

CCRIF Technical Workshop

Session 2: Interrogating the Policy Endorsements for TC and XSR Introduced in 2023 – How they Work and their Applications



Policy endorsements

In 2023 CCRIF introduced two endorsements to the XSR policy product and one endorsement to the TC policy product. The endorsements:

- ✓ Aim to meet members' need in peculiar situations that are not covered under the main policy
- ✓ Represent an enhancement of the models for TC and XSR.
- ✓ Are aimed at improving CCRIF's ability to identify and provide coverage for tropical cyclone and rainfall events that occur under very specific conditions that contribute to the negative impacts from the event: localized rainfall events and rainfall events that occur when soils are oversaturated (usually due to previous rainfall in a relatively short period of time).



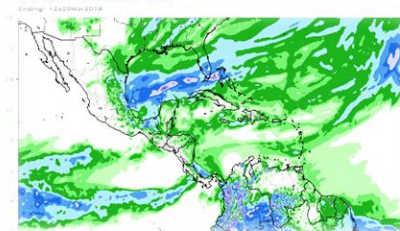
TC

Localized Damage
Index (LDI)

XSR

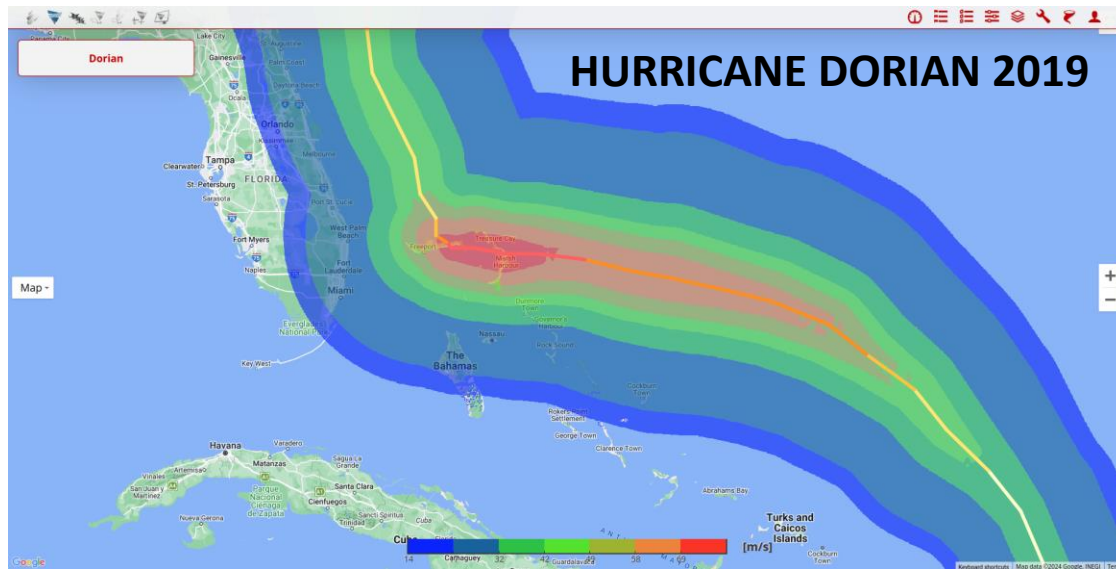
Localized Event Trigger
(LET)

Wet Season Trigger (WST)



TC – Localized Damage Index (LDI)

- ✓ CCRIF's models are built to estimate direct losses to assets caused by extreme events that affect a significant portion of the country
- ✓ What if extremely events severely affect a small part of the country?

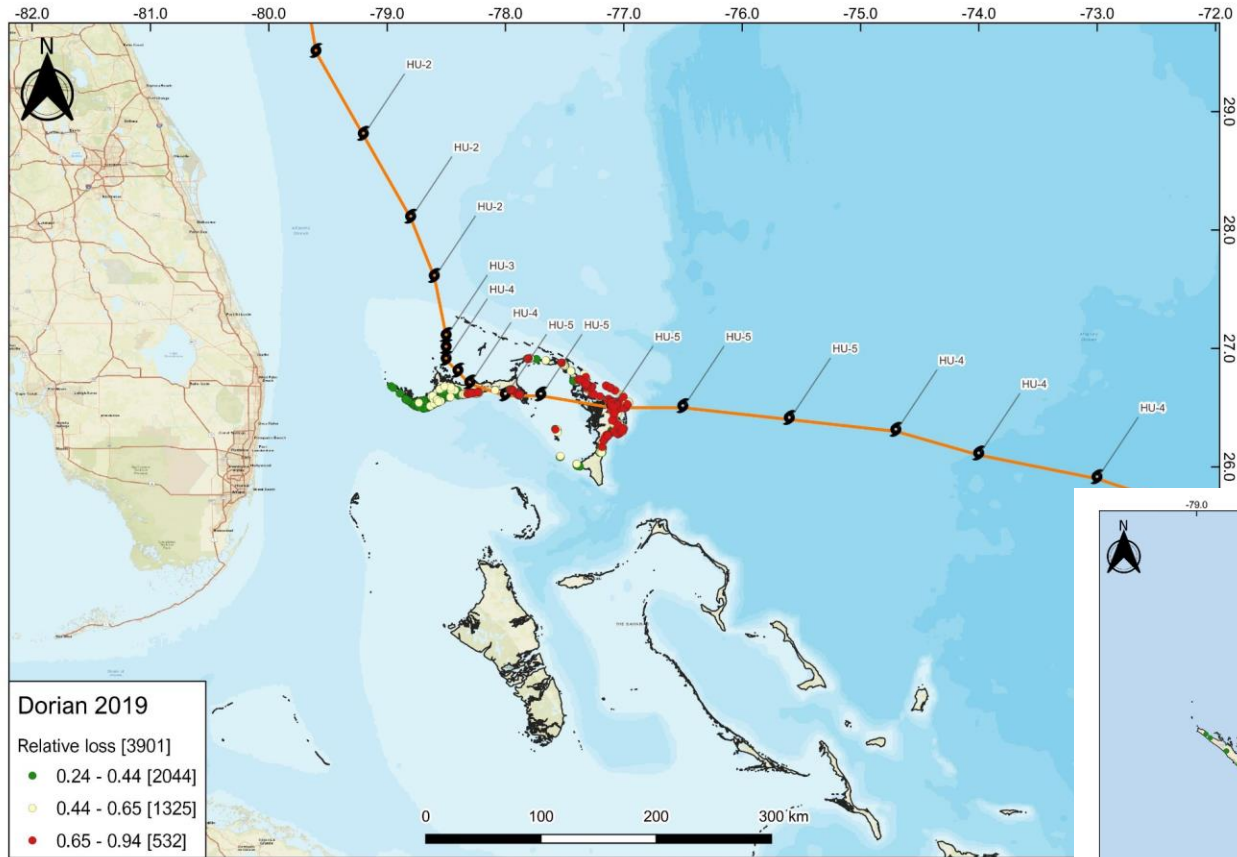


The value of the modelled losses may not be enough to trigger the main policy, or may trigger it with an inadequate payout

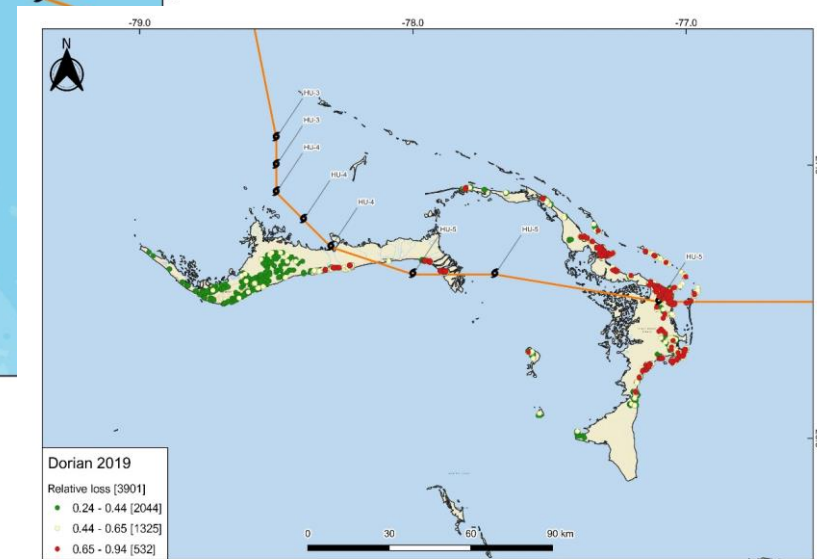
TC – Localized Damage Index (LDI)

- The LDI for tropical cyclone events provides coverage where losses are highly concentrated in small sections of the country – and which may not trigger the TC policy.
- The LDI relates the mean damage ratio computed at the most damaged areas and the mean damage ratio computed in the whole territory.
- The most damaged areas are the 5 per cent of the cells with the highest damage ratio.
- The LDI endorsement offers a single, flat payment when the LDI index value crosses a predetermined Activation Threshold.
- Both the TC main policy and the LDI policy endorsement may produce a payout for the same event.

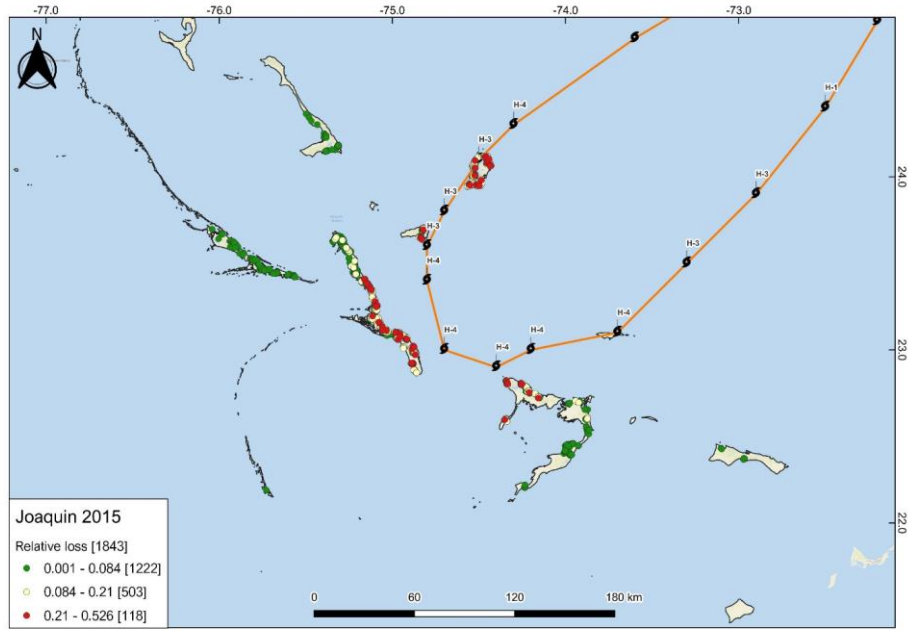
TC – Localized Damage Index (LDI)



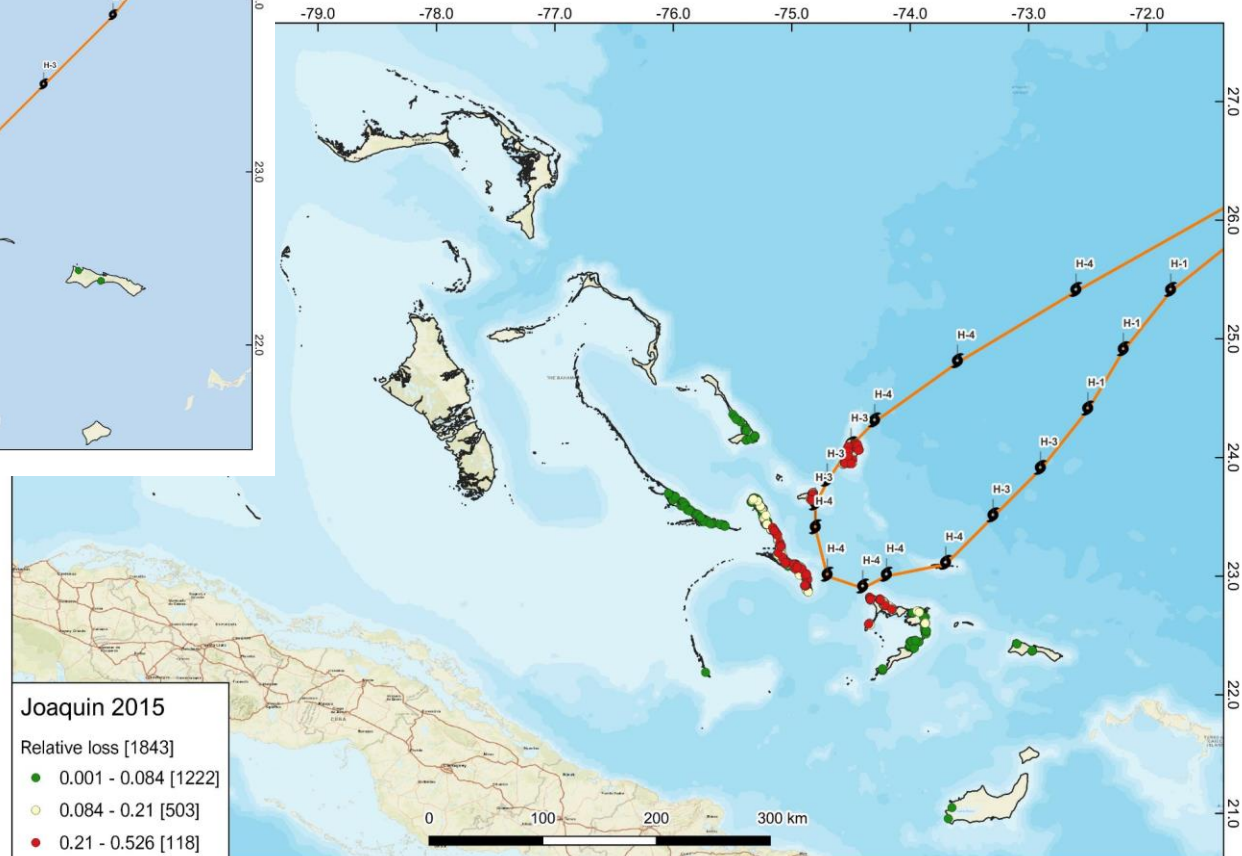
Dorian 2019



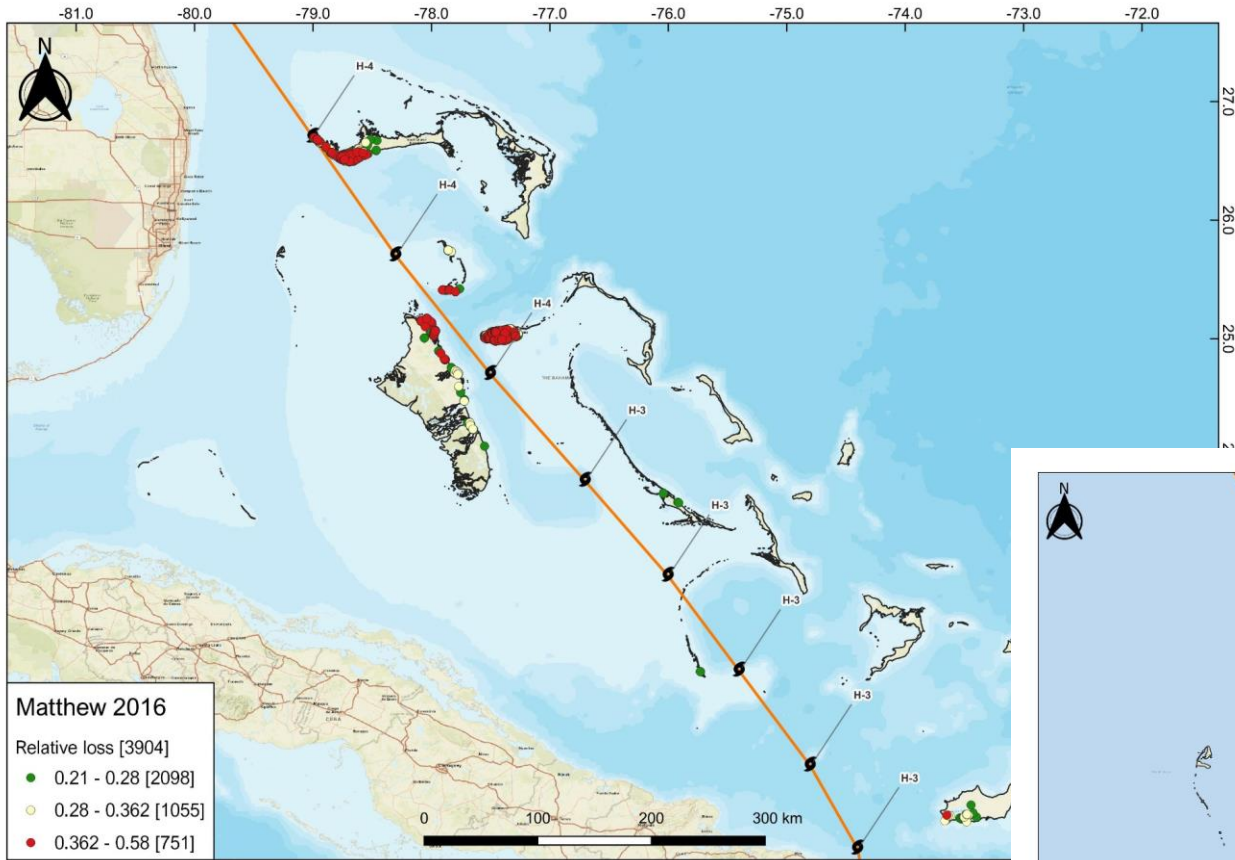
TC – Localized Damage Index (LDI)



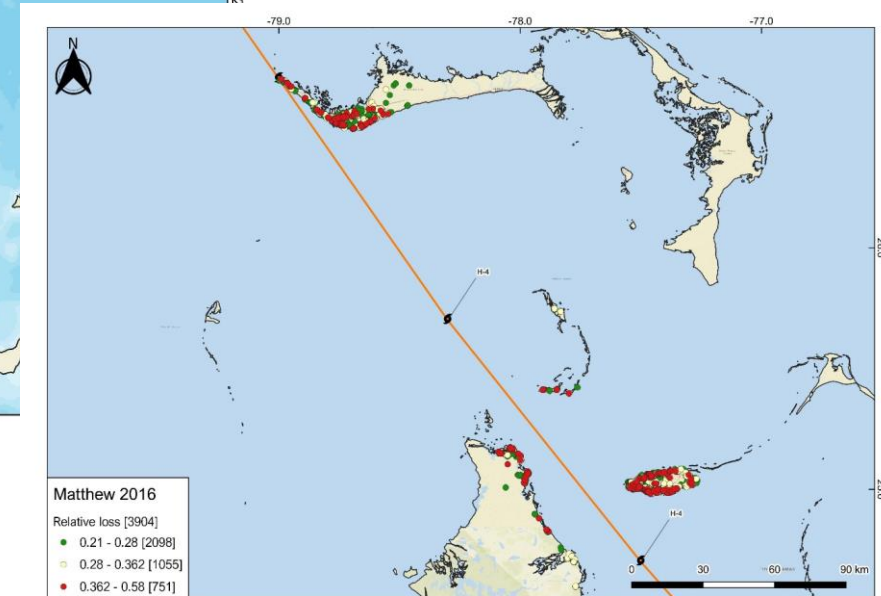
Joaquin 2015



TC – Localized Damage Index (LDI)



Matthew 2016



TC – Localized Damage Index (LDI)

How is *LDI* used?

- The country has a primary policy that is designed and operates in the same way as it operates now
- But there is a secondary policy whose payouts are indexed to LDI:
 - A $LDI_{threshold}$ is defined based on its probability of occurrence
 - When the threshold is exceeded, a fixed payment is triggered
 - The value of the payout depends on the amount of premium dedicated to the endorsement

$$PAYOUT = \begin{cases} 0 & LDI < LDI_{threshold} \\ LDI_{payout} & LDI \geq LDI_{threshold} \end{cases}$$

TC – Localized Damage Index (LDI)

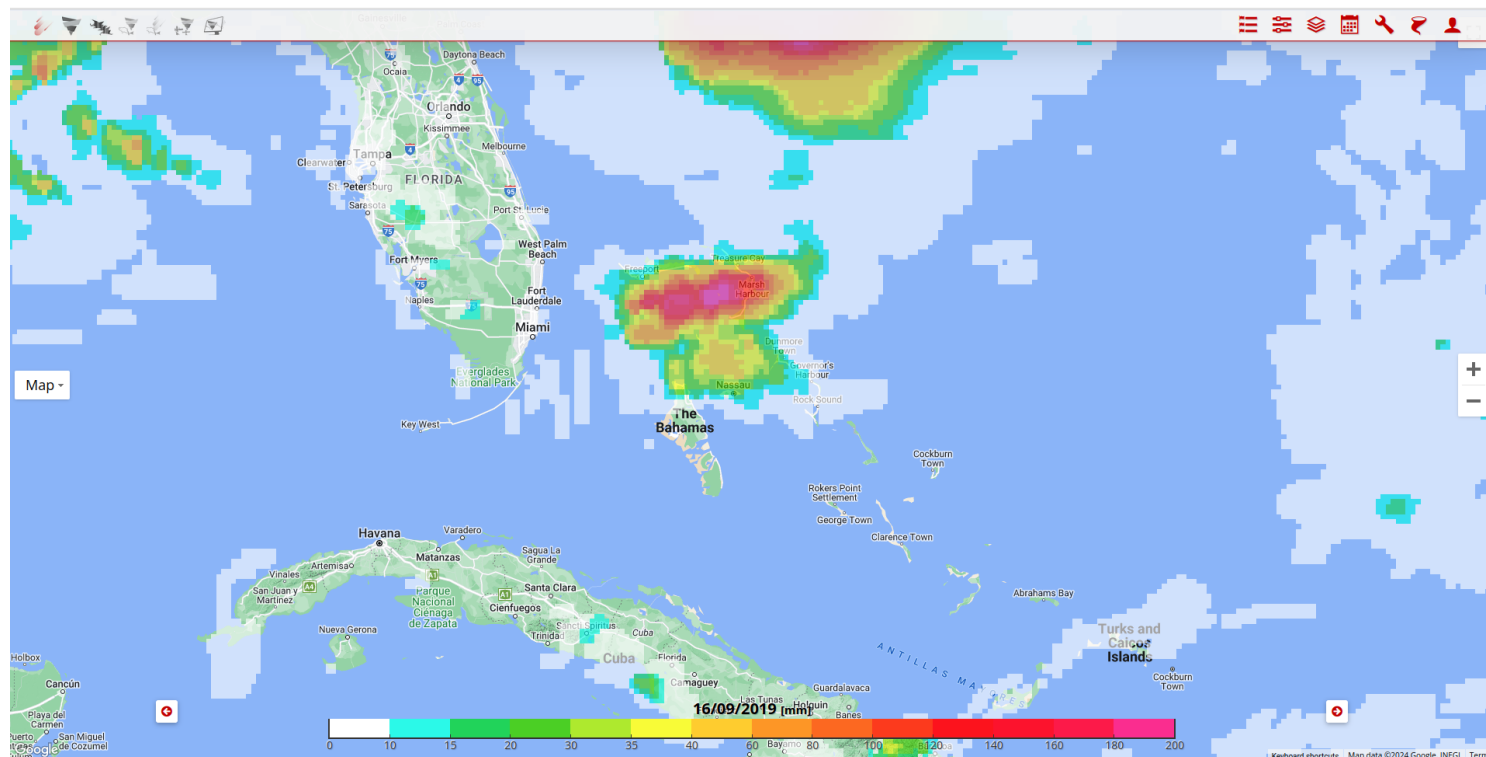
When is having an LDI endorsement meaningful?

- For large countries that can have only a portion affected by the event
- Widespread countries composed of two or more islands far from each other (where only some of the islands can be affected by the event)

XSR – Localized Event Trigger (LET)

Like the LDI, the LET triggers when only a relatively small portion of the country is affected by extreme precipitation

HURRICANE DORIAN 2019



XSR – Localized Event Trigger (LET)

- Localized rainfall events are rainfall events where there is high precipitation within a small area of the country, referred to as local precipitation, compared with the national precipitation average.
- This is measured using a ratio of local precipitation to national precipitation (known as the Local Index or LI) during a rainfall event.
- Given their characteristics, these rainfall episodes disproportionately affect a small part of the country. These localized events can generate significant damage but may not produce a payout under the main policy.
- The LET endorsement was developed to fill this gap by providing a fixed payment when a rainfall event has a Local Index that is greater than a pre-determined activation threshold.
- Both the XSR main policy and the LET policy endorsement may produce a payout for the same rainfall event.

XSR – Localized Event Trigger (LET)

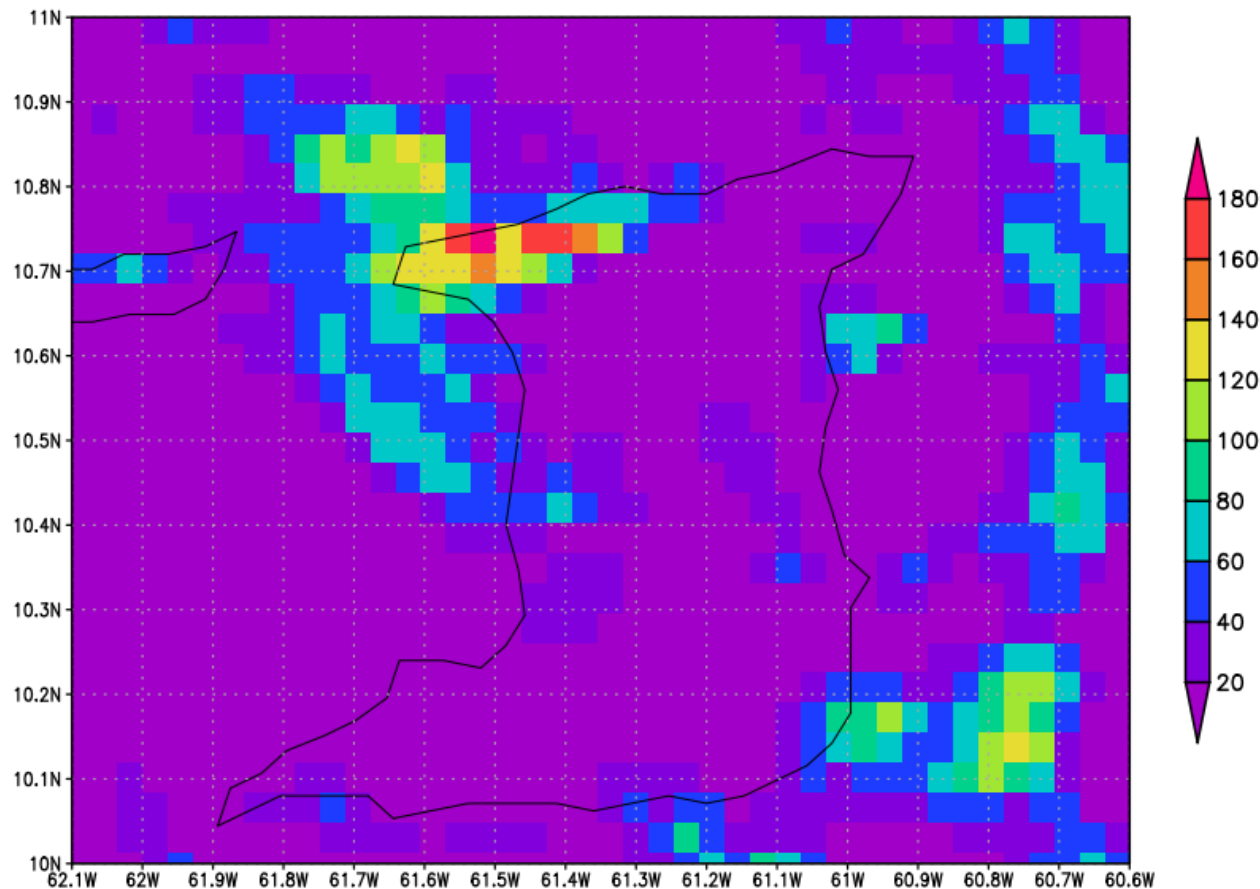
- Objective
 - Produce a payout for events that did not cause very large national-scale losses but affected a **relatively small part of the country**
- Methodology
 1. Identify large precipitation events:
 - Local precipitation must exceed 70 mm/day (based on a minimum of 3 models)
 - Country-scale losses must be larger than 0
 2. Compute the ratio between local precipitation and country-scale precipitation: **Precipitation index (Pindex)**
 3. Produce a payout every time Pindex exceeds a certain threshold

Local precipitation = average of precipitation in the red cells (5% with highest precipitation values)

Country-scale precipitation = average of precipitation in all exposed cells

XSR – Localized Event Trigger (LET)

- Localised event trigger
 - Example: Diego Martin Flood 2012 in Trinidad



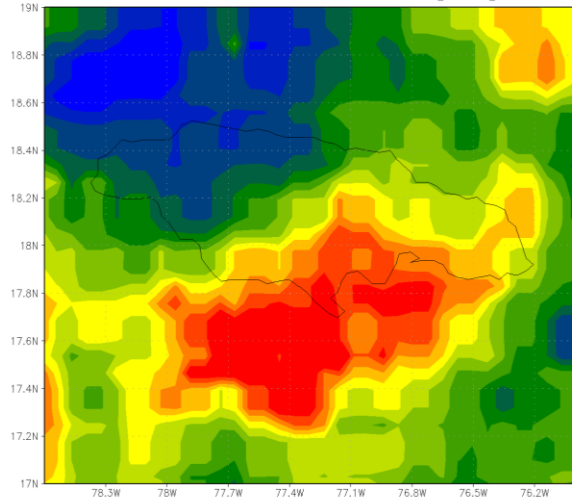
11/08/2012 to
13/08/2012 rainfall
over Trinidad by
WRF11

XSR – Wet Season Trigger (WST)

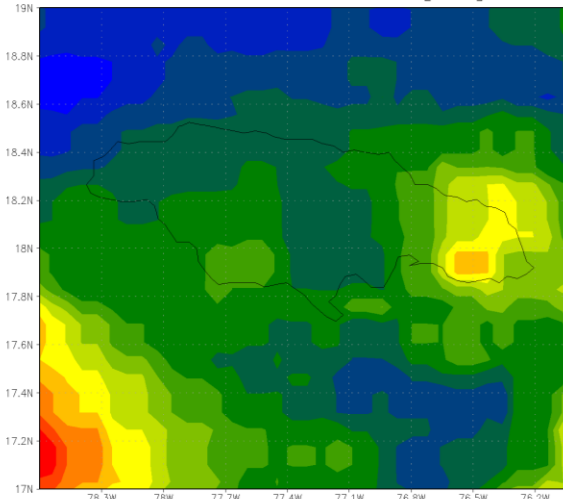
- ✓ XSR model loss estimates are based on the maximum precipitation observed by several models during an extreme rainfall event.
- ✓ What if several consecutive extreme events that are not extreme affect a country?

OCTOBER-NOVEMBER 2020 – JAMAICA WETTEST MONTH ON RECORD

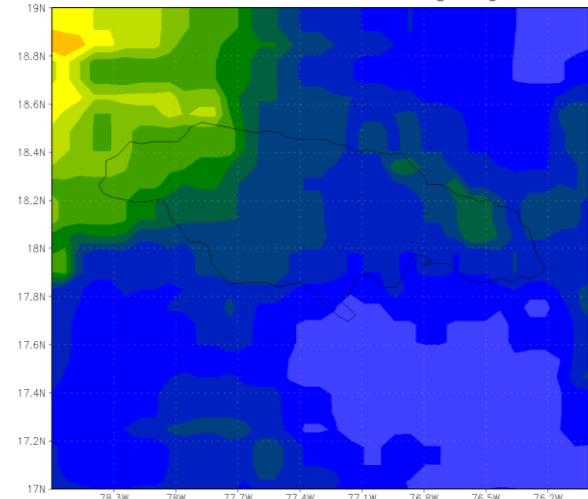
21–27 Oct 2020 – IMERG [mm]



1–4 Nov 2020 – IMERG [mm]



6–9 Nov 2020 – IMERG [mm]



There is the risk of not triggering the main policy even if damage may be observed on the ground

XSR – Wet Season Trigger (WST)

- The WST endorsement provides coverage for rainfall events that occur when soil is oversaturated (usually due to previous rainfall in a relatively short period of time).
- The WST provides a fixed payout for rainfall events that happen when the soil is already saturated and has limited absorption ability. These soil conditions often result in flooding and landslides that can cause significant damage to infrastructure and communities.
- The WST is based on the value of the Wet Index (WI), which is a measure of soil saturation, and the concept of Wet Periods (periods where the WI is greater than 1 which indicates that the soil is wetter than its long-term average).
- The WST endorsement generates a payment when a rainfall event occurs in a Wet Period and the Wet Index value in that Wet Period exceeds a pre-determined activation threshold.
- A payout can be made under the WST policy endorsement or the main XSR policy, not both.

XSR – Wet Season Trigger (WST)

- Objective:
 - To detect medium-severity rain events that happen after a long rainy spell, when the soil is already saturated
- Methodology:
 1. Calculate the 1-month **SPI** (Standardized Precipitation Index) for each Country:

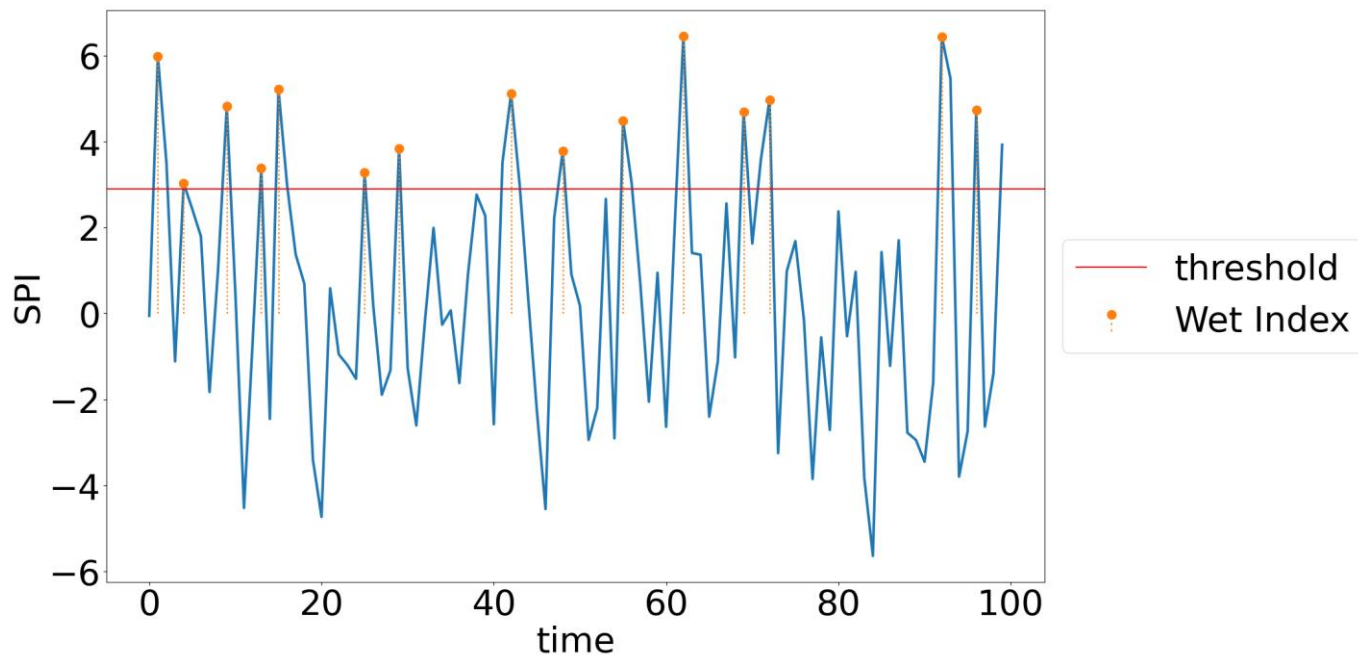
The SPI measures if the precipitation in an area is above or below normal for a given time period (e.g., 1 month) and can be interpreted as the number of standard deviations that the current precipitation is from the long-term average for that specific period of the year.

The higher the SPI, the higher the monthly precipitation was with respect to the long-term average

When a rainfall event hit a country after a long period of rainfall, it may result in floods even if the precipitation volume is not extreme

XSR – Wet Season Trigger (WST)

- Methodology:
 2. Define **Wet Events** as period of time where SPI is over a given threshold (1.0)
 3. Define a **Wet Index (WI)** as the maximum value of SPI during a wet event



XSR – Wet Season Trigger (WST)

When is having a WST endorsement meaningful?

Long rainy spells followed by additional rainfall events can always happen, all countries can benefit from this endorsement.