NERC EARTH OBSERVATION DATA CENTRE (NEODC)

ANNUAL REPORT FOR 2002/03

1. OVERVIEW

1.1 NEODC Rationale:

NERC has acquired - in support of high alpha-grade science during the preceding 30 years - a vast quantity of remotely sensed data of the surface of the Earth obtained by a variety of satellite sensors and airborne instruments. This valuable resource - estimated present-day value of the NEODC archive in excess of £15M - has fortunately been retained and now provides a unique record of environmental conditions during the previous three decades. It comprises digital data which in most cases have been rigorously calibrated and geo-corrected and scientists are therefore able to use such data with confidence in support of research and survey to understand and predict the natural environment and as a valuable input to long-term environmental monitoring.
The NEODC Mission - in line with the NERC Data Policy - is to ensure the responsible stewardship and distribution of NERC's Earth Observation (EO) data, to give guidance on the availability and use of this and other EO data, and to routinely acquire additions to the data holdings; all such data services to be carried out in an efficient and cost-effective manner in response to requests from accredited customers. The NEODC also has a responsibility to monitor the future stewardship accorded to other Earth observation data acquired by NERC so that such data are managed as a valuable resource for present and future environmental science. The NEODC is also increasingly acting as a single portal regarding Earth Observation data and information supporting environmental research - both in the UK and worldwide.

The NEODC Mission is:-

" To achieve the objective that the NERC Earth Observation Data Centre (NEODC) shall deliver effective and efficient services to the NERC community in locating, accessing, interpreting and exploiting Earth Observation data and associated EO information, and shall also ensure the long-term integrity of EO datasets produced and acquired by NERC projects and programmes".

In order to achieve its mission the NERC Earth Observation Data Centre :-

- maintains a central archive and catalogue of NERC commercial satellite data and NERC airborne remotely-sensed data - accessible through the NEODC website: www.neodc.rl.ac.uk
- provides access to this data for NERC Centres and Surveys, the UK HEI community, NERC Thematic Programmes, NERC EO Centres of Excellence, and NERC-funded academics in accordance with the terms of the NERC Data Policy
- co-ordinates and supervises the archiving of all digital data and ancillary information relating to the annual flying campaigns of the NERC Airborne Remote Sensing Facility
- enhances the information and metadata content of its web pages
- continues to ensure the professional curation, and ease of access for registered customers, of all EO data acquired by NERC by the addition of such data held at the Centres & Surveys, and EO Centres of Excellence onto the NEODC archive
- continues to develop its infrastructure software/hardware to improve the quality and scope of its data services to the scientific community

- acts as a contact and liaison point for communications on other national and international archiving/cataloguing initiatives relating to EO data
- provides policy and strategy input to NERC corporate data policy through the NERC Data Management Advisory Group.

1.2 Highlights of the year:

1.21 A completely new, and vastly improved, website for the NEODC - www.neodc.rl.ac.uk - was launched in late March 2002 and is designed to act as a one-stop portal for Earth Observation data and information.
Further development work and the production of additional information content has been carried out this year. Key interface components such as dataset footprint maps, download area, XSL stylesheets for the display of XML metadata, and a "shopping basket" system for ordering data have been developed. The new website has been designed to enhance its attractiveness to both regular academic customers and other visitors and has been constructed to ultimately allow efficient search and access to Earth Observation information as well as data - whether held at the NEODC or at other data centres. The website includes enhanced graphics with a hierarchical menu section for both the airborne and satellite data, a simplified search interface to the existing NEODC metadata catalogue, graphical tools for selection of geographical areas, and detailed information pages describing each type of data held by the NEODC.
Web access statistics for the NEODC web server show an overall increase in activity of around 100% on the previous year. These results suggest that the improvements made to the NEODC website at the start of the previous year are having a very positive effect on its visibility, and highlight the need for continual effort to be applied to updating and improving the public face of the NEODC on the internet.

1.22 New and archive satellite and airborne data were delivered to 5 NERC award holders in 2002/03 – two of these were projects relating to Research Grant awards and three comprised Studentships. (This is a significant reduction in the usual annual support of NERC-funded research by the NEODC and almost certainly reflects NERC's cancellation of one of its two Grant rounds in 2002/03).
The titles of some of the high α-grade projects supported this year and last are listed below and demonstrate the breadth of NERC science for which the NEODC data and information services provided a valuable input:

- **The application of satellite imagery for the monitoring of performance of young forestry plantations in Galloway and Kielder forests.**
- **Using remotely sensed data sources and GIS techniques to identify suitable sites for habitat creation/restoration under the requirements of EU habitats directives.**
- **Modelling incision in the Sorbas Basin, SE Spain: an integrated GIS and remote sensing approach.**
- **Geomatics for the detection, prediction, monitoring and understanding of geohazards.**
- **Evaluation of satellite imagery in the archaeological assessment of arid zone environments.**
- **The ecology and genetics of Mauritian skunks earmarked for use in habitat reconstruction.**
- **The late Cenozoic development of the Gediz River, Turkey.**
- **The temporal and spatial distribution of active deformation in the Basin and Range.**

- **Source mechanisms of shallow earthquakes in the Alpine-Himalayan belt from INSAR and waveform modelling.**
- **Individual dispersal decisions and emergent metapopulation dynamics of an endemic Afrotropical mammal – the Angolan black-and-white Colobus monkey.**
- **To understand the distribution of archaeological sites in relation to natural landscape factors.**
- **Differentiation between different grassland types using very high spatial and spectral resolution images.**
- **Mapping and scientific observations of caves in Thailand.**
- **Use of high resolution base maps for determination of key sites for peat gully blocking.**
- **Remote sensing and the use of GIS for archaeology in alluvial landscapes.**
- **Estimation of the input of dissolved inorganic carbon from rivers into the North Sea.**
- **The impact of Little Ice Age floods on steepland river systems, Crete.**

1.23 A bid was prepared and submitted to the NERC Data Management Advisory Group - **"Earth System Science: Enhanced Delivery and Visibility for Multiple Earth Observation Datasets"** - seeking additional funding for the NEODC for a 3-year period. The bid was successful and £225k funding over 3 years will allow the appointment of an additional staff member – specifically with knowledge/experience in the application of EO data for environmental research in the terrestrial regime.

1.3 Progress on deliverables/key milestones

Deliverables

The following comments relate to the deliverables defined in the NEODC Technical Annex for 2002/03 which forms part of the NERC/CLRC SLA for that year. Where the deliverables have not, or have only partially, been achieved this results from the significant reduction (40%) in staff resources available to the NEODC in 2002/03.

1. **Continued delivery of quality data services within prescribed timescales** – this was achieved with regard to the quality of data and support provided although there was a relaxation of the delivery timescales. This had been forwarned as a likely impact on the NEODC data delivery services due to the reduction in staff resources.

2. **Expanded information content and updating of items on the NEODC website** – this was only achieved to a marginal degree in 2002/03 particularly with respect to any increase in the Earth Observation information content at the website. There was no progress with regard to the establishment of discussion forums, creation of FAQ pages, further development of news pages, information on future EO satellite missions, examples of data processing techniques and advice thereon, technical pages describing the basis of NERC's ARSF data holdings, and limited help desk support on all matters of interest to our customers.

3. **Development of software and systems for extraction of metadata from several EO data types and generation of FGDC-compliant XML metadata** - some progress has been made in this area with regard to the development of automatic processing to produce FGDC-compliant metadata for certain data types held by the NEODC, such as Landsat 4/5 TM, ARSF ATM and *casi* (both HDF format). Similar mechanisms still need to be developed for other data types – eg other Landsat formats (GeoTiff and Fast L7A), ERS-1/2 SAR, SPOT CAP format etc). This process requires that the data are physically stored in an appropriate arrangement to enable non-interactive processing

and for many hundreds of such items this is not yet the case. Other “one-off” datasets- eg SHAC 2000 HyMap and ESAR data – require manual processing. Further significant development work in all these areas has been severely disrupted by lack of staff resouces with appropriate technical skills.

4. **Archiving of the ATSR-1/2 UBT products at the NEODC involving design of metadata catalogue and organisation of hardware/software framework** – significant progress has been made with this project which was recognised as a high priority task and the project is presently on schedule to deliver a complete ATSR UBT data archive which will include the provision of thumbnail imagery and automatic data search and retrieval systems. It is expected that a demonstration of the operational system by the NEODC in January 2004 will be followed by an operational service in early 2004.

5. **Development of an effective search interface for customers to locate EO data from various sources and a system to retrieve data from the NEODC archive in near real-time** - some progress has been made but the completion of this deliverable will almost certainly be delayed until 2004/05.
Progress towards improving the search interface has been made, by developing a new search interface to the catalogue of those FGDC-compliant XML metadata records which have been created thus far. However, since this is still an incomplete catalogue, both old and new search interfaces need to run alongside each other until further work can be done to complete the XML-based catalogue (or at least, catalogue all data to a common content standard).
Near real-time access to data (i.e. being able to request data and have it automatically made available for download) has not yet been achieved, although the necessary building blocks for this system are being put in place (e.g. a 1 Tb NAS server was purchased for use as an online cache store). Further development to integrate this into an automated system will require significantly more work, although the system being developed for the ATSR archive (at a higher priority) should spin off some useful benefits for this.

6. **Continuing secure storage of the secondary archive DSRS AVHRR and SeaWiFs data** – this project, which makes small demands on the NEODC staff resources, continues to schedule.

Key Milestones

The Key Milestones were defined in the NEODC Technical Annex which forms part of the NERC/CLRC SLA and these have been met:-

1. Quarterly Reports were delivered on schedule for the quarterly NERC SLA meetings.

2. Delivery to NERC of the NEODC Annual Report for 2001/02 was achieved by July 2002.

3. Financial Estimates for the NEODC for FY2002/03 were provided in January 2003.

2. SCIENTIFIC AND TECHNICAL OUTCOMES

2.1 Strategic Goals

The NEODC primary strategic goals for the period 2002-2005 were defined as:-

- Maintain and improve the acknowledged valuable services which the NEODC has previously delivered to the NERC scientific community
- Provide enhanced data, metadata and information services through the NEODC website
- Develop automated search and retrieval systems to further improve the quality and timeliness of the NEODC EO data services
- Develop and implement the professional curation of the ATSR-1/2 archives and the future delivery of associated data product services for which there is increasing demand from the NERC community.

Significant progress has been made towards the realisation of these objectives and, in particular, it has been possible to maintain the quality, though not so much the timeliness, of the NEODC data and information delivery services during the past year.
Similarly, by focussing the limited resources for development and implementation of the NEODC infrastructure on the ATSR-1/2 project, it has been possible to maintain the schedule of development for this programme in FY 2002/03 as agreed with the ATSR Core Group.

However, due to the 40% reduction in available staff resources during the past year, there has been a major delay and depletion in the progress of objectives during the preceding year with respect to the second and third goals listed above. Both these goals are critical to the provision of efficient services across the full range of NEODC products and have a major impact on the public image of the NEODC as an effective NERC Designated Data Centre for the delivery of high quality Earth Observation data and information.

Furthermore, it is argued later in this report that there is an additional strategic objective which the NEODC should be addressing as a priority:-

- Collaboration with the NERC EO Centres of Excellence by supporting their requirements for data acquisition, curation, access and delivery as appropriate in meeting the wider needs of the NERC scientific community.

It is therefore reasonable to suggest that additional staff resources are needed for the NEODC if it is to meet its present strategic objectives together with any further requirements as defined by the report of the EOEG Strategic Working Group on EO Data chaired by Barry Wyatt.

2.2 User Support, Operations, Science Support and Research

User Support/Relationship

The NEODC provided data and information services across almost all of the Environmental Science disciplines and covering all of the NERC Environment and Natural Resource Issues:-

Science:	**Atmos.**	**Earth**	**Marine**	**Terr.& Fresh.**	**Earth Obs.**	**Sc. Bas. Arch.**	**Polar**
No. of Projects:	**2**	**17**	**8**	**25**	**30**	**9**	**0**

ENRI:	**Bio-Div.**	**Env. Risk**	**Global Warm.**	**Natural Res. Man.**	**Pollut.& Waste**	**Other**
No. of Projects:	**7**	**9**	**4**	**35**	**3**	**35**

The majority of individual requests for data during this fianacial year were satisfied from the existing NEODC data archives. Five of the total 61 enquiries required the purchase of new data from other archive sources and were funded by the Earth Observation directorate. All such data

acquisitions were required in support of NERC-funded grants or studentships and copies of these datasets were added to the NEODC archives for future potential use.

Of the total 61 registered enquiries received by the NEODC in 2002/03, only 7 requests for data and/or information could not be satisfied; it is probable that alternative sources for these data were provided to the customer.
No enquiries for data in support of commercial applications could be satisfied by the NEODC either due to lack of the specified datasets or for reasons of copyright restrictions.

We have not previously recorded how much data is distributed to our customers and it is therefore not possible to report these statistics for 2002/03; we will be implementing such a record system for 2003/04.

Following confirmation of image specifications and data pricing, the supplier delivery time for new satellite data rarely exceeds 15 working days, except where data is sourced from non-European ground stations. Response time targets for both commercial archive data provision - two weeks - and the delivery of NEODC archive digital data - 5 days maximum - have been maintained for all data deliveries. Copy prints of archive aerial photography are usually delivered within two weeks. No significant data quality problems were recorded during the year and no formal/informal complaints regarding the quality and delivery of the NEODC services during 2002/03 have been received. In fact, there has often been correspondence complimenting the NEODC on the quality and timeliness of its data and information services.

Update on datasets

The present NEODC data holdings comprise commercial satellite datasets acquired in support of environmental research since 1972; the majority of these data comprise the Landsat series together with smaller holdings of SPOT, Radarsat, ERS-1/2 SAR, AVHRR and Ikonos imagery over the UK and worldwide. The NEODC holds complete sets of the satellite imagery used by NERC to create the UK Landcover Maps for 1996 and 2000. From 2004/05 there will be a significant increase in the size of the NEODC satellite archive when the Data Centre accepts responsibility for the complete ATSR-1/2 data archives (~ 40Tbytes).

The present NEODC data holdings also comprise the total archive of airborne data - digital multi-spectral imagery and photography - acquired by the NERC Airborne Remote Sensing Facility (ARSF) since 1982.
Specific datasets added to the NEODC archive during 2002/03 included:

- SHAC 2000 sites and extra data completed
- NERC ARSF backlog data (1995-1998)
- Landsat and other datasets (on CCT) from CEH Wallingford and Monks Wood, and from the University of Durham.

The NEODC also holds a secure secondary archive of the total AVHRR and SeaWiFs imagery acquired by the NERC Dundee Satellite Receiving Station (DSRS); this secondary archive is augmented quarterly each year.

Significant projected future additions to the NEODC archive include:

- ATSR-1/2 Gridded UBT imagery
- NERC ARSF *casi 2* and *casi SWIR* imagery
- NERC ARSF Lidar datasets
- NERC MODIS and MERIS datasets

The majority of the NEODC data holdings are probably unique in the UK in the context of their UK geographical coverage and the period of data coverage.
Certainly the total archive of the NERC Airborne Remote Sensing Facility datasets – comprising Airborne Thematic Mapper (ATM), Compact Airborne Spectrographic Imager (*casi*) and aerial photography is a unique collection both in the context of the data characteristics and their temporal coverage. Similarly the complete satellite imagery of the UK - predominantly Landsat and SPOT - which formed the basis of the UK Landcover Maps created by NERC for 1996 and 2000 is almost certainly unique.
It is possible to duplicate much of the commercial satellite imagery acquired over the preceding three decades by NERC, and lodged with the NEODC, by purchase from other sources. It is not possible to duplicate any of the NERC airborne datasets which are the sole property of NERC.

Update on system infrastructure

Significant progress has been made on designing components of the metadata archive for the ATSR UBT product archive, which will eventually be housed at the NEODC in 2004. Evaluation of the performance of the Xindice XML database in its current version proved disappointing, particularly for the anticipated size of the final ATSR UBT metadata catalogue. Alternative database solutions, which provide equivalent functionality (Oracle 9i XMLDB, Tamino XML Server), are being evaluated. Work has progressed well with using the EISCAT archiving software for creating a tape-contents index for the ATSR UBT archive. Software has been modified by a member of the EISCAT group at RAL, with the result that retrieval of data products, even from the end of an archive tape, now takes minutes rather than hours: a considerable benefit. Further work to modify the system to work with multiple tape drives is now underway.

The new Network-Attached-Storage (NAS) system is now operational and data is being copied from the ATLAS store to this online location, with some reorganisation to make the data available in a user-friendly manner. Nearly all of the ARSF ATM & CASI (hdf-format) data has now been made available on the NAS, with much of the LANDSAT data holdings and the SHAC dataset also available. For some of these items, no formal metadata yet exists, but, once sorted by data type, the process of creating formal metadata for these data will be greatly simplified by the data being available online (since the software needs to access the header files of the data products).

Update on Services

Web access statistics for the NEODC web server www.neodc.rl.ac.uk show an overall increase in activity of approximately 100% on the previous year. Around 1400 individual "visits" (see Appendix 1) took place each month, representing a total of over 400,000 individual HTTP requests ("hits") - see Appendix 1 for definition of “visits” and “hits”.
Concerning on-line data acquisition, a web-based download area has been developed, to enable customers to download data that they have requested from the NEODC. Registered users can enter a username and password, and be taken to a page where datasets which have been prepared for them have been placed and can be downloaded. So far the system is working reasonably well but it is still

very much under development and lacks convenient features like being able to "bundle" groups of files together as one item for downloading. It also still requires considerable manual intervention to make the data available for download, but the initial prototype has proved useful and will be developed further as it is integrated into a fully automated system in due course.

Update on Liaison and Publicity

Dr Matt Pritchard – the NEODC Project Scientist – gave oral presentations on metadata management within the NEODC at the workshop held at Cambridge University by the National Institute for Environmental e-Science.
He also presented a paper on recent developments within the NEODC of benefit to the NERC Airborne Remote Sensing Facility (ARSF) user community at the ARSF annual Workshop which was convened with logistic and administrative support from the NEODC at the Rutherford Appleton Laboratory. The updated NEODC poster was also presented at this meeting.
NEODC staff also attended the annual meeting of the Remote Sensing and Photogrammetry Society (RSPSoc) at the DTI, London and the Workshop for NERC's Earth Observation Centres of Excellence which was held at the University of Swansea.

It had been intended to create and publish a publicity leaflet for the NEODC highlighting its raison d'etre, the services it provides, and typical examples of the breadth of science its data services support. Unfortunately, due to lack of resources, it has not been possible to fulfill this objective.

Update on Collaboration

Dr Pritchard has continued to collaborate with the BADC/NERC DataGrid project group by attendance at meetings relating to metadata and GRID security issues, and by compiling performance metrics for XML databases which have also proved useful for the ATSR UBT archive development work. He has also been involved in the evaluation of the MapsDirect UK mapping service which is under consideration by NERC.
NEODC staff have been in discussion with staff from the National Centre for Environmental Data & Surveillance (NCEDS) of the UK Environment Agency (EA) with regard to mutual exchange of EO datasets, which are not copyright restricted, for research and survey purposes. A draft agreement, compiled by the NEODC has been forwarded to the NCEDS for consideration; this agreement would form a subsidiary part of the Memorandum of Understanding between NERC and the EA for Data Exchange and Exploitation.
Dr Pritchard has met with representatives of Qinetiq and Comsine Ltd regarding the possible use of NEODC metadata in a web map server which could result in a useful interactive tool for possible future integration into the NEODC website.
As part of the development of the ATSR UBT archive servies to be provided by the NEODC in 2004, there has been significant collaboration with both the ATSR PLS Core group and the EISCAT Radar group at RAL.

3. FINANCE OVERVIEW

Expenditure for 2002/03

The full cash cost budget for operating the NEODC in Financial Year 2002/03 was £135.8k.

The actual spend against the budget in 2002/03 was £161.4k comprising expenditure as follows:-

- £74.6k for staff
- £44.4k recurrent (including £35.2k for new acquisitions of satellite data for NERC award holders. The NEODC was re-imbursed by NERC for these costs)
- £36.7k overheads (RAL and NERC Swindon)
- £5.7k capital

Hence the total expenditure by the NEODC against the budget of £135.8k - allowing for the reimbursement of satellite data purchase costs by NERC - was £126.2k.

Budget for 2003/04

The budget allocation for the NEODC for 2003/04 is approximately £175k which includes £42k funding awarded for the first 1/2 year of the DMAG project: "Earth System Science: Enhanced Delivery and Visibility for Multiple Earth Obsevation Datasets" resulting from a successful bid to the DMAG 1st funding round.

4. FUTURE DEVELOPMENT & STRATEGIC FORWARD LOOK

Specific Changes to Strategic Goals

- *Collaboration with NERC EO Centres of Excellence*

NERC has established six Centres of Excellence in Earth Observation in order to exploit Earth Observation data in environmental science. The NEODC plans to collaborate more extensively with these Centres with the intention of providing support with respect to data acquisition, data curation and associated services. Initial collaboration has already been agreed with CPOM for data archiving services in support of a potential project making use of the ESA Cryosat mission to measure fluctuations the Earth's land and marine ice fluxes.

The NEODC is proposing a series of meetings with the Centres of Excellence to establish areas where it is appropriate for the NEODC to support their activities in the context of the NERC Data Policy.

- *DMAG Project: Earth System Science: Enhanced Delivery and Visibility for Multiple Earth Observation Datasets*

The NEODC has been awarded £225k funding over 3 years for this project and this will fund the appointment of a new staff member together with other recurrent and capital expenditure for the execution of this project. The overall objectives of this project, which commences 1st October 2003, are:-

- Developing a new software infrastructure which will provide a flexible framework for the NEODC's future activities, providing the ability to "bolt on" specialised online services in response to NERC science community demand. Initially, these will include services for online processing of ATSR and ARSF data, and an improved data ingestion system for more efficient data management within the NEODC.
- Groundwork for hosting upcoming datasets, such as Airborne LIDAR, MODIS, MERIS, SeaWiFS and AATSR.
- Bringing forward the start date for ATSR data services and restoring ATSR data availability to a community which has been lacking this service during archive development. Also, exploiting a current window of opportunity to produce preview images for all the ATSR UBT data products.

Future Funding Opportunities

The NEODC intends to bid into future round(s) of the EO Enabling Fund for activities such as the archiving of MODIS, MERIS and SeaWiFS data in collaboration with PML, and for other suitable projects. As a general point about this particular funding opportunity, we feel it should be noted that the level of funding provided by the EOEF does not currently cover even 1 staff year: this means that any staff effort must be found from re-deployment of staff from existing projects within the host institution, rather than being able to recruit suitable individuals externally, who may hold more appropriate skills and experience (particularly in the area of Terrestrial EO / Remote Sensing).

It is also quite likely that the NEODC will seek funding in support of bids, as appropriate, for future NERC Thematic Programmes, projects within future ESA programmes, and projects within the EC Framework 6 Programme.

Opportunities for Improvement

- *Handling of enquiries:*

The NEODC has recently adopted for testing purposes the "Footprints" CRM (Customer Relationship Management) software used by the BADC for handling all its queries, data requests and correspondence. Initial analysis suggests that this will significantly improve the quality of service that can be offered by the NEODC in handling customer enquiries, by keeping detailed and easily accessible records of correspondence and enabling the compilation of an online "knowledge-base", to be shared by members of the NEODC team on its own intranet. It is hoped that the system will be in operation by the Autumn of 2003, in time for the early start to ATSR data provision enabled by the addition of another staff member (part of the DMAG-funded project).

- *IT infrastructure:*

The IT infrastructure of the NEODC will be undergoing improvement, thanks in part to the injection of funding from the new DMAG project. A new web server, 4.5 Tb Network Attached Storage (NAS) server and database server be in operation in 2003/04 and although primarily aimed at providing specific online service deliverables of that project, will be of great benefit to the core activities of the NEODC as well.

- *Physical data storage and cataloguing:*

There is still much work to be done in arranging easily-accessible physical storage and metadata desriptions for many datasets that are currently held by the NEODC. The purchase of the 1 Tb NAS server in this Financial Year helped considerably in being able to handle large sets of data online for internal processing, and this is likely to be a growing need for future datacentre activities, particularly as data volumes increase each year.

Appendix 1

NEODC Website access statistics for FY 2002-3

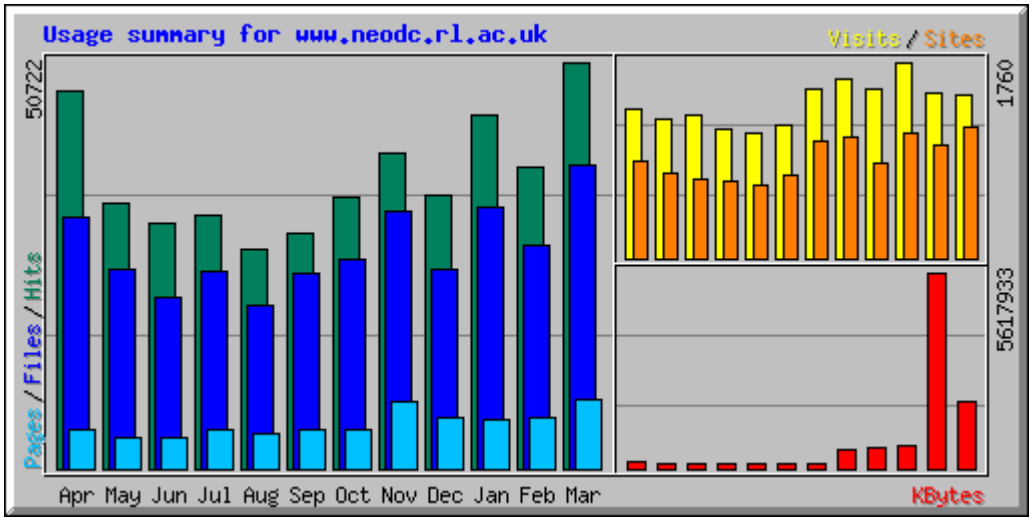


Figure 1 Graphical summary of access statistics for www.neodc.rl.ac.uk

Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Mar 2003	1636	1220	274	47	1174	1901938	1471	8500	37826	50722
Feb 2003	1442	1073	243	57	1014	5617933	1489	6339	27902	37497
Jan 2003	1418	1053	196	56	1125	643309	1760	6076	32652	43987
Dec 2002	1102	803	204	49	857	589284	1526	6324	24910	34169
Nov 2002	1313	1070	281	53	1090	569225	1613	8432	32113	39396
Oct 2002	1092	844	160	49	1043	162407	1520	4963	26187	33863
Sep 2002	979	810	158	40	743	154004	1201	4763	24304	29391
Aug 2002	885	659	138	36	654	139620	1131	4287	20455	27460
Jul 2002	1021	792	155	37	698	163626	1162	4833	24561	31654
Jun 2002	1016	713	126	42	715	127559	1284	3807	21403	30499
May 2002	1064	805	124	40	767	140325	1250	3870	24971	33014
Apr 2002	1573	1047	164	44	874	177878	1344	4924	31418	47209
Totals						**10387109**	**16751**	**67118**	**328702**	**438861**

Table 1 Tabular summary of access statistics for www.neodc.rl.ac.uk

Notes

Figure 1 and Table 1 show access statistics for the NEODC website at http://www.neodc.rl.ac.uk/. These statistics are produced by the *Webalizer* analysis program (available from http://www.mrunix.net/webalizer/).

The input data to these statistics consist simply of the Apache web server access log file, once the relevant log files covering the time period of interest had been concatenated. Filtering was applied to exclude from the statistics any visits to the site from computers operated by NEODC staff (by means of specifying their IP addresses), which would have skewed the statistics.

Several measures are reported, defined as follows:

- ***Hits.*** These are individual requests to the web server for any item, be they HTML documents, images, data files, requests to run a server-side script or other items. When a remote host (i.e. a computer elsewhere on the internet) requests a web address (say, a web page) from the web server, the loading of that page in the client's browser usually results in the requesting of many more files (e.g. images, stylesheets) which are part of that page, but count as separate "hits". Note that requests to non-existent pages or web addresses also result in "hits".

- ***Files.*** These are items successfully returned from the web server to the remote host. A request does not always result in a "hit", for a variety of reasons (e.g. mis-typing an address, files that have moved location, incorrect access permissions held by the client, etc.).

- ***Pages.*** These are text documents written in HTML, or generated on-the-fly by a request to a server-side script, that result in HTML text being transferred to the client's web browser. Images and other "files" are excluded (on the basis of their filename extension).

- ***Sites.*** These are remote computers, recognised as distinct IP addresses when recorded in the log file, which have submitted requests for items on the web server. Depending on how the client's access to the internet is configured, it is possible that multiple computers connected to the same network and sharing a web proxy (or cache) can result in only 1 "site" being reported for these multiple computers (Example: a classroom full of students using the internet, all submitting requests to the web server, may all count as 1 "site", [and, according to next definition, as one "visit"]). "Site" statistics are therefore likely to be conservative.

- ***Visits.*** Requests from the same "site" that are either the first request from that "site", or separated from the last request from that "site" by a period of 30 minutes. This is probably the most useful measure reported in the statistics, and is probably conservative. For example, someone browsing through the web site will initially access the front page, at which time the clock starts ticking and all subsequent requests to the webserver from their "site" still count as one visit, so long as no more than 30 mintues inactivity is recorded. The first request after a period of 30 minutes' inactivity will result in the visit count being incremented.

- ***KBytes.*** Kilobytes of data transmitted by the web server in response to successful HTTP requests from remote computers.

Appendix 2

NEODC IMPLEMENTATION PLAN 2002/03 – 2004/5

REVISED PLAN TO FIT THE NEW FINANCIAL ENVELOPE

The purpose of this paper is to:

1. Advise the EOEG of a revised NEODC Implementation Plan designed to fit within the reduced resources available
2. Advise the EOEG of the consequences of following the revised Plan rather than the original Plan
3. Advise the EOEG of other potential work for the NEODC
4. Inform the EOEG of steps being taken to restore NEODC capabilities to the level of the original Plan.

1. Overview of the Original Implementation Plan

The original NEODC Implementation Plan for 2002/3 – 2003/4 was submitted to the Earth Observation Expert Group for consideration at its February 2002 meeting.

The Plan comprised:-

- The new NEODC Mission Statement:

The NERC Earth Observation Data Centre (NEODC) shall deliver effective and efficient services to the NERC community in locating, accessing, applying and interpreting Earth Observation data and associated EO information, and shall also ensure the long-term integrity of EO data produced and acquired by NERC projects and programmes.

- A summary of the proposed work programme for the NEODC for the following 3 years, which explained the overall strategy for the various work packages that had been defined as necessary for the delivery of the objectives and targets summarised in the Mission Statement.
- A series of detailed individual work packages which would provide the basis of monitoring the progress of each aspect of the project.
- Three spreadsheets detailing the staff and financial resources required to enable the programme to proceed.

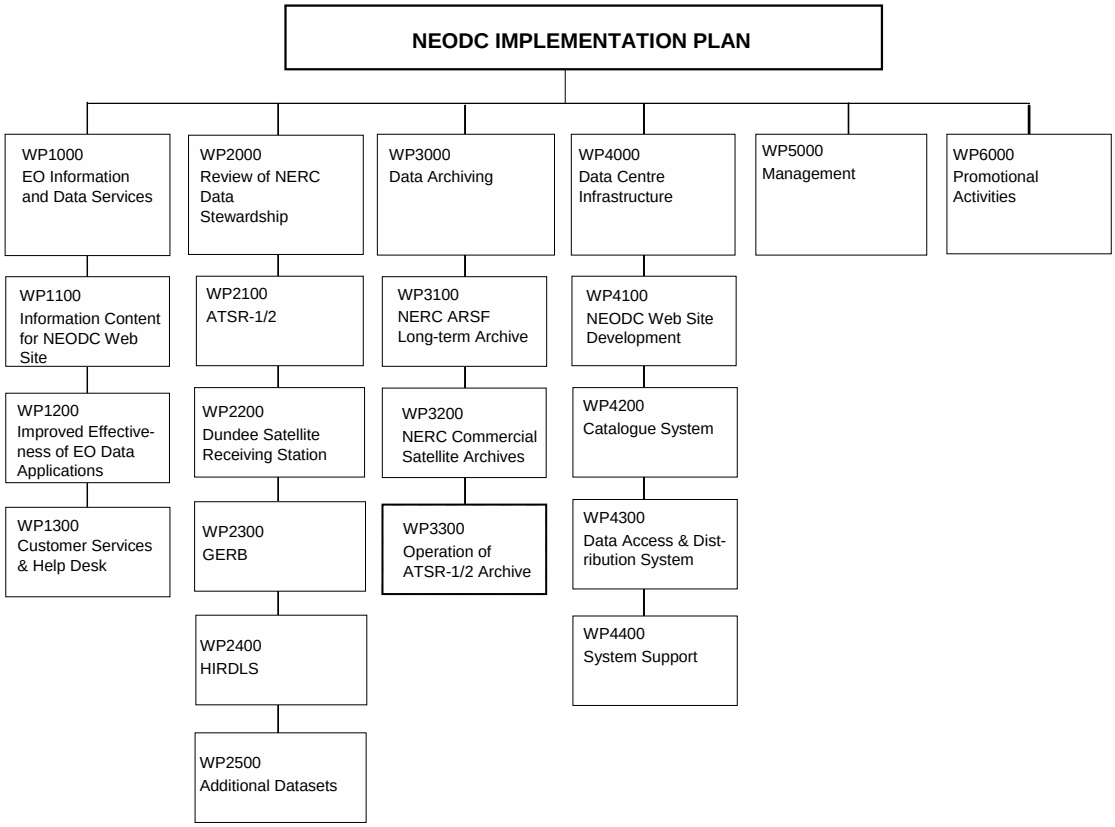
The overall annual cost to NERC of the NEODC Implementation Plan was approximately £190k per annum and it was noted that the Plan required approx £50k more than the available funding in the 3rd year. The Plan also assumed that the available funding included unspent monies from previous years (£106k).

This original NEODC Implementation Plan – which included a project to support the ATSR-1/2 data archives and to provide associated data search and delivery services for the NERC community – was approved by the EOEG in February 2002.

For the first two years of the NEODC Implementation Plan it was assumed that £53k per annum – derived from savings achieved over the previous 5 years of NEODC operations – could be carried forward to enable the Plan to proceed.
However, we have now been advised by the NERC Director Science Programmes that, due to NERC's present financial difficulties, these total accrued savings of £106k have to be returned to NERC for other purposes. These monies have now been returned to NERC by RAL.

The following diagram shows the schematic overview of each of the Work Packages which comprised the original NEODC Implementation Plan.

The first line of boxes define the six overall top-level work packages which made up the Implementation Plan; the subsidiary boxes - where shown - comprise specific project workpackages which together form the total work plan for each of the top-level work packages.



2. Overview of Revised Implementation Plan

The original NEODC Implementation Plan cannot proceed as planned and the only option we have to meet the reduced funding scenario is to reduce the NEODC staff complement from 2.5 to 1.5 staff per annum. This reduction in the NEODC staff resource has meant that we have had to revise the programme for the foreseeable future until we can recover the necessary funding to allow the full programme to proceed as originally proposed.

We have considered carefully which parts of the overall and component work packages could be reduced in content to be consistent with the staff resource capacity - *particularly in the context of the inherent expertise and skills base within this overall capacity.*

It should be emphasised that the allocations of staff time to specific work packages, used in both the original and revised implementation plans (see tabulation below), represent just that, and do NOT represent the amount of time taken to achieve the targets to which those work packages relate. Merely, that from the available staff resource for that year, it is feasible to allocate that proportion of staff time to that work package. Hence, any change in the number staff months allocated to a particular work package means that progress in achieving the target of the work package would be expected to change proportionally.

This has also been carried out in the context of maintaining to an acceptable level the NEODC's essential services to the NERC community.

Consequently it has been concluded that the resource for the routine archive, search and data delivery services to the scientific community should be retained at a high level, compared with the original Plan. In an effort to maintain the present high standards of customer service, WP1300 (Customer Services and Help Desk) has therefore been reduced by only 10%, since it is recognised that this is arguably the most important activity of the NEODC.

The most significant reductions are in the area of WP4000 (Data Centre Infrastructure), where manpower has been reduced from 10 to 3.5 staff-months and WP 3000 (Data Archiving) a reduction from 7.5 to 4.5 staffmonths, although manpower for essential IT system support has remained unchanged.

Promotional activities – website, promotional flyer, poster presentations, workshop and conference attendance – has also been cut by a half from 1 to 0.5 staffmonths.

3. Consequences of Following the Revised Plan rather than the Original Plan

The actual staff resource reductions and the remaining resource capacity with respect to specific work packages for the 1st year of the Plan is summarised below.

There would be a similar, if not increased impact, for the 2nd year of the Plan and, with the additional shortfall in the 3rd year equivalent to one staff-year, the NEODC would certainly no longer be viable at that time.

There will certainly be significant negative impacts and consequential delays in the realisation of development projects relating to automated metadata creation, data archiving and data delivery.

Similarly, it is clear that the development of an effective ATSR-1/2 archive and metadata catalogue will also suffer. It should be noted that the original proposal for the hosting of the ATSR-1/2 UBT archive by the NEODC (WP3300) was based upon the full complement of 2.5 staff, and benefited from the existing data management capabilities of the NEODC, including the planned development of its own enhanced catalogue system (WP4200) and data access and distribution system (WP4300). These components form an integral part of the ATSR-1/2 archive, and yet, on average, will suffer from a cut of over 60% in staff allocation.

Moreover, implementation of the ATSR-1/2 archive can only be achieved alongside the completion of these vital components of the NEODC's infrastructure. In view of this, it is anticipated that the currently-stated deliverable of a demonstration of the user interface for the ATSR archive by January 2003 will be delayed until July 2003 (thus extending the overall ATSR PLS milestones), and that the development work of WP4200 and WP4300 will only be achieved on a similarly-affected timescale.

The current ATSR PLS arrangements imply a cessation in the provision of data whilst the UBT archive is created. This is bound to cause a serious problem in the availability of data to the ATSR user community and it would be well worth considering whether some interim solution of limited, prioritised system of data access should be provided until the archive comes on stream at the NEODC (originally projected for the beginning of the financial year 2004/5). If the NEODC's staff resources were to be restored to the original level, then not only could the NEODC assist in providing this interim supply of data to the community, but it is likely that the restored progress in development work could proceed at a rate which could bring the achievement of the original milestones in the ATSR PLS back on track.

These, and the further cutbacks outlined below, will have a serious impact on the NEODC’s ability to deliver quality and timely services together with a dynamic and necessary development programme.

PROPOSED NEW RESOURCE PLAN (September 2002)

- **Summary Impact Assessment due to Resource Cut**

Work Packages	**Allocation of Staff Resources Staff-months per Annum Previous**	**(Reduction)**	**Remaining**
WP1000 EO Information and Data Services	**7.5**	**(2.0)**	**5.5**
WP1100 Information Content for NEODC Website • **Severely reduced new information on sensors, platforms, applications etc.** • **Fewer www links researched** • **Discussion fora and FAQ sections frozen or deleted**	2.5	(1.5)	1.0
WP1200 Improved Effectiveness of EO Data Applications • **This workpackage had already been delayed to later years because of limited resources**	0.0	(0.0)	0.0

WP1300 Customer Services & Help Desk	5.0	(0.5)	4.5
• **Some individual enquiries and data requests will experience delays and very large data requests will present severe difficulties**			
WP2000 Review of NERC Data Stewardship	**3.0**	**(0.0)**	**3.0**
WP2100 ATSR-1/2	0.5	(0.0)	0.5
WP2200 Dundee Satellite Receiving Station	0.5	(0.0)	0.5
WP2300 GERB	1.0	(0.0)	1.0
WP2400 HIRDLS	1.0	(0.0)	1.0
WP2500 Additional Datasets	0.0	(0.0)	0.0
WP3000 Data Archiving	**7.5**	**(3.0)**	**4.5**
WP3100 NERC ARSF Long-term Archive	1.5	(0.5)	1.0
WP3200 NERC Commercial Satellite Archive	3.0	(1.0)	2.0
• **For both these archives, insufficient resources to properly catalogue incoming datasets and process existing backlog – eg SHAC and commercial satellite**			
• **Resulting delay in customer service will adversely affect reputation – not good for potential AATSR archive developments**			
WP3300 ATSR-1/2 Archive	3.0	(1.5)	1.5
• **Present development of prototype search interface will be delayed with knock-on impact on services that can be offered**			
• **Design of XML documentation for metadata catalogue will not commence to schedule**			
• **Integrated metadata search and data retrieval system will experience a significant delay**			
• ***No ATSR-1/2 data and information services are feasible with the present NEODC staff***			
WP4000 Data Centre Infrastructure	**10.0**	**(5.5)**	**3.5**
WP4100 NEODC Web Site Development	4.5	(3.0)	1.5
• **Further development frozen for the time being**			
WP4200 Catalogue System	3.0	(2.0)	1.0
• **Much slower development – impacts WP3300**			
• **Fewer data items in launch of new catalogue system**			
• **No further work on inter-operability with other catalogue systems (NGDF/INFEO**)			
WP4300 Data Access & Distribution System	2.0	(1.5)	0.5
• **Effective freeze means relatively slow manual data distribution continues**			
• **Curtailment of ability to service large data requests efficiently**			
• **Service quality degraded**			
WP4400 System Support	0.5	(0.0)	0.5
• **Essential work continues unaffected**			

WP5000 Management	**1.0**	**(0.0)**	**1.0**
WP6000 Promotional Activities	**1.0**	**(0.5)**	**0.5**
• **No publicity flyer**			
• **Significant reduction in effective promotion by posters/papers and attendance at conferences/workshops**			
Totals:	**30.0**	**(12.0)**	**18.0**

4. Other Potential Additional Work for the NEODC

NERC Data Grid Project (part of NERC E-Science Programme)

The NEODC has also been requested to support the development of a specific project as part of the NERC E-Science programme; this would be in collaboration with staff at the BADC who are managing the "NERC Data Grid" project. This work – entirely relevant to the future NEODC role in this fundamental project for the effective use of large data resources in support of environmental science - is projected to increase significantly. Support of this project would further impact the limited resource capacity of the NEODC staff – *particularly in the critical resource area of research and development.*

Other Possible Datasets

It is probable that there will be an increasing interest and use of data sets from MODIS by NERC scientists. With the development of the NEODC metadata catalogue and data access/delivery system such datasets from MODIS could be easily searched and accessed by the environmental science community.

5. Proposed Action to Restore NEODC Capabilities to the Level of the Original Implementation Plan

For the NEODC to become a fully-effective and viable NERC Designated Data Centre for the provision of high quality EO data and information services in a timely manner, it is vital that we attempt to restore the NEODC capabilities - for service provision and research and development - to at least the level detailed in the original Implementation Plan. This will clearly require additional resources.

It is therefore proposed that the NEODC management should prepare a case for additional funding to allow the original Implementation Plan and its associated workpackages to be completed as closely within the original schedule as possible.

This additional funding would also ensure that the quality and timeliness of the data and information services - for which the NEODC has become renowned - would be recovered, and the significant enhancements to these services through its website pages could be implemented in a timely manner as originally projected.

We therefore propose to submit a case based on the need to:

- maintain the acknowledged valuable EO services which we have previously delivered to the NERC scientific community
- provide enhanced data and information services through the NEODC website
- develop automated search and retrieval systems to further improve the quality and timeliness of our EO data services
- develop and implement the professional curation of the ATSR-1/2 archives and the future delivery of associated data product and information services for which there is evidence of increasing demand from the NERC community.
- make an appropriate and significant contribution to the NERC E-Science programme

In order to achieve these objectives it will be necessary to increase the NEODC staff resource by at least one person with the appropriate qualifications and experience.

It is intended that this person should have appropriate experience and skills in software programming and the application of these for the purpose of data management. Experience of the application of Earth Observation data to environmental science and survey will also be important and the emphasis will be on applications within the terrestrial environment since this will help to plug a gap in the knowledge and expertise of present RAL staff concerned with the provision of EO data services.

This case will be submitted to the NERC Director Science Programmes through two routes, namely - the Enabling Fund of the NERC Earth Observation Programme and the Announcement of Opportunity for NERC Data Management Funding.

We would expect to submit the case for this additional funding in September/October 2002.