

cm4278c.jpg	AIRSAR C-band image
cm4278l.jpg	AIRSAR L-band image
cm4278p.jpg	AIRSAR P-band image
sts59-dv-photo.gif	Color photo from hand-held camera from the Space Shuttle
dvpan.gif	Color panchromatic photo of the area from the ground

4. What do you know about the C, L, and P band radar in terms of wavelengths, atmospheric interaction, and ground penetration? (4pts.)

Analyze the data

In this part of the lab you will open these images in ENVI and do some qualitative and quantitative comparisons of them.

Launch Internet Explorer and type [\\nyx\rs4093](http://nyx\rs4093) into address bar and hit enter, that takes you to the remote sensing class folder “rs4093” in CIRES server. Copy the folder “Lab_7” to “C:” drive.

In separate windows open three AIRSAR images.

5. Describe the major features visible in each of the SAR images as well as their locations in the image. What differences are there between the different bands (4 pts)?

From the TOOLS menu on one of the images, choose LINK and link all three displays. Be sure to turn the **DYNAMIC OVERLAY** feature **OFF**. Linking the displays allows you to look at the same data in each display. The dynamic overlay feature is useful because it allows you to see a linked image in the same image window by clicking in the image window. We need to be able to click in the image window to do what is coming next. I encourage you to explore dynamic overlays on your own.

Make all three SAR bands visible on your screen. Navigate around one of the images, moving the scroll box, zooming in and out, and so on.

6. What happens when you change one of the displays of a linked set of displays (1 pts)?

Next we will use the profile feature. Profiles allow you to view the data in cross-sections down (y-profile) or across an image (x-profile), or, for a multi-spectral image like a TM, can even give you the spectral reflectance curve (z-profile) of any point in the image (by plotting the brightness in each band). Here we will compare x-profiles of the SAR bands.

In each window, under the TOOLS menu, under PROFILES, choose X-PROFILE. This will bring up profiles through each of the bands. In one of the image windows, click on several different points to see how the profile changes.

Now, to make sure that we are all looking at the same profile, under the TOOLS menu of one of the images, choose PIXEL LOCATOR. Type in 168 for sample and 170 for line. Click APPLY and then close the window.

Compare the **profiles** for the different bands. You can look at sections of the profiles in detail by clicking down on the scroll wheel of your mouse to draw a zoom box around that section of the profile. Click down on the scroll wheel again to reset the zoom. You can also navigate the profile by clicking on the line at different points. The sample (column) and brightness value appear at the bottom left.

7. Describe any variation in the relative brightness of different features along the profile (3).

Close the profiles. Look carefully at the images now.

Next we will compute statistics for the three images. Under the ENVI main menu, select Basic Tools > Statistics > Compute Statistics. In the Compute Statistics Input File dialog, make sure the "select by" method is set to "Band". Select one of your AIRSAR images ("cm4278p", l, or c"), and select okay. In the Compute Statistics Parameters dialog, make sure only "Basic Stats" and "Output to the screen" are selected, and press OK. There is an option to export the statistics and any histograms to an output file, but this will not be necessary in this exercise. This will provide a statistics report for the entire image.

8. Record the mean and standard deviation for each radar image. (3).

C Band : Mean _____ St. Dev. _____

L Band: Mean _____ St. Dev. _____

P Band: Mean _____ St. Dev. _____

Now compute statistics for a subset of the image. Use the same statistics tool, but in the "Compute Statistics Input File" tool, after you select which image to calculate statistics based on, click on "Stats Subset" and after "Samples", type 128, 227, and 100 (Start, End, and # of pixels). After "Lines", type 290,389, and 100. This will select the drainage area north of the mountains and adjacent to the two roads visible in the cm4278c image.

9. Record the mean and standard deviation for each radar image. (3).

C Band: Mean _____ St. Dev. _____

L Band: Mean _____ St. Dev. _____

P Band: Mean _____ St. Dev. _____

10. Why is there a difference in the statistics when we look at this particular subset? What could we be seeing differently in the images that is dependent on the radar band? (3)

Open the space shuttle photograph from C: /Lab_7/sts59-dv-photo.gif and examine it closely. Next look at the ground-based panchromatic photograph **dvpan.gif** from the same directory. (you may use Paint or any other software to open these images)

11. Describe the differences between remote sensing in the visible and microwave frequencies. What can you tell from space that is not discernible from the ground? What can you tell from the ground that is not discernible from space (3 pts)?