Positionnement et Télédétection

Lab practical on Topography

Processing and visualization of point clouds and DEMs

Version 2024

The objective of this lab practical is to familiarize you with working with point clouds (PC), the main classes, and related products. In the second part, you will create specific visualizations designed to facilitate cartographic analysis.

Software:

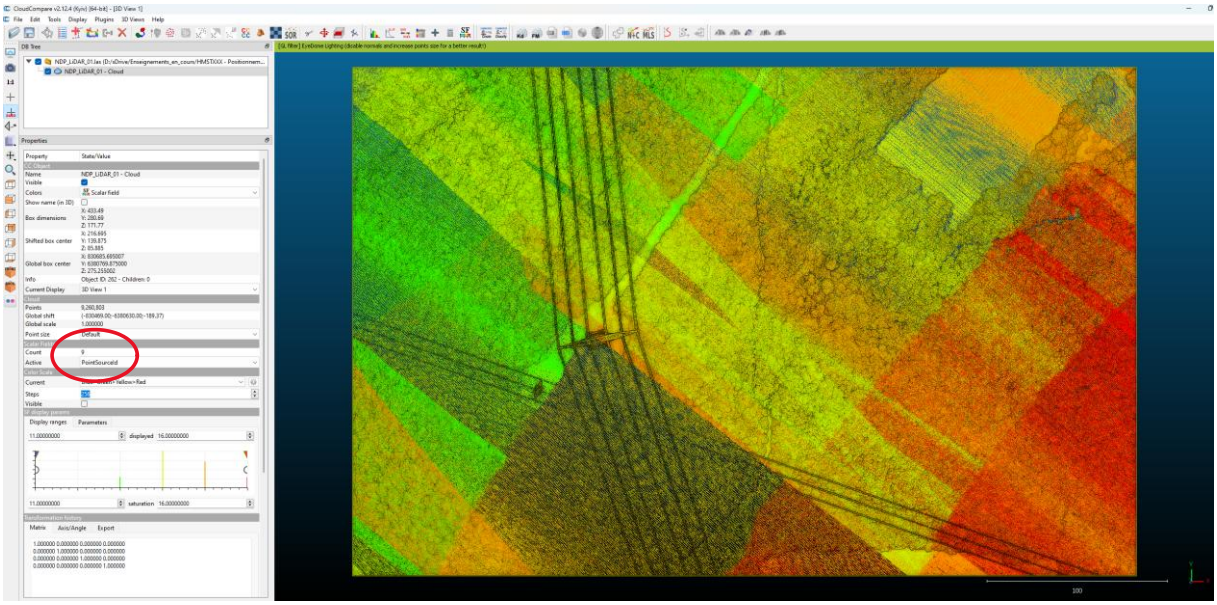
CloudCompare, QGIS + Relief Visualization Toolbox plugin.

Data:

NDP_LiDAR_01.las (Salagou), NDP_LiDAR_02.las (Pic St Loup), NDP_Photogram.las (Bhutan), Hovd_UAV_2017_S05_DSM_25cm.tif (Mongolia)

A. CloudCompare

1. Open NDP_LiDAR_01.las and note the value of “Global shift.” Explore the point cloud based on the various scalar fields (RGB, PointSourceId, NumberOfReturns, Intensity, Classification).



If you display “Classification,” the main PC classes are: Never classified (0), Unclassified (1), Ground (2), Low Vegetation (3), Medium Vegetation (4), High Vegetation (5), Building (6), Water (9).

Generate an DSM (raster) with a 0.2 m resolution. Use all points. Export as a GeoTIFF (NDP_LiDAR_01_MNS_0.2m.tiff).

Generate a DTM (raster) with a resolution of 0.2 m. Keep only classes 2 and 9. Export as a GeoTIFF (NDP_LiDAR_01_MNT_0.2m.tiff).

2. Repeat with NDP_LiDAR_02.las

B. Relief Visualization Toolbox (QGIS)

1. Open NDP_LiDAR_01_MNT_0.2m.tiff. Click “Select All,” then “Start.”

Import the resulting files into QGIS and analyze the visible features.

2. Repeat the process with NDP_LiDAR_02_MNT_0.2m.tiff.

3. Compare the results.

C. Bonus

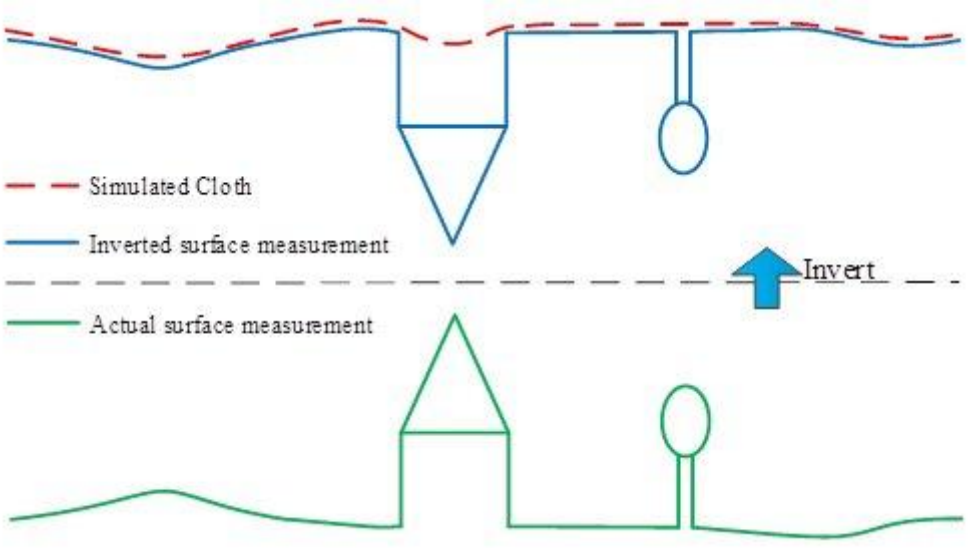
1. The NDP_Photogram.las file was generated using photogrammetry from drone images. It does not contain classification information, but you can identify ground points using the Cloth Simulation Filter.

Cloth resolution: resolution of the approximated surface; if the value is low, the “cloth” is rigid.

Max iterations: leave at 500.

Classification threshold: vertical distance (in + or -) from the “cloth” beyond which a point is no longer considered part of the ground.

Open NDP_Photogram.las in CloudCompare and use the CSF plugin to generate a DTM. You may need to repeat processing with a series of values.



2. Open Hovd_UAV_2017_S05_DSM_25cm.tif in QGIS and use the RVT plugin to find the fault.