RAL ATSR PLS Report to 16th ATSR Core Group Meeting

Covering the period 1st July 1999 until 30th September 1999

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1. PROGRESS SUMMARY

Good progress has been maintained throughout the summer holiday period, and a number of milestones achieved.

The first distributions of the intercomparison data were made, the ABT merging tool has gone operational, the ATSR Flyer has been completed, work on the CD-ROM has continued together with the algorithm updates and the cloud review.

However, during the period there have been long running problems with the ATSR Browse Facility (ABF) and its inability to ingest data onto the CD-ROM jukebox which was further exacerbated by a security breach in the SUN operating system. These problems have now be resolved, albeit more slowly than initially expected, by a complete rebuild of the ABF system by RAL staff with support from K-PAR and EOS.

2. INSTRUMENT STATUS

2.1 ATSR-1 STATUS

Throughout this period ATSR-1 has been 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 most of the reporting period, as usual there have been a few occurrences of high power spikes.

3. REPORTS ON INDIVIDUAL WORK PACKAGES

3.1 WP 1000 SCIENCE EXPLOITATION

3.1.1 WP 1100 Scientific Planning and Project Management

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

3.1.2 WP 1200 Scientific Support

The planning for the CD-ROM is now complete, and a schedule for its production has been developed. Science support staff are working closely with the software and processing teams, to provide quality control for the ABT merging project through continuous assessment of the ABT products as they are

produced. Prototype code for the operational retrieval of ASSTs from the merged ABT data sets is now under test, and will be available for use in early January in the pre-production run using the set of "best" set of coefficients available at that time.

In response to a number of queries about ATSR data geolocation an evaluation of the geolocation will take place over the next six months. In preparation for this evaluation an independent map database has been developed from the USGS GTOPO30 DEM. This new data base provides a land/sea mask, a coast flag, and the topography in a form that can be called by RAL's image processing software. Using these latest mapping data it will be possible to check the geolocation of ATSR imagery using a map data source that has not already been used in the processing. Furthermore, the inclusion of the new DEM allows the identification of land features in continental interiors, not currently in the ATSR-2 map data base, which can now be used to test geolocation in images that do not contain any coastline. This map data base will also be used to update the ATSR land flag, where this is considered necessary. Also, using this data base it would be possible to develop a means of correcting the co-location of the forward and nadir view data over land, if the ACG members consider this to be a priority. A scheme has already been developed for AATSR but has not been applied to ATSR-1/2 previously because of the lack of a suitable resolution DEM. For the record, one major limitation of this new data base is that lakes are not identified separately as they are considered to be land by the USGS.

3.1.3 WP 1300 Underpinning Physics

Work continues on the ongoing items listed in Table 2 of the attached progress summary. The two major activities continue to be the updating of the ATSR-1 algorithm and the cloud algorithms review. Progress remains good and will be reported to the ACG at future meetings.

3.1.4 WP 1400 Management Interfaces

The Project Scientist has maintained regular management level contact with ESA counterparts at ESA-HQ, ESTEC, ESRIN and ESOC. User Group Meeting.

3.1.5 WP 1500 Promotion

The final revisions for the EOS article have been made, and the galley proofs are currently being edited - publication is expected to take place in the next quarter. A new version of the ATSR advertising flyer has been completed and comments are awaited from the Core Group members who expressed an interest in this - the completed brochure will be provided to each member at the next Core Group Meeting.

Maintenance of the existing ATSR WWW pages continues, and some new material has been added during the last quarter (including the last RAL Report and the ACG Meeting summary). The 2nd phase in the updating of the project's web pages is well underway. A set of pages with a new more tidy look, and which are more easily maintainable are being developed by a Computer Science sandwich course student working for the project. These new developments include various scripts that automatically add and update material on the pages, and use the latest web technology to link pages "on the fly" so that changes can be made more efficiently and with less staff overhead.

The project team has now written to ERDAS (UK) and PCI Geomatics concerning the inclusion of ATSR data formats in their GIS and image processing products. As yet no replies have been received, but the ACG will be informed at future meetings of any progress on this

3.2 WP 2000 IN-FLIGHT OPERATIONS

3.2.1 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.

The DECNET link over which all the daily engineering data is transferred is under threat again due to network rationalisation within ESA. It now seems very likely that, despite all the repeated assurances we have previously received from the ERS Project, the removal of this connection is imminent. This is potentially very serious as we rely heavily on this link for the daily collection of the information we use to monitor both ATSR instrument's health. Considerable effort and testing will be required to switch the system to use a different networking protocol.

3.2.2 WP 2200 Instrument Operations

ATSR-1

Nothing to report. 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.

ATSR-2.

ATSR-2 continues to perform well. The instrument has been running continuously since November 1998. The scan mechanism is running nominally with no indications of the drive problems previously encountered. The cooler is maintaining the FPA temperature at 80K at roughly the same compressor amplitude since the start of the mission. Due to the long period of continuous operation, the 11µm gain is at the highest since launch. Hence, there will be a need to outgas the FPA in the near future. We intend this to take place during the next planned switch down of the ERS-2 payload in November 1999. Pixel map toggling is still suspended on the 14th and 24th of each month for the GOME/ATSR-2 synergy campaign.

We have been informed of two planned shutdowns of the ERS-2 payload on 17-18 November 1999 and during the millennium. The first is to coincide with the Leonids meteor storms. The aim is to shut down all non-essential equipment during these periods.

The most significant problem since the last report has been the loss of the DECNET link between RAL and ESOC between 30 August to 13 September 1999. This meant that no housekeeping data were available to RAL throughout that period. Fortunately no instrument anomalies occurred and the data backlog was recovered.

There has been a real threat that ESOC will not continue to support DECNET for some time. We therefore advise that the operations system should move away from the DECNET system as soon as possible.

The visible calibration table is now being updated once per fortnight.

The VISCAL data is available from:

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

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

3.2.3 WP 2300 Monitoring

ATSR-1: Basic health and safety check has been maintained over the period.

ATSR-2: Detailed daily monitoring has been maintained in case the scan anomaly recurs.

3.2.4 WP 2400 Troubleshooting and Diagnostics

No action has been required during this quarter.

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

No work required during this quarter.

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

There has been no work in this reporting period.

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

Year 2000 testing of the operational system, using input supplied by ESOC from ESA's formal Y2K System Test, has shown the EDS-2 system to be Y2K compliant. ESOC requested a short report summarising the results of the testing. This has been delivered.

The EDS-2 system currently runs on aging VAX/VMS hardware procured at the start of the ERS-1 mission. Maintenance costs of this hardware, as well as concern over its reliability, required the EDS-2 system be ported to modern ALPHA/VMS hardware. This port has been completed. Unit-testing has been successful and system testing is underway. The latter consists of running the system pseudo-operationally, in parallel with the operational VAX/VMS. The ALPHA system is currently scheduled to be operational by mid November.

3.3 WP 3000 CALIBRATION AND VALIDATION

3.3.1 WP 3100 Calibration and Validation Planning

The situation regarding the forthcoming campaigns is under review, an update will be given to the ACG meeting.

3.3.2 WP 3200 Infrared Calibration and Validation

NAURU 99 Campaign June / July 99

SISTeR instrument ALICE was deployed on the MIRAU research vessel, which is operated by JAMSTEC (Japanese Marine Science and Technology Centre), for the NAURU 99 campaign. The campaign was centered on the study of "Heat Fluxes" as part of the ARM project.

ALICE performed flawlessly during the campaign and cross validation was carried out with the University of Miami Instrument M-AERI. This showed agreement between SISTER/M-AERI to < 50 mk.

Unfortunately the number of validation points that will be obtained from the campaign will be limited due to the cloud cover present during the campaign.

Whilst on the NAURU'99 Campaign Tim Nightingale made some progress on visualisation tools that will make the operation of the instrument by third parties easier.

Tim Nightingale has just completed with Craig Donlon a paper that has been submitted to Applied Optics titled "The effect of atmospheric Radiance Errors in Radiance Sea Surface Skin Temperature Measurements".

SISTeR instrument BETH

Work on Sister no. 2 (BETH) is progressing well.

A brief report from the NAURU campaign and SISTeR status will be tabled at the ACG meeting.

3.3.3 WP 3300 Visible Calibration and Validation

Work on the long term monitoring of the visible channel calibration and the intercomparisons with other sensors continues.

Dave Smith is currently preparing a paper detailing the long term validation of the ATSR-2 visible channels.

3.4 WP 4000 ALGORITHMS

3.4.1 WP 4100 Algorithm Management

3.4.2 WP 4200 Algorithm Development

Reported under Science support, as the current work relates to improvements in the algorithm coefficients and a review of the cloud algorithm and its performance.

3.4.3 WP 4300 Algorithm Maintenance

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

3.5 WP 5000 DATA PROCESSING SOFTWARE

The ABT co-location/consolidation software is now ready for operational use. A workstation dedicated to ABT consolidation has been ordered and delivery is due by 15th November. Pending the start of full operational processing, two months of sample data, June/July 1995 ATSR-1 and ATSR-2, are being prepared for scientific validation of the consolidated product. A visualisation tool has been developed to aid in this assessment, and SST retrieval code is now available.

3.5.1 WP 5100 Software Requirements

The ATSR-1 LRDAF tapes now being delivered will eventually be consolidated onto the new AIT tape medium to allow the entire ATSR-1 raw data archive to be “near-line” in an AIT Jukebox. To be able to process raw data in this format, the SADIST preprocessor and tape-archiver will need to be modified. The software change requirements have now been defined and documented. Design work can begin in the next quarter.

3.5.2 WP5200 Software Maintenance (SADIST-2 V300)

The SADIST-2 preprocessor, processor and archiver all required Y2K-compliance modifications. These were more extensive than previously anticipated, but have now been implemented and successfully tested against input data provided by ESA.

This new Y2K compliant version of SADIST-2 will be available for use by the RAL data-processing centre in late November. Other data processing centres will receive the new version when their licensing/maintenance contracts are renewed.

3.6 WP6000 DATA HANDLING

3.6.1 WP6100 Data Management

The State Vector information from ESRIN continues to be received successfully, including simulated year 2000 state vectors which were archived at RAL.

3.6.2 WP6200 Archive Improvements & Population.

As a result of a joint effort between RAL and ESRIN, all the available ATSR-2 orbits have been received by RAL. The occasional missing orbits from the Canadian stations have now been supplied. However, raw data tapes have continued to fail and these are being replaced by ESRIN on a regular basis.

3.6.2.1 WP6201 Data Archive Maintenance.

The LRDAF tapes, representing the re-supply of ATSR-1 data, are now being received by RAL. So far, data from April 1992 to November 1992 has been received at a rate of approximately 1.5x real-time. ESA have still not increased the throughput by the addition of a second processing chain. However, even with the addition of this second processing chain, ESA estimate that the earliest the retranscription will finish is March 2001. A full MRF-processing run from this data will start during 1999 Q4 after the backlog of ATSR-2 MRF processing has been cleared.

3.6.3 WP6300 Primary Mission Processing.

ATSR-2 primary mission processing has been suspended due to the continuing unavailability of the ABF. It will recommence once the ABF is operational. A backlog of ATSR-2 data waiting to be processed as part of the MRF processing has built up. This will be given highest priority when the ABF is once again fully operational and should be cleared in approximately 6 weeks after the re commencement of processing.

3.6.3.1 WP6301 Browse Population & Operation.

Problems with the ABF continued during this period and RAL staff devoted substantial amounts of time supporting the external hardware and software engineers tasked with its repair. Significant progress has been made, the ABF has now successfully injested data at 5x real time and written a CD. The facility will be now be run “operationally” and should have written a further three or four CD’s by the ACG meeting. Assuming no further problems arise it is expected that the ABF will be fully operational by the time of the next ACG meeting.

The opportunity was taken to upgrade the ABF operating system (Sun Solaris 7) and the K-PAR CD jukebox control software. The CD control software update will have the effect of improving the diagnostic information from the jukebox. The upgrading of the operating system led to the ABF being removed from the network briefly during October.

A brief technical note outlining the activities / work carried out on the ABF facility will be tabled at the ACG meeting. This note will also detail the hardware, software and maintenance arrangements as well as outlining the missing data to date.

3.6.4 WP6400 Full Resolution Data Processing for the NERC Community.

The following table summarises data services for the reporting period.

	Received	Completed	Products Distributed
1999 Q3	11	5	7008
1999 Q2	15	11	22060

The decrease in the number of products distributed is a direct result of the temporary suspension of the ATSR-2 MRF processing as a result of continuing problems with the ABF. This will be resumed during

1999 Q4, and will result in a substantial increase in the number of products distributed during this period.

3.6.5 WP6500 Reprocessing.

The suspension of ATSR-2 MRF processing did allow substantial progress with the generation of ASST/ABT products from ATSR-1 data such that all data received for the period January 1994 to the end of continuous ATSR-1 operations in June 1996 has been processed. ASST products have been made available via FTP and ABT products provided.

3.6.6 WP 6600 Order Handling and Distribution

See reports under above work packages.

The following users have requested data during the reporting period

Name	Institute	Country	Requests
Ian Barton	CSIRO	Australia	2
Ross Mitchell	CSIRO	Australia	1
Jose Antonio Sobrino	University of Valencia	Spain	1
Chris Merchant	University of Edinburgh	UK	1
Phillip Cooper	University of Leicester	UK	1
Patrick Minnis	NASA Langley	USA	1
Sinde Hoqskolan	Royal Institute of Technology Stockholm	Sweden	1
Rob Potter	S.O.C	UK	1
Serei Semovsky	Russian Acedemy of Science, Siberia	Russia	1
Dave Smith	RAL	UK	1

Listed below are institutions that have accessed the ASST FTP site

Institution
Meterological Office
Southampton Oceanography Centre
CSIRO
University of Leicester
ESRIN
University of Dundee
University of East Anglia
University College, London
National Aerospace Laboratory, Netherlands
Plymouth Marine Laboratory
School of Engineering of Bilbao, Bilbao, Spain
Bristol University
Centre for Coastal and Marine Services, PML

4. WP 7000 HIGH LEVEL MANAGEMENT

4.1 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.

5. PLANS FOR THE NEXT QUARTER

The specific milestones for the next quarter are given in Table 3 of the attached progress summary, plus the following list of standing activities:

- Continued operational support for the ATSR-1 and -2 instruments.
- Continued ATSR image product service.
- Continued routine ATSR-2 ASST processing.
- Continued routine ABF population and image generation through the Master Request File.
- Continued support for routine ABF operations to users.
- Completion of the ATSR-1 reprocessing algorithm.
- Updating of the ATSR Web pages