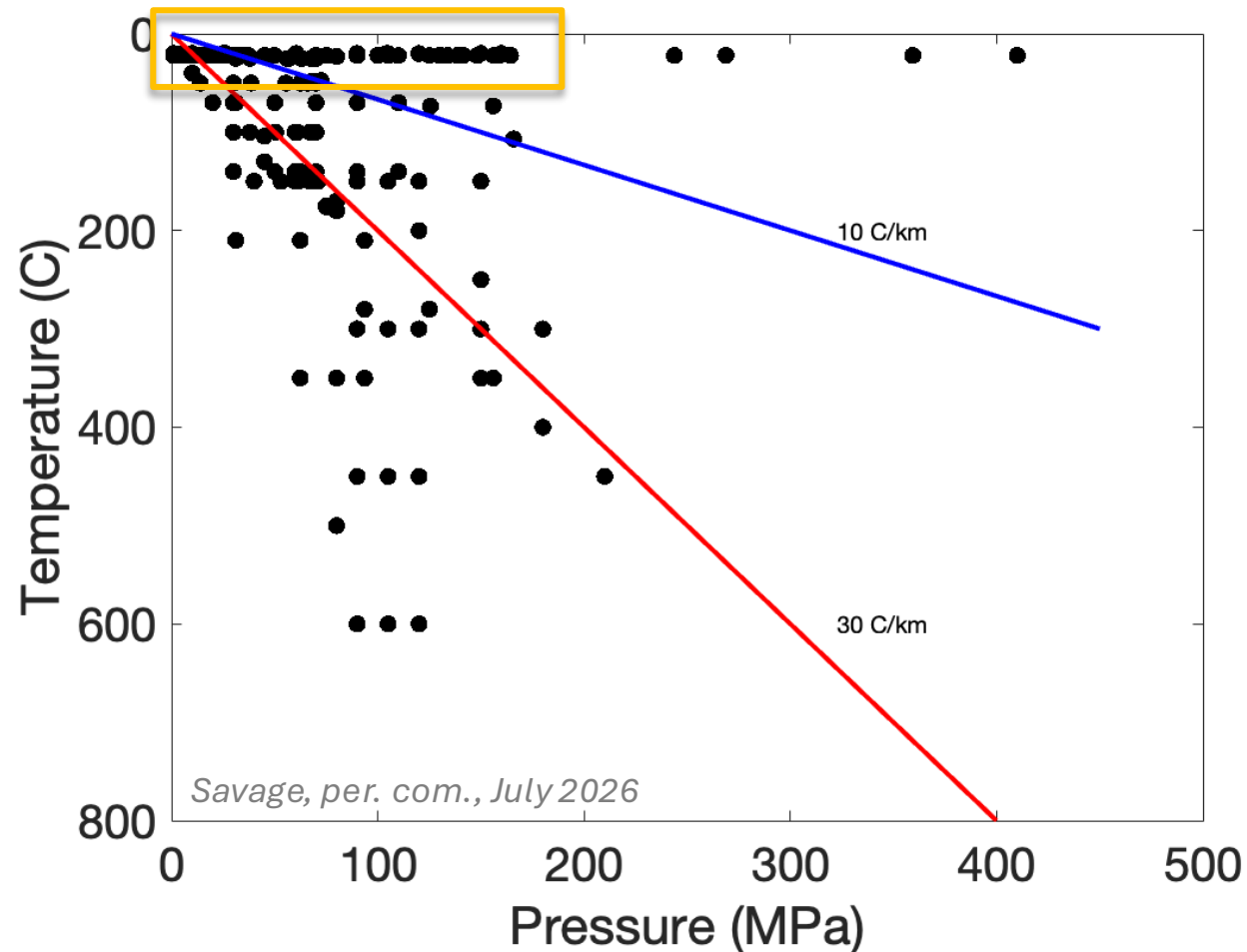


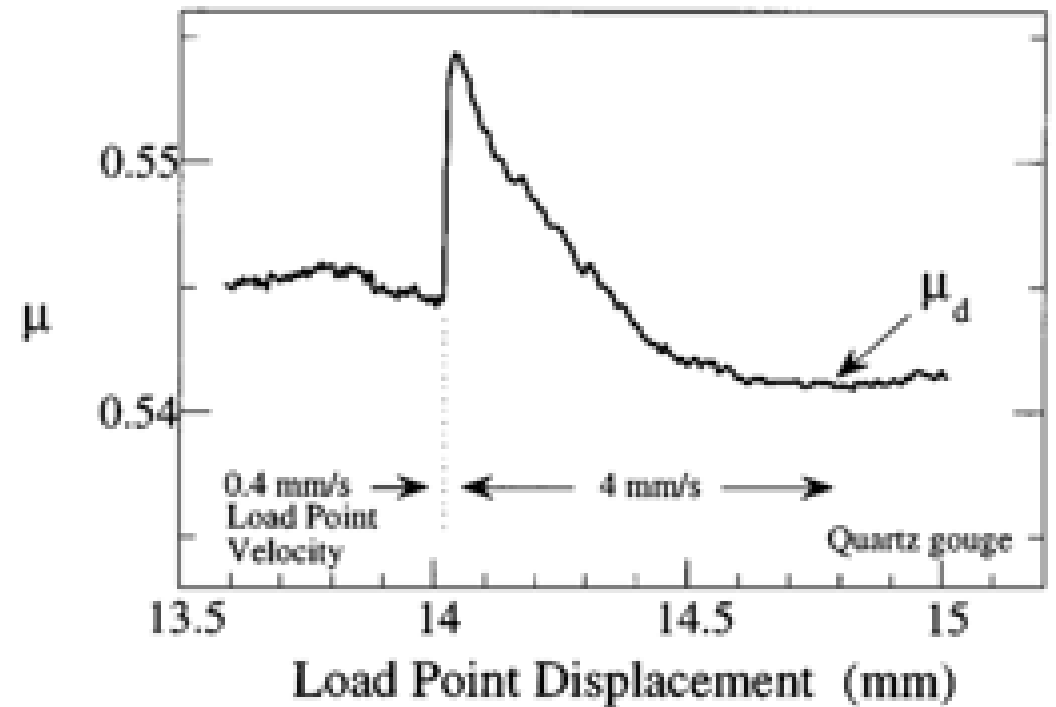
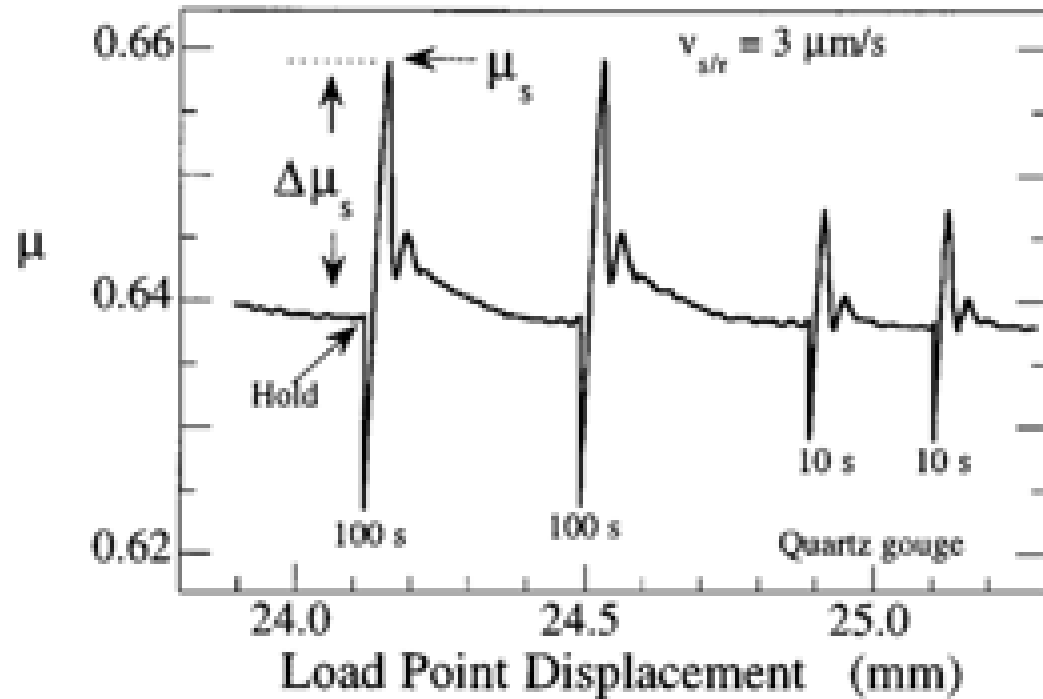
Experimental protocols when things get weird



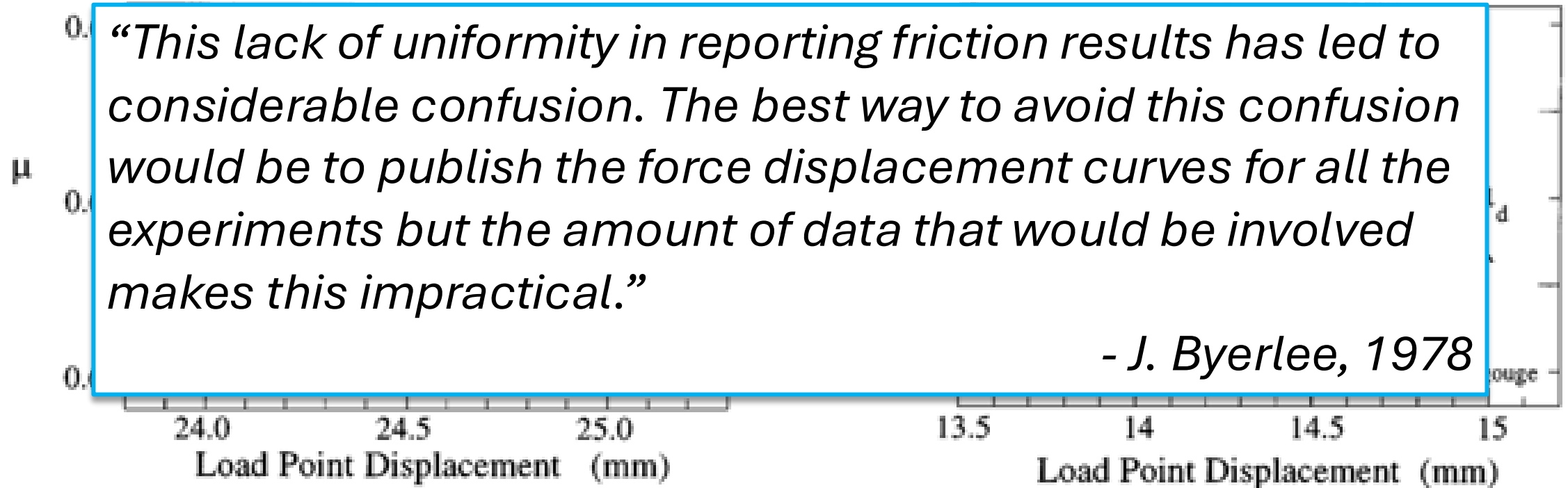
Tamara Jeppson
USGS Earthquake Science Center

2026 SCEC Friction Workshop
21 July 2026

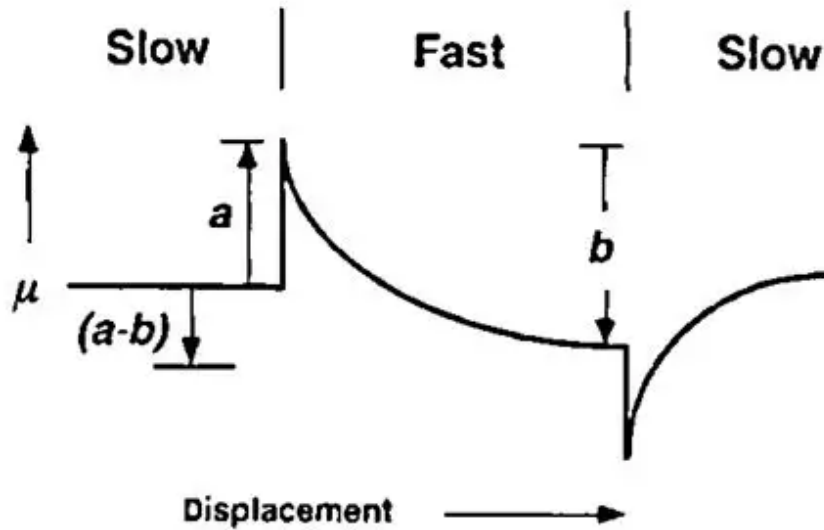
Characterizing friction



Characterizing friction

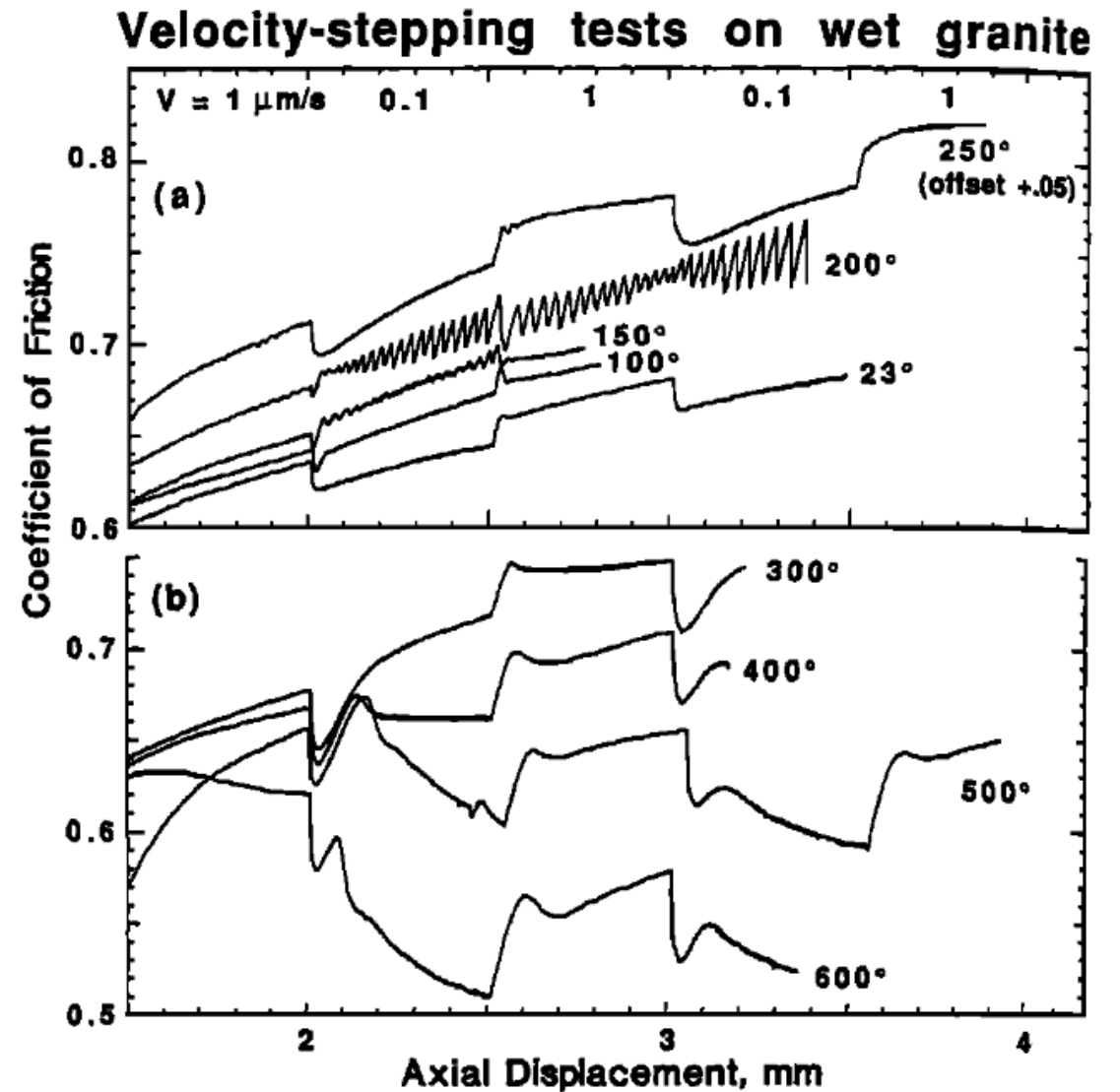


What is steady-state?



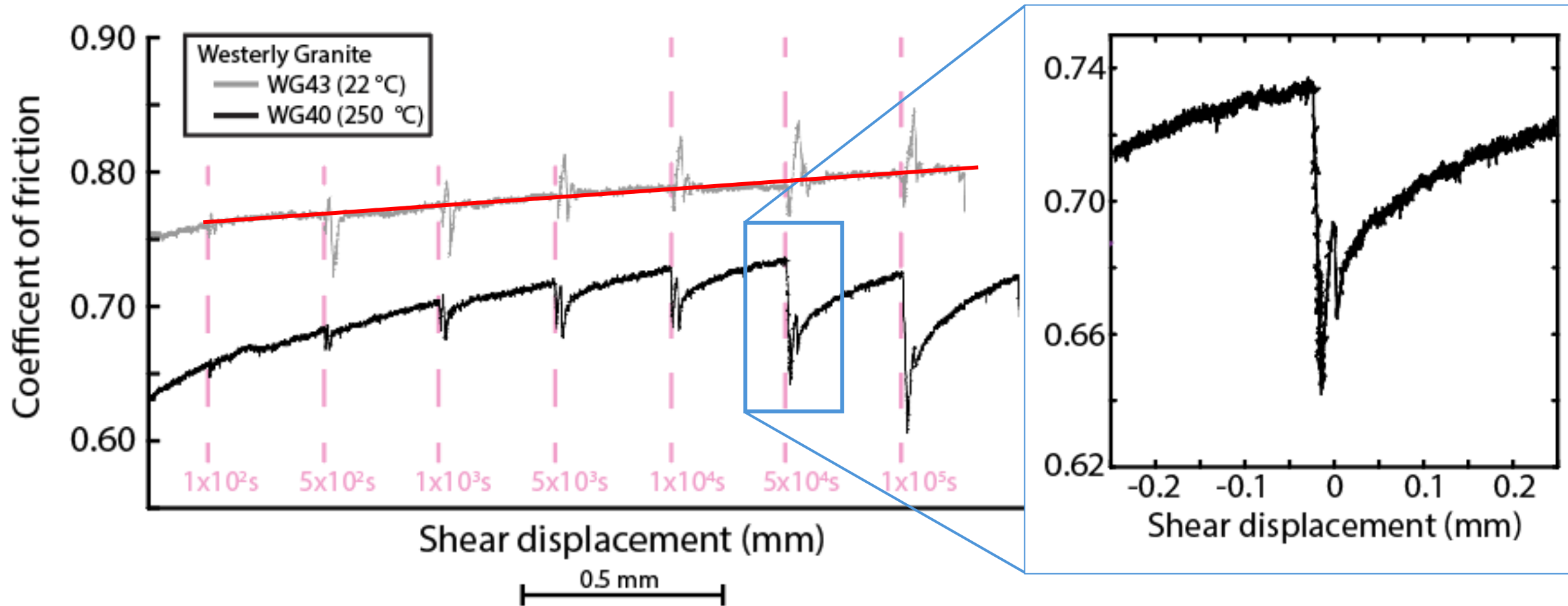
Scholz, 2002

- $< X\%$ variation in μ over Y mm of displacement
- Strain dependence
- Oscillations
- Long D_c



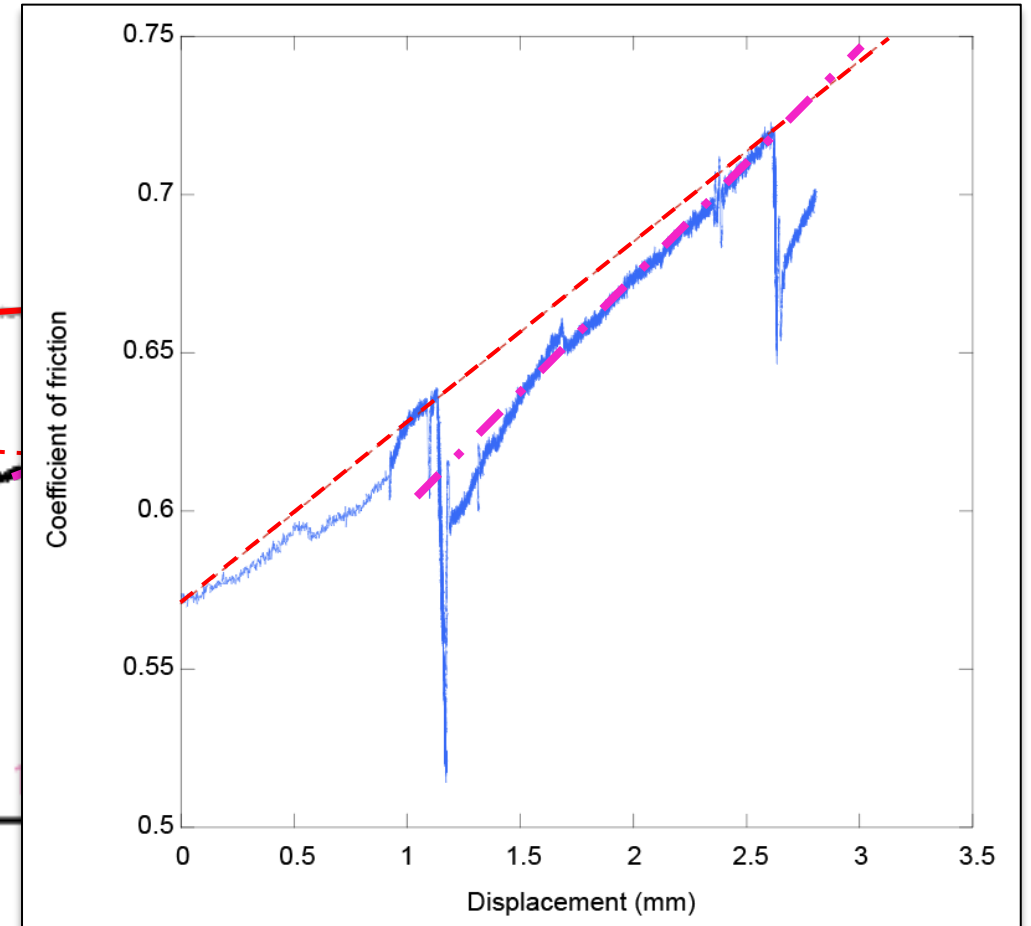
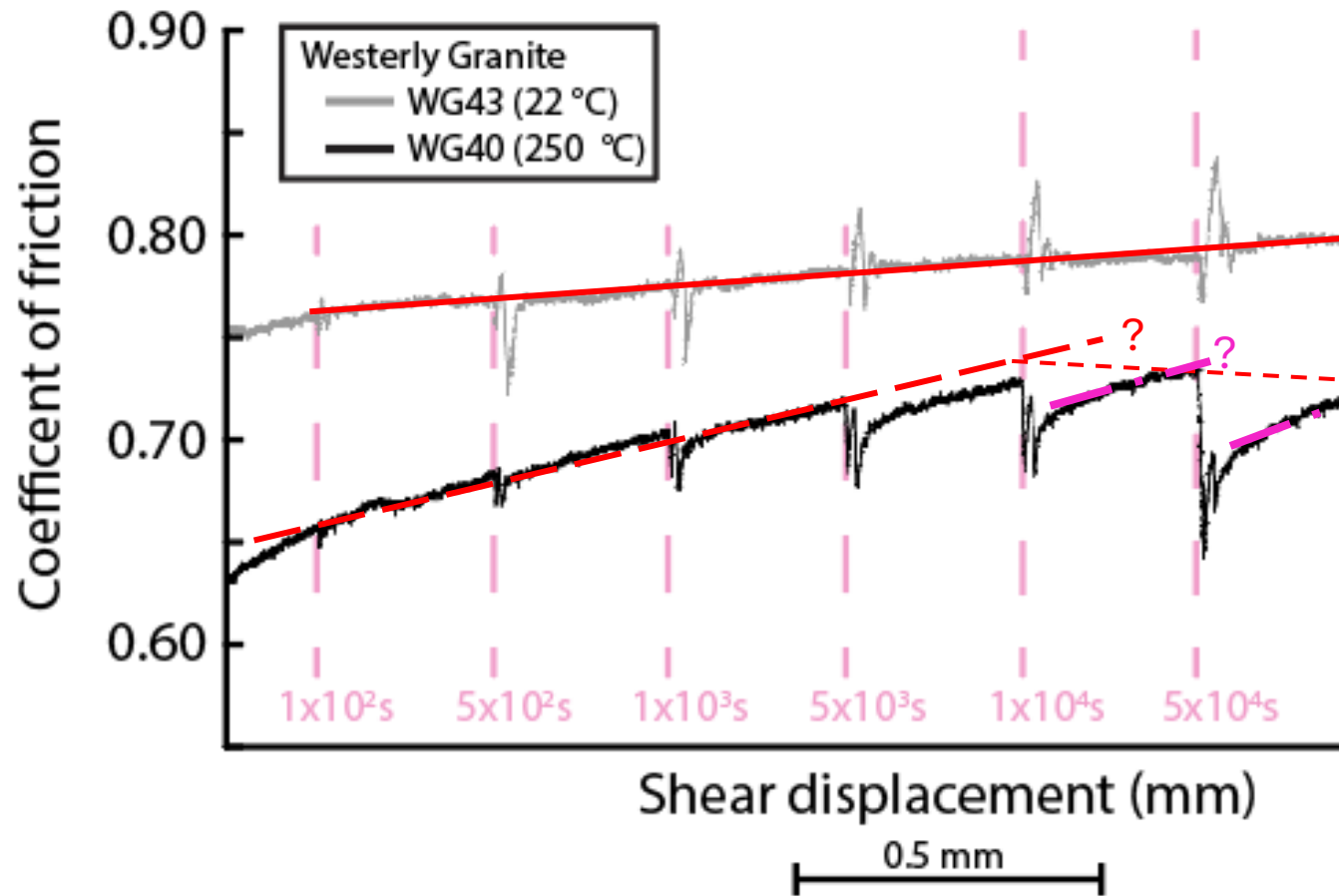
Blanpied et al., 1991

What is steady-state?



Jeppson et al., 2023

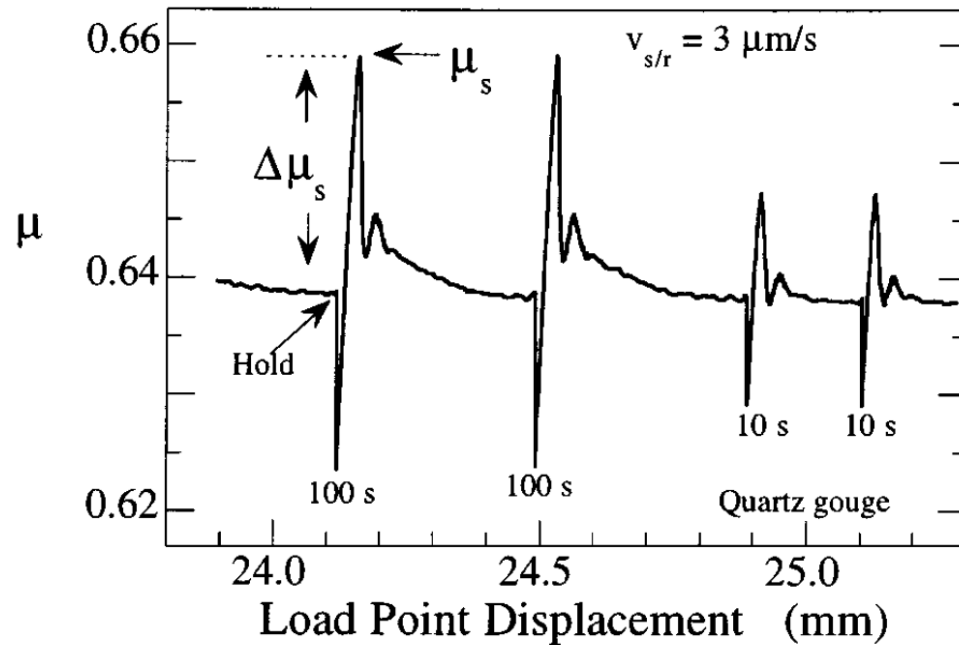
What is steady-state?



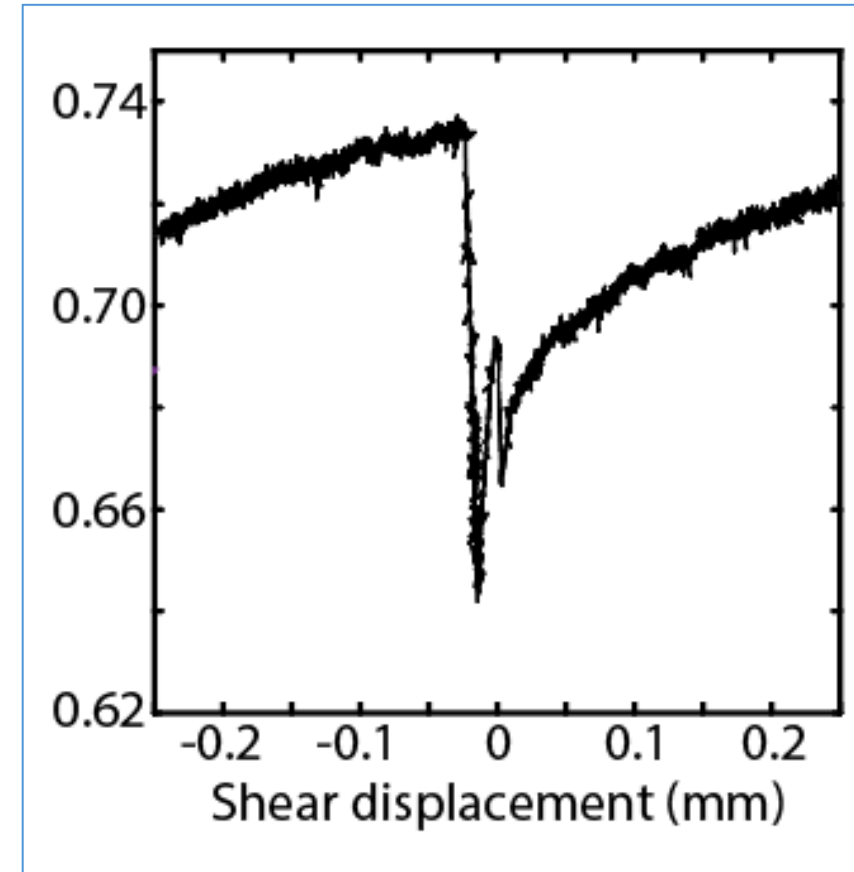
Jeppson et al., 2023

What is ~~healing~~ ^{frictional} ~~v~~?

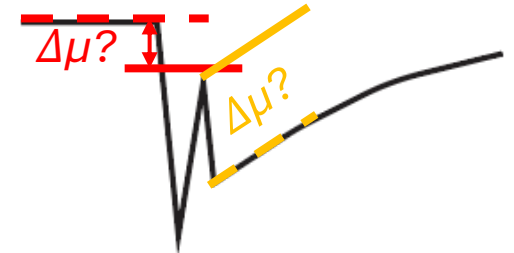
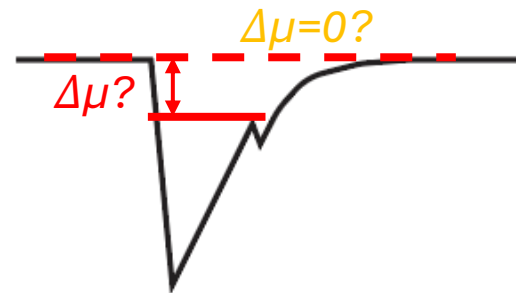
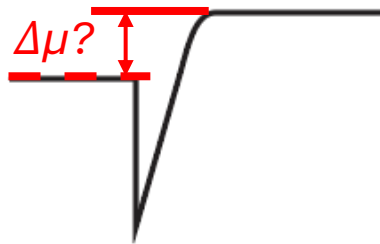
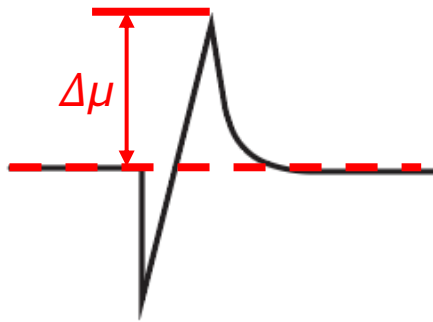
Time-dependent change in
Restrengthening
friction



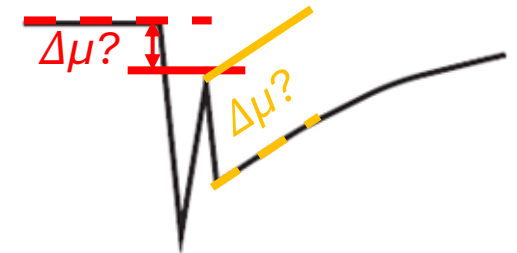
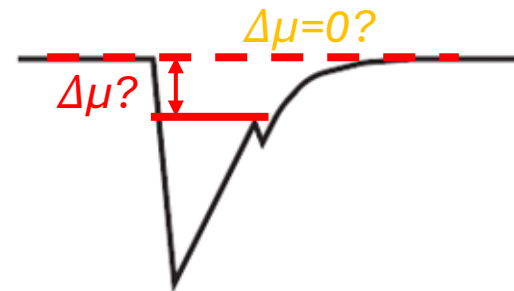
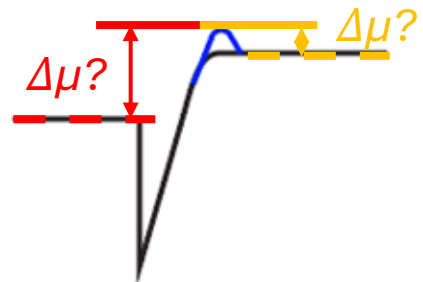
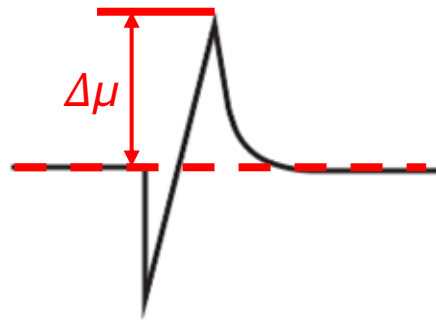
Marone, 1998



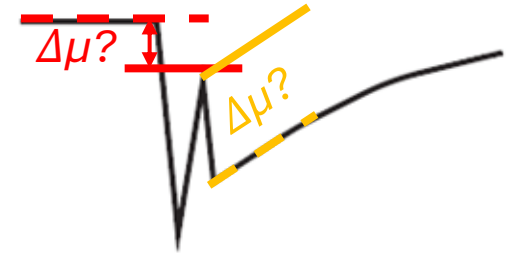
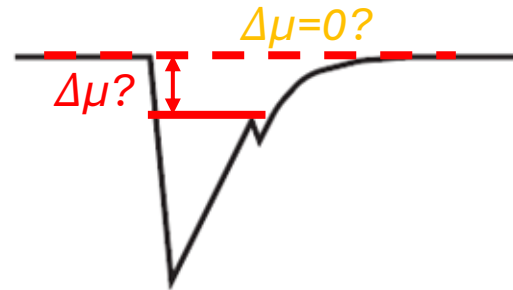
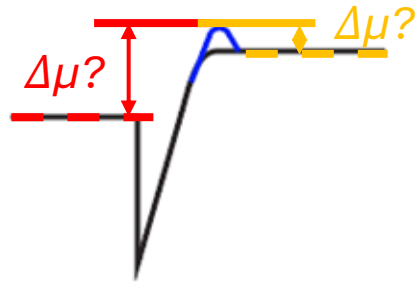
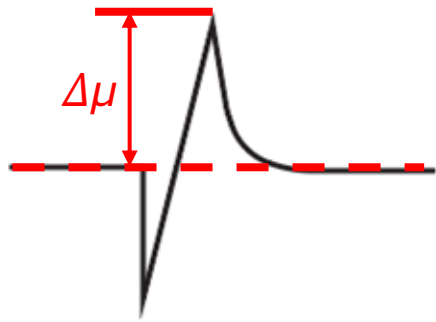
What is $\Delta\mu$?



What is $\Delta\mu$?



What is $\Delta\mu$?



$$\Delta\mu = \beta \cdot \cancel{\log_{10}}^{\ln}(t_h/t_0 + 1)$$

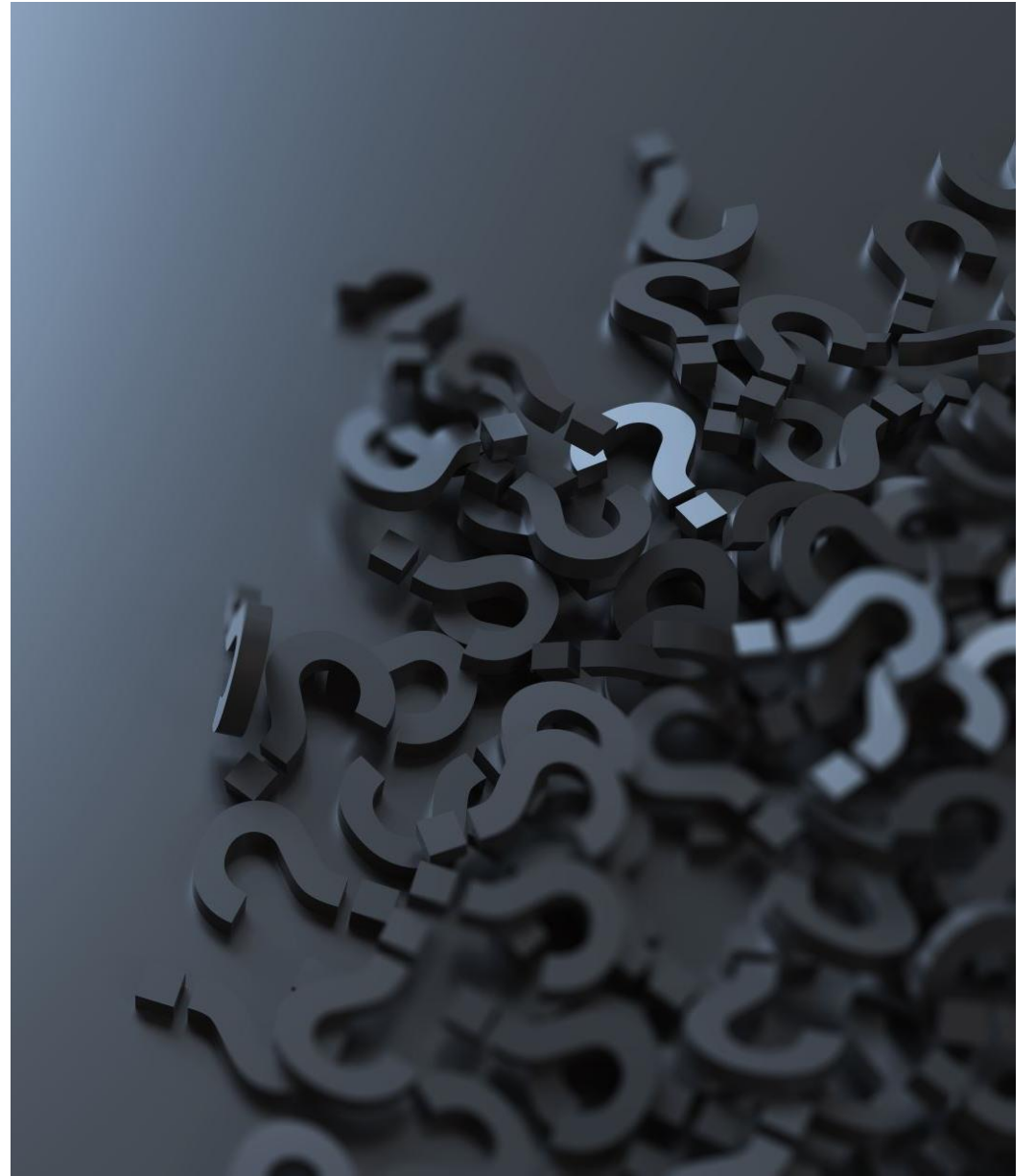
$$\Delta\mu = At^\omega$$

Rate-and-state inversion

- Can be determined from velocity steps, SHS, or oscillations
 - Yield different results
- Standardized fitting procedure or different but documented?

Uncertainty

- Measurements (stress, displacement, etc)
- Reproducibility
- Corrections
- Fitting parameters



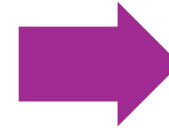
Sample selection & preparation

- Composition
- Grain size & shape
- Surface roughness
- Drying
- Packing
- Run-in
- Fabric
- Etc.



Experiment

- Apparatus
 - Stiffness
 - PID settings
- Test type
- Stress state
- Fluids/chemistry
- Pore pressure
- Slip rate
- Time
- Temperature
- Displacement
- Localization
- Etc.



Analysis

- Definitions
- Inversions
- Corrections
- Uncertainty
- Etc.