NEW TECHNIQUES FOR SAR: THE VALIDATION EXPERIMENTS OF SIR-C/X-SAR

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The SIR-C/X-SAR payload, flown aboard Space Shuttles S'1'S-S9 and STS-68 in April and October of 1994, served as a demonstration of the science and technology applications for which state.-of-thc-art synthetic aperture radar can be useful.

Several of the validation experiments addressed ncw techniques for calibration of SAR, including several types of active and passive ground point targets and thc usc of the Amazon rainforest as a homogeneous natural target. These experiments, together with Project calibration activities, have produced excellent calibration of images from both X-SAR and SIR-C. For example, nominal SIR-C data from the April flight arc now routinely calibrated to radar backscatter to within +/- 2.3 dB, with relative calibration to better than +/- 1.5 dB. Phase imbalance is no worse than +/- 6 degr ccs. SIR- C and X-SAR antenna patterns were demonstrated to be aligned to Icss than one degree[*Freeman et al.*, 1994; *Freeman*, 1995; *Bamler et al., 1994*]

Other microwave remote sensing techniques have been attempted during the flights, and latest results from these will be reviewed in this paper. These include experiments undertaken in Japan to test usc of SAR to assess crop types and crop health, and to measure surface topography, using traditional stereoradargrammetry techniques. In addition, usc of both repeat-pass and flight-to-flight interferometry techniques have been demonstrated. Another experiment rccordcd signals from forward and aft antenna panels separately to create an along-track interferometer. Preliminary results from data collected in this mode near the eastern US coast have shown that it is possible to accurately measure the cross-track component of ocean current velocities. Over land in the Amazon and over ocean in the western Pacific, both radars were able to detect rainstorm activity. Subsequent data analysis has shown that rainfall rate can be measured in the mm/hr range using C-band returns.

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