

IASI Level 1 PCC Product Format Specification

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1	17/06/2008		Initial release
2	09/10/2009		<p>Editorial updates: typos, formatting, captions, cross-references. Added link to Excel file annex.</p> <p>Changed unit of radiances and noise to $W/m^2/sr/m^{-1}$</p> <p>Chapter 5: Changed format version numbers from 0 to 1. Changed Issue defined from 1 to 2.</p> <p>Appendix A: Swapped DIM1 and DIM2 of /Eigenvectors.</p> <p>Chapter 4: Added details to tables.</p> <p>Section 1.3: Removed paragraph about foreseen changes to IASI L1C format (since these changes have now been published). Removed column with Current Issue in the table.</p> <p>Section 3.3.1: Added new fields from IASI L1C PFS version 11.</p> <p>Updated Document Signature Table and Distribution List.</p> <p>Changed IPCC to IASI PCC.</p> <p>Added a section 1.4 to list the abbreviations and acronyms</p> <p>Expanded abbreviations PCC, PCS and PCR at their first use.</p> <p>Added "EARS Operational Service Specification" to the list of reference documents</p> <p>See also Appendix B for other Annex-specific updates.</p>
v2A	28/06/2010	ODT_DCR_155	Added record subclass info.
			Use channel numbering from 1 to 8461 (instead of 0 to 8460)

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1 INTRODUCTION

1.1 Purpose and Scope

This document is the Infrared Atmospheric Sounding Interferometer (IASI) Level 1 Principal Component Compression (PCC) EPS Product Format Specification and specifies the format of the IASI_PCS_1C and IASI_PCR_1C products. These products are produced by the IASI PCC PPF. The document also specifies the format of the eigenvector files, which are used by the IASI PCC PPF to perform the compression and must be used for the reconstruction of Level 1C radiances from the PC scores contained in the Principal Component Scores (PCS) product.

The generic product format specification used by this document is defined in the EPS Generic Product Format Specification (GPFS) [AD1]. The conventions used by this document are defined in [AD1] and in the EPS Mission Conventions Document [AD2].

1.2 Structure of the Document

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

- Section 1 describes the scope of the document
- Section 2 gives an overview of the products and static auxiliary data files described in this document
- Section 3 contains the format description of the IASI L1 PCS and Principal Component Residuals (PCR) product, including structure and record description
- Section 4 details the occurrence rates of the various records within IASI Level 1 PCS and PCR products
- Section 5 provides version control for the different records defined
- Appendix A contains a detailed table describing the eigenvector file format
- Appendix B contains detailed tables describing the IASI L1 PCS and PCR specific record formats

1.3 Applicable and Reference Documents

Ref.	Document Title and Reference Number
[AD1]	Generic Product Format Specification, EPS.GGS.SPE.96167
[AD2]	EPS Mission Conventions Document, EPS/SYS/SPE/990002
[AD3]	IASI Level 1 Product Format Specification, EUM.EPS.SYS.SPE.990003
[AD4]	HDF-5 User Manual
[RD1]	IASI Level 1 PCC Product Generation Specification, EUM/OPS-EPS/SPE/08/0199
[RD2]	Future Dissemination Approach for IASI level 1 Products, EUM/STG-OPSWG/23/08/DOC/11

[RD3]	Operational Dissemination of IASI Data using PC Compression, EUM/OPS-EPS/TEN/08/0202
[RD4]	Generation of eigenvector files for the IPCC PPF, EUM/OPS-EPS/SPE/08/0200
[RD5]	EPS Programme Auxiliary Data Inventory, EUM/OPS/SYS/LIS/00/002
[RD6]	EARS Operational Service Specification, EUM/OPS/SPE/01/0839

1.4 Abbreviations and Acronyms

EARS	EUMETSAT Advanced Retransmission Service
EPS	EUMETSAT Polar System
GEADR	Global External Auxiliary Data Record
GIADR	Global Internal Auxiliary Data Record
GPFS	Generic Product Format Specification
HDF	Hierarchical Data Format
IASI	Infrared Atmospheric Sounding Interferometer
MDR	Measurement Data Record
PCC	Principal Component Compression
PCR	Principal Component Residuals
PCS	Principal Component Scores
PFS	Product Format Specification
PPF	Product Processing Facility
RMS	Root Mean Square

2 COMPRESSED IASI LEVEL 1 PRODUCTS AND AUXILIARY FILES

2.1 Overview

The EPS format products which are generated by the IASI PCC PPF encompass Level 1 PCS and PCR products.

Product Name	Product ID	Content
Level 1 PCS	IASI_PCS_1C	Principal component compressed IASI L1C spectra
Level 1 PCR	IASI_PCR_1C	Residual after reconstruction of principal component compressed IASI L1C spectra.

Table 1: List of IASI PCC products

The product format for all IASI PCC products is based on the generic product format as described in [AD1]. This document details the instrument- and level-specific additions required for IASI PCC products.

The eigenvectors and additional coefficients needed for the reconstruction of IASI L1C radiances are contained in three separate files - one for each band. Their file names adhere to the file name convention for EPS static auxiliary files [RD5].

Static Auxiliary File Name	File ID	Content
Eigenvector file, band 1	IASI_EV1_xx	Band 1. Spectral range, nedr, mean noise-normalised radiance, eigenvalues and eigenvectors.
Eigenvector file, band 2	IASI_EV2_xx	Band 2. Spectral range, nedr, mean noise-normalised radiance, eigenvalues and eigenvectors.
Eigenvector file, band 3	IASI_EV3_xx	Band 3. Spectral range, nedr, mean noise-normalised radiance, eigenvalues and eigenvectors.

Table 2: List of IASI PCC eigenvector files

The eigenvector files are formatted in HDF5 [AD3]. The three eigenvector files all contain the same fields and their contents are specified in Appendix A.

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 [AD1].

3 LEVEL 1C PCS AND LEVEL 1C PCR RECORDS

3.1 Secondary Product Header Record

There is no SPHR defined for the IASI Level 1C PCS or PCR products.

3.2 Global External Auxiliary Data Record

Three GEADR subclasses are defined to reference each of the three eigenvector files (static auxiliary datasets) used for the compression of the IASI L1C spectra. The same files must be used for the reconstruction.

Subclass	Description	Subclass ID
EV1	Eigenvector file name, band 1 (IASI_EV1_XX_) [Appendix A]	1
EV2	Eigenvector file name, band 2 (IASI_EV2_XX_) [Appendix A]	2
EV3	Eigenvector file name, band 3 (IASI_EV3_XX_) [Appendix A]	3

Table 3: GEADR subclasses for IASI Level 1 PCS and PCR products

3.3 Global Internal Auxiliary Data Record

There is one subclass of GIADR shared by the Level 1 PCS and PCR products.

Subclass	Description	Subclass ID
GIADR-IPCC	Contains information necessary for reconstruction of IASI L1C radiances	4

Table 4: GIADR subclasses for IASI Level 1 PCS and PCR products

The GIADR-IPCC is detailed in Appendix B.

3.3.1 GIADR-IPCC Fields

3.3.1.1 NbrScoresBand1_Part1, NbrScoresBand1_Part2, NbrScoresBand1_Part3, NbrScoresBand2_Part1, NbrScoresBand2_Part2, NbrScoresBand2_Part3, NbrScoresBand3_Part1, NbrScoresBand3_Part2 and NbrScoresBand3_Part3

The PC scores are computed individually for each of the three IASI bands. Since the dynamic range of the PC scores decreases rapidly with PC rank, a higher number of bytes are required to encode the leading PC scores than the subsequent PC scores. Therefore each score will be encoded in either 4, 2 or 1 bytes. These fields contain the number of PC scores encoded in each of the three possible type widths for each of the three IASI spectral bands and thereby define the dimensions used for the PC scores fields in the MDR-PCS.

3.3.1.2 FirstChannel and NbrChannels

Identifies the (contiguous) set of channels belonging to each of the three IASI bands. (Note that this information is redundant, in the sense that it is also included in the eigenvectors files.) Channels are numbered from 1 to 8461 and the wavenumber of channel number i is $(645 + (i-1) * 0.25) \text{ cm}^{-1}$.

3.3.1.3 ScoreQuantisationFactor

PC scores are divided by this number, before they are rounded to the nearest integer in the MDR-PCS.

3.3.1.4 ResidualQuantisationFactor

The noise-normalised residual is divided by this number, before it is rounded to the nearest integer in the MDR-PCR.

3.4 Variable External and Internal Auxiliary Data Records

There are no VEADRs or VIADRs defined for the IASI Level 1C PCS and PCR products.

3.5 Measurement Data Records

There is one subclass of MDR for the Level 1 PCS product, MDR-PCS, and one for the Level 1 PCR product, MDR-PCR.

Subclass	Description	Subclass ID
MDR-PCS	Compressed representation of IASI L1C radiances as PC scores as well as side information from the L1C product required for the BUFR encoding.	6
MDR-PCR	Noise-normalised reconstruction residuals.	7

Table 5: MDR subclasses for IASI Level 1 PCS and PCR products

The MDR-PCS and MDR-PCR records are detailed in Appendix B.

3.5.1 MDR-PCS Fields

The MDR-PCS contains reconstruction scores, quality information of the compression as well as a number of fields copied from the IASI L1C MDR. The fields which are copied from the IASI L1C MDR are:

DEGRADED_INST_MDR, GEPSPSPProcessingMode, GEPSDatlasi, GQisFlagQualDetailed, GqisQuallIndexRad, GGeoSondLoc,	DEGRADED_PROC_MDR, GEPSidConf,OBT, GEPS_SP, GQisQuallIndex, GqisQuallIndexSpect, GGeoSondAnglesMETOP,	GEPSlasiMode, OnboardUTC, GQisFlagQual, GqisQuallIndexLoc, GqisSysTecSondQual, GGeoSondAnglesSUN,
---	--	--

EARTH_SATELLITE_DISTANCE, IdefCcsChannelId, GccsRadAnalNbClass,
GccsRadAnalWgt, GccsRadAnalY, GccsRadAnalZ,
GccsRadAnalMean, GCcsRadAnalStd, GEUMAvhrr1BCIdFrac,
GEUMAvhrr1BLandFrac and GEUMAvhrr1BQual.

They were added in order to include all the data needed by the BUFR encoding software in a single product. They are described in the IASI L1 PFS [AD3].

3.5.1.1 PcScoresB1P1, PcScoresB1P2, PcScoresB1P3, PcScoresB2P1, PcScoresB2P2, PcScoresB2P3, PcScoresB3P1, PcScoresB3P2 and PcScoresB3P3

These fields contain the PC scores for each of the three IASI bands. The number of scores in each band and how many of these are encoded with 4, 2 and 1 bytes respectively is constant over a product and is given in the GIADR-IPCC record (see Section 3.3.1.1).

The PC scores within each field are ordered by rank (scores corresponding to eigenvectors with higher eigenvalues first). The order of the fields for each band x is PcScoresB x P1, PcScoresB x P2, PcScoresB x P3, i.e. the scores in PcScoresB x P1 correspond to eigenvectors with higher eigenvalues than the scores in PcScoresB x P2, which again corresponds to eigenvectors with higher eigenvalues than the scores in PcScoresB x P3. The total number of scores for a particular band x is NBS x P1+NBS x P2+NBS x P3 (where NBS x P y is the value contained in the GIADR-IPCC field NbrScores $_x$ _Party). PcScoresB x P1 contains the scores with rank 1 to NBS x P1, PcScoresB x P2 contains the scores with rank NBS x P1+1 to NBS x P1+NBS x P2 and PcScoresB x P3 contains the scores with rank NBS x P1+NBS x P2+1 to NBS x P1+NBS x P2+NBS x P3.

The eigenvector files (with format as described in Appendix A) are needed to reconstruct IASI L1C radiances from the PC scores, as described in the pseudo-code below:

Pseudo-code for reconstruction of radiances in band x (optional addition of residuals in blue)

```

Input sets:
K = [FirstChannel .. FirstChannel+NbrChannels[
N = [1 .. 8461]
P1 = [1 .. NBSxP1]
P2 = [NBSxP1 + 1 .. NBSxP1 + NBSxP2]
P3 = [NBSxP1 + NBSxP2 + 1 .. NBSxP1 + NBSxP2 + NBSxP3]
P = [1 .. NBSxP1 + NBSxP2 + NBSxP3]

Input data:
Noise(K) [unit: W/m2/sr/m-1] // from eigenvector file
Mean(K) // from eigenvector file
PcScoresBxP1(P1) // from MDR-PCS
PcScoresBxP2(P2) // from MDR-PCS
PcScoresBxP3(P3) // from MDR-PCS
Eigenvectors(K,P) // from eigenvector file
SQ = ScoreQuantisationFactor(x) // from GIADR-IPCC
PccResidual(N) // from MDR-PCR
RQ = ResidualQuantisationFactor(x) // from GIADR-IPCC

Output:
Radiance(K) [unit: W/m2/sr/m-1]
  
```

Algorithm:
 Radiance(K) = Noise(K)*(
 Mean(K)
 + SQ*sum(P1, PcScoresBxP1(P1)*Eigenvectors(K,P1))
 + SQ*sum(P2, PcScoresBxP2(P2)*Eigenvectors(K,P2))
 + SQ*sum(P3, PcScoresBxP3(P3)*Eigenvectors(K,P2))
 + RQ*PccResidual(K)
)

3.5.1.2 ResidualRMS

Noise-normalised residual RMS for each band (Quality indicator). The ResidualRMS is computed for each band based on noise-normalised reconstruction residuals before quantisation, as indicated in the pseudo-code below:

ResidualRMS pseudo-code

Input sets:
 B = [1 .. 3]
 N = [1 .. 8461]
 NB(N,B) = [FirstChannel(B) .. FirstChannel(B) + NbrChannels(B)] * B

Input data:
 Residual(N) = (GS1cSpect(N) - Radiance(N)) / Noise(N)

Output data:
 ResidualRMS(B)

Algorithm:
 ResidualRMS(B) = sqrt(sum(NB(N,B), Residual(N)*Residual(N))/NbrChannels(B))

If one (or more) PC scores in a particular band are unavailable (could not be encoded in the number of bytes allocated for it), the ResidualRMS for the band is set to UNAVAILABLE_VALUE (as per the GPFS [AD1]).

3.5.2 MDR-PCR Fields

Besides the generic header field and the two generic quality indicators, there is only one field, PccResidual, in the MDR-PCR record. Except for monitoring purposes, the Level 1 PCR product is to be used only together with the corresponding Level 1 PCS product.

3.5.2.1 PccResidual

Quantised noise-normalised residual. These can be used to obtain the original L1C radiances to within the ResidualQuantisationFactor (typically 0.5) of the instrument noise by applying the optional part of the “Pseudo-code for reconstruction of radiances in band x” (Section 3.5.1.1). Note that the PccResidual mainly consists of random noise and that the radiance reconstruction without adding the PccResidual provides noise-filtered spectra.

4 OCCURRENCE INFORMATION

4.1 Level 1C PCS

Record	Occurrence	Class	Instr. Group	Sub-class	Version	Size
MPHR	Once per product	1	0	0	2	3307
IPR	Five per product	3	0	0	1	27
GEADR-EV1	Once per product	4	8	1	1	120
GEADR-EV2	Once per product	4	8	2	1	120
GEADR-EV3	Once per product	4	8	3	1	120
GIADR-IPCC	Once per product	5	8	4	1	62
MDR-PCS	Once per scan line	8	8	6	1	Variable

The size of the MDR-PCS is determined by the values of the GIADR-IPCC fields as follows:

$$\begin{aligned}
 \text{Size(MDR-PCS)} = & 67014 + 480 * (\text{NBS1P1} + \text{NBS2P1} + \text{NBS3P1}) \\
 & + 240 * (\text{NBS1P2} + \text{NBS2P2} + \text{NBS3P2}) \\
 & + 120 * (\text{NBS1P3} + \text{NBS2P3} + \text{NBS3P3})
 \end{aligned}$$

4.2 Level 1C PCR

Record	Occurrence	Class	Instr. Group	Sub-class	Version	Size
MPHR	Once per product	1	0	0	2	3307
IPR	Five per product	3	0	0	1	27
GEADR-EV1	Once per product	4	8	1	1	120
GEADR-EV2	Once per product	4	8	2	1	120
GEADR-EV3	Once per product	4	8	3	1	120
GIADR-IPCC	Once per product	5	8	4	1	62
MDR-PCR	Once per scan line	8	8	7	1	1015342

5 RECORD FORMAT VERSION CONTROL

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

Record Subclass	Format Version Number	Issue Defined
GIADR-IPCC	1	2
MDR-PCS	1	2
MDR-PCR	1	2

Table 6: Record Format Version Numbers

APPENDIX A EIGENVECTOR FILE FORMAT

The eigenvector files are used for the compression as well as the reconstruction of Level 1C radiances. The three eigenvector file types (IASI_EV1, IASI_EV2 and IASI_EV3) all share the same format. They are HDF5 [AD4] files containing three Attributes and four Datasets, all belonging to the root group, as detailed in the table below:

Name	Type	Data Type	Rank	Dim 1	Dim 2	Description
/FirstChannel	Attribute	32-bit integer	0			Channel number (between 1 and 8461) of the first channel of the band.
/NbrChannels	Attribute	32-bit integer	0			Number of channels in the band.
/NbrEigenvectors	Attribute	32-bit integer	0			Number of eigenvectors included in the file. Can be greater, but not smaller, than the number of PC scores (for the corresponding band) included in the L1 PCS product.
/Noise	Dataset	64-bit floating-point	1	/NbrChannels		Random component of the instrument noise assumed for the noise normalisation within the PC compression scheme. [unit: $W/m^2/sr/m^{-1}$]
/Mean	Dataset	64-bit floating-point	1	/NbrChannels		Noise-normalised radiance means assumed for the PC compression scheme.
/Eigenvalues	Dataset	64-bit floating-point	1	/NbrEigenvectors		The eigenvalues corresponding to the eigenvector included in the file. Not used for compression/reconstruction.
/Eigenvectors	Dataset	64-bit floating-point	2	/NbrEigenvectors	/NbrChannels	The eigenvectors used for the compression/reconstruction of IASI L1C radiances.

Table 7: HDF5 objects contained in the eigenvector files

All entities, except Noise, are unitless. The unit of Noise is $W/m^2/sr/m^{-1}$.

The eigenvalues are provided for interest only and are not used for compression or reconstruction.

The eigenvectors are computed from a training set of IASI L1C spectra as described in [RD3] using the tools described in [RD4].

**APPENDIX B DETAILED SPECIFICATION OF IASI LEVEL 1 PCS AND
PCR SPECIFIC RECORDS**

In the following Annex, detailed format specifications for the GIADR-IPCC, MDR-PCS and MDR-PCR records are included.

The Annex is accessible under Document Reference: EUM/OPS-EPS/SPE/08/0203
or electronically via the following Hummingbird link:

[DOCSLIB-#209366-IASI Level 1 PCC Product Format Specification - Annex](#)

This Document	
Title	IASI LEVEL 1 PCC PRODUCT FORMAT SPECIFICATION TABLES
Reference Number	EPS/OPS-EPS/SPE/08/0203
Change Record	
Issue 1 16/06/2008	Initial release
Issue 2 09/10/2009	Added TOTAL SIZE to MDR-PCS Changed IASi to IASI in line 24 of Parameters sheet. Added date of issues Changed format of new IASI L1C fields (GEUMAvhrr1BCIdFrac, GEUMAvhrr1BLandFrac and GEUMAvhrr1BQual (were CLOUD_FRACTION and LAND_FRACTION) as well as GQisFlagQual and GQisFlagQualDetailed to be carried over to the PCS product, in accordance with new information in EUM/OPS-EPS/SPE/08/0231 v1, 23 June 2008.
Issue 2A 28/06/2010	Changed FirstChannel in GIADR-IPCC to run from 1 to 8461 (instead of 0 to 8460)

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Worksheet: MDR-PCS

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
OBT	On Board Time (Coarse time + Fine time)			SNOT	1	1	1	bitst(48)	6	180	62
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	242
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	422
GEPS_SP	Scan position for all observational targets			SNOT	1	1	1	integer4	4	120	602
GQisFlagQual	Quality flag for the system			SB	PN	SNOT	1	boolean	1	360	722
GQisFlagQualDetailed	Detailed Quality Flag for the system			PN	SNOT	1	1	bitst(16)	2	240	1082
GQisQualIndex	System-IASI general quality index			1	1	1	1	V-INTEGGER4	5	5	1322
GQisQualIndexLoc	Geometric quality index for sounder product			1	1	1	1	V-INTEGGER4	5	5	1327
GQisQualIndexRad	Radiometric quality index for sounder product			1	1	1	1	V-INTEGGER4	5	5	1332
GQisQualIndexSpect	Spectral quality index for sounder product			1	1	1	1	V-INTEGGER4	5	5	1337
GQisSysTecSondQual	System -TEC quality index for sounder			1	1	1	1	u-integer4	4	4	1342
GGeoSondLoc	Location of pixel centre in geodetic coordinates (long, lat) for each sounder pixel	6	degrees	2	PN	SNOT	1	integer4	4	960	1346
GGeoSondAnglesMETOP	Measurement angles for each sounder pixel (zenith, azimuth)	6	degrees	2	PN	SNOT	1	integer4	4	960	2306
GGeoSondAnglesSUN	Solar angles at the surface for each sounder pixel (zenith, azimuth)	6	degrees	2	PN	SNOT	1	integer4	4	960	3266

EARTH_SATELLITE_DISTANCE	Distance of satellite from Earth centre		m		1	1	1	1	u-integer4	4	4	4226
Level 1c Specific Data												
IDefCcsChannelId	Radiance Analysis: Identification of the AVHRR channel or pseudo-channels used for Radiance Analysis			NBK	1	1	1	1	integer4	4	24	4230
GCcsRadAnalNbClass	Radiance Analysis: Number of identified classes in the sounder FOV			PN	SNOT	1	1	1	integer4	4	480	4254
GCcsRadAnalWgt	Radiance Analysis: sounder FOV Radiance Analysis (% covered by each class)			NCL	PN	SNOT	1	1	V-INTEGER4	5	4200	4734
GCcsRadAnalY	Radiance Analysis: Y Angular position of the centre of gravity	6	degrees	NCL	PN	SNOT	1	1	integer4	4	3360	8934
GCcsRadAnalZ	Radiance Analysis: Z Angular position of the centre of gravity	6	degrees	NCL	PN	SNOT	1	1	integer4	4	3360	12294
GCcsRadAnalMean	Radiance Analysis: Mean AVHRR radiances (all channels) of the sounder FOV classes		W/m2/sr (ch. 1,2,3a) W/m2/sr/m-1 (ch. 3b,4,5)	NBK	NCL	PN	SNOT	1	V-INTEGER4	5	25200	15654
GCcsRadAnalStd	Radiance Analysis: Standard deviation AVHRR radiances (all channels) of the sounder FOV classes		W/m2/sr (ch. 1,2,3a) W/m2/sr/m-1 (ch. 3b,4,5)	NBK	NCL	PN	SNOT	1	V-INTEGER4	5	25200	40854
GEUMAvhrr1BCIdFrac	AVHRR L1B based cloud fraction	0	%	PN	SNOT	1	1	1	u-byte	1	120	66054
GEUMAvhrr1BLandFrac	AVHRR L1B based land and coast fraction	0	%	PN	SNOT	1	1	1	u-byte	1	120	66174
GEUMAvhrr1BQual	Quality indicator of GEUMAvhrr1BCId and - LandFrac	0	n/a	PN	SNOT	1	1	1	bitst(8)	1	120	66294
Level 1C PCS Specific Data												
PcScoresB1P1	Band 1 PC scores coded with 4 bytes	0		NBS1P1	PN	SNOT	1	1	integer4	4	1440	66414
PcScoresB1P2	Band 1 PC scores coded with 2 bytes	0		NBS1P2	PN	SNOT	1	1	integer2	2	4800	67854
PcScoresB1P3	Band 1 PC scores coded with 1 byte	0		NBS1P3	PN	SNOT	1	1	byte	1	6840	72654
PcScoresB2P1	Band 2 PC scores coded with 4 bytes	0		NBS2P1	PN	SNOT	1	1	integer4	4	1440	79494
PcScoresB2P2	Band 2 PC scores coded with 2 bytes	0		NBS2P2	PN	SNOT	1	1	integer2	2	4800	80934
PcScoresB2P3	Band 2 PC scores coded with 1 byte	0		NBS2P3	PN	SNOT	1	1	byte	1	11640	85734
PcScoresB3P1	Band 3 PC scores coded with 4 bytes	0		NBS3P1	PN	SNOT	1	1	integer4	4	1440	97374
PcScoresB3P2	Band 3 PC scores coded with 2 bytes	0		NBS3P2	PN	SNOT	1	1	integer2	2	4800	98814

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

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

SS	8700	Number of samples in an IASI spectrum
VP	1	Number of verification packets per IASI line
S	8461	Number of IASI channels
ST	3	Number of widths used for holding PC scores
NBS1P1	3	Number of PC scores, band 1, 4 bytes
NBS1P2	20	Number of PC scores, band 1, 2 bytes
NBS1P3	57	Number of PC scores, band 1, 1 bytes
NBS2P1	3	Number of PC scores, band 2, 4 bytes
NBS2P2	20	Number of PC scores, band 2, 2 bytes
NBS2P3	97	Number of PC scores, band 2, 1 bytes
NBS3P1	3	Number of PC scores, band 3, 4 bytes
NBS3P2	20	Number of PC scores, band 3, 2 bytes
NBS3P3	57	Number of PC scores, band 3, 1 bytes

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

NOTE: Table must be sorted into ascending order

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