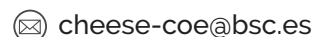The ChEESE CoE consortium consists of 13 partners including a range of world-class academic and industry partners from across Europe.

## Partners:

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

**Bull** atos technologies

CINECA

Icelandic Meteorological Office

IPGP
INSTITUT DE PHYSIQUE DU GLOBE DE PARIS

ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

cnrs

NGI

**ETH**zürich

Technical University of Munich — TUM

UNIVERSIDAD DE MÁLAGA

H L R S

🌐 www.cheese-coe.eu

✉ cheese-coe@bsc.es

in ChEESE CoE

🐦 @Cheese CoE

# ChEESE

Centre of Excellence for Exascale in Solid Earth

# Centre of Excellence for Exascale in Solid Earth. Simulation and Mitigation of Geohazards

www.cheese-coe.eu

## ChEESE in numbers

· One of the 10 HPC Centres of Excellence (CoEs) funded under H2020 INFRAEDI-02-2018 call
* Duration: 1 November 2018 - 31 October 2021
* Budget: 7.7M€
* Partners: 13

## Objectives

· Establish a **new Centre of Excellence** in the domain of Solid Earth targeting the preparation of 10 European flagship codes for the upcoming pre-Exascale (2020) and Exascale (2022) supercomputer.

· Address **15 scientific, technical, and socio-economic Exascale Computational Challenges** in the domain of Solid Earth.

· Develop **12 Pilot Demonstrators** and enable services orien-ted to society on critical aspects of geohazards like hazard assessment, urgent computing, and early warning.

· Bring together High Performance Computing and High-end Data Analysis transversal European institutions in charge of operational geophysical monitoring networks, Tier-0 supercomputing centers, academia, hardware developers, and third-parties from SMEs, Industry and public governance bodies (civil protection).

## Pilots

Exascale Pilot Demonstrators are "small-scale" proofs of concept aimed at testing codes on Exascale hardware prototypes.

· Urgent seismic simulations
· Faster than real-time tsunami simulations
· High-resolution volcanic plume simulation
· Physics-based tsunami-earthquake interaction
· Physics-based probabilistic seismic hazard assessment
· Probabilistic volcanic hazard assessment
· Probabilistic tsunami hazard assessment
· Probabilistic tsunami forecast for early warning
· Seismic tomography
· Array-based statistical source detection and restoration and machine learning from volcano slow-earthquakes monitoring
· Geomagnetic forecasts
· High-resolution volcanic ash dispersal forecast

## Flagship codes

10 different Solid Earth community codes have been selected in ChEESE for Exascale preparation.

· 4 in computational seismology: EXAHYPE, SALVUS, SEISSOL, SPECFEM3D
· 2 in magneto-hydrodynamics: PARODY_PDAF, XSHELLS
· 2 in physical volcanology: ASHEE, FALL3D
· 2 in tsunami modelling: T_HYSEA, L_HYSEA