

When you processed the first channel of data from the unknown radar system, you should have found the following system parameters, or a nearly equivalent set:

Altitude in orbit:	696000 m
Wavelength:	0.236057 m
PRF:	2159.827 Hz
Sample rate fs:	16.0 Mhz
Chirp slope:	$-5.1851852 \times 10^{11}$ Hz/s
Pulse length:	27.0 μ s
Veff:	7179.4 m/s
r0:	844768 m
fd:	0 Hz

Also, the number of bytes per line was 7000, with 112 header bytes. With the above parameters, your image should focus correctly, and the output size should be approximately 3072 by 14336 valid pixels.

Two output files, called image.1 and image.2, are now available on the class web page under homework 7. The first file, image.1, is essentially the same as the image you produced except that it has been calculated using a sinc-interpolating range migration processor. Each image is a complex floating point file consisting of 14336 lines of 3072 complex samples each. Use these files for this and next week's exercises.

- 1) Form an interferogram by multiplying the two images together and display the phase, showing interferogram fringes. Calculate and submit a multilook version of the interferogram with 4 looks in range and 4 looks in azimuth.
- 2) Calculate the offsets over the original images by cross-correlating small regions of each image as discussed in class. Plot the range offset vs. range, and determine the average azimuth offset. Submit plots and solve for the slope and offset of the range offset.
- 3) Calculate the baseline components B_{par} and B_{perp} from the offsets you calculated. Calculate the baseline length B and orientation angle α , and report these values.
- 4) Resample image.2 to align with image.1 and form the new interferogram. If you need to resample in azimuth, be sure to account for the Doppler centroids of the images in some manner. Submit an image of the interferogram, either with color to display the interferogram phase and amplitude as in class, or else show the phase only in a gray-scale image.
- 5) Calculate correlation images from step 1) and step 4), using 4 x 4 look averages

for determining each correlation coefficient. Display (and submit) the correlation images as byte files where zero correlation maps to 0, and unity correlation maps to 255.