



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

Deliverable

REPORT ON STAKEHOLDER AND PARTNER WORKSHOPS (3)

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Version: 10-07-2018

This report is part of a project that
has received funding by the
European Union's Horizon 2020
research and innovation programme
under grant agreement number
731166.



Deliverable Data		
Deliverable number	D5.6	
Dissemination level	Public	
Deliverable name	Report on stakeholder and partner workshops (3)	
Work package	WP5, Communication, Exploitation and Dissemination of the results	
Lead WP/Deliverable beneficiary	GEUS	
Deliverable status		
Submitted (Author(s))	14/7/2018	Lisbeth Flindt Jørgensen
Verified (WP leader)	14/7/2018	Jørgen Tulstrup
Approved (Coordinator)	24/7/2018	Yvonne Schavemaker



GENERAL INTRODUCTION

This report represents the last of three deliverables reporting on Stakeholder and Partners Workshops, called D5.6. GeoERA expects no further Stakeholder and Partners Workshops during the Joint Call Phase. Previous Stakeholder and Partners Workshop or similar events have been reported in a number of documents:

- The overall launch of GeoERA at the Geological Survey of The Netherlands, Utrecht, January 17-18th 2017, are reported in [D5.3 \(1\)](#).
- The GeoERA Stakeholder Council Workshop, held in at GBA in Vienna, Austria, on the 5 September 2017, is reported in [D3.3: Outcome of Stage One Call for Ideas](#).
- Next, [D5.3 \(2\)](#) describes the content of the GeoERA Launch Event of the Joint Stage Two Call, held on the 17th and 18th of October at NWO in The Hague, the Netherlands.
- The evaluation of project proposal carried out by an Independent Expert Panel at an Evaluation Meeting in Den Hague at March 21st 2018 is reported in [D.3.5: Report on Call Stage Two](#).
- Finally, the recommendation for ranking of the evaluated projects settle at an Executive Board meeting March 22nd 2018 in Den Hague is described in D3.4: Ranking list. This document is confidential.

This document reports the kick-off meeting of the 15 GeoERA projects selected for funding during the General Assembly on the 9th of April 2018. The kick-off meeting for projects was held at BluePoint conference centre in Brussels, Belgium, July 3rd to 5th 2018. The meeting was organized with an opening day with broad attendance, a day dedicated to kick-off for the individual projects, and finally a day with crosscutting issues.

All presentations from the event can be found on the GeoERA Intranet and on the website.



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1 DAY ONE – GENERAL INFORMATION AND COMMUNICATION

The first day, 3 July 2018, of the event was a broad meeting with attendance from the EC, stakeholders, project and WP leads etc. The agenda can be found in Annex 1.

1.1 Welcome, Yvonne Schavemaker, GeoERA Project Coordinator

The GeoERA PC opened the meeting by welcoming everyone to this kick-off meeting with broad attendance. She was happy to see so many participants, both from the GeoERA consortium but also from a wide range of stakeholders. This will help maximising the value of GeoERA towards society. We will have a busy day with many issues to be presented.

1.2 GeoERA and EuroGeoSurveys' Strategy, Teresa Ponce de Leão, President EGS

The EGS President started by expressing her compliment to DG Research Technology and Development represented at the meeting by GeoERA's Project Officer Wolfgang Schneider, to DG GROW represented by Milan Grohol, the survey Directors and to the project leads as well as all participants in the 15 projects. Today, this programme with 48 Geological Surveys, initiated from the EGS strategy, covering most of Europe and beyond, makes this not just another research project but a project with institutions advising governments making the content very important for society. The work will give valuable input to the EGS Expert Groups supporting the three pillars of EGS:

- Research - for the moment mainly represented by GeoERA;
- Infrastructure - between projects under GeoERA etc.
- Sharing knowledge and infrastructure – which is a vital instrument for GeoERA.

Teresa ended her presentation by wishing the best for GeoERA.

1.3 Introduction GeoERA, Yvonne Schavemaker, GeoERA Project Coordinator

GeoERA works to establish the European Geological Surveys Research Area to deliver a Geological Service for Europe. 48 partners from 33 countries participate in this uniqueness programme, as the partners have the role of data custodians and having a natural role in advising governments in times of changing societal challenges. GeoERA addresses a wide range of the currently important societal challenges, many of which arise from the access to and sustainable use of resources.



Yvonne encouraged the audience to keep up to date on the activities and outcomes of GeoERA, there are many channels of information as the GeoERA newsletter – subscribe at the GeoERA web page.

1.4 Relevance of GeoERA for EC Policy, Wolfgang Schneider, Policy Officer, DG RTD

ERA-nets, as GeoERA, is a result of initiatives from political side to enhance free exchange of knowledge, technology and researchers, when addressing grand challenges through public-private-partnerships. GeoERA works to address and integrate subsurface knowledge across borders while developing a Geological Service for Europe relevant for important and related policy areas.

A number of policy areas, where GeoERA is important was mentioned:

- EU climate policy: reducing greenhouse gas emissions, more climate-friendly and less energy-consuming society, more renewables....
- Geological storage of captures CO₂, GGUS
- Projects of common interest (PCI), e.g. on infrastructure for CO₂ for storage – call with deadline primo sept. on infrastructure
- Groundwater – gaps in status assessments, methods and monitoring networks, variability in range of threshold value; fitness check of legislation on water – GeoERA GW projects are very important in these aspects.
- Strategic Actions on Batteries: e.g. focus on raw materials, GeoERA is very important – does Europe have enough own resources or is import required etc.?
- Geological Survey of Europe – e.g. GIP-P; competitive subsurface uses, for this knowledge is important, and both intermediate and final results are important to be reflected in and impact EC policies.

1.5 Expectations of GeoERA for Raw Materials Policy (Milan Grohol, Policy Officer, DG GROW)

Milan Grohol started by thanking for the invitation to this important day, almost five years after the negotiations leading towards GeoERA started. Thanks was expressed towards EGS who has been a major partner in getting knowledge integrated so far. He emphasizes that the transition to a low carbon energy society is very important and that new projects, technologies and ideas will only be successful if these produces useful knowledge. There should be a very strong focus on the end-user in within the GeoERA projects.

DG GROW presently focusses on:

- Customers' needs
- Circular economy
- Domestic production
- Stronger partnerships within EU



- How to attract youth
- Raw materials for low carbon economy
- List of critical raw materials compiled by experts

GeoERA can help by – among other things – updating the Minerals Inventory as well as the Minerals Yearbook. DG GROW has large expectations on the data side, e.g. on how data enter projects and sees several co-operation partners; UN, EuroSTAT, Inspire, Copernicus, SCRREEN etc. He hopes to see you all at EU Raw Materials Week in Brussels 12-16 November 2018.

1.6 Project pitches

All Theme Coordinators were asked to represent their theme and present the Project Leads that will run the project, with a 5min pitch on the need, objectives and expected results of the project and how this would feed in to current policies. The project abstracts, pitches and their posters can be found on the website under their own project page on www.geoera.eu/projects. Detailed information on the projects can be found in Deliverable 1.7, containing the Project Plans.

1.7 Discussion on Expectations and Recommendations from the GeoERA Stakeholder Council

The GeoERA stakeholder Council has six members. Each of these had been asked to prepare a note to GeoERA on their expectations and recommendations and say a few words on this toward the GeoERA participants. Their notes are attached as Annex to this Deliverable:

- **EUROPEAN PLATE OBSERVING SYSTEM, MASSIMO COCCO (VIA SKYPE):** Massimo sees a long term impact on science and innovation and expects a data infrastructure that will support both scientific as well as legislative issues. Strong recommendation on good communication and interactions between the different projects and to have e.g. common workshops on the need of the geologists involved as of the user community in general. Recognized several areas of cooperation with EPOS, e.g on data management plans, handling ethical issues, save use of results.
- **JOINT PROGRAMMING INITIATIVE WATER, DOMINIQUE DARMENDRAIL:** Dominique started by encouraging to look at the results from a number of related groundwater research projects finalized within recent years and to use already established frameworks. She has high expectations and looks forward to find more information on the individual projects on the web and to find open access to open data and metadata. She recommended to connect and work with end-users beyond the GeoERA community, and to have annual GeoERA meetings with all projects participating to strengthen collaboration.



- **UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE, SUSTAINABLE ENERGY DIVISION, HARIKRISHNAN TULSIDAS:** Hari welcomed the activities on the UNFC which he would like to see spread to the two other themes as well. Raw Materials in general must work to have a better image as a 'clean and more sustainable industry' – currently people are running away from geology, mining etc. making it important to attract positive attention and establish acceptance of these for society needed activities. He encouraged the GeoERA community to get out of the silos and connect across themes. Different approaches are presently being used across Europe on similar issues, and this is addressed in many GeoERA projects. GeoERA will make communication easier and find areas/knowledge gaps to focus on in the future.
- **EUROPEAN FEDERATION OF GEOLOGIST, ISABEL FERNANDEZ:** EFG represent 44.000 geologists (academia and advisory) in Europe, and Isabel expressed her pleasure to be a part of the GeoERA stakeholder council and getting connected. Sees GeoERA very relevant for the community and for the industry connected with geo-science, adding extra value, especially in establishing a common platform and working to harmonize data. She hopes to see strong support and input to European policy as better information will be provided, and geoscience be better represented. Congratulations on a long-term strategy, look forward to the next EC research programme.
- **UNITED STATES GEOLOGICAL SURVEY, THOMAS CRAFTFORD:** Thomas hopes to learn from GeoERA; the US also focus on CRM needs aiming at mapping on domestic minerals and is constantly seeking for dialogues with users/industry. Recent report from the UN on low-carbon future foresee a huge need for minerals for e.g. storing energy – have a look at that report. USGS are currently looking into life-cycles of the widespread use of a lot of minerals. Find the activities on mine-waste and how to use these instead of creating problems interesting. Welcomes the initiatives on cross-boarders – hopefully the US can learn from Europe in this aspect.
- **NATIONAL RESOURCES CANADA, ANDRÉE BOLDUC:** Andrée started by congratulating all 15 projects – you've come a long way since the kick-off 1½ years ago. Reading the summaries sees that all addresses crosscutting issues and that there is a lot of expectations toward the GIP-P. Sees many similarities between challenges in GeoERA and Canada – geological borders contra national borders. Like the wording of harmonization instead of standardization. Recommend not only to look at European projects but also international – e.g. Canadian studies on hydrocarbon, effects of groundwater of thermal energy exploitation etc. – and get outside Europe with your results.

1.8 GeoERA's Impact Assessment, Jasna Sinigoj, GeoZS

A brief overview of the monitoring activities focusing on GeoERA achievements was presented. Project leads will be asked to establish indicators, and the Stakeholder



Council will be involved as well in the impact assessment. There will be a mid-term review meeting (expected March 2020) where all projects will have to be report and their results will be evaluated of independent experts.

1.9 Cooperation external projects with GeoERA

A number of project leads of related ongoing or recently ended projects were invited to give their view on GeoERA:

- **HORIZON 2020 project MIREU**; Network of Mining and Metallurgy Regions in EU – a complementary action to GeoERA, Meng-Chun Lee, GKZ Freiberg: MIREU has many partners and many regions involved and expect more to be invited. Sees many possibilities for cooperation in addressing the challenges in the RM sector in Europe on secure supply and the need to develop harmonized approaches at EU level instead of local/regional solutions. EGS adds value to MIREU stakeholder group.
- **EMODNET; YOUR GATEWAY TO MARINE DATA IN EUROPE, HENRY VALLIUS, GTK**: ‘Discover Europe’s seabed geology’ is one of EMODNET’s focus areas. The project involves 39 partners from 30 countries and seven of these are also partners in MINDeSEA. EMODNET has a lot of common interests with GGeoERA, e.g. harmonization of seabed maps on geology
- **KINDRA; KNOWLEDGE INVENTORY FOR HYDROGEOLOGICAL RESEARCH, MARCO PETITTA, SAPIENZA UNIVERSITY OF ROME**: Marco expresses his fascination of the GeoERA projects and their objectives. He finds that the outcome of KINDRA can help in some of the challenges for especially the groundwater projects and invites them to feed information on groundwater from GeoERA into KINDRA.
- **SUBSOL; bringing coastal SUBsurface water SOLutions to the market, Klaus Hinsby, GEUS (on behalf of project lead Gerard van den Berg, KWR)**: SUBSOL is coordinated by a Dutch water supply company, and institutions like that will definitely benefit from the information provided by both GeoERA and KINDRA. SUBSOL hopes to be able to link to EGDl and other related water databases.

1.10 Outlook and closure

Yvonne thanks everyone for their attendance and contribution to today’s meeting. All people have shown their enthusiasm to start working and we have learned today that the expectations of the results of GeoERA are high and that we should not forget about the end-users of GeoERA’s deliverables. The impact of GeoERA will have consequences to the ambition of the Geological Surveys to organize themselves towards a Geological Service for Europe. The next GeoERA programme meeting will be held in March 2020 in Ljubljana.



1.11 Poster sessions

During the day it was possible to visit a poster of each of the individual GeoERA projects during the lunch and coffee breaks, and to have a chat with the involved project and WP leads.



2 DAY TWO – DEDICATED PROJECT KICK-OFF MEETINGS

At day two, 4 July 2018, the individual projects (except RESOURCE that had their kick-off meeting 5 July) had their kick-off meetings in parallel sessions to allow people involved in more projects to be able to participate in more meetings.

A list of the projects and the project leads (PL) are given below. Minutes from the meetings are available to the individual project participants.

At the end of the day there was a meeting with all Raw Material meetings and Policy Officer Rodrigo Chanes-Vincente, from DG GROW. At this meeting interactions were discussed and Rodrigo expressed his satisfaction with the project content and the success of GeoERA so far.

RAW MATERIALS:

- Mintell4EU (Mineral Intelligence for Europe). PL: Jørgen Tulstrup, GEUS
- FRAME (Forecasting and assessing Europe's strategic and Raw Materials needs). PL: Daniel Oliveira, LNEG.
- EuroLithos (European Ornamental stone resources). PL: Tom Heldal, NGU
- MINDeSEA (Seabed Mineral Deposits in European Seas. Metallogeny and geological potential for Strategic and Critical Raw Materials). PL: Javier Gonzalez, IGME Spain)

GEO-ENERGY:

- 3DGeo-EU (3D geomodeling for Europe) PL: Stefan Knopf, BGR
- GARAH (Geological analysis and resource assessment of selected hydrocarbon systems) PL: Peter Britze, GEUS
- Hotline (Mapping and assessment of geothermal plays in deep carbonate rocks – Cross-domain implications and impacts) PL: Gerold Diepolder, LfU
- MUSE (Managing urban shallow geothermal energy) PL: Gregor Goetzl, GBA
- HIKE (Hazard and impact knowledge for Europe) PL: Serge van Gessel, TNO
- GeoConnect^{3D} (Cross-border, cross-thematic multiscale framework for combining geological models and data for resource appraisal and policy support) PL: Kris Piessens, GSB

GROUNDWATER: -

- HOVER (Hydrological 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) PL: Laurence Gourcy, BRGM
- RESOURCE (Resources of groundwater harmonized at cross-border and pan-European scale) PL: Hans-Peter Broers, TNO



-
- TACTIC (Tools for assessment of climate change impact on groundwater and adaptation strategies) PL: Anker Højberg, GEUS
 - VoGERA (Vulnerability of shallow groundwater resources to deep sub-surface energy-related activities) PL: Sian Loveless, BGS

INFORMATION PLATFORM:

- GIP-P (GeoERA Information Platform) PL: Jørgen Tulstrup, GEUS



3 THIRD DAY – CROSS THEMATIC MEETINGS

At the third and last day of the kick-off event, meetings were held theme by theme with the GIP-P project to inform the projects in the Groundwater, GeoEnergy and Raw Materials themes on expectations of, linkage to as well as deadlines in relation to the GeoERA Information Platform project, GIP-P.

Further, theme meetings were held to wrap up conclusions and prepare for the just initiated work in the 15 GeoERA projects.



ANNEX 1. AGENDA BROAD KICK-OFF MEETING JULY 3TH

Agenda Kick-Off Meeting of Projects

MEETING

KICK-OFF MEETING OF PROJECTS

MEETING ORGANISER

GeoERA Secretariat

DATE

3-5 July, 2018

VENUE

Bluepoint, Brussels, Belgium

DAY 1 – 3rd of July

Room: Archimedes

10:00 Registration and Coffee

10:30 Welcome (Yvonne Schavemaker, GeoERA Project Coordinator)

10:35 GeoERA and EuroGeoSurveys' Strategy (Teresa Ponce de Leao, President EGS)

10:45 Introduction GeoERA (Yvonne Schavemaker, GeoERA Project Coordinator)

10:55 Relevance of GeoERA for EC Policy (Wolfgang Schneider, Policy Officer, DG RTD)

11:10 Expectations of GeoERA for Raw Materials Policy (Milan Grohol, Policy Officer, DG GROW)

11:25 Project Pitches

1. Intro Raw Materials (Antje Wittenberg, BGR)

- Mintell4EU (Jørgen Tulstrup, GEUS)
- FRAME (Daniel Oliveira, LNEG)
- EuroLITHOS (Tom Heldal, NGU)
- MINDeSEA (Javier Gonzalez, IGME-SP)
- questions

2. Intro Groundwater (Klaus Hinsby, GEUS)

- HOVER (Laurence Gourcy, BRGM)
- RESOURCE (Hans-Peter Broers, TNO)
- TACTIC (Anker Højberg - Klaus, GEUS)
- VoGERA (Sian Loveless, BGS)
- questions

12:30 Lunch including Poster Session

14:00 Project Pitches

1. Intro Geo-Energy (Serge van Gessel, TNO)

- 3DGeo-EU (Stefan Knopf, BGR)
- GARAH (Peter Britze, GEUS)
- Hotlime (Gerold Diepolder, LfU)
- MUSE (Gregor Goetzl, GBA)
- HIKE (Serge van Gessel, TNO)
- GeoConnect^{3D} (Kris Piessens, GSB)

Agenda Kick-Off Meeting of Projects

MEETING

KICK-OFF MEETING OF PROJECTS

MEETING ORGANISER

GeoERA Secretariat

DATE

3-5 July, 2018

VENUE

Bluepoint, Brussels, Belgium

- questions

2. Intro IP (Jørgen Tulstrup, GEUS)

- GIP-P (Jørgen Tulstrup, GEUS)
- Questions

15:00 Discussion on Expectations and Recommendations from the GeoERA Stakeholder Council

- European Federation of Geologist, Isabel Fernandez
- European Plate Observing System, Massimo Cocco
- Joint Programming Initiative Water, Dominique Darmendrail
- National Resources Canada, Andrée Bolduc
- United Nations Economic Commission for Europe, Sustainable energy division, Harikrishnan Tulsidas
- United States Geological Survey, Thomas Crafford

16:00 *Coffee break – poster session*

16:15 GeoERA's Impact Assessment, Jasna, GeoZS

16:45 Cooperation external projects with GeoERA

- HORIZON 2020 project MIREU; Network of Mining and Metallurgy Regions in EU – a complementary action to GeoERA, Meng-Chun Lee, GKZ Freiberg
- EMODNET; Your gateway to marine data in Europe, Henry Vallius, GTK
- KINDRA; knowledge inventory for hydrogeological research, Marco Petitta, Sapienza University of Rome
- SUBSOL; bringing coastal SUBsurface water SOLutions to the market, Klaus Hinsby, GEUS

17:20 Outlook and Closure

17:30 *Celebration Drinks – poster session*

Agenda Kick-Off Meeting of Projects

MEETING

KICK-OFF MEETING OF PROJECTS

MEETING ORGANISER

GeoERA Secretariat

DATE

3-5 July, 2018

VENUE

Bluepoint, Brussels, Belgium

4th of July - Individual Kick-offs

10:00-10:30 Coffee break

12:00-13:00 Lunch

15:00-15:30 Coffee break

Day	Part of Day	Meeting	Room
4-7-2018	9:00-12:00	GeoEnergy plenary session	Newton ABC
4-7-2018	13:00-17:00	KO Hike	Newton ABC*
4-7-2018	13:00-17:00	KO Muse	Newton ABC*
4-7-2018	13:00-17:00	KO Hotlime	Newton ABC*
4-7-2018	13:00-17:00	KO 3D GeoNEU	Newton ABC*
4-7-2018	13:00-17:00	KO Geoconnect	Newton ABC*
4-7-2018	13:00-17:00	KO Garah	Koch
4-7-2018	10:00-17:00	KO GIP-P	Darwin
4-7-2018	9:00-17:00	KO Tactic	Fleming
4-7-2018	9:00-17:00	KO Hover	Vesalius
4-7-2018	9:00-17:00	KO Vogera	Curie
4-7-2018	9:00-17:00	KO Mintell4EU	Huygens
4-7-2018	9:00-17:00	KO Frame	Copernicus
4-7-2018	9:00-17:00	KO Euroolithos	Galilei
4-7-2018	9:00-17:00	KO Mindesea	Planck

**GeoEnergy can use Marconi and Edison for its afternoon program.*

5th of July - Synergy meetings

10:00-10:30 Coffee break

12:00-13:00 Lunch

15:00-15:30 Coffee break

Day	Part of Day	Meeting	Room
5-7-2018	9:00-12:00	Synergy Raw Materials + GIP-P (9:00-10:00)	Newton A
5-7-2018	9:00-12:00	Synergy GeoEnergy + GIP-P (10:15-11:15)	Newton BC
5-7-2018	9:00-12:30	Synergy Hover, Tactic and Vogera + GIP-P (11:30-12:30)	Huygens
5-7-2018	9:00-17:00	KO Resources	Copernicus

Agenda Kick-Off Meeting of Projects

MEETING

KICK-OFF MEETING OF PROJECTS

MEETING ORGANISER

GeoERA Secretariat

DATE

3-5 July, 2018

VENUE

Bluepoint, Brussels, Belgium

FLOORPLAN





ANNEX 2. ATTENDANCE LIST

July 3 - General KO

Dominique	Darmendrail	ANR
Timo	Spoerlein	Bavarian Environment Agency
Gerold	Diepolder	Bavarian Environment Agency
Roland	Eichhorn	Bayerisches Landesamt für Umwelt
Antje	Wittenberg	BGR
Henrike	Sievers	BGR
Jörg-Uwe	Damm	BGR
Fabian	Jähne-Klingberg	BGR
Jörg	Reichling	BGR
Stefan	Knopf	BGR
Stefan	Broda	BGR
Thomas	Oberthür	BGR Hannover
Keith	Bateman	BGS
Laurence	Gourcy	BRGM
Fernanda	Veloso	BRGM
Dan	Lapworth	British Geological Survey
Sian	Loveless	British Geological Survey
Patrick	Bell	British Geological Survey
John	Bloomfield	British Geological Survey
Staša	Borović	Croatian Geological Survey
Željko	Dedić	Croatian Geological Survey
Ajka	Šorša	Croatian Geological Survey
Marko	Špelić	Croatian Geological Survey
Karen	Hanghøj	EIT RawMaterials
Slavko	Solar	EuroGeoSurveys
Patrick	Wall	EuroGeoSurveys
Kim	van Zanten	EuroGeoSurveys
Wolfgang	Schneider	European Commission
Milan	Grohol	European Commission
Andrei	Lintu	European Commission
Andrei	Bocin-Dumitriu	European Commission JRC
Isabel Fernandez		European Federation of Geologists
Griet	Heuvelmans	Flanders Environment Agency (VMM)
Marc	Ostermann	GBA
Boris	Malyuk	Geoinform
Marian	Munteanu	Geological Institute of Romania
Stefan	Marincea	Geological Institute of Romania
Diana	Persa	Geological Institute of Romania
Diana	Persa	Geological Institute of Romania
Gráinne	O'Shea	Geological Survey Ireland
Gerry	Stanley	Geological Survey Ireland
Gerhard	Schubert	Geological Survey of Austria
Gregor	Goetzl	Geological Survey of Austria
Robert	Supper	Geological Survey of Austria
Christine	Hörfarter	Geological Survey of Austria
Pierre-Yves	Declercq	Geological Survey of Belgium
Yves	Vanbrabant	Geological Survey of Belgium
Sophie	Decrée	Geological Survey of Belgium
Andrée	Bolduc	Geological Survey of Canada
Andres	Marandi	Geological Survey of Estonia
James	Trench	Geological Survey of Ireland
Havard	Gautneb	Geological survey of Norway
Tom	Heldal	Geological Survey of Norway
Kari	Aasly	Geological Survey of Norway
Henrik	Schiellerup	Geological Survey of Norway
Cyprien	Habimana	Geological Survey of Norway
Jasna	Šinigoj	Geological Survey of Slovenia
Javier	Gonzalez	IGME-Spain
Luis	Somoza	IGME-Spain
Teresa	Medialdea	IGME-Spain
Lisbeth	Hildebrand	Geological Survey of Sweden
Martiya	Sadeghi	Geological survey of Sweden

Thomas	Eliasson	Geological Survey of Sweden
Nikolaos	Arvanitidis	Geological Survey of Sweden
Esther	Hintersberger	GBA
Andrej	Vihitelič	GeoZS
RENATA VALENTINA	ADLEŠIČ	GeoZS
Barbara	Simić	GeoZS
Špela	Kumelj	GeoZS
Lisbeth	Flindt Jørgensen	GEUS
Jørgen	Tulstrup	GEUS
Martin	Hansen	GEUS
Claus	Ditlefsen	GEUS
Peter	Britze	GEUS
Klaus	Hinsby	GEUS
Mikael	Pedersen	GEUS
Anker	Højberg	GEUS
Ida B	Karlsson	GEUS
Meng-Chun Lee		GKZ Freiberg
KRIS	PIESSENS	GSB-RBINS
Maria	Judge	GSI
Asko	Käpyaho	GTK
Henrik	Vallius	GTK
MANUEL	REGUEIRO Y GONZALEZ-BARROS	IGME
Román	Hernández Manchado	IGME
Ricardo	Leon	IGME
David	Pulido-Velazquez	IGME
Kostas	Laskaridis	IGME Greece
Elena	Gimenez-Forcada	IGME Spain
Juan	Grima	IGME Spain
Elena	Gimenez-Forcada	IGME Spain
Margarita	Sanabria	IGME-Spain
Emilio L.	Pueyo	IGME-Spain
Alejandro	García-Gil	IGME-Spain
Eduardo A.	Garrido Schneider	IGME-Spain
Irene	Zananiri	Institut of Geology & Mineral Exploration
Ignasi	Hermes	Institut Cartogràfic i Geològic de Catalunya
Luca	Guerrieri	ISPRA
Barbara	Dessi'	ISPRA
Mauro	Lucarini	ISPRA
Giulia	Clarotti	ISPRA
Carlo	Cipolloni	ISPRA
Monica	Serra	ISPRA
Pio	Di Manna	ISPRA
Chiara	D'Ambrogio	ISPRA
Jacqueline	Wood	JPI Oceans Secretariat
Gerard van den Berg		KWR Water
K.-Jörg	Hartmann	LAGB Sachsen-Anhalt
Melanie	Witthöft	LBEG
Dr. Jörg	Elbracht	LBEG
Christoph	Jahnke	LBGR
Daniel	de Oliveira	LNEG
Jorge	Carvalho	LNEG
Pedro	Ferreira	LNEG
Vitor	Lisboa	LNEG
José	Lisboa	LNEG
Teresa	Ponce de Leão	LNEG
Jan	Høst	NGU
Hayfaa	Abdul Aziz	NWO
Monika	Koniecznyńska	PIG-PIB
Maciej	Kłonowski	PIG-PIB
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Ewa	Szynkaruk	Polish Geological Institute
Isabel	Rupf	Regierungspräsidium Freiburg
Jörg-Detlef	Eckhardt	Regierungspräsidium Freiburg

Marco	Petitta	Sapienza University of Rome
Branislav	Žec	Slovak Geological Survey
Dušan	Wunder	Slovak Geological Survey
Yvonne	Schavemaker	TNO
Rob	van Ede	TNO
Serge	van Gessel	TNO
Johan	ten Veen	TNO
kim	nathalia	TNO
Hans Peter	Broers	TNO
Wim van Asch		TNO
Dries Hegen		TNO
Tom	Crafford	U.S. Geological Survey
Harikrishnan	Tulsidas	UNECE
Ben	Laenen	VITO
Tim	Debacker	VPO

July 4 - Projects KO

Dominique	Darmendrail	ANR
Timo	Spoerlein	Bavarian Environment Agency
Gerold	Diepolder	Bavarian Environment Agency
Roland	Eichhorn	Bayerisches Landesamt für Umwelt
Koen	Beerten	Belgian Nuclear Research Centre
sophie	verheyden	Belgian Science Policy Office
Antje	Wittenberg	BGR
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Fabian	Jähne-Klingberg	BGR
Jörg	Reichling	BGR
Stefan	Broda	BGR
Tanja	Wodtke	BGR
Thomas	Kuhn	BGR
Stefan	Ladage	BGR
Stefan	Knopf	BGR
Björn	Zehner	BGR
Stefan	Broda	BGR
Keith	Bateman	BGS
Laurence	Gourcy	BRGM
Fernanda	Velooso	BRGM
Isaline	Gravaud	BRGM
François	TERTRE	BRGM
Daniel	CASSARD	BRGM
François	Robida	BRGM
Nolwenn	Croiset	BRGM
Eric	Gloaguen	BRGM
Hélène	BESSIERE	BRGM
Benjamin	Lopez	BRGM
Dan	Lapworth	British Geological Survey
Sian	Loveless	British Geological Survey
Majdi	Mansour	British Geological Survey
Patrick	Bell	British Geological Survey
John	Bloomfield	British Geological Survey
Marcus	Sen	British Geological Survey
Staša	Borović	Croatian Geological Survey
Željko	Dedić	Croatian Geological Survey
Ajka	Šorša	Croatian Geological Survey
Marko	Špelić	Croatian Geological Survey
Petr	Rambousek	Czech geological Survey
Tereza	Peterková	Czech Geological Survey
Manuel	Sapiano	Energy and Water Agency
Henry	Debattista	Energy and Water Agency
Slavko	Solar	EuroGeoSurveys
Griet	Heuvelmans	Flanders Environment Agency
Andy	Louwyck	Flemish Environment Agency
Marc	Ostermann	GBA

Esther	Hintersberger	GBA
Boris	Malyuk	Geoinform
Igor	Melnyk	Geoinform
Kateryna	Boiko	Geoinform
Natalia	Kovalenko	Geoinform
Tamara	Bardygola	Geoinform
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Stefan	Marincea	Geological Institute of Romania
Diana	Persa	Geological Institute of Romania
Diana	Persa	Geological Institute of Romania
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Gerry	Stanley	Geological Survey Ireland
Brian	McConnell	Geological Survey Ireland
Gerhard	Schubert	Geological Survey of Austria
Gregor	Goetzl	Geological Survey of Austria
Robert	Supper	Geological Survey of Austria
Christine	Hörfarter	Geological Survey of Austria
Martin	Schiegl	Geological Survey of Austria
Estelle	Petitclerc	Geological Survey of Belgium
Pierre-Yves	Declercq	Geological Survey of Belgium
Yves	Vanbrabant	Geological Survey of Belgium
Christian	Burlet	Geological Survey of Belgium
Sophie	Decrée	Geological Survey of Belgium
Kris	Welkenhuysen	Geological Survey of Belgium
Andrée	Bolduc	Geological Survey of Canada
Andres	Marandi	Geological Survey of Estonia
Tuomo	Törmänen	geological Survey of Finland
James	Trench	Geological Survey of Ireland
Håvard	Gautneb	Geological Survey of Norway
Tom	Heldal	Geological Survey of Norway
Kari	Aasly	Geological Survey of Norway
Cyprien	Habimana	Geological Survey of Norway
Špela	Kumelj	Geological Survey of Slovenia
Bogomir	Celarc	Geological Survey of Slovenia
Klemen	Teran	Geological Survey of Slovenia
Milos	Markic	Geological Survey of Slovenia
Dejan	Šram	Geological Survey of Slovenia
Ana	Burger	Geological Survey of Slovenia
Janko	Urbanc	Geological Survey of Slovenia
Nina	Mali	Geological Survey of Slovenia
Helge	Reginiussen	Geological Survey of Sweden
Martiya	Sadeghi	Geological survey of Sweden
Thomas	Eliasson	Geological Survey of Sweden
Lars Kristian	Stölen	Geological Survey of Sweden
Nikolaos	Arvanitidis	Geological Survey of Sweden
Andrej	Vihetlič	GeoZS
SNJEŽANA	MILETIĆ	GeoZS
Jasna	Šinigoj	GeoZS
Lisbeth	Flindt Jørgensen	GEUS
Jørgen	Tulstrup	GEUS
Martin	Hansen	GEUS
Claus	Ditlefsen	GEUS
Peter	Britze	GEUS
Tine	Larsen	GEUS
Peter	Voss	GEUS
Niels	Schovsbo	GEUS
John	Hopper	GEUS
Anders	Mathiesen	GEUS
Klaus	Hinsby	GEUS
Mikael	Pedersen	GEUS
Bjarni	Pjetursson	GEUS
Anker	Højberg	GEUS
Ida B	Karlsson	GEUS

Thomas	Vangkilde-Pedersen	GEUS
Hyojin	Kim	GEUS
Jacob	Kidmose	GEUS
Aamand	Jens	GEUS
KRIS	PIESSENS	GSB-RBINS
Maria	Judge	GSI
MANUEL	REGUEIRO Y GONZALEZ-BARROS	IGME
Kostas	Laskaridis	IGME
VARVARA	PEFANI	IGME
Román	Hernández Manchado	IGME
Ricardo	Leon	IGME
Dqvid	Pulido-Velazquez	IGME
Juan de Dios	Gomez	IGME
Elena	Gimenez-Forcada	IGME Spain
Juan	Grima	IGME Spain
SUSANA	TIMÓN SÁNCHEZ	IGME Spain
Pedro	Delgado	IGME Spain
VASILIKI	ANGELATOU	IGME-Greece
NIKOLAOS	ANDROULAKAKIS	IGME-Greece
Javier	Gonzalez	IGME-Spain
Luis	Somoza	IGME-Spain
Teresa	Medialdea	IGME-Spain
Margarita	Sanabria	IGME-Spain
Emilio L.	Pueyo	IGME-Spain
Alejandro	García-Gil	IGME-Spain
Eduardo A.	Garrido Schneider	IGME-Spain
Irene	Zananiri	Institut of Geology & Mineral Exploration
Ignasi	Hermis	Institut Cartogràfic i Geològic de Catalunya
Georgina	Arnó	Institut Cartogràfic i Geològic de Catalunya
Montse	Colomer	Institut Cartogràfic i Geològic de Catalunya
Steinunn	Hauksdottir	ISOR
Luca	Guerrieri	ISPRA
Barbara	Dessi'	ISPRA
Mauro	Lucarini	ISPRA
Giulia	Clarotti	ISPRA
Carlo	Cipolloni	ISPRA
Monica	Serra	ISPRA
Pio	Di Manna	ISPRA
Chiara	D'Ambrogi	ISPRA
Lucio	Martarelli	ISPRA
Carlos	Inverno	Laboratório Nacional de Energia e Geologia
K.-Jörg	Hartmann	LAGB Sachsen-Anhalt
Melanie	Witthöft	LBEG
Dr. Jörg	Elbracht	LBEG
Christoph	Jahnke	LBGR
Daniel	de Oliveira	LNEG
Maria João	Ferreira	LNEG
Aurete	Pereira	LNEG
Jorge	Carvalho	LNEG
Pedro	Ferreira	LNEG
Vitor	Lisboa	LNEG
José	Lisboa	LNEG
Gyula	Maros	MBFSZ
Zoltán	Horváth	Mining and Geological Survey of Hungary
Teodora	Szocs	Mining and Geological Survey of Hungary
Anna	Kuczynska	PGI-NRI
Monika	Koniecznyńska	PIG-PIB
Maciej	Kłonowski	PIG-PIB
Tomasz	Gidziński	PIG-PIB
MAGDALENA	NIDENTAL	PIG-PIB
Ewa	Szynkaruk	PIG-PIB
Isabel	Rupf	Regierungspräsidium Freiburg
Robert	Colbach	SGL

Romain	Meyer	SGL
Mattias	Gustafsson	SGU
Lars	Rosenkvist	SGU
Branislav	Žec	Slovak Geological Survey
Dušan	Wunder	Slovak Geological Survey
Yvonne	Schavemaker	TNO
Rob	van Ede	TNO
Serge	van Gessel	TNO
Marielle	van Vliet	TNO
Willem	Zaadnoordijk	TNO
Susanne	Nelskamp	TNO
Dirk	Munsterman	TNO
Harry	Middelburg	TNO
Johan	ten Veen	TNO
Tom	Crafford	U.S. Geological Survey
Ben	Laenen	VITO
Jef	Deckers	VITO
Helga	Ferket	Vlaamse Overheid
Cis	Slenter	VMM
Tim	Debacker	VPO
Katrien	De Nil	VPO - Flanders

July 5 - Project KO + Theme Synergy meetings

Timo	Spoerlein	Bavarian Environment Agency
Gerold	Diepolder	Bavarian Environment Agency
Roland	Eichhorn	Bayerisches Landesamt für Umwelt
Antje	Wittenberg	BGR
Henrike	Sievers	BGR
Fabian	Jähne-Klingberg	BGR
Jörg	Reichling	BGR
Tanja	Wodtke	BGR
Thomas	Kuhn	BGR
Stefan	Ladage	BGR
Stefan	Knopf	BGR
Björn	Zehner	BGR
Stefan	Broda	BGR
Keith	Bateman	British Geological Survey
Laurence	Gourcy	BRGM
Fernanda	Veloso	BRGM
Jean Christophe	MARECHAL	BRGM
Daniel	CASSARD	BRGM
Nolwenn	Croiset	BRGM
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Ajka	Šorša	Croatian Geological Survey
Marko	Špelić	Croatian Geological Survey
Petr	Rambousek	Czech geological Survey
Tereza	Peterková	Czech Geological Survey
Manuel	Sapiano	Energy and Water Agency
Henry	Debattista	Energy and Water Agency
Griet	Heuvelmans	Flanders Environment Agency (VMM)
Benjamin	Lopez	BRGM
Marc	Ostermann	GBA
Marian	Munteanu	Geological Institute of Romania
Stefan	Marincea	Geological Institute of Romania
Diana	Persa	Geological Institute of Romania
Gráinne	O'Shea	Geological Survey Ireland
Gerry	Stanley	Geological Survey Ireland

Brian	McConnell	Geological Survey Ireland
Gerhard	Schubert	Geological Survey of Austria
Gregor	Goetzl	Geological Survey of Austria
Christine	Hörfarter	Geological Survey of Austria
Martin	Schiegl	Geological Survey of Austria
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Bogomir	Celarc	Geological Survey of Slovenia
Klemen	Teran	Geological Survey of Slovenia
Milos	Markic	Geological Survey of Slovenia
Dejan	Šram	Geological Survey of Slovenia
Ana	Burger	Geological Survey of Slovenia
Janko	Urbanc	Geological Survey of Slovenia
Nina	Mali	Geological Survey of Slovenia
Javier	Gonzalez	IGME-spain
Luis	Somoza	IGME-spain
Teresa	Medialdea	IGME-spain
Helge	Reginiussen	Geological Survey of Sweden
Lars Kristian	Stölen	Geological Survey of Sweden
Martiya	Sadeghi	Geological survey of Sweden
Thomas	Eliasson	Geological Survey of Sweden
Esther	Hintersberger	GBA
Andrej	Vihetlič	GeoZS
Jasna	Šinigoj	GeoZS
Lisbeth	Flindt Jørgensen	GEUS
Jørgen	Tulstrup	GEUS
Martin	Hansen	GEUS
Claus	Ditlefsen	GEUS
Peter	Britze	GEUS
Tine	Larsen	GEUS
Peter	Voss	GEUS
Niels	Schovsbo	GEUS
John	Hopper	GEUS
Anders	Mathiesen	GEUS
Klaus	Hinsby	GEUS
Mikael	Pedersen	GEUS
Anker	Højberg	GEUS
Ida B	Karlsson	GEUS
Thomas	Vangkilde-Pedersen	GEUS
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KRIS	PIESSENS	GSB-RBINS
MANUEL	REGUEIRO Y GONZALEZ-BARROS	IGME
Kostas	Laskaridis	IGME
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Román	Hernández Manchado	IGME
Ricardo	Leon	IGME
David	Pulido-Velazquez	IGME
Juan de Dios	Gomez	IGME
Elena	Gimenez Forcada	IGME Spain
Juan	Grima	IGME Spain
SUSANA	TIMÓN SÁNCHEZ	IGME Spain
Pedro	Delgado	IGME Spain
VASILIKI	ANGELATOU	IGME-Greece
NIKOLAOS	ANDROULAKAKIS	IGME-Greece
Margarita	Sanabria	IGME-Spain

Emilio L.	Pueyo	IGME-Zaragoza
Irene	Zananiri	Institut of Geology & Mineral Exploration
Ignasi	Hermis	Institut Cartogràfic i Geològic de Catalunya
Georgina	Arnó	Institut Cartogràfic i Geològic de Catalunya
Montse	Colomer	Institut Cartogràfic i Geològic de Catalunya
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Giulia	Clarotti	ISPRA
Carlo	Cipolloni	ISPRA
Monica	Serra	ISPRA
Lucio	Martarelli	ISPRA
Pio	Di Manna	ISPRA
Daniel	de Oliveira	Laboratório Nacional de Energia e Geologia
K.-Jörg	Hartmann	LAGB Sachsen-Anhalt
Melanie	Witthöft	LBEG
Christoph	Jahnke	LBGR
Maria João	Ferreira	LNEG
Aurete	Pereira	LNEG
Jorge	Carvalho	LNEG
Pedro	Ferreira	LNEG
Vitor	Lisboa	LNEG
José	Lisboa	LNEG
Gyula	Maros	MBFSZ
Zoltán	Horváth	Mining and Geological Survey of Hungary
Teodora	Szocs	Mining and Geological Survey of Hungary
Monika	Koniecznyńska	PIG-PIB
Maciej	Kłonowski	PIG-PIB
Agnieszka	Piasecka	PIG-PIB
Tomasz	Gidziński	PIG-PIB
Ewa	Szynkaruk	PIG-PIB
Isabel	Rupf	Regierungspräsidium Freiburg
Robert	Colbach	SGL
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Boris	Malyuk	Geoinform
Igor	Melnyk	Geoinform
Kateryna	Boiko	Geoinform
Natalia	Kovalenko	Geoinform
Tamara	Bardygola	Geoinform
Yvonne	Schavemaker	TNO
Rob	van Ede	TNO
Serge	van Gessel	TNO
Johan	ten Veen	TNO
Susanne	Nelskamp	TNO
Ronald	Vernes	TNO
Hans Peter	Broers	TNO
Helga	Ferket	Vlaamse Overheid
Cis	Slenter	VMM
Jan	Corluy	VMM
Tim	Debacker	VPO
Katrien	De Nil	VPO - Flanders



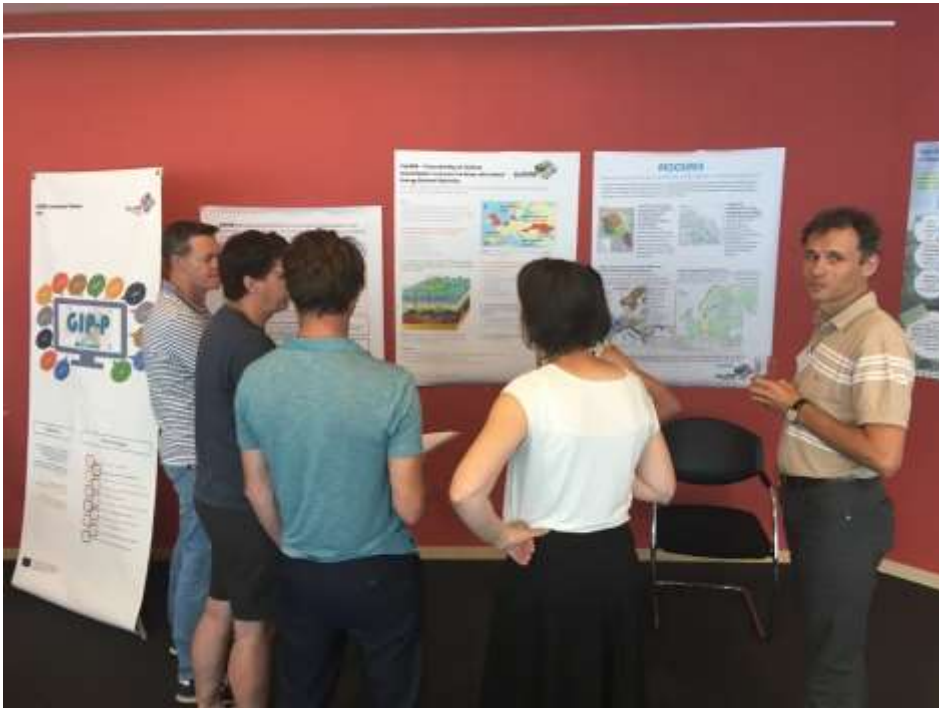
ANNEX 3. IMPRESSIONS OF THE KICK-OFF MEETING



Day 1 Plenary session



Poster Sessions



Poster Sessions



Stakeholder Council Session



Coffee Break



Individual Kick-off meeting



Raw Materials wrap up session



GIP-P Synergy sessions



ANNEX 4. FEEDBACK FROM THE STAKEHOLDER COUNCIL

Thomas Crafford – United States Geological Survey

- I very much appreciated the invitation and the opportunity to attend. My intentions were somewhat selfish, because I was looking to benefit from the discussions with GeoERA as much, or more, as I expected to be contributing.
- My interests were primarily in the Raw Materials theme, especially in the FRAME Working Group, because the USGS Minerals Program, which I head, is very much engaged in responding to Executive (Presidential) and Secretarial Orders regarding Critical Minerals. Collectively, those Orders direct the USGS and other federal agencies to develop a plan for topographic, geologic and geophysical mapping to improve the understanding of U.S. critical minerals potential; to study the recycling of critical minerals as well as alternative sources and substitutes for critical minerals; to evaluate potential and methods for obtaining critical minerals from mining wastes; and to explore opportunities for collaborating with foreign partners on critical minerals. Many of the FRAME Work Packets, and my attendance at the GeoERA meeting, touched on these components of the Executive & Secretarial Orders.
- I mentioned that some of the challenges of the GeoERA members working together with the EU were similar to ones facing in the U.S., where the States and USGS (and other federal agencies) needed to cooperate.
- I commented about having visited Umicore's high tech recycling facility in Hoboken, Belgium and encouraged others to learn more about Umicore. They are a successful company that is recycling metals from a variety of sources, including Rhenium from jet fan blades; Platinum Group metals from catalytic converters; Germanium from glass optics; and lithium, cobalt and graphite(?) from lithium ion batteries.
- I commented about the by-product nature and niche markets for many of today's critical metals, and our lack of knowledge about them in relation to the more historically large-market metals like copper, lead, zinc, silver, gold, aluminums, nickel, etc.
- I mentioned a 2017 World Bank report titled "The Growing Role of Minerals & Metals for a Low Carbon Future" that forecast major increases in the consumption of a wide array of metals in order to achieve a low carbon economy to limit global temperature increases.
- Again, I really want to thank the GeoERA organizers for the invitation to attend. I found the meeting very worthwhile and I look forward to participating in future meetings.

Harikrishnan Tulsidas – UNECE, sustainable energy division

- I believe GeoERA will be an important initiative not only for the EU but the world, as this will be a unique experiment where energy, raw materials and the information platform combine in a sort of liquid networks that can have a creative collision of ideas. Innovation today essentially means new combinations of existing technologies.
- In today's context, all discourses should be centred on Sustainable Development Goals (SDGs) and to the fact that the EU places a high-level of importance on the circular economy and decarbonization. GeoERA projects should always try to relate their findings and activities to these grand objectives.
- UNFC is being strengthened as a sustainable resource management system, that can provide a way to harmonize resource inventories for the EU, but also provide protocols and guidelines to see how projects can progress from a conceptual level to industrial-scale production with due care of the social and environmental impacts.
- United Nations Framework Classification for Resources (UNFC) is prominently featured in the raw material projects, but it is equally applicable to energy (especially to geothermal energy) and eventually could also be applied to groundwater. UNFC could provide a space where new ideas could germinate and take deep roots. The initiative of "UNFC for Europe" will be supported by GeoERA projects, especially for raw materials, but the energy and groundwater could consider participating in this effort. The projects can consider how UNFC can be used to see that the data and information generated through the projects can support policy formulation, national resource management, industry innovation and financial capital allocation.

GeoERA as a whole

- What do you think of the GeoERA initiative as a whole, e.g. having the GSOs collaborate to create and disseminate interoperable, harmonized data and information across borders?
One of the main problem in the H2020 projects is the lack of communication and follow up between projects with similar objectives. In this context GeoERA projects has a common frame and organization platform that hopefully will be useful to share information, outcome, and synergy.
In order to achieve the final aim of “Geological Service for Europe”, it will be necessary to work on projects focus on methodology to harmonized data and collaboration. Some of the projects presented have these objectives very well structured, but in some others, the objective are more focus on specific examples and case study, I am not sure of the contribution of these projects for the final aim.
- Do you see the value of GeoERA within the EU policy area and within other areas where we can find end-users of the results, e.g. industry or academia?
The final users of the GeoERA are not only from EU policy, also the national and regional policy can be beneficiaries of the more harmonize geological information. The role of GeoERA will be also promotion of the use of geological information, and in this context an important number of geologists working on research and apply geology can be indirectly benefices. In this context will be a win win situation if GeoERA manages to pass this message to the professionals of geoscience. Do you see the value of GeoERA in a global sense?
- Do you have any concerns that you would like to share?
My main concern is that GeoERA consortium stay closed in its small world of Geological Surveys and don't find out the need of support and synergy of the other geoscientific communities.
EGS offer an excellent platform for collaboration between national Geological Surveys, that it is a excellent achievement, but to reach the ambition of a Geology Service for Europe, it will be necessary to be more ambitious in the level of communities involvement.

Expectations

We have expectation on the role of GeoERA to promotion the Geoscience for Society. I this context we expect that GeoERA can contribute to concrete EU Policy and for example the groundwater projects including Social Challenges and Climate Changes is very relevant. The co-financial system of GeoERA is very positive. In this contexts the expectation of GeoERA should be very close of the National Geological Surveys expectations, and probably will guaranty a long term use of the projects outcome and long term strategy

Collaboration

Some of the [projects recently finished](#) as [KINDRA project](#) in the area or groundwater or [INTRAW project](#) in the area of international RM policy, have outcome very relevant for the GeoERA current projects. In this context the past and current projects need to find the collaboration in order to ensure a good use of the public money used by the EU.
Some [current H2020 projects](#), as [INFACT project](#), are very relevant for GeoERA Raw Material. INFACT explores no only new technologies, also social acceptance in different European regions. For sure that the collaboration with GeoERA projects could be a win win situation

Recommendations

GeoERA needs to explore new financial instruments relevant for the future, as European Missions Oriented.
GeoERA needs to establish official agreement of communication and collaboration with others Geoscientist associations.
[GeoERA Final Conference](#): a very ambitious event will be necessary and the synergy with all the Geoscientist organizations will be necessary for a successful event. I will be glad to offer EFG support on this context.

Massimo Cocco - European Plate Observing System

GeoERA as a whole and expectations

- What do you think of the GeoERA initiative as a whole, e.g. having the GSOs collaborate to create and disseminate interoperable, harmonized data and information across borders?
I believe that GeoERA is a great initiative, which can have an impact on a future collaborative framework for solid Earth science. I think that the funded projects addresses relevant issues for science and society and they can contribute to tackle grand challenges in Earth sciences. A general issue that I would like to point out and propose for discussion is **the long-term vision for Geo-ERA**. How GeoERA aims at implementing a long-living delivery framework? If the plan is to implement its own delivery framework through EGDl, this implies sharing the vision and the mission of implementing a research infrastructure for geological data. This has implications both for the internal communication with the involved scientists and for the external communication with complementary initiatives in solid Earth sciences. A second issue that I would like to emphasize concerns the final general objective of GeoERA: is it ensuring **scientific impact and innovation** or it also concerns the **development of new services for scientists and other stakeholders**? Is there a shared understanding of the data lifecycle among the scientists involved in the projects, which should foster the development of new services for multidisciplinary users?
- Do you see the value of GeoERA within the EU policy area and within other areas where we can find end-users of the results, e.g. industry or academia?
The engagement strategy for academia and industry is extremely different. The exploitation of GeoERA results by different stakeholders will depend on the answers to the abovementioned issues. Engaging the industry through a pan-European framework for Earth sciences is quite difficult, if not impossible (in my opinion). It might be relevant to identify the role of industry for the projects and for the Information Platform (i.e., industry as a user, a supplier or a customer of the new platform).
- Do you see the value of GeoERA in a global sense?
GeoERA has a relevant global perspective because of its contributions to environmental science and global changes.
- How do you think the results of GeoERA will optimally be used? What can we do to optimize it?
Data policy and access rules have to be agreed to elaborate a **Data Management Plan**. This requires a full awareness by involved scientists of the governance, legal and financial sustainability of data and service provision. Feeding the Information Platform with the perspective of making results, new data and scientific products available through EGDl implies acknowledging the efforts necessary to develop a research infrastructure for multidisciplinary users.

Collaboration

- How do you see the GeoERA programme within the ecosystem of other Joint programs/shared research programs/information platforms, or others?
GeoERA can foster new collaborations and interoperability in solid Earth sciences. The Information Platform should integrate the relevant achievements in the projects within the existing delivery frameworks for Earth sciences. Supporting the interoperability between EGDl and EPOS and joining efforts to achieve sustainability should be a shared objective.
- How do you see collaboration between these?
My opinion on this issue is biased since I am directly involved in EPOS. However, EGDl can become the pan-European research infrastructure for geological data and products. GeoERA can represent an essential opportunity to integrate new scientific communities and users.

The Information Platform should represent the development environment where GeoERA achievements can be exploited and integrated in EGDI and EPOS.

- Are there other external developments that we should really take notice of, during the development of GeoERA?

EOSC (European Open Science Cloud) and EDI (European Data Infrastructure) are key priorities for European Commission. Initiatives connected to FAIR data and EOSC should be monitored and followed to explore possible interactions and long-term sustainability (data preservation, procurement policies to computational resources).

Recommendations

- What would you like to recommend GeoERA to increase its impact?
GeoERA should share efforts for dissemination, communication and training with other initiatives. I can propose training on Research Infrastructure management, implementation of FAIR data principles and ethical approaches to geo-energy and geo-resources.
- Tips to the 15 project leads: How to manage these large consortia in which all of us work?
Do not underestimate efforts required for communication among and within the projects and with the external landscape (internal and external communication). GeoERA is a huge initiative. Implementing and adopting an effective and appropriate communication plan is demanding.
Developing Data Management plans for GeoERA is also challenging, since it requires integrating different data layers into the GeoERA layer through the Information Platform.
- Tips to the Theme Coordinators: How to ensure synergy between the projects and between the themes, and in particular with the Information Platform.
Communication is one key challenge to tackle (see above). However, the involvement of IT expertise for data management and interoperability is essential. These skills cannot be available only in the Information Platform.
The design of the Information Platform has to be shared with the projects. It should not be limited to share information (i.e., a common web portal for all projects); rather it should prepare integration of results in the EGDI infrastructure.
Validation of results and achievements that will be integrated in the Information platform should also be clarified.

Andrée Bolduc - Geological Survey of Canada

As a first point, I would like to congratulate all project leaders and their teams for such a nice suite of projects. It was a real challenge to bring forward meaningful projects involving so many countries. Kudos as well for some very creative acronyms. All projects have found their “marker”, and if this is any reflection of the creativity and innovation within the teams, then the outcomes of those projects are very promising.

That said, and only very briefly, let me share some thoughts.

- There are a few common threads in most if not all projects. Of course, all data is to be served the Information Platform, and this is challenging. Will the IP be a catalogue or a repository of all data to be maintained and managed well beyond the life of the projects?
- In the spirit of GeoERA, the projects aim at using geological boundaries rather than political boundaries to define the “playground”. This poses another challenge, harmonization. It is not just a question of names across borders, but more fundamentally of geological interpretation, based on facts, knowledge and expertise on all sides of borders.
- Most projects under GeoERA can benefit from research done outside of Europe, and from other EU programmes, such as M4Shale. I encourage you to look beyond the US, who have accomplished some marvelous research, and into Canada, for one, where unconventional energy assessment (GSC-Calgary), or aquifer vulnerability to shale gas development (GSC-Québec) or induced seismicity (GSC-Pacific) have been researched for many years. And I am sure there are other countries from which we can all learn.
- In Canada, new legislation is being passed on impact assessments. Research on cumulative effects will be at the forefront. I see some traces of this in the project descriptions, however it does not appear to be a main objective, and perhaps and doesn’t have to be, but please keep it in mind. We are also paying much more attention to Indigenous Knowledge from Inuit, Indigenous and Metis Peoples. Perhaps in continental Europe this may not be relevant, but I assume similar knowledge can be available in Scandinavia, for example. This knowledge may contribute directly to enhance Western science with respect to groundwater and climate change, for example.

As a final point, please share your results outside of Europe. Come to our meetings in Canada and the US and elsewhere, the research networks can only be strengthened that way. I am looking forward to hearing preliminary results, good success to all.

Dominique Darmendrail - Joint Programming Initiative Water

Notes Kick-off Meeting (July 3, Brussels):

Darmendrail recommends to connect projects and don't do double work. Her advice is to go from cooperation to collaboration and meet together often.

She also recommends all projects to give input for the Information Platform and Data Management Plan, and implement indicators.

See below the presentation at the Kick-off Meeting:

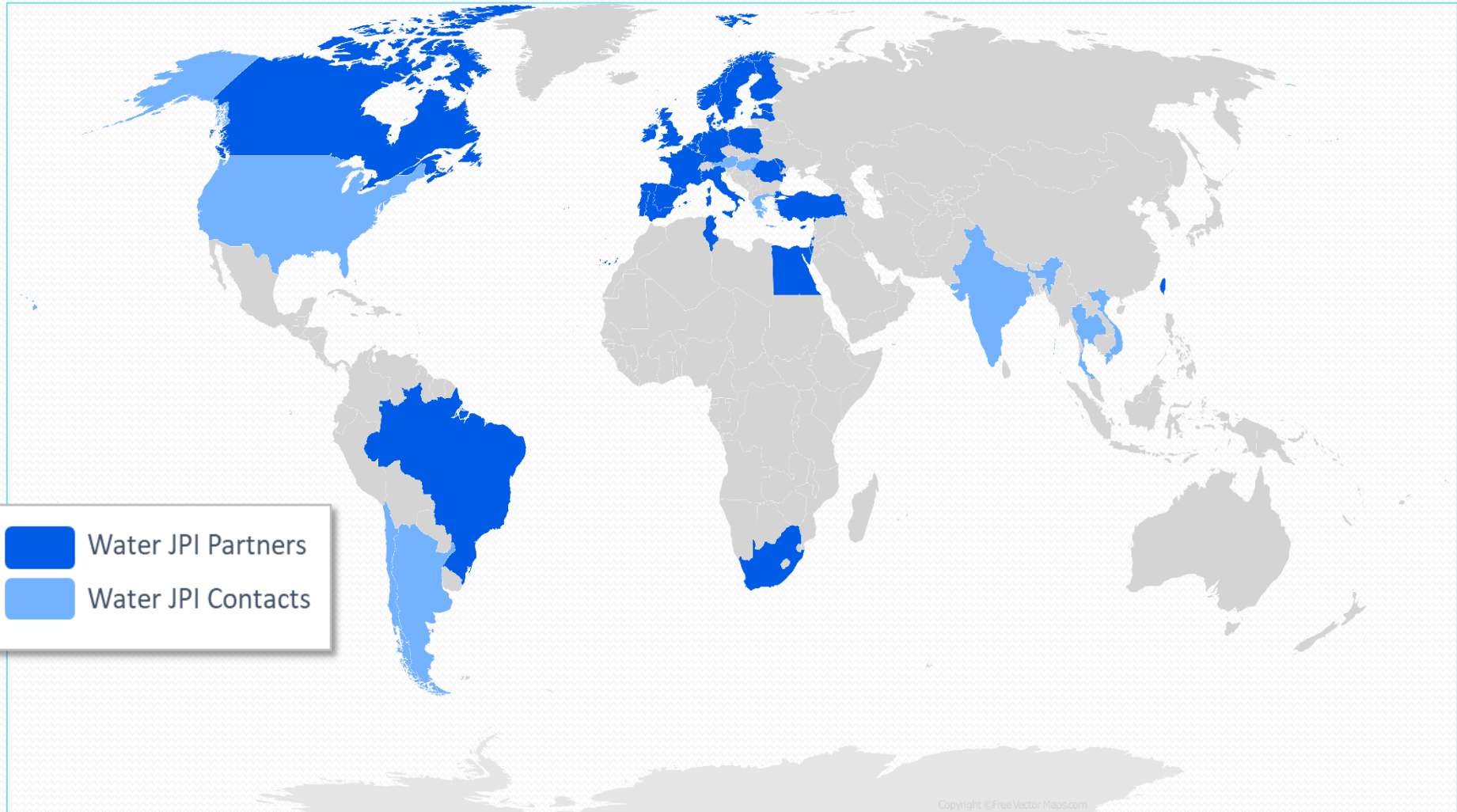
The Water JPI

Joint Programming Initiative
Water Challenges for a Changing World



GeoERA projects
Kick-off Meeting
Brussels
3 July 2018

The Water JPI Partnership



Water JPI Activities

Common Vision

Strategic R&I
Agenda

Research
funding: Calls,
TAP...

Impact
measures

Knowledge
transfer and
dissemination

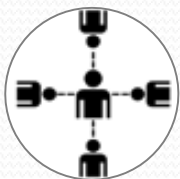
Data ,
Observatories &
Infrastructures

Capacity
Building

Stakeholders
involvement &
engagement

International
Cooperation

Mapping &
foresight
activities



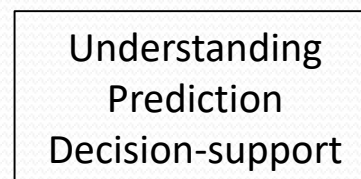
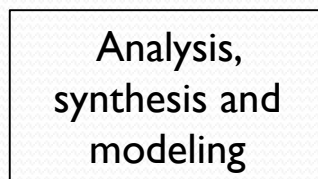
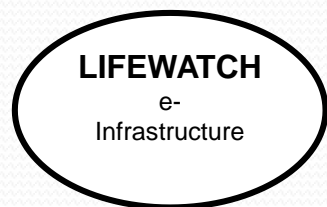
Research Infrastructure & Water JPI (1/6)

- Many projects require access to infrastructure for demonstration, validation, and integration with longer term studies; e.g.
 - Observatories
 - Demonstration sites
 - Reference facilities
- Implementation of the SRIA will require more cross-sectoral and transdisciplinary approaches
- Information on existing infrastructure relevant to JPI Water research activities, priorities and upcoming topics would be a valuable resource.



RI division of tasks and collaboration broadly used across RIs 2014-2017

Scientific and other user communities, e.g. PEER, BioDiversa, GEOSS, ALTER-Net, COPERNICUS



Data input



Required
parameters



Monitoring Infrastructure for
time and spatial data series



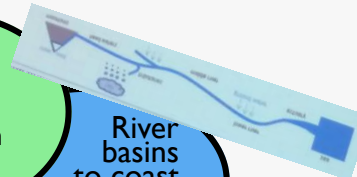
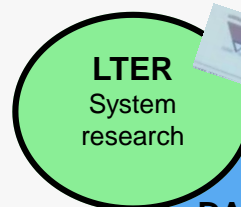
Complementarity
Interoperability
? Co-location

Experimentation



Natural and socio-ecological systems
research (trends & interactions)

In-situ
Ecosystem
Research Infrastructures



Water

Generic supporting e-Infrastructures (e.g. EUDAT) and reference data (e.g. CETAF/taxonomy)

©M. Mirtl

GeoERA as a whole

- Access to data, data collection conditions as promised in the proposal (what data is collected, stored and used? Raw or interpreted data with ad hoc information on methodologies)
 - **Gaps in infrastructure availability** can be identified on a rational basis – and therefore funded!
- Connectivity of GeoERA data with policy data (i.e. WFD and related directives, WISE, INSPIRE template) and relevant RDI infrastructures (i.e. research infrastructures) or similar tools (i.e. NORMAN network)
 - Do not re-invent the wheel!

Expectations

- Have detailed information on GeoERA projects to be able to assess their deliverables and how they fit the needs of our SRIA
- From cooperation to collaboration
- Connect end-users since the launch of the projects for better fine-tuning needs and consider their needs in the proposed tools
- Open Access / Open data

Collaborations

- Go beyond the GeoERA community(ies):
 - Pan European relevance of each GeoERA project
 - Connect to other data and research infrastructures
- Interoperability of the developed tools with existing ones and under development in parallel is fundamental
- Water JPI: Investments at **EU and Member State level** return better value through reduction in unnecessary replication and better informed decision making
- **Rates of use are tracked** – JPI Water can support bids for replication or upgrading on the basis of solid statistics

Recommendations

- Combine annual meetings / mid-term review & final term meetings for strengthening collaboration
- Publish data management plan and exploitation plan for GeoERA and for each funded projects
- Ensure that all products / deliverables delivered by the 15 funded projects will feed the Information Platform which should become the unique portal for getting open access
- Develop and implement indicators on the data collection levels, the use of the data by end-users and request reviews on the use of data

To know more about the Water JPI...



- A website : www.waterjpi.eu
- A Newsletter – Subscribe on line!
- Social Media
- LinkedIn - Water JPI researcher forum group (1340 members)
<https://www.linkedin.com/groups/8455262>
 - Joint Calls announcements & Networking
 - Announcement of events and activities
- A unique contact point
 - waterjpisecretariat@agencerecherche.fr
 - Phone + 33 1 78098120





ANNEX 5. PROJECT PITCHES

1 Energy

Geoconnect3D

HIKE

GARAH

Hotlime

MUSE

3DGEO-EU

2 Groundwater

HOVER

Resources

Tactic

VoGERA

3 Raw Materials

Euroolithos

Frame

MINDeSEA

Mintell4EU

4 Information Platform



1. ENERGY

3DGEO-EU
GEO-ENERGY



Introduction GeoERA-Energy

Serge van Gessel

Theme Coordinator GeoEnergy

TNO

GeoERA Kick-Off 03-07-2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



SPATIAL PLANNING & POLICY SUPPORT



HAZARDS & IMPACTS

FOSSIL

GEO THERMAL

STORAGE

3D GEOLOGICAL FRAMEWORK & PARAMETERIZATION



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SPATIAL PLANNING & POLICY



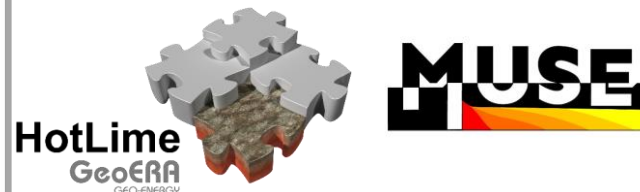
HAZARDS & IMPACTS



FOSSIL



GEOTHERMAL



STORAGE

3D GEOLOGICAL FRAMEWORK & PARAMETERIZATION



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3DGEO-EU
GEO-ENERGY



3D Geomodeling for Europe

Stefan Knopf (BGR)

Partners: BGR (lead), CGS, GEOINFORM, GEUS, IGME, LAGB, LBEG,
LBGR, LUNG, PGI, TNO

Kick-off meeting for GeoERA projects, July 3rd 2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166





problem/challenge

- 3D subsurface information is often inconsistent across borders, i.e. exhibit “border discontinuities”
⇒ *hampers reliable assessments of cross-border subsurface geo-energy potential in the EU*
- establishment of accepted and standardized methods for generating harmonized coherent cross-border 3D geomodels is needed
- challenge: heterogeneity of existing geological databases, standards, etc. across borders



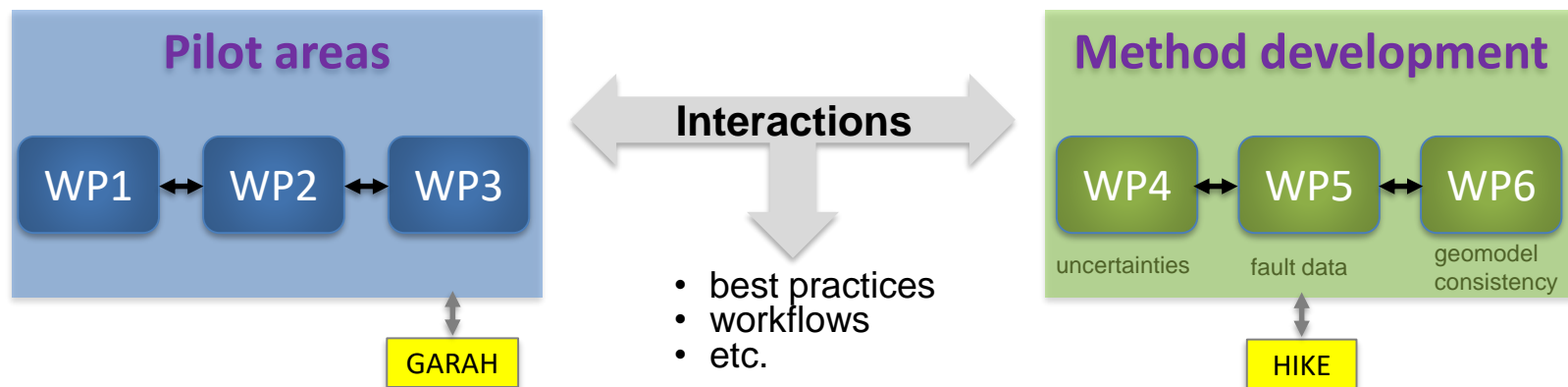
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approach

- optimize/develop and test methods and workflows for the harmonization of cross-border 3D geomodels in various pilot areas
- interactions of pilot area work packages with method development work packages

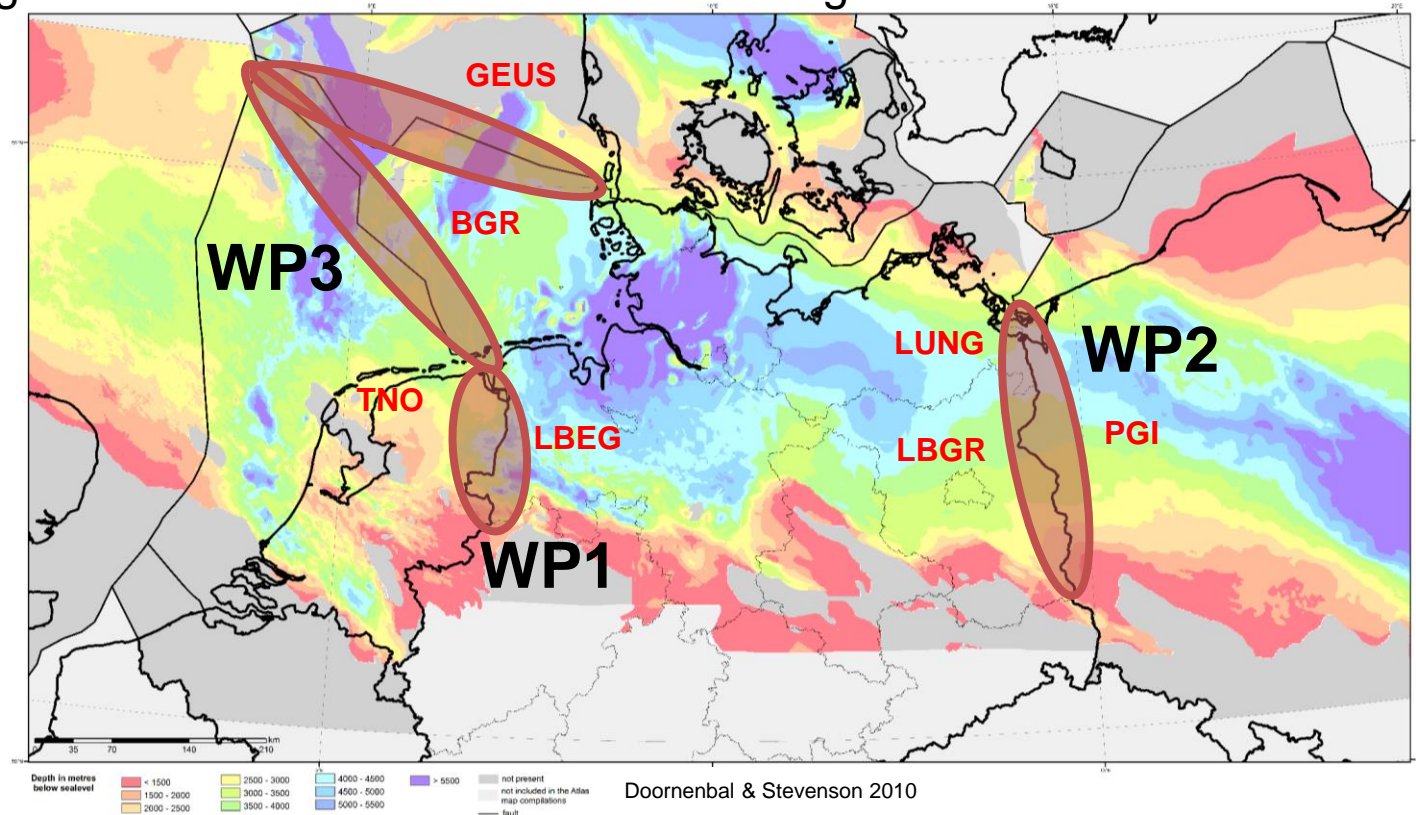


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approach

WP1–3: test harmonization methods in cross-border pilot areas with different geological situations and source data coverage



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results

- help to establish methods and (optimized) workflows for cross-border harmonization of 3D geomodels in Europe [[>> GSOs, scientific community](#)]
- cross-border consistent geomodels in the pilot areas [[involved GSOs](#)]
⇒ but can be the nucleus for further transnational harmonization projects
- improved visualization methods for uncertainties and optimized reconstruction and restoration workflows to reduce uncertainty of geomodels [[>> GSOs, scientific community](#)]
- the results will be important keystones towards the future goal of having coherently harmonized 3D geomodels across Europe ⇒ enhance the reliability of subsurface resource assessments, thus helping to adequately inform European stakeholders and decision makers [[>> policymakers](#)]



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GARAH

Geological Analysis and Resource Assessment of selected Hydrocarbon systems

Peter Britze

GEUS

Geological Survey of Denmark and Greenland

GeoERA Kick-off meeting 3rd July 2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



TNO Instituto Geológico
y Minero de España**GARAH**
GeoERA
GEO-ENERGY**Consortium**

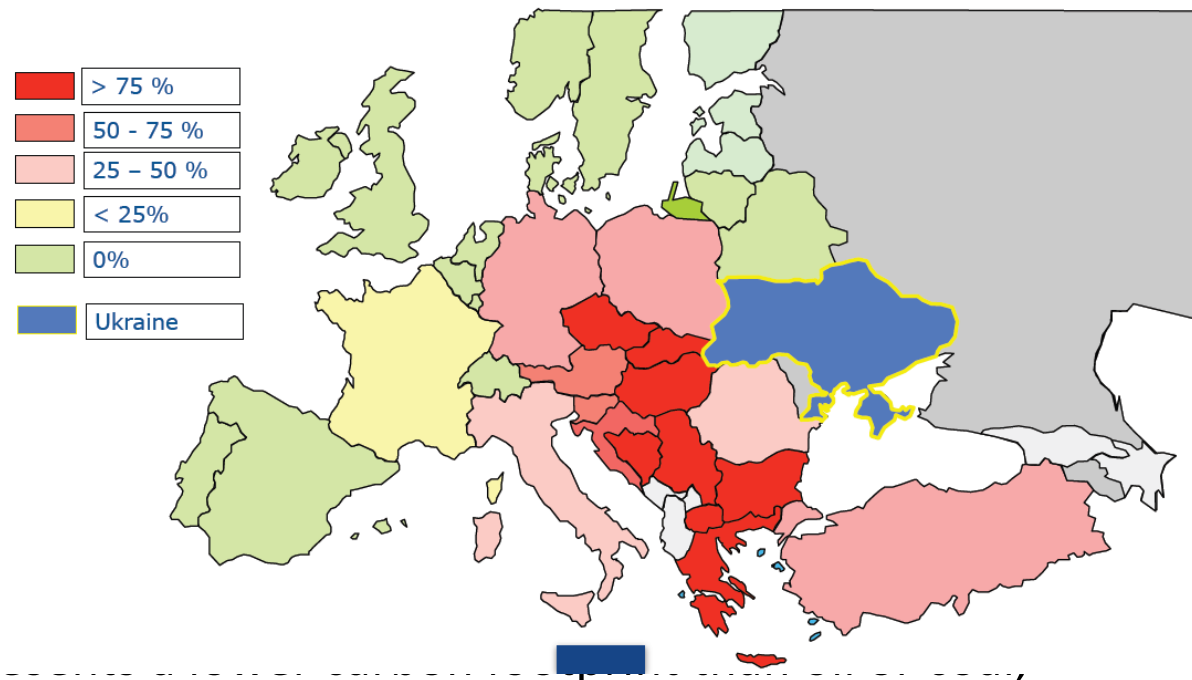
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Challenge

- Fossil fuels are expected to compose a major part of the European energy mix over the cc
- Important feed transfer to alte
- The current rat supply over the
- May hamper th
- Requirement fr exploration
 - to maintair
 - affordable
- Natural gas rep
 - assist/help the transition to a low-carbon Europe.

2009 gas disruption



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Hydrocarbon assessment

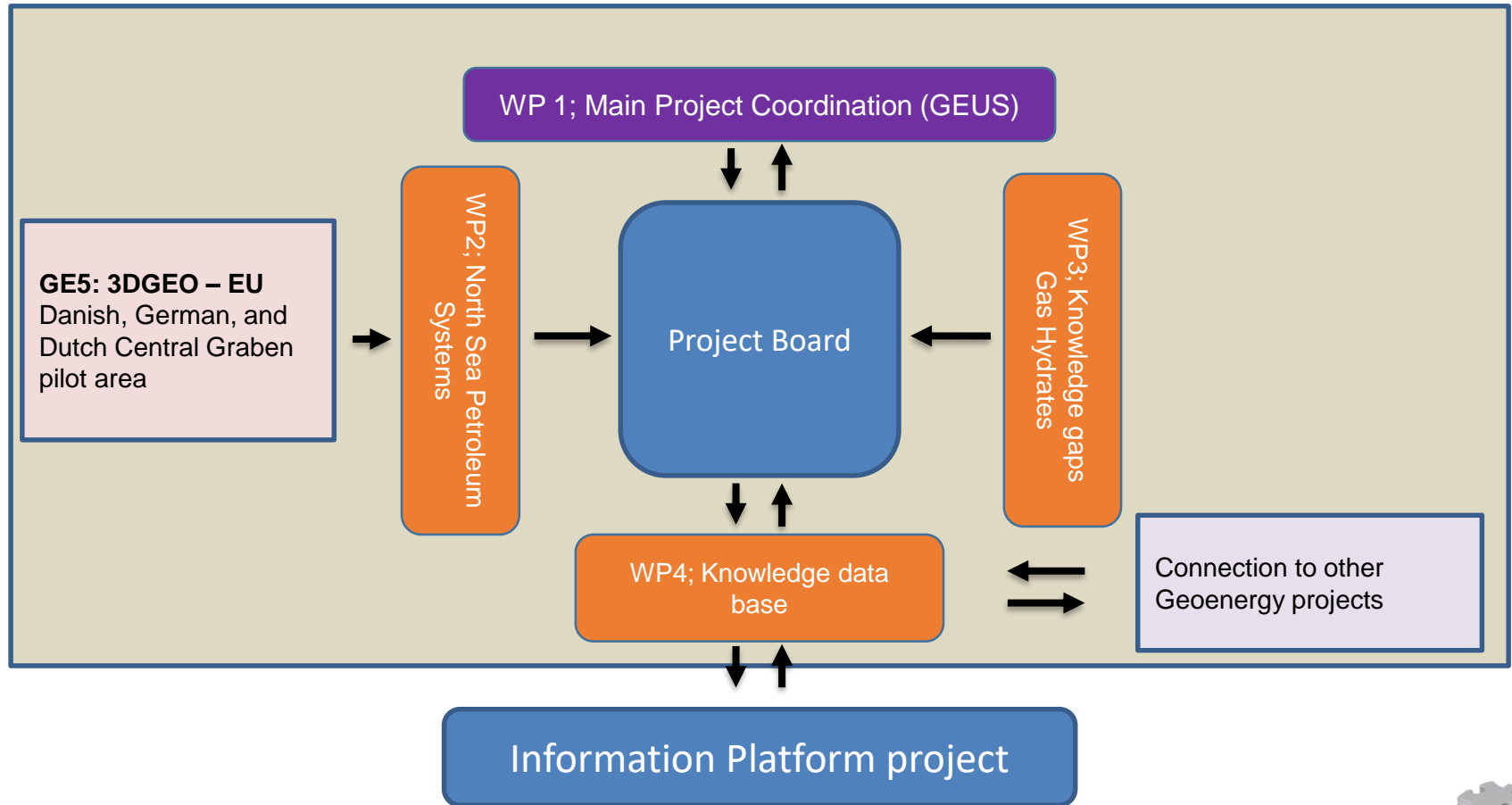
- A harmonized, scientifically based, geological analysis and assessment of conventional and unconventional hydrocarbon resources will help member states to continue the transition to lower Carbon energy sources. This will contribute to climate commitments, and allow the planning for secure sources of affordable energy. The analysis and assessment of hydrocarbons will focus on two areas:
 - (i) in Europe's major petroleum province – the North Sea a “Geological analysis and resource assessment of North Sea petroleum systems”,
 - (ii) with a pan-European view, “Hydrate assessment in the European continental margin and related risks”.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Work Plan



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Deliverables

- Resource assessment of the unconventional and conventional hydrocarbons in the North Sea basin utilizing the methodology developed in the “EUOGA” project.
- A 3D petroleum system model based assessment of conventional and unconventional resources in a cross border (DK-NL-GER) pilot study area in the North Sea.
- Options for alternative uses for hydrocarbon reservoirs will be appraised and a catalogue of options will be produced
- The principal hazards associated with hydrocarbon production will be compiled
- Develop a harmonized model for a pan-European gas hydrate data infrastructure
- Identify critical data gaps for understanding gas hydrates along European continental margins



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166





Mapping and Assessment of Geothermal Plays in Deep Carbonate Rocks – Cross-domain Implications and Impacts

Gerold Diepolder

Bayerisches Landesamt für Umwelt (LfU)

on behalf of **the HotLime Consortium**

GeoERA Projects Kick-off, Brussels, July 3rd, 2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

Who?

The HotLime Consortium



Geological Survey

Suirbhéireacht Gheolaíochta
Ireland | Éireann

An Roinn Cumarsáide, Gníomhaíthe ar son na hAeráide agus Comhshaoil
Department of Communications, Climate Action & Environment



Regione Umbria



Bayerisches Landesamt für
Umwelt



CONTINENTAL SHELF DEPARTMENT
OFFICE OF THE PRIME MINISTER
MALTA



TNO innovation
for life



G Geologische Bundesanstalt



ISPRA

Istituto Superiore per la Protezione
e la Ricerca Ambientale



**CZECH
GEOLOGICAL
SURVEY**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



What?



Hydrothermal systems in deep **carbonate** bedrock

- Low-enthalpy geothermal plays (basin / rift type).
- Crucially dependent on groundwater yield controlled by fracture conduits and karstification.
- Exploration & development is a high-risk investment.
- Spatial assessment & characterization to de-risk the set-up and maturation of regional plays.
- Identification of generic structural controls and petro- & hydro-physical characteristics.



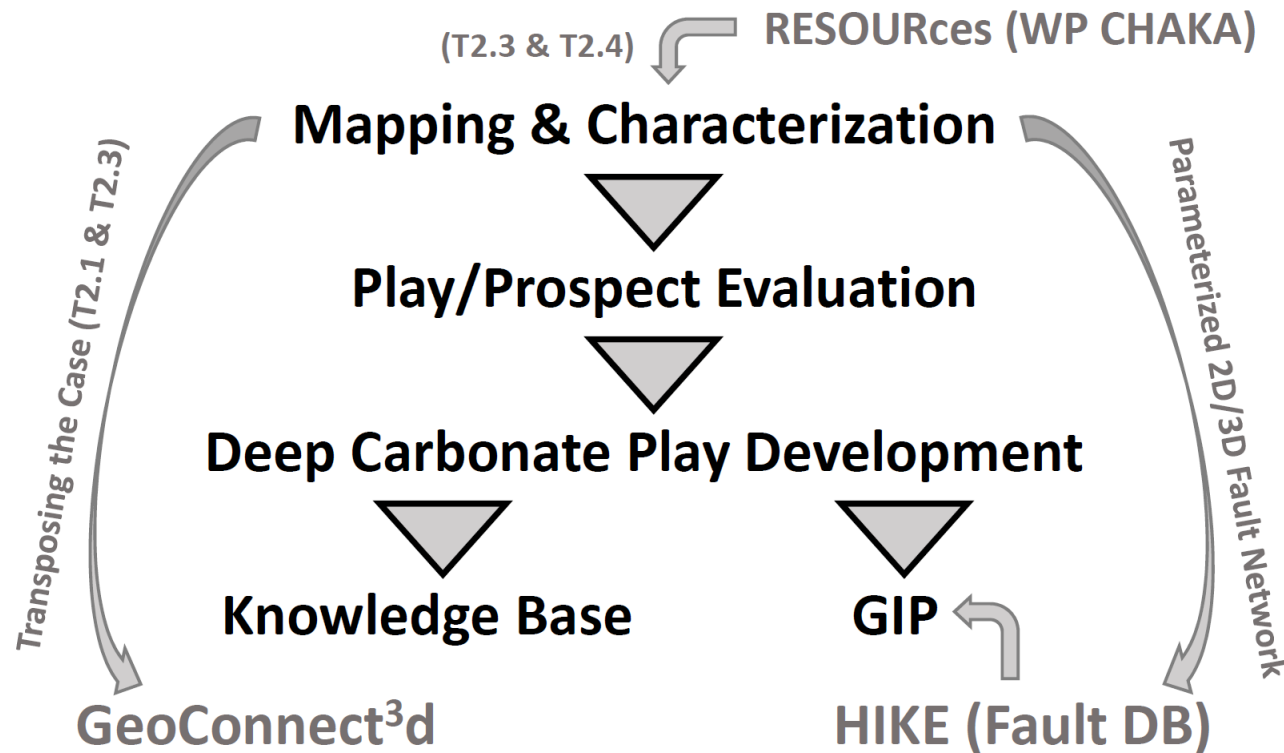
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How?



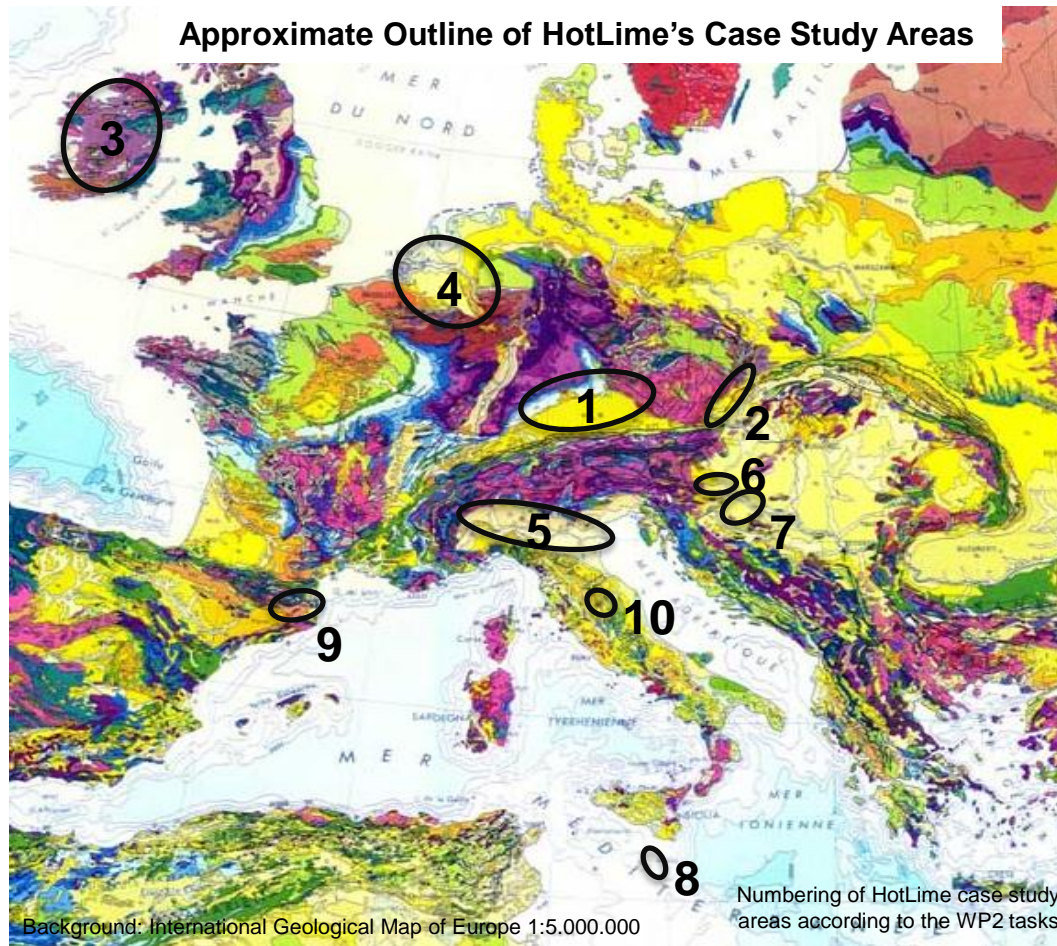
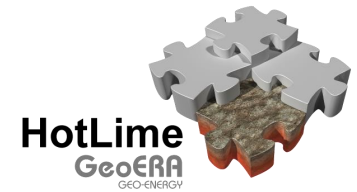
HotLime's general workflow & cross-project nexus



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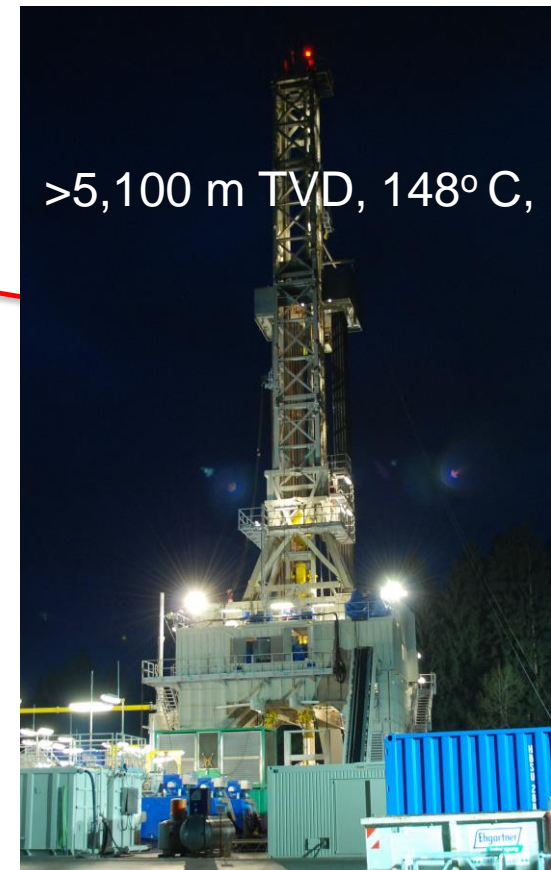
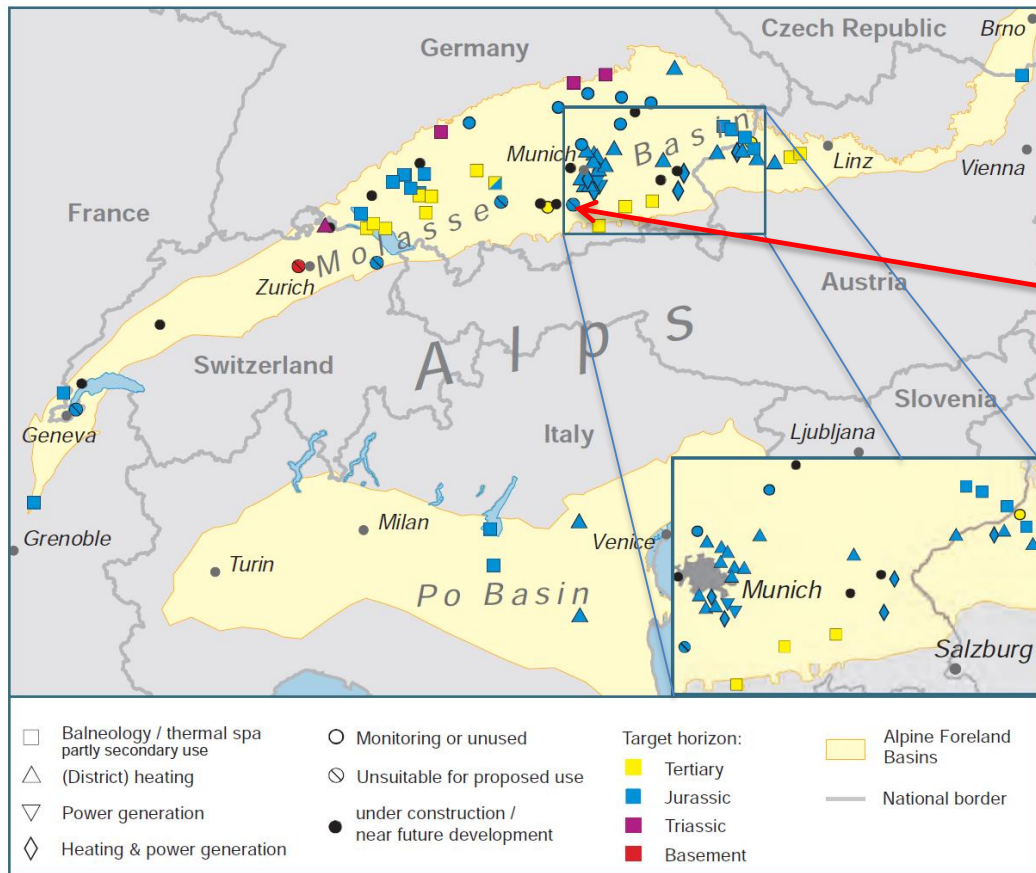
Where?



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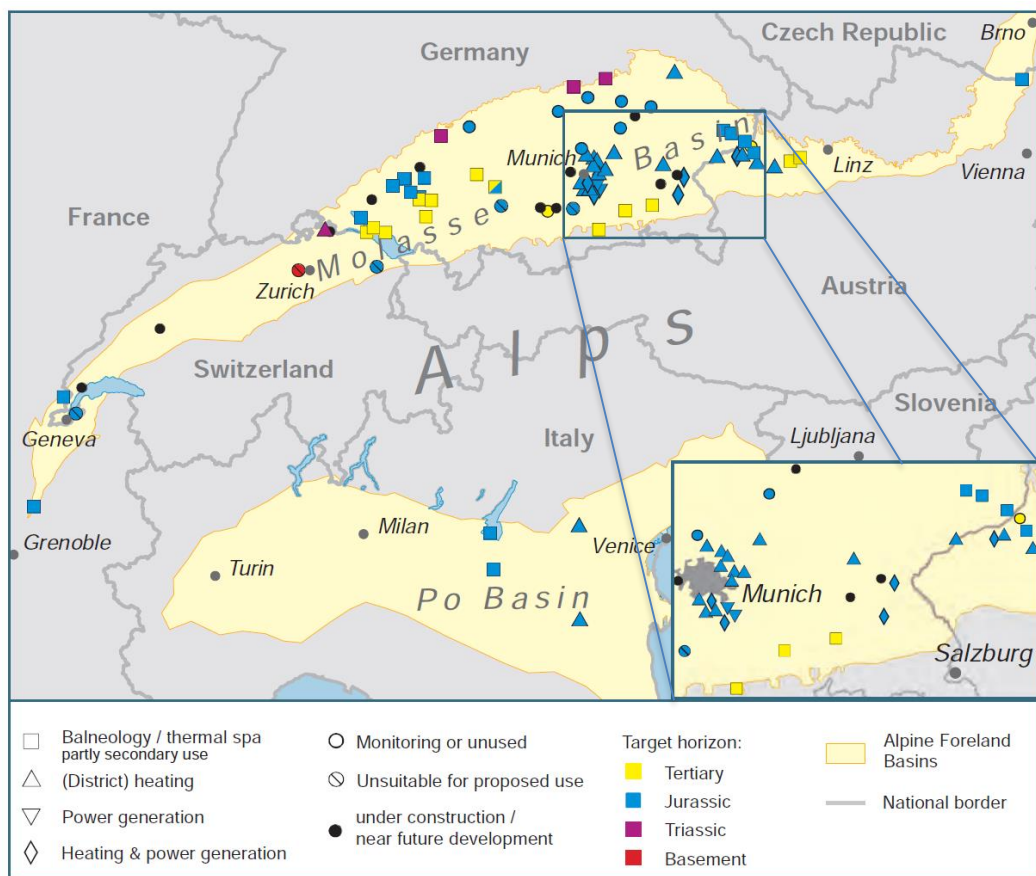
Why there?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Why there?



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Which questions we have to answer



Research questions to be addressed
to mitigate the risk of upfront investments.

- What are the structural controls on deep karst formation?
- How does past and present carbonate dissolution present itself in deep carbonate basins?
- How can we find pathways of fluid flow in deep karstic fractures?
- How can we exploit those geothermal resources?
- Are there any restrictive criteria for the recoverability?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



What we expect



The HotLime consortium's shared ambitions

- Cross-fertilization: knowledge exchange between partners and beyond to see the bigger picture.
- Shared learning: improve our understanding of the geological conditions that determine the distribution and technical recoverability of Hot Lime resources.
- Commonality: shared rating schemes & best practice workflows for estimation, comparison & prospect-ranking in Hot Lime plays
- Sustainability: an expert panel & network on Hot Lime issues also beyond the project runtime.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



What you can expect



Serving the stakeholders: HotLime's principal outcomes

- Spatial resource assessments (2D, 3D) of areas in focus.
- Report on best practice workflows & guidelines for characterization & mapping deep carbonate hydrothermal plays.
- Web-based classification system for plays and prospects.
- Assessment tool for doublet performance and the resources.
- Common knowledge base grounded on the Linked Open Data Semantic Web (methodology; glossary of technical terms; user manual geared towards subsurface planning and management).



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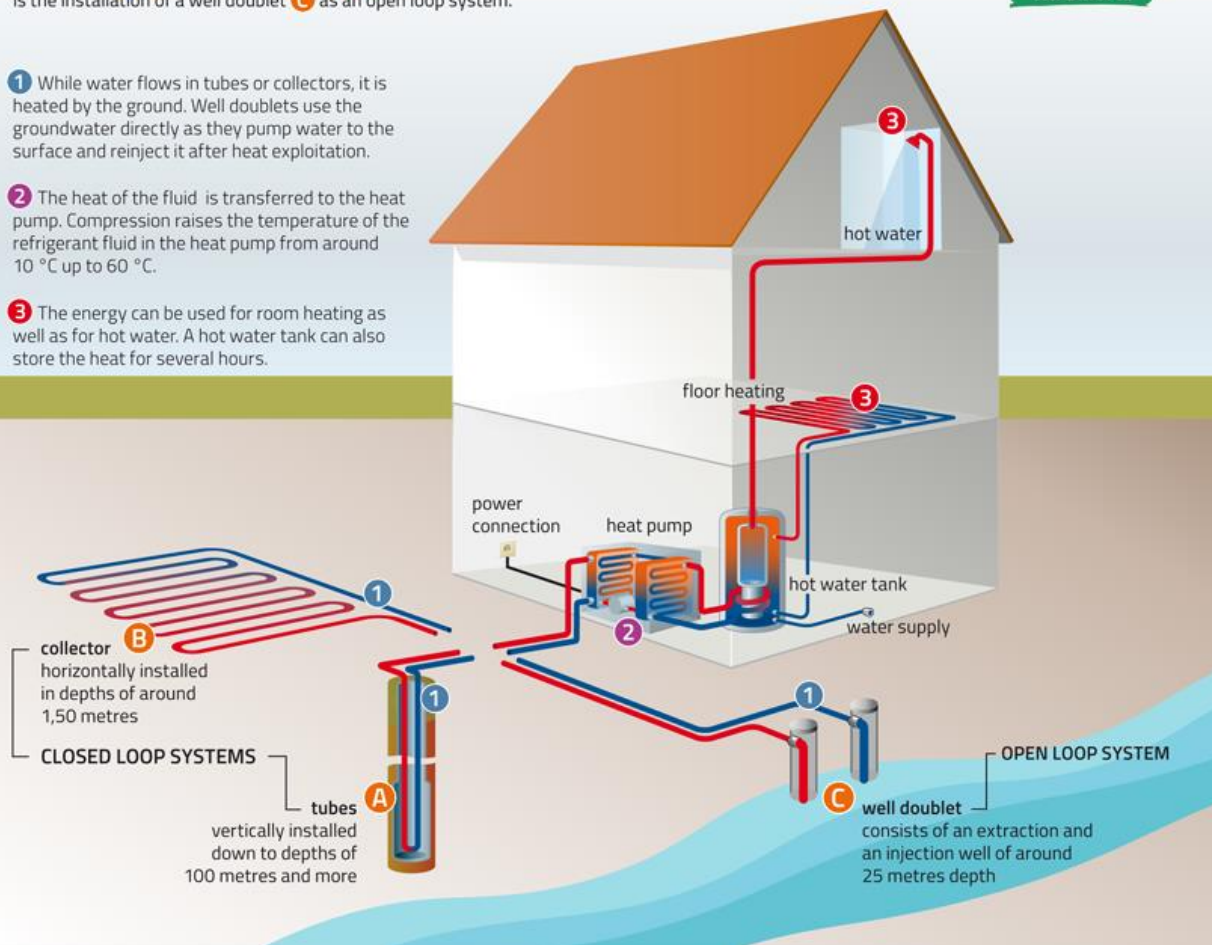


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Geothermal Energy can be used by closed loop systems using vertical tubes **A** or horizontal collectors **B**. Another possibility is the installation of a well doublet **C** as an open loop system.

- 1** While water flows in tubes or collectors, it is heated by the ground. Well doublets use the groundwater directly as they pump water to the surface and reinject it after heat exploitation.
- 2** The heat of the fluid is transferred to the heat pump. Compression raises the temperature of the refrigerant fluid in the heat pump from around 10 °C up to 60 °C.
- 3** The energy can be used for room heating as well as for hot water. A hot water tank can also store the heat for several hours.



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Present



Conventional HT district heating

New typology

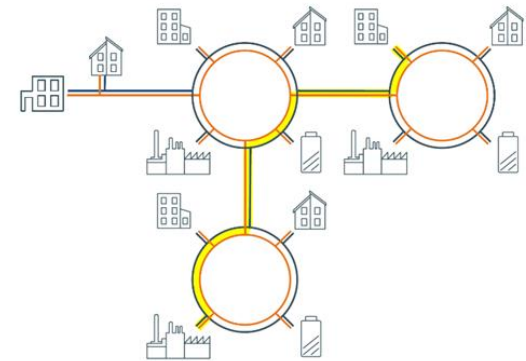


Single LT heating & cooling grids



ENERC

Linked typology



Multiple LT heating & cooling grids



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166





MUSE

Managing **U**rban **S**hallow geothermal **E**nergy (GeoE.171.006)

G. Goetzl

Geological Survey of Austria

GeoERA kick-off, July 4, 2018, Brussels



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Managing Urban Shallow geothermal Energy



16 Geological survey organizations

17 Eol letters of local stakeholders: **authorities, municipalities, agencies, universities, operators, drilling companies**

Project Lead Geological Survey of Austria



Total budget: € 1,313,260

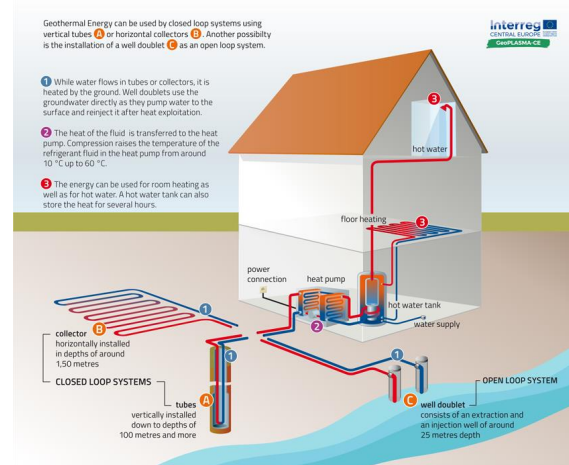
In-kind contribution: € 923,288



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Managing Urban Shallow geothermal Energy



- *Shallow geothermal energy (open loop systems, closed loop systems) a key technology for future heating, cooling and seasonal heat storage!*
- ***More than 75% of the European population live in urban areas!***
- *Services for a sustainable and efficient use of shallow geothermal energy in urban areas needed!*



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Managing Urban Shallow geothermal Energy

Main challenges

- ❖ Lack of uniform methods for assessing resources and conflicts of use
- ❖ Lack of modern efficient information services
- ❖ Lack of integrative management concepts ensuring a sustainable and efficient use
- ❖ Heterogeneous and insufficient legal framework for managing uses
- ❖ Low visibility and awareness

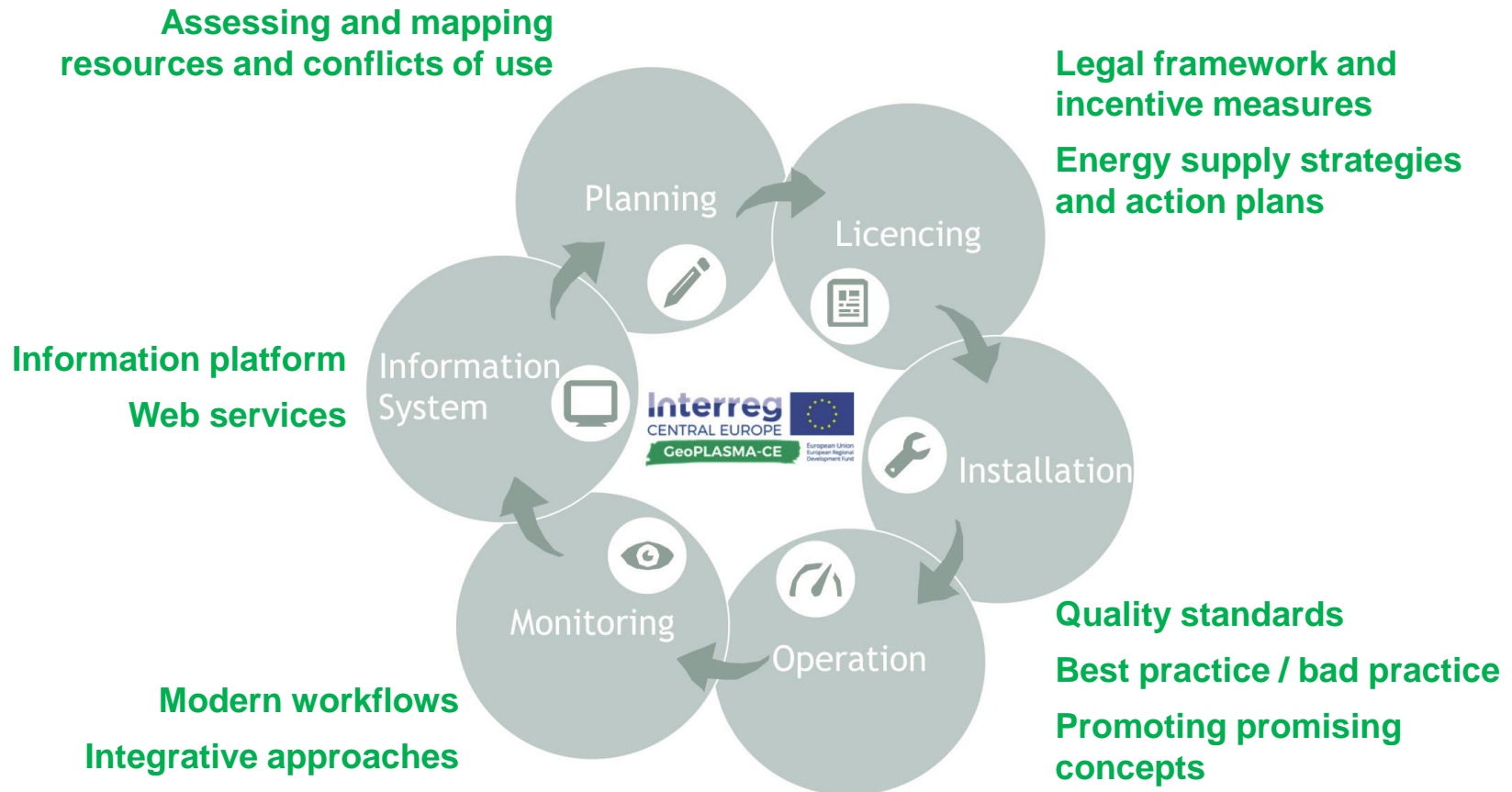


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Managing Urban Shallow geothermal Energy

Our approach



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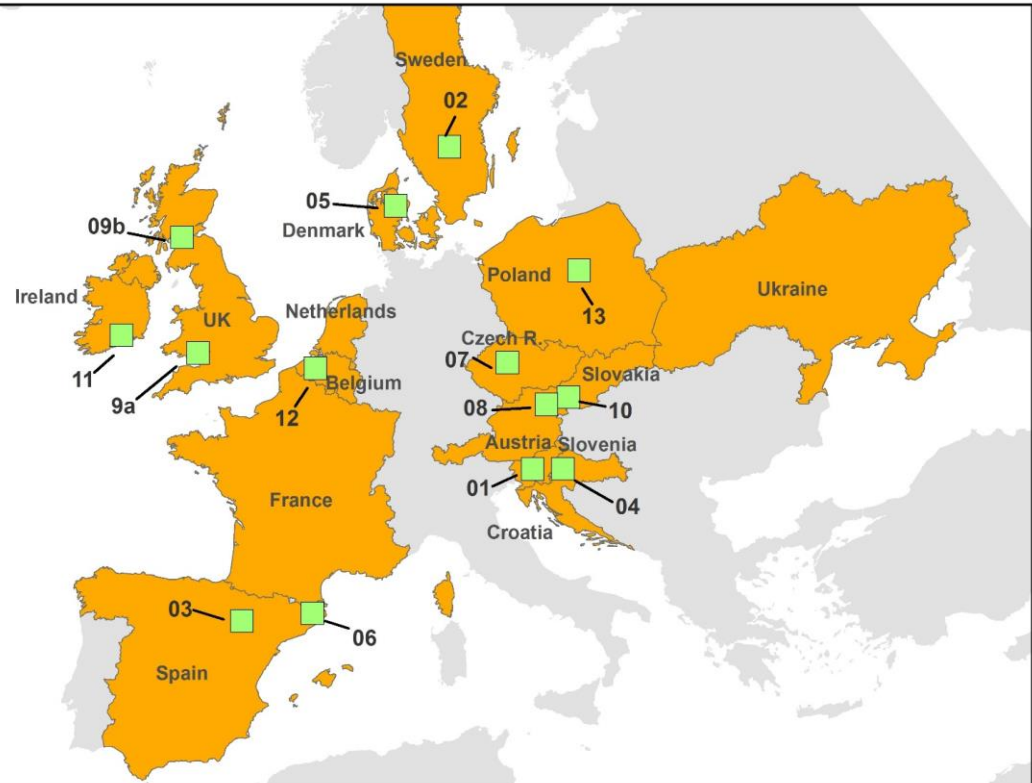
Managing Urban Shallow geothermal Energy

14 urban pilot areas across Europe

Managing Urban Shallow geothermal Energy (MUSE)

MUSE - Pilot areas

- 01 - Urban area of Ljubljana city (Slovenia)
- 02 - Urban area of Linköping city (Sweden)
- 03 - Urban area of Zaragoza city (Spain)
- 04 - Urban area of Zagreb city (Croatia)
- 05 - Urban area of Aarhus city (Denmark)
- 06 - Urban area of Girona city (Catalonia, NE Spain)
- 07 - Urban area of Prague city (Czech Republic)
- 08 - Urban area of Vienna city (Austria)
- 09a - Urban areas of Cardiff city (Wales, UK)
- 09b - Urban area of Glasgow city (Scotland, UK)
- 10 - Urban area of Bratislava city (Slovakia)
- 11 - Urban area of Cork city (Ireland)
- 12 - Urban area of Brussels city (Belgium)
- 13 - Urban area of Warsaw city (Poland)



- Involving local authorities, energy planners, environmental offices and municipality administration units, installers and (public) investors

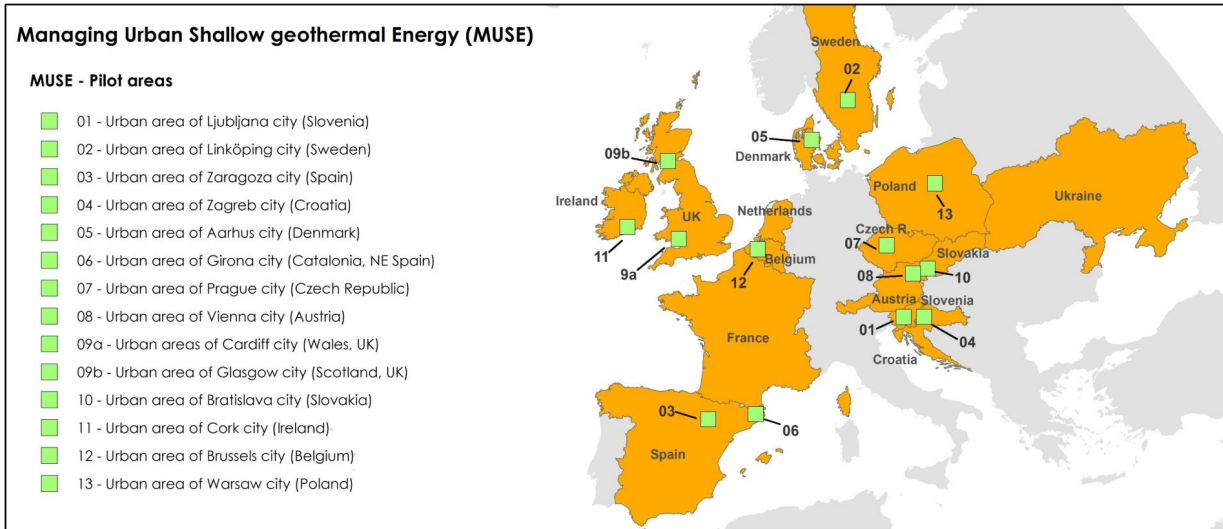


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Managing Urban Shallow geothermal Energy

14 urban pilot areas across Europe



- Providing proven concepts, strategies and tools for managing of environmentally friendly heating and cooling in Europe
- Adding urban shallow geothermal energy to the portfolio of EurogeoSurveys!



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166





M U S E
MUSE

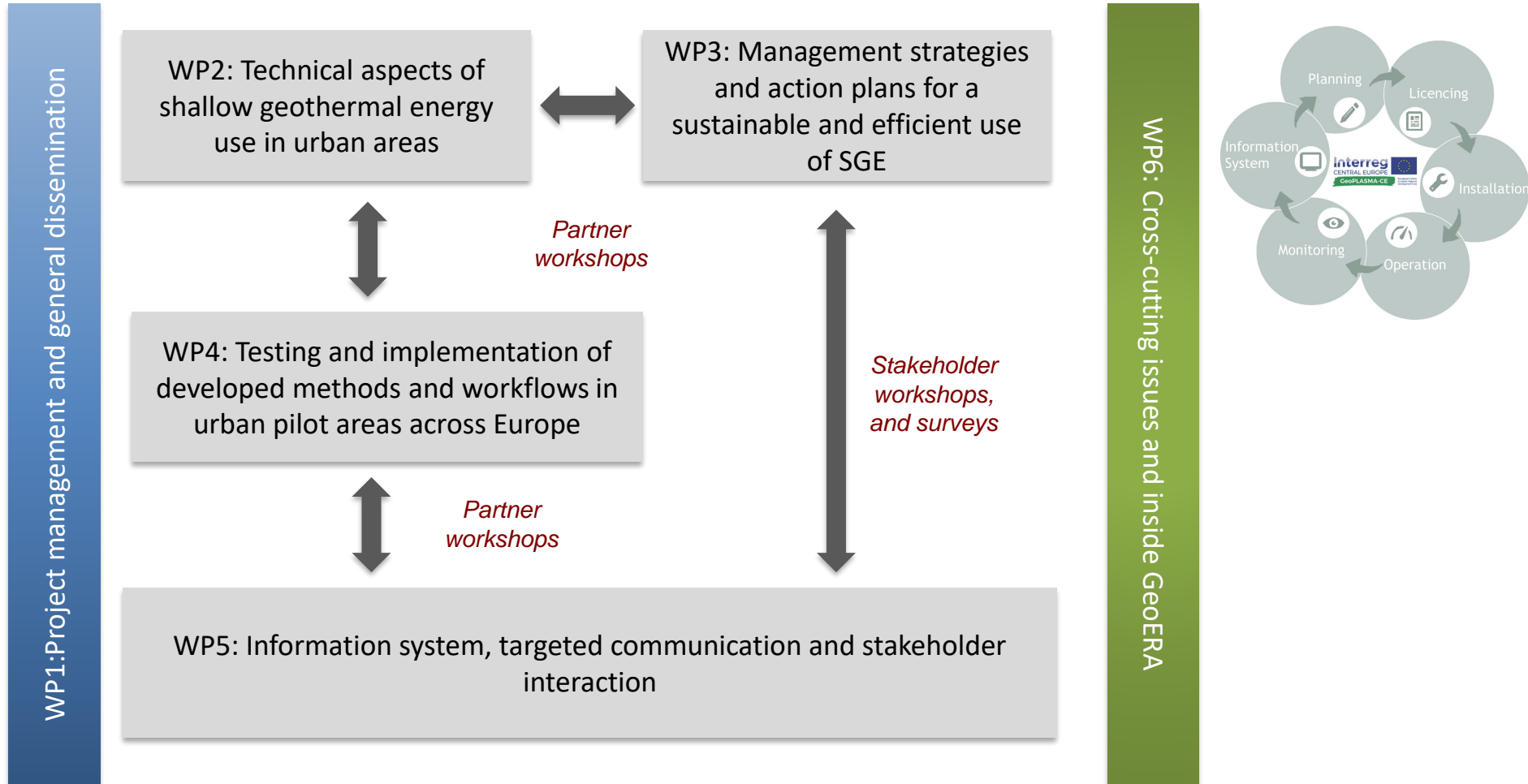
Managing Urban Shallow geothermal Energy
(GeoE.171.006)
MUSE@geologie.ac.at



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Managing Urban Shallow geothermal Energy



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

Knowledge Exchange Workshops



Hazard and Impact Knowledge for Europe

HIKE
GeoERA
GEO-ENERGY



Project coordination:	TNO (NL)
Project Board and Work Package Leads:	TNO (NL) , GEUS (DK) , BRGM (FR) , GBA (AT)
Partners:	19
Countries:	14
Collaboration:	3DGEO-EU, HOTLIME, GEOCONNECT ^{3D} , GeoERA-IP
Budget:	€ 1.139.316 partners in-kind, € 481.333 EC co-fund

TNO innovation
for life

 **brgm**
Géosciences pour une Terre durable



BGR Bundesanstalt für
Geowissenschaften
und Rohstoffe


Geological Survey
of Belgium



GeoZS
Geološki zavod
Slovenije



Bayerisches Landesamt für
Umwelt



GEUS



Landesamt für Geologie und
Bergwesen Sachsen-Anhalt


LAND
BRANDENBURG


ÍSOR
ICELAND GEOSURVEY

 **ISPRA**
Istituto Superiore per la Protezione
e la Ricerca Ambientale
Arpa
Agenzia Regionale
per la Protezione Ambientale


Regione Emilia-Romagna


LITHUANIAN
GEOLOGICAL SURVEY




LNEG

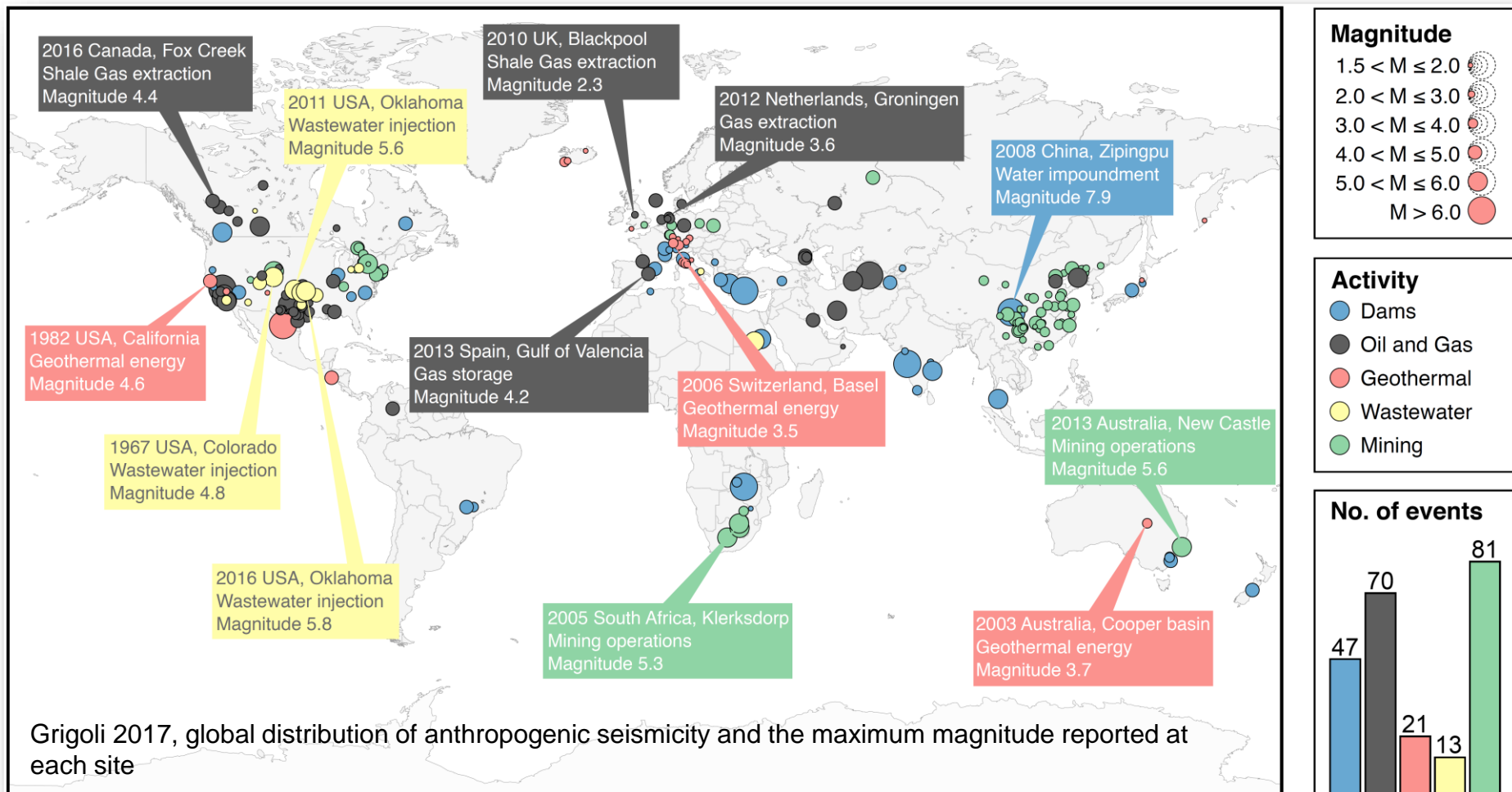


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

GeoERA
GEO-ENERGY



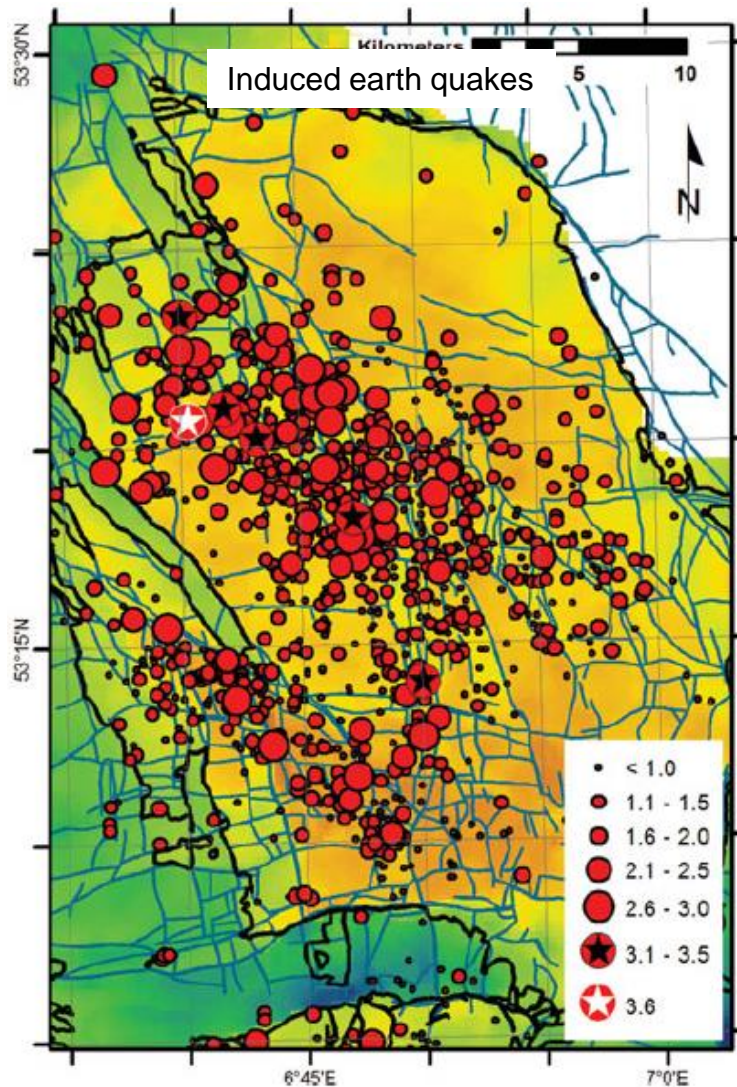
Induced Seismicity events



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Buijze et al, 2017



Groningen damage and consequences

Damage and preventive reinforcement: 1,2 billion euro

Psychological health issues 2x higher than elsewhere

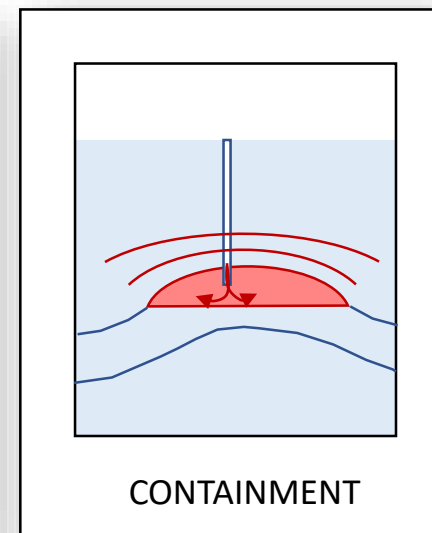
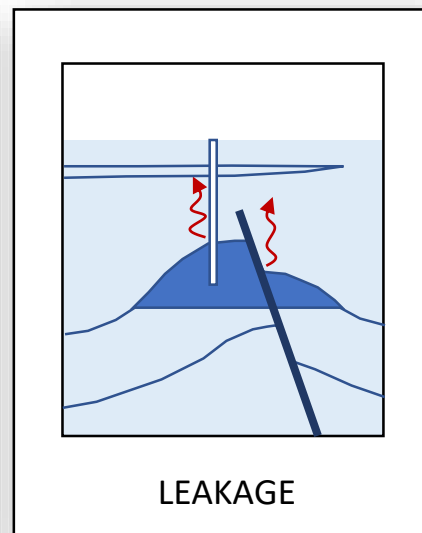
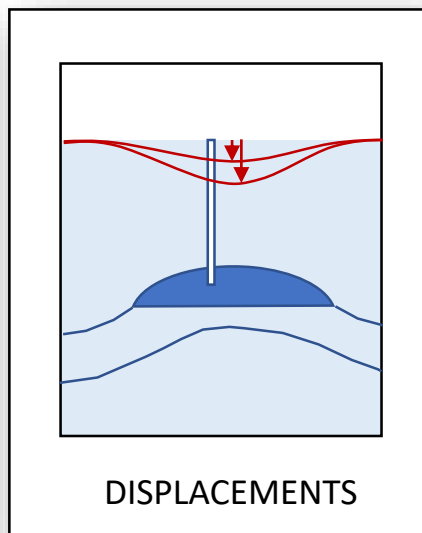
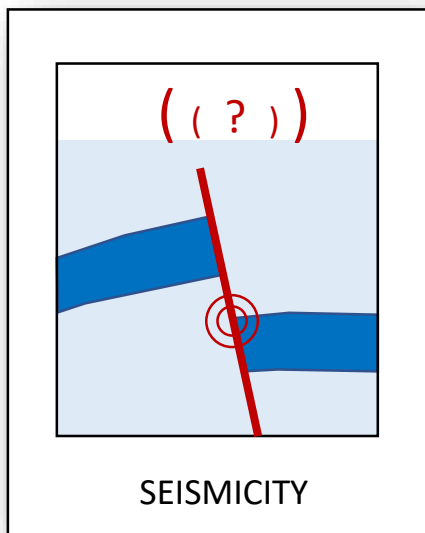
450 bcm gas reserves not produced: 70 billion euro

Indirectly: No more new oil/gas exploration on land
Huge opposition to other subsurface uses



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

Hazard and Impact research



EIA Directive

INSPIRE Directive

CCS Directive

Groundwater Directive

FP7 SHARE

FP7 IMAGE

EPOS

COPERNICUS

GEOMOL

M4SHALEGAS

DESTRESS

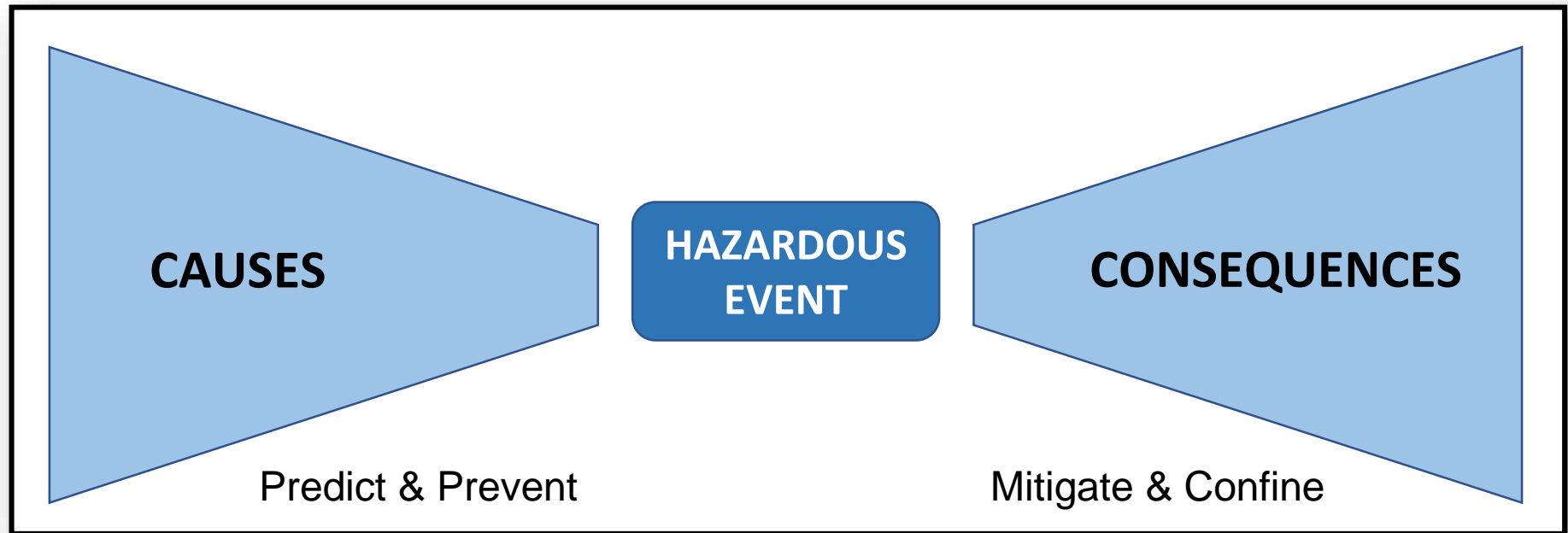
SHEER



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Bow-Tie >> Geological Knowledge and Assessment



Geological conditions
Vulnerable zones, faults, seals
Hazard mechanisms
Probability, extent, magnitude

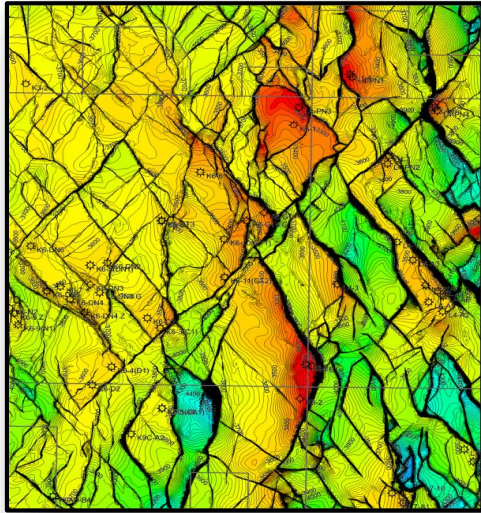
Observation and monitoring
Effects and impacts
Damage and pollution propagation
Mitigation and intervention



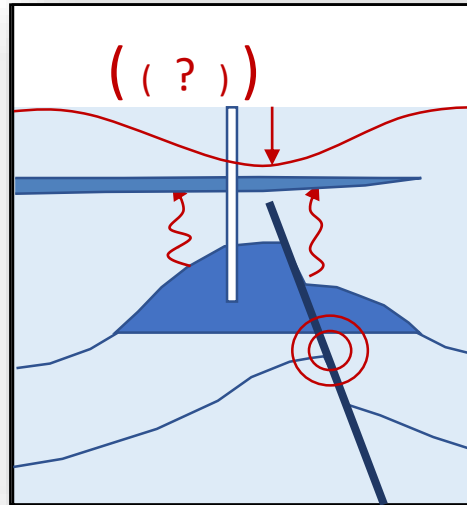
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



WP2:
EU Fault DBASE



WP3:
Methods & Use Cases



WP4:
Knowledge Share Point



WP5:
GIP integration

GeoERA
INFORMATION
PLATFORM

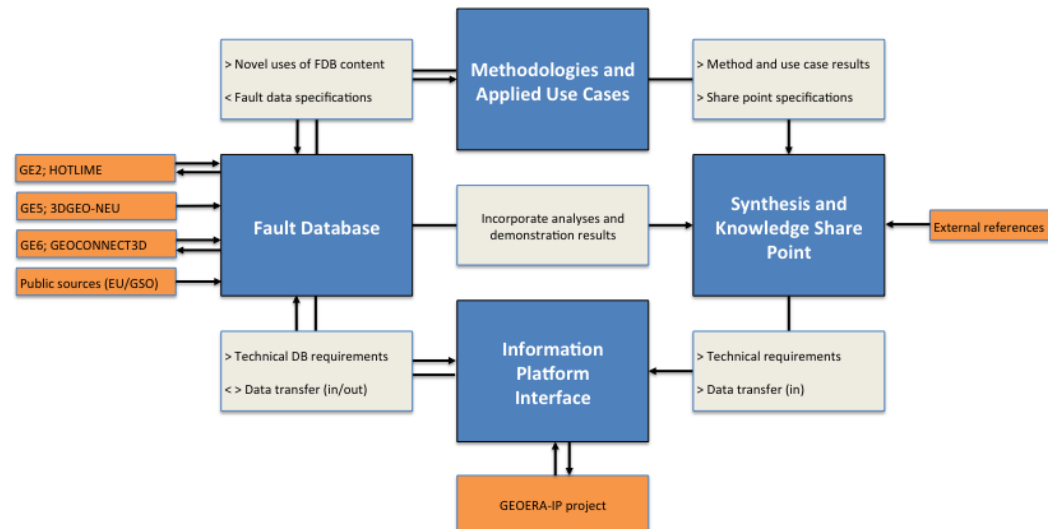


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



External Stakeholders and Benefits

- Information established and implemented in close collaboration with actual use cases
- Inform and consult stakeholders involved in hazard research and regulation
- Improve assessment of fault-related hazards with standardized “big data” repository
- More efficient assessment of hazards & impacts through shared knowledge and collaboration
- Direct collaboration with HOTLIME, 3DGEO-EU, GeoConnect^{3D} >> extending applicability
- Generic data portal in GIP



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2. GROUNDWATER



Brief introduction to the GeoERA groundwater projects

Klaus Hinsby, GEUS

Theme coordinator - GeoERA groundwater

GeoERA kick-off meeting

Brussels – 3.7.2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Groundwater and societal challenges of Horizon 2020

SOCIETAL CHALLENGES of Horizon 2020:

1. Health, demographic change and wellbeing;
2. Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy;
3. Secure, clean and efficient energy;
4. Smart, green and integrated transport;
5. Climate action, environment, resource efficiency and raw materials;
6. Europe in a changing world - inclusive, innovative and reflective societies;
7. Secure societies - protecting freedom and security of Europe and its citizens.

GeoERA GROUNDWATER PROJECTS (> 90 ideas boiled down to about 25 workpackages in four projects):

1. **HOVER** - Hydrogeological processes and geological settings elements in groundwater of relevance to **human health** and the status of dependent **ecosystems**
2. **TACTIC** - Tools for Assessment of **ClimaTe change Impact** on Groundwater and Adaptation Strategies
3. **RESOURCE** - **RESOURces** of groundwater, **harmonized** at Cross-Border and Pan-European Scale
4. **VOGERA** - **Vulnerability** of Shallow Groundwater Resources to **Deep Sub-surface Energy-Related Activities**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



GeoERA groundwater and EU water policy

The GeoERA groundwater consortium is active in Working Group Groundwater (WGG) of the Common Implementation Strategy of the Water Framework Directive, which is chaired by DG Environment/Elisa Vargas-Amelin, Unit C1 clean water - all groundwater projects are partly inspired and influenced by recent activities in WGG on topics such as:

- Emerging contaminants
- Chemical status and trend assessment
- Groundwater threshold values
- Dependent terrestrial and associated aquatic ecosystem
- Climate Change impacts on groundwater and surface water
- Groundwater ecology

The GeoERA groundwater projects have already been introduced to the WGG and GeoERA will report progress and results to WGG at a suitable number of the bi-annual WGG meetings and receive feedback and ideas from the WGG at these meetings.



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*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*

L. GOURCY

BRGM

Brussels, July 2018

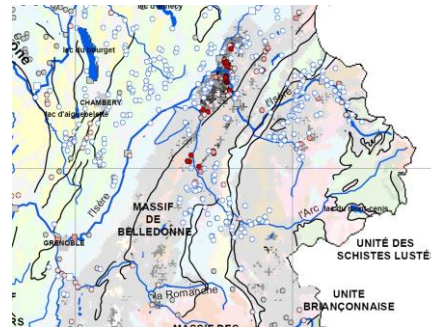
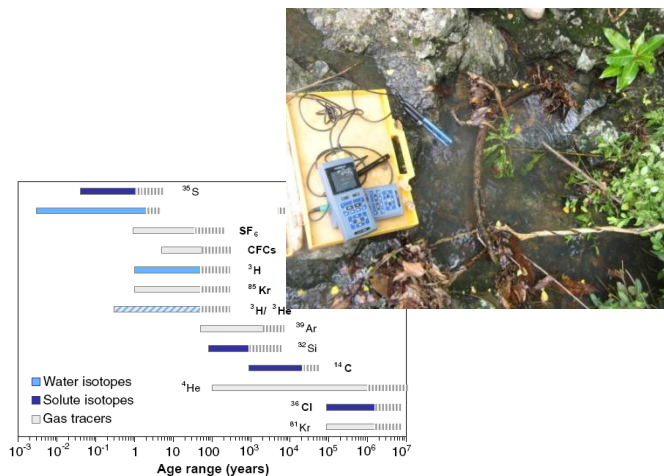


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Objectives

- to gain understanding of the controls on groundwater quality across Europe using the combined expertise and data held by member states



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Main focus

- Studying geogenic and anthropogenic pollutants
- In relation to drinking water, human and ecosystem health
- Linking geology, processes and variability of groundwater quality
- Considering data sharing, technical and scientific exchange
- Producing maps and web services

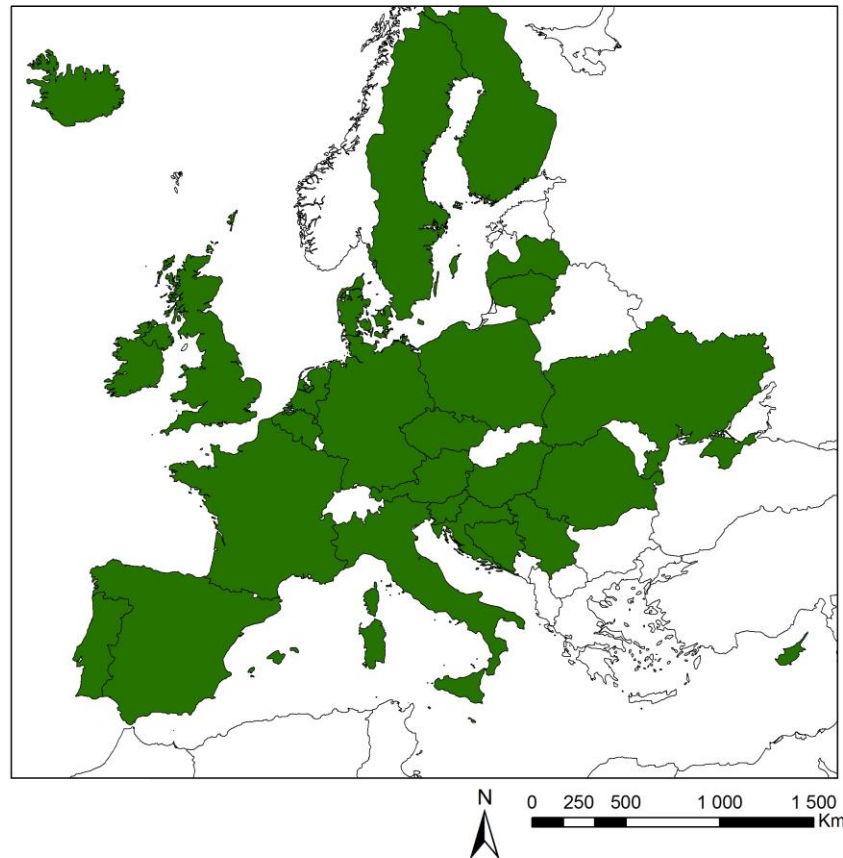


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Pan European

- 33 participants from 28 EU countries



Structure

WP 2 GEOERA INFORMATION PLATFORM AND CROSS THEMATIC COORDINATION, DATA MANAGEMENT AND DISSEMINATION
(coord. GEUS)

geogenic

WP 3
HYDROGEO
CHEMISTRY AND
HEALTH
(coord. GBA)

WP 6
GW AGE
DISTRIBUTION
Coord.
GEUS

anthropogenic

WP 7
GW
VULNERA-
BILITY
(coord. BGR)

WP 5
NITRATE &
PESTICIDE
TRANSPORT
(coord. BGS)

WP 8
EMERGING
CONTAMINANT
(coord. BRGM)

WP 4
GW-SW
TRANS. ZONE
(coord. GEUS)

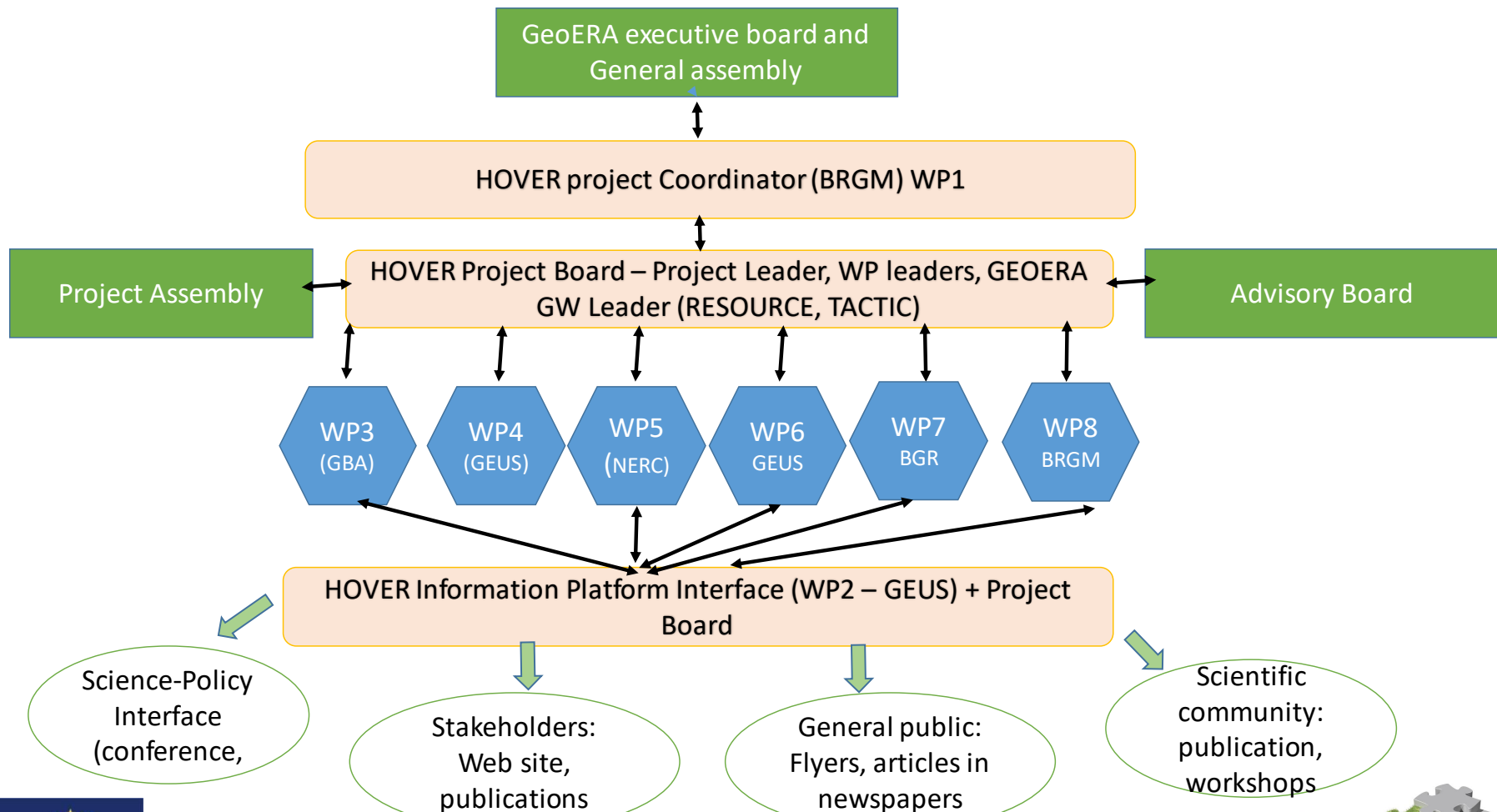
WP 1
PROJECT MANAGEMENT AND
SCIENTIFIC COORDINATION



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Project coordination



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



RESOURCE

**Resources of groundwater, harmonized at cross-border and
pan-European scale**

Hans Peter Broers

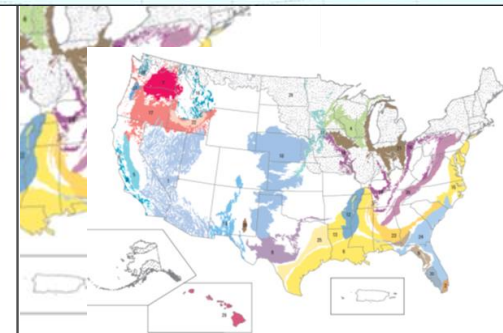
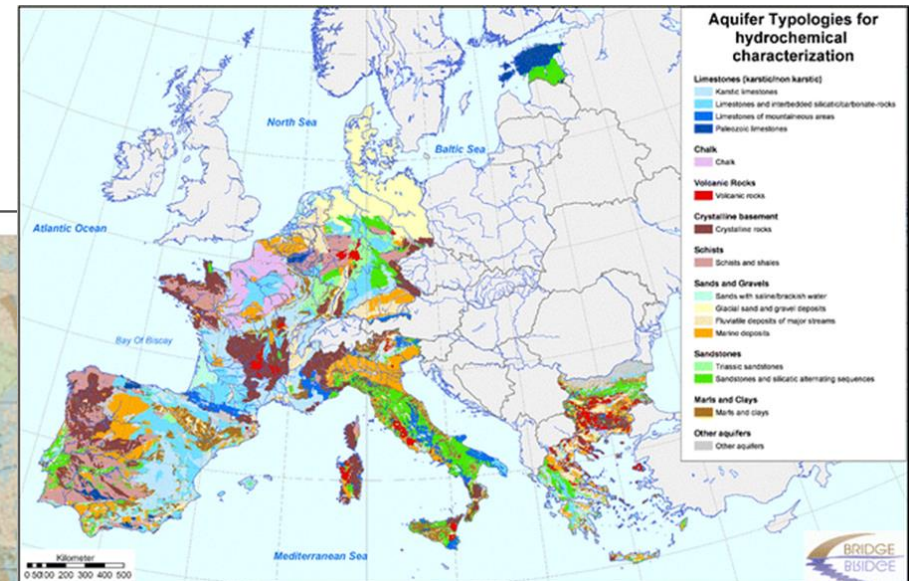
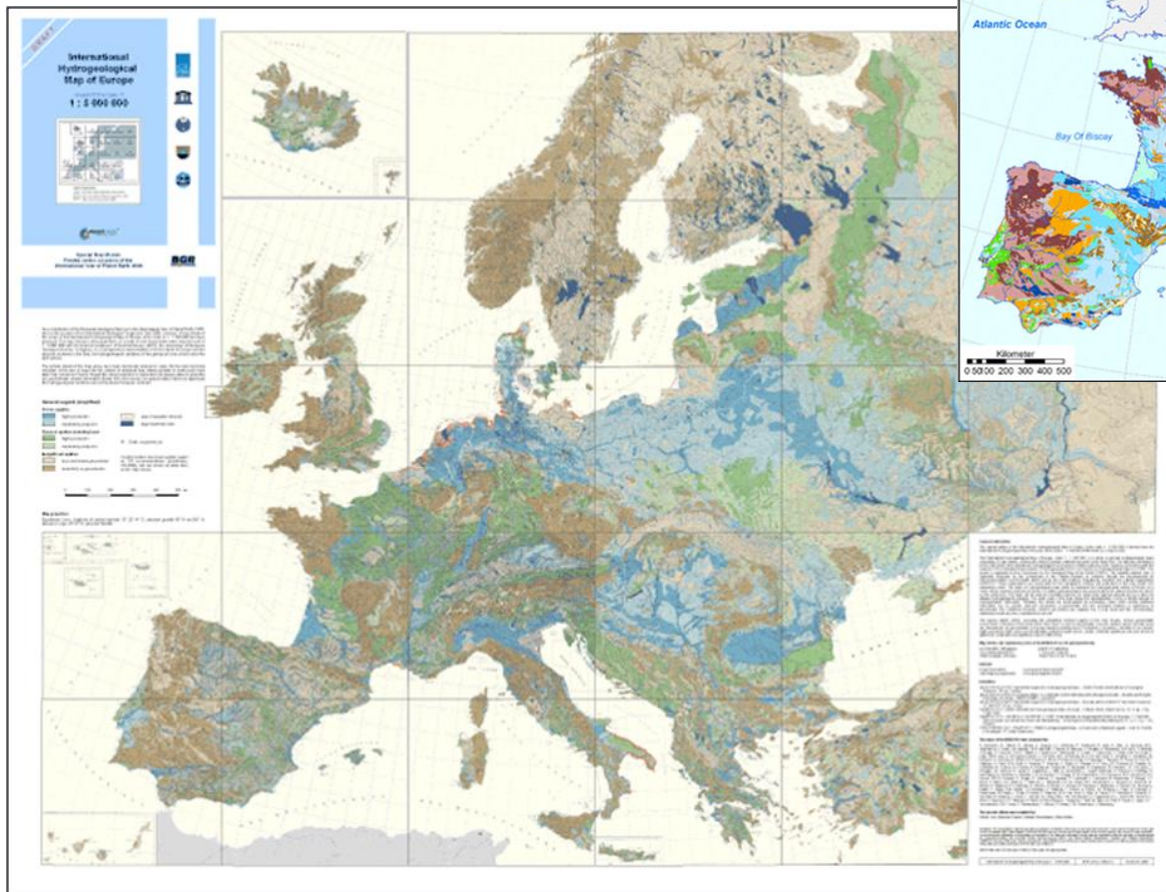
TNO Geological Survey of the Netherlands

July 3th 2018 GeoERA Kick-Off



Rationale

- Current state of the art
 - Rock types
 - What are the volumes of fresh water?



Work packages

- WP 1 Coordination
- WP 2 Interaction with the IP project
- WP3 Cross-border H3O-PLUS
- WP 4 Cross-border TRANSFLUX
- WP 5 Karst & Chalk pilots CHAKA
- WP6 Pan-European map of groundwater resources

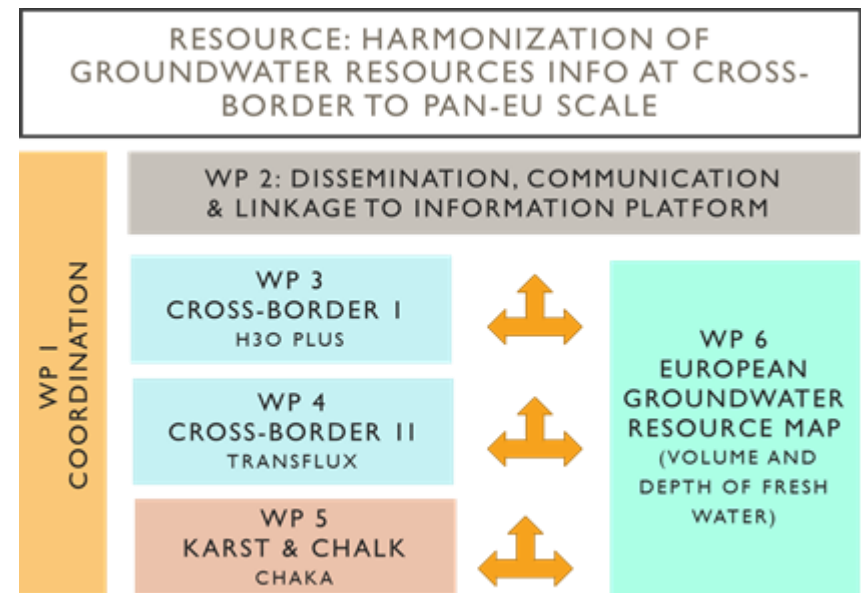


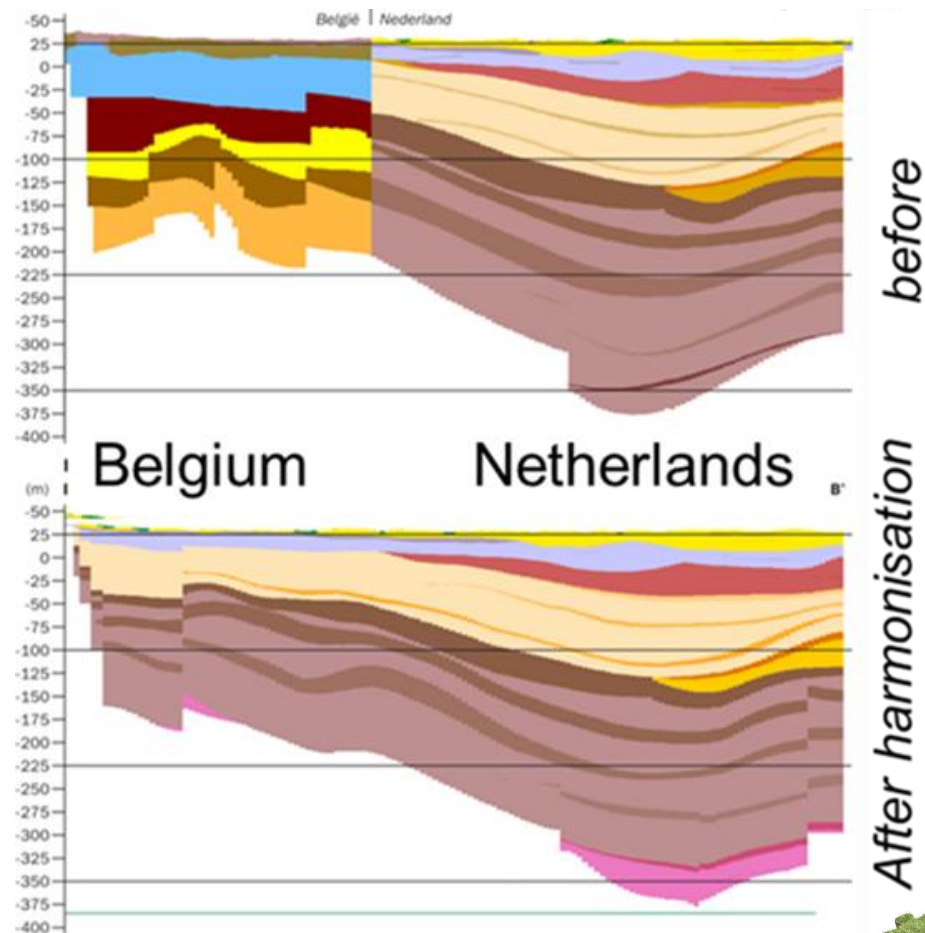
Figure 1 Overall structure of the RESOURCE project



WP3 & 4 : Cross-border demonstration projects H3O-PLUS and TRANSFLUX

H3O-PLUS: Harmonized information for subsurface spatial planning and management in a transboundary lowland aquifer system

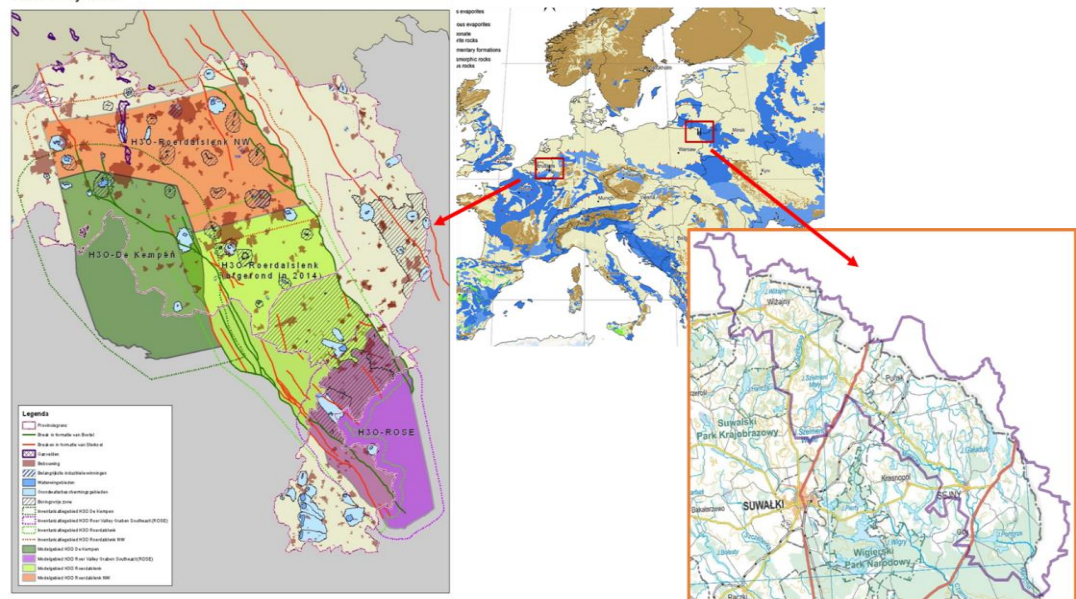
Create harmonized information over the Dutch, Flemish and German area of the Roer Valley Graben - a heavily used cross-border aquifer system, where many subsurface activities strive for prioritization.



WP3 & 4 : Cross-border demonstration projects H3O-PLUS and TRANSFLUX

TRANSFLUX:
Harmonization of data,
monitoring and
modelling in a
transboundary setting
 Determination of the
 transboundary
 groundwater flow
 directions in the cross-
 border area and
 estimation of the volume
 of groundwater, which
 flows through the state
 border between Poland
 and Lithuania.

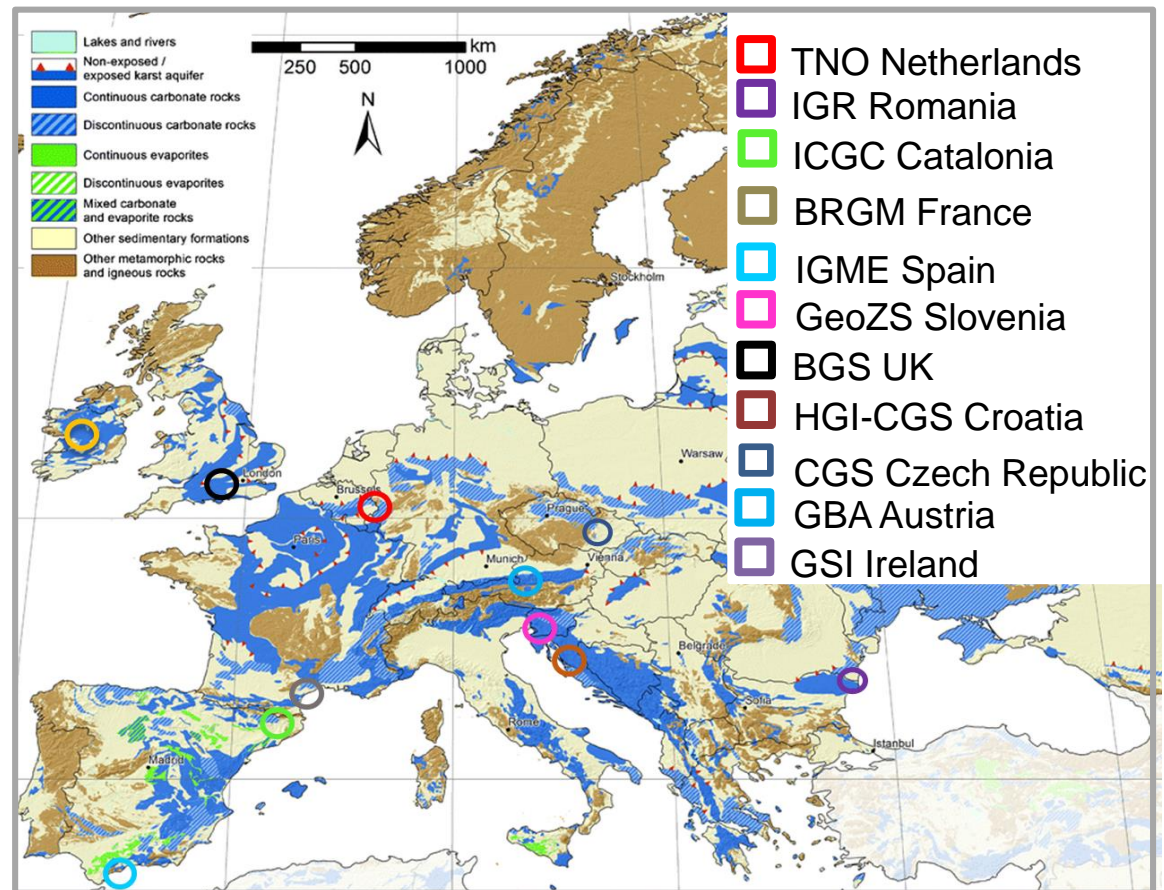
H3O-Projekten



WP 5 Karst & Chalk

CHAKA: Typology of karst and chalk aquifers and recommendations for their management

Develop a joint methodological framework for characterizing karst aquifer resources with the aim of solving water management issues (quantity and quality).



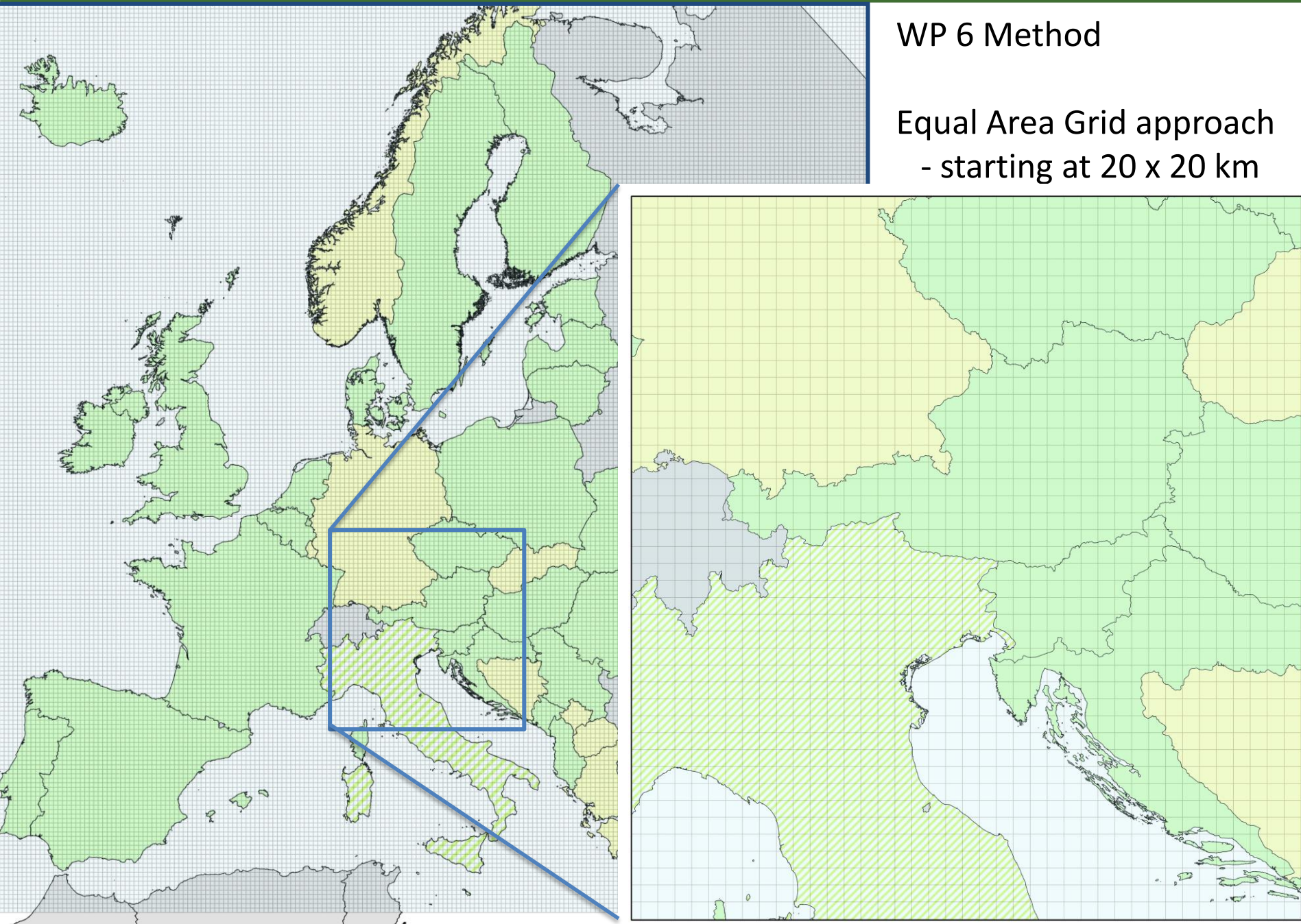
WP 6 Pan-EU map of fresh groundwater resources

- Pan-EU map of
 - Depth to saline water
 - Depths and thicknesses of aquifers and aquitards
 - Depth of hydrogeological base
 - (hydraulic parameters k_h , ϵ if feasible)
- Summarizes
 - Volumes and depths of fresh water in aquifers
 - Volume of fresh water confined in aquitards
- First estimate of the water balance of principal aquifers in Europe

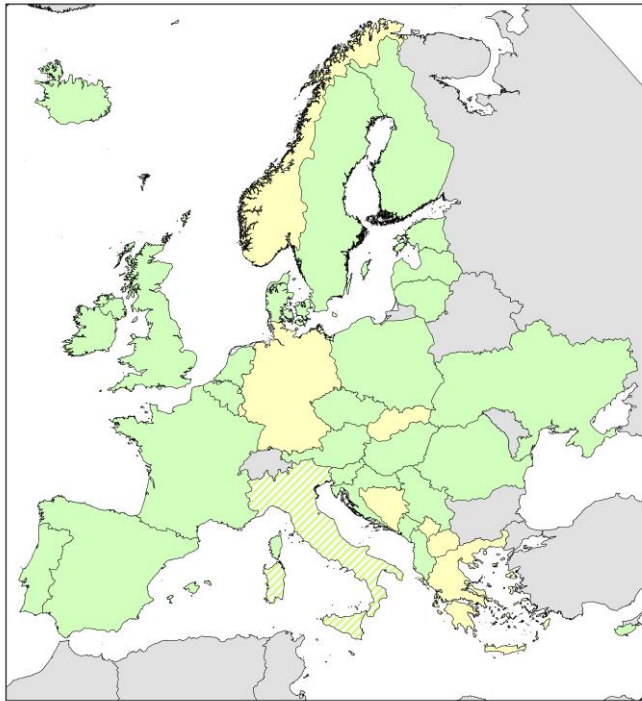


WP 6 Method

Equal Area Grid approach
- starting at 20 x 20 km



Participating surveys



Legend

- WP6 Participant
- Regional WP6 Participant
- GeoERA partner but not WP6 participant
- Countries not part of GeoERA

32 surveys involved
TNO, DLT, AGS, GBA, VMM,
HGI, GSD, CGS. GEUS, EGT,
GTK, BRGM,
MBFSZ, ISOR, GSI, ARPA, RT,
RU, LGMC, LGT, SGL, MTI,
PIG, LNEG, IGR, GSS, GZS,
ICGC, SGU, GIU, NERC



Stakeholders and advisory board

Stakeholders:

- Regional and national authorities
- Drinking water supply & Nature Conservation
- EU bodies and international stakeholders
 - CIS Working Group C on Groundwater
 - International Association of Hydrogeologists
 - UNESCO International Hydrological Program
 - European Environmental Agency

Advisory board:

- UNESCO International Hydrological Programme : Dr. Alice AURELI
- GEUS: Prof. Jens-Christian REFSGAARD
- International Association of Hydrogeologists : Prof. Stephen FOSTER

Table 2.1 – Stakeholders involved in RESOURCE

Work package	Stakeholders to be involved
WP 2 Dissemination, communication and linkage to the GeoERA Information Platform	CIS Working Group C on Groundwater European Environmental Agency Joint Research Centre
WP 3 H3O-PLUS	Regional and national authorities: <ul style="list-style-type: none"> • Province of Noord-Brabant (NL) • Province of Limburg (NL) • Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen (D) Drinking Water Supply: <ul style="list-style-type: none"> • Waterleiding Maatschappij Limburg (NL) • De Watergroep (BE) • Brabant water (NL)
WP 4 TRANSFLUX	Regional and national authorities <ul style="list-style-type: none"> • National Water Management Authority (PL) • Regional Water Management Authority, Białystok (PL) • Polish-Lithuanian Commission on Transboundary Waters • Regional Inspectorate of Environmental Protection in Białystok (PL)
WP 5 CHAKA: Karst & Chalk	Regional and national authorities <ul style="list-style-type: none"> • Province of Limburg (NL) • Waterboard Limburg (NL) • Catalan Water Agency (E) • General Directorate for Water Management (HU) • North-Hungarian Water Directorate • Region of Andalusia (E) • Bundesministerium für Nachhaltigkeit und Tourismus (A) • UBA - Umweltbundesamt (A) • HRVATSKE VODE (Croatian waters) • Rhone Mediterranean Corse Water Agency (F) • Constanta County Council (RO) • Romanian Waters National Administration • Dobrogea – Littoral Water Basin Administration (RO) • Environment Agency, England (UK) • Natural Resources Wales (UK) • Environmental Protection Agency (IRL) • Office of Public Works (IRL) • National Federation of Group Water Schemes (IRL) Drinking Water Supply & Nature Conservation: <ul style="list-style-type: none"> • North Hungarian Regional Waterworks (Hu) • Waterleiding Maatschappij Limburg (NL) • Andalusian Environmental and Water Agency • S.C. RAJA S.A. Constanta (RO) • Nature Conservation Agency of the Czech Republic • Portsmouth Water (UK) • Affinity Water (UK) • British Cave Research Association (UK) • Irish Water
WP6 Pan-EU Groundwater Resources	CIS Working Group C on Groundwater International Association of Hydrogeologists UNESCO International Hydrological Program European Environmental Agency Finnish Environmental institute Ministry of Infrastructure & Water (NL) Ministry of Environment MAPAMA (E) Portuguese Environmental Agency UBA - Umweltbundesamt (A) Environment Agency, England (UK)



GeoERA Projects Kick-off, July 3rd 2018, Brussels



Tools for Assessment of Climate change Impact on Groundwater and Adaptation Strategies

Senior researcher Anker L Højberg

Geological Survey of Denmark and Greenland



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



TACTIC consortium

- Partners:
 - 20 partners
 - 17 countries
- Budget:
 - Total: 1,799,979€
 - Partners: 1,265,385€
 - EU: 534,594€ from EU
- Coordinator:
 - GEUS, Denmark



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Climate change challenges

“...observed climate changes are already having widespread impact on ecosystems, economic sectors and human health and well-being in Europe.” - European Environmental Agency

“More extreme weather conditions are anticipated...and the impact is expected to increase in the future .” - JRC

- Impacts of climate change experienced today
 - Impacts expected to increase in future
 - The cost is immense
- Improved knowledge and tools to assess climate change impact are needed to support EU policy

“Cost of climate change in Europe could reach 4 % of GDP if no policy measures are adopted” – Horizon, the EU research and innovation Magazine

TACTIC contribution

- The groundwater system – a freshwater buffering system
 - Can enhance or dampening impacts from extreme weather events and vital for assessment of the CC impacts
 - but often ignored in CC assessments

TACTIC Vision

Improve **use and access** to data and knowledge acquired by the GSOs of the subsurface system in CC impact assessments and adaptation



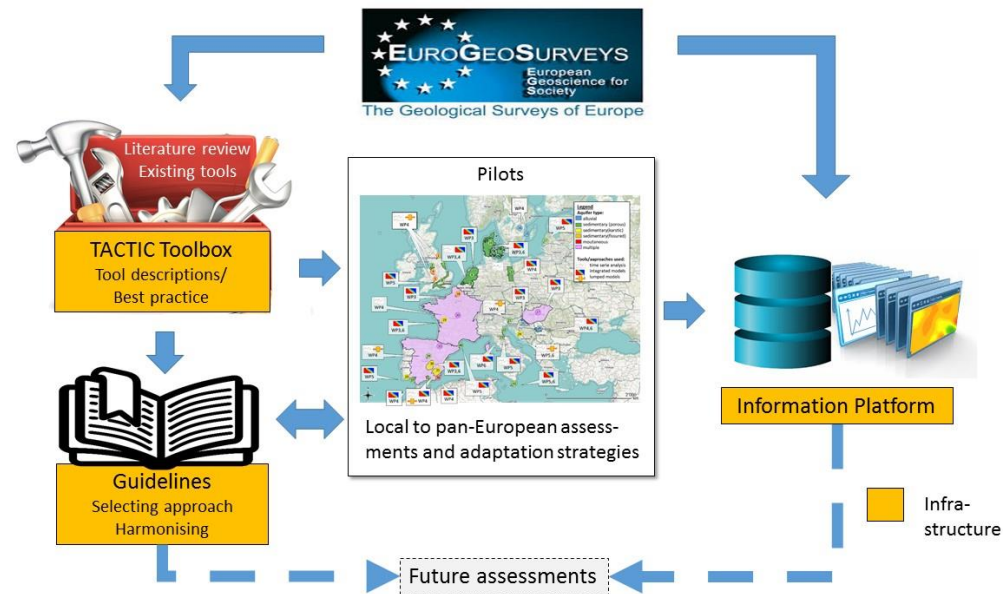
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



TACTIC objectives

Develop an infrastructure for improved CC impact assessments

- Collect and harmonise data
- Provide easy access to data and results in GIP
- Develop TACTIC toolbox
- Facilitating knowledge sharing/ best practice protocols
- Demonstrate in pilots (40 pilots)
- Develop guidelines and harmonised results
- Develop a roadmap for future developments



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TACTIC impacts

- Advance scientifically sound climate change impact assessments by EU GSOs – support EU policy on member state actions
 - Experiences varies presently
- Harmonising assessments and results
 - Prerequisite for EU policy-making
- Harmonising data
 - Making data available for future assessments/applications
 - Local, regional, national assessments (by GSOs)
 - Third parties, “on-top” services – decision support systems
 - Research activities, bring EU in front on innovative assessments and solutions



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166





VoGERA

**Vulnerability Of shallow Groundwater resources to
deep sub-surface Energy Related Activities**

Sian Loveless¹, Willem Zaadnoordijk², Cis Slenter³,
Koen Beerten⁴, Agnes Szalkai⁵, Klaus Hinsby⁶,
Kateryna Boiko⁷

BGS¹, TNO², VMM³, SCK•CEN⁴, MBFSZ⁵, GEUS⁶, Geoinform⁷

GeoERA Kick Off, Brussels - 3 July 2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



VoGERA - rationale

- Increased pressure on deep sub-surface in Europe for energy related activities
 - e.g. oil and gas, geothermal, energy storage
- Changes sub-surface/introduce new chemicals
- Possible impact on groundwater
- Concerns have lead to moratoria on or banning of some industries



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



VoGERA - aim

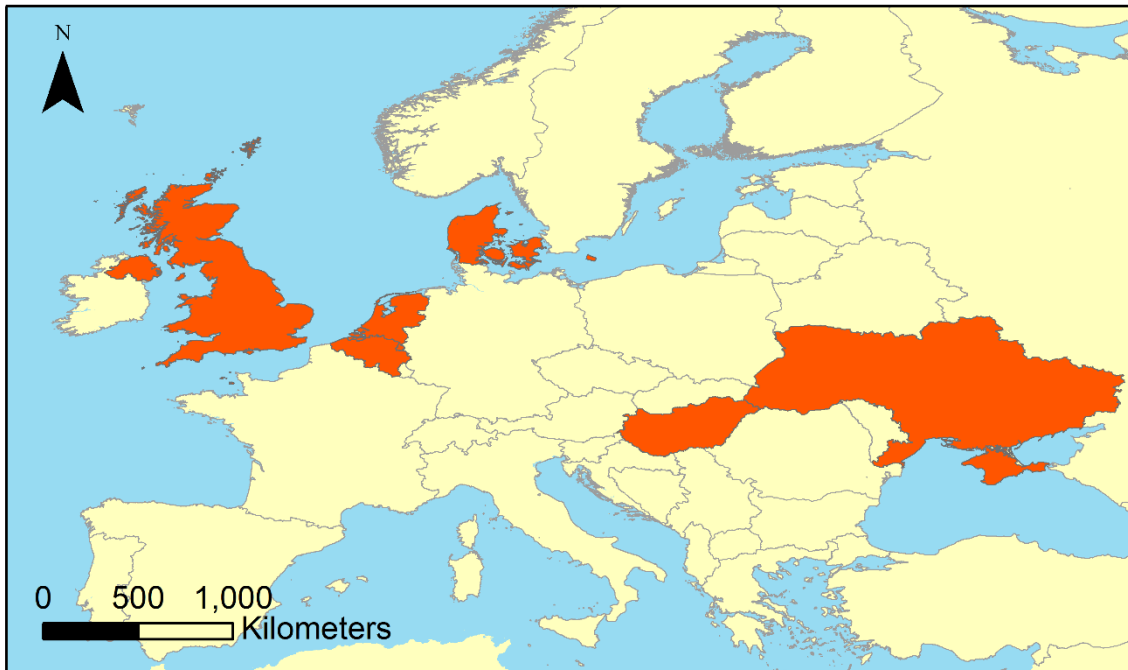
- To improve scientific understanding of the vulnerability of shallow groundwater from deep sub-surface energy-related activities.
 - Protect vulnerable groundwater
 - Allow responsible development of the sub-surface
 - European-wide approach
 - Consistent across energy activities



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



VoGERA - partners



BGS (UKRI)

TNO

VMM

SCK•CEN

MBFSZ

Geoinform

GEUS

Total budget: € 433 782

From EU: € 128 833

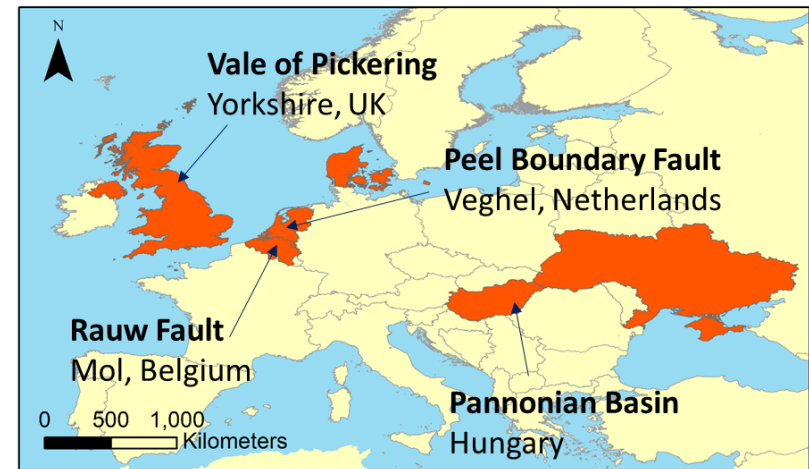


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



VoGERA - approach

- 1. Process understanding** – assess evidence for possible pathways for contamination from activities to shallow groundwater
 - Four pilot sites
- 2. Framework for vulnerability assessments** – tool for consistent approach



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

VoGERA – stakeholders and outputs

- Regional and local authorities, water supply companies, groundwater resource managers, public, academic researchers
- Evidence summarised in report
- Tool for assessing groundwater vulnerability



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166





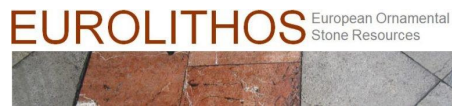
3. RAW MATERIALS



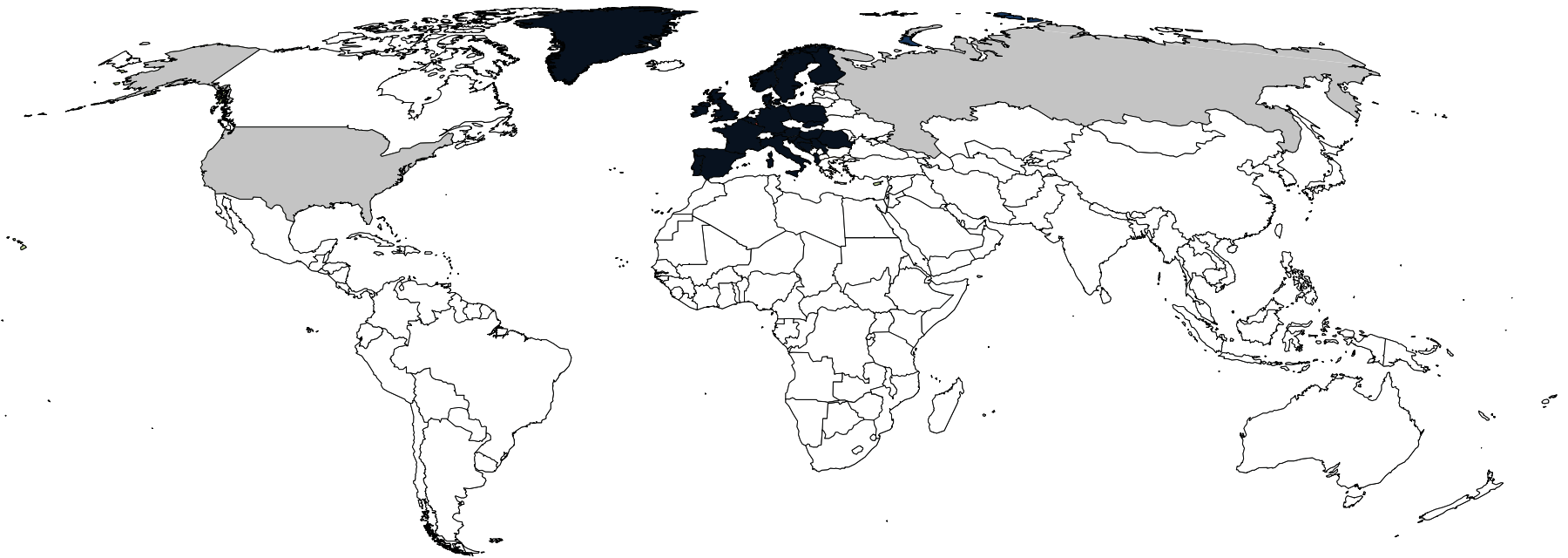
Projects and Relationships



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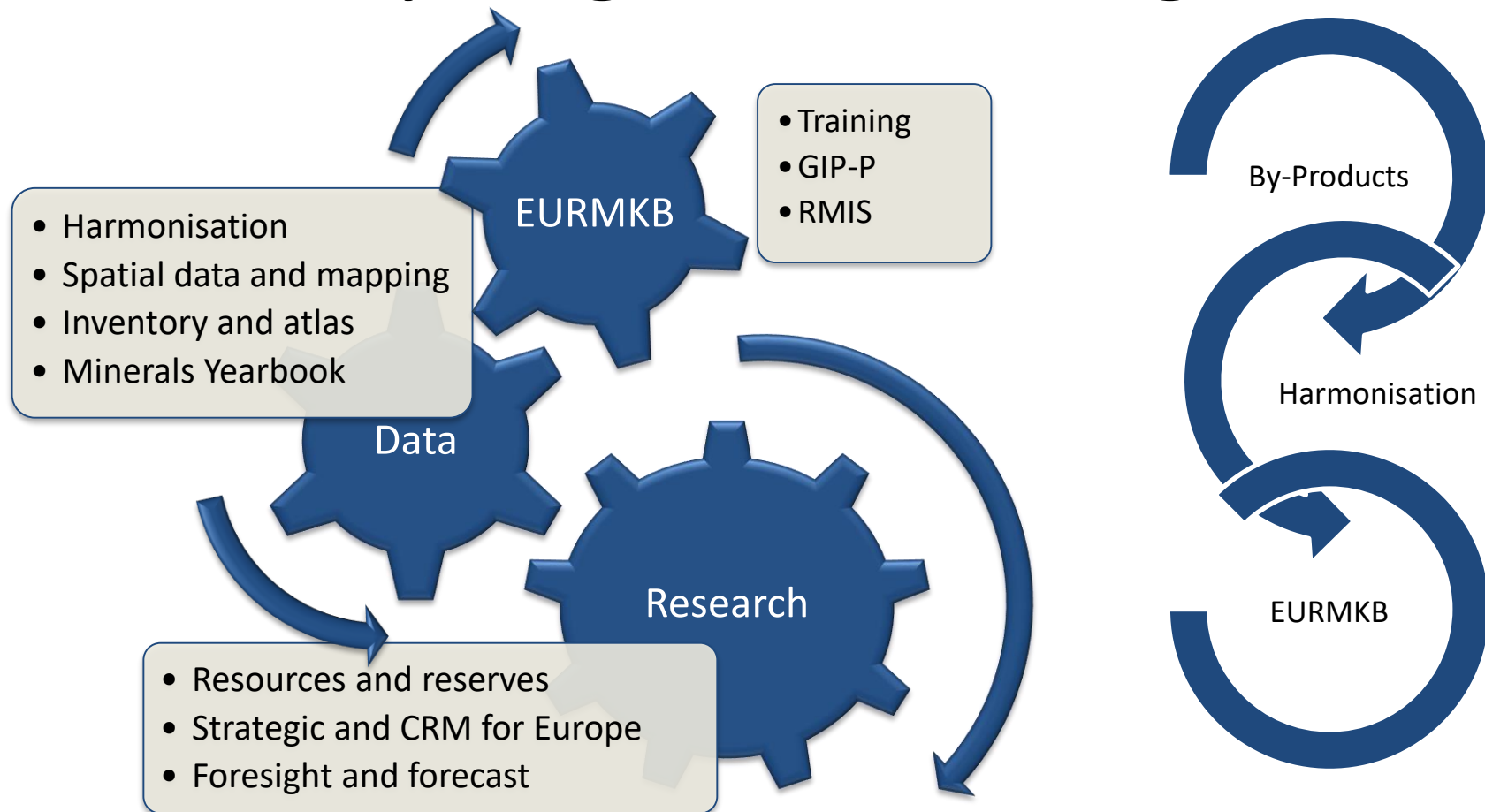
37 Regional and National Geological Survey Organizations and Marine Institutes
29 countries in Europe and beyond.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Synergies and linkages



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Mineral Intelligence for Europe

Jørgen Tulstrup, GEUS

GeoERA Kick-off meetings, Brussels, 3-5 July 2018



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Aim. What?

Support safe, informed and knowledgeable decisions from political bodies and the industry thereby stimulating both investment in the EU and job growth.



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Aim. How?

Improve the European Knowledge Base by generating reliable and comprehensive raw materials datasets:

- Update the electronic Minerals Yearbook
- Extend the spatial coverage and quality of data from past and ongoing European projects (Inventory)
- Improve harmonisation of Raw Materials data
- Integrate all into GIP



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A little more in details...

- Update the European Minerals Yearbook with production and trade data (2014-2017), and resource and reserve data as well as exploration information;
- Integrate the Yearbook in the Minerals4EU database (INSPIRE);
- Improve the quality and spatial coverage of the Minerals Inventory, addressing harmonization issues and facilitating interoperability with other ongoing European mineral intelligence projects;
- Test the application of the UNFC classifications to obtain more accurate pan-European mineral inventories;
- Recommend communication and interaction between existing databases and data portals, and the Raw Materials Information System (RMIS);
- Integrate the Yearbook and Minerals Inventory in the GIP and provide user-oriented search and visualisation facilities;
- Enable interoperability of raw materials data with data on groundwater and geoenery resources to support spatial planning and management of competing land uses



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We are building on



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



and will be working together with



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



The work

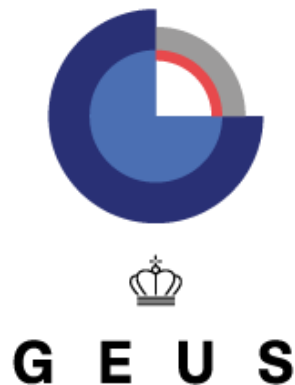
WP	Title	Lead	PMs
1	Management, communication, dissemination, and sustainability	GEUS	42
2	Update to Electronic European Minerals Yearbook	BGS	135
3	Minerals Inventory	GeoZS	135
4	UNFC pilot	NGU	34
5	Improvement of KDPs' applications and interaction with the RMIS and the GIP	BRGM/GEUS	47



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Project Lead



WP Leads



Partners



Thank you!



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FRAME – Forecasting and Assessing Europe's Strategic Raw Material Needs

Daniel de Oliveira

LNEG

Laboratório Nacional de Energia e Geologia, I. P.

FRAME Kick Off, 3 July 2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Project Lead



WP Leads



Partners



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



FRAME – Factsheet 2A

8 Work packages

WORK PACKAGE 1 – Project Coordination - LNEG

Contact Point: Daniel de Oliveira

WORK PACKAGE 2 – Communication, Dissemination and Exploitation - LNEG

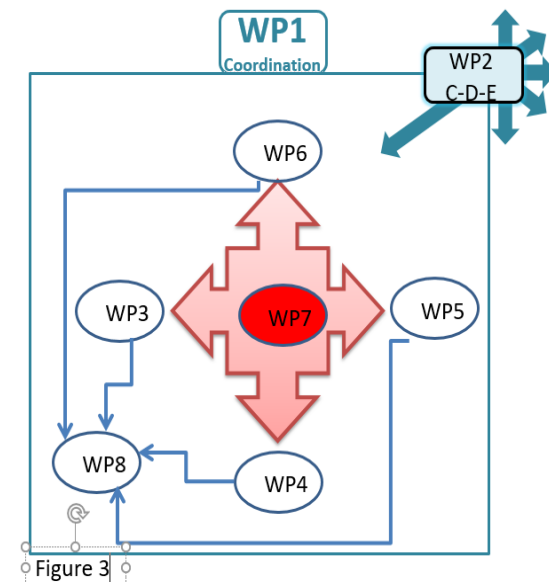
Contact Point: Maria João Ferreira

WORK PACKAGE 3 – Critical and Strategic Raw Materials Map of Europe - **SGU**

Contact Point: Nikos Arvanitidis

WORK PACKAGE 4 – Critical Raw Materials in phosphate deposits, and associated black shales - RBINS

Contact Point: Sophie Decree



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

FRAME – Factsheet 2B

WORK PACKAGE 5 – Energy Critical Elements –

Overall Lead: **NGU**, Contact Point: **Håvard Gautneb**

Lithium – Lead: **BRGM**, Contact Point: **Eric Gloaguen**

Graphite – Lead: **NGU**, Contact Point: **Håvard Gautneb**

Cobalt – Lead: **GTK**, Contact Point: **Tuomo Törmänen**

WORK PACKAGE 6 – Conflict free Nb-Ta for the EU - **SGU**

Contact Point: **Helge Reginiussen**

WORK PACKAGE 7 – Historical mining sites revisited - **BGR**

Contact Point: **Henrike Sievers**

WORK PACKAGE 8 – Link to Information Platform - **LNEG**

Contact Point: **Lídia Quental**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



FRAME – Factsheet 3

25 Milestones

42 Deliverables

> 400 Person Months

Total funding requested: 932471.61€

Total in-kind contribution: 2207162.87€



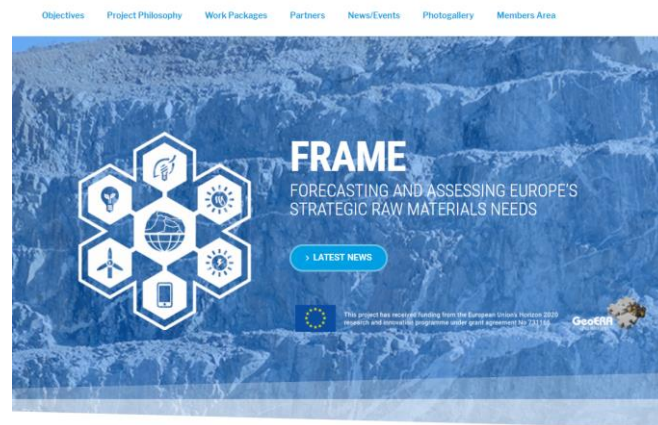
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FRAME – Factsheet 4

- Project site

Up and running!
www.frame.ineg.pt



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



FRAME – Factsheet 5

- Project synergies:
 - MINTELL4EU – Mineral Intelligence for Europe

<http://geoera.eu/projects/mintell4eu/>



- MINDeSEA - Seabed Mineral Deposits in European Seas

<http://geoera.eu/projects/mindesea/>



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1 H Hydrogen																	2 He Helium		
3 Li Lithium	4 Be Beryllium													5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium													13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton		
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon		
55 Cs Cesium	56 Ba Barium	57-71	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon		
87 Fr Francium	88 Ra Radium	89-103	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Uut Ununtrium	114 Fl Flerovium	115 Uup Ununpentium	116 Lv Livermorium	117 Uus Ununseptium	118 Uuo Ununoctium		
Lanthanide series			57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium		
Actinide series			89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium		


 Thank you!


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GeoERA
 RAW MATERIALS




MINDeSEA

Seabed Mineral Deposits in European Seas:
Metallogeny and Geological Potential for
Strategic and Critical Raw Materials

Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials **MINDeSEA**

Javier González

Geological Survey of Spain (IGME)

Kick-off, Brussels 03-July-2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Project Lead



Instituto Geológico
y Minero de España

WP Leads



Instituto Geológico
y Minero de España



LNEG
Laboratório Nacional de Energia e Geologia, I.P.



Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

An Bóird Comhairle, Grúpaíocht ar son na Meáin agus Comhairle
Department of Communications, Climate Action & Environment

Partners



GEOLOGICAL
SURVEY OF
NORWAY

- NGU -



SGU

Sveriges geologiska undersökning
Geological Survey of Sweden

(Non-Funded)



instituto português do mar e da atmosfera



science for a changing world



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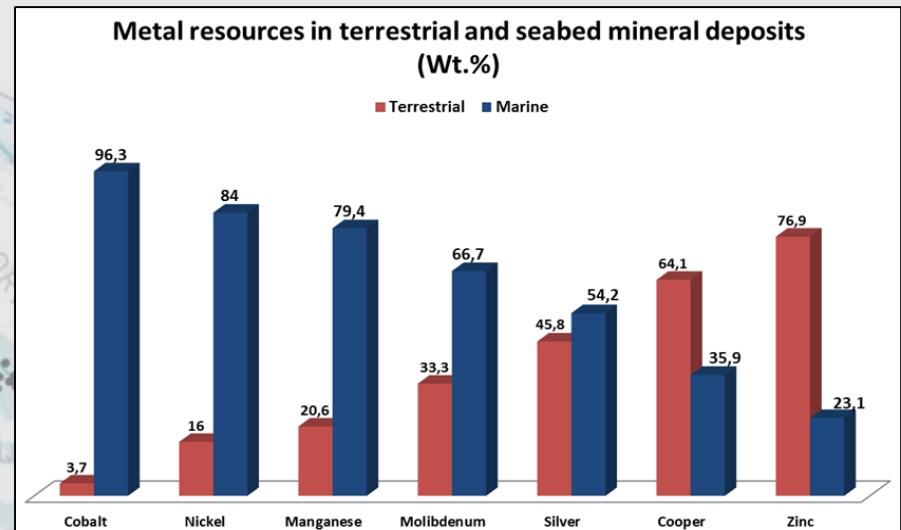
Challenge

Seafloor deposits:

the most important yet least explored resource of CRM

By 2030, 10% of the world's minerals, including cobalt, copper and zinc could come from the ocean floors.

Global annual turnover of marine mineral mining can be expected to grow from virtually nothing to **€10 billion by 2030.**



2017 CRMs (27)

Antimony	Fluorspar	LREEs	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	HREEs	PGMs	Vanadium
Coking coal	Indium	Phosphate rock	



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MINDeSEA Aim and Objectives

The **specific aim** of MINDeSEA is to establish the metallogenic context for different seabed mineral deposits with economic potential in the pan-European setting.

Objectives

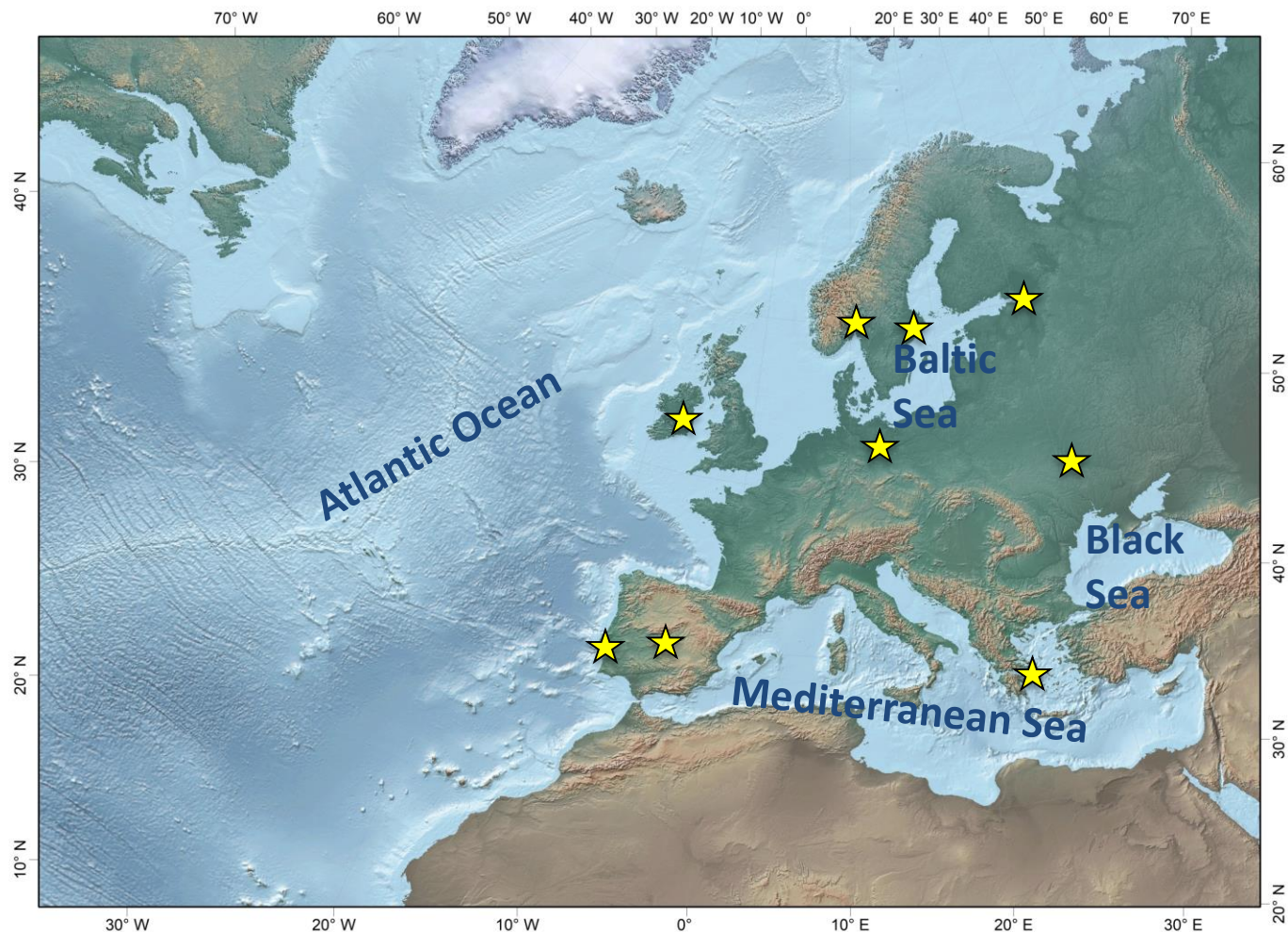
1. Characterise **deposit types**.
2. Characterise the **trace element** content of the deposit type including **CRM**.
3. Identify the principal **metallogenic provinces**.
4. Develop **harmonized mineral maps and datasets** of seabed deposits incorporating GSO datasets, along with mineral-potential and prospectivity maps.
5. Demonstrate how the **case study** results can be used in off-shore mineral exploration.
6. Analyse **present-day exploration and exploitation status** in terms of regulation, legislation, environmental impacts, exploitation and future directions.
7. Demonstrate **efficiency of a pan-European research approach** to understanding seabed minerals and modes of exploration.



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MINDeSEA Geographical Scope



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

MINDeSEA Outline

WP	Title / Lead	Contact
WP1	Project Management and Coordination. IGME-Spain	Javier González
WP2	Communication, Dissemination and Exploitation. IGME-Spain.	Teresa Medialdea
WP3	Seafloor Massive Sulphide Deposits. NGU-Norway	Henrik Schiellerup
WP4	Ferro-manganese crusts, phosphorites and Critical Raw Materials. IGME-Spain.	Javier González
WP5	Marine placer deposits. IGME-Greece.	Irene Zananiri
WP6	Polymetallic nodules. LNEG-Portugal	Pedro Ferreira
WP7	Exploration in the Atlantic, Mediterranean, Baltic and Black Sea. IGME-Spain	Luis Somoza
WP8	Link to Information Platform. GSI-Ireland	Maria Judge



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MINDeSEA Contribution

38 Deliverables

25 Milestones

123.8 Person Months

939,530 € Total Eligible Costs

**706,899 € Surveys in kind
Contribution**

**232,636 € Requested EU
Contribution**



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MINDeSEA: What and for whom?

Databases

Potential and Prospectivity Maps

Case Study

Metallogenic Models

Status of regulation, legislation and exploitation

Dissemination Products and Workshops

Progress Reports

Thank you!



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EUROLITHOS European Ornamental
Stone Resources



Eurolithos: Ornamental Stone Resources in Europe

Lead Partner: NGU



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Ornamental stone industry in Europe

- 8,5 billion Euro in 2010
- High proportion of SME's, backbone industry in many rural areas
- Strongly linked to European architectural heritage and cultural landscapes



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GeoERA RM scope:

- identify and map the type and quality of construction materials, and **provide tools and protocols for the assessment and comparison of deposits** using standard criteria



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Challenges

- Increasing replacement of traditional stone materials with «cheapest on the market»
- Deterioration of stone industri SME's based on regional markets and traditions
- Reduction of cultural heritage values
- Increasing environmental footprints from ornamental stone production and transport



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EuroLithos concept

Creating awareness and knowledge of

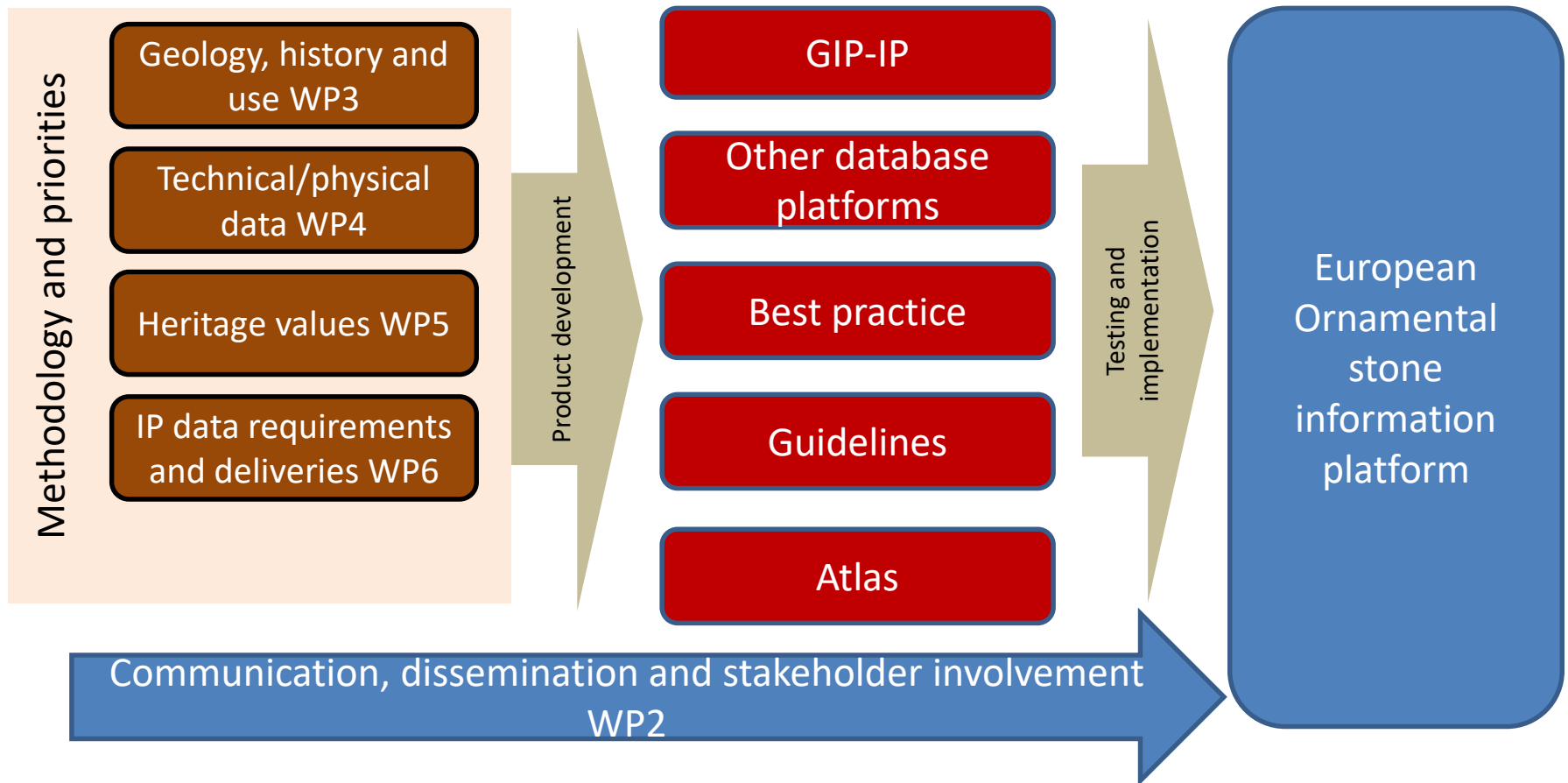
- The diversity of European ornamental stone resources,
- Their importance to our landscapes and architecture
- The environmental benefit of «short-travelled» resources

Will contribute to a better competitive regime for European SME's



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Project Lead



GEOLOGICAL
SURVEY OF
NORWAY

- NGU -

WP Leads



Partners



ISPRA
Istituto Superiore per la Protezione
e la Ricerca Ambientale

REGIONE
TOSCANA



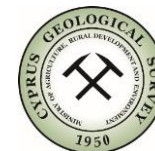
Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann



GeoZS
Geološki zavod
Slovenije

SGU

Sveriges geologiska undersökning
Geological Survey of Sweden



GBA



Service Géologique
du Luxembourg



Instituto Geológico
y Minero de España







Thank you!



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-  **Raw Materials Initiative (RMI)** – Specifically **Pillar 2** *Sustainable supply of raw materials from EU sources*; COM(2008) 699 final; COM(2011) 25 final and assists in unlock the full potential of the single market -> EU Industrial Policy Strategy for the Internal Market
-  Explores, monitors and forecasts strategic raw materials (*Critical Raw Materials 2020, Raw Materials Scoreboard 2020*)
-  Complement the **Strategic Implementation Plan (SIP)** of the European Innovation Platform on Raw Materials by supporting the three Priority Areas, in particular *Access to Mineral Potential in the EU*.
-  Will lease with Earth observation data as provided by Copernicus.



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4. INFORMATION PLATFORM

GeoERA

INFORMATION
PLATFORM



Jørgen Tulstrup

GEUS

Geological Survey of Denmark and Greenland

GeoERA Kick-off meetings, Brussels, 3 – 5 July 2018



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Aim. What?

- The GeoERA Information Platform Project (GIP-P) will establish a common platform for organising, disseminating and sustaining the digital results of the other GeoERA projects.



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Aim. How?

- The platform will include
 - a central database;
 - a metadatabase;
 - a user friendly web-portal including facilities for visualising complex information like 3D/4D geological models;
 - a digital archive for organising reports and unstructured data;
 - Probably many other new features...



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More how?

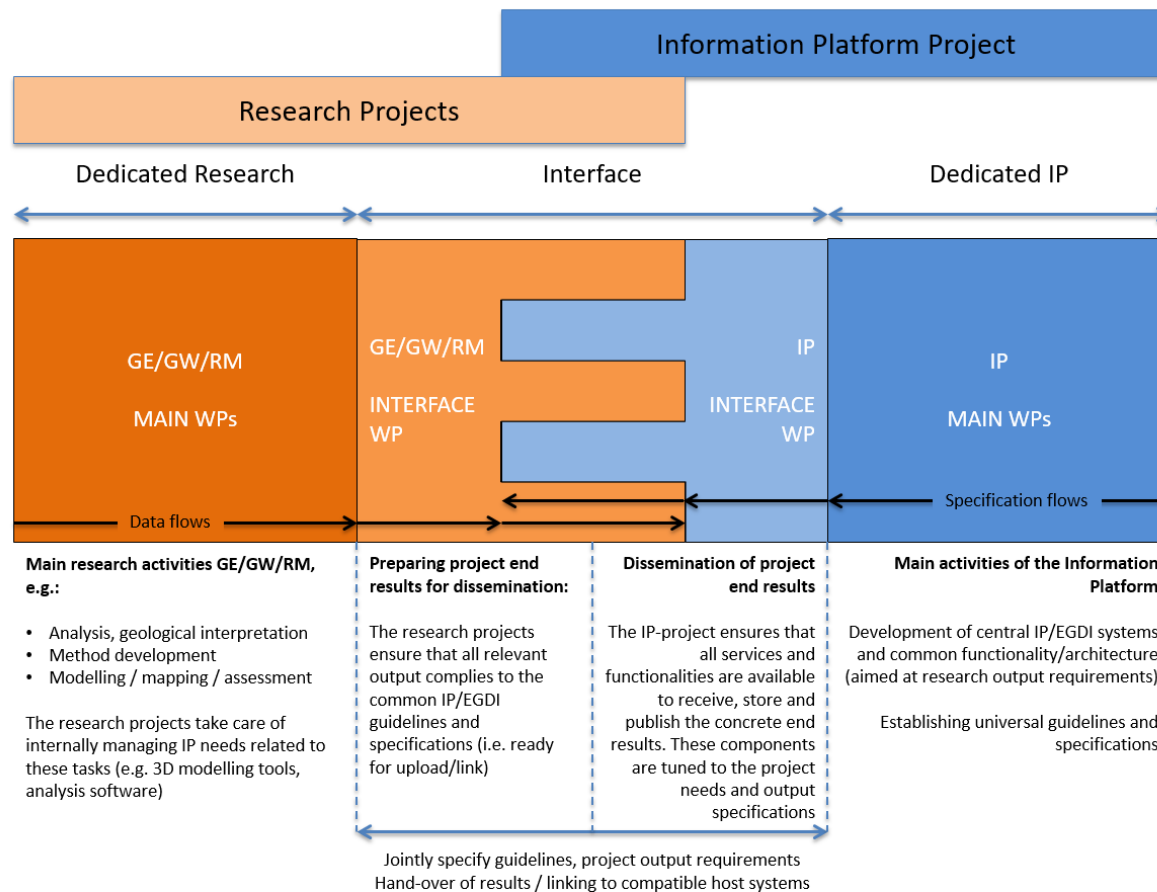
- Strong focus on standards
- Use Linked Open Data and Multilingual Thesauri for maximum interoperability
- To identify and ensure that the needs of the other projects are fully identified and understood a specific organisation will be set up to liaise between them and the GIP-P



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Who does what?



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A jump start, EGD

Home Projects Themes Call FAQ GeoERA material About GeoERA Contact Search

Information platform

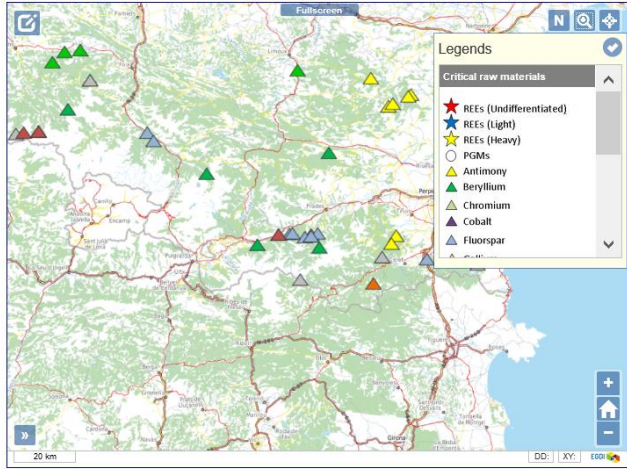
The geo-energy, groundwater and raw materials themes share the common objective to provide and disseminate spatial information on their respective resources and underpinning geological data. As the cross-thematic integration of information is an important aspect to be addressed in GeoERA a specific theme on an "Information Platform" that effectively integrates all ICT-related and technical issues (database and dissemination) from the three challenges has been introduced.

Under the Information Platform theme one [project](#) has been awarded and this will address the development of a common geoscience information platform capable of integrating up-to-date data, interpretations and models from different and distributed sources, both within and across the three main geoscientific themes of GeoERA.

The platform will be based on results obtained during the development of the European Geological Data Infrastructure (EGDI) (see www.europe-geology.eu) which has been implemented in a first version in 2016 by members of the EuroGeoSurveys Spatial Information Expert Group.

Theme coordinator for the Information Platform theme is Jørgen Tulstrup jt@geus.dk from GEUS.

Here is an example of the user interface of EGD:



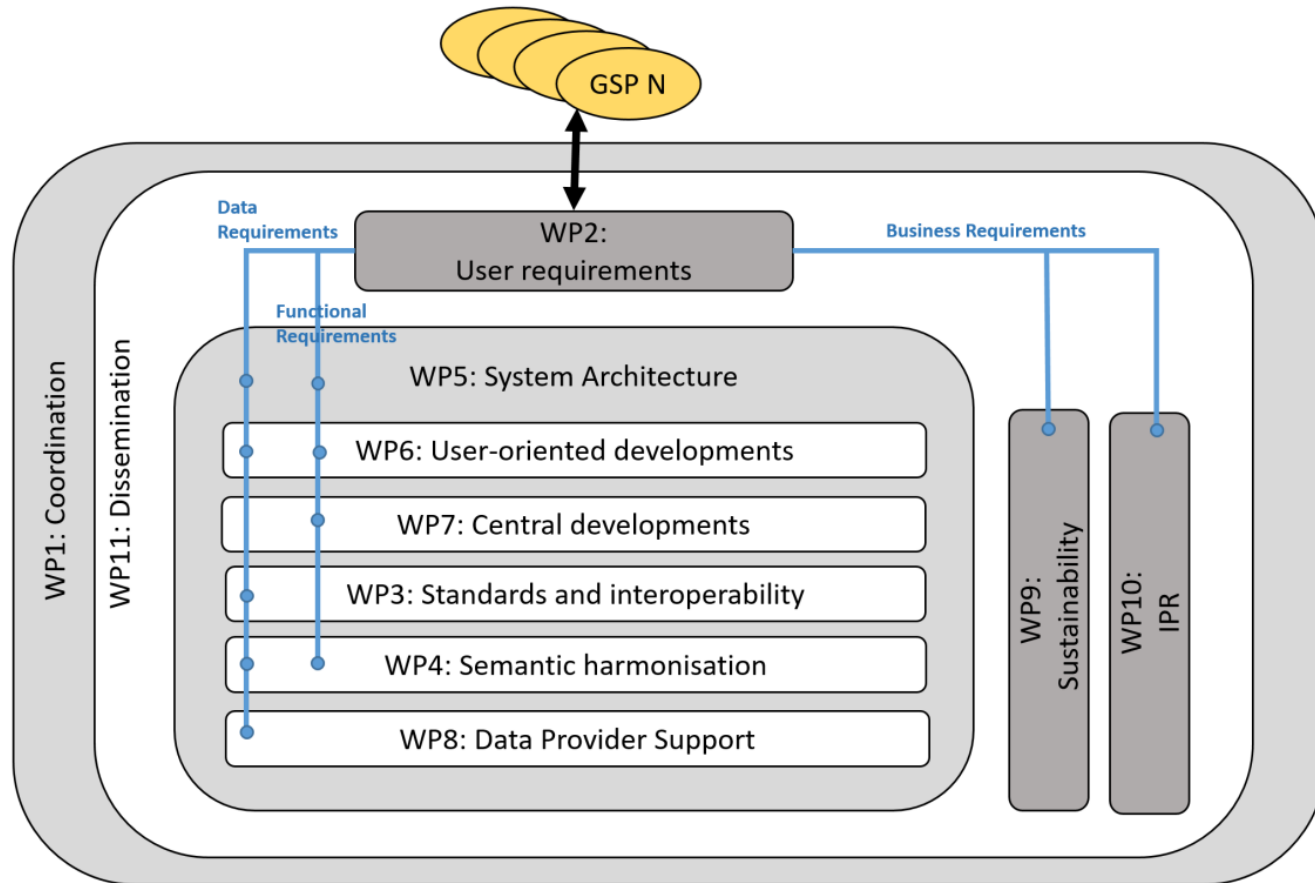
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ANNEX 6. PROJECT POSTERS

- 1 Geoconnect3D
- 2 HIKE
- 3 GARAH
- 4 Hotline
- 5 MUSE
- 6 3DGEO-EU
- 7 HOVER
- 8 Resources
- 9 Tactic
- 10 VoGERA
- 11 Eurolithos
- 12 Frame
- 13 MINDeSEA
- 14 Mintell4EU
- 15 GIP-IP

GEOCONNECT^{3d}

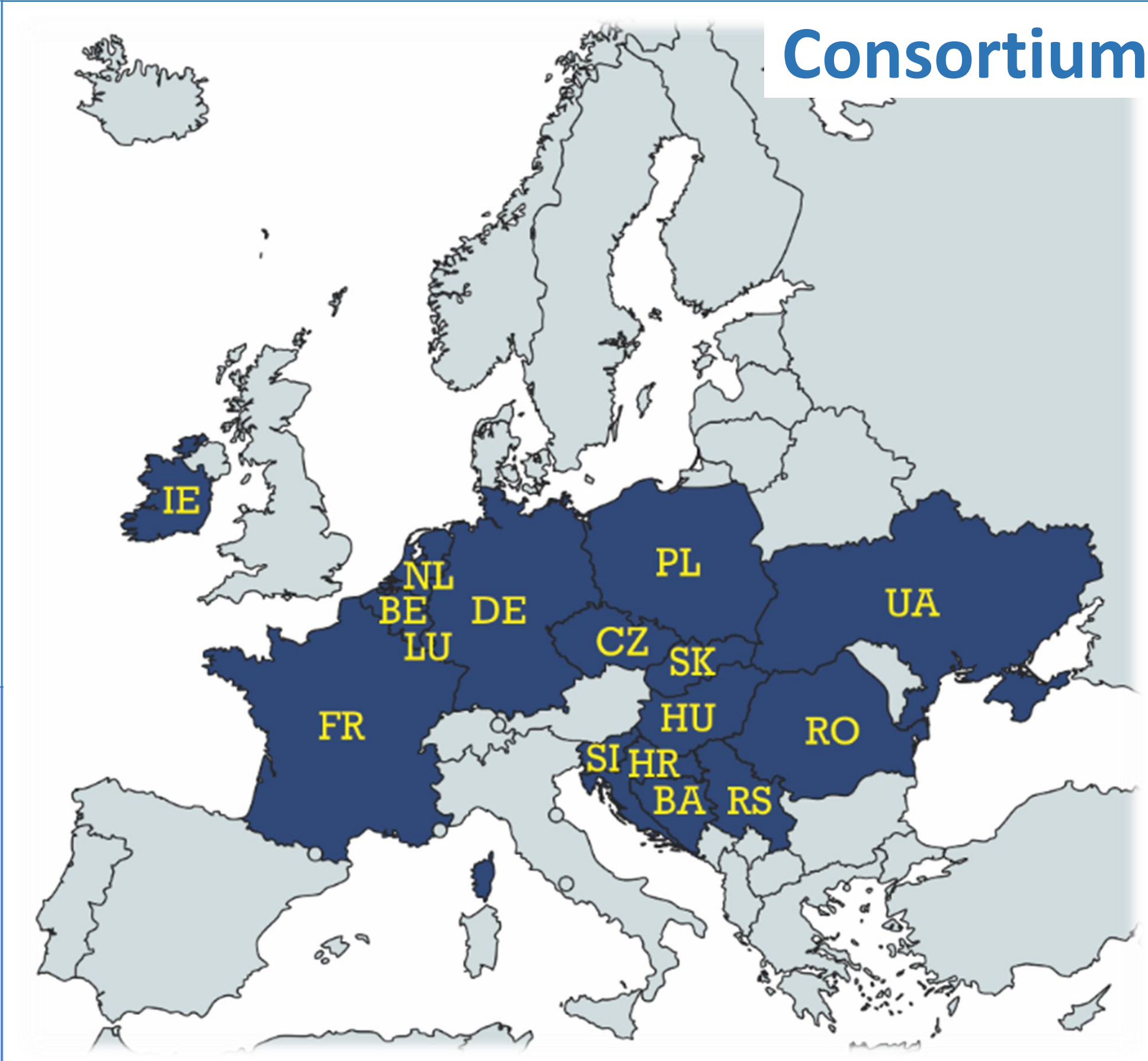
Cross-border, cross-thematic multiscale framework
for combining geological models and data for
resource appraisal and policy support



BRIDGING SCIENCE AND POLICY

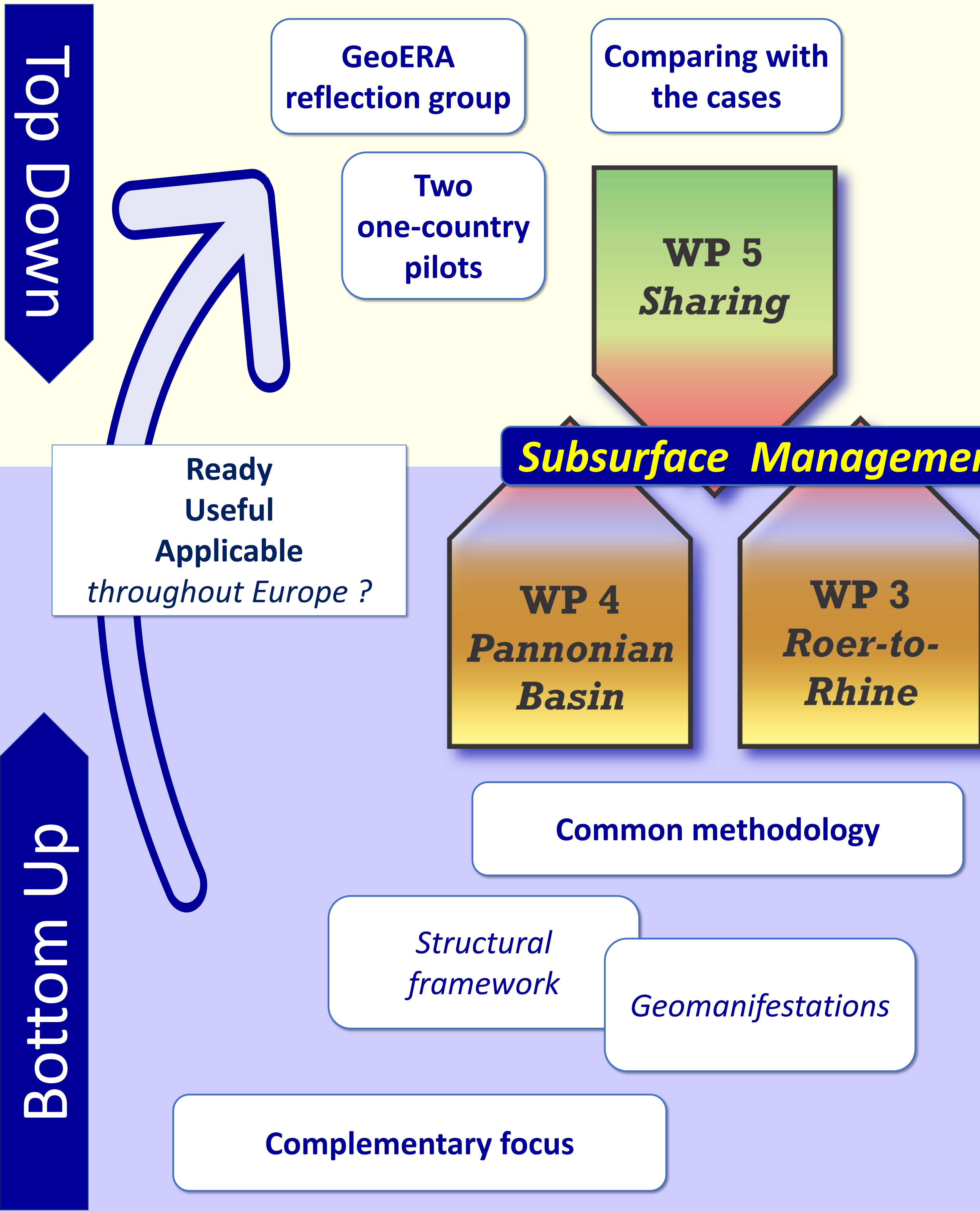
Objectives

- Disclosure of cross-border, cross-thematic geo-information
Understandable for stakeholders, tailored to the needs of end-users
- Establish cross-border, cross-thematic and multi-scale methodology
As new template for post-GeoERA projects, to highlights the complexity and main lessons regarding subsurface management
- Explore inter- and cross-thematic challenges
Integrate and exchange results with other projects, focus on subsurface management



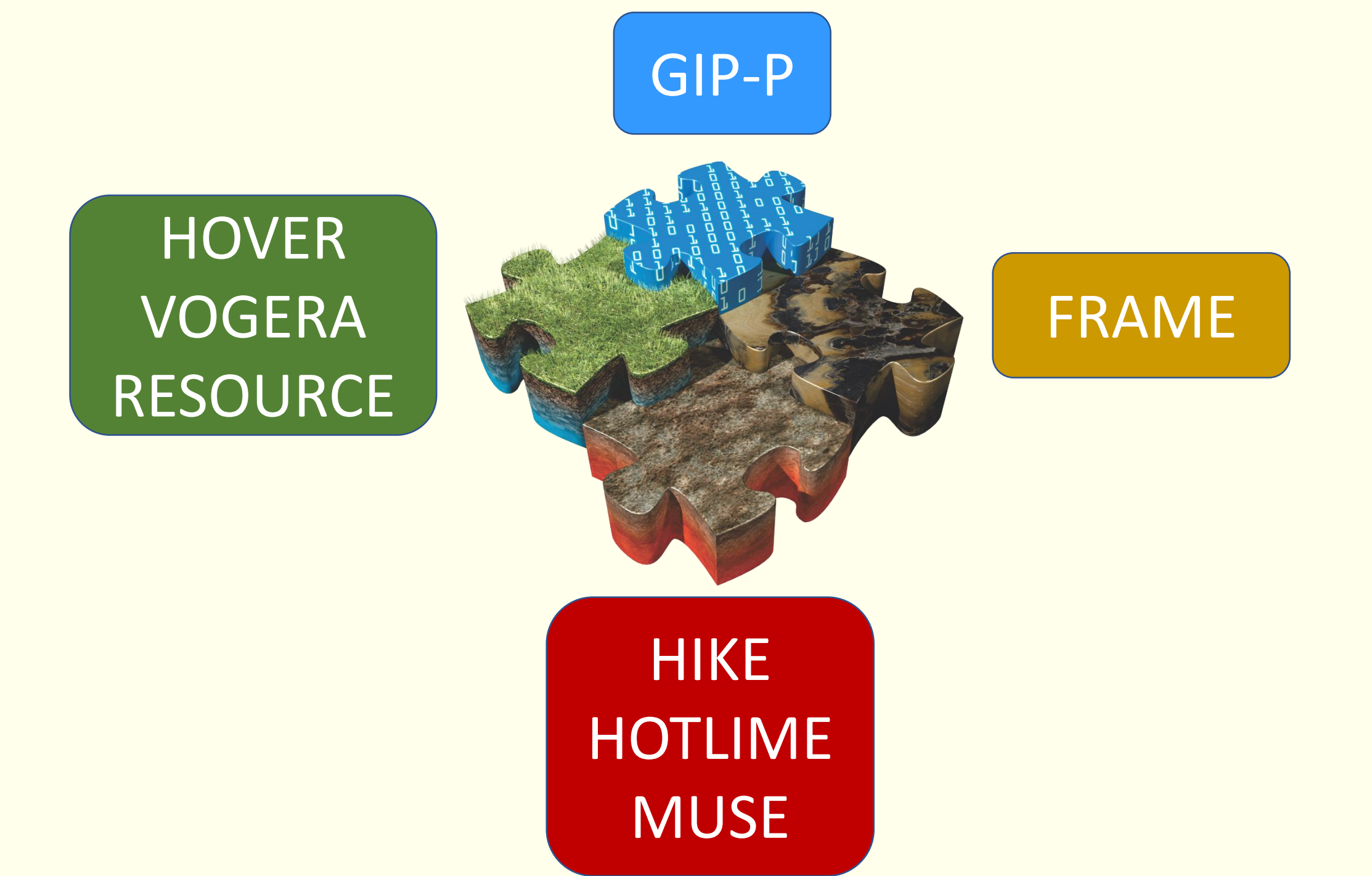
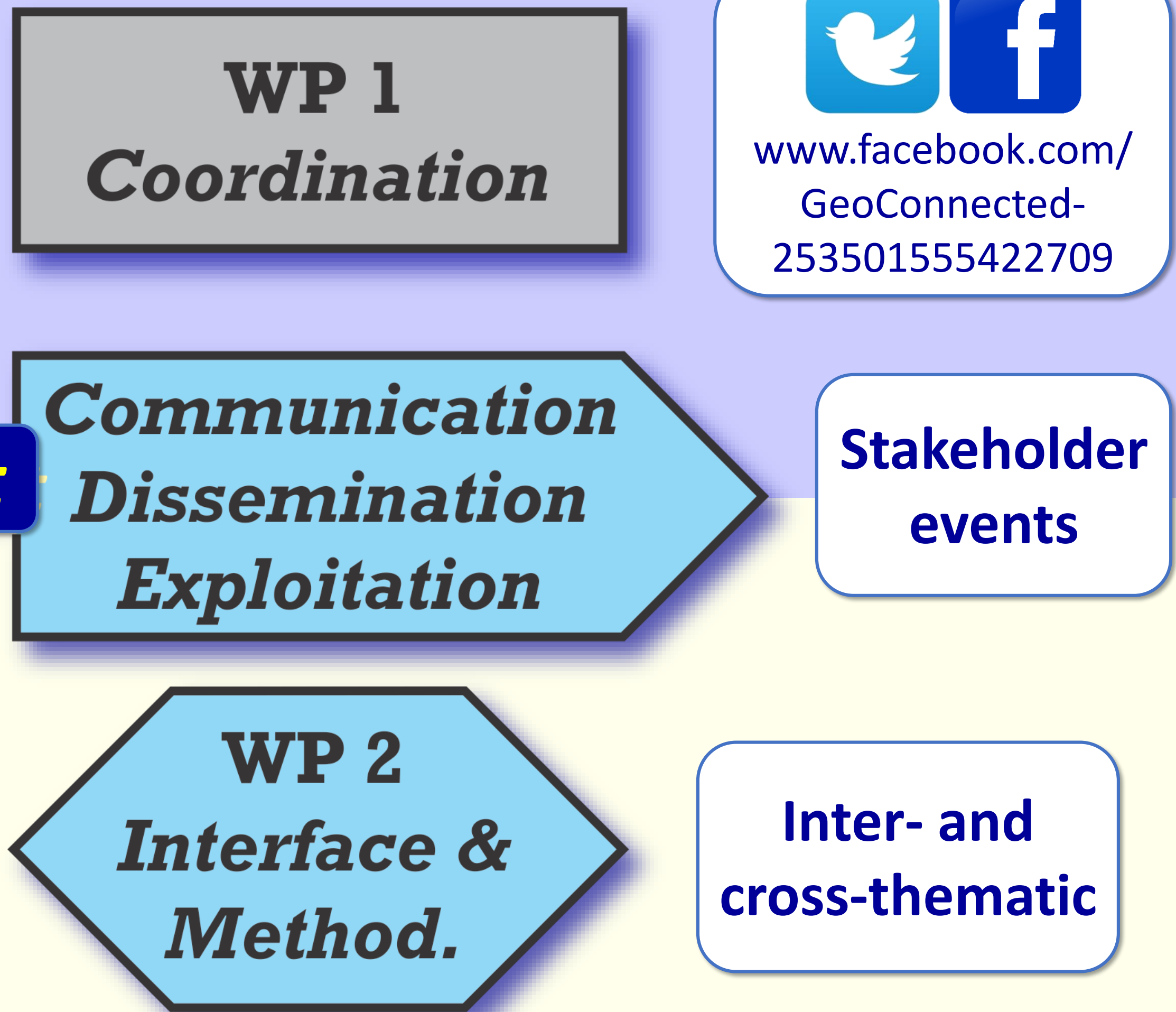
Consortium

Generic subsurface management



Two regional cases

Communication



Cooperation



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

Contact: Kris.Piessens@naturalsciences.be
Web: geoera.eu/projects/geoconnect3d





Hazard and Impact Knowledge for Europe



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



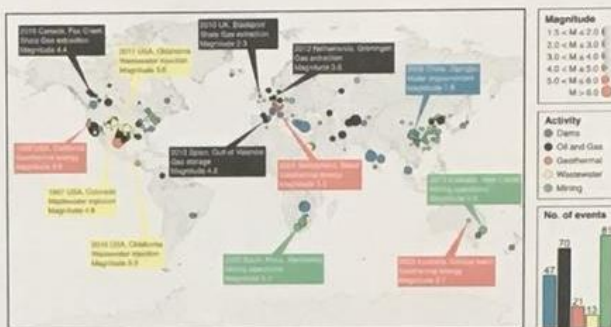
Project coordination: TNO (NL)
Project Board and work package leads: TNO (NL), GEUS (DK), BRGM (FR), GBA (AT)
Partners: 19
Countries: 14
Collaboration: 3DGEO-EU, HOTLINE, GEOCONNECT'D, GeoERA-IP
Budget: € 1.139.316 partners in-kind, € 481.333 EC co-fund

Abstract

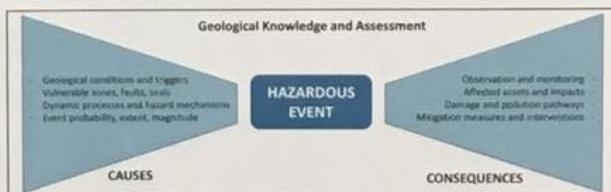
The HIKE project aims to support research and assessments of induced hazards and impacts that are related to the exploitation of subsurface resources and capacities throughout Europe. These goals will be achieved through development, demonstration and implementation of harmonized subsurface data sets and methodologies, investigation of applied use cases, and facilitation of knowledge shared between geological surveys and stakeholders.

Rationale and Main Goals

- Society depends on the exploitation of subsurface resources (energy, groundwater, raw materials).
- Their exploitation may trigger hazardous events or affect the natural and human environment.
- Examples are ground and mass movements, induced seismicity, leakage and groundwater pollution.
- Societal costs and impacts can be very high and result in economic losses as projects are delayed or even cancelled.
- Predictive geo-models and tailored mitigation measures can help to reduce or prevent negative impacts and manage eventual consequences.
- These models are founded on geological knowledge, which is the key to understanding the causes, mechanisms and impacts of induced hazards.
- Integration and standardization of geological knowledge and data across Europe will allow the development of better models.
- Collaboration among the European Surveys will improve the pool of knowledge, help countries to find better solutions and support the establishment of consistent national and EU legislation.



Grigoli 2017, global distribution of anthropogenic seismicity and the maximum magnitude reported at each site



Generic Bow-Tie model describing geological knowledge aspects relevant to the causes and consequences of induced hazard events

WP2: European Fault DataBase (TNO)



- Improved fault characterization and prediction of behaviour
- Novel standards and common data framework
- Comprehensive data pool from cross-boundary information exchange
- Case-based demonstration and implementation in other projects

WP3: Methodologies and Applied Use Cases (GEUS)



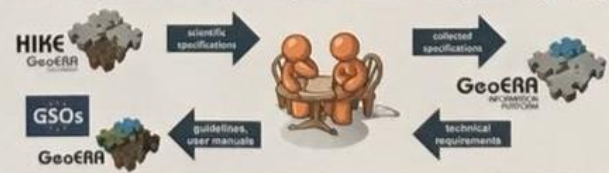
- Advanced localization of seismicity events in Europe
- Assessment of induced surface displacements
- Novel methods for reservoir sealing assessment
- Seismicity and safety in storage

WP4: Knowledge Share Point (BRGM)



- Synthesis regarding hazard & impact research
- Linking research results to policy and stakeholder needs
- Recommendations for follow-up research
- Hazard and impact knowledge management and sharing

WP5: Interaction with Information Platform (GBA)



- Implementation of Fault database specifications and functionality
- Implementation of Knowledge Base principles
- Implementation of HIKE Data Management Plan
- Recommendations for future maintenance and dissemination

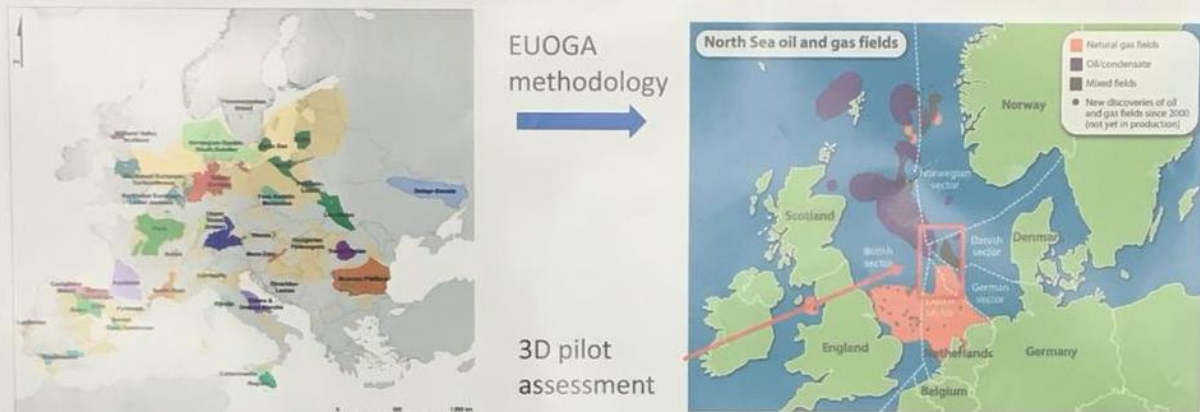
Partners



Geological Analysis and Resource Assessment of selected Hydrocarbon systems (GARAH)

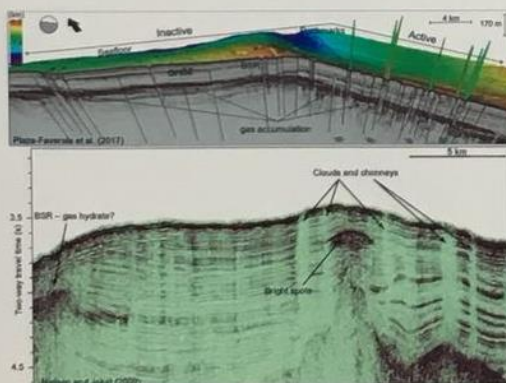


A harmonized, scientifically based, geological analysis and assessment of conventional and unconventional hydrocarbon resources will help member states to continue the transition to lower carbon energy sources. This will contribute to climate commitments and allow the planning for secure sources of affordable energy. The analysis and assessment of hydrocarbons will focus on two areas:



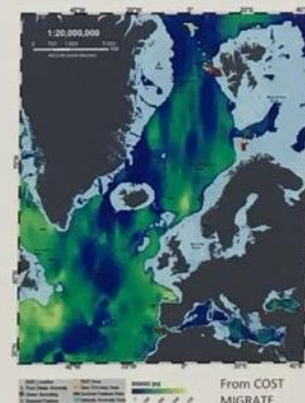
Geological analysis and resource assessment of North Sea petroleum systems

This research includes the assessment of conventional and unconventional oil and gas resources in the most important hydrocarbon basin in Europe. This will enable the remaining resources to be better understood and managed and identify options for multiple and alternative uses of the subsurface as producing fields come off-line.



Examples of gas hydrate indicators

GAS HYDRATE DISTRIBUTION EUROPE



Hydrate assessment in the European continental margin and related risks

The assessment of gas-hydrates resources on the European continental margin represents an information gap of pan-European interest. This will improve the understanding of the potential role that gas-hydrates may play in the future EU energy mix, as it will constitute a base-line for future projects pertaining to the improvement of the European model of the GHSZ, related hazards and potential for geological storage of CO₂.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Mapping and Assessment of Geothermal Plays in Deep Carbonate Rocks – Cross-domain Implications and Impacts HotLime



The HotLime Partners: IfU (DE), GSI (IE), TNO (NL), VLO (BE), GBA (AT), LGRB (DE), ISPRA (IT), GeoZS (SI), RER-SGSS (IT), HGI-CGS (HR), OPM (MT), ARPAP (IT), GEOINFORM (UA), CGS (CZ), RU (IT), ICGC (ES), *associate* RBINS-GSB (BE).

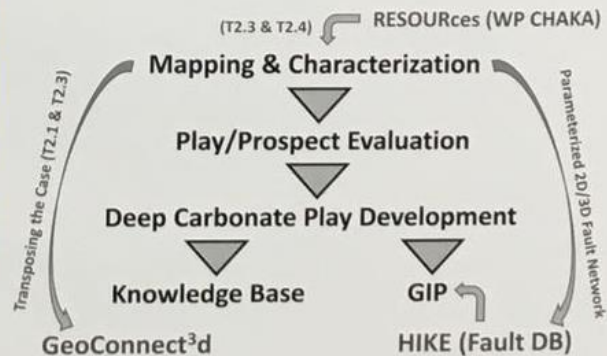
Contact: Dr. Gerold Diepolder, Bayerisches Landesamt für Umwelt (IfU), Bgm.-Ulrich-Str. 160, D-86179 Augsburg, gerold.diepolder@ifu.bayern.de

- Hydrothermal systems in deep carbonate bedrock are among the most promising low-enthalpy geothermal plays across Europe.
- Most deep carbonate bedrock has received relatively little attention, because such rocks are perceived as 'tight'.
- Exploration and development of the deep subsurface is an acknowledged high-risk investment. In order to de-risk these challenging geothermal plays, it is crucial to improve our understanding of geological conditions that determine the distribution and technical recoverability of their potential resources.
- The efficacy of carbonate-bedrock geothermal plays is crucially dependent on groundwater yield controlled by fracture conduits and karstification.

This project will identify the generic structural controls in deep carbonate formations, through a comparison of geological situations and their structural inventory, as well as collation of deep borehole data and their petro- and hydro-physical characteristics. A consistent assessment and the sharing of knowledge – bringing all partners to a common high level – will result in uniformly applicable best practice workflows for estimation, comparison and prospect-ranking of hydrothermal resources in deep carbonate bedrock.



Applied in 10 areas by means of 2D or 3D mapping and characterization, these spatial assessments will help in de-risking the set-up or maturation of regional plays, will reveal possible cross-domain implications, and will support sustainable subsurface management.



Principal outcomes:

- Spatial (maps, 3D models) resource assessments of areas in focus complemented by a report on best practice workflows & guidelines for characterization & mapping deep carbonate hydrothermal plays.
- Classification system for plays and prospects (web based).
- Quantitative assessment tool for doublet performance and the resources.
- Common knowledge base grounded on the Linked Data Semantic Web, including methodology, full glossary of technical terms, and a user manual for the proper use of spatial information in subsurface planning and management.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Managing Urban Shallow geothermal Energy

Contact: Gregor Goetzl - gregor.goetzl@geologie.ac.at / Staša Borović - sborovic@hgi-cgs.hr



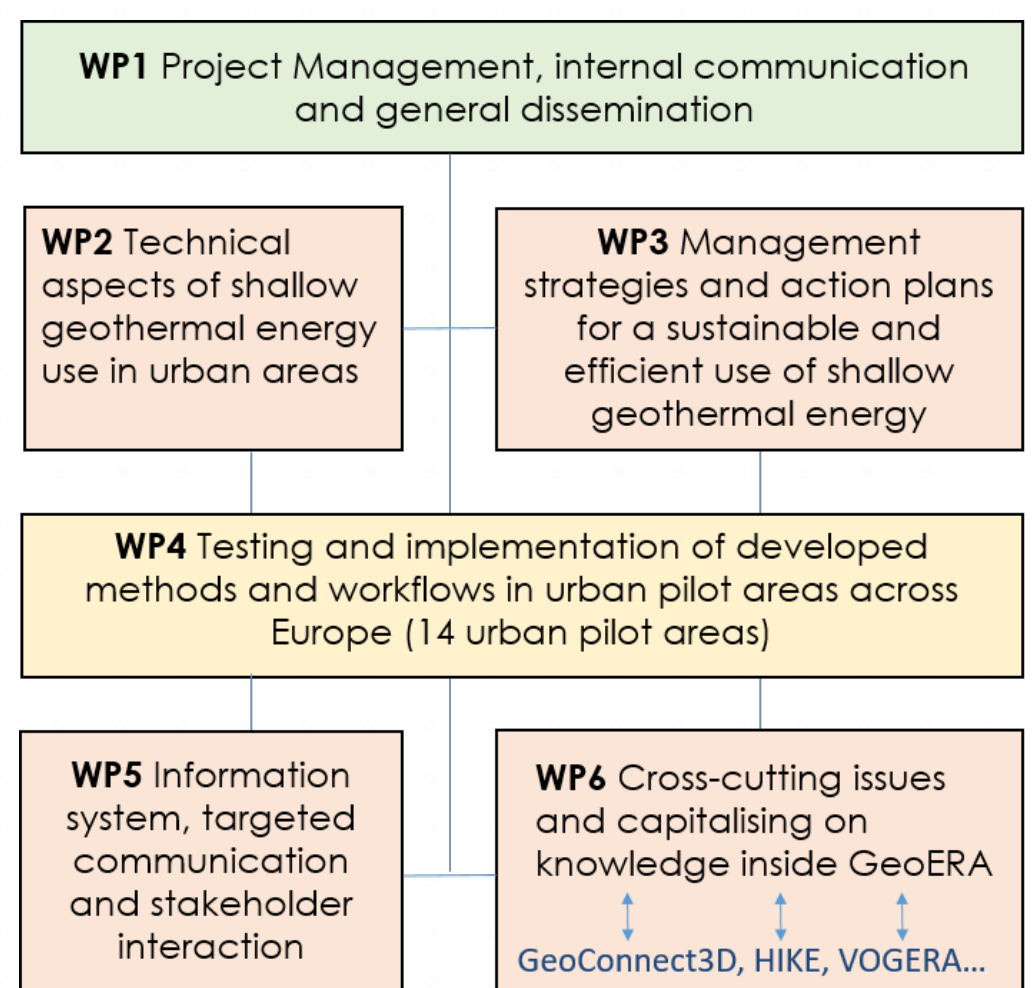
Partners



MUSE in a nutshell

- ❑ MUSE investigates **resources and possible conflicts of use associated with shallow geothermal energy (SGE)** in **European urban areas** and delivers key geoscientific subsurface data to stakeholders via a user-friendly web based GeoERA information platform.
- ❑ MUSE will lead to the development of **management strategies** considering both efficient **planning** and **monitoring** of environmental impacts to feed into general framework strategies of cities like SEAP's.
- ❑ The developed methods and approaches will be tested and evaluated together with input from local stakeholders in **14 urban pilot areas across Europe** representative for different conditions.
- ❑ The outcomes of the project represent a comprehensive collection of methods, approaches and tools, which **can be transferred to other urban regions in Europe** and be adopted by other organizations.

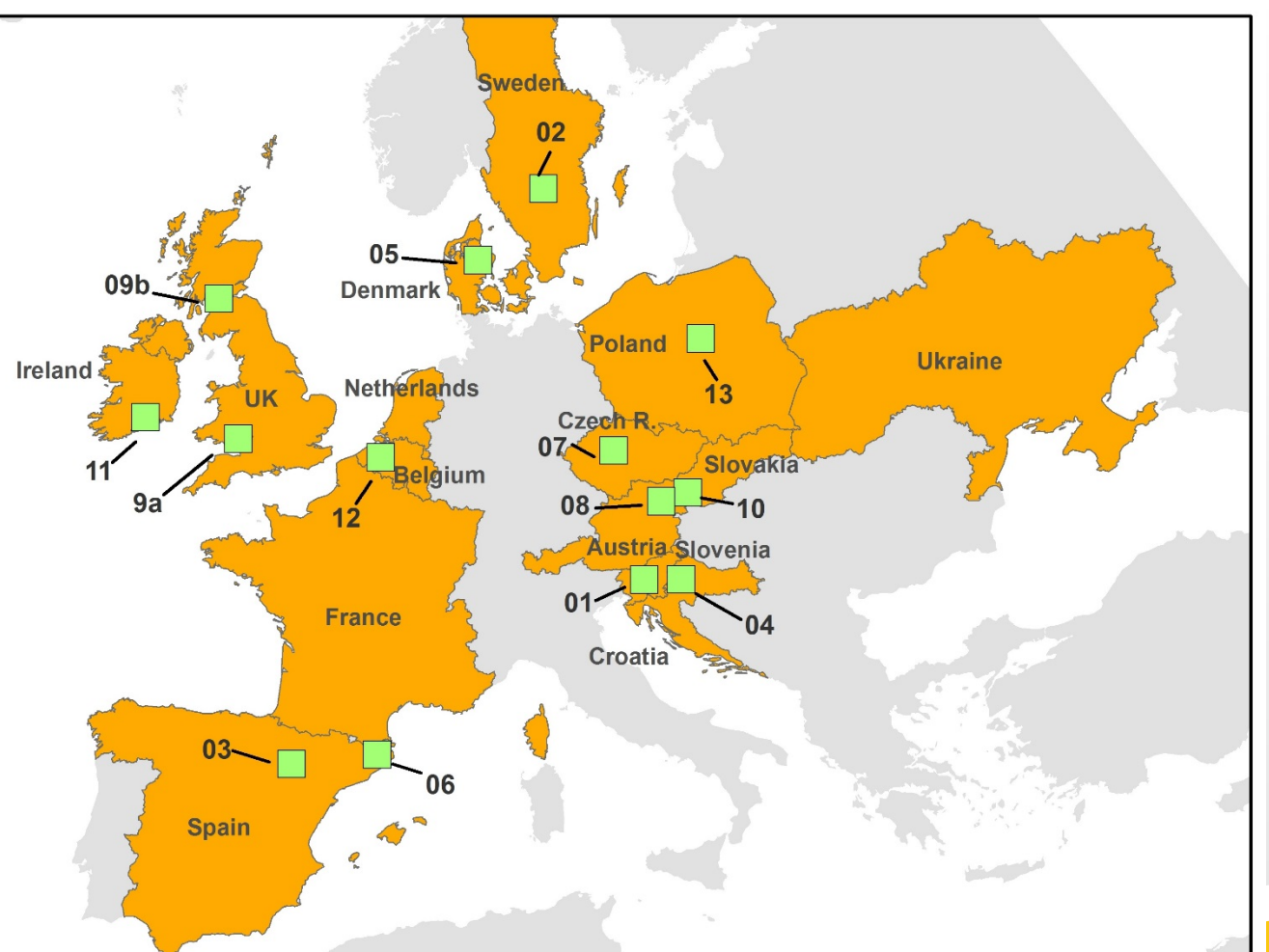
MUSE project scheme



Managing Urban Shallow geothermal Energy (MUSE)

MUSE - Pilot areas

- 01 - Urban area of Ljubljana city (Slovenia)
- 02 - Urban area of Linköping city (Sweden)
- 03 - Urban area of Zaragoza city (Spain)
- 04 - Urban area of Zagreb city (Croatia)
- 05 - Urban area of Aarhus city (Denmark)
- 06 - Urban area of Girona city (Catalonia, NE Spain)
- 07 - Urban area of Prague city (Czech Republic)
- 08 - Urban area of Vienna city (Austria)
- 09a - Urban areas of Cardiff city (Wales, UK)
- 09b - Urban area of Glasgow city (Scotland, UK)
- 10 - Urban area of Bratislava city (Slovakia)
- 11 - Urban area of Cork city (Ireland)
- 12 - Urban area of Brussels city (Belgium)
- 13 - Urban area of Warsaw city (Poland)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



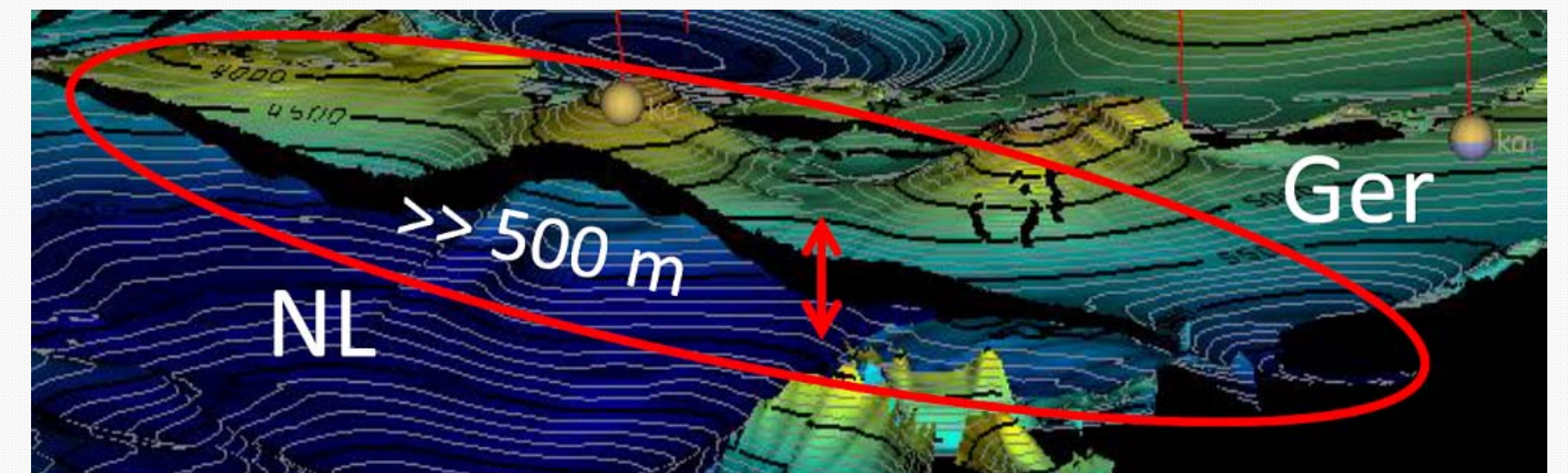
3D Geomodeling for Europe

3DGEO-EU



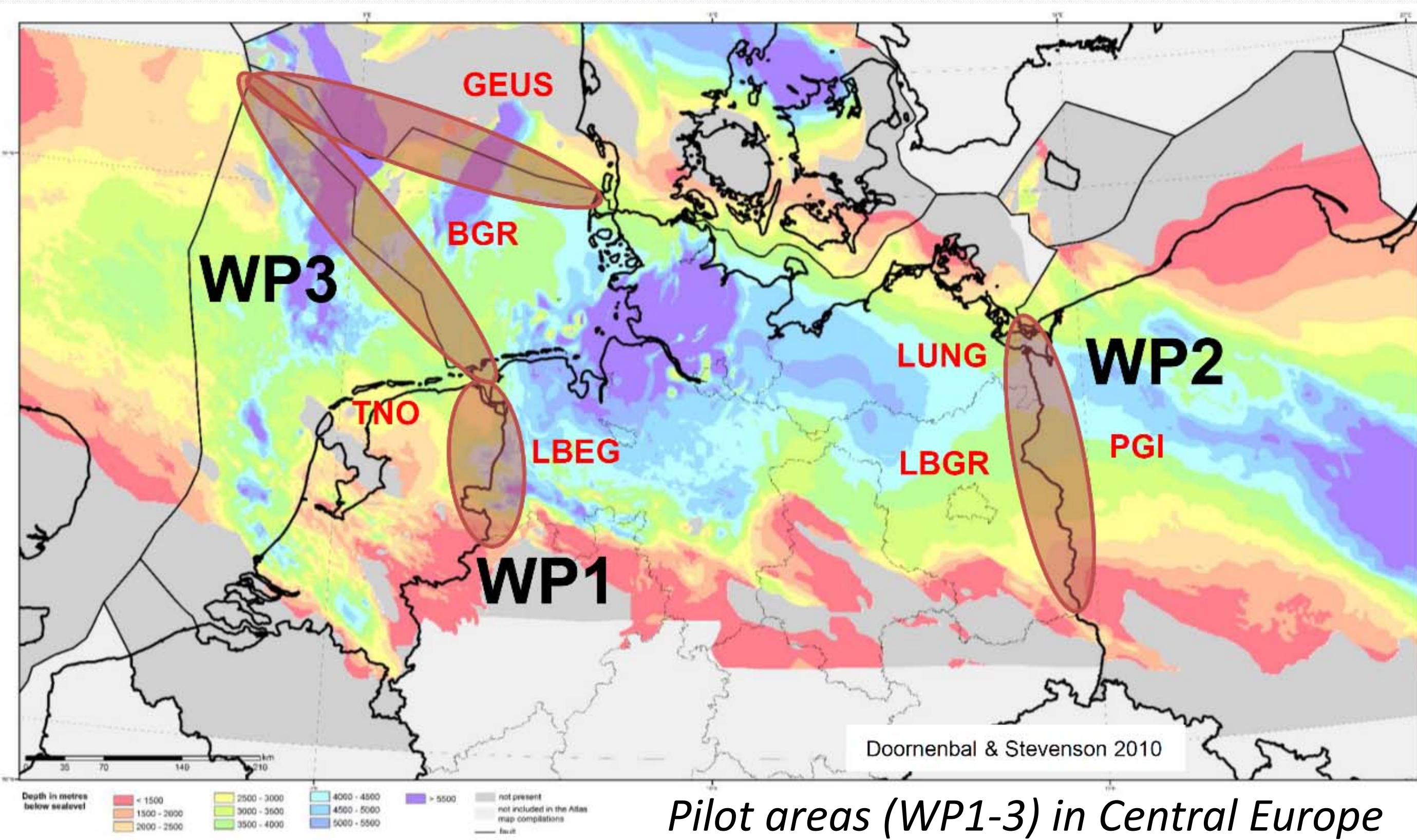
Problem/challenge

- inconsistencies of 3D subsurface information across borders hamper reliable assessments of cross-border subsurface resources
- challenge: heterogeneity of existing geological databases, standards, etc. across borders
- accepted methods for generating harmonized coherent cross-border 3D geomodels are needed



Example of border discontinuity (North Sea area)

Interactions of pilot area work packages with method development work packages



WP1: Dutch-German border region

- develops, amongst others, a harmonized 3D geomodel of 12 main horizons (top Neogene-base Triassic) and geothermal maps in the northern onshore cross-border region of the Netherlands and Germany (Lower Saxony)
- database of geothermal properties

WP2: Polish-German border region

- develops harmonized geological 3D models for selected horizons and structures in the Polish-German border region: 1) the Gorzów-block and 2) the near border part of Szczecin Trough
- to use potential field methods (gravimetry, magnetics) in addition to seismic investigations in less explored areas (cooperation with WP6)

WP3: North Sea area NL-GER-DK

- integrate existing regional and national geomodels into a harmonized, consistent cross-border geomodel of the North Sea area
- establishing criteria needed for the harmonization methods and testing these methods
- harmonize stratigraphic chart for pilot area; harmonize seismostratigraphic concepts and structural interpretations

WP4: Uncertainty in geomodels

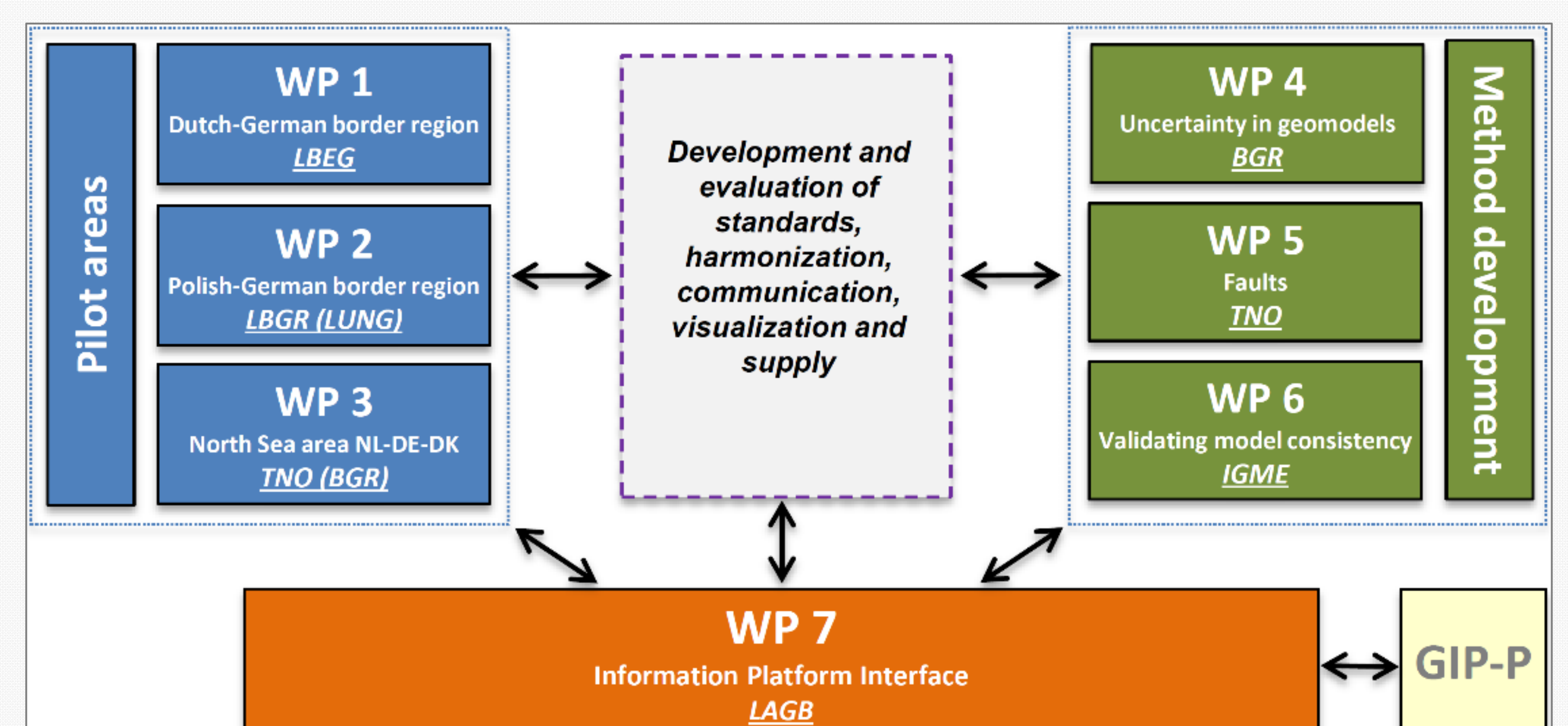
- identify and classify sources of uncertainty in geomodels
- finding visualization methods
- test state-of-the-art visualization methods using data sets from the pilot areas
- compilation of example data sets/geomodels (and documentation)

WP5: Faults

- consistent cross-border fault mapping- and characterization in all pilot areas
- following the requirements and specifications set by the Fault Database of the GeoEnergy project HIKE
- delivery of harmonized faults including attributes to the Fault Database

WP6: Validating model consistency

- optimizing 2D/3D reconstruction and restoration workflows aiming to support model consistency and cross-border harmonization
- integration of potential field geophysics data (gravimetrics and magnetics) to fill gaps in areas where certainty of 3D models is low
- use & test multi-approach reconstruction workflows & tools in case-studies (including an example of the Pyrenees)



Project structure and interactions between the work packages

Results

- help to establish methods and (optimized) workflows for cross-border harmonization of 3D geomodels in Europe
- cross-border consistent geomodels in the pilot areas (nucleus for further transnational harmonization projects)
- improved visualization methods for uncertainties
- optimized reconstruction and restoration workflows to reduce uncertainty of geomodels
- results will be keystones towards the future goal of having coherently harmonized 3D geomodels across Europe

Project partners: BGR (lead), CGS, GEOINFORM, GEUS, IGME, LAGB, LBEG, LBGR, LUNG, PGI, TNO



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



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*

Objective: The project will address groundwater management issues related to drinking water, human and ecosystem health across Europe in relation to both geogenic elements and anthropogenic pollutants by data sharing, technical and scientific exchange between European GSOs

WP3 (coord. GBA) – 23 partners – 128 PM

Hydrogeochemistry and health: Mapping groundwater characteristics for the management of aquifers naturally enriched in dissolved elements

Main goal: To propose a common methodology to identify the main geological factors and hydrogeological processes regulating the distribution of natural concentrations and to harmonize terminologies and criteria for classification of special water (mineral, thermal water)

WP4 (coord. GEUS) – 6 partners – 26 PM

Linking aquifer microbial ecology and diversity to contaminant transforming processes at European groundwater-surface water transition zones

Main goal: Increase our understanding of how groundwater ecology and microbial diversity determine contaminant-transforming processes at groundwater-surface water transition zones and provide knowledge on GW-SW diversity and its potential use for GW management.

WP5 (coord. BGS) – 12 partners – 63 PM

Nitrate and pesticides transport from soil to groundwater receptors

Main goal: Provide conceptual models of key European settings and assess nitrate and pesticide travel times and where possible attenuation patterns for a number of relevant European settings and develop transport models able to simulate contaminant discharge through the unsaturated zone.

WP6 (coord. GEUS) – 15 partners – 64 PM

Groundwater Age *DIS*tributions and residence times in European aquifers (“*GADIS*”)

Main goal: To establish a harmonized database on groundwater age tracers and indicators currently existing in GSO's and develop different age / residence time intervals suitable for classifying age structures and degree of protection of European aquifers on *maps and cross sections*

WP7 (coord. BGR) – 16 partners – 63 PM

Harmonized vulnerability to pollution mapping of the upper aquifers

Main goal: Investigation, comparison and potential extension of index methods for groundwater vulnerability assessment to pollution and presentation of the geospatial information results

WP8 (coord. BRGM) – 10 partners – 49 PM

Effective monitoring of emerging contaminants: development and validation of new assessment methods

Main goal: developing a consistent approach to GW monitoring for Organic Emerging Contaminants (ECs) in terms of sampling, site selection, monitoring frequency and methodology (including analytical techniques) and to ensure it is effective and data are comparable across the range of European geological and environmental settings.



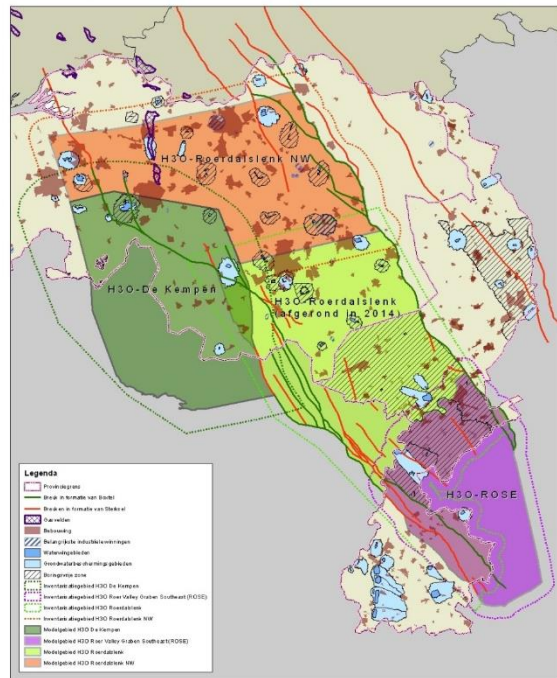
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Resources of groundwater, harmonized at Cross-Border and Pan-European Scale

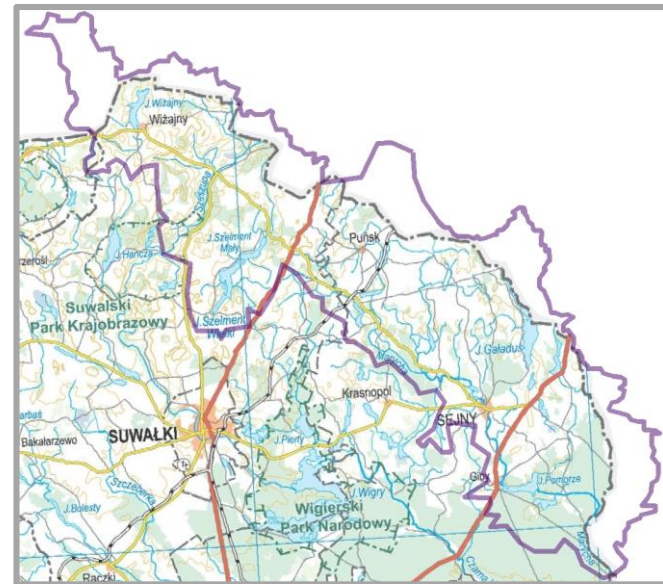
RESOURCE will demonstrate the potentials of the harmonization of information about Europe's groundwater resources through cross-border demonstrations projects, through harmonized characterization approaches for Karst and Chalk aquifers and through a first information product at Pan-European scale where available data is compiled and integrated to produce a map of the fresh groundwater resources of Europe.

H3O-Proecten



H3O-PLUS: Harmonized information for subsurface spatial planning and management in a transboundary lowland aquifer system

Create harmonized information over the Dutch, Flemish and German area of the Roer Valley Graben - a heavily used cross-border aquifer system, where many subsurface activities strive for prioritization.

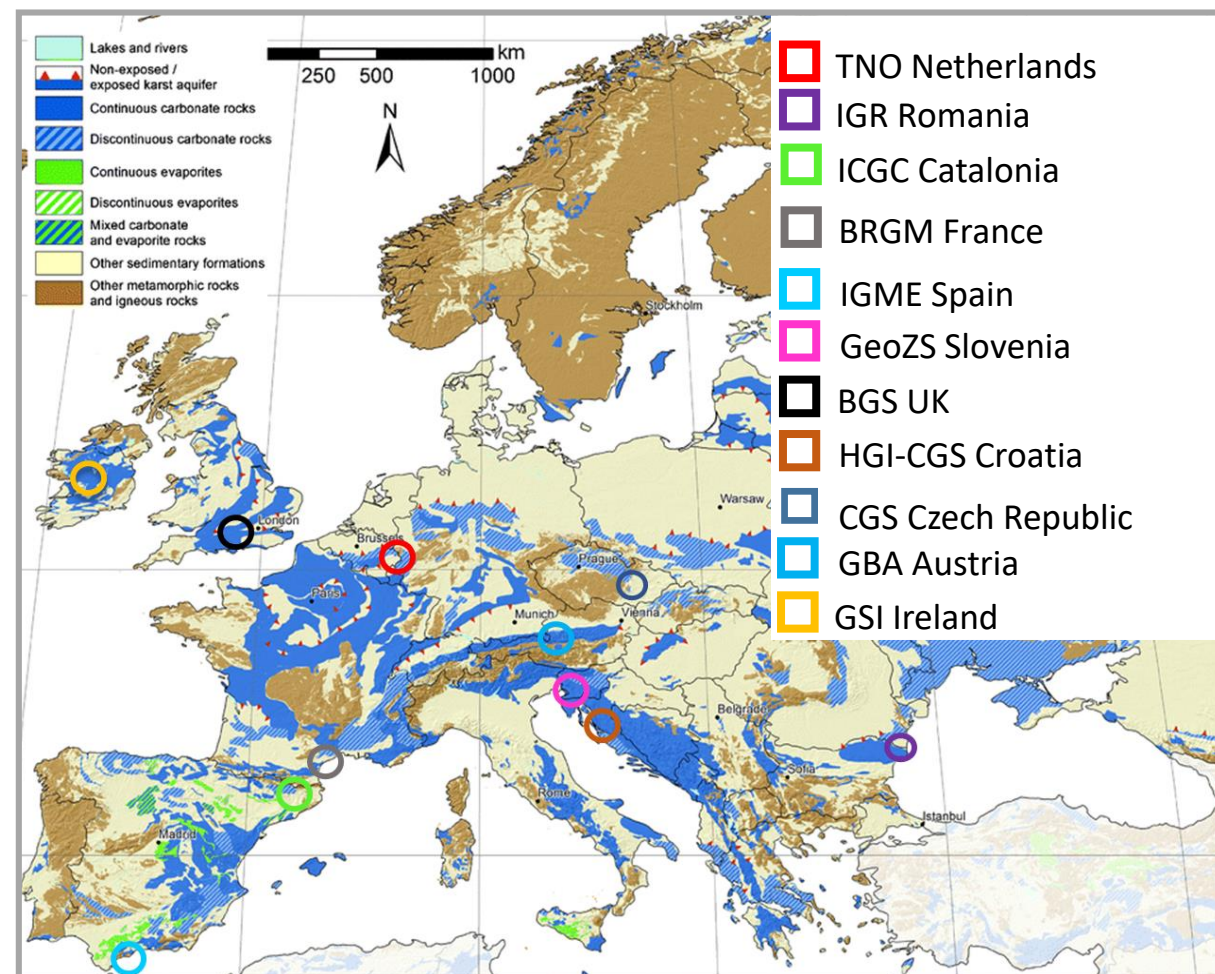


TRANSFLUX: Harmonization of data, monitoring and modelling in a transboundary setting

Determination of the transboundary groundwater flow directions in the cross-border area and estimation of the volume of groundwater, which flows through the state border between Poland and Lithuania.

CHAKA: Typology of karst and chalk aquifers and recommendations for their management

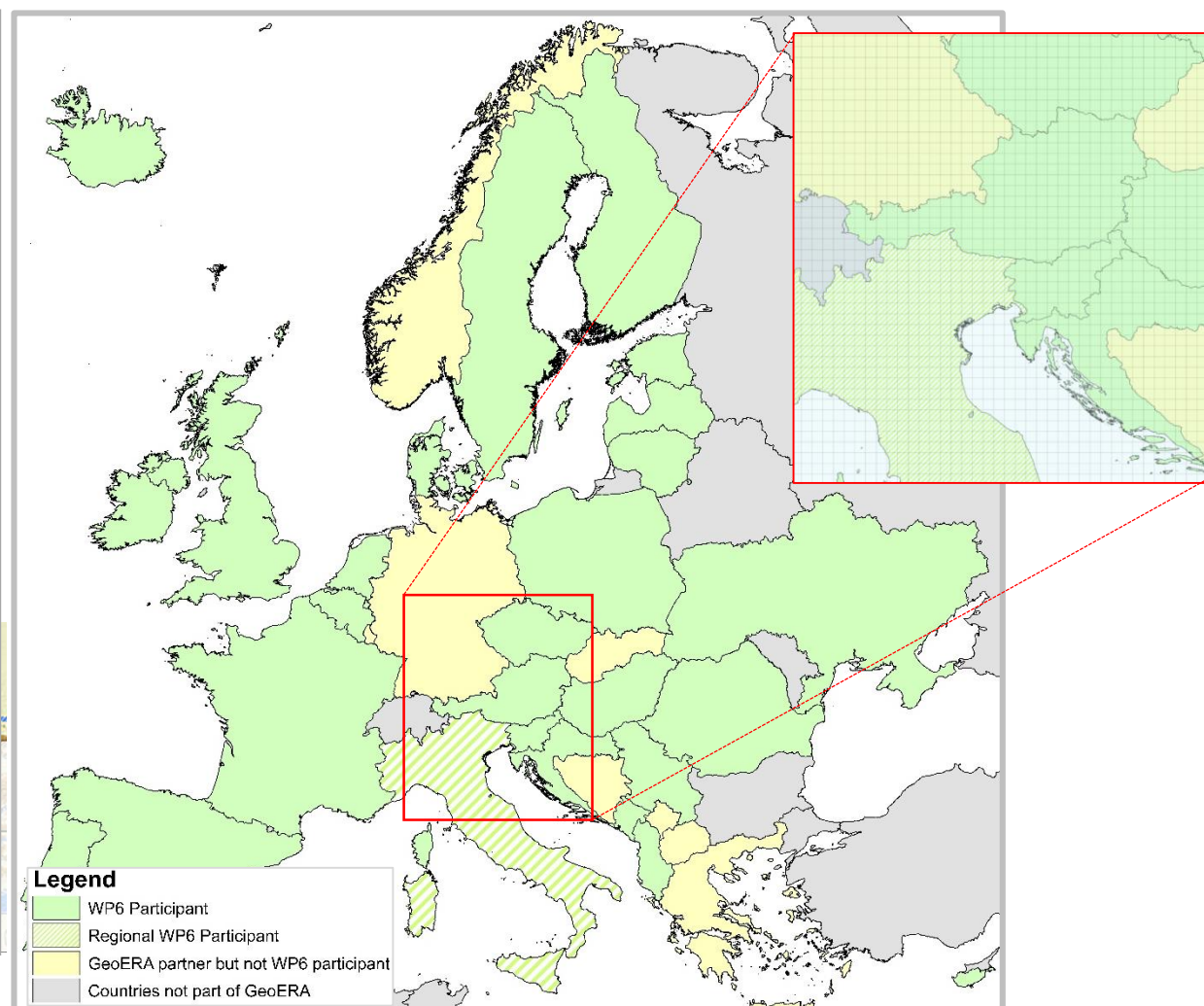
Develop a joint methodological framework for characterizing karst aquifer resources with the aim of solving water management issues (quantity and quality).



Pan-EU Groundwater Resources Map

Harmonize data and integrate and compile available data to produce a map of the fresh groundwater resources of Europe.

Example 20x20 grid to collect information on volumes and depths of fresh groundwater



Consortium: TNO (lead), DLT, AGS, GBA, VMM, SCK, FZZG, HGI, GSD, CGS, GEUS, GTK, BRGM, MBFSZ, ISOR, GSI, ARPA, RT, LGMC, LGT, SGL, MTI, PIG, LNEG, IGR, GSS, GZS, IGME, ICGC, SGU, GIU, NERC and non-funded partners EGT, RU, NRW



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RESOURCE

GeoERA
GROUNDWATER



Tools for Assessment of Climate change Impact on Groundwater and Adaptation Strategies



"...observed climate changes are already having widespread impact on ecosystems, economic sectors and human health and well-being in Europe." - The European Environmental Agency

"More extreme weather conditions are anticipated...and the impact is expected to increase in the future ." - JRC, 2015

"...the cost of repairing damages is estimated to be about 6 times higher than the cost of adaptation" – Horizon 2020

The overall vision of TACTIC

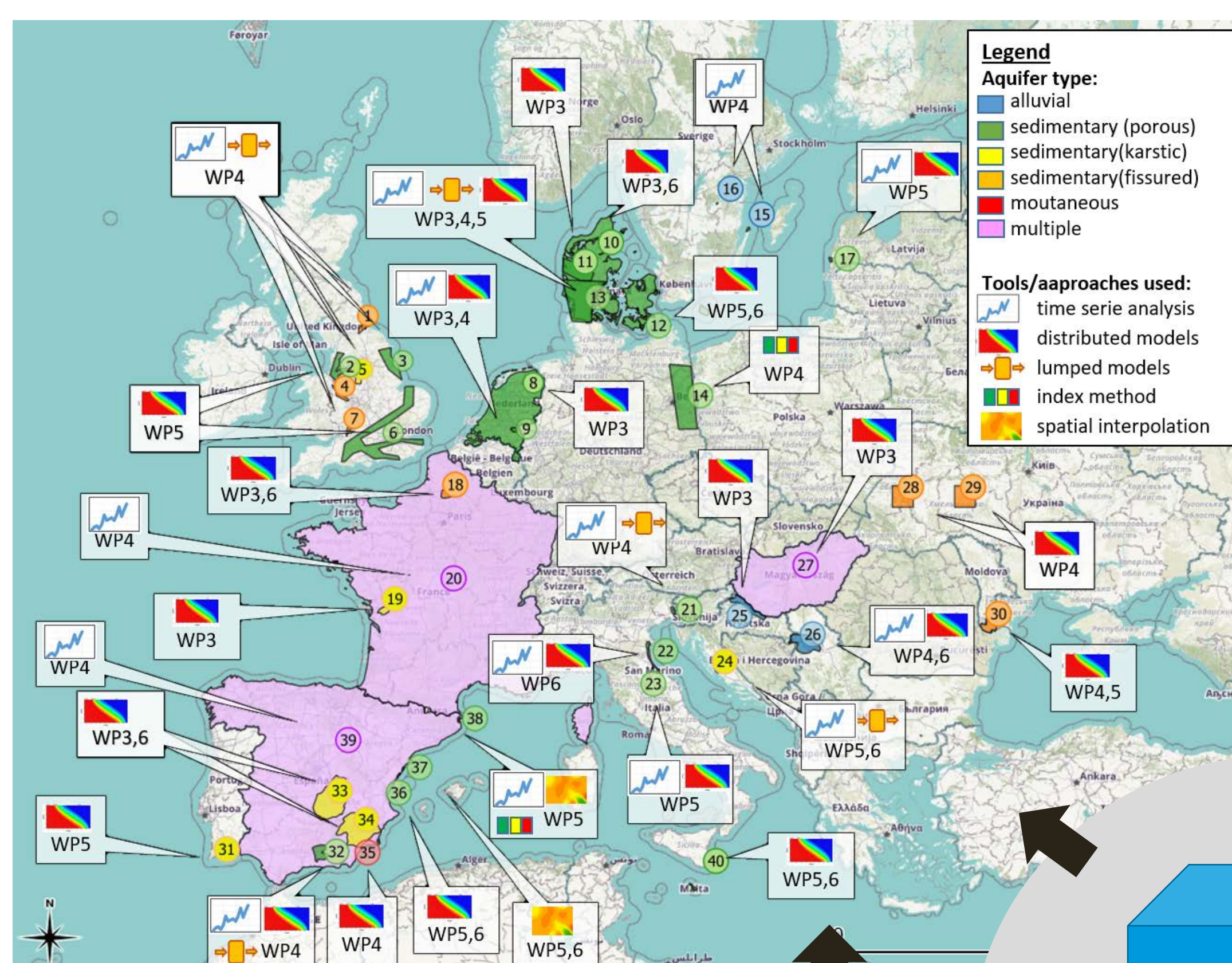
Enhance **utilisation of subsurface data** and knowledge acquired by the European Geological Survey Organisations (GSOs) essential in **understanding** the freshwater system and impacts of **climate change**.

TACTIC objectives



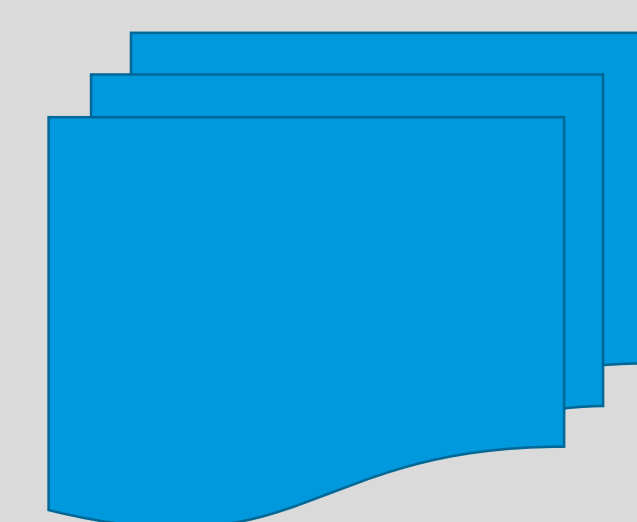
Concept of TACTIC

40 pilot sites distributed across 18 countries, with a large geographical coverage.



Pilots with indication of tool expected to be applied

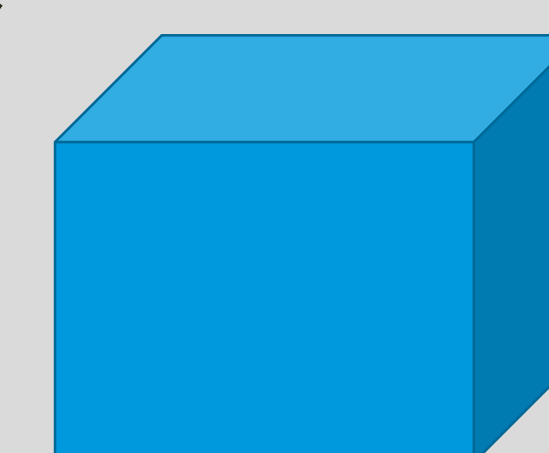
Difference in climate change impacts and hydrogeology



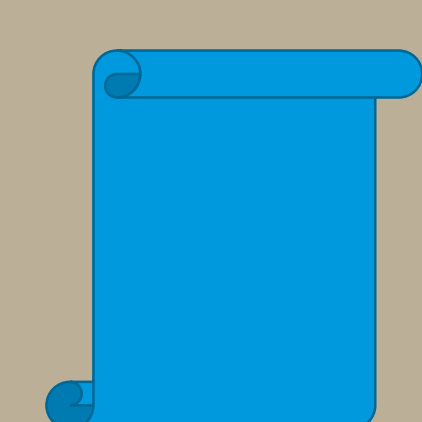
Information Platform



EUROGEOSURVEYS



Toolbox



Guidelines

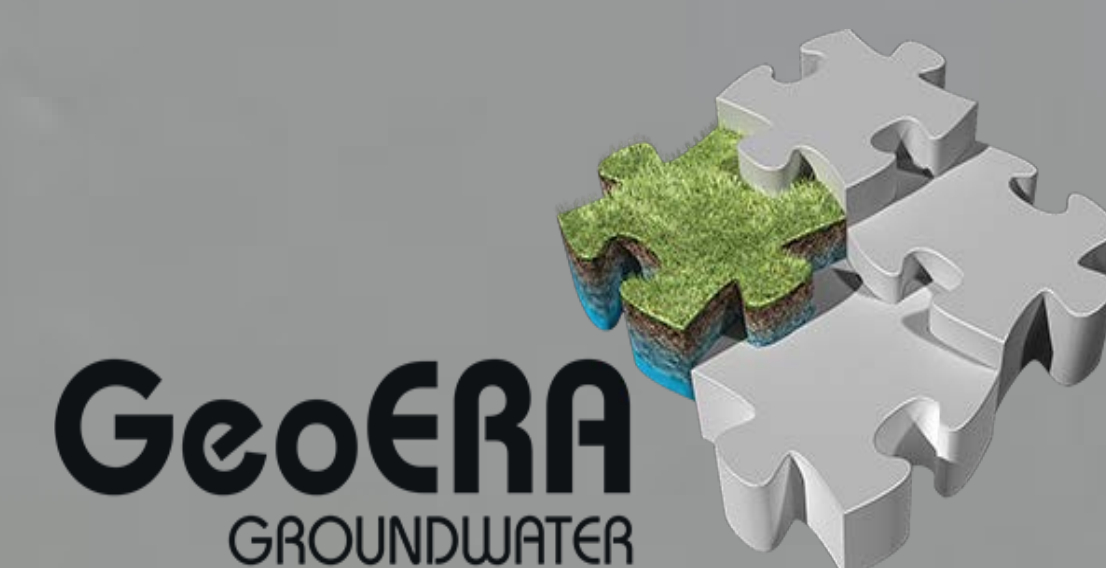
Expected impact

Facilitating scientifically sound **climate change impact assessments**, decision and policy making by **improved decision support** data and tools in a harmonized European subsurface database

Supporting EU, CC adap.stakeholders & private consulting companies



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



VoGERA – Vulnerability of shallow Groundwater resources to deep sub-surface Energy Related Activities



Sian Loveless¹, Willem Zaadnoordijk², Cis Slenter³, Koen Beerten⁴, Agnes Szalkai⁵, Klaus Hinsby⁶, Kateryna Boiko⁷
BGS¹, TNO², VMM³, SCK⁴, MBFSZ⁵, GEUS⁶, Geoinform⁷

Aim

Improve scientific understanding of the vulnerability of shallow groundwater (e.g. potable water, water for other human uses and water supporting ecosystems) from deep sub-surface industrial energy-related activities.

A consistent approach to assessing a range of sub-surface energy activities including:

- Conventional oil and gas
- Geothermal energy
- Unconventional oil and gas
- Storage (e.g. natural gas)
- Waste disposal (nuclear and fluid)

1 Develop conceptual models of the sub-surface activities with possible pathways of contamination to groundwater.

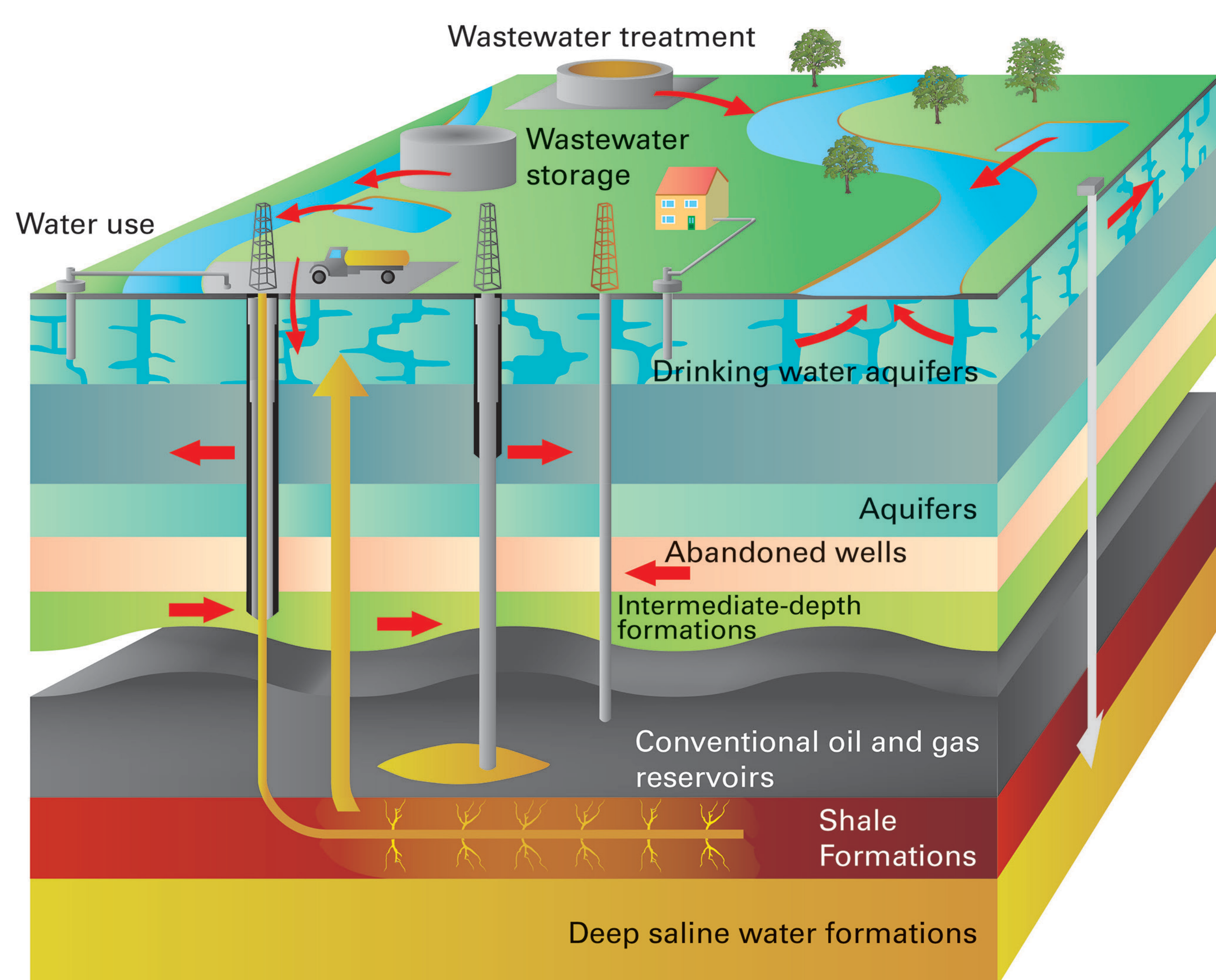


Figure 2 Example of a conceptual model showing possible contamination pathways from sub-surface energy activities (oil and gas) to shallow groundwater.

Outcome:

- Improved understanding of groundwater vulnerability to a range of energy related activities
- Improved sub-surface spatial planning and decision making
- Consistent approach for assessing groundwater vulnerability across Europe

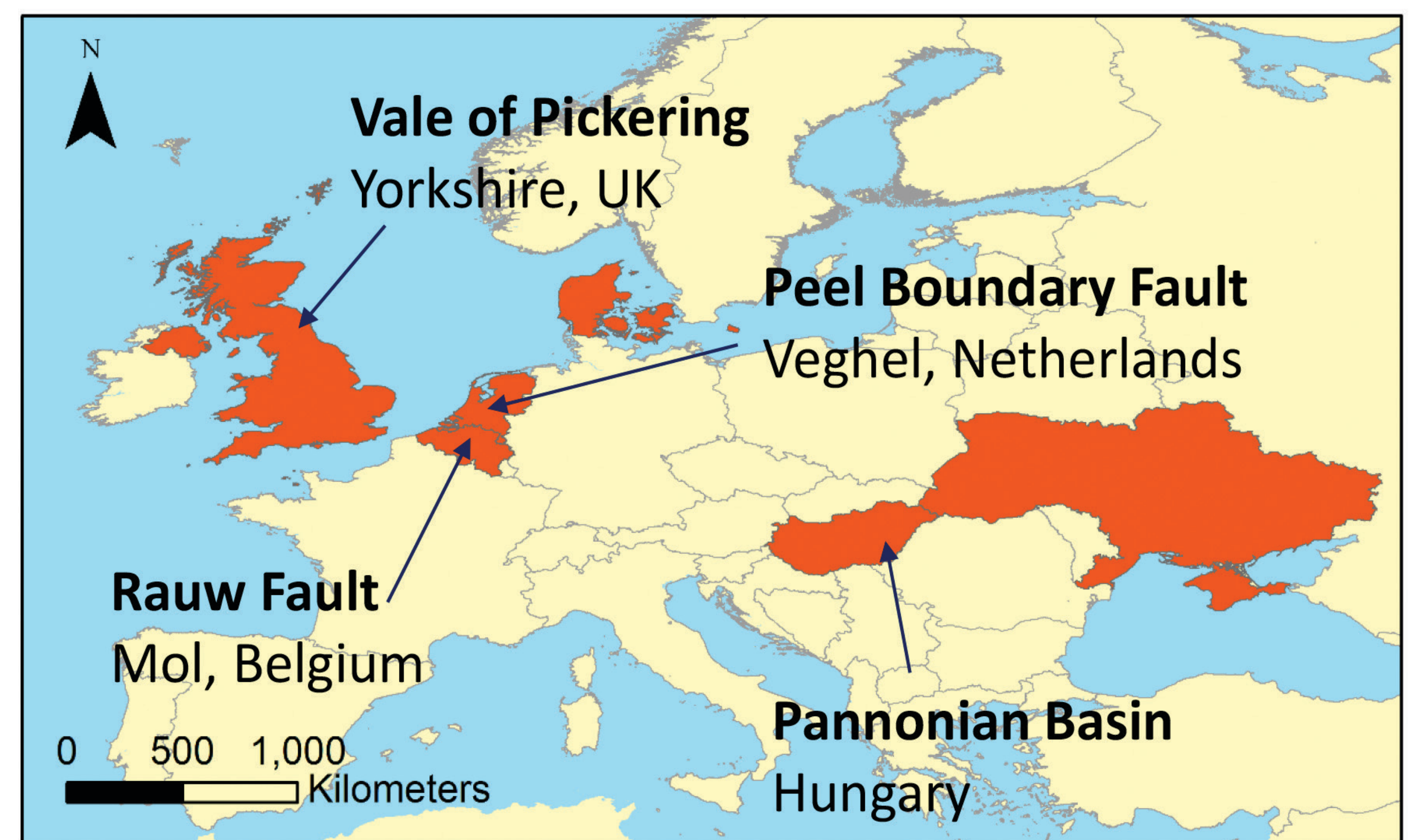


Figure 1 Countries involved in the VoGERA project (orange) and locations of pilot sites.

2 Use evidence to assess possible pathways (e.g. fault zones/abandoned wells) at pilot locations such as:

- Stable isotopes
- Dating/residence time indicators
- Temperature
- Hydraulic head
- Groundwater flow data
- 3D geological models

3 Develop framework for assessing vulnerability of shallow groundwater from the energy-related activities:

- That can be applied across a range of European hydrogeological settings
- That can be used as a tool for regulators and decision makers

4 Test vulnerability framework at pilot sites and modify according to results.



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EuroLithos – Ornamental Stone Resources in Europe



EuroLithos challenges: increasing replacement of traditional stone materials with «cheapest on the market»; decreasing competitiveness of SME's; reduction of cultural heritage values; increasing environmental footprints

EuroLithos concept: raising awareness and knowledge of the diversity of European ornamental stone resources, their importance to our landscapes and architecture, their quality and the environmental benefit of «short-travelled» resources

EuroLithos impact: improving cross-European knowledge sharing; improving tools for making good and sustainable choice of stone to construction projects; better competitive regime for European SME's

WP3 Atlas of European Ornamental Stones



WP4 Directory of Ornamental Stone Properties

WP5 Ornamental Stone Heritage



WP2 Dissemination, communication, stakeholders WP6 Information Platform

Project Lead



WP Leads



Partners










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GeoERA
RAW MATERIALS










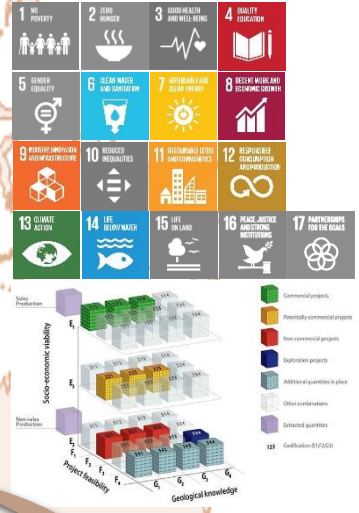
About GeoERA: Raw Materials

-  Brings together 37 Regional and National Geological Survey Organizations and Marine Institutes from 29 countries in Europe and beyond.
-  Addresses on-shore and off-shore resources and considers all mineral Raw Materials – metals, industrial minerals, and construction materials. Special attention is given to strategic raw materials, including Critical Raw Materials (CRM).
-  Projects address the sustainable supply of mineral Raw Materials.
-  Addresses the value chain in the context of the Circular Economy.
-  Considers best practice in the context of competing land uses for surface and subsurface.
-  Projects underpin societal challenges and Europe's ambition for economic growth and well-being by:
-  Providing **harmonised spatial** and **technical data** for European ornamental stone resources as well as guidelines for valuing and resource management.

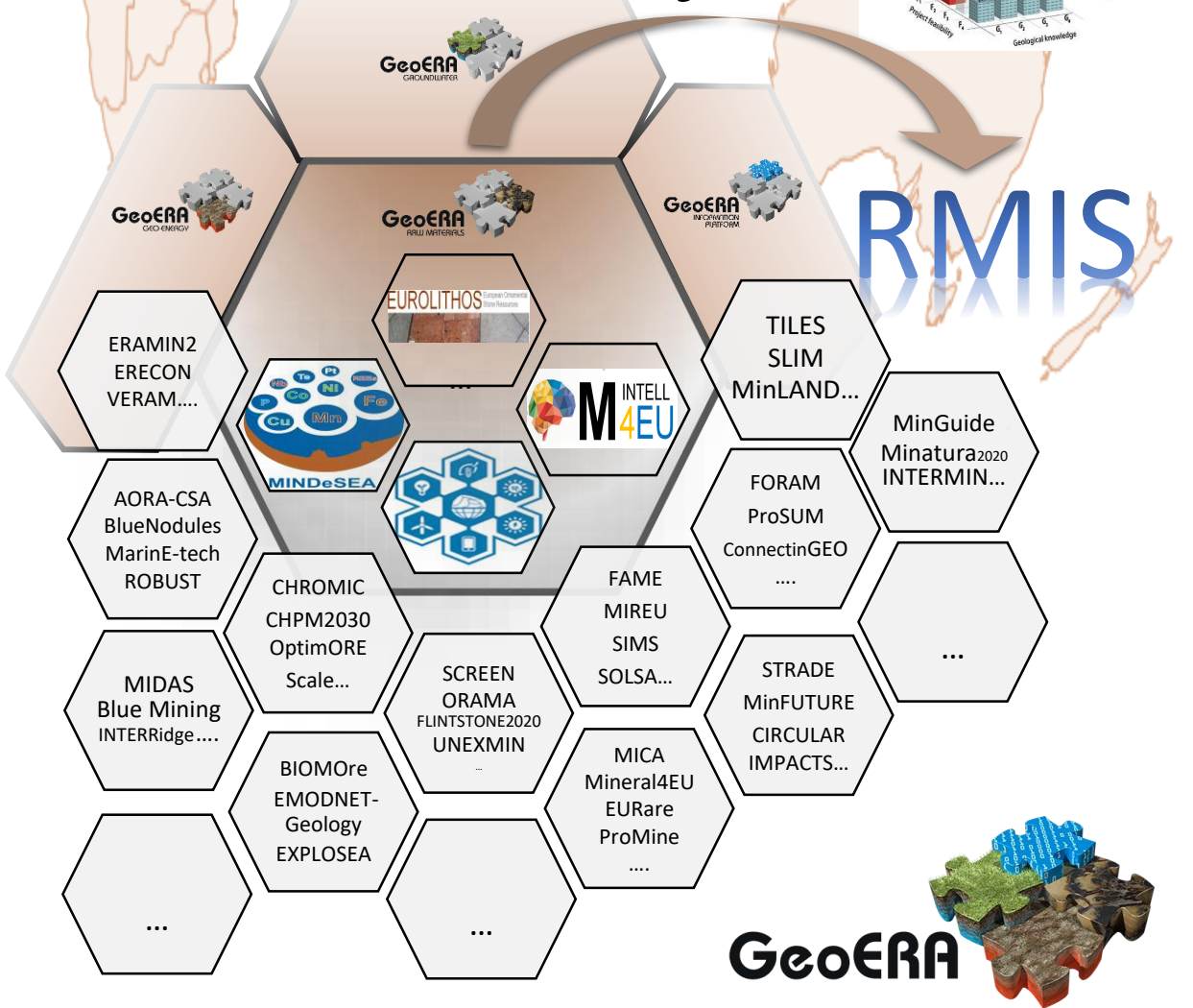
-  Designed to **research** the **Critical** and **Strategic Raw Materials** in Europe.
-  Providing **marine resource** information and maps; identify areas for responsible resource and CRM exploration and extraction; inform management and **Marine Spatial Planning** in European Seas.
-  Improving the **European Knowledge Base** for raw materials by updating the electronic Minerals Yearbook (produced in Minerals4EU) and extending the spatial coverage and quality of data currently in the Minerals Inventory.

Context:

-  Projects support Europe's Raw Materials Policy and Strategy and are in line with the Raw Materials Initiative (RMI) and in particular Pillar 2 **Sustainable supply of raw materials from EU sources**; COM(2008) 699 final; COM(2011) 25 final.
-  Projects complement the Strategic Implementation Plan (SIP) of the European Innovation Platform on Raw Materials by supporting the three Priority Areas, in particular **Access to Mineral Potential in the EU**.
-  Projects add to the **Strategic Action Plan for Batteries** COM(2018)293 final.
-  Support Europe's Integrated Maritime Policy by adding to **Maritime Spatial Planning, Marine Data and Knowledge, Blue Growth Strategy**; COM(2012) 494 final.
-  Projects assist the achievement of the **UN's Sustainable Development Goals** and **UNECE's framework classification** for resources.



Relationship to other EU Projects:



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Forecasting and Assessing Europe's Strategic Raw Material Needs - FRAME



Europe shows a growing and accelerating consumption of mineral commodities

Can supply meet demand? This cannot be answered with any certainty

Non-energy minerals underpin the modern economy and are essential for manufacturing and renewable “green” energy supply technologies

critical and strategic minerals and metals may be collected through recycling of mining related waste materials

even with the important contribution from recycling, it will still be necessary to extract them from primary mineral deposits, focusing on applying new technologies for deep exploration and mining, turning low-grade ores to exploitable resources and reducing generation of mining wastes and large tailings by converting them to exploitable resources

FRAME is designed to research the critical and strategic raw materials in Europe by employing sound strategies and a partner base spread far and wide amongst those that have some of these raw materials

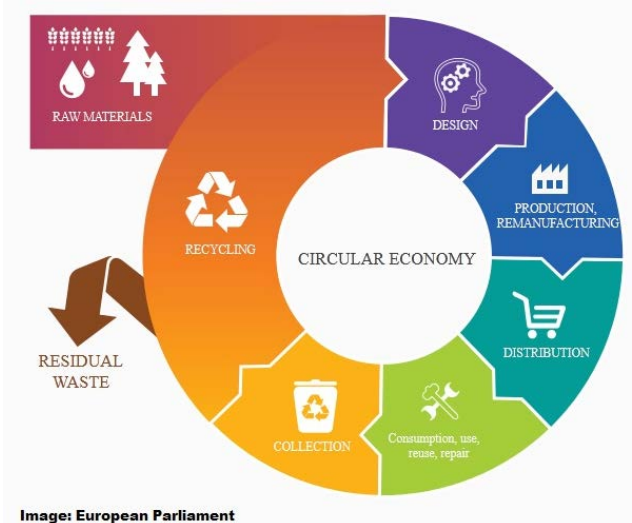
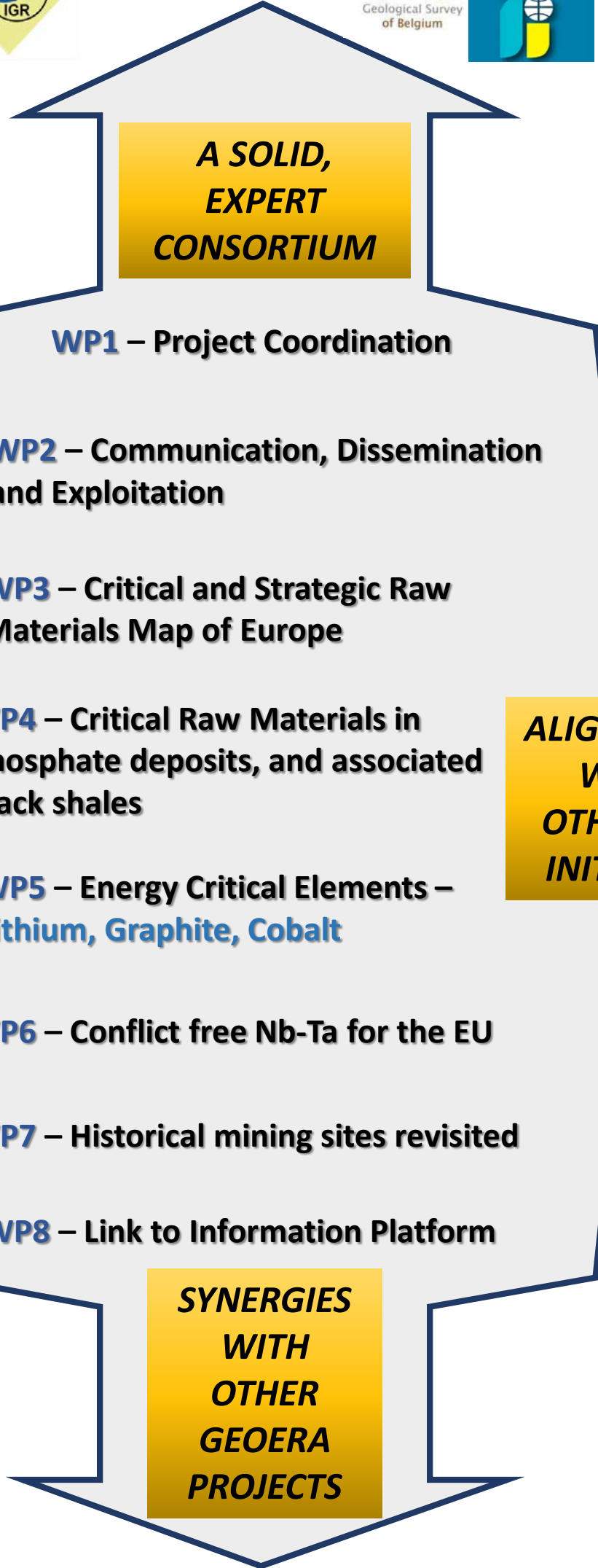


Image: European Parliament

THE EU LIST OF CRITICAL RAW MATERIALS

• Guidelines •



MINTELL4EU – Mineral Intelligence for Europe
MINDeSEA - Seabed Mineral Deposits in European Seas



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials

MINDeSEA



Approach

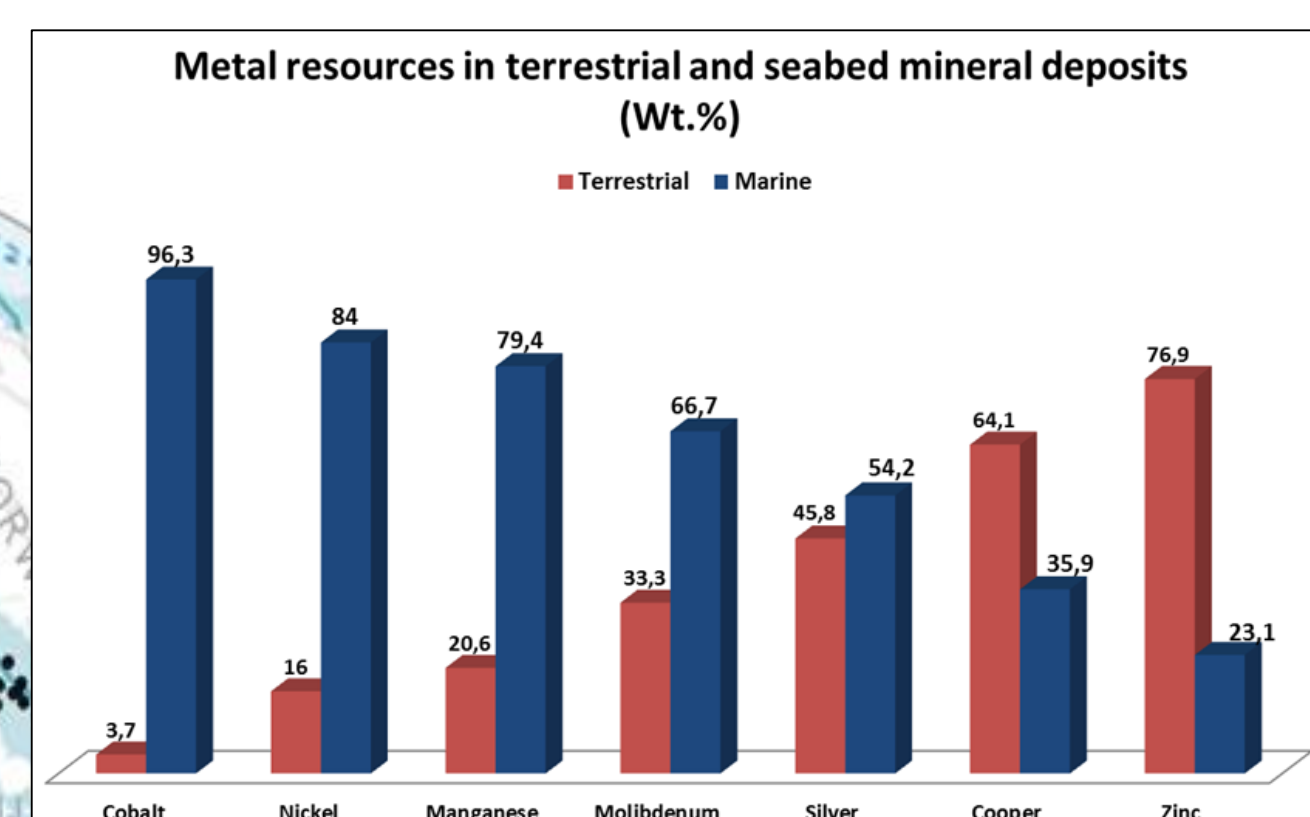
The overall objective of MINDeSEA is to establish the metallogenic context for different seabed mineral deposits with economic potential in the pan-European setting.

Challenge

Seafloor deposits: the most important yet least explored resource of CRM

By 2030, 10% of the world's minerals, including cobalt, copper and zinc could come from the ocean floors.

Global annual turnover of marine mineral mining can be expected to grow from virtually nothing to €10 billion by 2030.



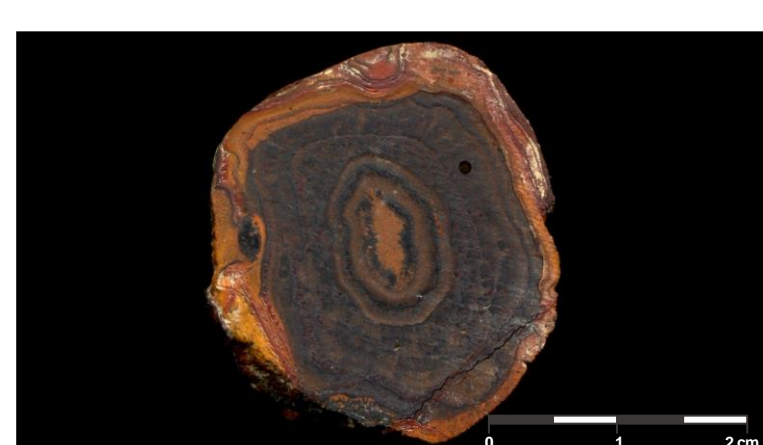
2017 CRMs (27)			
Antimony	Fluorspar	LREEs	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	HREEs	PGMs	Vanadium
Coking coal	Indium	Phosphate rock	

Workpackages

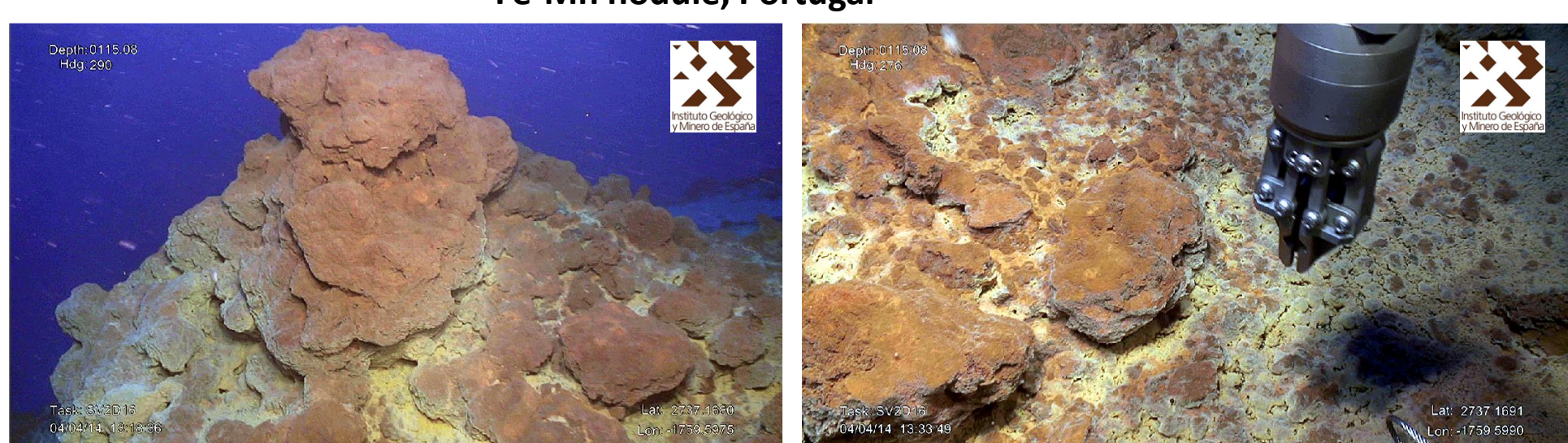
- WP1. Project Management and Coordination.** IGME-Spain.
- WP2. Communication, Dissemination and Exploitation.** IGME-Spain.
- WP3. Seafloor Massive Sulphide Deposits.** NGU-Norway.
- WP4. Ferro-manganese crusts, phosphorites and Critical Raw Materials.** IGME-Spain.
- WP5. Marine placer deposits.** IGME-Greece.
- WP6. Polymetallic nodules.** LNEG-Portugal.
- WP7. Exploration in the Atlantic, Mediterranean, Baltic and Black Sea.** IGME-Spain.
- WP8. Link to Information Platform.** GSI-Ireland.



Co-rich ferromanganese crusts, Canary Seamounts-Spain



Fe-Mn nodule, Portugal



Hydrothermal vents and metalliferous sediments, Canary Islands-Spain

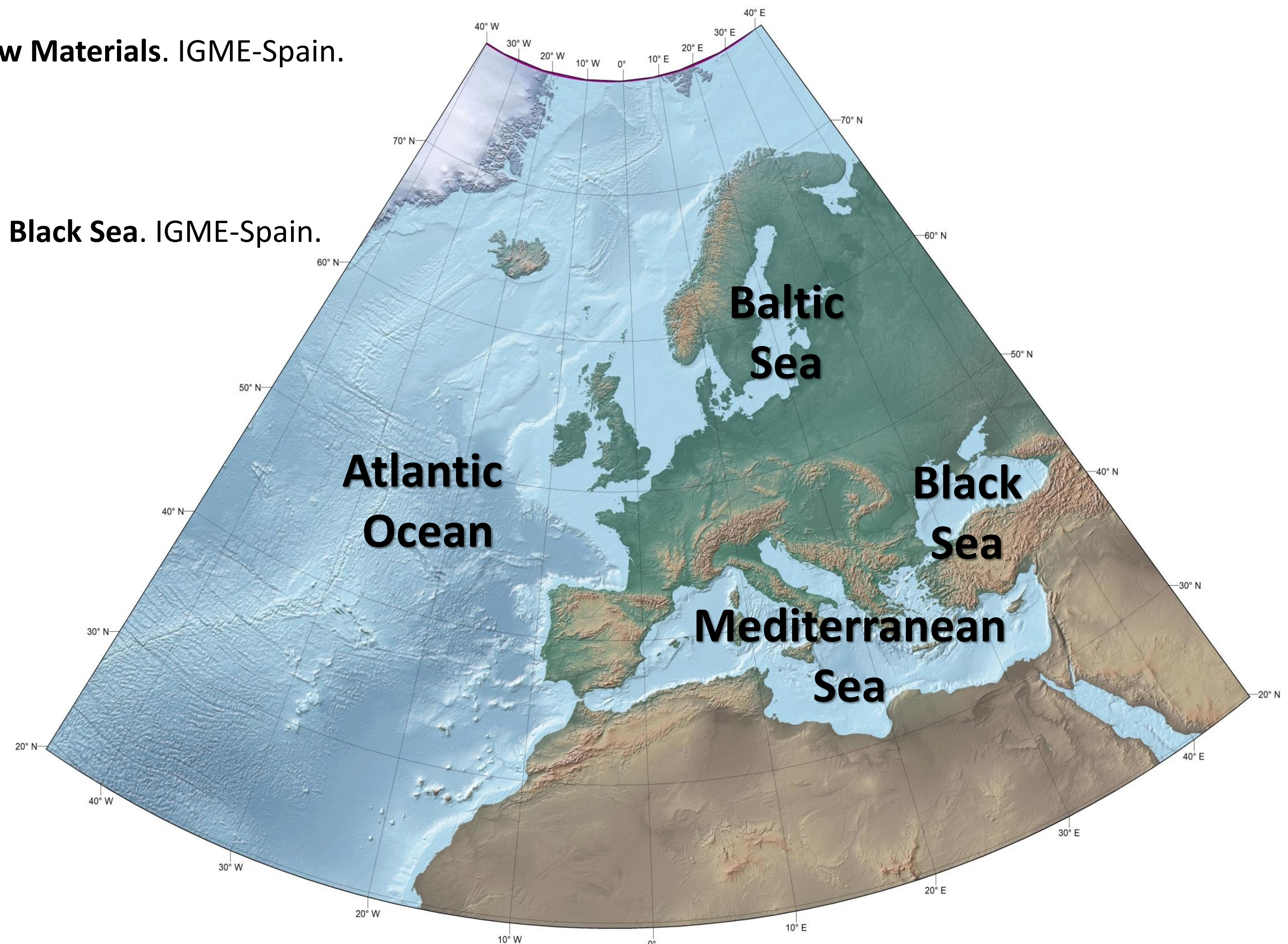
Partners



Objectives

1. Characterise **deposit types**.
2. Characterise the **trace element** content of the deposit type including **CRM**.
3. Identify the principal **metallogenic provinces**.
4. Develop **harmonized mineral maps and datasets** of seabed deposits incorporating GSO datasets, along with mineral-potential and prospectivity maps.
5. Demonstrate how the **case study** results can be used in off-shore mineral exploration.
6. Analyse **present-day exploration and exploitation status** in terms of regulation, legislation, environmental impacts, exploitation and future directions.
7. Demonstrate **efficiency of a pan-European research approach** to understanding seabed minerals and modes of exploration.

Geographical Scope



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166



Background

The European Union has identified **security of supply**, **improvement in environmental management** and **resource efficiency** as key challenges for the raw materials sector. Data regarding the location and spatial distribution of primary and secondary raw materials, with respect to exploration, exploitation, production and trade activities, underpin decision making in government and industry. Given the dynamic character of such data, regular updates of comprehensive, **reliable and harmonized information** across borders are required.

Aims and objectives

- The overall aim of this proposal is to improve the overall EURMKB and more specifically to deliver:
- Updating of the **European Minerals Yearbook** with production and trade data (2014-2017), and resource and reserve data as well as exploration information (reference year 2019);
 - Integration of the European Minerals Yearbook in the **INSPIRE-compliant Minerals4EU database**;
 - Improving the quality and spatial coverage of the Minerals Inventory, addressing harmonization issues and facilitating interoperability with other ongoing European mineral intelligence project;
 - Testing the application of the **UNFC classification system** as a tool to obtain more accurate panEuropean mineral inventories;
 - Recommendations of communication and interaction between already existing databases and data portals, and the **Raw Materials Information System (RMIS)**;
 - Integration of the European Minerals Yearbook and Minerals Inventory in the **GeoERA Information Platform** and provide user-oriented search and visualisation facilities, thereby de-facto establishing a dedicated **EURMKB portal**, but also enabling interoperability of raw materials data with data on groundwater and geenergy resources to support spatial planning and management of competing landuses.

Ambition

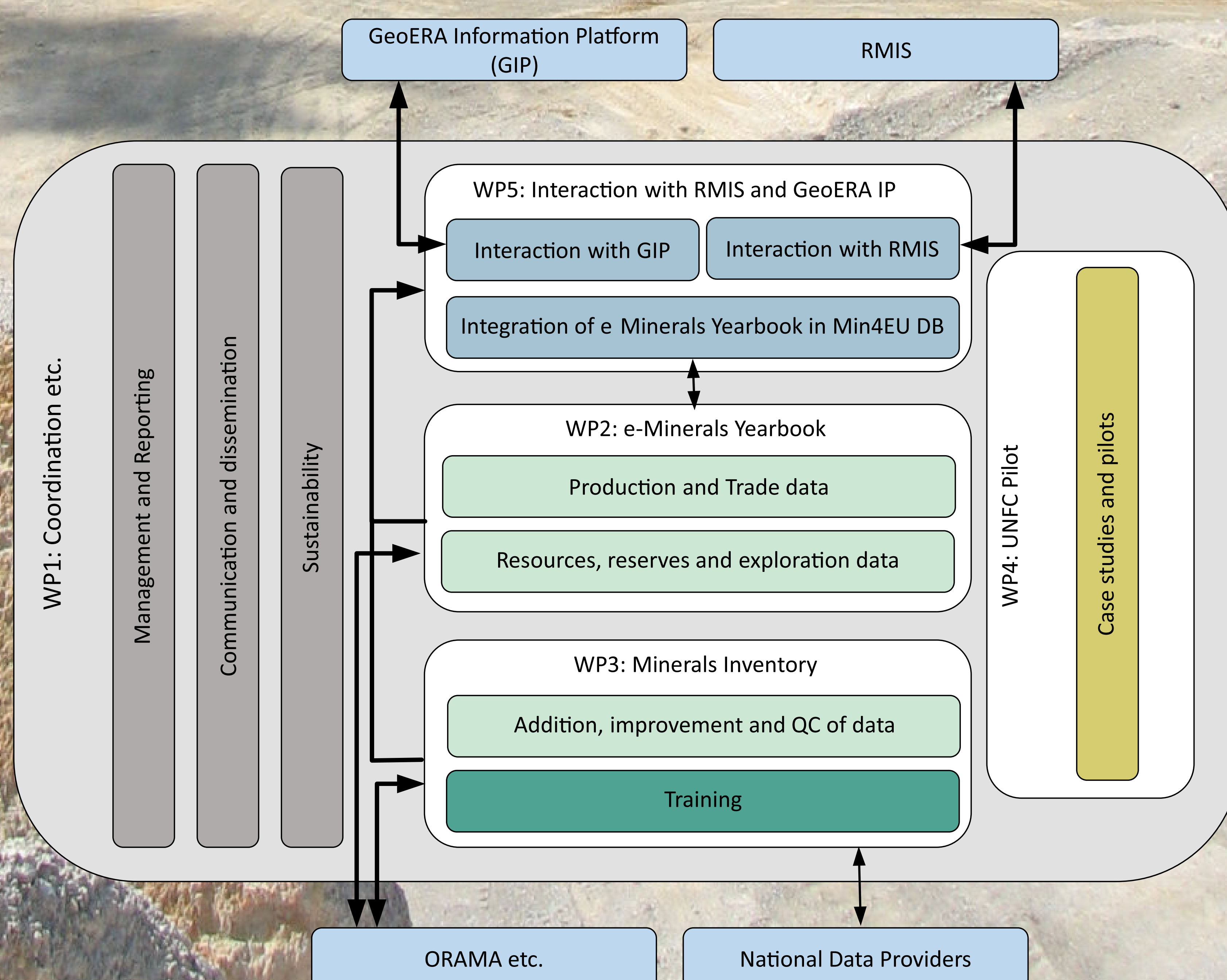
- Alimentation and automation of the e-Minerals Yearbook and its incorporation in the Minerals4EU database and further integration into the GeoERA Information Platform through the ECDI;
- Harvesting and harmonization of the minerals inventory;
- Reporting standards and UNFC;
- Data and knowledge delivery while keeping the existing platforms operational.

Partnership



Relationship between work packages and tasks in the Mintell4EU project

Related past or existing projects





Objectives

Work Packages

