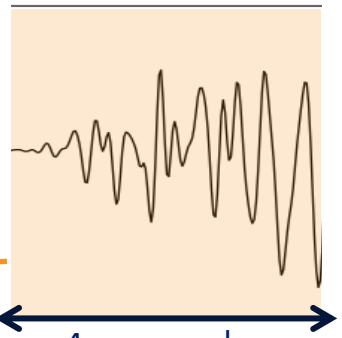
USING SEISMOGRAMS TO INVESTIGATE EARTHQUAKE DETERMINISM

What does  tell us about

?

This presentation participates in OSPP
EGU
Outstanding Student Poster & PICO Contest

Link to abstract

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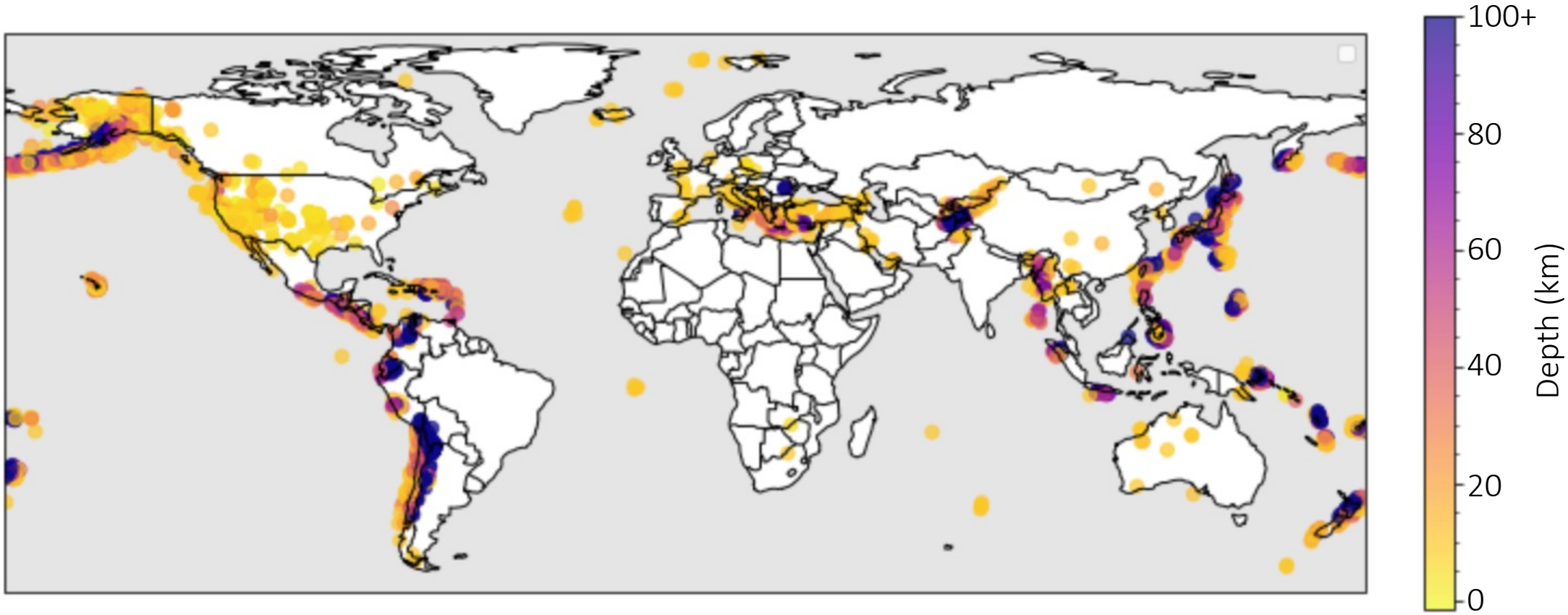
GLOBAL DATASET



Use every ≥M3.4 earthquake in 2019 with a station on IRIS within 100 km

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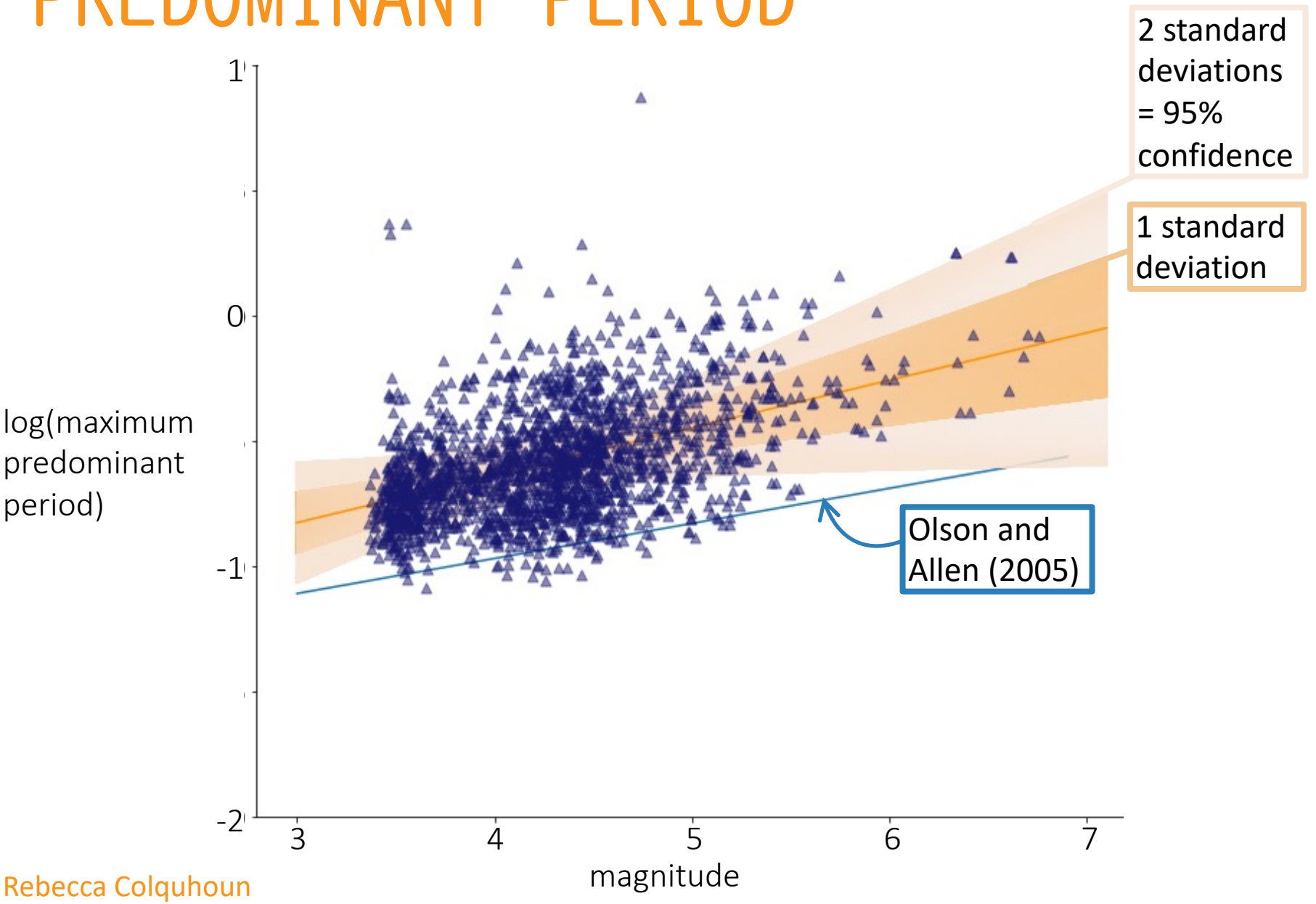
PREDOMINANT PERIOD



Measured velocity (low pass filtered)

$$\tau_i^p = 2\pi \sqrt{\frac{\alpha X_{i-1} + x_i^2}{\alpha D_{i-1} + \left(\frac{dx}{dt}\right)_i^2}}$$

Smoothing parameter

Predominant period at time *i*

characteristic value

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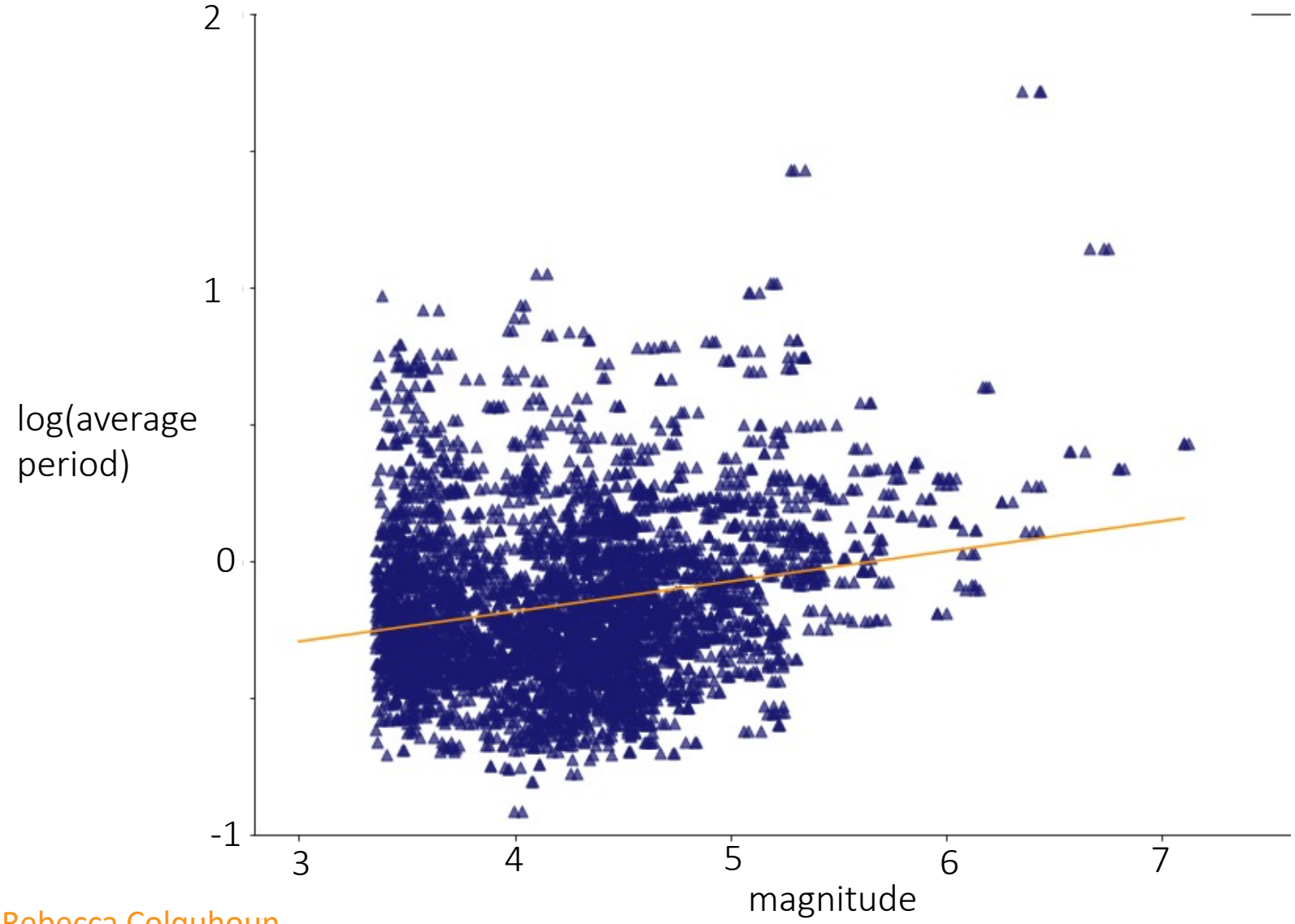
AVERAGE PERIOD HAS MORE SCATTER…



$$\tau_c = \frac{2\pi}{\sqrt{\frac{\int_0^{t_0} \dot{u}^2(t)\,dt}{\int_0^{t_0} u^2(t)\,dt}}}$$

Time window to consider (=4 s)

average period

High pass filtered displacement

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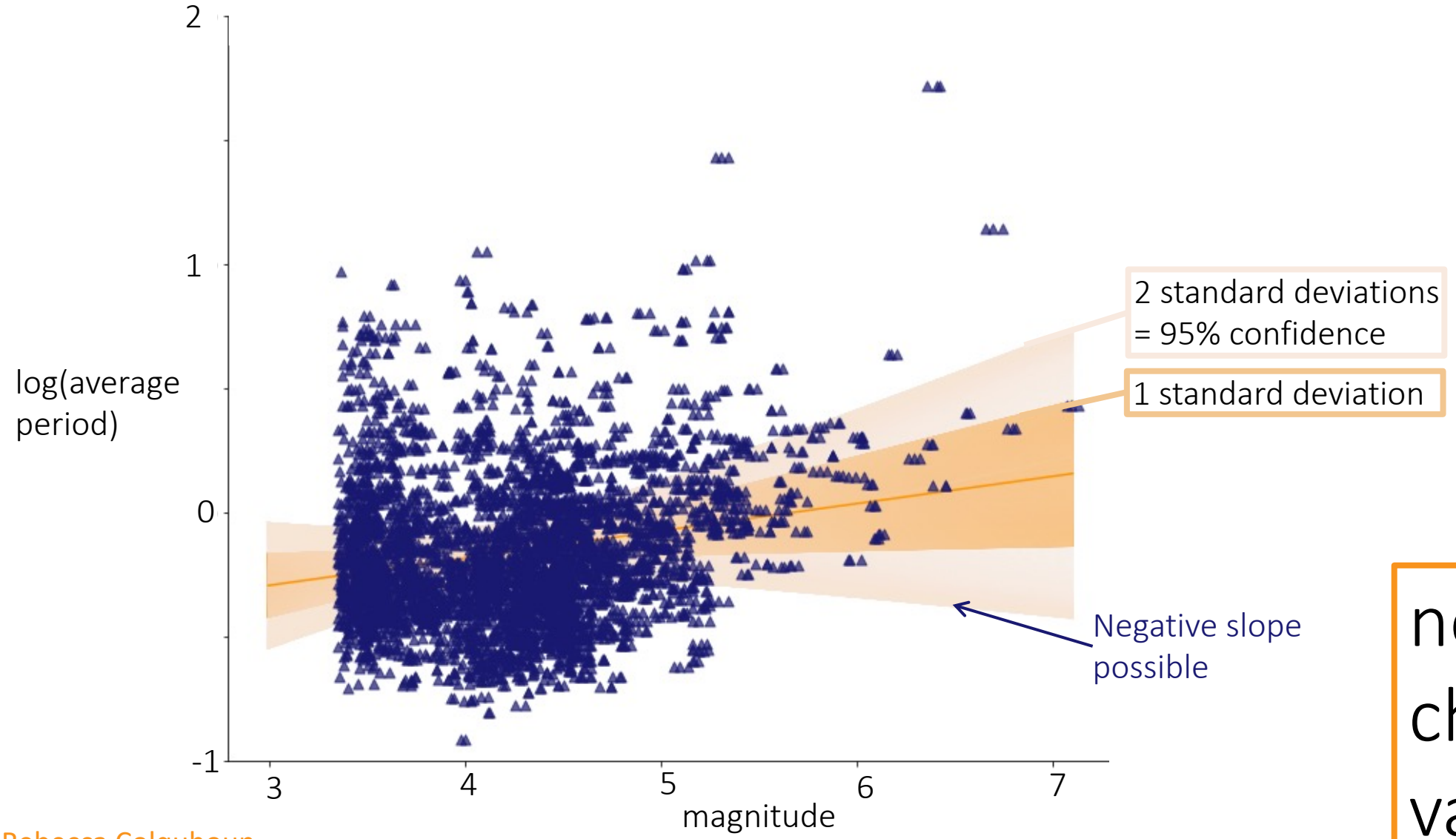
AND THEREFORE A MUCH MORE UNCERTAIN FIT



no characteristic value

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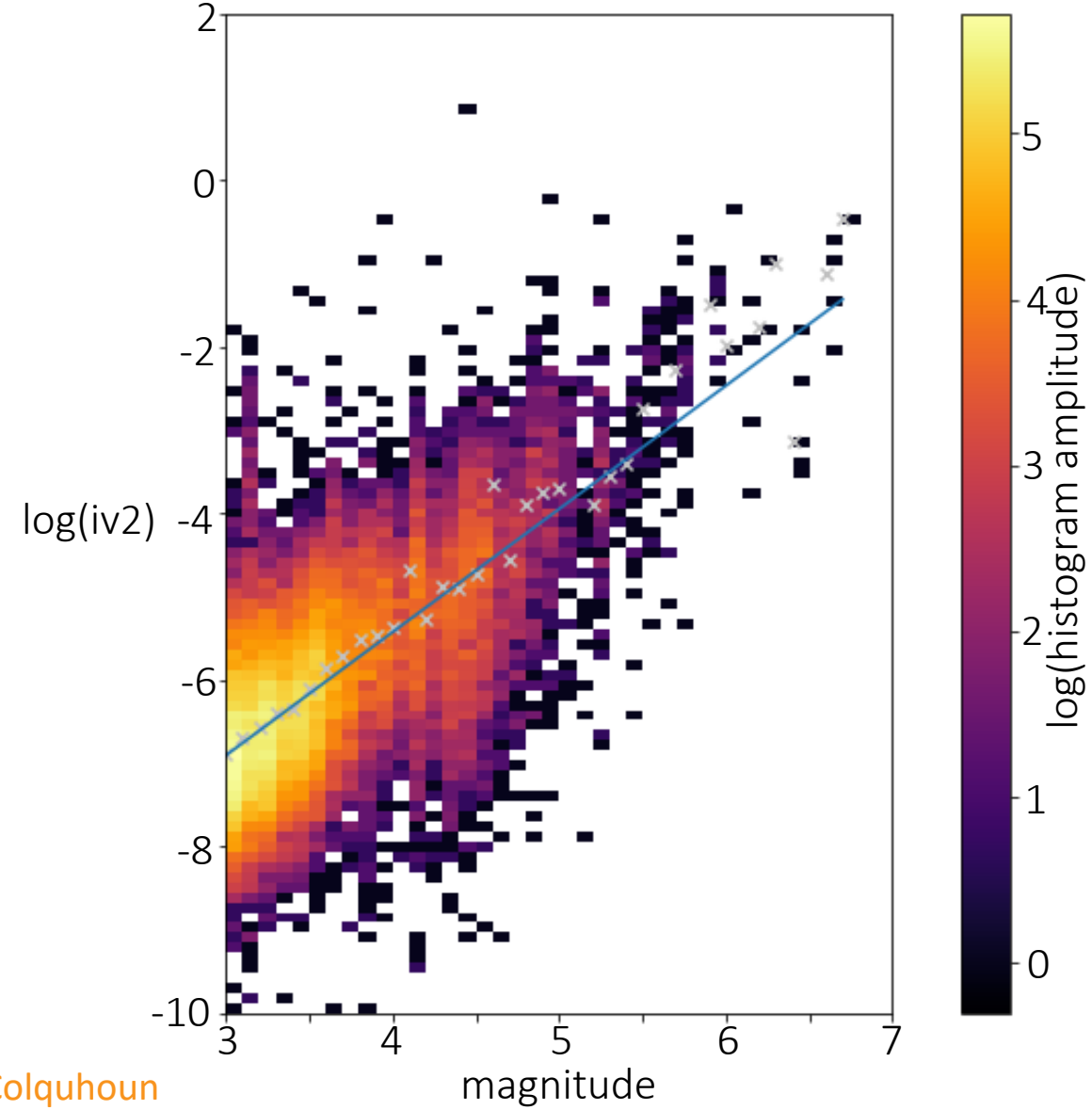
IV2 ∝ RADIATED ENERGY

a more physical parameter



Integral of velocity squared

$$IV2 = \int v^2 \, dt$$

Ground velocity

characteristic value

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CONCLUSIONS

Link to abstract

- Able to average out differences in individual earthquakes by using large data set

PREDOMINANT PERIOD	→ confident fit with magnitude
AVERAGE PERIOD	→ less certain fit
IV2	→ confident fit with magnitude

- Predominant period related to nucleation size?
  — Can we use modelling to probe physical basis of parameters?
- Relationships stronger in certain frequency bands?

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