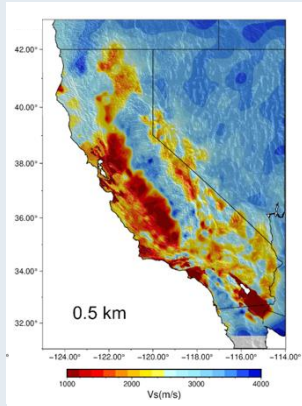


SCEC Community Velocity Model (CVM) Technical Activity Group



Kim Olsen, Evan Hirakawa, Te-Yang Yeh, Yehuda Ben-Zion,
Cliff Thurber, Oliver Boyd
and
the SCEC Community Velocity Model TAG Working Group

September 1, 2026

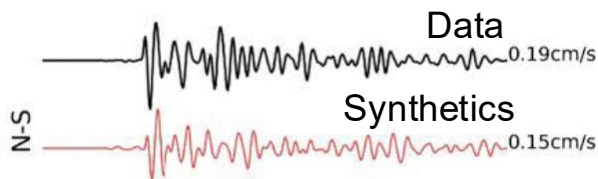
SCEC Annual Meeting, Palm Springs, California



SCEC CVM TAG: Inaugural Workshop

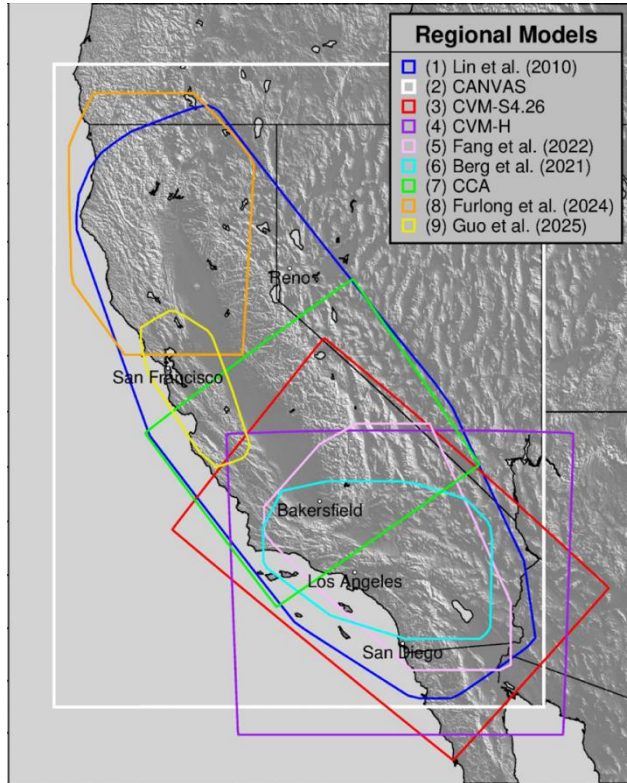
- Sunday Aug 30 9am-1pm
- 24 participants, 4 graduate students, 2 SCEC directors
- New California velocity model development
- Discussion of goals for CVM TAG

SCEC Community Velocity Model (CVM) TAG: **Challenge #1**

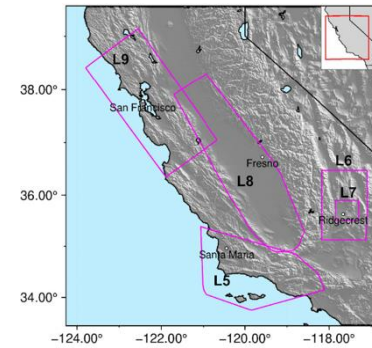
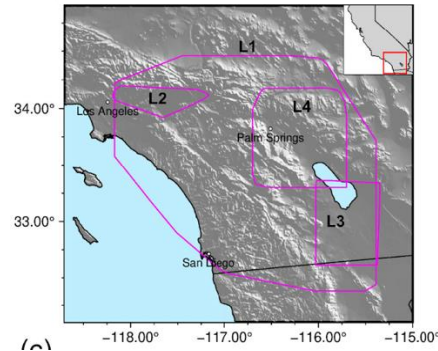


- Physics-based ground motion simulations depend, in part, on the accuracy of the underlying velocity model
- We want to use the most accurate velocity models available to generate the most accurate ground motion estimates

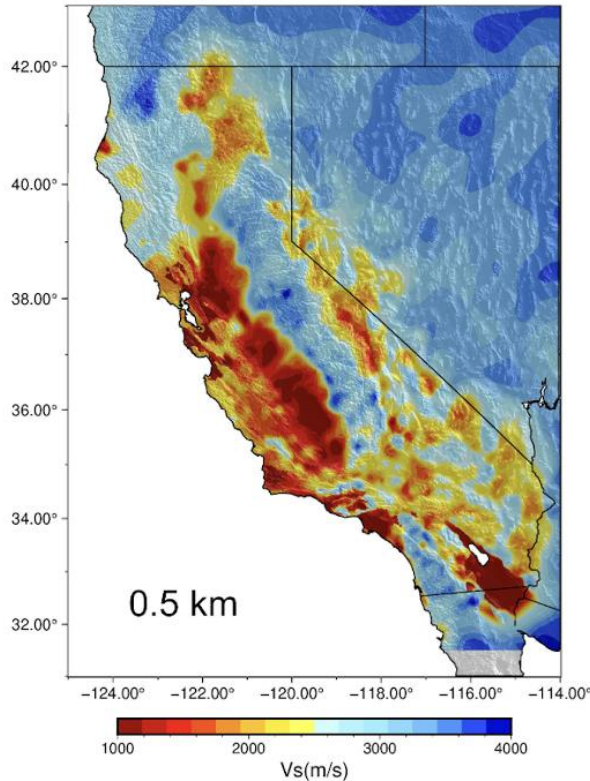
SCEC Community Velocity Model (CVM) TAG: Challenge #2



- Many velocity models with different resolution, accuracy and areal extent available – which one should I use?



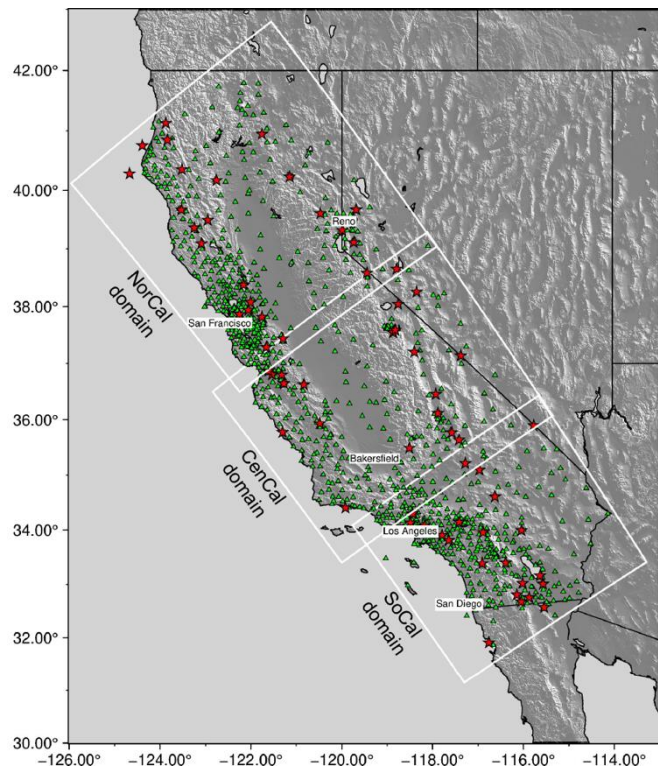
MUSCAL - Multi-Scale CALifornia P and S velocity model



- **Approach:** Merge existing velocity models into a statewide CVM of varying resolution
- **Result:** MUSCAL (Yeh, Ben-Zion and Olsen, 2026)

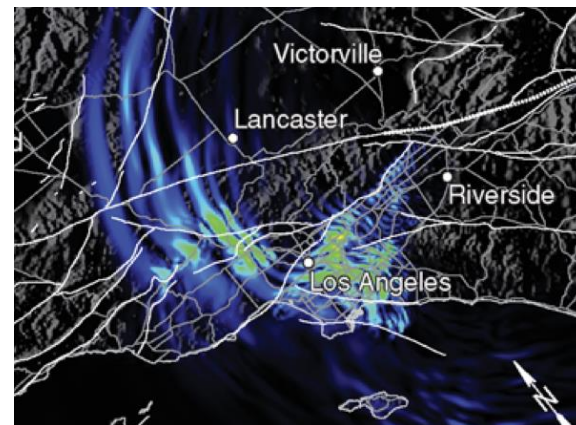
Yeh, T.-Y., Y. Ben-Zion, and K.B. Olsen (2026). Multi-Scale P and S Seismic Velocity Models of California and Western Nevada, *Jour. Geophys. Res. Solid Earth*, *in revision*.

MUSCAL - Multi-Scale CALifornia P and S velocity model

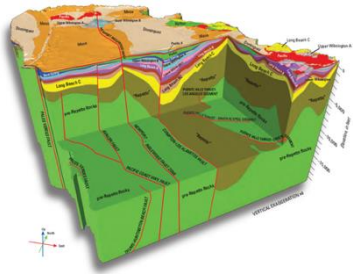


- Incorporates only the parts of the parent models that produce superior ground motion prediction efficacy at seismic stations
- **Uses dictionary learning to merge models**
- Incorporates a spatially-variable geotechnical layer ('velocity taper')
- **Science-to-Practice Opportunities:**

**CyberShake
ShakeOut2.0**

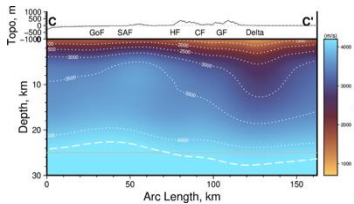


SCEC Community Velocity Model (CVM) TAG: Goals



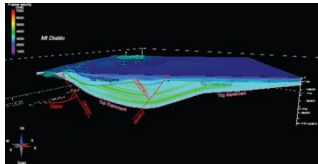
3D LA basin chrono-stratigraphic model (Yeh, Kohler, Olsen, 2026)

- MUSCAL V1 not perfect – need MUSCAL V2+
- MUSCAL validation/ingestion cyberinfrastructure
- Uncertainty estimation
- Scrutiny on overlap zones



FWI model of SF Bay Area (Rodgers et al., 2026)

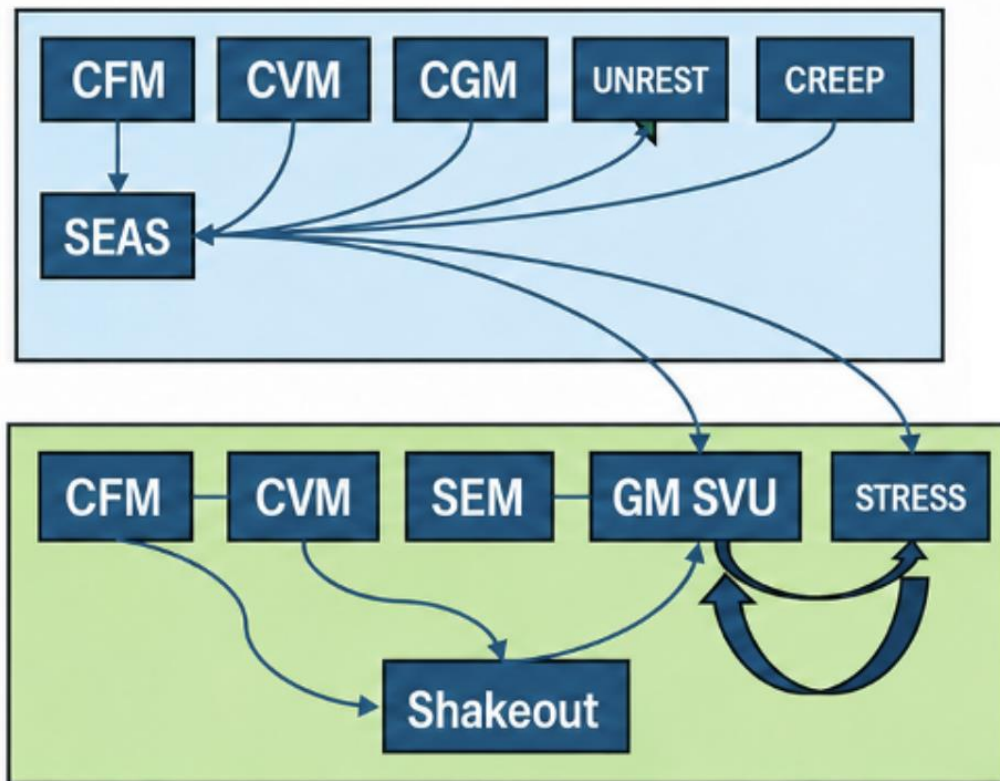
- Validate/ingest new velocity models – please share your model!
- Identify areas with data gaps
- Identify and use non-seismic datasets in CVM development and validation
- Improve anelastic attenuation models



Sacramento – San Joaquin Delta (Graymer et al., 2026)

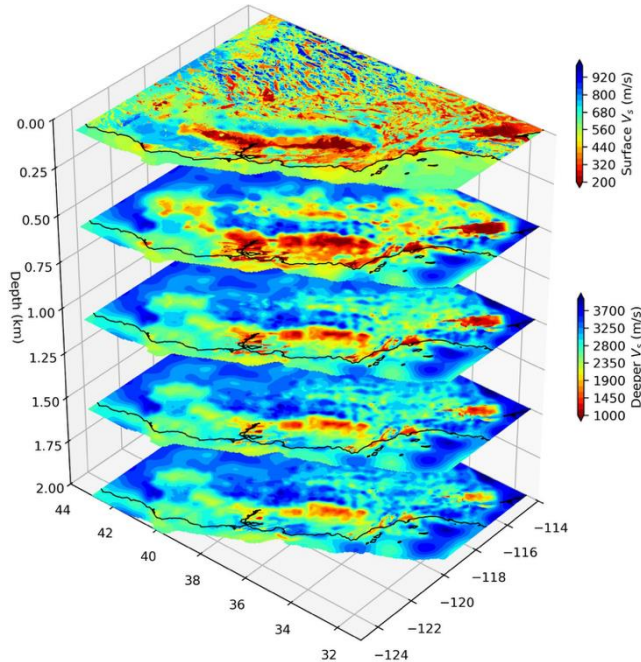
SCEC Community Velocity Model (CVM) TAG

- TAG support of the Earthquake System Science Ecosystem





SCEC Community Velocity Model (CVM) TAG



Poster **77** Category: CEM

SCEC Multi-scale Community Velocity Model TAG

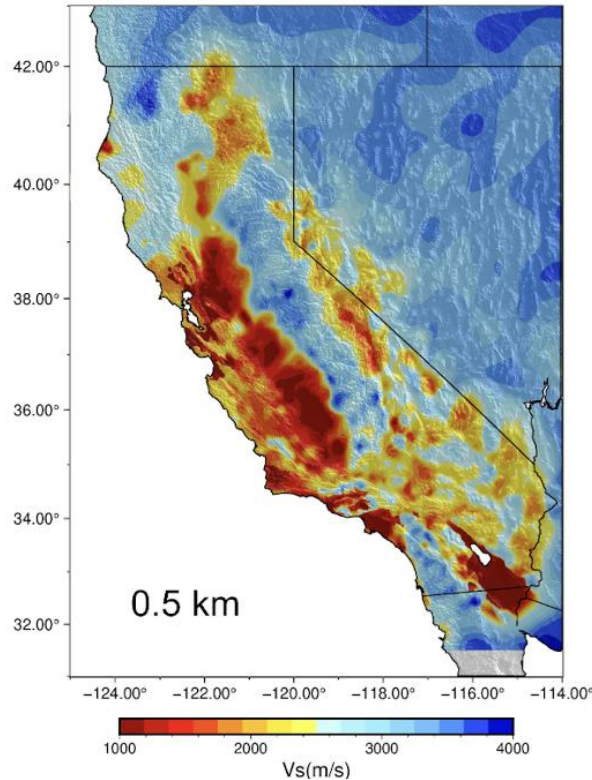
Kim Olsen, Evan Hirakawa, Te-Yang Yeh, Yehuda Ben-Zion, Clifford Thurber, Oliver Boyd, and the SCEC Multi-scale Community Velocity Model TAG Working Group

Poster **75** Category: CEM

Multi-scale Statewide California Seismic Velocity Models: Version 1

Te-Yang Yeh, Yehuda Ben-Zion, Kim Olsen

SCEC Community Velocity Model (CVM) TAG



- **Community Invitation:** We need your new velocity models to test and potentially ingest into MUSCAL!

