CERSAT

ERS FDC Products

Exabyte format

Ref. : C2-DSL-D-06-IF
Version : 1.2
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TABLE OF CONTENTS

LIST OF CHANGES

Version	***Date***	***Commentaire***
1.0	05/07/1995	Creation
1.1	24/07/1995	Correction in Annex B - Table B.2 : IEEE (no-DEC) instead of DEC
1.2	29/06/96	Addition of Annex C

1. GENERAL OVERVIEW

1.1. Products distribution

The Fast Delivery Copy products are distributed on exabyte cartridge. The products delivered are:

- Wind Scatterometer Fast Delivery Copy,
- Radar Altimeter Fast Delivery Copy,
- Sar Wave Mode Fast Delivery Copy.

The format of the files on a medium follows a convention named CCSDS described in Annex A.1. It is a format convention largely used in satellite data distribution.

The medium content in term of data consists in a month of products, organized in orbits extending from equator to equator. An orbit is fully defined by an absolute orbit number (since the beginning of satellite operation).

More than the data itself can be found on the exabyte, namely:

- general information,
- information enabling data extraction conforming to a time window and/or geographical criteria described in Annex A.2.

1.2. General exabyte structure

The exabyte contains the following files:

- one exabyte header file (ascii CCSDS format),
- one file per orbit, each one beginning with an ascii CCSDS header,
- one dates table file,
- the 48 geographic table files.

Hereafter, the exabyte files organization:

Exabyte header file EOF
First geographic table file (n=1) EOF ... Last geographic table file (n=48) EOF
Dates table file EOF
First orbit file EOF ... Last orbit file EOF
EOF
EOF

2. FILES DESCRIPTION

2.1. Exabyte header file

- **Content overview :**

Format :	ASCII CCSDS
Access :	sequential
Record length :	80 bytes
Volume :	1 520 bytes

This file is only a header following CCSDS convention. It provides organization, and data product identification, i.e. identification of the entity in charge of the exabyte and information about the exabyte content

The file is written on exabyte as only one block of 1520 bytes.

Header of 19 records (80 bytes each)

- **Format :**

File content is given below :

Table 2.1

Record	KEYWORD		VALUE	
N°	SIZE	CONTENT	SIZE	FORMAT/CONTENT
1	20	CCSD3ZF0000100000001	/	/
1	20	CCSD3KS00006EXABTHDR	/	/
1	40	38 blanks + CR + LF	/	/
2	20	Producer_Agency_Name	8	ESA
3	22	Producer_Facility_Name	12	FRENCH-PAF
4	11	Source_Name	4	ERS1 or ERS2
5	11	Sensor_Name	9	AMI-WIND for WSC.FDC AMI-WAVE for SWM.FDC ALTIMETER for ALT.FDC
6	23	Data_Handbook_Reference	14	*C2-DSL-D-06-IF*
7	16	Handbook_Version	3	"x.y" with x issue number (N1) and y revision number (N1)
8	25	Product_Create_Start_Time	17	UTC1 format
9	23	Product_Create_End_Time	17	UTC1 format
10	9	Volume_Id	12	"FeDvolu_v" for WSC.FDC "FeEvolu_v" for SWM.FDC "FeRvolu_v" for ALT.FDC
11	14	Version_Number	1	"v" (N1)
12	20	Facility_Software_Id	14	*C2-DSL-D-04-IF*
13	25	Facility_Software_Version	3	"x.y" with x issue number (N1) and y number revision (N1)
14	23	Package_Data_Start_Time	24	UTC2 format
15	21	Package_Data_End_Time	24	UTC2 format
16	18	Start_Orbit_Number	5	"xxxxx" xxxxx = orbit number (N5)
17	16	End_Orbit_Number	5	"xxxxx"
18	11	Orbit_Count	4	"nnnn" (N4)
19	20	CCSD$$MARKEREXABTHDR	/	/
19	60	58 blanks + CR + LF	/	/

- **Header elements description**

Producer_Agency_Name :	Producer Agency Name
Producer_Facility_Name :	Processing Facility Name
Source_Name :	Satellite Name
Sensor_Name :	Sensor Name
Data_Handbook_Reference :	Reference of FDC products user handbook
Handbook_Version :	Version number of the above handbook
Product_Create_Start_Time :	Production start date of the medium
Product_Create_End_Time :	Production stop date of the medium
Volume_Id :	Volume identification of the medium
Version_Number :	Issue number of the volume
Facility_Software_Id :	Producing facility software reference
Facility_Software_Version :	Producing facility software issue
Package_Data_Start_Time :	Start date of the data
Package_Data_End_Time :	Stop date of the data
Start_Orbit_Number :	Start orbit number of the data
End_Orbit_Number :	Stop orbit number of the data
Orbit_Count :	Number of orbit files

2.2. WSC.FDC orbit file

- **Content overview**

There is one file per orbit. It contains one header following CCSDS convention and N products that belong to the orbit. Each product includes one main product header, one specific product header and 361 product data set records.

One product includes the intermediate and final results of the wind product generation. It consists of an array of wind vectors expressed in wind speed and direction. The product corresponds to a 500 x 500-km area. This area is represented by a 19 x 19 array of cells, with nominal 25-km spacing. The produced wind field corresponds to an equivalent neutral stability wind field, referenced to a height of 10 m. For each cell a wind vector is given together with latitude and longitude. The sigma nought and other information needed to convert these to wind fields are also provided for each cell.

Format :	*header :* ASCII CCSDS *products* : binary
Access :	sequential
Record length :	*header* : 80 bytes *products* : main product header = 176 bytes specific product header = 166 bytes data set records = 46 bytes
Size :	*header :* 800 bytes *products :* 16948 bytes *N, N<=88 *Total :* 1492224 bytes

The file is written on exabyte as described below :

Block 1 = header of 10 records, 800 bytes

IRG

Block 2 = Product 1, 16948 bytes

IRG

...

Last block n = Product N, 16948 bytes n <= N+1 with N <= 88

- **CCSDS Header format**

Table 2.2

Record	KEYWORD		VALUE	
N°	SIZE	CONTENT	SIZE	FORMAT/CONTENT
1	20	CCSD3ZF0000100000001	/	/
1	20	CCSD3KS00006ORBTFILE	/	/
1	40	38 blanks + CR + LF	/	/
2	15	Orbit_File_Name	12	"eDxxxxxs.orb"
3	13	Orbit_Station	2	among FS,GS,KS,MS,PS and ES
4	16	Orbit_Start_Date	24	UTC2 format
5	21	Orbit_Generation_Date	17	UTC1 format
6	16	Orbit_Nb_Product	4	"nnnn" (N4)
7	24	Orbit_Start_End_Latitude	19	"ddddddddd_fffffffff" ddddddddd = start latitude (N9) 10^{-6} degree fffffffff = stop latitude (N9) 10^{-6} degree
8	25	Orbit_Start_End_Longitude	19	"ddddddddd_fffffffff" ddddddddd=start longitude (N9) 10^{-6} degree fffffffff = stop longitude (N9) 10^{-6} degree
9	12	Orbit_Version	19	"xx.yy" where xx issue number (N2) and yy revision number (N2)
10	40	40 blanks	/	/
10	20	CCS$$MARKERORBTFILE	/	/
10	20	FCST3IF0010500000001 (1)	/	/

(1) at the end of record 10, there is no CR + LF pair.

- **Products format**

See in Annex B Tables B.3 for main product header format, B.6 for specific product header format, and B.7 for data set record format.

2.3. SWM.FDC orbit file

- **Content overview**

There is one file per orbit. It contains one header following CCSDS convention and N products that belong to the orbit. Each product includes one main product header, one specific product header and one product data set records.

One product includes the power spectrum in polar coordinates generated in the acquisition station. The power spectrum is based on a sample of data covering an area of, at least, 5x5 km. The instrument on the satellite collects data at intervals of approximately 200 to 300 km. The sample patch may be anywhere in the 100 km wide swath in the order of 2 km steps.

Format :	*header :* ASCII CCSDS *products* : binary
Access :	sequential
Record length :	*header* : 80 bytes *products* : main product header = 176 bytes specific product header = 260 bytes data set records = 148 bytes
Size :	*header :* 800 bytes *products :* 584 bytes *N, N<=150 *Total :* 88400 bytes

The file is written on exabyte as described below :

Block 1 = header of 10 records, 800 bytes

IRG

Block 2 = Product 1, 584 bytes

IRG

...

Last block n = Product N, 584 bytes n <= N+1 with N <= 150

- **CCSDS Header format**

Table 2.3

Record	KEYWORD		VALUE	
N°	SIZE	CONTENT	SIZE	FORMAT/CONTENT
1	20	CCSD3ZF0000100000001	/	/
1	20	CCSD3KS00006ORBTFILE	/	/
1	40	38 blanks + CR + LF	/	/
2	15	Orbit_File_Name	12	"eExxxxxs.orb"
3	13	Orbit_Station	2	among FS,GS,KS,MS,PS and ES
4	16	Orbit_Start_Date	24	UTC2 format
5	21	Orbit_Generation_Date	17	UTC1 format
6	16	Orbit_Nb_Product	4	"nnnn" (N4)
7	24	Orbit_Start_End_Latitude	19	"ddddddddd_fffffffff" ddddddddd = start latitude (N9) 10^{-6} degree fffffffff = stop latitude (N9) 10^{-6} degree
8	25	Orbit_Start_End_Longitude	19	"ddddddddd_fffffffff" ddddddddd=start longitude (N9) 10^{-6} degree fffffffff = stop longitude (N9) 10^{-6} degree
9	12	Orbit_Version	19	"xx.yy" where xx issue number (N2) and yy revision number (N2)
10	40	40 blanks	/	/
10	20	CCS$$MARKERORBTFILE	/	/
10	20	FCST3IF0010500000001 (1)	/	/

(1) at the end of record 10, there is no CR + LF pair.

- **Products format**

See in Annex B Tables B.3 for main product header format, B.4 for specific product header format and B.5 for data set record format.

2.4. ALT.FDC orbit file

- **Content overview**

There is one file per orbit. It contains one header following CCSDS convention and N products that belong to the orbit. Each product includes one main product header, one specific product header and 77 product data set records.

The product is a copy of the product generated in real time by the acquisition stations. It contains an averaged wind speed, wave height, and satellite altitude together with the standard deviations (one per quantity) for single cells along the satellite track. One cell is sampled every 6.725 km and there is a maximum of 20 measured values during one second. Seventy seven cells are combined in one product and represent an area of approximately 500 km.

Format :	*header :* ASCII CCSDS *products* : binary
Access :	sequential
Record length :	*header* : 80 bytes *products* : main product header = 176 bytes specific product header = 56 bytes data set records = 88 bytes
Size :	*header :* 800 bytes *products :* 7008 bytes *N, N<=80 *Total :* 561440 bytes

The file is written on exabyte as described below :

Block 1 = header of 10 records, 800 bytes

IRG

Block 2 = Product 1, 7008 bytes

IRG

...

Last block n = Product N, 7008 bytes n <= N+1 with N <= 80

- **CCSDS Header format**

Table 2.4

Record	KEYWORD		VALUE	
N°	SIZE	CONTENT	SIZE	FORMAT/CONTENT
1	20	CCSD3ZF0000100000001	/	/
1	20	CCSD3KS00006ORBTFILE	/	/
1	40	38 blanks + CR + LF	/	/
2	15	Orbit_File_Name	12	"eRxxxxxs.orb"
3	13	Orbit_Station	2	among FS,GS,KS,MS,PS and ES
4	16	Orbit_Start_Date	24	UTC2 format
5	21	Orbit_Generation_Date	17	UTC1 format
6	16	Orbit_Nb_Product	4	"nnnn" (N4)
7	24	Orbit_Start_End_Latitude	19	"ddddddddd_fffffffff" ddddddddd = start latitude (N9) 10^{-6} degree fffffffff = stop latitude (N9) 10^{-6} degree
8	25	Orbit_Start_End_Longitude	19	"ddddddddd_fffffffff" ddddddddd=start longitude (N9) 10^{-6} degree fffffffff = stop longitude (N9) 10^{-6} degree
9	12	Orbit_Version	19	"xx.yy" where xx issue number (N2) and yy revision number (N2)
10	40	40 blanks	/	/
10	20	CCS$$MARKERORBTFILE	/	/
10	20	FCST3IF0010500000001 (1)	/	/

(1) at the end of record 10, there is no CR + LF pair.

- **Products format**

See in Annex B Tables B.3 for main product header format, B.8 for specific product header format and B.9 for data set record format.

2.5. GEOGRAPHIC TABLE FILE DESCRIPTION

- **Content Overview**

Format :	*out layer :* CCSDS *header* : binary *data* : binaire
Access :	sequential or direct
Record length	out layer: 20 bytes Header and data : 8 bytes
Size :	*SFDU label :* 20 bytes *header* : 8 bytes *records :* N*8, N<=250 *Total :* 2028 bytes

A geographic table file contains first a SFDU label (CCSDS out layer) , then a header followed by N data records corresponding to the N orbits crossing the geographic cell. N is around 250 as at most 1/4 of the passes cross each cell.

The SFDU label coded as 20 characters (A20) beginning the file is "FCST3SF0010100000001".

- **Header format**

Field No	Type	Position (bytes)	Content	Unit
1	SI2	1	cell number	/
2	SI2	3	number of orbit files	/
3	SI2	5	latitude north intermediate limit	degree
4	SI2	7	latitude of south intermediate limit	degree

- **Data Record format**

Field N°	Type	Position (bytes)	Content	UNIT
0+2*N	SI4	1	Absolute orbit number	/
1+2*N	A4	5	"x "	/

- **File structure on exabyte**

  This file is written on exabyte as only one block of 2028 bytes which is the maximum size for this file. If the number of recorded orbits is less than 250 then this block is padded with fillers (blanks) up to 2028 bytes.

SFDU label	(20 bytes)
Header	(8 bytes)+ **250 data records** (8 bytes each)

2.6. DATES TABLE FILE DESCRIPTION

- **Content overview**

File name :	**FeA.DAT**
Format :	*out layer : CCSDS* *header* : binary *data* : binary
Access :	sequential or direct
Record length:	out layer : 20 bytes header et data : : 28 bytes
Size :	*SFDU label:* 20 bytes *header* : 28 bytes *records :* N*28, N<=444 *Total :* 12480 bytes

The dates table file contains first a SFDU label (CCSDS out layer) then a header followed by as much data records as pass files.

The SFDU label codded as 20 characters (A20) beginning the file is "FCST3SF0010200000001".

The coded dates in this file are expressed in seconds since 01-01-1990, 0h and microseconds in the second.

- **Header format**

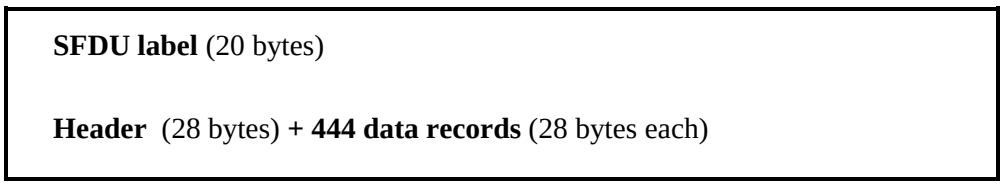
Field No	Type	Position (bytes)	Content	Unit
1	SI4	1	Number of orbit files	/
2	SI4	5	First orbit number	/
3	SI4	9	Last orbit number	/
4	2SI4	13	Start date of first orbit	/
5	2SI4	21	Stop date of last orbit	/

- **Data Record format**

Field No	Type	Position (bytes)	Content	Unit
0+5*N	SI4	1	Absolute orbit number	/
1+5*N	A4	5	"x "	/
2+5*N	SI4	9	Number of measurements in the orbit	/
3+5*N	2SI4	13	Start date of the orbit (first product)	/
4+5*N	2SI4	21	Stop date of the orbit (last product)	/

- **File structure on exabyte**

  This file is written on exabyte as only one block of 12480 bytes which is the maximum size for this file. If the number of recorded orbits is less than 444 then this block is padded with fillers (blanks) up to 12480 bytes.



ANNEX A

A.1. CCSDS FORMAT CONVENTION

CCSDS stands for Consultative Comittee on Space Data System, and this format is normalized (ISO 12175) since October 1993.

The following explanations are issued from the CCSDS recommandation defined in three documents :

- Unités de données à structuration normalisée (SFDU)
  Régle de structure et de construction

- Standard Formatted Data Units - - A Tutorial - CCSDS 621.0-G-1

- Parameter Value Language specification (CCSD0006) - CCSDS 641.0-B-1

a) CCSDS header format convention

Each file contains a header composed of fixed length records. All file headers are coded in ASCII and follow the CCSDS format convention. Headers provide identification, processing history and content information.

A header include SFDU identifiers (Standard Formatted Data Unit). The SFDU label is coded as one line (ascii record), and is recorded with 20 characters padded with ascii spaces to maintain a fixed length equal to the record length of the header. The first four letters of a SFDU label are most often CCSD.

All other header entries follow a "KEYWORD = VALUE"syntax as defined below:

KEYWORD assignment_symbol VALUE stmt_terminator

Where :

- **KEYWORD** is the leftmost component term and is made up with a character string that describes the keyword. It is of variable length.

- **Assignment_symbol** is the ASCII equal sign character " = ". It is coded as three characters.

- **VALUE** is the rightmost component term and is made up of a character string containing the value of the data object described by the keyword. It is of variable length.

- **stmt_terminator** is the ASCII semicolon character ";". It is coded as one character.

Each record is then padded with ascii spaces (blanks) to the record length minus two characters to end with a carriage return and line feed pair (CR + LF).

b) CCSDS time formats

Time has two formats in CCSDS headers :

- **UTC1** format gives time in seconds and is recorded with 17 characters :

YYYY-DDD**T**HH:MM:SS

- **UTC2** format gives time in microseconds and is recorded with 24 characters :

YYYY-DDD**T**HH:MM:SS.XXXXXX

With :

YYYY = year
DDD = day of the year (001 à 366)
HH = hours (00 à 23)
MM = minutes (00 à 59)
SS = seconds (00 à 59)
XXXXXX = microseconds

c) CCSDS header content description

Each CCSDS header will be described in this chapter in a table with the following items.

Record	KEYWORD		VALUE	
N°	SIZE	CONTENT	SIZE	FORMAT/CONTENT

- **record number** (or line number)
- **keyword size** = number of bytes of the keyword
- **value size** = number of bytes of the value
- **value content** = when the value of the keyword is determined
- **value format** = specifies the format used to express the value, it follows the convention :

  - the value is expressed between a pair of "quotes",
  - the value indicates the number of positions occupied by each element of the format,
  - If the element is ascii numeric, the value indicates the size as Nx.

example : "xxxxx.yyy" where xxxxx = absolute orbit number (N5), yyy = relative orbit number in the cycle (N3)

NB : The value of a numeric element shall be :

- a default value when the element cannot be determined,
- padded with digits '9' when it is greater than the element size.

A.2. GEOGRAPHIC AND TIME INFORMATIONS

Those informations are only of internal use of an extraction program that can be run on a medium to extract data regarding a time window and/or geographic criteria.

The tables below are present on CDROM and exabyte.

a) Geographic table

The world is cut up in 4 strips in latitude by 12 sectors in longitude that form geographic boxes regarding the following gridding :

90° (AC)	1	2	3	4	5	6	7	8	9	10	11	12
LIN	13	14	15	16	17	18	19	20	21	22	23	24
0°	25	26	27	28	29	30	31	32	33	34	35	36
LIS												
-90° (AC)	37	38	39	40	41	42	43	44	45	46	47	48
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300	330°

The values for north intermediate latitude and south intermediate latitude are :

LIN = 74° et LIS = -74°

Each geographic box is called a cell numbered from 1 to 48.

Each pass on a medium is recorded in each cell it is crossing. In each cell, the pass are recorded in a chronologic order, i.e. increasing orbit numbers and ascending pass before descending pass.

A medium contains exactly 48 geographic table files.

b) Time table

All the pass files present on a medium are recorded in another table regarding their date and in a chronologic order. Each record of this table contains the pass identification together with its start and stop date.

The program extracts the data using the geographical criteria first anf the time filter after.

A.3. Naming convention

The labelling of files referred in this document uses the following naming convention:

F	French PAF
e	Satellite (=1 for ERS1, =2 for ERS2)
R	Radar altimeter data type (ALT.FDC)
E	Sar wave mode (SWM.FDC)
D	Wind scatterometer data type (WSC.FDC)
volu	volume identifier coded as 4 digits = *mmaa* for month and year
v	Volume issue number
xxxxx	absolute orbit number coded as 5 digits

A N N E X B

Table B.1 - Data types in the FDC products

Data Type	Meaning
I1	1-byte unsigned integer
I2	2-byte integer in IEEE (no-DEC) format
I4	4-byte integer in IEEE (no-DEC) format
A	ASCII
B	1 byte or bits (flags)
S	Special format, as defined in description field

Table B.2 - Fillers for nonvalid fields

Field value	Used for data type
0	for integer numbers
space	for ASCII
0	for bit fields within a byte
0	for special format. Note that there may also exist a ‘non-value’ definition by also exist a ‘non-value’ definition by special format itself.

Table B.3 - MPH for all products

Field	Bytes	Type	Description
1	17	A/I	Product identifier (for ESA internal operational use only), i.e. a set of characters and integers which form a unique identifier. The set of 17 Bytes is defined as follows: Byte 1: Originator of logical schedule (for ESA internal use only) e.g.: I: MMCC/EECF, Immediate Command M: MMCC/EECF, Logical Schedule J: Local operator, Immediate Command K: Local operator, Logical Schedule Byte 2-5: Sequential Counter of Logical Schedule Byte 6-9: Unique Identification or Schedule Offset Byte 10-13: Not used, set to 0 Byte 14-17: Sequential Number of Currently Generated Product
2	1	I1	Type of Product : 5 for SWM.FDC (UWA) 8 for WSC.FDC (UWI) 9 for ALT.FDC (URA)
3	1	I1	Spacecraft 1: ERS-1 2: ERS-2
4	24	A	UTC time[1] of subsatellite point at beginning of product. Format in ASCII: DD-MMM-YYYY hh:mm:ss.ttt For example: 30-JAN-1987 14:30:27.123
5	1	I1	Station ID, where data was processed 1: Kiruna Station (KS) 2: Fucino Station (FS) 3: Gatineau Station (GS) 4: Maspalomas Station (MS) 5: EECF Station (ES) 6: Prince Albert Station (PS)

[1]UTC time at beginning of product, has the following meaning: for SAR it is the time of the first processed range line i.e. 0.4 to 0.48 sec before the zero doppler time of the first line of the product; for UWI it is the time of the first line of nodes; for URA it is the time of the first data set record.

6	2	B	Product Confidence Data bit 1 PCD Summary Flag 0: product correctly generated 1: at least one of the remaining 15 bits of the PCD in the MPH is set. In particular the specific header flags are not read when this bit is set. bit 2 - 3 spare bit 4 - 5 Downlink Performance and X-Band acquisition chain. This value summarizes the PCD snapshots rel. to the products. 0: performance better than MMCC/EECF-supplied minimum threshold 1: performance equal to or worse than threshold 2: performance unknown bit 6 - 7 HDDT Summary. This value summarizes the PCD snapshots rel. to the product. 0: performance better than MMCC/EECF-supplied minimum threshold 1: performance equal to or worse than threshold 2: performance unknown bit 8 - 9 Frame Synchronizer. This value summarizes the PCD snapshots rel. to the product. 0: performance better than MMCC/EECF-supplied minimum threshold 1: performance equal to or worse than threshold 2: performance unknown bit 10 - 11 FS to Processor I/F The LRDPF and SARFDP reads the status of the FS interface. 0: no parity error detected 1: at least one parity error detected 2: performance unknown bit 12 - 13 Checksum Analysis on LR Frames. The percentage of source packets, featuring a checksum error, and used in the actual product is compared to a MMCC/EECF given threshold. 0: lower than threshold 1: greater than threshold 2: performance unknown bit 14 - 15 Quality of Downlinked Formats and Source Packets. The RA product is based on using 80 consecutive source packets. The percentage of erroneous ones is determined and compared to a MMCC/EECF given threshold. 1: greater than threshold 2: performance unknown

			bit 16 Existence of Auxiliary Data.[2] 0: auxiliary data and/or chirp correctly extracted 1: not all auxiliary data extracted
7	24	A	UTC time when MPH was generated; Format as in field 4.
8	4	I4	Size of Specific Product Header: Record in Bytes
9	4	I4	Number of Product Data Set Records
10	4	I4	Size of each Product Data Set Record in Bytes
11	1	B	Subsystem that generated the product. 0: SARFDP 1 1: SARFDP 2 2: LRDPF 3: VMP 4: LRDTF
12	1	B	OBRC flag used for SAR products only bit 1 - 2 0: not used 1: OGRC data 2: OBRC data
13	24	A	UTC reference time. Time relation used to convert from satellite to ground, used together with the next two fields.
14	4	I4	Reference binary time of satellite clock (32-bit unsigned integer)
15	4	I4	Step length of satellite clock in nanoseconds
16	8	I2	Processor software version used to generate product. Format as defined by MMCC/EECF. 8 bytes = 4 words of integer x 2
17	2	I2	Threshold table version number.
18	2	B	Spare
19	24	A	UTC time of ascending node state vector
20-25	24	6I4	Ascending node state vector[3] in earth-fixed reference system
20	4	I4	State vector; X in 10^{-2} m
21	4	I4	State vector; Y in 10^{-2} m
22	4	I4	State vector; Z in 10^{-2} m
23	4	I4	State vector; X velocity in 10^{-5} m/s
24	4	I4	State vector; Y velocity in 10^{-5} m/s
25	4	I4	State vector; Z velocity in 10^{-5} m/s

[2]For the LRDPF it has the meaning that at least one auxiliary data field in a source packet header is corrupted and for the SARFDP it means that the chirp could not be extracted from the input raw data. For UWI and URA this flag is always set to zero.

[3]Product types which don't need valid orbit state vectors, e.g., UWAND and extracted products, for production, may contain invalid state vectors since these are not verified during production.

Table B.4 - Specific product header for SWM.FDC products

Field	Bytes	Type	Description	Units
1	2	B	Product Confidence Data for Processing[4]. bit 1 - 2: Processing equipment status 0: equipment working 1: degraded mode due to: - product channel not accessible; - display device not accessible; - CCT drive not accessible 2: hardware problem in either the STAR array processor or the APTEC image disk. bit 3: PRF code change flag 0: same PRF code for entire image 1: PRF value changed at least once bit 4: Sampling window change flag 0: same sampling window for entire image 1: sampling window changed at least once bit 5: Calibration system and receiver gain change flag 0: same system and receiver gain for entire image 1: system or receiver gain changed at least once bit 6: Chirp replica quality flag[5] 0: cross-correlation pulse width, first side lobe and ISLR all less than MMCC/EECF-specified values. 1: the correctly extracted chirp quality exceeds specified values	N/A

[4]The Product Confidence Data for Processing bits do not cause the MPH summary bit to be set

[5]Chirp Replica Quality flag (field 1, bit 6): see fields: 1, 8, 9 and 10. These fields refer to chirp cross-correlation. This means cross-correlation with an MMCC/EECF-supplied nominal chirp. These fields are only valid if the chirp replica is successfully extracted and is used (i.e. field 27, bit = 0). When field 27, bit 1 = 1, meaning that the chirp replica is not extracted successfully, then the cross-correlation values. fields 8, 9 and 10 will be set to 0. Also, if field 1 (bit 6) is set (ie. chirp quality failed) then the values in fields 8, 9 and 10 have no significance. The values given in fields 8, 9 and 10 are calculated on the assumptions that the chirp baseband and the chirp extraction index are correct.
The chirp replica quality flag is raised for a correctly extracted chirp, when either of the chirp quality figures (3dB width, sidelobe or ISLR - respectively fields 8, 9 or 10) is greater then the threshold values set by MMCC/EECF.

			bit 7: Input data statistic flag[6] 0: mean of I and Q input values are both within MMCC/EECF-specified percentage of dynamic range centre, and standard deviation values of I and Q input values are both greater than MMCC/EECF-given percentage of dynamic range 1: (flag is set) otherwise bit 8: Doppler centroid confidence measure flag 0: confidence measure ≤ MMCC/EECF-specified value 1: confidence measure > MMCC/EECF-specified value bit 9: Doppler centroid value flag 0: centroid absolute value ≤ PRF/2 1: centroid absolute value > PRF/2 bit 10: Doppler ambiguity confidence measure flag 0: confidence measure ≥ MMCC/EECF-specified value 1: confidence measure < MMCC/EECF-specified value bit 11 Output data mean flag[7]. 0: mean and standard deviation both greater than MMCC/EECF-specified percentage of dynamic range 1: otherwise bit 12 - 16 : Spare	
2	4	I4	Subsatellite Track Heading (relative to North) at mid-azimuth position of product	10^{-3} deg

[6]Input Data Statistic flag (field 1, bit 7): The dynamic range depending on the number of bits per samples, the following example is given for 5 bits. For 5 bits the values vary from 0 to 31, i.e. an expected mean value of 15.5. When MMCC/EECF gives a threshold of x\% of dynamic range centre, it is understood as specifying a range of: ± x/2 % around 15.5. The MMCC/EECF threshold of y % for the standard deviation is understood as y % of 31.
The input data statistics flag is set = 1 :
if ((abs(IN_MEAN_I - dynamic range/2) > mean I threshold % of dynamic range)
.or. (abs(IN_MEAN_Q - dynamic range/2) > mean Q threshold % of dynamic range)
.or. (IN_STDEV_I > std. dev. I threshold % of dynamic range)
.or. (IN_STDEV_Q > std. dev. Q threshold % of dynamic range))
where:
IN_MEAN_I is SPH byte 37-40 + OGRC/OBRC I bias
IN_MEAN_Q is SPH byte 41-44 + OGRC/OBRC Q bias
IN_STDEV_I is SPH Byte 45-48
IN_STDEV_Q is SPH Byte 49-52
The dynamic range for image OBRC is 63, for image OGRC is 31, for wave OBRC is 15, and for wave OGRC is 3.

[7]Output Data Statistics flag (field 1, bit 11). The mean and standard deviation of the output intensity of part of a complete image (typically 1/15 th) are computed but not reported. The actual values are compared to MMCC/EECF given thresholds to set the bit 11 of field 1.
The bit is set = 1 :
if ((output mean < mean threshold % of dynamic range) .or.
(output std. dev. < std. dev. threshold % of dynamic range))
The output mean is given by SPH byte 241-244, the output standard deviation is given by byte 245-248. The dynamic range is 255 for UI8 and 65535 for UI16, IWA, and UWA.

3	2	I2	Number of PRF code changes for test. During an imaging sequence no PRF changes are to be expected	
4	2	I2	Number of sampling window time changes	
5	2	I2	Sum of number of calibration sub-system and receiver gain changes	
6	2	I2	Number of missing lines	
7	2	I2	Spare	
8	4	I4	3-dB pulse width of chirp replica cross-correlation function[5].	10^{-3}
9	4	I4	First side lobe level of pointchirp replica cross-correlation function[5].	10^{-3} dB
10	4	I4	ISLR of chirp replica cross-correlation function[5].	10^{-3} dB
11	4	I4	Doppler centroid confidence measure. This is the goodness of fit between the Doppler data and the beam replica. A value of zero results when there is a perfect match between the Doppler data and the replica. A value of one represents the worst possible fit.	10^{-3}
12	4	I4	Doppler ambiguity confidence measure[8]. This is a measure of the peak of the matched filter output for the predicted Doppler ambiguity offset. This value is normalized : 1: best case ; 0: worst case.	10^{-3}
13	4	I4	Unbiased Mean of uncorrected I data	10^{-3}
14	4	I4	Unbiased Mean of uncorrected Q data	10^{-3}
15	4	I4	Standard Deviation of I input data	10^{-3}
16	4	I4	Standard Deviation of Q input data	10^{-3}
17-26	40	I4	Scene Latitudes and Longitudes[9].	
17	4	I4	Geodetic latitude of the first pixel of the first line of the scene product. A negative value denotes South latitude, and a positive value denotes North latitude.	10^{-3} deg
18	4	I4	East longitude (i.e. 360° from Greenwich to east) of the first pixel of the first line of the scene product.	10^{-3} deg
19	4	I4	Geodetic latitude of last pixel of the first line of the scene product	10^{-3} deg
20	4	I4	East longitude of the last pixel of the first line of the scene product	10^{-3} deg
21	4	I4	Geodetic latitude of last pixel of the last line of the scene product	10^{-3} deg
22	4	I4	East longitude of the last pixel of the last line of the scene product	10^{-3} deg
23	4	I4	Geodetic latitude of first pixel of the last line of the scene product	10^{-3} deg

[8]Field 12 is not used in wave mode products.

[9]Latitudes and Longitudes. The latitudes and longitudes always refer to the image frame (6300 by 5000 pixels) independent of the size of the actual data contained within the frame.

24	4	I4	East longitude of the first pixel of the last line of the scene product	10^{-3} deg
25	4	I4	Geodetic latitude of center pixel of the scene product	10^{-3} deg
26	4	I4	East longitude of the center pixel of the scene product	10^{-3} deg
27	1	B	Origin of used chirp[10] (not applicable for OBRC) bit 1 means: 0: chirp replica used derived from data (field 28) 1: default chirp from MMCC/EECF (field 29-37)	
28	2	I2	Chirp extraction index	sam-ples
29	4	I4	Chirp amplitude coefficient-constant	
30	4	I4	Chirp amplitude coefficient-linear	per sec
31	4	I4	Chirp amplitude coefficient-quadratic	10^{5} sec^{-2}
32	4	I4	Chirp amplitude coefficient-cubic	10^{10} sec^{-3}
33	4	I4	Chirp amplitude coefficient-quartic	10^{15} sec^{-4}
34	4	I4	Chirp phase coefficient[11]-constant a0	10^{-6} cycles
35	4	I4	Chirp phase coefficient- linear a1	Hz
36	4	I4	Chirp phase coefficient-quadratic a2	10^{-6} Hz/s
37	4	I4	Chirp phase coefficient-cubic a3	10^{-12} Hz/s^2
38	4	I4	I bias for raw data correction[12].	10^{-3}
39	4	I4	Q bias for raw data correction.	10^{-3}
40	4	I4	I/Q Standard Deviation Ratio for raw data correction	10^{-3}
41	4	I4	Output pixel bit length (8 or 16) applicable for UI16 and UI8 products only: 0: Wave Mode product 8: UI8 product 16: UI16 and II16 product	
42	4	I4	16-to-8-bit conversion coefficient for output pixel-constant[13].	10^{-3}
43	4	I4	16-to-8-bit conversion coefficient - linear[13].	10^{-6}
44	4	I4	16-to-8-bit conversion coefficient - quadratic[13].	10^{-9}
45	4	I4	Calibration System Gain (telemetry value)	

[10]Origin of used chirp: In case of requested chirp from telemetry but extraction fails, the default chirp from MMCC/EECF is used instead.

[11]Chirp phase coefficient: The chirp phase is expressed in radians :
$\exp\{\phi\} = \exp\{2\pi \times (a0 + a1 \times t + a2 \times t^2 + a3 \times \ldots)\}$. Since the unit of ϕ is radians, the expression (.....) is dimensionless. This implies that a1 must have the dimension of 1/t, a2 that of $1/t^2$, etc. The corresponding units used are Hz, Hz/s, etc.

[12]Raw Data Correction (fields 38 to 40) indicate the values before correction of the raw data i.e. are still biased unsigned integers. They are the same as the biases provided by MMCC (in the EXT_SAR table) and they include the nominal encoding bias (Image OGRC=16; Image OBRC=32; Wave OGRC=2; Wave OBRC=8).

[13]Applicable for UI8 products only, the coefficients in fields 42, 43 and 44 are used to convert from 16-bit pixels to 8-bit pixels.

46	4	I4	Receiver Gain (telemetry value)	
47	4	I4	Normalized clutter noise estimate[14] (UWA only).	10^{-3}
48	4	I4	For UWA only: max. of UWA spectrum components before normalization. For other products: Reserved for ESA usage.	
49	4	I4	Range pixel spacing. Slant range pixel spacing for II16. Ground range pixel spacing for UI16, UI8, and IWA.	10^{-3} m
50	4	I4	Azimuth pixel spacing	10^{-3} m
51	4	I4	Pulse Repetition Frequency	10^{-3} Hz
52	4	I4	2-way slant range time of the first processed range cell	nsec
53	4	I4	Doppler centroid value at near range	10^{-3} Hz
54	4	I4	Slope of Doppler centroid over 2-way slant range time	Hz/ sec
55	4	I4	Azimuth FM rate at near range	10^{-3} Hz/sec
56	4	I4	Slope of azimuth FM rate over 2-way slant range time	10^{-3} Hz/s^2
57	2	I2	Doppler ambiguity number	--
58	4	I4	Calibration coefficient (antenna), constant term	10^{-3}
59	4	I4	Calibration coefficient (antenna), linear term	10^{-6}
60	4	I4	Calibration coefficient (antenna), quadratic term	10^{-9}
61	4	I4	Calibration coefficient, spare term	
62	4	I4	Calibration coefficient, spare term	
63	2	I2	EXT_SAR parameter table ID	
64	1	I1	Datation improvement (for UI16, UI8 and II16 only) 0: successfully performed 1: attempted but failed	
65	2	I2	SARFDP Static Transfer Function Table ID (UWA only)	
66	2	I2	SARFDP Parameter Database ID	
67	4	I4	Output image mean (Only valid for UI16, UI8, II16, IWA)	10^{-3}
68	4	I4	Output image standard deviation (Only valid for UI16, UI8, II16, IWA)	10^{-3}
69	4	I4	Range compression scalar gain	10^{-5}
70	4	I4	Azimuth FFT scalar gain	10^{-5}
71	4	I4	Azimuth compression scalar gain	10^{-5}
72	4	I4	Overall processing gain. Includes all the gains in fields 69, 70 and 71 and the scaling due to look summation. Only valid for 16 bit images (not valid for UI8).	10^{-5}

[14]Clutter Noise (fields 47 and 48): For the case of UWA the normalization equations are: clutter = clutter * 255 / max_of_spectrum and spectrum_component = spectrum_component * 255 / max_of_spectrum.

Table B.5 - Data Set Record for SWM.FDC

Field	Bytes	Type	Description	Units
1	4	I4	Data record number, this number is always 1.	
2-13	12	I1	Intensity of sector 1 and Heading Range of 0° to 15°	
2	1	I1	Nominal wavelength 100 m Wavelength range 90 m - < 111 m	
3	1	I1	Nominal wavelength 123 m Wavelength range 111 m - < 137m	.
4	1	I1	Nominal wavelength 152 m Wavelength range 137 m - < 169 m	
5	1	I1	Nominal wavelength 187 m Wavelength range 169 m - < 208 m	
6	1	I1	Nominal wavelength 231 m Wavelength range 208 m - < 257 m	
7	1	I1	Nominal wavelength 285 m Wavelength range 257 m - < 316 m	
8	1	I1	Nominal wavelength 351 m Wavelength range 316 m - < 390 m	
9	1	I1	Nominal wavelength 433 m Wavelength range 390 m - < 481 m	
10	1	I1	Nominal wavelength 534 m Wavelength range 481 m - < 593 m	
11	1	I1	Nominal wavelength 658 m Wavelength range 593 m - < 731m	
12	1	I1	Nominal wavelength 811 m Wavelength range 731 m - < 901m	
13	1	I1	Nominal wavelength 1000 m Wavelength range 901 m-< 1110 m	
14-25	12	I1	Intensity of sector 2 and Heading Range of 15° to 30° Wavelengths as for sector 1.	
26-37	12	I1	Intensity of sector 3 and Heading Range of 30° to 45° Wavelengths as for sector 1.	
38-49	12	I1	Intensity of sector 4 and Heading Range of 45° to 60° Wavelengths as for sector 1.	
50-61	12	I1	Intensity of sector 5 and Heading Range of 60° to 75° Wavelengths as for sector 1.	
62-73	12	I1	Intensity of sector 6 and Heading Range of 75° to 90° Wavelengths as for sector 1.	
74-85	12	I1	Intensity of sector 7 and Heading Range of 90° to 105° Wavelengths as for sector 1.	
86-97	12	I1	Intensity of sector 8 and Heading Range of 105° to 120° Wavelengths as for sector 1.	

98-109	12	I1	Intensity of sector 9 and Heading Range of 120° to 135° Wavelengths as for sector 1.	
110-121	12	I1	Intensity of sector 10 and Heading Range of 135° to 150° Wavelengths as for sector 1.	
122-133	12	I1	Intensity of sector 11 and Heading Range of 150° to 165° Wavelengths as for sector 1.	
134-145	12	I1	Intensity of sector 12 and Heading Range of 165° to 180° Wavelengths as for sector 1.	

Table B.6 - Specific Product Header for WSC.DFC

Field	Bytes	Type	Description	Units
1	2	B	Product Confidence Data for Processing bit 1 & 2: Processing equipment status 0: equipment working 1: some problems with equipment 2: equipment failed during product generation bit 3: Spare bit 4: I/Q Imbalance Flag 0: all beams better than MMCC/EECF-defined threshold 1: any beam above or equal to MMCC/EECF-defined threshold bit 5: Internal Calibration level flag 0: all beams within MMCC/EECF-defined level window 1: any beam out of MMCC/EECF-defined level window bit 6: Blank Product Flag 0: data available 1 no data available bit 7: Doppler Compensation: Center of Gravity flag 0: all beams below MMCC/EECF defined threshold 1: any beam above or equal to MMCC/EECF-defined threshold bit 8: Doppler Compensation: Standard Deviation flag 0: all beams below MMCC/EECF defined interval 1: any beam outside MMCC/EECF-defined interval bit 9 - 16: Spare	N/A
2	4	I4	Geodetic latitude of Product Center; A negative value denotes South latitude, and a positive value denotes North latitude.	
3	4	I4	East longitude (i.e. 0-360°) from Greenwich to East)	10^{-3} deg
4	4	I4	Subsatellite Track Heading w.r. to North, turning clockwise 0at time of product center	10^{-3} deg
5	2	I2	Mean distance between two successive along track nodes at product center	meter
6	2	I2	Center of Gravity of averaged power spectrum (forebeam)	2.344 Hz[15]
7	2	I2	''Standard Deviation'' of averaged power spectrum (forebeam)	2.344 Hz

[15]The units in fields 6 to 11 have units of 2.344 Hz, while 234.4 Hz represents the frequency discretisation.

8	2	I2	Center of Gravity of averaged power spectrum (midbeam)	2.344 Hz
9	2	I2	''Standard Deviation'' of averaged power spectrum (midbeam)	2.344 Hz
10	2	I2	Center of Gravity of averaged power spectrum (aftbeam)	2.344 Hz
11	2	I2	''Standard Deviation'' of averaged power spectrum (aftbeam)	2.344 Hz
12	4	I4	I Mean Noise Power, forebeam	10^{-3} ADC units
13	4	I4	Q Mean Noise Power, forebeam	10^{-3} ADC units
14	4	I4	I Mean Noise Power, midbeam	10^{-3} ADC units
15	4	I4	Q Mean Noise Power, midbeam	10^{-3} ADC units
16	4	I4	I Mean Noise Power, aftbeam	10^{-3} ADC units
17	4	I4	Q Mean Noise Power, aftbeam	10^{-3} ADC units
18	4	I4	Internal Calibration level monitoring factor, forebeam	10^{-3} ADC units
19	4	I4	Internal Calibration level monitoring factor, midbeam	10^{-3} ADC units
20	4	I4	Internal Calibration level monitoring factor, aftbeam	10^{-3} ADC units
21	2	B	Mode of operation - set by the first midbeam source packet contributing to spatial filtering for the first node (near swath) in the center row of a product. bit 1 and 2: 0: windmode 1: wind/wave mode 2: no data found to identify mode	
22-71	82	I2	Parameter Table ID. Details as follows:	
22	2	I2	Global threshold Parameter Table ID	
23	2	I2	Static parameter Parameter Table ID	
24	2	I2	Dynamic parameter Parameter Table ID	
25	2	I2	F $R_b(n)$ Parameter Table ID	

26	2	I2	$T_{orbit,ref,D}$ Parameter Table ID	
27	2	I2	ϕ_F Parameter Table ID	
28	2	I2	ϕ_M Parameter Table ID	
29	2	I2	ϕ_A Parameter Table ID	
30	2	I2	F $T_b(n)$ Parameter Table ID	
31	2	I2	$C_{ADC,b}(n)$ Parameter Table ID	
32	2	I2	$T_{orbit,ref,N}$ Parameter Table ID	
33	2	I2	$F_{N,F}$ Parameter Table ID	
34	2	I2	$F_{N,M}$ Parameter Table ID	
35	2	I2	$F_{N,F}$ Parameter Table ID	
36	2	I2	$\theta_{N,b}(j,k)$ Parameter Table ID	
37	2	I2	$\phi_{N,b}(j,k)$ Parameter Table ID	
38	2	I2	$M_{eff,b}(j,k)$ Parameter Table ID	
39	2	I2	N(j,k) Parameter Table ID	
40	2	I2	Wind extraction software configuration Table ID	
41	2	I2	$LA_b(i_r,i_c)$ Parameter Table ID	
42	2	I2	$LZ_b(i_r,i_c)$ Parameter Table ID	
43	2	I2	LN_b Parameter Table ID	
44	2	I2	MA_b Parameter Table ID	
45	2	I2	MS_b Parameter Table ID	
46	2	I2	$NA_F(\upsilon,i_c)$ fore Parameter Table ID	
47	2	I2	$NA_M(\upsilon,i_c)$ mid Parameter Table ID	
48	2	I2	$NA_A(\upsilon,i_c)$ aft Parameter Table ID	
49	2	I2	$NS_F(\upsilon,i_c)$ fore Parameter Table ID	
50	2	I2	$NS_M(\upsilon,i_c)$ mid Parameter Table ID	
51	2	I2	$NS_A(\upsilon,i_c)$ aft Parameter Table ID	
52	2	I2	$NN_F(\upsilon,i_c)$ fore Parameter Table ID	
53	2	I2	$NN_M(\upsilon,i_c)$ mid Parameter Table ID	
54	2	I2	$NN_A(\upsilon,i_c)$ aft Parameter Table ID	
55	2	I2	l_{ref} Parameter Table ID	
56	2	I2	$a_F(\mu,i_c)$ fore Parameter Table ID	
57	2	I2	$a_M(\mu,i_c)$ mid Parameter Table ID	
58	2	I2	$a_A(\mu,i_c)$ aft Parameter Table ID	
59	2	I2	$av_F(k,i_r,i_c)$ fore Param. Table ID	
60	2	I2	$av_M(k,i_r,i_c)$ mid Parameter Table ID	
61	2	I2	$av_A(k,i_r,i_c)$ aft Parameter Table ID	
62	2	I2	i_b Parameter Table ID	
63	2	I2	Spare	

64	2	I2	Spare	
65	2	I2	Meteo Table ID (table type 83, Forecast F18)	
66	2	I2	Meteo Table ID (table type 84, Forecast F24)	
67	2	I2	Meteo Table ID (table type 85, Forecast F30)	
68	2	I2	Meteo Table ID (table type 86, Forecast F36)	
69	2	I2	Spare	
70	2	I2	Spare	
71	2	I2	Spare	

Table B.7 - Data Set Record for WSC.FDC

Field	Bytes	Type	Description	Units
1	4	I4	Data record number, starting with 1.	
2	4	I4	Geodetic latitude of Node. A negative value denotes South latitude, and a positive value denotes North latitude.	10^{-3} deg
3	4	I4	East longitude (i.e. 0-360° from Greenwich to east)	10^{-3} deg
4	4	I4	σ° of forebeam[16]	10^{-7} dB
5	2	I2	Incidence Angle for forebeam	0.1 deg
6	2	I2	Look Angle of forebeam[17] clock- wise w.r.t. North at grid point	0.1 deg
7	1	I1	Kp Value of forebeam, set to 255 if the calculation is not possible.	%
8	1	I1	Counter of forebeam corrupted or missing source packets[18]	
9	4	I4	σ° of midbeam	10^{-7} dB
10	2	I2	Incidence Angle of midbeam	0.1 deg
11	2	I2	Look Angle of midbeam clock- wise w.r.t. North at grid point .	0.1 deg
12	1	I1	Kp Value of midbeam, set to 255 if the calculation is not possible.	%
13	1	I1	Counter of midbeam corrupted or missing source packets	
14	4	I4	σ° of aftbeam	10^{-7} dB
15	2	I2	Incidence Angle of aftbeam	0.1 deg
16	2	I2	Look Angle of aftbeam clock- wise w.r.t. North at grid point.	0.1 deg
17	1	I1	Kp Value of aftbeam, set to 255 if the calculation is not possible.	%
18	1	I1	Counter of aftbeam corrupted or missing source packets	
19	1	I1	Wind speed (set to 255 if wind extraction is not possible)	0.2 m/s
20	1	I1	Wind direction[19] with respect to North turning clockwise at grid point (set to 255 if wind extraction is not possible)	2 deg

[16]It should be indicated that the σ° values, fields 4, 9 and 14, are derived from the linear values by using: *10log10(linearvalue)*. If beam is not available then the value of sigma_0 is set to -999 999 999.

[17]Look Angle for the three beams, Fields 6, 11 and 16: The beam look angle is defined as the angle between the unit vector tangential to the local meridian and pointing North and the projection of the vector from the centre of cell node to satellite onto the local tangential plane, counting clockwise.

[18]The counter of corrupted or missing source packets, fields 8, 13 and 18, is multiplied by -1 when in wind/wave mode to indicate wind/wave mode operation. The absolute value of the counter, in wind/wave mode, is always greater than two because the wind/wave mode operation causes two FMA sequences to be lost.

[19]For version 2.502 and onward, starting on date 15 October 1991, the wind direction, field 20, is given in the meteorological sense. The definitions of the wind direction used for version 2.502 and onward and used for versions before 2.502 are shown in **Error! Reference source not found.**.

21	2	B	Product Confidence Data[20] bit 1 Summary PCD factor 0: processing of cell according to full specification 1: result to be viewed with limitation, i.e. one of the PCD flags listed below is not 0 (except bits 11-13). bit 2 Forebeam Flag 0: beam OK 1: no forebeam calculation bit 3 Midbeam Flag 0: beam OK 1: no midbeam calculation bit 4 Aftbeam Flag 0: beam OK 1: no aftbeam calculation bit 5 Forebeam Arcing Flag 0: no arcing detected on forebeam 1: arcing detected on forebeam bit 6 Midbeam Arcing Flag 0: no arcing detected on midbeam 1: arcing detected on midbeam bit 7 Aftbeam Arcing Flag 0: no arcing detected on aftbeam 1: arcing detected on aftbeam bit 8 Limit of Kp value 0: all beams below MMCC/EECF-supplied threshold 1: any beam above or equal to MMCC/EECF-supplied threshold bit 9 Land-Sea Flag 0: Sea 1: Land bit 10 Rank one solution flag[21]. 0: Ambiguity removed 1: No ambiguity removal performed or ambiguity removal not successful See Note 6.	

[20]The schematic in Figure is used to unambiguously interprete the Product Confidence Data flags of field 21 of the UWI DSR. It corresponds to one run of the ambiguity removal.

[21]Rank one solution flag,bit 10: The ambiguity removal unit may result or not in a solution. When no ambiguity removal is performed or ambiguity removal is not successful, the solution with the highest probability (rank 1) is given and this flag raised.

			bit 11-12 Ambiguity Removal Method[22] . 0: ambiguity removed autonomously 1: use of meteorological tables after failure of autonomous ambiguity removal 2: ambiguity removed using meteorological data only 3: no ambiguity removal attempted bit 13 Maximum likelihood distance flag[23]. 0: Maximum Likelihood Distance M of the rank 1 solution is less than or equal to a threshold. 1: Maximum Likelihood Distance M of the rank 1 solution (i.e. solution of minimum residual) is greater than a threshold (see note 9). bit 14 Frame Checksum Flag 0: Checksum correct 1: Checksum error detected, noise and calibration replaced with default bit 15 and 16 Spare	N/A

[22]Flag on ambiguity removal method, bit 11 - 12: The ambiguity removal unit may or may not make use of external meteorological data. This flag is raised when meteo data are used. This indicator is set independently of the success of the ambiguity removal indicated by bit 10.

[23]Rank 1 is solution of minimum residual. A high occurrence of the bit 13 flag set to 1 is related to a low quality of the model.
Remark: it is necessary to indicate when the ambiguity removal is not attempted. This occurs for instance when the distance (in a maximum likelihood sense) between the measurement and the model is too big or when the number NB of adjacent nodes in a closed area is too small (eg. < 100) to allow for continuity reasoning.

Table B.8 - Specific Product Header for ALT.FDC

Field	Bytes	Type	Description	Units
1	2	B	Product Confidence Data bit 1-2 Processing Equipment Status 0: equipment working 1: some problems with equipment 2: equipment failed during product generation bit 3 Product type 0: ocean mode 1: non-ocean mode or blank product bit 4 Corrupt Data 0: all processing nominal 1: details of data corruption in Data Set Record bit 5 arithmetic flag 0: no arithmetic fault 1: at least one DSR has a flag raised in byte 62 bit 6-16 Spare	
2	4	I4	Geodetic latitude of data set record 1. A negative value denotes South latitude, and a positive value denotes North latitude.	10^{-3} deg
3	4	I4	East longitude (i.e. 0-360° from Greenwich to east) of data set record 1.	10^{-3} deg
4	4	I4	Subsatellite Track Heading at data set record 1.	
5	4	I4	USO offset frequency with respect to 5 MHz	10^{-3} Hz
6-23	36	I2	Identifier of external tables. Details as follows:	
6	2	I2	Global Threshold Parameter Table ID	
7	2	I2	Static Params Parameter Table ID	
8	2	I2	Dynamic Params Parameter Table ID	
9	2	I2	$\tau_{REF}{}^{G}$ Parameter Table ID	
10	2	I2	$TAB_{\tau 1}$ Parameter Table ID	
11	2	I2	$TAB_{\tau 2}$ Parameter Table ID	
12	2	I2	Reserved	
13	2	I2	$\sigma_{S,REF}{}^{G}$ Parameter Table ID	
14	2	I2	TAB_{S} Parameter Table ID	
15	2	I2	Reserved	
16	2	I2	$A_{REF}{}^{G}$ Parameter Table ID	
17	2	I2	Reserved	
18	2	I2	TAB_{A2} Parameter Table ID	
19	2	I2	TAB_{LOC} Parameter Table ID	

20	2	I2	Spare	
21	2	I2	Pressure Table ID (table type 83, Forecast F18)	
22	2	I2	Pressure Table ID (table type 84, Forecast F24)	
23	2	I2	Pressure Table ID (table type 85, Forecast F30)	
24	2	I2	Pressure Table ID (table type 86, Forecast F36)	

Table B.9 - Data Set Record for URA

Field	Bytes	Type	Description	Units
1	4	I4	Data record number, starting with 1.	
2	24	A	UTC Time at middle of the source packet ($T_{H,LOC}$) in ASCII: ''dd-mmm-yyyy hh:mm:ss.ttt'' For example: ''30-JAN-1987 14:30:27.123''	
3	4	I4	Geodetic latitude. A negative value denotes South latitude, and a positive value denotes North latitude.	10^{-3} deg
4	4	I4	East longitude (i.e. 0-360° from Greenwich to east)	10^{-3} deg
5	2	I2	Average Wind Speed	10^{-2} m/s
6	2	I2	Standard Deviation of Wind Speed	10^{-4} m/s
7	2	I2	Average Significant Wave Height	10^{-2} m
8	2	I2	Standard Deviation of Significant Wave Height	10^{-4} m
9	4	I4	Average Altitude (Corrected)	10^{-2} m
10	4	I4	Standard Deviation of Altitude	10^{-4} m
11	2	I2	Number of blocks used for averaging	
12	1	B	Product Confidence Data bit 1 Summary PC factor 0: processing of all according to specification 1: at least one of the following bits is raised; result to be viewed with limitation. bit 2 Standard Deviation Wind Speed. The average value and the standard deviation are calculated for the N available blocks measurements (N given in field 11). 0: Standard Deviation Wind Speed within MMCC/EECF-supplied limits 1: Standard Deviation Wind Speed outside MMCC/EECF-supplied limits bit 3 Standard Deviation SWH Limit The average value and the standard deviation are calculated for the N available blocks measurements (N given in field 11). 0: Standard Deviation SWH within MMCC/EECF-supplied limits 1: Standard Deviation SWH outside MMCC/EECF-supplied limits	

			bit 4 Standard Deviation Altitude Limit The average value and the standard deviation are calculated for the N available blocks measurements (N given in field 11). 0: Standard Deviation Altitude within MMCC/EECF-supplied limits 1: Standard Deviation Altitude outside MMCC/EECF-supplied limits bit 5 Mean Peakiness Limit 0: Mean peakiness within MMCC/EECF supplied limits 1: Mean peakiness outside MMCC/EECF supplied limits bit 6 Frame Checksum Flag 0: Checksum correct 1: Checksum error detected, no action taken bit 7 HTL time content correction (on product localization) 0: correction performed 1: when the search from the 2 input parameters to the time constant does not succeed; correction not performed bit 8 Enough Measurements 0: when N ≥ 10, enough measurements to process data 1: when N < 10, not enough measurements to process data	
13	2	I2	Average Peakiness	10^{-2}
14	2	I2	Averaged sigma_0	10^{-2} dB
15	2	I2	Integrated electron density [24]	

[24] Integrated electron density: Units: number of electrons per squaremeter; Scaling: written value is $1000\log_{10}()$, so scaling is $10^{\text{writtenvalue}/1000}$

16	1	B	Open Loop Calibration Status: bit 1 Height Error Correction 0: from open loop calibration 1: default bit 2 Reserved bit 3 AGC output correction 0: from open loop calibration 1: default bit 4 Reserved bit 5 is 1 after a real arithmetic overflow or underflow during processing bit 6 is 1 after an integer arithmetic overflow during processing bit 7 is 1 after division by zero during processing	
17	1	B	Instrument Mode[25], i.e. byte 2 of packet ID in Primary Header (see Document R-1). bit 1 Blank data record bit 2 Test bit 3 Calibration (closed loop) bit 4 BITE bit 5 Acquisition on Ice bit 6 Acquisition on Ocean bit 7 Tracking on Ice bit 8 Tracking on Ocean	
18	1	B	Reserved (e.g. for ATSR PCD)	
19	4	I4	Altitude Correction, ionosphere	10^{-3} m
20	4	I4	Altitude Correction, wet troposphere	10^{-3} m
21	4	I4	Altitude Correction, dry troposphere	10^{-3} m
22	4	I4	Altitude Correction, calibration constant	10^{-3} m
23	4	I4	Smoothed Open Loop HTL calibration correction	10^{-3} m
24	4	I4	Smoothed Open Loop AGC calibration correction	10^{-3} dB

[25]Instrument mode: 0 = no, 1 = yes. Fields 5-15 of this record are only valid if bit 8 of Field 17 is set to '1'.

A N N E X C

Figure 2 - PCD flags for UWI relations with ambiguity removal[26]

Remark : the case bit 10 = 0, bit 11-12 = 3 and bit 13 = 0, with the given solution v* may occur in the following example. The ambiguity removal is attempted over 6 consecutive products with a displacement of 2 products. After the first 2 products with successful ambiguity removal the results are kept. In case of non-successful ambiguity removal on the next products, the old results (after ambiguity removal) are used, but the indicator of the method used is lost.

[26] Legend: M: Maximum Likelihood Distance of rank 1 solution; V: Estimated Windspeed; NB: Number of adjacent nodes; v_1 := Windspeed of rank 1 solution; v* = Windspeed solution chosen by ambiguity removal;