Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

REPORT 1

Cloudcompare work process

Done by: Rawan Darwa
Tutor: Marialuisa Mongelli
with the support of : Marco Puccini

Thinking Process

The team received .las files only and was requested to create a 3d, mesh model for further analysis.

* First step was to figure out which software can read the las files, or would it be possible to transform it into other formats to give further options.
* Cloudcompare: files were easily openably by it and it was possible to edit the pointcloud. Also exporting it into .ply format
* Blender: importing .ply format then scaling it and moving center point center of drawing file for ease of viewing. But the problem was the pointcloud was not clear enough to work on it for any analysis.
* Agisoft Metashape: the .las, .ply files were easly imported but the points we're not clear enough to work out a mesh model in this software.
* Finally, Cloudcompare: again .las files were imported in, edited, commuted normal, and further

Goals

→ Introduction to the software cloudcompare.
→ Graphic interface
→ Importing the point cloud with .las file , or .bin combined group files
→ Filtering imported files
→ Editing the scans to focus on the study area.
→ Giving the shades to see the overall model.
→ Calculating normals
→ Change display ranges
→ Rendering into a mesh
→ Saving the file

• Introduction to the software cloudcompare.

CloudCompare is a software for processing 3D point clouds (and triangular mesh). It was created with the intention of comparing two dense 3D point clouds (such as those obtained with a laser scanner) or a point cloud and a triangular mesh. It makes use of a specialized octree structure for this reason. Following that, it was expanded into a more general point cloud processing software that included a number of advanced algorithms (registration, resampling, color/normal/ scalar field handling, statistics computation, sensor management, interactive or automatic segmentation, display enhancement, and so on).
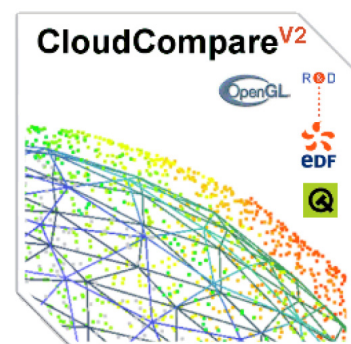
● Graphic interface
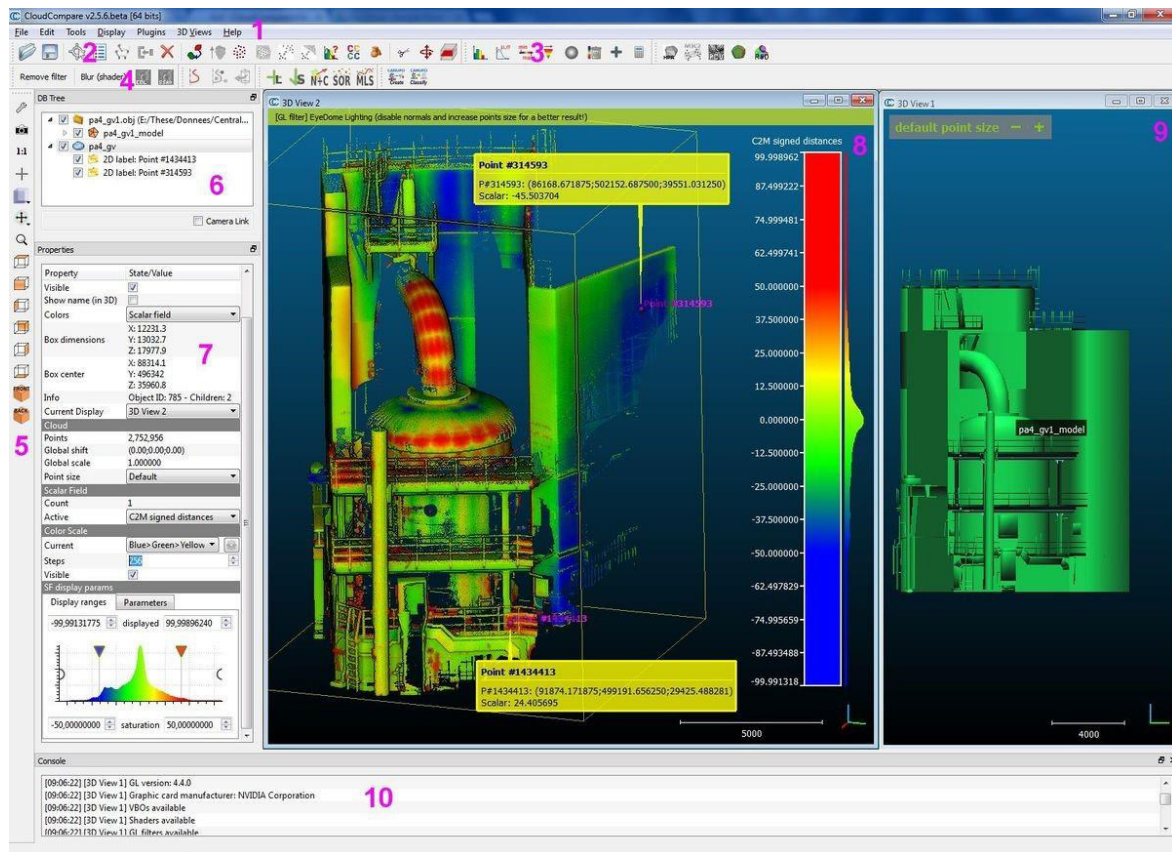
1. Menus
   - File (open, save, quit, etc.)
   - Edit (edit selected entities and their features - colors, normals, scalar fields, etc.)
   - Tools (segmentation, registration, projection, etc.)
   - Display (display-related options)
   - Plugins (loaded plugins)
   - 3D Views (3D views management)
   - Help (about, help, etc.)

2. Main toolbar (quick access to main editing and processing tools: open/save, point picking, clone, etc.)

3. Scalar fields toolbar (quick access to scalar fields related tools)

4. Plugins toolbar (quick access to currently loaded plugins - standard and OpenGL shaders)

5. View toolbar (quick access to display-related tools)

6. Database tree (for selection and activation of entities and their features)

7. Properties view (information on selected entity)

8. Default 3D view

9. Another 3D view (created with 3D Views > New)

10. Console.

* zoom, mouse scroll

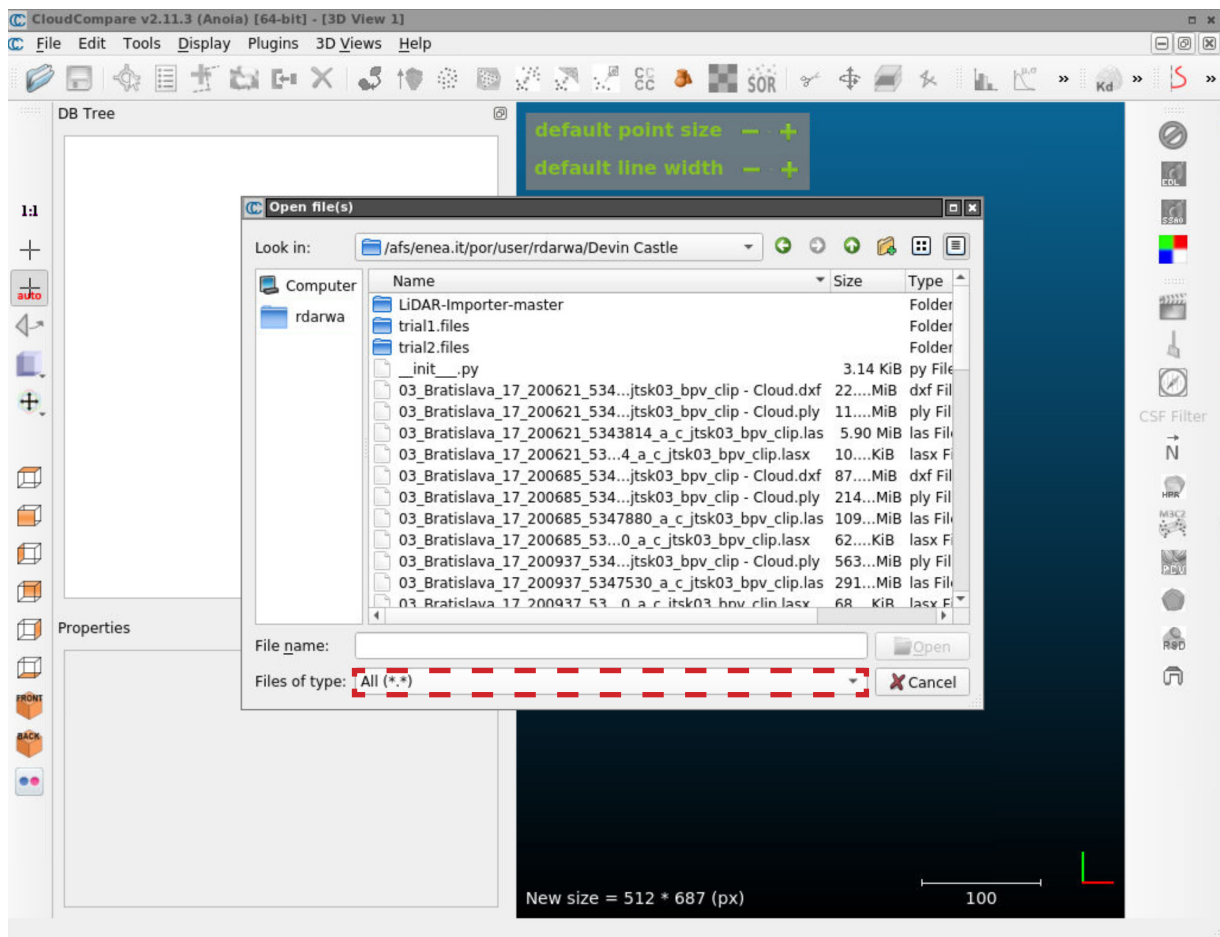* rotate, left mouse click

* move, right mouse click

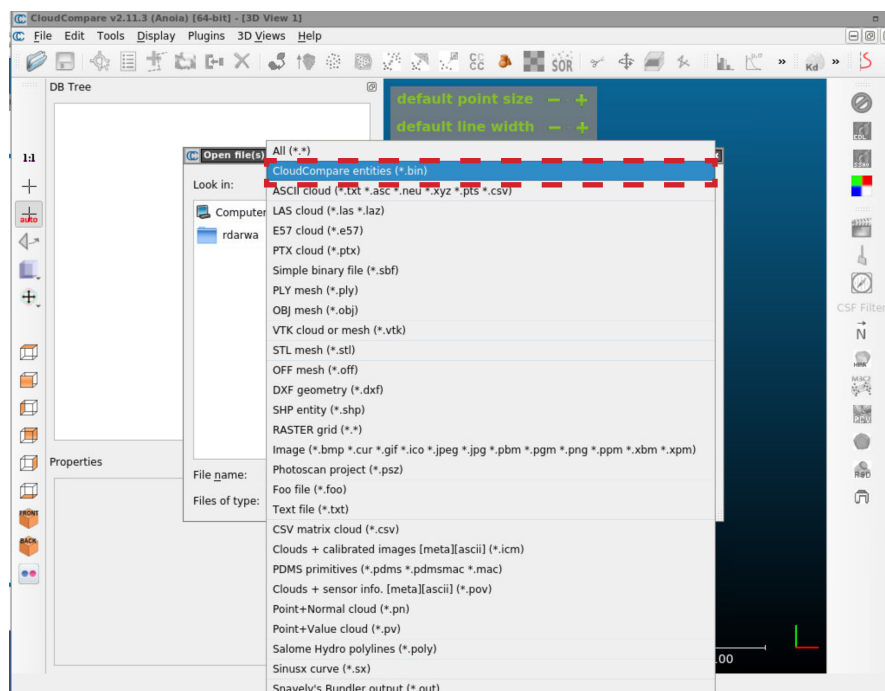# • Importing the point cloud with .las file or .bin combined group of files
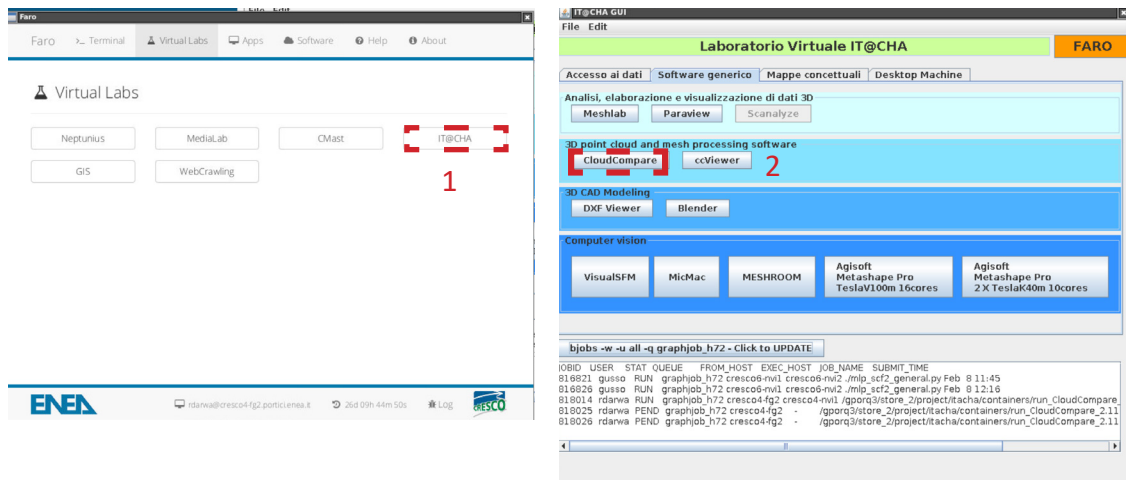
1. open IT@CHA
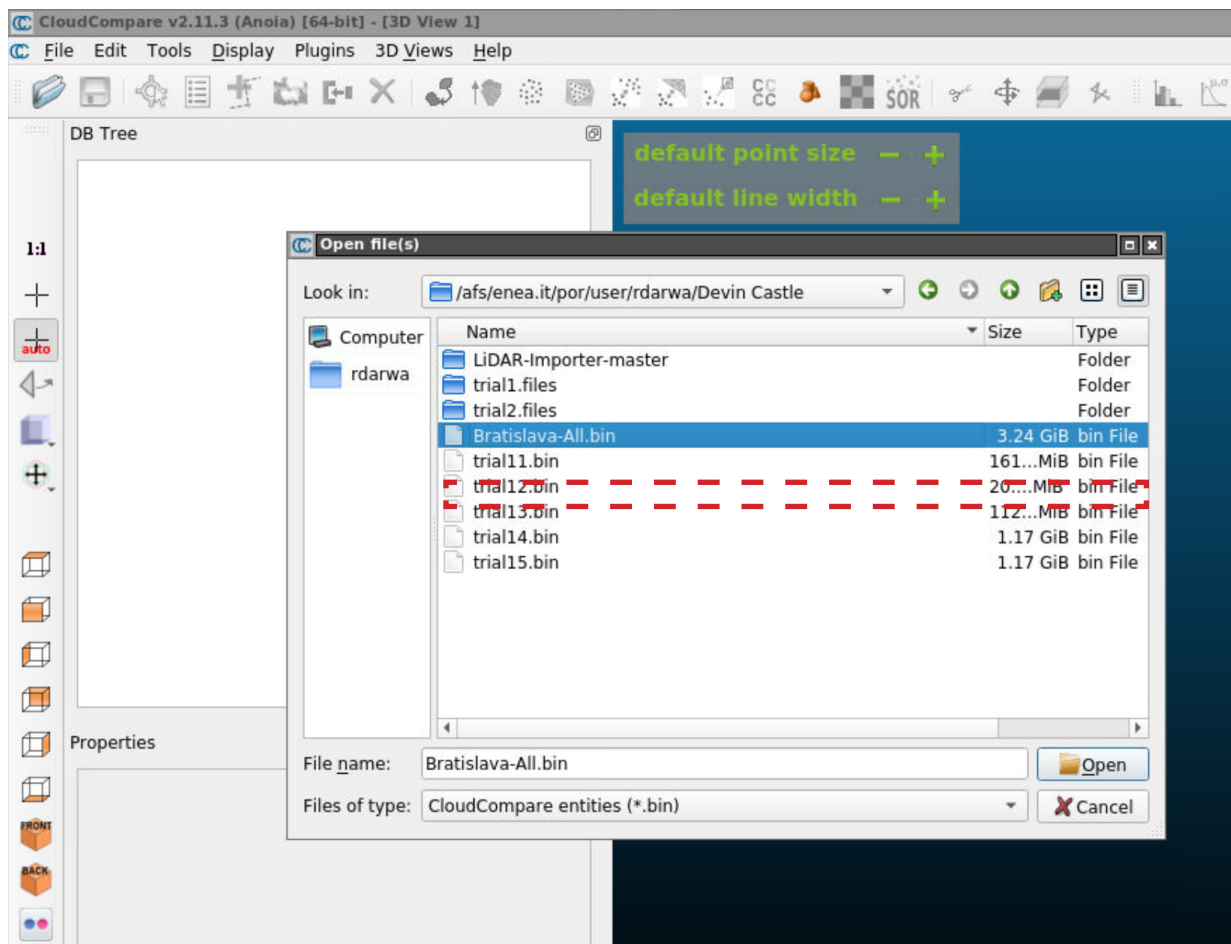2. open cloudcompare
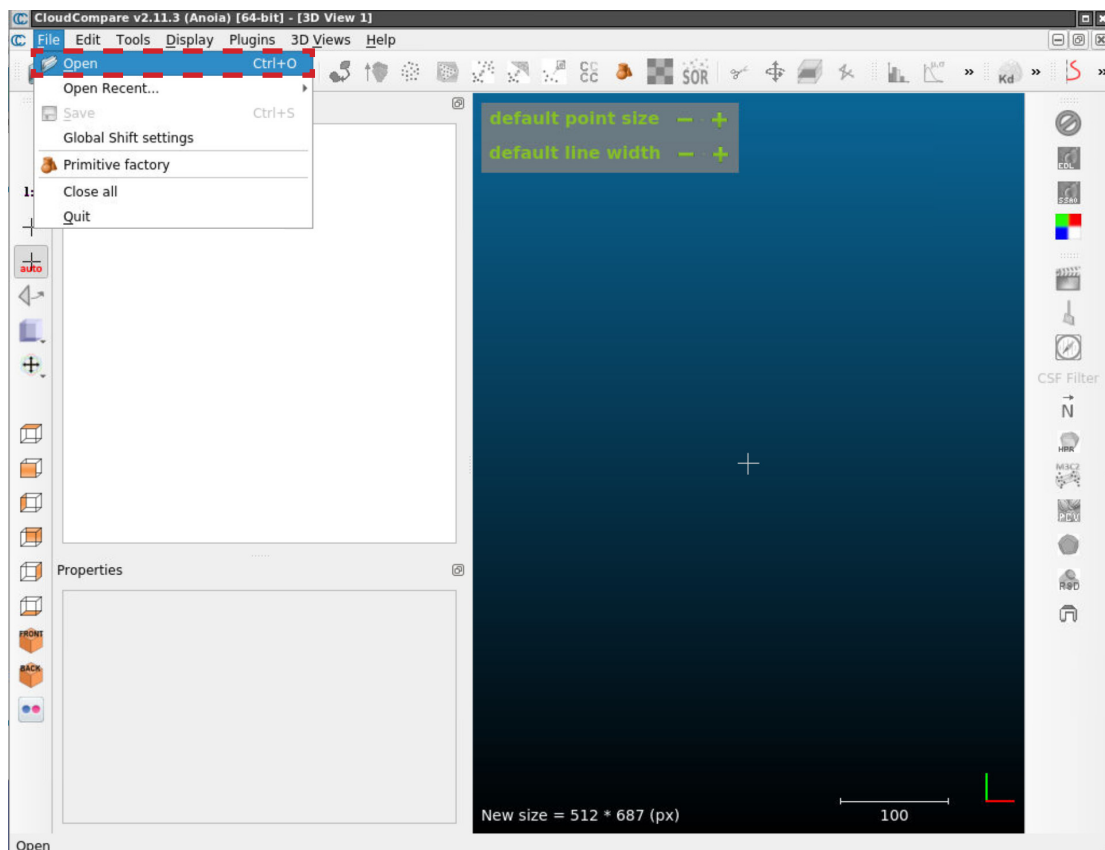
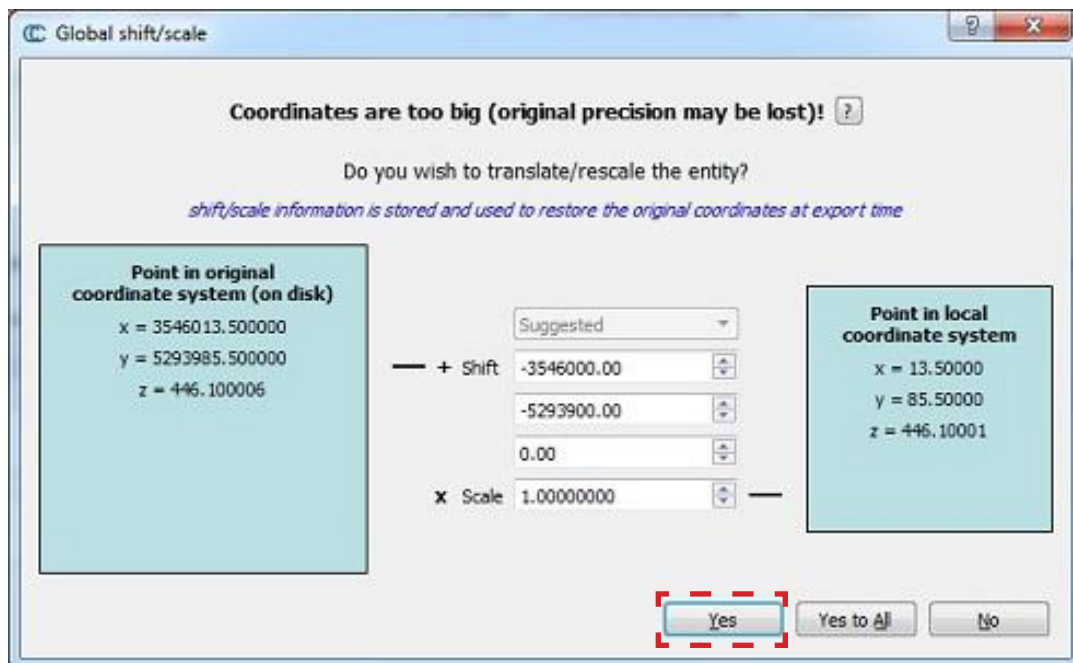
1. from the Menu click file
2. click open

1. Go to the dedicated file location
2. you can filter the files using file type
3. look for the .las, .laz, or .bin

1. .bin file is a compressed file for multiple different files.
2. for this project it is easier to insert the .bin

1. choose the file, then click open.

1. When loading (or generating) an entity with very big coordinates (typically greater than 105), CloudCompare will warn the user about this and suggest to shift (or rescale) the entity in order to work in a local coordinate system with smaller coordinates. Usually you are advised to click yes.

• Filtering imported files
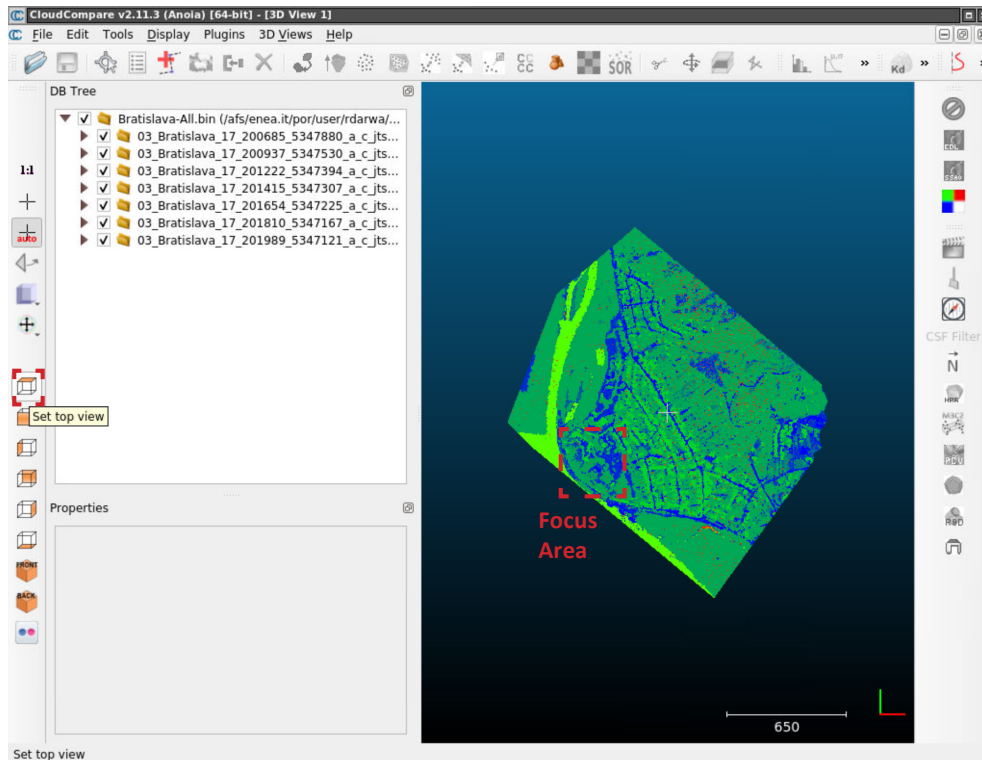
1. by click set to top view, you can see clearly the site in order to filter it according to the focused area
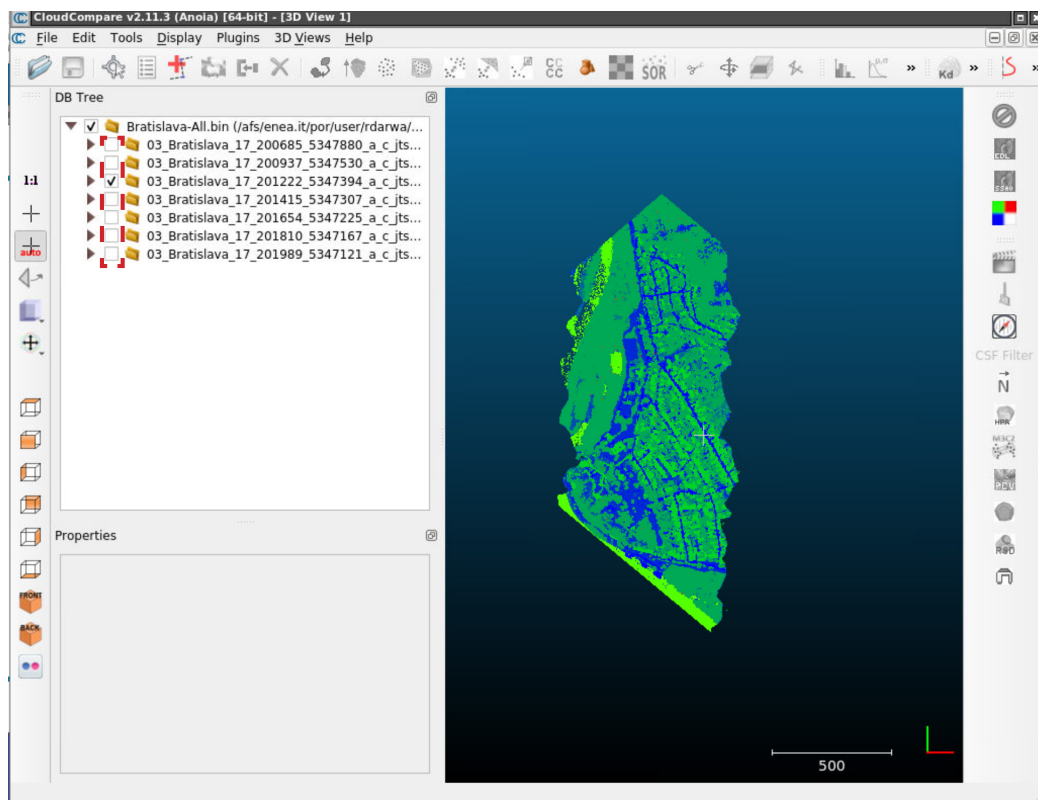
1. with the check mark on the left of the file name a user can hide or unhide a file, making it able to filter them according to the focused area
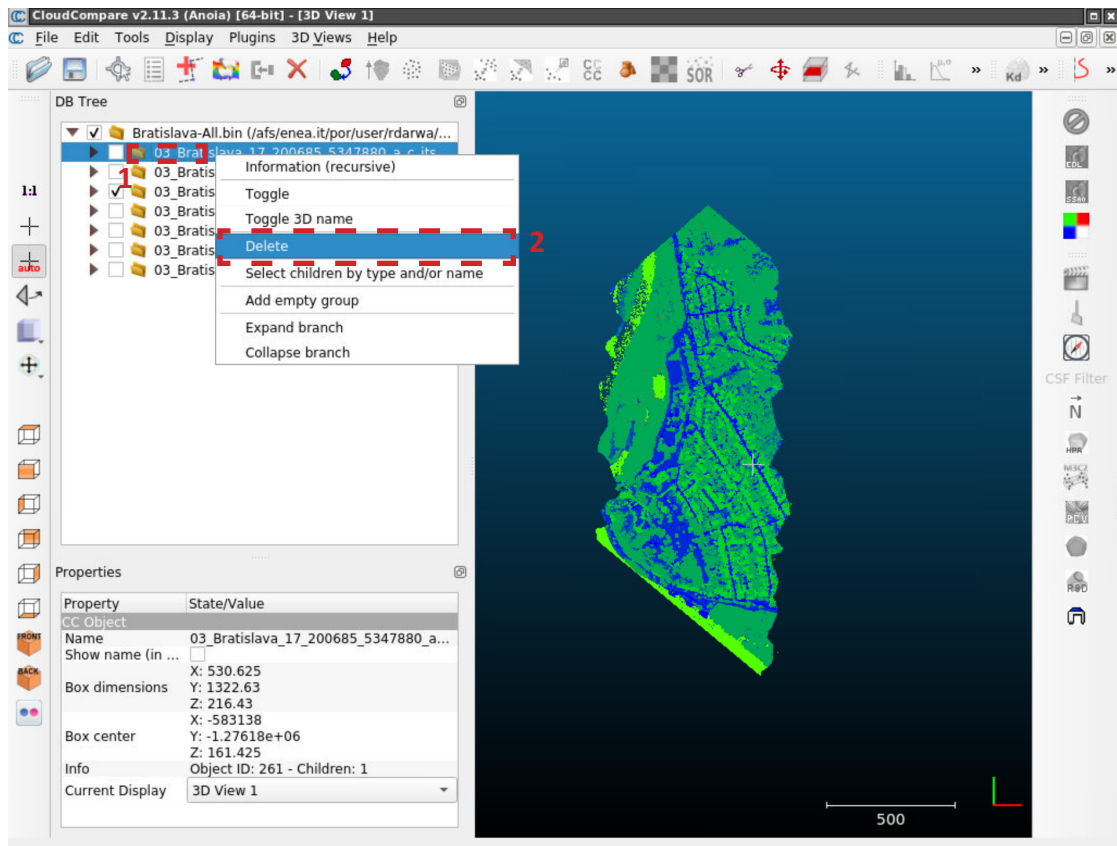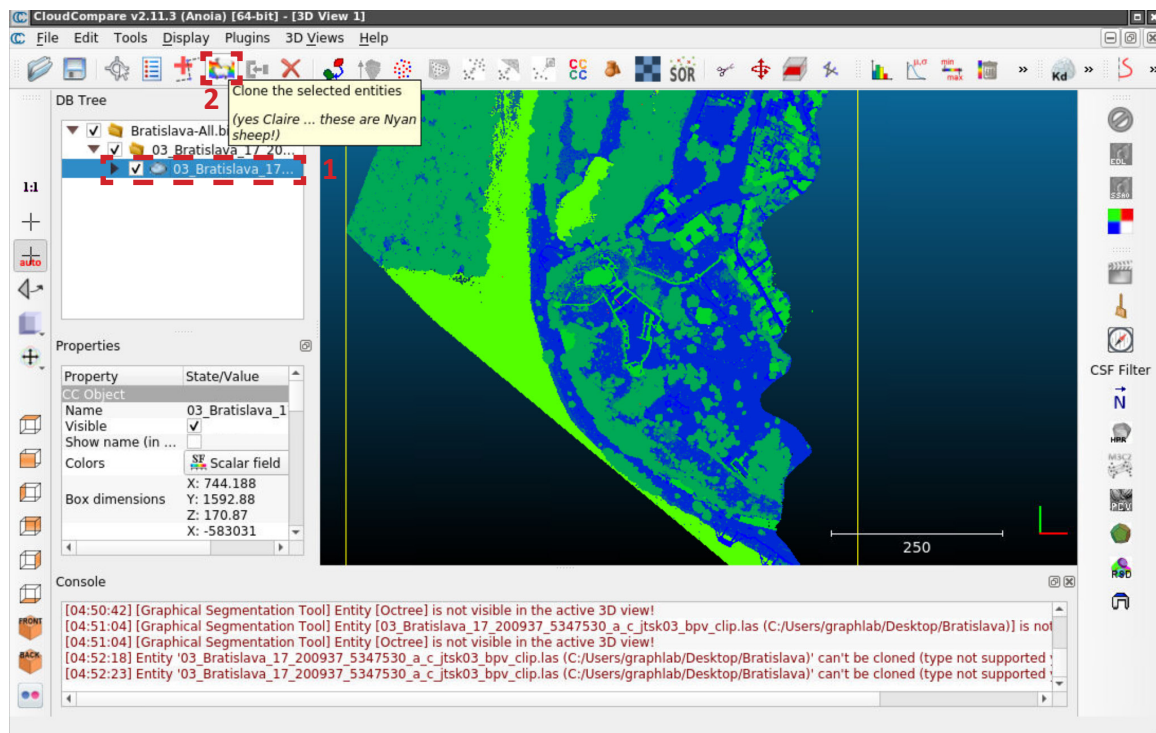
1. after deciding on which file need you can delete the unwanted file by right clck on the name of the file.
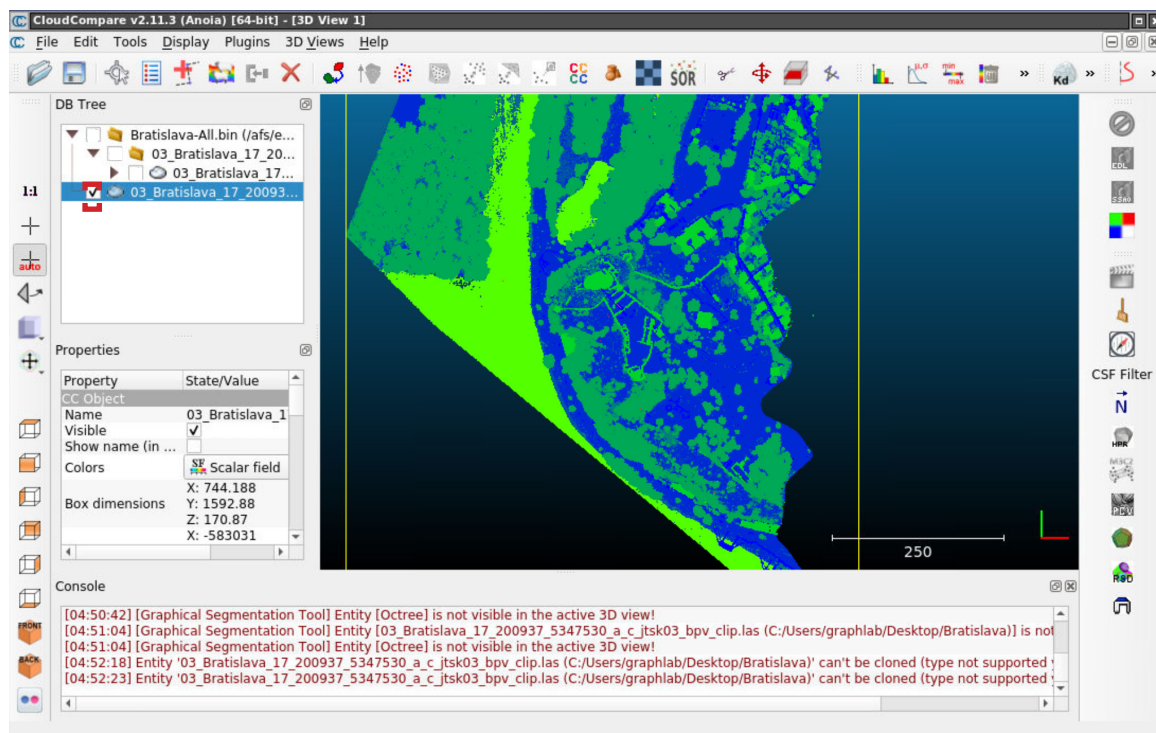2. select delete
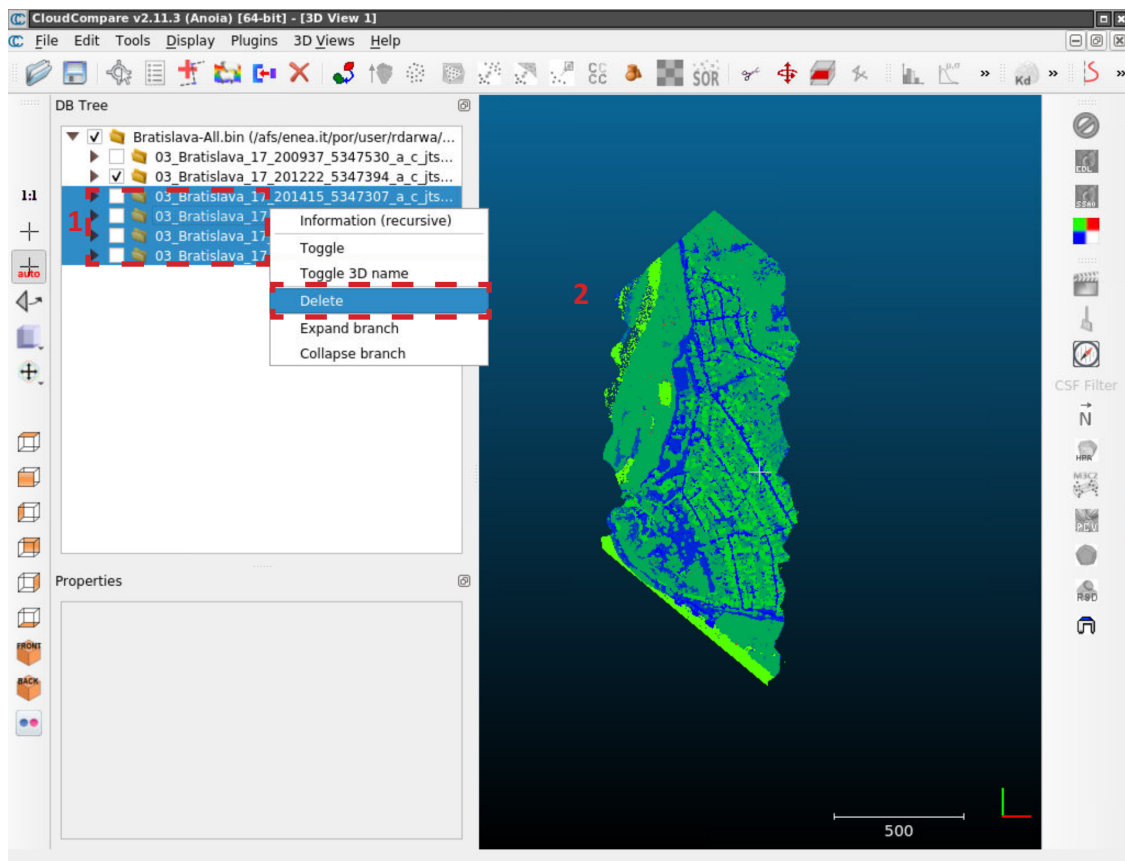
1. user can select multipe files by holding ctr;. while selecting.
2. select delete

• Editing the scans to focus on the study area.

1. choose the pointcloud from the file
2. click clone from the main tool bar, so any changes the user will do it will be done to the clone not to the original file. *AS THERE IS NO UNDO OPTION IN THIS SOFTWARE*
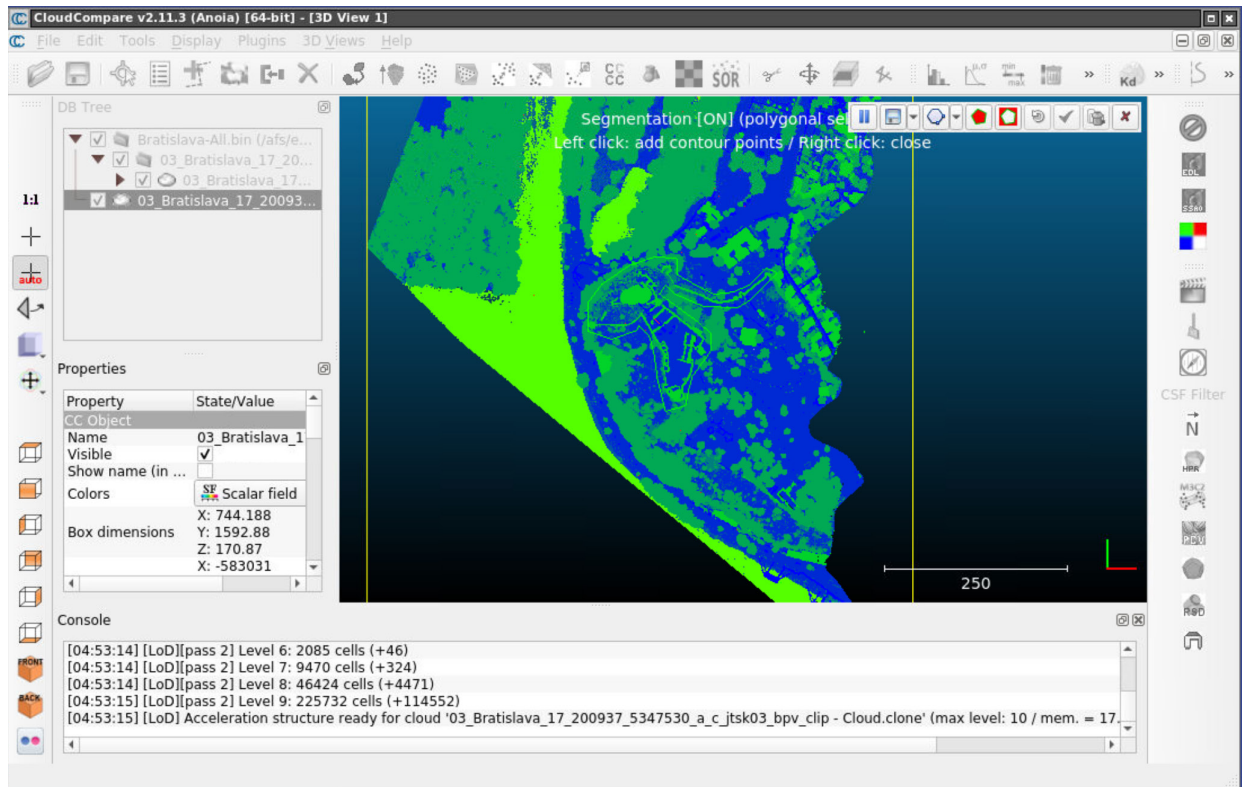

1. remove the check marks from all files except the clone to only show the clone. to make sure that only changes have been made to the clone
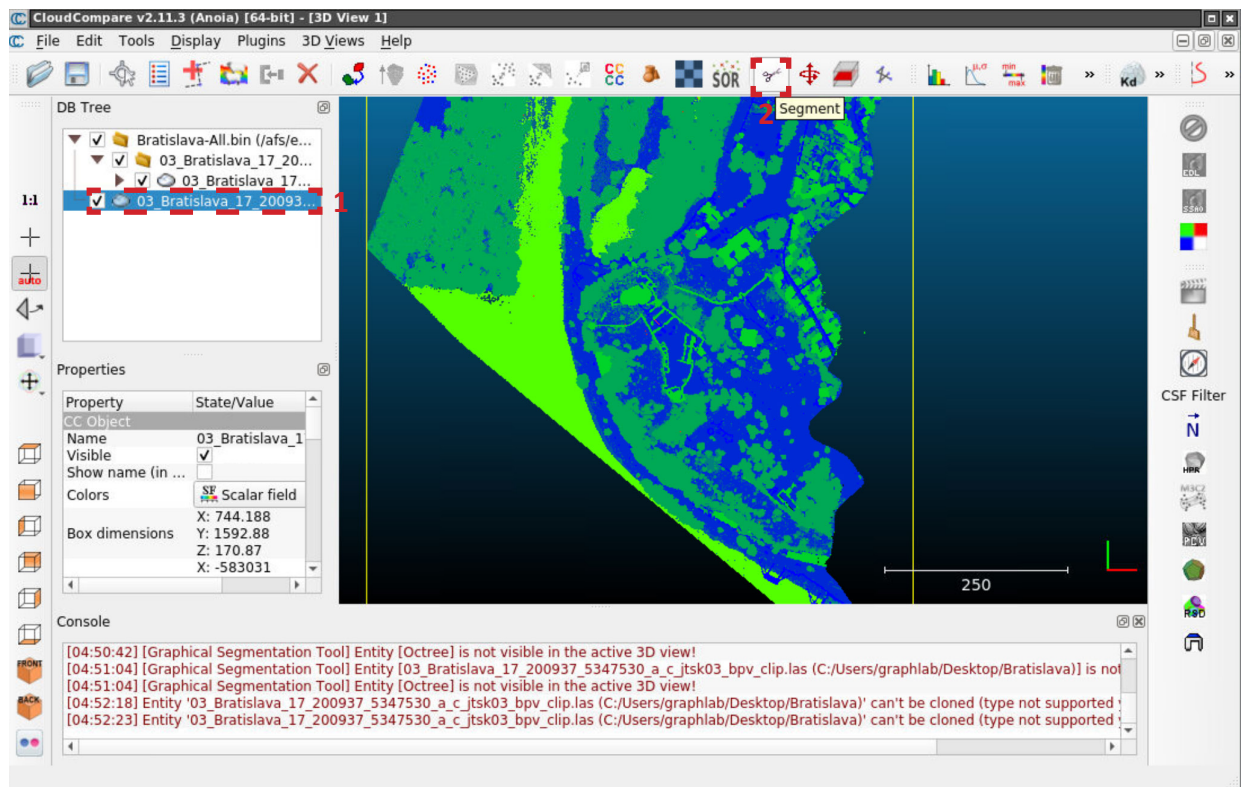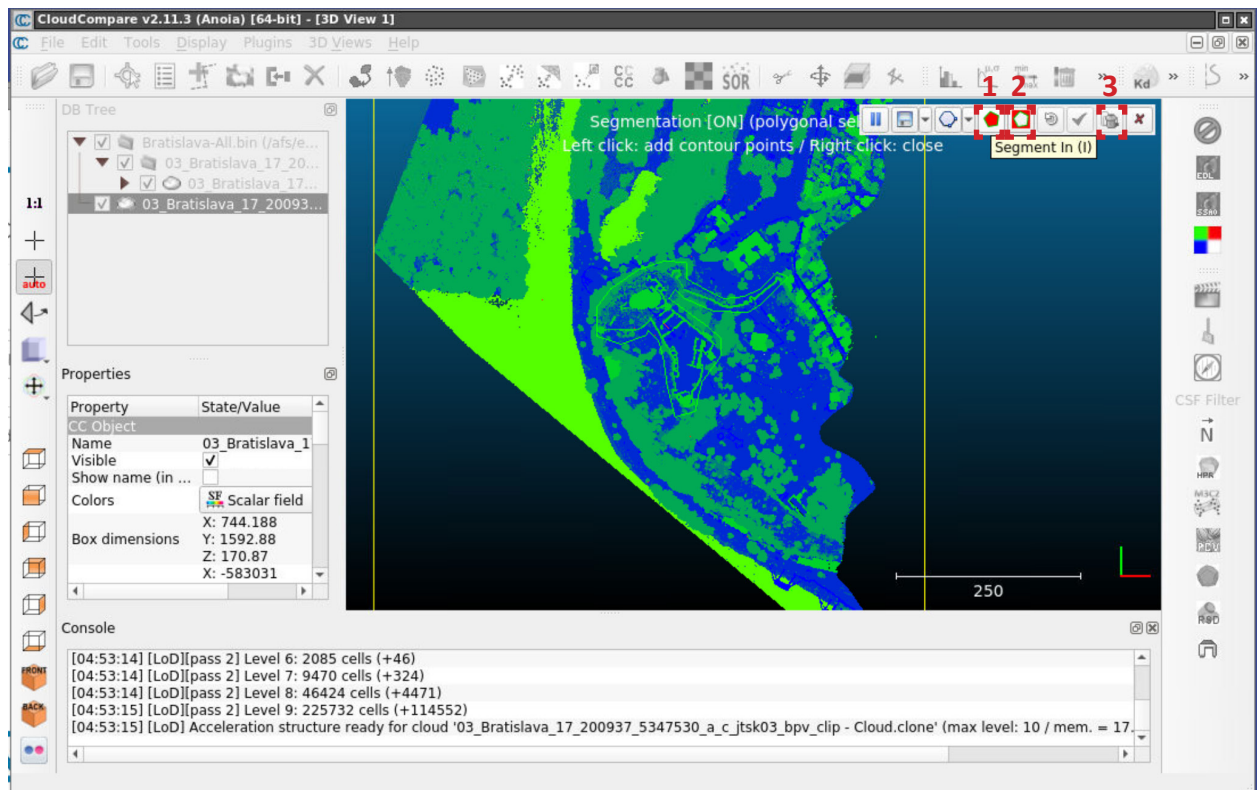
1. user must make sure that only the clone is selected so any editing would be done to the clone
2. select Segment from the main tool bar
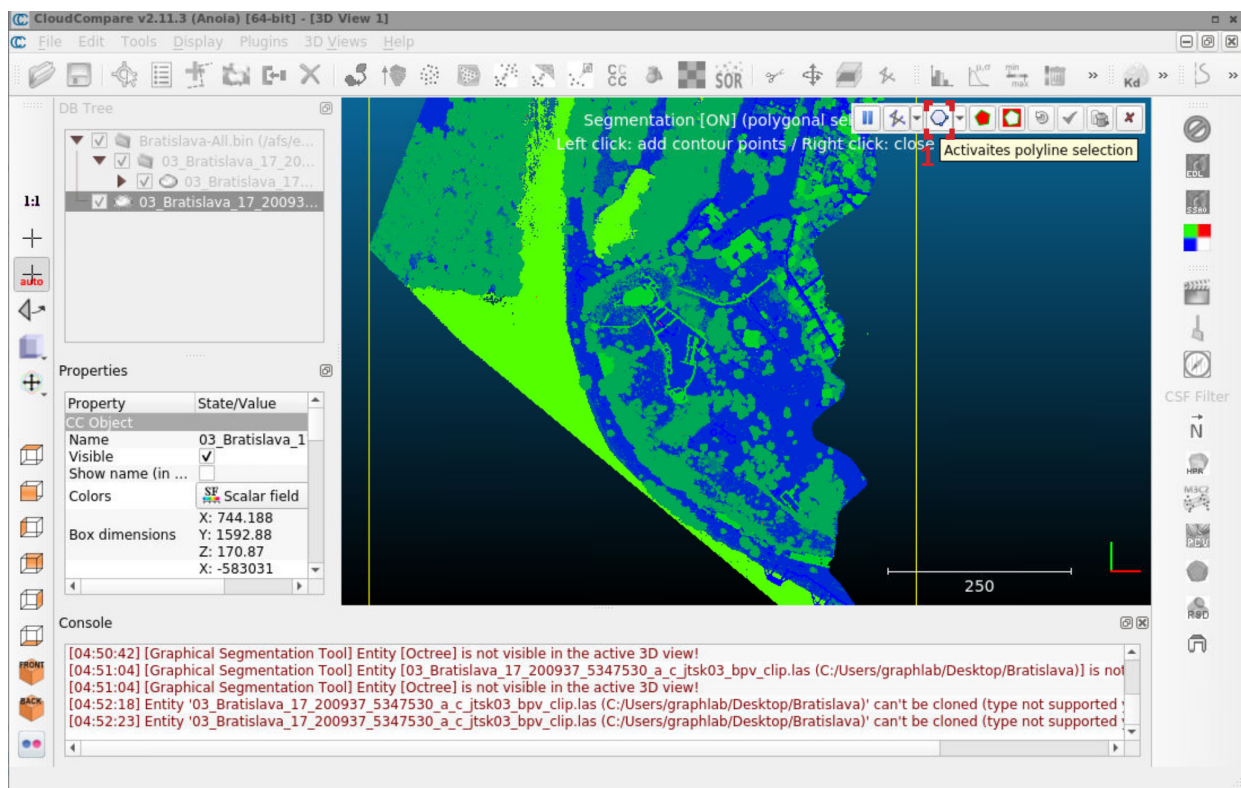
1. Select Activate polyline selection
2. start drawing the shape desired.

1. by using the polyline option user can draw any kind of shape desired
2. right click after finishing the shape to automatically close it.

1. Select Segment In to cut everything around the desired shape
2. user in different context can use the Segment out to cut only the shape desired out from the clone.
3. Select the trash can to delete the cut shapes and close the order of Segment
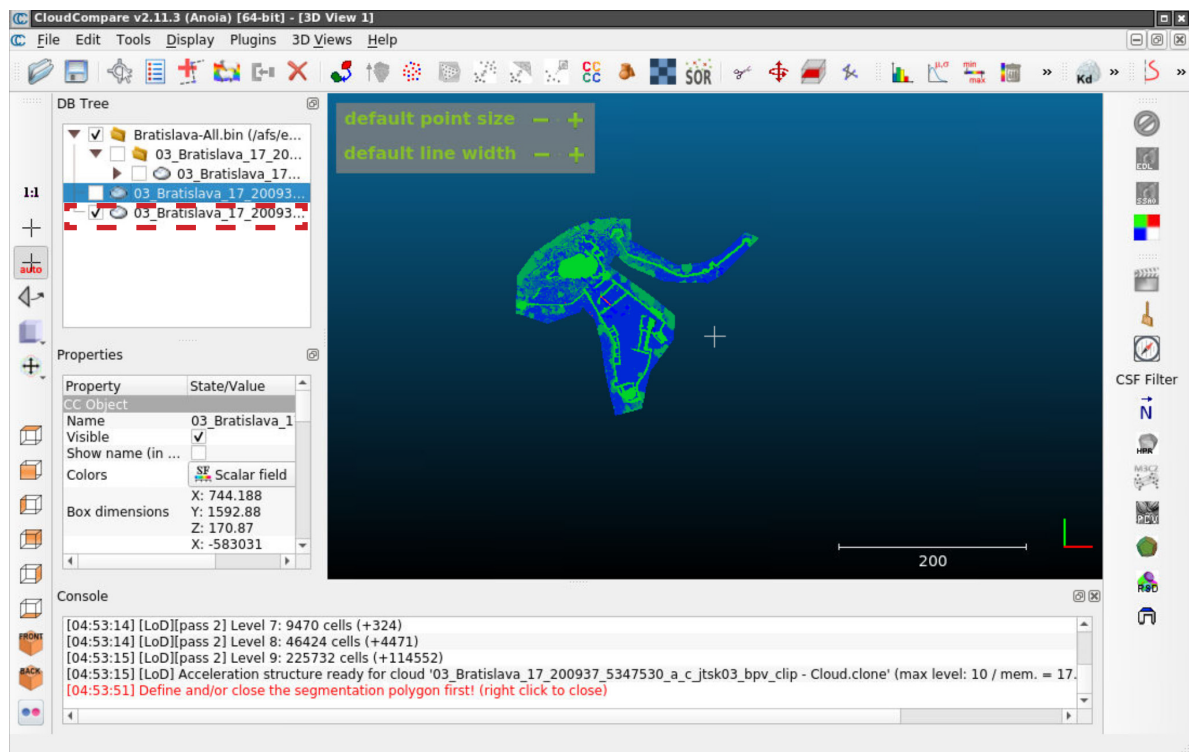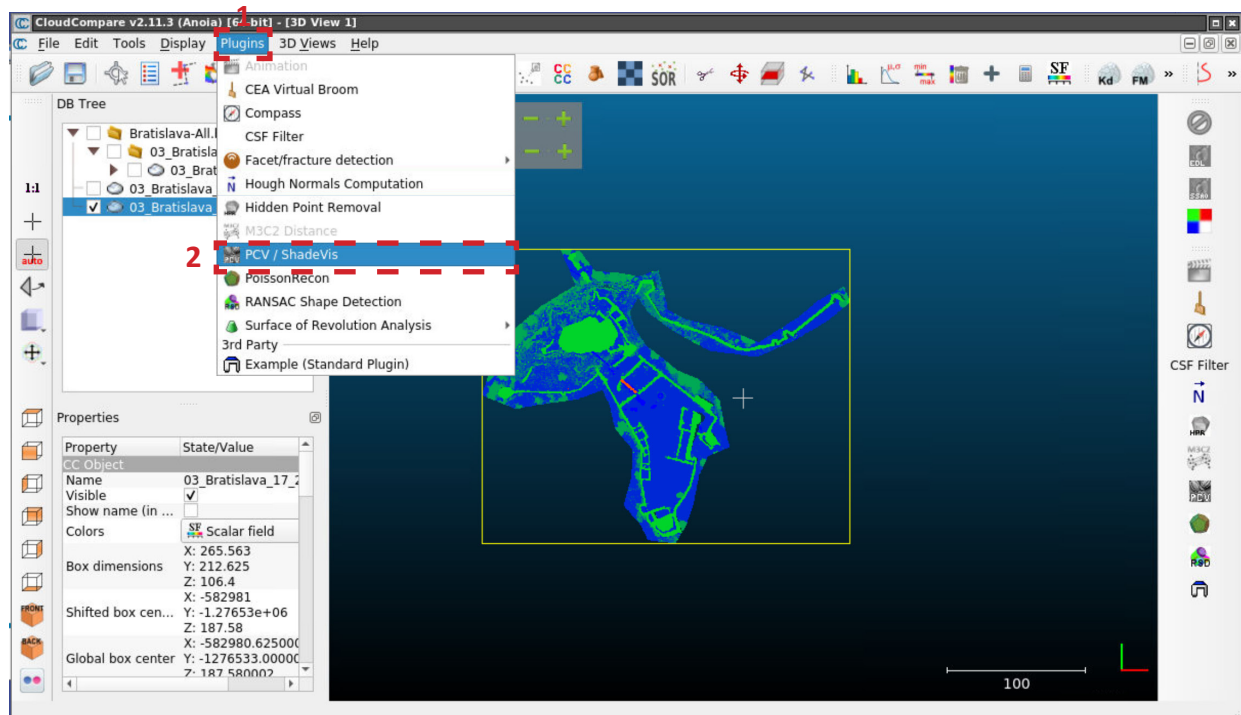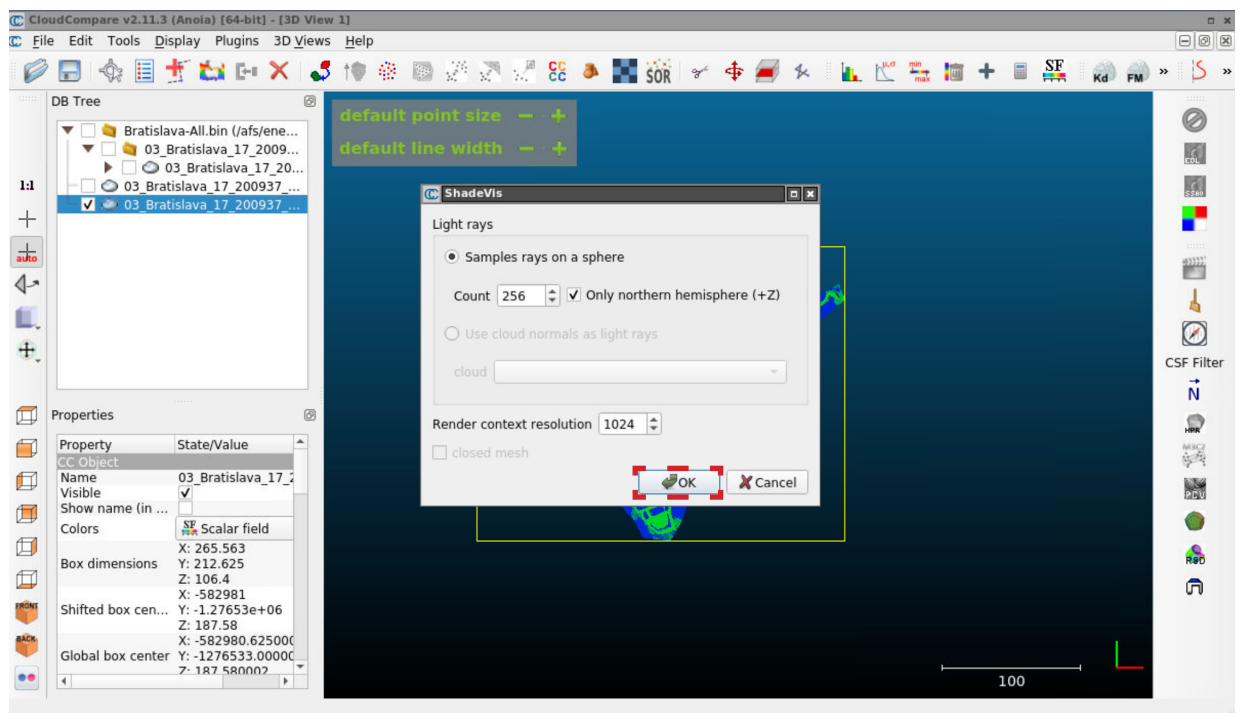
1. hide all other files except the cut area.
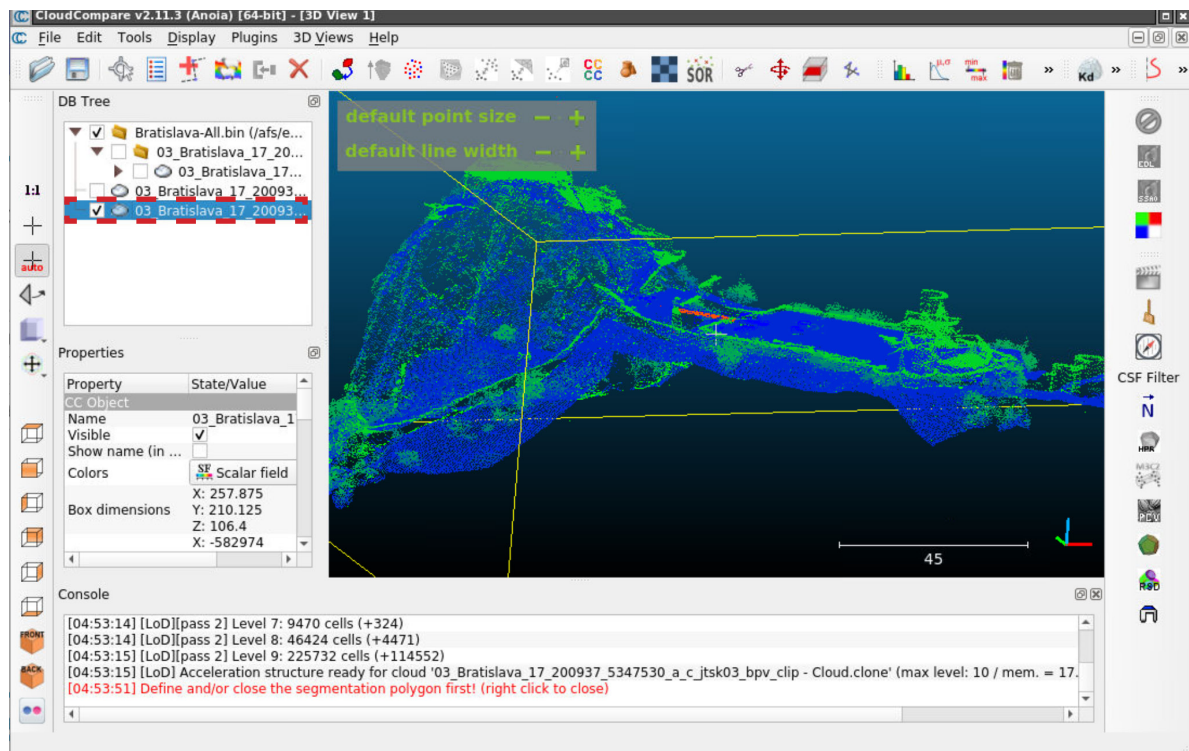
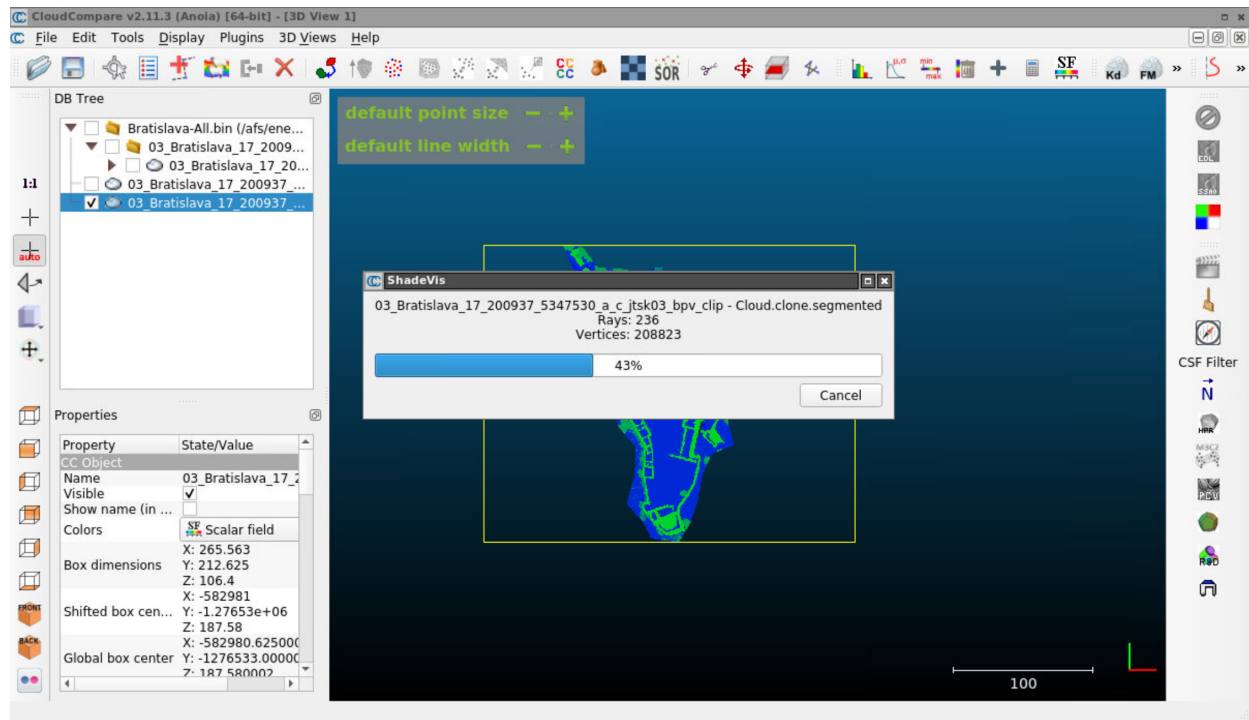1. A pointcloud only of the focused area

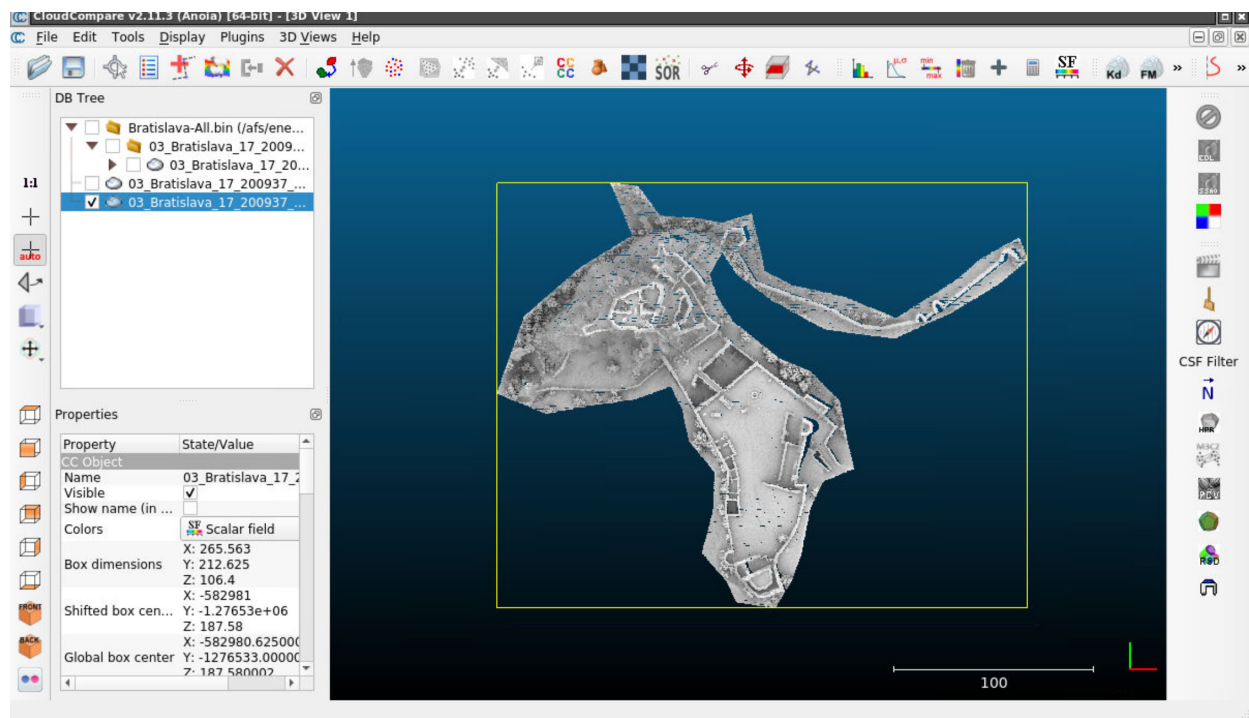# • Giving the shades to see the overall model.

1. Select Plugins from the Menu
2. Select PCV/ Shades Vis, to create shading system in order to be able to read the pointcloud more clearly

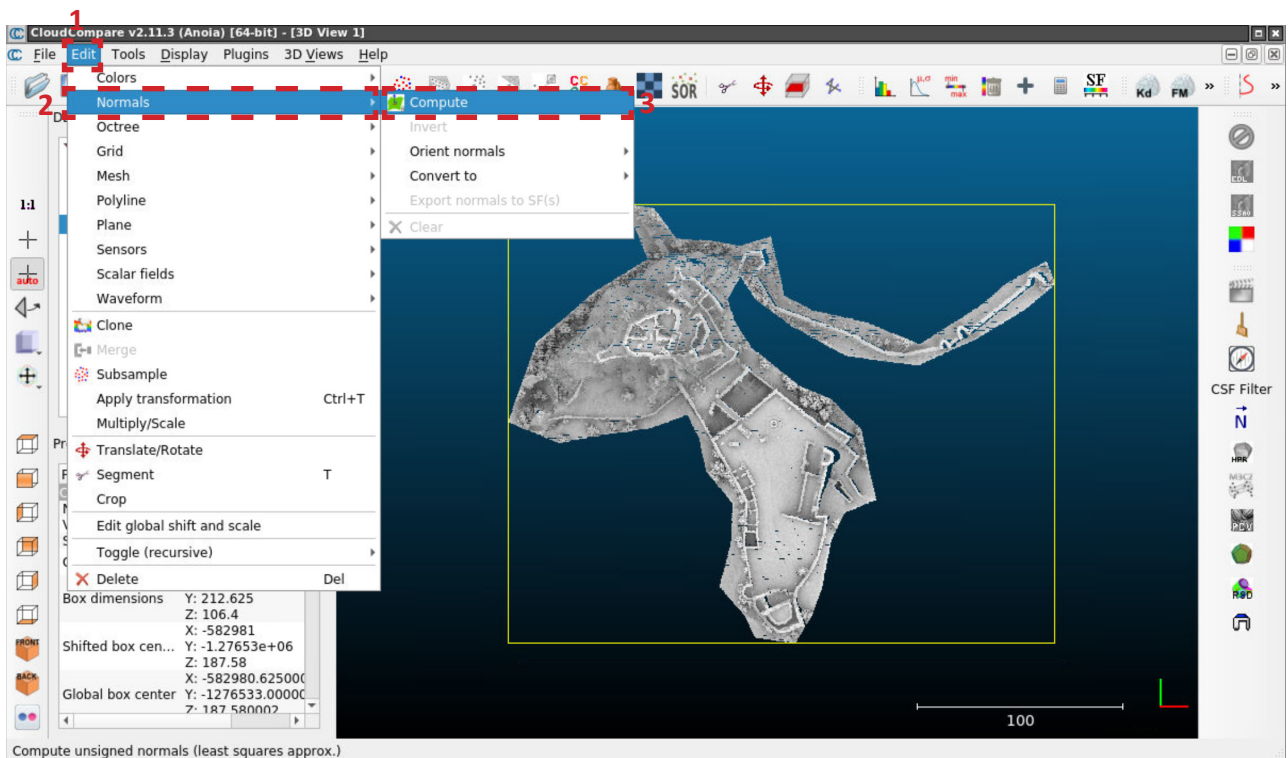1. use the default settings unless advised otherwise.
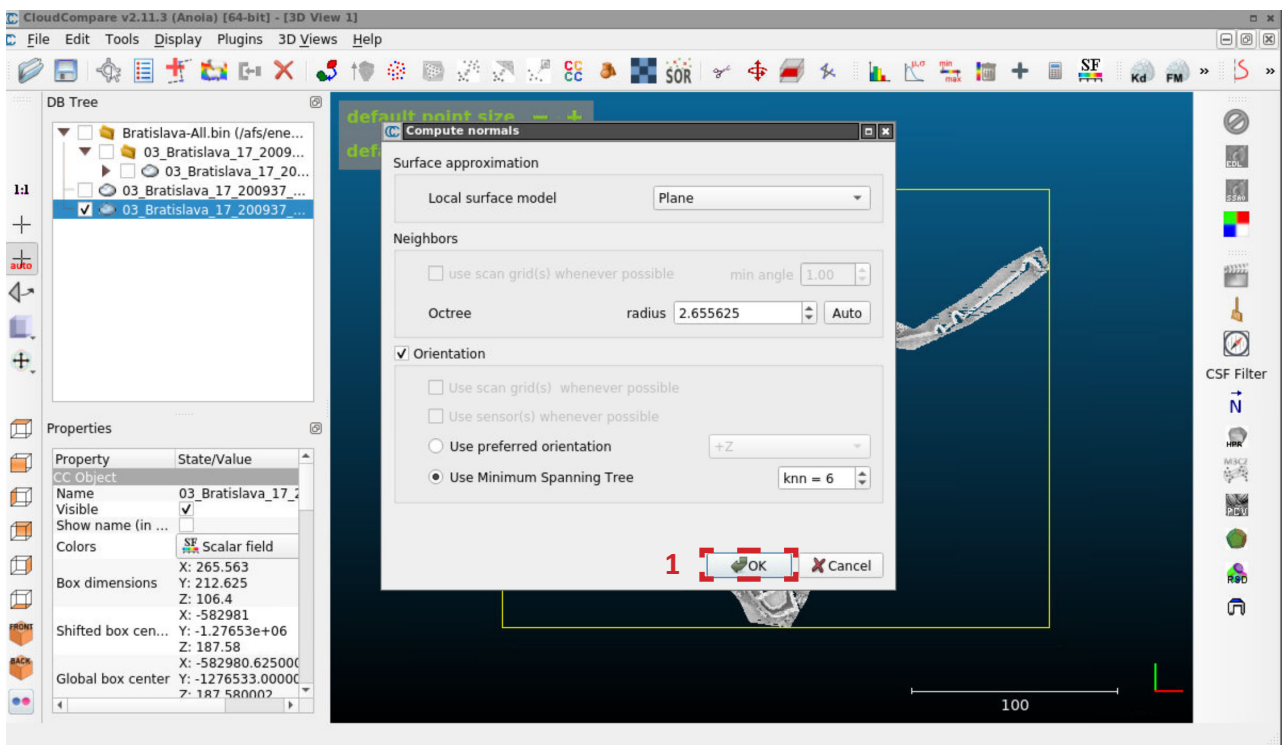
1. Calculating the shades

1. Resulting shades.
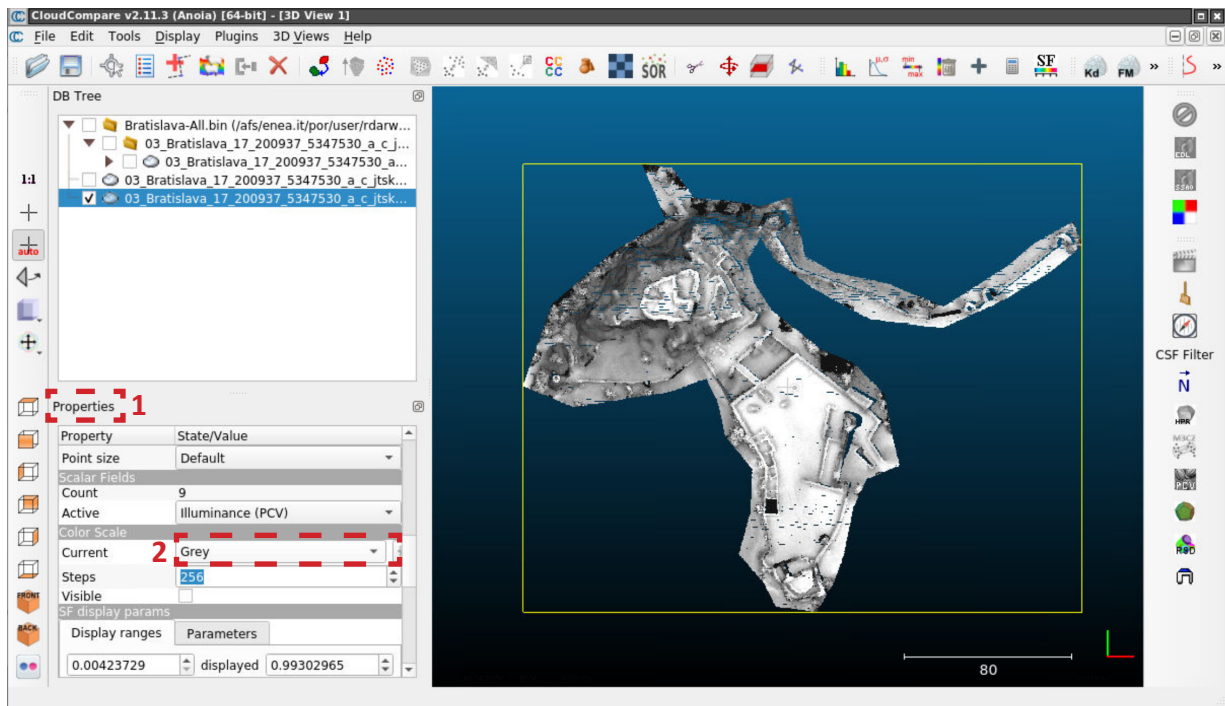
• Calculating normals.

1. Select Edit from the Menu.
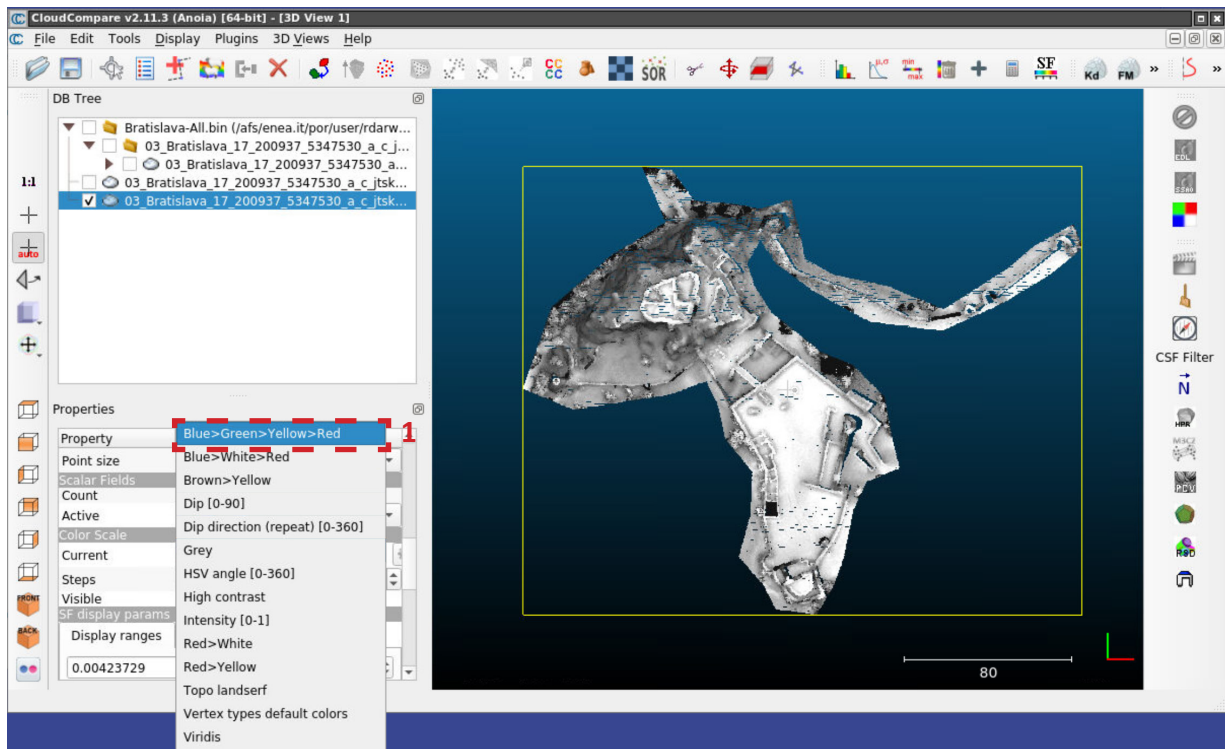2. Select Normals.
3. Select compute.

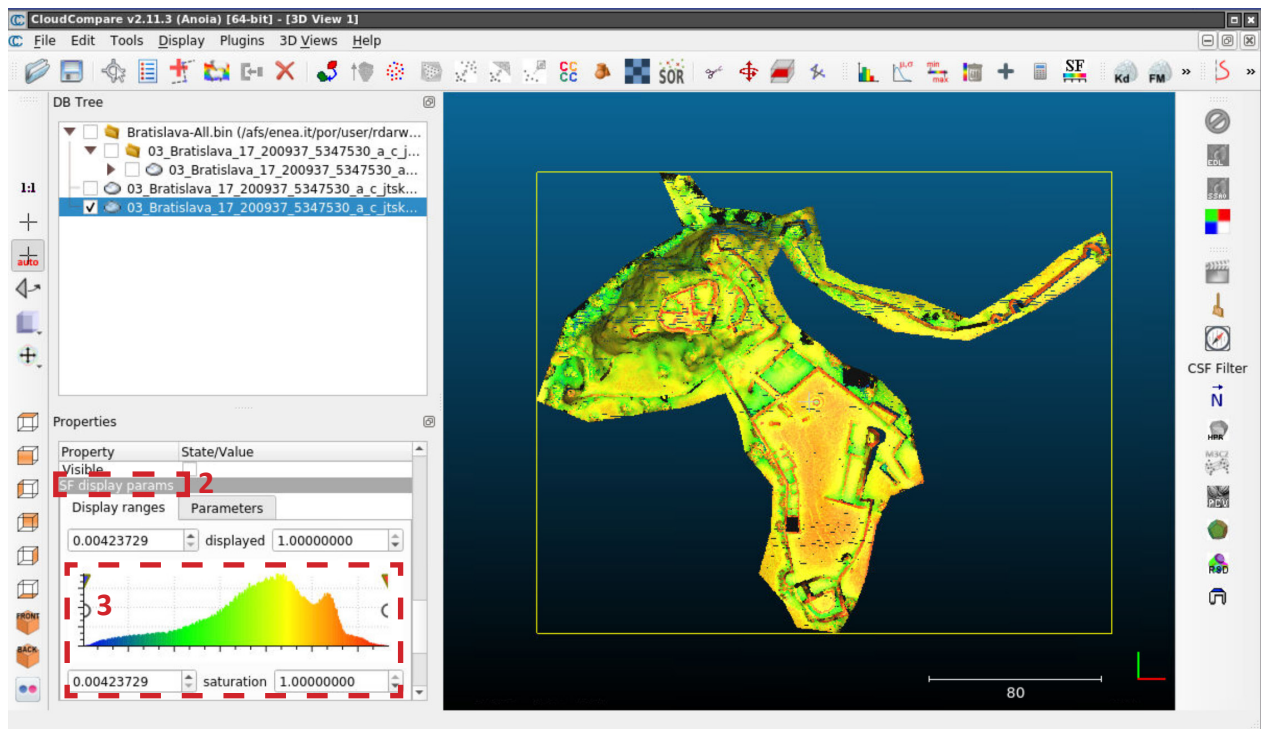1. Use the default settings unless advised otherwise.
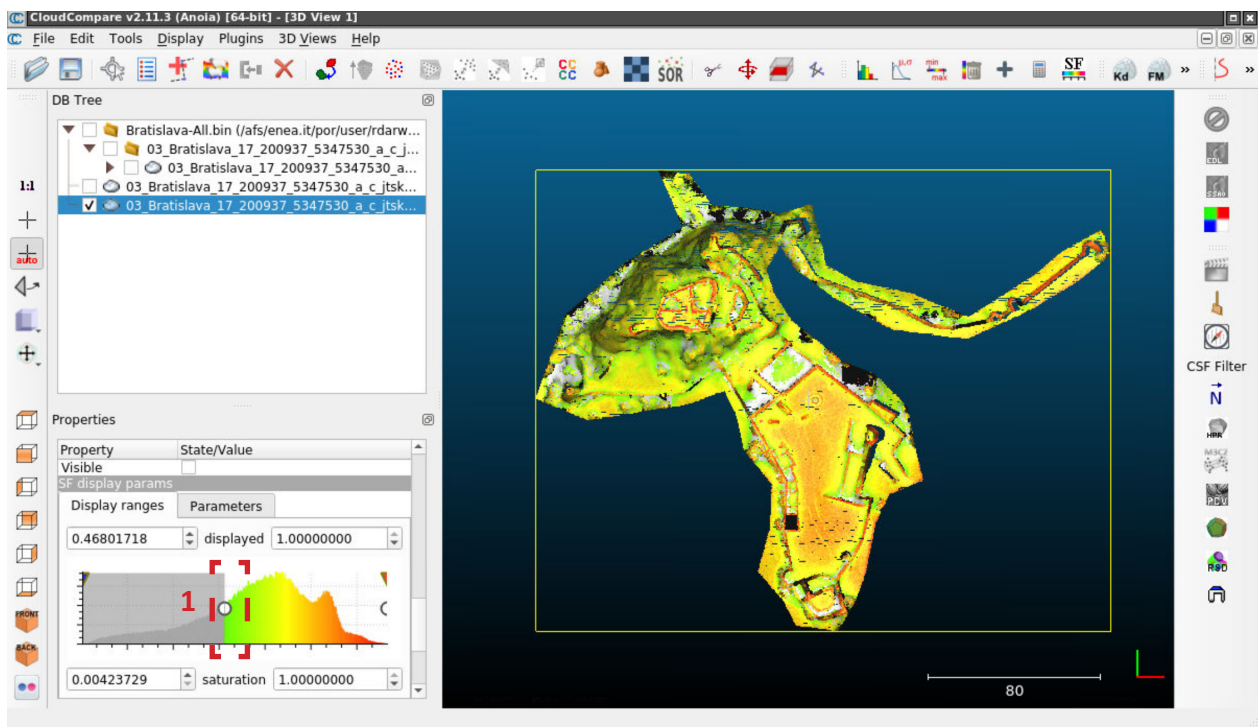
• Change display ranges

1. In the Properties Panal
2. Select from color scale, current, Grey in order to change it to show different scales in colors gradient scale
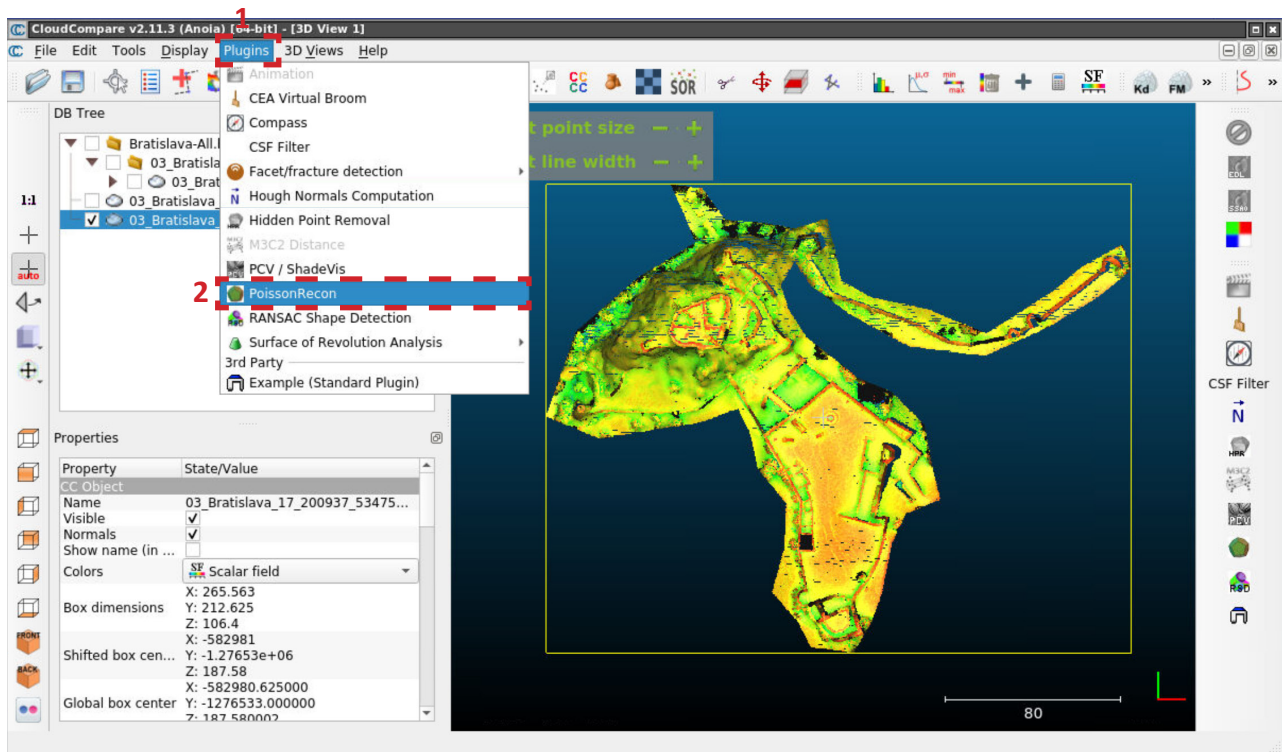

1. choose the prefered color gradient

1. Resuls from changing the color scale.
2. Go to SF display params, by moving the slider here it will automatically delete anything that is outside these parameters
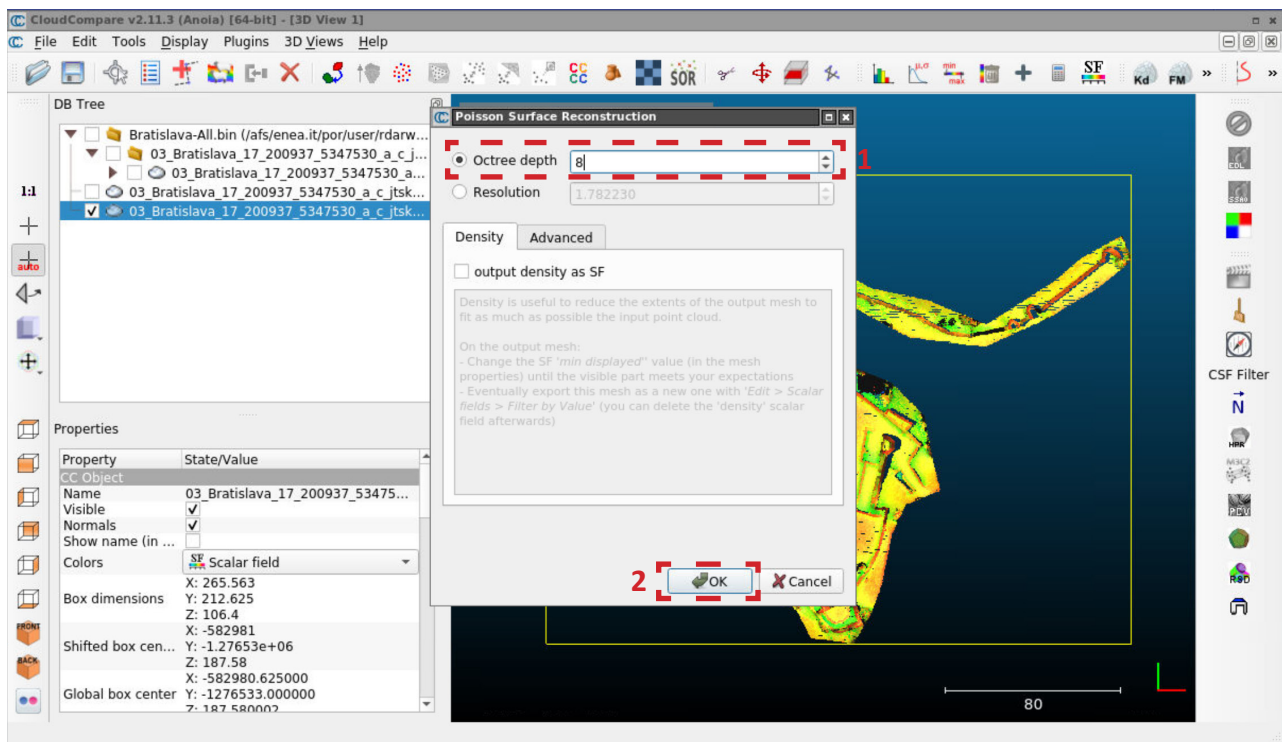

1. moving the slider to exclude anything with the color green, which have the highest normals.
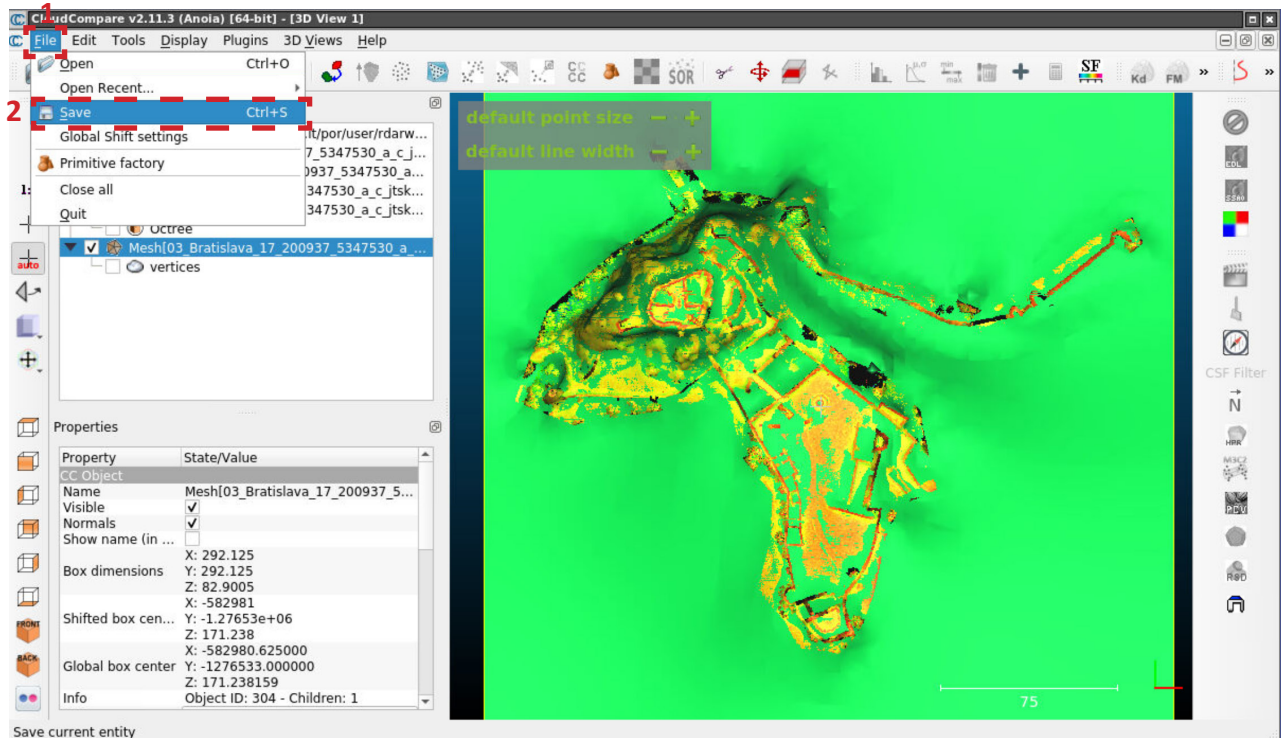
• Rendering into a mesh

1. from the Menu, select Plugins
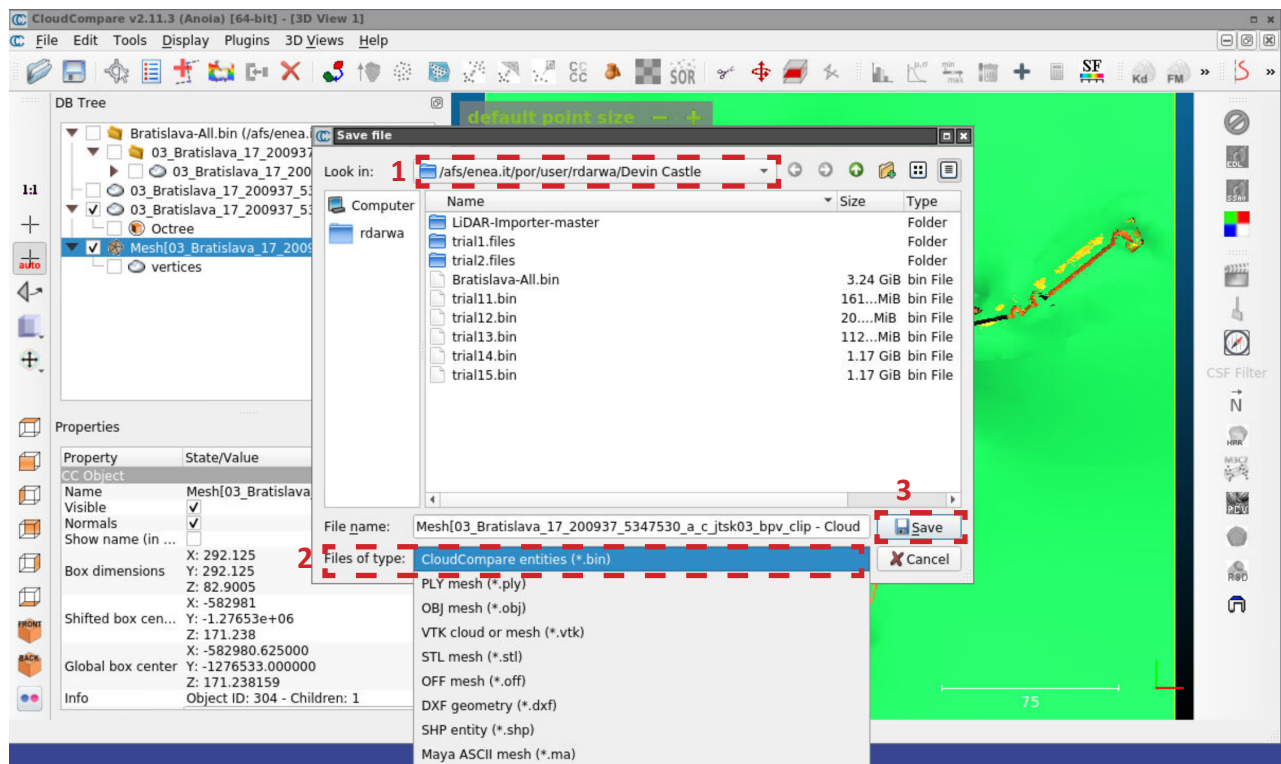2. Select PoissonRecon to create the mesh.

1. changing the Octree depth to a higher number means higher detail and higher rendering time.
2. Select Ok

• Saving the file

1. Select File from the Menu
2. Select Save

1. Choose file location desired to be saved
2. Choose desired format
3. Save

Conclusion

Considering the limited material given this was an absolute success given the lack of any RGB sources for inducing shadows for depth and perception. As well as no dimensional survey giving any scaled sources for the castle. The main goal inducted was to achieve the most information from the scans and have a new starting point for similar scans in the future, so we would have better information about what is needed to produce further results and also know the workflow to follow and achieve better-scanned material.
For the interface of Thinlinc it was intriguing to work with it as it was very efficient, fast, organized, and well maintained. The maintenance timings were well communicated through emails and finished as scheduled. Also downloading the client is a great help for beginners such as me to help with adapting to a new interface. The tutor and support were amazing help through the beginning process and workflow also regarding tasks and revisions.
The reached results were considered a success giving the information for future projects

→For a tutorial video of the same following steps please go to this link: https://youtu.be/0RpawFEoH7M