

AirMISR Radiometric Data Quality

The science flight made by AirMISR over Monterey, California on June 29, 1999 successful. The camera successfully slewed to all nine angle positions. The radiometric accuracy and signal-to-noise during this mission was as good as the Science Team has reported in the literature.

The radiometric calibration of AirMISR has been done using the same procedures as used to calibrate the MISR cameras. Cross-comparison studies with MISR, Landsat and Vicarious Calibration studies indicate AirMISR has a 5% bias as compared to other sensors, reporting higher radiances.

Vertical striping may at times be viewed in AirMISR imagery. These are insignificant in terms of radiance variability, as they are typically on the order of 0.5% fluctuations.

The exception is the camera-to-camera uncertainty, which is believed to be smaller for AirMISR, as the aircraft instrument consists of one gimbaled camera. Thus, it is believed that the radiometric uncertainties are small, and the camera signal-to-noise is high.

The values quoted for the systematic component of the radiometric uncertainty, based on vicarious calibration of the instrument, in fractional units, are:

abs_sys_error = 0.050
cam_sys_error = 0.000
band_sys_error = 0.010
pixel_sys_error = 0.005

That is, the systematic component of the absolute, camera-to-camera, band-to-band, and pixel-to-pixel are given above. The pixel-to-pixel uncertainty is large enough to cause some visible striping in the imagery where the scene contrast is low and the image display is stretched to highlight small radiometric differences.

These systematic components are combined with signal-to-noise (SNR), to determine the total error uncertainties. As SNR is signal dependent, the uncertainties are likewise signal dependent. SNR, at two radiance input levels, are as follows:

SNR(equivalent-reflectance=1.0) ~ 1000
SNR(equivalent-reflectance=0.05) ~ 200

Using these, the total radiometric uncertainties can be determined:

abs_total_error= $\sqrt{\text{abs_sys_error}^2+(1/\text{SNR})^2}$
cam_total_error= $\sqrt{2}/\text{SNR}$
band_total_error= $\sqrt{2}*\sqrt{\text{band_sys_error}^2+(1/\text{SNR})^2}$
pixel_total_error= $\sqrt{2}*\sqrt{\text{pixel_sys_error}^2+(1/\text{SNR})^2}$

AirMISR Geometric Data Quality

Geometric calibration was not performed as there was insufficient land in the images. Using nominal pointing corrections, geolocation errors of about 1000 meters for nadir view to up to 6000 meters for the most oblique views can be expected.

References on AirMISR and MISR are available from the [MISR web site](#).

Feedback:

For questions or comments on the AirMISR products, contact the NASA Langley Atmospheric Science Data Center [User Services Office](#).

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