CCRIF
The Caribbean Catastrophe Risk Insurance Facility

CCRIF: A Innovative Natural Catastrophe Risk Insurance Mechanism for Caribbean Islands

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Presentation Format

- CCRIF Overview
- Case: Haiti
- Hazard and loss analysis: technical basis
- Summary

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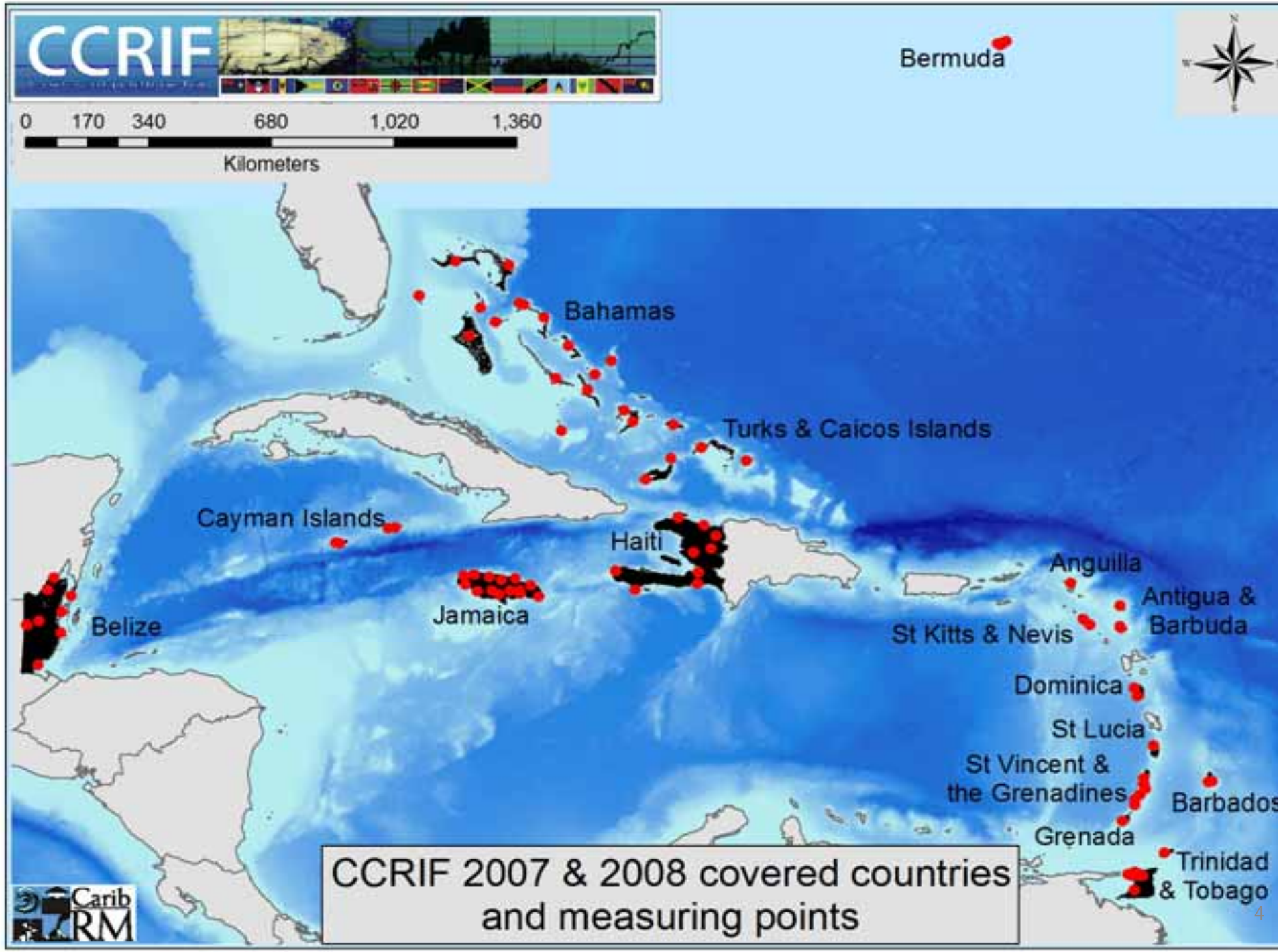
What is CCRIF?

- Launched in 2007 CCRIF is the world's first multi-national risk pool to cover sovereign risk via parametric insurance
- A regional catastrophe fund for Caribbean governments
- CCRIF is designed to limit the financial impact of devastating hurricanes and earthquakes by providing liquidity very quickly after a major event
- Functions like business interruption insurance against Government revenue reductions in the aftermath of major natural catastrophes
- Controlled by the 16 participating governments, with each government paying a premium related to its own risk exposure and being able to buy coverage up to an annual aggregate limit of US$100 million per peril


CCRIF
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Kilometers
Bermuda
Bahamas
Turks & Caicos Islands
Cayman Islands
Haiti
Jamaica
Belize
Anguilla
Antigua & Barbuda
St Kitts & Nevis
Dominica
St Lucia
St Vincent & the Grenadines
Barbados
Grenada
Trinidad & Tobago
Carib RM
CCRIF 2007 & 2008 covered countries and measuring points

Aims of CCRIF

- CARICOM Heads of Government asked the World Bank to design and implement a cost-effective risk transfer programme for member governments, with an aim:
  - To cover the post-disaster liquidity gap faced by governments between immediate emergency aid and long-term redevelopment assistance
  - To enable governments to receive money quickly, with the payout calculated in a completely objective way
  - To minimise the burden on governments to provide exposure information prior to coverage being initiated and loss information after a disaster

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Types of Coverage

- CCRIF currently offers parametric policies for hurricane (wind) and earthquake perils
- Policies have a high per-event deductible (1 in 15-yr loss for hurricane, 1 in 20-yr for quake), and an annual coverage limit
- Pricing is calculated as a function of the pure risk (expected annual loss) on each contract
- Coverage is designed to cover short term revenue shortfall (similar to business interruption insurance), NOT infrastructure, indirect social costs etc.
- Pooling of risk across wide geographical area provides excellent diversification and access to coverage previously unavailable to these countries

CCRIF Benefits

- Pooling of risk across wide geographical area provides excellent diversification and access to coverage previously unavailable to these countries
- Pricing based on technical risk avoids cross-subsidisation
- Parametric policies allow total objectivity and rapid payouts
- Pooling into single reinsurance transaction improves access and pricing and allows innovative structures

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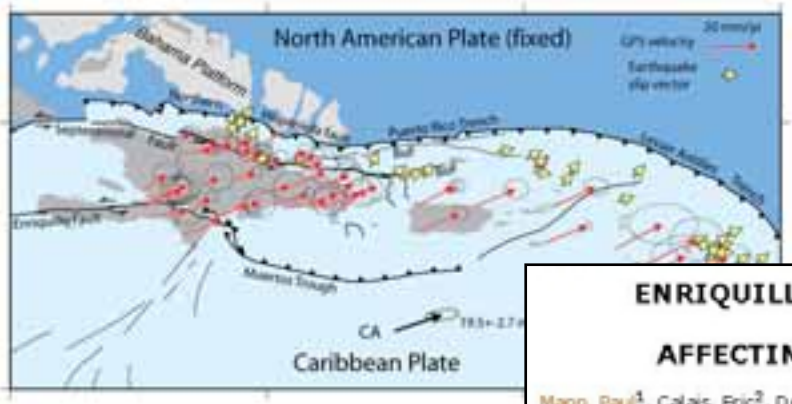
Haiti: Natural Hazards

- Hurricanes, and floods in particular, were the big disaster management focus
- Plate margin geophysics in Hispaniola reasonably well known at regional level



ENRIQUILLO-PLANTAIN GARDEN STRIKE-SLIP FAULT ZONE:
A MAJOR SEISMIC HAZARD
AFFECTING DOMINICAN REPUBLIC, HAITI AND JAMAICA

Mann, Paul[1], Calais, Eric[2], Demets, Chuck[3], Prentice, Carol S.[4], and Wiggins-Grandison, Margaret[5]

- Even knowing the risk, it was always a difficult task to maintain earthquake awareness in the face of hydro-met hazards and other major developmental challenges

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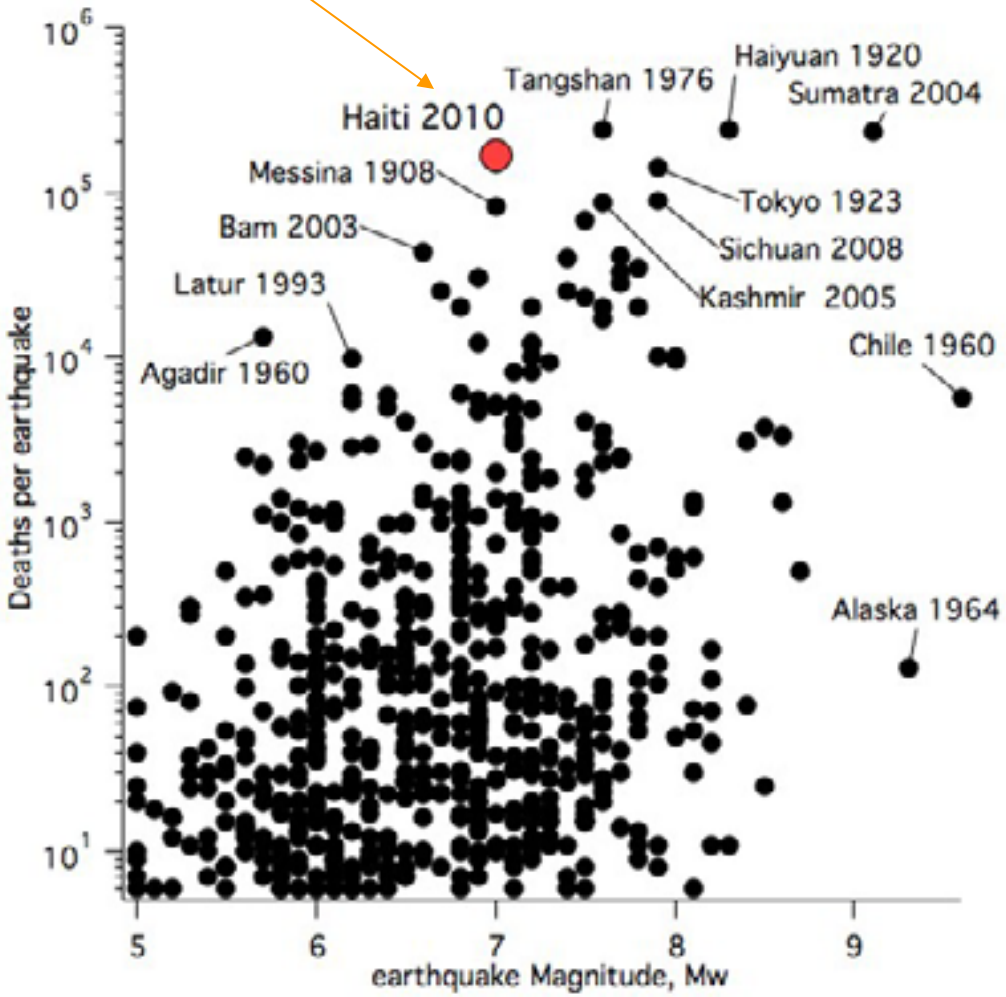
Haiti: January 2010 earthquake, a global catastrophe

Combine:

- a shallow, M=7.0 event
- very close to one of the most densely-populated cities in the world
- in the poorest country in the western hemisphere

Result



Haiti: CCRIF participation

- Both quake and hurricane coverage purchased
- As with all countries exposed to both perils, Haiti spent most (85%) of its overall premium on hurricane coverage
- Countries pay their own premium (some use soft loan vehicles), which is directly related to the risk transferred to CCRIF
- Haiti's premium actually paid through grant support from World Bank and, this year, CIDA

Haiti: CCRIF's payout

- Payout made 14 days after event, was used by Government of Haiti to pay salaries (police, civil servants etc) as soon as their systems were running (servers were salvaged from collapsed Ministry building).

- CCRIF payout of $8M represents perhaps 50% of the TOTAL aid Government of Haiti will receive in first 10 weeks in the form of direct liquidity.
  [based on AP estimate]

The future in Haiti

- A daunting task – Haiti was already in the top 5 most vulnerable countries to climate change

- Multi-hazard approach must be taken to redevelopment, which must also utilise the global risk transfer markets to spread Haiti's load and ultimately reduce the burden during and after re-building

- Scale is a huge issue – for context, Haiti's full National Adaptation Plan of Action (NAPA) for climate change had a total cost of less than $25M

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Haiti: Lessons for global catastrophe modeling community

- Use available science in modeling catastrophe risks in the developing world – even if it is not readily available or as comprehensive as in the developed world
- Support basic scientific and engineering research in the Caribbean, partnering with regional institutions, which are all poorly resourced to do much fieldwork or hi-tech data acquisition
- Going forward, greater focus should be directed at understanding not just insured risks but national infrastructure and economic susceptibility – this work is confined to academia and international finance institutions.

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Real-time Forecasting System

- Current position, forecast track
- Hazard layers (wind, surge, wave, rain, impact of wind)
- Impact estimates
  - ports and airports
  - population affected
- Second year of operation, free to CCRIF clients

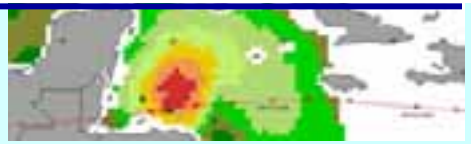
Second Generation Hurricane and Earthquake Modeling Framework

- 2G model incorporates improvements in hazard and loss modeling techniques
  - Model highly scalable
  - Applicable at a wide range of modeling resolutions
  - Addresses the issue of basis risk to some extent.
- Main changes to policies are:
  - The estimation of the loss, which is the basis for a payout on the policy, will be made from the new 2G model for 2010/2011
  - It will be run in real time
  - produce a modeled loss for all countries affected by an event (as well as hazard footprint maps)
  - Within the new modeling framework, risk profiles have changed somewhat, so that will affect coverage conditions for a given premium in some cases

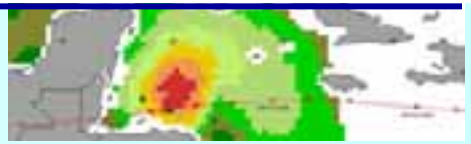
Extreme Rainfall Product

- CCRIF is nearing completion of the development of an excess rainfall product
- Aimed at helping to mitigate the economic consequences of major rainfall events in the region.
- Kinetic Analysis Corporation is contracted by CCRIF to produce historic rainfall probabilities for all CCRIF countries using 60 yrs of GFS Initialisation Data and climatology modelling
- Overland flow and accumulation are simulated to produce a crude proxy for flooding
- CIMH is analysing rain gauge and flood data for selected locations and events to calibrate the model configurations and is providing basin configurations for policy formulation

KAC Loss Modeling for CCRIF: Technical Approach

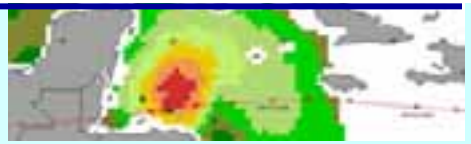


What questions are we trying to answer?



- What losses can we expect from a given event (historical, real time)? What is the probability of a loss?
- For a given country, what range of losses should we expect for any given time interval?
- For a given portfolio of countries with given set of policy provisions, what payouts should we expect per country and for the Facility per Event? Per Year?

Available / Required Modeling Data



- Historical Events—Available Atlantic tropical storm catalogs

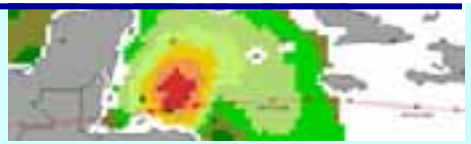
- Exposure [i.e. what's at risk?]

Questions about data:
- *Are there enough historical events? Is the data good enough?*
- *Is sufficiently accurate exposure data available?*

We feel that the historical data is sufficient for this analysis, and have demonstrated that statistically.

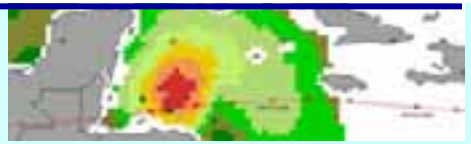
- Observed Losses from past storms
  Difficult data to obtain accurate information – must be corrected for exposure, inflation, etc.

Exposure Data

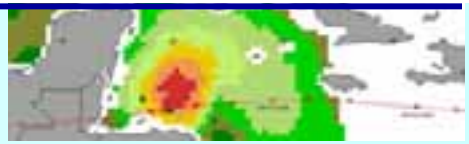


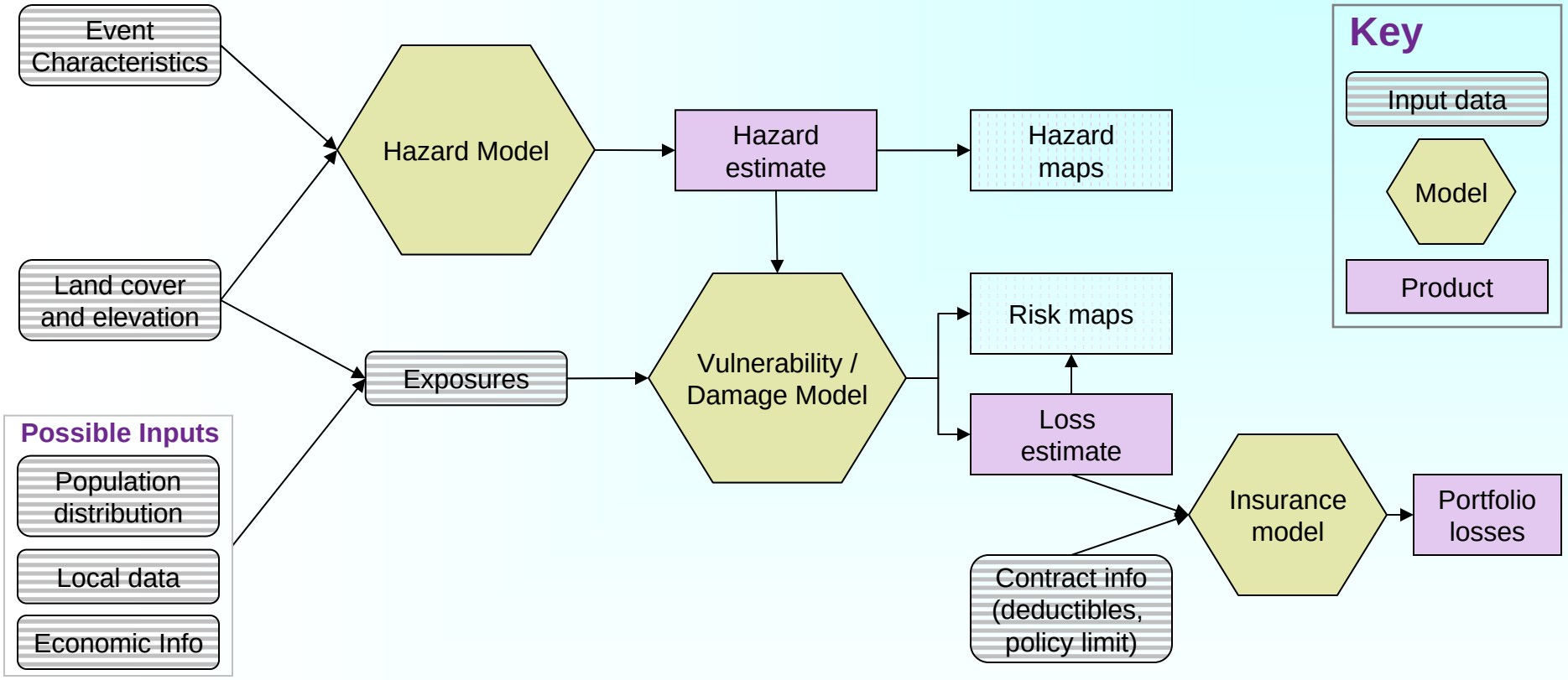
- Accurate exposure data generally not available in Caribbean
- Remote-sensing data can be used to estimate exposure
  - LANDSCAN for population
  - MODIS for Land Use Land Cover (LULC)
  - Economic data from CIA, WB, etc.
- Accurate distribution of exposures
- Fair accuracy for value of exposures for loss estimation. **Not** intended as an estimate of total valuation.
- Loss per unit of exposure (loss cost)—generally good results.

Theoretical Approach



Hazard and Loss Assessment Process
Single event

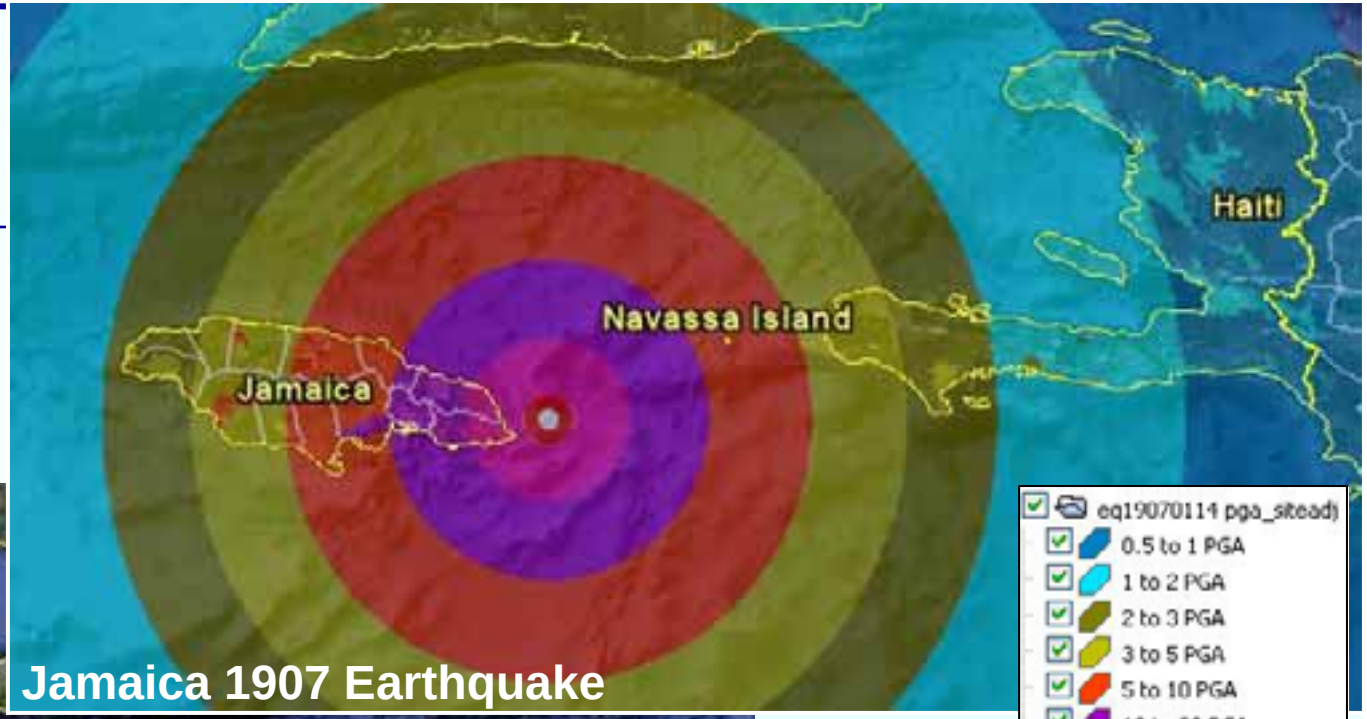




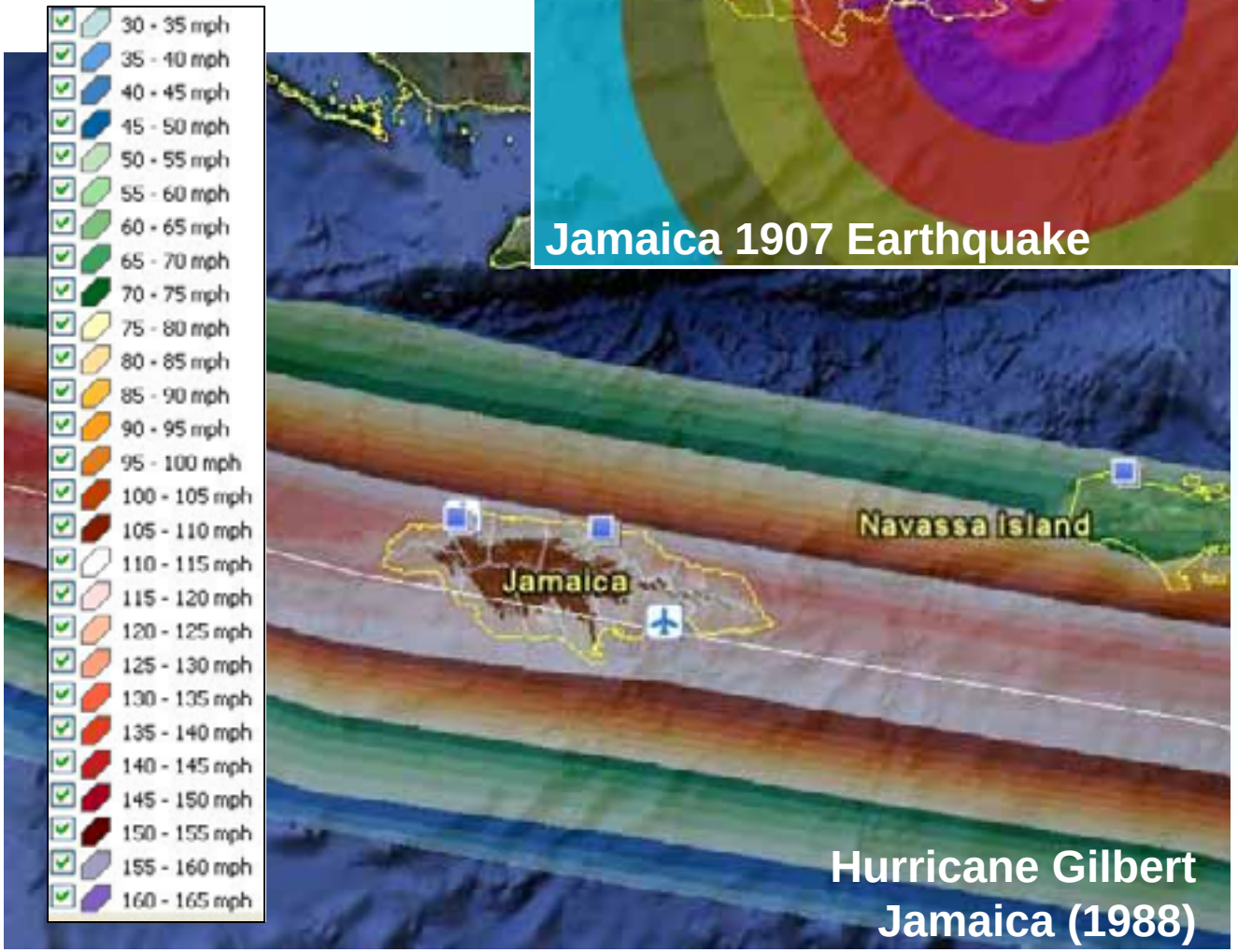
Producing valid and reliable loss estimates requires that:

- each stage of the process uses and produces valid information (input information, hazard model, damage function),
- input databases (e.g. land cover and exposure) have consistent spatial characteristics, and
- input databases use timely (i.e. current) data.

Historical Events

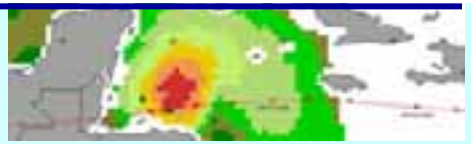


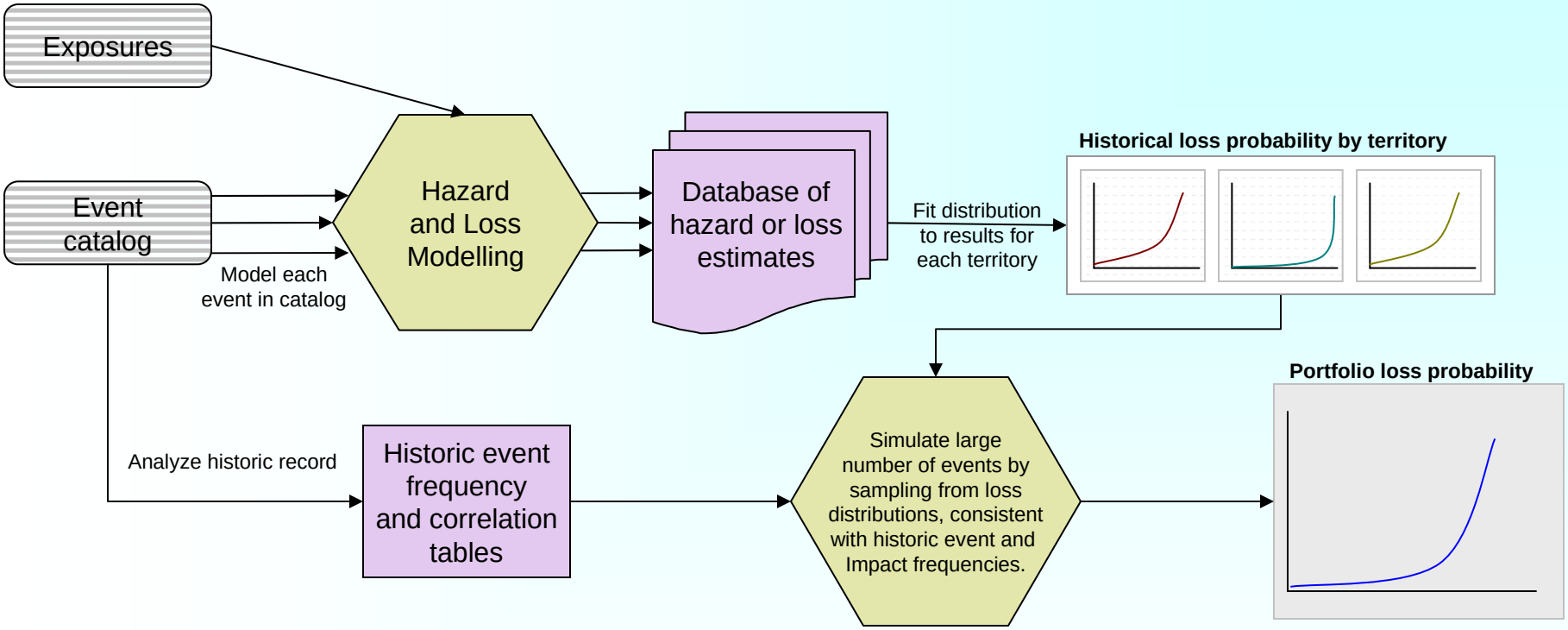
Jamaica 1907 Earthquake



Hurricane Gilbert Jamaica (1988)

Hazard and Loss Assessment Process
All historical events

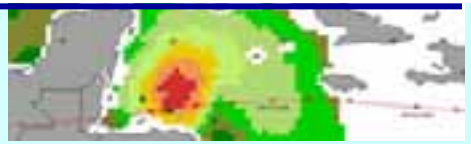


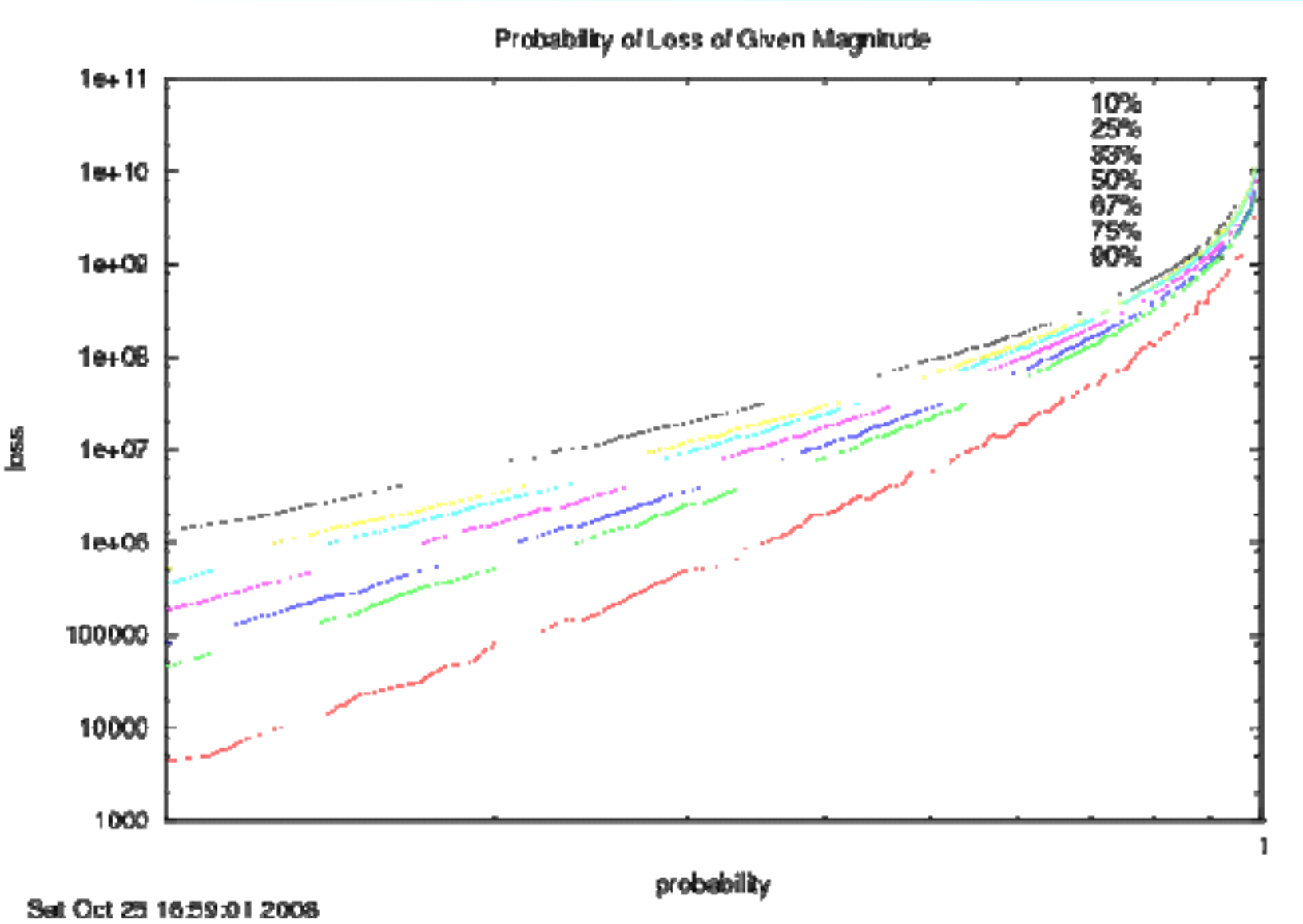


For CCRIF:

- Events—Atlantic tropical storms [1851-2008]: 1,634 storms
- Exposures—residential, commercial, agriculture, infrastructure exposures at 4,000,000+ exposure locations

Long-term Event Loss Probabilities (with uncertainty estimates)





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Additional CCRIF Activities

- Support for disaster risk reduction initiatives in at the community level, and in academic research
- Develop and implement an extreme weather data collection network across the region
- Assist in updating post-disaster loss methodology
- Supporting climate change adaptation in the Caribbean
  - Could also act as underwriters for index insurance schemes covering particularly vulnerable sectors (agriculture etc)
  - Linked to supporting institutional capacity in vulnerable states (i.e. through modelling support, country risk officers etc) which in turn will support broader adaptation programmes
  - Linking premium subsidy with sustained progress towards established benchmarks in adaptation and risk reduction

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Summary Points

- CCRIF is the world's first parametric risk pool and the first multi-national pool covering sovereign risk
- CCRIF has successfully implemented a low-cost insurance programme for governments in the Caribbean
- CCRIF works because of: 1) fast payouts, 2) low premiums, and 3) a pool that is mutually beneficial, transparent and fair
- CCRIF shows the feasibility of multi-country risk transfer and risk sharing
- CCRIF can be effectively used to address much of the additional risk imposed by climate change
- CCRIF has developed strong support from a broad range of stakeholders

THE END

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