

11th EGU Galileo Conference: The Solid Earth and Geohazards in the Exascale Era

With the birth of geosciences and then of computational geosciences, people's attitude towards the world has changed. People are no longer passive observers but rather more proactive players in their environment and the knowledge gained from computational geosciences has been used to save lives and prepare for future scenarios. Now, with the Exascale computing era dawning upon us, even more accurate, clearer and faster data will be within our reach. However, computational methods and codes need to be reshaped and honed, and geoscientists need to be prepared for the upcoming challenges. The geoscience community is multidisciplinary and transversal, encompassing Earth observatories (e.g. monitoring networks, data providers, tsunami warning centres, etc), research and academia, model developers and, finally, model end-users and social agents. From a scientific point of view, the entire community is facing scientific breakthrough problems for which researchers need to share their knowledge and experience and make roadmap recommendations in order to contribute to the advancement of this rapidly growing field. The “Solid Earth and Geohazards in the Exascale Era” conference would bring together some of the world's best minds in various branches of computational geosciences to jointly tackle challenges and issues of Exascale computing. Europe is making a huge effort in the strategic global race to Exascale, with large investments in the infrastructure and the application pillars (e.g. Centers of Excellence and national Competence Centers). In 2023 the EuroHPC Joint Undertaking will have deployed 3 Pre-exascale machines (LUMI, Leonardo and MareNostrum-V), and 2 Exascale systems will follow afterwards. From the point of view of science and services, this unprecedented pan-European infrastructure opens a myriad of possibilities but, at the same time, the transition is challenging and requires a joint effort from (geo)scientists, software developers, and data analysts. In this context, the conference will articulate around 4 sessions that will facilitate the exchange of ideas and brainstorming on corresponding trending topics:

- Session 1 (S1): Preparation and optimization of HPC codes to Exascale. Many scientific codes are being restructured (modernized), optimized and ported to run efficiently on the emerging hybrid-node architectures, eventually with different typologies of accelerators. Exascale is also posing challenges on code scalability, load balance, fault tolerance, and co-design among others.
- Session 2 (S2): Edge-to-end data workflows. Exascale is not only about applications and capability runs, but entails also workflow managers (orchestrators) and huge amounts of data streams and processes (eventually involving artificial intelligence), from decentralized edge (sensor level) computing, HPC applications (centralized or cloud-based) to the final post-processed results collided to the end- user.
- Session 3 (S3): State-of-the-art in computational geosciences. This session will consider the current state and the transition of European computational geosciences. Which are the emerging perspectives, bottlenecks and challenges in geosciences and geohazards and HPC services for a safer world (hazards and operational services)?
- Session 4 (S4): Horizon Europe and EuroHPC Policies. Which is the EuroHPC deployment roadmap, policy and HPC infrastructure access modes? Which are the research funding opportunities for geosciences from Horizon Europe (REA) or other EC Directorates-General (DGs)? How can European geoscientists better partner to benefit from the Exascale transition opportunities?

The ultimate goal of the conference is to produce a consensual white paper defining the vision and a roadmap for our Community towards the Exascale era. In addition to the sessions, the conference programme also includes a series of master classes aligned with the 4 session topics to train early-career scientists. Master classes will give the opportunity for PhD, MSc Students and early-stage post-doc researchers to present and discuss their research projects and results with senior scientists. Parallel master classes will be held the day before the formal opening of the Conference (day 0), each one gathering a maximum of 8 young researchers during a complete day of discussions and exchanges. Students will present their work in the morning (30 min presentation) while the afternoon will be devoted to interaction with the experts, discussions between students and experts, and debate among the students. Day 0 will close with a chill-out event.

Visit the conference website: <https://egu-galileo.eu/gc11-solidearth/general-information.html>

Speakers

Keynote Speakers:

- Richard Tran Mills (Argonne National Laboratory)
- Scott Callaghan (Southern California Earthquake Center/University of Southern California)
- Nicola Castelletto (Lawrence Livermore National Laboratory)
- Linda Gesenhues (EuroHPC Joint Undertaking)

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