

POINT CLOUD SECTION WITH CLOUDCOMPARE

Automated Survey Systems

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BUDAPESTI MŰSZAKI
ÉS GAZDASÁGTUDOMÁNYI EGYETEM
Építőmérnöki Kar - építőmérnöki képzés 1782 óta

Általános és Felsőgeodézia Tanszék

TASKS TO DO

- Use GUI (Graphical User Interface) and CLI (Command Line interface) of open-source CloudCompare (CC)
<https://www.danielgm.net/cc/>
- Horizontal and vertical section of a point cloud

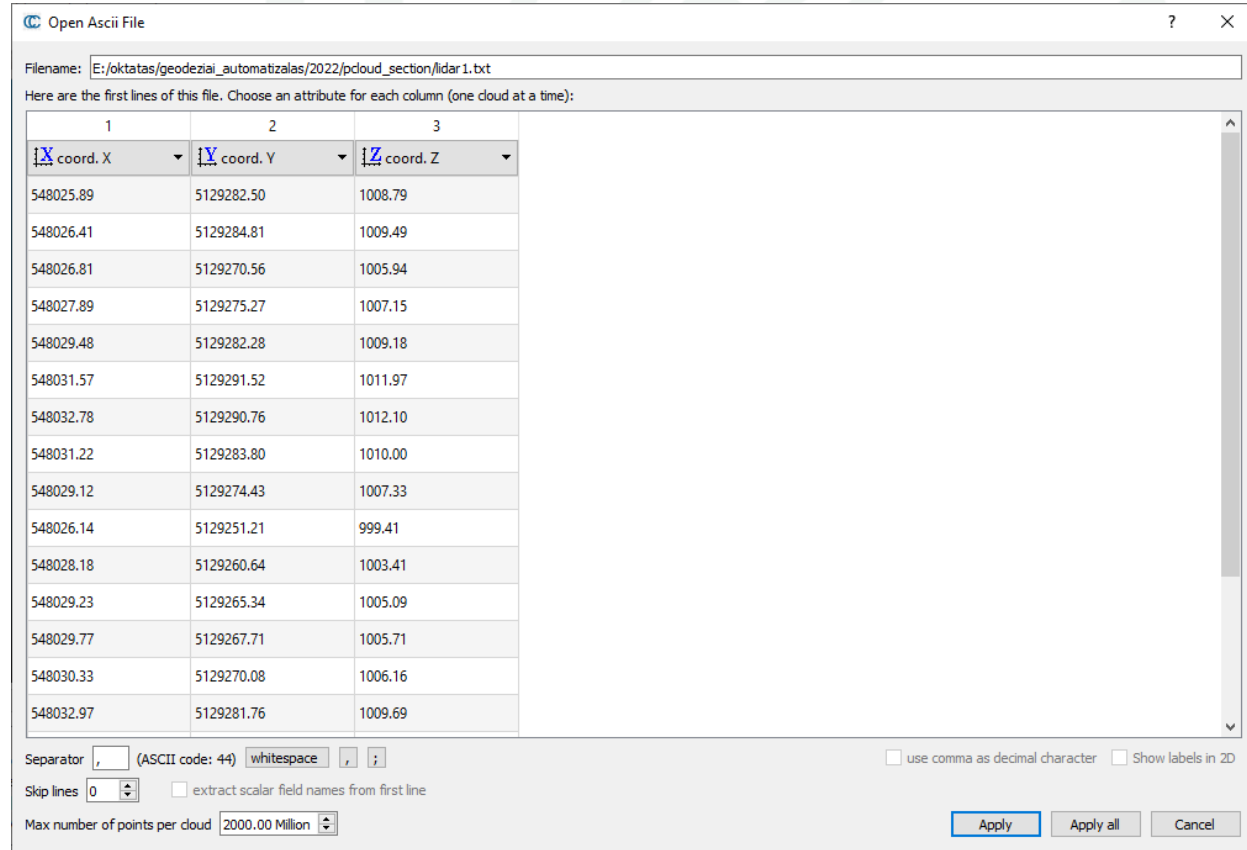


LOAD A POINT CLOUD INTO CC

- Download **lidar.txt** from OsGeoLabBp's github:
https://github.com/OSGeoLabBp/tutorials/blob/master/english/data_processing/lessons/code/lidar.txt
- Load into CloudCompare

LOAD A POINT CLOUD INTO CC

- There are 3 columns in the file (Easting, Northing, Elevation), separated by comma
- Map projection?



LOAD A POINT CLOUD INTO CC

- Shift coordinates to avoid big numbers

Global shift/scale

? X

Coordinates are too big (original precision may be lost)! ?

Do you wish to translate/rescale the entity?

shift/scale information is stored and used to restore the original coordinates at export time

Point in original
coordinate system (on disk)

x = 548025.890000
y = 5129282.500000
z = 1008.790000

+ Shift

Suggested

-548000.00

-5129200.00

0.00

x Scale

1.00000000

Point in local
coordinate system

x = 25.8900
y = 82.5000
z = 1008.7900

Preserve global shift on save

Yes

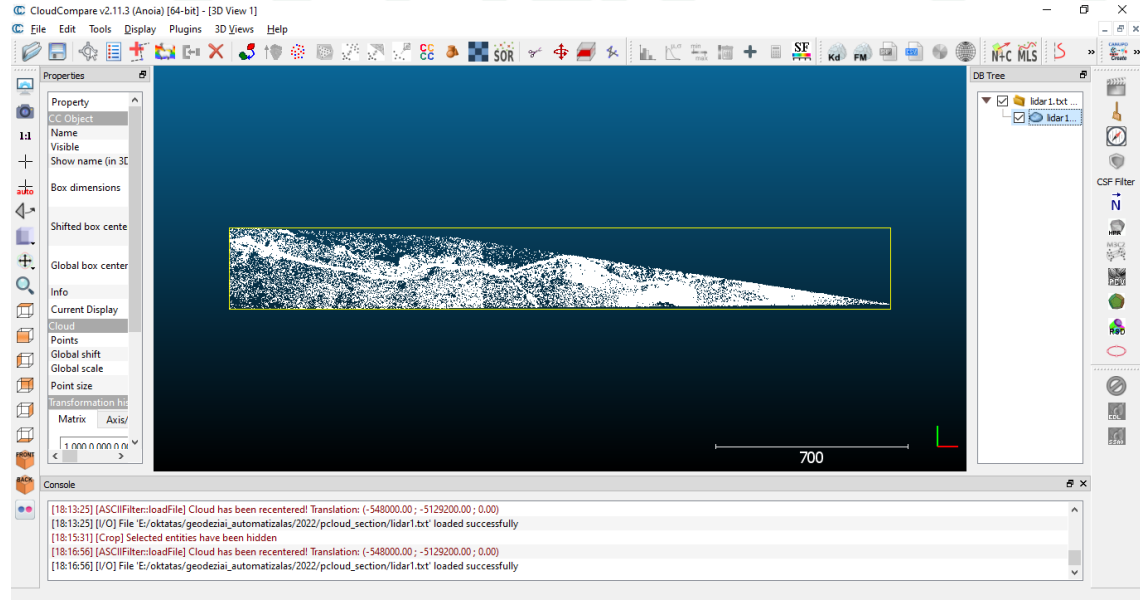
Yes to All

No



LOAD A POINT CLOUD INTO CC

- Top view of the point cloud
- Check out number of points (51150)
- Rotate in space



HORIZONTAL SECTION

- At the level of $1100\text{ m} \pm 1\text{ m}$
- Use **Edit** → **Crop** command

Crop

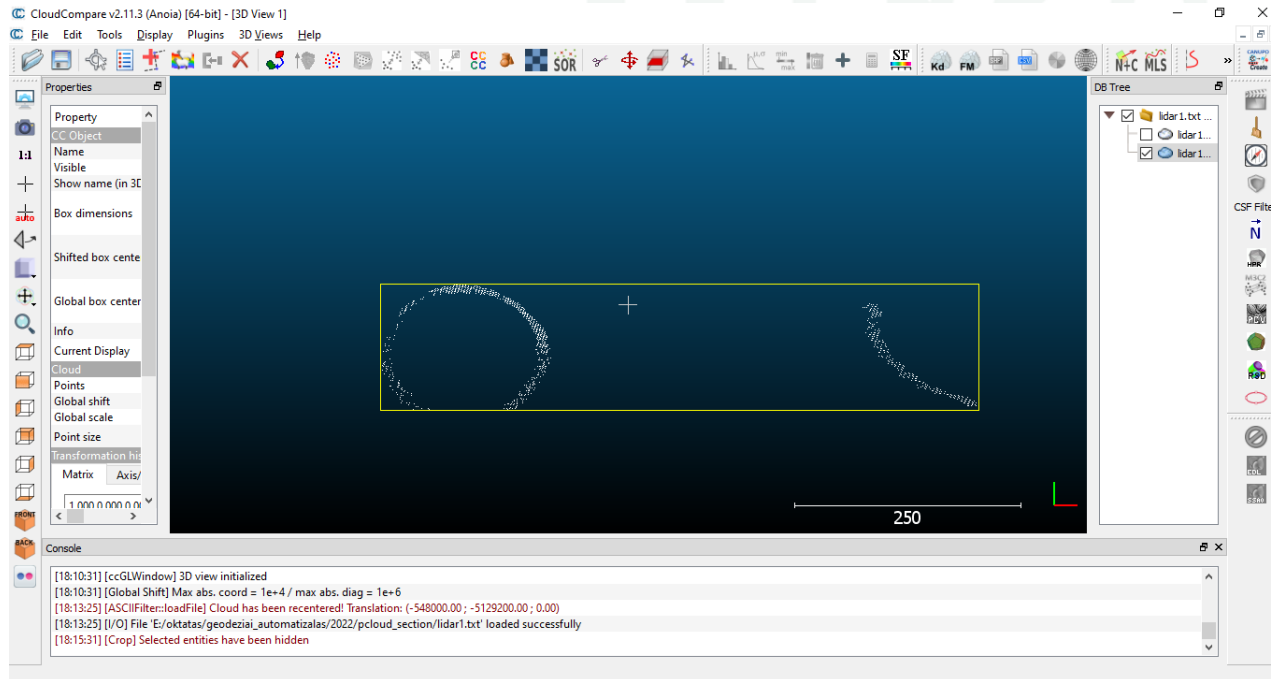
	Center	▼	Width	▼
X	1224.99499512	▲▼	2398.21020508	▲▼
Y	-55.21499634	▲▼	296.58999634	▲▼
Z	1100.00000000	▲▼	2 00000000	▲▼

keep square

Default OK Cancel

HORIZONTAL SECTION

- Check out the number of cropped points (903)



HORIZONTAL SECTION IN CLI

- https://www.cloudcompare.org/doc/wiki/index.php?title=Command_line_mode
- Open a terminal (Linux) / Command Prompt (Windows)
- Navigate into your folder
 - *cd = change directory*
 - *to switch to „E” drive type E:*
 - *To go your directory type:*
E:\oktatas\geodeziai_automatizalas\2022\pcloud_section

USE CROP COMMAND IN CLI

- Type: "C:\Program Files\CloudCompare\CloudCompare.exe" -O lidar.txt -C_EXPORT_FMT ASC -PREC 3 -Crop 548025.89:5128996.49:1099:550424.10:5129293.08:1101
- -O lidar.txt = open lidar.txt
- -C_EXPORT_FMT ASC = set output file format to asc
- -PREC 3 = precision (number of decimals) in output file
- 548025.89:5128996.49:1099:550424.10:5129293.08:1101 = coordinates of the crop 3D rectangle

USE CROP COMMAND IN CLI

- You can save the output with a specific filename too!
- First, switch off the CC's autosave function with: - **AUTOSAVE OFF** (You can also switch off the popping up CC window with the **-SILENT** command.)
- After using **-SAVE_CLOUDS FILE** add your filename!
- **"C:\Program Files\CloudCompare\CloudCompare.exe"**
-SILENT -AUTO_SAVE OFF -O lidar.txt -C_EXPORT_FMT ASC
-PREC 3 -Crop
548025.89:5128996.49:1099:550424.10:5129293.08:1101 -
SAVE_CLOUDS FILE lidar_hz_section.asc

USE CROP COMMAND IN CLI

- Check and load the output file
- E.g. lidar_CROPPED_2022-01-30_18h37_00_216.asc
- Copy the command into a shell script / batch file
- Use a python script, subprocess module, add parameters (e.g. point cloud file name, elevation, tolerance)
- an example:
- Adjust your python script to get horizontal sections at every 1/10/100 meters

VERTICAL SECTION

- Section line is defined by:
 - $e1 = 549400; n1 = 5128900$
 - $e2 = 549200; n2 = 5129300$
- Have a tolerance of 1 m
- Draw the section line and the section rectangle in CAD. Make sure to have a closed polygon. Save as in DXF format.
- Load the point cloud as well as the DXF in CC.

VERTICAL SECTION

The screenshot displays the CloudCompare v2.11.3 (Anoia) [64-bit] - [3D View 1] interface. The main 3D view shows a point cloud of a terrain with a vertical section cut. A yellow rectangular box highlights the section cut area, and a red line indicates the cut plane. A scale bar at the bottom right of the 3D view shows a length of 600 units. The interface includes a menu bar (File, Edit, Tools, Display, Plugins, 3D Views, Help), a toolbar, a Properties panel on the left, a DB Tree on the right, and a Console at the bottom.

Properties Panel:

- Property
- CC Object
- 1:1
- Name
- Show name (in 3D)
- Box dimensions
- Box center
- Info
- Current Display

DB Tree:

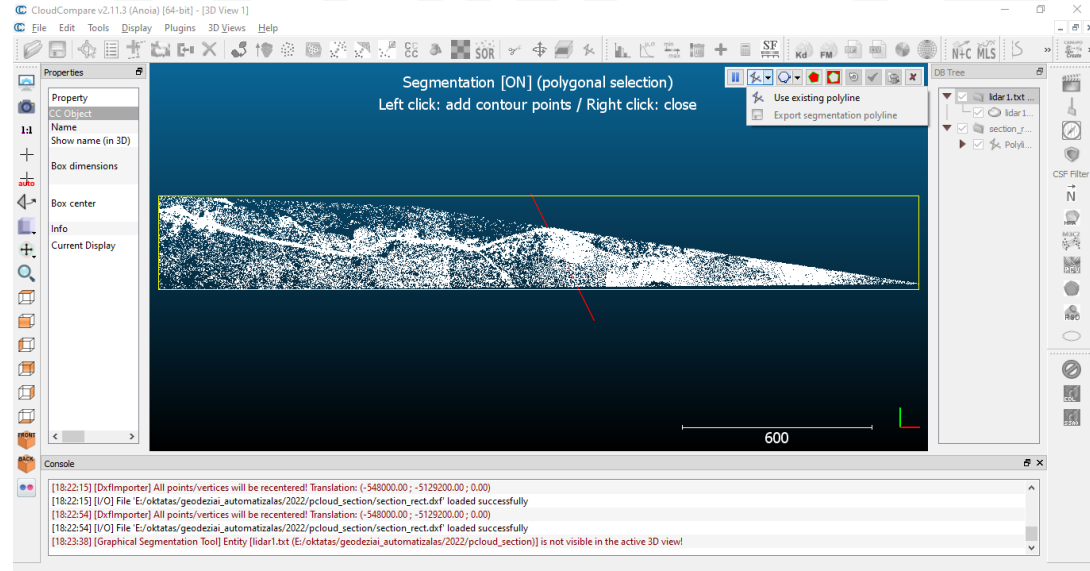
- lidar 1.txt ...
- lidar 1...
- section_f...
- Poly...

Console:

```
[18:16:56] [I/O] File 'E:/oktatas/geodeziai_automatizalas/2022/pcloud_section/lidar1.txt' loaded successfully
[18:22:15] [DxfImporter] All points/vertices will be recentered! Translation: (-548000.00 ; -5129200.00 ; 0.00)
[18:22:15] [I/O] File 'E:/oktatas/geodeziai_automatizalas/2022/pcloud_section/section_rect.dxf' loaded successfully
[18:22:54] [DxfImporter] All points/vertices will be recentered! Translation: (-548000.00 ; -5129200.00 ; 0.00)
[18:22:54] [I/O] File 'E:/oktatas/geodeziai_automatizalas/2022/pcloud_section/section_rect.dxf' loaded successfully
```

VERTICAL SECTION

- Use segment command
 - Existing polyline
 - Segment in
- Check out the number of points in the section (96)



VERTICAL SECTION

The screenshot displays the CloudCompare v2.11.3 (Anoia) [64-bit] - [3D View 1] interface. The main 3D view shows a dark blue background with a red line representing a vertical section plane. A yellow rectangle highlights the sectioned area. A scale bar at the bottom right of the 3D view indicates a length of 200 units. The interface includes a menu bar (File, Edit, Tools, Display, Plugins, 3D Views, Help), a toolbar with various tools, a Properties panel on the left, a DB Tree on the right, and a Console at the bottom.

Properties Panel:

- Property: CC Object
- Name
- Visible
- Show name (in 3D)
- Box dimensions
- Shifted box center
- Global box center
- Info
- Current Display
- Cloud
- Points
- Global shift
- Global scale
- Point size
- Transformation history
- Matrix / Axis
- 1 000 0 000 0 00

DB Tree:

- lidar1.txt ...
- lidar1...
- lidar1...
- section_f...
- Polyli...

Console:

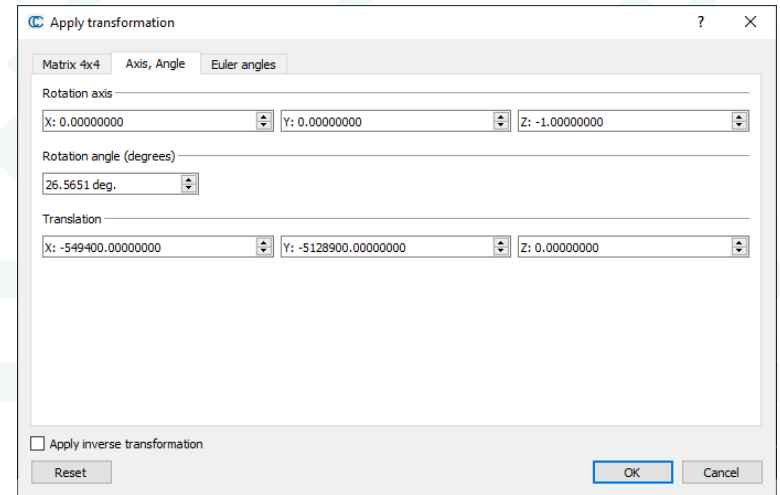
```
[18:22:15] [DxfImporter] All points/vertices will be recentered! Translation: (-548000.00 ; -5129200.00 ; 0.00)
[18:22:15] [I/O] File 'E:/oktatas/geodeziai_automatizalas/2022/pcloud_section/section_rect.dxf' loaded successfully
[18:22:54] [DxfImporter] All points/vertices will be recentered! Translation: (-548000.00 ; -5129200.00 ; 0.00)
[18:22:54] [I/O] File 'E:/oktatas/geodeziai_automatizalas/2022/pcloud_section/section_rect.dxf' loaded successfully
[18:23:38] [Graphical Segmentation Tool] Entity [lidar1.txt (E:/oktatas/geodeziai_automatizalas/2022/pcloud_section)] is not visible in the active 3D view!
```


VERTICAL SECTION IN CLI

- Open a command prompt / terminal, navigate to your folder
- Type: **"C:\Program Files\CloudCompare\CloudCompare.exe" -O lidar.txt -C_EXPORT_FMT ASC -PREC 3 -Crop2d Z 4 549200.89 5129300.45 549199.11 5129299.55 549399.11 5128899.55 549400.89 5128900.45**
- Copy the command into a shell script / batch file
- Use a python script, subprocess module, add parameters (e.g. section line coordinates, tolerance)

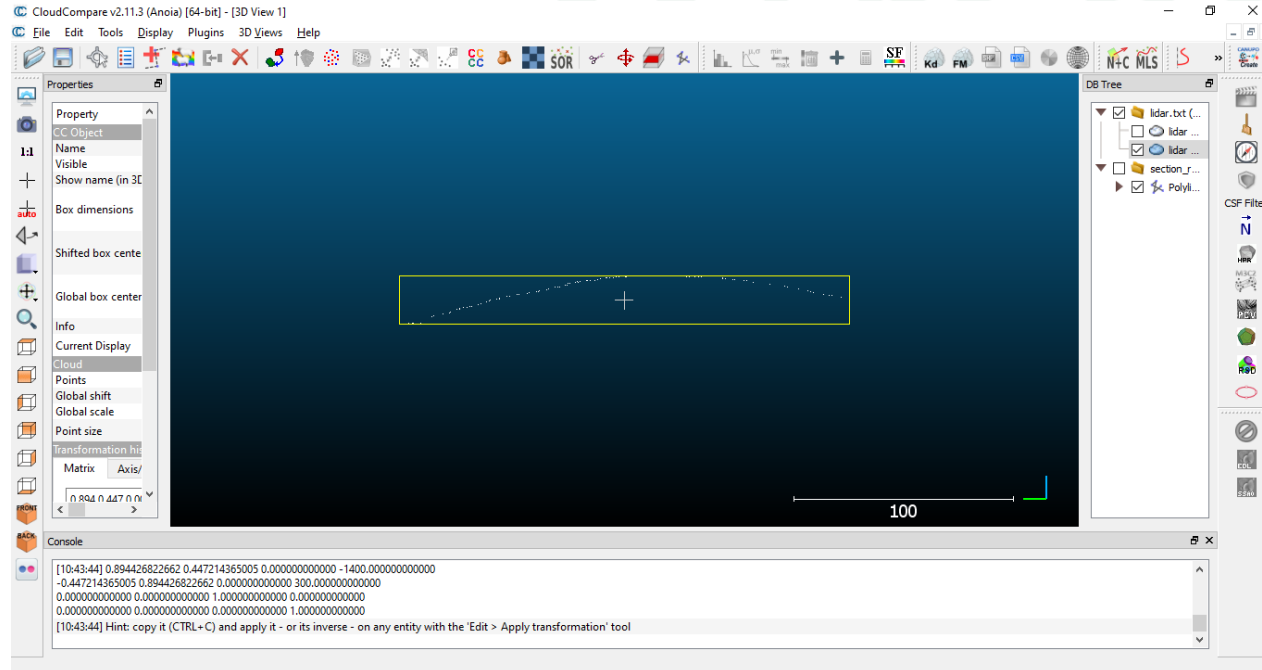
APPLY A TRANSFORMATION

- Translate by 549400, 549200 (coordinates of the first point of the section line)
- Rotate by -26.5651 (whole circle bearing of the section line)



SECTION VIEW

- Take a top and a left side view



TRANSFORMATION IN CLI

- 4x4 transformation matrix, save it in file
- Type "**C:\Program Files\CloudCompare\CloudCompare.exe**"
-O vert_section.asc -C_EXPORT_FMT ASC -PREC 3 -
APPLY_TRANS transf.txt

