2018 CRM Workshop Report
13 November 2018

A workshop under the aegis of SCEC's Community Rheology Model (CRM) effort was held on September 8th 2018 at Palm Springs Its goal was to explore observations and models bearing on the existence (or not) of narrow ductile shear zones and distributed ductile deformation in southern California's lower crust and upper mantle lithosphere. One session was devoted to examining evidence from lab ductile flow experiments, process-based modeling and the rock record, demonstrating how several weakening mechanisms promote shear localization but also are consistent with bulk ductile flow. A second evaluated geophysical evidence from the niche fields of structural seismology, non-volcanic tremor observations, and tectonic geology that strongly supported shear localization beneath several segments of the San Andreas fault but not excluding distributed deformation in other parts of Southern California. Finally, a third session included two provocative presentations; one showed emerging evidence that bulk ductile rheology may be inferred from tomographic models of P- and S-wave structure in SoCal; the other described a suite of numerical models of strike slip earthquake cycle deformation. Lively discussion followed all workshop presentations, with some arguing for strain localization and others supporting large-scale ductile flow. The meeting was well-attended, with 50-65 participants, and the meeting room was full from start at 9 am to adjournment at 5 pm.

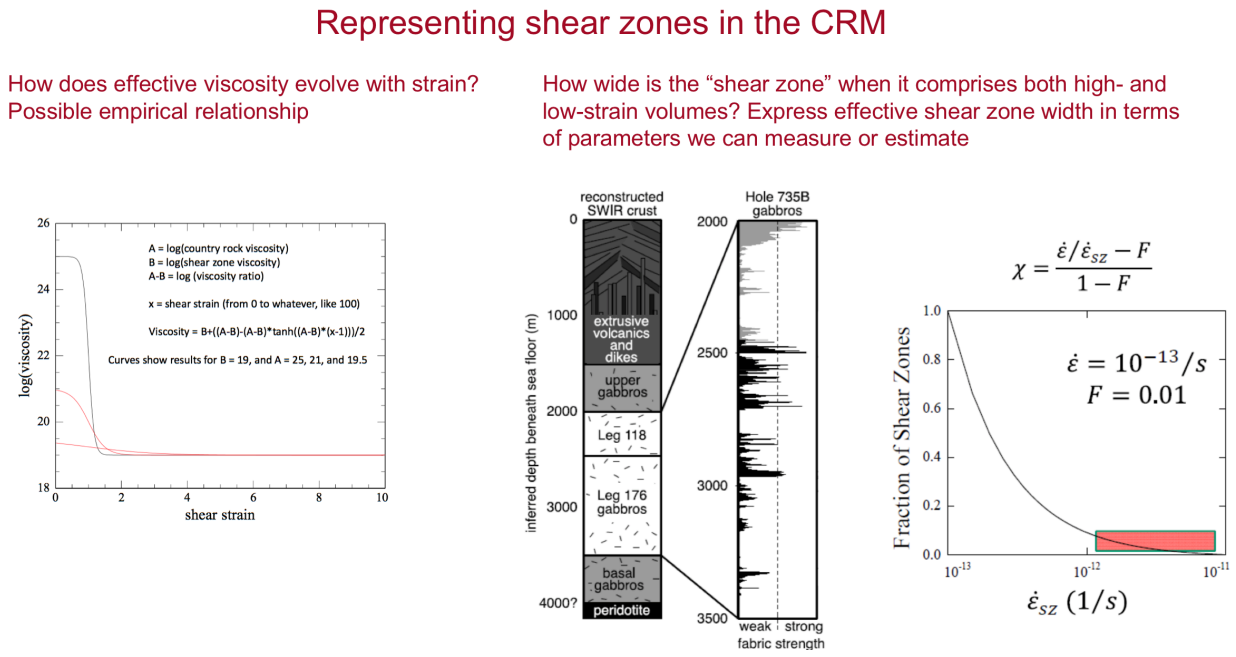

Figure 1: Important issues bearing on the development (or not) of localized ductile shear zones

WORKSHOP AGENDA

Loading of Southern California Faults: Bulk Lithospheric Deformation and/or Localized Ductile Shear Zone Strain

9:00-9:20 AM CRM Overview and Update; Workshop Outline and Goals (Hearn)

9:30-10:20 am Session 1: CRM Overview and updates - Liz Hearn - 30 minutes

- Geologic Framework update - Mark Legg, Mike Oskin
- Rheology update – Greg Hirth and Billy Shinevar
- CTM update – Wayne Thatcher
- Intro to the 2017 workshop: shear zones vs host rocks

10:20 – 10:30 am: SHORT COFFEEE BREAK

10:30 - Noon Session 2: Localized vs Bulk Ductile Deformation: Lessons from the Lab, Modeling and the Rock Record. (Greg Hirth and Mike Oskin)

- Presentation - Laurent Montesi - modeling and laboratory rock mechanics focus
- Presentation - Elisabeth Nadin – geology and structure focus
- Presentation - Elena Miranda - process/rheology focus

Open Discussion - where do we go from here? Specific scientific issues, ways to contribute to CRM. Example: do all CA faults have a localized ductile shear zone?

Noon - 1:00 pm LUNCH

1:00-2:45 pm Session 3: Localized vs Bulk Ductile Deformation - Lessons from Geophysics. (Thatcher)

- Presentation - Eileen Evans - Tectonic geodesy
- Presentation - David Shelly - Seismology (seismicity, tremor)
- Presentation – Heather Ford – Structural seismology
- Open Discussion - where do we go from here? Specific scientific issues, ways to contribute directly to CRM during SCEC5

2:45 – 3:00 pm COFFEE BREAK

3:00 - 5:00 PM Session 4: Provocative Talks and Discussion (Hearn)

- Billy Shinevar - The promise of constraining crustal rheology from Vp and Vs
- Eric Dunham – Strike-slip earthquake cycle modeling with localized or bulk ductile deformation
- Discussion