

EarthCARE JAXA

Product List

January 2016

Japan Aerospace Exploration Agency
(JAXA)

Document Change Record

Revision	Date	Description of Change
NC	June 2011	Baseline release
A	August 2011	The mistypings of the CPR L1b accuracies were corrected.
B	August 2012	Updated the whole document due to the upgrade of the algorithms to Ver0.1.
C	December 2012	<ul style="list-style-type: none">- Deleted CPR L1b NRT Product- Added Auxiliary Product (ECMWF).- Added Product ID.- Corrected the mistyping.- Added JAXA Product List extracted from Joint Product List as Annex.- Changed Status "Red R" to "UP"
D	August 2013	Updated based on the JAXA CDR.
E	January 2016	<ul style="list-style-type: none">- Corrected ECMWF-AUX Product Definition- Added L2 ATBD in Reference

1 Introduction

1.1 Purpose and Scope

The purpose of the “EarthCARE JAXA Product List” is to describe the EarthCARE JAXA Level 2 product list with the CPR Level 1 products.

1.2 Related Documents

The related documents to this document are listed below.

1.2.1 Reference Documents

The following documents are the reference documents for this document.

- [RD-1] EarthCARE/CPR JAXA Ground Segment Concept Document, MAS-110008
- [RD-2] EarthCARE ESA-JAXA Operational Interface Agreement (OIA), EC-ICD-ESA-GS-0215
- [RD-3] EarthCARE JAXA Level 2 Algorithm Theoretical Basis Document (L2 ATBD), NDX-110018

2 Product List

The following table details the JAXA products.

The meanings of each column are below;

- Sensor(s):
This is the name of the EarthCARE sensor(s) used to create the each product
- Processing Level:
This is the processing level (either L1b, L2a or L2b) of each product.
- Status:
“ST” = Standard product
“UP” = Research product that would be UPgraded to standard after one year or later when the release accuracy is approved.
“ER” = Research product that would be processed in JAXA EORC Research and Application System. Some are processed at JAXA/MOS when products are produced as by-product of the Standard processing.
“LR” = Research product that would be processed in Japanese Laboratories.
Detailed of each product is explained in Section 3.
- Product Identifier:
This is the product identifier which will be included in the header of HDF file.
The unit of a file is equal to the unit of the product identifier for the standard products.
- Product Name:
This name identifies the summary of the parameters included in the file.
- Primary Parameters:
This identifies the name of the primary physical parameters that are included in the file.
- Pixel Integration Length:
This is the length (size) of the data that are integrated to retrieve each pixel. The accuracy is defined using the "product resolution" in red italic numbers.

- Pixel Spacing:
This is the distance between the neighboring pixels.
- Release Accuracy:
This is the threshold accuracy used to decide whether the product will be released or not.
- Standard Accuracy:
Those parameters that satisfy this accuracy are recognized as scientifically good.
- Target Accuracy:
Those parameters that satisfy this accuracy are recognized as scientifically fine.

3 Product Category

JAXA's products are categorized as standard or research products. The differences between the categories are the following;

- (1) Standard Products (ST)
 - strongly promoted to be developed and released
 - processed and released from JAXA/Mission Operation System (MOS)
 - all data will be able to be sent to ESA when produced
 - warranted by JAXA with their accuracies
- (2) Research Products
 - promoted to be developed and released
 - no responsibility to process all of observation data; some will generate research products for some target duration.
 - further divided into two groups;
 - Upgrade Research Product (UP)
 - will be upgraded to standard after one year or later when the release accuracy is approved. Through the process, standard algorithm will be implemented into Mission Operation System and processed for all of observation data [RD-1].
 - EORC Research Products (ER)
 - released from JAXA/Earth Observation Research Center (EORC) Research and Application System
 - processed at JAXA/EORC Research and Application System. Some are processed at JAXA/MOS when products are produced as by-product of the Standard processing.
 - Laboratory Research Products (LR)
 - from cooperating Japanese Laboratories

4 Product Format

EarthCARE science product format is NetCDF4/HDF5. JAXA MOS use HDF5 (version 5.18 or later) format which is compatible with NetCDF4 for JAXA products. And JAXA products contain all ESA and JAXA required header information [RD-1]. These are defined in the OIA [RD-2].

5 Product Frame

The ESA-JAXA science product frame format is defined in [RD-2].

Table 1. JAXA Product List

標準プロダクト (L1b)

Standard Products (L1b)

センサ Sensor(s)	処理レベル Processing Level	ステータス Status	プロダクト識別子 Product ID	プロダクト名 Product Name		主要パラメータ Primary Parameter		グリッド間隔		空間解像度		リリース精度 Release Accuracy	標準精度 Standard Accuracy	目標精度 Target Accuracy	データ容量 (/周回) (TBD)
								Grid Spacing		Spatial Resolution					
								水平	鉛直	水平	鉛直				
								Horizontal	Vertical	Horizontal	Vertical				
CPR	L1b	ST	CPR_NOM	CPR単体 受信電力・ドップラー プロダクト	CPR One-sensor Received Echo Power and Doppler Product	受信電力	Received Echo Power	0.5km	0.1km	0.765km ³ (cross-track) 0.840km ³ (along-track)	0.5km	-	-	-	420MB
						レーダ反射因子	Radar Reflectivity Factor		-		-				
						地表面レーダ断面積	Surface Radar Cross Section		-		-				
						ドップラー速度	Doppler Velocity		-		-				

標準プロダクト (L2a)

Standard Products (L2a)

センサ Sensor(s)	処理レベル Processing Level	ステータス Status	プロダクト識別子 Product ID	プロダクト名 Product Name		主要パラメータ Primary Parameter		グリッド間隔		空間解像度		リリース精度 Release Accuracy	標準精度 Standard Accuracy	目標精度 Target Accuracy	データ容量 (/周回) (TBD)		
								Grid Spacing		Spatial Resolution							
								水平	鉛直	水平	鉛直						
								Horizontal	Vertical	Horizontal	Vertical						
CPR	L2a	ST	CPR_ECO	CPR単体 エコプロダクト	CPR One-sensor Echo Product	積分レーダ反射因子	Integrated Radar Reflectivity Factor	1km	0.1km	1km 10km	0.5km	-	-	-	950MB		
						積分ドップラー速度	Integrated Doppler Velocity									-	-
						大気減衰補正量	Gas Correction Factor									-	-
CPR	L2a	ST	CPR_CLP	CPR単体 雲プロダクト	CPR One-sensor Cloud Product	雲マスク	Cloud Mask	1km	0.1km	1km 10km	0.5km	-	±30%	±10%	±5%	1080MB	
						雲粒子タイプ	Cloud Particle Type						±100%	±50%	±20%		
						雲水量	Liquid Water Content						-	-	±50%		
						氷水量	Ice Water Content						-	-	-		
						水雲有効粒径	Effective Radius of Liquid Water Cloud						-	-	-		
						氷雲有効粒径	Effective Radius of Ice Water Cloud						-	-	-		
						光学的厚さ	Optical Thickness						-	-	±100%		±50%
ATLID	L2a	ST	ATL_CLA	ATLID単体 雲エアロゾルプロダクト	ATLID One-sensor Cloud and Aerosol Product	フィーチャー・マスク	Feature Mask	1km 10km	0.1km	1km 10km	0.1km	-	±100%	±40%	±10%	580MB	
						ターゲット・マスク	Target Mask						±100%	±40%	±10%		
						エアロゾル 消滅係数	Aerosol Extinction Coeff.						±60%	±40%	±20%		
						エアロゾル 後方散乱係数	Aerosol Backscat. Coeff.						±90%	±70%	±50%		
						エアロゾル ライダー比	Aerosol Lidar Ratio						±150%	±110%	±70%		
						エアロゾル 偏光解消度	Aerosol Depolarization Ratio						±150%	±130%	±100%		
						雲 消滅係数	Cloud Extinction Coeff.						±90%	±70%	±50%		
						雲 後方散乱係数	Cloud Backscat. Coeff.						±140%	±100%	±65%		
						雲 ライダー比	Cloud Lidar Ratio						±150%	±100%	±100%		
						雲 偏光解消度	Cloud Depolarization Ratio						±500m	±300m	±100m		
MSI	L2a	ST	MSI_CLP	MSI単体 雲プロダクト	MSI One-sensor Cloud Product	雲フラグ・雲フェイズ	Cloud Flag including Cloud Phase	0.5km	-	0.5km	-	-	±15% Ocean ±20% Land	±15%	±10%	1340MB	
						水雲光学的厚さ	Optical Thickness of Liquid Water Cloud						±10%	±100% (converting to LWP)	±50% (converting to LWP)		
						水雲雲粒有効粒径 (1.6 μm)	Effective Radius of Liquid (1.6 μm)						±30%	-	-		
						水雲雲粒有効粒径 (2.2 μm)	Effective Radius of Liquid (2.2 μm)						-	-	-		
						雲頂温度	Cloud Top Temperature						±1K	±3K	±1.5K		

標準プロダクト (L2b)

Standard Products (L2b)

センサ Sensor(s)	処理レベル Processing Level	ステータス Status	プロダクト識別子 Product ID	プロダクト名 Product Name		主要パラメータ Primary Parameter		グリッド間隔		空間解像度		リリース精度 Release Accuracy	標準精度 Standard Accuracy	目標精度 Target Accuracy	データ容量 (/周回) (TBD)		
								Grid Spacing		Spatial Resolution							
								水平	鉛直	水平	鉛直						
								Horizontal	Vertical	Horizontal	Vertical						
CPR + ATLID	L2b	ST	AC_CLP	CPR-ATLID複合 雲プロダクト	CPR-ATLID Synergy Cloud Product	雲マスク	Cloud Mask	1km	0.1km	1km 10km	0.5km	-	root mean square of errors of one-sensor products	-	1120MB		
						雲粒子タイプ	Cloud Particle Type									-	-
						水雲有効粒径	Effective Radius of Liquid Water Cloud									-	-
						氷雲有効粒径	Effective Radius of Ice Water Cloud									-	-
						雲水量	Liquid Water Content									-	-
						氷水量	Ice Water Content									-	-
						光学的厚さ	Optical Thickness									-	-
CPR + ATLID + MSI	L2b	ST	ACM_CLP	CPR-ATLID-MSI複合 雲プロダクト	CPR-ATLID-MSI Synergy Cloud Product	雲マスク	Cloud Mask	1km	0.1km	1km 10km	0.5km	-	root mean square of errors of one-sensor products	-	1120MB		
						雲粒子タイプ	Cloud Particle Type									-	-
						水雲有効粒径	Effective Radius of Liquid Water Cloud									-	-
						氷雲有効粒径	Effective Radius of Ice Water Cloud									-	-
						雲水量	Liquid Water Content									-	-
						氷水量	Ice Water Content									-	-
						光学的厚さ	Optical Thickness									-	-
						気柱雲水量	Liquid Water Path									-	-
						気柱氷水量	Ice Water Path									-	-
CPR ATLID MSI BBR	L2b	ST	ALL_RAD	4センサ複合 放射収支プロダクト	Four Sensors Synergy Radiation Budget Product	短波放射フラックス	SW Radiative Flux	10km ²	-	10km	0.5km	-	±25W/m2	±10W/m2	60MB		
						長波放射フラックス	LW Radiative Flux									-	-
						短波加熱率	SW Radiative Heating Rate									-	-
						長波加熱率	LW Radiative Heating Rate									-	-

補助プロダクト (ECMWF)

Auxiliary Products (ECMWF)

センサ Sensor(s)	処理レベル Processing Level	ステータス Status	プロダクト 識別子 Product ID	プロダクト名 Product Name	主要パラメータ Primary Parameter	グリッド間隔		データ容量 (/周回) (TBD) Data Volume (TBD)		
						水平	鉛直			
						Grid Spacing				
		Horizontal	Vertical							
AUX	Aux	ST	AUX_2D	ECMWF-AUX-2D プロダクト	ECMWF-AUX-2D Product	気圧	Pressure	1km	0.1km*4	510MB
						気温	Temperature	1km	0.1km*4	
						比湿	Specific Humidity	1km	0.1km*4	
						オゾン質量混合比	Ozone Mass Mixing Ratio	1km	0.1km*4	
						2m気温	2m Temperature	1km	-	
						10m 東西風	10 meter U-velocity	1km	-	
						10m 南北風	10 meter V-velocity	1km	-	
積算オゾン量	Total Column Ozone	1km	-							
AUX	Aux	ST	AUX_3D	ECMWF-AUX-3D プロダクト	ECMWF-AUX-3D Product	気圧	Pressure	10km	1 model layer*1	90MB
						気温	Temperature	10km	1 model layer*1	
						比湿	Specific Humidity	10km	1 model layer*1	
						オゾン質量混合比	Ozone Mass Mixing Ratio	10km	1 model layer*1	
						2m気温	2m Temperature	10km	-	
						10m 東西風	10 meter U-velocity	10km	-	
						10m 南北風	10 meter V-velocity	10km	-	
積算オゾン量	Total Column Ozone	10km	-							

The accuracy is defined using the "Pixel Integration Length" in red italic numbers.

The accuracies of CPR L1b are defined by 10km integration.

Those accuracies except for CPR are assumed under the condition that sensors developed by ESA functioned as expected.

The accuracies of ATLID is based on the information before the change of specifications.

The length of a scene is defined as the length of an orbit divided equally.

CPR-ATLID-MSI Synergy Cloud Products and Four Sensors Synergy Radiation Budget Products are the final goal of the EarthCARE mission. Therefore, they are defined as the standard products, although they will be released one year after the start of MOP.

NRT and Statistics (L2c) will be adjusted appropriately by taking user's needs into account.

*1: Depends on the resolution of ECMWF data that JAXA will receive by the time of launch

*2: The values shown are defined at the time of JAXA CDR. In future, the values may change if there are strong scientific requirements.

*3: The values shown are defined when antenna beam width was 0.095 degrees and satellite altitude was 460km.

*4: The vertical grid will be in JSG vertical grid

研究プロダクト (L2a)

Research Products (L2a)

B C D

センサ Sensor(s)	処理レベル Processing Level	ステータス Status	プロダクト識別子 Product ID	プロダクト名 Product Name		主要パラメータ Primary Parameter		空間解像度		データ容量 (/周回) (TBD) Data Volume (TBD)
								水平	鉛直	
								Spatial Resolution		
								Horizontal	Vertical	
CPR	L2a	UP	CPR_DOP	CPR単体 ドップラープロダクト	CPR One-sensor Doppler Product	ドップラー速度補正值 (不均質性考慮)	Doppler velocity correction value (considering inhomogeneity)	1km	0.5km	280MB
						ドップラー速度折り返し補正值	Doppler velocity unfolding value	10km		
		ER	CPR_RAS	CPR単体 雨・雪プロダクト	CPR One-sensor Rain and Snow Product	雨量(ドップラー無)	Rain Water Content without Doppler	1km		840MB
						雪水量(ドップラー無)	Snow Water Content without Doppler	10km		
						雨量(ドップラー有)	Rain Water Content with Doppler	1km		
						雪水量(ドップラー有)	Snow Water Content with Doppler	10km		
						降雨強度	Rain Rate	1km		
						降雪強度	Snow Rate	10km		
						減衰補正済みレーダ反射因子	Attenuation Corrected Radar Reflectivity Factor	1km		
						10km				
ER	CPR_VVL	CPR単体 鉛直速度プロダクト	CPR One-sensor Vertical Velocity Product	大気鉛直速度	Vertical Air Motion	1km	280MB			
				沈降速度	Sedimentation Velocity	10km				
ATLID	L2a	ER	ATL_ARL	ATLID単体 エアロゾル消散係数 プロダクト	ATLID One-sensor Aerosol Extinction Product	水溶性粒子消散係数	Aerosol Extinction Coefficient (Water Soluble)	10km	0.1km	560MB
						ダスト消散係数	Aerosol Extinction Coefficient (Dust)	10km		
						海塩消散係数	Aerosol Extinction Coefficient (Sea Salt)	10km		
						ブラックカーボン消散係数	Aerosol Extinction Coefficient (Black Carbon)	10km		
MSI	L2a	ER	MSI_ICE	MSI単体 氷雲プロダクト	MSI One-sensor Ice Cloud Product	氷雲光学的厚さ(反射法)	Optical Thickness of Ice Cloud with Reflection method	0.5km	-	580MB
						氷雲有効粒径(1.6 μm)	Effective Radius of Ice Cloud (1.6 μm)			
						氷雲有効粒径(2.2 μm)	Effective Radius of Ice Cloud (2.2 μm)			
						氷雲雲頂温度	Ice Cloud Top Temperature			
						氷雲雲頂気圧	Ice Cloud Top Pressure			
						氷雲雲頂高度	Ice Cloud Top Height			
		ER	MSI_ARL	MSI単体 エアロゾルプロダクト	MSI One-sensor Aerosol Product	エアロゾル光学的厚さ(海)	Aerosol Optical Thickness (Ocean)	0.5km	-	290MB
						エアロゾル光学的厚さ(陸)	Aerosol Optical Thickness (Land)			
						オングストローム指数(海)	Angstrom Exponent (Ocean)			

研究プロダクト (L2b)

Research Products (L2b)

センサ Sensor(s)	処理レベル Processing Level	ステータス Status	プロダクト識別子 Product ID	プロダクト名 Product Name		主要パラメータ Primary Parameter		空間解像度		データ容量 (/周回) (TBD) Data Volume (TBD)
								水平	鉛直	
								Spatial Resolution		
								Horizontal	Vertical	
CPR + ATLID	L2b	UP	AC_MRA	CPR-ATLID複合 雲粒質量比プロダクト	CPR-ATLID Synergy Particle Mass Ratio Product	質量比(2D氷/IWC) (ドップラー無)	Mass Ratio (2D_Ice/IWC) without doppler	1km	0.5km	20MB
						質量比(2D氷/IWC) (ドップラー有)	Mass Ratio (2D_Ice/IWC) with doppler	10km		
						雨水量(ドップラー無)	Rain Water Content without Doppler	10km		
		ER	AC_RAS	CPR-ATLID複合 雨・雪プロダクト	CPR-ATLID Synergy Rain & Snow Product	雨水量(ドップラー有)	Rain Water Content with Doppler	1km		840MB
						雪水量(ドップラー有)	Snow Water Content with Doppler	10km		
						降雪強度	Snow Rate	10km		
						降水強度	Rain Rate	10km		
						降雪強度	Snow Rate	10km		
						降水強度	Rain Rate	10km		
ER	AC_VVL	CPR-ATLID複合 鉛直速度プロダクト	CPR-ATLID Synergy Vertical Velocity Product	大気鉛直速度	Vertical Air Motion	1km	280MB			
				沈降速度	Sedimentation Velocity	10km				
ATLID + MSI	L2b	ER	AM_ARL	ATLID-MSI複合 エアロゾル成分プロダクト	ATLID-MSI Synergy Aerosol Components Product	水溶性粒子消散係数	Aerosol Extinction Coefficient (Water Soluble)	10km	0.1km	420MB
						ダスト消散係数	Aerosol Extinction Coefficient (Dust)			
						海塩消散係数	Aerosol Extinction Coefficient (Sea Salt)			
						ブラックカーボン消散係数	Aerosol Extinction Coefficient (Black Carbon)			
						モード半径 (小粒子)	Mode Radius (Fine Mode)			
						モード半径 (大粒子)	Mode Radius (Coarse Mode)			
				ATLID-MSI複合 エアロゾル直接放射 強制力プロダクト	ATLID-MSI Synergy Aerosol Direct Radiative Forcing Product	エアロゾル直接放射強制力 (TOA)	Aerosol Direct Radiative Forcing (TOA)	10km	-	
エアロゾル直接放射強制力 (BOA)	Aerosol Direct Radiative Forcing (BOA)									
CPR + ATLID + MSI	L2b	LR	ACM_CD P	CPR-ATLID-MSI複合 雲ドップラープロダクト	CPR-ATLID-MSI Synergy Cloud Doppler Product	雲マスク (ドップラー有)	Cloud Mask with Doppler	1km	0.5km	20MB
						雲粒子タイプ (ドップラー有)	Cloud Particle Type with Doppler	10km		
						水雲有効粒径 (ドップラー有)	Effective Radius of Liquid with Doppler	10km		570MB
						氷雲有効粒径 (ドップラー有)	Effective Radius of Ice with Doppler	10km		
						雲水量 (ドップラー有)	Liquid Water Content with Doppler	10km		
						氷水量 (ドップラー有)	Ice Water Content with Doppler	10km		
						光学的厚さ (ドップラー有)	Optical Thickness with Doppler	10km		
						気柱雲水量 (ドップラー有)	Liquid Water Path with Doppler	10km		
						気柱氷水量 (ドップラー有)	Ice Water Path with Doppler	10km		
						雨水量(ドップラー無)	Rain Water Content without Doppler	10km		
		雪水量(ドップラー無)	Snow Water Content without Doppler	10km						
		雨水量(ドップラー有)	Rain Water Content with Doppler	10km						
		雪水量(ドップラー有)	Snow Water Content with Doppler	10km						
		降水強度	Rain Rate	10km						
		降雪強度	Snow Rate	10km						
		LR	ACM_VV L	CPR-ATLID-MSI複合 鉛直速度プロダクト	CPR-ATLID-MSI Synergy Vertical Velocity Product	大気鉛直速度	Vertical Air Motion	1km	280MB	
						沈降速度	Sedimentation Velocity	10km		
			LR	ACM_ICE	CPR-ATLID-MSI複合 氷雲プロダクト	CPR-ATLID-MSI Synergy Ice Cloud Product	氷雲有効粒径 (赤外射出法)	Effective Radius of Ice Cloud derived from Emission Method	0.5km	20MB
							氷雲光学的厚さ (赤外射出法)	Optical Thickness of Ice Cloud derived from Emission	0.5km	

“ST” = Standard product

“Red R” = Research product, would be processed in JAXA EORC Research and Application System, and to be upgraded to standard after one year or later when the release accuracy is approved.

“ER” = Research product, would be processed in JAXA EORC Research and Application System. Some are processed at JAXA/MOS when products are produced as by-product of the Standard processing.

“LR” = Research product, would be processed in Japanese Laboratories.

Research Products are developed on best-effort basis and the description in the Product List is TBD;

although CPR Research Products are at high priority as the releasing of the CPR Research Products are one of the full-success criteria.