EUMETSAT

HIRS Level 1 Product Format Specification

Doc.No. : EPS/MIS/SPE/97230
Issue : v7F
Date : 20 June 2013

EUMETSAT
Eumetsat-Allee1, D-64295 Darmstadt, Germany
Tel: +49 6151 807-7
Fax: +49 6151 807 555
http://www.eumetsat.int

Document Change Record

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
Issue 2 Revision 0	25/5/99		• First Issue
Issue 2 Draft B	23/07/99		• Addressed RIDs
Issue 3 Draft A	27/06/00	EUM.EPS.SYS.DCN.029	• Incorporate change in EPS Generic Product Specification, Issue 3
Issue 4 Draft A	15/11/00		LEO/C/TP • Add GTS product section • Simplified document layout
Issue 4 Draft B	01/06/01		LEO/C/TP • Simplified document contents further by removing information redundant with GPFS format requirements [AD-1] • Removed GTS section • Expanded occurrence section • Updated in accordance to changes to GPFS [AD-1] • Updated signature table
Issue 4 Draft C	28/05/01		LEO/C/TP Removed requirement in Level 1a SPHR section Updated all sections in line with GPFS changes Removed items redundant with GPFS
Issue 5 Rev 0	01/06/01		Issue for CGS PDR
Issue 5 Rev 1	13/06/01		Revised issue for CGS PDR • Updated signature table
Issue 6 Rev 0			• Removed ADRs. Moved ADR contents to relevant MDR.
Issue 6 Rev 1	28/04/02		• Added Ref.Doc. HIRS/4 ICD • Removed Instrument Status in SPHR • Removed GEADR, VEADR, VIADR in L1A and L1B

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
Issue 6 Rev 2	13/06/02	EUM.EPS.SYS.DCR.02.115	• Removed SPHR in L1A and L1B • Added explanatory text to sect. 3.3, 3.6.1.4 and 3.6.1.5 • Updated GEADR/VEADR usage to be compatible with [AD-1] specification. • See also DCR in Annex
Issue 6 Rev 3	13/11/02	EUM.EPS.SYS.DCR.02.169	• Section 3.5.1.1: Quality_Indicator bit string definitions updated- bits 4 – 0 no longer used • Section 3.5.1.7: bit string defintions for Instrument_Invalid_Analog_Word_Flag clarified • Updates made to Annex (see DCR for Annex) • Added MDR record subclass IDs to give unique GRHs as per GPFS • Added Section 6 - record format version control • Break DATA_ELEM compound into more homogeneous parts. Split DIGITAL_A_DATA_ELEMENT field into three components with postfixes _COUNT, _FLAF, _RAD for counts, flags and radiances.
	11/02/03	EUM.EPS.SYS.DCR.03.044	• Updated Annex • Updated Signature Table
Issue 6 Rev 4	12/03/04	EUM.EPS.SYS.DCR.04.015	• Added clarification text as Section 3.5.1.12 for calibration coefficients for non-Earth view scan lines. • Added clarification for cold target can to Section 3.5.1.6 • Added clarification of array ordering to Section 3.3.1. • Extended Table 3 QUALITY_INDICATOR with bit 24 definition • Clarified storing of 13-bit integers in the 16-bit DATA_ELEM_COUNT compound
Issue 6 Rev 5	14/04/05	EUM.SYS.DCR.05.0210	• Section 3.5.1.6 - Change scale factor for radiances from 4 to 7 • See also change table in Annex
v7A	18/07/08		Migrated into Hummingbird. Body contents copied into standard template. Editorial updates only, signature table updated.
v7B	08/09/08		• Added Appendix A with hyperlink referring to Annex. • Section 1.1: deleted reference to AD-3. Relevant information now in AD-1.

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
			• Editorial edits – typos, standardisation, use of auto referencing for document and section references.
v7C	30/01/09	ODT_DCR_14	• Section 3.5.1.5 DATA_ELEM_FLAG: Update to paragraph to remove confusing details.
v7D	22/02/11	ODT_DCR_155	• Added record subclass info.
		ODT_DCR_232	• Section 3.5.2.4: Clarification of INSTR_DATA field: - integer value is signed; - deleted misleading Table 8 which shows raw bit format, not Level 1. • Annex: Worksheet 'Compounds', field INSTR_DATA: Corrected Type from bitst(16) to integer2.
		ODT_DCR_239	• Annex: Worksheets MDR-1A & MDR-1B, field ANGULAR_RELATION: Added Description note on azimuth angle range.
v7E	18/10/11	Wait for OPS_ECPD_299 to be approved, then make DOCET	• Field CALIBRATION_QUALITY replaced by compound data type DATA_CALIBRATION. Annex: Updates to MDR-1A & MDR-1B, and new worksheet COMPOUNDS (see Annex for full details).
v7F	20/06/13	EPS_DOCET_228	Changed the specifications for the16-bit field 'CALIBRATION_QUALITY'(old section 3.5.1.13). Subdivided this into an 8-bit unsigned integer (u-byte) called 'NEDT_VALUE' and an 8-bit bit string (bitst(8)) called 'CALIBRATION_QUALITY'. New version of document created to maintain version continuity with previous document. Previous document 211305 given invalid document reference by DM tool.

Table of Contents

Table of Tables

1 INTRODUCTION

1.1 Purpose and Scope

This document is the High Resolution Infrared Radiation Sounder (HIRS/4) Level 1 Product Format Specification.

The generic product format specification used by this document is defined in the EPS Generic Product Format Specification [AD 1].

The structure and content of the products will be developed in the course of further EPS system design and nothing in this document (including the Annex) shall be taken as restricting this development of the product structures, the product or field sizes, or the time during processing at which content will be inserted into the structure of the product.

1.2 Structure of the Document

The document is organised in the following sections, including the introduction:

Section 1	Provides the scope of the document.
Section 2	Details the product formats for Level 1a and 1b products.
Sections 3-4	Describe the instrument and level-specific records for Level 1a and 1b products.
Section 5	details the occurrence rates of the various records within Level 1a or 1b product
Sections 6	Provides a history of version numbers for records defined within the document.
Appendix A	Provides links to detailed tables describing the record formats.

1.3 Applicable Documents

AD 1	EPS Generic Product Format Specification	EPS/GGS/SPE/96167
AD 2	EPS Ground Segment AVHRR/3 Level 1 Product Generation Specification	EPS/SYS/SPE/990007

1.4 Reference Documents

RD 1	HIRS/4 Instrument Interface Control Document	MO-IC-MMT-HI-0001

2 FORMAT OF HIRS LEVEL 1 PRODUCT OVERVIEW

The product format for both HIRS Level 1a and 1b products is based on the generic product format as described in [AD 1]. This document details the instrument- and level-specific additions required for HIRS Level 1 products.

2.1 Generic Record Header Fields

All generic record header fields of the instrument/level specific records defined in this document shall have an INSTRUMENT_GROUP value of HIRS [AD 1]. Level 1a Records.

2.2 Secondary Product Header Record

No SPHR record.

2.3 Global External Auxiliary Data Record

The global auxiliary datasets that are used by the Level 1a PGF (described in [AD 2]) but not written into the product are referenced by GEADRs, as specified in [AD 1].

2.3.1 Record Subclasses

The following subclasses of GEADR are present for the HIRS Level 1a product.

Subclass	*Description*	*Subclass ID*
HIRS_CAL	Calibration and configuration parameters	1
xxxx_BIT	Land/sea/coast database	2
xxxx_TOP	Topography database	3

Table 1: GEADR Level 1a subclasses

2.4 Global Internal Auxiliary Data Record

There are two subclasses of GIADR for the Level 1a Product. These are detailed in Appendix A of this document. They contain data from static but configurable data sets.

2.4.1 Record Subclasses

Record subclass determines the type of auxiliary data referenced.

Subclass	*Description*	*Subclass ID*
GIADR-TEMP	Temperature-radiance conversion factors	1
GIADR-ANALOG	Analogue telemetry conversion coefficients	2

Table 2: GIADR subclasses

GIADR-TEMP contains band correction factors used by the HIRS Level 1 processor to convert the internal warm target temperatures to radiances.

GIADR-ANALOG contains coefficients to convert analogue telemetry data to digital values. They are not used by the HIRS Level 1 processor.

Temperature-Radiance conversion constants in the GIADR are stored in ascending channel order (1, 2, 3, 4, etc.) unlike calibration terms in the MDR which are stored in the same ordering as the radiance array (1, 17, 2, 3, 13, etc.).

2.5 Variable External and Internal Auxiliary Data Records

There are no VEADR or VIADR records in the HIRS Level 1 products.

2.6 Measurement Data Record

The MDR contains the HIRS measurement data, the HIRS housekeeping telemetry data and Earth view pixel navigation and calibration data. In addition, it contains derived cloud coverage information and quality indicators. The MDR is detailed in the Annex to this document.

2.6.1 Record Subclasses

There is one subclass of MDR for the Level 1a product.

Subclass	*Description*	*Subclass ID*
MDR-1A	Level 1A MDR	1

Table 3: MDR Level 1a subclasses

2.6.2 MDR Fields

2.6.2.1 QUALITY_INDICATOR

Bit	*Meaning*
31	Do not use scan for dataset generation
30	Time sequence error detected with this scan (see below)
29	Data gap precedes this scan
28	No calibration (see below)
27	No earth location (see below)
26	First good time following a clock update
25	Instrument status changed with this scan
24	Line incomplete, pixels missing
23-0	Not used

Table 4: QUALITY_INDICATOR bit string definitions

2.6.2.2 SCAN_LINE_QUALITY

Bit	*Meaning*
	Time Problem Code (all bits off implies the scan time is as expected)
31 – 24	Not used
23	Time field is bad but can probably be inferred from the previous good time
22	Time field is bad and can't be inferred from the previous good time
21	This record starts a sequence that is inconsistent with previous times (i.e., there is a time discontinuity). This may or may not be associated with a spacecraft clock update (See bit 26 in QUALITY_INDICATOR Field)
20	Start of a sequence that apparently repeats scan times that have been previously accepted
19 – 16	Not used
	Calibration Code Problem Note: These bits complement the channel indicators; for normal calibration all bits are set to 0.
15	Scan line was not calibrated because of bad time
14	Scan line was calibrated using fewer than the preferred number of scan lines because of proximity to start or end of data set or to a data gap
13	Scan line was not calibrated because of bad or insufficient PRT data
12	Scan line was calibrated but with marginal PRT data
11	Some uncalibrated channels on this scan. (See channel indicators.)
10	Uncalibrated due to instrument mode.
9	Questionable calibration because of antenna position error of space view
8	Questionable calibration because of antenna position error of black body
	Earth Location Problem Code (all bits off indicates the Earth location was normal)
7	Not earth located because of bad time; earth location fields zero filled
6	Earth location questionable because of questionable time code. (See time problem flags above.)
5	Earth location questionable – only marginal agreement with reasonableness check.
4	Earth location questionable – fails reasonableness check
3	Earth location questionable because of antenna position check
2 – 0	Not used

Table 5: SCAN_LINE_QUALITY bit string definitions

2.6.2.3 DATA_CALIBRATION

This is a compound data type. For each channel, it contains information about the actual value of the NEdN and the calibration quality:

Field	*Description*	*SF*	*Dimension*	*Type*	*Type Size*	*Field Size*
NEDN_VALUE	Value of the noise equivalent channel radiance	11 for Channel 1: 2 for Channel 2-12 4 for Channel 13-19	1, 1, 1	u-byte	1	1
CALIBRATION_QUALITY	Channel Quality Flags	0	1, 1, 1	bitst(8)	1	1

Table 6: Structure of compound data type DATA_CALIBRATION

The content of the individual fields is defined below:

2.6.2.3.1 NEDN_VALUE

Type: u-byte
Channel-dependent value of NEdN; the following scaling factors (SF) and limits are to be used:

Channel	*SF*	*Limits*
Channel 1	1	values corresponding to NEdNs larger than 25.5 K will be set to 255
Channels 2 to 12	2	values corresponding to NEdNs larger than 2.55 K will be set to 255
Channels 13 to 19	4	values corresponding to NEdNs larger than 0.0255 K will be set to 255
Channel 20	3	values corresponding to a dark current noise larger than 0.255 will be set to 255

NEdN and NEdT specifications:

Channel	*Limits*
Channel 1	3.0 mW/(m^2 sr cm^{-1}) or 1.792 K
Channel 2	0.67 mW/(m^2 sr cm^{-1}) or 0.397 K
Channel 3	0.50 mW/(m^2 sr cm^{-1}) or 0.294 K
Channel 4	0.31 mW/(m^2 sr cm^{-1}) or 0.181 K
Channel 5:	0.21 mW/(m^2 sr cm^{-1}) or 0.122 K
Channel 6	0.24 mW/(m^2 sr cm^{-1}) or 0.138 K
Channel 7	0.20 mW/(m^2 sr cm^{-1}) or 0.115 K
Channel 8	0.10 mW/(m^2 sr cm^{-1}) or 0.583×10^{-1} K
Channel 9	0.15 mW/(m^2 sr cm^{-1}) or 0.963×10^{-1} K
Channel 10	0.15 mW/(m^2 sr cm^{-1}) or 0.854×10^{-1} K
Channel 11	0.20 mW/(m^2 sr cm^{-1}) or 0.209 K
Channel 12	0.20 mW/(m^2 sr cm^{-1}) or 0.295 K

Channel	*Limits*
Channel 13	0.006 mW/(m^2 sr cm^{-1}) or 0.500 × 10^{-1} K
Channel 14	0.003 mW/(m^2 sr cm^{-1}) or 0.265 × 10^{-1} K
Channel 15	0.004 mW/(m^2 sr cm^{-1}) or 0.385 × 10^{-1} K
Channel 16	0.004 mW/(m^2 sr cm^{-1}) or 0.392 × 10^{-1} K
Channel 17	0.002 mW/(m^2 sr cm^{-1}) or 0.333 × 10^{-1} K
Channel 18	0.002 mW/(m^2 sr cm^{-1}) or 0.455 × 10^{-1} K
Channel 19	0.001 mW/(m^2 sr cm^{-1}) or 0.370 × 10^{-1} K
Channel 20	N/A

2.6.2.3.2 CALIBRATION_QUALITY

Type: bitst(8). All bits off implies a good calibration.

Bit	*Meaning*
7	Actual NEdN value exceeds specification
6	Actual NEdN value exceeds 95 % of specification
5	No good black body counts for scan line
4	No good space view counts for scan line
3	No good PRTs for this line
2	Marginal black body counts for this line
1	Marginal space view counts for this line
0	Marginal PRT temperatures for this line

Table 7: CALIBRATION_QUALITY bit string definitions

2.6.2.4 DATA_ELEM_COUNT

This is a compound data type. Please refer to [AD 1], section 3.3.3.2, for further details.

Field	*Description*	*SF*	*Dimension*	*Type*	*Type Size*	*Field Size*
DATA_ELEM_HEAD	Header of DATA_ELEM	0	1, 1, 1	bitst(32)	4	4
INSTR_DATA	20 array elements containing HIRS counts per channel	0	20, 1, 1	bitst(16)	2	40

DATA_ELEM_HEAD is a bit string with components as defined below:

Bit	*Meaning*
31 - 24	Scan Encoder Position (0 to 199)
23 - 19	Electronic Cal Level Indicator (0 to 31)
18 - 17	Not used
16	1 = Valid data, 0 = Ignore radiometric data
15	Odd Bit Parity
14 - 13	Not used
12 - 7	Channel 1 Period Monitor (0 – 63)
6 – 1	Element Number (0 – 63)
0	Filter Sync Designator (= 1 if the filter wheel is in sync with timing system)

Table 8: Data Element Header bit string definitions

This corresponds to the two first 13-bit words in the 288-bit element [RD 1].

For DIGITAL_A_DATA_ELEMENT_COUNT 0 to 55 the INSTR_DATA field contains the 20 channel values of the scan pixel with Element Number 0 to 55 respectively.

The 13-bit integer counts with the non-standard sign bit are converted to the equivalent 16-bit signed integer value as specified in the GPFS [AD 1] and the HIRS FOV counts scaled to the correct 0-8191 counts range [RD 1].

The sequence of the 20 channel values for each scan pixel begins with channel 1 and is followed by this channel sequence: 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9.

2.6.2.5 DATA_ELEM_FLAG

This is a compound data type.

Please refer to [RD 1], section 3.3.3.2, for further details.

Field	*Description*	*SF*	*Dimension*	*Type*	*Type Size*	*Field Size*
DATA_ELEM_HEAD	Header of DATA_ELEM as per DATA_ELEM_COUNTS	0	1, 1, 1	bitst(32)	4	4
FLAG_DATA	20 array elements containing data flags	0	20, 1, 1	bitst(16)	2	40

For DIGITAL_A_DATA_ELEMENT_COUNT 56 to 63 the FLAG_DATA fields contain HIRS instrument status information as detailed in [RD 1], figure 3.3.3.2/1.

2.6.2.6 DATA_ELEM_RADIANCES

This is a compound data type. Please refer to [RD 1], section 3.3.3.2, for further details.

Field	*Description*	*SF*	*Dimension*	*Type*	*Type Size*	*Field Size*
DATA_ELEM_HEAD	Header of DATA_ELEM as per DATA_ELEM_COUNTS	0	1, 1, 1	bitst(32)	4	4
RAD_DATA	20 instrument data	7	20, 1, 1	integer4	4	80

For DIGITAL_A_DATA_ELEMENT_RAD 0 to 55 the INSTR_DATA field contains the 20 radiance values of the scan pixel with Element Number 0 to 55 respectively.

The sequence of the 20 channel values for each scan pixel is channel 1 followed by the channels 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9.

If a cold target scan is performed (although possible in theory, this is not expected to occur in practice) then the radiances are not derived so default dummy values (as per GPFS [AD 1]) are placed in the INSTR_DATA field.

2.6.2.7 INSTRUMENT_INVALID_DIGITAL_WORD_FLAG

If bit = 1, associated telemetry bit was not recently updated (for NOAA satellites this means not updated during most recent minor frame cycle). This is possibly due to lost data. This information is derived by the HIRS level 1 processor.

Bit	*Meaning*
15	Instrument power
14	Electronics power
13	Filter motor power
12	Scan motor power
11	Cooler heater
10	Filter housing heater
9	Cooler door release
8	Cooler window heater
7	Go to nadir position
6	Calibration sequence
5	Cooler door closed
4	Cooler door fully open
3	Filter motor power level
2	Patch temperature controller
1-0	Not used

Table 9: INSTRUMENT_INVALID_DIGITAL_WORD_FLAG bit string definitions

2.6.2.8 DIGITAL_B_DATA

Bit	Meaning
15	Instrument power (0=off; 1=on)
14	Electronics power (0=off; 1=on)
13	Filter motor power (0=off; 1=on)
12	Scan motor power (0=off; 1=on)
11	Cooler heater (0=off; 1=on)
10	Filter housing heater (0=off; 1=on)
9	Cooler door release (0=disabled; 1=enabled)
8	Cooler window heater (0=on; 1=off)
7	Go to nadir position (0=no; 1=yes/initiated)
6	Calibration sequence (0=disabled; 1=enabled)
5	Cooler door closed (0=yes; 1=no)
4	Cooler door fully open (0=yes; 1=no)
3	Filter motor power level (0=normal; 1=high)
2	Patch temperature controller (0=off; 1=on)
1-0	Not used

Table 10: DIGITAL_B_DATA bit string definitions

2.6.2.9 INSTRUMENT_INVALID_ANALOG_WORD_FLAG

Bit	Meaning
31-17	Not used
16	Patch controller power (following word 16)
15-2	Following words 15 through 2 (in order)
1	Radiator temperature (following word 1)
0	Not used

Table 11: INSTRUMENT_INVALID_ANALOG_WORD_FLAG bit string definitions

2.6.2.10 ANALOG_DATA

Word	*Meaning*
1	Radiator Temperature
2	Base Plate Temperature
3	Electronics Temperature
4	Patch Temperature
5	Filter Housing Controller Current
6	Scan Motor Temperature
7	Filter Wheel Motor Temperature
8	+5 VDC Monitor
9	+10 VDC TLM/DC/DC/Conv.
10	+7.5 VDC TLM/DC/DC/Conv.
11	-7.5 VDC TLM/DC/DC/Conv.
12	+15 VDC Monitor
13	-15 VDC Monitor
14	Filter Wheel Motor Current
15	Scan Motor Current
16	Patch Controller Power

Table 12: ANALOG DATA words

2.6.2.11 NAVIGATION_STATUS

Bit	Meaning
31 – 17	Not used
16	Earth location corrected for Euler angles
15 – 12	Earth location indicator 0 = earth location available 1 = user ephemeris files older than 24 hours 2 = no earth location available
11 – 8	Spacecraft attitude control 0 = operating in YGC or NOMINAL mode 1 = operating in another mode 2 = attitude exceeds nominal tolerance
7 – 4	Attitude SMODE 0 = NOMINAL mode 1 = rate nulling mode 2 = YGC mode 3 = search mode 4 = coast mode
3 – 0	Attitude mode 0 = NOMINAL mode/no test 1 = yaw axis test in progress 2 = roll axis test in progress 3 = pitch axis test in progress

Table 13: NAVIGATION_STATUS bit string definitions

2.6.2.12 Calibration Coefficients

The instantaneous calibration coefficients shall be put into MDR-1A and MDR-1B for the Cold Space and Warm target scan lines (and also for the Cold Target which, although possible in theory, should not occur in normal practice). The calculated interpolated coefficients shall be stored for each Earth scan line.

3 LEVEL 1B RECORDS

The structure of the Level 1b records is mostly identical to those of Level 1a. Record differences for GEADR and MDR are given below.

The only difference for Level 1b data is that the Earth pixel counts are calibrated to radiances for the channels 1 to 19 and reflectance factors for the channel 20.

3.1 Global External Auxiliary Data Record

3.1.1 Record Subclasses

The following subclasses of GEADR are present for the HIRS Level 1b product.

Subclass	*Description*	*Subclass ID*
HIRS_CAL	Calibration and configuration parameters	1

Table 14: GEADR Level 1b subclasses

3.2 Measurement Data Record

See also Section 2.6 for more details of the MDR record and fields.

3.2.1 Record Subclasses

There is one subclass of MDR for the Level 1b product.

Subclass	*Description*	*Subclass ID*
MDR-1B	Level 1B MDR	2

Table 15: MDR Level 1b subclasses

4 RECORD OCCURRENCE INFORMATION

4.1 Level 1a

Record	*Occurrence*
MPHR	Once per product
GIADR-TEMP	Once per product
GIADR-ANALOG	Once per product
MDR-1A	Once per scan

Table 16: Level 1a records occurrence rates

4.2 Level 1b

Record	*Occurrence*
MPHR	Once per product
GIADR-TEMP	Once per product
GIADR-ANALOG	Once per product
MDR-1B	Once per scan

Table 17: Level 1b records occurrence rates

5 RECORD FORMAT VERSION CONTROL

This section provides version numbers for the records defined within this document.

Record Subclass	*Format Version Number*	*Issue Defined*
GIADR-ANALOG	**2**	**6.3**
	1	6.2 (CDR)
GIADR-TEMP	**2**	**6.3**
	1	6.2 (CDR)
MDR-1A	**3**	**7E**
	2	6.3
	1	6.2 (CDR)
MDR-1B	**3**	**7E**
	2	6.3
	1	6.2 (CDR)

Table 18: Record Format Version Numbers

APPENDIX A DETAILED SPECIFICATION OF HIRS LEVEL 1 DATA RECORDS

In the following Annex, detailed format specifications for all the Variable Internal and Measurement Data Records in HIRS Level 1 products are included:

- GIADR-ANALOG
- GIADR-TEMP
- MDR-1A
- MDR-1B

The Annex is accessible under Document Reference: EPS.MIS.SPE.97230.ANX .

Doc Ref: EPS.MIS.SPE.97230.ANX
HIRS_4_Level_1_Product_Format_Specification_-_Annex[1].xls
Worksheet: VERSION

This Document	
Title	HIRS/4 LEVEL 1 PRODUCT FORMAT SPECIFICATION TABLES
Reference Number	EPS/MIS/SPE/97230

Change Record	
Issue 4 Draft A Rev 1	Removed Detailed Navigation section from SPHR-1A
	Corrected 90 'points' in ADR-1A to 56 FsOV for ANGULAR_RELATION, EARTH_LOCATION, SURFACE_PROPERTY, and TERRAIN_ELEVATION, changed CALIBRATION_QUALITY to reflect 20 rather than 15 entities (because there are 20 HIRS channels)
Issue 4 Draft B	Updated tables to match updated GPFS document
	Changed CLOUD_INFORMATION in ADR-1A and 1B to PERCENTAGE_CLEAR_SKY
	Update REC_HEAD size from 12 to 24 bytes in TYPES worksheet
	Make SPHR an ASCII record
	Moved INSTRUMENT_STATUS fields from SPHR to VIADR
	Removed INSTRUMENT_STATUS_RECORD_CHANGE from VIADR-1a
	Made SPHR-1A, GIADR-1A (all types), VIADR-1a (all types) applicable to Level 1b product as wel
Revision	
Issue 5 Revision 0	Issue for CGS PDR
Issue 5 Revision 1	Revised Issue for CGS PDR
Issue 5 Revision 2	Moved contents of ADR into MDR-1A and MDR-1B records
	Removed Inbstrument Status information from SPHR as this is contained in VIADR-INSTATE and is not global information (it may change in a product)
Issue 6 Revision 0	Removed ADRs. Moved ADR contents to relevant MDR
	Added DEGRADED_INST_MDR and DEGRADED_PROC_MDR flags to MDRs
Issue 6 Revision 1	Complete reorganisation
Issue 6 Revision 2	Removed SPHR
	Removed OBT/UTC Correction Information from MDR-1A and MDR-1B
Issue 6 Revision 3	**EUM.EPS.SYS.DCR.02.169**
	EARTH_LOCATION field in MDRs. Changed field type to integer4 and scale factor to 4
	MDRs: INSTRUMENT_INVALID_ANALOG_WORD flag field type changed to bitst(32) consistent with main text
	CALIBRATION_QUALITY field size changed to 20 to make flag per channel
	GIADR-TEMP: TEMPERATURE_RADIANCE_CENTRAL_WAVELENGTH, TEMPERATURE_RADIANCE_CONSTANTB, TEMPERATURE_RADIANCE_CONSTANTC field data types changed from integer2 to integer4 in order to hold necessary data
	GIADR-ANALOG: C2 coefficients scale factor changed to 10^2

	Change TIME_ATTITUDE and SPACECRAFT_ATTITUDE fields to unsigned field types
	Correct SPACECRAFT_+ATTITUDE field name to SPACECRAFT_ALTITUDE
	Correct scale factor for MDR.ANGULAR_RELATIONS from 3 to 2
	EULER_ANGLE data type changed to integer2 and scale factor changed to 3
	Break DATA_ELEM compound into more homogeneous parts. Split DIGITAL_A_DATA_ELEMENT field into three components with postfixes _COUNT, _FLAF, _RAD for counts, flags and radiances.
	GIADR-TEMP: ALBEDO_RADIANCE_SOLAR_IRRADIANCE and ALBEDO_RADIANCE_EQUIVALENT_WIDTH TBD for units replaced with values.
	EUM.EPS.SYS.DCR.03.044
	GIADR-TEMP.TEMPERATURE_RADIANCE_CENTRAL_WAVENUMBER split scale factor. SF = 6 for ch 1 to 12 and 5 for ch 13 to 19
	GIADR-ANALOG: Calrified scale factor column and corrected units for coefficients
Issue 6 Revision 4	**EUM.EPS.SYS.DCR.04.015**
	GIADR-TEMP: Clarified ordering of channel indexed arrays
	COMPOUNDS: Copied compound structures into Annex for compatability with other PFSs
	MDR-1A/1B: added reference to Section 3.5.1.12
	GIADR-ANALOG: Corrected record name from GIADR-ANALOG-1A to GIADR-ANALOG consistent with main text
Issue 6 Revision 5	**EUM.EPS.SYS.DCR.05.0210**
	COMPOUNDS
	DATA_ELEM_FLAG.INSTR_DATA - corrected name to DATA_ELEM_FLAG.FLAG_DATA consistent with Section 3.5.1.5
	DATA_ELEM_RADIANCES.INSTR_DATA - corrected name to DATA_ELEM_RADIANCES.RAD_DATA consistent with Section 3.5.1.6
	Added Scale factor 7 for field DATA_ELEM_RADIANCES.RAD_DATA
	Added units for field DATA_ELEM_RADIANCES.RAD_DATA
	Corrected type for field DATA_ELEM_RADIANCES.RAD_DATA to integer4 from bitst(16) consistent with Section 3.5.1.6 and updated type size and field size accordingly
Version 7A 18/07/08	Migrated into Hummingbird. Contents identical with issue 6.5.
Version 7B 08/09/08	No changes to annex.
Version 7C 30/01/09	No changes to annex.
Version 7D 22/02/11	**ODT_DCR_232**
	COMPOUNDS: Update for documentation error:
	DATA_ELEM_COUNT.INSTR_DATA - Corrected Type from bitst(16) to integer2 (consistent with Section 3.5.2.4).

	ODT_DCR_239
	MDR-1A & MDR-1B, field ANGULAR_RELATION: Added Description note on azimuth angle range.
Version 7E 18/10/11	**TBD**
	New worksheet to describe compound data type DATA_CALQUAL. Also added to Types sheet. MDR-1A & MDR-1B: Field CALIBRATION_QUALITY replaced by DATA_CALIBRATION.

Doc Ref: EPS.MIS.SPE.97230.ANX
HIRS_4_Level_1_Product_Format_Specification_-_Annex[1].xls
Worksheet: Compounds

DATA_ELEM_COUNT

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE
DATA_ELEM_HEAD	Header of DATA_ELEM	NA	NA	1	1	1	bitst(32)	4	4
INSTR_DATA	20 array elements containing HIRS counts per channel	NA	NA	20	1	1	integer2	2	40

DATA_ELEM_FLAG

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE
DATA_ELEM_HEAD	Header of DATA_ELEM	NA	NA	1	1	1	bitst(32)	4	4
FLAG_DATA	20 array elements containing data flags	NA	NA	20	1	1	bitst(16)	2	40

DATA_ELEM_RADIANCES

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE
DATA_ELEM_HEAD	Header of DATA_ELEM	NA	NA	1	1	1	bitst(32)	4	4
RAD_DATA	20 instrument data	7	Ch 1 - 19 mW/(m^2.sr.cm) Ch 20 Percentage Reflectance	20	1	1	integer4	4	80

DATA_CALQUAL

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE
NEDN_VALUE	Value of the noise equivalent radiance	**1** for Ch.1; **2** for Ch. 2 to 12; **4** for Ch. 13 to 19	mW/(m^2 sr cm^-1)	1	1	1	u-byte	1	1
CALIBRATION_QUALITY	Channel Quality Flags	0	N/A	1	1	1	bitst(8)	1	1

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	1	1	REC_HEAD	20	20	0
TEMPERATURE-SENSOR CONVERSION										
TEMPERATURE_RADIANCE_CENTRAL_WAVENUMBER	Temperature-Radiance Central Wavenumber n_c -(ch. 1-19). Scale Factor is: 6 for ch 1 - 12 5 for ch 13 - 19 (ch 1 - 19 in order)	See Descrip.	cm^{-1}	19	1	1	integer4	4	76	20
TEMPERATURE_RADIANCE_CONSTANTB	Temperature-Radiance Constant Intercept b (ch 1 - 19 in order)	6	K	19	1	1	integer4	4	76	96
TEMPERATURE_RADIANCE_CONSTANTC	Temperature-Radiance Constant Slope c - (ch 1 - 19 in order)	6	K/K	19	1	1	integer4	4	76	172
ALBEDO_RADIANCE_SOLAR_IRRADIANCE	Albedo-Radiance Ch 20 Solar Filtered Irradiance	6	W/m^2	1	1	1	integer2	2	2	248
ALBEDO_RADIANCE_EQUIVALENT_WIDTH	Albedo-Radiance Ch 20 Equivalent Filter Width	6	cm^-1	1	1	1	integer2	2	2	250
Size of the record										252

Doc Ref: EPS.MIS.SPE.97230.ANX
HIRS_4_Level_1_Product_Format_Specification_-_Annex[1].xls
Worksheet: GIADR-ANALOG

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	1	1	REC_HEAD	20	20	0
AD CONVERSION										
Analog telemetry conversion										
RADIATOR_TEMPERATURE_COEFFICIENT	**Radiator Temperature Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	20
BASEPLATE_TEMPERATURE_COEFFICIENT	**Base Plate Temperature Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	32
ELECTRONIC_TEMPERATURE_COEFFICIENT	**Electronics Temperature Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	44
PATCH_TEMPERATURE_COEFFICIENT	**Patch Temperature Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	56
FILTER_HOUSING_CONTROLLER_CURRENT_COEFFICIENT	**Filter Housing Controller Current Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	68

SCAN_MOTOR_TEMPERATURE_COEFFICIENT	**Scan Motor Temperature Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	80
FILTER_WHEEL_MOTOR_TEMPERATURE_COEFFICIENT	**Filter Wheel Motor Temperature Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=K c1=K/cnt c2=K/cnt^2 c3=K/cnt^3 c4=K/cnt^4 c5=K/cnt^5	6	1	1	integer2	2	12	92
PLUS5_VDC_MONITOR_COEFFICIENT	**+5 VDC Monitor Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=V c1=V/cnt c2=V/cnt^2 c3=V/cnt^3 c4=V/cnt^4 c5=V/cnt^5	6	1	1	integer2	2	12	104
PLUS10_VDC_TMLDC_COEFFICIENT	**+10 VDC TLM/DC/DC Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=V c1=V/cnt c2=V/cnt^2 c3=V/cnt^3 c4=V/cnt^4 c5=V/cnt^5	6	1	1	integer2	2	12	116
PLUS75_VDC_TMLDC_COEFFICIENT	**+7.5 VDC TLM/DC/DC Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=V c1=V/cnt c2=V/cnt^2 c3=V/cnt^3 c4=V/cnt^4 c5=V/cnt^5	6	1	1	integer2	2	12	128
MINUS75_VDC_TMLDC_COEFFICIENT	**-7.5 VDC TLM/DC/DC Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=V c1=V/cnt c2=V/cnt^2 c3=V/cnt^3 c4=V/cnt^4 c5=V/cnt^5	6	1	1	integer2	2	12	140

PLUS15_VDC_MONITOR_COEFFICIENT	**+15 VDC Monitor Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=V c1=V/cnt c2=V/cnt^2 c3=V/cnt^3 c4=V/cnt^4 c5=V/cnt^5	6	1	1	integer2	2	12	152
MINUS15_VDC_MONITOR_COEFFICIENT	**-15 VDC Monitor Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=V c1=V/cnt c2=V/cnt^2 c3=V/cnt^3 c4=V/cnt^4 c5=V/cnt^5	6	1	1	integer2	2	12	164
FILTER_WHEEL_MOTOR_CURRENT_COEFFICIENT	**Filter Wheel Motor Current Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=A c1=A/cnt c2=A/cnt^2 c3=A/cnt^3 c4=A/cnt^4 c5=A/cnt^5	6	1	1	integer2	2	12	176
SCAN_MOTOR_CURRENT_COEFFICIENT	**Scan Motor Current Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=A c1=A/cnt c2=A/cnt^2 c3=A/cnt^3 c4=A/cnt^4 c5=A/cnt^5	6	1	1	integer2	2	12	188
PATCH_CONTROLLER_POWER_COEFFICIENT	**Patch Controller Power Coefficients (c_0-c_5)**	c0=2 c1=2 c2=3 c3=3 c4=3 c5=5	c0=W c1=W/cnt c2=W/cnt^2 c3=W/cnt^3 c4=W/cnt^4 c5=W/cnt^5	6	1	1	integer2	2	12	200
Size of the record										212

Doc Ref: EPS.MIS.SPE.97230.ANX
HIRS_4_Level_1_Product_Format_Specification_-_Annex[1].xls
Worksheet: MDR-1A

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	1	1	REC_HEAD	20	20	0
	GENERIC QUALITY INDICATORS									
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation	0	NA	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation	0	NA	1	1	1	boolean	1	1	21
Scan Line Information										
LINE_COUNTER	Line counter since last auto-calibration sequence. If calibration enabled then it runs from 0 to 39 else from 0 to 8191 followed by 0 to 8191 and so on	0	NA	1	1	1	u-integer2	2	2	22
SCAN_TYPE_CODE	Scan type code (0 = Earth view, 1 = space view, 2 = cold BB view, 3 = warm BB view, 4 = else.	0	NA	1	1	1	u-integer2	2	2	24
QUALITY_INDICATOR	Quality Indicator Bit Field	0	N/A	1	1	1	bitst(32)	4	4	26
SCAN_LINE_QUALITY	Scan Line Quality Flags	0	N/A	1	1	1	bitst(32)	4	4	30
DATA_CALIBRATION	Noise-Equivalent Delta N and Channel Quality Flags	0	N/A	20	1	1	DATA_CALQUAL	2	40	34
MEASUREMENT DATA										
DIGITAL_A_DATA_ELEMENT_COUNT	The 56 elements contain the 56 pixel values of a scan line in the 20 channels	0	NA	56	1	1	DATA_ELEM_COUNT	44	2464	74
DIGITAL_A_DATA_ELEMENT_FLAG	The 8 elements contain information on the instrument status	0	NA	8	1	1	DATA_ELEM_FLAG	44	352	2538
Digital B telemetry										
INSTRUMENT_INVALID_DIGITAL_WORD_FLAG	Invalid Word Bit Flags	0	N/A	1	1	1	bitst(16)	2	2	2890
DIGITAL_B_DATA	Digital B Data	0	N/A	1	1	1	bitst(16)	2	2	2892
Analog telemetry										

INSTRUMENT_INVALID_ANALOG_WORD_FLAG	Invalid Word Bit Flags	0	N/A	1	1	1	bitst(32)	4	4	2894
ANALOG_DATA	Analog Data	0	N/A	16	1	1	u-byte	1	16	2898
NAVIGATION DATA AT SCAN LINE										
TIME_ATTITUDE	Time Associated with Attitude Angles	0	s	1	1	1	u-integer4	4	4	2914
EULER_ANGLE	Euler Angles: Roll, Pitch, Yaw	3	deg	3	1	1	integer2	2	6	2918
NAVIGATION_STATUS	Navigation Status Bit Field	0	N/A	1	1	1	bitst(32)	4	4	2924
SPACECRAFT_ALTITUDE	Spacecraft Altitude Above Reference Geoid (MSL)	1	km	1	1	1	u-integer4	4	4	2928
ANGULAR_RELATION	Angular relationships: solar zenith angle, satellite zenith angle, solar azimuth angle, satellite azimuth angle (FOV 1 to 56). Note: azimuth angle range is -180 to +180, where minus is west and plus is east.	2	deg	4	56	1	integer2	2	448	2932
EARTH_LOCATION	Earth Location: latitude, longitude (FOV 1 to 56)	4	deg	2	56	1	integer4	4	448	3380
SURFACE_PROPERTY	Surface property (0 = water, 1 = mixed/coast, 2 = land)			56	1	1	integer2	2	112	3828
TERRAIN_ELEVATION	Average terrain elevation (FOV 1 to 56)		m	56	1	1	integer2	2	112	3940
Calibration Coefficient (see Section 3.5.1.12)										
PRIMARY_CALIBRATION_SECOND_TERM	Primary Calibration Second Order Term a2 (ch. 1-20)	12	†mW/m^2/sr/cm^{-1}/cnt^2 or % alb/cnt^2 (ch 20)	20	1	1	integer4	4	80	4052
PRIMARY_CALIBRATION_FIRST_TERM	Primary Calibration First Order Term a1 (ch. 1-20)	9	†mW/m^2/sr/cm^{-1}/cnt or % alb/cnt (ch 20)	20	1	1	integer4	4	80	4132
PRIMARY_CALIBRATION_ZEROTH_TERM	Primary Calibration Zeroth Order Term a0 (ch. 1-20)	6	†mW/m^2/sr/cm^{-1} or % alb (ch 20)	20	1	1	integer4	4	80	4212
SPARE_CALIBRATION_SECOND_TERM	Spare Calibration Second Order Term (ch. 1-20)	12	†mW/m^2/sr/cm^{-1}/cnt^2 or % alb/cnt^2 (ch 20)	20	1	1	integer4	4	80	4292

SPARE_CALIBRATION_FIRST_TERM	Spare Calibration First Order Term (ch. 1-20)	9	†mW/m^2/sr/cm^{-1}/cnt or % alb/cnt (ch 20)	20	1	1	integer4	4	80	4372
SPARE_CALIBRATION_ZEROTH_TERM	Spare Calibration Zeroth Order Term(ch. 1-20)	6	†mW/m^2/sr/cm^{-1} or % alb (ch 20)	20	1	1	integer4	4	80	4452
CLOUD COVERAGE INFORMATION										
PERCENTAGE_CLEAR_SKY	Percentage of sky that is clear of clouds	2	%	56	1	1	u-integer2	2	112	4532
SIZE OF THE MDR										4644

Doc Ref: EPS.MIS.SPE.97230.ANX
HIRS_4_Level_1_Product_Format_Specification_-_Annex[1].xls
Worksheet: MDR-1B

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	1	1	REC_HEAD	20	20	0
	GENERIC QUALITY INDICATORS									
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation	0	NA	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation	0	NA	1	1	1	boolean	1	1	21
Scan Line Information										
LINE_COUNTER	Line counter since last auto-calibration sequence. If calibration enabled then it runs from 0 to 39 else from 0 to 8191 followed by 0 to 8191 and so on	0	NA	1	1	1	u-integer2	2	2	22
SCAN_TYPE_CODE	Scan type code (0 = Earth view, 1 = space view, 2 = cold BB view, 3 = warm BB view, 4 = else.	0	NA	1	1	1	u-integer2	2	2	24
QUALITY_INDICATOR	Quality Indicator Bit Field	0	N/A	1	1	1	bitst(32)	4	4	26
SCAN_LINE_QUALITY	Scan Line Quality Flags	0	N/A	1	1	1	bitst(32)	4	4	30
DATA_CALIBRATION	Noise-Equivalent Delta N and Channel Quality Flags	0	N/A	20	1	1	DATA_CALQUAL	2	40	34
MEASUREMENT DATA										
DIGITAL_A_DATA_ELEMENT_RAD	Radiances for 56 pixel values of a scan line in the 20 channels. Earth scan pixel values are calibrated to radiances (channel 1 - 19) and reflectance factors (channel 20)	4	NA	56	1	1	DATA_ELEM_RAD	84	4704	74
DIGITAL_A_DATA_ELEMENT_FLAG	Information on the instrument status.	0	NA	8	1	1	DATA_ELEM_FLAG	44	352	4778
Digital B telemetry										
INSTRUMENT_INVALID_DIGITAL_WORD_FLAG	Invalid Word Bit Flags	0	N/A	1	1	1	bitst(16)	2	2	5130
DIGITAL_B_DATA	Digital B Data	0	N/A	1	1	1	bitst(16)	2	2	5132
Analog telemetry										

INSTRUMENT_INVALID_ANALOG_WORD_FLAG	Invalid Word Bit Flags	0	N/A	1	1	1	bitst(32)	4	4	5134
ANALOG_DATA	Analog Data	0	N/A	16	1	1	u-byte	1	16	5138
NAVIGATION DATA AT SCAN LINE										
TIME_ATTITUDE	Time Associated with Attitude Angles	0	s	1	1	1	u-integer4	4	4	5154
EULER_ANGLE	Euler Angles: Roll, Pitch, Yaw	3	deg	3	1	1	integer2	2	6	5158
NAVIGATION_STATUS	Navigation Status Bit Field	0	N/A	1	1	1	bitst(32)	4	4	5164
SPACECRAFT_ALTITUDE	Spacecraft Altitude Above Reference Geoid (MSL)	1	km	1	1	1	u-integer4	4	4	5168
ANGULAR_RELATION	Angular relationships: solar zenith angle, satellite zenith angle, solar azimuth angle, satellite azimuth angle (FOV 1 to 56) Note: azimuth angle range is -180 to +180, where minus is west and plus is east.	2	deg	4	56	1	integer2	2	448	5172
EARTH_LOCATION	Earth Location: latitude, longitude (FOV 1 to 56)	4	deg	2	56	1	integer4	4	448	5620
SURFACE_PROPERTY	Surface property (0 = water, 1 = mixed/coast, 2 = land)			56	1	1	integer2	2	112	6068
TERRAIN_ELEVATION	Average terrain elevation (FOV 1 to 56)		m	56	1	1	integer2	2	112	6180
Calibration Coefficient (see Section 3.5.1.12)										
PRIMARY_CALIBRATION_SECOND_TERM	Primary Calibration Second Order Term a2 (ch. 1-20)	12	†mW/m^2/sr/cm^{-1}/cnt^2 or % alb/cnt^2 (ch 20)	20	1	1	integer4	4	80	6292
PRIMARY_CALIBRATION_FIRST_TERM	Primary Calibration First Order Term a1 (ch. 1-20)	9	†mW/m^2/sr/cm^{-1}/cnt or % alb/cnt (ch 20)	20	1	1	integer4	4	80	6372
PRIMARY_CALIBRATION_ZEROTH_TERM	Primary Calibration Zeroth Order Term a0 (ch. 1-20)	6	†mW/m^2/sr/cm^{-1} or % alb (ch 20)	20	1	1	integer4	4	80	6452

SPARE_CALIBRATION_SECOND_TERM	Spare Calibration Second Order Term (ch. 1-20)	12	†mW/m^2/sr/cm^{-1}/cnt^2 or % alb/cnt^2 (ch 20)	20	1	1	integer4	4	80	6532
SPARE_CALIBRATION_FIRST_TERM	Spare Calibration First Order Term (ch. 1-20)	9	†mW/m^2/sr/cm^{-1}/cnt or % alb/cnt (ch 20)	20	1	1	integer4	4	80	6612
SPARE_CALIBRATION_ZEROTH_TERM	Spare Calibration Zeroth Order Term(ch. 1-20)	6	†mW/m^2/sr/cm^{-1} or % alb (ch 20)	20	1	1	integer4	4	80	6692
CLOUD COVERAGE INFORMATION										
PERCENTAGE_CLEAR_SKY	Percentage of sky that is clear of clouds	2	%	56	1	1	u-integer2	2	112	6772
SIZE OF THE MDR										**6884**

Doc Ref: EPS.MIS.SPE.97230.ANX
HIRS_4_Level_1_Product_Format_Specification_-_Annex[1].xls
Worksheet: Types

Field Type	Size in Bytes
bitst(8)	1
boolean	1
byte	1
char(1)	1
e-char(1)	1
enumerated	1
u-byte	1
bitst(16)	2
char(2)	2
DATA_CALQUAL	2
e-char(2)	2
integer2	2
u-integer2	2
bitst(24)	3
char(3)	3
e-char(3)	3
bitst(32)	4
char(4)	4
integer4	4
u-integer4	4
short cds time	6
integer8	8
long cds time	8
u-integer8	8
general time	15
REC_HEAD	20
DATA_ELEM_COUNT	44
DATA_ELEM_FLAG	44
DATA_ELEM_RAD	84
char(88)	88

NOTE: Table must be sorted into ascending order