

Earthquake Gate Area Incubator Workshop Report

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SCEC4 established Special Fault Study Areas (SFSAs) to focus interdisciplinary research on geographically targeted problems of fault-system behavior. Launching from the success of the San Geronio Pass and Ventura SFSAs in SCEC4, we are evolving the SFSA concept in SCEC5 by establishing an Earthquake Gates Areas (EGA) initiative. This initiative represents a shift in the concepts of the Special Fault Study Areas to the investigation of 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. Specifically, Earthquake Gates Areas arise where fault complexity, rupture direction, near fault rheology, and prior earthquake history may lead to the likelihood of the gate being open or closed to through rupture.

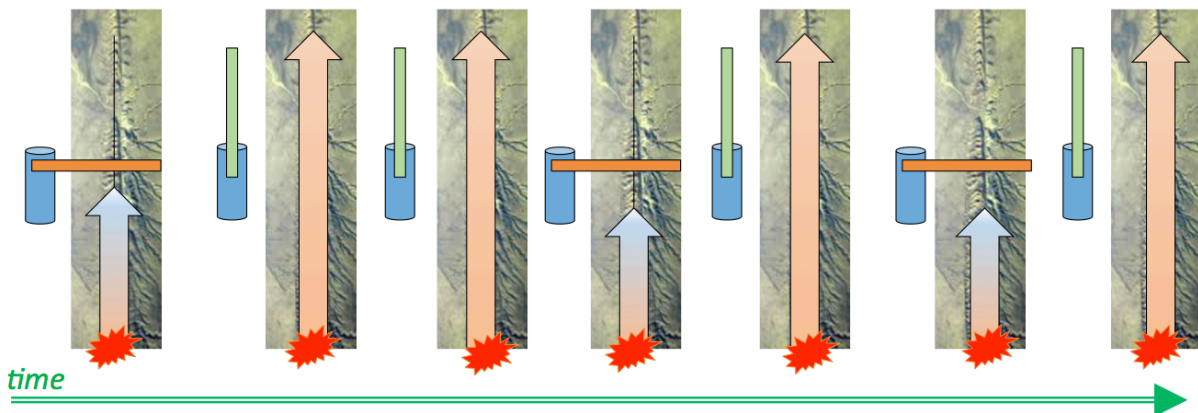


Figure 1: Cartoon illustrating the concept of an earthquake gate that conditionally stops rupture.

Workshop planning

Participants for the workshop were chosen by application, which were due December 5, 2016. We solicited participation both from investigators who proposed potential earthquake gate areas (EGA) as well as researchers interested in participating in future EGAs.

Description of the workshop

On March 10th SCEC hosted a 1-day Earthquake Gates Incubator Workshop at the Kellogg Center at CalPoly Pomona. The workshop drew 33 participants from a variety of disciplines. The agenda (<https://www.scec.org/workshops/2017/ega>) provided time for presentation of best-practices from past SFSAs, presentation of potential EGAs and time for group discussions and science planning.

Session I. The morning session focused on key features of successful earthquake gate areas. After an overview of the goal of the Earthquake Gates Area initiative, presentations by Michele Cooke and James Dolan highlighted what worked well in the SCEC4 SFSAs. Egill Hauksson and David Jackson presented on seismological aspects of an earthquake gate area. The morning concluded with a lively discussion on the key features of successful earthquake gate areas.

Session II. Short presentations outlined the scope, purpose, and community involvement of potential Earthquake Gates Area. The presentations introduced each Earthquake Gate location or idea, looked for cross-over and leveraging opportunities, and garnered interest in common problems. The presentations were not evaluated but rather aimed at sharing ideas. Each presentation strived to address the following topics

- What is the location or central topic of the earthquake gate they wish to investigate?
- What are the goals, data needs, and modeling investigations of proposed EGA?
- What fundamental problems in earthquake science does the proposed EGA address?
- What hazard questions in southern California does the proposed EGA address?

The following potential EGAS were presented

Big Bend Interaction of San Andreas Fault and Garlock Fault (James Dolan)
 Central Death Valley (PDF, 2.9MB) (Karl Mueller)
 Cajon Pass (Craig Nicholson / Julian Lozos)
 Ventura - San Cayetano Link (James Dolan)
 Santa Ana Gap: Example of a Releasing Step (Mark Legg)
 Salton Trough (Christos Kyriakopoulos)
 Northern Baja California (John Fletcher)

Session III and IV. Following the presentations we had a moderated discussion about outstanding questions for earthquake gates in southern California. Susanne Janecke outlined on-going uncertainty about active fault geometry. Also discussed was the potential for Parkfield as an EGA. The group was positive to this suggestion but there were no champions among the attendees

Break out groups after the discussion provided a change for investigated to coordinate among themselves for each of the potential earthquake gate areas. The lively break out discussion generated many ideas for EGA proposals. At the conclusion of the workshop, the following viable Earthquake Gate Areas emerged:

Potential EGA	Potential proposal coordinators
Cajon Pass	Craig Nicholson, Julian Lozos, Nate Onderdonk
Salton Trough	Christos K., Tom Rockwell, Susanne Janecke
Garlock-San Andreas Intersection	Julian Lozos and James Dolan
“The region of fault tips” (Western transverse ranges)	James Dolan
Santa Ana Gap	Mark Legg

The group discussed the assessment criteria for the earthquake gate proposals (below) and

refined the guidelines for the EGA proposals.

Assessment criteria: The proposed earthquake gates areas will be prioritized according to (a) prospects for reducing seismic hazard uncertainties associated with conditional propagation of earthquakes, (b) the opportunities for obtaining new hazard information from a broad range of studies and (c) availability of data to constrain conditional propagation of earthquakes through the region.

Outcomes of the workshop

Tran set up an informational web page about the viable earthquake gate areas and distributed an announcement to the community soliciting proposals.

Proposals for potential Earthquake Gate Areas were due May 19, 2017. The 5-page proposals should describe

- 1) the location or central topic of the earthquake gate they wish to investigate and
- 2) what fundamental problems in earthquake science and seismic hazard reduction the EGA could address
- 3) potential contributions of various research disciplines to the EGA
- 4) a four—year science plan with rough timeline

Proposals were emailed to proposals @scec.org.

Three viable Earthquake Gate Area proposals were received and reviewed by the planning committee in June