

NSF Site Visit to the Computational Infrastructure for Geodynamics

Computational Seismology
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CIG Computational Seismology Working Group

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Outline

- Workshops
- Current code development
- Long-term plans
- Synergy with other areas of CIG

Computational Seismology Workshop

- First CIG Computational Seismology Workshop was held in Stevenson, Washington, on June 8, 2005
- ~25 Attendees

Computational Seismology Goals

- Bring a number of 1D codes within the CIG framework
 - 1D codes are widely used, but there are no standards (e.g., mode, ray & reflectivity codes)
 - Critical for benchmarks
 - Suite of examples
 - Clear documentation (i.e., manuals)
 - Synergy with SPICE

Computational Seismology Goals

- Bring a number of 3D codes within the CIG framework
 - Spectral-element
 - Finite-difference
 - Finite-element
 - Eikonal solvers

Computational Seismology Goals

- All codes should be open source, well-documented and come with examples
- Parameterization is critical to all seismology codes and should be standardized
 - Source
 - Earth model
 - Stations
- Coordinate efforts with SCEC, IRIS, SPICE & GEON

Current CIG Work (Leif Strand)

- 1D mode code is being brought into the framework (Ritzwoller)
- 3D Spectral-element codes (regional and global) are within CIG framework (Tromp)



Other 2006 Activities

- Participation in the July SPICE meeting (further explore collaborations)
- Second CIG Computational Seismology Workshop to be held in late September/early October (jointly with the Imaging Science meeting organized by Levander & Rondenay)

Longer Term Plans

- 1D Reflectivity code (SPICE)
- 3D Finite-difference (Rodgers)
- 3D Finite-element (Bielak)
- Eikonal solvers

Longer Term Plans

- Automated/On-Demand simulations
 - Seismology web-portal
 - Near real-time simulations of global events
 - Provide synthetics & data together (with IRIS)
 - On-demand simulations
 - User control over Earth models, sources, stations, movies, etc.
- Collaborate with SPICE
- Coordinate with SCEC & GEON
- Leverage the TeraGrid

Long Term Plans

- Database of seismic models (crust, mantle, inner core, etc.)
- Development of data processing tools for field and laboratory use

Synergy within CIG

- On-demand simulations & CIG web portals
- Linkages between geodynamics and seismology (model parameterization)
- Mesh design (local simulations)
- 2D & 3D visualization

Hurdles

- First level
 - Second level
 - Third level
 - Fourth level
 - Fifth level