

# *SCEC Advisory Council Recommendations*

*Palm Springs, California*

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**Jeff Freymueller, AC Chair**  
**University of Alaska Fairbanks**

# SCEC Advisory Council Membership

- **Jeff Freymueller, Chair** (*University of Alaska Fairbanks*)
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- **Gail Atkinson** (*University of Western Ontario*)
- **Roger Bilham** (*University of Colorado*)
- **Donna Eberhart-Phillips** (*UC Davis*)
- **Kate Long** (*California Office of Emergency Services*)
- **Bob Lillie** (*Oregon State University*)
- **Susan Cutter** (*University of South Carolina*)
- **M. Meghan Miller** (*UNAVCO*)
- **Farzad Naeim** (*John A. Martin and Associates*)
- **John Vidale** (*University of Washington*)
- **Andrew Whittaker** (*University of Buffalo*)

# Overall Impressions

- **As always, the SCEC meeting is pulsing with scientific energy**
  - It is wonderful to see so many students actively participating!
- **New SCEC 4 initiatives progressing**
  - CGM, CSM, SFSAs.
- **“Old” SCEC initiatives continue to develop and evolve**
  - CFM, CVM, etc.
- **Interaction with the engineering community has been greatly strengthened.**
- **SCEC collaboration remains vibrant, with enthusiastic participation across many disciplines**

## Topics of AC Recommendations

- **How is SCEC4 doing?**
  - A look at progress on the 6 fundamental questions that SCEC has posed for itself
- **CEO Advisory Structure and Goals**
- **Met with SCEC leadership, agency reps in closed session**
  - SCEC Director succession proceeding well
    - We were pleased to have the USC Dept Chair and Chair of Search Committee here
  - Budget challenges are being addressed well

# **SCEC4 Fundamental Questions**

- 1. Stress transfer from plate motion to crustal faults: long-term fault slip rates**
- 2. Stress-modulated fault interactions and earthquake clustering: evaluation of mechanisms**
- 3. Evolution of fault resistance during seismic slip: scale-appropriate laws for rupture modeling**
- 4. Structure and evolution of fault zones and systems: relation to earthquake physics**
- 5. Causes and effects of transient deformations: slow slip events and tectonic tremor**
- 6. Seismic wave generation and scattering: prediction of strong ground motions**

# 1. Stress transfer from plate motion to crustal faults: long-term fault slip rates

- **Highlights**

- High resolution (space and time) geological slip rate estimates on additional faults
- Advances in characterization of earthquake cycle effects in geodetic data
- Geodetic and geologic slip rate estimates are increasingly in agreement, and rates constant in time

- **Remaining challenges**

- Disagreement remains for Garlock, Mojave segment
- Finding where the slip goes through San Geronio Pass (SFSA)
- Earthquake clustering and geologic slip rates

# Community Geodetic Model

- **The CGM is a challenging task, and a lot of hard work remains to make it a reality.**
  - Combining GPS solutions at the time series level is straightforward (e.g., the IGS), but combining velocity fields is much more challenging. Significant challenges remain in constructing a combined InSAR solution and then merging that with GPS.
- **Maintaining or expanding participation is critical**
- **Software development is needed for tools to merge and compare LOS velocity fields for InSAR**
  - May have elements in common with software developed for the CSM, but flexibility is needed because the best way to compare and combine results is still under investigation.

## 2. Stress-modulated fault interactions and earthquake clustering

- **Highlights**

- Continuing accumulation of data for forecasts to test models of interactions
- Evaluation of models with data
- Continuing development of Community Stress Model

- **Remaining challenges**

- Need global databases to answer critical questions
- Fundamental questions remain about absolute and differential stresses in the ground
- Taking on problems of earthquake early warning would be timely and societally useful – foundational research



### 3. Evolution of fault resistance during seismic slip

- **Highlights**

- Dynamic rupture simulations are becoming increasingly realistic.
- Incorporation of realistic heterogeneity of properties into numerical models
- Wider range of slip modes between end members “aseismic” and “seismic” in the observations
- New insights from lab experiments continue to come

- **Remaining challenges**

- Need to put rupture simulations into a more realistic velocity model (collaboration in place to do this).
- Compare, improve agreement with observations.

## 4. Structure and evolution of fault zones and systems: relation to earthquake physics

- **Highlights**

- Heat generated in earthquakes – JFAST, bio studies
- Rheological models of faults in the crust and mantle are advancing
- Experimental results are isolating the special properties of fault zone materials
- Paleoseismology is adjudicating the periodicity, clustering, and oscillating patterns of earthquake recurrence
- Numerical models are allowing ideas about influence of geometry, friction, scattering, etc. to be evaluated
- Continuing progress in constraining fault zone LVZs

## 4. Structure and evolution of fault zones and systems: relation to earthquake physics

- **Remaining challenges**

- Still many unknowns subsurface geometry of fault systems, effectiveness of segmentation
- Uncertain danger of coastal thrust faults
- Need to continue to improve models of the development of fault zones

## 5. Causes and effects of transient deformations

- **Highlights**

- Good progress in characterizing the kinematics of these events
- Rich array of geodetic transients detected
- Tectonic tremor detected on more faults
- Maturation of transient detection exercise
- Creep as an amplifier of stress changes

- **Remaining challenges**

- Causality of these events remains puzzling
- Impact of short-term transients and seasonal hydrological loading on faults

## **6. Seismic wave generation and scattering: prediction of strong ground motions**

- **Highlights**

- Development of broadband simulation platform, for simulation of many ground motion simulations
- Development of metrics to evaluate ground motions
- Coordination with earthquake engineering activity group to address uses of simulations in evaluating structural performance
- Potential for simulations to address important additional problems in earthquake engineering such as SSI and structure-soil-structure interaction
- Engineers becoming more positive about applications to critical infrastructure and tall buildings

## 6. Seismic wave generation and scattering: prediction of strong ground motions

- **Remaining challenges**

- Make the degree of complexity in building analysis commensurate with level of complexity in simulations
- Integrate simulations with engineering effects at local scales, particularly with respect to effects in the upper soil column that can be highly nonlinear
  - **How to use simulations to address liquefaction, landslide potential?**
- Continuing to build acceptance of simulations in engineering community (misplaced faith in GMPEs in engineering community)
  - **Really a matter of educating engineers as to what they are getting**
  - **This topic is mature enough to engage a broader engineering community (that uses codes) through a webinar**
- Deliver the simulation products in useful format for practicing engineers – eg through links to USGS-type webtools.
- Improved treatment of site effects
- How to integrate learning from broadband platform, CyberShake, and dynamic simulations

# CEO Advisory Structure and Goals

- **CEO-AC subcommittee met April 2013**
  - Susan Cutter, University of South Carolina
  - Jim Goltz, California Governor's Office of Emergency Services
  - Kate Long, California Governor's Office of Emergency Services
  - Bob Lillie, Oregon State University
  - Farzad Naeim, John A Martin & Associates
  - Mark Benthien, SCEC Associate Director for CEO
- **Reviewed CEO Strategic Plan metrics and milestones and recommended**
  - Removing, adding or simplifying metrics to focus on activities and achievable results
  - Extending some milestones
  - Developing statement of how metrics/milestones will be used as a management tool to improve programs, not just a reporting process.

# CEO-AC Plans

- **CEO-AC reports through the AC**
- **4 Advisory Council Members**
  - Farzad Naeim, John A Martin & Associates (Chair)
  - Susan Cutter, University of South Carolina
  - Kate Long, California OES
  - Bob Lillie, Oregon State University
- **4 Non-voting Subject Matter Advisors**  
**Representing CEO Strategic Plan Thrust Areas**
  - Implementation Interface
  - Public Education and Preparedness
  - K-14 Earthquake Education Initiative
  - Experimental Learning and Career Advancement



# SCEC CEO: The Next 8 Years

- **Develop plan over the next year through regular meetings**
  - Semi-monthly Webinars presented by CEO subject matter experts from the broader community will address “How can Earth science communication be improved?”
    - **Examples: social psychology, public health, risk communication, natural history interpretation, marketing, advertising, emergency management**
- **CEO-AC will make recommendations to Advisory Council for improvements in CEO program and SCEC 5 proposal**
- **Webinars also open to entire SCEC Community as well as the broader Communications, Education and Outreach Community**
  - CEO Subcommittee hears feedback from wide stakeholder base
  - Webinars themselves serve outreach purpose

# **Move Beyond Traditional Sources of Funding?**

- **SCEC is not immune from the impacts of Federal budget crises**
  - There are scary potential scenarios for next year and beyond
  - Everyone needs to be an advocate, including talking to your Congressional Delegation
- **Explore opportunities for additional (non-governmental) funding for SCEC, both for focused activities and for the core program**

# Finally

- **It was another exciting and stimulating SCEC Annual Meeting**
- **Keep up the good work, everyone!**
- **It has been a lot of fun for the last ~~47~~15 years!**



# Shameless Plug



April 30 – May 2, 2014  
Anchorage, Alaska