

PEER–LBNL SGMD Workshop 2026

Welcome

Advancing Regional-Scale Seismic Simulation for Engineering Applications



Khalid M. Mosalam, PhD, PE

Taisei Professor of Civil Engineering & PEER Director



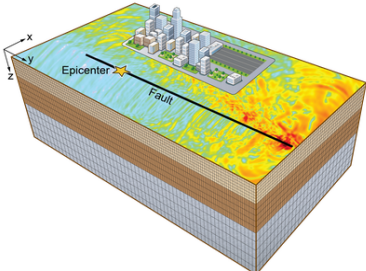
SGMD Status

<https://sgmd.peer.berkeley.edu/>

- ❑ Transitioned from development to **active user-facing platform**
- ❑ Increasing adoption across research & engineering communities

 PEER-LBNL Simulated Ground Motion Database

Welcome selingunay2! [Home](#) [Logout](#) [Documentation](#) [Forum](#)



The image shows a 3D perspective view of a simulated ground motion database. It features a city skyline on a grid, with a fault line running through it. A yellow star marks the epicenter. The ground surface is colored with a heatmap representing seismic activity, with red and yellow indicating higher intensity. A 3D coordinate system (x, y, z) is shown in the top left corner.

The Pacific Earthquake Engineering Research Center (PEER) – Lawrence Berkeley National Laboratory (LBNL) Simulated Ground Motion Database (SGMD) includes a large set of simulated ground motions generated from physics-based, deterministic, broad-band earthquake simulations. These simulated ground motions in the database have undergone careful validation, including comparisons against recorded ground motions from actual earthquakes. The PEER-LBNL SGMD is one of the few simulated ground motion databases globally and is anticipated to enable engineers to utilize validated simulated ground motions in seismically active regions in the U.S. and around the world..

The development and maintenance of SGMD is supported by the Department of Energy (DOE) and LBNL under award number 056892.

[Enter Database v1.1.0](#)

Number of ground motion time series in the SGMD = 1,021,500

Number of ground motion time series downloaded to date = 6,332,515

Number of registered users = 650

Please Cite SGMD with This Reference

McCallen, D., Pitarka, A., Tang, H., Nakata, R., Mosalam, K.M., Petrone, F., Günay, S., and Perez, C. (2025). **An open-access simulated earthquake ground-motion database for an M7 Hayward Fault earthquake in the San Francisco Bay Region.** *Earthquake Spectra*, p. 87552930251340960. <https://doi.org/10.1177/87552930251340960>

Opened to the public on April 17, 2025

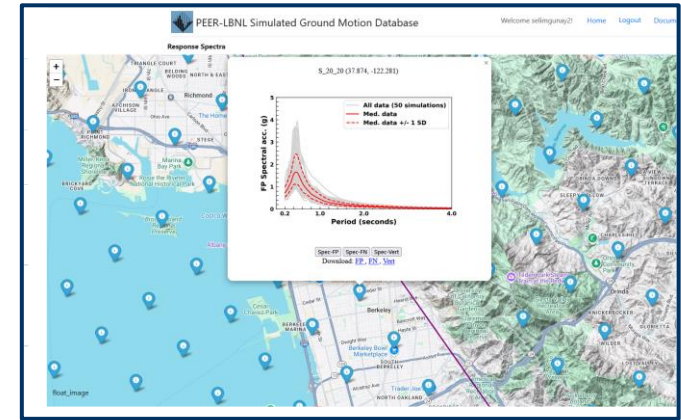
Why SGMD Matters

- Enables **physics-based, regionally consistent ground motions**
- Bridges gap between:
 - ✓ Simulation → Engineering design → Risk assessment
- Supports:
 - ✓ Performance-based engineering (PBEE)
 - ✓ Infrastructure resilience & decision-making
- Provides **scalable datasets** for:
 - ✓ AI / ML applications
 - ✓ Uncertainty quantification

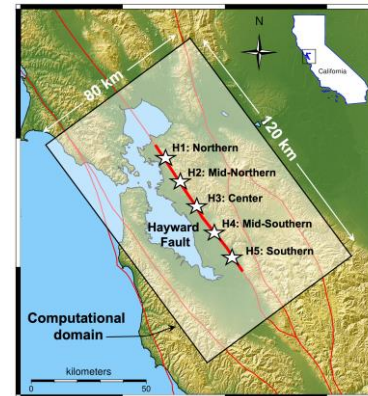
SGMD Key Achievements

- **50 realizations** of a Mw 7.0 Hayward Fault earthquake
- **2,270 sites**, with 9 time series (2 hrz + vl for acc, vel & disp)
- Advanced **search** capabilities:
 - ✓ Location, Vs30, distance metrics, intensity measures
- Interactive **visualization** tools:
 - ✓ Maps, response spectra, time series, PGV distributions
- Comprehensive **documentation**:
 - ✓ User guide, glossary, publications, structured data files
- Active user **forum**:
 - ✓ Questions, feedback, issue reporting, community engagement

Response spectra visualization module



Computational domain & hypocenters for realizations



Window for visualization modules & GM search

SGMD Future Developments

New data & Scenarios

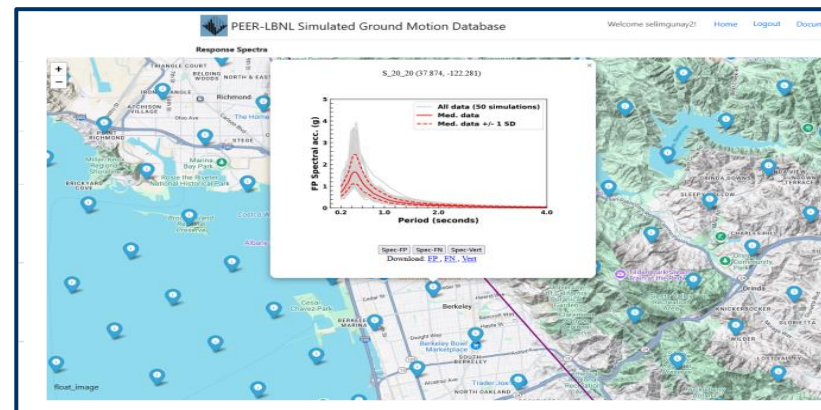
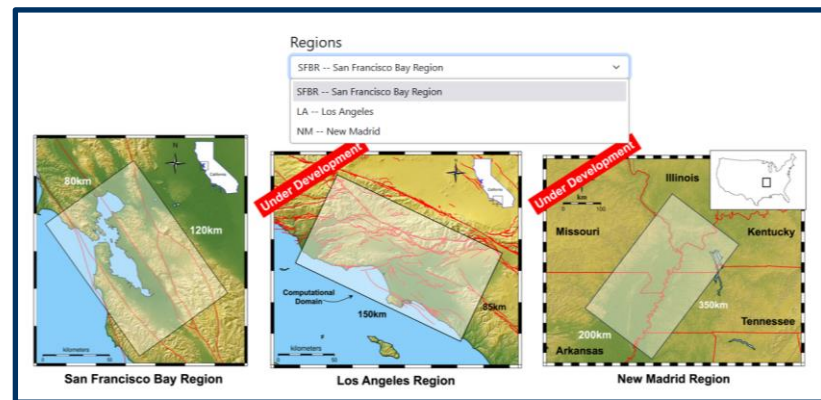
- ✓ Additional realizations (e.g., high rupture velocity M7 Hayward)
- ✓ New scenarios (Mw7.5 San Andreas (**ongoing**), Expansion to Los Angeles & New Madrid)

Enhanced parameters

- ✓ Pulse-like motions & pulse periods
- ✓ Duration parameters (e.g., significant duration)
- ✓ Cumulative IMs (CAV, Arias Intensity)

Expanded Outputs

- ✓ Design & MCER spectra
- ✓ RotD50 / RotD100 response spectra
- ✓ Spectral velocity & displacement spectra



2026 SGMD Workshop Overview

Workshop Objectives

- Showcase real-world use cases
- Foster collaboration within the international simulated GM community
- Introduce new tools for data exploration & utilization
- Advance strategies for integration into engineering design workflows
- Define future capabilities & impact of SGMD

2026 PEER LBNL Workshop on the Regional Scale Simulated Ground Motion Database (SGMD) for the San Francisco Bay Area, May 7–8



Register for the online
SGMD workshop

May 7–8, 2026

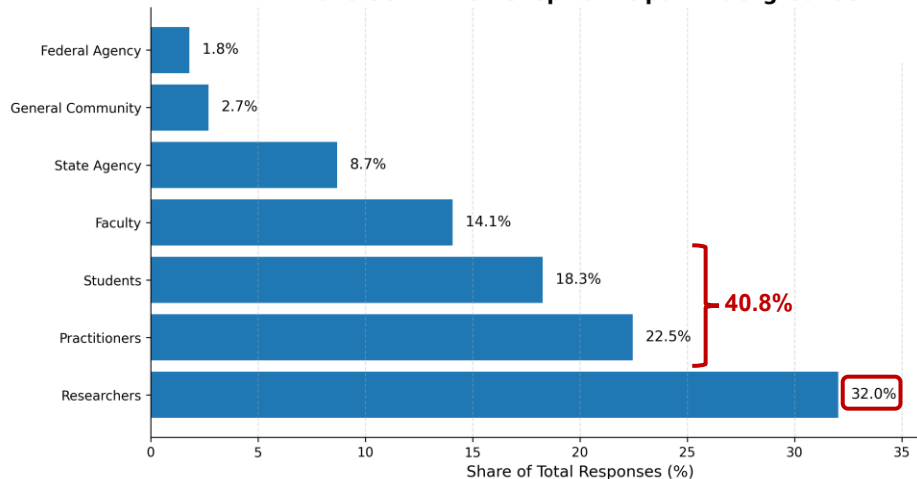
2026 SGMD Workshop
Speakers

PEER and Lawrence Berkeley National Laboratory (LBNL) will host an online workshop on the **Simulated Ground Motion Database (SGMD)**, an open-access resource supporting research and engineering applications involving simulated earthquake ground motions. This workshop will bring together researchers and practitioners to share how SGMD is being used in practice, highlight recent applications, and gather feedback to inform future development. The event will also provide an opportunity to strengthen connections within the growing SGMD user community and encourage collaboration.

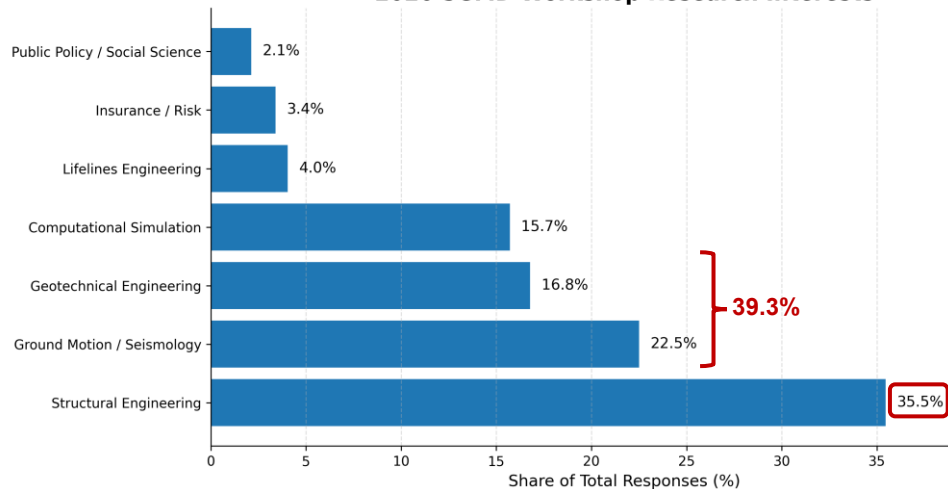
2026 SGMD Workshop Statistics

- 24 presenters/panelists across 5 sessions
- **~263 attendees worldwide**
- Panel discussion: *Enabling Applications in Engineering Design*

2026 SGMD Workshop Participant Backgrounds



2026 SGMD Workshop Research Interests



Enjoy the workshop!

The detailed program & abstracts are here:

<https://peer.berkeley.edu/news-and-events/2026-peer-lbnl-workshop-SGMD>

We look forward to your ideas, feedback, and collaboration