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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**.

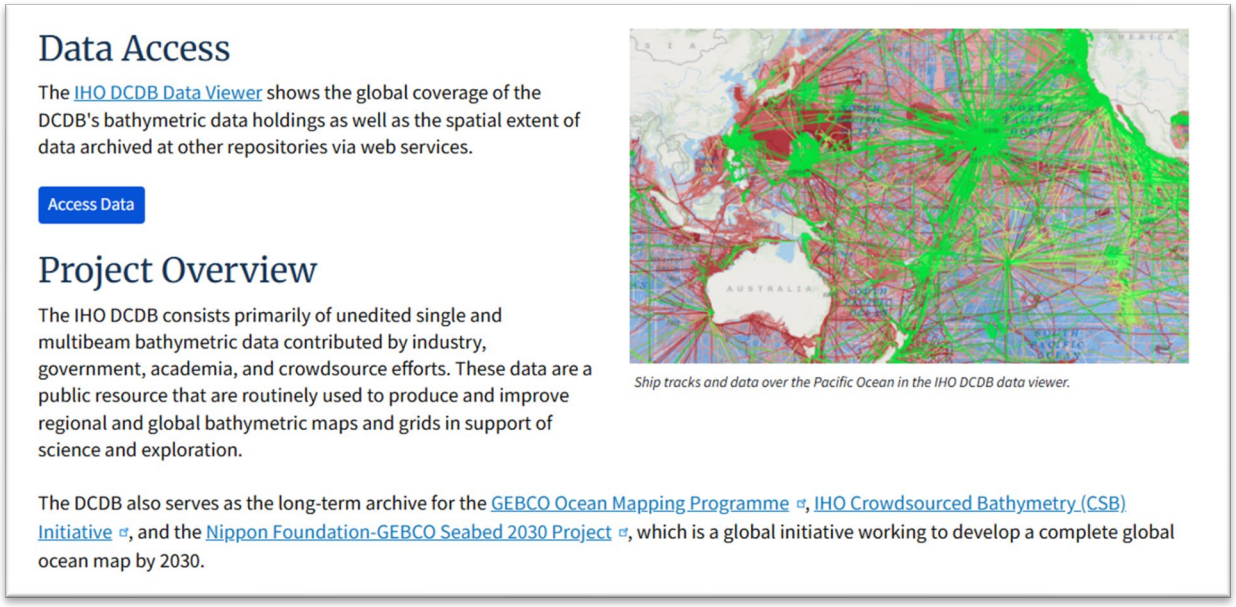

Figure 1. IHO Data Centre for Digital Bathymetry (DCDB)

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

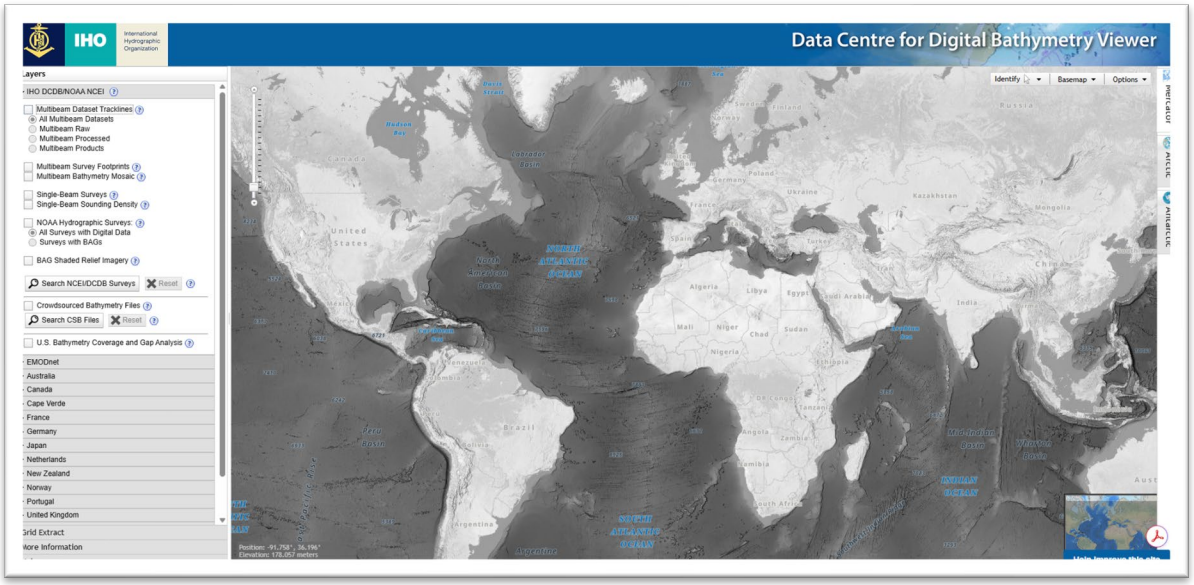

Figure 2. Uncheck Multibeam Dataset Tracklines

3. Expand **Grid Extract**.

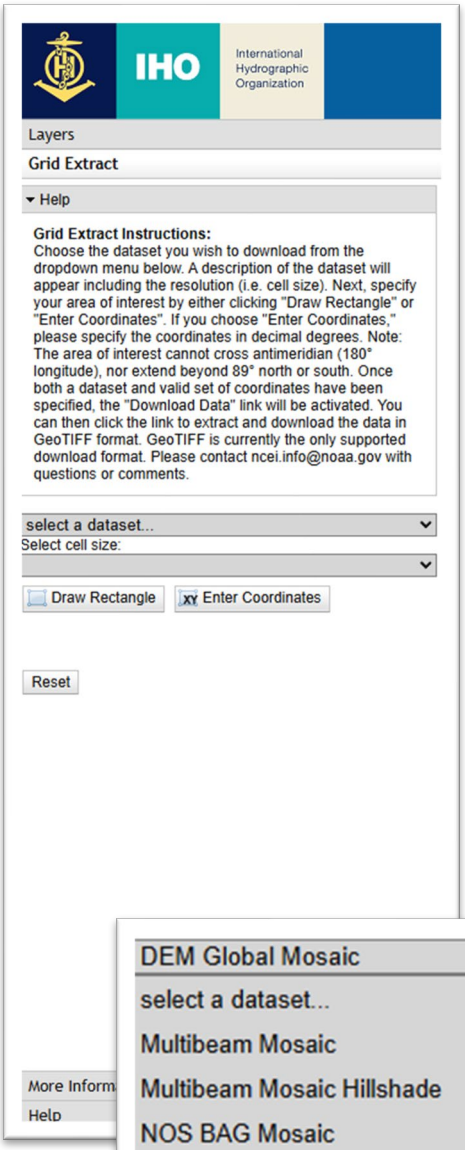

Figure 3. Expand Grid Extract

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

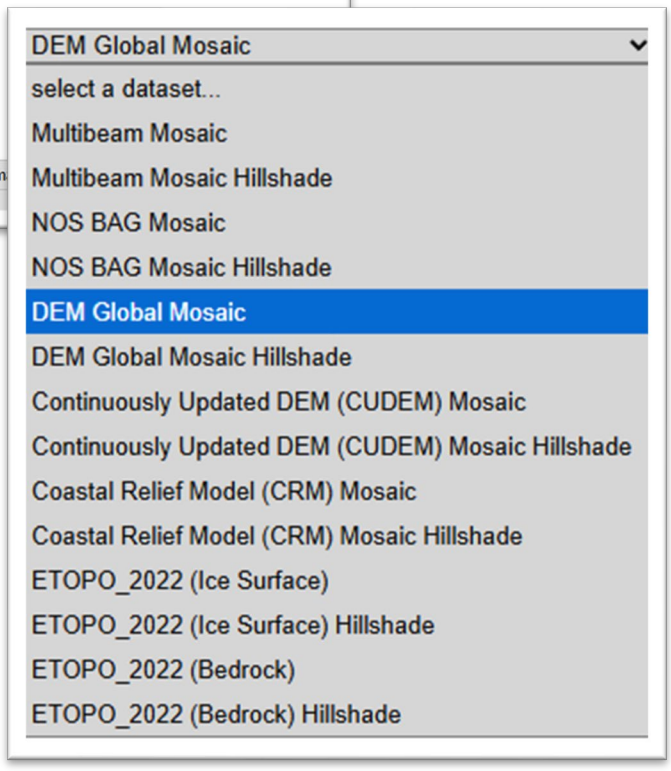

Figure 4. Select a dataset

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

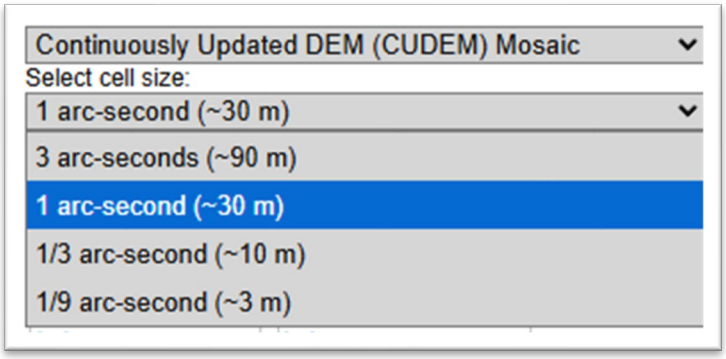

Figure 5. Choose appropriate arc-seconds

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

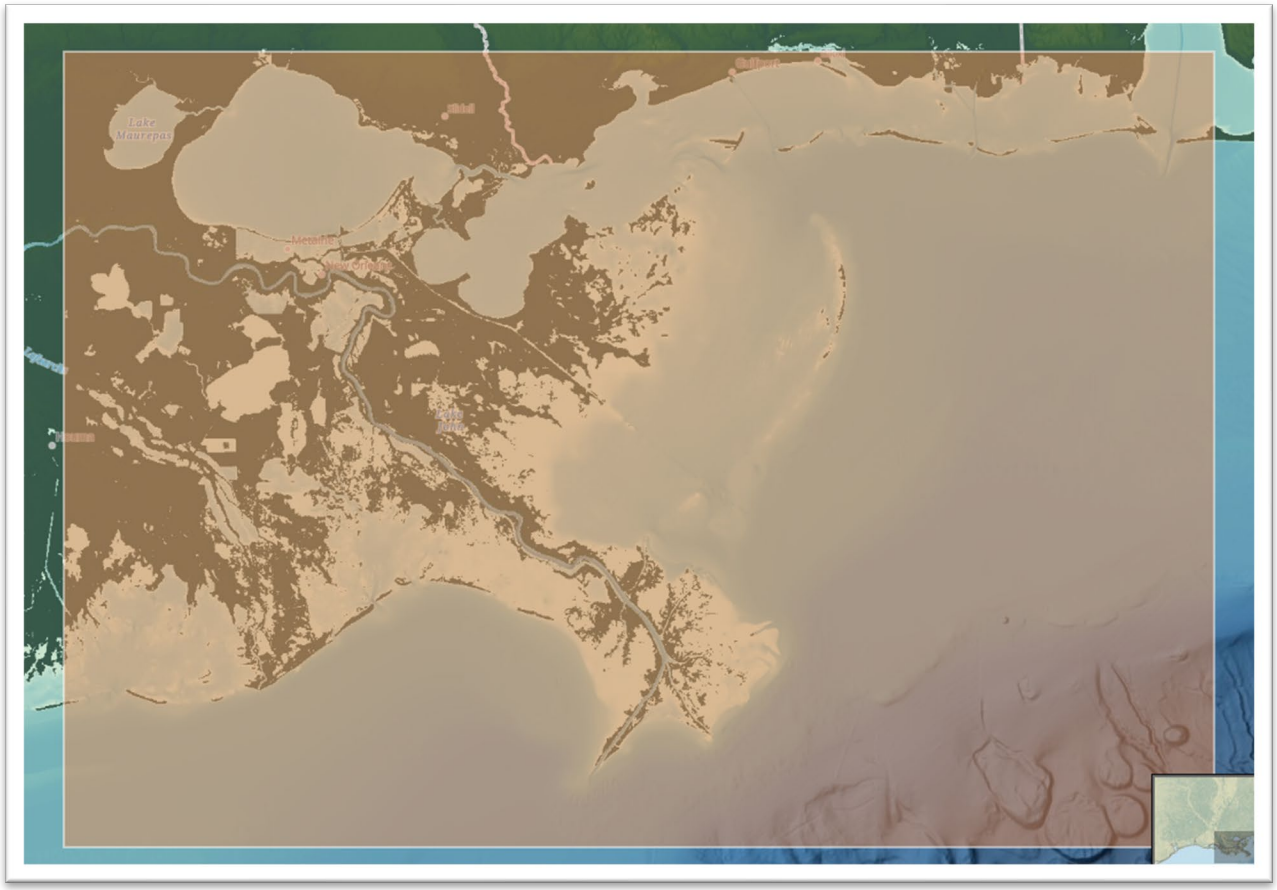

Figure 6. Draw a rectangle around your area of interest

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

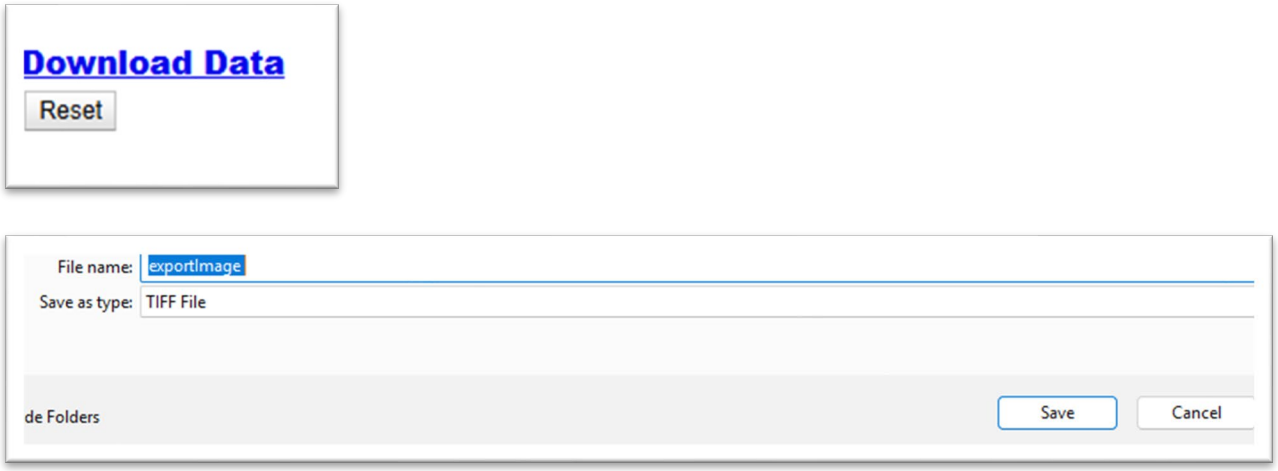

Figure 7. Download and save data

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.

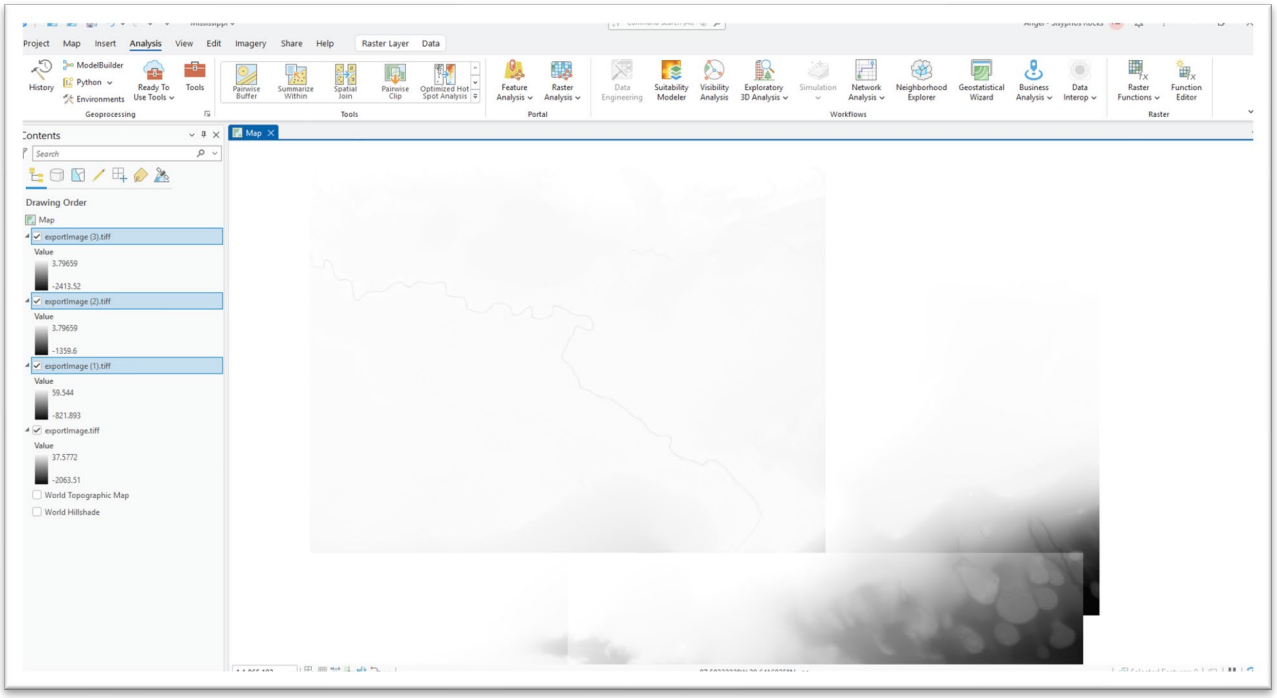

Figure 8. Drag your file onto your map

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

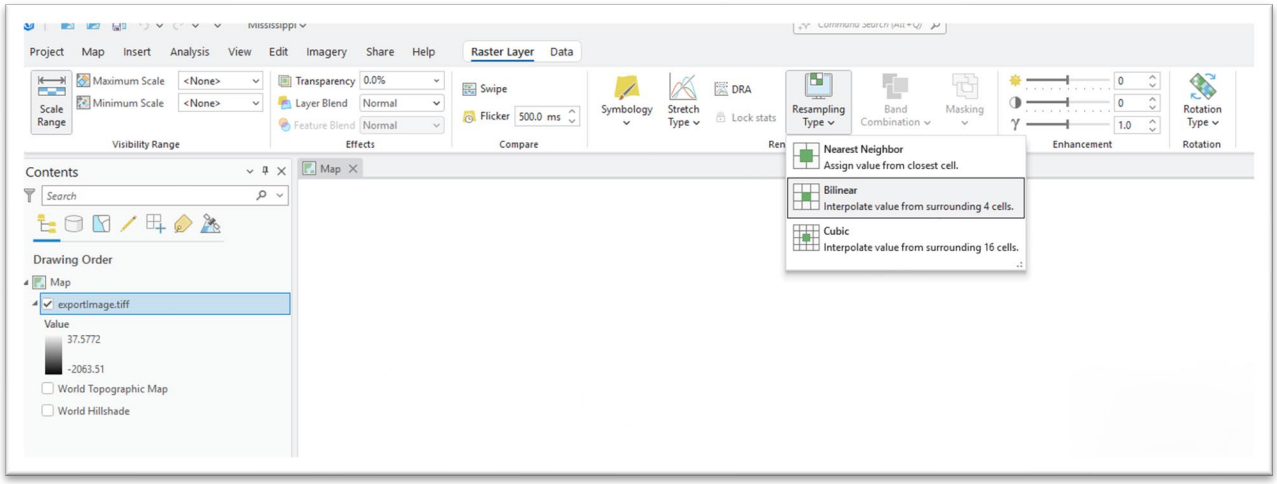

Figure 9. Bilinear resampling type

3. To merge multiple .tiff files:

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

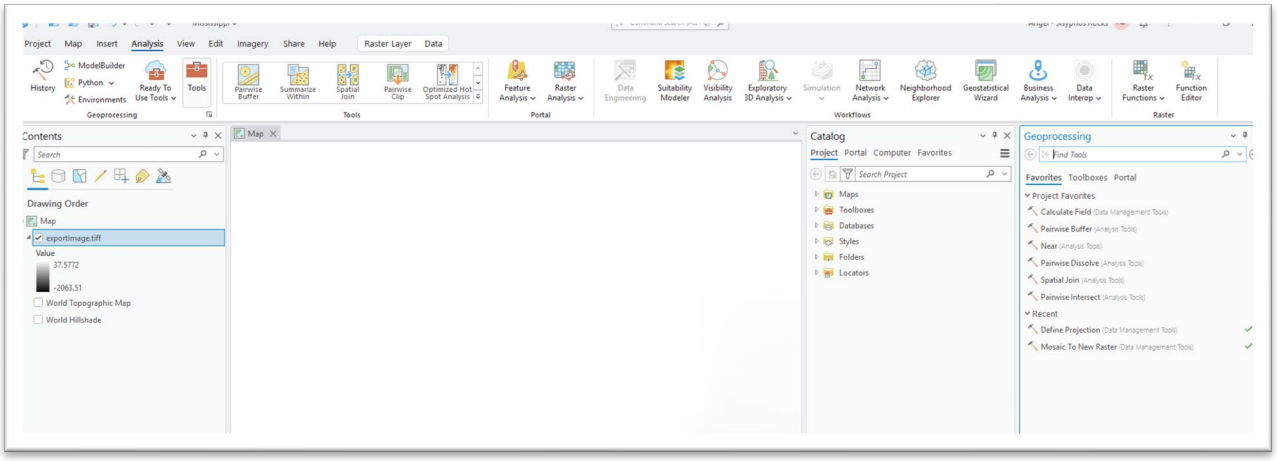

Figure 10. Geoprocessing panel

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

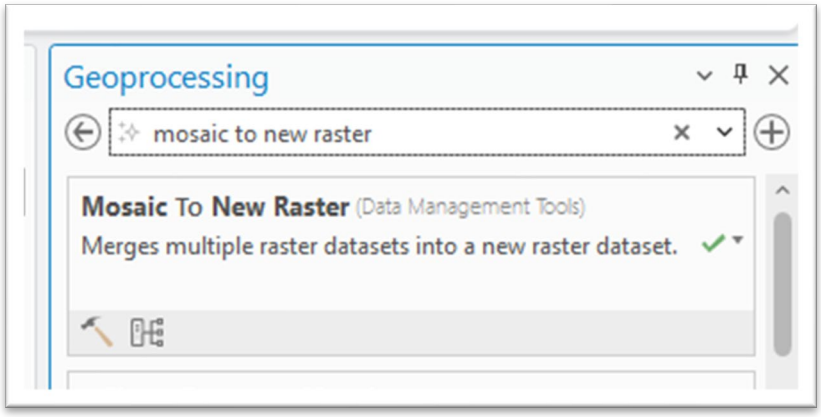

Figure 11. Mosaic to New Raster

- Add all input rasters.

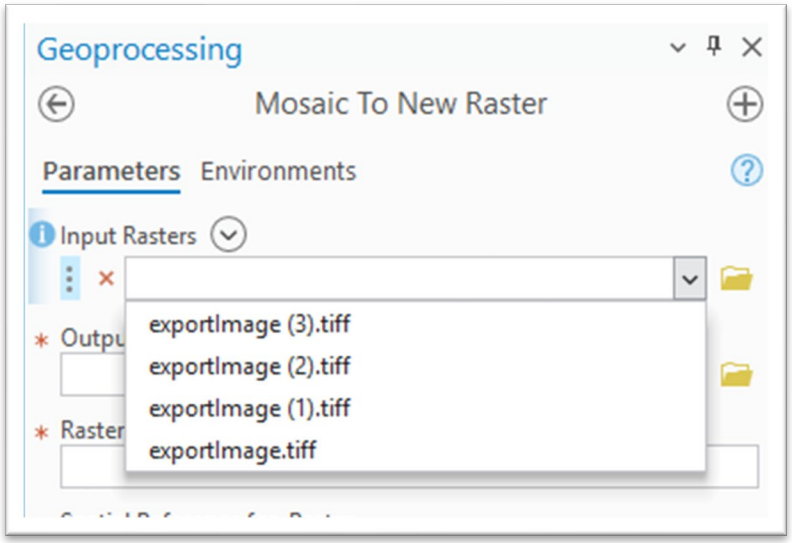

Figure 12. Input rasters

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

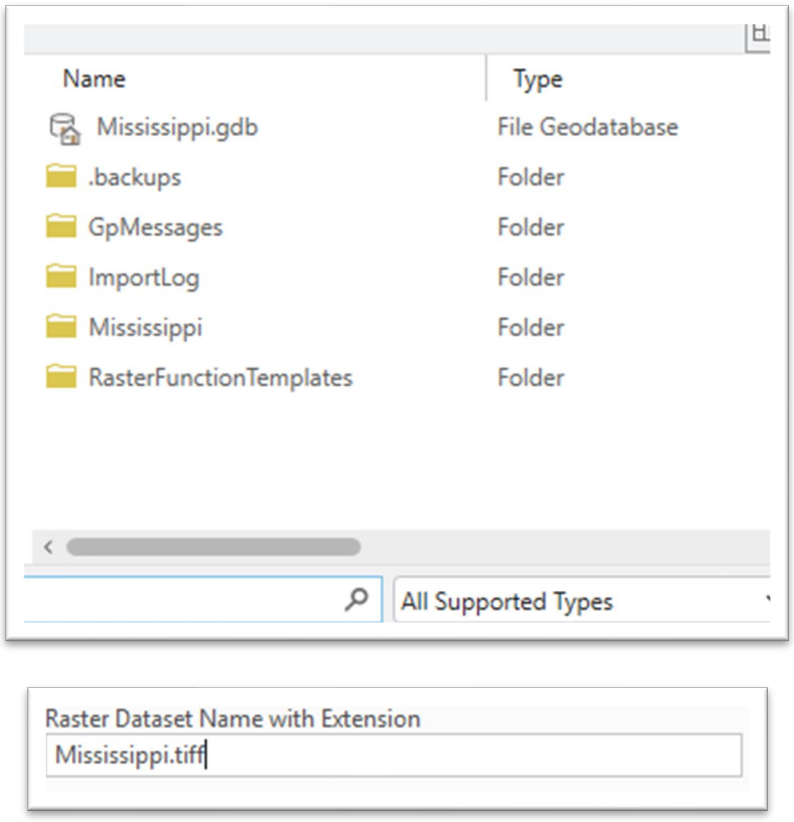

Figure 13. Set your output location

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

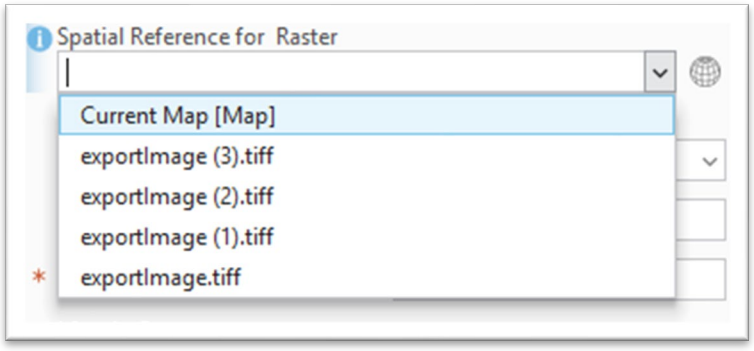

Figure 14. Spatial Reference for Raster

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

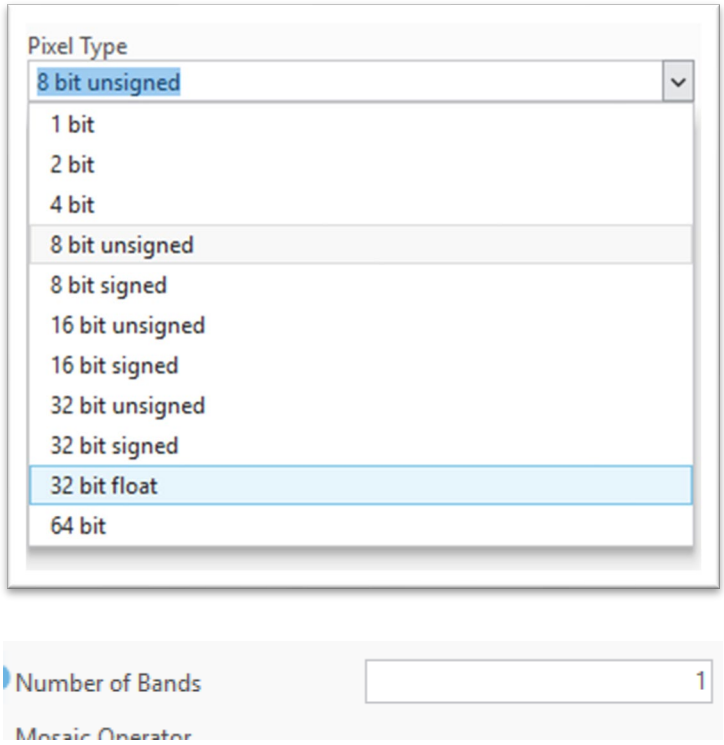

Figure 15. Pixel Type and Number of Bands

- Click **Run**.

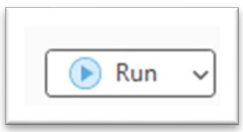

Figure 16. Run

4. When finished, export your new raster:
    - Go to **Share → Export Map → GeoTiff**.

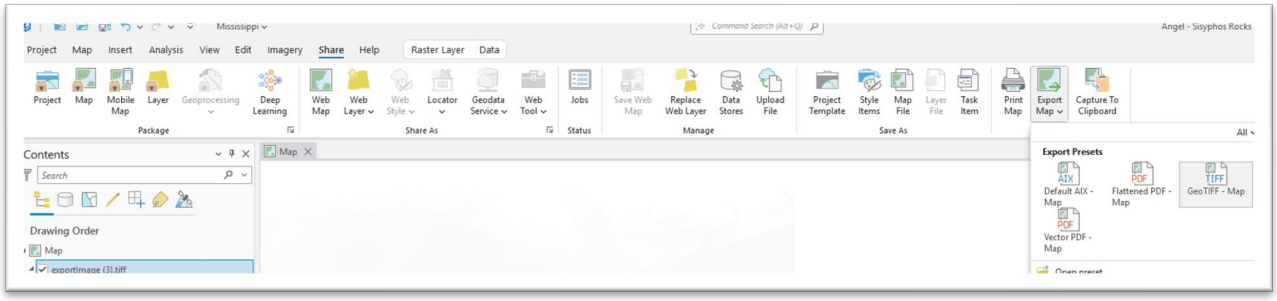

Figure 17. Export GeoTIFF

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

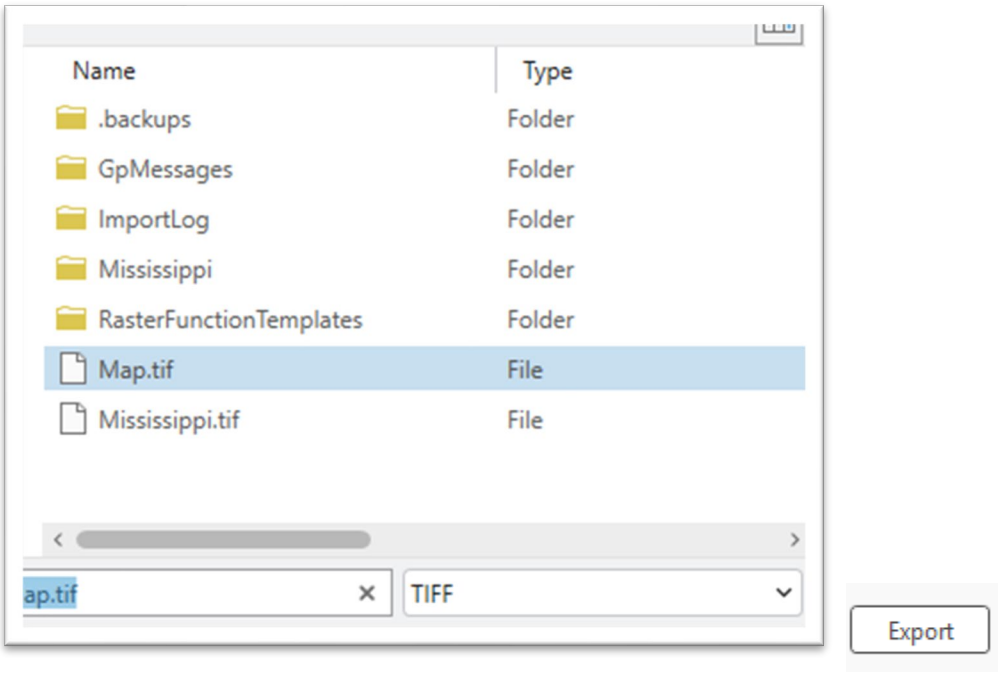

Figure 18. Choose file name and location and click export

3. Preparing the Model in QGIS

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

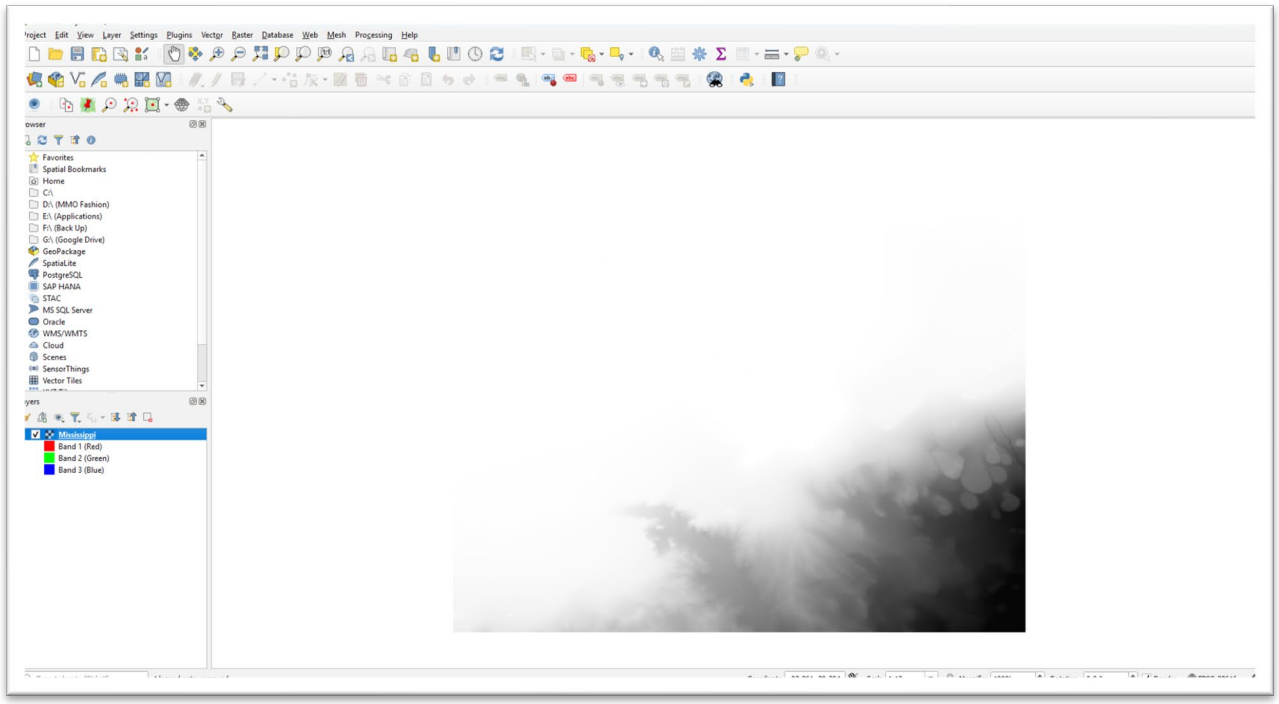

Figure 19. Drag your file into QGIS

2. If needed, install **DEMto3D Plugin**:
    - Go to **Plugins → Manage and Install Plugins → Search "DEMto3D" → Install**.

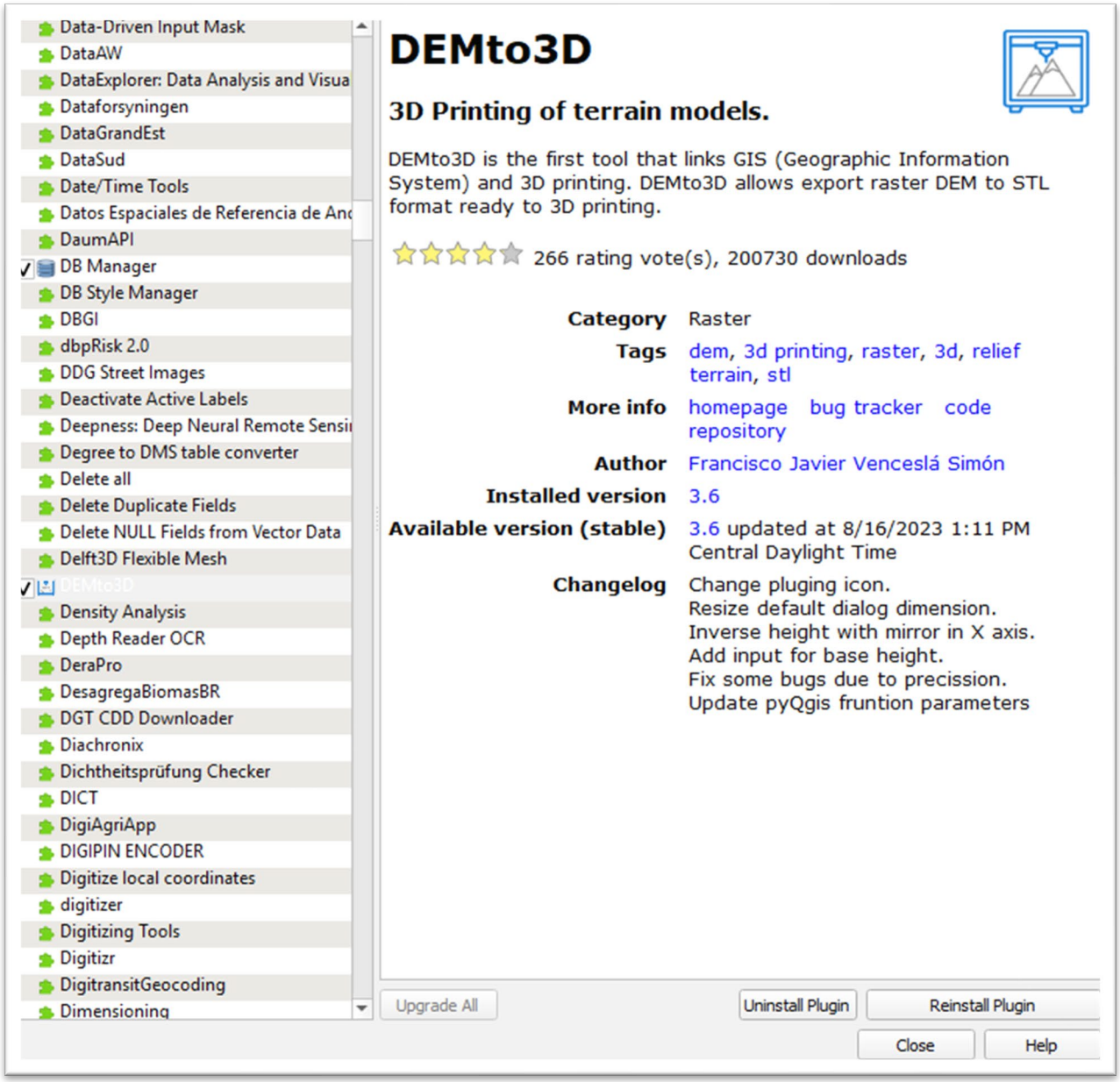

Figure 20. Install DEMto3D

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

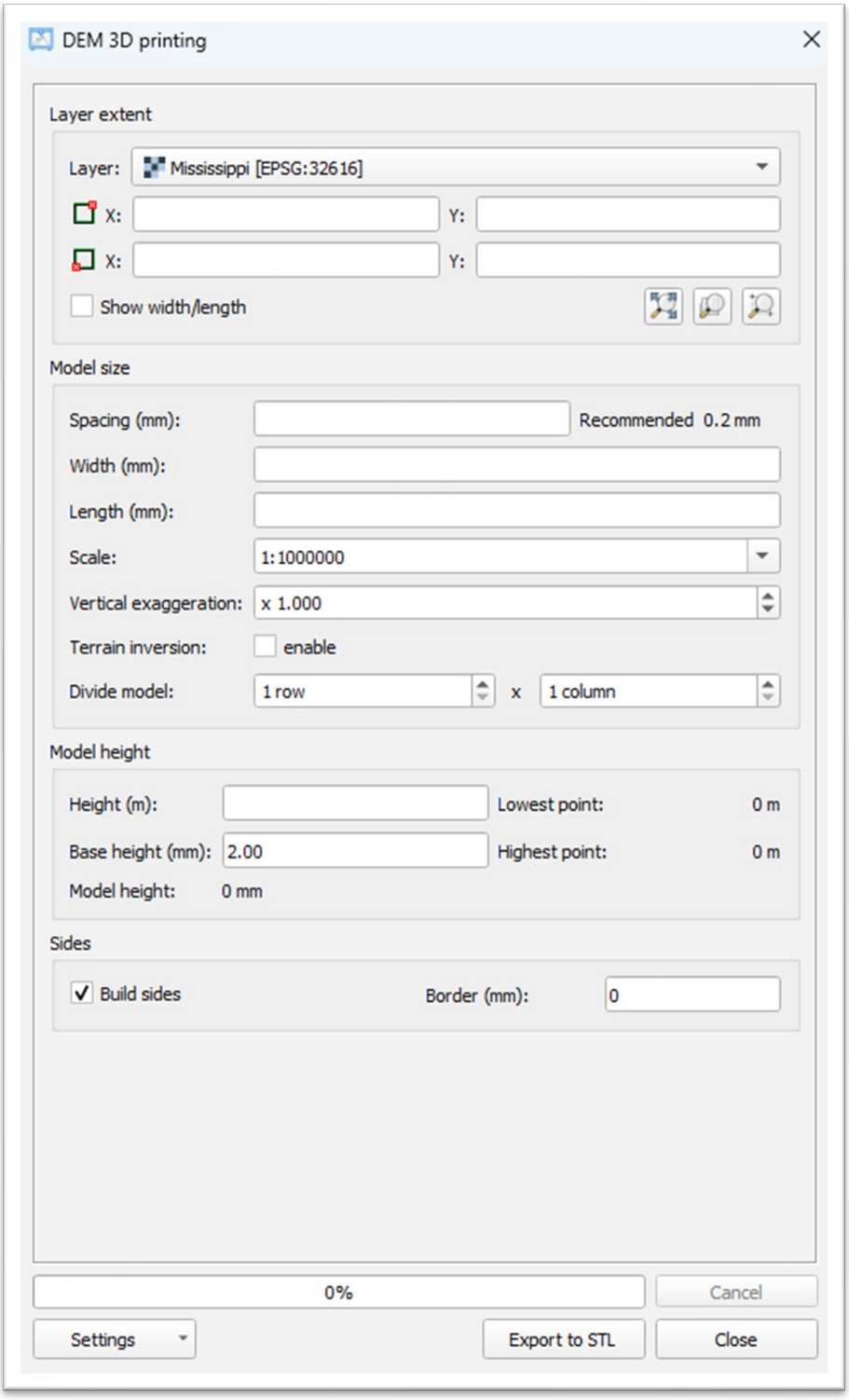

Figure 21. DEM 3D Printing

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

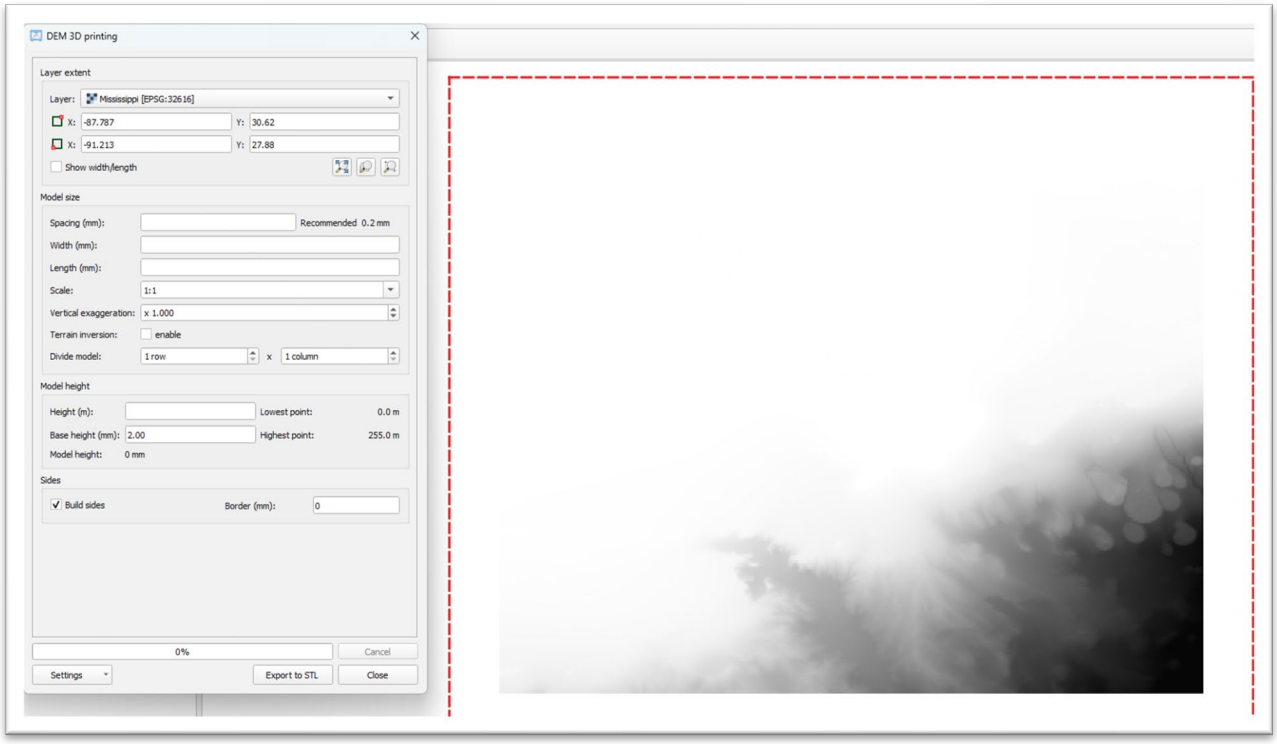

Figure 22. Outline your DEM

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

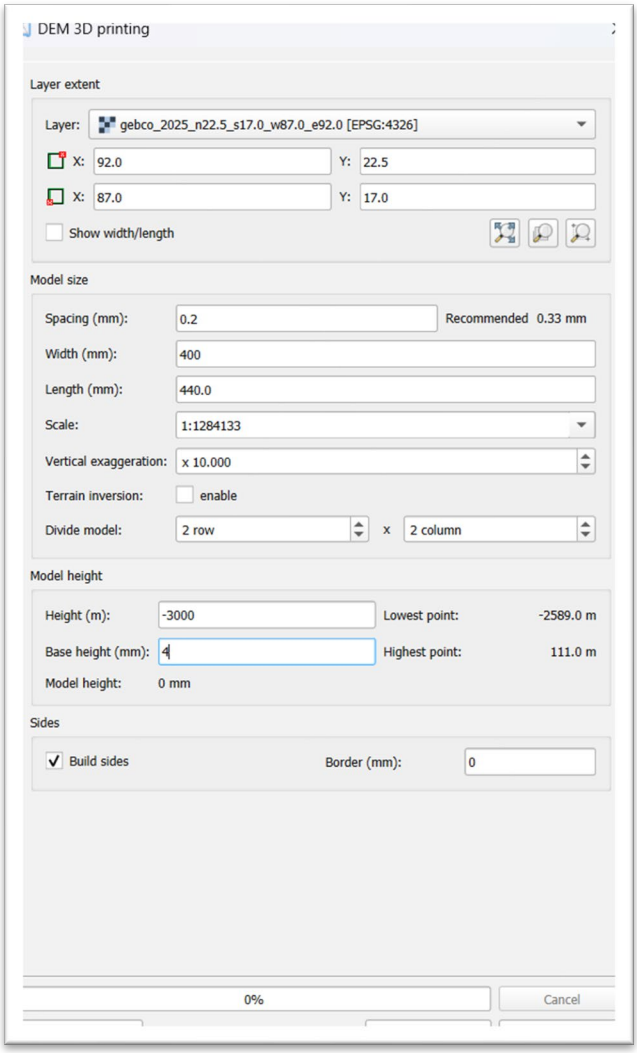

Figure 23. DEM 3D Settings

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.

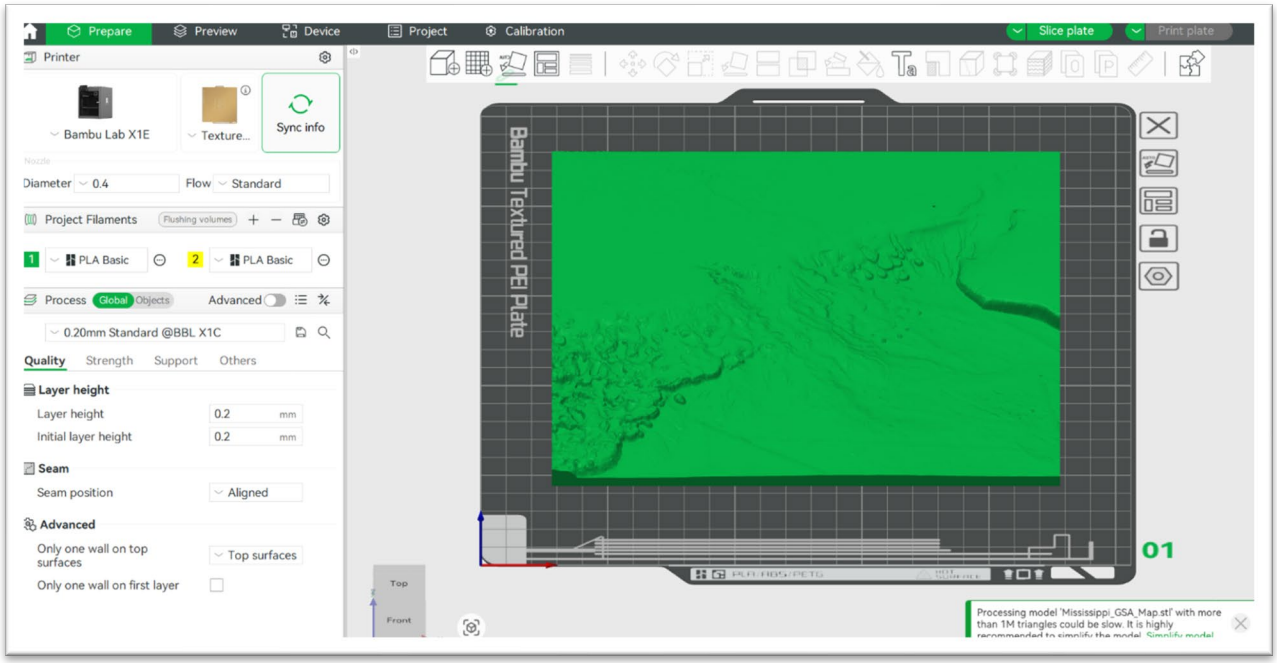

Figure 24. Import your STL into Bambu Studio

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.

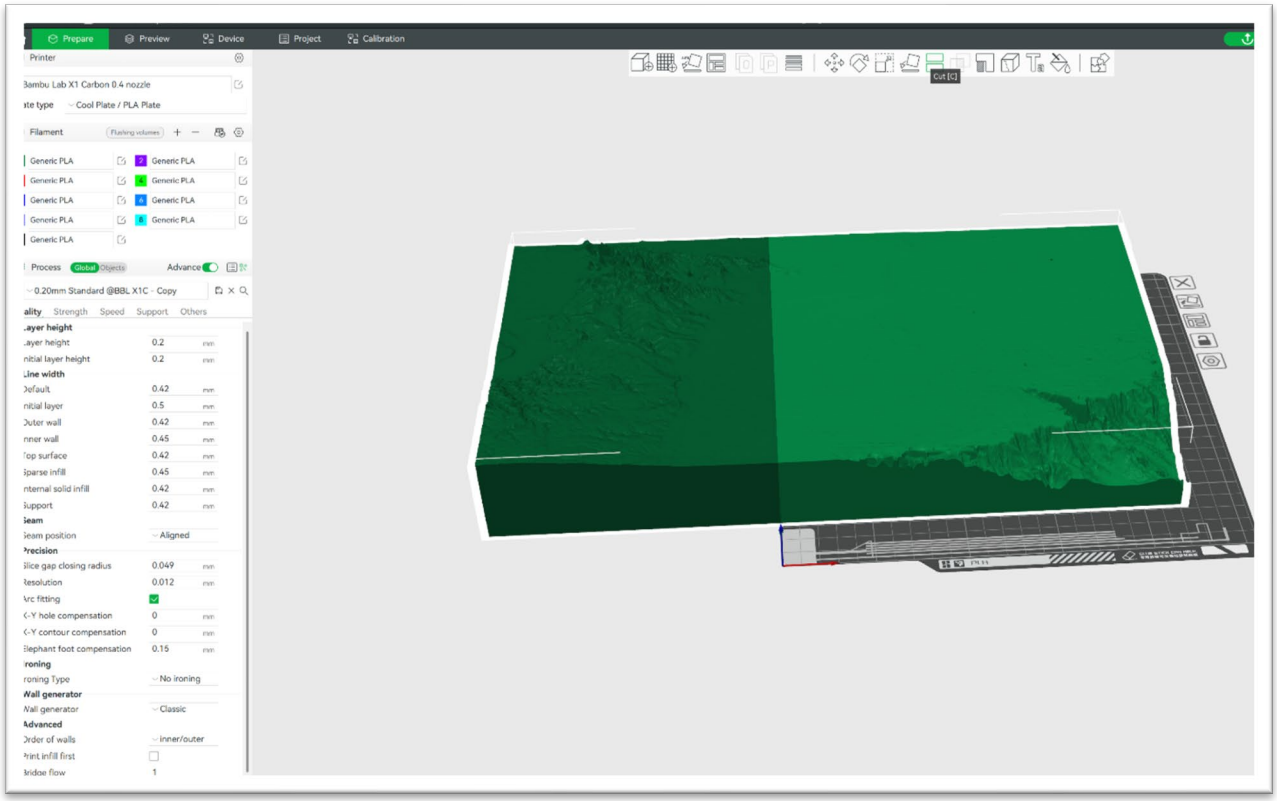

Figure 25. Bambu Studio settings

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

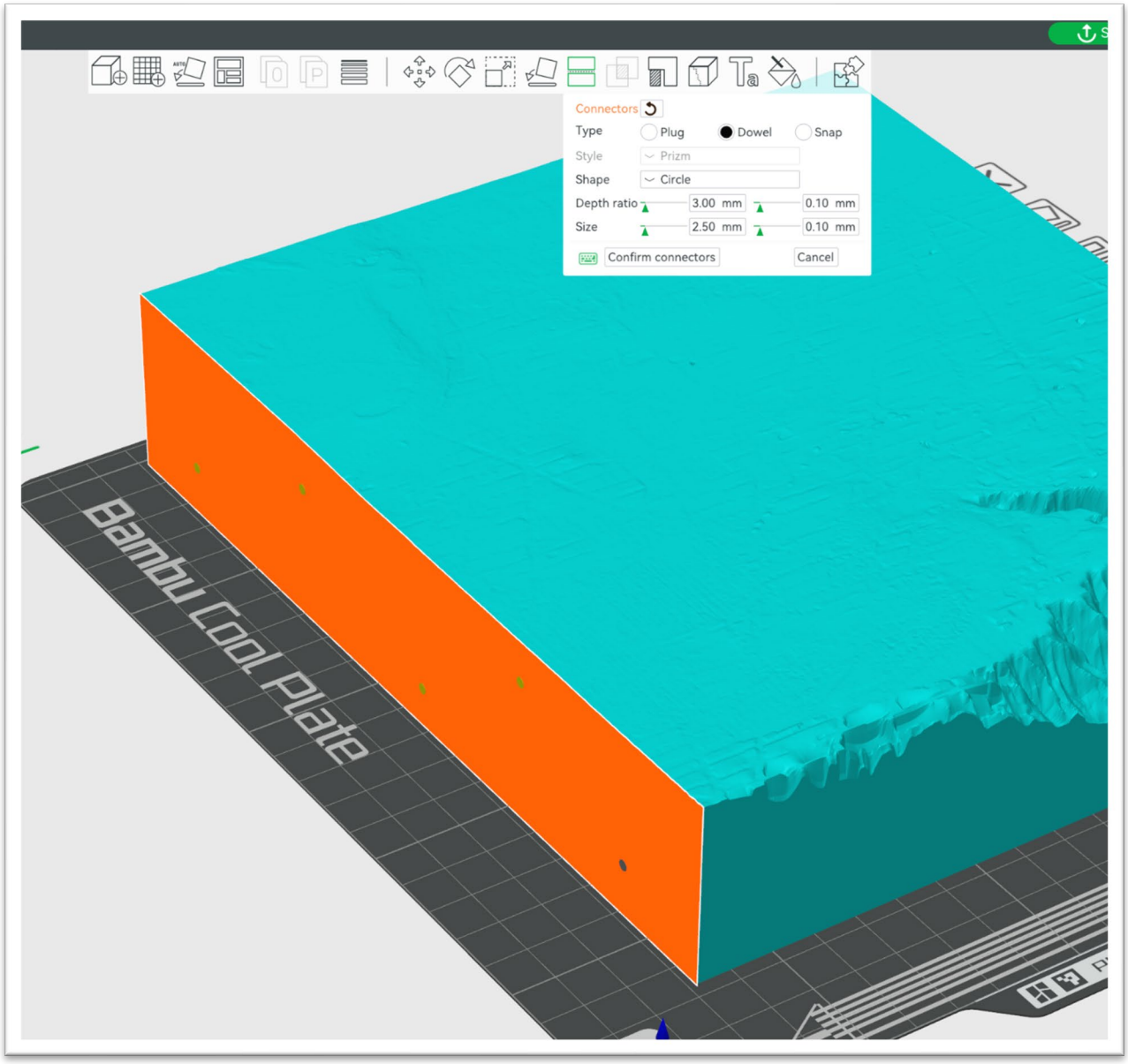

Figure 26. Connectors settings

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

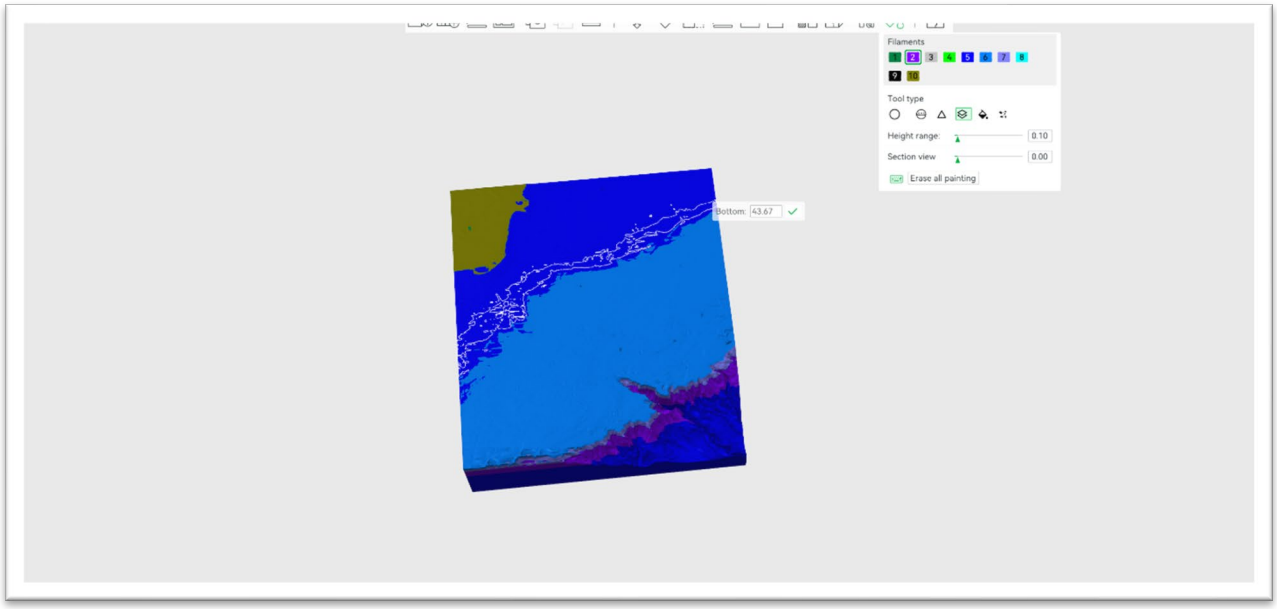

Figure 27. Plates settings

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.

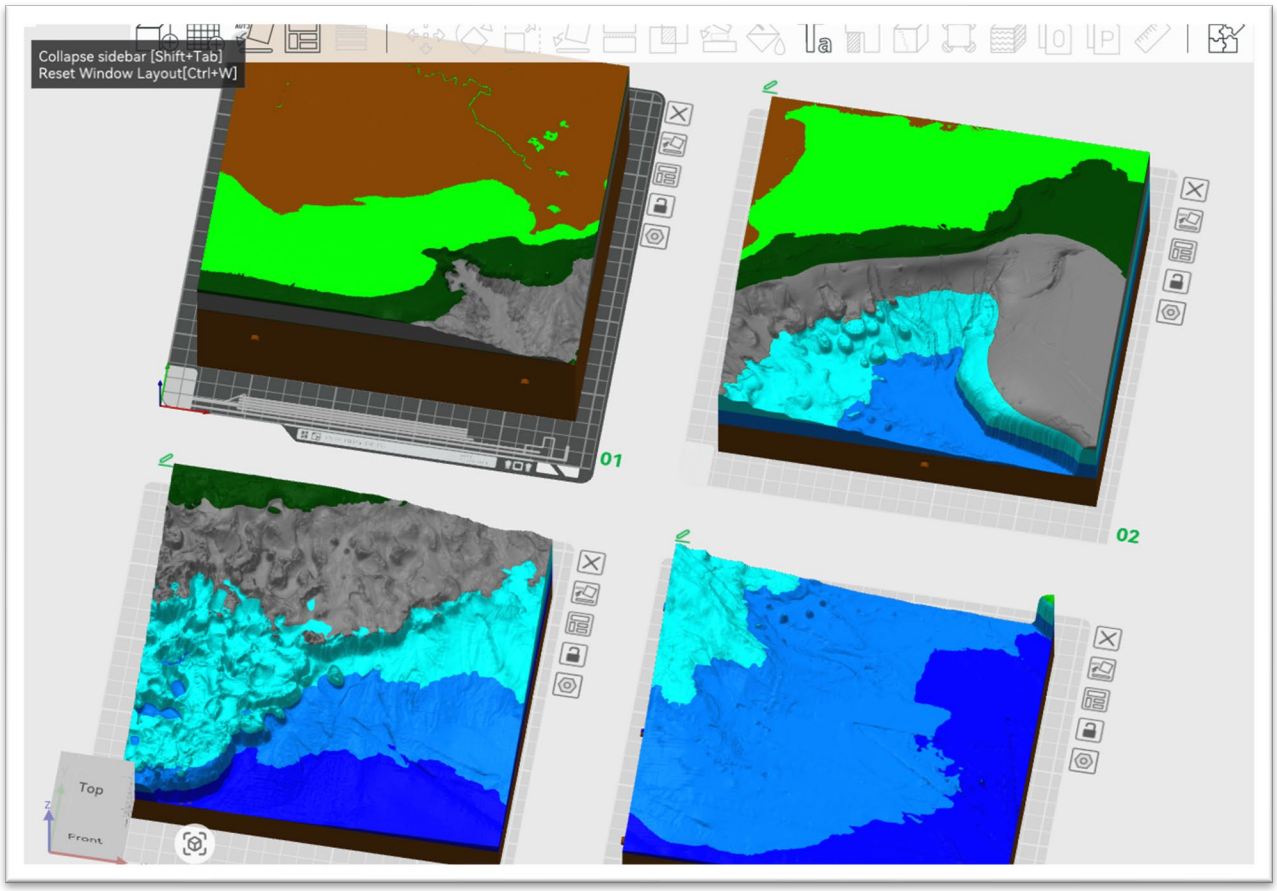

Figure 28. Paint your model

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.

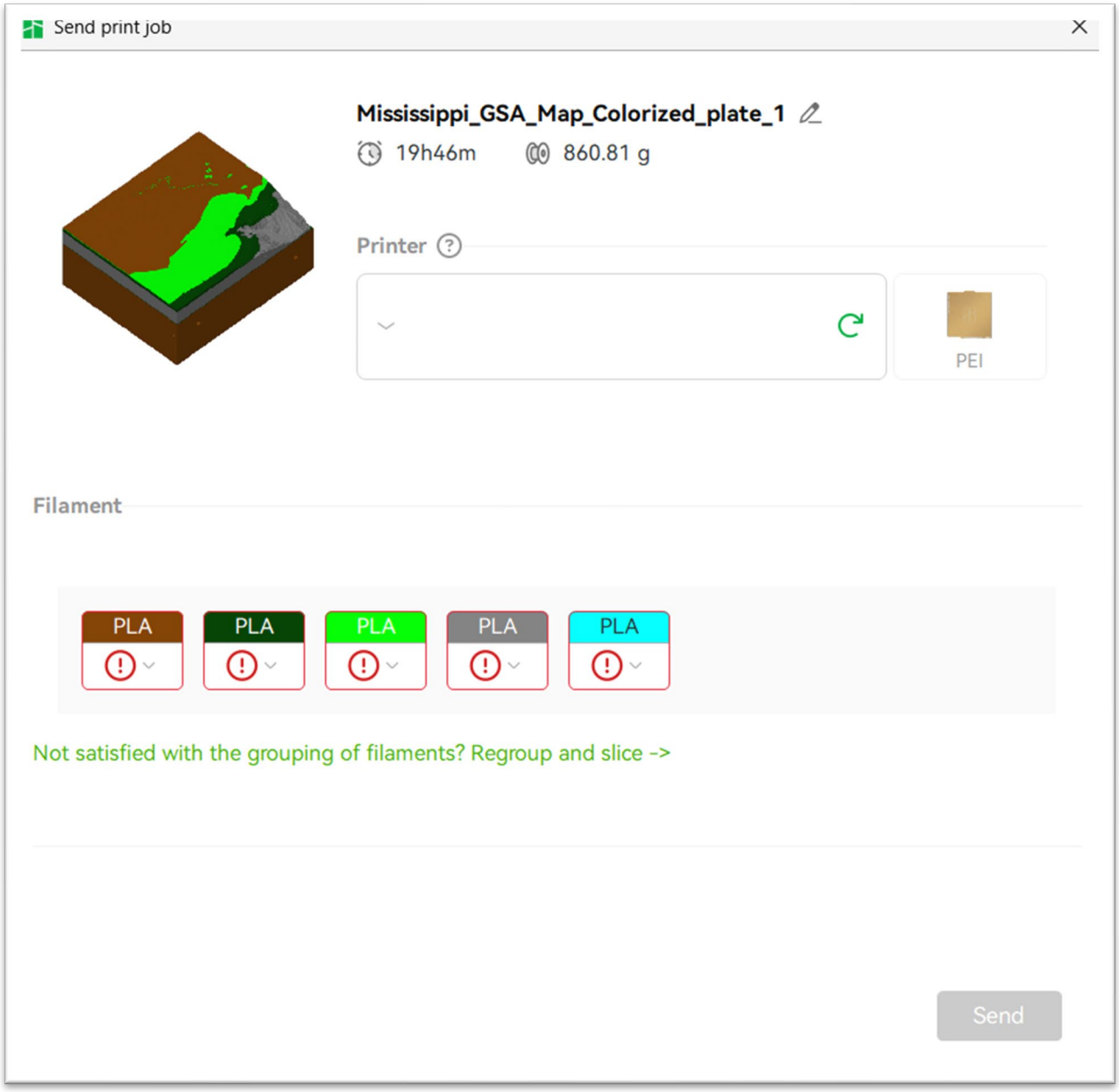

Figure 29. Correlate PLA colors with Bambu selections