USC | UNIVERSITY OF SOUTHERN CALIFORNIA

Welcome

2026 SCEC ShakeOut Scenario 2.0 Workshop

October 6–7, 2026

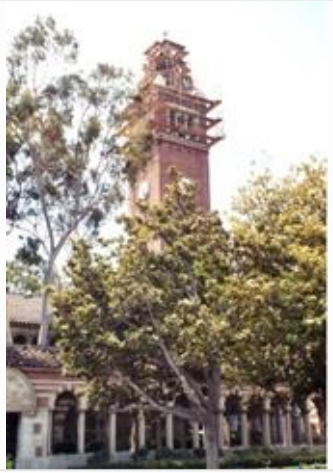
Mudd Hall, Room 203

University of Southern California, Los Angeles, CA

Welcome to USC

Mudd Hall: Northridge Damage → Repair → Resilience

Built in 1929. Damaged in the 1994 Northridge earthquake. Repaired and seismically strengthened while preserving historic character.

Tower under repair	Repair & retrofit	Restored space
		
Exterior tower work after Northridge	Interior construction and strengthening	Historic character preserved

Images/source material: Kaplan Chen Kaplan Architects & Planners project sheet

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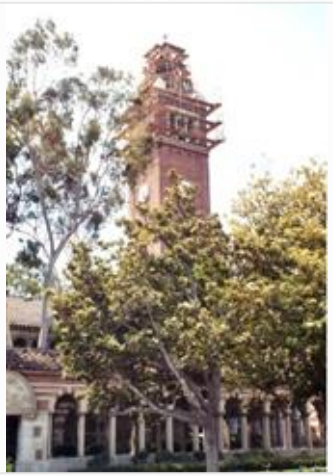

Exterior tower work after Northridge

Repair & retrofit

Interior construction and strengthening

Restored space

Historic character preserved

We are meeting today in the very same building to flip the script: from reactive to proactive!

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Seismic Resilience is a matter of National Security

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A USGS 2008 Scenario for a M7.8 Earthquake on the Southern San Andreas Fault is forecasted to result in:

~1,800 deaths and 53,000 injuries requiring emergency room care
~$213 billion in economic losses (2008 dollars)

- $113B in property damage + $68B in business interruption + $11B in related costs
- Fire: $87B — the single largest loss driver, exceeding all shaking damage combined
- Shaking damage to buildings and contents: $46B
- Business interruption from water system failure: $53B

~1,600 fires ignited; 200 million sq ft of building stock destroyed (≡ 133,000 homes)

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The societal consequences would exceed anything CA has seen in its modern history

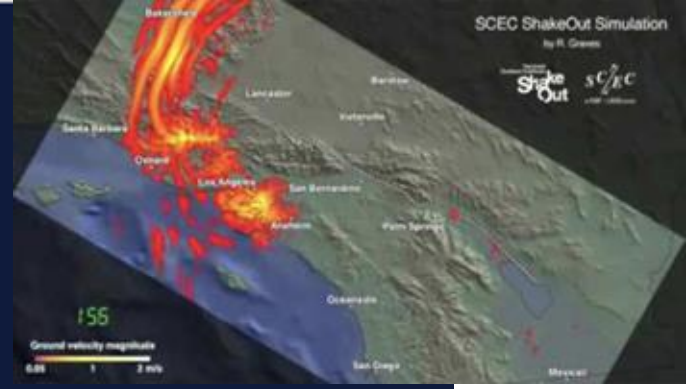
Compare this to the disruption and the economic loss from the 2025 LA Fires

We have no recent memory in CA for weeks to months loss of essential services (e.g., electricity, water, gas, and internet)

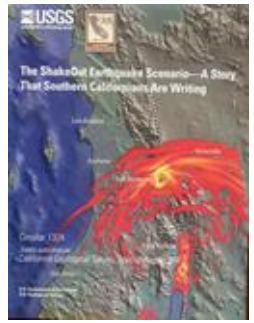
Significant Impact on social cohesion, economic activities, supply chain, and health care systems

Increased vulnerability to cyber attacks

The 2008 ShakeOut Scenario: From Science to Public Engagement to Legislation



Great ShakeOut
Earthquake Drills



ShakeOut™

EMERGENCY PLANNING

Our margin for error is shrinking– better planning is now essential, not optional

PREVIOUSLY

The system had more capacity to absorb forecasting error.

Gaps between forecast and reality were manageable. Slack in budgets and external support provided a cushion when plans fell short. Acting in the moment was more tolerable.

NOW

Mistakes are costlier and harder to recover from.

Tighter resources leave no buffer. One bad assumption can now cascade. We need sharper forecasts and decisions made ahead of the moment, not in reaction to it.

The implication: Planning quality is now an operational necessity: the quality of our scenarios directly determines our outcomes.

ENGINEERING & INFRASTRUCTURE

Design codes set the standards. But they necessarily evolve through deliberate cycles.

THE GAP

Science and scenarios can inform decisions between those cycles

When design codes haven't yet addressed an emerging risk, current science fills that gap, giving decision-makers the risk intelligence they need now, not in the next update cycle.

THE SOLUTION

Help stakeholders move faster than the regulatory cycle.

Turn emerging risk knowledge into practical, defensible decision. Stakeholders get actionable guidance.

The opportunity: **B**ridging science and decisions that make a difference!

ShakeOut Scenario2.0

20 Years Later!

Climate Change & Cascading Hazards

Wildfire, heat, and recovery challenges can compound earthquake impacts.

More Powerful Tools

Exascale computing, dense data, and AI enable deeper analysis.

Larger Exposure

More people, assets, and systems are at risk.

Digitization & Electrification

Daily life depends more on power, data, and connected infrastructure.

Unaddressed Vulnerabilities

Many buildings, lifelines, and communities remain exposed.

Better Knowledge of CA Earthquake Systems

Improved understanding of faults, rupture, and basin effects.

OUR GOALS

Our Goals Are Ambitious but Achievable

01

Assess the impact of our interventions

How have our interventions in the last 20 years changed our vulnerability? What are we missing?

02

Rerun the rupture scenario and ground motion products

Reduce uncertainty about shaking intensity and distributions

03

Run a large aftershock on Hollywood-Raymond fault

Evaluate the compounded hazard in the LA basin

04

Update our infrastructure portfolio

Evaluate risk across the full infrastructure portfolio using current models

05

Revisit multi-hazard maps

Assimilate the latest research results accounting for climate changes

06

Social science perspective

Human behavior and response under prolonged disruption

Co-planning with emergency managers and utilities : resource allocation, optimization, operations research, and decision frameworks.

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Scenario Target Release Date: Spring 2028

ShakeOut Scenario 2.0 : It takes a COMMUNITY!

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DR. LUCY JONES CENTER FOR SCIENCE AND SOCIETY

SCEC Statewide California Earthquake Center

USGS science for a changing world

STATE OF CALIFORNIA Seismic Safety Commission SSC

Alfred E. Alquist SEISMIC SAFETY COMMISSION

CGS CALIFORNIA GEOLOGICAL SURVEY

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UC DISASTER RESILIENCE NETWORK

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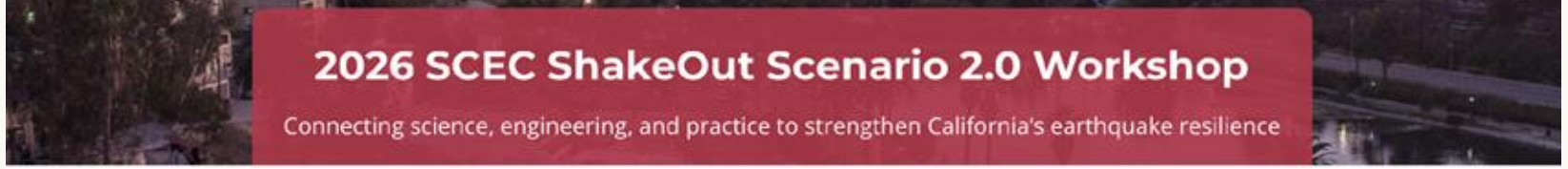
Additional partners across academia, industry, and state agencies

ONLY 18 MONTHS

We need to move at light speed.

And we can use all the support we can get!



2026 SCEC ShakeOut Scenario 2.0 Workshop

Connecting science, engineering, and practice to strengthen California's earthquake resilience

Date: October 6-7, 2026

Location: University of Southern California, Los Angeles, CA

Workshop Organizers: Kate Scharer (USGS), Ahmed Elbanna (USC), Negar Elhami-Khorasani (Univ at Buffalo), Keith Porter (SPA Risk), Lucy Jones (Caltech), Samantha Stanley (Caltech)

SCEC Award: 26067

Our Workshop Arc: science → impacts → mitigation → action

DAY 1 — Review progress, integrate impacts, and surface recommendations

S1 09:15–10:45

Scientific Foundations of ShakeOut Scenario 2.0

Fault constraints, candidate ruptures, dynamic rupture results, high-frequency extension, and preliminary USGS scenario products.

S2 11:05–12:00

Cascading Hazards

Landslides, fire following earthquake, chemical spills, air contamination, dam failures, and other secondary hazards.

S3 13:00–14:30

Social Impacts and Mitigation

Mitigation framework, building and infrastructure consequences, physical-loss reduction, response, recovery, and resilience.

S4 15:00–16:20

Topical Group Discussions

Breakout groups identify research questions, information needs, and priorities for safer and more resilient Southern California.

S5 16:20–16:59

Recommendations for ShakeOut 2.0 Planning

Groups share recommendations; full-group discussion identifies cross-cutting priorities, unresolved gaps, and next-phase implications.

DAY 2 — Communicate, coordinate, and plan

S6 09:00–10:10

Strategically Communicating Science and Risk

Lessons from 2008 ShakeOut, priority audiences, core messages, communication channels, and project communication strategy.

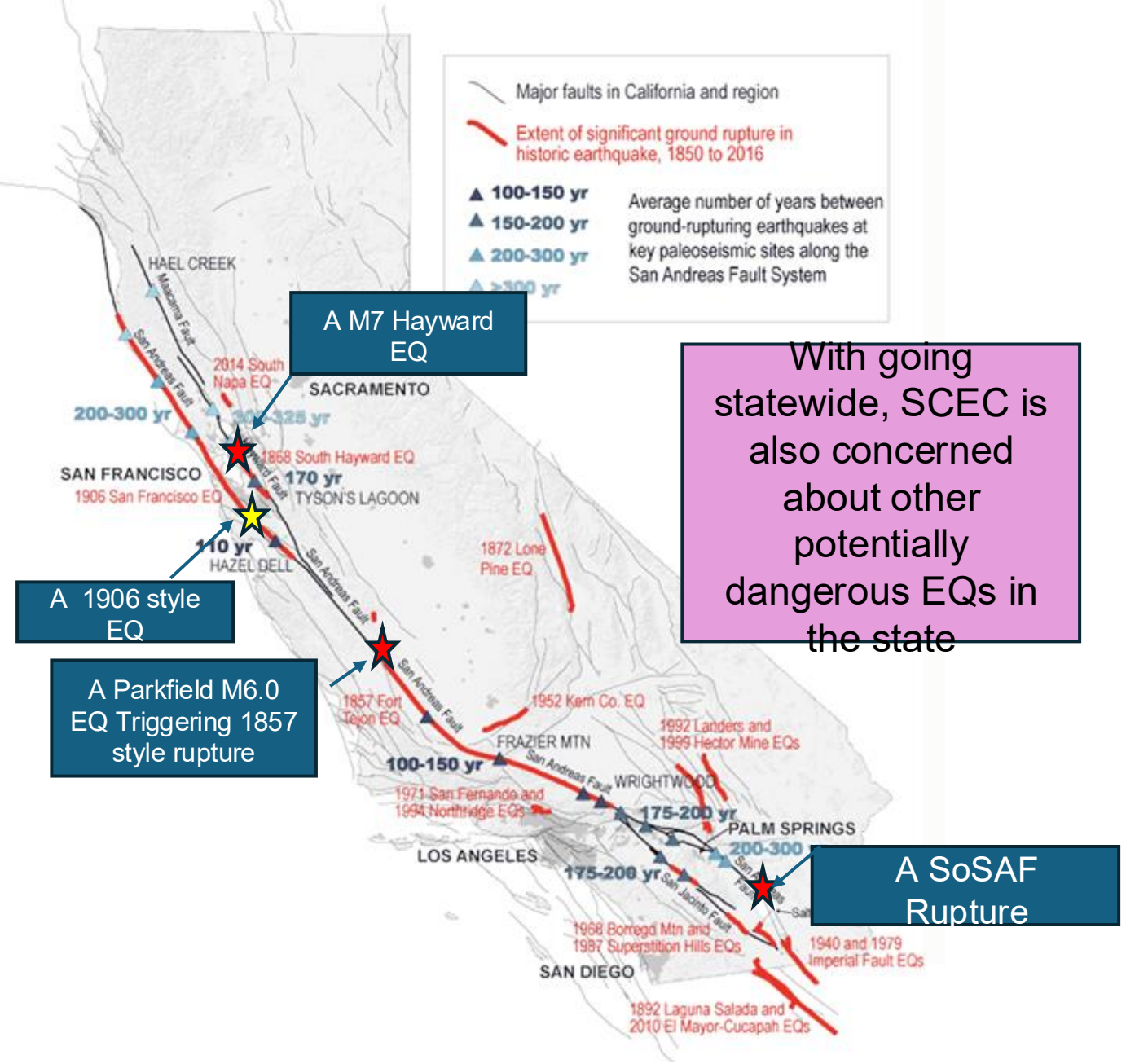
S7 10:30–11:45

Coordinating the Next Phase and Developing Plans

Topical leads outline next-phase plans, partnerships, expertise, data needs, and draft action summaries.

Workshop output

Shared priorities + action summaries for Year 2 planning



A M7 Hayward EQ

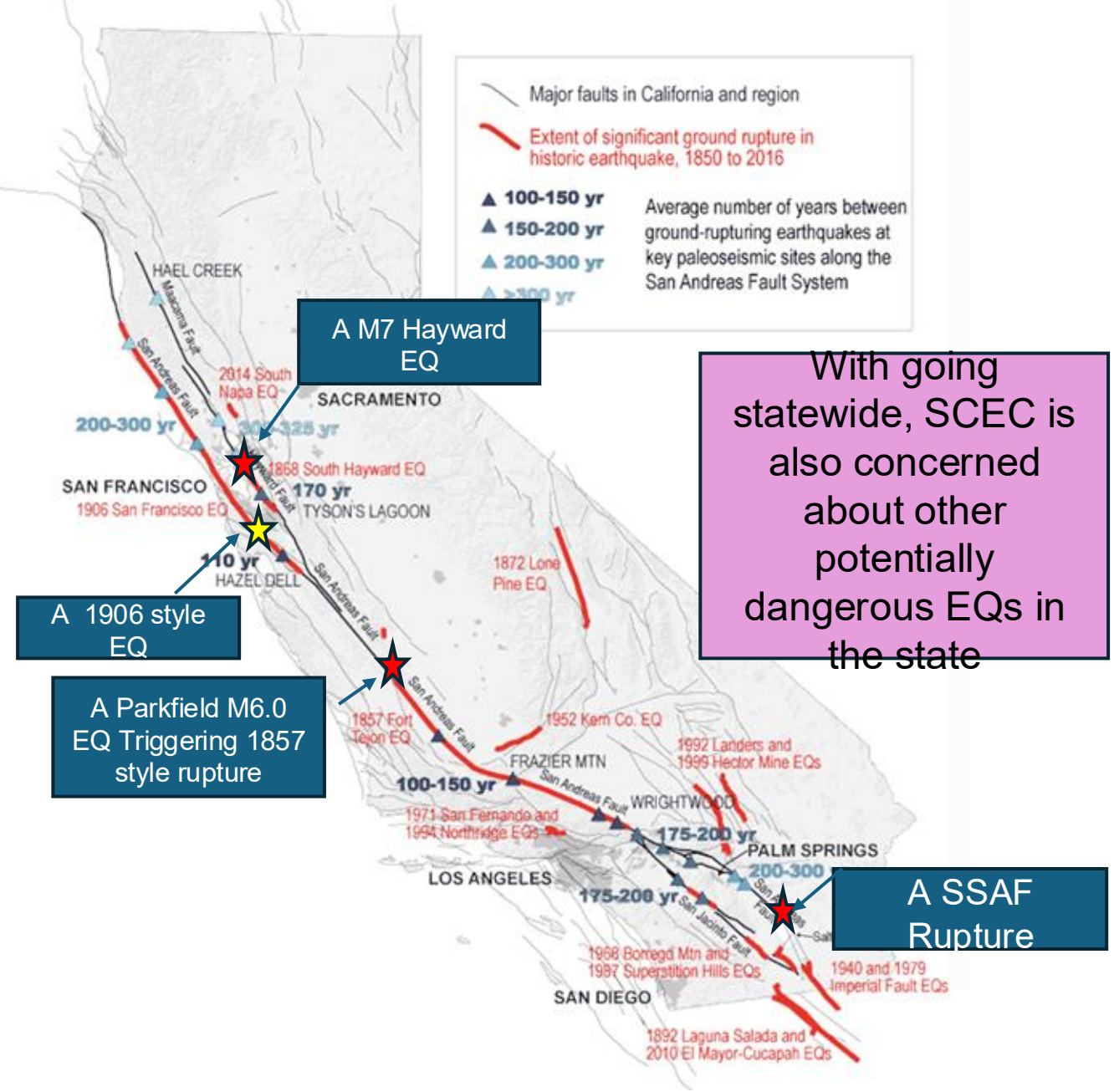
With going statewide, SCEC is also concerned about other potentially dangerous EQs in the state

A 1906 style EQ

A Parkfield M6.0 EQ Triggering 1857 style rupture

A SoSAF Rupture

Source: USGS EHP (2017)



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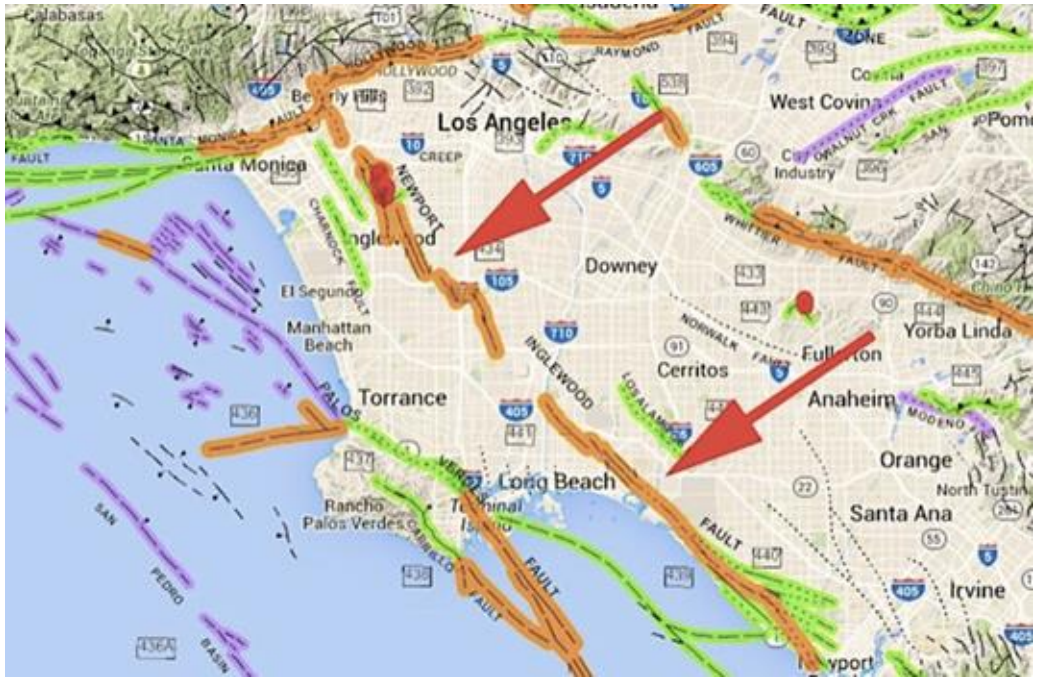
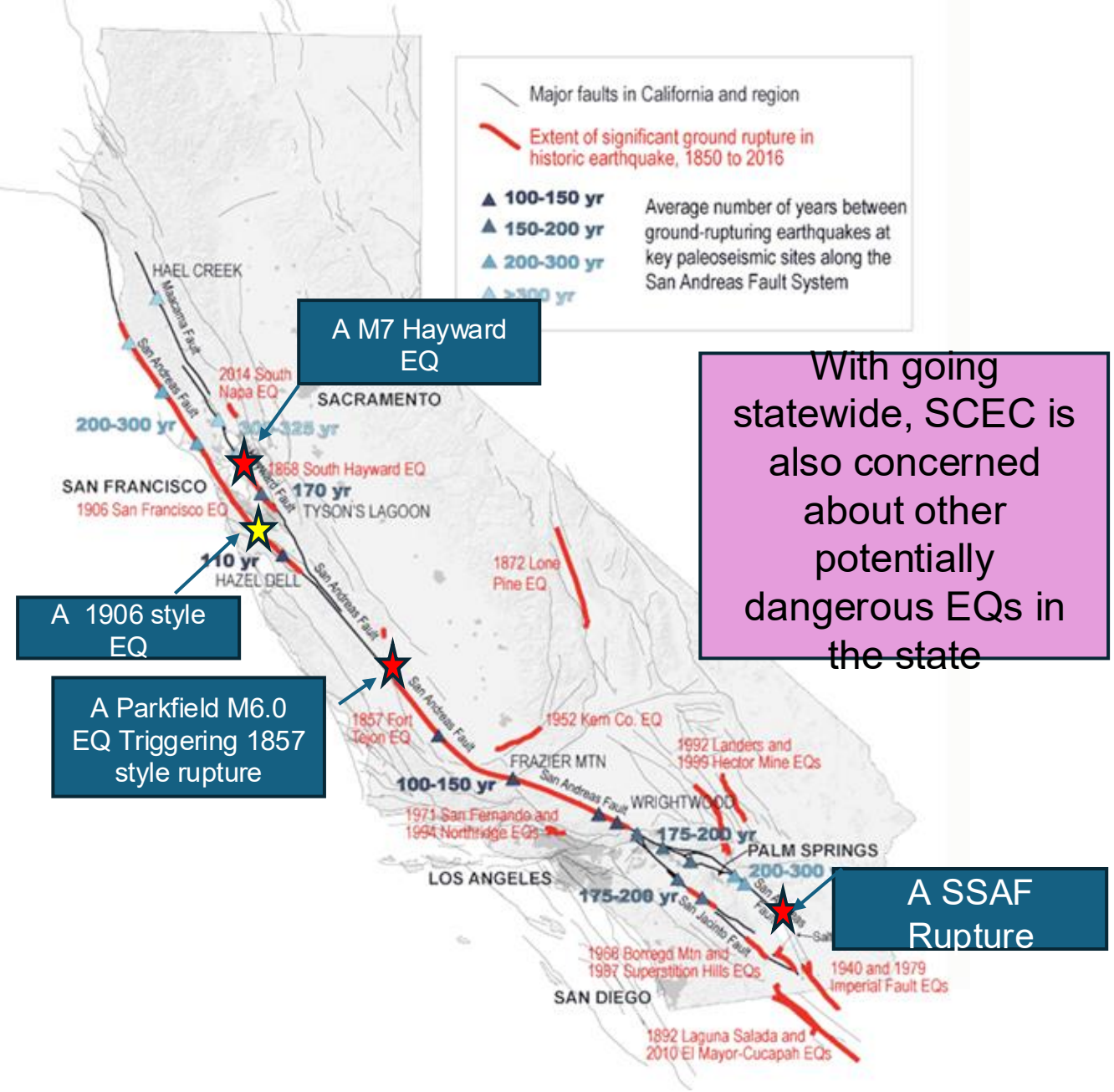


It is not only large earthquakes on the SAF that matter

Source: USGS EHP (2017)



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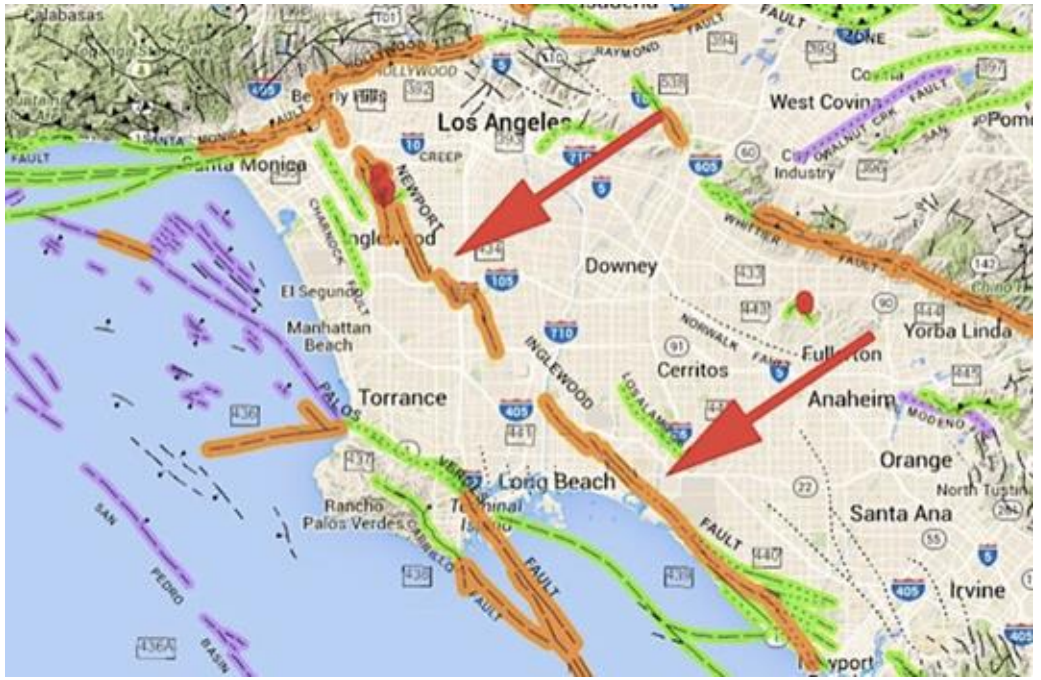
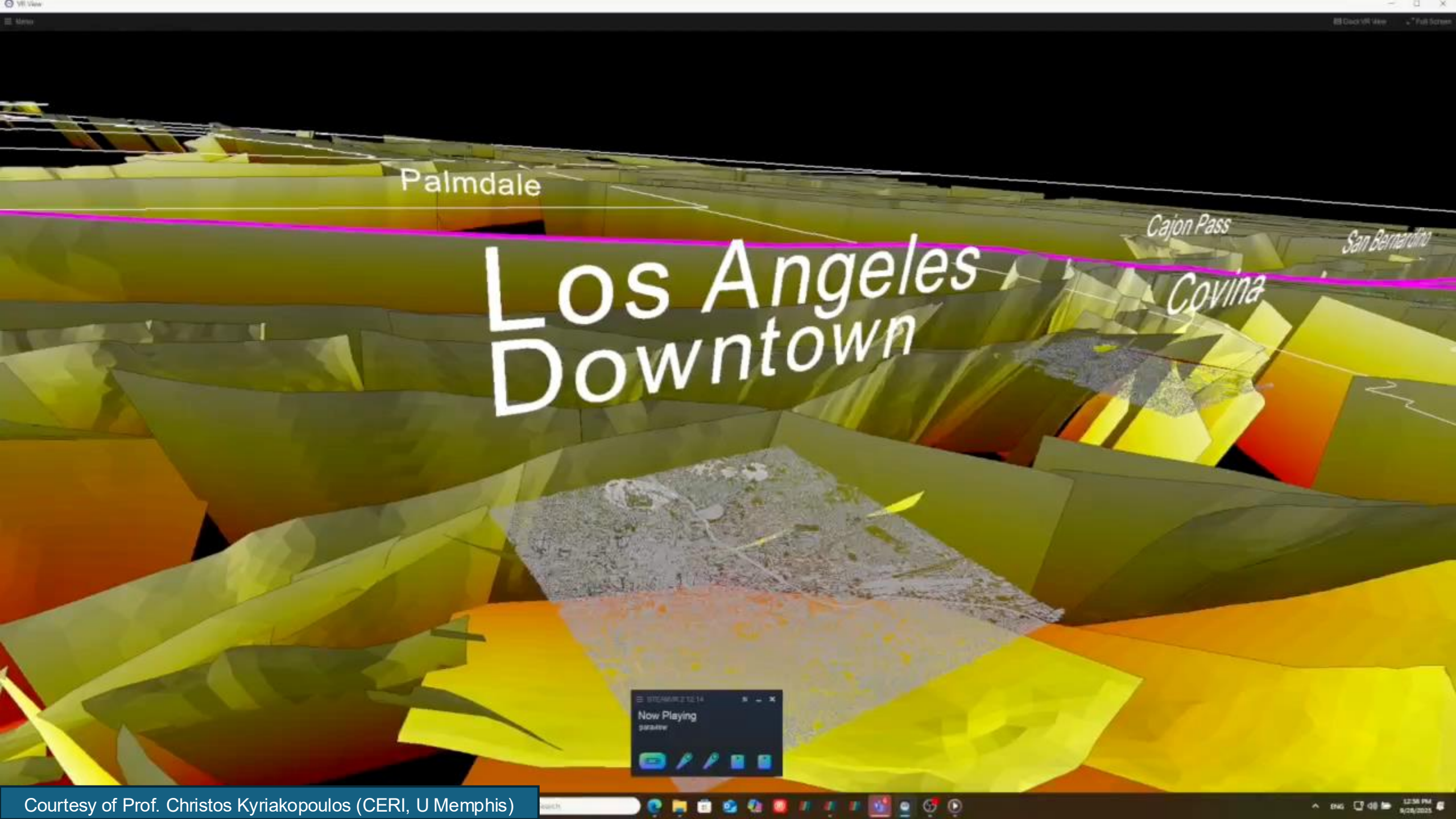


It is not only large earthquakes on the SAF that matter

It is not only strike slip faults that matter (We love all our faults!)

Even a moderate sized earthquake can be destructive (e.g., Northridge)

Source: USGS EHP (2017)



Courtesy of Prof. Christos Kyriakopoulos (CERI, U Memphis)

So, let's get to work starting with the Big One!

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And let's prove this earthquake expert wrong!

CALIFORNIA NEWS

Next 'Big One' along San Andreas Fault could cause $1 trillion in damage, earthquake expert warns

by: Jocelyn Fiset
Posted: Jul 28, 2026 / 10:38 AM PDT
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"I wouldn't say that a trillion dollars is an extreme, it could be very plausible if things go bad," Ahmed Elbanna, director of the Statewide California Earthquake Center, told the San Francisco Chronicle.

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Implement the mitigation.
Then the earthquake happens...
and the losses are far smaller than we predicted.

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Wouldn't it be wonderful to be proven wrong?