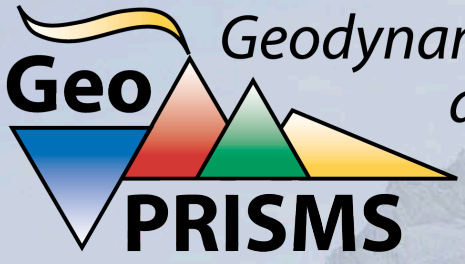

Geodynamic Processes at Rifting and Subducting Margins

NSF GeoPRISMS Program

Successor to MARGINS,
(Thanks Geoff!)

Website: www.geoprisms.org

E-mail: info@geoprisms.org

… Relationships to Fault Slip Behavior

What is GeoPRISMS

- **Community-driven, NSF-funded, cross-divisional, interdisciplinary, amphibious investigations of the origin and evolution of continental margins, and associated geodynamic processes**
- **Focus on rifts and subduction zones:**
  - Where geodynamic processes are most active
  - Where continental crust is formed and modified
  - Where geology and society intersect
  - Where economic resources form and are found
- **Shoreline-crossing:**
  - Where most rifts and subduction zones occur
  - Geologic & geodynamic processes span the shoreline
  - Where focused, interdisciplinary, cross-divisional efforts needed
- **Guided by a community-developed science plan; coordinated by a national office and steering committee; enabled by YOU!**

Two Initiatives

Rift Initiation and Evolution

- Where and why continental rifts initiate
- Fundamental rifting processes; feedbacks in time & space
- Controls on the architecture of rifted continental margins
- Mechanisms & consequences of fluid & volatile exchange

Subduction Cycles and Deformation

- Controls on size, frequency & slip behavior of subduction plate boundaries
- Spatial-temporal deformation patterns during seismic cycle
- Linkages between volatile release & rheology of plate boundary interface
- Volatile storage, transfer, & release in subduction systems
- Geochemical products of subduction; continent creation
- Subduction zone initiation and arc system formation
- Feedbacks - surface processes & subduction dynamics

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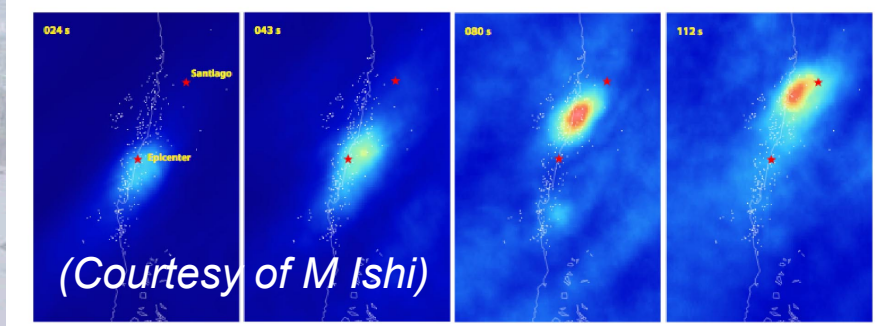
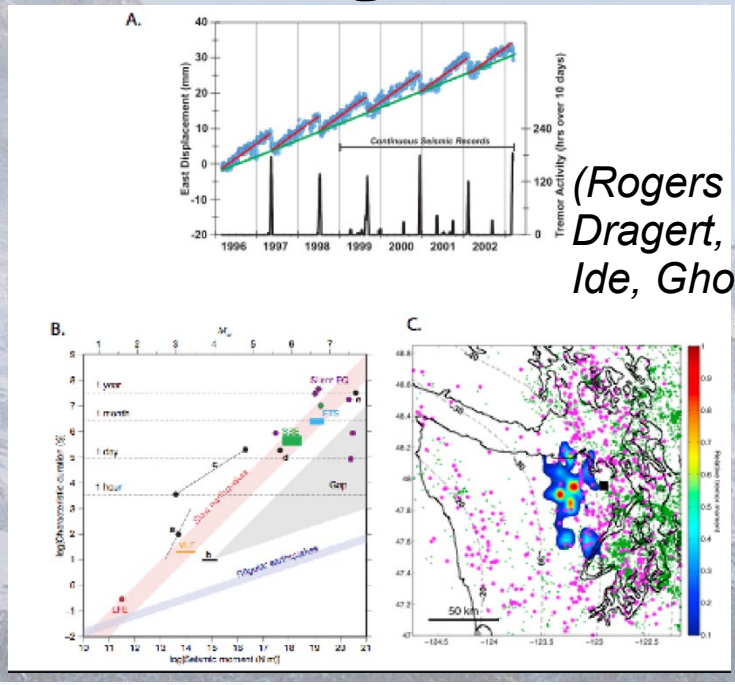
Fault Slip Related SCD Questions

- **What governs the size, location, & frequency of great subduction earthquakes? How do these relate to spatial / temporal variations in slip behaviors?**

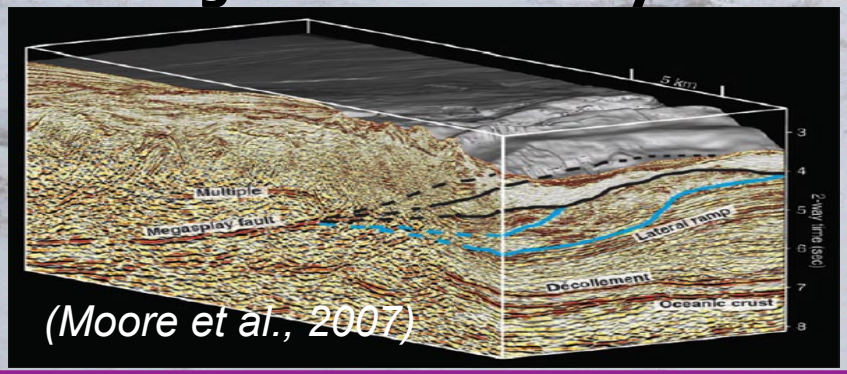


(Courtesy of M Ishi)

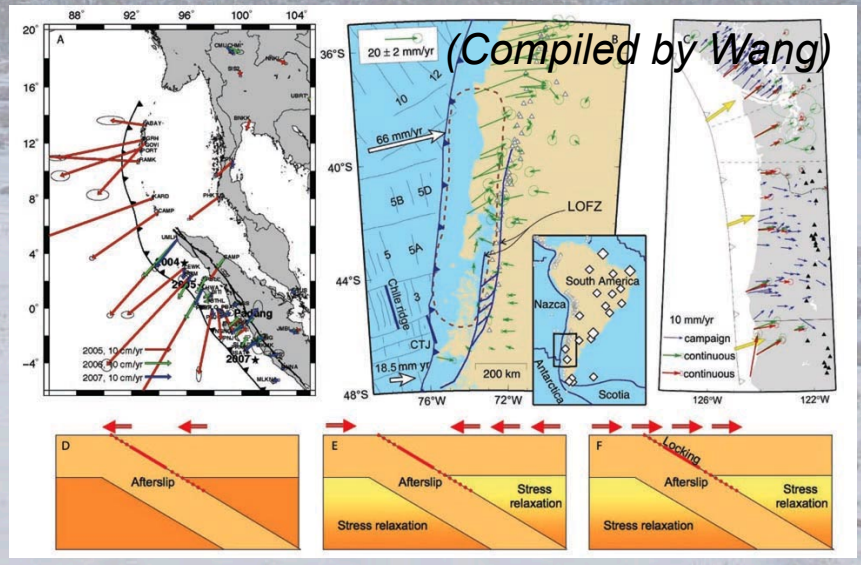


(Rogers & Dragert, Ide, Ghosh)

- **How does deformation across the subduction plate boundary evolve in space and time, through the seismic cycle?**



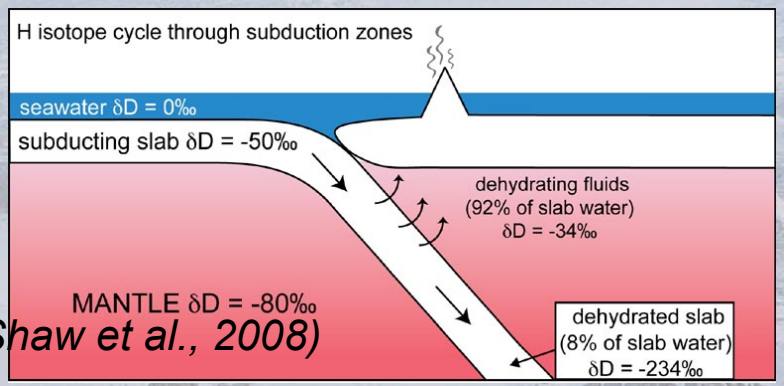
(Moore et al., 2007)



(Compiled by Wang)

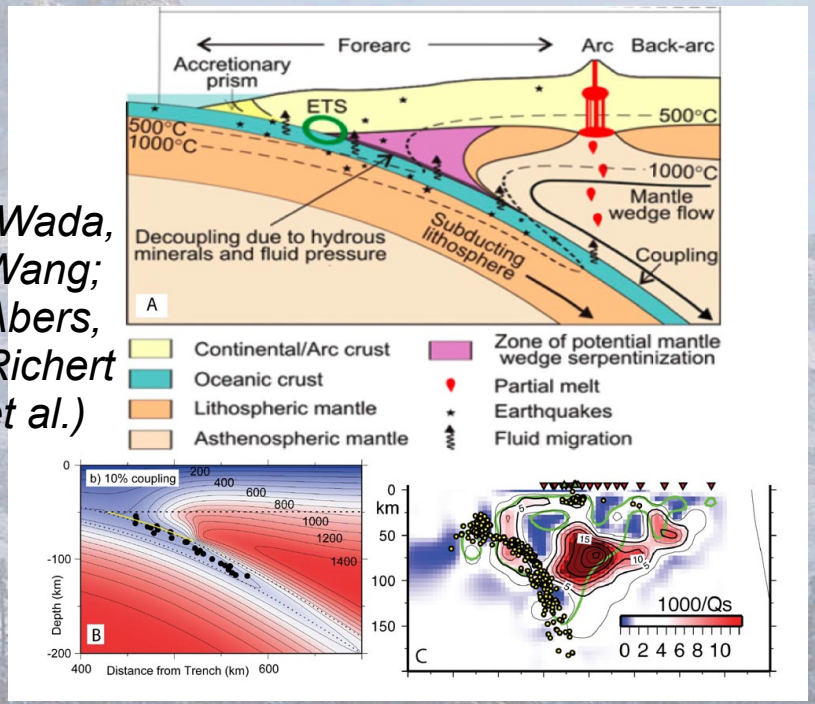
Fault Slip Related SCD Questions

- **How do volatile release and transfer affect rheology and dynamics of plate interface?**

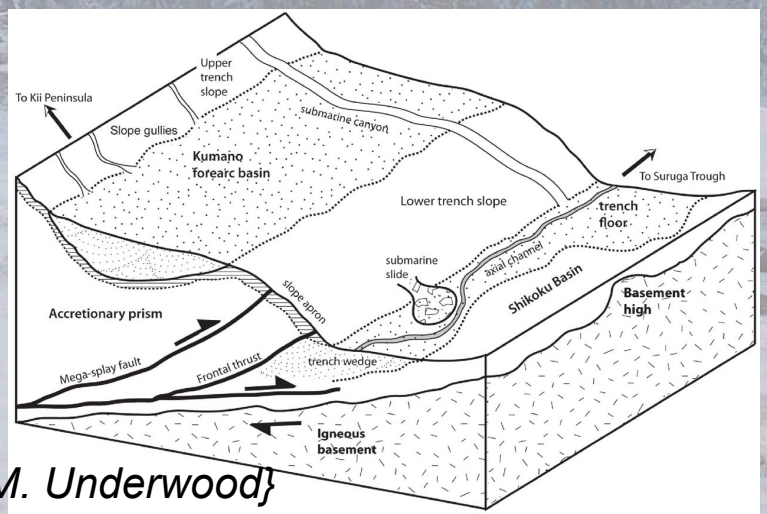


(Shaw et al., 2008)

(Wada, Wang; Abers, Richert et al.)



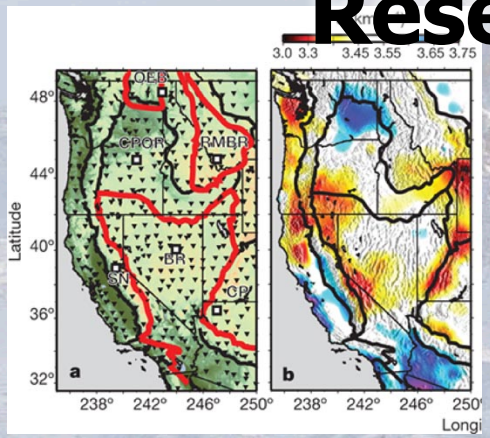
- **What are the critical feedbacks between surface processes & subduction zone mechanics and dynamics?**

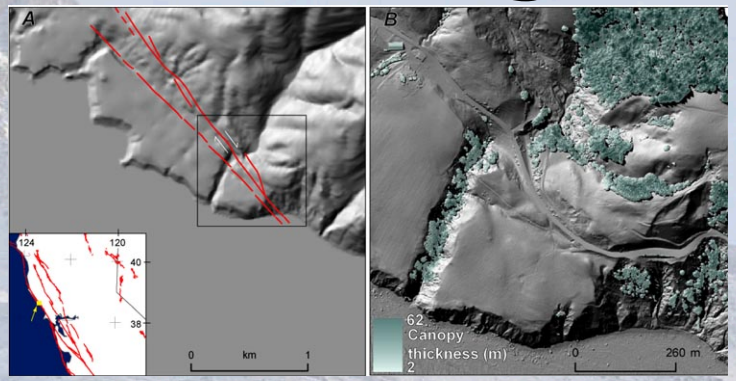


(Courtesy M. Underwood}

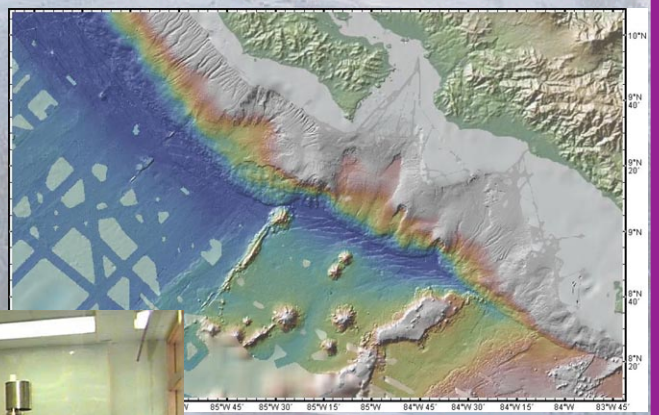
Research Strategies

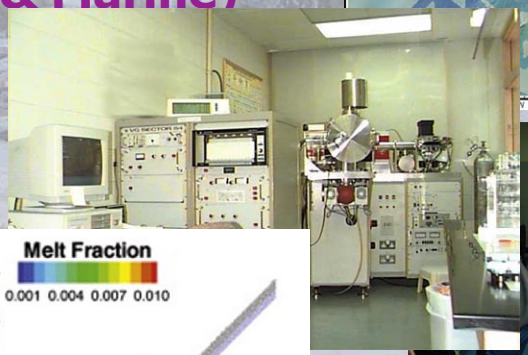
- Onshore-Offshore
- Interdisciplinary
- Community driven

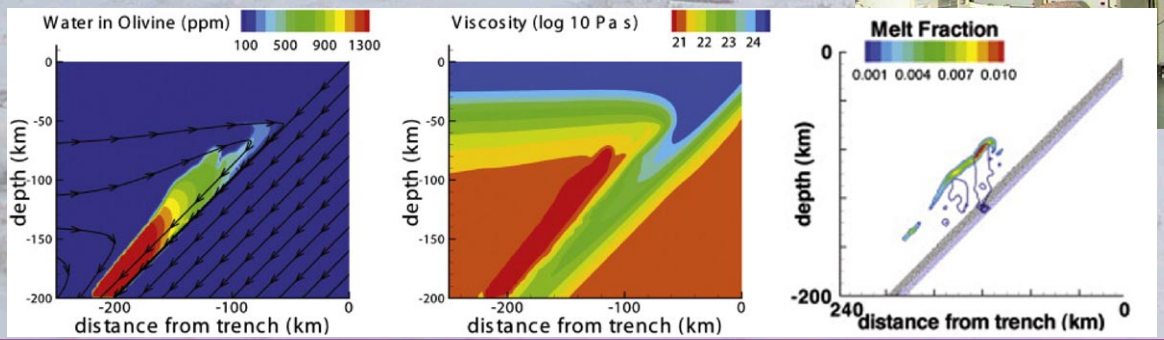




- Seismology
- Geodesy & Remote Sensing
- Other Geophysics (Heat Flow, MT, EM)
- Drilling, Coring & Logging (IODP, ICDP)
- Field Observations (Terrestrial & Marine)
- Experimental & Analytical
- Numerical Modeling







Opportunities for You

- **Help define science & implementation priorities: What, where, and how to best meet science objectives?**
  - Attend planning and implementation workshops (incl. Cascadia WS)
  - Contribute white papers
  - Stay informed, e.g., sign up for GeoPRISMS listserv/mailing list
- **Write proposals >> next solicitation ~July 2011**
  - Science proposals guided by the Final Science Plan (on-line)
  - Postdoctoral Fellowship proposals
- **GeoPRISMS Outstanding Student Presentations**
  - AGU - Apply on-line by Nov 20
- **Collaborate with GeoPRISMS scientists**

- **RIE Implementation Workshop** (Nov 4-6, Santa Fe, NM)
- **SCD Implementation Workshop** (Jan 5-7, Austin, TX)
- **AGU GeoPRISMS Forum** (Dec 14, Westin San Francisco)

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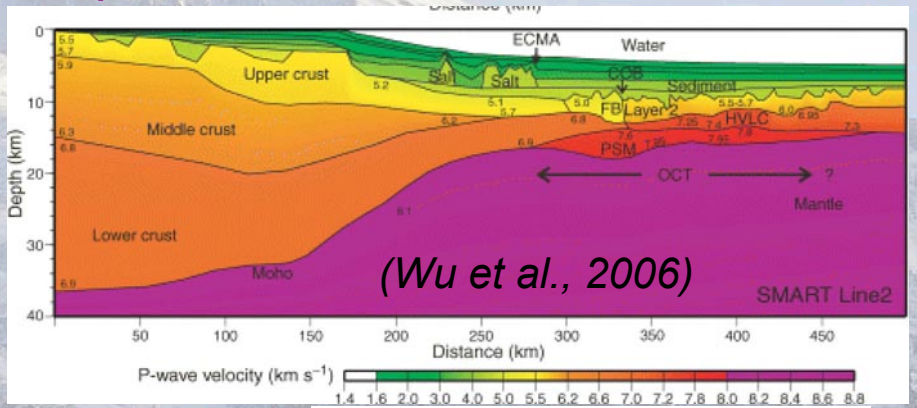
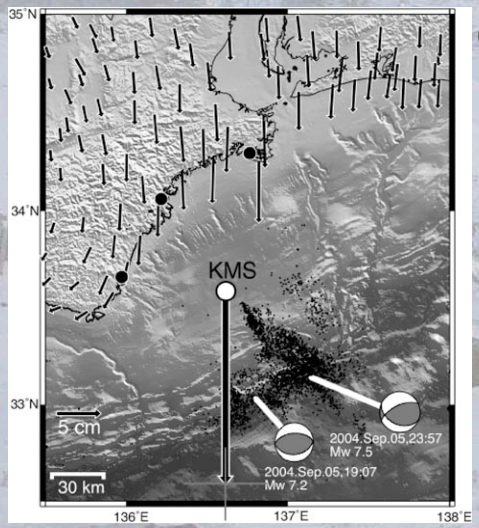
Why Cross-Divisional (EAR and OCE)

- Continental margins and processes span the shoreline
  - Crustal & lithospheric structures
  - Surface displacements
  - Fault processes



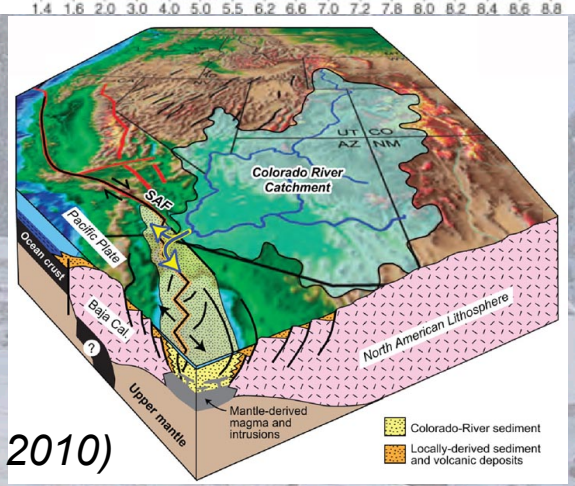
(Wu et al., 2006)



(Ikuta et al., 2008)

- Volatile fluxes
- Erosion, transport & deposition

e.g., Cascadia Initiative

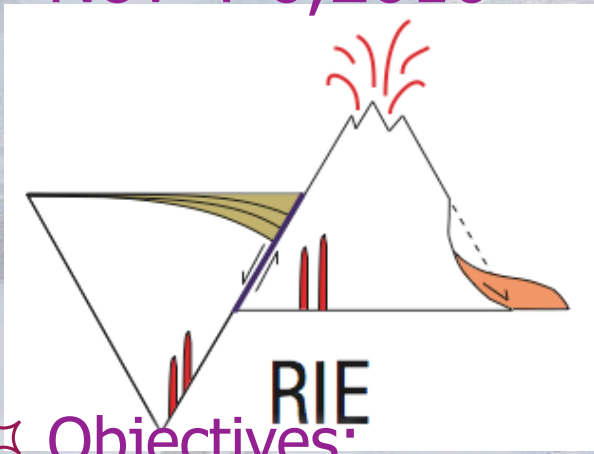


(Dorsey, 2010)

- Collaboration and interdisciplinary exchange of knowledge are critical to understanding the entire system

Initiative Implementation Workshops

- **RIE**: Santa Fe
  Nov 4-6,2010



- **SCD**: TBA
  early Jan, 2011

- Objectives:
  - Refine initiative themes and key unanswered questions in DSP
  - Resolve which themes require Primary focus sites to answer
  - Prioritize the scientific objectives, themes, and questions
  - Identify, justify, and select 1-2 Primary Sites per initiative
  - Outline research approaches & timetables for themes & sites
  - Identify and charge the final Science Plan writing team

GeoPRISMS Mission

... investigate the coupled geodynamics, earth surface processes, and climate interactions that build and modify continental margins over a wide range of timescales (from s to My), and cross the shoreline, with applications to margin evolution & dynamics, construction of stratigraphic architecture, accumulation of economic resources, and associated geologic hazards and environmental management.