Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe

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Report on the Midterm seminars

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EXECUTIVE REPORT SUMMARY

The GeoERA programme had planned to carry out a Midterm seminar as a physical meeting in March of 2020 in Ljubljana. This event was cancelled due to the corona pandemic, so instead 5 webinars were organised in November 2021. The webinar series included an introduction to the ideas for the creation of a Geological Service for Europe and individual seminars for each of the scientific topics of GeoERA. Stakeholders were invited to introduce and discuss the different topics.

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1 INTRODUCTION TO THE SEMINARS

The GeoERA programme had planned to carry out a Midterm seminar in Ljubljana on the 17th of March 2020. The purpose was to tell stakeholders about the results produced during the first 18 months of the GeoERA projects and discuss how to run the last part of the programme to achieve the best results. A total of 176 participants (stakeholders, EU representatives, external evaluators and EGS members) had registered for the seminar. Unfortunately, because of the corona virus the physical meeting had to be cancelled.

Instead a virtual seminar was arranged as a total of 5 webinars in the week 9 – 13 November 2020. There were webinars dealing with each of the 4 scientific themes of GeoERA (Information Platform, Raw Materials, GeoEnergy and Water) plus one about the creation of a Geological Service for Europe.

The purpose of the webinars was to provide an insight into the research projects of GeoERA and include insights from guest speakers to highlight the relevant links between geosciences and their sectors. How their results and products could be of use to the stakeholder community as well as the current EU policy objectives formed part of the following discussion where also future needs and opportunities for collaboration were discussed.

During the webinars the audience was invited to contribute by filling out some questionnaires specific to the scientific topic of each webinar.

In total of a little over 600 stakeholders were invited to the webinars and they were attended by:

Webinar topic	Number of attendees
Geological Service for Europe	108
Information Platform	88
Raw Materials	100
GeoEnergy	98
Groundwater	112

Each of the webinars is described in more detail below.

2 WEBINAR 1: GEOLOGICAL SERVICE FOR EUROPE

The first session was opened by European Commission Policy Officer *Wolfgang Schneider*, who emphasized the importance of reliable geological information on a European scale.

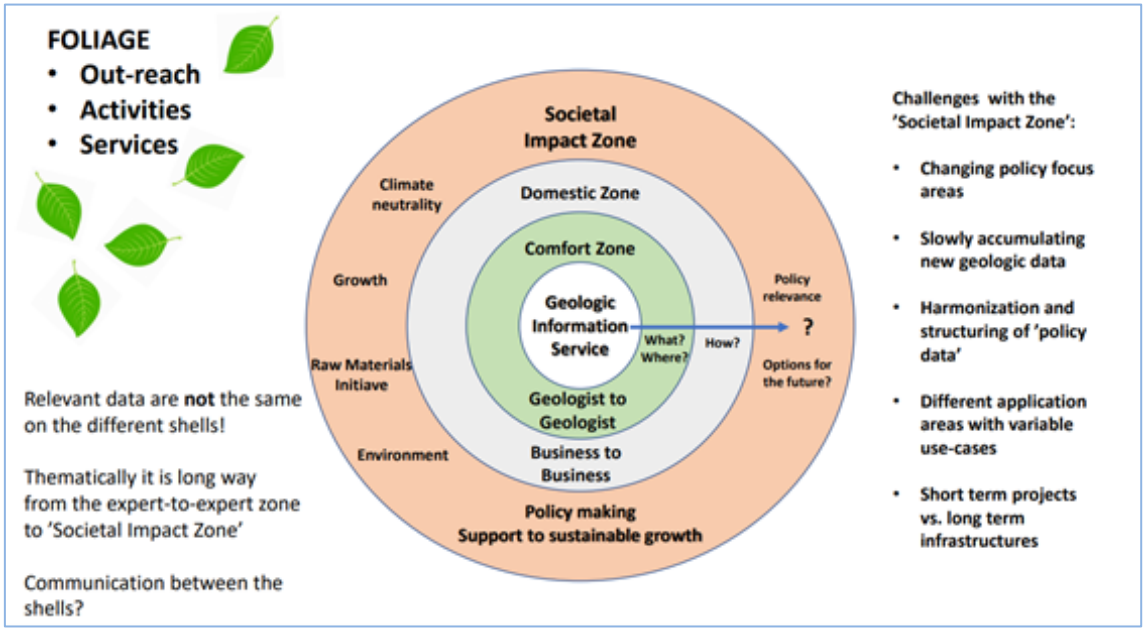
Scott Foster (UNECE) explained that climate change is a reality and that the rising consumption and productivity are leaving an ever-increasing footprint. Only an integrated (i.e. addressing raw materials, energy, water and food) and sustainable approach will enable us to accomplish the SDGs.

According to *Zdenek Venera* (EGS, CGS), a European Geological Service could support this sustainable approach. 38 European Geological Surveys want to contribute through a European Geological Service and have included this in their strategic vision. Today, many of these Surveys are working together in GeoERA, in the near future they will join forces to take the next step.

Taking the Dutch situation as an example, *Michiel van der Meulen* (TNO) then demonstrated the economic value of geological information. Using appealing examples, he showed that it pays off, through revenues and reduction of failure costs, to invest in the supply of reliable and usable subsurface information.

3 WEBINAR 2: INFORMATION PLATFORM

Using paintings by David Hockney, *Jarmo Kohonen* (GTK) showed that information should flow like a river and not stand still in separate ponds. There are many challenges to overcome in order to achieve the final goal of social impact. Communication has a key role in this. According to Jarmo: "sustainable growth is an optimising process based on information."

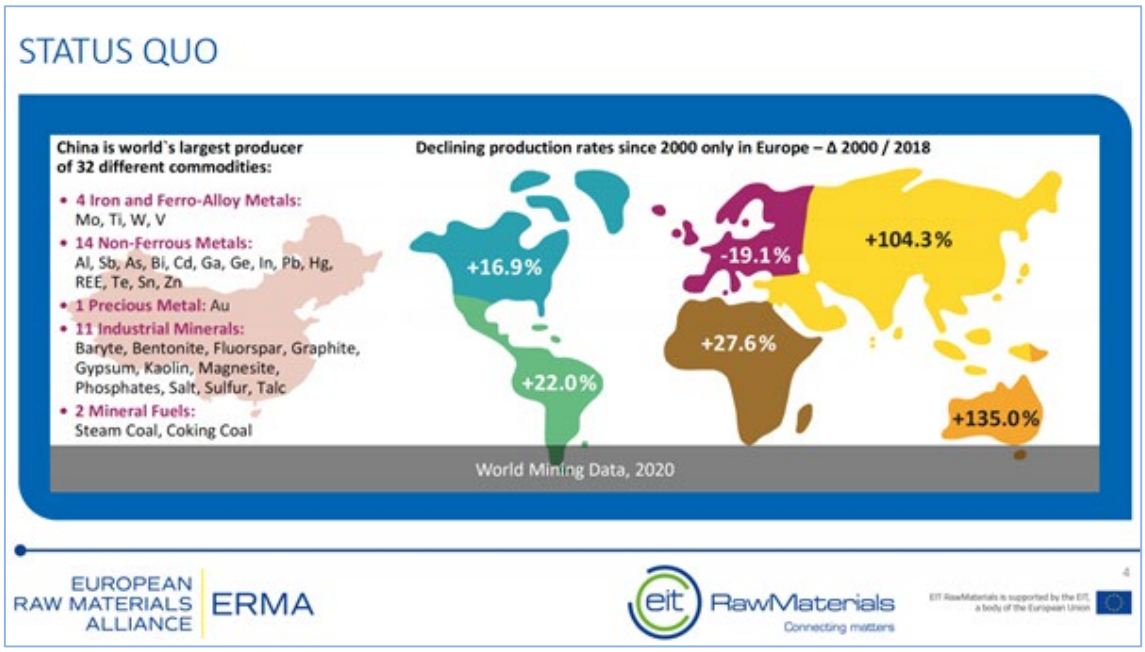


Jørgen Tulstrup (GEUS) theme coordinator Information Platform in GeoERA, explained what has been achieved in GeoERA's GIP-P project so far, how the EGDI (information platform) has developed on the topics of standardisation, dissemination and assistance to users and what progress has been made on safeguarding results from the GeoERA science projects and making them findable according to the FAIR principles. Furthermore, he gave us a glimpse of what can be expected when the EGDI will be further developed in next steps towards the European Geological Service.

In the subsequent polling, the audience indicated what they considered as largest obstacles to the exploitation of geoscientific information: 1) unharmonized data, 2) incomplete datasets and 3) lacking documentation.
The most promising new/emerging technologies in relation to geoscientific data were considered: 1) machine learning, 2) 3D/4D visualisation techniques and 3) 3D/4D modelling techniques.
The willingness to pay in certain cases for data in order to get higher quality or more complete datasets was equally divided between 'agree' and 'disagree'.

4 WEBINAR 3: RAW MATERIALS

Patrick Nadoll (EIT RawMaterials) demonstrated that the expected increase in electric passenger cars alone will require a significant increase in solar photovoltaic capacity and battery storage capacity, and that this will require an enormous increase in the production of raw materials. Whereas in other continents the raw materials production has increased, in Europe it has decreased at the same time.
Patrick argued that these problems are highly complex and involve many stakeholders, which calls for collective solutions. The right geological information on each (local, regional and national) level is crucial in this respect, which fits seamlessly with the vision of the European Raw Materials Alliance (ERMA) to secure access to critical and strategic raw materials, advanced materials, and processing know-how for EU Industrial Ecosystems.



Antje Wittenberg (BGR), theme coordinator raw materials in GeoERA, then showed where the added value of geological information is situated in the value chain from exploration and exploitation to production, use and reuse. The project leaders of EUROLITHOS (European Ornamental stone resources), FRAME (Forecasting and Assessing Europe's Strategic and Raw Materials Needs), MINDeSEA (Seabed Mineral Deposits in European Seas) and intell4EU (Mineral Intelligence for Europe) demonstrated how these projects contribute to the mentioned challenges.

Looking back on the webinar, Antje concluded:

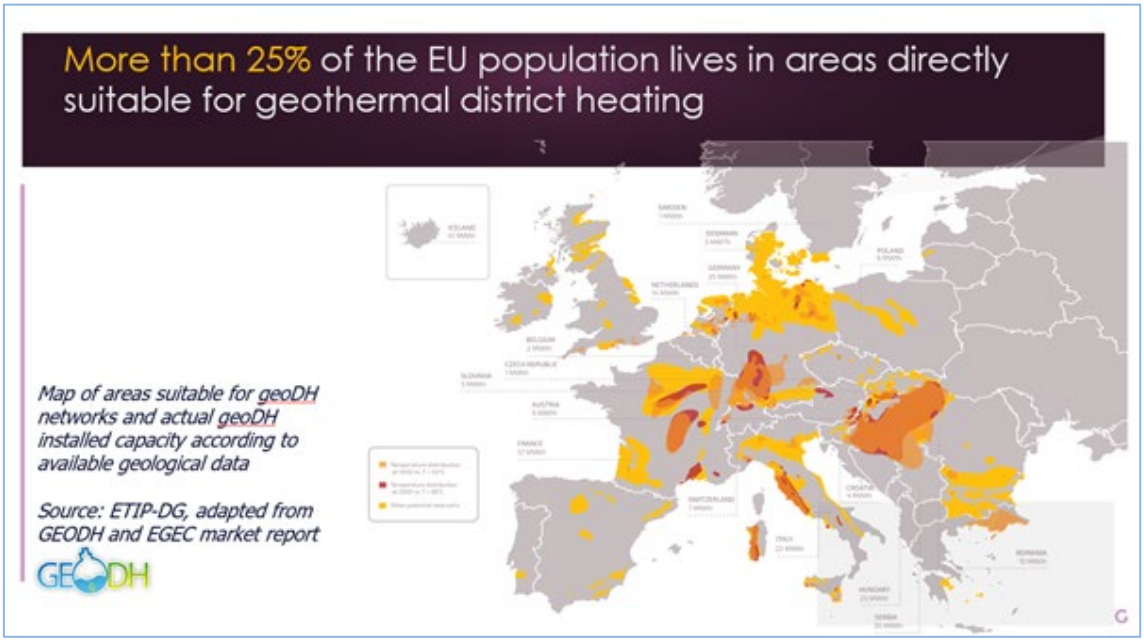
- Through networking of the Geological Surveys, the number of data providers has been increased significantly. Data density and key

information on Europe's minerals inventory and on Europe's raw materials potential has improved significantly by the ongoing work;

- Positive examples that touch the perception where and how local raw materials are used, helps to increase ownership and responsible sourcing by the local community;
- It has been demonstrated that the use of coordinated vocabulary and working level standards that conform to INSPIRE guidelines, leads to effective application;
- Greater understanding can be achieved through more and better communication with the public, policy makers, politicians and other groups;
- Industry and other organisations call on the Geological Surveys to play a stronger role in communication and education;
- Geological Surveys need to keep their neutrality; it is key to be a trustworthy source of information to the public, for policy makers and industry;
- The provision of harmonised data and information on a pan-European scale remains the main challenge.

5 WEBINAR 4: GEO-ENERGY

Gerdi Breembroek (RVO, CETP Core Team) explained the importance, objectives and planning of the European Partnership on Clean Energy Transition (CETP). With regards to the objectives of 'efficient and zero-emission heating and cooling' and 'climate neutrality with CCU/CCS, storage and fuels', CETP sees an important role to play for the Geological Surveys. It is shown that both areas still face major challenges. Gerdi concluded: the energy transition needs the subsurface, we need to collaborate.



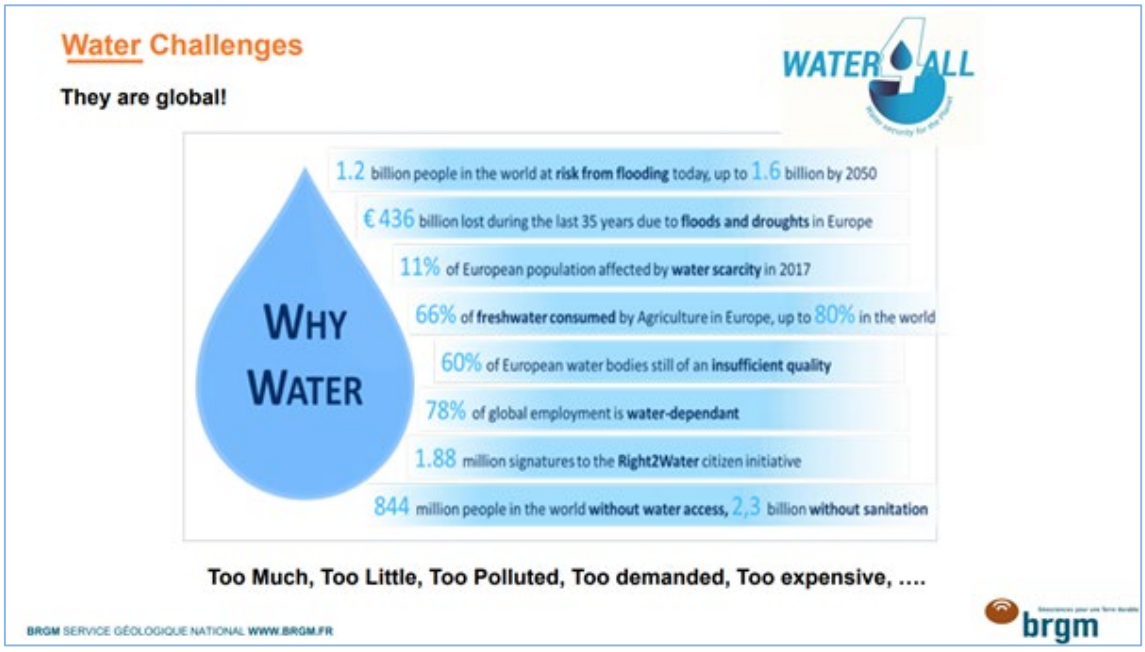
After the bridging presentation by *Serge van Gessel* (TNO), theme coordinator Geo-Energy in GeoERA, the project leaders of 3DGEO-EU (3D geo-modelling for Europe), GARAH (Geological Analysis and Resource Assessment of selected Hydrocarbon systems), GeoConnect^{3}d (Cross-border, cross-thematic multiscale framework for combining geological models and data for resource appraisal and policy support), HIKE (Hazard and Impact Knowledge for Europe), HotLime (Mapping and Assessment of Geothermal Plays in Deep Carbonate Rocks) and MUSE (Managing Urban Shallow geothermal Energy) showed how their projects contribute.

The GeoERA-Energy team looked back on a successful webinar and discussion with contributions from key-note presenters, project leads, UNECE representative Hari Tulsidas and participants (questions/online polls). The following conclusions can be drawn:

- Geothermal energy, CO2 storage and energy storage are key topics for geo-energy in the Horizon Europe research agenda and the transition to zero-carbon, flexible, sustainable and affordable energy systems;
- Geothermal energy is and remains important in the EU research scene;
- CCS is seen to get increasing support again;
- Energy storage is still an upcoming theme with hydrogen storage and thermal storage as most prominent technologies;
- Besides these topics, the participants of the webinar indicated a long and varied list of generic aspects that could be considered in the scope of geo-energy research including raw materials supply (energy technologies), efficient resource management, public involvement, etc.;
- Important synergies with other R&I partnerships (presented by CETP) are: 1) Subsurface data and understanding for energy technologies, 2) Safe operation, 3) Characterization methodologies and 4) Monitoring methodologies;
- Policy support and spatial planning are perceived as key for subsurface research by the Geological Surveys; they have an important contribution to research (including past and present projects);
- Access to public and harmonized data and knowledge is mentioned as key elements by the participants. This is an essential enabler for geo-energy R&I and policy support.

6 WEBINAR 5: GROUNDWATER

Dominique Darmendrail (BRGM, EP-Water4All) came straight to the point. Water: always too much, too little, too polluted, too demanded, too expensive... Problems with water quality are not only limited to poor countries; they have global dimensions and impact directly on health, agriculture and the environment. They also slow down the economic growth and are at the root of many conflicts. Water consumption will increase significantly in the coming years, especially in developing countries, related to increased electricity production and industrial growth.
Dominique clarified the planning and scheduling of Water4All; how this is incorporated in the development of their Strategic Research and Innovation Agenda and how it fits with the objectives of the European Green Deal. She showed the share of groundwater in the hydrological cycle and how groundwater plays a role in the mitigation of climate change effects. Particularly in this area, there are big opportunities to join forces with the future Geological Service for Europe.



*Klaus Hinsby (*GEUS) theme coordinator groundwater in GeoERA, elaborated on this and showed how water is interconnected and related to many policies and guiding principles at European and global scale e.g.:

- the European Green Deal,
- the 17 UN Sustainable Development Goals
- the Horizon Europe Cluster on "Food, bioeconomy, natural resources and the environment" including the Water4All Partnership candidate
- The five Horizon Europe Mission areas: Climate change adaptation, cancer, soil health and food, climate neutral and smart cities and healthy oceans, seas, coastal and inland waters

- The 10 Planetary Boundaries (Steffen et al., 2015, Gleeson et al., 2020)

Next, the four HOVER (groundwater quality and vulnerability to pollution), RESOURCE (pan-EU groundwater resources map), TACTIC (Groundwater and climate change) and VoGERA (groundwater vulnerability to deep energy related activities) project leaders showed how their projects contribute to meet these and other challenges ahead.

When the audience was asked during the panel discussion to identify keywords for the most important research challenges, the following appeared the most: Groundwater quality and quantity, climate change, vulnerability, contamination and ecosystems. When asked to rank predefined topics the following three were ranked highest: 1) groundwater quality, 2) climate change, 3) water-energy-food-climate-ecosystem-health nexus.
Klaus looked back and stated that in general the GeoERA groundwater webinar panel discussions and polling session revealed that the four GeoERA groundwater projects contribute to all the most eminent groundwater research, innovation and management needs; the GeoERA groundwater products cover the needs of the European Commission as originally defined in the call text for an ERA-NET on Applied Geoscience. Further, the panel discussions confirmed that EuroGeoSurveys support for developing the new UNFC groundwater resources classification system, initiated at the UNECE Resources Management week, May 2019 and currently on-going, is highly appreciated.