



Customer : ESRIN	Document Ref : IDEAS-SER-IPF-SPE-0288
Contract No : 21525/08/I-OL	Issue Date : 05 September 2013
ESA Doc Ref : PO-RS-MDA-GS-2009	Issue : 4 / C

TITLE: ENVISAT-1 PRODUCTS SPECIFICATIONS
VOLUME 7: AATSR PRODUCTS SPECIFICATIONS

Abstract : This document contains the AATSR Product Specifications.

Written by : _____ **Approval** : _____
M. Cardaci Siân O'Hara

Accepted : _____
Philippe Goryl

Distribution :
Hard Copy File:
Filename: IDEAS-SER-IPF-SPE-0288_4 / C.doc



TABLE OF CONTENTS

7. AATSR PRODUCTS SPECIFICATIONS	15
7.1 INSTRUMENT OVERVIEW	15
7.2 PRODUCTS OVERVIEW	17
7.2.1 Product Grid.....	18
7.3 LEVEL 0 PRODUCTS	19
7.3.1 AATSR Level 0 Product.....	19
7.3.1.1 Input Data	19
7.3.1.2 Auxiliary Data Used.....	19
7.3.1.3 Processing Performed.....	19
7.3.1.4 Product Structure	19
7.4 LEVEL 1B PRODUCTS.....	21
7.4.1 Gridded Brightness Temperature and Reflectance.....	21
7.4.1.1 Input Data	21
7.4.1.2 Auxiliary Data Used.....	21
7.4.1.3 Processing Performed.....	22
7.4.1.4 Product Structure	22
7.4.1.5 Main Product Header	23
7.4.1.6 Specific Product Header	23
7.4.1.7 Data Sets	30
7.4.1.7.1 Summary Quality ADS (SQADS).....	30
7.4.1.7.2 Grid Pixel Latitude and Longitude and Topographic Corrections ADS (LADS).....	31
7.4.1.7.3 Scan Pixel x and y ADSR	32
7.4.1.7.4 Nadir View Solar Angles ADS	32
7.4.1.7.5 Forward View Solar Angles ADS	33
7.4.1.7.6 Visible Calibration Coefficients ADS	33
7.4.1.7.7 Scan and Pixel Number, Nadir View Image ADS.....	33
7.4.1.7.8 Scan and Pixel Number, Forward View Image ADS.....	33
7.4.1.7.9 Brightness Temperature and Reflectance MDSs.....	34
7.4.1.7.10 Confidence Words, Nadir View MDS	35
7.4.1.7.11 Confidence Words, Forward View MDS	35
7.4.1.7.12 Cloud Flags, Nadir View MDS.....	35
7.4.1.7.13 Cloud Flags, Forward View MDS.....	36
7.4.1.8 Size Estimate.....	36
7.5 LEVEL 2 PRODUCTS	39
7.5.1 Gridded Sea Surface Temperature Product.....	39
7.5.1.1 Input Data	39
7.5.1.2 Auxiliary Data Used.....	39
7.5.1.3 Processing Performed.....	39
7.5.1.4 Product Structure	39
7.5.1.5 Main Product Header	40
7.5.1.6 Specific Product Header	40
7.5.1.7 Data Sets	41
7.5.1.7.1 Summary Quality ADS (SQADS).....	41
7.5.1.7.2 Grid Pixel Latitude and Longitude and Topographic Correction ADS (LADS)	42
7.5.1.7.3 Scan Pixel x and y ADS.....	42
7.5.1.7.4 Nadir View Solar Angles ADS	42
7.5.1.7.5 Forward View Solar Angles ADS	42
7.5.1.7.6 Scan and Pixel Number, Nadir View Image ADS.....	43
7.5.1.7.7 Scan and Pixel Number, Forward View Image ADS.....	43
7.5.1.7.8 Distributed Product MDS.....	43
7.5.1.8 Size Estimate.....	44
7.5.2 AATSR L2P (UPA-L2P-ATS_NR__2P) Product	46
7.5.3 AATSR Averaged Surface Temperature (AST) Product	47
7.5.3.1 Description.....	47
7.5.3.2 Input Data	47

7.5.3.3	Auxiliary Data Used	47
7.5.3.4	Processing Performed	47
7.5.3.5	Product Structure.....	47
7.5.3.6	Main Product Header	48
7.5.3.7	Specific Product Header.....	48
7.5.3.8	Data Sets	50
7.5.3.8.1	SST Record, 50km cell MDS	50
7.5.3.8.2	SST Record, 17km cell MDS	50
7.5.3.8.3	SST Record 10 arc minute cell MDS	51
7.5.3.8.4	SST Record 30 arc minute cell MDS	51
7.5.3.8.5	LST Record 50km cell MDS	52
7.5.3.8.6	LST Record 17km cell MDS	52
7.5.3.8.7	LST Record 10 arc minute cell MDS	53
7.5.3.8.8	LST Record 30 arc minute cell MDS	53
7.5.3.8.9	BT/TOA Land Record, 50km cell MDS.....	53
7.5.3.8.10	BT/TOA Land Record, 17km cell MDS.....	56
7.5.3.8.11	BT/TOA Land Record, 10 arc minute cell MDS	59
7.5.3.8.12	BT/TOA Land Record, 30 arc minute cell MDS	59
7.5.3.8.13	BT/TOA Sea Record, 50km cell MDS	59
7.5.3.8.14	BT/TOA Sea Record, 17km cell MDS	62
7.5.3.8.15	BT/TOA Sea Record, 10 arc minute cell MDS	63
7.5.3.8.16	BT/TOA Sea Record, 30 arc minute cell MDS	64
7.5.3.8.17	Pixel Threshold Failure Flags	64
7.5.3.9	Size Estimate	65
7.5.4	AATSR Spatially Averaged Surface Temperature (AST) Product for Meteo Users	66
7.5.4.1	Description	66
7.5.4.2	Input Data.....	66
7.5.4.3	Auxiliary Data Used	66
7.5.4.4	Processing Performed	66
7.5.4.5	Product Structure.....	66
7.5.4.6	Main Product Header	66
7.5.4.7	Specific Product Header.....	66
7.5.4.8	Data Sets	67
7.5.4.8.1	SST Record 10 arc minute cell MDS	67
7.5.4.9	Size Estimate	68
7.5.5	ARC L2P Gridded Sea Surface Temperature Product	69
7.5.5.1	Description	69
7.5.5.2	Input Data.....	69
7.5.5.3	Auxiliary Data Used	69
7.5.5.4	Processing Performed	70
7.5.5.5	Product Structure.....	70
7.5.5.5.1	ARC L2P filename convention	70
7.5.5.6	ARC L2P Global Attributes.....	71
7.5.5.7	ARC L2P Variable Attributes	73
7.5.5.8	ARC L2P File Contents	73
7.5.6	ARC L3U Sea Surface Temperature Product	75
7.5.6.2	Input Data.....	75
7.5.6.3	Auxiliary Data Used	75
7.5.6.4	Processing Performed	75
7.5.6.5	Product Structure.....	75
7.5.6.5.1	ARC L3U filename convention.....	75
7.5.6.6	ARC L3U Global Attributes	75
7.5.6.7	ARC L3U Variable Attributes	77
7.5.6.8	ARC L3U File Contents.....	77
7.6	BROWSE PRODUCT.....	79
7.6.1	Three Band Colour Composite Browse Product	79
7.6.1.1	Input Data.....	79
7.6.1.2	Auxiliary Data Used	79



7.6.1.3	Processing Performed.....	79
7.6.1.4	Product Structure	79
7.6.1.5	Main Product Header	79
7.6.1.6	Specific Product Header	80
7.6.1.7	Data Sets.....	80
7.6.1.7.1	Summary Quality ADS.....	80
7.6.1.7.2	Geolocation Grid ADS	81
7.6.1.7.3	Browse MDS.....	81
7.6.1.8	Size Estimate.....	82
7.7	AUXILIARY DATA FILES	83
7.7.1	Level 1B Processor Configuration Data File.....	83
7.7.1.1	Format	83
7.7.1.1.1	Processor Configuration Data GADS	83
7.7.2	AATSR Instrument Data File.....	85
7.7.2.1	Format	86
7.7.2.1.1	General Parameters GADS.....	86
7.7.2.1.2	Master Unpacking Definition Table GADS	87
7.7.2.1.3	Conversion Parameters GADS	87
7.7.2.1.4	Limits GADS.....	87
7.7.2.1.5	Surveillance Limits GADS.....	88
7.7.2.1.6	Validation Parameters GADS.....	88
7.7.3	Visible Calibration Data File.....	88
7.7.3.1	Format	89
7.7.3.1.1	Visible Channel Calibration Parameters GADS	89
7.7.4	General Calibration Data File.....	90
7.7.4.1	Format	90
7.7.4.1.1	General Parameters GADS.....	91
7.7.4.1.2	Temperature to Radiance LUT GADS	92
7.7.4.1.3	Radiance to Brightness Temperature LUT GADS	92
7.7.4.1.4	1.6 micron Channel Non-linearity Correction LUT GADS.....	92
7.7.5	Level 1b Characterisation Data File.....	92
7.7.5.1	Format	93
7.7.5.1.1	Characterisation GADS	93
7.7.6	Land-Sea Mask Data Product.....	94
7.7.7	Digital Terrain Model Data File	94
7.7.8	Cloud LUT Data File	94
7.7.8.1	Format	94
7.7.8.1.1	1.6 Micron Histogram Test LUT GADS.....	95
7.7.8.1.2	11 Micron Spatial Coherence Test LUT GADS	96
7.7.8.1.3	12 Micron Gross Cloud Test LUT GADS.....	96
7.7.8.1.4	12Micron Gross Cloud Test Land Surface LUT GADS	97
7.7.8.1.5	Thin Cirrus Test LUT GADS	97
7.7.8.1.6	Medium/High Level Cloud Test LUT GADS.....	97
7.7.8.1.7	Fog/Low Stratus Test LUT GADS.....	97
7.7.8.1.8	11/12 Micron Nadir/Forward Test LUT GADS.....	98
7.7.8.1.9	11/3.7 Micron Nadir/Forward Test LUT GADS	98
7.7.8.1.10	Infrared Histogram Test LUT GADS	98
7.7.8.1.11	General parameters for Visible Channel Cloud Tests.....	99
7.7.8.1.12	Zone vertices for Visible Channel Cloud Test.....	99
7.7.8.1.13	Zone definitions for Visible Channel Cloud Test.....	99
7.7.8.1.14	Snow-covered surface test LUT.....	99
7.7.9	Browse LUT Data File	100
7.7.9.1	Format	100
7.7.9.1.1	Browse Day-Time Colour LUT GADS	100
7.7.10	Level 2 Processor Configuration Data File	100
7.7.10.1	Format	101
7.7.10.1.1	Configuration Data GADS	101
7.7.11	SST Retrieval Coefficient Data File.....	102



- 7.7.11.1 Format.....102
 - 7.7.11.1.1 Across-track Band Mapping LUT GADS.....102
 - 7.7.11.1.2 SST Retrieval Coefficients GADS102
 - 7.7.11.1.3 Averaged SST Retrieval Coefficients GADS.....103
- 7.7.12 AATSR LST Retrieval Coefficients Data Product103
 - 7.7.12.1 Format.....104
 - 7.7.12.1.1 General Parameters for Land Surface Temperature Retrieval.104
 - 7.7.12.1.2 Surface Vegetation Class for Land Surface Temperature Retrieval.104
 - 7.7.12.1.3 Vegetation Fraction for Land Surface Temperature Retrieval105
 - 7.7.12.1.4 Climatology Data for Land Surface Temperature Retrieval105
 - 7.7.12.1.5 Topographic Variance flagsfor Land Surface Temperature Retrieval.....105
 - 7.7.12.1.6 Land Surface Temperature Retrieval Coefficients.....105
- 7.7.13 ENVISAT-1 Precision Orbit Data Files105
- 7.7.14 ENVISAT-1 Attitude File105
- 7.8 AATSR PRODUCT SUMMARY SHEETS107



INDEX OF TABLES

Table 7.1-1 AATSR Instrument Characteristics	15
Table 7.2-1 AATSR Products	17
Table 7.4.1.2-1 Auxiliary Data Files for AATSR Level 1B Processing	21
Table 7.4.1.4-1 AATSR Level 1B Product Structure	22
Table 7.4.1.6-1 AATSR Level 1B - SPH	23
Table 7.4.1.6-2 AATSR Level-1B DS_NAMES	29
Table 7.4.1.7.1-1 Summary Quality ADSR	30
Table 7.4.1.7.2-1 Grid Pixel Latitude and Longitude and Topographic Corrections ADSR	31
Table 7.4.1.7.3-1 Scan Pixel x and y ADSR	32
Table 7.4.1.7.4-1 Nadir View Solar Angles ADSR	32
Table 7.4.1.7.6-1 Visible Calibration Coefficients ADSR	33
Table 7.4.1.7.7-1 Scan and Pixel Number, Nadir View Image ADSR	33
Table 7.4.1.7.9-1 AATSR Level-1B MDS List	34
Table 7.4.1.7.9-2 MDSR for Brightness Temperature and Reflectance MDSs	34
Table 7.4.1.7.10-1 Confidence Words, Nadir View MDSR	35
Table 7.4.1.7.10-2 GBTR Confidence Flags (nadir or forward view)	35
Table 7.4.1.7.12-1 Cloud Flags, Nadir View MDSR	35
Table 7.4.1.7.12-2 GBTR Cloud-clearing/Land Flagging Flags (nadir or forward view)	36
Table 7.4.1.8-1 GBTR Product Size	36
Table 7.5.1.2-1 Auxiliary Data Files for AATSR Level 2 Processing	39
Table 7.5.1.4-1 AATSR Level 2 GSST Product Structure	39
Table 7.5.1.6-1 AATSR Level 2 - SPH	40
Table 7.5.1.6-2 AATSR Level-2 GSST DS_NAME	41
Table 7.5.1.7.1-1 Summary Quality ADS Format	41
Table 7.5.1.7.8-1 Distributed Product Record MDS	43
Table 7.5.1.7.8-2 GSST Nadir and Combined Field Contents	43
Table 7.5.1.7.8-3 GSST Confidence Flags Note: Bits are numbered as per Volume A convention	44
Table 7.5.1.8-1 GSST Product Size	44
Table 7.5.3.5-1 AATSR Level 2 AST Product Structure	47
Table 7.5.3.7-1 AATSR Level 2 AST – SPH	48
Table 7.5.3.7-2 AATSR Level-2 AST DS_NAME	49
Table 7.5.3.8.1-1 SST Record, 50km cell MDSR	50
Table 7.5.3.8.2-1 SST Record, 17km cell MDSR	50
Table 7.5.3.8.3-1 SST Record, 10 arc minute cell MDSR	51
Table 7.5.3.8.5-1 LST Record 50km cell MDSR	52
Table 7.5.3.8.6-1 LST Record 17km cell MDSR	52
Table 7.5.3.8.9-1 BT/TOA Land Record, 50km cell MDSR	53



Table 7.5.3.8.10-1 BT/TOA Land Record, 17km cell MDSR.....	56
Table 7.5.3.8.13-1 BT/TOA Sea Record, 50km cell MDSR	59
Table 7.5.3.8.14-1 BT/TOA Sea Record, 17km cell MDSR	62
Table 7.5.3.8.17-1 Pixel Threshold Failure Flags (Nadir or Forward View).....	64
Table 7.5.3.8.17-2 AST Confidence Word.....	64
Table 7.5.3.9-1 Number of Cells per AST Product	65
Table 7.5.3.9-2 AST Product Size	65
Table 7.5.4.5-1 AATSR ATS_MET_2P Product Structure.....	66
Table 7.5.4.7-1 AATSR ATS_MET_2P - SPH.....	66
Table 7.5.4.7-2 AATSR Level-2 Meteo DS_NAME	67
Table 7.5.4.8.1-1 SST Record, 10 arc minute cell MDSR.....	67
Table 7.5.4.9-1 ATS_MET_2P Product Size	68
Table 7.5.5.5-1 ARC L2P filename components.....	71
Table 7.5.5.6-1 ARC L2P global metadata.....	71
Table 7.5.5.7-1 ARC L2P variable metadata.....	73
Table 7.5.5.8-1 ARC L2P variables	73
Table 7.5.6.6-1 ARC L3U global metadata.....	75
Table 7.5.6.7-1 ARC L3U variable metadata	77
Table 7.5.6.8-1 ARC L3U variables	78
Table 7.6.1.4-1 AATSR Browse Product Structure.....	79
Table 7.6.1.6-1 AATSR Browse - SPH.....	80
Table 7.6.1.6-2 AATSR Browse DS_NAME.....	80
Table 7.6.1.7.2-1 Browse Grid Pixel Latitude and Longitude ADSR	81
Table 7.6.1.7.3-1 MDS Record.....	81
Table 7.6.1.8-1 Browse Product Size Estimate	82
Table 7.7.1.1-1 Schematic Structure of the Level 1B Processor Configuration File	83
Table 7.7.1.1.1-1 Processor Configuration Data GADS.....	83
Table 7.7.2.1-1 Schematic Structure of the Instrument Data File.....	86
Table 7.7.2.1.1-1 General Parameters for Unpacking Source Packet Auxiliary Data GADS	86
Table 7.7.2.1.2-1 Master Unpacking Definition Table (MU DT) GADS Record	87
Table 7.7.2.1.3-1 Conversion Parameters GADS Record	87
Table 7.7.2.1.4-1 Limits GADS Record.....	87
Table 7.7.2.1.5-1 Surveillance Limits GADS Record	88
Table 7.7.2.1.6-1 Validation Parameters GADS	88
Table 7.7.3.1-1 Schematic Structure of the Visible Calibration Data File	89
Table 7.7.3.1.1-1 Visible Channel Calibration Parameters GADS.....	89
Table 7.7.4.1-1 Schematic Structure of the General Calibration Data File	90
Table 7.7.4.1.1-1 General Parameters for Infrared Channel Calibration	91
Table 7.7.4.1.2-1 Temperature to Radiance LUT GADS Record.....	92

Table 7.7.4.1.3-1 Radiance To Brightness Temperature LUT.....	92
Table 7.7.4.1.4-11.6 micron Channel Non-linearity Correction LUT	92
Table 7.7.5.1-1 Schematic Structure of the Level 1B Characterisation File.....	93
Table 7.7.5.1.1-1 Characterisation GADS	93
Table 7.7.8.1-1 Schematic Structure of the Cloud LUT Data File	94
Table 7.7.8.1.1-1 1.6 Micron Histogram Test LUT GADS	95
Table 7.7.8.1.2-1 11 Micron Spatial Coherence Test LUT GADS.....	96
Table 7.7.8.1.3-1 12 Micron Gross Cloud Test LUT GADS Record	96
Table 7.7.8.1.4-112 Micron Gross Cloud Test Land Surface LUT GADS Record	97
Table 7.7.8.1.5-1 Thin Cirrus Test LUT GADS Record.....	97
Table 7.7.8.1.6-1 Medium/High Level Cloud Test LUT GADS Record.....	97
Table 7.7.8.1.7-1 Fog/Low Stratus Test LUT	97
Table 7.7.8.1.8-1 11/12 Micron Nadir/Forward Test LUT GADS	98
Table 7.7.8.1.9-1 11/3.7 Micron Nadir/Forward Test LUT GADS	98
Table 7.7.8.1.10-1 Infrared Histogram Test LUT GADS	98
Table 7.7.8.1.11-1 General parameters for Visible Channel Cloud Tests	99
Table 7.7.8.1.12-1 Zone vertices for Visible Channel Cloud Test	99
Table 7.7.8.1.13-1 Zone definitions for Visible Channel Cloud Test.....	99
Table 7.7.8.1.14-1 Snow-covered surface test LUT	99
Table 7.7.9.1-1 Schematic Structure of the Browse Product Data File	100
Table 7.7.9.1.1-1 Browse Day-Time Colour LUT GADS.....	100
Table 7.7.10.1-1 Schematic Structure of the Level 2 Processor Configuration File.....	101
Table 7.7.10.1.1-1 Level 2 Processor Configuration Data GADS.....	101
Table 7.7.11.1-1 Schematic Structure of the SST Retrieval Coefficients Data File	102
Table 7.7.11.1.1-1 Across-track Band Mapping Look-up Table GADS Record.....	102
Table 7.7.11.1.2-1 SST Retrieval Coefficients GADS Record.....	102
Table 7.7.12.1-1 Schematic Structure of the LST retrieval coefficients data product	104
Table 7.7.12.1.1-1 General Parameters for Land Surface Temperature Retrieval	104
Table 7.7.12.1.2-1 Vegetation Fraction for Land Surface Temperature Retrieval	104
Table 7.7.12.1.3-1 Vegetation Fraction for Land Surface Temperature Retrieval	105
Table 7.7.12.1.4-1 Climatology Data for Land Surface Temperature Retrieval	105
Table 7.7.12.1.5-1 Topographic Variance for Land Surface Temperature Retrieval	105
Table 7.7.12.1.6-1 Land Surface Temperature Retrieval coefficients	105



INDEX OF FIGURES

Figure 7.2-1 AATSR Product Tree.....	17
Figure 7.2.1-1 AATSR Product Grid for Level 1B and Level 2 Products (from R-41)	18



AMENDMENT POLICY

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

AMENDMENT RECORD SHEET

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
1	A	12/01/96	Issue 1	
1	B	16/02/96	SCR #16, CR #16 Issue 1, Revision B <u>Reason for Change:</u> Updated to reflect information in PO-TN-ESA-GS-0381 and to address RIDs of Feb. 2/96 pertaining to the Level 0 structure. MPH, SPH, DSD, and DSR structures modified. Table added showing generalized Level 0 product structure. <u>RIDs Addressed:</u> ESA/0001: FEP header defined ESA/0002: PF-Host time stamp clarified ESA/0004: Processing PCD added ESA/0006: AF PCD ADS and DSD added ESA/0007: page A-3 updated ESA/0008: page B-3 updated ESA/0009: Table 8.1.1 modified ESA/0011: TBD changed to Range/ Doppler ESA/0013: FEP header defined ESA/0014: Table 8.4.7.4-2 corrected CSF/1: filename in MPH corrected CSF/2: page A-3 updated CSF/3: MPH PCD information updated CSF/5: DSD added to Level 0 SPH CSF/6: Section on AATSR updated and re-issued CSF/8: AATSR_O Summary Sheet updated	
1	C	04/04/96	SCR #38, CR #38 Issue 1, Revision C <u>Reason for Change:</u> Updated Sections 1-6, 17 and Annex A to reflect changes discussed at the Products Review Meeting #1, March 5-8, 1996, as per action item "AI MDA 6 April 96" from PO-MN-ESA-00416, Pg. 35.	Products Review Meeting #1
2	A	20/05/96	SCR #71, CR #71 Issue 2 <u>Reason for Change:</u> Separate volume created. Updated new product information from Document A-3.	
2	B	14/04/97	SCR #145, CR #145 Issue 2, Revision B <u>Reason for Change:</u> Updated with information from first issue of IODD. Differences w.r.t R-39, Issue 1, revision 5: <ul style="list-style-type: none"> • SPH changed to correct ASCII format. • Stripline continuity counters added to SPH. 	

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
			<ul style="list-style-type: none"> • Geolocation and acquisition time information added to SPH (same format as for MERIS). • Data sets re-ordered so SQADS and LADS are directly after SPH. Smaller ADSs placed before large ADSs and MDSs. • More reference DSDs added to SPH to reference all auxiliary data sources. • ADS attachment flags added, as per ENVISAT format. • Spares added to accommodate future changes. • Sizes recalculated. • SQADS and Geolocation ADS added to browse product. • Browse product RGB pixel interleaving changed to follow MERIS format and SQADS and LADS added. • Lat/long info converted to ENVISAT standard format. • Lat/long info for AST product converted from "cell" format to explicit lat/long co-ordinates. • AST confidence word changed to 4 bytes from 2 bytes in IODD to accommodate the number of bits described in Table 7.5.3.8.17-2. • Level 2 SPH "DSD(R) - Input Visible Calibration file" changed to "DSD(R) - Retrieval coeff. data file". 	
3	A	15/10/97	<p>SCR #169, CR #169 Issue 3, Revision A</p> <p><u>Reason for Change:</u> Updated to account for RIDs from Review Meeting #3 (PO-MN-CSF-GS-1523) and changes due to release 1.7 of the AATSR IODD. Also updated with respect to the minutes of Review Meeting #4 (PO-MN-CSF-GS-1802) and fax DPD/JMJ/ENV,2632/97</p>	<p>Products Review Meeting #3 and Products Review Meeting #4</p>
3	B	23/10/98	<p>SCR #218, CR #218 Issue 3, Revision B</p> <p><u>Reason for Change:</u> Updated for the following SPRs: SPR-42000-0154-CSF, SPR-42000-0155-CSF, SPR-42000-0160-CSF to SPR-42000-0170-CSF, SPR-42000-0179-CSF, SPR-42000-0180-CSF, SPR-42000-0208-CSF, SPR-42000-0209-CSF, SPR-42000-0219-CSF.</p>	
3	C	30/10/99	<p>Issue 3, Revision C</p> <p><u>Reason for Change:</u> Updated in accordance with the AATSR IODD PO-TN-RAL-GS-10003, Issue 1 Rev. 11 :</p> <ul style="list-style-type: none"> • 7 fields added in General Parameters GADS 	

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
			<p>of ATS_GC1_AX</p> <ul style="list-style-type: none"> • 1 Data Set added in ATS_GC1_AX : GADS for 1.6 micron Non-linearity Correction LUT. File structure and SPH updated accordingly • 1 field added in 11 micron Spatial Coherence Test LUT GADS of ATS_CL1_AX • Type of 3 fields changed in ATS_BRW_AX GADS. 	
3	D	08/01/01	<p>Issue 3, Revision D</p> <p><u>Reason for Change:</u> Updated in accordance with the AATSR IODD ENV-TN-RAL-GS-10003, Issue 1 Rev. 12 :</p> <ul style="list-style-type: none"> • All the fields AST-MDS x-6 redefined to "Mean across-track pixel number". • All infra-red BT field redefined as sl, units K/1000. Typo in units of AST-MDS 9,12-17 & 13,16-15 and parallels corrected (K, not %). • Units specified as 0.0001 of fields "Mean NDVI" and "standard deviation of NDVI" in all the LST record of Level-2 AST. • Table ATS_ABM_AX_GADS added. • 6 Fields added in table 6-38. 	
3	E	27/9/2001	<p>Corrections according to SPRs: SPR-100M0-1031-ESA SPR-100M0-1032-ESA SPR-100M0-1033-ESA SPR-100M0-1034-ESA SPR-100M0-1035-ESA That is errors in the total size of SST & LST MDSRs</p>	
3	F	28/10/02	<p>Changed format of ATS_PC1_AX file. Size of level1 GBTR product corrected, Table 7.4.1.8-1</p>	<p>IODD Issue 1 Rev.14 (PO-TN-RAL-GS-10003) 18 July 2002</p>
3	G	15/10/03	<p>Change to reflect new baseline, Land Surface Temperature retrieval algorithm implemented, ATS_LST_AX file defined.</p> <p>From: DPM PO-TN-RAL-GS-10004 issue 1 Rev8 of 29 May 2003 DPM PO-TN-RAL-GS-10005 issue 1 Rev6 of 18 June 2003 IODD PO-TN-RAL-GS-10003 issue 1 Rev 15</p>	
3	H	27/01/04	<p>Added reference DSD to ATS_LST_AX in level2 products.</p>	
3	K	24/08/06	<p>The changes are limited to Section 5.2.10 (on the Cloud LUT Data Product).</p> <p>Several new data sets have been introduced into this Cloud LUT auxiliary file (ATS_CL1_AX), as follows:</p> <ul style="list-style-type: none"> • A new LUT is defined for the gross cloud test over land. This is specified in Table 5-65. 	<p>IODD Issue 1 Rev.16 (PO-TN-RAL-GS-10003) 2 June 2006</p>

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
			<p>This data set has the same format as the existing gross cloud test LUT (Table 5-58), but the contents may differ.</p> <ul style="list-style-type: none"> • Three new data sets (Tables 5-66, 5-67 and 5-68) are defined to support the new visible channel cloud test. • A new data set (Table 5-69) is defined to support the snow-covered surface flag. • GBTR Cloud-clearing/land flagging flags (nadir or forward view), bit 13 and 14 are no more unused Table "AST confidence word", bits 4-5 are no more unused <p>The new baseline also includes DPM L1b Is. 1.9 and DPM L2 Is. 1.7</p>	
4	A	25/03/09	<p>Issue 4, Revision A</p> <p><u>Reason of change:</u> A new product: AATSR L2P, available since November 2008 has been added (section 7.5.2)</p>	
4	B	09/07/2012	<p>Issue 4, Revision B</p> <p><u>Reason for change:</u></p> <ul style="list-style-type: none"> • Introduction of visible calibration drift files (used in generation of ATS_VC1_AX) <ul style="list-style-type: none"> • Level 1B SPH DSDs updated • Modification of ATS_VC1_AX SPH • Update to ATS_PC1_AX field • Alteration of AST confidence word bits 	<p>IODD Issue 1 Rev 17 (PO-TN-RAL-GS-10003) 14 October 2011</p>
4	C	05/09/2013	<p>Issue 4, Revision C</p> <p><u>Reason for change:</u></p> <ul style="list-style-type: none"> • AATSR L2P section edited • New product ARC L2P added • New product ARC L3U added • General updates 	



REGISTER OF CHANGES

Affected pages:

Section 7.2	(Page 17)	Edited AATSR L2P details and added ARC L2P and ARC L3U to Table 7.2-1 and Figure 7.2-1 (replaced figure)
Section 7.5	(Page 39)	Updated text regarding L2P products in introduction
Section 7.5.2	(Page 46)	AATSR L2P section mostly removed
Section 7.5.5	(Page 69)	Added new section for ARC L2P
Section 7.5.6	(Page 75)	Added new section for ARC L3U
All sections		Typographic and formatting changes applied in all sections



7. AATSR PRODUCTS SPECIFICATIONS

7.1 INSTRUMENT OVERVIEW

The **Advanced Along Track Scanning Radiometer (AATSR)** is an advanced version of the ATSR system operated successfully on ERS-1 and ERS-2. The main objective of the AATSR is the precise measurement of Sea Surface Temperature (SST). The AATSR has a similar performance to the ATSR; the inclusion of three visible channels in addition to the four infrared channels allows it to observe land surface parameters such as temperature and vegetation characteristics. AATSR performs a conical scan with only those parts of the cone that fall inside the 500 km wide ground swath being sampled. The rearward part of the scan cone views the ground at approximately nadir, while the forward part looks at about 47 degrees from nadir. As a result, the AATSR produces two superimposed 500 km wide images, one from the nadir view and one from the forward view. These two views may be combined to correct for atmospheric effects. Spatial resolution is approximately 1 km by 1 km at nadir. On-board calibration sources provide internal references for the data to derive Brightness Temperature values from the radiance measurements.

Table 7.1-1 AATSR Instrument Characteristics

<p>GEOMETRIC:</p>	<p>Sensor acquires data from two curved scans:</p> <ul style="list-style-type: none"> i) forward curved scan ii) nadir curved scan <p>Nominal pixel resolution: 1 km x 1 km at sub-satellite point</p>
<p>RADIOMETRIC:</p>	<p>Absolute SST accuracy is better than 0.5 K averaged over areas of 50 km by 50 km, assuming 20% of pixels are cloud free. For 1 km by 1 km cloud free pixels, relative accuracy is better than 0.1 K</p>
<p>SPECTRAL:</p>	<p>7 spectral channels:</p> <ul style="list-style-type: none"> i) 0.555 μm (visible) bandwidth: 20 nm ii) 0.659 μm (visible) bandwidth: 20 nm iii) 0.865 μm (thermal) bandwidth: 20 nm iv) 1.61 μm (near-IR) bandwidth: 60 nm v) 3.70 μm (infrared) bandwidth: 390 nm vi) 10.85 μm (infrared) bandwidth: 900 nm vii) 12.00 μm (infrared) bandwidth: 1000 nm



This page has been left intentionally blank

7.2 PRODUCTS OVERVIEW

The AATSR products are summarized in Table 7.2-1 and Figure 7.2-1.

Table 7.2-1 AATSR Products

Instrument / mode	Product ID	Description
AATSR	ATS_NL__0P	AATSR Level 0
	ATS_TOA_1P	AATSR Gridded Brightness Temperature and Radiance product. Full Resolution for all channels/both views.
	ATS_NR__2P	AATSR Geophysical Product for Ocean, Land and Atmosphere
	(AATSR L2P)	(AATSR L2P Product generated by the L2P Processor; this product has been replaced by ARC L2P)
	ATS_AR__2P	AATSR Spatially Averaged Sea/Land Geophysical product
	ATS_MET_2P	AATSR Spatially Averaged Sea Surface Temperature for Meteo users.
	ARC L2P	ARC L2P Product generated by the ARC_L2P Processor
	ARC L3U	ARC L3U Product generated by the ARC_L2P Processor
	ATS_AST_BP	AATSR Browse Product (3 colour composite)

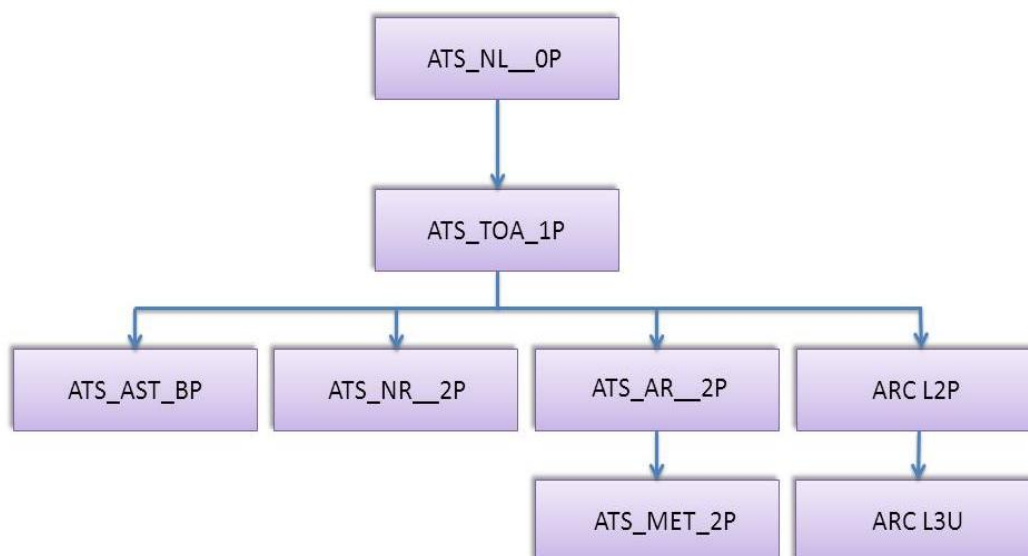
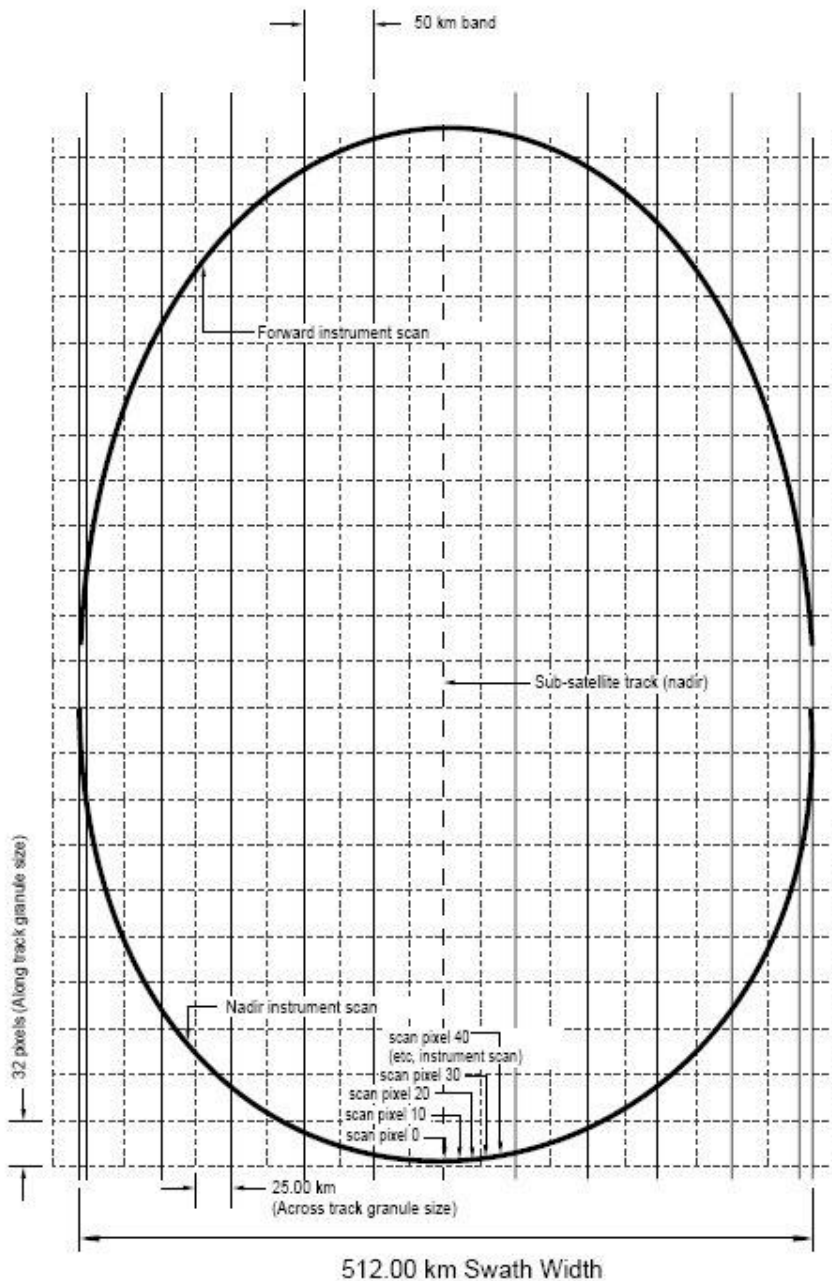


Figure 7.2-1 AATSR Product Tree

7.2.1 Product Grid

The Level 1B and Level 2 MDS records are resampled to a 1 km grid. The philosophy is to migrate each pixel to the nearest grid point, and carry out a cosmetic fill where the density of measured scan pixels is lower than the grid point density. Thus each MDS pixel is a measured scan pixel, but displaced in position. The format of the grid for AATSR products is shown in the figure below. The granule size in azimuth is defined as 32 scan lines. An across track granule size is not needed for AATSR, since child product extraction is limited to full swath extraction, however, a nominal across track granule size of 25 km has been adopted to standardize the positions of annotation data included in the product.



AI-8589-D1R1/KF

Figure 7.2.1-1 AATSR Product Grid for Level 1B and Level 2 Products (from R-41)

7.3 LEVEL 0 PRODUCTS

AATSR has one Level 0 product.

7.3.1 AATSR Level 0 Product

The Level 0 product contains time ordered Annotated Instrument Source Packets. It is archived and is used for all further processing of the data. Until EOM, the NRT version of the product was available 3 hours after data acquisition and the OFL (fully consolidated) version was available within 2 weeks after data acquisition. Detailed description of all Level 0 products is provided in Section 6.1.

7.3.1.1 Input Data

Annotated ISPs as received from the Front End Processor (FEP) plus auxiliary data.

7.3.1.2 Auxiliary Data Used

The Level 0 product requires the following auxiliary information (refer to Volume 6):

- Phase, cycle and orbit number data,
- ID of the systems and subsystem that collect and process the data,
- ENVISAT orbital state vectors,
- Processor Configuration file, which includes PCD error codes and threshold values,
- SBT to UTC conversion data.

7.3.1.3 Processing Performed

Determination of the satellite position and conversion of Satellite Binary Time (SBT) to Universal Time Co-ordinates (UTC) is accomplished using ESA software.

7.3.1.4 Product Structure

As defined in Volume 6. A detailed description of the Instrument Source Packets is provided in Document A-1.



This page has been left intentionally blank

7.4 LEVEL 1B PRODUCTS

There is one AATSR Level 1B product, the Gridded Brightness Temperature and Reflectance (GBTR) product.

7.4.1 Gridded Brightness Temperature and Reflectance

The Level 1B Product consists of TOA radiance measurements and brightness temperatures at full resolution for both the nadir and forward views (7 channels each view, 14 measurements total) of the conical scan. The product has been calibrated for known instrument and atmospheric effects. The Level 1B product is resampled to a fixed grid aligned to the subsatellite track, with both the forward view and the nadir view resampled to the same grid. Surface identification is also performed on a pixel by pixel basis. Pixels types (Land, Sea, Cloud) will be identified using flags. In addition, the localization (Lat. Lon.) and the viewing geometry is provided. The Level 1B product is the base product for all Level 2 processing. The product is produced systematically in stripline form, from which portions may be extracted using multiples of the 512 km by 512 km minimum scene size. Until EOM, the NRT version was available 3 hours after data acquisition, while an OFL (fully consolidated) version was available within 2 weeks after data acquisition.

7.4.1.1 Input Data

The Level 0 product plus auxiliary data.

7.4.1.2 Auxiliary Data Used

The following auxiliary data files are required for Level 1B processing:

Table 7.4.1.2-1 Auxiliary Data Files for AATSR Level 1B Processing

Description	Auxiliary File ID
AATSR Instrument characterization file	ATS_INS_AX
AATSR Level 1B Processing Configuration file	ATS_PC1_AX
Visible Calibration Data file	ATS_VC1_AX
Visible Calibration Drift file: Measured *	ATS_DTM_AX
Visible Calibration Drift file: Extrapolated *	ATS_DTE_AX
General Calibration data file	ATS_GC1_AX
Level 1B Characterization file	ATS_CH1_AX
Land-Sea Mask data file	AUX_LSM_AX
Digital Terrain Model file	AUX_DEM_AX
Cloud LUT Data file	ATS_CL1_AX
Orbit state vectors (one of following)	DOR_NAV_0P AUX_FPO_AX AUX_FRO_AX DOR_POR_AX DOR_VOR_AX

* Note that these files are not used in the L1B processing per se, but are used in the generation of the visible calibration data files (ATS_VC1_AX) and the name of the drift table used is copied from the VC1 file SPH into the L1B headers for traceability. The



extrapolated visible calibration drift files were intended to be used in on-going processing but due to the EOM they never became operational; data from the third reprocessing uses a measured visible calibration drift file.

7.4.1.3 Processing Performed

The major steps involved in Level 1B processing are:

- extraction and validation of source packet data
- calibration of the AATSR visible and infra-red channels
- geolocation of the data
- re-sampling into a rectangular grid of image pixels
- pixel classification
- cloud clearing

7.4.1.4 Product Structure

The high level structure of the Level 1B product is shown below:

Table 7.4.1.4-1 AATSR Level 1B Product Structure

MPH
SPH (includes DSDs)
Summary Quality ADS
Grid pixel latitude and longitude, topographic corrections ADS (LADS)
Scan pixel x and y ADS
Nadir view solar angles ADS
Forward view solar angles ADS
Visible Calibration Coefficients ADS
Scan and pixel number, nadir view image ADS
Scan and pixel number, forward view image ADS
12 micron nadir view BT MDS
11 micron nadir view BT MDS
3.7 micron nadir view BT MDS
1.6 micron nadir view reflectance MDS
0.87 micron nadir view reflectance MDS
0.67 micron nadir view reflectance MDS
0.55 micron nadir view reflectance MDS
12 micron forward view BT MDS
11 micron forward view BT MDS
3.7 micron forward view BT MDS
1.6 micron forward view reflectance MDS
0.87 micron forward view reflectance MDS

0.67 micron forward view reflectance MDS
0.55 micron forward view reflectance MDS
Confidence words, nadir view MDS
Confidence words, forward view MDS
Cloud flags, nadir view MDS
Cloud flags, forward view MDS

7.4.1.5 Main Product Header

The Main Product Header is defined in Volume 5.

7.4.1.6 Specific Product Header

The content of the Specific Product Header shall be as follows. The SPH is an ASCII header. Refer to Volume 5 for an explanation of ASCII header conventions.

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
1	SPH_DESCRIPTOR=	keyword	15	uc	15
	quotation mark ("	-	1	uc	1
	SPH Descriptor ASCII string describing the product.	-	28	uc	28
	quotation mark ("	-	1	uc	1
	newline character	terminator	1	uc	1
2	STRIPLINE_CONTINUITY_INDICATOR=	keyword	31	uc	31
	Value: 0= No stripline continuity, the product is a complete segment Other: Stripline Counter	-	4	Ac	1
	newline character	terminator	1	uc	1
3	SLICE_POSITION=	keyword	15	uc	15
	Value: +001 to NUM_SLICES Default value if no stripline continuity = +001	-	4	Ac	1
	newline character	terminator	1	uc	1
4	NUM_SLICES=	keyword	11	uc	11
	Number of slices in this stripline Default value if no continuity = +001	-	4	Ac	1
	newline character	terminator	1	uc	1
<i>Product Time Information</i>					
5	FIRST_LINE_TIME=	keyword	16	uc	16
	quotation mark ("	-	1	uc	1
	Azimuth time first line of product UTC Time of first range line in the MDS of this product. UTC time format contained within quotation marks.	UTC	27	uc	27
	quotation mark ("	-	1	uc	1
	newline character	terminator	1	uc	1

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
6	LAST_LINE_TIME=	keyword	15	uc	15
	quotation mark (")	-	1	uc	1
	Azimuth time last line of product Time of last range line in the MDS of this product. UTC time format contained within quotation marks.	UTC	27	uc	27
	quotation mark (")	-	1	uc	1
	newline character	terminator	1	uc	1
<i>Product Positioning Information</i>					
7	FIRST_FIRST_LAT=	keyword	16	uc	16
	Geodetic Latitude of the first sample of the first line A negative value denotes south latitude, a positive value denotes North latitude	10 ⁻⁶ degrees	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
8	FIRST_FIRST_LONG=	keyword	17	uc	17
	East geodetic longitude of the first sample of the first line. Positive values East of Greenwich, negative values west of Greenwich.	10 ⁻⁶ degrees	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
9	FIRST_MID_LAT=	keyword	14	uc	14
	Geodetic Latitude of the middle sample of the first line A negative value denotes south latitude, a positive value denotes North latitude	10 ⁻⁶ degrees	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
10	FIRST_MID_LONG=	keyword	15	uc	15
	East geodetic longitude of the middle sample of the first line. Positive values East of Greenwich, negative values west of Greenwich.	10 ⁻⁶ degrees	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
11	FIRST_LAST_LAT=	keyword	15	uc	15
	Geodetic Latitude of the last sample of the first line A negative value denotes south latitude, a positive value denotes North latitude	10 ⁻⁶ degrees	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
12	FIRST_LAST_LONG=	keyword	16	uc	16
	East geodetic longitude of the last sample of the first line. Positive values East of Greenwich, negative values west of Greenwich.	10-6 degrees	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
13	LAST_FIRST_LAT=	keyword	15	uc	15
	Geodetic Latitude of the first sample of the last line A negative value denotes south latitude, a positive value denotes North latitude	10-6 degrees	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
14	LAST_FIRST_LONG=	keyword	16	uc	16
	East geodetic longitude of the first sample of the last line. Positive values East of Greenwich, negative values west of Greenwich.	10-6 degrees	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
15	LAST_MID_LAT=	keyword	13	uc	13
	Geodetic Latitude of the middle sample of the last line A negative value denotes south latitude, a positive value denotes North latitude	10-6 degrees	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
16	LAST_MID_LONG=	keyword	14	uc	14
	East geodetic longitude of the middle sample of the last line. Positive values East of Greenwich, negative values west of Greenwich.	10-6 degrees	11	AI	1
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
17	LAST_LAST_LAT=	keyword	14	uc	14
	Geodetic Latitude of the last sample of the last line A negative value denotes south latitude, a positive value denotes North latitude	10-6 degrees	11	AI	1
	<10-6degN>	units	10	uc	10
	newline character	terminator	1	uc	1
18	LAST_LAST_LONG=	keyword	15	uc	15
	East geodetic longitude of the last sample of the last line. Positive values East of Greenwich, negative values west of Greenwich.	10-6 degrees	11	AI	1

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
	<10-6degE>	units	10	uc	10
	newline character	terminator	1	uc	1
19	Spare (blank characters)	-	50	uc	50
	newline character	terminator	1	uc	1
	<i>Other Product Information</i>				
20	MIN_FPA_BASEPLATE_TEM=	keyword	22	uc	22
	Minimum FPA ¹baseplate temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
21	MIN_12_MICRON_DETECTOR_TEMP=	keyword	28	uc	28
	Minimum 12 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
22	MIN_11_MICRON_DETECTOR_TEMP=	keyword	28	uc	28
	Minimum 11 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
23	MIN_3_7_MICRON_DETECTOR_TEMP=	keyword	29	uc	29
	Minimum 3.7 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
24	MIN_1_6_MICRON_DETECTOR_TEMP=	keyword	29	uc	29
	Minimum 1.6 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
25	MIN_0_87_MICRON_DETECTOR_TEMP=	keyword	30	uc	30
	Minimum 0.87 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
26	MAX_FPA_BASEPLATE_TEM=	keyword	22	uc	22
	Maximum FPA baseplate temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1

¹ Focal Plane Assembly

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
27	MAX_12_MICRON_DETECTOR_TEMP=	keyword	28	uc	28
	Maximum 12 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
28	MAX_11_MICRON_DETECTOR_TEMP=	keyword	28	uc	28
	Maximum 11 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
29	MAX_3_7_MICRON_DETECTOR_TEMP=	keyword	29	uc	29
	Maximum 3.7 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
30	MAX_1_6_MICRON_DETECTOR_TEMP=	keyword	29	uc	29
	Maximum 1.6 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
31	MAX_0_87_MICRON_DETECTOR_TEMP=	keyword	30	uc	30
	Maximum 0.87 micron detector temperature	K	15	Afl	1
	<K>	units	3	uc	3
	newline character	terminator	1	uc	1
32	LAT_LONG_TIE_POINTS=	keyword	20	uc	20
	x coordinates of lat/long tie points. 23 values, central pixel is 0 km	km	138	As	23
	<km>	units	4	uc	4
	newline character	terminator	1	uc	1
33	VIEW_ANGLE_TIE_POINTS=	keyword	22	uc	22
	x coordinates of solar angle tie points. 11 values	km	66	As	11
	<km>	units	4	uc	4
	newline character	terminator	1	uc	1
34	XY_TIE_POINTS_PIXEL_NUM=	keyword	24	uc	24
	pixel numbers of x-y tie points	-	594	As	99
	newline character	terminator	1	uc	1
35	Spare (blank characters)	-	50	uc	50
	newline character	terminator	1	uc	1

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
	<i>DSDs for included Data Sets</i>				
36	DSD(A) - Summary Quality ADS (SQADS)	-	280	dsd	1
37	DSD(A) -Grid pixel latitude and longitude, topographic corrections ADS (LADS)	-	280	dsd	1
38	DSD(A) - Scan pixel x and y ADS	-	280	dsd	1
39	DSD(A) - Nadir view solar angles ADS	-	280	dsd	1
40	DSD(A) - Forward view solar angles ADS	-	280	dsd	1
41	DSD(A) - Visible Calibration Coefficients ADS	-	280	dsd	1
42	DSD(A) - Scan and pixel number, nadir view image ADS	-	280	dsd	1
43	DSD(A) - Scan and pixel number, forward view image ADS	-	280	dsd	1
44	DSD(M) - 12 micron nadir view MDS	-	280	dsd	1
45	DSD(M) - 11 micron nadir view MDS	-	280	dsd	1
46	DSD(M) - 3.7 micron nadir view MDS	-	280	dsd	1
47	DSD(M) - 1.6 micron nadir view MDS	-	280	dsd	1
48	DSD(M) - 0.87 micron nadir view MDS	-	280	dsd	1
49	DSD(M) - 0.67 micron nadir view MDS	-	280	dsd	1
50	DSD(M) - 0.55 micron nadir view MDS	-	280	dsd	1
51	DSD(M) - 12 micron forward view MDS	-	280	dsd	1
52	DSD(M) - 11 micron forward view MDS	-	280	dsd	1
53	DSD(M) - 3.7 micron forward view MDS	-	280	dsd	1
54	DSD(M) - 1.6 micron forward view MDS	-	280	dsd	1
55	DSD(M) - 0.87 micron forward view MDS	-	280	dsd	1
56	DSD(M) - 0.67 micron forward view MDS	-	280	dsd	1
57	DSD(M) - 0.55 micron forward view MDS	-	280	dsd	1
58	DSD(M) - Confidence words, nadir view MDS	-	280	dsd	1
59	DSD(M) - Confidence words, forward view MDS	-	280	dsd	1
60	DSD(M) - Cloud flags, nadir view MDS	-	280	dsd	1
61	DSD(M) - Cloud flags, forward view MDS	-	280	dsd	1
62	DSD Spare (279 blank space characters, followed by 1 newline character)	-	280	dsd_sp	1
	<i>DSDs for referenced files</i>				
63	DSD (R) - Level 0 data file	-	280	dsd	1
64	DSD (R) - AATSR Instrument characterization file	-	280	dsd	1
65	DSD (R) - AATSR Level 1B Processing Configuration file	-	280	dsd	1

Table 7.4.1.6-1 AATSR Level 1B - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
66	DSD (R) - Visible Calibration Data file	-	280	dsd	1
67	DSD (R) - General Calibration data file	-	280	dsd	1
68	DSD (R) - Level 1B Characterization file	-	280	dsd	1
69	DSD (R) - Land-Sea Mask data file	-	280	dsd	1
70	DSD (R) - Digital Terrain Model file	-	280	dsd	1
71	DSD (R) - Cloud LUT Data file	-	280	dsd	1
72	DSD (R) - Orbit state vectors file	-	280	dsd	1
73	DSD (R) – Visible Calibration Drift file	-	280	dsd	1
	size (in bytes)		12830		

In each DSD of the SPH, the field DS_NAME is filled as described in the table below.

Table 7.4.1.6-2 AATSR Level-1B DS_NAMES	
DSD	DS_NAME
DSD(A) - Summary Quality ADS (SQADS)	SUMMARY_QUALITY_ADS
DSD(A) - Grid pixel latitude and longitude, topographic corrections ADS (LADS)	GEOLOCATION_ADS
DSD(A) - Scan pixel x and y ADS	SCAN_PIXEL_X_AND_Y_ADS
DSD(A) - Nadir view solar angles ADS	NADIR_VIEW_SOLAR_ANGLES_ADS
DSD(A) - Forward view solar angles ADS	FWARD_VIEW_SOLAR_ANGLES_ADS
DSD(A) - Visible Calibration Coefficients ADS	VISIBLE_CALIB_COEFS_GADS
DSD(A) - Scan and pixel number, nadir view image ADS	NADIR_VIEW_SCAN_PIX_NUM_ADS
DSD(A) - Scan and pixel number, forward view image ADS	FWARD_VIEW_SCAN_PIX_NUM_ADS
DSD(M) - 12 micron nadir view MDS	11500_12500_NM_NADIR_TOA_MDS
DSD(M) - 11 micron nadir view MDS	10400_11300_NM_NADIR_TOA_MDS
DSD(M) - 3.7 micron nadir view MDS	03505_03895_NM_NADIR_TOA_MDS
DSD(M) - 1.6 micron nadir view MDS	01580_01640_NM_NADIR_TOA_MDS
DSD(M) - 0.87 micron nadir view MDS	00855_00875_NM_NADIR_TOA_MDS
DSD(M) - 0.67 micron nadir view MDS	00649_00669_NM_NADIR_TOA_MDS
DSD(M) - 0.55 micron nadir view MDS	00545_00565_NM_NADIR_TOA_MDS
DSD(M) - 12 micron forward view MDS	11500_12500_NM_FWARD_TOA_MDS
DSD(M) - 11 micron forward view MDS	10400_11300_NM_FWARD_TOA_MDS
DSD(M) - 3.7 micron forward view MDS	03505_03895_NM_FWARD_TOA_MDS
DSD(M) - 1.6 micron forward view MDS	01580_01640_NM_FWARD_TOA_MDS
DSD(M) -0.87 micron forward view MDS	00855_00875_NM_FWARD_TOA_MDS
DSD(M) - 0.67 micron forward view MDS	00649_00669_NM_FWARD_TOA_MDS



DSD	DS_NAME
DSD(M) - 0.55 micron forward view MDS	00545_00565_NM_FORWARD_TOA_MDS
DSD(M) - Confidence words, nadir view MDS	NADIR_VIEW_CONFIDENCE_MDS
DSD(M) - Confidence words, forward view MDS	FORWARD_VIEW_CONFIDENCE_MDS
DSD(M) - Cloud flags, nadir view MDS	NADIR_VIEW_CLOUD_MDS
DSD(M) - Cloud flags, forward view MDS	FORWARD_VIEW_CLOUD_MDS
<i>DSDs for referenced files</i>	
DSD (R) - Level 0 data file	AATSR_SOURCE_PACKETS
DSD (R) - AATSR Instrument characterization file	INSTRUMENT_DATA_FILE
DSD (R) - AATSR Level 1B Processing Configuration file	PROCESSING_PARAMS_L1B_FILE
DSD (R) - Visible Calibration Data file	VISIBLE_CALIBRATION_FILE
DSD (R) - General Calibration data file	GENERAL_CALIBRATION_FILE
DSD (R) - Level 1B Characterization file	CHARACTERIZATION_L1B_FILE
DSD (R) - Land-Sea Mask data file	LAND_SEA_MASK_DATA_FILE
DSD (R) - Digital Terrain Model file	DIGITAL_ELEVATION_MODEL_FILE
DSD (R) - Cloud LUT Data file	CLOUD_LUT_DATA_FILE
DSD (R) - Orbit state vectors file	ORBIT_STATE_VECTOR_FILE
DSD (R) - Visible Calibration Drift file	VISCAL_DRIFT_TABLE

7.4.1.7 Data Sets

The contents of the Data Sets are described in the following sections. Data Sets are in mixed binary format. They may contain ASCII strings, but the ASCII strings are not contained within quotation marks as for the MPH/SPH.

7.4.1.7.1 Summary Quality ADS (SQADS)

This ADS contains product quality information. There is one ADSR per set of 512 scans and the information corresponds to the MDSRs which lie between the time stamp indicated at the start of the ADSR, and the next ADSR time stamp in this ADS. The format of each ADSR is defined in the table below.

N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Attachment flag (set to 1 if all MDSRs corresponding to this ADSR are blank, set to 0 otherwise)	-	1	uc	1
3	Spare	-	3	uc	3
4	Image scan number	-	2	us	1
5	Packet Validation during nadir view number of scans null packet	-	2	ss	1

Table 7.4.1.7.1-1 Summary Quality ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
6	Packet Validation during nadir view number of scans failing basic validation	-	2	ss	1
7	Packet Validation during nadir view number of scans failing CRC check	-	2	ss	1
8	Packet Validation during nadir view number of scans showing buffers full	-	2	ss	1
9	Packet Validation during nadir view number of scans showing scan jitter	-	2	ss	1
10	reserved for future use	-	2	ss	1
11	reserved for future use	-	2	ss	1
12	reserved for future use	-	2	ss	1
13	reserved for future use	-	2	ss	1
14	Packet Validation during nadir view number of scans - all other errors	-	2	ss	1
15	Packet Validation during forward view number of scans null packet	-	2	ss	1
16	Packet Validation during forward view number of scans failing basic validation	-	2	ss	1
17	Packet Validation during forward view number of scans failing CRC check	-	2	ss	1
18	Packet Validation during forward view number of scans showing buffers full	-	2	ss	1
19	Packet Validation during forward view number of scans showing scan jitter	-	2	ss	1
20	reserved for future use	-	2	ss	1
21	reserved for future use	-	2	ss	1
22	reserved for future use	-	2	ss	1
23	reserved for future use	-	2	ss	1
24	Packet Validation during forward view number of scans - all other errors	-	2	ss	1
25	Spare	-	28	uc	28
Size			86		

7.4.1.7.2 Grid Pixel Latitude and Longitude and Topographic Corrections ADS (LADS)

This ADS contains grid pixel latitude and longitude. It is composed of several ADSRs, updated at the granule level (32 scans). The format of each ADSR is defined in the table below.

Table 7.4.1.7.2-1 Grid Pixel Latitude and Longitude and Topographic Corrections ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Attachment Flag (set to 1 if all MDSRs corresponding to this ADSR are blank, set to 0 otherwise)	-	1	uc	1
3	Spare	-	3	uc	3



Table 7.4.1.7.2-1 Grid Pixel Latitude and Longitude and Topographic Corrections ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
4	image scan y coordinate	m	4	sl	1
5	tie point latitudes	10 ⁻⁶ deg	92	sl	23
6	tie point longitudes	10 ⁻⁶ deg	92	sl	23
7	latitude corrections, nadir view	10 ⁻⁶ deg	92	sl	23
8	longitude corrections, nadir view	10 ⁻⁶ deg	92	sl	23
9	latitude corrections, forward view	10 ⁻⁶ deg	92	sl	23
10	longitude corrections, forward view	10 ⁻⁶ deg	92	sl	23
11	Topographic Altitude	metres	46	ss	23
12	Spare	-	8	uc	8
Size			626		

7.4.1.7.3 Scan Pixel x and y ADSR

This ADS contains scan pixel x and y. These are supplied for specialist users who want to know by how much the pixels have been displaced in the regridding. The ADS is composed of several ADSRs updated every 32 scans. The format of each ADSR is defined in the table below.

Table 7.4.1.7.3-1 Scan Pixel x and y ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Scan UTC time in MJD format	MJD	12	mjd	1
2	Attachment Flag (always set to zero for this ADS)	-	1	uc	1
3	Spare	-	3	uc	3
4	instrument scan number	-	2	us	1
5	tie pixel x coordinate	m	396	sl	99
6	tie pixel y coordinate	m	396	sl	99
7	Spare	-	20	uc	20
Size			830		

7.4.1.7.4 Nadir View Solar Angles ADS

This ADS contains solar angles. These are not required with great precision, and are therefore calculated only once for each across-track band. (i.e., with an across-track sampling of about 50 km. The ADS contains several ADSRs. The format of each ADSR is defined in the table below.

Table 7.4.1.7.4-1 Nadir View Solar Angles ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Attachment Flag (always set to zero for this ADS)	-	1	uc	1
3	Spare	-	3	uc	3

Table 7.4.1.7.4-1 Nadir View Solar Angles ADSR					
4	image scan y coordinate	m	4	sl	1
5	tie point solar elevation	mdeg	44	sl	11
6	tie point satellite elevation	mdeg	44	sl	11
7	tie point solar azimuth	mdeg	44	sl	11
8	tie point satellite azimuth	mdeg	44	sl	11
9	Spare	-	20	uc	20
Size			216		

7.4.1.7.5 Forward View Solar Angles ADS

Follows identical format to Table 7.4.1.7.4-1, with the data corresponding to the forward scan image.

7.4.1.7.6 Visible Calibration Coefficients ADS

This ADS may contain several time-stamped ADSRs if processing is done in stripline. The format of each ADSR is described in the table below:

Table 7.4.1.7.6-1 Visible Calibration Coefficients ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Time of visible calibration	MJD	12	mjd	1
2	Attachment flag (always set to zero for this ADS)	-	1	uc	1
3-32	As described in Table 7.7.3.1.1-1, fields 3 to 32.	-	141	-	-
Size			154		

7.4.1.7.7 Scan and Pixel Number, Nadir View Image ADS

This ADS retains the full 1 km grid sampling, and is provided so that the original scan positions can be recovered if anyone should a user wish to do so. The ADS contains several ADSRs, the format of which is described in the table below.

Table 7.4.1.7.7-1 Scan and Pixel Number, Nadir View Image ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Attachment flag (always set to zero for this ADS)	-	1	uc	1
3	Spare	-	3	uc	3
4	image scan y coordinate	m	4	sl	1
5	instrument scan number	-	1024	us	512
6	pixel number	-	1024	us	512
Size			2068		

7.4.1.7.8 Scan and Pixel Number, Forward View Image ADS

Follows identical format to Table 7.4.1.7.7-1 with the data corresponding to the forward scan image.



7.4.1.7.9 Brightness Temperature and Reflectance MDSs

The MDSs which contain the Brightness Temperature and Reflectance data included in the product follow the order listed in the table below. Both forward and nadir views are included in the product.

Table 7.4.1.7.9-1 AATSR Level-1B MDS List

MDS
12 micron nadir view BT MDS
11 micron nadir view BT MDS
3.7 micron nadir view BT MDS
1.6 micron nadir view reflectance MDS
0.87 micron nadir view reflectance MDS
0.67 micron nadir view reflectance MDS
0.55 micron nadir view reflectance MDS
12 micron forward view BT MDS
11 micron forward view BT MDS
3.7 micron forward view BT MDS
1.6 micron forward view reflectance MDS
0.87 micron forward view reflectance MDS
0.67 micron forward view reflectance MDS
0.55 micron forward view reflectance MDS

Each MDS is composed of several MDSRs. The format of the MDSRs is the same for all MDSs listed in Table 7.4.1.7.9-1.; the format of each MDSR is defined in the table below

Table 7.4.1.7.9-2 MDSR for Brightness Temperature and Reflectance MDSs

N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator set to -1 if MDSR is invalid (all values are exceptional), set to 0 otherwise	-	1	sc	1
3	Spare	-	3	uc	3
4	Image scan y coordinate	m	4	sl	1
5	BT or reflectance for pixel 0 - 511 (Units are K/100 for BT, %/100 for reflectance [small negative values may be used to represent channel-specific exceptional values])	K/100 %/100	1024	ss	512
Size			1044		

7.4.1.7.10 Confidence Words, Nadir View MDS

This MDS contains product quality information at the pixel level. The MDS contains several MDSRs. The format of each MDSR is defined in the table below.

Table 7.4.1.7.10-1 Confidence Words, Nadir View MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (set to -1 if all values in record are invalid, set to zero otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Image scan y coordinate	m	4	sl	1
5	Confidence words (Table 7.4.1.7.10-2)	flags	1024	us	512
Size			1044		

Table 7.4.1.7.10-2 GBTR Confidence Flags (nadir or forward view)

Bit	Meaning if set to 1
0	Blanking Pulse
1	Cosmetic Fill Pixel
2	Entire scan absent from telemetry
3	Pixel absent from telemetry
4	Pixel not decompressed owing to error in packet validation
5	No signal in some channel (zero count)
6	Saturation in some channel (maximum count)
7	Derived radiance of some channel outside range of calibration
8	Calibration Parameters unavailable for pixel
9	Pixel unfilled (cosmetic fill algorithm unable to find nearest neighbour pixel)
10 - 15	Unused

Note: Bits are numbered as per Volume A

7.4.1.7.11 Confidence Words, Forward View MDS

The format of each MDSR in this MDS is identical to that described in Table 7.4.1.7.10-1.

7.4.1.7.12 Cloud Flags, Nadir View MDS

This MDS contains cloud information at the pixel level. The MDS contains several MDSRs. The format of each MDSR is defined in the table below.

Table 7.4.1.7.12-1 Cloud Flags, Nadir View MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (set to -1 if all values in record are invalid, set to zero otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	image scan y coordinate	m	4	sl	1



Table 7.4.1.7.12-1 Cloud Flags, Nadir View MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
5	cloud/land flags (Table 7.4.1.7.12-2)	flags	1024	us	512
Size			1044		

Table 7.4.1.7.12-2 GBTR Cloud-clearing/Land Flagging Flags (nadir or forward view)

Bit	Meaning if set to 1
0	Pixel is over land
1	Pixel is cloudy (result of all cloud tests)
2	Sunlint detected in pixel
3	1.6 micron reflectance histogram test shows pixel cloudy (day-time only)
4	1.6 micron spatial coherence test shows pixel cloudy (day-time only)
5	11 micron spatial coherence test shows pixel cloudy
6	12 micron gross cloud test shows pixel cloudy
7	11/12 micron thin cirrus test shows pixel cloudy
8	3.7/12 micron medium/high level test shows pixel cloudy (night-time only)
9	11/3.7 micron fog/low stratus test shows pixel cloudy (night-time only)
10	11/12 micron view-difference test shows pixel cloudy
11	3.7/11 micron view-difference test shows pixel cloudy (night-time only)
12	11/12 micron thermal histogram test shows pixel cloudy
13	Visible channel cloud test shows pixel cloudy
14	NDSI snow flag
15	Unused

Note: Bits are numbered as per Volume A

7.4.1.7.13 Cloud Flags, Forward View MDS

This MDS contains MDSRs which follow the identical format as described in Table 7.4.1.7.12-1.

7.4.1.8 Size Estimate

The following table provides a size estimate for the Level 1B product. The estimated size is based on a nominal product size of one orbit. For equal time interval sampling, one orbit contains 1258 granules and 40256 image scans. Instrument-scan based ADSs are assumed to contain 1288 granules. Note that 1 MByte = 1x10⁶ bytes.

Table 7.4.1.8-1 GBTR Product Size		
Description	Record size (byte)	Data Set Size (Mbyte/product)
MPH	1247	0.001247
SPH	12830	0.012830
Summary Quality ADS (every 512 scans)	86	0.0066
Grid pixel latitude and longitude, topographic corrections ADS	626	0.79
Scan pixel x and y ADS	830	0.810
Nadir view solar angles ADS	216	0.27
Forward view solar angles ADS	216	0.27
Visible Calibration Coefficients ADS	154	0.000154
Scan and pixel number, nadir view image ADS	2068	2.66

Table 7.4.1.8-1 GBTR Product Size		
Description	Record size (byte)	Data Set Size (Mbyte/product)
Scan and pixel number, forward view image ADS	2068	2.66
12 micron nadir view MDS	1044	40.08
11 micron nadir view MDS	1044	40.08
3.7 micron nadir view MDS	1044	40.08
1.6 micron nadir view MDS	1044	40.08
0.87 micron nadir view MDS	1044	40.08
0.67 micron nadir view MDS	1044	40.08
0.55 micron nadir view MDS	1044	40.08
12 micron forward view MDS	1044	40.08
11 micron forward view MDS	1044	40.08
3.7 micron forward view MDS	1044	40.08
1.6 micron forward view MDS	1044	40.08
0.87 micron forward view MDS	1044	40.08
0.67 micron forward view MDS	1044	40.08
0.55 micron forward view MDS	1044	40.08
Confidence words, nadir view MDS	1044	40.08
Confidence words, forward view MDS	1044	40.08
Cloud flags, nadir view MDS	1044	40.08
Cloud flags, forward view MDS	1044	40.08
Total size of product		728.72 MB



This page has been left intentionally blank



7.5 LEVEL 2 PRODUCTS

Three Level 2 products are created, a full resolution product, an averaged product, and an averaged product for Meteo users. There are two additional Level 2 products, the ARC L2P and ARC L3U products in netCDF, generated by the ARC_L2P Processor, which have become available since September 2013. (These replace the previous AATSR L2P product, which was a repackaging of the L2 full resolution gridded SST data into netCDF format with ancillary information.)

7.5.1 Gridded Sea Surface Temperature Product

The AATSR Level 2 Gridded Sea Surface Temperature (GSST) product is a full spatial resolution (approximately 1 km by 1 km) product. The dataset is switchable, meaning that the contents of the pixel fields depend on surface type and are a mixture of geophysical product, surface brightness temperature/radiance and TOA brightness temperature/radiance in the case of an unclassified pixel. This product is used for land and ocean studies requiring high resolution localized temperature/radiance data. It is distributed using 512 by 512 km minimum scenes. Until EOM, the NRT version was available 3 hours after data acquisition, while the OFL (fully consolidated) version was available within 2 weeks after data acquisition.

7.5.1.1 Input Data

Level 1B product plus auxiliary data.

7.5.1.2 Auxiliary Data Used

Auxiliary data used to produce the Level 2 GSST product includes:

Table 7.5.1.2-1 Auxiliary Data Files for AATSR Level 2 Processing	
Description	Auxiliary File ID
AATSR Level 2 Processing Configuration file	ATS_PC2_AX
Retrieval Coefficient Data file	ATS_SST_AX
LST Coefficient Data file	ATS_LST_AX

7.5.1.3 Processing Performed

Level 2 GSST processing includes:

- Derivation of Sea Surface Temperature (SST) and other parameters (e.g. NDVI) from the gridded brightness temperatures of the Level 1B product;

7.5.1.4 Product Structure

The high level structure of the Level 2 GSST product is shown below.

Table 7.5.1.4-1 AATSR Level 2 GSST Product Structure

MPH
SPH (includes DSDs)
Summary Quality ADS (SQADS)
Grid pixel latitude and longitude, topographic corrections ADS (LADS)



Scan pixel x and y ADS
Nadir view solar angles ADS
Forward view solar angles ADS
Scan and pixel number, nadir view image ADS
Scan and pixel number, forward view image ADS
Distributed product MDS

7.5.1.5 Main Product Header

The Main Product Header is defined in Volume 5.

7.5.1.6 Specific Product Header

The content of the Specific Product Header shall be as follows. The SPH is an ASCII header. Refer to Volume 5 for an explanation of ASCII header conventions. The SPH is similar to the SPH of the Level 1B product. Only the DSD list is changed. The format of the SPH is defined in the table below.

Table 7.5.1.6-1 AATSR Level 2 - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
1-35	First 35 fields of the Level 1B SPH described in Table 7.4.1.6-1	-	2190	-	-
	<i>DSDs for included data sets</i>				
36	DSD (A) - Summary Quality ADS (SQADS)	-	280	dsd	1
37	DSD (A) - Grid pixel latitude and longitude, topographic corrections ADS (LADS)	-	280	dsd	1
38	DSD (A) - Scan pixel x and y ADS	-	280	dsd	1
39	DSD (A) - Nadir view solar angles ADS	-	280	dsd	1
40	DSD (A) - Forward view solar angles ADS	-	280	dsd	1
41	DSD (A) - Scan and pixel number, nadir view image ADS	-	280	dsd	1
42	DSD (A) - Scan and pixel number, forward view image ADS	-	280	dsd	1
43	DSD (M) - Distributed product MDS	-	280	dsd	1
44	DSD Spare (279 blank characters followed by 1 newline character)	-	280	dsd_sp	1
	<i>DSDs for referenced files</i>				
45	DSD (R) - Level 1B data file from which this product was created	-	280	dsd	1
46	DSD (R) - AATSR Level 2 Processing Configuration file	-	280	dsd	1
47	DSD (R) - Retrieval Coeff. Data file	-	280	dsd	1
48	DSD (R) - LST Coeff. Data file	-	280	dsd_sp	1
	size (in bytes)		5830		

In each DSD of the SPH, the field DS_NAME is filled as described in the table below.

Table 7.5.1.6-2 AATSR Level-2 GSST DS_NAME	
DSD	DS_NAME
DSD (A) - Summary Quality ADS (SQADS)	SUMMARY_QUALITY_ADS
DSD (A) - Grid pixel latitude and longitude, topographic corrections ADS (LADS)	GEOLOCATION_ADS
DSD (A) - Scan pixel x and y ADS	SCAN_PIXEL_X_AND_Y_ADS
DSD (A) - Nadir view solar angles ADS	NADIR_VIEW_SOLAR_ANGLES_ADS
DSD (A) - Forward view solar angles ADS	FWARD_VIEW_SOLAR_ANGLES_ADS
DSD (A) - Scan and pixel number, nadir view image ADS	NADIR_VIEW_SCAN_PIX_NUM_ADS
DSD (A) - Scan and pixel number, forward view image ADS	FWARD_VIEW_SCAN_PIX_NUM_ADS
DSD (M) - Distributed product MDS	DISTRIB_SST_CLOUD_LAND_MDS
<i>DSDs for referenced files</i>	
DSD (R) - Level 1B data file from which this product was created	LEVEL_1B_PRODUCT
DSD (R) - AATSR Level 2 Processing Configuration file	PROCESSING_PARAMS_L2_FILE
DSD (R) - Retrieval Coeff. Data file	RETRIEVAL_COEFS_DATA_FILE
DSD (R) - LST Coeff. Data file	LST_COEFS_DATA_FILE

7.5.1.7 Data Sets

The contents of the Data Sets are described in the following sections. Data Sets are in mixed binary format. They may contain ASCII strings, but the ASCII strings are not contained within quotation marks as for the MPH/SPH.

7.5.1.7.1 Summary Quality ADS (SQADS)

The Summary Quality ADS consists of several ADSRs. There is one ADSR per set of 512 scans, and the information contained applies until the next ADSR. The format of the ADSR is described in the table below.

Table 7.5.1.7.1-1 Summary Quality ADS Format					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	mjd	12	mjd	1
2	Attachment Flag	-	1	uc	1
3	Spare	-	3	uc	3
4	Image scan number	-	2	us	1
5	Packet Validation during nadir view number of scans null packet	-	2	ss	1
6	Packet Validation during nadir view number of scans failing basic validation	-	2	ss	1
7	Packet Validation during nadir view number of scans failing CRC check	-	2	ss	1
8	Packet Validation during nadir view number of scans showing buffers full	-	2	ss	1



Table 7.5.1.7.1-1 Summary Quality ADS Format					
N	Description	Units	Byte Length	Data Type	Dim.
9	Packet Validation during nadir view number of scans showing scan jitter	-	2	ss	1
10	Percentage of cloudy pixels	0.01%	2	ss	1
11	Percentage of NDVI invalid	0.01%	2	ss	1
12	Percentage of SST (nadir view) invalid	0.01%	2	ss	1
13	Percentage of SST (dual view) invalid	0.01%	2	ss	1
14	Packet Validation during nadir view number of scans - all other errors	-	2	ss	1
15	Packet Validation during forward view number of scans null packet	-	2	ss	1
16	Packet Validation during forward view number of scans failing basic validation	-	2	ss	1
17	Packet Validation during forward view number of scans failing CRC check	-	2	ss	1
18	Packet Validation during forward view number of scans showing buffers full	-	2	ss	1
19	Packet Validation during forward view number of scans showing scan jitter	-	2	ss	1
20	Reserved for future use	-	2	ss	1
21	Reserved for future use	-	2	ss	1
22	Reserved for future use	-	2	ss	1
23	Reserved for future use	-	2	ss	1
24	Packet Validation during forward view number of scans - all other errors	-	2	ss	1
25	Spare	-	28	uc	28
	Size (in bytes)		86		

7.5.1.7.2 Grid Pixel Latitude and Longitude and Topographic Correction ADS (LADS)

This data set is identical to that of the Level 1B product, and the ADSR is described in Table 7.4.1.7.2-1.

7.5.1.7.3 Scan Pixel x and y ADS

This data set is identical to that of the Level 1B product, and the ADSR is described in Table 7.4.1.7.3-1.

7.5.1.7.4 Nadir View Solar Angles ADS

This data set is identical to that of the Level 1B product, and the ADSR is described in Table 7.4.1.7.4-1.

7.5.1.7.5 Forward View Solar Angles ADS

This data set is identical to that of the Level 1B product, and the ADSR is described in Table 7.4.1.7.4-1.

7.5.1.7.6 Scan and Pixel Number, Nadir View Image ADS

This data set is identical to that of the Level 1B product, and the ADSR is described in Table 7.4.1.7.7-1.

7.5.1.7.7 Scan and Pixel Number, Forward View Image ADS

This data set is identical to that of the Level 1B product, and the ADSR is described in Table 7.4.1.7.7-1.

7.5.1.7.8 Distributed Product MDS

The MDS contains the calculated geophysical parameters. The MDS is composed of one MDSR per scan. The format of each MDSR is common, and is defined in the table below. The contents of each MDSR varies depending on the type of pixels located in the scan.

Table 7.5.1.7.8-1 Distributed Product Record MDS					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	image scan y coordinate	m	4	sl	1
5	confidence words (Defined in Table 7.5.1.7.8-3)	flags	1024	us	512
6	nadir field (Note 1, 2)	K/100	1024	ss	512
7	combined field (Note 1, 3)		1024	ss	512
Size			3092		

Note 1: The contents of these MDS fields depend on the setting of the forward and nadir cloud flags and the land flag according to the following table. The units and range of these quantities consequently depend on the flag settings; values quoted are for cloud-free sea data.

Note 2: The range values quoted refer to valid data. If a valid nadir sea surface temperature cannot be derived, the nadir field may contain an exception value. If so, this will refer to the 11 micron channel.

Note 3: The NDVI is a dimensionless quantity and is given in the product in units of 0.0001. Thus if the combined field represents a land pixel, its value will be in the range -10000 to +10000. An exception value of -19999 will be used if a valid NDVI cannot be derived.

Table 7.5.1.7.8-2 GSST Nadir and Combined Field Contents

Nadir cloud	Forward cloud	Land	Nadir field	Combined field
0	0	0	SST nadir	SST combined
0	1	0	SST nadir	SST combined (see Note 1)
1	0/1	0	Cloud top temp (see Note 2)	Cloud top height (see Note 3)
0/1	0/1	1	Land surface temp	NDVI

Note 1: A dual view SST is calculated in this case as if the forward view were cloud-free, but the value is excluded from the smoothing, and the corresponding confidence flag ('dual view SST valid') is not set.

Note 2: Placeholder, field currently filled with 11 micron Brightness Temperature nadir data.

Note 3: Placeholder, field currently empty.

The content of the confidence flags are defined in the table below.

Table 7.5.1.7.8-3 GSST Confidence Flags Note: Bits are numbered as per Volume A convention	
Bit	Meaning if set
0	Nadir-only SST is valid
1	Nadir-only SST retrieval includes 3.7 micron channel
2	Dual-view SST is valid
3	Dual-view SST retrieval includes 3.7 micron channel
4	Pixel is over land
5	Nadir-view pixel is cloudy
6	Nadir-view pixel has blanking pulse
7	Nadir-view pixel is cosmetic fill
8	Forward-view pixel is cloudy
9	Forward-view pixel has blanking pulse
10	Forward-view pixel is cosmetic fill
11	One or both views flagged cloudy by 1.6 micron test (daytime only)
12	Cloud flagged by 11 micron/12 micron nadir -forward test
13	One or both views flagged cloudy by infra-red histogram test
14 - 15	Topographic variance flags for LST retrieval

7.5.1.8 Size Estimate

The following size estimate assumes 40256 scans per product (i.e., one orbit), and a granule size of 32 scans. Hence, the product contains 1258 granules. Note that 1 MByte = 1×10^6 bytes.

Table 7.5.1.8-1 GSST Product Size		
Description	Record size (byte)	Data Set Size (Mbyte/orbit)
MPH	1247	0.001247
SPH	5830	0.005830
Summary Quality ADS (every 512 scans)	86	0.007
Grid pixel latitude and longitude, topographic corrections ADS	626	0.79
Scan pixel x and y ADS	830	1.0
Nadir view solar angles ADS	216	0.27
Forward view solar angles ADS	216	0.27
Scan and pixel number, nadir view image ADS	2068	2.66
Scan and pixel number, forward view image ADS	2068	2.66



Table 7.5.1.8-1 GSST Product Size		
Description	Record size (byte)	Data Set Size (Mbyte/orbit)
Distributed product record MDS	3092	124.5
Total size of product (Mbyte)		133



7.5.2 AATSR L2P (UPA-L2P-ATS_NR__2P) Product

The AATSR L2P Product (UPA-L2P-ATS_NR__2P) has been replaced by the ARC L2P product (see section 7.5.5) for the third full reprocessing of AATSR data. Full details of the AATSR L2P product can be viewed in version 4/B of this document.



7.5.3 AATSR Averaged Surface Temperature (AST) Product

7.5.3.1 Description

This AATSR Level 2 product is a spatially averaged version of the Geophysical Product. Measurements contained in this product are thus averages of values calculated for the Geophysical Product. Several types of averages are produced: 50 km by 50 km cells, 17 by 17 km cells, 10 arcminute cells, and 30 arcminute cells. These products cover a full orbit and are used for global monitoring. Until EOM, the NRT version of the product was available 3 hours after data acquisition, while the OFL (fully consolidated) product was available within 2 weeks after data acquisition.

7.5.3.2 Input Data

AATSR Level 1B full resolution GBTR product.

7.5.3.3 Auxiliary Data Used

See section 7.5.1.2. No additional files are required.

7.5.3.4 Processing Performed

The algorithm must average the values from the full resolution Geophysical Product.

7.5.3.5 Product Structure

The high level structure of the Level 2 AST product is shown below:

Table 7.5.3.5-1 AATSR Level 2 AST Product Structure

MPH
SPH (includes DSDs)
SST Record, 50 kilometre cell MDS
SST Record, 17 kilometre cell MDS
SST Record, 10 arc minute cell MDS
SST Record, 30 arc minute cell MDS
LST Record, 50 kilometre cell MDS
LST Record, 17 kilometre cell MDS
LST Record, 10 arc minute cell MDS
LST Record, 30 arc minute cell MDS
BT/TOA Land Record, 50 kilometre cell MDS
BT/TOA Land Record, 17 kilometre cell MDS
BT/TOA Land Record, 10 arc minute cell MDS
BT/TOA Land Record, 30 arc minute cell MDS
BT/TOA Sea Record, 50 kilometre cell MDS
BT/TOA Sea Record, 17 kilometre cell MDS



BT/TOA Sea Record, 10 arc minute cell MDS
BT/TOA Sea Record, 30 arc minute cell MDS

7.5.3.6 Main Product Header

The Main Product Header is defined in Volume 5.

7.5.3.7 Specific Product Header

The content of the Specific Product Header shall be as follows. The SPH is an ASCII header. Refer to Volume 5 for an explanation of ASCII header conventions.

The format of the SPH is defined in the table below.

Table 7.5.3.7-1 AATSR Level 2 AST – SPH					
N	Description	Units	Byte Length	Data Type	Dim.
1-31	First 31 fields of the Level 1B SPH described in Table 7.4.1.6-1	-	1264	-	-
32	Spare	-	50	uc	50
	newline character	terminator	1	uc	1
	<i>DSDs for included data sets</i>				
33	DSD (M) - SST Record, 50 kilometre cell MDS	-	280	dsd	1
34	DSD (M) - SST Record, 17 kilometre cell MDS	-	280	dsd	1
35	DSD (M) - SST Record, 10 arc minute cell MDS	-	280	dsd	1
36	DSD (M) - SST Record, 30 arc minute cell MDS	-	280	dsd	1
37	DSD (M) - LST Record, 50 kilometre cell MDS	-	280	dsd	1
38	DSD (M) - LST Record, 17 kilometre cell MDS	-	280	dsd	1
39	DSD (M) - LST Record, 10 arc minute cell MDS	-	280	dsd	1
40	DSD (M) - LST Record, 30 arc minute cell MDS	-	280	dsd	1
41	DSD (M) - BT/TOA Land Record, 50 kilometre cell MDS	-	280	dsd	1
42	DSD (M) - BT/TOA Land Record, 17 kilometre cell MDS	-	280	dsd	1
43	DSD (M) - BT/TOA Land Record, 10 arc minute cell MDS	-	280	dsd	1
44	DSD (M) - BT/TOA Land Record, 30 arc minute cell MDS	-	280	dsd	1
45	DSD (M) - BT/TOA Sea Record, 50 kilometre cell MDS	-	280	dsd	1
46	DSD (M) - BT/TOA Sea Record, 17 kilometre cell MDS	-	280	dsd	1
47	DSD (M) - BT/TOA Sea Record, 10 arc minute cell MDS	-	280	dsd	1
48	DSD (M) - BT/TOA Sea Record, 30 arc minute cell MDS	-	280	dsd	1



Table 7.5.3.7-1 AATSR Level 2 AST – SPH					
N	Description	Units	Byte Length	Data Type	Dim.
49	DSD Spare (279 blank space characters followed by 1 newline character)	-	280	dsd_sp	1
	<i>DSDs for referenced files</i>				
50	DSD (R) - Level 1B data file from which this product was created	-	280	dsd	1
52	DSD (R) - AATSR Level 2 Processing Configuration file	-	280	dsd	1
54	DSD (R) - Retrieval Coeff. Data file	-	280	dsd	1
55	DSD (R) - LST Coeff. Data file	-	280	dsd	1
	size (in bytes)		7195		

In each DSD of the SPH, the field DS_NAME is filled as described in the table below.

Table 7.5.3.7-2 AATSR Level-2 AST DS_NAME	
DSD	DS_NAME
DSD (M) - SST Record, 50 kilometre cell MDS	SEA_ST_50_KM_CELL_MDS
DSD (M) - SST Record, 17 kilometre cell MDS	SEA_ST_17_KM_CELL_MDS
DSD (M) - SST Record, 10 arc minute cell MDS	SEA_ST_10_MIN_CELL_MDS
DSD (M) - SST Record, 30 arc minute cell MDS	SEA_ST_30_MIN_CELL_MDS
DSD (M) - LST Record, 50 kilometre cell MDS	LAND_ST_50_KM_CELL_MDS
DSD (M) - LST Record, 17 kilometre cell MDS	LAND_ST_17_KM_CELL_MDS
DSD (M) - LST Record, 10 arc minute cell MDS	LAND_ST_10_MIN_CELL_MDS
DSD (M) - LST Record, 30 arc minute cell MDS	LAND_ST_30_MIN_CELL_MDS
DSD (M) - BT/TOA Land Record, 50 kilometre cell MDS	BT_TOA_LAND_50_KM_CELL_MDS
DSD (M) - BT/TOA Land Record, 17 kilometre cell MDS	BT_TOA_LAND_17_KM_CELL_MDS
DSD (M) - BT/TOA Land Record, 10 arc minute cell MDS	BT_TOA_LAND_10_MIN_CELL_MDS
DSD (M) - BT/TOA Land Record, 30 arc minute cell MDS	BT_TOA_LAND_30_MIN_CELL_MDS
DSD (M) - BT/TOA Sea Record, 50 kilometre cell MDS	BT_TOA_SEA_50_KM_CELL_MDS
DSD (M) - BT/TOA Sea Record, 17 kilometre cell MDS	BT_TOA_SEA_17_KM_CELL_MDS
DSD (M) - BT/TOA Sea Record, 10 arc minute cell MDS	BT_TOA_SEA_10_MIN_CELL_MDS
DSD (M) - BT/TOA Sea Record, 30 arc minute cell MDS	BT_TOA_SEA_30_MIN_CELL_MDS
<i>DSDs for referenced files</i>	
DSD (R) - Level 1B data file from which this product was created	LEVEL_1B_PRODUCT
DSD (R) - AATSR Level 2 Processing Configuration file	PROCESSING_PARAMS_L2_FILE
DSD (R) - Retrieval Coeff. Data file	RETRIEVAL_COEFS_DATA_FILE
DSD (R) - LST Coeff. Data file	LST_COEFS_DATA_FILE

7.5.3.8 Data Sets

The contents of the Data Sets are described in the following sections. Data Sets are in mixed binary format. They may contain ASCII strings, but the ASCII strings are not contained within quotation marks as for the MPH/SPH

7.5.3.8.1 SST Record, 50km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 50x50km cell	10-6 deg	4	sl	1
5	Longitude of 50x50km cell	10-6 deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	mean nadir-only SST in 50x50km cell	K/100	2	ss	1
8	standard deviation of nadir-only SST	K/100	2	ss	1
9	Number of pixels in nadir-only average, 50x50km cell	-	2	us	1
10	mean dual-view SST, 50x50km cell	K/100	2	ss	1
11	standard deviation of dual-view SST	K/100	2	ss	1
12	Number of pixels in dual view average, 50x50km cell	-	2	us	1
13	AST confidence word	flags	4	us	2
14	Cloud-top temperature, nadir view	K/100	2	ss	1
15	Percentage cloud-cover, nadir view	%/100	2	ss	1
16	Cloud-top temperature, forward view	K/100	2	ss	1
17	Percentage cloud-cover, forward view	%/100	2	ss	1
Size			50		

7.5.3.8.2 SST Record, 17km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 17x17km cell	10-6	4	sl	1

Table 7.5.3.8.2-1 SST Record, 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
		deg			
5	Longitude of 17x17km cell	10-6deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	mean nadir-only SST in 17x17km cells	K/100	2	ss	1
8	Number of pixels in nadir-only average, 17x17km cells	-	2	us	1
9	mean dual-view SST in 17x17km cells	K/100	2	ss	1
10	Number of pixels in dual-view average, 17x17km cell	-	2	us	1
11	AST confidence word	flags	4	us	2
Size			38		

7.5.3.8.3 SST Record 10 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.3-1 SST Record, 10 arc minute cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 10 arcmin cell	10-6 deg	4	sl	1
5	Longitude of 10 arcmin cell	10-6deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	mean nadir-only SST in 10 arcmin cell	K/100	2	ss	1
8	Number of pixels in nadir-only average, 10 arcmin cell	-	2	us	1
9	mean dual-view SST in 10 arcmin cell	K/100	2	ss	1
10	Number of pixels in dual-view average, 10 arcmin cell	-	2	us	1
11	AST confidence word	flags	4	us	2
Size			38		

7.5.3.8.4 SST Record 30 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.1-1 above, with references to "50x50km cell" replaced by "30 arc minute cell".



7.5.3.8.5 LST Record 50km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.5-1 LST Record 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 50x50km cell	10 ⁻⁶ deg	4	sl	1
5	Longitude of 50x50km cell	10 ⁻⁶ deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	mean land surface temperature (ST)	K/100	2	ss	1
8	standard deviation of land ST	K/100	2	ss	1
9	Number of pixels in land surface temperature average, 50x50km cell	-	2	us	1
10	mean NDVI	0.0001	2	ss	1
11	standard deviation of NDVI	0.0001	2	ss	1
12	Number of pixels in NDVI average, 50x50km cell	-	2	us	1
13	AST confidence word	flags	4	us	2
14	Cloud-top temperature, nadir view	K/100	2	ss	1
15	Percentage cloud-cover, nadir view	%/100	2	ss	1
16	Cloud-top temperature, forward view	K/100	2	ss	1
17	Percentage cloud-cover, forward view	%/100	2	ss	1
Size			50		

7.5.3.8.6 LST Record 17km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.6-1 LST Record 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 17x17km cell	10 ⁻⁶ deg	4	sl	1
5	Longitude of 17x17km cell	10 ⁻⁶ deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	mean land ST in 17x17km cells	K/100	2	ss	1
8	Number of pixels in land surface temperature average, 17x17km cells	-	2	us	1
9	mean NDVI in 17x17km cells	0.0001	2	ss	1

Table 7.5.3.8.6-1 LST Record 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
10	Number of pixels in NDVI average, 17x17 km cells	-	2	us	1
11	AST confidence word	flags	4	us	2
Size			38		

Note: The NDVI is a dimensionless quantity and is expressed here in units of 0.0001. An exception value of -19999 will be used if a valid NDVI cannot be derived.

7.5.3.8.7 LST Record 10 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.6-1 above, with references to "17x17km cell" replaced with "10 arc minute cell".

7.5.3.8.8 LST Record 30 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.5-11 above, with references to "50x50km cell" replaced by "30 arc minute cell".

7.5.3.8.9 BT/TOA Land Record, 50km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.9-1 BT/TOA Land Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 50x50km cell	10-6 deg	4	sl	1
5	Longitude of 50x50km cell	10-6 deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	Number of filled pixels in cell, nadir view	-	2	ss	1
8	Number of filled pixels in cell over land surface, nadir view	-	2	ss	1
9	Percentage of cloudy pixels in cell over land surface, nadir view	-	2	ss	1
10	Topographic latitude correction, 50x50km cell, nadir view	10-6 deg	4	sl	1
11	Topographic longitude correction, 50x50km cell, nadir view	10-6 deg	4	sl	1
12	Spatially averaged 12 micron BT of all clear pixels, 50x50km cell (nadir view)	K/1000	4	sl	1
13	Standard deviation of above	K/1000	4	sl	1
14	Spatially averaged 11 micron BT of all clear pixels, 50x50km cell (nadir view)	K/1000	4	sl	1
15	Standard deviation of above	K/1000	4	sl	1



Table 7.5.3.8.9-1 BT/TOA Land Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
16	Spatially averaged 3.7 micron BT of all clear pixels, 50x50km cell (nadir view)	K/1000	4	sl	1
17	Standard deviation of above	K/1000	4	sl	1
18	Spatially averaged 1.6 micron TOA reflectance of all clear pixels, 50x50km cell (nadir view)	%/100	2	ss	1
19	Standard deviation of above	%/100	2	ss	1
20	Spatially averaged 0.87 micron TOA reflectance of all clear pixels, 50x50km cell (nadir view)	%/100	2	ss	1
21	Standard deviation of above	%/100	2	ss	1
22	Spatially averaged 0.67 micron TOA reflectance of all clear pixels, 50x50km cell (nadir view)	%/100	2	ss	1
23	Standard deviation of above	%/100	2	ss	1
24	Spatially averaged 0.55 micron TOA reflectance of all clear pixels, 50x50km cell (nadir view)	%/100	2	ss	1
25	Standard deviation of above	%/100	2	ss	1
26	Spatially averaged 12 micron BT of all cloudy pixels, 50x50km cell (nadir view)	K/1000	4	sl	1
27	Standard deviation of above	K/1000	4	sl	1
28	Spatially averaged 11 micron BT of all cloudy pixels, 50x50km cell (nadir view)	K/1000	4	sl	1
29	Standard deviation of above	K/1000	4	sl	1
30	Spatially averaged 3.7 micron BT of all cloudy pixels, 50x50km cell (nadir view)	K/1000	4	sl	1
31	Standard deviation of above	K/1000	4	sl	1
32	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels, 50x50km cell (nadir view)	%/100	2	ss	1
33	Standard deviation of above	%/100	2	ss	1
34	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels, 50x50km cell (nadir view)	%/100	2	ss	1
35	Standard deviation of above	%/100	2	ss	1
36	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels, 50x50km cell (nadir view)	%/100	2	ss	1
37	Standard deviation of above	%/100	2	ss	1
38	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels, 50x50km cell (nadir view)	%/100	2	ss	1
39	Standard deviation of above	%/100	2	ss	1
40	Pixel threshold failure flags for averages, nadir view	-	2	us	1
41	Number of filled pixels in cell, forward view	-	2	ss	1
42	Number of filled pixels in cell over land surface, forward view	-	2	ss	1

Table 7.5.3.8.9-1 BT/TOA Land Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
43	Percentage of cloudy pixels in cell over land surface, forward view	-	2	ss	1
44	Topographic latitude correction, 50x50km cell, forward view	10 ⁻⁶ deg	4	sl	1
45	Topographic longitude correction, 50x50km cell, forward view	10 ⁻⁶ deg	4	sl	1
46	Spatially averaged 12 micron BT of all clear pixels, 50x50km cell (forward view)	K/1000	4	sl	1
47	Standard deviation of above	K/1000	4	sl	1
48	Spatially averaged 11 micron BT of all clear pixels, 50x50km cell (forward view)	K/1000	4	sl	1
49	Standard deviation of above	K/1000	4	sl	1
50	Spatially averaged 3.7 micron BT of all clear pixels, 50x50km cell (forward view)	K/1000	4	sl	1
51	Standard deviation of above	K/1000	4	sl	1
52	Spatially averaged 1.6 micron TOA reflectance of all clear pixels, 50x50km cell (forward view)	%/100	2	ss	1
53	Standard deviation of above	%/100	2	ss	1
54	Spatially averaged 0.87 micron TOA reflectance of all clear pixels, 50x50km cell (forward view)	%/100	2	ss	1
55	Standard deviation of above	%/100	2	ss	1
56	Spatially averaged 0.67 micron TOA reflectance of all clear pixels, 50x50km cell (forward view)	%/100	2	ss	1
57	Standard deviation of above	%/100	2	ss	1
58	Spatially averaged 0.55 micron TOA reflectance of all clear pixels, 50x50km cell (forward view)	%/100	2	ss	1
59	Standard deviation of above	%/100	2	ss	1
60	Spatially averaged 12 micron BT of all cloudy pixels, 50x50km cell (forward view)	K/1000	4	sl	1
61	Standard deviation of above	K/1000	4	sl	1
62	Spatially averaged 11 micron BT of all cloudy pixels, 50x50km cell (forward view)	K/1000	4	sl	1
63	Standard deviation of above	K/1000	4	sl	1
64	Spatially averaged 3.7 micron BT of all cloudy pixels, 50x50km cell (forward view)	K/1000	4	sl	1
65	Standard deviation of above	K/1000	4	sl	1
66	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels, 50x50km cell (forward view)	%/100	2	ss	1
67	Standard deviation of above	%/100	2	ss	1
68	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels, 50x50km cell (forward view)	%/100	2	ss	1
69	Standard deviation of above	%/100	2	ss	1
70	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels, 50x50km	%/100	2	ss	1

Table 7.5.3.8.9-1 BT/TOA Land Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
	cell (forward view)				
71	Standard deviation of above	%/100	2	ss	1
72	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels, 50x50km cell (forward view)	%/100	2	ss	1
73	Standard deviation of above	%/100	2	ss	1
74	Pixel threshold failure flags for averages, forward view	-	2	us	1
75	Number of filled pixels (N-Sigma), nadir view	-	2	ss	1
76	Percentage filled pixels over land surface	%/100	2	ss	1
77	Lowest 11 micron BT of all cloudy pixels, nadir view	K/100	2	ss	1
78	Corresponding 12 micron BT, nadir view	K/100	2	ss	1
79	Corresponding 3.7 micron BT, nadir view	K/100	2	ss	1
80	Corresponding 1.6 micron reflectance, nadir view	%/100	2	ss	1
81	Corresponding 0.87 micron reflectance, nadir view	%/100	2	ss	1
82	Corresponding 0.67 micron reflectance, nadir view	%/100	2	ss	1
83	Corresponding 0.55 micron reflectance, nadir view	%/100	2	ss	1
84	Lowest 11 micron BT of all cloudy pixels, forward view	K/100	2	ss	1
85	Corresponding 12 micron BT, forward view	K/100	2	ss	1
86	Corresponding 3.7 micron BT, forward view	K/100	2	ss	1
87	Corresponding 1.6 micron reflectance, forward view	%/100	2	ss	1
88	Corresponding 0.87 micron reflectance, forward view	%/100	2	ss	1
89	Corresponding 0.67 micron reflectance, forward view	%/100	2	ss	1
90	Corresponding 0.55 micron reflectance, forward view	%/100	2	ss	1
Size			250		

7.5.3.8.10 BT/TOA Land Record, 17km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.10-1 BT/TOA Land Record, 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3

Table 7.5.3.8.10-1 BT/TOA Land Record, 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
4	Latitude of 17x17km cell	10 ⁻⁶ deg	4	sl	1
5	Longitude of 17x17km cell	10 ⁻⁶ deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	Number of filled pixels in cell, nadir view	-	2	ss	1
8	Number of filled pixels in cell over land surface, nadir view	-	2	ss	1
9	Percentage of cloudy pixels in cell over land surface, nadir view	-	2	ss	1
10	Topographic latitude correction, 17x17km cell, nadir view	10 ⁻⁶ deg	4	sl	1
11	Topographic longitude correction, 17x17km cell, nadir view	10 ⁻⁶ deg	4	sl	1
12	Spatially averaged 12 micron BT of all clear pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
13	Spatially averaged 11 micron BT of all clear pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
14	Spatially averaged 3.7 micron BT of all clear pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
15	Spatially averaged 1.6 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
16	Spatially averaged 0.87 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
17	Spatially averaged 0.67 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
18	Spatially averaged 0.55 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
19	Spatially averaged 12 micron BT of all cloudy pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
20	Spatially averaged 11 micron BT of all cloudy pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
21	Spatially averaged 3.7 micron BT of all cloudy pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
22	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
23	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
24	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
25	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
26	Pixel threshold failure flags for averages, nadir view	-	2	us	1

Table 7.5.3.8.10-1 BT/TOA Land Record, 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
27	Number of filled pixels in cell, forward view	-	2	ss	1
28	Number of filled pixels in cell over land surface, forward view	-	2	ss	1
29	Percentage of cloudy pixels in cell over landsurface, forward view	-	2	ss	1
30	Topographic latitude correction, 17x17km cell, forward view	10 ⁻⁶ deg	4	sl	1
31	Topographic longitude correction, 17x17km cell, forward view	10 ⁻⁶ deg	4	sl	1
32	Spatially averaged 12 micron BT of all clear pixels in 17x17km cells (forward view)	K/1000	4	sl	1
33	Spatially averaged 11 micron BT of all clear pixels in 17x17km cells (forward view)	K/1000	4	sl	1
34	Spatially averaged 3.7 micron BT of all clear pixels in 17x17km cells (forward view)	K/1000	4	sl	1
35	Spatially averaged 1.6 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
36	Spatially averaged 0.87 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
37	Spatially averaged 0.67 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
38	Spatially averaged 0.55 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
39	Spatially averaged 12 micron BT of all cloudy pixels in 17x17km cells (forward view)	K/1000	4	sl	1
40	Spatially averaged 11 micron BT of all cloudy pixels in 17x17km cells (forward view)	K/1000	4	sl	1
41	Spatially averaged 3.7 micron BT of all cloudy pixels in 17x17km cells (forward view)	K/1000	4	sl	1
42	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
43	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
44	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
45	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
46	Pixel threshold failure flags for averages, forward view	-	2	us	1
Size			138		

7.5.3.8.11 BT/TOA Land Record, 10 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.10-1 above, with references to "17x17km cell" replaced with "10 arc minute cell".

7.5.3.8.12 BT/TOA Land Record, 30 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.9-1 above, with references to "50x50km cell" replaced by "30 arc minute cell".

7.5.3.8.13 BT/TOA Sea Record, 50km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.13-1 BT/TOA Sea Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 50x50km cell	10 ⁻⁶ deg	4	sl	1
5	Longitude of 50x50km cell	10 ⁻⁶ deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	Number of filled pixels in cell, nadir view	-	2	ss	1
8	Number of filled pixels in cell over sea surface, nadir view	-	2	ss	1
9	Percentage of cloudy pixels in cell over sea surface, nadir view	-	2	ss	1
10	Spatially averaged 12 micron BT of all clear pixels in 50x50km cells (nadir view)	K/1000	4	sl	1
11	Standard deviation of above	K/1000	4	sl	1
12	Spatially averaged 11 micron BT of all clear pixels in 50x50km cells (nadir view)	K/1000	4	sl	1
13	Standard deviation of above	K/1000	4	sl	1
14	Spatially averaged 3.7 micron BT of all clear pixels in 50x50km cells (nadir view)	K/1000	4	sl	1
15	Standard deviation of above	K/1000	4	sl	1
16	Spatially averaged 1.6 micron TOA reflectance of all clear pixels in 50x50km cells (nadir view)	%/100	2	ss	1
17	Standard deviation of above	%/100	2	ss	1
18	Spatially averaged 0.87 micron TOA reflectance of all clear pixels in 50x50km cells (nadir view)	%/100	2	ss	1
19	Standard deviation of above	%/100	2	ss	1
20	Spatially averaged 0.67 micron TOA reflectance of all clear pixels in 50x50km cells (nadir view)	%/100	2	ss	1
21	Standard deviation of above	%/100	2	ss	1
22	Spatially averaged 0.55 micron TOA reflectance of all clear pixels in 50x50km cells (nadir view)	%/100	2	ss	1
23	Standard deviation of above	%/100	2	ss	1



Table 7.5.3.8.13-1 BT/TOA Sea Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
24	Spatially averaged 12 micron BT of all cloudy pixels in 50x50km cells (nadir view)	K/1000	4	sl	1
25	Standard deviation of above	K/1000	4	sl	1
26	Spatially averaged 11 micron BT of all cloudy pixels in 50x50km cells (nadir view)	K/1000	4	sl	1
27	Standard deviation of above	K/1000	4	sl	1
28	Spatially averaged 3.7 micron BT of all cloudy pixels in 50x50km cells (nadir view)	K/1000	4	sl	1
29	Standard deviation of above	K/1000	4	sl	1
30	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels in 50x50km cells (nadir view)	%/100	2	ss	1
31	Standard deviation of above	%/100	2	ss	1
32	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels in 50x50km cells (nadir view)	%/100	2	ss	1
33	Standard deviation of above	%/100	2	ss	1
34	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels in 50x50km cells (nadir view)	%/100	2	ss	1
35	Standard deviation of above	%/100	2	ss	1
36	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels in 50x50km cells (nadir view)	%/100	2	ss	1
37	Standard deviation of above	%/100	2	ss	1
38	Pixel threshold failure flags for averages, nadir view	-	2	us	1
39	Number of filled pixels in cell, forward view	-	2	ss	1
40	Number of filled pixels in cell over sea surface, forward view	-	2	ss	1
41	Percentage of cloudy pixels in cell over sea surface, forward view	-	2	ss	1
42	Spatially averaged 12 micron BT of all clear pixels in 50x50km cells (forward view)	K/1000	4	sl	1
43	Standard deviation of above	K/1000	4	sl	1
44	Spatially averaged 11 micron BT of all clear pixels in 50x50km cells (forward view)	K/1000	4	sl	1
45	Standard deviation of above	K/1000	4	sl	1
46	Spatially averaged 3.7 micron BT of all clear pixels in 50x50km cells (forward view)	K/1000	4	sl	1
47	Standard deviation of above	K/1000	4	sl	1
48	Spatially averaged 1.6 micron TOA reflectance of all clear pixels in 50x50km cells (forward view)	%/100	2	ss	1
49	Standard deviation of above	%/100	2	ss	1
50	Spatially averaged 0.87 micron TOA reflectance of all clear pixels in 50x50km cells (forward view)	%/100	2	ss	1
51	Standard deviation of above	%/100	2	ss	1
52	Spatially averaged 0.67 micron TOA reflectance of all clear pixels in 50x50km cells (forward view)	%/100	2	ss	1
53	Standard deviation of above	%/100	2	ss	1
54	Spatially averaged 0.55 micron TOA reflectance of all clear pixels in 50x50km cells (forward view)	%/100	2	ss	1
55	Standard deviation of above	%/100	2	ss	1



Table 7.5.3.8.13-1 BT/TOA Sea Record, 50km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
56	Spatially averaged 12 micron BT of all cloudy pixels in 50x50km cells (forward view)	K/1000	4	sl	1
57	Standard deviation of above	K/1000	4	sl	1
58	Spatially averaged 11 micron BT of all cloudy pixels in 50x50km cells (forward view)	K/1000	4	sl	1
59	Standard deviation of above	K/1000	4	sl	1
60	Spatially averaged 3.7 micron BT of all cloudy pixels in 50x50km cells (forward view)	K/1000	4	sl	1
61	Standard deviation of above	K/1000	4	sl	1
62	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels in 50x50km cells (forward view)	%/100	2	ss	1
63	Standard deviation of above	%/100	2	ss	1
64	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels in 50x50km cells (forward view)	%/100	2	ss	1
65	Standard deviation of above	%/100	2	ss	1
66	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels in 50x50km cells (forward view)	%/100	2	ss	1
67	Standard deviation of above	%/100	2	ss	1
68	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels in 50x50km cells (forward view)	%/100	2	ss	1
69	Standard deviation of above	%/100	2	ss	1
70	Pixel threshold failure flags for averages, forward view	-	2	us	1
71	Number of filled pixels (N-Sigma), nadir view	-	2	ss	1
72	Percentage filled pixels over sea surface	%/100	2	ss	1
73	Lowest 11 micron BT of all cloudy pixels, nadir view	K/100	2	ss	1
74	Corresponding 12 micron BT, nadir view	K/100	2	ss	1
75	Corresponding 3.7 micron BT, nadir view	K/100	2	ss	1
76	Corresponding 1.6 micron reflectance, nadir view	%/100	2	ss	1
77	Corresponding 0.87 micron reflectance, nadir view	%/100	2	ss	1
78	Corresponding 0.67 micron reflectance, nadir view	%/100	2	ss	1
79	Corresponding 0.55 micron reflectance, nadir view	%/100	2	ss	1
80	Lowest 11 micron BT of all cloudy pixels, forward view	K/100	2	ss	1
81	Corresponding 12 micron BT, forward view	K/100	2	ss	1
82	Corresponding 3.7 micron BT, forward view	K/100	2	ss	1
83	Corresponding 1.6 micron reflectance, forward view	%/100	2	ss	1
84	Corresponding 0.87 micron reflectance, forward view	%/100	2	ss	1
85	Corresponding 0.67 micron reflectance, forward view	%/100	2	ss	1
86	Corresponding 0.55 micron reflectance, forward view	%/100	2	ss	1
Size			234		



7.5.3.8.14 BT/TOA Sea Record, 17km cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.3.8.14-1 BT/TOA Sea Record, 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 17x17km cell	10 ⁻⁶ deg	4	sl	1
5	Longitude of 17x17km cell	10 ⁻⁶ deg	4	sl	1
6	Mean across-track pixel number	-	2	ss	1
7	Number of filled pixels in cell, nadir view	-	2	ss	1
8	Number of filled pixels in cell over sea surface, nadir view	-	2	ss	1
9	Percentage of cloudy pixels in cell over sea surface, nadir view	-	2	ss	1
10	Spatially averaged 12 micron BT of all clear pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
11	Spatially averaged 11 micron BT of all clear pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
12	Spatially averaged 3.7 micron BT of all clear pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
13	Spatially averaged 1.6 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
14	Spatially averaged 0.87 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
15	Spatially averaged 0.67 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
16	Spatially averaged 0.55 micron TOA reflectance of all clear pixels in 17x17km cells (nadir view)	%/100	2	ss	1
17	Spatially averaged 12 micron BT of all cloudy pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
18	Spatially averaged 11 micron BT of all cloudy pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
19	Spatially averaged 3.7 micron BT of all cloudy pixels in 17x17km cells (nadir view)	K/1000	4	sl	1
20	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
21	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
22	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
23	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels in 17x17km cells (nadir view)	%/100	2	ss	1
24	Pixel threshold failure flags for averages, nadir	-	2	us	1

Table 7.5.3.8.14-1 BT/TOA Sea Record, 17km cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
	view				
25	Number of filled pixels in cell, forward view	-	2	ss	1
26	Number of filled pixels in cell over sea surface, forward view	-	2	ss	1
27	Percentage of cloudy pixels in cell over sea surface, forward view	-	2	ss	1
28	Spatially averaged 12 micron BT of all clear pixels in 17x17km cells (forward view)	K/1000	4	sl	1
29	Spatially averaged 11 micron BT of all clear pixels in 17x17km cells (forward view)	K/1000	4	sl	1
30	Spatially averaged 3.7 micron BT of all clear pixels in 17x17km cells (forward view)	K/1000	4	sl	1
31	Spatially averaged 1.6 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
32	Spatially averaged 0.87 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
33	Spatially averaged 0.67 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
34	Spatially averaged 0.55 micron TOA reflectance of all clear pixels in 17x17km cells (forward view)	%/100	2	ss	1
35	Spatially averaged 12 micron BT of all cloudy pixels in 17x17km cells (forward view)	K/1000	4	sl	1
36	Spatially averaged 11 micron BT of all cloudy pixels in 17x17km cells (forward view)	K/1000	4	sl	1
37	Spatially averaged 3.7 micron BT of all cloudy pixels in 17x17km cells (forward view)	K/1000	4	sl	1
38	Spatially averaged 1.6 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
39	Spatially averaged 0.87 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
40	Spatially averaged 0.67 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
41	Spatially averaged 0.55 micron TOA reflectance of all cloudy pixels in 17x17km cells (forward view)	%/100	2	ss	1
42	Pixel threshold failure flags for averages, forward view	-	2	us	1
Size			120		

7.5.3.8.15 BT/TOA Sea Record, 10 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.14-1 above, with references to “17x17km cell” replaced with “10 arc minute cell”.

7.5.3.8.16 BT/TOA Sea Record, 30 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in Table 7.5.3.8.13-1 above, with references to “50x50km cell” replaced by “30 arc minute cell”.

7.5.3.8.17 Pixel Threshold Failure Flags

Table 7.5.3.8.17-1 Pixel Threshold Failure Flags (Nadir or Forward View)	
Bit	Meaning if set to 1
0	Number of clear pixels contributing to average is less than threshold, 12 micron channel
1	Number of clear pixels contributing to average is less than threshold, 11 micron channel
2	Number of clear pixels contributing to average is less than threshold, 3.7 micron channel
3	Number of clear pixels contributing to average is less than threshold, 1.6 micron channel
4	Number of clear pixels contributing to average is less than threshold, 0.870 micron channel
5	Number of clear pixels contributing to average is less than threshold, 0.670 micron channel
6	Number of clear pixels contributing to average is less than threshold, 0.555 micron channel
7	Number of cloudy pixels contributing to average is less than threshold, 12 micron channel
8	Number of cloudy pixels contributing to average is less than threshold, 11 micron channel
9	Number of cloudy pixels contributing to average is less than threshold, 3.7 micron channel
10	Number of cloudy pixels contributing to average is less than threshold, 1.6 micron channel
11	Number of cloudy pixels contributing to average is less than threshold, 0.870 micron channel
12	Number of cloudy pixels contributing to average is less than threshold, 0.670 micron channel
13	Number of cloudy pixels contributing to average is less than threshold, 0.555 micron channel
14	View contains day-time data
15	Unused

Note: Bits are numbered as per the convention defined in Volume A.

Table 7.5.3.8.17-2 AST Confidence Word	
Bit	Meaning if set to 1
0-15	Unused
16	Sea MDS: Nadir-only SST retrieval used 3.7 micron channel Land MDS: Reserved
17	Sea MDS: Dual-view SST retrieval used 3.7 micron channel Land MDS: Reserved
18	Nadir view contains day-time data
19	Forward view contains day-time data
20-21	Topographic variance flag for LST calculation
22-31	Unused

Where bit 0 is the least significant bit of the 4 byte structure.

7.5.3.9 Size Estimate

The size estimate below is based on the assumptions shown in Table 7.5.3.9-1.

Cells Size	Number of Cells across track (512km)	Number of Cells along track (40000km)	Total Number of Cells (40000km)
50 km	11	800	8800
17 km	32	2400	76800
30 mins. (55.56 km)	10	720	7200
10 mins. (18.52 km)	28	2160	60480

Note that the final size estimates for the 10 arc-minute and 30 arc-minute data sets tabulated below are increased by a factor of 40% from their nominal size to allow for the reduction in cell size at high latitudes. The estimates here do not allow for the reduction that would apply if empty records (e.g., Sea MDSRs corresponding to cells that are entirely over land, and vice versa) were eliminated from the product.

Description	Record size (byte)	Data Set Size (Mbyte/ orbit)
MPH	1247	0.001
SPH	7195	0.007
SST Record, 50 kilometre cell MDS	50	0.420
SST Record, 17 kilometre cell MDS	38	2.783
SST Record, 10 arc minute cell MDS	38	3.068
SST Record, 30 arc minute cell MDS	50	0.481
LST Record, 50 kilometre cell MDS	50	0.420
LST Record, 17 kilometre cell MDS	38	2.783
LST Record, 10 arc minute cell MDS	38	3.068
LST Record, 30 arc minute cell MDS	50	0.481
BT/TOA Land Record, 50 kilometre cell MDS	250	2.098
BT/TOA Land Record, 17 kilometre cell MDS	138	10.107
BT/TOA Land Record, 10 arc minute cell MDS	138	11.143
BT/TOA Land Record, 30 arc minute cell MDS	250	2.403
BT/TOA Sea Record, 50 kilometre cell MDS	234	1.964
BT/TOA Sea Record, 17 kilometre cell MDS	122	8.936
BT/TOA Sea Record, 10 arc minute cell MDS	122	9.851
BT/TOA Sea Record, 30 arc minute cell MDS	234	2.249
Total size of product (MByte)		62.263



7.5.4 AATSR Spatially Averaged Surface Temperature (AST) Product for Meteo Users

7.5.4.1 Description

This AATSR product is extracted from the AST product described in the previous section. It is intended for use by Meteo users.

7.5.4.2 Input Data

AATSR Level 2 AST product.

7.5.4.3 Auxiliary Data Used

See section 7.5.1.2. No additional files are required.

7.5.4.4 Processing Performed

The product is extracted from the ATS_AR__2P product.

7.5.4.5 Product Structure

The high level structure of the Level 2 AST product is shown below.

Table 7.5.4.5-1 AATSR ATS_MET_2P Product Structure

MPH
SPH (includes DSDs)
SST Record, 10 arc minute cell MDS

7.5.4.6 Main Product Header

The Main Product Header is defined in Volume 5.

7.5.4.7 Specific Product Header

The content of the Specific Product Header shall be as follows. The SPH is an ASCII header. Refer to Volume 5 for an explanation of ASCII header conventions.

The format of the SPH is defined in the table below.

Table 7.5.4.7-1 AATSR ATS_MET_2P - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
1-31	First 31 fields of the Level 1B SPH described in Table 7.4.1.6-1	-	1264	-	-
32	Spare	-	50	uc	50
	newline character	terminator	1	uc	1
	<i>DSDs for included data sets</i>				
33	DSD (M) - SST Record, 10 arc minute cell MDS	-	280	dsd	1
34	DSD Spare (279 blank space characters followed	-	280	dsd_sp	1

Table 7.5.4.7-1 AATSR ATS_MET_2P - SPH					
N	Description	Units	Byte Length	Data Type	Dim.
	by 1 newline character)				
	<i>DSDs for referenced files</i>				
35	DSD (R) - Level 1B data file from which this product was produced	-	280	dsd	1
36	DSD (R) - AATSR Level 2 Processing Configuration file	-	280	dsd	1
37	DSD (R) - Retrieval Coeff. Data file	-	280	dsd	1
38	DSD (R) - LST Coeff. Data file	-	280	dsd	1
	size (in bytes)		2995		

In each DSD of the SPH, the field DS_NAME is filled as described in the table below.

Table 7.5.4.7-2 AATSR Level-2 Meteo DS_NAME	
DSD	DS_NAME
DSD (M) - SST Record, 10 arc minute cell MDS	SEA_ST_10_MIN_CELL_MDS
<i>DSDs for referenced files</i>	
DSD (R) - Level 1B data file from which this product was created	LEVEL_1B_PRODUCT
DSD (R) - AATSR Level 2 Processing Configuration file	PROCESSING_PARAMS_L2_FILE
DSD (R) - Retrieval Coeff. Data file	RETRIEVAL_COEFS_DATA_FILE
DSD (R) - LST Coeff. Data file	LST_COEFS_DATA_FILE

7.5.4.8 Data Sets

The contents of the Data Sets are described in the following sections. Data Sets are in mixed binary format. They may contain ASCII strings, but the ASCII strings are not contained within quotation marks as for the MPH/SPH.

7.5.4.8.1 SST Record 10 arc minute cell MDS

The MDS is composed of several MDSRs. The format of each MDSR is defined in the table below.

Table 7.5.4.8.1-1 SST Record, 10 arc minute cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator (-1 if all measurement values are invalid, 0 otherwise)	-	1	sc	1
3	Spare	-	3	uc	3
4	Latitude of 10 arcmin cell	10 ⁻⁶ deg	4	sl	1
5	Longitude of 10 arcmin cell	10 ⁻⁶ deg	4	sl	1
6	Spatially averaged 12 micron BT of all clear pixels in 10 arcmin cell	K/1000	4	sl	1



Table 7.5.4.8.1-1 SST Record, 10 arc minute cell MDSR					
N	Description	Units	Byte Length	Data Type	Dim.
7	Spatially averaged 11 micron BT of all clear pixels in 10 arcmin cell	K/1000	4	sl	1
8	Spatially averaged 3.7 micron BT of all clear pixels in 10 arcmin cell	K/1000	4	sl	1
9	Spatially averaged 12 micron BT of all clear pixels in 10 arcmin cell	K/1000	4	sl	1
10	Spatially averaged 11 micron BT of all clear pixels in 10 arcmin cell	K/1000	4	sl	1
11	Spatially averaged 3.7 micron BT of all clear pixels in 10 arcmin cell	K/1000	4	sl	1
12	Mean across-track pixel number	-	2	ss	1
13	mean nadir-only SST in 10 arcmin cell	K/100	2	ss	1
14	Number of pixels in nadir-only average, 10 arcmin cell	-	2	us	1
15	mean dual-view SST in 10 arcmin cell	K/100	2	ss	1
16	Number of pixels in dual-view average, 10 arcmin cell	-	2	us	1
17	AST confidence word	flags	4	us	2
Size			62		

7.5.4.9 Size Estimate

The size estimate below is based on the assumptions shown in Table 7.5.3.9-1.

Table 7.5.4.9-1 ATS_MET_2P Product Size		
Description	Record size (byte)	Data Set Size (Mbyte/ orbit)
MPH	1247	0.001
SPH	2995	0.003
SST Record, 10 arc minute cell MDS	62	5.006
Total size of product (Mbyte)		5.010

7.5.5 ARC L2P Gridded Sea Surface Temperature Product

7.5.5.1 Description

The ARC L2P Product (ENVISAT.UPA-L2P) is generated by the ARC_L2P Processor, which is based on the processor developed by the ATSR Reprocessing for Climate (ARC) project². Details on the product are given in the ARC_L2P Product Description document³.

The ARC L2P product contains full resolution dual-view Sea Surface Temperature (SST) values; these SST were generated using the ARC SST retrieval and cloud screening which differ from the methods used to produce the SST within the AATSR Level 2 Gridded Surface Temperature (ATS_NR__2P) products. In addition to SST, the ARC L2P products contain the ATSR Saharan Dust Index (ASDI) and the clear-sky probability estimated by the ARC cloud detection algorithm.

7.5.5.2 Input Data

Level 1B product plus auxiliary data.

7.5.5.3 Auxiliary Data Used

The auxiliary data used in the ARC_L2P processor comprise:

- ECMWF-interim wind speed
- ECMWF-interim total column water vapour
- ECMWF-interim sea-ice fraction (for filling auxiliary field in output product)

The ARC processing also uses the RTTOV model and the following auxiliary data are required as inputs for this:

- Atmospheric temperature profile
- Atmospheric water vapour profile
- Log surface pressure
- Sea surface temperature
- Mean sea level pressure
- 10m wind U-component
- 10m wind V-component
- 2m air temperature
- 2m dew point temperature
- Skin temperature

² Merchant C. J. et al. (2012) A 20 year independent record of sea surface temperature for climate from Along-Track Scanning Radiometers, J. Geophys. Res., **117**, C12013, <http://dx.doi.org/10.1029/2012JC008400>

³ ARC_L2P Product Guide, Issue 1.3, 1 September 2013, https://earth.esa.int/documents/10174/56700/L2P_Product_Description

7.5.5.4 Processing Performed

The processing performed by the ARC_L2P processor consists of:

- The derivation of Sea Surface Temperature (SST) and other parameters (e.g. uncertainties, cloud probability, ATSR Saharan Dust Index) from the gridded brightness temperatures of the Level 1B product.

7.5.5.5 Product Structure

The ARC L2P products are produced in NetCDF-4 format, compliant with both the Climate and Forecast (CF) conventions v1.4 and the GHRSSST Data Specification (GDS), version 2.0 revision 5⁴.

The netCDF data format is extremely flexible, self-describing, in the sense that each variable in the file has an associated description of what it represents, including physical units if appropriate, and that each value can be located in space (relative to earth-based coordinates) and time (NetCDF Climate and Forecast (CF) Metadata Conventions, Version 1.0-beta5, 2003). NetCDF files include: dimensions, variables, data, and global attributes (for an illustration of this format [click here](#)).

The following web reference documents are applicable to GDS netCDF file formats:

netCDF: <http://www.unidata.ucar.edu/packages/netcdf/>
CF conventions: <http://www.cgd.ucar.edu/cms/eaton/cf-metadata/CF-working.html>
COARDS conventions: http://ferret.wrc.noaa.gov/noaa_coop/coop_cdf_profile.html
UDUNITS: <http://www.unidata.ucar.edu/packages/udunits/>

CF NetCDF data files components are:

- Dimensions,
- Variables,
- Variable Attributes,
- Global Attributes,
- Data.

In the following paragraphs the ARC L2P product components are described with reference to the GDS L2P product format; for the handling of netCDF data files, users are referred to the above web reference documents.

7.5.5.5.1 ARC L2P filename convention

ARC L2P products follow the GDS 2.0 filename convention which is:

```
{datetime}-{RDAC}-{level}_GHRSSST-{SST type}-{product}-{extra info}-v{GDS version}-fv{file version}.nc
```

Where the variable components denoted with braces, {...}, are summarised in Table 7.5.5.5-1. For ARC L2P products several of these fields are fixed and the filenaming convention can be simplified to:

```
{datetime}-UPA-{level}_GHRSSST-SSTskin-ARC-{extra info}-v02.0-fv01.0.nc
```

⁴ GHRSSST Data Specification (GDS): <https://www.ghrsst.org/documents/q/category/gds-documents/operational/>

Table 7.5.5.5-1 ARC L2P filename components

Element	Content	Description
{datetime}	yyyymmddHHMMSS	Identifying date and time for the file in UTC. The time corresponds to the first data in the file
{RDAC}	UPA	The RDAC where the file was created (United Kingdom Multi-Mission Processing and Archiving Facility)
{level}	L2P	Processing level code for file
{SST type}	SSTskin	Type of SST data included in file
{product}	ARC	GHR SST product identifier
{extra info}	ATSR1 ATSR2 AATSR	Used to indicate the source instrument for the data
{GDS version}	02.0	GDS version number used to generate file
{file version}	01.0	File version number

7.5.5.6 ARC L2P Global Attributes

ARC L2P products include both global and variable metadata. Global metadata describes the whole file with information such as title, creation date, and the source instrument for the data. Details of the global attributes are given in Table 7.5.5.6-1.

Table 7.5.5.6-1 ARC L2P global metadata

Attribute	Content	Description
Conventions	CF-1.4	A text string identifying the netCDF conventions used for the file.
title	Sea Surface Temperature from {atsr}	The title of the dataset. {atsr} is one of ATSR1, ATSR2, or AATSR
summary	This netCDF file contains...	A brief summary of the dataset
references	Embury, O., Merchant...	Published references for the dataset.
institution	UPA	The GHR SST RDAC where the dataset was produced
history	Created using GBCS library \$Rev: 1735 \$	Information on the ARC_L2P software version used for processing
comment	These data were produced...	Miscellaneous information about the dataset
license	GHR SST protocol describes data use as free and open	Information on data use
id	ARC-UPA-L2P-AATSR-v2.1	
naming_authority	org.ghrsst	"org.ghrsst"
product_version	"2.1"	
uuid	91402d16-803b-11e2-adff-4f08fa4039dc	A Universally Unique IDentifier (UUID) for this file
gds_version_id	"2.0"	GDS version used to create this file
netcdf_version_id	"4.1.3"	Version of netCDF library used to generate this file
date_created	2013-02-26 17:40:10Z	Date and time this file was created

Attribute	Content	Description
file_quality_level	0 1 2 3	unknown bad suspect good
spatial_resolution	1 km	Approximate resolution of product
start_time	2003-10-18 01:15:07Z	Time of the first data in the file
time_coverage_start	As start_time	As start_time
stop_time	2003-10-18 02:58:47Z	Time of the last data in the file
time_coverage_end	As stop_time	As stop_time
northernmost_latitude	90.0	Valid range of file
southernmost_latitude	-90.0	Valid range of file
easternmost_longitude	180.0	Valid range of file
westernmost_longitude	-180.0	Valid range of file
source	ATSR1-ESA-L1-v2.1 ATSR2-ESA-L1-v2.1 AATSR-ESA-L1-v2.1	Source data used to generate this product
platform	ERS-1 ERS-2 Envisat	Satellite used to generate this product
sensor	ATSR AATSR	Sensor used to generate this product. NB GHRSSST does not distinguish ATSR1 and ATSR-2 as different sensor types
Metadata_Conventions	Unidata Dataset Discovery v1.0	Metadata conventions used for product
metadata_link		Link to collection metadata record at archive
keywords	Oceans > Ocean Temperature > Sea Surface Temperature	GCMD Science Keyword categorising product
keywords_vocabulary	NASA Global change Master Directory (GCMD) Science Keywords	Vocabulary used for keywords attribute
standard_name_vocabulary	NetCDF Climate and Forecast (CF) Metadata Convention	Vocabulary used for standard_name attributes
geospatial_lat_units	degrees_north	Units of latitudinal resolution
geospatial_lat_resolution	0.01	Latitudinal resolution
geospatial_lon_units	degrees_east	Units of longitudinal resolution
geospatial_lon_resolution	0.01	Longitudinal resolution
acknowledgment	The ATSR sea surface temperature data in this project were developed by The University of Edinburgh within the ATSR Reprocessing for Climate, were processed at the UK Processing and Archive Facility and downloaded from the NERC Earth Observation Data Centre.	Information about funding source and citation of data.
creator_name		Contact information at the RDAC which produced the dataset
creator_email		
creator_url		
project	Group for High Resolution Sea Surface Temperature	
publisher_name	publisher_name	The GHRSSST Project Office
publisher_url	http://www.ghrsst.org	
publisher_email	ghrsst-po@nceo.ac.uk	
processing_level	L2P	GHRSSST processing level of file



Attribute	Content	Description
cdm_data_type	swath	Grid type used for file
time_coverage_duration	PT1H43M40S	Period covered by this product

7.5.5.7 ARC L2P Variable Attributes

ARC L2P variable metadata contain information on how a particular variable in the file should be interpreted. This includes both scale and offset values used by data reading software, and titles and comments for human interpretation of the data. Details of the variable attributes are given in Table 7.5.5.7-1.

Table 7.5.5.7-1 ARC L2P variable metadata

Attribute	Description
long_name	A free-text descriptive name for the variable
standard_name	The standard name for the variable as defined by CF conventions
references	Published or web-based reference describing the methods used to generate the variable
comment	Other information about the variable or methods used to generate it
units	Text description of the units the data is stored in.
_FillValue	A value used to indicate array elements which contain invalid or missing data
scale_factor	Used to pack data into a smaller datatype. The original data can be recovered using: value = scale_factor * packed_data + add_offset
add_offset	
valid_min	The minimum valid value for the variable
valid_max	The maximum valid value for the variable

7.5.5.8 ARC L2P File Contents

ARC L2P products contain SSTs on the 512-km wide swath used by the ATSR instruments. Each SST in the ARC L2P corresponds to a pixel in the source L1B file and is supplied with a probability of being clear as determined by the Bayesian cloud detection algorithm. The variables in an ARC L2P file are given in Table 7.5.5.8-1.

Table 7.5.5.8-1 ARC L2P variables

Variable	Description
time	Reference time of the file. Gives the reference time of the file in seconds since 1981-01-01 00:00:00
sst_dtime	Time difference from reference time. Observation time is calculated as time+sst_dtime
lat	Latitude coordinates
lon	Longitude coordinates
sea_surface_temperature	Sea surface skin temperature
solar_zenith_angle	Solar zenith angle at SST observation
sses_bias	(unused)
sses_standard_deviation	Estimated retrieval uncertainty
synoptically_correlated_uncertainty	Component of uncertainty that is correlated over synoptic scales
radiometric_uncertainty	Component of uncertainty that is due to



Variable	Description
	radiometric noise
l2p_flags	GHRSSST l2P flag variable. Used to flag land pixels and use of D2/D3 retrieval
quality_level	GHRSSST quality level indicator
aerosol_dynamic_indicator	ATSR Saharan Dust Index
probability_clear	Probability of pixel being clear as estimated by Bayesian cloud detection
dt_analysis	(unused)
wind_speed	ECMWF-interim wind speed at time of observation
sea_ice_fraction	ECMWF-interim sea-ice fraction at time of observation

7.5.6 ARC L3U Sea Surface Temperature Product

7.5.6.1 Description

The ARC L3U Product (ENVISAT.UPA-L3U) is derived from the ARC L2P product (ENVISAT.UPA-L2P) and uses the ARC_L2P processor, detailed in section 7.5.5. The ARC L3U product differs from the ARC L2P product in that it contains SSTs on a global 0.1 degree grid: 3600 x 1800 cells, instead of at full resolution and contains data only if the quality level is equal to 5. Each SST in the L3U file corresponds to an average of several pixels in the source L1B product. These SST use the ARC SST retrieval and cloud screening. In addition to SST, the ARC L3U products contain the ATSR Saharan Dust Index (ASDI) and the clear-sky probability estimated by the ARC cloud detection algorithm. The ARC L3U product is provided in NetCDF-4 format following GHRSSST Data Specifications (GDS) v2.

7.5.6.2 Input Data

The ARC L2P product (ENVISAT.UPA-L2P)

7.5.6.3 Auxiliary Data Used

Refer to section 7.5.5.3.

7.5.6.4 Processing Performed

Refer to section 7.5.5.4.

7.5.6.5 Product Structure

Refer to section 7.5.5.5.

7.5.6.5.1 ARC L3U filename convention

Refer to section 7.5.5.5.1 but note that "L2P" is replaced by "L3U".

7.5.6.6 ARC L3U Global Attributes

ARC L3U products include both global and variable metadata. Global metadata describes the whole file with information such as title, creation date, and the source instrument for the data. Details of the ARC L3U global attributes are given in Table 7.5.6.6-1.

Table 7.5.6.6-1 ARC L3U global metadata

Attribute	Content	Description
Conventions	CF-1.4	A text string identifying the netCDF conventions used for the file.
title	Sea Surface Temperature from {atsr}	The title of the dataset. {atsr} is one of ATSR1, ATSR2, or AATSR
summary	This netCDF file contains...	A brief summary of the dataset
references	Embury, O., Merchant...	Published references for the dataset.
institution	UPA	The GHRSSST RDAC where the dataset was produced
history	Created using GBCS library \$Rev: 1735 \$	Information on the ARC_L2P software version used for

Attribute	Content	Description
		processing
comment	These data were produced...	Miscellaneous information about the dataset
license	GHRSSST protocol describes data use as free and open	Information on data use
id	ARC-UPA-L3U-AATSR-v2.1	
naming_authority	org.ghrsst	"org.ghrsst"
product_version	"2.1"	
uuid	91402d16-803b-11e2-adff-4f08fa4039dc	A Universally Unique IDentifier (UUID) for this file
gds_version_id	"2.0"	GDS version used to create this file
netcdf_version_id	"4.1.3"	Version of netCDF library used to generate this file
date_created	2013-02-26 17:40:10Z	Date and time this file was created
file_quality_level	0 1 2 3	unknown bad suspect good
spatial_resolution	0.1 degree	Approximate resolution of product
start_time	2003-10-18 01:15:07Z	Time of the first data in the file
time_coverage_start	As start_time	As start_time
stop_time	2003-10-18 02:58:47Z	Time of the last data in the file
time_coverage_end	As stop_time	As stop_time
northernmost_latitude	90.0	Valid range of file
southernmost_latitude	-90.0	Valid range of file
easternmost_longitude	180.0	Valid range of file
westernmost_longitude	-180.0	Valid range of file
source	ATSR1-ESA-L1-v2.1 ATSR2-ESA-L1-v2.1 AATSR-ESA-L1-v2.1	Source data used to generate this product
platform	ERS-1 ERS-2 Envisat	Satellite used to generate this product
sensor	ATSR AATSR	Sensor used to generate this product. NB GHRSSST does not distinguish ATSR1 and ATSR-2 as different sensor types
Metadata_Conventions	Unidata Dataset Discovery v1.0	Metadata conventions used for product
metadata_link		Link to collection metadata record at archive
keywords	Oceans > Ocean Temperature > Sea Surface Temperature	GCMD Science Keyword categorising product
keywords_vocabulary	NASA Global change Master Directory (GCMD) Science Keywords	Vocabulary used for keywords attribute
standard_name_vocabulary	NetCDF Climate and Forecast (CF) Metadata Convention	Vocabulary used for standard_name attributes
geospatial_lat_units	degrees_north	Units of latitudinal resolution
geospatial_lat_resolution	0.1	Latitudinal resolution
geospatial_lon_units	degrees_east	Units of longitudinal resolution



Attribute	Content	Description
geospatial_lon_resolution	0.1	Longitudinal resolution
acknowledgment	The ATSR sea surface temperature data in this project were developed by The University of Edinburgh within the ATSR Reprocessing for Climate, were processed at the UK Processing and Archive Facility and downloaded from the NERC Earth Observation Data Centre.	Information about funding source and citation of data.
creator_name		Contact information at the RDAC which produced the dataset
creator_email		
creator_url		
project	Group for High Resolution Sea Surface Temperature	
publisher_name	publisher_name	The GHR SST Project Office
publisher_url	http://www.ghrsst.org	
publisher_email	ghrsst-po@nceo.ac.uk	
processing_level	L3U	GHR SST processing level of file
cdm_data_type	grid	Grid type used for file
time_coverage_duration	PT1H43M40S	Period covered by this product

7.5.6.7 ARC L3U Variable Attributes

ARC L3U variable metadata contain information on how a particular variable in the file should be interpreted. This includes both scale and offset values used by data reading software, and titles and comments for human interpretation of the data. Details of the ARC L3U variable attributes are given in Table 7.5.6.7-1.

Table 7.5.6.7-1 ARC L3U variable metadata

Attribute	Description
long_name	A free-text descriptive name for the variable
standard_name	The standard name for the variable as defined by CF conventions
references	Published or web-based reference describing the methods used to generate the variable
comment	Other information about the variable or methods used to generate it
units	Text description of the units the data is stored in.
_FillValue	A value used to indicate array elements which contain invalid or missing data
scale_factor	Used to pack data into a smaller datatype. The original data can be recovered using: value = scale_factor * packed_data + add_offset
add_offset	
valid_min	The minimum valid value for the variable
valid_max	The maximum valid value for the variable

7.5.6.8 ARC L3U File Contents

ARC L3U files contain SSTs on a global 0.1° grid: 3600 x 1800 cells. Each SST in the L3U file corresponds to an average of several pixels in the source L1B file. The variables in a L3U file are given in Table 7.5.6.8-1.



Table 7.5.6.8-1 ARC L3U variables

Variable	Description
time	Reference time of the file. Gives the reference time of the file in seconds since 1981-01-01 00:00:00
sst_dtime	Time difference from reference time. Observation time is calculated as time+sst_dtime
lat	Latitude coordinates
lon	Longitude coordinates
sea_surface_temperature	Sea surface skin temperature
solar_zenith_angle	Solar zenith angle at SST observation
sses_bias	(unused)
sses_standard_deviation	Estimated retrieval uncertainty
synoptically_correlated_uncertainty	Component of uncertainty that is correlated over synoptic scales
radiometric_uncertainty	Component of uncertainty that is due to radiometric noise
l2p_flags	GHRSSST I2P flag variable. Used to flag land pixels and use of D2/D3 retrieval
quality_level	GHRSSST quality level indicator. Only quality_level 5 pixels are included in ARC L3U products
aerosol_dynamic_indicator	ATSR Saharan Dust Index
probability_clear	Probability of pixel being clear as estimated by Bayesian cloud detection
dt_analysis	(unused)
wind_speed	ECMWF-interim wind speed at time of observation
sea_ice_fraction	ECMWF-interim sea-ice fraction at time of observation
or_number_of_pixels	Number of pixels from the ARC L2P contributing to the SST value



7.6 BROWSE PRODUCT

A single Browse product is produced for AATSR.

7.6.1 Three Band Colour Composite Browse Product

The browse product is generated systematically from the Level 1B product for all data acquired, and is a three band colour composite product. The three bands are selected to best show the features of the image and vary between daylight and night scenes. The browse product covers a full orbit. A geolocation grid is provided as part of the product. The primary application of the browse product is for on-line viewing by users to aid in ordering. The pixel spacing is 4 km by 4 km.

7.6.1.1 Input Data

Level 1B data plus auxiliary data.

7.6.1.2 Auxiliary Data Used

The only additional Auxiliary Data required to produce the Browse Product is the Browse LUT auxiliary data file (ATS_BRW_AX).

7.6.1.3 Processing Performed

The algorithms used to generate the Browse Product perform the following steps:

- sub-sample the Level 1B product;
- choose best three bands for viewing;
- apply contrast enhancement techniques if required.

7.6.1.4 Product Structure

The high level structure of the Browse product is shown below.

Table 7.6.1.4-1 AATSR Browse Product Structure

MPH
SPH (includes DSDs)
Summary Quality ADS
Grid pixel latitude and longitude, topographic corrections ADS
Browse MDS

7.6.1.5 Main Product Header

The Main Product Header is defined in Volume 5.

7.6.1.6 Specific Product Header

The SPH is identical to the Level 1B product SPH, but with a different DSD list. The format is defined in the table below.

N	Description	Units	Byte Length	Data Type	Dim.
1-35	First 35 fields of the Level 1B SPH described in Table 7.4.1.6-1		2190	-	-
	<i>DSDs for included data sets</i>				
36	DSD (A) - Summary Quality ADS		280	dsd	1
37	DSD (A) -Grid pixel latitude and longitude, topographic corrections ADS		280	dsd	1
38	DSD (M) - Browse MDS		280	dsd	1
39	DSD Spare (279 blank space characters followed by 1 newline character)		280	dsd_sp	1
	<i>DSDs for referenced files</i>				
40	DSD (R) - Level 1B data file from which this browse product was created		280	dsd	1
41	DSD (R) - Browse Data file used to create this product		280	dsd	1
42	DSD Spare (279 blank space characters followed by 1 newline character)		280	dsd_sp	1
	size (in bytes)		4150		

In each DSD of the SPH, the field DS_NAME is filled as described in the table below.

DSD	DS_NAME
DSD(A) - Summary Quality ADS (SQADS)	SUMMARY_QUALITY_ADS
DSD(A) - Grid pixel latitude and longitude, topographic corrections ADS (LADS)	GEOLOCATION_ADS
DSD (M) - Browse MDS	BROWSE_MDS
<i>DSDs for referenced files</i>	
DSD (R) - Level 1B data file from which this product was created	LEVEL_1B_PRODUCT
DSD (R) - Browse Data file used to create this product	BROWSE_LUT_DATA_FILE

7.6.1.7 Data Sets

The contents of the Data Sets are described in the following sections. Data Sets are in mixed binary format. They may contain ASCII strings, but the ASCII strings are not contained within quotation marks as for the MPH/SPH.

7.6.1.7.1 Summary Quality ADS

This ADS is extracted from the Level 1B product and follows the format defined in Table 7.4.1.7.1-1.

7.6.1.7.2 Geolocation Grid ADS

The geolocation grid ADS for the browse product contains tie points which can be used to provide geolocation information useful for display purposes. It consists of one ADSR per granule (32 scans = 8 browse product lines). The format of each ADSR is defined below.

Table 7.6.1.7.2-1 Browse Grid Pixel Latitude and Longitude ADSR					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Attachment flag (set to 1 if all MDSRs corresponding to this ADSR are zero. Set to 0 otherwise)	-	1	uc	1
3	Spare	-	3	uc	3
4	image scan y coordinate	m	4	sl	1
5	tie point latitudes	10 ⁻⁶ deg	92	sl	23
6	tie point longitudes	10 ⁻⁶ deg	92	sl	23
Size			204		

7.6.1.7.3 Browse MDS⁵

The browse MDS contains R,G, B values used for display of the browse image. The RGB values are interleaved by pixel (i.e. each pixel coded with 3 consecutive values: R, G, B) to follow standard computer image formats. The format of each MDSR is defined below.

Table 7.6.1.7.3-1 MDS Record					
N	Description	Units	Byte Length	Data Type	Dim.
1	Nadir UTC time in MJD format	MJD	12	mjd	1
2	Record Quality Indicator -1 if all data values are zero, 0 otherwise	-	1	sc	1
3	Spare	-	3	uc	3
4	image scan y coordinate	m	4	sl	1
5	Red, Green, Blue channel intensity for pixel 1- 128	intensity	384	uc	3* 128
Size			404		

⁵ Changed from product described in R-41 to match the format of the MERIS browse product.



7.6.1.8 Size Estimate

The size estimate assumes there are 40256 MDSRs in the original Level 1B product. Therefore there are 10064 MDSRs in the browse product. There are 1258 ADSRs for both the SQ ADS and the Geolocation ADS (i.e., granule spacing not changed from Level 1B product).

Table 7.6.1.8-1 Browse Product Size Estimate		
Description	Record size (byte)	Data Set Size (Mbyte/ product)
MPH	1247	0.001247
SPH	4150	0.00415
SQ ADS	86	0.11
Geolocation ADS	204	0.257
MDS	404	4.066
TOTAL		5 MB

7.7 AUXILIARY DATA FILES

The following sections provide definitions of the auxiliary data files used in AATSR processing.

7.7.1 Level 1B Processor Configuration Data File

This file contains parameters used to configure the processor for Level 1B processing.

- FILE ID: ATS_PC1_AX
- TYPE: Auxiliary
- USE: Level 1B processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(378 bytes) + GADS(232 bytes)

7.7.1.1 Format

The high level breakdown of the file is shown below.

Table 7.7.1.1-1 Schematic Structure of the Level 1B Processor Configuration File

MPH
SPH - standard Auxiliary Data SPH as described in Volume 16 with 1 DSD: <i>DSD for the Processor Configuration GADS</i>
Processor Configuration GADS

7.7.1.1.1 Processor Configuration Data GADS

The format of the GADS is defined below.

Table 7.7.1.1.1-1 Processor Configuration Data GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	blinking pulse calibration code blinking_pulse_calibration_flag	-	4	sl	1
2	Number of scans in calibration period	-	4	sl	1
3	Reserved for visible calibration option code	-	4	sl	1
4	Spare	-	12	uc	12
	<i>Pixel map limit parameters</i>				
5	max_viscal_pixels	-	2	ss	1
6	max_nadir_pixels	-	2	ss	1
7	max_pxbb_pixels	-	2	ss	1
8	max_frwrd_pixels	-	2	ss	1
9	max_mxbb_pixels	-	2	ss	1
10	Spare	-	12	uc	12

Table 7.7.1.1.1-1 Processor Configuration Data GADS					
N	Description	Units	Byte Length	Data Type	Dim.
	<i>Cal. Blanking pulse options:</i>				
11	Cal. bp flag value: both bp flags off	-	2	ss	1
12	Cal. bp flag value: ASAR only flag off	-	2	ss	1
13	Cal. bp flag value: RA only flag off	-	2	ss	1
14	Cal. bp flag value: both bp flags on	-	2	ss	1
15	INIT_CAL_PARAM	-	4	fl	1
16	Spare	-	12	uc	12
	<i>Visible cal. options:</i>				
17	vis_bb_code_px	-	2	ss	1
18	vis_bb_code_mx	-	2	ss	1
19	vis_bb_code_both	-	2	ss	1
20	vis_bb_code_none	-	2	ss	1
21	Spare	-	12	uc	12
	<i>Pixel exceptional value codes:</i>				
22	PIXEL_COUNT_FROM_NULL_PACKET	-	2	ss	1
23	PIXEL_COUNT_INITIAL_VALUE	-	2	ss	1
24	PIXEL_COUNT_SCIENCE_DATA_NOT_DECOMPRESSED	-	2	ss	1
25	PIXEL_COUNT_ZERO	-	2	ss	1
26	PIXEL_COUNT_SATURATED	-	2	ss	1
27	CALIBRATION_UNAVAILABLE_FOR_PIXEL	-	2	ss	1
28	PIXEL_RADIANCE_OUTSIDE_CALIBRATION	-	2	ss	1
29	PIXEL_UNFILLED	-	2	ss	1
30	Spare	-	12	uc	12
	<i>Miscellaneous internal error codes:</i>				
31	NULL_PKT_ERR	-	2	ss	1
32	RAW_PKT_FAILS_BASIC_VALIDATION_ERR	-	2	ss	1
33	CRC_ERR_DETECTED_ERR	-	2	ss	1
34	BUFFERS_FULL_CHECK_ERR	-	2	ss	1
35	RAWPKT_FAILS_AUXILIARY_DATA_PROCESSING_ERR	-	2	ss	1
36	TEMP_OUT_OF_RANGE_FOR_LUT_ERR	-	2	ss	1
37	PIX_SCAN_JITTER_ERR	-	2	us	1
38	UTMZ_DOMAIN_ERROR	-	2	us	1
39	TMZ_AT_LIMIT_ERR	-	2	us	1
40	TMZ_ROGUE_PRT_ERR	-	2	us	1
41	TMZ_CALIBRATION_ERR	-	2	us	1
42	TMZ_BB_OVERRANGE_ERR	-	2	us	1
43	TMZ_SURVEILLANCE_ERR	-	2	us	1
44	TMZ_PRT8_ERR	-	2	us	1
45	TMZ_ROGUE_SCP_ERR	-	2	us	1
46	TMZ_BB_OUT_OF_LIMIT_ERR	-	2	us	1
47	BB_PIX_COUNT_OUT_OF_RANGE_ERR	-	2	ss	1



Table 7.7.1.1.1-1 Processor Configuration Data GADS					
N	Description	Units	Byte Length	Data Type	Dim.
48	BB_PIX_COUNT_OUT_OF_RANGE_ALL_CHANS	-	2	ss	1
49	TMZ_ROGUE_BB_ERR	-	2	us	1
	<i>VISCAL extraction parameters</i>				
50	monitor_threshold	-	2	ss	1
51	Calibration_window_diff1	-	2	ss	1
52	Calibration_window_diff2	-	2	ss	1
53	VISCAL threshold	-	2	ss	1
54	orbit_period	s	4	fl	1
55	time_offset	s	4	fl	1
56	1.6 micron reflectance factor	-	4	fl	1
57	0.870 micron reflectance factor	-	4	fl	1
58	0.670 micron reflectance factor	-	4	fl	1
59	0.555 micron reflectance factor	-	4	fl	1
60	1.6 micron solar irradiance	mW/ cm ² /μm	4	fl	1
61	0.870 micron solar irradiance	mW/ cm ² /μm	4	fl	1
62	0.670 micron solar irradiance	mW/ cm ² /μm	4	fl	1
63	0.555 micron solar irradiance	mW/ cm ² /μm	4	fl	1
64	1.6 micron channel bandwidth	micron	4	fl	1
65	0.870 micron channel bandwidth	micron	4	fl	1
66	0.670 micron channel bandwidth	micron	4	fl	1
67	0.555 micron channel bandwidth	micron	4	fl	1
68	window_half_width_in_min	minutes	4	fl	1
69	Spare	-	8	uc	8
Size				232	

7.7.2 AATSR Instrument Data File

- FILE ID: ATS_INS_AX
- TYPE: Auxiliary
- USE: Level 1B processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(1778 bytes) + GADS(approx. 201 kBytes)



7.7.2.1 Format

The high level breakdown of the file is shown below.

Table 7.7.2.1-1 Schematic Structure of the Instrument Data File

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 6 DSDs:</p> <p><i>DSD for the General Parameters GADS</i></p> <p><i>DSD for the MU DT GADS</i></p> <p><i>DSD for Conversion Parameters GADS</i></p> <p><i>DSD for Limits GADS</i></p> <p><i>DSD for Surveillance Limits GADS</i></p> <p><i>DSD for Validation Parameters GADS</i></p>
General Parameters GADS
Master Unpacking Definition Table GADS
Conversion Parameters GADS
Limits GADS
Surveillance Limits GADS
Validation Parameters GADS

7.7.2.1.1 General Parameters GADS

The format of this GADS is shown below.

Table 7.7.2.1.1-1 General Parameters for Unpacking Source Packet Auxiliary Data GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	aux_tot: Total number of auxiliary data items in MU DT	-	4	sl	1
2	aux_val_tot: Total number of sets of auxiliary limits data items	-	4	sl	1
3	n_conv: Total number of auxiliary items for conversion	-	4	sl	1
4	n_surv_tot: Total number of surveillance limit specifications	-	4	sl	1
5	Spare	-	12	uc	12
Size			28		

7.7.2.1.2 Master Unpacking Definition Table GADS

The GADS consists of several records, 1 record for each auxiliary data item within the source packet. The format of the GADS record is shown below. All auxiliary data, the data item identifiers, their unpacking and conversion parameters will be defined in the detailed AATSR Telemetry Specifications, from which the total number of auxiliary data items will also be derived. This is expected to be less than 1000.

Table 7.7.2.1.2-1 Master Unpacking Definition Table (MUDT) GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	auxiliary item identifier	-	5	uc	5
2	word number in packet containing auxiliary item	-	2	us	1
3	mask to extract auxiliary item from word	-	2	ss	1
4	shift to normalise	-	2	us	1
Size			11		

7.7.2.1.3 Conversion Parameters GADS

The GADS consists of several records, 1 record for each auxiliary data item within the source packet. The format of each GADS record is defined below. A maximum of 1000 records are expected.

Table 7.7.2.1.3-1 Conversion Parameters GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	auxiliary item identifier	-	5	uc	5
2	function identifier	-	3	uc	3
3	parameter list (Note 1)	variable	160	do	20
Size			168		

Note 1: The type of these fields depends on the context. In the majority of cases the definition "do" (double float) is appropriate, but in certain cases the fields have to be interpreted as ASCII strings ("8*uc") in accordance with the processing model.

7.7.2.1.4 Limits GADS

This GADS contains parameters used to check the non-converted auxiliary data values. The GADS consists of several records, 1 record for each auxiliary data item within the source packet. The format of each GADS record is defined below. A maximum of 1000 records are expected.

Table 7.7.2.1.4-1 Limits GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	auxiliary identifier limits	-	5	uc	5
2	aux validation lower limit	-	2	us	1
3	aux validation upper limit	-	2	us	1
Size			9		

7.7.2.1.5 Surveillance Limits GADS

This GADS contains parameters used for checks on converted auxiliary items. The GADS consists of several records, 1 record for each auxiliary data item within the source packet. The format of each GADS record is defined below. A maximum of 1000 records are expected.

Table 7.7.2.1.5-1 Surveillance Limits GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	surveillance limit auxiliary identifiers	-	5	uc	5
2	surveillance lower limit	-	4	fl	1
3	surveillance upper limit	-	4	fl	1
Size			13		

7.7.2.1.6 Validation Parameters GADS

This GADS provides information for specialised checks of converted auxiliary items. The format of the GADS is shown below.

Table 7.7.2.1.6-1 Validation Parameters GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	prt_mean_difference	Deg K	8	do	1
2	max_hbb_prt_mean_diff	Deg K	8	do	1
3	max_cbb_prt_mean_diff	Deg K	8	do	1
4	scp2_6_temp_diff	Deg K	8	do	1
5	scp7_10_temp_diff	Deg K	8	do	1
6	prt8_fixed_val	Digitised counts	2	ss	1
7	prt8_variance	Digitised counts	2	ss	1
Size			44		

7.7.3 Visible Calibration Data File

- FILE ID: ATS_VC1_AX
- TYPE: Auxiliary
- USE: Level 1B processing
- UPDATED: Daily / orbital
- SIZE: MPH(1247 bytes) + SPH(658 bytes) + GADS(154 bytes)

7.7.3.1 Format

The high level breakdown of the file is shown below.

Table 7.7.3.1-1 Schematic Structure of the Visible Calibration Data File

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 2 DSDs:</p> <p><i>DSD for the Visible channel calibration parameters GADS</i></p> <p><i>DSD (R) for the visible calibration drift table</i></p>
Visible channel calibration parameters GADS

7.7.3.1.1 Visible Channel Calibration Parameters GADS

The format of the GADS is defined in the table below.

Table 7.7.3.1.1-1 Visible Channel Calibration Parameters GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	Time of cal in MJD format	MJD	12	mjd	1
2	Attachment flag (always set to zero)	-	1	uc	1
3	Spare	-	3	uc	3
4	1.6 micron slope	-	4	fl	1
5	0.870 micron slope	-	4	fl	1
6	0.670 micron slope	-	4	fl	1
7	0.555 micron slope	-	4	fl	1
8	UTC at ascending node crossing, in MJD format	MJD	12	mjd	1
9	Average Monitor count	-	4	fl	1
10	Standard deviation of Monitor count	-	4	fl	1
11	Solar irradiance (1.6 micron)	-	4	fl	1
12	Solar irradiance (0.870 micron)	-	4	fl	1
13	Solar irradiance (0.670 micron)	-	4	fl	1
14	Solar irradiance (0.555 micron)	-	4	fl	1
15	Average VISCAL Pixel Counts (1.6 µm)	-	4	fl	1
16	Average VISCAL Pixel Counts (0.87 µm)	-	4	fl	1
17	Average VISCAL Pixel Counts (0.67 µm)	-	4	fl	1
18	Average VISCAL Pixel Counts (0.55 µm)	-	4	fl	1
19	VISCAL Pixel Noise (1.6 micron)	-	4	fl	1
20	VISCAL Pixel Noise (0.87 micron)	-	4	fl	1
21	VISCAL Pixel Noise (0.67 micron)	-	4	fl	1
22	VISCAL Pixel Noise (0.55 micron)	-	4	fl	1



Table 7.7.3.1.1-1 Visible Channel Calibration Parameters GADS					
N	Description	Units	Byte Length	Data Type	Dim.
23	Average -X BB Pixel Counts (1.6 μm)	-	4	fl	1
24	Average -X BB Pixel Counts (0.87 μm)	-	4	fl	1
25	Average -X BB Pixel Counts (0.67 μm)	-	4	fl	1
26	Average -X BB Pixel Counts (0.55 μm)	-	4	fl	1
27	-X BB Pixel Noise (1.6 micron)	-	4	fl	1
28	-X BB Pixel Noise (0.87 micron)	-	4	fl	1
29	-X BB Pixel Noise (0.67 micron)	-	4	fl	1
30	-X BB Pixel Noise (0.55 micron)	-	4	fl	1
31	(Reserved for parity indicator)	-	2	ss	1
32	Spare	-	20	uc	20
Size			154		

7.7.4 General Calibration Data File

- FILE ID: ATS_GC1_AX
- TYPE: Auxiliary
- USE: Level 1B processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(1218 bytes) + GADS(approx. 226 kbytes)

7.7.4.1 Format

The high level breakdown of the file is shown below.

Table 7.7.4.1-1 Schematic Structure of the General Calibration Data File

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 4 DSDs:</p> <p><i>DSD for the General Parameters GADS</i></p> <p><i>DSD for the Temperature to Radiance LUT GADS</i></p> <p><i>DSD for the Radiance to Brightness Temperature LUT GADS</i></p> <p><i>DSD for the 1.6 micron Channel Non-linearity Correction LUT GADS</i></p>
General Parameters GADS
Temperature to Radiance LUT GADS
Radiance to Brightness Temperature LUT GADS
1.6 micron Channel Non-linearity Correction LUT GADS

7.7.4.1.1 General Parameters GADS

The format of the General Parameters GADS is defined below.

Table 7.7.4.1.1-1 General Parameters for Infrared Channel Calibration					
N	Description	Units	Byte Length	Data Type	Dim.
1	Emissivity factor for MXBB, 12 micron channel		8	do	1
2	Emissivity factor for MXBB, 11 micron channel		8	do	1
3	Emissivity factor for MXBB, 3.7 micron channel		8	do	1
4	Emissivity factor for PXBB, 12 micron channel		8	do	1
5	Emissivity factor for PXBB, 11 micron channel		8	do	1
6	Emissivity factor for PXBB, 3.7 micron channel		8	do	1
7	Number of entries in Temperature to Radiance LUT or size_of_LUT	-	2	ss	1
8	Increment in Temperature to Radiance LUT	K	8	do	1
9	First value in Temperature to Radiance LUT	K	8	do	1
10	Last value in Temperature to Radiance LUT	K	8	do	1
11	Number of entries in 12 micron Radiance to Brightness Temperature LUT	-	2	ss	1
12	Increment in 12 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
13	First value in 12 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
14	Last value in 12 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
15	Number of entries in 11 micron Radiance to Brightness Temperature LUT	-	2	ss	1
16	Increment in 11 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
17	First value in 11 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
18	Last value in 11 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
19	Number of entries in 3.7 micron Radiance to Brightness Temperature LUT	-	2	ss	1
20	Increment in 3.7 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
21	First value in 3.7 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
22	Last value in 3.7 micron Radiance to Brightness Temperature LUT	Wcm-2 sr-1	8	do	1
23	Number of entries in 1.6 micron Channel Non-linearity Correction LUT	-	2	ss	1
24	Increment in 1.6 micron Channel Nonlinearity Correction LUT	-	8	do	1
25	First value in 1.6 micron Channel Nonlinearity Correction LUT	-	8	do	1
26	Last value in 1.6 micron Channel Nonlinearity Correction LUT	-	8	do	1
27	Spare	-	20	uc	20
Size			198		

7.7.4.1.2 Temperature to Radiance LUT GADS

There are expected to be 4000 records in this GADS. The format of each GADS record is defined below.

Table 7.7.4.1.2-1 Temperature to Radiance LUT GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	temperature	K	8	do	1
2	radiance_lut [12 micron]	Wcm-2 sr-1	8	do	1
3	radiance_lut [11 micron]	Wcm-2 sr-1	8	do	1
4	radiance_lut [3.7 micron]	Wcm-2 sr-1	8	do	1
Size			32		

7.7.4.1.3 Radiance to Brightness Temperature LUT GADS

There are expected to be 4000 records in this GADS. The format of each GADS record is defined below.

Table 7.7.4.1.3-1 Radiance To Brightness Temperature LUT

N	Description	Units	Byte Length	Data Type	Dim.
1	temperature_lut [12 micron]	K	8	do	1
2	temperature_lut [11 micron]	K	8	do	1
3	temperature_lut [3.7 micron]	K	8	do	1
Size			24		

7.7.4.1.4 1.6 micron Channel Non-linearity Correction LUT GADS

There are expected to be 101 records in this GADS. The format of each GADS record is defined below.

Table 7.7.4.1.4-11.6 micron Channel Non-linearity Correction LUT

N	Description	Units	Byte Length	Data Type	Dim.
1	Uncorrected count table entry	-	8	do	1
2	Corrected count table entry	-	8	do	1
Size			16		

7.7.5 Level 1b Characterisation Data File

- FILE ID: ATS_CH1_AX
- TYPE: Auxiliary
- USE: Level 1B processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(378 bytes) + GADS(176 bytes)

7.7.5.1 Format

The high level breakdown of the file is shown below.

Table 7.7.5.1-1 Schematic Structure of the Level 1B Characterisation File

MPH
SPH - standard Auxiliary Data SPH as described in Volume 16 with 1 DSD: <i>DSD for the Characterisation GADS</i>
Characterisation GADS

7.7.5.1.1 Characterisation GADS

The GADS is defined in the table below.

N	Description	Units	Byte Length	Data Type	Dim.
1	cone angle	radians	4	fl	1
2	mirror offset angle	radians	4	fl	1
3	x misalignment correction	radians	4	fl	1
4	y misalignment correction	radians	4	fl	1
5	z misalignment correction	radians	4	fl	1
6	AOCS parameter Cx	deg.	8	do	1
7	AOCS parameter Cy	deg.	8	do	1
8	AOCS parameter Cz	deg.	8	do	1
9	AOCS pitch mispointing	deg.	8	do	1
10	AOCS roll mispointing	deg.	8	do	1
11	AOCS yaw mispointing	deg.	8	do	1
12	EARTH_MAJOR_AXIS	km	8	do	1
13	Along-track sampling interval	km	8	do	1
14	Uniform time step	days	8	do	1
15	Number of image rows per granule	-	4	sl	1
16	Number of grid rows	-	4	sl	1
17	Displacement of table start before ascending node	-	4	sl	1
18	eccentricity of ellipsoid	-	8	do	1
19	Geodetic parameter (square of 'second eccentricity')	-	8	do	1
20	Spare	-	8	uc	8
21	FIRST_NADIR_PIXEL_NUMBER	-	4	sl	1
22	FIRST_FORWARD_PIXEL_NUMBER	-	4	sl	1
23	Estimate of relative scan position, nadir scan	days	8	do	1
24	Estimate of relative scan position, forward scan	days	8	do	1
25	Along-track interpolation interval	-	2	ss	1



Table 7.7.5.1.1-1 Characterisation GADS					
N	Description	Units	Byte Length	Data Type	Dim.
26	Across-track interpolation interval	-	2	ss	1
27	Regridding perturbation (eps_x)	m	2	ss	1
28	Regridding perturbation (eps_y)	m	2	ss	1
29	Longitude offset flag (0=no offset)	-	4	sl	1
30	Longitude offset (for system testing)	10 ⁻⁶ deg	4	sl	1
31	Spare	-	8	uc	8
Size			176		

7.7.6 Land-Sea Mask Data Product

AATSR shall use the ENVISAT standard LSM specified in Volume 16 (AUX_LSM_AX).

7.7.7 Digital Terrain Model Data File

Digital Terrain Model files for topographic correction. AATSR shall use the ENVISAT standard DEM specified in Volume 16 (AUX_DEM_AX).

7.7.8 Cloud LUT Data File

- FILE ID: ATS_CL1_AX
- TYPE: Auxiliary
- USE: Level 1B processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(2618 bytes) + GADS(approx. 20 kbytes)

7.7.8.1 Format

The high level breakdown of the file is shown below.

Table 7.7.8.1-1 Schematic Structure of the Cloud LUT Data File

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 14 DSDs:</p> <p><i>DSD for the 1.6 Micron Histogram Test LUT GADS</i></p> <p><i>DSD for the 11 Micron Spatial Coherence Test LUT GADS</i></p> <p><i>DSD for the 12 Micron Gross Cloud Test LUT GADS</i></p> <p><i>DSD for the 12 micron Gross Cloud Test Land Surface LUT</i></p> <p><i>DSD for the Thin Cirrus Test LUT GADS</i></p> <p><i>DSD for the Medium/High Level Cloud Test LUT GADS</i></p> <p><i>DSD for the Fog/low Stratus Test LUT GADS</i></p> <p><i>DSD for the 11/12 Micron Nadir/Forward Test LUT GADS</i></p> <p><i>DSD for the 11/3.7 Micron Nadir/Forward Test LUT GADS</i></p>



<i>DSD for the Infrared Histogram Test LUT GADS</i>
<i>DSD for the General parameters for Visible Channel Cloud Tests</i>
<i>DSD for the Zone vertices for Visible Channel Cloud Test</i>
<i>DSD for the Zone definitions for Visible Channel Cloud Test</i>
<i>DSD for the Snow-covered surface test LUT</i>
1.6 Micron Histogram Test LUT GADS
11 Micron Spatial Coherence Test LUT GADS
12 Micron Gross Cloud Test LUT GADS
12 micron Gross Cloud Test Land Surface LUT
Thin Cirrus Test LUT GADS
Medium/high Level Cloud Test LUT GADS
Fog/low Stratus Test LUT GADS
11/12 Micron Nadir/Forward Test LUT GADS
11/3.7 Micron Nadir/Forward Test LUT GADS
Infrared Histogram Test LUT GADS
General parameters for Visible Channel Cloud Tests
Zone vertices for Visible Channel Cloud Test
Zone definitions for Visible Channel Cloud Test
Snow-covered surface test LUT

7.7.8.1.1 1.6 Micron Histogram Test LUT GADS

The format of the GADS is defined in the table below.

Table 7.7.8.1.1-1 1.6 Micron Histogram Test LUT GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	v16_histogram_spread[nadir]	%	4	fl	1
2	v16_histogram_spread[forward]	%	4	fl	1
3	v16_histogram_peak_count[nadir]	-	2	ss	1
4	v16_histogram_peak_count[forward]	-	2	ss	1
5	min_for_v16_histogram	-	2	ss	1
6	tilt_threshold	degrees	4	fl	1
7	threshold_3	-	4	fl	1
8	near_glint_range	degrees	4	fl	1
9	min_for_passed	-	2	ss	1
10	search_range_for_peak	%	4	fl	1
11	tilt_weight_limit	degrees	4	fl	1
12	range_weight_limit	degrees	4	fl	1
13	tilt_weight_factor	-	4	fl	1
14	min_peak_value	-	2	ss	1
15	min_for_detrend	-	2	ss	1



Table 7.7.8.1.1-1 1.6 Micron Histogram Test LUT GADS					
N	Description	Units	Byte Length	Data Type	Dim.
16	max_glint_threshold	%	4	fl	1
17	Spare	-	20	uc	20
Size			72		

7.7.8.1.2 11 Micron Spatial Coherence Test LUT GADS

The format of the GADS is defined below.

Table 7.7.8.1.2-1 11 Micron Spatial Coherence Test LUT GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	sea_max_dev	K/100	2	ss	1
2	land_day_max_dev	K/100	2	ss	1
3	land_night_max_dev	K/100	2	ss	1
4	coherence_reset_thresh	K/100	2	ss	1
5	coh_area_size	Km	2	ss	1
6	coh_fraction_passed	-	4	fl	1
7	coh_adj_thresh_land	K/100	2	ss	1
8	coh_adj_dif_land	-	4	fl	1
9	coh_area_dif_nv	K/100	2	ss	1
10	coh_area_dif_fv	K/100	2	ss	1
11	coh_min_dif_nv	K/100	2	ss	1
12	coh_min_dif_fv	K/100	2	ss	1
13	coh_area_thresh_nv	K/100	2	ss	1
14	coh_area_thresh_fv	K/100	2	ss	1
15	Dependency test flag (cloudy_box_thresh)	-	2	ss	1
Size			34		

7.7.8.1.3 12 Micron Gross Cloud Test LUT GADS

The GADS contains one record for each latitude index $i = 0, \dots, 179$ and for each month $j = 0, \dots, 11$). The format of each GADS record is defined below.

Table 7.7.8.1.3-1 12 Micron Gross Cloud Test LUT GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	12 micron threshold nadir	K/100	2	ss	1
2	12 micron threshold forward	K/100	2	ss	1
Size			4		

7.7.8.1.4 12Micron Gross Cloud Test Land Surface LUT GADS

The GADS contains one record for each latitude index $i = 0, \dots, 179$ and for each month $j = 0, \dots, 11$). The format of each GADS record is defined below.

Table 7.7.8.1.4-112 Micron Gross Cloud Test Land Surface LUT GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	12 micron land threshold nadir	K/100	2	ss	1
2	12 micron land threshold forward	K/100	2	ss	1
Size			4		

7.7.8.1.5 Thin Cirrus Test LUT GADS

This GADS contains one record for each temperature level $i = 0, \dots, 60$ and for each across-track band $j = 5, \dots, 9$). The format of each GADS record is shown below.

Table 7.7.8.1.5-1 Thin Cirrus Test LUT GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	nadir_threshold[i][j]	K/100	2	ss	1
2	frwrdr_threshold[i][j]	K/100	2	ss	1
Size			4		

7.7.8.1.6 Medium/High Level Cloud Test LUT GADS

This GADS contains one record for each temperature level $i = 0, \dots, 120$. The format of the GADS record is defined in the table below.

Table 7.7.8.1.6-1 Medium/High Level Cloud Test LUT GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	med_high_level_threshold[i], nadir	K/100	2	ss	1
2	med_high_level_threshold[i], forward	K/100	2	ss	1
Size			4		

7.7.8.1.7 Fog/Low Stratus Test LUT GADS

This GADS contains one record for each across-track band $j = 5, \dots, 9$. The format of the GADS record defined in the table below.

Table 7.7.8.1.7-1 Fog/Low Stratus Test LUT

N	Description	Units	Byte Length	Data Type	Dim.
1	fog_threshold[j], nadir	K/100	2	ss	1
2	fog_threshold[j], forward	K/100	2	ss	1
Size			4		



7.7.8.1.8 11/12 Micron Nadir/Forward Test LUT GADS

The format of the GADS is defined below.

Table 7.7.8.1.8-1 11/12 Micron Nadir/Forward Test LUT GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	view_diff_slope[j] (For each across-track band j = 5,...9)	-	20	fl	5
2	view_diff_offset[j] (For each across-track band j = 5,...9)	-	20	fl	5
3	ir11_ir12_view_diff_thresh	K/100	2	ss	1
Size			42		

7.7.8.1.9 11/3.7 Micron Nadir/Forward Test LUT GADS

The format of the GADS is defined below.

Table 7.7.8.1.9-1 11/3.7 Micron Nadir/Forward Test LUT GADS

N	Description	Units	Byte Length	Data Type	Dim.
1	constant coefficient a0[j] (For each across-track band j = 5,...9)	-	20	fl	5
2	linear coefficient a1[j] (For each across-track band j = 5,...9)	-	20	fl	5
3	quadratic coefficient a2[j] (For each across-track band j = 5,...9)	-	20	fl	5
4	ir37_ir11_view_diff_thresh	K/100	2	ss	1
Size			62		

7.7.8.1.10 Infrared Histogram Test LUT GADS

The format of the GADS is defined below.

Table 7.7.8.1.10-1 Infrared Histogram Test LUT GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	min_for_ir11_ir12_histogram	TBD	2	ss	1
2	peak_frac_min	TBD	4	fl	1
3	positive_latitude_thresh	TBD	4	fl	1
4	second_low_fraction	TBD	4	fl	1
5	half_width_m[1]	TBD	4	fl	1
6	half_width_b[1]	TBD	4	fl	1
7	half_width_m[0]	TBD	4	fl	1
8	half_width_b[0]	TBD	4	fl	1
9	max_dif_ave_chan_1	TBD	4	fl	1
10	max_dif_peak_chan_1	TBD	4	fl	1
11	ratio_b	TBD	4	fl	1
12	ir_spread_nv	TBD	4	fl	1
13	ir_spread_fv	TBD	4	fl	1
14	slope_max_allowed	TBD	4	fl	1

Table 7.7.8.1.10-1 Infrared Histogram Test LUT GADS					
N	Description	Units	Byte Length	Data Type	Dim.
15	ir_peak_min	TBD	4	fl	1
Size			58		

7.7.8.1.11 General parameters for Visible Channel Cloud Tests

Table 7.7.8.1.11-1 General parameters for Visible Channel Cloud Tests

N	Description	Units	Byte Length	Data Type	Dim.
1	N_VERT: Number of vertices		2	ss	1
2	N_ZONES: Number of defined zones		2	ss	1
3	Spare		16	uc	1
Size			20		

7.7.8.1.12 Zone vertices for Visible Channel Cloud Test

The GADS contains one record for each vertex $i = 0, \dots, N_VERT - 1$).

Table 7.7.8.1.12-1 Zone vertices for Visible Channel Cloud Test

N	Description	Units	Byte Length	Data Type	Dim.
1	X co-ordinate of vertex J	-	4	Float	1
2	Y co-ordinate of vertex J	-	4	float	1
3	J : vertex identifier	-	2	ss	1
Size			10		

7.7.8.1.13 Zone definitions for Visible Channel Cloud Test

The GADS contains one record for each zone $i = 0, \dots, N_ZONE - 1$).

Table 7.7.8.1.13-1 Zone definitions for Visible Channel Cloud Test

N	Description	Units	Byte Length	Data Type	Dim.
1	i_zone: Zone identifier	-	2	ss	1
2	Vertex identifier $v[k]$, $k = 0, 4$	-	10	ss	5
3	Short ID	-	8	uc	1
4	Full ID	-	48	uc	1
Size			68		

7.7.8.1.14 Snow-covered surface test LUT

Table 7.7.8.1.14-1 Snow-covered surface test LUT

N	Description	Units	Byte Length	Data Type	Dim.
1	NDSI_THRESHOLD	0.0001	2	ss	1
2	R87_THRESHOLD	%/100	2	ss	1
3	T11_THRESHOLD	K/100	2	ss	1
4	Spare	n/a	14	uc	1
Size			20		

7.7.9 Browse LUT Data File

Contains parameters used during the creation of the browse product.

- FILE ID: ATS_BRW_AX
- TYPE: Auxiliary
- USE: Browse processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(378 bytes) + GADS(116 bytes)

7.7.9.1 Format

The high level breakdown of the file is shown below.

Table 7.7.9.1-1 Schematic Structure of the Browse Product Data File

MPH
SPH - standard Auxiliary Data SPH as described in Volume 16 with 1 DSDs: <i>DSD for the Browse Product Day-Time Colour LUT GADS</i>
Browse Day-Time Colour LUT GADS

7.7.9.1.1 Browse Day-Time Colour LUT GADS

The format of the GADS is defined in the table below.

Table 7.7.9.1.1-1 Browse Day-Time Colour LUT GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	Number of red coefficients in LUT	-	2	ss	1
2	Red channel reflectance	0.01%	20	ss	10
3	Red channel colour coefficients	-	10	uc	10
4	Number of green coefficients in LUT	-	2	ss	1
5	Green channel reflectance	0.01%	20	ss	10
6	Green channel colour coefficients	-	10	uc	10
7	Number of blue coefficients in LUT	-	2	ss	1
8	Blue channel reflectance	0.01%	20	ss	10
9	Blue channel colour coefficients	-	10	uc	10
10	Spare	-	20	uc	20
Size			116		

7.7.10 Level 2 Processor Configuration Data File

This file contains parameters used to configure the processor for Level 2 processing

- FILE ID: ATS_PC2_AX
- TYPE: Auxiliary
- USE: Level 2 processing

- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(378 bytes) + GADS(90 bytes)

7.7.10.1 Format

The high level breakdown of the file is shown below.

Table 7.7.10.1-1 Schematic Structure of the Level 2 Processor Configuration File

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 1 DSDs:</p> <p><i>DSD for the Configuration Data GADS</i></p>
Configuration Data GADS

7.7.10.1.1 Configuration Data GADS

The format of the GADS is defined in the table below.

Table 7.7.10.1.1-1 Level 2 Processor Configuration Data GADS					
N	Description	Units	Byte Length	Data Type	Dim.
1	Threshold for ABT flag, 10 arcmin cell nadir view	-	4	sl	1
2	Threshold for ABT flag, 10 arcmin cell forward view	-	4	sl	1
3	Threshold for ABT flag, 30 arcmin cell nadir view	-	4	sl	1
4	Threshold for ABT flag, 30 arcmin cell forward view	-	4	sl	1
5	Threshold for ABT flag, 17 km cell nadir view	-	4	sl	1
6	Threshold for ABT flag, 17 km cell forward view	-	4	sl	1
7	Threshold for ABT flag, 50 km cell nadir view	-	4	sl	1
8	Threshold for ABT flag, 50 km cell forward view	-	4	sl	1
9	NGRID or NGRANULE Granule Size	-	4	sl	1
10	AST Cell dimension	-	4	sl	1
11	TROPICAL_INDEX	degrees	4	fl	1
12	TEMPERATE_INDEX	degrees	4	fl	1
13	POLAR_INDEX	degrees	4	fl	1
14	NADIR-PIXELS_THRESH	-	4	fl	1
15	FRWRD_PIXELS_THRESH	-	4	fl	1
16	IR37_THRESH	-	4	fl	1
17	Smoothing scaling factor	-	2	ss	1
18	MAX_CELLS_X (number of 50 km cells across-track)	-	2	ss	1
19	MAX_CELLS_Y (number of 50 km cells along-track)	-	2	ss	1
20	MX: across-track origin of 50 km cells	-	4	sl	1
21	Spare	-	12	uc	12
Size			86		



7.7.11 SST Retrieval Coefficient Data File

- FILE ID: ATS_SST_AX
- TYPE: Auxiliary
- USE: Level 2 processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(938 bytes) + GADS(19376 bytes)

7.7.11.1 Format

The high level breakdown of the file is shown below.

Table 7.7.11.1-1 Schematic Structure of the SST Retrieval Coefficients Data File

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 3 DSDs:</p> <p><i>DSD for the Across-track Band Mapping Look-up Table GADS</i></p> <p><i>DSD for the SST Retrieval Coefficients GADS</i></p> <p><i>DSD for the Averaged SST Retrieval Coefficients GADS</i></p>
Across-track Band Mapping LUT GADS
SST Retrieval Coefficients GADS
Averaged SST Retrieval Coefficients GADS

7.7.11.1.1 Across-track Band Mapping LUT GADS

The GADS contains one entry for each value of the pixel index $j = 0, 511$. The format of the GADS record is defined in the table below.

Table 7.7.11.1.1-1 Across-track Band Mapping Look-up Table GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	pixel index (j)	-	2	ss	1
2	Across-track band index (map index)	-	2	ss	1
Size			4		

7.7.11.1.2 SST Retrieval Coefficients GADS

This GADS contains several (15) GADS records. The coefficient values to be contained in this table will be determined by numerical modelling when the frequency responses of the infrared channels have been characterised.

The GADS contains one record each latitude zone $i = 1,2,3$, and for each cross-track band $j = 0, \dots, 37$). The format of the GADS record is defined in the table below.

Table 7.7.11.1.2-1 SST Retrieval Coefficients GADS Record

N	Description	Units	Byte Length	Data Type	Dim.
1	a[i][j][0]	K/100	4	fl	1
2	a[i][j][1]	-	4	fl	1

N	Description	Units	Byte Length	Data Type	Dim.
3	a[i][j][2]	-	4	fl	1
4	b[i][j][0]	K/100	4	fl	1
5	b[i][j][1]	-	4	fl	1
6	b[i][j][2]	-	4	fl	1
7	b[i][j][3]	-	4	fl	1
8	c[i][j][0]	K/100	4	fl	1
9	c[i][j][1]	-	4	fl	1
10	c[i][j][2]	-	4	fl	1
11	c[i][j][3]	-	4	fl	1
12	c[i][j][4]	-	4	fl	1
13	d[i][j][0]	K/100	4	fl	1
14	d[i][j][1]	-	4	fl	1
15	d[i][j][2]	-	4	fl	1
16	d[i][j][3]	-	4	fl	1
17	d[i][j][4]	-	4	fl	1
18	d[i][j][5]	-	4	fl	1
19	d[i][j][6]	-	4	fl	1
Size			76		

7.7.11.1.3 Averaged SST Retrieval Coefficients GADS

This GADS contains several (15) GADS records. The coefficient values to be contained in this table will be determined by numerical modelling when the frequency responses of the infrared channels have been characterised.

The GADS contains one record each latitude zone $i = 1,2,3$, and for each cross-track band $j = 5, \dots, 9$.

The format of the GADS record is identical to that described above in Table 7.7.11.1.2-1.

7.7.12 AATSR LST Retrieval Coefficients Data Product

- FILE ID: ATS_LST_AX
- TYPE: Auxiliary
- USE: Level 2 processing
- UPDATED: Infrequently.
- SIZE: MPH(1247 bytes) + SPH(1778 bytes) + GADS(13479188)



7.7.12.1 Format

The high level breakdown of the file is shown below.

Table 7.7.12.1-1 Schematic Structure of the LST retrieval coefficients data product

MPH
<p>SPH - standard Auxiliary Data SPH as described in Volume 16 with 6 DSDs:</p> <p><i>DSD for the General Parameters GADS</i></p> <p><i>DSD for the Surface Vegetation Class GADS</i></p> <p><i>DSD for the Vegetation Fraction GADS</i></p> <p><i>DSD for the Climatology Data GADS</i></p> <p><i>DSD for the Topographic Variance Flags GADS</i></p> <p><i>DSD for the LST Retrieval Coefficients GADS</i></p>
General Parameters GADS
Surface Vegetation Class GADS
Vegetation Fraction GADS
Climatology Data GADS
Topographic Variance Flags GADS
LST Retrieval Coefficients GADS

7.7.12.1.1 General Parameters for Land Surface Temperature Retrieval.

Table 7.7.12.1.1-1 General Parameters for Land Surface Temperature Retrieval

N	Description	Units	Byte Length	Data Type	Dim
1	D: Water vapour factor for LST retrieval	-	4	fl	1
2	M: Angle factor for LST retrieval	-	2	ss	1
3	N_CLASS: Number of veg. classes for LST	-	2	ss	1
4	Spare	-	12	ss	1
Size			20		

7.7.12.1.2 Surface Vegetation Class for Land Surface Temperature Retrieval.

File contains one record for each parallel of latitude i=0, ... ,359

Table 7.7.12.1.2-1 Vegetation Fraction for Land Surface Temperature Retrieval

N	Description	Units	Byte Length	Data Type	Dim
1 ... 720	Vegetation class index [360][720]	-	1440	ss	2
Size			1440		

7.7.12.1.3 Vegetation Fraction for Land Surface Temperature Retrieval

File contains one record for each parallel of latitude $i=0, \dots, 359$ and for each month $m=0, \dots, 11$

Table 7.7.12.1.3-1 Vegetation Fraction for Land Surface Temperature Retrieval

N	Description	Units	Byte Length	Data Type	Dim
1 ... 720	Vegetation Fraction[12][360][720]	0.001	1440	ss	2
Size			1440		

7.7.12.1.4 Climatology Data for Land Surface Temperature Retrieval

File contains one record for each parallel of latitude $i=0, \dots, 359$ and for each month $m=0, \dots, 11$

Table 7.7.12.1.4-1 Climatology Data for Land Surface Temperature Retrieval

N	Description	Units	Byte Length	Data Type	Dim
1... 720	Precipitable water[12][360][720]	0.01 mm	1440	ss	2
Size			1440		

7.7.12.1.5 Topographic Variance flags for Land Surface Temperature Retrieval

File contains one record for each parallel of latitude $i=0, \dots, 359$

Table 7.7.12.1.5-1 Topographic Variance for Land Surface Temperature Retrieval

N	Description	Units	Byte Length	Data Type	Dim
1... 720	Topographic variance flags [360][720]	-	1440	ss	2
Size			1440		

7.7.12.1.6 Land Surface Temperature Retrieval Coefficients

Table 7.7.12.1.6-1 Land Surface Temperature Retrieval coefficients

N	Description	Units	Byte Length	Data Type	Dim
1	LST Coefficient A0 (day-time)	K/100	4	fl	1
2	LST Coefficient A1(day-time)	-	4	fl	1
3	LST Coefficient A2 (day-time)	-	4	fl	1
4	LST Coefficient A0 (night-time)	K/100	4	fl	1
5	LST Coefficient A1 (night-time)	-	4	fl	1
6	LST Coefficient A2 (night-time)	-	4	fl	1
Size			24		

7.7.13 ENVISAT-1 Precision Orbit Data Files

Both DORIS and FOS orbit state vector files may be used during processing. Refer to Volume 9 and Volume 16, respectively.

7.7.14 ENVISAT-1 Attitude File

Refer to Volume 16.



This page has been left intentionally blank

7.8 AATSR PRODUCT SUMMARY SHEETS

The information presented on the following pages is a record of the data stored in the Data Dictionary Tool (DDT) Product Summary Sheets. The DDT contains data formats and descriptions for all products produced by the ENVISAT PDS.

AATSR Level 0

PRODUCT ID	ATS_NL__0P
PRODUCT NAME	AATSR Level 0
DESCRIPTION	This product contains time ordered, annotated, Instrument Source Packets from the AATSR sensor.
APPLICATIONS	Archived product forming basis for all higher level processing
DELIVERY TIME	This product is available for internal PDS use within 3 hours of data take from the PDHS. This product is available from the LRAC starting 2 weeks after data take.
COVERAGE	512 km by 40 000 km
THROUGHPUT	1 product per orbit. Satellite data generation at 651 kbps
PRODUCT SIZE	max. 488.25 Mbytes per product NOTE: Size assumes a nominal 100 minutes x 651 kbps, and assumes a negligible size for header information.
GEOMETRICAL SAMPLING	N/A
GEOMETRIC RESOLUTION	N/A
GEOMETRIC ACCURACY	N/A
RADIOMETRIC RESOLUTION	N/A, Coded on 12 bits for all 7 channels
RADIOMETRIC ACCURACY	N/A
AUXILIARY DATA	Orbit state vectors, SBT/UTC time conversion parameters
ALGORITHMS USED	Satellite Positioning, UTC Time Conversion
NOTES	produced systematically



AATSR Gridded brightness temperature and reflectance

PRODUCT ID	ATS_TOA_1P
PRODUCT NAME	AATSR Gridded brightness temperature and reflectance
DESCRIPTION	The product contains geolocated, radiometrically and geometrically corrected brightness temperature/radiance images. The images are oriented in the along track /across track directions. Both the forward and nadir views are represented in the product (7 forward and 7 nadir) but the two views are 'co-located' as a result of geometric correction. The pixels are classified based on contents and so indicated by a flag for each pixel.
APPLICATIONS	Engineering foundation product enabling the derivation (via higher level processing) of sea surface temperature, land, and cloud parameters.
DELIVERY TIME	NRT product is available within 3 hours of sensor data take from the PDHS. OFL product is available from the LRAC starting 2 weeks after data take.
COVERAGE	512 km by 40 000 km of coverage
THROUGHPUT	1 product per orbit (100 minutes)
PRODUCT SIZE	max. 764 MB / product
GEOMETRICAL SAMPLING	Resampled to approx. 1km by 1km along track
GEOMETRIC RESOLUTION	Information not available
GEOMETRIC ACCURACY	Information not available
RADIOMETRIC RESOLUTION	Information not available. Coded on 16 bits/sample
RADIOMETRIC ACCURACY	For VIS/NIR: 5% relative to sun; For IR: < 0.1 K
AUXILIARY DATA	Orbit State Vectors; SBT/UTC time conversion parameters; SQ ADS; grid pixel lat/long ADS; scan pixel x/y ADS; Nadir view solar angles ADS; Forward view solar angles ADS; Visible calibration coef. ADS; scan and pixel number ADSs (forward and nadir views)
ALGORITHMS USED	Extraction and validation of source packets; Calibration of the AATSR visible and IR channels; Geolocation of the data; resampling to a rectangular grid of image pixels; pixel classification; Cloud clearing
NOTES	Produced systematically from Level 0 product. On demand disseminations of multiple of minimum scene size of 512 km by 512 km.

AATSR geophysical product (full resolution)

PRODUCT ID	ATS_NR__2P
PRODUCT NAME	AATSR geophysical product (full resolution)
DESCRIPTION	This product contains the values various geophysical parameters for each pixel, dependent on the classification of the pixel. Parameters include SST over oceans, NVI over land, Cloud Top Temp. for cloud pixels, and Brightness Temp for unclassified pixels.
APPLICATIONS	Measurement of geophysical parameters
DELIVERY TIME	NRT product available in PDHS within 3 hours of data take. OFL product available from the PAC starting 2 weeks after data take.
COVERAGE	512 km by 40000 km
THROUGHPUT	1 product per orbit (approx. 100 minutes)
PRODUCT SIZE	max. 133 MB / product
GEOMETRICAL SAMPLING	1km by 1km cells (nominal)
GEOMETRIC RESOLUTION	Info. not available
GEOMETRIC ACCURACY	Info. not available
RADIOMETRIC RESOLUTION	Coded on 16 bits/sample, dependent on gain and channel
RADIOMETRIC ACCURACY	For VIS/NIR: 5% relative to sun; For IR: < 0.1 K
AUXILIARY DATA	Orbit State Vectors; SBT/UTC time conversion parameters; Summary Quality ADS (SQ ADS); Grid pixel lat/long ADS; scan pixel x/y ADS; Nadir view solar angles ADS; Forward view solar angles ADS; scan and pixel number ADSs (nadir and forward views)
ALGORITHMS USED	Derivation of geophysical parameters from the Level 1B product
NOTES	Produced systematically from Level 1B product. On demand disseminations of multiple of minimum scene size of 512 km by 512 km.



AATSR averaged geophysical product

PRODUCT ID	ATS_AR__2P
PRODUCT NAME	AATSR averaged geophysical product
DESCRIPTION	This is the global monitoring product for climatology applications. Contains average measurements for 50 km, 17 km 30 arc minutes, and 10 arc minute cells.
APPLICATIONS	Global monitoring for oceanography, meteorology and climatology.
DELIVERY TIME	NRT product available in PDHS from 3 hours after data take. OFL product available from the PAC starting 2 weeks after data take.
COVERAGE	512 by 40 000 km
THROUGHPUT	1 product per orbit (100 minutes)
PRODUCT SIZE	max. 56MB/product
GEOMETRICAL SAMPLING	50 km by 50 km, 17 km by 17 km, 30 arc minute by 30 arc minute, and 10 arc minute by 10 arc minute.
GEOMETRIC RESOLUTION	info. not available
GEOMETRIC ACCURACY	info. not available
RADIOMETRIC RESOLUTION	0.01 deg. for SST
RADIOMETRIC ACCURACY	0.5 K for SST
AUXILIARY DATA	Orbit State Vectors; SBT/UTC time conversion parameters;
ALGORITHMS USED	Spatial averaging of Level 2 geophysical parameters; calculation of other statistics.
NOTES	Produced systematically from Level 2 geophysical product.



AATSR Spatially Averaged Sea surface Temperature for Meteo Users

PRODUCT ID	ATS_MET_2P
PRODUCT NAME	AATSR Spatially Averaged Sea surface Temperature for Meteo Users
DESCRIPTION	This product contains spatially averaged sea surface temperatures extracted from the ATS_AR__2P product.
APPLICATIONS	This product is intended for Meteo users.
DELIVERY TIME	NRT only
COVERAGE	full orbit/product
THROUGHPUT	1 product per orbit
PRODUCT SIZE	3.22 MB/product
GEOMETRICAL SAMPLING	10 arc-minute averaging
GEOMETRIC RESOLUTION	Info. not available
GEOMETRIC ACCURACY	Info. not available
RADIOMETRIC RESOLUTION	Info. not available
RADIOMETRIC ACCURACY	Info. not available
AUXILIARY DATA	Orbit State Vectors; SBT/UTC time conversion parameters;
ALGORITHMS USED	Extraction from ATS_AR__2P
NOTES	Produced systematically.



AATSR browse image

PRODUCT ID	ATS_AST_BP
PRODUCT NAME	AATSR browse image
DESCRIPTION	3 band colour product derived from Level 1B data. Three bands will be chosen to form a colour composite image. Choice of bands may vary between night and daylight images. Samples are taken every 4 km by 4km.
APPLICATIONS	Aids user selection of products
DELIVERY TIME	NRT product available to users from the PDHS within 3 hours of data take.
COVERAGE	512 km by 40 000 km
THROUGHPUT	1 product per orbit (100 minutes).
PRODUCT SIZE	max 5 MB/product
GEOMETRICAL SAMPLING	4 km by 4 km subsampling
GEOMETRIC RESOLUTION	N/A
GEOMETRIC ACCURACY	N/A
RADIOMETRIC RESOLUTION	N/A
RADIOMETRIC ACCURACY	N/A
AUXILIARY DATA	Orbit State Vectors; SBT/UTC time conversion parameters; SQ ADS (extracted from Level 1B product); Grid pixel lat/long ADS (extracted from Level 1B product).
ALGORITHMS USED	sub-sample the Level 1B product; choose best three bands for viewing;
NOTES	The browse is produced from the Level 1B product for all data acquired

DISTRIBUTION LIST

NAME	COPY	NAME	COPY
Bojan Bojkov (EOP-GMQ) (ESA)	1		
Philippe Goryl (EOP- GMQ) (ESA)	1		
Guenther Landgraf (EOP- GT) (ESA)	1		
Nigel Houghton (EOP- GT) (ESA)	1		



End of Document