

San Francisco Bay Area Seismic Velocity Models for Seismic Hazard Assessment

May 16, 2019

Short-Term Goals, Years 1–2

- Expand inner detailed USGS San Francisco Bay region seismic velocity model outward
 - San Joaquin - Sacramento Delta (east)
 - Central Coast (south)
- Refine the existing detailed seismic velocity model using existing data
 - Improve the underlying geologic model and velocity-depth relationships
 - Hayward fault zone (especially east side) and Napa Valley
- Assess the accuracy of the model in areas with high seismic risk and acquire new data where model is less accurate
- Establish data sets for validation and quantifying how changes to the model improve its accuracy in seismic hazard applications

Long-Term Goals, Years 3+

- Catalog data and models; archive important ones in open, curated repositories
- Improve the resolution of the seismic velocity model(s), especially at depths less than 1 km
- Add uncertainty estimates to the seismic velocity model(s) and geologic/fault model(s)
- Acquire new data to bridge the gap between local high-resolution observations and regional sparse or coarse-resolution observations
 - Nodal arrays
 - Distributed acoustic sensing
 - PG&E Smartmeters (if implemented)
- Leverage improved methods for constructing and constraining 3-D geologic and seismic velocity models
 - Ambient field tomography
 - Sequential structurally-constrained inversion
 - Reverse time migration
 - Machine learning

Community Building

- Curated, open data
- Leverage open-source tools for building, analyzing, and improving models
- Open, efficient organizational structure that fosters guided collaboration
 - Website
 - Annual workshops
 - Working group
- Sustainable long-term funding
 - Bring your own funding
 - Identify opportunities for collaborative funding

Community Building: Data/Model Repositories

- Need catalog with data/models relevant to 3-D seismic velocity models for San Francisco Bay region
- Data/model in standard formats + metadata
- Data repositories
 - FDSN data centers: IRIS, NCEDC, SCEDC
 - USGS: Sciencebase (www.sciencebase.gov)
 - General: zenodo (zenodo.org, OpenAIRE and CERN)

Community Building: Open Organization

- Annual workshop

- Immediately before/after Northern CA earthquake hazards workshop?

- Website + communication

- **Proposal: GitHub** pages (website) + issues (discussions / announcements)
- **Proposal: Google Group** email list for notifications
- Alternative suggestions?

- Working group

- **Proposal: Brad + Keith** identify people, balancing institutions/disciplines
- How big/small?

- Funding

- USGS NEHRP (deadline: May 29, 2019)
- NSF Geoinformatics (deadline: Aug 15, 2019)
- Other?