AirMISR
SNOW_ICE_2001
Quality Summary

AirMISR Radiometric Data Quality

The science flight made by AirMISR in support of the Snow and Ice 2001 campaign on March 8, 2001 was successful. The camera successfully slewed to all nine angle positions. The radiometric accuracy and the signal-to-noise (SNR) during this mission was as good as the Science Team has reported in the literature. Individual product files contain metadata identifying dropped/corrupt lines, saturated pixels and related image quality parameters.

The radiometric calibration of AirMISR has been accomplished using the same procedures as those used to calibrate the MISR cameras; the reported radiometric calibration uncertainties are therefore the same as reported for MISR. 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 SNR 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 = 0.030
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 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

March 8, 2001 - Yampa Valley near Steamboat Springs, CO

The geometric calibration has been performed prior to orthorectification to the Universal Transverse Mercator (UTM) map projection grid. The orthorectified Landsat TM scene (p035r032) obtained through Earth Science Enterprises (ESE) Scientific Data Purchase is used to collect a set of ground control points in order to remove static errors in the camera pointing and airplane position. Using calibration results, geolocation errors of about 1000 meters (m) for nadir view to up to 6000m for the most oblique views are reduced to an average of about 200m regarding both, absolute geolocation and coregistration between the nine viewing angles. The largest geolocation errors, of about 450m, have been observed in the images acquired with the D (forward and aft) camera and mostly in the areas with high surface relief. These remaining errors are regarded as a result of the dynamic airplane attitude and position changes which are not fully 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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