

## **Collaboratory for the Study of Earthquake Predictability**

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Earthquake prediction is one of the most difficult problems in physical science and, owing to its societal implications, one of the most controversial. This presentation will be organized around three related questions: (1) How should scientific earthquake predictions be conducted and evaluated? (2) What is the intrinsic predictability of the earthquake rupture process? (3) Can knowledge of large-earthquake predictability be deployed as useful predictions; i.e., reliable advance warning of potentially destructive events? In response to public expectations, scientists have long sought a heroic answer to Question (3): the discovery of a precursory phenomenon or pattern that can reliably signal when a fault is approaching a large earthquake. While it is premature to say such deterministic predictions are impossible, this “silver bullet approach” has not been successful so far. An alternative is a “brick-by-brick approach” to Question (2): building an understanding of earthquake predictability through interdisciplinary, physics-based investigations of active fault systems across a wide range of spatial and temporal scales. However, the study of earthquake predictability has been impeded by the lack of an adequate experimental infrastructure—the capability to conduct scientific prediction experiments under rigorous, controlled conditions and evaluate them using accepted criteria specified in advance (Question 1). To remedy this deficiency, SCEC is working with its international partners to develop a virtual, distributed laboratory with a cyberinfrastructure adequate to support a global program of research on earthquake predictability. This Collaboratory for the Study of Earthquake Predictability (CSEP) will have rigorous procedures for registering prediction experiments, community-endorsed standards for assessing probabilistic predictions, access to authorized data sets and monitoring products, and software support to allow researchers to participate in prediction experiments and update their procedures as results become available.