

## 2011-2016 Work Plans

### Short-Term Tectonics Priorities

Short-Term Tectonics Working Group priorities for Mar 2011 – Jan 2016.

#### Immediate, Urgent goals

##### SOFTWARE DEVELOPMENT

- PyLith development (For more details see PyLith Development Plans)
- Bring semi-analytic codes (layered elastic and viscoelastic, internal and surface loads) under version control. Add documentation as necessary and provide portability via a standard build procedure. (POLLITZ?)
- Establish interaction with computational seismology group on meshing issues (e.g., keep up-to-date on the development of Geo-CUBIT).

##### COMMUNITY ACTIVITIES

- Provide training via virtual workshops  
Initial virtual workshop tentatively scheduled for Jun 20-22, 2011. We would likely schedule virtual workshops to immediately follow releases in order to get users up to speed on changes and new features. We could also have community workshops focused on solving a specific type of problem or dealing with a specific computational or workflow issue (e.g., meshing).

Begin development of a PyLith wiki to complement the cig-short email list

Continue series of workshops on biannual basis (even years)

ADD MORE DETAIL HERE

### Questions (UPDATE THESE)

tionally constrained and internally consistent physics for the entire seismic cycle  
e the entire seismic cycle in simulations that capture interseismic deformation, rupture nucleation and  
ation, and postseismic deformation with realistic Earth models (geometrical complexity, material  
ogeneity, and inelastic rheologies). Constraints on fault and bulk rheologies that are consistent with  
ve geodetic, seismic, and geologic observations are critical to understanding the behavior of fault  
s and improving the accuracy and precision of earthquake hazard assessments.

ly constrained and internally consistent physics for tectonics of magmatic systems, geothermal systems,  
here

eling tectonic processes with heat and fluid flow, thereby enabling complex rheologies with temperature

parameters. Incorporating heat and fluid flow into tectonic modeling significantly expands the range of problems that can be addressed (such as seismic tremor in geothermal areas) and permits direct application of physical constraints. Viscoelastic, elastoplastic, and viscoplastic rheologies are important for bridging geologic and tectonic time scales.

Improved modeling of crustal deformation associated with surface loads and the validation of rheologies of the crust using geodetic and geologic observations of deformation arising from glacial unloading, tectonic unloading, and other surface loads.

### Computational Techniques

Implications of using currently available and emerging computational techniques for earthquake simulation, including undesirable limitations on the geometry of the domain (e.g., topography) and faults or may introduce

(e.g., deal.ii and p4est) to resolve small length scale features through local refinement and coarsening of the mesh.

Quantification of the uncertainty in parameters based on observations.

Application of computational techniques to specific problems using high-level tools

Resolution of dislocations and material boundaries within a structured grid. This would permit a structured grid for simulation of fault zones.

Multi-scale homogenization. Resolution of multiple time scales through slow/fast timescale coupling.

Automation of the various stages of modeling (creating the geologic model, meshing the domain, simulating the

urrent software.

e to new users but also provides the flexibility and extensibility required by expert users.  
codes  
eatures to community codes in order to solve specific research problems.

rt modeling codes and tools.

arth science developers and vice versa. This could be implemented via some form of travel grants for in-

d features