

ChEESE: Centre of Excellence for Exascale in Solid Earth

Description

This project aims to establish a Center of Excellence to prepare flagship codes and enable services for Exascale supercomputing in the area of Solid Earth (SE). ChEESE will harness European institutions in charge of operational monitoring networks, tier-0 supercomputing centers, academia, hardware developers and third-parties from SMEs, Industry and public-governance.

The scientific ambition is to prepare 10 flagship codes to address Exascale Computing Challenging (ECC) problems on computational seismology, magnetohydrodynamics, physical volcanology, tsunamis, and data analysis and predictive techniques for earthquake and volcano monitoring. The codes will be audited and optimized at both intranode level (including heterogeneous computing nodes) and internode level on Exascale architecture hardware prototypes (codesign approach). Preparation to Exascale will also consider code inter-kernel aspects of simulation workflows.

First, ChEESE will develop Pilot Demonstrators (PD) for scientific problems requiring of Exascale computing on near real-time seismic simulations and full-wave inversion, ensemble-based volcanic ash dispersal, faster than real-time tsunami simulations and physics-based hazard assessments for seismics, volcanoes and tsunamis. Second, pilots will serve to enable services on urgent computing, early warning forecast of geohazards, hazard assessment and data analytics. Selected pilots will be tested in an operational environment and made available to a broader user community. Additionally, and in collaboration with the European Plate Observing System (EPOS), ChEESE will promote and facilitate the integration of HPC services to widen the access to codes to the SE users community. Finally, ChEESE seeks to act as a hub to foster HPC across the Solid Earth Community and related stakeholders and to provide specialized training on services and capacity building measures.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

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