



# Tropical Cyclone Gonzalo

## Excess Rainfall

### Event Briefing

**24 October 2014**

## **1 SUMMARY**

Tropical Cyclone (TC) Gonzalo affected four CCRIF member countries: Anguilla, Antigua and Barbuda, Bermuda and St. Kitts and Nevis. Of these countries, only Anguilla and St. Kitts and Nevis have Excess Rainfall (XSR) policies. As a result, this briefing describes the reported losses and damage in Anguilla and St. Kitts and Nevis due to extreme rainfall as a result of the passage of TC Gonzalo. The Caribbean Rainfall Model indicated that a Covered Area Rainfall Event (CARE) was generated in Anguilla starting on 13 October 2014 and ending on 14 October 2014. Anguilla's policy subsequently triggered, indicating that they are due a payout. While St. Kitts and Nevis experienced heavy rainfall, a CARE was not registered, and no payout is due.

Note that, as reported in a [previous briefing on TC Gonzalo](#) issued on 18 October, none of the TC policies for the four affected countries were triggered and therefore no payout was due on those policies.

## **2 INTRODUCTION**

Tropical Storm Gonzalo developed east of the northern Leeward Islands on 12 October at 1:30 pm AST (1730 UTC). It passed through the northern Leeward Islands before impacting Anguilla as a Category 1 hurricane shortly after 5:00 pm AST (2100 UTC) on 13 October 2014. After leaving the eastern Caribbean, Gonzalo strengthened to a Category 4 hurricane over the Atlantic but weakened to Category 2 before passing over Bermuda on 17 October 2014.

## **3 IMPACTS**

This section of the report provides a summary of the impact on Anguilla and St. Kitts and Nevis as a result of excess rainfall associated with the passage of Gonzalo.

### *Anguilla*

Gonzalo passed directly over Anguilla as a Category 1 hurricane on 13 October 2014. Preliminary reports from Anguilla's National Emergency Operations Centre (NEOC) indicated the effects of the rainfall produced by the storm were restricted to slight water damage of the roof of the Princess Alexandria Hospital.

A report from the Ministry of Economic Development, Investment and Commerce dated 16 October 2014, indicated that flooding occurred at the entrance of Covecastles Resort and "the front" of Turtle's Nest Beach Resort which are both located in the West End (District #1). There was also flooding in the Valley (District #7), at the Clayton J. Lloyd International Airport and the Public Library. The grounds of the St. Andrew's Anglican Church, which is situated at Island Harbour (District 14), also were also flooded as a result of the passage of the storm.

Although the report only mentions flooding in 3 of the 14 districts on the island, it was confirmed that this was an initial damage and loss assessment of the storm's impact on the island.

### ***St. Kitts and Nevis***

Prior to impacting Anguilla, Gonzalo affected St. Kitts and Nevis as a Tropical Storm and generated heavy rainfall but damage was negligible. A damage assessment report by the Damage Assessment and Needs Analysis Sub-Committee in St. Kitts and Nevis, noted two minor rock falls on the South East Peninsula Highway. In addition, minor erosion and deposits of silt were observed at a few locations on the Island Main Road.

## **4 RAINFALL MODEL INPUTS**

### ***Anguilla***

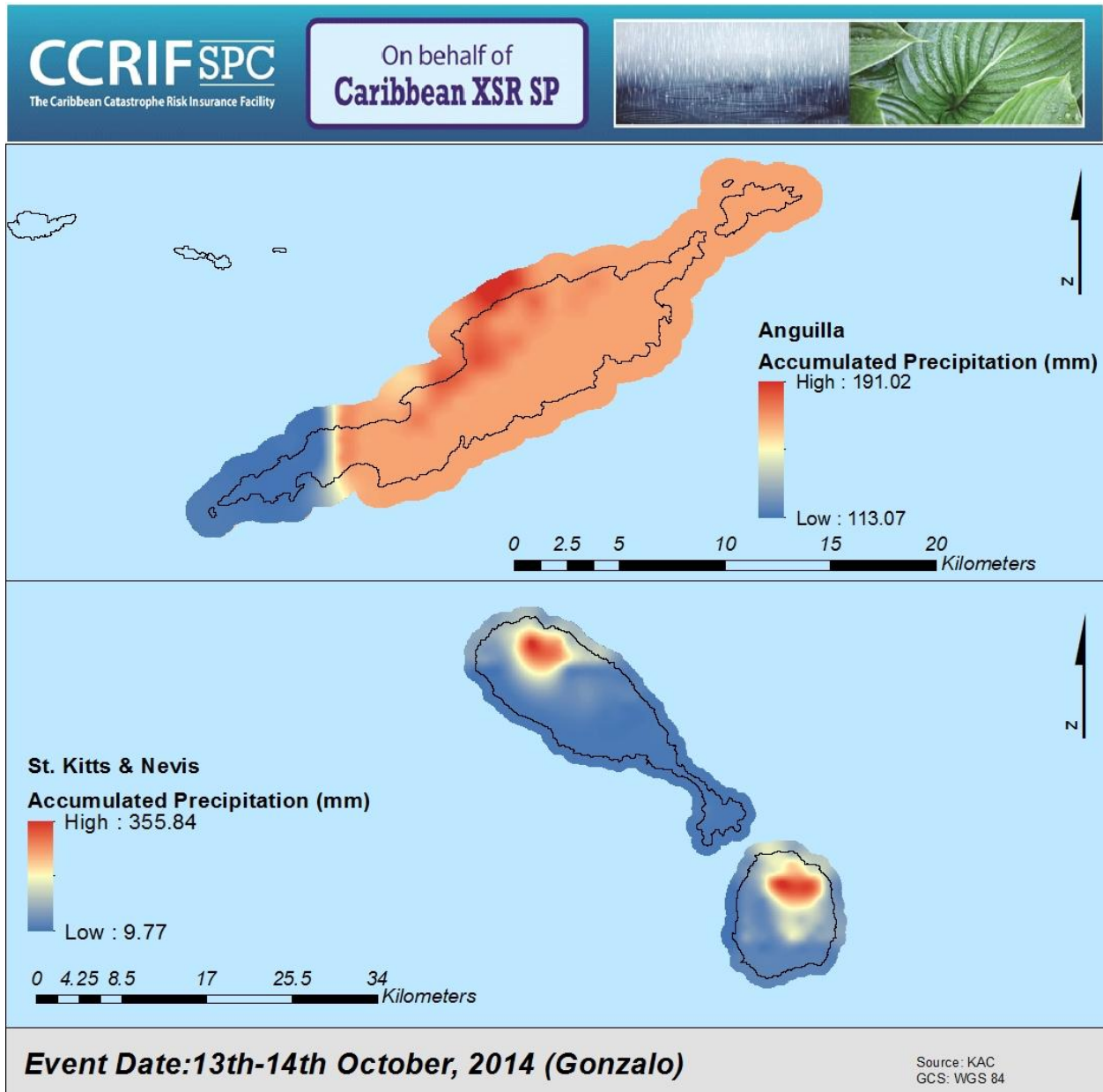
The Anguilla Air and Sea Ports Authority recorded 120 mm of rainfall over the period 8:00 am on 13 October to 2:00 pm on 14 October (1200 UTC 13 October to 1800 UTC 14 October) at the airport. The rainfall measurement, used as input to CCRIF's Caribbean Rainfall Model (operated by Kinetic Analysis Corporation (KAC)), over the same period, in the iTRMM Grid Cell that included the airport rain gauge, was 168.39 mm. It should be noted that the rainfall produced by the model at the airport location, is not necessarily reflective of the rainfall that occurred elsewhere on the island. The Caribbean Rainfall Model produced a maximum accumulated rainfall of 190.23 mm during this period in the north of the island.

The discrepancy in rainfall amounts is due to the different precipitation measurement systems. Airports use a rain gauge while CCRIF's Rainfall Model is based on satellite remote sensed data. A rain gauge provides a single discrete rainfall measurement while CCRIF's model data provides broad spatial coverage. In essence, the rain gauge registers data at one location at the airport, whereas CCRIF's Rainfall Model captures data for the entire grid cell (in this instance, the cell which captures the airport rain gauge).

### ***St. Kitts and Nevis***

According to the aforementioned damage assessment report, St. Kitts' Meteorological Services recorded 40.13 mm of rainfall over the 24-hour period 8:00 pm on 12 October to 8:00 pm on 13 October (0000 UTC 13 October to 0000 UTC 14 October) at the Robert L. Bradshaw International Airport in the south of St. Kitts. The rainfall measurement, used as input to the Caribbean Rainfall Model, over the same period in the corresponding iTRMM Grid Cell in St. Kitts, was 14.76 mm. However, the model produced a maximum accumulated rainfall of 356 mm over this period in the north of St. Kitts. As mentioned earlier, the difference in readings is based on the method for measuring rainfall.

Figure 1 shows the accumulated rainfall over Anguilla and St. Kitts and Nevis from 13 to 14 October 2014. According to the Caribbean Rainfall Model, in Anguilla, the heaviest precipitation was concentrated in the coastal region north-northwest of the district of North Side. In St. Kitts, the rains were concentrated on the north-eastern flank of Mount Liamuiga. This area is largely rural and forested and likely drains north toward Dieppe Bay Town and the airport region. The precipitation in Nevis was concentrated in the St. James Windward Parish south of the airport on the steep slopes of Nevis Peak.



**Figure 1** Map showing accumulated rainfall in Anguilla and St. Kitts and Nevis, 13-14 October 2014.

## **5 RAINFALL MODEL OUTPUTS**

The Caribbean Rainfall Model uses a 2-day running aggregate of rainfall measurements for both Anguilla and St. Kitts and Nevis, meaning that the rainfall attributed to a particular day is the total sum of the rainfall on that day itself and the following day.

For the CARE in Anguilla, the Caribbean Rainfall Model produced Maximum Aggregate Rainfall of 191.02 mm in the north of the island and the maximum number of ongoing iTRMM Grid Cell Events (iGCEs) was 114 (Anguilla's full complement).

In St. Kitts and Nevis, the model produced Maximum Aggregate Rainfall (over the period 12 to 14 October 2014) of 355.84 mm in the north and the maximum number of ongoing iGCEs was 57.

## **6 TRIGGER POTENTIAL**

### ***Anguilla***

The number of ongoing iGCEs in Anguilla exceeded the required threshold (109) to trigger a CARE on 13 October and fell below this threshold on 15 October.

It must be noted that while a CARE may last only one or two days, a CARE is not considered complete until the Aggregate Rainfall in each iTRMM Grid Cell (that had an ongoing iGCE that contributed to the CARE) has fallen below 75 mm for at least 1 day (2 days in the case of those countries for which the model uses 3-day Aggregate Rainfall). In this instance, the CARE and its contributing iGCEs ended on the same day.

The Rainfall Index Losses calculated for Anguilla's CARE exceeded the attachment point on its Excess Rainfall policy and therefore a payout of \$493,465 is due.

These payouts reflect the application of policy conditions to the modelled government loss. Each member of CCRIF selects their own policy attachment point (equivalent to a deductible), exhaustion point (equivalent to the full policy value) and the level of premium they wish to pay. These three conditions then dictate what the payout will be relative to the Rainfall Index Loss.

### ***St. Kitts and Nevis***

Only 57 iGCEs occurred during the passage of Gonzalo over St. Kitts and Nevis. For a CARE to have triggered, at least 186 iGCEs would have needed to take place. Therefore, a CARE was not triggered, no Rainfall Index Loss was calculated and no payout is due on St. Kitts and Nevis' Excess Rainfall policy.

## DEFINITIONS

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| <b><i>Active Percentage</i></b>                  | The percentage of the total number of iTRMM Grid Cells, within the Covered Area of the Insured, in which an iTRMM Grid Cell Event must be occurring to trigger a Covered Area Rainfall Event. The Active Percentage is defined in the Schedule.  |
| <b><i>Aggregate Rainfall</i></b>                 | The value of Aggregate Rainfall, as measured in millimetres (mm), using the iTRMM 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:<br><br>(a) 2-day aggregate - the total sum of rainfall on the day itself, and the day after; or<br><br>(b) 3-day aggregate - the total sum of rainfall on the day itself, and the two following days. |
| <b><i>Caribbean Rainfall Model</i></b>           | The computer model used to calculate the iTRMM Grid Cell Event Loss and the Rainfall Index Loss.   |
| <b><i>Covered Area Rainfall Event (CARE)</i></b> | Any continuous period of days during which the number of iTRMM Grid Cell Events is greater than or equal to the product of (a) Active Percentage multiplied by (b) the total number of iTRMM Grid Cells within the Covered Area.   |
| <b><i>Covered Area</i></b>                       | The territory of the Insured as represented in the Caribbean Rainfall Model.   |
| <b><i>iTRMM Grid Cell</i></b>                    | 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.  |
| <b><i>iTRMM Grid Cell Event (iGCE)</i></b>       | Any continuous period of days during which the Aggregate Rainfall value equals or exceeds the Rainfall Event Threshold in an iTRMM Grid Cell. For Covered Areas that have 3-day aggregation periods, an iTRMM Grid Cell Event is only considered to be over once there have been two or more consecutive days where the Aggregate Rainfall does not exceed the Rainfall Event Threshold.   |

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| <b><i>iTRMM Grid Cell Event Loss</i></b> | For any iTRMM Grid Cell Event, the US Dollar loss calculated by the Calculation Agent, using the Caribbean Rainfall Model.                            |
| <b><i>Maximum Aggregate Rainfall</i></b> | The highest Aggregate Rainfall amount during an iTRMM Grid Cell Event for each iTRMM Grid Cell in which there is an iTRMM Grid Cell Event.            |
| <b><i>Rainfall Event Threshold</i></b>   | Aggregate Rainfall level which, when exceeded, starts an iTRMM Grid Cell Event.   |
| <b><i>Rainfall Index Loss</i></b>        | For any Covered Area Rainfall Event affecting the Insured, the US Dollar loss calculated by the Calculation Agent using the Caribbean Rainfall Model. |