



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

*Source Inversion Validation Workshop
KAUST, March 22, 2010*

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Problems in Assessing Predictions

- Scientific publications provide insufficient information for independent evaluation
- Data to evaluate prediction experiments are often improperly specified
- Active researchers are constantly tweaking their procedures, which become moving targets
- Difficult to find resources to conduct and evaluate long-term prediction experiments
- Standards are lacking for testing predictions

CSEP System Requirements

- CSEP Testing Center Goals (as outlined by Schorlemmer and Gerstenberger (2005)):

Transparency

- Data Archive
 - Raw and post-processed catalogs
 - Input parameters for forecasts models, forecasts
 - Evaluation tests results
- Version Control
 - Testing center codes
 - Forecast data and codes
- Publishing of results to the web server

CSEP System Requirements

- CSEP Testing Center Goals (as outlined by Schorlemmer and Gerstenberger (2005)):

Transparency

Controlled environment

- Raw catalog from authorized data source
- Forecasts Procedures
 - Installed in the testing center
 - Controlled by the testing center
 - No modeler access



CSEP Computer System

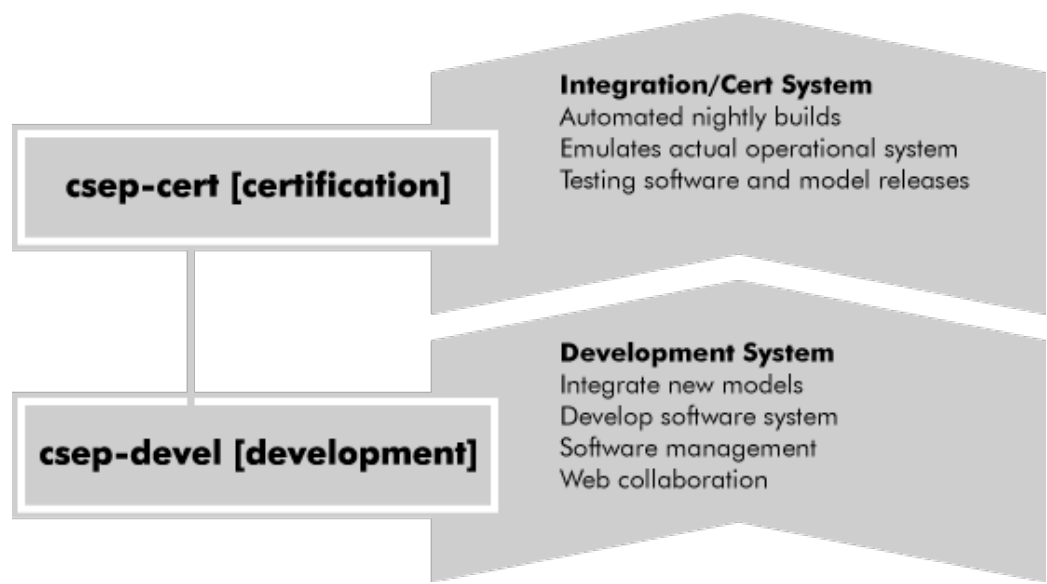
csep-devel [development]

Development System

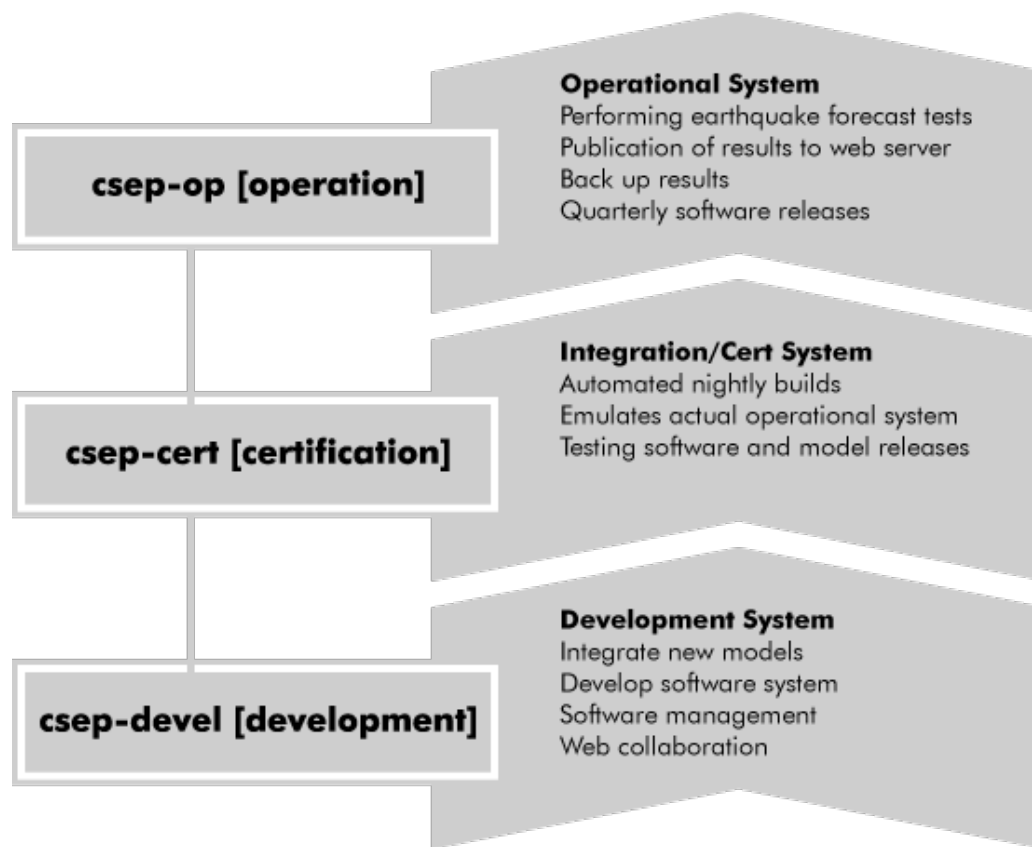
- Integrate new models
- Develop software system
- Software management
- Web collaboration



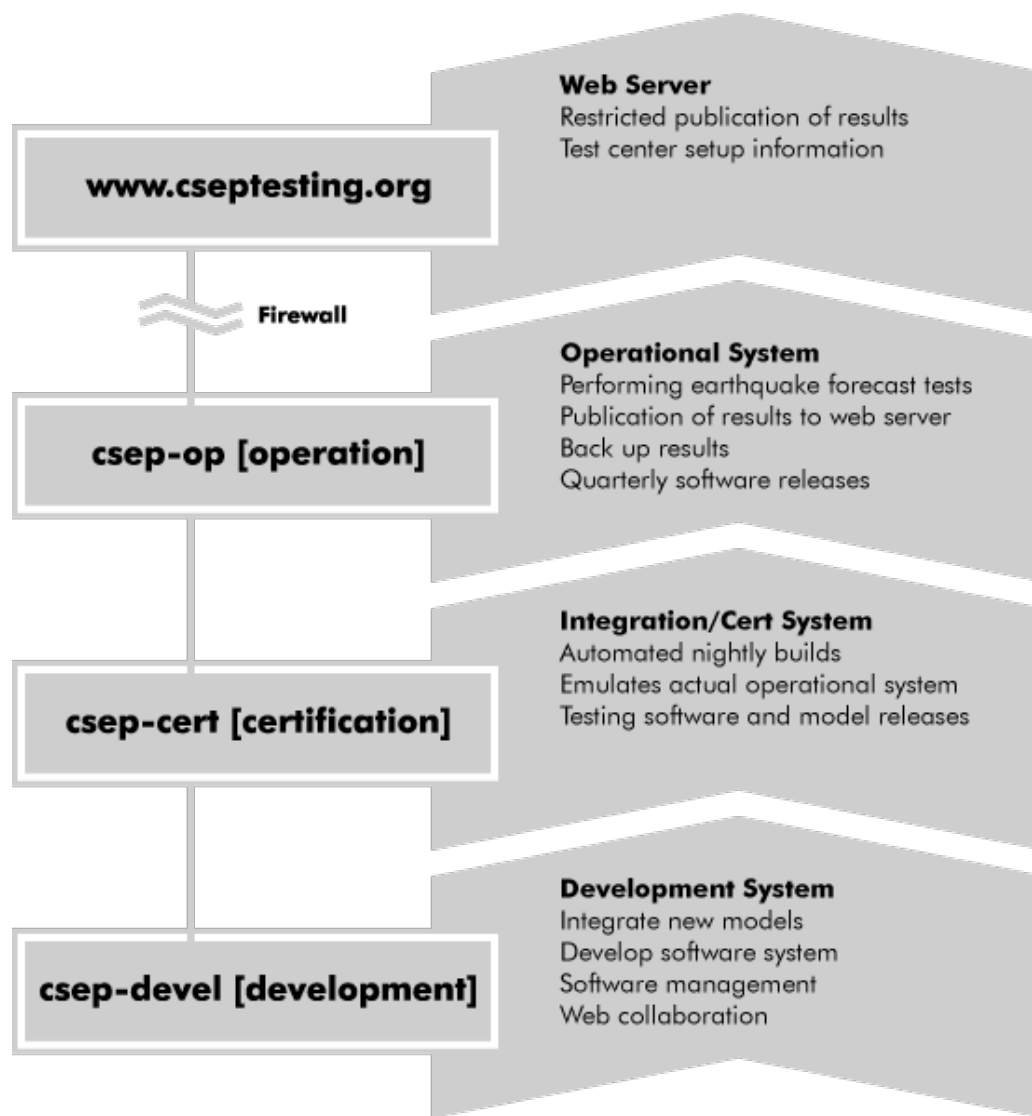
CSEP Computer System



CSEP Computer System



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CSEP System Requirements

- CSEP Testing Center Goals (as outlined by Schorlemmer and Gerstenberger (2005)):

Transparency

Controlled environment

Reproducibility

- Ability to re-run experiment at later time
 - With alternative options
 - With new tests
 - With fixed version of Testing Center codes



CSEP System Requirements

- CSEP Testing Center Goals (as outlined by Schorlemmer and Gerstenberger (2005)):

Transparency

Controlled environment

Reproducibility

Comparability

- Tested within an experiment
 - Forecast model against observed data
 - Forecasts models against each other
 - Standardization of experiments

Experiment

Classes

5-year forecast

Forecast

0.1x0.1 degree bins

Rates for M5-9 (0.1 step)

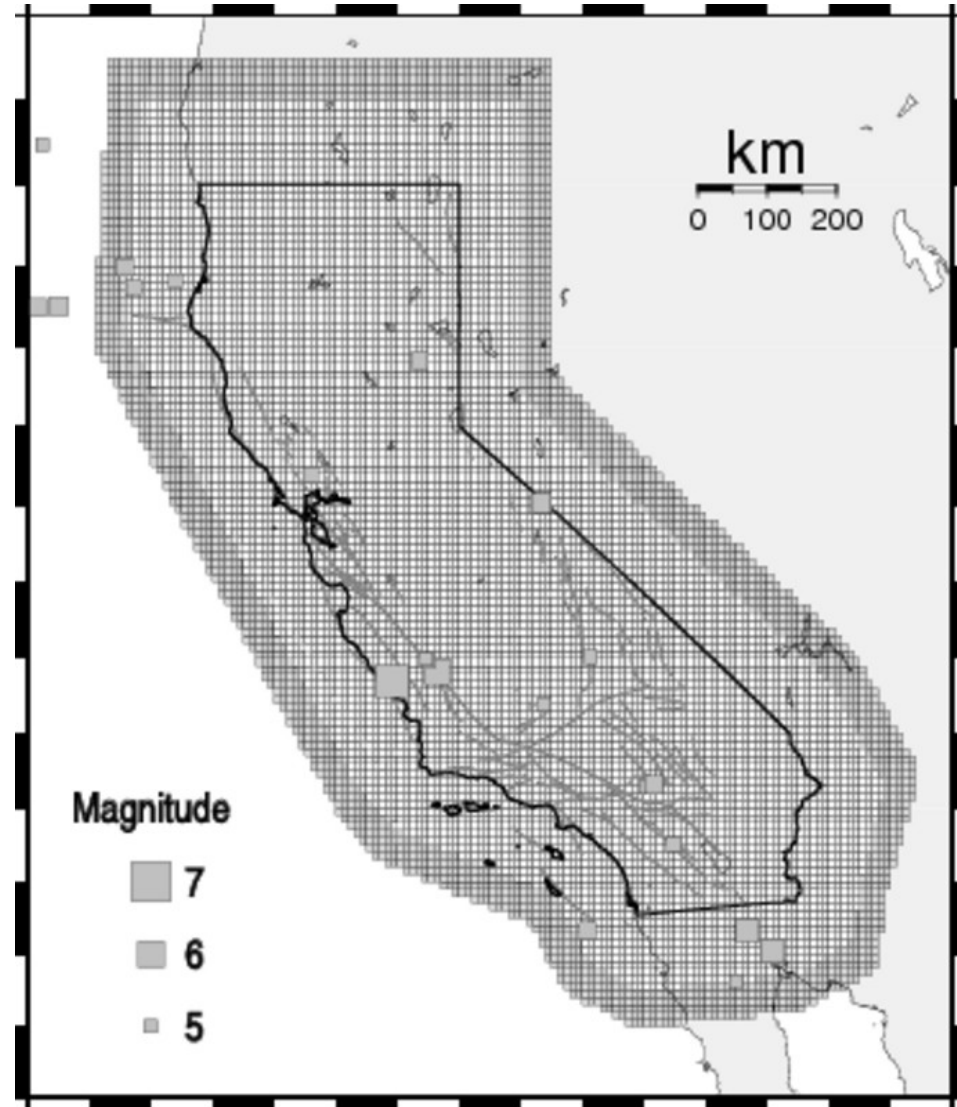
Data

ANSS Catalog

1 month delay

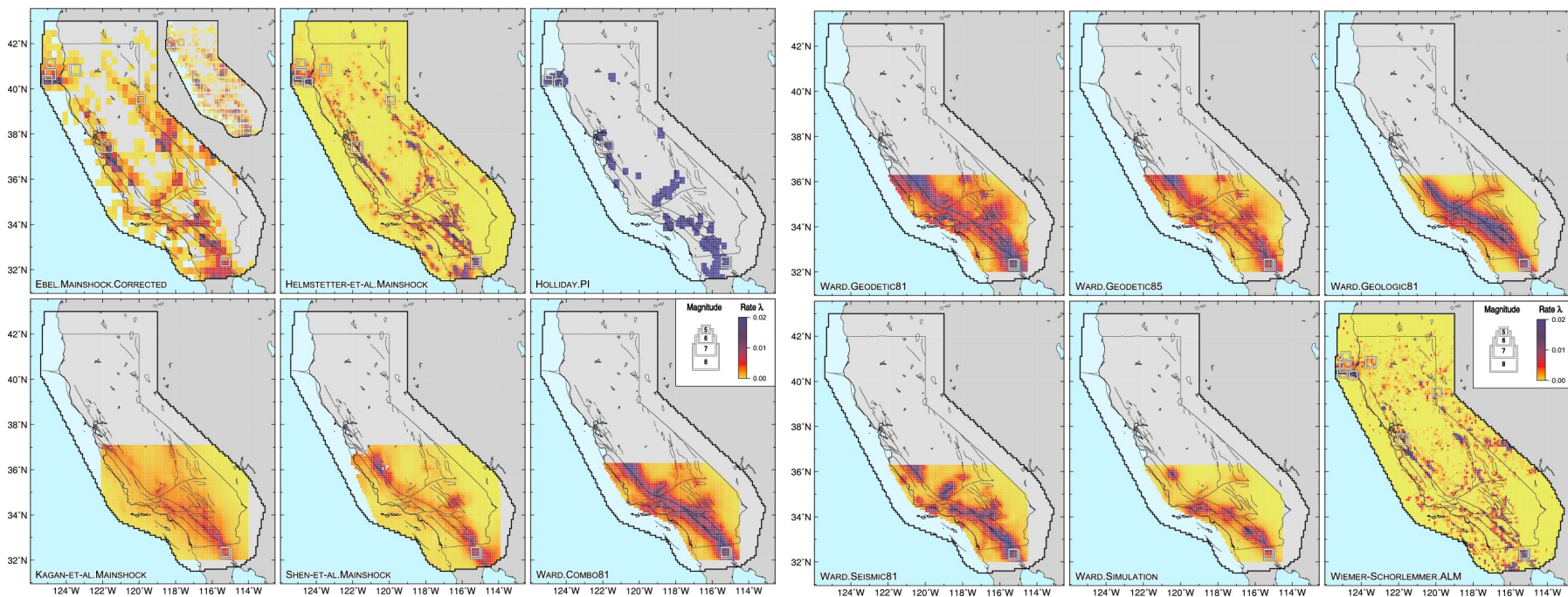
Test

L-, N-, R-Test



Experiment

- 12 Models were submitted before January 1, 2006
- Experiment will continue until January 1, 2011



CSEP Software

- Retrieve data on a daily basis

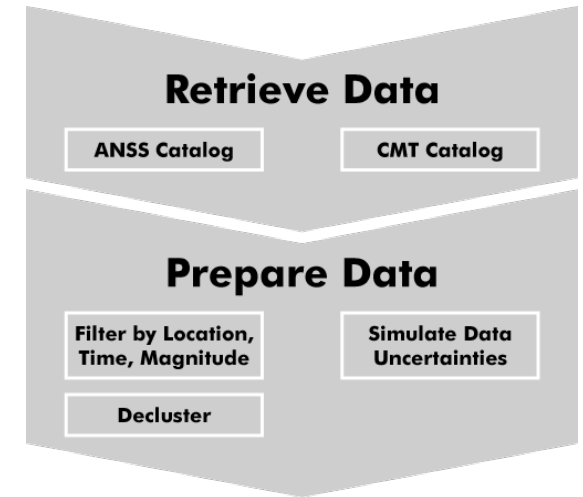
Retrieve Data

ANSS Catalog

CMT Catalog

CSEP Software

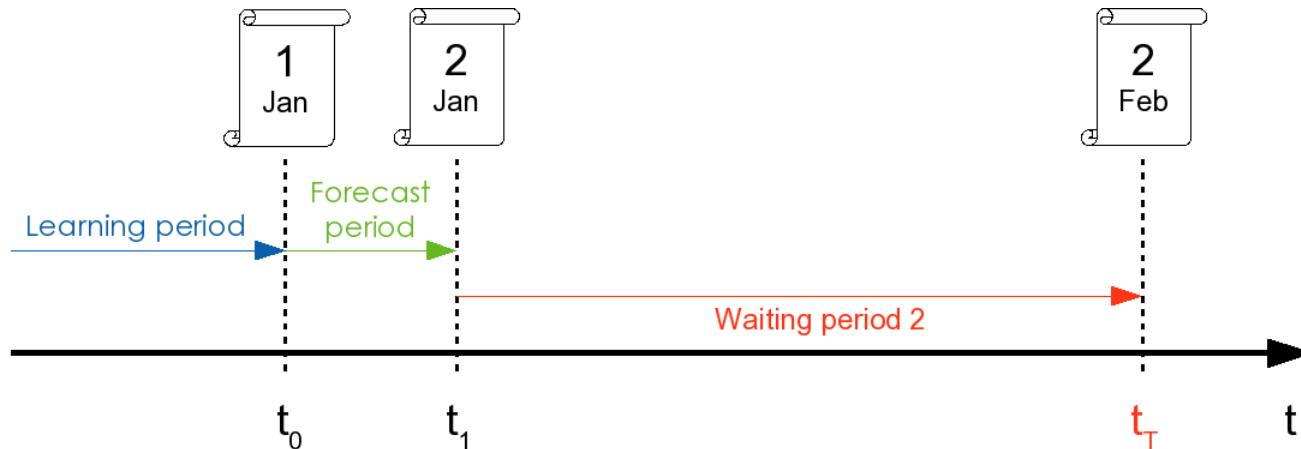
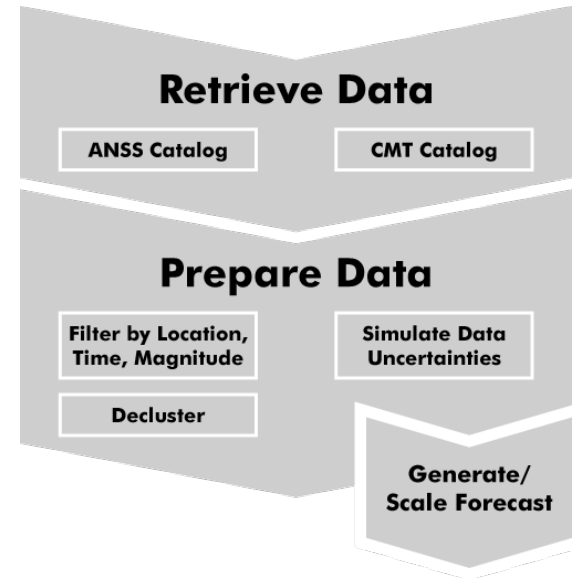
- Retrieve data on a daily basis
- Prepare data sets for
 - Forecast model
 - Testing



CSEP Software

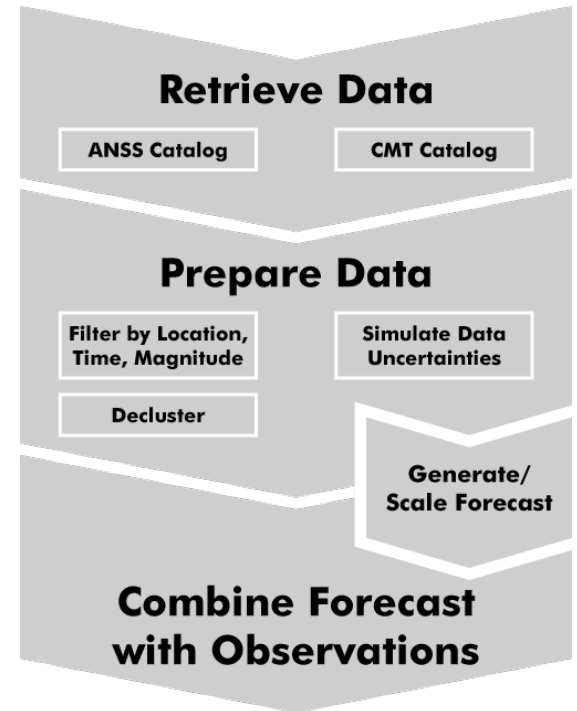
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Forecast model
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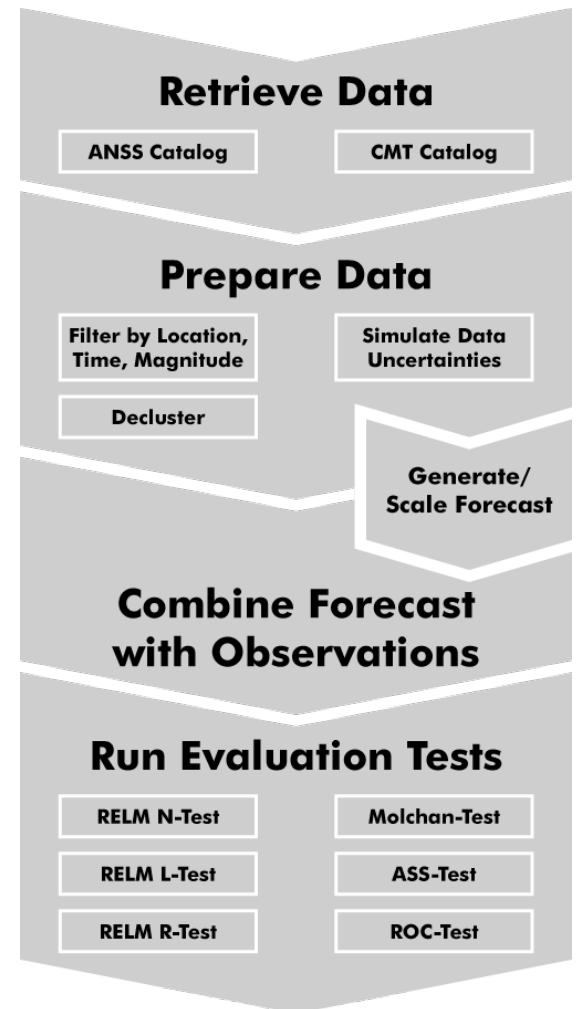
CSEP Software

- Retrieve data on a daily basis
- Prepare data sets for
 - Forecast model
 - Testing
- Prepare for testing



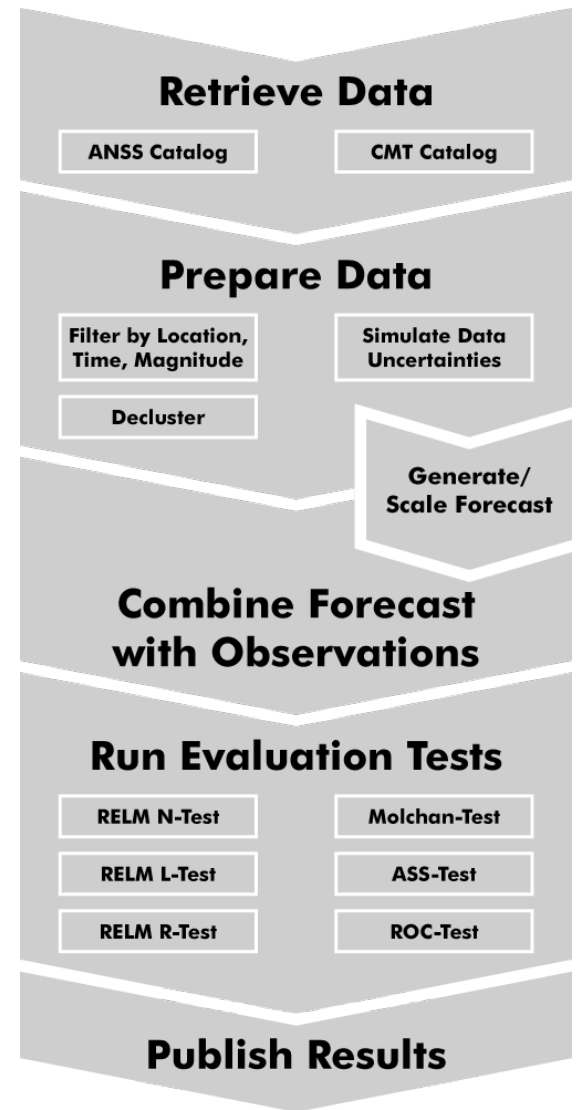
CSEP Software

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- Test



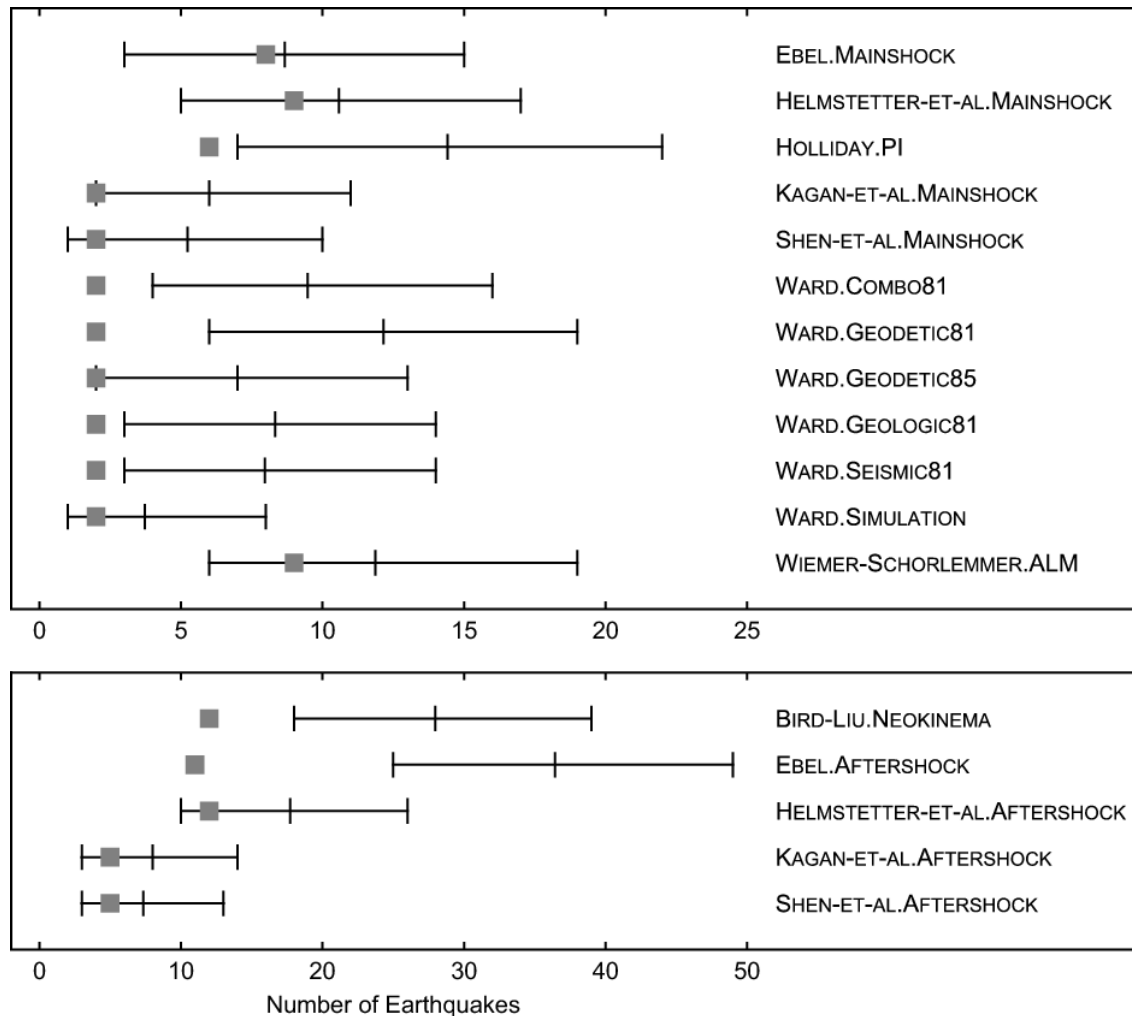
CSEP Software

- Retrieve data on a daily basis
- Prepare data sets for
 - Forecast model
 - Testing
- Prepare for testing
- Test
- Publish results



Experiment

N-Tests for consistency of forecasts with observation



Experiment

- Web representation

CSEP
Collaboratory for the Study of Earthquake Predictability

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Home » Results » SCEC Testing Center Results

SCEC Testing Center Results

california
RELM-mainshock-models
wiemer_schorlemmer.alm
go

wiemer_schorlemmer.alm results as of 2009-08-03
---Test Results--- ---R-Test Comparisons---

Testing Centers

- ERI, Japan
- ETH, Switzerland
- GNS, New Zealand
- SCEC, United States

Testing Regions

- California
- Japan
- Northwest Pacific
- Southwest Pacific
- New Zealand
- Global

CSEP Tests

- The N(umber)-test
- The L(ikelihood)-test
- The likelihood R(atio)-test
- The Molchan-test
- The ASS-test
- The ROC-test

User login

Username *

Password *

Log in

• Request new password

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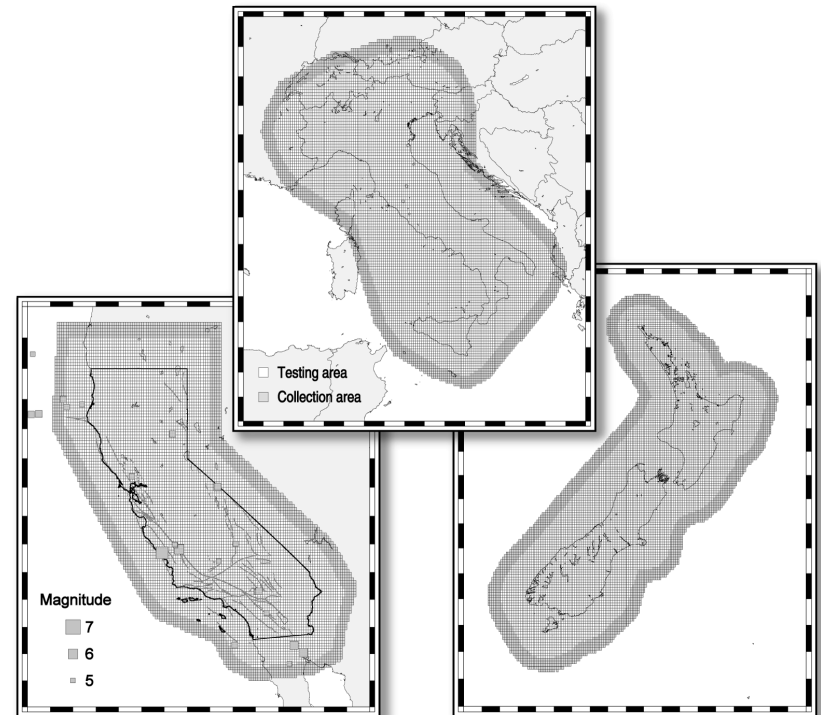
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Testing Center Challenges

- Multiple Testing Regions
- Modelers not conforming to the experiment rules
- Keeping all testing centers codes up-to-date



Summary

- CSEP is globally established with 4 testing centers
- CSEP became the “Gold Standard” for earthquake prediction research
 - Full characterization of regions and experiments
 - Standardization of procedures, formats, software, and experiments