TARRAWARRA, AUSTRALIA       TOPSAR

This is a portion of Tarrawarra, Australia home of the Cistercian Monks who produce a decent wine. These are TOPSAR data which are acquired from a plane. The data are quadpolarized (VV, HH, HV, VH) for L, and P bands and a C VV band.

Load the raw C-band image TS0218_C.VVI by selecting Radar Tools → TOPSAR Tools → Convert TOPSAR Data. This takes the raw image and converts the data into radar backscatter coefficient (sigma zero) and the embedded digital elevation model (DEM) into meters.

Display the VV image. Open the header by selecting Radar → TOPSAR Tools → View TOPSAR header for the above image. Locate Tarrawarra on the World Atlas.

1. Sketch the geometry of the radar system using the header data including look angle, height, range and azimuth resolution and spatial resolution.

Now we will open the L and P data, but must first decompress the data. Radar → Open File → Synthesize AIRSAR data. Select file TS02218_L.DAT; this includes both L and P data. You will now see the Synthesize Parameters dialog box. Select "floating point" as output data type and "yes" to output in dB?

2. Look at the L and P bands. What is the typical sigma zero for bright regions, for dark regions, for water?

Compare the data sets. Remember to use the Link option under Tools to view the exact same area of two images simultaneously. Or create a RBG image of the bands of interest.

3. Look at the radar-bright area at ~ 761, 756 (C-band image coordinates). What are the sigma zero values for this region in C, L and P? Compare this to the backscatter values for the intermediate unit at ~753, 900.

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<tr>
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4. What accounts for the variations seen in the radar, or what is the ground cover for the bright and intermediate units?

5. Why do some areas, such as ~749, 661 appear bright in L band and neutral in C band?

NOTE the following figure is a general rule, but depends on the nature of the canopy or overlying material!

Compare the cross-polarized and like-polarized L and P data.

6. What may control variations in brightness seen between the HV and VV or HH data?

7. Which data would you use to measure variations in soil moisture? Can you discern these variations? If so, where?
Open IMDRstretch.gif in Photoshop or ENVI (it is a black and white). This is an image of a feature on the surface of Venus taken by Magellan SAR. The radar is looking from the left (west), with a depression angle of ~27.5°. The spatial resolution in 75m/pixel. The black data gaps are approximately 20 km across. Magellan radar is S band, 12.6 cm. The surface of Venus is hot, 450°C, so there is no water and no weathering by water. Winds are also very slow at the surface and do not produce significant weathering.

8. Identify this feature based on the geomorphology - what is it? What accounts for the variations in radar brightness seen within the feature?

9. What is the nature (roughness, morphology) of the dark material beneath this feature?

10. What are the NE-trending structures on the dark material? Sketch their topography based on the radar look angle.

11. Make a sketch map of this feature and the region. Include the dark materials, the generations of bright materials and structures. Label the units and create a stratigraphic column for the map.