

**REMOTE SENSING DATA ANALYSIS SERVICE
ANNUAL REPORT APRIL 2000 – MARCH 2001
ANNEXES**

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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 the NSS Science Budget, taking into account recommendations made through the NERC peer review mechanisms.
2. To review the scientific 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 from 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 JUNE 1999**

Mr Trevor Guymer (Chairman) 6/99	James Rennell Centre for Ocean Circulation Southampton Oceanography Centre European Way Southampton SO14 3ZH	thg@soc.soton.ac.uk Tel: (+44)1703 596 430 Fax:(+44)1703 596 204
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Dr Mark Danson 6/96	Telford Insititute of Environmental Systems (TIES) School Of Environment and Life Sciences University of Salford Salford Manchester M5 4WT	F.M.Danson@salford.ac.uk Tel:0161 295 4038 Fax:0611 295 5015
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Mr Ian Morgan 4/01	Room R326A Meteorological Office London Road Bracknell Berkshire RG12 2SZ	Ian.morgan@metoffice.com Tel:01344 856049 Fax:01344 854462
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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
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Mr Steven Groom	RSDAS Plymouth Marine Laboratory Prospect Place West Hoe Plymouth P11 3DH	s.groom@nerc.ac.uk Tel:01752 633150 Fax: 01752 633101
Mr Neil Lonie	NERC Satellite Receiving Station Satellite Receiving Station Department of A.P.E.M.E University of Dundee Perth Road Dundee Scotland D01 4HN	Ntl@sat.dundee.ac.uk (secretary) 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 (in italics)

- **New satellite sensors** providing multi-disciplinary capability (combined atmosphere, ocean and land observation), or with higher spectral, spatial and possibly temporal resolution, are planned for the next few years. These include NASA MODIS (one launched in 1999, another due in 2001); ESA ENVISAT (2001); ESA CHRIS (2001); NASDA ADEOS II (2001). The high data volumes will be transmitted in X-band and in many cases can be received at the Dundee Satellite Receiving Station. *The first data received on X-band are from MODIS, the major NASA ocean colour/SST instrument until 2006, and NERC has funded RSDAS to develop marine applications. In order to transfer the massive image data files from Dundee to Plymouth, an upgrade is required to PML's local Internet link from 2 to 100 megabits/second: joint funding is being sought from NERC and PML.*
- **Development of terrestrial and Earth sciences applications** by RSDAS has been suggested on a number of occasions by ARSFSC: the increasing focus on "Earth Systems Science" and the availability of multi-disciplinary sensors such as MODIS provides added impetus. The limitation to date has been that RSDAS staff possessed little experience in terrestrial or geological sciences. *The recruitment of the RSDAS development officer, with a PhD in terrestrial applications, and the MODIS development post, with a PhD and postdoctoral experience in the atmospheric physics, will provide some scope for effort in these areas.*
- **NERC Airborne RS Facility** has been upgraded through the Dornier 228 with an improved range for outer-shelf and oceanic observations (such as the 2001 North Atlantic deployment) and RSDAS has already been contacted regarding atmospheric correction of the ocean colour data. *The research required to develop an atmospheric correction service has been funded through a NERC grant during FY 2001/2 to Dr Lavender, University of Plymouth (ex-RSDAS) and through core strategic funding to PML. The degree to which this service can be offered needs to be considered by the steering committees. There is potential for further collaboration between ARSF and RSDAS to provide integrated airborne/satellite observations of ocean colour and temperature, and to exploit satellite data for real-time guidance of aircraft to cloud-free regions.*
- **Evolving NERC priorities** in support of the environmental sciences is the primary driver on service development. This is reflected through steering committee advice and specific requirements of applications from: non-thematic research grants; thematic programmes; core strategic research at NERC centre/surveys; and standard responsive mode applications. In principle the service may be affected by future JIF awards, but no current grants have any impact. *Where the requirements are significant and need research or development then the service is advised by the steering committees. In some cases (e.g. with the NERC Marine Productivity thematic) a grant application is prepared by RSDAS for peer-review so as to tension remote sensing against other facets of a programme.*
- **Development of new applications and modes of exploitation of EO data** by the UK community is likely to increase with the availability of new sensors. *RSDAS has previously incorporated new algorithms into the processing chain in order to provide results to the wider community and will continue this practice.*
- **Availability of global data sets from space agencies** via the internet means that the community using EO data is likely to grow particularly among non-specialists. *This suggests an increasing role for RSDAS in providing training for users with different levels of expertise.*

Infrastructure Replacement

The core data processing service (AVHRR and SeaWiFS) will require capital to replace computers and peripherals and to store the yearly increase in processed data: this is estimated at approximately 10-15% of SLA or £10-15k p.a.. Major new data processing requirements, and the other service developments described above, will require specific funding, such as provided by the MODIS and Marine Productivity grants and may be derived from NERC thematic or non-thematic sources. In particular, a fast microwave internet link from PML to the University of Plymouth is required during FY 2001/2 to enable real-time transfer of data from MODIS and future sensors.

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 35 applications, 22 of which were new applications. All applications received were supported. These were graded as follows:

	$\alpha5$	$\alpha4$	$\alpha3$	$\alpha2$	$\alpha1$	β	R*/Pilot	Reject
NERC Grant projects	2	5	2					
Other academic	1	14	5					
Students		2	4					
Pilot								
TOTAL	3	21	11	-	-	-	-	-

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	2	3
Marine	28	82
Atmospheric	-	12
Terrestrial and Freshwater	1	3
Earth Observation	4	0
Polar	-	0
TOTAL	35	100

ENRI	Number of Projects	Allocated Cost (%)
Biodiversity	6	11
Environmental Risks	6	16
Global Change	24	50
Natural Resource Mgmt.	17	16
Pollution and Waste	5	3
Other	1	4
TOTAL	-	100

5.3: APPLICATIONS SUPPORTED DURING FY 2000/2001

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		S		a5			1	1	1	
Watson Prof Andrew	Univ. East Anglia	SeaWiFS images for SOIREE (Southern Ocean Iron Enrichment Experiment)	T	R	GR3/11431	a5			1			
Hunter Dr Ewan	Univ. East Anglia	Validation of plaice ground tracks using sea-surface temperature data		R		a4	1		1	1		
Austin Dr W	Univ. St. Andrews	Holocene palaeoceanography of shelf seas: long term (1000-10000 years) seasonal stratification dynamics	NT	R	GR3/11467	a4			1	1		
Joyce Ms Linda	Heriot-Watt Univ.	Investigation into paralytic shellfish poisoning in Orkneys coastal waters with reference to Scapa Flow		R		a3		1		1	1	
Hays Dr Graeme	Univ. Wales Swansea	Potential role of air-borne olfactory cues for migrating green turtles	NT	R	GR3/12740	a3				1		
Nygaard Ms M.	Univ. Aberdeen	Spatial distribution of 2 squid species in the Irish Sea		S		a3	1			1		
Freitas Ms. Carla	Univ. Aberdeen	Analysis of humpback whales in Abrolhos, Brazil		S		a4				1		
Reid Prof. Chris	SAHFOS	Pulses of Eastern Margin current linked to changes in N Sea ecosystem	CS	O		a4	1	1	1	1		
Heath Dr Mike	Mar. Lab. Aberdeen	Model-based assimilation methods for spatially resolved zooplankton data	T	R	GST/02/2749	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				
Barton Dr Des	Univ. Wales Bangor	Fronts in the Canaries region		O		a4			1			
Turrell Dr Bill	Mar. Lab. Aberdeen	Monitoring the Atlantic Inflow toward the Arctic (MAIA)		O		a4			1			
Harris Dr Andy	Open University	Volumetric characteristics of Oct-Nov 1999 activity at Etna		O		a4		1				
Holliday Dr Penny	SOC	Investigating pathway and mesoscale features of Shelf Edge Current and its branches in the Rockall Trough	CS	O		a4			1			
Siddorn Mr John	Plymouth Mar. Lab.	Restricted exchange environments	CS	O		a4	1				1	
Tyrrell Dr Toby	SOC	Winter Coccolithophores in the Bering Sea?	NT	R	GR3/12811	a4			1			

Merico Mr. Agostino	SOC	Modelling the seasonal succession of <i>Emiliana huxleyi</i> and other phytoplankton in the Bering sea.	CS	S		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	
Lavender Dr Sam	Univ. Plymouth	An investigation into the use of Kd values as an indicator of water quality		S		a3					1	
Woodward Mr M.	Plymouth Mar. Lab.	Atlantic Meridional Transect	CS	O		a4			1			
Smeed Dr David	SOC	Novel measurements in the Strait of Sicily	T	R	GST/02/2144	a3			1			
Osborne Dr Patrick	Univ. Stirling	Monitoring the effects of agricultural landscape change on avian biodiversity using satellite remote sensing		O		a4	1		1			
Young Dr Jeremy	Nat. Hist. Mus.	CODENET-Coccolithophorid Ecology Cruise		O		a3			1	1		
Mitchelson-Jacob Dr	Univ Wales Bangor	The determination of sub-surface chlorophyll concentrations using ocean colour imagery and in situ optical properties - MSc project		O		a3	1			1		
Steinke Dr Michael	Univ. East Anglia	ACSOE/MAGE North Atlantic experiment	T	R	F60/G16/03	a5			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		
Martin Dr Adrian	SOC	Eddy detection in SST images	CS	O		a3			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			
Cipollini Dr Paulo	SOC	OMEGA	CS	O		a3			1			
Sharples Dr Jonathan	SOC	Relationships between physical variability and primary production in shelf seas	NT	R	GR3/11829	a4			1	1		
Groom Mr. S	Plymouth Mar. Lab.	In-house research	INF	O		-		1	1	1		

SERVICES AND FACILITIES COST ALLOCATIONS FORM 2000/01

Scientific Service: Remote Sensing Data Analysis Service

Full Cash Cost: £140,830

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

NERC	University/Cente	Department/NERC site	Name of User (Surname First)	Funding Mode	Funding Type	NERC Ref No	A	t	m	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		S							1								2	5	740				3,103
Y	Univ. East Anglia		Watson Prof Andrew	T	R	GR3/11431			1							1				50						1,390
	Univ. East Anglia	Biological Sciences	Hunter Dr Ewan		R				1						1	1	1			4	15		752	139		7,366
Y	Univ. St. Andrews	Geography & Geosci.	Austin Dr W	NT	R	GR3/11467			1						1	1				4	5	153		20		1,168
	Heriot-Watt Univ.	Civil & Offshore Eng.	Joyce Ms Linda		R				1						1		1			2	10	814				3,487
Y	Univ. Wales Swansea	Biological Sciences	Hays Dr Graeme	NT	R	GR3/12740			1								1			10			15			368
	Univ. Aberdeen	Zoology	Nygaard Ms M.		S				1					1						2	10	130	62			1,123
	Univ. Aberdeen	Zoology	Freitas Ms. Carla		S				1											11	30		161	10		1,975
Y	SAHFOS		Reid Prof. Chris	CS	O				1					1	1	1	1			100			1080	216		13,115
Y	Mar. Lab. Aberdeen		Heath Dr Mike	T	R	GST/02/2749			1							1	1			10	40			12		1,192
Y	Proudman Oc. Lab.		Proctor Dr Roger	CS	O				1									1		20		232	47		30	4,766
Y	Proudman Oc. Lab.		Proctor Dr Roger	CS	R	GST/02/1472			1						1					100			700			6,980
	Univ. Wales Bangor	Ocean Sciences	Barton Dr Des		O				1						1					11			14			390
	Mar. Lab. Aberdeen	Fisheries Research	Turell Dr Bill		O				1							1				5		206		30	28	4,298
	Open University	Earth Sciences	Harris Dr Andy		O			1							1					1	4		217			1,400
Y	SOC	James Rennell	Holliday Dr Penny	CS	O				1							1				10	5			120		2,507
Y	Plymouth Mar. Lab.	Ecosystem Modelling	Siddorn Mr John	CS	O				1					1			1			2	70		146	10		2,335
Y	SOC		Tyrell Dr Toby	NT	R	GR3/12811			1						1					5	10		98	98	31	5,751
Y	SOC		Merico Mr. Agostino	CS	S				1						1					5	10		98	98		2,651
	Open University	Earth Sciences	Harris Dr Andy		O			1							1					1	5		348			2,203
Y	SOC		Srokosz Dr Meric	CS	O				1						1	1	1			5	5					227
	SOC		Blair Mr Ian		S						1						1	1		1	5	10				155
	Univ. Plymouth	Marine Studies	Lavender Dr Sam		S						1							1		2	5	209				979
Y	Plymouth Mar. Lab.		Woodward Mr M.	CS	O				1							1				10	10		20	10	42	4,951
Y	SOC	James Rennell	Smeed Dr David	T	R	GST/02/2144			1							1				2	50	226	15		48	6,725
	Univ. Stirling	Env. Science	Osborne Dr Patrick		O						1				1	1				10	296		1619	84		16,671
	Nat. Hist. Mus.		Young Dr Jeremy		O				1							1	1			1	5		30			295
	Univ. Wales Bangor	Ocean Sciences	Mitchelson-Jacob Dr		O						1				1		1			10	5		20			486
Y	Univ. East Anglia	Env. Sciences	Steinke Dr Michael	T	R	F60/G16/03			1							1				2	2		20	1		228
	Nat. Resources Inst.		Macleod Ms Kelly		S				1							1	1			1	20		36			594
	SOC	Ocean and Earth Sci.	Da Silva Dr Jose		O				1							1	1			25	5	542	30			3,131
Y	SOC	Ocean and Earth Sci.	Martin Dr Adrian	CS	O				1							1				2	4	1800				7,326
	SOC	Ocean and Earth Sci	Robinson Prof Ian		O				1							1				2	5	1501				6,147
Y	SOC	James Rennell	Cipollini Dr Paulo	CS	O				1							1				2	5	327				1,451
Y	SOC	Ocean and Earth Sci	Sharples Dr Jonathan	NT	R	GR3/11829			1							1	1			2	5	661				2,787
Y	Plymouth Mar. Lab.	In-house research	Groom Mr. S	INF	O				1						1	1	1			466	466					21,110
																										0
																										0
	Totals																			898	1112	7551	5528	648	179	140,830
	Total value per unit £																			24,964	19,460	30,204	33,168	15,133	17,900	

ANNEX 6: PUBLICATION DETAILS FOR CALENDER YEAR 2000

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- Willson, H.R., and N.W. Rees, Classification of mesoscale features in the Brazil-Falkland Current confluence zone, *Progress in Oceanography*, 45 (3-4), 415-426, 2000.

NON-REFEREED PUBLICATIONS AND CONFERENCE PROCEEDINGS (45)

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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, open-ended)
- Dr Peter Miller, RSDAS manager (33% RSDAS funded, open-ended)
- Dr Tim Smyth, Global datasets/web manager (25%, fixed-term)
- Dr Sam Lavender, SeaWiFS/development (16%, left Jun. 2000)
- Dr Peter Land, Development (50%, fixed-term, joined Sep. 2000)
- Dr Kate Evans-Jones, Development (50%, fixed-term, joined Oct. 2000)
- Steve Webber, Martin Collins: Students (left July 2000) } total 130%
- Luke Tudor, John Beisley: Students (joined July 2000) }