



## **Toward a service-oriented e-infrastructure for data mining and data-intensive modeling applications in seismology: the VERCE (Virtual Earthquake and Seismology Research Community in Europe) initiative.**

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Global and regional seismology monitoring systems are continuously operated and are transmitting a growing wealth of seismological data in Europe and from around the world. This opens exciting opportunities for a large range of geophysical research. The multi-use nature of these data puts a great premium on open-access data archive infrastructures that are well integrated in the European Plate Observing System (EPOS)—an ESFRI initiative of the solid earth community. To exploit the full potential of this cornucopia of data and to guarantee optimal operation and design of the high-cost monitoring facilities, we need to new methods for data visualisation, data analysis and data modelling (imaging/inversion). Recent breakthroughs in theory and data analysis allow every byte of continuous seismological records to be used, extracting for example coherent information contained in background seismic “noise”. This enables entirely new and exciting approaches for the imaging of wave sources and structures, the investigations of environmental changes, and the monitoring of volcanic and earthquake hazards. Data integration and data analysis applications are rapidly increasing in scale and complexity. Enabling advanced data analysis of these data within a well-designed data-aware distributed computing environment is becoming instrumental.

Based on a set of data analysis and data modelling application requirements, the VERCE strategy will be presented here. The strategy of VERCE is to provide a comprehensive architecture and framework adapted to the scale and the diversity of these applications. It aims to integrate the community data infrastructure with Grid and HPC infrastructures. The first novel aspect of VERCE is a service-oriented architecture that provides well-equipped workbenches with an efficient communication layer between data and Grid infrastructures, which is augmented with bridges to European HPC facilities. The second novel aspect is the coupling between Grid data analysis and HPC data modelling applications through efficient workflow managing systems and data sharing protocols. The VERCE initiative is part of the European Plate Observing Systems (EPOS) initiative. It will strengthen European Earthquake and seismology research and enhance data exploitation and modelling capabilities of the community. Furthermore, it will contribute to European and national e-infrastructures.

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