Why together on Subsurface Geology? The benefits of collaboration in assessing subsurface potential

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Three regions working group on subsurface geology

- The collaboration between the regions of Emilia–Romagna, Bavaria and Catalonia in the field of Earth Sciences began in 1992.

- The aim of collaborating is to exchange methodologies and experiences between the respective Geological Surveys (GSOs) focused on supporting:
  - policy making
  - environmental management
  - sustainable access to natural resources,
  - the mitigation of the impacts of natural hazards of geological origin,
  - the development of downstream services
  - the information of the general public.

Three regions working group on subsurface geology

At the 6th Eurogeo Congress (Munich, 2009) four working groups were created with a focus on strategic earth science topics for the 21th century:

- Popularization of geosciences and geoheritage
- Soil and land planning
- Slope instability
- Subsurface geology (geothermal energy, CCS and 3D geological modeling)

Three regions working group on subsurface geology

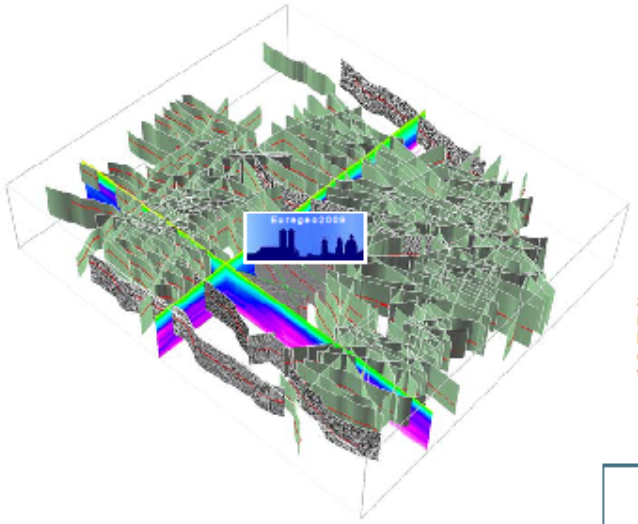
The kick-off on collaboration on subsurface geology was simply a poster presented at the last Eurogeo Congress in Munich (2006), defining the basic principles.

3 Dimensions – 3 Principles – 3 Regions collaborating

Geology is inherently a 3D science. 3D models emerge from the imagination of the minds of geoscientists. Modern information technology facilitates the conversion of this mental image into a tangible product, which provides access to new aspects that enhance the use and applicability of geodata.

Geology and the resources and risks connected with it do not respect political boundaries. To operate on a globalised stage geoscientists have to work trans-nationally towards modern and consistent standards for data and data access, to promote the economic usability of geoscientific knowledge.

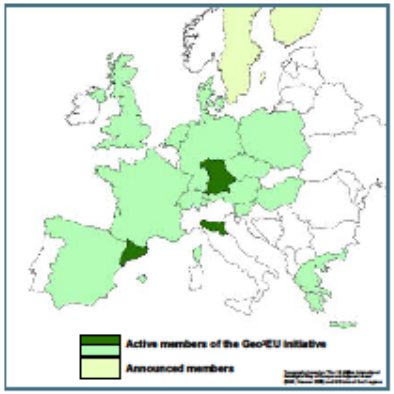
To make accessible the best geological information existing is a core function of geological surveys.



3D model of the surface of the main hydrothermal aquifer beneath greater Munich and vicinity using seismic cross sections and a regionalized velocity model (Panteer & Stiebitz 2006)

Bavaria, Catalonia and Emilia-Romagna are collaborating in the field of 3D subsurface modelling within the framework and the objectives of the Geo^{3}EU initiative with special emphasis on

- bringing research, knowledge and capabilities to a common high level
- sharing best practices
- creating a network of excellence for cross-border, interoperable 3D modelling of geological structures, properties and processes

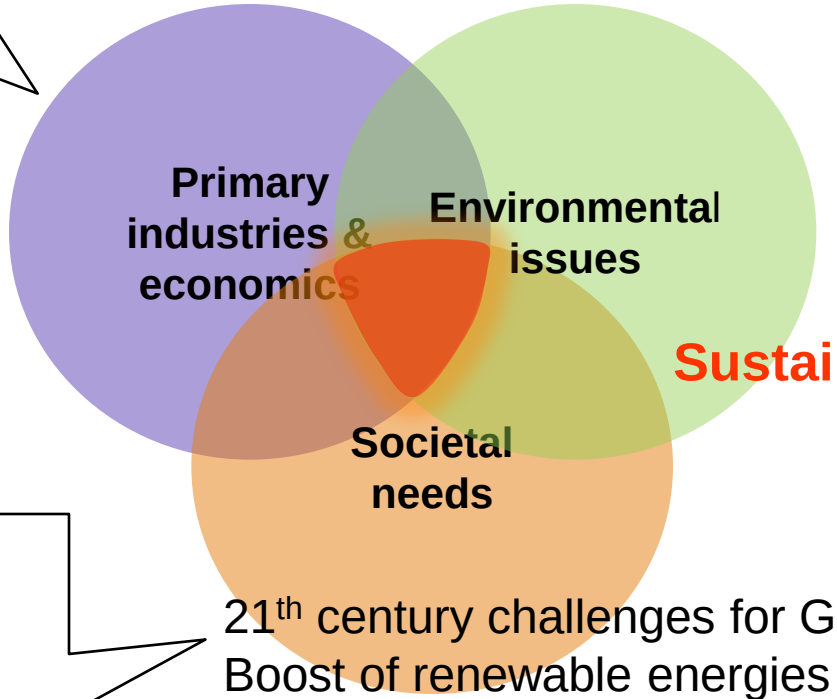


Subsurface geology: a strategic topic in the 21th century

A glimpse on the evolution of GSOs' general tasks

From mid 19th century to the1980's: Geological mapping for exploration.

From the 1980's to early 21th century: Geological heritage preservation and geological risks.



Sustainable development

In 21th century …facing global climate change

21th century challenges for GSOs:
Boost of renewable energies
Assessing and prioritizing other subsurface uses
Sustainable management of natural resources

Subsurface geology: a strategic topic in the 21th century

Facing new challenges: Up-coming subsurface uses

Classical uses of subsurface	21th century demands
✓ Oil and gas supply ✓ Mining ✓ “Construction” (mainly in urban areas and tunneling)	✓ Geothermal energy ✓ Deep aquifers ✓ Carbon capture and storage ✓ Deep repositories for nuclear waste ✓ Stand-by storage of non base load capable renewable energies

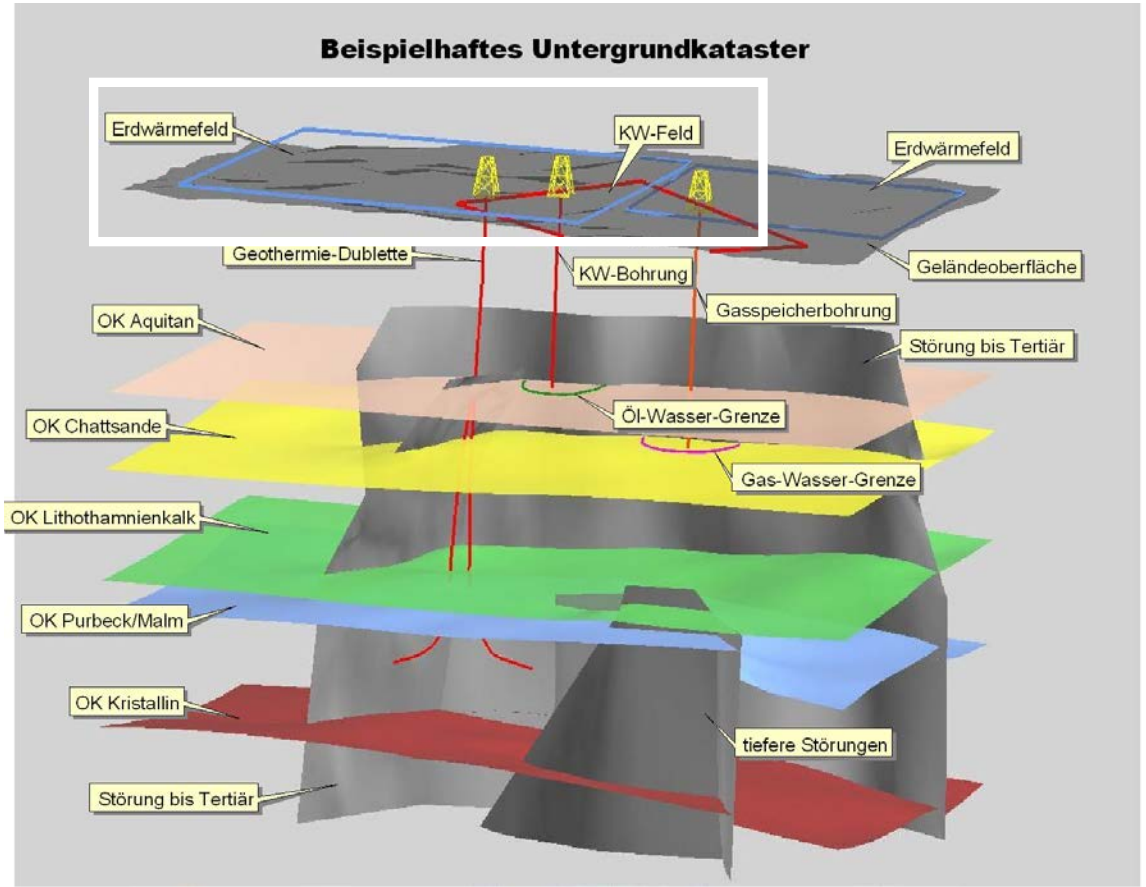
Spatial planning of the subsurface

Compatibility of subsurface uses

One claim “from the soil to the hell”

versus

Multipurpose use of the subsurface



e.g. subsurface multi-purpose registry

The role of GSOs in subsurface geology

"GSOs have the responsibility to provide **quality data and information** for policy makers and approving authorities and to make this knowledge also accessible to the citizens."

It is generally accepted that a comprehensive understanding of the geological build-up of the territory's **surface** is a basic prerequisite for land uses planning.

But only few people can understand geological maps.

A sound knowledge of the **subsurface** geology is even more important for possible subsurface uses and its sustainable planning and management.
(i.e: storage uses can only be planned if properties and structure of the subsurface are known and suitable)

Even less people (experts) understand subsurface geology … without 3D models!

Why 3D geological modeling?

- ✓ Geology is inherently a 3D issue.
- ✓ GSOs have to make the complex structures of the subsurface understandable also to non-experts like policy makers and approving authorities.
- ✓ Thus, the “geology beneath our feet” has to be converted into tangible products.

So,

Implementing 3D modeling tools on GSOs are vital for discussing, assessing and evaluating subsurface potential uses on each region.

Requirements for 3D geological modeling

Information must be made available (geological maps, borehole, seismic profiles, …)	**A legal framework to guarantee data access is needed.**
Geology does not respect political boundaries.	**Collaboration and transnational agreements are needed.**
Geologist and land use planners do not speak the same language.	**Harmonization and ready-to-use products are needed.**
Many GSOs have only limited economic and technical capacities.	**Cooperation with other GSOs benefits all.**

The benefits of collaboration

- ✓ To jointly raise awareness of our policy makers on the strategic importance of sustainable subsurface use and its planning and management.
- ✓ To exchange best practices and to use common work flows on the implementing 3D geological models, harmonization of information, software availability, …
- ✓ To cooperate in geoscientific and technical aspects of assessing subsurface potentials.

and…

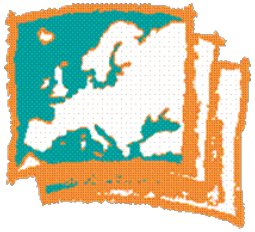
Why together?

Each of the 3 Regions has share in a deep foreland basin.

Why don’t we use our experience jointly?

Working group actions & objectives

- ✓Learning from the special skills of the others.
- ✓Avoiding mistakes that others encountered already.
- ✓Jointly defining and sharing best practices.
- ✓…. eventually bringing knowledge and capabilities to a common high level.
- ✓Organizing congress sessions to encourage other GSOs to joint us in harmonization and standardization.



On the behalf of Three Regions Working Group on Subsurface Geology

Thank you very much for your attention!

Enjoy your lunch!

See you again in the afternoon session.