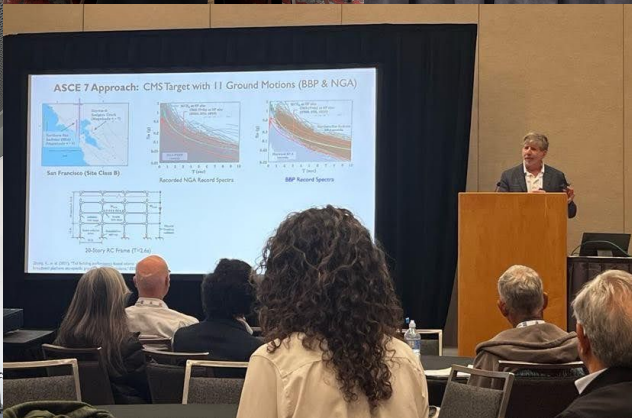




JULY 13-17, 2026 | PORTLAND, OREGON

13th National Conference on Earthquake Engineering



2026 SCEC/USGS Workshop on Ground Motion Simulation Validation and Utilization for Engineering Applications

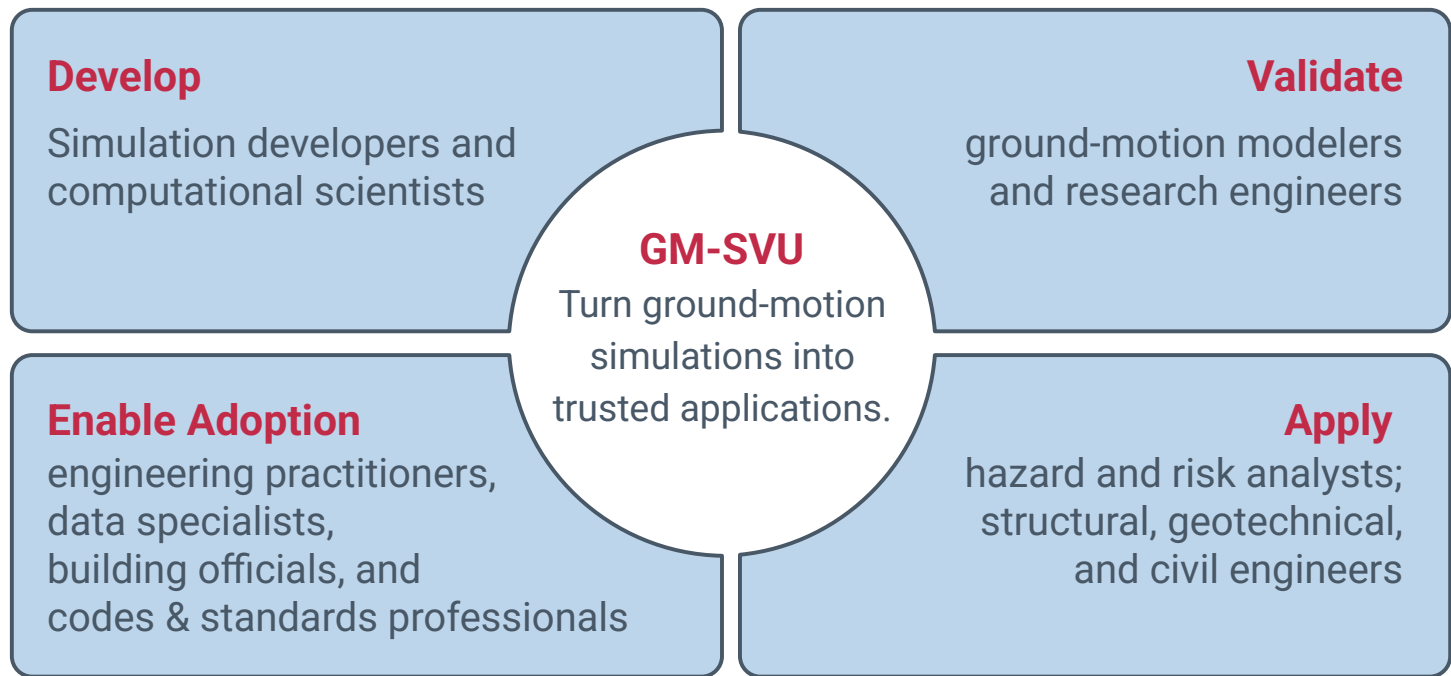
July 13, 2026

Organizers: Sanaz Rezaeian (USGS), Nico Luco (USGS),
Ahmed Elbanna (SCEC), **Tran Huynh (SCEC)**

Bring the science and engineering communities together to build confidence in simulated earthquake ground motions—and create practical pathways for their use in hazard assessment, engineering design, and risk reduction.

Advancing GM-SVU **requires the full community**

78 workshop registrants · 11 countries · 10 disciplinary areas





SCEC/USGS GM-SVU Workshop Program

www.scec.org/events/2026-scec-gm-svu-workshop

1 | Validation

Lessons from past validation work and priorities for the future

Jon Stewart, UCLA
Nico Luco, USGS
Sanaz Rezaeian, USGS

2 | Simulations

SCEC capabilities, accessibility, and future innovation

Xiaofeng Meng, SCEC/USC
Kim Olsen, SCEC/SDSU
Ahmed Elbanna, SCEC/USC

3 | Utilization

Standards, practical tools, and engineering applications

Brad Aagaard, USGS
Edric Pauk, SCEC/USC
Greg Deierlein, Stanford

4 | Closing Panel: What makes ground-motion simulations application-ready?

Validation evidence · Usable datasets · Uncertainty quantification · Engineering adoption

CB Crouse, AECOM · Norm Abrahamson, UC Berkeley · Felipe Kuncar, University of Canterbury



Application readiness depends on the intended use

The workshop discussions clarified what “application-ready” requires:

Match the evidence to the use. PSHA requires region-specific validation of the ground-motion distribution and its uncertainties; RHA may rely on application-specific methods with scenario-appropriate motions.

Validate the complete configuration. Evidence must cover the source, rupture, velocity, and site assumptions used in the application.

Deliver more than waveforms. Usable datasets need standardized metadata, input models, validation evidence, and clear guidance.

The **GM-SVU Community Survey** reinforces these priorities.



Top priorities for next 3-5 years:

Engineering guidance and best practices – 15

Site response and basin effects – 12

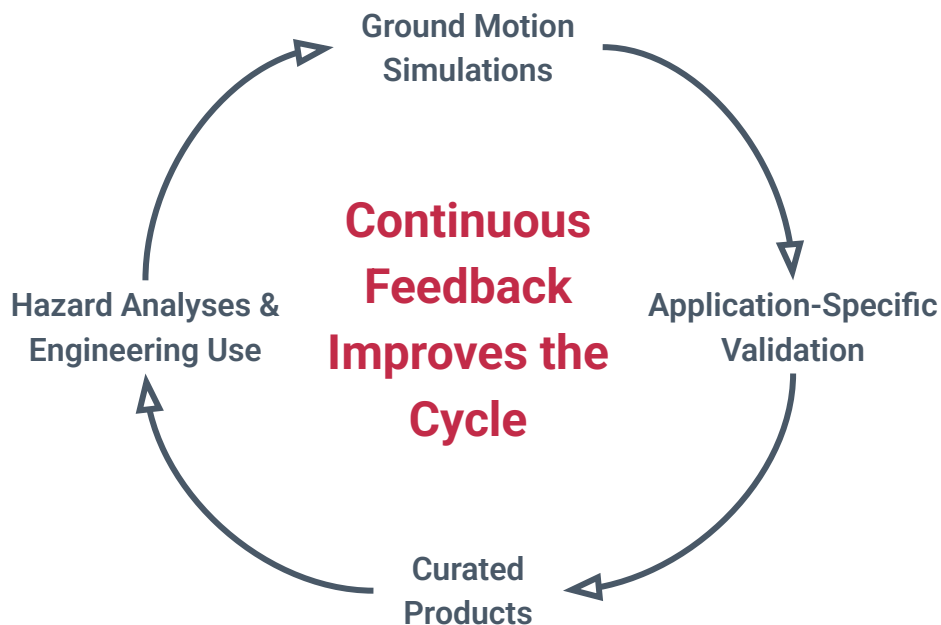
Validation methods – 8

Velocity-model uncertainty – 8

Leading barriers to adoption are insufficient validation evidence, lack of engineering guidance, and limited training or familiarity.

Efforts to carry forward

Progress requires **sustained coordination** among the communities that develop, validate, and use simulated ground motions.



1. Define readiness by use: Develop distinct validation pathways for PSHA and RHA, with evidence and uncertainty matched to the intended decision. Rezaeian talk Tue 10:00

2. Build products people can use: Provide searchable, curated datasets with raw waveforms, standardized metadata, model inputs, validation evidence, and practical guidance. Plenary Sessions 5 & 6

3. Create a continuous feedback loop: Use validation results and engineering experience to improve simulations, demonstrate applications, and inform guidance and standards. GM-SVU TAG poster #239

Come talk to the
SCEC team here
about **simulated
ground motions**
and other
**computational
seismic hazard
capabilities.**



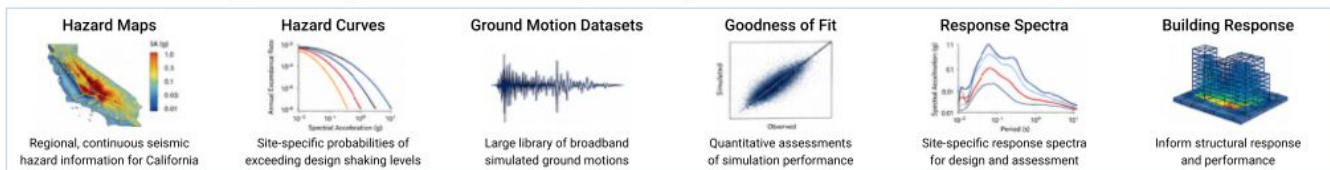
Computational Seismic Hazard Capabilities

scec-software@usc.edu

Contact Us



Integrated earthquake science. Community models. Open tools. **Reliable hazard information beyond available observations.**



1 Model Earthquakes
To simulate future earthquakes from source to site effects

- CEMs and Explorers**
Community Earth Models (CEMs) describe California's faults, geology, and 3D Earth structure
- ERFs**
Earthquake rupture forecasts (ERFs) covering all of California
- Rupture Generators**
Realistic earthquake rupture scenarios for simulations
- 3D Wave Propagation**
Simulate seismic waves through complex 3D Earth structure
- Site Effects Modules**
Local site amplification and near-surface ground response

2 Simulate Ground Motions
To characterize future ground shaking from large earthquakes

- SCEC CyberShake**
Regional 3D simulations using supercomputers to produce close to a billion seismograms that capture basin effects and ground-motion variability across entire fault systems
- SCEC Broadband Platform**
Generates site-specific, 1D broadband (0–20+ Hz) ground motions for historical and user-defined earthquake scenarios using multiple methods
- Simulation Datasets**
A massive library of synthetic seismograms and simulation data representing millions of earthquake scenarios and realizations

3 Processing and Validation
To transform simulations into trusted community resources

- Ground Shaking Maps**
Rapid ShakeMap-style visualization of simulated ground motions and intensity
- Observational Data**
Historical earthquake recordings and community datasets for validation
- SCEC GMSV Toolkit**
Generates standardized comparisons of simulations and observations using common engineering metrics
- Scenarios & Benchmarks**
Plausible California scenario earthquakes and benchmark datasets for validation

4 Hazard and Risk Analyses
To support engineering analysis, risk assessment, and design

- OpenSHA**
Computes site-specific probabilistic seismic hazard and disaggregation for engineering and risk analyses
- UGMS Data Access Tool**
Provides site-specific MCER response spectra for the Los Angeles region per ASCE 7-16
- Selected Ground Motions**
Extracted, validated site-specific ground motions for engineering analysis and design
- Building Insights**
Simulation datasets prepared for response history analysis, PBEE, and collapse assessment



Academic, government, and industry partners



Open data, open-source code, and transparent documentation



Community standards and best practices



Training, education, and capacity building



Continuous improvement through feedback and innovation

Collaborate with SCEC. Advance open science. Build earthquake resilience.



How do you use ground motion simulations? Learn about the SCEC GM-SVU group.

Statewide California Earthquake Center
www.scec.org