

EUMETSAT POLAR SYSTEM	EPS Programme IASI Level 1 Product Format Specification	 EUMETSAT Ref.: EUM.EPS.SYS.SPE.990003 Issue: 6 Rev. 6 WBS number: 270000 Date: 23/03/04
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EPS PROGRAMME **IASI Level 1 Product Format Specification**

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DOCUMENT CHANGE RECORD

Issue	Rev	Date	DCN No.	Changed Pages/Paragraphs
2	0	25/5/99		<ul style="list-style-type: none"> First Issue
2	Draft B	23/07/99		<ul style="list-style-type: none"> Addressed RIDs
2		10/07/00		<ul style="list-style-type: none"> Incorporate change in EPS Generic Product Specification, Issue 3, and IASI Level 1 product content (IA-TN-2100-9469-CNE, issue 2 draft, 08/06/00)
3	0	18/07/00		
4	Draft A	15/11/00		<ul style="list-style-type: none"> Add GTS Product section Simplified document layout Editorial changes Incorporated changes in [RD-1]
4	Draft B	22/05/01		LEO/C/TP <ul style="list-style-type: none"> Made [AD-2] “IASI Level 1 Product Contents”, IA-TN-2100-9469-CNE into a reference document, [RD-1]. Renumbered other documents accordingly Incorporated changes from [RD-1] (See also change notice in Annex) Removed GTS Section and all references to GTS products. Updated text in Section 1.1 Incorporated changes to [AD-1] GPFS Removed references to product footer records Removed idea of “datasets” within a product as per updated GPFS
4	Draft C	28/05/01		LEO/C/TP <ul style="list-style-type: none"> Removed requirement in Level 1a SPHR section Updated all sections in line with GPFS changes Removed items redundant with GPFS
5	0	01/06/01		CGS PDR Issue

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Issue	Rev	Date	DCN No.	Changed Pages/Paragraphs
5	1	13/06/01		Revised issue for CGS PDR <ul style="list-style-type: none"> Updated signature table
5	2			<ul style="list-style-type: none"> Reference corrected from EPS/MIS/SPE/990003 to EUM.EPS.SYS.SPE.990003
6	0 Draft A	13/02/02		<ul style="list-style-type: none"> Updated document template Updated to correspond to updated IASI L1 Product Contents Document, IA.TN.2100.9469.CNE, Ed. 5, Rev 2 (01/02/02) Changed [AD-2] from Product Convention Document to Mission Convention Document. Updated in line with [AD-1] Issue 6.0 Draft B
6	1	5/4/02		<ul style="list-style-type: none"> Updated document template again Updated document in line with revised [AD-1] Added V-INTEGGER types to product specification
6	2	13/06/02		<ul style="list-style-type: none"> Updated Annex to allow spectral data in each MDR to be divided into up to 10 bands each with its own scale factor. This allows data size to be reduced from 3 bytes to integer2. Added new GIADR to include this scale factor information
6	3	13/06/02	EUM.EPS.SYS. DCR.02.129	<ul style="list-style-type: none"> Updated Table 1 Product IDs to be compatible with IDs defined in Core Ground Segment Requirements Document Updated WBS number and corrected document reference in header
6	4	1/12/02	EUM.EPS.SYS. DCR.02.175	<ul style="list-style-type: none"> Corrected name of bit 76 in Section 3.4.1.3 (typo) Added text to MDR-VIADR description in Section 7.3 to describe contents of VIADR-MDR Updated Section 6.6.1.4 GccsConfAvhrrChannel Added Section 3.4.1.3 IDefCcsMode Added sub sections to Section 2 detailing computation of wavenumbers, interpolation ion the spectral database, referencing of AVHRR

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				co-ordinates and general quality indices for the product. <ul style="list-style-type: none"> Added Record Format Version Control - section 9. Updated occurrence tables See also DCR in Annex
6	5	17/01/03	EUM.EPS.SYS. DCR.02.251	Annex modified - See DCR in Annex
		11/02/03	EUM.EPS.SYS. DCR.03.042	Inserted new Section 8 with corrected subclass numbering for GIADRs and added subclass numbering for MDRs.
6	6	23/03/04	EUM.EPS.SYS. DCR.04.009	<ul style="list-style-type: none"> Added Section 2.7 describing differences between external calibration and normal operations products Added Section 2.8 describing decoding of IASI spectra and images Added Section 2.9 describing start/stop time of IASI lines Added Section 2.10 describing IASI Integrated Imager sub-grid Added Section 2.11 describing radiance analysis in IASI FOV Section 3.4.1.3 GEPSIdConf extended definition of bits in bitstring Clarified setting of GQisFlagQual in Section 3.6 Update table of Record Subclass Version Numbers See also changes in Document Change Record of Annex

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1 INTRODUCTION

1.1 Purpose and Scope

This document is the Infrared Atmospheric Sounding Interferometer (IASI) level 1 (1a, 1b and 1c) EPS Product Format Specification. It also includes the specification of the IASI engineering and verification products.

The generic product format specification used by this document is defined in the EPS Generic Product Format Specification (GPFS) [AD-1]. The conventions used by this document are defined in [AD-1] and in the EPS Mission Conventions Document [AD-2].

NOTE: The use of the term “database” in [RD-1] shall not constrain the implementation of the storage of the datasets referred to in this document.

1.2 Structure of the Document

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

- section 1 describes the scope of the document,
- section 2 details the product formats for Level 1 products
- sections 3 to 7 describe the instrument and level specific records for Level 1 products
- section 8 details the occurrence rates of the various records within Level 1 products
- the Annex contains detailed tables describing the record formats

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1.3 Applicable Documents

AD-1 EPS Generic Product Format Specification, EPS/GGS/SPE/96167, Issue 6, Revision 1

AD-2 EPS Mission Convention Document, EPS/SYS/SPE/990002, Issue 1, Revision 0

1.4 Reference Documents

RD-1 IASI Level 1 Product Contents, IA-TN-2100-9469-CNE, Edition 5, Revision 2

1.5 Array Sizing Parameters

The values of parameters used for the dimensioning of arrays for the product fields in the annex to this document can be found in Section 2.1 of [RD-1].

1.6 PPS Produced Product Content

The product content for IASI Level 1 products that is generated by the IASI Level 1 PPS is described in [RD-1].

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2 FORMAT OF IASI LEVEL 1 PRODUCTS

2.1 Overview

The EPS format products which are generated by the IASI Level 1 PPS encompasses Level 1a, 1b and 1c products, verification products and engineering products. Table 1 describes the contents of the Level 1 products, verification and engineering products.

Product Name	Product ID	Content
Level 1a	IASI_XXX_1A	Decoded spectral and image data after additional radiometric calibration corrections, spectral calibration appended, location and co-location with AVHRR/3 images.
Level 1b	IASI_XXX_1B	Re-sampled spectrum.
Level 1c	IASI_XXX_1C	Re-sampled spectrum with apodisation
Verification Product	IASI_VER_01	Verification data: raw interferogram and calibration coefficients used on-board.
Engineering Product	IASI_ENG_01	All parameters: output of IASI SW used by the TEC for evaluation.

Table 1: List of IASI Level 1 Products

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

2.2 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 IASI [AD-1].

2.3 Computation of Wavenumbers

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2.3.1 IASI Integrated Imager

The description of the IASI Integrated Imager (IIS) Spectral Response Function (SRF) is provided in the IASI Level 1 products as an array that can contain up to 100 samples.

The wave number associated to the sample k is given by the formula:

$$w(k) = \text{IDefIISrfdWn} * (\text{IDefIISrfsfirst} + k - 2)$$

For example, the wavenumber associated with the first sample ($k=1$) is equal to:

$$w(1) = \text{IDefIISrfdWn} * (\text{IDefIISrffirst} - 1)$$

The data **IDefIISrfslast** determines the actual size of the SRF description ($(\text{IDefIISrffirst} + k - 1) = \text{IDefIISrflast}$).

2.3.2 Level 1a

The wavenumber of Level 1a spectra sample number k is computed by

$$w(k) = \text{IDefSpectrDWn} * (\text{IDefNsfirst} + k - 2) * \text{fcs}(k)$$

where the spectral calibration function **fcs()** must be computed from information extracted from the IASI spectral database provided to the users (see Section 2.4).

2.3.3 Level 1b/c

Level 1b and 1c spectra are provided with the same constant sampling. Only the useful part of the spectra is provided. The wave number associated to the sample k is given by the formula:

$$w(k) = \text{IDefSpectDwn1b} * (\text{IDefNsfirst1b} + k - 2)$$

For example, the wavenumber associated with the first sample ($k=1$) is equal to:

$$w(1) = \text{IDefSpectDwn1b} * (\text{IDefNsfirst1b} - 1)$$

The data **IDefNsfirst1b** determines the actual size of the spectrum ($(\text{IDefNsfirst1b} + k - 1) = \text{IDefNsfirst1b}$).

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2.4 Interpolation in the sounder spectral database

Level 1a and 1b products usage will imply the knowledge of the current

- spectral calibration function : $fcs(w,p,CCD)$,
- instrument spectral response function : $ISRF(w,p,CCD)$

defined for the 4 pixels ($p=1,2,3,4$) and the 2 cube corner directions ($CCD=0$ or 1) and the wavenumber, w .

These functions are computed from the following data :

- $ISdbGridFcs$ and $ISdbGridIsrf$ extracted from the IASI spectral database provided to the users
- $GIsfPds1$, $GIsfPds2$, $GIsfPds3$, $GIsfPds4$, $GIsfLinOrigin$, $GIsfColOrigin$ extracted from the product itself

using the following formula.

$$\begin{aligned}
 i0 &= GIsfLinOrigin, j0 = GIsfColOrigin \\
 p1 &= GIsfPds1, fcs1 = ISdbGridFcs(k,p,CCD,i0,j0) \\
 p2 &= GIsfPds2, fcs2 = ISdbGridFcs(k,p,CCD,i0,j0+1) \\
 p3 &= GIsfPds3, fcs3 = ISdbGridFcs(k,p,CCD,i0+1,j0+1) \\
 p4 &= GIsfPds4, fcs4 = ISdbGridFcs(k,p,CCD,i0+1,j0) \\
 fcs(k,p,CCD) &= p1*fcs1 + p2*fcs2 + p3*fcs3 + p4*fcs4
 \end{aligned}$$

The same computations can be used to derive the correct $ISRF$.

This computation provides an undersampled spectral calibration function (typically every 15 cm^{-1}). The wave number associated to $fcs(k)$ is given by

$$w(k) = IDefSafDWn * (IDefSafNsfirst + k - 2)$$

This (smooth) function can now be oversampled to every wavenumber where it is needed.

2.5 AVHRR Co-Ordinates Referenced in IASI Products

Localisation of some reference points is given in AVHRR pixels units (fractional) in

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order to help the collocation of IASI products with AVHRR products (e.g. **GEPSLocIasiAvhrr_IASI** and **GEPSLocIasiAvhrr_IIS**)

Columns pose no problem of definition but avoiding ambiguity in row identification is more difficult. Generally, the time of the line is used as a unique identifier for each AVHRR line and the duration of the AVHRR line is used to be able to represent fractional lines. The row position in the AVHRR raster is therefore represented as a time given in milliseconds (relative to a reference time of the current IASI product).

More precisely, given:

- a line numbered **u** in some AVHRR 1b product,
- a fraction of AVHRR line **x** ($0 < x < 1$)
- the reference time of the current IASI line : **T₀**
- the start time of this AVHRR line : **T_{start}(u)**
- the end time of this AVHRR line : **T_{end}(u)**

where **T₀** is **GEPS_IasiDatIasi(SN=1)** and **T_{start}(u)** and **T_{end}(u)** are respectively the **RECORD_START_TIME** and **RECORD_END_TIME** extracted from the Generic Record Header of the AVHRR MDR_1B_FULL record, then the encoded value of the fractional line **u+x** is given by:

$$t(u+x) = T_{start}(u) + x * (T_{end}(u) - T_{start}(u)) - T_0$$

where duration, computed as the difference between 2 times, is converted into milliseconds. The users can then compute the line number **u** in any AVHRR product from the values **T₀** and **t** extracted from the IASI product.

2.6 Quality indices description

Quality of the IASI Level 1 products is characterised by the following items :

- **GQisFlagQual** : general quality flag which indicates, when it is set to **TRUE (=1)**, that some anomaly has been detected at some step in the Level 0 or Level 1 IASI Processing. The products should not be used if this occurs.
- **GQisQualIndex** : Is the general quality index for the sounder spectra. It is defined as a ratio : **NeDT_estimated / NeDT_expected**
- **GQisQualIndexRad** : radiometric quality index for the sounder product. It is defined as a ratio : **NeDT_estimated / NeDT_expected** where the **NeDT_estimated** takes into account only the elementary quality indices related to the radiometric performance.

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- **GQisQualIndexSpect** : spectral quality index for the sounder product. It is defined as a ratio (NeDT_estimated/NeDT_expected) where the NeDT_estimated takes into account only the elementary quality indices related to the spectral performance.
- **GQisQualIndexIIS** : quality index for the IIS image. It is defined as a ratio : NeDT_estimated / NeDT_expected
- **GQisQualIndexLoc**. It is defined as the uncertainty of the coregistration between IIS and Avhrr

2.7 IASI instrument “EXTERNAL CALIBRATION” mode

During the IASI instrument mode “EXTERNAL CALIBRATION” the data corresponding to SN=1, SN=2 and SN=30 are not relevant. As a matter of fact, the transmission of the instrument packets is the same as in NORMAL OPERATION mode except for the subcycle SN = 1,2, 30 where there is no transmission for the spectrum and image packets.

1	2	3.... ...29	30	31	32 33	34	35 36	37
Scan Moving	Scan Moving	One specific target	Scan Moving	Scan Moving	Blackbody	Scan Moving	First Cold Space	Scan Moving

From the subcycle SN = 3 to the subcycle SN = 29, the scan mirror points at one specific target among all possible targets of the instrument.

On the last seven subcycles, the calibration process is exactly the same as in NORMAL OPERATION MODE.

2.8 Decoding of IASI Spectra and Images

2.8.1 Introduction

IASI Spectra radiances are coded with several scaling factors (up to 10 scaling factors for one spectra). Though configurable, these factors will not probably evolve during the time span of the METOP mission.

IASI images are coded with a single scaling factor. Though configurable, this factor will not probably evolve during the time span of the METOP mission.

As a consequence, a dedicated GIADR has been created (GIADR-SCALEFACTORS) in order to provide this information to the users.

Note1: the scale factors found in GIADR from level 1A shall be used only for level 1A data (neither 1B, neither 1C). The scale factors from level 1B are to be applied to level 1B. The scale factors from level 1C shall be exclusively applied to level 1C data.

Note2: in this section the indices of tables start at 1 (not 0).

2.8.2 Decoding of spectra

FOR numScale=1 to IDefScaleSondNbScale DO

SF = IDefSondScaleFactor(numScale)

FOR(chanNb=IDefScaleSondNsfirst(numscale) TO IDefScaleSondNslast(numscale) DO

w=chanNb - IDefNsfirst + 1

SpectDecoded(w) = Spect(w).10-SF

Where Spect=GSmcSpect in case of level 1A, Spect=GS1bSpect in case of Level 1B and Spect=GS1cSpect in case of Level 1C

2.8.3 Decoding of images

There is one single scale factor to be applied to all pixel of one images, with SF=IDefScaleIIScaleFactor.

2.9 Start/Stop time of IASI lines

2.9.1 RECORD_START_TIME and RECORD_STOP_TIME

For all Level 1 products (1A, 1B, 1C, Engineering, Verification):

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- RECORD_START_TIME field in each MDR is the start time of the corresponding line in the product (see §2.9.2 and §2.9.3)
- RECORD_STOP_TIME field in each MDR is the stop time of the corresponding line in the product (see §2.9.2 and §2.9.3)
- RECORD_START_TIME field in the MPHR is the start time of the first line in the product
- RECORD_STOP_TIME field in the MPHR is the stop time of the last line in the product

2.9.2 In NORMAL instrument mode

- IASI start time is the time of the spectra packets for SN (Scan Number) = 1
- IASI stop time is the time of the packet IP36

2.9.3 In EXTERNAL CALIBRATION instrument mode

- IASI start time is the time of the spectra packets for SN (Scan Number) = 3
- IASI stop time is the time of the packet IP36

2.10 IASI Integrated Imager sub-grid

The IASI Integrated Imager (IIS) is sub-sampled in a 5x5 sub-grid.

This sub-grid corresponds to the IIS pixels with column and line number indexes from the set {1, 16, 32, 48, 64}

The dimension of the sub-grid is specified as SGI (=25) in the PFS annex. This SGI corresponds to a dual-dimension array (for which DIM1=IIS columns and DIM2=IIS lines)

2.11 Radiance analysis in IASI Field Of View

2.11.1 Introduction

Data named **GCcsxxxx** in MDR-1C provide a description of the radiance spatial distribution in the IASI sounder Field Of View (FOV). This information can be used in many ways when processing IASI L1 data (e.g. for spectral correction in the case of non uniform radiance distribution in IASI FOV).

The radiances used for this analysis are nominally AVHRR measured radiances. IIS radiances can

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also be used as a backup. The case is identified by the data **IDefCcsMode** (value : 0 or 1, cf. §3.4.1.4).

When using AVHRR radiances, only a small part of the AVHRR raster is used (typically less than 100x100 pixels, covering the 4 pixels of the sounder). When using IIS radiances, the full IIS image is used.

Three levels of information are provided :

- Classified image at the full imager resolution,
- Classes characteristics (synthesis in term of radiance, position in IASI FOV)
- Fraction of pixel sounders covered by each class

This 3 levels of information are further described in the next subsections.

2.11.2 Classified image

The classified image is stored in table **GCcsImageClassified**.

Each pixel of this image corresponds exactly to one pixel of the AVHRR (or IIS¹) image. Image size is variable with SN and is defined by line number **GCcsImageClassifiedNbLin** and columns number **GCcsImageClassifiedNbCol**.

Position of this image in AVHRR raster is defined by the position of Line 1 and Column 1 in the AVHRR raster : **GCcsImageClassifiedFirstLin** and **GCcsImageClassifiedFirstCol**. This detailed information can be used to map the individual imager pixels into the FOV of the IASI sounder pixels, however this should not be necessary because synthetic information is already computed by the Level 1 processor (see §2.11.4).

Class number is limited to 6. The numbering is from 1 to the actual class number found by the algorithm (variable). The special number 7 is reserved for pixels which have not been affected to a class by the algorithm (non classified pixels).

2.11.3 Class description

A synthesis of the classes spatial distribution is provided by the position in IASI FOV of the geometrical centre of gravity for each class (data : **GCcsRadAnalY** and **GCcsRadAnalZ**). Class properties, in the radiances space, is given by the characteristics of the cluster containing all the pixels which belong to the class :

¹ Actually, in case of IIS image classification, the classified image is of size 62 x 62.

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- **GCcsRadAnalMean** : mean value of imager channel data (either radiance or local variance for the IIS pseudo-channel),
- **GCcsRadAnalStd** : standard deviation of the data (which provide information about the compactness of the cluster).

•

The data are, for each class, a vector of fixed dimension (6) which are always stored in the same order :

- { ch 1, ch 2, ch 3a, ch 3b, ch 4, ch 5 } if **IDefCcsMode= 0 (AVHRR)**,
- { Brightness Temperature, local variance } if **IDefCcsMode= 1 (IIS)**

When imager data is not available for a given channel (e.g. for visible AVHRR channels during night) then the corresponding position is filled with 0.

2.11.4 Class projection in IASI pixels

Synthetic description of the classes present in each sounder pixel FOV is given by :

- **IDefCcsRadAnalNbClass** : Number of classes actually present in the FOV of sounder pixel PN (including class 7 if any pixels are affected to this class),
- **IDefCcsRadAnalWgt** : Fraction of the FOV of sounder pixel PN covered by class NCL. Sum over all the classes (including class 7) for a given (PN,SN) is equal to 1.

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3 LEVEL 1A RECORDS

3.1 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include all the global auxiliary datasets used by the Level 1a product generation function which are not written into the product.

3.2 Variable External Auxiliary Data Record

The auxiliary datasets to be referenced by a VEADR shall include all the variable auxiliary datasets used by the Level 1a product generation function which are not written into the product.

3.3 Global Internal Auxiliary Data Record

There are two subclasses of GIADR for the Level 1A Product.

Name	Description
GIADR-QUALITY	Contains quality information for the product
GIADR-SCALE-FACTORS	Contains the scale factors used to scale the spectral data in the MDR

3.4 Measurement Data Records

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

The MDR is detailed in the Annex to this document.

3.4.1 MDR Fields

3.4.1.1 GEPSIasiMode

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Bit	Meaning
0 – 15	Instrument mode: word 19 of instrument packet
16 – 23	during external calibration mode, scan position SP (see wordx 12 of instrument packet). 00 if not during external calibration mode
24 – 31	not used

3.4.1.2 GEPSOPSProcessingMode

Bit	Meaning
0 – 1	Input data level (00 = Level 0, 01 = Level 1, 11 = Level 2)
2	0 = normal/auxiliary instrument mode, 1 = external calibration mode
3	debug mode (0 = debug mode off)
4	interface mode (0 = granule per granule, 1 = dump per dump)
5	Target type during external calibration mode (0 = Earth, 1 = not Earth)
6 – 31	Not used

CNES:

In the §3.4.1.3 of PFS correct the bit 76 of GEPSIdConf to GOPSFltImgCSMiss(typo)

3.4.1.3 GEPSIdConf

Bit	Meaning
0 - 31	PTSI (word 16 and 17 of the instrument packet)
32 – 63	IDefIDConf: ID of the algorithm configuration
64	Normal processing mode (0 = off, 1 = On)
65	Backlog processing mode (0 = off, 1 = On)
66	Re-processing mode (0 = off, 1 = On)
67	Parallel validation (0 = off, 1 = On)
68	In-plane satellite manoeuvre (0 = no manoeuvre, 1 = manoeuvre)
69 – 81	Degraded cases at line level. If the bit is set (= 1), then the corresponding flag below has been raised
69	GOPSFlaPixMiss
70	GOPSFlaDataGap
71	GOPSFltIsrfemOff
72	GOPSFltBandMiss
73	GOPSFltBBTMiss
74	GOPSFltImgEWMiss

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75	GOPSFItImgBBMiss
76	GOPSFItImgCSMiss
77	GOPSFItImgVPMiss
78	GOPSFItImgAPMiss
79	GOPSFItImgPXMiss
80	GOPSFItImgIPMiss
81	GOPSFItGeoAvhrrMiss

3.4.1.4 IDefCcsMode

Bit	Meaning
31 - 1	unused
0	0 = AVHRR 1 = IIS

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4 LEVEL 1B RECORDS

4.1 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include all the global auxiliary datasets used by the Level 1b product generation function which are not written into the product.

4.2 Variable External Auxiliary Data Record

The auxiliary datasets to be referenced by a VEADR shall include all the variable auxiliary datasets used by the Level 1b product generation function which are not written into the product.

4.3 Global Internal Auxiliary Data Record

The Level 1B product uses the same subclasses of GIADR as the Level 1A product.

4.4 Measurement Data Records

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

The MDR is detailed in the Annex to this document.

4.4.1 MDR Fields

4.4.1.1 GEPSIasiMode

See Section 3.4.1.1

4.4.1.2 GEPSOPSProcessingMode

See Section 3.4.1.2

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4.4.1.3 GEPSIdConf

See Section 3.4.1.3.

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5 LEVEL 1C RECORDS

5.1 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include all the global auxiliary datasets used by the Level 1c product generation function which are not written into the product.

5.2 Variable External Auxiliary Data Record

The auxiliary datasets to be referenced by a VEADR shall include all the variable auxiliary datasets used by the Level 1c product generation function which are not written into the product.

5.3 Global Internal Auxiliary Data Record

The Level 1B product uses the same subclasses of GIADR as the Level 1A product.

5.4 Measurement Data Records

There is one subclass of MDR for the Level 1c product, MDR-1C.

The MDR is detailed in the Annex to this document.

5.4.1 MDR Fields

5.4.1.1 GEPSIasiMode

See Section 3.4.1.1

5.4.1.2 GEPSOPSProcessingMode

See Section 3.4.1.2

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5.4.1.3 GEPSIdConf

See Section 3.4.1.3.

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6 ENGINEERING RECORDS

6.1 Notation

The Engineering product is for the use of the IASI-TEC, which requires that a certain number of IEEE real type values be stored within the product, contrary to [AD-1]. The IEEE real values are stored within a bit string type of the correct length (64 bits for a real*8 and 32 bits for a real*4). This is indicated within the Annex table defining the Engineering product using the notation: bitst(64)[real*8] and bitst(32)[real*4] respectively.

6.2 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include all the global auxiliary datasets used by the Level 1 engineering product generation function which are not written into the product.

6.3 Variable External Auxiliary Data Record

The auxiliary datasets to be referenced by a VEADR shall include all the variable auxiliary datasets used by the Level 1 engineering product generation function which are not written into the product.

6.4 Global Internal Auxiliary Data Record

There is one subclass of GIADR for the Engineering Product, GIADR-ENGINEERING.

This is detailed in the Annex to this document.

6.5 Variable Internal Auxiliary Data Record

There is one subclass of VIADR defined for Engineering products, VIADR-ENGINEERING.

This is detailed in the Annex to this document.

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6.6 Measurement Data Records

There is one subclass of MDR for the Engineering product, MDR-ENGINEERING.

This is detailed in the Annex to this document.

6.6.1 MDR Fields

6.6.1.1 GEPSIasiMode

See Section 3.4.1.1

6.6.1.2 GEPSOPSProcessingMode

See Section 3.4.1.2

6.6.1.3 GEPSIdConf

See Section 3.4.1.3.

6.6.1.4 GccsConfAvhrrChannel

Bit	Meaning
7 - 2	Unused
0 - 1	00 = AVHRR channels not available; 10 = AVHRR channels available; 01 = AVHRR channels transition between available and not available channels. Synthesis of the AVHRR lines overlaying IIS image.

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7 VERIFICATION RECORDS

7.1 Global External Auxiliary Data Record

The auxiliary datasets to be referenced by a GEADR shall include all the global auxiliary datasets used by the Level 1 verification product generation function which are not written into the product.

7.2 Variable External Auxiliary Data Record

The auxiliary datasets to be referenced by a VEADR shall include all the variable auxiliary datasets used by the Level 1 verification product generation function which are not written into the product.

7.3 Measurement Data Records

There is one subclass of MDR for the Verification product, MDR-VERIFICATION. It contains verification and auxiliary data in the order composed of concatenated IASI ISPs in the following order: AP-VPA-VPB-VPC-VPD-VPE. These are pure ISPs without the header added in the Level 0 MDR.

The MDR is detailed in the Annex to this document.

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8 RECORD SUBCLASSES

8.1 GIADR

Subclass	Name
0	GIADR-QUALITY
1	GIADR-SCALE-FACTORS
2	GIADR-ENGINEERING

8.2 VIADR

Subclass	Name
0	VIADR-ENGINEERING

8.3 MDR

Subclass	Name
0	MDR-1A
1	MDR-1B
2	MDR-1C
3	MDR-ENGINEERING
4	MDR-VERIFICATION

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9 OCCURRENCE INFORMATION

9.1 Level 1a

Record	Occurrence
MPHR	Once per product
SPHR	Deleted
GIADRs	Once per product
MDR-1A	Once per scan line

9.2 Level 1b

Record	Occurrence
MPHR	Once per product
SPHR	Deleted
GIADRs	Once per product
MDR-1B	Once per scan line

9.3 Level 1c

Record	Occurrence
MPHR	Once per product
SPHR	Deleted
GIADRs	Once per product
MDR-1C	Once per scan line

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9.4 Engineering

Record	Occurrence
MPHR	Once per product
SPHR	Deleted
GIADR-ENGINEERING	Once per product
VIADR-ENGINEERING	Once every 10 scan lines
MDR-ENGINEERING	Once per scan line

9.5 Verification

Record	Occurrence
MPHR	Once per product
SPHR	Deleted
MDR-VERIFICATION	Once per scan line

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10 RECORD FORMAT VERSION CONTROL

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

Record Subclass	Format Version Number	Issue Defined
SPHR	DELETED	6.4
	1	6.3 (CDR)
GIADR-QUALITY	2	6.4
	1	6.3 (CDR)
GIADR-SCALEFACTORS	2	6.4
	1	6.3 (CDR)
MDR-1A	4	6.6
	3	6.5
	2	6.4
	1	6.3 (CDR)
MDR-1B	4	6.6
	3	6.5
	2	6.4
	1	6.3 (CDR)
MDR-1C	4	6.6
	3	6.5
	2	6.4
	1	6.3 (CDR)
GIADR-ENGINEERING	3	6.5
	2	6.4
	1	6.3 (CDR)
VIADR-ENGINEERING	3	6.6
	2	6.4
	1	6.3 (CDR)
MDR-ENGINEERING	4	6.6
	3	6.5
	2	6.4
	1	6.3 (CDR)

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MDR-VERIFICATION	3	6.5
	2	6.4
	1	6.3 (CDR)

Table 2: Record Format Version Numbers

This Document	
Title	IASI LEVEL 1 PRODUCT FORMAT SPECIFICATION TABLES
Reference Number	EPS/MIS/SPE/990003

Change Record	
Issue 4 Draft A	Added Version Control Worksheet (LEO/C/TP)
	Removed detailed navigation section from all VIADRs (LEO/C/TP)
Issue 4 Draft B	Updated layout to allow automatic calculation of sizes
Issue 4 Draft C	Removed VIADR and VEADR because there were no specified contents
	Moved MDR and ADR for Levels 1a,b and c onto separate worksheets for clarity
	Updated contents in line with revised version of IASI-TN-2100-9469-CNE
	Increased parameter NBK from 5 to 6
	Increased parameter NCL from 6 to 7
	Added temporary field names to those fields that were still named with a "?" after revised version updates.
	Divided ADR field GEPSLoclasiAvhrr into two fields, GEPSLoclasiAvhrr_IASI and GEPSLoclasiAvhrr_IIS
	MDR field GSmcSpect moved from byte*3 to byte type in line with GPFS. Extra array dimension added to compensate
	ADR verification Verification_Data field changed from integer8 to bytetype for flexibility - total size not changed
Issue 5 Revision 0	Issue for CGS PDR
Issue 5 Revision 1	Revised Issue for CGS PDR
	Corrected some formula errors that resulted in incorrect reocrd size calculations
Issue 6 Revision 0	Removed ADRS. ADR contents moved to relevant MDR.
Draft A	Updated PFS in line with revised version of IASI Level1 Product Content version 5.2
	Updated SPHR
	- Removed CDA Status
	- Removed Processing Mode Status Change field
	Reduced number of classes for FOV sounder analysis parameter (NCL) from 7 to 6
	Introduced new notation - bitsr(64)[real*8] and bitst(32)[real*4] for the engineering product to show a bitst field that is used to store a binary dump of an IEEE real type of 8 and 4 bytes, respectively.
Draft B	Added EARTH_SATELLITE_DISTANCE field to Level 1a/1b/1c MDRs as this info is availbale at Level 1a and is required again at Level 2 processing

Issue 6 Revision 1	Introduced V-INTEGER types in line with Issue 6.1 of GPFS [AD-1]
Issue 6 Revision 2	Size of spectral data in all three MDRs reduced from 3*byte to integer2. This is possible by using a number of scale factors in a number of spectral bands
	New GIADR-SCALEFACTORS added to include scaling factors for up to 10 spectral bands to accommodate scaling of spectral data
	Original GIADR renamed to GIADR-QUALITY to avoid confusion
Issue 6 Revision 3	Modifications to Word document
Issue 6 Rev 4	EUM.EPS.SYS.DCR.02.175
	GIADR_QUALITY:
	Deleted GEPSIdConf_product
	Updated IDefPsfSondY/Z fields - scale factors, units, array definition and field type
	Changed array ordering for IDefIISNeDT and IDefDptIISDeadPix
	GIADR.SCALE_FACTORS:
	Renamed NUMBER_OF_SPECTRAL_BANDS to IDefScaleSondNbScale
	Added IDefScaleSondNsfirst
	Renamed SPECTRAL_BAND_END_CHANNEL to IDefScaleSondNslast
	Renamed SCALE_FACTORS to IDefScaleSondScaleFactor
	Added IDefScaleIISScaleFactor
	MDR-1A/1B/1C
	Changed array size and field type for GEPSIdConf
	GlslfLinOrigin and GlslfColOrigin units deleted
	GlslfPds1-4 units removed, scale factor of 6 added
	IDefSpecDWn, IDefNsfirst and IDefNslast moved to 1a/1b/1c specific areas in MDR and renamed for MDR-1b/1c
	Array ordering of GlrcImage changed
	MiscOffsetSondIIS deleted
	Added field GQisFlagQual
	GQisSysTecIISQual and GQisSysTecSondQual field types changed from V-integer4 to u-integer4
	Angle fields and location fields changed from V-integer4 to u-integer4 and given scale factor of 6
	GSmcSpect array order changed. Data type made unsigned
	IDefCovarMatEigenVal1 name changed to IDefCovarMatEigenVal11b for MDR-1a/1b and to IDefCovarMatEigenVal11c for MDR-1c. Description updated
	MDR-1C:

	IDefCcsChannelId array size increased
	GCcsRadAnalWgt, GCcsRadAnalY, GCcsRadAnalZ array order changed
	GCcsRadAnalY, GCcsRadAnalZ data type changed to integer4. Units and scale factor added
	Image classification fields added at end of MDR
	General: Cloud Analysis phrase replaced by more accurate Radiance Analysis
	GIADR ENGINEERING:
	GEPSDatProcessing array size reduced
	GEPSIdConf_Product deleted
	OBT to UTC fields added
	VIADR-ENGINEERING
	MDptIISBadHealthPix and MDptIISinHomPix arrays order changed
	MDR ENGINEERING
	Made changes requested by CNES (as detailed in DCR)
	MDR VERIFICATION
	Made changes requested by CNES (as detailed in DCR)
	The following fields are defined to be in the order (zenith, azimuth) :
	GGeoSondAnglesMETOP
	GGeoIISAnglesMETOP
	GGeoSondAnglesSUN
	GGeoIISAnglesSUN fields
	Added Parameters AMCO, AMLI
	Updated Parameter NCL from 6 to 7
	Updated size calculations and offset calculations
Issue 6 Rev 5	EUM.EPS.SYS.DCR.02.251
	MDR 1C: Fields GCcsRadAnalY and GCcsRadAnalZ. Changed array size from [NCL,PN,SNOT,2] to [NCL,PN,SNOT,1] and changed data types from V-INTEG4 to integer4
	MDR 1C : Fields GCcsImageClassifiedNbLin, GCcsImageClassifiedNbCol, GCcsImageClassifiedFirstLin and GCcsImageClassifiedFirstCol changed array ordering from [1,1,SNOT,1] to [SNOT,1,1,1]
	MDR-ENGINEERING changed field name CGeoSubSatellitePosition to GGeoSubSatellitePosition
	MDR-ENGINEERING changed field name CGCcsRadAnalNbClass to GCcsRadAnalNbClass
	MDR-ENGINEERING. Corrected formula that calculates field sizes for all fields. Requires updated of Parameters worksheet as well. This results in updated field sizes, offsets and record size for MDR-ENGINEERING.
	Added DCR reference to this table for issue 6.4

Issue 6 Rev 6	EUM.EPS.SYS.DRC.04.009
	MDR-1a, 1b, 1c - Change GQisFlagQual from scalar to array of PN x SNOT
	MDR-1A, 1b, 1c - Add clarification of ordering to flag GEPSLoclasiAvhrr_IASI
	MDR-1a - Change data type of field GSmcSpect from unsigned integer2 to signed integer2
	MDR-1b - Change data type of field GS1bSpect from unsigned integer2 to signed integer2
	MDR-1c - Change data type of field GS1cSpect from unsigned integer2 to signed integer2
	MDR-1c - Add units and update description for GCcsImageClassifiedFirstLin
	MDR-1c - Add units and update description for GCcsImageClassifiedFirstCol
	MDR-1c - Change datatype of field GCsImageClassified
	MDR-Engineering - Correct calculation of field size for field MMcxNoiseCalRad
	MDR-Engineering - Correct calculation of field size for field MMcxBiasCalRad
	MDR-Engineering - Field GOPSFItIsrfemOff array size changed from PN x SNOT to PN
	MDR-Engineering - Field GOPSFlagPacketIPMiss array size changed from SNOT to SNOT+4
	MDR-Engineering - Added field GOPSFlaGeoAVHRRMiss
	MDR-Engineering - Deleted field SPARE
	MDR-Engineering - Added units for field GlacPosMaxQual
	MDR-Engineering - add units to field GlacVarImagIIS
	MDR-Engineering - change units for field GCOffsetSondAvhrr
	MDR-Engineering - Add units to field GlaxAxeRes
	MDR-Engineering - Add units to field GIfaxAxeRes
	MDR-Engineering - Change units of field GlccRadCalOffsetImag
	MDR-Engineering - Change datatype of field GlccRadCalOffsetImag
	MDR-Engineering - Add units to field GlccRadCalSlopeImag
	MDR-Engineering - Add ScaleFactor to field GlccRadCalSlopeImag
	MDR-Verification - Added typical size for record and reference to Section 7.3 for order of contents
	MDR-Verification - Change datatype for field VERIFICATION_DATA
	VIADR-Engineering - Change datatype from byte to u-byet for fields MExsSmin, MExsSmax and MDptIISinHomPix
	Parameters - Added N to provide typical MDR-Verification size
	Parameters - Added description of SNOT+4 parameter

[illegible]

[illegible]

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	DIM4	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	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			1	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation			1	1	1	1	boolean	1	1	21
Level 1 Data											
GEPSIasiMode	Instrument mode			1	1	1	1	bitst(32)	4	4	22
GEPSOPSProcessingMode	Processing mode			1	1	1	1	bitst(32)	4	4	26
GEPSIdConf	System configuration at line level: PTSI, TEC conf file ID,.....			1	1	1	1	bitst(256)	32	32	30
GEPSLocIasiAvhrr_IASI	Measure positioning relatively to AVHRR: position of 4 IASI sounder pixels in AVHRR raster with DIM1 equal to 2 corresponding to (line, column)		Avhrr pixels	2	PN	SNOT	1	V-INTEG4	5	1200	62
GEPSLocIasiAvhrr_IIS	Measure positioning relatively to AVHRR: position of IIS pixels for a subgrid 5*5 of IIS with DIM1 equal to 2 corresponding to (line, column)		Avhrr pixels	2	SGI	SNOT	1	V-INTEG4	5	7500	1262
OBT	On Board Time (Coarse time + Fine time)			SNOT	1	1	1	bitst(48)	6	180	8762
OnboardUTC	Date of IASI measure (on board UTC): Number of Days since 1 January 2000; Number of ms in the day			SNOT	1	1	1	short cds time	6	180	8942
GEPSDatIasi	Date of IASI measure (Corrected UTC): Number of Days since 1 January 2000; Number of ms in the day		UTC	SNOT	1	1	1	short cds time	6	180	9122
GlsfLinOrigin	Zero point in line in the interpolation grid of the spectral database			CCD	1	1	1	integer4	4	8	9302
GlsfColOrigin	Zero point in column in the interpolation grid of the spectral database			CCD	1	1	1	integer4	4	8	9310

[illegible]

[illegible]

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	DIM4	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	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			1	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation			1	1	1	1	boolean	1	1	21
Level 1 Data											
GEPSIasiMode	Instrument mode			1	1	1	1	bitst(32)	4	4	22
GEPSOPSProcessingMode	Processing mode			1	1	1	1	bitst(32)	4	4	26
GEPSIdConf	System configuration at line level: PTSI, TEC conf file ID,.....			1	1	1	1	bitst(256)	32	32	30
GEPSLocIasiAvhrr_IASI	Measure positioning relatively to AVHRR: position of 4 IASI sounder pixels in AVHRR raster with DIM1 equal to 2 corresponding to (line, column)		Avhrr pixels	2	PN	SNOT	1	V-INTEG4	5	1200	62
GEPSLocIasiAvhrr_IIS	Measure positioning relatively to AVHRR: position of IIS pixels for a subgrid 5*5 of IIS with DIM1 equal to 2 corresponding to (line, column)		Avhrr pixels	2	SGI	SNOT	1	V-INTEG4	5	7500	1262
OBT	On Board Time (Coarse time + Fine time)			SNOT	1	1	1	bitst(48)	6	180	8762
OnboardUTC	Date of IASI measure (on board UTC): Number of Days since 1 January 2000; Number of ms in the day			SNOT	1	1	1	short cds time	6	180	8942
GEPSDatIasi	Date of IASI measure (Corrected UTC): Number of Days since 1 January 2000; Number of ms in the day		UTC	SNOT	1	1	1	short cds time	6	180	9122
GlsfLinOrigin	Zero point in line in the interpolation grid of the spectral database			CCD	1	1	1	integer4	4	8	9302
GlsfColOrigin	Zero point in column in the interpolation grid of the spectral database			CCD	1	1	1	integer4	4	8	9310

[illegible]

[illegible]

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	DIM4	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	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			1	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation			1	1	1	1	boolean	1	1	21
Level 1 Data											
GEPSIasiMode	Instrument mode			1	1	1	1	bitst(32)	4	4	22
GEPSOPSProcessingMode	Processing mode			1	1	1	1	bitst(32)	4	4	26
GEPSIdConf	System configuration at line level: PTSl, TEC conf file ID,.....			1	1	1	1	bitst(256)	32	32	30
GEPSLocIasiAvhrr_IASI	Measure positioning relatively to AVHRR: position of 4 IASI sounder pixels in AVHRR raster with DIM1 equal to 2 corresponding to (line, column)		Avhrr pixels	2	PN	SNOT	1	V-INTEG4	5	1200	62
GEPSLocIasiAvhrr_IIS	Measure positioning relatively to AVHRR: position of IIS pixels for a subgrid 5*5 of IIS with DIM1 equal to 2 corresponding to (line, column)		Avhrr pixels	2	SGI	SNOT	1	V-INTEG4	5	7500	1262
OBT	On Board Time (Coarse time + Fine time)			SNOT	1	1	1	bitst(48)	6	180	8762
OnboardUTC	Date of IASI measure (on board UTC): Number of Days since 1 January 2000; Number of ms in the day			SNOT	1	1	1	short cds time	6	180	8942
GEPSDatIasi	Date of IASI measure (Corrected UTC): Number of Days since 1 January 2000; Number of ms in the day		UTC	SNOT	1	1	1	short cds time	6	180	9122
GlsfLinOrigin	Zero point in line in the interpolation grid of the spectral database			CCD	1	1	1	integer4	4	8	9302
GlsfColOrigin	Zero point in column in the interpolation grid of the spectral database			CCD	1	1	1	integer4	4	8	9310

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IDefSpectDwn1b	Sample width of IASI 1C spectra (same as 1B)		m-1	1	1	1	1	V-INTEGER4	5	5	276297
IDefNsfirst1b	Number of the first sample of IASI 1C spectra (same as 1B)			1	1	1	1	integer4	4	4	276302
IDefNslast1b	Number of the last sample of IASI 1C spectra (same as 1B)			1	1	1	1	integer4	4	4	276306
GS1cSpect	Level 1C spectra		W/m2/sr/m-1	SS	PN	SNOT	1	integer2	2	2088000	276310
IDefCovarMatEigenVal1c	Level 1c noise variance-covariance matrix index			CCD	100	1	1	V-INTEGER4	5	1000	2364310
IDefCcsChannelId	Radiance Analysis: Identification of the AVHRR channel or pseudo-channels used for Radiance Analysis			NBK	1	1	1	integer4	4	24	2365310
GCcsRadAnalNbClass	Radiance Analysis: Number of identified classes in the sounder FOV			PN	SNOT	1	1	integer4	4	480	2365334
GCcsRadAnalWgt	Radiance Analysis: sounder FOV Radiance Analysis (% covered by each class)			NCL	PN	SNOT	1	V-INTEGER4	5	4200	2365814
GCcsRadAnalY	Radiance Analysis: Y Angular position of the centre of gravity	6	degrees	NCL	PN	SNOT	1	integer4	4	3360	2370014
GCcsRadAnalZ	Radiance Analysis: Z Angular position of the centre of gravity	6	degrees	NCL	PN	SNOT	1	integer4	4	3360	2373374
GCcsRadAnalMean	Radiance Analysis: Mean AVHRR radiances (all channels) of the sounder FOV classes		W/m2/sr/m-1	NBK	NCL	PN	SNOT	V-INTEGER4	5	25200	2376734
GCcsRadAnalStd	Radiance Analysis: Standard deviation AVHRR radiances (all channels) of the sounder FOV classes		W/m2/sr/m-1	NBK	NCL	PN	SNOT	V-INTEGER4	5	25200	2401934
GCcsImageClassified	Radiance Analysis: Image AVHRR or IIS classified			AMCO	AMLI	SNOT	1	u-byte	1	300000	2427134
IDefCcsMode	Radiance Analysis: Image used is from AVHRR or IIS imager (degraded cases)			1	1	1	1	bitst(32)	4	4	2727134
GCcsImageClassifiedNbLin	Radiance Analysis: Number of usefull lines			SNOT	1	1	1	integer2	2	60	2727138
GCcsImageClassifiedNbCol	Radiance Analysis: Number of usefull columns			SNOT	1	1	1	integer2	2	60	2727198

[illegible]

[illegible]

[illegible]

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	DIM4	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		1	1	1	1	REC_HEAD	20	20	0
ASSOCIATED DATA											
BIMSBTT	Black Body temperature		K	1	1	1	1	bitst(64)[real*8]	8	8	20
GFtbFilteredBBT	Filtered Black Body temperature		K	1	1	1	1	bitst(64)[real*8]	8	8	28
GEPSIdConf_Line	System Configuration: PTSI, TEC conf file ID, ...			1	1	1	1	bitst(256)	32	32	36
GEPSIasiMode	Instrument mode			1	1	1	1	bitst(32)	4	4	68
GCcsConfAvhrrChannel	Avhrr channel configuration			NBK	SNOT	1	1	bitst(32)	4	720	72
GEPSGranulNumber	Granule Number			1	1	1	1	integer4	4	4	792
GEPSDatIasi	Date of IASI measure (corrected UTC) - number of days since 1 January 2000 - number of ms in the day (TBC)			SNOT	1	1	1	short cds time	6	180	796
GEPSOPSProcessingMode	Processing mode			1	1	1	1	bitst(32)	4	4	976
GEPS_SP	Scan position for all observational targets			SNOT	1	1	1	integer4	4	120	980
GEPS_CCD	Corner cube direction for all observational targets			SNOT	1	1	1	boolean	1	30	1100
GGeoSubSatellitePosition	Geodetic position of the centre of IIS at image number 15 (approximation of subsatellite position)		degrees	2	1	1	1	bitst(64)[real*8]	8	16	1130
GEPSOPSFlagNan	This flag is raised when a Nan error has occurred during the processing			1	1	1	1	boolean	1	1	1146
GEPSEndEclipseTime	Date of the end of the previous satellite eclipse		UTC	1	1	1	1	short cds time	6	6	1147
GSmeTScan	Estimated temperature of the scanning mirror		K	1	1	1	1	bitst(64)[real*8]	8	8	1153
GSmeFlagDateNOK	Flag for inconsistency between current date and ascending node			1	1	1	1	boolean	1	1	1161
GFtbBBTRes	Quality index for the filtering of the black-body temperature			1	1	1	1	bitst(64)[real*8]	8	8	1162
GFtbFlagBBTNonQual	Quality flag of the black-body temperature			1	1	1	1	boolean	1	1	1170
GEPS_LN	Number of the IASI line since the beginning of the dump			1	1	1	1	integer4	4	4	1171
GDocFlagUnderOverflow	Indicates that there is an under or an overflow			PN	SNOT	1	1	boolean	1	120	1175
GDocNbUnderFlow	Number of underflow occurred during spectra decoding			PN	SNOT	1	1	integer4	4	480	1295

GDocNbOverflow	Number of overflow occurred during spectre decoding			PN	SNOT	1	1	integer4	4	480	1775
GDocPosUnderFlow	Buffer of 3 positions of underflow occurred during spectra decoding			3	PN	SNOT	1	integer4	4	1440	2255
GDocPosOverflow	Buffer of 3 positions of overflow occurred during spectre decoding			3	PN	SNOT	1	integer4	4	1440	3695
BCodSpecVerif	Full bit stream of IASI coded level 0 data (i.e. full spectra) data corresponding to VDS (verification data selection)		W/m2/sr/m-1	4320	1	1	1	integer2	2	8640	5135
GlacOffsetIISAvhrr	IASI imager AVHRR imager coregistration offset		AVHRR pixels	2	SNOT	1	1	bitst(64)[real*8]	8	480	13775
GlacCorrelQual	Correlation quality index			SNOT	1	1	1	bitst(64)[real*8]	8	240	14255
GlacPosMaxQual	Quality index of maximum correlation position		AVHRR pixels	SNOT	1	1	1	bitst(64)[real*8]	8	240	14495
GlacFlagCoregNonValid	Flag for imagers IASI/AVHRR non coregistration			SNOT	1	1	1	boolean	1	30	14735
GlacFlagCoregNonQual	Flag for imagers IASI/AVHRR non coregistration			SNOT	1	1	1	boolean	1	30	14765
GlacVarImagIIS	Variance of IIS image		W/m^2/sr/m^-1	SNOT	1	1	1	bitst(64)[real*8]	8	240	14795
GCcsOffsetSondAvhrr	IASI sounder/AVHRR coregistration offset		degrees	2	PN	SNOT	1	bitst(64)[real*8]	8	1920	15035
GCcsOffsetSondIIS	IASI sounder/imager coregistration offset		degrees	2	PN	SNOT	1	bitst(64)[real*8]	8	1920	16955
GQisCcsQualIndex	FOV sounder radiances analysis quality index			SNOT	1	1	1	bitst(64)[real*8]	8	240	18875
GCcsFlagDateNOK	Flag for inconsistency between current date and ascending node			1	1	1	1	boolean	1	1	19115
GCcsRadAnalNbClass	Number of clases in the sounder FOV			PN	SNOT	1	1	integer4	4	480	19116
GCcsFlagPostProcessing	Post-processing flag			SNOT	1	1	1	integer4	4	120	19596
GCcsNonClassifRate	Rate of unclassified points			SNOT	1	1	1	bitst(64)[real*8]	8	240	19716
GCcsVarianceRate	Standard deviation (1σ) of the classified image			SNOT	1	1	1	bitst(64)[real*8]	8	240	19956
GSsdWnShift	Spectral shift calculated for the spectral window		m-1	PN	SNOT	1	1	bitst(64)[real*8]	8	960	20196
GSsdWnShiftQual	Quality index of calculated spectral shift			PN	SNOT	1	1	bitst(64)[real*8]	8	960	21156
GSsdFlagSpectralShiftNonQual	Quality flag of spectral shift determination			PN	SNOT	1	1	boolean	1	120	22116

GSsWnShiftMean	Mean spectral shift for 1 pixel during 1 IASI line		m-1	PN	CCD	1	1	bitst(64)[real*8]	8	64	22236
GSsWnShiftMeanQual	Quality index of mean spectral shift for each PN and CCD			PN	CCD	1	1	bitst(64)[real*8]	8	64	22300
GSsFlagNonSelPix	Flag for pixel not selected			PN	CCD	1	1	boolean	1	8	22364
GSsFlagDateNOK	Flag for inconsistency between current date and ascending node			1	1	1	1	boolean	1	1	22372
GlaxAxeY	Y coordinates of interferometric axis		degrees	CCD	1	1	1	bitst(64)[real*8]	8	16	22373
GlaxAxeZ	Z coordinates of interferometric axis		degrees	CCD	1	1	1	bitst(64)[real*8]	8	16	22389
GlaxFlagAxeNonQual	Interferometric axis determination quality flag			CCD	1	1	1	boolean	1	2	22405
GlaxAxeQual	Interferometric axis position quality flag			CCD	1	1	1	bitst(64)[real*8]	8	16	22407
GlaxAxeRes	Verisimilitude index of the measure/model shift		degrees	CCD	1	1	1	bitst(64)[real*8]	8	16	22423
GFaxAxeY	Y filtered coordinates of interferometric axis		degrees	CCD	1	1	1	bitst(64)[real*8]	8	16	22439
GFaxAxeZ	Z filtered coordinates of interferometric axis		degrees	CCD	1	1	1	bitst(64)[real*8]	8	16	22455
GFaxFlagAxeNonQual	Interferometric axis filtered position quality flag			CCD	1	1	1	boolean	1	2	22471
GFaxAxeRes	Filtering quality index		degrees	CCD	1	1	1	bitst(64)[real*8]	8	16	22473
GlslFlagPdsNonValid	Interpolation weight validity flag			CCD	1	1	1	boolean	1	2	22489
GlccRadCalOffsetImag	Offset coefficient of image radiometric calibration		counts	IMCO	IMLI	1	1	integer2	2	8192	22491
GlccRadCalSlopeImag	Slope coefficient of image radiometric calibration	14	W/m ² /sr/m ⁻¹ /count	IMCO	IMLI	1	1	integer4	4	16384	30683
GlccFlagInit	Indicator of the initialisation of the radiometric calibration			1	1	1	1	boolean	1	1	47067
GQisFlagQual	Quality flag for the system			PN	SNOT	1	1	boolean	1	120	47068
GQisQualIndex	Quality index for the sounder products			PN	SNOT	1	1	bitst(64)[real*8]	8	960	47188
GQisQualIndexIIS	Quality index for the IIS imager products			SNOT	1	1	1	bitst(64)[real*8]	8	240	48148
GQisQualIndexLoc	Geometric Quality index for the sounder products			PN	SNOT	1	1	bitst(64)[real*8]	8	960	48388
GQisQualIndexRad	Radiometric Quality index for the sounder products			PN	SNOT	1	1	bitst(64)[real*8]	8	960	49348
GQisQualIndexSpect	Spectral Quality index for the sounder products			PN	SNOT	1	1	bitst(64)[real*8]	8	960	50308
MMcxNoiseCalRad	Noise of complex radiometric calibration		K	NIM	PN	SNOT	1	bitst(32)[real*4]	4	13440	51268
MMcxBiasCalRad	Bias of complex radiometric calibration		K	NIM	PN	SNOT	1	bitst(32)[real*4]	4	13440	64708

MMcxFlagNoiseCalRad	Flag for radiometric calibration noise threshold crossing			PN	SNOT	1	1	boolean	1	120	78148
MMcxFlagBiasCalRad	Flag for radiometric calibration bias threshold crossing			PN	SNOT	1	1	boolean	1	120	78268
MMcxCoeffCalRad	Error coefficient for radiometric calibration			SB	PN	SNOT	1	bitst(64)[real*8]	8	2880	78388
MDptVarImagMax	Maximum value of the pseudo-variance in the IIS image			1	1	1	1	bitst(64)[real*8]	8	8	81268
MDptVarImagMean	Mean value of the pseudo-variance in the IIS image			1	1	1	1	bitst(64)[real*8]	8	8	81276
MDptPixQual	Qulaity Index for the imager			1	1	1	1	bitst(64)[real*8]	8	8	81284
GHecFlagDateNOK	Flag for inconsistency between current date and ascending node			1	1	1	1	boolean	1	1	81292
Data_PX	Words 4 to 31 and words 150 to 151 of PC packet			PN	SNOT	30	1	integer2	2	7200	81293
Data_IP	Words 4 to 22 and 32 bits for the equalization counter			PN	SNOT+4	21	1	integer2	2	5712	88493
GOPSFlaPixMiss	Flag for degraded mode: sounder-pixel is temporarily missing			PN	SNOT	1	1	boolean	1	120	94205
GOPSFlaDataGap	Flag for degraded mode: spectral gap			1	1	1	1	boolean	1	1	94325
GOPSFltIsrfemOff	Flag for degraded mode: ISRFEM chain not activated for this SN number			SNOT	1	1	1	boolean	1	30	94326
GOPSDatIsrfemOff	Apparation date of ISrfemOff degraded case			1	1	1	1	short cds time	6	6	94356
GOPSFltBandMiss	Flag for degraded mode: spectral band is temporarily missing			SNOT	1	1	1	boolean	1	30	94362
GOPSDatBandMiss	Apparation date of BandMiss degraded case			1	1	1	1	short cds time	6	6	94392
GOPSFltBBTMiss	Flag for degraded mode:black body temperature is temporarily missing			1	1	1	1	boolean	1	1	94398
GOPSDatBBTMiss	Apparation date of BBTMiss degraded case			1	1	1	1	short cds time	6	6	94399
GOPSFltImgEWMiss	Flag for degraded mode:one operational image is temporarily missing			SNOT	1	1	1	boolean	1	30	94405
GOPSDatImgEWMiss	Apparation date of ImgEWMiss degraded case			1	1	1	1	short cds time	6	6	94435
GOPSFltImgBBMiss	Flag for degraded mode:one black body image is temporarily missing			1	1	1	1	boolean	1	1	94441
GOPSDatImgBBMiss	Apparation date of ImgBBMiss degraded case			1	1	1	1	short cds time	6	6	94442

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Name	Size	Description
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	
10	10	
16	16	
21	21	
30	30	
32	32	
40	40	
64	64	
100	100	
550	550	
4319	4319	
4320	4320	
10000	10000	
12500	12500	
AMCO	100	Number of columns for AVHR image pixel
AMLI	100	Number of lines for AVHRR image pixel
CCD	2	Number of corner cube directions
IMCO	64	Number of columns for IASi imager pixel
IMLI	64	Number of lines for IASi imager pixel
MAXBA	3600	Maximum number of samples in one IASi band
N	221000	Typical size of packets stored in MDR-Verification
NBK	6	Number of AVHRR channels
NCL	7	Number of classes for FOV sounder analysis
NIM	28	Number of samples used to represent the imaginary part of the IASi spectrum
PN	4	Number of sounder pixels
SB	3	Number of spectral bands
SGI	25	5 x 5 - Number of pixels of the subgrid imager
SNOT	30	Number of steps for observational target
SNOT+4	34	Number of steps for observational and calibration targets
SS	8700	Number of samples in an IASi spectrum

Parameters used in the IASi array sizing
From IA-TN-2100-9469-CNE, Edition 5, Rev 1, 20/11/01

VP	1	Number of verification packets per IASI line
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Field Type	Size in Bytes
bitst(128)	16
bitst(16)	2
bitst(24)	3
bitst(256)	32
bitst(32)	4
bitst(32)[real*4]	4
bitst(48)	6
bitst(64)	8
bitst(64)[real*8]	8
bitst(8)	1
boolean	1
byte	1
char(1)	1
char(2)	2
char(3)	3
char(4)	4
char(40)	40
char(88)	88
e-char(1)	1
e-char(2)	2
e-char(3)	3
enumerated	1
general time	15
integer2	2
integer4	4
integer8	8
long cds time	8
REC_HEAD	20
short cds time	6
u-byte	1
u-integer2	2
u-integer4	4
u-integer8	8
V-BYTE	2
V-INTEGER2	3

NOTE: Table must be sorted into ascending order

V-INTEGER4	5
V-INTEGER8	9
VU-BYTE	2
VU-INTEGER2	3
VU-INTEGER4	5
VU-INTEGER8	9

FIELD	DESCRIPTION	SF	UNITS	TYPE	ENCODE CHARS	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header	0		REC_HEAD	20	20	0
SPARES							
Nothing defined for SPHR							
TOTAL SIZE							0