

3D GEOMODELLING ACTIVITY IN EUROPE

The Geological Surveys of Europe



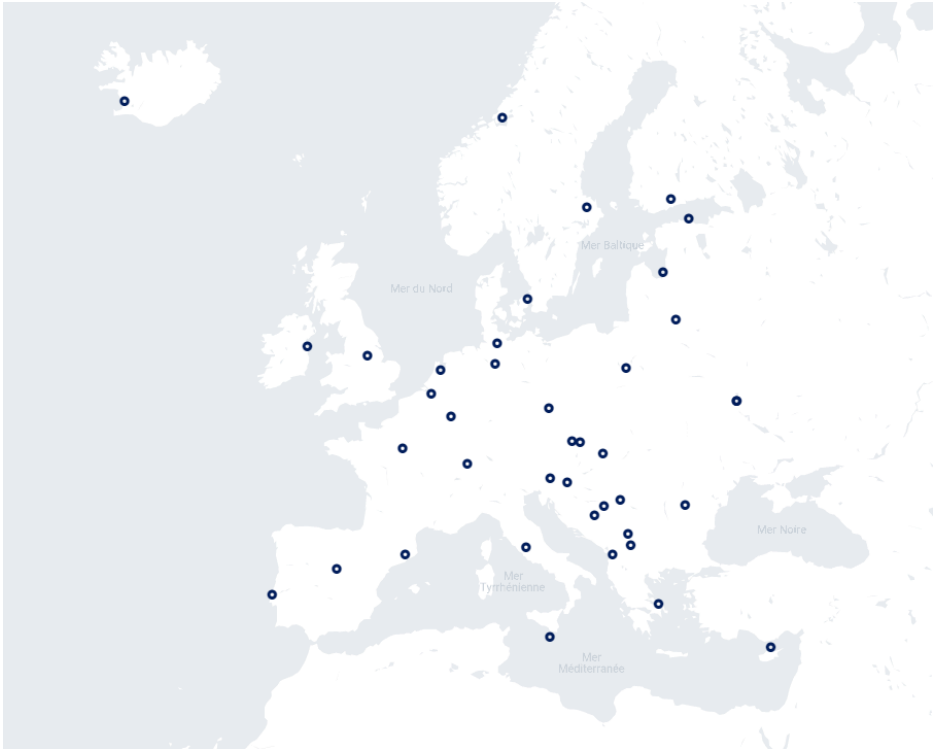
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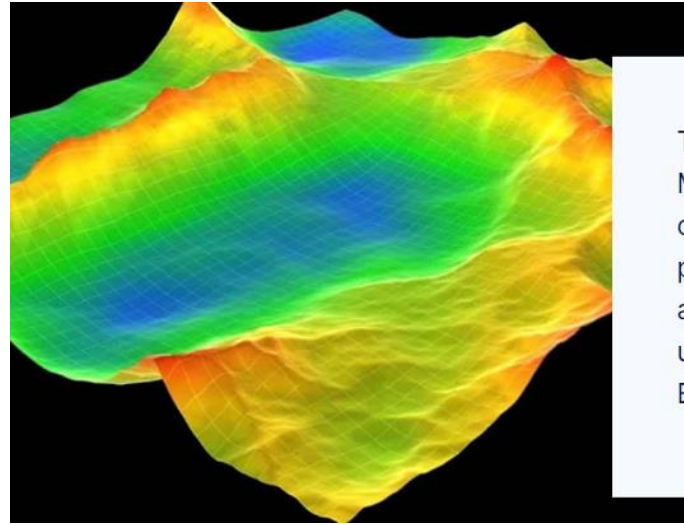
16th of November 2023



The 3D geomodelling community in GMMEG



Map of the involved countries in the GMM-Expert Group.



The Geological Mapping and Modelling Expert Group focuses on producing and harmonising pan-European geological maps and models to increase our understanding of the geology of Europe.

The GMMEG is actively working on the following aims:

- Developing standardised, hierarchical geological names (scientific nomenclatures)
- Using automated tools for showing digital maps at different scales in a study area
- Sharing best practice **data-models** and a reference data-model
- Developing new seamless digital **geological models** and datasets in a study area
- Developing tools to describe uncertainty in geological maps and **models**
- Promoting geological mapping and **modelling**

A dedicated focus on 3D geomodelling for GMMEG

Ranking by the expert group of potential activities concerning 3D (2021) :

| TOPIC | RANKING (/33) |
|---|----------------------|
| Collection of best-practise-examples for public data delivery of geological maps and map-data (and 3D-models) | 2nd (64pts) |
| Develop and share methodologies and tools for 3D geomodelling (e.g. common tools for constructing geological models and for visualisation and communication of their uncertainty) | 3rd (62pts) |
| Communication materials and guidelines for the promotion of geological mapping and modelling in Europe | 5th (61pts) |
| Collection of best-practise-examples for application of 3D models | 6th (58pts) |
| Collection of best-practise-examples for building national scale 3D models | 7th (58pts) |
| Tools for visualisation and communication of uncertainty in geological models | 8th (58pts) |
| Urban geomodeling | 13th (49pts) |
| NEW : link and integrate 2D maps and 3D models in one vizualisation system, both linked to underlying data and concepts. | Added in 2023 |
| NEW : A 3D geological model of Europe? | Added in 2023 |

A historically active European 3D Geological Modelling

2013 : Utrecht, Netherlands
2014 : Edinburgh, UK
2016 : Wiesbaden, Germany



2018 : Orléans, France

2019 : Bern, Switzerland

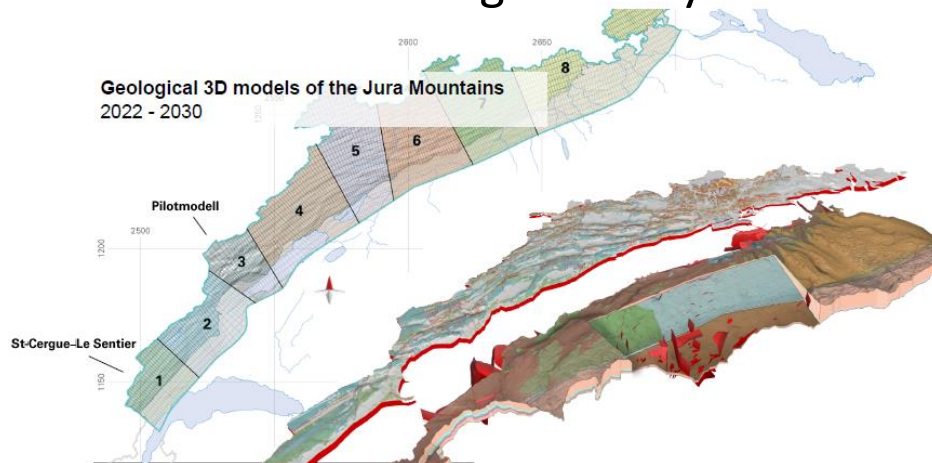


2023 : Copenhagen, Denmark

« 6th European Meeting in 3D Geological Modelling »

...Who consistently generates country updates and brainstorming

Regular « **country update** » sessions where geosurveys share their practices, success and bottlenecks.



Example of SwissTopo (Switzerland)

2.3.11. Do you deliver 3D mapping of the underground?

Most answers: No

Partially (project based) : Austria, Belgium, Czech R, Denmark, Finland, France, Germany, Ireland , Italy, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK

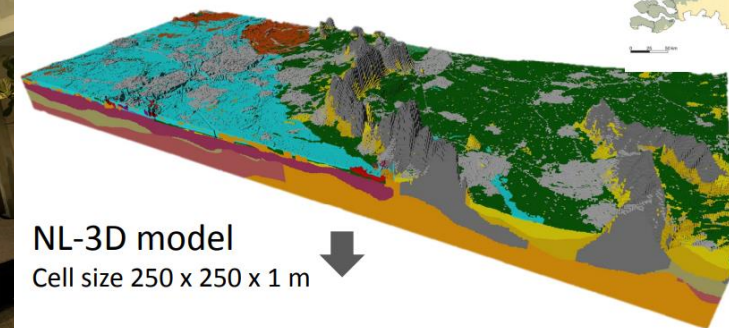
Yes: Netherlands

Conclusion: No systematic 3D mapping of the subsurface. Except in the Netherlands.

Krenmayr H.G., Nehlig P., 2020 - Geological Mapping and Modelling in Europe: results and preliminary interpretations of a questionnaire sent to the National Geological Surveys. EuroGeoSurveys Public Report, N°1/2020



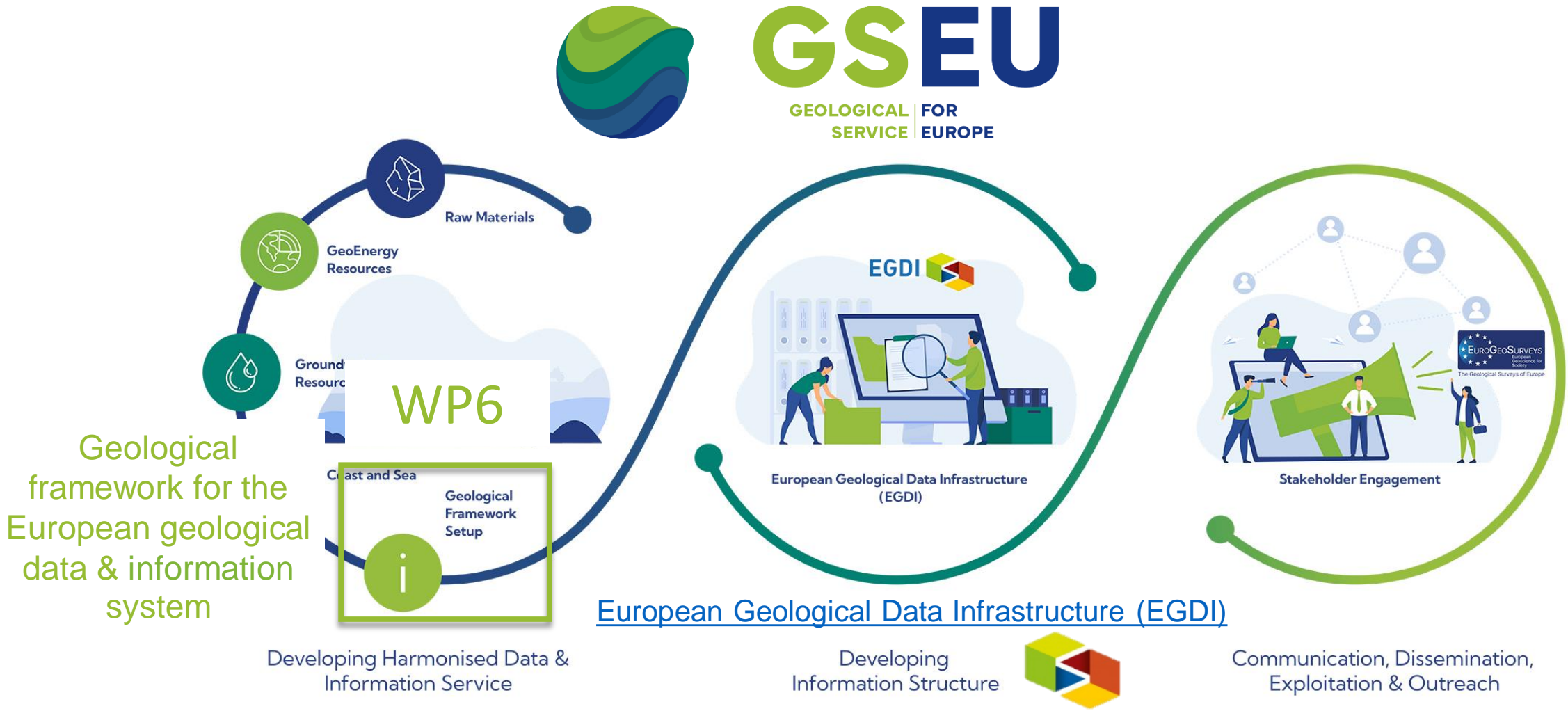
TNO GeoTOP model
Cell size 100 x 100 x 0.5 m



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Example of TNO (Netherlands) presentation

An opportunity for further best practices with the European project GSEU



An opportunity for further best practices with the GSEU project

WP 6 : Geological framework setup

- Task 6.1 Comprehensive **metadata** of European maps, map data sets and 3D-models
- Task 6.2 Development of a conceptual framework and scientific **vocabularies**



Task 6.3 Methods, tools, workflows, and best practices for 3D geomodelling and visualization

- ✓ 6.3.1 3D geomodelling
- ✓ 6.3.2 3D visualization of geo models

- Task 6.4 Demonstration of cross thematic use of geological information for subsurface management and its added value for decision support

Objectives of the task

- ✓ Strengthening an (existing) **community** inside and around surveys
- ✓ Structured **toolbox of open tools** along with relevant tutorials/examples
- ✓ Official deliverable, report:

“3D Geological Modeling using open source software - State of the art and perspectives for the SRIA”

Webinars on 3D geomodeling (open)-tools presentations



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- ✓ **Loop3D** : *An open-source, integrative 3D geological modelling platform*, by Laurent Aillères (Monash Uni, Australia), 28/09/2023
- ✓ **Visual KARSYS**, *a webtool for modelling geology and heterogeneous aquifers in 3D*, by Arnaud Malard (ISSKA, Switzerland), 12/10/023
- ✓ *Open-source Geological Modelling with GemPy and GemGIS*, by Florian Wellmann (RWTH, Aachen, Germany), 26/10/023

Thank you ! Any questions?