

Implications of Non-linear Modeling for SCEC Community Models

Philip Maechling

Implications for SCEC Models

Existing California grid-based model such as CVM-H v15.1 that provide V_p , V_s , and density may be extended to return additional parameters for any point.

- Rheology parameters
- Geological framework parameters
- Temperature

Future models might support anisotropy by permitting x,y,z coordinates, and date:time inputs to inputs.

A geographic interface to the models with additional input parameters date:time,coordinates,parameter type might look like this:
`get_earth_properties(lat,long, depth (elevation), date:time,coordinates, param_of_interest)` returns `param_of_interest_at_given_pt`

Data Management Tools Techniques

- **Ability to combine multiple models a key challenge.**
- **Merging needed:**
 - **1) To build separate meshes, and then combine them into a final. Tools for building multi-resolution meshes and for combining original model and model with small scale heterogeneities into a final model.**
 - **2) Embed a region model into a larger regional model. Even simple processes like adding background model outside the defined volume creates reflectors and smoothing issues.**

Implications for SCEC Models

SCEC should consider storage of Earth Models parameters in formats supported by IRIS and other geoscience organizations including: HDF-5, netCDF, Adaptable Seismic Data Format (ASDF)

SCEC should participate in geoinformatics work like EarthCube and learn the state of the art in other domains, and learn what works.

Expect to the science groups to produce multiple alternative models, and to need tools to view and compare alternative models.

SCEC should follow peer standards, such as IRIS earth model practices, for publishing our earth models.

SCEC should follow peer standards, such as CIG good software practices, for publishing SCEC model related software.

Implications for SCEC Models

- **Discuss and agree on methods for evaluating new models, and new version of existing models.**
- **Identify status of alternative models. What versions replace early ones. Which models are considered viable alternatives ?**

SCEC

AN NSF+USGS CENTER

*Southern California
Earthquake Center*

www.SCEC.org