

Lab 2 Multispectral Landsat Processing Name:

Upload the following files to the instructor:

(11) "Your Name_Scatterplot_map.pdf"

(13) "Your Name_Scatterplot_with_ROIs.png"

Question 1: Which band is most unlike the other 9 bands?

Question 2: Why are the Landsat 8 thermal IR bands collected with pixels that cover an area more than 100 times larger than the VNIR-SWIR 30 x 30 m pixels?

(see Equation 1-2 and Table 3-1 in the textbook)

Question 3: A. What is the Mean and Standard Deviation of all the pixels in the grayscale Band 5 NIR?

B. What percentage of pixels have values within one standard deviation of the mean? (see textbook Figure 9-3 for explanation)

C. What digital number (DN) is displayed by the most pixels (Data Value on the horizontal axis of the histogram)? How many pixels have that DN ("Count" value)? What percentage of the 256 DNs is contained by this largest DN?

Question 4: A. What is the Mean and Standard Deviation of all the pixels in the 9-band Landsat dataset's Band 5 NIR?

B. Scroll down (or use the "Locate Stat" dropdown menu) and select Band 5. Computer screens can typically only display 256 levels (DNs) of brightness. So each DN on the histogram and your computer screen contains many DNs from the original USGS data. How many original DNs are contained within each DN displayed in the histogram and on the computer screen (look for "binsize =...").

C. What range of original USGS digital numbers (DN) have the highest count in band 5?

D. How many pixels (the “Count” value) in band 5 have the highest DN?

E. The USGS delivers Landsat 8 OLI and TIR bands with 16-bit radiometric resolution! How many levels of brightness is available with 16-bit data?

Question 5: A. How is the DN profile from the enhanced grayscale Band 5 NIR (shown above) compare with the DN profile from the original USGS data for Band 5 NIR (seen as a red line in the profile (not shown))?

B. What is different about the profiles? (Do not include the difference in the “Data Value” on the vertical axis)

C. Why the difference in the profiles? (Hint: what is different in the image processing?)

Question 6: Reflected near IR light is very bright (high Data Value) over irrigated agricultural fields on your Arbitrary Profile across the original USGS Landsat data. On this same plot, what happens to the reflected red light (band 4) over irrigated agricultural fields in comparison to reflected green light (band 3)? Any idea why this occurs?

Question 7: A. Explain the statistical plot. (also look at the metadata table)

B. What band has the highest mean DN?

C. What band has the highest DN range?

D. What band has the largest standard deviation?

Question 8: List the colors displayed with the different color composites in the agricultural fields along the Wind River. Zoom in on a field with much irrigation and vigorous crops and a field with limited irrigation and less vigorous crops to fill in the blanks on the table.

Features of Interest OLI Bands	Agriculture fields with much irrigation and vigorous crops	Agriculture fields with limited irrigation and less vigorous crops
Natural Color OLI 4-3-2 as R-G-B		
Color IR OLI 5-4-3 as R-G-B		
Enhanced Color OLI 7-5-2 as R-G-B		
Total IR OLI 7-6-2 as R-G-B		