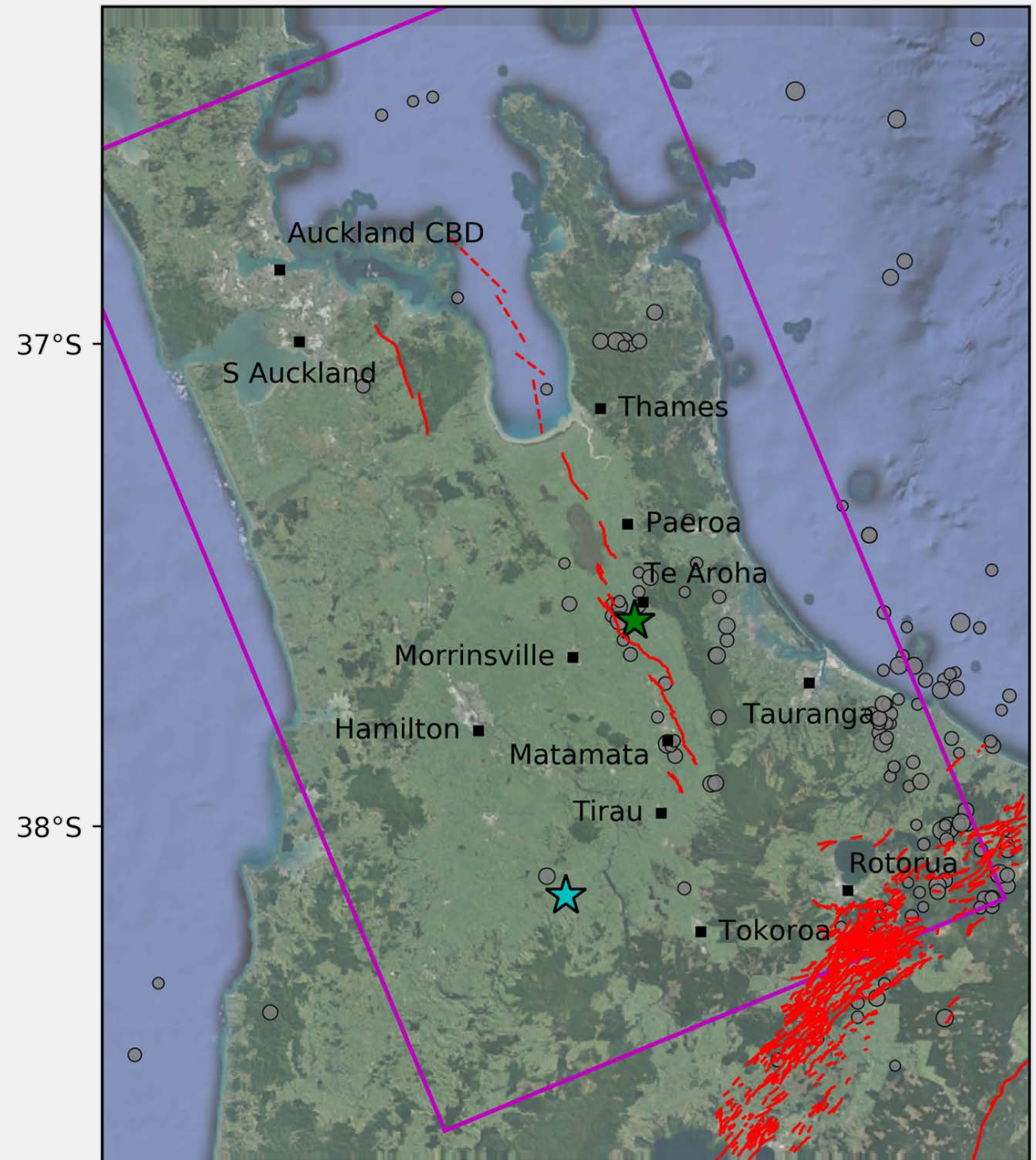


Effect of Hauraki and Hamilton Basins on Ground Motions from Future Upper North Island Earthquakes

D Dempsey¹, L Wotherspoon¹, J Eccles¹, S Jeong², A Stolte³, J Huang³, B Bradley³
¹University of Auckland, ²University of Waikato, ³University of Canterbury
(d.dempsey@auckland.ac.nz)

Upper North Island Seismic Hazard

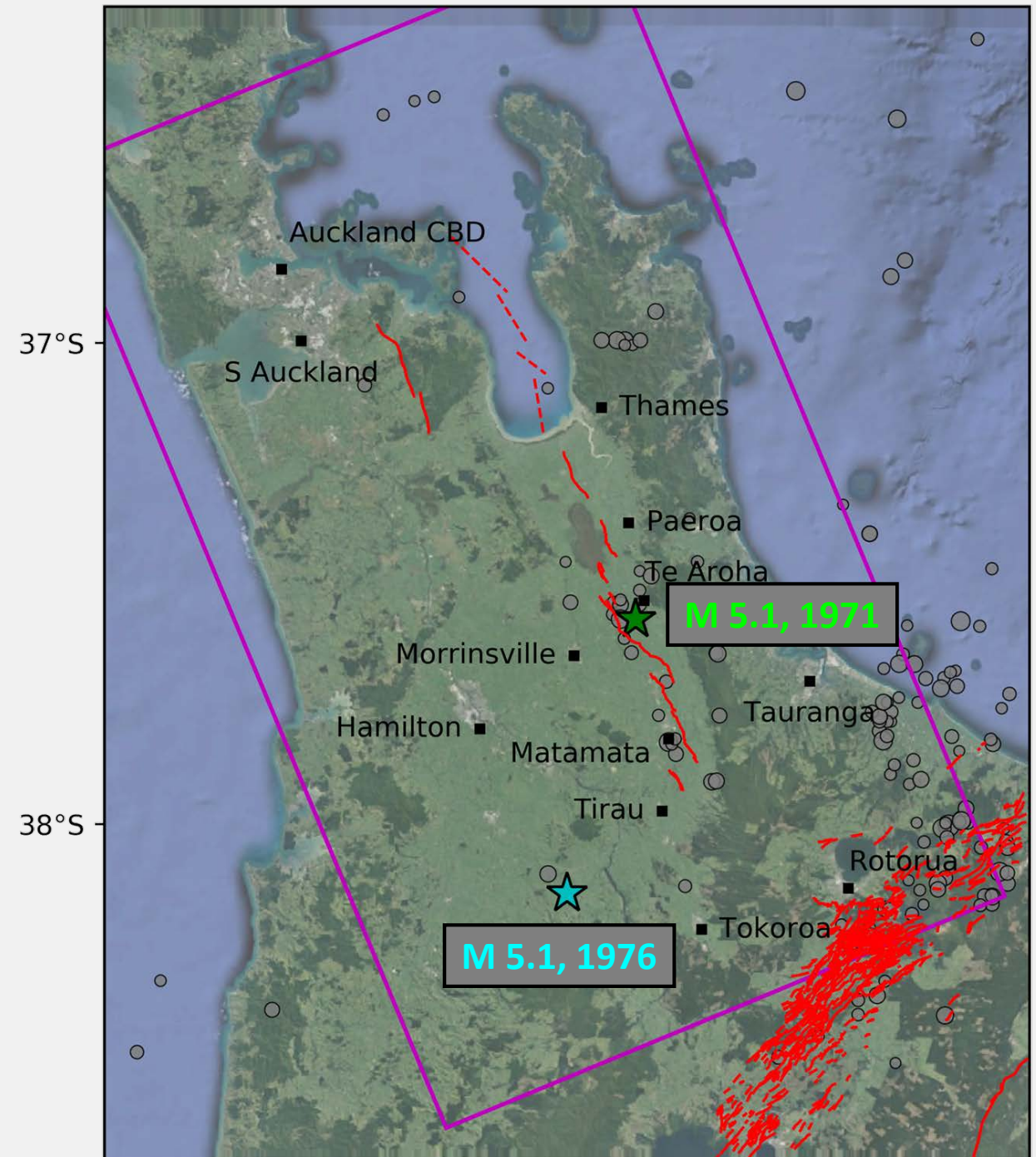
~45% of NZ population resides in the purple box



Upper North Island Seismic Hazard

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A few $M > 5$ events in the last 50 years.

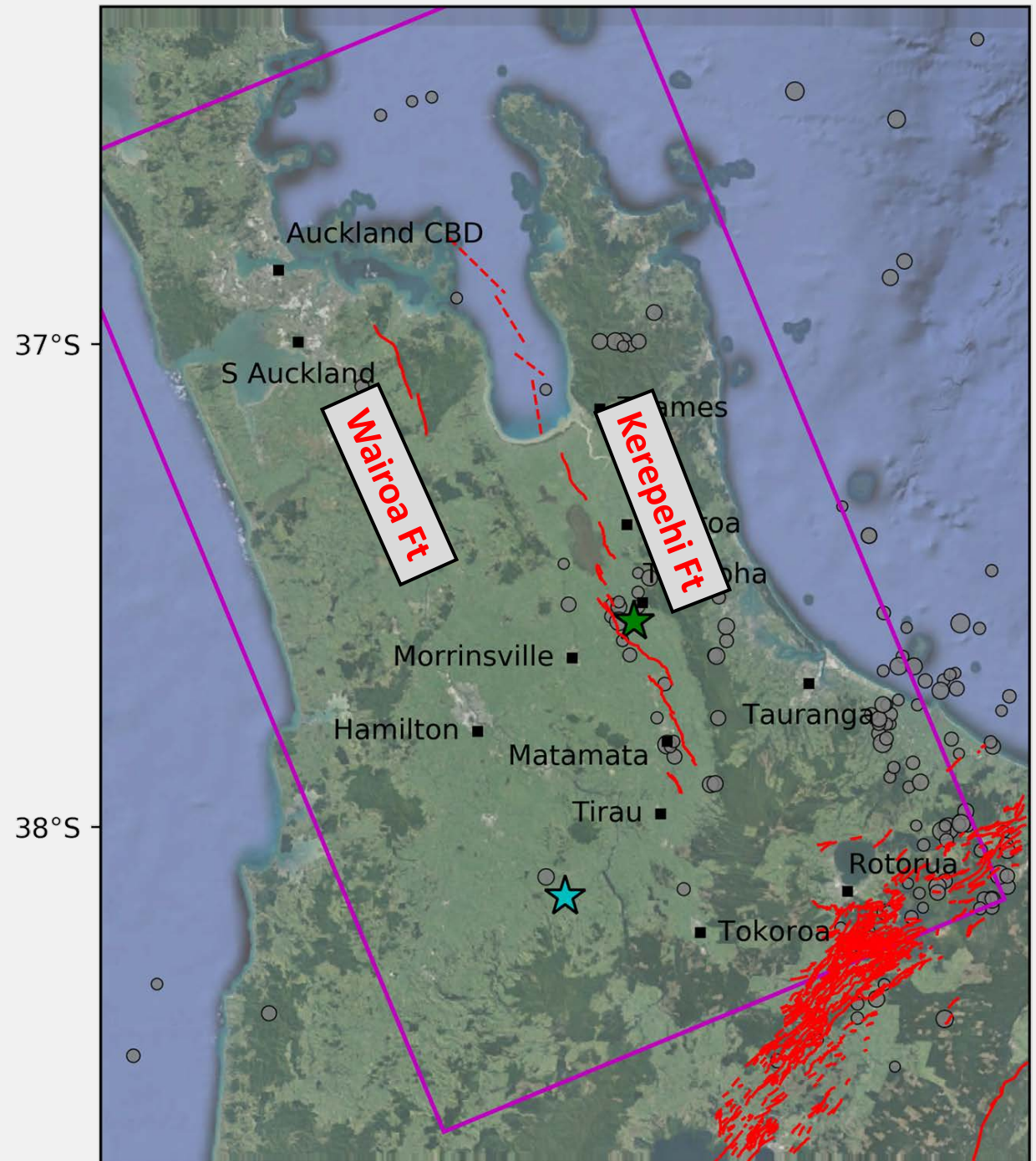


Upper North Island Seismic Hazard

~45% of NZ population resides in the purple box

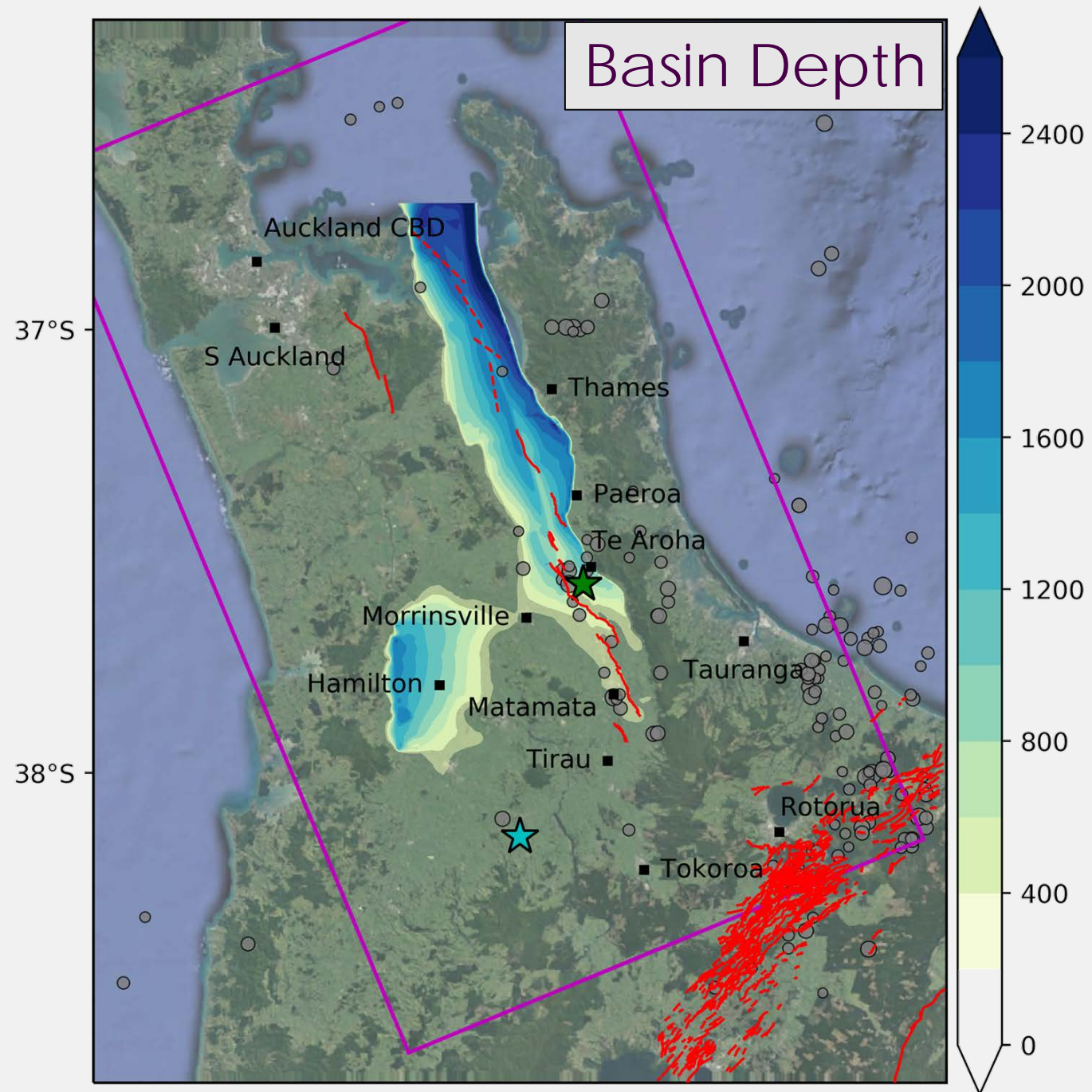
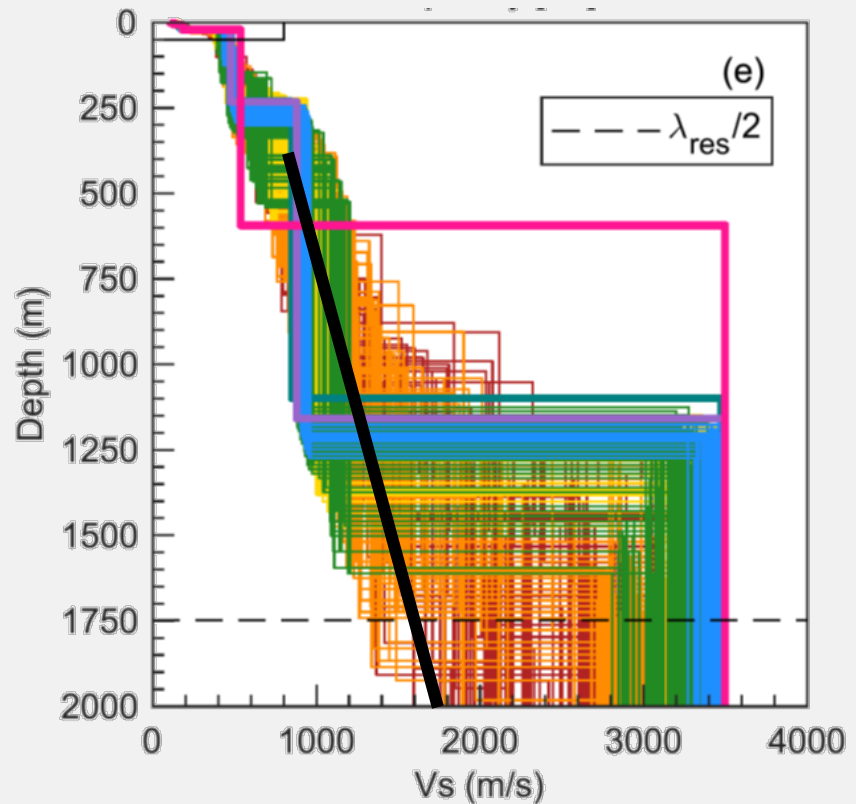
A few M 5.1 events in the last 50 years.

Known active faults are Kerepehi and Wairoa. Long return time ~10 kyr (Persaud et al., 2016).



Velocity Structure

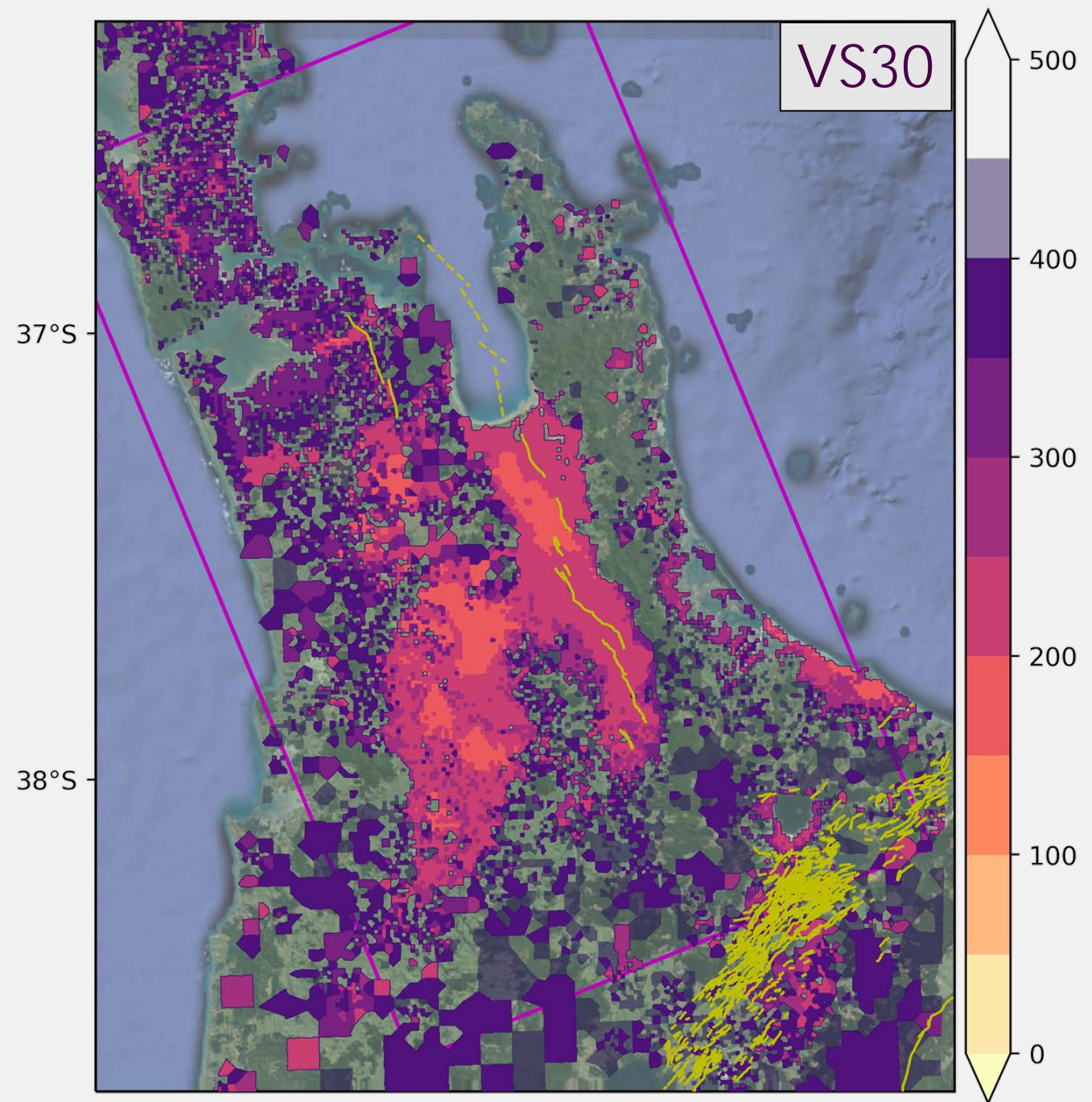
Main basins are Hauraki rift and Hamilton.



Velocity Structure

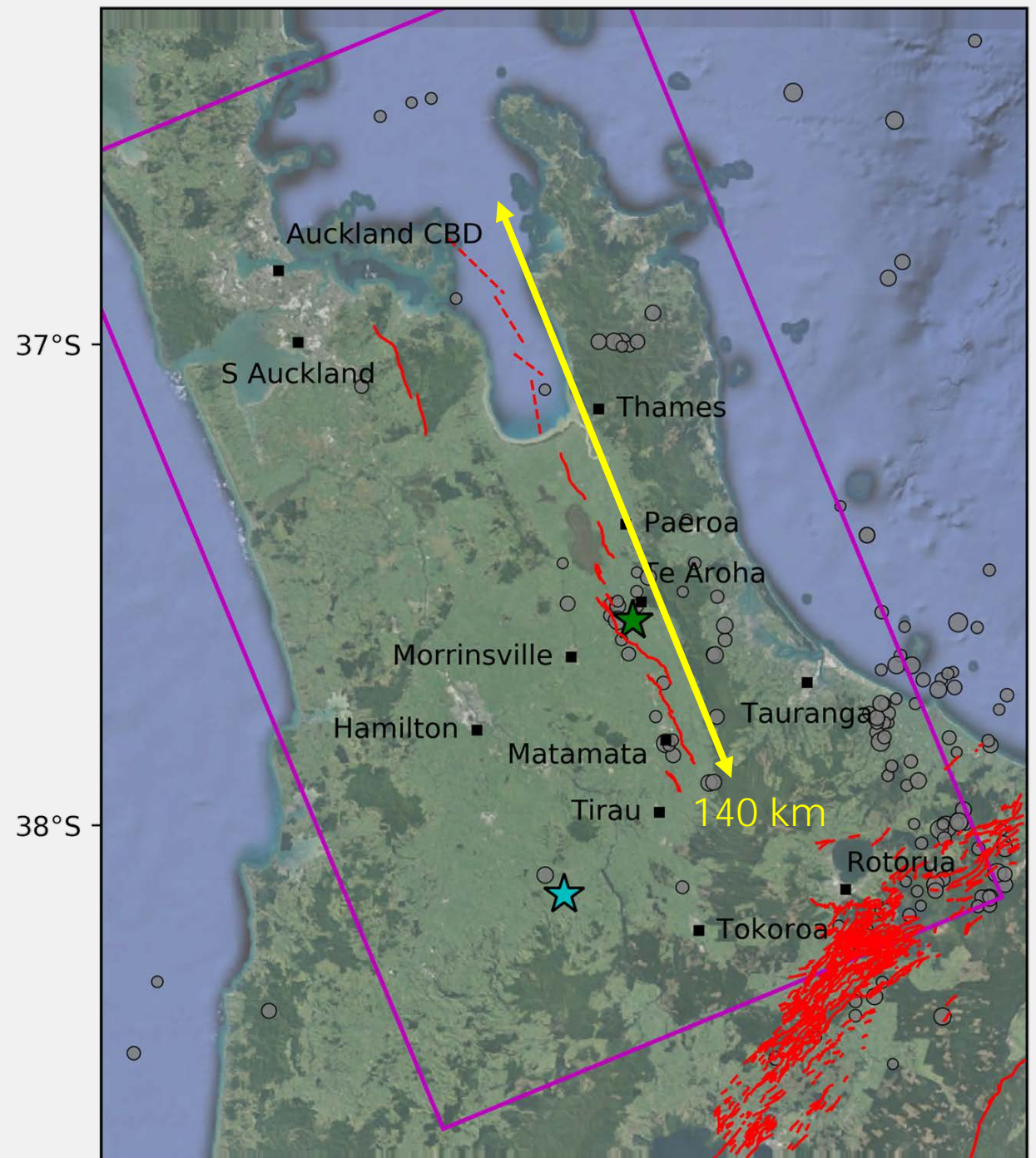
Main basins are Hauraki rift and Hamilton.

Site-specific VS30 correction.



Scenarios

Kerepehi all segments \Rightarrow M_w 7.2
(Wenousky, 2008)



Scenarios

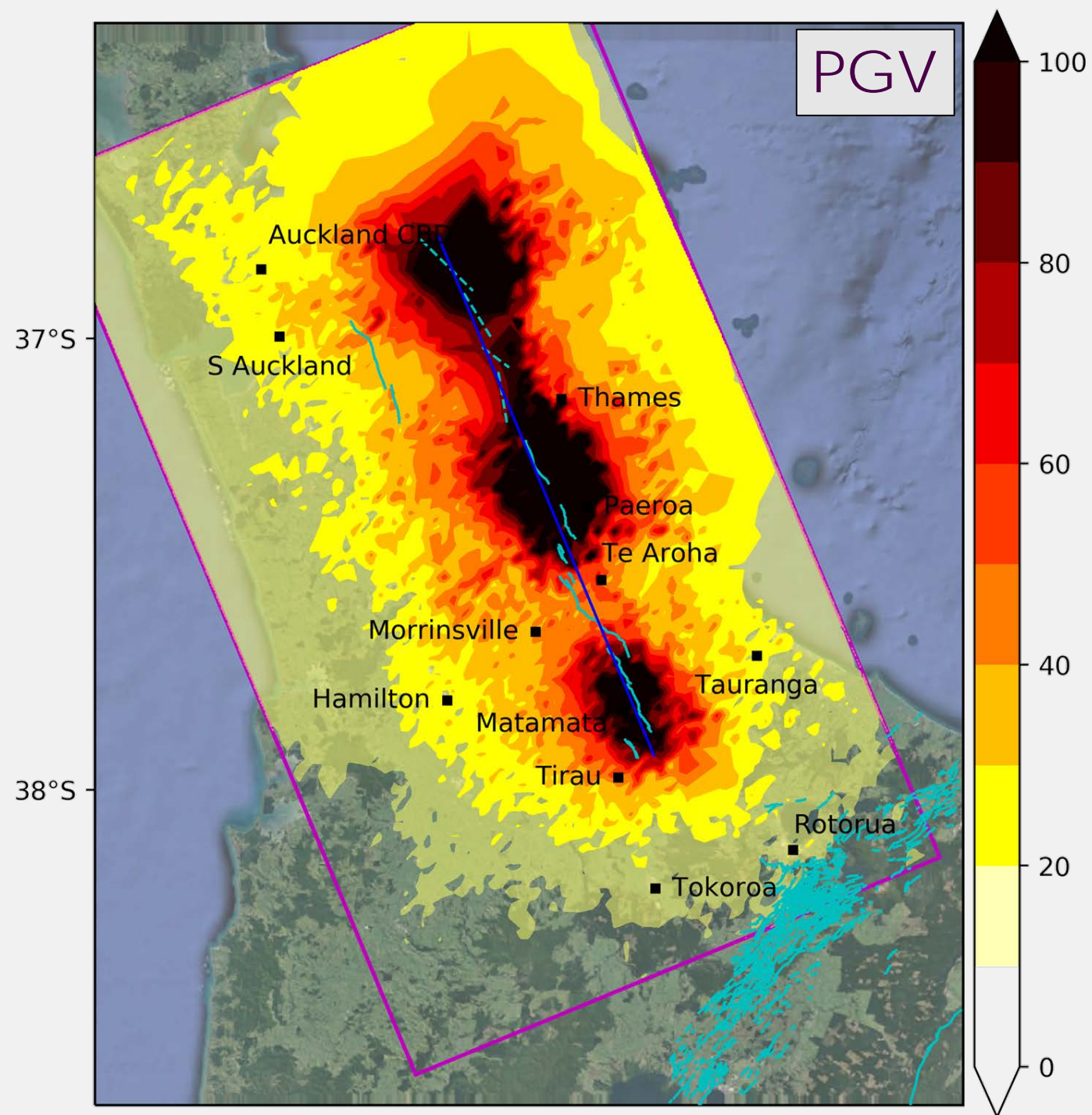
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Simulated motions:

MM 7: Auckland, Hamilton, Tauranga

MM 8: Te Aroha, Thames

MM 9: Paeroa



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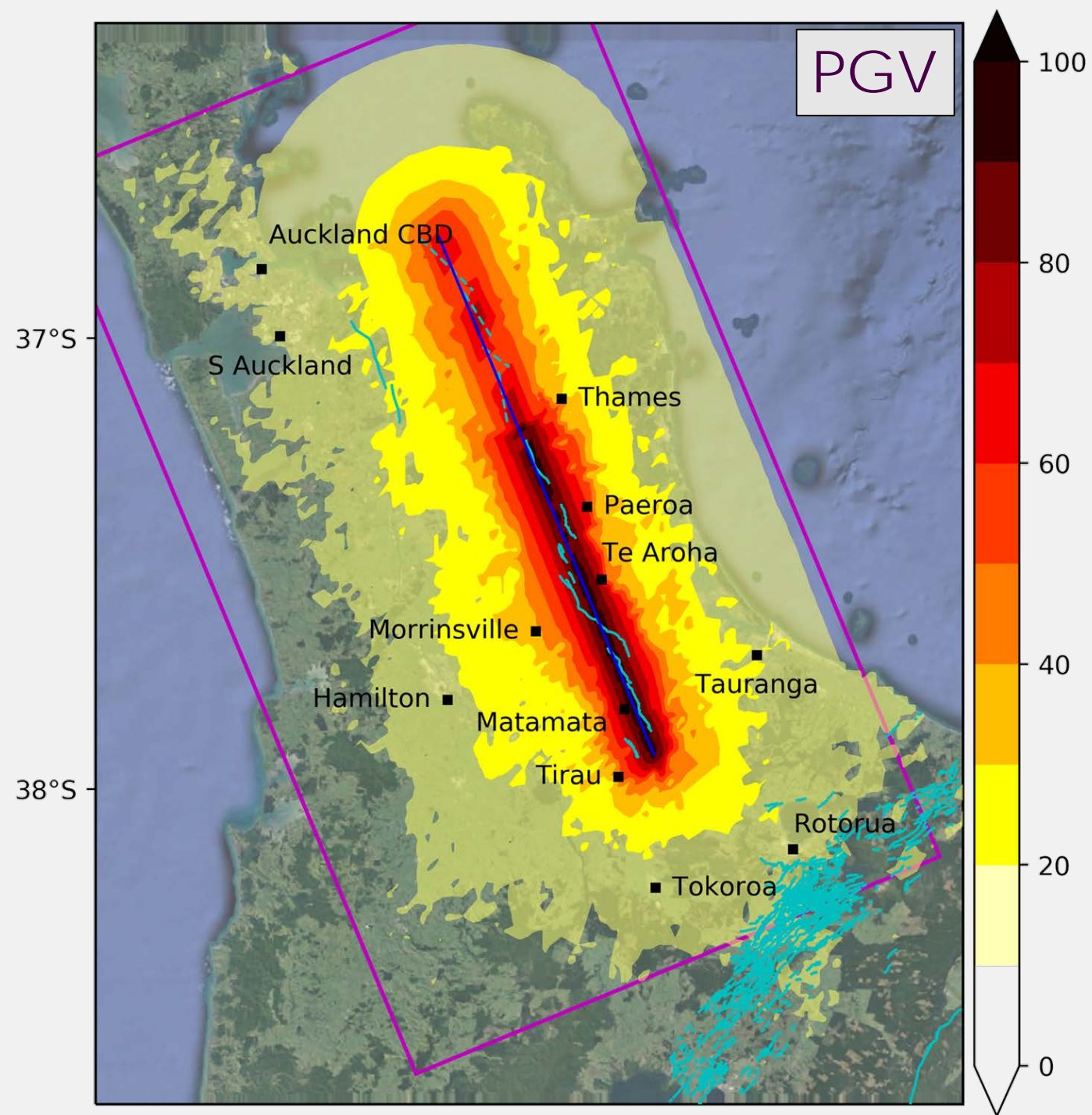
MM 9: Paeroa

Empirical GMPE:

MM 6: Auckland, Hamilton

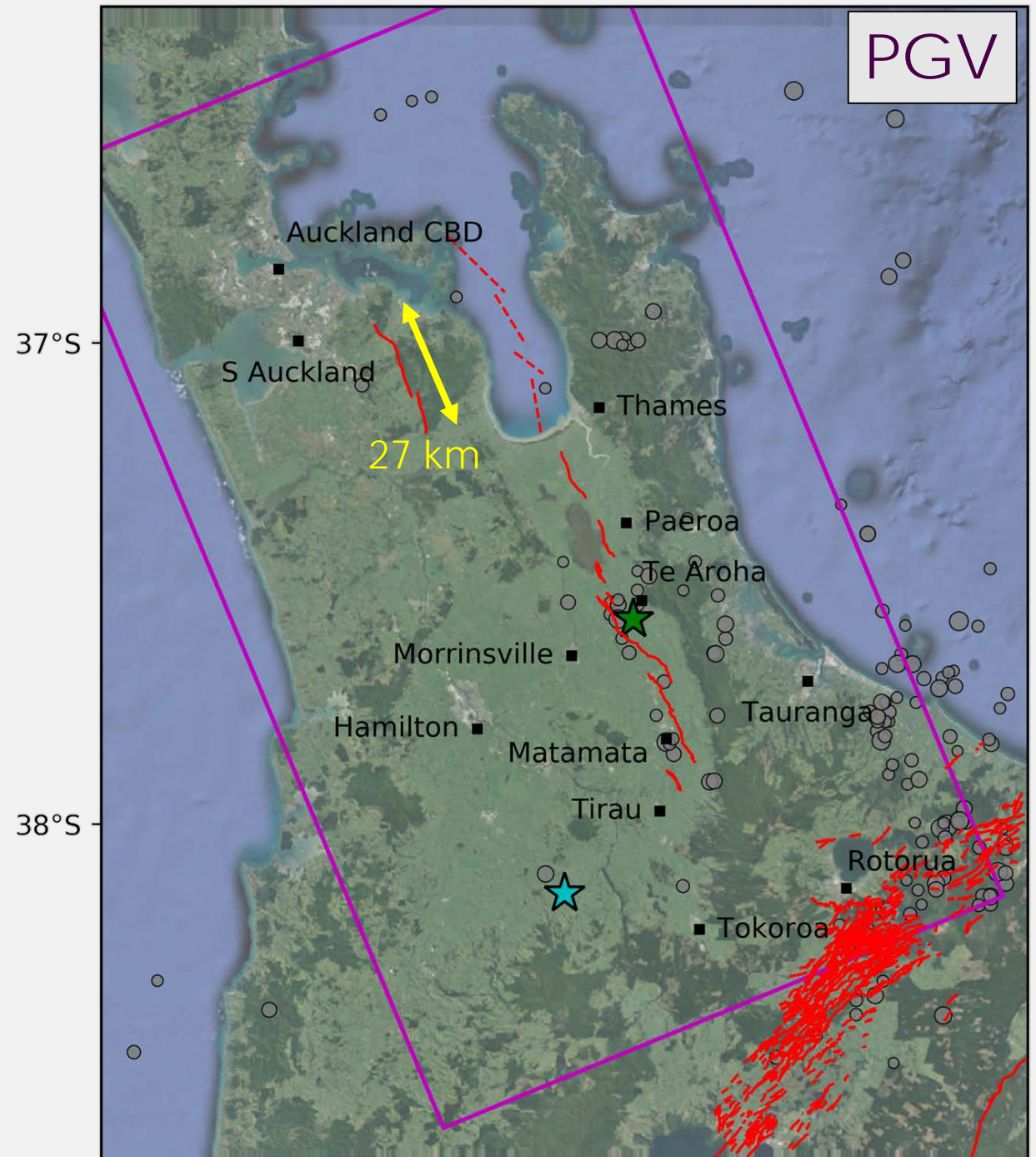
MM 7: Tauranga, Thames

MM 8: Te Aroha, Paeroa



Sources

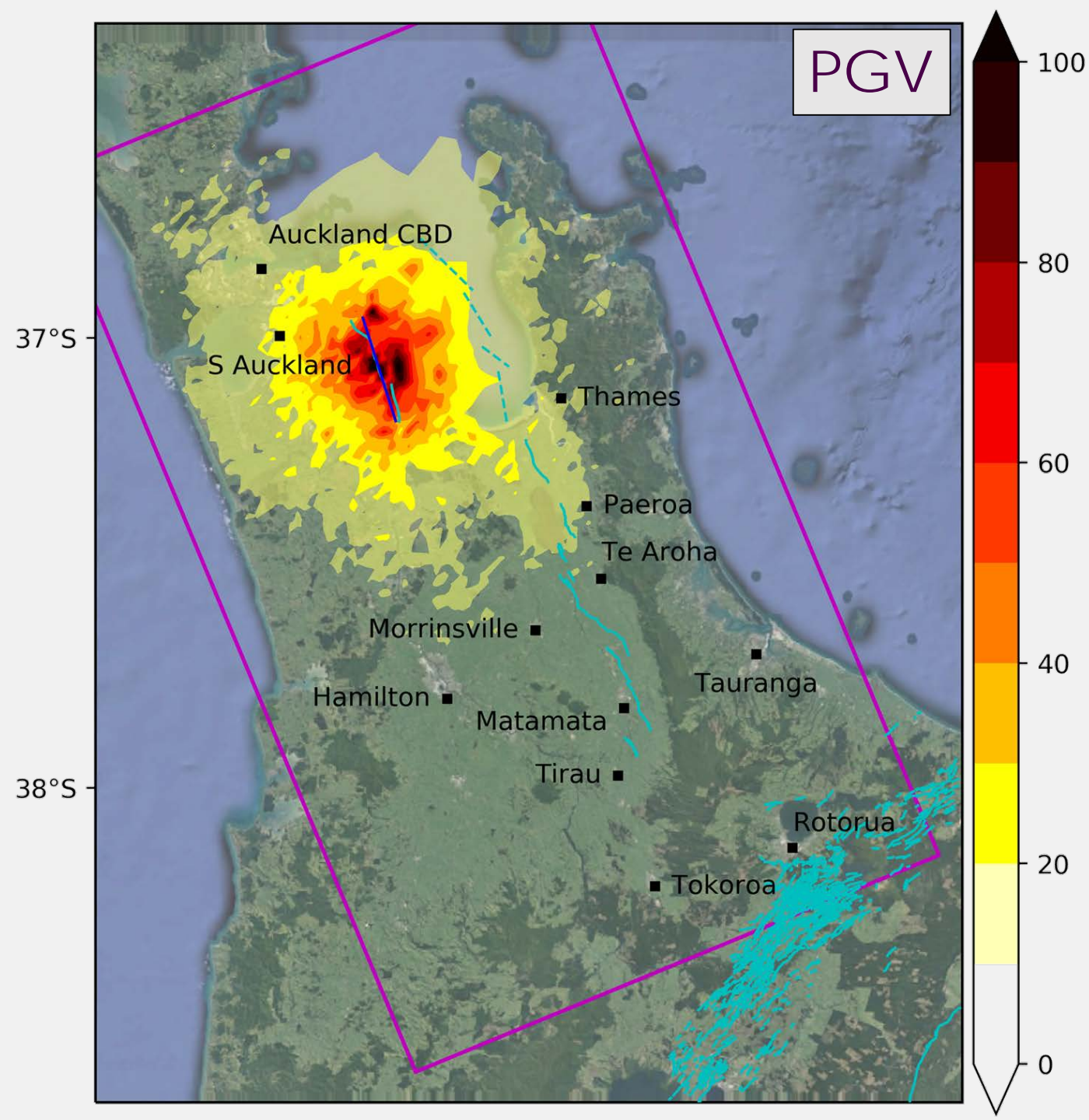
Wairoa \Rightarrow Mw 6.7
(Villamor et al., 2001)



Sources

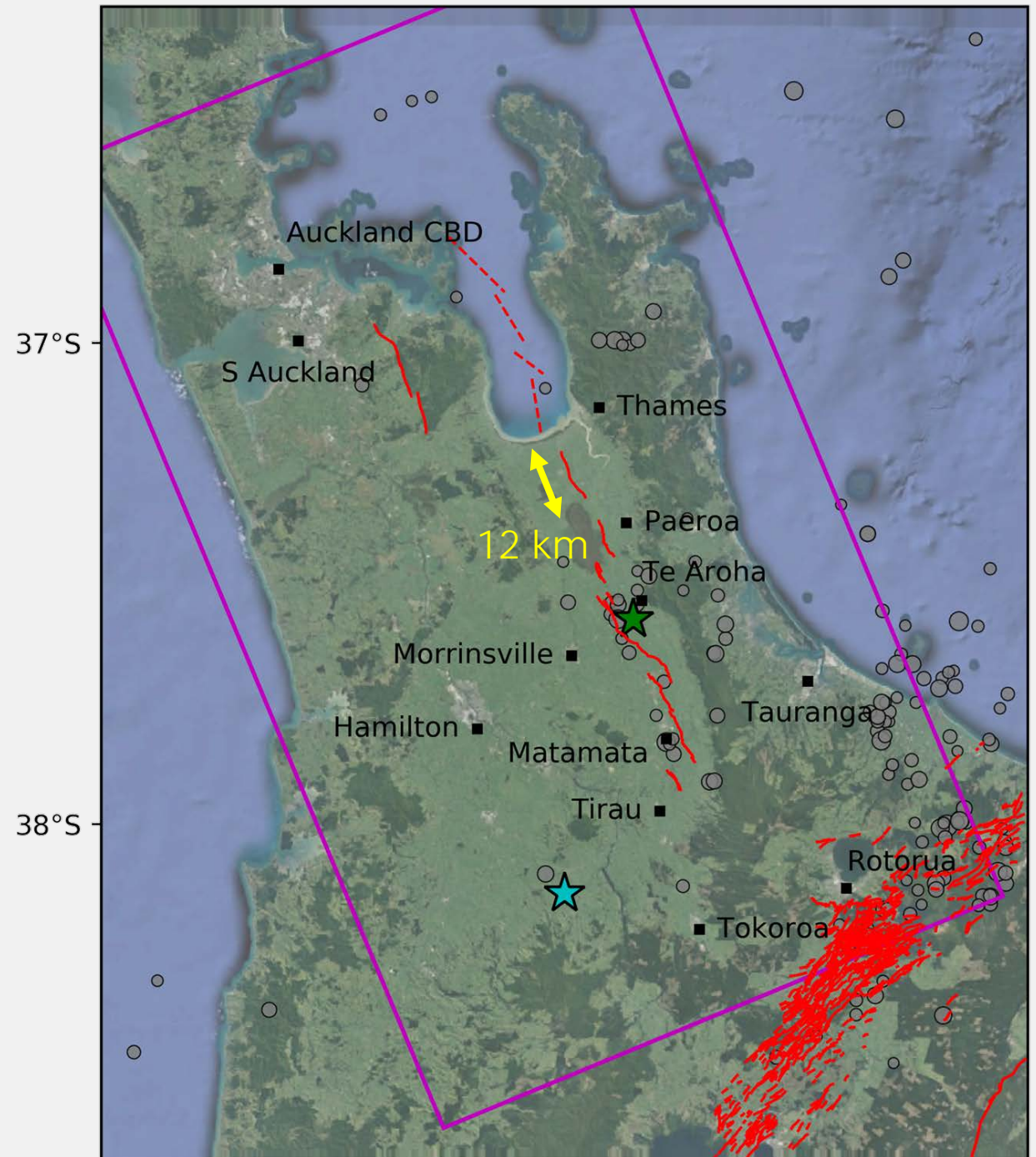
Wairoa \Rightarrow Mw 6.7
(Villamor et al., 2001)

Simulated motions:
MM 6: Auckland CBD
MM 7: S Auckland



Sources

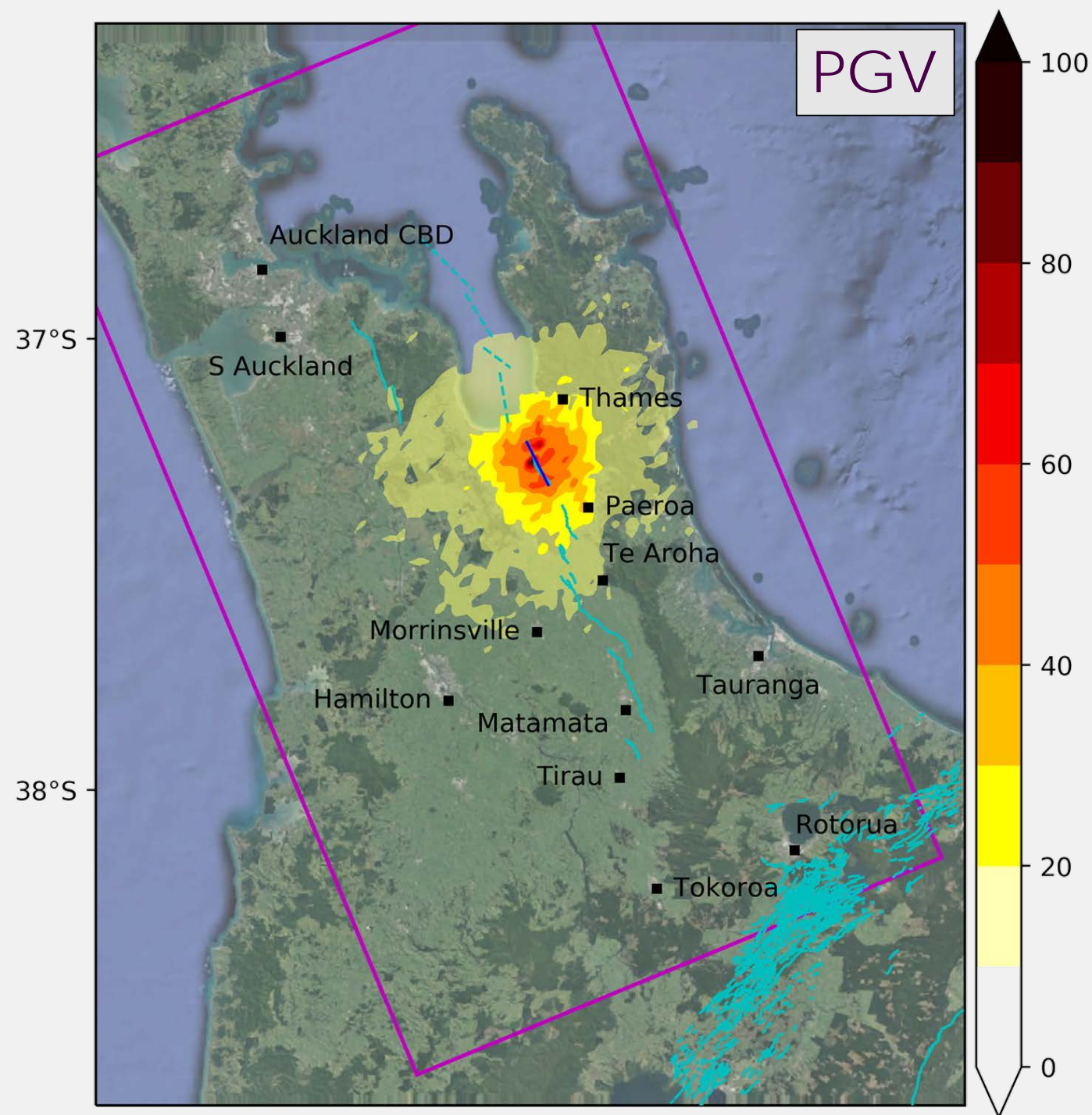
Awaiti segment \Rightarrow Mw 6.1
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Sources

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MM 7: Thames, Paeroa



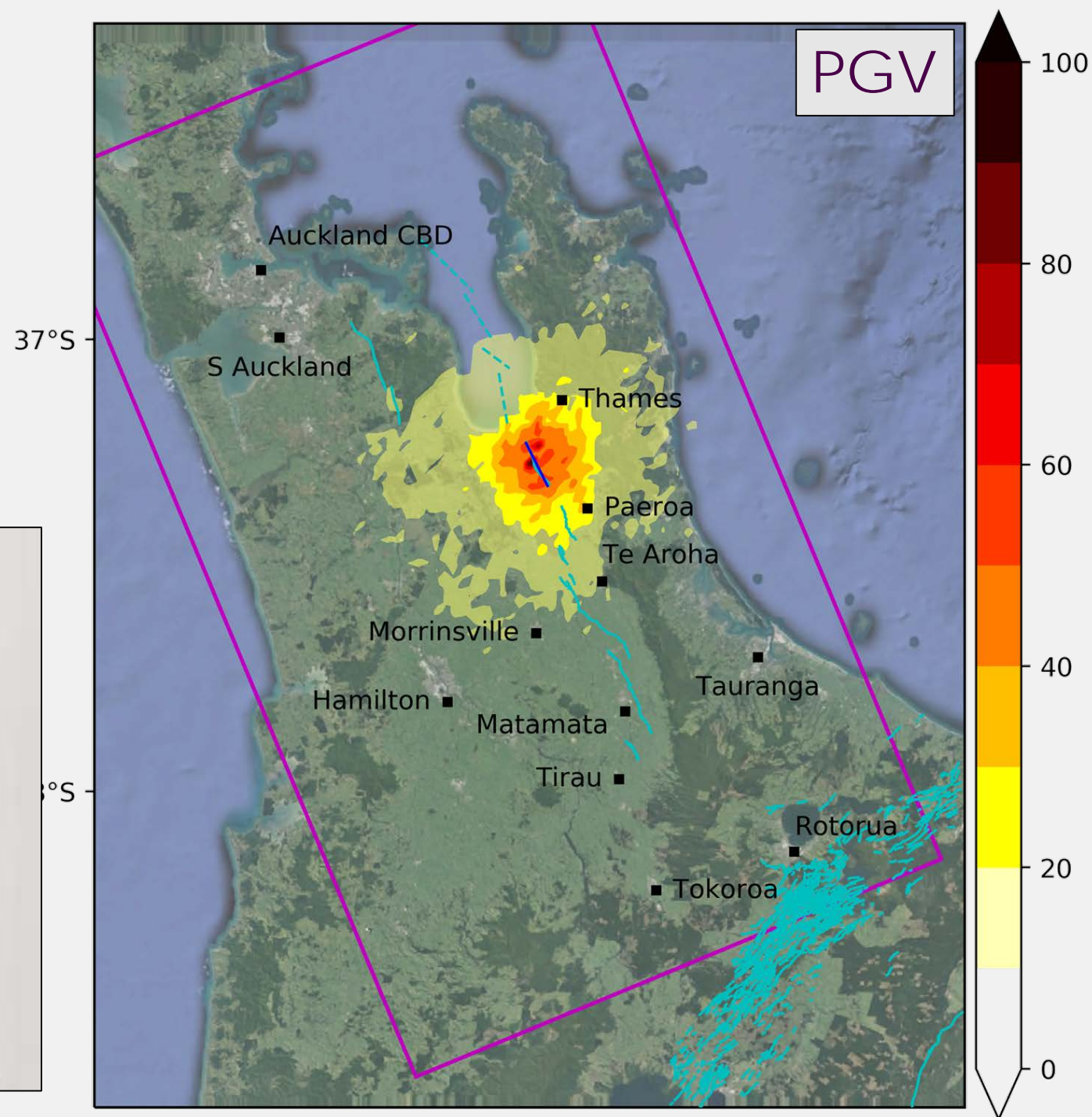
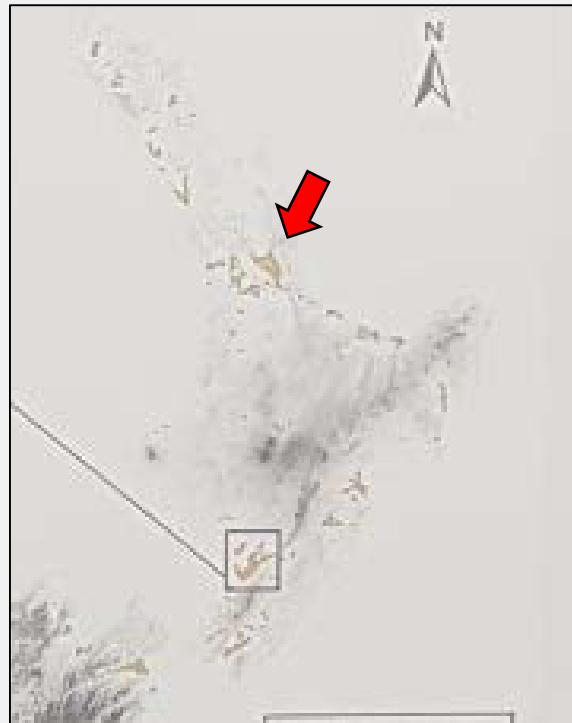
Sources

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Exposure of
stopbank network in
Hauraki depression?

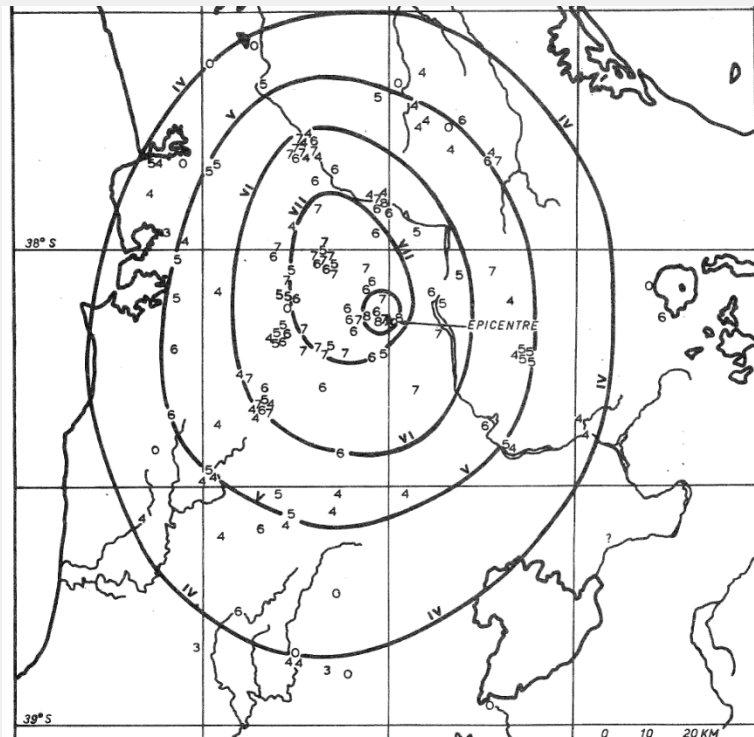
(Blake et al., 2019)



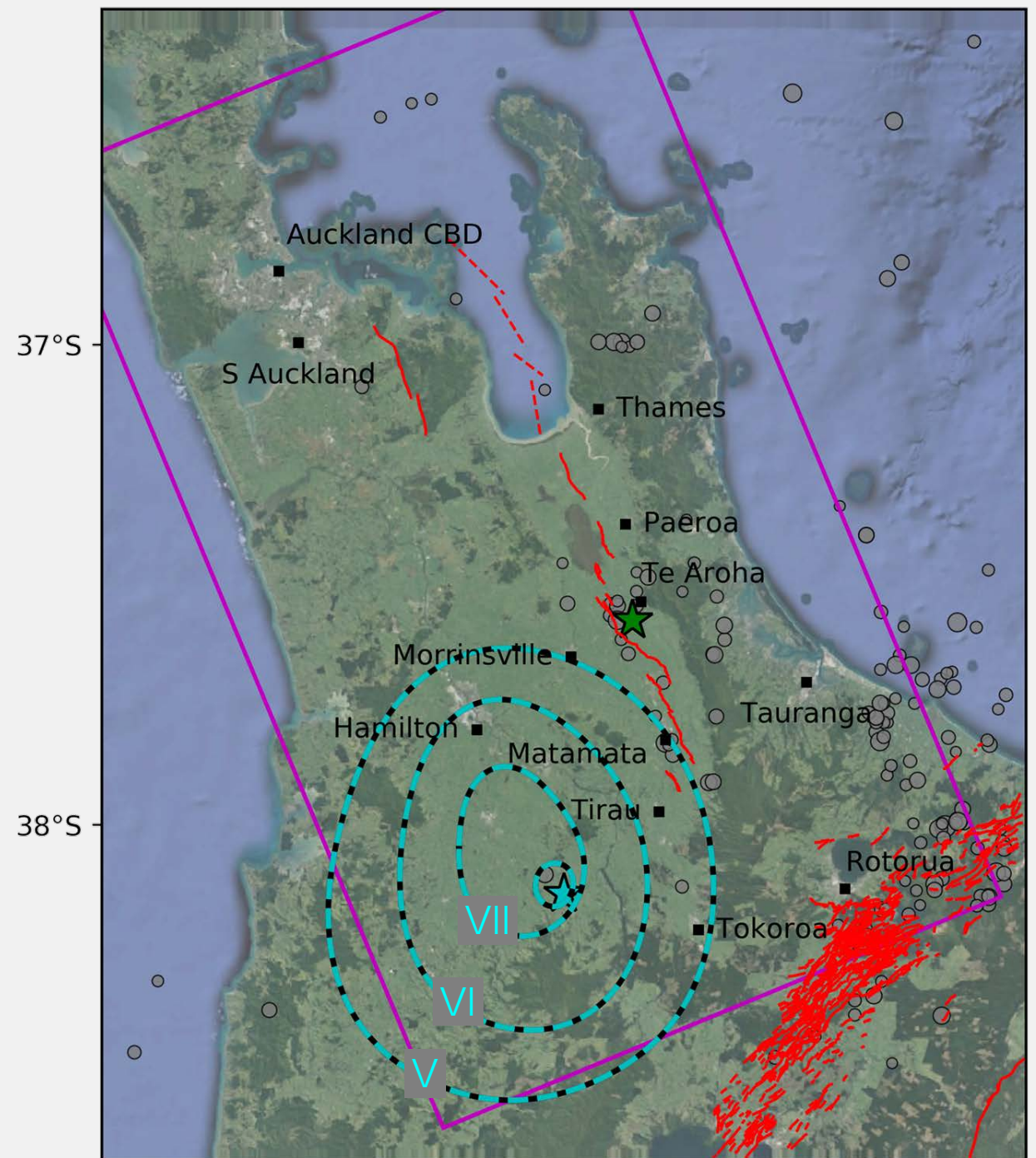
Sources

Korakonui \Rightarrow Mw 5.1

(anomalous intensities to NW)



(Eiby, 1977)

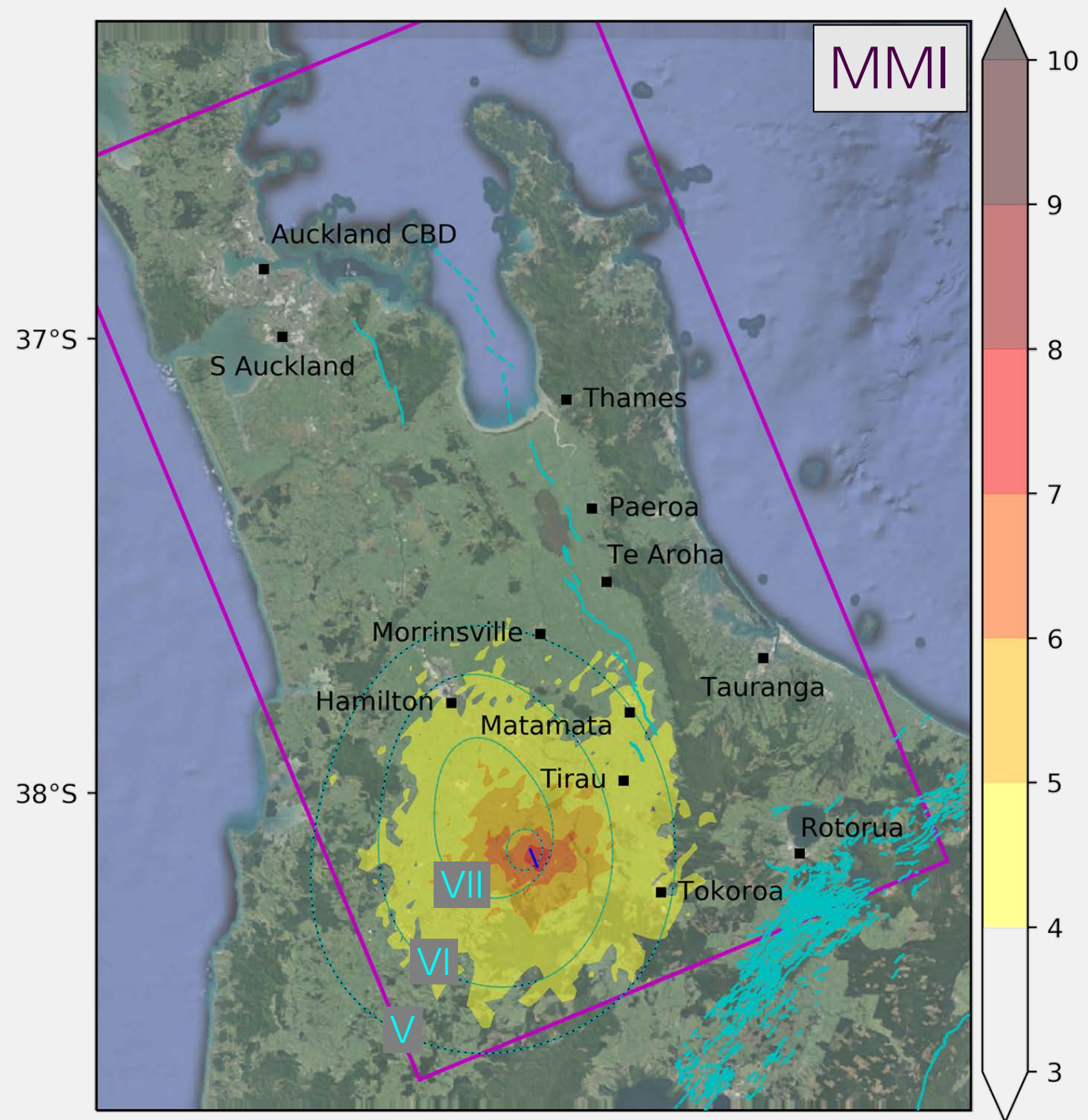


Sources

Korakonui \Rightarrow Mw 5.1
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Simulation without basin shows
no preference towards NW.

Simulation WITH basin...?



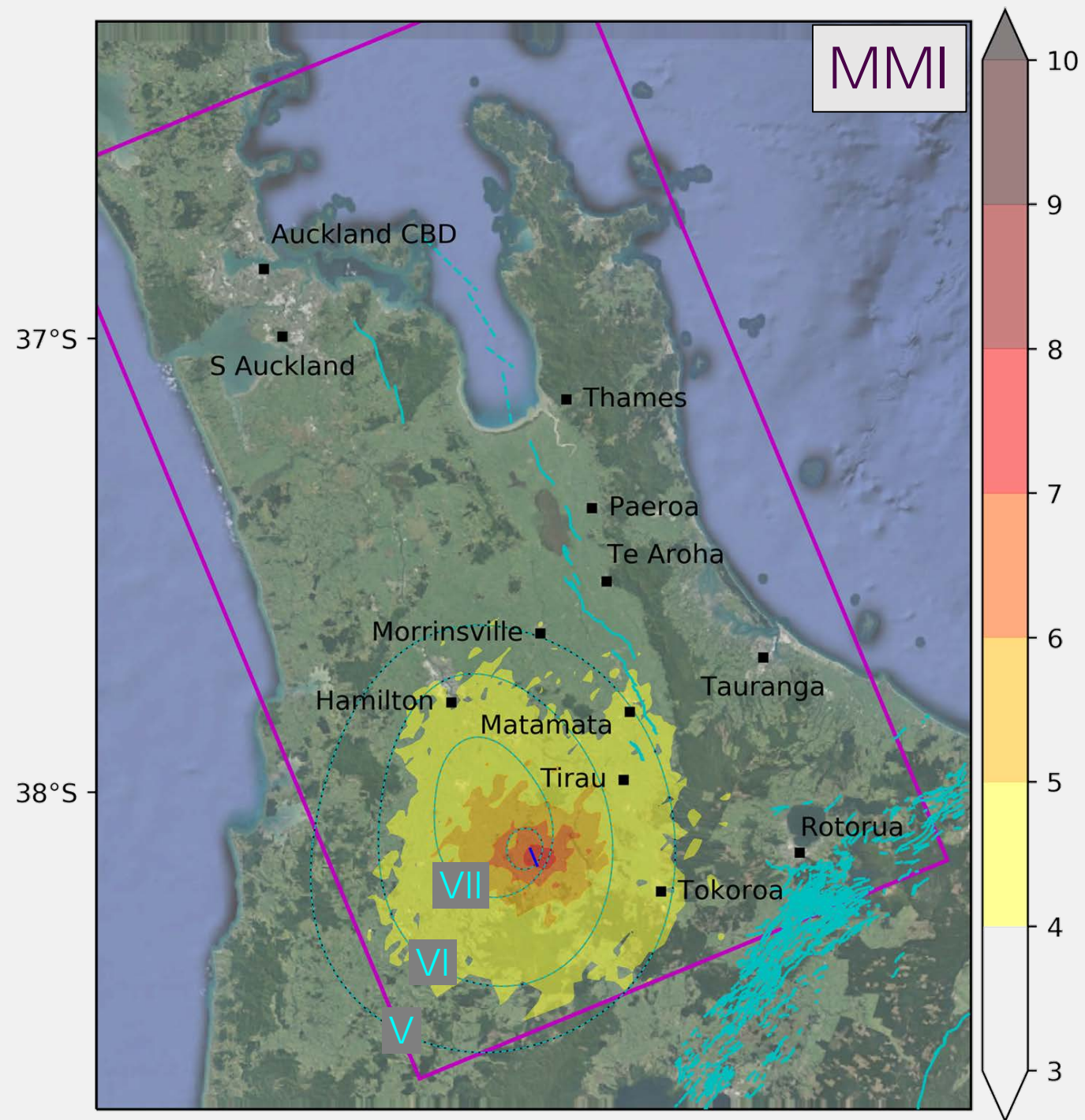
Sources

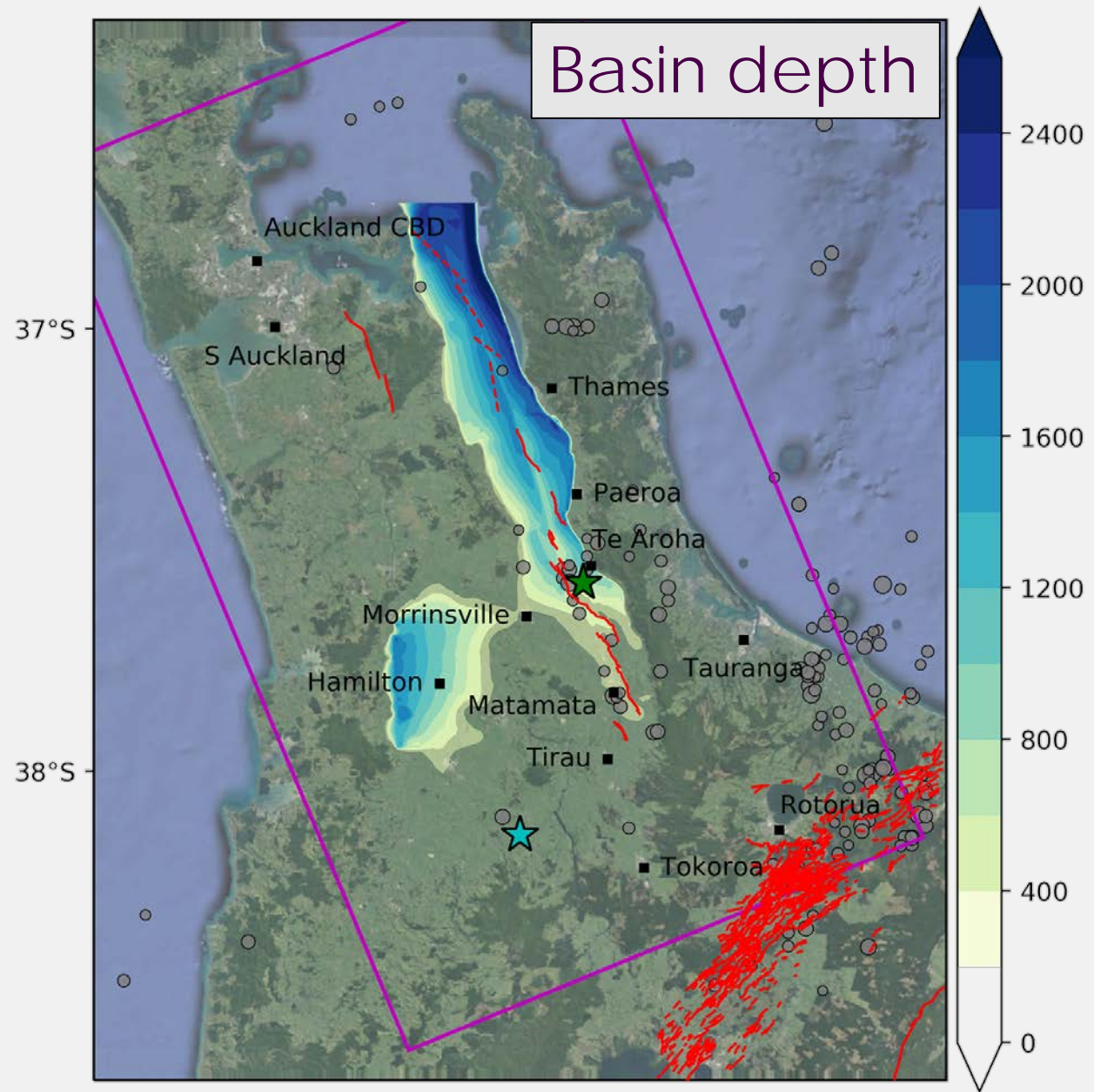
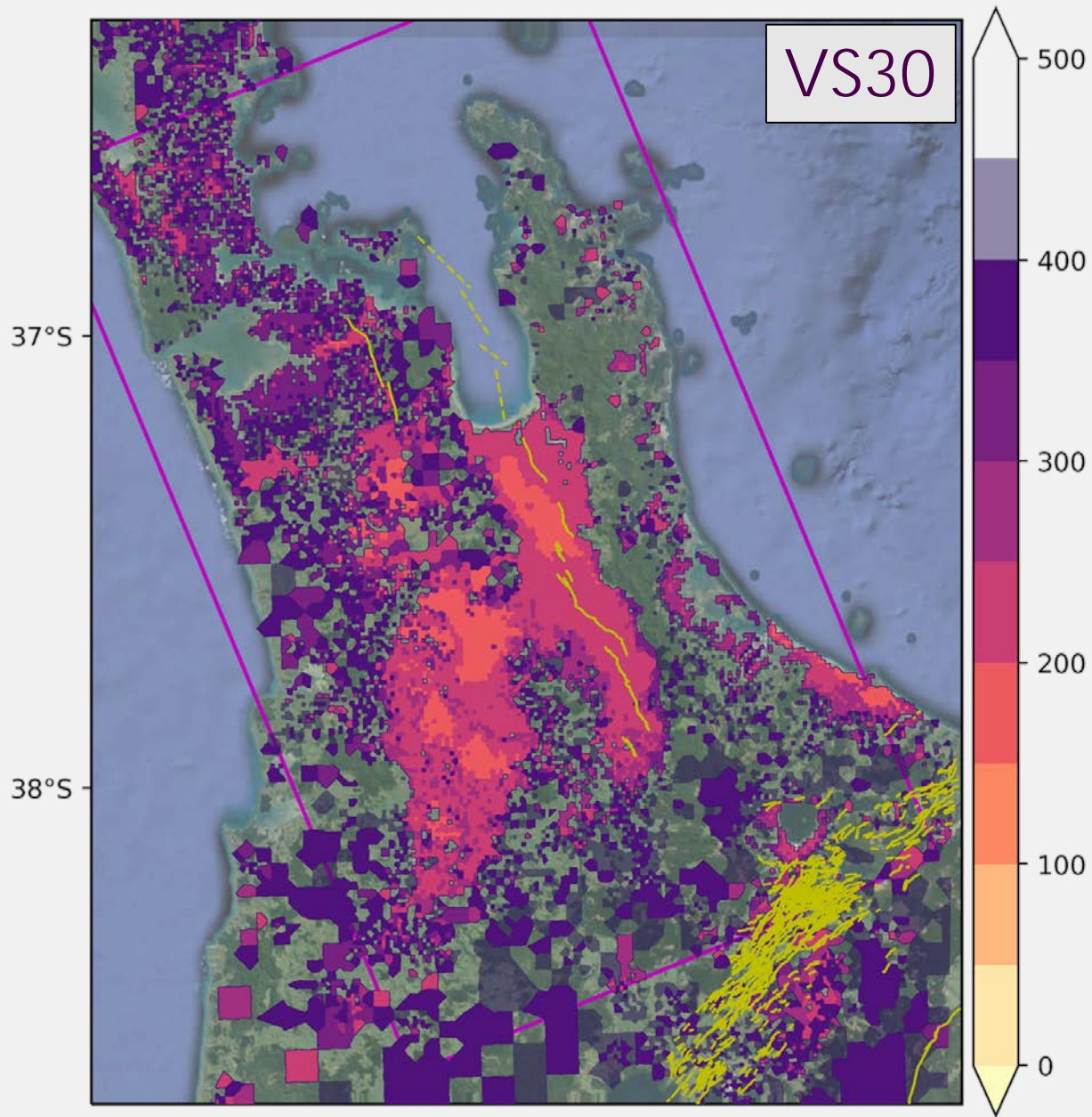
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Simulation WITH basin...

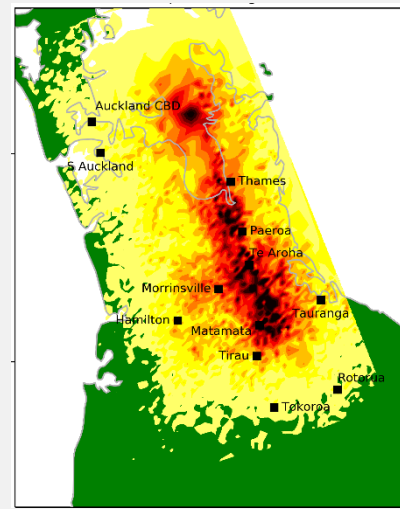
...also shows no preference
towards NW.





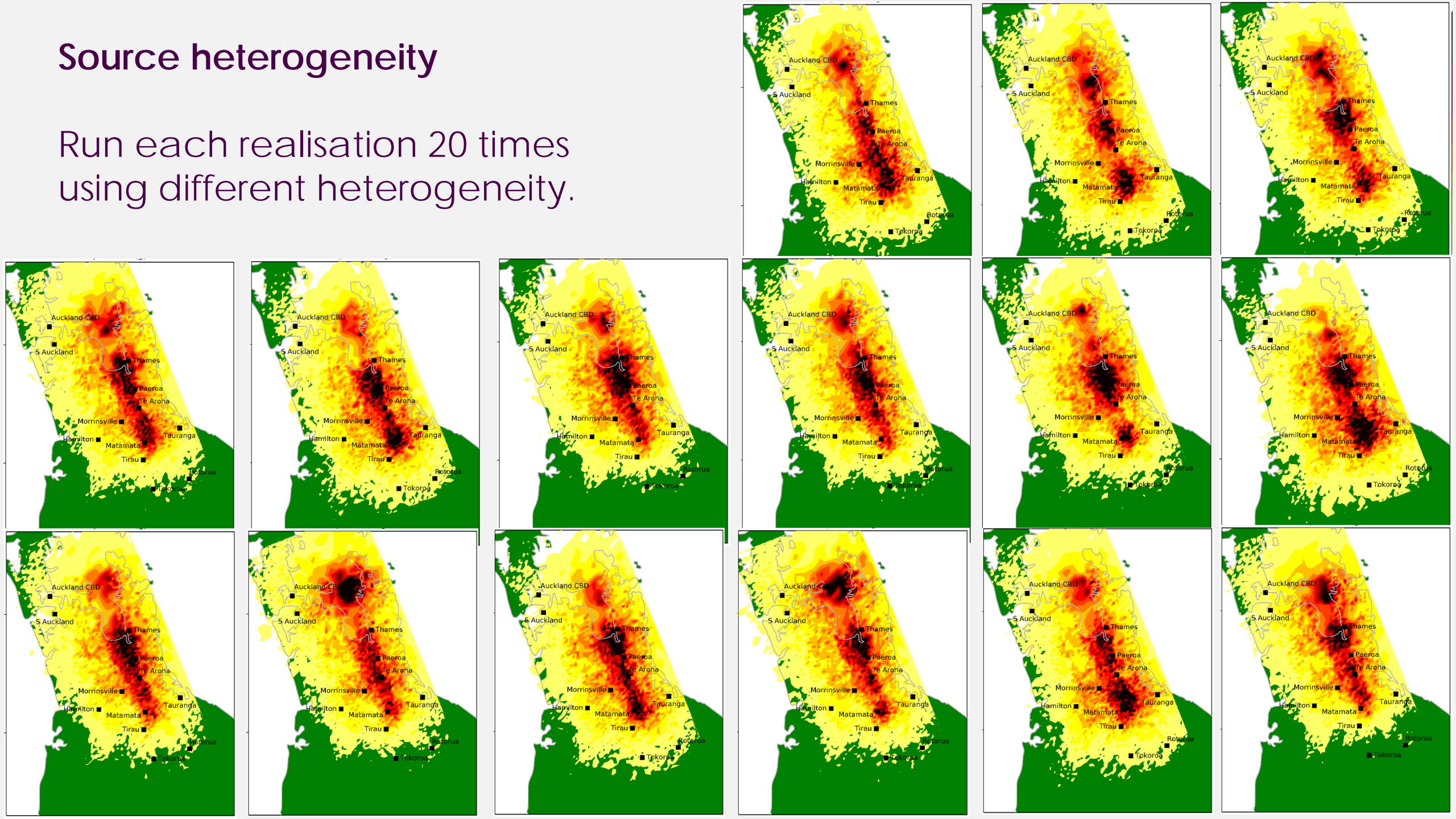
Source heterogeneity

Run each realisation 20 times using different heterogeneity.



Source heterogeneity

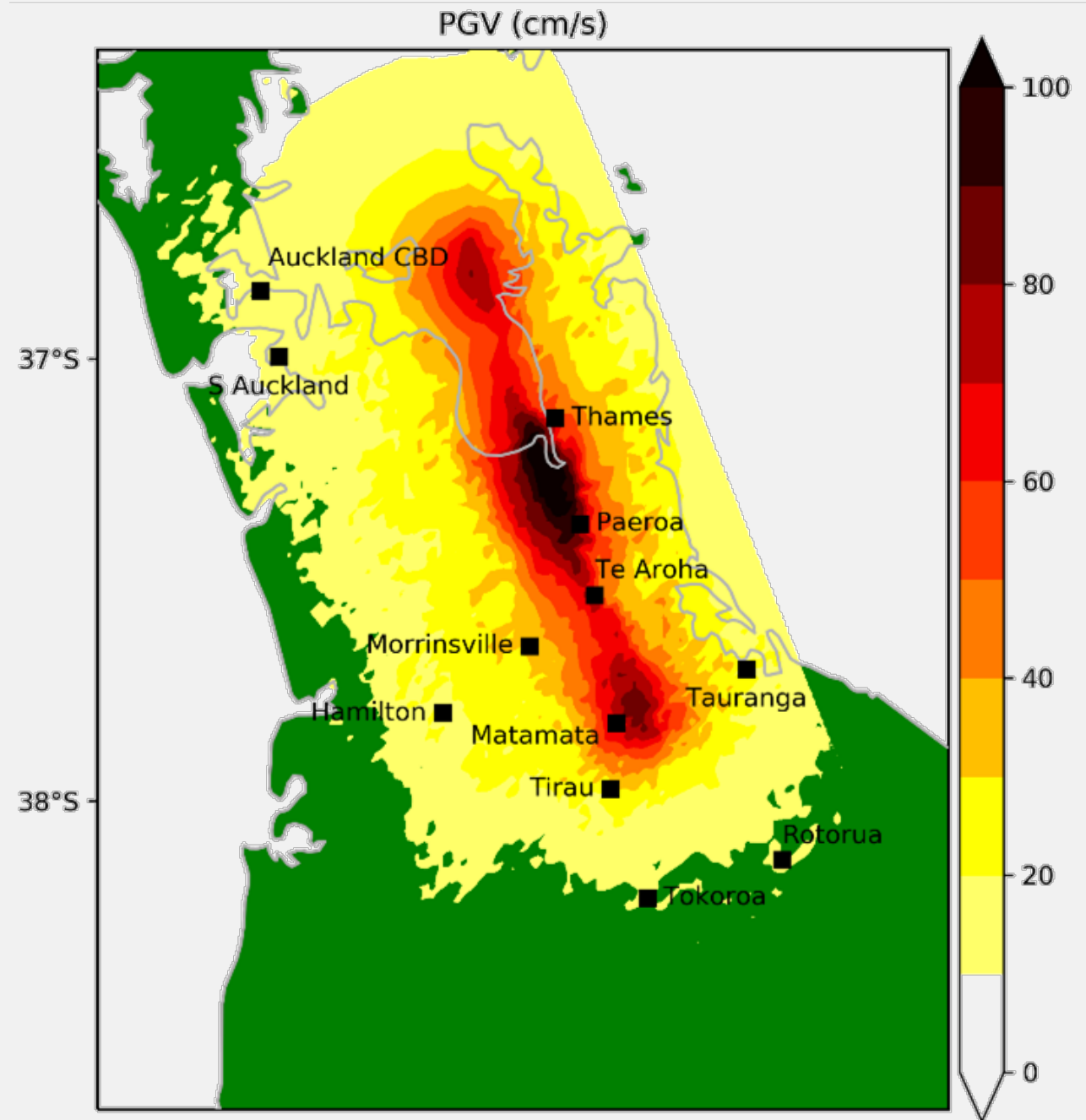
Run each realisation 20 times using different heterogeneity.



Source heterogeneity

Run each realisation 20 times using different heterogeneity.

Compute mean and spread of IMs across map.
(IMs strongly log-normal)



Source heterogeneity

Run each realisation 20 times using different heterogeneity.

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