# Expanding the Earth Science Community

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*NA4 Activity*

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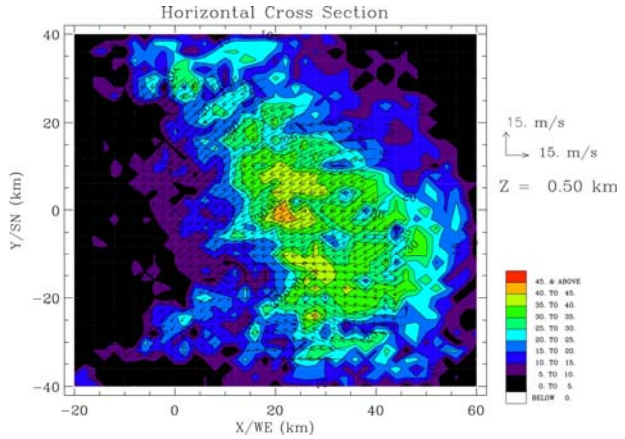
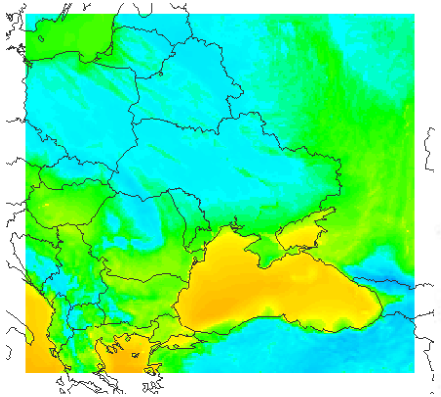
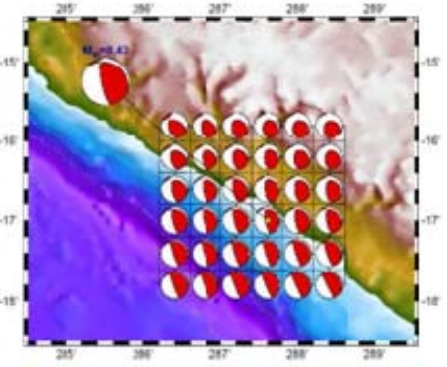
www.eu-egee.org

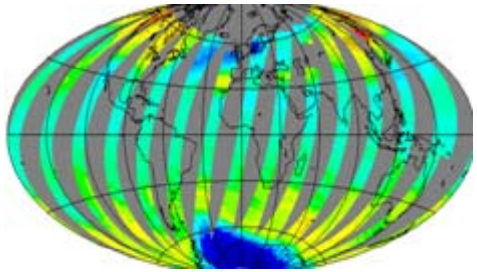
Information Society and Media

# ES Domain





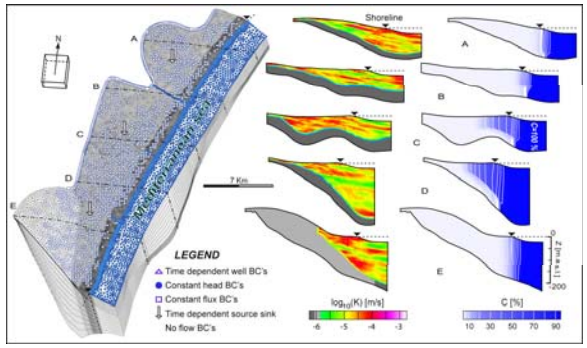


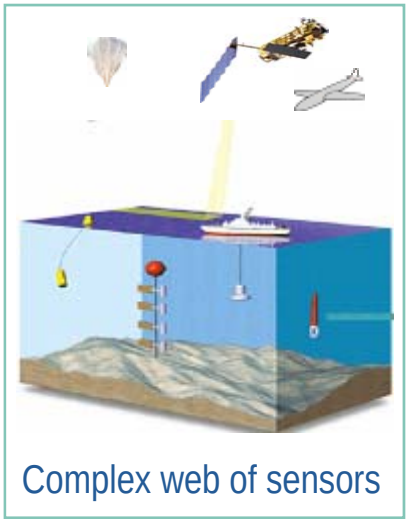
Large variety of ES disciplines

Observations

Sensors

Simulation & model



Complex web of sensors

# ES Community

Common needs and characteristics:

- Easy access to data and metadata
- MPI Jobs
- Monte Carlo simulation
- Geographical Information Services
- Ensemble of simulations (Meteorology, Climate)
- Parametric jobs
- Exploitation of large data sets, data fusion and data mining
- Production of large data sets
- Same models used for different applications
- Near Real-time jobs

# ES GRID COMMUNITY

- So far in ES there are
  - many interesting individual applications.
  - Most of applications use the grid for the computing resources available. It is also important as it is the only way to get results in a reasonable time delay.
  - Few collaborative applications.

- Grid is "collaboration" and "community".

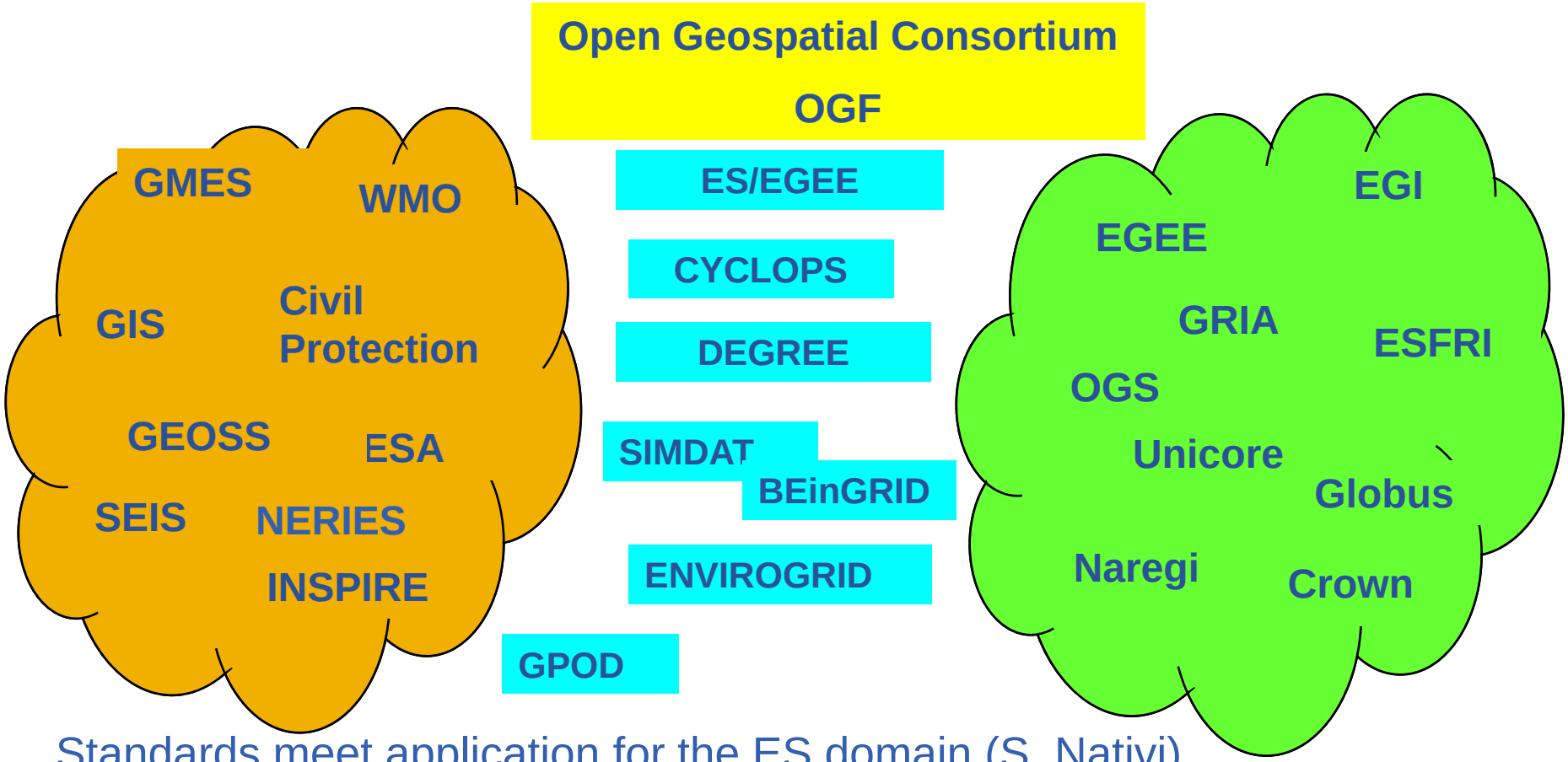
  Number of Services offered depend on the collaboration among the community

- ES applications spread in different VOs
  - ESR (earth Science Research), EGEODE (expanding Geosciences on Demand), SEEGRID
  - Cyclops, EELA, IBERGRID….

# GRID ES Community

Each ES discipline has been organized since several decades or more

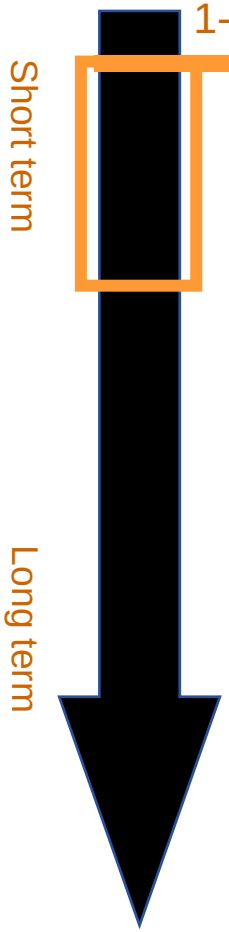
•Data format, Data exchange, standards, web services, data centres, computing resources, architecture




Standards meet application for the ES domain (S. Nativi)

# Grid ES Community Building

Roadmap defined by the DEGREE (Dissemination and Exploitation of Grids in Earth sciencE) FP6 EU project (2006-2008) (http://www. eu-degree.eu




Short term

- To build the ES-Grid community and to significantly reduce the gaps towards a basic Grid infrastructure suitable for the needs of ES community
- Porting of applications from different ES disciplines throughout a wide community, initially for dissemination and moving gradually to more applications that produce useful results

*… facilitate, within 2 years, the development and availability of shared data, metadata, and products commonly required across diverse societal benefit areas …*

*… sharing of information and full decentralised access (as of 2009)…*

*… metadata available for spatial data; discovery and view services operational,the EC establishes and runs a geo-portal at Community level*

# GRID ES Community Building

- **Role of the ES cluster**
  - **to enable new applications/experiments**
  - **ES domains to use the EGEE environment**
  - **make life easier for today ported applications**
  - **Provide tools useable by more than one application**
  - **Provide a more general framework for a larger range of applications**

  **A catalyst for ES Grid community building**

- **SSC in EGI**
  - One SSC could
    - increase the interaction and collaboration among teams
    - Facilitate the expertise sharing
    - New services offered

# Applications

- **Question to be discussed for each collaborative project:**

  **Where is the limit of the collaboration :**

  - on one hand scientific and technical collaboration
  - on the other hand scientific or technical competition

# ES Grid developments

- **Interface with data centers**
  - Access to several European satellite data centers by using the interface –Genesi-DR (MoU with EGEE) (R. Cossu et al.)
  - GOME scenario for the test

- **The climate-G testbed: towards a large scale data sharing environment for climate change (S. Fiore et al.) (demo)**
  - CMCC, IPSL, SCAI, NCAR, Univ. of Reading, Univ. of Catania and Univ. of Salento

- **Workflow**
  - see presentation of V. Tran (IISAS, SK) on Monday afternoon
  - Advanced workflow management system
  - Dynamic workflow construction based on user's request
  - Personal assistant helps users to choose best options during workflow construction

# MPI Jobs

- **MPI**
  - Benchmark done by IPGP
    - Too long restitution time, often several hours, for a job requesting 4 CPUs and 30min execution time
    - Non Homogeneity of MPI installation (recommendations of the nTGC wG – Dublin Dec 2006) mainly not followed)
  - Cluster heterogeneity (processors, architecture)
  - New WG on MPI

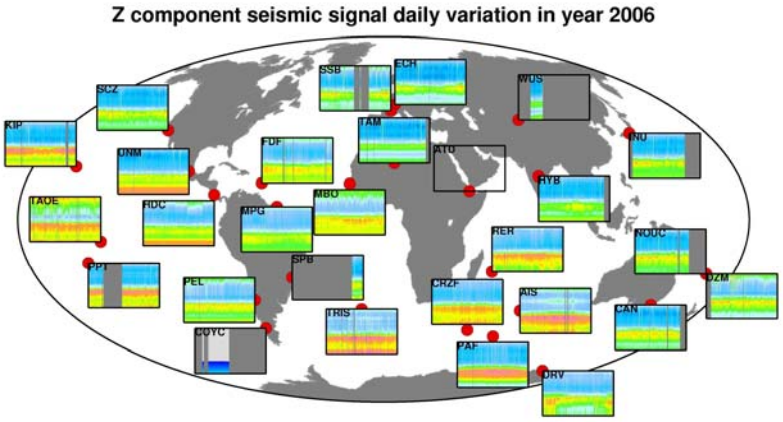
# Exploitation of large data sets

**FOOTPRINT :pesticide risk assessment and management in Europe**

- **FP6 EU project BRGM + 14 partners – 9 countries**
- **Creation of a large database including 4 millions scenarios (climate, soil, pesticides….)**
- **Successful results with the first 1 millions scenarios run on EGEE.**

## Geoscope

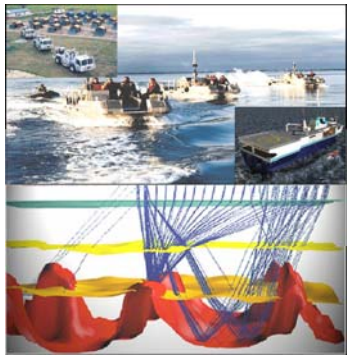
- 28 seismological stations and data cente
- 25 years of data
- Processing of the whole data set on EGEE for different applications
  - Noise
  - Polarization



# Earth Science Applications

## Sharing Algorithm

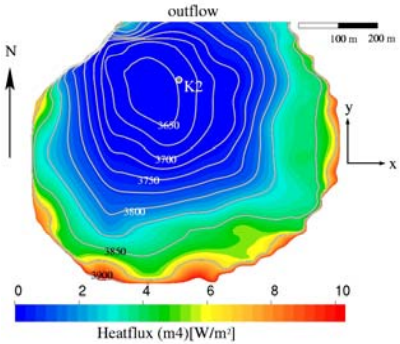
### GEOCLUSTER
CGG-Veritas



Partners:
VO - EGEODE

software platform for seismic data processing, imaging and reservoir characterization

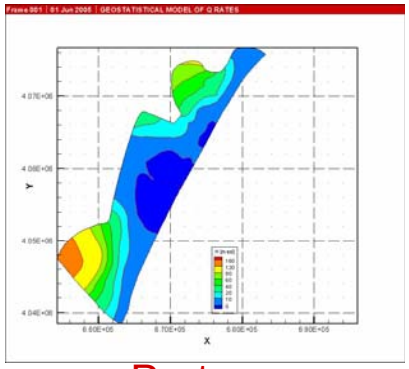
### ELMER
CSC - Finland




Partners:
VO- ESR

Physical models of fluid dynamics, structural mechanisms, electromagnetics, heat transfer and acoustics

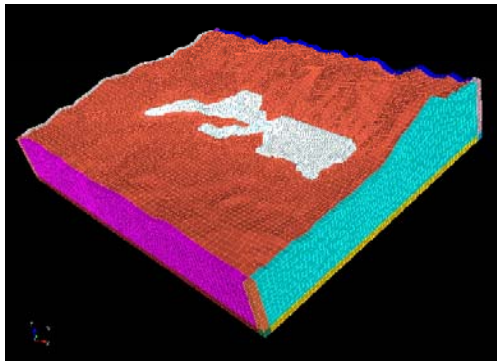
### CODESA-3D
CRS4 -Italy



Partners:
EUMEDGrid

Probabilistic map of sea water intrusion in coastal aquifer of the mediterranean basin- Monte Carlo simulations

### 3DSEM_UNSTRUCT
IPGP- France



Partners:
EELA

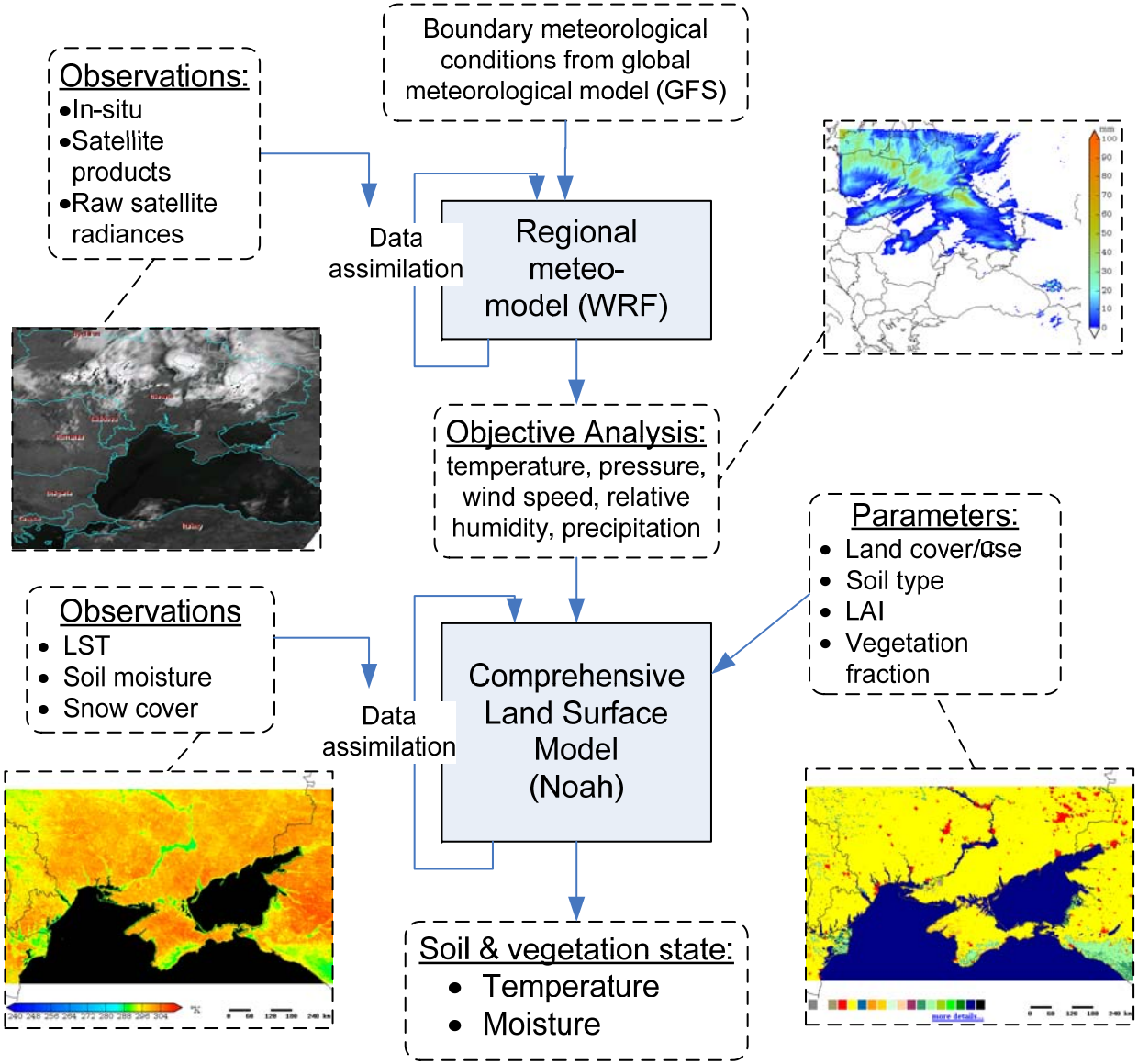
3D seismic waves Propagation in complex geological media on a local scale

# OGC Components

- From Cyclops project: risk management
  - G-FireStation: Fire simulation from desktop to Grid (A. Piña – Univ. Minho)
  - GALHTAIR: a platform dedicated to the flash flood in the south of France (V. Thiron et al., LGEI-IMAA)
- Flood in plain : N. Kussul, SRI – Ukrainia
- Integrated Grid workflow for mesoscale climate modeling and visualization - A. Polyakov (GCRAS)
- Envirogrid-Gridifying the Black Sea catchment to support its sustainable development (N. Ray Univ. Geneva)
- The climate-G testbed: towards a large scale data sharing environment for climate change (S. Fiore et al.)

# Application of WRF Model

- **Cascade**
  - WRF
  - NOAH LSM
- **Tasks**
  - drought monitoring
  - Vegetation stress assessment




N. Kussul, SRI, Ukrainia

# Meteorological model

- **Many times the meteorological model is only a piece of a workflow that includes observations, other models…**
- **MM5/WRF**
  - Weather multi-model and multi-analysis ensemble forecasting on the Grid (E. Floros – Grnet)
  - Integrated Grid workflow for mesoscale climate modeling and visualization (A. Polyakov (GCRAS) –presenter)
  - WRF for meteorology and land coverage (N. Kussul…)
  - Flood forecasting of a Danub river (L. Hluchy,V. Tran, IISAS, SK)
- **RAMS**
  - Meteorological and Air quality applications in RAMS integrated in Grid Environment (C. Spyrou et al., UOA)

# Meteorological model

- **CAM:**
  - Workflow management of the CAM global climate model on Grid (V. Fernandez
- **Aladin & MM5….**
  - Multi-scale atmospheric composition modelling for the Balkan region (K. Ganev,et al.,Geophys. Inst. Academia Bulgaria)
- **Nasa-GISS &Arpege &RegCM & Hycom: coupled models**
  - Global and regional scale Climate simulations (A.Romanou, Acad. Athens)
- **----------**
- **Carbon Dioxide flux Data computing and data Grid Warehouses using Grid techniques (HSU et al., China)**

# Solid Earth

- **CMT- earthquake characteristics retrieved from Geoscope seismograms a few times after its occurrence (Clévédé et al., IPGP, France)**
- **EGEODE usage overview in EGEE infrastructure G. Youinou**
- **Seismic Risk Assessment application framework C. Sener et al.**
- **The step-by-step computation of the energy flow and geo-massif fracture (I. Miklashevich, Belarussia)**
- **Enabling Numerical Modeling of Mantle Convection on the Grid (M. Kozlovszky et al., MTA SZTAKI, HU)**

# News

- **European Geosciences Union meeting Vienna (19-24 April)**
  - EGEE Booth
  - Grid sessions on Friday 24 –oral presentations in the afternoon, poster session in the morning
- **Special Issue in Earth Science Informatics –soon to appear**
  - 12 ES Grid papers
- **Special Issue in Journal of Grid Computing**
  - Possibility to submit a paper deadline: first half of July
  - Peer review of the papers
- **Publications**
  - Acknowledgement: This work makes use of results produced with the EGEE (www.eu-egee.org) grid infrastructure, co- funded by the European Commission (INFSO-RI-222667)."
  - Don’t forget the people that help you substantially for the application porting!