Tutorial: How Do I Use ENVI to Manipulate AIRSAR Images?

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The processes involved to generate analysis-ready images from AIRSAR data is often a deterant to investigators who are more interested in extracting information from their remote sensing data than in data processing. The IDL-based ENVI program from Research Systems, INC. (RSI), provides a convenient, user-friendly, and flexible means of performing several tasks needed to transform the compressed Stokes matrix format POLSAR data or the various filed for the TOPSAR data supplied to investigators by the JPL AIRSAR processing group into usable images. It also enables some higher-level functions such as conventional speckle filtering and image classification. This presentation will show various ENVI capabilites for AIRSAR data manipulation through a step-by-step demonstration applied to an example image.

This tutorial presentation will cover the following processes available in ENVI:
- Reading AIRSAR header: can display header information and write it to a separate file.
- Synthesizing images from compressed Stokes matrix format POLSAR data: can form backscatter images for any frequency and polarization combinations, including arbitrary ellipticity and orientations. Can also generate phase images.
- Ground projection of POLSAR data: assuming a flat Earth, slant-range data can be projected onto ground coordinates.
- Cross-track illumination correction: Effect of cross-track incidence angle variations can be estimated and removed.
- Georeferencing: Ground-projected images from either TOPSAR or POLSAR can be georeferenced if corner coordinated are given. A number of coordinate projections can be chosen.
- Coregistration: ground control points can be selected between the AIRSAR image and another image, which are then used to warp one onto the other chosen as the reference. If the reference image is georeferenced, the warped image will also be assigned map coordinates after coregistration.
- Filtering and speckle reduction: a number of conventional adaptive filtering methods are available to reduce the speckle noise present in all SAR images.
- Classification: several conventional supervised and unsupervised classification methods are available.
- Writing output: the results of any of the above steps can be written to files of various generic formats such as TIFF, GIF, JPEG, BMP, and HDF, as well as several other image processing formats such as ERDAS IMAGINE, PCI, ArcView, and ER Mapper.

As time permits, other capabilities will also be shown. Some capabilities currently lacking will also be discussed.