Ground motion simulations for Hauraki Rift earthquakes

Jeremy Riffault

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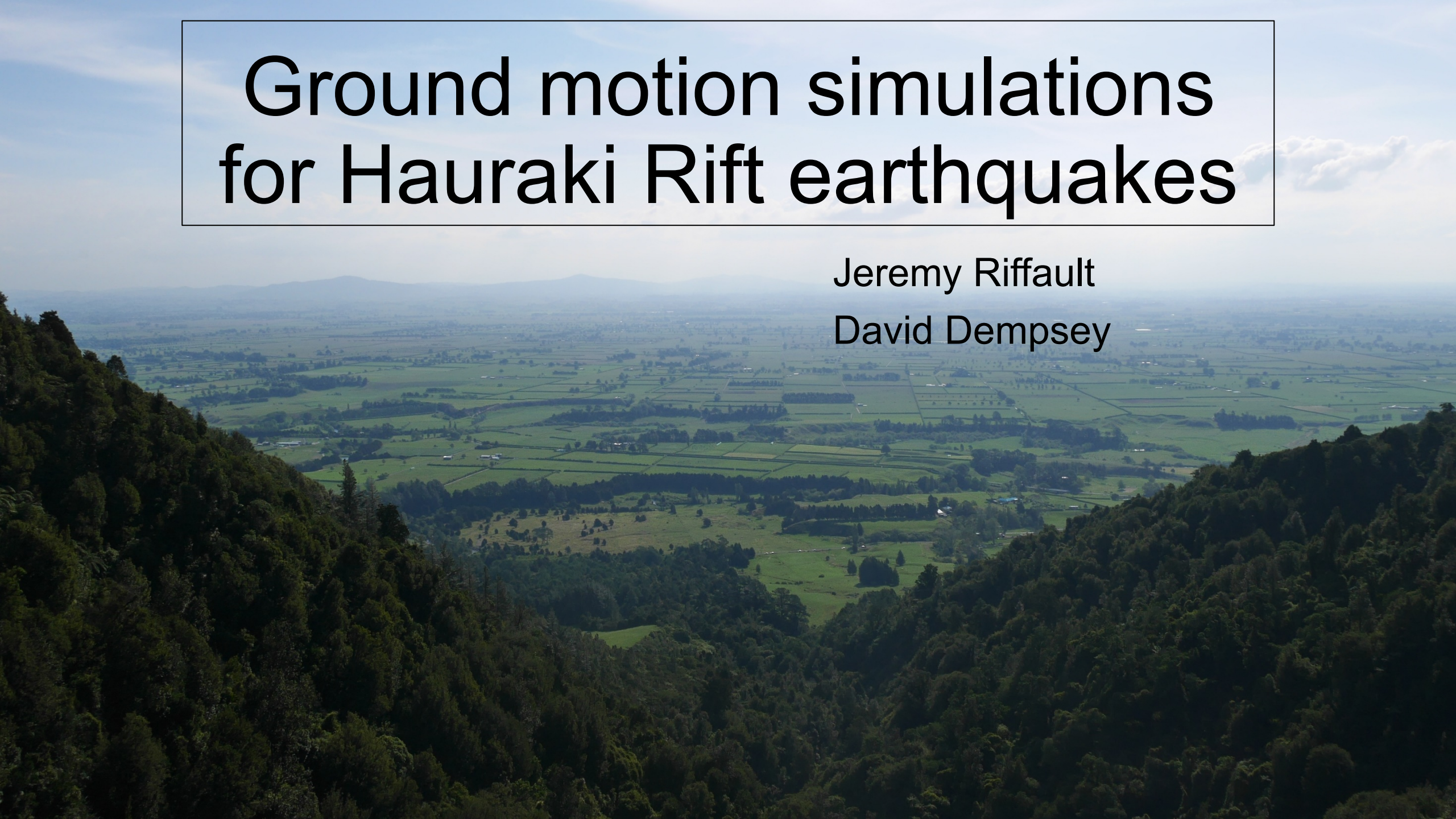
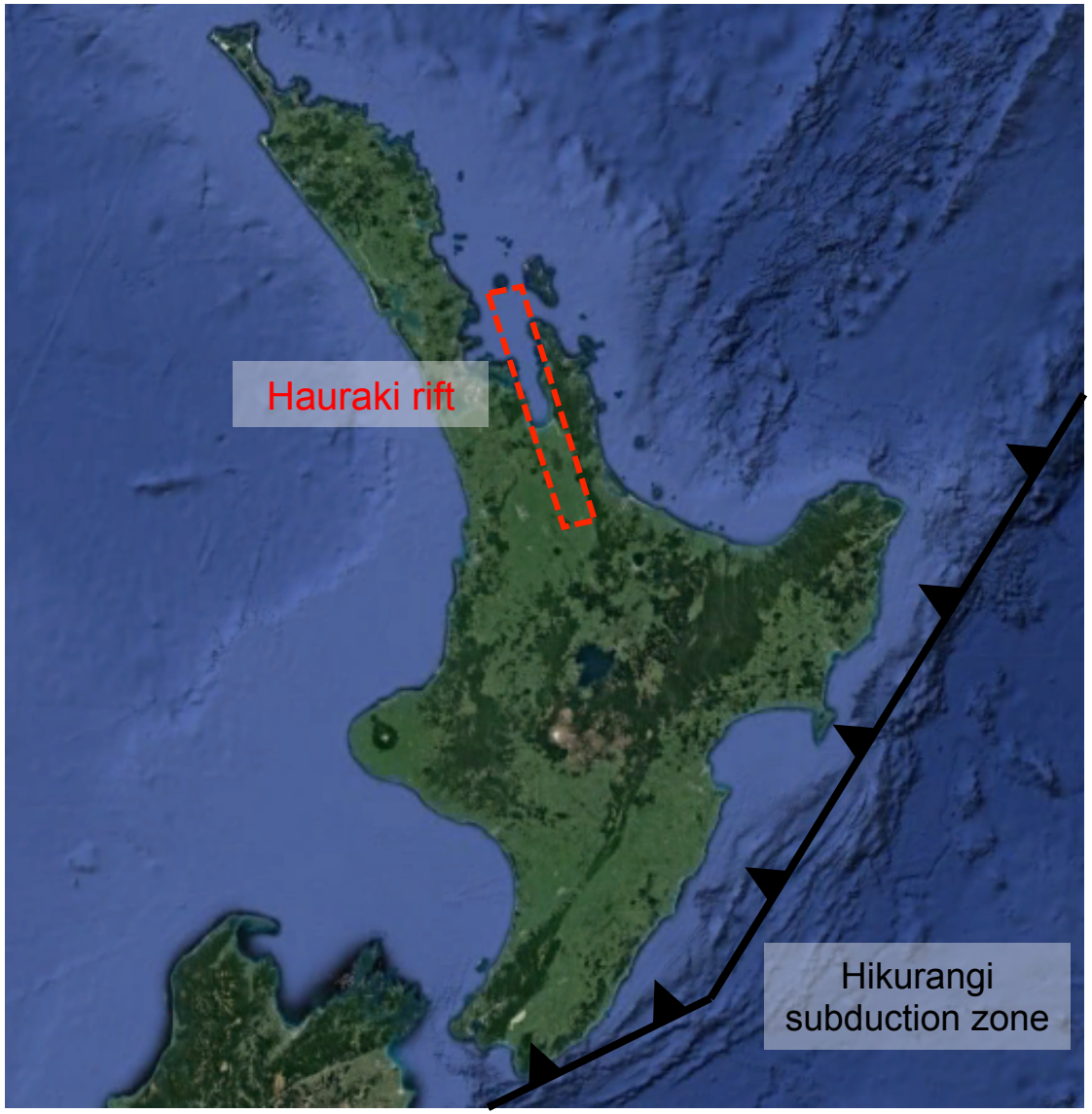


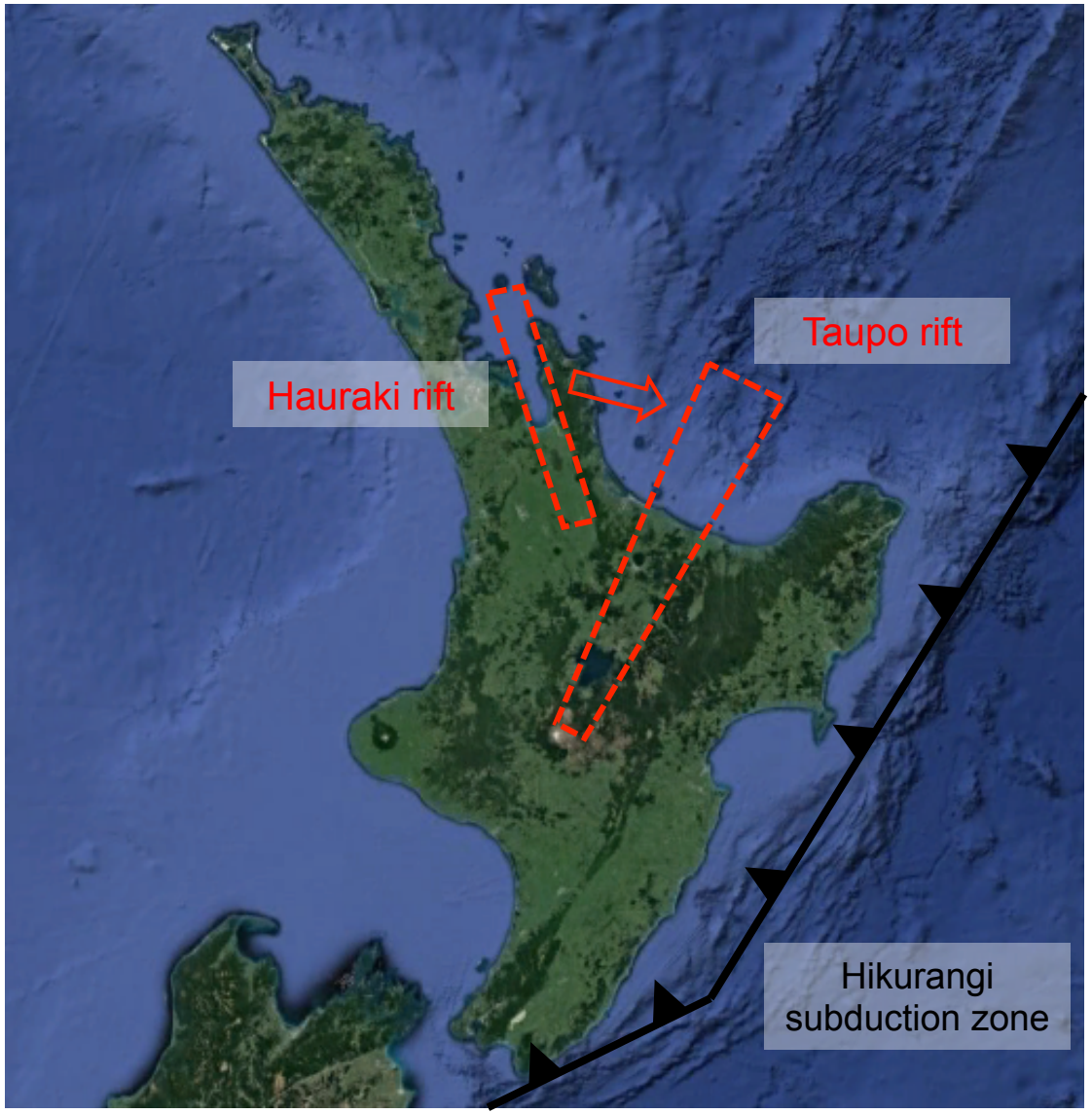
Hauraki rift presentation

- Depression + bay
- Back-arc continental rift
- Started -5 Ma



Hauraki rift presentation

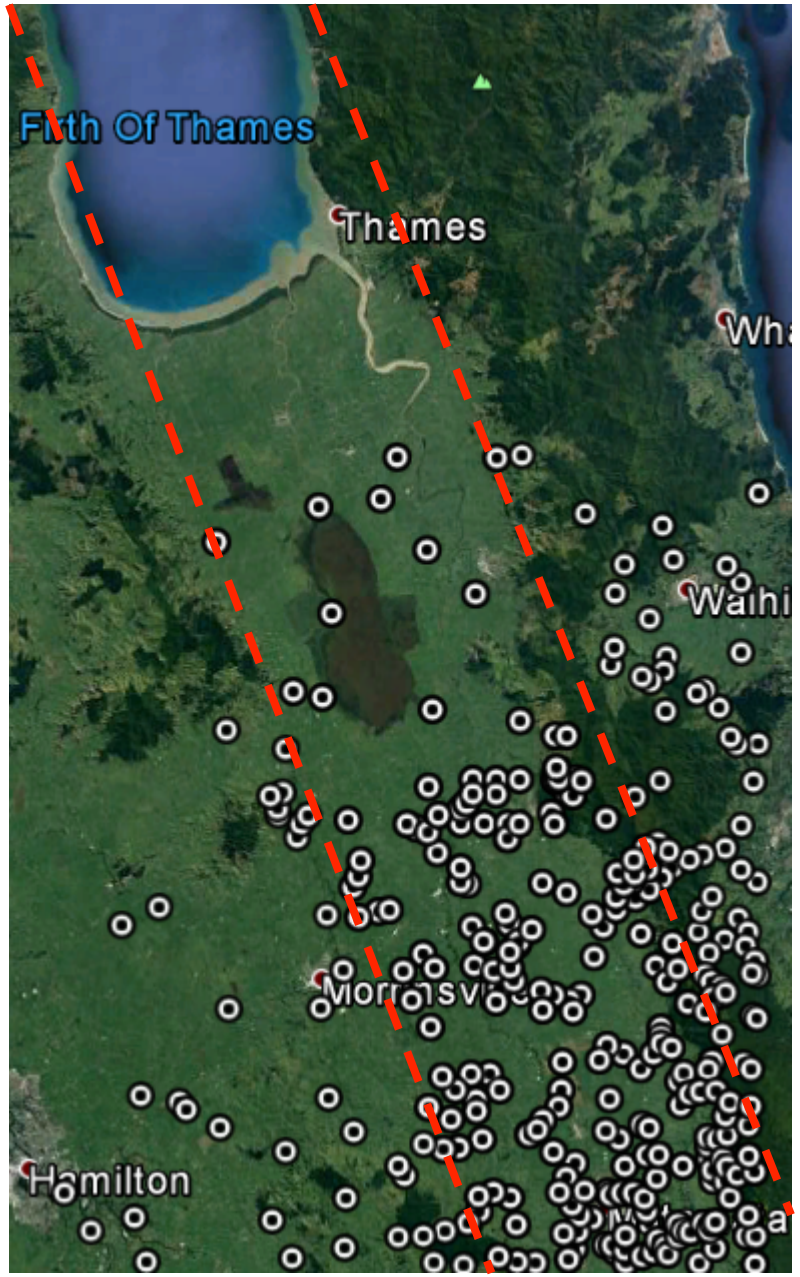
- Depression + bay
- Back-arc continental rift
- Started -5 Ma
- Main activity shifted to TVZ 2 to 3 Ma



Hauraki rift presentation

Still active:

➢Shallow seismic activity (<12 km)

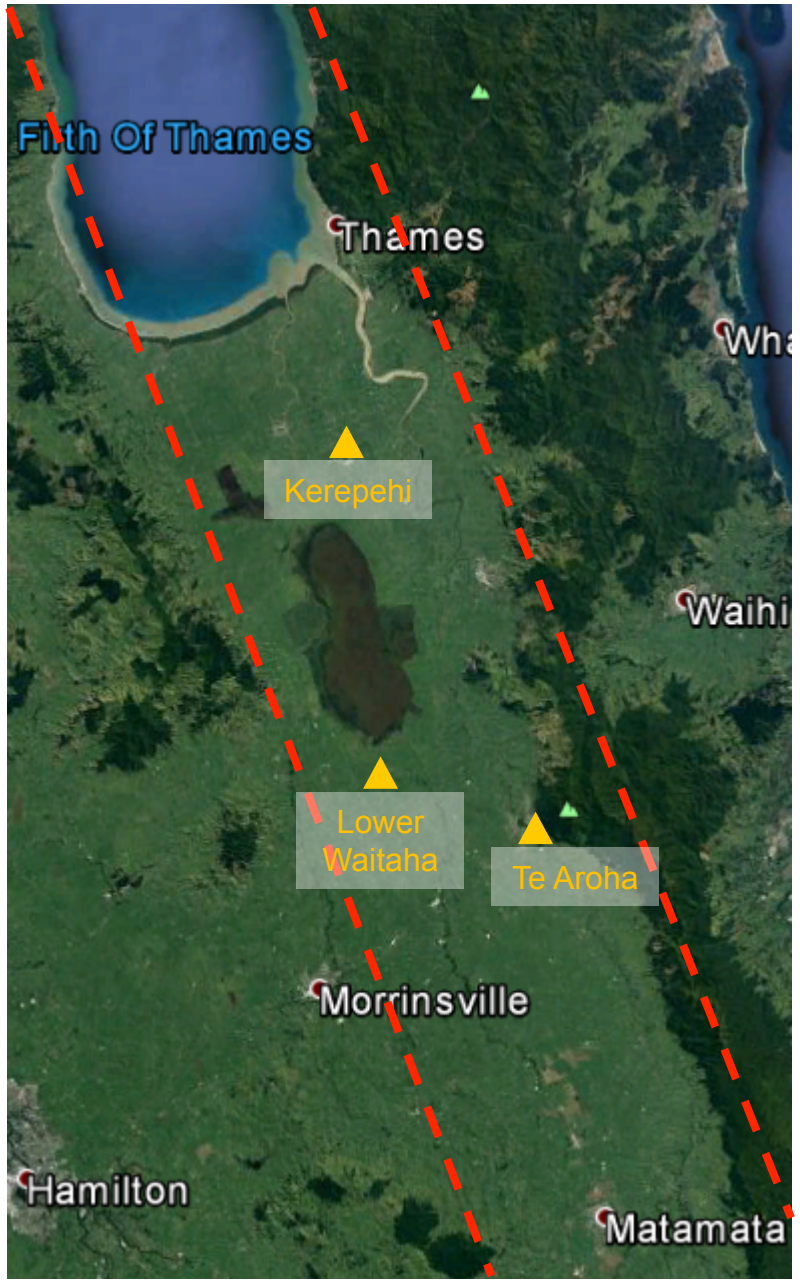


Hauraki rift presentation

Still active:

- Shallow seismic activity (<12 km)
- Numerous hot springs

Chemistry indicates high temperature (250-300°C) at depths less than 5 km



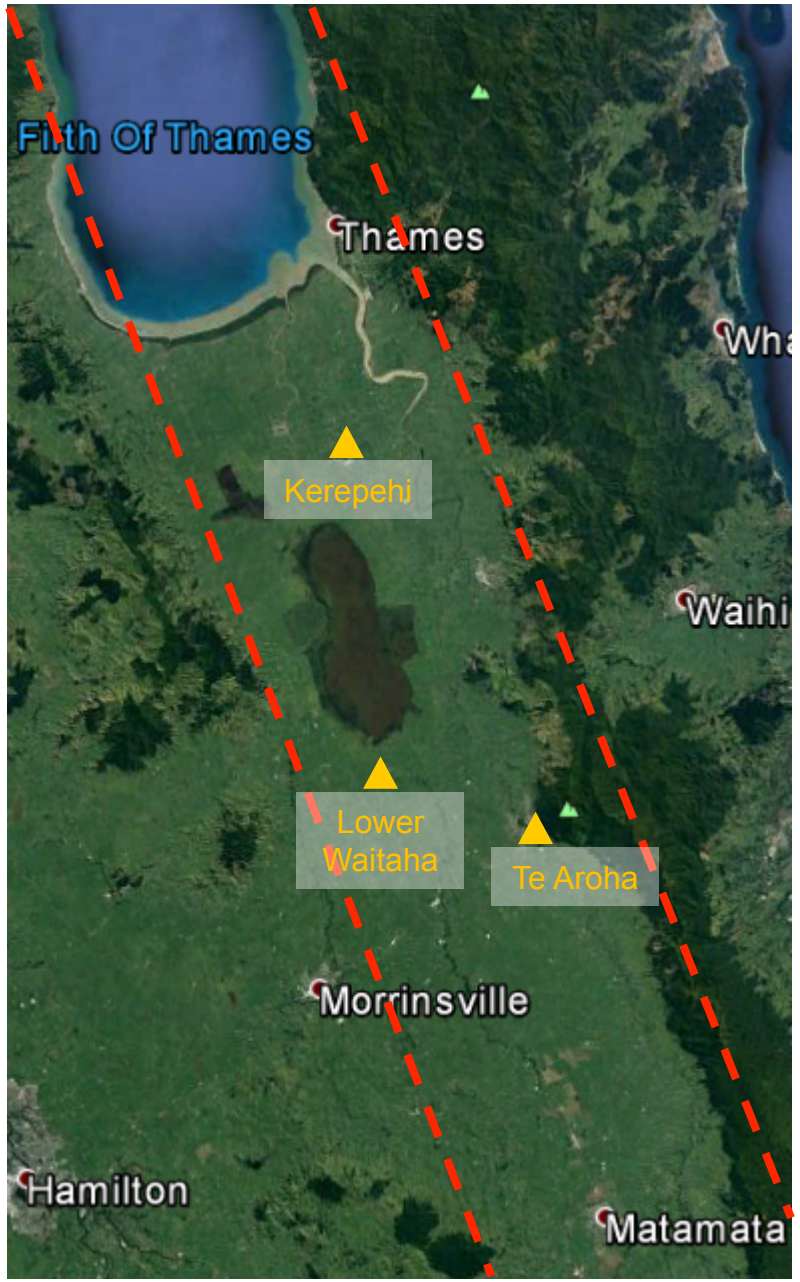
Hauraki rift presentation

Still active:

- Shallow seismic activity (<12 km)
- Numerous hot springs

Chemistry indicates high temperature (250-300°C) at depths less than 5 km

- Subsidence at 1.5 mm/year

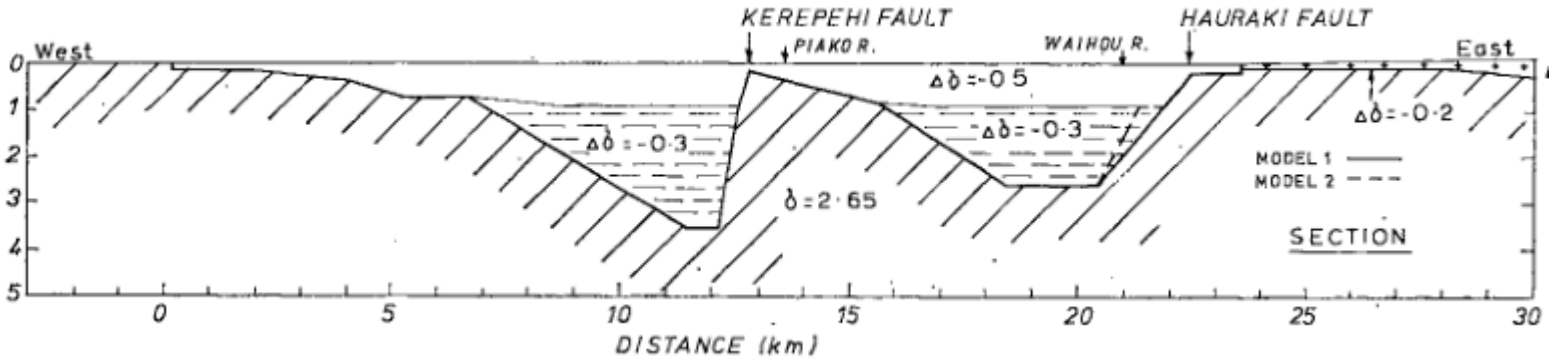


Hauraki rift presentation

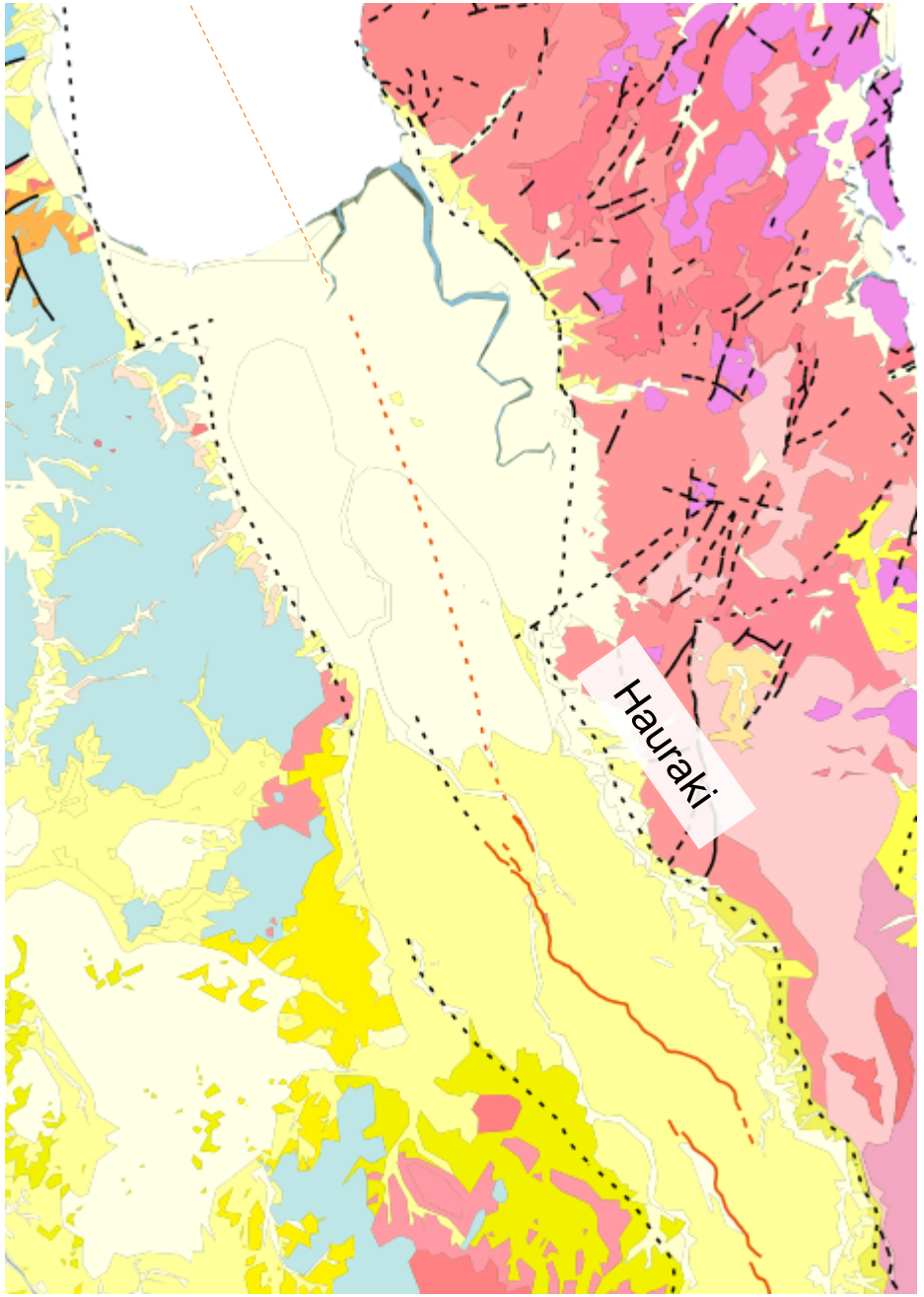
2 main normal faults

- Hauraki, inactive

Wairere falls



Hochstein and Nixon (1979)

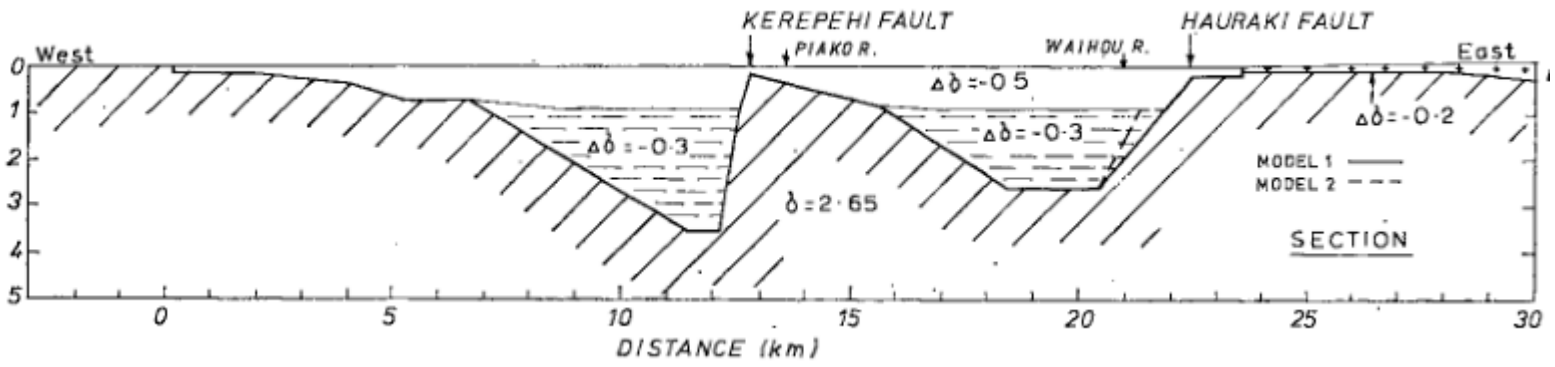


Hauraki rift presentation

2 main normal faults

- Hauraki, inactive
- Kerepehi, active in southern part, hidden by sediments

6 land segments, 4 offshore



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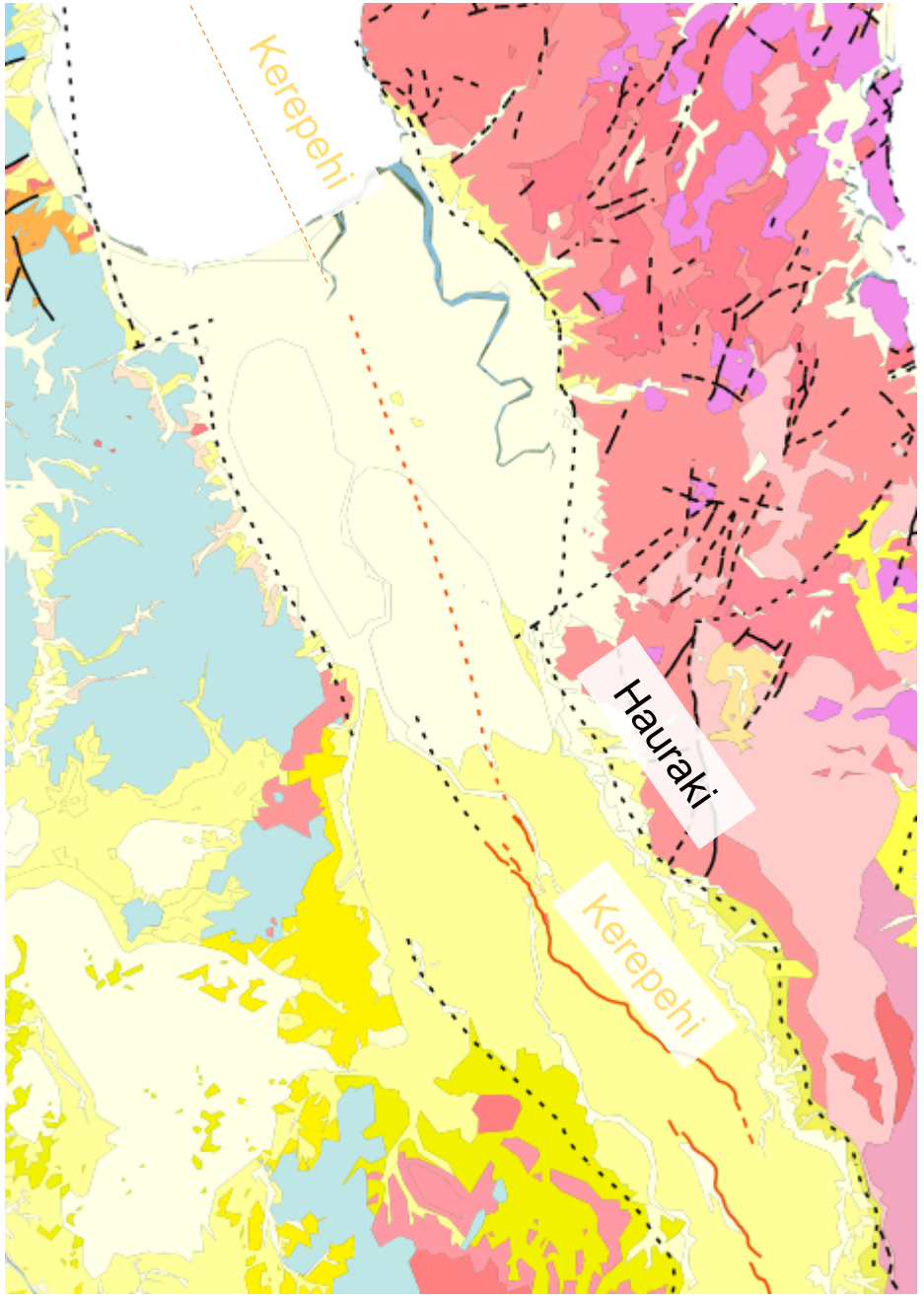
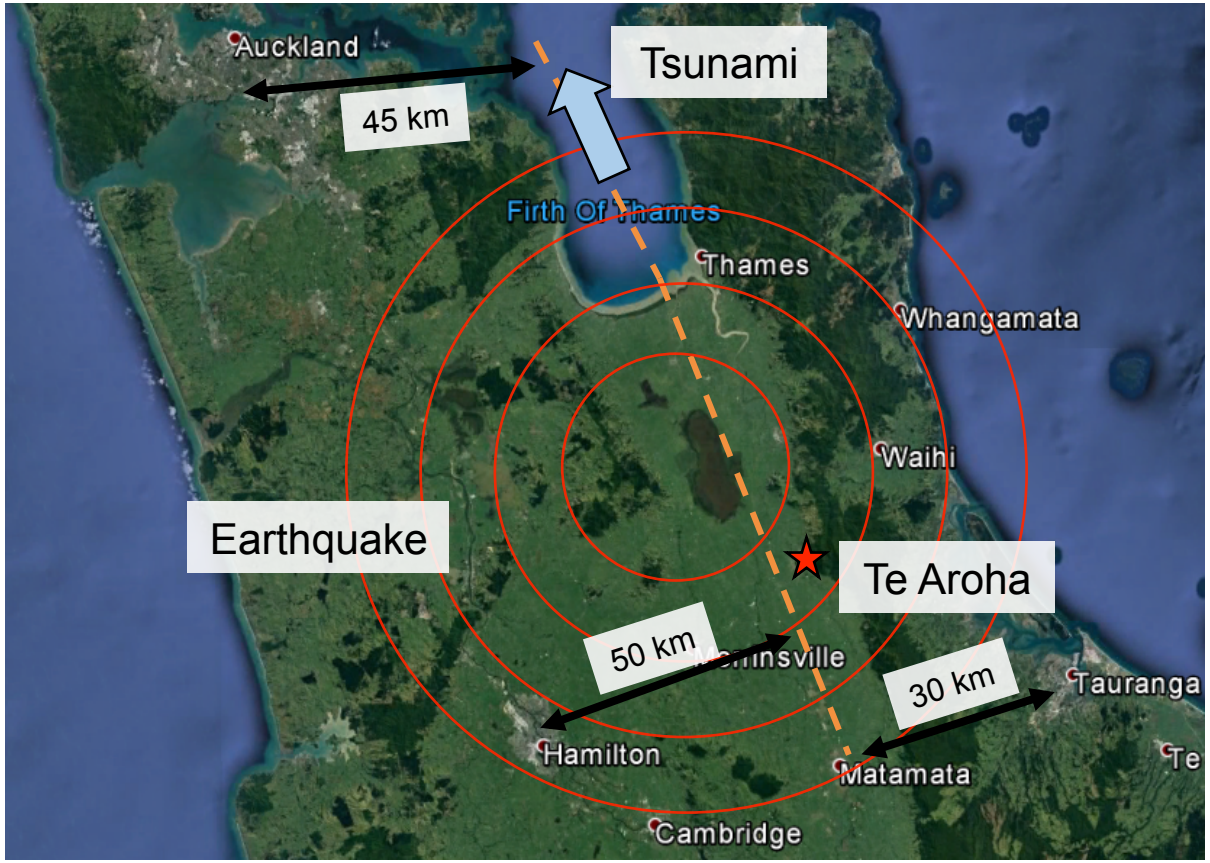


Hauraki rift hazards

- Strongest event recorded: Te Aroha, M_w 5.2, 1972
- Maximum possible magnitude: 7.4 (Persaud et al., 2014).
- Average recurrence time: 1000 years.
- Setting similar to Edgecumbe EQ (normal fault), 1987 , M_w 6.5, extensive damage in a less populated area.
- 40% of NZ population within 50 km of Kerepehi fault
- Tsunami hazard exists in Firth of Thames (Chick et al., 2001)



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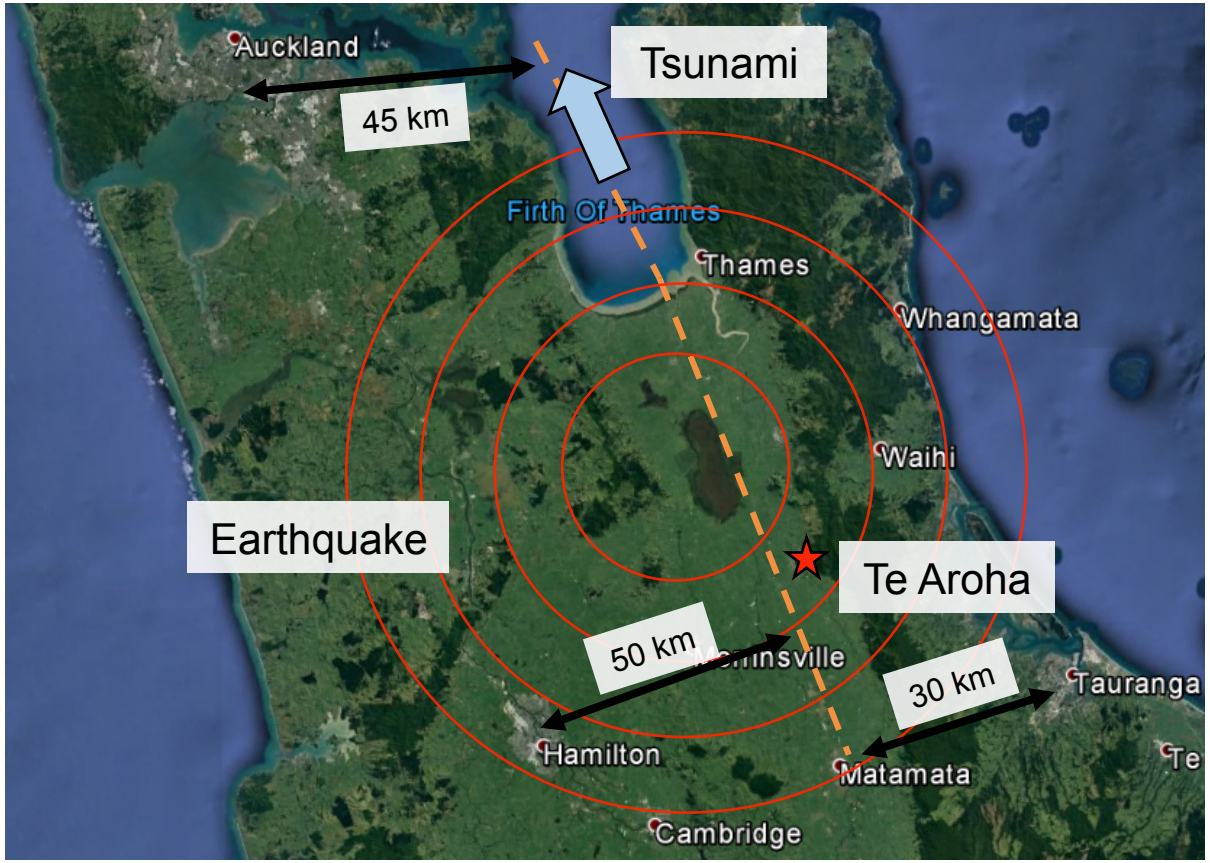
Ground motion simulation can help to estimate the risks to the different population centers

A calibrated model is thus needed



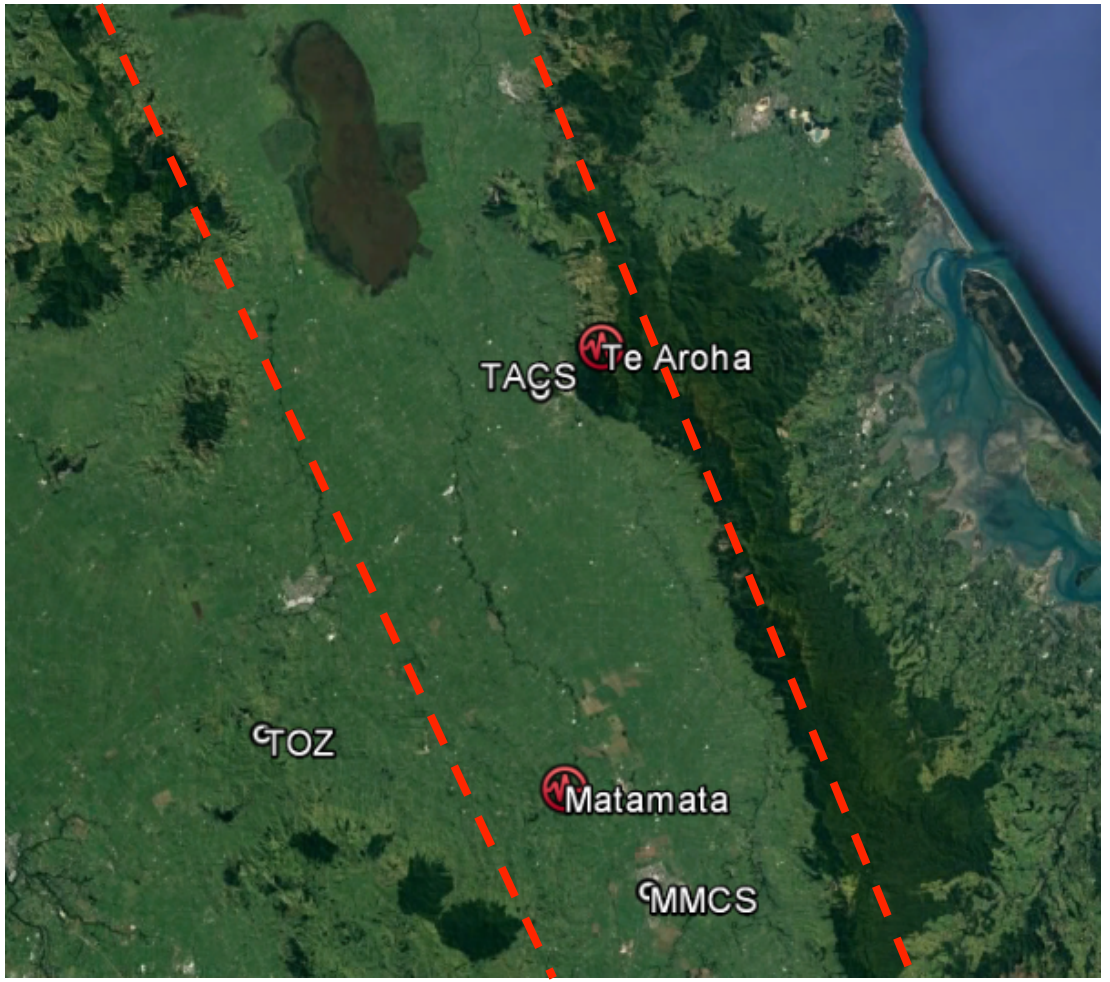
Ground motion model calibration

2 historical events:

Te Aroha, 08/07/2005, M_w 3.9, depth 6 km

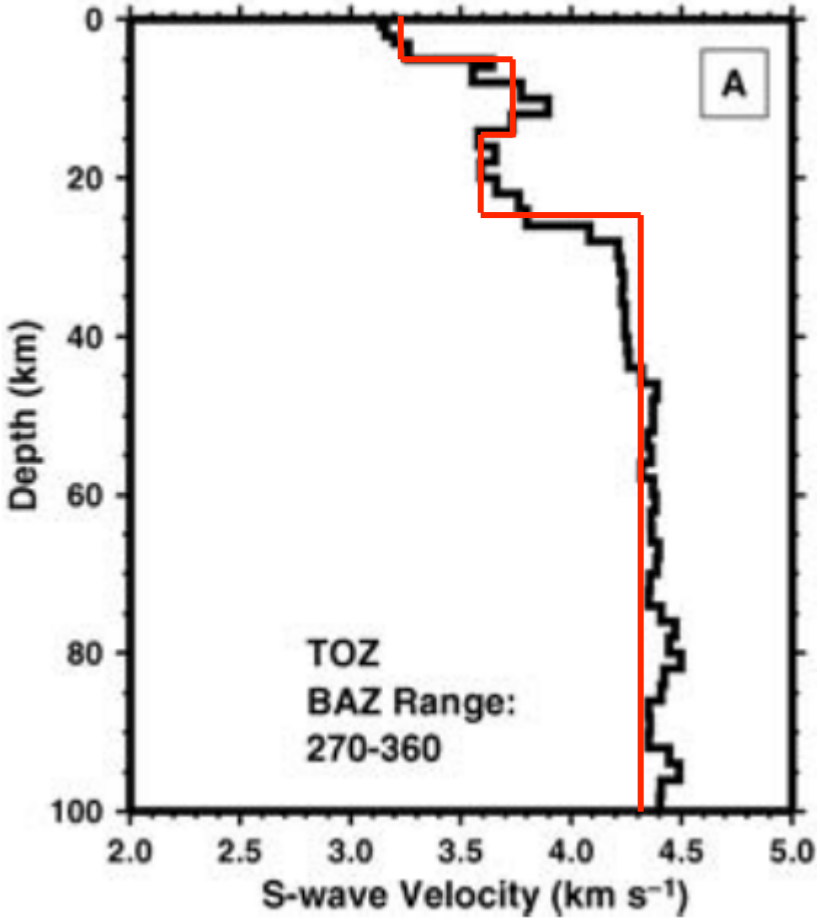
Matamata, 05/11/2014, M_w 3.6, depth 7 km

Strong motion acceleration recorded at MMCS at TACS Geonet stations



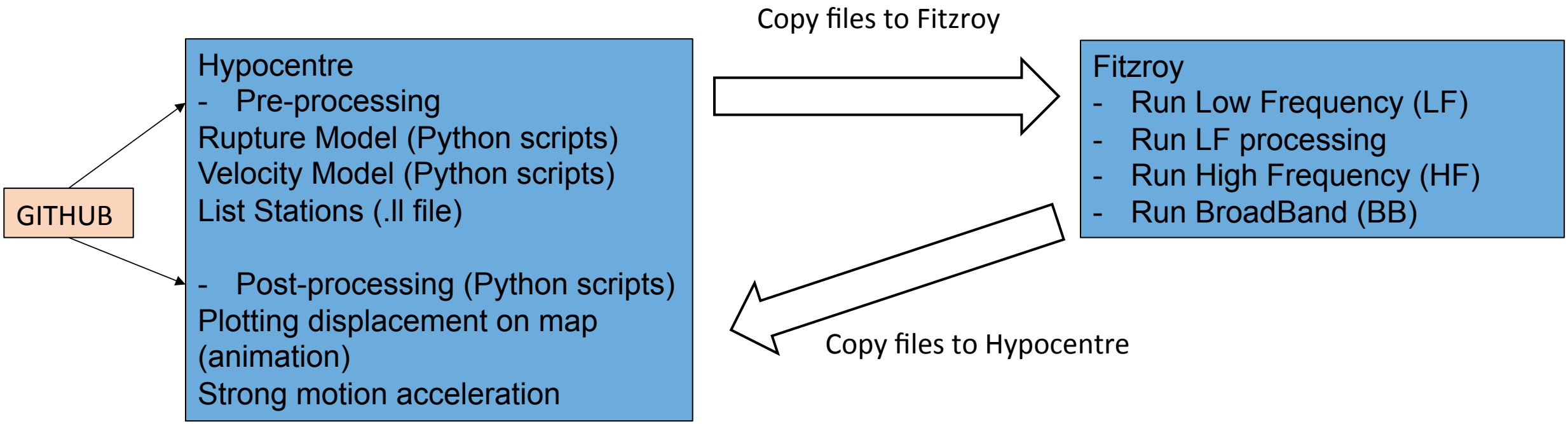
Ground motion model calibration

- 1D initial velocity model (Horspool et al., 2006)
- Constructed using distant strong events for several stations in North West North Island, including TOZ.
- Concluded to the presence of LVZ (Low Velocity Zone) in this area



Horspool et al. (2006)

QuakeCore learning



QuakeCore learning

- ❑ Access to Hypocentre computer from Auckland
- ❑ Full access to Fitzroy
- ✓ 1D Velocity model for LF
- ❑ Strong motion acceleration output

Objectives

- Run QuakeCore model without assistance from Auckland
- Streamline the submission process to Fitzroy for calibration
- Apply automated calibration tools