William Horn Lab 1

2.1.2 Answer the following image interpretation questions:

Water surfaces: Look at the lakes and rivers in the scene and compare the optical and SAR images. Focus roughly on the area marked “WS” in Figure 1.

a. In the VH SAR data, can you discriminate the frozen parts of the river from the open water regions? Feel free to rescale the image to help with answering this question.—1.5 points

Can’t really see any difference in the signal from the river, the whole river looks black.

b. In the VV SAR data, can you discriminate the frozen parts of the river from the open water regions? Feel free to rescale the image to help with answering this question. —1.5 points

The river has more response in VV, parts are light grey instead of being completely black.

c. Explain your findings from questions a) and b). What may the properties of the ice be like to create the observed SAR response? —2 points

Since VV signal response is strongly influenced by surface roughness. I would expect that the frozen parts of the river would show up brighter, since we would be getting response from the roughness of the ice/water barrier.

Residual Snow Fields: Look at the areas of residual snow (regions marked as “SF” in Figure 1) and
compare the optical and SAR images.

d. In the VH band, describe the radar brightness patterns you see within this snow field. In your answer, also address whether or not the radar brightness is roughly uniform across this area. —1.5 points

The snow field shows up as a grey with black patches. There is a good bit of variability in the grey, not even accounting for the black patches.

e. In the VV band, describe the radar brightness patterns you see within this snow field. In your answer, also address whether or not the radar brightness is roughly uniform across this area. —1.5 points

The VV band is much more uniform and has a darker grey where the snow patch is. It also has black patches throughout in the same spots as the VH band.

f. Based on your answers to a) & b), what might the properties of the snow in this area be? —2 points

I would assume the dark patches are frozen lakes, VH corresponds to volume scattering, so I would say the different grey values would be different densities of snow (or maybe different depths?). Since these images were taken in May, they snow will be wet, which is why we get darker responses in both VV and VH

Look at the pair of optical and SAR images over a Bridge in Germany shown in the top row of Figure 2. Answer the following questions:

a. Given what you see in the image. Which direction did the sensor look? Is it more likely that the sensor looked left to right or from bottom up? Provide a justification for your answer. —1 point

If the sense was looking bottom up, we couldn't get any of the double and triple bounces that make the bridge show up as 3 lines. The sense has to be looking left to right.

b. Due to the imaging geometry, the SAR image of this bridge looks a bit weird. You may see that there are three main bright responses in the image that are labeled 1, 2, and 3, in the top right figure. The images on the bottom row shows scattering mechanisms that created the bright responses in the SAR image. Please answer which scattering mechanism corresponds to which of the bright lines. —1 point

Since the sense is imaging left to right, signals received farther left correspond to signals received first. The more bounces, the longer it takes for the signal to get back to the sensor, so they will be farther right in the image.

I would say 1 is B, direct from the bridge, shows up first
2 is A, double bounce.
3 is C triple bounce.

3.1.2 Answer the following image interpretation questions:

a) Start with the optical images from Aug 5 and Aug 21. Which difference do you see and how would you interpret them? – 2 points

The August 21 image looks darker than the Aug 5 one. Also zooming in on some features it looks like there is some movement towards the water from the 5th to 21st. It's a bit hard to compare them because of how different the colors in the two images are, but the overall geometries are similar.

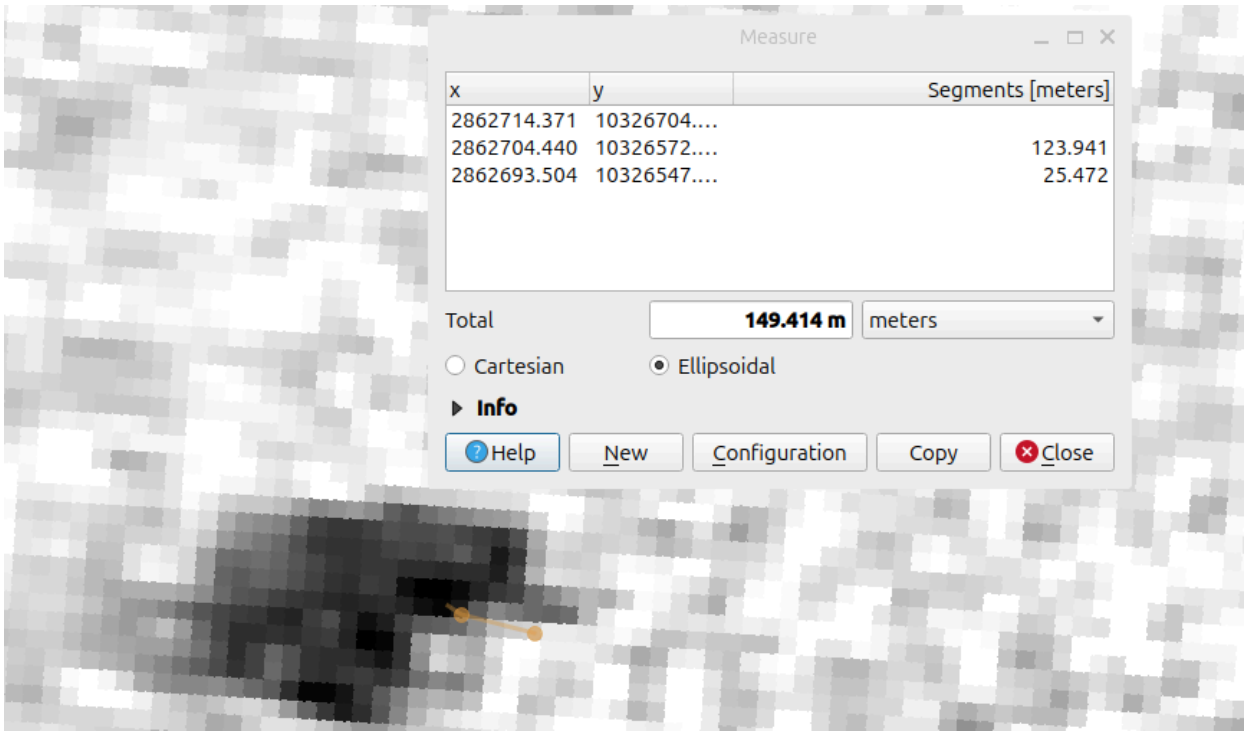
b) Now look at the SAR images. Using your theory developed from the optical data, how do you explain the differences you see in the SAR images? – 2 points

This first thing I notice is that the radar backscatter is the opposite of the optical image. It goes from being darker on the 04th to brighter on the 21st. Maybe the snow in the first image has more moisture and as time passes it freezes up/gets dryer. It's also much easier to see the dynamics of the ice compared to the optical image. It looks like there is more sea ice in the second image compared to the first.

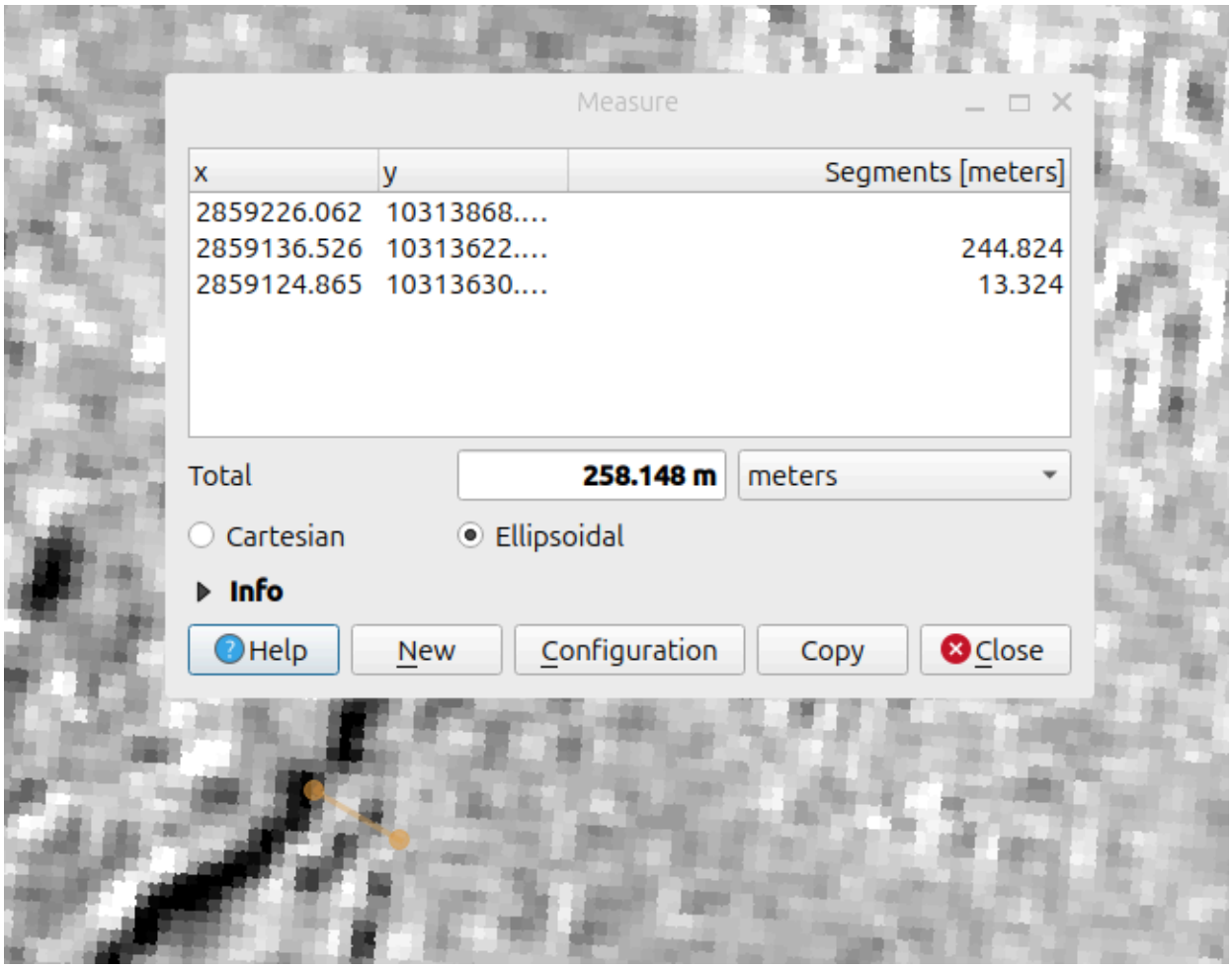
3.1.3 Answer the following Geodesy question

c) Pick either the optical or SAR image pair and measure the amount of glacier motion that occurred in between the two respective image dates. Pick the region shown in Figure 4 for your assessment. Identify objects you can track and measure the magnitude of the objects motion meters/day units. – 4 points

Feature farther from the ocean: ~124m



Feature close to the water: ~244m


Measure
x
y
Segments [meters]
2859226.062
10313868....
2859136.526
10313622....
244.824
2859124.865
10313630....
13.324
Total
258.148 m
meters
Cartesian
Ellipsoidal
Info
Help
New
Configuration
Copy
Close