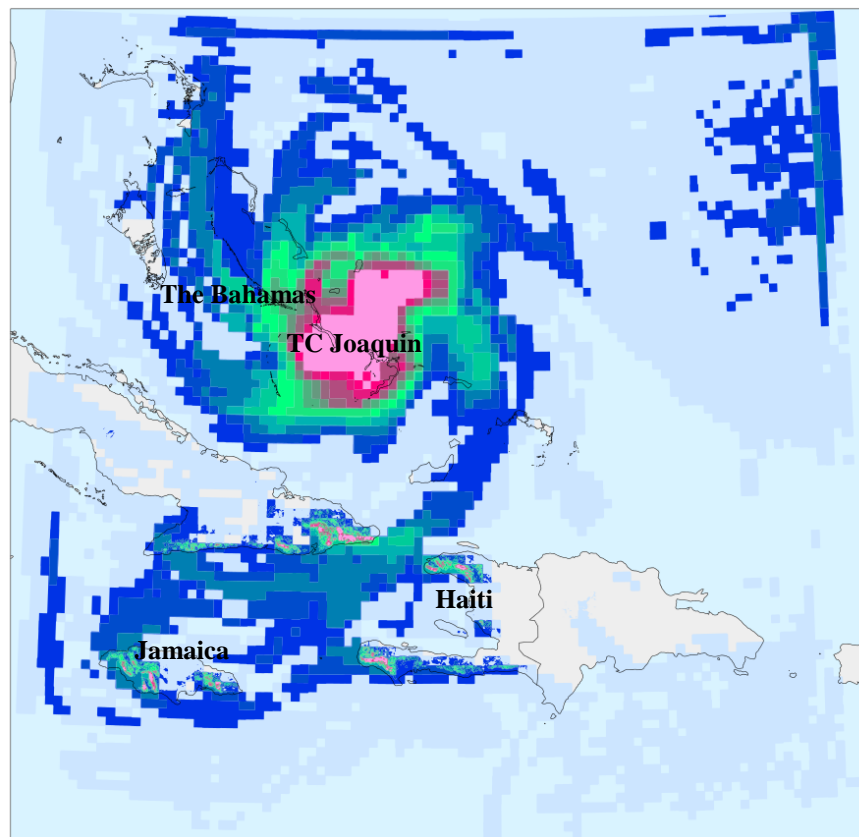


Figure 1. Map showing rainfall field by TC Joaquin over the affected countries. (KAC)

¹ Weather Research and Forecasting (WRF) Excess Rainfall (XSR)

5 RAINFALL MODEL OUTPUTS

The Caribbean Rainfall Model uses a 3-day running aggregate of rainfall measurements for Haiti, Jamaica and The Bahamas, meaning that the rainfall attributed to a particular day is the total sum of the rainfall on that day itself and the following two days.

The Bahamas

For the CARE in The Bahamas, the Caribbean Rainfall Model produced Maximum Aggregate Rainfall of 1,241 mm and the maximum number of ongoing WRFXHR Grid Cell Events was 1,931.

Haiti

For the CARE in Haiti, the Caribbean Rainfall Model produced Maximum Aggregate Rainfall of 1,087 mm and the maximum number of ongoing WRFXHR Grid Cell Events was 14,784.

Jamaica

For the CARE in Jamaica, the Caribbean Rainfall Model produced Maximum Aggregate Rainfall of 972 mm and the maximum number of ongoing WRFXHR Grid Cell Events was 9,546.

6 TRIGGER POTENTIAL

The Bahamas

The number of ongoing Grid Cell Events in The Bahamas exceeded the required threshold (1,176) to trigger the CARE on 30 September and remained above the threshold until 2 October 2015.

It must be noted that, for The Bahamas, the Rainfall Index Loss for a CARE cannot be determined until the Aggregate Rainfall in each WRFXHR Grid Cell that had an ongoing Active Grid Cell Events that contributed to the CARE has fallen below 50 mm for at least 2 days. In this instance, the CARE's contributing Active Grid Cell Events ended on 4 October 2015.

Haiti

The number of ongoing Grid Cell Events in Haiti exceeded the required threshold (4,964) to trigger the CARE on 27 September and remained above the threshold until 2 October 2015.

For Haiti, the Rainfall Index Loss for a CARE cannot be determined until the Aggregate Rainfall in each WRFXHR Grid Cell that had an ongoing Active Grid Cell Events that contributed to the CARE has fallen below 50 mm for at least 2 days. In this instance, the CARE's contributing Active Grid Cell Events ended on 3 October.

Jamaica

The number of ongoing Grid Cell Events in Jamaica exceeded the required threshold (3,359) to trigger the CARE on 29 September and remained above the threshold until 3 October 2015.

For Jamaica, the Rainfall Index Loss for a CARE cannot be determined until the Aggregate Rainfall in each WRFXS Grid Cell that had an ongoing Active Grid Cell Events that contributed to the CARE has fallen below 50 mm for at least 2 days. In this instance, the CARE's contributing Active Grid Cell Events ended on 4 October.

The Rainfall Index Losses calculated for the CAREs in Haiti, Jamaica and The Bahamas did not exceed the attachment points on their Excess Rainfall policies and therefore no payouts are due.

For further information, please contact ERN-RED, the CCRIF SPC Risk Management Specialist.

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DEFINITIONS

<i>Active Percentage</i>	The percentage of the total number of WRFXSR ² Grid Cells, within the Covered Area of the Insured, in which a WRFXSR Grid Cell Event must be occurring to trigger a Covered Area Rainfall Event. The Active Percentage is defined in the Schedule.
<i>Aggregate Rainfall</i>	The value of Aggregate Rainfall, as measured in millimeters (mm), using the WRFXSR Precipitation Data over the Covered Area and evaluated by the Calculation Agent as part of the Rainfall Index Loss Calculation Methodology. For a given day: (a) 2-day aggregate - the total sum of rainfall on the day itself, and the day after; or (b) 3-day aggregate - the total sum of rainfall on the day itself, and the two following days.
<i>Caribbean Rainfall Model</i>	The computer model used to calculate the WRFXSR Grid Cell Event Loss and the Rainfall Index Loss.
<i>Covered Area Rainfall Event</i>	Any continuous period of days during which the number of WRFXSR Grid Cell Events is greater than or equal to the product of (a) Active Percentage multiplied by (b) the total number of WRFXSR Grid Cells within the Covered Area.
<i>Covered Area</i>	The territory of the Insured as represented in the Caribbean Rainfall Model.
<i>WRFXSR Grid Cell (grid cell)</i>	The 30 arc-second by 30 arc-second grid of cells each of which is attributed with an exposure value and, for those with exposure value greater than zero, to which an Aggregate Rainfall Amount is attributed each day.
<i>WRFXSR Grid Cell Event (cell event)</i>	Any continuous period of days during which the Aggregate Rainfall value equals or exceeds the Rainfall Event Threshold in a WRFXSR Grid Cell. For Covered Areas that have 3-day aggregation periods, a WRFXSR Grid Cell Event is only considered to be over once there have been

² Weather Research and Forecasting (WRF) Excess Rainfall (XSR)

two or more consecutive days where the Aggregate Rainfall does not exceed the Rainfall Event Threshold.

Maximum Aggregate Rainfall

The highest Aggregate Rainfall amount during a WRFXSR Grid Cell Event for each WRFXSR Grid Cell in which there is a WRFXSR Grid Cell Event.

Rainfall Event Threshold

Aggregate Rainfall level which, when exceeded, starts a WRFXSR Grid Cell Event.

Rainfall Index Loss

For any Covered Area Rainfall Event affecting the Insured, the US Dollar loss calculated by the Calculation Agent using the Caribbean Rainfall Model.