Calibration and Performance of the AIRSAR Along-Track Interferometric Processor

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In an Along-Track Interferometric (ATI) SAR the interferometric phase received by two antennas observing a scene from the same location at different times directly corresponds to the component of the motion of the scatterers within a pixel along the line of sight to the radar. The AIRSAR instrument has had an ATI capability since the late 1980's. However, until recently, the data have served as an experimental demonstration only. We present a new processor for AIRSAR ATI data, which takes advantage of improved motion-measurement and new processing techniques.

Calibration of ATI data requires co-registration of the interferometric channels, monitoring of the absolute phase difference between the two channels, accurate timing for each channel, compensation for attitude biases and removal of any residual cross-track baseline. We present this calibration procedure and evaluate the performance of the calibrated data.

The AIRSAR system has both L-band and C-band ATI baselines and can collect ATI data with several different time intervals, with sensitivities to velocity components from a few mm/s to 100 m/s. We display multi-frequency, multi-baseline ATI data sets collected from the 1996 Pacific Rim Campaign through the most recent data collection campaigns. We discuss the application of these data to near-shore coastal monitoring, wave spectral analysis and ship or moving target detection.