San Francisco Bay Area Seismic Velocity Models for Seismic Hazard Assessment

May 16, 2019

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Workshop Objectives

Provide updates on recent science activities associated with the 3-D Bay Area geologic and seismic velocity models.

Discuss draft of five-year science plan for improving seismic velocity models in the San Francisco Bay region.

Overview of Workshop

9:05 Introductions

9:15 Summary of five-year science plan

9:30 Session I: Evaluating and revising the current model

11:15 Session II: Incorporating path and site effects into seismic hazard assessment

12:15 Lunch (on your own)

13:30 Session III: Constraints from 3D geologic models and potential field geophysics

14:30 Discussion

15:00 Adjourn

Related to 3-D seismic velocity models (and the San Francisco Bay region):

1. What have you done in the past 14 months?
2. What are your plans for the next 12 months?

Science Plan for Improving 3-D Seismic Velocity Models in the San Francisco Bay Region, 2019-24

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Objectives:

- Summarize state of 3-D seismic velocity models in the San Francisco Bay region
- Identify short-term and long-term goals
- Develop strategy for community effort

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