ExTerra
The inner workings of GeoPRISMS

Fault systems

Arc crust

Subducted slab

Mantle wedge

Ritter Range, Sierra Nevada

Monviso, Italy

Ring Mountain, Tiburon, California
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Agenda:
• Reception and introduction
• **Keynote** - Brad Hacker
• First breakout
• **Sample and data management** - Maureen Feineman
• Second breakout
• Synthesis
Your mission:

• Identify scientific objectives for ExTerra.

• Identify logistical and organizational needs for ExTerra.

• Think about what you can do with others and for others.
GeoPRISMS
Draft Implementation Plan

“Living Document”

Theme 1: Identifying Controls on Fault Slip Behavior and Deformation History

Online discussion forum after the workshop for discussion and contributions to workshop white paper:
www.geoprisms.org

Stay tuned!

B. Metamorphism, melting and fluid/melt migration in the mantle wedge

C. Arc crustal architecture and evolution

Theme 5: Subduction Initiation
GeoPRISMS

Key Questions

1) What governs the size, location and frequency of great subduction zone earthquakes and how is this related to the spatial and temporal variation of slip behaviors observed along subduction faults?

2) How does deformation across the subduction plate boundary evolve in space and time, through the seismic cycle and beyond?

3) How do volatile release and transfer affect the rheology and dynamics of the plate interface, from the incoming plate and trench through to the arc and backarc?

4) How are volatiles, fluids, and melts stored, transferred, and released through the subduction system?

5) What are the geochemical products of subduction zones and how do these influence the formation of new continental crust?

6) What are the physical and chemical conditions that control the initiation and development of subduction zones, including subduction initiation and the evolution of mature arc systems?

7) What are the feedbacks between surface processes and subduction zone mechanics and dynamics?
What can studies of exhumed systems contribute to GeoPRISMS?

• Organizes individual efforts into major interdisciplinary objectives
  – the whole is greater than the sum of the individuals
• Integrating data from multiple sites allows coverage of a broad range of conditions not observable at a single site
• Links experiments and seismic observation to physical reality
  – Adds components of space and time
  – Do the measurements scale up? grain scale to outcrop scale, outcrop scale to seismically resolvable features, days to millions of years
• Enables coupled study of mechanical and chemical processes
• Allows sample and data collection to be tuned to serve the needs of other groups (geochemists helping seismologists, petrologists helping modelers, etc...)
Scientific Questions

• What are the rates and fluxes associated with fluid and melt production as recorded by interaction with rocks?
• What are the mass transfer processes important for global evolution models as well as concentration of ore metals (societal relevance)?
• How are tremor and slip recorded in the rock record?
• What are the geophysical properties of natural rocks (velocity structure, anisotropy, fabrics) at a variety of scales?
• How is magma formed and stored in the crust, and how does the crust evolve in response?
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Breakout #1:

Your mission
Get together with your group and discuss the following:

• How is the study of exhumed terranes relevant and necessary to the objectives of the GeoPRISMS SCD initiative?
• What critical scientific questions can we address using exhumed rocks/terranes?
• How can field geologists interface productively with experimentalists, seismologists, and modelers?

Report back!
Breakout #2:

Your mission
Get together with your group to discuss the following:

• What data and meta-data do we need to collect and store?
• How can we make data and samples accessible to all?
• Is there a need for a physical curated sample repository?
• Should we identify key sites for collaborative field efforts? If so, which ones?
• What other efforts (e.g. workshops, fieldtrips) would facilitate collaboration?

Report back!
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