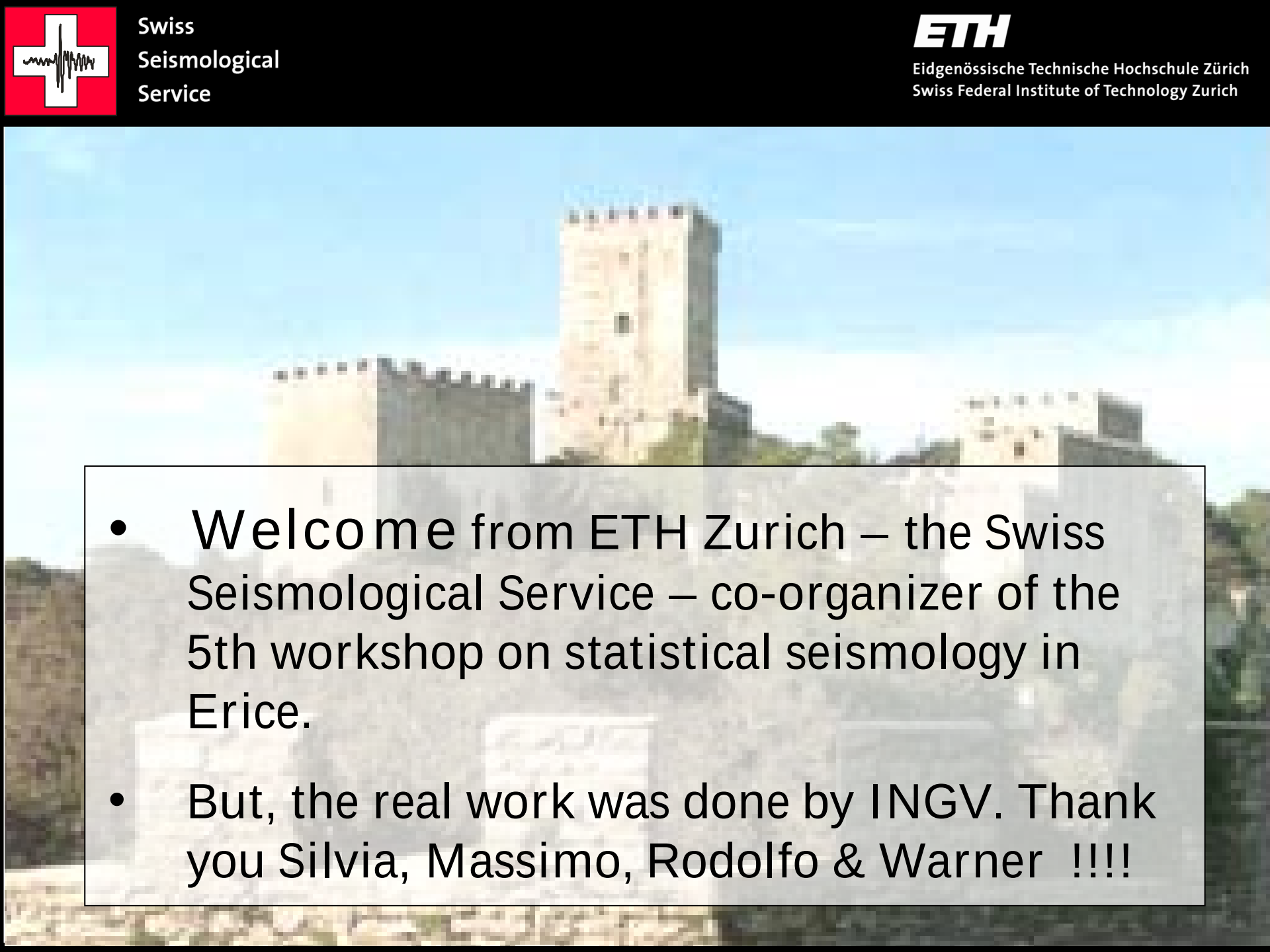
Swiss
Seismological
Service

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

News from NERIES, SAFER, SEISTRAIN and other trans-national European projects

Stefan Wiemer &

- ***The earthquake statistic group at ETH Zurich.***
- ***The NERIES JRA2 (5) team***
- ***The SAFER WP5 (2) team***
- ***The SEISTRAIN team***



Swiss Seismological Service

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

- Welcome from ETH Zurich – the Swiss Seismological Service – co-organizer of the 5th workshop on statistical seismology in Erice.
- But, the real work was done by INGV. Thank you Silvia, Massimo, Rodolfo & Warner !!!!

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

EARTHQUAKE STATISTICS GROUP

News | About us | People
Research | Education | Documents
Seismic Hazard | Software | Links

Contact | Sitemap | Help
Search GO

www.earthquake.ethz.ch


Annemarie Christophersen


Georgia Cua


David Eberhard


Fabian Euchner


Michael Fischer


Silvio Maraini


Kazuyoshi Nanjo


Corinne Bachmann


Danijel Schorlemmer


Matteo Spada


Thessa Tormann


Thomas van Stiphout

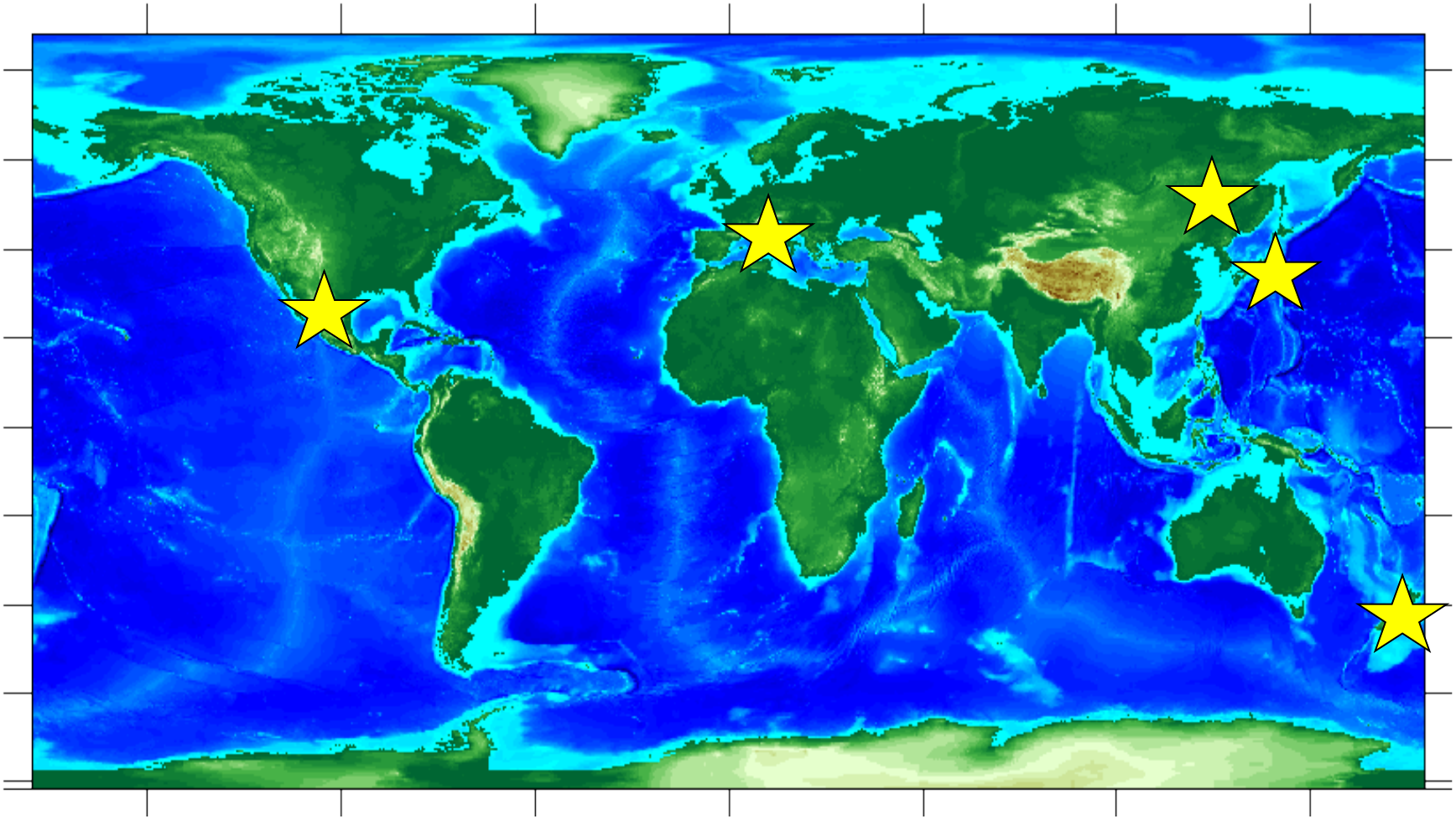

Stefan Wiemer


Jochen Wössner

Swiss Seismological Service

5th Workshops on Statistical Seismology

ETH



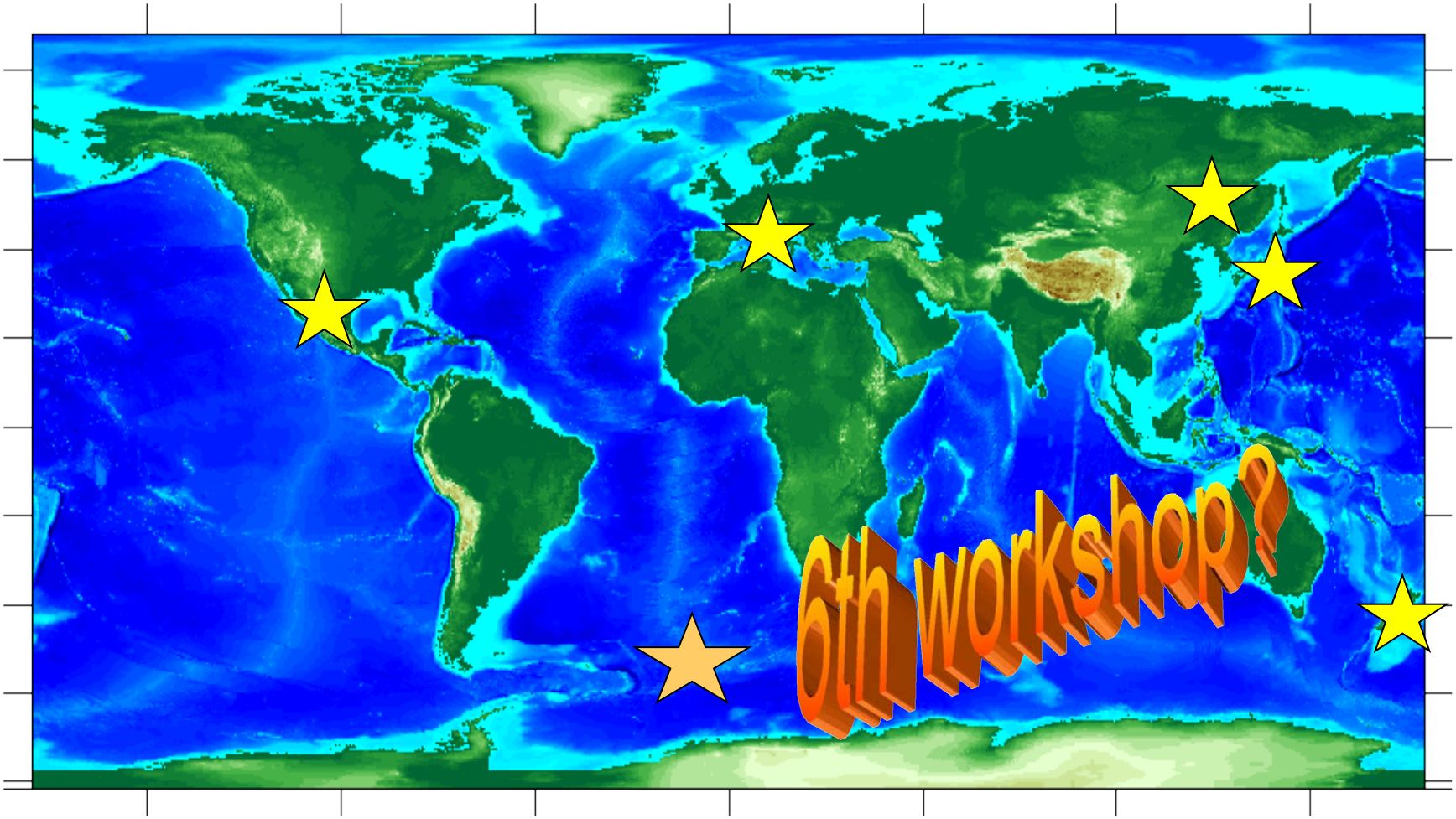
Workshops on Statistical Seismology

- The StatSeis ‘community’ is growing, because it is topical, or because we have meetings in the right places ?
- What exactly *IS* statistical seismology ?
- Do we include the right people ?
- Where do we go from here, and who is ‘*we*’ anyhow ?

Swiss Seismological Service

Workshops on Statistical Seismology

ETH



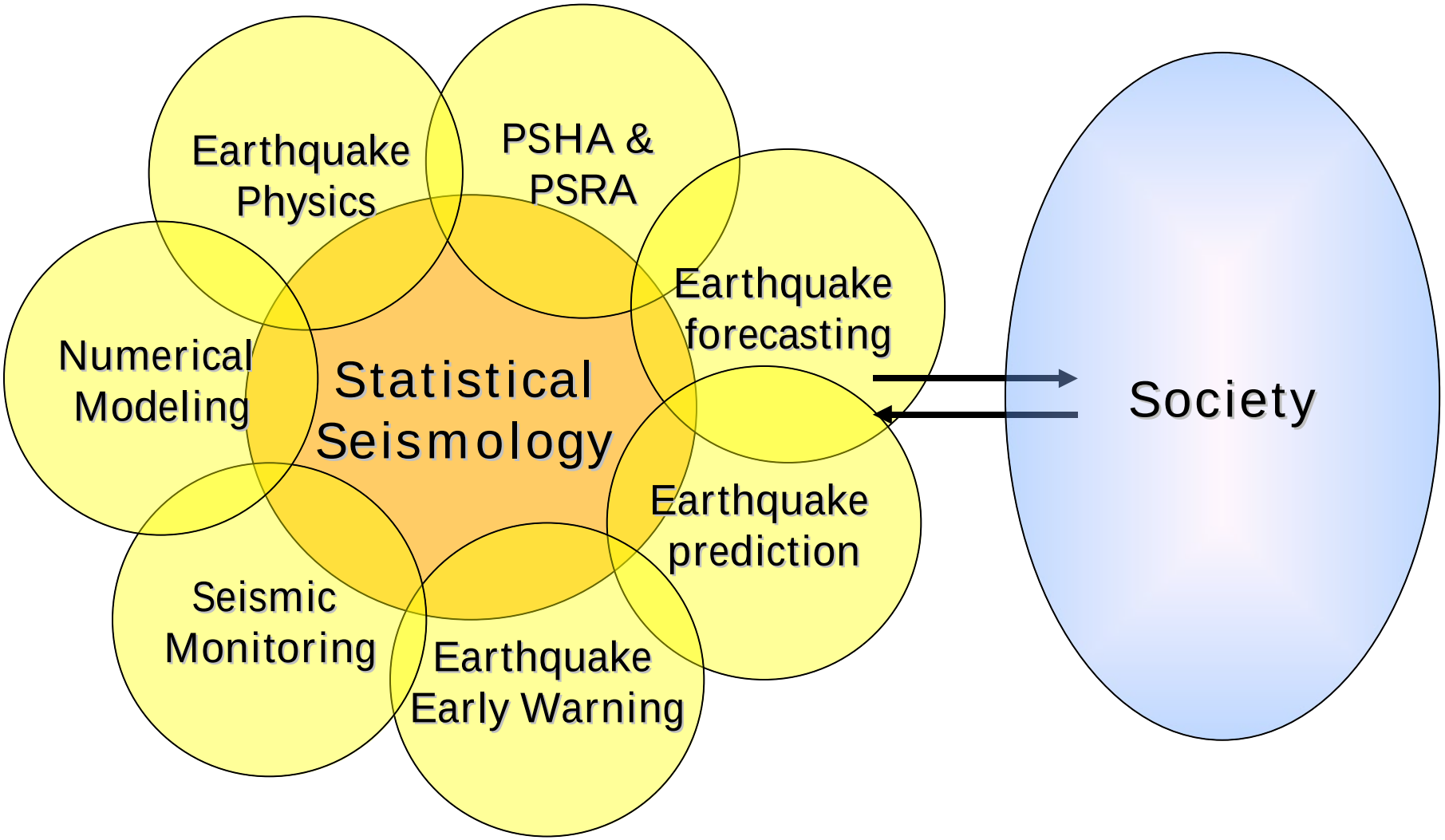
Personal Statements

- Statistical Seismology addresses the growing need (of society and funding agencies) for *validation* of scientific models and ideas.
- Statistical Seismology is trying to move seismology towards a '*hard, quantitative science*' (in the provocative words of Yan Kagan).
- Statistical Seismology, to me, is growing because it sits at a critical interface between different disciplines.

Swiss Seismological Service

What is Statistical Seismology ?

ETH



Time to ‚grow up‘ ?

- We need to make our needs, as critical data users, known to the community.
- We should increasingly make ‘our’ standards known and thus spread good practice through the community.
- I believe that generously funded, large scale international projects are critical for moving ahead.

The role of large-scale projects

- Large-scale, well funded, transnational projects are critical to:
  - Build a community
  - Attract bright students to the field.
  - Build a sustainable 'infrastructure'
- Europe's Framework Projects (FP5, 6, 7) offer interesting opportunities for bringing together experts from EU countries and beyond.
- Europe could, ideally, play a critical role as an integrator.

The role of large-scale projects

- Recently funded projects of relevance for statistical seismology are:
  1. NERIES (12.1 M€)
  2. SAFER (3.5 1M€)
- Under evaluation: SEISTRAIN (2.5 M€).
- In addition, CSEP, GSHAP2 + EU hazard, etc. (→ Tom, Domenico).
- Here at Erice, we have about 25 people who participate at various levels within these projects, a number of presentations/posters – and will have the first annual meeting.

EC Project NERIES:

NEtwork of Research Infrastructures for European Seismology

EC Implementation: Integrated Research Infrastructures (I3):

Domenico Giardini[1], D ; Torild van Eck[2], Remy Bossu[3], Stefan Wiemer[1] and the NERIES consortium
(23 inst. from 13 European countries).

Duration: 4 years; start June 1 2006

Budget: 12.1 M€

[1] ETH Zurich
[2] ORFEUS
[3] EMSC

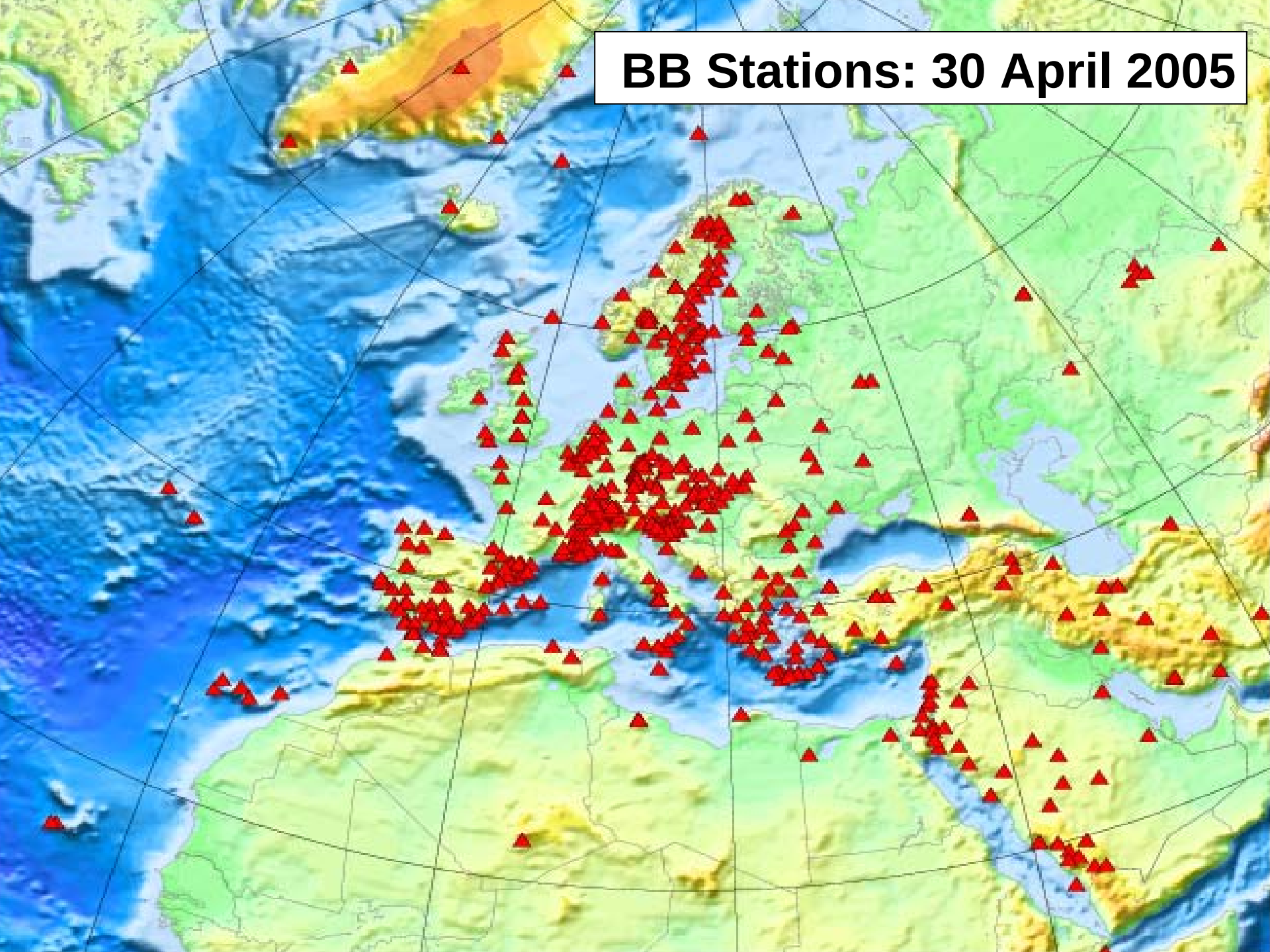
NERIES Goals

- ***NERIES will combine 9 Networking Activities (NA), 5 Transnational Access (TA) and 5 Joint Research Activities (JRA) to promote improved access to distributed databases, common protocols, standardized procedures and strategies for long-term archiving and distribution of seismological data;***

- ***Develop a new generation of hazard and risk assessment tools designed to improve monitoring and understanding of the earthquake process;***

NERIES - NA
Networking Activities

NA1 – Project Management	(KNMI/van Eck)
NA2 – Real-time data exchange	(ORFEUS/Dost)
NA3 – Distributed European waveform data archive	(GFZ/Hanka)
NA4 – Distributed European historical data archive	(INGV/Stucchi)
NA5 – Improving access to accelerometer data	(ICC/Roca)
NA6 – Broadband OBS networking	(IPGP/Singh)
NA7 – Portal for integrated data access	(EMSC/Bossu)
NA8 – Technology Transfer (workshops, grants)	(KNMI/van Eck)
NA9 – European earthquake data services	(EMSC/Bossu)


BB Stations: 30 April 2005

NERIES EC-project: NA8 Technology Transfer

- **Workshops**
- **Web pages with Technical Software Documentation etc.**
- **Grants for exchange of technical personnel**

This includes 20k Euro for this workshop and (possibly) support for CORSSA.

Thank you, NERIES!

NERIES - JRA
Joint Research Activities

JRA1 – European seismological reference model
(INGV/Morelli)

JRA2 – Real-time hazard tools
(ETHZ/Wiemer)

JRA3 – Shake-maps and rapid loss estimation
(Kandilli/Erdik)

JRA4 – Geotechnical site characterization
(LGIT/Bard)

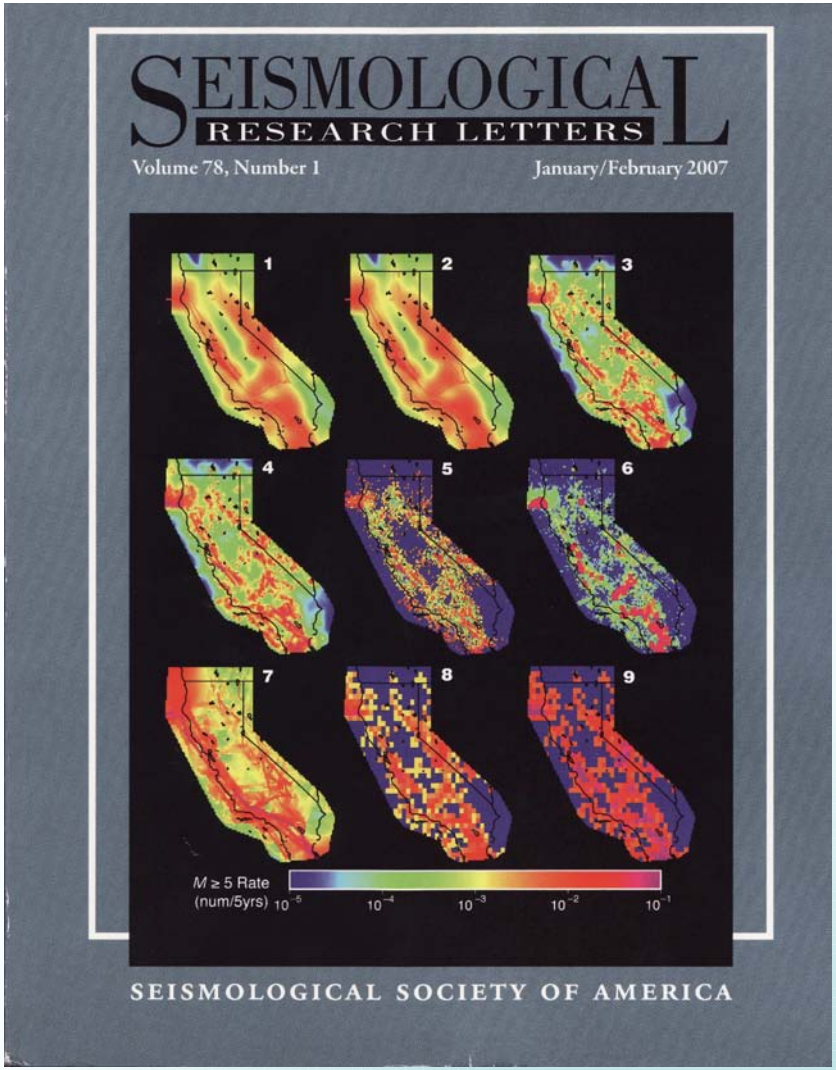
JRA5 – New approaches to data mining
(UnLiverpool/Rietbrock)

JRA 2 Objectives

- Update the European seismic hazard model, and implement a ‘living hazard’ approach.
- Develop a first generation of time-dependent hazard models for Europe and sub-regions.
- Implement a EU forecasting testing center (a node of the global CSEP infrastructure), and assist in setting up regional tests.

Inspired by RELM

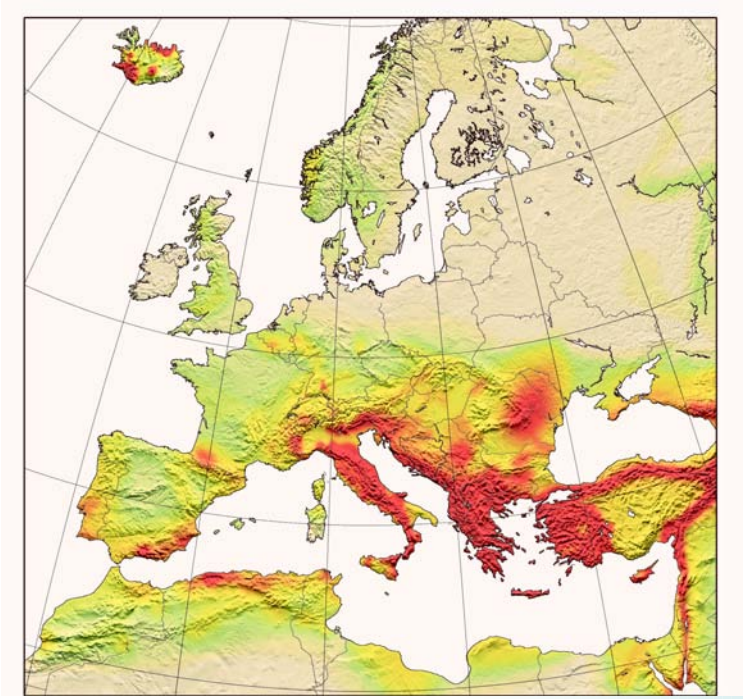
EELM:
European
Earthquake
Likelihood
Models



- ***RELMs in a special issue of SRL Jan/Feb 2007, vol. 78, Num. 1***
- ***http://www.relm.org/***

JRA 2 Progress

- **New catalog for hazard assessment under preparation (Gruenthal et al). Infrastructure for hazard computation under development (→ OpenSHA ?)**

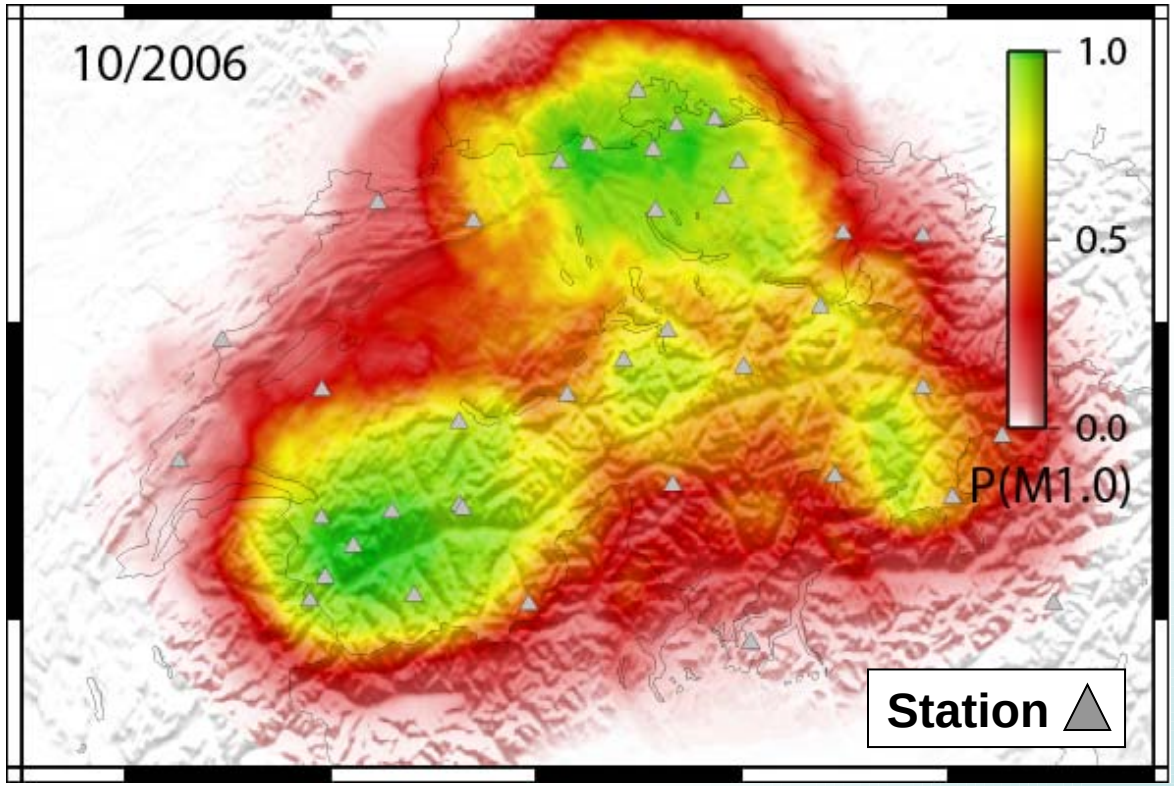


JRA 2 Progress

- **Various models under developments (STEP, ETAS, PI), first at national scale, the expanded to EU/global scale (→ Woesner, Nanjo, vanStiphout, Thormann, Spada, Christophersen, Gerstenberger, Main, Lombardi, Marzocchi).**

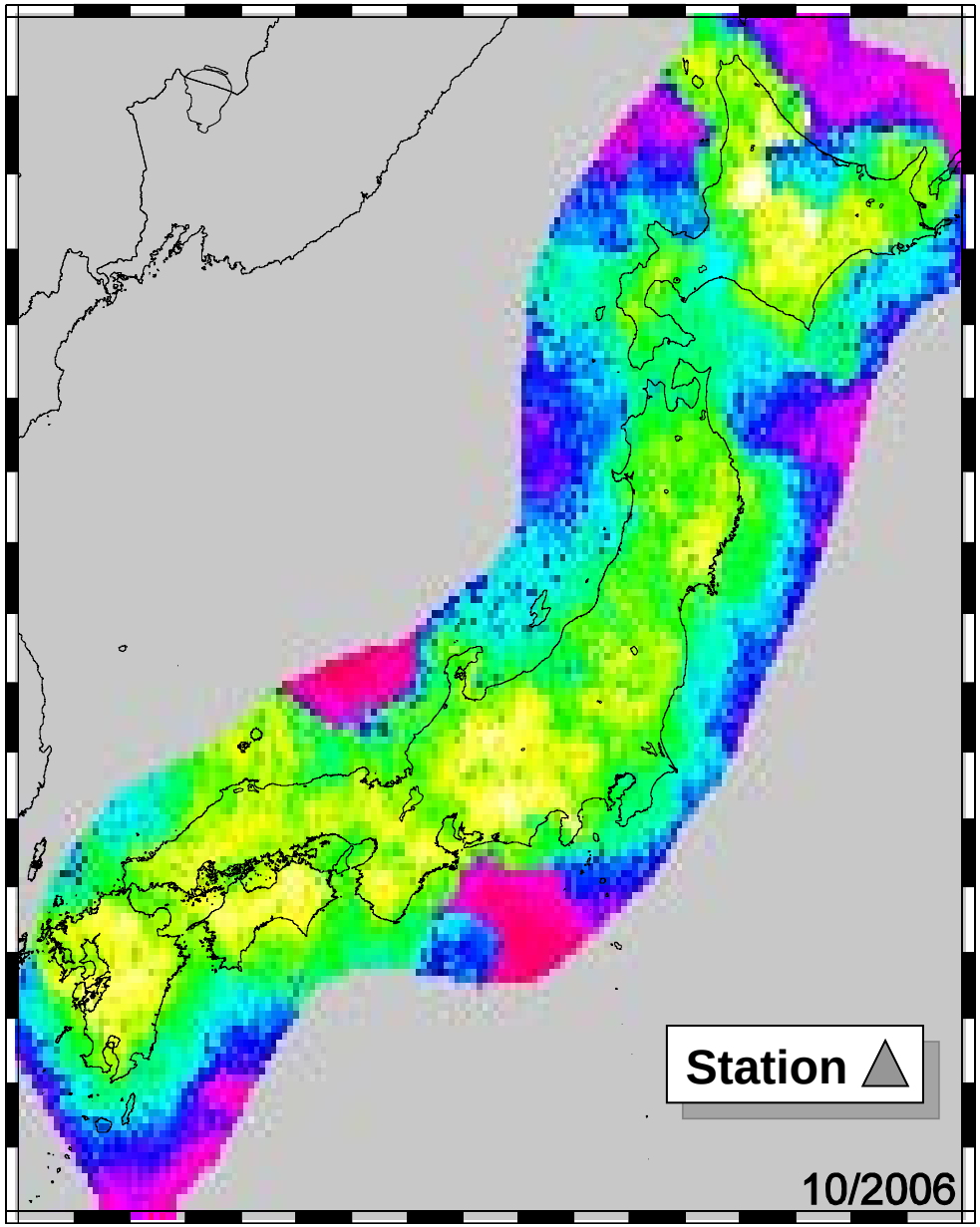
JRA 2 Progress

- **Quality assessment initiated at national level (Mc via EMR and PMC: Woessner, Schorlemmer, Nanjo).**



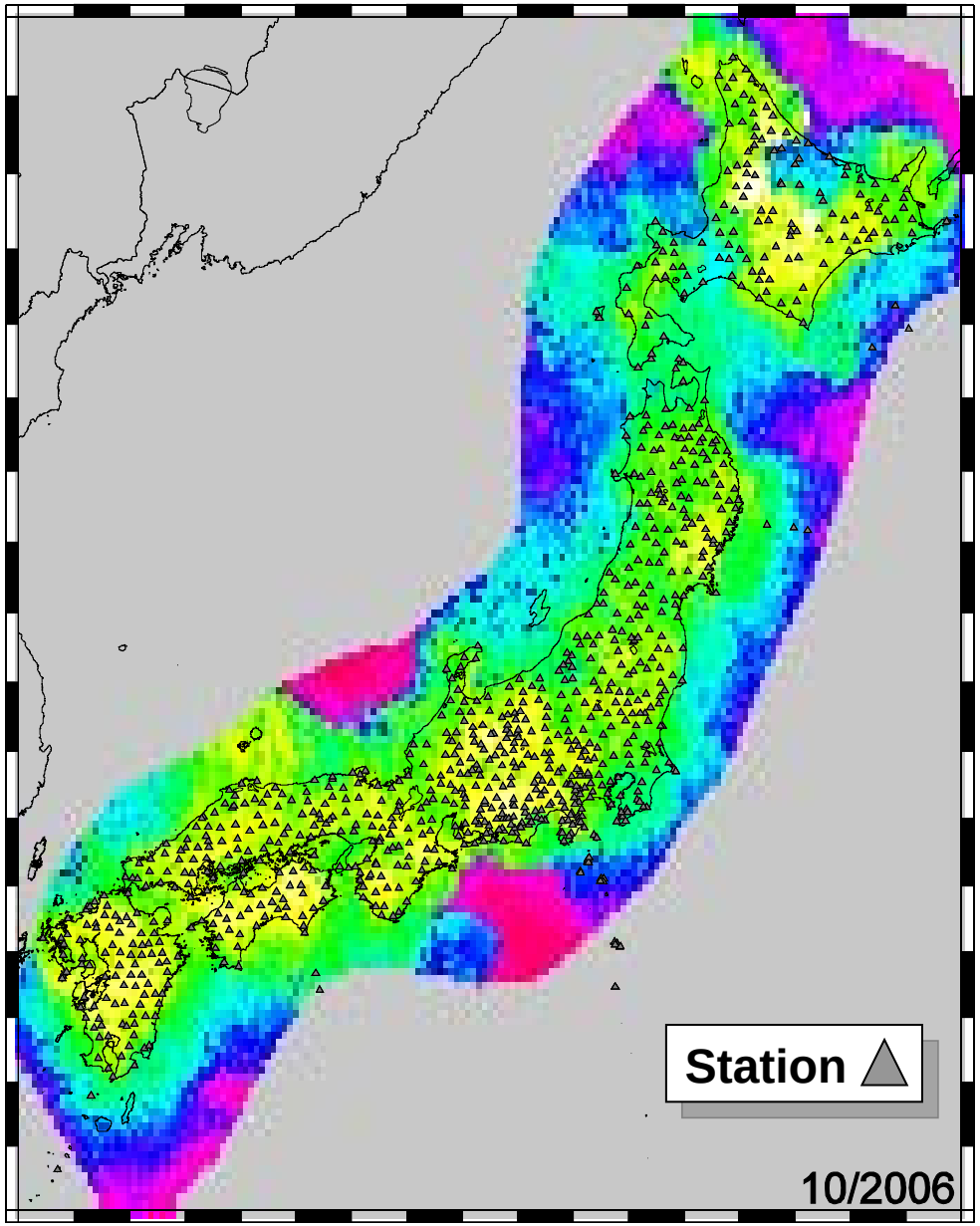
Probability of detecting earthquakes, M1.0, Nanjo, 2007

Completeness magnitude for Japan: GR law based method



- EMR method
- Depth <= 30 km
- 2005-2006
- 200 earthquakes for each node
- JMA data

Nanjo, 2007



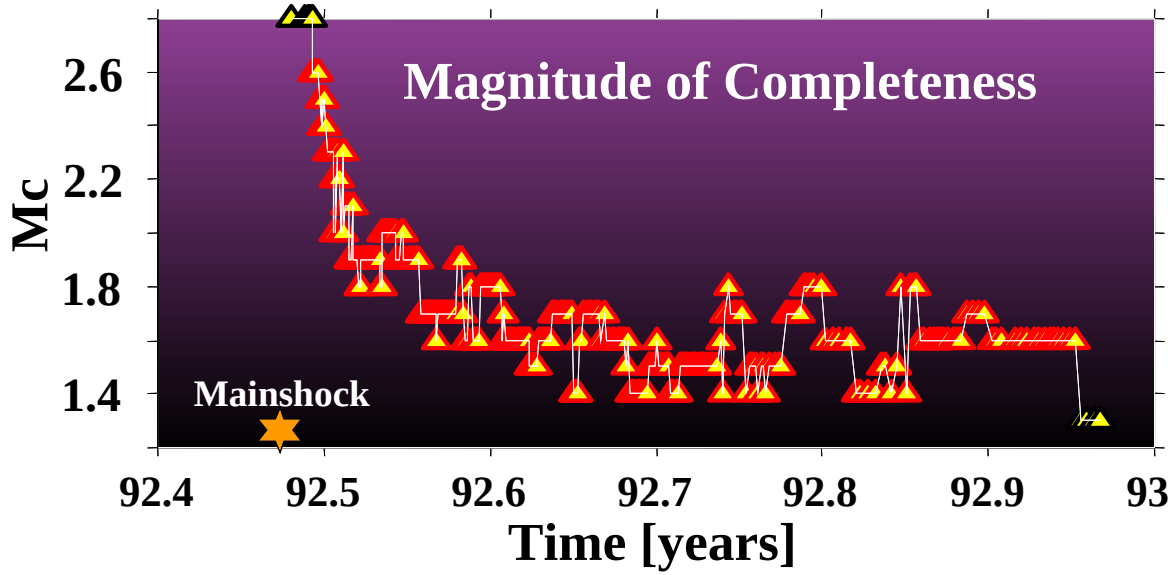
Completeness magnitude for Japan: GR law based method

- EMR method
- Depth <= 30 km
- 2005-2006
- 200 earthquakes for each node
- JMA data

Nanjo, 2007

- We (i.e., the StatSeis community) should encourage all seismic networks to pay closer attention to maintaining and routinely monitoring homogeneity (location & magnitude).

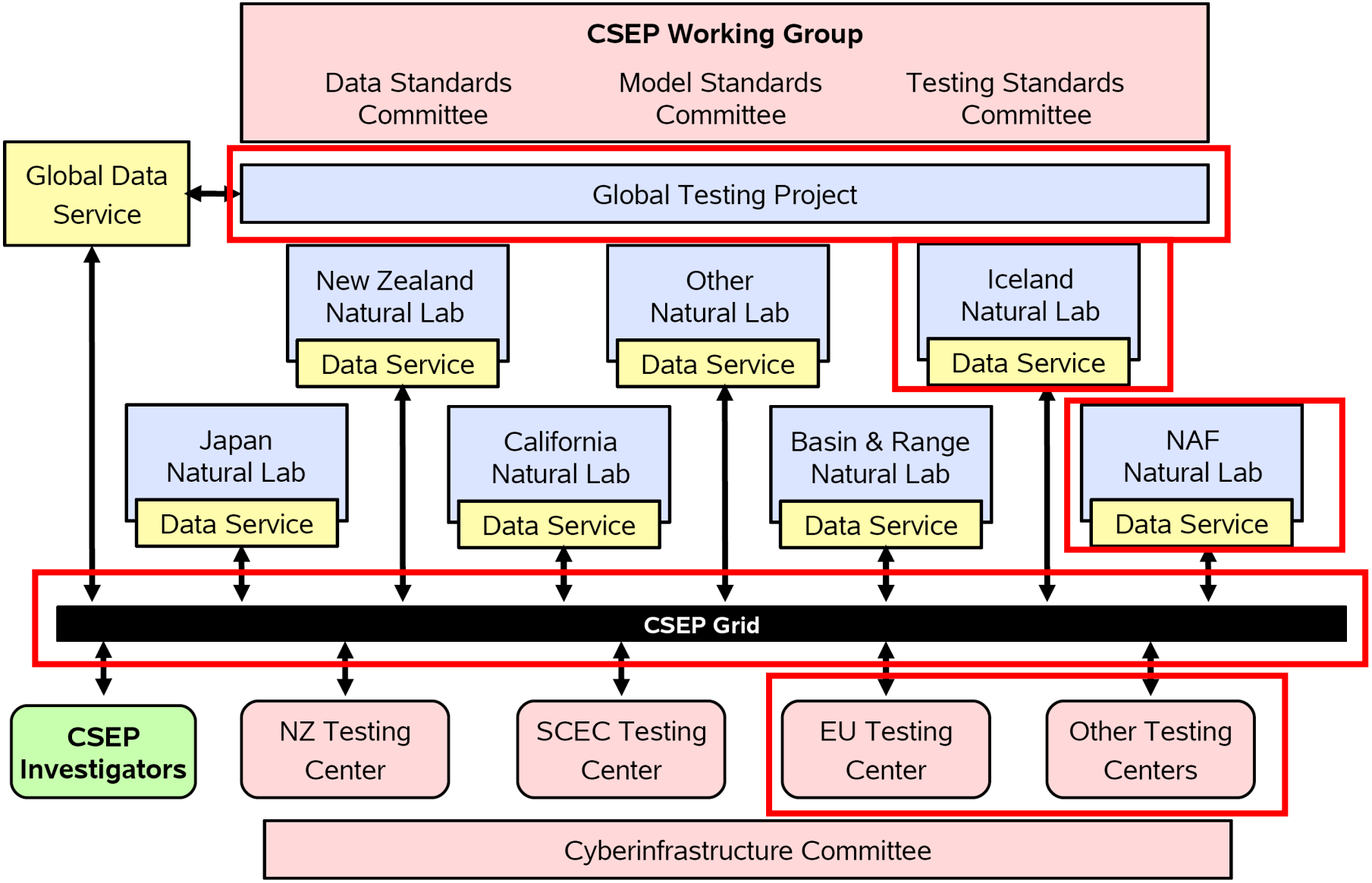
- We should request web servletes for QC archives, updated in near-real time (e.g., Mc(x,y,z,t)), as authoritative resources.



On Bricks and Bullets

Silver Bullet approach

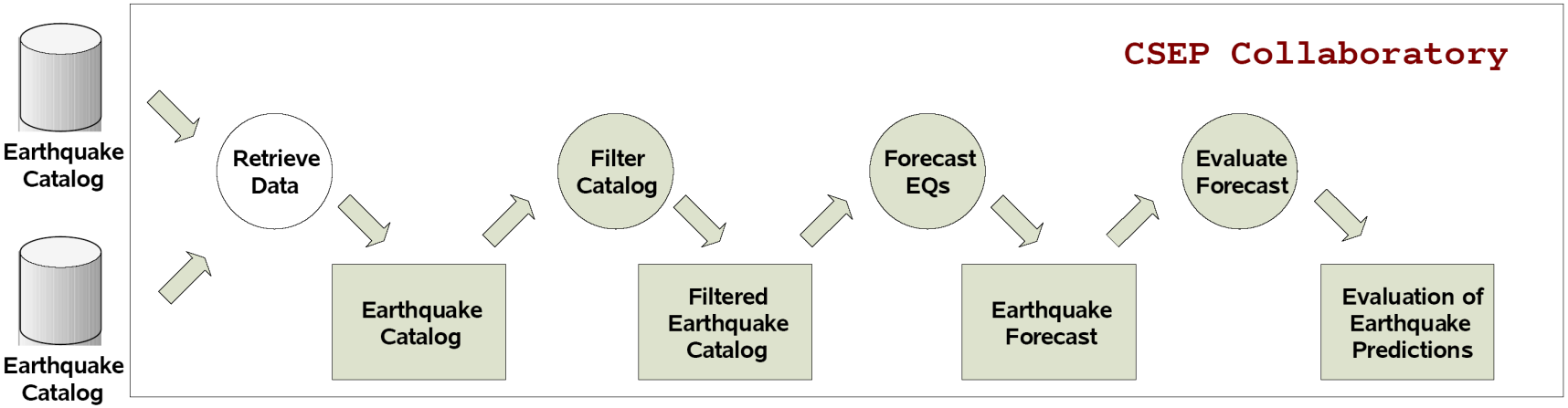
Brick by Brick approach



Jordan et al. (2007)

JRA 2 Progress

- Testing center development, in collaboration CSEP/SCEC/NZ, on the way (Schorlemmer, Euchner, Woessner, Cocco, …)



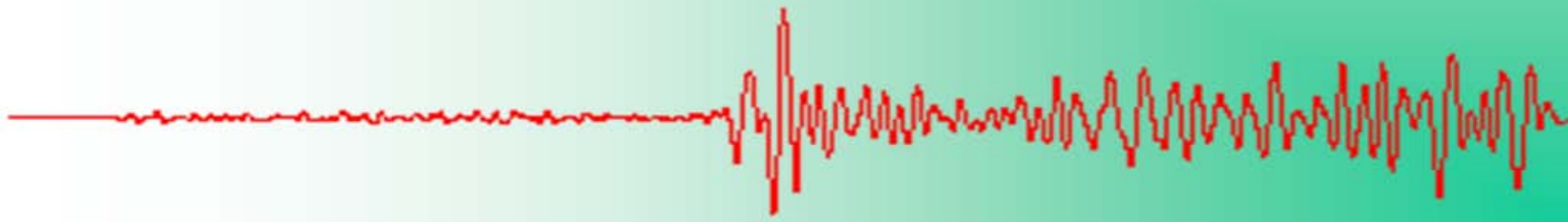
NERIES - TA
Transnational Access

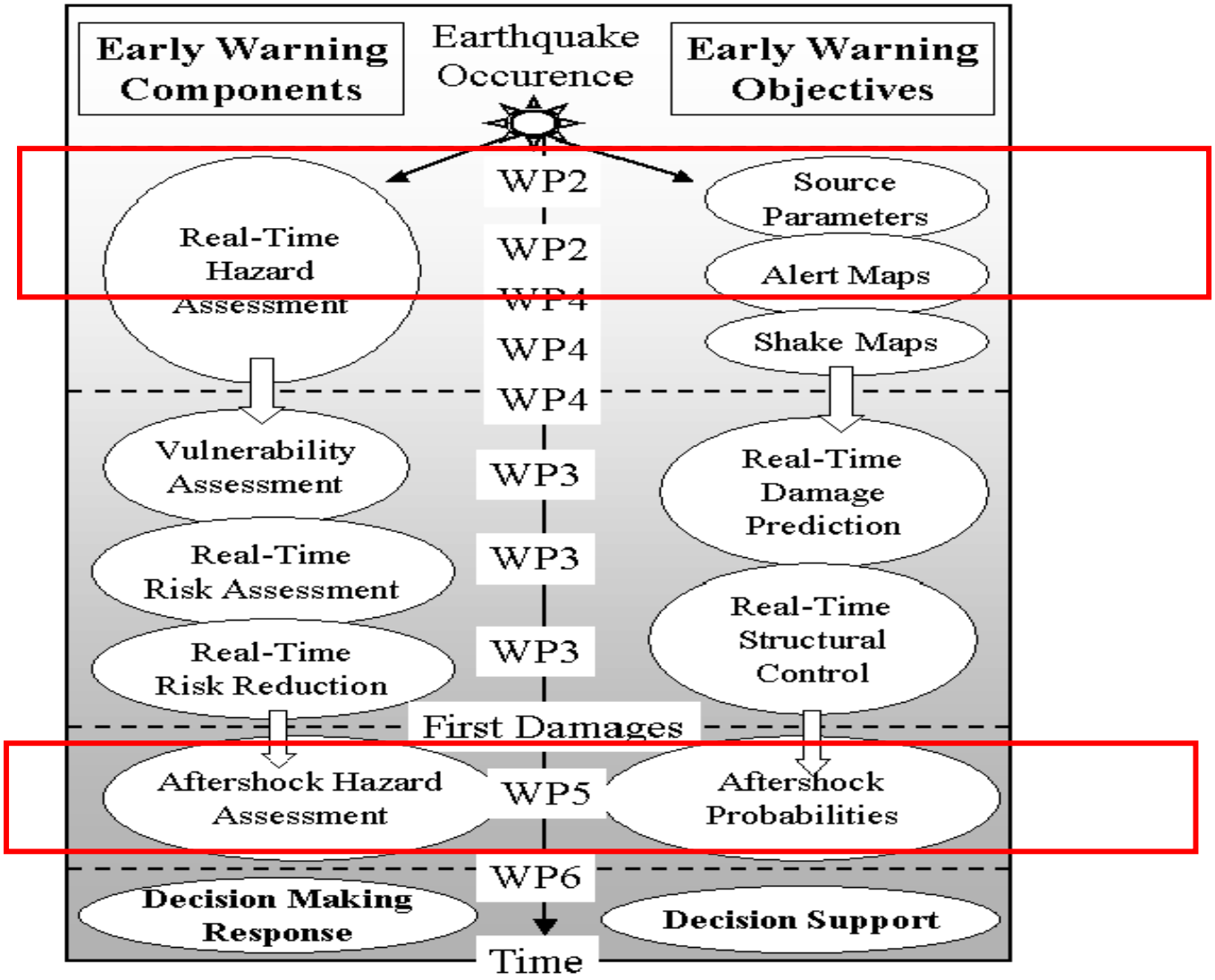
More than 60 grants to visit and collaborate with these institutions:

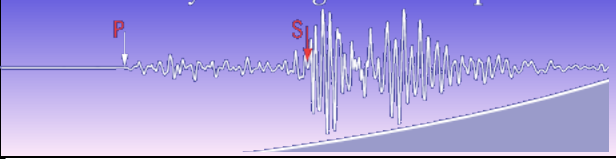
TA1 – Dense broadband network seismology
SDSN/ETHZ (Christophersen)
TA2 – Verification seismology
CEA/DASE (Feignier)
TA3 – Historical seismograms
SISMOS (INGV/Michelini)
TA4 – Array seismology
NORSAR (Schweitzer)
TA5 – Instrumentation test facility
CONRAD (ZAMG/Lenhardt)

SAFER: Seismic Early Warning for Europe

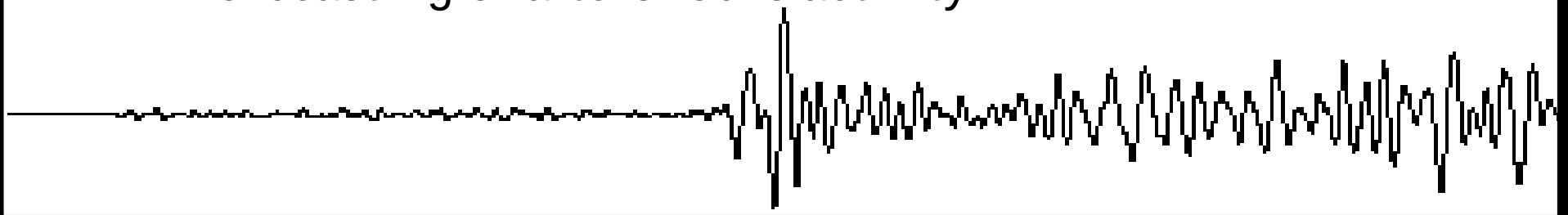
SIXTH FRAMEWORK PROGRAMME
CALL: FP6-2005-Global-4
SUSTAINABLE DEVELOPMENT, GLOBAL CHANGE AND ECOSYSTEM
PRIORITY 6.3.IV.2.1: Reduction of seismic risks
Budget: About 3.5 MEuro
Start: June 15 2006

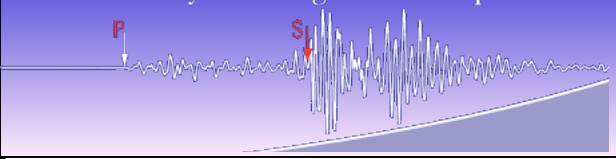



Early Warning Components
Earthquake Occurence
Early Warning Objectives
WP2
WP2
WP4
WP4
WP4
Real-Time Hazard Assessment
Source Parameters
Alert Maps
Shake Maps
Vulnerability Assessment
WP3
Real-Time Damage Prediction
Real-Time Risk Assessment
WP3
Real-Time Structural Control
Real-Time Risk Reduction
WP3
First Damages
Aftershock Hazard Assessment
WP5
Aftershock Probabilities
WP6
Decision Making Response
Decision Support
Time



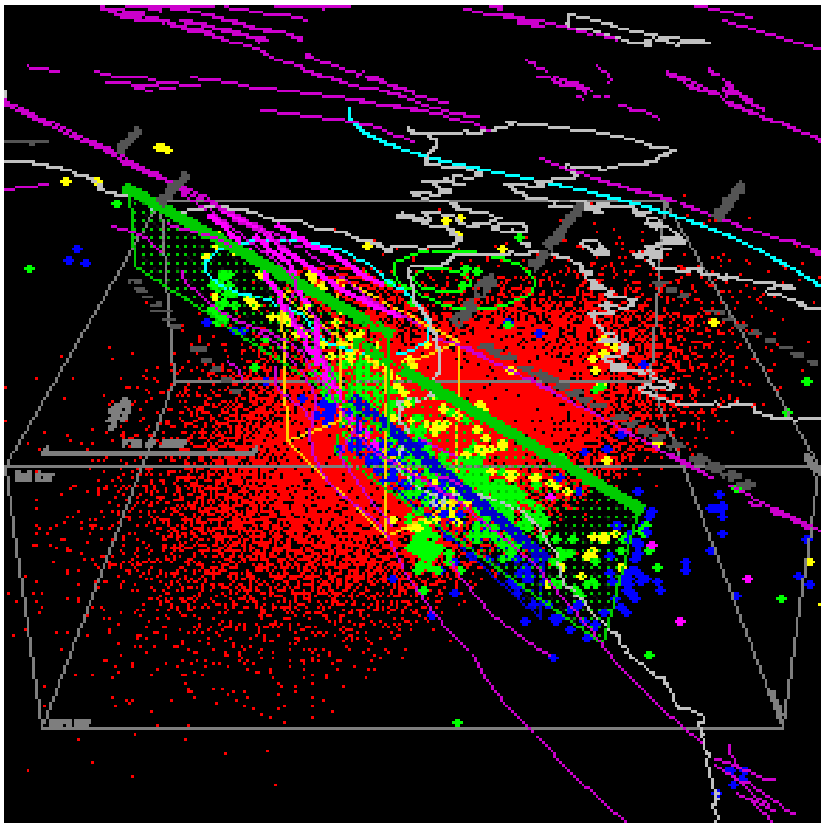
- To calibrate and regionalize the parameters needed for real-time aftershock hazard assessment in several test locations with a diverse tectonic setting
- To improve our understanding of the physics of aftershock occurrence and triggering, and derive and test more accurate forecast models.
- To develop and test robust implementation schemes that can operate specifically with the highly heterogeneous data sets available after a mainshock. This should allow for the rapid integration of data from temporarily deployed networks.
- To develop, train and test an expert system for the forecasting of aftershocks activity.





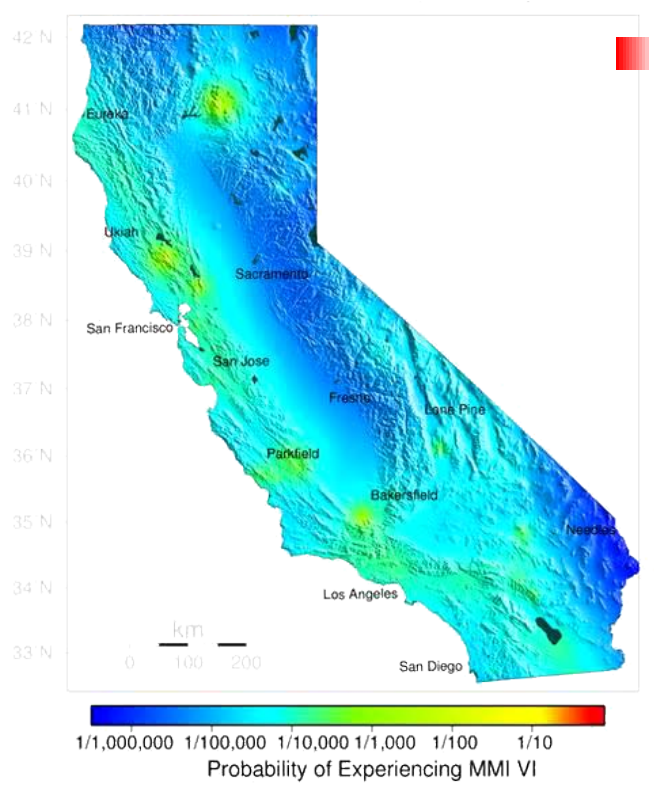
NERIES ←→ SAFER ?

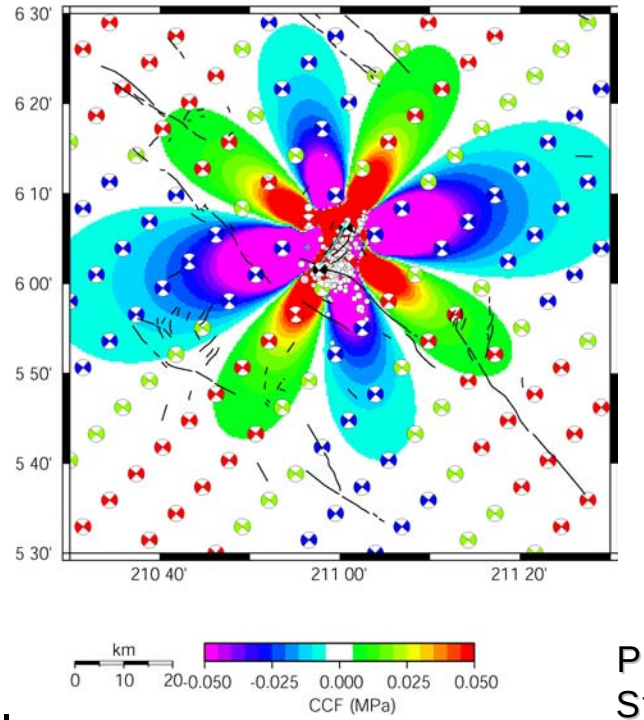
- Ideal synergies: NERIES addresses background models, regional scale and testing, WP5 local scale clustering models and physical models of aftershocks.
- Decision: Close collaboration, e.g., joint workshops of JRA 2 and WP 5.



- Improving Task Force Data Processing Capabilities (GFZ, Sobiesiak, Hainzl).

Improving and Combining Statistical & Physical Models of Aftershocks

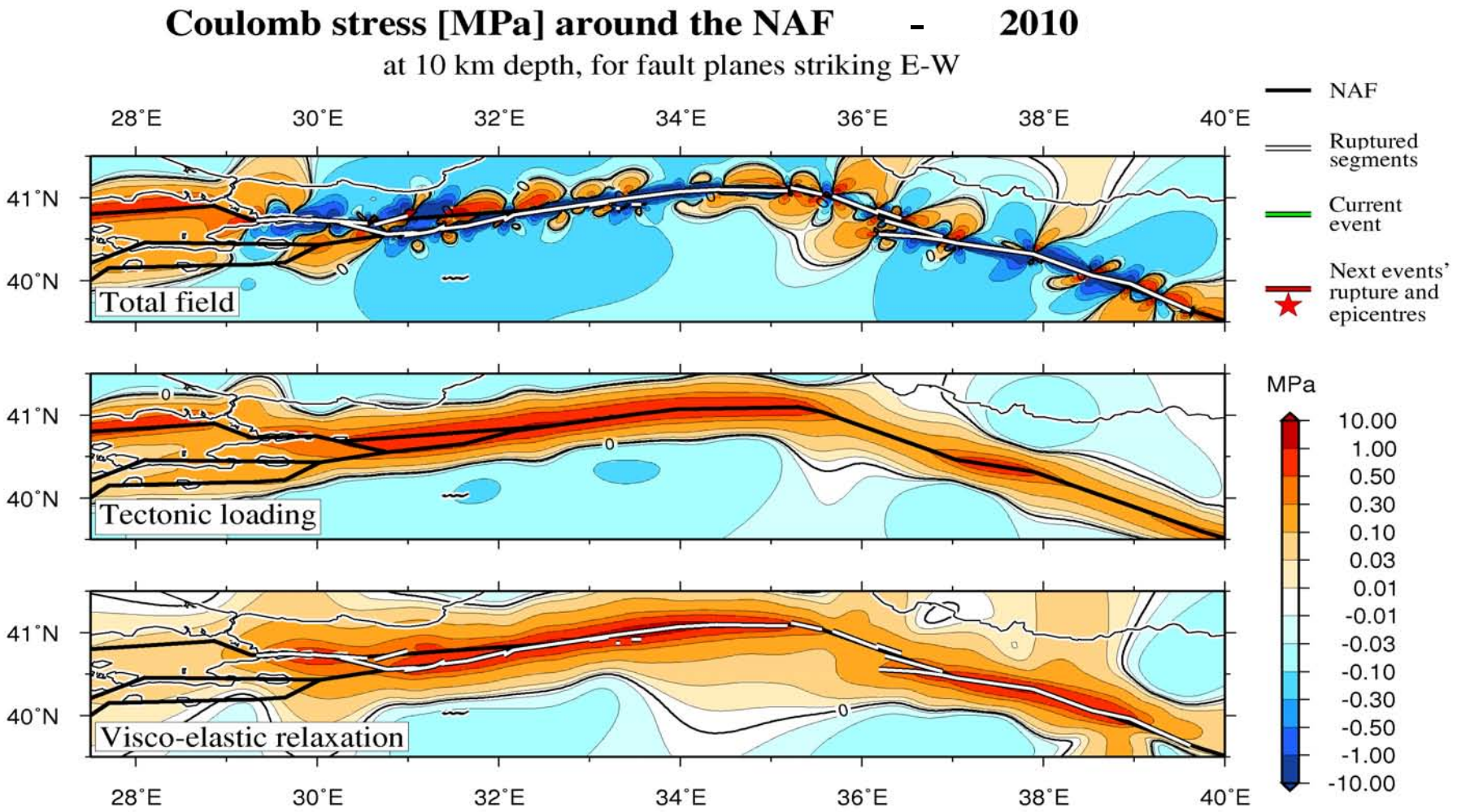




STEP,
Gerstenberger et al

PRESAP,
Steacy et al

North Anatolian Fault Zone, Turkey



Roth et. al, GFZ

What can SAFER & NERIES do for us ?

- Much improved data and data access for Europe.
- Testable models for (parts of) Europe, stationary as well as time-dependent ones.
- A regional + several local CSEP testing centers
- Software (ZMAP++, ...), data standards (QuakeML) documentation and web portals.
- Exchange of people and ideas, workshops, knowledge transfer.
- Data quality assessment (QC, e.g. Mc).

Challenges

- Delays due to the challenge of finding personnel
  → Almost done !
- Maintaining focus and momentum in a distributed environment
  → Even more meetings ?
- Data quality and availability in Europe
  → Request to EMSC/NERIES for a real-time European 'composite catalog' formulated during this meeting ?

What is missing ?

- Opportunities for young people (i.e. PhD students to get involved !

  → SEISTRAIN proposal

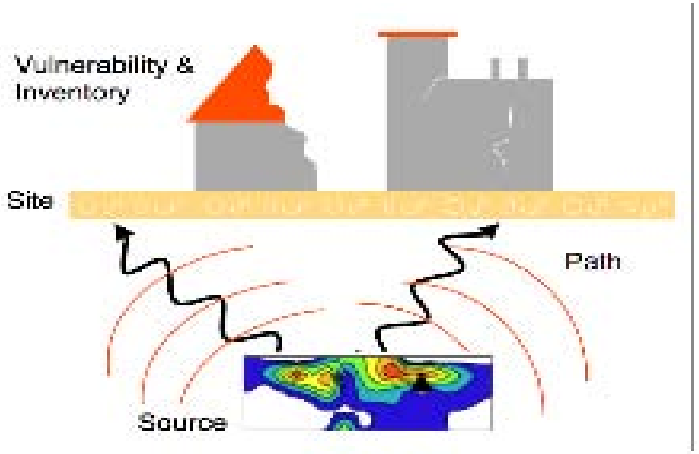
  EU Marie Curie ITNs (Initial Training Networks) on time-dependent hazard assessment (submitted May 7, 2007).

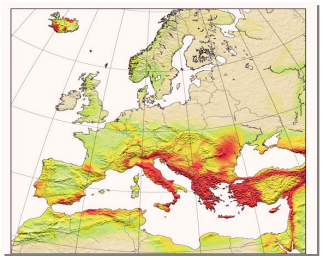
  If funded, it will support about 25 PhD fellowships and post-doc opportunities, summerschools etc.

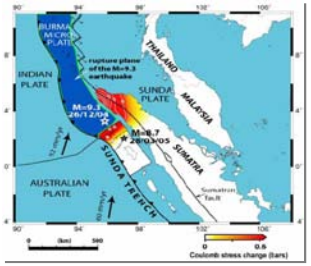
What is missing ?

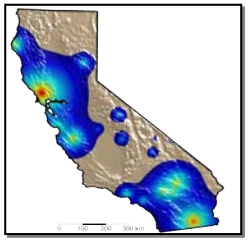
ETH (lead)
U. Ulster
INGV
Potsdam Univ.
U. Edinburgh
Kandilli

AMRA/Naples
LMU Munich
U. Savoyen
+ industry
+ pan-European partner

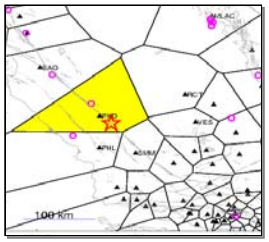


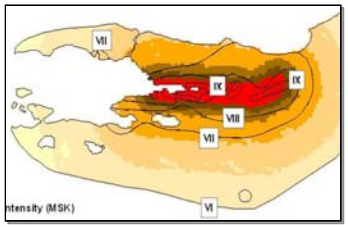






Earthquake





Long-term Hazard mapping & scenarios

Long-Term Forecasting

Short-Term Forecasting

Early Warning

ShakeMaps & Rapid Loss Assessment

decades years days seconds 0 seconds hours


Swiss
Seismological
Service
ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich
Thanks for listening – please stay tuned & enjoy the workshop !