

**REMOTE SENSING DATA ANALYSIS SERVICE
ANNUAL REPORT APRIL 2001 – MARCH 2002
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MISSION STATEMENT
of the
REMOTE SENSING DATA ANALYSIS SERVICE FACILITY

The mission of RSDAS is to research & develop, implement, and operate systems for cost effective processing and analysis of remote sensing data in collaboration with, or on behalf of, the NERC and UK academic communities.

- * RSDAS will supply data products to customers in a timely fashion appropriate to customer's reasonable requirements.
- * RSDAS will provide services *complementary* to those reliably available through NASA or ESA.
- * RSDAS will ensure data products meet international standards for formats or quality where defined.
- * RSDAS will provide advice on processing satellite data to ensure efficient use of resources throughout the community.

In order to achieve its mission the RSDAS will:

- maintain awareness of developments in the remote sensing/image analysis fields, and act as a point of contact with NASA-GSFC, NASA-JPL, NOAA, NMC, to ensure changes or updates to processing systems, or new methodologies, are implemented in a timely manner, and to ensure advice is up-to-date;
- maintain awareness of its customers' needs through regular contact;
- actively seek funding opportunities for its customers and itself;
- maintain close contact with the Dundee Satellite Receiving Station staff and the NERC Earth Observation Data Centre;
- provide services to customers through peer-reviewed application and will itself apply for funding through peer-review;
- undertake small exploratory research and development projects to investigate the feasibility and scope of new services or research areas, and to justify CR funding.

User Communities

The NSS Remote Sensing Data Analysis Service will provide specialist services to the Environmental Sciences community supporting Council's remit to promote and support high quality research thereby meeting the needs of the User Communities identified in the NERC Mission.

PML/SPD May 2000

ANNEX 2: STEERING COMMITTEE MEMBERSHIP AND TOR

REMIT AND TERMS OF REFERENCE FOR THE NERC SATELLITE RECEIVING STATION STEERING COMMITTEE

Remit

The NERC Satellite Receiving Station Steering Committee exists to:

- review applications for use of data from the Satellite Receiving Station
- monitor outputs from the Satellite Receiving Station
- provide advice to Director, Science Programmes on aspects of the operations of the Satellite Receiving Station .

Director, Science Programmes, in turn, provides advice to the Science and Technology Board of Council on Services and Facilities relevant to their remit.

Terms of Reference

1. To review applications and establish priorities, for the Head of the Station, for the allocation of those of the Station's resources funded from NSS science budget, taking into account recommendations made through the NERC peer review mechanisms.
2. To review the science quality of work undertaken by users utilising data from the Station based on reports and publications.
3. To monitor the level of user satisfaction with the service and to analyse the user base.
4. To give guidance to the Head of the Station on improvement of the Station's equipment and on its service function.
5. To advise Director, Science Programmes on:
 - a. the level and direction of the internal R&D programme for the Station.
 - b. anticipated changes in requirements from the Station and the anticipated levels of future demand for data from the Station.
6. To receive annually a report from the Head of the Station and to comment thereon as appropriate prior to submission of the report to the Director, Science Programmes.
- 6a. To also receive annually a report from the NERC Earth Observation Data Centre and to comment thereon as appropriate prior to submission of the report to the Director, Science Programmes.
- 6b. To also receive annually a report form the Remote Sensing Data Analysis Service and to comment thereon as appropriate prior to submission of the report to the Director, Science programmes.
7. To provide advice to the Director, Science Programmes at other times as appropriate.

Membership Constraints

Membership of the Committee will be decided by Director, Science Programmes with advice from the Science and Technology Board and suggestions from the Committee itself. It will include the Head of the Station and a representative from the Science Programmes Directorate.

Members, other than ex-officio members will be invited to serve for a term of up to four years with a maximum extension of a further two years. The Chairman will serve a maximum of four years.

**NERC DUNDEE SATELLITE RECEIVING STATION STEERING COMMITTEE
MEMBERSHIP AS AT OCTOBER 2001**

Mr Trevor Guymer (Chairman) 6/99	James Rennell Division for Ocean Circulation & Climate Southampton Oceanography Centre European Way Southampton SO14 3ZH	thg@soc.soton.ac.uk Tel: (+44) 23 80596 430 Fax: (+44) 23 80596 204
Dr Gay Mitchelson-Jacob 6/99	Unit for Coastal and Estuarine Studies Marine Science Laboratories Menai Bridge Anglesey LL59 5EY	egm@uces.bangor.ac.uk Tel: +44 1248 713808 Fax: +44 1248 716729
Dr Steven Wilson 6/99	Earth Observation Programme British National Space Centre 151 Buckingham Palace Road London SW1 9SS	steven.wilson@nerc.ac.uk Tel: 020 7215 1422 Fax: 020 7821 5387
Dr Jo D Haigh 6/99	Imperial College Space and Atmospheric Physics The Blackett Laboratory Imperial College of Science, Technology London SW7 2BZ	j.haigh@ic.ac.uk Tel: 020 7594 7671 Fax: 020 7594 7900
Dr John Turner 10/01	British Antarctic Survey High Cross Madingley Road Cambridge CB3 0ET	j.turner@bas.ac.uk Tel: 01223 221485 Fax: 01223 362616
Dr Robert Bryant 10/01	Department of Geography University of Sheffield Winter Street Sheffield S10 2TN	r.g.bryant@sheffield.ac.uk Tel: 0114 222 7966 Fax: 0114 279 7912
<u>Ex Officio</u>		
Dr Steve Parkes	NERC Satellite Receiving Station Department of Applied Computing University of Dundee Dundee DD1 4HN	sparkes@computing.dundee.ac.uk Tel: +44 01382 345194 Fax: +44 01382 202575
Mr Steven Groom	RSDAS Plymouth Marine Laboratory Prospect Place West Hoe Plymouth PL1 3DH	sbg@pml.ac.uk Tel: 01752 633150 Fax: 01752 633101
Dr Peter Miller	RSDAS Plymouth Marine Laboratory Prospect Place West Hoe Plymouth PL1 3DH	pim@pml.ac.uk Tel: 01752 633485 Fax: 01752 633101

Dr Stuart White	Room 119, Building R25 Rutherford Appleton Laboratory (RAL) Space Sciences Department Chilton Didcot OX11 0QX	s.j.white@rl.ac.uk Tel: 01235 446168 Fax: 01235 445848
Dr Lin Kay	NERC Science Programmes Directorate Polaris House North Star Avenue Swindon SN2 1EU	rlfk@wpo.nerc.ac.uk Tel: 01793 411600 Fax: 01793 411610
Mr Peter Purcell	NERC Science Programmes Directorate Polaris House North Star Avenue Swindon SN2 1EU	ppu@wpo.nerc.ac.uk Tel: 01793 411649 Fax: 01793 411610
Mr Neil Lonie (Secretary)	NERC Satellite Receiving Station Satellite Receiving Station Department of A.P.E.M.E University of Dundee Perth Road Dundee DD1 4HN	ntl@sat.dundee.ac.uk Tel: 01382 344409 Fax: 01382 202575

ANNEX 3: EQUIPMENT INVENTORY

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ANNEX 4: FUTURE DEVELOPMENTS

The development of RSDAS is driven by a combination of internal factors, defined by the NERC community, and externally, by the availability of new satellite systems and products. These are briefly described below with development strategy and scheduled enhancements.

DATA PROCESSING, STORAGE AND ARCHIVING UPGRADES

PML has recently been awarded significant capital from the NERC Research Centres Infrastructure Fund and the South-West Regional Development Agency (SWRDA) for core science activities. Some of this has enabled purchase of an 18-node "LINUX Beowulf" cluster, together with a file server and new backup systems. These will be used mainly by the modelling and remote sensing groups and for RS will complement capital from NERC-SPD (for MODIS processing) and earned through EC contracts. The SWRDA funds also enabled purchase of a 155 Mbit/s microwave link to SuperJANET, though the University of Plymouth who provide the "sponsored connection" limit this to 10Mbit/s. The systems are still being installed and should lead to significant increases in volumes of data that can be received, processed, stored on-line and archived by RSDAS.

RE-WRITE OF REMOTE SENSING PROCESSING SOFTWARE

In order to take maximum advantage of the new network connection, and computing hardware, specifically the parallel processing capability it has been decided re-write the remote sensing processing software (Panorama). This is supported by a number of other factors including: 1) a decision to move operating systems from Solaris to Linux, 2) an increase in the number of sensors being processed (MODIS and CASI in addition to AVHRR and SeaWiFS); 3) to take advantage of more recent software methods, and 4) to simplify the software. The project is being funded through existing allocations to RSDAS and through internal PML and contract income.

ATMOSPHERIC CORRECTION PROCEDURES FOR ARSF

In 2002-3 it is planned to develop and implement further AC procedures for the NERC-CASI including:

- PML bright pixel algorithms for coastal turbid waters by end May
- Gordon and Wang correction using interpolated SeaWiFS look-up tables by end June
- Iterative algorithms, such as the Siegel and PML absorption models, by end of July

The aim is to have an operational CASI processing service towards the end of the flying year.

MODIS

Progress on the NERC funded MODIS project in the first year (20001-2) was limited due to delays in delivery of software from either NASA or the University of Wisconsin (UoW) and only new versions of the level 0-1 software were installed. However, in April 2002 UoW delivered the beta-test version of the cloud masking and cloud classification software that are required prior to ocean processing; this will enable a prototype meteorological service to be established during June 2002. The ocean code is still outstanding so we have decided to write our own simple atmospheric correction routine, based on the SeaWiFS and NERC-CASI codes. We will also implement the published MODIS chlorophyll algorithms. It is aimed to have a prototype MODIS ocean service in operation towards the end of 2002.

TRAINING

The issue of training in the use of data received at Dundee or processed in Plymouth has largely been left to user's host institutes. However, with an increasing number of products becoming available (such as from MODIS) a number of new initiatives will be started during the coming year.

- **MSc courses:** RSDAS staff have offered to give short presentations (or seminars) for MSc courses introducing Dundee and products that RSDAS can provide. Southampton will start a new MSc in Marine Remote sensing whilst well established MSc's in Oceanography exist at UW-Bangor and Southampton. PhD students often participate in MSc lectures and so will benefit from these seminars.
- **Training courses in Plymouth:** We are considering a higher level training course in the use of data processing software such as SeaDAS (for SeaWiFS processing). The user community will be polled for interest.
- **National and international conferences:** Although the range of users of DSRS and RSDAS is widespread, a surprising number of initial contacts are unaware of the services that can be provided, suggesting that some advertising is warranted. We propose to attend major national, and few international, conferences with a poster or oral presentation as appropriate.

ANNEX 5: SUMMARY OF PERFORMANCE INFORMATION

5.1 APPLICATION GRADES

RSDAS supports UK scientists who have submitted an application form either to RSDAS or DSRS. Applications expected to 'cost' greater than £500 are peer-reviewed by the DSRSSC on an ongoing basis, so that the grading is known before undertaking the work. Applications are also accepted on-line for access to pre-processed imagery available via the RSDAS web site, which logs the images accessed by authorised users in a database.

During this year RSDAS supported 37 applications, 22 of which were new applications. Two applications were ineligible due to non-UK academic funding, so the authors were encouraged to resubmit taking account of these rules. These were graded as follows:

APPLICATIONS: DISTRIBUTION OF GRADES (Current FY — 2001/02)								
	α5	α4	α3	α2	α1	β	R*/Pilot	Reject
NERC Grant projects	2	7	1					
Other academic	1	10	4				2	
Students		2	10					
Pilot								
TOTAL	3	19	15				2	

5.2 DISTRIBUTION OF PROJECTS

The applications can be mapped onto NERC's Science Areas and Environment and Natural Resource Issues (ENRI's), as a percentage of the Full Cash Cost:

Science Area	Number of Projects	Allocated Cost (%)
Science-based Archaeology	-	0
Earth	1	4
Marine	25	78
Atmospheric	-	0
Terrestrial and Freshwater	2	14
Earth Observation	9	4
Polar	-	0
TOTAL	37	100

ENRI	Number of Projects	Allocated Cost (%)
Biodiversity	9	17
Environmental Risks	7	8
Global Change	26	44
Natural Resource Mgmt.	21	26
Pollution and Waste	5	2
Other	2	3
TOTAL	-	100

5.3: APPLICATIONS SUPPORTED DURING FY 2001/2002

Name of User (Surname First)	University/ Institute	Proposal title	Funding Mode	Funding type	NERC Ref. No	Grading	Biodi- versity	Env Risks	Global change	Nat RM	P & W	Other
Lavender Dr Sam	Univ. Plymouth	Development of algorithms for processing ocean color imagery from European coastal waters		O		a5			1	1	1	
Scourse Dr James	Univ. Wales Bangor	Holocene palaeoceanography of shelf seas: long term (1000-10000 years) seasonal stratification dynamics	NT	R	GR3/11467	a4			1	1		
Proctor Dr Roger	Proudman Oc. Lab.	Prediction of currents for the Olympic Games 2000	CS	O		a4						1
Proctor Dr Roger	Proudman Oc. Lab.	SEAMAR: Development of an ecosystem model for massively parallel computers	CS	R	GST/02/1472	a4		1				
Turrell Dr Bill	Mar. Lab. Aberdeen	Monitoring the Atlantic Inflow toward the Arctic (MAIA)		O		a4			1			
Harris Dr Andy	Open University	Emplacement of lava flow fields and tube systems at Etna volcano: satellite insights		O		a4		1				
Srokosz Dr Meric	SOC	FISHES	CS	O		a4			1	1		
Blair Mr Ian	SOC	SeaWiFS Case I/II algorithms		S		a3				1	1	
Osborne Dr Patrick	Univ. Stirling	Monitoring the effects of agricultural landscape change on avian biodiversity using satellite remote sensing		O		a4	1		1			
Mitchelson-Jacob Dr	Univ Wales Bangor	Determination of sub-surface chlorophyll conc. using ocean colour imagery and in situ optical properties		O		a3	1			1		
Macleod Ms Kelly	Nat. Resources Inst.	Habitat assessment of cetaceans off the west coast of Scotland		S		a3			1	1		
Da Silva Dr Jose	SOC	Multi-sensor imaging of ocean organic films and sea surface slicks		O		a4			1	1		
Robinson Prof Ian	SOC	Study of coastal processes in the North Sea by combined analysis of satellite imagery from ERS-2 SAR, AVHRR and SeaWiFS		O		a4			1			
Sharples Dr Jonathan	SOC	Relationships between physical variability and primary production in shelf seas	NT	R	GR3/11829	a4			1	1		
Groom Mr. Steve	Plymouth Mar. Lab.	In-house research	INF	O		-		1	1	1		
Mower, Ms Jen	SOC	Variability of Autumn bloom in N. Sea off Norfolk		S		a3					1	
Emsley Dr Stephen	Dunstaffnage Mar. Lab.	Modelling persistence of zooplankton in Irish Sea using optimal vertical migration patterns	T	R	GST/02/2757	a3			1			
Burkill Prof Peter	Plymouth Mar. Lab.	Sub-surface cell and particle analysis (SSCAPA)	T	R	GST/02/2153	a5	1		1			
Wakefield Mr Ewan	Univ. Wales Bangor	Acoustic assessment of populations of common dolphins in relation to Celtic Sea front		S	NER/S/M/2000/0372	a3	1			1		

May Mr Vincent	Univ. Bournemouth	Durlston Marine Research Project: fish stocks		S		a3		1	1			
Vaughan Dr Robin	Univ. Dundee	Integration of satellite data into GIS: fisheries management on the Galician coast of Spain		S		a3				1		
Glegg Ms Gillian	Univ. Plymouth	Detecting oil spills in Arabian Gulf by remote sensing		S		a3					1	
Moffat Dr Collin	Mar. Lab. Aberdeen	Investigation into harmful algae bloom in Shetlands	CS	O		a3		1			1	
Burkill Prof Peter	Plymouth Mar. Lab.	Analysing microbial biodiversity in the Indian Ocean (AMBITION) cruise support	T	R	M&FMB	a4	1					
Shepherd Mr Barry	Sea Watch Foundation	Candidate Special of Area of Conservation for protection of bottlenose dolphin in Cardigan Bay		O		a3	1				1	1
Williams Dr Ric	Univ. Liverpool	Why do ocean deserts bloom? A stable isotope approach		S	GT/04/99/MS/134	a3			1			
Turrell Dr Bill	Mar. Lab. Aberdeen	Relationship between mesoscale circulation and biological productivity of the Faroe-Shetland Channel.		S		a3			1	1		
Burrows Dr Mike	Dunstaffnage Mar. Lab.	SAMS Northern Seas Programme	T	R	GST/02/2757	a4	1			1	1	
Sims Dr David	Marine Biological Assoc	Effects of zooplankton gradients in fronts on the foraging and migration behavior of basking sharks		O		a4			1	1		
Gaffney Mr Sean	Univ. Wales Bangor	Inherent optical properties of marine particle suspensions and influence on Case II R.S. reflectance	NT	R	GR3/12903	a4		1	1			
Bowers Dr David	Univ. Wales Bangor	Suspended sediment dynamics in the Irish Sea: testing ideas against satellite observations	NT	S	NER/S/A/2001/06379	a4			1	1		
Williams Dr Roddy	Marine Biological Assoc	Map projection expertise for fish eye receptor density		O		a3	1					
Hydes Dr David	SOC	Biophysical interactions and controls on export production (BICEP)	CS	O		a4			1	1	1	
Collins Prof MB	SOC	A conceptual model of water & sediment fluxes in the Eastern English Channel		S		a3			1	1		
Tyrrell Dr Toby	SOC	Winter Coccolithophores in the Bering Sea?	NT	R	GR3/12811	a4			1			
Tyrrell Dr Toby	SOC	Modelling the seasonal succession of <i>Emiliana huxleyi</i> and other phytoplankton in the Bering sea.	CS	S		a4			1			
Evans-Jones Dr Kate	Plymouth Mar. Lab.	In-house development: rewrite processing software	INF	O		-		1	1	1		
Hunter Dr Ewan	Univ. East Anglia	Validation of plaice ground tracks using sea-surface temperature data		O		a4	1			1	1	
Steinke Dr Michael	Univ. East Anglia	ACSOE/MAGE North Atlantic experiment	T	R	F60/G16/03	a5			1			

SERVICES AND FACILITIES COST ALLOCATIONS FORM 2001/02

Scientific Service: Remote Sensing Data Analysis Service

Full Cash Cost = 151030.00

UNIT PRICING	Enter price here
Unit Price 1	HSO hours £28
Unit Price 2	SO/ASO hours £18
Unit Price 3	Routine/web images £4
Unit Price 4	Archive/external images £6
Unit Price 5	Composite images £18
Unit Price 6	Real-time support days £100

University/Cente	Department/NERC site	Name of User (Surname First)	Funding Mode	Funding Type	NERC Ref No	A	T	E	S	P	B	E	G	N	P	O	Unit 1: HSO hrs	Unit 2: SO hrs	Unit 3: Routine	Unit 4: Archive	Unit 5: Comp.	Unit 6: Cruise	£'s
Univ. Plymouth	Marine Studies	Lavender Dr Sam		O													1	5	144				694
Univ. Wales Bangor	Ocean Sciences	Scourse Dr James	NT	R	GR3/11467												6			24	24		744
Proudman Oc. Lab.		Proctor Dr Roger	CS	O													25			150	150		4,300
Proudman Oc. Lab.		Proctor Dr Roger	CS	R	GST/02/1472												10		40				440
Mar. Lab. Aberdeen	Fisheries Research	Turrell Dr Bill		O													20	5	145		29	29	4,652
Open University	Earth Sciences	Harris Dr Andy		O													25		200			41	5,600
SOC		Srokosz Dr Meric	CS	O													60	5	3561		14	62	22,466
SOC		Blair Mr Ian		S													1	5	405				1,738
Univ. Stirling	Env. Science	Osborne Dr Patrick		O													50	14	3500		120		17,812
Univ Wales Bangor	Ocean Sciences	Mitchelson-Jacob Dr		O													10					20	640
Nat. Resources Inst.		Macleod Ms Kelly		S													5	10	155		33		1,534
SOC	Ocean and Earth Sci.	Da Silva Dr Jose		O													20	5	347		10		2,218
SOC	Ocean and Earth Sci	Robinson Prof Ian		O													2	5	191				910
SOC	Ocean and Earth Sci	Sharples Dr Jonathan	NT	R	GR3/11829												1	5	115				578
Plymouth Mar. Lab.	In-house research	Groom Mr. Steve	INF	O													26	26					1,202
SOC	Ocean and Earth Sci	Mower, Ms Jen		S													2		12				104
Dunstaffnage Mar. Lab.		Emsley Dr Stephen	T	R	GST/02/2757												5		1236		279		10,106
Plymouth Mar. Lab.		Burkill Prof Peter	T	R	GST/02/2153												15		262		8	23	3,912
Univ. Wales Bangor	Ocean Sciences	Wakefield Mr Ewan		S	NER/S/M/2000/0372												5		286			27	3,984
Univ. Bournemouth	Conservation Sciences	May Mr Vincent		S													1	5			118		2,242
Univ. Dundee	Electronic Eng. & Physics	Vaughan Dr Robin		S													1	1	10				86
Univ. Plymouth	Marine Studies	Glegg Ms Gillian		S													5						140
Mar. Lab. Aberdeen	Fisheries Research	Moffat Dr Collin	CS	O													20		45			27	3,440
Plymouth Mar. Lab.		Burkill Prof Peter	T	R	M&FMB												30	20			15	44	5,870
Sea Watch Foundation		Shepherd Mr Barry		O													5	13		350			2,474
Univ. Liverpool	Earth Sciences	Williams Dr Ric		S	GT/04/99/MS/134												10	7		200			1,606
Mar. Lab. Aberdeen		Turrell Dr Bill		S													5						140
Dunstaffnage Mar. Lab.	SAMS	Burrows Dr Mike	T	R	GST/02/2757												1	2	3200				12,864
Marine Biological Assoc		Sims Dr David		O													5	5	2000				8,230
Univ. Wales Bangor	Ocean Sciences	Gaffney Mr Sean	NT	R	GR3/12903												1	2	153	15			766
Univ. Wales Bangor	Ocean Sciences	Bowers Dr David	NT	S	NER/S/A/2001/06379												1	2	2447	4			9,876
Marine Biological Assoc		Williams Dr Roddy		O													3						84
SOC	George Deacon Division	Hydes Dr David	CS	O													3	5	84		10	27	3,390
SOC	Ocean and Earth Sci	Collins Prof MB		S													1	5	218				990
SOC		Tyrrell Dr Toby	NT	R	GR3/12811												3	15			30		894
SOC		Tyrrell Dr Toby	CS	S													20	47		90			1,946
Plymouth Mar. Lab.	In-house development	Evans-Jones Dr Kate	INF	O													222						6,216
Univ. East Anglia	Biological Sciences	Hunter Dr Ewan		O													2	20			276		5,384
Univ. East Anglia	Env. Sciences	Steinke Dr Michael	T	R	F60/G16/03												1	5	160				758
Totals																	629	239.35	18916	833	1136	280	151,030
Total value per unit £																	17,612	4,308	75,664	4,998	20,448	28,000	

ANNEX 6: RSDAS PUBLICATIONS FOR CALENDER YEAR 2001

RSDAS staff in bold.

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ANNEX 7: TARGETS AND MILESTONES

RSDAS utilisation runs at 100% of capacity, with greater effort applied to in-house research and development whenever there is a lull in customer requests. Response times have not been recorded, but average between 2-3 weeks from application grading to data delivery. This year RSDAS has received frequent favourable comments from customers and no formal complaints.

ANNEX 8: FINANCE

This section removed.

ANNEX 9: SERVICE MANAGEMENT

List of staff with role, status, and percentage of time allocated to RSDAS duties:

- Steve Groom, Head of Service (PML funded, Band 4)
- Dr Pete Miller, RSDAS manager (33%, HSO open-ended)
- Dr Tim Smyth, Global datasets (25%, HSO open-ended)
- Dr Peter Land, MODIS Development (80%, HSO open-ended)
- Dr Kate Evans-Jones, Development (100%, HSO open-ended)
- Luke Tudor, John Beisley: Students } total 130%
- Tom Coupland, Vyvyan Codd: Students }

Total: 3.68 Full-Time Equivalent.