



ChEESE

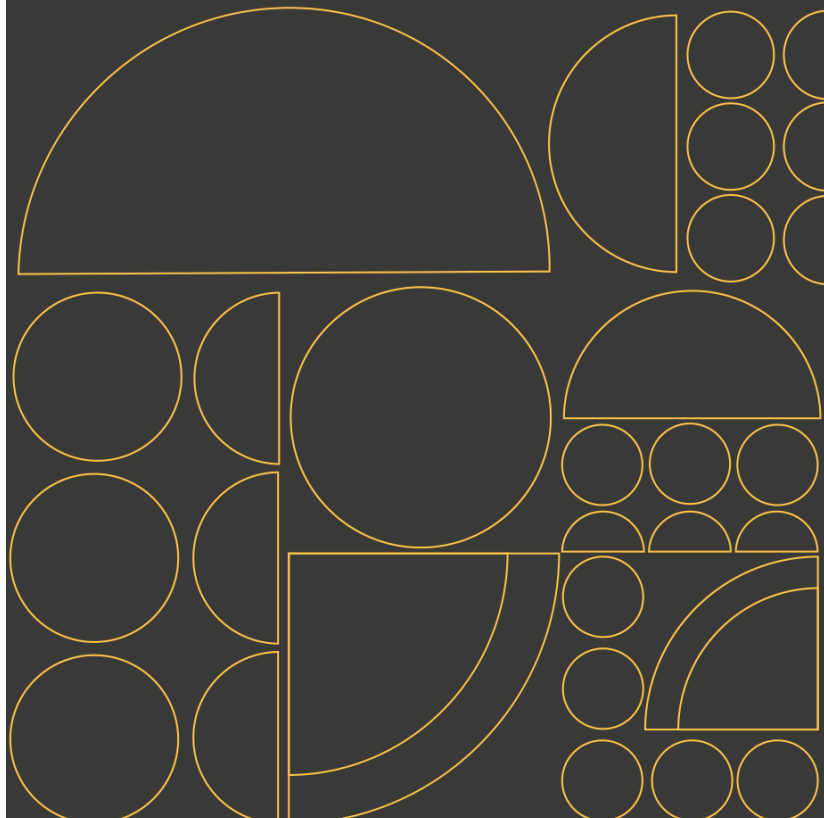
Work Package 6:
Simulation cases and service enabling using
EuroHPC infrastructures

Project kick-off meeting Barcelona,
19-20 January 2023

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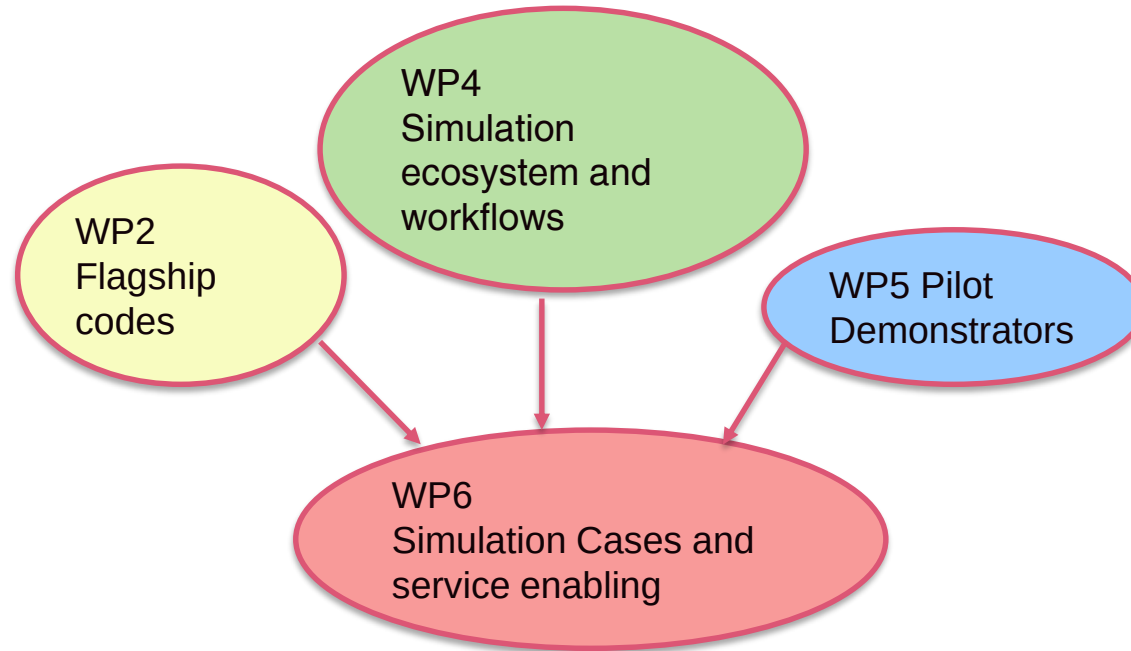


WP6: Objectives

1	Define the 15 Simulation Cases (SCs) leading to capability/capacity production runs generating open EOSC-enabled datasets and hazard maps
2	Execute 4 Scientific Grand Challenges (if full-scale resources are allocatable)
3	Enable 2 services in EPOS for tsunami and volcano Thematic Core Services (TSU-TCS and VO-TCS)
4	Enable 4 urgent computing services in EuroHPC infrastructures, including policy recommendations
5	Engage the end-user community in the service co-design activities ensuring that the resulting products are well-suited for the applications and their users, including live demo exercises (trials)



Main WP6 dependencies



WP6: Tasks

Task	Task name	Start	End	Lead
Task 6.1	Setup of Simulation Cases and trials	13	18	INGV
Task 6.2	Exascale capability simulation cases and Scientific Grand Challenges	19	48	CNRS/L MU
Task 6.3	Exascale capacity simulation cases	19	48	INGV
Task 6.4	EuroHPC urgent computing service enabling	25	48	BSC



WP6: Deliverables

D	Deliverable name	Lead	Type	Level	M	Date
6.1	Simulation Cases and Trials definition	INGV	R	PU	18	Dec 2024
6.2	SCs report and datasets from PD1	LMU	R	PU	46	Oct 2026
6.3	SCs report and datasets from PD2	INGV	R	PU	46	Oct 2026
6.4	SCs report and datasets from PD3	UMA	R	PU	46	Oct 2026
6.5	SCs report and datasets from PD4	RBI	R	PU	46	Oct 2026
6.6	SCs report and datasets from PD5	CSIC	R	PU	46	Oct 2026
6.7	SCs report and datasets from PD6	INGV	R	PU	46	Oct 2026
6.8	SCs report and datasets from PD7	IPGP	R	PU	46	Oct 2026
6.9	SCs report and datasets from PD8	SU	R	PU	46	Oct 2026
6.10	SCs report and datasets from PD9	IMO	R	PU	46	Oct 2026
6.11	Open Hazard Maps	INGV	DATA	PU	47	Nov 2026
6.12	Urgent computing service enabling	BSC	DEM	PU	48	Dec 2026

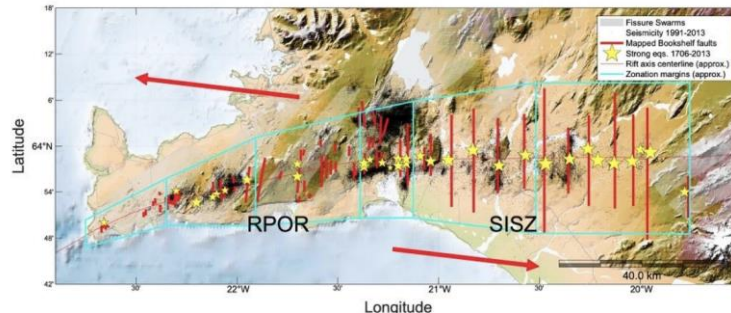
PD1 : Extreme-scale modeling of seismic hazards

Simulation cases

SC1.1. Anthropogenic noise and seismicity, wave propagation at higher frequencies in Rade d'Hyères (CNRS, CSIC; Hazard Assessment; **Capability**)

SC1.2. Next generation of earthquake simulators for the Hellenic arc and Iceland (LMU, TUM CNRS, UM; **Capability**)

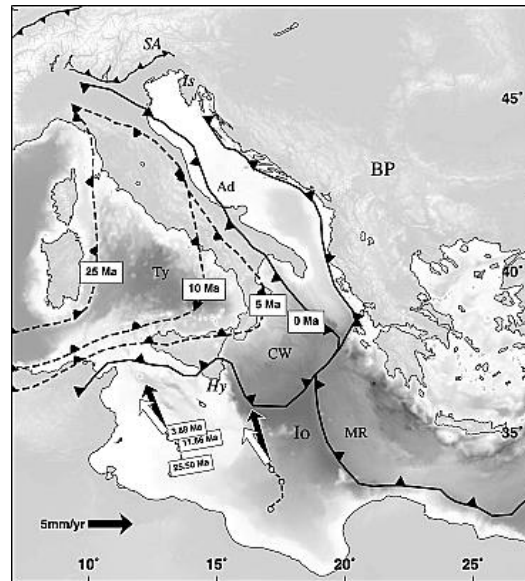
SC1.3. Physics-based PSHA and urgent UQ for Iceland: next generation hazard map (LMU, IMO, BSC, TUM; **Capability**/urgent computing)



PD2. High-resolution seismic inversion and tomography

Simulation cases

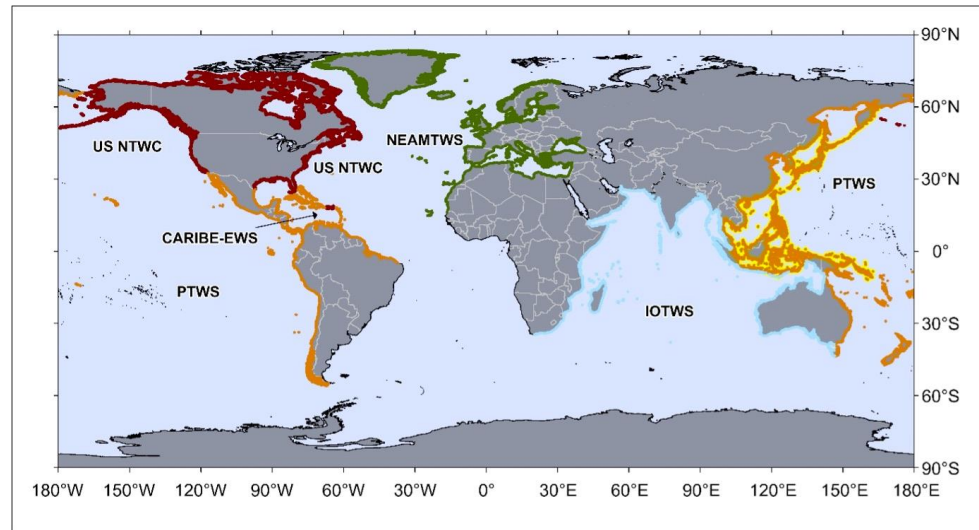
SC2.1. Seismic tomography of the Adriatic-Ionian region (INGV, CNRS; **Capability**)



PD3. Global probabilistic tsunami hazard and uncertainty quantification

Simulation cases

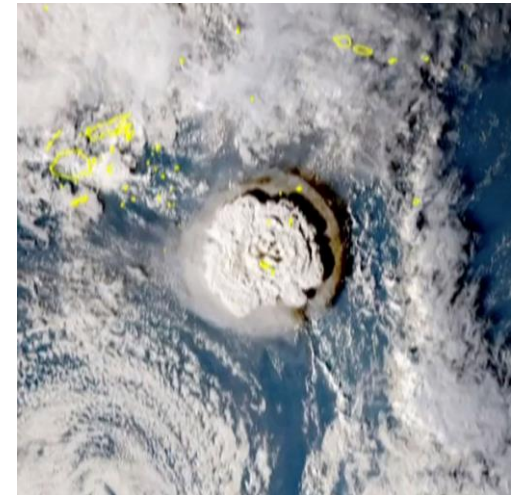
SC3.1. The Global Tsunami Hazard Map (INGV, NGI, UMA, TUM; **Capacity**)



PD4. Complex multi-source tsunami modeling

Simulation cases

SC4.1. Multi-source local high-resolution scenario with emphasis on the 2022 Tonga case (INGV, TUM, INGV, UMA, LMU, IRB, CNRS; **Capability**)

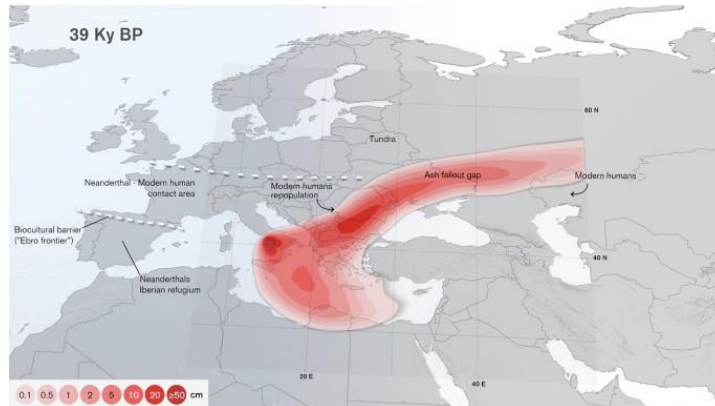


PD5. Ensemble-based volcanic dispersal across multiple scales

Simulation cases

SC5.1. Towards the European tephra hazard map (INGV, CSIC, IMO; **Capacity**)

SC5.2. Volcanic dispersal at local scale: a reanalysis of the 2021 La Palma case (CSIC, INGV; **Capacity**)

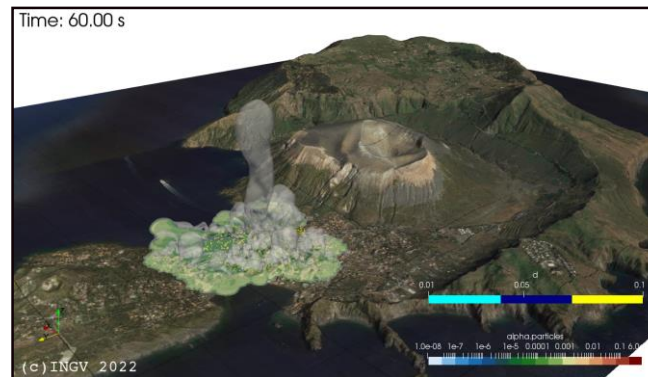


PD6. Multiphase 3D volcanic explosion modeling

Simulation cases

SC6.1. Urgent high-resolution, 3D multiphase flow simulation of phreatic eruptions at Vulcano (INGV, CIN; **Capability**)

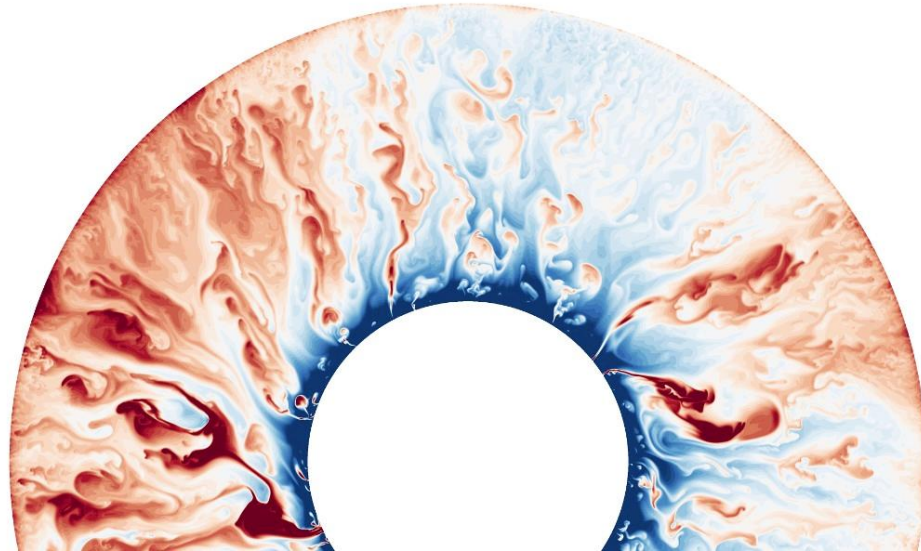
SC6.2. Long-term probabilistic hazard maps for phreatic eruptions at Vulcano island (INGV, CIN; **Capability**)



PD7. The Earth's dynamo model

Simulation cases

SC7.1. MHD turbulence closure models in planetary cores using AI (CNRS; **Capacity**)

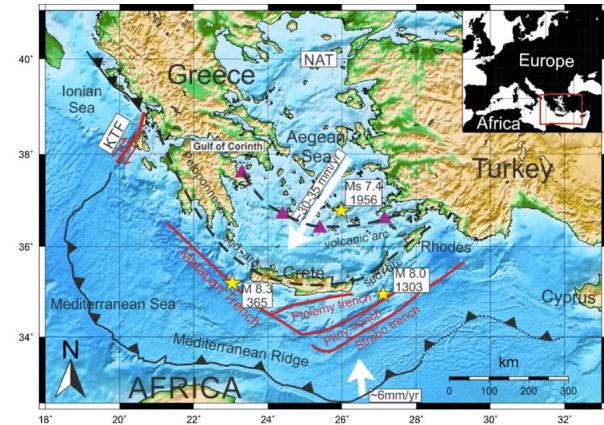
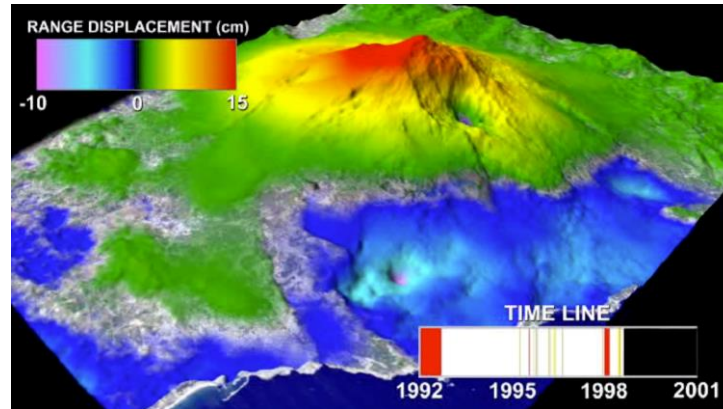


PD8. Geodynamics to geohazards

Simulation cases

SC8.1. Magmatic systems and induced landslides: the Etna case (UM, CNRS, INGV; **Capability**)

SC8.2. 3D evolution of tectonic deformation as driver of seismic hazard in the Hellenic arc (CNRS, UM, LMU, TUM, CSIC; **Capability**)



PD9. Glacial outburst floods

Simulation cases

SC9.1. Eastern Skaftá cauldron GLOF simulation, Iceland (CSC, IMO; **Capacity**)

SC9.2. Calving glacier hazard in Greenland (CNRS, CSC; **Capacity**)





Role of WP coordination

1. Planning and control: ensure homogeneity and timely delivery of project products

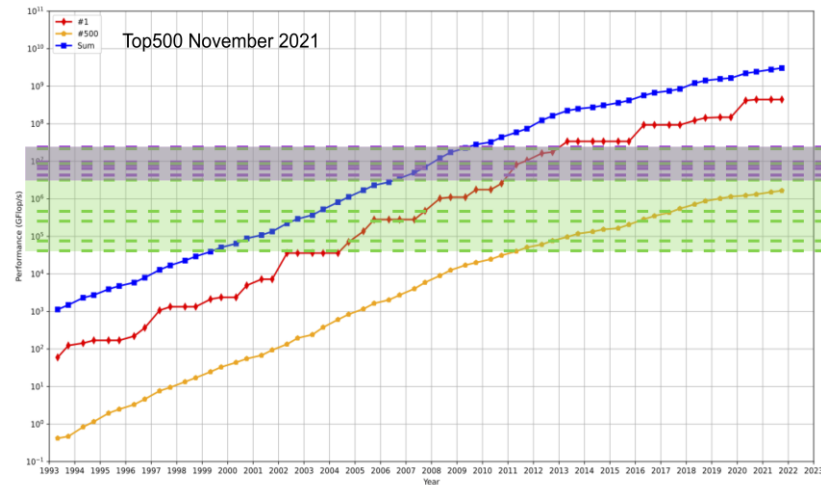
- Planning and preparation of EuroHPC access call (with T1.4)
- Harmonization of Deliverables D6.2-D6.9 (Pilot Demonstrators SC and SGC)
- Define Trials (live demos) methodology

2. Coordinate and harmonize services in different frameworks

- Urgent computing
 - Probabilistic Hazard Assessment
- 

Role of WP coordination

3. Monitor the global ChESEE target performance for both capacity and capability applications



Extrapolated performance of **ChESEE-1P** services



ChESEE

Center of Excellence for Excellence in Excellence

Grand challenges

Services

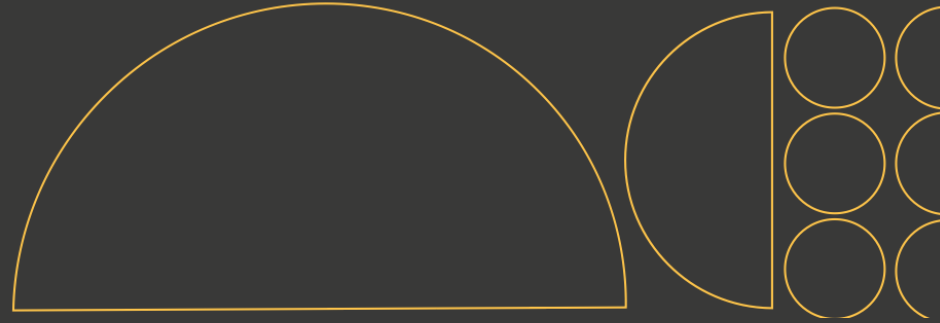


First actions

1. Identify WP6 interactions and dependencies.
Identify critical issues.
2. Start collecting HPC needs for Simulation Cases.
3. Define Trials methodology.



Thank you!



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