REDUCTION OF ECONOMIC-FINANCIAL EXPOSURE OF THE STATE AND PROTECTION OF HUMAN LIVES

Model for the prevention and mitigation of damages to people and properties through an insurance coverage

PRESENTATION

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GNS Science - introduction

- Also known as the «Institute of Geological and Nuclear Sciences».
- A Crown Research Institute with ~360 staff.
- Providing research and consultancy in geological resources, environmental and industrial isotopes, and natural hazards.
- Applying scientific knowledge to create wealth, protect the environment, and improve the safety of people.

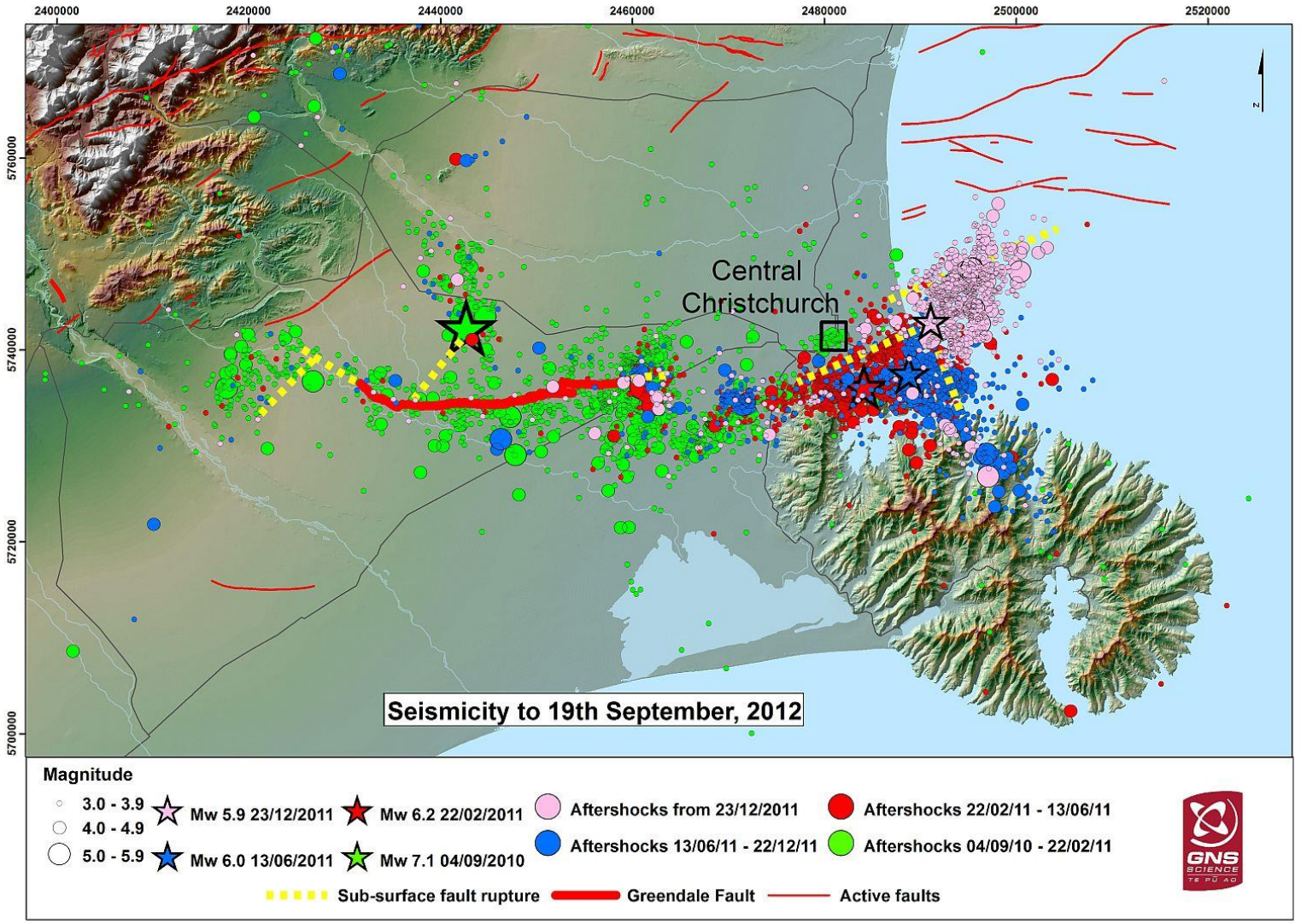
GNS Science - structure

- **Geological Resources Division** (Departments: Paleontology, Geothermal Science, Marine Geoscience, Petroleum Geoscience)
- **National Isotope Centre** (Hydrogeology, Ion beam technologies, Isotope Biogeoscience)
- **Natural Hazards Division** (GeoNet and Geohazards Monitoring, Tectonophysics, Volcanology, Regional Geology, Active Landscapes, Risk and Society)

My position and research specialty

- Geophysical statistician in the Tectonophysics Department of GNS Science
- Earthquake hazard modeller;
- Developer of long-term and time-dependent earthquake rate models.
- Participant in the Collaboratory for the Study of Earthquake Predictability (CSEP).
- Current research focus on methods for assembling different earthquake rate models and systematically collected earthquake-related data into hybrid earthquake rate models.

Lessons from Canterbury earthquakes



Lessons from Canterbury earthquakes

- We have incomplete knowledge our major earthquake sources.
- Aftershocks make an important contribution to seismic hazard.
- Economic losses are greatly increased when permanent ground deformation (e.g. land-slips, liquefaction) occurs.
- The NZ earthquake insurance system worked well in this major disaster. In this system a government owned insurance company, the Earthquake Commission (EQC), covers all dwellings up to a certain cap, with private insurers providing insurance over the cap.

CGIAM – INGV proposal – time dependent modelling

- The characteristic earthquake hypothesis is the basis of time-dependent modelling of earthquake recurrence on major faults., using the renewal process methodology.
- In this methodology, the earthquake probability is initially low following the occurrence of an earthquake, and slowly increases thereafter.
- Although in use for more than 30 years, the characteristic earthquake hypothesis is not strongly supported by observational data.
- Few fault segments have long historical or paleoseismic records of individually dated ruptures.
- When data and parameter uncertainties are allowed for, the form of the recurrence-distribution is difficult to establish.

CGIAM – INGV proposal – time dependent modelling

- A strong aspect of the proposal is the use of earthquake simulators to improve time dependent modelling.
- Advantages of simulators:
  - strongly physics-based ;
  - include interactions between major faults and the effects of minor earthquakes in redistributing stress;
  - provide long synthetic catalogues suitable for statistical analysis;
  - reveal patterns in earthquake occurrence , e.g., regularity (or not) of earthquake recurrence;
  - help estimation of uncertainties in the slip rates and recurrence-time distributions for real faults;
  - will supporting an elaboration of the renewal process methodology for estimating earthquake rates on faults,;
  - will provide insights into earthquake generation processes.