



(A)ATSR Third Reprocessing Dataset User Summary

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This document contains key information for users concerning the (A)ATSR Third Reprocessing dataset; it is issued as part of the (A)ATSR Third Reprocessing Information Pack.



AMENDMENT RECORD SHEET

The Amendment Record Sheet below records the history and issue status of this document.

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QUALITY STATEMENT

This quality statement, issued on behalf of ESA and the (A)ATSR Quality Working Group, provides highlights of the status of the (A)ATSR Third Reprocessing dataset. This dataset comprises ATSR-1, ATSR-2 and AATSR data from 1991 to 2012.

- Radiometry:
 - Thermal channel radiometric uncertainty < 0.1 K
 - VIS-SWIR channel radiometric uncertainty < 3%
 - Note that these are type B estimates of the uncertainty due to systematic effects and not the random noise estimates*
- SST validation
 - SST uncertainty < 0.15 K ($k=1$) for AATSR, ATSR-2
 - SST uncertainty < 0.25 K ($k=1$) for ATSR-1
- LST validation (AATSR only)
 - LST bias is in the range 0.0–2.0 K (night) and 0.2–3.8 K (day)
- Cloud identification
 - Cloud identification has been improved over land and sea
- Geolocation and view colocation
 - Absolute nadir geolocation has been improved to within 1 km (AATSR)
 - Nadir/forward view colocation has been improved
 - AATSR retains an along-track shift of 1 pixel
 - ATSR-2 and ATSR-1 best-fit empirical offsets are within 1 pixel
- Quality of whole dataset
 - The full archived dataset has undergone systematic QC to ensure the products are self-consistent and contain readable data

For best results, users are encouraged to access the improved SST and LST data within the newly generated NetCDF products, rather than the Envisat-format Level 2 NR products.



1. INTRODUCTION

The opening Quality Statement provides a top-level glance at the improvements seen in the third reprocessing (A)ATSR dataset. The remainder of this document provides further details on those improvements, along with background information on the third reprocessing, and a listing of the contents of the Third Reprocessing Information Pack. The Information Pack has been compiled to provide full visibility of all evaluation information and processing details of the dataset to users.

This User Summary contains the following sections:

- Section 2 EXECUTIVE SUMMARY: This section lists the improvements found in the third reprocessing dataset, and gives further details of the quality evaluation and quality control (QC) results highlighted in the opening Quality Statement.
- Section 3 THIRD REPROCESSING INFORMATION PACK CONTENTS: Gives the full listing of the evaluation and QC reports, and auxiliary information, that are contained within the Third Reprocessing Information Pack.
- Section 4 FURTHER INFORMATION: Includes QC points of information that users should be aware of, information on the third reprocessing for those users who are unfamiliar with the dataset, archive information, and details on updated documentation.

1.1 Version Information

The first official release of this dataset will be termed version 3.0. References to version 2.1 (the “evaluation dataset”) within the documents are equivalent to v3.0, as the product contents are identical. (The only differences are in the composition of the set of products that make up the whole dataset.)

A reprocessing of the ATSR-1 and ATSR-2 datasets is being scheduled, and will be termed v3.0.1. Data from ATSR-2 post-June 2003 are considered to be v3.0.1 and are available in the NEODC archive. The products will be transferred to the ESA archive once the full v3.0.1 reprocessing has been completed. More details will be available once the products have been generated.



2. EXECUTIVE SUMMARY

This section gives further details of the quality evaluation and quality control (QC) results that were highlighted in the opening Quality Statement:

- Improvements in VIS-SWIR Calibration
- Improvements in SST
- Improvements in LST
- Improvements in Cloud Identification
- Improvements in Absolute Nadir Geolocation
- Improvements in Nadir/Forward View Colocation
- Quality Control on Whole Datasets

Evaluation and QC reports are contained within the Third Reprocessing Information Pack, available from the [ESA EO SPPA](#) web pages, and are referenced by [QCn] (see Section 3.1 for the full listing).

2.1 Improvements in VIS-SWIR Calibration

The third reprocessing has made adjustments for the calibration drift corrections and radiometric offsets between the three ATSR sensors that were reported in Smith and Cox (2013). An assessment of the third reprocessing dataset, to be reported in the Calibration Report [QC1], has drawn the following main conclusions:

- Globally reprocessed (A)ATSR calibration is self-consistent at the 1% level, as shown in Figure 1. This is compared to differences of ~10% between the sensors in the second reprocessing (Figure 2).
- The long-term stability of calibration is at the 1% level (Figure 1).
- Comparisons with MERIS and MODIS-Aqua show consistent differences of ~3% at 555, 660 and 870 nm (Figure 3).
- AATSR shows some improvement over outgassing periods when compared with previous datasets.

Users must take the changes in the calibration into account in any applications that have previously used second reprocessing L1 datasets (for example, routines that implement long-term drift corrections).

The conclusions are based on reanalysis of (A)ATSR measurements over stable desert and ice targets that were used to derive long-term drift and sensor intercomparisons (Smith and Cox, 2013). The analysis takes into account the seasonal variations of the top-of-atmosphere reflectance due to the surface BRDF, atmospheric effects (O_3 , TCWV) and spectral differences between sensors (in particular between MERIS and MODIS).

In Figure 1, the third reprocessing calibration results for (A)ATSR demonstrate the improved self-consistency and long-term stability of the VIS-SWIR channel calibration. This is a significant improvement over the results for the second reprocessing dataset (Figure 2).

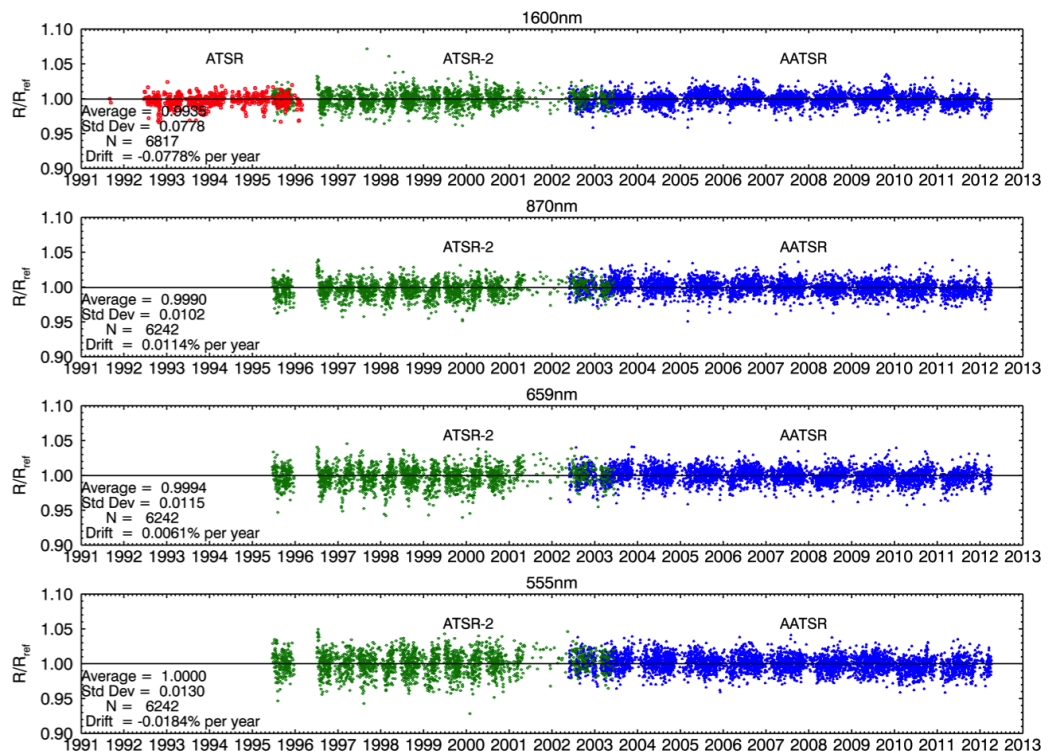


Figure 1. Calibration summary for (A)ATSR for the visible-shortwave IR channels in the third reprocessing dataset. From top: 1600, 870, 659 and 555 nm.

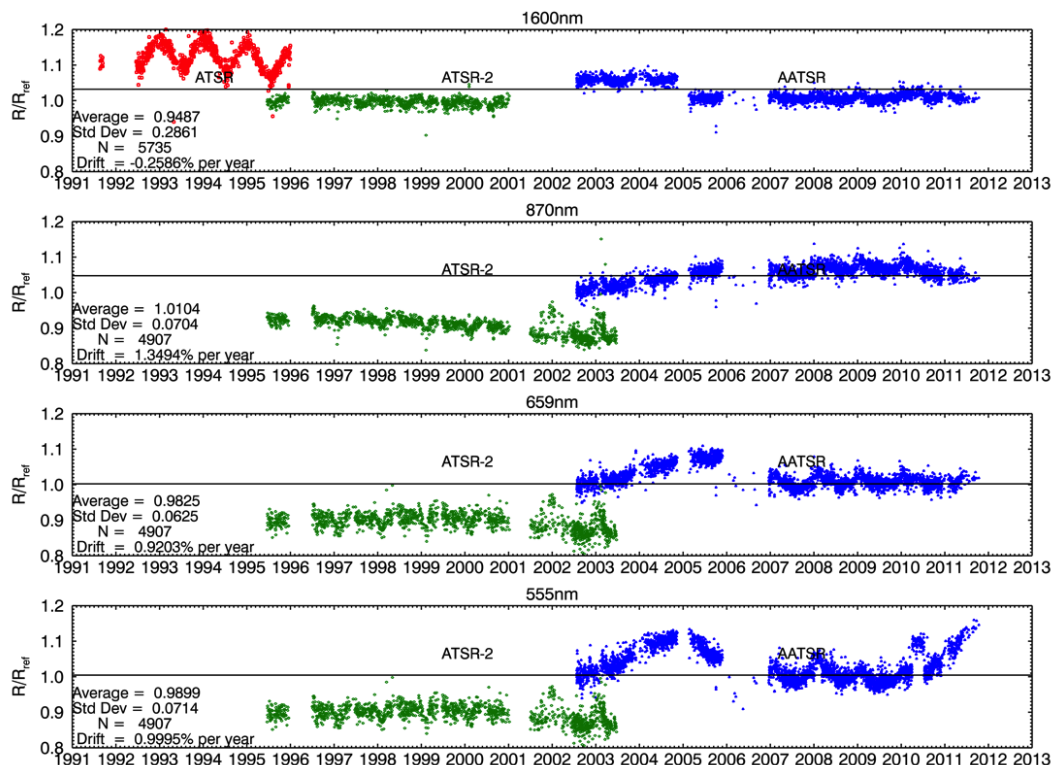


Figure 2. As for Figure 1 but for the second reprocessing dataset that does not have the corrections for long-term drift or sensor-to-sensor differences applied.

Figure 3 shows a summary of the comparisons of the AATSR third reprocessing data with ATSR-1 and ATSR-2 third reprocessing, AATSR second (v2.0) reprocessing (with drift correction applied), MERIS second reprocessing and MODIS-Aqua collection 5 L1 data. The results demonstrate that the differences between the three ATSR sensors are within 1%. Comparisons with MERIS and MODIS-Aqua show a consistent 3% difference at 555, 659 and 870 nm.

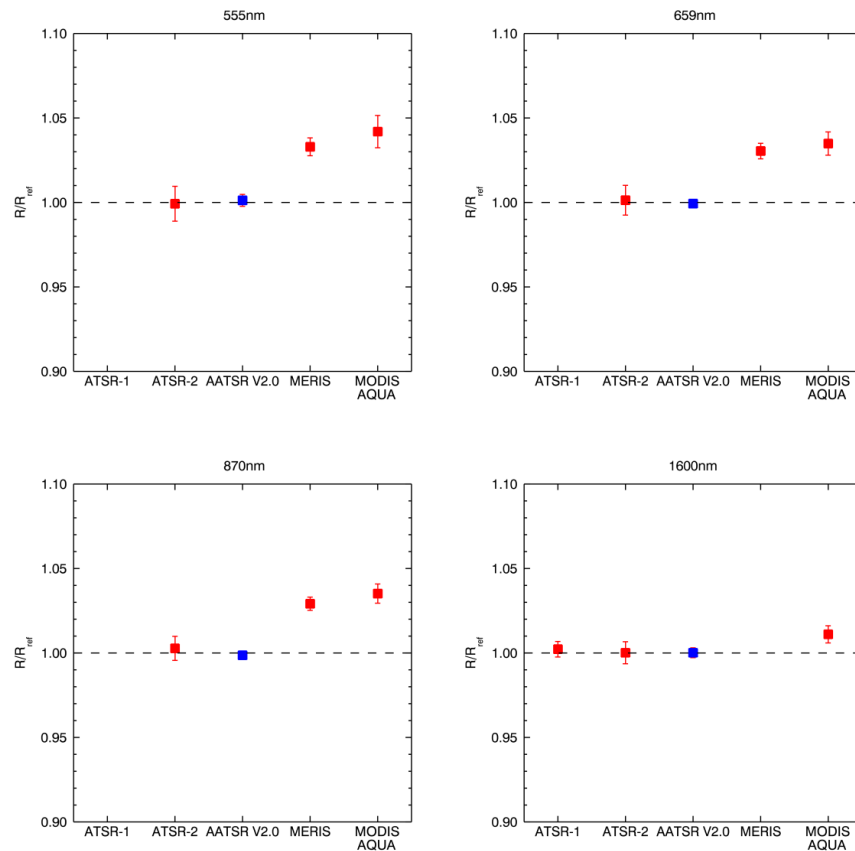


Figure 3. Relative calibrations of third reprocessing AATSR data with ATSR-1, ATSR-2, AATSR second reprocessing (v2.0), MERIS and MODIS-Aqua. Clockwise from top left: 555, 659, 1600 and 870 nm. AATSR second reprocessing data were corrected for long-term drift corrections. Error bars represent the standard deviation of the intercomparison measurements.

The full Calibration Report [QC1] will be added to the data pack once complete.

2.2 Improvements in SST

The SST Validation Report [QC2] summarises the validation of the two different SST products from the (A)ATSR v2.1 dataset: (1) NR (Level 2 SST product in Envisat-format) and (2) L2P (Level 2 SST product containing ARC-like data in NetCDF format). The assessment was carried out through comparisons to validation data taken *in situ* or from ships of opportunity and research vessels.

In general, global biases are very similar for AATSR and ATSR-2 in both the NR and L2P products, with both being slightly warm but within specification (< 0.3 K). ATSR-1 L2P data exhibit a slightly cooler global bias compared to NR data but are still within specification. In all cases, the robust standard deviation (RSD) is lower for the L2P product due to a combination of reduced regional biases and improved cloud masking.

The following conclusions are presented in [QC2, Issue 1B], which also contains validation for the ATSR-2 post-June 2003 products:

- AATSR and ATSR-2 SST dual-view retrievals are < 0.15 K for both NR and L2P products.
- Regional variations exist, particularly for known retrieval issues. For example, water vapour affecting nadir-only two-channel (11 and 12 μm) retrievals; and tropospheric aerosol affecting nadir-only two- and three-channel (3.7, 11 and 12 μm) retrievals.
- The L2P product has reduced regional biases and improved cloud clearing.
- ATSR-1 dual-view two-channel retrievals are < 0.25 K for both the NR and L2P products.
- ATSR-1 NR nadir-view retrievals are significantly affected by aerosol dust during the period around Mount Pinatubo (from 1991 to 1993) and should not be used for quantitative analysis.

The time series for L2P SST compared to drifting buoys and available Argo measurements is given in Figure 4 (figure 4-3 from [QC2]); results are shown for dual-view retrievals from two or three channels.

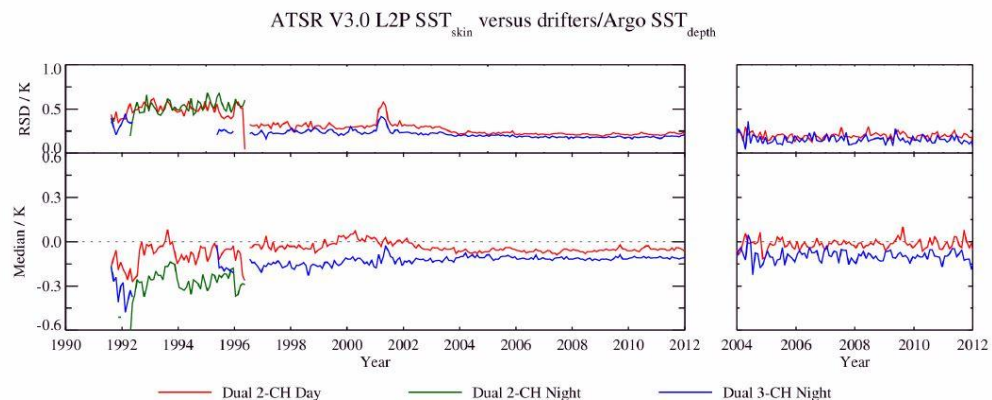


Figure 4. Figure 4-3 from [QC2]. Left: Time series of (lower) median discrepancy and (upper) robust standard deviation (RSD) for the ATSR v3.0 L2P dataset compared to drifting buoys. Right: the equivalent time series for comparisons to Argo. Each point in the time series has at least 30 match-ups.

For the highest quality SST data, users are advised to use the L2P SST products and from these to choose quality_level 5 data.

2.3 Improvements in LST

The report on the *previous version* of the LST products [QC3] gives details on the clear improvements in the UOL LST dataset when compared with the LST field in the NR products. Further improvements were introduced in the dataset generated for the third reprocessing; a validation report on this data will be distributed once it is available. Note that UOL LST is available only for AATSR within the ESA archive; ATSR-1 and ATSR-2 LST products are available via the GlobTemperature project.

For the highest quality LST data, users are advised to use the UOL LST products and to apply the V3 cloud mask (where QC bit 16 is set), and to treat with caution any LST where LST_uncertainty > 2.0 K.

2.4 Improvements in Cloud Identification

2.4.1 L1B and L2 Envisat-format products

An improvement in cloud identification for the L1B (and therefore L2) products has been confirmed [QC4, QC5, QC6]. This is due to updates made to the cloud look-up and the visible calibration Auxiliary Data Files (ADFs).

An example of the improvement is given in Figure 5, which shows L1B and L2 NR SST data from Envisat orbit 33506 (product orbit number 33505): no SST in the third reprocessing product (on the right) indicates correct cloud identification.

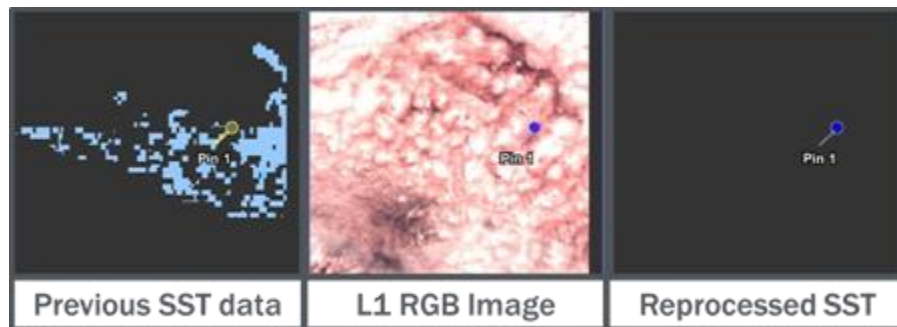


Figure 5. Cloud identification improvement example for orbit 33506; no false SST retrieval in the reprocessed data.

Cloud identification over land also changed as a result of the improved visible channel calibration. In general, the changes were an improvement with fewer clear sky land pixels being flagged as cloudy [QC6].

Note that there still exist some cloud identification anomalies [QC7, QC8]. Users are referred to the monthly Level 3 SST anomaly maps within the Information Pack (Section 3.2) to identify the sites of possible failures in cloud identification. Known examples include, for AATSR, cold temperatures in the equatorial Pacific off the coast of Ecuador, most notably on and around 17 September 2002.

2.4.2 L2P SST Cloud Improvements

The L2P SST processing scheme uses a Bayesian technique for cloud identification, based on that used in the ATSR for Climate (ARC) Project. An investigation looking at AATSR cloud identification in the region of strong SST gradients over the Gulf Stream clearly showed the improvement in cloud masking for the L2P SST products when compared with the Level 2 NR products [QC9]. Figure 6 gives an example of the improvement, showing data averaged over 2 weeks (1–15 June 2003): the enhanced SST coverage can clearly be seen in the L2P SST dataset and this is due to improved cloud identification.

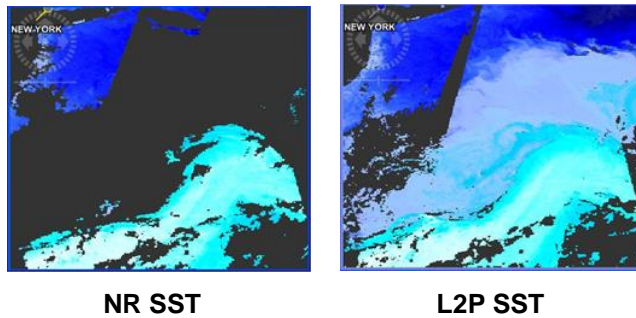


Figure 6. Example of SST data available in NR and L2P SST products (1–15 June 2003); more data coverage in L2P SST is due to improved cloud identification.

2.4.3 UOL LST Cloud Improvements

The UOL LST processing uses a probabilistic scheme that has been optimised for use over land, and which shows improvements when compared with the cloud identification in NR products. Figure 7 gives an example of this improvement: the LST field within the NR product generates no data over hot urban areas (see circled region, centre) due to mistaken cloud identification, whereas the UOL LST product (right) has not wrongly identified cloud in these areas.

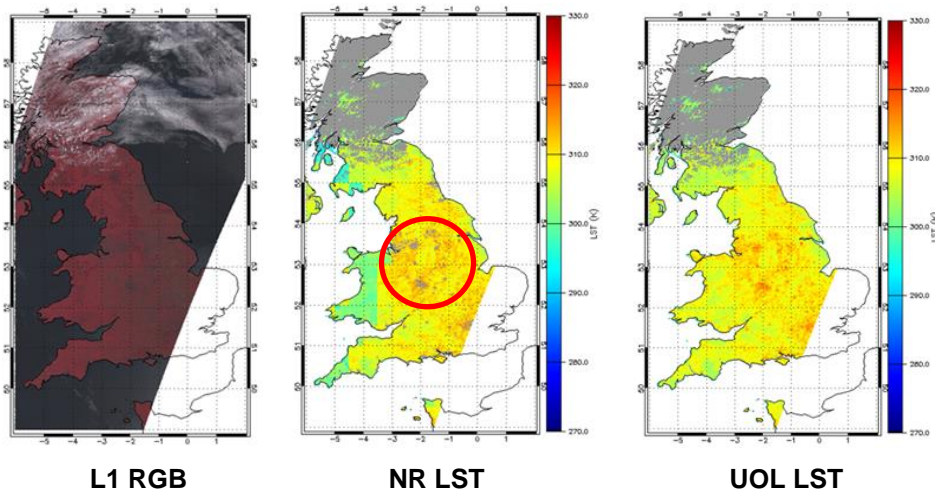


Figure 7. Example of LST data available in NR and UOL products (product orbit 22907); retrieval of UOL LST in hot urban areas demonstrates improved cloud identification. (Images from the University of Leicester)

2.5 Improvements in Absolute Nadir Geolocation

Improvements in AATSR absolute nadir geolocation have been confirmed such that it is now to within 1 km [QC6]. This was achieved via the use of an updated global characterisation ADF [QC10], which removed an average offset of one pixel along track and one pixel across track that had been present in the previous dataset.

Comparisons with MERIS FR scenes (regridded to AATSR resolution), using 105 distinct features within the images, revealed that the average distance between the features in the colocated MERIS and AATSR images decreased from 1.4 to 0.1 km [QC6].

Comparisons of features in AATSR products with a set of 22 reference locations showed that the average distance of the AATSR pixel centre from the reference location decreased from 1.2 to 0.7 km [QC6].

Planning for the fourth reprocessing of (A)ATSR data includes the implementation of ortho-geolocation (pixels geolocated to a Digital Elevation Model) for all three instruments. This is expected to result in improved absolute nadir geolocation.

2.6 Improvements in Nadir/Forward View Colocation

Improvements in nadir/forward view colocation have been confirmed for all instruments [QC6, QC11, QC12]. This was achieved via the use of an updated global characterisation ADF [QC10].

A review of AATSR colocation that looked at case studies of six small islands and lakes again confirmed the improvement, both visually and when distance calculations were made between the locations of the weighted centres of the features within both views [QC11]. The average of the forward–nadir distance of the features decreased from 2.5 to 1.4 km.

However, visual inspections showed that while the across-track positioning between the two views is now more appropriate, the along-track positioning is not: the forward view is considered to be, on average, 1 pixel in advance of the nadir view (measured in the increasing y-direction, i.e. along the satellite track). A statement on colocation within the third reprocessing dataset has been issued by the AATSR QWG [QC13].

The planned improvement in geolocation (see Section 2.5), along with the use of updated auxiliary information, is expected to result in improved view colocation for the fourth reprocessing dataset.

2.7 Quality Control on Whole Datasets

Systematic QC analysis was carried out on all products in all formats: product headers were checked for consistency and correct contents. This systematic QC was complemented by visual inspections performed on a subset of products. Full details of all systematic and detailed QC are given in the IDEAS reports listed in Section 3.1 [QC6–QC9, QC11–QC19].

The points below are highlights from the QC activities:

1. The processing configuration and the correct format and content of **all** data products were confirmed.
2. Completeness analysis of the full dataset on the ESA archive confirmed that all products were present and segregated appropriately.
3. Alignment between the ESA and NEODC archives for v3.0 has been verified. Users can note that the NEODC archive contains products for ATSR-2 post-June 2003, after the data recorder failure. These products are being considered as v3.0.1 and are not yet available on the ESA archive. This is due to the fact that a complete reprocessing for ATSR-1/-2 will take place (v3.0.1) and so ESA will transfer all products from that reprocessing once complete.
4. A full set of monthly L3 SST maps (in jpeg format) were generated for all instruments and are available in the Information Pack (see Section 3 for a listing of Information Pack contents).
5. A full set of monthly L3 SST anomaly maps (in jpeg format) were generated for all instruments and are available in the Information Pack. These maps are referenced to



the GOSTA-4 climatology dataset; regions affected by sustained cloud-clearing failures show up as strong blue.

QC points of information that arose are listed in Section 4.1; the following subsections contain specific details on certain issues.

2.7.1 L2P and L3U SST products

QC on the L2P and L3U SST datasets found the following anomalies [QC14, QC15]:

- L2P products contain three incorrectly filled bands (`sses_standard_deviation`, `synoptically_correlated_uncertainty` and `radiometric_uncertainty`). However, the incorrect filling only occurs in pixels where there is no SST available, and so the products were accepted into the archive.
- Some L2P and L3U products were found to contain no SST data and were removed from the archive. Instances causing products to contain no SST were:
 - No thermal channel data available in the parent L1 product (e.g. during outgassing periods)
 - Very short input products (there is no overlap between nadir/forward data so no dual-view SST retrievals are possible)
 - L3U products empty due to there being no SST at `quality_level=5`

2.7.2 UOL LST products

QC on the UOL LST dataset found the following anomalies [QC16]:

- An anomaly was found at the 180° meridian, where LST values are set to 273 K (fractional vegetation cover and total column water vapour bands are also affected). Since there is little land at this longitude, the dataset was accepted into the archive.
- Some products (during outgassing periods) were found to contain no LST data, but as they had the potential to contain NDVI data, they remain in the (segregated) archive. (See Section 4.3.1 for information on segregation.)

2.7.3 ATSR-1 and ATSR-2 corrupted products

Systematic QC and validation activities on the ATSR-1 and ATSR-2 datasets found the following anomalies [QC2, QC8, QC18]:

- 243 ATSR-1 L1 products are corrupted in the last granule of the MDS and contain invalid information in the SPH
 - 146 of these products also contain a mismatch in the ADS/MDS record information
- 70 ATSR-2 L1 products are corrupted in the last granule of the MDS and contain invalid information in the SPH

These L1 and their associated L2 products were moved to the segregated archive, unless the product had already been designated for segregation or removal. (See Section 4.3.1 for information on segregation.)

2.7.4 ATSR-2 post-gyro failure period

ATSR-2 SST validation [QC2] revealed the following anomaly:



- A period of high RSD in the first half of 2001, coinciding with the loss of the final ERS-2 gyro. The inspection of random products during this time revealed large discrepancies in both nadir geolocation and nadir–forward view colocation.

Further investigation on this time period [QC19] showed that products from 16th January to 5th July 2001 were subject to degraded geolocation and colocation. All L1 and L2 products generated during this period were moved to the segregated archive, unless the product had already been designated for segregation or removal. (See Section 4.3.1 for information on segregation.)

2.7.5 ATSR-1 and ATSR-2 removals

A number of ATSR-1 and ATSR-2 products that had been available in previous datasets were removed from the third reprocessing dataset. The reasons are specified below. Lists of the orbit numbers and times that have been removed are given in the README files that are available in the Information Pack and also at the FTP download sites.

1. ATSR-1 products generated during outgassings (all channels were cooled and so no useful science data are available);
2. ATSR-1 products generated during the start of a phased shut-down prior to hibernation (June 1996);
3. ATSR-1 and ATSR-2 products with a high degree of corruption;
4. ATSR-1 and ATSR-2 products generated from “empty” UBTs;
5. ATSR-2 products generated at the start of the scan-mirror anomaly period (Dec. 1995).

2.7.6 ATSR-1 detector temperatures and the 12 micron channel response

The performance of the ATSR-1 cooler deteriorated in the latter part of the mission, and temperatures were allowed to rise gradually from below 95 to 110 K. An effect of this warming was to modify significantly the spectral response of the 12 micron detector (although the other detectors may also be affected to some degree). The long-wavelength cut-off for the 12 micron spectral response was affected, which in turn had an impact on the calibration and the retrieved SSTs. A full analysis is given in [QC20].

2.7.7 Scheduled ATSR-1/-2 reprocessing, v3.0.1

Subsequent to the main third reprocessing run, an error in gap handling within the ATSR-1/-2 processor was found. This was corrected before the generation of ATSR-2 post-June 2003 products, and a full reprocessing has been scheduled. It was agreed with the AATSR QWG that the reprocessing would be termed v3.0.1, as there are no science updates to the processor. Further news on this reprocessing will be available once the products have been generated.

2.8 References

Smith, D.L. and Cox, C.V. (2013) (A)ATSR solar channel on-orbit radiometric calibration. *Geoscience and Remote Sensing, IEEE Trans.* **51**, 1370-1382.



3. THIRD REPROCESSING INFORMATION PACK CONTENTS

This User Summary is the summarising document for the third reprocessing dataset and is contained within the Information Pack. The full contents of the Information Pack are outlined in the following sections.

3.1 Evaluation and QC reports

The following list outlines the third reprocessing evaluation and QC reports that are contained within the Information Pack.

- QC1. ATSR Calibration Report (D. Smith, RAL) -- **to follow** (not yet included in the Information Pack)
- QC2. ATSR V3.0 Sea Surface Temperature Validation Report, UL-SST-P05 (G. Corlett, UoL): ATSR_V3_SST_Validation_Report_Issue1B_20160907.pdf
- QC3. LST Validation and Algorithm Verification (D. Ghent, UoL): D4.1 Validation_Report_Issue_1A_20120416.pdf
- QC4. Checking Cloud Flagging over SST Anomaly Areas (C. Cox, RAL): Cloud_masking_SST_anomaly.pdf
- QC5. A Study of the Cloud Flagging in Reprocessed (A)ATSR Data (C. Cox, RAL): study_cloud_flag_reprocessed_aatsr_v0.pdf
- QC6. AATSR Third Reprocessing Detailed QC Report (TVUK): IDEAS-VEG-OQC-REP-1356
- QC7. AATSR Reprocessing Systematic QC Investigation (TVUK): IDEAS-VEG-OQC-REP-1261
- QC8. ATSR-1 and ATSR-2 Reprocessing Systematic QC Investigation (TVUK): IDEAS-VEG-OQC-REP-1331
- QC9. AATSR L2P SST front detection comparison (TVUK): IDEAS-VEG-OQC-MEM-1450
- QC10. Geolocation of AATSR Images (A. R. Birks, RAL): PO-TN-RAL-AT-0565 - Geolocation Report - Issue 1.0.pdf
- QC11. AATSR Colocation Review (TVUK): IDEAS-VEG-OQC-REP-1490
- QC12. ATSR-1 and ATSR-2 Reprocessing Detailed QC Report (TVUK): IDEAS-VEG-OQC-REP-1349
- QC13. Colocation Statement for the Third Reprocessing of (A)ATSR (QWG): IDEAS+-VEG-OQC-MEM-2528
- QC14. AATSR ARC L2P Reprocessing QC Report (TVUK): IDEAS-VEG-OQC-REP-1348
- QC15. ATSR-1 and ATSR-2 ARC L2P Reprocessing QC Report (TVUK): IDEAS-VEG-OQC-REP-1374
- QC16. AATSR UOL LST Reprocessing QC Report (TVUK): IDEAS-VEG-OQC-REP-1484
- QC17. AATSR Third Reprocessing Detailed QC Summary (TVUK): IDEAS-VEG-OQC-MEM-1344
- QC18. ATSR-1 and ATSR-2 Corrupted Products (TVUK): IDEAS+-VEG-OQC-REP-2187



- QC19. ATSR-2 in the ERS-2 Post Gyro Failure Period (TVUK): IDEAS+-VEG-OQC-REP-2236
- QC20. Detector temperature dependence of the 12 micron channel filter profile and its impact on the ATSR-1 calibration (A. R. Birks, RAL, October 2008: Detector Temperature Dependence.pdf)

3.2 Auxiliary Information

The Information Pack also includes auxiliary information, such as Reprocessing User Notes, listings of L0 input data, ADF (including VC1) lists, and the README notes that contain version numbering information and segregation/removal listings. As an aid to users, there are zipped packages of monthly Level 3 SST and SST anomaly maps (relative to GOSTA-4 climatology) that were generated from the reprocessed Meteo products.

A detailed listing of the auxiliary information contained within the Information Pack is given in Table 1.

Table 1. Auxiliary information in the Information Pack

Item	Contents
<u>Reprocessing User Notes</u>	
IDEAS-VEG-OQC-MEM-1158 AATSR 3rd Reprocessing User Note_1-0.pdf	AATSR User Note
IDEAS-VEG-OQC-MEM-1226 ATSR 3rd Reprocessing User Note_1-0.pdf	ATSR-1 and ATSR-2 User Note
IDEAS-VEG-OQC-MEM-1294 L2P Reprocessing User Note v1-0.pdf	L2P SST User Note
<u>Input information</u>	
AATSR_3rdReprocessing_L0_Master_20130509_50150_01149_52866.txt	AATSR Level 0 input list
AATSR_3rdReprocessing_Configuration-ADFs.txt ATSR-2_3rdReprocessing_Configuration-ADFs.txt ATSR-1_3rdReprocessing_Configuration-ADFs.txt	Processor and ADF configuration lists
AATSR_3rdReprocessing_2gVC1_List.txt	AATSR VC1 list
<u>Analysis outputs</u>	
AATSR_3rdReprocessing_L0Failures.txt	Level 0 failure list
AATSR_README_20141113.txt ATSR2_README_20150514.txt ATSR1_README_20150514.txt	README files for ftp sites (version information; segregation/removal lists, including orbits and reasons)
AATSR_3rdReprocessing_L0Gaps.txt	Level 0 gap list
AATSR_3rdReprocessing_L1Gaps.txt	Level 1/Level 2 gap list
AATSR_3rdReprocessing_L2PL3U_ExtraGaps	Additional L2P/L3U gaps
<u>Level 3 outputs</u>	
AATSR_L3_maps.tar.gz ATSR2_L3_maps.tar.gz ATSR1_L3_maps.tar.gz	Monthly L3 mean SST maps
AATSR_L3_anomaly_maps.tar.gz ATSR2_L3_anomaly_maps.tar.gz	Monthly L3 SST anomaly maps



Item	Contents
ATSR1_L3_anomaly_maps.tar.gz	



4. FURTHER INFORMATION

4.1 QC Points of Information

Points of information that have arisen during quality control of the third reprocessing dataset are given in this section. Notes in brackets specify which data are affected by each issue. See also Section 2.7 for more detailed items.

- Users are informed that all segregated data should be used with caution.
Segregated data [All instruments; All products]
- The processing stage flag is set to “S” rather than “U”. **All data [ATSR-1/-2; Browse and Meteo products]**
- Users are advised that June 1992 was a month with many instrument disruptions (3.6 micron failure investigations/outgassing/ERS-1 PDU anomaly) and that data from this month should be used with caution even if not segregated. **All data [ATSR-1; All products]**
- Envisat format products from Phase 6 now have Rel Orb '99999' in agreement with product specification (was '99998' previously). **All data [ATSR-1; All products]**
- The MPH of one product set contains an incorrect sensing stop time. However, the first line and last line times in the SPH are correct. **Filename orbit 09852 on 04/06/1993 [ATSR-1; All Envisat-format products]**
- The default visualisation in BEAM does not invert the NetCDF products across-track and so the daytime view appears to be reversed, running east–west from left to right. This is in contrast to Envisat-format products that are displayed west–east in the daytime view. **All data [All instruments; All NetCDF products]**
- There are a number of NetCDF products within the dataset where the start time in the header of the product is one or two seconds earlier than the start time in the filename (and that of the parent L1). Due to the small difference involved, these products have not been removed from the archive, and there are no quality issues raised. The L1 product contains the definitive information. **All data [All instruments; Subset of NetCDF products]**

4.2 Information on the Third Reprocessing

4.2.1 Background

The third reprocessing was conducted in order to introduce some key improvements:

- Improved SST coefficients (based on ARC knowledge) for the NR products
- Improved view collocation and absolute geolocation
- Improved and consistent visible channel calibration
- New SST L2P (and L3U) NetCDF products based on the ARC processor
- New LST NetCDF products from the University of Leicester

Further information is available from the user notes relating to AATSR, ATSR-1/-2 and the new SST L2P processor: [User Note for the Third AATSR Reprocessing](#), [User Note for the Third ATSR Reprocessing](#) and [User Note for \(A\)ATSR L2P Reprocessing](#). The User Notes are also included in the Information Pack.

4.2.2 Scope

Table 2 displays the date and product orbit information of the data included in the third reprocessing (v3.0). Note that this now includes data from the Commissioning Phases. However, as the quality of these data cannot be guaranteed, these products are segregated from the main archive.

Table 2. Range of data included in the third reprocessing (v3.0)

Instrument	Phase	Date Range	Orbit Number*
ATSR-1	Commissioning	01 August 1991 – 28 October 1991	00213 – 01487
	Operations	01 November 1991 – 17 December 1997	01545– 33597
ATSR-2	Commissioning	01 June 1995 – 31 July 1995	00585 – 01457
	Operations	01 August 1995 – 22 June 2003	01459 – 42720
AATSR	Commissioning	20 May 2002 – 22 July 2002	01149 – 02058
	Operations	22 July 2002 – 08 April 2012	02059 – 52866

* N.B. the majority of (A)ATSR products start before the ascending node crossing (ANX) point at the equator and so products are labelled with the preceding Envisat orbit number.

It can be noted that v3.0.1, a full reprocessing of ATSR-1 and ATSR-2 that is scheduled to take place in 2016, also includes data from ATSR-2 after the failure of the on-board tape recorder. This data runs from 17 July 2003 to 31 January 2008.

4.3 Archive Information

4.3.1 Segregation

Segregation has been implemented to separate data of unknown or non-nominal quality from the remainder of the (A)ATSR datasets. Users are advised that all segregated data should be used with caution.

Products have been segregated for a variety of reasons, including:

- Commissioning Phase
- Instrument operations: outgassings, blackbody cross-over tests
- Platform manoeuvres
- Low-quality products (see Sections 2.7.3 and 2.7.4)

Detailed explanations, including the full listing of data which have been segregated, are given in the README files available from the Third Reprocessing Information Pack (as well as in the data archives themselves).

ATSR-1 and ATSR-2 products

- There are no products available for ATSR-1 during instrument outgassings in the segregated archive. Since all four channels were cooled there is no useful scientific data in the products, so they have been removed.
- See Section 2.7.5 for further details of ATSR-1 and ATSR-2 products that have been removed.

L2P and L3U products



L2P and L3U products from outgassing periods have been removed from the segregated archives (since there was no thermal channel data, no SST data was generated). Envisat-format products may still be available in the archives for these times.

LST products

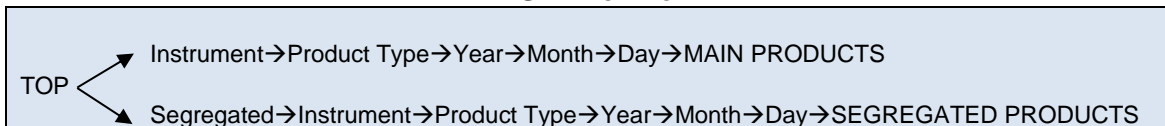
LST products from outgassing periods do not contain LST data (since there was no thermal channel data available), but the potential exists for NDVI data to be present within these products, so they remain in the segregated archive.

4.3.2 Structure

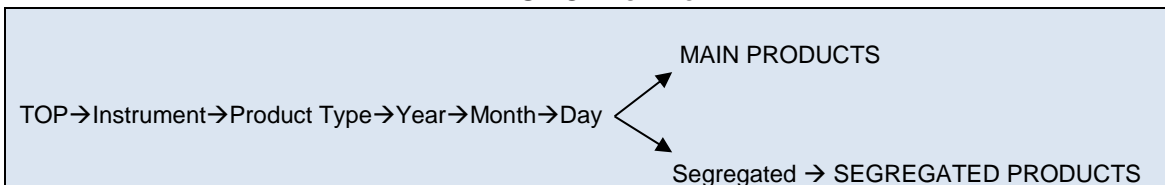
In contrast with the archive structure of previous (A)ATSR datasets, the third reprocessing archives now have the product type selection before the date selection. A separate section for segregated products is also now available. This is illustrated below.

Users should note the different structure between the ESA and NEODC archives for the segregated products.

ESA Archive



NEODC Archive



4.4 Documentation Updates

A number of updates have been made to (A)ATSR documentation that reflect the changes made in the third reprocessing. These are listed below.

- **AATSR Product Specification:** The AATSR Product Specification has undergone two revisions to cater for the third reprocessing: Issue 4/B provided details on the changes in the Envisat-format products; Issue 4/C added full information on the new ARC L2P and L3U products. Both versions are available from the ESA library: [Issue 4/B](#) and [Issue 4/C](#).
- **AATSR FAQ:** The AATSR FAQ on the ESA EO website has been updated (issue 2; issue 3 in progress) to cover many aspects of AATSR and its products, and also includes information relevant to the data from the third reprocessing: [AATSR FAQ](#).
- **AATSR Product Quality Readme Files:** The AATSR Product Quality Readme Files (formerly termed the Disclaimers) have been updated and are available from the [ESA EO SPPA web pages](#).
- **AATSR Level 1B Detailed Processing Model:** The L1 DPM has been updated (version 1.10) and is available from the ESA library: [AATSR L1 DPM](#).



- **AATSR Level 2 Detailed Processing Model:** The L2 DPM has been updated (version 1.8) and is available from the ESA library: [AATSR L2 DPM](#).
- **ATSR-1 and ATSR-2 data in Envisat format technical note:** The technical note describing ATSR-1 and ATSR-2 data in Envisat format (APP-TN-05) has been updated (issue 3.0) to reflect the new reprocessed products. It is available from the ESA library: [Envisat-style products for ATSR-1 and ATSR-2 data](#).
- **SST and LST User Guides** containing product specifications for the new NetCDF products have been published in the ESA library:
 - [ARC L2P SST User Guide \(issue 1.3\)](#)
 - [UOL LST User Guide \(v1.0\)](#)