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DEVELOPMENT OF SIR-C GROUND CALIBRATION EQUIPMENT

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ABSTRACT

SIR-C/X-SAR is currently scheduled for launch in April 1994. SIR-C is an L-Band and C-Band, multi-polarization space.borne. SAR system developed by NASA/J PL. X-SAR is an X-hand SAR system developed by DARA/ASI. One of the problems involved in calibrating the SIR-C instrument is to make sure that the horizontal (H) and vertical (V) polarized beams arc aligned in the azimuth dire.e[ion, i.e. that they arc pointing in the same direction. This is important if the polarimetric performance specifications for the system arc to be met. To solve this problem, wc have designed and built a protot ypc of a low-cost ground receiver capable of recording received power from two antennas, onc H-polarized, the other V-polarized. The two signals arc mixed to audio then recorded on the left and right stereo channels of a standard audio cassette player. The audio cassette recording can then be played back directly into a Macintosh computer, where it is digitized. Analysis of the digitized data allows the beam patterns and alignment of the recorded signals to be determined. The ground receiver has been field-tc.stcd using signals received from the TOPEX altimeter and plots of the beam pattern have been dc.rived from the recorded data.

Another problem in SIR-C calibration is the accuracy and precision of the 8-foot corner reflectors used by JPL in radiometric calibration, These same corner reflectors have been used in many parts of the world to calibrate data from the NASA/JPl. All<SAR, ERS-1 and J-ERS- 1. Recently 8 of these reflectors were measured at a wide-frequency, polarimetric RCS measurement facility. Preliminary analysis of the measurements indicate that the reflectors show close to theoretical performance at L-Band, but that the overall RCS at C-hand is ~2dB lower than the theoretical. Futher results will be presented in the. paper.

The RCS of an 8-foot corner reflector is too low for accurate absolute calibration of S1 R-C data. The U. of Michigan have developed a high -RCS, single horn transponder as a solution to this problem. Prototypes have been built at 1.- and C-hand and tested in an RCS measurement chamber. A temperature control circuit maintains the amplifier in the transponder at a constant temperature, reducing fluctuations in transponder gain.

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