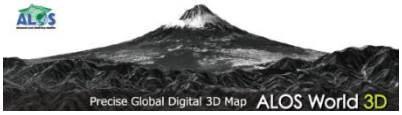


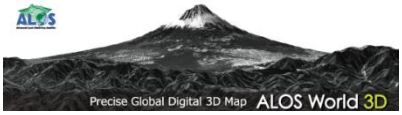
ALOS Global Digital Surface Model (DSM)
"ALOS World 3D-30m" (AW3D30) Dataset

Product Format Description

Version 1.1

March 2017

Earth Observation Research Center (EORC),
Japan Aerospace Exploration Agency (JAXA)



“ALOS World 3D-30m” (AW3D30) dataset
Product Format Description

Table of Contents

Revision record

Ver.	Date	Chapter/ Table	Field No.	Contents of revision
1	2015/03/31	-	-	First edition
1.1	2017/03/6	Chp. 1		Addition of the explanation on the void-filling of DSM values in cloud and show masked pixels
		Chp 2.1/ Table1		Format definition change of mask (MSK) file
		Chp 2.3/ Table 3		Field addition to quality assurance information (QA) file
		Chp 5		Chapter addition for references

1. Overview

The Japan Aerospace Exploration Agency (JAXA) has proceeded since 2014 the project to develop the “precise digital 3D map”[*1] covering the global land areas through the use of 3 million scene archives acquired by the PRISM panchromatic stereo mapping sensor on the Advanced Land Observing Satellite "DAICHI" (ALOS) operated from 2006 to 2011[1-3)]. The developed digital 3D maps consist of Digital Elevation Model (DEM) or Digital Surface Model (DSM) that can represent land terrains with 5 meters in spatial resolution and 5 meters in height accuracy (standard deviation), and orthorectified PRISM nadir look images. The digital 3D maps have been utilized in a wide variety of applications such as map development, damage prediction of natural disasters, and water resource investigation.

JAXA released “ALOS World 3D-30m” (AW3D30) dataset, the global digital surface model (DSM) dataset with a horizontal resolution of approximately 30-meter mesh (1 arcsec. latitude and longitude) generated from 5m resolution DSM, free of charge in May 2016[4)]. Void height values in cloud and show pixels between 60-degree North and 60-degree South are filled with existing DEMs using the Delta Surface Fill[*2] method in the update in March 2017. This dataset is highly expected to be used in scientific research and geospatial information application services.

*1: Precise Global Digital 3D Map “ALOS World 3D” http://www.eorc.jaxa.jp/ALOS/en/aw3d/index_e.htm

*2: Delta Surface Fill (DSF) is a void-filling method that replaces the void values in the original DEM with the adjusted values calculated from surrounding valid pixels in other reference DSM. By using the difference of valid height values in the original and reference DEM, this process ensures the smooth continuity of topography at the boundaries of void-fills[5)].

2. AW3D30 Dataset

2.1. Dataset file composition

A tile of this dataset covers the unit area of 1 degree latitude and longitude. The tile ID stands for the latitude and longitude at lower-left corner. For every tile, the set of data shown in **Table 1** is stored in a tar+gz compressed file.

Table 1: File composition of AW3D30 dataset.

Dataset composition	Contents and details	Notes
DSM file (DSM)	Elevation (in meter) converted from the ellipsoidal height based on ITRF97 and GRS80, using EGM96 geoid model. Signed 16bit (LSB) raster data, GeoTIFF format. Equirectangular projection, Spacing: 1 arcsec. (approx. 30 m) Average and median values are adopted in resampling the 0.15 arcsec. resolution DSM into 1 arcsec. resolution. Value “-9999” are stored in void pixels.	Average and median sets are stored in ./AVERAGE/ and ./MEDIAN/, respectively. Use them in accordance with purpose of their use.
Mask file (MSK)	Following mask information are generated from resampled DSM: 8 bits raster data (only lower 4 bits are used), GeoTIFF format. 0000 (DN=0): Valid 0001 (DN=1): Cloud and show mask (invalid) 0010 (DN=2): Land water and low correlation mask†1 (valid) 0011 (DN=3): Sea mask†2 (valid) 0100 (DN=4): Void filled with National Land Numerical Information 10m DEM (by Geographical Survey Institute of Japan) (valid)†3 1000 (DN=8): Void filled with Shuttle Radar Topography Mission (SRTM) SRTM-1 Version 3†3（valid） 1100 (DN=12): Void filled with PRISM DSM†3 (valid)	†1: Land water and low correlation mask indicates the area with low correlation in the calculation of DSM. Height in DSM files with this mask tends to be less reliable. †2: Height values of zero are stored in the DSM pixels of sea mask. †3: Height values could be stored in the DSM pixels of land water and low correlation areas in the tiles covering both land and land water areas.
Stacking number file (STK)	Stacking number of the scene unit DSM used in producing DSM. The file is derived by resampling the stacking number file for 5m resolution DSM to 30 m resolution 8bit raster data, GeoTIFF format	
Header information file (HDR)	Processing information in producing DSM. Information was derived from HDR file for original 5 m resolution DSM. Information on image size and pixel spacing were converted for 30 m dataset. Text format	**Table 2** for details.
Quality assurance information file (QAI)	Quality assurance information consisting of the comparison and correlation analysis results of 5 m resolution DSM with other existing DEMs, and statistics from 30 m resolution DSM. Text format	**Table 3** for details.

2.2. Header information file format

Table 2 shows the detailed items in the header information (HDR) file included in the AW3D30 dataset.

Table 2: Items in AW3D30 header information (HDR) file.

Field No.	Description	Number of Bytes	Start Byte Position	Type	Note
Product Record	Data Identifier				Field No.1~58
	Product Information Product Identifier Details				Field No.1~10
1	Mesh ID = 'NNNNNNNNbbbbbbbb'	16	1	A16	
2	DSM Product ID = 'AABBBCDEEbbbbbbb' AA : Satellite code = 'AL' BBB : Sensor code = 'PSM':PRISM C : Grid type = 'L': Lat-Lon D : DSM type = 'A': Absolute EE : DSM grid spacing = '05'	16	17	A16	
3	Product type = 'PSM-DSMbbbbbbbbb'	16	33	A16	
4	Mesh code = 'NNNNNNNNbbbbbbbb'	16	49	A16	
5	Satellite name = 'ALOSbbbb' (fixed)	8	65	A8	
6	Sensor code = 'PSMbbbbb': PRISM	8	73	A8	
7	Coordinates = 'LTLNbbbb': Lat-Lon	8	81	A8	
8	DSM type = 'Abbb': Absolute	4	89	A4	
9	DSM grid spacing (sec) = 'b1.00bbb'	8	93	A8	
10	Blank (fixed)	28	101	A28	Total 128 bytes
	Mesh Information Mesh Identifier				Field No.11~35
11	Mesh upper-left line number = 'bNNNNN.N'	8	129	F8.1	Addresses correspondance to the corner of a pixel, not its center. Since each pixel/line integer value is assigned at pixel center, pixel/line number for four corners is described with real values.
12	Mesh upper-left column number = 'bNNNNN.N'	8	137	F8.1	
13	Mesh upper-right line number = 'bNNNNN.N'	8	145	F8.1	
14	Mesh upper-right column number = 'bNNNNN.N'	8	153	F8.1	
15	Mesh lower-left line number = 'bNNNNN.N'	8	161	F8.1	
16	Mesh lower-left column number = 'bNNNNN.N'	8	169	F8.1	
17	Mesh lower-right line number = 'bNNNNN.N'	8	177	F8.1	
18	Mesh lower-right column number = 'bNNNNN.N'	8	185	F8.1	
19	Mesh upper-left latitude (deg) = 'NNNNNNNN.NNNNNNN' (-90.0000000～90.0000000)	16	193	F16.7	Negative value for southern hemisphere
20	Mesh upper-left longitude (deg) = 'NNNNNNNN.NNNNNNN' (-180.0000000～180.0000000)	16	209	F16.7	Negative value for west longitude
21	Mesh upper-right latitude (deg) = 'NNNNNNNN.NNNNNNN' (-90.0000000～90.0000000)	16	225	F16.7	Negative value for southern hemisphere
22	Mesh upper-right longitude (deg) = 'NNNNNNNN.NNNNNNN' (-180.0000000～180.0000000)	16	241	F16.7	Negative value for west longitude
23	Mesh lower-left latitude (deg) = 'NNNNNNNN.NNNNNNN' (-90.0000000～90.0000000)	16	257	F16.7	Negative value for southern hemisphere
24	Mesh lower-left longitude (deg) = 'NNNNNNNN.NNNNNNN' (-180.0000000～180.0000000)	16	273	F16.7	Negative value for west longitude
25	Mesh lower-right latitude (deg) = 'NNNNNNNN.NNNNNNN' (-90.0000000～90.0000000)	16	289	F16.7	Negative value for southern hemisphere
26	Mesh lower-right longitude (deg) = 'NNNNNNNN.NNNNNNN' (-180.0000000～180.0000000)	16	305	F16.7	Negative value for west longitude
27	Mesh upper-left map address X (km) = 'NNNNNNNN.NNNNNNN' (Northing for UTM)	16	321	F16.7	All blank for LTLN product
28	Mesh upper-left map address Y (km) = 'NNNNNNNN.NNNNNNN' (Easting for UTM)	16	337	F16.7	
29	Mesh upper-right map address X (km) = 'NNNNNNNN.NNNNNNN' (Northing for UTM)	16	353	F16.7	
30	Mesh upper-right map address Y (km) = 'NNNNNNNN.NNNNNNN' (Easting for UTM)	16	369	F16.7	
31	Mesh lower-left map address X (km) = 'NNNNNNNN.NNNNNNN' (Northing for UTM)	16	385	F16.7	
32	Mesh lower-left map address Y (km) = 'NNNNNNNN.NNNNNNN' (Easting for UTM)	16	401	F16.7	
33	Mesh lower-right map address X (km) = 'NNNNNNNN.NNNNNNN' (Northing for UTM)	16	417	F16.7	
34	Mesh lower-right map address Y (km) = 'NNNNNNNN.NNNNNNN' (Easting for UTM)	16	433	F16.7	
35	Blank (fixed)	16	449	A16	Total 336 bytes
	Processing Information Processing Details				Field No.36~58
	Map Projection Map Projection Parameters				
36	Coordinates = 'LTLNbbbb'	8	465	A8	
37	PS origin latitude (deg) = 'NNNNNNNN.NNNNNNN'	16	473	F16.7	All blank for LTLN product
38	PS origin longitude (deg) = 'NNNNNNNN.NNNNNNN'	16	489	F16.7	All blank for LTLN product
39	PS reference latitude (deg) = 'NNNNNNNN.NNNNNNN'	16	505	F16.7	All blank for LTLN product
40	PS reference longitude/ UTM central meridian (deg) = 'NNNNNNNN.NNNNNNN'	16	521	F16.7	All blank for LTLN product
41	Hemisphere = 'bbbN':North / 'bbbS':South	4	537	A4	
42	UTM zone no. = 'bbb1'～'bb60'	4	541	I4	All blank for LTLN product
43	Angle between vertical axis of coordinates and true north direction (deg) = 'NNNNNNNN.NNNNNNN'	16	545	F16.7	At mesh center All blank for LTLN product
44	Blank (fixed)	32	561	A32	Total 128 bytes
	Datum Datum Parameters				
45	ECR coordinates = 'ITRF97bbbbbbbbbb'	16	593	A16	
46	Ellipsoid model = 'GRS80bbbbbbbbbb'	16	609	A16	
47	Equator radius of ellipsoid model (km) = 'NNNNNNNN.NNNNNNN'	16	625	F16.7	
48	Polar radius of ellipsoid model (km) = 'NNNNNNNN.NNNNNNN'	16	641	F16.7	
49	Inverse flattening (1/f) of ellipsoid model = 'NNNNNNNN.NNNNNNN'	16	657	F16.7	
50	Blank (fixed)	48	673	A48	Total 128 bytes
	DSM Data DSM Data Parameters				
51	Coordinates = 'LTLNbbbb'	8	721	A8	Same as field No.7
52	DSM type = 'Abbb': Absolute	4	729	A4	Same as field No.8
53	Vertical grid spacing (m)/(sec) = 'NNN.NNNb'	8	733	A8	
54	Horizontal grid spacing (m)/(sec) = 'NNN.NNNb'	8	741	A8	
55	Height resolution of DSM (m) = '1bbbbbbb'	8	749	I8	
56	Height type = 'Ebbb': Ellipsoidal Height / 'Obbb': Orthometric Height	4	757	A4	
57	Geoid data = 'XXXXXXXXXXXXXXXX' : 'GSI-2000bbbbbbbb': Japan Geoid 2000 / 'NGA-EGM96bbbbbbb': EGM96	16	761	A16	All blank for height type 'E'
58	Blank (fixed)	8	777	A8	Total 64 bytes
Quality Record	Quality Information				Field No.59~64
59	Mask (00000000) rate = 'bNNN' %	4	785	I4	Right-aligned
60	Mask (00000001) rate = 'bNNN' %	4	789	I4	
61	Mask (00000010) rate = 'bNNN' %	4	793	I4	
62	Mask (00000011) rate = 'bNNN' %	4	797	I4	
63	DSM data quality = 'bbbX' 'G': Good = 100 – 81 % (Rate of valid pixels) 'F': Fair = 80 – 51 % 'P': Poor = 50 – 0 %	4	801	A4	
64	Blank	44	805	A44	Total 64 bytes

Field No.	Description	Number of Bytes	Start Byte Position	Type	Note
Format Record	Data Format Information				Field No.65~82
65	Header record length (byte) = 'bbbbNNNN'	8	849	I8	Variable header file size
66	Data column length (number of pixels for each line) = 'bbbNNNNN'	8	857	I8	
67	Data line length (number of pixels for each column) = 'bbbNNNNN'	8	865	I8	
68	Byte order = 'MSBbbbbbb' / 'LSBbbbbbb' (default)	8	873	A8	Total 32 bytes
	DSM Data Format DSM Data Format Structures				
69	Number of bits for DSM 1 pixel (bit) = 'bb16'	4	881	I4	
70	Number of pixels for DSM 1 data (pixel) = 'bbb1'	4	885	I4	
71	Number of bytes for DSM 1 data (byte) = 'bbb2'	4	889	I4	
72	Bit start for DSM 1 pixel (bit) = 'bbb0'	4	893	I4	0~15 bits per data
73	Bit end for DSM 1 pixel (bit) = 'bb15' DSM data settings 2 bytes (signed short) with a vertical accuracy of 1m	4	897	I4	0~15 bits per data
74	Number of DSM files = 'bbb1' (fixed)	4	901	I4	
75	Blank (fixed)	8	905	A8	Total 32 bytes
	MSK Data Format MSK Data Format Structures				
76	Number of bits for MSK 1 pixel (bit) = 'bbb8'	4	913	I4	
77	Number of pixels for MSK 1 data (pixel) = 'bbb1'	4	917	I4	
78	Number of bytes for MSK 1 data (byte) = 'bbb1'	4	921	I4	
79	Bit start for MSK 1 pixel (bit) = 'bbb0'	4	925	I4	0~7 bits per data
80	Bit end for MSK 1 pixel (bit) = 'bbb7'□ Mask data setting (8bits) 00000000 : Valid 00000001 : Invalid: No-data, cloud, snow 00000010 : Valid: Land water, low correlation 00000011 : Valid: Sea 00000100 : Valid: Void filled with National Land Numerical Information 10m DEM (by Geographical Survey Institute, Japan) 00001000 : Valid: Void filled with SRTM-1 Version 3 00001100 : Valid: Void filled with PRISM DSM	4	929	I4	0~7 bits per data
81	Number of MSK files = 'bbb1' (fixed)	4	933	I4	
82	Blank (fixed)	40	937	A40	Total 64 bytes
System Record	Data Processing System Information				Field No.88~95
83	Processing date (JST) = 'YYYYMMDDbbbbbbbb' YYYY : Year MM : Month DD : Day	16	977	A16	
84	Processing time (JST) = 'HHMMSSbbbbbbbbbb' HH : Hour MM : Minute SS : Second	16	993	A16	
85	Processing country = 'JAPANbbbbbbbbbb'	16	1009	A16	
86	Processing organization = 'JAXAbbbbbbbbbbbb'	16	1025	A16	
87	Processing facility = 'EORC-AGAPbbbbbbb'	16	1041	A16	
88	Software version = 'VVV-RRR-YYYYMMDDbbbbbbbb' VVV : Version No. RRR : Release No. YYYY : Release year MM : Release month DD : Release date	24	1057	A24	
89	DFCB revision = 'Abbb'～'Zbbb' (26 types)	4	1081	A4	
90	Blank (fixed)	20	1085	A20	Total 128 bytes
Reserve	Reserve				Field No.91
91	Blank (fixed)	4	1105	I4	Total 4 bytes
		1108		byte	

2.3. Quality assurance information file format

Detailed items in the quality assurance information (QAI) file included in the AW3D30 dataset are summarized in **Table 3**. First half of the items are the quality assurance information obtained from the 5m resolution DSM which are the original data in producing the 30m resolution DSM.

Table 3: Items in AW3D30 quality assurance information (QAI) file.

Category	Item	Key	Value (sample)
5m DSM	Comprehensive assessment: accuracy[*1]	TOTAL_ACCURACY	G
	Comprehensive assessment: completeness[*1]	TOTAL_INTEGRITY	G
	Comprehensive assessment: reliability[*1]	TOTAL_RELIABILITY	G
	Average of difference: SRTM	SRTM_AVERAGE	0.25
	Standard deviation of difference: SRTM	SRTM_STDEV	11.38
	RMS of difference: SRTM	SRTM_RMS	11.38
	Maximum of difference: SRTM	SRTM_MAX	463
	Mode of difference: SRTM	SRTM_MODE	0
	Average of difference: ASTER GDEM	ASTER_AVERAGE	0.27
	Standard deviation of difference: ASTER GDEM	ASTER_STDEV	23.95
	RMS of difference: ASTER GDEM	ASTER_RMS	26.36
	Maximum of difference: ASTER GDEM	ASTER_MAX	61.28
	Mode of difference: ASTER GDEM	ASTER_MODE	1
	Number of comparison points with ICESat	ICESAT_NUM	3386
	Average of difference: ICESat	ICESAT_AVERAGE	0.24
	Standard deviation of difference: ICESat	ICESAT_STDEV	3.14
	RMS of difference: ICESat	ICESAT_RMS	3.15
	Maximum of difference: ICESat	ICESAT_MAX	41.16
	Mode of difference: ICESat	ICESAT_MODE	0
	Average of relative error between stacked images	REL_STACK_AVERAGE	1.93
	Standard deviation of relative error between stacked images	REL_STACK_STDEV	1.88
	Number of valid pixel	MASK_NUM_VALID	568409256
	Number of cloud and snow masked pixel	MASK_NUM_CLOUDSNOW	5092528
	Number of inland water masked pixels	MASK_NUM_INLANDWATER	2498216
	Number of sea masked pixels	MASK_NUM_SEA	0
	Rate of valid pixel	MASK_RATE_VALID	98.68
	Rate of cloud and snow masked pixels	MASK_RATE_CLOUDSNOW	0.88
	Rate of inland water masked pixels	MASK_RATE_INLANDWATER	0.43
	Rate of sea masked pixels	MASK_RATE_SEA	0
	Correlation coefficient: average	CORREL_AVERAGE	0.72
	Correlation coefficient: standard deviation	CORREL_STDEV	0.16
	Correlation coefficient: maximum	CORREL_MAX	-0.59
	Correlation coefficient: minimum	CORREL_MIN	1
	Correlation coefficient histogram: -1.0~-0.9	CORREL_HIST_-1.0to-0.9	0
	Correlation coefficient histogram: -0.9~-0.8	CORREL_HIST_-0.9to-0.8	0
	Correlation coefficient histogram: -0.8~-0.7	CORREL_HIST_-0.8to-0.7	0
	Correlation coefficient histogram: -0.7~-0.6	CORREL_HIST_-0.7to-0.6	21
	Correlation coefficient histogram: -0.6~-0.5	CORREL_HIST_-0.6to-0.5	123
	Correlation coefficient histogram: -0.5~-0.4	CORREL_HIST_-0.5to-0.4	461
	Correlation coefficient histogram: -0.4~-0.3	CORREL_HIST_-0.4to-0.3	1236
	Correlation coefficient histogram: -0.3~-0.2	CORREL_HIST_-0.3to-0.2	4193
	Correlation coefficient histogram: -0.2~-0.1	CORREL_HIST_-0.2to-0.1	15003
	Correlation coefficient histogram: -0.1~0.0	CORREL_HIST_-0.1to0.0	646970
	Correlation coefficient histogram: 0.0~0.1	CORREL_HIST_0.0to0.1	1699541
	Correlation coefficient histogram: 0.1~0.2	CORREL_HIST_0.1to0.2	5350540
	Correlation coefficient histogram: 0.2~0.3	CORREL_HIST_0.2to0.3	11789461

	Correlation coefficient histogram: 0.3~0.4	CORREL_HIST_0.3to0.4	30902088
	Correlation coefficient histogram: 0.4~0.5	CORREL_HIST_0.4to0.5	65110659
	Correlation coefficient histogram: 0.5~.0.6	CORREL_HIST_0.5to0.6	111734882
	Correlation coefficient histogram: 0.6~0.7	CORREL_HIST_0.6to0.7	142957951
	Correlation coefficient histogram: 0.7~0.8	CORREL_HIST_0.7to0.8	129144617
	Correlation coefficient histogram: 0.8~0.9	CORREL_HIST_0.8to0.9	69039487
	Correlation coefficient histogram: 0.9~1.0	CORREL_HIST_0.9to1.0	24940
	Number of stacking: average	STACK_AVERAGE	3.76
	Number of stacking: standard deviation	STACK_STDEV	1.19
	Number of stacking: Minimum	STACK_MIN	0
	Number of stacking: Maximum	STACK_MAX	11
Information on void-filling	Number of valid pixel	InsPSM10M_MASK_NUM_VALID	568409256
	Number of cloud and snow mask pixel	InsPSM10M_MASK_NUM_CLOUDSNOW	5092528
	Number of inland water mask pixels	InsPSM10M_MASK_NUM_INLANDWATER	2498216
	Number of sea mask pixels	InsPSM10M_MASK_NUM_SEA	0
	Rate of valid pixel	InsPSM10M_MASK_RATE_VALID	98.68
	Rate of cloud and snow mask pixels	InsPSM10M_MASK_RATE_CLOUDSNOW	0.88
	Rate of inland water mask pixels	InsPSM10M_MASK_RATE_INLANDWATER	0.43
	Rate of sea mask pixels	InsPSM10M_MASK_RATE_SEA	0
30m DSM	Number of valid pixel	DegradeXXX_MASK_NUM_VALID*2	15789146
	Number of cloud and snow mask pixel	DegradeXXX_MASK_NUM_CLOUDSNOW*2	141459
	Number of inland water mask pixels	DegradeXXX_MASK_NUM_INLANDWATER*2	69394
	Number of sea mask pixels	DegradeXXX_MASK_NUM_SEA*2	0
	Rate of valid pixel	DegradeXXX_MASK_RATE_VALID*2	98.68
	Rate of cloud and snow mask pixels	DegradeXXX_MASK_RATE_CLOUDSNOW*2	0.88
	Rate of inland water mask pixels	DegradeXXX_MASK_RATE_INLANDWATER*2	0.43
	Rate of sea mask pixels	DegradeXXX_MASK_RATE_SEA*2	0
Information on 30m void-filling	Number of cloud and snow mask pixel (after void-filling)	GapFillXXX_MASK_NUM_CLOUDSNOW*2	0
	Number of pixels filled with GSI 10m DEM	GapFillXXX_MASK_NUM_FILLED_GSI10*2	0
	Number of pixels filled with SRTM1 Version 3	GapFillXXX_MASK_NUM_FILLED_SRTM-1_V3*2	141459
	Number of pixels filled with PRISM DSM	GapFillXXX_MASK_NUM_FILLED_PSM*2	0
	Rate of cloud and snow mask pixel (after void-filling)	GapFillXXX_MASK_RATE_CLOUDSNOW*2	0
	Rate of pixels filled with GSI 10m DEM	GapFillXXX_MASK_RATE_FILLED_GSI10*2	0
	Rate of pixels filled with SRTM1 Version 3	GapFillXXX_MASK_RATE_FILLED_SRTM-1_V3*2	0.88
	Rate of pixels filled with PRISM DSM	GapFillXXX_MASK_RATE_FILLED_PSM*2	0
void-filling product	Version of void-filling product	VERSION_GapFill_PRODUCT	1.1

*1: Evaluation items and strategies in comprehensive assessment are as follows.

1) Comprehensive assessment - accuracy: statistical evaluation on the absolute difference from existing global topographic data such as SRTM-3, ASTER GDEM, and ICESat

2) Comprehensive assessment - completeness: evaluation on the area occupancy of cloud and show mask and land water and low correlation mask to land areas

3) Comprehensive assessment - reliability: statistical evaluation on the histograms of correlation coefficients in stereo-pair matching and on stacking number

Table 4: Criteria for comprehensive evaluation in QAI file.

Item	Good	Fair	Poor
Accuracy	< 5m	< 7m	>= 7m
Completeness	>= 90%	>= 70%	< 70%
Reliability	>= 1.5	>= 1.0	< 1.0

*2: XXX = AVE: Average DSM
MED: Median DSM

3. GeoTIFF Product

3.1. TIFF tag settings for GeoTIFF product

Tables 5 and **6** summarize the TIFF tag settings for GeoTIFF product.

Table 5: TIFF tag settings for GeoTIFF product (DSM).

Tag	Value
TIFFTAG_SUBFILETYPE	0
TIFFTAG_IMAGEWIDTH	dsm width
TIFFTAG_IMAGELENGTH	dsm height
TIFFTAG_BITSPERSAMPLE	16
TIFFTAG_COMPRESSION	COMPRESSION_NONE
TIFFTAG_PHOTOMETRIC	PHOTOMETRIC_MINISBLACK
TIFFTAG_ORIENTATION	ORIENTATION_TOPLEFT
TIFFTAG_SAMPLESPERPIXEL	1
TIFFTAG_ROWSPERSTRIP	dsm height
TIFFTAG_XRESOLUTION	72
TIFFTAG_YRESOLUTION	72
TIFFTAG_RESOLUTIONUNIT	RESUNIT_INCH
TIFFTAG_SAMPLEFORMAT	SAMPLEFORMAT_INT
TIFFTAG_PLANARCONFIG	1
GTIFF_TIEPOINTS	6 parameters of model tie point tag
GTIFF_PIXELSCALE	3 parameters of model pixel scale tag
GTIFF_ASCIIPARAMS	text data

Table 6: TIFF tag settings for GeoTIFF product (MSK and STK).

Tag	Value
TIFFTAG_SUBFILETYPE	0
TIFFTAG_IMAGEWIDTH	image width
TIFFTAG_IMAGELENGTH	image height
TIFFTAG_BITSPERSAMPLE	8
TIFFTAG_COMPRESSION	COMPRESSION_NONE
TIFFTAG_PHOTOMETRIC	PHOTOMETRIC_MINISBLACK
TIFFTAG_ORIENTATION	ORIENTATION_TOPLEFT
TIFFTAG_SAMPLESPERPIXEL	1
TIFFTAG_ROWSPERSTRIP	image height
TIFFTAG_XRESOLUTION	72
TIFFTAG_YRESOLUTION	72
TIFFTAG_RESOLUTIONUNIT	RESUNIT_INCH
TIFFTAG_SAMPLEFORMAT	SAMPLEFORMAT_UINT
TIFFTAG_PLANARCONFIG	1
GTIFF_TIEPOINTS	6 parameters of model tie point tag
GTIFF_PIXELSCALE	3 parameters of model pixel scale tag
GTIFF_ASCIIPARAMS	text data

3.2. GeoTIFF key settings for GeoTIFF product

Table 7 shows the GeoTIFF key settings for GeoTIFF product.

表 7：GeoTIFF key settings for GeoTIFF product.

Key	Value
GTModelTypeGeoKey	ModelTypeProjected
GTRasterTypeGeoKey	RasterPixelIsArea
GeographicTypeGeoKey	GCS_WGS_84
GeogAngularUnitsGeoKey	Angular_Degree
GTCitationGeoKey	text data
PCSCitationGeoKey	text data

4. Others

Please contact to the ALOS Science Project via e-mail to the address below for any questions or inquiries regarding the use of the dataset. For our future reference, sending the offprints and copies of the research results using the dataset to the following point of contact is highly appreciated.

5. References

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