

# Do intraplate and plate boundary fault systems evolve in a similar way with repeated slip events?

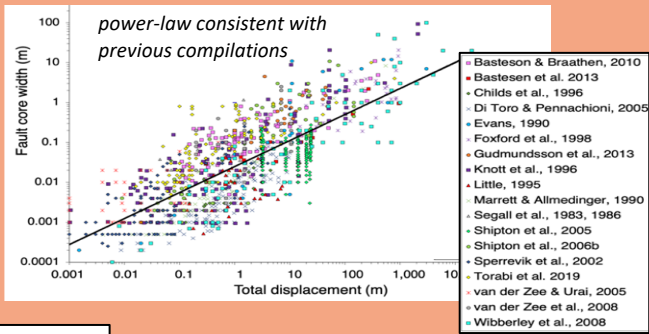
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All figures and data compilations from:  
 McKay et al 2022  
<https://doi.org/10.1016/j.epsl.2021.116757>



## ① Intraplate faults...

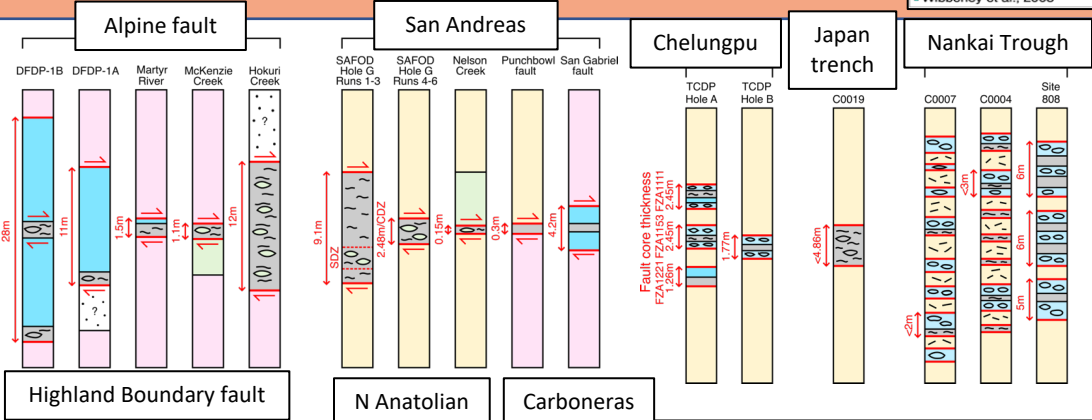
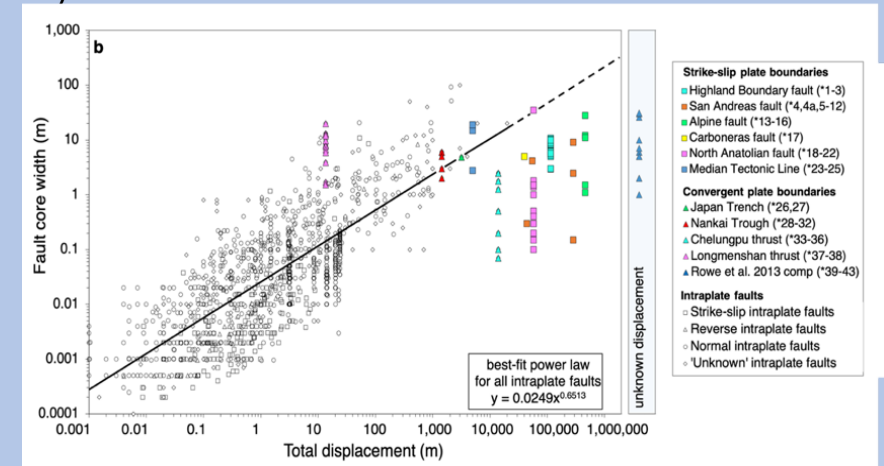
- wider with increasing total displacement (slip events)
- Fault core width = gouge, breccia and/or cataclasite in single fault core strand



## ② Plate boundary faults with large total displacement (>1000 m) 'should' have wide fault cores...

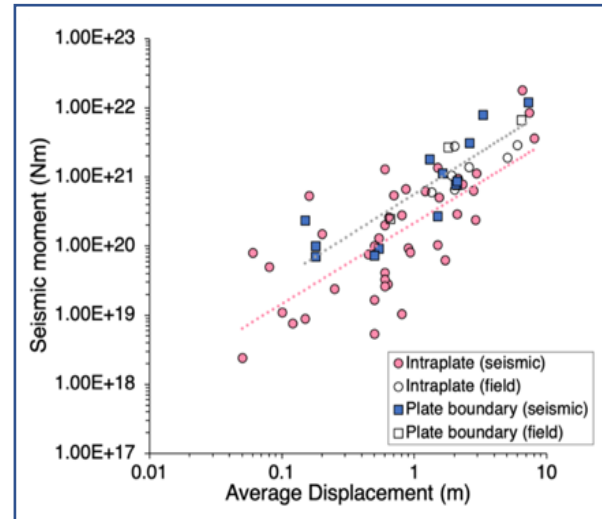
### 3-second summary

- Plate boundary fault cores are narrow
- Plate boundary EQ's have a greater seismic moment
- Narrow fault cores allow more energy to be radiated



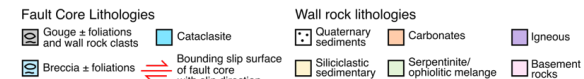
## ③ Plate Boundary faults are narrow regardless of:

- host rock
- kinematics (strike-slip or convergent)
- distance along-strike
- number of fault strands



## ④ Plate boundary EQ's typically have a greater seismic moment

- With more complex fault geometry, more energy has to be consumed at depth during an EQ and the less energy reaches the surface.
- Plate boundary faults narrow fault cores consume less energy allowing more energy to be radiated to the surface as higher magnitude earthquakes
  - Intraplate faults widen as fault slip increases, with complex zones of damage + propagation via linkage of neighboring structures



# Links to the research papers

McKay L., Lunn R. J., Shipton Z. K., Pytharouli S. and Roberts J. J. 2021. Do intraplate and plate boundary fault systems evolve in a similar way with repeated slip events? *Earth and Planetary Science Letters*. 559, 116757. <https://doi.org/10.1016/j.epsl.2021.116757>

McKay L., Shipton Z. K., Lunn R. J., Andrews B., Raub T. & Boyce A.J. 2019. Detailed internal structure and along-strike variability of the core of a plate boundary fault: The Highland Boundary fault, Scotland. *Journal of the Geological Society, London*, 177, 283-296  
<https://doi.org/10.1144/jgs2018-226>