

How to Create a 3D-Printed Terrain Model from DEM Data

1. Downloading DEM Data

Source: IHO Data Centre for Digital Bathymetry (DCDB)

Website: <https://www.ncei.noaa.gov/iho-data-centre-digital-bathymetry>

1. Click **Access Data**.

Data Access

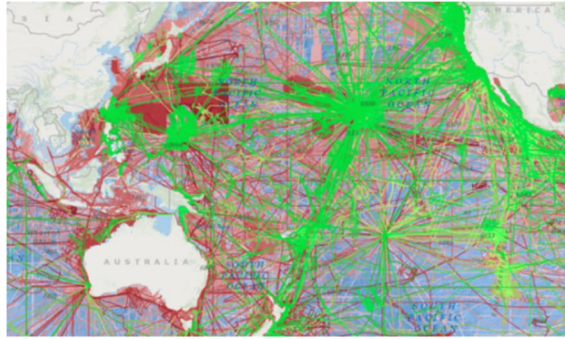
The [IHO DCDB Data Viewer](#) shows the global coverage of the DCDB's bathymetric data holdings as well as the spatial extent of data archived at other repositories via web services.

[Access Data](#)

Project Overview

The IHO DCDB consists primarily of unedited single and multibeam bathymetric data contributed by industry, government, academia, and crowdsourced efforts. These data are a public resource that are routinely used to produce and improve regional and global bathymetric maps and grids in support of science and exploration.

The DCDB also serves as the long-term archive for the [GEBCO Ocean Mapping Programme](#) [↗], [IHO Crowdsourced Bathymetry \(CSB\) Initiative](#) [↗], and the [Nippon Foundation-GEBCO Seabed 2030 Project](#) [↗], which is a global initiative working to develop a complete global ocean map by 2030.



Ship tracks and data over the Pacific Ocean in the IHO DCDB data viewer.

Figure 1. IHO Data Centre for Digital Bathymetry (DCDB)

2. Under *IHO DCDB/NOAA NCEI*, **uncheck** “Multibeam Dataset Tracklines.”

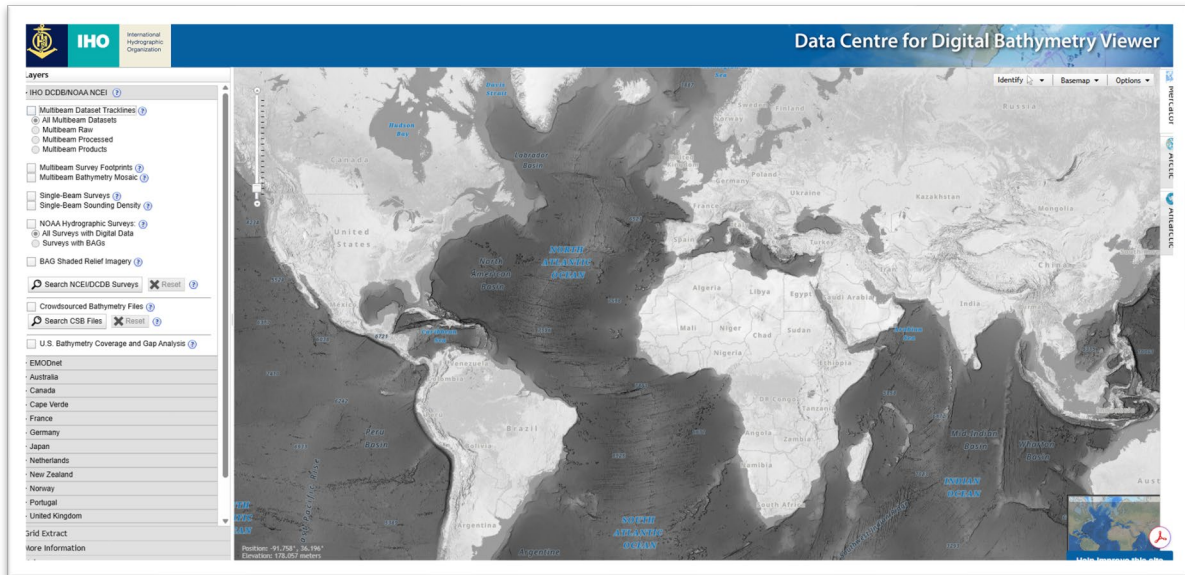


Figure 2. Uncheck Multibeam Dataset Tracklines

3. Expand **Grid**

Extract.

The screenshot shows the IHO Grid Extract web interface. At the top is the IHO logo and the text 'International Hydrographic Organization'. Below this is a 'Layers' section. The main section is titled 'Grid Extract' and contains a 'Help' link. A 'Grid Extract Instructions' box provides detailed guidance on how to use the tool, including instructions on selecting a dataset, specifying coordinates, and downloading data in GeoTIFF format. Below the instructions are two dropdown menus: 'select a dataset...' and 'Select cell size:'. There are two buttons: 'Draw Rectangle' and 'Enter Coordinates'. A 'Reset' button is located at the bottom left. A 'More Information' link and a 'Help' link are at the bottom right.

Figure 3. Expand Grid Extract

4. Under *Select a dataset...*, choose **DEM Global Mosaic**.

The screenshot shows the 'select a dataset...' dropdown menu. The menu is open, displaying a list of datasets. The 'DEM Global Mosaic' option is highlighted in blue. The list includes: 'select a dataset...', 'Multibeam Mosaic', 'Multibeam Mosaic Hillshade', 'NOS BAG Mosaic', 'NOS BAG Mosaic Hillshade', 'DEM Global Mosaic', 'DEM Global Mosaic Hillshade', 'Continuously Updated DEM (CUDEM) Mosaic', 'Continuously Updated DEM (CUDEM) Mosaic Hillshade', 'Coastal Relief Model (CRM) Mosaic', 'Coastal Relief Model (CRM) Mosaic Hillshade', 'ETOPO_2022 (Ice Surface)', 'ETOPO_2022 (Ice Surface) Hillshade', 'ETOPO_2022 (Bedrock)', and 'ETOPO_2022 (Bedrock) Hillshade'.

Figure 4. Select a dataset

5. Choose the appropriate **arc-seconds** for your project resolution.

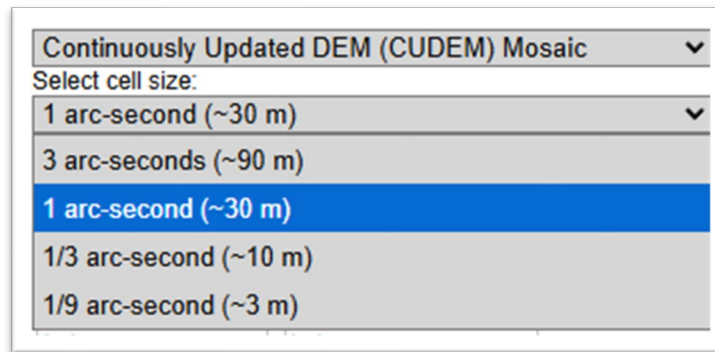


Figure 5. Choose appropriate arc-seconds

6. Click **Draw Rectangle** and drag across your area of interest
 - Note: Maximum size is 10,000 × 10,000 pixels.



Figure 6. Draw a rectangle around your area of interest

7. Click **Download Data** and save the exportimage.tiff file.

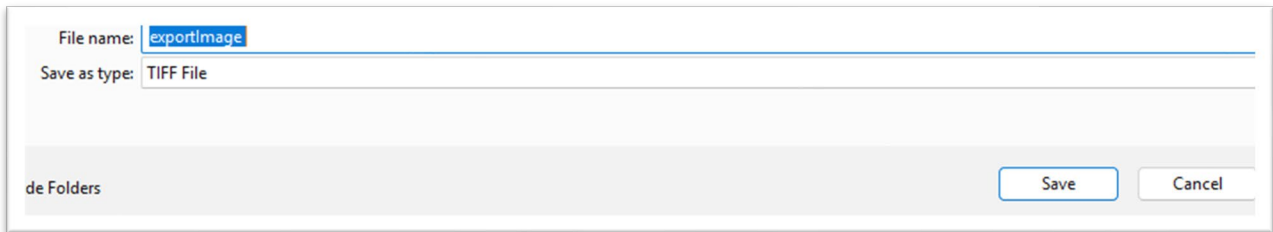
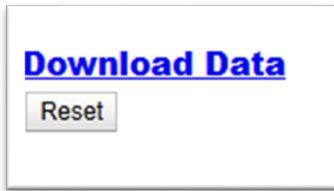


Figure 7. Download and save data

8. If your region is too large, repeat steps 6–7 for additional tiles.

2. Mosaicking Several TIFFs in ArcGIS Pro

1. Open ArcGIS Pro and **drag** all of the exportimage.tiff files into your map.

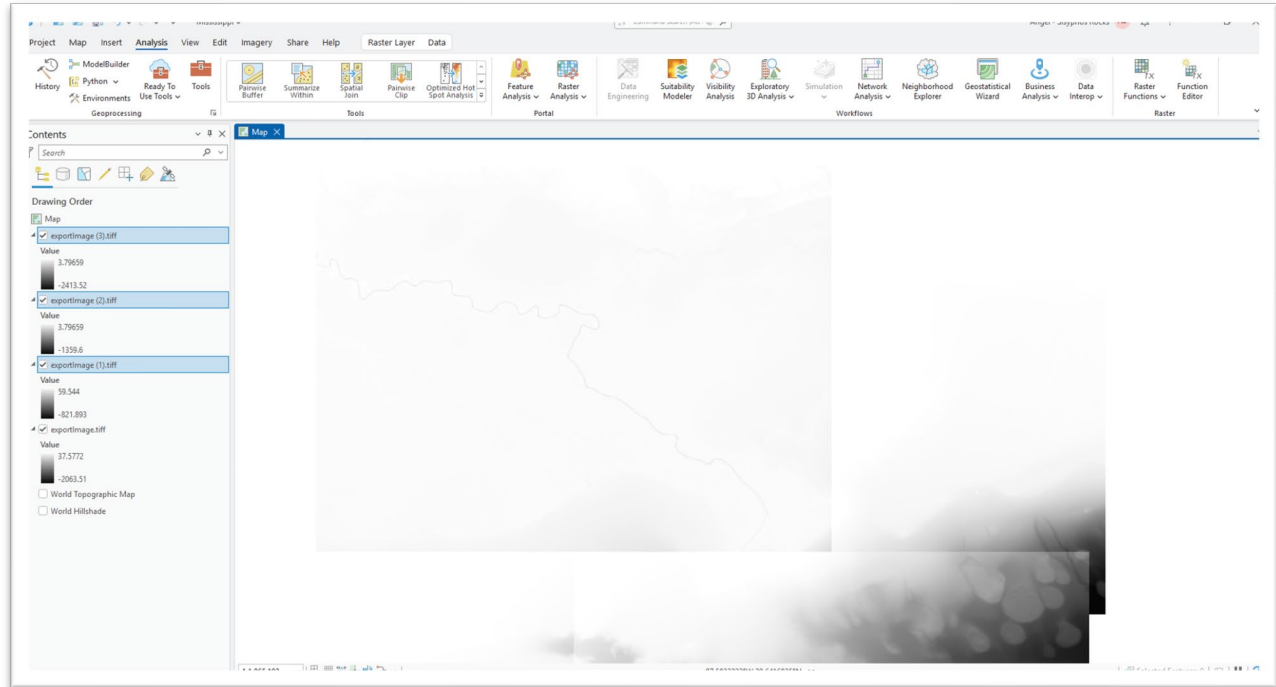


Figure 8. Drag your file onto your map

2. Highlight the layer and select **Raster Layer → Rendering → Resampling Type → Bilinear**.

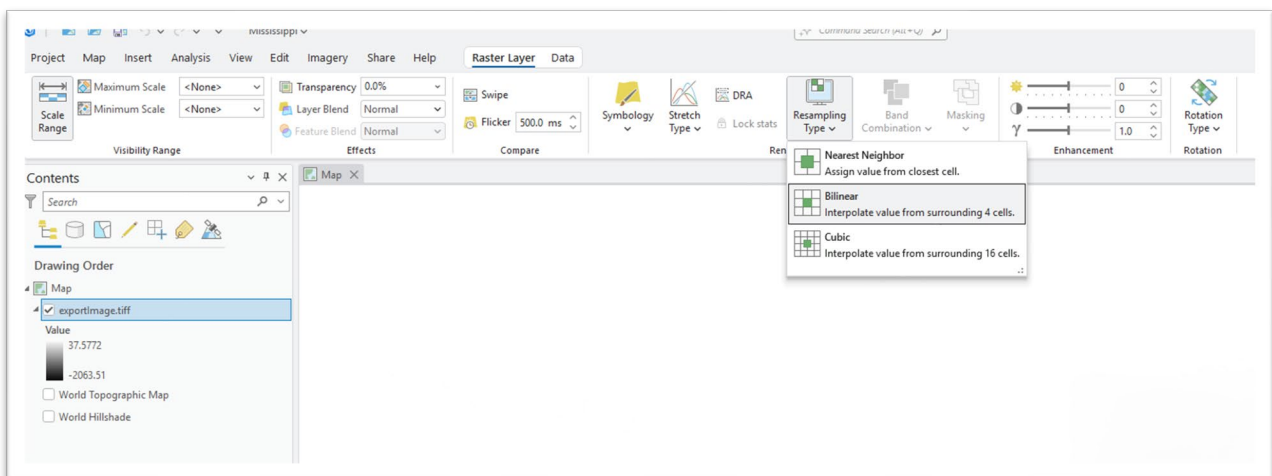


Figure 9. Bilinear resampling type

3. To merge multiple .tiff files:

- Go to **Analysis → Tools → Geoprocessing panel.**

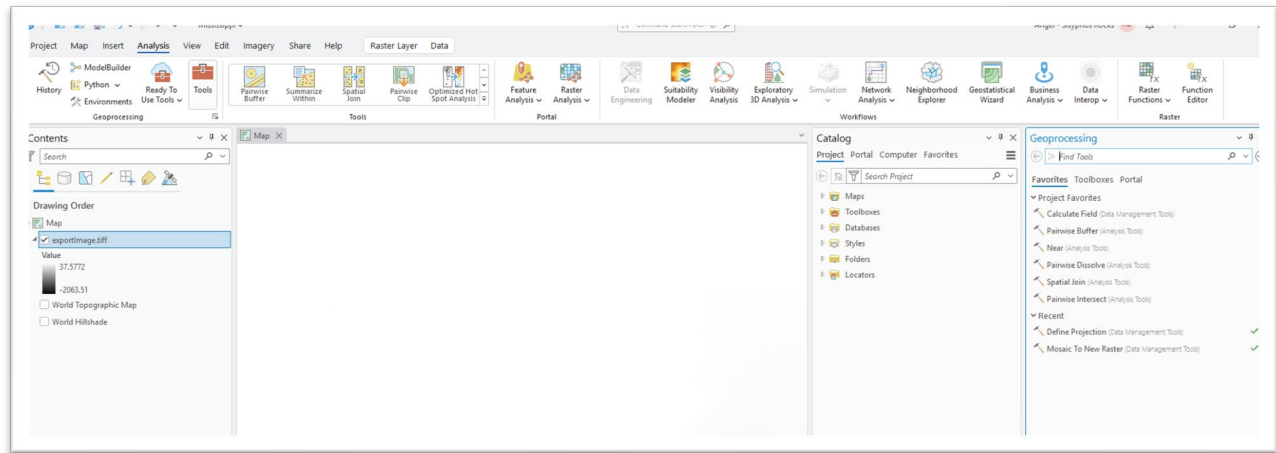


Figure 10. Geoprocessing panel

- Search for **Mosaic to New Raster.**

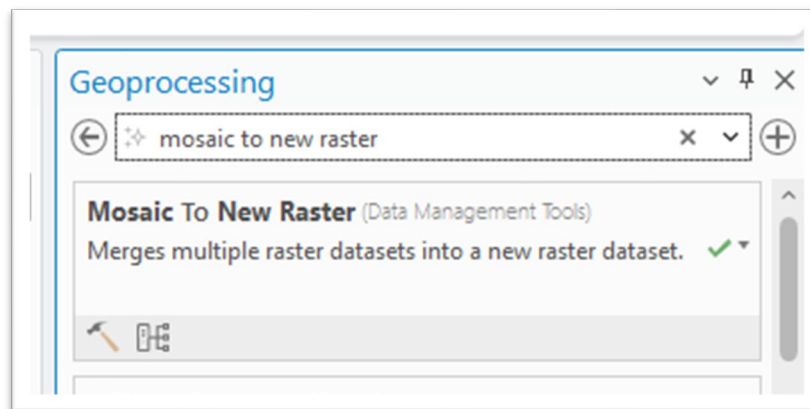


Figure 11. Mosaic to New Raster

- Add all input rasters.

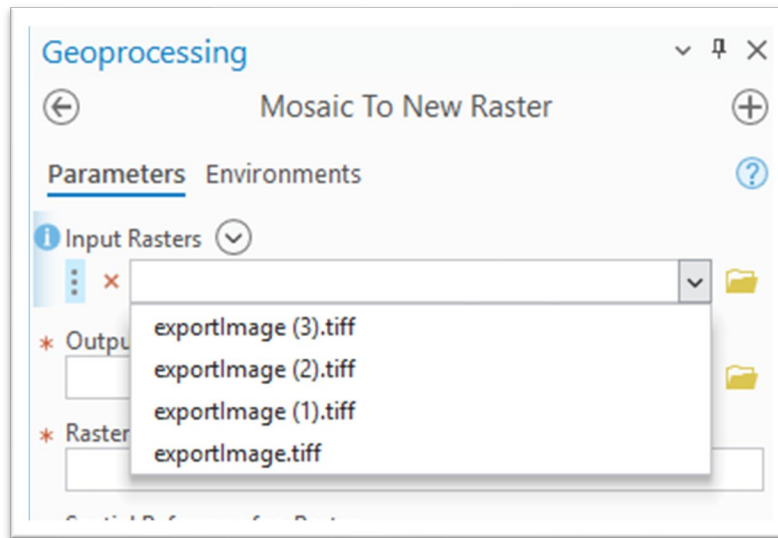


Figure 12. Input rasters

- Set output location and filename (include .tif).

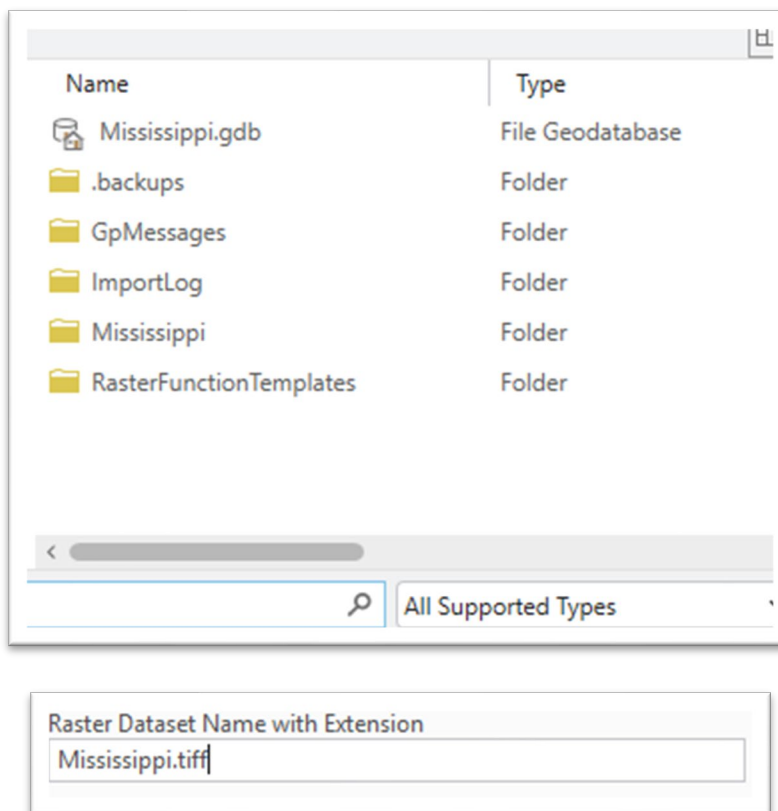


Figure 13. Set your output location

- Choose **Spatial Reference** → **Current Map**.

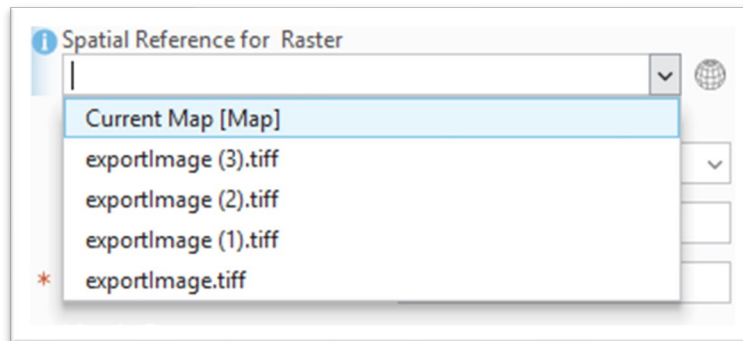


Figure 14. Spatial Reference for Raster

- Set **Pixel Type** → **32 bit float** and **Number of Bands** → **1**.

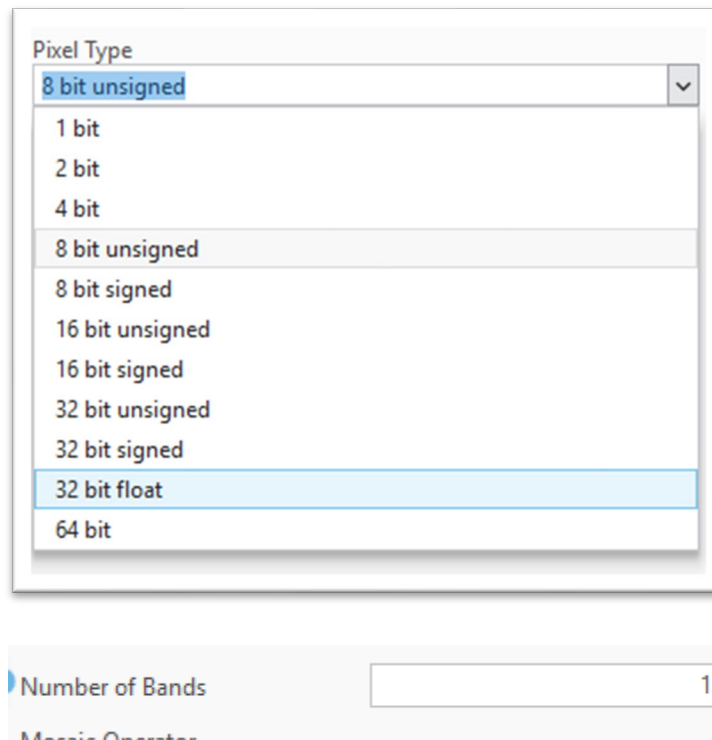


Figure 15. Pixel Type and Number of Bands

- Click **Run**.

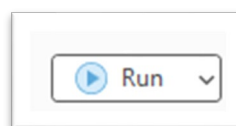


Figure 16. Run

4. When finished, export your new raster:

- Go to **Share → Export Map → GeoTiff**.

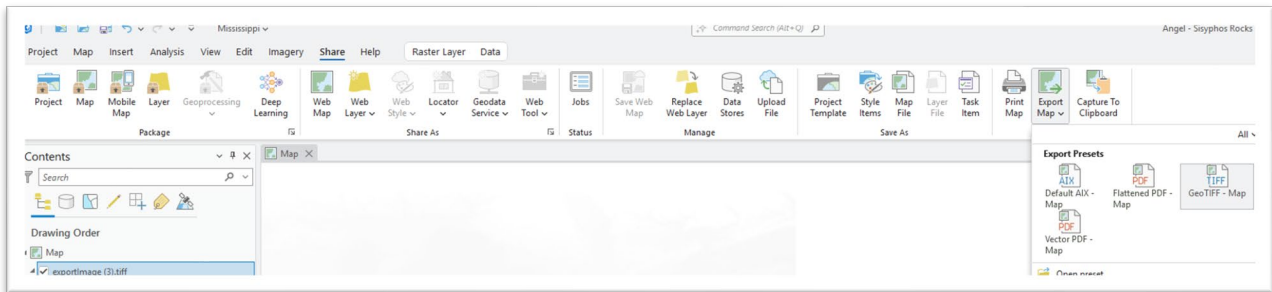


Figure 17. Export GeoTIFF

- Choose file name and location.
- Click **Export**.

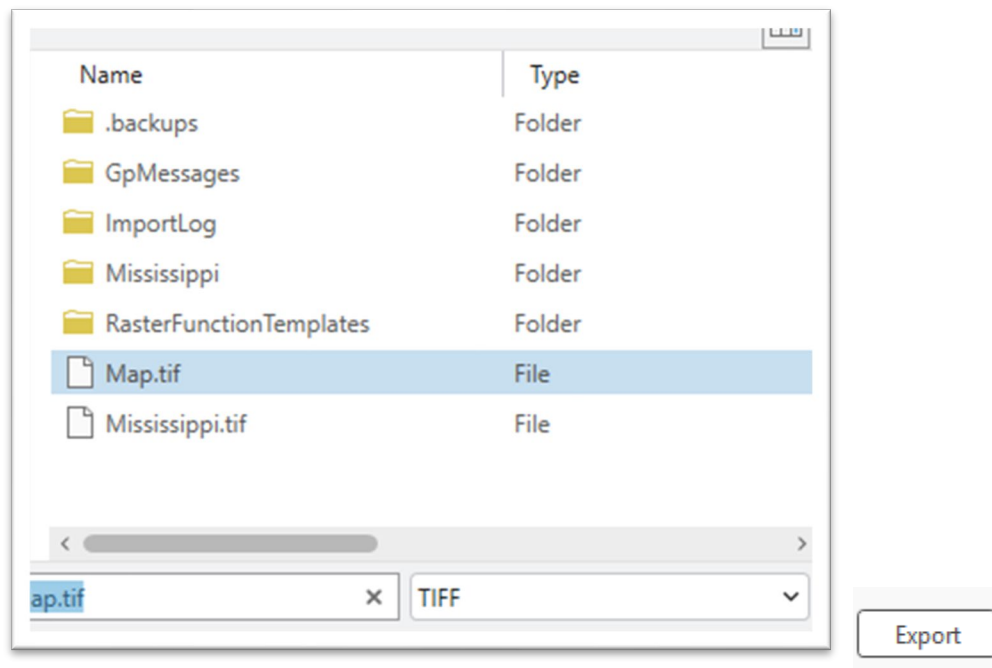


Figure 18. Choose file name and location and click export

3. Preparing the Model in QGIS

1. Open QGIS and **drag your exported GeoTiff** into the Layers panel.

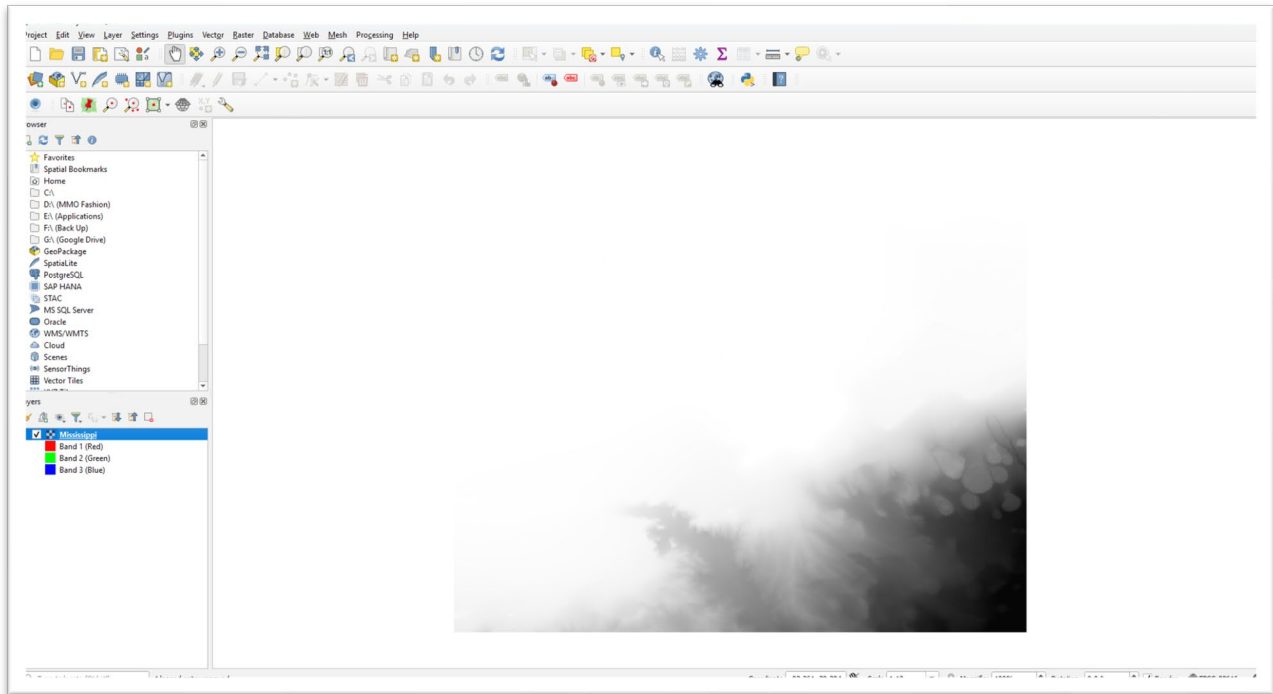


Figure 19. Drag your file into QGIS

2. If needed, install **DEMto3D Plugin**:

- Go to **Plugins → Manage and Install Plugins → Search “DEMto3D” → Install**.

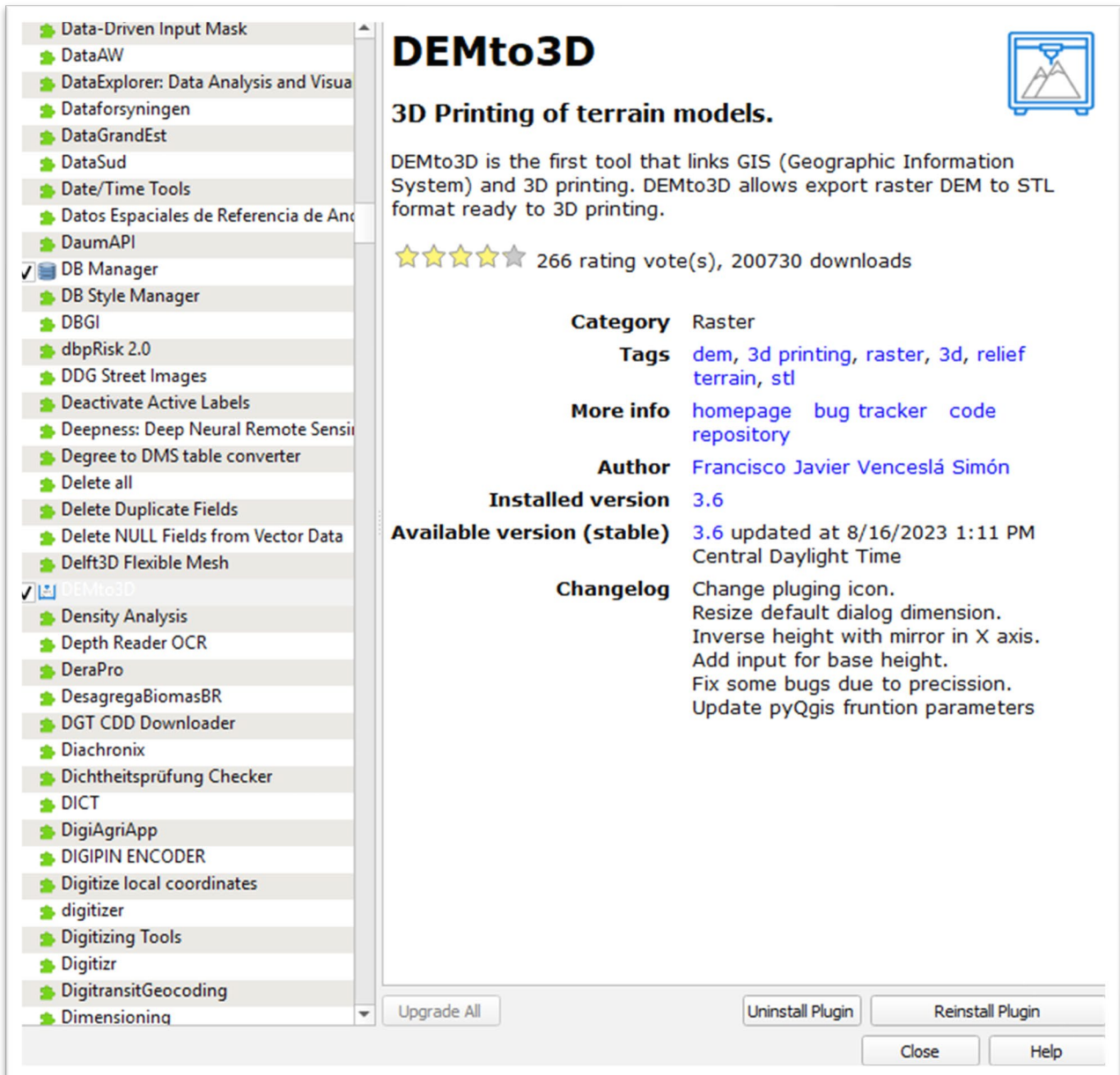
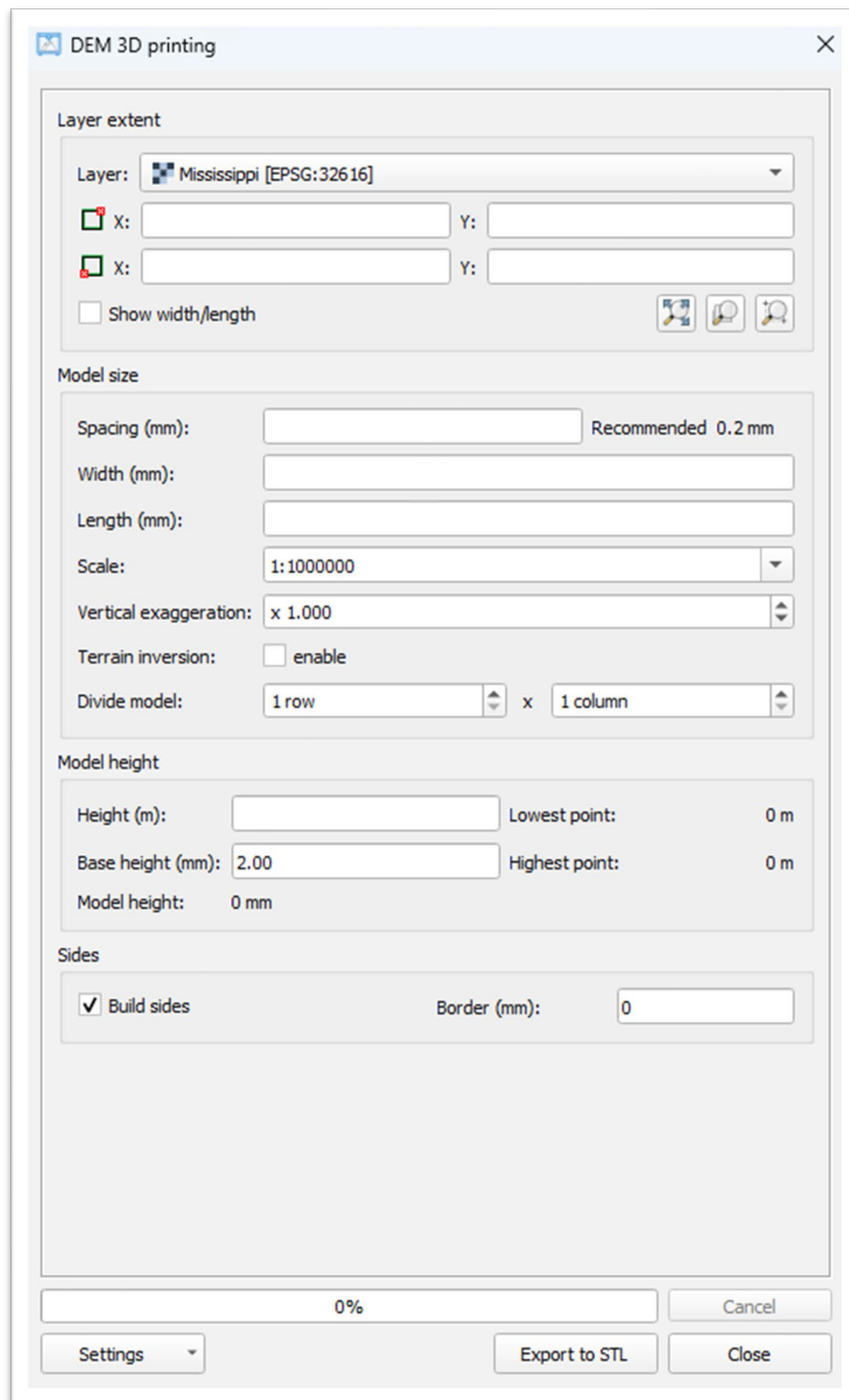


Figure 20. Install DEMto3D

3. Open the tool: **Raster → DEMto3D → DEM 3D Printing.**



The image shows a software dialog box titled "DEM 3D printing". It is organized into several sections: "Layer extent", "Model size", "Model height", and "Sides".

- Layer extent:** Includes a "Layer:" dropdown menu set to "Mississippi [EPSG:32616]". Below are two rows of "X:" and "Y:" input fields. A checkbox "Show width/length" is at the bottom left of this section.
- Model size:** Contains input fields for "Spacing (mm)", "Width (mm)", and "Length (mm)". A "Scale:" dropdown is set to "1:1000000". "Vertical exaggeration:" is set to "x 1.000". "Terrain inversion:" has an unchecked "enable" checkbox. "Divide model:" is set to "1 row" x "1 column".
- Model height:** Includes "Height (m)", "Base height (mm)" (set to 2.00), and "Model height" (set to 0 mm). It also displays "Lowest point: 0 m" and "Highest point: 0 m".
- Sides:** Features a checked checkbox "Build sides" and a "Border (mm):" input field set to 0.

At the bottom of the dialog, there is a progress bar showing "0%", a "Settings" dropdown, and buttons for "Export to STL", "Cancel", and "Close".

Figure 21. DEM 3D Printing

4. Click the first **magnifying glass icon** to outline your DEM.

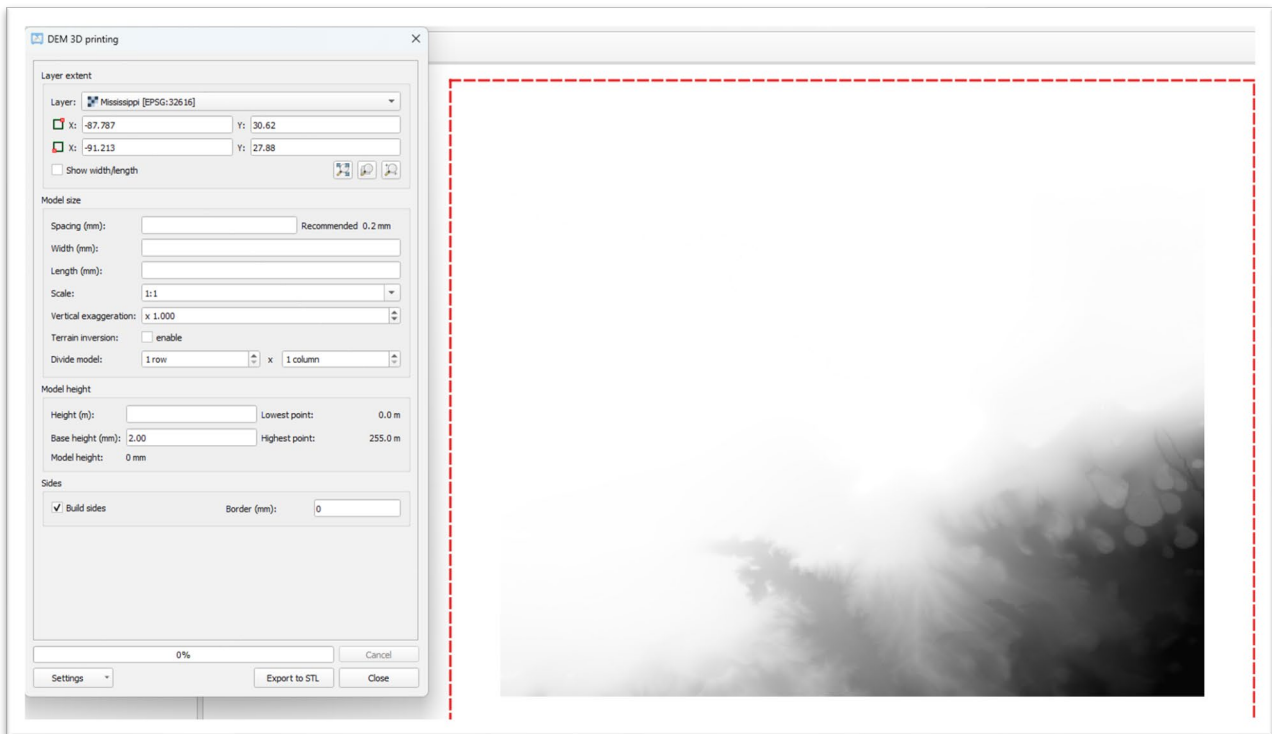


Figure 22. Outline your DEM

5. Enter the following recommended settings:

- **Spacing:** 0.2
- **Width:** size of your final print (may be larger than your printer plate)
- **Vertical Exaggeration:** 10.000
- **Height:** set to the lowest elevation value
- **Base Height:** 4

The screenshot shows the 'DEM 3D printing' dialog box with the following settings:

- Layer extent:**
 - Layer: gebco_2025_n22.5_s17.0_v87.0_e92.0 [EPSG:4326]
 - X: 92.0, Y: 22.5
 - X: 87.0, Y: 17.0
 - ☐ Show width/length
- Model size:**
 - Spacing (mm): 0.2 (Recommended 0.33 mm)
 - Width (mm): 400
 - Length (mm): 440.0
 - Scale: 1:1284133
 - Vertical exaggeration: x 10.000
 - Terrain inversion: ☐ enable
 - Divide model: 2 row x 2 column
- Model height:**
 - Height (m): -3000, Lowest point: -2589.0 m
 - Base height (mm): 4, Highest point: 111.0 m
 - Model height: 0 mm
- Sides:**
 - ☒ Build sides
 - Border (mm): 0

At the bottom, there is a progress bar at 0% and a 'Cancel' button.

Figure 23. DEM 3D Settings

6. Click **Export to STL**, confirm, and save your file.
7. If the output looks off, adjust these parameters and re-export.

4. Printing in Bambu Studio

1. Open Bambu Studio.
2. Go to **File** → **Import** → **Import 3MF/STL/STEP/SVG/OBJ/AMF...** and select your STL.

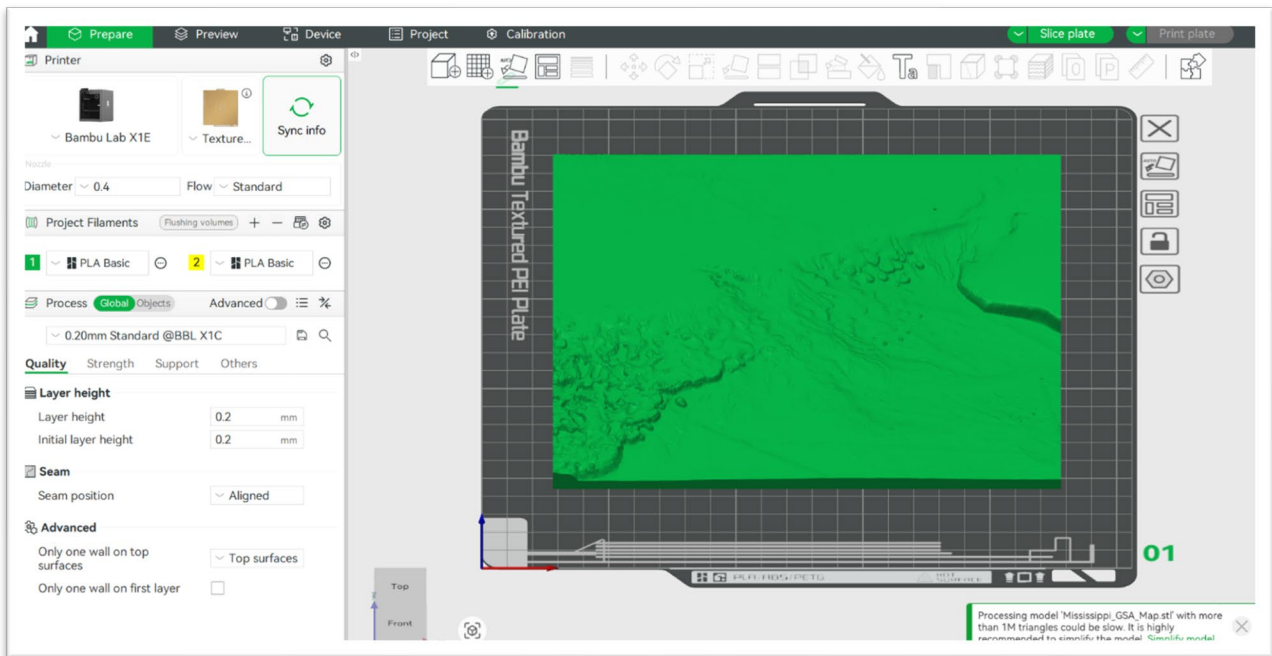


Figure 24. Import your STL into Bambu Studio

3. Review your model's scale and orientation. Adjust vertical exaggeration (X/Y/Z) if desired.
4. Under **Others** (bottom left), **disable the Prime Tower**.
5. Use the **Cut** tool to slice large models into smaller blocks.

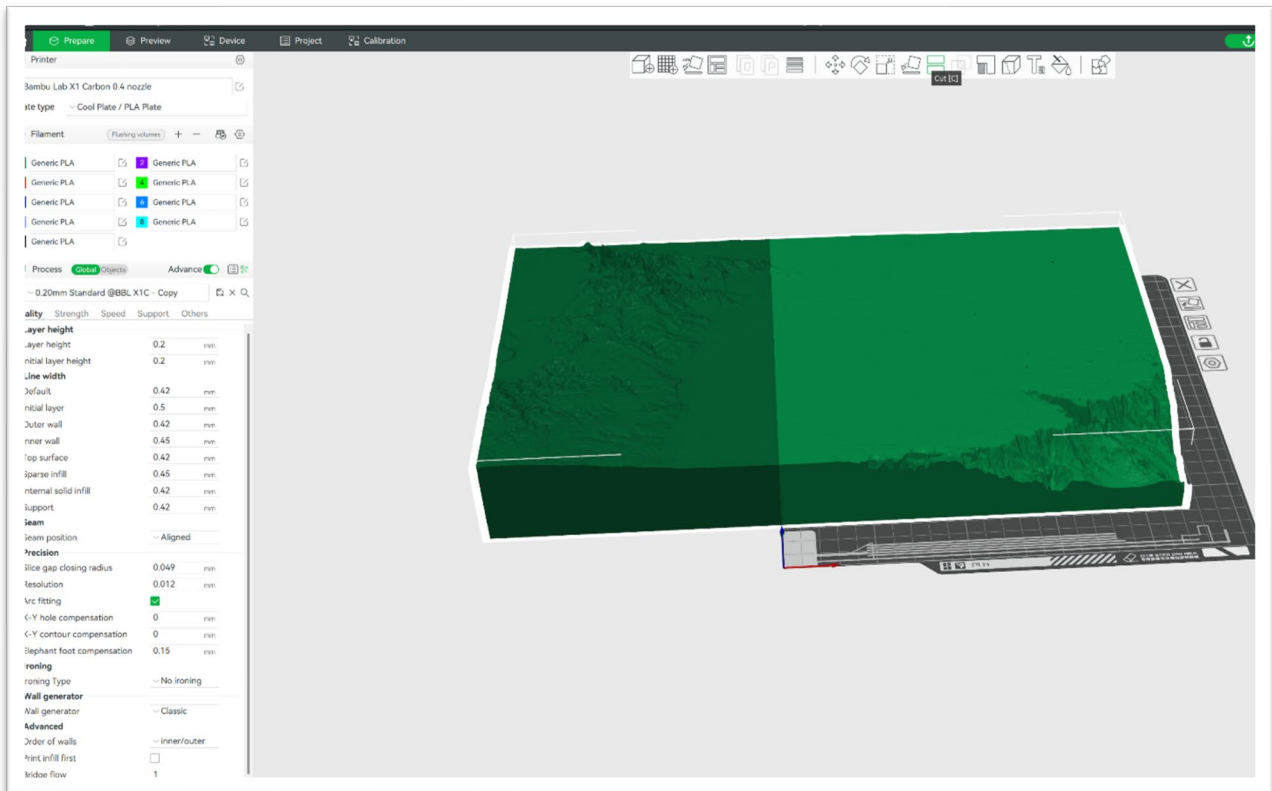


Figure 25. Bambu Studio settings

6. Add connectors:

- Click **Add Connectors**, select connector type, and choose attachment points.
- Click **Confirm Connectors** to finish.

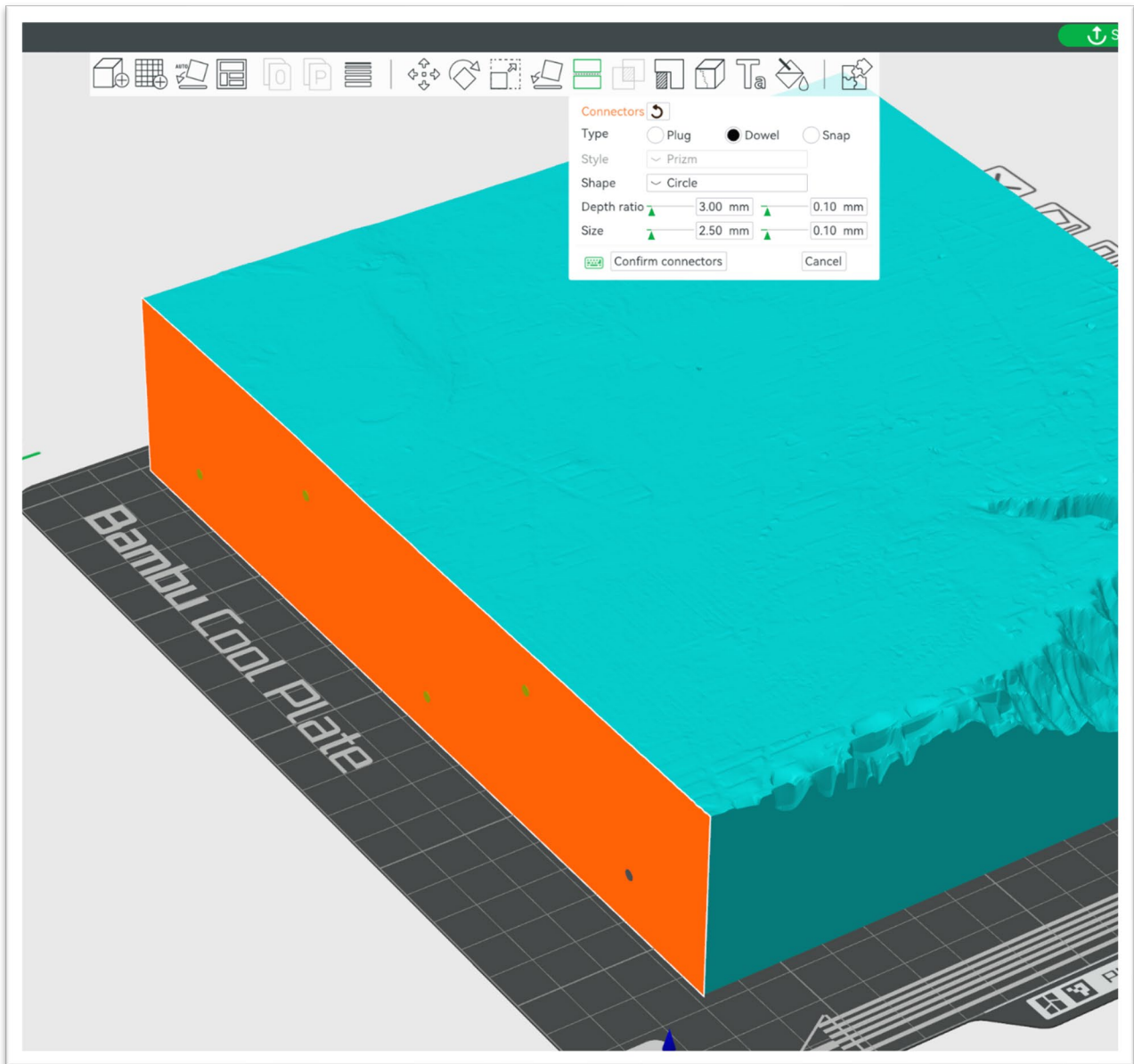


Figure 26. Connectors settings

7. Use **Add Plates** to organize separate blocks.

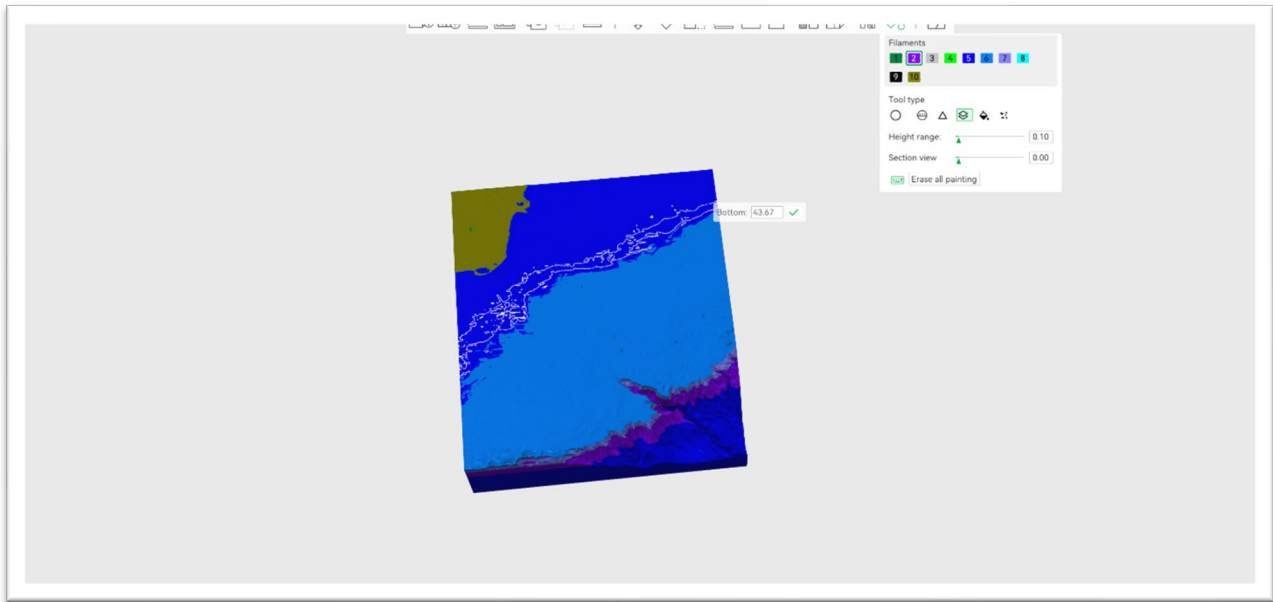


Figure 27. Plates settings

8. Color the model:

- Click the **Paint Bucket** tool.
- Select the number and colors of PLA filaments.
- Use **Height Range Tool** to paint by elevation.
- Track “Bottom” values to maintain color continuity across blocks.

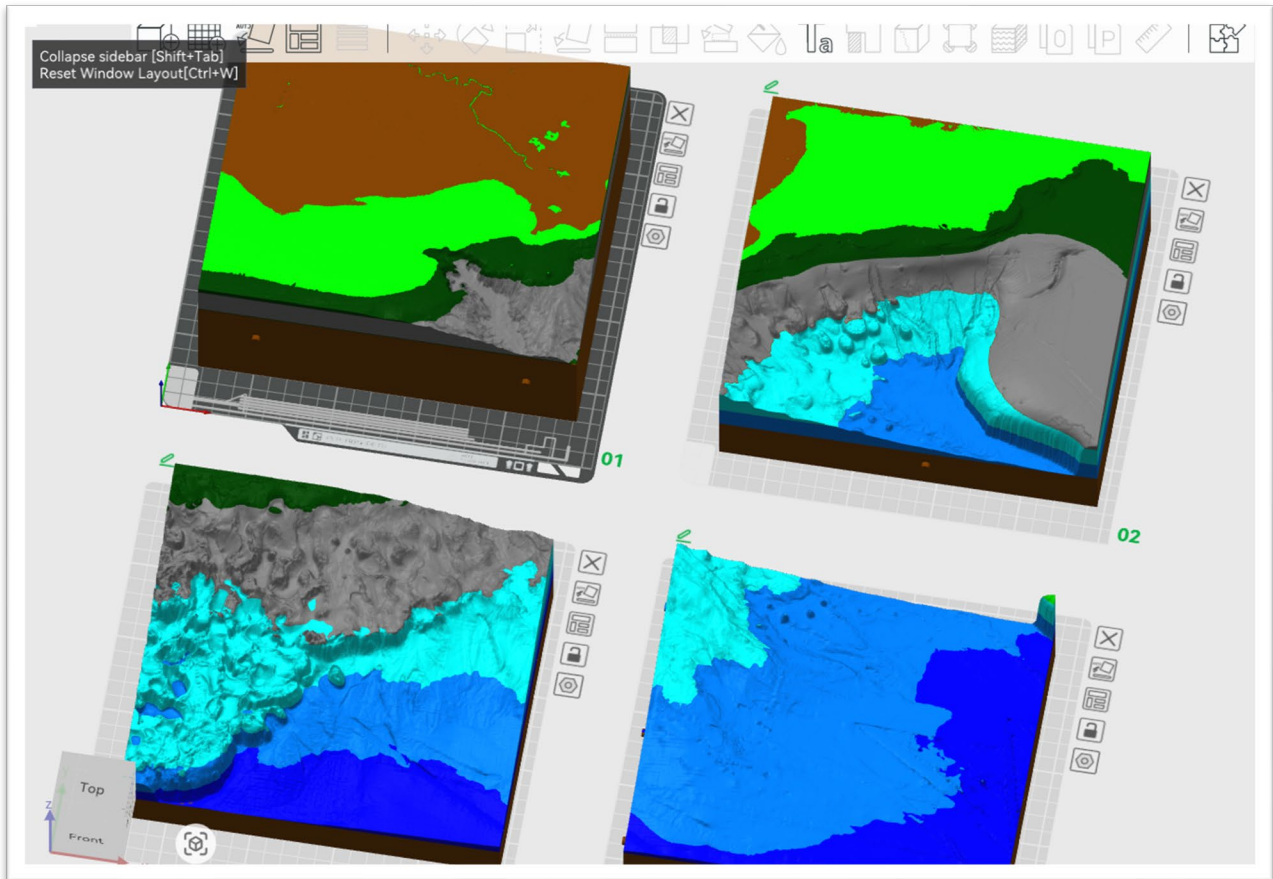


Figure 28. Paint your model

9. When ready, click **Slice Plate** (may take several minutes).
10. Click **Print Plate** to prepare for printing.

11. Load PLA filaments and correlate colors with Bambu's selections.
 12. Click **Send** to begin printing.
- Each block may take **10–20 hours** to print.

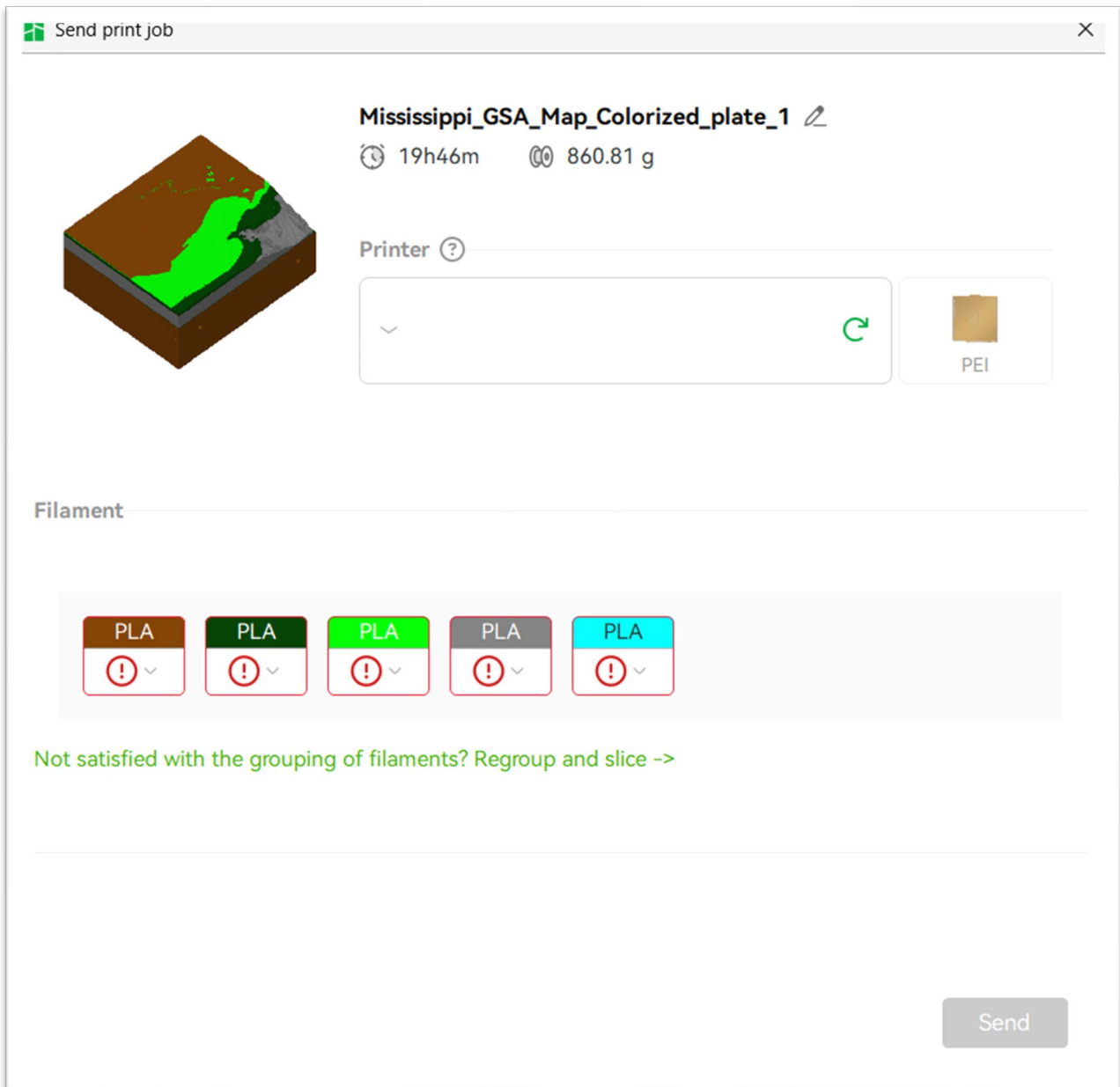


Figure 29. Correlate PLA colors with Bambu selections