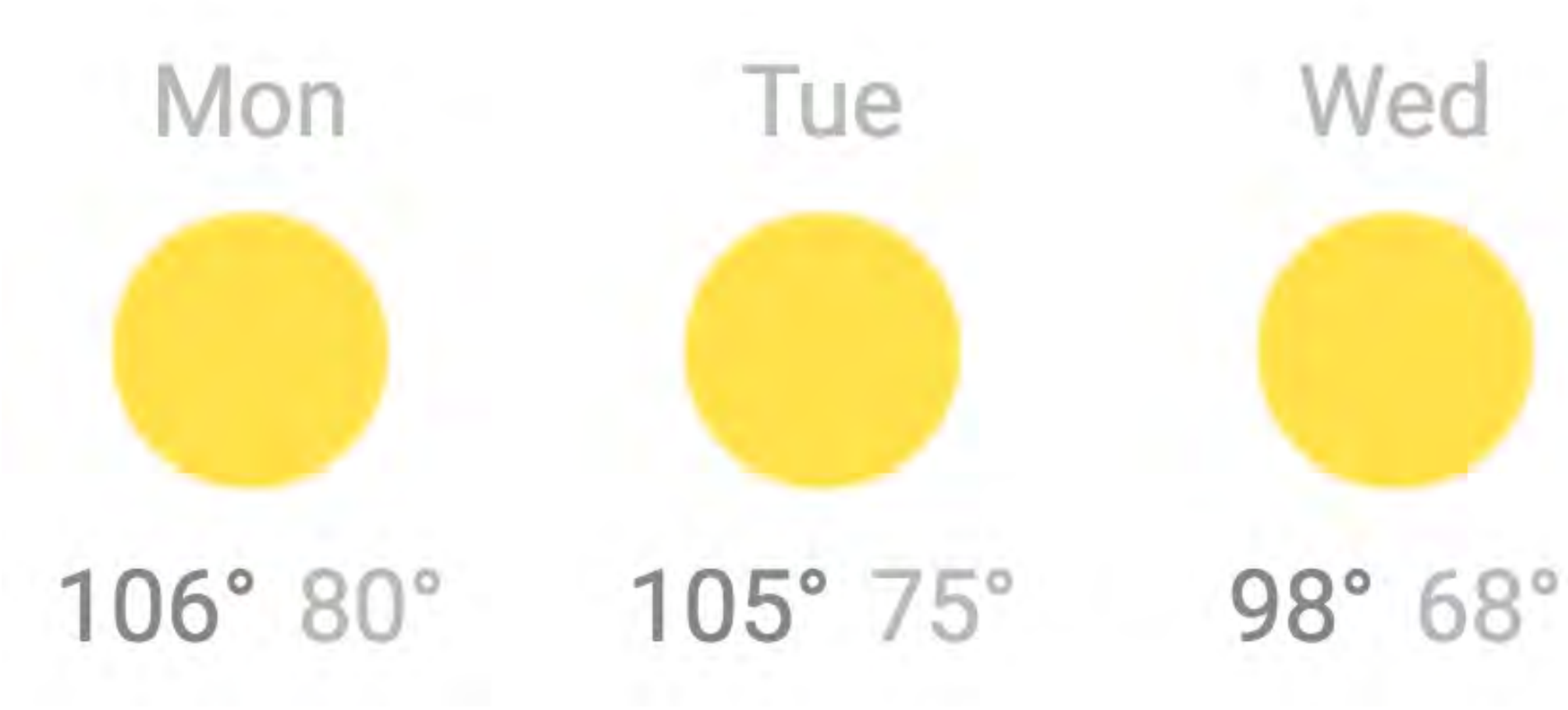
SCEC Annual Meeting

Palm Springs, California
10-13 September 2017

Welcome to Palm Springs!



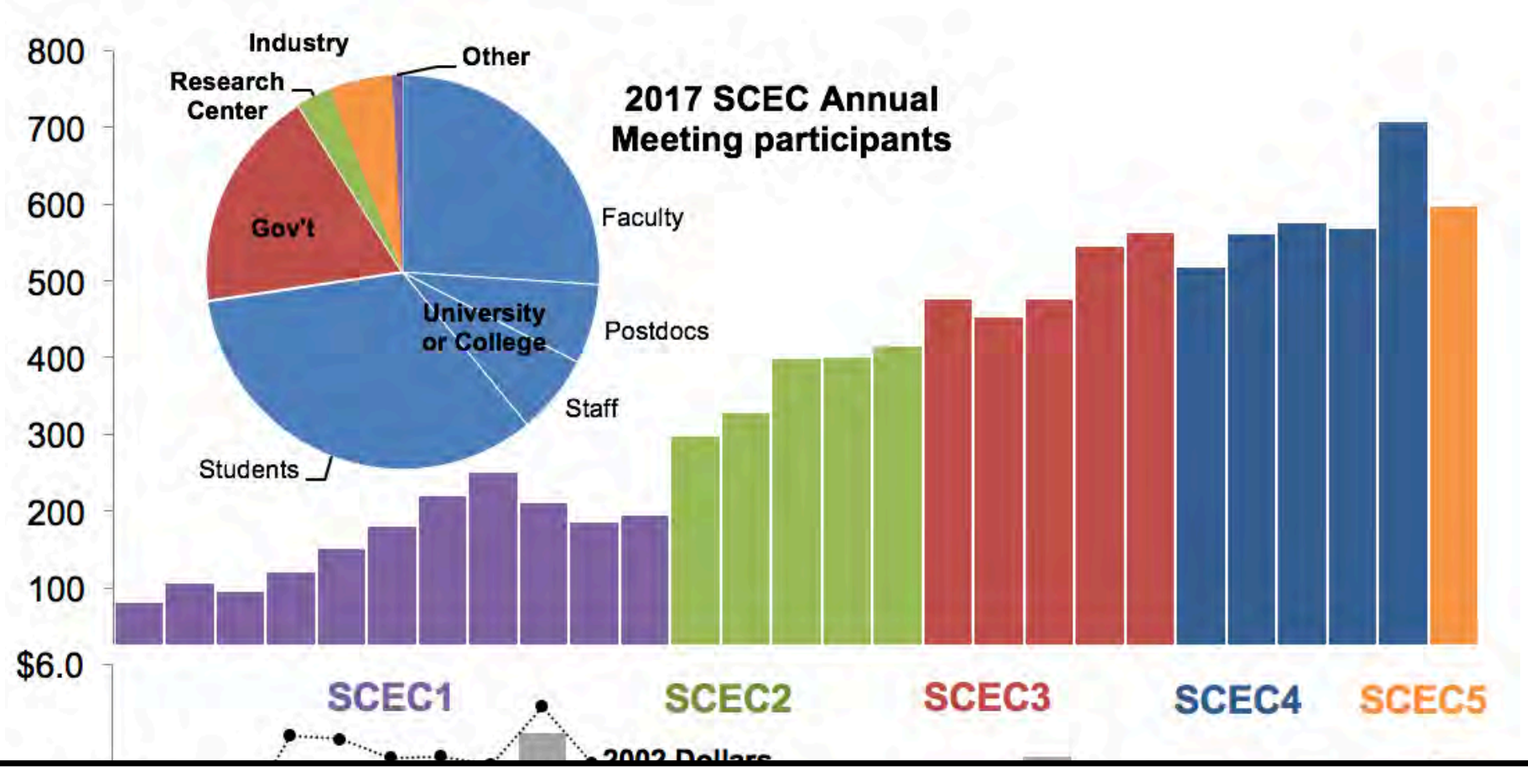
Today will be hot!

Let's welcome John Vidale as the new SCEC Director!

SCEC Directorship Transition

- John joined USC faculty on Aug 16
- USC is in the process of requesting the transfer of SCEC Core Program PI-ship
- Formal transfer of the directorship will take place tonight!

SCEC Participation and Core Program Funding



- 596 pre-registrants
- 292 poster abstracts

- 160 first-time attendees
  (108 students/postdocs)

- 285 early-career attendees
  200 students
  25 postdocs

We also request that students and early-career scientists provide suggestions about how to best enhance your participation and satisfaction with the meeting.

SCEC Institutions

Don't see your logo here? The process to join SCEC as a participating institution is very simple:

Submit a letter from a cognizant official (e.g., your department chair or dean) that requests participating institution status and appoints an institutional representative who will act as the point-of-contact with the Center.

SCEC Board of Directors

USC, *Lead*
Tom Jordan, *Chair*

Stanford
Paul Segall

UNR
Graham kent

Caltech
Jean-Phillippe Avouac

Texas A&M
Patrick Fulton

USGS, Golden
Nico Luco (*liaison, non-voting*)

CGS
Tim Dawson

UCLA
Peter Bird

USGS, Menlo Park
Ruth Harris (*liaison, non-voting*)

Nominations are still open for the at-large members of the SCEC5 Board

ing)

Harvard
John Shaw, *Vice-Chair*

UCSD
Yuri Fialko

USGS, Pasadena
Rob Graves (*liaison, non-voting*)

MIT
Tom Herring

UCSB
Toshiro Tanimoto

Member-At-Large
TBA

SDSU
Tom Rockwell

UCSC
Emily Brodsky

Member-At-Large
TBA

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M. Meghan Miller, *Chair*
UNAVCO


Roger Bilham
U of Colorado Boulder


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INGV Rome


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Rick Aster
Colorado State


Donna Eberhart-Phillips
U of California Davis


Tom O'Rourke
Cornell University


Heidi Tremayne
EERI


Susan Beck
University of Arizona


Yann Klinger
IPGP/Paris


Susan Owen
JPL

CEO Planning Committee


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Chair


Timothy Dawson, *CGS*
Implementation Interface


Sally McGill, *CSUSB*
Experiential Learning & Career Advanvement


Danielle Sumy, *IRIS*
K-14 Education


Kate Long, *CalOES*
Public Education & Preparedness

SCEC Management Teams


Tom Jordan
*Director**


Greg Beroza
*Co-Director**

***Executive Committee of the Center**, *also includes the Vice-Chairs of the Board & Planning Committee*

Comm, Educ, & Outreach


Mark Benthien
*Associate Director**


Jason Ballmann
Communications Manager


John Marquis
Web Manager for CEO


Gabriela Noriega
Manager of ELCA


Sharon Sandow
Asst Dir of Strategic Partnerships for CEO

Community Modeling Env


Phil Maechling
*Associate Director**


Scott Callaghan
Research Programmer


Fabio Silva
Research Programmer


John Yu
Computing Services

Special Projects


Christine Goulet
*Exec Sci Director**


Kevin Milner
Research Programmer

Science Operations


Tran Huynh
*Associate Director**


Deborah Gormley
Business Operations Specialist


Edric Pauk
Research Programmer

Administration


John McRaney
*Associate Director**


Karen Young
Contracts & Grants

SCEC Manager of Experiential Learning and Career Advancements

Gabriela Noriega

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*Associate Director**


Karen Young
Contracts & Grants

SCEC Planning Committee

PC Chairs

Greg Beroza, *Chair*

Judi Chester, *Vice-Chair*

Continuing with new roles

Disciplinary Committees

Seismology

Yehuda Ben-Zion

Jamie Steidl

Tectonic Geodesy

David Sandwell

Gareth Funning

Earthquake Geology

Mike Oskin

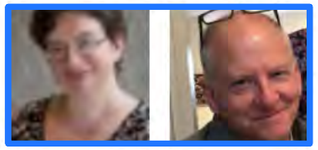
Whitney Behr

Computational Science

Eric Dunham

Ricardo Taborda

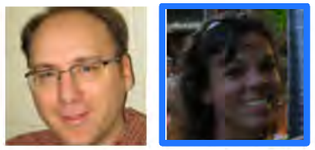
Interdisciplinary Focus Groups



FARM

Nadia Lapusta

Nick Beeler



SDOT

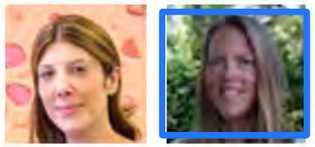
Kaj Johnson

Bridget Smith-Konter

EFP

Max Werner

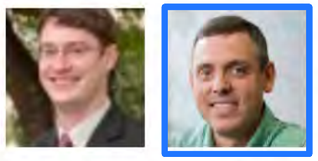
Ned Field



GM

Domniki Asimaki

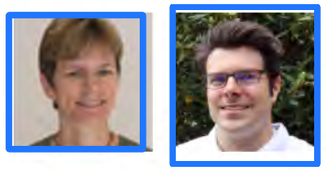
Annemarie Baltay



EEII

Jack Baker

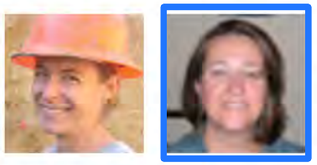
Jon Stewart



CXM

Liz Hearn

Scott Marshall



SAFS

Kate Scharer

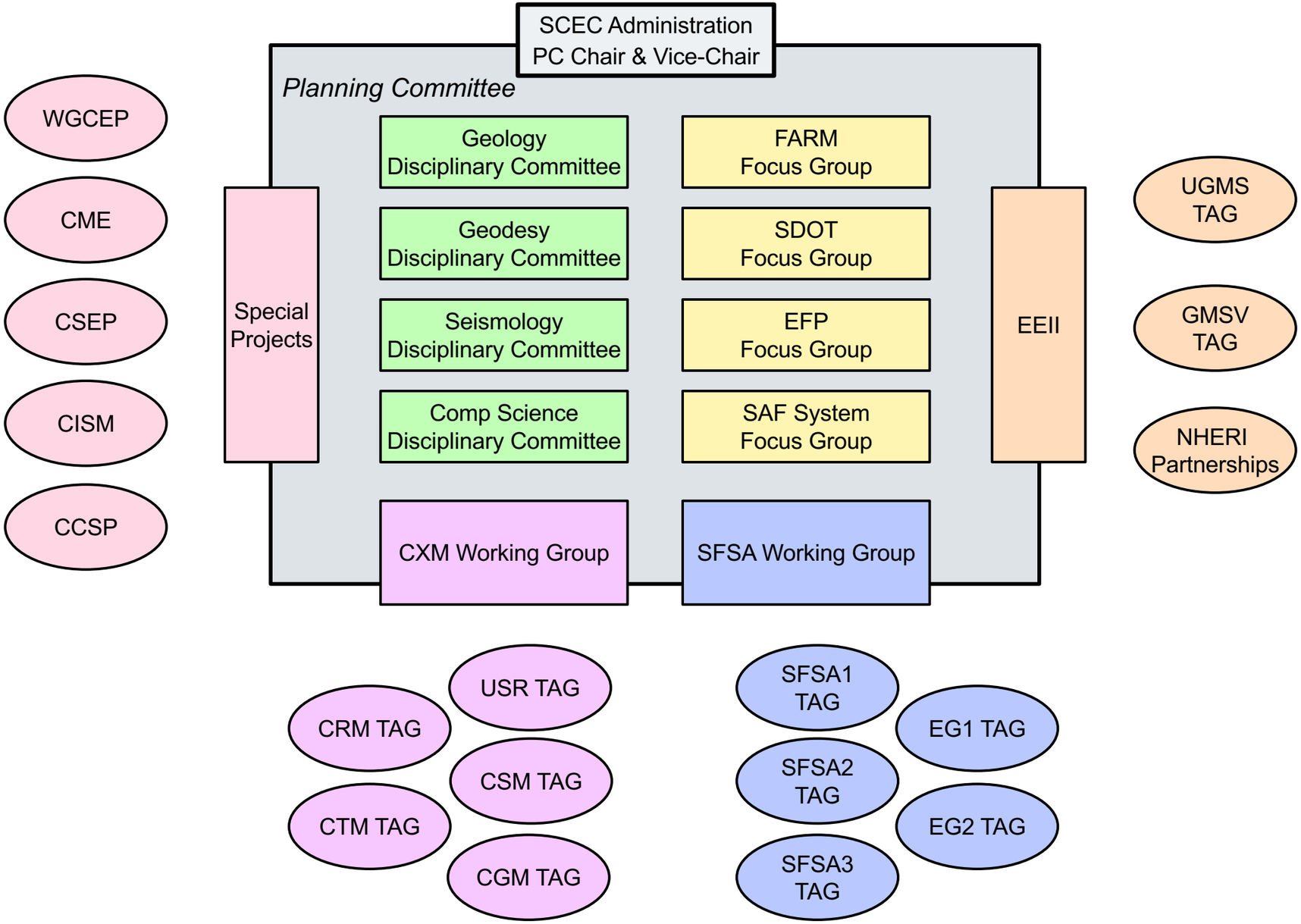
Michele Cooke

Special Projects

Christine Goulet

Phil Maechling

SCEC5 Science Planning Organization



SCEC5 Initiatives

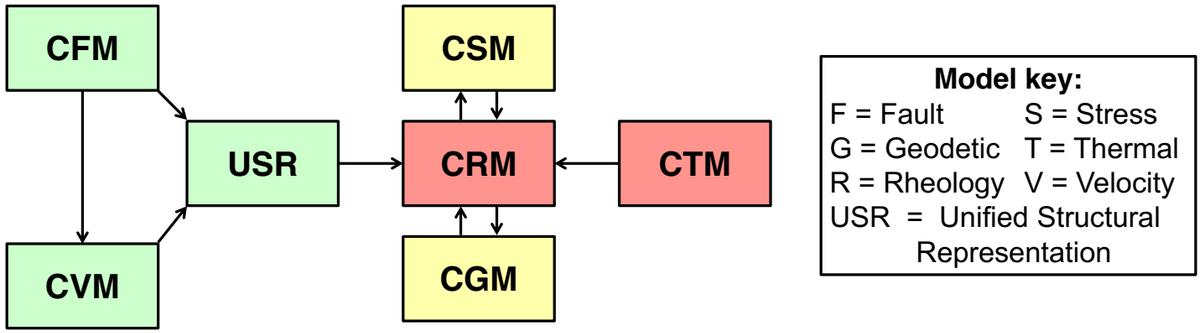
Selected Science Topics

- **Special Fault Study Areas – Focus on Earthquake Gates**
  - "Earthquake gates" are regions of fault complexity conjectured to inhibit propagating ruptures, owing to dynamic conditions set up by proximal fault geometry, distributed deformation, and earthquake history. We will test the hypothesis that earthquake gates control the probability of large, multisegment and multifault ruptures.

- **Beyond Elasticity** **Saturday workshop: Nonlinear Shallow Crustal Effects**
  - We will test hypotheses about inelastic fault system behavior against geologic, geodetic, and seismic data, refine them through dynamic modeling across a wide range of spatiotemporal scales, and assess their implications for seismic hazard analysis.

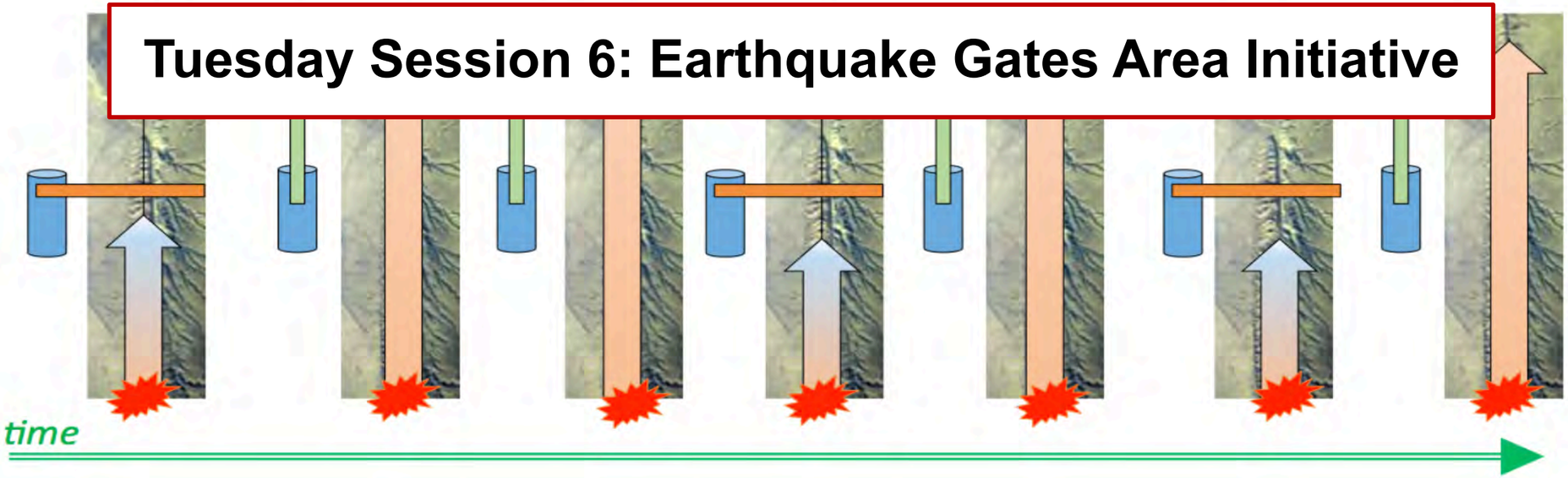
- **Community Models** **Saturday workshop: SCEC Community Rheology Model**
  - We will enhance the accessibility of the SCEC Community Models, including the model uncertainties. Community thermal and rheological models will be developed.

Figure 3.5. Schema of the SCEC Community Models, showing the main directions of information flow among the models. The colors indicate the development status: mature (green), youthful (yellow), in utero (red).



Earthquake Gates

Tuesday Session 6: Earthquake Gates Area Initiative



Earthquake Gates: Investigate the factors that can conditionally halt or pass earthquake ruptures and thus have a control on the probability of large, multi-segment or multi-fault ruptures.

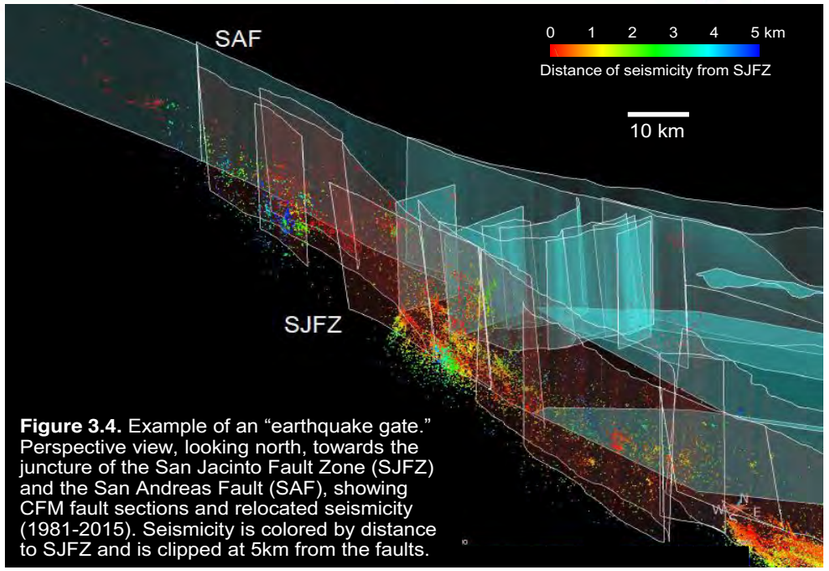


Figure 3.4. Example of an "earthquake gate." Perspective view, looking north, towards the juncture of the San Jacinto Fault Zone (SJFZ) and the San Andreas Fault (SAF), showing CFM fault sections and relocated seismicity (1981-2015). Seismicity is colored by distance to SJFZ and is clipped at 5km from the faults.

SCEC UseIT Intern Program

The 2017 UseIT Grand Challenge
1. Develop a computational system for the probabilistic forecasting of earthquake sequences in Southern California using long seismicity catalogs generated on the Blue Waters supercomputer by the RSQSim rupture simulator.
2. Apply the system to three initial-event scenarios: M6.1 Parkfield, M7.0 Mojave, M6.0 Bombay Beach. Compare the simulator-based probabilities for large aftershocks (M ≥ 7) with the values given by the official Uniform California Earthquake Rupture Forecast, Version 3.
3. Select multi-event scenarios that could threaten the Los Angeles region, and illustrate their hazard and risk with sequence-specific maps of expected ground motions, economic losses, and human casualties.

See the UseIT posters #309-311!

Agenda

Monday, September 11, 2017
08:00 - 09:40 Session 1: "The Long Run"
10:00 - 11:00 Session 2: "Hotel California"
13:30 - 15:00 Session 4: "One of These Nights"
19:00 - 22:00 Banquet: "Tequila Sunrise"

Tuesday, September 12, 2017
08:00 - 10:00 Session 5: "New Kid in Town"
10:30 - 12:00 Session 6: "Life in the Fast Lane"
13:30 - 15:00 Session 7: "Take It Easy"

Wednesday, September 13, 2017
08:30 - 10:00 Session 8: "Desperado"
10:30 - 12:00 Session 9: "Already Gone"

Enjoy the Meeting!

SCEC

AN NSF+USGS CENTER

Southern California Earthquake Center

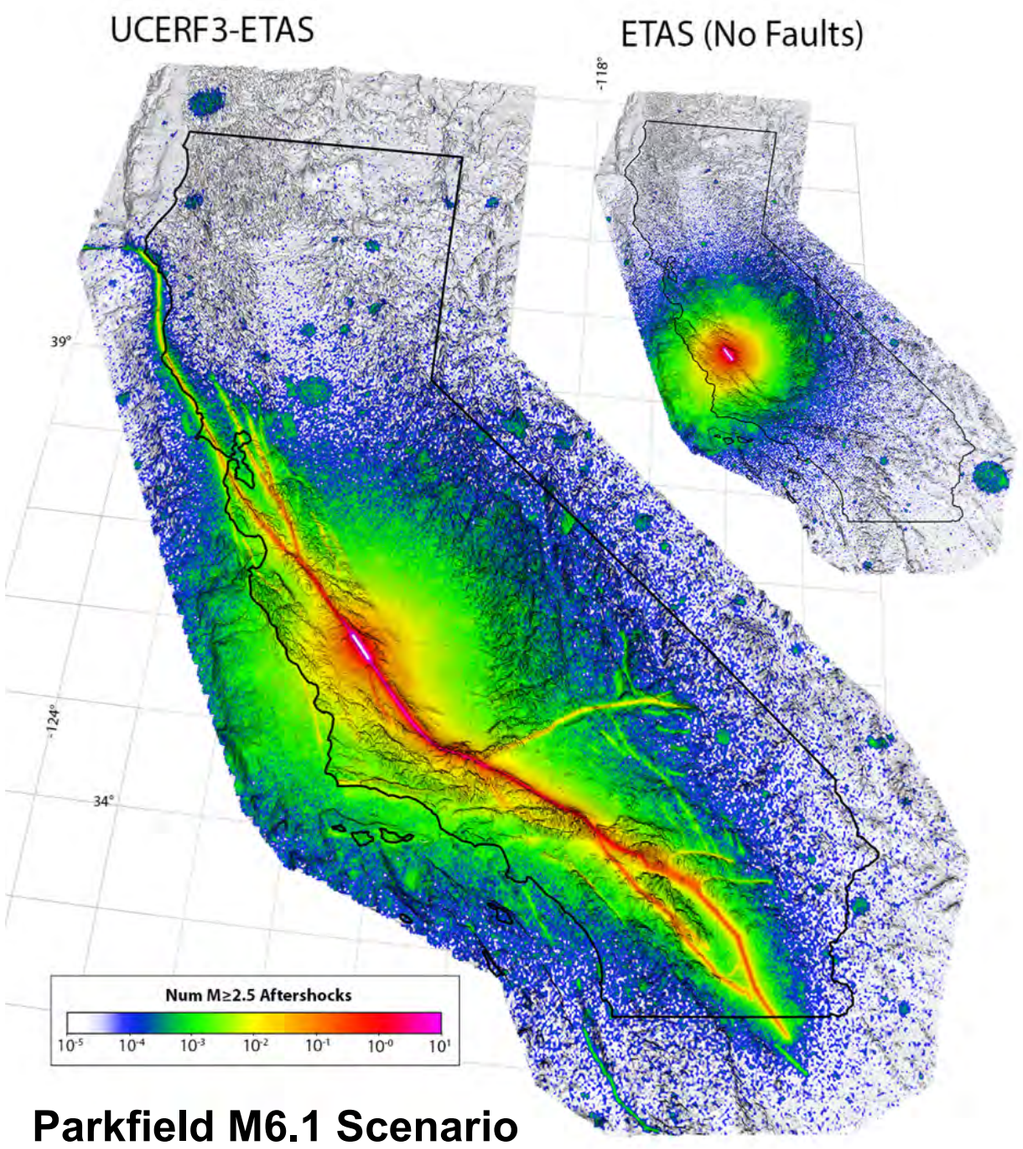
SCEC5 Vision

- Three main problems of earthquake science are coupled through the nonlinear processes of brittle and ductile deformation:
  1. *Dynamics of fault systems*—how forces evolve within fault networks on time scales of hours to millennia to generate sequences of earthquakes
  2. *Dynamics of fault ruptures*—how forces produce fracture and slip on time scales of milliseconds to minutes when faults break chaotically during earthquakes
  3. *Dynamics of ground motions*—how seismic waves propagate from rupture volumes to shake the surface of the strongly heterogeneous, inelastic crust
- Long-range science vision:
  - *Develop dynamical models of earthquake processes that are comprehensive, integrative, verified, predictive, and validated against observations*
- SCEC5 goal:
  - *Provide new concepts that can improve the predictability of the earthquake system models, new data for testing the models, and a better understanding of model uncertainties*

SCEC5 Vision

- Goal of risk reduction poses a fourth problem that couples earthquake science to engineering:
  4. *Earthquake dynamics of the built environment*—how seismic phenomena cause damage to structures, lifelines, critical facilities, and other engineered systems
  - Earthquake Engineering Implementation Interface vision: collaborate with earthquake engineers to develop end-to-end, physics-based modeling capabilities that span system processes from “ruptures-to-rafters”
  - EEII approach: maintain partnerships with leading earthquake engineering organizations
    - Pacific Earthquake Engineering Research Center
    - DesignSafe-CI Center of NSF’s new Natural Hazards Engineering Research Infrastructure Program
    - Building Seismic Safety Council’s *Project 17*
- Fifth problem couples earthquake science to the social sciences:
  5. *Social dynamics of communicating earthquake knowledge*—how to convey scientific information to society in ways that result in lowered risk and enhanced resilience
  - *CEO vision*: promote this dialog on many levels, through many different channels, and inform the conversations with authoritative earthquake information
  - *CEO approach*: engage end-users and the public at large in on-going, community-centric conversations about how to manage particular risks by taking specific actions

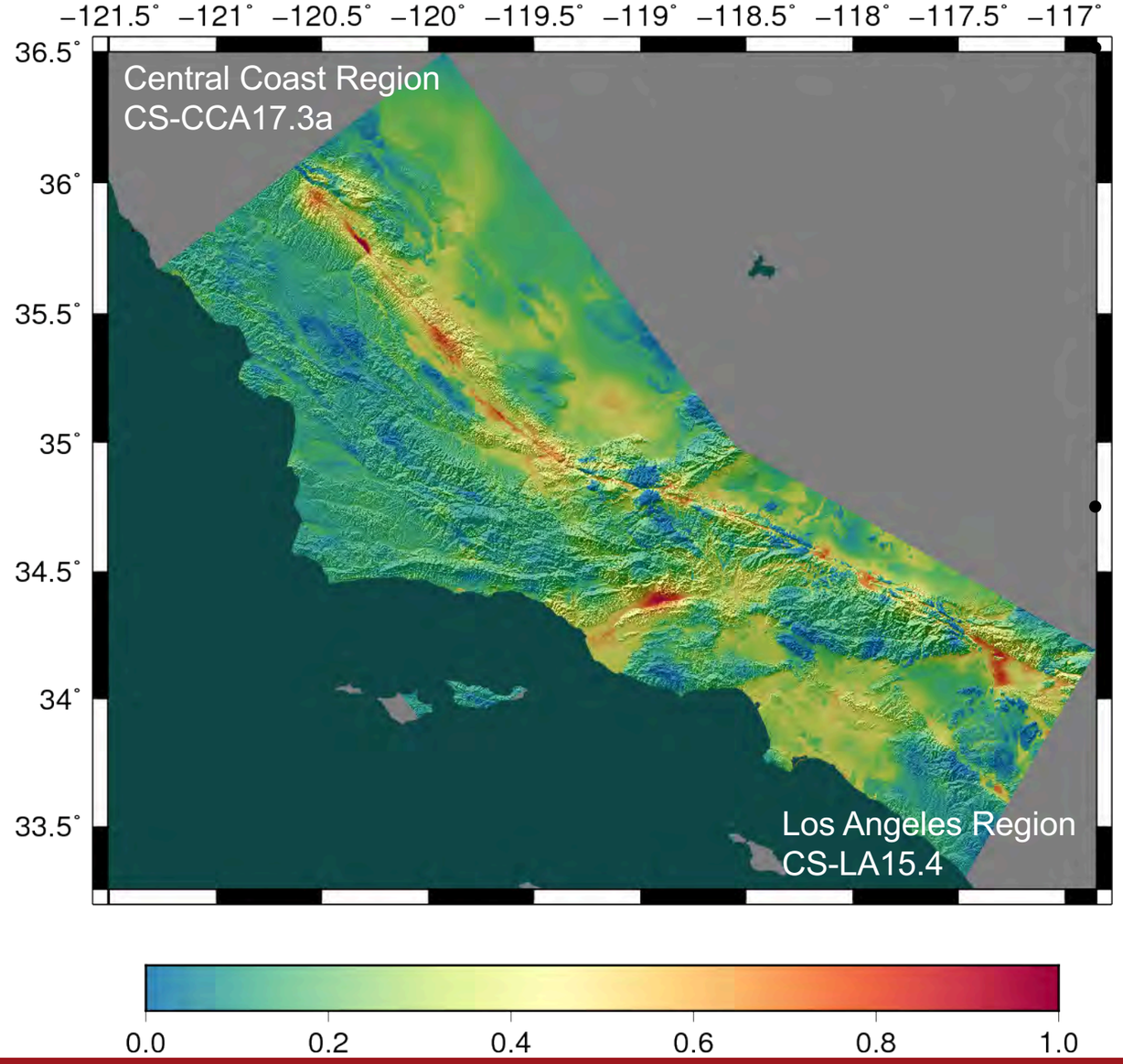
UCERF Research



Parkfield M6.1 Scenario

- The WGCEP development team led by Ned Field has completed UCERF3
  - UCERF3-TI (Field et al., 2014)
  - UCERF3-TD (Field et al., 2015)
  - UCERF3-ETAS (Field et al., 2017a,b)
- Third Powell meeting on Operational Earthquake Forecasting was held on Apr 3-4, 2017
  - "Review of Operational Earthquake Forecasting Capabilities"
  - Representatives from CEPEC, NEPEC, SESAC in attendance, as well as potential first-adopters
  - Workshop report with important science content by Field et al. (2017)

CyberShake Research



3sec SA, 2% in 50 yrs

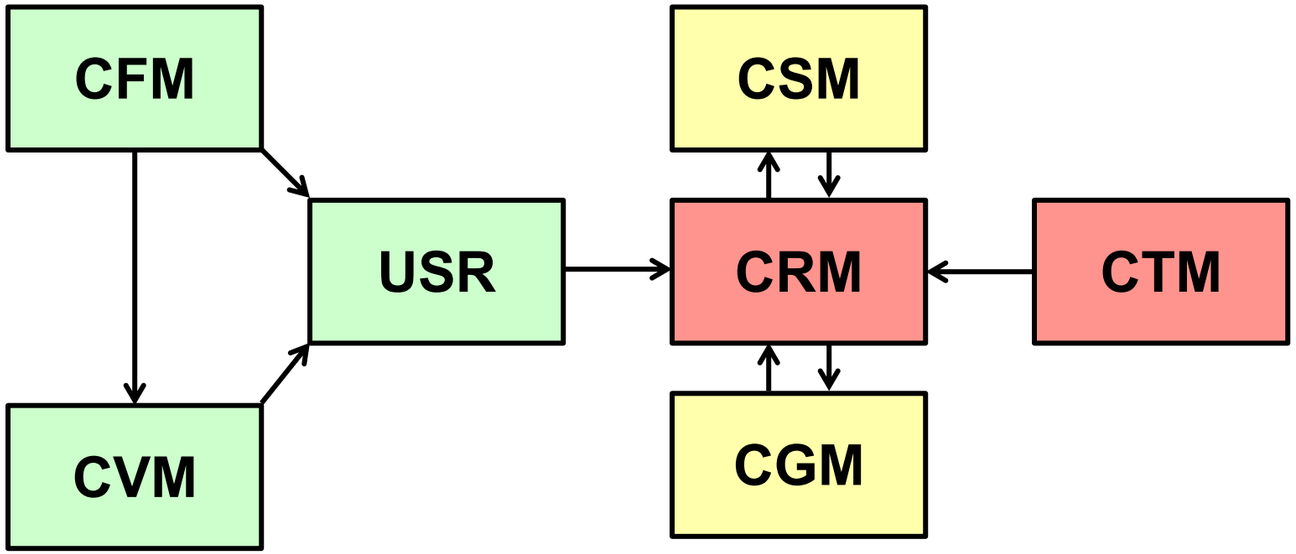
CyberShake development team led by Scott Callaghan has made significant model improvements

- Extended to 1 Hz seismic frequency
- Extended to Central California
- CyberShake runs ever more efficiently on both NCSA *Blue Waters* and OLCF *Titan*

SCEC High-F project continues to develop high-frequency simulations

- Fault complexity
- Near-fault plasticity
- Frequency-dependent attenuation
- Near-surface nonlinearity
- Small-scale heterogeneity

SCEC Community Models (CXMs)



Model key:

F = Fault S = Stress
G = Geodetic T = Thermal
R = Rheology V = Velocity
USR = Unified Structural Representation

Schema of the SCEC Community Models, showing the main directions of information flow among the models. Box colors indicate the development status: mature (green), youthful (yellow), in utero (red).