

Call for Applications for 3-yr PhD Scholarship on Dynamic Risk Modelling

University of Canterbury, Ōtautahi Christchurch, Aotearoa New Zealand



Damage to port facilities in Wellington during the 2016 Kaikōura earthquake. Understanding how quickly infrastructure can recover from similar events, and the implications for further earthquakes during the recovery is critical to inform disaster risk planning for earthquake sequences.

Ngā Ngaru Wakapuke: Building resilience to future earthquake sequences

Central Aotearoa-NZ marks the confluence of our largest earthquake factories, the Hikurangi Subduction Zone and Alpine Fault; and is characterised by a complex zone of faulting and earthquake dynamics termed the Transition Zone. We currently lack sufficient understanding of Transition Zone earthquake behaviour to accurately forecast the hazard posed by future large (>M7) earthquake sequences and our approaches to Disaster Risk Reduction are insufficient to mitigate the major economic, societal, and environmental consequences for Aotearoa-NZ posed by them.

The ability to accurately forecast and build societal resilience to large earthquake sequences is hindered by existing DRR initiatives, which have focused on single earthquake scenarios, meaning resilience, response and recovery planning fails to account for the compounding consequences of temporally clustered large earthquakes separated by years to decades. The current generation of models quantifying Aotearoa-NZ's exposure to seismic hazard and risk assess earthquake likelihoods and impacts using relatively simplistic methods that cannot easily capture the time-dependence of large earthquake sequences and their compounding consequences.

As part of the Ngā Ngaru Wakapuke research programme, this Ph.D. project aims to develop new approaches to model dynamic risk to people and critical infrastructure by advancing current static approaches to risk and loss modelling. The project will involve modelling of casualties and infrastructure damage states accounting for fragility through time, interdependencies, and phased restoration. It will generate datasets that feed into household and economic impact models, and will use earthquake sequence scenarios developed elsewhere in the research project. Key research topics that will be explored include:

- How does infrastructure vulnerability to earthquakes change through time?
- What effect does the timing of an earthquake have on the damage and losses?
- Can our infrastructure recover quickly enough during a major earthquake sequence?

The project will be based in Christchurch, New Zealand, in the School of Earth and Environment | Te Kura Aronukurangi at the University of Canterbury, with the opportunity to spend time at GNS Science

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Te Kura Aronukurangi

in Wellington and University of Auckland. The Scholarship funding includes Tuition and Enrolment fees and a competitive annual stipend of NZ\$35,000 for 3 yrs. For International Students, health insurance will be included. The project is part of a wider NZ-funded programme led by Victoria University of Wellington.

Eligibility:

The scholarship supports study towards a PhD in Disaster Risk Reduction. The successful candidate must have an Honours or Master's degree (with a Research Thesis component) in a relevant subject such as Disaster Risk, Physical Geography, Engineering, or Geology with a strong background in risk modelling. A good grasp of Geospatial analyses, including GIS skills are necessary. Experience in statistical/computational/modelling processes is an advantage, but not a requirement.

The scholarship is open to domestic and international candidates, and international candidates moving to New Zealand pay domestic tuition fees. The successful candidate will be enrolled full-time at the University of Canterbury and reside full-time in New Zealand for the duration of the PhD project. Candidates must meet [the PhD eligibility criteria](#) for enrolling at University of Canterbury.

How to apply:

Interested candidates should apply via email with the subject line “*Dynamic Risk Modelling PhD Application*” to Dr Tom Robinson thomas.robinson@canterbury.ac.nz. Applications should include:

1. A Curriculum Vitae (including publication list, if any)
2. Academic transcript(s)
3. A 1-page cover letter outlining your motivation, experience and interest in the topic

Timetable:

- PhD Commencement on or before **1 April 2025**

About Ngā Ngaru Wakapuke Project:

This PhD will be part of a broader five-year project funded through the MBIE Endeavor Research Programme, titled, “Ngā Ngaru Wakapuke: Building resilience to future earthquake sequences”. This research programme seeks to plan for, invest smartly, and reduce our risk from earthquake sequences in central New Zealand. This project aims to, for the first-time, focus on how seismic hazard, risk, and socio-economic consequences play out through time (over 50 years).

The research involves a large team of interdisciplinary researchers from across New Zealand and internationally, including Victoria University of Wellington (lead organisation), University of Otago, University of Auckland, and GNS Science. The wider project includes multiple PhD projects and the successful candidate will be part of a wider Early Career network with opportunities to engage with the wider research team and develop their research networks in New Zealand and globally.