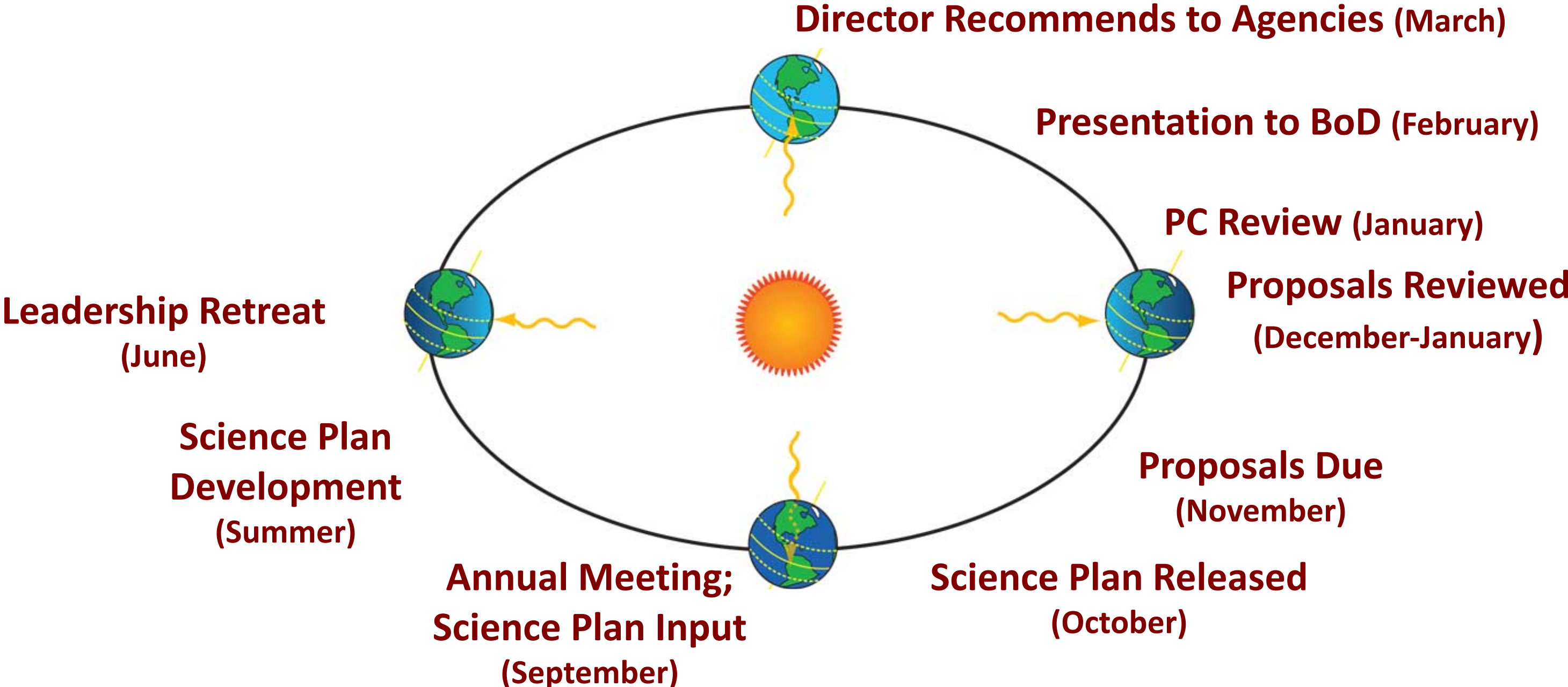


The SCEC Planning Cycle



DRAFT 2017 Science Plan: Research Priorities for SCEC5

New This Year

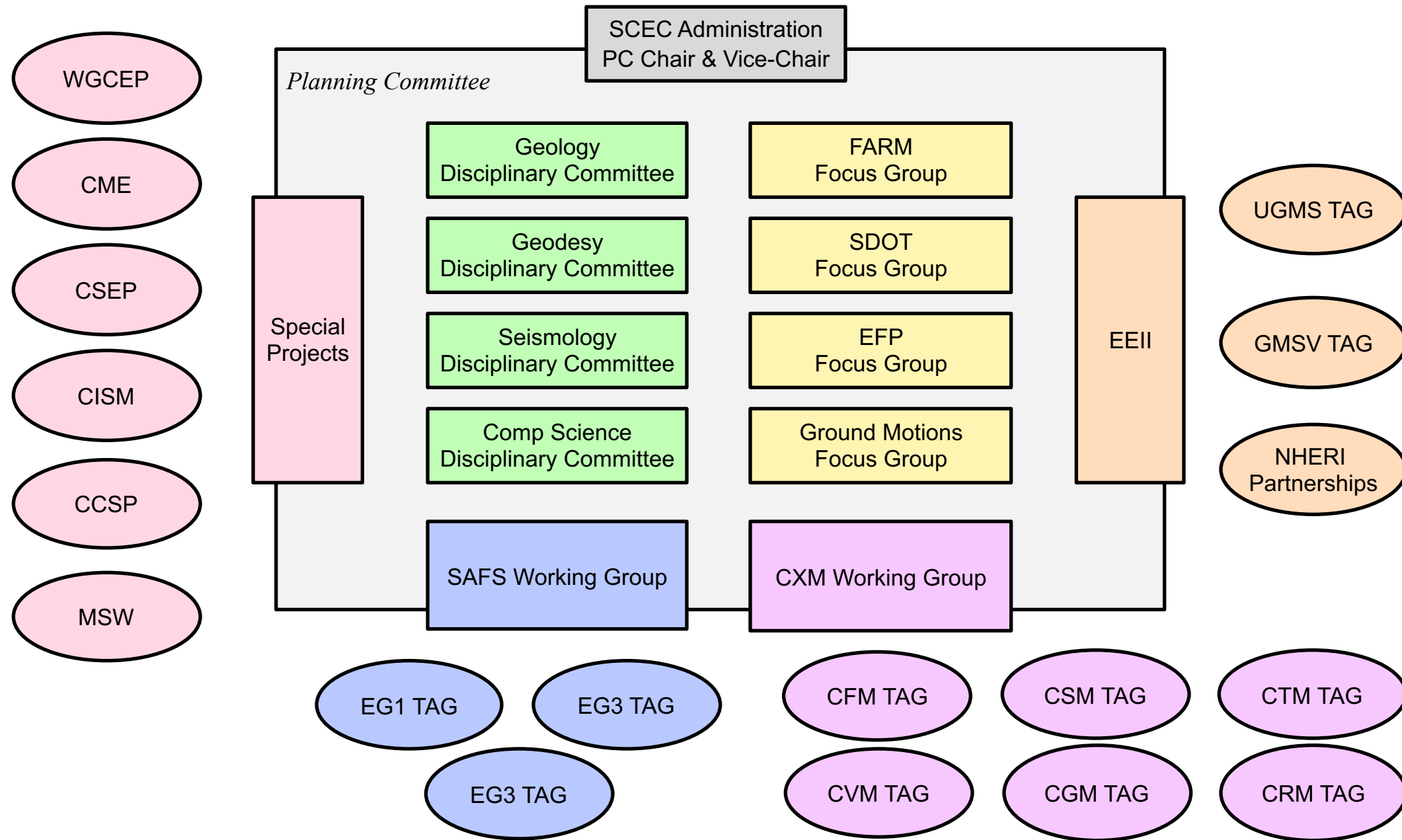
- **Planning Committee reconfigured for SCEC5.**
- **Disciplinary Committees**
 - **Seismology, Geodesy, Geology, and Computational Science**
- **Interdisciplinary Focus Groups**
 - **Fault & Rupture Mechanics (FARM), Stress & Deformation Over Time (SDOT), and Earthquake Engineering Implementation Interface (EII)**
- **Ground Motion Prediction (GMP) and Southern San Andreas Fault Evolution (SoSAFE) working groups have been evolved slightly to the more general**
 - **Ground Motions (GM) and San Andreas Fault System (SAFS) groups.**
- **Unified Structural Representation (USR) focus group has evolved to include all community models under the new**
 - **CXM group.**
- **Special Projects will be represented by the Executive Director for Special Projects (Christine Goulet) and the SCEC IT Architect (Phil Maechling).**

DRAFT 2017 Science Plan: Research Priorities for SCEC5

New This Year

- **Planning Committee reconfigured for SCEC5.**
- **Technical Activity Groups**
 - All TAGS will sunset at the end of SCEC4
 - New TAGs will have to be re-initiated in SCEC5 through the yearly proposal process.
- **Special Fault Study Area focus has evolved to the new Earthquake Gates Initiative**
 - The San Geronio Pass and Ventura Special Fault Study Area groups are in the process of synthesizing the community results obtained through SCEC4.
 - Understanding is not complete, so PC will accept research proposals focusing on these areas.
 - The evolved approach for focused multidisciplinary research on complex fault systems will be under the new Earthquake Gates Initiative, and will require new proposals for workshops and/or collaborative research

SCEC5 Science Planning Organization



SCEC5 Planning Committee Membership

Geology
Disciplinary Committee

Mike Oskin; Whitney Behr

Geodesy
Disciplinary Committee

David Sandwell; Gareth Funning

Seismology
Disciplinary Committee

Yehuda Ben-Zion*; Jamie Steidl*

Comp Science
Disciplinary Committee

Eric Dunham; Ricardo Taborda*

CXM Working Group

Liz Hearn; Brad Aagaard

Special Projects

Christine Goulet; Phil Maechling

FARM
Focus Group

Nadia Lapusta*; Nick Beeler*

SDOT
Focus Group

Kaj Johnson; Bridget Smith-Kontor*

EFP
Focus Group

Max Werner; Ned Field

Ground Motions
Focus Group

Eric Dunham; Ricardo Taborda*

SAFS Working Group

Kate Scharer; Michele Cooke*

EEII

Jack Baker, Jonathan Stewart*

DRAFT 2017 Science Plan: Research Priorities for SCEC5

New This Year

- **Use of SCEC computational resources**
 - Anyone that would like to use SCEC computational resources and/or get help from SCEC software developers should consult with SCEC IT leadership for budget time support estimates and coordination planning
- **Undergraduate Summer Interns**
 - Include an "intern project" description in your proposal.
 - Selected intern projects will be awarded as supplemental funds on the proposal award.
 - Interns will be recruited by the SCEC CEO Program staff.
 - Funds will be disbursed and managed at USC to use for a summer stipend and travel support to the SCEC annual meeting.
 - The number of intern projects awarded each year will depend on available funding and applicant interest pool.

DRAFT 2017 Science Plan: Proposal Process

- **Annual Proposal Solicitation**

- **Targets individuals and groups that will participate in the SCEC research program.**
- **Typical grants awarded fall in the range of \$10,000 to \$35,000.**
- **Field research investigations outside southern California are generally not supported.**
- **Proposals can be submitted by eligible Principal Investigators from U.S. academic institutions and U.S. private corporations.**
- **Collaborative projects involving U.S. and foreign organizations will be considered, provided funding is requested only for the U.S. portion of collaborative effort.**
- **Collaborative proposals with the USGS are encouraged.**
- **Any person with an overdue project report (for prior SCEC-funded awards) at the time of the proposal deadline will not be allowed to submit a new or continuation proposal as a PI or co-PI.**

DRAFT 2017 Science Plan: Expectations

- **Community Participation**

- **SCEC Annual Meeting.**

- **PI will attend the annual meeting and present results of SCEC-funded research in the poster sessions, workshops and/or working group meetings.**

- **Data Sharing.**

- **Funded investigators are required to contribute data and results to the appropriate SCEC resource (e.g., Southern California Earthquake Data Center, database, community model).**

Understanding Earthquake Processes

Observations, partitioning, and interaction of on-fault and off-fault deformation

- Geologic record of past earthquakes and slow slip. Earthquakes on the creeping section?
- Feedback between the structure of fault shear zones and fault geometry/roughness
- Damage zones, effect on source/observations, evolution with fault maturity

Fault resistance to slip

- Relative importance of various coseismic weakening mechanisms and off-fault processes
- Compatibility with observational constraints (stress drops, temperature measurements)
- Effects of fine-scale processes on large-scale dynamics, coarse graining (possible?)

Interaction between the seismogenic zone and deeper crust/fault extensions

- Structure and rheology of the vicinity of brittle-ductile transition and fault roots
- Implications for depth limits of large earthquakes, transition from friction to flow
- Beyond back-slip loading; physical reason for potential “supercycles”?

Water and the seismogenic cycle

- Workshop
- Variations of pore fluid pressures (and hence) effective stress with depth and with time
- The spatial scale, amplitude, and magnitude of potential inhomogeneities

From discussion: Where/why earthquakes arrest? Supercycles?

- Testing a priori established criteria of arresting at geological complexities
- Are supercycles real? Looking at other regions
- Physical reasons for supercycles: interaction, deeper loading processes, fluids

New Observations

- High-res imaging of the shallow Crust (seismic velocities, attenuation coefficients)
- Near-fault stations (seismic and geodetic co-located when possible)
- Dense networks (detection of new signals)

- Shallow boreholes?

- Joint analysis of seismic and geodetic data for seismic coupling along major faults

- Better seismic catalogs (smaller events, locations, mechanisms)

- Better source properties (directivities, non-double-couple ...)

- Remote sensing signals (high-res topography, spectroscopy, pre-event inventory)

- MT/EM data across major faults

- Optical fiber technologies for measuring strain
- UAVSAR for near-fault deformation fields

- Paleoclimate data in relation to geomorphology
- More data on small geomorphic offsets
- Soil moisture

- Correlating/integrating geological and geophysical data

SCEC5 Tasks

- **Revise the project plan**
 - **Milestones**
 - **Revise the budget**
 - **Accommodate \$1.1M cut by NSF**
 - **Find new resources to cover budgetary shortfall**
 - **Other federal agencies (NASA, DOE, NIST, DOD)**
 - **Private partnerships (CEA, PG&E, Mercury, etc.)**
- Due Oct 15, 2016**

- **Seismology - 4.1.3. Research Priorities**

- **Low-cost seismic network data utilization and archiving.** Several groups are developing seismic networks that use low-cost MEMS accelerometers. We seek proposals on innovative algorithms to utilize data from these networks, develop metadata and archiving models, and make the data and products available to the user community.
- **The shallow crust.** Seismic properties in top few kilometers of the crust have strong effects on ground motion, but are generally not well known. We seek proposals on deriving detailed regional images of seismic velocities and attenuation coefficients in the shallow crust.
- **Tremor and related signals.** Tremor has been observed on several faults in California, yet it does not appear to be ubiquitous. We seek proposals that explore the distribution and source characteristics of tremor in southern California, and on distinguishing tremor from other sources that may produce similar signals.
- **Earthquake directivity.** Rupture directivity can have strong influence on ground motion, but it is not clear if earthquake directivity on given fault sections is systematic or random. We seek proposals on robust estimations of rupture directivities of a large population of earthquakes in relation to the major faults in southern California.

- **Seismology - 4.1.3. Research Priorities**

- **Seismic coupling.** The partitioning between seismic and aseismic deformations strongly affects the seismic potential of faults, but is generally not well known. We seek proposals that develop and implement improved techniques for estimating the seismic coupling of different fault sections, and for constraining the depth-extent of seismic faulting in large earthquakes.
- **Short-term earthquake predictability.** We seek proposals that develop new methods in earthquake statistics or analyze seismicity catalogs to develop methods for determining short-term (hours to days) earthquake probability gain.
- **Processes and properties in special areas.** We seek proposals that use seismic data to improve the knowledge on structural properties and seismotectonics Southern California, especially those identified as “Earthquake Gates” (see SAFS for definition).

- **Seismology - 4.1.3. Research Priorities.**

- **Develop innovative methods to search for unusual signals using combined seismic, GPS, and borehole strainmeter data; Encourage collaborations with EarthScope or other network operators.**
- **Investigate near-fault crustal properties, evaluate fault structural complexity, and develop constraints on crustal structure and state of stress.**
- **Enhance collaborations, for instance with ANSS, that would augment existing and planned network stations with downhole and surface instrumentation to assess site response, nonlinear effects, and the ground coupling of built structures.**
- **By preliminary design and data collection, seed future passive and active experiments such as dense array measurements of basin structure, fault zones and large earthquake properties, OBS deployments, and deep basement borehole studies.**
- **Investigate whether earthquake properties in southern California have systematic dependencies on properties of faults, the crust, and anthropogenic activities, which may be used to extract more detailed information from the available seismic data.**

- **Tectonic Geodesy - 4.2.1. Research Strategies**

- **Develop innovative methods to search for unusual signals using combined seismic, GPS, and borehole strainmeter data; Encourage collaborations with EarthScope or other network operators.**
- **Investigate near-fault crustal properties, evaluate fault structural complexity, and develop constraints on crustal structure and state of stress.**
- **Enhance collaborations, for instance with ANSS, that would augment existing and planned network stations with downhole and surface instrumentation to assess site response, nonlinear effects, and the ground coupling of built structures.**
- **By preliminary design and data collection, seed future passive and active experiments such as dense array measurements of basin structure, fault zones and large earthquake properties, OBS deployments, and deep basement borehole studies.**
- **Investigate whether earthquake properties in southern California have systematic dependencies on properties of faults, the crust, and anthropogenic activities, which may be used to extract more detailed information from the available seismic data.**