

# VERCE Newsletter

Virtual Earthquake & seismology Research Community in Europe e-science environment

Spring 2014 • Issue 3

## NEWS & ANNOUNCEMENTS

• **VERCE deliverables** are available at:

<http://www.verce.eu/Repository/Deliverables.php>

• **EPOS latest Newsletter** is available at:

<http://www.epos-eu.org/newsletter/>

• **The next VERCE Training will take place 16<sup>th</sup> to 18<sup>th</sup> June 2014 in Liverpool.**

- Introduction to the VERCE infrastructure;

- General overview of the platform;

- Using the VERCE platform;

- Practical session & use case with the L'Aquila aftershocks sequence;

- Innovating with the VERCE platform using DisPy.

• **The 15<sup>th</sup> European Conference on Earthquake Engineering (EAGE) and the 34<sup>th</sup> General Assembly of the European Seismological Commission (ESC) will be organized in Istanbul during 24-29 August 2014.** <http://www.2eeestistanbul.org/>

• **EGU 2014 - ESSI 2.8 - Earth science on Cloud, HPC and Grid:** The VERCE Science Gateway: enabling user friendly seismic waves simulations across European HPC infrastructures (Thu, 01 May, 11:30 - 11:45 - Room G1)

**VERCE Poster:**  
Attendance Wed, 30 April, 17:30-19:00 / Red Posters

## Introduction to the Forward Modelling Demo

Lion Krischer & Heiner Igel

Department of Earth and Environmental Sciences, Geophysics, Munich University

Numerical modelling of seismic waves in realistic three-dimensional media has become an indispensable tool for modern seismology at all scales. The co-evolving advances in wave propagation theory and computational power in the last decades enable simulations across the observable frequency band. Applications are numerous and range from synthetic experiments exploring vast parameter spaces to large scale inverse problems for structure and source leading to improved quantitative seismic hazard estimations.

Nowadays advanced programs to simulate seismic waveforms are available but practical issues still exist. Amongst these are the installation and

execution of the codes on high performance computers, which differs for each machine, mesh and velocity model generation in a suitable format, and the creation of the input files to steer the different solvers. All of these are problems that a scientist should not be concerned with and they oftentimes create a considerable barrier for entrance and reduce the time of actual research.

The forward modelling demo shows an example of the VERCE scientific gateway to perform forward wave simulations with SPECFEM. Seismologists can use it to create earthquake scenarios with an intuitive interface and simulate them by simply pressing a button.



## The Infrastructure Provider's Perspective

Cerlane Leong & Anton Frank

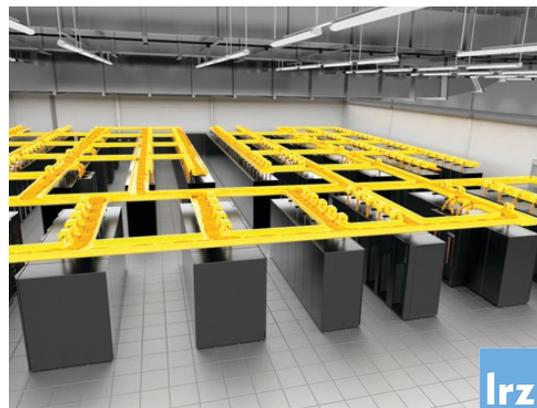
Leibniz Supercomputing Centre

Seismological use cases like the one presented above demand huge computing power and hence the involvement of top level supercomputers. In VERCE, the Leibniz Supercomputing Centre (LRZ) in Munich will make available such resources to the seismologists via the VERCE Science Gateway. This gateway hides IT issues, like hardware architecture, schedulers or compilers, so that the scientists can fully concentrate on their research questions. The software portfolio provided through the Science Gateway includes highly optimized versions of seismic wave propagation codes like SPECFEM3D and SeisSol, which has just recently been used to achieve a new computational record<sup>1</sup>.

LRZ's supercomputing resources integrated in the VERCE infrastructure are the 9400-core Linux cluster and SuperMUC, one of the fastest supercomputers in Europe. To keep up with the ever increasing computational demands, SuperMUC is frequently extended by the latest hardware. SuperMIC, a new cluster of Intel Xeon Phi

Coprocessors is currently added and expected to start user-operation in mid-2014. In the near future, researchers will be able to rely on even more HPC resources: Both, the PLX and the Fermi supercomputers at Italy's national supercomputing centre CINECA will be integrated in the infrastructure as well.

1. <http://www.tum.de/en/about-tum/news/press-releases/short/article/31478/>



lrz



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<http://www.verce.eu>

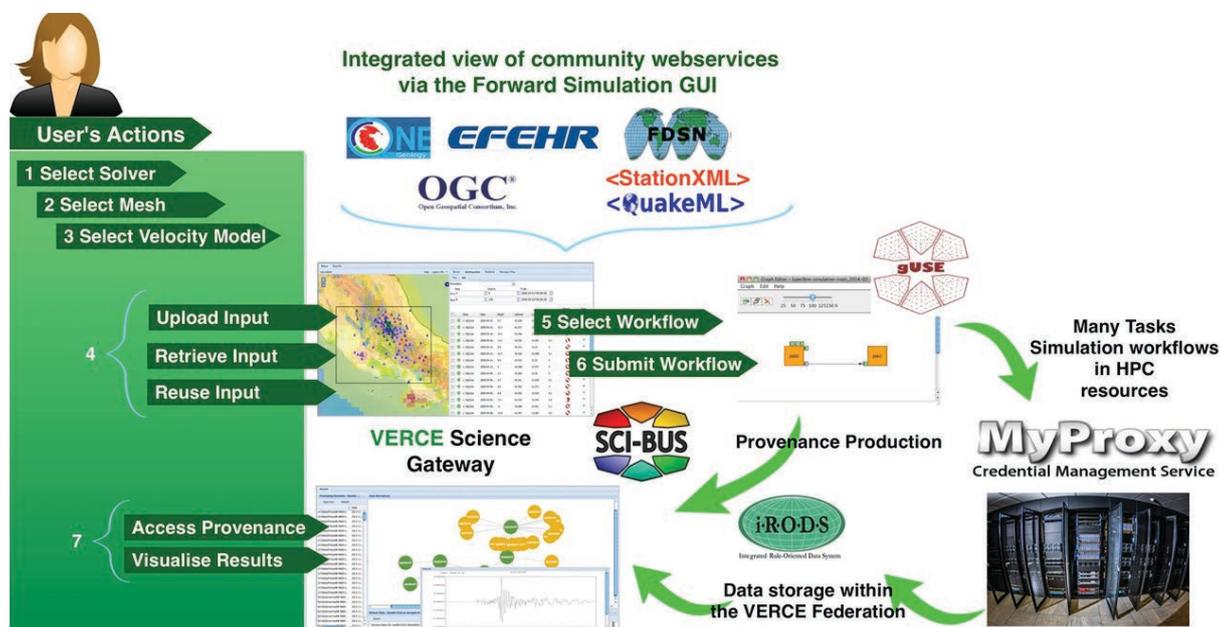
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## The VERCE Science Gateway: User Friendly Forward Modeling across European HPC infrastructures.

Alessandro Spinuso & Jonas Matser  
R&D department, KNMI

The VERCE Science Gateway has reached its beta release (<http://portal.verce.eu>) offering to the community a tool for Seismic Forward Modeling. The integration of the computational and data-management com-

ponents of the VERCE platform required a very specific and dedicated effort. We can group the functionalities of the Forward Modeling application into five main sections.



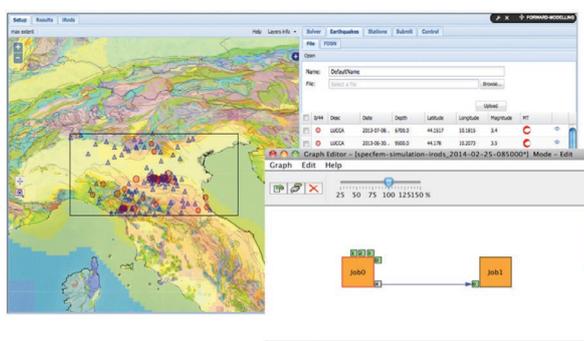
**Simulation solver selection and configuration:** Allows the configuration of the solver input parameters. Meshes and velocity models can be also submitted for their use via the portal.

**Earthquakes and stations selection:** Earthquakes and stations can be selected in two different modes, via file upload or by querying the FDSN webservices directly.

**Workflow submission and control:** Users can give their runs names and descriptions and monitor their execution.

**Provenance and results visualisation:** Users can examine and validate their simulations by exploring the information related to the processes and the data products involved in the computation.

**Access to data management resources:** The gateway offers interactive access to the users' data products stored into the VERCE iRODS federation.



The details of the infrastructure and the security policies challenged the development team in achieving the interactive and user friendly exploitation of the EGI and PRACE resources. This was fostered by the established partnership with the SCI-BUS project\*, which allowed us to delegate a number of tasks concerning workflow, jobs and security management, to the gUSE/WS-PGRADE framework.

\* <http://www.sci-bus.eu>

