DEVELOPMENT OF CARIBBEAN RISK ATLAS FOR EARTHQUAKE HAZARDS (RISK ATLAS PROJECT)

Walter Salazar, Richard Robertson, Machel Higgins, Cassandra La Barrie, Lloyd Lynch, Joan Latchman, Alia Juman, Jillian Bernard

Port of Spain, Trinidad May 3rd 2011
DEVELOPMENT OF CARIBBEAN RISK ATLAS FOR EARTHQUAKE HAZARDS (RISK ATLAS PROJECT)

- Project Manager: U.W.I Disaster Risk Reduction Centre (DRRC) at Mona, UWI in Jamaica.

- Main Sponsor: World Bank

- Completion Date: December 2011.
AGENDA

- Justification
- Objectives
- Project components
- Limitations
- Future work plans
JUSTIFICATION

- Earthquake hazards present a serious threat to sustainable regional social and economic development.

- Critical need for the assessment and quantification of potential economic, infrastructural and social loss from earthquakes in the Caribbean.
OBJECTIVES

To develop a methodology for seismic risk assessment in the Caribbean for *three pilot States: Jamaica, Grenada and Barbados.*

To provide guidelines and open-source software for the estimation of earthquake loss using available socio-economic data.
PROJECT COMPONENTS

- Seismic hazard assessment for Jamaica in terms of PGA and spectral ordinates for 0.2s and 1.0s
- For Barbados and Grenada: we will use the seismic hazard results of the Eastern Caribbean Project (SRC/EUCENTRE).
- Development/Adapted Fragility Curves
- Modification, testing and validation of ELE software
- Determination of data requirements and collection of geo-referenced data
- Risk evaluation
We are including the local catalogue from the Earthquake Unit of Jamaica and the IPGH Catalogue
FOCAL MECHANISMS

Centroid Moment Tensor Solutions

Special studies
(Wiggins 2003)

STRIKE SLIP AND THRUST FAULTING
Seismic Hazard

Grenada and Barbados

RP=2475 years (2% in 50 years)

Resolution: every 0.025 degrees = 2.8 km
VULNERABILITY AND BUILDING STOCK

Building Footprints for Kingston Metropolitan Area

Legend
- Yellow: Building Footprints
- Black: Electoral Districts

Scale: 0 0.5 1 2 3 4 Kilometers
Precast houses

Reinforced concrete apartments

Reinforced concrete buildings on slopes

Masonry Houses

Modern Reinforced Concrete Building at New Kingston

Historical Buildings

Wooden house
Connections between panels are effected by welding together matching metal angle sections embedded in the edge ribs of the panels.
Three classes of connections: wall to wall, wall to roof and wall to floor.

Redekop (1981)
Additions in Pre Cast Houses
MAEViz (Mid America Earthquake center VIZualisation) was selected – in conjunction with Civil Engineering Department of UWI.

We have a MoU between Seismic Research Centre and the National Center for Supercomputing Applications and Middle America Earthquake Center Illinois, USA, who are the developers of MAEViz.
MAEVIZ: Consequence-Based Risk Management for Seismic Events

- An open source ELE software package
- Built in GIS package
MODIFICATION OF CHOSEN ELE PACKAGE

- Technical components requiring modification are being identified to fit regional data (with developer of MAEVIZ and Software Engineers at Seismic Research Centre)
- Produce a training manual
- Creation of Regions of Interest plug-ins to accommodate each island state
COLLECTION OF GEO-REFERENCED DATA

- Currently on-going

- Key Institutions:
  
  **Jamaica:**
  Mona Geo Informatics at UWI Mona,
  Town Clerk in Jamaica: Structural drawings and specifications

  **Barbados:**
  Town and Country Planning & Land and Surveys Department

  **Grenada:**
  Permanent Secretary of Ministry of Housing, Lands and Community Development
GRENADA DATA

Ikonos Satellite Imagery for Grenada, 2000
LIMITATIONS

- Building footprints for Kingston: there is no classification for building types
- Time
- Few personnel and resources
**Future Work**

- **Modification of MAEViz:**
  - Once completed, and sufficient data is available, testing and verification will commence.

- **Collection of geo-referenced datasets:**
  - Finalising agreements to obtain the available GIS datasets.

- **Amplification of motion employing microtremors**
Site effects estimation: amplification of motion employing spectral techniques (Nakamura H/V, traditional spectral ratios)
FUTURE WORK

• GEM collaboration:
  - Collaboration with GEM in terms of assistance with the OpenQuake software development.
THANK YOU FOR YOUR ATTENTION