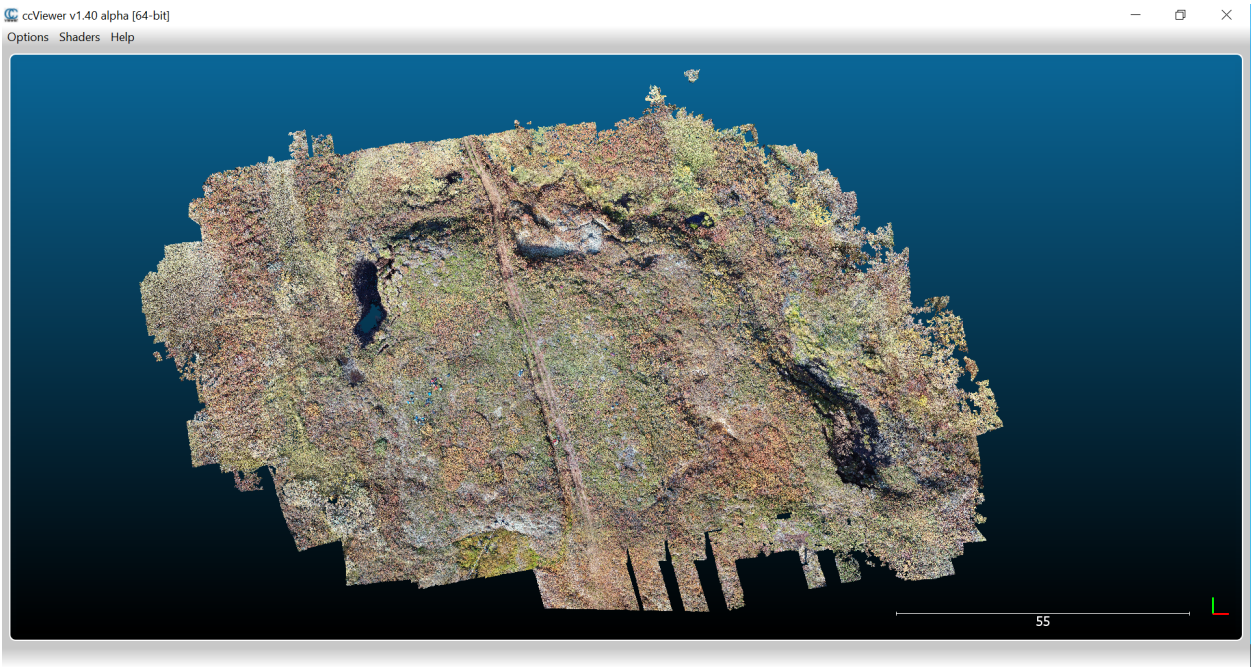
Course NGN235
GIS: Introduction to remote sensing

Report for Exercise 5

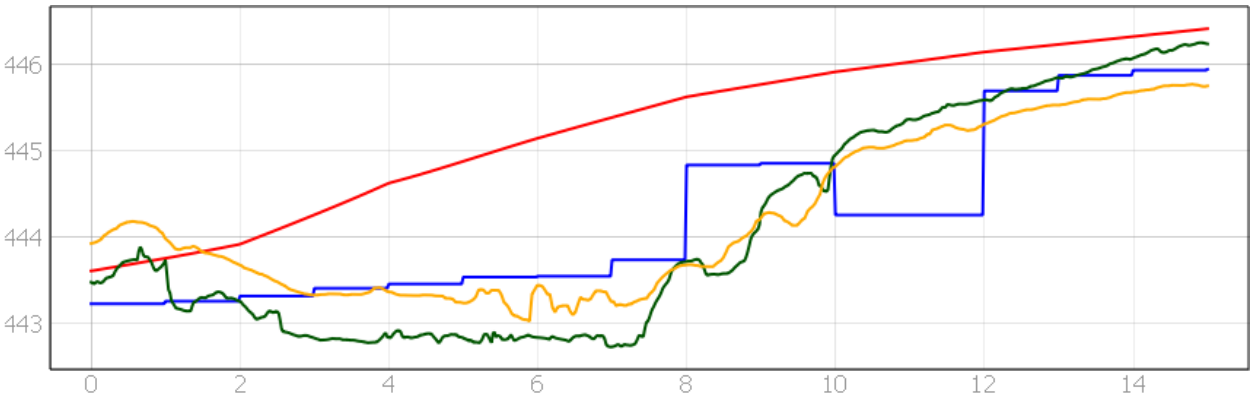
Student: Xi Chen

#1) Screenshot of the 3D display of the Palsa point cloud

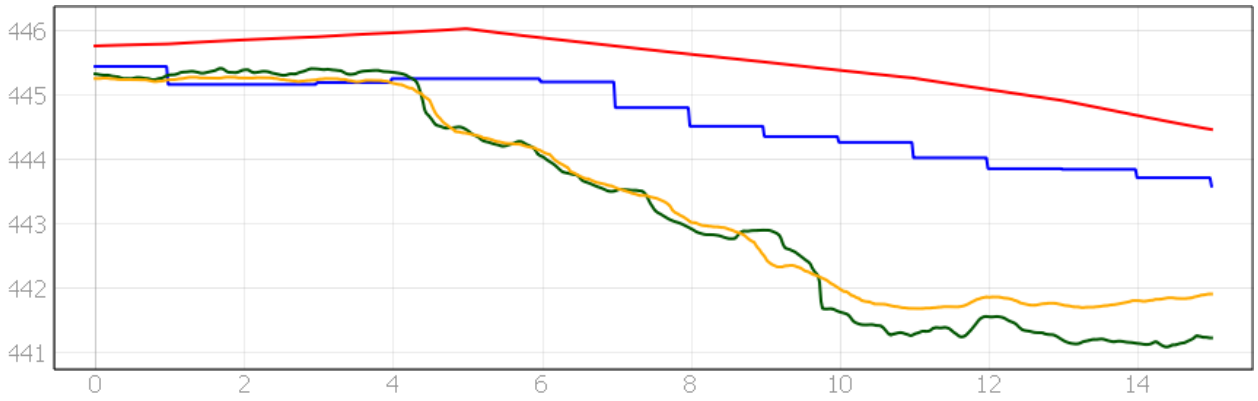


#2) Elevation profiles over transect #1 and #2

Red: LiDAR DSM from 2010 Blue: Aerial photo DSM from 2016
Green: Drone DSM from 2018 Yellow: Drone DSM from 2019



This figure represents the elevation profile over transect #1 on the northwest side of the palsa. In 2010, it was in the original good shape, while the values in 2016, 2018 and 2019 shows that it has collapsed. It has collapsed more in 2018 than 2016 on the very left part of the palsa. However, in 2019 the height on the left part has risen a little while decreased a little on the right part, compared to 2018.



This figure represents the elevation profile over transect #2 which is located on the southeast part of the palsa. The palsa had a good shape in 2010, while it has collapsed a little in 2016. In 2018 and 2019 it has collapsed much more than in 2016. In 2019, the height on the very east part of the area has risen a little bit than in 2018, which probably is because some vegetation has begun growing there, or maybe more collapsed parts have landed there.

The lines for 2010, 2018 and 2019 are much more smooth than the line for 2016. This is because the DSMs made from LiDAR and drones have higher resolutions, while the DSM made from aerial photos have lower resolutions, i.e. bigger pixels.

#3 Segmentation results

I do not think that the segments are good representative units, because some of them seemed good, but most of them are not. For example, some rocks consist of several segments rather than one whole segment, some green shrubs have been divided into many parts, and the ground has been divided into too many small segments. It could also be found that small rocks are segmented together with the ground. The objects that have pure colors were easier to be identified within segments, such as the north part of the roof, some bigger white rocks. The objects, such as the south part of the roof, all the rocks, tree leaves, the stone walls, would be considered as whole objects in real life, but are represented instead by several segments here.

#5 Automated segmentation vs manual approach

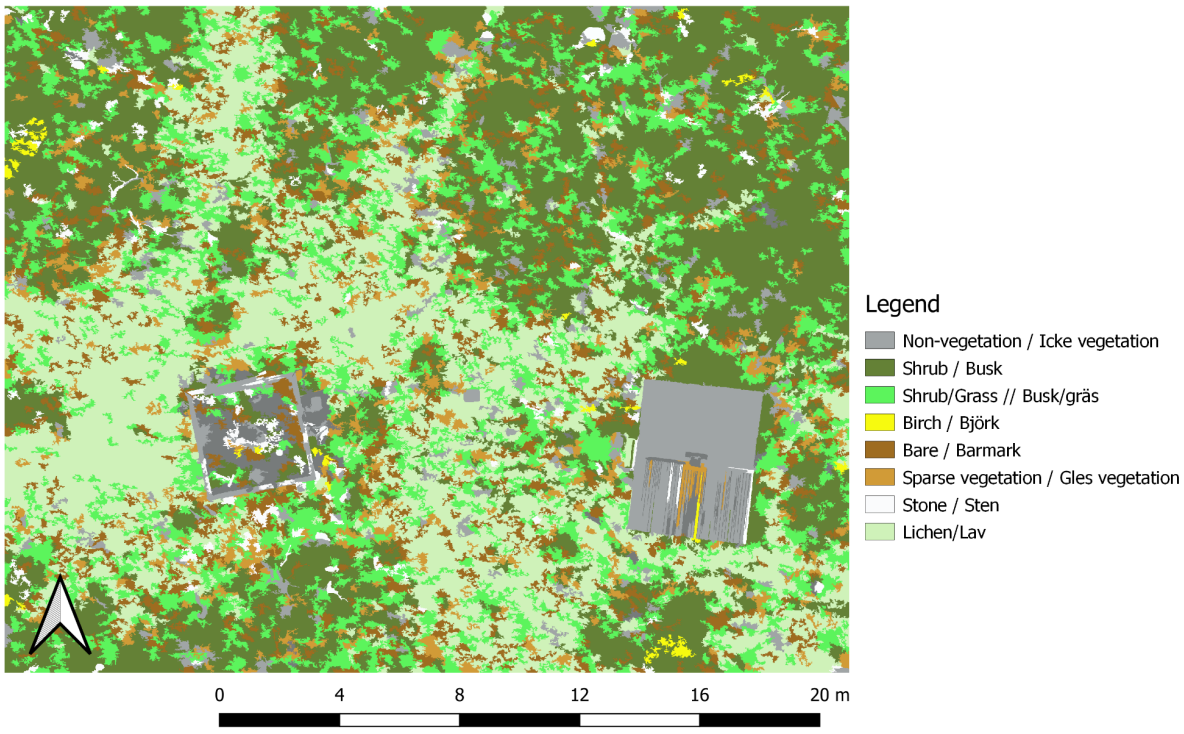
If I were to manually draw polygons of the paths around the cabin, the outcome would be much better than an automated segmentation. Since the paths have similar spectral values as the objects nearby, it is hard to identify it by an automated segmentation. If a manual approach is implemented, the paths could be accurately identified by our eyes.

If we want to identify boulders, I will prefer the automated segmentation, since it has already provided receptacle results in this exercise: most of the big stones were correctly identified. However, if the amount of the stones is not many, a manual approach is also considerable.

The biggest advantage of an automated segmentation approach is that it saves a lot of time, compared to a manual approach. The borders of different objects can be correctly identified, if they have distinct spectral values.

#4 Layout of the map from unsupervised classification and the original drone image

Image from the unsupervised classification



Oringinal drone image