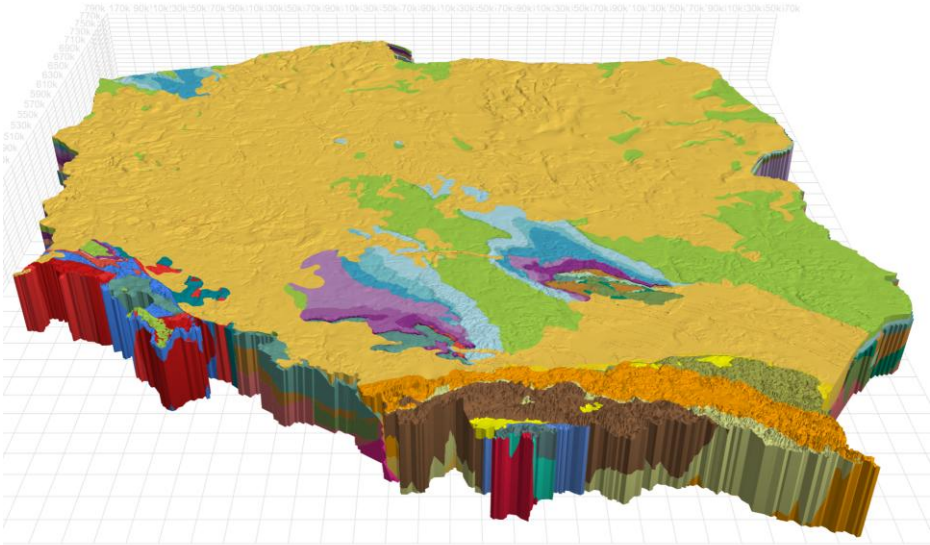
3D geological model of Poland v.2 – another lesson learned for national-scale models

Ewa Szynkaruk, Zbigniew Małolepszy, Dominik Szrek

& the PGI-NRI Geomodelling Teams

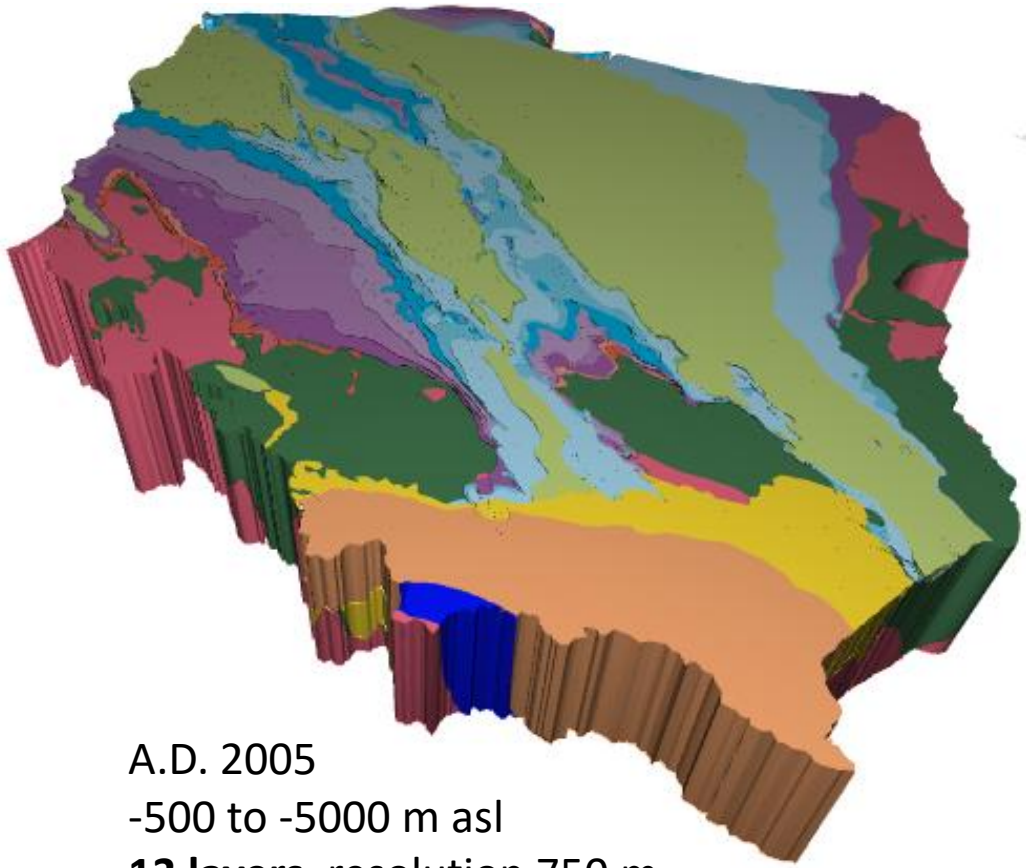
GSEU WP6.3 Workshop: Towards a 3D Geomodel of Europe | 12-13.10.2026



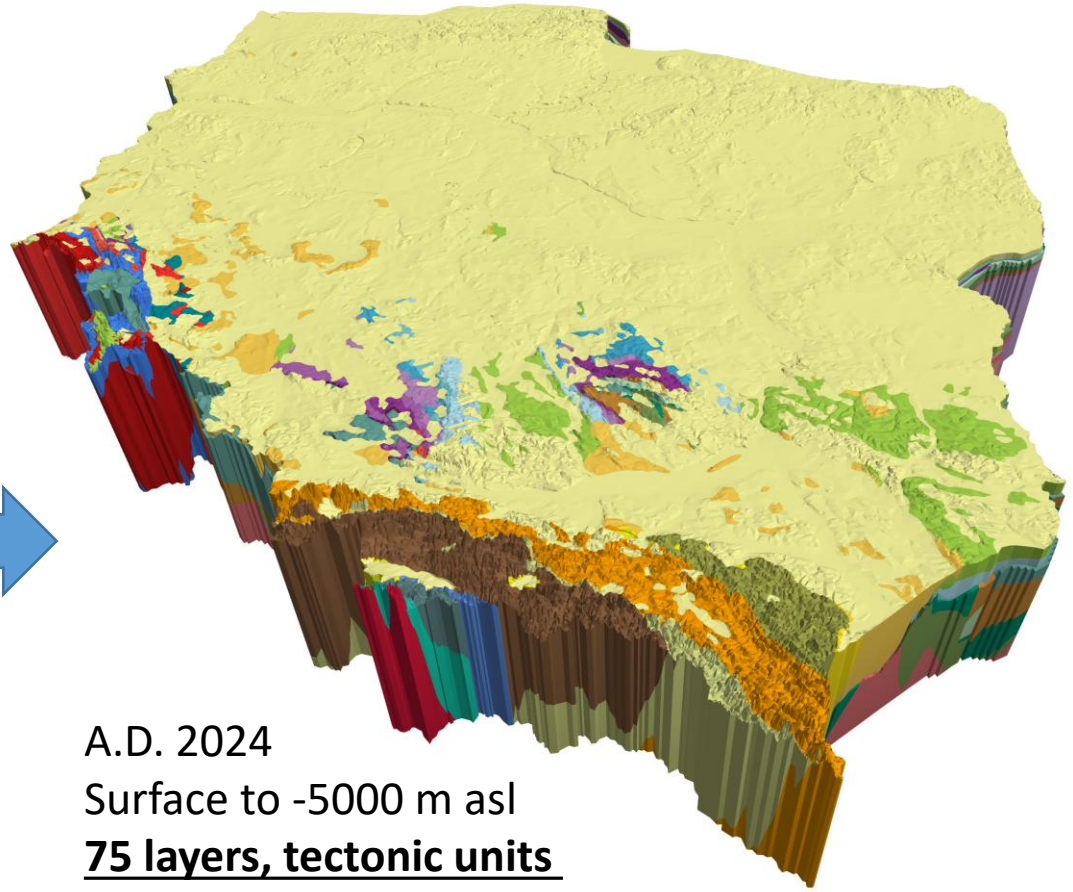
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3D geological model of Poland: remodelled after almost 20 years



A.D. 2005
-500 to -5000 m asl
13 layers, resolution 750 m

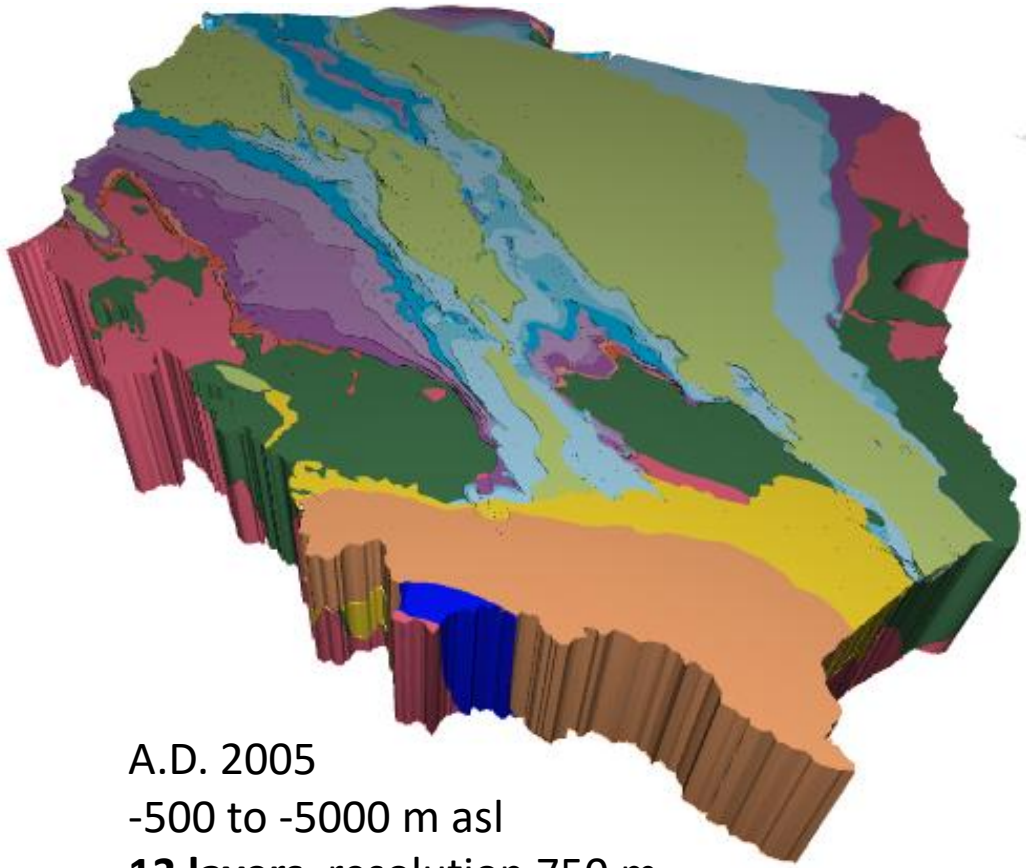


A.D. 2024
Surface to -5000 m asl
75 layers, tectonic units and intrusions, resolution 500 m

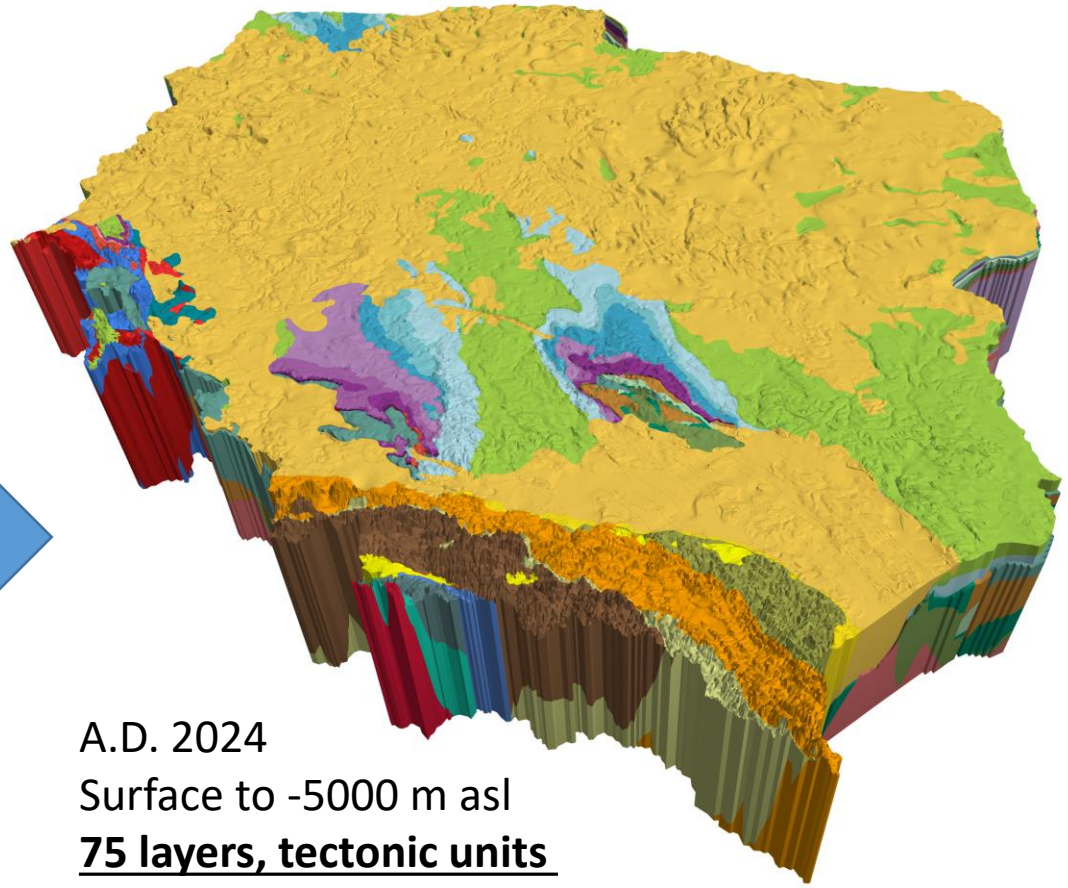
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Małolepszy Z., Meissner, U., Szynkaruk E., (Eds.). 2023.
Framework geological model of Poland. PGI-NRI, Warsaw, Poland

3D geological model of Poland: remodelled after almost 20 years



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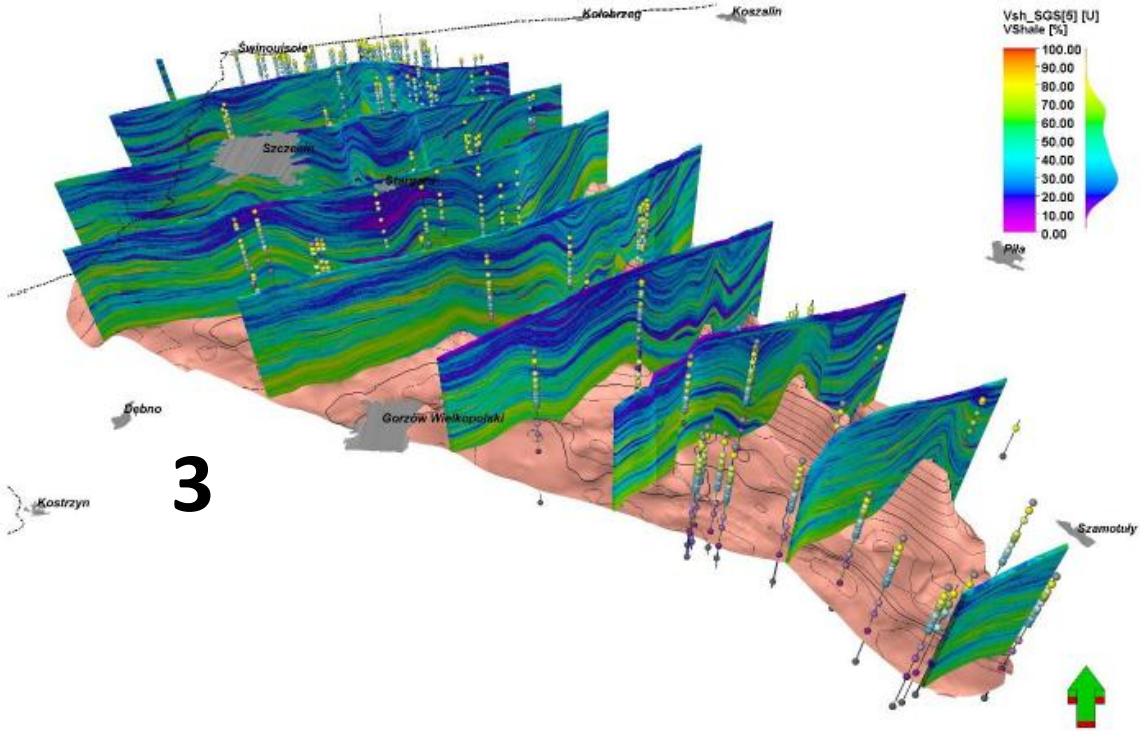


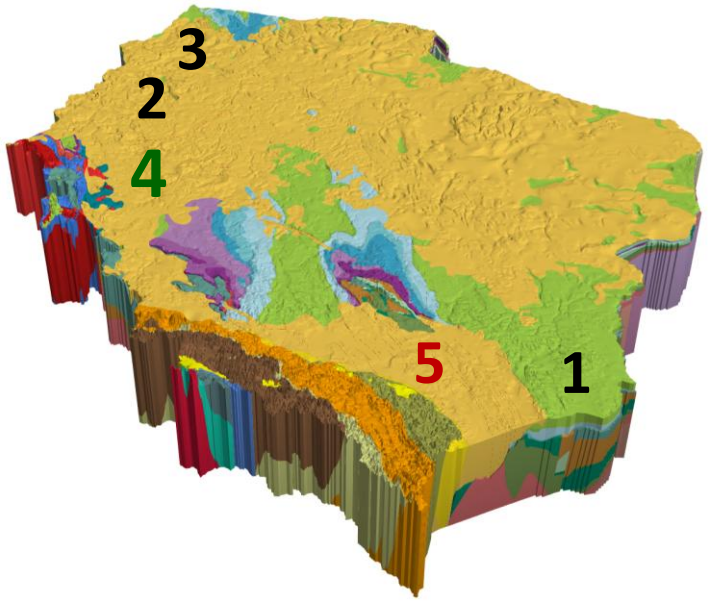
A.D. 2024
Surface to -5000 m asl
75 layers, tectonic units and intrusions, resolution 500 m

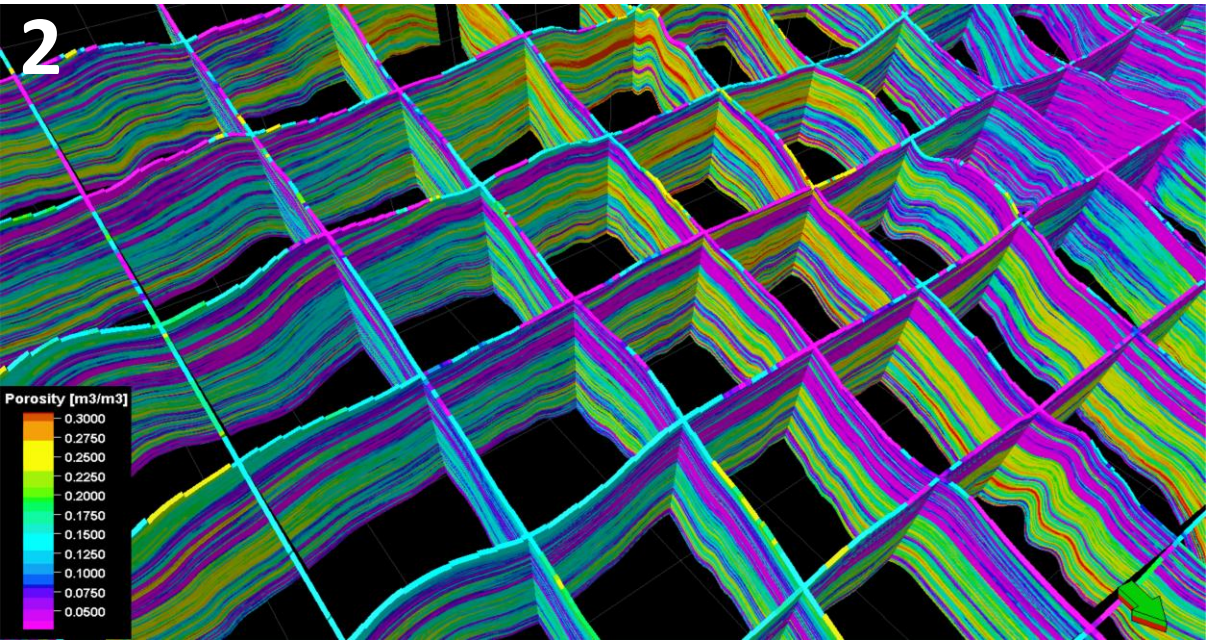
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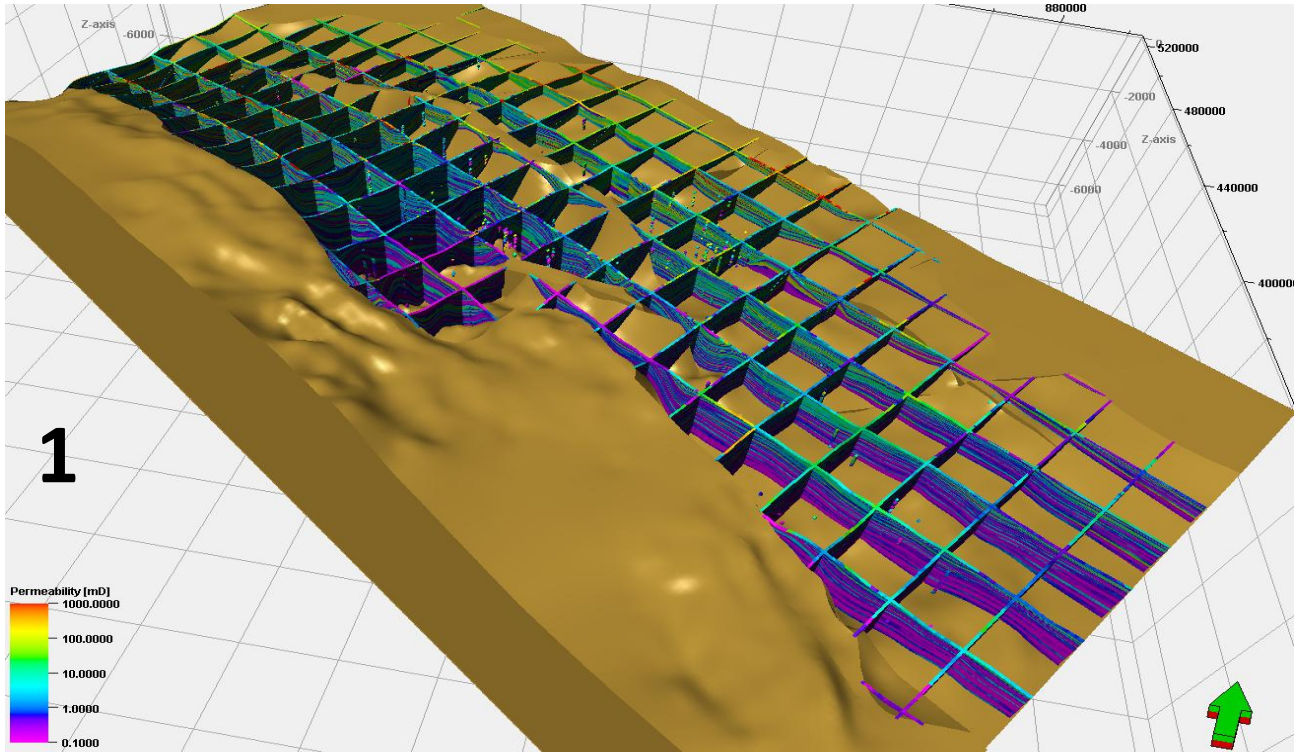
Małolepszy Z., Meissner, U., Szynkaruk E., (Eds.). 2023. Framework geological model of Poland. PGI-NRI, Warsaw, Poland

Regional parametric geological models

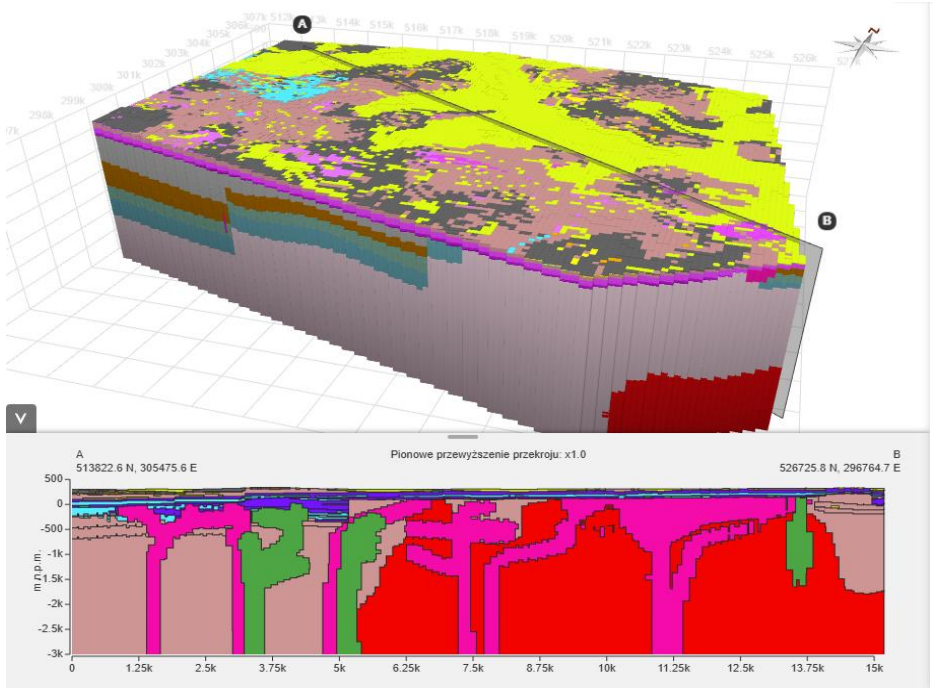








Resources-focused parametric models



Mo-Cu-W Myszków deposit

Zbigniew Małolepszy, Ryszard Habryn, 2025

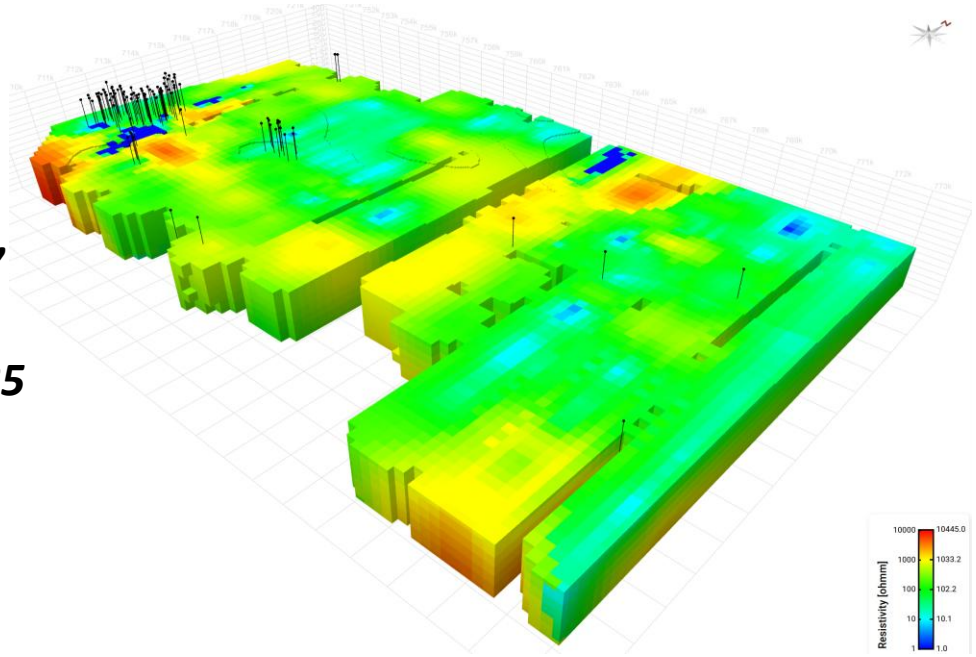


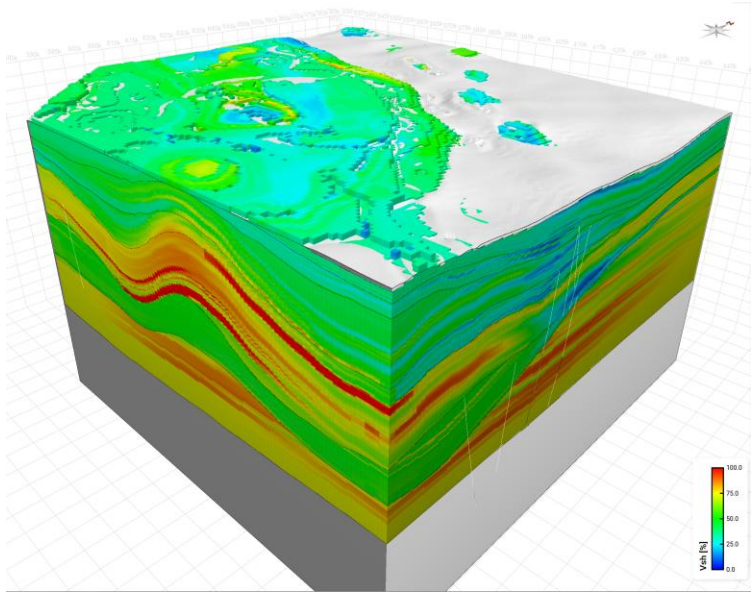
Hydrocarbon data integration, area B3

Rafał Laskowicz, Marcin Bolek et al.

Suwałki Anorthosite Massif, geophysical model

Olga Rosowiecka et al., 2025



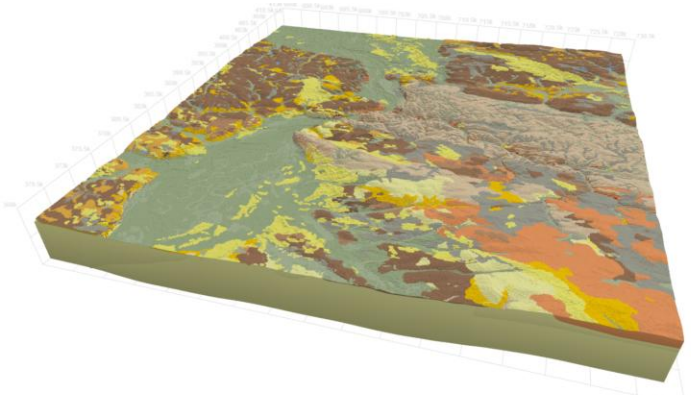


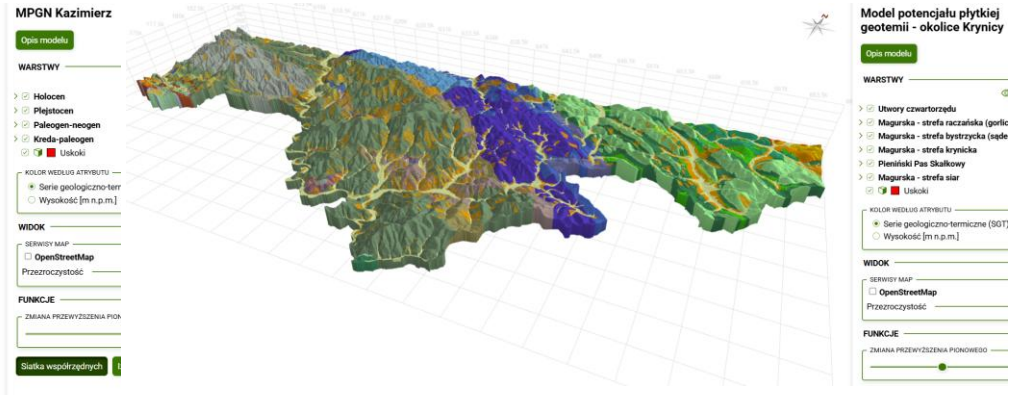
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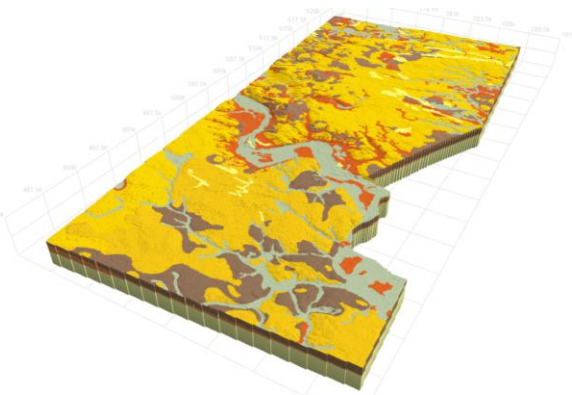
3D geological modelling for shallow geothermal resources assesement

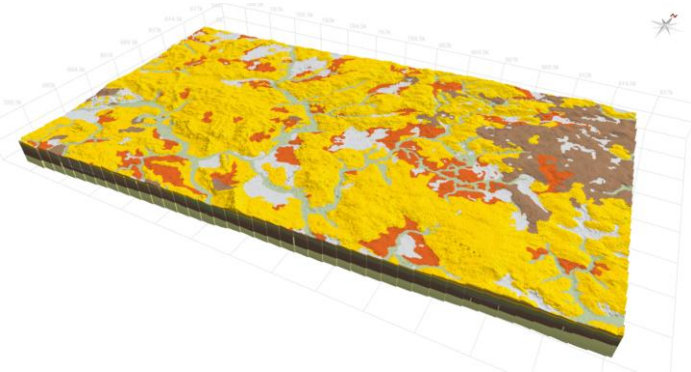
Adam Mydłowski, Grzegorz Ryżyński, Marta Szlasa et al. 2025

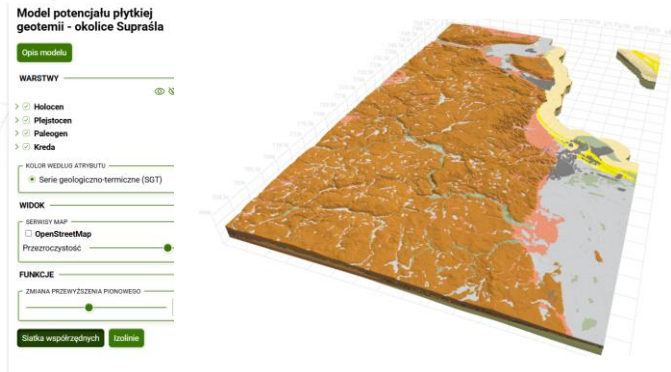




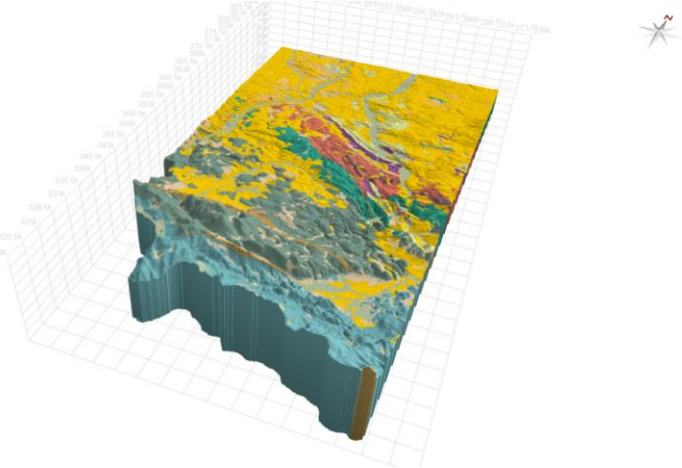












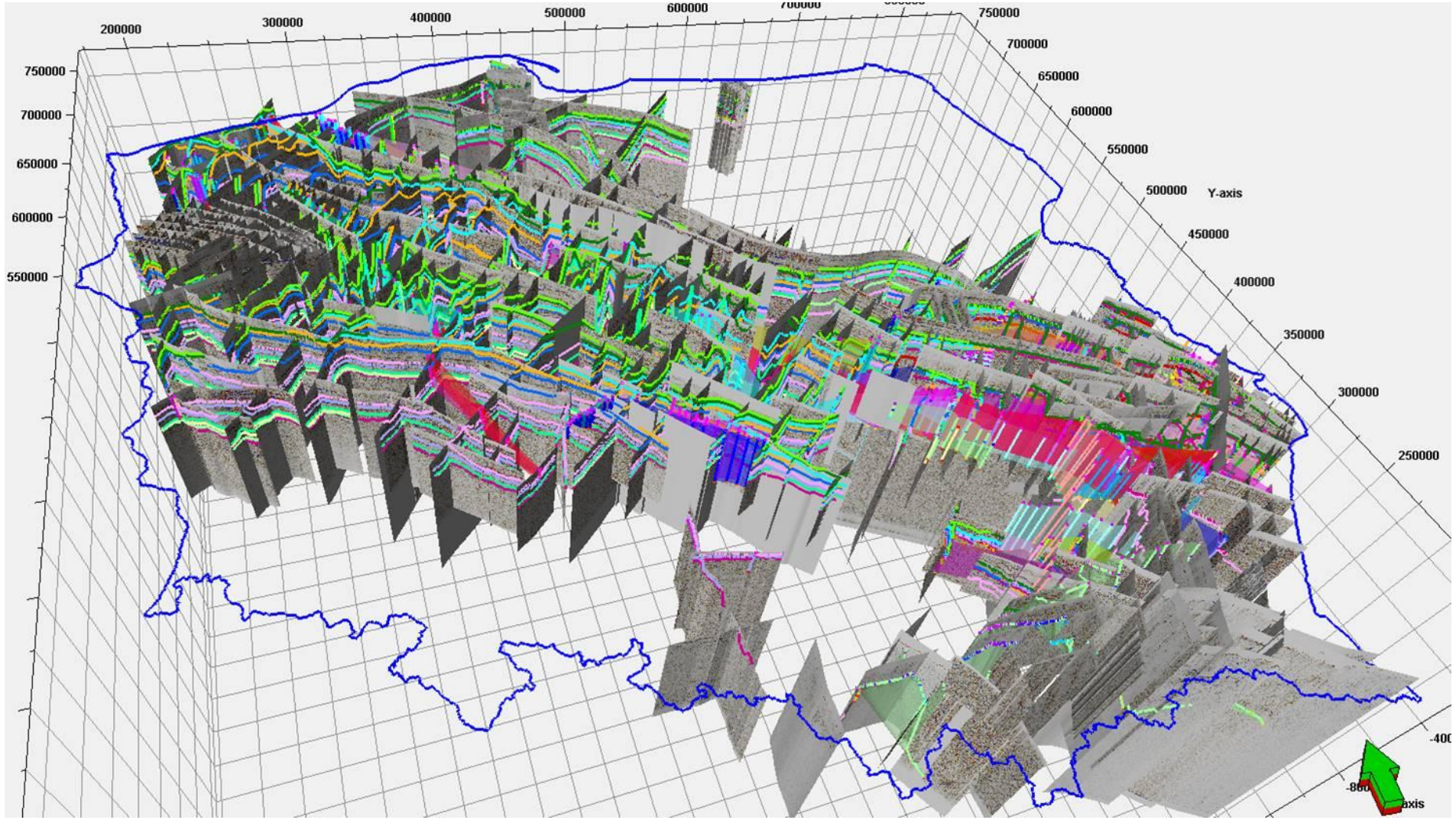


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3D geological model of Poland: input data and expertise

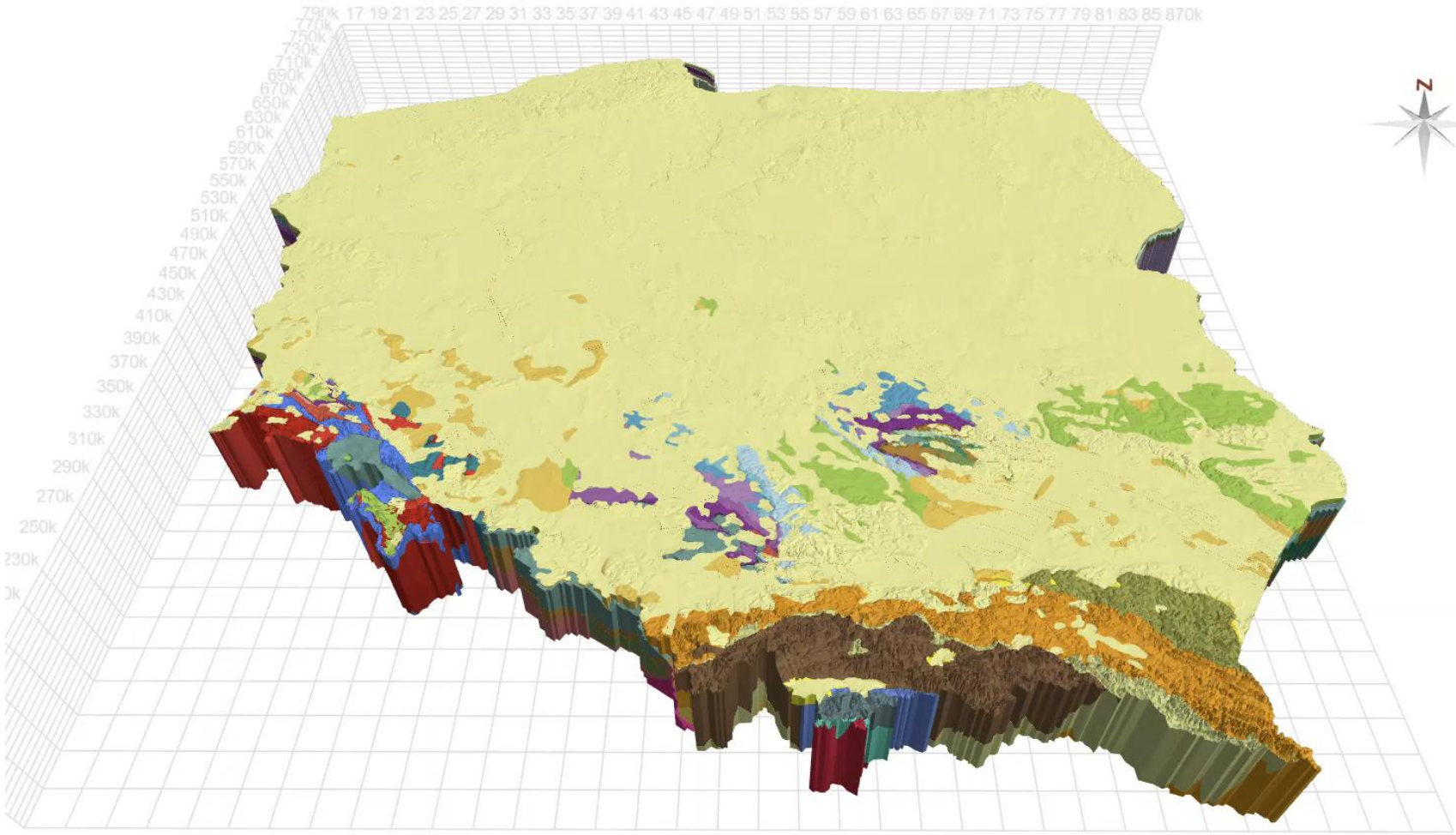
- Almost 22.5 thousand km of seismic lines
- 712 re-interpreted boreholes
- 9231 raw borehole data from Central Geological Database
- Grawimetric data
- Dozens of maps, atlases and geological cross-sections
- Expert knowledge: almost 50 researchers in the team
- Industry modeling software (Petrel and Skua-Gocad)

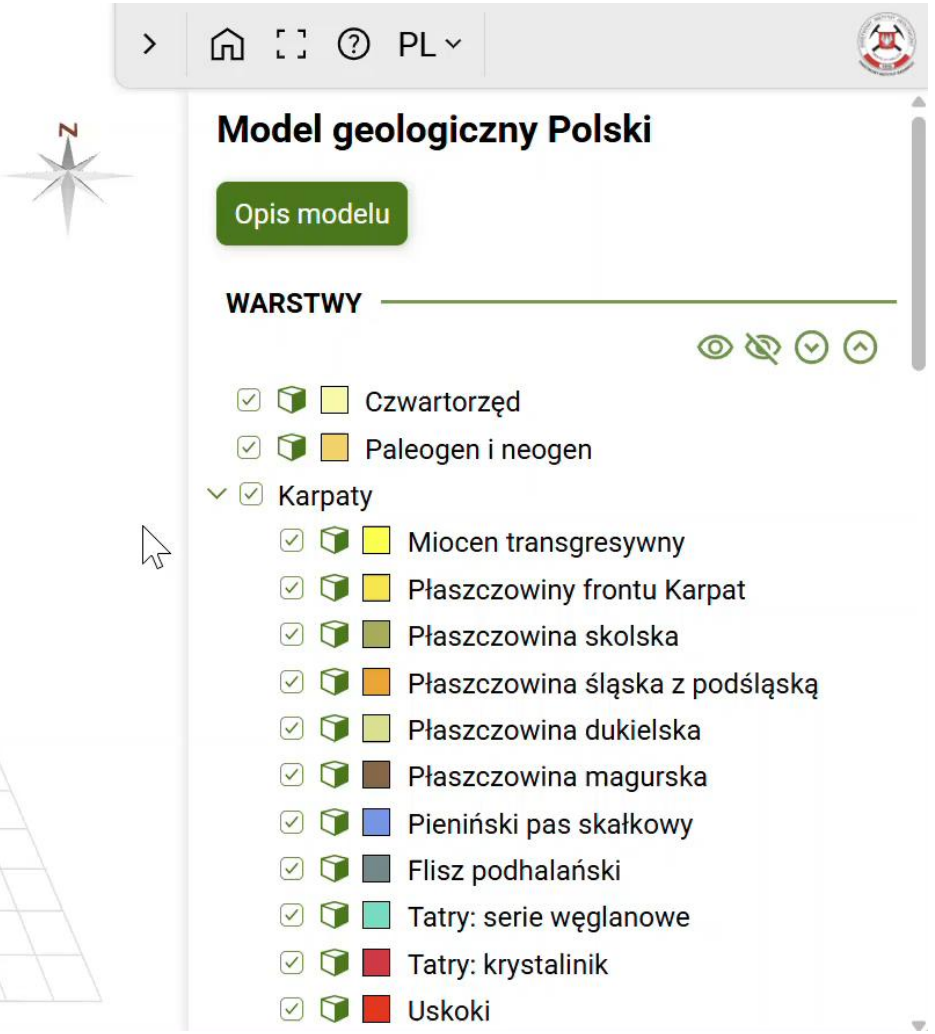


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3D geological model of Poland: results



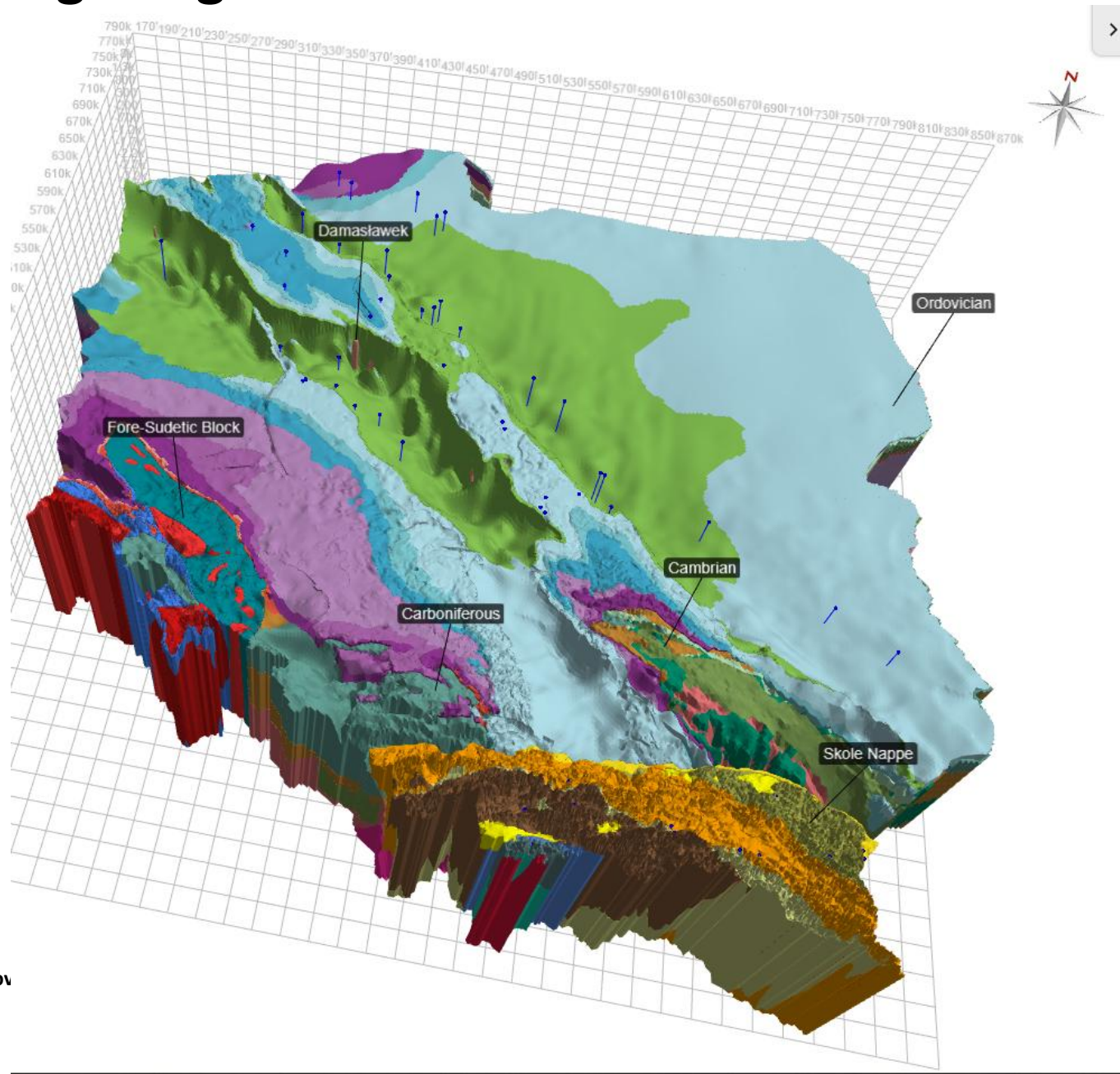


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3D geological model of Poland: results

- 18 stratigraphic layers (Precambrian to Quaternary)
- 47 tectonostratigraphic units and intrusions within the crystalline basement and the Sudetes mountains
- 10 Carpathian nappes & syn-orogenic basins
- Overall geological structure of Poland down to 5 km below sea level



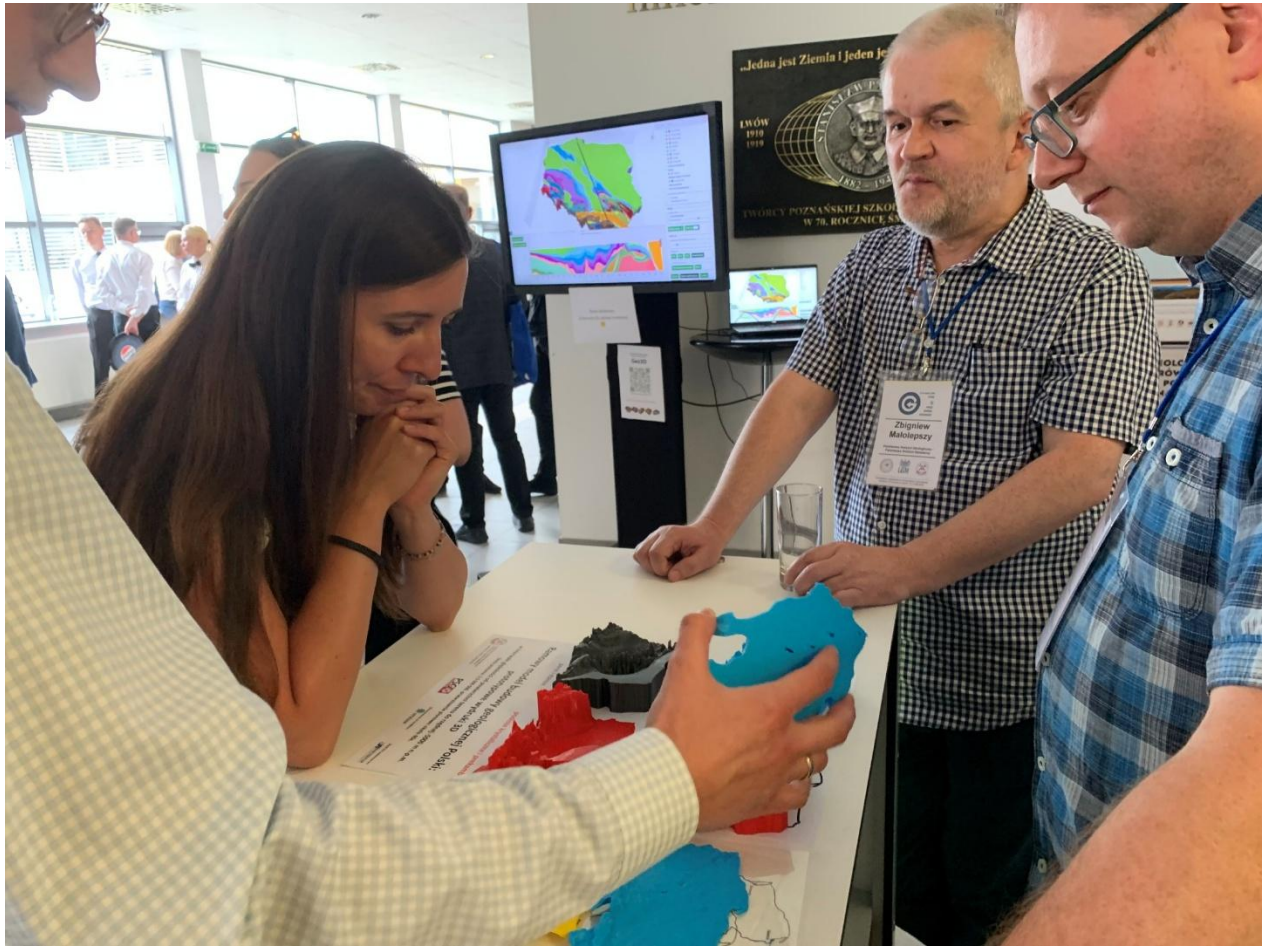


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3D geological model of Poland: 3D print

Tomasz Gogołek, Konrad Świerczewski et al., 2026







Download [3D print files with instructions](#) (Wydruk_3D_geologii_Polski.zip, 9.5 MB)

Download [instructions for 3d printing](#)

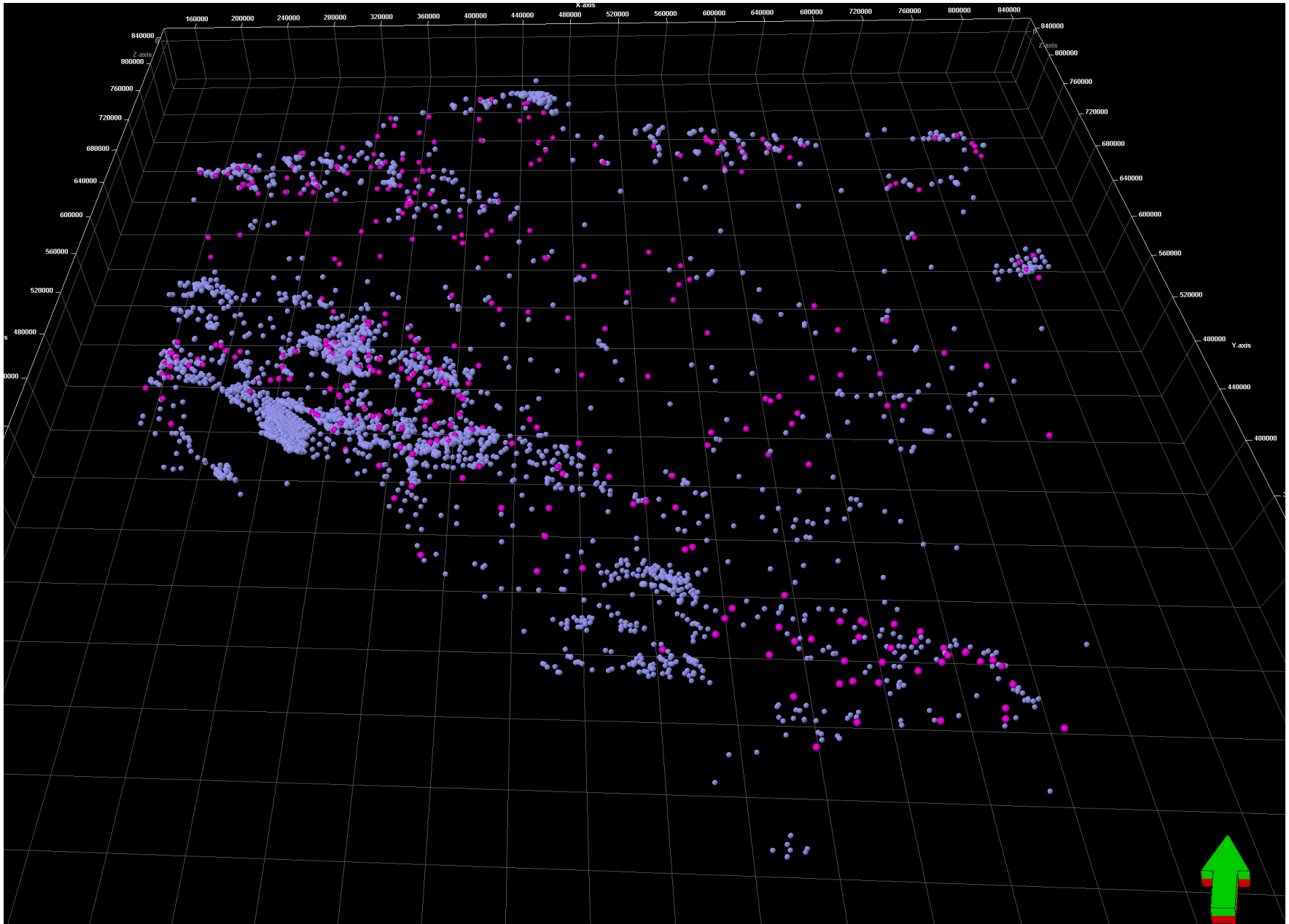
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Lesson 1: Too much data is a headache

Base Triassic:

- interpreted welltops in magenta
- all welltops in violet

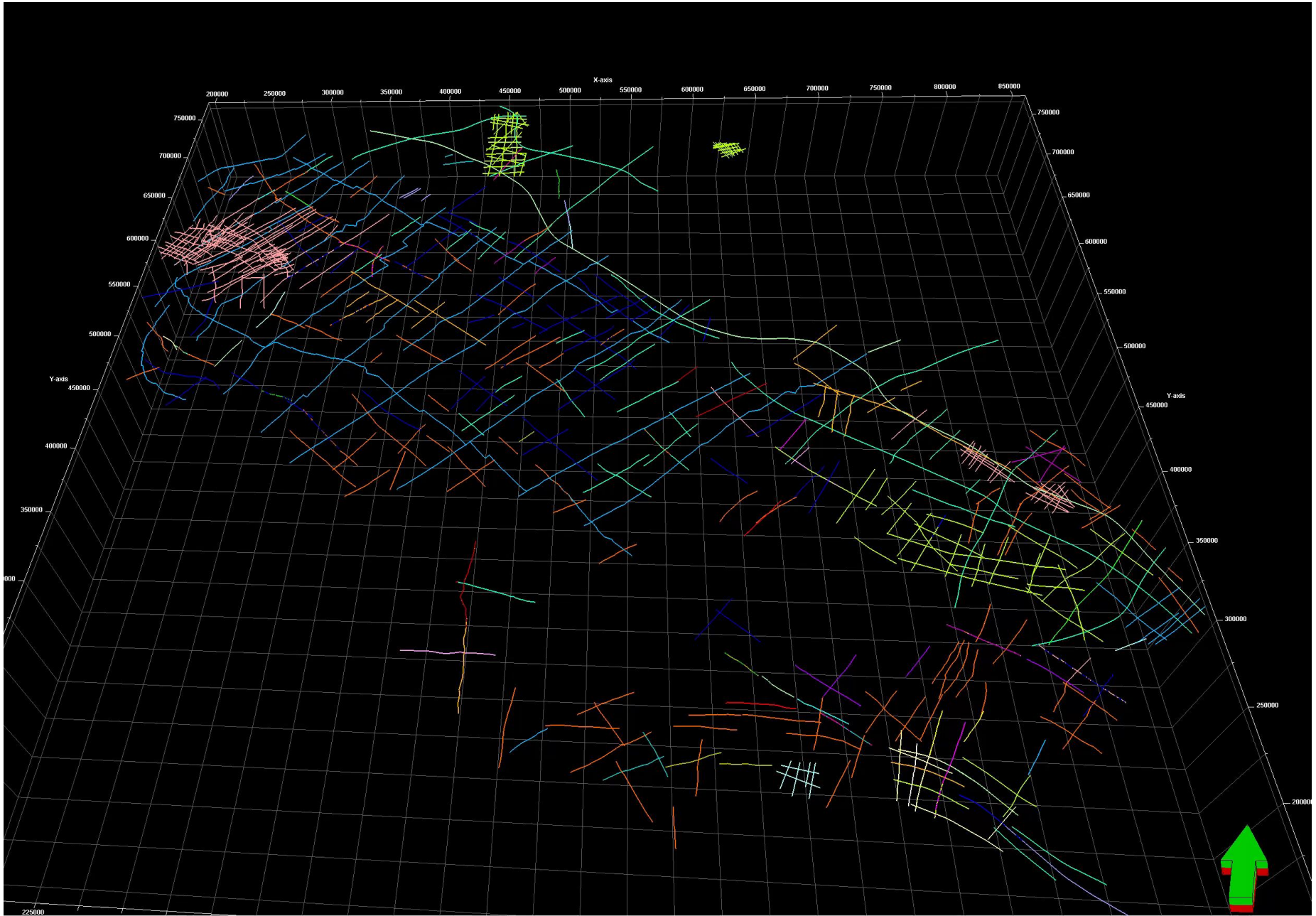


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Lesson 1: Too much data is a headache

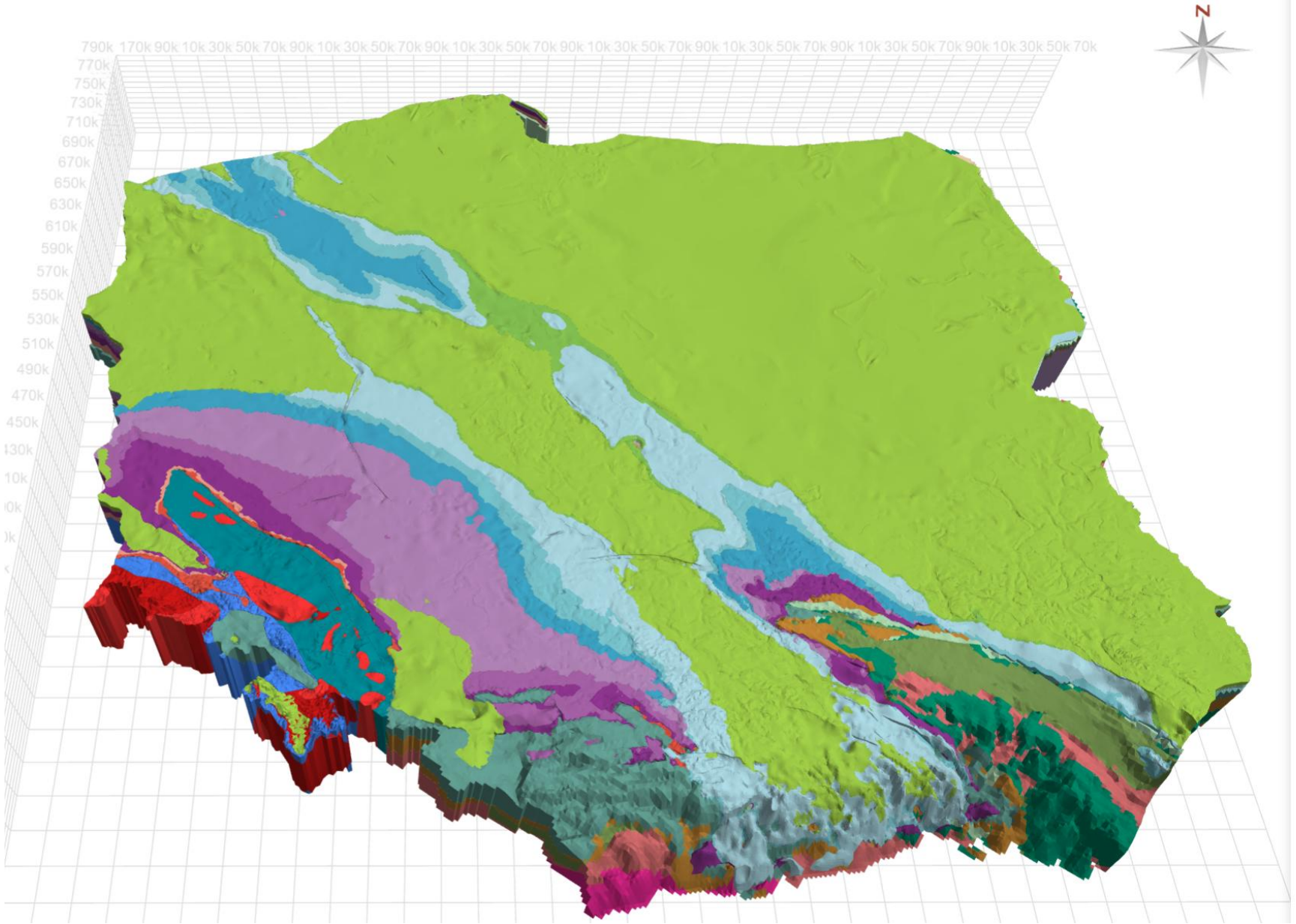
Seismics:

- interpreted
- all 2D lines
- all 3D surveys



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Lesson 2: Top or base of a layer?



Geological model of Poland

Model info

LAYERS

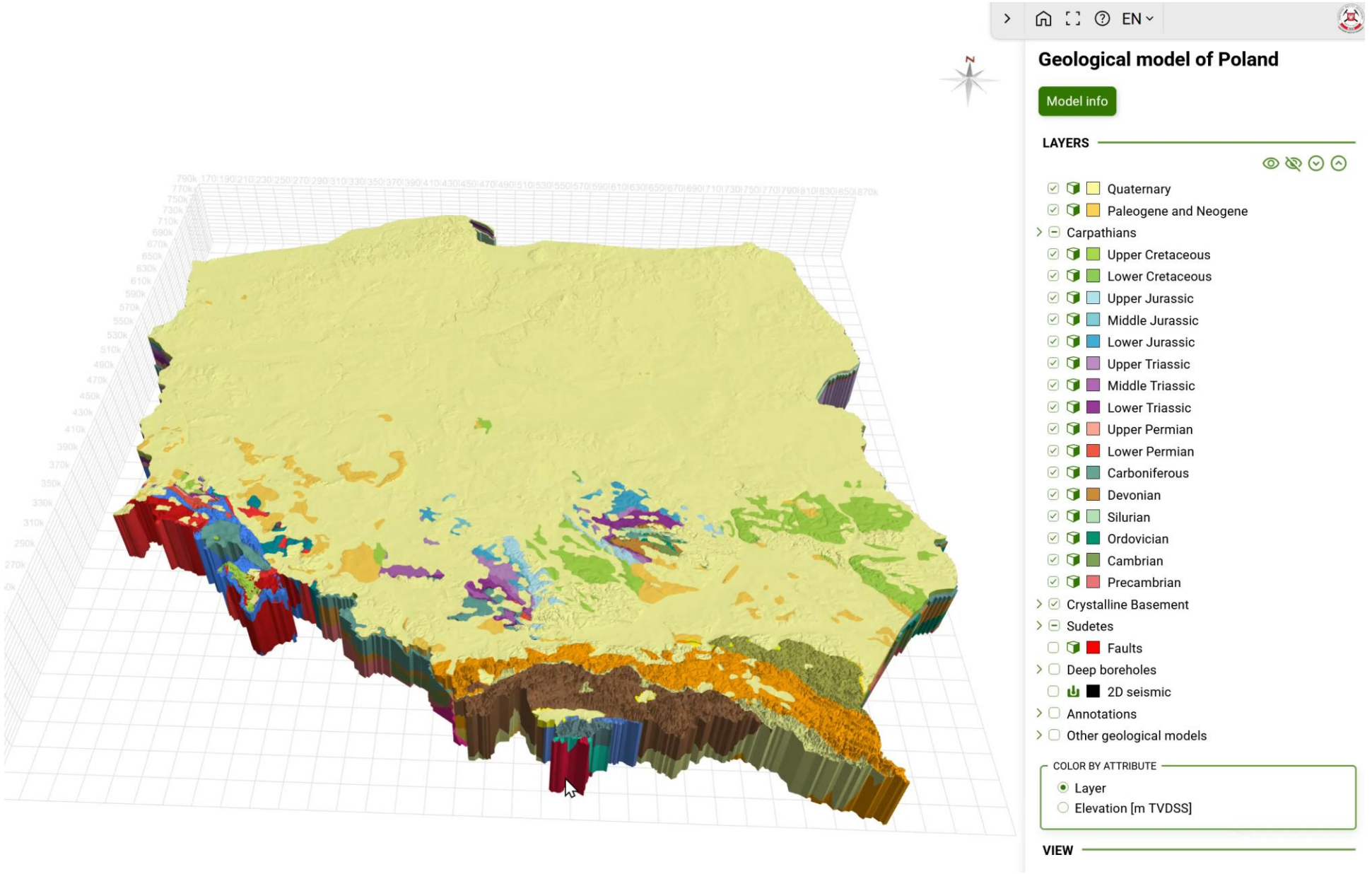
- Quaternary
- Paleogene and Neogene
- Carpathians
- Upper Cretaceous
- Lower Cretaceous
- Upper Jurassic
- Middle Jurassic
- Lower Jurassic
- Upper Triassic
- Middle Triassic
- Lower Triassic
- Upper Permian
- Lower Permian
- Carboniferous
- Devonian
- Silurian
- Ordovician
- Cambrian
- Precambrian
- Crystalline Basement
- Sudetes

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1919
NATIONAL RESEARCH INSTITUTE

Lesson 3: Stratigraphy vs. Tectonics

What to model where?

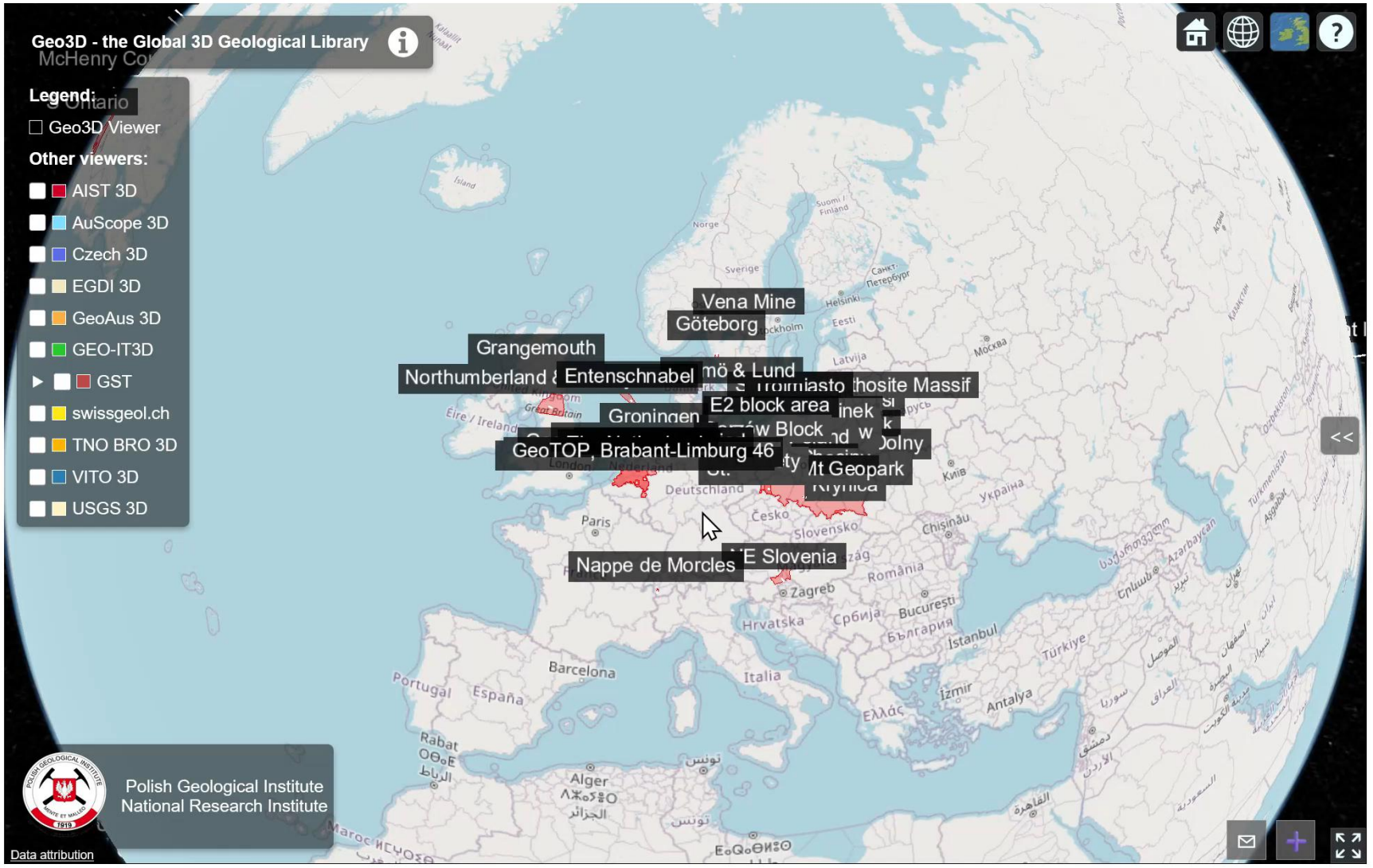
- Stratigraphic layers in the Polish Lowlands
- Nappes in the Carpathian orogenic belt
- Tectonostratigraphic units and intrusions within the crystalline rocks



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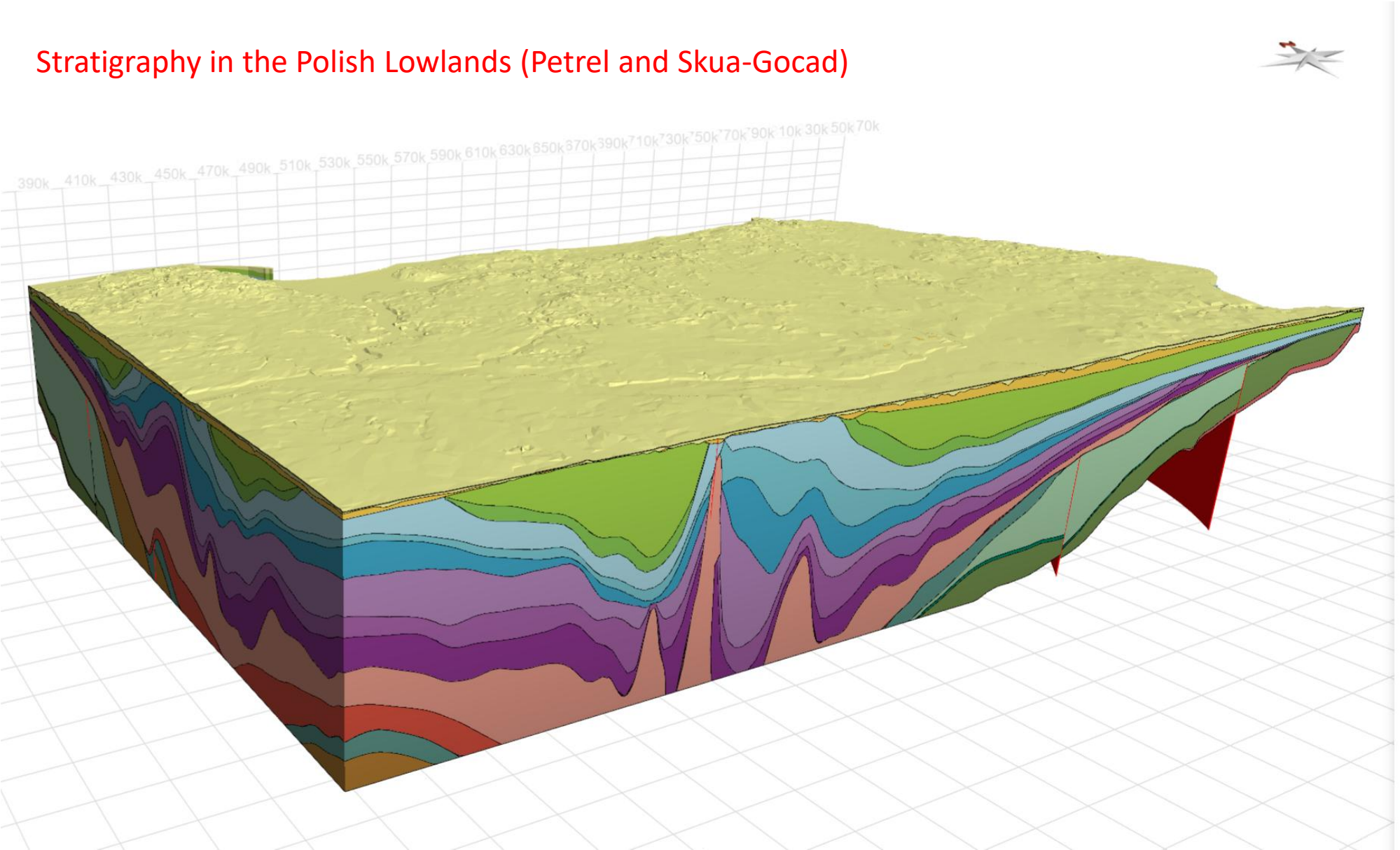
Lesson 4: Extreme lateral extent as compared to vertical extent is a major issue

GLOBE VIEW



Lesson 5: Different tectonic styles needed to be modelled separately

Stratigraphy in the Polish Lowlands (Petrel and Skua-Gocad)



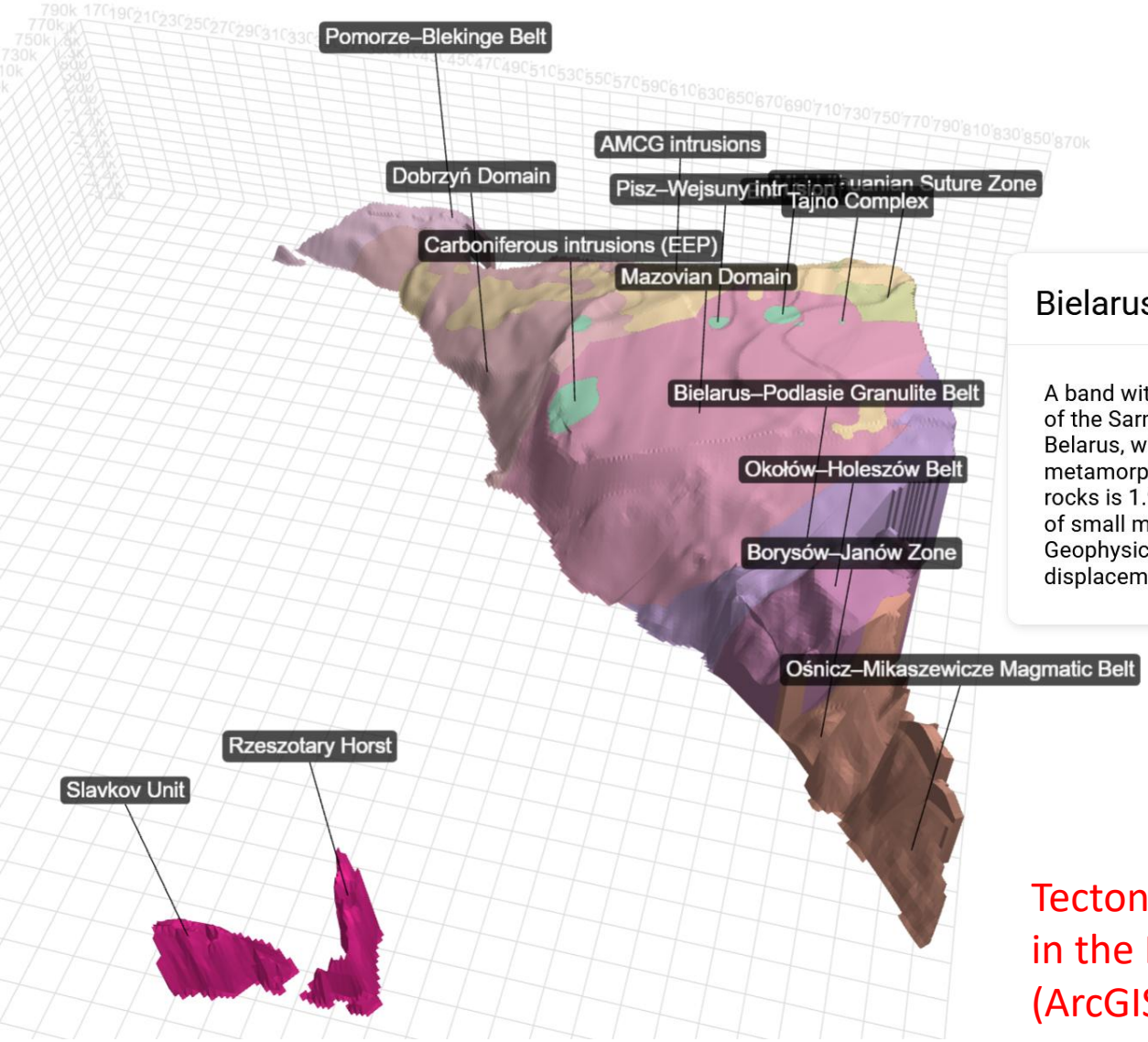
Geological model of Poland

Model info

LAYERS

- Quaternary
- Paleogene and Neogene
- Carpathians
- Upper Cretaceous
- Lower Cretaceous
- Upper Jurassic
- Middle Jurassic
- Lower Jurassic
- Upper Triassic
- Middle Triassic
- Lower Triassic
- Upper Permian
- Lower Permian
- Carboniferous
- Devonian
- Silurian
- Ordovician
- Cambrian
- Precambrian

Lesson 5: Different tectonic styles needed to be modelled separately



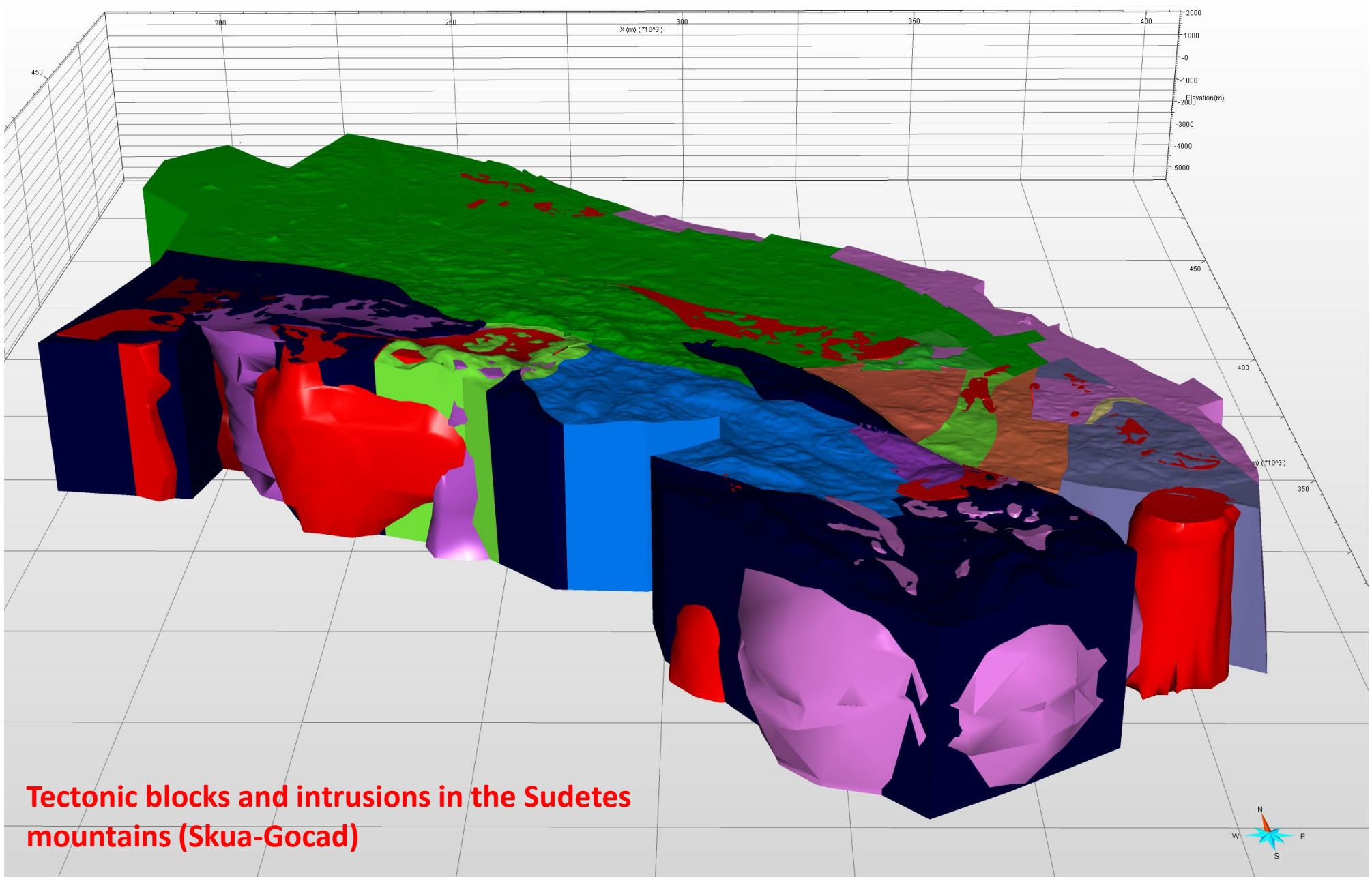
Bielarus–Podlasie Granulite Belt

A band with a SW-NE alignment located in the oblique collision zone of the Sarmatian and Fennoscandian block, mostly located in Belarus, with strongly thermally altered rocks with granulite facies metamorphism of about 1.80 billion. Age of magmatic protolith rocks is 1.90-1.85 billion years. They are accompanied by a series of small magmatic bodies with an age of 1.80 billion years. Geophysical studies indicate the possibility of disintegration and displacement of crustal fragments in this area.

Tectonostratigraphic units and intrusions in the Precambrian Baltica plate (ArcGIS)

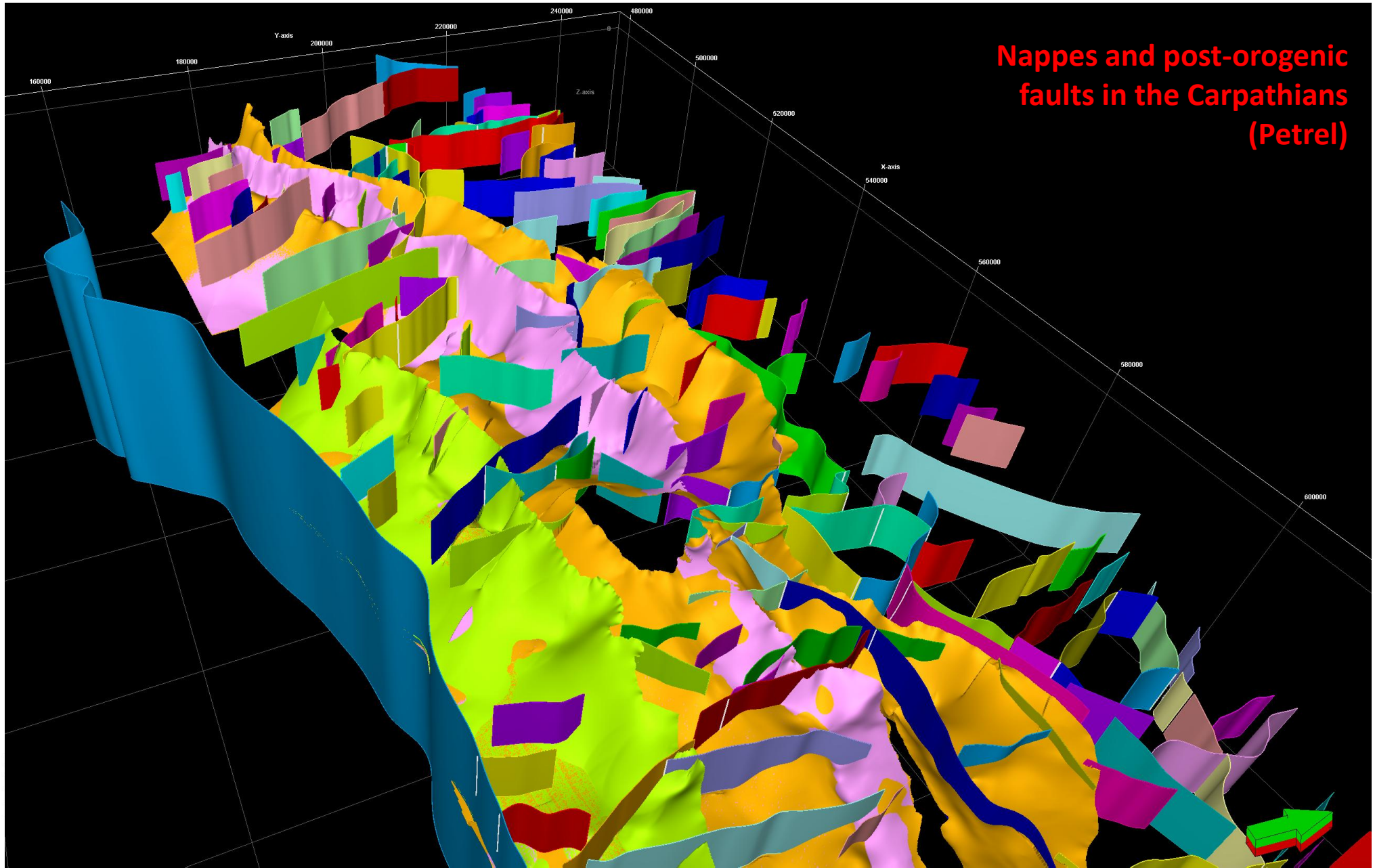
- Crystalline Basement
  - AMCG intrusions
  - Mid-Lithuanian Suture Zone
  - Carboniferous intrusions (EEP)
  - Pomorze-Blekinge Belt
  - Dobrzyń Domain
  - Mazovian Domain
  - Bielarus-Podlasie Granulite Belt
  - Okołów-Holeszów Belt
  - Borysów-Janów Zone
  - Ośnicz-Mikaszewicze Magmatic Belt
  - Rzeszotary Horst
  - Slavkov Unit
- Sudetes
- Faults
- Deep boreholes
- 2D seismic
- Annotations
  - Crystaline basement
    - Mid-Lithuanian Suture Zone
    - AMCG intrusions
    - Carboniferous intrusions (EEP)
    - Ełk Massif
    - Tajno Complex
    - Pisz–Wejsuny intrusion
    - Pomorze–Blekinge Belt
    - Dobrzyń Domain
    - Mazovian Domain
    - Bielarus–Podlasie Granulite Belt
    - Okołów–Holeszów Belt

Lesson 5: Different tectonic styles needed to be modelled separately

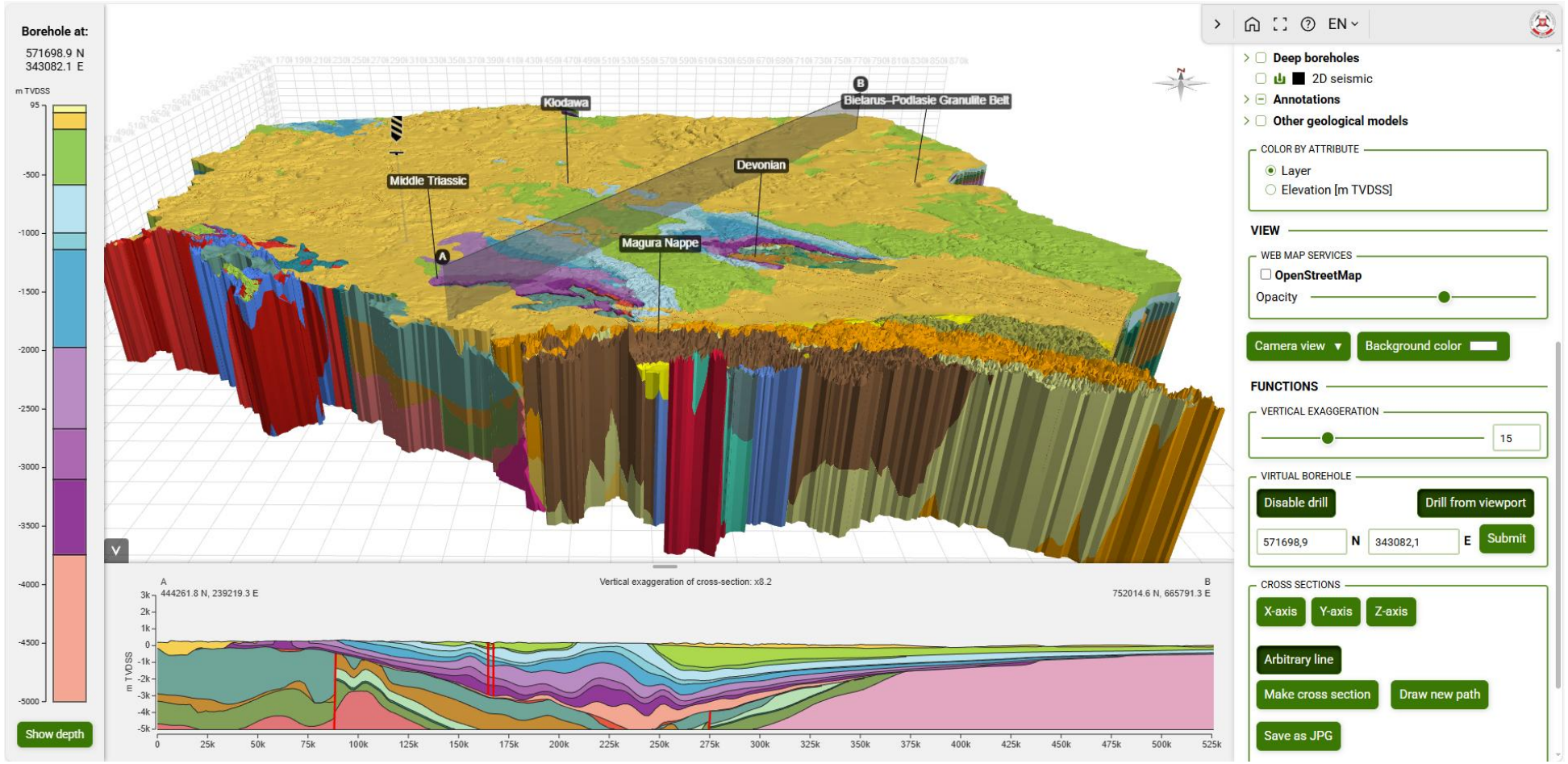


Tectonic blocks and intrusions in the Sudetes mountains (Skua-Gocad)

Lesson 5: Different tectonic styles needed to be modelled separately



Thank you very much for your attention!



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Małolepszy Z., Meissner, U., Szynkaruk E., (Eds.). 2023. Framework geological model of Poland. PGI-NRI, Warsaw, Poland