



Informational Brochure

CCRIF, A NOT-FOR-PROFIT COMPANY,
IS THE FIRST AND ONLY
MULTI-COUNTRY RISK POOL IN THE WORLD

THE CCRIF EARTHQUAKE HAZARD INSURANCE

The Caribbean Catastrophe Risk Insurance Facility (CCRIF) offers CARICOM governments an opportunity to transfer some of the economic risk they face from the impact of hurricanes and earthquakes. To assess this risk, and to price the insurance policies offered to the countries, CCRIF uses the hurricane and earthquake hazard and loss modeling technology developed by Kinetic Analysis Corporation (KAC).

The CCRIF earthquake insurance premium rates are based on a long-term risk assessment conducted by KAC using its earthquake hazard and loss modeling platform. Prior to issuing policies, the selected loss modeling configuration is locked down as the “CCRIF earthquake model”, and is then used as soon as USGS data on the event become available, to determine if a policy has triggered, and what the related payout will be to the affected country(ies). Payouts are made 14 days after the event.

Using a loss modeling platform offers CCRIF the flexibility to test and implement various attenuation functions – a distinct advantage in dealing with the complex geological and seismo-tectonic characteristics of the Caribbean Basin – as well as other hazard and loss modeling variables. For this year's insurance season which starts in June 2011, the following configuration has been implemented:

1. Seismic Return-period Analysis

Modeling

Event Simulations - Existing seismic event data sets in the Caribbean are not sufficient to be used directly in the statistical modeling process. Strong seismic events have return periods in the hundreds of years, and historic records do not reach far enough in the past to capture a sufficient density of such events. To address this issue, we developed a seismic source/rate model to generate a synthetic event set for hazard and loss modeling.

Source/rate model-derived seismic catalog - A synthetic earthquake catalog was generated for the CCRIF region using the following inputs and parameters:

- *Input historic event information* - From the USGS PDE catalog covering the period from 1 January 1990 through 31 December 2010 was used. Hypocenter depth and magnitude, as well as the moment-centroid information is used for modeling both historical and real-time events. [Where needed, the event information in the PDE was supplemented with moment-centroid information from the CMT catalog.]
- *Gutenberg-Richter 'b' value* - A fixed value of 1.0 was used for the entire Caribbean region.
- *Synthetic years* - A total of 5,000 synthetic years was generated for the current CCRIF earthquake model runs.

Outputs

Ground-shaking hazard return-period maps - The maps are based on the event-specific geographic hazard footprints for individual seismic events from the synthetic catalog. To produce these maps, hazard curves were fit to the detailed event peak ground acceleration results for each grid cell in the output map. For mapping a specific hazard return period, the hazard level for that return period was selected from the fitted distribution for each cell. These regional maps were generated at a 0.1 degree resolution.

Territory-specific loss curves - Raw event simulations were carried out for all events in the synthetic event catalog to generate territory-specific losses. Loss curves were derived from the sorted empirical loss catalogs.

2. Real-time Single-event Modeling

Event Information

The USGS' Preliminary Determination of Epicenters (PDE) data is used for event information (hypocenter location and magnitude, moment-centroid information).

Hazard and loss model configuration [NOTE: this section applies to both the RT and long-term analyses.]

Attenuation Functions - The attenuation function used for the CCRIF seismic modeling is a two-step composite of stand-alone attenuation functions based on the event depth and event magnitude, with the following components:

1. ShakeMap 'shakesmall' function
2. Composite function based on event depth
 - 0 - 12km: the Boore, Joyner and Fumal (BJF) function
 - 12 - 18km: transition from BJF to the Youngs et. al. interface formulation
 - 18 - 40km: the Youngs et. al. interface formulation
 - 40 - 50km: transition from the Youngs et. al. interface formulation to the Youngs et. al. intraslab formulation.
 - Over 50km: the Youngs et. al. intraslab formulation

The resulting attenuation for an event is calculated based on the event magnitude:

Magnitude	Function applied
< 5.2	'shakesmall'
5.2 – 5.4	Transition from shakesmall to depth-based composite function.
> 5.4	Depth-based composite function.

Site Amplification - Site-specific amplification factors were derived using the methodology described in Wald and Allen (2007), using SRTM topographic data at 90m resolution.

Damage Functions - The functions developed by the Global Earthquake Safety Initiative (GESI) for standard building types are used to calculate damage from seismic ground motion [GeoHazards International 2001]. Construction types in areas with lower GDPC areas are mapped to less resilient asset categories than in higher GDPC areas.



About CCRIF

The Caribbean Catastrophe Risk Insurance Facility (CCRIF) is the first multi-country risk pool in the world, and is also the first insurance instrument to successfully develop parametric policies backed by both traditional and capital markets. It is a regional catastrophe fund for Caribbean governments designed to limit the financial impact of devastating hurricanes and earthquakes by quickly providing financial liquidity when a policy is triggered.

CCRIF was developed through funding from the Japanese Government, and was capitalised through contributions to a multi-donor Trust Fund by the Government of Canada, the European Union, the World Bank, the governments of the UK and France, the Caribbean Development Bank and the governments of Ireland and Bermuda, as well as through membership fees paid by participating governments.

CCRIF Vision

CCRIF will be a key partner with the Caribbean region in its disaster risk management strategies to support long-term sustainable development goals.

CCRIF Mission

Our Mission is to serve Caribbean governments and their communities in reducing the economic impact of natural catastrophes. We provide immediate liquidity through a range of affordable insurance products in a way that is financially responsible and responsive to their needs.



Sixteen governments are currently members of CCRIF:

Anguilla, Antigua & Barbuda, Bahamas, Barbados, Belize, Bermuda, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago and Turks & Caicos Islands

Published by: Caribbean Catastrophe Risk Insurance Facility (CCRIF)

Contact: Caribbean Risk Managers Ltd, Facility Supervisor

Barbados: +1 246 426-1525; Jamaica: +1 876 920-4182; USA: +1 202 465-4301

Email: ccrif@ccrif.org; Website: www.ccrif.org