



RAL ATSR PLS Report to 12th ATSR Core Group Meeting

Covering the period 1st July until 30th September 1998

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1. PROGRESS SUMMARY

Significant progress has been made in several areas of the programme despite the inevitable disruptions caused by summer vacations. Several scientific improvements have been made to the SADIST code, the X-band telemetry system has been completed, progress has been made on the draft User Guide and the ATSR Reference Handbook, the cloud clearing paper has been completed and submitted to JGR, the backlog processing of the ATSR-2 was completed 2 months ahead of schedule, and the ABF ingestion is now up-to-date with the ATSR-2 processing.

2. INSTRUMENT STATUS

2.1 ATSR-1 STATUS

ATSR-1 is powered off, and only the basic monitoring activities necessary to check basic health and safety and keep the microwave radiometer in operation are being maintained.

2.2 ATSR-2 STATUS

ATSR-2 has operated nominally throughout the reporting period. However, there was a short loss of ATSR-2 operation and data as a result of an RA anomaly on 15th September.

2.3 REPORTS ON INDIVIDUAL WORK PACKAGES

2.4 WP 1000 SCIENCE EXPLOITATION

2.4.1 WP 1100 Scientific Planning and Project Management

Regular meetings have been held of the whole ATSR PLS Project team to progress all aspects of the ATSR Post Lunch Support Programme.

2.4.2 WP 1200 Scientific Support

Work on updating the VISCAL LUTs has continued.

Work is progressing well on the short User Guide and a draft will be available to the meeting. Work on the more extended user guide, now known as the "ATSR Reference Handbook", is progressing and the Chairman has been provided with a copy for comment - further discussion needs to take place on how to progress this.

2.4.3 WP 1300 Underpinning Physics

The cloud clearing paper has been submitted to JGR and is currently under review.

Work on the algorithms for re-processing ATSR-1 data is continuing well.

The updating of the basic SST retrieval coefficients has been completed and a dual-view algorithm robust to stratospheric aerosol is now available. All coefficients have been updated to include the benefits of an improved treatment of the water vapour continuum, which has reduced the water vapour related biases in tropical regions (Merchant and Harris, 1998). They are also based on a much larger (1354) and more representative set of atmospheric states and associated surface conditions, and use the surface emissivity parameterisations of Watts et al. (1996). The new dual-view coefficients are global, i.e. identical for tropical, mid and high latitudes.

Changes have also been made to the way the across-track variation in the air-mass is handled to avoid the banding effects introduced by the simple 10 across-track band scheme employed in the original retrieval. The revised scheme uses a much finer banding, with 38 bands in each half-swath. These bands are equally separated in atmospheric path length, so are widest, in kilometres, at the centre of the swath, and symmetrical.

Further work continues on including the effects of the detector warm-up at the end of the ATSR-1 mission, this work is expected to be complete by the end of the year.

2.4.4 WP 1400 Management Interfaces

The Project Scientist has maintained regular management level contact with ESA counterparts.

2.4.5 WP 1500 Promotion

The large (8 ft × 8 ft) ATSR-2 mosaic of Africa which was generated as part of the Open Day exhibit has continued to arouse great interest. It was recently exhibited at the Remote Sensing Society meeting at the University of Greenwich.

A paper on ATSR-1/2 was delivered at the recent ESLAB Conference at ESTEC.

The ATSR World Wide Web pages have been maintained.

2.5 WP 2000 IN-FLIGHT OPERATIONS

2.5.1 WP 2100 System Management

The software, hardware, and data links necessary to support the ATSR-1 and 2 instruments have been maintained throughout the period.

2.5.2 WP 2200 Instrument Operations

ATSR-1

ATSR-1 is now non-operational, apart from the Digital Electronics Unit (DEU) which is active to support the Microwave Radiometer (MWR) operations required for the generation of the tropospheric delay correction for the Radar Altimeter data. ATSR-1 is no longer in operation because of the lack of power resulting from the ERS-1 solar generator anomaly, and the need to maintain the remaining capacity in the time limited items on the ERS-1 platform (i.e. the tape recorder spring).

ATSR-2.

The instrument has continued to run nominally except for the anomalies and incidents reported below.

The instrument was switched down to STANDBY for about 20 hours on the 15th September caused by a Radar Altimeter operational anomaly. In this case, the ATSR-2 instrument came back up to nominal mode without incident. The scan mirror start-up being uneventful.

Close monitoring of scan mirror performance continues with only one power spike event of 52 watts occurring on 2nd July. There have been no occurrences of 2002 pixel events since the middle of May.

During the whole period ATSR-2 viscal data has been processed routinely from three orbits/day and results from this are available on:

http://www.atsr.rl.ac.uk/html/calibration_table.html

Over the duration of the ATSR-2 mission the optical surfaces have been degrading at a steady rate resulting in a signal loss of 3-4%. To compensate for this the gains of the 0.56, 0.67, and 0.87 μm channels were re-adjusted to allow the signals to take up to ~95% of the available range. These gain changes were made on 8th September.

Support from ESOC for ATSR-2 continues to be excellent.

2.5.3 WP 2300 Monitoring

For ATSR-2 the usual close level of monitoring has been maintained in case the scan anomaly recurs, whereas for ATSR-1 only a basic health and safety check is being maintained

2.5.4 WP 2400 Troubleshooting and Diagnostics

Fortunately, no action has been required under this work package this quarter.

2.5.5 WP 2500 On-board Software and High-level Documents

No work required during this period.

2.5.6 WP 2600 ATSR-2 X-band EDS development and Maintenance

The development work has now been completed, and software is now available to select and display X-band auxiliary data parameters using a graphical user interface.

2.5.7 WP 2700 Maintenance of the S-Band EDS-1/2

The S-band system continues to function nominally with no problems to report.

The probable loss of the RAL/ESRIN DECNET service reported previously has again been held at bay by the ERS Project Team. During the time when loss of DECNET looked likely, trials of the new TCP/IP features in the latest version of the VMS operating system showed that they do not enable a simple "fix" to be made in the event of the DECNET service being withdrawn.

The ERS Project management are maintaining their position that DECNET will now be preserved until the end of the ERS-2 mission. We have asked ESA for at least three months warning of loss of the DECNET service to enable us to design, implement and test an alternative approach.

2.6 WP 3000 CALIBRATION AND VALIDATION

2.6.1 WP 3100 Calibration and Validation Planning

Further deployments for 1998/99 are being planned.

2.6.2 WP 3200 Infrared Calibration and Validation

The data processing for MUBEX'97 has continued. Three overpasses, two morning and one evening, have now been completed. The agreement between SISTeR and the ATSR-2 1km SST products is to better than 200mK in each case.

Initial examination of the data collected in CHAOS'98 suggests that no clear ATSR-2 overpasses were obtained. However, the SISTeR data set from the cruise will constitute the central part of a Leicester University PhD.

SISTeR was installed on the RRS James Clark Ross at Grimsby for the AMT-7/ROSSA98 cruise. Just before departure from Grimsby an intermittent fault in chopper sub-system was identified. The problem could not be solved in the short time available before the ship sailed, therefore the sub-system was removed and the fault repaired at RAL. The working chopper was then reinstalled on the ship in Lisbon, a week later. SISTeR is currently working well, and collecting valuable validation data.

Laboratory accommodation has always been very cramped for the SISTeR project. During the last quarter it has been possible to identify new laboratory space for the project, and move the work into this improved accommodation.

The ATSR validation scientist contributed to the paper "The calibration and inter-calibration of sea going infrared radiometer systems using a low cost blackbody cavity", currently accepted for publication in the Journal of Atmospheric and Oceanic Technology.

Progress on the second SISTeR is on schedule. The second-generation SISTeR signal processing and thermometry PCBs are being fabricated, together with the kits for component loading.

RAL is now involved in the ISAR autonomous radiometer consortium, and is working with the other partners in the programme under US funding to build simple radiometers for deployment on ships of opportunity.

RAL's validation work was reported at the recent CEOS IVOS meeting in ESTEC.

2.6.3 WP 3300 Visible Calibration and Validation

Work on monitoring the stability of the visible channels is continuing, and benefiting from partial funding by NOAA has been extended to include several new sites. Comparisons with the POLDER instrument are continuing, and the ATSR-2 visible calibration scientist and his POLDER equivalent met at the recent CEOS IVOS meeting in ESTEC. This close collaboration is working to the benefit of both projects, and is now being extended to include data from VEGETATION.

2.7 WP 4000 ALGORITHMS

2.7.1 WP 4100 Algorithm Management

2.7.2 WP 4200 Algorithm Development

Reported under Science support, as the current work relates to improvements in the algorithm coefficients.

In addition several other improvements have been made to the SADIST V300 code to improve the resultant products. In the ABT the mean across track band has been replaced by a mean across-track pixel based on the 11 μ m pixels contributing to the average. Brightness temperatures are now 4-byte integers in mK, and reflectances 4-byte integers per-1000, whereas previously the temperatures were presented in cK and reflectances as percent. These changes were required to avoid truncation problems that had previously prevented the ABT data being used to generate correct ASSTs (i.e. in the old ver-

sion the ASST calculated using the truncated ABTs was different to the value in the actual ASST product).

Significant testing of the new algorithms has also been undertaken, this will be completed in the next few weeks.

2.7.3 WP 4300 Algorithm Maintenance

Other than those reported above, no significant maintenance activities have been required during this reporting period.

2.8 WP 5000 DATA PROCESSING SOFTWARE

SADIST-2 V320 is currently undergoing pre-operational testing at RAL. V320 enhancements include:

1. Improved dual-view sea-surface temperature retrieval in SST/ASST products through incorporation of new stratospheric-aerosol-robust retrieval coefficients and improved radiative transfer modelling of the water vapour continuum.
2. Improved ABT product format with brightness temperature precision sufficient to allow precise ASST derivation.
3. Correction to the infrared histogram cloud test problem described in the previous report.

This version will be used to reprocess ATSR-1 data now arriving on the re-transcribed (LRDAF) tapes from ESRIN.

In the previous report it was mentioned that SADIST-2 had been installed at Tromsø Satellite Station. ESA have recently informed RAL that they are hoping to start a NRT ATSR-2 service in the last quarter of this year; details will be announced by ESA in the near future.

There is no further news at this point in time regarding any DERA NRT service from West Freugh. Any subsequent information will be given at the meeting.

2.8.1 WP 5100 Software Requirements

The modifications to SADIST necessary to support the archived LRDAF tapes are currently being developed and implemented.

With the continuing demise of VMS in scientific environments, and the increasing difficulty experienced in recruitment and retention of VMS-experienced staff, it is recommended that no further changes to the VMS version of the SADIST-2 slave processor be made beyond V320 other than bug-fixes. Future development of the SADIST system should be co-ordinated with development of the AATSR Reference Processor. A further point for the Core Group to note is that ESA are not maintaining the VMS version of the ERSORB orbit propagation software used within SADIST which may force us to move to UNIX.

The SADIST-2 pre-processor and archiver both require infrastructure modifications to handle retranscribed archive of ATSR-1 data on AIT tapes. These modifications must be made in the VMS environment to allow the reprocessing to go ahead in a timely fashion.

Operationally, existing ALPHA hardware running VMS can be reconfigured to run UNIX. Hence, if a move to UNIX is made then no loss of existing hardware investment would be involved.

2.8.2 WP 5200 SADIST-2 V300 Maintenance

The SST retrieval improvements made by the RAL Science Team and Chris Merchant have been integrated into the system (in V320) and placed under configuration control.

The ATSR-1 data reprocessing from AIT tapes, as currently baselined, requires the SADIST-2 tape-archiver to be able to handle hundreds of orbit-files per tape. The design of the current tape-archiver and the design its associated tape catalogue is based on a maximum of thirty orbit-files per tape. (The tape catalogue and archiver were designed at the start of the ERS-1 mission when this was a reasonable assumption.) To handle the AIT tapes, the tape-archiver must be re-designed and the catalogue recreated. This design work is ongoing.

The re-transcribed ATSR-1 data can be processed without the new archiver, but only using the predicted state vectors found in the tape file headers.

No new Software Problem Reports have been received.

2.9 WP 6000 DATA HANDLING

2.9.1 WP 6100 Data Management

ESRIN is currently rationalising its network links and has decided to remove the FTAM protocol as a means of transferring orbital elements to RAL. Therefore, over the last few months RAL has supported ESRIN in the testing of a new FTP distribution system. Currently, the new FTP service has been established operating in parallel with the existing FTAM system. However, as these tests have satisfactorily proved the reliability of the FTP transfers, a change to FTP as the operational protocol is due to take place in the next two weeks.

RAL welcomes this change as the FTP protocol is already widely supported at RAL as part of the laboratory infrastructure. The continued use of FTAM by ESA had posed the ATSR Project with significant technical difficulties for sometime, because of the specialist networking knowledge and hardware that was required to maintain the stable daily operation this link.

2.9.2 WP 6200 Archive Improvements and Population

See below for the status of re-transcribed ATSR-1 data.

It is still intended to place the description of all Master Request File (MRF) areas on the WWW, this work will proceed during the next quarter

A WWW page is under development which will allow month ASST maps from ATSR to be downloaded. Ultimately, this will be expanded to allow the download of ASST products directly from this site. It is still intended to place the description of all MRF areas on the WWW but it has not been possible to progress with this during the previous period.

2.9.2.1 WP 6201 Data Archive Maintenance

On-going, awaiting the re-transcribed data from ESA.

2.9.3 WP 6300 Primary Mission Processing

The backlog of ATSR data to be processed with Master Request File processing has been cleared. All ATSR-2 data obtained between the launch of the instrument in April 1995 and the current date has been processed. This processing was completed at the end of July, some 3 months ahead of the schedule previously agreed. Highlights of this processing will be presented at the next meeting of the ACG.

The data processing section has now commenced a detailed Quality Assurance of the ATSR-2 ASST archive to ensure that all the data have been processed correctly and that all missing orbits are accounted for.

2.9.3.1 WP 6301 Browse Population and Operation

The previously reported problems with the ABF have been investigated by EOS, the contractor which developed it. This resulted a restructuring of the database by EOS with the result that the ABF is usable once more.

2.9.4 WP 6400 Full Resolution Data Processing for the NERC Community

RAL has continued to receive requests for ATSR data. Only one request is outstanding - awaiting input from the user. Details will be presented to the ACG at the next meeting.

2.9.5 WP 6500 Reprocessing

As previously described, the existing ATSR-1 data set is being reprocessed with SADIST-1 on behalf of the Met. Office. Currently all data between the start of the ATSR-1 mission and the end of July 1994 has been processed to ASST and ABT. At the current rate of processing, this should be complete by the end of October, some 2 months ahead of the planned schedule.

The re-transcribed ATSR-1 data set through the LRDAF at Fucino was further delayed due to technical problems at Fucino. However, the first pre-operational tapes have now been dispatched and will have been processed by the time of the ACG meeting. It is envisaged that an MRF reprocessing run will commence sometime in October 1998.

2.9.6 WP 6600 Order Handling and Distribution

See reports under above work packages.

3. WP 7000 HIGH LEVEL MANAGEMENT

3.1 WP 7100 OVERALL RAL PROJECT MANAGEMENT

Regular progress meetings with the Project Scientist and the EO Data Group Leader have been held to progress work.