Investigation into ATSR-1 and ATSR-2 data availability

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Issue	Date	Description
0.1	24-Aug-2016	First complete draft
0.2	26-Aug-2016	Updated following checks by Space Connexions Limited
1.0	26-Aug-2016	Issue 0.2 updates accepted. Prepared for distribution as Issue 1.0.

Table of Contents

1 Scope of Document

This Technical Note describes the work performed by RAL Space to investigate the availability of ATSR-1 and ATSR-2 data for periods where there are gaps in the current archive of UBT and higher-level products.

This work is performed as Work Package 4.4 of the proposal described in [AD 1].

2 Terms, Definitions and Abbreviations

2.1 Acronyms

ATSR	Along-Track Scanning Radiometer
CRC	Cyclic Redundancy Check
DSI	Data Services Initiative
ERS	European Remote Sensing satellite
IDL	Interactive Data Language (data manipulation and graphics software)
QC	Quality Control
SADIST(-2)	Synthesis of ATSR(-2) Data Into Sea surface Temperature (RAL software to process Level 0 ATSR data from tape into UBT products)
SET	SUPPLE pre-processor
SUM	SUPPLE main processor
SUPPLE	Sadist UBT Processor Linux Environment. Linux-ported version of the SADIST L0 to UBT processor software
TOA	Top of Atmosphere
UBT	Ungridded Brightness Temperature (Level 1 ATSR product, generated at single-scene spatial coverage, 512x512km)
YSM	Yaw-Steering Mode

3 Documents

3.1 Applicable Documents

Ref	Title	Document code	Version	Date
AD 1	ATSR Satellite Dataset Supporting Activities, 2014 - 2017	Proposal 2014-07-001 (response to DECC ITT : TRN 829/06/2014)	2	28-Jul-2014
AD 2	(A)ATSR Validation Activities, validation Issues Report	UL-AATSR-VIR	5B	29/11/2014
AD 3	ATSR-1 anomaly log	http://www.atsr.rl.ac.uk/satellite/logs/anomaly/archive/ers-1/index.shtml	n/a	n/a
AD 4	ATSR-2 anomaly log	http://www.atsr.rl.ac.uk/satellite/logs/anomaly/archive/atsr-2/index.shtml	n/a	n/a
AD 5	SADIST-2 v100 Products	ER-TN-RAL-AT-2164		06-Sep-1995
AD 6	ATSR-1/2 User Guide	http://www.atsr.rl.ac.uk/documentation/docs/userguide/index.shtml	1.0	15 June 1999

3.2 Reference Documents

Ref	Title	Document code	Version	Date
RD 1	Filezilla home page	https://filezilla-project.org	n/a	n/a
RD 2	Investigation into ATSR-1 uncalibrated brightness temperatures	PO-TN-RAL-AT-0572	1.0	05-Aug-2016
RD 3	Investigations into ATSR-1 1.6 & 3.7μm channel switching	PO-TN-RAL-AT-0571	Draft	TBD

4 Overview

The proposal [AD 1] describes this work package as follows:

“Unlike earlier versions, the v3.0 archive offers the opportunity to identify missing input (UBT) data at both the orbit and sub-orbit levels. This can be done by scanning the improved pre-processor log files to provide the UBTs per orbit product. The results from this activity would then need to be compared with ESA’s L0 (disk-based) archive to see how much, if any, available L0 data is yet to be processed, and how much is really unavailable at L0.”

The validation report [AD 2] makes more specific references to data gaps:

“Noticeable gaps have been reported at the start of the ATSR-1 mission (during the eruption of Mount Pinatubo) and also at the start and end of the ATSR-2 mission.

Most of the data gaps appear in the commissioning phase of the parent spacecraft (ERS-1 for ATSR-1 and ERS-2 for ATSR-2) when both platform and instrument operations were highly variable. Consequently, the observed data gaps may be times when the instrument was off or in a non-standard mode.”

In practice, a direct, detailed comparison between UBT products and available Level 0 files is not straightforward. The ATSR-1 and ATSR-2 UBT products are “scene-based” rather than orbit-based. Each product contains 512 consecutive scan lines, with approximately 80 separate products per orbit. The Level 0 files are approximately orbit-based, presumably containing all data available from a single downlink transmission, with a filename containing the start and end acquisition times of the data. UBT products are identified by the orbit ascending node time and the along-track distance of the scene, rather than by acquisition time (although the start and end acquisition times are present in the product header). As a result it is not straightforward to compare the time coverage of UBT and Level 0 products. The number of source packets or scans in a Level 0 product may be estimated from the file size, but there is no summary information regarding missing or duplicated source packets. It is therefore difficult to determine whether there are gaps in the data in a Level 0 file, or where the gaps occur, without processing the entire file and making checks at the individual packet level.

The work package was intended to identify available Level 0 data primarily at the orbit level, as stated above. For this reason, several different approaches have been attempted.

1) A listing of all UBT files used as input to the v3.0 processing was generated by recursively searching all the processing logs. This listing was passed to DSI in order to allow a detailed comparison with their Level 0 data base, if a means could be found.

2) The NEODC holds a Postgres database of all UBT products, which was used as the starting point for APP processing. This entire database was dumped to an ASCII file and was passed to DSI, again for possible comparison with their L0 data base.

3) A recursive search of the NEODC UBT archive was scripted. The script reports days for which fewer than 14 orbits are present. The resulting log can be compared with (a sample of) the DSI consolidated data set available by FTP, to try to identify at a fairly high level where gaps might be filled.

5 Investigations

5.1 Investigation approach

As noted in section 4, listings of the UBT files processed in v3.0 and of the Postgres database of UBT files held by the NEODC have been generated and passed to DSI, in order to allow investigation of possible means of comparison with the consolidated Level 0 archive from the recent re-transcription by ESA. This section therefore focusses on the 3rd approach taken, i.e. looking for days where UBT data for fewer than the expected number of orbits are archived.

A Linux shell script was written to descend the NEODC UBT archive directories recursively for a specified year and list the available UBT files. Based on the listing, the script derives and reports the number of UBT product files and the number of distinct orbits for which UBT products exist on each day. The script generates distinct log messages for any day directory where there are no UBT files or where the number of orbits is fewer than 14. There is no check on the "completeness" of each orbit (there are approximately 80 UBT products in a complete orbit, whereas the script only determines the orbits for which 1 or more UBTs are present), so the log messages give only a general indication of the archived data availability per day.

An example listing for part of August 1991 is shown below

91/08/07: 1192 UBTs and 15 orbits
91/08/08: 1110 UBTs and 14 orbits
91/08/09: 1027 UBTs and 14 orbits
91/08/10: no data
91/08/11: no data
91/08/12: no data
91/08/13: no data
91/08/14: 139 UBTs and 2 orbits
91/08/14 missing orbit(s)? nOrbits 2
91/08/15: 1110 UBTs and 14 orbits

In this example, the two listing entries for 91/08/14 show that (1) there are 139 UBT scene products in the archive, from 2 distinct orbits and (2) there are potentially missing orbits on this date because "nOrbits" found is 2. Logging the information on two separate lines aids filtering by standard Linux tools.

Based on the listing, any day for which missing data are reported can be checked against the ATSR-1 or ATSR-2 anomaly log ([AD 3] and [AD 4]) and, if the log indicates that the instrument was operating, the Level 0 data set can be checked for available files. N.B. the anomaly logs are not available for the entire missions for either ATSR-1 or ATSR-2. The early part of the ATSR-1 mission is covered by a single statement that from 16 July 1991 to 14 Sept 1991 is the commissioning period. The earliest entry in [AD 4] is from June 1998.

RAL has (at the time of the investigation) access to Level 0 data from the DSI re-transcription of Matera ERS data for ESA, via the CEMS (commercial) FTP server. It is therefore possible to search for any missing days' data in the DSI Level 0 archive. Since the access method is restricted to FTP, the archive search has been done manually and is quite time-consuming, although this task is made easier by the availability of visual FTP tools such as FileZilla [RD 1] e.g. FileZilla allows the user to set up filters which can be used to exclude duplicate Level 0 files or to select Level 0 filenames containing a specific version number. Given the manual nature of the task it makes sense to prioritise the days with the largest amount of data missing.

It may be possible to automate the FTP search for Level 0 files by scripting, but the comparison must take account of the possible presence of multiple versions of Level 0 files for the same period, files with overlapping time ranges, or duplicate files.

The comparisons performed to date take no account of which orbits are present in either the UBT or Level 0 archives; only the number of Level 0 products and total number of orbits of UBT are compared. The presence of more Level 0 files than UBT orbits may imply that new UBT products can be generated, but there is no guarantee that a Level 0 product corresponds to a whole orbit. If UBT products exist for fewer than 14 orbits

and fewer than 14 Level 0 products are available on a given day, there is no guarantee that the same orbits are present.

The availability of Level 0 files does not always imply that new ATSR UBT products can be generated. For example, there are periods within the DSI re-transcription data set where Level 0 products exist when it is known that ATSR was not operating. It is also possible that if ATSR data are present, the pixel map used or the operating mode of the instrument may make it impossible for SUPPLE to process the data to UBT.

Note that the Level 0 data available from DSI's re-transcription are subject to an ongoing discussion on data quality and time coverage (see [RD 2]). Until questions over the Level 0 data quality are resolved it will not be possible to process a "production quality" UBT data set from any new Level 0 data found. There are days in which several different Level 0 file versions are available with different transcription dates, different time coverage and varying data quality.

While the Level 0 data quality discussion is ongoing, sample periods of data have been transferred for processing in order to check the possibility of generating valid UBT products for the missing data periods, and to give an indication of the amount of data that might be recovered.

5.2 ATSR-1 Level 0 data availability

The following sub-sections report in detail the likely ability to fill gaps from the consolidated Level 0 archive for different periods of the ATSR-1 mission. Detailed results of the sample processing of specific days are reported in section 5.3.

5.2.1 1991

The ATSR-1 archive for 1991 was checked as the first priority, as [AD 2] makes specific mention of the commissioning period and Mount Pinatubo eruption. The results are listed in Table 1. The column "L0 available" represents the number of Level 0 products in the DSI consolidated data set. Note that the consolidated Level 0 data set excludes products which are complete duplicates (these product files are denoted by an additional ".1", ".2" etc at the end of the filename). These duplicate files are therefore not returned by the search but there may be more than one product with the same times and different orbit numbers in the filename. Columns "L0 processed" and "UBTs generated" show the sample days processed and the number of UBT scene products generated for each day. For details of data quality checks on these days' data see later sections.

In general, days with no data or a small number of orbits archived were given priority, although in the case of 1991 the total number of days to check is small.

Date	Missing data status	L0 available	L0 processed	UBTs generated	UBT quality? / Comments
91/07/31	missing orbit(s)? nOrbits 2				Start of mission? Anomaly log notes 16 July start date. No Level 0 data before 31 July.
91/08/10	no data	16	Yes	1112	Blackbody temperatures not stabilised?
91/08/11	no data	14			
91/08/12	no data	14			
91/08/13	no data	15			

Date	Missing data status	L0 available	L0 processed	UBTs generated	UBT quality? / Comments
91/08/14	missing orbit(s)? nOrbits 2	13			
91/09/10	missing orbit(s)? nOrbits 13	12			13 orbits archived, 12 at L0 – same orbits?
91/09/13	missing orbit(s)? nOrbits 10	10			
91/09/14	missing orbit(s)? nOrbits 10	14			Within “missing” 1.6µm data period. Awaiting validation of SUPPLE update.
91/10/15	no data	15	Yes	1283	No problems detected (missing 1.6µm data as noted above)
91/10/16	no data	14			Within “missing” 1.6µm data period.
91/10/17	no data	14			As above
91/10/18	no data	15			As above
91/10/19	no data	14			As above
91/10/20	no data	14			As above
91/10/21	no data	15			As above
91/10/22	missing orbit(s)? nOrbits 2	14			As above
91/10/24	no data	15			As above
91/10/25	no data	14	Yes	1116	As above
91/10/26	missing orbit(s)? nOrbits 1	14			As above
91/10/28	missing orbit(s)? nOrbits 13	15			As above
91/10/29	no data	14			As above
91/10/30	no data	15			As above
91/10/31	no data	14			As above
91/11/01	missing orbit(s)? nOrbits 1	13			As above
91/11/12	missing orbit(s)? nOrbits 13	14			As above

Date	Missing data status	L0 available	L0 processed	UBTs generated	UBT quality? / Comments
91/11/13	missing orbit(s)? nOrbits 1	14			As above
91/12/11	missing orbit(s)? nOrbits 12	0			ERS-1 performing orbit manoeuvres to change from Commissioning Phase (3 day) to Ice Phase (3 day) orbit. Within "missing" 1.6µm data period.
91/12/12	missing orbit(s)? nOrbits 12	0			Within "missing" 1.6µm data period.
91/12/19	missing orbit(s)? nOrbits 13	0			As above
91/12/22	missing orbit(s)? nOrbits 13	0			As above
91/12/25	missing orbit(s)? nOrbits 13	0			As above

Table 1: Results of the check for missing ATSR-1 data in 1991, including sample days processed from Level 0 to UBT.

For the 2 large missing data periods in August and October 1991 there are significant numbers of Level 0 products available to fill the gap, potentially allowing recovery of approximately 21 days' data.

However, it is also notable that there is a period in December 1991 where there are no Level 0 products at all, despite the fact that UBT data exist in the archive.

It should be noted that many of the days where data are missing in 1991 fall within the period of the 1.6/3.7µm channel switching investigation described in [RD 3]. The fix to the SUPPLE processor for this problem is pending validation.

5.2.2 1992

Comparisons of the DSI Level 0 data set with the archive listings were continued into 1992, although in this case no sample days have been processed. The full listing of missing data days for 1992 is included in Appendix A.

In January and February 1992 there are 13 days where the number or orbits in the UBT archive is less than 10 (in several cases only 1 or 2 orbits) and 13-15 Level 0 files are available. For these dates the Level 0 files available are all version 8700. No test processing has been done in this period. N.B. this period is within the range affected by the 1.6/3.7µm channel switching problem [RD 3].

For later dates in 1992, days reported as having UBT products for fewer than 10 orbits have been checked against the Level 0 data set, with the results below.

- All the days reported as having no archived UBT data correspond to events in the instrument anomaly log [AD 3], such as outgassing or ATSR in standby.
- There appear to be 6 days where data might be recoverable, i.e. significantly more Level 0 files are available than there are UBT orbits archived.

- From April 1992 there are 2 or more versions of Level 0 product available for the days checked.
- During the earlier part of the year versions 8311 and 8700 are available; from September 1992 there are Level 0 files with version 8311 and 9120. In both cases advice is needed on which is the best Level 0 version for processing. As reported in [RD 2] version 9120 files were transcribed from tape much more recently than the version 8700 (and presumably version 8311). Samples of version 9102 products processed for 1996 were found to contain a higher level of data drop-outs or corruption than earlier transcriptions.

5.2.3 1993-1996

Checks on the ATSR-1 archive have not been continued into 1993 for the moment, since the work requires quite a high level of effort and is pending advice on the Level 0 data quality, as discussed in [RD 2].

5.3 ATSR-1 sample processing

FileZilla was used to search the FTP directories for Level 0 files for sample days listed as having no archived UBT data. Sample periods were then transferred from the FTP server and processed using SUPPLE.

Checks on the quality or validity of the processed UBT files can be done in several ways. Where possible, tools developed for other work packages such as that described in [RD 2] have been used in data checks in order to minimise development effort.

1. The number of UBT products generated per Level 0 file and the size of those products can give a first indication of the level of success.
2. Visual inspection of scenes using IDL provides a quick way to check general data quality, missing scan lines etc. Given the number of channels and the ATSR dual view, inspection is limited to a sample of data from each product and to a sample of the available UBT products. Checking a whole day's data is possible but time-consuming.
3. Inspection of the SUPPLE log files gives an indication of the data quality or problems. The pre-processor (SET) log records the number of packets "padded", i.e. where null packets are inserted because of missing source packets, and the first and last relative scan numbers, from which the maximum possible number of source packets present can be calculated. The main processor (SUM) logs progress and errors. However, the amount of output per Level 0 file is large: e.g. for the data on 15-Oct-1991 the 16 SUM.log files generated by the main SUPPLE processor varied from about 13,000 to 33,000 lines each. Filtering to remove the "routine" status and low-level error messages is necessary. Standard Linux tools such as grep and awk have been used to filter the log file content and calculate totals.

5.3.1 10-Aug-1991

The archive checking script reported that no UBT files were present for 10-13-Aug-1991 and files from only 2 orbits (or parts of) were present on 14-Aug-1991.

Level 0 files, version 8700, were found for all days in the period 10-14-Aug-1991. In this case only one Level 0 version is present (see [RD 2] for discussion of available Level 0 versions and data quality), which simplifies the decision over which files to use as the input for processing to UBT.

A sample day's Level 0 data for 10-Aug-1991 was downloaded and processed using the SUPPLE Level 0 to UBT processor. 1112 UBT products were generated, equivalent to almost 14 orbits.

The output UBT products from 2 Level 0 files were inspected visually using IDL (nadir views for the 12µm, 11µm and 1.6µm channels were inspected; it is assumed that if the nadir view data looks nominal the forward view is also free of anomalies as both views are extracted from the same source packet). Many scenes were present with no apparent data quality issues. There were scenes in parts of the orbit where data artefacts or

corruption were present, but these features are found in many archived UBT products. Figure 1 shows two example scenes from this day's data.

Nonetheless, these data may not be suitable for all science use because the instrument was undergoing commissioning activities. As shown in Figure 2, the warm and cold blackbody signals in the 12µm channel appear to be inverted: the warm blackbody counts are lower than those from the cold blackbody. The blackbody temperatures plotted in Figure 3 show that the "cold" blackbody is, in fact, warmer than the "warm" blackbody at this point in the mission.

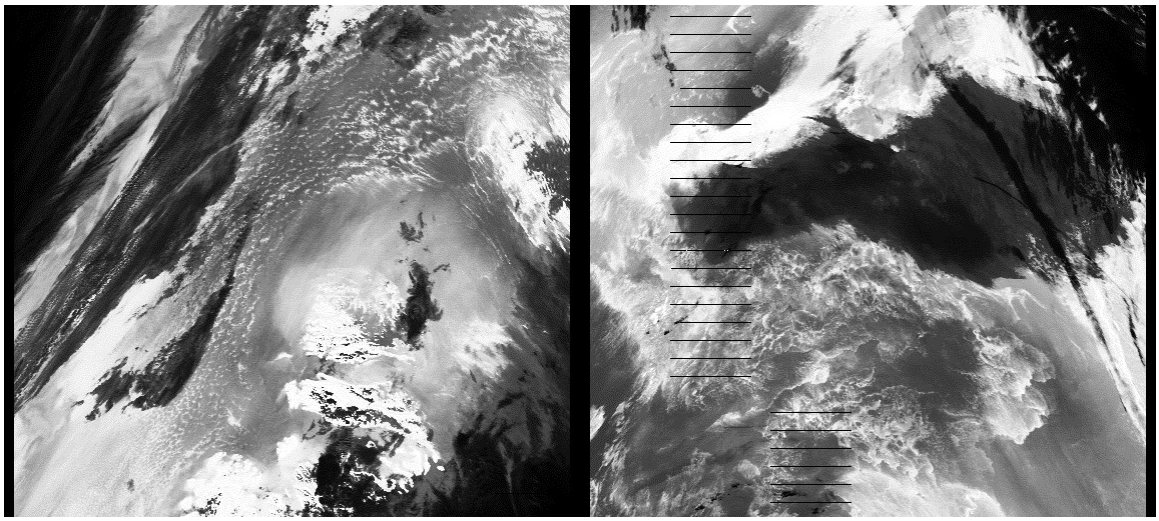

Figure 1: Two 11µm nadir-view scenes from UBT products generated from Level 0 data from 10-Aug-1991. Left: apparently valid brightness temperatures (ralubt-9108101517-11914) and right: examples of data artefacts (ralubt-9108101658-07411).

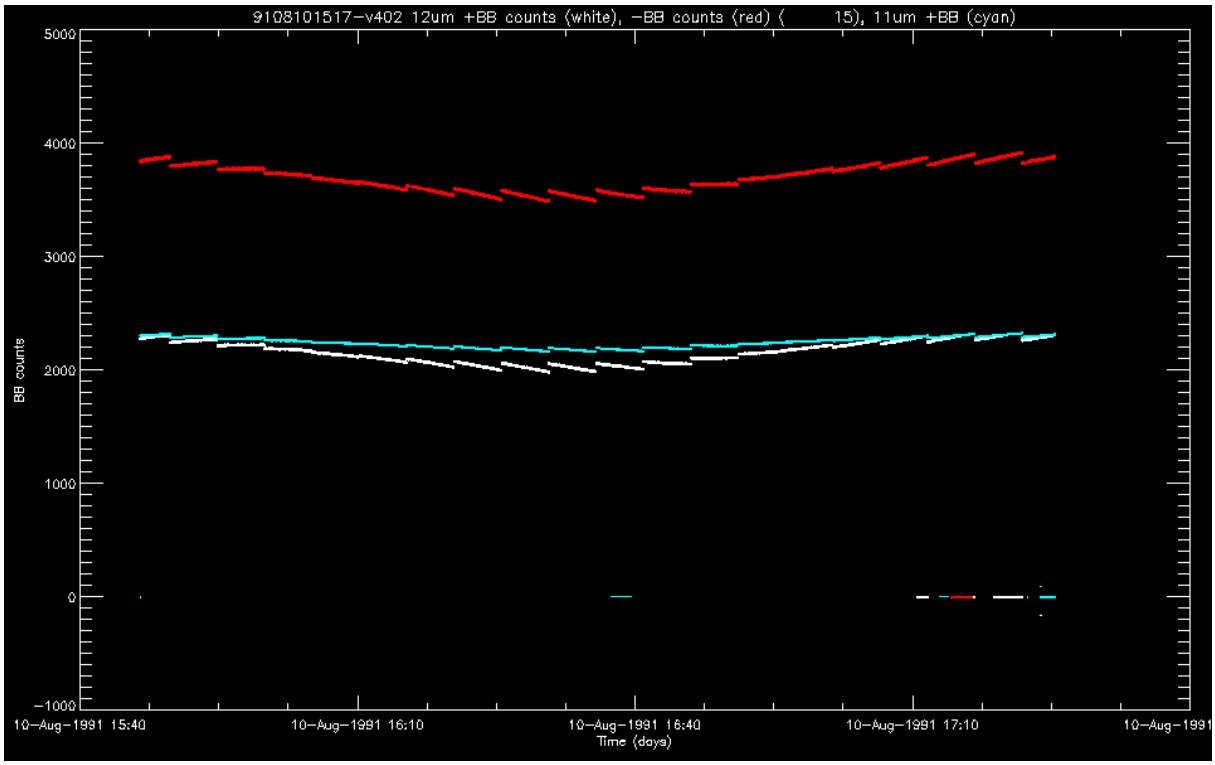

Figure 2: Blackbody counts from orbit with ascending node time 19910810 15:17. The plotted curves are the 12µm warm blackbody (white), the 12µm cold blackbody (red) and the 11µm warm blackbody (cyan).

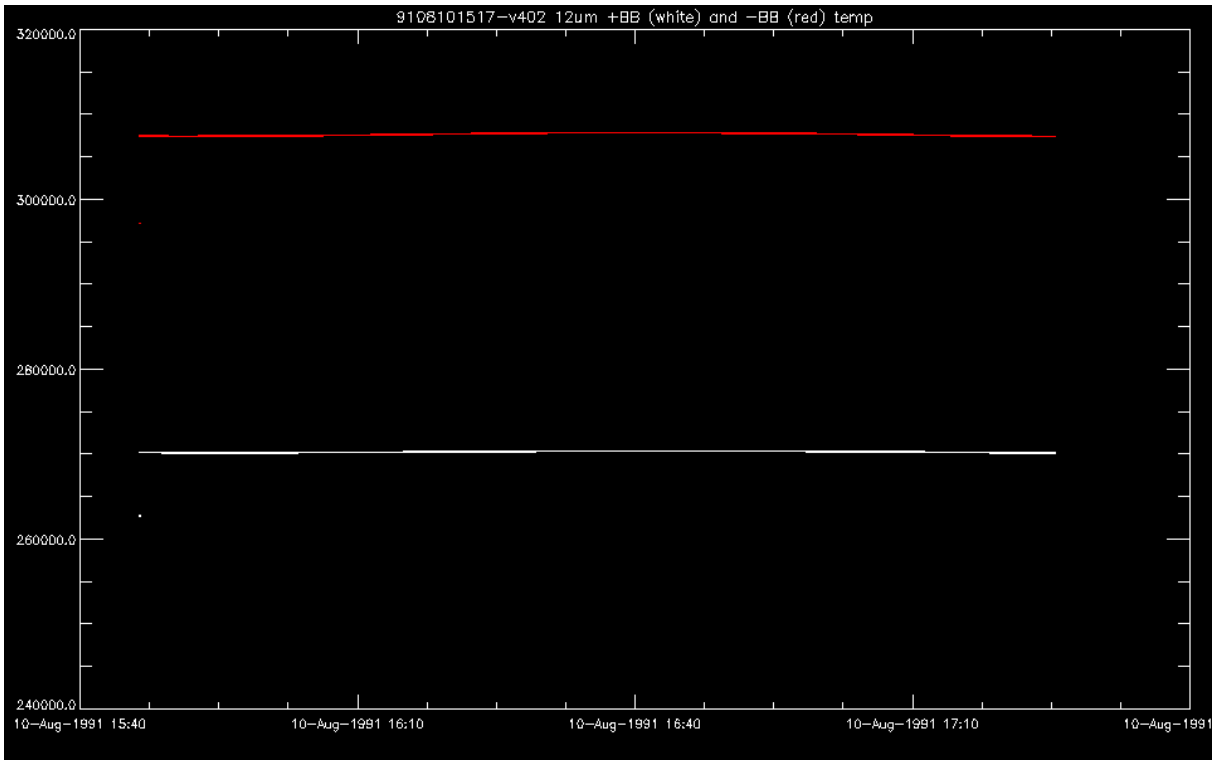

Figure 3: Blackbody temperatures from orbit with ascending node time 19910810 15:17. The plotted curves represent the "warm" blackbody (white) and "cold" blackbody" (red).

The SUPPLE pre-processor log reports the numbers of missing packets and possible total number of scans per Level 0 file (or orbit, approximately) listed in Table 2 for the 10-Aug-1991 data.

Start and end times from L0 filename	Missing packets padded	Total (possible) scans	Number of UBT products generated
19910809T224656_19910810T002531	4819	39737	78
19910810T011924_19910810T021414	331756	114681	0
19910810T021346_19910810T035333	605	40507	80
19910810T035310_19910810T053636	526	41896	82
19910810T053604_19910810T073144	11443	46363	91
19910810T073121_19910810T091359	322	41364	81
19910810T091332_19910810T105357	171	40335	79
19910810T105332_19910810T123222	269	39792	78
19910810T123158_19910810T140958	1721	39212	77
19910810T140934_19910810T154746	2934	39302	77
19910810T154722_19910810T172618	1131	40699	80
19910810T172554_19910810T190437	330	39804	78
19910810T190502_19910810T204455	288	40239	79
19910810T204427_19910810T222422	255	40222	79
19910810T222355_19910810T235324	260	36054	71
19910810T235259_19910811T014047	8720	44009	86

Table 2: Counts of missing packets from Level 0 files for 10-Aug-1991

For many of the Level 0 files listed, the number of missing source packets detected is low, and in several cases is less than 1%. The file for 19910810T011924_19910810T021414 is clearly unusual: the duration is less than an hour and the number of apparently missing source packets is greater than the total number of scans present, as derived from the first and last relative scan numbers. The number of scans is itself about half of what would be expected from the duration. There are in fact 2 Level 0 files for this time period, with different orbit numbers (by 1). SUPPLE fails to generate any UBT files from either Level 0 file. The pre-processor logs a large number of “time delta anomaly” messages for these files, suggesting that a re-set may have been performed.

Despite the data quality issues reported above, as there are no existing UBT files for this period it is presumably desirable to process all the available Level 0 and archive the resulting UBT products.

5.3.2 15-Oct-1991

Between 15-Oct-1991 and 31-Oct-1991 there are 12 days with no UBT data archived. Of the remaining 3 days, 2 days have only 1 or 2 orbits and 28-Oct-1991 has 13.

14 or 15 level 0 files per day exist for this entire date range, with file version 8700. Files for 15-Oct-1991 were transferred and processed, generating 1283 UBT products.

The SUPPLE pre-processor logs show that in most cases the number of missed source packets padded is equivalent to approximately 1% of an orbit. The main processor logs do not appear to contain any severe errors after filtering of routine status and low-level error messages.

Visual inspection of sample scenes in IDL did not reveal any problems other than data corruption or artefacts in part of the orbit.

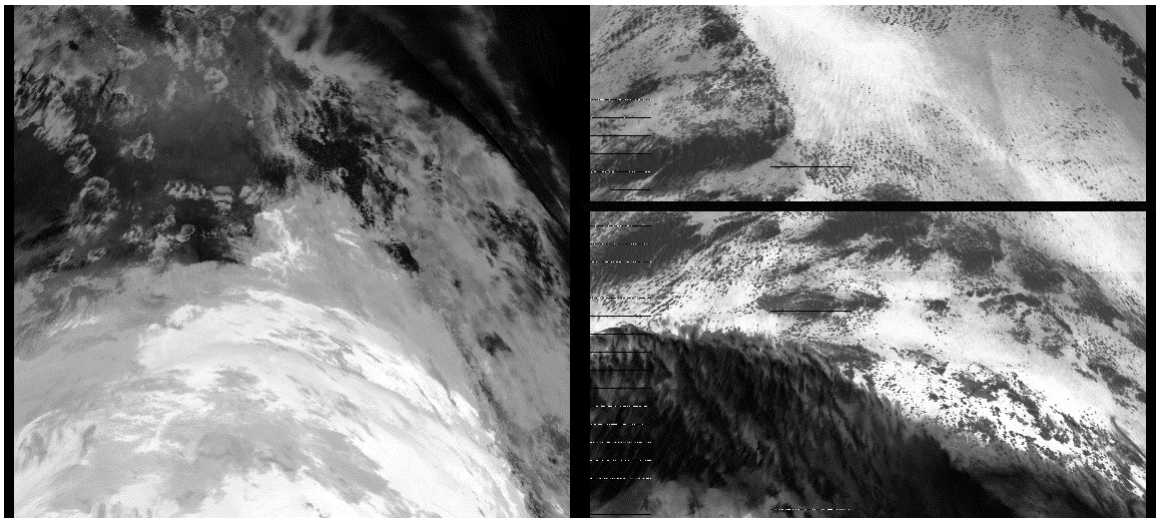

Figure 4: Two 11µm nadir-view scenes from UBT products generated from Level 0 data from 15-Oct-1991. Left: apparently valid brightness temperatures (9110150013-05256) and right: examples of data artefacts (ralubt-9110150153-03689).

Plots of the 12µm warm and cold blackbody counts and temperatures look nominal, as shown in Figure 5 and Figure 6.

Based on the limited set of quality checks performed the UBT products for this date appear to contain no major anomalies.

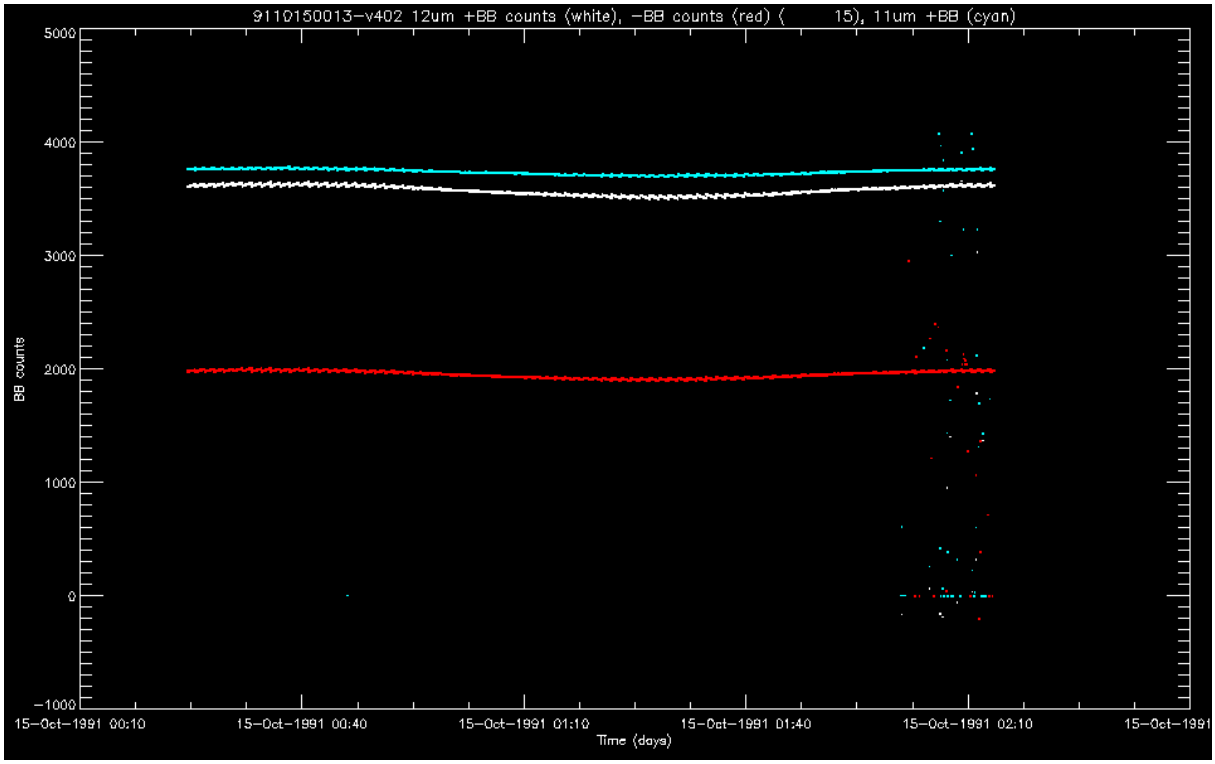

Figure 5: Blackbody counts from orbit with ascending node time 19911015 00:13. 12µm warm blackbody (white), 12µm cold blackbody (red) and 11µm warm blackbody (cyan).

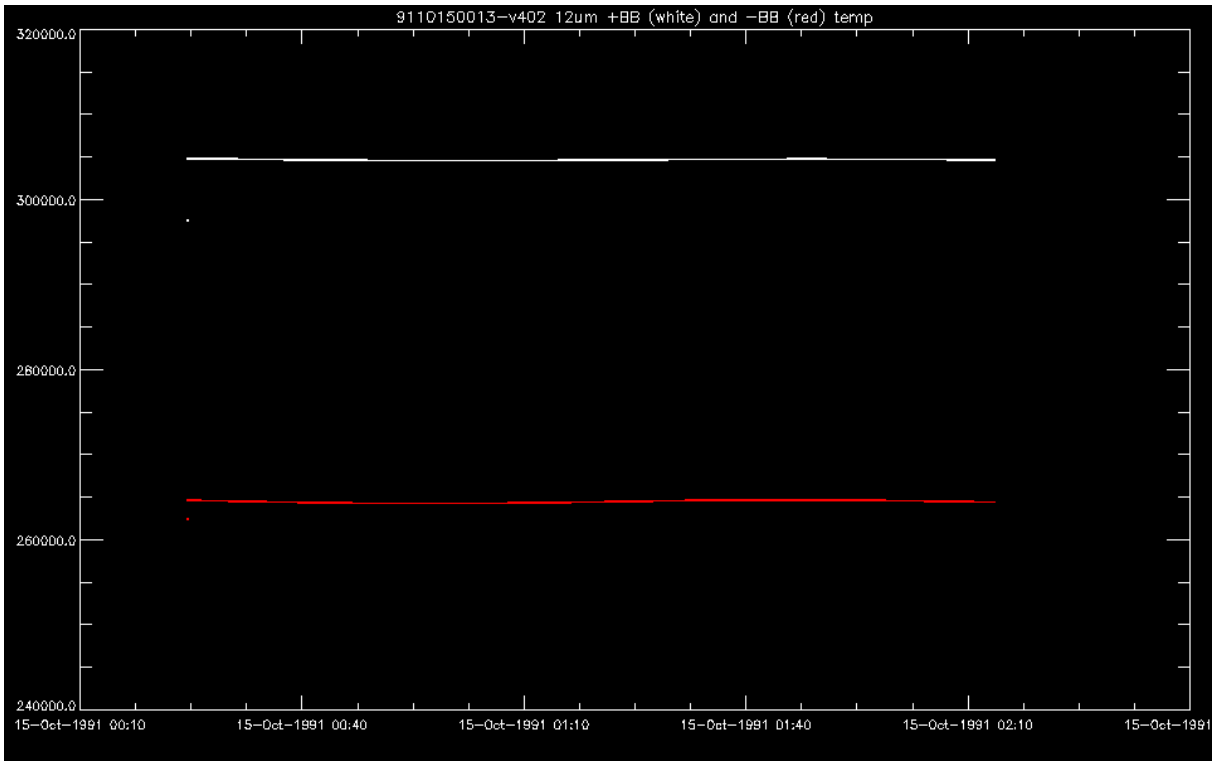

Figure 6: Blackbody temperatures from orbit with ascending node time 19911015 00:13. Warm blackbody (white) and cold blackbody (red).

5.3.3 25-Oct-1991

Due to the length of the period in October 1991 for which no UBT products are archived, additional Level 0 products from 25-Oct-1991 were transferred and processed. The data quality checks on logs files and visual checks in IDL produced similar results to the 10-Oct-1991 data.

5.4 ATSR-2 data availability

The following sub-sections report the likely ability to fill gaps in the UBT archive from the consolidated Level 0 archive for different periods of the ATSR-2 mission. Detailed results of the sample processing of specific days are reported in section 5.5. See Appendix B for complete listings from the UBT listing tool.

5.4.1 Start of mission: May and June 1995

The earliest data held on the NEODC UBT archive are from 01-Jun-1995 (the higher-level products before 14-Aug-1995 are stored as "segregated" commissioning data). The ERS-2 launch took place in April 1995. The official ERS-2 mission time range begins at 15-May-1995 22:29:29.

Level 0 products are available from the DSI archive starting from 28-Apr-1995. The number of products in April and May 1995 varies considerably from day to day, up to a maximum of 25 different products of the same version on one day and including products where the start and end acquisition times are only a few seconds apart.

Products checked from 28-Apr-1995, 20-May-1995 and 21-May-1995 contained no valid pixel data; all were flagged as "calibration parameters unavailable for pixel". The blackbody counts in the 11µm and 12µm channels are zero for the orbits checked on these days.

Products from 24-May-1995 and 28-May-1995 contain apparently valid pixel data in the forward and nadir views.

It is possible that valid science products could be recovered for some or all days between 22-May-1995 and 01-Jun-1995.

5.4.2 June to December 1995

Between 01-Jun-1995 and 31-Dec-1995 there are 11 days where UBT products are archived for fewer than 14 orbits: only 4 days in this period have fewer than 10 orbits. The Level 0 data set may allow recovery of a total of 35 orbits on these days.

5.4.3 1996

N.B. the anomaly log [AD 4] does not cover events in 1996-7. The first entry is for 03-Jun-1998.

There is a long gap in the data set at the beginning of 1996. ATSR-2 was in STANDBY mode from 22-Dec-1995 following a temperature trip caused by scan jitter [AD 6]. Continuous operation resumed on 1st July 1996.

Between July and December 1996 there is 1 day with no data present. 8 days are reported as having fewer than 14 orbits archived, but only 1 of these has data for fewer than 10 orbits. Potentially 26 orbits could be recovered from the Level 0 archive for July to December 1996.

5.4.4 1997-2003

Comparisons between the ATSR-2 UBT archive and the Level 0 data set have not been continued beyond 1996 for the moment, since the work requires quite a high level of effort and is pending advice on the Level 0 data quality, as discussed in [RD 2].

The gaps in UBT archive for 1998 were compared to the anomaly log [AD 4] and relevant information has been noted in the missing data list, in order to give an idea of the frequency of outages due to instrument causes.

5.4.5 Data after July 2003

The data from July 2003 onwards are very fragmented. Following the failure of the on-board tape recorder, data were only downlinked for partial orbits and only for certain orbits within each day. Since this UBT data set was derived from a set of Level 0 data recently made available on tape it may be reasonable to consider this period as outside of the scope of the data availability investigation. It is also possible that the consolidated Level 0 data set now available was taken from different tape sources than the processed data for this period.

As a result of the partial data coverage, every day in this period is likely to be flagged as having missing data by the archive listing script. Checking each day against the Level 0 data set is not practical unless a way can be found to automate the Level 0 and UBT comparison. These data are stored as “segregated” on the NEODC archive. N.B. at present the listing script makes no checks on segregated archive directories.

5.5 ATSR-2 sample processing

Several days’ Level 0 data from 1995 were transferred and processed using SUPPLE.

5.5.1 28-Apr-1995

No UBT products are present in the NEODC archive for this date.

9 Level 0 files are available, all with version 6210. From these files 716 UBT products were generated.

The SET log reports close to 40,000 scans per Level 0 product and approximately 1000 scans padded with null packet data for each product.

The SUM logs report close to 40,000 scans per product with NIBBLE_SHIFT_DETECTED_ERR for these Level 0 products.

Visual inspection of a sample of scenes in IDL shows that no valid pixel data are present; all pixels are flagged -7: calibration unavailable. Plots of the blackbody counts in the 11µm and 12µm channels show that no blackbody data are available (see **Figure 7**).

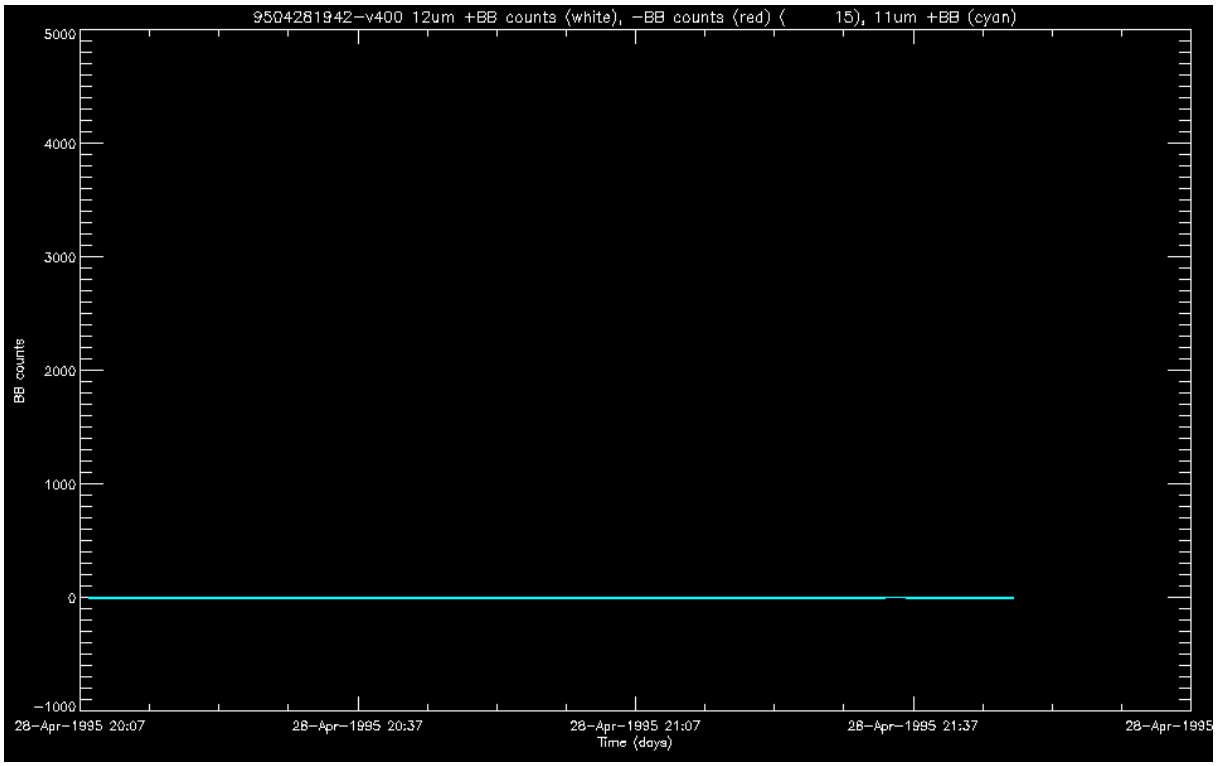

Figure 7: Blackbody counts from the 12µm and 11µm channels for ATSR-2 orbit 9504281942. As all counts are 0, the 12µm warm blackbody count (white) and cold blackbody count (red) are hidden by the trace for the 11µm warm blackbody count (cyan).

5.5.2 20-May-1995

No UBT products are present in the NEODC archive for this date.

17 Level 0 files are available, all with version 6210. From these files 1134 UBT products were generated.

The SET logs report close to 40,000 scans per Level 0 product for the bulk of the products available and low numbers of scans padded with null packet data, with the exception of a small number of products which have only 1 scan present and 2 products which have 14,000 or 15,000 scans padded.

The SUM logs report up to 83 scans with RAWPKT_FAILS_BASIC_VALIDATION_ERR for most of these Level 0 products. The number of NIBBLE_SHIFT_DETECTED_ERR reported for these products is reduced to single figures per product.

No valid pixel data are present in the scenes inspected in IDL for this day. The blackbody counts in the 11µm and 12µm channels are 0.

5.5.3 21-May-1995

No UBT products are present in the NEODC archive for this date.

22 Level 0 files are available, all with version 6210 (several of these files have very small size and short duration). From these files 787 UBT products were generated.

The SET logs report close to 40,000 scans per Level 0 product for the bulk of the products available and low numbers of scans padded with null packet data.

The SUM logs report a number of RAWPKT_FAILS_BASIC_VALIDATION_ERR for these Level 0 products, up to a maximum of 80 instances in one product.

No valid pixel data are present in the scenes inspected in IDL for this day. The blackbody counts in the 11µm and 12µm channels are 0 for the entire day.

5.5.4 24-May-1995

No UBT products are present in the NEODC archive for this date.

11 Level 0 products are available, all with version 6210. From these files 800 UBT products were generated.

The SET logs report close to 40,000 scans per Level 0 product for the bulk of the products available and low numbers of scans padded with null packet data (mostly 100-200, maximum 4574).

The SUM logs report between 100 and 814 scans per product with HEX5_IRR_HRATE_MULTIPLE_ERR in 9 of the Level 0 products, a few hundred scans per product with NIBBLE_SHIFT_DETECTED_ERR and 30-90 instances of RAWPKT_FAILS_BASIC_VALIDATION_ERR per Level 0 product.

Visual inspection in IDL shows that apparently valid pixel data are present in the 11µm, 12µm and 1.6µm nadir views for all scenes checked from orbit 9505240922, for example.

5.5.5 28-May-1995

No UBT products are present in the NEODC archive for this date.

19 Level 0 files are available, all with version 6210. From these files 1271 UBT products were generated.

The SET log reports close to 40,000 scans in each of the Level 0 products, except for a small number of products with between 1,000 and 4,000 scans, which may be duplicates.

The SUM logs report a number of scans from each Level 0 product where there are RAWPKT_FAILS_BASIC_VALIDATION_ERR, NIBBLE_SHIFT_DETECTED_ERR, HEX5_IRR_HRATE_SINGLE_ERR or HEX5_IRR_HRATE_MULTIPLE_ERR. The maximum number of HEX5_IRR_HRATE errors in any Level 0 file is 1399.

Visual inspection in IDL shows that apparently valid pixel data are present in the 11µm, 12µm and 1.6µm nadir views for all scenes checked from orbits 950528 00:33 and 950528 05:35 (other channels and forward view were not inspected).

The plotted blackbody counts also look nominal based on a cursory inspection, i.e. the 12µm warm blackbody counts are higher than the cold blackbody counts and the curves are regular.

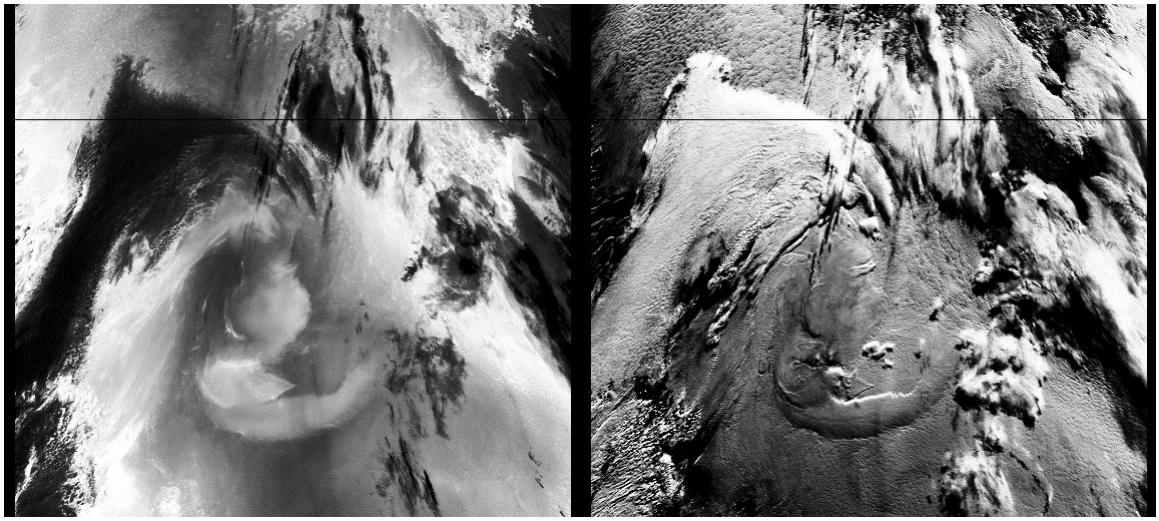

Figure 8: Nadir-view scenes from the ATSR-2 orbit at 950528 00:33, 11µm (left) and 12µm (right).

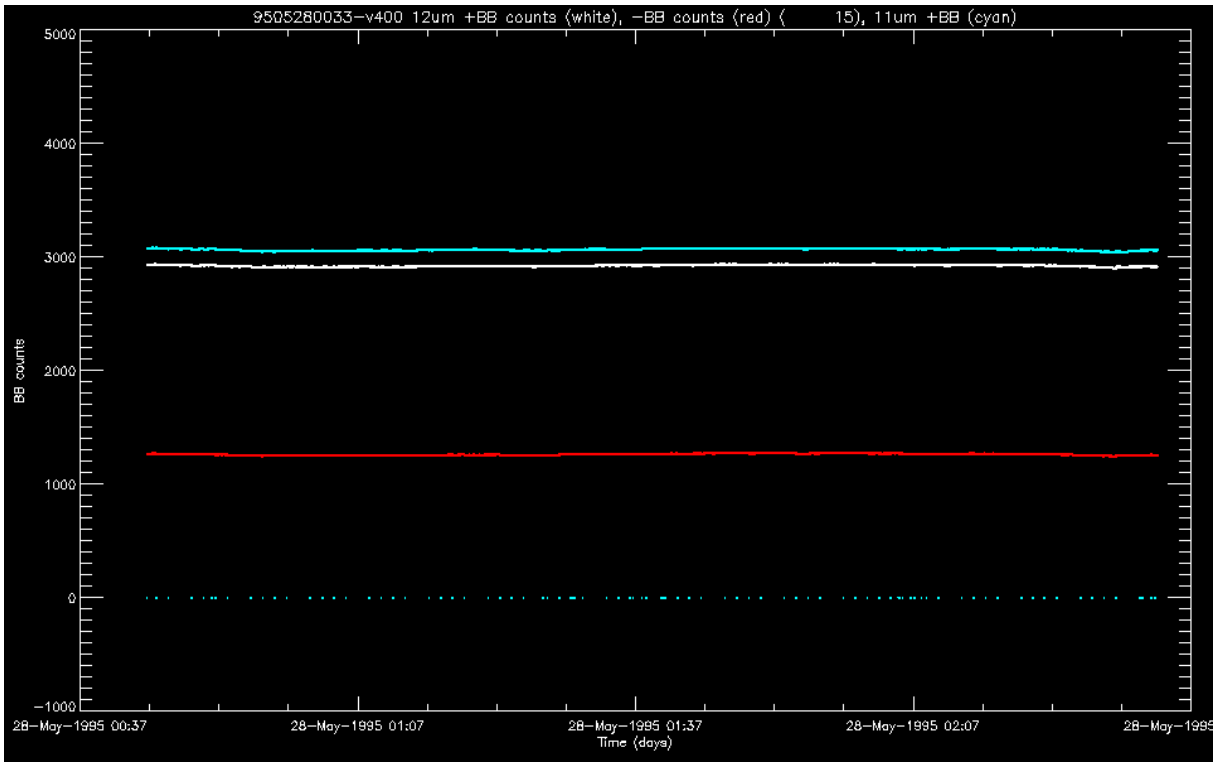

Figure 9: Blackbody values from the ATSR-2 orbit at 950528 00:33, processed by SUPPLE version 400. 12µm warm blackbody (white), 12µm cold blackbody (red) and 11µm warm blackbody (cyan).

6 Conclusions

While the Level 0 data quality and available product versions are still subject to discussion [RD 2], only sample checks and processing have been performed.

6.1 ATSR-1

In 1991 there are many Level 0 products available for days where the NEODC archive contains UBT products from fewer than 14 orbits. Potentially, 21 days' data are recoverable. Sample processing to UBT and data checks on the UBT products suggest that there are no specific data quality issues affecting these data. For 1991 a single Level 0 product version exists, which removes any uncertainty regarding which Level 0 products to process.

In 1992 there are 19 days where UBT data might be recoverable from Level 0, particularly in the early part of the year. For later dates in 1992, the gaps in the data set correspond increasingly to logged instrument or platform outages. Level 0 products are available in more than 1 version after April 1992.

In both 1991 and 1992 the data are affected by the 1.6/3.7μm channel switching problem [RD 3], for which the suggested solution is not yet validated.

While additional UBT products may be recovered for 1991, the instrument was still undergoing commissioning and therefore care is required in using the resulting products for scientific study.

Note that one period has been found where the UBT archive contains data but there are no products available in the consolidated Level 0 data set.

Data after 1992 have not been checked to date.

6.2 ATSR-2

At the start of the mission in 1995 there are Level 0 products for the period before the beginning of the UBT archive, from 28-Apr to 31-May-1995, although the results of sample processing indicate that only the products from the last 8-9 days of this period are likely to contain products with measurement data. The reason for the start date of 01-Jun-1995 in the UBT data set archived by NEODC does not appear to be documented.

Comparison of the Level 0 and UBT archives for June to December 1995 has only identified a possible 35 orbits that are potentially recoverable from the Level 0 data set.

Archive comparisons have been made for 1996, although ATSR-2 was in STANDBY mode from 22-Dec-1995 to 01-Jul-1996 (the first day of continuous operation). Between July and December 1996 there are potentially 26 orbits that could be recovered from the Level 0 archive.

Data after 1996 have not been checked to date.

The fragmented data starting from July 2003 (following the on-board tape recorder failure) are a recent addition to the UBT archive and may not need further checking, although this depends whether the tapes were created from the same archive source as the Matera data consolidated by DSI.

Appendix A ATSR-1 missing data listings

1991

Date	Missing data?	DSI L0 available	L0 processed	nUBTs	UBT quality / Comments
91/07/31	missing orbit(s)? nOrbits 2	4			
91/08/10	no data	16	Yes	1112	BB temps?
91/08/11	no data	14	No		
91/08/12	no data	14	No		
91/08/13	no data	15	No		
91/08/14	missing orbit(s)? nOrbits 2	13	No		
91/09/10	missing orbit(s)? nOrbits 13	12			13 orbits archived, 12 at L0 - same?
91/09/13	missing orbit(s)? nOrbits 10	10			
91/09/14	missing orbit(s)? nOrbits 10	14			
91/10/15	no data	15	Yes	1283	
91/10/16	no data	14			
91/10/17	no data	14			
91/10/18	no data	15			
91/10/19	no data	14			
91/10/20	no data	14			
91/10/21	no data	15			
91/10/22	missing orbit(s)? nOrbits 2	14			
91/10/24	no data	15			
91/10/25	no data	14	Yes	1116	
91/10/26	missing orbit(s)? nOrbits 1	14			
91/10/28	missing orbit(s)? nOrbits 13	15			
91/10/29	no data	14			
91/10/30	no data	15			
91/10/31	no data	14			
91/11/01	missing orbit(s)? nOrbits 1	13			
91/11/12	missing orbit(s)? nOrbits 13	14			
91/11/13	missing orbit(s)? nOrbits 1	14			
91/12/11	missing orbit(s)? nOrbits 12	0			ERS-1 performing orbit manoeuvres to change from Commission Phase (3 day) to Ice Phase (3 day) orbit
91/12/12	missing orbit(s)? nOrbits 12		0		
91/12/19	missing orbit(s)? nOrbits 13		0		
91/12/22	missing orbit(s)? nOrbits 13		0		
91/12/25	missing orbit(s)? nOrbits 13		0		

1992

Date	Missing data?	DSI L0 available	L0 processed	nUBTs	UBT quality / Comments
92/01/01	missing orbit(s)? nOrbits 2	14			
92/01/12	missing orbit(s)? nOrbits 13	14			
92/01/17	missing orbit(s)? nOrbits 1	14			
92/01/18	missing orbit(s)? nOrbits 1	13			
92/01/22	missing orbit(s)? nOrbits 2	15			
92/01/23	missing orbit(s)? nOrbits 2	14			
92/01/27	missing orbit(s)? nOrbits 2	14			
92/02/03	missing orbit(s)? nOrbits 12	11			
92/02/10	missing orbit(s)? nOrbits 2	14			
92/02/13	missing orbit(s)? nOrbits 5	14			
92/02/14	missing orbit(s)? nOrbits 9	9			
92/02/17	missing orbit(s)? nOrbits 10	14			
92/02/19	missing orbit(s)? nOrbits 13	15			
92/02/20	missing orbit(s)? nOrbits 1	13			
92/02/21	missing orbit(s)? nOrbits 7	15			
92/02/24	missing orbit(s)? nOrbits 12	15			
92/02/25	missing orbit(s)? nOrbits 10	15			

92/02/26 missing orbit(s)? nOrbits 13	14	
92/02/27: no data	15	
92/02/28 missing orbit(s)? nOrbits 2	14	
92/02/29 missing orbit(s)? nOrbits 6	14	
92/03/08 missing orbit(s)? nOrbits 13		
92/03/10 missing orbit(s)? nOrbits 12		
92/03/16 missing orbit(s)? nOrbits 13		
92/03/17 missing orbit(s)? nOrbits 12		
92/03/20 missing orbit(s)? nOrbits 13		
92/03/21 missing orbit(s)? nOrbits 12		
92/03/23 missing orbit(s)? nOrbits 11		
92/03/25 missing orbit(s)? nOrbits 13		
92/03/31 missing orbit(s)? nOrbits 12		
92/04/01 missing orbit(s)? nOrbits 12		
92/04/02 missing orbit(s)? nOrbits 12		
92/04/04 missing orbit(s)? nOrbits 13		
92/04/05 missing orbit(s)? nOrbits 6	6 v8700 10 v8311	
92/04/13 missing orbit(s)? nOrbits 11		
92/04/14 missing orbit(s)? nOrbits 10		
92/04/15 missing orbit(s)? nOrbits 1	14 v8311	
92/04/20 missing orbit(s)? nOrbits 11		
92/05/14 missing orbit(s)? nOrbits 11		
92/05/19 missing orbit(s)? nOrbits 13		
92/05/28 missing orbit(s)? nOrbits 13		
92/06/11 missing orbit(s)? nOrbits 7	6	Outgassing 10-16-Jun
92/06/12: no data 0		
92/06/13: no data 0		
92/06/14: no data 0		
92/06/15 missing orbit(s)? nOrbits 11		
92/06/25 missing orbit(s)? nOrbits 12		
92/06/26: no data	0	26-27th in standby
92/06/27 missing orbit(s)? nOrbits 6		
92/07/18 missing orbit(s)? nOrbits 13		
92/07/19: no data		19-23rd in standby
92/07/20: no data		
92/07/21: no data		
92/07/22: no data		
92/07/23 missing orbit(s)? nOrbits 1		
92/08/09 missing orbit(s)? nOrbits 6		9-10 in standby
92/08/10 missing orbit(s)? nOrbits 9		
92/08/20 missing orbit(s)? nOrbits 4	5	
92/08/25 missing orbit(s)? nOrbits 12		
92/09/02 missing orbit(s)? nOrbits 9		2-5th Sept standby
92/09/03 missing orbit(s)? nOrbits 2		
92/09/05 missing orbit(s)? nOrbits 12		
92/09/06 missing orbit(s)? nOrbits 10		
92/09/08 missing orbit(s)? nOrbits 13		8 Sep standby
92/09/20 missing orbit(s)? nOrbits 13		
92/09/21 missing orbit(s)? nOrbits 1	13 v8311 5 v9120	
92/10/03 missing orbit(s)? nOrbits 5	14 v8311	
92/10/13 missing orbit(s)? nOrbits 4	15	
92/11/04 missing orbit(s)? nOrbits 13		
92/11/10 missing orbit(s)? nOrbits 11		
92/11/20 missing orbit(s)? nOrbits 13		
92/12/05 missing orbit(s)? nOrbits 13		
92/12/06 missing orbit(s)? nOrbits 1	13	

1993

93/02/19 missing orbit(s)? nOrbits 2
93/03/09 missing orbit(s)? nOrbits 13
93/04/07: no data
93/04/08 missing orbit(s)? nOrbits 2
93/04/14 missing orbit(s)? nOrbits 13
93/04/15 missing orbit(s)? nOrbits 8

93/05/01 missing orbit(s)? nOrbits 13
93/05/02 missing orbit(s)? nOrbits 1
93/06/01 missing orbit(s)? nOrbits 12
93/06/02 missing orbit(s)? nOrbits 2
93/07/08 missing orbit(s)? nOrbits 13
93/07/09 missing orbit(s)? nOrbits 2
93/07/21 missing orbit(s)? nOrbits 13
93/07/22 missing orbit(s)? nOrbits 2
93/07/26 missing orbit(s)? nOrbits 13
93/08/18 missing orbit(s)? nOrbits 11
93/09/14 missing orbit(s)? nOrbits 8
93/10/01 missing orbit(s)? nOrbits 13
93/10/02 missing orbit(s)? nOrbits 3
93/10/16 missing orbit(s)? nOrbits 13
93/10/17 missing orbit(s)? nOrbits 2
93/10/19 missing orbit(s)? nOrbits 13
93/10/20 missing orbit(s)? nOrbits 2
93/10/27 missing orbit(s)? nOrbits 13
93/10/28 missing orbit(s)? nOrbits 2
93/10/30 missing orbit(s)? nOrbits 13
93/10/31: no data
93/11/01 missing orbit(s)? nOrbits 2
93/11/02 missing orbit(s)? nOrbits 13
93/11/03: no data
93/11/04: no data
93/11/05: no data
93/11/06: no data
93/11/07: no data
93/11/08 missing orbit(s)? nOrbits 2
93/11/11 missing orbit(s)? nOrbits 2
93/12/06 missing orbit(s)? nOrbits 11
93/12/10 missing orbit(s)? nOrbits 10
93/12/13 missing orbit(s)? nOrbits 10
93/12/14 missing orbit(s)? nOrbits 13
93/12/19 missing orbit(s)? nOrbits 12
93/12/25 missing orbit(s)? nOrbits 12
93/12/26 missing orbit(s)? nOrbits 1
93/12/28 missing orbit(s)? nOrbits 13
93/12/29 missing orbit(s)? nOrbits 2

1994

94/01/06 missing orbit(s)? nOrbits 8
94/01/07 missing orbit(s)? nOrbits 10
94/01/08 missing orbit(s)? nOrbits 10
94/01/10 missing orbit(s)? nOrbits 13
94/01/11 missing orbit(s)? nOrbits 11
94/01/12 missing orbit(s)? nOrbits 11
94/01/22 missing orbit(s)? nOrbits 10
94/01/23 missing orbit(s)? nOrbits 11
94/01/29 missing orbit(s)? nOrbits 13
94/01/30 missing orbit(s)? nOrbits 7
94/03/07 missing orbit(s)? nOrbits 13
94/03/08 missing orbit(s)? nOrbits 2
94/03/09 missing orbit(s)? nOrbits 11
94/03/10 missing orbit(s)? nOrbits 2
94/04/11 missing orbit(s)? nOrbits 9
94/04/20: no data
94/04/21 missing orbit(s)? nOrbits 2
94/05/02: no data
94/05/03: no data
94/05/04 missing orbit(s)? nOrbits 2
94/05/05 missing orbit(s)? nOrbits 8
94/05/06: no data
94/05/07: no data

94/05/08 missing orbit(s)? nOrbits 13
94/05/17 missing orbit(s)? nOrbits 12
94/06/17 missing orbit(s)? nOrbits 12
94/06/20 missing orbit(s)? nOrbits 13
94/06/23 missing orbit(s)? nOrbits 13
94/06/26 missing orbit(s)? nOrbits 13
94/06/29 missing orbit(s)? nOrbits 13
94/07/01 missing orbit(s)? nOrbits 12
94/07/04 missing orbit(s)? nOrbits 13
94/07/25 missing orbit(s)? nOrbits 12
94/07/26 missing orbit(s)? nOrbits 10
94/08/13: no data
94/08/14: no data
94/08/15 missing orbit(s)? nOrbits 2
94/08/22 missing orbit(s)? nOrbits 13
94/08/23 missing orbit(s)? nOrbits 2
94/09/08 missing orbit(s)? nOrbits 10
94/09/18: no data
94/09/19: no data
94/09/20: no data
94/09/21: no data
94/09/22 missing orbit(s)? nOrbits 2
94/10/05 missing orbit(s)? nOrbits 2
94/10/06 missing orbit(s)? nOrbits 7
94/10/15 missing orbit(s)? nOrbits 13
94/10/16 missing orbit(s)? nOrbits 1
94/10/23 missing orbit(s)? nOrbits 2
94/11/14 missing orbit(s)? nOrbits 8
94/11/24 missing orbit(s)? nOrbits 4
94/11/25: no data
94/11/26: no data
94/11/27: no data
94/12/01 missing orbit(s)? nOrbits 12
94/12/02 missing orbit(s)? nOrbits 1
94/12/03: no data
94/12/04 missing orbit(s)? nOrbits 12
94/12/11 missing orbit(s)? nOrbits 13
94/12/12: no data
94/12/13: no data
94/12/14: no data
94/12/15: no data
94/12/16: no data
94/12/17 missing orbit(s)? nOrbits 1

1995

95/01/20: no data
95/01/23 missing orbit(s)? nOrbits 7
95/01/24 missing orbit(s)? nOrbits 11
95/01/26 missing orbit(s)? nOrbits 9
95/01/27: no data
95/01/28 missing orbit(s)? nOrbits 8
95/02/01 missing orbit(s)? nOrbits 12
95/02/02: no data
95/02/03: no data
95/02/04 missing orbit(s)? nOrbits 6
95/02/05 missing orbit(s)? nOrbits 8
95/02/09 missing orbit(s)? nOrbits 1
95/02/10: no data
95/02/11 missing orbit(s)? nOrbits 8
95/02/13 missing orbit(s)? nOrbits 7
95/02/14 missing orbit(s)? nOrbits 8
95/02/15: no data
95/02/16: no data
95/02/17: no data

95/02/18 missing orbit(s)? nOrbits 10
95/02/22 missing orbit(s)? nOrbits 2
95/02/23: no data
95/02/24 missing orbit(s)? nOrbits 6
95/03/02 missing orbit(s)? nOrbits 6
95/03/08 missing orbit(s)? nOrbits 13
95/04/14 missing orbit(s)? nOrbits 13
95/04/15 missing orbit(s)? nOrbits 2
95/04/20 missing orbit(s)? nOrbits 11
95/05/02 missing orbit(s)? nOrbits 7
95/07/05 missing orbit(s)? nOrbits 4
95/07/06 missing orbit(s)? nOrbits 8
95/07/19 missing orbit(s)? nOrbits 13
95/07/20 missing orbit(s)? nOrbits 12
95/07/21 missing orbit(s)? nOrbits 6
95/07/23 missing orbit(s)? nOrbits 13
95/07/26 missing orbit(s)? nOrbits 9
95/07/29 missing orbit(s)? nOrbits 13
95/07/31 missing orbit(s)? nOrbits 8
95/08/01 missing orbit(s)? nOrbits 1
95/08/02 missing orbit(s)? nOrbits 6
95/08/27 missing orbit(s)? nOrbits 11
95/09/01 missing orbit(s)? nOrbits 11
95/09/02 missing orbit(s)? nOrbits 7
95/10/22 missing orbit(s)? nOrbits 13
95/10/23 missing orbit(s)? nOrbits 12
95/10/25 missing orbit(s)? nOrbits 12
95/10/26 missing orbit(s)? nOrbits 12
95/10/27 missing orbit(s)? nOrbits 13
95/11/11 missing orbit(s)? nOrbits 12
95/11/13 missing orbit(s)? nOrbits 13
95/11/14 missing orbit(s)? nOrbits 7
95/12/15 missing orbit(s)? nOrbits 3
95/12/19 missing orbit(s)? nOrbits 6
95/12/21 missing orbit(s)? nOrbits 13
95/12/24 missing orbit(s)? nOrbits 8
95/12/28 missing orbit(s)? nOrbits 5

1996

N.B. in June 1996 ESA ceased data collection from ERS-1 [AD 6]. The platform was re-activated to acquire three days of data once every 70 days until December 1997.

96/01/02 missing orbit(s)? nOrbits 6
96/02/10 missing orbit(s)? nOrbits 7
96/02/17 missing orbit(s)? nOrbits 13
96/03/29 missing orbit(s)? nOrbits 13
96/03/31 missing orbit(s)? nOrbits 9
96/05/09 missing orbit(s)? nOrbits 2
96/05/10 missing orbit(s)? nOrbits 12
96/05/20 missing orbit(s)? nOrbits 12
96/06/03 missing orbit(s)? nOrbits 4
96/06/04: no data
until
96/07/10: no data
96/07/11 missing orbit(s)? nOrbits 1
96/07/12: no data
96/07/13: no data
96/07/14: no data
96/07/15 missing orbit(s)? nOrbits 1
96/07/16: no data
96/07/17: no data
96/07/18: no data
96/07/19: no data
96/07/20: no data

See note at beginning of 1996 section

96/07/21: no data
96/07/22: no data
96/07/23: no data
96/07/24: no data
96/07/25: no data
96/07/26 missing orbit(s)? nOrbits 3
96/07/27: no data
96/07/28: no data
96/07/29 missing orbit(s)? nOrbits 3
96/07/30: no data
96/07/31: no data
96/08/01 missing orbit(s)? nOrbits 1
96/08/02: no data
96/08/03: no data
96/08/04 missing orbit(s)? nOrbits 1
96/08/05: no data
96/08/06: no data
96/08/07 missing orbit(s)? nOrbits 1
96/08/08 missing orbit(s)? nOrbits 2
96/08/09: no data
until
96/10/21: no data
96/10/22 missing orbit(s)? nOrbits 9
96/10/23 missing orbit(s)? nOrbits 9
96/10/24 missing orbit(s)? nOrbits 11
96/10/25: no data
until
96/12/29: no data
96/12/30 missing orbit(s)? nOrbits 1

1997

97/01/03: missing orbit(s)? nOrbits 3
97/01/04: no data
until
97/03/09: no data
97/03/10: missing orbit(s)? nOrbits 1
97/03/12: missing orbit(s)? nOrbits 6
97/03/13: missing orbit(s)? nOrbits 12
97/03/14: missing orbit(s)? nOrbits 3
97/03/15: no data
until
97/05/19: no data
97/05/20: missing orbit(s)? nOrbits 12
97/05/23: missing orbit(s)? nOrbits 3
97/05/24: no data
until
97/07/27: no data
97/07/28: missing orbit(s)? nOrbits 1
97/08/01: missing orbit(s)? nOrbits 3
97/08/02: no data
97/08/03: no data
until
97/10/05: no data
97/10/06: missing orbit(s)? nOrbits 1
97/10/10: missing orbit(s)? nOrbits 3
97/10/11: no data
until
97/12/15: no data
97/12/16: missing orbit(s)? nOrbits 10
97/12/17: missing orbit(s)? nOrbits 10
97/12/18: no data
97/12/19: no data
97/12/20: no data
97/12/21: no data

97/12/22: no data
97/12/23: no data
97/12/24: no data
97/12/25: no data
97/12/26: no data
97/12/27: no data
97/12/28: no data
97/12/29: no data
97/12/30: no data — ERS-1 spacecraft emergency declared when 40% of the solar array output was lost.
97/12/31: no data

The ATSR-1 anomaly log [AD 3] contains entries relating to “dehibernation” and data collection on 28 & 29-Apr-1999 and 24 & 25-Jan-2000. In March 2000 contact was lost with the spacecraft.

Appendix B ATSR-2 missing data listings

1995

All dates listed as missing for 1995 have been compared to the Level 0 archive.

Date	Missing data?	DSI L0 available	L0 processed	nUBTs	UBT quality /comments
95/04/28:	no data	9	Yes	716	No pixel data present 41,000 nibble shift errors per L0
95/04/29:	no data	9			
95/04/30:	no data	10			
95/05/01:	no data	13			
95/05/02:	no data	14			
95/05/03:	no data	17			
95/05/04:	no data	16			
95/05/05:	no data	25			
95/05/06:	no data	17			
95/05/07:	no data	9			
95/05/08:	no data	19			
95/05/09:	no data	15			
95/05/10:	no data	10			
95/05/11:	no data	15			
95/05/12:	no data	16			
95/05/13:	no data	15			
95/05/14:	no data	14			
95/05/15:	no data	13			
95/05/16:	no data	15			
95/05/17:	no data	15			
95/05/18:	no data	17			
95/05/19:	no data	16			
95/05/20:	no data	17	Yes	1134	
95/05/21:	no data	22	Yes	787	No pixel data present
95/05/22:	no data	13			
95/05/23:	no data	15			
95/05/24:	no data	11	Yes	800	Pixel data present
95/05/25:	no data	15			
95/05/26:	no data	14			
95/05/27:	no data	16			
95/05/28:	no data	19	Yes	1271	
95/05/29:	no data	15			
95/05/30:	no data	14			
95/05/31:	no data	7			
95/06/06:	missing orbit(s)? nOrbits 13	13			
95/08/09:	missing orbit(s)? nOrbits 11	14			
95/08/26:	missing orbit(s)? nOrbits 6	15			
95/09/24:	missing orbit(s)? nOrbits 10	10			
95/10/10:	missing orbit(s)? nOrbits 11	15			
95/10/21:	missing orbit(s)? nOrbits 12	12			
95/10/24:	missing orbit(s)? nOrbits 13	14			
95/10/28:	missing orbit(s)? nOrbits 8	14			
95/11/09:	missing orbit(s)? nOrbits 7	14			
95/11/11:	missing orbit(s)? nOrbits 13	13			
95/12/22:	missing orbit(s)? nOrbits 7	12			In STANDBY from 22-Dec-1995
1996					
96/01/01:	no data				In STANDBY until 26-Jun-1996
96/06/26:	no data				Software patch loaded
96/06/27:	no data				
96/06/28:	no data				
96/06/29:	no data				

96/06/30:	no data		Continuous operation resumes on 01-Jul-1996
96/07/28:	no data	6	
96/11/02:	missing orbit(s)? nOrbits 12	10	
96/11/09:	missing orbit(s)? nOrbits 13	14	
96/11/22:	missing orbit(s)? nOrbits 12	14	
96/11/23:	missing orbit(s)? nOrbits 10	15	
96/11/25:	missing orbit(s)? nOrbits 13	13	
96/11/29:	missing orbit(s)? nOrbits 12	15	
96/12/04:	missing orbit(s)? nOrbits 13	14	
96/12/31:	missing orbit(s)? nOrbits 6	17	

From this point onwards no comparison with the Level 0 archive has been made.

1997

97/02/14:	no data	
97/02/15:	missing orbit(s)? nOrbits 8	
97/04/03:	missing orbit(s)? nOrbits 13	
97/07/05:	missing orbit(s)? nOrbits 13	
97/11/25:	missing orbit(s)? nOrbits 12	
97/11/26:	missing orbit(s)? nOrbits 9	

1998

98/03/09:	missing orbit(s)? nOrbits 11	
98/04/01:	missing orbit(s)? nOrbits 13	
98/06/03:	missing orbit(s)? nOrbits 8	
98/06/04:	no data	ERS-2 attitude control anomaly ATSR recovered 08-Jun
98/06/05:	no data	
98/06/06:	missing orbit(s)? nOrbits 7	
98/08/01:	missing orbit(s)? nOrbits 12	
98/09/15:	missing orbit(s)? nOrbits 13	Payload anomaly, recovered 16-Sep
98/09/16:	missing orbit(s)? nOrbits 3	
98/11/17:	missing orbit(s)? nOrbits 8	ERS-2 shut down. ATSR restart 19-Nov
98/11/18:	missing orbit(s)? nOrbits 6	
98/11/23:	missing orbit(s)? nOrbits 13	

1999

99/01/25:	no data	
99/01/26:	no data	
99/01/27:	no data	
99/01/28:	no data	
99/01/29:	no data	
99/01/30:	no data	
99/01/31:	no data	
99/02/16:	missing orbit(s)? nOrbits 6	
99/02/26:	missing orbit(s)? nOrbits 3	
99/02/27:	no data	
99/02/28:	no data	
99/08/28:	missing orbit(s)? nOrbits 12	
99/08/29:	no data	
99/08/30:	no data	
99/08/31:	no data	
99/09/09:	missing orbit(s)? nOrbits 13	
99/09/22:	missing orbit(s)? nOrbits 13	
99/10/17:	missing orbit(s)? nOrbits 13	
99/10/20:	missing orbit(s)? nOrbits 11	
99/11/01:	missing orbit(s)? nOrbits 12	
99/11/07:	missing orbit(s)? nOrbits 13	
99/11/17:	missing orbit(s)? nOrbits 10	
99/11/18:	missing orbit(s)? nOrbits 6	
99/12/01:	missing orbit(s)? nOrbits 5	
99/12/17:	missing orbit(s)? nOrbits 13	

99/12/20: missing orbit(s)? nOrbits 5
99/12/31: missing orbit(s)? nOrbits 7

2000
00/01/01: no data
00/01/02: missing orbit(s)? nOrbits 5
00/02/07: missing orbit(s)? nOrbits 4
00/02/08: no data
00/02/09: no data
00/02/10: missing orbit(s)? nOrbits 7
00/03/09: missing orbit(s)? nOrbits 6
00/03/20: missing orbit(s)? nOrbits 12
00/03/24: missing orbit(s)? nOrbits 11
00/03/25: missing orbit(s)? nOrbits 8
00/05/23: missing orbit(s)? nOrbits 6
00/06/05: missing orbit(s)? nOrbits 13
00/06/13: missing orbit(s)? nOrbits 6
00/06/30: missing orbit(s)? nOrbits 3
00/07/01: no data
00/07/02: no data
00/07/03: no data
00/07/04: no data
00/07/05: missing orbit(s)? nOrbits 9
00/07/07: missing orbit(s)? nOrbits 13
00/07/10: missing orbit(s)? nOrbits 9
00/07/11: missing orbit(s)? nOrbits 10
00/08/08: missing orbit(s)? nOrbits 7
00/08/10: missing orbit(s)? nOrbits 13
00/10/07: missing orbit(s)? nOrbits 10
00/10/08: no data
00/10/09: no data
00/10/10: no data
00/10/11: missing orbit(s)? nOrbits 9
00/11/18: missing orbit(s)? nOrbits 13
00/11/26: missing orbit(s)? nOrbits 13
00/11/29: missing orbit(s)? nOrbits 13
00/11/30: missing orbit(s)? nOrbits 13
00/12/01: missing orbit(s)? nOrbits 13
00/12/02: missing orbit(s)? nOrbits 13
00/12/04: missing orbit(s)? nOrbits 13
00/12/06: missing orbit(s)? nOrbits 13
00/12/09: missing orbit(s)? nOrbits 12
00/12/13: missing orbit(s)? nOrbits 13
00/12/15: missing orbit(s)? nOrbits 13
00/12/17: missing orbit(s)? nOrbits 12
00/12/20: missing orbit(s)? nOrbits 13
00/12/22: missing orbit(s)? nOrbits 13
00/12/23: missing orbit(s)? nOrbits 13
00/12/27: missing orbit(s)? nOrbits 13
00/12/28: missing orbit(s)? nOrbits 13
00/12/31: missing orbit(s)? nOrbits 12

2001
01/01/02: missing orbit(s)? nOrbits 13
01/01/03: missing orbit(s)? nOrbits 12
01/01/04: missing orbit(s)? nOrbits 13
01/01/13: missing orbit(s)? nOrbits 13
01/01/14: missing orbit(s)? nOrbits 13
01/01/16: missing orbit(s)? nOrbits 13
01/01/17: missing orbit(s)? nOrbits 12
01/01/18: no data
01/01/19: no data
01/01/20: no data
01/01/21: no data

01/01/22: no data
01/01/23: no data
01/01/24: no data
01/01/25: no data
01/01/26: no data
01/01/27: no data
01/01/28: no data
01/01/29: no data
01/01/30: no data
01/01/31: no data
01/02/01: no data
01/02/02: no data
01/02/03: no data
01/02/04: no data
01/02/05: no data
01/02/06: no data
01/02/07: missing orbit(s)? nOrbits 8
01/02/08: missing orbit(s)? nOrbits 10
01/02/09: missing orbit(s)? nOrbits 12
01/02/10: missing orbit(s)? nOrbits 13
01/02/11: missing orbit(s)? nOrbits 11
01/02/12: missing orbit(s)? nOrbits 11
01/02/13: missing orbit(s)? nOrbits 13
01/02/14: missing orbit(s)? nOrbits 11
01/02/15: missing orbit(s)? nOrbits 11
01/02/17: missing orbit(s)? nOrbits 9
01/02/18: missing orbit(s)? nOrbits 11
01/02/19: missing orbit(s)? nOrbits 13
01/02/20: missing orbit(s)? nOrbits 12
01/02/21: missing orbit(s)? nOrbits 11
01/02/22: missing orbit(s)? nOrbits 12
01/02/23: missing orbit(s)? nOrbits 12
01/02/24: missing orbit(s)? nOrbits 11
01/02/25: missing orbit(s)? nOrbits 12
01/02/27: missing orbit(s)? nOrbits 11
01/02/28: missing orbit(s)? nOrbits 8
01/03/01: missing orbit(s)? nOrbits 13
01/03/02: missing orbit(s)? nOrbits 11
01/03/03: missing orbit(s)? nOrbits 11
01/03/04: missing orbit(s)? nOrbits 13
01/03/05: missing orbit(s)? nOrbits 11
01/03/06: missing orbit(s)? nOrbits 10
01/03/07: missing orbit(s)? nOrbits 13
01/03/08: missing orbit(s)? nOrbits 9
01/03/09: missing orbit(s)? nOrbits 10
01/03/10: missing orbit(s)? nOrbits 13
01/03/12: missing orbit(s)? nOrbits 11
01/03/13: missing orbit(s)? nOrbits 13
01/03/14: missing orbit(s)? nOrbits 11
01/03/15: missing orbit(s)? nOrbits 11
01/03/16: missing orbit(s)? nOrbits 12
01/03/17: missing orbit(s)? nOrbits 13
01/03/18: missing orbit(s)? nOrbits 11
01/03/19: missing orbit(s)? nOrbits 11
01/03/20: missing orbit(s)? nOrbits 13
01/03/21: missing orbit(s)? nOrbits 10
01/03/22: missing orbit(s)? nOrbits 11
01/03/23: missing orbit(s)? nOrbits 13
01/03/24: missing orbit(s)? nOrbits 12
01/03/25: missing orbit(s)? nOrbits 11
01/03/26: missing orbit(s)? nOrbits 13
01/03/27: missing orbit(s)? nOrbits 12
01/03/28: missing orbit(s)? nOrbits 11
01/03/29: missing orbit(s)? nOrbits 13

01/03/31: missing orbit(s)? nOrbits 12
01/04/01: missing orbit(s)? nOrbits 13
01/04/03: missing orbit(s)? nOrbits 11
01/04/04: missing orbit(s)? nOrbits 13
01/04/09: missing orbit(s)? nOrbits 12
01/04/10: missing orbit(s)? nOrbits 11
01/04/11: missing orbit(s)? nOrbits 13
01/04/14: missing orbit(s)? nOrbits 13
01/04/16: missing orbit(s)? nOrbits 11
01/04/29: missing orbit(s)? nOrbits 11
01/04/30: missing orbit(s)? nOrbits 13
01/05/06: missing orbit(s)? nOrbits 12
01/05/08: missing orbit(s)? nOrbits 10
01/05/15: missing orbit(s)? nOrbits 11
01/05/16: missing orbit(s)? nOrbits 3
01/05/17: missing orbit(s)? nOrbits 10
01/05/20: missing orbit(s)? nOrbits 12
01/05/21: missing orbit(s)? nOrbits 11
01/05/22: no data
01/05/23: no data
01/05/24: missing orbit(s)? nOrbits 9
01/05/25: missing orbit(s)? nOrbits 12
01/05/28: missing orbit(s)? nOrbits 13
01/05/30: missing orbit(s)? nOrbits 10
01/06/06: missing orbit(s)? nOrbits 13
01/06/17: missing orbit(s)? nOrbits 6
01/07/07: missing orbit(s)? nOrbits 12
01/07/31: missing orbit(s)? nOrbits 1
01/08/01: missing orbit(s)? nOrbits 3
01/08/09: missing orbit(s)? nOrbits 4
01/08/15: missing orbit(s)? nOrbits 4
01/08/27: missing orbit(s)? nOrbits 5
01/09/03: missing orbit(s)? nOrbits 10
01/09/25: missing orbit(s)? nOrbits 11
01/11/01: missing orbit(s)? nOrbits 6
01/11/17: missing orbit(s)? nOrbits 11
01/11/18: no data
01/11/19: missing orbit(s)? nOrbits 7
01/11/21: missing orbit(s)? nOrbits 10
01/11/27: missing orbit(s)? nOrbits 5
01/11/28: missing orbit(s)? nOrbits 7

2002

02/01/28: missing orbit(s)? nOrbits 13
02/01/30: missing orbit(s)? nOrbits 13
02/01/31: missing orbit(s)? nOrbits 7
02/02/01: missing orbit(s)? nOrbits 9
02/02/02: missing orbit(s)? nOrbits 9
02/02/03: missing orbit(s)? nOrbits 8
02/02/04: missing orbit(s)? nOrbits 8
02/02/05: no data
02/02/06: missing orbit(s)? nOrbits 2
02/02/08: missing orbit(s)? nOrbits 6
02/02/09: missing orbit(s)? nOrbits 7
02/02/11: missing orbit(s)? nOrbits 13
02/02/12: no data
02/02/13: no data
02/02/14: missing orbit(s)? nOrbits 5
02/03/08: missing orbit(s)? nOrbits 2
02/03/09: no data
02/03/10: no data
02/03/11: no data
02/03/12: no data
02/03/13: no data

02/03/14: no data
02/03/15: no data
02/03/16: no data
02/03/17: no data
02/03/18: no data
02/03/19: no data
02/03/20: missing orbit(s)? nOrbits 1
02/04/08: missing orbit(s)? nOrbits 5
02/04/11: missing orbit(s)? nOrbits 9
02/04/19: missing orbit(s)? nOrbits 13
02/04/20: missing orbit(s)? nOrbits 8
02/08/17: missing orbit(s)? nOrbits 6
02/11/18: missing orbit(s)? nOrbits 11
02/11/19: missing orbit(s)? nOrbits 2
02/12/09: missing orbit(s)? nOrbits 13
02/12/10: missing orbit(s)? nOrbits 12
02/12/13: missing orbit(s)? nOrbits 12
02/12/14: missing orbit(s)? nOrbits 12
02/12/16: missing orbit(s)? nOrbits 13
02/12/17: missing orbit(s)? nOrbits 11
02/12/18: missing orbit(s)? nOrbits 11
02/12/19: missing orbit(s)? nOrbits 13
02/12/20: missing orbit(s)? nOrbits 9
02/12/21: missing orbit(s)? nOrbits 11
02/12/22: missing orbit(s)? nOrbits 13
02/12/23: missing orbit(s)? nOrbits 12
02/12/24: missing orbit(s)? nOrbits 11
02/12/25: missing orbit(s)? nOrbits 12
02/12/26: missing orbit(s)? nOrbits 13
02/12/27: missing orbit(s)? nOrbits 11
02/12/28: missing orbit(s)? nOrbits 11
02/12/29: missing orbit(s)? nOrbits 13
02/12/30: missing orbit(s)? nOrbits 12

2003

03/01/18: missing orbit(s)? nOrbits 12
03/02/02: missing orbit(s)? nOrbits 13
03/04/06: missing orbit(s)? nOrbits 13
03/04/07: missing orbit(s)? nOrbits 12
03/04/11: missing orbit(s)? nOrbits 6
03/04/17: missing orbit(s)? nOrbits 12
03/04/30: missing orbit(s)? nOrbits 12
03/05/01: missing orbit(s)? nOrbits 13
03/05/11: missing orbit(s)? nOrbits 6
03/05/16: missing orbit(s)? nOrbits 6
03/05/17: no data
03/05/18: no data
03/05/19: no data
03/05/20: missing orbit(s)? nOrbits 10
03/05/25: missing orbit(s)? nOrbits 13
03/05/27: missing orbit(s)? nOrbits 3
03/05/29: missing orbit(s)? nOrbits 11
03/06/05: missing orbit(s)? nOrbits 6
03/06/22: missing orbit(s)? nOrbits 9
03/06/23: no data
03/06/24: no data
03/06/25: no data
03/06/26: no data
03/06/27: no data
03/06/28: no data
03/06/29: no data
03/06/30: no data
03/07/01: no data
03/07/02: no data

03/07/03: no data
03/07/04: no data
03/07/05: no data
03/07/06: no data
03/07/07: no data
03/07/08: no data
03/07/09: no data
03/07/10: no data
03/07/11: no data
03/07/12: no data
03/07/13: no data
03/07/14: no data
03/07/15: no data
03/07/16: no data

Starting from 17-Jul-2003, UBT products are available for orbit fragments, stored as “segregated” on the NEODC archive.