

Monitoring and Mapping Groundwater Systems in Europe

The viewpoint of EGS



EUROGEO SURVEYS

MISSION

Provision of public Earth science knowledge to support:

- ✓ EU's competitiveness
- ✓ Social well-being
- ✓ Environmental management
- ✓ International commitments



OUR TEAM

Expert Groups

Earth Observation and Geohazards

GeoEnergy (**including CCS**)

Marine Geology

Mineral Resources

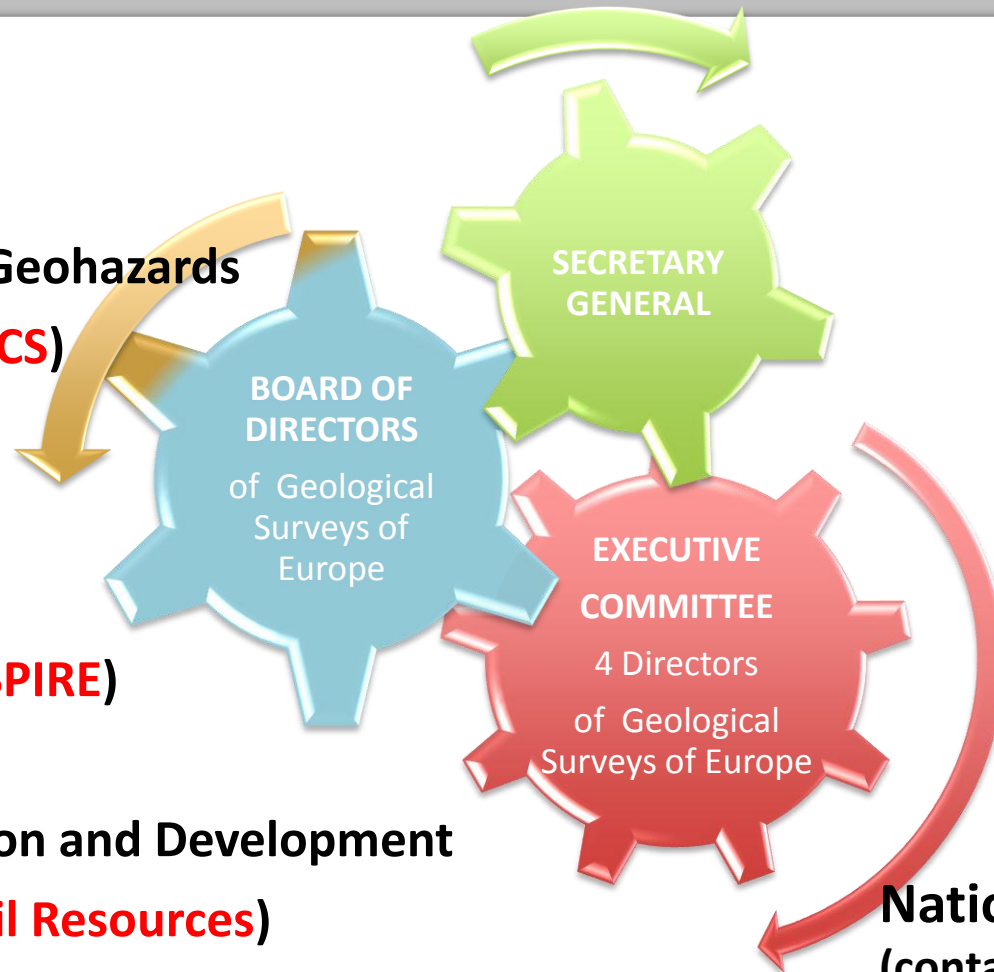
Water Resources

Spatial Information (**INSPIRE**)

Geochemistry

International Cooperation and Development

Superficial Deposits (**Soil Resources**)

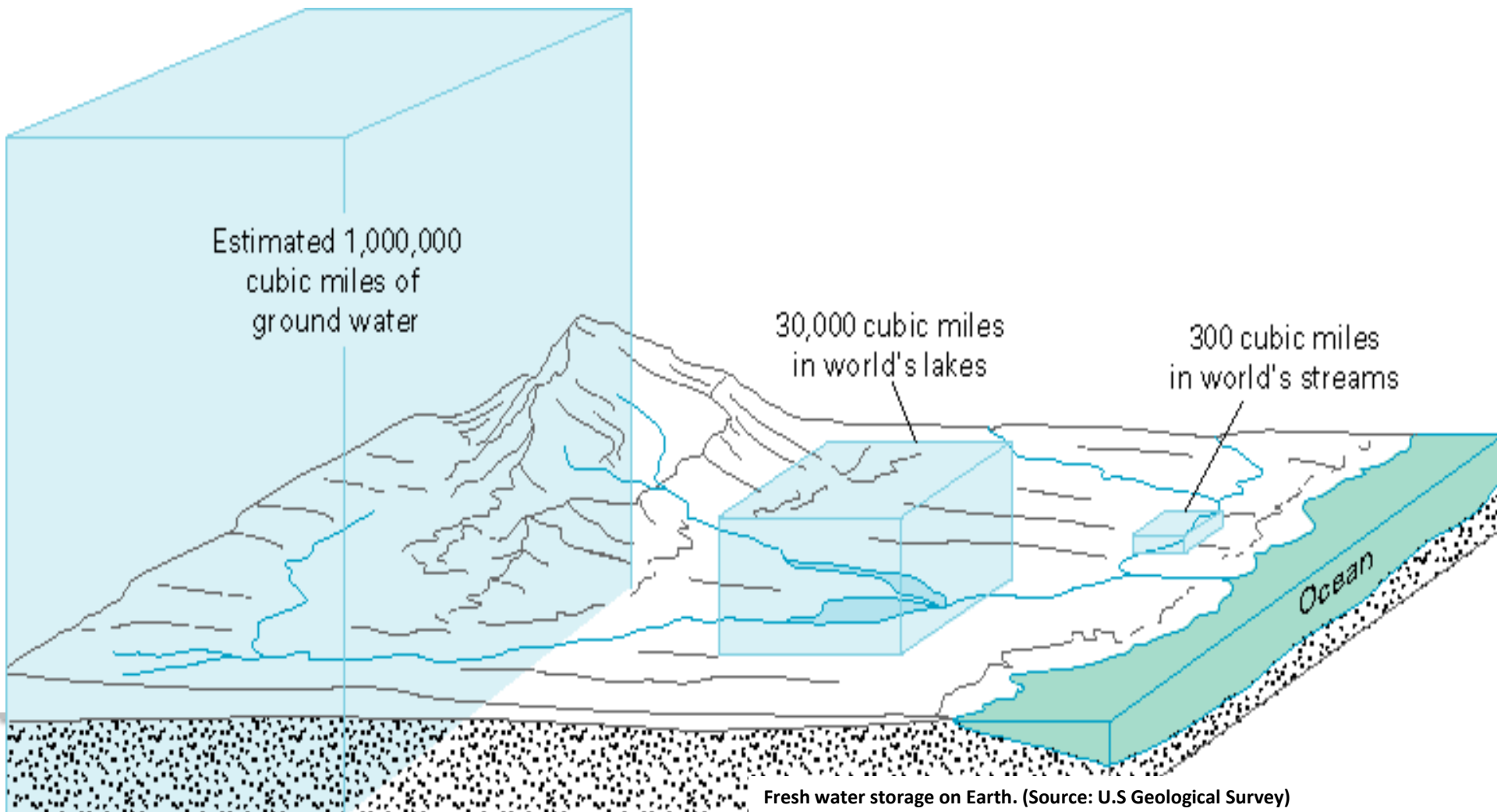


National Delegates
(contact persons of each Geological Survey)



Earth's fresh water resources consist mostly of glaciers ice caps and groundwater

Rivers and lakes constitute a very small part of the total global freshwater volume.



Responding to EU requests

European Innovation Partnership on Raw Materials COM(2012) 85 final:

“For many years the basic geological exploration and mapping in the EU has been carried out by **national geological surveys** that have to **operate within the constraints of national frameworks and regulations**. **Today, the full benefits of an appropriate coordination or even integration of some of the activities of the EU’s different 27 geological surveys has not been achieved**. Yet, innovative thinking based on **increased networking and cooperation** offers a huge potential to move forward. Setting **European standards** will facilitate the creation of a **uniform EU geological knowledge base**, and can also lead to a **more cost-effective development and use of required modern technologies**, such as **satellite-based resource information** and **advanced 4D computer modelling systems**.”



Making in-situ data available

A number of projects is being carried out by The Geological Surveys of Europe

Is their continuation ensured after the end of each project?

Are those projects connected and their results interoperable?

How can the EU really benefit of this huge amount of in-situ data?

THE GEOSCIENTIFIC COMMUNITY IS PROBABLY, AT THE MOMENT, THE WORLD LARGEST PROVIDER OF IN-SITU DATA







Background

20th September 2011

Unanimous resolution by the EuroGeoSurveys Directors at their 31st General Meeting in Warsaw:

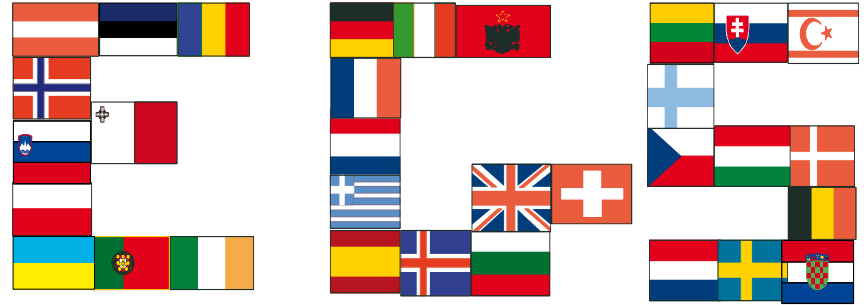
OneGeology-Europe shall become the basis for the European Geological Database, owned and sponsored by EGS.



EUROGEO SURVEYS

32 NGSO

from across Europe



Work force of

SEVERAL THOUSANDS

Over **1** billion euro annual budget



EuroGeoSurveys - The Geological Surveys of Europe



Responding to EU needs

Towards a European Geological Data Infrastructure?





EMODnet

 European Marine
Observation and
Data Network



Geo-Seas

GEO-SEAS

Pan-European marine geoscientific e-infrastructure

EMODnet

European Marine Observation Data NETWORK



EuroGeoSurveys - The Geological Surveys of Europe



GEO-SEAS

Improved discovery and access to **federated marine geological and geophysical data** and data products via a dedicated web based portal

Improved interoperability of geological and geophysical data with other data and data products

Underpinning European and global Directives and/or programmes e.g. INSPIRE, GEOSS and GMES



1G-E portal

importing WMS services from Geo-Seas

The screenshot displays the 1G-E portal interface. At the top left is the ONE Geology Europe logo. The top right features a language selection menu with various European flags and the text "Lataa lisensiointisopimus". Below the language menu are three tabs: "Etsi", "Karttanäkymä", and "INSPIRE". The main map area shows a satellite-style view of Europe with a dense network of red lines representing survey data. A small inset map in the top left of the main map shows the location of the main map. On the left side, there is a "Karttatasot" (Layers) panel with several options: "Geo-Seas data availability" (checked), "Emodnet Substrate map", "Country Outlines/Political boundaries", and "1GE - 1M:M Harmonized Geological Map". Below these options is a "Maanpinta" (Terrain) dropdown menu. At the bottom of the layers panel is a "Poista kaikki karttatasot" (Remove all layers) button. The bottom of the map area contains a scale bar (1200 km), a scale indicator (Mittakaava: 1 : 25 000 000), and coordinate information (SRS: WGS 84, X: -4.35, Y: 23.45). A "Siirry..." (Go to...) dropdown menu is located in the top right corner of the map area. In the bottom left corner of the screenshot, there is a circular logo for "Geo-Seas" featuring the European Union flag and a stylized globe.



EMODnet

To provide access to observations and highlight gaps

Investment 2008-2010: €6,450,000

Expected benefits in long-term (impact assessment):

€300 million annually by reducing operating costs

Increasing competition and opportunities

Contribution to innovation and growth



Portals

EMODnet

Pilot portal for Chemistry

EMODnet

Pilot Portal For Biology
Data Discovery and Access Service

EMODnet

Pilot portal for Hydrography

EMODnet

EUSeaMap

EMODnet

Pilot Portal For Physical Parameters

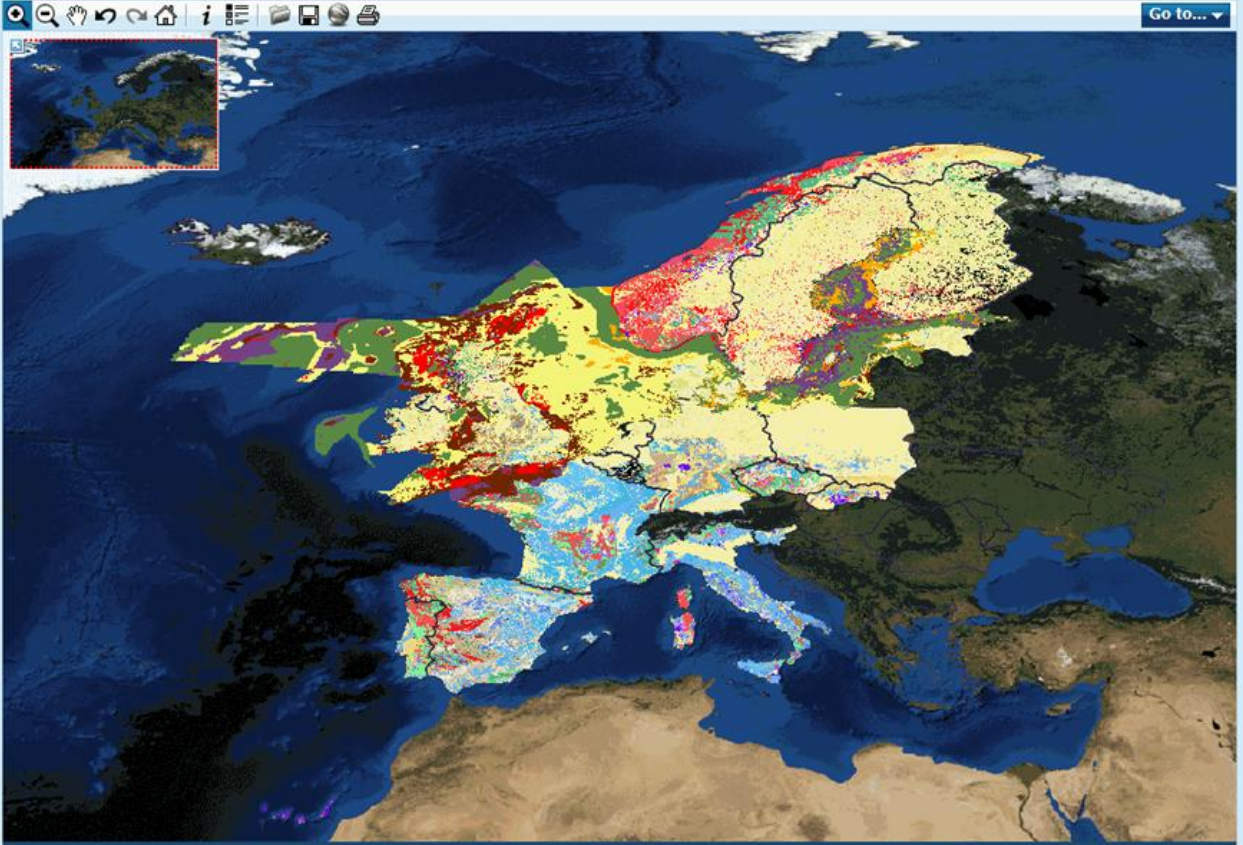


Download License Agreement | Language :

Search Map viewer

Layers

- Emodnet Substrate map
- Emodnet Substrate map
- Country Outlines/Political boundaries
- IGE - 1M:M Harmonized Geological Map



Remove all layers | 1200 km | Scale : 1 : 25 000 000 | SRS : WGS 84 | X : -6,01 | Y : 69,01

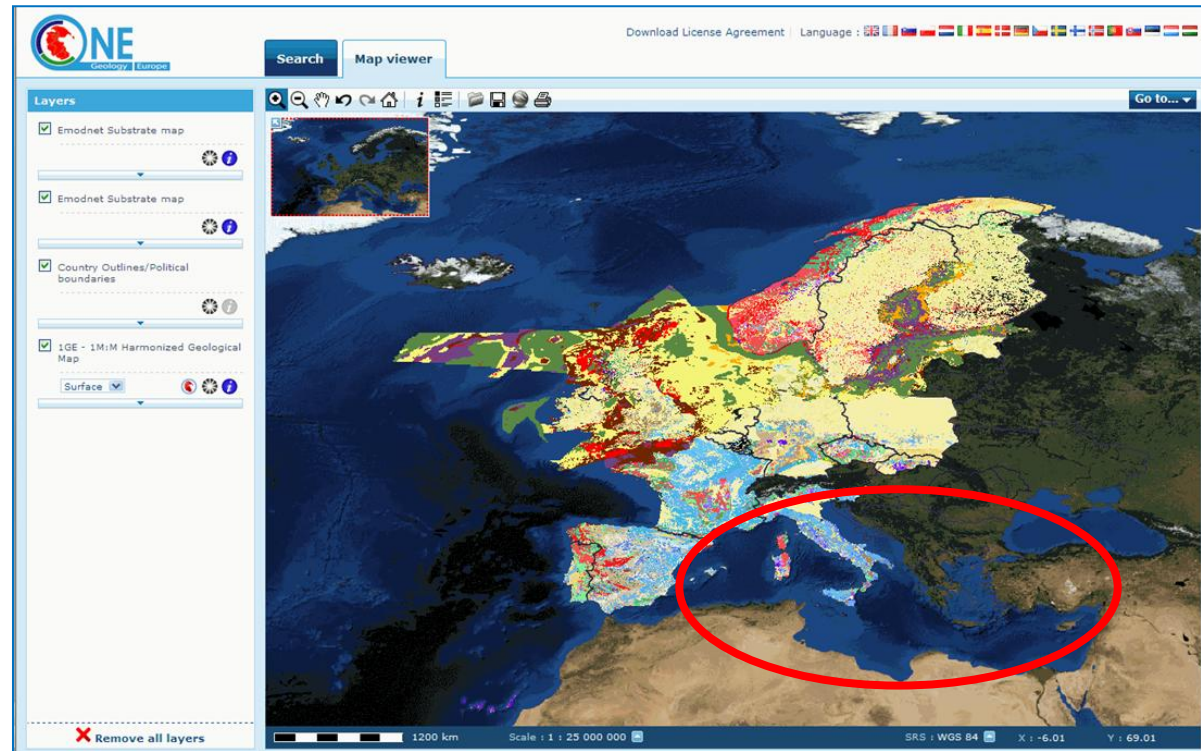
40 Years Listening to the Beat of the Earth

EMODnet

European Marine Observation Data NETWORK



EMODnet-Geology
2013-2016:
€4,200,000



EuroGeoSurveys - The Geological Surveys of Europe



The ProMine project

“Nano-particle products from new mineral resources in Europe” 2009-2013

- Total budget: 17 M €
- 27 partners from 11 EU countries
- To ensure that all potential mineral resources within EU are fully documented in a GIS-based resource assessment and modelling system



The ProMine project

ProMine

All Commodities

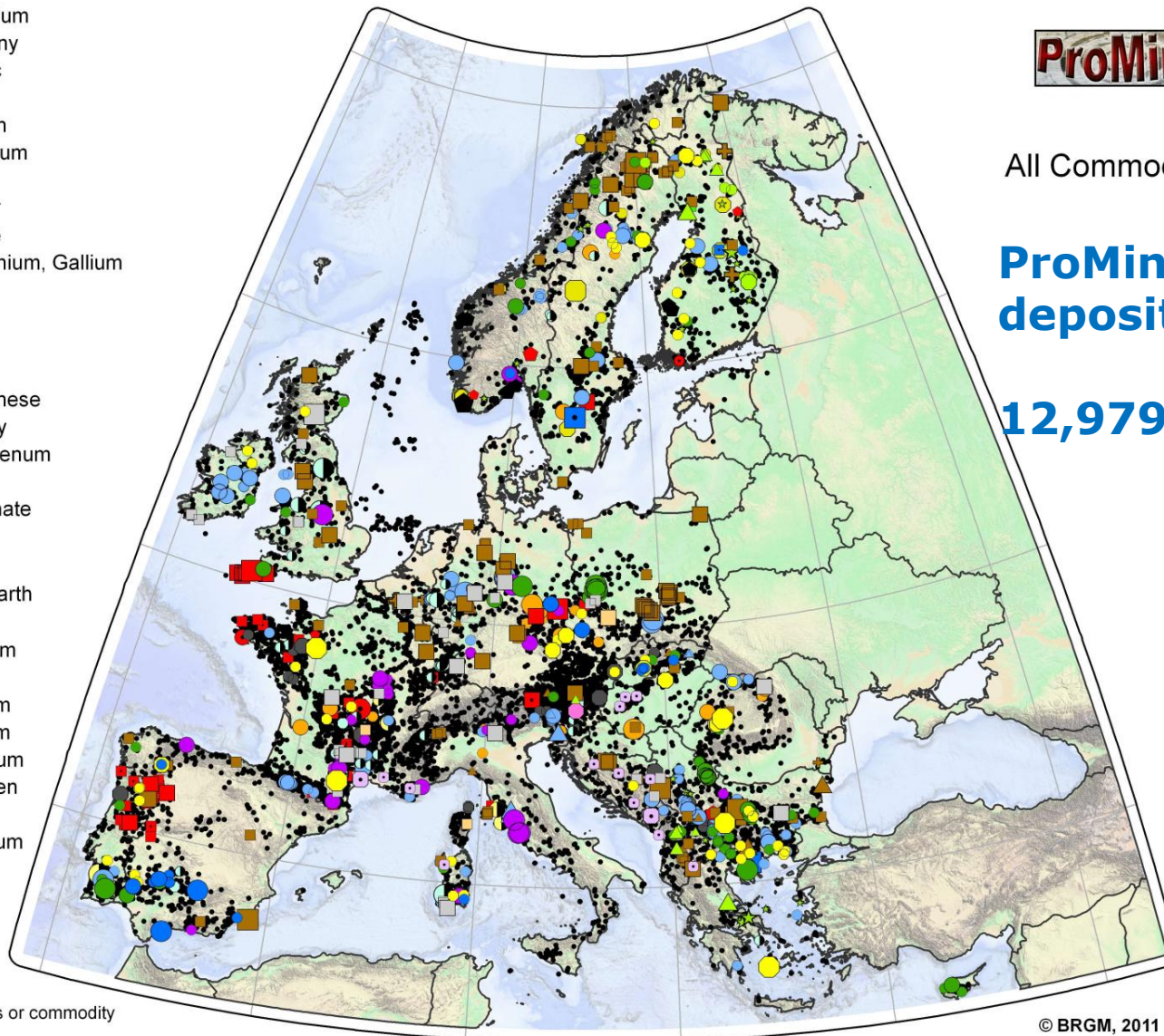
**ProMine mineral
deposits database**

12,979 records

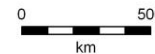
- Aluminium
- Antimony
- Arsenic
- Barite
- Bismuth
- ▲ Chromium
- Cobalt
- Copper
- Fluorite
- ⊕ Germanium, Gallium
- Gold
- Iron
- Lithium
- Lead
- ▲ Manganese
- ▲ Mercury
- ◆ Molybdenum
- ★ Nickel
- ⊕ Phosphate
- PGE
- Pyrite
- Rare Earth
- Silver
- Tantalum
- Tin
- Titanium
- Uranium
- Vanadium
- Tungsten
- Zinc
- Zirconium

- Class A
- Class B
- Class C

- Other class or commodity



© BRGM, 2011



The ProMine project



ProMine Portal

ProMine Project

The screenshot displays the ProMine Portal interface. On the left is a 'Table of Contents' panel with a scrollable list of layers. The main area shows a map of France with a colorful geological overlay. On the right is a 'WMS-layers' panel showing the active layers. At the top right is a toolbar with navigation and map controls. At the bottom right, a status box shows screen and map coordinates. At the bottom left, a status bar indicates data transfer from mapsonne.brgm.fr...

Table of Contents

- 1GE BRGM 1M surface Geologic Structure
- 1GE BRGM 1M surface Geologic Unit
- ProMine - Mineral deposit layers
 - Base metals
 - Precious metals
 - Iron and ferro-alloy metals
 - Speciality and rare metals
 - Energy commodities
 - Minerals for chemical use
 - Ceramic and refractory minerals
 - Fertilizer minerals
 - Building raw materials
 - Specialty and other industrial rocks and minerals
 - Precious and semi-precious stones
 - Critical mineral raw materials
- ProMine - Anthropogenic concentration layers
- ProMine - Density maps
- ProMine - District - Province mineral potential maps
- ProMine - 3D-4D belts
- ProMine - Geological layers

WMS-layers

- BRGM Superficial geology
 - 1GE BRGM 1M surface Geologic Unit
 - 1GE BRGM 1M surface Geologic Structure

Screen Coords: X = 860, Y = 532
Map Coords: X = 3.047, Y = 41.022

Transfert des données depuis mapsonne.brgm.fr...

Adding in the ProMine Portal external WMS: Geological map of France from

EuroGeoSurveys - The Geological Surveys of Europe



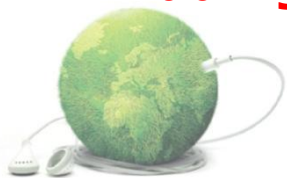
The ProMine project

The screenshot displays the OneGeology Europe portal. The main map shows Europe with numerous colored symbols representing mineral deposits. A scale bar indicates 1600 km, and the scale is 1 : 35 595 703. The coordinates are Lon : 59.34 and lat : 68. The 'Add external layers' dialog box is open, showing the WMS URL: `cgi-bin/mapserv54?map=/carto/promine/mapFiles/wp1ogc.map`. The supported formats are: `image/png, image/gif, image/jpeg, image/png; mode=24bit, image/vnd.wap.wbmp, image/tiff, image/svg+xml, image/svg+xml`. The dialog lists several layers to be added:

- ProMine WP1 OGC-Web-Service (1.3.0, 1.1.1)
- Mineral deposits (1.3.0, 1.1.1)
- Main commodities (1.3.0, 1.1.1)
- Base Metals (1.3.0, 1.1.1)
- Precious Metals (1.3.0, 1.1.1)
- Iron and ferro-alloy metals (1.3.0, 1.1.1)
- Speciality and rare metals (1.3.0, 1.1.1)
- Enerov commodities (1.3.0, 1.1.1)

The dialog also includes a 'Keywords' field and a 'Submit' button. The browser status bar shows the URL: `http://mapdmzrec.brgm.fr/cgi-bin/mapserv54?map=/carto/promine/mapFiles/wp1ogc`.

Adding ProMine WMS to the OneGeology-Europe Portal



EuroGeoSurveys - The Geological Surveys of Europe



EUROGEOSOURCE

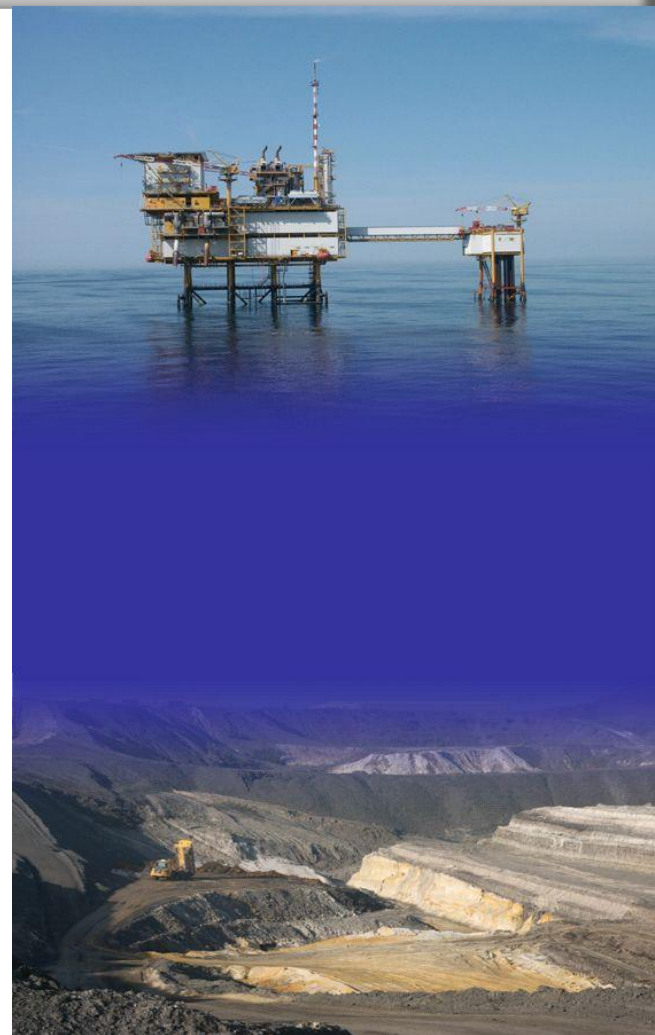
for sustainable and secure supply of energy and minerals

A multilingual Web GIS System that brings harmonised information on Energy and Minerals resources

To your desktop

Main data

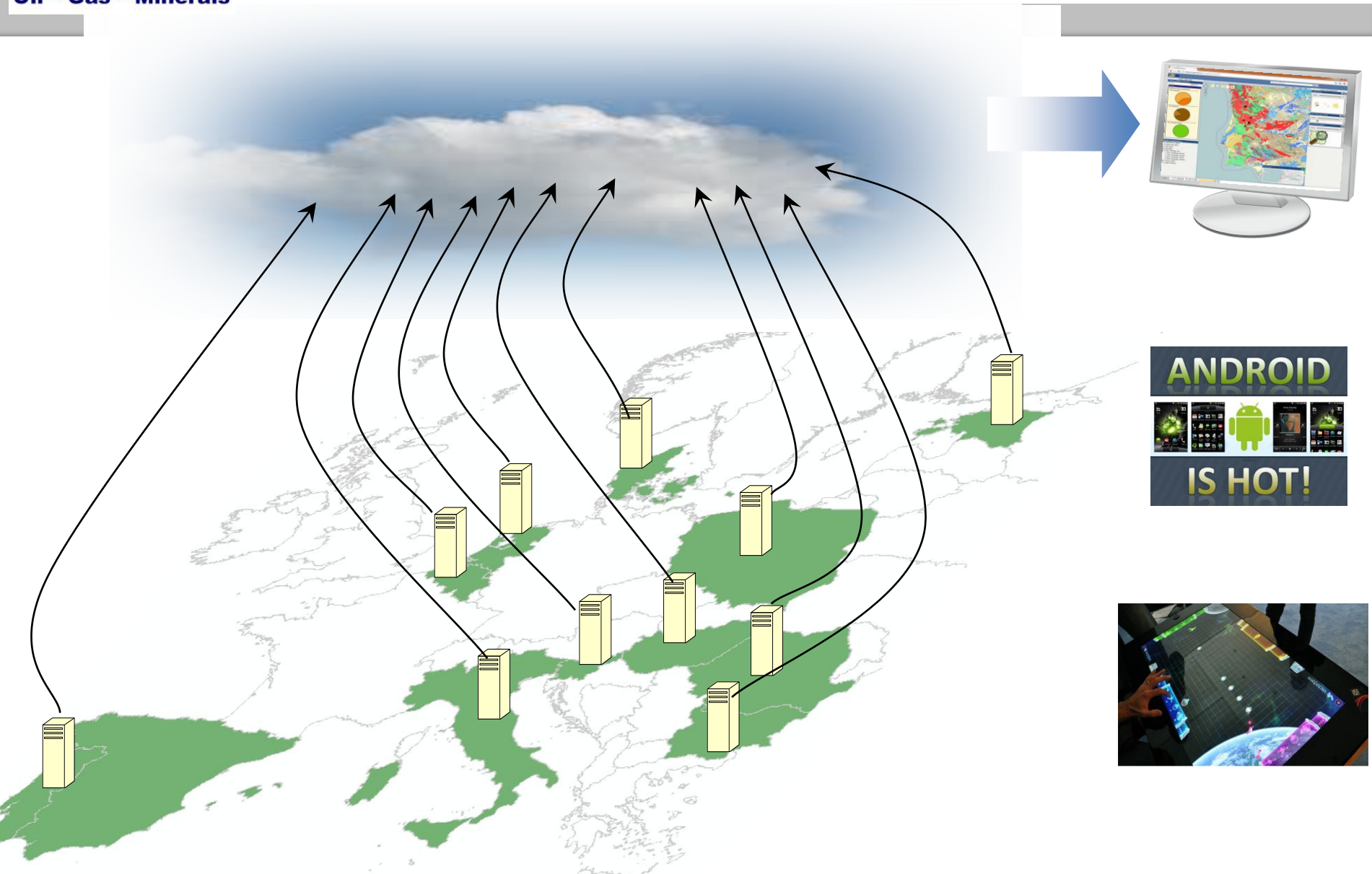
- Energy (oil and gas) and Minerals (including aggregates)
- Production and industrial sites
- Geological reserves
- SPBA atlas: Petroleum geology for Northwest and central Europe



EuroGeoSurveys - The Geological Surveys of Europe



Distributed WEB system



EuroGeoSource portal uses OneGeology-Europe

The screenshot displays the EuroGeoSource web portal interface. At the top, there is a navigation bar with links for [Help](#), [Metadata](#), [Contact info](#), and [Homepage](#). A search bar is located on the right side of the navigation bar, with the text "Search on the Map" and a "search" button. Below the navigation bar, the main content area is divided into several sections:

- Data sources:** A search bar for commodities (e.g., "search") and a "remove" button.
- Results:** A list of search results, including "Energy resources", "Natural gas", "Mineral occurrences", "Deposit Type", "Names", and "Background Map".
- Map data:** A legend for the geological map, listing various rock types and materials such as andesite, anorthositic rock, arenite, basalt, carbonatite, clastic sandstone, clay, diamicton, diorite, doleritic rock, foid bearing syenite, gabbro, granite, granitoid, granodiorite, granulite, impact generated material, komatiitic rock, limestone, orthogneiss, paragneiss, peat, porphyry, pyroxenite, quartzite, rhyolite, sand, and sediment.
- Overview map:** A small inset map showing the location of the main map area within Europe.

The main map area shows a geological map of Europe, with various rock types and materials color-coded according to the legend. The map includes a scale bar (100 km / 50 mi) and a position indicator at the bottom left: "position: -11.52344, 62.22820".

...and EMODnet-Geology substrate map

Help | Metadata | Contact info | Homepage

Search on the Map search English

Data sources

search for commodities: search

remove

Results

Energy resources

Natural gas

Mineral occurrences

No Mineral Commodities

Deposit Type

No Deposit Type

Names

No Mines

► Background Map

► Southern Permian Basin Atlas

► European data

Corine Landcover

Natura 2000

USGS: mining facilities

EMODNET substrate map

One Geology

► EuroGeoSource services

► Country specific data

► Administrative Units

Add WMS capabilities url add WMS

Map data

► Natural gas

Point @ Polygon

► EMODNET substrate map

Substrate (mod. Folk + mixed subcat)

1. Mud to sandy mud
2. Sand to muddy sand
3. Coarse-grained sediment
- 4.1 Mixed sediment, multimodal
- 4.2 Glacial clay
- 4.3 Hard bottom complex
- 4.4 Patchy seafloor
4. Mixed sediment, Undefined
6. Diamicton (Till)
- 7.1 Bedrock
- 7.2 Boulders

► One Geology

- andesite
- anorthositic rock
- arenite
- basalt
- carbonatite
- clastic sandstone
- clay
- diamicton
- diorite
- doleritic rock
- feld bearing syenite
- gabbro
- granite
- granitoid
- granodiorite
- granulite
- impact generated material
- komatiitic rock
- limestone
- orthogneiss
- paragneiss
- peat
- porphyry
- pyroxenite
- quartzite

Overview map

100 km
50 mi

http://europa.eu/ 50 89080

CC-BY-SA OpenStreetMap

...and ProMine data... etc...

Help | Metadata | Contact info | Homepage

Search on the Map search English

Data sources

search for commodities; eq
search

- Background Map
- Southern Permian Basin Atlas
- European data
 - Corine Landcover
 - Natura 2000
 - USGS: mining facilities
 - EMODNET substrate map
 - One Geology
- EuroGeoSource services
- Country specific data
- Administrative Units
- EOEST = GetCapabilities
- add WMS

Results:

- ProMine WP1 OGC-Web-Service
- Minerals for chemical use
- Ceramic and refractory minerals
- Fertilizer minerals
- Building raw materials, dimension stones
- Precious and semi-precious stones
- Specialty and other industrial rocks and minerals
- Critical mineral raw materials
- Critical mineral raw materials
- Alkaline Peralkaline
- Epithermal
- Igneous Felsic
- Igneous Intermediate
- Igneous Replacement
- IOCG
- Mafic Intrusion
- Mafic Ultramafic
- Orogenic Gold
- Pegmatites
- Carbonate-Hosted
- Sandstone-and-shale-hosted
- Sedimentary Deposits
- VMS
- Residual Deposits
- Base Metals Veins
- Alkaline Peralkaline
- Epithermal
- Igneous Felsic
- Igneous Intermediate
- Igneous Replacement
- IOCG
- Mafic Intrusion
- Mafic Ultramafic
- Orogenic Gold

position: -3 10791 53 91880

Map data

Critical mineral raw materi...

- Antimony (Sb);
- Beryllium (Be);
- Cobalt (Co);
- Fluorspar (Ft);
- Gallium (Ga);
- Germanium (Ge);
- Graphite (Gr);
- Indium (In);
- Magnesium (Mg);
- Niobium (Nb);
- PGM;
- Rare earth (REE);
- Tantalum (Ta);
- Tungsten (W)

Pattern:

- Old deposits and prospects;
- Deposit under exploitation.

Deposit size:

- Very large
- Large
- Medium
- Small

One Geology

OpenStreetMap

Overview map

PANGEO

PanGe

Hazard Categories

	Deep Ground Motions
	Natural Ground Instability
	Natural Ground Movement
	Anthropogenic Ground Instability
	Other
	Unknown

Made Ground

Click [here](#) for detailed information

Hazard Category:	Man Made (Anthropogenic) Ground Instability
Hazard Type:	Made Ground
Determination Method:	Potential Instability
Confidence:	High
Area (sq km):	0.114
Observed Start Date:	09/02/2012
Observed End Date:	12/02/2012
Estimated Population:	101 - 1000
InspireID:	PGGH_Roma_026
Town:	Rome
Country:	Italy



[PanGeo Licence](#)

Google earth

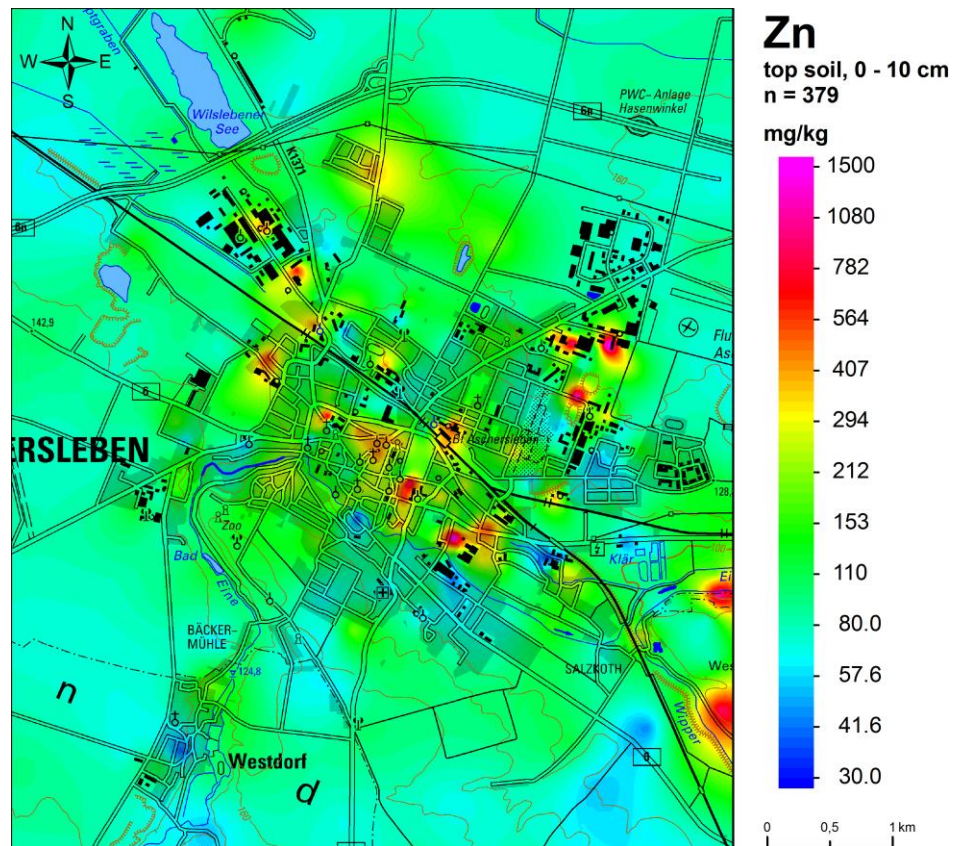
Urban Geochemistry – URGE Project

Mapping the Chemical Environment of Urban Areas

● Editors
Christopher C. Johnson
Alec Demetriades
Juan Locutura
Rolf Tore Ott

WILEY

EUROGEO SURVEYS
European Geoscience for Society



Zinc (Zn) in the topsoils (0-10 cm) of Aschersleben, Germany

EUROGEO SURVEYS
European Geoscience for Society

EuroGeoSurveys - The Geological Surveys of Europe

EO-MINERS



Earth Observation for
Monitoring and Observing
Environmental and Societal
Impacts of Mineral Resources
Exploration and Exploitation



EuroGeoSurveys - The Geological Surveys of Europe



A concept for the future

I²Mine

- marks the start of a series of development activities aiming to realise the concept of an invisible, zero-impact mine

I²Mine

- will develop innovative methods, technologies, machines and equipment for economical, ecological and safe exploitation of mineral raw materials in the EU

I²Mine

- will contribute to securing the supply of mineral raw materials for Europe in a sustainable way and reduce the import dependency

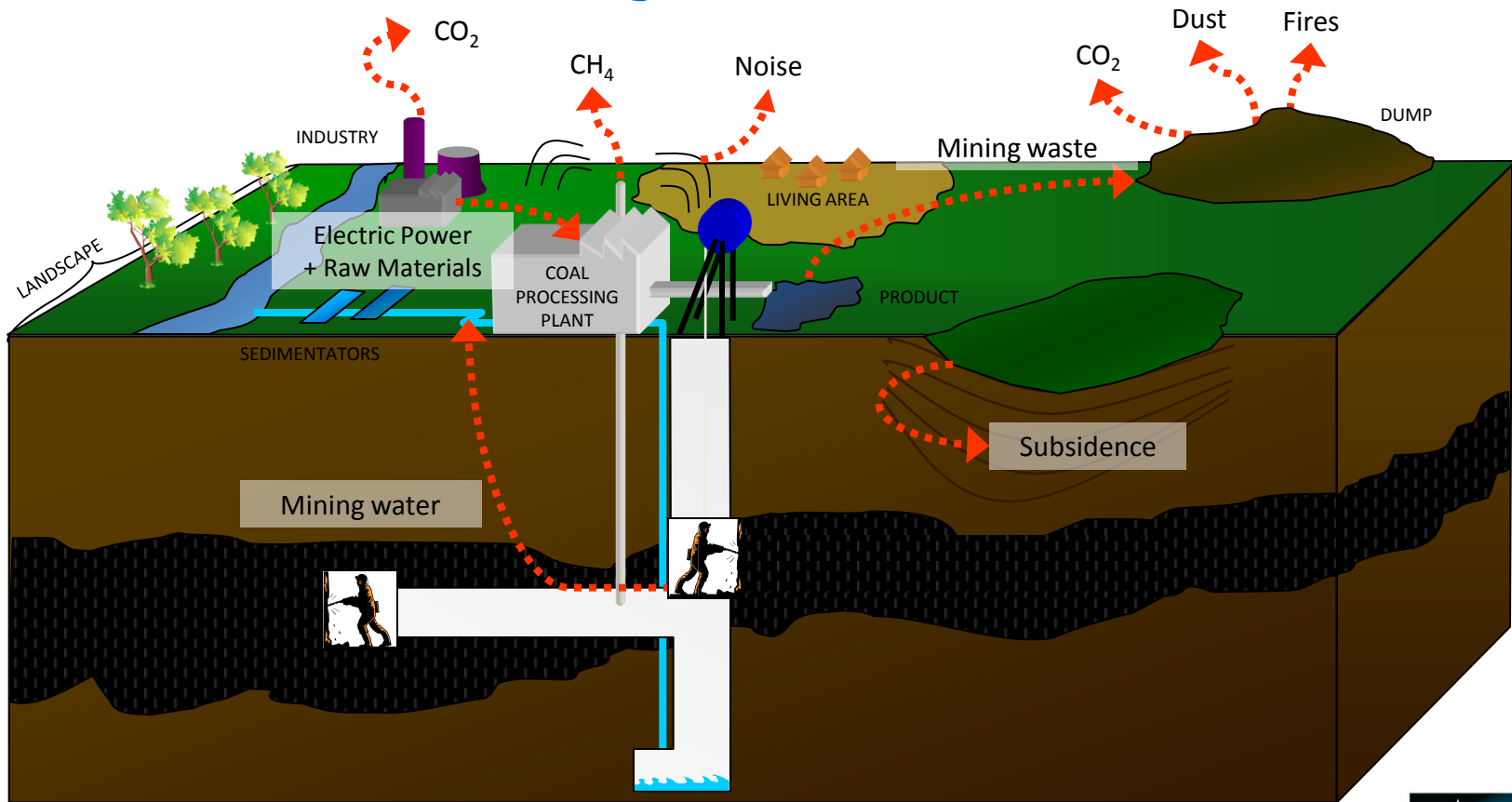
I²Mine

- will improve the competitiveness of the extractive sector in Europe as well as the competitiveness of European equipment suppliers



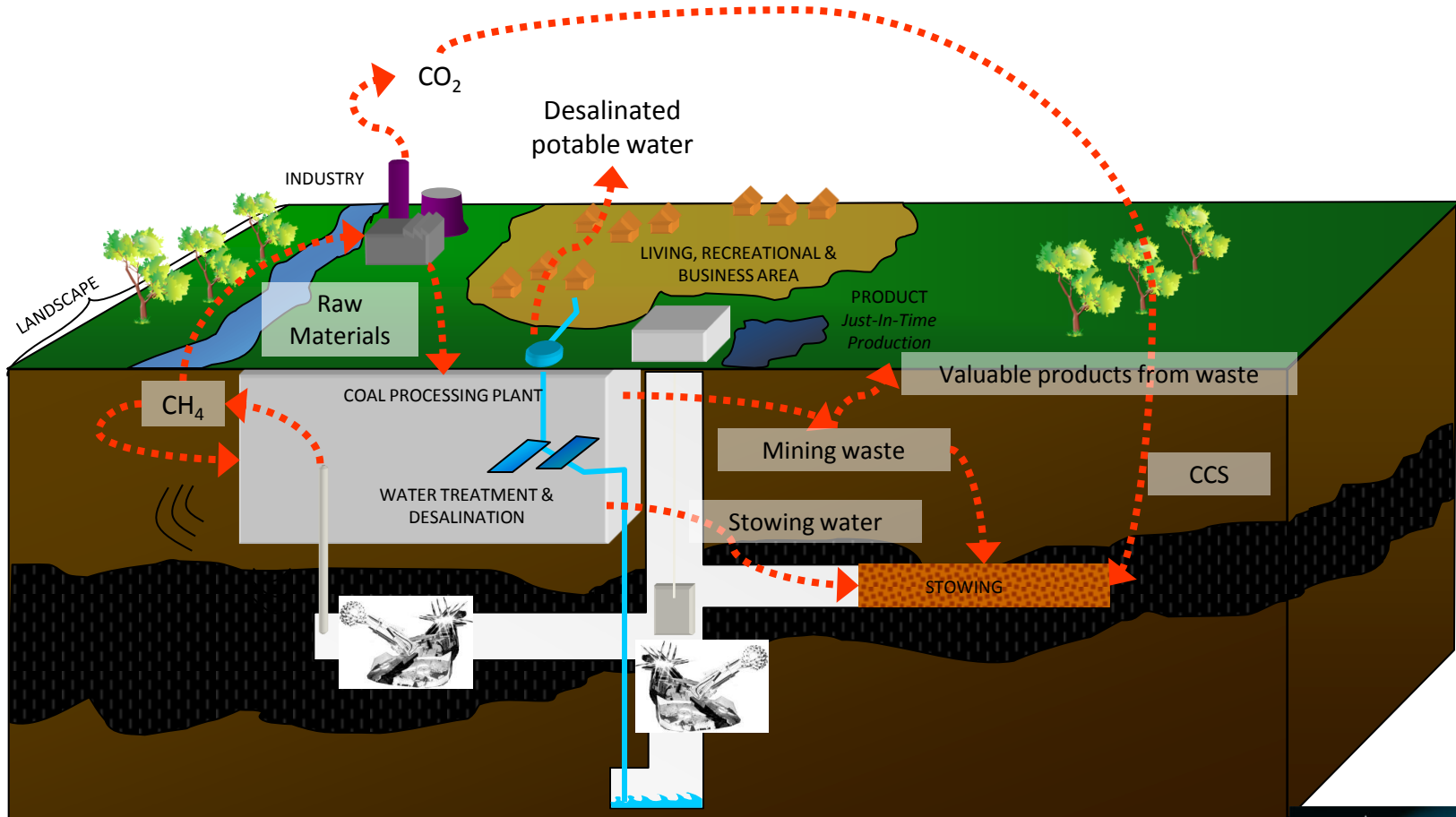
A concept for the future

Today's hardcoal mine Becoming invisible



A concept for the future

„Invisible“ hardcoal mine of tomorrow



SUSTAINABLE AGGREGATES RESOURCE MANAGEMENT

SARMa

- to develop common approach to sustainable aggregate resource management (**SARM**) and
- to ensure sustainable supply mix (**SSM**) planning, at three scales, to ensure efficient and secure supply in SEE

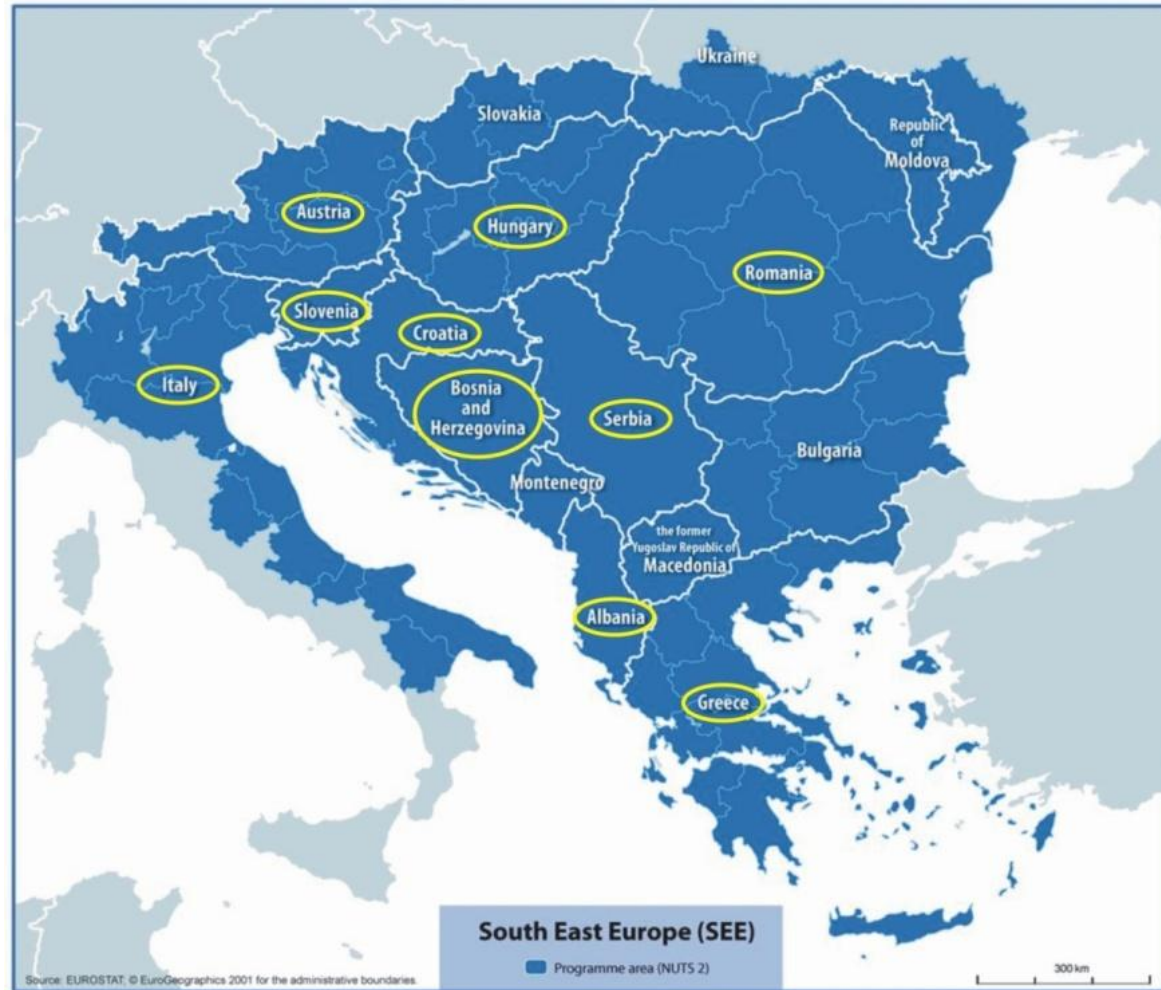
SARM is efficient, low socio-environmental impact quarrying and waste management.

SSM uses multiple sources, including recycled wastes and industrial by-products (slag) that together maximize net benefits of aggregate supply across generations.



SUSTAINABLE AGGREGATES PLANNING IN SOUTH EAST EUROPE (SNAP-SEE)

Geological Surveys:
Albania
Croatia
Emilia-Romagna (Italy)
Greece
Romania
Slovakia
Slovenia



Responding to EU needs

Towards a European Geological Data Infrastructure?



GROUNDWATER IS NOT THERE...

...YET



EuroGeoSurveys - The Geological Surveys of Europe



**THANK YOU FOR
YOUR ATTENTION!**



EuroGeoSurveys - The Geological Surveys of Europe

