CSEP Progress Report

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Major Tasks

Software
- CSEP Software V1.0 development
- Distribution to other Testing Centers (NZ, RELM in Zurich)

Working Groups
- Data, Model, Testing

Natural Laboratories
- Introduction of new natural laboratories
- Introduction of new models
- Introduction of new model classes and tests

Working Groups

Data WG

- Defines data standards and explores new data sources

Model WG

- Defines model standards and submission guidelines

Testing WG

- Explores new testing methods

Cyberinfrastructure Committee

- Supervision of the software development process

CSEP Software

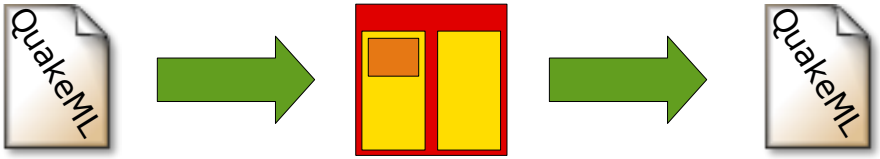
- 1 full-time developer at SCEC (Maria Liukis)
- Expected release of V1.0: 1. September 2007
- Test operations start 1. August

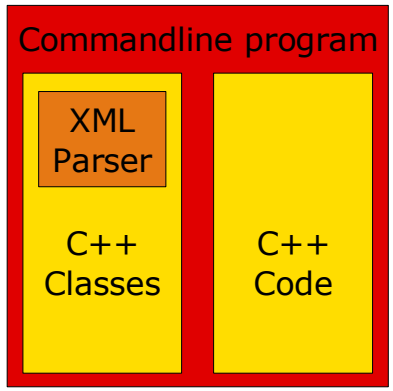
- Completely version-controlled (CSEP software & models)
- Web-based collaboration tools
- Automatic build and self tests (daily)
- Unit tests & acceptance tests
- Supported platforms: Linux, OS X
- Grid-based testing (RELM Tests)
- 5-year/1-day models
- 3-month update cycle of operational system

Software Design Principles

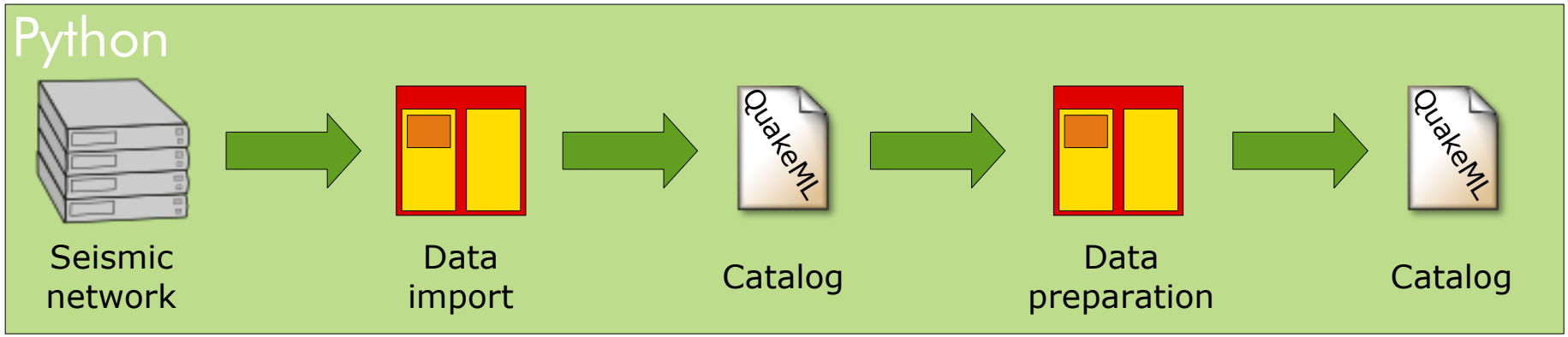
- Interface formats (XML-based)

- CSEP Core (Toolkit C++)





- Natural laboratory testing class business logic (Python)



Full Reproducibility

The Testing Center keeps

- All input data (e.g., earthquake catalogs)
- All results
- All simulations (e.g., random numbers)
- System configurations used for computations (metadata)

```
<result>
  <config>smi://org.scec.csep/system#12</config>
  <L-Test>
    <alpha>0.55</alpha>
  </L-Test>
</result>
```

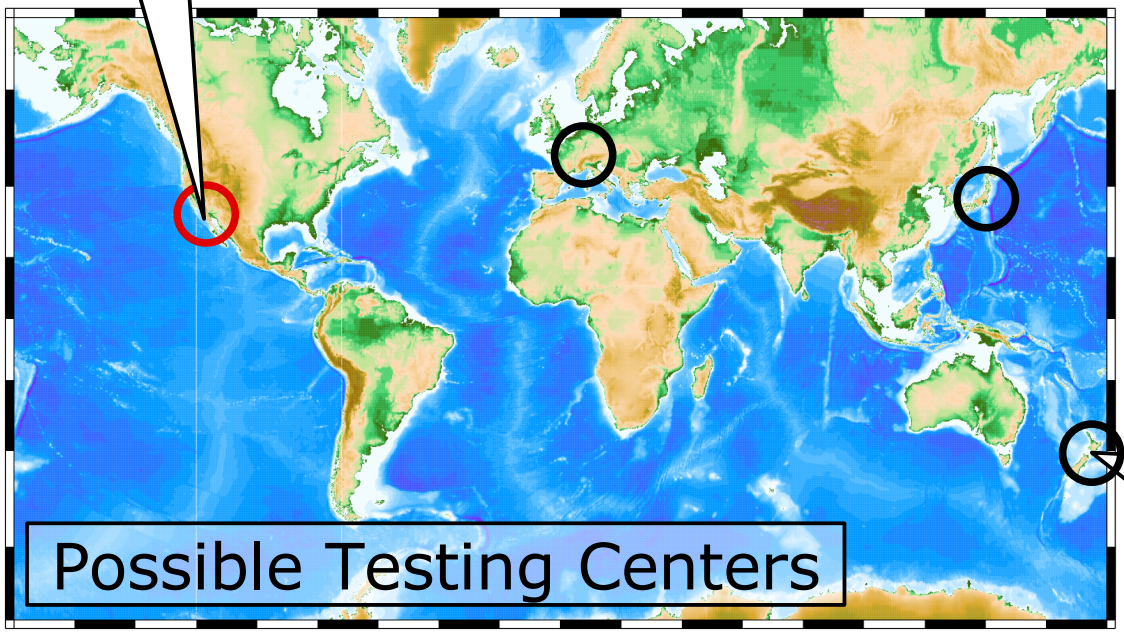
Example

Software Distribution

CSEP Development Team

Unlimited Downstream

Moderated Upstream



QuakeML
XML Definition and API

C++ Core (Toolkit)

Python
Natural Laboratory Code

Examples

QuakeML
XML Definition and API

C++ Core (Toolkit)

Python
Natural Laboratory Code

CSEP V2.0

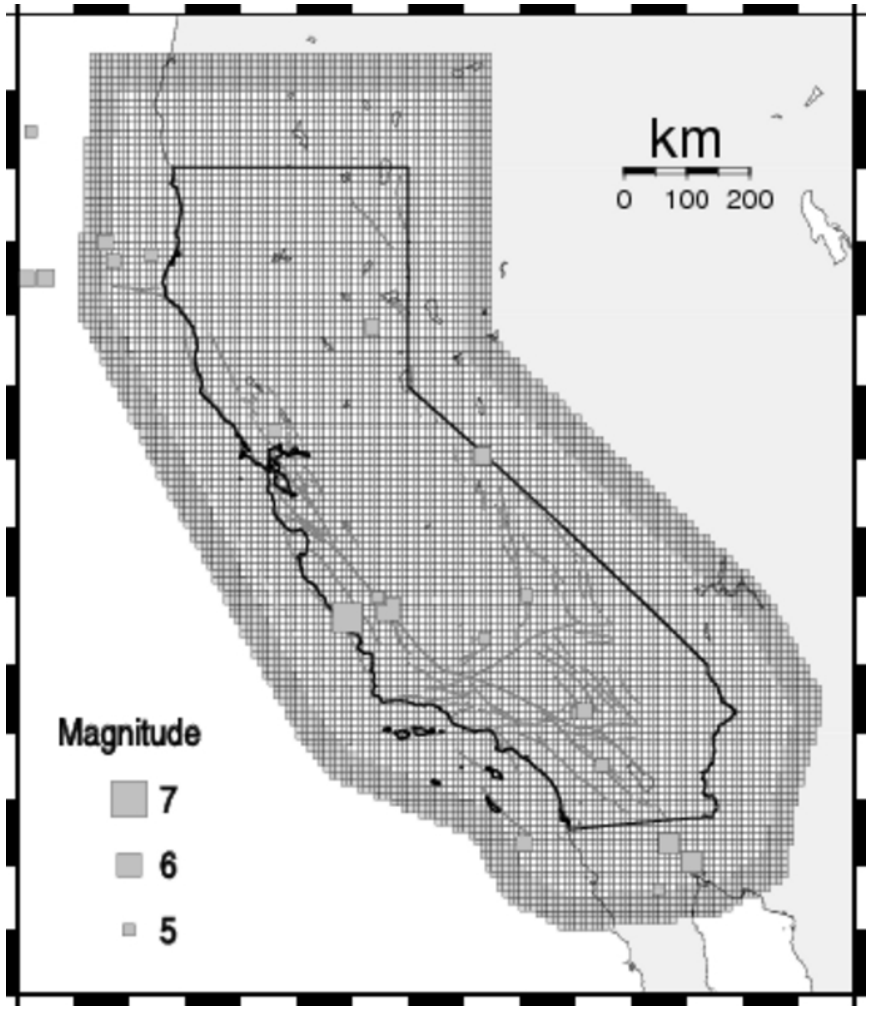
- Fully XML-based
- No Matlab -> Python/C++ -> Fully Open-Source
- Scalable -> Cluster computing
- Interactive web presentation
- New tests (ASS, fault-based, etc.)

California Natural Laboratory

5-year models
- Cellular Seismology (Kafka & Ebel)

1-year models
- STEP (Gerstenberger et al.)
- EEPAS (Rhoades)
- EEPAS+STEP
- PPE (Rhoades)
- ETAS (Rhoades)
- ETES (Zhuang, Kagan, Jackson)

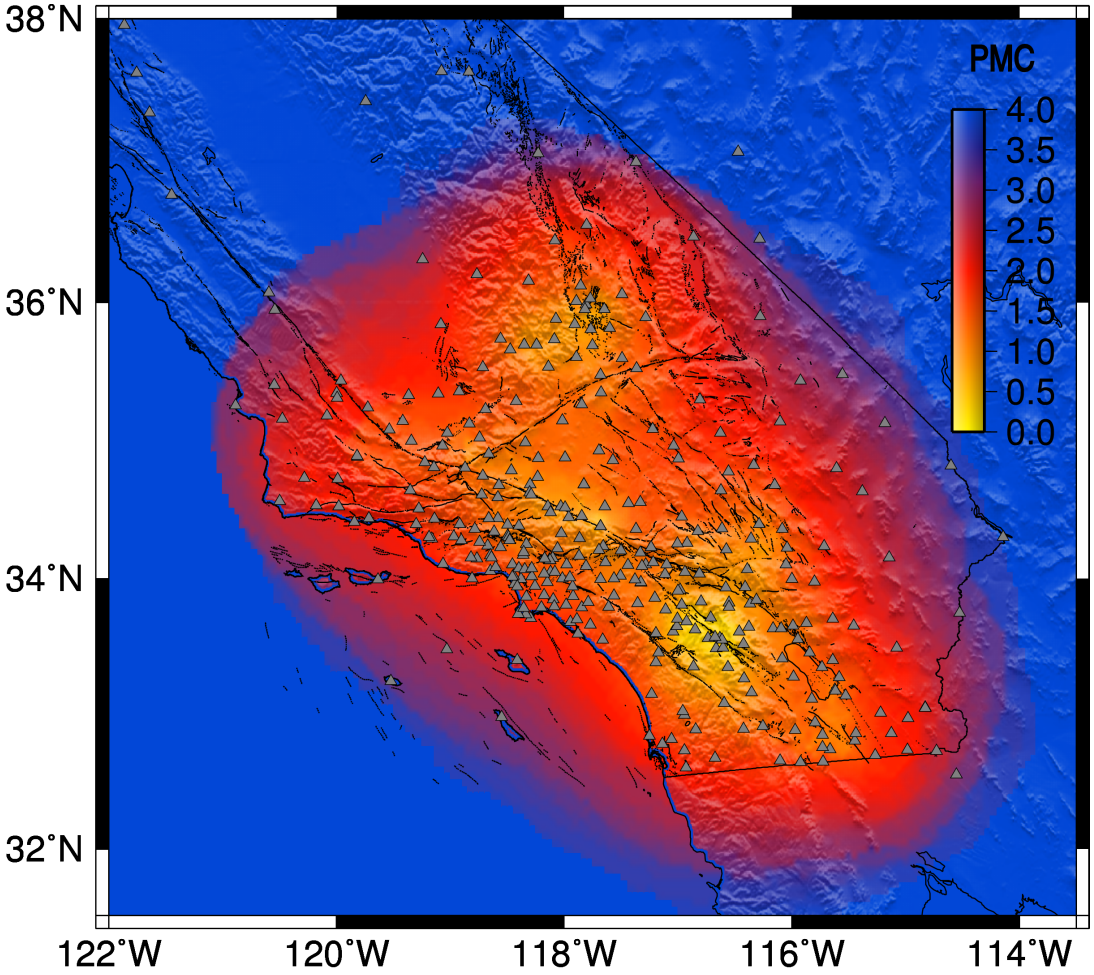
1-day models
- **STEP (Gerstenberger et al.)**
- **ETES (Zhuang, Kagan, Jackson)**
- EEPAS+STEP

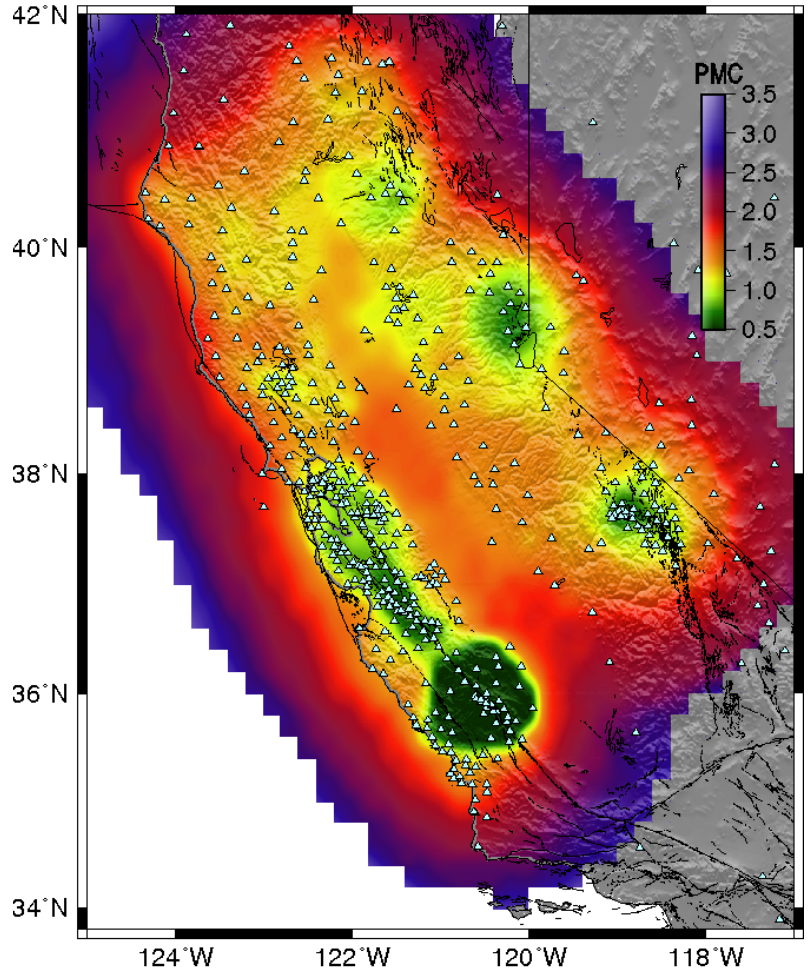


Evaluation
- Area Skill Score (Zechar)
- Improving RELM-Tests (Rhoades & Schorlemmer)

California Natural Laboratory

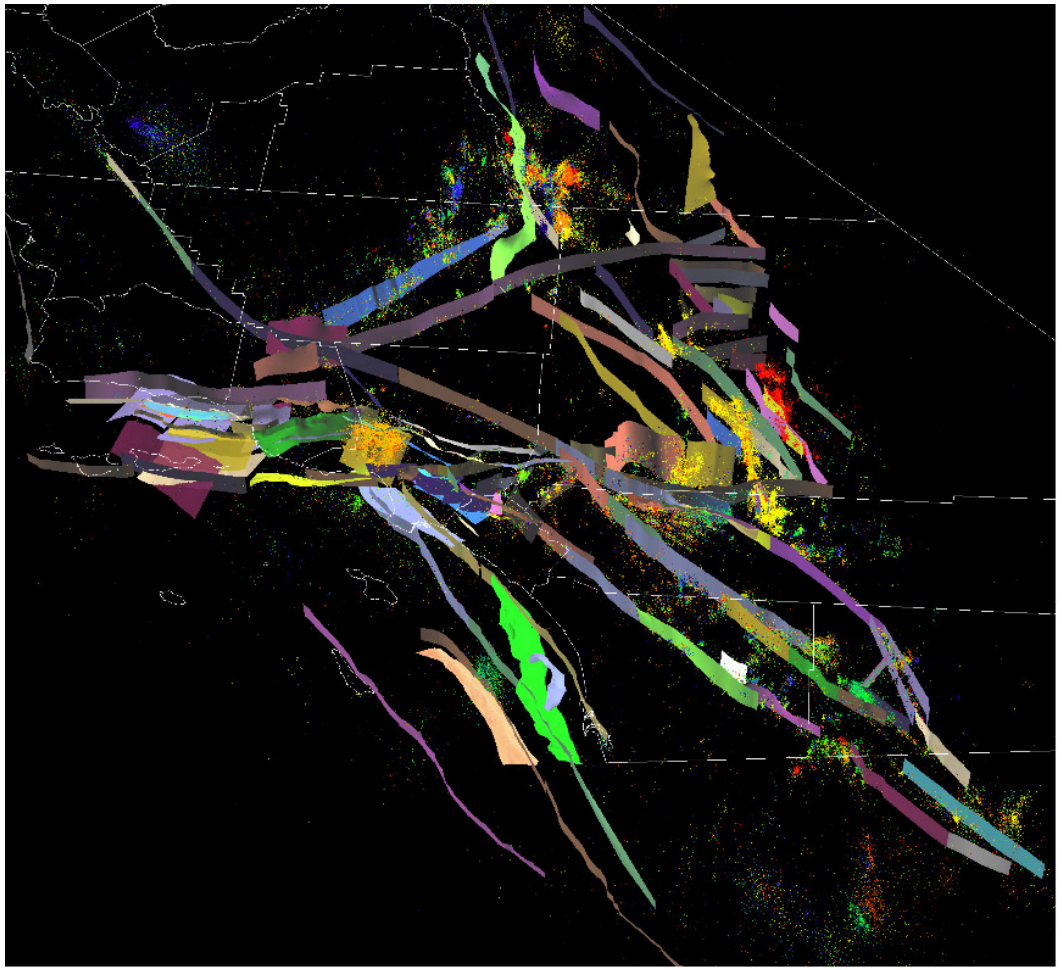
- Update completeness with PMC-method
- Compilation of Completess-database for California (USGS-NEHRP funding available)





Fault-based Testing

- Fault database as model input
- Forecast includes focal mechanism information
- Test against catalog providing focal mechanisms



SCEC Community Fault Model

Fault-based Testing

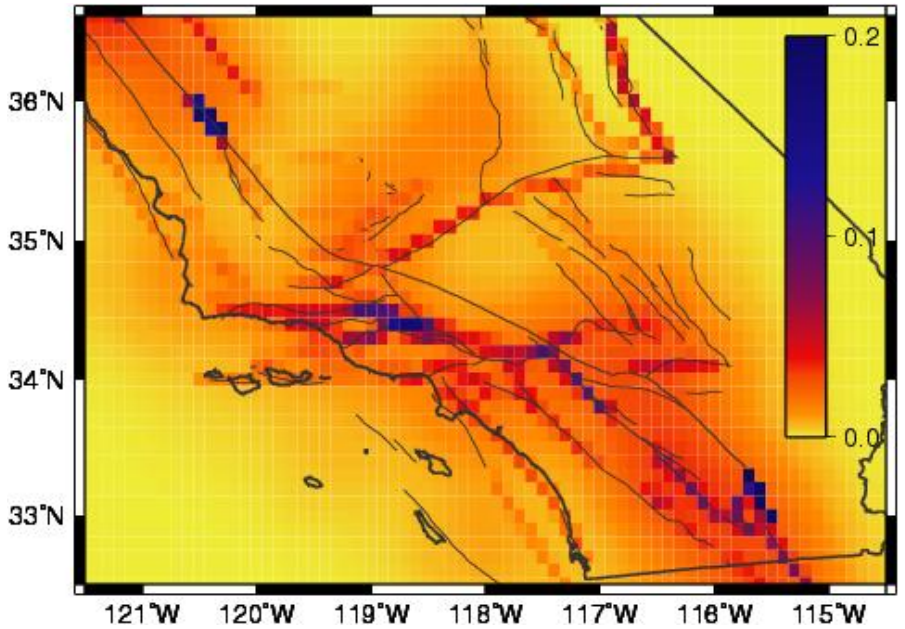
- Fault database as model input
- Forecast includes focal mechanism information
- Test against catalog providing focal mechanisms
- Forecast smoothed to a grid

Why smoothing?

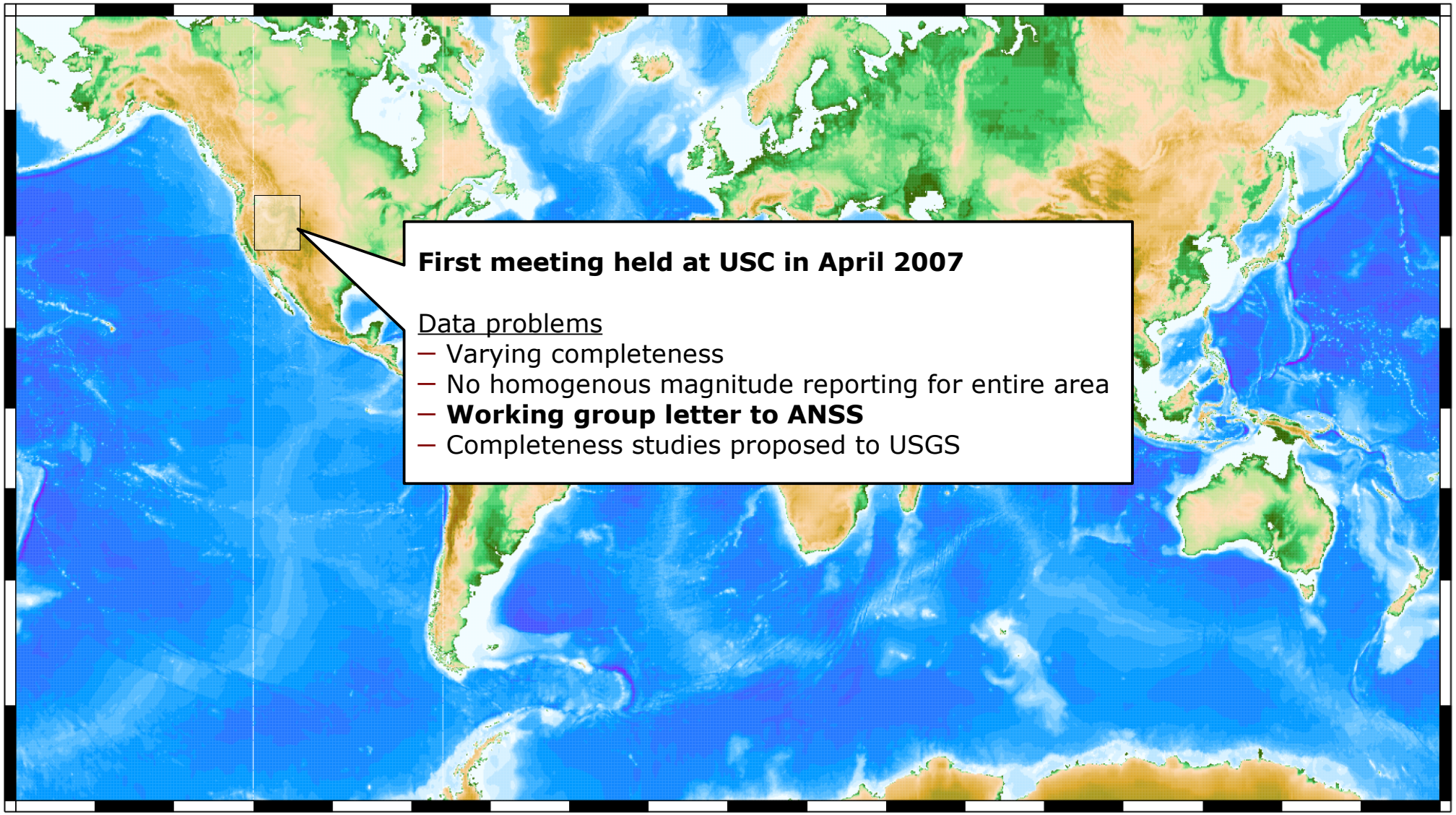
- Difficulties in determining the ruptured fault (see Parkfield)
- Rupture along unknown faults (see Loma Prieta)

Prototype Models

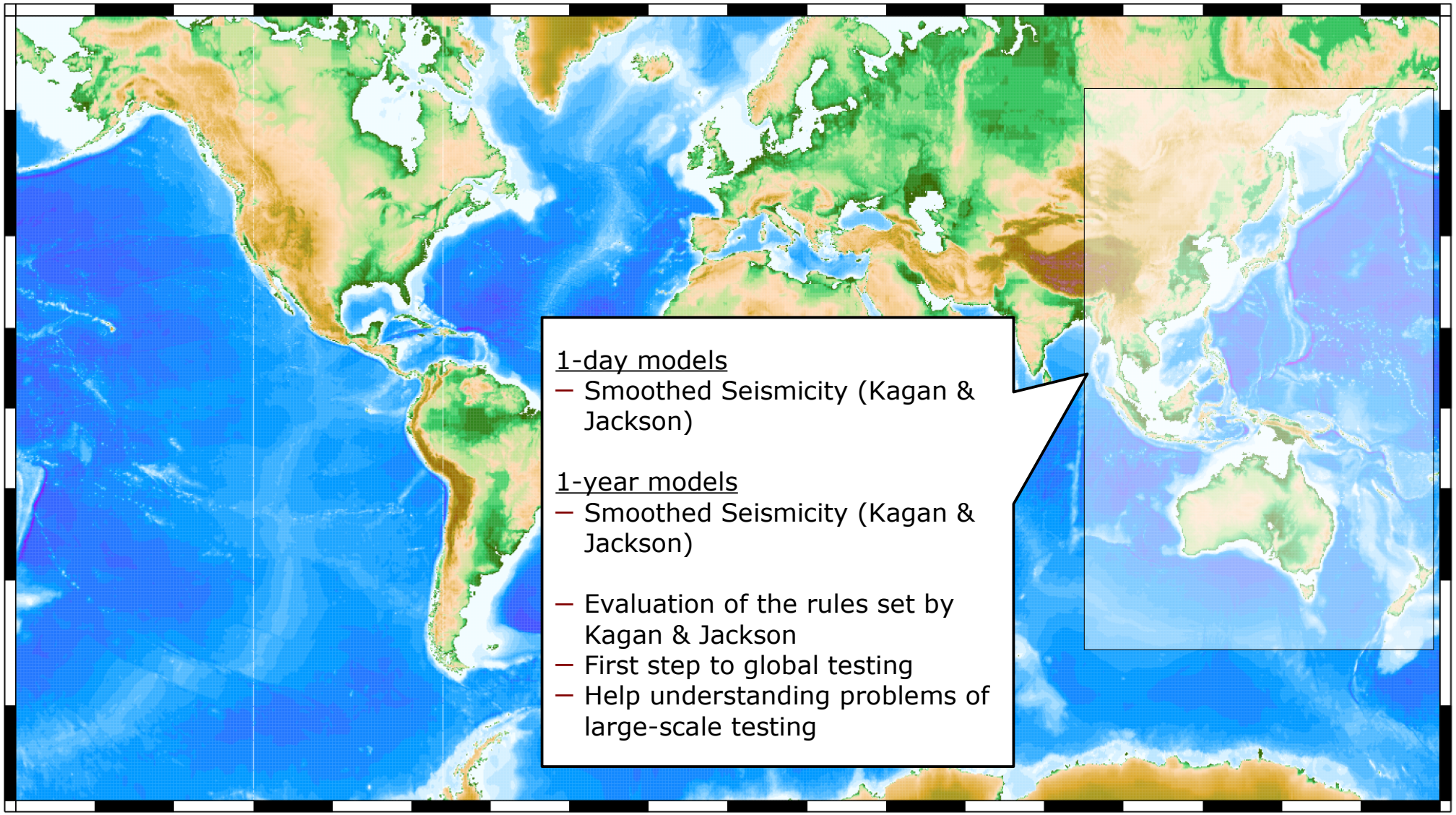
- CALM (Tormann)
- AMR (Bowman)



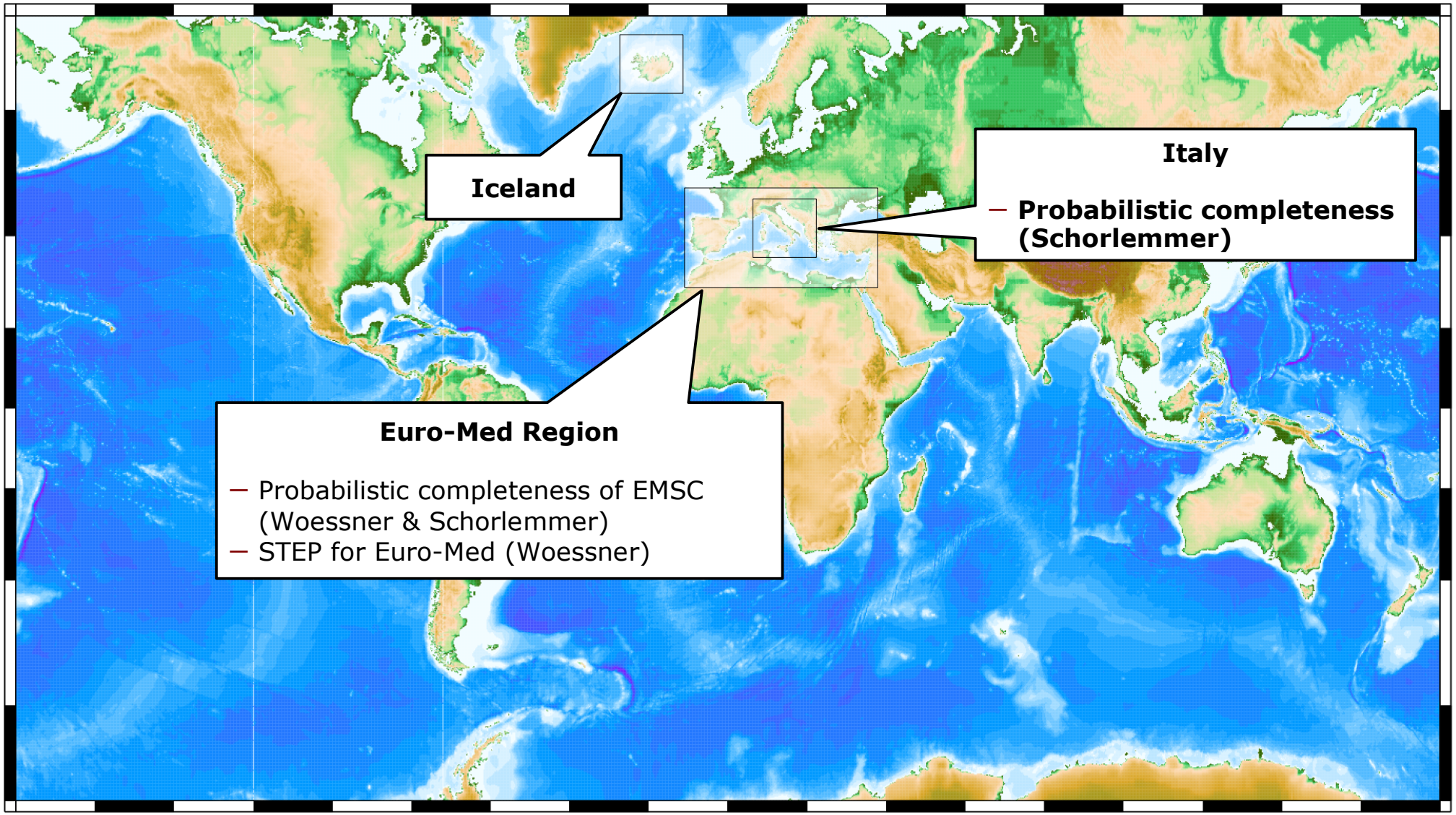
New Lab: Basin & Range



New Lab: Western Pacific



New Natural Laboratories in Europe



We Need to Discuss

Possible natural laboratories in Europe

- Italy
- Euro-Med region
- Iceland

Data (earthquake catalogs) availability & quality

- Any additional data available
- Testing rules depend on data

Model availability

- Data requirements
- Coverage