Assignment 1(Advanced Spectral Imaging)
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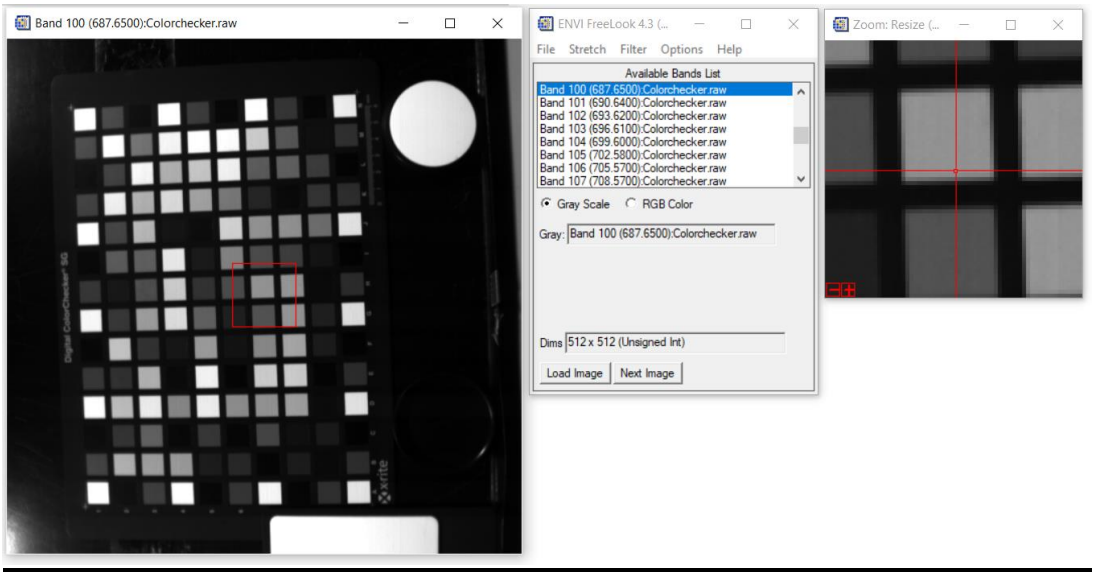
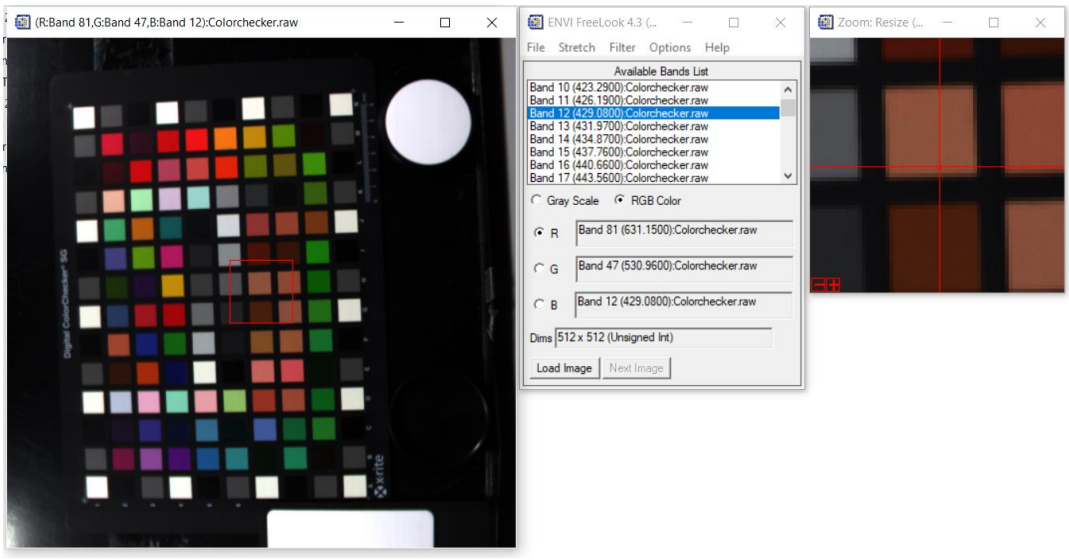
Task 1.1: Download Freelook viewer for ENVI spectral files: I downloaded the Freelook viewer and used it for further tasks.

Task 1.2: Download spectral files: I downloaded the file and ready to explore.

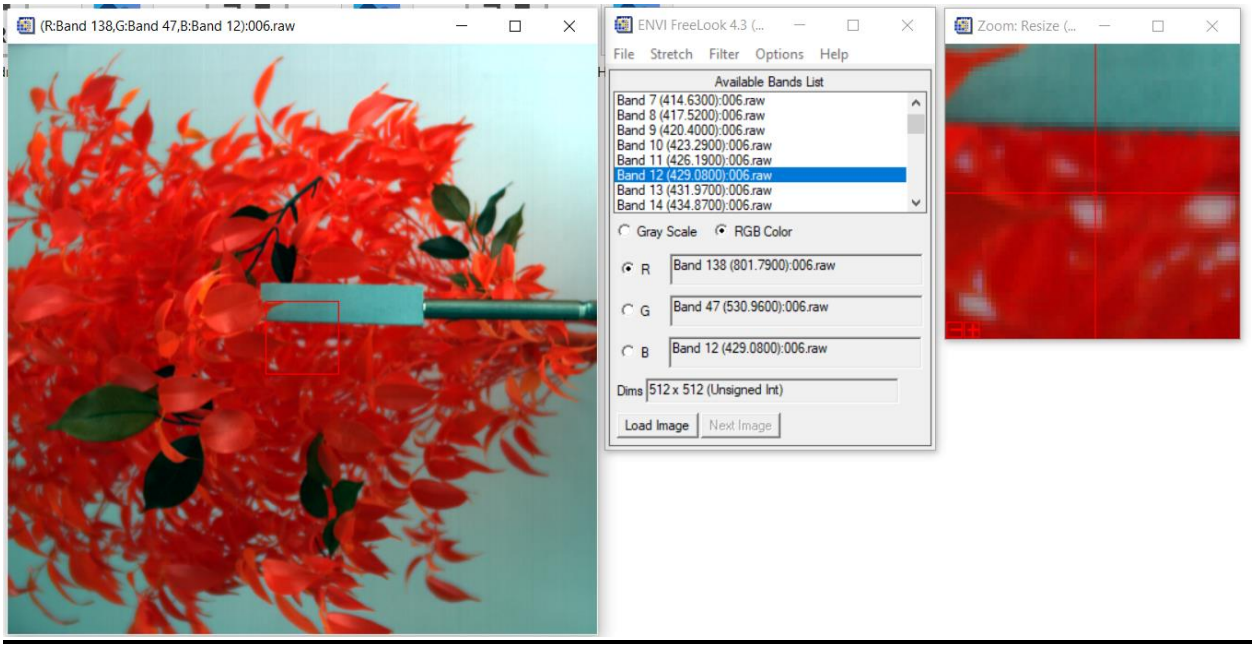
Task 1.3.1: Using Freelock, Gray scale image of color checker :



Task 1.3.2: Using Freelock, RGB image (using spectral bands RED 630 nm, Green 530 nm, Blue 430 nm) :

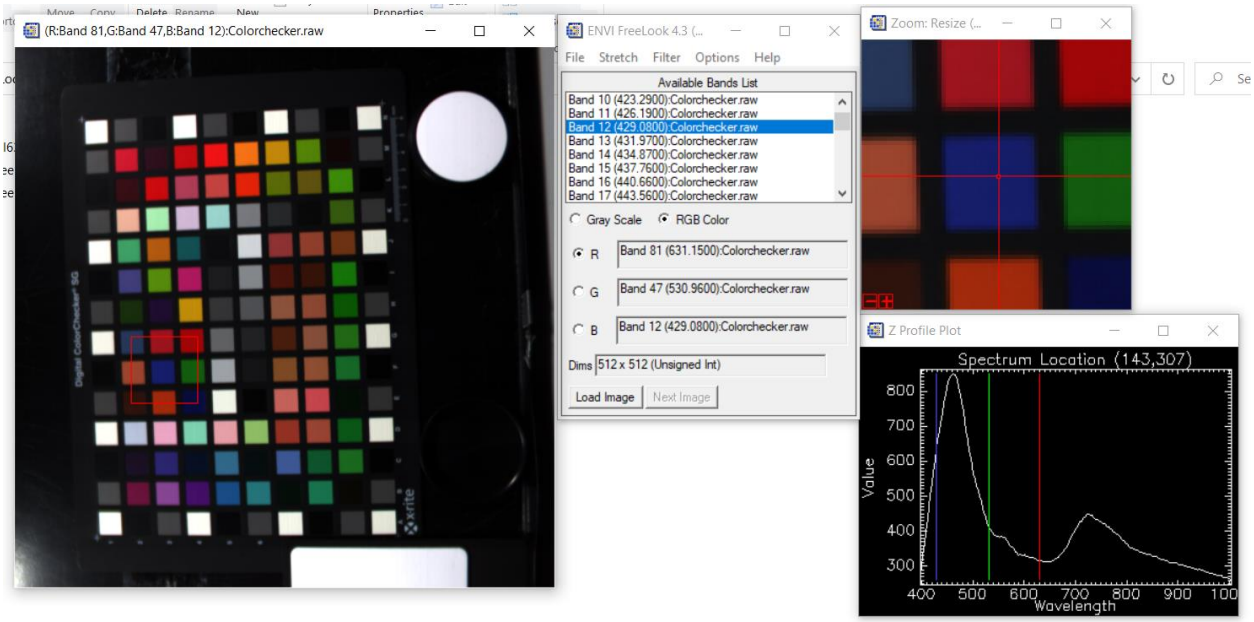


Task 1.3.3: Using Freelock, RGB using other spectral bands (use IR channel of 800 nm instead if 630 nm for Leaves) :

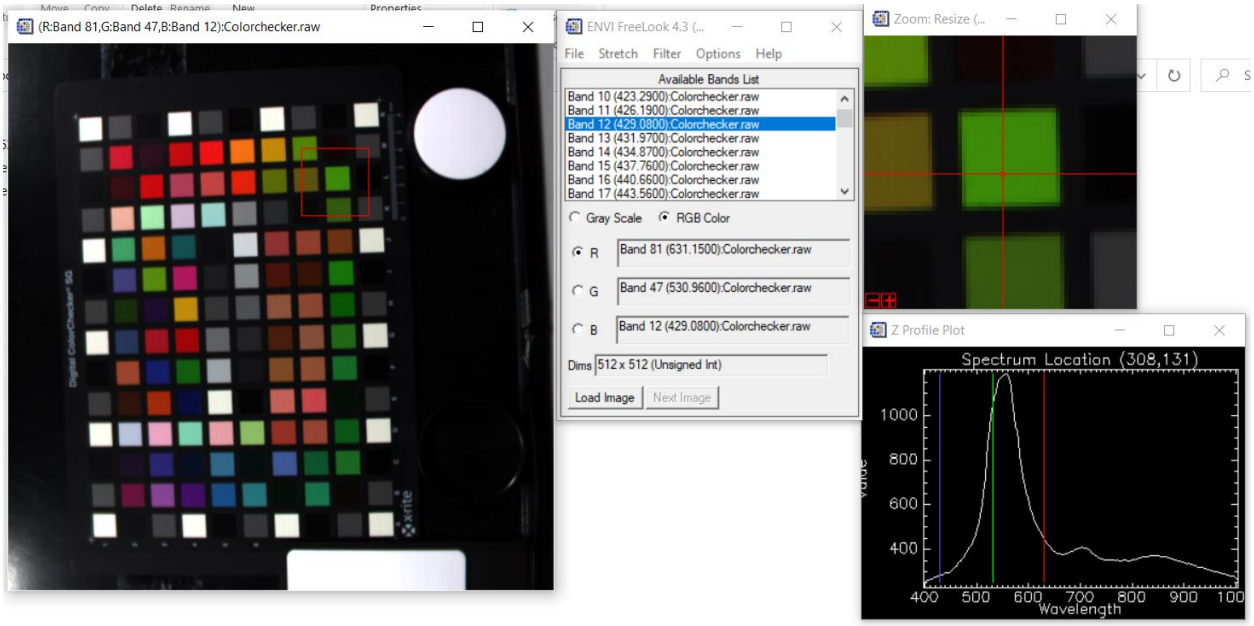


Task 1.3.4: Using Freelock, check spectra of different color-patches in Colorchecker :

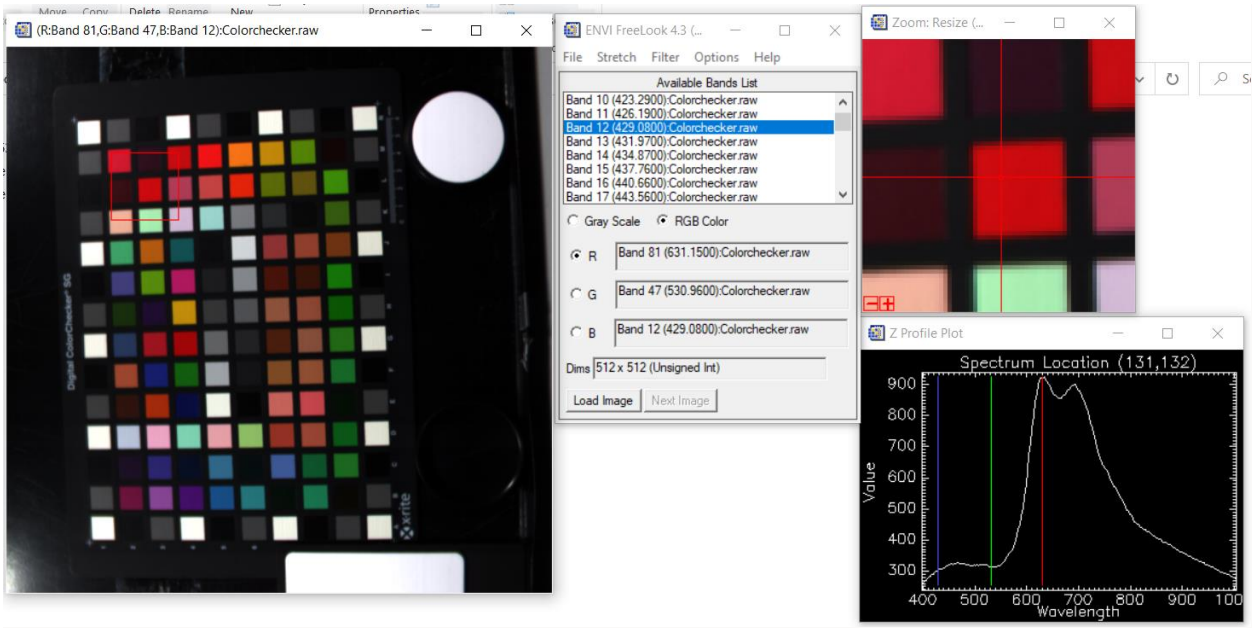
Let's check the spectra of one of the **Blue** Patch:



Let’s check the spectra of one of the **Green** Patch:

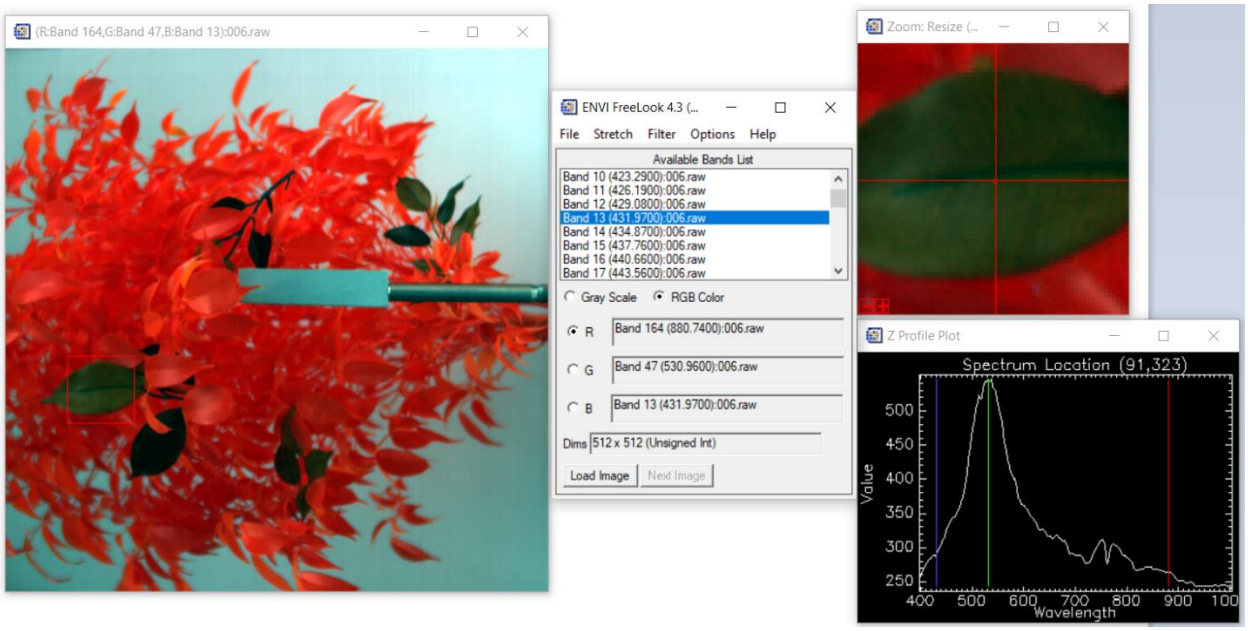


Let’s check the spectra of one of the **Red** Patch:

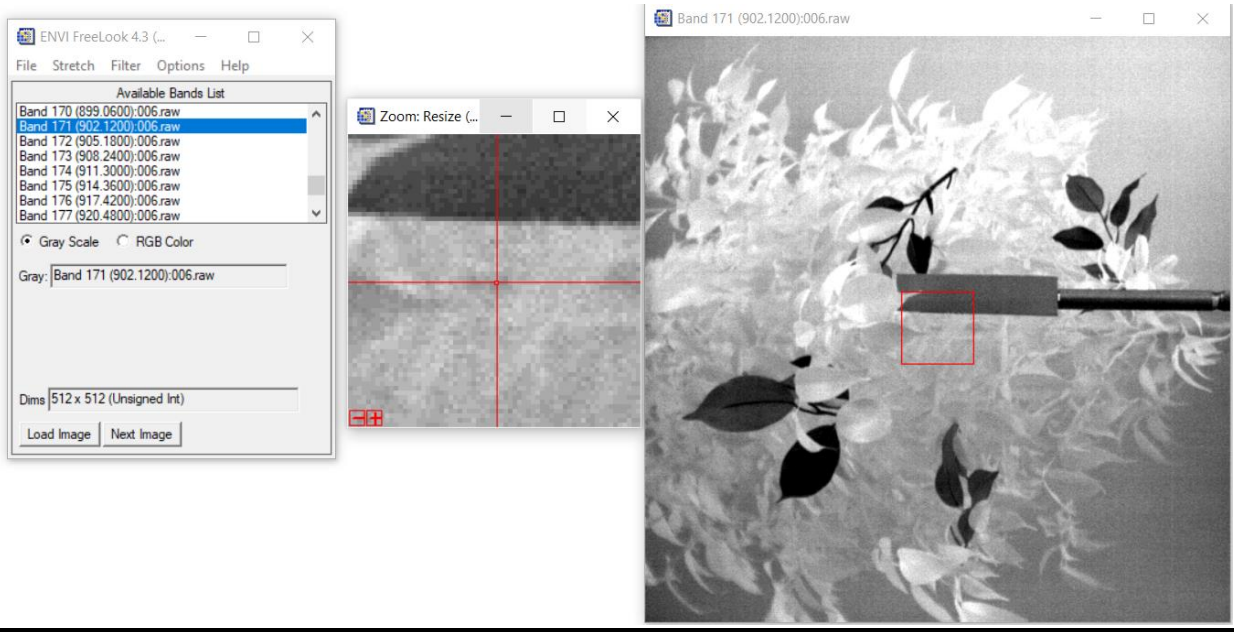


Task 1.3.5: Using Freelock, in "Leaves (Specim IQ)" make plastic leaves "visible" as we did on lectures :

We can see them using both RGB and Grayscale and we can look into the spectral dustrution of different leaves as well to be more precise, here for visualization, I am showing the RGB and Grayscale preview using NIR band with some other bands.



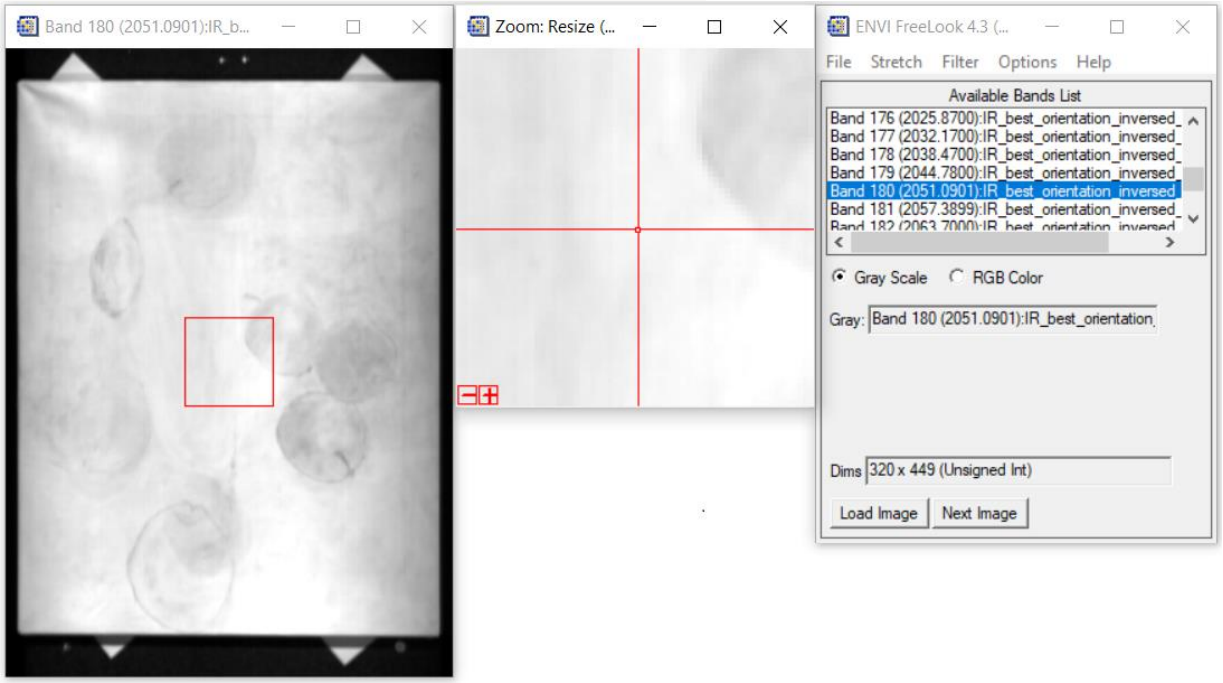
RGB Preview



Grayscale preview

Task 1.3.6: Using Freelock, the image "Infrared by sarita.keski-saari@uef.fi" is an IR image. Play with bands and show that we see the second image below the first on the top :

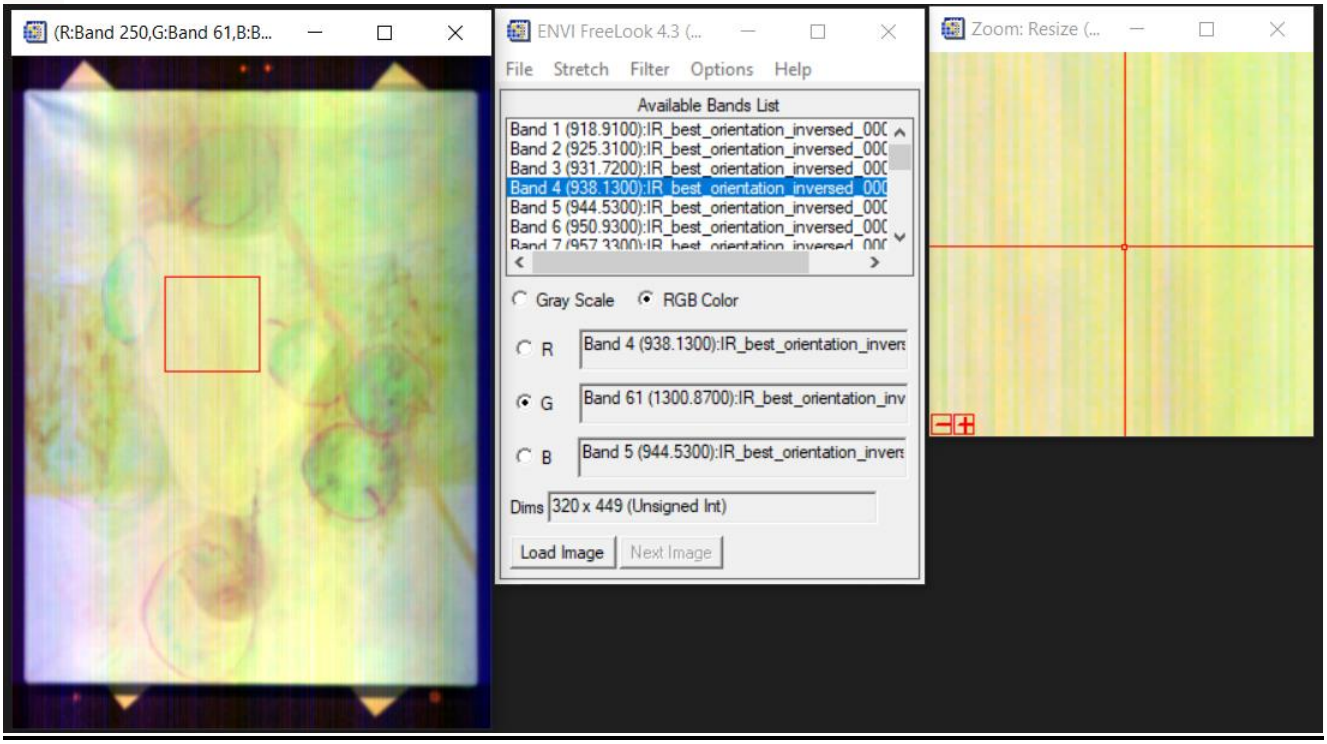
To investigate this I first look into the NIR and IR bands in grayscale mode to have a look which range provides more information towards the target task

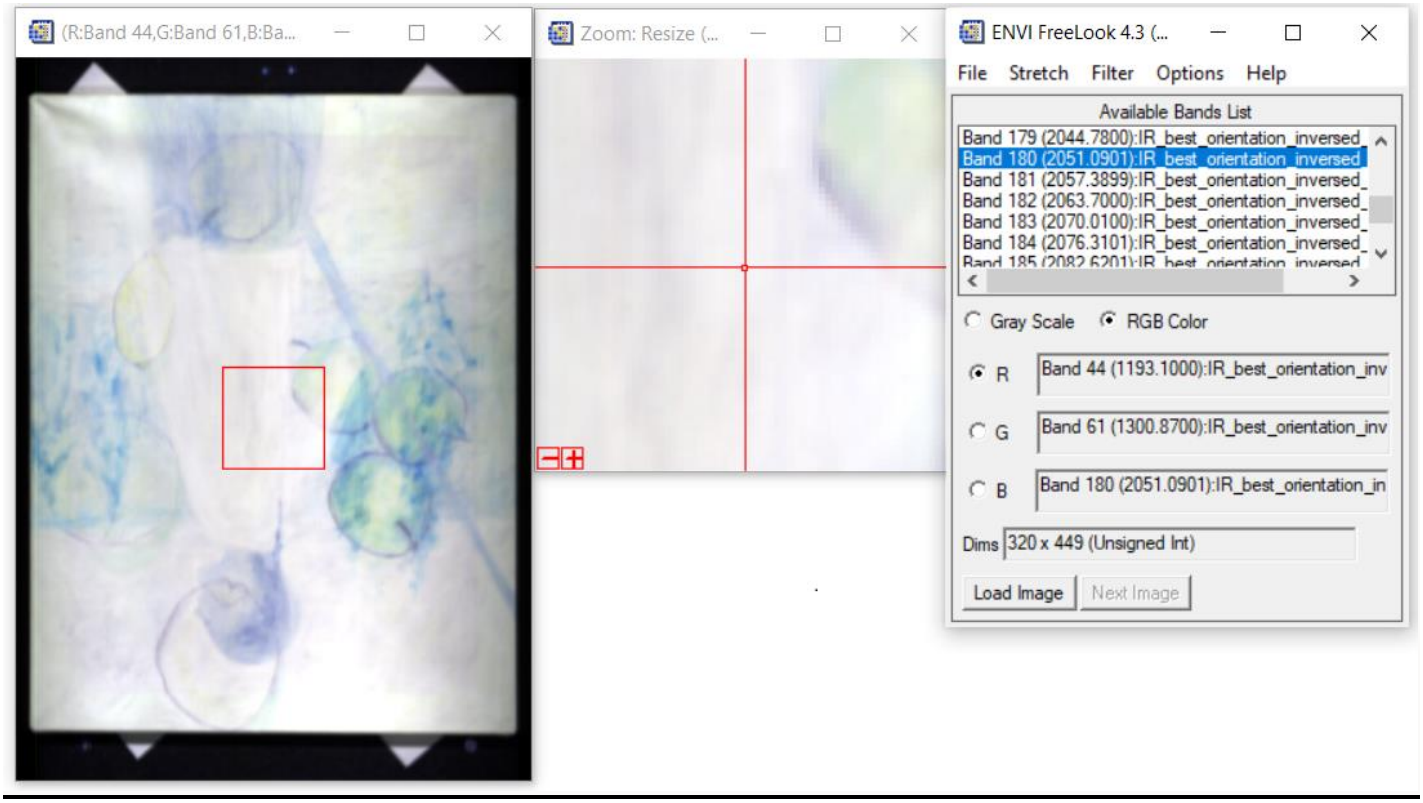


Band: 1193.1000 nm

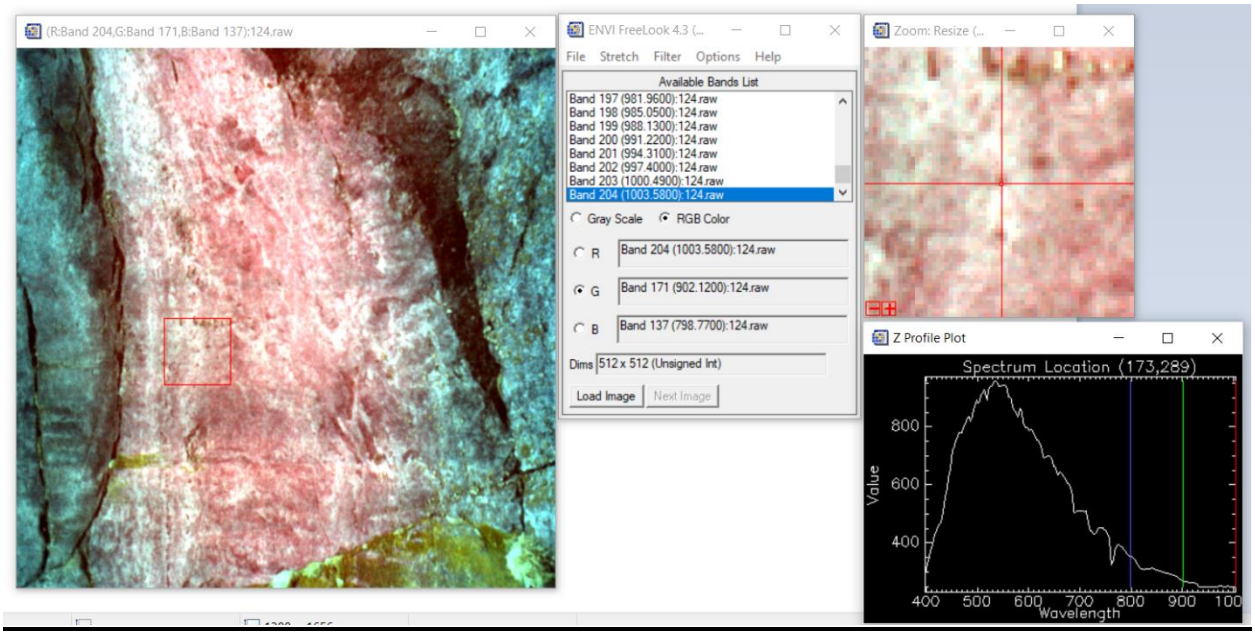
Band: 2051.0901 nm

Later I this two combination given below, which for me seem like giving better result for target task:

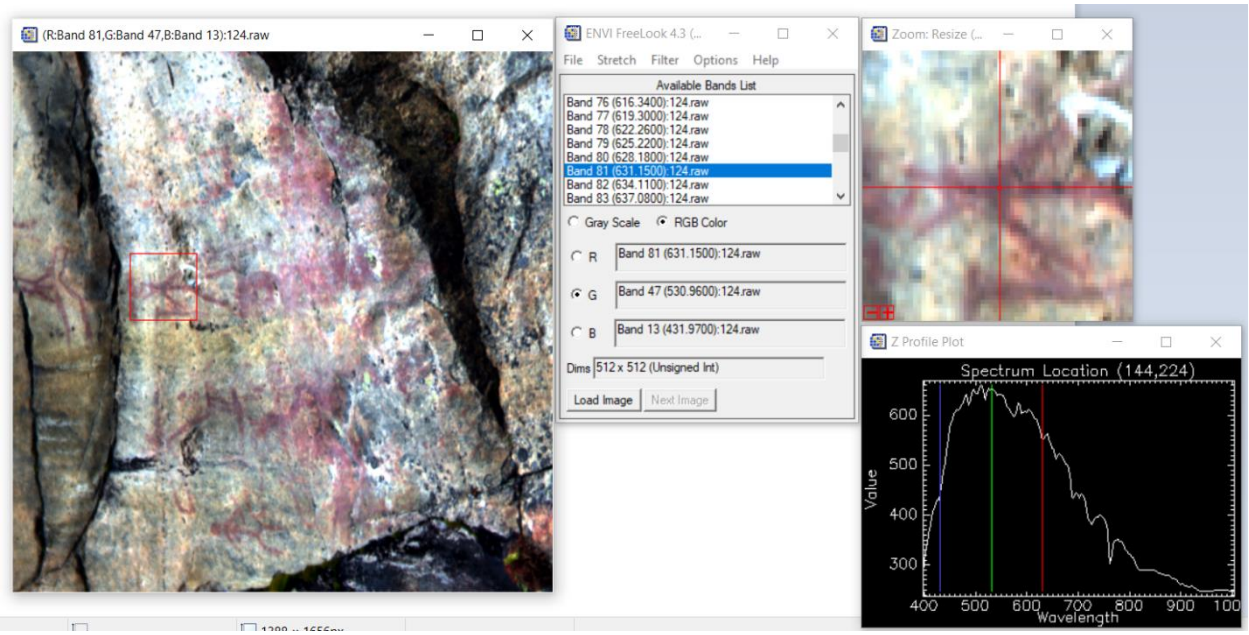




Task 1.3.7: Using Freelock, With image "124 (rock painting)" play with spectral bands and check whether all bands are equal for visibility of rock painting:



Here one noticeable thing is even if we select the near IR bands; we are not able to see the paintings anymore, which means IR range is not required everywhere.

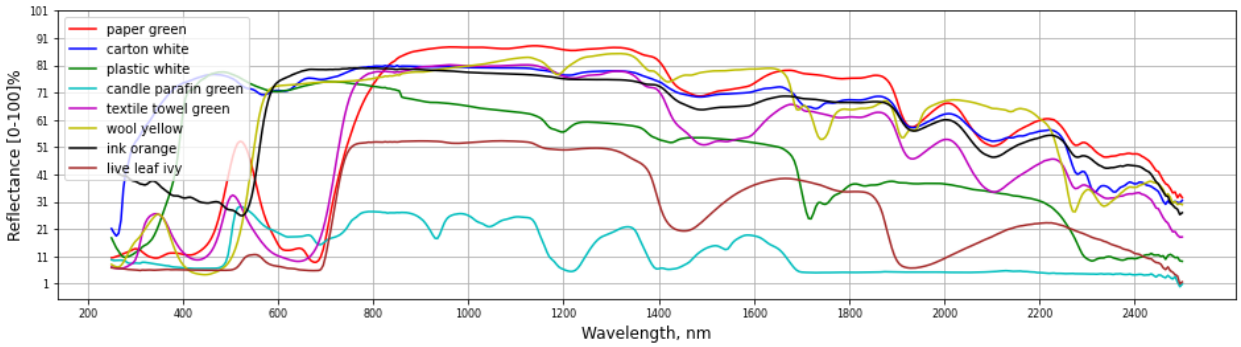


Here we can see if we select RGB bands, we get the prominent visibility of the rock painting.

Tasks #2. Study csv spectra of different materials

Task 2.1: Select several different materials and plot spectra.

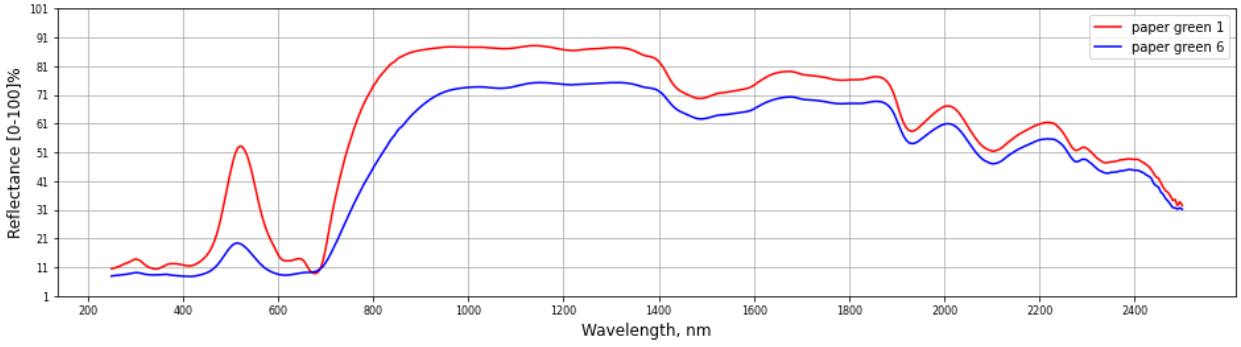
Solution: Here I selected 8 different materials randomly and plot their spectra using the given sample python code using Google Colab:



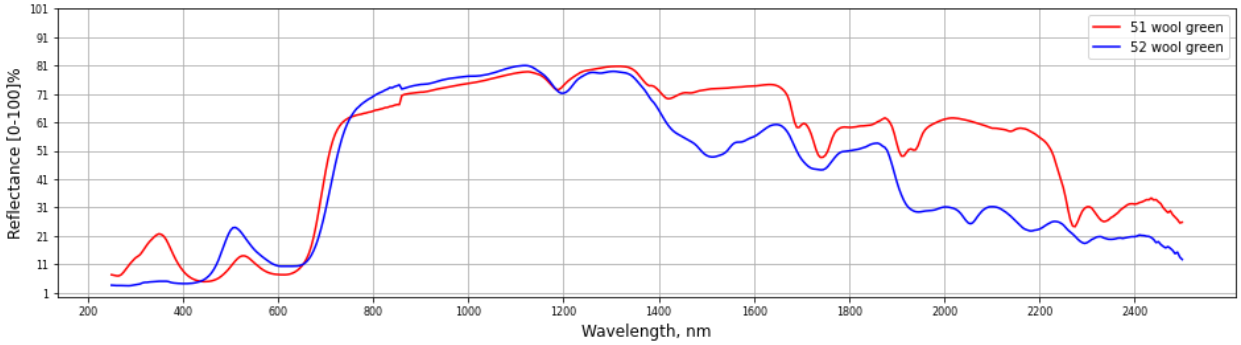
Task 2.2: Select similar materials (papers) and different (paper and plastic). Compare results by plotting 2 spectra in one plot.

Solution: Here I selected 4 different materials and consider 2 spectra from the same material to plot using the given python code using Google Colab.

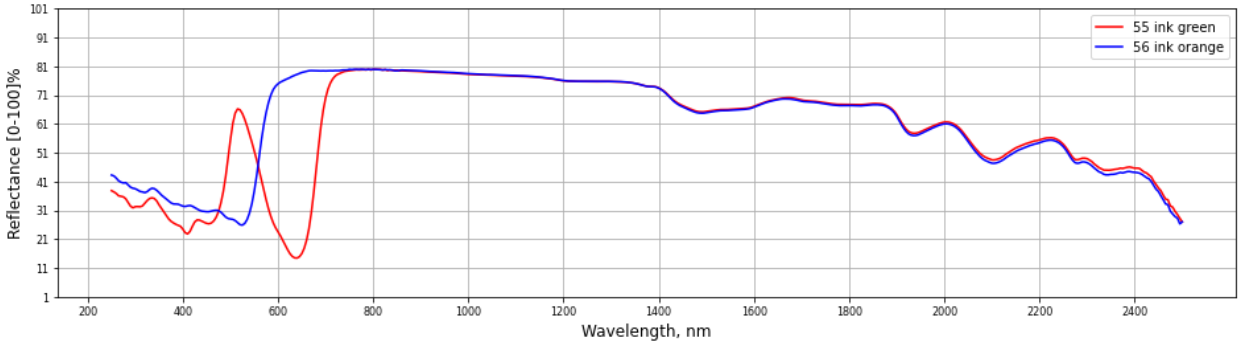
Material: (Paper)



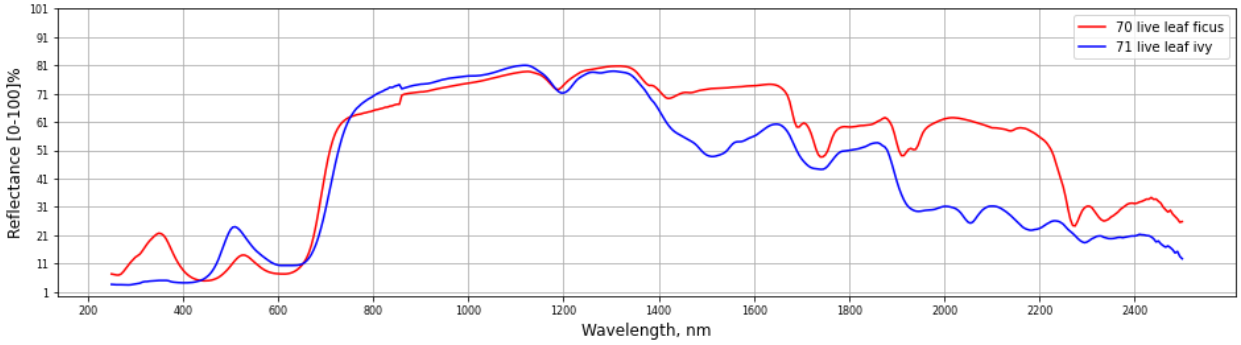
sMaterial: (Wool)



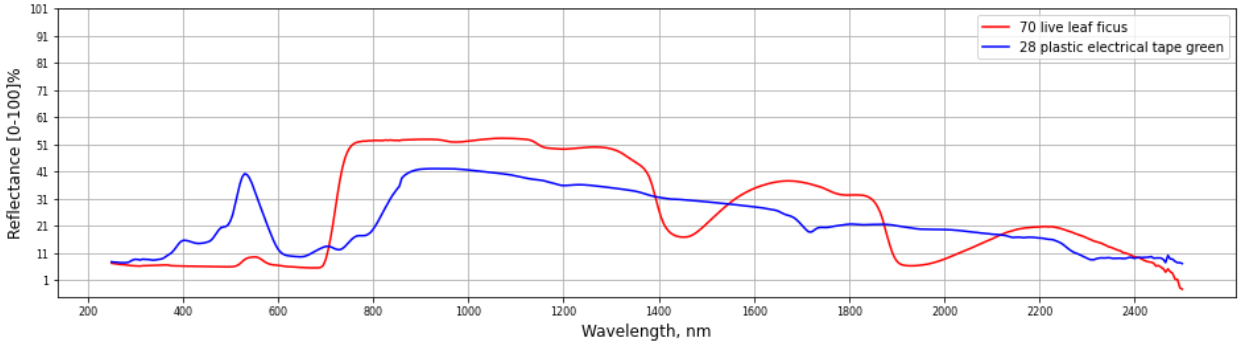
Material: (ink)



Material: (Live leaf)



Material: (Live leaf and Plastic)



Material: (Wool and ink)