



# Leading and Strengthening Earth Sciences in Europe

**GEO<sup>8</sup>**  
European  
Alliance  
for Earth  
Sciences

From fundamental science and discovery to improved management of natural resources and mitigation of geological risks, Earth Sciences support our society's environmental sustainability, health, wealth and well-being.

The GEO\*8 consortium is a group of eight leading institutions with a state-of-the-art infrastructure and skills for a wide range of applications of Earth science research and innovation.



### **KRAFLA MAGMA TESTBED (KMT)**

The Krafla Magma Testbed (KMT) is an ambitious challenge involving the BGS, GFZ, INGV and Icelandic and international colleagues. The objective is to drill into a known magma body sited at ~2km below Krafla in Iceland. We will create a global observatory that will pioneer new drilling technology and sensor systems capable of working in extreme environments. KMT will establish new technologies that will allow us to harness near-magma heat in regions across the planet and will lead to a step change in volcano monitoring by bringing sensors to the magma–rock interface.

### **We want to lead and strengthen Earth Sciences in Europe in the following interconnected spheres:**

- **Understanding** the dynamic Earth – the internal motor of our planet, which has built the continents and created a habitat for life, shaped the Earth's surface and affected our society on human timescales.
- **Creating** a safe and healthy planet by minimizing the impact of unavoidable natural hazards and by building a cleaner, sustainable environment.
- **Living more sustainably** on planet Earth and providing the foundation for the responsible exploration and use of global natural resources, now and in the future.
- **Driving growth** to find the resources that build economic prosperity, support industry and promote innovative technologies.

*“Geologists were largely responsible for finding coal, oil and gas over the past two centuries and thus influencing the carbon budget of the planet. Although industry and humanity has benefitted from this, it is now our role as geoscientists to be active in exploring the use of the subsurface to achieve the next energy transition and reduce greenhouse gases.”*

**John Ludden** CBE, GEO\*8 founding member

### **Mitigating Natural Geohazards and Risk – Creating a Safe And Healthy Planet**

We will pursue global geological hazard and risk-related research. This requires us to shift from simple identification of earthquake, volcano or landslide risk, to modelling and forecasting and communication of geological risk – that is, where the hazard affects people's lives directly. Databases such as those produced by the Global Earthquake Model will become essential in urban planning (including reinsurance management) and disaster relief.



# What we do:

**Optimising** scientific research interests by facilitating co-operation and international reach • **Providing advice** to governments on issues of public concern in Earth and Environmental Sciences • **Providing collective responses to societal questions and challenges** such as global change and sustainability (UN Sustainable Development Goals) • **Providing added value** in the European Commission's Science and Technology Horizon Europe 2030 Framework • **Optimising the use of members' infrastructure** by encouraging joint use • **Contributing to the harmonization of national roadmaps**, enabling the development of a single European roadmap for Earth Sciences • **Promoting earth sciences education** on a pan-European level by holding workshops and implementing joint training programs and networks • **Providing partnerships** with geological surveys and environmental agencies, and providing leadership in scientific and professional societies.

## A digital transition for Geosciences

Access to rapid strategic modelling in disaster-affected regions is still a challenge. Increasingly high performance computing (HPC) and access to large and complex data will be available in management and modelling of intervention scenarios during disaster relief. Examples are in landslide management, location of water resources, prediction of secondary problems such as aftershocks, volcano collapse, and tsunami and weather patterns. The disaster relief community will be transformed in the coming years through rapid data assimilation, HPC and edge computing.

*“Understanding fluid-solid interaction is key to breakthroughs in subsurface utilization and risk mitigation. HPC is essential to image the subsurface in unprecedented detail, model its evolution and forecast risk associated with exploration. To reach the desired level of modelling precision, a 1,000-fold increase in computer power and data processing is essential. GEO\*8 is taking the lead identifying major research targets and together with the climate community tries to push for the required technological change at the EU level.”*

**Jeannot Trampert**, Utrecht University, GEO\*8 chair person

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for Earth Sciences

## An authoritative voice

**Earth Sciences in Europe needs strategic decision making, integrated research infrastructure and a strong voice to address research and social challenges and drive prosperity through innovation. As a cohesive group, GEO\*8 can make this happen.**



**Our network** Founded in 2012, the GEO\*8 partners are a group of leading European Earth Science institutes with a focus on infrastructure, natural resources, natural hazards and risk research.

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