The Collaboratory for the Study of Earthquake Predictability (CSEP) Testing Center.

M. Liukis, D. Schorlemmer, P. Maechling, T.H. Jordan, J. Yu, F. Euchner, J. D. Zechar and the CSEP Working Group

an NSF+USGS center

USC UNIVERSITY OF SOUTHERN CALIFORNIA

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The CSEP

The Collaboratory for the Study of Earthquake Predictability (CSEP) has established the initial hardware and software infrastructure for conducting earthquake forecast experiments.

Objectives

- Establish rigorous procedures for registering and evaluating prediction experiments.
- Construct community standards and protocols for comparative testing of predictions.
- Develop an infrastructure that allows groups of researchers to participate in prediction experiments.
- Provide access to authorized data sets and monitoring products for calibrating and testing prediction algorithms.
- Accommodate experiments involving fault systems in different geographic and tectonic environments.

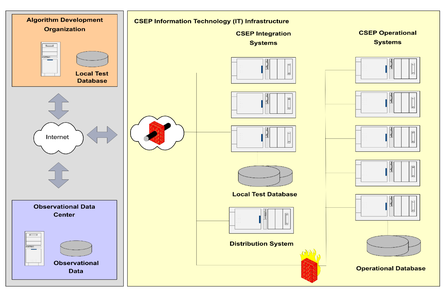
Goals

- Reduce the controversy surrounding earthquake prediction through a collaboratory infrastructure to support a wide range of scientific prediction experiments.

- Promote rigorous research on earthquake predictability through the SCEC program and its global partnerships.

- Help the responsible government agencies assess the feasibility of earthquake prediction and the performance of proposed prediction algorithms.

System Infrastructure



SCEC Testing Center

The initial implementation of the CSEP Testing Center for the California Natural Laboratory became operational on September 1, 2007 at SCEC/USC and is designed to evaluate forecasts stated in terms of seismic rate per latitude/longitude/magnitude bin.

The SCEC Testing Center performs prospective forecast testing with a 31-day waiting period for the test date to guarantee integrity of the input catalog data.

Forecast Models

— 2 one-day models (STEP, ETAS)
— 19 RELM five-year models

Authorized Data Set

— ANSS Catalog

Evaluation Tests

—RELM N (number of events) test
—RELM L (log-likelihood) test
—RELM R (log-likelihood ratio) test

Processing Schedule

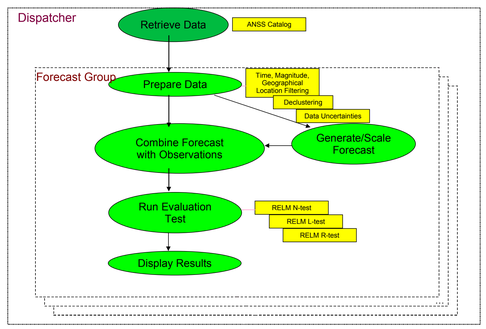
— One-day models: daily
— Five-year models: monthly

How to Enter Your Model into the Testing Center

As with all aspects of CSEP, we encourage interested scientists to join our efforts. For more information please contact us at *info@cseptesting.org*

CSEP Version 1.0.0

Automated end-to-end processing



Full Reproducibility

The testing center keeps:

—All input data (earthquake catalogs)
—All simulations (random numbers)
—All results
—System and software configurations used for computations (metadata)

Software Design

Modular design of the CSEP software seeks to meet the requirement of experiment reproducibility; the processing infrastructure allows for automated forecast generation and evaluation within testing center as well as manual processing for research purposes.

Software Stack

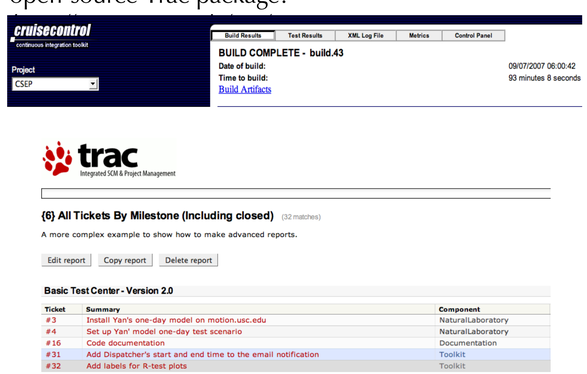
The CSEP system provides a controlled integration environment with a standardized software stack for developing and installing forecast models. We ask the modelers to use open source software only. Current list:

— Linux
— MPICH2
— GCC, G77/gfortran
— Python
— R (Matlab)

Software Engineering Tools

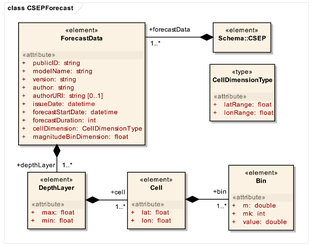
The CSEP development:

— Uses open-source *Eclipse* as Integrated Development Environment (IDE)
— Maintains a single source repository by using open-source version control system *Subversion: http://intensity.usc.edu/svn/csep*
— Conforms with continuous integration software practice by using *CruiseControl* package as a framework for continuous build process: *http://motion.usc.edu:8080/cruisecontrol/buildresults/CSEP*
— Uses software project management by utilizing open-source Trac package:



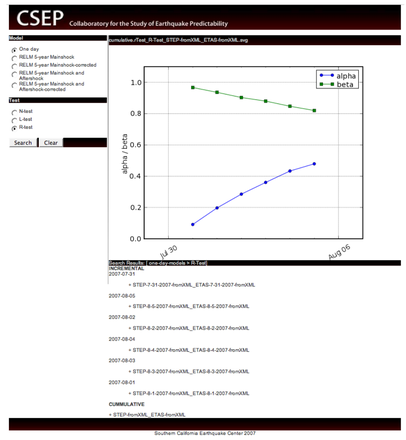
XML Datatypes Definitions

— Earthquake Catalog Format
  — QuakeML (in development)
— CSEP Formats
  — Test Result
  — Forecast (OpenSHA)



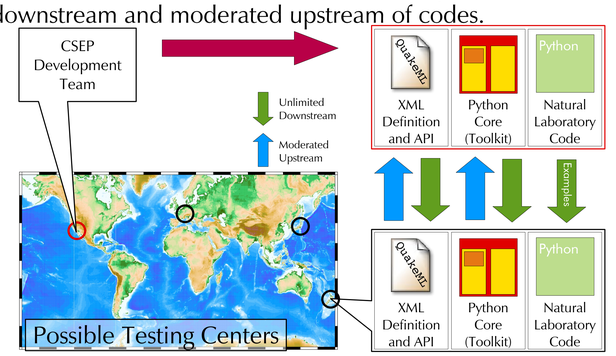
SCEC Testing Center Results

Please visit http://cseptesting.org web page (login name and password are required)



Development organization

CSEP Software is released under open-source licenses and being validated and distributed to other earthquake forecast testing facilities outside of California. We host the XML-definitions, the software core, and the scripts for Natural Laboratories hosted in our center. We provide unlimited downstream and moderated upstream of codes.



References: Jordan, T. H.: Earthquake Predictability, Brick by Brick. Seismol. Res. Letts., 77, 3-6, 2006. Schorlemmer, D. et al.: Earthquake Likelihood Model Testing. Seismol. Res. Letts., 78, 17-29, 2007. Schorlemmer, D. & Gerstenberger, M.: RELM Testing Center. Seismol. Res. Letts., 78, 30-36, 2007.