3. Level 1B Data Product

3.1 Overview

Level 1B Data Products is an HDF file. Each file contains a complete 1-scene image data generated from Level 1A Data.
All of these data are stored together with Metadata and Swath Layout parts in one HDF file (see Note1).
Level 1B Product is created by performing the geometric and radiometric corrections on the original Level 1A image data, and the final result is projected onto map at full instrument resolutions. The Level 1B Data generation includes also scene registrations for SWIR and TIR data.
And furthermore for SWIR in particular, the parallax errors due to the spatial locations of all of its bands are also corrected.

Note1: As Ancillary Data and Supplement Data (VNIR, SWIR and TIR) are included in Level 1B Data Product in "ASTER Level 1 Data Product Specification (science version, version 2.0)", these will be stored in Level 1B data product HDF in next version.

Note2: Resolution is shown as follows.

Subsystem	VNIR	SWIR	TIR
Resolution	15 m	30 m	90 m

3.2 Data Structure

(1) Data Type
There are five categories of HDF data type included in Level 1B data product.
NOTE: VNIR (4 bands) and SWIR (6 bands) image data are 8-bit unsigned integer science data, and TIR (5 bands) image data are 16-bit unsigned integer science data in each categories.

(2) Data Structure
The physical data of Level 1B Data Product is shown in Figure 3.2-1.

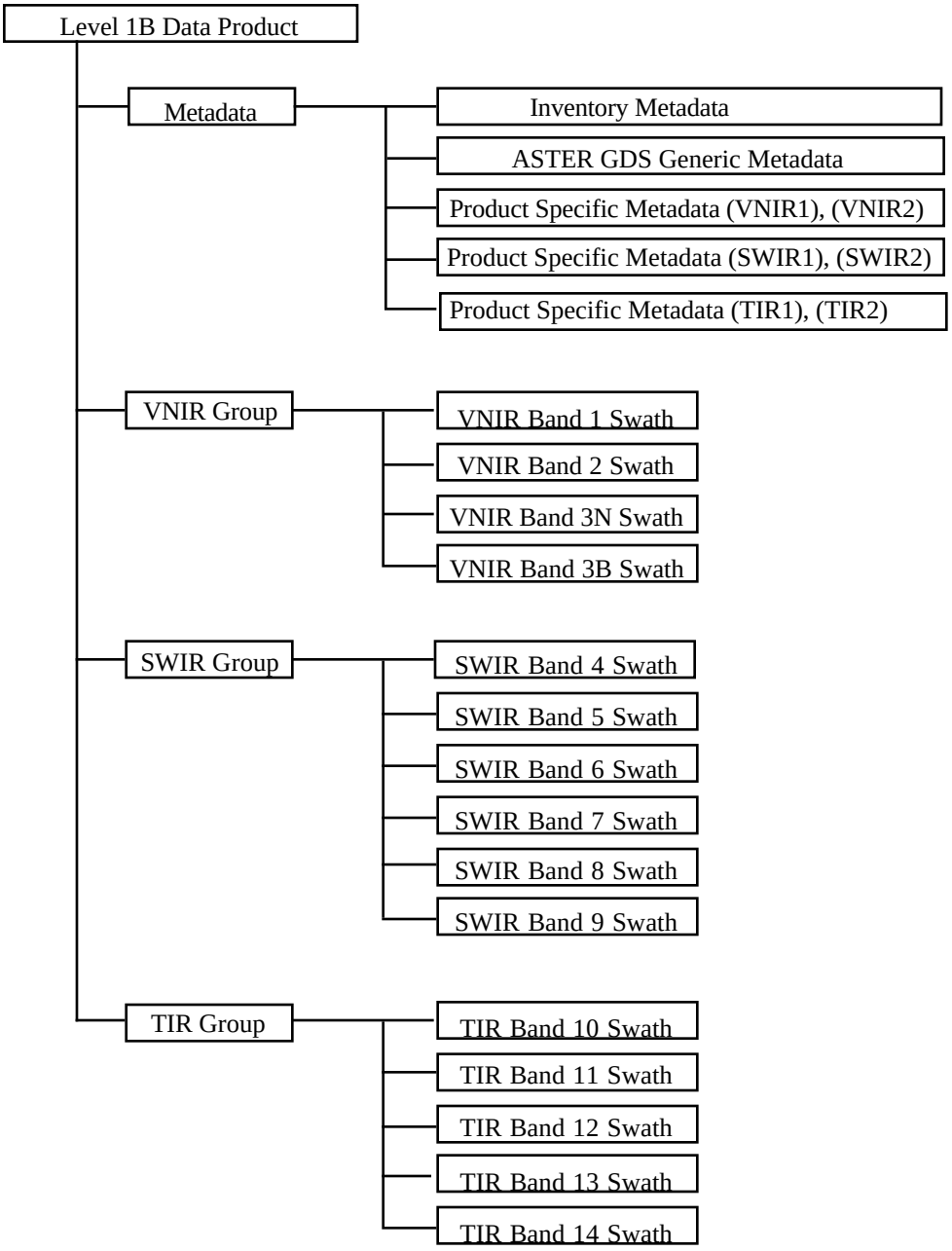


Figure 3.2-1 Physical Data of Level 1B Data Product

3.3 Data Format

3.3.1. Metadata

Level 1B Metadata consists of five Master Groups, which are

(1) Inventory Metadata
(2) ASTER GDS Generic Metadata
(3) Product Specific Metadata(VNIR1): including the attribute about band-1 and 2 data.
(4) Product Specific Metadata(VNIR2): including the attribute about band-3N and 3B data.
(5) Product Specific Metadata(SWIR1): including the attribute about band-4, 5 and 6 data.
(6) Product Specific Metadata(SWIR2): including the attribute about band-7, 8 and 9 data
(7) Product Specific Metadata(TIR1): including the attribute about band-10,11 and 12 data.
(8) Product Specific Metadata(TIR2): including the attribute about band-13 and 14 data.

About concept and definition of master groups, refer to SDP Toolkit Users Guide for the ECS Project, Appendix J.

3.3.1.1. Inventory Metadata

(1) Indexes of Objects

The object list of Inventory Metadata is shown in Table 3.3.1-1. Inventory metadata attributes apply to the whole L1B product, and are written to the HDF file attribute coremetadata.0.
Inventory metadata contains ASTER Meta-Parameters in Generic header for ASTER GDS Products (about Generic header for ASTER GDS Products, see ASTER LEVEL1 DATA PRODUCTS SPECIFICATION, science version, version 2). The attributes included in inventory metadata are associated with DID311.
(In Table 3.3.1-1, group names are written in **Bold** characters. A group contains a set of objects which all have a similar theme.)
The objects in *Italic* character are not authorized by Level1 WG, and will be deleted in next version.

Table 3.3.1-1 List of Objects in Inventory Metadata(1/2)

No.		**Group**/Object Name	type(*1)	Description
1		sizeMBDataGranule	double	The volume of data contained in the granule.
2		PlatformShortName	string	'AM-1' fixed.
3		InstrumentShortName	string	'ASTER' fixed.
4		**BoundingRectangle**		This block contains area coverage for a granule.
	1	WestBoundingCoordinate	double	Western-most coordinate of the scene expressed in longitude.
	2	NorthBoundingCoordinate	double	Northern-most coordinate of the scene expressed in latitude.
	3	EastBoundingCoordinate	double	Eastern-most coordinate of the scene expressed in longitude.
	4	SouthBoundingCoordinate	double	Southern-most coordinate of the scene expressed in latitude.
5		**SingleDateTime**		This contains the time of day and calendar date for a granule.
	1	TimeofDay	string	format: HHMMSSSSSSSZ
	2	CalendarDate	string	format: YYYYMMDD
6		**Review**		This block provides for dates and status as applicable for collection which are active.
	1	FutureReviewDate	string	The date of the nearest planned QA peer review in future. format: YYYYMMDD
	2	ScienceReviewDate	string	The date of the last QA peer review. format: YYYYMMDD

Table 3.3.1-1 List of Objects in Inventory Metadata(2/2)

No.		**Group**/Object Name	type(*1)	Description
7		**QAStats**		This block contains measures of quality for a granule.
	1	QAPercentMissingData	double	% of missing data of the scene.
	2	QAPercentOutofBoundsData	double	% of out of bounds data of the scene.
	3	QAPercentInterpolatedData	double	% of interpolated data of the scene.
8		ReprocessingActual	string	The stating what reprocessing has been performed on this granule. {not reprocessed, reprocessed once, reprocessed twice, free text}
9		PGEVersion	string	The version of PGE
10		ProcessingLevelID	string	The classification of the science data processing level: '1B'
11		MapProjectionName	string	The name of the mapping method for the data.
12		***AdditionalAttributes***		This group contains the product specific attributes definition.
		*AdditionalAttributesContainer(n)(*2)*		This container contains the additional attributes of the product. Currently, only Day/Night Flag is contained in this container.
	1	*AdditionalAttributeName(n)(*2)*	string	Name of additional attribute: Day/Night Flag
	2	*AdditionalAttributeDescription(n)(*2)*	string	Description of additional attribute: ‘The Flag indicates observation condition’
	3	*AdditionalAttributeDataType(n)(*2)*	string	Data type of additional attribute: ‘STRING’
13		***InformationContent***		This group contains the product specific attribute value.
		*InformationContentContainer(n)(*2)*		This container contains the information content. Currently, only Day/Night Flag is contained in this container.
	1	*ParameterValue(n)(*2)*	string	Value of additional attribute: ‘DT’: observation in daytime ‘NT’: observation in nighttime
14		*SensorShortName*	string	The short name for sensor(s) using in generating the product: ‘ASTER_VNIR’,’ASTER_SWIR’,’ASTER_TIR’,’ASTER_STEREO’

NOTES:
(*1) Object types used in Metadata are
a. datetime: CCSDS A(UTC)Format
b. integer
c. double
d. string
(*2) Object whose name followed by (n) has “class” attribute, it may repeat n-times.

3.3.1.2. ASTER GDS Generic Metadata

(1) Indexes of Objects
The Object list of ASTER GDS Generic metadata is shown in Table 3.3.1-2. ASTER GDS Generic metadata attributes are written to the HDF file attribute productmetadata.0.
ASTER GDS Generic metadata contains ASTER Parameters in Generic Header for ASTER GDS Products (about Generic header for ASTER GDS Products, see ASTER LEVEL1 DATA PRODUCTS SPECIFICATION, science version, version 2). The ASTER Parameters are ASTER GDS specific attributes, i.e. not associated with DID311.
(In Table 3.3.1-2, group names are written in **Bold** characters. A group contains a set of objects which all have a similar theme.)
The objects in *Italic* character are not authorized by Level1 WG, and will be deleted in next version.

Table 3.3.1-2 List of Object in ASTER GDS Generic Metadata (1/4)

No.		**Group**/Object Name	type(*1)	Description
1		IDofASTERGDSDataGranule	string	This provides a unique identifier for location of a data granule held in ASTER GDS.
2		ReceivingCenter	string	'EDOS' fixed.
3		ProcessingCenter	string	'ASTER-GDS' fixed.
4		GenerationDateandTime	datetime	Generation date and time of this Level1B product.
5		**PointingAngles**		Specification of the pointing angles of ASTER sensors.
		PointingAnglesContainer(n) (*2)		n = number of sensors
	1	SensorName(n)(*2)	string	‘VNIR’ or ‘SWIR’ or ‘TIR’
	2	PointingAngle(n)(*2)	double	pointing angle in degrees
	3	SettingTimeofPointing(n)(*2)	datetime	YYYY-MM-DDThh:mm:ssZ
6		**GainInformation**		The information of the gain level.
		GainInformationContainer(n) (*2)		This container contains the level of the data acquisition gain for VNIR and SWIR.
	1	Gain(n)(*2)	string	(Band Number, Band Gain) where , Band Number: ‘01’,’02’,’3N’,’3B’,’04’,’05’,’06’,’07’,’08’,’09’ Band Gain: for VNIR: ‘HGH’: high gain ‘NOR’: normal gain ‘LOW’: low gain for SWIR: ‘HGH’: high gain ‘NOR’: normal gain ‘LO1’: low gain 1 ‘LO2’: low gain 2 when data is not acquired or doesn't exist: 'OFF'
7		**CalibrationInformation**		Calibration information used to generate the geometric and radiometric correction tables.

Table 3.3.1-2 List of Object in ASTER GDS Generic Metadata (2/4)

No.			**Group**/Object Name	type(*1)	Description
7	1		GeometricDBversion	string	The version information of the geometric correction data. (Version, Issuance date, Comments)
	2		RadiometricDBversion	string	The version information of the radiometric correction data. (Version, Issuance date, Comments)
8			**DataQuality**		The information about the quality of this product.
	1		**CloudCoverage**		The information about the cloud coverage of the scene
		1	SceneCloudCoverage	integer	The percentage of cloud coverage for the whole scene.
		2	QuadrantCloudCoverage	integer	The percentages for 4 quarters of a scene in the order of: upper left -> upper right -> lower left -> lower right
9			SourceDataProduct	string	The information about the input data used for generating this Level-1B product. (DataID, GenDT, Datatyp) where, DataID: ID of ASTER GDS Data granule. GenDT: Generation date and time. Datatyp: Data type, 'PDS' or 'EDS'
10			**InstrumentInformation**		The information about sensors used to acquire data.
	1		ASTEROperationMode	string	The types of ASTER operation. 'OBSERVATION' or 'CALIBRATION' or 'TEST'
	2		**ObservationMode**		This group contains ASTER observation mode.
			ObservationModeContainer(n) (*2)		The container of ASTER observation mode.
		1	ASTERObservationMode(n) (*2)	string	The observation mode of each sensor group. (SGname, Observation) where, SGname : 'VNIR1' or 'VNIR2' or 'SWIR' or 'TIR' Observation : ‘ON’ (data is acquired) or ‘OFF’ (data is not acquired, or not existing in the granule)

Table 3.3.1-2 List of Object in ASTER GDS Generic Metadata (3/4)

No.		Parameter Name	type(*1)	Description
10	3	ProcessedBands	string	The status of all bands during observation. Format : set of flags described as 2-byte string. byte = 01,02,3N~14 (band 01,02,3N~14 data is acquired.) = XX (data corresponding to its band position is not acquired) Example : Value = "01023NXX0405XXXXXXXX1011121314"
11		**SceneInformation**		The information about the scene concerning with the data granule.
	1	ASTERSceneID	integer	The scene identifier defined by path, row and view. (path, row, view) where, path: 1-233(nominal) row: 1-TBD view: 1-TBD
	2	*AOSSceneID*	string	The scene ID defined by AOS (definition: TBD).
	3	OrbitNumber	integer	The orbit number of the satellite, when data is acquired.
	4	RecurrentCycleNumber	integer	The satellite recurrent cycle number and the revolution number in the cycle. (cycle No., revolution No.) where, cycle: 1-260(max.) revolution: 1-233(nominal)
	5	FlyingDirection	string	The satellite flight direction when observation is done. ‘AS’: ascending direction. ‘DE’: descending direction.
	6	SolarDirection	double	The sun direction as seen from the scene center. (az, el) where, az: azimuth angle in degree. 0.0 <= az < 360.0 measured eastward from North. el: elevation angle in degree. -90.0 <= el <= 90.0
	7	SpatialResolution	integer	The nominal spatial resolutions of VNIR, SWIR and TIR (unit : meter). (resolution of VNIR, resolution of SWIR, resolution of TIR)

Table 3.3.1-2 List of Object in ASTER GDS Generic Metadata (4/4)

No.			Parameter Name	type(*1)	Description
12			***SceneCoordinates***		This group contains the information of coordinates of the scene.
	1		***SceneCoord***		
			*SceneCoordContainer(n)(*2)*		The container of the scene coordinates, in the order of: upper left -> upper right -> lower left -> lower right
		1	*FourCornersLongandLat(n) (*2)*	double	Longitude and latitude of each corners of the full scene. unit : degree (long, lat) where, long: East longitude -180.0 <= long <= 180.0 lat: latitude -90.0 <= lat<= 90.0
	2		*CenterLongitudeandLatitude*	double	Longitude and latitude of the scene center. unit : degree (long, lat) where, long: East longitude -180.0 <= long <= 180.0 lat: latitude -90.0 <= lat <= 90.0
	3		***QuadSceneCoord***		
			*QuadSceneCoordContainer(n) (*2)*		This container contains longitudes and latitudes of the quadrant scene, in the order of: upper left -> upper right -> lower left -> lower right
		1	*FourCornersLongndLatofQuad(n)(*2)*	double	Longitude and latitude of 4 corners of the each quadrant, in the order of: upper left -> upper right -> lower left -> lower right ((long, lat)*4) where, long: East longitude (degree) -180.0 <= long <= 180.0 lat: latitude (degree) -90.0 <= lat <= 90.0
13			*IDofBrowseDatagranule*	string	Logical reference to the browse product.

NOTES:

(*1) Object types used in Metadata are

a. datetime: CCSDS A(UTC)Format
b. integer
c. double
d. string

(*2) Object whose name followed by (n) has “class” attribute, it may repeat n-times.

3.3.1.3. Product Specific Metadata(VNIR)

(1) Indexes of Objects
The Object list of Product Specific metadata(VNIR1) and Product Specific metadata(VNIR2) are shown in Table 3.3.1-3. Product Specific metadata(VNIR1) attributes (VNIRBand1Data and VNIRBand2Data Groups) are written to the HDF file attribute productmetadata.v1 and Product Specific metadata(VNIR2) attributes (VNIRBand3NData and VNIRBand3BData Groups) are written to productmetadata.v2.
Product Specific Metadata(VNIR1) and Product Specific metadata(VNIR2) include product specific attributes, i.e. not associated with DID311.
(In Table 3.3.1-3, group names are written in **Bold** characters. A group contains a set of objects which all have a similar theme.)
The objects in *Italic* character are not authorized by Level1 WG, and will be changed in next version.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(1/9)

No.			**Group**/Object Name	type(*1)	Description
1			**VNIRBand1Data**		The information about VNIR band 1 of Level-1B
	1		ImageDataInformation1	integer	The information of VNIR band 1 image data. (npx, nln, bpp) where, npx: Number of pixels per line(4980 : nominal) nln: Number of lines in frame(4200 : nominal) bpp: Bytes per pixel (1 : fixed)
	2		**ImageStatistics1**		The statistical information about the quality of Level1B VNIR band 1 data.
		1	MinimumValue1	integer	Minimum value in this band of Level1B VNIR image data: 0 <= min. <= 255
		2	MaximumValue1	integer	Maximum value in this band of Level1B VNIR image data: 0 <= max. <= 255
		3	MeanValue1	double	Mean value in this band of Level1B VNIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue1	double	Standard deviation value in this band of Level1B VNIR image data.
		5	ModeValue1	integer	Mode value in this band of Level1B VNIR image data: 0 <= mode <= 255
		6	MedianValue1	integer	Median value in this band of Level1B VNIR image data: 0 <= med. <= 255
	3		**DataQuality1**		This group contains the information about the quality of Level1B band 1 VNIR data.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(2/9)

No.					**Group**/Object Name	type(*1)	Description
1	3	1			NumberofBadPixels1	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels1**		This group contains the information about bad pixels.
					ListofBadPixels1Container(n)(*2)		
			1		DirectionofBadPixel1(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP1(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP1(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP1(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel1(n)(*2)	string	The cause of bad data: 'M' : Data missing 'D' : Damaged Detector 'I' : Interpolated Data
	4				**ProcessingParameters1**		This group contains the parameters used by Level-1B generation processing.
		1			CorIntel1	string	Correction of the intertelescope error of SWIR and TIR: 'N/A' fixed.
		2			CorPara1	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3			ResMethod1	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4			SceneRotationAngle1	double	Scene rotation angle of Level-1B Band-1 image.
		5			ProjectionParameters1	double	Parameters used in GCTP Map projection.
		6			*UTMZoneCode1*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7			*SpheroidCode1*	integer	Spheroid code used in processing.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(3/9)

No.			**Group**/Object Name	type(*1)	Description
1	5		**UnitConversionCoeff1**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-1 image.
		1	Incl1	double	Inclination.
		2	Offset1	double	Offset : 0.0 fixed.
		3	UnSatMin1	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax1	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit1	string	Converted Unit
2			**VNIRBand2Data**		The information about VNIR band 2 of level-1B.
	1		ImageDataInformation2	integer	The information of VNIR band 2 image data. (npx, nln, bpp) where, npx: Number of pixels per line(4980: nominal) nln: Number of lines in frame(4200: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics2**		The statistical information about the quality of Level1B VNIR data.
		1	MinimumValue2	integer	Minimum value in this band of Level1B VNIR image data: 0 <= min. <= 255
		2	MaximumValue2	integer	Maximum value in this band of Level1B VNIR image data: 0 <= max. <= 255
		3	MeanValue2	double	Mean value in this band of Level1B VNIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue2	double	Standard deviation value in this band of Level1B VNIR image data.
		5	ModeValue2	integer	Mode value in this band of Level1B VNIR image data: 0 <= mode <= 255
		6	MedianValue2	integer	Median value in this band of Level1B VNIR image data: 0 <= med. <= 255
	3		**DataQuality2**		This group contains the information about the quality of Level1B VNIR data.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(4/9)

No.				**Group**/Object Name	type(*1)	Description
2	3	1		NumberofBadPixels2	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2		**ListofBadPixels2**		This group contains the information about bad pixels.
				ListofBadPixels2Container(n)(*2)		
			1	DirectionofBadPixel2(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP2(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP2(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP2(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel2(n)(*2)	string	The cause of bad data: 'M' : Data missing 'D' : Damaged Detector 'I' : Interpolated Data
	4			**ProcessingParameters2**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel2	string	Correction of the intertelescope error of SWIR and TIR: 'N/A' fixed.
		2		CorPara2	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3		ResMethod2	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle2	double	Scene rotation angle of Level-1B Band-2 image.
		5		ProjectionParameters2	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode2*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7		*SpheroidCode2*	integer	Spheroid code used in processing.
	5			**UnitConversionCoeff2**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-2 image.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(5/9)

No.			**Group**/Object Name	type(*1)	Description
2	5	1	Incl2	double	Inclination.
		2	Offset2	double	Offset : 0.0 fixed.
		3	UnSatMin2	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax2	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit2	string	Converted Unit
3			**VNIRBand3NData**		The information about VNIR band 3N of level-1B.
	1		ImageDataInformation3N	integer	The information of VNIR band 1 image data. (npx, nln, bpp) where, npx: Number of pixels per line(4980: nominal) nln: Number of lines in frame(4200: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics3N**		The statistical information about the quality of Level1B VNIR data.
		1	MinimumValue3N	integer	Minimum value in this band of Level1B VNIR image data: 0 <= min. <= 255
		2	MaximumValue3N	integer	Maximum value in this band of Level1B VNIR image data: 0 <= max. <= 255
		3	MeanValue3N	double	Mean value in this band of Level1B VNIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue3N	double	Standard deviation value in this band of Level1B VNIR image data.
		5	ModeValue3N	integer	Mode value in this band of Level1B VNIR image data: 0 <= mode <= 255
		6	MedianValue3N	integer	Median value in this band of Level1B VNIR image data: 0 <= med. <= 255
	3		**DataQuality3N**		This group contains the information about the quality of Level1B VNIR data.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(6/9)

No.					**Group**/Object Name	type(*1)	Description
3	3	1			NumberofBadPixels3N	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels3N**		This group contains the information about bad pixels.
					ListofBadPixels3NContainer (n)(*2)		
			1		DirectionofBadPixel3N(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP3N(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP3N(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP3N(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel3N(n)(*2)	string	The cause of bad data: 'M' : Data missing 'D' : Damaged Detector 'I' : Interpolated Data
	4				**ProcessingParameters3N**		This group contains the parameters used by Level-1B generation processing.
		1			CorIntel3N	string	Correction of the intertelescope error of SWIR and TIR: 'N/A' fixed.
		2			CorPara3N	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3			ResMethod3N	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4			SceneRotationAngle3N	double	Scene rotation angle of Level-1B Band-3N image.
		5			ProjectionParameters3N	double	Parameters used in GCTP Map projection.
		6			*UTMZoneCode3N*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7			*SpheroidCode3N*	integer	Spheroid code used in processing.
	5				**UnitConversionCoeff3N**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-3N image.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(7/9)

No.			**Group**/Object Name	type(*1)	Description
3	5	1	Incl3N	double	Inclination.
		2	Offset3N	double	Offset : 0.0 fixed.
		3	UnSatMin3N	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax3N	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit3N	string	Converted Unit
4			**VNIRBand3BData**		The information about VNIR band 3B of Level-1B.
	1		ImageDataInformation3B	integer	The information of VNIR band 3B image data. (npx, nln, bpp) where, npx: Number of pixels per line(4980 : nominal) nln: Number of lines in frame(4200 : nominal) bpp: Bytes per pixel (1 : fixed)
	2		**InitialExtractAddress**	integer	The extract address of the first available pixel in each refreshing cycle of VNIR band-3B image data. Since, there are as many as 9 refreshing cycles in a frame data (nominal = 9 for a 9.5 sec frame), there extract addresses will form a list consisting of 9 elements. (ExtrAd-1, ExtrAd-2, ..., ExtrAd-nrc) ExtrAd : 0-899
	3		**ImageStatistics3B**		The statistical information about the quality of Level1B VNIR data.
		1	MinimumValue3B	integer	Minimum value in this band of Level1B VNIR image data: 0 <= min. <= 255
		2	MaximumValue3B	integer	Maximum value in this band of Level1B VNIR image data: 0 <= max. <= 255
		3	MeanValue3B	double	Mean value in this band of Level1B VNIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue3B	double	Standard deviation value in this band of Level1B VNIR image data.
		5	ModeValue3B	integer	Mode value in this band of Level1B VNIR image data: 0 <= mode <= 255
		6	MedianValue3B	integer	Median value in this band of Level1B VNIR image data: 0 <= med. <= 255

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(8/9)

No.					**Group**/Object Name	type(*1)	Description
4	4				**DataQuality3B**		This group contains the information about the quality of Level1B VNIR data.
		1			NumberofBadPixels3B	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels3B**		This group contains the information about bad pixels.
					ListofBadPixels3BContainer (n)(*2)		
			1		DirectionofBadPixel3B(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP3B(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP3B(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP3B(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel3B(n)(*2)	string	The cause of bad data: 'M' : Data missing 'D' : Damaged Detector 'I' : Interpolated Data
	5				**ProcessingParameters3B**		This group contains the parameters used by Level-1B generation processing.
		1			CorIntel3B	string	Correction of the intertelescope error of SWIR and TIR: 'N/A' fixed.
		2			CorPara3B	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3			ResMethod3B	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4			SceneRotationAngle3B	double	Scene rotation angle of Level-1B Band-3B image.
		5			ProjectionParameters3B	double	Parameters used in GCTP Map projection.
		6			*UTMZoneCode3B*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7			*SpheroidCode3B*	integer	Spheroid code used in processing.

Table 3.3.1-3 List of Object in Level 1B Product Specific Metadata(VNIR)(9/9)

No.			**Group**/Object Name	type(*1)	Description
4	6		**UnitConversionCoeff3B**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-3B image.
		1	Incl3B	double	Inclination.
		2	Offset3B	double	Offset : 0.0 fixed.
		3	UnSatMin3B	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax3B	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit3B	string	Converted Unit

NOTES:
(*1) Object types used in Metadata are
a. datetime: CCSDS A(UTC)Format
b. integer
c. double
d. string
(*2) Object whose name followed by (n) has “class” attribute, it may repeat n-times.

3.3.1.4. Product Specific Metadata(SWIR)

(1) Indexes of Objects
The Object list of Product Specific metadata(SWIR1) and Product Specific metadata(SWIR2) are shown in Table 3.3.1-4. Product Specific metadata(SWIR1) attributes (SWIRBand4Data, SWIRBand5Data and SWIRBand6Data Groups) are written to the HDF file attribute productmetadata.s1 and Product Specific metadata(SWIR2) attributes (SWIRBand7Data, SWIRBand8Data and SWIRBand9Data Groups) are written to the HDF file attribute productmetadata.s2.
Product Specific Metadata(SWIR1) and Product Specific metadata(SWIR2) include product specific attributes, i.e. not associated with DID311.
(In Table 3.3.1-4, group names are written in **Bold** characters. A group contains a set of objects which all have a similar theme.)
The objects in *Itaric* character are not authorized by Level1 WG, and will be changed in next version.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(1/19)

No.			**Group**/Object Name	type(*1)	Description
1			**SWIRBand4Data**		The information about SWIR band 4 of Level-1B.
	1		ImageDataInformatiln4	integer	The information of SWIR band 4 image data. (npx, nln, bpp) where, npx: Number of pixels per line(2490: nominal) nln: Number of lines in frame(2100: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics4**		The statistical information about the quality of Level1B SWIR data.
		1	MinimumValue4	integer	Minimum value in this band of Level1B SWIR image data: 0 <= min. <= 255
		2	MaximumValue4	integer	Maximum value in this band of Level1B SWIR image data: 0 <= max. <= 255
		3	MeanValue4	double	Mean value in this band of Level1B SWIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue4	double	Standard deviation value in this band of Level1B SWIR image data.
		5	ModeValue4	integer	Mode value in this band of Level1B SWIR image data: 0 <= mode <= 255
		6	MedianValue4	integer	Median value in this band of Level1B SWIR image data: 0 <= med. <= 255

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(2/19)

No.					**Group**/Object Name	type(*1)	Description
1	3				**DataQuality4**		This group contains the information about the quality of Level1B SWIR data.
		1			NumberofBadPixels4	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels4**		This group contains the information about bad pixels.
					ListofBadPixels4Container(n)(*2)		
			1		DirectionofBadPixel4(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP4(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP4(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP4(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel4(n)(*2)	string	The cause of bad data: 'Me' : Missing Even Pixel 'Mo' : Missing Odd Pixel 'D' : Damaged Detector 'I' : Interpolated Data
		3			**SWIRRegistrationQuality4**		The registration information of SWIR based on VNIR.
			1		ProcessingFlag4	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2		NumberofMeasurements4	integer	The number of measurements
			3		MeasurementPointNumber4	integer	The number of measurement points.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(3/19)

No.				**Group**/Object Name	type(*1)	Description
1	3	3	4	AverageOffset4	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset4	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold4	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
		4		**ParallaxCorrectionQuality4**		The information of SWIR parallax correction.
			1	PctImageMatch4	integer	The percent of image matching used in the SWIR parallax collection processing.
			2	AvgCorrelCoef4	double	The Average Correlation Coefficient.
			3	Cthld4	double	The Correlation Threshold value.
	4			**ProcessingParameters4**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel4	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara4	string	Correction of the SWIR parallax error: 'Corrected Parallax Error' or 'Uncorrected Parallax Error'
		3		ResMethod4	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle4	double	Scene rotation angle of Level-1B Band-4 image.
		5		ProjectionParameters4	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode4*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).

Table 3.3.1-4 List of Object in Level1B Product Specific Metadata(SWIR)(4/19)

No.			**Group**/Object Name	type(*1)	Description
1	4	7	*SpheroidCode4*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff4**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-4 image.
		1	Incl4	double	Inclination.
		2	Offset4	double	Offset : 0.0 fixed.
		3	UnSatMin4	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax4	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit4	string	Converted Unit
2			**SWIRBand5Data**		The information about SWIR band 5 of Level-1B.
	1		ImageDataInformation5	integer	The information of SWIR band 5 image data. (npx, nln, bpp) where, npx: Number of pixels per line(2490: nominal) nln: Number of lines in frame(2100: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics5**		The statistical information about the quality of Level1B SWIR data.
		1	MinimumValue5	integer	Minimum value in this band of Level1B SWIR image data: 0 <= min. <= 255
		2	MaximumValue5	integer	Maximum value in this band of Level1B SWIR image data: 0 <= max. <= 255
		3	MeanValue5	double	Mean value in this band of Level1B SWIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue5	double	Standard deviation value in this band of Level1B SWIR image data.
		5	ModeValue5	integer	Mode value in this band of Level1B SWIR image data: 0 <= mode <= 255
		6	MedianValue5	integer	Median value in this band of Level1B SWIR image data: 0 <= med. <= 255
	3		**DataQuality5**		This group contains the information about the quality of Level1B SWIR data.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(5/19)

No.				**Group**/Object Name	type(*1)	Description
2	3	1		NumberofBadPixels5	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2		**ListofBadPixels5**		This group contains the information about bad pixels.
				ListofBadPixels5Container(n)(*2)		
			1	DirectionofBadPixel5(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP5(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP5(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP5(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel5(n)(*2)	string	The cause of bad data: 'Me' : Missing Even Pixel 'Mo' : Missing Odd Pixel 'D' : Damaged Detector 'I' : Interpolated Data
		3		**SWIRRegistrationQuality5**		The registration information of SWIR based on VNIR.
			1	ProcessingFlag5	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements5	integer	The number of measurements
			3	MeasurementPointNumber5	integer	The number of measurement points.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(6/19)

No.				**Group**/Object Name	type(*1)	Description
2	3	3	4	AverageOffset5	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset5	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold5	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
		4		**ParallaxCorrectionQuality5**		The information of SWIR parallax correction.
			1	PctImageMatch5	integer	The percent of image matching used in the SWIR parallax collection processing.
			2	AvgCorrelCoef5	double	The Average Correlation Coefficient.
			3	Cthled5	double	The Correlation Threshold value.
	4			**ProcessingParameters5**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel5	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara5	string	Correction of the SWIR parallax error: 'Corrected Parallax Error' or 'Uncorrected Parallax Error'
		3		ResMethod5	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle5	double	Scene rotation angle of Level-1B Band-5 image.
		5		ProjectionParameters5	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode5*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).

Table 3.3.1-4 List of Object in Level1B Product Specific Metadata(SWIR)(7/19)

No.			**Group**/Object Name	type(*1)	Description
2	4	7	*SpheroidCode5*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff5**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-5 image.
		1	Incl5	double	Inclination.
		2	Offset5	double	Offset : 0.0 fixed.
		3	UnSatMin5	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax5	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit5	string	Converted Unit
3			**SWIRBand6Data**		The information about SWIR band 6 of Level-1B.
	1		ImageDataInformation6	integer	The information of SWIR band 5 image data. (npx, nln, bpp) where, npx: Number of pixels per line(2490: nominal) nln: Number of lines in frame(2100: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics6**		The statistical information about the quality of Level1B SWIR data.
		1	MinimumValue6	integer	Minimum value in this band of Level1B SWIR image data: 0 <= min. <= 255
		2	MaximumValue6	integer	Maximum value in this band of Level1B SWIR image data: 0 <= max. <= 255
		3	MeanValue6	double	Mean value in this band of Level1B SWIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue6	double	Standard deviation value in this band of Level1B SWIR image data.
		5	ModeValue6	integer	Mode value in this band of Level1B SWIR image data: 0 <= mode <= 255
		6	MedianValue6	integer	Median value in this band of Level1B SWIR image data: 0 <= med. <= 255
	3		**DataQuality6**		This group contains the information about the quality of Level1B SWIR data.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(8/19)

No.					**Group**/Object Name	type(*1)	Description
3	3	1			NumberofBadPixels6	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels6**		This group contains the information about bad pixels.
					ListofBadPixels6Container(n)(*2)		
			1		DirectionofBadPixel6(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP6(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP6(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP6(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel6(n)(*2)	string	The cause of bad data: 'Me' : Missing Even Pixel 'Mo' : Missing Odd Pixel 'D' : Damaged Detector 'I' : Interpolated Data
		3			**SWIRRegistrationQuality6**		The registration information of SWIR based on VNIR.
			1		ProcessingFlag6	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2		NumberofMeasurements6	integer	The number of measurements
			3		MeasurementPointNumber6	integer	The number of measurement points.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(9/19)

No.				**Group**/Object Name	type(*1)	Description
3	3	3	4	AverageOffset6	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset6	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold6	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
		4		**ParallaxCorrectionQuality6**		The information of SWIR parallax correction.
			1	PctImageMatch6	integer	The percent of image matching used in the SWIR parallax collection processing.
			2	AvgCorrelCoef6	double	The Average Correlation Coefficient.
			3	Cthled6	double	The Correlation Threshold value.
	4			**ProcessingParameters6**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel6	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara6	string	Correction of the SWIR parallax error: 'Corrected Parallax Error' or 'Uncorrected Parallax Error'
		3		ResMethod6	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle6	double	Scene rotation angle of Level-1B Band-6 image.
		5		ProjectionParameters6	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode6*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).

Table 3.3.1-4 List of Object in Level1B Product Specific Metadata(SWIR)(10/19)

No.			**Group**/Object Name	type(*1)	Description
3	4	7	*SpheroidCode6*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff6**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-6 image.
		1	Incl6	double	Inclination.
		2	Offset6	double	Offset : 0.0 fixed.
		3	UnSatMin6	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax6	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit6	string	Converted Unit
4			**SWIRBand7Data**		The information about SWIR band 7 of Level-1B.
	1		ImageDataInformation7	integer	The information of SWIR band 7 image data. (npx, nln, bpp) where, npx: Number of pixels per line(2490: nominal) nln: Number of lines in frame(2100: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics7**		The statistical information about the quality of Level1B SWIR data.
		1	MinimumValue7	integer	Minimum value in this band of Level1B SWIR image data: 0 <= min. <= 255
		2	MaximumValue7	integer	Maximum value in this band of Level1B SWIR image data: 0 <= max. <= 255
		3	MeanValue7	double	Mean value in this band of Level1B SWIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue7	double	Standard deviation value in this band of Level1B SWIR image data.
		5	ModeValue7	integer	Mode value in this band of Level1B SWIR image data: 0 <= mode <= 255
		6	MedianValue7	integer	Median value in this band of Level1B SWIR image data: 0 <= med. <= 255
	3		**DataQuality7**		This group contains the information about the quality of Level1B SWIR data.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(11/19)

No.				**Group**/Object Name	type(*1)	Description
4	3	1		NumberofBadPixels7	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2		**ListofBadPixels7**		This group contains the information about bad pixels.
				ListofBadPixels7Container(n)(*2)		
			1	DirectionofBadPixel7(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP7(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP7(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP7(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel7(n)(*2)	string	The cause of bad data: 'Me' : Missing Even Pixel 'Mo' : Missing Odd Pixel 'D' : Damaged Detector 'I' : Interpolated Data
		3		**SWIRRegistrationQuality7**		The registration information of SWIR based on VNIR.
			1	ProcessingFlag7	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements7	integer	The number of measurements
			3	MeasurementPointNumber7	integer	The number of measurement points.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(12/19)

No.				**Group**/Object Name	type(*1)	Description
4	3	3	4	AverageOffset7	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset7	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold7	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
		4		**ParallaxCorrectionQuality7**		The information of SWIR parallax correction.
			1	PctImageMatch7	integer	The percent of image matching used in the SWIR parallax collection processing.
			2	AvgCorrelCoef7	double	The Average Correlation Coefficient.
			3	Cthled7	double	The Correlation Threshold value.
	4			**ProcessingParameters7**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel7	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara7	string	Correction of the SWIR parallax error: 'Corrected Parallax Error' or 'Uncorrected Parallax Error'
		3		ResMethod7	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle7	double	Scene rotation angle of Level-1B Band-7 image.
		5		ProjectionParameters7	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode7*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).

Table 3.3.1-4 List of Object in Level1B Product Specific Metadata(SWIR)(13/19)

No.			**Group**/Object Name	type(*1)	Description
4	4	7	*SpheroidCode7*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff7**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-7 image.
		1	Incl7	double	Inclination.
		2	Offset7	double	Offset : 0.0 fixed.
		3	UnSatMin7	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax7	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit7	string	Converted Unit
5			**SWIRBand8Data**		The information about SWIR band 8 of Level-1B.
	1		ImageDataInformation8	integer	The information of SWIR band 8 image data. (npx, nln, bpp) where, npx: Number of pixels per line(2490: nominal) nln: Number of lines in frame(2100: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics8**		The statistical information about the quality of Level1B SWIR data.
		1	MinimumValue8	integer	Minimum value in this band of Level1B SWIR image data: 0 <= min. <= 255
		2	MaximumValue8	integer	Maximum value in this band of Level1B SWIR image data: 0 <= max. <= 255
		3	MeanValue8	double	Mean value in this band of Level1B SWIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue8	double	Standard deviation value in this band of Level1B SWIR image data.
		5	ModeValue8	integer	Mode value in this band of Level1B SWIR image data: 0 <= mode <= 255
		6	MedianValue8	integer	Median value in this band of Level1B SWIR image data: 0 <= med. <= 255
	3		**BandDataQuality8**		This group contains the information about the quality of Level1B SWIR data.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(14/19)

No.					**Group**/Object Name	type(*1)	Description
5	3	1			NumberofBadPixels8	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels8**		This group contains the information about bad pixels.
					ListofBadPixels8Container(n)(*2)		
			1		DirectionofBadPixel8(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP8(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP8(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP8(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel8(n)(*2)	string	The cause of bad data: 'Me' : Missing Even Pixel 'Mo' : Missing Odd Pixel 'D' : Damaged Detector 'I' : Interpolated Data
		3			**SWIRRegistrationQuality8**		The registration information of SWIR based on VNIR.
			1		ProcessingFlag8	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2		NumberofMeasurements8	integer	The number of measurements
			3		MeasurementPointNumber8	integer	The number of measurement points.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(15/19)

No.				**Group**/Object Name	type(*1)	Description
5	3	3	4	AverageOffset8	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset8	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold8	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
		4		**ParallaxCorrectionQuality8**		The information of SWIR parallax correction.
			1	PctImageMatch8	integer	The percent of image matching used in the SWIR parallax collection processing.
			2	AvgCorrelCoef8	double	The Average Correlation Coefficient.
			3	Cthled8	double	The Correlation Threshold value.
	4			**ProcessingParameters8**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel8	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara8	string	Correction of the SWIR parallax error: 'Corrected Parallax Error' or 'Uncorrected Parallax Error'
		3		ResMethod8	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle8	double	Scene rotation angle of Level-1B Band-8 image.
		5		ProjectionParameters8	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode8*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).

Table 3.3.1-4 List of Object in Level1B Product Specific Metadata(SWIR)(16/19)

No.			**Group**/Object Name	type(*1)	Description
5	4	7	*SpheroidCode8*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff8**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-8 image.
		1	Incl8	double	Inclination.
		2	Offset8	double	Offset : 0.0 fixed.
		3	UnSatMin8	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax8	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit8	string	Converted Unit
6			**SWIRBand9Data**		The information about SWIR band 9 of Level-1B.
	1		**ImageDataInformation9**		The information of SWIR band 9 image data. (npx, nln, bpp) where, npx: Number of pixels per line(2490: nominal) nln: Number of lines in frame(2100: nominal) bpp: Bytes per pixel (1: fixed)
	2		**ImageStatistics9**		The statistical information about the quality of Level1B SWIR data.
		1	MinimumValue9	integer	Minimum value in this band of Level1B SWIR image data: 0 <= min. <= 255
		2	MaximumValue9	integer	Maximum value in this band of Level1B SWIR image data: 0 <= max. <= 255
		3	MeanValue9	double	Mean value in this band of Level1B SWIR image data: 0.0 <= mean <= 255.0
		4	StandardDeviationValue9	double	Standard deviation value in this band of Level1B SWIR image data.
		5	ModeValue9	integer	Mode value in this band of Level1B SWIR image data: 0 <= mode <= 255
		6	MedianValue9	integer	Median value in this band of Level1B SWIR image data: 0 <= med. <= 255
	3		**BandDataQuality9**		This group contains the information about the quality of Level1B SWIR data.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(17/19)

No.				**Group**/Object Name	type(*1)	Description
6	3	1		NumberofBadPixels9	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2		**ListofBadPixels9**		This group contains the information about bad pixels.
				ListofBadPixels9Container(n)(*2)		
			1	DirectionofBadPixel9(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP9(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP9(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP9(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel9(n)(*2)	string	The cause of bad data: 'Me' : Missing Even Pixel 'Mo' : Missing Odd Pixel 'D' : Damaged Detector 'I' : Interpolated Data
		3		**SWIRRegistrationQuality9**		The registration information of SWIR based on VNIR.
			1	ProcessingFlag9	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements9	integer	The number of measurements
			3	MeasurementPointNumber9	integer	The number of measurement points.

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(18/19)

No.				**Group**/Object Name	type(*1)	Description
6	3	3	4	AverageOffset9	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset9	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold9	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
		4		**ParallaxCorrectionQuality9**		The information of SWIR parallax correction.
			1	PctImageMatch9	integer	The percent of image matching used in the SWIR parallax collection processing.
			2	AvgCorrelCoef9	double	The Average Correlation Coefficient.
			3	Cthled9	double	The Correlation Threshold value.
	4			**ProcessingParameters9**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel9	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara9	string	Correction of the SWIR parallax error: 'Corrected Parallax Error' or 'Uncorrected Parallax Error'
		3		ResMethod9	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle9	double	Scene rotation angle of Level-1B Band-9 image.
		5		ProjectionParameters9	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode9*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).

Table 3.3.1-4 List of Object in Level1B Product Specific Metadata(SWIR)(19/19)

No.			**Group**/Object Name	type(*1)	Description
6	4	7	*SpheroidCode9*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff9**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-9 image.
		1	Incl9	double	Inclination.
		2	Offset9	double	Offset : 0.0 fixed.
		3	UnSatMin9	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax9	integer	Maximum value of unsaturated pixel : 254 fixed.
		5	ConUnit9	string	Converted Unit

NOTES:
(*1) Object types used in Metadata are
a. datetime: CCSDS A(UTC)Format
b. integer
c. double
d. string
(*2) Object whose name followed by (n) has “class” attribute, it may repeat n-times.

3.3.1.5. Product Specific Metadata(TIR)

(1) Indexes of Objects
The Object list of Product Specific metadata(TIR1) and Product Specific metadata(TIR2) are shown in Table 3.3.1-5. Product Specific metadata(TIR1) attributes (TIRBand10Data, TIRBand11Data and TIRBnad12Data Groups) are written to the HDF file attribute productmetadata.t1 and Product Specific metadata(TIR2) attributes (TIRBand13Data and TIRBnad14Data Groups) are written to the HDF file attribute productmetadata.t2.
Product Specific Metadata(TIR1) and Product Specific Metadata(TIR2) include product specific attributes, i.e. not associated with DID311.
(In Table 3.3.1-5, group names are written in **Bold** characters. A group contains a set of objects which all have a similar theme.)
The objects in *Italic* character are not authorized by Level1 WG, and will be changed in next version.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(1/14)

No.			**Group**/Object Name	type(*1)	Description
1			**TIRBand10Data**		The information about TIR band 10 of Level-1B.
	1		ImageDataInformation10	integer	The information of TIR band 10 image data. (npx, nln, bpp) where, npx: Number of pixels per line(830: nominal) nln: Number of lines in frame(700: nominal) bpp: Bytes per pixel (2: fixed)
	2		**ImageStatistics10**		The statistical information about the quality of Level1B TIR data.
		1	MinimumValue10	integer	Minimum value in this band of Level1B TIR image data: 0 <= min. <= TBD
		2	MaximumValue10	integer	Maximum value in this band of Level1B TIR image data: 0 <= max. <= TBD
		3	MeanValue10	double	Mean value in this band of Level1B TIR image data: 0.0 <= mean <= TBD
		4	StandardDeviationValue10	double	Standard deviation value in this band of Level1B TIR image data.
		5	ModeValue10	integer	Mode value in this band of Level1B TIR image data: 0 <= mode <= TBD
		6	MedianValue10	integer	Median value in this band of Level1B TIR image data: 0 <= med. <= TBD
	3		**DataQuality10**		This group contains the information about the quality of Level1B TIR data.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(2/14)

No.				**Group**/Object Name	type(*1)	Description
1	3	1		NumberofBadPixels10	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2		**ListofBadPixels10**		This group contains the information about bad pixels.
				ListofBadPixels10Container(n)(*2)		
			1	DirectionofBadPixel10(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP10(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP10(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP10(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel10(n)(*2)	string	The cause of bad data: 'M' : Missing Data 'D' : Damaged Detector 'I' : Interpolated Data
		3		**TIRRegistrationQuality10**		The registration information of TIR based on VNIR.
			1	ProcessingFlag10	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements10	integer	The number of measurements
			3	MeasurementPointNumber10	integer	The number of measurement points.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(3/14)

No.				**Group**/Object Name	type(*1)	Description
1	3	3	4	AverageOffset10	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset10	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold10	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
	4			**ProcessingParameters10**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel10	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara10	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3		ResMethod10	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle10	double	Scene rotation angle of Level-1B Band-10 image.
		5		ProjectionParameters10	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode10*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7		*SpheroidCode10*	integer	Spheroid code used in processing.
	5			**UnitConversionCoeff10**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-10 image.
		1		Incl10	double	Inclination.
		2		Offset10	double	Offset : 0.0 fixed.
		3		UnSatMin10	integer	Minimum value of unsaturated pixel : 0 fixed.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(4/14)

No.			**Group**/Object Name	type(*1)	Description
1	5	4	UnSatMax9	integer	Maximum value of unsaturated pixel.
		5	ConUnit9	string	Converted Unit
2			**TIRBand11Data**		The information about TIR band 11 of Level-1B.
	1		**ImageDataInformation11**	integer	The information of TIR band 11 image data. (npx, nln, bpp) where, npx: Number of pixels per line(830: nominal) nln: Number of lines in frame(700: nominal) bpp: Bytes per pixel (2: fixed)
	2		**ImageStatistics11**		The statistical information about the quality of Level1B TIR data.
		1	MinimumValue11	integer	Minimum value in this band of Level1B TIR image data: 0 <= min. <= TBD
		2	MaximumValue11	integer	Maximum value in this band of Level1B TIR image data: 0 <= max. <= TBD
		3	MeanValue11	double	Mean value in this band of Level1B TIR image data: 0.0 <= mean <= TBD
		4	StandardDeviationValue11	double	Standard deviation value in this band of Level1B TIR image data.
		5	ModeValue11	integer	Mode value in this band of Level1B TIR image data: 0 <= mode <= TBD
		6	MedianValue11	integer	Median value in this band of Level1B TIR image data: 0 <= med. <= TBD
	3		**BandDataQuality11**		This group contains the information about the quality of Level1B TIR data.
		1	NumberofBadPixels11	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2	**ListofBadPixels11**		This group contains the information about bad pixels.
			ListofBadPixels11Container(n) (*2)		

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(5/14)

No.				**Group**/Object Name	type(*1)	Description
2	3	2	1	DirectionofBadPixel11(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP11(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP11(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP11(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel11(n)(*2)	string	The cause of bad data: 'M' : Missing Data 'D' : Damaged Detector 'I' : Interpolated Data
		3		**TIRRegistrationQuality11**		The registration information of TIR based on VNIR.
			1	ProcessingFlag11	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements11	integer	The number of measurements
			3	MeasurementPointNumber11	integer	The number of measurement points.
			4	AverageOffset11	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset11	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(6/14)

No.				**Group**/Object Name	type(*1)	Description
2	3	3	6	Threshold11	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
	4			**ProcessingParameters11**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel11	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara11	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3		ResMethod11	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle11	double	Scene rotation angle of Level-1B Band-11 image.
		5		ProjectionParameters11	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode11*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7		*SpheroidCode11*	integer	Spheroid code used in processing.
	5			**UnitConversionCoeff11**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-11 image.
		1		Incl11	double	Inclination.
		2		Offset11	double	Offset : 0.0 fixed.
		3		UnSatMin11	integer	Minimum value of unsaturated pixel : 0 fixed.
		4		UnSatMax11	integer	Maximum value of unsaturated pixel.
		5		ConUnit11	string	Converted Unit
3				**TIRBand12Data**		The information about TIR band 12 of Level-1B.
	1			ImageDataInformation12	integer	The information of TIR band 12 image data. (npx, nln, bpp) where, npx: Number of pixels per line(830: nominal) nln: Number of lines in frame(700: nominal) bpp: Bytes per pixel (2: fixed)

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(7/14)

No.					**Group**/Object Name	type(*1)	Description
3	2				**ImageStatistics12**		The statistical information about the quality of Level1B TIR data.
		1			MinimumValue12	integer	Minimum value in this band of Level1B TIR image data: 0 <= min. <= TBD
		2			MaximumValue12	integer	Maximum value in this band of Level1B TIR image data: 0 <= max. <= TBD
		3			MeanValue12	double	Mean value in this band of Level1B TIR image data: 0.0 <= mean <= TBD
		4			StandardDeviationValue12	double	Standard deviation value in this band of Level1B TIR image data.
		5			ModeValue12	integer	Mode value in this band of Level1B TIR image data: 0 <= mode <= TBD
		6			MedianValue12	integer	Median value in this band of Level1B TIR image data: 0 <= med. <= TBD
	3				**DataQuality12**		This group contains the information about the quality of Level1B TIR data.
		1			NumberofBadPixels12	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels12**		This group contains the information about bad pixels.
					ListofBadPixels12Container(n)(*2)		
			1		DirectionofBadPixel12(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP12(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP12(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP12(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(8/14)

No.				**Group**/Object Name	type(*1)	Description
3	3	2	5	CauseofBadPixel12(n)(*2)	string	The cause of bad data: 'M' : Missing Data 'D' : Damaged Detector 'I' : Interpolated Data
		3		**TIRRegistrationQuality12**		The registration information of TIR based on VNIR.
			1	ProcessingFlag12	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements12	integer	The number of measurements
			3	MeasurementPointNumber12	integer	The number of measurement points.
			4	AverageOffset12	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset12	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold12	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
	4			**ProcessingParameters12**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel12	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara12	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3		ResMethod12	string	Resampling Method: 'BL' or 'NN' or 'CC'

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(9/14)

No.			**Group**/Object Name	type(*1)	Description
3	4	4	SceneRotationAngle12	double	Scene rotation angle of Level-1B Band-12 image.
		5	ProjectionParameters12	double	Parameters used in GCTP Map projection.
		6	*UTMZoneCode12*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7	*SpheroidCode12*	integer	Spheroid code used in processing.
	5		**UnitConversionCoeff12**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-12 image.
		1	Incl12	double	Inclination.
		2	Offset12	double	Offset : 0.0 fixed.
		3	UnSatMin12	integer	Minimum value of unsaturated pixel : 0 fixed.
		4	UnSatMax12	integer	Maximum value of unsaturated pixel.
		5	ConUnit12	string	Converted Unit
4			**TIRBand13Data**		The information about TIR band 13 of Level-1B.
	1		**ImageDataInformation13**	integer	The information of TIR band 13 image data. (npx, nln, bpp) where, npx: Number of pixels per line(830: nominal) nln: Number of lines in frame(700: nominal) bpp: Bytes per pixel (2: fixed)
	2		**ImageStatistics13**		The statistical information about the quality of Level1B TIR data.
		1	MinimumValue13	integer	Minimum value in this band of Level1B TIR image data: 0 <= min. <= TBD
		2	MaximumValue13	integer	Maximum value in this band of Level1B TIR image data: 0 <= max. <= TBD
		3	MeanValue13	double	Mean value in this band of Level1B TIR image data: 0.0 <= mean <= TBD
		4	StandardDeviationValue13	double	Standard deviation value in this band of Level1B TIR image data.
		5	ModeValue13	integer	Mode value in this band of Level1B TIR image data: 0 <= mode <= TBD
		6	MedianValue13	integer	Median value in this band of Level1B TIR image data: 0 <= med. <= TBD

Table 3.3.1-4 List of Object in Level 1B Product Specific Metadata(SWIR)(10/14)

No.					**Group**/Object Name	type(*1)	Description
4	3				**BandDataQuality13**		This group contains the information about the quality of Level1B TIR data.
		1			NumberofBadPixels13	integer	The information about bad pixels. (nmp, ndd, nelm) where, nmp: number of missing pixels. ndd: number of damaged detectors. nelm: number of elements of the next list of bad pixels.
		2			**ListofBadPixels13**		This group contains the information about bad pixels.
					ListofBadPixels13Container(n)(*2)		
			1		DirectionofBadPixel13(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2		BadPixelLP13(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3		BPSFirstLP13(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4		BPSLastLP13(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5		CauseofBadPixel13(n)(*2)	string	The cause of bad data: 'M' : Missing Data 'D' : Damaged Detector 'I' : Interpolated Data
		3			**TIRRegistrationQuality13**		The registration information of TIR based on VNIR.
			1		ProcessingFlag13	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2		NumberofMeasurements13	integer	The number of measurements
			3		MeasurementPointNumber13	integer	The number of measurement points.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(11/14)

No.				**Group**/Object Name	type(*1)	Description
4	3	3	4	AverageOffset13	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset13	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.
			6	Threshold13	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
	4			**ProcessingParameters13**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel13	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara13	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3		ResMethod13	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle13	double	Scene rotation angle of Level-1B Band-13 image.
		5		ProjectionParameters13	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode13*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7		*SpheroidCode13*	integer	Spheroid code used in processing.
	5			**UnitConversionCoeff13**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-13 image.
		1		Incl13	double	Inclination.
		2		Offset13	double	Offset : 0.0 fixed.
		3		UnSatMin13	integer	Minimum value of unsaturated pixel : 0 fixed.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(12/14)

No.			**Group**/Object Name	type(*1)	Description
4	5	4	UnSatMax13	integer	Maximum value of unsaturated pixel.
		5	ConUnit13	string	Converted Unit
5			**TIRBand14Data**		The information about TIR band 14 of Level-1B.
	1		ImageDataInformation14	integer	The information of TIR band 14 image data. (npx, nln, bpp) where, npx: Number of pixels per line(830: nominal) nln: Number of lines in frame(700: nominal) bpp: Bytes per pixel (2: fixed)
	2		**ImageStatistics14**		The statistical information about the quality of Level1B TIR data.
		1	MinimumValue14	integer	Minimum value in this band of Level1B TIR image data: 0 <= min. <= TBD
		2	MaximumValue14	integer	Maximum value in this band of Level1B TIR image data: 0 <= max. <= TBD
		3	MeanValue14	double	Mean value in this band of Level1B TIR image data: 0.0 <= mean <= TBD
		4	StandardDeviationValue14	double	Standard deviation value in this band of Level1B TIR image data.
		5	ModeValue14	integer	Mode value in this band of Level1B TIR image data: 0 <= mode <= TBD
		6	MedianValue14	integer	Median value in this band of Level1B TIR image data: 0 <= med. <= TBD
	3		**DataQuality14**		This group contains the information about the quality of Level1B TIR data.
		1	NumberofBadPixels14	integer	The information about bad pixels. (nmp, nelm, ndd) where, nmp: number of missing pixels. nelm: number of elements of the next list of bad pixels. ndd: number of damaged detectors.
		2	**ListofBadPixels14**		This group contains the information about bad pixels.
			ListofBadPixels14Container(n) (*2)		

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(13/14)

No.				**Group**/Object Name	type(*1)	Description
5	3	2	1	DirectionofBadPixel14(n)(*2)	string	The direction of bad pixel segment. 'C' = cross-track 'A' = along-track
			2	BadPixelLP14(n)(*2)	integer	The line number (in cross-track segment) or the pixel number (in along-track segment) including BPS.
			3	BPSFirstLP14(n)(*2)	integer	First pixel number in cross-track segment) or first line number (in along-track segment) of BPS.
			4	BPSLastLP14(n)(*2)	integer	Last pixel number in cross-track segment) or last line number (in along-track segment) of BPS.
			5	CauseofBadPixel14(n)(*2)	string	The cause of bad data: 'M' : Missing Data 'D' : Damaged Detector 'I' : Interpolated Data
		3		**TIRRegistrationQuality14**		The registration information of TIR based on VNIR.
			1	ProcessingFlag14	integer	0: no output, because processing is impossible. 1: output is the result computed. 2: output is extracted from registration file. 4: output obtained by other method.
			2	NumberofMeasurements14	integer	The number of measurements
			3	MeasurementPointNumber14	integer	The number of measurement points.
			4	AverageOffset14	double	Average offset value. (LAOset, PAOset) where, LAOset: Line direction average offset. PAOset: Pixel direction average offset.
			5	StandardDeviationOffset14	double	Standard deviation offset value. (LSDOset, PSDOset) where, LSDOset: Line direction SD offset. PSDOset: Pixel direction SD offset.

Table 3.3.1-5 List of Object in Level 1B Product Specific Metadata(TIR)(14/14)

No.				**Group**/Object Name	type(*1)	Description
5	3	3	6	Threshold14	double	Threshold value. (CThld, LOThld, POThld, VOThld) where, CThld: Correction threshold LOThld: Line direction offset threshold POThld: Pixel direction offset threshold VOThld: Vector offset threshold
	4			**ProcessingParameters14**		This group contains the parameters used by Level-1B generation processing.
		1		CorIntel14	string	Correction of the intertelescope error of SWIR and TIR: 'Corrected Intertelescope Error' or 'Uncorrected Intertelescope Error'
		2		CorPara14	string	Correction of the SWIR parallax error: 'N/A' fixed.
		3		ResMethod14	string	Resampling Method: 'BL' or 'NN' or 'CC'
		4		SceneRotationAngle14	double	Scene rotation angle of Level-1B Band-14 image.
		5		ProjectionParameters14	double	Parameters used in GCTP Map projection.
		6		*UTMZoneCode14*	integer	Zone code for UTM projection (when mapping without UTM : 0 fixed).
		7		*SpheroidCode14*	integer	Spheroid code used in processing.
	5			**UnitConversionCoeff14**		This group contains the coefficients used for radiance conversion, from the pixel value of the band-14 image.
		1		Incl14	double	Inclination.
		2		Offset14	double	Offset : 0.0 fixed.
		3		UnSatMin14	integer	Minimum value of unsaturated pixel : 0 fixed.
		4		UnSatMax14	integer	Maximum value of unsaturated pixel.
		5		ConUnit14	string	Converted Unit

NOTES:

(*1) Object types used in Metadata are

a. datetime: CCSDS A(UTC)Format
b. integer
c. double
d. string

(*2) Object whose name followed by (n) has “class” attribute, it may repeat n-times.

3.3.2. VNIR Group

3.3.2.1. Overview

VNIR Group contains a series of Swath Objects through the use of the Vgroup API. Vgroup name which establishes access to a Vgroup is as follows.

vgroup name: VNIR_Group

(1) Concept of Level 1B Data Product
The Level 1B Data Product is generated for the requested map projection and the resampling method, which for this release is:
Map projection methods: Geographic (**Uniform Lat/Long**), Universal Transverse Mercator (**UTM**), Lambert Conformal Conic (**LCC**), Mercator (**Mercator**), and Polar Stereographic (**PS**).
Resampling methods: Nearest Neighbor (**NN**), Bi-Linear (**BL**), Cubic Convolution (**CC**).
For further details on projection parameters (Projection Codes, Zone Codes, and so on), please refer to the HDF-EOS User's Guide for ECS Project, June, 1996, (170-TP-005-001) and the SDP Toolkit Users Guide for the ECS Project, May, 1996, (333-CD-003-001).

3.3.2.2. VNIR Band 1 Swath

(1) Structure
A single swath contains any number of Tables and Multidimensional Arrays. There is however one type of information that is special: geolocation information. In a swath, geolocation information is stored as a series of arrays. We require that every swath contain some geolocation component. The data itself is stored in multidimensional arrays in the swath. The only limitation is that the first dimension is the Track dimension.
For the Level 1B Data Product, each Band is stored as separate Swath structure, one per geolocation object. The structure of each Swath is almost as same as the Level 1A Swath (see Figure 2.3.4-1), though the Level 1B swath consists of a 2D data array (VNIR Band 1 image data) and a series of 2D geolocation arrays only.

(2) Characteristics
Table 3.3.2-1 shows the List of data items in VNIR Swath 1 (Swath data for VNIR band 1).

a) Data model: Swath
b) Object Name: VNIR_Band1
c) Format: Table 3.3.2-1 shows the contents of Swath Object. Table 3.3.2-2 shows the format of one.

Table 3.3.2-1 List of data items in Level 1B VNIR Band 1 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 1 image data

Table 3.3.2-2 Format of data items in VNIR Band 1 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[4980][4200]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	498 × 420

3.3.2.3. VNIR Band 2 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.2-3 shows the List of data items in VNIR Swath 2 (Swath data for VNIR band 2).

a) Data model: Swath
b) Object Name: VNIR_Band2
c) Format: Table 3.3.2-3 shows the contents of Swath Object. Table 3.3.2-4 shows the format of one.

Table 3.3.2-3 List of data items in Level 1B VNIR Band 2 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 2 image data

Table 3.3.2-4 Format of data items in VNIR Band 2 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[4980][4200]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	498 × 420

3.3.2.4. VNIR Band 3N Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.2-5 shows the List of data items in VNIR Swath 3N (Swath data for VNIR band 3N).

a) Data model: Swath
b) Object Name: VNIR_Band3N
c) Format: Table 3.3.2-5 shows the contents of Swath Object. Table 3.3.2-6 shows the format of one.

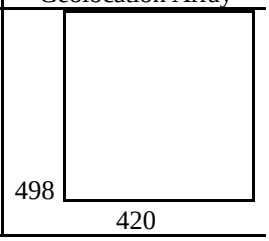
Table 3.3.2-5 List of data items in Level 1B VNIR Band 3N Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 3N image data

Table 3.3.2-6 Format of data items in VNIR Band 3N Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[4980][4200]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.2.5. VNIRBand 3B Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.2-7 shows the List of data items in VNIR Swath 3B (Swath data for VNIR band 3B).

a) Data model: Swath
b) Object Name: VNIR_Band3B
c) Format: Table 3.3.2-7 shows the contents of Swath Object. Table 3.3.2-8 shows the format of one.

Table 3.3.2-7 List of data items in Level 1B VNIR Band 3B Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 3B image data

Table 3.3.2-8 Format of data items in VNIR Band 3B Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[4980][4200]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	498 × 420

3.3.3. SWIR Group

3.3.3.1. Overview

SWIR Group contains a series of Swath Objects through the use of the Vgroup API. Vgroup name which establishes access to a Vgroup is as follows.

vgroup name: SWIR_Group

3.3.3.2. SWIRBand 4 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.3-1 shows the List of data items in SWIR Swath 4 (Swath data for SWIR band 4).

a) Data model: Swath
b) Object Name: SWIR_Band4
c) Format: Table 3.3.3-1 shows the contents of Swath Object. Table 3.3.3-2 shows the format of one.

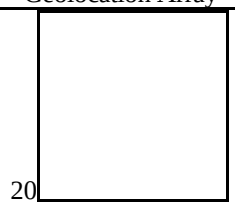
Table 3.3.3-1 List of data items in Level 1B SWIR Band 4 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 4 image data

Table 3.3.3-2 Format of data items in SWIR Band 4 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[125][106]	DOUBLE	geolocation field (Array)
Longitude	[125][106]	DOUBLE	geolocation field (Array)
ImageData	[2490][2100]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.3.3. SWIRBand 5 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.3-3 shows the List of data items in SWIR Swath 5 (Swath data for SWIR band 5).

a) Data model: Swath
b) Object Name: SWIR_Band5
c) Format: Table 3.3.3-3 shows the contents of Swath Object. Table 3.3.3-4 shows the format of one.

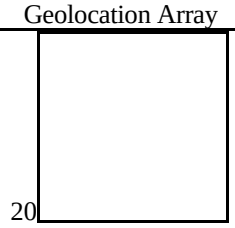
Table 3.3.3-3 List of data items in Level 1B SWIR Band 5 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 5 image data

Table 3.3.3-4 Format of data items in SWIR Band 5 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[125][106]	DOUBLE	geolocation field (Array)
Longitude	[125][106]	DOUBLE	geolocation field (Array)
ImageData	[2490][2100]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.3.4. SWIR Band 6 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.3-5 shows the List of data items in SWIR Swath 6 (Swath data for SWIR band 6).

a) Data model: Swath
b) Object Name: SWIR_Band6
c) Format: Table 3.3.3-5 shows the contents of Swath Object. Table 3.3.3-6 shows the format of one.

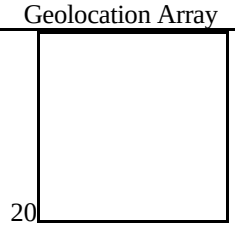
Table 3.3.3-5 List of data items in Level 1B SWIR Band 6 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 6 image data

Table 3.3.3-6 Format of data items in SWIR Band 6 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[125][106]	DOUBLE	geolocation field (Array)
Longitude	[125][106]	DOUBLE	geolocation field (Array)
ImageData	[2490][2100]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.3.5. SWIR Band 7 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.3-7 shows the List of data items in SWIR Swath 7 (Swath data for SWIR band 7).

a) Data model: Swath
b) Object Name: SWIR_Band7
c) Format: Table 3.3.3-7 shows the contents of Swath Object. Table 3.3.3-8 shows the format of one.

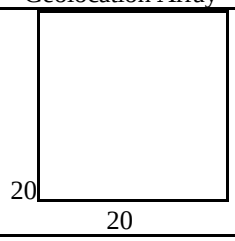
Table 3.3.4-7 List of data items in Level 1B SWIR Band 7 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 7 image data

Table 3.3.3-8 Format of data items in SWIR Band 7 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[125][106]	DOUBLE	geolocation field (Array)
Longitude	[125][106]	DOUBLE	geolocation field (Array)
ImageData	[2490][2100]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.3.6. SWIR Band 8 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.3-9 shows the List of data items in SWIR Swath 8 (Swath data for SWIR band 8).

a) Data model: Swath
b) Object Name: SWIR_Band8
c) Format: Table 3.3.3-9 shows the contents of Swath Object. Table 3.3.3-10 shows the format of one.

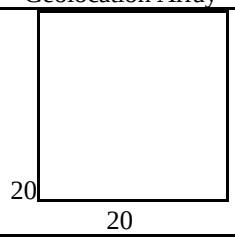
Table 3.3.4-9 List of data items in Level 1B SWIR Band 8 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 8 image data

Table 3.3.3-10 Format of data items in SWIR Band 8 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[125][106]	DOUBLE	geolocation field (Array)
Longitude	[125][106]	DOUBLE	geolocation field (Array)
ImageData	[2490][2100]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.3.7. SWIR Band 9 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.3-11 shows the List of data items in SWIR Swath 9 (Swath data for SWIR band 9).

a) Data model: Swath
b) Object Name: SWIR_Band9
c) Format: Table 3.3.3-11 shows the contents of Swath Object. Table 3.3.3-12 shows the format of one.

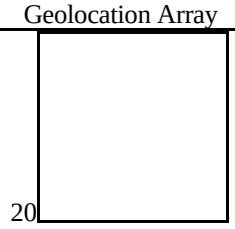
Table 3.3.3-11 List of data items in Level 1B SWIR Band 9 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 9 image data

Table 3.3.3-12 Format of data items in SWIR Band 9 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[125][106]	DOUBLE	geolocation field (Array)
Longitude	[125][106]	DOUBLE	geolocation field (Array)
ImageData	[2490][2100]	UINT8	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.4. TIR Group

3.3.4.1. Overview

TIR Group contains a series of Swath Objects through the use of the Vgroup API. Vgroup name which establishes access to a Vgroup is as follows.

vgroup name: TIR_Group

3.3.4.2. TIR Band 10 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.4-1 shows the List of data items in TIR Swath 10 (Swath data for TIR band 10).

a) Data model: Swath
b) Object Name: TIR_Band10
c) Format: Table 3.3.4-1 shows the contents of Swath Object. Table 3.3.4-2 shows the format of one.

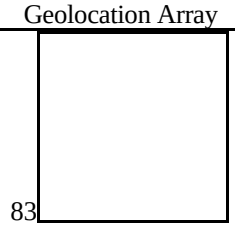
Table 3.3.4-1 List of data items in Level 1B TIR Band 10 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 10 image data

Table 3.3.4-2 Format of data items in TIR Band 10 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[830][700]	UINT16	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.4.3. TIR Band 11 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.4-3 shows the List of data items in TIR Swath 11 (Swath data for TIR band 11).

a) Data model: Swath
b) Object Name: TIR_Band11
c) Format: Table 3.3.4-3 shows the contents of Swath Object. Table 3.3.4-4 shows the format of one.

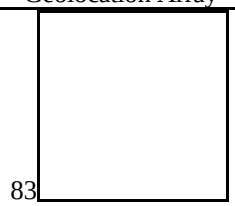
Table 3.3.4-3 List of data items in Level 1B TIR Band 11 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 11 image data

Table 3.3.4-4 Format of data items in TIR Band 11 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[830][700]	UINT16	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.4.4. TIR Band 12 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.4-5 shows the List of data items in TIR Swath 12 (Swath data for TIR band 12).

a) Data model: Swath
b) Object Name: TIR_Band12
c) Format: Table 3.3.4-5 shows the contents of Swath Object. Table 3.3.4-6 shows the format of one.

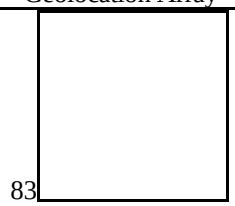
Table 3.3.4-5 List of data items in Level 1B TIR Band 12 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 12 image data

Table 3.3.4-6 Format of data items in TIR Band 12 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[830][700]	UINT16	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.4.5. TIR Band 13 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.4-7 shows the List of data items in TIR Swath 13 (Swath data for TIR band 13).

a) Data model: Swath
b) Object Name: TIR_Band13
c) Format: Table 3.3.4-7 shows the contents of Swath Object. Table 3.3.4-8 shows the format of one.

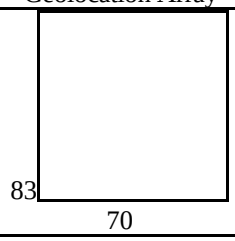
Table 3.3.4-7 List of data items in Level 1B TIR Band 13 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 13 image data

Table 3.3.4-8 Format of data items in TIR Band 13 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[830][700]	UINT16	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

3.3.4.6. TIR Band 14 Swath

(1) Structure
Refer to VNIR Swath 1 in page D-57.

(2) Characteristics
Table 3.3.4-9 shows the List of data items in TIR Swath 14 (Swath data for TIR band 14).

a) Data model: Swath
b) Object Name: TIR_Band14
c) Format: Table 3.3.4-9 shows the contents of Swath Object. Table 3.3.4-10 shows the format of one.

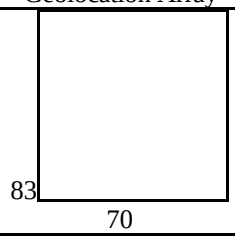
Table 3.3.4-9 List of data items in Level 1B TIR Band 14 Swath

No.	Field Name	Type	Unit	Comments
1.	Latitude	Geolocation Array	deg.	geocentric latitude -90.0 ~ +90.0
2.	Longitude	Geolocation Array	deg.	longitude -180.0 ~ +180.0
3.	ImageData	2D Data Array	N/A	Level 1B spectral band 14 image data

Table 3.3.4-10 Format of data items in TIR Band 14 Swath

Field Name	Dimension Size	Variable Type	Remarks
Latitude	[11][11]	DOUBLE	geolocation field (Array)
Longitude	[11][11]	DOUBLE	geolocation field (Array)
ImageData	[830][700]	UINT16	mapping to geolocation array

(3) Block Size
Block size is shown as follows.

Table	Geolocation Array
Block size	

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Appendix A. Programming Model

A.1. Overview

This Section contains programming model for accessing Level 1A and 1B Data Products through the use of the Swath and Grid API, respectively.
The reader is directed to The HDF-EOS User's Guide for the ECS Project, Sections 7 and 8, for further detailed references.

A.2. Swath

The programming model for accessing a swath data set through the SW interface is as follows:

1. Open the file and initialize the SW interface by obtaining a file ID from a file name.
2. Open a swath data set by obtaining a swath ID from a swath name.
3. Perform desired operations on data set.
4. Close the swath data set by disposing of swath ID.

5 Terminate swath access to the file by disposing of the file ID.

To access a single swath data set in Level 1A Data Product (HDF file), the calling program must contain the following sequence of C calls:

```
file_id = SWopen(filename, DFACC_READ) ;

sw_id = SWattach(file_id, swath_name) ;

  <Optional operations>
        inquiry or subset or  read by using function as follows:
            SWnentires(sw_id, entry_code, string_buffer_size) ;
            SWinqgeofields(sw_id, field_list, rank, number_type) ;
            SWinqdatafields(sw_id, field_list, rank, number_type) ;
            SWfieldinfo(sw_id, field_name, rank, dims, number_type, dim_list
            SWreadfield(sw_id, field_name, start, stride, edge, buffer) ;
            SWdefboxregion(sw_id, corner_lon, corner_lat, mode) ;
            SWextractregion(region_id, field_name, external_made, buffer) ;

status = SWdetach(sw_id) ;
status = SWclose(file-id) ;
```

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Abbreviations and Acronyms

A.

AOS: ASTER Operations Segment
API: application program interface
APID: application process identifier
ASTER: Advanced Spacebone Thermal Emission and Reflection Radiometer (formerly ITIR)
ATBD: Algorithm Theoretical Basis Document

C.

CCSDS: Consultative Committee on Space Data System
CDR: Critical Design Review
CDRL: Construct Data Requirement List
CDS: CCSDS day segmented time code
CSCI: computer software configration item
CUC: CCSDS unsegmented time code

D.

DAAC: Distributed Active Archive Center
DID: data item description
DOUBLE: double type
DPS: Data Processing Subsystem

E.

ECI: Earth centered internal
ECS: EOSDIS Core System
EDOS: EOSDIS Data and Operation System
EOSDIS: Earth Observing System Data and Information System
EPH: ephemeris data access

F.

FLOAT: float type

G.

GCTP: general cartographic transformation package
GDS: Ground Data System
GMT: Greenwich mean time

H.

HDF: Hierarchical Data Format
HDF-EOS: an EOS proposed standard for a specialized HDF data format

I.

ICD: interface control document
ID: identification
IDR: Incremental Design Review
IMS: information management system
INT8: 8-bit integer type
INT16: 16-bit integer type
IRD: interface requirements document

N.

N/A: not applicable
NCSA: the National Center for Supercomputing Applications

P.

PGE: Product Generation Executive
PDR: Preliminary Design Review
PDS: production data set
PGE: Product Generation Executive
PGS: Product Generation System
PGSTK: Product Generation System Toolkit
PS: Polar Stereographic

Q.

QA: quality assurance

R.

RIS8: 8-bit Raster type
RIS24: 24-bit Raster type

S.

SCF: Science Computing Facility
SDP: science data production
SDPS: Science Data Processing Segment
SDPTK: SDP Toolkit CSCI
SOM: Space Oblique Mercator

T.

TBD: To Be Determined

U.

UINT8: 8-bit unsighned integer type.
UINT16: 16-bit unsighned integer type.
UINT32: 32-bit unsighned integer type
UINT64: 64-bit unsighned integer type
UTC: Coordinated Universal Time (or universal time code)
UTM: Universal Transverse Mercator

W.

WGS84: World Geometric System ‘84