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NEWS

• The EPOS Mission Statement.

EPOS will integrate the diverse, but advanced European Research Infrastructures for solid Earth Science, and will build on new e-science opportunities to monitor and understand the dynamic and complex solid-Earth System. EPOS will identify existing gaps and promote implementation plans with other disciplines of environmental science to help solve the grand challenges facing the Earth and its people.

• Participation in EC - USA bilateral cooperation

EPOS participated in the Symposium on Research infrastructures organized by the American Association for the Advancement of Science (AAAS) that took place in Washington DC, from 17 to 21 February 2011 and contributed to the session: Multidisciplinary Research Infrastructures for Environmental Research. This symposium promoted a debate on future bilateral transatlantic cooperation in environmental research between EC and NSF.

• Collaborations with ICT and the e-science community

EPOS is participating in European initiatives for promoting collaboration between environmental research infrastructures and the e-IR/ICT community. In particular, EPOS is participating in:

- VERCE (VIRTUAL EARTHQUAKE AND SEISMOLOGY RESEARCH COMMUNITY IN EUROPE E-SCIENCE ENVIRONMENT)
- EUDAT (EUROPEAN DATA)
- ENVRI (COMMON OPERATIONS OF ENVIRONMENTAL RESEARCH INFRASTRUCTURES)

by Massimo Cocco | Director of Research INGV & EPOS team

Adding scientific and socio-economic value in Europe by integrating infrastructures for solid Earth science

Understanding the physical processes responsible for earthquakes, volcanic eruptions, landslides, surface and tectonic processes, and tsunamis requires the prompt and continuous availability of high quality data obtained through direct observations, and accurate predictive modeling of their temporal and spatial evolution. The ready accessibility of these data can accelerate the discovery of new Earth science results and novel uses for societal benefit. The in-situ monitoring and forecast modeling elements of the EPOS RI are essential for, among other things, earthquake, volcano, and tsunami early-warning systems and to aid disaster relief. Open access to the multidisciplinary research infrastructure will not only stimulate innovative research on Earth dynamics and processes leading to catastrophic events, but will lead to new developments in disaster prevention research, and is therefore invaluable for improving hazard assessment and forecasting.

The potential socio-economic impact of EPOS integration is exemplified in recent catastrophic events such as the Christchurch (M 6.3, New Zealand) and Tohoku (M 9.0, Japan) earthquakes as well as the Eyjafjallajökull volcano (Iceland). The Christchurch earthquake, for instance, occurred on a previously unknown fault outside the principal recognized seismic areas of New Zealand and caused more than 12 B\$ of direct damages in addition to the loss of electricity and water supply (more than 50%) to the city for several days. This situation parallels that of several tectonic areas in Europe, where recurrence times of destructive earthquakes are large and public awareness is generally not adequate. The eruption of the Eyjafjallajökull volcano in Iceland caused enormous disruption to air travel across western and northern Europe. The impact was broad, but could have been even worse. Moreover, whilst the devastating effects of the recent Japanese giant earthquake and tsunami on the population of that region are evident, their

impact on the world economy has still to be completely assessed (for instance in terms of energy supply, insurance and re-insurance companies, financial markets, etc...). In addition to its other effects, the Tohoku earthquake will affect Japan's and the world's supply of some minerals, at least temporarily according to a recently released U.S. Geological Survey report. Up to one-quarter of the world's iodine and one-third of Japan's cement production may be affected.

Understanding the processes, and forecasting and mitigating the effects of such events requires, a pan-European coordination of national facilities and expertise. The EPOS plan aims to integrate the currently scattered, but highly advanced European facilities into one distributed but coherent multidisciplinary Research Infrastructure enabling sustainable long-term Earth science research strategies and an effective coordinated Europe-wide monitoring facility for solid Earth dynamics taking full advantage of new e-science opportunities. EPOS is that Research Infrastructure plan.

Advances in understanding the behavior of faults, volcanoes Earth surface dynamics as well as in quantifying associated hazards largely relies on strategic investment in research infrastructures at the national and European level. To this end the EPOS consortium will also identify existing gaps to coordinate and address the optimal use of such investment.



Hazard Europe Peak Ground Acceleration

IN EVIDENCE

VERCE (Virtual Earthquake and Seismology Research Community e-science environment in Europe) is an e-infrastructure project presently under negotiation.

VERCE will provide an e-Science environment driven by the needs of the data intensive applications of the earthquake and seismology research community. Novel aspects:

- a three-layer service oriented architecture and a platform of services and tools wrapping the community Data infrastructure and the European data-aware HPC and Grid infrastructures.

- a workflow environment to productise the applications and orchestrate data intensive and computing intensive applications across Grid and HPC resources.

VERCE will also provide a scientific gateway with user and application tailored interfaces lowering the barrier of uptake. It will provide to the seismological community innovative tools for data analysis and modelling which will allow to tackle basic scientific questions on solid Earth science.



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ANNOUNCEMENTS

- **ORFEUS Observatory coordination workshop:** "Integrating seafloor and land-based seismographic observations". May 25 | 28 - 2011, Lisbon.

This workshop addresses the challenges involved in integrating and coordinating seismological observations at the seafloor and on land that is the technological, organisational and interpretational aspects. The program will consist of selected keynote lectures, presentations, posters and demonstrations. Organised by Instituto de Meteorologia, Instituto Dom Luis, Instituto Superior Tecnico in collaboration with ORFEUS, NERA and EPOS.

<http://orfeus-lisbon.ist.utl.pt/>

- **First EPOS workshop on legal and governance issues** June 20 | 21 - 2011, Osservatorio Vesuviano in Ercolano, Italy. Workshop organized by WP2 and WP3 to discuss and define the present legal and governance framework.



Broadband Stations in Europe and surroundings provided by Orfeus /CSEM-EMSC

by Luca Postpischl | INGV researcher

EPOS web presence

The Epos preparatory phase web presence is based on two different LAMP (Linux Apache MySQL PHP) software platforms, running on servers hosted at the INGV Bologna branch.

The high reliability hardware configuration is composed of a four node cluster, where each node currently sports:

- two Intel Xeon Quad E5420 CPUs (2.50GHz/core frequency)
- Four DDR2 RAM FB Kingston 4GB (16GB total)
- Three 500GB sata II Hard Disks, 32 MB cache (1,5TB total)

Cluster load-balancing and crash-recovery are managed via the Pacemaker & Heartbeat Linux modules. Normally two virtual machines are kept alive (one runs Apache and PHP, the other the MySQL server) the remaining two machines serve as a crash recovery safeguard. Under exceptional traffic peaks all four machines can be activated at once.

An automatic backup procedure runs nightly between the cluster and an external RAID5 NAS unit.

The two LAMP platforms are the "MODx Revolution" content management system for the public, 'institutional' website (<http://www.modxcms.com/>) and the "ActiveCollab" project management framework for the collaborative area (extranet, <http://www.activecollab.com/>); traffic stats for each of the platforms are monitored separately by Google Analytics.

Both platforms were chosen after comparing and reviewing many other similar software packages. Aside from the actual features the most important element in the final decision was the availability of reliable API libraries (Application Programming Interfaces) for developers; this should enable the possibility of integrating the two environments and manage future phases of the EPOS initiative (distributed data portal).

Compared to other CMS systems, MODx is very flexible in the control of the HTML output, allowing developers to avoid work-arounds with predefined modules and to concentrate on the

optimization of code in terms of web-standards compliance and page-rendering performance. The back-end architecture achieves a complete layout-content-logic separation: consequently the workflows of content editors, graphic designers (CSS) and developers (PHP, Javascript) are merged into that of an efficient web-team.

We plan to manage future issues of the Epos newsletter directly form the MODx-generated RSS feed of the Web site.

The Epos web presence will also exploit social media both as promotional, traffic generating channels and as cloud-based hosting for multimedia content.

To avoid unnecessary security risks the Collaborative Area (CA) reserved for EPOS partners is not directly linked from the EPOS public web site pages; all members will be notified of the login address and credentials by the Epos Management Team or by the various Working Package and Working Group Project Leaders.

The work is organized taking into account two different necessities: to guarantee to all users of the CA an overall view of what is happening and, at the same time, to avoid any waste of energy and contributions. To ensure this, everyone has the opportunity to access all working areas, with some limited restrictions, promoting transparency and the engagement of all members, irrespective of their status. On the other hand, specific powers regarding the ability to create and manage tasks, files, discussions and pages have been assigned in order to give everyone the tools he/she needs and to create a research and working environment that is both efficient and challenging.

To keep track of what is going on, each user can choose to activate e-mail notifications or to subscribe to the rss feed for any events related to the projects he/she is participating in; conversely project leaders and system administrators can easily send announcements to groups of users, or configure automatic warnings concerning project deadlines.

All these features will help us build the EPOS virtual community!