38 GEOLOGICAL SURVEYS ORGANISATIONS FROM ACROSS EUROPE

A WORKFORCE THAT INCLUDES THOUSANDS OF GEOSCIENTISTS AT THE SERVICE OF EUROPEAN CITIZENS

PIONEERING RESEARCH FOR SOCIETY’S BENEFIT SINCE 1971
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EXECUTIVE SUMMARY

EuroGeoSurveys (EGS) and its Secretariat made significant progress in implementing the EGS Strategy during 2019 and 2020. This included consolidating and refining the Strategy, supporting members, and liaising with EU institutions such as the European Commission. EGS also made necessary statutory updates and continued to assist members in project engagement, including connecting with EU institutions and promoting international cooperation.

Several important projects were launched or continued during this time, including GeoERA, the European Geological Data Infrastructure (EGDI), and the Global Earth Observation System of Systems for Europe (EuroGEOSS). EGS also successfully launched the Pan-African Support to the EuroGeoSurveys-Organisation of African Geological Surveys (EGS-OAGS) Partnership, Mineral Resources in Sustainable Land-Use Planning (MINLAND), and other projects with funding from the European Commission.

The interactions and synergies among the EGS Expert Groups increased significantly during 2019 and 2020, with successful pan-European projects developed together. Relationships were also maintained and strengthened with EU institutions, international organizations, and other geological surveys around the world.

Overall, EGS's collaborative approach and leading role in providing geoscience for society in Europe have been recognized as an added value to the European Union's Open Science strategy.
MISSION

EuroGeoSurveys (EGS) is a European geological organisation that provides public Earth science knowledge to support the EU’s competitiveness, social well-being, environmental management and international commitments. By providing technical advice in the field of geoscience to the European Institutions, EuroGeoSurveys contributes to shaping more effective policies and regulations for the benefit of society.

EGS represents 38 national Geological Surveys in Europe, an overall workforce of several thousand experts. Since 1971 we have combined and coordinated the expertise of our members to support the direct interests of the European Union and the European Free Trade Association. Today we are the leading technical advisory body to the EU Institutions in the field of geosciences.

From 2020, EGS offers a unique gateway to unbiased and seamless subsurface data at European level. EGS has established a common European Geological Knowledge Base, a foundational component of a future Geological Service for Europe, which we are working toward through the EGS Strategy action plan, built around three pillars:

1. Developing a joint research programme with a focus on EU policy;
2. Harmonizing, sharing and providing pan-European geological data;
3. Sharing knowledge, capacities and infrastructure.

Our strength is based on the work carried out by the EGS Expert Groups, which integrate geoscientific information, knowledge and expertise from the National Geological Surveys in the following fields:

- Earth Observation – GeoHazards
- GeoEnergy
- Geochemistry
- Geological Mapping and Modelling
- International Cooperation and Development Task Force
- Marine Geology
- Mineral Resources
- Spatial Information – INSPIRE
- Urban Geology
- Water Resources

As Europe is currently facing a number of grand challenges, with special regard to economic growth, climate change, safety of environment, and demand for adequate water and food supplies, Europe’s need for reliable scientific data on geological resources grows exponentially. Moreover, as noted by the European Parliament\(^1\), there is a clear and urgent necessity for a common European Geological Service to support national and EU institutions in effective policy- and decision-making. Our experts answer daily questions, such as: Will Europe’s industries remain dependent on imports of critical raw materials or can we supply this demand with our own resources? or, How can we mitigate the effects of climate change and develop a European strategy?

The EU is well aware that securing a sustainable supply of raw materials will be essential in meeting demand and maintaining and stimulating economic growth. At the same time, understanding the relationship between climate and natural hazards such as floods, droughts, land subsidence, and landslides becomes increasingly important. Knowledge of the subsurface is also of vital importance in reducing CO\(_2\) release into the atmosphere, locating where and to what extent CO\(_2\) can be safely stored in the subsurface. These are just some of the topics EGS works on through a coordinated network of European experts.

\(^1\) European Parliament report ‘On an effective raw materials strategy for Europe’ (2011/2056(INI))
WE ARE ACTIVE IN:

**Earth Observation - GeoHazards**
- Satellite, airborne and ground-based Earth observation for geoscience
- Mapping, characterising and monitoring areas exposed to geohazards
- Geoscience contributions to EC Global Monitoring for Environment & Security
- Global Earth Observing System of Systems for Disasters, Energy & Geo-resource

**GeoEnergy**
- Exploration and assessment of fossil energy sources
- Development of renewable geothermal energy water resources
- Climate change and carbon capture and storage
- Paleoclimates and paleogeography
- Storage of CO$_2$ in geological formations
- Impacts of climate change

**Geochemistry**
- Distribution of natural backgrounds and anomalies in rocks, sediments, soil and water
- Exploration for energy and mineral resources
- Support to land-use planning and public health policies

**International Cooperation and Development**
- International cooperation with a focus on North America and Africa: European data available for the African Geological Surveys
- Collaboration with Latin America and Asia

**Marine Geology**
- Marine Geology database
- Sedimentological, geochemical, geophysical and paleontological information of the ocean floor and coastal areas
- Exploration for energy and mineral resources
- Environmental protection
- Marine geological information as a basis for marine spatial planning

**Mineral Resources**
- Exploration, characterisation and exploitation of mineral deposits
- Mineral economics and statistics
- Environmental protection around mine site and post-closure mitigation

**Spatial Information - INSPIRE**
- Technical strategy to guarantee adequacy of infrastructure developments in the context of global spatial information infrastructures, e.g. INSPIRE, GEOSS, One Geology.
- Global consistency in the definition, management, and delivery of spatial information to provide harmonized services at European scale.

**Water Resources**
- Characterisation of groundwater bodies and their recharge area
- Groundwater resources exploration, exploitation, management and protection
- Pollution mitigation and remediation

**Urban Geology**
- Integrated Geo City Information Modelling
- Geo-environmental pressures in urbanised catchments
- Geoscience communication for cities and citizens
KEY PEOPLE
2019 - 2020
WORKING TOGETHER TO REACH OUR GOALS
### EGS SECRETARIAT 2019

**STAFF COMPLEMENT**

- Slavko Solar
- Céline Andrien
- Laura Sanz
- Patrick Wall
- Jelena Vidovic (Jan-Oct)
- Anthea Sutherland
- Erika Maugeri
- Krishnan Subramani Ramakrishnan

### EGS SECRETARIAT 2020

**STAFF COMPLEMENT**

- Slavko Solar
- Céline Andrien
- Laura Sanz
- Patrick Wall
- Laura Quijano Gaudes
- Erika Maugeri
- Krishnan Subramani Ramakrishnan
KEY PERSONS OF YEAR 2019 & 2020

Expert knowledge at the disposal of all European citizens, institutions, companies, media and universities.

THE EXECUTIVE COMMITTEE is the primary decision-making body. It implements the strategy formulated by the General Assembly of Members and makes proposals for future actions. THE SECRETARY GENERAL is responsible for the day-to-day operational management and administration of EGS, contacts with the European Commission and other third parties, managing the budget and carrying out the activities agreed by all Members.

YEAR 2019

- President
  Zdenek Venera
  Czech Geological Survey

- Vice President
  Olivier Lateltin
  Swiss Geological Survey

- Treasurer
  Tirza van Daalen
  Geological Survey of the Netherlands

- Member
  Flemming Larsen
  Geological Survey of Denmark and Greenland

- Secretary General
  Slavko Solar

YEAR 2020

- President
  Zdenek Venera
  Czech Geological Survey

- Vice President
  Olivier Lateltin
  Swiss Geological Survey

- Treasurer
  Tirza van Daalen
  Geological Survey of the Netherlands

- Member
  Flemming Larsen
  Geological Survey of Denmark and Greenland

- Secretary General
  Slavko Solar
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Director General, Continental Shelf
Department Office of the Prime Minister

THE NETHERLANDS
Tirza van Daalen
Director, Geological Survey of the Netherlands

NORWAY
May Britt Myhr
Director, Geological Survey of Norway

POLAND
Mateusz Damrat
Director, Polish Geological Institute – National Research Institute

PORTUGAL
Teresa Ponce de Leão
President, Laboratório Nacional de Energia e Geologia

Machado Leite
Director, Laboratório Nacional de Energia e Geologia

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Stefan Marincea,
General director, Geological Institute of Romania

REPUBLIC OF NORTH MACEDONIA
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Director, Geological Survey of Macedonia

RUSSIAN FEDERATION
Oleg Petrov
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SERBIA
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Director, Geološki zavod Srbije

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SERBIA
Sergii I. Prymushko
Director, Geoinform of Ukraine

UNITED KINGDOM
Karen Hanghøj
Executive Director, British Geological Survey
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Ministry for Finance and Employment

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UNITED KINGDOM
Karen Hanghøj
# National Delegates - 2019

National Delegates are the contact points for each Geological Survey.

<table>
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<th>Country</th>
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<td>Albanian Geological Survey</td>
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**NATIONAL DELEGATES - 2020**

National Delegates are the contact points for each Geological Survey.

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<tr>
<th>Country</th>
<th>Delegate</th>
<th>Contact Details</th>
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<tr>
<td>Albania</td>
<td>Elisa Prendi</td>
<td>Albanian Geological Survey</td>
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<td>Austria</td>
<td>Hans-Georg Krenmayr</td>
<td>Geological Survey of Austria</td>
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<td>Belgium</td>
<td>Kris Piessens</td>
<td>Geological Survey of Belgium</td>
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<td>Bosnia &amp; Herzegovina</td>
<td>Hazim Hrvatovic</td>
<td>Geological Survey of Federation of Bosnia and Herzegovina</td>
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<td>Croatia</td>
<td>Željka Brkić</td>
<td>Hrvatski Geološki Institut – Croatian Geological Survey</td>
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<tr>
<td>Cyprus</td>
<td>Christodoulos Hadjigeorgiou</td>
<td>Ministry of Agriculture, Natural Resources and Environment, Geological Survey Department</td>
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<tr>
<td>Czech Republic</td>
<td>Ivana Svojtkova</td>
<td>Czech Geological Survey</td>
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<td>Denmark</td>
<td>Jørgen Tulstrup</td>
<td>Geological Survey of Denmark and Greenland</td>
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<td>Sten Suuroja</td>
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<td>Asko Käpyaho</td>
<td>Geological Survey of Finland</td>
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<td>France</td>
<td>Pierre Nehlig</td>
<td>Bureau de Recherches Géologiques et Minières</td>
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<tr>
<td>Germany</td>
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<td>Bundesanstalt für Geowissenschaften und Rohstoffe</td>
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<td>Germany</td>
<td>Renate Taugs</td>
<td>Geologisches Landesamt Hamburg</td>
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<td>Kostas Laskaridis</td>
<td>Hellenic Survey of Geology and Mineral Exploration</td>
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<td>Luca Guerrieri</td>
<td>Istituto Superiore per la Protezione e la Ricerca Ambientale</td>
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<td>Italy – Emilia Romagna</td>
<td>Michela Grandi</td>
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**CHAIRMANSHIP AND DEPUTY-CHAIRMANSHIP OF THE EGS EXPERT GROUPS - 2019**

**EARTH OBSERVATION AND GEOHAZARDS EXPERT GROUP (EOEG)**
Chair: Gerardo Herrera (IGME, Spain)
Deputy Chair (for GEOSS Programme and EO raw materials Sub-Group): Veronika Kopackova (CGS, Czech Republic)
Deputy Chair (for GeoHazards): Eleftheria Poyiadji (H.S.G.M.E, Greece)
Deputy Chair (for Earth Observation): Maria Przyłucka (PGI-NRI, Poland)

**GEO-ENERGY EXPERT GROUP (GEEG)**
Chair: Serge van Gessel (TNO, Netherlands)
Deputy Chair (for Geoenergy and CCS): Kris Piessens (GSB, Belgium)
Deputy Chair (for Fossil Fuels): Peter Britze (GEUS, Denmark)
Deputy Chair (for Geothermal Energy): Annamária Nádor (MBFSZ, Hungary)

**GEOCHEMISTRY EXPERT GROUP (GEG)**
Chair: Philippe Négrel (BRGM, France)
Deputy Chair: Jasper Griffionen (TNO, Netherlands)
Deputy Chair: Anna Ladenberger (SGU, Sweden)

**INTERNATIONAL COOPERATION AND DEVELOPMENT TASK FORCE (ICDTF)**
Chair: Diana Ponce de León (IGME, Spain)
Deputy Chair: Fabian Helms (BGR, Germany)

**MARINE GEOLOGY EXPERT GROUP (MGEG)**
January 2019 – March 2019
Chair: Henry Vallius (GTK, Finland)
Deputy Chair: Sytze van Heteren (TNO, Netherlands)

**APRIL 2019 – DECEMBER 2019**
Chair: Sytze van Heteren (TNO, Netherlands)
Deputy Chair: Teresa Medievaldea Cela (IGME, Spain)

**MINERAL RESOURCES EXPERT GROUP (MREG)**
Chair: Daniel Oliveira (LNEG, Portugal)
Deputy-Chair: Sebastian Pfleiderer (GBA, Austria)
Deputy-Chair: Henrik Sievers (BGR, Germany)
Deputy-Chair: Henrik Schiellerup (NGU, Norway)

**SPATIAL INFORMATION EXPERT GROUP (INSPIRE)**
January 2019 – March 2019
Chair : François Robida (BRGM, France)
Deputy Chair: Jørgen Tulstrup (GEUS, Denmark)
Deputy Chair: Jasna Šinigoj (GeoZS, Slovenia)

**APRIL 2019 – DECEMBER 2019**
Chair : Dana Čápová (CGS, Czech Republic)
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Deputy Chair: Jasna Šinigoj (GeoZS, Slovenia)

**URBAN GEOLOGY (UGEG)**
Chair: Stephanie Bricker (BGS, United Kingdom)
Deputy Chair: Krzysztof Majer (PGI-NRI, Poland)
Deputy Chair: Martin Smith (BGS, United Kingdom)

**WATER RESOURCES EXPERT GROUP (WREG)**
Chair: Klaus Hinsby (GEUS, Denmark)
Deputy Chair: Laurence Gourcy (BRGM, France)
Deputy Chair: Hans-Peter Broers (TNO, Netherlands)
Deputy Chair: Anna Kuczyńska (PGI-NRI, Poland)
CHAIRMANSHIP AND DEPUTY-CHAIRMANSHIP OF THE EGS EXPERT GROUPS - 2020

EARTH OBSERVATION AND GEOHAZARDS EXPERT GROUP (EOEG)
January 2020 – June 2020
Chair: Gerardo Herrera (IGME, Spain)
Deputy Chair: Veronika Kopackova (CGS, Czech Republic)
Deputy Chair (for GeoHazards): Eleftheria Poyiadji (H.S.G.M.E, Greece)
Deputy Chair (for Earth Observation): Maria Przyłucka (PGI-NRI, Poland)

July 2020 – December 2020
Chair: Eleftheria Poyiadji (H.S.G.M.E, Greece)
Deputy Chair (for Remote sensing and geoscience data): Lídia Quental (LNEG, Portugal)
Deputy Chair (for Investigations and monitoring of geohazards): Mateja Jemec Auflič (GeoZS, Slovenia)
Deputy Chair: (for Socioeconomic impact of geohazards): Rosa María Mateos (IGME, Spain)

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THE SHAPE OF OUR BUSINESS 2019
Earth Observation and Geohazards Expert Group

Number of EOEG Members: 86

Chair: Gerardo Herrera (IGME, Spain)
Deputy Chair: Veronika Kopackova (CGS, Czech Republic)
Deputy Chair (for GeoHazards): Eleftheria Poyiadji (H.S.G.M.E, Greece)
Deputy Chair (for Earth Observation): Maria Przyłucka (PGI-NRI, Poland)

1. Executive Summary

The Earth Observation and Geohazards Expert Group (EOEG) participated in U-Geohaz and E-SHAPE H2020 projects and submitted two new H2020 project proposals to different calls. The EOEG landslide density map of Europe and the damaging landslide database 2015-2017 was published by the Emergency Response Coordination Centre (ERCC) of the European Commission.

The work made by the Landslide working group “Integration of landslide hazard into urban planning across Europe” was accepted for publication in the Journal Landscape and Urban Planning. During the EOEG annual meeting, hosted by the Geological Survey of Greece in Athens, a workshop on landslide hazard and training on Earth Observation tools took place.

2. Mission and vision

The mission and vision of EOEG is twofold: to improve geoscience knowledge exploiting the full range of Earth Observation tools and to evaluate the impact of geohazards in Europe through the harmonization and upgrading of national databases and the application of innovative mapping, monitoring and modeling techniques and methods across Europe.

3. Scope and focus

The scope and focus of EOEG are twofold: landslide and subsidence mapping, monitoring and modelling at different scales from local to European and the application of remote sensing (radar, optical, hyperspectral and thermal) for geohazards monitoring, mineral exploration and assessing the impact of mining activity.

4. Achievements 2019 - Activity report

4.1. EOEG activities:

e) EOEG workshop on science topics and EOEG annual meeting in Athens, 7/06/2019.
g) Submission of H2020 project proposal REStoGEO - improving RESilience of societies to GEO-hazards, with the involvement of 9 Geological Surveys to the call H2020-SU-SEC-2019, 22/08/2019.

4.2. Landslide working group activities:

a) Report submission to DG ECHO: Recent damaging landslides reported by the Geological Surveys of Europe. Grant Agreement No. 783169 U-Geohaz – “Geohazard impact assessment for urban areas”, 05/02/2019.

b) Publication of EGS landslide density at DG ECHO Emergency Response Coordination Centre (ERCC) of the European Commission, Brussels, 18/02/2019


4.3. EOEG Projects:

a) H2020 U-Geohaz project: Geohazard impact assessment for urban areas. Closure year activities.


4.4. GEO:

a) GEO-XVI EGS poster elaboration.

5. Future perspectives

EOEG will continue participating in H2020 E-SHAPE project.

The Landslide working group will continue its activities regarding landslide hazard analysis in Europe, even though additional funding must be sought to provide continuity.

Next EOEG annual meeting to be held in June 2020, will be hosted by the Geological Survey of Serbia in Belgrade.
Geo-Energy Expert Group

Number of GEEG Members: 59

Chair: Serge van Gessel (TNO, Netherlands)
Deputy Chair (for CCS): Kris Piessens (GSB, Belgium)
Deputy Chair (for Fossil Fuels): Peter Britze (GEUS, Denmark)
Deputy Chair (for Geothermal Energy): Annamária Nádor (MBFSZ, Hungary)

1. Executive Summary

The 2019 activities of the Geo-Energy Expert Group (GEEG) mainly focused on GeoERA and supporting the third pillar of EGS strategy. The GEEG works on the renewal of its strategic agenda and raising its profile within the EC.

2. Mission and Vision

GEEG initiates and coordinates collaborative activities by its members to provide and publish impartial, scientifically robust and harmonized information and expertise to advance the understanding of fossil fuel and geothermal energy resources, and CO₂ and energy storage capacities in Europe. This information is used to analyze and facilitate possibilities for responsible and sustainable use of geoenergy resources in Europe, thereby contributing to securing access to energy in Europe.

3. Scope and Focus

The current scope and main focus for the Geo-Energy Expert Group is the initiation and execution of research projects that were submitted under the GeoERA programme in January 2018. Under this programme, GEEG collaborates with the other expert groups, in particular WREG, MREG and SIEG. Upon the ranking and selection of the project proposals (external expert panel), the project activities shall be carried out from mid-2018 until mid-2021. The results will support the establishment of a sustained future geological service for Europe.

4. Achievements 2019 - Activity report

4.1. Annual meeting:

The GEEG held its annual meeting of 2019 on March 13th at GBA (Vienna). The meeting was held back-to-back with a GeoERA-technical workshop (11-12/03/2019). The meeting focused on elaborating the strategic roadmap of the GEEG group and the definition of the Key Performance Indicators as requested by EGS secretariat.

4.2. Research activities:

a) In 2018 the partners in GEEG and other national/regional surveys were involved in the establishment of 6 GeoERA projects: GARAH, HOTLIME, MUSE, HIKE, 3DGE0-EU and GeoConnect3d, beginning in July 2018. Besides the scientific research work, partners frequently engaged in workshops, fieldwork and other project related events since then. At the end of 2019 the projects began preparing for the GeoERA midterm event in Ljubljana (17-20/03/2020).

b) In general research activities at partner surveys focus on topics including 3D modelling, hydrocarbons, CCS, geothermal, energy storage, subsurface spatial planning and management, and induced risk/hazard assessment. These topics are covered in several joint collaborative projects and national programs. GEEG Members are involved in EU / Interreg projects and cooperations including GeoPlasma-CE, DarlingE and ENOS.

c) GEEG actively investigates future opportunities for EU research. During the previous bi-annual meetings in Ljubljana and Vienna, the members
made an inventory of key research topics for EGS-GEEG and related these inputs to the various EC institutions and the programming of the upcoming Horizon Europe Programme. The information is included in the latest documents established by the Horizon Europe – Task group. GEEG supports the establishment of the Geological Service for Europe.

d) GEEG contributed the latest state of art to the proposal for the European Partnership on Geological Service for Europe.

4.3. Workshops, exposure and policy events:

a) GEEG submitted two session proposals for the European Sustainable Energy Week 18-20 June in Brussels (one on GeoPlasma-CE and one more general for GEEG). The GeoPlasma-CE proposal was granted and successfully organized and convened by Gregor Goetzl (https://www.eusew.eu/geothermal-energy-meeting-financial-and-technical-challenges).

b) GEEG co-organized the European workshop on underground energy (UES) storage with ENERG, FluidSTORY project and BRGM in Paris on 7-8 November 2019. It was a big success with more than 130 registered participants from 23 countries, 28 oral presentations, 2 panel debates and 16 posters the event proved UES to be a “hot” topic of these days. http://www.energnet.eu/ewues-presentations

c) GEEG supports an EGEC shallow geothermal energy summit in Brussels, 24 - 25/09/2019.

d) GEEG presented a keynote presentation on Underground Energy Storage during the Danube Region Energy Event in Hungary-Budapest (organized by the Hungarian Ministry).

e) GEEG is represented as Local Advisory Committee member for the organization of the EAGE-2020 conference in Amsterdam.

4.4. Coordination and structure:

Currently the coordination structure of GEEG is under revision. New positions for co-chairs are to be fulfilled.

5. Future perspectives

2019 Planned events (preliminary list):

- GeoERA Mid-Term event and workshops in Ljubljana (17-20 March)
- A proposal was submitted for a session at the European Sustainable Energy Week in Brussels (June 22-26).
- A GEEG position paper on Energy Storage is being prepared. The current plan is to present the paper to the EC at the European Sustainable Energy Week.
- European Geoscience Union: presentations of GeoERA projects at EGS session
- The second bi-annual GEEG meeting is considered for the autumn of 2020.
- Possible stakeholder events in conjunction with GeoERA projects
- Supporting the EP-GSE.

GEEG members will continue their activities towards supporting the EGS strategy pillars and raising the profile in the EC. Activities are organized in close cooperation with the EGS secretariat and ExCom.
1. Executive Summary

The 2019 activities of the EuroGeoSurveys Geochemistry Expert Group (GEG) were:

a) Publication of papers and presentations in conferences using results from the FOREGS Geochemical Atlas of Europe, European Groundwater Geochemistry (EGG), Geochemistry of Agricultural and Grazing land soil (GEMAS), and Urban Geochemistry (URGE) projects.

b) Discussion of ideas for developing pan-European geochemical projects of interest to policy makers, the scientific community, and the public.

c) Preparation of the GEMAS on-line version, and

d) The 2019 two-day autumn annual joint business meeting of the EuroGeoSurveys Geochemistry Expert Group (EGS-GEG) and the IUGS Commission on Global Geochemical Baselines (IUGS-CGGB) was held on the 26th and 27th September 2019 and hosted by the Mining and Geological Survey of Hungary, Budapest.

2. Mission and vision

Sound scientific data must be in the forefront for planning and political decision-making. The mission of GEG is, thus:

a) To provide high quality geochemical data of near-surface materials, which affect directly or indirectly our quality of life.

b) To develop harmonised geochemical databases for multi-purpose use: “one project – many customers”.

c) To offer independent non-biased expert advice to the European Commission, and to supply sound geochemical background data to scientists for their research, and to the public in general, for education and other applications (e.g., land use planning, agriculture, remediation).

d) Results from all completed projects are relevant for various European Commission Directives and EU international commitments.

3. Scope and focus

The focus of GEG is on the execution of pan-European applied geochemical projects using harmonised and quality-controlled procedures of sampling, sample preparation, and laboratory analysis to produce high-quality data for multipurpose use. The scope is to bring under the same umbrella applied geochemists with various specialties (e.g., environmental, mineral exploration, ground water) from all EGS member institutions, and to act as a forum for the exchange of expertise and to work together to deliver high quality professional products and services to European Union countries.

4. Achievements 2019 - Activity report

4.1. GEG projects:

a) GEMAS: (i) The presentation of results in conferences; (ii) writing of articles on different aspects of the GEMAS project; (iii) preparation of the 4th GEMAS quality control report; (iv) preparation of a new GEMAS website by BGR (all geochemical maps in different formats will be available in the BGR Geoviewer and, of course, all the GEMAS data
sets); (v) development of an internet viewer for the GEMAS data sets under Public Data Viewer Series by the Geological Survey of Ireland, and (vi) GEMAS data are included on the EGDI/GeoERA portal (under preparation by GEUS); (vii) additional mineralogical determinations on the agricultural and grazing land soil samples, and (v) continued work on the interpretation of magnetic properties, and complete magnetic profiles that were measured at the University of Kazan, Russia.

b) URGE: After publication of a series of papers on urban geochemical projects in a Special Issue of the Journal of Geochemical Exploration (vol. 187), the current activity is to produce a certified standard for urban geochemical soil studies (ongoing sample preparation by the Geological Survey of Slovakia).

4.2. Involvement in European Commission co-financed projects:

a) The INTERREG Danube Transnational Programme (SIMONA: Sediment-quality Information, Monitoring and Assessment System to support transnational cooperation for joint Danube Basin water management). The main objective of SIMONA is to respond to the current demand for the effective and comparable measurements and assessments of sediment quality in surface waters in the Danube River Basin. The FOREGS and GEMAS data will be used in this project. http://www.interreg-danube.eu/approved-projects/simona.


d) AgriAs (Evaluation and management of Arsenic contamination in agricultural soil and water) - The FOREGS and GEMAS maps, databases and publications have been used in the AgriAs project lead by the Geological Survey of Finland. http://projects.gtk.fi/AgriAs/.


f) Explora – ALENTEJO 2020 – Regional H2020 - EXPLORA/Alentejo2020-Op ALT20-03-0145-FEDER-000025 Project is funded by Alentejo2020/Portugal2020+ European Regional Development Fund/ERDF. The project is about improving the knowledge of the vectors of exploration at Neves Corvo mining site in 3D with the aim to have evidence of new mineralised bodies. http://www.lneg.pt/iedt/projectos/582/.

g) FRAME - Forecasting and assessing Europe’s strategic critical raw materials (CRM) needs – GeoERA. http://www.frame.lneg.pt/.

h) PERFORM - “Improving Geothermal System Performance through collective Knowledge Building and Technology Development” (website under construction). The work in PERFORM focuses on implementation and evaluation of capabilities to control mineral scaling, particles clogging, corrosion, and temperature/stress related effects of geothermal flow and injectivity.

i) ERANETMED/1114/02 Cr (VI) Impacted water bodies in the Mediterranean: Transposing management options for Efficient water Resources use through an Interdisciplinary Approach.

j) INFRASTRUCTURES/1216/09 - BIOMERA - Platform for Biosciences and Human Health in Cyprus: MicroCT Enabled and Synchrotron Radiation Enabled Analyses.

k) CircVol project - good practices for application of CDWs and industrial side products in infrastructure building. This project is partly funded by EU Regional Development Fund and lead by Turku Science Park.

m) HEATSTORE: Demonstration and improvement of techniques for high-temperature aquifer thermal energy storage.

n) EURAD: EJP on disposal of radioactive waste; the project studies the redox reactivity of clay minerals in relation to redox-sensitive radionuclides as Se.

o) ENOS: Groundwater and soil monitoring in relation to CCS.

p) EU HBM4EU human biomonitoring project, i.e., looking at health risks from metals.

q) PERFORM: Establishment of transnational database on injectivity problems at geothermal doublets, specifically related to geochemistry and formation water chemistry.

r) SECURE: Groundwater monitoring for shale gas exploitation and CCS, including gas monitoring and impact on microbiological communities.

s) SEAMOUNT: Development of new methods and technologies to discover submarine groundwater discharge.

t) GeoERA HOVER: Addressing groundwater management issues related to drinking water, human and ecosystem health caused by both geogenic elements and anthropogenic pollutants.

u) UpDeep: Development of a new geochemical toolset for mineral exploration to discover previously unknown mineralisation. The project provides means for geochemical exploration in all sensitive terrains of Europe. The surface geochemical techniques considered are based on sampling of upper soil horizons and plant organs.

4.3. Participation in regional projects and other research activities:

a) Urban geochemistry surveys (Prague in Czech Republic; Turku in Finland; Budapest in Hungary; Maribor in Slovenia)

b) HazArctic project: GTK is participating in the HazArctic (Geo-Bio Hazards in the Arctic Region) project in which soil geochemical mapping methods are applied in the identification of acid sulphate soil in the Barents region. HazArctic is a co-operation project between Geological Surveys from Finland, Sweden and Norway (GTK, SGU, NGU), Natural Resources Institute Finland (LUKE), as well as Geological Institute and Mining Institute from the Federal Research Centre “Kola Science Centre of the Russian Academy of Sciences”.

c) About 2,500 solid samples for several international projects (e.g., CASE, NOGRAM: Norway, Denmark, Canada, United States) have been analysed for Polar Geology and Marine Geology by BGR (Germany).

d) BGR has analysed about 1,500 rock samples from Chile, Brazil, Mexico and Egypt for the research of different mineral deposits.

e) BGR carries out a soil mapping project in Cameroon (soil sampling and laboratory set up; financed by the German Ministry of Cooperation and Development with 2.5 Million Euro); analysis of 500 soil samples.

f) Analysis of Au and PGE in the stream sediment samples of the former German Geochemical atlas (950 samples).

g) **Terra Soil project**: A collaborative research project of Geological Survey Ireland and Teagasc (Ireland’s agriculture agency) to produce new agricultural advice on trace elements and nutrient availability using the Tellus geochemical sample archive, field observations and geochemical data.

h) Soil Recovery Sites Project: Geological Survey Ireland and Ireland’s Environmental Protection Agency working together to establish geochemically appropriate criteria for the acceptance of excavated subsoil into unlined quarry voids, using baseline geochemical data from the National Soil Database and Tellus.

i) Mineral Prospectivity Mapping: A new initiative is being established between Geological Survey Ireland and the Irish Centre for Research in Applied Geosciences (iCRAG) to use baseline geochemical (Tellus) and historical exploration data together with other relevant geological data to produce Mineral Prospectivity Products for Ireland’s Carboniferous midlands and orogenic gold mineralisation models.

j) National project "Rehabilitation of industrial sites and contaminated land No. 05.6.1-APVA-V-020" using EU Funds according the 5th Priority of the 2014-2020 Investment framework; the work involves expertise and supervision of geochemical and hydrochemical investigations of...
potentially contaminated sites and control investigations after recultivation in Lithuania.

k) PLANAGEO (carried out by LNEG, Portugal) – the geological, geochemical and geophysical mapping of one third of the Angolan territory for mineral resources purposes and support of the Geological Survey of Angola. Study in detail areas of mineral resources, metallic and non-metallic. Supervision and writing of Mineral resources descriptions and explanatory notes in the geological mapping of Angola at a scale of 1:250,000.

l) Geochemical mapping at a scale of 1:500,000 using overbank and stream sediment in Serbia.


n) A regional stream sediment geochemical sampling survey is being carried out in the Iberian Geological Domain Ossa-Morena (6,000 km²) in the north-west of Andalusia for mineral exploration purposes.

o) Regional till geochemical mapping in Bergslagen, Central Sweden.


q) Pb and Cd in private wells in Skåne, southern Sweden (collaboration with Skåne County and Occupational and Environmental Medicine at Lund University).


s) The United Kingdom stream sediment geochemical atlas has been published: http://nora.nerc.ac.uk/id/eprint/524956/.

t) Phosphate chemistry during exfiltration of nutrient-rich groundwater in clay polders (The Netherlands).

u) Biogeochemistry of mud in relation to creating wetlands from lakebed sediments (The Netherlands).

v) Feasibility of continuous XRF core scanning for environmental geochemical characterisation of Caenozoic sediments.

w) Monitoring protocol for potential leakage of methane at abandoned oil and gas wells in The Netherlands.

x) Biogeochemistry of nitrate in groundwater and coupling to air-borne geophysics. Subsurface nitrate reduction architecture (The Netherlands).

y) Arsenic geochemistry – mobilisation in groundwater and mitigation measures including development of new technologies for cleaning of drinking water (The Netherlands).

z) Outside funding source: Eurometaux is still interested to partially finance a surface and spring water geochemistry project of Europe based on low-density sampling (like GEMAS, i.e., up to 30% of the funds come from Eurometaux). The problem is to find another financing source.

4.4. Offering expert advice:

a) Lithuania: National representative in the EU expert group on Soil protection at EC DG Environment and NRC for Soil at the EEA EIONET.

b) United Kingdom: Member of the United Nations Food and Agriculture Organisation (FAO) Global Soil Laboratory Network (GLOSOLAN) Technical Working Group.

c) Sweden: Committee work on Cadmium strategy for Sweden led by the Toxicological Council by the Swedish Chemicals Agency.

d) International involvement: Members of the EGS-GEG are involved in the writing or review of two manuals, which are being compiled by the IUGS Commission on Global Geochemical Baselines, namely:
“International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network” (on-going), and

“International Union of Geological Sciences Manual of Standard Geochemical Methods for the Global Black Soil Project”. This manual was completed and submitted to the IUGS Executive Committee for ratification at its 74th meeting in Busan (South Korea) in mid-January 2020.

4.5. Conferences:

a) **Hellas**: The IUGS-CGGB in collaboration with the GEG and the Society of Environmental Geochemistry and Health (SEGH) organized a Special Session on “Geochemical mapping for environmental and resource management” on the occasion of the 15th International Congress of the Geological Society of Greece, Athens, Hellas, 22-24/05/2019 (https://www.gsg2019.gr/). The special session was held on 23/05/2019. In total, there were two keynote lectures, ten oral presentations and eleven poster presentations.

b) The GEG keynote presentation “GEMAS: Geochemistry of European soils for producing good quality food” by Anna Ladenberger (GEG Deputy Chair) and delivered by Philippe Negrel (GEG Chair).

c) Oral presentations delivered by GEG members were:


- Soil Geochemical Baselines of Ni on a Continental, National and Local Scale. T. Hatakka, T. Tarvainen.


- The global sustainability of high-temperature aquifer thermal energy storage as indicated by LCA and CED analysis. Jasper Griffioen, Jacques Werner, Joris Koornneef. EGU2019-6080


- Tile drains as efficient phosphorous traps during exfiltration of phosphate rich groundwater. Alwina Hoving, Erica Caverzam Barbosa, Joris Dijkstra, Jasper Griffioen. EGU2019-9491


- SEGH 2019: 35th International Conference on Geochemistry and Health, 1-5/07/2019, Manchester Metropolitan University (https://www2.mmu.ac.uk/segh-19/): Towards spatial machine
learning for data analytics in environmental geochemistry in the big data era. Chaozheng Zhang using GEMAS data - refer above to the paper by Xu et al. (2019)

- SEGH 2019: 35th International Conference on Geochemistry and Health, 1-5/07/2019, Manchester Metropolitan University (https://www2.mmu.ac.uk/segh-19/): SEM/EDS characterisation of metal-bearing particulate matter deposited in snow in an urban area. Martin Gaberšek, Mateja Gosar

- City Futures VI conference, 22/06/2019, University College Dublin, Ireland: Dublin city geo-environmental challenges as addressed by Geological Survey Ireland (M. Glennon, B. Mozo Lopez, M. Sheehy, S. O’Connor, S. Blake, E. McGrath, S. Caloca-Casado, R. Scanlon). This presentation and paper (for a non-geological audience) included consideration of the geochemistry of the urban environment and its significance for building and infrastructure projects.

- City Futures VI conference, 22/06/2019, University College Dublin, Ireland: Dublin city geo-environmental challenges as addressed by Geological Survey Ireland (M. Glennon, B. Mozo Lopez, M. Sheehy, S. O’Connor, S. Blake, E. McGrath, S. Caloca-Casado, R. Scanlon). This presentation and paper (for a non-geological audience) included consideration of the geochemistry of the urban environment and its significance for building and infrastructure projects.


d) Poster presentations:


- ISMAR10, 10th International Symposium on Managed Aquifer Recharge, 20-24/05/2019, La Nave, Madrid, Spain (http://www.iiama.upv.es/redAguaCV/ismar10-10th-international-symposium-on-managed-aquifer-recharge/): Combining social and hydrogeological factors for MAR site selection in southwest Bangladesh (Floris Loys Naus, Kennard Burer, Frank van Laerhoven, Jasper Griffioen, Kazi Matin Achmed, Paul Schot).


e) Workshops:
• Hellas: The IUGS-CGGB in collaboration with the EGS-GEG organised a one-day Workshop on “Global-Scale Geochemical Mapping” on the occasion of the 15th International Congress of the Geological Society of Greece, Athens, Hellas, 22-24 May 2019. The one-day Workshop was held on Friday, 24th May 2019. Tutors were Timo Tarvainen (EGS-GEG), Ariadne Argyraki (IUGS-CGGB) and Alecos Demetriades (IUGS-CGGB).

• Portugal: (a) Radiometric mapping and its application to mineral exploration for the Economic Geology students of the University of Lisbon, and (b) International Year of the Periodic Table Commissions – Os elementos nas jazidas minerais portuguesas - “Urâno e tório, suas características e ocorrência em Portugal. ([https://www.ordemengenheiros.pt/pt/agenda/coloquio-2019-ano-internacional-da-tabela-periodica-dos-elementos-quinicos/?fbclid=IwAR1DG1oNwIAecBVOf7Yc5Bp1ZqeYA1-9aUwvpmhqREwTuRRGNEhEc2tXjso](https://www.ordemengenheiros.pt/pt/agenda/coloquio-2019-ano-internacional-da-tabela-periodica-dos-elementos-quinicos/?fbclid=IwAR1DG1oNwIAecBVOf7Yc5Bp1ZqeYA1-9aUwvpmhqREwTuRRGNEhEc2tXjso)).

• Sweden: Nordic geochemistry meeting at SGU (25-26.02.2019, Uppsala). Geochemists from SGU, GTK and NGU met to discuss common projects and possible collaboration.

f) Seminars:

• CGS – BGS - GTK joint seminar on “Urban Geology and Underground Space Planning”, Shanghai, China, 3-7 June 2019: Application of geochemical data in soil the assessment of soil remediation needs, re-use of excavated soil and re-use of construction and demolition waste (T. Tarvainen, GTK).

4.6. Publications:


4.7. Book sales:

GEMAS atlas: In total, 11 copies of both volumes, and 3 copies of volume 1 were sold in 2018. The hitherto total sales by Schweizerbart are 544 copies of (Parts 1 & 2), and 13 copies of volume 1. In addition, BGR has sent through its library exchange programme 140 copies of both volumes to national geological surveys, ministries or politicians. NGU has also given free volumes to different institutions. It is, therefore, difficult to estimate the exact number of hard copies that are worldwide since its publication in April 2014. A conservative estimate is around 700 to 750 copies.
EGG atlas: Book sales, since publication in August 2010, reached 925 copies.

Urban Geochemistry textbook: Book sales, since publication in April 2011, reached 647 copies, and royalties earned from the sale of 12 books up to the end of 2019 are £17.73.

5. Future Perspectives

Geochemistry Expert Group would like to see closer collaboration between the EGS expert groups in the area of future Geological Services for Europe and with the future GeoERA initiatives, including the planning phase. Among the future perspectives, apart from on-going work on the GEMAS project samples, the following harmonised data sets have been identified as 'missing' in the eyes of the Geochemistry Expert Group and GEG’s efforts to find both the external and internal financial sources are on-going:

- Modern isotope systems on GEMAS samples.
- DNA Analysis on the GEMAS samples.
- Mineralogical determinations on GEMAS samples.
- URGE - urban geochemistry phase II – towards the production of homogeneous and representative urban data sets (for this purpose a brochure was written).
- Harmonised and coherent lithogeochemistry of Europe (complementary to the parent material map of Europe).
- Tap/Surface/Spring water geochemistry.
- Low sampling density geochemistry of the European shelf.
- Forest soil geochemistry.
- Geochemistry of the North Atlantic Basin (for this purpose a brochure was written in collaboration with EGS Marine Geology Expert Group).
- Biogeochemistry.
- Coal and oil geochemistry database.

- Internally consistent geochemistry database of European mineral deposits geochemistry (complementary to the ProMine and Minerals4EU databases).
- Use of the GEMAS data as ground proofing data set for remote sensing (discussion with European Space Agency).
- Electronic version of the GEMAS Atlas for free download on the Internet to be finalised in 2020.

A one-page project description is available for most of the proposed project ideas. Further, the development of the tasks has been allocated to different Task Groups. Finally, it is worth mentioning that the European fertiliser industry showed interest in the GEMAS data.
International Cooperation & Development Task Force

Number of ICDTF Members: 49

**Chair:** Diana Ponce de León (IGME, Spain)
**Deputy Chair:** Fabian Helms (BGR, Germany)

1. Executive Summary

In 2019, the International Cooperation and Development Task Force (ICDTF) reviewed and agreed with the Association of Iberoamerican Geological and Mining Surveys (ASGMI) the final version of the PanLatEUGeo concept note. This document was submitted to DG GROW, and subsequently a meeting was held with DG DEVCO, attended by DG GROW, EGS and ASGMI representatives. The conclusions after the meeting and a conversation with the DG GROW representative were that DG GROW has no funds to finance this kind of proposals (DG GROW only has H2020). In the case of DG DEVCO, cooperation with Latin America must be within the framework of the EUROCLIMA Program, related to climate change.

In subsequent discussions, ASGMI expressed interest in keeping trying an EGS-ASGMI collaboration, as well as participating in the EUROCLIMA Programme, which includes some lines of interest of two of its expert groups.

Subsequently, at the ICDTF meeting, the group agreed to wait for a more propitious context to submit again an EGS-ASGMI collaboration proposal, returning to the original demands and needs of ASGMI. In parallel, the attendees of the meeting considered that it might also be interesting to participate in the EUROCLIMA call (2020) to make the EGS-ASGMI collaboration known to the EC, reinforcing future proposals.

2. Mission and vision

The mission of ICDTF is to increase the capacity of EGS and its members to establish stable and effective relationships with Geological Survey organisations and other relevant stakeholders internationally, as well as to capitalize on international cooperation opportunities. ICDTF ensures that members share their international cooperation expertise, acting upon request of the EU institutions.

3. Scope and focus

The focus of ICDTF is to consolidate cooperation with ASGMI. To this end, a far-reaching proposal, PanLatEUGeo, has been outlined, as well as other smaller proposals that can facilitate mutual understanding and raise awareness of the possibilities that an EGS-ASGMI collaboration can offer to the EC.

4. Achievements 2019 - Activity report

4.1. Projects proposals:

a) PanLatEUGeo proposal

- Improvement and updating of the concept note, including the comments made by DG GROW. In February, the International Cooperation Expert Group of ASGMI (GECI) decided to change the orientation of the document for a better alignment with European policies, focusing on critical raw materials, EV minerals reserves, environmental management of mining activities and land use management relying on a geological knowledge.

- Review of the latest version of the concept note by GECI and ICDTF
(March 2019), which was sent to the Secretaries-General of EGS and ASGMI.

- After the Secretary General of EGS sent the concept note to DG GROW, a meeting was arranged at DG DEVCO headquarters attended by representatives of DG GROW, EGS (General Secretariat and ICDTF), ASGMI and IGME (September 2019).

- In the meeting, DG GROW kept a low profile and DG DEVCO talked about a programme (a call, not a grant). In the case of DG GROW, the objectives of PanLatEUGEO are aligned with its interests, but DG GROW has no funds to finance this kind of proposals (DG GROW only has H2020). In the case of DG DEVCO, cooperation with Latin America must be within the framework of the EUROCLIMA Programme, related to climate change.

- PanLatEUGeo was reconsidered as it does not fit into EUROCLIMA, either in terms of budget or objectives. ASGMI is still interested in collaborating with EGS, both in PanLatEUGeo and in an EUROCLIMA proposal.

- At the ICDTF meeting (October 2019) it was proposed to try again to seek funding for PanLatEUGeo, hoping for a more propitious time (now it is a time of change in the EC). Meanwhile, it was suggested to return to the beginning, seeking original interests of ASGMI without forcing alignment with EU policies. For this purpose, it was proposed to simplify the questionnaire made in PanAfGeo and fill it out by the members of ASGMI. This questionnaire would serve as documentary support to subsequently seek funding in the EC. At the ICDTF meeting, it was proposed to dedicate 2020 to the development and analysis of these questionnaires.

b) EUROCLIMA proposals

- 3rd phase of EUROCLIMA Programme will start in 2020. Proposals related to geological hazards (floods and mass movements) and water management could be submitted. At the meeting with DG DEVCO (September 2019), it was also proposed that EGS and ASGMI could work to improve knowledge of mineral reserves needed for development of electric vehicles and transition to clean energy, but DG DEVCO was not interested in anything related to mining. DG DEVCO showed interest in regional actions and an EGS-ASGMI proposal can clearly offer a regional impact action.

- In consultations with ASGMI (September 2019), the Geological Hazards and Hydrogeology expert groups of ASGMI are interested in participating in the next call of EUROCLIMA.

- EUROCLIMA programme is also supported by financial contributions from the German Cooperation, French Cooperation and Spanish Cooperation (AECID). In contacts with AECID (September 2019), we were told that in the 3rd phase of EUROCLIMA, the focal points of the Programme (civil servants designated in each Latin American country to ensure synergies and complementarities with the Programme) will define local needs that will set priorities of the next call.

- The Geological Hazards and Hydrogeology expert groups of ASGMI defined their needs and lines of interest in order to prepare a proposal for the EUROCLIMA Programme (November 2019). The International Cooperation Group of ASGMI has been in charge of contacting the focal points in each country to communicate these common needs and interests in case they can be included in the next call (December 2019).

4.2. Meetings and workshops:

- EGS Expert Group Chairs Meeting (Brussels, February 2019).
- ASGMI General Assembly (Tegucigalpa, Honduras, April 2019):
  - Presentation of advances in PanLatEUGeo proposal.
  - Meetings with the Secretary General, the Executive Committee and the International Cooperation Expert Group of ASGMI to define
PanLatEUGeo proposal (first trimester) and follow it up (May to June).

- Meeting with DG GROW and DG DEVCO (Brussels, September 2019) to seek funding for an EGS-ASGMI collaboration.
- Meetings with the International Cooperation, Hydrogeology and Geological Hazards expert groups of ASGMI to define common interests that could fit in the EUROCLIMA Programme and the strategy to be followed (last quarter of the year).
- ICDTF annual meeting (Madrid, October 2019)

4.3. Reports and documents:

- Last version of PanLatEUGeo concept Note (March 2019).
- Minutes of the meeting with DG GROW and DG DEVCO (September 2019).
- Minutes of the ICDTF meeting (November 2019).

5. Future perspectives

5.1. Project proposals:

- PanLatEUGeo
- Agree with ASGMI to carry out the questionnaires in order to identify the needs and interests of its members. Analyse the questionnaires (2020).
- Prepare a new proposal, taking into account the results of the questionnaires.
- Find the right time and context to submit again the proposal.
- EUROCLIMA.
- Monitoring of ASGMI contacts with the EUROCLIMA focal points in Latin America.
- Identify the EGS’s member interested in participate in the EUROCLIMA proposals (taking into account that the terms of reference of the call is not yet known and the budget will not be very high).
- When the EUROCLIMA call opens (2020):
  o Confirm that ASGMI’s lines of interest are included in the call and that ASGMI’s expert groups are still interested in it
  o Confirm the interest of EGS members in participating
  o Coordinate with ASGMI the preparation and submission of proposals

5.2. Meetings and workshops:

- Participate in the General Assembly of ASGMI in Belo Horizonte (Brazil, April 2019) to strengthen EGS-ASGMI relations and consolidate future collaborations.
- ICDTF annual meeting (Autumn, 2020).
Marine Geology Expert Group

Number of MEGG Members: 49

January 2019 – March 2019
Chair: Henry Vallius (GTK, Finland)
Deputy Chair: Sytze van Heteren (TNO, Netherlands)

April 2019 – December 2019
Chair: Sytze van Heteren (TNO, Netherlands)
Deputy Chair: Teresa Medialdea Cela (IGME, Spain)

1. Executive Summary

The Marine Geology Expert Group (MEGG) includes representatives from 25 EuroGeoSurveys member organizations. The group held its Annual Meeting in Anavyssos, Greece on October 22, 2019. Since 2009, the group has provided marine geoscience information to the European Commission’s European Marine Observation and Data Network (EMODnet). The fourth phase (September 2019 – September 2021) of EMODnet, coordinated by GTK, was granted in 2019. Like its predecessors, it is solidifying links between the national marine mapping programs of its member and associate surveys and has enabled the ones with a developing mapping program to profile themselves nationally. For some of our member surveys, EMODnet is the only marine project, ensuring some continuity in offshore mapping and strengthening their digital presence as part of the European Geological Data Infrastructure EGDI.

In 2019, MEGG members have contributed to a substantial number of EU-funded and transnational projects, commonly with a multidisciplinary scope. In addition, they continue to play a lead role in the Atlantic research alliance between the EU, the USA and Canada, as well as in other global initiatives, particularly with China and Australia. The MEGG participates in two GeoERA projects: MINDeSEA on metallogenetic mineral resources and GARAH on hydrates in the continental margin. Although some marine sections were growing (Denmark, Croatia, Netherlands), others have been under pressure (Cyprus, Greece, Ukraine). Presently, the MEGG is overly dependent on EMODnet, and uncertainty about continuity and future budgets is a major worry for the smaller partners. Marine geology appears to be on the rise, however, where vast volumes of new subsurface data become available as part of windfarm development, where surveying is deemed important for geopolitical reasons (Arctic), and where marine minerals are a potential resource.

2. Mission and vision

The MEGG promotes marine geological information and interpretations as a fundamental requirement for all activities that take place in Europe’s seas. We deliver high-quality information and advice to inform decision makers responsible for our seas, underpinning EU Action Plans and Directives by ensuring that marine science is integrated. We focus on issues of global importance such as sustainable use of natural resources, climate change, habitat mapping, natural hazards and long-term maintenance of databases. Through pan-European and transnational cross-disciplinary collaboration, the MEGG ensures visibility within EuroGeoSurveys.

3. Scope and focus

Recognizing that different members have different tasks and responsibilities at a national level, including mapping, modeling, licensing and decision support, the group’s strategy revolves around collaboration and visibility. The EMODnet program has provided an opportunity for all MEGG members to work together. In addition, some members have been active in initiatives such as the EuroGeoSurveys Northeast Atlantic Geosciences group (NAG), with the initiation of the NAG-Coast Group and
the MIM group (MAREANO-INFOMAR-MAREMAP) for knowledge and best-practice sharing related to marine mapping. The MGEG expands its geographical scope whenever possible, as the issues that affect the European seas have global significance. Knowledge exchange with Geoscience Australia, the USGS, various Chinese partners, and the Geological Survey of Canada is ongoing. The group is represented in the International Council for the Exploration of the Sea, the European Consortium for Ocean Research Drilling, the Atlantic Seabed Mapping International Working Group, the Global Ocean Research Alliance, JPI Oceans, the International Seabed Authority, INSPIRE Thematic Clusters, the European Plate Observing System, the European Multidisciplinary Seafloor and water-column Observatory, and the International Geological Correlation Program IGCP.

4. Achievements 2019 - Activity report

All MGEG members are involved in:

a) The fourth phase of EMODnet-Geology. The project started on September 26, 2019 and will end on September 25, 2021. Information on seabed sediments, subsurface geology, coastal behavior and resilience, geological hazards, mineral resources and drowned landscapes, compiled for all European sea areas, is made available through the project portal (http://www.emodnet.eu) using Web Map Services (WMS) that also feed other portals such as OneGeology-Europe, the European Geological Data Infrastructure EGDI, and the European Atlas of the Seas.

b) Other projects with multiple MGEG partners include EU-China collaborative project EMOD-PACE, EMODnet-Bathymetry (and High Resolution Seabed Mapping), EMODnet Data Ingestion for industry and several Geo-ERA projects.

c) New Interreg projects are FiberAct, on contaminant loads from the pulp and paper industry, and SEAmBOTH, on seamless mapping of the Bothnian Bay were awarded. Some activities that have been carried out by individual members, including arctic environments, land-sea integration, environment and hazards, and sediment records, are being adopted by the group. National mapping programs address areas not surveyed previously, especially in the Arctic, and make the transition from 2D to 3D. Significant efforts concern digitizing paper records and disseminating information through new multidisciplinary marine portals. As mapping is transitioning into subsurface modelling, it becomes possible to build decision-support tools. Important advances concern the use of virtual reality and an increasing capability for vessel-based monitoring and study of shallow nearshore and inshore waters.

d) In support of their activities and to ensure visibility, MGEG organized a conference on the Quaternary geology of the North Sea and Celtic Sea and co-organized summer schools on coastal-zone geology, sessions on seabed mapping at AGU, EGU and GeoHab, study days on regional marine science and extreme events, workshops on seabed loss and disturbance in the context of marine spatial planning and deep-sea mining.

e) MGEG is active in working groups on Atlantic seabed mapping and seabed integrity. Many of these activities have a land-sea component. Of particular importance is the formalization of an international network of marine geologists and seabed mappers initiated by GSI and Geoscience Australia in Seabed 2030, bringing together all available bathymetric data to produce the definitive map of the world ocean floor by 2030 and make it available to all.

f) MGEG continues to pay attention to outreach, participating in many public events, restyling websites with case studies, organizing press releases, appearing in newspaper and magazine articles, on TV and radio, and helping to establish marine geoparks. A key contribution was made to the UNEP report “Sand and sustainability: Finding New Solutions for Environmental Governance of Global Sand Resources”. Peer-reviewed published highlights concern EMODnet as the gateway of European marine information, geostatistical seabed-sediment mapping, 3D subsurface modeling, marine spatial management, linking marine geo- and bio-diversity, submarine groundwater discharge, mass-transport deposits, seepage and corals, Atlantic sediment
records, marine minerals and optimizing data acquisition and processing.

5. Future perspectives

At a European level, the main collaborative focus of the marine departments of the geological surveys will continue to be the EMODnet Program, although funding during the next phase of EMODnet appears less certain than before. Still, the program is expected to continue after 2021 to underpin ‘Blue Growth’, the European Commission’s long-term strategy to support sustainable growth in the marine and maritime sectors as a whole. New vessels that are being built, such as the new Belgica, will have the equipment needed to answer tomorrow’s questions. Indirectly, EMODnet will continue to employ marine geoscientists and data experts fulfilling both EU mandates and national needs. It has spawned and strengthened regional collaboration, as exemplified by the Baltic and North Sea Coordination and Support Action.

While mapping the seabed, MGEG members will continue to address issues such as the security of energy supplies (hydrocarbons and renewable energy) and raw materials (mineral and aggregate resources), both GeoERA topics; the protection of the amenity value of the marine environment for food (e.g., habitat mapping for fisheries and aquaculture); and the optimization of aspects related to health and safety (pollution and geohazards), cultural heritage and recreation.

In the drive to ensure that the MGEG contribution remains relevant to Europe for the foreseeable future, new research roadmaps are being developed that focus on emphasizing the role of marine-geological mapping and research in everyday lives. In many of these roadmaps, standard mapping evolves into 3D- and 4D modeling and adaptive monitoring, supporting the knowledge economy and underpinning EU directives for sustainability (with emphasis on seafloor-integrity indicators, mapping of priority areas, and data products relevant to effective spatial planning, maritime jurisdiction and business development). Quantification of the uncertainty of geodata adds to its applied value and is expected to play an increasingly important role in decision making. Marine geological data and sample management moves toward an open-access policy and toward public outreach aimed at broadening the surveys’ appeal and visibility. Storage of industry samples should become an important task.

Aside from ensuring the connectivity across marine seabed mapping internationally, moved forward by EMODnet, the MGEG network will also need to look beyond the realm for which it is responsible. There is a clear need for linking marine and terrestrial geology. Groundwater cells do not stop at the coastline, sediment is exchanged temporarily and permanently between land and sea, and tools and protocols developed for one purpose or group may well be useful for another. In this light, the EGDI portal as embedded in GeoERA will be used to disseminate past and future EMODnet deliverables. Beyond Europe, the best way of solidifying our role and influence is by continuing to work together and by having a strong representation. To broaden and strengthen its position and to increase the use and visibility of the European geological surveys, the MGEG sees significant added value in interacting and collaborating with other EuroGeoSurveys Expert Groups.
Mineral Resources Expert Group

Number of MREG Members: 73

Chair: Daniel Oliveira (LNEG, Portugal)
Deputy-Chair: Sebastian Pfleiderer (GBA, Austria)
Deputy-Chair: Henrike Sievers (BGR, Germany)
Deputy-Chair: Henrik Schiellerup (NGU, Norway)

1. Executive Summary

The Mineral Resources Expert Group (MREG) was active on a number of fronts in 2019, ranging from its active role as an “advisory board” to the Commission on several mineral resources issues, the continued collaboration with JRC, minerals events and several minerals-themed research projects. The Group has significantly contributed to augmenting the Battery Raw Materials database and checked the data, at the Commission’s request, associated with the Dialogue on Battery Raw Materials. The MREG continues to have a strong input with UNFC and contributed as an expert in other H2020 funded projects.

2. Mission and vision

The MREG mission is to provide the best available mineral expertise and information based on the knowledge of member Geological Surveys, for policy, communication, public awareness and education purposes at European and international level, focusing mainly on strengthening the position of the European minerals industry towards resource sustainability and competitive growth. Because this mission and vision are important gateways into the Group, the entry site of MREG was updated in 2019 to reflect the dynamic nature of the Expert Group. (https://www.eurogeosurveys.org/expertgroups/mineral-resources/)

3. Scope and focus

The Mineral Resources Expert Group is actively involved in contributing to policy- and strategy-making processes aiming to identify, characterize and safeguard a sustainable resource potential, notably on critical and strategic raw materials, through research, development and innovation.

4. Achievements 2019 – Activity report

4.1. Bi-annual meetings:

MREG held its spring meeting in Trondheim, Norway, at the invitation of the Geological Survey of Norway (NGU). The meeting was held in May 2019 to allow for slightly better Nordic weather at the Geological Survey of Norway.

The meeting was held over three days (13-15/05/2019) with one day dedicated to GeoERA and the Raw Materials projects. The last day was used to visit Olav’s Mine (Fig. 1), Røros Mine Museum, Røros town and Follstad Quarry in Støren, the type locality for trondhjemite (a leucocratic intrusive igneous rock, a variety of tonalite in which the plagioclase is mostly in the form of oligoclase) were undertaken.

The winter meeting took place in Madrid, hosted by the Geological and Mining Institute of Spain (IGME). As previously, the meeting was held for three days (5-7/11/2019) to accommodate a full day of GeoERA Mineral
Resources projects, MREG issues and a field trip to Cabañas de La Sacra sepiolite/smectite deposits.

Figure 1. MREG underground at Olavs Mine, Norway

4.2. Project involvement:

Since 2014, the MREG task force on “National Mineral Resources Projects in Europe” collects information on MR related activities carried out by European Geological Survey Organizations (GSO’s) on a national level. The objective is to establish, maintain and share a meta-database of past and current projects to identify expertise, to instigate knowledge exchange between GSO’s, and to reveal new areas of research or shifts of focus.

Metadata of projects include title, description, country, scope, start and end year, contact email and internet link. In addition, projects are indexed according to the field of activity (e.g. primary resource mapping, environmental impact assessment, investigation of secondary resources, market reviews, web portals) and according to the commodities investigated. MREG strives to update the database once a year.

MREG continues to exhibit a sizeable project portfolio that can be seen in Fig. 3. This portfolio has been built up over the years and totals now 652. This almost double the projects that were reported in 2016. In terms of commodity groups, the majority of projects deal with ores, closely followed by industrial minerals and construction materials and approximately 10% of the sum of the two previous categories deal with energy raw materials.

Figure 2. MREG at IGME, Madrid
Most of the projects deal with minerals *per se* but MREG members also deal with subjects related to minerals-directed activities, including databases, licencing, market reviews and portals. As of May 2019, the number of reported projects dealing with all activities totaled 1074 (Fig. 4).

The MREG is involved in several current “minerals” projects. MREG’s flagship minerals project, FRAME (FORECASTING AND ASSESSING EUROPE’S STRATEGIC RAW MATERIALS NEEDS), is the one that has kept and centred most of the group’s activity. This project, being the one that is closely followed by DG GROW and JRC because of the deliverables that are of interest to them, has already delivered a map of the Battery Raw Materials/Energy Critical Elements (Li, Co, C) that was also presented at the PDAC (Toronto, Canada) in March (Fig. 5). This map, thanks to new data supplied by MREG members that are not partners in FRAME has allowed at least three updates of this map, the latest of which was shown at PDAC 2020.
Below is a summary of other “Minerals projects” in which MREG members are involved:

**INTERMIN** aimed to create a self-sustainable long-term lasting international network of training centres for professionals. This project involved educational and research institutions in the EU and the leading counterparts in third countries, based on specific country expertise in the primary and secondary raw materials sectors. The network mapped skills and knowledge in the EU and the third countries, identified key knowledge gaps and emerging needs, developed a roadmap for improving skills and knowledge, as well as established common training programmes in the raw materials sector. In line with the EU’s strategy for international co-operation in research and innovation (COM(2012)497), the consortium sought international collaboration, fostering and exploring synergies with the relevant EU Member States initiatives.

**ORAMA** has identified the best practices in collecting information on raw materials and focuses on finalized data collection for primary and secondary raw materials in Member States. The network mapped skills and knowledge in the EU and the third countries, identified key knowledge gaps and emerging needs, developed a roadmap for improving skills and knowledge, as well as established common training programmes in the raw materials sector. In line with the EU’s strategy for international co-operation in research and innovation (COM(2012)497), the consortium sought international collaboration, fostering and exploring synergies with the relevant EU Member States initiatives.

**MINLAND** aimed to secure access to land, with actual or potentially valuable resources, for exploration and extraction of minerals, in an integrated and finalized process, within the EU. The EU has recognised the need for shared guidelines about finalized land use and the need for mineral policy strategies within Europe. MINLAND offers an answer to these challenges. MREG participated in the round table discussion during the final meeting in Brussels (November 2019).

**PanAfGeo**, for “Pan-African Support to the EuroGeoSurveys-Organisation of African Geological Surveys (EGS-OAGS) Partnership”, is a project which supported the training of geoscientific staff from African Geological Surveys through the development of an innovative training programme. This 3-year (2017-2019) Pan-African cooperation programme provided about 50 training sessions for some 1,200 geologists from 54 African countries. This programme of 10.3 million euros was co-funded by the European Union through its Directorate-General for International Cooperation and Development (DG DEVCO), and a Consortium of 12 European Geological Surveys led by BRGM-French Geological Survey.
EGDI - Launched in 2016, EGDI gives access to datasets and services from pan-European data and infrastructure projects, either entirely funded by EGS members or co-funded by the EU, including OneGeology-Europe (geological mapping), EuroGeoSource (energy and minerals), ProMine (minerals), PanGeo (Earth Observation and geohazards), TerraFirma (Earth Observation and geohazards), GeoMind (geophysics), GEMAS (soils and geochemistry) and EMODNet (seabed mapping). For this first version of EGDI a new digital geological map of Europe, developed according to the EC INSPIRE Directive specifications, has been prepared to replace the previous OneGeology-Europe map. It features: 1- A central database systems for storing pan-European geological datasets; 2- Mechanisms for populating these databases with data from National Geological Survey Organisations; 3- A metadatabase containing a large amount of information about pan-European, national and cross border geological datasets, and, 4- A website including a GIS enabling the user to easily find and show data related to a number of pre-defined topics, search for all datasets in the system, combine data from different topics, show metadata and for some data also show detailed recordings.

GeoERA – The main objective of GeoERA was to contribute to the optimal use and management of the subsurface. GeoERA funded 15 research projects aimed at supporting 1) a more integrated and efficient management and 2) more responsible and publicly accepted, exploitation and use of the subsurface. The projects cover the app lied geosciences, addressing the following four themes: Raw Materials, Geo-Energy, Ground Water and Information Platform.

The data from these projects are very relevant to the European Commission’s current strategies; namely the Battery Initiative and e-Mobility, the Circular Economy and the Critical Raw Materials List. Those strategies resulted in urgent and spontaneous requests by the European Commission to which the group responds. Moreover, the data will ultimately also feed JRC’s RMIS by using the EGDI platform. The overarching themes and interconnectivity with the other GeoERA themes (Groundwater and Energy) means that MREG also has had a contribution in projects like HIKE (Hazard and Impact Knowledge for Europe), RESOURCE (Resources of groundwater harmonized at cross-border and pan-European scale) and MUSE (Managing Urban Shallow geothermal Energy).

Apart from these, MREG has had active participations; be it as a whole or partially through member states, in ORAMA, PanAfGeo, FORAM, ITERMIN, MINLAND and SCRREEN. This last project is of particular importance because MREG was called to assist in the 2020 Criticality Assessment that is currently being finalized by the Commission. Additionally, SCRREEN 2 is counting on EGS/MREG partnership depending on conditions.

4.3. Research and dissemination activities:

Research activities of MREG are undertaken through the “minerals” projects. However, requests by the Commission focus activities of the Group on particular aspects – circular economy, battery raw materials, criticality, UNFC, exploration.

MREG is investigating criticality in light of value chains where groups of elements rather than individual elements.

The MREG was highly involved in all those projects.

MREG took part in workshops/presentations/representations:

a) Supply of the Energy Critical Elements at the PDAC, Toronto early 2019
b) National Delegates Forum meeting in Lisbon; September 2019
c) SCRREEN workshop, Brussels as part of the criticality assessment; September 2019
d) Analysis identifying the key third countries with an economic mineral potential of Critical raw materials, and in particular Rare earths, and providing a shortlist of countries in Africa, EU neighbouring countries like Ukraine and Serbia, Latin America, Central Asia, and Mongolia; September 2019

e) FRAME data management workshop; Lisbon 2019; f) Raw materials week, Brussels; November 2019.

5. Future perspectives

MREG continues to have a strong input into the United Nations Framework Classification for Resources (UNFC) and was present, as it has been in the last years, at the UNECE Resource Management Week 2019 held in April-May (29-30) in Geneva. UNFC provides countries, companies, financial institutions and other stakeholders a futuristic tool for sustainable development of energy and mineral resource endowments and applies to oil and gas; renewable energy; nuclear fuel resources; mineral resources; injection projects for the geological storage of CO₂; and the anthropogenic resources such as secondary resources recycled from residues and wastes. UNFC is capable of managing the natural resources required for the present and future needs of the society and is a unique tool for harmonizing policy framework, government oversight, industry business process and efficient capital allocation, which is adopted by the Commission for mineral resource description and characterization.

The MREG is also involved in the European Partnerships under Horizon Europe – Draft Guidance document and proposal, which will shape the future in terms of mineral resources.
**Spatial Information Expert Group**

Number of SIEG Members: 73

January 2019 – March 2019  
**Chair:** François Robida (BRGM, France)  
**Deputy Chair:** Jørgen Tulstrup (GEUS, Denmark)  
**Deputy Chair:** Jasna Sinigoj (GeoZS, Slovenia)

April 2019 – December 2019  
**Chair:** Dana Čápová (CGS, Czech Republic)  
**Deputy Chair:** Jørgen Tulstrup (GEUS, Denmark)  
**Deputy Chair:** Jasna Sinigoj (GeoZS, Slovenia)

1. Executive Summary

One of the prioritized activities of SIEG has been focused on the European Geological Data Infrastructure (EGDI), the e-infrastructure of EGS. It facilitates sustainable access to multinational harmonized geological data, information and knowledge on European level, derived from the GSOs’ national databases. EGDI has been operated by the EGDI Consortium, consisting of five SIEG members, as agreed in the Service Level Agreement with EGS. Regarding data sharing, the EGDI infrastructure has a potential to serve as an EGS platform to visualize and provide data to other infrastructures. One of these is the European Plate Observing System (EPOS), the infrastructure for which the European Research Infrastructure Consortium (ERIC) was established and will commence operation in 2020. European Marine Observation and Data Network (EMODnet) collects and harmonizes large amounts of marine geological data that are accessible on the EGDI platform. The EGDI strategic topics and the proposed rules for further development were discussed at the SIEG meeting.

Many SIEG members are involved in GeoERA project Geoinformation Platform (GIP-P). The aim of this project is to effectively integrate results of the other 14 GeoERA projects and make them available as EGDI extensions. The GeoERA GIP-P project update has been regularly presented and discussed at SIEG meetings.

The main SIEG discussion topics also focused on the development priorities answering to the new Horizon Europe call with the proposal of the European Partnership on a Geological Service for Europe (EP-GSE). The participants have drafted a list of scientific preferences of SIEG for future development of EGDI regarding the content, user access and technology. SIEG contributed to the Expert Group Scientific Topics to help the formulation of the proposal for the EP-GSE.

2. Mission and Vision

EGS has formulated a strategy for establishing a Geological Service for Europe. A central pillar in this strategy expresses the need for pan-European interoperable geoscientific information, which shall be addressed by developing a common sustainable infrastructure. The SIEG strives to contribute to the definition of the strategy, which aims at developing the European information infrastructure in geological sciences. SIEG is an advisor in the continued design and development of the European Geological Data Infrastructure (EGDI), which is at the core of the EGS pillars strategy. It is also a common platform to share expertise among EGS members and to discuss the science topics relevant to the geoinformation development for the next period.

The SIEG vision is to contribute to further development on the concept of the infrastructure to reach a highly advanced technological level and provide more user-demanded products and to help the definition of the “Subsurface in Europe’s Digital Twin”. Establishing the connections between the different infrastructures will be paramount to achieve
interoperability and to improve the user-friendliness. The concept should assess the possibilities of the new technology as artificial intelligence (AI), big data processing, modelling, and the potential to solve some of the recent problems related to knowledge representation, learning, natural language processing, advanced methods of search and mathematical optimization, etc. More focus on the latest technology together with more efficient public outreach may help to improve visibility and usability of the products as a decision support system.

3. Scope and Focus

In the near future, the highest priority is given to the sustainable operation and further development of EGDI. The strategic topics concerning data updating, rules for data entry, governance of codelists and vocabularies as well as technical solutions, should be defined by SIEG. The organization and financing of the work will be planned and approved by the EGDI consortium and EGS.

The position of EGS and its strategy and potential for collaboration with EPOS has been defined in the amended proposal of the Memorandum of Understanding. Further discussion and negotiation with EPOS-ERIC is expected. The Thematic Core Service Geological Information and Modelling Consortium Agreement was signed by EGS and seven geological surveys (SIEG members). The agenda for the next period will be prepared and discussed with SIEG.

Cooperation with the other Expert Groups should be intensified to ensure their involvement in the EGDI content definition and responsibility. By incorporating all the information from other EGs, SIEG fosters the inclusion of all key partners. SIEG will dedicate all its efforts to contributing to the success of the EP-GSE proposal.

4. Achievements 2019 - Activity report

Thirty-one organizations are active members of SIEG; of these, 29 GSOs are represented by 32 EGS members (3 missing: Latvia, Lithuania, Republic of North Macedonia), and 2 regional surveys (Bavaria, Catalonia) are involved.

Dana Čápová (ČGS) became the new chair on 1st April 2019. Both deputy chairs, Jasna Šinigoj (GeoZS) and Jørgen Tulstrup (GEUS), agreed to continue in their position. Two regular meetings of SIEG were organized by the Czech Geological Survey in Prague on 29th-30th April 2019 and on 26th-27th November 2019. 18 participants from 13 surveys attended the first meeting (4 participated remotely via Webex), 23 participants of 16 surveys attended the second meeting (5 participated remotely via Webex). Two videoconference meetings were organized via Webex on 12th August 2019 and on 10th January 2020.

The main discussion topics focused on the evaluation of the SIEG past activities, amendment of the mission and vision and proposal of the preferred scientific topics for the Horizon Europe programme. Some updates concerning the important ongoing activities were presented as GeoERA and EGDI status, plans and ideas, EPOS, INSPIRE Earth Science Cluster, EOSC. The explanation of the EP-GSE development and SIEG contribution to the drafting were also discussed. Minutes of all meetings are available on EGS intranet. The need for a stronger SIEG relationship with other EGs was agreed, the need for the interdisciplinary communication was proved in GeoERA. To improve the EGDI development and sustainability, close communication and coordination is essential.

4.1. Research activities:

Research activities of SIEG have mainly focused on improvement of the EGDI technical infrastructure. New technologies and processes have been developed and introduced to the operation.

Some SIEG members are active in development, amendment and implementation of standards: for example, encoding of 3D Models or geothermal data using INSPIRE, GeoSciML and O&M schemas, definition a
metadata profile for 3D models, or procedure of publication of 3D Models by Atom Feed.

a) The EGS contribution provided funding for the operation and maintenance of EGDI again in the period July 2018 – June 2019. For the second half of 2019 no further funding has been provided. The EGDI Consortium consisting of GEUS, BRGM, GeoZS, CGS and BGS has been operating and maintaining the system and has provided support to users. For the period 2020 – 2021 (the end of GeoERA) the EGS General Assembly has agreed to provide 80,000€ per year for the operations, maintenance and user support. Costs for other than operations and basic maintenance have been kept as low as possible and all meetings have been held through teleconferences. The achievements have been made in the governance, funding and roadmap definition. It was proposed that EGS should be the body to sign the contract on behalf of EGDI with EPOS ERIC, but no conclusions have been drawn to date. A longer term roadmap for the evolution of EGDI has been drafted. The strategic position of EGDI has been agreed in some of the newly established infrastructures and projects (EMODnet, ResToGeo etc.). Attention is given to interaction with EGS - the chairs of the EGs were invited to discuss the content of EGDI for their individual topics so that this reflects their priorities and projects. We see the importance of raising the awareness of EGDI among GSOs.

Architecture was improved in terms of interaction between the EGDI metadata catalogue and EGDI map viewer, transition of existing processes to upgraded metadata catalogue based on technology MIcKA version 6, and amendment of the metadata profile and validation in accordance with current standards (INSPIRE technical guidelines v. 2.0.1). The basic maintenance was focused on the continuous update of metadata and data included to the system, harvesting and including in current dataset, correction of issues relating to the legend, and revision of service metadata. Regarding the surface geological map, great effort was given to help to provide the harmonised maps from missing European Countries (e.g. Austria, Switzerland, Slovakia, Iceland and some Balkan countries). Data from new data providers (Serbia, Bosnia-Herzegovina, Republic of Srpska and Montenegro) were added to the Minerals4EU database, and numerous errors were corrected in the datasets that are being harvested. Metadata from the Minerals4EU project metadata catalogue were migrated to the EGDI catalogue, the harvesting from the national catalogues was set whenever possible. Subsequent inclusion of new data into the system is being prepared for Roof Of Rock, Co2STOP, GEMAS, North Sea Regulators data, Borehole data, combined dissemination of EPOS and EMODnet data. User support has been focused mainly on harvesting data from new providers, provision of metadata, and preparing data to be included in the surface geological map and Minerals4EU.

b) The main activity was focused on GeoERA Geoinformation Platform (GIP), in which a substantial proportion of members participated. SIEG members also actively participated in other GeoERA projects such as Resource, FRAME, Geoconnect3d, Mintel and HotLime. The GIP project has established a platform to safeguard and disseminate the geospatial results from the 14 other GeoERA projects and has been built as an extension of EGDI.

c) EPOS became the ERIC legal entity; the European Commission granted it the legal status of European Research Infrastructure Consortium (ERIC). EPOS Thematic Core Service (TCS) Geological Information and Modelling Consortium Agreement for the Construction and Operation of the EPOS Research Infrastructure was signed by 10 parties, including EGS and 7 geological surveys (SIEG active members). The purpose of this agreement is to create a framework for ensuring a long-term cooperation between the initiatives regarding integration and exchange of data, information, products and knowledge. The amendment of the previous MoU between EGS and EPOS has been drafted and negotiated but not signed yet.

d) SIEG members are also active in the Geoscience Information Consortium (GIC) http://www.g-i-c.org, a global initiative for the
exchange of information among the GSOs on the use and management of geoscience information systems to support Earth science internationally. Membership is open to all national GSOs who wish to contribute to the improved understanding of geoscience information systems. At present, the members of GIC are representatives of 35 GSOs from Europe, North America, South America, Asia, Africa and Australia. The 34th Annual Geoscience Information Consortium (GIC) Conference in Madrid was hosted by IGME-Spain from 6th to 10th of May 2019. Of 45 participants, 15 were also members of SIEG.

4.2. Publications:
The nature of SIEG activities is such that no formal publications can be produced, regardless of vigorous communication and reporting by SIEG members, on EGDI and EPOS in particular.

SIEG has contributed to the Geoscience Domain Working Group in OGC by proposing developments of new standards initiated in Europe (such as 3D model metadata, borehole exchange etc.).

5. Future perspectives

Regular SIEG meetings are planned twice a year. The next SIEG meeting is proposed to be held in Madrid on 21st-22nd April 2020, organized by IGME Spain. Videoconferences will be organized as needed. We expect more frequent communication activity in connection with the preparation of the EP-GSE. The SIEG page on the EGSI intranet will be amended to better fit the current situation. The SIEG mission and vision should be more precisely reformulated. [http://intranet.eurogeosurveys.org:8080/](http://intranet.eurogeosurveys.org:8080/)

EGDI and the website will be on the agenda of the annual meeting of all the Expert Group Chairs, which will be organized together with the next National Delegates Meeting. Maintenance of the geoscientific keyword thesaurus, which is now being built within GeoERA GIP project, will be a discussion topic, as EGs representatives should be appointed to be responsible for the technical, content-related and language-related aspects of running the thesaurus for future use in any geoscientific projects and research. Otherwise, after a certain time, the thesaurus will gradually become obsolete. The SIEG chair will try to establish communication with the other EGs chairs in order to better coordinate the proposal to sustain further development of the EGDI and to share the responsibility with the other EGs. Maintenance of the geoscientific keyword thesaurus (built in GeoERA GIP-P) should be a common responsibility of the EGs, while SIEG could be responsible for the technical status and the other EGs should be responsible for the content. Administrative codelists should be developed and maintained as a database of former, ongoing and planned projects, and a database of member GSOs.

Rules for EGDI data entry should be defined in discussion with the other EGs on what they wish to have in EGDI from the content point of view, the minimum requirements for the services that should be used in EGDI and to define what should be included.

Involvement of EGS in larger projects should be coordinated, and EGDI should be chosen as the platform to preserve and present the results of these projects.

In the following years, greatest attention will be given to the GeoERA GIP project fulfilment. SIEG has contributed to the EP-GSE proposal and supported the process of proposal writing. The strategy should be formulated on how to establish a sustainable information platform in the new structure, safeguarding both the advanced pan-European data ecosystem and also the sophisticated technologically advanced platform, bringing a better understanding and use of the subsurface digital information.

The EGS strategy regarding the new landscape prepared by the Commission in the EOSC implementation should also be discussed to better address the long-term development of our activities.

Finally, SIEG should certainly discuss the challenges and opportunities of new technologies (such as 3D/BIM, Big data, Linked data, AI…) for its
members, and to explore the synergies that could be developed between members on that matter.

The Czech Geological Survey will organize the 35th Annual Conference of the Geoscience Information Consortium from 15th to 19th June 2020 in Prague.
Urban Geology Expert Group

Number of UGEG Members: 48

Chair: Stephanie Bricker (BGS, United Kingdom)
Deputy Chair: Krzysztof Majer (PGI-NRI, Poland)
Deputy Chair: Martin Smith (BGS, United Kingdom)

1. Executive Summary

The Urban Geology Expert Group (UGEG) is a newly formed expert group established in 2019 and the terms of reference were formally ratified at the inception meeting in Brussels, June-19. The UGEG is a multi-disciplinary group of geosciences, with 48 members from 22 geological surveys. Building on the success of the EU COST Sub-Urban Action, UGEG aims to support Europe’s Urban Agenda and be the focal point for delivery of high-quality surface and subsurface geoscience data, knowledge, advice and understanding relevant to the needs of urban decision-makers.

The group will focus on three priority science topics, Integrated geo City Information Modelling approaches; Assessment of geo-environmental pressures in urbanised catchments, and Geoscience communication for cities. Preliminary activities of the group have comprised:

- a review of EU policy and strategy, urban networks and funding streams,
- definition of the science topics, research objectives and work programme for 2020-2022.

Tasks of UGEG include preparation of a position paper on urban geology in Europe; production of guidance and benefits analysis for urban models and digital urban planning; development of an urban geology typology classification system, and; production of multi-media communication materials for urban geology.

2. Mission and Vision

The Urban Geology Expert Group aims to support Europe’s Urban Agenda and be the focal point for delivery of high-quality surface and subsurface geoscience data, knowledge, advice and understanding relevant to the needs of the EU’s urban decision-makers. The wider goal is to link geological surveys with the user community of planners, policy makers and industry and lead on urban issues to underpin the Sustainable Development Goals.

UGEG, and its Members, will provide European Institutions with consistent expert, neutral, balanced and practical pan-European information and advice as an aid to problem-solving, policy, and regulatory and programme formulation in areas such as sustainable urban development, urban resilience, future-proofing of cities, SMART Cities, and safe construction. The UGEG acts as a forum for a cohort of multidisciplinary, applied geoscientists, selected from all EGS Member organizations, to develop a joint research programme directed to EU policies.

The UGEG will undertake collective work to address specific issues that contribute to the Urban Agenda for the EU, related policy initiatives, and which fulfil the requirements of European Commission (EC) Directives including the Water Framework Directive, Habitats Directive and Environmental Impact Assessment Directive, and which underpin the UN Sustainable Development Goals and Sendai Framework for Disaster Risk Reduction.

The UGEG is resolved to encourage acquisition of systematic geoscience data for European cities and make this information available in a range of freely available media and formats, which can be used in relation to urban planning and policy on various urban scales such as City, Euro-district, National and Pan-European. The UGEG will encourage and share
knowledge, data and good practice between Member organisations and the EU, national governments, local authorities and stakeholders.

3. **Scope and Focus**

The UGEG draws together a multidisciplinary pool of experts in: data acquisition and management, subsurface monitoring, earth observation, ground investigation and 2/3/4D modelling (geologists, hydrogeologists, geothermal specialists, engineering geologists and geochemists).

The group focuses on three science topics, as informed by current EU strategy and Directives and by the individual urban properties of the member countries.

a) **Integrated Geo City Information Modelling (GeoCIM) (SDG 9, 11, 17):**

Providing relevant and more accessible geological data to the user at the right time and in the right format is crucial to improve efficiency in planning and development, for resource extraction and to reduce the impacts of geological hazards. We will do this by combining geoscience-data with data exchange, informatics and 3D geological modelling, for example, by applying the City Information Modelling (CIM) philosophy to enable users to develop a subsurface “Digital twin”.

b) **Geo-environmental pressures in urbanised catchments (SDGs 6, 11, 12, 13, 15):**

A catchment-based approach was chosen because it allowed to understand the impacts of climate, demographic, resource and waste flows and land-use change in the context of the wider geo-environmental setting. Using this solution, we aim to assess the multiple geo-environmental pressures impacting on the city and identify geoscience priorities and nature-based solutions to underpin urban resilience and sustainability.

c) **Geoscience communication for cities and citizens (SDGs 9, 11, 12, 17):**

The solutions to our urban challenges require interdisciplinary collaboration and integrated approaches. UGEG in partnership with others including, ITACUS, ACUUS and JPI Urban Europe, aims to bridge the knowledge gap between subsurface experts and city practitioners (e.g. urban planners, architects and policy-makers). UGEG aims to embed geoscience information and insights into policy, legislation, and industry practice.

4. **Achievements 2019 - Activity report**

4.1. **Science priorities:**

The UGEG inception meeting (Brussels June-19) and the Bi-annual meeting (Bucharest Nov-19) were used to identify the urban geoscience challenges of the member countries and to define the priority science topics for the group. The main urban geoscience challenges identified for the group to address were: City info-modelling and 3D urban modelling approaches; Geo-data for urban planning; assessment of urban ground and shallow geothermal resources; Evaluation of urban geo-hazards; Geoscience communication.

The three science topics agreed for the group are

- Integrated geo-city information modelling;
- Geo-environmental pressures in urbanised catchments, and
- Geoscience communication for cities and citizens.

For each of these three science topics the group has identified the key priorities, suggested group activities, and potential research questions. The research questions include: ‘Multiscale urban-regional modelling approaches’; Characterizing the dynamic impact of growing cities on the subsurface and its resources; ‘How do we bridge the gaps between different urban disciplines and city practitioners’. These research questions provide direction for the UGEG to pursue future research grants and funding.

4.2. **EU Strategy Review:**

The UGEG Exec team have undertaken a review of current EU Policy and Strategy of relevance to urban environments and the groups mission and
science focus. The over-arching ambition set by the European Commission is for all Europeans to be ‘living well, within the limits of the planet’ by 2050 with the development of ‘...a set of criteria to assess the environmental performance of cities, taking into account economic, social and territorial impacts’. Whilst, disappointingly, there is no explicit reference to the urban subsurface and the role it provides for cities, priority themes for the EU include: climate adaption and nature-based solutions including urban green-blue infrastructure; digital transitions for cities including a mandate for Building Information modelling (BIM) via EU Directive 2014/24/EU; and Natural Capital assessments and improved resource efficiency. Aligned research and innovation strategies (e.g. JPI Urban Europe) are also pressing for increased science-policy cooperation.

The outcomes of the EU strategy review will be used in combination with outputs from the Sub-Urban COST Action and UGEG Science topics to prepare a position paper and policy brief on the state of urban geology in Europe.

4.3. Meetings and events:

a) Eurasian Network for Urban Geology (EANUG): Connections have been established with the newly formed Eurasian Network for Urban Geology (EANUG). This network includes the geological surveys of China, S Korea, Japan, UK and Finland and follows on from a series of meetings and presentations at workshops at CCOP (M Smith) and in China (Shanghai July 2019 – BGS M Smith & GTK), Wuhan (November 2019 – BGS) and Daejeon (December – BGS M Smith & GTK P Schmidt-Thome and T Lindqvist). It provides an important link that will enable Europe-China relations and sharing of best practice between cities and surveys. EANUG will establish an urban research center at the CGS Nanjing Centre and will be linked to university urban research. Pilot city studies, research priorities and staff exchange arrangements are under discussion.

b) International Association of Hydrogeologists Annual Congress (Malaga, Sept-2019):
   - Guri Venvik (TNO) Presentation on “Urban Water Cycle linked to subsidence by InSAR data”

c) City Future Conference, University College Dublin (June 2019)
   - Mairead Glennon (GSI) – Presentation on “Dublin City geo-environmental challenges”.

d) International Groundwater Quality Conference, Liège (September 2019)
   - Sebastian Pfleiderer (GBA) – Poster on “The urban hydrochemistry of groundwater in the city of Vienna, Austria”

e) UGEG Bi-annual meeting and parallel Urban Groundwater Management Conference in partnership with Universitatea Tehnica de Constructii Bucuresti, Bucharest (Nov, 2019).
   - Francesco La Vigna and Paolo Guarino (ISPRA) “Naples Metro Area Subsoil Database” and “A new hydrogeological map of Rome”
   - Rouwen Lehne “Urban geology at the State Geological Survey Hesse, Germany – case study Darmstadt_3D”

4.4. Publications:


5. Future perspectives

Proposed activities for 2020-22:

a) UGEG management:
   - Bi-annual UGEG meetings and parallel conference sessions
• Contribute to the European Partnership on the Geological Service for Europe proposal.
• Prepare a position paper on the state of urban geology in Europe and accompanying briefing pack for high-level policy engagement.
• Business development and engagement to expand networks and influence.
• Representation at EGU
• Seek funding opportunities to develop pilot/case studies and strengthen network

b) Geo-CIM sub-task:
• Guidance on data standards and exchange formats for Building and City Information modelling linking with the SIEG expert group and the Open Geospatial Consortium.
• Development of Case study exemplars of the ‘value’ of BIM and digital planning approaches for the urban subsurface.
• developing a method and possibilities of using and introducing 3D-geoimaging

c) Urban Catchments sub-task:
• Development of an urban typology classification system (resource, hazard, resilience, and engineering) and link cities with shared geo-environmental issues.
• Develop data-needs, monitoring regimes, policy targeted to the geo-urban typologies and link to the relevant EGS Expert Groups.

d) Geo-Comms sub-task:
• Reflection survey on the benefits and impact of the Sub-Urban COST Action.
• Cost-benefit analysis of geoscience info for planning and construction.
• developing (citizen-oriented) popular science publications, articles, leaflets about the importance and need for knowledge of geology understood as underground city space

• Development of multi-language infographics, illustrations and videos that communicate simple messages about the role of geology for cities.
1. Executive Summary

The activity of Water Resources Expert Group (WREG) in 2019 was related to the implementation of the four groundwater projects HOVER, RESOURCE, TACTIC and VoGERA of the GeoERA program, their Data Management and Communication, Dissemination and Exploitation plans of the projects as well as collaboration with the GeoERA Information Platform project on identification and description of products for EGDI.

The contents of the four groundwater project proposals and the GeoERA project in general were presented (communicated and disseminated) in an abstract for a poster for EGU 2019 and furthermore together with the other GeoERA themes in an abstract for an oral presentation. In addition, the TACTIC project was presented at the 36th meeting of the CIS Working Group Groundwater (WGG) in Bucharest in April 2019. All four groundwater projects have been disseminated at different relevant conferences in Europe (Austria, Spain, Luxembourg, Romania, Sweden, Switzerland, Denmark etc.).

2. Mission and Vision

WREG strives to collect and provide data and decision-support tools for the long-term protection, sustainable management and improvement of groundwater resources across Europe based on sound groundwater research. The efforts focus on EU societal challenges and support of EU policies on water, taking into account both protection of groundwater legitimate uses and terrestrial and aquatic ecosystems according to the Water Framework and Groundwater directives as well as the Blueprint to Safeguard Europe’s Water Resources.

3. Scope and Focus

 Provision of groundwater and hydrogeology data for sustainable management and safeguarding of Europe’s Water Resources on a scientifically sound basis. Focus of WREG for the coming five years will be to:

- Identify and supply relevant data for the groundwater part of GeoERA and the Geoscience Information Platform (GIP / EGDI).
- Identify groundwater research gaps and develop groundwater research projects and publishable scientific papers related to these. In addition, we will contribute to getting a European Partnership on a Geological Service for Europe for GSO’s and relevant partners as a follow up to GeoERA.

4. Achievements 2019 - Activity report

The main achievements in 2019 (some but not all communication and dissemination activities are listed in this section) were the implementation of the four projects of the GeoERA groundwater theme generally according to the project schedules:

- **HOVER**: Hydrogeological processes and Geological settings over Europe controlling dissolved geogenic and anthropogenic elements in groundwater of relevance to human health and the status of dependent ecosystems (Lead: Laurence Gourcy, BRGM)
• **RESOURCE**: RESOUR ces of groundwater, harmonized at Cross-Border and Pan-European Scale (Lead: Hans Peter Broers, TNO)

• **TACTIC**: Tools for Assessment of ClimaTe change ImpaCt on Groundwater and Adaptation Strategies (Lead: Anker Lajer Højberg, GEUS)

• **VoGERA**: Vulnerability of Shallow Groundwater Resources to Deep Sub-surface Energy-Related Activities (Lead: Sian Loveless, BGS – recently replaced by Marco Bianchi, BGS)

All four projects just received good to excellent reviews at the midterm project evaluation.

4.1. Main activities:

a) **January – March 2019**
- Several internal meetings in all four GeoERA groundwater projects.
- February 2019 - Presentation of WREG annual report at National Delegates Forum: Laurence Gourcy, BRGM.
- February: RESOURCE meeting at the Geological Survey of Hungary.

b) **April – June 2019**:
- Bucharest, DG ENV: 02-03/04/2019. 36th CIS Working Group Groundwater Meeting: WREG were represented by: Laurence Gourcy (BRGM) and Klaus Hinsby (GEUS). BRGM and GEUS presented progress on activities on trend assessment in relation to the implementation of the Water Framework Directive and the TACTIC project on “Tools for assessment of climate change impact on groundwater and adaptation strategies” of the GeoERA program.
- Geneve, UNECE: WREG activities and GeoERA groundwater projects presented at UNECE resource management week in Geneve (May 2nd)
- Vienna, IAEA/UN: HOVER related work presented and a HOVER project meeting was held at the IAEA International Symposium on Isotope Hydrology in Vienna (the WREG chairs: Laurence Gourcy and Hans Peter Broers / the coordinators of HOVER and RESOURCE and the GeoERA groundwater theme coordinator Klaus Hinsby were all there).

The meeting discussed the summer field campaign for groundwater sampling with globally leading groundwater dating laboratories.

c) **July-September**:  
- HOVER field work campaigns completed in collaboration between WREG partners and globally leading European groundwater dating laboratories at University of Bern Switzerland, University of Heidelberg, Germany and University of Bremen, Germany
- VoGERA present at the IAH conference in Malaga (September)

d) **October-December**:  
- TACTIC project assembly meeting incl. advisory board at JRC, ISPRA (October)
- Presentation of the GeoERA groundwater projects and their contributions to EGDI at the Hydrology Day, Odense, Denmark (22nd October)
- Presentation of the GeoERA groundwater projects and their contributions to EGDI at the Swedish “Groundwater Days”, Lund University, Sweden (24th October)
- RESOURCE project assembly meeting at the Geological Survey of Croatia, Zagreb (November)
- **Web meetings**: In addition to the physical meetings mentioned above, the groundwater projects leads and coordinator have monthly web coordination meetings with participation of the GIP contact, Margarita Sanabria, IGME, ES (first Monday in every month). All project boards of WP leaders and WPs have also frequent web meetings coordinating the activities and ensuring project progress.
- Finally, all groundwater projects provided information for their project websites on the GeoERA website: [http://geoera.eu](http://geoera.eu). In addition, many news from the projects were posted on the GeoERA groundwater blog ([https://geoera-groundwater.com](https://geoera-groundwater.com)), LinkedIn, Twitter, Facebook and ResearchGate. The news on the GeoERA groundwater received more than 10.000 views.

4.2. Publications:
Four papers have now been published or accepted in the GeoERA TACTIC project:


5. Future perspectives

A key aim of WREG in and beyond GeoERA is to conduct groundwater research and provide scientifically sound and standardized data for the European Geoscience Information Platform/European Geological Data Infrastructure (GIP / EGDI) to support implementation of EU policies, sustainable resources management and integrated surface and subsurface spatial planning. Easy and efficient access to these data according to the “FAIR” principles (Wilkinson et al. 2016) will benefit public and private research organisations and public-private partnerships developing innovative water and environment monitoring and modelling, as well as the authorities developing integrated, sustainable and cost-efficient resource policies. Innovative and broadly applicable solutions and products/instrumentation for sustainable water management and smart monitoring and modelling will support and preserve Europe’s leading role in developing sustainable solutions to safeguard water resources and the environment. WREG has entered the core group developing the proposal for a European Partnership on a Geological Service for Europe (EP-GSE) as a follow up to GeoERA and will provide relevant input primarily related to groundwater research and management. Such a partnership is considered of great importance and WREG will contribute as much as possible to the EGS mission of getting such a partnership. WREG will furthermore follow the development of other related European Partnerships such as the Water4All partnership, closely, and enable coordination with such partnerships.

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THE SHAPE OF OUR BUSINESS 2020
Earth Observation and Geohazards Expert Group

Number of EOEG Members: 87

Chair: Eleftheria Poyiadji (HSGME, Greece)
Deputy Chair: Rosa María Mateos (IGME, Spain)
Deputy Chair: Lidia Quental (LNEG, Portugal).
Deputy Chair: Mateja Jemec – Auflič (GeoZS, Slovenia)

1. Executive Summary

Year 2020 will be known as the year of Pandemic Covid-19 and is characterised by many changes in the way Geological Surveys operate. Among other changes, there were the restrictions in travelling and thus the EOEG Annual Meeting hosted by the Serbian Geological Survey on 27th May had to be postponed. In June 2020, after Gerardo Herrera left for a new appointment, a new Chair was elected and Deputy Chairs were appointed. Finally, the EOEG Annual Meeting took place (online via Webex) on 26th November with the participation of 32 participants.

2. Mission and vision

The mission and vision of EOEG are twofold: (1) to improve geoscience knowledge by detection, characterization and monitoring of geohazards (e.g. landslides, earthquakes, coastal erosion) and geological resources (e.g. mineral exploration, assessing the impact of mining activity) exploiting the full range of Earth Observation platforms and tools (radar, optical, hyperspectral and thermal) and (2) to evaluate the impact of geohazards in Europe through the harmonization and upgrading of national databases and the application of innovative mapping, monitoring and modelling techniques and methods.

3. Scope and focus

The scope and focus of EOEG has been on landslide and subsidence mapping, monitoring and modelling at different scales from local to European and the application of remote sensing for geohazards monitoring, mineral exploration and assessing the impact of mining activity. EOEG specifically focus on delivering new scientific insights for the primary customers from the Geological Surveys’ perspective and thus contributing to the safety and wealth of the society and policy making.

4. Achievements 2020

EOEG activities:


c. Elaboration of Earth Observation and Geohazards topics for the Strategic Research & Innovation Agenda 0.5 for the European Partnership on a Geological Service for Europe, 20/02/2020.


e. Participation in the European Partnership core team meeting, 09/04/2020.

f. EOEG Annual meeting planned to be hosted by the Geological Survey of Serbia in Belgrade on May the 27th, has been postponed.

h. Participation to the NDF workshop on September 15th.
i. Participation to the Copernicus Industry Workshop: European Ground Motion Service with Copernicus on 21\textsuperscript{st} and 22\textsuperscript{nd} October with the keynote speech, “The rationale behind and justification for the EGMS and overarching user requirements”.

j. Participation to the GEO Week 2-6 November.

k. Organization of the EOEG Annual Meeting (online via Webex) on 26\textsuperscript{th} November with the participation of 32 participants.

l. Continuous promotion of EOEG activities to social media channels.

**Landslide working group activities:**


**EOEG Projects:**

a. E-SHAPE project meeting of EuroGeoSurveys: training on Pilot 3 products and services for EuroGeoSurveys: 12/05/2020.

**EOEG Chairmanship:**

On 23\textsuperscript{rd} June 2020, the Executive Committee ExCom approved the election from the National Delegates of the new Chair of EOEG (Eleftheria Poyiadji, H.S.G.M.E., Greece) after the departure of the former Chair (Gerardo Herrera, IGME, Spain), going to DG GROW.

Moreover, after the expression of interest from three members of EOEG group, for the position of Deputy Chairs, the ExCom, on the first half of July, confirmed the new Deputies of the Expert Group, namely:

- Dr. Rosa Maria Mateos, IGME Spain, socioeconomic impact of geohazards.
- Dr. Lidia Quental, LNEG Portugal, remote sensing and geoscience data.
- Dr. Mateja Jemec – Auflič, GeoZS Slovenia, investigations and monitoring of geohazards.

5. **Future perspectives**

- EOEG will continue participating in H2020 E-SHAPE project.
- The Landslide working group will continue its activities regarding landslide hazard analysis in Europe, even though additional funding must be sought to provide continuity.
- EOEG carried out a complete analysis on landslide monitoring across Europe. The initiative is led by Dr. Mateja Jemec Auflič (GeoZS, Slovenia) and a new manuscript on this topic will be delivered in 2021.
- To prepare a joint proposal within the New Horizon Europe Programme in the framework of geological hazards and remote sensing.
- To exploit European datasets and generation of relevant new products for the geoscience community
- EOEG will continue its activities within the Strategic Research and Innovation Agenda (SRIA), as a living document for the EuroGeoSurveys, as well on Coordination and Support Action (CSA) SA R&I, where the group express the interest of project proposal to achieve the following CSA objective: Collating and integrating geological and climate related information and data to assess and map coastal vulnerability, and to optimise siting of offshore windfarms (as well as associated infrastructure), in support of multifunctional use of pan-European marine space.
- Continuation of promotion of EOEG activities to social media channels.
- White paper on geohazards, emphasising on landslides and subsidence, and their introduction to urban development.
Geo-Energy Expert Group

Number of GEEG Members: 59

Chair: Serge van Gessel (TNO, Netherlands)
Deputy Chair: Gregor Götzl (GBA, Austria)
Deputy Chair: Ceri Vincent (BGS, United Kingdom)
Deputy Chair: Staša Borović (HGI-CGS, Croatia)

1. Executive Summary

The 2020 activities of the Geo-Energy Expert Group (GEEG) mainly focused on GeoERA and supporting the third strategy pillar of EGS. Additionally, the GEEG worked on CSA – Geological Services for Europe and strengthening links with external organizations and stakeholders (amongst others: Clean Energy Technology Partnership, ETIP Renewable Heating and Cooling, ETIP – Deep Geothermal).

2. Mission and Vision

The subsurface is and has been the main provider of energy resources. As of now oil, gas and coal are still prevailing. Yet other renewable forms of energy (geothermal) and energy services (storage of clean energy, and heating and cooling, permanent sequestration of CO2) are emerging, and will become key pillars for Europe’s Green Deal ambitions.

The Geo-Energy Expert Group members aim to support the discovery and responsible development of renewable subsurface energy sources and services. This is first of all achieved by collecting, interpreting and disseminating transnational datasets, maps and models. Secondly, the results of our scientific work are translated to products and tools which support local and national authorities in their decision-making processes and inform science communities, industry and the public on potential uses and impacts of subsurface utilization. The essential instruments to accomplish these acts are research collaboration among GSO’s and with the broader science community, knowledge sharing and educational events, and capacity building and stakeholder interaction.

Through cross-disciplinary research with the other Expert Groups in EuroGeoSurveys, the GEEG will realize its objectives through the H2020 GeoERA programme, the upcoming CSA Geological Services for Europe, and various strategic research projects under Horizon Europe, Interreg projects and COST actions.

3. Scope and Focus

The main scope and focus of the GEEG is related to the following subsurface activities:

- **Hydrocarbon exploration**: This has been the past focus of the group. In the coming years this topic remains part of our scope in the following context: i) dependence on domestic natural gas as least polluting bridge-fuel during the energy transition, ii) assessing impacts of methane emissions, iii) re-use of depleted reservoirs and infrastructure for storage (energy, CCS), and iv) valorizing the investments of past exploration and development for renewable technologies.

- **Geothermal energy**: This is one of the major growing clean technologies, ranging from deep high-enthalpy sources for industrial heating and electricity production purposes up to shallow low-enthalpy sources for sustainable district heating and cooling. Key aspects are i) assessing technical and economical recoverability of deep geothermal, ii) planning and management of shallow geothermal, iii) assessment of seismic hazards related to injection, and iv) producing essential minerals (i.e. lithium) from geothermal water.
**CO₂ storage**: To achieve the emission reduction goals, CCS will be a key technology to reduce (unavoidable) CO₂ emissions from industry and electricity production processes and enable negative emissions through capturing emissions from biomass combustion. The GEEG focuses on i) delivering databases and atlases to support selection of preferred locations for storage, ii) develop plans for upscaling and iii) assess possible interactions with other uses (geothermal, energy storage, EOR/EGR).

**Energy Storage**: Until now, the majority of all energy storage capacities (>99%) is contained in underground gas storages. In the near future, clean storage of energy can be achieved through underground hydrogen storage, compressed air energy storage, pumped hydro, and high/low temperature storage. GEEG focuses on i) establishing databases and atlases providing insight in the potential of energy storage technologies, ii) resolving key research questions that will raise the technical readiness levels of energy storage technologies.

Besides the above-mentioned technologies, the GEEG members support development of subsurface management tools and assessment of potential hazards and impacts induced by subsurface activities.

**4. Achievements 2020**

**GeoERA**: In the first half of 2020, the activities of the GEEG were mainly focused on the GeoERA projects. Specific highlights are:
- The mid-term review meetings with stakeholders and resulting reports
- Very successful stakeholder webinars sessions
- Presentations and support at several conferences including EGU-2020 conference
- A further integration with the GeoERA GIP-P project activities
- Stakeholder interaction workshops

Despite the COVID-19 situation, the GeoERA projects are well capable to adjust and continue activities. Some projects may experience delays due to the fact that field work and some analyses activities are postponed. The projects are in communication with the GeoERA coordination team to negotiate the conditions for postponement of the GeoERA end date.

**CSA – Geological Services for Europe**: The expert group is involved in the definition of the HE CSA with contribution of scope and (strategic) research objectives.

**Network and engagement**: As GEEG we have built and extended further relationships with:
- The Clean Energy Technology Partnership
- Renewable Heating partnership
- EGEC
- CO2Stop
- UNECE (meetings/presentations)

**Presentation/co-coordination of Brussels-EC geothermal event**: By the end of November 2020, a start was made with the drilling of new geothermal wells near the EU Parliament Building. GEEG supported a public event with EGEC, GSB and the EC.

**Organization and convening of the Shallow Geothermal days**: This event was held on the following dates: Policy session on 4th of December covering two presentations from members of the Geonergy Expert Group (Estelle Petitclerc presented the geology of Brussels for the use of shallow geothermal energy, Gregor Goetzl presented urban shallow geothermal management approaches). On the 9th of December, the Geonergy group was supporting a session on best practices. The final session took place on the 12th of December hosting a R&D session.
• **Group meetings:** two major online meetings were organized to evaluate (CSA-SRIA) research opportunities for Geothermal energy (21.10.2020), CO₂ storage and Energy Storage. Follow-up events are scheduled for early 2021. A special Christmas event was organized on December 16th.

• **Energy Storage Position Paper (in prep):** A position paper on underground energy storage is under development. The paper should strengthen the SRIA scope and objectives. Endorsement is sought from EASE, UNFC, CETP. The paper is expected to become finalized in Q1 2021. Promotion and communication will be done in coordination with EGS secretariat.

• **GEEG coordination:** The GEEG has selected three new co-chairs (Gregor Goetzl from GBA, Ceri Vincent from BGS and Staša Borović from HGI-CGS). These positions are aligned with the upcoming challenges in the CSA process and the research topics under the EC-Green Deal. A stronger involvement in organizing activities is one of the key attention points. Co-chair roles were selected and confirmed in the GEEG meetings on 12th October 2020.

Other activities: Member surveys are involved in various collaboration projects (e.g. INTERREG) and COST actions. A complete overview of current and upcoming opportunities will be discussed during the upcoming GEEG meetings.

5. **Future perspectives**

The GEEG is in a good position to remain active and expand its impact. The importance of renewable subsurface energy sources and services is widely acknowledged by stakeholders in national governments, the EC and industry. The GSOs in EGS possess crucial and unique knowledge that is needed to enable other research programmes (partnerships) and actual exploration and development.

In 2021, the key focus will be on the following activities:

- **Regular (online and later face-to-face) meetings and workshops:** Here members will discuss strategic research items and actions in CSA. The first meetings are planned on February 5th (geothermal) and February 12th (storage)

- **Projects (participation/coordination):**
  - Proposal for geothermal energy integration into heating and cooling networks (EU-GD, Zero-Multi-Grid)
  - Hystories
  - IEA task Underground Hydrogen Storage

- **Representations:**
  - BGS-UK subsurface storage conference – presentation by Gregor Goetzl on underground thermal energy storage
  - GeoERA events
  - Meetings/presentations for EU partnerships (CETP)
  - Meetings/presentations/participation RHC – ETIP/DG
  - Meetings/presentations for UNECE (storage related)

- **Position/Input papers**
  - Geothermal
  - Energy Storage
  - Phase out fossil fuels

- **Stakeholder/science community events**
  - EGU
  - Shallow Geothermal Energy Days 2021
  - GeoERA final events
  - Geo2POL event
1. Executive Summary

The implementation of the Geological Mapping and Modelling Expert Group (GMMEG) was approved unanimously in the EuroGeoSurveys General Meeting in October 2020 and without abstains. The application of Hans Georg Krenmayr and Philippe Calcagno for chair-and co-chair positions, respectively was approved by ExCom on 1st of December 2020. The start-up-meeting of GMM-EG took place with 39 nominated expert group members from 28 NGSOs on 16th of December 2020. The main focus of the expert group in 2021 will be to contribute to the CSA-GSE-application in the EG’s thematic fields.

2. Mission and Vision

Our ambition is to share - at a European scale - the knowledge and expertise of the different national and regional geological surveys along with the other public and private sectors active in the field of geosciences, in order to improve the quantity and quality of basic-geological subsurface data, information and knowledge, and to federate R&D and best practices in geomodelling, and hereby contribute to the development of an EGDI-based, world leading European geological information platform (contributing to the subsurface in “Europe’s digital twin”) to better serve the needs of society.

3. Scope and focus

Overall scope as well as specific objectives are summarized in the EG’s Terms of Reference:

1) Develop new and refined scientific nomenclatures (with respect to GeoSciML and INSPIRE) for the following themes: Lithology, Lithotectonic units, Geological structures (tectonic boundaries), Lithogenetic units, Lithostratigraphic / lithodemic units, Geomorphological units, Geological structures (point related measurements/features), Geological processes, Geological age, Sedimentary environments, Magmatic environments, Metamorphic environments, Mineralogy, and Anthropogenic features and deposits. Most of these vocabularies need to be hierarchically organised, ready to be applied in multiscale geological map datasets and models.
2) Share best practice data-models (within which the above standards can be implemented) and develop a reference data-model.
3) Explore and promote automated scalability tools for map data as key for new digital European map products.
4) Develop new European, digital, transboundary, geological models and datasets.
5) Develop new quality evaluation tools and procedures for geological maps, models and datasets.
6) Develop and deliver digital solutions for field data acquisition and storage.
7) Develop and share tools to describe, manage and display uncertainty in geological maps and models.
8) Produce lobbying material for the promotion of geological mapping and modelling.
9) Explore possibilities to fund the work of the GMM-EG.

4. Achievements 2020

Preparation phase of the new EG:

To get a more detailed insight into the situation of national and regional geological surveys in the field of geological mapping and modelling, a questionnaire with 44 questions was designed and sent to all EGS National
Delegates. The results were used to elaborate the specific objectives of the GMM-EG, as documented in the Terms of Reference.


Booster phase:

- Organization and transaction of start-up meeting (online) on 16th of December with 38 nominated members from NGSOs.
- Compilation of meeting-summary
- Upload of all relevant documents to the EG’s fileshare in EGS-intranet
- Preparation of EG’s description for EGS-Website in cooperation with EGS Secretariat

5. Future Perspectives

In 2021, we will concentrate on our contribution to the CSA-GSE-application in the EG’s thematic fields, characterised as follows:

1. New and/or better scientific standards (hierarchic nomenclatures for use in multiscale subsurface data sets)
2. Development of best practise data models to take up subsurface data sets for common use
3. Development of tools (semiautomatic scalability of map data, geomodelling capabilities, display of uncertainty, etc.) necessary for modelling and display of results
4. New transboundary subsurface datasets of selected European regions in various scales (depending on existence and availability of data sets and their potential for standardisation and harmonisation)
5. Outreach, communication, user-interaction

We strive to achieve this contribution by

- Close interaction with CSA-WGs and EGS-EGs, in particular SIEG and UEGE
- Continuous lobbying for geological basic data as an independant issue (comparable to information technology and geodata management), which serves as indispensible groundwork for all applied geoscience disciplines

Ongoing activities:

- Gap analysis of European geological maps and map data sets in scales from 1:25.000 – 1:1.000.000
- Organization of exchange of knowledge and expertise by means of online-workshops and lectures & discussions
1. Executive Summary

The 2020 activities of the EuroGeoSurveys Geochemistry Expert Group (GEG) were:

- Publication of papers and presentations using results from the FOREGS Geochemical Atlas of Europe and Geochemistry of Agricultural and Grazing land soil (GEMAS); Activities were somewhat limited due to the pandemic crisis.
- Discussion of ideas for developing pan-European geochemical projects of interest to policy makers, the scientific community, and the public; Monitoring of EU commission calls.
- Participation in on-line events related to soil protection initiatives by FAO, EEA and the European Commission.
- Preparation of the GEMAS on-line version: For the provision of the GEMAS results in the BGR Geoviewer and the Product Center all single element maps as an ArcGIS project for the WMS as well as the download files for the Product Center (in total 2009 files; shapefiles, PNG and PDF files including metadata descriptions) have been calculated and completed by the geochemistry group and passed then to the geoinformation group for technical implementation. In February 2021, the whole material will be freely available and downloadable in or from the BGR Geoviewer. After that, the GEMAS website will be set up and made available in 2021.
- The planned 2020 two-day autumn annual joint business meeting of the EuroGeoSurveys Geochemistry Expert Group (EGS-GEG) and the IUGS Commission on Global Geochemical Baselines (IUGS-CGGB) that was going to be held in Athens (Hellas) on 5-6 November 2020 was postponed to 2021 (exact dates to be decided) because of Covid-19.

2. Mission and Vision

Sound scientific data must be in the forefront for planning and political decision-making. The mission of GEG is, thus:

- To provide high quality geochemical data of near-surface geo-materials, which affect directly or indirectly our quality of life.
- To develop harmonized geochemical databases for multi-purpose use: “one project – many users”.
- To offer independent non-biased expert advice to the European Commission, and to supply sound geochemical background data to scientists for their research, and to the public in general, for education and other applications (e.g., land use planning, agriculture, remediation).
- Results from all completed projects are relevant for various European Commission Directives and EU international commitments.

3. Scope and Focus

The focus of GEG is on the execution of pan-European applied geochemical projects using harmonized and quality-controlled procedures of sampling, sample preparation, and laboratory analysis to produce high-quality data for multipurpose use. The scope is to bring under the same umbrella applied geochemists with various specialties (e.g., environmental, mineral exploration, ground water geochemistry) from all EGS member institutions, and to act as a forum for the exchange of expertise and to work together to deliver high quality professional products and services to European Union countries.
4. Achievements 2020

4.1. GEG Projects

- Writing of articles on different aspects of the GEMAS project.
- Preparation of the 4th GEMAS quality control report.
- Preparation of a new GEMAS website by BGR.
- GEMAS data are included on the EGDI/GeoERA portal (under preparation by GEUS).

4.2. Involvement in EU Commission co-financed projects

Members of the EGS-GEG continued to be involved in many EU Commission co-financed projects as detailed in last year’s Annual Report 2019. GEG members participate in different projects (a selection):

- The INTERREG Danube Transnational Programme (SIMONA: Sediment-quality Information, Monitoring and Assessment System to support transnational cooperation for joint Danube Basin water management). The main objective of SIMONA is to respond to the current demand for the effective and comparable measurements and assessments of sediment quality in surface waters in the Danube River Basin. The FOREGS and GEMAS data will be used in this project. [http://www.interreg-danube.eu/approved-projects/simona](http://www.interreg-danube.eu/approved-projects/simona).


- AgriAs (Evaluation and management of Arsenic contamination in agricultural soil and water) - The FOREGS and GEMAS maps, databases and publications have been used in the AgriAs project lead by the Geological Survey of Finland. [http://projects.gtk.fi/AgriAs/](http://projects.gtk.fi/AgriAs/).

- Smart Exploration - Sustainable mineral resources by utilising new exploration technologies H2020-SC5-2016-2017. [https://smartexploration.eu/](https://smartexploration.eu/).

- Explora – ALENTEJO 2020 – Regional H2020 - EXPLORA/Alentejo2020-Op ALT20-03-0145-FEDER-000025 Project is funded by Alentejo2020/Portugal2020+ European Regional Development Fund/ERDF. The project is about improving the knowledge of the vectors of exploration at the Neves Corvo mining site in 3D with the aim of finding evidence of new mineralised bodies. - [http://www.lneg.pt/iedt/projectos/582/](http://www.lneg.pt/iedt/projectos/582/).


- PERFORM - “Improving Geothermal System Performance through collective Knowledge Building and Technology Development” (web-site under construction). The work in PERFORM focuses on implementation and evaluation of capabilities to control mineral scaling, particles clogging, corrosion, and temperature/stress related effects of geothermal flow and injectivity as well as the establishment of a transnational database on injectivity problems at geothermal doublets, specifically related to geochemistry and formation water chemistry.

- ERANETMED/1114/02 Cr (VI) Impacted water bodies in the Mediterranean: Transposing management options for Efficient water Resources use through an Interdisciplinary Approach.

- CircVol project - good practices for application of CDWs and industrial side products in infrastructure building. This project is partly funded by EU Regional Development Fund and lead by Turku Science Park.

- PanAfGeo - Work package Geohazards (WP4 and WP5). Training in the geohazards courses for 91 participants from 29 African countries. Training topics included soil degradation and desertification, geo-pollution and health, and geochemical mapping. [http://panafgeo.eurogeosurveys.org](http://panafgeo.eurogeosurveys.org)

- HEATSTORE: demonstration and improvement of techniques for high-temperature aquifer thermal energy storage.

- EURAD: EJP on disposal of radioactive waste; the project studies the redox reactivity of clay minerals in relation to redox-sensitive radionuclides as Se.
ENOS: groundwater and soil monitoring in relation to CCS.
EU HBM4EU human biomonitoring project, i.e., looking at health risks from metals.
PERFORM: Establishment of transnational database on injectivity problems at geothermal doublets, specifically related to geochemistry and formation water chemistry.
SECURE: Groundwater monitoring for shale gas exploitation and CCS, including gas monitoring and impact on microbiological communities.
GeoERA HOVER: Addressing groundwater management issues related to drinking water, human and ecosystem health caused by both geogenic elements and anthropogenic pollutants.
PI Rural: The overall objective of the action is to support formulation and implementation of Chinese policies, legislation, standards and measures that will contribute enable better management, use and protection of groundwater resources and increased coverage of safe groundwater-based water supply in rural areas.

4.3. Advisory work for European agencies and international organisations:

- Chairmen of the GEG were invited as experts by EEA (Eionet NRC Soil) to contribute to the new European Soil Condition Assessment 2020/2021.
- Members of the GEG participated in the virtual meeting on the ‘Launch of the EU Soil Observatory’, which was organized by the Joint Research Centre on the 4th of December 2020.

- Members of the EGS-GEG are involved in the writing or review of two manuals, prepared by the IUGS Commission on Global Geochemical Baselines:

4.4. Advisory work at the national level (examples)

- Lithuania: National representative in the EU expert group on Soil protection at EC DG Environment and NRC for Soil at the EEA EIONET.
- Sweden: Agency representative in the Toxicological Council and committee work on Cadmium strategy for Sweden led by the Toxicological Council by the Swedish Chemicals Agency.
- United Kingdom: Member of the United Nations Food and Agriculture Organization (FAO) Global Soil Laboratory Network (GLOSOLAN) Technical Working Group.
- The Netherlands: Member of the Groundwater Domain group for the Dutch BRO Key Register of the Subsurface.

Member of EGS-GEG is a Chair of Geochemistry Group of ASGMI, Association of Iberoamerican Geological and Mining Surveys. The present mission is to prepare a Manual of Standard Geochemical Methods for the South American and Iberian Peninsula.

4.5. Participation in regional/national projects and other research activities (examples):


• Release of the Brownfield ground risk calculator: https://www.bgs.ac.uk/geology-projects/brownfield-ground-risk-calculator/.

• Acid sulfate soils as a geo-biohazard in the Barents region. Partners: Geological Survey of Finland (GTK), Geological Survey of Sweden (SGU), Geological Survey of Norway (NGU), Geological Institute of the Kola Science Centre of the Russian Academy of Sciences (GI KSC RAS) and Aarhus University. Project funded by Kolarctic.

• Urban geochemical mapping of Longyearbyen, Svalbard, Funded by Svalbard environmental fund.


• Regional multi-disciplinary mapping project in the Bergslagen area of central Sweden (SGU).

• Environmental monitoring of organic pollutants and elements in Swedish marine sediments (SGU, Swedish EPA; 2020-2021).

• Characterization and remediation of contaminated fibrous sediments (from pulp and paper industry discharges). Partners: universities, governmental agencies and a consultant agency in Sweden and Germany.

• On-going urban geochemical mapping of the city of Esztergom.

• Soil geochemical mapping of the Dorog Basin and the Pilis Mts. (northwest of Budapest).

• Participation in Dutch research programme KIWK Knowledge Impulse Water Quality.

• BGR has analyzed about 2000 solid samples (by WDXRF, EDXRF) for the geological mapping of Lower Saxony.

• About 350 solid samples from the Pacific and Indian Ocean have been analyzed by BGR for the Marine Geology.

• BGR carries out a prospecting project in the area of a kaolin deposit in Mauretania, for which 350 samples were analyzed.

• Member of the EGS-GEG is one of the authors of a method applied to a national and a European patent, registered under the number EP20184099, consisting of a geochemical and geological method to predict buried massive sulfide deposits “A method for characterizing underground metallic mineral deposits based on rock coatings and fracture fills”, carried out in EXPLORA project under the Alentejo2020 Programme.

4.6 Book sales
• GEMAS atlas: In total, 11 copies of both volumes, and 3 copies of volume 1 were sold in 2018. The hitherto total sales by Schweizerbart are 544 copies of (Parts 1 & 2), and 13 copies of volume 1. In addition,
BGR has sent through its library exchange programme 140 copies of both volumes to national geological surveys, ministries or politicians. NGU has also given free volumes to different institutions. It is, therefore, difficult to estimate the exact number of hard copies that are worldwide since its publication in April 2014. A conservative estimate is around 700 to 750 copies.

- **EGG atlas**: Book sales, since publication in August 2010, reached 925 copies.
- **Urban Geochemistry textbook**: Book sales, since publication in April 2011, reached 647 copies, and Royalties earned from the sale of 12 books up to the end of 2019 are £17.73. We do not yet have the Wiley statement on book sales in 2020 and royalties earned. This statement is expected in April 2021.

4.7 Conferences

- **36th IGC, New Delhi, 2-8 March 2020**: Due to Covid-19 the 36th International Geological Congress in New Delhi has been moved to 16-21 August 2021. Due to the mismanagement of the Congress by the Local Organizing Committee, IUGS decided to withdraw its support. Hence, the joint EGS-GEG and IUGS-CGGB planned activities (Session and Workshop) did not go ahead following withdrawal of IUGS support.

- **Global Soil Partnership Assembly (8th Session), Rome, 3-5 June 2020**: Members of EGS-GEG participated in the virtual assembly (Zoom meeting), where many soil issues were discussed. Also, comments were made on the “Protocol for the assessment of sustainable soil management practices”.

- **EGU 2020, Vienna, 4-8 May 2020**: Session BG1.6 - Functions and functioning of the Critical Zone. Co-organized by HS10/SSS12. Convener: Gerd Gleixner | Co-conveners: Antonello Provenzale, Beatrice Bechet, Tamara Kolbe, Philippe Négrel (Chair EGS-GEG). Virtual Zoom session open to EGS members but due to Covid-19 there were few attendees.

4.8 Publications


5. Future Perspectives

The Geochemistry Expert Group would like to see closer collaboration between the EGS expert groups regarding the future of Geological Services for Europe and GeoEra initiatives, including the planning phase. Geological Surveys are the only geoscientific organizations that can develop truly harmonized databases. Pan-European projects that have high priority and could be carried out in EU countries by EGS associated surveys are (for details refer to the 2019 mid-term report):

- Urban geochemistry of Europe (URGE) Phase II (see Appendix 1, p.11-18);
- Water Geochemistry of Europe (WAGE) – Surface & spring water (see Appendix 2, p.19-20),
- Ore deposit geochemistry database (OREDAT) (see Appendix 3, p.21-22).

Among the future perspectives, apart from on-going work on the GEMAS project samples, the following harmonised data sets have been identified as ‘urgently needed’ and GEG’s explores the possibilities to find both the external and internal financial sources to carry out the following projects:

a. Modern isotope systems on GEMAS samples
b. Mineralogical determinations on GEMAS samples
c. URGE - urban geochemistry phase II – towards the production of homogeneous and representative urban data sets (for this purpose a brochure was written)

d. Harmonized and coherent lithogeochemistry of Europe (complementary to the parent material map of Europe)

e. Tap/Surface/Spring water geochemistry

f. Low sampling density geochemistry of the European shelf

g. Forest soil geochemistry

h. Geochemistry of the North Atlantic Basin (for this purpose a brochure was written in collaboration with EGS Marine Geology Expert Group)

i. Biogeochemistry – geochemistry of biological/organic materials

j. Internally consistent database of the geochemistry of European mineral deposits (complementary to the ProMine and Minerals4EU databases).

k. Use of the GEMAS data as ground proofing data set for remote sensing (discussion with European Space Agency), and

l. Electronic version of the GEMAS Atlas for free download on the Internet to be finalised in 2021.

The GEG would like to be involved at a higher level in the soil initiatives which launched by the European Commission such as Soil Observatory – possible networking help from the EGS Secretariat might be needed in mediations.

The GEG is organising a session at the Goldschmidt conference (Lyon, 4-9th July, 2021) “Geochemical mapping at all scales for all reasons” with Philippe Négrel and Anna Ladenberger as conveners.
https://2021.goldschmidt.info/goldschmidt/2021/meetingapp.cgi/Session/1855

The GEG has plans for two-day autumn annual joint business meeting of the EuroGeoSurveys Geochemistry Expert Group (EGS-GEG) and the IUGS Commission on Global Geochemical Baselines (IUGS-CGGB), to be held in Athens in November 2021. In case of restrictions, a digital meeting will be organised.
International Cooperation and Development Task Force

Chair: Diana Ponce de León Gil (IGME, Spain)
Deputy Chair: Fabian Helms (BRG, Germany)

Number of ICDTF Members: 47

1. Executive Summary

During 2020, questionnaires were conducted with ASGMI members to identify their needs and interests so that this information could serve as a starting point while waiting for a better context for a more comprehensive EGS-ASGMI collaboration, such as PanLatEUGeo.

Attempts have also been made to advance in the EUROCLIMA+ Programme proposals, contacting the focal points of the Programme in Latin America, CEPAL and UN Environment without obtaining significant results due to the COVID context.

The current MDNP project represents an opportunity, and it is proposed to take advantage of it to make ASGMI's capacities and EGS-ASGMI collaboration visible, in order to promote the interest of the EC in ASGMI and to serve as an introduction for future joint EGS-ASGMI proposals.

2. Mission and Vision

The mission of ICDTF is to increase the capacity of EGS and its members to establish stable and effective relationships with Geological Survey organisations and other relevant stakeholders internationally, as well as to capitalize on international cooperation opportunities. ICDTF ensures that members share their international cooperation expertise, acting upon request of the EU institutions.

3. Scope and Focus

The focus of ICDTF is to consolidate cooperation with ASGMI. To this end, work continues on a wide-ranging proposal, PanLatEUGeo, as well as other smaller proposals that can facilitate mutual understanding and raise awareness of the possibilities that an EGS-ASGMI collaboration can offer to the EC.

4. Achievements

Projects proposals

PanLatEUGeo proposal

- After not finding funding for this kind of proposal, ICDTF decided to return to the initial needs of ASGMI in order to have a good analysis done while waiting for a suitable context to present again a more comprehensive EGS-ASGMI proposal.

- During 2020, questionnaires have been sent to ASGMI members to identify their needs and priorities.

- Not all ASGMI members have responded to the questionnaire, so a reminder will be sent through the ASGMI Secretariat.

EUROCLIMA+ proposals
• The EC finances cooperation with Latin America under the EUROCLIMA+ Programme. After receiving proposals from the ASGMI Hydrogeology and Geological Hazards Expert Groups, the members of the ASGMI International Cooperation Group have been encouraged to contact the Programme’s focal points in their respective countries to convey ASGMI’s interests. These focal points will communicate to the EC the interests gathered in their countries to be taken into account in the selection of proposals. The regional offices of UN Environment and CEPAL, in charge of evaluating regional proposals, have also been contacted.

• However, in the current context due to COVID-19, the Programme seems to be at a standstill. We have not had any response from those responsible for the program at UN Environment and CEPAL, even after insisting through other contacts in those regional offices, and some Latin American focal points have commented that new projects will probably not come out until 2021-2022.

In December a call from DG DEVCO for EU - LATAM project proposals (EU- Latin America Alliance for Sustainable Growth and Jobs: AL-INVEST Verde. Component 1) was reviewed, but it is aimed to SMEs, so it would not be of interest to ASGMI and EGS

Collaborations in other projects

MDNP

We have spoken with the ASGMI Secretariat to try to make visible, through the MDNP Project, some works that show its capabilities (e.g. Metallogenetic Map of Central America and the Caribbean, the future Metallogenetic Map of South America, the inventory of critical raw materials in Latin America, etc.). These works could persuade the EC to invest in ASGMI and finance an EGS-ASGMI cooperation, for example to build a common data model for Latin America in the way of the European INSPIRE initiative. A common data model is of great interest to ASGMI and Latin America and will facilitate the use of the information for researchers, potential investors and general public, and will serve as a basis for providing information for EU-Latin American initiatives such as MDNP.

Other proposals

EGS-ASGMI experts groups collaboration

• It has been discussed with the ASGMI Secretariat to promote collaboration between EGS and ASGMI expert groups. For now, it has been assessed that ASGMI groups still need to mature further, although in the medium term a collaboration with the most consolidated ASGMI groups could be considered. Interested EGS counterpart groups would then be asked to summarize their focus and activities to identify common interests to work on.

Meetings and Workshops

• EGS Expert Group Chairs Meeting and National Delegates Forum (Brussels, February 2020). Gerardo Herrera (IGME) presented the ICDTF activities due to the impossibility of the ICDTF chair to attend.

• Meetings with the Secretary General and the Executive Committee of ASGMI to update the EGS-ASGMI cooperation.

• Participation in meetings with the International Cooperation Expert Group of ASGMI for the follow-up of the EGS-ASGMI cooperation.

5. Future Perspectives

For now, the context is not favorable for PanLatEUGeo or EUROCLIMA. DG GROW seems to be more interested in Africa than Latin America and the
EUROCLIMA+ Programme also seems to be at a standstill. Therefore, ICDTF activity has decreased over the last year.

In this context, ICDTF will continue to be in contact with ASGMI and will look for new opportunities (we will try to create new opportunities through MDNP). We can expect that at some point there will be a change in the direction of DG GROW more favourable to Latin America. We will continue to monitor the EUROCLIMA+ programme (some expert groups of ASGMI are very interested in this programme).

In case we have a concrete opportunity to cooperate, ICDTF will prepare a proposal.
**Marine Geology Expert Group**

*Chair:* Henry Vallius (GTK, Finland)

*Deputy Chair:* Sytze van Heteren (TNO, The Netherlands)

### 1. Executive Summary

The Marine Geology Expert Group (MGEG) includes representatives from 25 EuroGeoSurveys member organizations. The group intended to hold its Annual Meeting in Ostend, Belgium during the EMODnet Jamboree but ended up meeting online in January of 2021. The overall effect of COVID varies among partners, with some coming to a near standstill and others in full operation. Since 2009, the group has provided marine geoscience information to the European Commission’s European Marine Observation and Data Network (EMODnet). The fourth phase (2019-2021) of EMODnet, coordinated by GTK, is ongoing. Like its predecessors, it is solidifying links between the national marine mapping programs of its member and associate surveys and has enabled the ones with a developing mapping program to profile themselves nationally. A proposal for a fifth phase (2021-2023, 2.4 M EUR) was submitted in July. For some of our member surveys, EMODnet is the only marine project, ensuring some continuity in offshore mapping and strengthening their digital presence as part of the European Geological Data Infrastructure EGDI. In 2020, MGEG members have contributed to a substantial number of EU-funded and transnational projects, commonly with a multidisciplinary scope. In addition, they continue to play a lead role in the Atlantic research alliance between the EU, the USA and Canada, as well as in other global initiatives, particularly with China and Australia. The MGEG participates in two GeoERA projects: MINDeSEA on metallogenic mineral resources and GARAH on hydrates in the continental margin. Some marine sections (Denmark, Croatia, Finland, Ireland, Italy, Portugal, Sweden) were growing, primarily because of a shift to detailed nearshore and inshore geological, geochemical, habitat and drowned-landscape mapping. Others have been under pressure (Cyprus, Greece, Malta, Ukraine). Presently, the MGEG is still overly dependent on EMODnet. Uncertainty about continuity and future budgets, especially because of COVID, is a major medium-term worry for several partners. Success rates in all financing instruments (Horizon, European Economic Area, EUROFLEETS) keep going down because of increased competition and shrinking funds. Marine geology appears to be on the rise, however, where vast volumes of new subsurface data become available as part of windfarm development, where surveying is deemed important for geopolitical reasons (Arctic), and where marine minerals are a potential resource.

### 2. Mission and vision

The MGEG promotes marine geological information and interpretations as a fundamental requirement for all activities that take place in Europe’s seas. We deliver high-quality information and advice to inform decision makers responsible for our seas, underpinning EU Action Plans and Directives by ensuring that marine science is integrated. We focus on issues of global importance such as sustainable use of natural resources, climate change, habitat mapping, natural hazards and long-term maintenance of databases. Through pan-European and transnational cross-disciplinary collaboration, the MGEG ensures visibility within EuroGeoSurveys.

### 3. Scope and focus

Number of MGEG Members: 48
Recognizing that different members have different tasks and responsibilities at a national level, including mapping, modeling, licensing and decision support, the group’s strategy revolves around collaboration and visibility. The EMODnet program has provided an opportunity for all MEGG members to work together. In addition, some members have been active in initiatives such as the EuroGeoSurveys Northeast Atlantic Geosciences group (NAG), with the initiation of the NAG-Coast Group and the MIM group (MAREANO-INFOMAR-MAREMAP) for knowledge and best-practice sharing related to marine mapping. The MEGG expands its geographical scope whenever possible, as the issues that affect the European seas have global significance. Knowledge exchange with Geoscience Australia, the USGS, various Chinese partners, and the Geological Survey of Canada is ongoing. The group is represented in the International Council for the Exploration of the Sea, the European Consortium for Ocean Research Drilling, the Atlantic Seabed Mapping International Working Group, the Global Ocean Research Alliance, JPI Oceans, the International Seabed Authority, INSPIRE Thematic Clusters, the European Plate Observing System, the European Multidisciplinary Seafloor and water-column Observatory, and the International Geological Correlation Program IGCP.

4. Achievements 2020

All MEGG members are involved in the fourth phase of EMODnet-Geology. Information on seabed sediments, subsurface geology, coastal behavior and resilience, geological hazards, mineral resources and drowned landscapes, compiled for all European sea areas, is made available through the project portal (http://www.emodnet.eu) using Web Map Services (WMS) that also feed other portals such as OneGeology-Europe, the European Geological Data Infrastructure EGDI, and the European Atlas of the Seas. In July, the group finalized a proposal for the next EMODnet phase, with stronger focus on dynamic and hierarchical legends as well as 3D models. Other projects with multiple MEGG partners include EU-China collaborative project EMOD-PACE, EMODnet-Bathymetry (and High Resolution Seabed Mapping), EMODnet Data Ingestion for industry, several ongoing Geo-ERA (including a Mintell4EU UNFC classification pilot study) and Interreg projects (on minerals, gas, coastal erosion and research infrastructures EPOS and observatories EMSO). Ongoing Interreg projects are FiberAct, on contaminant loads from the pulp and paper industry, and SEAmBOTH, on seamless mapping of the Bothnian Bay. GoFHAZ project (Hazardous substances in the Gulf of Finland). Some activities that have been carried out by individual members, including arctic environments, land-sea integration (COST Action on Ocean Governance for Sustainability), environment and hazards, and sediment records, are being adopted by the group. National mapping programs address areas not surveyed previously, especially in the Arctic, and make the transition from 2D to 3D. Significant efforts concern digitizing paper records and disseminating information through new multidisciplinary marine portals. As mapping is transitioning into subsurface modelling, it becomes possible to build decision-support tools. Important advances concern the use of virtual reality and an increasing capability for vessel-based monitoring and study of shallow nearshore and inshore waters. Several members received new data-acquisition and laboratory equipment, including sub-bottom profilers, echo sounders, underwater vehicles, automated core loggers, geochemistry instruments, mobile laser scanners and drones. These new tools and associated software are part of a transition to ever more detailed seabed and coastal mapping.

In support of our activities and to ensure visibility, we organized online conferences on earthquake engineering, monitoring coastal erosion from space, Mediterranean climate, and seabed mining. Much of our hands-on outreach came to a standstill. Peer-reviewed published highlights are Geological Society of London Special Publication 505 ‘From Continental
5. **Future perspectives**

At a European level, the main collaborative focus of the marine departments of the geological surveys will continue to be the EMODnet Program. The program will continue after 2021 to underpin ‘Blue Growth’, the European Commission’s long-term strategy to support sustainable growth in the marine and maritime sectors as a whole and the Green Deal. New vessels that are being built for shallow as well as deep water will have the equipment needed to answer tomorrow’s questions. Indirectly, EMODnet will continue to employ marine geoscientists and data experts fulfilling both EU mandates and national needs. It has spawned and strengthened regional collaboration, as exemplified by the Baltic and North Sea Coordination and Support Action.

While mapping the seabed, MEG members will continue to address issues such as the security of energy supplies (hydrocarbons and renewable energy) and raw materials (mineral and aggregate resources), both GeoERA topics; the protection of the amenity value of the marine environment for food (e.g., habitat mapping for fisheries and aquaculture); and the optimization of aspects related to health and safety (pollution and geohazards), cultural heritage and recreation.

In the drive to ensure that the MEG contribution remains relevant to Europe for the foreseeable future, new research roadmaps are being developed that focus on emphasizing the role of marine-geological mapping and research in everyday lives. In many of these roadmaps, including the SRIA for the European Geological Service, standard mapping evolves into 3D- and 4D modeling and adaptive monitoring, supporting the knowledge economy and underpinning EU directives for sustainability (with emphasis on seafloor-integrity indicators, mapping of priority areas, and data products relevant to effective spatial planning, maritime jurisdiction and business development). Quantification of the uncertainty of geodata adds to its applied value and is expected to play an increasingly important role in decision making. Marine geological data and sample management moves toward an open-access policy and toward public outreach aimed at broadening the surveys’ appeal and visibility. Storage of industry samples should become an important task.

Aside from ensuring the connectivity across marine seabed mapping internationally, moved forward by EMODnet, the MEG network will also need to look beyond the realm for which it is responsible. There is a clear need for linking marine and terrestrial geology. Groundwater cells do not stop at the coastline, sediment is exchanged temporarily and permanently between land and sea, and tools and protocols developed for one purpose or group may well be useful for another. In this light, the EGDI portal as embedded in GeoERA will be used to disseminate past and future EMODnet deliverables. Beyond Europe, the best way of solidifying our role and influence is by continuing to work together and by having a strong representation. To broaden and strengthen its position and to increase the use and visibility of the European geological surveys, the MEG sees significant added value in interacting and collaborating with other EuroGeoSurveys Expert Groups.

**List of primary member representatives**

The Chair and Deputy Chair of the MEG acknowledge the contributions of all group members in the compilation of this report. The following list includes current representatives and member organizations of the MEG: Sytze van Heteren (Netherlands) MEG Chair, Teresa Medialdea Cela (Spain) MEG Deputy Chair, Sokol Marku (Albania), Vera Van Lancker (Belgium), Ozren Hasan (Croatia), Zomenia Zomeni (Cyprus), Jørgen Overgaard Leth (Denmark), Sten Suuroja (Estonia), Aarno Kotilainen (Finland), Fabien Paquet (France), Lutz Reinhardt (Germany), Irene Zananiri (Greece),...
Xavier Monteys (Ireland), Andrea Fiorentino (Italy), Mara Brune (Latvia), Jolanta Čyžienė (Lithuania), Charles Galea (Malta), Reidulv Bøe (Norway), Dorota Kaulbarsz (Poland), Pedro Terrinha (Portugal), vacancy (Romania), Daria Ryabchuk (Russian Federation), Bogomir Celarc and Špela Kumelj (GeoZS, Slovenia), Lovisa Zillén Snowball (Sweden), Rhys Cooper (UK).

Non-EGS organisations associated with the MGEG:
Institute of Oceanology, Bulgaria (Lyubomir Dimitrov); Hydrographic Institute of Croatia (Ranko Crmaric and Nenad Leder); Jarðfeingi, Faroe Islands (Lis Mortensen and Bartal Højgaard); Ifremer, France (Laure Simplet); Bundesamt für Seeschifffahrt und Hydrographie, Germany (Manfred Zeiler); ISOR, Iceland (Ögmundur Erlendsson, Árni Hjartarson and Skuli Vikingsson); Geological Survey of Montenegro (Slobodan Radusinovic); GeoEcoMar, Romania (Gabriel Ion); Dokuz Eylül University, Turkey (Günay Çifçi, Mustafa Ergun and Erdeniz Ozel); and Prichernomorske State Regional Geological Enterprise, Ukraine (Valerii Rokytskyi).
Mineral Resources Expert Group

Number of MREG Members: 72

Chair: Daniel de Oliveira (LNEG, Portugal)
Deputy Chair: Henrike Sievers (BGR, Germany)
Deputy Chair: Henrik Schiellerup (NGU, Norway)
Deputy Chair: Sebastian Pfleiderer (GBA, Austria).

1. Executive summary

While the global pandemic situation has caused a readjustment of how we do business, MREG has maintained a very high level of activity with the same commitment to providing expert mineral intelligence analyses. The year has been punctuated with several events to which MREG was invited and participated in. These events were, for the most cases, ones where the expertise of MREG could be tapped and provide not only meaningful information but also generate discussion and exchange of views and opinions. Participations in PDAC2020, Raw Materials Week and the 7th Prometia scientific seminar were highlights for the year. MREG has also maintained a stream of information sharing with the EU during 2020. MREG continues the involvement in minerals and data projects, once again highlighting the close relationships between itself and the GeoERA Raw Materials projects as well as other H2020 projects. The mission and vision of MREG continues to be the compass by which the group guides itself.

2. Mission and vision

The Mineral Resources Expert Group (MREG) is actively involved in contributing to policy- and strategy-making processes aiming to identify, characterize and safeguard a sustainable resource potential, notably on critical and strategic raw materials, through research, development and innovation. Its mission is to provide the best available mineral expertise and information based on the combined knowledge of member Geological Surveys, for policy, communication, value chain creation, public awareness and education purposes at European level, focusing mainly on strengthening the position of the European minerals industry towards resource sustainability and competitive growth. To stimulate economic growth and minimizing the societal, environmental and political values and developments that place increasing pressure on the availability and exploitation of geological resources.

EGS MREG aims to become the leading partner within a European Raw Materials Knowledge Base and Information Network or other forms of cooperation that will be providing innovative tools and expertise to support a secure and sustainable minerals supply for Europe. Mineral information provided by the EGS MREG is based on globally comparable, maintained, standards of excellence for research and development. The MREG Vision is carried out collaboratively with other organizations that have mineral intelligence capacities and expertise and with consumers of that information and other potential stakeholders. Integrate innovation and value creation in combination with environmentally sound and resource-efficient exploitation.

3. Scope and focus

The EU faces a number of major societal and economic growth challenges including the access of critical and strategic raw materials from primary and secondary sources as well as the creation of relevant jobs, skills and technological competencies. At the same time, the need for mineral resources continues to rise because of an ever-increasing global population and a growing demand from developing countries and emerging economies (BRICS countries: Brazil, Russia, India, China, South Africa). Addressing these challenges requires that the appropriate exploration efforts, technologies, innovation, processes and products are in place,
along with adequate policies to implement and stimulate the required changes.

MREG’s scope and focus is to integrate innovation and value creation in combination with environmentally sound and resource-efficient exploitation in added value chains in the circular economy. Provide the best, up-to-date mineral intelligence for policy making initiatives, EU economy, resource sourcing in the fields of both metallic, non-metallic minerals, strategic and critical minerals, contribute towards data homogenization efforts in both the INSPIRE and UNFC initiatives while providing the latest minerals information to all who so request it.

Additionally, this Group will contribute towards and collaborate with EU organizations by making available minerals data through EGDI as well as maintaining the strong ties and collaboration efforts within the EuroGeoSurveys Member Organizations.

4. Achievements 2020

Achievements MREG activities were conditioned by the Covid-19 pandemic that is active over Europe and the rest of the world. Contact within the group was effectively maintained using digital means.

Projects

MREG is involved in several “minerals” projects. MREG’s flagship minerals project, FRAME (FORECASTING AND ASSESSING EUROPE’S STRATEGIC RAW MATERIALS NEEDS; www.frame.ineg.pt), is the one that has kept and centred most of the group’s activity for the year. This project, being the one that is closely scrutinized by DG GROW because of the deliverables that are of interest to them, has already delivered a map of the Battery Raw Materials/Energy Critical Elements (Li, Co, C). DG Grow has also requested additional maps that FRAME has since produced: phosphates, niobium and tantalum distribution in Europe. FRAME was also present at several conferences and events (GeoUtrecht 2020, RM Week 2020 etc.)

MREG was also involved in the other GeoERA raw materials projects, namely EuroLithos (European Ornamental stone resources), MINDeSEA (Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials), Mintell4EU (Mineral Intelligence for Europe) and GIP-P (GeoERA Information Platform Project). The overarching themes and interconnectivity with the other GeoERA themes (Groundwater and Energy) means that MREG also has a contribution in projects like HIKE (Hazard and Impact Knowledge for Europe), RESOURCE (Resources of groundwater harmonized at cross-border and pan-European scale) and MUSE (Managing Urban Shallow Geothermal Energy).

Additionally, MREG has been involved in validating and delivering data to DG GROW to produce the Critical Minerals list for Europe and the resulting Map in 20 different languages for the CRM report that was published in September.

Apart from these, MREG has had active participations; be it as a whole or partially through member states, in INTERMIN.

MREG has successfully been integrated in the recently successful SCRREEN2 proposal to assist in the 2023 Criticality Assessment that is updated every 3 years by the Commission.

Events

Annual/bi-annual meetings

1. At the half-way mark of a “strange” 2020, MREG had to resort to a digital spring meeting in 18/05/2020 because of the Covid-19 pandemic. This was in place of the planned meeting in scheduled Romania in April. The Romania meeting was postponed for the fall but this meeting of the MREG was also an on-line event because of the pandemic situation and it took place on 13/10/2020.
2. MREG was represented at the PDAC2020 and at the “Opportunities in the EU’s Exploration and Mining Sectors Networking Breakfast” (Toronto, Canada); 29 February to 4 March (Fig. 1).

Figure 1 – Opportunities in the EU’s Exploration and Mining Sectors Networking Breakfast at PDAC 2020

3. 45th EGS National Delegates Forum; 15 September 2020;
4. Launch of the European Raw Materials Alliance (ERMA) on 29/09/2020;

5. Plenary meeting of the Raw Materials Supply Group 14/10/2020;
6. MREG contributed to the survey “European Innovation Partnership (EIP) on Raw Materials - Strategic Implementation Plan 2021-2027”;
7. Raw Materials Week, November 2020;
8. Virtual Workshop – “UNFC Europe: Ensuring sustainable raw material management to support the European Green Deal”

MREG is and continues to be, a part of the CSA+ action being planned and negotiated with the EU Commission under the GeoERA programme and a “Geological Service for Europe”.

Publications
MREG activities were featured in a publication in 2020, namely:
Oliveira, D., Stanley, G., Schillerup, H., Pfeiderer, S., Solar, S., Ponce de Leão, T., Arvanitidis, N., 2020. The role of EuroGeoSurveys’ Mineral Resources Expert Group in the European minerals context. Comunicações Geológicas 107, Especial 1, 55-57, ISSN: 0873-948X; e-ISSN: 1647-581X. The subjects dealt within this publication has earlier been presented at the X Congresso Nacional de Geologia in Ponta Delgada (São Miguel, Azores) in July 2018, which served to propel the group’s activities into the academic world.

Research activities
Research activities of MREG are undertaken through projects. However, requests by the Commission focus activities of the Group on particular aspects – circular economy, battery raw materials, criticality, UNFC, exploration.

5. Future Perspectives

In 2021, MREG will continue to research and innovate in the fields of mineral intelligence while maintaining the important connection with and keeping appraised the EU institutions that govern a large part of the group’s activities, namely, DG GROW, JRC, Raw Materials Supply Group.

In terms of events, MREG has been invited to deliver a talk in the COGITO program entitled: Lithium and the energy transition. Is this the correct path?” on 14 January 2021.

MREG will also participate in the “Critical Minerals Forum – Advances in Critical Minerals Research: a forum in memory of Victor Labson”, PDAC2021, Raw Materials Week and any other where the Group receives an invitation.

MREG will continue to investigate criticality in the light of value chains envisaging groups of elements rather than individual elements.

MREG will undergo a change in management structure as one of the vice-Chairs has requested to leave the position in 2021 due to other commitments.
1. Executive Summary

The main role of SIEG is to contribute to the definition of a strategy aimed at the development of information infrastructure in the geological sciences.

SIEG is an advisor in the continued design and development of the European Geological Data Infrastructure (EGDI), which is at the core of the EGS strategy. It facilitates sustainable access to multinational geological data, information and knowledge at European level, derived from the GSOs’ national databases. Great efforts are being made to harmonize the most important data and make them available in accordance with INSPIRE standards. The strategic topics concerning data updating, rules for data entry, governance of codelists and vocabularies as well as technical recommendations, should be defined by SIEG.

In terms of data sharing, the EGDI infrastructure has the potential to serve as an EGS platform for the visualization and provision of data also to other infrastructures, in particular for EPOS-ERIC. The European Marine Observation and Data Network (EMODnet) collects and harmonizes large amounts of marine geological data that are accessible on the EGDI platform. The EGDI strategic topics and the proposed rules for further development were discussed at the SIEG meetings.

Many SIEG members are involved in GeoERA Information Platform project (GIP-P). The aim of this project is to effectively integrate, secure and make accessible the results of the other 14 GeoERA projects and to further develop the technical infrastructure of EGDI. The SIEG has also drafted a list of scientific preferences for future development of EGDI regarding the content, user access and technology.

The highest priority of SIEG was given to the discussion of the project proposal for the expected new call Horizon Europe - Coordination and Support Action (CSA): Support to the activities of the European Geological Services. SIEG has contributed to the formulation of the EGS Strategic Research and Innovation Agenda (SRIA), specifically focused on the subsurface in Europe’s digital twin.

2. Mission and Vision

EuroGeoSurveys (EGS) has formulated a strategy for establishing a Geological Service for Europe. A central pillar in this strategy expresses the need for pan-European accessible and interoperable geoscientific information, which has been addressed by developing a common sustainable infrastructure, EGDI. SIEG is an advisor in its continued design and development. It also brings a common platform to share expertise among EGS members and to discuss the science topics relevant to the geoinformation development for the next period.

The SIEG vision is to contribute to further development on the concept of the infrastructure to reach a highly advanced technological level and provide more user-demanded products and to help the definition of the “Subsurface in Europe’s Digital Twin”. Establishing the connections
between the different infrastructures will be paramount to achieve interoperability and to improve the user-friendliness. The concept should assess the possibilities of the new technology as artificial intelligence (AI), big data processing, modelling, and the potential to solve some of the recent problems related to knowledge representation, learning, natural language processing, advanced methods of search and mathematical optimization, etc. More focus on the latest technology together with more efficient public outreach may help to improve visibility and usability of the products as a decision support system.

3. **Scope and Focus**

64 experts from 30 GSOs were members of the SIEG in 2020. Due to travel restrictions related to COVID-19, it was not possible to hold a SIEG meeting, originally scheduled for 21-22 April 2020 in Madrid, or any other physical meeting. Members remained active, with working meetings taking place on 10 January (16 participants), 21 April (18 participants), 11 June (25 participants), 8 September (28 participants) and 8 December (33 participants) in the form of videoconferences.

The main agenda of the meetings was focused on the preparation of a joint project of EGS members within the Horizon Europe program aimed at establishing a Geological Service for Europe, originally as a European Partnership (EP-GSE), then the Coordination and Support Action (CSA-GSE). The program also included the definition and elaboration of topics in the Strategic Research and Innovation Agenda (SRIA), specifically focused on the subsurface in Europe’s digital twin. It was important to inform members about the development of preparations and the results of negotiations with the EC. This encouraged the members to be more active, as evidenced by the growing number of meeting participants. An important part of the meetings was devoted to updates on ongoing activities as GeoERA GIP-P, EGDI status, plans and ideas, EPOS, INSPIRE etc. Minutes of all meetings are available on EGS intranet.

The need for interdisciplinary communication and a stronger relationship with other EGs has resulted in joint meeting and discussions with UGEG. Close communication and coordination with the other Expert Groups is essential to ensure their involvement in the responsibility of EGDI content and so improve the sustainability of EGDI. This will be further developed and become part of the CSA concept.

The number of issues to be addressed is growing, so several working groups have been set up within the SIEG to better organize work: INSPIRE WG, EGDI WG, EPOS WG, EC Programmes WG. The SIEG is also represented in specific EGS working groups for the preparation of the CSA: Coordination, Governance, Research and Innovation, EGDI, Position and Outreach, and also in the Working Group for the Development of SRIA.

4. **Achievements 2020**

Activities of SIEG have mainly focused on strategy, organizational support and recommendations regarding improvement of the EGDI technical infrastructure. It has been recognized as a fundamental basis for the development of the Geological Service for Europe.

The highest priority was given to the sustainable operation and further development of EGDI. The EGDI Consortium consisting of GEUS, BRGM, GeoZS, CGS, BGS and now also IGME maintains the system and provides support to users. For the period 2020 – 2021 the EGS General Assembly agreed to provide 82,644.63 € per year. Costs for other than operations and basic maintenance have been kept as low as possible and all meetings have been held through teleconferences.

The main project activity has been focused on GeoERA Information Platform Project (GIP-P), in which a substantial part of members participates. SIEG members are also actively participating in the other GeoERA projects as RESOURCE, FRAME, GeoConnect3d, Mintell4EU and HotLime.

7 geological surveys (SIEG active members) and EGS are members of the EPOS Thematic Core Service (TCS) Geological Information and Modelling (GIM) Consortium. Collaboration agreements between EPOS ERIC and GIM related to Governance and Coordination, Outreach activities and Service provision are being discussed. The proposed service providers are GEUS,
GeoZS and BRGM on behalf of EGDI/EGS for services on geological maps, mineral resources, 3D geological model index and borehole index. The agreements for the period 2021-2023 are still being prepared, the proposed EPOS financial contribution is much lower than anticipated. Technical issues with the EPOS Portal functionality and incompatible EPOS DCAT metadata have not yet been resolved. The amendment to the previous MoU between EGS and EPOS was drafted by SIEG, but EPOS-ERIC is still reluctant to progress in it. EPOS, as a recognized EC body, can ensure better visibility of EGDI at EU institutional level.

In response to the EC-EGS-INSPIRE meeting in April 2020, the INSPIRE working group has been set up within SIEG to assess the state of implementation and compliance of INSPIRE, the management of the Geoscience Europe Registry and related topics. The group had two webmeetings, the results of their discussion and the proposed actions were presented at the last SIEG webmeeting.

A proposal is being made to ensure the further management and maintenance of the Geoscientific Keyword Thesaurus (Knowledge base), created as a product of GeoERA projects, as well as other relevant codelists and registers (that may be registered in INSPIRE). The involvement of the other EGs and their responsibility for the content is paramount.

The specific organizational codelists (lists of relevant projects and organizations) have been developed by SIEG and will be maintained in cooperation with the EGS Secretariat. To ensure accuracy and timeliness of information, regular cooperation of the National Delegates is necessary.

Contribution to the CSA proposal has been the highest priority in 2020. The priorities of EC as drafted in the call proposal are clearly focused on developing a user-friendly digital Europe geological information system providing sustainable FAIR data access. It emphasizes, in particular, the strong need for data harmonization, both technical (standards, common models and dictionaries) and scientific (geometric and geological harmonization of data, especially at national borders). It is a clear priority for EGDI to focus on standardization, consolidation, presentation and dissemination of data and products.

The expected technological innovations are mostly focused on modelling and visualization, but also on the specific presentation of data to various user groups, especially in the form of a decision support system.

SIEG has contributed to the formulation of the EGS Strategic Research and Innovation Agenda (SRIA), specifically focused on the “Subsurface in Europe’s Digital Twin”. In cooperation with other EGs, the SIEG evaluates the preliminary proposal. Great efforts are needed to reformulate and prioritize the main themes related to data management and dissemination and IT innovation.

In response to the newly proposed partnerships and infrastructures, discussions are under way on possible cooperation and contribution.

SIEG members are also active in the Geoscience Information Consortium (GIC) [http://www.g-i-c.org], a global initiative for the exchange of information among the GSOs on the use and management of geoscience information systems to support Earth science internationally. At present, the members of GIC are representatives of 36 GSOs from Europe, North America, South America, Asia, Africa and Australia. 15 of them are also members of SIEG. Due to travel restrictions associated with COVID-19, the 35th Annual Conference of the Geoscience Information Consortium (GIC), originally scheduled for 15-19 June 2020 in Prague, Czech Republic was cancelled. To minimize the impact of these extreme circumstances on international cooperation in the field of geosciences, a videoconference was held on 16 June 2020, which covered at least the basic discussion topics of the meeting. It was attended by 30 members from 17 geological surveys from 5 continents.

5. **Future Perspectives**

Regular SIEG meetings are planned every 2-3 months as webmeetings. The physical SIEG meetings would be greatly appreciated, as these are often more effective, but it depends on the global situation. Webmeetings of the working groups will be organized as needed. We expect more frequent communication activity in connection with the preparation of the CSA.
Update of the EGDI Portal and the website will be discussed with the other Expert Group Chairs as EGs representatives should be appointed to be responsible for the technical, content-related and language-related aspects. Maintenance of the Geoscientific Keyword Thesaurus will also be a discussion topic as it should be a common responsibility of the EGs. An organizational codelist should be further developed and maintained in close collaboration with the EGS Secretariat and National Delegates. Next year, the greatest attention will be given to the successful completion of the GeoERA GIP project.

SIEG will dedicate all its efforts to contributing to the success of the CSA proposal and support the process of proposal writing. High priority is also given to the development and continuous future updating of the SRIA. A decision will be needed on what part of the SRIA development should be included in CSA and what will be proposed as the content of future specific HE calls. The strategy should be formulated on how to establish a sustainable information platform in the new structure, safeguarding both the advanced pan-European data ecosystem and also the sophisticated technologically advanced platform, bringing a better understanding and use of the subsurface digital information. The role of EGs in the future organizational structure of the GSE should also be clearly defined as part of the Governance actions within CSA.

SIEG will carefully observe the EC programmes (Green Data Space, Destination Earth, EOSC etc.) and its possible benefits and also the potential of collaboration with the other Partnerships. Finally, SIEG should certainly discuss the challenges and opportunities of new technologies (such as 3D, BIM and CIM, Big data, Linked data, AI...) for its members, and to explore the synergies that could be developed between members on that matter.

If circumstances allow, the Czech Geological Survey will organize the 36th Annual Conference of the Geoscience Information Consortium in June 2021 in Prague.
Urban Geology Expert Group

Number of UEGE Members: 53

Chair: Stephanie Bricker (BGS, United Kingdom)
Deputy Chair: Martin Smith (BGS, United Kingdom)
Deputy Chair: Krzysztof Majer (PGI-NRI, Poland)

With contributions from: Hilkka Kallio (Geo-CIM lead) – GTK, Finland
Mickael Beaufils (Geo-CIM lead) – BRGM, France
Guri Venvik (Geo-Comms lead) – NGU, Norway

1. Executive Summary

The Urban Geology Expert Group was established in 2019 and has ~50 members from ~20 geological surveys. During 2020 we welcomed 6 additional members, including new representation from Latvia, Slovenia and Greece.

UGEG aims to support Europe’s Urban Agenda and be the focal point for delivery of high-quality surface and subsurface geoscience data, knowledge, advice and understanding relevant to the needs of urban decision-makers. The group focuses on three priority science topics, Integrated geo City Information Modelling approaches; Assessment of geoenvironmental pressures in urbanised catchments, and Geoscience communication for cities.

Whilst the Covid-19 pandemic has hindered our activities and the opportunity for face-to-face events and engagement we have been able to make progress with our priority tasks. This includes: engagement with urban practitioners including the C40 network, JPI Urban Europe and the Open Geospatial Consortium and consultation with and webinars for city authorities and urban geologists. Under our science tasks we are working towards delivery of a BIM Survival Handbook and a position paper on Urban Geology in Europe, and the development of a method to appraise geological indicators or ‘geo-footprint’ of European Cities in support of sustainability and resilience assessments. Over the next year we intend to see these activities through to completion with the delivery and promotion of the outputs.

2. Mission and vision

Vision

The Urban Geology Expert Group aims to support Europe’s Urban Agenda and be the focal point for delivery of high-quality surface and subsurface geoscience data, knowledge, advice and understanding relevant to the needs of the EU’s urban decision-makers. The wider goal is to link geological surveys with the user community of planners, policy makers and industry and lead on urban issues to underpin the Sustainable Development Goals.

UGEG, and its Members, will provide European Institutions with consistent expert, neutral, balanced and practical pan-European information and advice as an aid to problem-solving, policy, and regulatory and programme formulation in areas such as sustainable urban development, urban resilience, future-proofing of cities, SMART Cities, and safe construction.

Mission

- The UEGE acts as a forum for a cohort of multidisciplinary, applied geoscientists, selected from all EGS Member organizations, to develop a joint research programme directed to EU policies.
- The UEGE will undertake collective work to address specific issues that contribute to the Urban Agenda for the EU, related policy initiatives, and which fulfil the requirements of European Commission (EC) Directives including the Water Framework Directive, Habitats Directive and Environmental Impact Assessment
The UGEG is resolved to encourage acquisition of systematic geoscience data for European cities and make this information available in a range of freely available media and formats, that can be used in relation to urban planning and policy on various urban scales such as City, Euro-district, National and Pan-European. The UGEG will encourage and share knowledge, data and good practice between Member organizations and the EU, national governments, local authorities and stakeholders.

**Scope and focus**

The UGEG draws together a multidisciplinary pool of experts in: data acquisition and management, subsurface monitoring, earth observation, ground investigation and 2/3/4D modelling (geologists, hydrogeologists, geothermal specialists, engineering geologists and geochemists).

The group focuses on three science topics, as informed by current EU strategy and Directives and by the individual urban proprieties of the member countries.

i. **Integrated Geo City Information Modelling (GeoCIM) (SDG 9, 11, 17):** Providing relevant and more accessible geological data to the user at the right time and in the right format is crucial to improve efficiency in planning and development, for resource extraction and to reduce the impacts of geological hazards. We are going to do this by combining geoscience-data with data exchange, informatics and 3D geological modelling for example, by applying the City Information Modelling (CIM) philosophy to enable users to develop a subsurface “Digital twin”.

ii. **Geo-environmental pressures in urbanised catchments (SDGs 6, 11, 12, 13, 15):** A catchment-based approach was chosen because it allowed to understand the impacts of climate, demographic, resource and waste flows and land-use change in the context of the wider geo-environmental setting. Using this solution, we aim to assess the multiple geo-environmental pressures impacting on the city and identify geoscience priorities and nature-based solutions to underpin urban resilience and sustainability.

iii. **Geoscience communication for cities and citizens (SDGs 9, 11, 12, 17):** The solutions to our urban challenges require interdisciplinary collaboration and integrated approaches. UGEG in partnership with others including, ITACUS, ACUUS and JPI Urban Europe, aims to bridge the knowledge gap between subsurface experts and city practitioners (e.g. urban planners, architects and policy-makers). UGEG aims to embed geoscience information and insights into policy, legislation, and industry practice.

### 3. Achievements 2020

**Science Projects**

**Geo-City Information Modelling (CIM)**

The Geo-CIM task group is focused on the application of geological data in BIM systems and integrated city models. A survey of UGEG members has been completed to find out more about the current situation regarding building information modelling. The questions asked were: what kind of BIM/CIM collaborations exist? Are geologists taking part? How is geological data shared? And how are anthropogenic deposits observed? In light of the results, a BIM Survival Handbook is being drafted which provides a shared resource with information on projects, data models, vocabulary and software concerning BIM, geological modelling and data modelling.

To support our GeoCIM activities we are contributing to the OGC Model for Underground Data Definition and Integration (MUDDI), with Mickael Beaufils leading the Geoscience Domain Working Group. The Geoscience working group are providing representation and advise to the OGC to ensure that geoscience data standards and practices are included in MUDDI alongside other data formats (BIM; CityGML;). An initial workshop on this subject was held in Dec-2020. A literature review is being
undertaken of existing papers and reports describing the lithological characterization and stratigraphic subdivision of anthropogenic deposits.

**Urbanised catchments**

Urban Geo Footprint: The urban geo-footprint concept (akin to carbon footprint) to present the local importance of geology for cities is under development, led by colleagues at ISPRA. Based on expert feedback, the tool will include different tiers of information and include quantitative and qualitative indicators. We hope that the C40 City Climate Action network will provide advice on applications of the tool to city needs. To support work on the Geo-footprint tool, a review of the availability and effectiveness of city-scale geological data will be undertaken, aligned to our survey of representatives from the EuroGeoSurveys.

**Urban Geo-Communications**

Our GeoCommunication activities have this year have focused on engagement with stakeholders, to understanding their issues and preparation of materials to promote urban geology and the interests of the UGEF. The GeoCommunications task group prepared a series of communications for the UN World Cities Day (31st Oct) to highlight the importance of geology for urban development. This included tweets and cartoons, adaptable for different European languages, illustrating groundwater borehole drilling, tunnelling and issues of mining hazard for construction.

Guri Venvik and Steph Bricker attended the JPI Urban Europe – Driving Urban Transitions online conference, following which a dialogue with Jonas Byland and Mari Solerød (Board Chair), JPI Urban Europe, has opened to promote the aims of the UGEG and future engagement with JPI Urban Europe.

GeoComms task group leads (Guri Venvik – NGU and Jan Jelenek – CGS) organized an Urban Geology Webinar attended by 100 city authority representatives and geologists from 40 countries. Attendees were surveyed as part of the webinar, which highlighted a lack of attention on urban subsurface issues and opportunities to enhance data availability and use.

Internal workshop sessions have been held to draw together content for a position paper on Urban Geoscience for Europe. This includes data on urban pressures, policies, future research needs. As part of the exercise the EuroGeoSurveys will be surveyed to provide an updated position on geological data availability for urban practitioners. This activity will support our urban policy activities and the EGS-CSA.

UGEF Chairs, together with Francesco La Vigna (ISPRA) and Peter van der Keur (GEUS) have represented the UGEF at the relevant EGS-CSA meetings and workshops and are coordinating the UGEF input to the SRIA and CSA documents.

**Meetings and Events**

- **Bi-annual Virtual UGEF meetings** were held on 14th May and the 27th Oct to share updates and progress with the science activities, attended by 25 and 30 group members respectively. The meeting on the 27th Oct was attended by Dana Copova and Jorgen Tulstrup of the Spatial Information Expert Group to provide an overview of EGDI and to highlight collaborative opportunities between SIEG and UGEF. Identifying case studies which highlight the benefit of geological data for urban challenges was agreed as a priority activity, along with UG population of the EGDI.

- **C40 (City Climate Action Network) (7 July):** A webinar on urban geology was delivered to the C40 flood risk and landuse planning networks by Steph Bricker and Martin Smith. This included case studies from Warsaw, Glasgow, Dublin, Rome and Oslo. Discussion points included information on appropriate monitoring schemes; linkages between geological mapping and landuse classes; data-sharing mechanisms and drivers for collection of geological data.

- **Urban Geology Webinar** (18th Nov) was delivered by NGU (Guri Venvik) and CGS (Jan Jelenek) in collaboration with the UGEF. The meeting was attended by c 100 people from Geological Surveys and City authorities across Europe. Presentations focused on city case studies and urban 3D modelling; these were recorded and are now available on EGS YouTube channel ([www.youtube.com/user/EuroGeoSurveys/videos](http://www.youtube.com/user/EuroGeoSurveys/videos))
Open Geospatial Consortium (OGC) – Geoscience Domain Working Group: (8\textsuperscript{th} Dec) Workshop organised by our Geo-CIM lead (Mickael Beaufils), the working group is defining the geoscience data requirements for the OGC ‘Model for Underground Data Definition and Integration’ (MUDDI). The group are reviewing data standards, data formats (e.g. GeoSciML) and model requirements for the integration of urban geology models with city modelling. https://external.ogc.org/twiki_public/GeoScienceDWG/WebHome

UGEG Position Paper Workshop: (24\textsuperscript{th} Nov) Virtual workshop session and meetings have been held for UGEG members using Miro (interactive online whiteboard software) to bring together content from EU projects and GeoSurveys for the UG Position Paper.

Outputs
Urban Geology Presentations: Webinar series. 18 Nov 2020 www.youtube.com/user/EuroGeoSurveys/videos

- City Case studies: Darmstadt (R. Lehne); Manchester (S. Bricker); Nantes (C. LeGuern); Oslo (I. Eriksson).
- Urban geology and modelling: BGS (T. Kearsey); BRGM (M. Beaufils); GTK (H. Kallio); PGI (G. Ryzynski); TNO (J. Schokker).

4. Future perspectives

Proposed activities for 2021-22

UGEG management
- Bi-annual UGEG meetings and parallel conference sessions
- Contribute to the European Partnership on the Geological Service for Europe proposal.

Prepare a position paper on the state of urban geology in Europe and accompanying briefing pack for high-level policy engagement.
- Business development and engagement to expand networks and influence.
- Seek funding opportunities to develop pilot/case studies and strengthen network.

Geo-CIM sub-task
- Guidance on data standards and exchange formats via a ‘Survival Handbook’ for Building and City Information modelling linking with the SIEG expert group and the Open Geospatial Consortium.
- Development of Case study exemplars of the ‘value’ of BIM and digital planning approaches for the urban subsurface.
- Lead the Geoscience contribution to the OGC’s Model for Underground Data Definition and Integration (MUDDI)

Urban Catchments sub-task
- Finalise the urban typology classification system – ‘Geo-footprint’ (resource, hazard, resilience, and engineering) and apply to a cross-section of European cities and link cities with shared geo-environmental issues.
- Develop data-needs, monitoring regimes, policy targeted to the geo-urban typologies and link to the relevant EGS Expert Groups.

Geo-Comms sub-task
- Cost-benefit analysis of geoscience info for planning and construction.
- Develop (citizen-oriented) popular science publications, articles, leaflets about the importance and need for knowledge of geology understood as underground city space
- Development of multi-language infographics, illustrations and videos that communicate simple messages about the role of geology for cities.
- Ensure representation of urban geology at key conferences and events.
1. Executive Summary

The activities of WREG in 2020 focused on implementation of the four GeoERA groundwater projects HOVER, RESOURCE, TACTIC and VoGERA, including their Data Management and Communication, Dissemination and Exploitation plans of the projects and collaboration with the GeoERA Information Platform project on identification, description and provision of digital information products for EGDI. The GIP collaboration includes, for example, discussion and decision on data formats and visualizations for the new 3D groundwater resources map of Europe that include information on total depths of the freshwater resources, salinity, groundwater and sediment ages, and water balances etc. in 10 x 10 km cells (RESOURCE WP6 product) as well as Pan European maps of groundwater recharge (TACTIC WP4 product) and vulnerability to pollution (HOVER WP7 product) to name a few important products.

All four GeoERA groundwater projects were ranked as having good to excellent progress by all internal and external reviewers at the mid-term review conducted in February 2020. There was a general consensus that the GeoERA groundwater projects provide very valuable data for sustainable management of groundwater and integrated sustainable use of subsurface resources in Europe in general, and that they inspire scientists across the world. This was later confirmed by several panellists during panel discussions at the GeoERA webinar series 9-13 November, including members of UN organisations.

The contents of the four GeoERA groundwater projects and their contribution to the GeoERA information platform (EGDI) were presented (communicated and disseminated) at the 34th Nordic Geological Winter Meeting in Oslo, 6-8.1.2020, which was the only physical conference in 2020 that we attended due to the Corona pandemic. In addition, we have submitted and presented seven abstracts for the EGU 2020 virtual conference 4-8 May 2020, of which three were presented in the ERE 1.2 session organized specifically for GeoERA projects and the four other in other relevant sessions. Eight scientific papers were published or submitted in 2020 (see publication list at the end of the report). Besides that, it is worth mentioning that work is currently on-going in HOVER and TACTIC on four research papers for the special issue of WATER on natural background levels, which has the WREG chair as guest editor. All EU member states have to establish groundwater threshold values based on natural background levels e.g. for trace elements (e.g. As, Ni, Hg) to protect human health and ecosystems (groundwater chemical status) according to the Water Framework and Groundwater directives.

Another important activity in 2020 were our contributions to the GeoERA webinar series 9-13.11.2020. The GeoERA webinar series were announced in a virtual presentation at the 38th Working Group Groundwater Meeting under the Common Implementation Strategy of the Water Framework Directive, which originally was planned as a physical meeting in Berlin, but was organized as a virtual conference instead by the German EPA on 30.9 – 1.10, 2020.

The stakeholder panel at the GeoERA groundwater webinar invited for discussions following the presentation of the new European Partnership “Water4All” (see below), the GeoERA groundwater theme in the bigger picture / i.e. the relation to the EU Green Deal, the UN SDGs and the planetary boundaries by the GeoERA groundwater theme coordinator, as
well as the presentations of HOVER, RESOURCE, TACTIC and VOGERA by the project leads, included Elisa Vargas-Amelin, chair of the CIS working group groundwater, European Commission, Prof. of hydrology, Ad de Roo, coordinator of the WEFE (Water-Energy-Food-Ecosystem nexus) project, Joint Research Centre of the European Commission (JRC), Prof. in hydrogeology, Marco Petitta, Univ. Rome, President for IAH Europe (and chair of the Hydrogeology expert group of the European Federation of Geologists), Hari Tulsidas (Sustainable resource management and energy specialist at UNECE) and Prof. in hydrogeophysics, Esben Auken, new vice director at GEUS. All panellists agreed on the importance and relevance of the research and information products of all four GeoERA groundwater projects and acknowledged Europe’s important role in water resources research, innovation, and management within and beyond European borders.

The groundwater webinar obtained the highest number of attendees and responses to the included polling on groundwater research needs within Horizon Europe. Groundwater quality, groundwater and climate change, and the water-food-energy-climate-ecosystem-health nexus were ranked highest among 10 predefined research topics. Groundwater quality and quantity, climate change, pollution and emerging contaminants were most frequently mentioned as the most important research topics and challenges for the next ten years by the audience. The feedback provided important input for the work on the Strategic Research and Innovation Agenda (SRIA) for the EGS-CSA and Water4All partnership (see section below).

In addition to the activities in GeoERA, the WREG chairs and a few WREG volunteers also initiated preparations of WREG inputs to the EGS Strategic Research and Innovation Agenda (SRIA) and the CSA (EU Coordination and Support Actions) for a geological service for Europe as well as the SRIA for the new European Partnership candidate “Water4All – water security for the planet”. The WREG chair organized a meeting on general EGS interests in Water4All on September 11th, where all EGS expert groups were represented except for the EG on International Cooperation and Development. At that occasion, a TEAMS TEAM for collaboration on the GES-CSA and Water4All that includes members from all EGS expert groups was established. A WREG meeting for presentation of the current GSE-CSA and Water4All drafts and presentation of water related EGS project ideas for these was furthermore planned for 3.2.2021.

2. Mission and vision

The Water Resources Expert Group (WREG) strives to collect and provide data and decision-support tools for the long-term protection, sustainable management and improvement of groundwater resources across Europe based on sound groundwater research. The efforts focus on EU societal challenges and support of EU policies on water taking into account both protection of groundwater legitimate uses and terrestrial and aquatic ecosystems according to the Water Framework and Groundwater directives as well as policies defined by the Blueprint to Safeguard Europe’s Water Resources, the UN sustainable development goals, the UNFC resources classification system and most recently the European Green Deal.

3. Scope and focus

Collection, preparation and provision of digital and scientifically sound groundwater and hydrogeology data with FAIR access for sustainable management and safeguarding of Europe’s Water Resources. The focus of WREG in GeoERA and beyond (e.g. the EGS-CSA and Water4All) for the coming years will be:

1) to identify and supply relevant data for the groundwater part of GeoERA, the EGS-CSA, Water4All and the Geoscience Information Platform (GIP / EGDI) and

2) to identify groundwater research gaps and develop groundwater research projects and publishable scientific papers related to these.
We will contribute to define the contents of the Strategic Research and Innovation Agendas for a European Partnership on a Geological Service for Europe (the EGS-CSA) and the European Partnership “Water4All – water security for the planet” within Horizon Europe and strive to get common EGS projects and projects with other organizations such as the European Federation of Geologists, representing geoscientists at universities and consultancies and environmental research organizations in general. We will furthermore explore the possibilities of collaborating with relevant SME’s in Public-Private Partnerships to develop new digital solutions and information products of benefit to society.

4. Achievements 2020

The main achievements in 2020 were the consolidation of the collaboration between the partners of the four GeoERA groundwater projects and the GeoERA GIP project on the joined effort to create valuable digital groundwater information products for the sustainable management of groundwater resources in a changing climate. The work of all four projects: HOVER; RESOURCE, TACTIC and VoGERA (see title and coordinators below) was delayed because of the Covid-19 pandemic as many involved partners were not able to work as efficiently at home, and field and laboratory work had to be postponed etc. Despite the difficult conditions WREG managed to continue to develop, consolidate and improve the collaboration between groundwater scientists (as well as data scientists) working in nearly all European GSO’s for the first time ever on the 24 work packages included in the four projects:

HOVER: Hydrogeological processes and Geological settings over Europe controlling dissolved geogenic and anthropogenic elements in groundwater of relevance to human health and the status of dependent ecosystems (Lead: Laurence Gourcy, BRGM)

RESOURCE: RESOURces of groundwater, harmonized at Cross-Border and Pan-European Scale (Lead: Hans Peter Broers, TNO)

TACTIC: Tools for Assessment of Climate change Impact on Groundwater and Adaptation Strategies (Lead: Anker Lajer Højberg, GEUS)

VoGERA: Vulnerability of Shallow Groundwater Resources to Deep Subsurface Energy-Related Activities (Lead: Sian Loveless, BGS – recently replaced by Marco Bianchi, BGS)

All four projects received good to excellent reviews at the midterm project evaluation in the February 2020.

MAIN ACTIVITIES

Jan-March

January 2020 - Preparation and submission of seven EGU abstracts

February 2020 - Presentation of WREG annual report at National Delegates Forum: Jørgen Tulstrup, GEUS, on behalf of WREG.

February: Midterm project evaluation successfully completed with high scores for all four groundwater projects

March: The Corona virus is classified as a pandemic and all planned project meetings, the midterm meeting in Ljubljana, field work and all other project travels are cancelled

April-June:

EGU-2020 is held as a virtual conference with a special GeoERA session (ERE1.2) with more than 20 GeoERA abstracts of which 3 were from the four GeoERA groundwater projects. In addition, four other GeoERA groundwater abstracts were sent to other sessions.
All groundwater projects have virtual meetings with the GIP-theme coordinator and WP leads to discuss groundwater products for EGDI from the groundwater projects.

**July-September:**

Preparation and submission of project deliverables and preparation of the GeoERA webinar series together with the other GeoERA themes.

Application for GeoERA session ERE1.2 at EGU 2021.

**October-December:**

Preparation of the webinar series 9-13.11, and work on strategic research and innovation agendas for EGS and for the Water4All partnership. Submission of deliverables from all four GeoERA groundwater projects of which most are delayed due to the pandemic. Modification of DoWs for all groundwater projects except VOGERA due to delays and the general extension of all GeoERA projects with four months for the projects and 8 months for the program, hence the project period for the four groundwater projects was extended from 30.6.2021 to 31.10.2021.

**GeoERA groundwater theme meetings:** In addition to the meetings mentioned above, the groundwater projects leads and theme coordinator have monthly web coordination meetings with participation of the GIP contact, Margarita Sanabria, IGME, ES, (first Monday in every month). All project boards of WP leaders and WPs have also frequent web meetings coordinating the activities and ensuring project progress.

Finally, all groundwater projects provided information for their project websites on the GeoERA website and social media have not been quantified but seem to be significant.

**Publications**

At least eight GeoERA research papers from the WREG group were published, accepted or submitted in 2020 (4.5 from TACTIC and 3.5 from HOVER) – one of the papers (Hinsby et al., 2020) is developed and submitted in collaboration with the GeoERA GIP project and the BONUS SEAMOUNT project ([www.seamount.eu](http://www.seamount.eu)). The number of submitted and published papers are expected to increase in 2021.


5. Future perspectives

A key aim of WREG in and beyond GeoERA is to conduct groundwater research and provide scientifically sound and standardized data for the European Geoscience Information Platform/European Geological Data Infrastructure (GIP/EGDI) to support implementation of EU policies, sustainable resources management and integrated surface and subsurface spatial planning. Easy and efficient access to these data according to the “FAIR” data principles will benefit public and private research organizations and public-private partnerships developing innovative and efficient water and environment monitoring and modelling techniques, as well as the authorities developing integrated, sustainable and cost-efficient resource policies. Innovative and broadly applicable solutions and products/instrumentation for sustainable water management and smart monitoring and modelling will support and preserve Europe’s leading role in developing sustainable solutions to safeguard water resources and the environment.

References


https://www.mdpi.com/journal/water/special_issues/Background_Levels_Groundwater


KEY PERFORMANCE INDICATORS
2019 - 2020
**Introduction to Key Performance Indicators (KPIs)**

**What is a KPI?**

Key Performance Indicators (KPIs) are measurable values that demonstrate how effectively a company or entity is achieving key strategic and/or business objectives. They provide an insight into the degree of success and the progress made in pursuing goals.

**Why are we doing this?**

KPIs should help us to understand how well the Expert Groups (EGs) are performing compared to their strategic goals and objectives and will help us to evaluate their success at reaching targets. KPIs also act as a framework to assist the EGs to initiate the continuation of growth, progress and development. With effective analysis and dialogue, KPIs will enhance the productivity of the EGs and provide them with a non-restraining set of indicators/orientation points.

**Are they relevant?**

KPIs are only as valuable as the action they inspire. To make KPIs relevant, the Expert Groups should adopt them with a positive and proactive mindset so they can guarantee that their use will provide positive change. Expert Groups should be proactive in looking and analyzing their activities in accordance with the KPIs, as these can provide a good framework for continued development and good dialogue with members of the Expert Group. Furthermore, as all EGs and EuroGeosurveys have targets and goals in mind. Adding KPIs to the ‘dashboard’ only makes the decision making, reporting and efficiency easier.

**Defining the KPIs:**

The current KPIs were adapted from the basic KPIs by the EuroGeoSurveys Secretariat and are intrinsically linked to EGS strategic goals. They are defined according to the critical strategic objectives of the Expert Groups.

KPIs of EGS are based on 5 categories; 1) Relevance and sustainability; 2) Scientific output and/or possible impacts on industry; 3) Structuring effect on National and European levels; 4) Expert Group coordination, and, 5) Contribution to the third pillar of EGS.

It must be noted, that the EGS do not remain static and, as a consequence, the KPIs should not either. The KPIs are likely to change as the Expert Groups evolve. Therefore, KPIs should be reviewed and, if necessary, redefined on a regular basis (i.e. annually or bi-annually).

**The process:**

The EGS Secretariat formulated a draft KPIs document based on the Annual Reports of the EGs, whereby KPIs that are related to specific outcomes and objectives of EGS and the Expert Groups (EGs) were noted. This was sent to the Expert Group Chairs for their comments and suggestions.

For this process, it was agreed during the Chairpersons meeting on 11\textsuperscript{th} February 2020, the EGS secretariat would conduct a draft KPI analysis for each Expert Group based on the KPIs’ categories. This draft would be sent to the EG Chairs and they would have the opportunity to comment further, with their comments added to their KPI report in the relevant section.
EuroGeoSurveys (EGS) KPIs for Expert Groups (EGs)

**KPI1. Relevance and sustainability**
1.1. Global consistency of the Expert Group to achieve the EGS strategy.
1.2. The relevance of the topics covered in the description of Expert Group work.
1.3. The inclusion of the key partners (surveys) and the level of their commitment in Expert Group.
1.4. Quality of the management of Expert Group.
1.5. Sustainability of the funding business model in Expert Group.
1.6. Expert Group capacity to look to the future.

**KPI2. Scientific outputs and/or possible impacts on the industry**
2.1. Relevance
   2.1.1. of scientific output Expert Group deliverables,
   2.1.2. possible impacts on industry.
2.2. Launched and running Expert Group common projects.
2.3. Publications of Expert Group in last 5–10 years.
2.4. Added value offered by the Expert Group to the industry.

**KPI3. Structuring effect on national and European levels**
3.1. Networking with other European entities in the field (ex. EIP-RM, KIC, EPOS, etc).
3.2. Links with or impacts on national programmes.
3.3. Dissemination activities towards public or member states.
3.4. Active interfaces with other Expert Groups.

**KPI4. Expert Group coordination inside and outside helping to reduce the number of other potential overlapping work**
4.1. Actions that resulted from sharing resources.
4.2. The inclusion of all EGS community.

**KPI5. Contribution to the third pillar**
5.1. Contribution to mobilityfostering.
5.2. Contribution to infrastructuresharing.
5.3. Openness towards international cooperation.
5.4. Foreseen training activities.

**1. KPI Evaluation for Earth Observation Expert Group (EOEG)**

*Number of Members: 86*

EGS Secretariat comments based on EOEG Annual Report 2019 and comments from EOEG Chair Gerardo H

Some of the key achievements of 2019 for EOEG:

- Submission of H2020 project proposal REStoGEO.
- EOEG and U-Geohaz workshop.
- Invited presentation at the workshop organized by the Greek Committee of IAEG.
- Invited talk at the EuroGEOSS workshop.
- EOEG landslide density map of Europe and the damaging landslide database 2015-2017 published by the Emergency Response Coordination Centre of the European Commission.
Review:

KPI1:
- EOEG has been actively working in the analysis of landslide hazard in Europe contributing to third Pillar of EGS.
- EOEG submitted the RESGEO project proposal to the call H2020-SU-SEC-2019 with the involvement of nine Geological Surveys.
- The Landslide working group will continue its activities, even though additional funding must be sought to provide continuity.
- EOEG will continue participating in H2020 E-SHAPE project and EOEG is involved in the new Horizon Europe call with the proposal of the European Partnership on a Geological Service for Europe (EP-GSE).

KPI2:
- Report submission to DG ECHO: Recent damaging landslides reported by the Geological Surveys of Europe.
- The manuscript “Integration of landslide hazard into urban planning across Europe” by the Landslide working group was accepted for publication:

KPI3:
- EOEG workshop on science topics and EOEG annual meeting in Athens.
- Invited talk at the EuroGEOSS workshop.
- Invited presentation at the workshop organised by the Greek Committee of IAEG.

KPI4:
- EOEG landslide density map of Europe and the damaging landslide database 2015-2017 was published by the Emergency Response Coordination Centre (ERCC) of the European Commission.

KPI5:
- EOEG participated in training on Earth Observation Tools for Urban Geohazards in Athens.

2. KPI Evaluation for Geochemistry Expert Group (GEEG)

Number of Members: 59

Some of the key achievements of 2019 for GEEG:
- Involved with the establishment and starting of six GeoERA projects (main focus).
- Working on the renewal of its strategic agenda and raising its profile within the EC (including EP-GSE, COST action).
- Position paper on Energy Storage is being prepared.

Review:

KPI1:
- GEEG works on the renewal of its strategic agenda and raising its profile within the European Commission (e.g. inventory of key research topics for EGS-GEEG).
- GEEG members will continue their activities towards supporting the EGS strategy pillars and raising the profile in the EC. Activities are organized in close cooperation with EGS secretariat and ExCom.
- GEEG contributes to the establishment of the Geological Service for Europe by contributing to the latest state of art to the proposal for the
EP- GSE (Decarbonisation and Climate Action).

- Currently the coordination structure of GEEG is under revision. New positions for co-chairs are to be fulfilled.
- GEEG Spring meeting March 2019.

**KPI2:**
- In general research activities at partner surveys focus on various topics including 3D modelling, Hydrocarbons, CCS, Geothermal, Energy Storage, Subsurface Spatial Planning and Management, induced risk/hazard assessment. These topics are covered in several joint collaborative projects and national programs.
- EC projects currently focusing on GeoERA. Specifically, MUSE has strong connection with Shallow Geothermal Industry and local stakeholders.
- Interreg projects: GeoPlasma-CE.
- An Energy Storage workshop with EC (DG-RTD and DG-ENER) is under discussion.
- GeoERA Stakeholder event being planned.

**KPI3:**
- GEEG Members are involved in EU / Interreg projects and cooperations including GeoPlasma-CE, DarlingE and ENOS.
- GeoERA Energy projects have interactions with Groundwater, Raw Materials and Spatial Information theme.
- Through EP-GSE the GEEG seeks concrete further interactions URBAN, EOEG, MGE, GEG (defining links in the proposal themes and the SRIA topics).
- GEEG submitted two session proposals for the European Sustainable Energy Week in Brussels. One was granted and successfully organized (Shallow Geothermal, Gregor Goetzl).
- GEEG co-organized the European workshop on underground energy (UES) storage with ENERG, FluidSTORY project and BRGM in Paris.
- EGS-GEEG supported an EGEC shallow geothermal energy summit in Brussels (Shallow Geothermal Energy Days).
- GEEG presented a keynote presentation on Underground Energy Storage during the Danube Region Energy Event in Hungary-Budapest.
- GEEG is represented as Local Advisory Committee member for the organization of the EAGE-2020 conference in Amsterdam (responsible for technical workshop programme, field trip programme and executive forum contributions).
- A proposal was submitted for a session on Underground Energy Storage at the European Sustainable Energy Week in Brussels.

**KPI4:**
- A GEEG position paper on Energy Storage is being prepared. The current plan is to present the paper to the EC at the European Sustainable Energy Week.
- GEEG project results are integrated into the EGDI platform.

**KPI5:**
- The 2019 activities of the GEEG mainly focused on six GeoERA projects (GARAH, HOTLIME, MUSE, HIKE, 3DGEO-EU and GeoConnect3d) and supporting the third strategy pillar of EGS.
- Technical and policy-oriented workshops are held on a yearly basis to strengthen the position with industry, policy and other science organizations.
3. KPI Evaluation for Geochemistry Expert Group (GEEG)

Number of Members: 55

Some of the key achievements of 2019 for GEEG:

- Preparation of the GEMAS on-line version.
- Participation in 21 EU Commission co-financed projects.
- Offering expert advice to Lithuania, UK, and Sweden.
- Writing or review of two manuals compiled by the IUGS Commission on Global Geochemical Baselines (CGGB).
- 5 publications and an increase of book sales.

Review:

KPI1:

- GEG provides valuable information through GEMAS and URGE projects.
- Among the future perspectives, GEG have been identified as 'missing' harmonized data sets and GEG’s efforts will focus on finding both the external and internal financial sources.

KPI2:

- Five research papers and several presentations in conferences by using results from the FOREGS Geochemical Atlas of Europe, European Groundwater Geochemistry (EGG), Geochemistry of Agricultural and Grazing land soil (GEMAS), and Urban Geochemistry (URGE) projects.
- Eurometaux is still interested to partially finance a surface and spring water geochemistry project of Europe based on low-density sampling.
- The European fertilizer industry showed interest in the GEMAS data.

KPI3:

GEG offers expert advice to Lithuania (National representative in the EU expert group on Soil protection at EC DG Environment and NRC for Soil at the EEA EIONET), United Kingdom (Member of the United Nations Food and Agriculture Organisation (FAO) Global Soil Laboratory Network (GLOSOLAN) Technical Working Group) and Sweden (Committee work on Cadmium strategy for Sweden led by the Toxicological Council by the Swedish Chemicals Agency). GEG members participate in a total of 21 EU Commission co-financed projects (e.g. SCRREEN, ProSUM). Furthermore, its members are involved in several regional and national projects. GEG participated in the following conferences:

- 5 Oral, 4 poster presentations and 1-day workshop at 15th International Congress of the Geological Society of Greece.
- Workshops: Radiometric mapping and its application to mineral exploration for the Economic Geology students of the University of Lisbon, and International Year of the Periodic Table Commemoration.
- Nordic geochemistry meeting at SGU.
- 6 Oral and 1 poster presentations at EGU General Assembly 2019.
- ISMAR10, 10th International Symposium on Managed Aquifer Recharge (Oral presentation).
- World Soils User Consultation Meeting (Oral presentation).
- 2 Oral and 1 poster presentations at 35th International Conference on Geochemistry and Health.
- City Futures VI conference, Ireland (Oral presentation).
- Network for Ireland’s Environmental Compliance and Enforcement (NIECE) Symposium on Waste and the Circular Economy (Oral presentation).
GEG would like to see closer collaboration between the EGS expert groups in the area of future Geological Services for Europe and with the future GeoEra initiatives, including the planning phase.

KPI4:
Members of the EGS-GEG are involved in the writing or review of two manuals, which are being compiled by the IUGS Commission on Global Geochemical. GEMAS data are included on the EGDI/GeoEra portal.

KPI5:
- Development of an internet viewer for the GEMAS data sets under Public Data Viewer Series by the Geological Survey of Ireland, and (vi) GEMAS data are included on the EGDI/GeoEra portal.
- Discussion of ideas for developing pan-European geochemical projects of interest to policy makers, the scientific community, and the public.

4. KPI Evaluation for International Cooperation and Development Task Force (ICDTF)

Number of Members: 49

Some of the key achievements of 2019 for ICDTF:
- Final version of the PanLatEUGeo concept note.
- Interest in strengthening EGS-ASGMI collaboration.
- Meetings with DG GROW and DG DEVCO.

Review

KPI1:
- ICDTF attempts to reinforce EGS-ASGMI collaboration and raise awareness of the possibilities that this collaboration can offer to the EC. The PanLatEUGeo proposal and the possible participation in the EUROCLIMA Programme with ASGMI are international cooperation proposals that contribute to the third pillar of EGS's vision.
- International cooperation is also the mission of ICDTF.
- In the case of PanLatEUGeo, most of the EGS members have expressed interest in participating.
- At the meeting held in October 2019, ICDTF members decided to continue seeking funding for PanLatEUGeo and contact ASGMI to participate in the EUROCLIMA Program.

KPI2:
- Currently, no scientific results have been generated, but ICDTF has worked on the PanLatEUGeo proposal that aims to transfer scientific knowledge between Europe and Latin America, as well as collecting and systematizing data at a regional level in Latin America, which could lead to publications and a subsequent use by the industry. Initiating contacts with ASGMI to participate in the EUROCLIMA Programme could also lead to scientific results in the future.
- Actions carried out in the PanLatEUGeo proposal:
  - Final version of the concept note (focused on critical raw materials, EV minerals reserves, environmental management of mining activities and land use management relied on a geological knowledge).
  - Submission of the concept note to DG GROW.
  - Meeting with DG DEVCO and DG GROW to seek funding.
- Actions carried out in the EUROCLIMA proposal:
  - Contacts with ASGMI to participate together in the EUROCLIMA
Programme and follow-up of ASGMI's contacts with the focal points of EUROCLIMA in Latin America.

**KPI3:**
The EUROCLIMA Programme is co-financed and implemented by the international cooperation and development agencies of Spain (AEID), France (AFD) and Germany (GIZ). The AECID has been contacted to guide the proposal and for a better alignment with objectives of the Programme.

**KPI4:**
- All EGS members have been asked about their interest in participating in the PanLatEUGeo proposal. Most of them are interested in participating.

**KPI5:**
- Coordination with the International Cooperation Expert Group, the General Secretariat and the ExCom of ASGMI for the preparation and review of the PanLatEUGeo proposal, and the subsequent meeting with DG DEVCO and DG GROW to seek funding.
- Coordination with the regional offices of UN Environment and UNESCO, both interested in participating in the PanLatEUGeo proposal.
- Coordination with the Hydrogeology, Geological Hazards and International Cooperation expert groups of ASGMI for participation in the EUROCLIMA Programme.

5. KPI Evaluation for Marine Geology Expert Group (MGEG)

**Number of Members:** 49

EGS Secretariat comments based on MEGE Annual Report 2019 and comments from MEGE Chair Sytze van Heteren.

Some of the key achievements of 2019 for MEGE:
- Fourth phase of EMODnet-Geology.
- National mapping programs and strengthened regional collaboration.
- A key contribution was made to the UNEP report “Sand and sustainability: Finding New Solutions for Environmental Governance of Global Sand Resources”.
- Significant efforts concern digitizing paper records and disseminating information through new multidisciplinary marine portals.

**Review:**

**KPI1:**
- MEGE was granted with the 4th phase of EMODnet that ensures some continuity in offshore mapping and strengthening the digital presence as part of the EGDI contributing to second pillar of EGS.
- MEGE members have contributed to a substantial number of EU-funded and transnational projects.
- In the drive to ensure that the MEGE contribution remains relevant to Europe for the foreseeable future, new research road maps are being developed that focus on emphasizing the role of marine-geological mapping and research in everyday lives.

**KPI2:**
The MEGE participates in two GeoERA projects: MINDeSEA on metallogenetic mineral resources and GARAH on hydrates in the continental margin.

**KPI3:**
The 4th Phase of EMODnet coordinated by GTK, is solidifying links between the national marine mapping programs of its member and associate surveys and has enabled the ones with a developing mapping program to profile themselves nationally. Furthermore, MEGE was involved in the following activities:
- Organized conference on the Quaternary geology of the North Sea and Celtic Sea.
Co-organized summer schools on coastal-zone geology, sessions on seabed mapping (at AGU, EGU and GeoHab).

Study days on regional marine science and extreme events, workshops on seabed loss and disturbance in the context of marine spatial planning and deep-sea mining.

Participating in many public events, restyling websites with case studies, organizing press releases, appearing in newspaper and magazine articles, on TV and radio, and helping to establish marine geoparks.

A key contribution was made to the UNEP report “Sand and sustainability: Finding New Solutions for Environmental Governance of Global Sand Resources”.

KPI4:
Information on the project EMODnet-Geology (2019-2021) for all European sea areas, is made available through the project portal (http://www.emodnet.eu) using Web Map Services (WMS) that also feed other portals such as OneGeology-Europe, the European Geological Data Infrastructure EGDI, and the European Atlas of the Seas.

KPI5:
- MREG continues to play a lead role in the Atlantic research alliance between the EU, the USA and Canada. Other projects with multiple MREG partners include EU-China collaborative project EMOD-PACE, EMODnet-Bathymetry (and High-Resolution Seabed Mapping), EMODnet Data Ingestion for industry.
- The formalization of an international network of marine geologists and seabed mappers initiated by GSI and Geoscience Australia in Seabed 2030, bringing together all available bathymetric data to produce the definitive map of the world ocean floor by 2030 and make it available to all.

6. KPI Evaluation for Mineral Resources Expert Group (MREG)

Number of Members: 73
EGS Secretariat comments based on MREG Annual Report 2019 and comments from MREG Chair Daniel Oliveira.

Some of the key achievements of 2019 for MREG:
- Advisory board to the Commission on mineral resources.
- Collaboration with JRC, minerals events and several minerals-themed research projects.
- A new collaboration agreement between EGS and JRC.
- Significant contribution to Battery Raw Materials database (at the Commission’s request).
- Expert Advice UNFC and other H2020 funded projects.
- Relevant deliverables for JRC and DG Grow.

Review:

KPI1:
MREG continues to have a strong input into the United Nations Framework Classification for Resources (UNFC) and is highly involved in the GeoERA programme: EuroLithos, FRAME, MINDeSEA and Mintell4EU. Moreover, data will, ultimately, also feed JRC’s RMIS by using the EGDI platform, contributing to the first, second and third pillars of EGS. In addition, MREG is also involved in the European Partnerships under Horizon Europe.

KPI2:
MREG has significantly contributed to augmenting the Battery Raw Materials database and checked the data, at the Commission’s request, associated with the Dialogue on Battery Raw Materials.
KPI3:
MREG’s flagship minerals project, FRAME is the one that has kept and centred most of the group’s activity. This project, being the one that is closely scrutinised by DG Grow and JRC because of the deliverables that are of interest to them, has already delivered a map of the Battery Raw Materials/Energy Critical Elements (Li, Co, C). Since 2014, the MREG task force on “National Mineral Resources Projects in Europe “collects information on MR related activities carried out by European Geological Survey Organizations (GSO’s) on a national level.

• Supply of the Energy Critical Elements at the PDAC in Toronto
• SCRREEN workshop on criticality in Brussels
• FRAME data management workshop in Lisbon
• Raw materials week 2019 in Brussels
• UNECE Resource Management Week 2019 in Geneva

KPI4:
MREG is highly involved in the Raw Materials themed projects of GeoERA: EuroLithos, FRAME, MINDeSEA and Mintell4EU. Data coming from Raw Materials themed projects of GeoERA are very relevant to the European Commission’s current strategies; namely the Battery Initiative and e-Mobility, the Circular Economy and the Critical Raw Materials List. The overarching themes and interconnectivity with the other GeoERA themes (Groundwater and Energy) means that MREG also has a contribution in projects like HIKE (Hazard and Impact Knowledge for Europe), RESOURCE (Resources of groundwater harmonized at cross-border and pan-European scale) and MUSE (Managing Urban Shallow geothermal Energy).

KPI5:
MREG made a global analysis identifying the key third countries with an economic mineral potential of Critical raw materials, in particular Rare earths, and providing a shortlist of countries in Africa, EU neighbouring countries like Ukraine and Serbia, Latin America, Central Asia, and Mongolia.

7. KPI Evaluation for Spatial Information Expert Group (SIEG)

Number of Members: 73

Some of the key achievements of 2019 for SIEG:
✓ Focus on EGDI, the e-infrastructure of EGS Standardisation.
✓ EGDI governance, funding, and roadmap definition.
✓ Active in the Geoscience Information Consortium.
✓ Contribution to the Geoscience Domain Working Group in OGC.
✓ 34th Annual Geoscience Information Consortium

Review:

KPI1:
One of the prioritized activities of SIEG has been focused on EGDI, the e-infrastructure of EGS (2nd Pillar). In addition, SIEG contributed to the Expert Group Scientific Topics to help the formulation of the proposal for the EPGSE.

KPI2:
Research activities of SIEG have mainly focused on advisory related to the improvement of the EGDI technical infrastructure. Some SIEG members are active in development, amendment and implementation of standards (encoding of 3D Models or geothermal data using INSPIRE, GeoSciML and O&M schemas, definition a metadata profile for 3D models, procedure of publication of 3D Models by Atom Feed etc.).

Many SIEG members are involved in GeoERA project Geoinformation Platform (GIP-P). The aim of this project is to effectively integrate results of the other 14 GeoERA projects and make them available as EGDI
extensions. SIEG members are also actively participating in the other GeoERA projects as Resource, FRAME, Geoconnect3d, Mintel and HotLime.

**KPI3:**
The EGDI Consortium consisting of GEUS, BRGM, GeoZS, CGS and BGS has been operating and maintaining the system and has provided support to users. EPOS Thematic Core Service (TCS) Geological Information and Modelling Consortium Agreement for the Construction and Operation of the EPOS Research Infrastructure was signed by 10 parties, including EGS and 7 geological surveys (SIEG active members). The position of EGS and its strategy and potential for collaboration with EPOS has been defined in the amended proposal of the Memorandum of Understanding. Further discussion and negotiation with EPOS-ERIC is expected. Collaboration with EMODnet European Marine Observation and Data Network results is making large amounts of marine geological data accessible on the EGDI platform.

User support has been provided through EGDI (harvesting data from new providers, provision of metadata, help to provide the missing data). The need for a stronger SIEG relationship with other EGs was agreed to ensure their involvement in the EGDI content definition and responsibility.

**KPI4:**
SIEG members are active in the Geoscience Information Consortium (GIC).

**KPI5:**
At present, the members of GIC are representatives of 35 GSOs from Europe, North America, South America, Asia, Africa and Australia.

8. **KPI Evaluation for Urban Geology Expert Group (UGEG)**

**Number of Members: 48**

EGS Secretariat comments based on UGEG Annual Report 2019 and comments from UGEG Chair Stephanie Bricker.

Some of the key achievements of 2019 for UGEG:
- Expert group established in 2019.
- Identification of Expert Group key priorities, group activities, and potential research questions.
- UGEG inception meeting (Brussels) and the Bi-annual meeting (Bucharest).
- Three papers have been published.

**Review:**

**KPI1:**
- UGEG, in line with the third pillar of EGS, is resolved to encourage acquisition of systematic geoscience data for European cities, and make this information available in a range of freely available media and formats, that can be used in relation to urban planning and policy on various urban scales such as City, Euro-district, National and Pan-European.
- Regarding UGEG management it is planned in the upcoming years 2020-2022 working on business development and engagement to expand networks and influence.
- UGEG will seek funding opportunities to develop pilot/case studies and strengthen network.
- UGEG will contribute to the European Partnership on the Geological Service for Europe proposal and will prepare a position paper on the state of urban geology in Europe and accompanying briefing pack for high-level policy engagement.

**KPI2:**
The UGEG Exec team have undertaken a review of current EU Policy and Strategy of relevance to urban environments and the groups mission and science focus. The outcomes of the EU strategy review will be used in combination with outputs from the Sub-Urban COST Action and UGEG Science topics to prepare a position paper and policy brief on the state of
urban geology in Europe. In addition, EGEG has been published three papers.

KPI3:

- Two presentations at the International Association of Hydrogeologists Annual Congress
- Presentation in City Future Conference, University College Dublin
- Poster in the International Groundwater Quality Conference
- Urban Groundwater Management Conference in partnership with Universitatea Tehnica de Constructii Bucuresti

The above-mentioned conference talks and publications (KPI2), whilst carried out by members of the UEGG and aligned to UEGG’s mission were not directly instigated by the Urban Geology Expert Group. These complementary dissemination activities demonstrate the capability and potential of the Expert Group to ensure visibility and promotion of the project’s outcomes.

KPI4:

Future perspectives to intensify EGS networking.

KPI5:

Connections have been established with the newly formed Eurasian Network for Urban Geology (EANUG). This network includes the geological surveys of China, S Korea, Japan, UK and Finland.

9. KPI Evaluation for Water Resources Expert Group (WREG)

Number of Members: 68

Some of the key achievements of 2019 for WREG:

- Implementation of the four groundwater projects of the GeoERA program.
- All four groundwater projects have been disseminated at different relevant conferences in Europe: Austria, Spain, Luxembourg, Romania, Sweden, Switzerland, Denmark etc.
- Monthly web coordination meetings.
- Four papers published or accepted in the GeoERA TACTIC project.

Review:

KPI1:

- WREG activity was mainly related to the implementation of four groundwater projects (HOVER, RESOURCE, TACTIC and VoGERA) of the GeoERA program contributing to the first and second pillars of EGS.
- All four projects received good to excellent reviews at the midterm project evaluation. Monthly web meetings were organized to coordinate the activities and ensure project progress.
- WREG has entered the core group developing the proposal for a European Partnership on a Geological Service for Europe. In addition, WREG will follow the development of other related European Partnerships such as the Water4All partnership, closely, and enable coordination with such partnerships.

KPI2:

The news on the groundwater projects were posted on the GeoERA groundwater blog (https://geoera-groundwater.com/), LinkedIn, Twitter, Facebook and ResearchGate. These news on the GeoERA groundwater received more than 10,000 views. Four papers have been published or accepted in the GeoERA TACTIC project.

EGS Secretariat comments based on WREG Annual Report 2019 and comments from WREG Chair Klaus Hinsby.
KPI3:

- HOVER field work campaigns completed in collaboration between WREG partners and globally leading European groundwater dating laboratories at University of Bern (Switzerland), University of Heidelberg and University of Bremen (Germany).
- Poster and oral presentations at EGU2019.
- TACTIC project was presented at the 36th meeting of the CIS Working Group Groundwater (WGG)
- WREG activities and GeoERA groundwater projects presented at the UNECE resource management week in Geneve (Switzerland).
- HOVER related work presented, and a HOVER project meeting was held at the IAEA International Symposium on Isotope Hydrology in Vienna (Austria).
- VoGERA present at the IAH conference in Malaga (Spain).
- TACTIC project assembly meeting incl. advisory board at JRC, ISPRA (Italy).
- Presentation of the GeoERA groundwater projects and their contributions to EGDI at the Hydrology Day, Odense (Denmark).
- Presentation of the GeoERA groundwater projects and their contributions to EGDI at the Swedish “Groundwater Days”, Lund University (Sweden).

KPI4:

WREG has been working on data management and communication, dissemination and exploitation plans of the projects and has been collaborating with the GeoERA Information Platform project on identification and description of products for EGDI.

KPI5:

All groundwater projects provided information for their project websites on the GeoERA website: [http://geoera.eu](http://geoera.eu).
KEY PERFORMANCE INDICATORS – 2020
1. KPI Evaluation for Earth Observation Expert Group (EOEG)

Number of Members: 87

Key achievements of 2020 for EOEG:

- Elaboration of Earth Observation and Geohazards topics for the Strategic Research & Innovation Agenda.
- Contribution to the elaboration of the CSA HE proposal.
- Participation to the Copernicus Industry Workshop.

Review:

KPI1:

- The Landslide working group continues its activities, even though additional funding must be sought to provide continuity.
- EOEG continues participating in H2020 E-SHAPE project: training on Pilot 3 products and services for EuroGeoSurveys.

KPI2:

- The manuscript “Integration of landslide hazard into urban planning across Europe” by the Landslide working group was accepted for publication.
  

KPI3:

- Elaboration of Earth Observation and Geohazards topics for the Strategic Research & Innovation Agenda.
- Participation in the CSA proposal core team meeting, 09/04/2020.

KPI4:

- Participation to the Copernicus Industry Workshop: European Ground Motion Service with Copernicus on 21st and 22nd October with the keynote speech, “The rationale behind and justification for the EGMS and overarching user requirements”. Participation to the GEO Week 2-6 November 2020.

KPI5:

- Promotion of EOEG activities to social media channels, continuous activity.

2. KPI Evaluation for Geochemistry Expert Group (GEG)

Number of Members: 55

Some of the key achievements of 2020 for GEG:

- Preparation of the GEMAS on-line version and the 4th GEMAS quality control report.
- Participation in on-line events related to soil protection initiatives by FAO, EEA and EU Commission
- Publication of the results from the FOREGS Geochemical Atlas of Europe and Geochemistry of Agricultural and Grazing land soil and an increase of book sales.

Review:

KPI1:

- GEEG works on the renewal of its strategic agenda and raising its profile Discussion of ideas for developing pan-European geochemical
projects of interest to policy makers, the scientific community, and the public; Monitoring of EU commission calls.

- Members of the EGS-GEG continued to be involved in many EU Commission co-financed projects.

KPI2:


- Publication of papers and presentations using results from the FOREGS Geochemical Atlas of Europe and Geochemistry of Agricultural and Grazing land soil (GEMAS); Activities were somewhat limited due to pandemic crisis.


KPI3:

EGG offers expert advice to Lithuania (National representative in the EU expert group on Soil protection at EC DG Environment and NRC for Soil at the EEA EIONET), United Kingdom (Member of the United Nations Food and Agriculture Organisation (FAO) Global Soil Laboratory Network (GLOSOLAN) Technical Working Group) and Sweden (Committee work on Cadmium strategy for Sweden led by the Toxicological Council by the Swedish Chemicals Agency), The Netherlands (Member of the Groundwater Domain group for the Dutch BRO Key Register of the Subsurface), Portugal (Member of EGS-GEG is also a member of the Scientific Board of IGCP-UNESCO (2016-2024) in Earth Resources and Geohazards Groups. http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/international-geoscience-programme/igcp-council/).

- Member of EGS-GEG is a Chair of Geochemistry Group of ASGMI, Association of Iberoamerican Geological and Mining Surveys. Present mission is to prepare a Manual of Standard Geochemical Methods for the South American and Iberian Peninsula.

- Chairmen of the GEG were invited as experts by EEA (Eionet NRC Soil) to contribute to the new European Soil Condition Assessment 2020/2021.


- Members of the GEG participated in the virtual meeting on the ‘Launch of the EU Soil Observatory’, which was organised by the Joint Research Centre on the 4th of December 2020.


KPI4:

Members of the EGS-GEG are involved in the writing or review of two manuals, which are being compiled by the IUGS Commission on Global Geochemical Baselines (CGGB).
GEG participated in the following conferences: Global Soil Partnership Assembly (8th Session), Rome, 3-5 June 2020 and EGU 2020, Vienna, 4-8 May 2020: Session BG1.6 - Functions and functioning of the Critical Zone. Co-organized by HS10/SSS12.

Chairmen of the GEG were invited as experts by EEA (Eionet NRC Soil) to contribute to the new European Soil Condition Assessment 2020/2021.

Members of the GEG participated in the virtual webinar ‘Keep soil alive, Protect soil biodiversity’ organised by FAO’s Global Soil Partnership on the 4th of December 2020 for the celebration of United Nations World Soil Day.

Members of the GEG participated in the virtual meeting on the ‘Launch of the EU Soil Observatory’, which was organised by the Joint Research Centre on the 4th of December 2020.


KPI5:
- GEMAS data are included on the EGDI/GeoERA portal (under preparation by GEUS).
- Discussion of ideas for developing pan-European geochemical projects of interest to policy makers, the scientific community, and the public.

3. KPI Evaluation for Geochemistry Expert Group (GEEG)

Number of Members: 59

EGS Secretariat comments based on GEEG Annual Report 2020 and comments from GEEG Chair Serge van Gessel.

Some of the key achievements of 2020 for GEEG:
- In the first half of 2020, the activities of the GEEG were mainly focused on the GeoERA projects.
- The expert group is involved in the definition of the upcoming HE CSA with contribution of scope and (strategic) research objectives.
- Two major online meetings were organized to evaluate (CSA-SRIA) research opportunities for Geothermal energy, CO2 storage and Energy Storage.
- The Group contributed to various events such as Shallow Geothermal Days, Brussels geothermal development (drilling site event), GeoERA stakeholder event.

Review:

KPI1:
- GEEG worked on CSA – Geological Services for Europe and strengthening links with external organizations and stakeholders (amongst others: Clean Energy Technology Partnership, ETIP Renewable Heating and Cooling, ETIP – Deep Geothermal).
- The GEEG has selected three new co-chairs. These positions are aligned with the upcoming challenges in the CSA process and the research topics under the EC-Green Deal.
- Member surveys are involved in various collaboration projects (e.g. INTERREG) and COST actions. Defining overviews of current and upcoming opportunities and links is part of GEEG meetings.
- GEEG members/organizations are involved in (collaborate with) many other networks in supporting/enabling the EU commission goals (e.g. EGEC, CO2GeoNET, ENeRG, ETIP, UNECE)

KPI2:
Energy Storage Position Paper (in prep): A position paper on underground energy storage is under development. The paper should strengthen the SRIA scope and objectives. Endorsement is sought from EASE, UNFC, CETP. The paper is expected to become finalized in Q1 2021. Promotion and communication will be done in coordination with EGS Secretariat.

The GeoERA projects gradually lead to more published results (presented at events like EGU, GeoConnect3d workshops, reports/fact sheets, etc.

KPI3:
GEEG has built and extended further relationships with: The Clean Energy Technology Partnership, Renewable Heating partnership, EGEC, CO2Stop, UNECE (meetings/presentations)

A special Christmas event was organized on December 16th.

KPI4:
- Presentation/co-ordination of Brussels-EC geothermal event.
  GEEG supported a public event with EGEC, GSB and the EC.
- The GeoConnect3D project organized a multi-day stakeholder event with GEEG/GeoERA contributions. Also, there was a multi-day GeoERA mid-term event.
- Organization and convening of the Shallow Geothermal days.

KPI5:
- The 2020 activities of the GEEG mainly focused on six GeoERA projects (GARAH, HOTLIME, MUSE, HIKE, 3DGEO-EU and GeoConnect3d) and supporting the third strategy pillar of EGS.
- GEEG is seeking to strengthen its connection with UNECE/UNFC (participation in working groups)
- EUSEW 2022 should be on our radar as an event where we can position our work.
- Organization of Webinar/Workshop events (e.g. follow-up for Paris 2019 underground energy storage)
- Strengthening our positions in relevant networks (e.g., ETIP-Deep Geothermal, RHC)

4. KPI Evaluation for Geological Mapping and Modelling Expert Group (GMMEG)

Number of Members: 47

Some of the key achievements of 2020 for GMMEG:

- Expert group established in 2020.
- Identification of Expert Group key priorities and group activities.
- Organisation and transaction of start-up meeting.

Review:

KPI1:
The implementation of the Geological Mapping and Modelling Expert Group (GMMEG) was approved unanimously in the EuroGeoSurveys General Meeting in October 2020. The application of Hans Georg Krenmayr and Philippe Calcagno for chair- and co-chair positions, respectively was approved by ExCom on 1st of December 2020. The start-up-meeting of GMM-EG took place with 39 nominated expert group members from 28 NGSOs on 16th of December 2020.

KPI2:

KPI3:
- Close interaction with CSA-WGs and EGS-EGs, in particular SIEG and UGEF
KPI4:
• Continuous lobbying for geological basic data as an independent issue (comparable to information technology and geodata management), which however serves as indispensable groundwork for all applied geoscience disciplines.

KPI5:
• Gap analysis of European geological maps and map data sets in scales from 1:25,000 – 1:1,000,000
• Organization of exchange of knowledge and expertise by means of online-workshops and lectures & discussions

5. KPI Evaluation for International Cooperation and Development Task Force (ICDTF)

Number of Members: 49

Some of the key achievements of 2020 for ICDTF:
✓ Questionnaires sent to ASGMI members to identify their needs and priorities in order to have a good analysis done while waiting for a suitable context to present again a more comprehensive EGS-ASGMI proposal (PanLatEUGeo)
✓ Strengthening EGS-ASGMI collaboration within the context of EU funded project “EU-Latin America Partnership on Raw Materials” (MDNP2). Meetings with the ASGMI Secretariat to try to make visible, through the MDNP Project, some works that show its capabilities to persuade the EC to invest in ASGMI and finance an EGS-ASGMI cooperation
✓ Participation in meetings with the International Cooperation Expert Group of ASGMI, and meetings with the Secretary General and the Executive Committee of ASGMI for the follow-up of the EGS-ASGMI cooperation.

Review

KPI1:
• ICDTF attempts to reinforce EGS-ASGMI collaboration and raise awareness of the possibilities that this collaboration can offer to the EC. The collaboration in the MDNP2 project, the PanLatEUGeo proposal and the possible participation in the EUROCLIMA Programme with ASGMI are international cooperation proposals that contribute to the third pillar of EGS's vision.
• In the case of PanLatEUGeo, most of the EGS members have expressed interest in participating.

KPI2:
ICDTF proposals do not generate scientific outputs of their own but can offer a transfer of research results and applications generated by other EGS expert groups to Latin America.

KPI3:
Contacts with the focal points of the EUROCLIMA+ Programme in Latin America, CEPAL and UN Environment to advance in the EUROCLIMA+ Programme proposals.

KPI4:
Supporting the work of the EGS secretariat in the MDNP2 project, strengthening the EGS-ASGMI collaboration, in order to promote the interest of the EC in ASGMI and to serve as an introduction for future joint EGS-ASGMI proposals.

KPI5:
Regarding to openness towards international cooperation:
• During 2020, questionnaires were conducted with ASGMI members to identify their needs and interests so that this information could serve as a starting point while waiting for a better context for a more comprehensive EGS-ASGMI collaboration, such as PanLatEUGeo.

• Attempts have been made to advance in the EUROCLIMA+ Programme proposals, contacting the focal points of the Programme in Latin America, CEPAL and UN Environment without obtaining significant results due to the COVID context.

• The current MDNP project represents an opportunity and it is proposed to take advantage of it to make ASGMI's capacities and EGS-ASGMI collaboration visible, in order to promote the interest of the EC in ASGMI and to serve as an introduction for future joint EGS-ASGMI proposals.

• It has been discussed with the ASGMI Secretariat to promote collaboration between EGS and ASGMI expert groups. For now, it has been assessed that ASGMI groups still need to mature further, although in the medium term a collaboration with the most consolidated ASGMI groups could be considered.

6. KPI Evaluation for Marine Geology Expert Group (MGEG)

Number of Members: 48

*EGS Secretariat comments based on MEGG Annual Report 2020 and comments from MEGG Chair Sytze van Heteren.*

Some of the key achievements of 2020 for MEGG:

- Fourth phase of EMODnet-Geology activities.
- A proposal for a fifth phase EMODnet (2021-2023, 2.4 M EUR) was submitted in July.
- Peer-reviewed published highlights are Geological Society of London Special Publication 505 and Quarterly Journal of Engineering Geology and Hydrogeology
- Contribution to CSA and SRIA documents

**Review:**

**KPI1:**

- MEGG was granted with the 4th phase of EMODnet that ensures some continuity in offshore map harmonisation and strengthens the digital presence as part of the EGDI contributing to second pillar of EGS.
- MEGG members have contributed to a substantial number of EU-funded and transnational projects.
- The MEGG participates in two GeoERA projects: MINDeSEA on metallogenetic mineral resources, GARAH on hydrates in the continental margin and FRAME on strategic and critical raw materials.
- Some marine sections (Denmark, Croatia, Finland, Ireland, Italy, Portugal, Sweden) were growing (by adding permanent as well as temporary staff, including graduate students), primarily because of a shift to detailed nearshore and inshore geological, geochemical, habitat and drowned-landscape mapping.
- Presently, the MEGG is still overly dependent on EMODnet. Several members report that EMODnet is their only marine project.
- Several members received new data-acquisition and laboratory equipment, including sub-bottom profilers, echo sounders, underwater vehicles, automated core loggers, geochemistry instruments, mobile laser scanners and drones. These new tools and associated software are part of a transition to ever more detailed seabed and coastal mapping.
KPI2:
The expert group has provided marine geoscience information to the European Commission’s European Marine Observation and Data Network (EMODnet). Contribution to “The EU Blue Economy Report 2020” attending the petition of the DG MARE. In support of our activities and to ensure visibility, we organized online conferences on earthquake engineering, monitoring coastal erosion from space, Mediterranean climate, and seabed mining. Publications in Peer-reviewed Scientific Journals.

KPI3:
Other projects with multiple MGEG partners include EU-China collaborative project EMOD-PACE, EMODnet-Bathymetry (and High Resolution Seabed Mapping), EMODnet Data Ingestion for industry, several ongoing Geo-ERA (including a Mintell4EU UNFC classification pilot study) and Interreg projects (on minerals, gas, coastal erosion and research infrastructures EPOS and observatories EMSO).

Ongoing Interreg projects are FiberAct, on contaminant loads from the pulp and paper industry, and SEAmBOTH, on seamless mapping of the Bothnian Bay. GoFHaz project (Hazardous substances in the Gulf of Finland). Some activities that have been carried out by individual members, including arctic environments, land-sea integration (COST Action on Ocean Governance for Sustainability), environment and hazards, and sediment records, are being adopted by the group.

KPI4:
Information on seabed sediments, subsurface geology, coastal behavior and resilience, geological hazards, mineral resources and drowned landscapes, compiled for all European sea areas, is made available through the project portal (http://www.emodnet.eu) using Web Map Services (WMS) that also feed other portals such as OneGeology-Europe, the European Geological Data Infrastructure EGDI, and the European Atlas of the Seas.

Significant efforts were done concerning the digitizing paper records and disseminating information through new multidisciplinary marine portals.

KPI5:
MGEG continues to play a lead role in the Atlantic research alliance between the EU, the USA and Canada.

7. KPI Evaluation for Mineral Resources Expert Group (MREG)

Number of Members: 72

Some of the key achievements of 2020 for MREG:
✓ MREG is involved in several EU projects.
✓ Annual/bi-annual MREG expert meetings
✓ Involvement in CSA and SRIA documents
✓ Invited to deliver keynote speeches and talks in international fora, e.g., Critical Raw materials Forum, PDAC2020, Raw Materials Week and the 7th Prometia Scientific Seminar.

Review:

KPI1:
MREG has successfully been integrated in the recently successful SCRREEN2 proposal to assist in the 2023 Criticality Assessment that is updated every 3 years by the Commission.
KPI2:
DG GROW has requested additional maps that FRAME has since produced: phosphates, niobium and tantalum distribution in Europe. MREG has been involved in validating and delivering data to DG Grow to produce the Critical Minerals list for Europe and the resulting Map in 20 different languages for the CRM report that was published in September.

KPI3:
MREG’s flagship minerals project, FRAME (FORECASTING AND ASSESSING EUROPE’S STRATEGIC RAW MATERIALS NEEDS; www.frame.ineg.pt), is the one that has kept and centred most of the group’s activity for the year. The overarching themes and interconnectivity with the other GeoERA themes (Groundwater and Energy) means that MREG also has a contribution in projects like HIKE (Hazard and Impact Knowledge for Europe), RESOURCE (Resources of groundwater harmonized at cross-border and pan-European scale) and MUSE (Managing Urban Shallow Geothermal Energy).

KPI4:
• MREG was represented at the PDAC2020 in Toronto.
• Launch of the European Raw Materials Alliance (ERMA) Plenary meeting of the Raw Materials Supply Group 14/10/2020.
• MREG contributed to the survey “European Innovation Partnership (EIP) on Raw Materials - Strategic Implementation Plan 2021-2027”;
• Raw Materials Week, online November 2020;
• Virtual Workshop – “UNFC Europe: Ensuring sustainable raw material management to support the European Green Deal”
• MREG took part in the 7th PROMETIA Scientific Seminar

KPI5:
Research activities of MREG are undertaken through EU projects. However, requests by the Commission focus activities of the Group on aspects – circular economy, battery raw materials, criticality, UNFC, exploration.

8. KPI Evaluation for Spatial Information Expert Group (SIEG)

Number of Members: 64

Some of the key achievements of 2020 for SIEG:

- Continued design, development and maintenance of the European Geological Data Infrastructure (EGDI)
- Contribution to CSA and SRIA documents
- Working groups have been set up within the SIEG to better organize work: INSPIRE WG, EGDI WG, EPOS WG, EPOC, WG, EC Programmes WG.

Review:
KPI1:
Preparation of the Coordination and Support Action (CSA-GSE) and the definition and elaboration of topics in the Strategic Research and Innovation Agenda. The SIEG is also represented in specific EGS working groups for the preparation of the CSA: Coordination, Governance, Research and Innovation, EGDI, Position and Outreach, and also in the Working Group for the Development of SRIA. The EGDI Consortium consisting of GEUS, BRGM, GeoZS, CGS, BGS and now also IGME maintains the system and provides support to users.

KPI2:
Activities of SIEG have mainly focused on strategy, organizational support and recommendations regarding improvement of the EGDI technical infrastructure.

KPI3:
The need for interdisciplinary communication and a stronger relationship with other EGs has resulted in joint meeting and discussions with UEG.
Close communication and coordination with the other Expert Groups is essential to ensure their involvement in the responsibility of EGDI content and so improve the sustainability of EGDI.

KPI4:
Collaboration agreements between EPOS ERIC and GIM related to Governance and Coordination, Outreach activities and Service provision are being discussed.

A proposal is being made to ensure the further management and maintenance of the Geoscientific Keyword Thesaurus (Knowledge base), created as a product of GeoERA projects, as well as other relevant codelist and registers (that may be registered in INSPIRE).

KPI5:
The main project activity has been focused on GeoERA Information Platform Project (GIP-P), in which a substantial part of members participates. SIEG members are also actively participating in the other GeoERA projects as RESOURCE, FRAME, GeoConnect3d, Mintell4EU and HotLime.

SIEG members are also active in the Geoscience Information Consortium (GIC) http://www.g-i-c.org, a global initiative for the exchange of information among the GSOs on the use and management of geoscience information systems to support Earth science internationally.

9. KPI Evaluation for Urban Geology Expert Group (UGEG)

Number of Members: 53

Some of the key achievements of 2020 for UGEG:
- A BIM Survival Handbook is being drafted
- Activities and feedback to support the EGS-CSA and SRIA documents

Review:

KPI1:
- A survey of UGEG members has been completed to find out more about the current situation regarding building information modelling.
- The Geoscience working group are providing representation and advise to the OGC to ensure that geoscience data standards and practices are included in MUDDI alongside other data formats.
- The C40 City Climate Action network will provide advice on applications of the tool to city needs. To support work on the Geo-footprint tool, a review of the availability and effectiveness of city-scale geological data will be undertaken, aligned to our survey of representatives from the EuroGeoSurveys.
- Participation and coordination to contribute to the SRIA and CSA documents.

KPI2:
- A BIM Survival Handbook is being drafted which provides a shared resource with information on projects, data models, vocabular and software concerning BIM, geological modelling and data modelling.
- Contributing to the OGC Model for Underground Data Definition and Integration (MUDDI) and workshop on this subject in December 2020

KPI3:
- Engagement with urban practitioners including the C40 network, JPI Urban Europe and the Open Geospatial Consortium and consultation with and webinars for city authorities and urban geologists.
- GeoCommunication activities have focused on engagement with stakeholders, to understanding their issues and preparation of materials to promote urban geology and the interests of the UGEG.
- The GeoCommunications task group prepared a series of communications for the UN World Cities Day (31st Oct) to highlight the importance of geology for urban development. This included tweets and cartoons, adaptable for different European languages, illustrating
groundwater borehole drilling, tunnelling and issues of mining hazard for construction.

- Participation at the JPI Urban Europe – Driving Urban Transitions online conference.

**KPI4:**

- Organized an Urban Geology Webinar attended by 100 city authority representatives and geologists from 40 countries.
- Internal workshop sessions have been held to draw together content for a position paper on Urban Geoscience for Europe.

**KPI5:**

The results of the BIM Survival Handbook provide a shared resource with information on projects, data models, vocabulary and software concerning BIM, geological modelling and data modelling.

### 10. KPI Evaluation for Water Resources Expert Group (WREG)

**Number of Members:** 79

EGS Secretariat comments based on WREG Annual Report 2020 and comments from WREG Chair Klaus Hinsby.

Some of the key achievements of 2020 for WREG:

- Implementation of the four groundwater projects of the GeoERA program.
- All four groundwater projects have been disseminated at different regional, national and international events incl. meetings of Working Group Groundwater of the Common Implementation Strategy of the Water Framework Directive and EGU 2020.
- Feedback provided for the work on the Strategic Research and Innovation Agenda (SRIA) for the EGS-CSA and the Water4All partnership.
- Contact established to water and spatial information key persons at EEA - regular meetings have been agreed to discuss common interests e.g. for the implementation of the European Green Deal and the Water Framework / Groundwater directives.

**Review:**

**KPI1:**

- WREG activity was mainly related to the implementation of four groundwater projects (HOVER, RESOURCE, TACTIC and VoGERA) of the GeoERA program contributing to the first and second pillars of EGS.
- WREG has entered the core group developing the proposal for a European Partnership on a Geological Service for Europe. In addition, WREG will follow the development of other related European Partnerships such as the Water4All partnership, closely, and enable coordination with such partnerships.
- The work of all GeoERA four projects was delayed because of the Covid-19 pandemic.
- All groundwater projects have virtual meetings with the GIP-theme coordinator and WP leads to discuss groundwater products for EGDI from the groundwater projects.

**KPI2:**

- Midterm project evaluation successfully completed with high scores for all four groundwater projects.
- Preparation and submission of GeoERA groundwater project deliverables.
- All groundwater projects provided information for their project websites on the GeoERA website: http://geoera.eu. In addition, selected news from the projects were posted on the GeoERA groundwater WordPress blog (https://geoera-groundwater.com), LinkedIn, Twitter, Facebook and ResearchGate.
KPI3:

- The contents of the four GeoERA groundwater projects and their contribution to the GeoERA information platform (EGDI) were presented at the 34th Nordic Geological Winter Meeting in Oslo, 6-8 January 2020.
- Seven abstracts for the EGU 2020 virtual conference 4-8 May 2020.
- Eight scientific papers were published or submitted in 2020.
- On-going work in HOVER and TACTIC on research papers for the special issue of WATER on natural background levels, which has the WREG chair as guest editor, one paper were published in May 2021 in the Water SI and another submitted to the special issue on Coastal groundwater dynamics, environmental issues, and sustainability: A synthesis in the Marine Pollution Bulletin, May 2021.
- GeoERA webinar series were announced in a virtual presentation at the 38th Working Group Groundwater Meeting under the Common Implementation Strategy of the Water Framework Directive 30 September – 1 October 2020.
- Discussions on the new European Partnership “Water4All”
- The WREG chair organised a meeting on general EGS interests in Water4All on September 11th, where all EGS expert groups were invited.

KPI4:

- WREG has been working on data management and communication, dissemination and exploitation plans of the projects and has been collaborating with the GeoERA Information Platform project on identification and description of products for EGDI.
- Participation at the GeoERA webinar series 9-13 November.

KPI5:

- All groundwater projects provided information for their project websites on the GeoERA website: http://geoera.eu.
- Collaboration with the GeoERA Information Platform project on identification, description and provision of digital information products for EGDI.
- Consolidation of the collaboration between the partners of the four GeoERA groundwater projects and the GeoERA GIP project on the joined effort to create valuable digital groundwater information products for the sustainable management of groundwater resources in a changing climate.
- WREG is part of the core group developing the UNFC groundwater classification system. The progress of this work is expected to be presented in October 2021 at the 40th meeting of Working Group Groundwater within the Common Implementation Strategy of the Water Framework Directive.
EGS Secretariat
Activities
2019-2020
YEARS 2019:

Statutory meetings - 2019

February: 42nd National Delegates Forum, Expert Groups Chairs meeting – Brussels

March: 100th Executive Committee, Directors Workshop, 46th General Meeting - Brussels

June: 101st Executive Committee, Directors Strategy Workshop – Warsaw

September: 43rd National Delegates Forum – Lisbon

October: 102nd Executive Committee, 47th General Meeting – Prague

December: 103rd Executive Committee - Bern

1. Project engagement

PanAfGeo Project
Start date: 16/12/2016  End date: 15/12/2019
Coordinator: BRGM
Budget: €10,248,953 co-funded by DG DEVCO through the Pan-African Programme

The role of EGS is to promote and facilitate dialogue and interactions between the Project partners, African Geological Surveys and stakeholders. The goal is to increase the visibility of the PanAfGeo actions and to create a communication network raising awareness on the importance of sharing (WP8 Communication & Dissemination). EGS also became WP leader of WP9 (logistic of the trainings, travel, allowances, IT equipment).

On 24 and 25 October 2019, about 70 PanAfGeo partners from around 50 European and African countries gathered in Dar es Salaam, Tanzania, for the Phase 1 closing meeting. The Ministers responsible for minerals in Tanzania and Kenya were the guests of honour. Attendees included some of the project’s main contributors: OAGS Executive Committee members, stakeholders and representatives of Geological Surveys in Africa and Europe and the European Commission. PanAfGeo increased the technical competence of 1,074 trainees from 49 African countries. The European Commission’s intention of increasing attention for more effective cooperation with Africa has therefore been fully met by PanAfGeo Phase 1, through its geoscience training programmes for officers of African Geological Surveys. The programme has clearly strengthened the partnership between EU and African countries in several areas, bringing substantial benefits to the societies in Africa and, indirectly, in Europe, through the establishment of stable institutional relations based on mutual trust and respect.

GeoERA ERA-NET
Start date: 1/01/2017  End date: 31/12/2021
Coordinator: TNO
Budget: €31,303,030.39 co-funded by the EU Horizon 2020 Programme [€10,000,000 EU contribution, €21,303,030.39 in kind from participants]
Role of EGS: Subcontracted to assist GEUS in WP5 “Communication & Dissemination”.

Project with a full title “Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe”.

MINLAND Project
Start date: 1/12/2017  End date: 30/11/2019
Coordinator: Geological Survey of Sweden (SGU)
Budget: € 1,498,691.25 funded by the EU Horizon 2020 Programme
Role of EGS: WP leader for WP8, partner in WP1, WP2, WP
“Mineral resources in sustainable land-use planning” or MINLAND project has been designed to meet the challenges of competing land use from many different needs. The MINLAND consortium, coordinated by the Geological Survey of Sweden builds upon participation from all over Europe. The consortium consists of partners and third parties covering such expertise as geological land use information mining authorities, land use authorities, industry and academy. It is further supported by a broad stakeholder group covering from municipal and regional level land use authorities to Euromines, World Wildlife Fund, PDAC, UEPG, and land use experts. EGS is one of the 22 partners and there are seven EGS members who are third parties (GeoZS, GIU, MBFSZ, CGS, BRGM, Gsd, HGI-CGS). The Grant agreement was signed in November 2017. On 22 November 2019, the MINLAND project held its Final Conference and Clustering Event in Brussels, Belgium. Members of the Consortium and the Advisory Group and relevant stakeholders from the Commission, the Member States and the Industry met before the very end of the project to share the project results and outcomes and discuss the progress and the achievements made by MinLand. The attendees at the final conference comprised of experts from the policy field at various authorisation level, industry, SME's, experts and relevant stakeholders.

INTERMIN Project
Start date: 01/02/2018 End date: 31/01/2021
Coordinator: Geological Survey of Spain (IGME)
Budget: € 1,266,021.25 funded by the EU Horizon 2020 Programme
Role of EGS: WP leader for WP5 (Communication and dissemination), partner in all WPs

“International network of raw materials training centres” or INTERMIN project will create a long-term sustainable international network of training centres for professionals. The project involves educational and research institutions in the EU and the leading counterparts in some raw materials producing countries, based on specific country expertise in the primary and secondary raw materials sector. The network will map skills and knowledge in the European Union and the other countries, identify key knowledge gaps and emerging needs, develop roadmap for improving skills and knowledge, as well as establish common training programmes in the raw materials sector. In line with the EU's strategy for international cooperation in research and innovation, the consortium will seek international collaboration, fostering and exploring synergies with all relevant EU Member States initiatives. The INTERMIN consortium, coordinated by the Geological Survey of Spain (IGME) builds upon participation from all over Europe. EGS is one of the 14 partners and there are seven EGS members IGME, SGU and five an EGS linked third parties (GIU, MBFSZ, CGS, LNEG, IGME Gr.). The Grant Agreement was signed in November 2017.

e-shape Project
Start date: 1/05/2019 End date: 30/04/2023
Coordinator: ARMINES
Budget: € 14,998,976.27 co-funded by the EU Horizon 2020 Programme
Role of EGS: Task partner

e-shape project to strengthen the benefits of the Global Earth Observation System of Systems for Europe (GEOSS) - establish “EuroGEOSS”. The project was started in May 2019 and general promotional activity about the project was performed.

European Technology Platform on Sustainable Mineral Resources (ETP SMR)
EGS is a member of the ETP SMR, an industry-led stakeholder forum recognised by the European Commission. EGS is contracted to run the Secretariat of the ETP SMR.

EGS continued to run the ETP SMR Secretariat in 2017. The ETP SMR continued its involvement in the EIP on Raw Materials with representation in the Operational Groups, however its application to renew its seat on the High-Level Steering Group was rejected by the EC without explanation (several member organisations have seats here however). The main activity in 2017 revolved around the further development of the VERAM project’s vision and roadmap for raw materials research and innovation towards 2050. The ETP SMR held their General Assembly December 2017 in Brussels, at which a new Executive Committee was elected for the next
two years – Slavko Solar was elected as Vice President on behalf of EGS. Seen as a key representative body of EU research and innovation in the mineral resources sector, the ETP SMR is involved in many EU project Advisory Boards, including FORAM, EURARE and the newly established INTERMIN project. EGS will continue to operate the Secretariat of the ETP SMR in 2018.

2. Communication

In 2019, EGS published approximately 15 articles on the EGS website NEWS section, the interactive e-Newsletter of EGS. Several articles were also published on the EGS social media channels as well as promotions of news, interviews, media and press releases via the latter and the EGS website. EGS renewed its efforts in keeping steady relationships with the press, both at local and national levels. In 2019, EGS NEWS increased the number of visitors, page views, sessions and followers. Overall, the EGS website was continuously updated throughout the year, and changes were reported in the members’ data, Expert Groups, news and events. A designated EGS brochure was designed highlighting the activities and achievements in view of disseminating them at key events and on the social media platforms.

Over the past 12 months, social media activity has continued to increase the EGS visibility, as well as promoted projects and events. LinkedIn platform gained more followers totalling 1029 followers, EGS Twitter gained 332 followers (taking the total number of followers to 1521) and the EGS Facebook page now has 621 followers. Further to this, the EGS YouTube channel has had an increased number of views in 2019 compared to 2018.

EGS participated in several events. The most important ones, in terms of visibility, are listed under “External activities.” By attending these events EGS has reinforced its visibility and capabilities, especially in relation to the European Commission creating the basis of support for projects such as PanAfGeo, MinLand and Intermin.

During 2019, the EGS Communication team was also involved in the communication activities (in the framework of the WP communication). The Communications team was also involved in developing and promoting the activities carried out by the following projects:

- ETP SMR (website, press releases, newsletters). The ETP SMR was involved in the coordination of the VERAM project, supporting communication activities.
- GeoERA (events, social media)
- PanAfGeo (final meeting, brochure, press releases, stakeholder workshops, events, booth)
- MINLAND (visual identity, logo, website, social media, press release)
- INTERMIN (visual identity, logo, website, social media)

All the activities have been carried out by optimizing the financial resources available. The next priorities from the communication point of view, are to increase the visibility of EGS amongst the EU Institutions, particularly within the EC and the EU Parliament; raise awareness of geosciences amongst the general public; keep the involvement of EGS Members high, and, maintain and reinforce the relations with media.
EGS
Secretariat
Activities
2020
YEAR 2020:

**Statutory meetings - 2020**

- **February:** 44th National Delegates Forum, Expert Groups Chairs meeting – Brussels
- **March:** 104th Executive Committee – Online
- **June:** 105th Executive Committee – Online
- **September:** 45th National Delegates Forum – Online
- **October:** 106th Executive Committee - Online, 49th General Meeting – Online
- **December:** 107th Executive Committee - Online

*In addition*  
**October:** Directors Workshop - Online

1. **Project engagement**

**INTERMIN Project**  
*Start date: 01/02/2018  End date: 31/01/2021*  
*Coordinator: Geological Survey of Spain (IGME)*  
*Budget: € 1,266,021.25 funded by the EU Horizon 2020 Programme*  
*Role of EGS: WP leader for WP5 (Communication and dissemination), a partner in all WPs.*

EGS leads WP5 communication and dissemination (exploitation). The WP5 tasks include - Task 5.1 developing the communication strategy (completed); Task 5.2 dissemination support services (completed); Task 5.3 fostering communication (work in progress); Task 5.4 networking map (work in progress). The INTERMIN project was present at several international conferences throughout the year 2020. All project activities are in accord with the plan of the project. An amendment to cope with the delays of Covid 19 was presented in November 2020 and approved by the European Commission. The project will now finish in month 42. The amendment included a revision of the proposed meetings (cancelling or postponing them) and a new task of populating the training centres database in the INTERMIN Portal to all consortium members was agreed.

**e-shape Project**  
*Start date: 01/05/2019  End date: 30/04/2023*  
*Coordinator: ARMINES*  
*Budget: € 14,998,976.27 co-funded by the EU Horizon 2020 Programme*  
*Role of EGS: Task partner*

e-shape project to strengthen the benefits of the Global Earth Observation System of Systems for Europe (GEOSS) - establish “EuroGEOSS”. In 2020, dissemination of e-shape news and announcements on EGS social media channels and website were performed. The EGS members were also kept updated with pertinent e-shape information.

**MDNP II**  
*Start date: 15/05/2020  End date: 15/05/2023*  
*Coordinator: Projekt-Consult*  
*Budget: 2,200,000.00 € funded by the EU from the Budget Line 19.050100 of the general budget of the European Union for 2019 — Partnership Instrument 2019 Annual Action Program.*  
*Role of EGS: Consortium Partner*

EU-Latin America Mineral Development Network Platform (MDNP2). The project promotes sustainable and responsible mining with the environment and the communities to achieve a fair, green and climate-neutral economy. The project is on track and the events that had been planned as face-to-face events, were successfully redesigned to digital
events, the refurbishing of the Mineral Development Network Platform was also carried out. The 2-day online EU-Latin America Partnership on Raw Materials conference was organised and successfully implemented on 24 and 25 November 2020.

**SCRREEN II**

*Start date: 01/11/2020  End date: 31/10/2023*

*Coordinator: French Alternative Energies and Atomic Energy Commission (CEA)*

*Budget: €2,999,875 funded by the EU Horizon 2020 Programme*  

*Role of EGS: a partner in four WPs.*

Solutions for Critical Raw materials - a European Expert Network 2 (SCRREEN II). Europe’s CRM strategy was strengthened through an expert network built by the EU-funded SCRREEN project, which ended in 2020. Its successor, SCRREEN2, was launched to develop the SCRREEN expert network to cover all raw materials. EGS will contribute to the animation of the network of experts (WP1) to provide an overview of the supply chain and market analysis of CRM (WP3) which impact current (WP5) and future EU supply and demand (WP7). Specifically, EGS will contribute to the following project tasks: Task 1.1 Network – Network strategy and animation; Task 3.1 Market analysis, trade and prices – Global market; Task 5.1: Supply from primary resources; Task 5.2: Supply from secondary resources and recycling; Task 5.3: General supply chain of CRM in EU; Task 7.1 Outlooks – Future supply.

**GeoERA ERA-NET**

*Start date: 1/01/2017  End date: 31/12/2021*

*Coordinator: TNO*

*Budget: €31,303,030.39 co-funded by the EU Horizon 2020 Programme [€10,000,000 EU contribution, €21,303,030.39 in kind from participants]*  

*Role of EGS: Subcontracted to assist GEUS in WP5 “Communication & Dissemination”.*

Project with a full title “Establishing the European Geological Surveys Research Area to deliver a Geological Service for Europe” started officially in 2017. In May 2020, GeoERA hosted a scientific session at the European Geoscience Union (EGU) 2020. The session entitled ‘GeoERA: Towards integrated European geoscience services for todays and future generations’ was organized within the EGU Division on Energy, Resources and the Environment (ERE). The session had 23 abstract submissions, 22 displays and 22 presenting authors joining at the live chat.

**European Technology Platform on Sustainable Mineral Resources (ETP SMR)**

EGS is a member of the ETP SMR, an industry-led stakeholder forum recognised by the European Commission. EGS is contracted to run the Secretariat of the ETP SMR.

EGS continued to run the ETP SMR Secretariat in 2020, managing the day-to-day business and arranging the General Meetings and Executive Committee Meetings. In June 2020, ETP SMR had its 11th online General Meeting.

2. Communication

In 2020, EGS published several news articles on the EGS website NEWS section and internal EGS newsletter. Numerous materials were also published on the EGS social media channels as well as promotions of news, interviews, media and press releases via the latter and the EGS website. EGS renewed its efforts in keeping steady relationships with the press, both at local and national levels. In 2020, EGS website increased the number of visitors, page views, sessions, and followers. Overall, the EGS website was continuously modernized throughout the year, and changes were reported in the members’ data, Expert Groups, communication materials, and events.

Over the past 12 months, social media activity has continued to increase the EGS visibility, as well as promoted projects and events. LinkedIn
platform gained around 270 followers, EGS Twitter gained 200 followers (taking the total number of followers to 1603) and the EGS Facebook page now has 680 followers (from 507 followers in the beginning of 2020). Further to this, the EGS YouTube channel has had an increased number of views in 2020 compared to 2019. The YouTube channel gained 24 new subscribers in 2020.

EGS participated in several on-site and virtual events in 2020. Most of the events in 2020 were cancelled or switched to virtual in view of COVID-19 outbreak. The most important ones, in terms of visibility, are listed under “External activities.” By attending these events EGS has reinforced its visibility and capabilities, especially in relation to the European Commission creating the basis of support for projects such as PanAfGeo, MDNP II, SCRREEN II and Intermin.

During 2020, the EGS Communication team was also involved in the communication activities (in the framework of the Work Package communications). The Communications team was also involved in developing and promoting the activities carried out by the following projects:

- ETP SMR (website, press releases, newsletters)
- GeoERA (events, social media)
- INTERMIN ( consortium meeting, events, visual identity, logo, website, press releases, social media)
- E-shape (social media, press release)
- MDNP II (events, social media)
- SCRREEN II (events, social media)

All the activities have been carried out by optimising the financial resources available.

The next priorities from the communication point of view, are to increase the visibility of EGS amongst the EU Institutions, particularly within the EC and the EU Parliament; raise awareness of geosciences amongst the general public; keep the involvement of EGS Members high; and uphold and reinforce the relations with media.
EGS STRATEGIC DEVELOPMENTS 2019 - 2020
STRATEGIC DEVELOPMENTS – 2019-2020

In the context of the EGS strategy, the Geological Service for Europe needs to be integrated as the joint vision and action plan of the Geological Service of Europe and EuroGeoSurveys towards the establishment, by 2020, of a common European Geological Knowledge Base and to jointly provide a pan-European Geological framework. The Geological Service will guarantee Europe access to objective and seamless data and knowledge on geology and wider geosciences.

The vision of EGS bases all its activities in a full-comprehensive strategy organised in three pillars:

Pillar I: RESEARCH

The first pillar of EGS strategy concerns a joint research programme with a focus on EU policy on mineral and natural resources describing the development of a coordinated common programme of geoscientific research identifying and tackling the issues connected with the societal challenges and the needs that require knowledge of subsurface properties and conditions. The GeoERA project, coordinated by TNO and supported by EU Horizon 2020 co-financing, started in January 2017 together with its sub-projects, is part of the first pillar aiming to bring together the National Geological Surveys for providing an active exchange of researchers and best practices while building the environment and processes, particularly amongst the programme “owners”, to facilitate joint activities (including the identification and overcoming of legal and other barriers).

Pillar II: INFRASTRUCTURE

The second pillar of EGS is about completing, harmonizing, sharing and providing pan-European geological data for covering the need of sustainable and interoperable geoscientific information. As part of the second pillar, the European Geological Data Infrastructure (EGDI), launched in 2016, already gives access to data from numerous projects and more than 600 data layers through a user-friendly web portal and a related INSPIRE-compliant meta-database. The EGDI platform will develop connections with and gather user requirements from EGDI end-users, select and prioritize datasets producing maximum societal benefit while working out the Technical design of the infrastructure; develop models for governance and future, sustainable funding of the EGDI. It is important to note, that EGDI is financed voluntarily by some EGS members, and partly by the EGS budget. Discussions have now developed with the user community and stakeholders, and amongst them a clear opportunity for cooperation with EPOS has arisen. EGS will continue to seek out opportunity to develop these ties with a view to obtaining sustained financing to maintain and further develop EGDI in a user-oriented manner.

Pillar III: OUTREACH

The third pillar of the EGS Strategy was named ‘OUTREACH’ and includes sharing knowledge, capacities and infrastructure and communication addressing capacity building through training and the participation to multinational and multidisciplinary research. This approach is actively supported by the multidisciplinary exchange of researchers and the best practices followed by the share of laboratories, facilities and infrastructures. In order to achieve these aims, the action is needed to developing training programmes and systematic knowledge exchange, working out agreements for the joint use of infrastructures, while identifying expertise that are threatened to disappear as well as developing modalities for the mutual exchange of staff.

Other Activities

Geological Service for Europe: EGS is also focusing on the creation and implementation of a common Geological Service for Europe (GSE). The Geological Service for Europe can provide key advice to the EU supporting
the objective of global effective action on climate change. The aim is to consolidate a common vision and approach for organising the geological knowledge on a European level, with national services providing key recommendations on management of our natural resources and how Earth systems are likely to respond to climate change ultimate causes. The importance of a Geological Service for Europe lies in the creation of data products, services and on the improvement of knowledge for all stakeholders.

EGS is engaged in several other European and International projects, using the technical expertise in the network within research and innovation actions, as well as the more policy focused coordination and support actions under Horizon 2020. In 2020, the second phase of activities started for the PanAfGeo project following successful actions in 2019, co-financed by the EC DG DEVCO under the Pan-African Programme.

Several Memoranda of Understanding (MoU) were signed to strengthen the cooperation between EGS and its major partners. This included a signing of a MoU between EGS and United States Geological Survey (USGS).

According to the EGS long-term strategic communication plan, each of the initiatives above mentioned will contribute to the promotion of EGS, its objectives and the work of the partners involved in EGS activities. The current projects and initiatives where EGS are involved can count on a very solid expertise and knowledge in the geological sector, which is shared through the arrangement of trainings and workshops. Moreover, the dissemination of communications materials, such as brochures, leaflets and newsletters maintain the media coverage and the presence of EGS and the projects in the public sphere.

Overall, 2019-2020 can be considered as a time of a deepening commitment to the EGS Strategy and its implementation.

EGS Strategic Developments:

STATISTICS
2019
In this section, we present statistical information on EuroGeoSurveys’ membership evolution. For example: member organizations, staff numbers, budget data, number of publications, showing past trends as well as specific details from 2019.

Please note that the following data has been compiled with contributions from the national Geological Surveys of Europe, however, should not be considered as official – requests for official data on each Geological Survey should be made to the relevant national authorities.

**Membership and Staffing:**

EuroGeoSurveys represented a combined total of 10427 staff in 2019 (according to the feedback received from 33 Geological Surveys). **Figure 1** shows the percentage of permanent staff, i.e. graduate researchers, scientists and engineers (blue), other permanent staff, i.e. secretaries, accountants, technicians, drivers, etc (orange), and temporary staff, i.e. staff contracted on a short term basis, such as students or subcontracted staff, such as interim (grey).

In 2019, 42 percent of the total number of EGS members’ employees was female (Figure 2). By comparison, the percentages of female employees were 39%, 45% and 46% for permanent, other permanent and temporary staffs, respectively.

Ukraine has the highest numbers of total staff (2914) and permanent staff followed by France and Poland. In the Figure 3, total (orange) and permanent staffs (including permanent and other permanent categories) (blue) are presented by country. Staff figures for Belgium, Kosovo, Republic of North Macedonia and Russian Federation were not available.

![Figure 1](image1.png) **Figure 1** Percentage of permanent and temporary employees in 2019.

![Figure 2](image2.png) **Figure 2** Percentage of the total number of staff by gender in 2019.

![Figure 3](image3.png) **Figure 3**. Total and permanent staffs by country.
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**Table 1** Total number of staff employed by country).

*EGS non – members
Table 1 shows the fluctuations of staff numbers in EGS membership since 2006. Note that the data is not always available at the time of collection, hence, there are areas of no data. The numbers of staff in 2019 compared to 2018 have remained relatively stable for most of the Surveys and Institutions. A notable increase in the number of staff (n>10) was noticed in Finland, France, Greece, Poland, Slovenia, Spain and United Kingdom whereas a drop in the number of total employees was shown in Germany, Hungary, Sweden and Ukraine.

The combined 2019 expenditures of EGS members totaled >630.5 million euros (according to feedback received from 33 Geological Surveys). France has the largest expenditure, at 138.4 million euros. Note that there was no information given for Belgium, Kosovo, Republic of North Macedonia, and Russian Federation and Serbia were not available.

Figure 4. Total expenditures (including total salaries and wages and other recurrent expenditures) per country 2019 (Million €)

The national geological surveys throughout Europe receive funding from a number of different sources which are mainly from government state funding and other national public funding. Other funding bodies include, EU research funding, and private funding through commercial activities (Figure 5).
Expertise can be called upon to address a broad range of topics, from the more common geological standpoints such as geological mapping or geohazards to more recent research topics such as geocultural assets. Basic geological research (Basic Geology, Geological Mapping and Regional Geology) together with data management (Figure 6) is the main topic in which geological surveys get involved.

The total number of peer reviewed publications in international scientific journals is 1864. As in previous years, the surveys of the United Kingdom, Slovak Republic and Denmark are the EGS institutions with highest publication rankings. These three Geological Surveys published 701 peer-reviewed papers in 2019 (Figure 7).

The national Geological Surveys that comprise EGS are all public bodies that are under the supervision of various government Ministries. In 2019, there was a continuing trend over the last few years for Geological Surveys increasingly coming under the supervision of the Ministry of Environment (Figure 8).

The main strategic core competences with the high number of Geological Surveys involved is Applied research, Public policy support and Public information whereas Technological transfer and Laws and regulations had a half number of countries involved in these strategic core competences in 2019. (Figure 9).
STATISTICS 2020
In this section we present statistical information on EuroGeoSurveys’ membership evolution, publications, member organisations, such as staff numbers and budget data, showing mostly specific details from 2020 and sometimes past trends. Note that the following data has been collated with contributions from the National Geological Surveys of Europe, however, it should not be considered as official – requests for official data on each Geological Survey should be made to the relevant national authorities. Not every country submitted their data which means the report might be missing them in some places.

### Membership and Staffing:

EuroGeoSurveys represented a combined total of 11,698 staff in 2020. This table shows the fluctuations of staff numbers within our membership since 2010. Please note that the data is not always available at the time of collection, hence there are areas of no data. Although the numbers of staff went up in 2019 - 2020, in general, for most of the Surveys and Institutions, the numbers of staff have remained relatively stable since 2012.

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Total number of staff employed: 154,597

Staff numbers show mainly a downward trend from 2010 to 2012 (Staff fluctuation from 2010 – 2020). In general, for most of the Surveys, there is a slight decrease in staff numbers, most likely linked to the economic downturn in Europe. The increase in 2016 – 2017 is due to the inclusion of date from the Russian Federation. The difference between 2019 and 2020 is explained by the fact that Russian Federation did not submit their data in 2019, thus the large difference.
Concerning the total amount of staff for each of the EGS Members, the bar chart below showcases the proportion of permanent graduate researchers, scientists, and engineers to all the staff. The sizes of the surveys throughout Europe vary considerably.

The ratio of female workers as permanent graduate researchers, scientists and engineers have remained near enough stable from 2019 to 2020.

Men = 3328  
Women = 2092  
Total = 5420

Finances

The chart below visualizes the annual expenditure of the geological surveys in 2020. As shown, in most countries total salaries and wages comprise the largest expenditure for each survey. The combined expenditures in 2020 of EGS members summed to 694 million euros. France has the biggest expenditure, at 67.8 million euros in 2020.

Men = 3767  
Women = 2508  
Total = 6275
Below is a simple comparison between the Survey expenditures and Survey income. Expenditures and income are similar to one another for the majority of European Surveys with income being very often slightly higher. Only in rare cases expenditure surpasses the income.

The following 2 charts show the income sources for each geological survey in 2020, showing that the national geological surveys throughout Europe receive funding from a number of different sources. The majority of funding in most cases comes from the government state budget, however, there is also investment from private funding through commercial activities.
Activities:
Expertise can be called upon to address a broad range of topics, from the more common geological standpoints such as geological mapping or spatial geology to the less obvious topics such as nuclear energy (6 surveys involved), glaciology (7 surveys involved) and open sea (9 surveys involved). Geological mapping is the main topic with which geological surveys get involved (35 surveys involved).

This graph shows that the main activities of each Survey in terms of percentage of work spent on the main activities. Expertise can be called upon to address a broad range of topics, from the more common basic geological research activities, water resources and marine geology to the topics such as culture.
The total number of peer reviewed publications on international scientific journals is 2247. The United Kingdom, France and Denmark published the highest number of publications with a total of 841 papers combined.

**Supervising bodies**

The national geological surveys that are EGS members are all public bodies under the supervision of various government ministries. There was a continuing trend over the last few years for Geological Surveys increasingly coming under the supervision of the Ministry of Energy/Industry and Economy (previously it was the Ministry of Environment). Now, the main governing body is Environment (33%) followed by Research, Science and Technology and Energy/Industry/Economy being equally on 18%. The ‘Other’ category is at 31%.
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