

Catastrophe Modelling, challenges and role of the broker

**International Istanbul Insurance Conference
“Earthquake Risk, Modelling & Insurance”**

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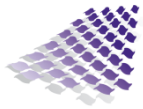
10 Sep 2009

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Role of the broker

- Expert advice
- Transaction
- Other services (premiums, claims, contract wordings, carrier security, regulatory submissions, etc)

Willis Analytics product groups



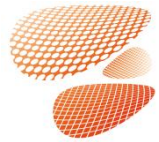
risk estimation

modelling probable losses



process integration

making the modelling fully accessible to clients and risk partners



model interpretation

explaining the model assumptions and outputs



custom modelling

our own brand of data and loss models



global knowledge

the expertise of the team and the Willis Research network



risk decisions

modelling to help our clients' business

Modelling usage

Reinsurers → extensive

- Majority use only one model, some up to three models
- range of sophistication

Insurers → limited

- largest multinational insurance groups use one for underwriting
- majority obtain modelling from reinsurance broker

Brokers → extensive

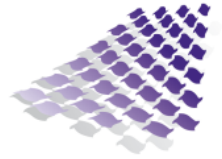
- global licences
- process integration

Regulatory authorities, eg UK Financial Services Authority

- Solvency II: board director use-test

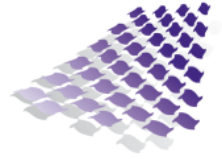
Rating Agencies, e.g. Standard & Poor, AM Best

- Standard Rating Questionnaire



Unique perspective of brokers on modelling

- Using all vendor and in-house models
- Extensive knowledge of various aspects of catastrophe risk: hazard, vulnerability
- Expertise to understand, deploy and interpret (as far as possible) the vendor models
- In-depth knowledge of insurance/reinsurance issues and effect of modelling on transaction
- Access to significant amount of “unprocessed” exposure data from various parts of the world

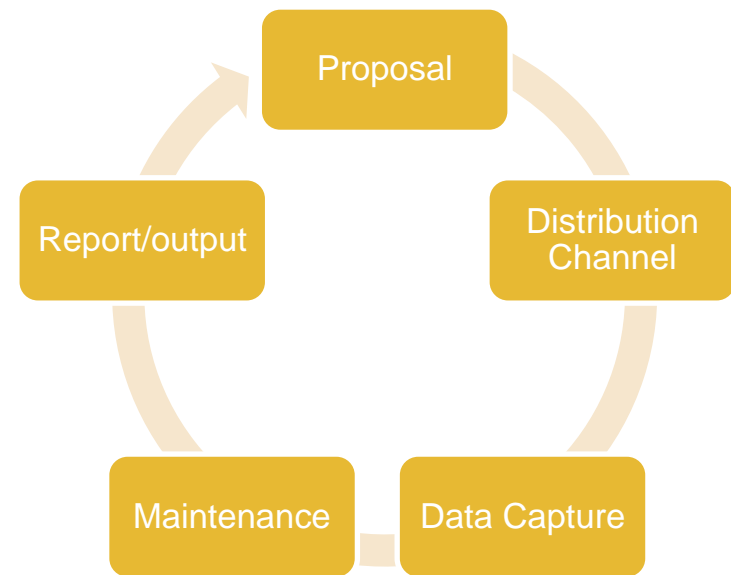


How important is data quality?

- *Modelled losses can only ever be as reliable as the exposure that they are based on*
- Acceptable data for modelling:
 - Policy level
 - Record by record
 - Split by sub-location
 - Includes all available descriptors relevant to modelling that exist in the client's IT system
 - Not pre-processed to select or remove descriptors
 - Captures data exactly as entered on insurer's IT system
 - All policy details unchanged through the data life-cycle



Data-life cycle



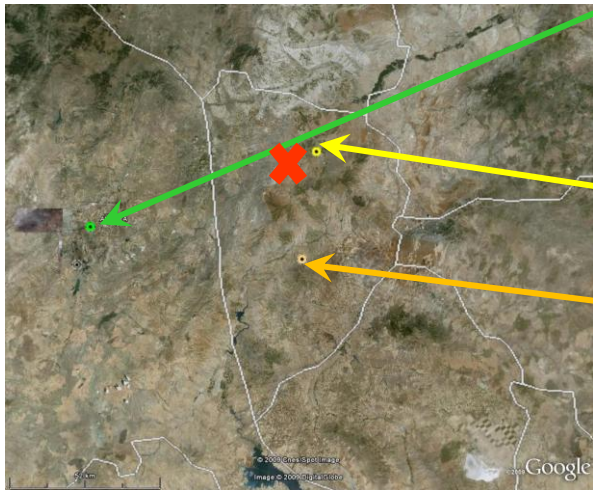
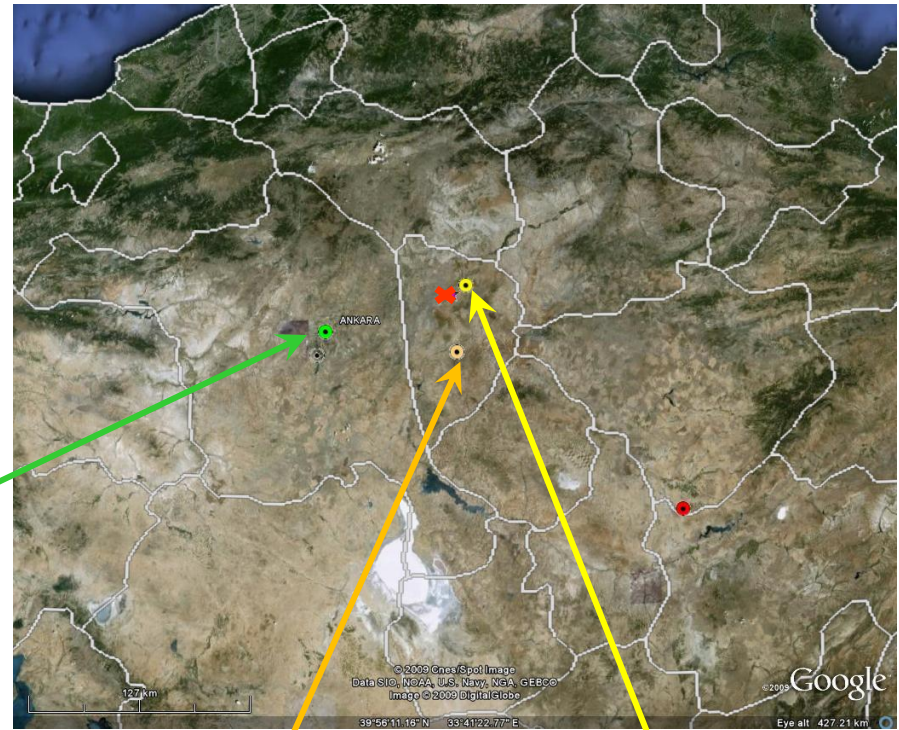
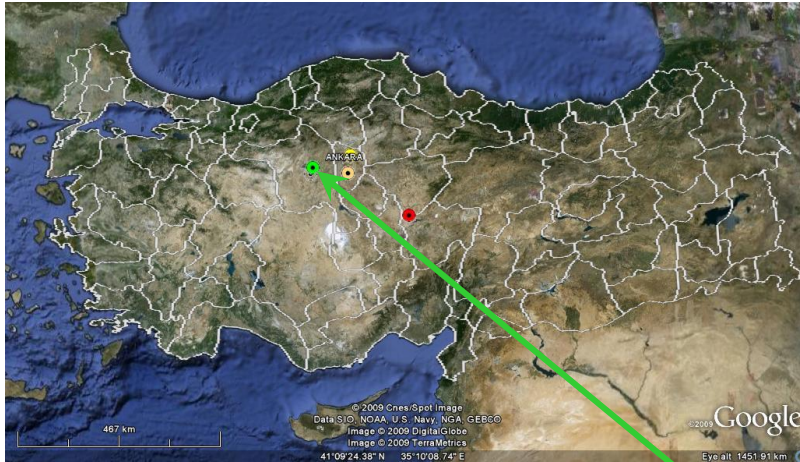
Why Policy level data?



- Why?
 - Ensures the most appropriate use of models for the nature of the portfolio
 - Allows for most appropriate application of insurance policy terms and conditions and reinsurance structures
 - Enables where applicable the use of additional tools (portfolio analysis, accumulation analysis, etc.)
 - Allows complete flexibility for all end-user requirements
 - e.g. can be summarised at aggregate level if that is a requirement
 - e.g. can produce CRESTA aggregates

- *“Whenever required data is not provided, assumptions will be made, explicitly or implicitly”*

Gecoding data

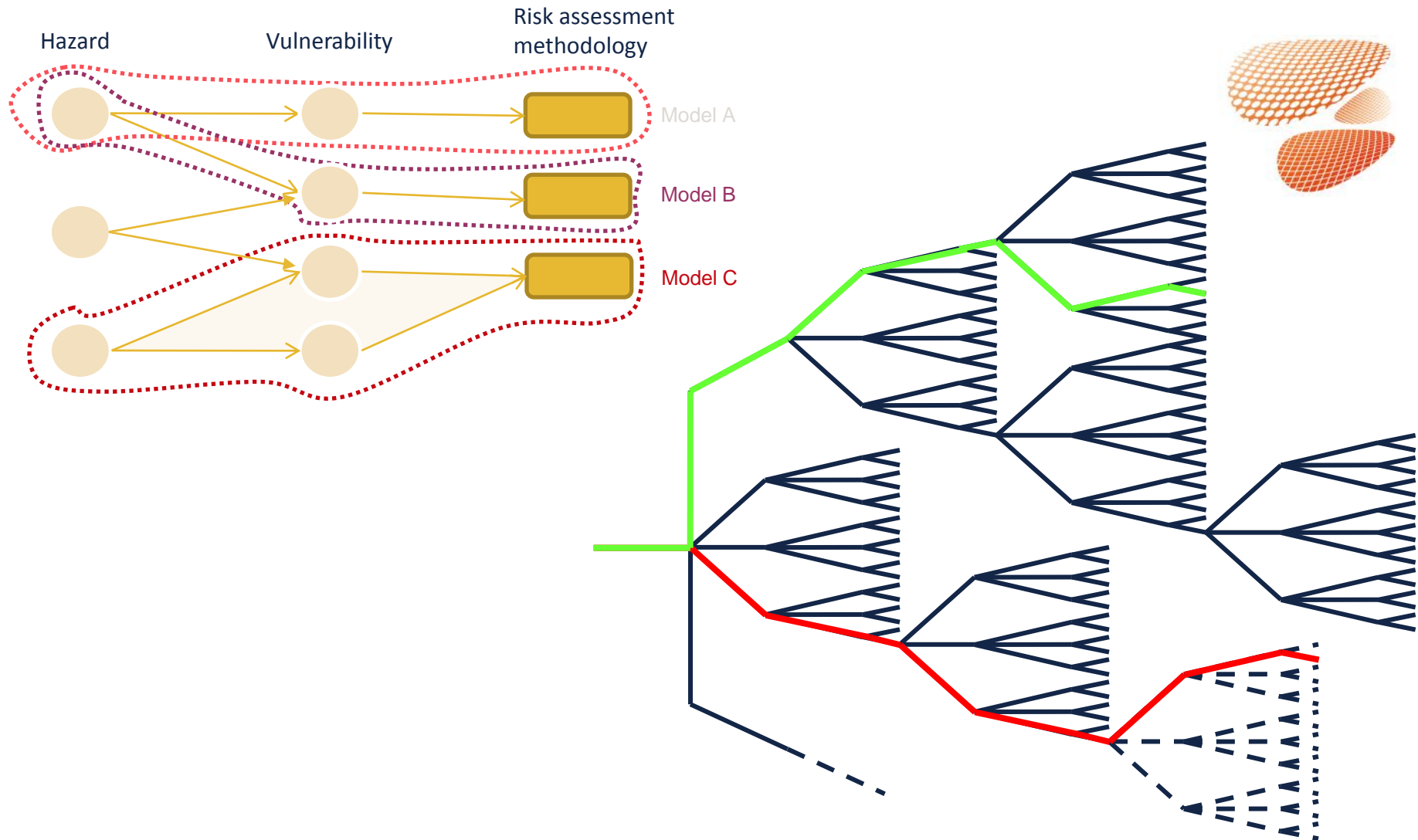


Cresta

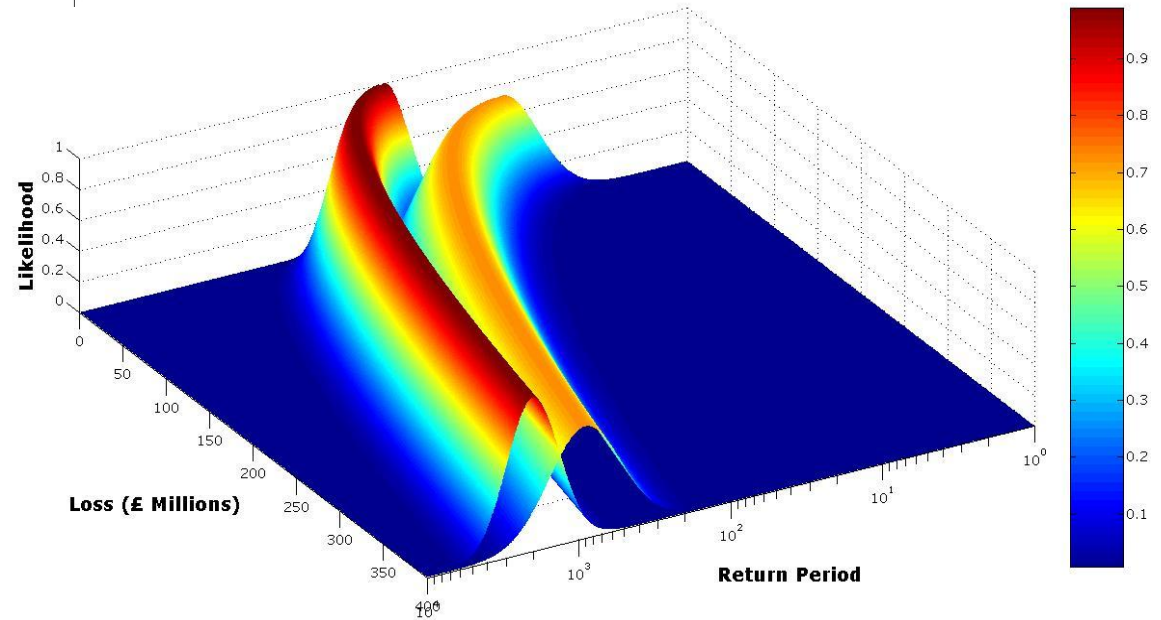
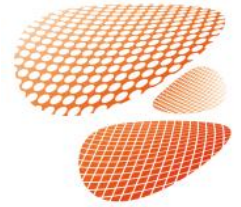
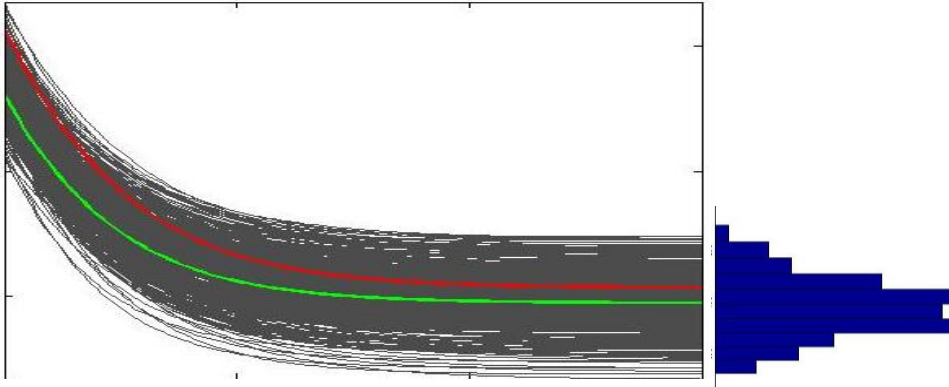
Subcresta

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Why modelled results are different?



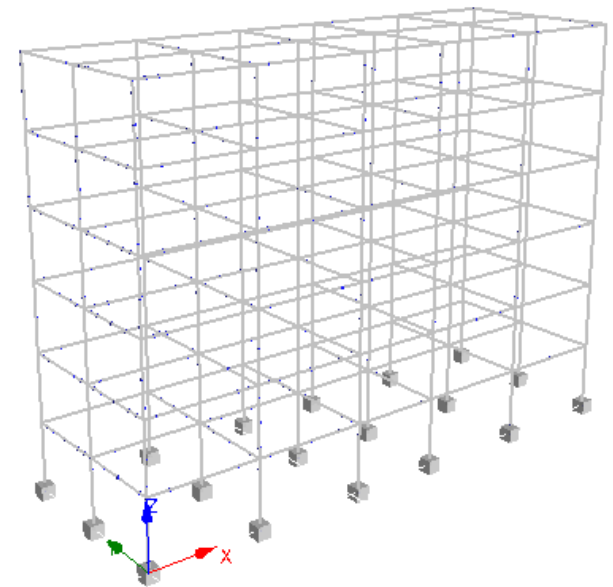
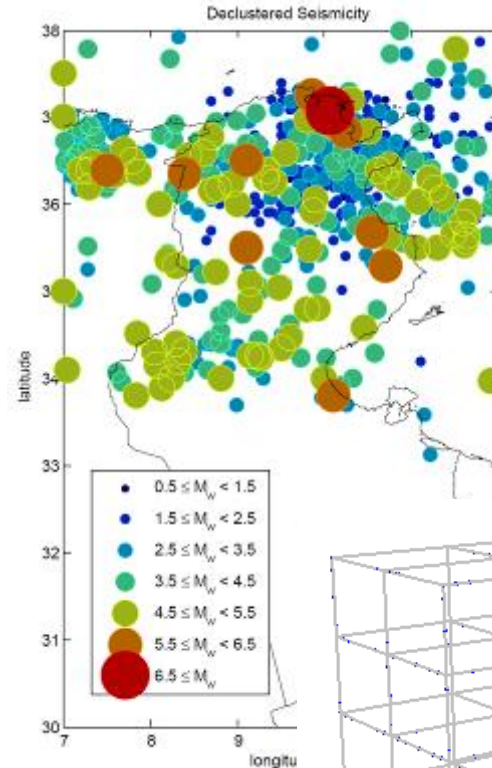
Hybrid modelling and uncertainty



Hybrid Earthquake model: Tunisian example

Tunisian earthquake project

- Direct comparison of the performance of alternative loss modelling approaches – analytical and empirical vulnerability methods
- Improved insight into the degree of uncertainty that is associated with earthquake loss estimates
- Develop a new modelling approach that encompasses and integrates various methodologies:
 - Seismic source identification
 - Quantification of seismic activity rates
 - Characterisation of local soil conditions
 - Application of empirical ground-motion models



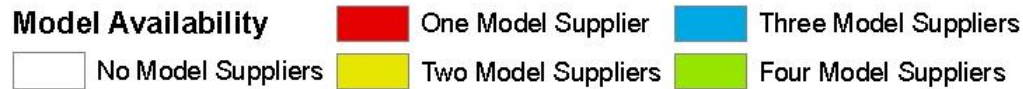
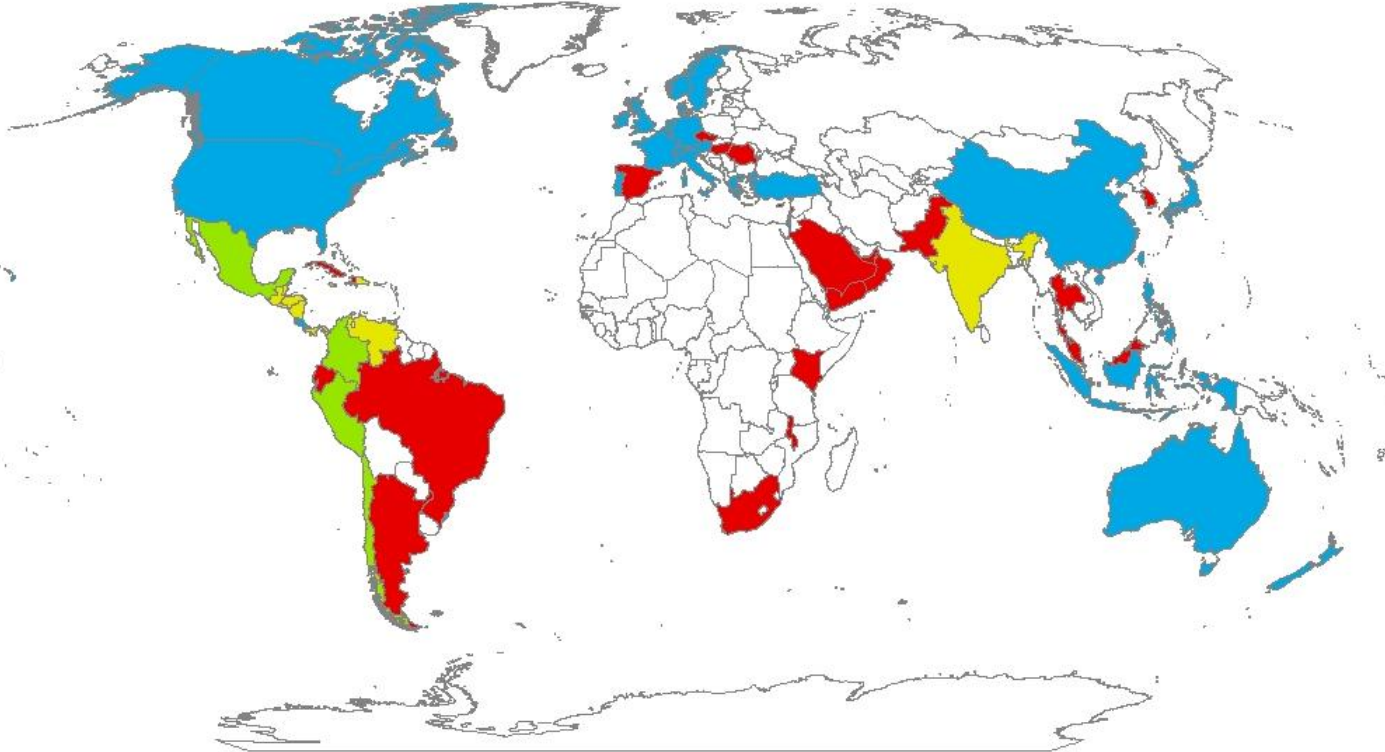
Imperial College
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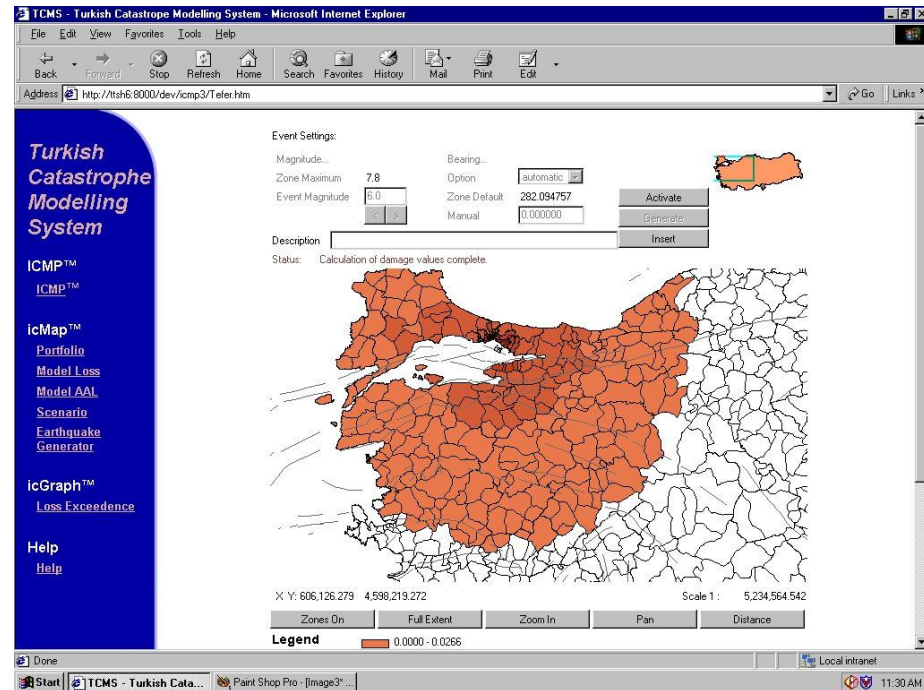
Catastrophe models – vendor coverage



Willis ICMP™ Turkey Earthquake model



- Turkish Emergency Flood and Earthquake Recovery project (TEFER) supported by the Turkish government and the World Bank
- The catastrophe risk modelling and establishment of an insurance pool were requirements of the World Bank, in order for emergency funds to be released after the Kocaeli earthquake in 1999
- The project was tendered according to strict World Bank rules, with a requirement for a very high “technical score”
- Willis Re was appointed in 2000 by the Turkish Government and the World Bank to create a new earthquake insurance model and design / reinsure a national pool (TCIP)
- Project concluded in 2001 and the software has been in constant use for TCIP and other clients ever since



Willis Research Network



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WRN Core Research Projects

- Developed in consultation with key industry constituencies - clients, reinsurers, Willis business units, vendor companies
- Tackling key global issues across themes:
 - Seismic
 - Climate and atmospheric
 - Flooding and hydrological
 - Statistical and geospatial
 - Vulnerability and exposure
 - Uncertainty
- Each project 'owned' by Analytics specialists – ensuring focus and relevance
- Publication encouraged and expected
- Outputs: research papers, academic articles, Willis seminars, client briefings
- Model development – research laboratories



WRN and GEM

- The GEM is a major €35 million programme organised under the auspices OECD Global Science Forum.
- To create an open, consistent earthquake risk model covering all countries world-wide incorporating the latest data and leading science.
- Funded by a combination of private sponsors (Munich Re, ZFS, AIR worldwide and Willis) and governments (Germany, Italy, Turkey, etc.)
- Willis is a member of governing board
- WRN scientist an integral part of GEM: Prof. R. Spence (Cambridge), Prof. C. Scawthorn in board of scientists, Dr R. Pinho (EU Centre) Secretary General
- Seat of GEM is EUCENTRE in Pavia a WRN partner
- Bogazici University has been cooperating with Willis since 2000 while developing the ICMP Turkey EQ model. Prof. Erdik leads the EMME initiative of GEM



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