European Training Programmes in Computational Seismology

Heiner Igel, LMU Munich and the SPICE Team

- European Funding Schemes
- The SPICE Research and Training Network (2004-2008)
  - Format and Implementation
  - Successes and failures
- The QUEST initial training network (2009-2013)*

* Contract pending

Science Funding in the EU

7th framework programme

Cooperation 32.400 MEuro	People 4.800 MEuro
Ideas 7.500 MEuro	Capacities 4.200 MEuro

The Human Mobility Programme: Marie Curie Research Training Networks

People
4.800 MEuro

- Open to any topic (also methodology!)
- At least 3 countries involved (multi-partner)
- Funding for PhD and postdocs (no infrastructure or support staff) + admin (7%)
- Researchers from *outside* host country
- 4-year programme
- ~90 proposals in „Environment"
- Funding likelihood 5-10%

Seismic Wave **P**ropagation and **I**maging in **C**omplex Media: a **E**uropean Network

Scale

- 14 institutions (INGV Rome, IPG, ENS Paris, Oxford, Utrecht, Munich, Bratislava, Prague, Oslo, Dublin, Naples, Hamburg, OGS Trieste, ETH Zurich)
- 14 postdocs and 14 PhDs
- 5.5 MEuro Budget

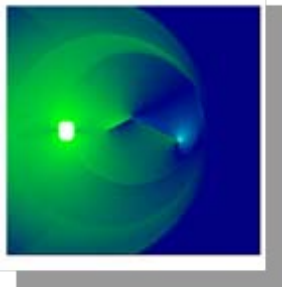
Rationale

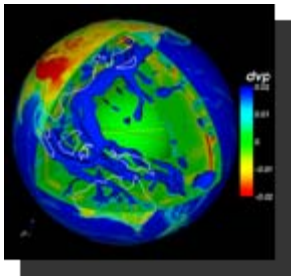
- Connect groups developing and using 3-D wave propagation and rupture *on all scales*
- Train researchers in numerical methods and high-performance computing
- Push Earth science in the fields of wave propagation, earthquake rupture, and associated fields
- **Create a library with software, training material and benchmarking**

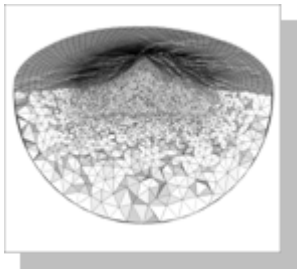
SPICE Implementation

5 Task Groups (TG meetings with invited guests)

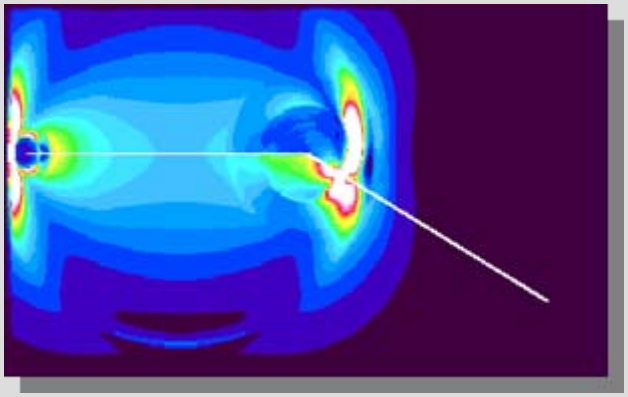
- Small Scale (reservoirs, volcanoes)
- Local Scale (rupture, seismic hazard)
- Planetary Scale (global wave propagation, tomography)
- Numerical Methods (tetrahedral grids, time-frequency analysis, hybrid methods)
- Digital Library

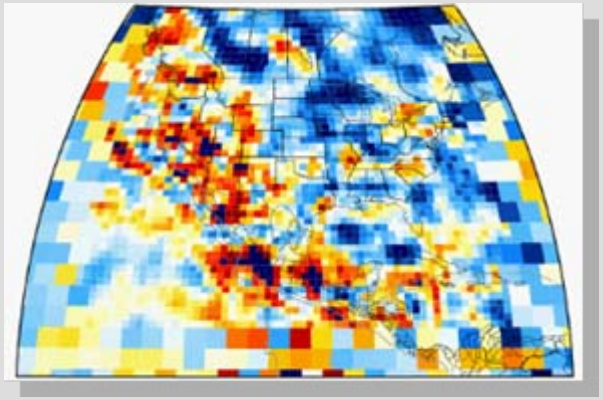


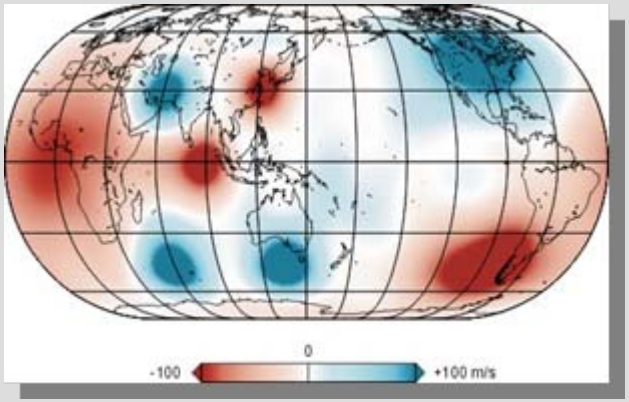


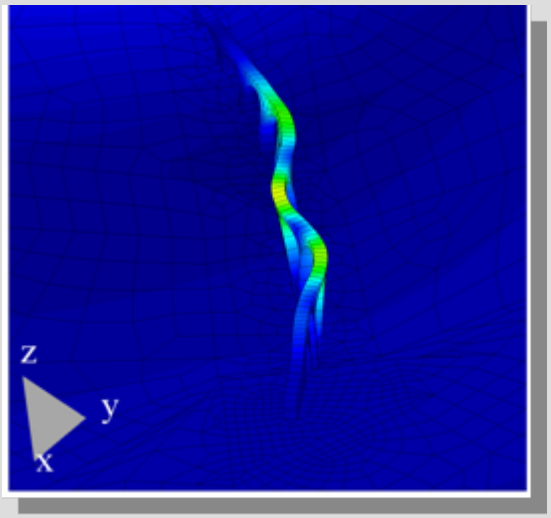


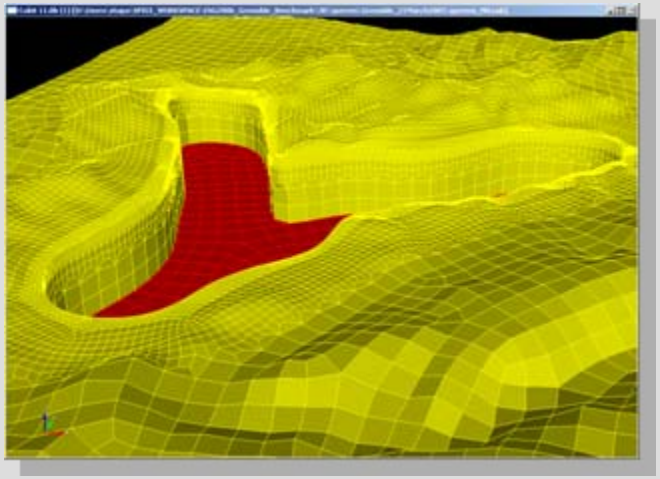
SPICE Science

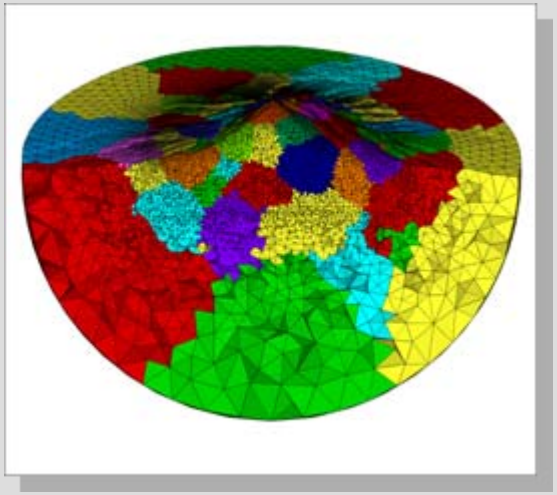




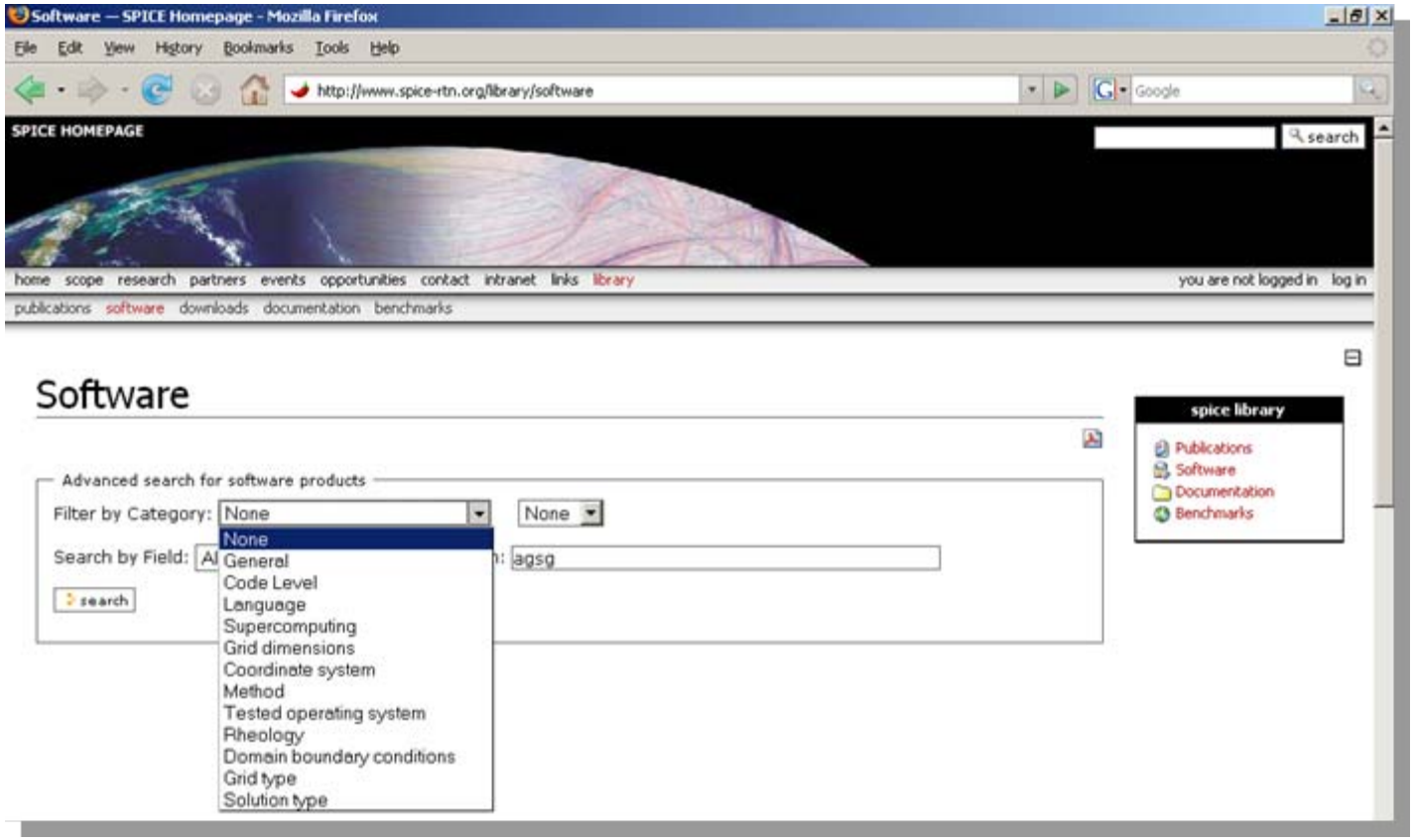






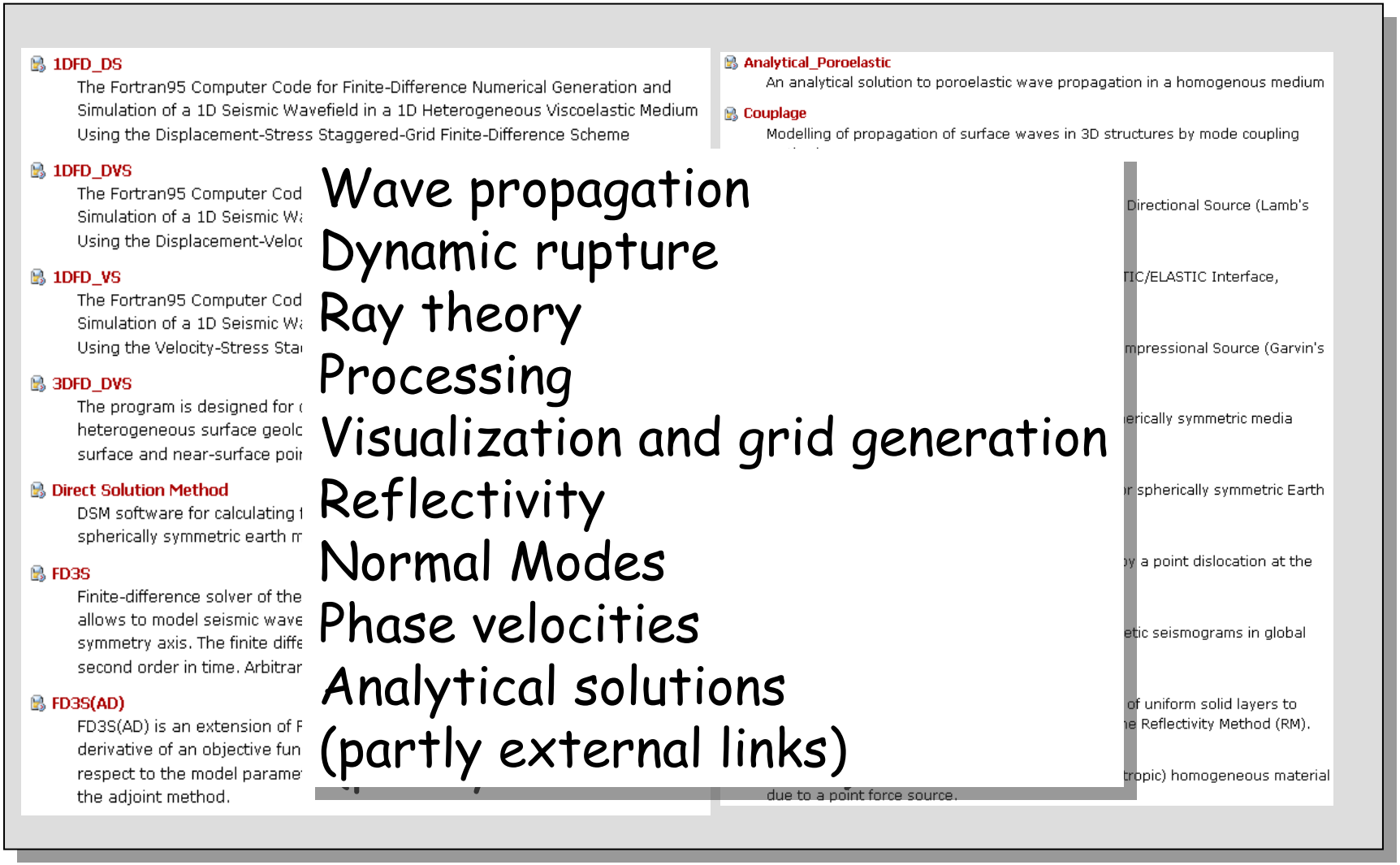


SPICE Digital Library

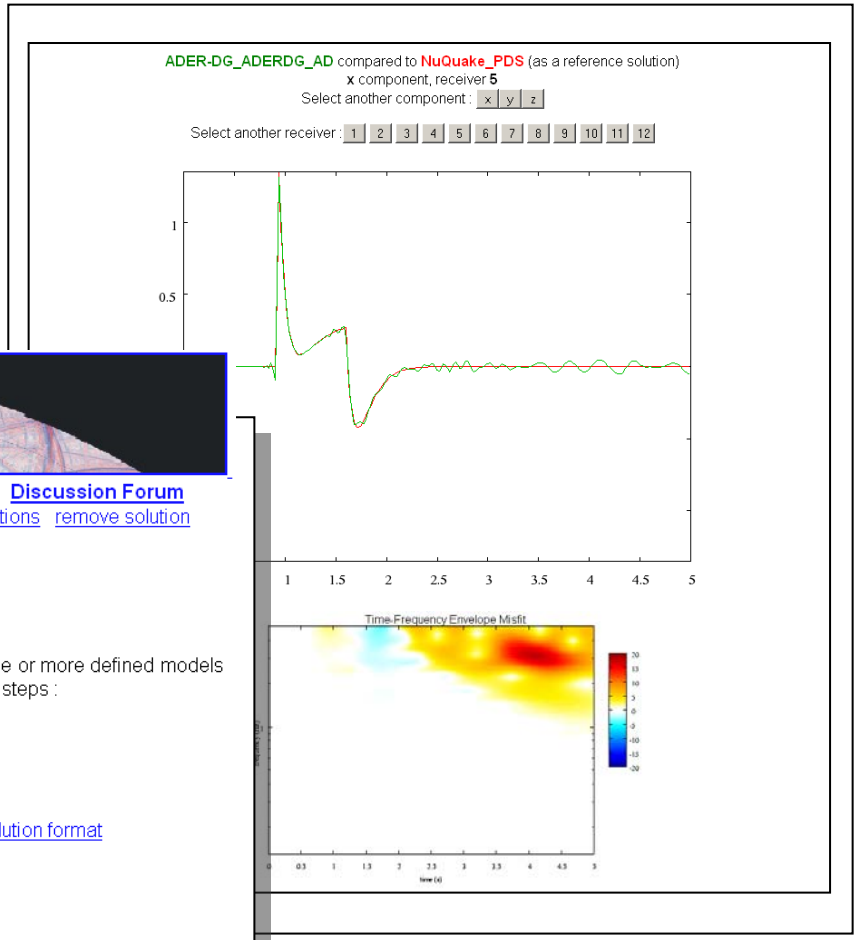


www.spice-rtn.org

SPICE (heroic) codes



Interactive Benchmarking



Home | About the SPICE Code Validation | Discussion Forum

registration | model | solution format | upload your solution | view/compare solutions | remove solution

The SPICE Code Validation

home

To participate in the SPICE Code Validation (that is, calculate your solution for one or more defined models and compare it with solutions submitted by other participants), please follow these steps :

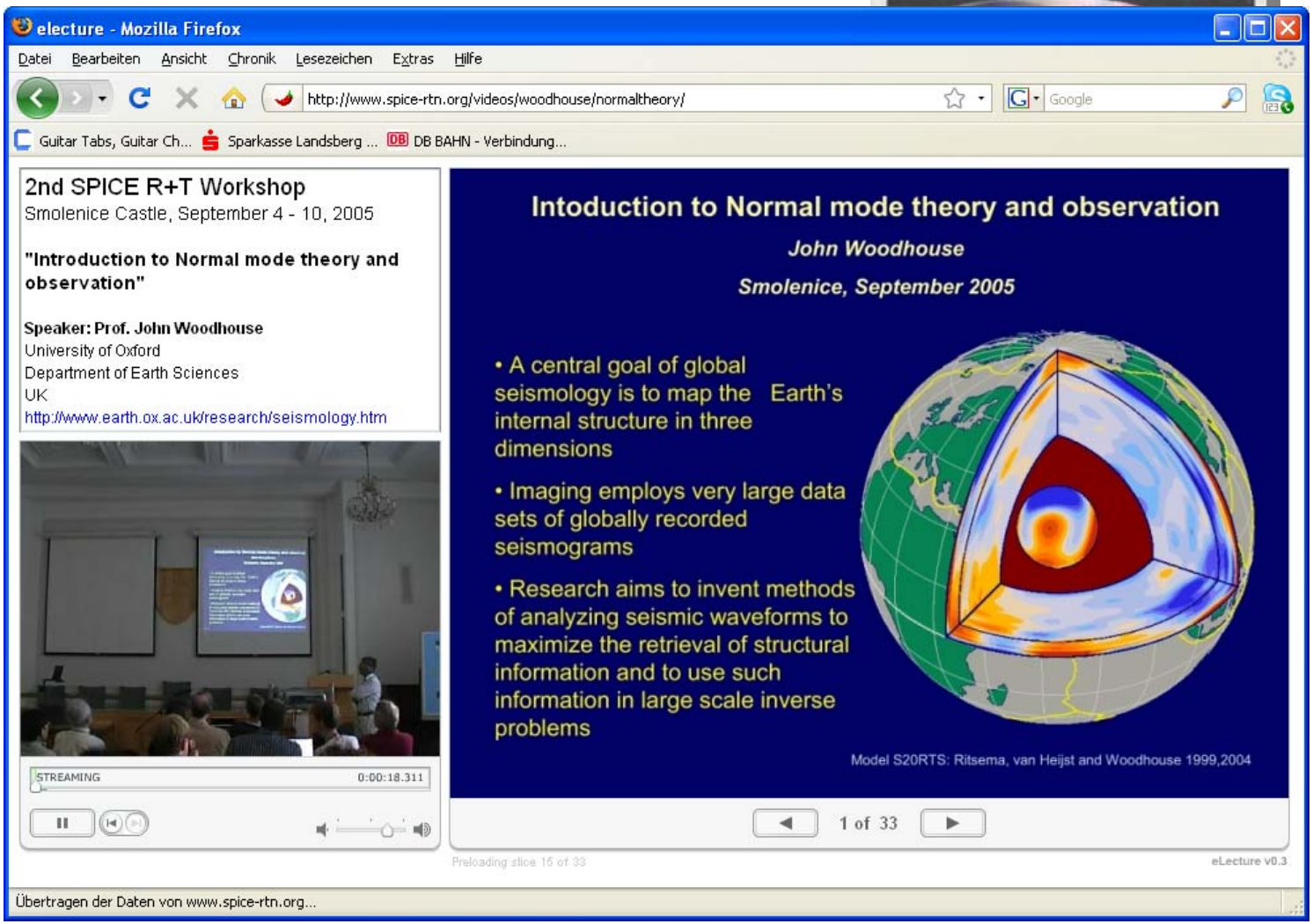
0. go to registration (do it only once for each method)

1. choose and download a model description
2. perform a computation with your code
3. convert your solution into a format appropriate for upload - see solution format
4. upload your solution (your solution will be stored on the server)
5. view/compare solutions

comments and suggestions to spice.cv@nuquake.eu

Moczo et al., 2006

MARIE CURIE RESEARCH TRAINING NETWORK



Workshop Sequence - Philosophy

Research

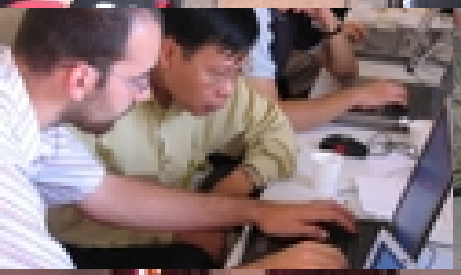
Training

2004 Wave propagation Physics – Numerical Methods

2005 Large scale applications – parallel computing

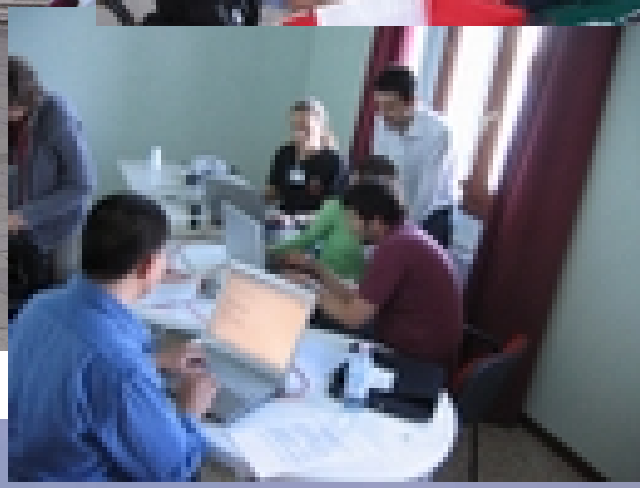
2006 Inverse problems

2007 Links to other fields (acoustics, helioseismology, oceanography)

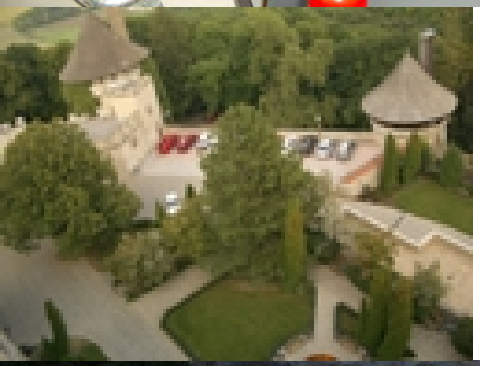





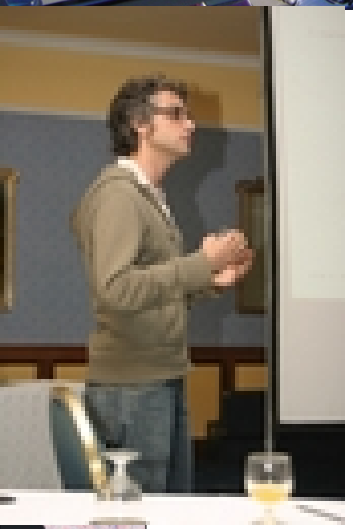





Venice 2004
Workshop I

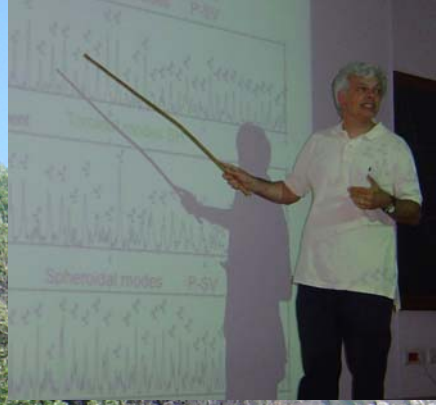


Smolenice 2005
Workshop II



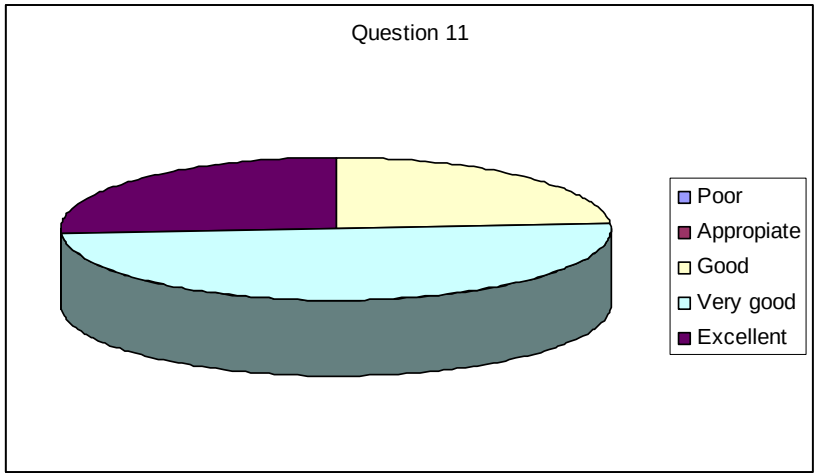
Kinsale 2006
Workshop III

Corsica 2007
Workshop IV



Student Evaluation

Venice



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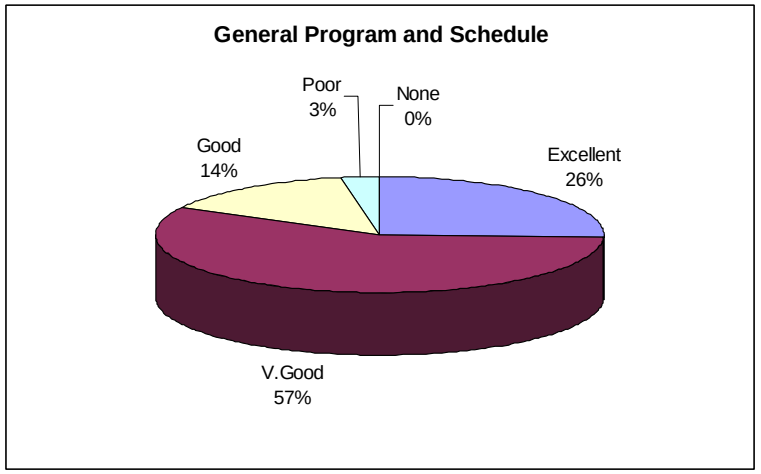


SPICE Publications (2004-2007)

Papers in reviewed journals:

Total (inv. PhD or postdoc): 178

At least two partners: **13**

Presentations: ~1000 (90 invited)

SPICE Exchange visits (2004-207)

Promised:	2520
Actual:	400

„Each researcher funded through the project is expected to spend 2-3 months per year at other participating institutions"
(SPICE contract)

SPICE – conclusion

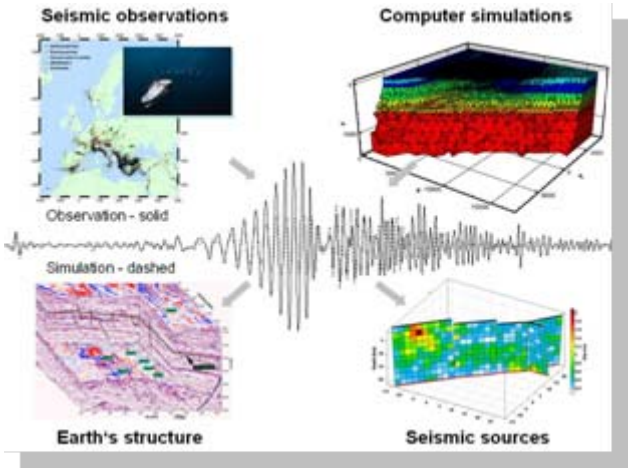
- It **did** create the lasting network we wanted
- SPICE was more than SPICE (a lot of other institutions/resarchers could be involved)
- A wonderful way **to spot talents**!
- It **did** create careers!
- We created standards, there is less duplication
- Amazing *chemistry* between network researchers
- **Individuals** drive it, get the right ones!
- SPICE benefitted from CIG

Problems:

- Very hard to fill 28 positions in a field like computational seismology!
- The right workshop **format**, the right **venue**
- Level of training partly too ambitiuous (maths)
- Computational practicals have to be very well prepared to work!
- Unfortunately no support for infrastructure (or software engineering, it has to come from elsewhere)
- Relatively little mobility between partners (is it necessary?)
- No sustainability because project can not be prolonged

QUEST

QUantitative estimation of
Earth's sources and **ST**ructure



15 partners, 19 PhDs, 7 postdocs

Industry involvement was the key to success!

e.g., Schlumberger Cambridge, **IBM Research Centre** Zurich, SpectraSeis Zurich, Microseismic Inc, Houston, **GOCAD, DEISA**, **Munich Centre for Advanced Computing (MCAC)**

Project start Sep-Dec 2009.

… and hopefully continuous good collaborations, joint workshops with CIG!

Thank you!