POLISH GEOLOGICAL SURVEY

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INSTRUCTIONS FOR 3D PRINTING OF THE GEOLOGICAL MODEL OF POLAND

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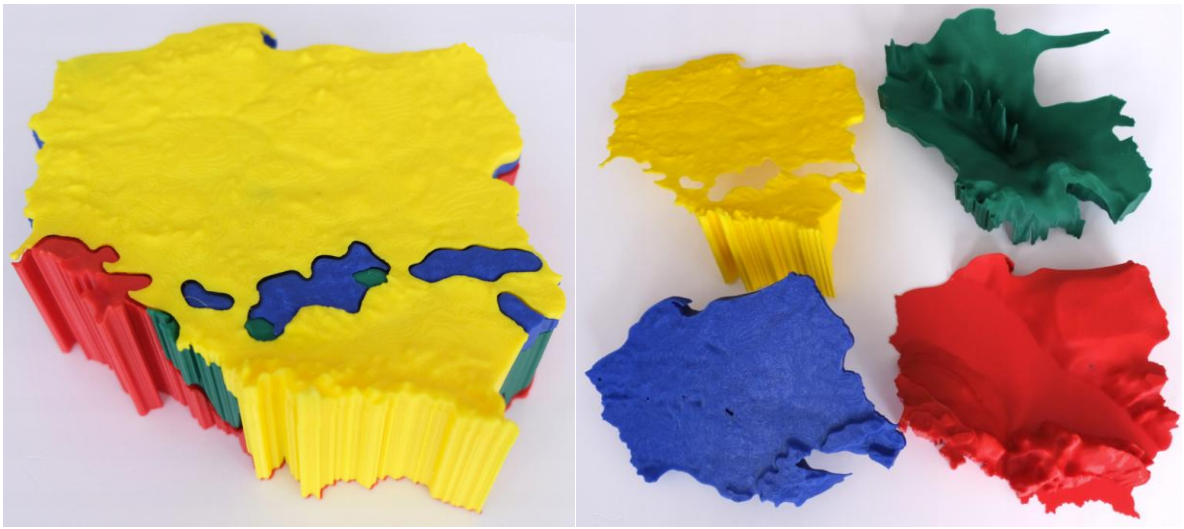
The framework geological model of Poland, developed at the Polish Geological Institute – National Research Institute in the years 2020–2024, is available for digital exploration at: https://geo3d.pgi.gov.pl/model_Polski/index.html

The model has also been generalized for 3D printing, allowing the digital data to be materialized into a small physical object consisting of four geological units. This is probably the first print of this type of the entire country, therefore, we encourage you to use the instructions below to print the model on your own. The files for printing are available in the Download section of the website: https://geo3d.pgi.gov.pl/



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1. WHAT YOU'LL NEED

- FDM/FFF 3D printer
- Software for generating printer instructions (slicing software, e.g. PrusaSlicer, Bambu Studio, or software recommended by the printer manufacturer)
- Model print files contained in the attached ZIP archive; the files do not require any additional editing before printing
- Filament suitable for use with your printer (e.g. PLA), preferably in 4 colors. Suggested colors:
    - Cenozoic – yellow
    - Mesozoic – blue
    - Paleozoic – green
    - Basement – red

This description of printer setup and operation is illustrative and exemplary.

Procedures, parameters, menu option names, and available functions may differ depending on the specific 3D printer model, firmware version, slicing software used, and filament type and manufacturer.

Before starting work, always read the official manufacturer's manual for your printer model and the documentation of the software used, and follow the recommendations provided there.

We recommend performing a test print before the final print, especially if this is your first print on a given printer.

2. IMPORTING THE FILE INTO THE SLICING SOFTWARE

1. Launch the slicing software.
2. Set up your printer in the software (you may first need to add the printer in the program configuration).
3. Load the STL/OBJ file (File → Import or drag the file into the window).

3. MODEL ORIENTATION

- In the slicing software, place the model with its flat surface on the build plate (the files should load in the correct orientation by default).
- Optional: adjust the print size to the desired scale. If you decide to do this, remember to apply the change to each model element and along all axes (X, Y, Z), preferably by scaling in percentages. The provided files have dimensions of 14 cm × 13 cm × 6 cm.
- For the Cenozoic and Mesozoic elements, which are printed in two parts, rotate and reposition the parts on the build plate if necessary so they can be printed together, or print them separately.

4. SAMPLE PRINT SETTINGS

Material

Set the filament type (according to what you use) and nozzle and bed temperatures (e.g. 205 °C and 60 °C).

Quality

Print settings:

- Quality: 0.2 mm
- Layer height: 0.2 mm

Infill

Infill density: Standard: 15–20%; it can be reduced to e.g. 10% to speed up printing, reduce filament usage, and still maintain sufficient strength

Infill type: default or e.g. gyroid

Supports

For the Cenozoic, Mesozoic, and basement: NONE

Enable supports only for the Paleozoic – build plate only (optionally set the support type, e.g. organic)

After printing, evaluate the quality and accuracy, then adjust parameters as needed. Print settings can be made more precise (e.g. 0.1 mm) to obtain smoother surfaces, or increased to 0.3 mm to speed up printing if quality is not a priority.

Note, however, that the files are optimized for 0.2 mm; if you change the settings—especially to less precise ones—we cannot guarantee correct fitting of the model components.

5. PRINTER PREPARATION

1. Level and clean the build plate (isopropyl alcohol – IPA, or a dedicated cleaning agent).
2. Load the filament and select the appropriate color.

6. PRINTING

1. Generate the G-code in the slicer (e.g. using the “Slice” button).
2. Make sure the software does not report any errors in the file.
3. Optionally save the generated file.
4. Load/send the file to the printer.
5. Start printing (check filament temperature settings and print speed) – follow the instructions for your specific printer model.
6. Observe the first 2–3 layers to ensure they print correctly.

7. POST-PROCESSING OF PRINTED ELEMENTS

- Remove supports from the Paleozoic element (pliers/modeling knife); often they can be broken off by hand without tools. If removing supports is difficult or damages the model, try changing the support type or settings/location.
- A hot-air tool (e.g. soldering station, heat gun) may be useful for removing stringing created during printing. Be careful not to overheat the print.
- Optionally smooth the support contact areas (sandpaper).
- For the Cenozoic, glue the two surfaces together (cyanoacrylate "super glue" or any universal plastic adhesive).
- For the Mesozoic, gluing the two layers is optional; without gluing, it is easier to see that salt diapirs built of Permian salts extend into the Mesozoic.
- Always follow safety rules when using tools!

The finished model will look excellent when placed on a printed base with a legend (see below).

8. REQUEST FOR FEEDBACK

To further improve and develop the project, we kindly ask you to provide feedback regarding:

- the 3D printing technology used,
- the place where the print was produced,
- the material used for printing,
- the intended use of the print (e.g. education, research, promotion, personal use),
- experiences related to using the printed model.

Your comments and experiences will be extremely valuable for the continued development of the project.

The Geo3D Team
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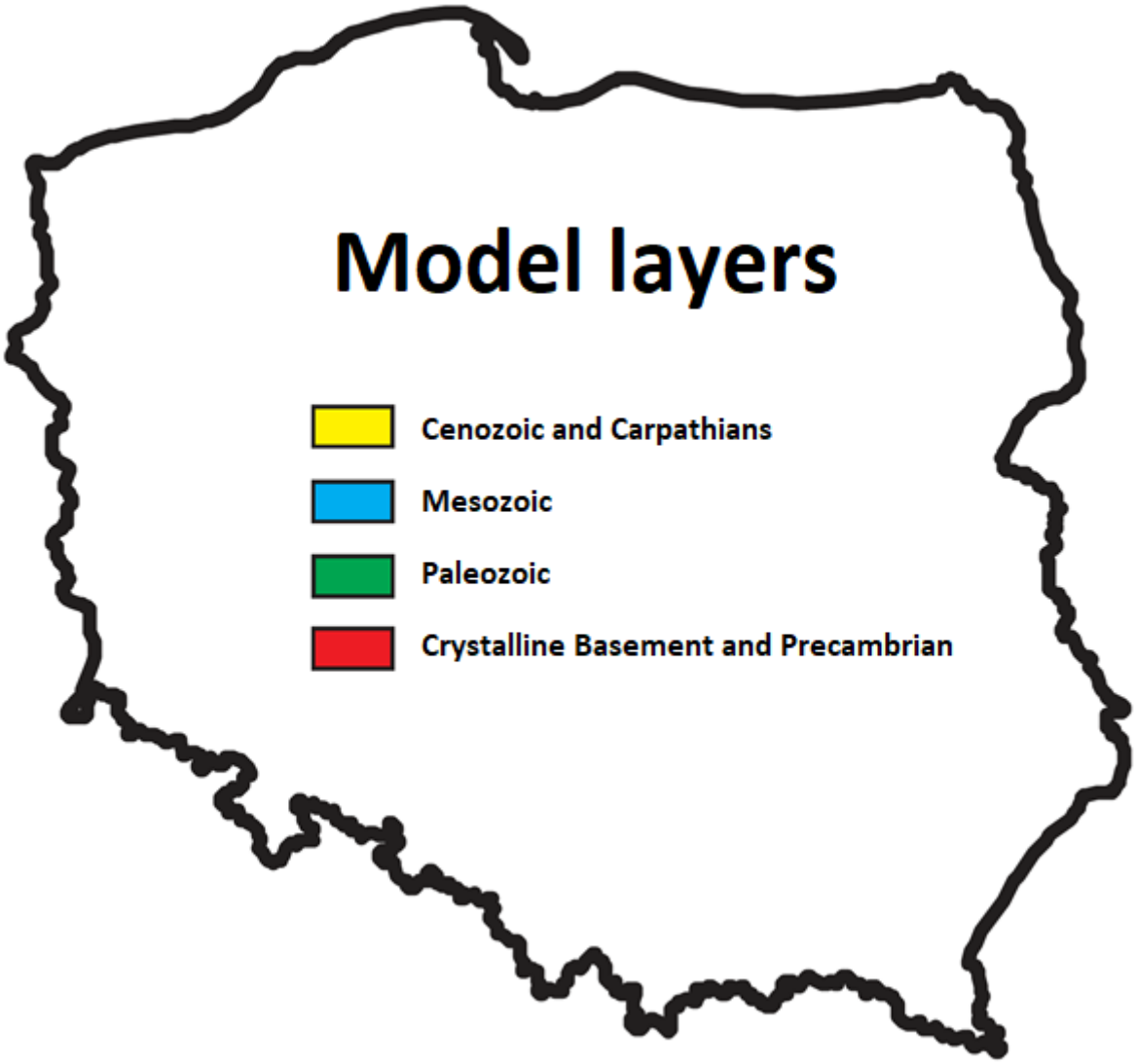
3D PRINT OF GEOLOGICAL MODEL OF POLAND

Vertical extent of the model: from the ground surface down to 5 km below sea level. Horizontal scale: approximately 1:5,000,000; vertical exaggeration: approximately 40×.



More information: https://geo3d.pgi.gov.pl/edukacja/index.html
https://geo3d.pgi.gov.pl/model_Polski/index.html