ECE/OPTI 531
LAB2 IMAGE STATISTICS/SCATTERPLOTS

Report due: 9/20/05 (beginning of class)

Purpose: Introduction to image statistics and spectral signatures

Comments: Note, this lab is less structured and will take more time than Lab1!

Maximum number of report text pages (excluding graphs, pictures): 3

Image file(s): "marana432tm" (512byte header + 3bands x 200lines x 200pixels x 8bits/pixel/band, BIL)

Plan:

• *Statistics*

Calculate the DN statistics, histograms and covariance matrix. Plot the DN means and standard deviations versus band number. Which bands have the highest and lowest contrast? Which bands are most correlated, which are least correlated, and what does that mean in terms of their visual appearance relative to each other?

• *Scattergrams/plots*

Calculate the scattergram (Tools menu) and scatterplots for the two most-correlated bands and for the two least-correlated bands. How are the shapes of the scattergrams/plots consistent with the correlation values for these band pairs?

(Tip: Use a contrast stretch such as logarithm or square root (repeated if necessary) to better see the scattergram. Note: the DN origin of the scattergram is at the upper left corner of the scattergram - use Geometry/Mirror to put the origin at the lower left)

• *Controlling scattergram/plot axes*

The scattergram axes ranges in tclSADIE are set by the minimum and maximum DN values in the image. This is a problem in comparing scattergrams from different images, because the axis "floats". What is needed is a "fixed" axis that does not change from image to image. Devise a way, using routines in tclSadie, to make the scattergram axes limits fixed at DN = 0 and 100, without changing the scattergram significantly. (You will have to "dig" through the routines available

to achieve this, and it will take several routines. Start by thinking about what has to be done to fix the DN axes.)

• *Correspondance between image and spectral spaces*

Determine the DN statistics for some representative areas of the following landcover types (tip: Use the polygon tool to define a rectangular image area for statistics calculations, or extract a small area using **Geometry>Window and Subsample** and then calculate the statistics of the area):

vegetation
dark soil
light soil

Plot (precisely) these landcover "signatures" on the TM band4-versus-band3 scattergram for the entire image (there is no direct way to do this in tclSadie, so you will probably have to do it manually, using a printout of the full image scattergram as a base. The scattergram should be plotted over the range [0..100] in both axes, as described above.

20 percentage points extra credit on this lab if you devise a way to do the above class signature plot, in color, using tclSadie routines.

Plot the "signature" of a thinly-vegetated desert area in the spectral space. How is the location of this signature related to the signatures of the compnent landcover types?