EPOS
European Plate Observing System

EUROPEANPLATEOBSERVINGSYSTEM

Research Infrastructure and e-science for Data and Observatories on Earthquakes, Volcanoes, Surface Dynamics and Tectonics

www.epos-eu.org

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What is EPOS ?

EPOS is a **long-term integration plan** that aims to create a single sustainable, permanent and distributed infrastructure that includes:

- geophysical monitoring networks
- local observatories (including permanent in-situ and volcano observatories)
- experimental laboratories in Europe

EPOS will give open access to geophysical and geological data and modelling tools, enabling a step change in multidisciplinary scientific research into different areas

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EPOS: the Partnership

- EPOS presently includes 13 countries: Italy, France, United Kingdom, Switzerland, Germany, The Netherlands, Denmark, Turkey, Greece, Norway, Iceland, Romania, Portugal
- New entries in the near future: Spain, Israel, Czech Republic
- Two international organizations involved: ORFEUS and EMSC (they will favour open access & new entries)

  http://www.orfeus-eu.org/
- Several countries have direct links to their national roadmaps, but others are looking for an official commitment
- New contacts are ongoing with several other countries (Ireland, Sweden, Slovak Republic, Poland); others will start soon.

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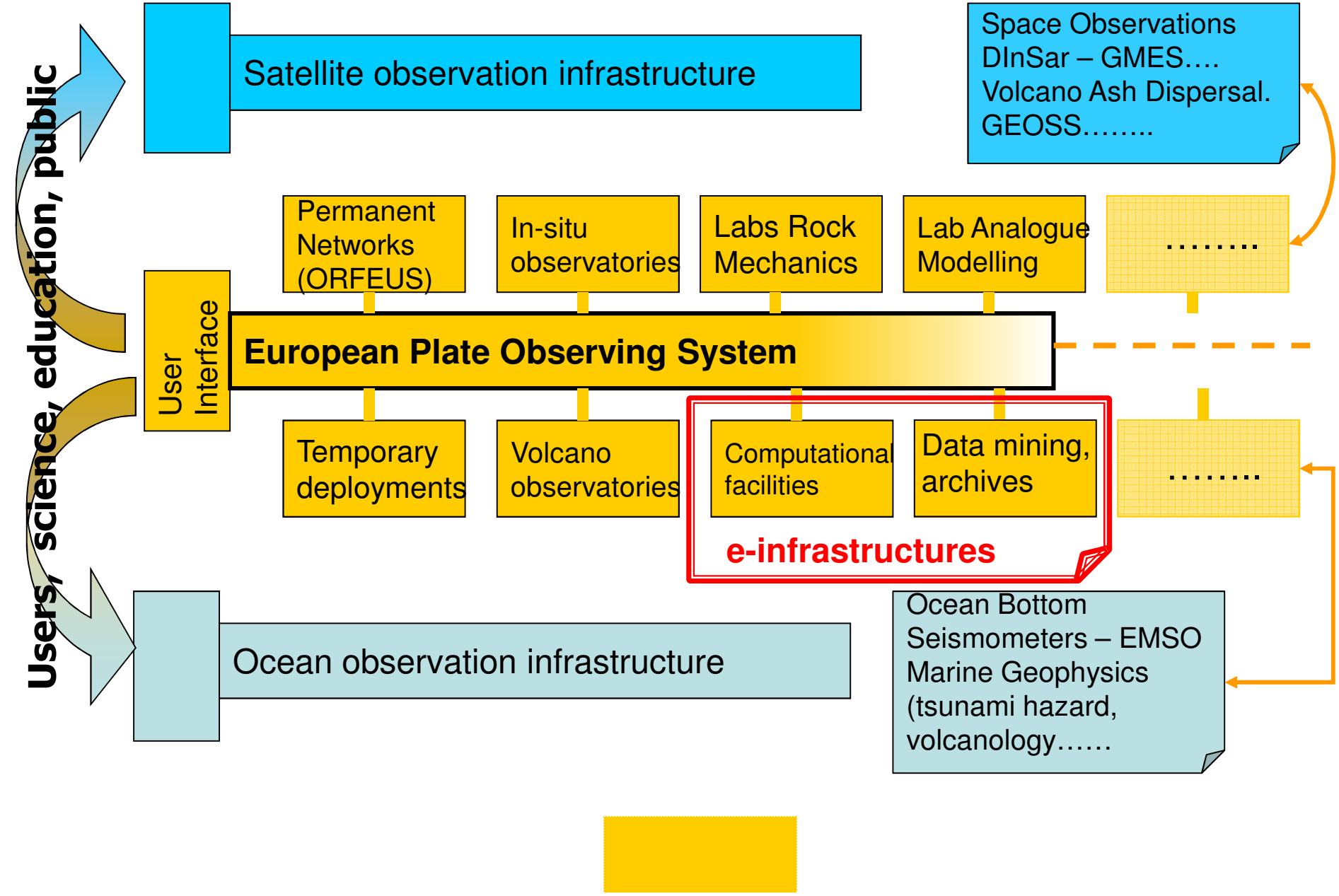
EPOS infrastructure concept



Rationale

The need for e-infrastructures

- Gigantic Earth Science Data Volumes require the development of new approaches to web-based data and model exchange, data mining and visualization

  (500 seismometers yield ≈17 GB/day and 6.2 TB/year)

- "Virtual Earth Laboratory" - Hypothesis testing will make increasingly use of high-performance simulation technology of Earth's dynamic behaviour

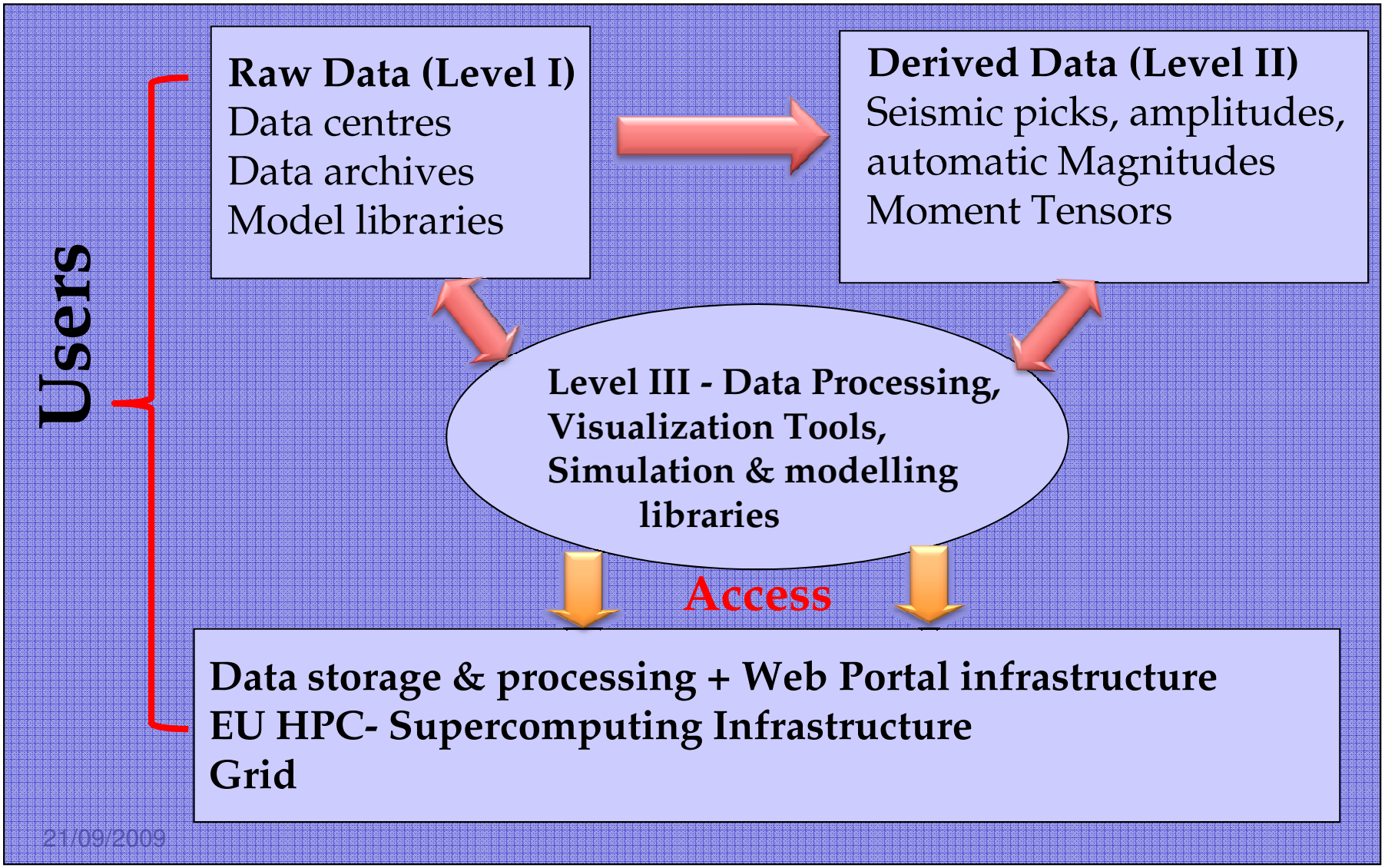
- "software is infrastructure" – scientific simulation technology needs to be adapted and maintained for wide use by the community

Data & Simulations

The need for e-infrastructures

- "data rich" Elements: Web-based superstructure linking Earth Science Data Centres, standardize multi-disciplinary data and model exchange
- "cpu rich" Elements: Simulation and processing technology needs to be professionally engineered, linked to the European High-Performance Computing infrastructure and the scientific data infrastructure

EPOS: data life cycle



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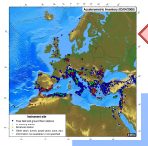
EGI
NGI

VERCE

PRACE
HPC

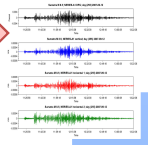
EPOS USER INTERFACE

NERIES
NERA



EPOS

- Monitoring Networks
- Instruments
- Multidisciplinary data
- Surface dynamics data



EPOS

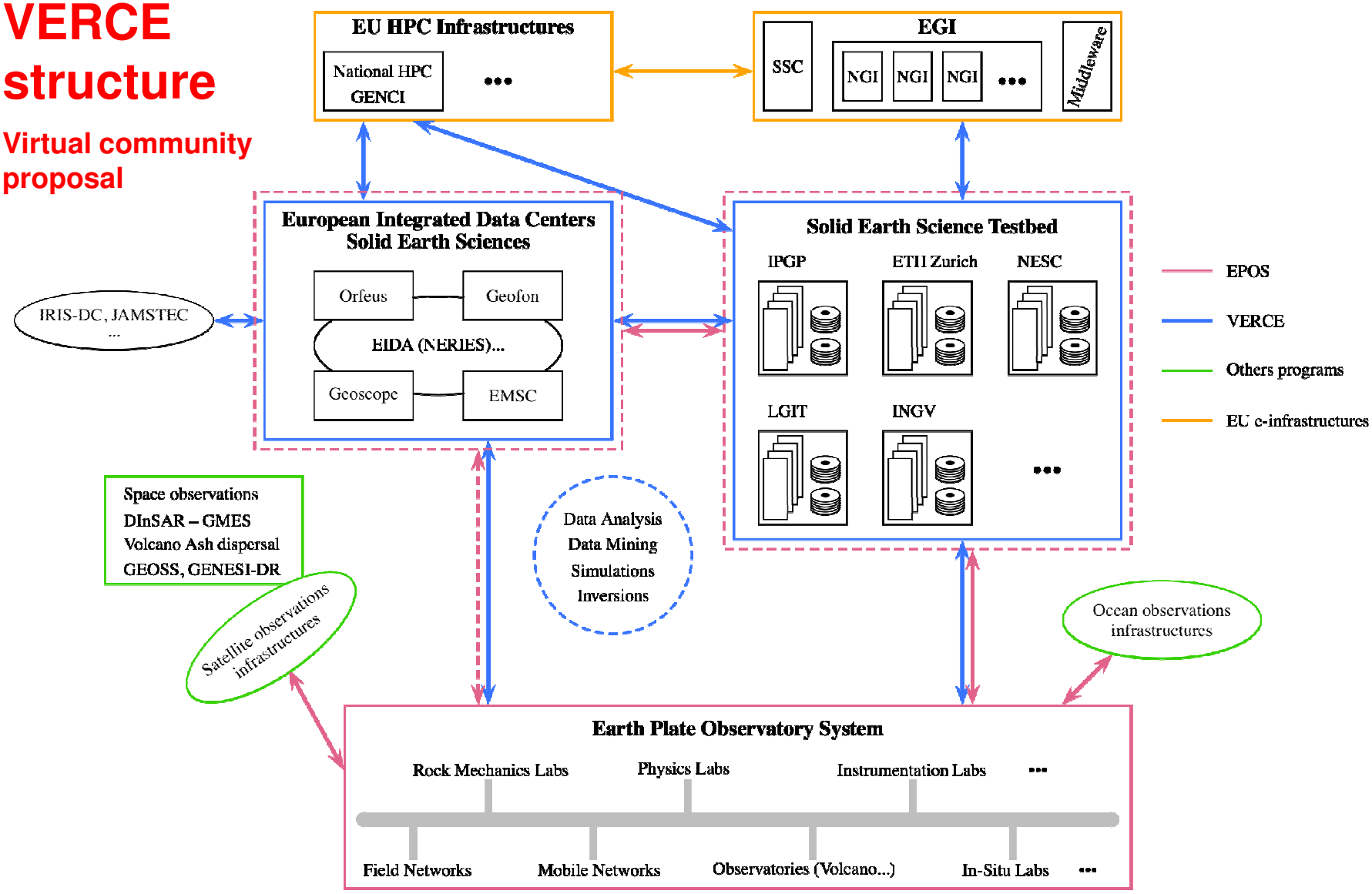
- Data Archives
- Data Centers
- Data processing
- Modeling tools

EPOS

- Rock Physics Lab
- Analog Lab
- Technological challenges
- Pilot projects

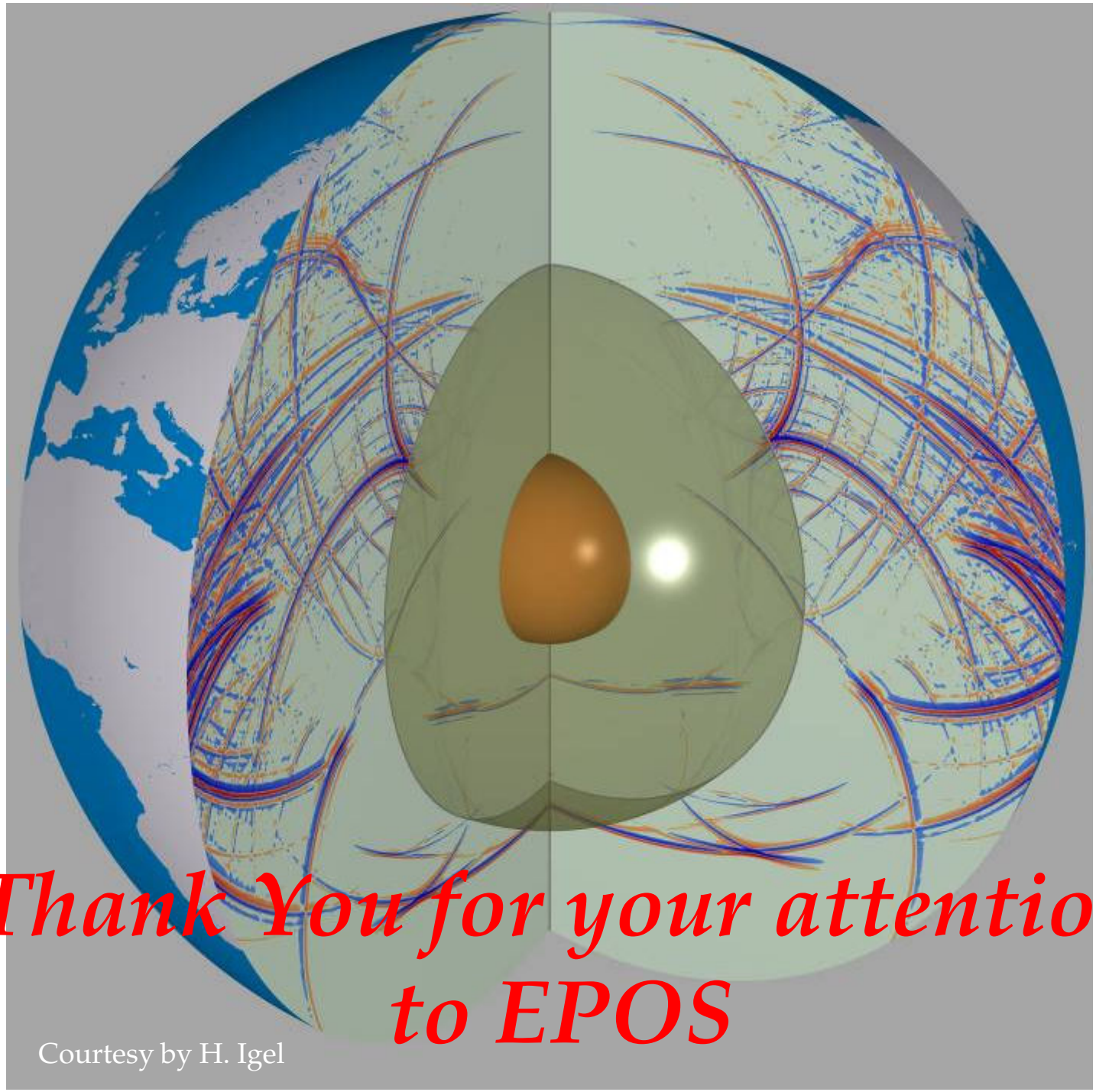
VERCE structure

Virtual community proposal



IMPACT ON USERS

- EPOS will attract a potential user community in Europe and worldwide with particular attention to Mediterranean countries
- The user community will come from different disciplines (multidisciplinary RI)
- User community contributed to the EPOS conception phase by participating to international programs and projects (NERIES, EXPLORIS, Topo-EUROPE, SPICE,..)
- EPOS will be accompanied by a coherent training program for the Earth science user community starting a competitive fellowship program dedicated to young researchers (Marie Curie, ESF, ERC, ITN,…)



Thank You for your attention to EPOS

Courtesy by H. Igel

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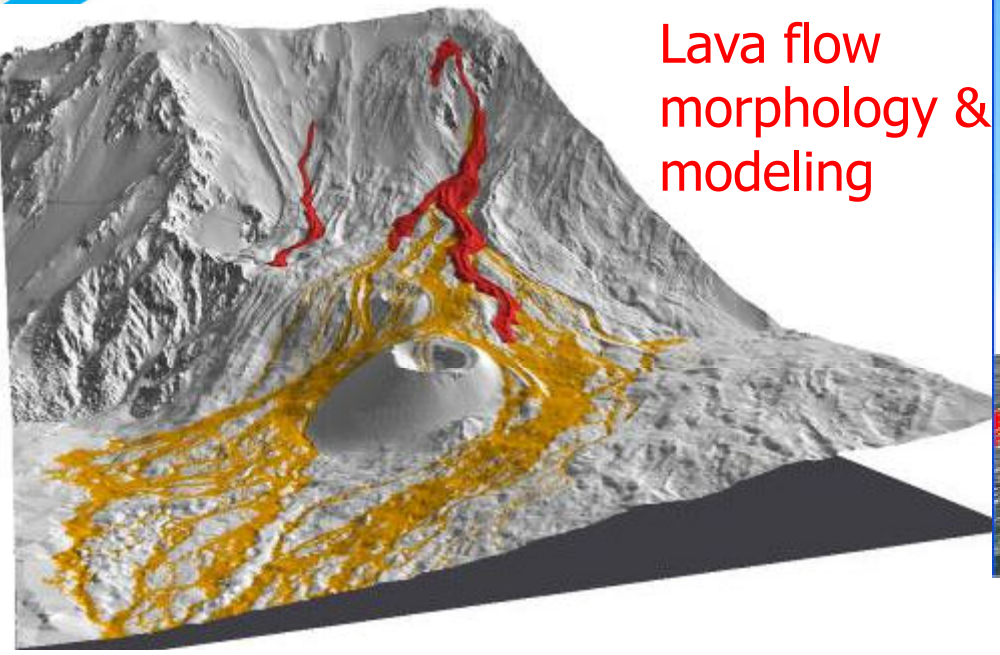
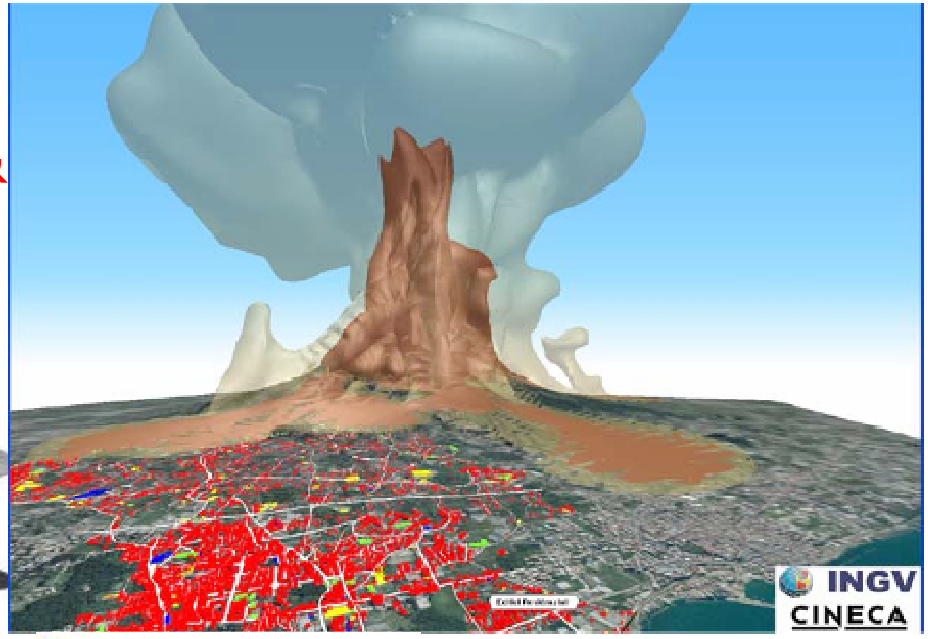
Science Case

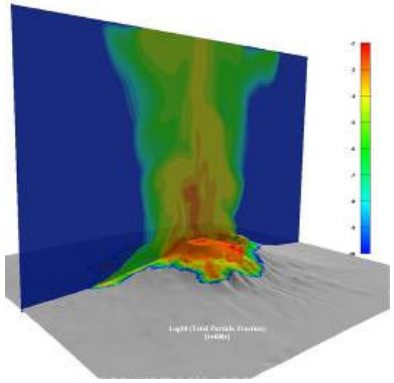
- impact on society Volcanic hazard & risk

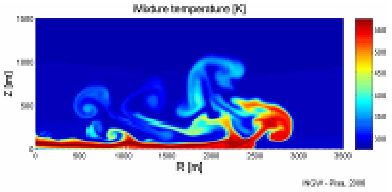


Lava flow morphology & modeling



A laser scanning survey of the summit topography of Etna forms the basis for quantifying with a probabilistic model lava flow hazard areas





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EPOS: the Concept

EPOS intends to integrate five existing core elements within one cyber infrastructure to realize:

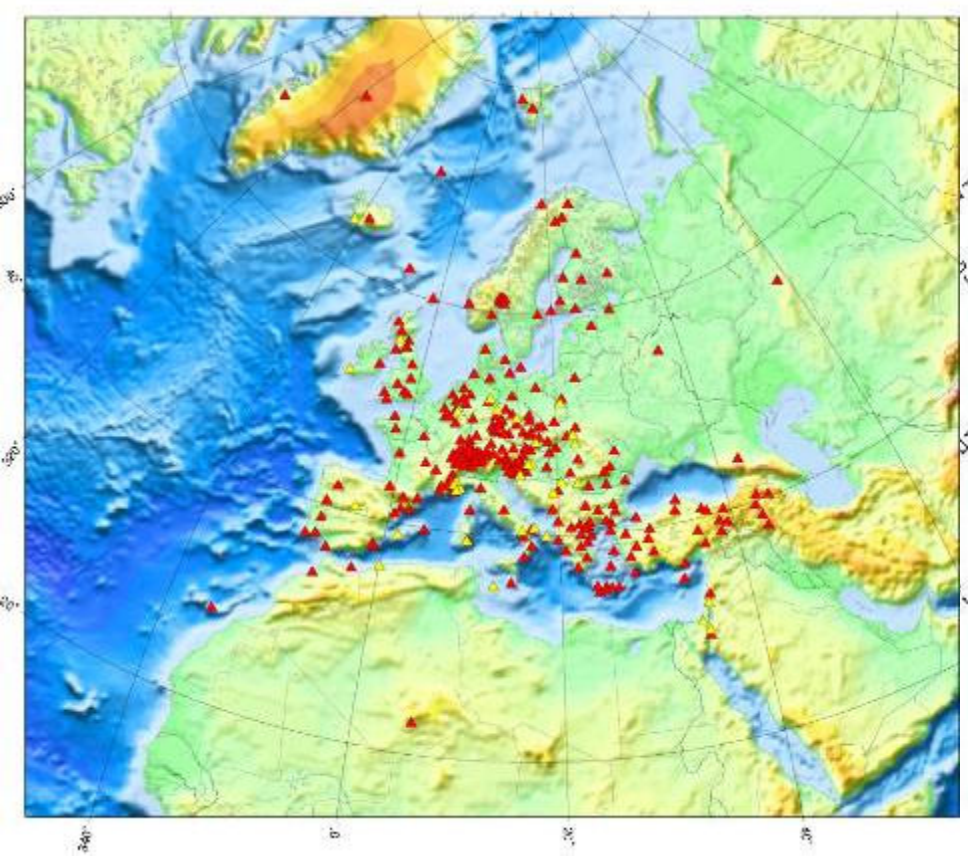
- A comprehensive geographical distributed observational infrastructure consisting of existing permanent monitoring networks on a European scale (seismic, geodetic, ….)
- Dedicated observatories for multidisciplinary local data acquisition (volcanoes, in-situ fault monitoring experiments, surface dynamics, geothermal and deep drilling experiments, geological repositories)
- A network of experimental laboratories creating a single distributed research infrastructure for rock and mineral properties (like the ESF THYMER, TECTOMOD and EU-Login networks)
- Facilities for data repositories as well as for data integration, archiving and mining (including different solid Earth data, such as geophysical, geological, topographic, geochemical)
- Facilities for high performance distributed computing consisting of cyber infrastructures for collaborative computing and large scale data analysis

www.neries-eu.org

seismology

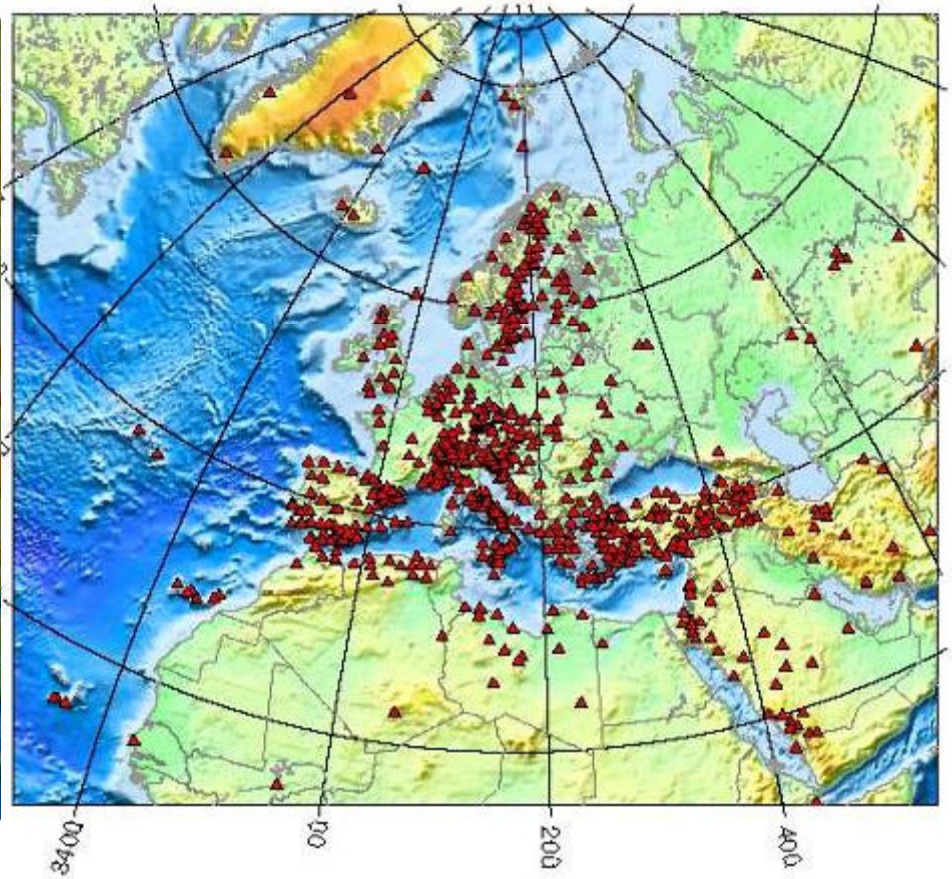
ORFEUS/NERIES:
Virtual European Broadband Seismic Network

VEBSN December 2008



VEBSN ~ 320 stations March 2009

BB stations in Europe beginning 2009



≈1000 operating BB stations in 2009

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EPOS IS TIMELY

- There exists:
  - ➔ a unique opportunity to join efforts in coordinating and integrating multi- and cross-disciplinary activities and data
  - ➔ the concrete possibility to plan future investments in RIs relying on solid existing infrastructures and a coordinated perspective
  - ➔ a shared vision to rely on e-infrastructure investments and to propose new initiatives
  - ➔ the necessity to face challenging problems through new shared programs and projects

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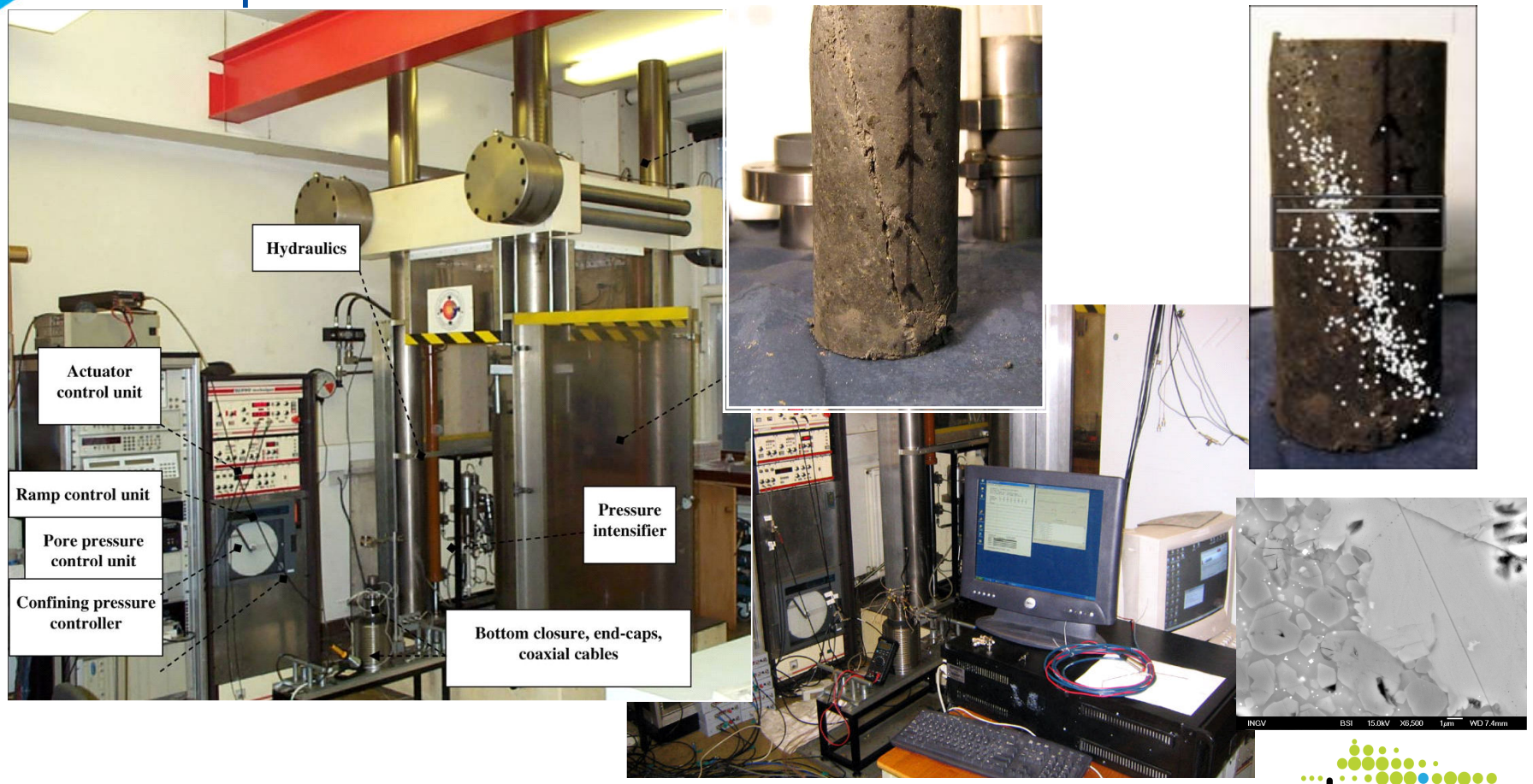
Science Case

- facing technological challenges: rock physics Laboratory Experiments



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