Customer	**:**	**ESRIN**	**Document Ref**	**:**	**IDEAS-SER-IPF-SPE-1413**
Contract No	**:**	**21525/08/I-OL**	**Issue Date**	**:**	**07 January 2014**
ESA Doc Ref	**:**	**PO-RS-MDA-GS-2009**	**Issue**	**:**	**3 / E**

TITLE: ENVISAT-1 PRODUCTS SPECIFICATIONS
VOLUME 5: PRODUCT STRUCTURES

Abstract : This document contains product general structures (MPH and SPH) description

Written by : M. Cardaci- IDEAS

Approval : A .Dehn - IDEAS

Accepted : Bojan Bojkov - ESA

Distribution :

Hard Copy File:
Filename: IDEAS-SER-IPF-SPE-1413_3 / E.doc

TABLE OF CONTENTS

INDEX OF TABLES

INDEX OF FIGURES

AMENDMENT POLICY

This document shall be amended by releasing a new edition of the document in its entirety. The Amendment Record Sheet below records the history and issue status of this document.

AMENDMENT RECORD SHEET

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
1	A	12/01/96	Issue 1	
1	B	16/02/96	SCR #16, CR #16 Issue 1, Revision B	
			Reason for Change:	
			Updated to reflect information in PO-TN-ESA-GS-0381 and to address	
			RIDs of Feb. 2/96 pertaining to the Level 0 structure.	
			MPH, SPH, DSD, and DSR structures modified.	
			Table added showing generalized Level 0 product structure.	
			RIDs Addressed:	
			ESA/0001: FEP header defined	
			ESA/0002: PF-Host time stamp clarified	
			ESA/0004: Processing PCD added	
			ESA/0006: AF PCD ADS and DSD added	
			ESA/0007: page A-3 updated	
			ESA/0008: page B-3 updated	
			ESA/0009: Table 8.1.1 modified	
			ESA/0011: TBD changed to Range/ Doppler	
			ESA/0013: FEP header defined	
			ESA/0014: Table 8.4.7.4-2 corrected	
			CSF/1: filename in MPH corrected	
			CSF/2: page A-3 updated	
			CSF/3: MPH PCD information updated	
			CSF/5: DSD added to Level 0 SPH	
			CSF/6: Section on AATSR updated and re-issued	

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
			CSF/8: AATSR_O Summary Sheet updated	
1	C	04/04/96	SCR #38, CR #38 Issue 1, Revision C	Products Review Meeting #1
			Reason for Change:	
			Updated Sections 1-6, 17 and Annex A to reflect changes discussed at the Products Review Meeting #1, March 5-8, 1996, as per action item “AI MDA 6 April 96” from PO-MN-ESA-00416, Pg. 35.	
2	A	20/05/96	SCR #71, CR #71 Issue 2	
			Separate volume created.	
			Minor updates added.	
2	B	02/09/96	SCR #102, CR #102 Issue 2, Revision B	Products Review Meeting #2
			Reason for Change:	
			New ASCII format for MPH and DSD.	
			Minor updates added.	
3	A	10/02/97	SCR #133, CR #133 Issue 3	ESA RIDs
			Reason for Change:	
			Updated due to ESA RIDs received 06/01/97 (fax DPD/JMJ/ENV, 0021/ 97).	
3	B	19/06/97	SCR #169, CR #169 Issue 3, Revision B	Products Review Meeting #3
			Reason for Change:	
			Attachment flag strategy explained in greater detail.	
			Minor clarifications added.	
			Physical Medium section removed, as information was not useful. Section	
			may be re-inserted when physical medium strategy becomes better defined.	
3	C	16/10/98	SCR #218, CR #218 Issue 3, Revision C	
			Reason for Change:	
			Updated for the following SPRs:	
			SPR-42000-0190-CSF to	
			SPR-42000-0192-CSF	

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
3	D	23/11/2007	OSV definition update for MPH of L0, L1 and L2 products. Note: OSV in MPH of ADF is only made of “0” entries, equivalent to not used.	
3	E	07/01/2014	Update of Stations list to include DSI Update of interpretation of product counter in case of reprocessing campaigns	JCCB-CP-323 - UPDATE OF ENVISAT PRODUCT SPECIFICATIONS for DSI

REGISTER OF CHANGES

Section	Change
Table 5.2.2-1	Added reference to “note 8” in field 1 (reference in the table and text after the table.
Table 5.2.2-1	Added “DSI” centre in field 5
All	Porting of template

This page has been left intentionally blank

5. PRODUCT STRUCTURES

This section outlines the basic structures used to form the products, and the physical media characteristics upon which products are stored.

5.1 GENERALIZED PRODUCT STRUCTURE

ENVISAT products will all follow a generalized structure consisting of:

1. the Main Product Header (MPH);
2. a Specific Product Header (SPH) containing information specific to the whole product plus one or more Data Set Descriptors (DSDs) which describe individual Data Sets;
3. One or more Data Sets (DSs), each consisting of one or more Data Set Records (DSRs).

This structure was previously introduced in Volume 3. A diagram of the ENVISAT Product structure is shown in Figure 5.1-2.

5.1.1 ASCII and Binary Structures

The following convention has been defined for ENVISAT products:

- MPH and SPH (including DSDs) headers are produced in ASCII format using a keyword-value-terminator approach. The purpose of this method is to create header structures that are self-documenting, understandable, and easily readable by the user. The details of the method are described further below.
- Data Sets which follow the MPH and SPH are in mixed ascii-binary format. The purpose of using this format is to reduce the size of the detailed data contained in the data sets. Note that ASCII strings may occur in the Data Sets, but they are not surrounded by quotation marks as in the MPH and SPH structures.

5.1.1.1 ASCII Header Conventions

The MPH and SPH of ENVISAT products follow the following conventions:

1. Headers use only ASCII characters. For a full list of allowable ASCII characters refer to ANNEX A.
2. They are fixed size structures (i.e. the SPH may vary across products, but within each product it is a fixed number of bytes long).
3. Each entry in the MPH and SPH will follow a keyword-value<units>-terminator structure.

4. KEYWORDS: Keywords are limited to the set of ASCII characters which include the capital english alphabet [A...Z], and the numbers [0...9]. The only other characters allowed in a keyword is the underscore (_), and the equal sign (=). A keyword is a single word, or several words connected by underscore characters, followed by an equal sign.

5. VALUES: All values are expressed in ASCII format and follow immediately after the equal sign in the keyword (i.e. no white space in between keyword and value). Values may be of two classes: numeric-values, or string-values. Numeric-values are those which would normally be expressed as an integer or floating point value. The conversion of these values into a fixed size ASCII representation is described in ANNEX A. String-values are those values which would normally be expressed in ASCII characters regardless of their location in the product. String values fall into two types: single character entries, and multi-character entries. Multi-character entries must be placed within double quotes (“ ”) in the MPH or SPH. The string within these quotes may use any of the allowable ASCII character set. Single value characters do not require quotation marks, but are limited to the characters [A..Z], [a..z] and [0..9].

6. UNITS: The use of units is required for numeric-values unless the value has no units or the unit type is inherently obvious. For numeric-values which do not require units and string-values, the value is followed directly by the terminator character and no units entry is included. When units are deemed necessary, they are placed within angled braces (< >) directly following the last character of the value to which the units apply. No white space is left between the value and the first angled brace, nor is any white space left between the first angled brace and the first character of the units expression. Finally, no white space is left between the last character of the units expression and the closing angled brace. Within the braces, the units expression may use any allowable ASCII characters and be of any length.

7. TERMINATOR: The terminator character is placed directly after the closing angled brace of the units for entries which have units, or directly after the last character in the value for entries which do not have units attached to them. The terminator value for ENVISAT products is the ASCII newline character (character code 10 in Table A.2.1-1). The use of this terminator allows the MPH/SPH structure to be displayed in an easily readable format (one entry per line) on most UNIX text editors[1].

8. All ASCII string entries are left-justified within the quotation marks. Therefore, if the string is shorter than the number of characters allocated for it, blank-space ASCII characters are placed after the last character in the string, but before the closing quotation mark.

[1] Note: The use of a single newline character to terminate an ASCII line is a UNIX convention. Some DOS and Apple text editors use both a carriage return and a newline character to terminate a line (ASCII codes 13 and 10 respectively). If such an editor is used to read this header, the header will appear as a continuous line of text which will have to be parsed by the user.

Note that in the data definitions in this document, the notation Ø is used to indicate the inclusion of an ASCII blank-space character (ASCII character 32).

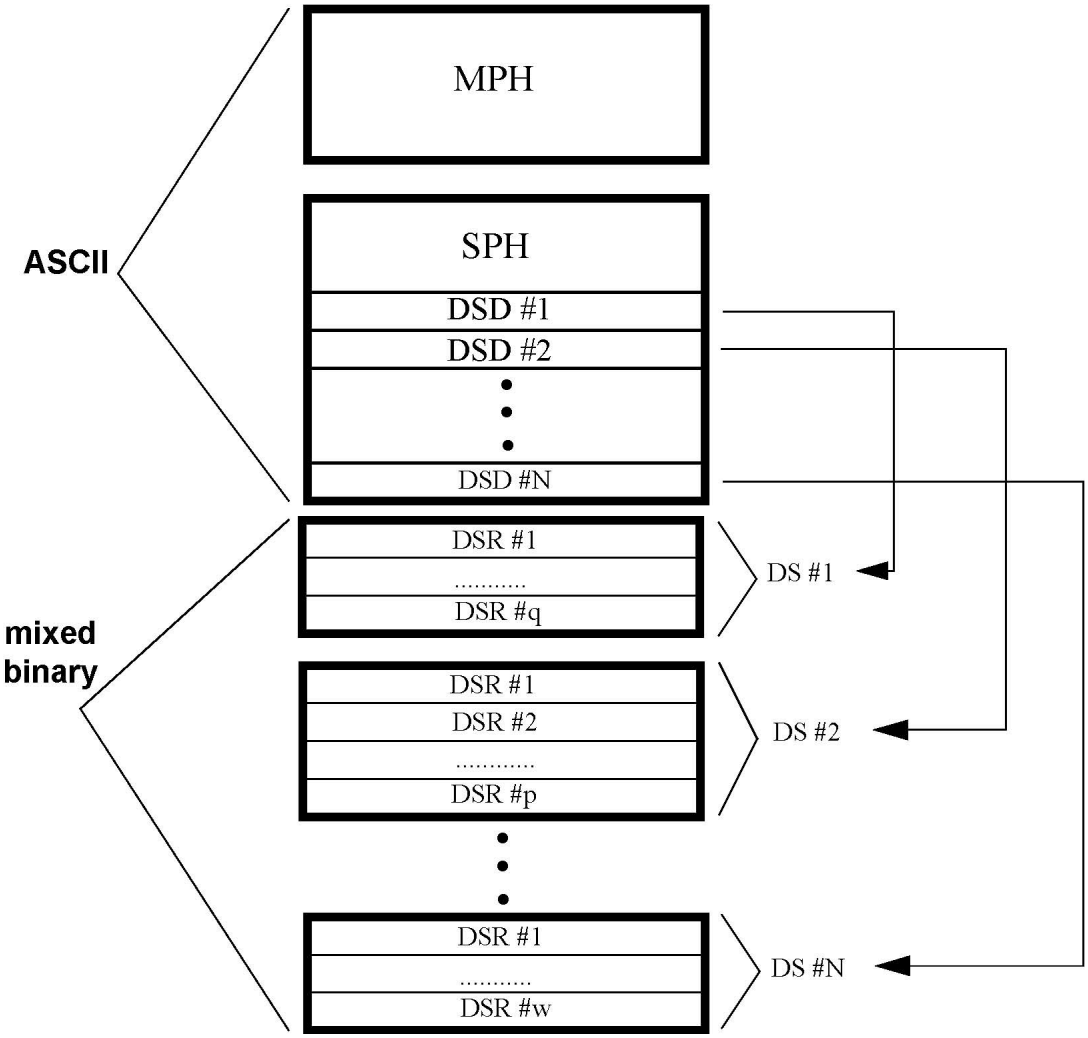

Figure 5.1-1 Generalized Product Structure

5.2 MAIN PRODUCT HEADER

5.2.1 Contents

The Main Product Header (MPH) identifies the product and its main characteristics. The Main Product Header is an ASCII structure containing information needed for all ENVISAT sensors. It is of fixed length and format for all products. The MPH contains the following major types of information:

5.2.1.1 Product Identification Information

This information includes the file name of the product (which describes most of the essential features of the product, such as instrument, mode, and processing level), the consolidation level of the product, and the document ID number of the documentation describing this product.

5.2.1.2 Information Regarding Data Acquisition and Processing

This information identifies where the product was acquired, where it was processed, when it was processed, and what hardware/software performed the processing.

5.2.1.3 Information on Time of Data

Included in these fields are the UTC start and stop time of data sensing.

5.2.1.4 Information on ENVISAT Orbit and Position

These fields contain orbit positioning data which allow one to determine the exact position of the satellite at the time of sensing.

5.2.1.5 SBT to UTC Conversion Information

This data allows for precise conversion from Satellite Binary Time (as stored in Instrument Source Packets) to the conventional UTC time system.

5.2.1.6 Product Confidence Data

Product Confidence Data in the MPH is designed to very simply provide the user with an assessment of the overall product quality by reporting if errors have

occurred during the processing. To obtain a detailed description of the errors which occurred the user refers to the SPH or the detailed PCD structures of the product.

5.2.1.7 Product Size Information

These fields identify the size of various structures within the product so that they may be accurately interpreted.

5.2.2 Format

All entries are left justified unless otherwise stated (i.e., any spare characters within an entry are included at the end of the entry). If blank characters are included at the end of a multi-character string, the blanks are written before the closing quotation mark, not after. The fields of the MPH are presented below.

Table 5.2.2-1 Main Product Header

Fld.	Contents	Units	Byte length	Data Type
	Product Identification Information			
1	**PRODUCT=**	keyword	8	8*uc
	quotation mark (“)		1	uc
	Product File name (Note 1) The following fields describe the product naming convention for products. For Auxiliary data files these fields will be different.		62	
	10 character Product ID (including underscoring)	-	10	10*uc
	Processing stage flag (see field 2 below)	-	1	uc
	Originator ID	-	3	3*uc
	start_day (YYYYMMDD UTC of first MDSR, or file creation date for auxiliary files)	-	8	8*uc
	underscore character	-	1	uc
	start_time (HHMMSS UTC of first MDSR, or file creation time for auxiliary files)	-	6	6*uc
	underscore character	-	1	uc
	duration (seconds of product coverage, or 00000000 if not relevant)	sec.	8	8*uc
	phase identifier	-	1	uc
	cycle number within the phase	-	3	3*uc

Table 5.2.2-1 Main Product Header

Fld.	Contents	Units	Byte length	Data Type
	underscore character	-	1	uc
	relative orbit # within the cycle (at start of product)	-	5	5*uc
	underscore character	-	1	uc
	absolute orbit # (at start of product)	-	5	5*uc
	underscore character	-	1	uc
	product type file counter (0000 to 9999, then wraps to 0000) (see note 8)	-	4	4*uc
	period	-	1	uc
	satellite ID (ENVISAT-1=N1, E1 = ERS1, E2 =ERS2)	-	2	2*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
2	**PROC_STAGE=**	keyword	11	11*uc
	Processing Stage Flag N = Near Real Time, T = test product, V= fully validated (fully consolidated) product, S = special product. Letters between N and V (with the exception of T and S) indicate steps in the consolidation process, with letters closer to V meaning higher levels of consolidation. If not used, set to X.	-	1	uc
	newline character	terminator	1	uc
3	**REF_DOC=**	keyword	8	8*uc
	quotation mark (“)	-	1	uc
	Reference Document Describing Product (Note 2) AA-BB-CCC-DD-EEEE_V/IØØ (23 characters, including blank space characters) where AA-BB-CCC-DD-EEEE is the ESA standard document no. and V/I is the Version / Issue If not used, set to ØØØØØØØØØØØØØØØØØØØØØØØ	-	23	23*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
4	**Spare (blank characters (Ø))**	-	40	40*uc
	newline character	terminator	1	uc
	Information with regard to Data Acquisition and Processing			
5	**ACQUISITION_STATION=**	keyword	20	20*uc
	quotation mark (“)	-	1	uc

Table 5.2.2-1 Main Product Header

Fld.	Contents	Units	Byte length	Data Type
	Acquisition Station ID (up to 3 codes from:) Center Code PDHS-K = PDHS-K PDHS-E = PDHS-E LRAC = LRAC PDCC = PDCC FOS-ESOC = FOS-ES PDAS-Fucino = PDAS-F UK-PAC = UK-PAC D-PAC = D-PAC I-PAC = I-PAC F-PAC = F-PAC S-PAC = S-PAC E-PAC = E-PAC ECMWF = ECMWF DSI = DSI others TBD. All codes TBC by ESA multiple entries are separated by commas. e.g. PDHS-K,D-PAC,LRACØØØ. String is left justified with blank space characters used for unused characters.	-	20	20*uc
	If not used, set to ØØØØØØØØØØØØØØØØØØØØ.			
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
6	**PROC_CENTER=**	keyword	12	12*uc
	quotation mark (“)	-	1	uc
	Processing Center ID which generated current product (Note 3) (1 site code according to list in Field 5 above, left justified). If not used, set to ØØØØØØ	-	6	6*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
7	**PROC_TIME=**	keyword	10	10*uc
	quotation mark (“)	-	1	uc
	UTC Time of Processing (product generation time) UTC Time format. If not used, set to ØØØØØØØØØØØØØØØØØØØØØØØØØØØØ.	UTC	27	27*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
8	**SOFTWARE_VER=**	keyword	13	13*uc
	quotation mark (“)	-	1	uc

Table 5.2.2-1 Main Product Header

Fld.	Contents	Units	Byte length	Data Type
	Software Version number of processing software Format: Name of processor (up to 10 characters)/ version number (4 characters) -- left justified (any blanks added at end). If not used, set to ØØØØØØØØØØØØØØ. e.g. MIPAS/2.31ØØØØ	-	14	14*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
9	**Spare (blank characters (Ø))**	-	40	40*uc
	newline character	terminator	1	uc
	Information on Time of Data			
10	**SENSING_START=**	keyword	14	14*uc
	quotation mark (“)	-	1	uc
	UTC start time of data sensing (Note 4) (first measurement in first data record) UTC Time format. If not used, set to ØØØØØØØØØØØØØØØØØØØØØØØØØØØØ.	UTC	27	27*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
11	**SENSING_STOP=**	keyword	13	13*uc
	quotation mark (“)	-	1	uc
	UTC stop time of data sensing (Note 4) (last measurements last data record) UTC Time format. If not used, set to ØØØØØØØØØØØØØØØØØØØØØØØØØØØØ.	UTC	27	27*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
12	**Spare (blank characters (Ø))**	-	40	40*uc
	newline character	terminator	1	uc
	Information on Envisat Orbit and Position			
13	**PHASE=**	keyword	6	6*uc
	Phase phase letter. If not used, set to X.	-	1	uc
	newline character	terminator	1	uc
14	**CYCLE=**	keyword	6	6*uc
	Cycle Cycle number. If not used, set to +000.	-	4	Ac

Table 5.2.2-1 Main Product Header				
Fld.	**Contents**	**Units**	**Byte length**	**Data Type**
	newline character	terminator	1	uc
15	**REL_ORBIT=**	keyword	10	10*uc
	Start relative orbit number (Note 5). If not used, set to +00000	-	6	As
	newline character	terminator	1	uc
16	**ABS_ORBIT=**	keyword	10	10*uc
	Start absolute orbit number (Note 5). If not used, set to +00000.	-	6	As
	newline character	terminator	1	uc
17	**STATE_VECTOR_TIME=**	keyword	18	18*uc
	quotation mark (“)	-	1	uc
	UTC of ENVISAT state vector (see Note 6) UTC time format. If not used, set to ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ.	UTC	27	27*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
18	**DELTA_UT1=**	keyword	10	10*uc
	DUT1=UT1-UTC (see Note 6). If not used, set to +.000000.	s	8	Ado06
	<s>	units	3	3*uc
	newline character	terminator	1	uc
19	**X_POSITION=**	keyword	11	11*uc
	X Position in Earth-Fixed reference (see Note 6). If not used, set to +0000000.000.	m	12	Ado73
	<m>	units	3	3*uc
	newline character	terminator	1	uc
20	**Y_POSITION=**	keyword	11	11*uc
	Y Position in Earth-Fixed reference (see Note 6). If not used, set to +0000000.000.	m	12	Ado73
	<m>	units	3	3*uc
	newline character	terminator	1	uc
21	**Z_POSITION=**	keyword	11	11*uc

Table 5.2.2-1 Main Product Header				
Fld.	**Contents**	**Units**	**Byte length**	**Data Type**
	Z Position in Earth-Fixed reference (see Note 6). If not used, set to +0000000.000.	m	12	Ado73
	<m>	units	3	3*uc
	newline character	terminator	1	uc
22	**X_VELOCITY=**	keyword	11	11*uc
	X velocity in Earth fixed reference (see Note 6). If not used, set to +0000.000000.	m/s	12	Ado46
	<m/s>	units	5	5*uc
	newline character	terminator	1	uc
23	**Y_VELOCITY=**	keyword	11	11*uc
	Y velocity in Earth fixed reference (see Note 6). If not used, set to +0000.000000.	m/s	12	Ado46
	<m/s>	units	5	5*uc
	newline character	terminator	1	uc
24	**Z_VELOCITY=**	keyword	11	11*uc
	Z velocity in Earth fixed reference (see Note 6). If not used, set to +0000.000000.	m/s	12	Ado46
	<m/s>	units	5	5*uc
	newline character	terminator	1	uc
25	**VECTOR_SOURCE=**	keyword	14	14*uc
	quotation mark (“)	-	1	uc
	Source of Orbit Vectors (see Note 6) FP = FOS predicted orbit state vectors (NRT processing) DN = DORIS Level 0 navigator product acquired at PDHS (NRT) FR = FOS restituted orbit state vectors DI = DORIS initial (preliminary) orbit DP = DORIS precise orbit If not used, set to ØØ.	-	2	2*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
26	**Spare (blank characters (Ø))**	-	40	40*uc
	newline character	terminator	1	uc
	SBT to UTC Conversion Information			
27	**UTC_SBT_TIME=**	keyword	13	13*uc

Table 5.2.2-1 Main Product Header				
Fld.	**Contents**	**Units**	**Byte length**	**Data Type**
	quotation mark (“)	-	1	uc
	UTC time corresponding to SBT below (currently defined to be given at the time of the ascending node state vector). If not used, set to ØØØØØØØØØØØØØØØØØØØØØØØØØØØØ.	UTC	27	27*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
28	**SAT_BINARY_TIME=**	keyword	16	16*uc
	Satellite Binary Time (SBT) 32bit integer time of satellite clock. If not used, set to +0000000000. (This value is unsigned, i.e., to be interpreted ≥0)	-	11	Al
	newline character	terminator	1	uc
29	**CLOCK_STEP=**	keyword	11	11*uc
	Clock Step Size clock step in picoseconds. If not used, set to +0000000000. (This value is unsigned, i.e., to be interpreted ≥0)	psec.	11	Al
	<ps>	units	4	4*uc
	newline character	terminator	1	uc
30	**Spare (blank characters (Ø))**	-	32	32*uc
	newline character	terminator	1	uc
	Leap Second Informationa			
31	**LEAP_UTC=**	keyword	9	9*uc
	quotation mark (“)	-	1	uc
	UTC time of the occurrence of the Leap Second Set to ØØØØØØØØØØØØØØØØØØØØØØØØØØØØ if not used.	UTC	27	27*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
32	**LEAP_SIGN=**	keyword	10	10*uc
	Leap second sign (+001 if positive Leap Second, -001 if negative) Set to +000 if not used.	s	4	Ac
	newline character	terminator	1	uc
33	**LEAP_ERR=**	keyword	9	9*uc

Table 5.2.2-1 Main Product Header				
Fld.	**Contents**	**Units**	**Byte length**	**Data Type**
	Leap second error if leap second occurs within processing segment = 1, otherwise = 0 If not used, set to 0. (see Note 7)	-	1	uc
	newline character	terminator	1	uc
34	**Spare (blank characters (Ø))**	-	40	40*uc
	newline character	terminator	1	uc
	Product Confidence Data Information			
35	**PRODUCT_ERR=**	keyword	12	12*uc
	1 or 0. If 1, errors have been reported in the product. User should then refer to the SPH or Summary Quality ADS of the product for details of the error condition. If not used, set to 0.		1	uc
	newline character	terminator	1	uc
	Product Size Information			
36	**TOT_SIZE=**	keyword	9	9*uc
	Total Size Of Product (# bytes DSR + SPH+ MPH)	bytes	21	Ad
	<bytes>	units	7	7*uc
	newline character	terminator	1	uc
37	**SPH_SIZE=**	keyword	9	9*uc
	Length Of SPH (# bytes in SPH)	bytes	11	Al
	<bytes>	units	7	7*uc
	newline character	terminator	1	uc
38	**NUM_DSD=**	keyword	8	8*uc
	Number of DSDs This number includes the Spare DSDs and all other types of DSDs.	-	11	Al
	newline character	terminator	1	uc
39	**DSD_SIZE=**	keyword	9	9*uc
	Length of Each DSD (# bytes for each DSD, all DSDs shall have the same length)	-	11	Al
	<bytes>	units	7	7*uc
	newline character	terminator	1	uc

Table 5.2.2-1 Main Product Header				
Fld.	**Contents**	**Units**	**Byte length**	**Data Type**
40	**NUM_DATA_SETS=**	keyword	14	14*uc
	Number of DSs attached (not all DSDs have a DS attached)	-	11	Al
	newline character	terminator	1	uc
41	**Spare (blank characters (Ø))**	-	40	40*uc
	newline character	terminator	1	uc
TOTAL		-	**1247**	

a. If a leap error occurs in the product, the product is not in true UTC time (no leap correction is applied).

MPH Notes:

1. The product identifier is a unique string which may be used as a file name when storing a product. The format is presented in detail in the section on product identification scheme in Annex A. The duration of a product is frequently not an integer number of seconds. When it is not, the duration field of the product file name shall be reported as the nearest whole integer (e.g. 4.6 seconds duration is reported as 00000005 in the product file name. For Auxiliary Data files, the filename will follow the format described in Volume 16.
2. The reference document describing the product must be updated with any change in the processor software. If the reference document is the Products Specifications PO-RS-MDA-GS-2009, the version and the revision have to refer to the Volume 1 of the document, where the status (version and revision) of all volumes of the document can be found.
3. Since a product can be generated in a different center than the receiving station, it is necessary to have this field to identify the Production Center ID.
4. This is the start time and stop time in UTC format when the data sensing occurred on board the satellite, as calculated from the Satellite Binary Time counter for the first and last MDSR in the Level 0 product.
5. The satellite orbit number is specified in two ways: absolute number and relative to a specific orbit cycle. The orbit numbers given are those current at the Sensing Start Time of the product .
6. The Orbit State Vector (OSV) corresponds to the Ascending Node crossing of the orbit that includes the sensing start of the product to be processed (either L0 or L1, to generate the higher level product L1 or L2), when the OSV is generated from the DORIS Navigator Level 0 product (DOR_NAV_OP), or from the FOS Predicted Orbit (AUX_FPO_AX). The

OSV is the closest after the start time of the product to be processed (either L0 o L1, to generate the higher level product L1 or L2), when the OSV is generated from the DORIS preliminary product (DOR_POR_2P), DORIS precision product (DOR_VOR_2P), or from the FOS Restituted Orbit (AUX_FRO_AX).

7. The processing segment is defined by the segment start and stop times. In stripline processing, the strips processed represent a subset of the segment data. As a result, the product coming from a strip may have the LEAP_ERR set to 1 with the LEAP_UTC after SENSING_STOP or before SENSING_START.
8. In the case of Reprocessing Campaigns, the 4 digits of the file counter could optionally be set to the same value (as an example: “0000”). The file counter will in this case only differentiate (i.e. be incremented) in case of real processing duplicates.

An example of an MPH is shown in Figure 5.2.2-1 (values used are for illustrative purposes only and may not correspond exactly to the proper product values).

```
PRODUCT="MIP_NL__0PVD-P19990210_133254_00006040A031_00067_15598_0324.N1"
PROC_STAGE=V
REF_DOC="PO-TN-ESA-GS-0000_3/B "

ACQUISITION_STATION="PHDS-K,DPAC,LRAC "
PROC_CENTER="DPAC "
PROC_TIME="11-JAN-2000 09:56:14.000000"
SOFTWARE_VER="MIPAS/1.21 "

SENSING_START="10-FEB-1999 13:32:54.000000"
SENSING_STOP="10-FEB-1999 15:12:54.000100"

PHASE=A
CYCLE=+031
REL_ORBIT=+00067
ABS_ORBIT=+15598
STATE_VECTOR_TIME="10-FEB-1999 13:32:54.000000"
DELTA_UT1=+.123456<s>
X_POSITION =+0082343.324<m>
Y_POSITION =+0000340.223<m>
Z_POSITION =+0034345.664<m>
X_VELOCITY =+0045.433223<m/s>
Y_VELOCITY=+0345.056564<m/s>
Z_VELOCITY=+0000.003432<m/s>
VECTOR_SOURCE="DP"

UTC_SBT_TIME="10-FEB-1999 13:32:54.000000"
SAT_BINARY_TIME=+1643678245
CLOCK_STEP=+1345466557<ps>

LEAP_UTC=" "
LEAP_SIGN=+000
LEAP_ERR=0

PRODUCT ERR=0
TOT_SIZE=+00000000000083426100<bytes>
SPH_SIZE=+0000001200<bytes>
NUM_DSDS=+0000000005
DSD_SIZE=+0000000280<bytes>
NUM_DATA_SETS=+0000000003
```

Figure 5.2.2-1 Example MPH

5.3 SPECIFIC PRODUCT HEADER

5.3.1 Contents

The Specific Product Header is included with every product. It contains information specific to the product itself. This information may include PCD information applying to the whole product, and/or relevant processing parameters. At a minimum, each SPH will include an SPH descriptor, and at least one DSD.

5.3.2 Format

The SPH will follow an ASCII keyword-value<units>-terminator format identical to that of the MPH. The detailed SPH structure and contents are given in the sections where each specific product is described.

5.4 DATA SET DESCRIPTORS

The Data Set Descriptor (DSD) are used to describe an attached Data Set or to provide references to external files relevant to the current product (e.g., auxiliary data used in processing but not included with the product). There must be one DSD per Data Set or per reference to an external file. The DS may be a Measurement Data Set (MDS), an Annotation Data Set (ADS) or a Global Annotation Data Set (GADS).

5.4.1 Contents

All DSDs have the same format. The Data Set Descriptor is contained within the SPH as shown in Figure 5.1-2. As such, the DSD is also in ASCII format. The DSD contains information specific to a given Data Set within the product. The general contents of a DSD are shown in Table 5.4.2-1.

5.4.2 Format

The structure of the DSDs will be the same for all products and all instruments. The ASCII format conventions are the same as those used for the MPH and SPH. This structure is referred to as “dsd” throughout this document. The general format is shown in Table 5.4.2-1.

Table 5.4.2-1 General DSD Format

Field #	Description	Units	Byte length	Data Type
1	**DS_NAME=**	keyword	8	8*uc
	quotation mark (“)	-	1	uc
	Data Set Name Name describing the data set. Characters not used are blanked.	-	28	28*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
2	**DS_TYPE=**[a]	keyword	8	8*uc
	DS Type = M if a Measurement DS is attached. = A if an Annotation DS is attached = G if a Global ADS is attached = R if no DS is attached (reference DSD only)	-	1	uc
	newline character	terminator	1	uc
3	**FILENAME=**	keyword	9	9*uc
	quotation mark (“)	-	1	uc
	External Product Reference If the DS Attachment flag was set to R this field contains the name of the referenced product using the standard naming convention (as defined in ANNEX A or Volume 16 for auxiliary data) of the MPH. If the DS Attachment Flag was set to A, M, or G, this field may contain the name of the file from which the Data Set was copied, or it may be blank (set to ascii blank space characters). For a product which was supposed to contain a data set or reference to one, but the file was unavailable, the first 7 characters of this field may be set to MISSING and the rest blanked. If space for a DSD has been set aside in the SPH, but the DSD is not used in the current product, this field may be set to NOT USED.	-	62	62*uc
	quotation mark (“)	-	1	uc
	newline character	terminator	1	uc
4	**DS_OFFSET=**	keyword	10	10*uc
	DS Offset in bytes Gives the position of the first byte of the corresponding DS with respect to the whole product. Set to 0 if no DS is attached.	bytes	21	Ad
	<bytes>	units	7	7*uc
	newline character	terminator	1	uc
5	**DS_SIZE=**	keyword	8	8*uc
	Total Size of DS in bytes Length in bytes of the Data Set. Set to zero if no DS is attached.	bytes	21	Ad

Table 5.4.2-1 General DSD Format				
Field #	**Description**	**Units**	**Byte length**	**Data Type**
	<bytes>	units	7	7*uc
	newline character	terminator	1	uc
6	**NUM_DSR=**	keyword	8	8*uc
	Number of DSRs within the DS Number of Data Set Records within the DS, set to zero if no DS is attached.	-	11	Al
	newline character	terminator	1	uc
7	**DSR_SIZE=**	keyword	9	9*uc
	Length of the DSRs in bytes Length of each DSR if DSR length is constant within the Data Set. 0 = no DSRs attached (i.e. no DS attached) -1 = DSR length is variable.	bytes	11	Al
	<bytes>	units	7	7*uc
	newline character	terminator	1	uc
8	**Spare (blanks)**	ascii	32	32*uc
	newline character	terminator	1	uc
	TOTAL		280	

a. The “DSD Type” flag has been combined with the “DSD Attachment” flag by allowing more possible letters.

5.4.3 Example DSDs

All DSDs must be the same size. In order to clarify the use of DSDs within the product structure, the 5 possible DSD contents are shown explicitly below. All DSDs should fall into one of the following categories. Note that the symbol Ø is used to denote the ASCII blank space character (ASCII character 32). Values given in the following examples are for illustrative purposes only and may not correspond to the true values.

5.4.3.1 DSD Pointing to a Data Set

If the DSD points to a Data Set actually contained within the current product, the contents of the DSD will follow the example given below. The example given below assumes that the ASAR SR/GR ADS is being described,

however the same format would be used for any other ADS, MDS or GADS.

DS_NAME=“SR/GRØADSØØØØØØØØØØØØØØØØØØØ”
DS_TYPE=A
FILENAME=“ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØØ
ØØØØØØØØØØØØØØØØØØØØØØØØØ”
DS_OFFSET=+00000000000000012345<bytes>
DS_SIZE=+00000000000000006788<bytes>
NUM_DSR=+0000000002
DSR_SIZE=+0000003394<bytes>
ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ

5.4.3.2 DSD Referencing a File

If the DSD is referencing a file external to the current product, the contents of the DSD will follow the example given below. The example below assumes that the ASAR Processor Configuration file is being referenced; however, the same format would be used with any other file.

DS_NAME=“ASARØProcessorØConfig.ØFileØ”
DS_TYPE=R
FILENAME=“ASA_CON_AXVPDK19990324_150411_19990325_123000
_200
01231_101413Ø”
DS_OFFSET=+00000000000000000000<bytes>
DS_SIZE=+00000000000000000000<bytes>
NUM_DSR=+0000000000
DSR_SIZE=+0000000000<bytes>
ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ

5.4.3.3 DSD Not Used

In some cases, space may be allocated to a DSD in an SPH, but the DSD is not used during normal processing of the current product either due to the nature of the product or due to operator selected options during product processing. For example, room may be allocated for an ADS, but the ADS is not included normally in the current product. In such cases, the DS_NAME and DS_TYPE fields are filled as they normally would be, but the FILENAME entry is set to NOT USED as shown in the example below. The remaining fields are set to values of zero.

The example below is for the ASAR SR/GR ADS and assumes that we are describing an ASAR Single Look Complex product. This ADS is not included in the ASAR SLC products, however, space for it is included in the

ASAR Image Products SPH. Therefore, this is a good example of a DSD which is not used for a certain product. In this case, the DSD would have the following format:

DS_NAME="SR/GRØADSØØØØØØØØØØØØØØØØØØØ"
DS_TYPE=A
FILENAME="NOTØUSEDØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ"
DS_OFFSET=+00000000000000000000<bytes>
DS_SIZE=+00000000000000000000<bytes>
NUM_DSR=+0000000000
DSR_SIZE=+0000000000<bytes>
ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ

5.4.3.4 Spare DSD

A spare DSD is simply 279 blank space characters (Ø) followed by a newline character. This structure is referred to as "dsd_sp" throughout this document

5.4.3.5 DSD for a Missing Data Set or File

If a Data Set was *supposed* to be included in the product or an external file was *supposed* to be referenced, but for some reason was not, the DSD indicates this by setting the FILENAME field to MISSING. Note that this is different from the NOT USED DSD. The MISSING DSD indicates that something unexpected has happened, and a reference or Data Set that was supposed to be included has not been.
In contrast, the NOT USED DSD indicates that a file or Data Set is simply not used for this product - nothing unexpected has happened.

Note that for most products, if an auxiliary file could not be read or a Data Set produced then the entire product will not be produced. Thus the MISSING DSD will only be used in special situations which warrant its use.
The example below assumes the ASAR Chirp Parameter ADS was supposed to be in the product, but was not produced for some reason. The following DSD would thus be produced:

DS_NAME="CHIRPØPARAMSØADSØØØØØØØØØØØØ"
DS_TYPE=A
FILENAME="MISSINGØØØØØØØØØØØØØØØØØØØØØØØØØØØØ
ØØ
ØØØØØØØØØØØØØØØØØØØØØØØØØØ"
DS_OFFSET=+00000000000000000000<bytes>

DS_SIZE=+0000000000000000000<bytes>
NUM_DSR=+0000000000
DSR_SIZE=+0000000000<bytes>
ØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØØ

5.5 THE DATA SET

5.5.1 Contents

The Data Set contains the actual data of interest. It is composed of Data Set Records (DSRs). The number of Data Sets within a product depends on the product type, and the size of Data Sets within a product may vary. Two types of Data Sets have been defined: Measurement Data Sets (MDS) consisting of MDSRs containing instrument/processed data, and Annotation Data Sets (ADS) which consist of ADSRs containing auxiliary data. In addition, ADSs may exist in two forms. The basic ADS contains time stamped ADSRs, which can be used to relate the information to the correspondingly time stamped MDSRs. Global Annotation Data Sets (GADS), however, contain information which pertains to the full product and thus each GADSR may not be time stamped.

5.5.2 Format

The Data Set is in a mixed-binary format. This may consist of integers, floats, characters (1-byte numbers), or ASCII values and ASCII strings. Note that for ASCII multi-character strings in the Data Sets, quotation marks are not used to enclose the string.
A Data Set is composed of Data Set Records (DSRs), as shown in Figure 5.1-2. For Level 1B and Level 2 products, the structure includes:

- the start time of the DSR in Modified Julian Date 2000 (MJD) format;
- the DSR length (optional: include if DSR size is variable within the Data Set);
- Quality Flag: for MDSRs, a signed character is used to indicate the MDSR quality. A value of -1 indicates the MDSR is a blank MDSR (used for Level 1B and Level 2 only);
- Attachment Flag: for ADSRs, a signed character flag may be included to indicate if corresponding MDSRs exist for the ADSR (1 = error, no corresponding MDSRs, 0 = no error). This flag is used to identify large gaps in the sequence of MDSRs.[2] In

[2] *To simplify processing, this flag is only used for geolocation ADSs (LADSs), and Summary Quality ADSs (SQADSs). In all other cases, it is always set to zero.*

LADSRs, this flag identifies empty granules. An example is provided in Figure 5.5.2-1. If an ADS corresponds to more than 1 MDS, the attachment flag is evaluated for each MDS in turn, then combined into 1 flag via a logical OR operation.

- for GADS, no time stamp or flag is required.
- the data itself.

For Level 0 data, the MDSRs contain Annotated Instrument Source Packets (AISPs) preceded by a time stamp (sensing time) in MJD 2000 format.

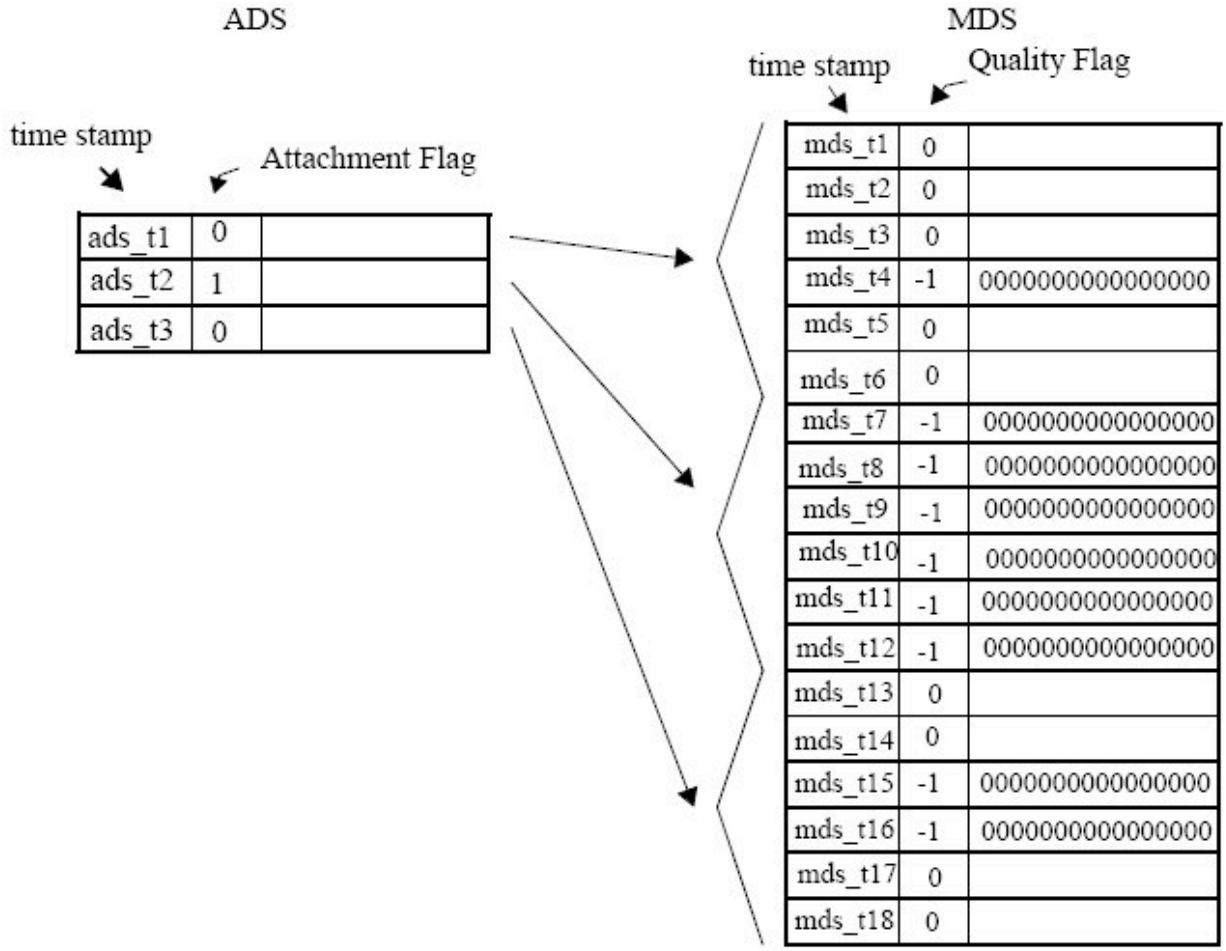

Figure 5.5.2-1 Example of Attachment Flag Usage

In this example, the ADSR with time stamp ads_t2 is valid for the MDSRs from mds_t7 to mds_t12. However, all these MDSRs have been zero filled due to missing data, as indicated by the fact that their Quality Flags are set to -1. Therefore the Attachment Flag for ads_t2 is set to 1. The Attachment Flag for the ADSRs with time stamps ads_t1 and ads_t3 are not set to 1 since only part of the data is missing. In this way, the Attachment Flag can be used to identify large gaps of missing measurement data.

DISTRIBUTION LIST

NAME	COPY	NAME	COPY
Henri Laur (ESA)	1		
Bojan Bojkov (ESA)	1		
Simon Jutz (ESA)	1		
Pascal Gilles (ESA)	1		

End of Document