

# Te Kura Kairūri School of Surveying Lunchtime Seminar Series

## Understanding Tectonic Vertical Land Motions for Relative Sea-Level Changes in Southeast Asia: Through Geodetic Observations and Earthquake Models

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Regional sea-level changes in Southeast Asia are highly variable due to the influence of both climate and solid Earth processes. In particular, vertical land motions (VLM) due to tectonics are a major source of local spatial variability and uncertainty owing to recent earthquake history and mantle dynamics at regional subduction zones. Over the last two decades, the Sumatran subduction zone hosted a series of large earthquakes, starting with the 2004 Mw 9.2 Sumatra-Andaman earthquake. These large earthquakes not only rapidly changed land heights by several meters near the earthquake locations but also induced longer-term changes in the distant back-arc regions through broadscale mantle processes. At some locations, the tectonic VLM changes can be comparable to or greater than climate-induced sea-level changes. Thus, to generate accurate and robust regional sea-level projection models for coastal risk assessment and adaptation planning, it is imperative to quantify the contribution of tectonic VLM. In this talk, we explore a new technique to derive VLM from satellite altimetry and tide gauge data to supplement GNSS observations that are often limited by spatial and temporal availability in our region. We will also examine the challenges faced when modelling the postseismic viscoelastic process controlled by the mantle rheological structure to better capture the effects of VLM on regions far from the trench. From our results, many Southeast Asian countries – including Thailand, Peninsula Malaysia, and Singapore – are vulnerable to postseismic subsidence following the Sumatran earthquakes. The broad subsidence can last for years or even decades. Though some of these countries are far from the trench and the rate of subsidence is low, the total cumulative subsidence over many years is non-negligible and adds to the climate-induced relative sea-level rise.

**Thursday 6 April 2023 (12pm – 1pm)**

L1 Lecture Theatre | School of Surveying, 310 Castle Street  
OR join remotely: <https://zoom.us/join> (ID: 329 427 2033, P/W: 310310)