Ngā Ngaru Wakapuke

Ngā Ngaru Wakapuke:

Building resilience to future earthquake sequences

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Victoria University of Wellington Te Herenga Waka | The University of Auckland New Zealand | Earth Sciences New Zealand | Te Kunenga ki Purehuroa Massey University | UC University of Canterbury Te Whare Wānanga o Waitaha Christchurch New Zealand | University of Otago Te Whare Wānanga o Otāgo New Zealand | m.e market economics research & consulting

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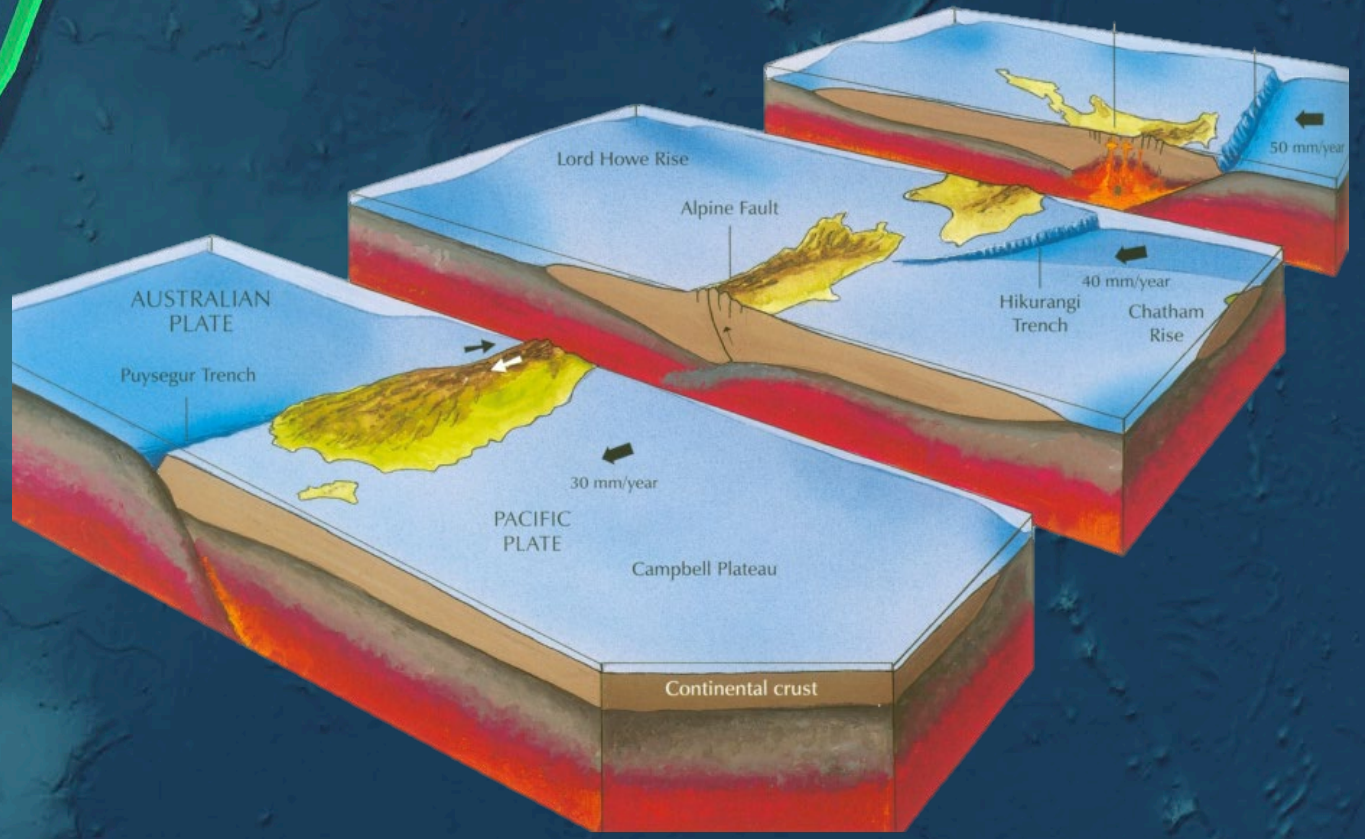

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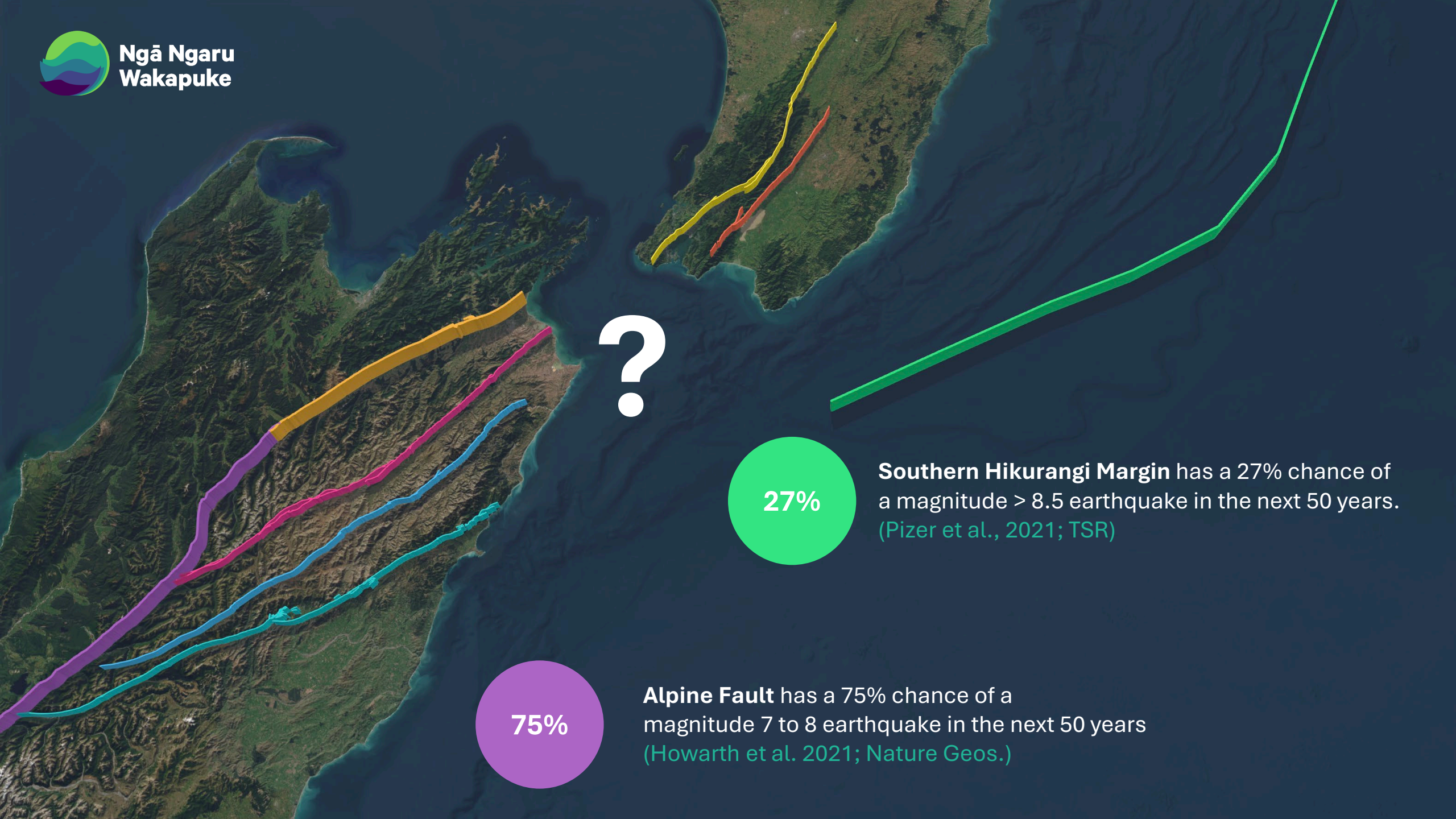
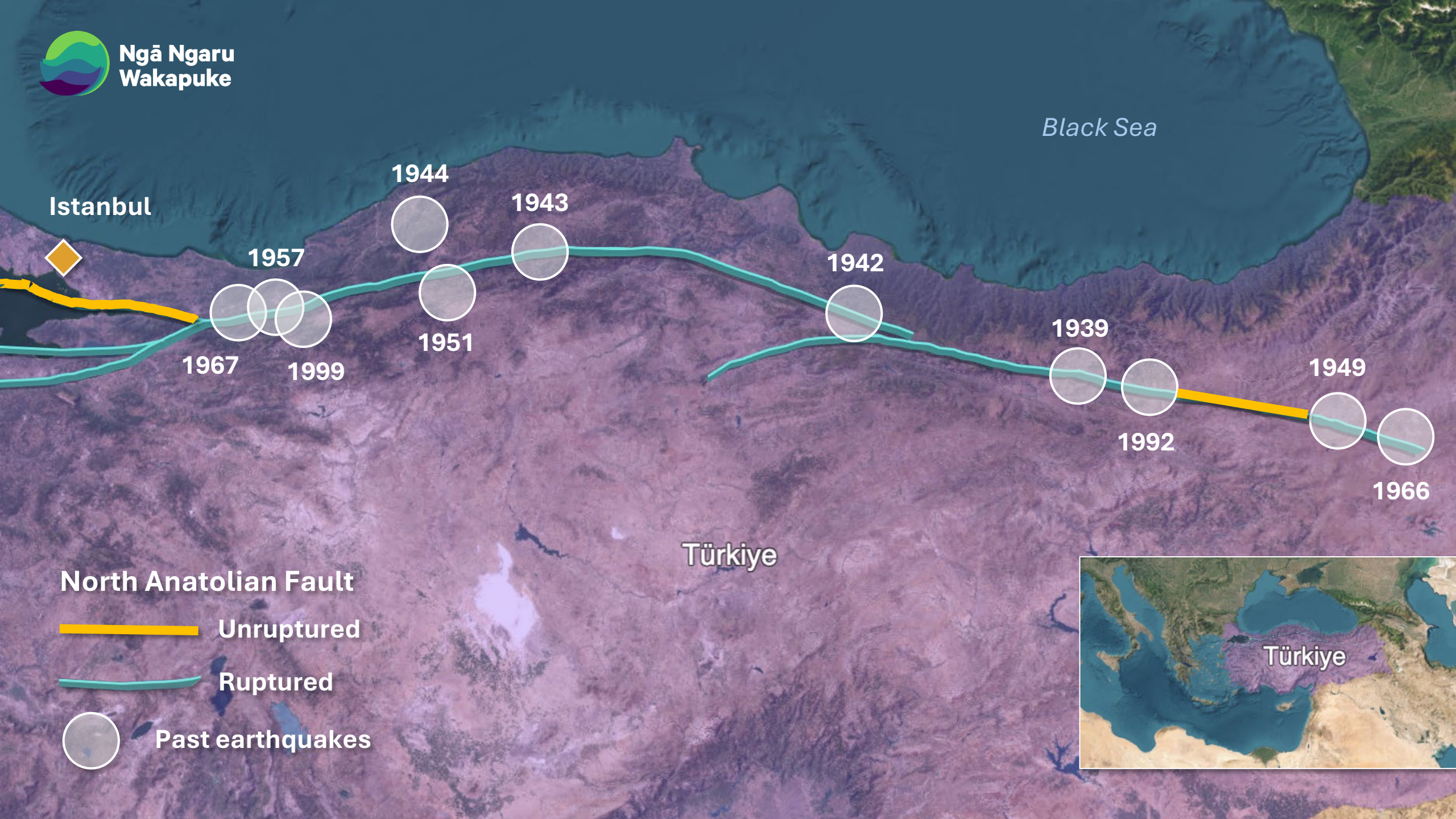


27%

Southern Hikurangi Margin has a 27% chance of a magnitude > 8.5 earthquake in the next 50 years.
(Pizer et al., 2021; TSR)

75%

Alpine Fault has a 75% chance of a magnitude 7 to 8 earthquake in the next 50 years
(Howarth et al. 2021; Nature Geos.)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Black Sea
Istanbul
1944
1943
1957
1942
1939
1951
1967
1999
1992
1949
1966
Türkiye
North Anatolian Fault
Unruptured
Ruptured
Past earthquakes
Türkiye

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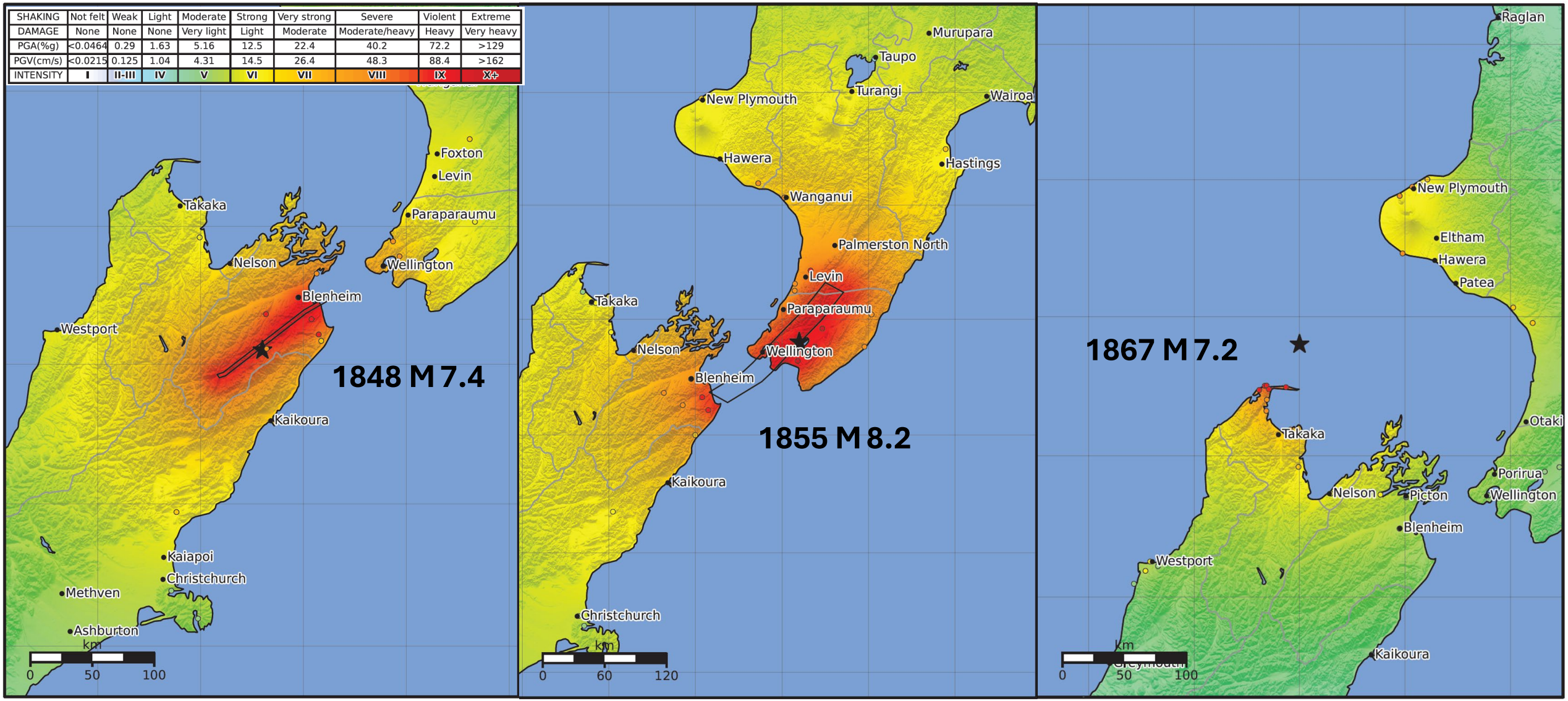
Earthquake sequences and our transition zone



Geonet Shaking Layers Tool: https://www.geonet.org.nz/earthquake/felt/2177819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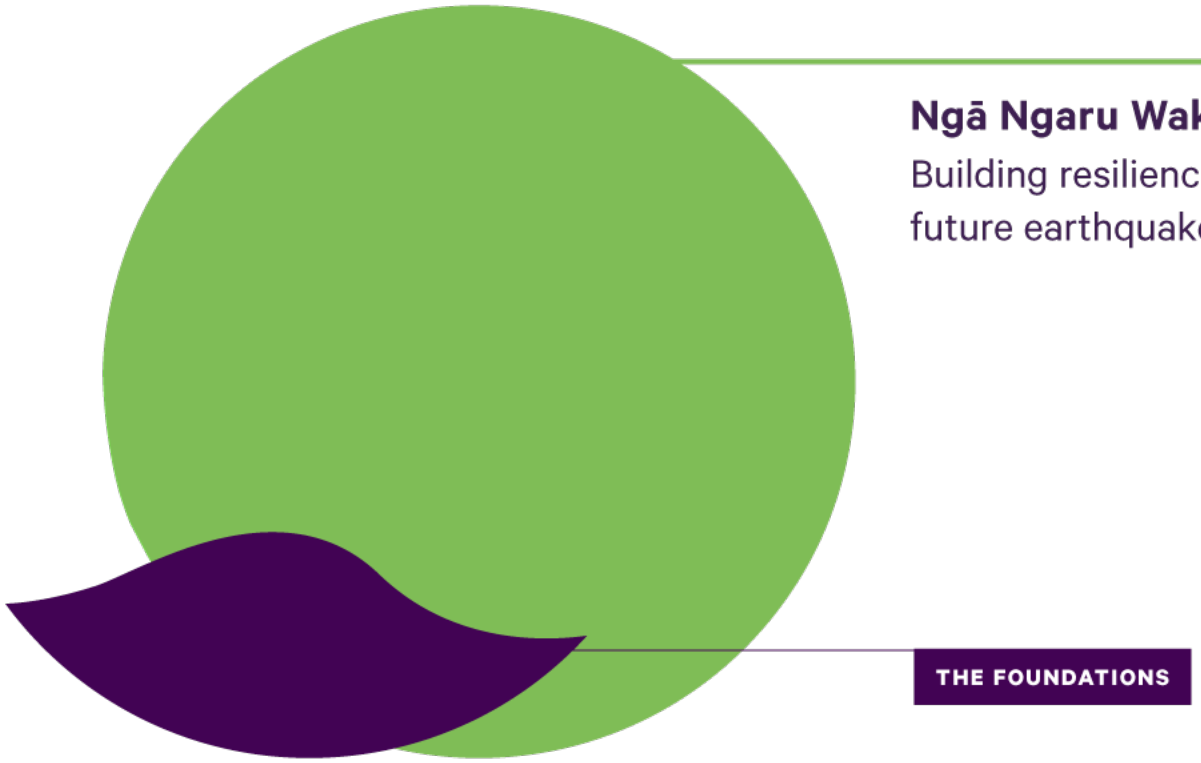

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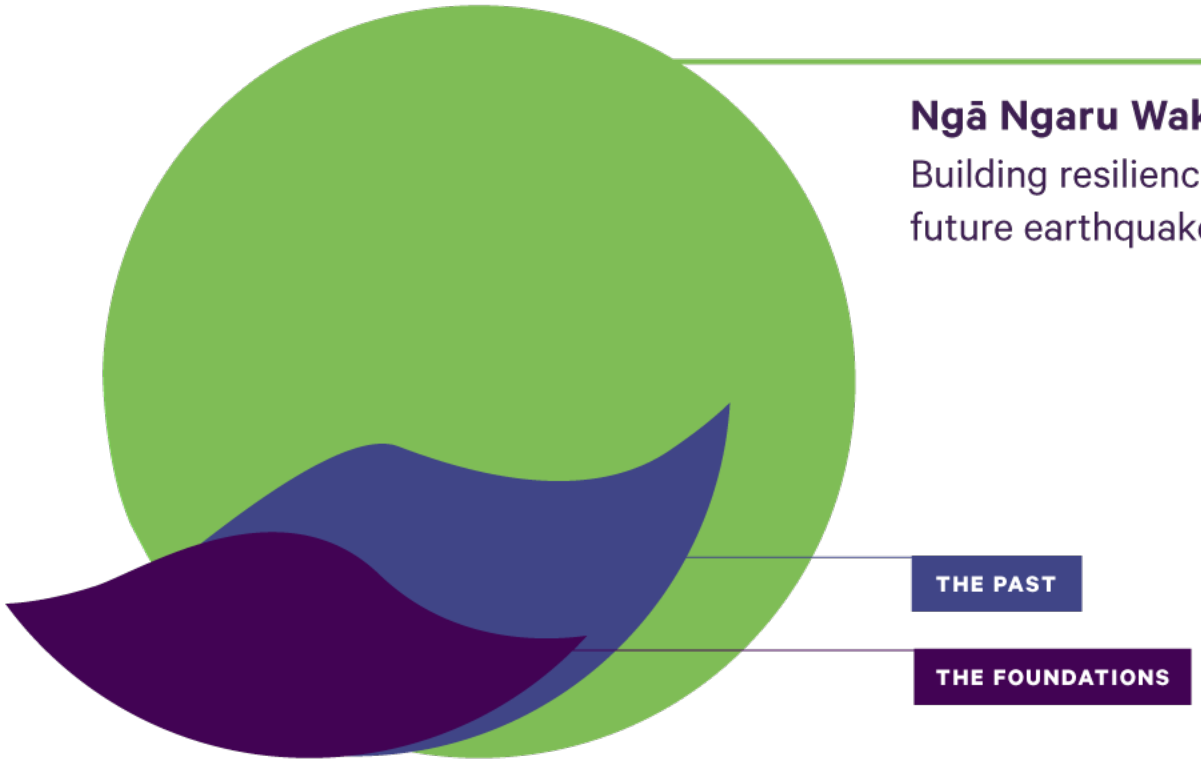
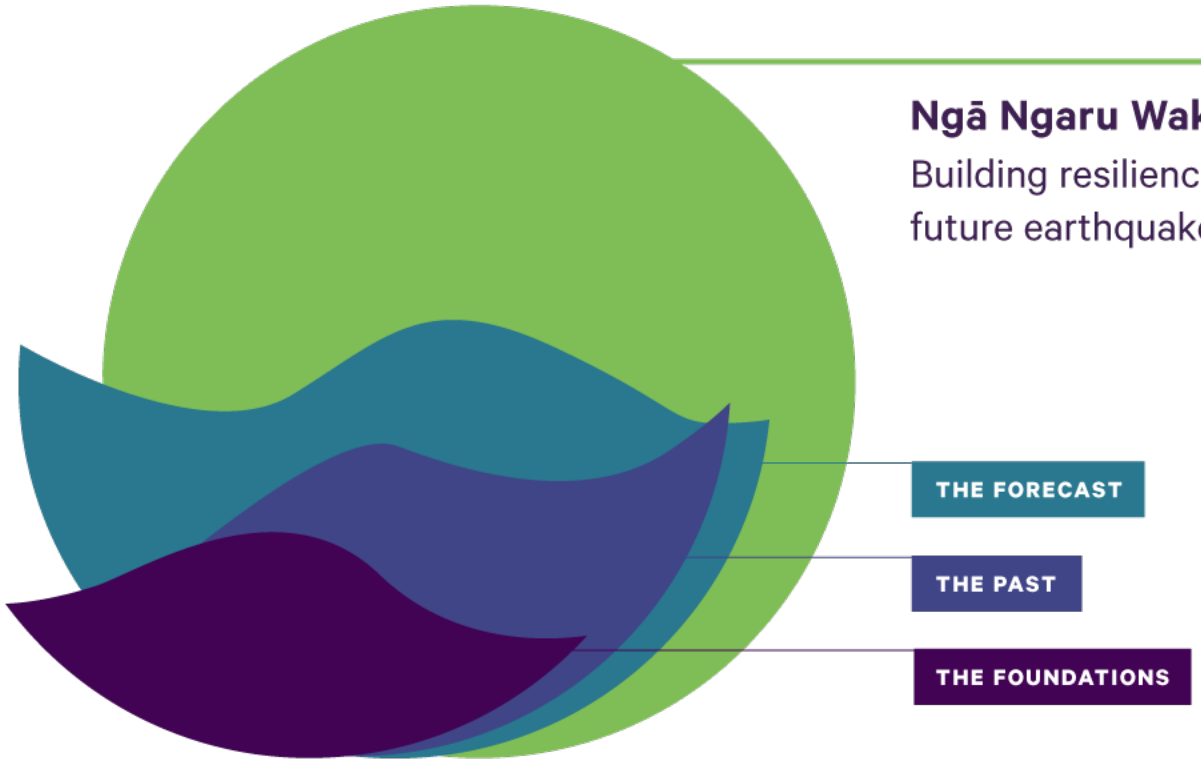
THE FOUNDATIONS

We are using earthquake and seismic data as an imaging tool to improve our understanding of the shape and structure of faults in the Transition Zone

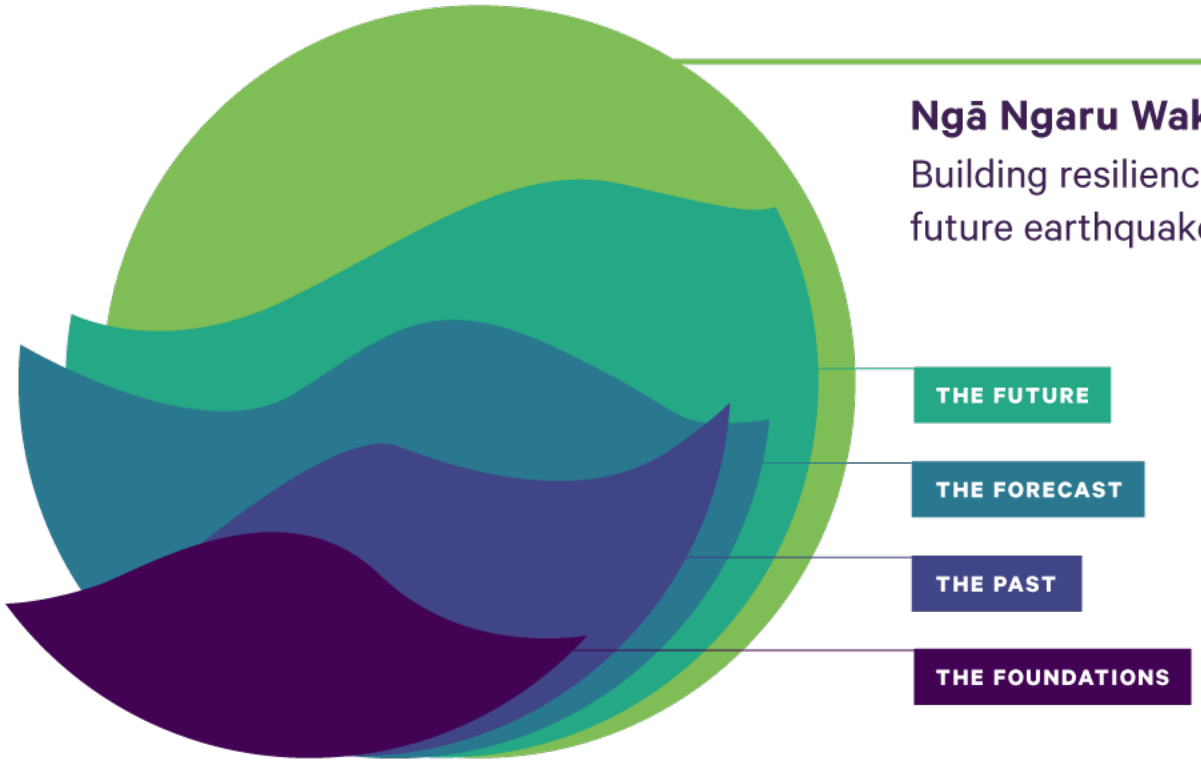


We are looking to the past to find evidence of earthquakes from our lakes and wetlands, to help us understand patterns of earthquake sequence over the last 10,000 years ago.



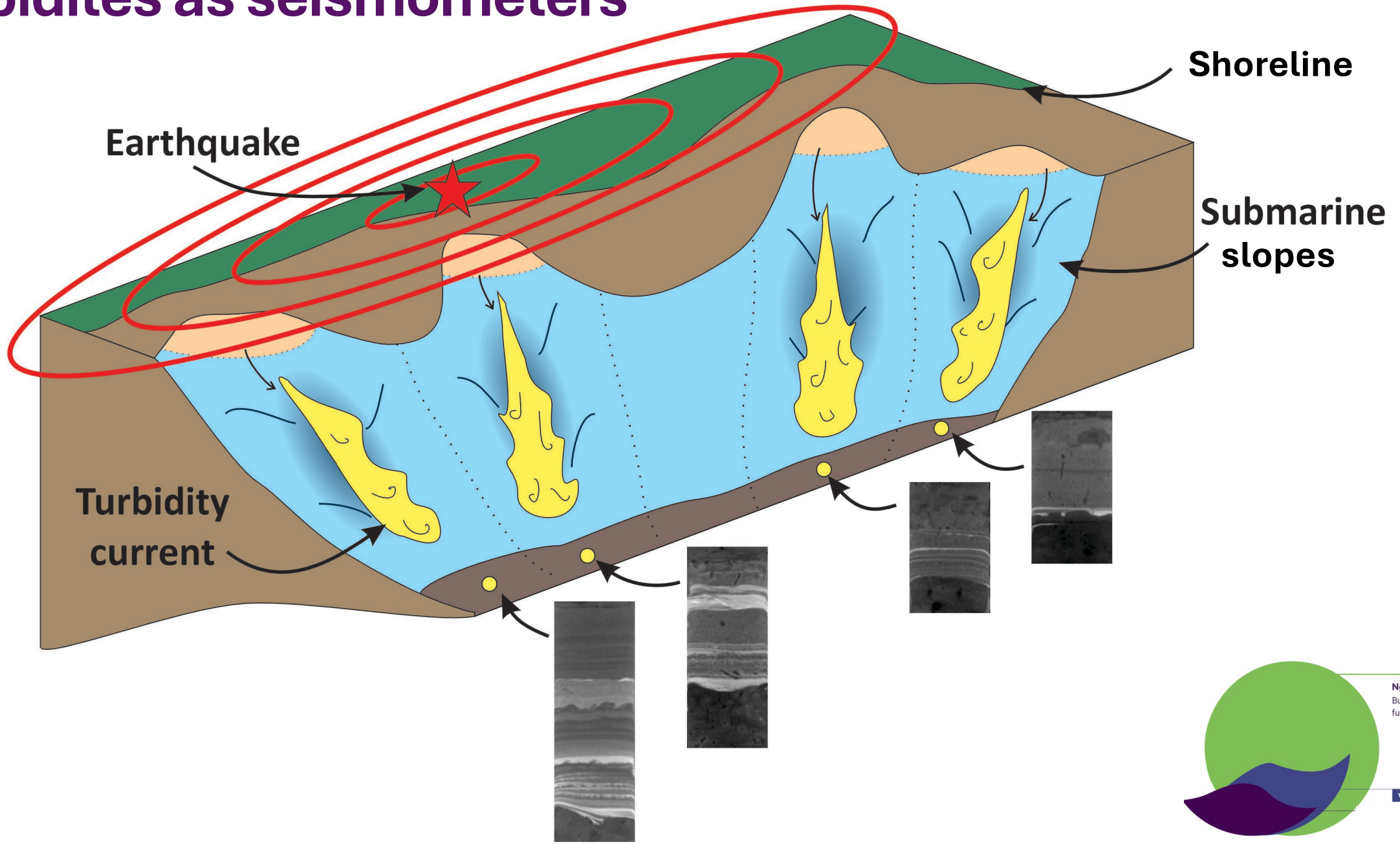
We develop new tools to explore the consequences of earthquake sequences for people and places.

To help build resilience, by informing government decision-making and supporting awareness and preparedness in communities.



We are working with iwi and case study communities to develop scenario narratives of earthquake sequences that inform resilience initiatives and improve preparedness at the grassroots.

Turbidites as seismometers



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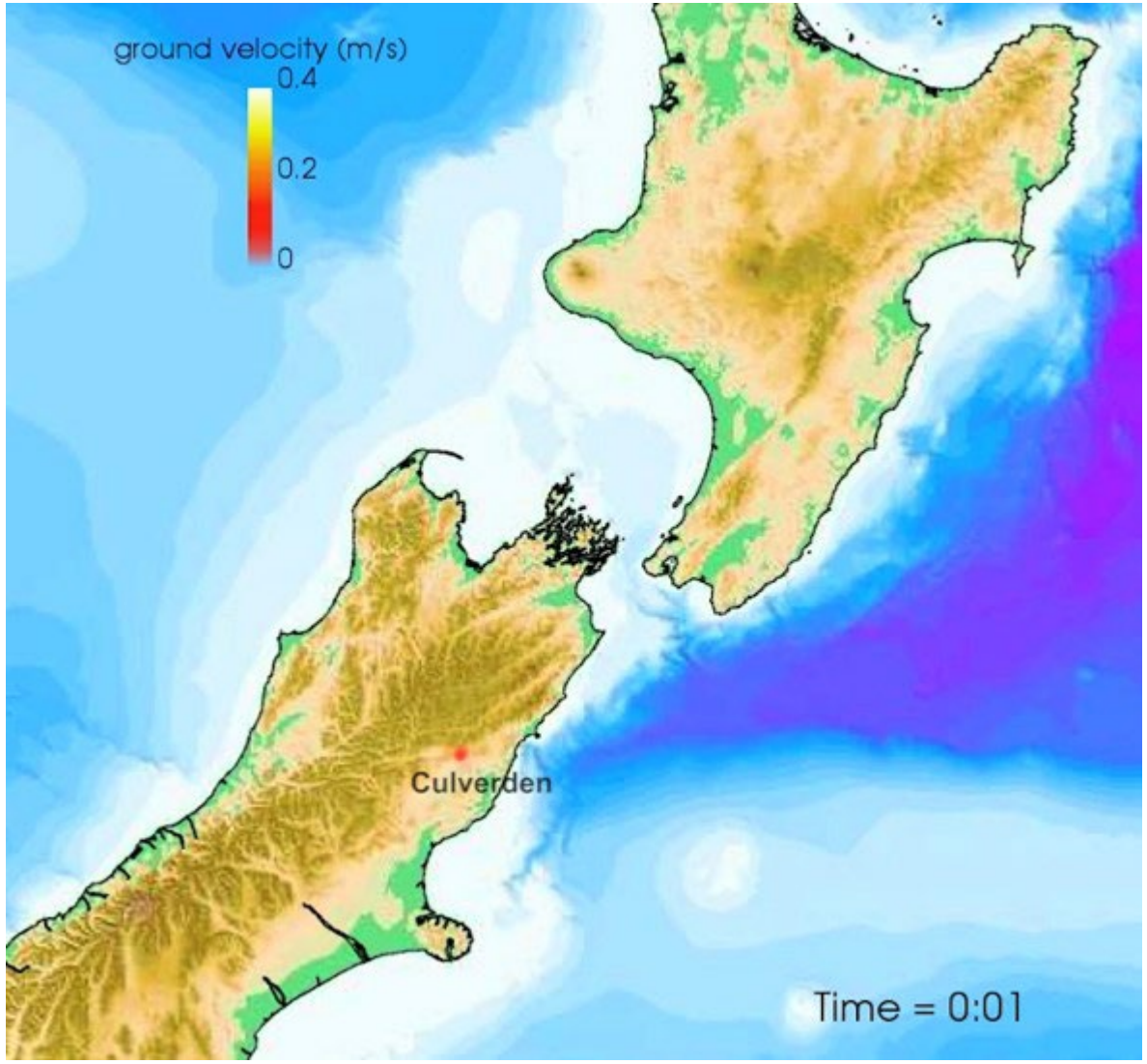
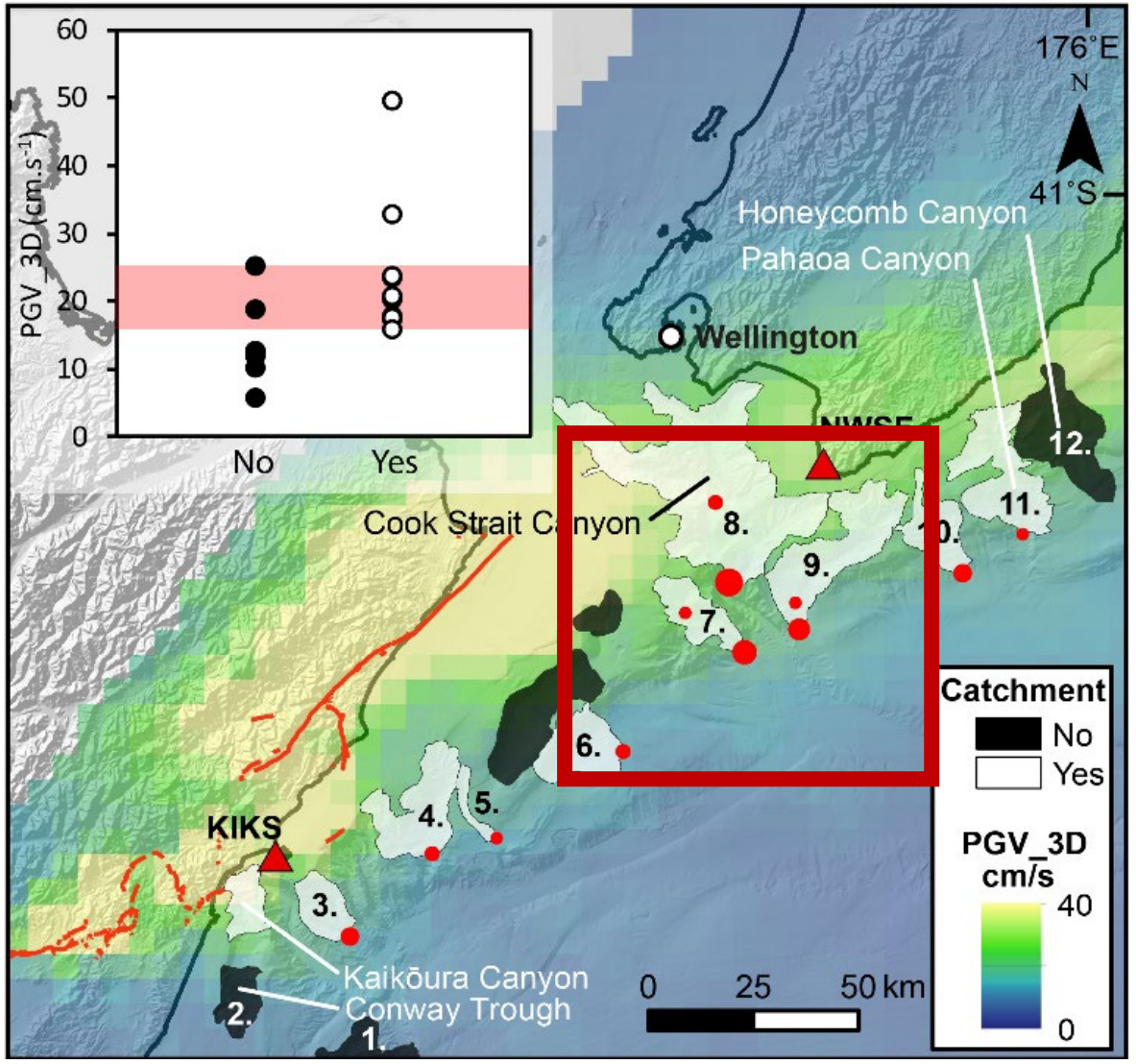
THE PAST

Turbidites from the 2016 Kaikōura earthquake



Kenako et al. (2019) JGR; Wallace et al. (2018) Nature Geos.



Mountjoy, Howarth et al. (2018) Science Adv.; Howarth, Orpin et al. (2021b) Nature Geos.

Turbidite records of the 1855 and 1848 earthquakes

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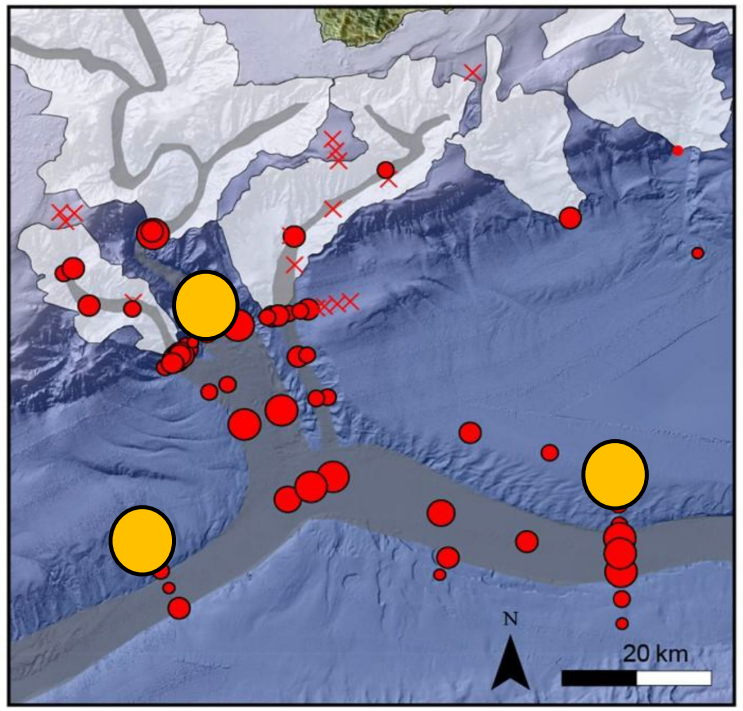

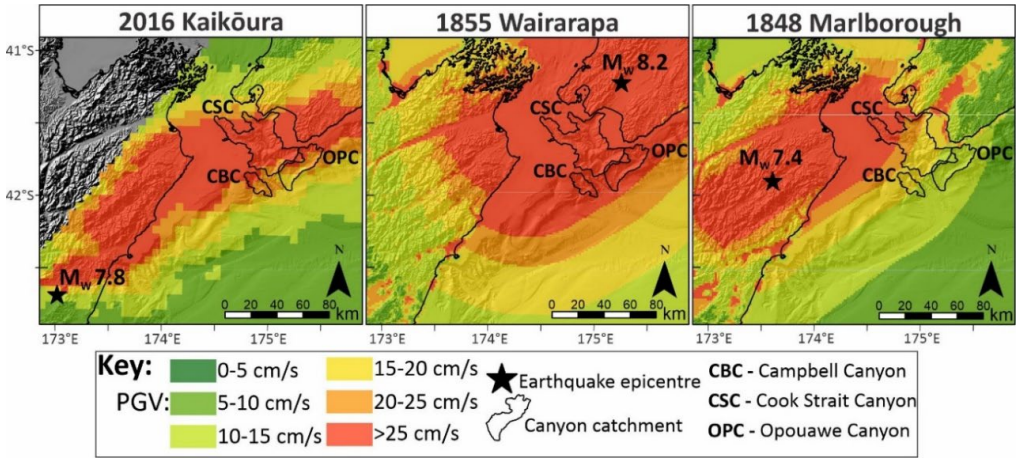

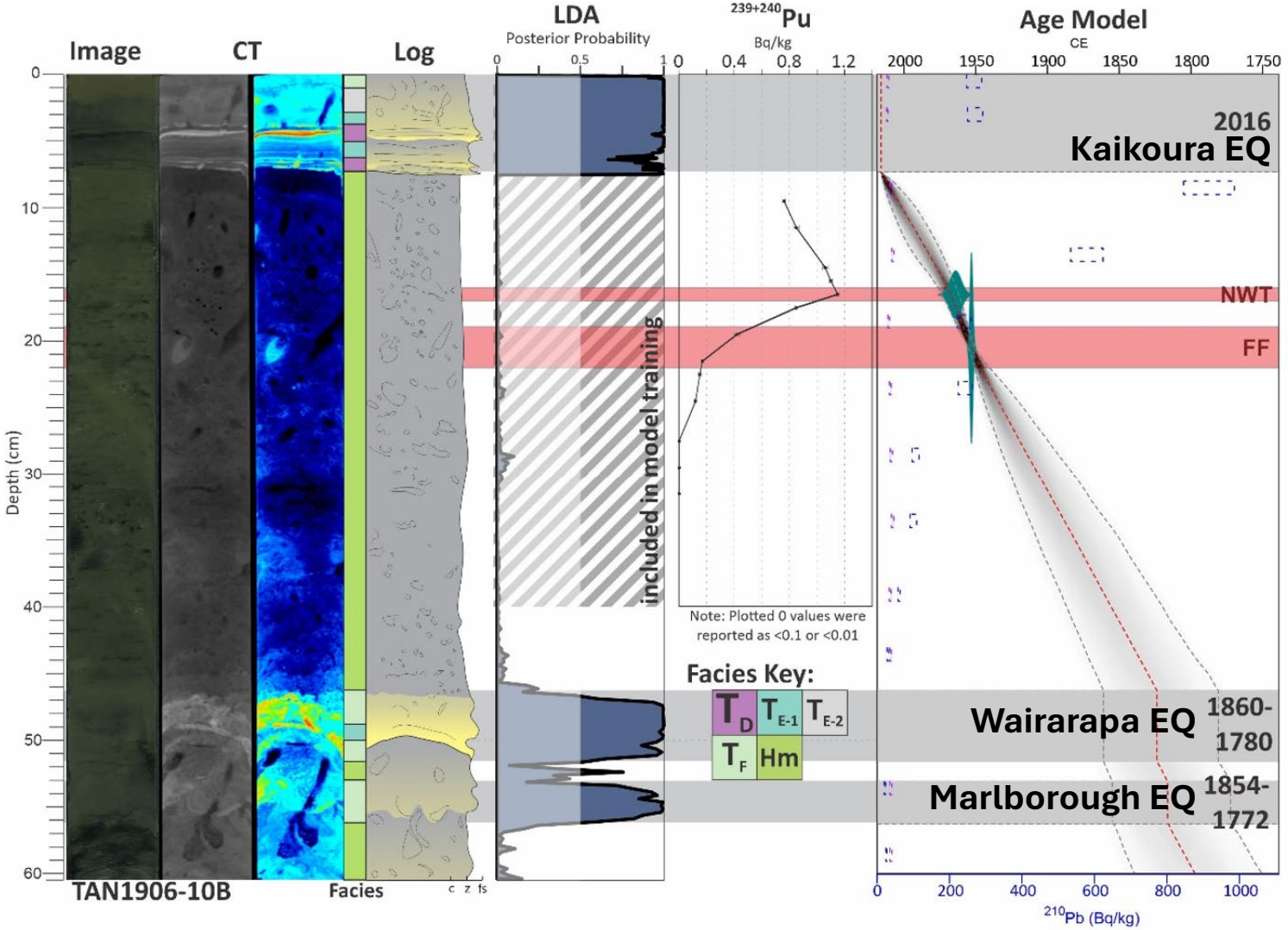

Tickle et al. (In Prep)

A millennium of transition zone earthquakes

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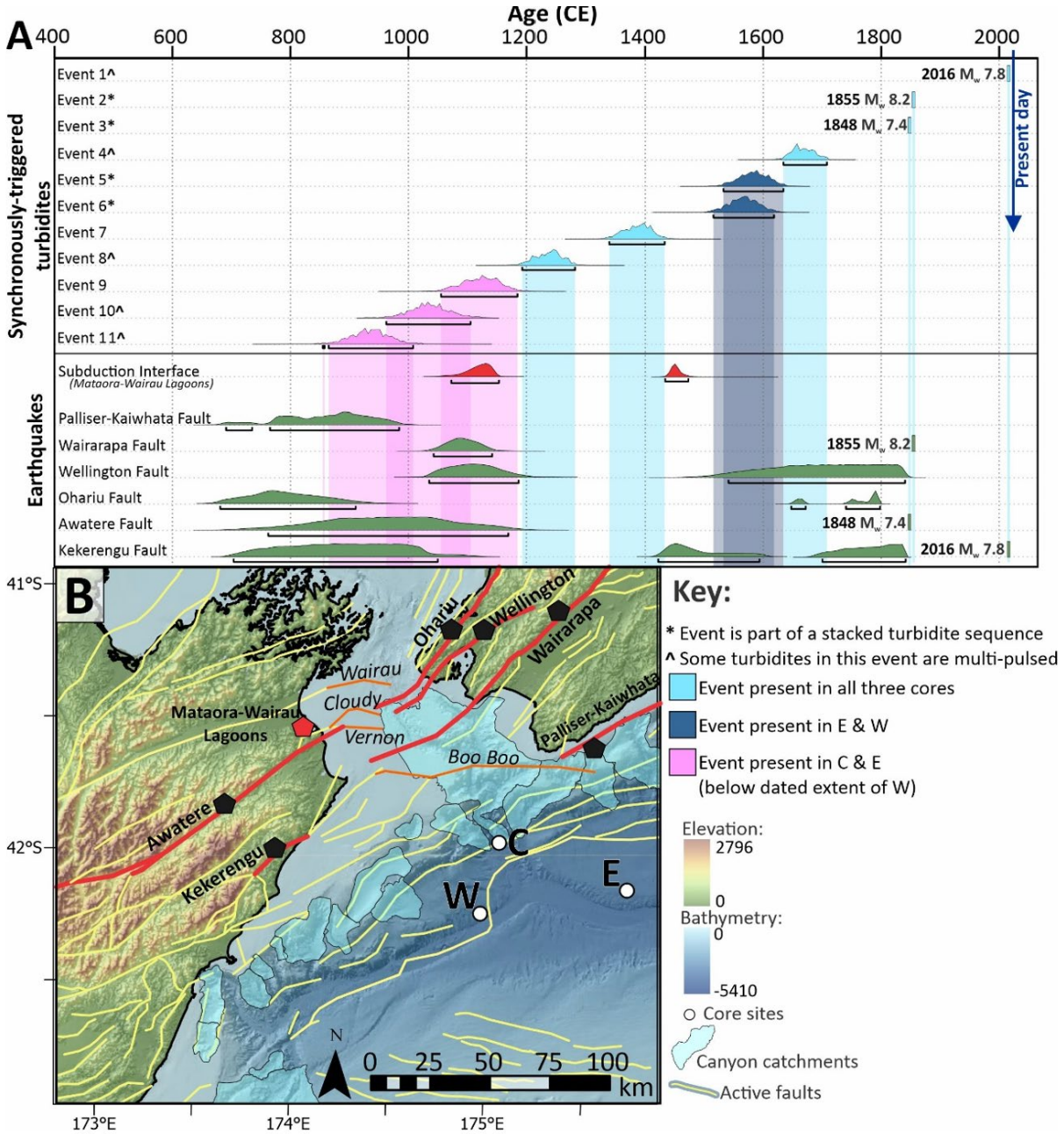

- 11 large earthquakes generating strong shaking in the Cook Strait region over the last ~1000 years.
- Comparison of earthquake-triggered turbidite ages with on-shore paleoseismic studies reveals:
  - Six multi-fault ruptures similar to Kaikōura
  - Five singe-fault ruptures
  - Two sequences of two or more large earthquakes
- Earthquake sequences are not uncommon, and we should prepare for them.

Tickle et al. (In Prep)

Case Study Community 2:
Ruamāhanga Farm and Foundation

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Ngā mihi! Thank you!

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The University of Auckland New Zealand

Earth Sciences New Zealand

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