Initial Experimental Results from PLIS : Polarimetric L-Band Imaging SAR

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PLIS is a fully polarimetric airborne L-band synthetic aperture digital radar that is used in conjunction with a passive L band radiometer to simulate the SMAP (Soil Moisture Active Passive) satellite whose deployment is currently scheduled for late 2014. PLIS was delivered in early to mid 2010 and since then has been used in a number of experimental airborne proving trials. Interesting results from these and other experiments using PLIS will be presented.

The initial airborne tests were carried out in June 2010 and consisted of a series of flights over calibration targets at the University of Adelaide's Buckland Park experimental site. The calibration targets included PARCs (Polarimetric Active Radar Calibrators) as well as square and triangular trihedral PRCs (Passive Radar Calibrators). Some interesting features of the data from these trials will be presented, including demonstrating the ability of unfocussed SAR to provide a quick look analysis for this particular configuration.

Further tests were carried out over test sites near Yanco, a well monitored semi-arid agricultural area in the Murrumbidgee catchment in south-eastern Australia during July and December 2010. Unseasonal wet weather during December turned out to provide some useful data for evaluating the changes in reflectivity of signals scattered from dry and quite wet sites. Results showing these comparisons will be presented, including the difference between motion and non-motion compensated data demonstrating limits to the existing motion compensation algorithms.

Example PLIS image

PLIS can alternate transmission of H and V polarizations and for each transmitted polarization collects H and V data. Comparisons of HH, HV, VH and VV results will be presented together with displays fusing these results.

The relatively wide beamwidth of PLIS and the large grazing angle means that the ground as opposed to the slant resolution varies from ~7.5m to ~30m resulting in quite different statistical behaviour of the ground returns across the swath. The use of histogram normalizing techniques is being investigated to remove this variability and initial results will be presented.

A quite different use of PLIS was a fixed rooftop installation on the Engineering North building at the University of Adelaide. In this mode, PLIS was used to track aircraft arriving at Adelaide airport. Range Doppler aircraft tracks will be presented.

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