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

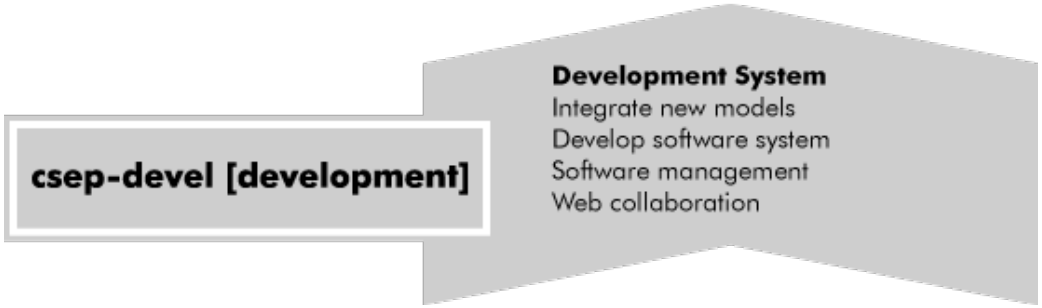
- CSEP Testing Center Goals (as outlined by Schorlemmer and Gerstenberger (2005)):

Transparency

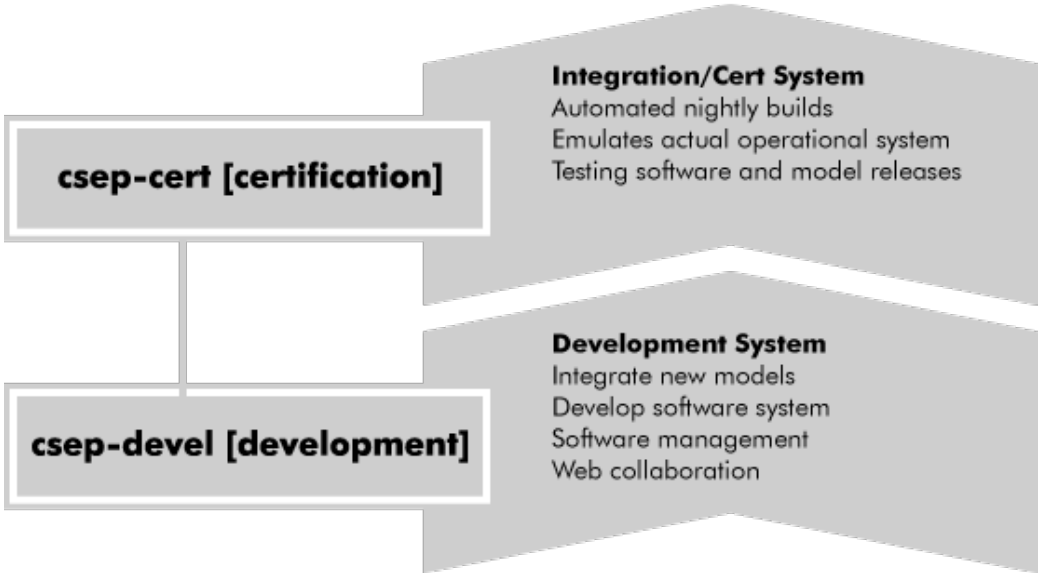
Controlled environment

- 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 Computer System



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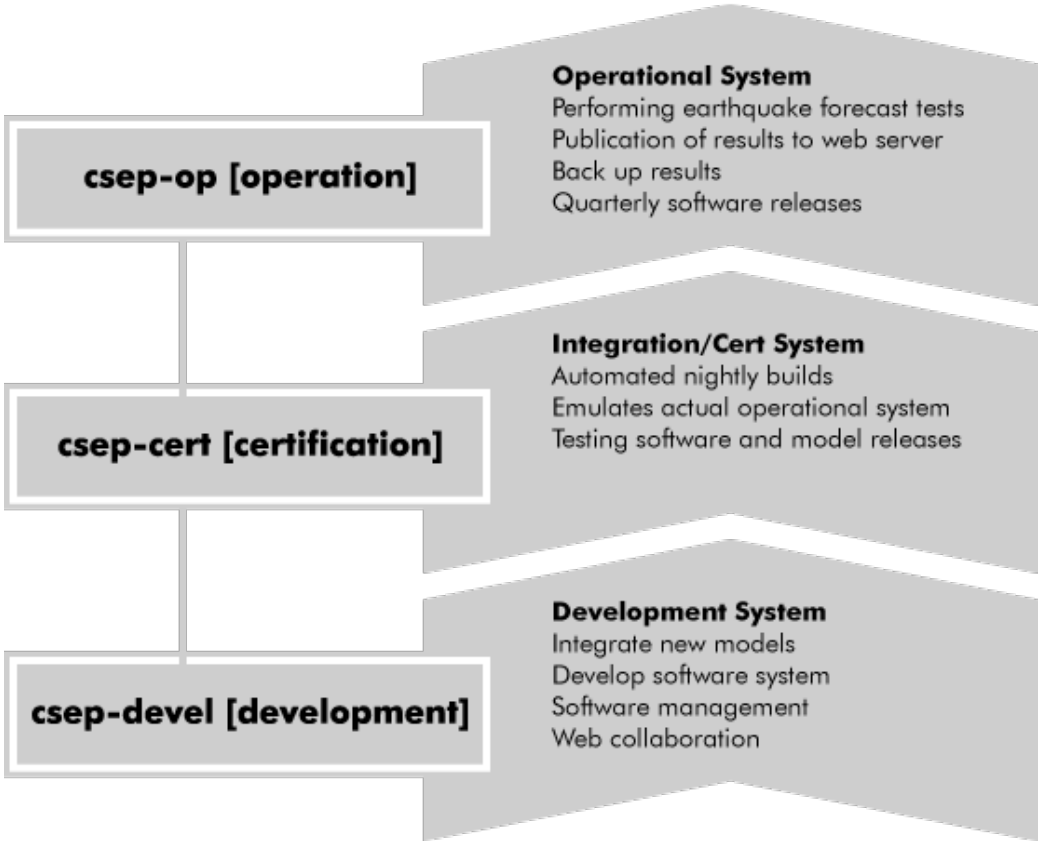

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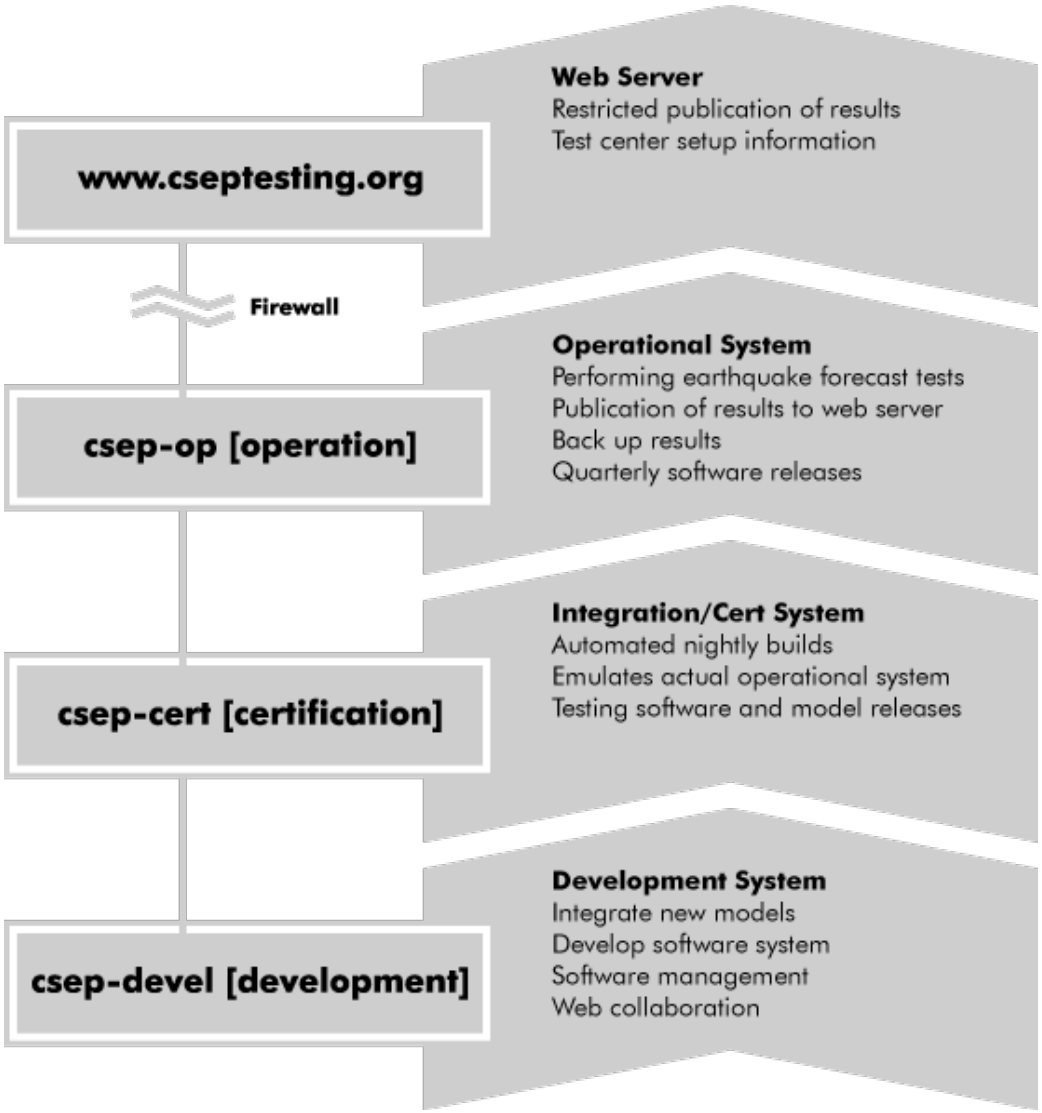


CSEP System Requirements

- 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

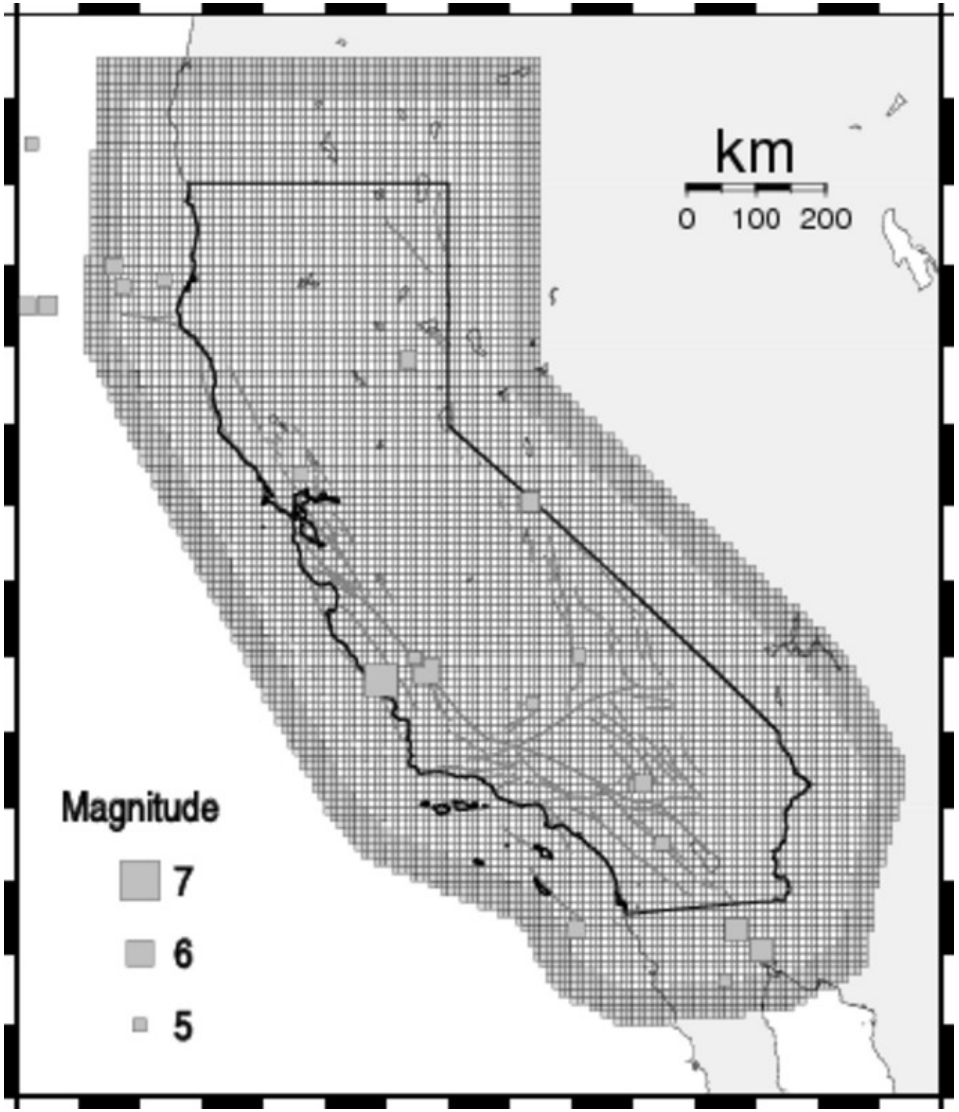
Experiment

Classes
5-year forecast

Forecast
0.1x0.1 degree bins
Rates for M5-9 (0.1 step)

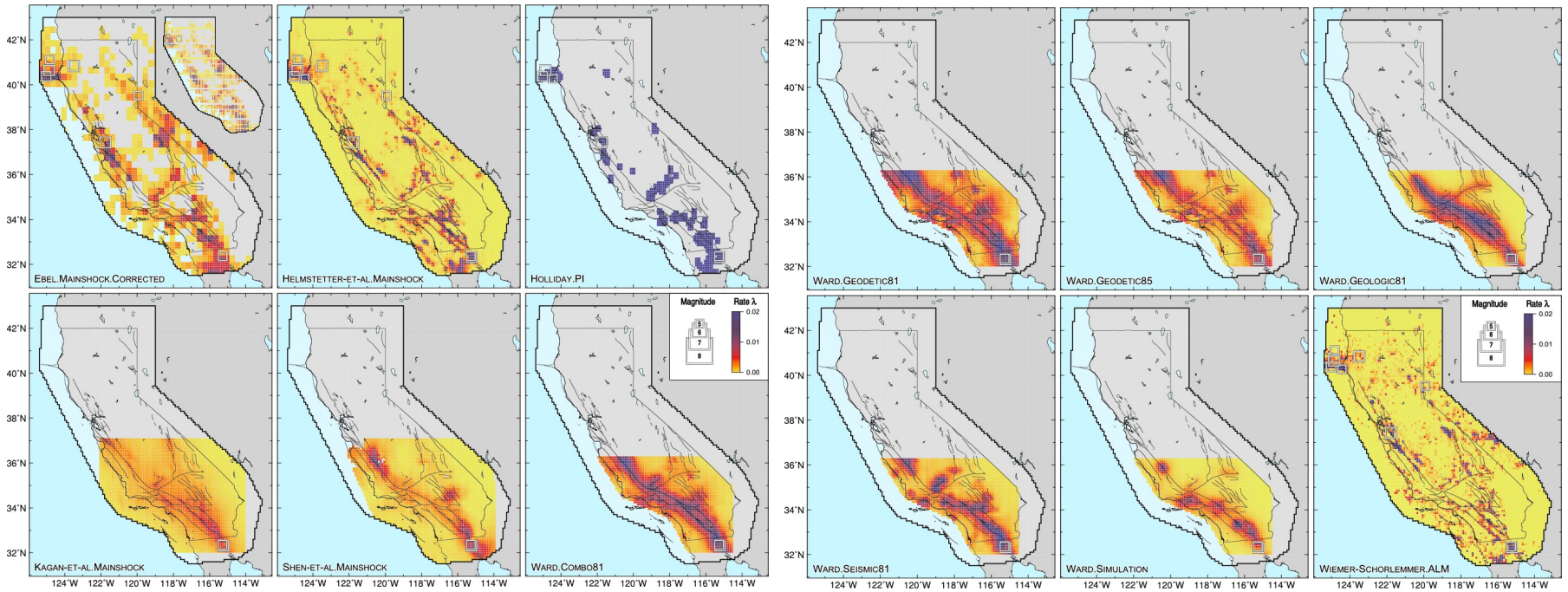
Data
ANSS Catalog
1 month delay

Test
L-, N-, R-Test



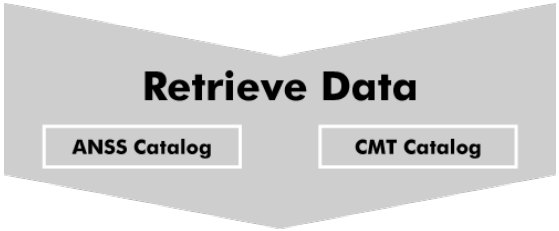
Experiment

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



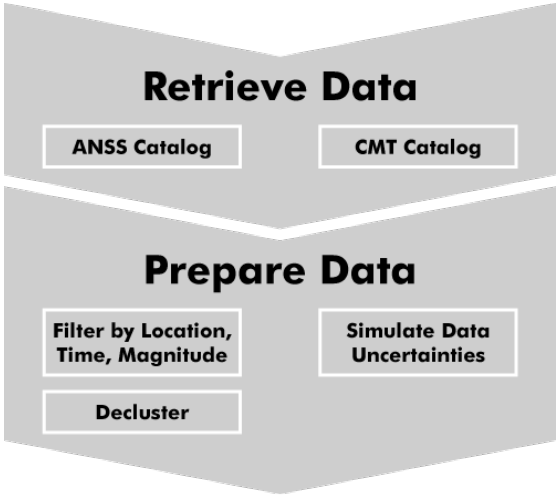
CSEP Software

- Retrieve data on a daily basis



CSEP Software

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



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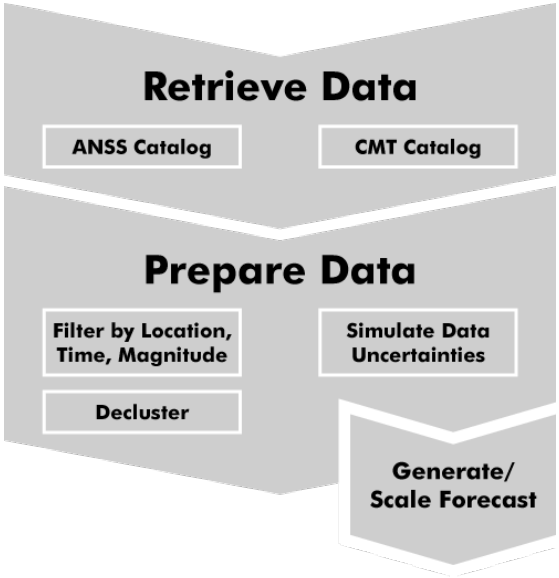
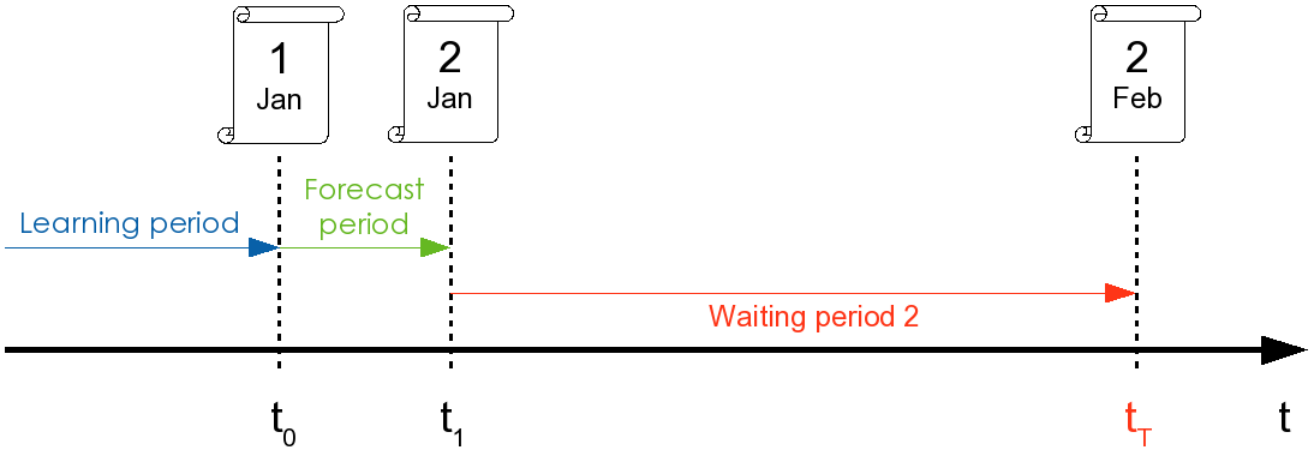
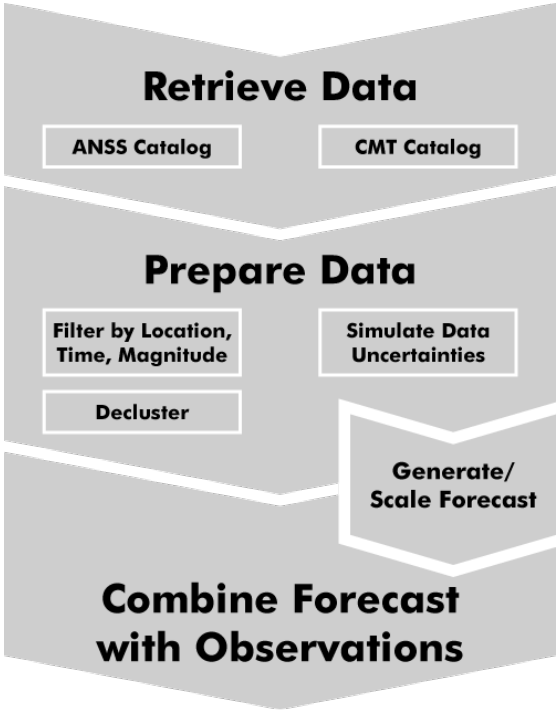




CSEP Software

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

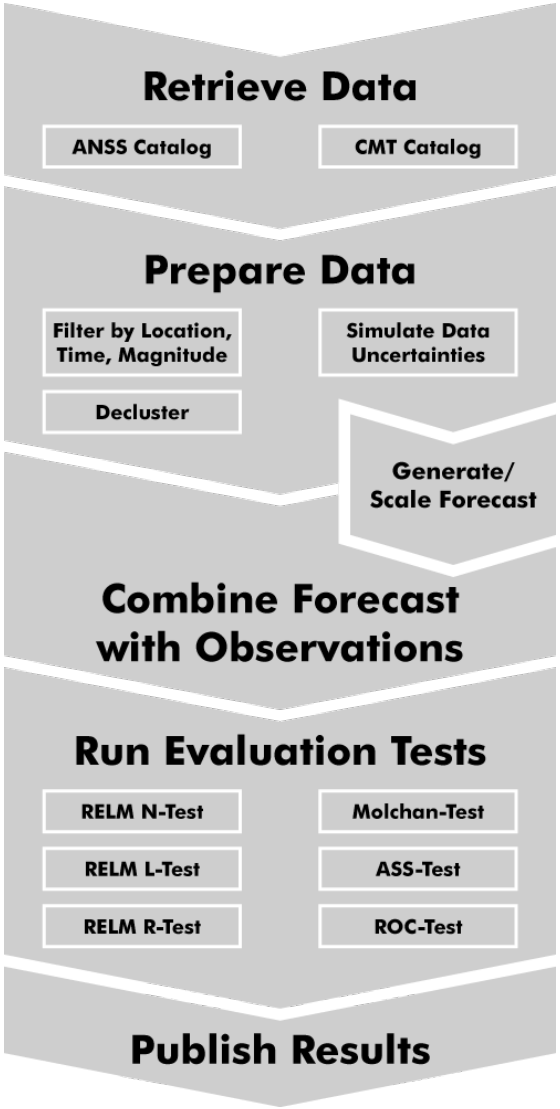


CSEP Software

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

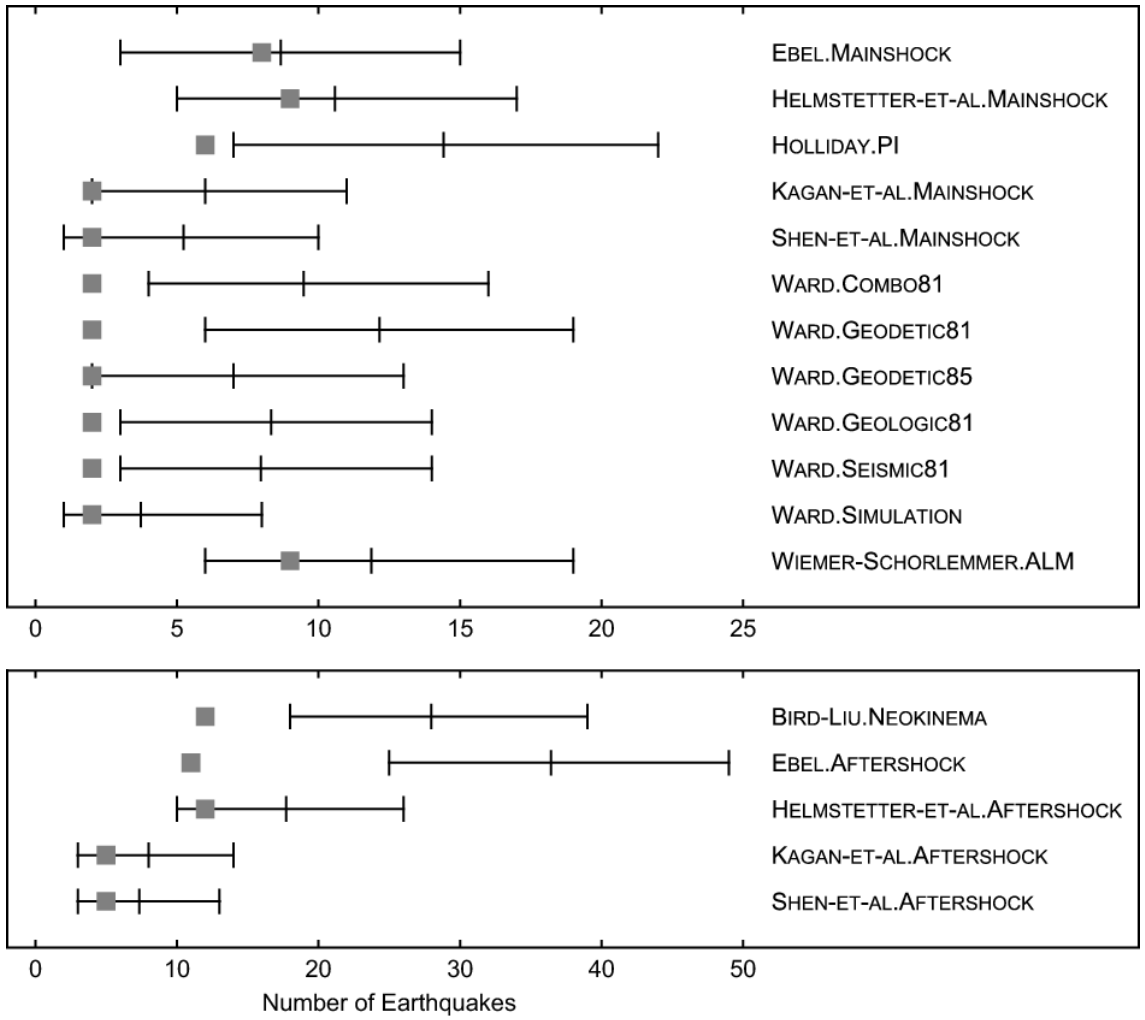
CSEP Software

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



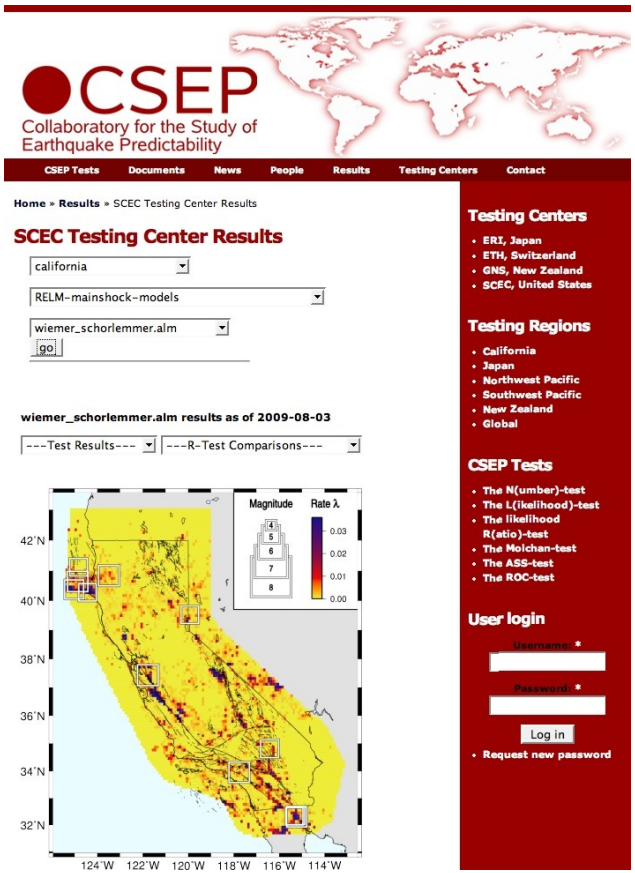
Experiment

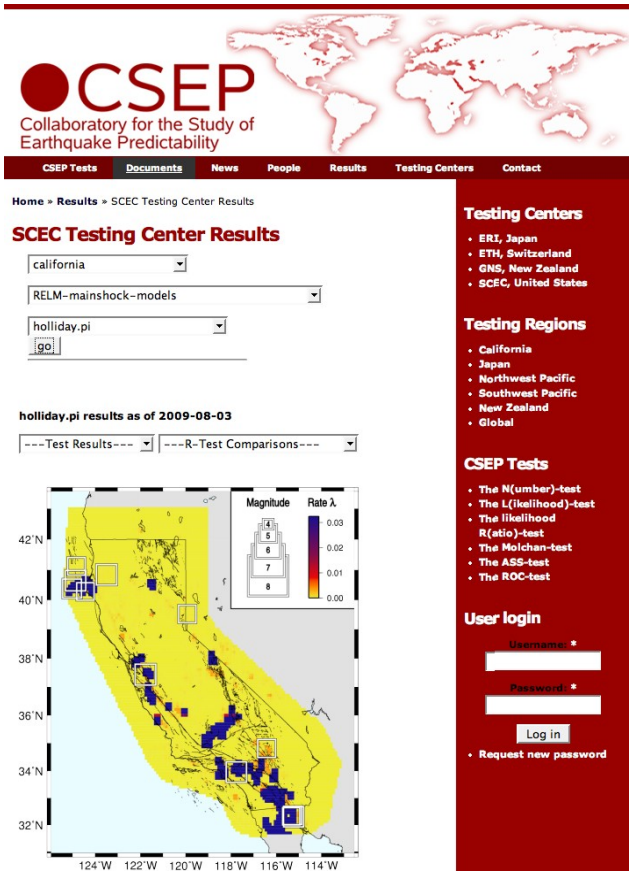
N-Tests for consistency of forecasts with observation



Experiment

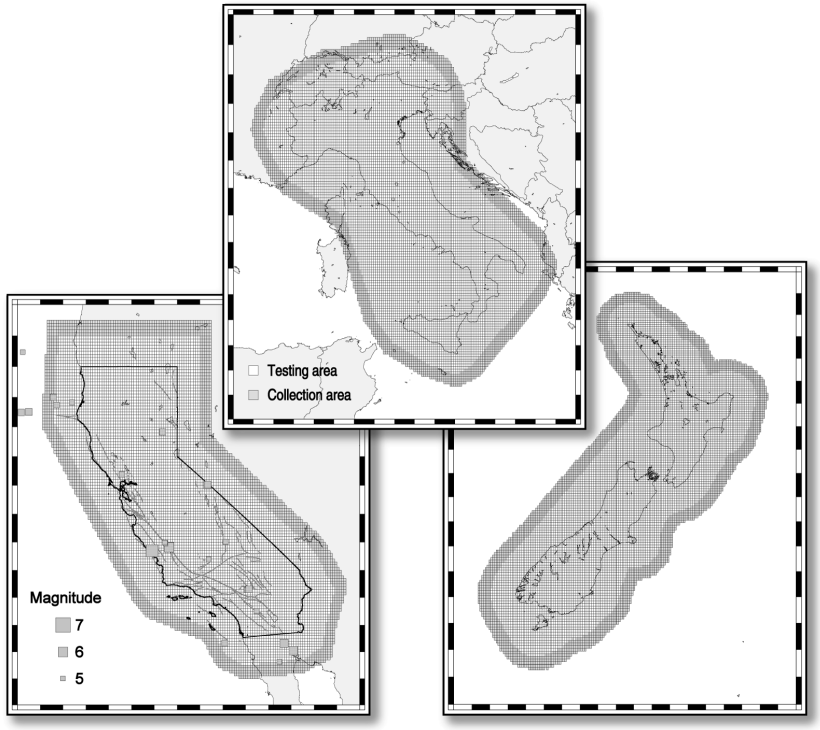
- Web representation





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