



DOCUMENT

Swarm Cal/Val Users - Data Access Manual

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CHANGE RECORD

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Added Interface for Calibration Processors Output Products	5/10/2012	12-13	4.2
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Modified description and added examples in MPPF interface	15/10/2012	12-13	4.2
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Non Nominal Lo Data not delivered to EFI/ASM Teams	30/09/2013	22 & 25	5.2.2 & 5.2.3
Project Feedbacks implementation: <ul style="list-style-type: none"> - Document Title changed - Limited Users accessing MPPF - Added screen dumps as evidence of available data structure - FOS reference removed - Removed IPs, just DNS names - Added DISSHARM, removed UK FTP server - Updated Swarm Cat-1 Users Directory Structure - New users account added i.e. Project, Prime 	14/10/2013	1 6 32 19,21,23,25 17 20,21	Document Title Section 1.1 Section 5.1 Section 5.2 Annex A Section 5.1 Section 5.2.1.1
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Updated version for removing systematic			



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distribution of Production Reports & Working Directories.			
Updated version for removing both the two Instrument Team sections and Project.			
Updated version for ACCELE data both EEF & CDF format.			
Updated version for describing new FTP server structure and removal of distribution for L2 Cat1 Intermediate products			
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Document Structure re-organized and simplified by removing references to Swarm PDGS sub-systems (i.e. APDF & MPPF).			
User account updated for Swarm L1B Quick Look and Calibration Products access.			Section 1.1 Section 3 Section 5 Annex A
Updated Applicable Document versions and Baseline definition.	27/05/2015	Pages 7, 10, 13, 21	
Swarm User Community section removed.			
Clarified that also for Level2daily there are both Current & Previous folders			
Updated Applicable Document versions			
Added footnote clarification on file extension of those Swarm L1B products not converted in CDF: native extension is used instead of generic .DBL file for products in SP3 and RINEX format.	10/11/2015	12, 18-19	Section 2.1 Section 4.1 (Table-6)
Added footnote clarification that Swarm L2C2 products will be distributed still in EEF, but with their native extension i.e. .CDF instead of .DBL.			
Updated with delivery path & Swarm Products List including: <ul style="list-style-type: none"> DNSxPOD_2_ AUX_OBSM2_ ACCxCAL_2_ ACCxVAL_2_ Updated Applicable Documents Added Table-6 for describing Auxiliary Data Grouping Added Advanced Data Set Reference/Description Removed Swarm Level-1 Quick Look Products Updated Figure-1 (Swarm FTP #1 Data Structure) Removed Swarm FTP #2 Server	29/07/2016	12, 13, 14, 16, 19	Section 2.1 Section 3 Section 4 Section 4.1 Section 4.2



Issue 2		Revision 13	
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Removed Swarm Level-1B Calibration Products			
Updated Applicable Document versions			
Improved description for products DNSxPOD_2_ and DNSxWND_2_			
Removed AUX_OBS_ auxiliary data from distributed products: they are no more stored neither distributed by the Swarm PDGS.	31/12/2016	13, 14 20-25, 22, 24	Section 2.1 & 2.2 Section 5
Removed “Data Availability” column because not introducing added value.			
Document updated – WD systematic and directory structure	02/03/2017	12, 17	Section 1.2.2, 4.1
Document updated – New FTP directory structure	19/06/17	14-17, 20-22	Section 3,4,4.1,5



Table Of Contents

1	INTRODUCTION.....	8
1.1	Document Scope.....	8
1.2	Acronyms and Terminology	8
1.2.1	Acronyms.....	8
1.2.2	Terminology	9
2	DOCUMENTS	13
2.1	Applicable Documents.....	13
2.2	Reference Documents.....	13
3	SWARM DATA.....	14
4	SWARM DATA ACCESS	15
4.1	Swarm PDGS FTP Server	15
5	ANNEX A.....	22



1 INTRODUCTION

1.1 Document Scope

The purpose of this document is to describe the data access mechanism available for the Swarm Cal/Val Users to the Swarm PDGS facilities.

The interface to the Swarm data is available for Swarm users via two different PDGS servers that provide their data & services via a FTP service¹:

- Swarm FTP Server #1: it provides different levels of Swarm data (Level-0, Level-1, Level-2, Auxiliary Files, etc.)

During operations, users can contact EO Help Desk for any request (e.g. registration) or clarification. EO Help Desk may be contacted via the ESA portal (eosupport.eo.esa.int). In case of major issues EO Help Desk can also be contacted via e-mail (eohelp@esa.int)

1.2 Acronyms and Terminology

1.2.1 Acronyms

ADP	Auxiliary Data Provider
APDF	Archive, Processing and Dissemination Facility
ASM	Absolute Scalar Magnetometer
EADS	European Aeronautic Defence and Space Company
EE	Earth Explorer
EFI	Electrical Field Instrument
EO	Earth Observation
ESA	European Space Agency
FOS	Flight Operations Segment
GPS	Global Positioning System
GS	Ground Segment
ICD	Interface Control Document
IGRF	International Geomagnetic Reference Field
IPF	Instrument Processing Facility
IPFo	Instrument Processing Facility Level-0
IPF1	Instrument Processing Facility Level-1B (i.e. L1B)

¹ Via a FTP client, each user can access Swarm data by logging into the FTP server, selecting the desired Swarm data and activating the download function of its own specific FTP client.



IPF2	Instrument Processing Facility Level-2 CAT-2
ISP	Instrument Source Packet
L1B	Level-1 Processors/Products
L2 CAT-2	Level-2 Cat-2 Processors/Products
L2 CAT-1	Level-2 Cat-1 Products
L2PS	Level-2 Processing System
MPPF	Mission Performance and Planning Facility
PDGS	Payload Data Ground Segment
S/C	Spacecraft
TBD	To Be Defined

1.2.2 Terminology

This document and its appendixes use the following terms:

- Auxiliary Data to indicate any data needed to process the Swarm data not generated by the satellite. They include:
 - Orbit and manoeuvre files
 - Calibration and Characterization Data Base (CCDB) files
 - External L1b auxiliary data files (GPS constellation, etc.)
 - External CAT-2 L2 auxiliary data files (GPS constellation, magnetic field models, solar activity prediction, etc.)
 - External CAT-1 L2 auxiliary data files (GPS constellation, solar activity prediction, etc.)
- Ancillary Data to indicate non-science data produced by the Swarm satellites, needed to process the science data.
- Cal/Val Users to indicate institutional groups or individuals, with appropriate expertise in conducting scientific pre-processing, external calibration and validation of Swarm products.
- L1b file naming convention is defined in [RD 1], [RD 2], and [AD 4] documents.
- L2 file naming convention is defined in [RD 1], [RD 2], and [AD 5] documents



- Ground Segment to indicate the main elements of the Swarm Ground Segment (GS), under ESA control; they are the Flight Operations Segment (FOS) and the Payload Data Ground Segment (PDGS)
- Product Baseline is the baseline associated to a specific product file and satellite. In Swarm the Product Baseline depends on its level, processors version, satellite source, and relative Calibration and Characterization Data Base. The Product Baseline is identified by the first two of the four digits placed at the end of the file name, i.e. the first two digits of the File_Version field represent the Product Baseline, while the last two represent an incremental counter.
- Mission to indicate the Swarm system includes the Swarm Satellites, the Swarm Ground Segment and the Swarm Users. *The Swarm mission is referred to as “the Mission” throughout this document*
- Non-Nominal Lo Products to indicate Lo products where the timing synchronization on-board was lost and hence the correct timeline of the product cannot be asserted. This can occur during instrument power-up or malfunctions.
- Payload Data Ground Segment (PDGS) to indicate the system responsible for Swarm
 - Data Processing, Archiving and Dissemination
 - Data Quality Control
 - Ground Performances Monitoring
 - Mission Planning
 - User Services
 - Instrument Calibration
- Parallel Processing to indicate a dedicated L1b processing chain available on the PDGS to execute ad-hoc L1b processing, for testing purpose, in parallel to the nominal one. The L1b products generated with this parallel processing chain will have the file class set to TEST and will be available only for Cal/Val Users on a dedicated directory on the APDF ftp server.



- Swarm Level-0 Data: Level 0 products will consist in raw telemetry source packets, time ordered, error free (e.g. duplicated ISP removed) with time and quality annotation. Level 0 products will include both science and ancillary data. The Level 0 products will only be distributed to Special users.
- Swarm Level-1b Data: The level 1b products will consist of time series of relevant quantities as observed along the orbit, corrected, calibrated and converted to physical units. The data will be converted to engineering units using the best possible characterization data available.
- Swarm Level-2 Data: While the Level-1b products are produced per spacecraft, the Level-2 products will benefit from the use of the 3 satellites of the Swarm constellation. The Level-2 products are generated from 2 sources (PDGS and L2PS) and they will all be archived in the PDGS. Two different categories of Swarm Level 2 products have been defined:
 - Swarm CAT-1 products: Complex algorithms contributing to the generation of a Level 2 product of the various sources of the Earth's magnetic field, of thermospheric products, and for Precise Orbit determination. The products will be processed by the L2PS (consortium composed by scientists) under ESA responsibility, and will be distributed by the PDGS.

Swarm CAT-1 Level-2 Products can be further divided into:

- Level-2 Cat-1 Products
 - Level-2 Cat-1 Validation Products (providing products validation reporting)
- Swarm CAT-2 products: Algorithms leading to a Level 2 product with minimum delay with respect to the generation of the corresponding Level 1b data. The generation of CAT-2 products is designed to run automatically. The CAT-2 products will be generated and distributed by PDGS.
- Users to indicate any registered users not part of the Cal/Val Users.
- Validation to indicate the process of assessing by independent means the quality of the



data products derived from the system inputs.

- Working Directories to indicate directories containing a full set of input and output files used to generate L1b products. Dissemination of L1b working directory is performed systematically.

2 DOCUMENTS

2.1 Applicable Documents

- [AD 1] Swarm LO Product Format, Swarm-GSEG-EOPG-05-001, Issue 1.8
- [AD 2] Swarm LO Product Definition, SW-IF-EDA-GS-00017, V13
- [AD 3] L1A Product Definition, SW-ID-GMV-GS-0003, V.3.10
- [AD 4] L1B Product Definition, SW-RS-DSC-SY-0007, V5.20
- [AD 5] Product specification for L2 Products and Auxiliary Products, SW-DS-DTU-GS-0001, Issue 2T
- [AD 6] Swarm ADP to PDGS ICD – Annex B, SWAM-GSEG-EOPG-ID-08-0033, 1.17
- [AD 7] Swarm FOS to PDGS Predicted Orbit File ICD, SW-IC-ESC-FS-5014, 7.0
- [AD 8] Swarm FOS to PDGS Orbit Maneuver History File ICD, SW-IC-ESC-FS-5021, 5.0
- [AD 9] IPF SWARM L1B Processor Interfaces Doc. No: SW-ID-GMV-GS-0001, Issue 4.0
- [AD 10] SWARML2 CAT2 Interface Control Document, SW-ID-GMV-GS-2001, 2.0
- [AD 11] Swarm CEFI-TII Calibration Product Format Description, ST-ESA-SWARM-PFD-0001, 1.2
- [AD 12] Swarm CDF Converter Data Format Document, SW-ID-GMV-GS-0006, 3.9
- [AD 13] RINEX: The Receiver Independent Exchange Format Version 3.00
<http://igscb.jpl.nasa.gov/igscb/data/format/rinex300.pdf>
- [AD 14] Swarm Level_1b_CCDB, SW-TN-DSC-SY-0005, Issue 4.15
- [AD 15] Swarm CAT-2 L2 ADP Swarm PDGS ICD, SWAM-GSEG-EOPG-IC-011-0004, Issue 1.15
- [AD 16] Swarm Orbit Counter Specifications (AUXxORBCNT)

2.2 Reference Documents

The following documents are though not formally part of this document, amplify or clarify its content:

- [RD 1] Earth Explorer File Format Standards, Doc. No: PE-TN-ESA-GS-0001, 1.4
- [RD 2] Tailoring of File Format Standards to Swarm Mission, Doc. No: SW-TN-ESA-GS-0074, 1.5
- [RD 3] Swarm Data Access User Manual, SWAM-GSEG-EOPG-MA-14-0032, Is. 1.5

3 SWARM DATA

The Swarm data provided to the Swarm Cal/Val users via the Swarm PDGS external FTP servers will consist of:

Data Types	Description
Advanced Data Set	<p>This is a data set including advanced data e.g.</p> <ul style="list-style-type: none"> • ASM/VFM Residuals • ASM Vector Data • ASM Burst Mode Data • Updated MAGx_LR_1B Data • Provisional Plasma Data <ul style="list-style-type: none"> ○ Langmuir Data ○ Thermal Ion Images Data • 2 Hz TII Cross-track Data • 2 Hz LP Extended Dataset. • TII Level-0 16 Hz Image Data • Faceplate 16 Hz Plasma Density • STR Thermally Corrected Data
Level 0	Raw measurement and housekeeping data (from instruments and spacecraft)
Level 1A	Decoded and de-multiplexed instrument data
Level 1B	Calibrated and validated instrument data
Level 2 (CAT-1 & CAT-2)	Validated scientific data and models
Auxiliary	Auxiliary data (including CCDB, orbit data and orbit manoeuvre)
L1B Calibration	Results of Level 1B Calibration activities and corresponding product reports

Table 1 - Swarm Data Types

Detailed list of Swarm data and relevant description is available in Annex-A.

4 SWARM DATA ACCESS

The Swarm Calibration and Validation (Cal/Val) team will be allowed to access **all** Swarm data generated by the Swarm PDGS of any quality.

Data will be available on Swarm FTP Server.

4.1 Swarm PDGS FTP Server

The following tables provide information about how to access the Swarm data available on this Swarm PDGS FTP server.

Parameter	Value
Server Host Name (IP)	swarm-diss.eo.esa.int
Protocol	FTP
Transfer Mode	Binary
Strategy	Pull
Compression	None, ZIP or tar.bz2 ²
Applicable Clean-Up Policy	None
Username	*****
Password	*****

Table 2 Swarm FTP Server Network Parameters

In order to access data credentials are required.

The Swarm PDGS Team, via the Swarm Project will provide credentials.

Available products are grouped in separated directories structured per *product level/baseline/satellite/start time* as shown in table and figure below.

² The tar.bz2 compression is used to store processors working directories only.



To be noted that:

- The Product Baseline is the version associated to a specific product file and satellite
- The “**Entire_mission_data**” folder which will contain the full data coverage of the entire mission, regardless of any consideration of interoperability among the same product type. In other words the data might have been produced with strategies or knowledge that does not make the products necessarily interoperable for certain type of science. This information can still be captured by looking at the Product Baseline number.
- The “**Latest_baselines**” folder which will contain interoperable products generated in a consistent way with the application of all significant data quality improvements, but not necessarily covering the entire mission.
- The “**Older_baselines**” folder will contain data that are not interoperable with the latest existing products. Such products are identified with an older Product Baseline number.

Data Level	Directories Structure	Description
Advanced	<Advanced Data Type>\<data use purpose>	Containing Advanced Data Sets
Level o Products	Levelo\Latest_baselines\<Simplified type> ³ \Sat_{A,B,C}\<year>\<data file> Levelo\Entire_mission_data\<Simplified type>\Sat_{A,B,C}\<year>\<data file> Levelo\Older_baselines\<Simplified type>\Sat_{A,B,C}\<year>\<data file>	Containing Level-o products for all instruments
Level o Non Nominal Products	Levelo_NonNominal/<year>/<month>/<day>/<time>/<data file> ⁴	Containing Level-o products with packets with time stamp in Y2000 generated at instruments start-up

³ Where <Simplified Type> is Swarm Level-o Product Type without "_o_"

⁴ Where:

- <year>, <month> and <day> correspond to the Generation Date of the Lo file;

Data Level	Directories Structure	Description
Level 1A Products	Level1a\Latest_baselines\<Simplified type>5 \Sat_{A,B,C}\<data file> Level1a\Entire_mission_data\<Simplified type>\Sat_{A,B,C}\<data file> Level1a\Older_baselines\<Simplified type>\Sat_{A,B,C}\<data file>	Containing Orbit, Attitude and Magnet Level-1a products
Level 1B Products	Level1b\Latest_baselines\<Simplified type>6[\Sat_{A,B,C}]\<data file> Level1b\Entire_mission_data\<Simplified type>[\Sat_{A,B,C}]\<data file> Level1b\Older_baselines\<Simplified type> [\Sat_{A,B,C}]\<data file>	Containing Orbit, Attitude, Magnet Level-1b products in CDF format or in EEf (if the product type is not foreseen in CDF i.e. GPS, MOD) and Swarm Orbit Counter Data File
Level 2 Products	Level2daily\Latest_baselines\<Simplified type>7\Sat_{A,B,C}\<data file> Level2daily\Entire_mission_data\<Simplified type>\Sat_{A,B,C}\<data file> Level2daily\Older_baselines\<Simplified type>\Sat_{A,B,C}\<data file> Level2longterm\<Product group>\<data file> ⁸	Containing Final Level-2 Cat-1 and Level-2 Cat-2 products
Auxiliary Data	Auxiliary\Sat_{A,B,C,ALL}\<File_Type>\<year> \	Containing auxiliary files used for L1 processing

- <time> corresponds to the Generation time of the Lo file, using the hhmmss (hour, minute, second) mask.

⁵ Where <Simplified Type> is Swarm Level-1A Product Type without "_1A"

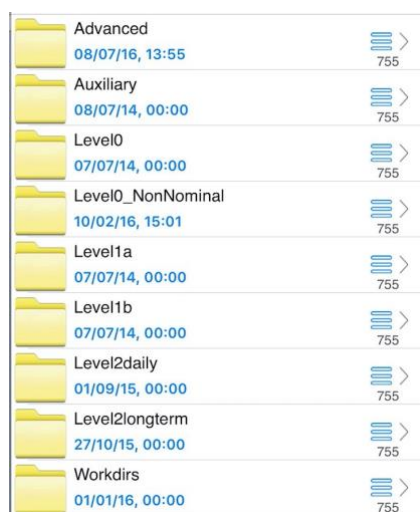
⁶ Where <Simplified Type> is Swarm Level-1B Product Type without "_1B"

⁷ Containing L2 data, where <Product Group> & <Sub-Group> is as described in **Table 4 – Level-2 Daily Grouping**

⁸ Containing L2 data where <Product Group> is as described in **Table 5**

Data Level	Directories Structure	Description
Working Directories ⁹	Workdirs/yyyy/mm/<processor_name><processor_version><prdr_number><file_class><start_time><stop_time><creation_time>.tar.bz2	Containing all the input products used for the generation of the Lo and L1 products

Table 3 Swarm FTP Server Available Data



Directory Name	Creation Time	Size
Advanced	08/07/16, 13:55	755
Auxiliary	08/07/14, 00:00	755
Level0	07/07/14, 00:00	755
Level0_NonNominal	10/02/16, 15:01	755
Level1a	07/07/14, 00:00	755
Level1b	07/07/14, 00:00	755
Level2daily	01/09/15, 00:00	755
Level2longterm	27/10/15, 00:00	755
Workdirs	01/01/16, 00:00	755

Figure 1 - Swarm FTP Server Data Structure

The <data file> represents the Swarm data file name according to the Swarm data files naming convention defined in [RD 1] and [RD 2].

Product Group / Sub-Group			Type ¹⁰
Level2daily	ACC	AE	ACCxAE_2
		CAL	ACCxCAL_2
		POD	ACCxPOD_2
		VAL	ACCxVAL_2
	EEF	TMS	EEFxTMS_2F
	FAC	TMS	FACxTMS_2F
		TMS	FAC_TMS_2F
	IBI	TMS	IBIxTMS_2F
	POD	RD	SP3xCOM_2
		KIN	SP3xKIN_2
		VAL	SP3xVAL_2
	TDW	WND	DNSxWND_2

⁹ Swarm Processing environments (working directories) where <processor_name> and <processor_version> correspond to the IPF used to process the data, <prdr number> corresponds to an internal sequence counter, <file_class> corresponds to the type of processing performed, <start_time> and <stop_time> correspond to the time window of the production and <creation_time> corresponds to the time when the production started

¹⁰ In the column type of the previous tables, “x” is the Satellite placeholder (x=A,B,C) and “y” is L2PS chain placeholder (y=C,D,E,F_).

Product Group / Sub-Group			Type ¹⁰
		VAL	TDWxVAL 2
		POD	DNSxPOD 2
	TEC	TMS	TECxTMS 2F

Table 4 – Level-2 Daily Grouping

Product Group		Type ¹¹
Level2longterm	MCO	MCO_SHA_2y MCO_VAL_2y
	MCR	MCR_1DM_2_ MCR_3DM_2_ MC1_VAL_2_ MC3_VAL_2_
	MIN	MIN_1DM_2_ MIN_3DM_2a MIN_3DM_2b MI1_VAL_2_ MI3_VAL_2_
	MIO	MIO_SHA_2y MIO_VAL_2y
	MLI	MLI_SHA_2y MLI_VAL_2y
	MMA	MMA_SHA_2C MMA_SHA_2F MMA_VAL_2C
	MSW	MSW_EUL_2y MSW_VAL_2y

Table 5 - Level-2 Long Term Grouping

¹¹ In the column type of the previous tables, “x” is the Satellite placeholder (x=A,B,C) and “y” is L2PS chain placeholder (y=C,D,E,F_).

Auxiliary Group		Type ¹²
Auxiliary	Sat_X	MPLxORBPRE ¹³
		AUXxORBMAN ¹⁴
		AUXx<...> ¹⁵
	Sat_All	AUX xxx 2 ¹⁶
		AUX xxx 2F ¹⁷
		AUX DSTIND ¹⁸
		AUX GAUSSC
		AUX GPSCCLK
		AUX GPSEPH
		AUX SOLACT
		AUX USLEAP
		AUX USNEOP

Table 6 - Auxiliary Data Grouping

¹² In the column type of the previous tables, “x” is the Satellite placeholder (x=A,B,C) and “y” is L2PS chain placeholder (y=C,D,E,F_).

¹³ These are the Swarm Predicted Orbit Files as described in [AD 7]

¹⁴ These are the Swarm Orbit Maneuver History File as described in [AD 8]

¹⁵ These are the Swarm CCDB Auxiliary Data Files as described in [AD 14]

¹⁶ These are the Level-2 Auxiliary Data Files as described in [AD 5]

¹⁷ These are the Level-2 Cat-2 Auxiliary Data Files as described in [AD 15]

¹⁸ These are the Level-1 Auxiliary Data Files as described in [AD 6]

Swarm products on this FTP server will be available in the following format:

Swarm Product	Product Type	Format	Format Specification Document
Level-0 Products	All	EEF	[AD 1] & [AD 2]
Level-1A Products	All	EEF	[AD 3]
Level-1B Products	All	CDF /RNX/SP3/ASCII	[AD 4] & [AD 13] & [AD 16]
Level-2 Cat1 Products	MCO_SHA_2C MCO_SHA_2D MCO_SHA_2F MLI_SHA_2C MLI_SHA_2D MLI_SHA_2E	ASCII Listing (SHC)	[AD 5]
Level-2 Cat1 Products	MSW_EUL_2C MSW_EUL_2D MSW_EUL_2F MIN_1DM_2_ MIN_3DM_2a MIN_3DM_2b MCR_1DM_2_ MCR_3DM_2_ MIO_SHA_2C MIO_SHA_2D	ASCII Listing	[AD 5]
Level-2 Cat1 Products	MMA_SHA_2C MMA_SHA_2F DNSxWND_2_	CDF	[AD 5]
Level-2 Cat1 Validation Products	All	PDF	[AD 5]
Level-2 Cat2 Products	All	CDF	[AD 5]

Table 7 - Swarm Products Format (FTP Server)

5 ANNEX A

Swarm Data Levels	Swarm Data File Description	Swarm Data Types
Swarm Level-0 Products	ACC Standard Measurement Mode Science Data	ACCxNOM_o_
	ACC Selftesting Mode Science Data	ACCxTESTo_
	ASM Burst Mode Science Data	ASMxBUR_o_
	ASM SpectroLaser Mode Science Data	ASMxLAS_o_
	ASM SpectroMag Mode Science Data	ASMxMAG_o_
	ASM SpectroPowerLaser Mode Science Data Rep	ASMxPOW_o_
	ASM Scalar Mode Science Data	ASMxSCA_o_
	ASM Vector Mode Science Data	ASMxVEC_o_
	EFI LP and TII Science Data – LP Calibration Mode	EFIxLPC_o_
	EFI LP and TII Science Data – Normal Mode	EFIxNOM_o_
	EFI LP and TII Science Data – TII Calibration Mode	EFIxTIC_o_
	GPS constellation, almanac, ephemeris, iono data	GPSxGPS_o_
	GPS Navigation Data	GPSxNAV_o_
	GPS Noise Histogram Data - Standby	GPSxNOISo_
	GPS Carrier amplitude and phase, code phase data	GPSxOBS_o_
	GPS AGC Status Data - Navigate	GPSxAGN_o_
	GPS AGC Status Data - Standby	GPSxAGS_o_
	Housekeeping	HK_xNOM_o_
	STR Attitude Data	STRxNOM_o_
	STR Attitude Data – Redundant	STRxRED_o_
	VFM Science Data 10Hz	VFMxN10_o_
	VFM Science Data	VFMxNOM_o_
	VFM Science Data 1Hz	VFMxN_1_o_
Swarm Level-1A Products	ACC Scientific Data, 1 Hz	ACCxSCI_1A
	ASM Scientific Data, 1 Hz	ASMxSCI_1A
	EFI TII data, 2 Hz, and 1 Hz (HK)	EFIxTII_1A
	EFI LP sweep/harmonic/offset/time series	EFIx_LP_1A
	GPS data, 1Hz	GPSxNOM_1A
	AOCS housekeeping data, 1 Hz (Mag_HK and Thru_HK)	HK_xAOCS1A
	BUS housekeeping data, 0.25 Hz	HK_xBUS_1A
	STR scientific data, 1 Hz	STRxSCI_1A
	VFM scientific data, 1 Hz	VFMxSCI_1A
Swarm Level-1B Products	Pre-processed ACC data, 1 Hz	ACCx_PR_1B
	ASM auxiliary data, 50 Hz	ASMxAUX_1B

Swarm Data Levels	Swarm Data File Description	Swarm Data Types
	Swarm Orbit Counter Data File	AUXxORBCNT
	Plasma data, 2 or 16 Hz	EFIx_PL_1B
	GPS RINEX Observation data, 1 Hz	GPSxNAV_1B
	GPS RINEX Navigation data, 2 hours	GPSx_RN_1B
	GPS RINEX Observation data, 0.1 Hz	GPSx_RO_1B
	Magnetic Calibration data, 0.25 Hz	MAGx_CA_1B
	Magnetic Vector Data, 50 Hz	MAGx_HR_1B
	Magnetic Vector Data, 1 Hz	MAGx_LR_1B
	Ephemeris of spacecraft, 1 Hz	MODx_SC_1B
	Attitude of S/C, 1Hz	STRxATT_1B
	VFM auxiliary data, 50 Hz	VFMxAUX_1B
	Langmuir Probe offset calibration data	LP_x_CA_1B
Swarm Level-2 Cat1 Products	CAT-1: Spherical harmonic model	MCO_SHA_2F
	CAT-1: Spherical harmonic model	MLI_SHA_2C
	CAT-1: Spherical harmonic model	MMA_SHA_2C
	CAT-1: Spherical harmonic model	MMA_SHA_2F
	CAT-1: 1D model of mantle conductivity	MIN_1DM_2_
	CAT-1: Euler angles for all satellites	MSW_EUL_2C
	CAT-1: Spherical harmonic model	MCO_SHA_2C
	CAT-1: Spherical harmonic model	MIO_SHA_2C
	CAT-1: time series of position and velocity	SP3xCOM_2_
	CAT-1: Accelerometer calibration parameters	ACCxCAL_2_
	CAT-1: Time series of non-gravitational accelerations	ACCxPOD_2_
	CAT-1: Time series of accelerometer observations	ACCx_AE_2_
	CAT-1: time series of neutral thermospheric density from precise orbit determination data only	DNSxPOD_2_
	CAT-1: time series of neutral thermospheric density and wind speed from precise orbit determination and accelerometer data	DNSxWND_2_
	CAT-1: Spherical harmonic model	MLI_SHA_2D
	CAT-1: Extended spherical harmonic model	MLI_SHA_2E
	CAT-1: Spherical harmonic model	MIO_SHA_2D
	CAT-1: 1D C-response maps	MCR_1DM_2_
	CAT-1: Euler angles	MSW_EUL_2D
	CAT-1: Euler angles	MSW_EUL_2F
	CAT-1: Spherical harmonic model	MCO_SHA_2D
	CAT-1: 3D model of mantle conductivity	MIN_3DM_2a
	CAT-1: 3D model of mantle conductivity	MIN_3DM_2b
	CAT-1: 3D C-response maps	MCR_3DM_2_
	Kinematic orbit solution for CoM Satellites	SP3xKIN_2_

Swarm Data Levels	Swarm Data File Description	Swarm Data Types
Swarm Level-2 Cat1 Validation Products	CAT-1: Validation report about Euler angles	MSW_VAL_2_
	CAT-1: Validation Report for ACCxCAL_2_	ACCxVAL_2_
	CAT-1: Validation report on core magnetic field	MCO_VAL_2_
	CAT-1: Validation report on lithospheric field	MLI_VAL_2_
	CAT-1: Validation report on ionospheric magnetic model	MIO_VAL_2_
	CAT-1: Validation report on ionospheric magnetic model	MIO_VAL_2C
	CAT-1: Validation report for SP3xCOM_2_	SP3xVAL_2_
	CAT-1: Validation report for DNSxWND_2_	TDWxVAL_2_
	CAT-1: Validation report about Euler angles	MSW_VAL_2C
	CAT-1: Validation report about Euler angles	MSW_VAL_2D
	CAT-1: Validation report on core magnetic field	MCO_VAL_2C
	CAT-1: Validation report on core magnetic field	MCO_VAL_2D
	CAT-1: Validation report on lithospheric field	MLI_VAL_2C
	CAT-1: Validation report on lithospheric field	MLI_VAL_2D
	CAT-1: Validation report on lithospheric field	MLI_VAL_2E
	CAT-1: Validation report on ionospheric magnetic model	MIO_VAL_2D
	CAT-1: Validation report magnetospheric magnetic model	MMA_VAL_2C
	CAT-1: Validation report on 1D mantle conductivity	MI1_VAL_2_
	CAT-1: Validation report on 3D mantle conductivity	MI3_VAL_2_
	CAT-1: Validation report on 1D C-response	MC1_VAL_2_
	CAT-1: Validation report on 3D C-response	MC3_VAL_2_
Swarm Level-2 Cat2 Products	Ionospheric Bubble Index	IBIxTMS_2F
	Ionospheric Total Electron Content	TECx_TMS_2F
	Ionospheric Field-Aligned Current	FACxTMS_2F
	Dayside Equatorial Electric Field	EEFxTMS_2F
	Ionospheric Field-Aligned Current Combined	FAC_TMS_2F

Table 8 - Swarm Products List

Swarm Data Levels	Swarm Data File Description	Swarm Data Types
Swarm Level-1B Aux Data	DST Index Information	AUX_DSTIND
	GAUSS Coefficients	AUX_GAUSSC
	GPS Satellite Clock Correction	AUX_GPSCCLK
	GPS Constellation Ephemeris	AUX_GPSEPH
	Kp Index Information	AUX_KP__2F
	Solar Activity Information	AUX_SOLACT
	Leap Second Information	AUX_USLEAP
	Earth Orientation Parameters	AUX_USNEOP
Swarm Level-2 Cat1 Aux Data	IGRF	AUX_IGR_2_
	Model for the core magnetic field	AUX_COR_2_
	Model for the lithospheric magnetic field	AUX_LIT_2_
	Model of magnetic signals of major tidal constitute	AUX_MTI_2_
	2D model of surface conductance	AUX_OCM_2_
	A priori radially-symmetric (1D) model of mantle	AUX_MCM_2_
	Planetary index of geomagnetic activity	AUX_KP__2_
	Equivalent equatorial magnetic disturbances index	AUX_DST_2_
	Interplanetary magnetic field	AUX_IMF_2_
	Index of daily solar radio flux	AUX_F10_2_
Swarm Level-2 Cat2 Aux Data	GPS Constellation Ephemeris	AUX_GPSEPH
	GPS Differential Code Biases	AUX_DCB_2F
	Solar Radio Flux Information	AUX_F10_2F
	Leap Second information	AUX_USLEAP
	DTS Index Information	AUX_DST_2F
	Kp Index Information	AUX_KP__2F
	Magnetospheric Field Model Information	AUX_PMF_2F
	Lithospheric Field Model Information	AUX_LIT_2F
	Interplanetary Magnetic Field Information	AUX_IMF_2F
	Solar Wind Velocity	AUX_SWV_2F
	Core Magnetic Field Model Information	AUX_COR_2F
	IGRF	AUX_IGR_2F
	Ig/R12	AUX_IRZ_2F
	Coefficients to transform from Solar Magnetic (SM)	AUX_PSM_2F
	Coefficients to transform from GSM to GC	AUX_PGM_2F
	Apex magnetic coordinates	AUX_APX_2F
Swarm CCDB	ACC characterisation data	AUXxACC_C_

Swarm Data Levels	Swarm Data File Description	Swarm Data Types
Auxiliary Data Files	ASM characterisation data	AUXxASM_C_
	Bus characterisation data	AUXxBUS_C_
	HK Data Conversion Data	AUXxHK_C_
	EFI-LP characterisation data	AUXxEFLPC_
	EFI-TII characterisation data	AUXxEFITC_
	SC/AOCS related characterisation data	AUXxAOC_C_
	Star Tracker characterisation data	AUXxSTR_C_
	Swarm system characterisation data set #1	AUXxSW1_C_
	Swarm system characterisation data set #2	AUXxSW2_C_
	Swarm system characterisation data set #3	AUXxSW3_C_
	VFM characterisation data	AUXxVFM_C_
	Constants For EULER Calibration	AUXxCONSC_
	Euler Angle Characterization Data	AUXxEUL_C_
	GPS Characterisation Data	AUXxGPS_C_
	Level-o Calibration File	AUXxTMC_C_
	STR, VFM and ASM System Level Proc Parameters	AUXxL1BPC_
Swarm CCDB EFI LP PostCalib Auxiliary Data Files	EFI LP post-calibration files	AUXxC_H_HH
	EFI LP post-calibration files	AUXxC_H_HL
	EFI LP post-calibration files	AUXxC_H_LH
	EFI LP post-calibration files	AUXxC_H_LL
	EFI LP post-calibration files	AUXxC_S_HH
	EFI LP post-calibration files	AUXxC_S_HL
	EFI LP post-calibration files	AUXxC_S_LH
	EFI LP post-calibration files	AUXxC_S_LL
	EFI LP post-calibration files	AUXxE_H_HH
	EFI LP post-calibration files	AUXxE_H_HL
	EFI LP post-calibration files	AUXxE_H_LH
	EFI LP post-calibration files	AUXxE_H_LL
	EFI LP post-calibration files	AUXxE_S_HH
	EFI LP post-calibration files	AUXxE_S_HL
	EFI LP post-calibration files	AUXxE_S_LH
	EFI LP post-calibration files	AUXxE_S_LL
Swarm Mission Auxiliary Data	Predicted Orbit File	MPLxORBP
	Orbit Manoeuvre History File	AUXxORBMAN

Table 9 - Swarm Auxiliary Data List