AirMISR
WISCONSIN_2000
Quality Summary

AirMISR Radiometric Data Quality

The science flight made by AirMISR over Wisconsin and the ARM/CART site in Oklahoma on March 3, 2000 was 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 gimballed 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:

$abs\_total\_error=sqrt(abs\_sys\_error^2+(1/SNR)^2)$
$cam\_total\_error=sqrt(2)/SNR$
$band\_total\_error=sqrt(2)*sqrt(band\_sys\_error^2+(1/SNR)^2)$
$pixel\_total\_error=sqrt(2)*sqrt(pixel\_sys\_error^2+(1/SNR)^2)$

AirMISR Geometric Data Quality

The geometric calibration has been performed prior to orthorectification to the UTM map projection grid. A set of ground control points collected from US 1:24000 topographic maps were used to improve geometric data quality. These points are identified in AirMISR imagery in order to remove static errors in the camera pointing and airplane position. Only runs 1 and 5 which are taken over clear land are used for ground control point identification. The results of calibration are also applied to runs 2, 3 and 4 which are acquired over cloudy targets. It is expected that geolocation errors of about 1000 meters for nadir view to up to 6000 meters for the most oblique view are reduced down to an average of about 150 meters regarding both absolute geolocation and coregistration between nine view images. The remaining errors can be regarded as a result of the dynamic errors in airplane attitude and position which are not modeled in the current calibration algorithm.

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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