World Bank Panel:
The Role of Governments and Donors in Catastrophe Risk Modeling

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Agenda

- Catastrophe Modeling Overview
- Current Examples of Public-Private Risk Management
- Opportunities for Governments and Donors

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What Do Catastrophe Models Do?

- Models and associated software offer convenient integration of
  - ***Science***: Meteorology, seismology, structural and civil engineering
  - ***Data***: Physical landscape and exposures at risk
  - ***Statistics***: Rules for transforming raw losses into "perspectives" of the consumer, insurer, reinsurer
  - ***Functionality***: Throughput of data and results, entry of assumptions, reporting capabilities

- Models simulate thousands of seasons and events to provide
  - ***Full Range*** of scientifically tenable events
  - ***Credibility*** of large sample sizes not found in the raw historical record
  - ***Sensitivity Testing*** framework for impacting results by varying assumptions and exposure data

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What Questions are Catastrophe Models Designed to Answer?

- Where are future events likely to occur?
- How big are they likely to be? How frequently are they likely to occur?
- For each potential event, what will be the property damage and insured losses? What will be the number of people injured?

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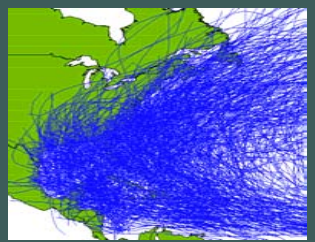
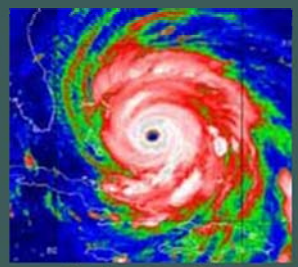
How Do Cat Models Work?



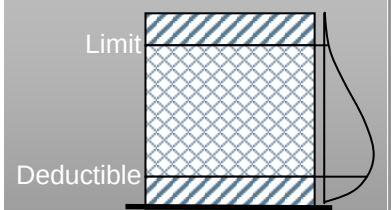
Event Generation



Intensity Calculation

Exposure Information

Damage Estimation



Policy Conditions

Loss Calculation

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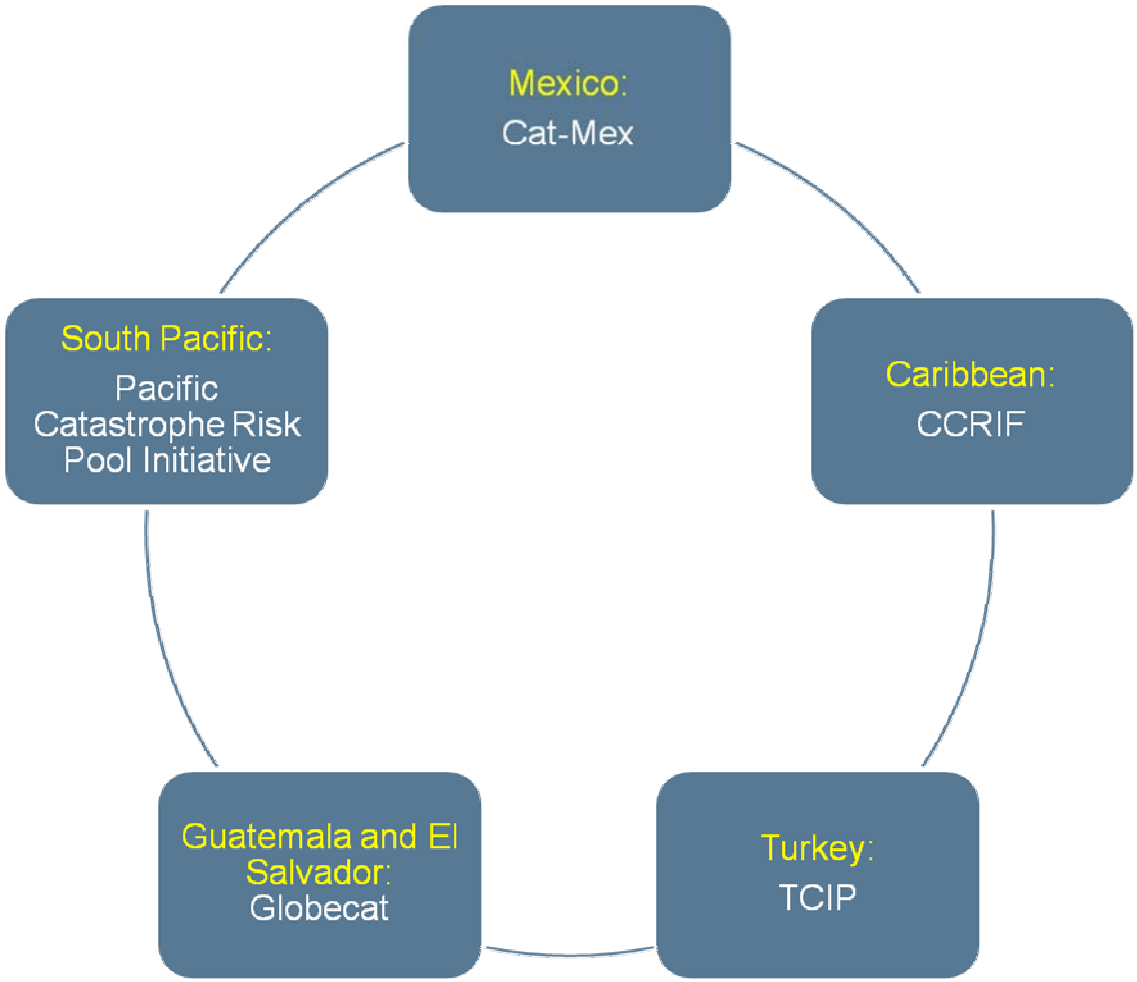
Public Sector Catastrophe Risk Management Programs



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Cat Models and Potential Applications for Governments and Donors

Identify Active Hazard Areas

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Inventory of Distribution, Type and Value of Assets

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Quantify Vulnerability

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Distribution of Potential Losses

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Informed Risk Management Decisions

Hazard Mapping

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Relate Distribution of Assets to Hazard

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Mitigation

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Emergency Response Planning

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Financial and Social Protection

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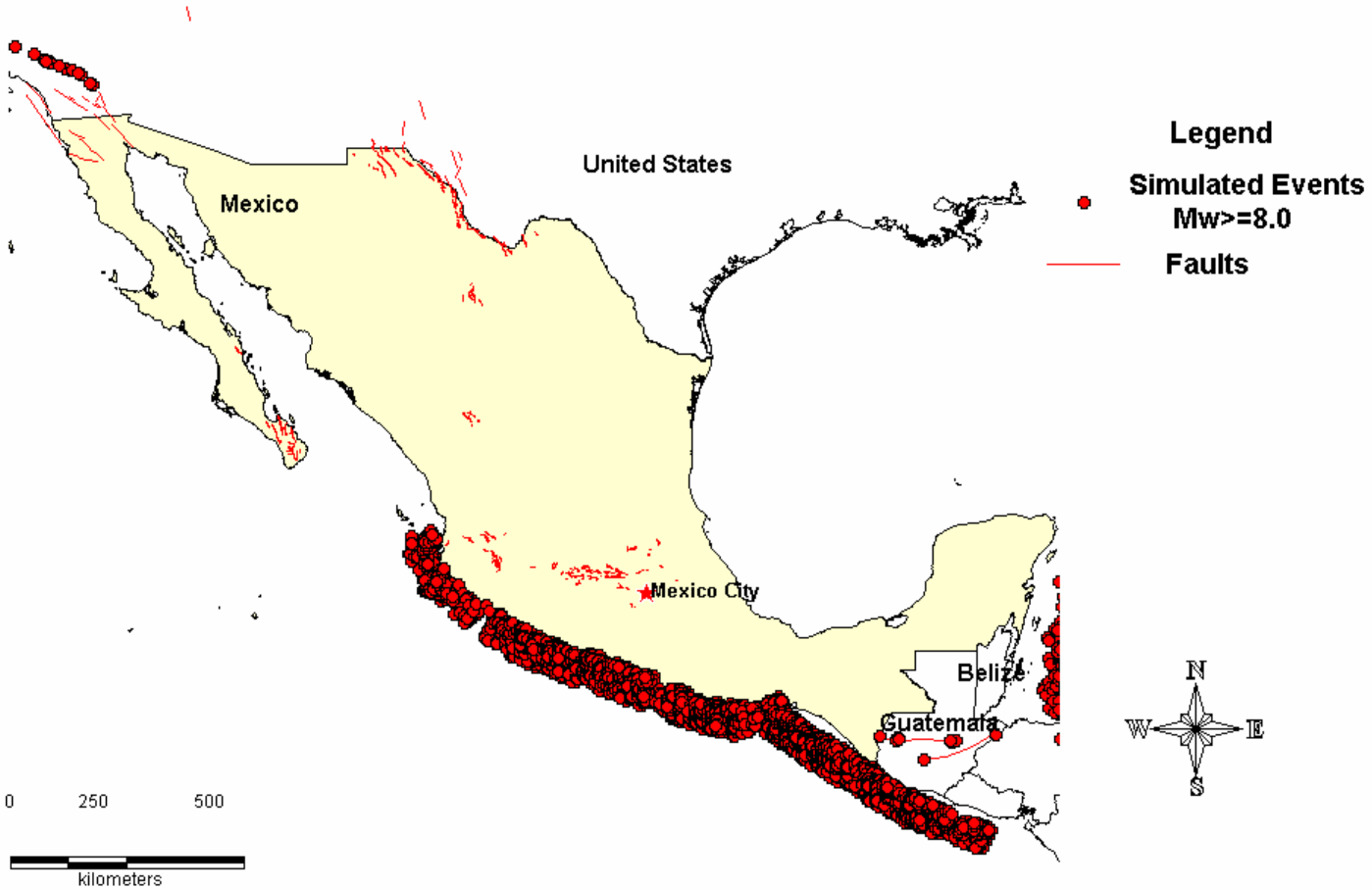
Example: Earthquake Hazard Mapping



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Example: Earthquake Hazard Mapping (Continued)

- Map areas of strongest seismicity
- Potential applications of the data:
  - Identify distribution of population and assets in high risk areas
  - Building code design and enforcement
  - Allocation of emergency response services
  - Assess financial protection strategies

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Opportunities for Governments and Donors

- Public sector asset databases
  - Data sets on public sector assets are not frequently updated and in some cases not compiled.
  - Updated public sector exposure databases will enhance the precision of modeled output.
- Building code
  - Enforcement and strengthening serve to reduce vulnerability.
  - Models typically assume a high degree of compliance with building codes.
- Emergency planning and response
  - Governments and donors can compare probabilistically model scenarios (e.g. a 1 in 100 year event) to incorporate additional perspectives into emergency planning.
  - Real-time post event impact estimates (affected people, financial loss, etc.)
- Financial protection
  - Governments and donors can continue to leverage catastrophe models to acquire financial protection against catastrophic losses.
- Model development
  - Provide financial support for model creation in developing regions where private sector demand for cat models is low.

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