

Centre of Excellence for **Exascale in Solid Earth**

Who We Are

- A European initiative advancing flagship codes for **Exascale, ready for EuroHPC systems**
- A community using supercomputing to explore geohazards such as earthquakes, tsunamis, volcanoes, glaciers, and geodynamics
- A hub linking science, HPC, and civil protection, turning research into tools for society

Where We're Heading

- Optimise **flagship codes for Exascale computing** to run efficiently on EuroHPC systems
- Develop Pilot Demonstrators and Simulation Cases showcasing real-world applications, from early warning systems to urgent computing
- Build capacity and train communities, enabling scientists, institutions, and stakeholders to harness **HPC for disaster preparedness** and response

Impacts & Collaborations

The Codes Behind ChEESE

11 open-source codes optimised for exascale.



COMPUTATIONAL SISMOLOGY

ExaHyPE Tandem SeisSol SPECFEM3D



TSUNAMI MODELLING

HySEA



VOLCANOLOGY

OpenPDAC FALL3D



EARTH CORE

xSHELLS



GEODYNAMICS

LaMEM pTatin3D



GLACIER HAZARDS Elmer/ICE

DELIVERABLES

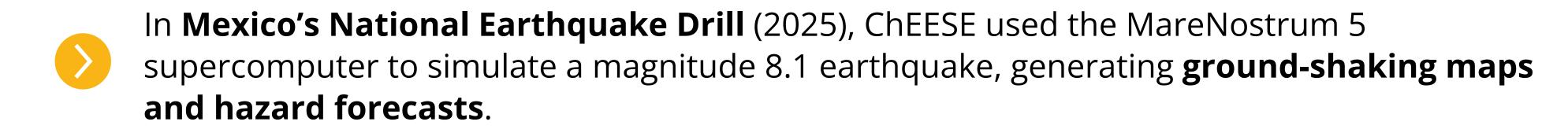
SOFTWARE

CONSENSUAL DOCUMENT

EGU GALILEO CONFERENCE

Validating Exascale Workflows for Disaster Response

ChEESE is successfully testing urgent computing in real-world emergency drills, showcasing how European HPC can directly support disaster response.



In **Spain's first national volcanic-eruption exercise** in the Canary Island, ChEESE tested ash-dispersion and eruption-source models with civil protection authorities.

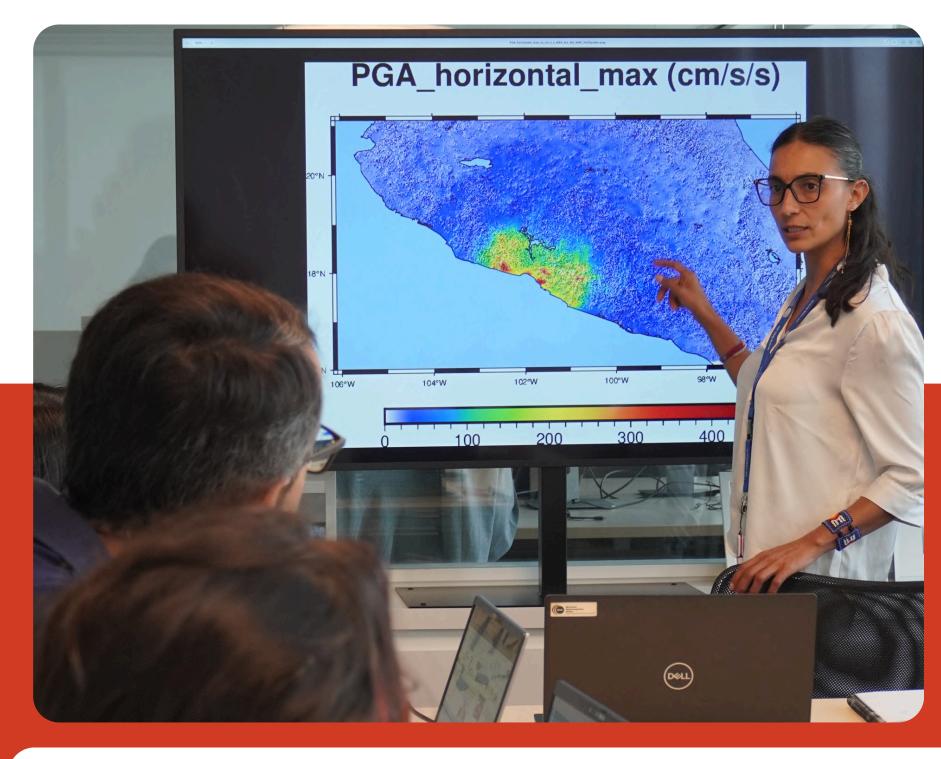
These large-scale demonstrations validated ChEESE research in operational settings, proving that exascale computing can be integrated into real-time disaster preparedness and response.



Integrated Multi-Hazard **Tsunami Simulation**

ChEESE's Pilot Demonstrator on Multi-**Source Tsunami Modelling** integrates earthquakes, landslides, volcanic eruptions, and atmospheric forcing into a single exascale workflow for near realtime forecasting.

It demonstrates how advanced computing can power **next-generation multi-hazard Early Warning Systems.**



Shaping the Exascale Geoscience Roadmap

ChEESE led the **EGU Galileo Conference on** "Solid Earth and Geohazards in the **Exascale Era"** (2023), uniting the scientific community to define a shared roadmap for future collaboration in exascale geoscience.



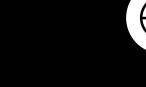
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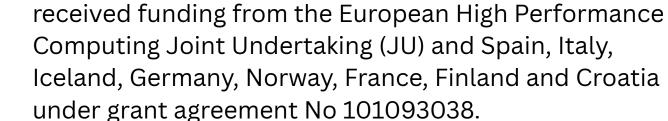


















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