Customer	: ESRIN	Document Ref	: IDEAS-VEG-OQC-REP-1141
Contract No	: 21525/08/I-OL	Issue Date	: 11 March 2013
WP No	: 10000	Issue	: 1.0

Title : **IDEAS - Envisat AATSR Events Report**

Abstract : This document describes the major events that occurred for the AATSR instrument during the Envisat mission

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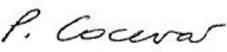
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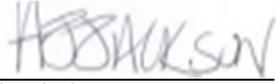
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Hard Copy File:
Filename: IDEAS-VEG-OQC-REP-1141 Envisat AATSR Events v1-0.docx

GEN.CTF.006, Issue 6

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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	DATE	DCI No	REASON
1.0	11-Mar-2013		First issue of report

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1. INTRODUCTION

1.1 Purpose and Scope

This document describes all major events that occurred during the full ENVISAT mission for the AATSR instrument. These include instrument housekeeping events and anomalies.

1.2 Structure of the Document

After this introduction, the document is divided into a number of major sections that are briefly described below.

2 AATSR EVENTS

This section outlines the main AATSR instrument events throughout the mission, including instrument housekeeping events and anomalies.

3 GLOSSARY

This section contains explanations of the acronyms used throughout this document.

ANNEX A AATSR EVENT HISTORY

This section contains full AATSR event history listing tables.

1.3 Referenced Documents

The following is a list of documents with a direct bearing on the content of this report. Where referenced in the text, these are identified as RD.n, where 'n' is the number in the list below:

RD.1 Smith. D. L. (2012) ENVISAT AATSR Instrument Performance – End of Mission Report, PO-RP-RAL-AT-0621, Issue 1.0.

1.4 Definitions of Terms

The following terms have been used in this report with the meanings shown.

Term	Definition
IDEAS	Instrument Data quality Evaluation and Analysis Service, reporting to the ESA Data Quality and Algorithms Management Office (EOP-GMQ), responsible for quality of data provided to users including the data calibration and validation, the data processing algorithms, and the routine instrument and processing chain performances.

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2. AATSR EVENTS

AATSR had one main operational mode: MEASUREMENT. There were also several support modes that were used in conjunction with this mode, these are outlined in Section 2.1.

When in MEASUREMENT mode, science data were generated and distributed. For most of the time, AATSR was in MEASUREMENT mode and required no commanding from ground for specific observations. The exceptions to this operations scenario were:

• Orbit Control Manoeuvres (**OCM**) where AATSR was commanded to HEATER mode.

• Periodic planned outgassing activities where the cooler drive amplitudes were commanded to zero to allow the infrared focal plane assembly (**IR-FPA**) to warm up to ambient for decontamination. AATSR remained in MEASUREMENT mode, but the data it recorded were compromised.

• Blackbody (**BB**) cross-over tests that were performed to determine any gross calibration errors of the on-board blackbodies. AATSR remained in MEASUREMENT mode during this test to allow generation of L0 data for analysis, but resulting L1B/L2 were not suitable for scientific use.

The above procedures occurred periodically throughout the Envisat routine operational phase. Other exceptions include specific activities during the Commissioning Phase where AATSR was commanded to a non-standard configuration (data may have been generated during this period but the data quality may render the data unsuitable) and precautions taken in November 2002 for the Leonid Meteor Shower (not repeated).

Table 4 and Table 5, given in the Annex, list the full AATSR event history and corresponding changes in instrument modes during the Envisat mission. These were taken from information compiled by RAL [RD.1]; information is currently also available at http://www.aatsrops.rl.ac.uk/status.html. Note that nearly half of the events listed took place during the commissioning phase; these are given in a separate table (Table 4) to events during the rest of the mission (Table 5).

2.1 AATSR Support Modes

As outlined in RD.1, AATSR, when in operation, was in MEASUREMENT mode. The following support modes were used to achieve or maintain full instrument operational conditions:

• LAUNCH

• OFF

• RESET / WAIT

• STANDBY

• STANDBY / REFUSE

• HEATER – In HEATER mode, the Instrument Control Unit (**ICU**) is running, and monitoring and controlling the instrument. All instrument subsystems are running and at operational temperatures, only the generation of measurement (science) data is paused.

A summary of the modes in which AATSR was placed during the mission is shown in Figure 1 (modified by D. L. Smith from RD.1).
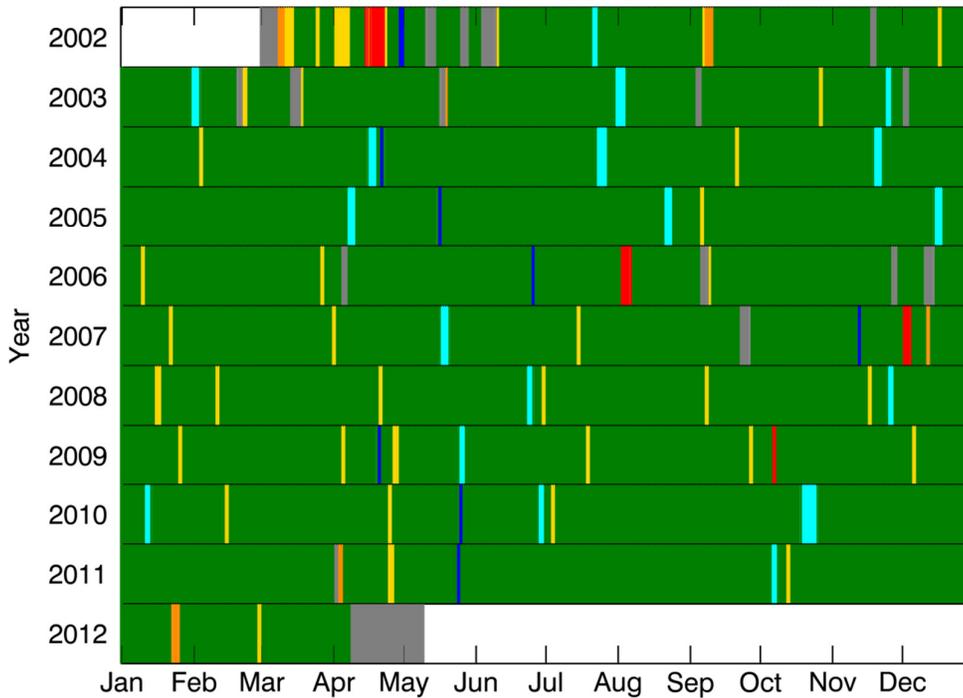
Figure 1. Bar chart showing the AATSR modes for the mission lifetime from launch on 01 March 2002 to end of mission in 2012 (modified by D. L. Smith from RD.1).

Key to Figure 1: Grey = all units off; **Orange** = AATSR in STANDBY or WAIT; **Amber** = AATSR in HEATER or transition to HEATER; **Green** = AATSR in MEASUREMENT mode; **Cyan** = outgassing while AATSR in MEASUREMENT mode; **Blue** = blackbody cross-over while AATSR in MEASUREMENT mode; **Red** = AATSR in STANDBY/REFUSE or WAIT due to instrument anomaly.

Note that Figure 1 indicates the days on which the instrument was in a certain mode and not necessarily the duration. For example, to cover an OCM, AATSR will have been in HEATER mode for only a few hours and returned to MEASUREMENT at the end of the manoeuvre. For more detail on specific occurrences, refer to the event history in Annex A.

In the event of a platform anomaly AATSR was commanded to OFF or STANDBY by platform command.

In the event of an instrument anomaly, AATSR would enter STANDBY/REFUSE autonomously or be commanded to RESET/WAIT by platform command.

Because of the low frequency of AATSR commanding, scheduling of activities was conducted by issuing an instrument operations request (**IOR**) following ERS-1/2 practice. A total of 44 operations requests were issued over the mission lifetime (itemised in RD.1). In the case of outgassings or blackbody cross-over tests, the Mission Planning System would generate an instrument unavailability report (although L0 data would be generated).

Note that mode switches do not equate directly to AATSR events. Events causing the data to be compromised could also occur whilst the instrument was still in MEASUREMENT mode – as explained in sections 2.2 and 2.3.

2.2 Outgassings

Instrument outgassings were performed in order to reduce contamination on the IR-FPA; the cooler was switched off and the IR-FPA allowed to warm up to ambient temperature for decontamination.

During planned outgassings, AATSR remained in MEASUREMENT mode but notification was given that the infrared (**IR**) channels would be unavailable and that the reflectance channels would likely be affected by non-nominal calibration. However, it was found that some products later in the mission did contain data for some of the IR channels, either intermittently or throughout the official outgassing period, so products from during an outgassing need to be treated with caution.

Occasionally, the opportunity was taken during a payload switch off (**PLSO**) to allow AATSR to remain off and warm up for outgassing purposes; this led to unplanned outgassings. Therefore, it was possible that once the PLSO was over, some AATSR L0 data were generated even though the measurements themselves were not valid until the cooler again achieved the required temperature.

Table 1 lists the AATSR outgassings that took place during the mission. A commanded outgassing was where the cooler was switched off; there are still data in the archive for these periods so they must be used with caution. At times where there was an Envisat anomaly as well as an outgassing, there are no data available.

The start and end orbit numbers in Table 1 correspond to the Envisat orbit numbers at the start and end times outlined in the table. Note that, since nominal AATSR archived products start before the ascending node crossing (**ANX**) of a particular orbit, they are generally *named* with the orbit number previous to the whole orbit that they represent.

Table 1. AATSR outgassing periods

Start time	End time	Orbit start	Orbit end	Details
22/07/2002 09:06	24/07/2002 11:21	02051	02081	Commanded outgassing
31/01/2003 09:39	03/02/2003 17:15	04814	04861	Commanded outgassing
01/08/2003 09:17	05/08/2003 10:34	07419	07477	Commanded outgassing
25/11/2003 10:10	28/11/2003 18:30	09080	09128	Commanded outgassing
16/04/2004 08:40	19/04/2004 17:04	11126	11183	Commanded outgassing
23/07/2004 09:00	27/07/2004 15:39	12529	12576	Commanded outgassing
19/11/2004 10:00	22/11/2004 18:10	14233	14281	Commanded outgassing
08/04/2005 08:19	11/04/2005 13:16	16236	16283	Commanded outgassing
22/08/2005 08:46	25/08/2005 15:07	18183	18230	Commanded outgassing
16/12/2005 09:40	19/12/2005 15:07	19844	19891	Commanded outgassing
18/05/2007 08:19	21/05/2007 11:50	27258	27303	Commanded outgassing
24/09/2007 12:27	28/09/2007 13:39	29107	29165	Envisat service module (**SM**) anomaly + outgassing

Start time	End time	Orbit start	Orbit end	Details
23/06/2008 07:46	26/06/2008 14:18	33012	33059	Commanded outgassing
25/11/2008 08:10	28/11/2008 21:33	35231	35282	Commanded outgassing
26/05/2009 09:32	29/05/2009 21:09	37837	37887	Commanded outgassing
11/01/2010 09:01	14/01/2010 14:07	41129	41175	Commanded outgassing
29/06/2010 08:49	02/07/2010 20:31	43548	43598	Commanded outgassing
20/10/2010 16:12	27/10/2010 18:55	45170	45272	Commanded outgassing [Note 1]
04/04/2011 13:50	06/04/2011 15:41	47553	47583	Envisat SM anomaly + outgassing
07/10/2011 08:19	10/10/2011 14:49	50222	50269	Commanded outgassing
23/01/2012 07:28	26/01/2012 13:52	51773	51820	Envisat SM memory fault + outgassing

Note 1: Data were generated and are available in the archive from the beginning of this outgassing period. However, from 23/10/2010 22:47 to 27/10/2010 18:55 (orbits 45217 to 45272), AATSR was taken out of MEASUREMENT mode for manoeuvres connected with the Envisat Mission Extension.

2.3 Blackbody Cross-over Tests

Blackbody cross-over tests were performed to determine if there were any gross calibration errors by switching the heated blackbodies. During this time, although an official unavailability was declared, AATSR remained in MEASUREMENT mode to allow L0 data generation for analysis. The processing chain continued, however, and this has resulted in some non-nominal data populating the AATSR archive, so AATSR products from during the blackbody cross-over tests should be treated with caution.

Table 2 lists the AATSR blackbody cross-over test times during the mission. The first took place during the commissioning period, and detailed times are not available.

The start and end orbit numbers in Table 2 correspond to the Envisat orbit numbers at the start and end times outlined in the table. Note that, since nominal AATSR archived products start before the ANX of a particular orbit, they are generally *named* with the orbit number previous to the whole orbit that they represent.

Table 2. AATSR blackbody cross-over test times

Start time	End time	Orbit start	Orbit end
30/04/2002	02/05/2002	*(not known)*	*(not known)*
21/04/2004 07:42	23/04/2004 08:17	11197	11226
17/05/2005 07:47	19/05/2005 08:24	16794	16823
26/06/2006 07:20	28/06/2006 08:10	22591	22620
13/11/2007 07:53	15/11/2007 08:30	29820	29849
21/04/2009 07:53	23/04/2009 08:31	37335	37364
26/05/2010 08:18	28/05/2010 08:55	43061	43090
25/05/2011 10:46	27/05/2011 11:12	48284	48313

2.4   Anomalies

There were only four AATSR instrument anomalies that led to a disruption of operations (i.e. no generated data) during the mission, and one of these was during the commissioning period. These are listed in Table 3 and are taken from RD.1; a fuller explanation of each anomaly is given in RD.1. In each case AATSR was recovered successfully and operations continued as before. No flight hardware failures occurred during the mission.

Table 3. AATSR anomalies during the Envisat mission

Date	Anomaly details
15-24 Apr 2002	AATSR entered REFUSE mode after cooler body temperature fell below the lower switchdown limit of -10C
04-08 Aug 2006	AATSR was switched into RESET/WAIT by the platform macro command
03-06 Dec 2007	AATSR was commanded into STANDBY mode during an ENVISAT memory maintenance activity. On restart the instrument went into STANDBY/REFUSE mode at 08:10 on 05-Dec-2007.
08 Oct 2009	AATSR switched into WAIT mode following consecutive ICU FORMAT High Data Rate (**HDR**) Errors.

2.5   Summary

A summary of AATSR data availability and quality for the mission is presented in Figure 2 (modified by D. L. Smith from RD.1) and has been based on the AATSR modes of operation and the instrument event history outlined in Section 2.1 and in Annex A, respectively.
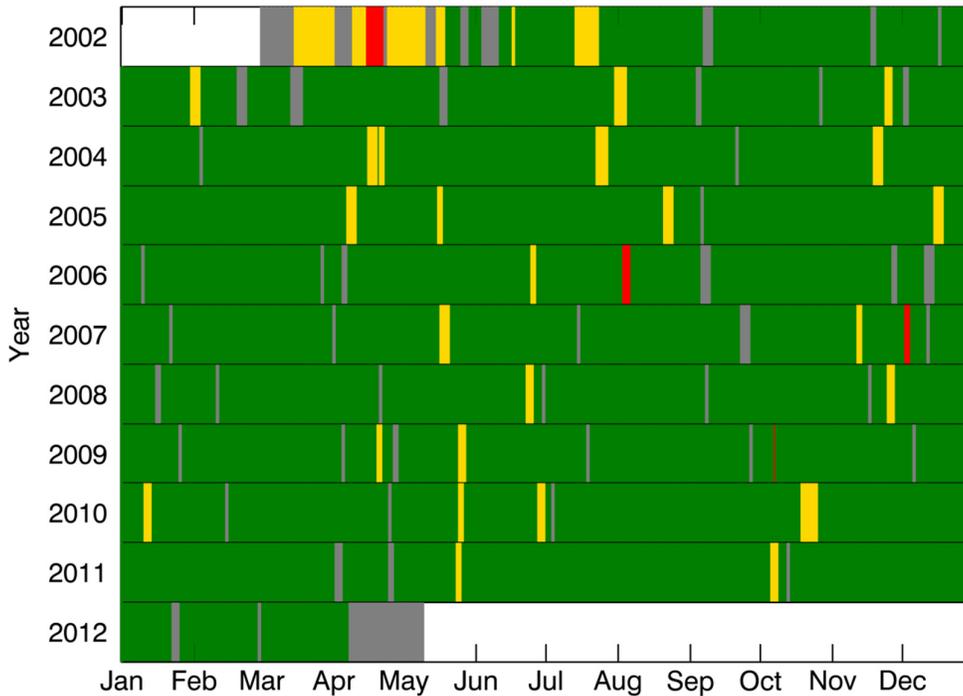
Figure 2. Bar chart showing the event history of AATSR for the mission lifetime from launch on 01 March 2002 to end of mission (modified by D. L. Smith from RD.1).

Key to Figure 2: Grey = No data generated (AATSR not in MEASUREMENT mode); Green = Good quality data; Amber = Data generated but of lower quality; Red = No data generated due to AATSR anomaly.

AATSR measurement data were available for > 95% of the mission, excluding the main commissioning phase up to 23 July 2002.

The majority of AATSR data outages during the operational phase were due to OCMs or platform anomalies, as well as operations to perform decontamination or blackbody cross-over tests. The periods where data are considered to be of low quality (in yellow) are during planned outgassings, blackbody cross-over tests or during the commissioning phase. Measurement data were generated during these activities to provide L0 data to allow the performance of the instrument to be assessed. However, processing to L1 was not disabled during these activities; hence products were generated and available to users and are of lower quality.

Note that Figure 2 does not take into account instrument performance and external factors such as the problems due to the high speed multiplexer (**HSM**), and other downlinking, transcription or ground processing errors (known details of any such event are included in Annex A).

3. GLOSSARY

The following acronyms and abbreviations have been used in this report.

ANX	Ascending Node Crossing
BB	BlackBody
HDR	High Data Rate
HSM	High Speed Multiplexer
ICU	Instrument Control Unit
IOR	Instrument Operations Request
IR	InfraRed
IR-FPA	InfraRed Focal Plane Assembly
OCM	Orbit Control Manoeuvre
PLSO	PayLoad Switch Off
RD	Reference Document
SM	Service Module

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ANNEX A   AATSR EVENT HISTORY

Table 4 and Table 5 are summarised from RD.1; this information is also currently available at http://www.aatsrops.rl.ac.uk/status.html. These tables list the AATSR event history and corresponding changes to operational modes during the Envisat mission, with Table 4 covering events from during the commissioning phase (prior to 23 July 2002) and Table 5 covering the routine operations phase (23 July 2002 until 08 April 2012).

Corresponding Envisat orbit numbers are made available in Table 4 and Table 5 where possible, but before 04 April 2002 Envisat was still undergoing positioning towards its nominal orbit. Also note that, since nominal AATSR archived products start before the ANX of a particular orbit, they are generally *named* with the orbit number previous to the whole orbit that they represent.

RD.1 itemises the individual operations requests (AATSR-IOR-nnnn) mentioned in the tables.

Table 4. AATSR Event History – Commissioning Phase

Year	Date	Time	Orbit	Event(s)
2002	01-Mar			Launch from Kourou, French Guyana
	06-Mar			First Platform data received at RAL, covering 4 days of operations.
	09-Mar	09:25		AATSR was commanded into STANDBY mode from OFF for the first time since launch. The first data confirmed that the cooler was clamped as expected.
		11:00		The cooler was un-clamped and AATSR was configured for in-flight operations.
	10-Mar			STANDBY mode. No AATSR operations.
	11-Mar			STANDBY mode. No AATSR operations.
	12-Mar	17:45		AATSR commanded from STANDBY to HEATER mode.
	13-Mar			AATSR in HEATER mode.
	14-Mar			HEATER mode. No AATSR operations.
	15-Mar	14:37		AATSR switched to MEASUREMENT mode. First instrument source packets generated.
	16-Mar			MEASUREMENT mode. No AATSR operations.
	24-Mar			AATSR in MEASUREMENT mode.
		10:00		Visible channel gains updated following analysis of science data.
	26-Mar	09:15		The instrument was restarted with the SCC cooling the FPA for the first time.
		10:39		The scan mirror was restarted and the cooler set to maximum amplitudes.
		14:07		The FPA reached 80K and AATSR automatically entered HEATER mode. The IR gains and offsets were being set by the auto-gain-offset control loop.
		15:43		AATSR was commanded back into measurement mode.
	03-Apr	08:26		AATSR was commanded into HEATER mode with the cooler drives at zero amplitude and the scan mirror switched off in preparation for the ENVISAT orbit control manoeuvre.
	09-Apr	08:34	00562	The scan mechanism was restarted, the auto-gain-offset loop re-enabled and AATSR was commanded back into MEASUREMENT mode.
	15-Apr	11:59	00650	The instrument entered STANDBY/REFUSE mode due to the cooler body temperature dropping below the lower switchdown limit of -10C.

Year	Date	Time	Orbit	Event(s)
	17-Apr	11:02	00678	AATSR commanding was re-enabled and cooler compressor and displacer amplitude initial settings commanded. Transition to HEATER mode could not be started because the Cooler Body Temperature remained below the switch-on condition of -8C and rising during passes.
	18-Apr	17:37	00696	The HEATER mode command was executed and AATSR immediately returned to STANDBY/REFUSE mode. The immediate cause was a command echo failure.
	19-Apr			An Anomaly Review Board was held to agree a recovery plan for AATSR and identify further investigations. Memory Dump of the RAM area was taken and the instrument returned to STANDBY mode.
		17:03	00710	A further attempt to return to HEATER mode was made but resulted in AATSR immediately returning to STANDBY/REFUSE mode.
	23-Apr			AATSR Recovery Procedure AATSR-IOR-0009
		11:13	00764	AATSR ICU reset and returned to STANDBY mode
		12:53	00765	Cooler initial amplitudes sent
		15:00	00766	AATSR transition to HEATER mode started
		16:11	00767	Cooler default amplitudes sent
		19:33	00769	AATSR in HEATER mode
	24-Apr			AATSR Recovery Procedure AATSR-IOR-0009
		07:26	00776	Scan mirror started
		07:27	00776	AATSR in MEASUREMENT mode
				Visible channel auto-offset loops not enabled and signal channels at hardware default gain settings
	26-Apr	13:00	00808	AATSR in MEASUREMENT mode
				Visible channel auto offset loop enabled and visible channel gains commanded
	30-Apr			Part 1 of Blackbody Cross-over Test started -(S-D-P-3.5)
	01-May			Part 2 of Blackbody Cross-over Test started -(S-D-P-3.5)
	02-May			Blackbody Cross-over Test completed
				Blackbody temperatures stabilised and auto-gain/offset loop re-enabled
	03-May			Scan Mirror Checkout S-D-P-3.3
		12:41	00908	Snapshot-2 commanded to 2002
		14:15	00909	Snapshot-2 commanded to 2003
		15:52	00910	Snapshot-2 commanded to 2004
		17:30	00911	Snapshot-2 commanded to 2001
	04-May			Scan Mirror Checkout S-D-P-3.3
		10:34	00921	Snapshot-2 commanded to 2002
		12:05	00922	Snapshot-2 commanded to 2003
		13:44	00923	Snapshot-2 commanded to 2004
		15:23	00924	Snapshot-2 commanded to 2001
	05-May			Scan Mirror Checkout S-D-P-3.3
		08:15	00934	Snapshot-2 commanded to 2002
		09:55	00935	Snapshot-2 commanded to 2003
		11:34	00936	Snapshot-2 commanded to 2004
		13:13	00937	Snapshot-2 commanded to 2001

Year	Date	Time	Orbit	Event(s)
	06-May	09:34 to 15:59	00949 to 00953	IOR#11 A207 Reporting Anomaly Test performed
				Commands sent to disable and re-enable auto gain offset loop and check command execution reporting in Report Formats
	09-May	09:36 to 17:50	00992 to 00997	Pixel Map Optimisation Test performed
	11-May	06:50	01019	Pixel Map with Extended Along-Track Swath loaded
		10:14	01021	Default Pixel Map loaded
		12:54	01022	ENVISAT PL in SUSPEND (AATSR OFF)
	15-May			AATSR Recovery from PL Suspend
		08:07	01077	AATSR in STANDBY Mode
		11:25	01079	Transition to HEATER Mode started, cooldown commenced
		12:58	01080	Cooler to nominal compressor and displacer amplitude
		16:02	01082	Transition to HEATER Mode complete
		16:19	01082	Scan Mirror started
		16:21	01082	AATSR to MEASUREMENT Mode
	16-May			AATSR Auto Gain Offset Loop Test S-D-P-3.8
		14:20	01095	Loop frequency commanded to 2048 scans
		17:41	01097	Loop frequency commanded to 4096 scans
		21:02	01099	Loop frequency commanded to 8192 scans
	17-May			AATSR Auto Gain Offset Loop Test S-D-P-3.8
		10:36	01107	Loop frequency commanded to 16384 scans
	18-May			AATSR Auto Gain Offset Loop Test S-D-P-3.8
		11:46	01122	Loop frequency commanded to 32768 scans
		21:49	01128	Loop frequency commanded to 1024 scans (default)
	19-May			AATSR Auto Gain Offset Loop Test S-D-P-3.8
		11:10	01136	Number of temp samples set to 64 and number of irradiance samples set to 32
		12:50	01137	Number of temp samples set to 128 and number of irradiance samples set to 64
		14:31	01138	Number of temp samples set to 16 and number of irradiance samples set to 8
		16:11	01139	Number of temp samples set to 8 and number of irradiance samples set to 4
		17:52	01140	Number of temp samples set to 32 and number of irradiance samples set to 16 (default)
	27-May			AATSR OFF due to ENVISAT PLSO for all instruments
	28-May			ENVISAT recovery started
	29-May			AATSR Recovery from PLSO
		09:06	01278	AATSR in STANDBY
		10:42	01279	Transition to HEATER Mode started
		15:22	01282	AATSR in HEATER Mode
		18:51	01284	Scan Mirror started
		18:53	01284	AATSR in MEASUREMENT Mode
	05-Jun	21:18	01385	Payload in SUSPEND due to Level 3 PROTOCOL INTERRUPT

Year	Date	Time	Orbit	Event(s)
	10-Jun			AATSR recovery started
		15:30	01453	AATSR in STANDBY Mode
		17:59	01455	Transition to HEATER Mode started
		22:33	01458	AATSR in HEATER Mode
	11-Jun			AATSR recovery continued
		12:48	01466	AATSR in MEASUREMENT Mode
	18-Jun			AATSR Low-Gain Mode
		07:04	01563	AATSR switched to low-gain mode over desert
	15-Jul			Rerun of Cooler Optimisation Procedure S-D-P-3.3
		07:45	01950	Cooler commanded to run at fixed amplitude of 7D(hex)
	16-Jul			Cooler Optimisation - Cooler at different phase settings
		08:55	01965	Cooler Phase commanded to 30(dec)
		11:57	01967	Cooler Phase commanded to 31(dec)
		14:57	01968	Cooler Phase commanded to 32(dec)
		17:57	01970	Cooler Phase commanded to 33(dec)
		20:57	01972	Cooler Phase commanded to 29(dec) Default Setting
	17-Jul			Cooler Optimisation - Cooler at different balance settings
		08:24	01979	Compressor Delta setting commanded 118(dec)
		11:24	01981	Compressor Delta setting commanded 120(dec) Default Setting
		14:24	01982	Compressor Delta setting commanded 122(dec)
		17:24	01984	Compressor Delta setting commanded 128(dec) Default Setting
	18-Jul			Cooler returned to amplitude control
		09:35	01994	Cooler Compressor and Displacer commanded to zero amplitude
		13:45	01996	FPA at 80K
	19-Jul			Cooler Optimisation - control temperature at different settings
		08:59	02008	Set Point Temperature commanded to 81K
		13:58	02011	Set Point Temperature commanded to 84K
		18:52	02014	Set Point Temperature commanded to 83K
		23:57	02017	Set Point Temperature commanded to 80K Default Setting
	22-Jul			FPA Outgassing
		09:06	02051	Cooler Compressor and Displacer commanded to zero amplitudes

Table 5. AATSR Event History – Routine Operations Phase

Year	Date	Time	Orbit	Event(s)
2002	23-Jul			FPA Outgassing
		13:30	02068	1.6 µm gain commanded to 337(dec)
	24-Jul			FPA Cooldown
		09:41	02080	Cooler Compressor amplitude commanded 92(hex), Displacer amplitude commanded to 90(hex)
		11:21	02081	Cooler Compressor amplitude commanded B4(hex), Displacer amplitude commanded to 9B(hex)
	25-Jul			AATSR-IOR-0014 outgassing completed
		09:15	02094	IR Auto-gain Offset Loop activated
	04-Sep			Repeat of BB Functional Test AATSR-IOR-0015
		11:11	02682	Started
		11:19	02682	Complete
	08-Sep	06:45	02736	AATSR in HEATER Mode
		07:19	02737	AATSR in STANDBY Mode
	10-Sep	14:34	02770	AATSR in STANDBY Mode
	11-Sep	14:00	02784	AATSR in TR HEATER Mode
		20:08	02787	AATSR in HEATER Mode
	12-Sep	13:13	02798	AATSR in Measurement Mode
	18-Nov			Start of Leonid Meteor Shower Precautions
		06:43	03753	AATSR Powered Off
	20-Nov			End of Leonid Meteor Shower Precautions
		09:05	03783	AATSR in STANDBY mode
		10:48	03784	AATSR in TR HEATER mode
		15:28	03787	AATSR in HEATER mode
		15:40	03787	AATSR in MEASUREMENT mode
	18-Dec	02:24	04180	AATSR in HEATER Mode
		14:00	04187	AATSR in MEASUREMENT Mode
2003	31-Jan	09:39	04814	AATSR Outgassing Started
	03-Feb	17:15	04861	AATSR Outgassing Completed
	20-Feb			ENVISAT Command Procedure Failure, all instruments commanded OFF
		07:27	05099	AATSR commanded OFF
	21-Feb			Envisat OCM out-of-plane Orbit Inclination Maintenance Manoeuvre
		04:42	05111	Single Burn (Delta-V 1.6901 m/sec)
				Instrument Recovery
		18:36	05120	AATSR commanded to STANDBY
		20:12	05121	AATSR commanded to TR HEATER
	22-Feb			Instrument Recovery
		00:51	05123	AATSR commanded to HEATER
	23-Feb			Instrument Recovery
		10:26	05143	AATSR commanded to MEASUREMENT

Year	Date	Time	Orbit	Event(s)
	15-Mar			Spacecraft problem, all instruments off
		04:21	05426	AATSR off
	18-Mar			Instrument Recovery
		13:54	05475	AATSR commanded to STANDBY
		15:30	05476	AATSR commanded to TR HEATER
		20:43	05479	AATSR commanded to HEATER
	19-Mar			Instrument Recovery
		13:22	05489	AATSR commanded to MEASUREMENT
	18-May			Spacecraft Maintenance/Instrument Switchoff
		06:25	06343	AATSR commanded to HEATER, then OFF
	19-May			Spacecraft Maintenance/Instrument Recovery
		11:34	06361	AATSR commanded to STANDBY
	20-May			Spacecraft Maintenance/Instrument Recovery
		07:33	06373	AATSR commanded to TR HEATER
		12:20	06376	AATSR commanded to HEATER
		12:35	06376	AATSR commanded to MEASUREMENT
	01-Aug	09:17	07419	AATSR Outgassing Started
	05-Aug	10:34	07477	AATSR Outgassing Completed
	13-Aug			Reflectance Channels Gains Update
		11:00	07592	AATSR commanded
	14-Aug			Amendment to 1.6 um Channel Gain
		15:33	07608	AATSR commanded
	05-Sep			AATSR OFF due to ENVISAT PL-SOL for all instruments
	07-Sep	09:55	07949	AATSR back in measurement mode
	28-Oct	02:55	08675	AATSR into HEATER mode for Envisat Out-of-Plane Manoeuvre
		06:30	08677	AATSR returns to MEASUREMENT mode
	25-Nov	10:10	09080	AATSR outgassing procedure begins
	28-Nov	18:30	09128	AATSR outgassing complete
	03-Dec	07:18	09193	Envisat PL-SOL: AATSR and all other instruments OFF
	05-Dec	11:41	09224	Envisat restored to nominal with AATSR available
2004	04-Feb	02:40	10092	AATSR unavailable from 02:40 to 08:01 due to orbital correction manoeuvre
	16-Apr	08:40	11126	Cooler off, Start Outgassing
	19-Apr	12:15	11171	Cooler On, Start Cooldown
		17:04	11174	Cooldown Completed
	20-Apr	08:09	11183	Auto Gain Offset Loop Restarted
		09:23	11183	Visible Channel Gains Updated
	21-Apr	07:42	11197	Blackbody Cross-over Test Part I Started
	22-Apr	07:13	11211	Blackbody Cross-over Test Part II started
	23-Apr	08:17	11226	Auto Gain Offset Loop restarted, Instrument in Nominal Operation
	23-Jul	09:00	12529	Outgassing begins as planned in orbit #12529

Year	Date	Time	Orbit	Event(s)
	27-Jul	09:42	12586	Cooler On, Start Cooldown
		15:39	12590	Cooldown Complete
	21-Sep	03:00	13384	AATSR into HEATER mode for OCM
		18:00	13393	AATSR into MEASUREMENT mode
	19-Nov	10:00	14233	Outgassing begins as planned in orbit #14233
	22-Nov	12:06	14277	Cooler On, Start Cooldown
		18:10	14281	Cooldown Complete
	08-Apr	08:19	16236	Coolers commanded off. Outgassing begins as planned in orbit #16236
	11-Apr	08:22	16279	Cooler commanded on
		13:16	16282	Cooldown completed by orbit #16282 and by the time given
	17-May	07:47	16794	Blackbody cross-over test starts
		09:03	16794	Reflectance channels gains update commanded
	19-May	08:24	16823	Blackbody cross-over test ends.
	22-Aug	08:46	18183	Coolers commanded off. Outgassing begins as planned in orbit #18183
2005	25-Aug	09:13	18226	Coolers commanded on. Cool-down begins
		13:55	18229	Cooldown completes
		15:25	18230	Outgassing procedure concludes
	07-Sep	04:20	18409	AATSR into HEATER mode for OCM
		13:40	18415	AATSR into MEASUREMENT mode
	16-Dec	09:40	19844	Coolers commanded off. Outgassing begins as planned in orbit #19844
	19-Dec	10:29	19887	Coolers commanded on
		15:07	19890	Cooldown verified
	10-Jan	01:00	20196	AATSR into HEATER mode for ENVISAT OCM
		13:00	20204	AATSR into MEASUREMENT mode
	28-Mar	00:45	21299	AATSR into HEATER mode for ENVISAT OCM
		13:00	21306	AATSR into MEASUREMENT mode
	06-Apr	02:09	21428	Envisat down - AATSR OFF
		18:39	21438	AATSR ON and back in MEASUREMENT mode
	26-Jun	07:20	22591	Blackbody Cross-Over Test starts
		08:10	22591	Blackbody Cross-Over Test completed with Auto-Gain/Offset loop restored
	04-Aug	01:25	23145	AATSR in Reset/Wait, anomaly under investigation
2006		13:11	23153	AATSR back in measurement mode
	07-Sep	16:39	23641	AATSR OFF owing to ENVISAT AOCS STD-A anomaly
	10-Sep	15:48	23684	AATSR coolers commanded on
		22:02	23687	AATSR in HEATER mode
	11-Sep	07:07	23693	AATSR returns to Measurement Mode
	28-Nov	07:58	24810	AATSR to OFF following Envisat memory maintenance anomaly
	30-Nov	15:07	24843	AATSR returns to Measurement Mode
	12-Dec	18:02	25016	AATSR unavailable due to an Envisat LVL3 PROTOCOL ERROR AND INTERRUPT
	16-Dec	08:26	25068	AATSR returns to Measurement Mode

Year	Date	Time	Orbit	Event(s)
2007	22-Jan	23:52	25607	AATSR to HEATER Mode during ENVISAT OCM
	23-Jan	12:05	25614	AATSR returns to MEASUREMENT Mode
	02-Apr	23:51	26609	AATSR to HEATER Mode during ENVISAT OCM
	03-Apr	07:00	26613	AATSR returns to MEASUREMENT Mode
	18-May	08:19	27258	Cooler off - AATSR outgassing begins
	21-May	06:59	27300	Cooler commanded on
		08:28	27301	Cooler commanded to nominal levels
		11:50	27303	Cooldown complete
	16-Jul	22:05	28111	AATSR to HEATER Mode for ENVISAT OCM
	17-Jul	07:11	28116	AATSR returns to MEASUREMENT Mode
	24-Sep	12:27	29107	AATSR OFF following payload switch-off due to Service Module Anomaly (Global AOCS Surveillance triggered)
	28-Sep	13:40	29165	AATSR Returns to MEASUREMENT mode. Outgassing also completed
	13-Nov	07:53	29820	BB cross-over test starts. IR channel auto/gain offset control disabled, +XBB HEATER to OFF, -XBB HEATER to ON
	15-Nov	08:30	29849	BB cross-over test ends. Instrument configuration returns fully to nominal
	03-Dec	22:00	30115	Into STANDBY mode for the duration of Envisat OCM and maintenance
	06-Dec	07:29	30149	Return to MEASUREMENT mode
	13-Dec	06:44	30249	Into STANDBY mode for the duration of Envisat memory maintenance activities
	14-Dec	08:17	30264	Return to MEASUREMENT mode
2008	16-Jan	16:11	30741	Science data interrupted due to Envisat High Speed Multiplexer (HSM) anomaly. No science data until HSM recovered
	17-Jan	09:38	30751	AATSR to HEATER mode for Envisat/HSM recovery procedure
		10:35	30752	Envisat/HSM returns to nominal after reset
		13:02	30753	AATSR returns to MEASUREMENT mode
	11-Feb	23:45	31118	AATSR out of MEASUREMENT mode for Envisat OCM
	12-Feb	09:11	31123	AATSR returns to MEASUREMENT mode
	21-Apr	22:05	32119	AATSR out of MEASUREMENT mode for Envisat OCM
	22-Apr	07:15	32124	AATSR returns to MEASUREMENT mode
	23-Jun	07:46	33012	AATSR cooler off - outgassing begins
	26-Jun	14:18	33059	AATSR outgassing completed
	30-Jun	22:05	33121	AATSR out of MEASUREMENT mode for Envisat OCM
	01-Jul	07:00	33126	AATSR returns to MEASUREMENT mode
	08-Sep	22:06	34123	AATSR out of MEASUREMENT mode for Envisat OCM
	09-Sep	07:00	34128	AATSR returns to MEASUREMENT mode
	17-Nov	22:05	35125	AATSR out of MEASUREMENT mode for Envisat OCM
	18-Nov	07:00	35130	AATSR returns to MEASUREMENT mode
	25-Nov	08:10	35231	AATSR cooler off - outgassing begins
	28-Nov	21:33	35282	AATSR outgassing completed. All channels return to nominal
2009	26-Jan	23:44	36128	AATSR out of MEASUREMENT mode for Envisat OCM
	27-Jan	06:49	36132	AATSR returns to MEASUREMENT mode
	06-Apr	23:44	37130	AATSR out of MEASUREMENT mode for Envisat OCM

Year	Date	Time	Orbit	Event(s)
	07-Apr	06:50	37134	AATSR returns to MEASUREMENT mode
	21-Apr	07:53	37335	BB cross-over test starts. IR channel auto/gain offset control disabled, +XBB HEATER to OFF, -XBB HEATER to ON
	23-Apr	08:31	37364	BB cross-over test ends. Instrument configuration returns fully to nominal
	28-Apr	13:03	37438	Envisat data transmission interrupted due to HSM anomaly. No AATSR science data available
	29-Apr	10:14	37451	AATSR out of MEASUREMENT mode for Envisat HSM reset
		10:24	37451	Envisat HSM restored to nominal following reset
		10:27	37451	AATSR returns to MEASUREMENT mode
	26-May	09:32	37837	AATSR cooler off - outgassing begins
	29-May	21:09	37887	AATSR outgassing completed. All channels return to nominal
	20-Jul	22:07	38632	AATSR out of MEASUREMENT mode for Envisat OCM
	21-Jul	06:55	38637	AATSR returns to MEASUREMENT mode
	28-Sep	22:07	39634	AATSR out of MEASUREMENT mode for Envisat OCM
	29-Sep	07:00	39639	AATSR returns to MEASUREMENT mode
	08-Oct	03:15	39765	Envisat PMC switched AATSR into WAIT following two or more TM format errors
		17:05	39774	AATSR returns to MEASUREMENT mode
	07-Dec	22:04	40636	AATSR out of MEASUREMENT mode for Envisat OCM
	08-Dec	07:00	40641	AATSR returns to MEASUREMENT mode
2010	11-Jan	09:00	41129	AATSR cooler to off - outgassing begins
	14-Jan	14:07	41175	AATSR outgassing completed. All channels return to nominal
	15-Feb	22:04	41638	AATSR out of MEASUREMENT mode for Envisat OCM
	16-Feb	07:00	41643	AATSR returns to MEASUREMENT mode
	26-Apr	22:08	42640	AATSR out of MEASUREMENT mode for Envisat OCM
	27-Apr	07:00	42645	AATSR returns to MEASUREMENT mode
	26-May	08:18	43061	BB cross-over test starts. IR channel auto/gain offset control disabled, +XBB HEATER to OFF, -XBB HEATER to ON
	28-May	08:55	43090	BB cross-over test ends. Instrument configuration returns fully to nominal
	29-Jun	08:49	43548	AATSR cooler to off - outgassing begins
	02-Jul	20:32	43598	AATSR outgassing completed. All channels return to nominal.
	05-Jul	23:54	43643	AATSR out of MEASUREMENT mode for Envisat OCM
	06-Jul	07:00	43647	AATSR returns to MEASUREMENT mode
	20-Oct	16:12	45170	AATSR cooler to off - outgassing begins
	27-Oct	18:55	45272	AATSR outgassing completed. All channels return to nominal
2011	03-Apr	15:52	47540	Envisat platform anomaly results in Payload/PEB switch-off. AATSR OFF
	04-Apr	13:50	47553	AATSR in STANDBY for outgassing, cooler still off
	06-Apr	15:42	47583	Outgassing is completed, All channels available
	26-Apr	13:58	47869	Envisat HSM Anomaly - AATSR science data acquired but unavailable
	28-Apr	09:53	47895	Envisat HSM Anomaly recovered - AATSR science data available again
	25-May	10:46	48284	Blackbody cross-over test starts. IR channel auto/gain offset control disabled, +XBB HEATER to OFF, -XBB HEATER to ON

Year	Date	Time	Orbit	Event(s)
	27-May	11:12	48313	Blackbody cross-over test ends. Instrument configuration returns to normal
	07-Oct	08:19	50222	Outgassing starts, AATSR cooler to off
	10-Oct	14:50	50269	Outgassing is completed. All channels available
	14-Oct	01:15	50318	AATSR out of MEASUREMENT mode for Envisat OCM
		06:00	50321	AATSR returns to MEASUREMENT mode
2012	23-Jan	07:25	51773	AATSR to STANDBY for Envisat memory anomaly and to start outgassing
	26-Jan	13:52	51820	AATSR outgassing is completed. All channels available
	29-Feb	22:21	52313	AATSR out of MEASUREMENT mode for planned Envisat OCM maintenance
	01-Mar	06:00	52318	AATSR returns to MEASUREMENT mode
	08-Apr	12:28	52868	Envisat data transmission anomaly announced. No data via S-, Ka- and X-band
	09-Apr	02:12	52876	Final AATSR science data packet processed through EDS-X, acquired 10:56, April 8th, 2012
	09-May			End of ENVISAT mission declared

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