

# ***GOME-2 Level 1 Product Format Specification***

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## Document Change Record

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Issue 2 Draft B	23/07/1999		Addressed RIDs
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Issue 4 Draft B			LEO/C/TP  Removed items redundant with GPFS  Updated signature table  Removed GTS section – covered by PGS document  Added Generic Record Header details  Removed Footer records in line with latest GPFS update
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Issue 6:0	17/05/2002		Harmonisation with GOME-2 PGS Issue 6:0.  Section on Enumerated Variables added.  For further details see the Annex to this document.
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Issue 6:2	14/06/2002	EUM.EPS.SYS. DCR.02.132	<p>Occurrence rates for VIADR-1a-Dark and VIADR-1a-Spec are now variable.</p> <p>Section on Generic Record Header: Details on MDR start/stop time added.</p> <p>Table 7 (enumerated variables) expanded. Among the new enumerated variables are those for channel number (1 to 6) and band number (1 to 10).</p> <p>Sections on Associated Data Records (2.3.7, 2.4.7) removed, as ADRs have been deleted from Generic PFS (as from version 6.0, Feb 2002).</p> <p>Generic Record Header subclass IDs updated.</p> <p>Typographical errors corrected.</p> <p>For further details see the Annex to this document</p>
Issue 6:3	03/09/2002	EUM.EPS.SYS. DCR.02.161	<p>Record Format Version Control added</p> <p>Further changes detailed in the Annex to this document</p>
Issue 6:4	27/03/2003	EUM.EPS.SYS. DCR.03.077	<p>Separate scaling factors for FPA and PMD wavelength coefficients.</p> <p>GIADR-Channels, GIADR-1a-Bands, GIADR-1b-Bands: Bands/channels merged into single GIADR. Accordingly, occurrence information changed to once per product.</p> <p>For further details see the Annex to this document.</p>
Issue 6:5	12/03/2004	EUM.EPS.SYS. DCR.04.007	<p>Record subclasses for GEADR defined.</p> <p>Clarification on record ordering added in section "Occurrence information".</p> <p>Reference to PFS Variable name APPLIED_CAL_STEPS added to first column of Table 9 enumerated variables.</p> <p>For further details see the Revision History in the Annex to this document.</p>
Issue 7:0	19/03/2004	EUM.EPS.SYS. DCR.04.024	<u>Section 2.1 Form</u>
		MoM EPS-APS-MN-1907	Storage of arrays of Variable Scale Factor Integers clarified.

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		DJO-GOME- SPR-115	<u>Table 9: Enumerated Variables</u>  PCD_BASIC: F_OLD_CAL_DATA values altered to allow addition of values in the case that more than one of the in-flight calibration data are older than a specified threshold.
Issue 7:1	09/03/2006	EUM.EPS.SYS. DCR.06.0308	
		EUM.EPS.AR.1 758	<u>Table 1: Level 1a GEADR Subclasses</u>  Updated to be consistent with PPF implementation.  <u>Table 3: Level 1a VEADR Subclasses</u>  Added to be consistent with PPF implementation.  <u>Table 6: Level 1b GEADR Subclasses</u>  Updated to be consistent with PPF implementation.  <u>Occurrence Information</u>  Updated to be consistent with PPF implementation
		DJO.SPR.GOM E.134 & MO-DCP-ESA- GO-002  EUM.EPS.NCR. 1254 & MO-DCP- ESA-GO-008	<u>Annex:</u>  Scaling factor for VIADR-1a-Spec field POLY_COEFF_PMD changed from 3 to 0 to avoid overflow.  Obsolete remark removed.  Criteria for which generic quality flag DEGRADED-PROC_MDR will be raised have been reduced to prevent unnecessary operator warnings.
Issue 7:2	19/01/2007	EUM.SYS.DCR. 07.0345  Associated GOME-2 PPF AR EUM.EPS.AR.7 020	<u>Annex:</u>  Fields GOOD_FIT and FINAL_CHI_SQUARE from the compound variable CLOUD, both previ- ously u-integer2 have been combined so that GOOD_FIT is no longer written to the product and FINAL_CHI_SQUARE becomes integer4. The size and structure of the product does not change, only the use of these specific 4 bytes. Additionally the scaling factor for FINAL_CHI_SQUARE has been reduced from 6 to 5. These changes were necessary to accomodate the dynamic range of FINAL_CHI_SQUARE which was not possible

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			<p>using u-integer2.</p> <p>The scaling factors for E_FIT_1 and E_FIT_2 have been changed to be 1 and 4 respectively to accommodate the range of values experienced with in-flight data.</p> <p>The flag F_HOT no longer causes DEGRADED_PROC_MDR to be raised as hot pixels occur regularly in the SAA due to particle bombardment and are filtered out by on-ground processing where necessary. The instrument is not degraded as such.</p> <p>Occurrence rate of VEADR and VIADR records updated to take account of improved logic of in-flight calibration data usage.</p>
Issue 7:3	11/01/2008	EPS_AB_DCR_EUM_32  Associated AR's  EUM.EPS.AR.9 064 & EUM.EPS.AR.9 103	<p><u>Annex:</u>            VIADR-1a-SPEC updated to replace the polynomial coefficients describing the FPA and PMD spectral calibration with the complete spectral grid in both cases. Field PCD_SPEC: N_ITERATIONS changed to be SHIFT_PER_WINDOW with size unchanged.</p> <p>Record GIADR-1b-PMDBandDef added on user request.</p>
Issue 7:4	01/04/2008	EPS_AB_DCR_EUM_39	Possible values for enumerated variable PCD_BASIC: F_OLD_CAL_DATA listed in Table 11 expanded.
V8A	11/09/2008		<p>Migrated into Hummingbird. Body contents copied into standard template and reformatted, This version is effectively the same as Issue 7.4 with only editorial updates made:</p> <p>Use of bookmarks for document references and auto-referencing of these in body text.</p> <p>'Section 6 Annex' retitled Appendix A and link inserted to Annex Excel file in Hummingbird.</p> <p>Various typo corrections and standardisations.</p>
V9	01/07/2010	EPS_AB_ECP_474	<p>Update on Section 2.3.2.1 Table 1 and Section 2.4.2.1 Table 6 on level 1A and 1B GEADR sub-classes; likewise in tables in Sections 3.1, 3.2 &amp; 5. Added enumerated values to PCD_BASIC_F_OLD_CAL_DATA and new entries for SCAN_DIRECTION in Table 11. GEADR-1a-Timecorrelation and GEADR-1a-Orbit changed to VEADRs for both level 1A and B. GEADR-1a-CorrectionFactor changed to VEADR-</p>

Issue / Revision	Date	DCN. No	Changed Pages / Paragraphs
			1a-CorrectionFactor.  <u>Annex:</u>  Changes to PCD_BASIC in Compounds: increased read-out numbers predominantly by changing variable type to bitstring. GEO_EARTH_ACTUAL: compound field added for scan-direction index. Added field to BAND_P compound: UNCORR_RAD provides PMD-P and PMD_S read-outs which are not corrected for the instrument sensitivity to polarisation. UNCORR_ERR_RAD provides the corresponding error. MDR-1b-Earthshine: Introduction of new GEO_EARTH_ACTUAL_[#] fields where # is from 1 to 10 and corresponds to the unique integration time index. Their field dimension is given by N_UNIQUE_INT and GEO_REC_LENGTH. CHANNEL_READOUT_SEQ field added in GIADR-Channel for detector pixel read-out sequence direction. Two cloud parameter fields CLOUD_PMD_1 and CLOUD_PMD_2 added in CLOUD compound for PMD derived cloud parameters. MDR level 0 GHR start and stop time have been added as additional fields to the ISP and ISP_HEAD compounds.
v9A	04/03/2011	ODT_DCR_241	<u>Annex:</u> MDR-1a-Other: Version number should be 2. Corrected in this version. Compounds: Updated Flag descriptors in PCD_BASIC. Updated CLOUD parameter description to add the reference BAND readouts Types: Positions of GEO_SUN and GEO_MOON swapped to put into correct alphabetic order.
V9B – V9D	21/03/2012	Associated AR EUM/EPS/AR/1 3781.4	Correct GOME-2 PFS v9 to report correctly on occurrence rates for GIADR files. Occurrence rate changed from “once per product” to “maximum twice per product” for all GIADR files.

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# 1 INTRODUCTION

## 1.1 Purpose and Scope

This document is the Global Ozone Monitoring Experiment-2 (GOME-2) 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 conventions used by this document are defined in the EPS Product Conventions Document [AD 3].

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 describes the scope of the document
- Section 2 details the product formats for Level 1a and 1b products
- Section 3 details the occurrence rates of the various records within the Level 1a or 1b product
- Section 4 lists the enumerated variables used within the level and their possible values and associated meanings
- Section 5 provides a history of version numbers for the records defined within the document
- Appendix A links to detailed tables describing the record formats

## 1.3 Applicable Documents

<i>No.</i>	<i>Document Title</i>	<i>Reference</i>
AD 1	EPS Generic Product Format Specification.	EPS/GGS/SPE/96167.
AD 2	EPS Ground Segment GOME-2 Level 1 Product Generation Specification,	EPS/SYS/SPE/990011
AD 3	EPS Product Conventions Document	EPS/SYS/TEN/990007



## 2 STRUCTURE OF GOME-2 LEVEL 1 PRODUCTS FORMAT

### 2.1 Form

The product format for both GOME-2 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 GOME-2 Level 1a and 1b products.

An array of Variable Scale Factor Integers shall be stored as an array of the compound data type, and not as an array of scale factors followed by an array of the integer type (the second solution being suggested but not strictly required in [AD 1]).

### 2.2 Generic Record Header Fields

All generic record header fields of the instrument- or level-specific records defined in this document shall have an INSTRUMENT\_GROUP value of GOME. See[AD 1]).

The RECORD\_SUBCLASS shall have the value 1 if there is only one record defined for the record class. For record classes with more than one subclass, RECORD\_SUBCLASS is defined in the tables below.

The RECORD\_START\_TIME for a Measurement Data Record (both Level 1a and Level 1b) shall be the UTC time corresponding to the first scan position in this record, for example,  $t_{\psi,0}$  as determined in Module Determine UTC Time Grid. The RECORD\_END\_TIME for a Measurement Data Record (both Level 1a and Level 1b) shall be the UTC time corresponding to the last scan position in this record,  $t_{\psi,64}$  as determined in Module Determine UTC Time Grid. See [AD 2]).

### 2.3 Level 1a

#### 2.3.1 Secondary Product Header Record

The Level 1a SPHR is detailed in the Annex (Appendix A) to this document. Note that the SPHR is common to both the Level 1a and Level 1b products.

#### 2.3.2 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include those auxiliary datasets used by the GOME-2 PGF but not written into the GOME-2 Level 1a product. This comprises for Level 0 to 1a processing initialisation datasets, pre-flight calibration key datasets, orbit datasets and correction factor datasets as detailed in [AD 2]. The referencing format is to be defined by ASPI.

There are three subclasses of GEADR for the Level 1a Product.

##### 2.3.2.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
GEADR-Static	Surface elevation (topography) and land-sea mask required for Level 1a processing (STA file)	3
GEADR-Initialisation	Initialisation parameters (INS file)	7
GEADR-KeyData	Pre-flight calibration key data (CAL file)	8

*Table 1: Level 1a GEADR Subclasses*

### 2.3.3 Global Internal Auxiliary Data Record

There are four subclasses of GIADR for the Level 1a Product. These are detailed in the Annex (Appendix A) to this document.

#### 2.3.3.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
GIADR-1a-Bands	Level 1a band definition parameters	1
GIADR-1a-Steps	Level 0 to 1a applicable calibration steps	2
GIADR-1a-MME	Müller Matrix Elements	3
GIADR-Channels	Definition of wavelength (and corresponding pixel) ranges for valid data (also used in Level 1b)	4

*Table 2: Level 1a GIADR Subclasses*

### 2.3.4 Variable External Auxiliary Data Record

There are four subclasses of VEADR for the Level 1a Product.

#### 2.3.4.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VEADR-InFlightCal	In-flight calibration data (IFC file)	1
VEADR-1a-CorrectionFactor	Degradation correction factors (COR file)	2
VEADR-TimeCorrelation	Time correlation information (OBT file)	3
VEADR-Orbit	Orbit state vector (OSV file)	4

*Table 3: Level 1a VEADR Subclasses*

### 2.3.5 Variable Internal Auxiliary Data Record

There are five subclasses of VIADR for the Level 1a Product. These are detailed in the Annex (Appendix A) to this document.

#### 2.3.5.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VIADR-1a-Dark	Dark signal parameters	1
VIADR-1a-PPG	Pixel-to-Pixel Gain parameters	2
VIADR-1a-Etalon	Etalon parameters	3
VIADR-1a-Spec	Spectral calibration parameters	4
VIADR-SMR	Solar Mean Reference spectrum parameters (also used in Level 1b)	5

*Table 4: Level 1a VIADR Subclasses*

### 2.3.6 Measurement Data Record

There are five subclasses of MDR for the Level 1a product. They are detailed in the Annex to this document.

### 2.3.6.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
MDR-1a-Earthshine	Earthshine measurements	1
MDR-1a-Calibration	Calibration measurements (except sun and moon)	2
MDR-1a-Sun	Sun measurements	3
MDR-1a-Moon	Moon measurements	4
MDR-1a-Other	Other instrument modes	5

*Table 5: Level 1a MDR Subclasses*

**Note:** The integration period for an MDR is variable, and consequently the size of the MDR-1a-Earthshine, MDR-1a-Calibration, MDR-1a-Sun and MDR-1a-Moon records is variable.

## 2.4 Level 1b

### 2.4.1 Secondary Product Header Record

The Level 1b SPHR is detailed in the Annex (Appendix A) to this document. Note that the SPHR is common to both the Level 1a and Level 1b products.

### 2.4.2 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include those auxiliary datasets used by the GOME-2 PGF but not written into the GOME-2 Level 1b product. This comprises for Level 1a to 1b processing the initialisation datasets, static auxiliary datasets and pre-flight calibration key datasets as detailed in [AD 2]. The referencing format is to be defined by ASPI.

There are three subclasses of GEADR for the Level 1b Product.

#### 2.4.2.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
GEADR-Static	Surface elevation (topography) plus transmittance database, surface reflectance database and TOMS UV reflectance database required for Level 1b cloud algorithm (STA file)	3
GEADR-Initialisation	Initialisation parameters (INS file)	7
GEADR-KeyData	Pre-flight calibration key data (CAL file)	8

*Table 6: Level 1b GEADR Subclasses*

### 2.4.3 Global Internal Auxiliary Data Record

There are four subclasses of GIADR for the Level 1b Product. These are detailed in the Annex (Appendix A) to this document. Note that although the *format* of GIADR-1a-Steps and GIADR-1b-Steps is the same, separate records are used because the assignment to individual calibration steps is different between Level 1a and Level 1b, i.e., calibration step number  $N$  has a different meaning in Level 1a and Level 1b. Therefore the *content* of GIADR-1a-Steps and GIADR-1b-Steps will be different.

### 2.4.3.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
GIADR-Channels	Definition of wavelength (and corresponding pixel) ranges for valid data (also used in Level 1a)	4
GIADR-1b-Bands	Level 1b band definition parameters	5
GIADR-1b-Steps	Level 1a to 1b applicable calibration steps	6
GIADR-1b-PMDBandDef	PMD band definition information	7

*Table 7: Level 1b GIADR Subclasses*

## 2.4.4 Variable External Auxiliary Data Record

There is one subclass of VEADR for the Level 1b Product.

### 2.4.4.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VEADR-InFlightCal	In-flight calibration data (IFC file)	1
VEADR-TimeCorrelation	Time correlation information (OBT file)	3
VEADR-Orbit	Orbit state vector (OSV file)	4

*Table 8: Level 1b VEADR Subclasses*

## 2.4.5 Variable Internal Auxiliary Data Record

There is one subclass of VIADR for the Level 1b Product. Note that this subclass, VIADR-SMR, is common to both the Level 1a and 1b products. This is detailed in the Annex (Appendix A) to this document.

### 2.4.5.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VIADR-SMR	Solar Mean Reference spectrum parameters (also used in Level 1a)	5

*Table 9: Level 1b VIADR Subclasses*

## 2.4.6 Measurement Data Record

There are four subclasses of MDR for the Level 1b product. They are detailed in the Annex to this document.

### 2.4.6.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
MDR-1b-Earthshine	Earthshine measurements	6
MDR-1b-Calibration	Calibration measurements (except sun and moon)	7
MDR-1b-Sun	Sun measurements	8
MDR-1b-Moon	Moon measurements	9

*Table 10: Level 1b MDR Subclasses*

**Note:** The integration period for an MDR is variable, and consequently the size of the MDR-1b-Earthshine, MDR-1b-Calibration, MDR-1b-Sun, and MDR-1b-Moon records is variable.

### 3 OCCURRENCE INFORMATION

An example timeline illustrating the variability of the occurrence rate and size of the records identified is given in [AD 2]. Note that the tables below do NOT define the order of records within the product. The record order is defined by the EPS Generic Product Format Specification [AD 1].

#### 3.1 Level 1a Product

<i>Record</i>	<i>Occurrence</i>
MPHR	Once per product
SPHR	Once per product
GEADR-Static	Once per product
GEADR-Initialisation	Once per product
GEADR-KeyData	Once per product
GIADR-1a-Bands	Maximum twice per product
GIADR-1a-Steps	Maximum twice per product
GIADR-1a-MME	Maximum twice per product
GIADR-Channels	Maximum twice per product
VEADR-InFlightCal	Variable occurrence rate.
VEADR-1a-CorrectionFactor	Once per product
VEADR-TimeCorrelation	Maximum twice per product
VEADR-Orbit	Maximum twice per product
VIADR-1a-Dark	Variable occurrence rate. To be filled with those Dark signal corrections to be used subsequently during the processing of the complete Level 1b product.
VIADR-1a-PPG	Variable occurrence rate. To be filled with those PPG corrections to be used subsequently during the processing of the complete Level 1b product.
VIADR-1a-Etalon	Variable occurrence rate. To be filled with those Etalon corrections to be used subsequently during the processing of the complete Level 1b product.
VIADR-1a-Spec	Variable occurrence rate. To be filled with those spectral calibration parameters to be used subsequently during the processing of the complete Level 1b product.
VIADR-SMR	Maximum twice per product
MDR-1a-Earthshine	Variable occurrence rate / variable size
MDR-1a-Calibration	Variable occurrence rate / variable size
MDR-1a-Sun	Variable occurrence rate / variable size
MDR-1a-Moon	Variable occurrence rate / variable size
MDR-1a-Other	Variable occurrence rate

### 3.2 Level 1b Product

<i>Record</i>	<i>Occurrence</i>
MPHR	Once per product
SPHR	Once per product
GEADR-Static	Once per product
GEADR-Initialisation	Once per product
GEADR-KeyData	Once per product
GIADR-Channels	Maximum twice per product
GIADR-1b-Bands	Maximum twice per product
GIADR-1b-Steps	Maximum twice per product
GIADR-1b-PMDBandDef	Maximum twice per product
VEADR-InFlightCal	Variable occurrence rate.
VEADR-TimeCorrelation	Maximum twice per product
VEADR-Orbit	Maximum twice per product
VIADR-SMR	Maximum twice per product
MDR-1b-Earthshine	Variable occurrence rate / variable size
MDR-1b-Calibration	Variable occurrence rate / variable size
MDR-1b-Sun	Variable occurrence rate / variable size
MDR-1b-Moon	Variable occurrence rate / variable size

## 4 ENUMERATION VARIABLES

The following tables list the enumeration variables used in the GOME-2 Level 1a and 1b products. For all variables listed, all the possible values and associated meanings are given. A reference to equivalent variable names used in [AD 2] is also provided.

<i>PFS Variable Name</i>	<i>Description and Equivalent Variable Name in [AD 2]</i>	<i>Value</i>	<i>Description of Value</i>	<i>Equivalent Name for Value in [AD 2]</i>
CHANNEL_NUMBER	Channel number	1	Main FPA channel 1	N/A
		2	Main FPA channel 2	
		3	Main FPA channel 3	
		4	Main FPA channel 4	
		5	PMD channel p	
		6	PMD channel s	
BAND_NUMBER	Band number (do not confuse with PMD bands)	1	Main FPA band 1a	N/A
		2	Main FPA band 1b	
		3	Main FPA band 2a	
		4	Main FPA band 2b	
		5	Main FPA band 3	
		6	Main FPA band 4	
		7	PMD p blocks CDE	
		8	PMD s blocks CDE	
		9	PMD p block B	
		10	PMD s block B	
PMD_READOUT	PMD readout mode <i>PMD_readout</i>	0	Nominal	<i>nominal</i>
		1	Solar	<i>solar</i>
		2	Calibration	<i>calibration</i>
		3	Various (PMD read-out mode changes within a scan)	<i>various</i>

<i>PFS Variable Name</i>	<i>Description and Equivalent Variable Name in [AD 2]</i>	<i>Value</i>	<i>Description of Value</i>	<i>Equivalent Name for Value in [AD 2]</i>
PMD_TRANSFER	PMD transfer mode <i>PMD_transfer</i>	1	Band + Raw	<i>band + raw</i>
		2	Band + Mixed	<i>band + mixed</i>
		3	Raw transfer	<i>raw</i>
		4	Various (PMD transfer mode changes within a scan)	<i>various</i>
OBSERVATION_MODE	Observation mode <i>Mode</i>	0	Nadir	<i>Nadir_scan</i>
		1	North pole scanning	<i>Nth_pole_scan</i>
		2	South pole scanning	<i>Sth_pole_scan</i>
		3	Other scanning	<i>Other_scan</i>
		4	Nadir static	<i>Nadir_static</i>
		5	Other static	<i>Other_static</i>
		6	Dark	<i>Dark</i>
		7	LED	<i>LED</i>
		8	WLS	<i>WLS</i>
		9	SLS	<i>SLS</i>
		10	SLS over diffuser	<i>SLS_diff</i>
		11	Sun	<i>Sun</i>
		12	Moon	<i>Moon</i>
		13	Idle	<i>Idle</i>
		14	Test	<i>Test</i>
		15	Dump	<i>Dump</i>
16	Invalid	<i>Invalid</i>		



<i>PFS Variable Name</i>	<i>Description and Equivalent Variable Name in [AD 2]</i>	<i>Value</i>	<i>Description of Value</i>	<i>Equivalent Name for Value in [AD 2]</i>
<i>APPLIED_CAL_STEPS</i>	Calibration steps, Level 1a	Calibration steps applied in the processing are reported in GIADR-1a-Steps in two-dimensional boolean arrays. The first dimension corresponds to enumerated variable OBSERVATION_MODE. For the second dimension, an enumerated variable with values defined by the corresponding algorithm numbers (i.e., <i>N</i> for algorithm A2. <i>N</i> ) in [AD 2] shall be used.		
<i>APPLIED_CAL_STEPS</i>	Calibration steps, Level 1b	As Calibration steps, Level 1a, with <i>N</i> for algorithm A3. <i>N</i> .		
<i>PCD_DARK F_DARK_MISS  PCD_PPG F_PPG_MISS  PCD_ETALON F_ETALON_MISS</i>	Flag indicating that missing mean <i>Dark/LED/WLS</i> calibration mode measurements have been filled by interpolation or that one complete channel/ band is missing	0	no missing pixels	<i>no_missing</i>
		1	missing pixels filled by interpolation	<i>some_missing</i>
		2	complete channel/ band missing	<i>all_missing</i>
<i>PCD_PPG PPG_BACK</i>	Switch for selection of backup source (WLS) in case of LED failure <i>PPG_back</i>	0	LED	<i>LED</i>
		1	WLS backup	<i>WLS</i>
<i>PCD_ETALON ETALON_BACK</i>	Switch for selection of backup source (SMR) in case of WLS failure <i>Eta_back</i>	0	WLS	<i>WLS</i>
		1	SMR backup	<i>Sun</i>
<i>PCD_ETALON ETALON_ALGO</i>	Etalon correction algorithm selection <i>Eta_algo</i>	0	Algorithm option 1	<i>Algo1</i>
		1	Algorithm option 2	<i>Algo2</i>
<i>PCD_BASIC F_SUNGLINT</i>	Flag indicating risk of sun-glint	0	no risk	<i>NoRisk</i>
		1	low risk	<i>LowRisk</i>
		2	high risk	<i>HighRisk</i>
<i>OUTPUT_SELECTION</i>	Switch indicating whether to calculate the absolutely calibrated radiance or a sun-normalised radiance <i>SunNorm</i>	0	Absolutely calibrated radiance	<i>AbsRad</i>
		1	Sun normalised radiance	<i>NormRad</i>

<i>PFS Variable Name</i>	<i>Description and Equivalent Variable Name in [AD 2]</i>	<i>Value</i>	<i>Description of Value</i>	<i>Equivalent Name for Value in [AD 2]</i>
CLOUD FAIL_FLAG	Fail flag for cloud parameter fitting <i>CloudFail</i>	0	Successful fit	<i>success</i>
		1	R out of range	<i>reflectivity_out_of_range</i>
		2	$\theta_0$ out of range	<i>solar_zenith_out_of_range</i>
		3	$\theta$ out of range	<i>satellite_zenith_out_of_range</i>
		4	Fit did not converge	<i>no_convergence</i>
		5	Missing input data	<i>missing_input</i>
CLOUD FIT_MODE	Flag indicating cloud fitting mode <i>FitMode</i>	0	Default fitting for c and $z_c$	<i>cloud</i>
		1	Snow/ice mode for A and z	<i>snow_ice</i>
PCD_BASIC DATA	F_OLD_CAL_ DATA Flag to indicate that in-flight auxiliary calibration data in use in the Level 0 to 1 processing is older or outside a user-specified validity range. Given are the decimal values of the most significant bit. <b>Note</b> : Multiple bits can be set at a time.	0	No in-flight auxiliary calibration data is old	N/A
		1	Dark signal correction old	
		2	PPG correction old	
		4	Spectral calibration parameters old	
		8	Etalon correction old	
		16	SMR old	
		32	Missing dark signal	
		64	Missing spectral calibration	
		128	Missing other	
		$2^y$	Bad dark signal (either missing or old) in band 0...9 with $y=8,9,\dots,17$ respectively	
SCAN_DIRECTION	Flag to indicate the direction of scanning per read-out.	0	other	N/A
		1	forward	
		2	backward	

Table 11: Enumerated variables used in the GOME-2 PFS

## 5 RECORD FORMAT VERSION CONTROL

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

1. In PFS Issue 6:4, records GIADR-1a-Bands, GIADR-1b-Bands, GIADR-Channels and VIADR-1a-Spec were changed, but their format version number was erroneously kept at 1 instead of being updated to 2. This error has been corrected.
2. Format version 2 for records MDR-1b-\* was used as an intermediate version between PFS Issues 6:4 and 6:5. Therefore format version 3 is used for these records from Issue 6:5 on.

<i>Record Subclass</i>	<i>Format Version Number</i>	<i>Issue Defined</i>
SPHR	2	6.5
GEADR-TimeCorrelation	1	6.5
GEADR-Orbit	1	6.5
GEADR-Static	1	7.1
GEADR-Initialisation	1	6.5
GEADR-KeyData	1	6.5
GEADR-1a-CorrectionFactor	1	6.5
GIADR-1a-Bands	2	6.4
GIADR-1a-Steps	1	6.2 (CDR)
GIADR-1a-MME	2	6.5
GIADR-Channels	3	9
VEADR-InFlightCal	1	7.1
VIADR-1a-Dark	1	6.2 (CDR)
VIADR-1a-PPG	1	6.2 (CDR)
VIADR-1a-Etalon	1	6.2 (CDR)
VIADR-1a-Spec	4	7.3
VIADR-SMR	1	6.2 (CDR)
MDR-1a-Earthshine	3	9
MDR-1a-Calibration	3	9
MDR-1a-Sun	3	9
MDR-1a-Moon	3	9
MDR-1a-Other	1	6.2 (CDR)
GIADR-1b-Bands	2	6.4
GIADR-1b-PMDBandDef	1	7.3
GIADR-1b-Steps	1	6.2 (CDR)
MDR-1b-Earthshine	5	9
MDR-1b-Calibration	4	9
MDR-1b-Sun	4	9
MDR-1b-Moon	4	9

*Table 12: Record Format Version Numbers*

## **APPENDIX A      DETAILED SPECIFICATION OF GOME LEVEL 1 DATA RECORDS**

The Annex that follows contains detailed format specifications for all the Variable Internal and Measurement Data Records in GOME Level 1 products listed in this document.

The Annex is maintained as a spreadsheet and is accessible under EUMETSAT DM Tool Document Reference: EPS.MIS.SPE.97232.ANX

[DOCSLIB-#215487-GOME-2 Level 1 Product Format Specification - Annex](#)

<b>This Document</b>	
<b>Title</b>	<b>GOME LEVEL 1 PRODUCT FORMAT SPECIFICATION (ANNEX)</b>
<b>Reference Number</b>	EPS/MIS/SPE/97232 (ANNEX)
<b>Revision History</b>	
<b>Issue 4 Draft B - Jan 2001</b>	Complete Update corresponding to document: GOME-2 Level 0 to 1b Processing: Input/Output Data Defintion, MO-IS-DLR-GO-008, Issue 1/A, 15 Nov 00
<b>Issue 4 Draft C - May 2001</b>	Modifications to reflect update of GOME-2 PGS as far as possible
	Modification of MDR/ADR for 1B product to match MDR/ADR for 1A
<b>Issue 5 Revision 0</b>	Issue for CGS PDR
<b>Issue 5 Revision 1</b>	Revised Issue for CGS PDR
<b>Issue 5 Revision 2</b>	For level 1a and 1b, moved ADR-Earthshine fields into MDR-Earthshine
<b>Issue 5 Revision 3 DRAFT</b>	Corrections to harmonise with PGS: MDR-1a-Dark, MDR-1a-P2PGain, MDR-1a-Etalon, MDR-1a-Spectral, MDR-1a-SMR deleted.
	GIADR-1a-PSP and GIADR-1a-RSP deleted.
	VIADR-1a-MME added.
	GIADR-1a-Dark/P2PGain/Etalon/SpecCal/SMRS changed into VIADR-1a-...
	Compounds, MDR-1a-Earthshine: Single scattering polarisation parameters separated from measured Stokes fractions
	New Compound for moon geolocations
	MDR-1a-Moon corrected. Now the only difference between MDR-1a-Moon and MDR-1a-Calibration is that MDR-1a-Moon has additional geolocation information.
	Field sizes in GIADR-1a-Bands, GIADR-1a-P2PGain, GIADR-1a-Errors corrected.
<b>Issue 6: 0</b>	<b>Compounds:</b>
	Revised: BAND-M, BAND-P, B-PMD, COORD, POLSS, POLV
	Deleted: GEO_B, GEO_E, GEO_M, BDINFO, PCD_E, PCD_C, PCD_O
	Added: GEO_BASIC, GEO_EARTH, GEO_EARTH_ACTUAL, GEO_SUN, GEO_MOON, PCD_DARK, PCD_PPG, PCD_SPEC, PCD_ETALON, PCD_SMR, PCD_BASIC, PCD_EARTH, PCD_EARTH_1B, CLOUD
	<b>Records:</b>
	SPH-1a revised and renamed SPH
	GIADR-1a-Steps, GIADR_Channels, GIADR-1b-Steps and GIADR-1b-Bands added
	GIADR-1a-Static, GIADR-1a-PBA, GIADR-1a-Errors and GIADR-1b-SpecCal deleted
	GIADR-1a-Bands and GIADR-1a-MME revised

	VIADR-1a-Dark, VIADR-1a-Etalon revised
	VIADR-1a-SpecCal revised and renamed VIADR-Spec
	VIADR-1a-SMRS revised and renamed VIADR-SMR
	MDR-1a-Earthshine, MDR-1a-Moon, MDR-1a-Calibration and MDR-1b-Earthshine revised
	MDR-1a-Sun, MDR-1b-Calibration, MDR-1b-Sun, and MDR-1b-Moon added
<b>Issue 6: 1</b>	Scaling factors added.
	UTC_TIME added to GEO_BASIC.
	Treatment of short wavelength polarisation data made consistent between level 1a and level 1b products.
<b>Issue 6: 2</b>	All spares removed in order to conform to Generic PFS concept of version control.
	Minor editorial changes (textual clarifications)
	<b>Compounds:</b>
	Deleted: B_PMD
	Revised (apart from removal of spares which affects all compounds): GEO_EARTH, GEO_EARTH_ACTUAL, PCD_DARK, PCD_PPG, PCD_SMR, PCD_BASIC, CLOUD, POLSS, POLV
	<b>Records:</b>
	SPH revised in order to conform to Generic PFS 6.2: u_integer2 changed to u-integer, number of encoded characters reduced from 6 to 5, no array variables.
	GIADR-Channels, GIADR-1a-Bands, GIADR-1b-Bands: Channel/band numbers are now enumerated variables
	GIADR-Channels: Start/end wavelength of valid range added.
	VIADR-1a-Dark, VIADR-1a-PPG, VIADR-1a-Etalon, VIADR-1a-Spec, VIADR-SMR: Date/time type changed from long cds time to short cds time
	VIADR-1a-Dark: Channel number added
	VIADR-1a-Etalon: Position of wavelength within record changed
	VIADR-1a-SMR: PMD readout mode added, position of wavelength within record changed
	All MDRs: START_TIME removed as it is redundant with RECORD_START_TIME field in the Generic Record Header
	All MDRs: Conditions for setting generic quality indicators slightly changed.
	All MDRs: First two dimensions exchanged for band data records in order to have band data for a given readout in contiguous fields.
MDR-1a-Earthshine, MDR-1a-Calibration, MDR-1a-Sun, MDR-1a-Moon revised: order of PMD p and PMD s now as in SDP (PMD p first), PMD data type harmonised with main channels (u-integer2 instead of B_PMD)	

	MDR-1b-*: order of PMD p and PMD s now as in SDP (PMD p first), PMD short wavelength (block B) data type harmonised with PMD block CDE data type (BAND_P instead of V-INTEG4)
<b>Issue 6: 3</b>	Changes according to MO-DCP-GMV-GO-0008 (see also e-mail GMV-GOME2-MAI-094/02)
	<b>Compounds:</b>
	GEO_MOON compound size corrected.
	<b>Records:</b>
	MDR-1a-Moon, MDR-1b-Moon automatically updated according to change in GEO_MOON compound size.
	MDR-1a-Sun and MDR 1a-Moon field offsets corrected.
	MDR-1b-Earthshine: Missing value for cloud compound size added. Field offsets updated accordingly.
<b>Issue 6:4</b>	<b>Records:</b>
	VIADR-1a-Spec: Field POLY_COEFF separated into two individual fields for FPA and PMD channels with different scaling factors. Record size remains unchanged.
	GIADR-Channels, GIADR-1a-Bands, GIADR-1b-Bands: GIADRs per channel/band replaced by single GIADRs containing all channels/bands. Needed because a GIADR must occur exactly once per product.
<b>Issue 6:5</b>	<b>Records:</b>
	All records: Record subclass versions (to be used in GRH) specified. Subclass version is set to 1 for those records which have not changed compared to PFS issue 6:3, to 2 for those records which have been changed since PFS issue 6:3 (including those changed in issue 6:4) except the MDR-1b-* records, and to 3 for the MDR-1b-* records. Record subclass versions are repeated in the main part of the PFS, but it is convenient to have them as well on the same page as the record descriptions.
	SPH: Fields N_INV_STOKES_* renamed to N_MISS_STOKES_*. Fields N_BAD_STOKES_* added. Field PROCESSING_INDICATOR added
	GIADR-1a-MME: PMD number of wavelengths changed from 256 to 279 (see sheet Parameters). This changes overall number of wavelengths from 4608 to 4654. Variable dimensions clarified by using parameter names instead of numbers (similar to the MDR specifications).
	GIADR-1a-MME: Field MME_ERR_POL_SHIFT added

MDR-1*-Earthshine, MDR-1*-Calibration, MDR-1*-Sun, MDR-1*-Moon: Field REC_LENGTH added. For the first record dimension of band data, REC_LENGTH is replacing NUMBER_OF_PIXELS from GIADR-1*-Bands. For the main channels, REC_LENGTH and NUMBER_OF_PIXELS will be the same, but for the PMD channels they will differ. See also sheet "Parameters". (DCP MO-DCP-GMV-GO-0024)
MDR-1b-Earthshine, MDR-1b-Calibration, MDR-1b-Sun, MDR-1b-Moon: Fields WAVELENGTH_* (one for each of the ten bands) added to store wavelengths only once per scan (MDR) instead of repeating them for every readout, thereby significantly (by 25 %) reducing the size of the level 1b products. See also corresponding changes in compounds BAND_M, BAND_P.
<b>Compounds:</b>
GEO_EARTH: Field SURFACE_ELEVATION added. Description of fields CENTRE, SOLAR_ZENITH, SOLAR_AZIMUTH, SAT_ZENITH, SAT_AZIMUTH, SCAT_ANGLE updated with respect to height for which they are calculated (CENTRE for ground instead of TOA, other fields for h0 instead of TOA, see also PGS)
GEO_EARTH_ACTUAL: Fields SCANNER_ANGLE_ACTUAL, SOLAR_ZENITH_ACTUAL, SOLAR_AZIMUTH_ACTUAL, SAT_ZENITH_ACTUAL, SAT_AZIMUTH_ACTUAL added
GEO_SUN: Scaling factor for field VEL_SAT_SUN reduced from 6 to 3 to avoid overflow
CLOUD: Fields CLOUD_ALBEDO, SURFACE_ALBEDO, SURFACE_PRESSURE added
PCD_Earth: Field F_INV_STOKES renamed to F_MISS_STOKES
PCD_Earth: Field F_BAD_STOKES added
PCD_Earth: Field SIGMA_SCENE added
POLSS: Field COS_2CHI_POL_SS replaced by CHI_POL_SS
POLSS: Field F_POLSS_WL renamed to WL_POLSS
POLSS: Field F_POLSS renamed to Q_POLSS for clarity (because there are two <F>rations now, q and u, and because it's not a <F>lag either)
POLSS: Field U_POLSS added
POLV: Field F_POL renamed to Q_POL
POLV: Field F_POL_ERR renamed to Q_POL_ERR
POLV: Field F_POL_WL renamed to WL_POL
BAND_M, BAND_P: Field LAMBDA_RAD (storing the wavelength) removed. See corresponding changes in records MDR-1b-*
<b>Parameters:</b>



	<p>MME number of wavelengths (n_lambda_*) added</p> <p>Description updated for length of band data records (* and n*) which is now defined in MDR, no longer in GIADR-1*-Bands.</p> <p>Description corrected for n7 and n8 (exchanged PMD s and p, allowed raw or band pixel transfer).</p> <p>m7 and m8 (number of PMD readouts per scan) changed from 16 to 256 which is the correct number for band transfer mode.</p> <p>Column with band numbers added.</p>
<b>Issue 7:0</b>	No Changes to Annex.
<b>Issue 7:1</b>	<p>Scaling factor for VIADR-1a-Spec field POLY_COEFF_PMD changed from 3 to 0 to avoid overflow.</p> <p>For the length of band data records I7, I8, the obsolete remark "This number does not depend on PMD transfer mode" has been removed as they do in fact depend on PMD transfer mode. For the two band transfer modes they are set to 304, for the raw transfer mode they are set to 256. This is done to minimise level 1a product size rather than storing 48 dummy words per PMD readout. I7, I8 are specified in the REC_LENGTH field of the level 1a MDR.</p> <p>Criteria for which the generic quality flag DEGRADED_PROC_MDR will be raised have been reduced to avoid unnecessary operator warnings.</p>
<b>Issue 7:2</b>	<p>Fields GOOD_FIT and FINAL_CHI_SQUARE from the compound variable CLOUD, both previously u-integer2 have been combined so that GOOD_FIT is no longer written to the product and FINAL_CHI_SQUARE becomes u-integer4. The size and structure of the product does not change, only the use of these specific 4 bytes. Additionally the scaling factor for FINAL_CHI_SQUARE has been reduced from 6 to 5. These changes were necessary to accommodate the dynamic range of FINAL_CHI_SQUARE which was not possible using u-integer2</p> <p>The scaling factors for E_FIT_1 and E_FIT_2 have been changed to be 1 and 4 respectively to accommodate the range of values experienced with in-flight data.</p> <p>The flag F_HOT no longer causes DEGRADED_PROC_MDR to be raised as hot pixels occur regularly in the SAA due to particle bombardment and are filtered out by on-ground processing where necessary. The instrument is not degraded as such.</p>
<b>Issue 7:3</b>	<p>VIADR-1a-SPEC updated to replace the polynomial coefficients describing the FPA and PMD spectral calibration with the complete spectral grid in both cases. Field PCD_SPEC: N_ITERATIONS changed to be SHIFT_PER_WINDOW with size unchanged. Record GIADR-1b-PMDBandDef added.</p>

<b>Issue 7:4</b>	No changes to Annex
<b>Version 8A - 11/09/2008</b>	Migrated into Hummingbird. Contents identical with issue 7.4.
<b>Version 9 - 01/07/2010</b>	Changes to PCD_BASIC in Compounds: increased read-out numbers predominantly by changing variable type to bitstring. GEO_EARTH_ACTUAL: compound field added for scan-direction index. Added field to BAND_P compound: UNCORR_RAD provides PMD-P and PMD_S read-outs which are not corrected for the instrument sensitivity to polarisation. UNCORR_ERR_RAD provides the corresponding error. MDR-1b-Earthshine: Introduction of new GEO_EARTH_ACTUAL_[#] fields where # is from 1 to 10 and corresponds to the unique integration time index. Their field dimension is given by N_UNIQUE_INT and GEO_REC_LENGTH. CHANNEL_READOUT_SEQ field added in GIADR-Channel for detector pixel read-out sequence direction. Two cloud parameter fields CLOUD_PMD_1 and CLOUD_PMD_2 added in CLOUD compound for PMD derived cloud parameters. MDR level 0 GHR start and stop time have been added as additional fields to the ISP and ISP_HEAD compounds.
<b>Version 9A - 04/03/2011</b>	<b>ODT_DCR_241</b>
	MDR-1a-Other: Version number should be 2. Corrected in this version.
	Compounds: Updated Flag descriptors in PCD_BASIC. Updated CLOUD parameter description
	Types: Positions of GEO_SUN and GEO_MOON swapped to put into correct alphabetic order.

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COORD - Geographical co-ordinate (ISO 6709)									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
LATITUDE	Geodetic latitude (-90 to 90, -90 is the south pole, 90 the north pole, 0 the equator) (Earth-fixed CS)	6	deg	1	1	1	integer4	4	4
LONGITUDE	Geocentric longitude (-180 to 180, meridian is 0 and minus is going west) (Earth-fixed CS)	6	deg	1	1	1	integer4	4	4
Size of the Compound									8
GEO_BASIC - Basic geolocation record for all measurement modes									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
UTC_TIME	UTC time associated with every second scanner position (0,2,...,62)	NA		32	1	1	short cds time	6	192
SUB_SATELLITE_POINT	Geodetic latitude and geocentric longitude of sub-satellite point (earth-fixed CS)	NA		32	1	1	COORD	8	256
SATELLITE_ALTITUDE	Geodetic altitude of satellite (earth-fixed CS)	3	m	32	1	1	integer4	4	128
SOLAR_ZENITH_ANGLE	Solar zenith angle (Satellite Relative Actual CS)	6	deg	32	1	1	integer4	4	128
SOLAR_AZIMUTH_ANGLE	Solar azimuth angle (Satellite Relative Actual CS)	6	deg	32	1	1	integer4	4	128
Size of the Compound									832
GEO_EARTH - Additional geolocation record for earthshine measurements, given for fixed grid									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
SCAN_CORNER	Geodetic latitude and geocentric longitude for the complete scan at ground, points ABCD (earth-fixed CS)	NA		4	1	1	COORD	8	32
SCAN_CENTRE	Geodetic latitude and geocentric longitude for the complete scan at ground, point F (earth-fixed CS)	NA		1	1	1	COORD	8	8
CORNER	Geodetic latitude and geocentric longitude at ground, points ABCD (earth-fixed CS)	NA		32	4	1	COORD	8	1024
CENTRE	Geodetic latitude and geocentric longitude at ground, point F (earth-fixed CS)	NA		32	1	1	COORD	8	256
SOLAR_ZENITH	Solar zenith angle at height h0 (specified as initialisation parameter), points EFG (topocentric CS)	6	deg	32	3	1	integer4	4	384
SOLAR_AZIMUTH	Solar azimuth angle at height h0, points EFG (topocentric CS)	6	deg	32	3	1	integer4	4	384
SAT_ZENITH	Satellite zenith angle at height h0, points EFG (topocentric CS)	6	deg	32	3	1	integer4	4	384
SAT_AZIMUTH	Satellite azimuth angle at height h0, points EFG (topocentric CS)	6	deg	32	3	1	integer4	4	384
SCAT_ANGLE	Scattering angle at height h0, point F (topocentric CS)	6	deg	32	1	1	integer4	4	128
SURFACE_ELEVATION	Land/sea floor elevation (above sea level), point F	3	m	32	1	1	integer4	4	128
EARTH_RADIUS	Radius of the earth	0	m	1	1	1	integer4	4	4
Size of the Compound									3116

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GEO_EARTH_ACTUAL - Additional geolocation record for the actual integration time of earthshine measurements									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
SCANNER_ANGLE_ACTUAL	Scanner viewing angle corresponding to actual integration time	6	deg	1	1	1	integer4	4	4
SCAN_DIRECTION	Scanning direction 1: forward, 2: backward, 0: other	NA		1	1	1	enumerated	1	1
CORNER_ACTUAL	Geodetic latitude and geocentric longitude at ground corresponding to actual integration time, points ABCD (earth-fixed CS)	NA		4	1	1	COORD	8	32
CENTRE_ACTUAL	Geodetic latitude and geocentric longitude at ground corresponding to actual integration time, points F (earth-fixed CS)	NA		1	1	1	COORD	8	8
SOLAR_ZENITH_ACTUAL	Solar zenith angle corresponding to actual integration time at height h0, points EFG (topocentric CS)	6	deg	3	1	1	integer4	4	12
SOLAR_AZIMUTH_ACTUAL	Solar azimuth angle corresponding to actual integration time at height h0, points EFG (topocentric CS)	6	deg	3	1	1	integer4	4	12
SAT_ZENITH_ACTUAL	Satellite zenith angle corresponding to actual integration time at height h0, points EFG (topocentric CS)	6	deg	3	1	1	integer4	4	12
SAT_AZIMUTH_ACTUAL	Satellite azimuth angle corresponding to actual integration time at height h0, points EFG (topocentric CS)	6	deg	3	1	1	integer4	4	12
READOUT_START_TIME	UTC time associated with the read-out of the detector pixel which is read out first per band	NA		1	1	1	short cds time	6	6
Size of the Compound									99
GEO_SUN - Additional geolocation record for Sun measurements									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
DISTANCE_SAT_SUN	Satellite-Sun distance	-3	m	1	1	1	integer4	4	4
VEL_SAT_SUN	Relative speed of satellite and sun (negative if satellite is moving towards the sun)	3	m/s	1	1	1	integer4	4	4
Size of the Compound									8
GEO_MOON - Additional geolocation record for Moon measurements									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
LUNAR_AZIMUTH	Lunar azimuth angle, points HJKLM (Satellite Relative Actual Reference CS)	6	deg	5	1	1	integer4	4	20
LUNAR_ELEVATION	Lunar elevation angle, points HJKLM (Satellite Relative Actual Reference CS)	6	deg	5	1	1	integer4	4	20
DISTANCE_SUN_MOON	Sun-Moon distance	-3	m	1	1	1	integer4	4	4
DISTANCE_SAT_MOON	Satellite-Moon distance	0	m	1	1	1	integer4	4	4
LUNAR_PHASE	Lunar phase angle (geometrical)	6	deg	1	1	1	integer4	4	4
LUNAR_FRACTION	Illuminated fraction of lunar disc	6		1	1	1	integer4	4	4
Size of the Compound									56

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PCD DARK - Product Confidence Data record for Dark Signal Correction									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
AV_DARK	Dark signal correction averaged per band	3	BU	1	1	1	integer4	4	4
AV_DARK_NOISE	Dark signal correction readout noise averaged per band	6	BU	1	1	1	integer4	4	4
F_AV_DARK	Flag indicating that AV_DARK exceeds a specified threshold	0		1	1	1	boolean	1	1
F_AV_DARK_NOISE	Flag indicating that AV_DARK_READ exceeds a specified threshold	0		1	1	1	boolean	1	1
F_DARK_MISS	Flag indicating that missing mean dark calibration mode measurements have been filled by interpolation or that complete band is missing	0		1	1	1	enumerated	1	1
<b>Size of the Compound</b>									<b>11</b>
PCD_PPG - Product Confidence Data record for PPG Correction									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
PPG_BACK	Switch indicating whether back-up algorithm using WLS for calculation of PPG has been used	0		1	1	1	enumerated	1	1
AV_PPG	PPG correction averaged per channel	6		6	1	1	integer4	4	24
STDDEV_PPG	Standard deviation of PPG per channel	9		6	1	1	integer4	4	24
F_AV_PPG	Flag indicating that AV_PPG exceeds a specified threshold	0		6	1	1	boolean	1	6
F_STDDEV_PPG	Flag indicating that STDDEV_PPG exceeds a specified threshold	0		6	1	1	boolean	1	6
F_PPG_MISS	Flag indicating that missing mean LED calibration mode measurements have been filled by interpolation or that complete channel is missing	0		6	1	1	enumerated	1	6
F_PPG_LED	Flag indicating LED status	0		1	1	1	u-byte	1	1
<b>Size of the Compound</b>									<b>68</b>
PCD_SPEC - Product Confidence Data record for Spectral Calibration									
FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	SIZE
N_LINES	Number of lines used for spectral calibration per main channel	0		4	1	1	u-integer2	2	8
MAX_LINE_DEV	Maximum deviation between fitted and true line position per channel	6	nm	4	1	1	integer4	4	16
AV_LINE_DEV	Average deviation between fitted and true line position per channel	6	nm	4	1	1	integer4	4	16
LINE_DEV	Deviation between fitted and true line positions per channel	6	nm	4	30	1	integer4	4	480
F_N_LINES	Flag indicating that N_LINES is insufficient	0		4	1	1	boolean	1	4
F_MAX_LINE_DEV	Flag indicating that MAX_LINE_DEV exceeds a specified threshold	0		4	1	1	boolean	1	4
F_SPEC_MISS	Flag indicating that no spectral calibration was generated due to missing mean SLS mode measurements per channel	0		4	1	1	boolean	1	4
SHIFT_PER_WINDOW	Derived shift in fine grid pixels for PMD spectral calibration, per fitting window and PMD channel	0		2	20	1	integer2	2	80

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<b>F_NO_CONVERGENCE</b>	Flag indicating that PMD spectral calibration has not converged, per PMD channel	0		2	1	1	boolean	1	2
<b>F_GOF</b>	Flag indicating that PMD spectral calibration goodness of fit is not acceptable	0		2	1	1	boolean	1	2
<b>Size of the Compound</b>									<b>616</b>
<b>PCD_ETALON - Product Confidence Data record for Etalon Correction</b>									
<b>FIELD</b>	<b>DESCRIPTION</b>	<b>SF</b>	<b>UNITS</b>	<b>DIM1</b>	<b>DIM2</b>	<b>DIM3</b>	<b>TYPE</b>	<b>TYPE SIZE</b>	<b>SIZE</b>
<b>ETALON_BACK</b>	Switch indicating whether back-up algorithm using Sun calibration mode measurements for calculation of Etalon has been used	0		1	1	1	enumerated	1	1
<b>ETALON_ALGO</b>	Switch indicating which Etalon correction algorithm has been used	0		1	1	1	enumerated	1	1
<b>AV_ETALON</b>	Etalon correction averaged per channel	6		6	1	1	integer4	4	24
<b>STDDEV_ETALON</b>	Standard deviation of Etalon per channel	9		6	1	1	integer4	4	24
<b>AV_RESIDUAL</b>	Mean residual structure at a pixel level	6		6	1	1	integer4	4	24
<b>STDDEV_RESIDUAL</b>	Standard deviation of the residual structure at a pixel level	9		6	1	1	integer4	4	24
<b>F_AV_ETALON</b>	Flag indicating that AV_ETALON exceeds a specified threshold	0		6	1	1	boolean	1	6
<b>F_STDDEV_ETALON</b>	Flag indicating that STDDEV_ETALON exceeds a specified threshold	0		6	1	1	boolean	1	6
<b>F_AV_RESIDUAL</b>	Flag indicating that AV_RESIDUAL exceeds a specified threshold	0		6	1	1	boolean	1	6
<b>F_STDDEV_RESIDUAL</b>	Flag indicating that STDDEV_RESIDUAL exceeds a specified threshold	0		6	1	1	boolean	1	6
<b>F_ETALON_MISS</b>	Flag indicating that missing mean WLS calibration mode measurements have been filled by interpolation or that complete channel is missing	0		6	1	1	boolean	1	6
<b>Size of the Compound</b>									<b>128</b>
<b>PCD_SMR - Product Confidence Data record for SMR spectrum</b>									
<b>FIELD</b>	<b>DESCRIPTION</b>	<b>SF</b>	<b>UNITS</b>	<b>DIM1</b>	<b>DIM2</b>	<b>DIM3</b>	<b>TYPE</b>	<b>TYPE SIZE</b>	<b>SIZE</b>
<b>N_INTENSITY</b>	Number of Sun calibration mode spectra which pass the intensity check	0		1	1	1	u-integer2	2	2
<b>F_N_INTENSITY</b>	Flag indicating that number of sun calibration mode spectra passing the intensity check was too low	0		1	1	1	boolean	1	1
<b>F_SMR_MISS</b>	Flag indicating that no SMR was generated due to missing Sun calibration mode measurements, per channel	0		6	1	1	boolean	1	6
<b>Size of the Compound</b>									<b>9</b>
<b>PCD_BASIC - Product Confidence Data Records common to all measurement modes</b>									
<b>FIELD</b>	<b>DESCRIPTION</b>	<b>SF</b>	<b>UNITS</b>	<b>DIM1</b>	<b>DIM2</b>	<b>DIM3</b>	<b>TYPE</b>	<b>TYPE SIZE</b>	<b>SIZE</b>
<b>F_NN_DT</b>	Flag indicating non-nominal detector temperature, per channel	0		1	1	1	bits(8)	1	1



































































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 Worksheet: GIADR-1b-PMDBandDef

<b>RECORD_HEADER</b>	Generic Record Header	NA		1	1	1	REC_HEAD	20	20	0
<b>PMD Band Definition Information</b>										
<b>START_PIXEL</b>	PMD band start pixel, 15 bands, PMD-p first.	0		15	2	1	u-integer2	2	60	20
<b>LENGTH_PIXEL</b>	PMD band length in pixels, 15 bands, PMD-p first.	0		15	2	1	u-integer2	2	60	80
<b>WAVELENGTH</b>	PMD band wavelength (nm), 15 bands, PMD-p first.	6	nm	15	2	1	integer4	4	120	140
<b>Size of the Record</b>										260
<b>GIADR-1b-PMDBandDef record subclass version: 1</b>										

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 Worksheet: MDR-1b-Earthshine

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	NA		1	1	1	REC_HEAD	20	20	0
<b>GENERIC QUALITY INDICATORS</b>										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation. Occurs if any of F_NN_DT, F_NN_PDP, F_NN_RAD, F_NN_WLS_U, F_NN_WLS_I, F_NN_SLS_U, F_NN_SLS_I, F_SAT, F_MIN in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation. Occurs if F_MISS or F_OLD_CAL_DATA in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	21
<b>Earthshine measurements 1b</b>										
OUTPUT_SELECTION	Calibrated radiance or sun-normalised radiance	NA		1	1	1	enumerated	1	1	22
PCD_BASIC	Basic product confidence data records for the scan common to all measurement data	NA		1	1	1	PCD_BASIC	190	190	23
PCD_EARTH	Product confidence data records for the scan	NA		1	1	1	PCD_EARTH	623	623	213
CLOUD	Cloud parameters given for every 187.5ms and 23.4375ms sub-pixel	NA		1	1	1	CLOUD	3136	3136	836
OBSERVATION_MODE	Observation mode	NA		1	1	1	enumerated	1	1	3972
PMD_TRANSFER	PMD transfer mode	NA		1	1	1	enumerated	1	1	3973
PMD_READOUT	PMD readout mode	NA		1	1	1	enumerated	1	1	3974
SCANNER_ANGLE	Scanner viewing angle with additional element at end of scan	6	deg	65	1	1	integer4	4	260	3975
GEO_BASIC	Basic geolocation records given for each 187.5 ms sub-pixel	NA		1	1	1	GEO_BASIC	832	832	4235
GEO_EARTH	Earth geolocation records given for each 187.5 ms sub-pixel	NA		1	1	1	GEO_EARTH	3116	3116	5067
N_UNIQUE_INT	Number of unique integration times in scan	0		1	1	1	u-byte	1	1	8183
UNIQUE_INT	Unique integration times in scan	6	s	10	1	1	integer4	4	40	8184
GEO_REC_LENGTH	Number of geo-record per unique integration time (gl1, gl2, ..., gl10)	0		10	1	1	u-integer2	2	20	8224
GEO_EARTH_ACTUAL_1	Geolocation records given for actual integration time 1	NA		gl1	1	1	GEO_EARTH_ACTUAL	99	396	8244
GEO_EARTH_ACTUAL_2	Geolocation records given for actual integration time 2	NA		gl2	1	1	GEO_EARTH_ACTUAL	99	3168	8640
GEO_EARTH_ACTUAL_3	Geolocation records given for actual integration time 3	NA		gl3	1	1	GEO_EARTH_ACTUAL	99	25344	11808
GEO_EARTH_ACTUAL_4	Geolocation records given for actual integration time 4	NA		gl4	1	1	GEO_EARTH_ACTUAL	99	3168	37152
GEO_EARTH_ACTUAL_5	Geolocation records given for actual integration time 5	NA		gl5	1	1	GEO_EARTH_ACTUAL	99	0	40320

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 Worksheet: MDR-1b-Earthshine

<b>GEO_EARTH_ACTUAL_6</b>	Geolocation records given for actual integration time 6	NA		gl6	1	1	GEO_EARTH_ACTUAL	99	0	40320
<b>GEO_EARTH_ACTUAL_7</b>	Geolocation records given for actual integration time 7	NA		gl7	1	1	GEO_EARTH_ACTUAL	99	0	40320
<b>GEO_EARTH_ACTUAL_8</b>	Geolocation records given for actual integration time 8	NA		gl8	1	1	GEO_EARTH_ACTUAL	99	0	40320
<b>GEO_EARTH_ACTUAL_9</b>	Geolocation records given for actual integration time 9	NA		gl9	1	1	GEO_EARTH_ACTUAL	99	0	40320
<b>GEO_EARTH_ACTUAL_10</b>	Geolocation records given for actual integration time 10	NA		gl10	1	1	GEO_EARTH_ACTUAL	99	0	40320
<b>PDP_TEMP</b>	Temperature of the pre-disperser prism for reference to the corresponding spectral calibration parameters	3	K	1	1	1	integer4	4	4	40320
<b>FPA_TEMP</b>	FPA temperature, per channel	3	K	6	1	1	integer4	4	24	40324
<b>RAD_TEMP</b>	Radiator temperature	3	K	1	1	1	integer4	4	4	40348
<b>INTEGRATION_TIMES</b>	Integration times per band	6	s	10	1	1	integer4	4	40	40352
<b>POL_SS</b>	Single scattering polarisation values given every 187.5 ms	NA		32	1	1	POLSS	20	640	40392
<b>POL_M</b>	Measured polarisation values given every 187.5 ms	NA		4	32	1	POLV	150	19200	41032
<b>POL_M_P</b>	Measured polarisation values given for each PMD readout	NA		256	1	1	POLV	150	38400	60232
<b>POL_M_SW</b>	Fractional polarisation value for the short-wave PMD region (currently not used, set to zero)	6		1	1	1	integer4	4	4	98632
<b>REC_LENGTH</b>	Number of elements per band data record for the 10 bands that follow (n1, n2, ..., n10)	0		10	1	1	u-integer2	2	20	98636
<b>NUM_RECS</b>	Number of band data records for the 10 bands that follow (m1, m2, ..., m10)	0		10	1	1	u-integer2	2	20	98656
<b>WAVELENGTH_1A</b>	Wavelength for Band 1a	6	nm	n1	1	1	integer4	4	3524	98676
<b>WAVELENGTH_1B</b>	Wavelength for Band 1b	6	nm	n2	1	1	integer4	4	572	102200
<b>WAVELENGTH_2A</b>	Wavelength for Band 2a	6	nm	n3	1	1	integer4	4	768	102772
<b>WAVELENGTH_2B</b>	Wavelength for Band 2b	6	nm	n4	1	1	integer4	4	3328	103540
<b>WAVELENGTH_3</b>	Wavelength for Band 3	6	nm	n5	1	1	integer4	4	4096	106868
<b>WAVELENGTH_4</b>	Wavelength for Band 4	6	nm	n6	1	1	integer4	4	4096	110964
<b>WAVELENGTH_PP</b>	Wavelength for PMD p	6	nm	n7	1	1	integer4	4	60	115060
<b>WAVELENGTH_PS</b>	Wavelength for PMD s	6	nm	n8	1	1	integer4	4	60	115120
<b>WAVELENGTH_SWPP</b>	Wavelength for short wavelength range (block B) PMD p	6	nm	n9	1	1	integer4	4	140	115180
<b>WAVELENGTH_SWPS</b>	Wavelength for short wavelength range (block B) PMD s	6	nm	n10	1	1	integer4	4	140	115320
<b>BAND_1A</b>	Band data record for Band 1a	NA		n1	m1	1	BAND_M	12	10572	115460
<b>BAND_1B</b>	Band data record for Band 1b	NA		n2	m2	1	BAND_M	12	54912	126032
<b>BAND_2A</b>	Band data record for Band 2a	NA		n3	m3	1	BAND_M	12	73728	180944
<b>BAND_2B</b>	Band data record for Band 2b	NA		n4	m4	1	BAND_M	12	319488	254672



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 Worksheet: MDR-1b-Calibration

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	NA		1	1	1	REC_HEAD	20	20	0
<b>GENERIC QUALITY INDICATORS</b>										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation. Occurs if any of F_NN_DT, F_NN_PDP, F_NN_RAD, F_NN_WLS_U, F_NN_WLS_I, F_NN_SLS_U, F_NN_SLS_I, F_SAT, F_MIN in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation. Occurs if F_MISS or F_OLD_CAL_DATA in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	21
<b>Calibration measurements 1b</b>										
PCD_BASIC	Basic product confidence data records for the scan common to all measurement data	NA		1	1	1	PCD_BASIC	190	190	22
OBSERVATION_MODE	Observation mode	NA		1	1	1	enumerated	1	1	212
PMD_TRANSFER	PMD transfer mode	NA		1	1	1	enumerated	1	1	213
PMD_READOUT	PMD readout mode	NA		1	1	1	enumerated	1	1	214
SCANNER_ANGLE	Scanner viewing angle with additional element at end of scan	6	deg	65	1	1	integer4	4	260	215
GEO_BASIC	Basic geolocation records given for each 187.5 ms sub-pixel	NA		1	1	1	GEO_BASIC	832	832	475
PDP_TEMP	Temperature of the pre-disperser prism for reference to the corresponding spectral calibration parameters	3	K	1	1	1	integer4	4	4	1307
FPA_TEMP	FPA temperature, per channel	3	K	6	1	1	integer4	4	24	1311
RAD_TEMP	Radiator temperature	3	K	1	1	1	integer4	4	4	1335
INTEGRATION_TIMES	Integration times per band	6	s	10	1	1	integer4	4	40	1339
REC_LENGTH	Number of elements per band data record for the 10 bands that follow (n1, n2, ..., n10)	0		10	1	1	u-integer2	2	20	1379
NUM_RECS	Number of band data records for the 10 bands that follow (m1, m2, ..., m10)	0		10	1	1	u-integer2	2	20	1399
WAVELENGTH_1A	Wavelength for Band 1a	6	nm	n1	1	1	integer4	4	3524	1419
WAVELENGTH_1B	Wavelength for Band 1b	6	nm	n2	1	1	integer4	4	572	4943
WAVELENGTH_2A	Wavelength for Band 2a	6	nm	n3	1	1	integer4	4	768	5515
WAVELENGTH_2B	Wavelength for Band 2b	6	nm	n4	1	1	integer4	4	3328	6283
WAVELENGTH_3	Wavelength for Band 3	6	nm	n5	1	1	integer4	4	4096	9611
WAVELENGTH_4	Wavelength for Band 4	6	nm	n6	1	1	integer4	4	4096	13707
WAVELENGTH_PP	Wavelength for PMD p	6	nm	n7	1	1	integer4	4	60	17803
WAVELENGTH_PS	Wavelength for PMD s	6	nm	n8	1	1	integer4	4	60	17863





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 Worksheet: MDR-1b-Sun

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	NA		1	1	1	REC_HEAD	20	20	0
<b>GENERIC QUALITY INDICATORS</b>										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation. Occurs if any of F_NN_DT, F_NN_PDP, F_NN_RAD, F_NN_WLS_U, F_NN_WLS_I, F_NN_SLS_U, F_NN_SLS_I, F_SAT, F_MIN in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation. Occurs if F_MISS or F_OLD_CAL_DATA in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	21
<b>Sun measurements 1b</b>										
PCD_BASIC	Basic product confidence data records for the scan common to all measurement data	NA		1	1	1	PCD_BASIC	190	190	22
OBSERVATION_MODE	Observation mode	NA		1	1	1	enumerated	1	1	212
PMD_TRANSFER	PMD transfer mode	NA		1	1	1	enumerated	1	1	213
PMD_READOUT	PMD readout mode	NA		1	1	1	enumerated	1	1	214
SCANNER_ANGLE	Scanner viewing angle with additional element at end of scan	6	deg	65	1	1	integer4	4	260	215
GEO_BASIC	Basic geolocation records given for each 187.5 ms sub-pixel	NA		1	1	1	GEO_BASIC	832	832	475
GEO_SUN	Additional geolocation records for Sun measurements given for each 187.5 ms groundpixel	NA		1	1	1	GEO_SUN	8	8	1307
PDP_TEMP	Temperature of the pre-disperser prism for reference to the corresponding spectral calibration parameters	3	K	1	1	1	integer4	4	4	1315
FPA_TEMP	FPA temperature, per channel	3	K	6	1	1	integer4	4	24	1319
RAD_TEMP	Radiator temperature	3	K	1	1	1	integer4	4	4	1343
INTEGRATION_TIMES	Integration times per band	6	s	10	1	1	integer4	4	40	1347
REC_LENGTH	Number of elements per band data record for the 10 bands that follow (n1, n2, ..., n10)	0		10	1	1	u-integer2	2	20	1387
NUM_RECS	Number of band data records for the 10 bands that follow (m1, m2, ..., m10)	0		10	1	1	u-integer2	2	20	1407
WAVELENGTH_1A	Wavelength for Band 1a	6	nm	n1	1	1	integer4	4	3524	1427
WAVELENGTH_1B	Wavelength for Band 1b	6	nm	n2	1	1	integer4	4	572	4951
WAVELENGTH_2A	Wavelength for Band 2a	6	nm	n3	1	1	integer4	4	768	5523
WAVELENGTH_2B	Wavelength for Band 2b	6	nm	n4	1	1	integer4	4	3328	6291
WAVELENGTH_3	Wavelength for Band 3	6	nm	n5	1	1	integer4	4	4096	9619
WAVELENGTH_4	Wavelength for Band 4	6	nm	n6	1	1	integer4	4	4096	13715



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 Worksheet: MDR-1b-Moon

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	NA		1	1	1	REC_HEAD	20	20	0
<b>GENERIC QUALITY INDICATORS</b>										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation. Occurs if any of F_NN_DT, F_NN_PDP, F_NN_RAD, F_NN_WLS_U, F_NN_WLS_I, F_NN_SLS_U, F_NN_SLS_I, F_SAT, F_MIN in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation. Occurs if F_MISS or F_OLD_CAL_DATA in PCD_BASIC have been raised	NA		1	1	1	boolean	1	1	21
<b>Moon measurements 1b</b>										
PCD_BASIC	Basic product confidence data records for the scan common to all measurement data	NA		1	1	1	PCD_BASIC	190	190	22
OBSERVATION_MODE	Observation mode	NA		1	1	1	enumerated	1	1	212
PMD_TRANSFER	PMD transfer mode	NA		1	1	1	enumerated	1	1	213
PMD_READOUT	PMD readout mode	NA		1	1	1	enumerated	1	1	214
SCANNER_ANGLE	Scanner viewing angle with additional element at end of scan	6	deg	65	1	1	integer4	4	260	215
GEO_BASIC	Basic geolocation records given for each 187.5 ms sub-pixel	NA		1	1	1	GEO_BASIC	832	832	475
GEO_MOON	Additional geolocation records for moon measurements given for each 187.5 ms groundpixel	NA		1	1	1	GEO_MOON	56	56	1307
PDP_TEMP	Temperature of the pre-disperser prism for reference to the corresponding spectral calibration parameters	3	K	1	1	1	integer4	4	4	1363
FPA_TEMP	FPA temperature, per channel	3	K	6	1	1	integer4	4	24	1367
RAD_TEMP	Radiator temperature	3	K	1	1	1	integer4	4	4	1391
INTEGRATION_TIMES	Integration times per band	6	s	10	1	1	integer4	4	40	1395
REC_LENGTH	Number of elements per band data record for the 10 bands that follow (n1, n2, ..., n10)	0		10	1	1	u-integer2	2	20	1435
NUM_RECS	Number of band data records for the 10 bands that follow (m1, m2, ..., m10)	0		10	1	1	u-integer2	2	20	1455
WAVELENGTH_1A	Wavelength for Band 1a	6	nm	n1	1	1	integer4	4	3524	1475
WAVELENGTH_1B	Wavelength for Band 1b	6	nm	n2	1	1	integer4	4	572	4999



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 Worksheet: Types

Field Type	Size in Bytes
BAND_M	12
BAND_P	16
bitst(16)	2
bitst(24)	3
bitst(32)	4
bitst(8)	1
boolean	1
byte	1
char(1)	1
char(2)	2
char(3)	3
char(4)	4
char(6)	6
char(88)	88
CLOUD	3136
COORD	8
e-char(1)	1
e-char(2)	2
e-char(3)	3
enumerated	1
general time	15
GEO_BASIC	832
GEO_EARTH	3116
GEO_EARTH_ACTUAL	99
GEO_MOON	56
GEO_SUN	8
integer2	2
integer4	4
integer8	8
ISP	18750
ISP_HEAD	990
long cds time	8
PCD_BASIC	190

NOTE: Table must be sorted into ascending order

Highlighted types are defined in this document, remaining ones in the generic PFS.

Basic data types are written in lower case, compound types in upper case.



Name	Size	Description	Band
b1	1	Number of band data records (i.e., number of readouts) in Level 1a MDR. This number is specified in field NUM_RECS of the MDR.	FPA 1a
b10	1		PMD s short wavelength
b2	32		FPA 1b
b3	32		FPA 2a
b4	32		FPA 2b
b5	32		FPA 3
b6	32		FPA 4
b7	16		PMD p (this number does NOT depend on PMD transfer mode)
b8	16		PMD s (this number does NOT depend on PMD transfer mode)
b9	1		PMD p short wavelength
l1	881	Length of band data records in Level 1a MDR. This number is specified in field REC_LENGTH of the MDR. For the main channels this number equals the number of detector pixels in a band.	FPA 1a
l10	35		PMD s short wavelength
l2	143		FPA 1b
l3	192		FPA 2a
l4	832		FPA 2b
l5	1024		FPA 3
l6	1024		FPA 4
l7	304		PMD p
l8	304		PMD s
l9	35		PMD p short wavelength
m1	1	Number of band data records (i.e., number of readouts) in Level 1b MDR. This number is specified in field NUM_RECS of the MDR.	FPA 1a
m10	1		PMD s short wavelength
m2	32		FPA 1b
m3	32		FPA 2a
m4	32		FPA 2b
m5	32		FPA 3
m6	32		FPA 4
m7	256		PMD p (raw transfer: 16 readouts, band transfer: 256 readouts)
m8	256		PMD s (raw transfer: 16 readouts, band transfer: 256 readouts)
m9	1		PMD p short wavelength
n1	881	Length of band data records (i.e., number of spectral elements within a readout) in Level 1b MDR. This number is specified in field REC_LENGTH of the MDR.	FPA 1a
n10	35		PMD s short wavelength
n2	143		FPA 1b



n3	192		FPA 2a
n4	832		FPA 2b
n5	1024		FPA 3
n6	1024		FPA 4
n7	15		PMD p (raw transfer: 256 pixels, band transfer: 15 bands)
n8	15		PMD s (raw transfer: 256 pixels, band transfer: 15 bands)
n9	35		PMD p short wavelength
ng	4	Number of unique integration times	
gl1	4		
gl2	32		
gl3	256		
gl4	32		
gl5	0		
gl6	0		
gl7	0		
gl8	0		
gl9	0		
gl10	0		
num_channels	6	Number of channels (4 main FPA, 2 PMD, see enumerated variables)	
num_main_channels	4	Number of main FPA channels	
num_PMD_channels	2	Number of PMD channels	
num_bands	10	Number of bands (6 main FPA, 4 PMD, see enumerated variables)	
num_main_bands	6	Number of main FPA bands	
n_psi_f	21	MME: number of viewing angles (fine grid). This number is specified in field MME_N_PSI_F of record GIADR-1a-MME	
n_e_f	33	MME: number of elevation angles (fine grid). This number is specified in field MME_N_E_F of record GIADR-1a-MME	
n_phi_f	35	MME: number of azimuth angles (fine grid). This number is specified in field MME_N_PHI_F of record GIADR-1a-MME	
n_lambda_FPA	1024	MME: number of wavelengths for a main channel	
n_lambda_PMD	279	MME: number of wavelengths for a PMD channel	
n_lambda_total	4654	MME: number of wavelengths (all channels)	

**Note: Values in shaded fields are variable (depending on initialisation parameters and/or instrument modes) and given as examples only. Actual values will be specified in the products. These values will determine the sizes of records GIADR-1a-MME, MDR-1\*-Earthshine, MDR-1\*-Calibration, MDR-1\*-Sun, MDR-1\*-Moon.**