1 Instructions

Lab 8 is optional. You may attempt one or all of the problems for extra credit. Please save your code for the following exercises to an m-file and send it to me via email (`suadusum@ucsd.edu`). To help you download a file called `lab8start.m` (`http://topex.ucsd.edu/rs/lab8/lab8start.m`). This file has a few lines of code to get you started.

Online you will find 2 binary SAR image files, `*.SLC`, and 2 ascii header files, `*.PRM` (download at `http://topex.ucsd.edu/rs/lab8/`). This is an ERS-1 to ERS-2 tandem pair from the Salton Sea, perpendicular baseline 58m. The `*.PRM` files have been included for your information only and will not be of much use for the problems below.

This lab illustrates SAR interferometry. First look at the phase of the reference image. It will look like random noise. Then look at the phase of the repeat image. It will also look like noise. Finally examine the phase difference. This will show interferometric fringes across the image related to the curvature if the Earth.

2 Exercises

1) Make the best-looking amplitude image that you can using both images 1 and 2. This could involve low-pass filtering and perhaps averaging the two images. I can't provide a recipe for doing this but note that the pixels are 16 m in the range direction and only 4 m in the azimuth direction (top-to-bottom) so the filter should be taller than it is wide by about 4 times. Remember these are complex numbers so would one construct amplitude then filter or filter the real and imaginary parts and then make amplitude? When and how should the images be averaged?

2) Make the interferogram and filter it to make the best-looking phase map. Should one filter before or after interferogram formation? Should one filter the real and imaginary components or filter the phase?

3) Do the best that you can to remove the phase ramp across the image. How do you estimate the phase ramp and what is the best way to remove it?

4) Can you unwrap the phase using MATLAB?