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Earth Observing System

Multi-angle Imaging Spectro-Radiometer

AirMISR Data Products Specifications

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Acronym List

AirMISR .....Airborne Multiangle Imaging SpectroRadiometer
API .....Application Interface
DAAC .....Distributed Active Archive Center
ECS .....EOS Core System
EOS .....Earth Observing System
EOSDIS.....Earth Observing System Data and Information System
HDF.....Hierarchical Data Format
JPL .....Jet Propulsion Laboratory
LaRC .....Langley Research Center
MISR.....Multiangle Imaging SpectroRadiometer
NASA.....National Aeronautics and Space Administration
NCSA.....National Center for Supercomputing Applications
SCF .....Science Computing Facility
SDP .....Science Data Processing

1.0 INTRODUCTION

1.1 IDENTIFICATION

This document describes the data products produced by the Airborne Multiangle Imaging SpectroRadiometer (AirMISR) sensor. The AirMISR instrument was developed to perform validation studies for the MISR project. MISR is a component of the Earth Observing System (EOS) Terra Mission, and the EOS Data Information System (EOSDIS), which in themselves are components of the National Aeronautics and Space Administration's (NASA) Earth Science Enterprise.

1.2 OVERVIEW

AirMISR Science Data Processing (SDP) exists to produce science and supporting data products from AirMISR instrument data. This document describes the data products which are delivered to the Atmospheric Sciences Data Center (ASDC) at NASA's Langley Research Center (LaRC).

The MISR Science Computing Facility (SCF) will support the development of AirMISR science algorithms and software, instrument calibration and performance assessment, as well as provide quality assessment and data validation services with respect to AirMISR SDP. This will include production of data and coefficients required to produce AirMISR data products at the SCF.

1.3 DOCUMENT SCOPE

This document describes the AirMISR SDP Level 1 deliverable data products. It describes in detail each of the AirMISR product files. This document is not meant to be the definitive description of the external input files that are products of other data processing systems. It will only describe the elements that AirMISR needs for its processing, in sufficient detail for AirMISR purposes.

Section 1 of this document is the Introduction to the document.

Section 2 describes the interfaces which this document covers.

Section 3 gives descriptive information common to all of the files described in this document. It describes the overall structure of the native HDF and HDF-EOS grid files.

Section 4 covers the Level 1B1 Radiometric Product.

Section 5 covers the Level 1B2 Georectified Radiance Product.

1.4 METHOD

The method employed in describing these interfaces is to detail the file structure, giving the general layout of the file schematically, describing the contents of the metadata included and describing the grid structures as needed.

1.5 NOTATION

Different types of notation are used for the sections that make up this document:

1) Grid metadata and the various types of AirMISR-specific metadata (such as file and per-block metadata) are listed in tables.

1.6 CONTROLLING DOCUMENTS

1) MISR Science Data Processing Functional Requirements Document, (FRD) JPL D-12417, September 1996 (or latest version).
2) MISR Experiment Implementation Plan, Volume III, Science, Data Processing, and Instrument Operations, Technical and Management Plan (EIP), JPL D-11520, 24 January 1996 (or latest version).
3) MISR Science Data System Software Management Plan (SMP), JPL D-11641, February 1996 (or latest version).
4) SDPIO Implementation Handbook, JPL D-16392, January 1999 (or latest version).
5) MISR Data System Science Requirements, JPL D-11398, September 1996 (or latest version).
6) MISR Level 1 Radiance Scaling and Conditioning Algorithm Theoretical Basis, JPL D-11507, Revision D, January 1999 (or latest version).
7) MISR Level 1 Georectification and Registration Algorithm Theoretical Basis, JPL D-11532, Revision B, August 1996 (or latest version).
8) MISR Level 1 In-flight Radiometric Calibration and Characterization Algorithm Theoretical Basis, JPL D-13398, June 1996 (or latest version).
9) MISR Level 1 Ancillary Geographic Product Algorithm Theoretical Basis, JPL D-13400, Revision B, March 1999 (or latest version).
10) MISR Science Data Quality Indicators, JPL D-13496, January 1997 (or latest version).
11) Data Production Software and Science Computing Facility (SCF) Standards and Guidelines, GSFC EOSDIS document 423-16-01
12) MISR Science Data Processing Quality Assessment Plan, JPL D-13965, 17 January 1997 (or latest version).

1.7 APPLICABLE DOCUMENTS

13) Science User's Guide and Operations Procedure Handbook for the ECS Project, HAIS 193-205-SE1-001 (or latest version).

14) Interface Requirements Document Between EOSDIS Core System (ECS) and Science Computing Facilities, HAIS 209-CD-005-005, March 1996 (or latest version).

15) Software Implementation Guidelines, JPL D-10622 (or latest version).

16) MISR Science Data System Error Policy, JPL D-13137 (or latest version).

17) Statement of Work for the Multi-Angle Imaging SpectroRadiometer (MISR), GSFC 421-12-13-03 (or latest version).

18) MISR Mission Operations Concepts and Requirements, JPL D-11594 (or latest version).

19) SDP Toolkit Users Guide for the ECS Project, HAIS 194-809-SD4-001 (or latest version).

20) HDF Reference Manual, version 4.1r4, developed by the National Center for Supercomputing Applications at the University of Illinois. Contributors: Fortner Research, Unidata Program Center (netCDF), The Independent JPEG Group (JPEG), Jean-loup Gailly and Mark Adler (gzip), and Digital Equipment Corporation (DEC), December 2000.

2.0 INTERFACES

2.1 OVERVIEW

This section gives an overview of the external interfaces for Science Data Processing (SDP) for the AirMISR instrument. All AirMISR data processing takes place at the MISR SCF.

2.2 INPUTS/OUTPUTS FOR AirMISR PROCESSING

The inputs and outputs for the MISR SCF are listed below.

2.2.1 Inputs for the AirMISR Processing at the MISR SCF

Table 2-1: Input Ancillary Datasets and Products

Product	File name(s) (Local Granule ID)	Product Description
AirMISR Ancillary Radiometric Product (ARP)	AIRMISR_ARP_CONFIG_F02_001.hdf AIRMISR_ARP_INFLTCAL_T001_F02_001.hdf AIRMISR_ARP_INFLTCAL_T002_F02_001.hdf[a] AIRMISR_ARP_PRFLTCAL_F02_001.hdf AIRMISR_ARP_PRFLTCHAR_F02_001.hdf	Contains calibration coefficients and other data needed to convert raw measurements to radiances. INFLTCAL file is updated when AirMISR is re-calibrated.
Camera Geometric Model (CGM)	initial.camcol initial orbmodel	Nominal values of corrections to the instrument pointing and position measurements established on the ground.
	cal.camcol cal.orbmodel	Calibrated corrections to the instrument pointing and position measurements established in-flight using ground truth.
DID	/data/bank/anc/DID/database /data/bank/anc/DID/MeanSeaLevel/ geoid_2160h_4320w.half	DTED Intermediate Dataset where DTED is Digital Terrain Elevation Model.
Target List (Optional)	*<date_target>*_target_list.txt	Contains coordinates of targets to be identified by line/sample number in L1B1 metadata.

[a] For flights occuring on or after 6/30/2001.

2.2.2 Outputs for the AirMISR Processing at the MISR SCF

Table 2-2: Output Products

Product	File name(s) (Local Granule ID)	Product Description
Level 1B1 Radiometric Product	AIRMISR_RP_yymmdd_hhmmss_ca_Fvf_vc.hdf	Contains radiometrically calibrated images
Level 1B2 Georectified Radiance Product	AIRMISR_GP_yymmdd_hhmmss_ca_Fvf_vc.hdf	Contains radiometrically calibrated images that have been co-registered and geo-located

Where yymmdd corresponds to the date of the AirMISR flight, hhmmss is the approximate time of target overpass (UTC), ca is the camera angle identifier, vf is the file format version number and vc is the file content version number.

3.0 GENERAL FILE INFORMATION FOR AirMISR PRODUCTS

3.1 GENERAL FILE STRUCTURE

This document describes the specifications for the AirMISR products that will be archived at the NASA LaRC ASDC. The AirMISR files are implemented in the Hierarchical Data Format (HDF), except for the browse files which are in Graphical Interchange Format (GIF). Some of the HDF files covered by this document are of a special type: HDF-EOS Grid, which is an extension of the original HDF as developed by the National Center for Supercomputing Applications (NCSA). The HDF-EOS file interfaces were developed by the EOS Core System (ECS) developers. The standard NCSA HDF terminology as well as the EOS developed interface terminology are used in this document when describing these files.

The HDF-EOS data products created by AirMISR have been defined within the HDF framework and are supported by special application programming interfaces (API) which aid the data producer and user in applying the requisite conventions. These APIs allow data products to be created and manipulated in ways appropriate to each datatype, without regard to the actual HDF objects and conventions underlying them.

It is important to understand that the file specifications are given here are in terms of the logical implementation of the products in HDF and are not the physical description of file contents, although there is an attempt to show what the physical layout looks like. The same data object may exist in different relative locations for two iterations of a product file. The locations are determined by HDF on a file-by-file basis.

3.2 AirMISR PRODUCTS IN NATIVE HDF FORMAT

The AirMISR Ancillary Radiometric Product and the Level 1B1 Radiometric Product use the standard NCSA-supplied HDF file structure.

3.3 AirMISR PRODUCTS IN HDF-EOS GRID FORMAT

The HDF-EOS Grid is the implementation of HDF-EOS originally intended for storing Level 3 and above products, that is, products which have been “gridded” to a single Earth-based map projection. The storage of map projection parameters are part of the format, and routines to access the data in Grid format by geolocation are supplied in the Grid API.

The AirMISR Level 1B2 product includes a separate file for each camera angle at which data were acquired (typically 9 angles) during a single imaging run. As shown in Figure 1, a bounding box is first defined which encloses all of the images. The UTM coordinates of the upper left corner of the bounding box are defined to be the Projection Origin for a particular set of nine images.

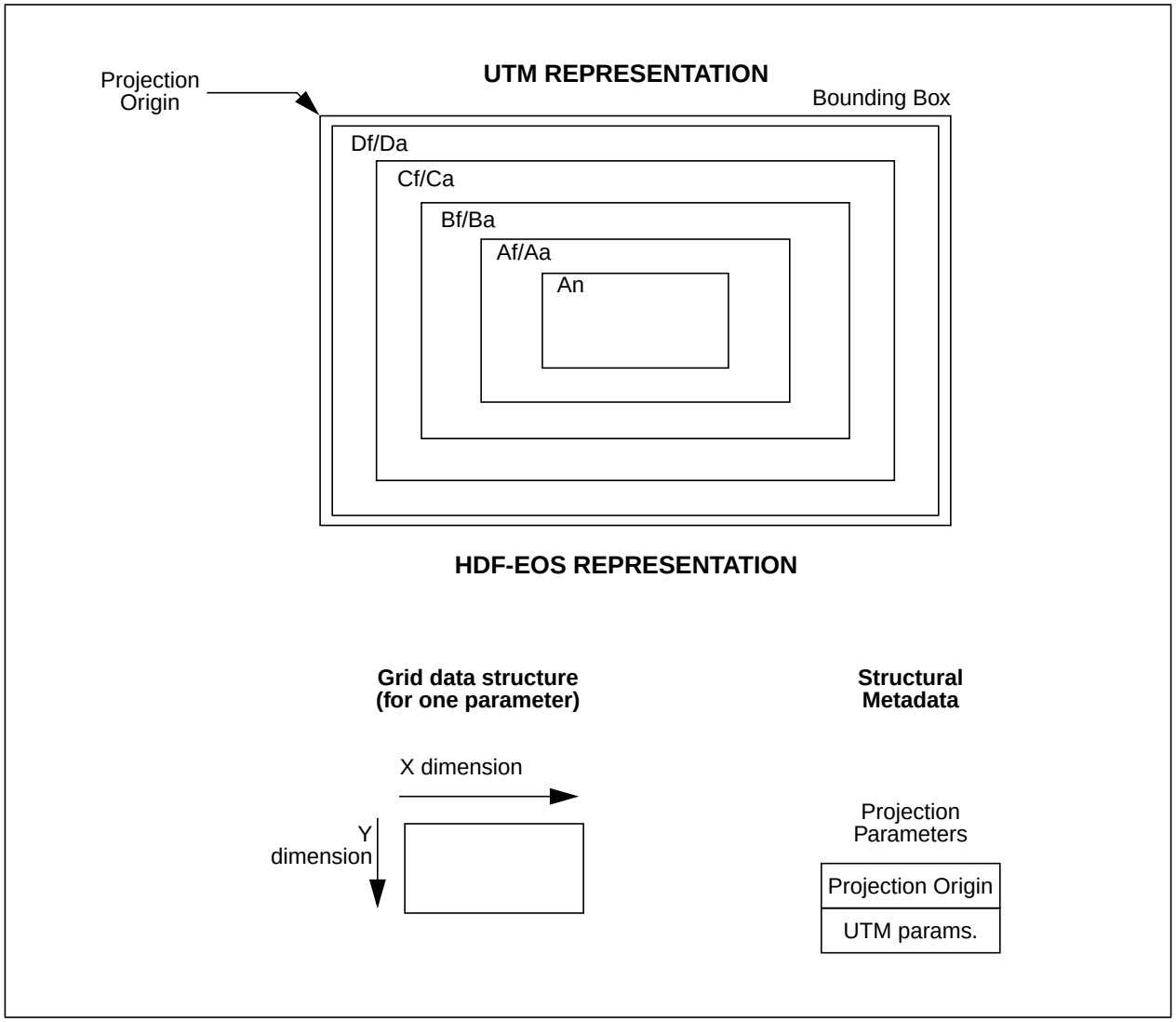

Figure 1: UTM Representation vs. HDF-EOS Grid Representation

3.4 AirMISR PRODUCT METADATA STORAGE

No matter what kind of product file is created, metadata must be attached to it for descriptive purposes. For example, both the radiometric product and the georectified radiance product contain scaled radiances stored as integers to save space. In each case, the metadata contains four Rad_scale_factor values (one per band). Scaled radiances retrieved from the product must be multiplied by the appropriate scale factor to retrieve the measured radiance.

3.4.1 Level 1B1 Radiometric Product Metadata

Metadata for the Radiometric Product are stored in the native HDF file as File Metadata, SDS Metadata and Science Datasets, in some cases. A complete description of the parameters is given in Table 4-2.

3.4.2 Level 1B2 Georectified Radiance Product Metadata

Metadata for the Georectified Radiance Product is stored in the HDF-EOS Grid format file as Grid interface metadata. A complete description of the parameters is given in Table 5-3.

4.0 DATA PRODUCTS FOR LEVEL 1B1

4.1 RADIOMETRIC PRODUCT

4.1.1 Purpose

The Radiometric Product contains the radiances.

During radiance scaling and conditioning the DN values are converted to spectral radiances, and reported in MKS (meter, kilogram, second) units referred to as SI (Système International). Use is made of the camera calibration data, where the response of the system to a known radiance field is quantized. These data represent our best estimate of instrument response, as determined through many different activities.

It is noted that AirMISR does not provide a radiometric product scaled to the exo-atmospheric solar irradiance. As AirMISR does not view the Sun directly, such a data set could only be obtained by employing a solar model, and would be of no greater accuracy than the radiance product.

4.1.2 Product Description

The AirMISR Radiometric Product is produced in native HDF format. Each physical file contains the datasets shown in Table 4-1, including those with color designations corresponding to the four bands of the AirMISR camera.

Table 4-1: AirMISR Level 1B1 Radiometric Product File and Datasets

Local Granule ID[a]	Field Name
AIRMISR_RP_yymmdd_hhmmss_ca_Fvf_vc.hdf	L1B1_Scaled_Rad_Blue
	L1B1_DQI_Blue[b]
	L1B1_Scaled_Rad_Green
	L1B1_DQI_Green[b]
	L1B1_Scaled_Rad_Red
	L1B1_DQI_Red[b]
	L1B1_Scaled_Rad_Nir
	L1B1_DQI_Nir[b]
	line_summary[b]
	std_total_resp
	rad_gain_coeff_1x1
	integration_time

a. Where yymmdd corresponds to the date of the AirMISR flight, hhmmss is the approximate time of target overpass (UTC), ca is the camera angle identifier, vf is the file format version number and vc is the file content version number.

b. Field is not yet implemented. Product files contain default values.

4.1.3 Radiometric Product Files

Table 4-2: AirMISR Level 1B1 Radiometric Product File Contents

Parameter name	Description	Dimensions	Format	Field name
Science Data Sets				
Scaled Radiance, $L^{std}(l_{ccd},p)$.	Total-band, standardized spectral response function weighted.	l_{ccd} x 1504	int16	L1B1_Scaled_Blue L1B1_Scaled_Green L1B1_Scaled_Red L1B1_Scaled_Nir
Image data quality indicator, IDQI (l_{ccd},p)[c]	0 (within specification), 1 (reduced accuracy), 2 (unusable for science), or 3 (unusable for any purpose). Reports performance due to saturation, SNR, or loss of data. See footnote [a].	l_{ccd} x 1504	uint8	L1B1_DQI_Blue L1B1_DQI_Green L1B1_DQI_Red L1B1_DQI_Nir
Per line report[c]: 1) navigation data loss; 2) lost line; 3) corrupt line; 4) pixel 1-1504 DN average, standard deviation, minimum, maximum; 5) overclock pixels 1513-1520 DN average and standard deviation. Note: items 1-3 can be flaged with a 0/1 bit.		l_{ccd} x 7	float32	line_summary
Radiance calibration coefficients, $G_0(p,b)$ [DN], $G_1(b,p)$ [DN/ W m^{-2} μm^{-1} sr^{-1}], $G_2(b,p)$ [DN/ (W m^{-2} μm^{-1} sr^{-1})^2]		3x1504x4	float32	rad_gain_coeff_1x1
$t_{integ}(b)$ [msec]	Integration time associated with above calibration coefficients	4	float32	integration_time

Table 4-2: AirMISR Level 1B1 Radiometric Product File Contents (Continued)

Parameter name	Description	Dimensions	Format	Field name
$S_\lambda(b,\lambda)$ [none], standardized response profiles		4x1471	float32	std_total_resp
File Metadata				
Site location name		1	char8	site_name
Experiment date [yyyymmdd]	This is the date corresponding to the UT time stamp of the first image line, i.e.19980625	1	char8	exp_date
Expected overpass time [UT]	Expected time of Terra overpass (if applicable)	1	char8	expected_overpass_time
Intended target coordinates: latitude [±ddd.ddddd]	Center of target	1	float32	intended_target_lat
Intended target coordinates: longtitude [±ddd.ddddd]	Center of target	1	float32	intended_target_lon
Local time zone name	It is possible for the image to be acquired over an area which spans two time zones. We define the time zone as that associated with the first image line.	1	char8	time_zone_name
Time difference Local time-UT, Δt [hh]		1	float32	ut_to_local_time
Earth-Sun distance (A.U.)		1	float64	earth_sun_distance

Table 4-2: AirMISR Level 1B1 Radiometric Product File Contents (Continued)

Parameter name	Description	Dimensions	Format	Field name
Camera serial no. or identifier		1	char8	serial_number
View angle [±dd.d]	Nominal camera gimbal pointing angle	1	float64	camera_angle
Band names (e.g., Band 1/ Blue)		4	char8	band_name
UT time of first image line [hh.ddddd]		1	char8	time_start
UT time of last image line [hh.ddddd]	Ground target assumed to be in time zone where first image line was acquired.	1	char8	time_stop
Number of image lines, l_{ccd}	Identical for all four bands.	1	int32	no_lines
File revision number	Incremented if this L1B1 file updates and replaces a previous delivery	1	char8	file_revision_number
File generation code name	Code which reads raw image and navigation, and AM-ARP data and writes L1B1 file.	1	char8	code_name
Generation code configuration label	Traces production code configuration used to write the output file	1	char8	code_cm_label

Table 4-2: AirMISR Level 1B1 Radiometric Product File Contents (Continued)

Parameter name	Description	Dimensions	Format	Field name
Per view-angle report: 1) Angle reached or missed report; 2) % of lost lines (per band); 3) % of interpolated lines (per band) 4) % of saturated pixels (per band) 5) % of navigation data acquired		6	char8 float32 float32 float32 float32 float32 float32 float32 float32 float32 float32 float32 float32	angle_reached lost_line_pct_blue lost_line_pct_green lost_line_pct_red lost_line_pct_nir interp_line_pct_nir interp_line_pct_blue interp_line_pct_green interp_line_pct_red sat_pixel_pct_nir sat_pixel_pct_blue sat_pixel_pct_green sat_pixel_pct_red nav_data_pct
Target Location (Optional)	Line/sample coordinates of target in image	2	float64	<*target_name*>_BLUE <*target_name*>_GREEN <*target_name*>_RED <*target_name*>_NIR
SDS Metadata				
Radiance scale factor, $L_{utm}(b,l_{utm},s)$ [W m^{-2} sr^{-1} μm^{-1}].	Conversion factor from scaled radiance to radiance	4	float64	Rad_scale_factor (1 = Blue; 2 = Green; 3 = Red; 4 = Nir)
Integration time [msec]		4	float64	Ccd_int_time
$E_0^{std,in\text{-}band}$ [W m^{-2} μm^{-1}]	Solar irradiances, in-band standardized response weighted	4	float64	std_inband_solar_wgted_height

Table 4-2: AirMISR Level 1B1 Radiometric Product File Contents (Continued)

Parameter name	Description	Dimensions	Format	Field name
$\lambda_{m,solar}^{std,in\text{-}band}$ [nm]	Center wavelength, solar and in-band standardized response weighted	4	float64	std_inband_solar_wgted_center_wav
$\Delta\lambda_{m,solar}^{std,in\text{-}band}$ [nm]	Bandwidth, solar and in-band standardized response weighted	4	float64	std_inband_solar_wgted_width
E_0^{std} [W m^{-2} μm^{-1}]	Solar irradiances, standardized response weighted	4	float64	std_solar_wgted_height
$\lambda_{m,solar}^{std}$[nm]	Center wavelength, solar and standardized response weighted	4	float64	std_solar_wgted_center_wav
$\Delta\lambda_{m,solar}^{std}$ [nm]	Bandwidth, solar and standardized response weighted	4	float64	std_solar_wgted_width
L_{max}(b) [W m^{-2} μm^{-1} sr^{-1}]	Band weighted maximum radiance	4	float64	band_wgted_max_rad

a. IDQIs correspond roughly to a <3%, 3-5%, 5-10%, and >10% absolute radiometric error
b. AM-ARP is AirMISR Ancillary Radiometric Product
c. Field is not yet implemented. Product files contain default values.

5.0 DATA PRODUCTS FOR LEVEL 1B2

5.1 GEORECTIFIED RADIANCE PRODUCT

5.1.1 Purpose

The Level 1B2 Georectified Radiance Product (GRP) consists of four parameter sets that have had applied certain kinds of geometric correction and have been projected to a Universal Transverse Mercator (UTM) map grid. First, the terrain-projected TOA radiance parameter has had a geometric correction applied which removes the errors of aircraft position and pointing knowledge and errors due to topography. The parameter is then ortho-rectified to the surface defined by a global DEM and associated ellipsoid of reference. Second, the ellipsoid-projected TOA radiance uses corrections to the supplied aircraft position and pointing and is not corrected for topography, but is resampled to the ellipsoid of reference. Third, there are the geometric parameters which measure the sun and view angles at the reference ellipsoid. The parameters defined here also carry a Radiometric Data Quality Indicator (RDQI) associated with the parameter.

5.1.2 Product Description

The product is produced as single physical file, as shown in Table 5-1. Each physical file is in the HDF-EOS Grid format and each contains one or more HDF-EOS Grid datasets, corresponding to parameters at certain spatial resolutions. The grid datasets will have the usual x and y dimensions. The x and y dimensions will correspond to the the number of samples in the along-track and cross-track directions.

Table 5-1: AirMISR Level 1B2 Georectified Radiance Product File and Datasets

Local Granule ID	Grid Name	Field Name
AIRMISR_GP_yymmdd_hhmmss_ca_Fvf_vc.hdf [a]	AirMisr	Terrain Blue
		Terrain Green
		Terrain Red
		Terrain Infrared
		Terrain Blue DQI
		Terrain Green DQI
		Terrain Red DQI
		Terrain Infrared DQI
		Ellipsoid Blue
		Ellipsoid Green
		Ellipsoid Red
		Ellipsoid Infrared
		Ellipsoid Blue DQI
		Ellipsoid Green DQI
		Ellipsoid Red DQI
		Ellipsoid Infrared DQI
		Sun Azimuth (degrees)
		Sun Zenith (degrees)
		View Azimuth (degrees)
		View Zenith (degrees)
		Elevation (meters)
		Elevation uncertainty [b]

a. Where yymmdd corresponds to the date of the AirMISR flight, hhmmss is the approximate time of target overpass (UTC), ca is the camera angle identifier, vf is the file format version number and vc is the file content version number.

b. Corresponds to the source used to produce global elevation dataset and is related to elevation accuracy. RMS errors are obtained by CAG group at JPL (IOM:NAB: 388:98-56) using report prepared by Dr. Peter Muller for the EOS-DEM Science Working Group on 12/12/96, titled, "Trade Study #6 -DEM Accuracy Assessment: Difference Map Report". Standard deviation, metric used by MISR is at 1 sigma (i.e., 67 percentile) level, RMS.

5.1.3 Georectified Radiance Product Files

Table 5-2: AirMISR-Grid data structures

Parameter name	Description	Dimensions	Format	Field name
location, upper left corner [UTM coordinates]		2 values	float (f12.5)	location, upper left corner
location, lower right corner [UTM coordinates]		2 values	float (f12.5)	location, lower right corner
Scaled radiance, I_{utm}_band_terr(l_{utm},s) [unitless].	Total-band, standardized spectral response function weighted, resampled to UTM grid (terrain projected).	XDim, YDim	uint16	Terrain Blue, Terrain Green Terrain Red Terrain Infrared.
Data quality index, DQI_band_terr	Value=0 if data missing in some of the 9 image files; Value=255 if data good (Isn't this backwards to the MISR convention of 0=good; 255=bad)	XDim, YDim	uint8	Terrain Blue DQI, Terrain Green DQI Terrain Red DQI Terrain Infrared DQI.
Scaled radiance, I_{utm}_band_ellip(l_{utm},s) [unitless].	Total-band, standardized spectral response function weighted, resampled to UTM grid (ellipsoid projected).	XDim, YDim	uint16	Ellipsoid Blue, Ellipsoid Green Ellipsoid Red Ellipsoid Infrared.
Data quality index, DQI_band_ellip	Value=0 if data missing in some of the 9 image files; Value=255 if data good (Isn't this backwards to the MISR convention of 0=good; 255=bad)	XDim, YDim	uint8	Ellipsoid Blue DQI, Ellipsoid Green DQI Ellipsoid Red DQI Ellipsoid Infrared DQI.

Table 5-2: AirMISR-Grid data structures (Continued)

Parameter name	Description	Dimensions	Format	Field name
Solar zenith angle $\theta_o(l_{utm},s)$ [degrees]		XDim, YDim	float32	Sun Azimuth (degrees)
Solar azimuth angle $\phi_o(l_{utm},s)$ [degrees]		XDim, YDim	float32	Sun Zenith (degrees)
View zenith angle $\theta(l_{utm},s)$ [degrees]		XDim, YDim	float32	View Azimuth (degrees)
View azimuth angle $\phi_o(l_{utm},s)$ [degrees]		XDim, YDim	float32	View Zenith (degrees)
Elevation (l_{utm},s) [meters]		XDim, YDim	int16	Elevation (meters)
Elevation uncertainty (l_{utm},s)		XDim, YDim	float32	Elevation uncertainty

Table 5-3: AirMISR-Metadata (attributes) display

Parameter name	Description	Dimensions	Format	HDF metadata name(s)
location, upper left corner [lat, lon]		2 values	float64	UL Corner (deg): Latitude Longitude
location, lower right corner [lat, lon]		2 values	float64	LR Corner (deg): Latitude Longitude
Radiance scale factor, $L_{utm}(b,l_{utm},s)$ [W m^{-2} sr^{-1} μm^{-1}].	Conversion factor from scaled radiance to radiance	4 values	float64	Rad_scale_factor (1 = Blue; 2 = Green; 3 = Red; 4 = Nir)

Table 5-3: AirMISR-Metadata (attributes) display (Continued)

Parameter name	Description	Dimensions	Format	HDF metadata name(s)
E_0^{std}(b) [W m^{-2} μm^{-1}]	Solar irradiances, standardized response weighted	XDim, YDim	float64	(std_inband_solar_wgted _height) (Values 1-4)
$\lambda_{m,solar}^{std,in\text{-}band}$ [nm]	Center wavelength, solar and in-band standardized response weighted	4	float64	std_inband_solar_wgted _center_wav
$\Delta\lambda_{m,solar}^{std,in\text{-}band}$ [nm]	Bandwidth, solar and in-band standardized response weighted	4	float64	std_inband_solar_wgted _width
E_0^{std} [W m^{-2} μm^{-1}]	Solar irradiances, standardized response weighted	4	float64	std_solar_wgted_height
$\lambda_{m,solar}^{std}$[nm]	Center wavelength, solar and standardized response weighted	4	float64	std_solar_wgted_center_ wav
$\Delta\lambda_{m,solar}^{std}$ [nm]	Bandwidth, solar and standardized response weighted	4	float64	std_solar_wgted_width
L_{max}(b) [W m^{-2} μm^{-1} sr^{-1}]	Band weighted maximum radiance	4	float64	band_wgted_max_rad
Start image time (UT)		scalar	char8	Minimum_image_time
End image time (UT)		scalar	char8	Maximum_image_time
Earth-Sun distance (A.U.)		scalar	float64	Sun_distance