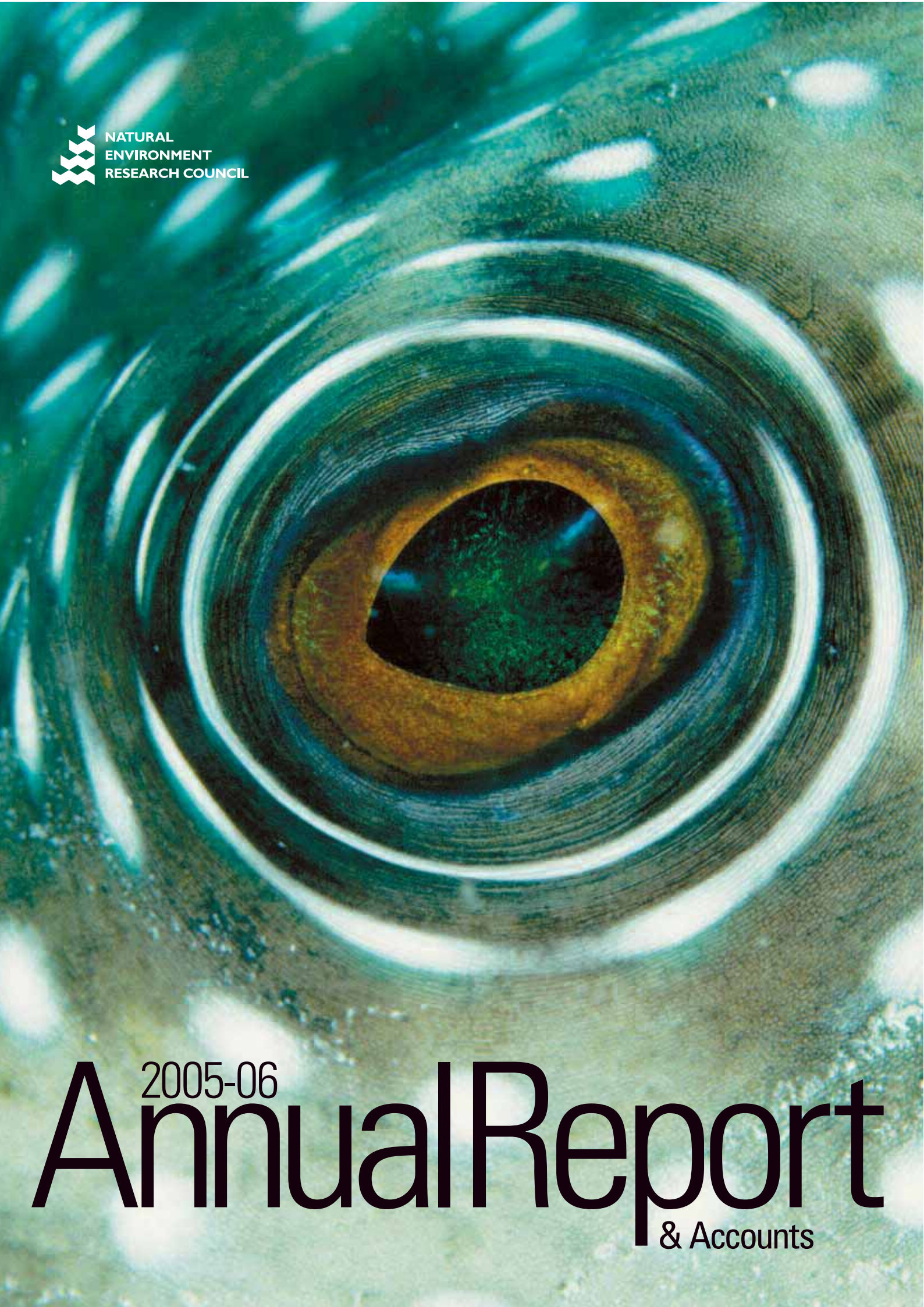
NATURAL
ENVIRONMENT
RESEARCH COUNCIL
2005-06
Annual Report
& Accounts

Contents

Some of the research results reported here may not yet have been peer-reviewed or published.

For a list of NERC Council members see page 69. For members of other committees please see our website www.nerc.ac.uk.

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INVESTOR IN PEOPLE

Natural Environment Research Council
Annual Report and Accounts 2005-06

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World-class science: sustainable solutions

About us

The Natural Environment Research Council supports world-class science that increases knowledge and understanding of the natural world and its resources for the benefit of policy makers, the public and the economy.

Pushing forward the frontiers of knowledge through cutting-edge research and innovation.

Proposing sustainable solutions to environmental problems: pollution, climate change, loss of biodiversity.

Advising decision makers how to predict, avoid, or reduce the harmful effects of natural hazards: floods, droughts, earthquakes, volcanoes, landslides, tsunamis.

Training, funding and supporting a world-class community of environmental scientists.

Transferring knowledge, products, information and skilled people to benefit UK business, policy and industry.

Improving wealth creation and the quality of life.

Engaging and informing the public through debate and dialogue about environmental issues that matter to us all.

Directing our budget to achieve the best quality, impact and relevance from our research.

Building and maintaining a first-class infrastructure for the UK's environmental scientists.

This annual report to Parliament describes selected achievements from 1 April 2005 to 31 March 2006. It highlights NERC's progress in delivering our five-year strategy *Science for a sustainable future*. A more detailed Delivery Report 2005-06 is presented to the Office of Science and Innovation, reporting progress in meeting the targets in our delivery plan. These and other NERC publications are available at www.nerc.ac.uk/publications or by phoning 01793 411750.

NERC uses a budget of around £375 million a year to fund independent research, training, long-term monitoring, knowledge transfer and engagement in the environmental sciences.

Our four wholly owned research centres are:

- British Antarctic Survey (BAS)
- British Geological Survey (BGS)
- Centre for Ecology & Hydrology (CEH)
- Proudman Oceanographic Laboratory (POL).

We also fund research in universities, including collaborative centres in partnership with other organisations. These centres are listed at www.nerc.ac.uk

Science highlights
at a glance

The Atlantic circulation largely responsible for Europe's temperate climate may have slowed by nearly one-third since 1957. Page 12.

The largest algal virus ever found, which infects the marine alga *Emiliania huxleyi*, produces an anti-ageing compound to keep its victims alive until it has reproduced. Page 9.

Blackcaps that over-winter in Britain get to the breeding grounds earlier and bag better breeding spots than blackcaps that fly south for the winter. This shows how new species could form in a population that isn't separated geographically. Page 8.

When marine methane hydrates suddenly melted 183 million years ago, they caused severe global warming and the extinction of many species. Carbon dioxide is being added to the atmosphere today at a similar rate. Man-made climate change may therefore have profound and long-lasting consequences. Page 12.

New energy scenarios for achieving a 60 percent cut in carbon dioxide emissions by 2050 show that governments have seriously underestimated what needs to be done, because they excluded emissions from international aviation and shipping. But Britain can achieve its 60 per cent target and still have a dynamic, economically successful society. Page 13.

A new understanding of how continental margins formed is helping the hydrocarbon industry to discover oil and gas. Page 18.

An improved model of river floods shows the shape of the whole event rather than just the peak. This information can be used to design better flood defences and to understand past floods. Page 17.

Using an instrument on the Envisat satellite, scientists can now accurately measure – on a continental scale – the amount of carbon dioxide used by plants. Page 15.

In the last 30 years air temperatures above the whole of Antarctica have risen three times faster than anywhere else in the world. Page 14.

Ecologists should reconsider how they target their conservation work in biodiversity hotspots such as rainforests, according to an analysis of the first global database of bird biodiversity. Page 7.

The year in review

From an organisational perspective, NERC has been planning for change this year. We are developing a new strategy, have begun a major reorganisation of the Centre for Ecology & Hydrology, and are building or planning new research ships, an Antarctic base and powerful new computing facilities.

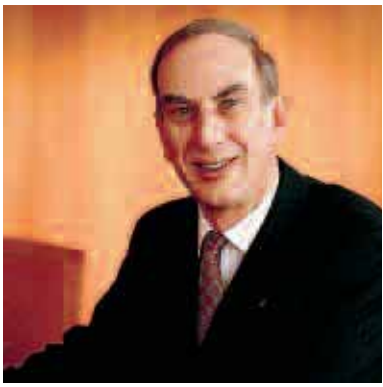
Environmental science was at the forefront of public debate this year during the UK presidencies of the G8 and the European Union. Climate change and all its many impacts on the environment are widely recognised as the foremost problem facing planet Earth. NERC-funded science contributes important evidence that supports and informs the development of policies to respond and adapt to a changing climate. Increasingly, adaptation to climate change is seen as an opportunity for business to develop innovative solutions for energy production and transport. Transferring new NERC-funded knowledge into such solutions remains a top priority.

The quality of environmental science research in the UK was confirmed by the annual analysis for the Office of Science and Innovation (OSI) of citations of published research, compared across fields and countries. The UK continues to perform strongly in environmental science, being best in value for money and second only to the US in nearly all indicators of research quality. NERC is proud to support the efforts of many people who contribute to such world-class science. Much of our research is done in collaboration with others, both nationally and internationally; with government departments and agencies, such as Defra, the Met Office and the Environment Agency; and with business.

This annual report celebrates some of the highlights of NERC's year. Our research centres and university-based scientists have produced results of the highest quality – generating new knowledge, and applying and communicating research findings to benefit the economy and society.

NERC's new strategy will build on *Science for a Sustainable Future*. The 21st century may well be the century of environmental sciences, and NERC is well placed to be a major contributor. As this report shows, NERC science is tackling many of the big issues facing the planet: climate change, sustainable use of resources, natural hazards and Earth's life-support systems. We are developing science themes and strategies for people, organisations, scientific infrastructure and knowledge, to meet some of the key challenges facing society, policy makers and the economy. Our new strategy will form the major input from NERC to the

Clockwise from top left:
Our new ship RRS *James Cook*.
The new Halley station, Antarctica.
Chairman, Robert Margetts.
Chief Executive, Alan Thorpe.
Engaging young people in science.



Government's Comprehensive Spending Review 2007, from which OSI allocates funds to the research councils. Although strategies need to be flexible and evolutionary, there is no doubt that this is an opportunity to rethink our approach, and these come along only every few years. We are consulting extensively on our new strategy.

We also this year planned for change at the Centre for Ecology & Hydrology, CEH. After thoroughly analysing its future science programme and sustainability, NERC Council decided that a major restructuring of CEH was essential to enable this world-leading centre to be sustainable both scientifically and financially. The activities of CEH will be focused at four sites in future, with its core skills being complemented by a new partnership fund for work with the academic sector and other organisations. Regrettably, this restructuring will mean fewer staff. There is no doubt that this, like most major change, is painful.

Another element of planning for change is a major re-organisation of the way the National Oceanography Centre, Southampton (NOCS) is structured and run (page 42). This will be beneficial in many ways, including enabling NOCS to be more effective in national and international leadership on behalf of marine science in the UK. The development of a coordinated science programme across marine centres in a proposal called Oceans 2025 is a sign of this thinking beginning to bear fruit.

We are looking forward to a naming ceremony for the new NERC research ship *James Cook*, and are planning for a new ship to replace the *Discovery*. A replacement base at Halley in Antarctica will provide well-designed and comfortable accommodation for research (page 43). This reminds us that we need major infrastructure in diverse locations to carry out our research. We are procuring the next-generation high-performance computing service, and have signed a partnership agreement with the Met Office and Engineering and Physical Sciences Research Council (EPSRC) on the next-but-one generation.

Working with the other research councils through the Research Councils UK (RCUK) partnership, we are planning to deliver most of our administrative support services jointly by 2009. This will improve the overall performance of the research councils and provide better and more efficient services. This year we developed a joint RCUK 'science in society' strategy (page 28), which covers our collaborative work to engage with the adult public and reach young people and teachers.

Robert Margetts CBE FREng FIChem**, Chairman**
Alan Thorpe, Chief Executive

Science highlights

In this chapter, we celebrate a selection of NERC's research highlights for the year, under headings that reflect our current research priorities. Some of our research is directed towards specific themes; the rest is driven by the curiosity of individual scientists and teams. A rigorous system of peer review helps NERC to fund the highest-quality research.

Earth's life-support systems

Improving our knowledge of how the natural world works

Two projects in this section have challenged the accepted wisdom on how best to protect our environment. The first global database of bird biodiversity showed that areas where birds are most at risk of extinction do not necessarily coincide with areas with the most diverse species – suggesting that different conservation methods are needed in each region. And a study of the 55-million-year history of the Amazon rainforest concluded that breaking it up into isolated 'islands' by logging and climate change will be more damaging to its survival than expected.

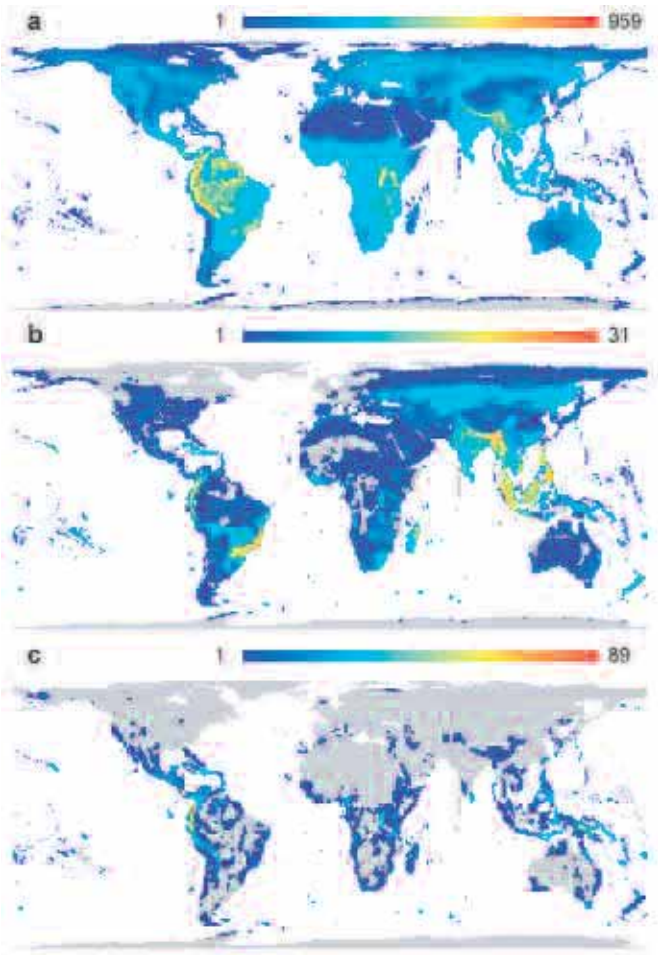
This year, we invested £105m – 28 percent of our budget – in projects investigating the complex workings and interactions of Earth's life-support systems, including biodiversity, water and the nitrogen cycle.

Biodiversity hotspots map shows up surprises

Ecologists may need to reconsider how they target their conservation work in biodiversity hotspots such as rainforests, according to Ian Owens, of the NERC Centre for Population Biology and Imperial College London, and colleagues. Using one of NERC's first consortium grants, they produced the first global database of bird biodiversity. Their analyses show that hotspots of diversity in species richness, rarity and threat occur in widely differing geographical areas and that there is surprisingly little overlap between these patterns.

Until now conservationists have assumed that 'hot' areas for one aspect of diversity will also be hot for other aspects. These analyses found different types of hotspot in different areas. Ian said, 'They are probably produced by different mechanisms and will probably need different sorts of conservation effort.' For birds, hotspots of species richness are the mountains of South America and Africa, whereas hotspots of extinction risk are on the islands of Madagascar, New Zealand and the Philippines.

Professor Ian Owens, i.owens@imperial.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2005-39 conservation.asp



There is surprisingly little overlap in global maps of: a) species richness, b) threatened species richness and c) endemic species richness in birds.

Clockwise from top left:

The blackcap: an example of evolution in action. © fotolincs/Alamy

Earth from space.

Emiliania huxleyi, a chalk-covered marine alga.
© Steve Gschmeissner/Science Photo Library

A complete fossil of the armour-plated fish, *Errivaspis*, from early Devonian rocks in Wales.

Quantifying and Understanding the Earth System (QUEST)

NERC's £21m QUEST programme brings together scientists' knowledge of the Earth as a complex integrated system of interactions and feedbacks. It aims to substantially improve predictions and understanding of global environmental change. This year the programme awarded over £7m in seven multi-institutional research grants and contracts.

Highlights for the year include a novel use of climate models to show how climate change could threaten freshwater supplies, increase the risk of forest fires, and damage ecosystems. 'Our computer simulations show that these risks increase sharply with the degree of global warming,' said QUEST leader, Colin Prentice of Bristol University.

In other computer simulations, Ayako Abe-Ouchi at the University of Tokyo, working with Colin, found that the increased growth of plants as carbon dioxide levels rise could have paradoxical knock-on effects including increased global warming. And John Pyle and colleagues at the University of Cambridge predicted that increased emissions of volatile organic compounds from plants in a warm, high-CO_2 climate – interacting with natural and human sources of nitrogen oxides – may lead to increased ozone pollution in the northern hemisphere.

Professor Colin Prentice, Colin.Prentice@bristol.ac.uk
http://quest.bris.ac.uk

Speciation can occur in time

Stuart Bearhop, NERC Fellow at Queen's University Belfast, has shown that reproductive isolation (the first stage in the formation of a new species) may occur when populations are separated by time rather than location. Stuart and colleagues, from the Max Planck Institute in Germany and the NERC Life Sciences Mass Spectrometry Facility, studied blackcaps that breed in Germany. About 50 years ago some blackcaps started migrating north-west to winter in Britain rather than south-west to Spain and Portugal.

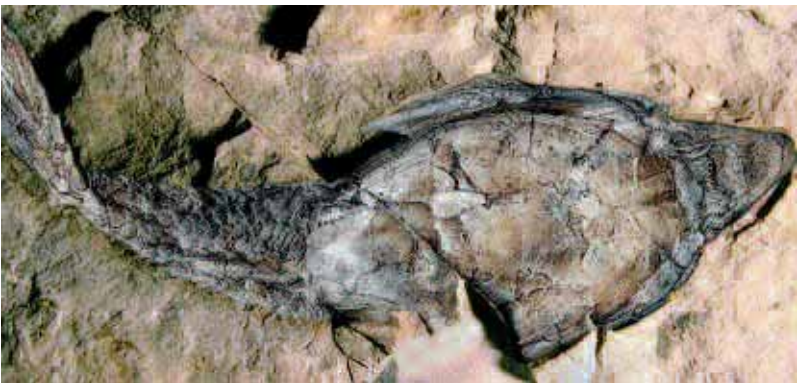
Stuart and colleagues studied isotopes in the birds' claws and feathers and found that at the German breeding grounds, British winterers only bred with other British winterers. Stuart said, 'Blackcap migration is triggered by day length. The British birds arrive in Germany earlier and grab the best breeding spots and breed with each other. Although it hasn't happened yet, this shows that speciation could take place within a population that isn't separated geographically. This has been a matter of debate for many years.'

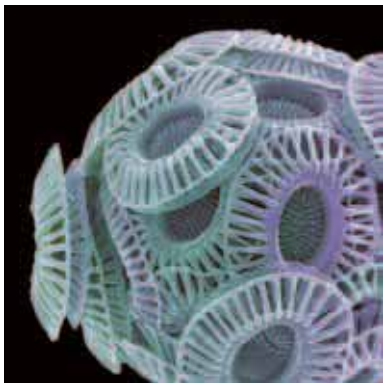
This research was identified by *Science* magazine as one of the top science achievements for 2005.

Dr Stuart Bearhop, s.bearhop@qub.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2005-51blackcaps.asp

CO_2 makes plants less thirsty

Rising levels of carbon dioxide in the air are increasing the amount of water in our rivers, according to a *Nature* paper from the Joint Centre for Hydro-Meteorological Research. This could explain why many rivers around the world have released more water into the oceans over the past century,





even though there has been little change in rainfall. Because plants close their leaf pores for longer when there is plenty of carbon dioxide around, they breathe out less water vapour and need less water from the soil. This leaves more rainwater to run into rivers rather than being taken up by vegetation. This is mixed news: there will be more fresh water in some areas that need it but flooding may also increase.

Peter Cox, at the Centre for Ecology & Hydrology, explains: 'Direct effects of carbon dioxide on vegetation need to be included in assessments of how global water resources will change over the coming decades.' Nicola Gedney from the Met Office, who led the research, said: 'This answers a key question about what is driving the changes in the global water cycle. CO_2 is not only a greenhouse gas: it can also affect the world's water directly through plant life.'

Professor Peter Cox, pcox@ceh.ac.uk
www.metoffice.gov.uk/corporate/pressoffice/2006/pr20060216.html

Fossil fish challenge gene theory

New evidence from fossil fish, hundreds of millions of years old, casts doubt on one aspect of current evolutionary theory. The research, by Philip Donoghue of the University of Bristol and Mark Purnell of the University of Leicester, used the fossil record to explain that apparent evolutionary 'leaps' between species are just gaps in our knowledge.

This work, funded by NERC and NESTA, challenges the theory that jumps in evolution occurred at times when large numbers of genes were duplicated in animals with backbones. As Philip explained: 'We consider this picture – a view of living animals only – is seriously distorted. What appear to be evolutionary jumps are really just gaps in the evolutionary tree, dead branches that have fallen by the wayside. These branches are not 'missing links', more like 'missed' links, and when we use the fossil record to put them back in place, the vertebrate evolutionary tree looks very different.' Mark added: 'Fossils may be long extinct, their genes having rotted away millions of years ago, but if geneticists want to say anything meaningful about evolution they must include fossils in the vertebrate family tree – they cannot simply ignore them.'

Dr Philip Donoghue, phil.donoghue@bris.ac.uk
Dr Mark Purnell, map2@le.ac.uk
www.bris.ac.uk/news/2005/706

Virus can programme cell death

The largest algal virus ever found, which infects blooms of the chalk-covered marine alga *Emiliania huxleyi,* produces a compound to keep the algae alive until it has done with

Clockwise from top left:

Pollution from traffic threatens plant diversity. © archivberlin Fotoagentur GmbH/Alamy

Logging in the Amazon rainforest may cause more damage than expected. © Ron Giling/Still Pictures

Satellite data shows that subglacial lakes are linked: when ice sinks above lake 1 it rises over lakes 2 and 3.

The grey squirrel is one of our most destructive 'aliens'. © Warwick Sloss/Nature Picture Library

them. Willie Wilson from Plymouth Marine Laboratory led the team that discovered this after sequencing the virus's giant genome. Willie found genes which encode a pathway that eventually produces a compound called ceramide. Such genes have never been seen in a virus before.

Willie said, 'Plants and animals use ceramide to control a process called programmed cell death, the same mechanism that causes tadpoles' tails to disappear. It seems the virus controls this mechanism and delays algal cell death while it reproduces itself in a virus 'factory'. Eventually the cell disintegrates and new viruses infect other cells in the bloom.'

This natural ceramide source may be useful in anti-ageing creams: an Italian company is looking into the possibilities. There may also be applications for inhibiting cancer.

Dr Willie Wilson, whw@pml.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2005-38virus.asp

Global pollution threat to plants

Nitrogen emissions from cars, power stations and livestock farming may threaten many of the world's valuable plant species, according to an international team led by the University of Sheffield and the Stockholm Environment Institute in York. Researchers estimated the atmospheric nitrogen deposition in 34 biodiversity hotspots, which between them contain half of the world's plant species as endemics (occurring nowhere else in the world). Combining predictions of future emissions with computer models of the chemistry of the atmosphere, the team discovered that some global biodiversity hotspots already receive significant nitrogen fall-out from polluted rain and gas, and half of them will get potentially damaging amounts by 2050. This threatens plant diversity because nitrogen-loving plants can outgrow other species. 'Until recently, scientists have focused on the threat of atmospheric nitrogen deposition in Europe and North America – partly because these were the first areas of the world to receive high levels of this pollutant,' explained RCUK academic fellow Gareth Phoenix. 'Our work shows that air pollution poses a far greater threat to global biodiversity than previously considered.' Kevin Hicks added: 'Scientists know very little about the sensitivity of the hotspot ecosystems to nitrogen deposition, so accurate estimates of the amount of species loss are currently not possible.'

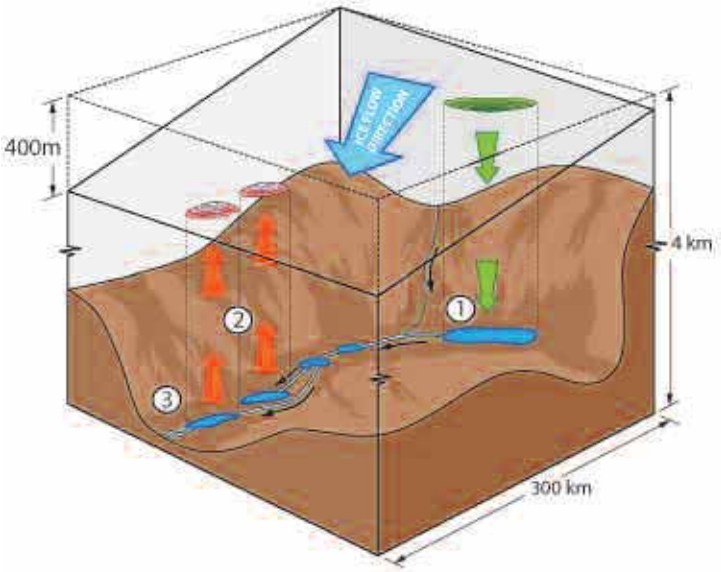
Dr Gareth Phoenix, g.phoenix@sheffield.ac.uk,
Dr Kevin Hicks, wkh1@york.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2006-17nitrogen.asp

Severe threat to the Amazon rainforest

The Amazon rainforest, which has survived for more than 55 million years in the face of enormous global climate changes, may now face destruction this century.

It was previously believed that the forest retreated into isolated patches during ice ages, and new species evolved in isolation before the patches merged again in warmer periods. But new NERC-funded research shows that the rainforest remained largely intact during ice ages, and another explanation is needed for its diversity. There is therefore no precedent for the fragmentation caused by current logging and climate change.

Since the extinction of the dinosaurs, the Amazon



rainforest has played a steady and influential role in the global water and carbon cycles, accounting for a quarter of today's terrestrial biomass. It provides a significant source of water in the atmosphere, affecting rainfall in North America and Eurasia. 'Despite its resilience to change in the past, predicted climate changes and direct human threats this century may end up destroying this crucial part of our biodiversity and life support system,' said Mark Maslin of University College London.

Dr Mark Maslin, m.maslin@geog.ucl.ac.uk
http://earth.leeds.ac.uk/ebi/publications/Maslin_2005.pdf

Auditing England's aliens

The Biological Records Centre coordinated a project that has compiled the first comprehensive list of the non-native species found in England, including its coastal waters. A total of 2,721 alien species were listed, of which 1,798 were vascular plants on land and in fresh water. The most numerous marine group was the red algae, Rhodophyceae, with 12 species. On land, many animal groups were bugs and aphids (102 species), beetles (101), butterflies and moths (48), and molluscs (43). Most animals, microbes and marine organisms are introduced by accident. Terrestrial and freshwater plants, on the other hand, have mostly escaped from cultivation. Introduced animals occupy a wide variety of habitats, especially surface waters, woodland, and cultivated land. Plants are concentrated on cultivated, built and derelict land.

This project identified alien species with substantial environmental and economic effects, and showed that non-native animals, especially vertebrates, have in general much larger effects – mainly negative – than introduced plants. Worst of all are the grey squirrel and muntjac.

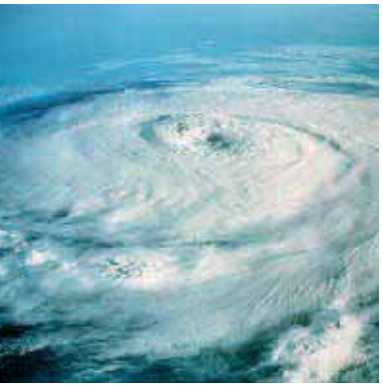
Dr Mark Hill, moh@nerc.ac.uk

Rivers under ice

Plans to drill deep beneath Antarctic ice, to investigate lakes where ancient life is thought to exist, may have to be reviewed following a surprising discovery that the lakes are linked. Using radars on the European Space Agency ERS-2 satellite to examine small changes in the surface of some of the oldest, thickest ice in Antarctica, the scientists found synchronous changes in the height of sections of the ice sheet 290 kilometres apart. The team, from the NERC Centre for Polar Observation and Modelling, reported in *Nature* that these changes are caused by rivers the size of the Thames, moving water for hundreds of miles under the ice. The discovery challenges the assumption that subglacial lakes evolved in isolation for several million years and may support unique microbial life.

Duncan Wingham of University College London, who led the team, said: 'Previously, it was thought water moves underneath the ice by very slow seepage. But this new data shows that, every so often, the lakes beneath the ice pop off like champagne corks, releasing floods that travel very long distances.'

Professor Duncan Wingham, djw@cpom.ucl.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2006-23rivers.asp



Climate change

Understanding, predicting and mitigating the impacts

This year, we invested £108m – 29 percent of our budget – in projects investigating climate change.

Evidence that humans are changing the climate becomes more convincing each year, and NERC science is helping to inform policy makers about how their decisions will affect the future of the planet. In this section: the Atlantic circulation largely responsible for Europe's temperate climate may have slowed by nearly a third since 1957, human activities are definitely warming the oceans, and greenhouse gases could be affecting Antarctica more than the rest of the world; but the UK can achieve its target of a 60 percent reduction in carbon emissions and still have a successful economy.

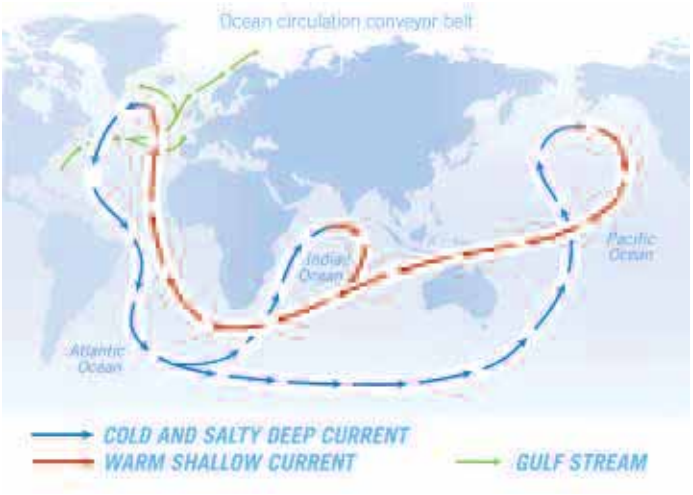
Could the Atlantic current switch off?

The Atlantic circulation largely responsible for Europe's temperate climate may have slowed by nearly one third since 1957, Harry Bryden and colleagues from the National Oceanography Centre, Southampton have reported. They compared the Atlantic's flow across latitude 25°N in 2004 with measurements from 1957, 1981, 1992 and 1998. Their analysis indicated the flow dropped by 30 percent between 1992 and 2004. The research supports computer model predictions that greenhouse-gas emissions would cause this major circulation to change, but the change is much earlier than predicted. Harry said, 'From 1957 to 1992 the circulation and heat transport at this latitude were reasonably constant. We were surprised that the circulation in 2004 was so different from previous estimates. Climate models predict that UK temperatures could drop by 4°C if this current stopped, and this temperature drop would occur a decade or two after the circulation slowed. We won't see icebergs off Dover, but Europe's climate would change.'

Professor Harry Bryden, hlb@noc.soton.ac.uk
www.nerc.ac.uk/publications/documents/pe-wint05/columbus.pdf

Global warming like this has happened before

A sudden episode of extreme global warming and the extinction of many species occurred around 183 million years ago, when marine methane hydrates suddenly melted. Angela Coe, Anthony Cohen and Dave Kemp from the



Open University discovered that there were three separate and unusually large enrichments of carbon-12 within a 60,000-year interval.

Angela said, 'The only likely source is methane hydrate, a frozen mixture of water and methane found in huge quantities on the sea bed. Melting probably started when a combination of volcanic activity and periodic changes in the Earth's orbit warmed the climate. Our evidence suggests that the upheaval lasted around 150,000 years, but that methane release – and associated environmental change – may have taken no more than 500 years. The rate at which carbon dioxide is being added to the atmosphere today is similar to 183 million years ago; man-made climate change may therefore have profound and long-lasting consequences.'

Angela Coe, a.l.coe@open.ac.uk
www.nerc.ac.uk/publications/documents/pe-spr06/burps.pdf

Aerial view of a chain of atolls in the Maldives, Indian Ocean.

Brenda Boardman (bottom right) and the Lower Carbon Futures team with their book *40% house*, a strategy to cut energy use at home.

Flood hazard in the Maldives

The low-lying Maldive islands are often used as case studies of the effects of future changes in sea level. So it is important to understand the past and future variations of sea level in these islands as well as possible changes in the future. Geologists who visited the Maldives a couple of years ago concluded from their fieldwork that sea level in the islands had fallen by about 30 cm in the past few decades. 'This seemed really implausible,' said Philip Woodworth of the Proudman Oceanographic Laboratory, 'so we examined the evidence using extensive meteorological and oceanographic data sets and tide gauge records'. Philip found no evidence that would support a large fall in sea level in recent decades and, in fact, all Maldives tide-gauge records for the 1990s (the only records available) showed a small rise. He concluded that a rise in sea level of approximately half a metre during the 21st century, as suggested by the *IPCC Third Assessment Report*, remains the most reliable prediction for the future of the islands.

Dr Philip Woodworth, plw@pol.ac.uk

Decarbonising Britain

The Tyndall Centre for Climate Change Research unveiled the most comprehensive new set of energy scenarios for achieving a 60 percent cut in UK carbon-dioxide emissions by 2050. Its *Decarbonising Britain* programme showed that governments have seriously underestimated what needs to be done because they have not included emissions from international aviation and shipping. But Kevin Anderson said, 'The Tyndall scenarios clearly illustrate that we can achieve a true 60 percent reduction in UK emissions and still have a dynamic, economically successful society.'

Brenda Boardman from the Oxford Environmental Change Institute and colleagues researched how the UK residential sector can achieve the target, and published a practical strategy on how to make deep cuts in carbon emissions in our existing housing stock, while successfully meeting household energy needs.

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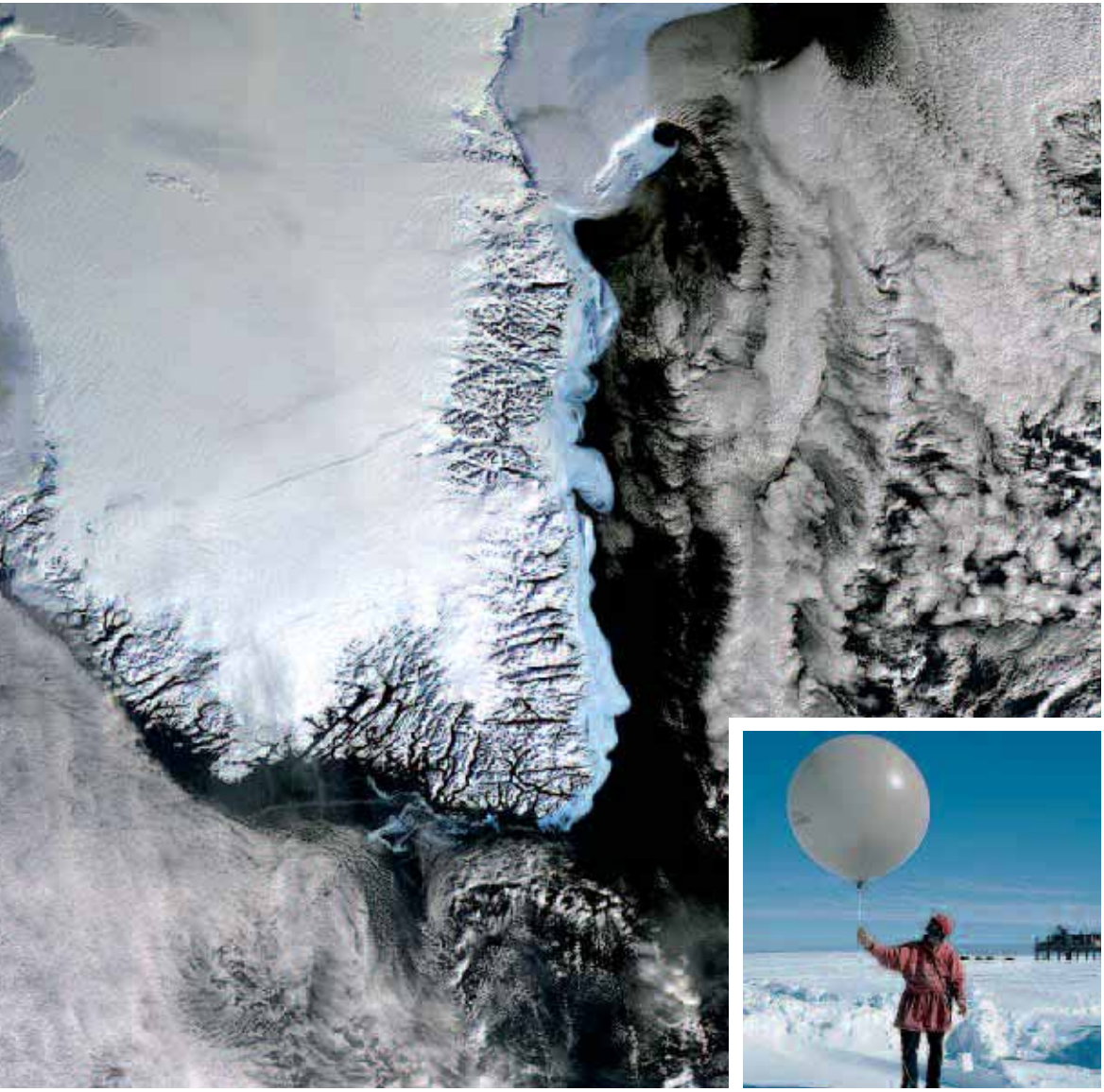
Dr Brenda Boardman, Brenda.boardman@eci.ox.ac.uk
www.tyndall.ac.uk/events/decarb.shtml
www.40percent.org.uk



The changing poles

NERC-funded scientists are studying the effects of climate change in the polar regions, an essential task if we are to predict global effects such as future sea-level rise.

In the last 30 years, air temperatures above Antarctica have risen three times faster than anywhere else in the world. It was already known that surface temperatures on the Antarctic Peninsula had warmed by 2.5°C since the 1950s, but surface measurements suggested no pronounced changes elsewhere on the continent and even a small cooling effect. But when John Turner and colleagues at the British Antarctic Survey (BAS) analysed weather balloon data, they found that temperatures in the lowest 8km of the atmosphere over the whole continent have warmed by up to 0.7°C per decade. The balloon data showed a pronounced warming throughout the troposphere during the winter, while the stratosphere above cooled noticeably.

John said, 'Greenhouse gases could be affecting Antarctica more than the rest of the world and we don't understand why. Climate model simulations don't reproduce this warming and our next step is to try and improve them.'

Dr John Turner, j.turner@bas.ac.uk
www.antarctica.ac.uk/News_and_Information/Press_Releases/story.php?id=281

In the first regional study of the changes in Antarctic glaciers, scientists at BAS and the US Geological Survey found previously unknown patterns of change over the last 60 years. 'We analysed more than 2,000 aerial photographs and over 100 satellite images to identify changes in the position of glacier and ice-shelf fronts around the coast of the Antarctic Peninsula,' reported Alison Cook. 'Fifty years ago, most of the glaciers we looked at were slowly growing in length, but since then this pattern has reversed. In the last five years the majority were actually shrinking rapidly.' The research was published in the journal *Science*.

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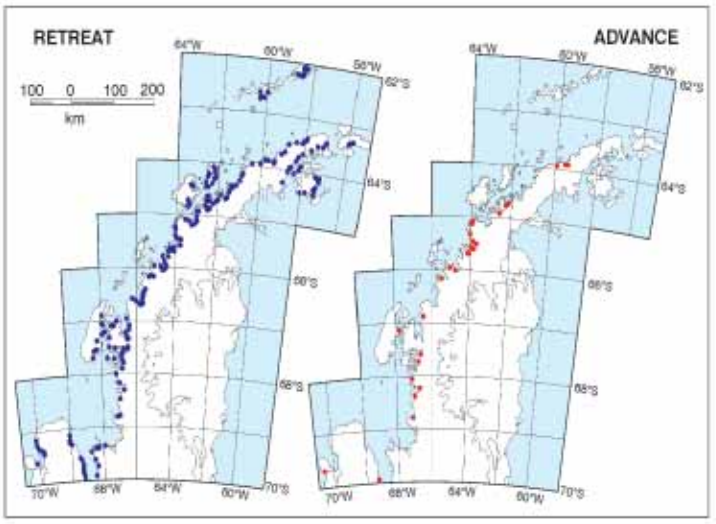
www.antarctica.ac.uk/News_and_Information/Press_Releases/story.php?id=163

The physical impacts of global climate change on the oceans are affecting local marine food webs in the Southern Ocean, including predators such as Antarctic fur seals, penguins, albatrosses and right whales. BAS scientists are using computer models, as well as direct observations, to investigate the effect of some of these large-scale ocean changes, such as El Niño, on the populations of marine predators. These models predicted that the fur seal pup production at Bird Island, South Georgia would be very low



Clockwise from top left:

The southern tip of Greenland. © ESA

Envisat was used to measure carbon dioxide in the atmosphere. © ESA

A map of the change in Antarctic Peninsula glacier fronts since the earliest records.

Antarctic fur seals with pups. © Jaume Forcada

Measuring the temperature over Antarctica using weather balloons.

in the 2005-06 season. As it turned out, it was the second-worst pup production on record in over 23 years.

Dr Jaume Forcada, jfor@bas.ac.uk
www.antarctica.ac.uk/BAS_Science/programmes2005-2010/discovery2010/index.html

Jonathan Gregory at the National Centre for Atmospheric Science at Reading and Philippe Huybrechts of the Free University of Brussels have developed improved methods to simulate the influence of future climate change on the Greenland ice sheet and hence, its likely effect on sea-level rise. The high-resolution climate models – which combine ocean and atmospheric effects – suggest that the Greenland ice sheet will survive a higher temperature rise than earlier studies predicted. The research found that the ice sheet will survive a temperature rise of no more than 4.5°C +/- 1.9°C annual average in Greenland relative to pre-industrial times. But even this is likely to be exceeded in the 21st century, according to many current predictions. Sea level would rise by seven metres if the Greenland ice sheet melted completely, a process that could take a thousand years or more.

Dr Jonathan Gregory, j.m.gregory@reading.ac.uk

Measuring carbon uptake from space

Using a special instrument onboard the Envisat satellite, Paul Monks and Michael Barkley from the University of Leicester are measuring how much carbon dioxide is being used by plants.

Using 20,000 individual measurements a month they are monitoring carbon dioxide drawn down over Siberia, North America and Northern Europe. Paul said, 'Usually researchers put up a tower and measure carbon-dioxide concentrations in the surrounding kilometres, but we are taking high precision measurements on a continental scale. A year's measurements for each continent take 12 weeks of computer time on 60 processors, and we can actually see streaks of low carbon dioxide where the vegetation is sucking it out of the atmosphere during the growing season.'

Funded by NERC's Centre for Observation of Air-Sea Interactions and Fluxes, this work will provide important information for policy makers and scientists alike.

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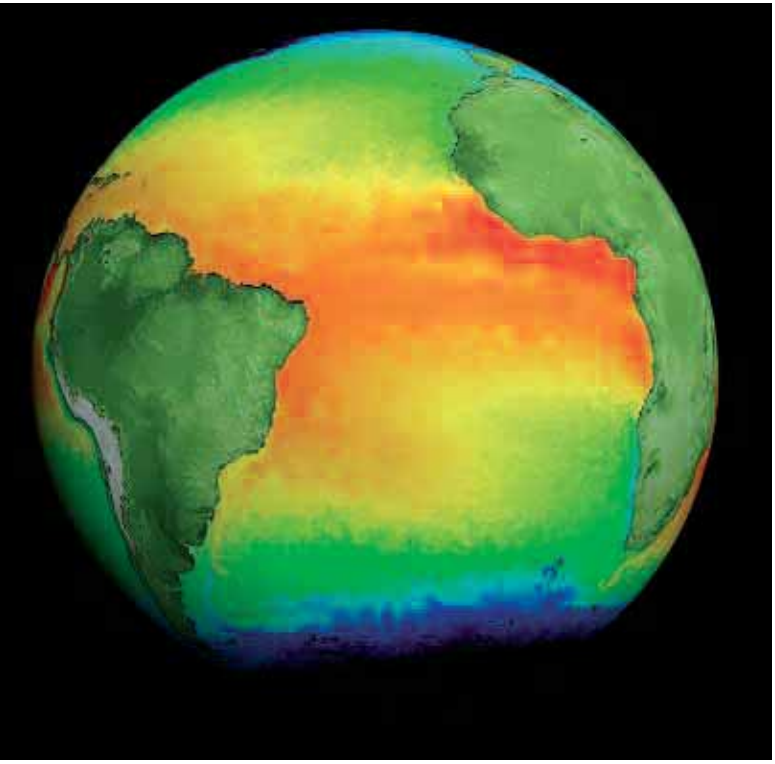
http://atmos.chem.le.ac.uk/group/atmos_space.html

Earliest humans in northern Europe

Researchers have confirmed evidence of early humans in East Anglia some 200,000 years before any previous traces of human colonisation north of the Alps.

The climate of northern Europe was thought to have been too hostile to support prehistoric people until about 500,000 years ago. But new geological information from the British Geological Survey, combined with evidence of ancient climates collected by other academic institutions, found that the region was significantly hotter and drier than today, resembling the Mediterranean. 'This climate would have provided early humans with an abundance of food and shelter, which they needed for survival,' reported Jonathan Lee of BGS.

A team from the University of York provided the final



Left: Envisat continuously monitors sea surface temperature. Blue is the coldest water and red the warmest. © ESA.

Right: Our decisions could leave a legacy of increasing climate change.

piece of evidence by showing that primitive stone tools discovered in Suffolk could date back to as much as 700,000 years ago. 'We confirmed the age of the flints by measuring the deterioration of protein in fossil opercula from the site. These opercula, the tiny trap doors that close a snail's shell, effectively form a time capsule,' said Kirsty Penkman.

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Dr Kirsty Penkman, kp9@york.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2005-59oldhuman.asp

We are warming the oceans

Human activities are causing ocean temperatures to rise, according to strong evidence published in the journal *Science* by an international team. Natural climate variability and solar or volcanic effects alone cannot account for the observed changes over the last 40 years. The warming was only accurately simulated if greenhouse gases and other emissions from human activities (industry, agriculture and transport) were incorporated in the climate models. In all the ocean basins, ocean warming predicted by the computer models matched the measurements obtained at sea with a high statistical significance.

'This research complements that done on temperature change in the atmosphere. Our analysis of the ocean component of climate models agrees with conclusions about the atmospheric surface temperature simulated by models: that human influence is causing the warming we are measuring,' said Jonathan Gregory, from the National Centre for Atmospheric Science at the University of Reading.

Dr Jonathan Gregory, j.m.gregory@reading.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2005-22climchng.asp

A thousand years of climate change

Research commissioned by the Environment Agency looked for the first time at climate change over the next thousand years. Combining predictions of the carbon cycle and climate change using the GENIE-1 Earth system model, the research, led by Tim Lenton and Rachel Warren of the Tyndall Centre and the University of East Anglia showed that the decisions of this and the next few generations could leave a legacy of increasing climate change over the next millennium unless there is a major reduction in CO_2 emissions. The total amount of fossil fuel emitted by year 3000 will determine the amount of warming (from 1.5 to 15°C), and the corresponding sea level rise (0.5 to 11.4 metres), which could threaten low-lying areas of the UK with flooding. Environment Agency Chief Executive, Barbara Young, said: 'We now know from this report that we are walking off a shorter plank than we previously thought – the research shows far more dangerous and dramatic climate change effects appearing much earlier than previously predicted. Tough decisions are needed soon.'

Dr Tim Lenton, t.lenton@uea.ac.uk
www.tyndall.ac.uk/media/press_releases/pr45.pdf

Sustainable economies

Making the most of our natural resources without damaging the environment

Science can offer better predictions of natural hazards such as floods and droughts, and help to improve planning. Sustainable use of natural resources, from bushmeat to wind power, relies on scientific knowledge. This section explores the diverse ways that NERC research can improve responses to natural hazards and the use of the planet's finite resources.

This year, we invested £71m – 19 percent of our budget – in projects investigating sustainable economies.

Better predictions for floods and droughts

Researchers at the Centre for Ecology & Hydrology have improved the way river floods are modelled so that people can see the shape of the whole event rather than just the peak. While other methods focus on just the highest flow in a river during a flood, the revised technique models the whole pattern of the river rise, its peak and then the fall.

Lisa Stewart explained, 'The new rainfall-runoff model estimates river flow in cubic metres per second, showing how much water will flow through the river from the start of the rise to the fall back to normal flow. It can be used to design better flood defences and also to look back at damaging flood events, such as in Lewes in 2000, to work out what happened.'

Lisa Stewart, ejs@ceh.ac.uk

During recent droughts in England, the National Hydrological Monitoring Programme, operated jointly by CEH and BGS, has provided authoritative and impartial guidance to government departments, environmental regulators, the water industry, the media and the public on the extent, severity and range of effects of the droughts.

Recent droughts have also been placed in a historical context by research identifying major droughts in England and Wales over the last 200 years. Using observed and modelled data, and contemporary evidence of drought effects, the study found that the droughts of the last decade are not exceptionally long or severe. The extended drought from 1890 to 1905 would – given current patterns of water demand – be a considerable challenge to southern Britain's water supply. The study gave important insights into long-term climate variability, which should improve water-management strategies.

The floods in Lewes, Sussex in 2000. © Grant Rooney/Alamy

Terry Marsh, tm@nerc.ac.uk

New geological model helps the search for oil

The University of Liverpool and University of Cambridge iSIMM project, funded by the NERC–LINK Ocean Margins programme and the oil and gas industry, has developed a new quantitative model of how rifted continental margins form. Understanding these geological features is important both for the science of plate tectonics and for finding oil and gas reserves at ocean margins.

Nick Kusznir explained, 'The deep-water sedimentary basins of rifted continental margins are the present frontier-exploration target of the oil and gas industry. Industry needs to know where the continental crust stops and oceanic crust starts. With deep-water boreholes costing up to $100m each, understanding how rifted continental margins and their sedimentary basins form, and how to locate the ocean-continent transition, is critically important to this exploration effort, which is proving to be scientifically as well as technically challenging. We have implemented our new model in a software package which our industry partners are using to find new oil reserves.'

The project also developed new ways of 'seeing' through the overlying igneous rocks to the sediments and basement rocks beneath. Major oil companies have used the technique for multi-million-pound oil surveys.

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www.nerc.ac.uk/funding/thematics/oceanmargins

Can bushmeat ever be sustainable?

The African trade in wild meat, or bushmeat, poses serious problems. Many species are at risk of extinction, threatening the livelihoods of people who depend on the trade as well as the animals themselves. But efforts to make the trade sustainable are hampered by lack of knowledge. Using a powerful combination of biology and socioeconomics, Guy Cowlishaw, a NERC Advanced Fellow at the Institute of Zoology, investigated the bushmeat commodity chain that

supplies the city of Takoradi in Ghana.

Surprisingly, there was no evidence that the current trade is unsustainable. But this appeared to be because species that were vulnerable to hunting had already disappeared from the market, leaving only species with higher reproductive rates. These robust species – such as cane rat and Maxwell's duiker – were hunted in the mainly agricultural hinterland.

Hunters, wholesalers, market traders and café owners traded bushmeat freely among themselves. Individually, the largest share of the trade was handled by wholesalers, but – as a group – café owners sold most bushmeat to the public. Hunters appeared to make the most profit per sale. The participation of all these groups is likely to be necessary for effective management of the trade.

Guy concludes: 'The best policy for bushmeat management might be to protect vulnerable species from hunting, but allow a sustainable trade in robust species.'

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www.zoo.cam.ac.uk/ioz/projects/bushmeat.htm

Agri-environment schemes can help rare plants and bumblebees

The UK has recently replaced subsidies for intensive food production with agri-environment schemes intended to

Clockwise from top left:

The brown-banded cardor bee can be helped by agri-environment schemes. © Mike Edwards.

Low-calorie sprats threaten common guillemots. © Mike Harris

Bushmeat trader in Takoradi market, Ghana. © Samantha Mendelson

A new geological model is improving oil exploration. © Statoil

protect and enhance biodiversity alongside food production. A research project into the effects of agri-environment schemes on biodiversity across Europe concluded that only widespread and mobile species benefited from this environmental enhancement. But recent monitoring of the new generation of agri-environment schemes in the UK by the Centre for Ecology & Hydrology found the first evidence that rare species of arable plants and bumblebees do benefit from these targeted schemes, which have clear objectives

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Kevin Walker, kwal@ceh.ac.uk

Junk food and seabird breeding failures

Research using long-term studies on the Isle of May has provided important clues about why many British seabirds are failing to raise their chicks. During the recent catastrophic breeding failures in the North Sea, common guillemots (one of the worst-affected species) still seemed to be bringing in plenty of food for their chicks. But the chicks were not growing properly and many were apparently dying of starvation.

The researchers discovered that the energy value and fat content of the sandeels and sprats that the parents were feeding their chicks was massively reduced, effectively putting the chicks on a low-fat diet. 'This junk food is totally inadequate for the growing chicks and explains why they were doing so badly despite apparently receiving enough food,' said Sarah Wanless of CEH.

The lack of fat reserves suggests that the fish themselves were also starving, maybe because climate change is affecting the plankton they eat. This will have economic consequences for the North Sea industrial fishery as well as for seabirds, since a reduction in the fat content of sandeels may also reduce the value of the catch for processing into fishmeal and oil.

Professor Sarah Wanless, swanl@nerc.ac.uk
www.int-res.com/abstracts/meps/v294/feature

Slow-release fertilisers

Chalk-stream catchments in lowland Britain contain a nutrient 'time bomb', according to research from NERC's Lowland Catchment research programme (LOCAR). The scientists found that much of the massive amount of agricultural fertilisers applied to fields in recent decades is still in the groundwater, and may take 15 years to percolate into streams and rivers. This means that changes in land management will not improve the quality of river water for more than a decade. The £10 million research programme also found that chalk-stream channels are a significant

Clockwise from top left:

Intermittent sources such as wind farms will not cause problems to our energy supplies. © Skyscan Photolibrary/Alamy

A phytoplankton bloom off the coast of France. © ESA

Grazing parrotfish keep coral reefs healthy.

Ticks offer help against respiratory disease. © Volker Steger/Science Photo Library

source of the greenhouse-gas methane, releasing as much as all the underground water in the whole catchment. The findings of this programme will improve the sustainable management of lowland catchments, water resources and fishing streams now and in the future.

Professor Ian Douglas, i.douglas@man.ac.uk
www.nerc.ac.uk/funding/thematics/locar

Tick protein might alleviate disease

Acute respiratory distress syndrome (ARDS) kills many people each year. A synthetic copy of the histamine-binding protein from parasitic ticks – identified at CEH Oxford and developed by Evolutec group plc – protected mice with a similar disease. This is the first demonstration that a tick protein that damps down its host's immune response may be useful for treating ARDS, for which there is currently no effective therapy. Evolutec, NERC's first spinout company, now has a range of candidate therapies exploiting the pharmaceutical properties of proteins from tick saliva. The potential markets for some of the target diseases are worth several billion dollars a year.

Guido Paesen, gcp@nerc.ac.uk
www.evolutec.co.uk

What happens when the wind doesn't blow?

The UK Energy Research Centre (UKERC) has published a definitive report on the costs and impacts of an intermittent energy supply from renewable sources, such as wind and waves. None of the 200+ studies reviewed by UKERC suggested that our energy supply would be less reliable if a significant proportion of it came from intermittent renewable sources, and the extra cost would be very modest.

Commenting on the report, Energy Minister Malcolm Wicks said: 'Our target is to have 10 percent of the UK's electricity produced from renewable sources by 2010 and a significant proportion of that will come from wind power. Suggestions that it is excessively expensive, or that traditional power stations are needed to back up the energy produced by all our wind farms, are just two of the myths that have been peddled by their opponents. The UK Energy Research Centre's study demonstrates that these claims have been exaggerated. I welcome the report's contribution to the debate.' The work was funded by UKERC and the Carbon Trust.

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www.ukerc.ac.uk/content/view/258/852

Models lead to switch in fisheries policy

A study to model the effects of parrotfish on the health of Caribbean coral reefs has led to a rare example of science informing stakeholders, who then take a lead in influencing government policy.

Research by Peter Mumby and colleagues at the University of Exeter shows that parrotfish keep coral reefs healthy by eating the seaweed that competes for space with the coral. Grazing by parrotfish can help reefs to recover from hurricanes and coral bleaching. Overfishing the parrotfish reduces the complexity of reef habitats and decreases commercial fish species.

The Fisheries Cooperative in Belize invited Peter to discuss the role of parrotfish in reef ecosystems. To everyone's surprise, the 170 fishermen at the meeting voted unanimously to recommend a ban on the exploitation of parrotfish – largely because they see their value in maintaining the reef habitat for their target fish species. As a result, the government of Belize is preparing new legislation to address the issue.

Dr Peter Mumby, p.j.mumby@exeter.ac.uk
www.ex.ac.uk/msel, www.ex.ac.uk/celp

Patchy plankton

Jonathan Sharples of the Proudman Oceanographic Laboratory and colleagues at the Universities of Southampton and Wales, Bangor, have identified a previously unrecognised, but apparently predictable, patchiness in the distribution of phytoplankton in shallow seas. These single-celled ocean plants are the base of the marine food chain, so the results should help understand why fish live in different areas.

'We found most phytoplankton over banks in the sea bed,' said Jonathan. 'We think that the banks cause underwater waves that mix both the cooler deep water and the thermocline (the boundary layer between warm and cold water), stirring up nutrients that the plankton need to grow.'

Anecdotally, the scientists saw more fishing vessels over these seabed banks, suggesting that internal mixing could be the physical start to a cascade of events that ultimately provides more fish over the banks. This work is part of the basic understanding that is needed to support sustainable fisheries.

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www.pol.ac.uk

Science for society

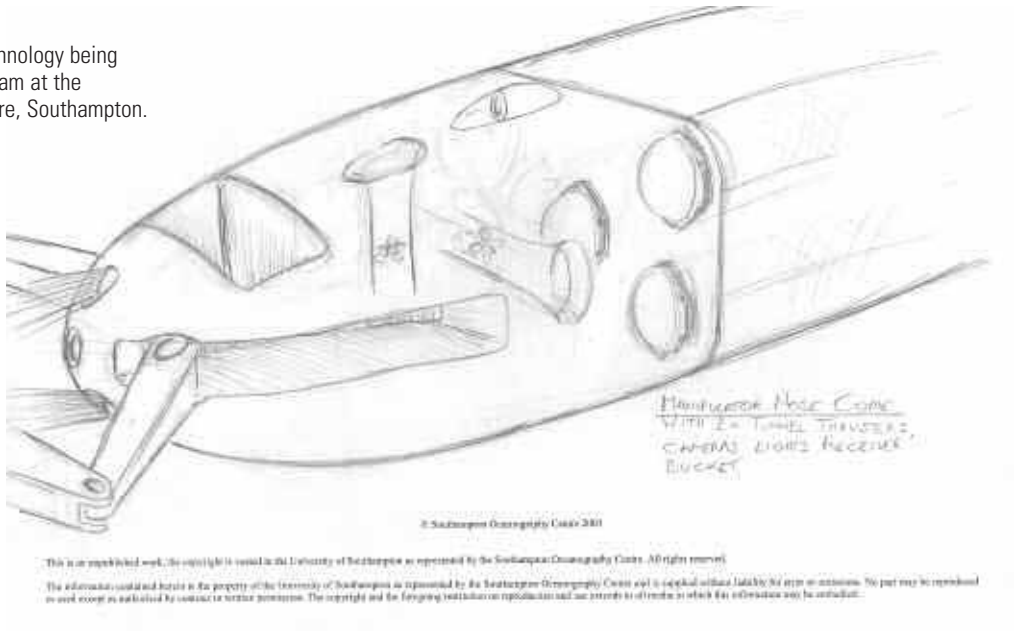
Using science to produce solutions, provide advice and benefit the economy and society.

Working with business, regulators and policy makers, we ensure that knowledge, expertise and products from our research can boost innovation and inform policies. Stimulating a wider public debate on our research helps scientists and funders to understand and respond to public aspirations and concerns, and helps all of us to appreciate the relevance of science to our daily lives and decisions.

Using knowledge

Contributing to the health of the economy and to better policy making

Working drawing of new technology being developed by the Autosub team at the National Oceanography Centre, Southampton.



Water software made simpler

An international research team has revolutionised the opportunities for water industry software developers. They have developed a new toolkit that, for the first time, provides a common standard for linking essential computer programs that help balance water supplies against the demand from domestic, leisure and industrial users. The Open Modelling Interface (OpenMI) will make life easier for thousands of water and environmental managers who must comply with the EU's Water Framework Directive, and will also save money and open up the market for small companies and universities who are developing computer models.

Roger Moore, the Open MI project leader from the Centre for Ecology & Hydrology, explains: 'The unique thing about the Open MI is that it provides a standard that links the computer models and allows them to talk to each other while they are actually running.'

Roger Moore, rvm@nerc.ac.uk
www.nerc.ac.uk/publications/latestpressrelease/2006-07openmifinal.asp

Autosub ideas for defence industry

The designers of NERC's Autosub from the National Oceanography Centre, Southampton have taken what they've learnt in providing world-leading technology for marine scientists and adapted it for future defence needs. Autosub is an autonomous robot submarine, which has been licensed for use by the oil, gas and sub-sea cable industries as well as for marine science.

As part of a Ministry of Defence research programme, NOCS engineers have been working alongside companies Systems Engineering and Assessment, Subsea7 and many other technology developers. In the key areas of vehicle architecture, energy and propulsion, NOCS led the technology assessment teams and contributed to the design of integrated systems trials. In turn, several of the advanced technologies identified by this programme may be added into future generations of underwater vehicles for marine science.

Keith Birch, kgb@noc.soton.ac.uk
www.noc.soton.ac.uk/OED/usl_index.php?page=as

Clockwise from above:

A new software package has been developed to help the coastguard predict rescue locations. © Nicholas Leach

Is carbon dioxide making the oceans more acidic?

Local authorities can benefit from science.

Measuring soils in SHRINKiT.

Ocean acidification: the other CO_2 problem

Carbon dioxide in the air is changing the climate, but its effect on the oceans is less well known outside scientific circles. The world's oceans have taken up half of the carbon dioxide produced by human activities in the last 200 years, and marine scientists are increasingly worried that this is acidifying the water and damaging marine life and ecosystems. Carol Turley and colleagues at the Plymouth Marine Laboratory (PML) have been researching the effects of CO_2 on the oceans and bringing the issue to the attention of policy makers, the media and the public. Carol was a member of a Royal Society working group on ocean acidification, and contributed to the government report *Avoiding Dangerous Climate Change*. Elliot Morley, minister for environment and climate change, visited the lab to hear about ocean acidification, and PML scientists supplied information to Defra for the G8 summit.

Dr Carol Turley, ct@pml.ac.uk
www.nerc.ac.uk/publications/planetearth

Is it safe to build here?

The British Geological Survey (BGS) has released new GeoSure Ground Stability data to identify areas potentially susceptible to ground movement and subsidence. The digital data are helping homeowners, surveyors, insurers, planners and local government to assess the stability and value of land and property, and the safety of residents. Financial losses associated with house subsidence are estimated to be over £300 million a year. BGS is looking to extend this service, in collaboration with the Coal Authority, to provide a complete ground-stability hazard assessment to the householder, including radon potential and hazards from old mine shafts.

BGS has also launched a safe and accurate way for the building industry to measure directly how much rocks and soils will shrink in hot dry weather. SHRINKiT uses an automated laser, weighing and software package to measure soil samples. The method replaces the existing British Standard Test that uses mercury and is likely to be banned in the near future. 'SHRINKiT produces more detailed results than the old test and, most importantly, can be done in complete safety,' explains Peter Hobbs.

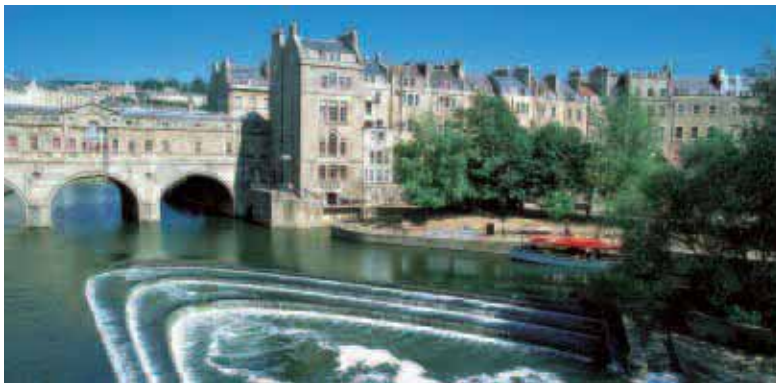
Jenny Walsby, jcw@bgs.ac.uk (GeoSure)
Peter Hobbs, prnh@bgs.ac.uk (SHRINKiT)

e-science for faster rescues at sea

A NERC e-science project is using live Met Office forecasts to predict the location of a person who has fallen overboard. Ocean currents and surface winds carry people away from their original position, making it harder for rescuers to find them quickly.

Scientists at the Environmental Systems Science Centre (ESSC) at the University of Reading worked with BMT Cordah Ltd to adapt a software package used by coastguards to predict drift trajectories. The modified SARIS software uses a web service at ESSC to add the most up-to-date weather and ocean forecasts to its predictions. It is hoped that this will reduce rescue times and therefore save lives.

'The forecast data are large and complex,' explains Jon Blower, 'so our web service lets you download just the data



you need and presents them in your chosen format.' So far, the prototype has been tested only in the lab. The DEWS (Delivering Environmental Web Services) project, which involves the Met Office, ESSC, BMT and the NERC British Atmospheric Data Centre among other partners, is taking this work forward.

Dr Jon Blower, jdb@mail.nerc-essc.ac.uk
www.dews.org.uk

Partners in the business of science

Isis Enterprise, part of Isis Innovation Ltd, Oxford University's Technology Transfer Company, joined forces with NERC to improve the way we turn research results and ideas into businesses. Isis is also training the 'exploitation scouts', who search our research centres for good scientific ideas with commercial possibilities. 'Technology transfer is a long-term activity and we believe that the partnership between Isis and NERC will provide benefits to both,' said Dr Tim Cook, Managing Director of Isis Innovation Ltd.

The partnership is already paying dividends in developing a culture of innovation and entrepreneurship across NERC. The Commercial Team and Isis gave presentations at all of NERC's UK research sites and this has produced a significant increase in the number of new innovative ideas reported to the team. Annual targets for new ideas have been exceeded by nearly 50 percent.

Chris Miller, cmill@nerc.ac.uk

Researchers and local government learn from each other

'A wonderful opportunity to learn about research funded by the Research Councils – I was unaware how relevant their work was. The LARCI seminar was one of the few opportunities I have had to talk about research with like-minded people,' said a satisfied local government delegate at a seminar organised by the Local Authority Research Council Initiative. This initiative brings local authorities and scientists together to explore the practical applications of Research Council results, leading to better informed policy.

Steven Wilson, Director, Science and Innovation at NERC, opened the LARCI seminar on climate change research with a presentation on the world-class research funded by the Research Councils. This event was organised during National Science Week 2006 to promote and debate research of relevance to local government policy and practice.

Andrea Turner, andrea.turner@esrc.ac.uk
www.larci.org.uk

Patents filed	
2001-02	8
2002-03	13
2003-04	13
2004-05	6
2005-06	7

These patents were filed by NERC research centres and grant holders.

Better evaluations of industrial greenhouse gases

Keith Shine and colleagues at the University of Reading are working with scientists at Ford and other companies to produce accurate calculations of the global warming potential of certain fluorinated gases. This is required by the Kyoto protocol, and helps both industry and regulators to know what level of emissions are acceptable. One collaborator, Gerry May, said: 'It is essential for companies like F2 Chemicals to have reliable and up-to-date information on the environmental impact of their products … both for our own planning and for advising customers.'

The team produced significant revisions to the values proposed by the Intergovernmental Panel on Climate Change for two gases: one used in refrigeration and air conditioning and one emitted by aluminium smelting and semi-conductor industries. 'We also calculated the impact of perfluorodecalin, a compound proposed for use in vaccine delivery,' said Keith. 'This has never been done before.'

This research stems from long-term NERC funding, which allowed the team to study a wide range of gases and bring in industrial co-funding. It has been used in IPCC and World Meteorological Organization assessments, which will inform the UN Framework Convention on Climate Change.

Professor Keith Shine, k.p.shine@reading.ac.uk

Spin-out companies

Research from NERC's Marine and Freshwater Microbial Biodiversity programme has led to the launch of Actinomics, a spin-out company working with a global pharmaceutical company to identify new antibiotics and drugs using rare and unusual microbes.

There were no new spin-outs in 2005-06 from NERC's four wholly owned research centres, though four active spin-out projects are being carried over into 2006-07 and we expect one of these to be completed very early next year.

Trends in research council income from the UK private sector (£m)

	2002-03	2003-04	2004-05	2005-06
Private sector	6.4	5.5	8.1	13.3*
Total at 2005-06 prices	6.9	5.7	8.3	13.3

** Figure includes IODP/ESO income to BGS of £4.5m. This is a change of classification on 2004-05.*

Direct income to NERC data centres from the sale of data and software licences (£k)

Data centre income	2002-03	2003-04	2004-05	2005-06
British Oceanographic Data Centre	25	26	18	23
Environmental Information Centre / National Water Archive	220	311	343	340
National Geosciences Data Centre / National Geosciences Information Service	1,336	1,642	1,341	2,092
Total	**1,581**	**1,979**	**1,702**	**2,455**

Note: Three of the NERC data centres do not raise income through the licensing of data or software. These are the Antarctic Environmental Data Centre, the British Atmospheric Data Centre and the NERC Earth Observation Data Centre.

Trends in publications with industry

	2002			2003			2004			2005		
Funding type	No. ISI® listed papers	No. with private sector co-author	%	No. ISI® listed papers	No. with private sector co-author	%	No. ISI® listed papers	No. with private sector co-author	%	No. ISI® listed papers	No. with private sector co-author	%
Responsive (Blue Skies)	943	17	2	903	34	4	833	26	3	1,392	39	3
Core strategic	1,124	15	1	1,314	83	6	1,462	61	4	1,671	75	4
Directed	266	13	5	326	18	6	280	13	5	397	25	6
Infrastructure	239	11	5	234	10	4	187	9	5	236	3	1
Unclassified										88		
Total	**2,572**	**56**	**2**	**2,777**	**145**	**5**	**2,762**	**109**	**4**	**3,784**	**142**	**4**

The number of publications produced from NERC-funded science has been rising for several years. Part of the increase this year reflects a big improvement in reporting, rising from a return rate of 73 percent last year to 98 percent this year.

Royalties and licence income by research centres (£k)

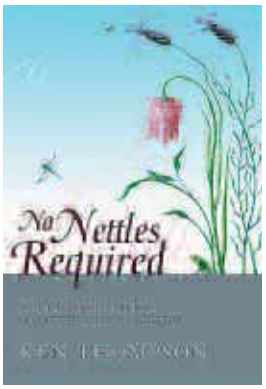
Centre	2004-05	2005-06
BAS	13	10
BGS	1,316	1,394
CEH	83	305
POL	40	42
Swindon Office	0	53
Total	**1,452**	**1,804**

Value of earned income (contract research) by research centres (£k)

Centre	2004-05	2005-06
BAS	1,748	738
BGS	19,297	22,521
CEH	11,554	11,400
POL	1,682	1,672
Swindon Office	2,486	796
Total	**36,767**	**37,127**

Engaging the public

Communicating and debating science and its outcomes



From left:

Ken Thompson's book *No Nettles Required* and Dave Reay's book *Climate change begins at home.*

The Biodiversity exhibit.

Prize-winning student Eric Topham.

Brochure produced for a parliamentary reception on the importance of satellites in climate change research.

Strategy for science in society

The eight UK research councils published a joint science in society strategy this year. Ian Diamond, Chair of Research Councils UK, said: 'The research councils invest large amounts of public money in research that affects everyone's lives. By working together to actively engage with the public, who ultimately pay for the research we fund, we aim to raise awareness of science and innovation and find out what matters to them. The research councils have been at the forefront of science in society activities for many years and we plan to build on these achievements in the future.'

The science in society strategy provides a framework for the research councils to work together in four main areas: finding out what people think; reaching young people and teachers; encouraging researchers to engage with the public; and keeping people informed and up-to-date.

Dr Kerry Leslie, kerry.leslie@rcuk.ac.uk
www.rcuk.ac.uk/sis/strategy.htm

Popular books

NERC-funded researchers published several popular science books this year, featuring an engaging mixture of research findings and personal opinion.

- Dave Reay's book *Climate change begins at home. Life on the two-way street of global warming* featured in the Amazon best-seller lists and comes out in paperback in summer 2006. Dave is a NERC Research Fellow at the University of Edinburgh.
- Jim Smith and Nick Beresford of the Centre for Ecology & Hydrology wrote *Chernobyl: Catastrophe and consequences*, to mark the 20th anniversary of the accident and to chart its effect on wildlife and people.
- Ken Thompson of the University of Sheffield describes his research on the biodiversity of urban gardens in *No nettles required: the reassuring truth about wildlife gardening*. He found that a well-stocked garden with some trees, a compost heap and a pond are all you need to attract wildlife.

Student prize for research on ants

Eric Topham, a sixth-form student from Thomas Hardye School, Dorchester, spent part of his summer holidays researching how caterpillars communicate with ants using sound. His project, at the Centre for Ecology & Hydrology Dorset, won him the prestigious Astra Zeneca Young Innovator's Award at the BA Crest Science Fair.

'The project was a wonderful opportunity for me to discover exactly what scientific research was all about, and to work with real scientists,' said Eric. 'It was also a chance to

study an area of biology that I had never come across in school. Also, the project was invaluable in helping me to decide which university courses to choose, as well as a great topic of conversation for the interviews that followed.'

Judith Wardlaw, jcwa@ceh.ac.uk
www.nerc.ac.uk/publications/planetearth

Events and exhibitions

This was a busy year for the NERC events team. 'We arranged a variety of events and exhibitions for the general public, young people, industry, policy makers and other stakeholders,' explained Ruth Welters, NERC events manager.

Research Councils UK ran a lively debate on ethics, including whether scientists should sign up to the universal ethical code then being developed by the Council for Science and Technology and the Office of Science and Innovation. The debate was held at the British Association science festival in Dublin.

NERC and the Biotechnology and Biological Sciences Research Council (BBSRC) launched a new exhibition 'Biodiversity: what on earth is it?' at the Royal Botanic Gardens Edinburgh in May 2005. The interactive display shows how understanding biodiversity can help us face today's challenges, such as climate change and feeding a growing world population. The exhibition has since been to Glasgow, Newcastle and Cardiff and is still on tour. A debate to accompany the exhibition was held at the Cardiff Museum in National Science Week.
www.nerc.ac.uk/insight/exhibitions/biodiversity.asp

Space researchers showed MPs and policy makers their contribution to understanding climate change at a parliamentary reception in November 2005. Over 150 people attended, and around 30 MPs listened to the UK's top climate change experts explain the value of Earth observation satellites to their work.

We held four regional conferences in 2005 with speakers on climate change, archaeology, GM crops and ocean acidification. This was a chance for the audience to find out more about our research, funding and the applications of NERC science for policy, business and industry.

We organised events to mark the end of four directed research programmes. These events are for policy makers and businesses who might wish to use the results of the research, the media, and any member of the interested

public. We also published booklets celebrating the highlights of the programmes, available via the NERC website. The four programmes were Marine and Freshwater Microbial Biodiversity, Global Atmospheric Nitrogen Enrichment, Gene Flow, and COAPEC (a programme on how interactions between the ocean and atmosphere affects Europe's climate). Similar events and publications are planned for directed programmes ending this year.

Rap met Earth sciences at an event in West Norwood for National Science Week. Geologist Toyin Solanke's rap lyrics, now out on CD as Geothrillology, proved a hit with 13-year-olds.

Ruth Welters, rewe@nerc.ac.uk
www.nerc.ac.uk/insight/events/

The secret life of diving mammals

The Sea Mammal Research Unit's display 'What Ahab never saw', developed for the Royal Society's summer science exhibition in 2005, is now touring several science centres around the country and will visit the Royal Society's Glasgow exhibition in 2006. The exhibit explains how high-tech listening devices and acoustic playback experiments allow researchers at SMRU to investigate how deep-sea mammals communicate.

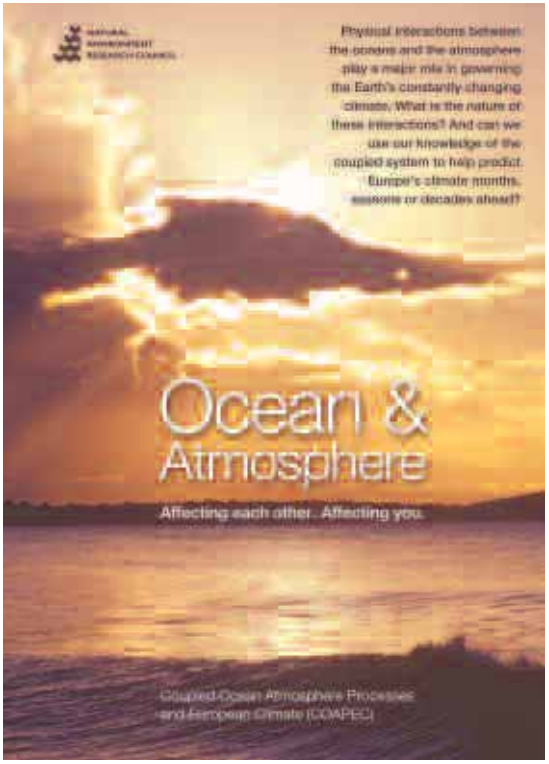
'These animals live in dark, cold, high-pressure conditions', explains Vincent Janik. 'In such an environment, it is crucial that they have an effective and fail-safe system to stay in touch with each other. We found that dolphins have developed recognition signals that are almost as versatile as human names.'

Images and other data from tagged animals have revealed previously unknown behaviour in some species. Most animals make use of their buoyancy to get a free ride to the surface, but the Antarctic fur seal makes itself less buoyant by blowing bubbles as it comes up for air. Why would the seal make its ascent so much harder? Sascha Hooker suggests that it may prevent blackouts as they return to the surface, a well-known problem experienced by human 'breath-hold' divers.

Dr Vincent Janik, vj@st-andrews.ac.uk
http://smub.st-and.ac.uk/Royal%20Society/web%20files/SMRU.htm

Scientists and MPs link up

Two NERC scientists took part in the Royal Society's 'MP-Scientist Pairing Scheme' this year. The scheme kicked off with a week in Westminster, followed by constituency and research site visits.



Clockwise from left:

A young adult grey seal. © Niall Benvie/Nature Picture Library

Two brochures produced to mark the end of directed research programmes.

Mike Billett meets David Hamilton MP during the Royal Society pairing scheme.

The Sea Mammal Research Unit's exhibit 'What Ahab never saw'.

Biogeochemist Mike Billett from CEH Edinburgh was paired with David Hamilton, Labour MP for Midlothian. Mike viewed the scheme as a real success: 'This was a great experience for all of us and the scientist-politician divide doesn't seem so wide now. The scheme gave us the opportunity to see how scientists can become more involved in key decision making and also the confidence to engage with politicians.'

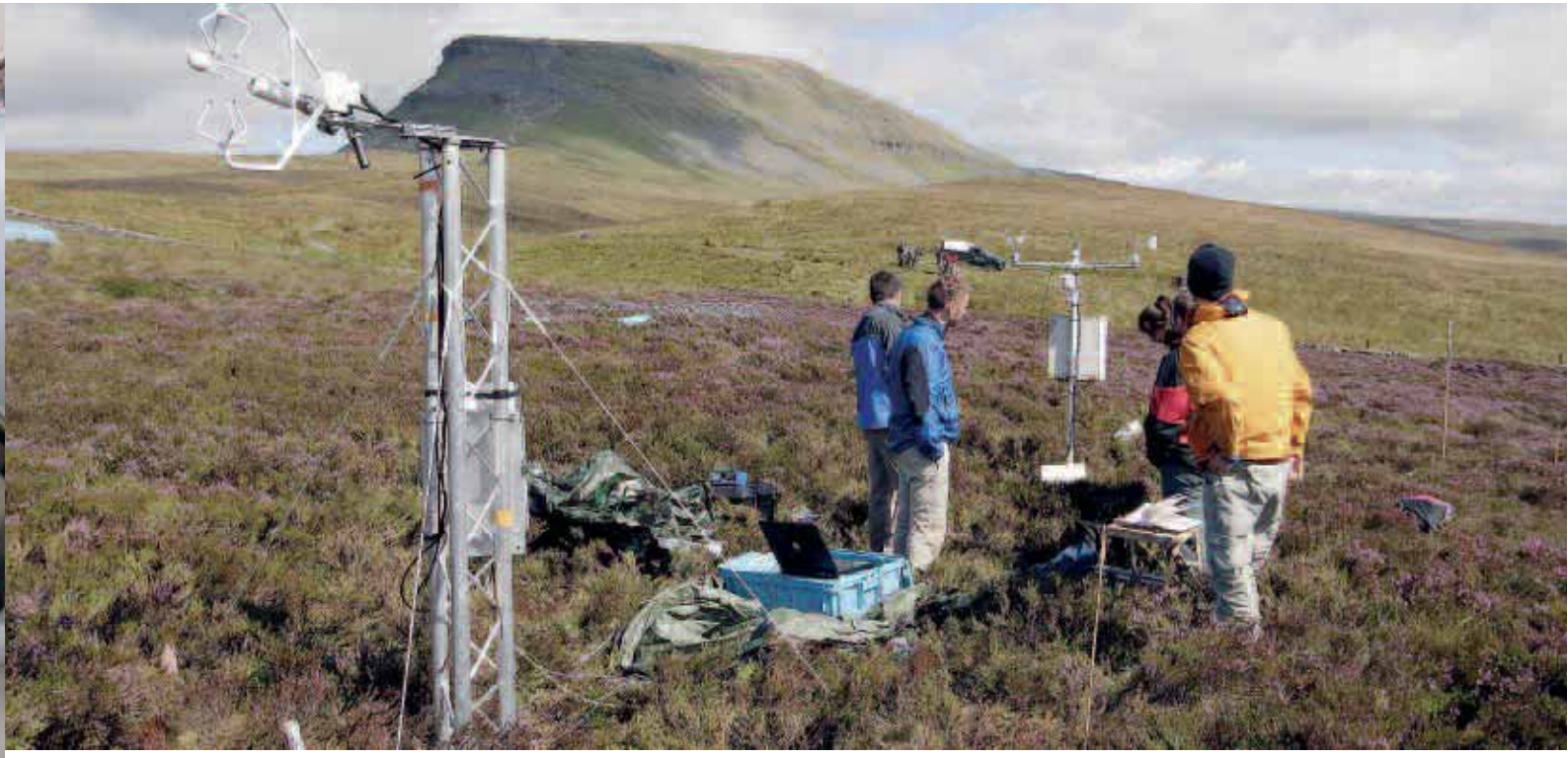
Mathematical modeller Jim Smith from CEH Dorset was paired with Jim Knight, who is Jim's local MP and was Minister for Rural Affairs, Landscape and Biodiversity at Defra at the time. After a week shadowing the minister, Jim Smith said, 'It was fascinating to see the contrasts between the scientific and political worlds. MPs seem to work to amazingly tight deadlines and have to quickly get a grasp on a wide variety of different subjects. We scientists, on the other hand, have the luxury of analysing things in much greater detail. I think I'll be glad to get back to the relative peace and quiet of my lab.' Professor Howard Dalton, Chief Scientific Adviser at Defra, praised the scheme, saying: 'Dr Smith has quickly understood the challenges that scientists face working in policy organisations. A week in Westminster certainly would have been good preparation for me before I became Chief Scientific Adviser.'

www.royalsociety.ac.uk/page.asp?id=1142

Skilled people

Training and developing individuals to meet national needs.

To remain competitive and encourage innovation, the UK needs trained people and attractive career prospects. NERC trains environmental scientists and our other staff through grants for postgraduate degrees, fellowships, courses and professional development. We work through Research Councils UK to improve research careers. This chapter also celebrates the successes of our staff and grant holders.



Clockwise from top left:

Ameena Camps, a PhD student studying underground carbon storage at BGS.

Students learning to measure the movement of carbon in the environment.

Nicola McLoughlin, prize-winning NERC PhD student, examines the evidence for early life on Earth.

Divers from the British Antarctic Survey.

Training the next generation

NERC completed a major review of its support for masters courses in 2005. Following a recommendation of the 2004 review of our training strategy, the panels supported the view that we should continue to fund vocational masters courses, with employers increasingly involved in courses that meet their needs. We will be funding 290 masters studentships a year for the next five years, on 65 approved courses, with a light-touch review before year four.

We have increased the number of awards funded through the 'Open CASE Competition' from 20 to 35. The CASE (Co-operative Awards in Sciences of the Environment) scheme gives PhD students first-hand experience of work outside the academic environment by involving external partners in the project. Partners include private industry, public bodies and non-government organisations. This scheme allows NERC students to learn from varied and interesting partners, including London Zoo, Diamond Trading Co, International Paint Ltd, Wildlife DNA Services and Airbus UK.

Avril Allman, aval@nerc.ac.uk
www.nerc.ac.uk/funding/students/mreview.shtml
www.nerc.ac.uk/funding/students/indcase.shtml

Carbon cycle summer school

The NERC Centre for Terrestrial Carbon Dynamics (CTCD) ran a novel summer school on terrestrial carbon dynamics and Earth observation in North Yorkshire, funded by NERC and the European Science Foundation. The 34 PhD students (from 23 institutions and ten countries) enjoyed an intensive week learning how to measure the movement of carbon through a peatland ecosystem near Malham. As well as the fieldwork, there were evening lectures by leading scientists. The students worked with CTCD staff using state-of-the-art equipment. By the end of the week, each student had experienced six different techniques, from analysing satellite images to continuous measurements of how much carbon dioxide comes out of the soil. By combining detailed experimental measurements with satellite data, the students also learned how to scale up local findings to larger regions and even the whole planet. The summer school trained the students in the latest methods and analysis, and enthused them with the excitement of complex research in action.

Dr Andreas Heinemeyer, ah126@york.ac.uk
www.nerc.ac.uk/publications/documents/pe-wint05/carbon_chasers.pdf

Academic Fellowships

The Research Councils' UK Academic Fellowships, which are designed to help researchers move from short-term contracts to permanent positions, are now into their second round. In March, the assessment panel recommended the second batch of academic fellowships on behalf of all the research councils, bringing the total number awarded to institutions to 800. The panel was impressed that many institutional strategies include building interdisciplinary research areas and was pleased to support fellows in novel interdisciplinary research as well as fellows in niche subjects.

Rosie Beales, rosie.beales@rcuk.ac.uk
www.rcuk.ac.uk/rcd

Clockwise from top left:

Damage from the Bam earthquake.

Autosub science was the subject of an international masterclass.

Professor John Croxall of BAS.

Dr Kim Last (right) being presented with his award.

Professor Gillian Foulger.

Professor Harry Bryden.

Support for international training

Several awards were made under a new NERC funding scheme, the International Opportunities Fund. The fund supports international collaboration and leadership. £1.64m was invested in ten projects, in a variety of NERC programme areas. Here are two examples:

Earthquake training for Iran

Staff at NERC's Centre for Observation and Modelling of Earthquakes and Tectonics (COMET) are training young scientists from the Geological Survey of Iran in a range of techniques for assessing seismic hazards. Iran has suffered a number of major earthquakes recently, including the Bam earthquake which killed over 50,000 people in 2003. The Iranian scientists trained in this programme will play a leading role in the huge effort of assessing and mitigating seismic hazard in Iran.

Autosub masterclass

The Autosub team ran a masterclass and workshop on 'Autosub science in extreme environments', to enable young scientists from the UK and overseas to develop lasting collaborative links, and to learn about the world-class technologies developed for NERC's robot submarine. The masterclass attracted people from 12 countries: 11 delegates from the UK and 25 from overseas. There is also a bursary scheme to help young scientists and engineers to study overseas to strengthen international links.

Lesley Aspinall, laa@nerc.ac.uk
www.noc.soton.ac.uk/CASEE/CASEE2/index.html

Bayesian computation for population ecology

A workshop on Bayesian computation for population ecology – funded by NERC and the Engineering and Physical Sciences Research Council's Environmental Mathematics and Statistics programme – was very well received by the delegates, who will now be able to use these statistical methods in their research. The feedback was very positive: 'The workshop has enabled many people to become aware of Bayesian techniques and hopefully we will be able to use these (and more complicated) methods in the future.' 'Excellent, probably the best workshop, in terms of being pitched at the right level, I have been on.' 'I do feel confident in beginning to apply some of these tools to my research.'

Materials for the workshop are available on CD. The course will be run again in 2007, and the organisers are writing a book based on material from the workshop.

Byron Morgan, b.j.t.morgan@kent.ac.uk

Staff, students and fellows

	2002-03	2003-04	2004-05	2005-06
Directly employed staff*	2,596	2,600	2,727	2,736
Staff in HEIs**	965	773	690	1,216
Fellows	70	77	84	98
PhD	1,017	1,033	1,042	1,032
Masters***	337	330	325	335

Notes:

** Total number of individuals.*

*** Staff in higher education institutions employed on research grants. This year's total for staff employed on research grants is significantly higher than the previous year. We have changed the basis of the calculation of the number of staff employed on research grants to better reflect staff effort on grants. This has produced a higher but more representative total. We are confident this method is more accurate and will use it as the basis for future statistics.*

**** Masters figures reflect the number of grants to institutions, not the number of students, since some studentships are only half-funded by NERC.*

People and prizes

Many NERC staff and grant holders won prizes this year. We have space only to mention a few here:

Nick Cox and Captain Chris Elliot of BAS were awarded the MBE.

Professor David Fowler, CEH, was awarded the CBE.

Professor Mike Hornung, retired site director of CEH Merlewood, was awarded the OBE.

Professor Harry Bryden of Southampton University, Professor John Croxall of BAS and Professor Alistair Fitter of the University of York were made Fellows of the Royal Society.

Professor Colin Snape of the University of Nottingham received the Storch Award of the American Chemical Society.

Dr Charlie Cornwallis of Oxford University won the White Rose Centre for Enterprise business plan competition with his company Wild Expeditions Limited.

Professor Gillian Foulger of Durham University won the Price Medal of the Royal Astronomical Society for new theories on the causes of volcanic hotspots.

Dr Kim Last of Newcastle University won the GlaxoSmithKline award for the best poster presentation at the SET for Britain event in the House of Commons.

Terry Marsh of CEH won the British Hydrological Society's President's Prize for his outstanding contribution to hydrology.

Nicola McLoughlin, a NERC PhD student at the University of Oxford, won the Perspectives prize for posters on the social and ethical implications of research, at the British Association science festival in Dublin.

Professor Pat Monaghan of the University of Glasgow was elected president of the International Society for Behavioural Ecology.

Dr Tommaso Pizzari, a NERC New Investigator from Oxford University, won the Outstanding Young Investigator Award from the Association for the Study of Animal Behaviour.

David Stevenson of the University of Edinburgh received the 2005 editors' citation for excellence in refereeing from the American Geophysical Union.

William Sutherland of the University of East Anglia won the Marsh Award for Conservation from the Zoological Society of London, the major award for conservation in the UK.

Professor Ian Boyd of the Sea Mammal Research Unit received the Marsh Award for Marine and Freshwater Conservation from the Zoological Society of London.

A *Science* paper 'Multiple Causes of High Extinction Risk in Large Mammal Species' by Marcel Cardillo of Imperial College London, Georgina Mace of the Institute of Zoology and colleagues was cited as exceptional by the peer review website 'Faculty of 1000'.

Dr Alastair Lewis of the University of York won the Royal Society of Chemistry's SAC Silver Medal for 'services to atmospheric and pollution monitoring'.

Leadership

Providing leadership for the environmental sciences.

This chapter highlights NERC's contribution to national and international research programmes, policies and activities. Climate change was high on the agenda of world leaders this year, during the UK's presidency of the EU and G8. NERC scientists were active in contributing to these debates.

Clockwise from top left:

Artist's impression of Cryosat. © EADS Astrium GmbH

Carbon dioxide capture in use on the Sleipner oil rig. © Statoil

The drilling rig used in the Tahiti Sea-Level Expedition.

Scientists examining a core taken from the drilling rig.

Towards zero emissions

The British Geological Survey has taken a leading role in the international development of carbon dioxide capture and storage (CCS) technology since 2000. These efforts were translated into policy this year.

In the UK, DTI and Defra endorsed CCS with the launch in June 2005 of 'A strategy for developing carbon abatement technologies for fossil fuel use'. BGS coordinates the European Research Network of Excellence on CO_2 storage, 'CO_2 GeoNet'.

A major strategic initiative, launched in 2005, is the Technology Platform for zero emission power from fossil fuels. This brings together all the industrial and research stakeholders across Europe, and aims to build Europe's first zero-emission coal-fired power station by 2015. BGS is on the project's advisory council and working groups.

BGS also took a lead on the international promotion of CCS. The Plan of Action agreed by the G8 countries said: 'We will work to accelerate the development and commercialisation of CCS technology.' The UK has signed a memorandum of understanding with China on CCS, and is negotiating with India. BGS has also contributed to the IPCC report on CO_2 capture and storage.

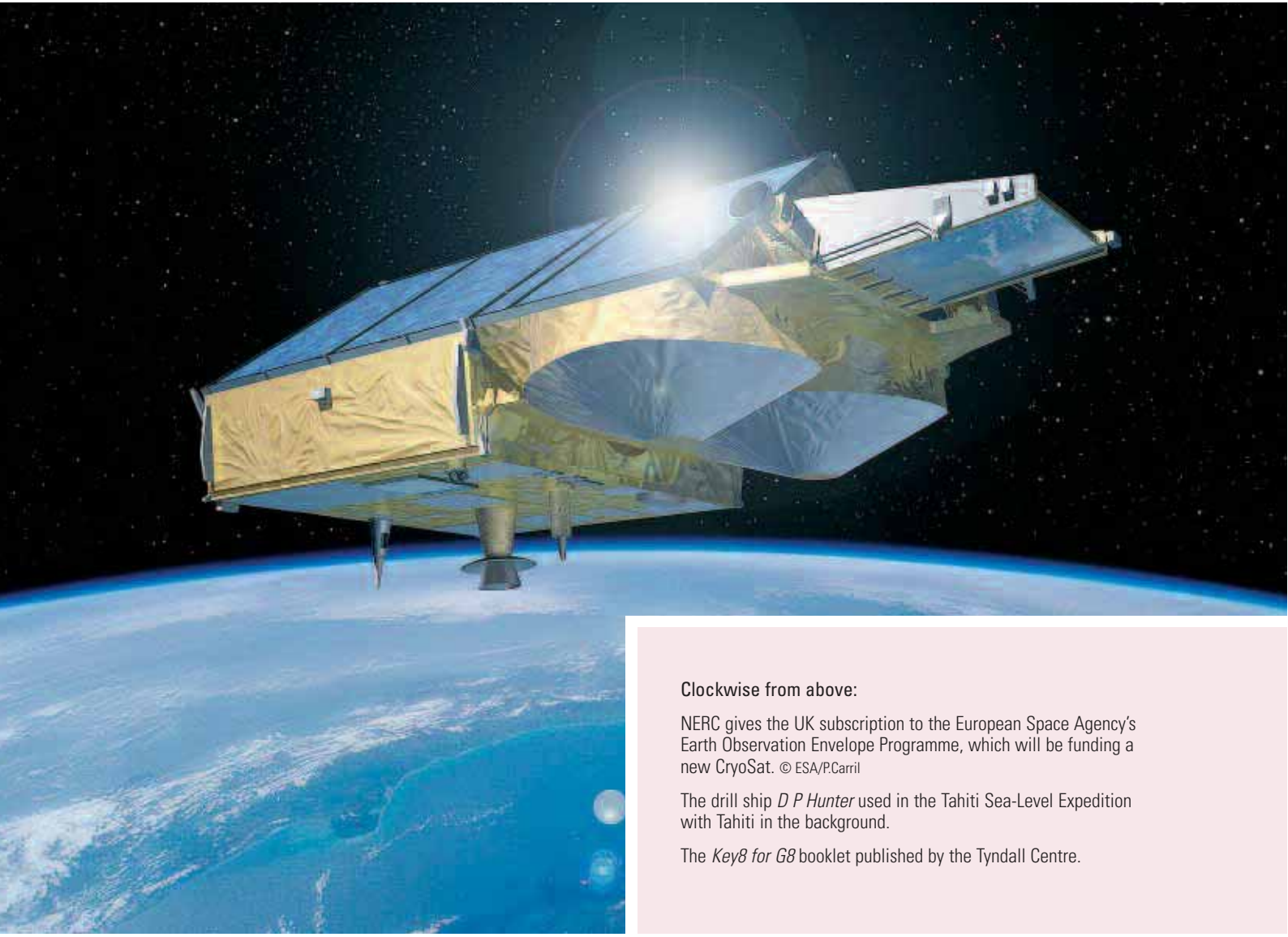
Nick Riley, njr@bgs.ac.uk
www.CO2GeoNet.com

Launch of the Genomic Standards Consortium

The Centre for Ecology & Hydrology (CEH) is leading an international collaboration calling for improved standards for describing genome data. Scientists at CEH, working with collaborators in the US, UK and Europe, have launched the Genomic Standard Consortium, an international working body designed to capture a richer set of information about genomes – the whole hereditary information of an organism that is encoded in its DNA. The consortium is working to develop new guidelines for the international community to describe complete genome sequences and data about genomes. This is an important step in allowing scientists to compare their results using a consistent approach.

CEH scientists have helped organise two major meetings on genome standards at the National Institute for Environmental e-Science and the European Bioinformatics Institute in 2005. The consortium is developing a first draft of the 'Minimal Information about a Genome Sequence' specification and has launched the Genome Catalogue database for holding this information, in collaboration with the international community.

Dawn Field, dfield@ceh.ac.uk
http://gensc.sourceforge.net



Clockwise from above:

NERC gives the UK subscription to the European Space Agency's Earth Observation Envelope Programme, which will be funding a new CryoSat. © ESA/P.Carril

The drill ship *D P Hunter* used in the Tahiti Sea-Level Expedition with Tahiti in the background.

The *Key8 for G8* booklet published by the Tyndall Centre.

UK-China Partners in Science

NERC held three workshops during the year, which was designated 'UK-China Partners in Science 2005'. In July, we held a climate change workshop in Beijing with the Natural Science Foundation of China (NSFC) and the Chinese Meteorological Association. NERC signed a memorandum of understanding with NSFC during the workshop to co-operate in environmental research. The British Antarctic Survey joined the Polar Research Institute of China to discuss UK-Chinese joint activities for International Polar Year 2007-2008. The workshop was opportune because China plans to spend an extra US$64 million on polar research and infrastructure over the next few years. A third workshop discussed geological approaches to carbon management. The workshop took place at the Institute of Geochemistry in China, and scientists from the British Geological Survey took part.

Gerry Lawson, gela@nerc.ac.uk

Polar satellite will fly again

An environmental satellite which was destroyed last October will be rebuilt and launched in 2009, thanks in part to the leadership of Duncan Wingham, director of NERC's Centre for Polar Observation and Modelling, who first proposed the mission in 1999. CryoSat, a satellite designed to monitor Earth's shrinking ice caps in unprecedented detail, plummeted into the Arctic Ocean shortly after lift-off when the rocket containing the satellite malfunctioned. The satellite loss brought home the value of this mission to climate change scientists, who successfully persuaded the European Space Agency to invest in a second mission.

'Losing CryoSat-1 after only four minutes was quite a blow, so of course we are delighted to have our mission back. It has been very heartening to see the very strong support for CryoSat-2 from all sections of the scientific and funding communities, and from the European Space Agency. I am sure this reflects the widespread recognition of the importance of Arctic climate change to all of us in Europe,' said Duncan.

Professor Duncan Wingham, djw@cpom.ucl.ac.uk
www.esa.int/esaLP/LPcryosat.html

Environment and human health

NERC led the development of a joint capacity-building programme for environment and human health. Our programme partners were Defra, the Environment Agency, four other research councils, the Ministry of Defence, the

Health Protection Agency and the Wellcome Trust. The programme aims to improve human health by strengthening the UK's capacity for multidisciplinary studies and identifying the key research areas that need to be tackled.

Lucy Parnall, lcpa@nerc.ac.uk
www.nerc.ac.uk/funding/thematics/envhh

Tahitian coral holds ice-age history

NERC was an organiser and participant in the Tahiti Sea-Level Expedition, which aims to reconstruct events at the end of the last ice age. Tahiti may seem a strange place to study ice ages. But – because it is remote from the effects of earthquakes and past ice sheets – it turns out to be the ideal spot to measure the past sea level and environmental changes, which can be read in Tahitian coral reefs. This information should also improve our ability to predict what might happen in the future as the Greenland and Antarctic ice sheets melt. Co-chief scientist Gilbert Camoin summarised the expedition's success: 'Tahiti has given us a treasure of records that archive sea-level change over approximately the last 20,000 years.'

This expedition was the second European-led operation of the Integrated Ocean Drilling Program (IODP). NERC contributes to IODP through the European Consortium for Ocean Research Drilling, which we currently co-chair.

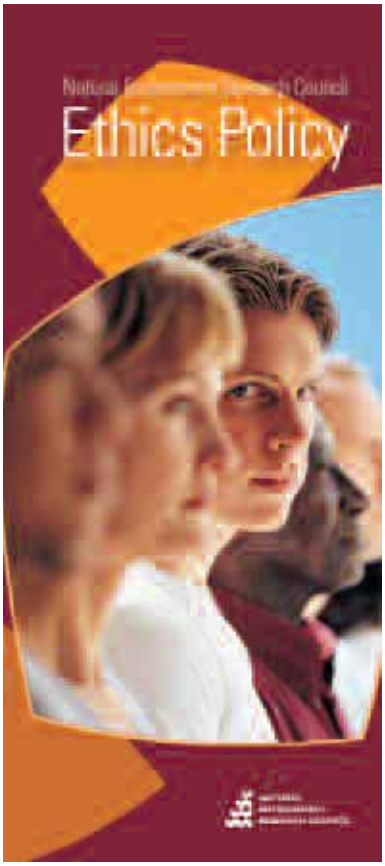
Chris Franklin, cfr@nerc.ac.uk
www.ecord.org/exp/tahiti/310.html

Science informs international policy

Many NERC-funded scientists and research centres contributed to activities for Britain's presidency of the G8 and EU last year. For example, the UK Energy Research Centre hosted a Clean Energy G8 workshop with five developing nations, to inform the G8 Gleneagles summit. The Tyndall Centre published a booklet *Key8 for G8*, highlighting eight Tyndall research discoveries which can help world leaders to develop informed policy responses to climate change. The British and German Geological Surveys ran a workshop on geological storage of carbon dioxide. And NERC contributed to the sponsorship and planning of a 'Science meets policy' workshop with Defra and the Environment Agency for the EU presidency.

Mary Thornton, math@nerc.ac.uk

The organisation



Ensuring that NERC is a flexible, fit-for-purpose organisation.

Clockwise from top left:

The Buncefield oil depot fire.© Hertfordshire Police/PA

The British Geological Survey's award-winning meadow (left) encourages more birds to visit including this waxwing.

Artist's impression of the new Halley Research station, Antarctica.

The Ethics Policy leaflet.

Ethics policy

Scientists are making advances in research faster than ever before, and sometimes these advances raise ethical concerns. Researchers and funders want to consider and discuss the ethical implications of their work and the work of others. NERC adopted a new ethics policy in June 2005 after much debate, discussion and consultation. The policy applies to all aspects of our governance, policy, research, commercial, operational and administrative activities. It sets out principles for working with others, scientific integrity and standards, and impact on the environment.

The web version of the policy is accompanied by annexes on existing NERC policies, on the 'Seven Principles of Public Life' and a summary of our main activities, with relevant ethical questions.

Sheila Anderson, sand@nerc.ac.uk
www.nerc.ac.uk/aboutus/ethics

Green awards for BGS

The British Geological Survey's Keyworth site won the Nottinghamshire Wildlife Trust's 2005 'green business' award for the way the grounds are managed to encourage wildlife and for their recycling systems. In recent years, BGS has installed bird and bat boxes and a pond, and planted hedges and two wildflower meadows at its site. As a result the numbers of birds has increased considerably and colonies of the relatively rare bee orchid have been found in the grounds.

BGS Edinburgh picked up a number of green awards in 2005, including first prize in the 'Keep Edinburgh Growing Competition'; the biodiversity prize in the 'Keep Edinburgh Clean' competition; and a 'Cycle Friendly Employer' award from Cycling Scotland.

All BGS electricity is generated from renewable energy sources. BGS's Edinburgh office is heated by a new heat exchange system using waste heat from Edinburgh University.

BGS is an active supporter of the Nottinghamshire Wildlife Trust, offering geological advice about nature reserves as well as providing training for their staff on mapping software. BGS also provides geological advice to the charity Trees for Life, which is restoring the Caledonian Forest in Scotland.

Adrian Cooke, ades@bgs.ac.uk

Don't panic!

The cost and impact of a natural or man-made disaster can be made worse by over-reaction based on lack of knowledge of the threat posed. The oil depot fire at Hemel Hempstead in December was the largest explosion in Europe since World War II. It released a huge plume of smoke that caused widespread concern to local residents and businesses. NERC helped to limit the disturbance by providing rapid information that allowed potential mass evacuation and disruption to be avoided. The NERC/Met Office BAe146 research aircraft was scrambled to sample the cloud's composition and measure dispersion of pollutants; CEH scientists rapidly advised that long-term damage to the environment was likely to be minimal; and NERC's Satellite Receiving Station at Dundee University produced many of the most useful images of the blast and subsequent cloud, helping to track and predict the course of the cloud to identify areas likely to be affected. The ability to respond so quickly to the explosion was thanks in part to the operational expertise of the staff and new state-of-the-art equipment on board the aircraft. NERC and staff at our facilities and centres also handled numerous media requests for information during the emergency.

www.nerc.ac.uk/publications/documents/pe-wint05/action_stations.pdf

National Oceanography Centre named

The Southampton Oceanography Centre changed its name to the National Oceanography Centre, Southampton (NOCS) in May 2005. The Centre's new Director, Ed Hill, said: 'The formal designation as a National Centre … reflects the expectation that it will act as the national focus for oceanography. This will also facilitate in an inclusive way a strategic co-ordination of research for the UK's marine and Earth science community.' He added, 'The National Oceanography Centre, Southampton is the UK's largest marine centre and one of just a handful of oceanographic institutions in the world capable of sustaining research with global reach.' NOCS is jointly owned by NERC and the University of Southampton.

www.noc.soton.ac.uk

Economic impacts study

In the first study of its kind for the research councils, NERC received confirmation that its research has a positive effect on the UK economy. The news is timely, given the government requirement for research councils to realise and demonstrate benefits from its investments.

The *Economic Impacts Study*, commissioned from PricewaterhouseCoopers (PwC), was a pilot project to

Trends in annual capital investment (£m)

	2002-03	2003-04	2004-05	2005-06
Major projects (>£400k)	10.1	10.4	14.9	21.4
Research Centre Infrastructure Fund	1.6	6.0	8.1	0.8
Minor projects and equipment (<£400k)	6.4	8.9	4.9	9.9
(less capital sales income)	-0.1	0.0	0.0	-0.2
Capital grants to HEIs* (excluding JIF)	6.9	0.0	0.0	0.0
Total	24.9	25.3	27.9	31.9

**from 2003-04 not classed as Capital*

Clockwise from left:

Satellie image of the Buncefield oil depot fire processed by NERC's Satellite Receiving Centre, Dundee University.

NERC research has saved councils around £20m in unnecessary road gritting. © Scottish Viewpoint

National Oceanography Centre, Southampton.

improve NERC's understanding of its contribution to the economy and to measure its monetary value where possible. PwC used ten case studies of research investments of varying scale and maturity in different science areas.

An example of a measurable direct benefit of NERC research is the flood estimation handbook, which provides better methods for predicting flood frequency. PwC estimated that, even taking a very cautious approach to economic modelling, this handbook has saved the UK economy between £7m and £34m (present value) over 25 years, depending on the cost and number of hydrologists carrying out flood risk assessments. Conservative estimates of the value of one Urban Regeneration and the Environment (URGENT) project, which reduces unnecessary gritting on icy roads, suggest a value of around £20 million over the same period.

Jo Tudor, j.tudor@nerc.ac.uk

New Halley station

A futuristic design by Faber Maunsell and Hugh Broughton Architects won the competition for the new British Antarctic Survey Halley Research Station. Director of BAS Chris Rapley said, 'We were presented with three outstanding schemes – each creating an exceptional solution for living and working in this extreme environment. This competition was launched to bring innovation and creativity to the challenge of building a scientific research station on a floating ice shelf. The process, which involved a working partnership between each design team and the BAS technical teams, was stimulating and exciting for everyone involved.'

The new modular station, elevated on ski-based jackable legs to avoid burial by snow, can be towed across the ice. The modules are simple to construct and can be re-arranged or relocated inland periodically as the ice shelf flows towards the sea. A central module packed with stimulating areas for recreation and relaxation is flanked by a series of modules designed to suit the changing needs of the science programmes. It features improved environmental strategies for fuel, waste and material handling. Construction will begin in 2007 and is due for completion by 2010.

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www.bas.ac.uk/News_and_Information/Press_Releases/story.php?id=178

International Polar Year

The press launch for International Polar Year 2007-2008, a major international scientific collaboration with a budget of over £1.5 billion, took place in London in the spring. Science Minister Lord Sainsbury said, 'We are on the brink of a hugely exciting scientific campaign. I am proud that the UK, notably through the Natural Environment Research Council, is taking a lead role.'

Programme director David Carlson said he believed the year could make as big an impact as any previous scientific programme, moon landings included.

www.ipy.org

Vital statistics

In this section we present an overview of our expenditure, funding, environmental impacts, equality monitoring, grant application success rates, health and safety and freedom of information.

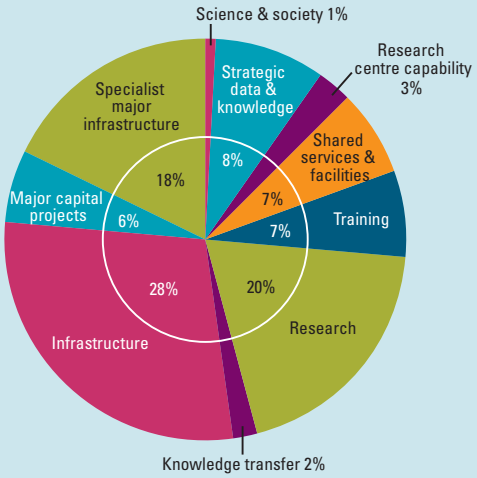
Income and expenditure account for 2005-06 (£m)

	Outturn
Income grant-in-aid	281.66
Other income	54.70
Total income	**336.36**
Programme expenditure	330.16
Notional charge against capital	7.27
Depreciation	18.84
Provisions	15.98
Impairments	2.60
Administration costs	20.94
Total expenditure	**395.79**
Deficit	**59.43**

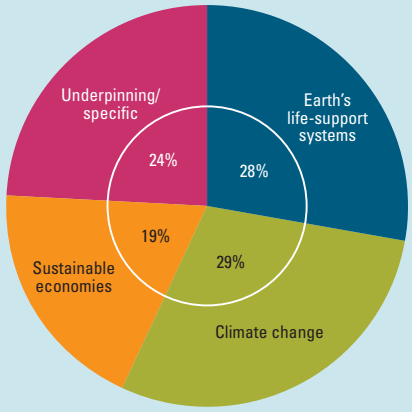
External funding

Funding from outside NERC meets the costs of commissioned and co-funded research carried out by NERC's centres for government departments, other public bodies, industry, the European Commission, and international and overseas organisations. NERC's centres depend to a greater or lesser extent on this income, which funds an important means of transferring knowledge to users.

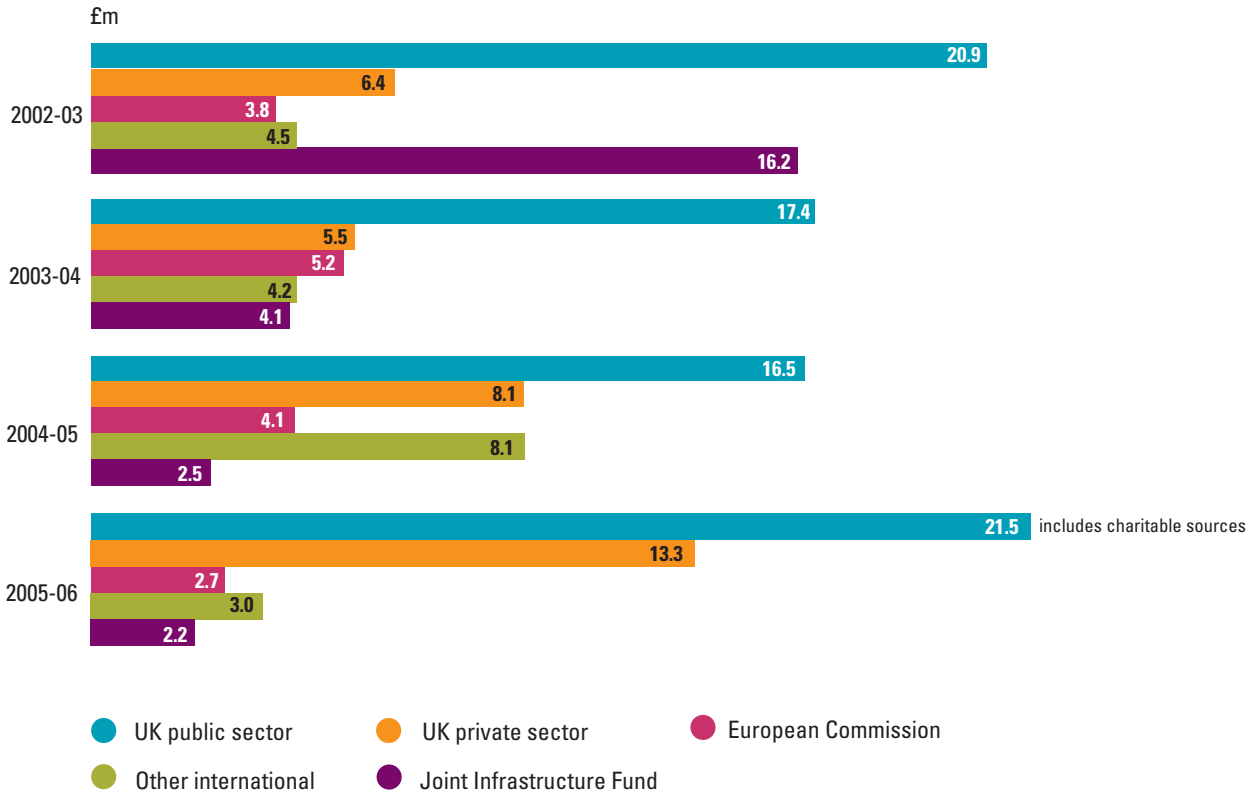
Allocation of science budget by funding category



Allocation of science budget by priority science areas



External funding for research (£m)



Environmental accounts

This is the third year that NERC has produced a set of accounts that cost the environmental impact of our operations. The accounts cover areas of NERC over which we have direct operational and financial control, including our bases in the UK and abroad, and our research vessels and aircraft. These are not precise audited financial accounts, but an indicative management tool that encourages thought and action to measure NERC's environmental impacts, and take cost-effective steps to minimise them. This tool has been developed over the years and is now part of our capital purchasing procedures.

In summary, the total environmental costs for 2005-06 decreased to £873,700. This is the cost to NERC if we are to avoid or restore our most significant environmental impacts to a sustainable level. The table below shows the environmental accounts for 2005-06, and comparative figures for 2004-05. There has been a small reduction in the cost of electricity usage as a result of buying more renewable/green electricity. Use of gas has increased because of the prolonged cold winter. NERC has recently invested in new video-conferencing equipment across the wholly owned sites; this will reduce business mileage. The cost of NERC aircraft has increased this year due to a specific science programme. The cost of ships is still the most significant factor; there was a decrease this year as unlike, in 2004-05, no ships were chartered for specific science programmes. Although our fleet already meets the highest environmental standards, work continues to mitigate this effect further; in particular we are installing devices to monitor funnel emissions and maximise engine performance.

NERC has introduced a 'Greening Fund' for local initiatives to reduce its environmental footprint and to mitigate some of the restoration costs.

Restoration/avoidance costs

	2004-05 £	2005-06 £
Impacts to air		
Arising from:		
Energy		
Electricity consumption	98,700	97,200
Gas consumption	23,600	26,000
Oil consumption	2,800	3,000
Petrol consumption	1,000	400
Diesel consumption	11,400	11,200
Total energy	**137,500**	**137,800**
Transport		
Business mileage	118,200	120,700
Commuting	33,400	32,000
NERC ships	720,400	520,400
NERC planes	33,500	53,600
Total transport	**905,500**	**726,700**
Total impacts to air	**1,043,000**	**864,500**

Restoration/avoidance costs cont.

	2004-05 £	2005-06 £
Impacts to land		
Waste disposal to landfill	11,500	9,200
Total impacts to land	**11,500**	**9,200**
Impacts to water		
Water use and sewerage	not quantified	not quantified
Total environmental costs	**1,054,500**	**873,700**
Staff costs	91,752,000	106,640,000
Other operating costs	69,914,000	72,684,000
Total operating costs	**161,666,000**	**179,324,000**
Total revised operating costs	**162,720,500**	**180,197,700**

The following table shows the total emissions to air from the impacts included in the accounts above, by category of emission (in tonnes).

	2004-05	2005-06
Carbon dioxide	36,100	36,000
Sulphur dioxide	150	116
Nitrous oxide, particulates, hydrocarbons, carbon monoxide	350	300
Methane	3	3

Racial equality monitoring table – 2005-06

	No. of staff in post	% of staff in post by ethnic group	No. of applicants for employment	No. of applicants for employment as % of total	No. of applicants for promotion [1]	No. of applicants for promotion as % of total	No. of applicants for promotion as % of staff in post	No. of applicants for training [2]
Ethnic group								
Asian/Asian British	17	0.62	86	5.90	0	0	0	40
Black/Black British	9	0.33	30	2.06	1	0.75	11.11	4
Chinese	19	0.70	11	0.75	0	0	0	17
Mixed	8	0.29	5	0.34	1	0.75	12.50	18
Other	16	0.58	14	0.96	0	0	0	40
Unknown	189	6.91	288	19.74	8	6.02	4.23	175
White	2,478	90.57	1,025	70.25	123	92.48	4.96	2,812
Totals	**2,736**		**1,459**		**133**			**3,106**

	No. of applicants for training as % of total	No. of applicants for training as % of staff in post	No. of recipients of training [2]	No. of recipients for training as % of total	No. of recipients for training as % of staff in post	No. of staff subject to disciplinary procedures	No. of staff who have raised a grievance	No. of staff who have left	No. of staff who have left as % of total
Ethnic group									
Asian/Asian British	1.29	235.29	34	0.81	200.00	0	0	3	1.36
Black/Black British	0.13	44.44	6	0.14	66.67	0	1	2	0.91
Chinese	0.55	89.47	20	0.48	105.26	0	0	1	0.46
Mixed	0.58	225.00	12	0.28	150.00	0	0	0	0
Other	1.29	250.00	23	0.55	143.75	0	0	0	0
Unknown	5.63	92.59	90	2.14	47.62	0	0	22	10.00
White	90.53	113.48	4,024	95.60	162.39	18	9	192	87.27
Totals			**4,209**			**18**	**10**	**220**	

(1) Applicants for merit promotion only.
(2) These figures show the number of training requests made and received during the year – it does not show the number of people who made these requests or received training.

Racial equality

Under the Race Relations (Amendment) Act (RRAA), public bodies with more than 150 staff are required to report back their monitoring of specified employment trends. This is to help identify any signs of employment practices or procedures discriminating against people from ethnic minorities. NERC's figures required under the RRAA are set out above.

We do not collect information against one category, namely the number of staff who benefit or suffer as a result of our performance assessment procedures. This is because our appraisal system focuses much more on future development needs than past performance. The system allows people to assess their own performance and to discuss both performance and future development with their manager at a formal meeting at least once a year. Identifying measures of benefit or detriment which are directly attributable to the appraisal process is therefore not possible in NERC.

Openness and transparency in NERC

Since January 2005 NERC has been subject to the Freedom of Information Act 2000, and also the Environmental Information Regulations 2004 which provide broadly similar access rights to the Act but relate specifically to information about the environment. We have worked with the other research councils to ensure a consistent approach to open access legislation on key issues such as peer review.

During 2005 we answered 58 requests for information under the new legislation covering a wide range of subjects from environmental data to personal information. New policies, systems and procedures were put in place to comply with the legislation and we answered 95 percent of our requests, some of which were complex, within the statutory 20 working-day limit.

A significant amount of our information is available without a specific Freedom of Information Act request; for details see foi.nerc.ac.uk

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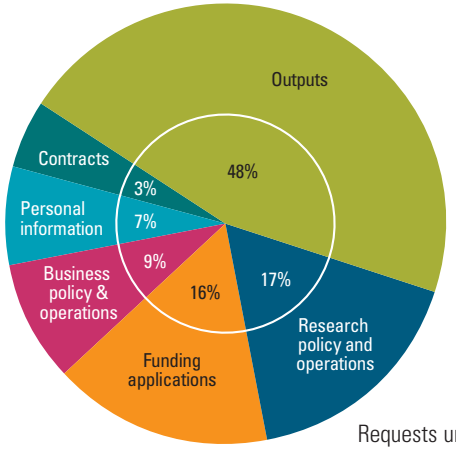

Requests under the Freedom of Information Act.

Blue skies standard and small grant applications and success rates

	2002-03	2003-04	2004-05	2005-06
No. applications	491	860	596	864
No. awards	163	252	153	176
Total £k	13,805	30,582	22,349	27,024
% success rate	33	29	26	20

The figures for 2005-06 have been calculated using new methods recently agreed by all research councils. This analyses applications and awards in the financial year in which decisions are made, and the success rates are therefore more accurate and representative.This change has meant that the figures for 2004-05 show only one round of Standard Grant applications. Future calculations will be made using similar methods to enable comparisions to be made and trends identified.

Success rates for grants by gender

	2003-04		2004-05		2005-06	
	Men	Women	Men	Women	Men	Women
Number of applications	988	179	1,092	193	906	175
Number of successful applicants	354	57	179	20	212	39
% successful applicants	36	32	25	18	23	22

**Shaded figures are based on partial data, from a single grant round.*

Success rates for fellowships by gender

	2004-05		2005-06	
	Men	Women	Men	Women
Number of applicants	108	67	93	50
Number of successful applicants	24	8	17	13
% successful applicants	22	12	18	26

Equality matters and success rates

Staff

2005 saw the third NERC equal pay audit, which aims to identify anomalies of pay between the genders. The final report demonstrated a continuing trend towards parity, with the pay gap dropping from 5.8 percent to 3.1 percent since the last audit. This was achieved in part by introducing guaranteed progression points into the pay scale and by a fairer pay formula for staff who are promoted. The report identified no other trends that could cause concern in equal pay. We will implement the report's recommendations, including continual monitoring.

As part of our merit promotion review, we undertook to ensure that there are no barriers to promotion within the scheme on the grounds of diversity, and a working group is examining how to monitor our performance.

Diversity training has been introduced in some areas of NERC, and this is proving very valuable to individuals. We plan to offer more of this training to our staff. We continue to monitor recruitment, and make sure that our job trawls are advertised to potential applicants from all ethnic groups. We advertise in the journal Ethnic Britain, and on the website. So far the uptake from target groups has not been significant, but we will continue to pursue this.

Gill Sharpe, gesh@nerc.ac.uk

Grants, fellowships and studentships

We monitor the success rates of grant and fellowship applications to ensure that we do not discriminate against any applicants. Trend data have shown that the proportion of women applying for research grants has been relatively constant and success rates between men and women have been similar over several years. The fear that 2004-05 was the start of a decline in success rates for women appears not to be justified. We will continue to monitor the trend.

For NERC fellowships, the proportion of female applicants stayed at a similar level to the previous two years (35 percent this year compared to 38 percent in 2004 and 36 percent in 2003). However, the overall success rate for women in the fellowship scheme increased this year, with 43 percent of fellowships being offered to women compared to 25 percent last year and 32 percent in 2003.

For PhD and masters courses, the students are selected by the universities, and we assess only their eligibility for a grant. The gender data are based on eligible applications received by universities. Of 4,188 male applicants for NERC studentships, 311 were awarded (success rate 7.4 percent). Of 4,557 female applicants for NERC studentships, 352 were awarded (success rate 7.7 percent). Therefore, 53 percent of the studentships awarded this year were to women.

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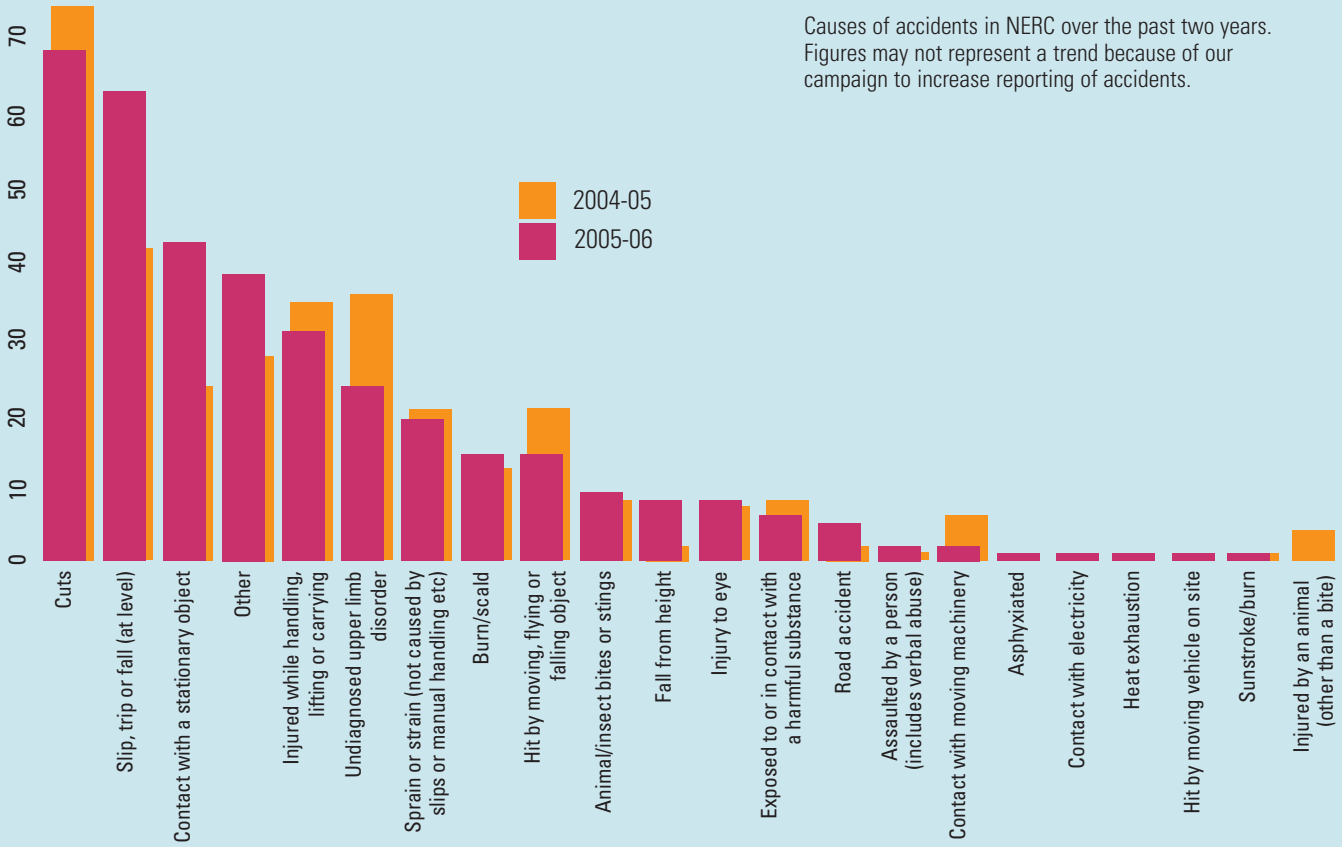

Causes of accidents in NERC over the past two years. Figures may not represent a trend because of our campaign to increase reporting of accidents.

Health and safety

During 2005, accident and incident reports across NERC confirmed the key areas for further safety management identified from the first full year of classifying accidents in 2004. Our accident reporting is improving following a campaign, and new software should make it even better next year.

As last year, the commonest injuries were cuts, followed by slips, trips and falls. These were mainly minor and largely beyond the control of management, as shown by a more detailed breakdown of the figures this year. Our research centres have taken action to avoid future injuries where possible.

We are actively monitoring NERC's new guidance on managing upper-limb disorder caused by using display screen equipment. Manual handling, which has been a major issue for the organisation for some time, is the subject of new in-house training. We are in the final stages of developing a policy and guidance on driving, probably the highest risk across NERC. Full auditing against the policies and procedures for the key area of musculoskeletal injury starts in autumn 2006.

Stuart Dobson, sd@nerc.ac.uk

HOW WE SPENT THE SCIENCE BUDGET (£m)

	Final Allocation	Final Outturn	Variance
Directed Programmes			
Aerosol Impacts	1.000	0.000	1.000
Autosub under ice (AUTOSUB)	0.679	0.549	0.130
Clouds, Water Vapour and Climate (CWVC)	0.181	0.120	0.061
Coupled Ocean-Atmosphere Processes and their Effect on Climate (COAPEC) (joint programme with MST)	0.490	0.407	0.083
Core Strategic Measurements for Atmospheric Science (COSMAS)	0.327	0.322	0.005
Cross Council Contribution (Flooding)	0.150	0.047	0.103
E Science	3.495	2.115	1.380
Depleted Uranium	-0.069	-0.022	-0.047
Environment and Health	0.400	0.012	0.388
Environmental factors in the chronology of human evolution and dispersal (EFCHED)	0.610	0.629	-0.019
Environmental genomics	3.122	2.338	0.784
Environmental Nanotechnology	0.000	0.001	-0.001
Faraday Partnerships	0.298	0.200	0.098
Flood Risk in Extreme Events	1.473	0.031	1.442
Global Nitrogen Enrichment (GANE)	0.109	-0.015	0.124
Integrated Ocean Drilling Programme	3.459	2.606	0.853
International Polar Year - Science Programme	0.000	0.018	-0.018
Joint NERC/EPSRC Environmental Maths & Statistics (EMS) programme	-0.200	0.053	-0.253
Lowland Catchment Research	1.569	1.256	0.313
Marine Microbial Biodiversity: Assessment and Exploitation (with TFST)	0.387	0.265	0.122
Marine Productivity: physical controls on ecosystem dynamics	0.226	0.083	0.143
Ocean Drilling Programme Transition	0.220	0.090	0.130
Ocean Margins LINK Programme	0.987	0.595	0.392
Polluted Troposphere	0.946	0.831	0.115
Post Genomics	3.629	2.230	1.399
Quantifying the Earth System	3.148	1.072	2.076
Rapid climate change and the stability of the thermohaline circulation	4.374	4.325	0.049
Rapid climate change and the stability of the thermohaline circulation capital		*0.241*	*-0.241*
Rural Economy & Land Use	1.500	0.807	0.693
Study of composition and structure of the lower stratosphere and upper troposphere at middle latitudes (OZONE)	1.062	1.024	0.038
Biological Diversity and Ecosystem Function in Soil	0.050	0.082	-0.032
UK Surface Ocean Lower Atmosphere Interactions	3.170	1.257	1.913
Sustainable Energy	1.837	2.094	-0.257
Environmental Diagnostics	0.000	0.262	-0.262
Seasense	0.000	0.170	-0.170
Understanding the micro-to-macro behaviour of fluid rock systems (M2M)	0.000	0.007	-0.007
Urban Regeneration and the Environment (URGENT)	0.157	0.057	0.100
UKPopNet	0.673	0.673	0.000

HOW WE SPENT THE SCIENCE BUDGET (£m) cont.

	Final Allocation	Final Outturn	Variance
Other Programmes			
Eurocores – Mineral Sciences	0.150	0.001	0.149
Eurocores – Biodiversity	0.130	0.000	0.130
International Subscriptions & Projects	1.259	1.128	0.131
Knowledge Transfer	2.457	2.476	-0.019
Commercialisation	1.075	0.478	0.597
Grants Admin	0.006	0.045	-0.039
Short Courses	0.059	0.073	-0.014
Deputy Director of Science & Innovation Small Initiatives Fund	0.020	0.007	0.013
Minor Initiatives	0.175	0.063	0.112
Collaborative Centres			
Centre for Population Biology (CPB)	1.071	0.662	0.409
National Centre for Atmospheric Science	6.103	5.835	0.268
Tyndall Centre for Climate Change Research	0.950	2.266	-1.316
Continuous Plankton Recorder Survey of the North West European Shelf and the North East Atlantic (SAHFOS)	0.190	0.000	0.190
Marine Biological Association	1.191	1.179	0.012
Plymouth Marine Laboratory	4.447	4.487	-0.040
National Oceanography Centre Southampton	7.431	8.353	-0.922
National Oceanography Centre Southampton capital		*0.045*	*-0.045*
UK Ocean Research Services	2.527	1.830	0.697
Scottish Association for Marine Science	2.390	2.534	-0.144
Sea Mammal Research Unit	0.639	0.640	0.000
EO National Programme			
EO Centres of Excellence	3.746	3.600	0.146
EO Instrument Development	0.824	0.630	0.194
EO Post Launch Support	0.489	0.810	-0.321
EO Data Centre (NEODC)	0.241	0.355	-0.114
EO Administration	0.500	0.290	0.210
EO Applications, Science & Mission Support	1.298	0.650	0.648
European Space Agency	46.069	47.737	-1.668
Scientific Facilities & Technology			
High Performance Computing	2.815	2.863	-0.048
Data Centre Support	0.440	0.287	0.153
Aircraft Infrastructure & Operation	3.450	2.752	0.698
Aircraft Infrastructure & Operation capital		*0.097*	*-0.097*
Services & Facilities	5.668	5.651	0.017

	Final Allocation	Final Outturn	Variance
Scientific Facilities & Technology cont.			
Services & Facilities capital	*0.540*	*0.534*	*0.006*
Prince Madog Hire	0.266	0.267	-0.001
Marine Barter Bank	0.316	0.028	0.288
National Marine Facilities Division capital (incl. RCIF)	*0.900*	*0.894*	*0.006*
Large Facilities Diamond	*0.622*	*0.000*	*0.622*
Large Facilities ISIS	*0.040*	*0.000*	*0.040*
Research Grants			
Standard Grants	25.036	22.438	2.082
Small Grants	1.503	1.594	-0.091
New Investigator Grants	0.754	0.796	-0.042
Antarctic Funding Initiative (AFI)	1.006	1.458	-0.452
Consortium Grants	3.650	3.958	0.208
Capital Grants	7.915	7.040	0.875
Peer Review	0.000	0.401	-0.401
Training			
Studentships	20.021	19.943	0.078
Fellowships	4.076	4.459	-0.383
British Antarctic Survey			
International Polar Year	0.137	0.137	0.000
Core Infrastructure	24.743	24.688	0.055
Artic Station	0.125	0.156	-0.031
RRS Ernest Shackleton	1.700	1.700	0.000
Antarctic Bases Environmental Clean Up (PR)	0.554	0.554	0.000
LF Halley 6 resource – unsuccessful designers	0.837	0.837	0.000
BAS for non-BAS use of JCR	0.651	0.940	-0.289
BAS Science Programme	8.978	8.959	0.019
Core Capital	*2.459*	*2.513*	*-0.054*
Halley VI	*3.492*	*3.492*	*0.000*
Rothera Redevelopment Phase 1	*0.966*	*0.966*	*0.000*
British Geological Survey			
Core Infrastructure	7.271	5.798	1.473
Research Centre Infrastructure Fund Resource	0.220	0.219	0.001
Geology and Resources	6.157	6.180	-0.023
Environment and Hazards	4.415	4.551	-0.136
Information Services	5.615	5.581	0.034
Development of Scientific Capabilities	1.039	0.808	0.231

HOW WE SPENT THE SCIENCE BUDGET (£m) cont.

	Final Allocation	Final Outturn	Variance
British Geological Survey cont.			
Commercialisation	0.014	0.014	0.000
Core Capital	*3.059*	*3.059*	*0.000*
Research Centre Infrastructure Fund Capital	*0.303*	*0.298*	*0.005*
Hazard Material Handling Facility	*0.133*	*0.133*	*0.000*
NIGL Capital	*0.759*	*0.760*	*-0.001*
Keyworth Blocks A-F	*0.065*	*0.068*	*-0.003*
Centre for Ecology and Hydrology			
CEH Science Programme	9.047	8.856	0.191
Core Infrastructure	11.317	11.306	0.011
Data Grid	0.007	0.045	-0.038
Environmental Genomics Thematic Data Centre	0.040	0.052	-0.012
CEH Lancaster Development	0.180	0.522	-0.342
GECAFS International Subscription	0.161	0.165	-0.004
Environmental Centre for Wales	0.205	0.052	0.153
Consultancy Costs	0.200	0.195	0.005
Core Capital	*1.154*	*1.234*	*-0.080*
Vehicles (RCIF 04/05)	*0.566*	*0.191*	*0.375*
Proudman Oceanographic Laboratory			
POL Science Programme	2.016	1.931	0.085
PSMSL	0.092	0.092	0.000
British Oceanographic Data Centre	0.754	0.545	0.209
Core Infrastructure	1.150	1.150	0.000
British Oceanographic Data Centre Infrastructure	0.446	0.446	0.000
Core Capital	*0.388*	*0.315*	*0.073*
IT Infrastructure - storage and backup (RCIF 04/05)	*0.100*	*0.100*	*0.000*
Liverpool Relocation	*0.332*	*0.232*	*0.100*
Other Infrastructure			
Research Ship Unit	5.701	7.425	-1.724
Discovery – Exhaust Gas Monitoring System	*0.048*	*0.145*	*-0.097*
Swindon Office	13.389	12.648	0.741
Swindon Office – capital	*0.025*	*0.000*	*0.025*
Programme Review Project	0.062	0.061	0.001
Admin Strategy Contribution	0.160	0.128	0.032
Vacated Sites	0.551	0.320	0.231
GRID Highband Width Connection	0.428	0.186	0.242

	Final Allocation	Final Outturn	Variance
Other Infrastructure cont.			
Electronic Records Management System	0.315	0.647	-0.332
Resource Management System (RMS)	0.170	0.182	-0.012
Other Corporate Systems Development Projects	0.579	0.101	0.478
Corporate Systems Development – capital	*0.732*	*0.503*	*0.229*
Value Added Tax rebate	-1.235	-2.035	0.800
Merchant Navy Pension Fund	0.606	0.606	0.000
Bangladesh legal costs	0.501	0.409	0.092
Other Corporate Activities	0.198	0.147	0.051
Electronic Records Management System	*0.423*	*0.304*	*0.119*
James Cook Research Vessel	*15.874*	*15.916*	*-0.042*
Greening	*0.200*	*0.000*	*0.200*
Net Book Value of asset disposals	*0.000*	*-0.198*	*0.198*
Staff Restructuring	2.109	2.651	-0.542
EU Income budgetary cover	1.250	1.109	0.141
Shackleton Lease funded outside Science Budget	-0.859	-1.456	0.597
Cost of Capital	7.840	7.891	-0.051
Depreciation	19.278	18.840	0.438
Balance Sheet Provisions and asset impairments	17.373	18.382	-1.009
Science Budget overcommitment - resource	-6.115	0.000	-6.115
Science Budget overcommitment - capital	*-2.072*	*0.000*	*-2.072*
TOTAL NERC EXPENDITURE	**383.292**	**373.235**	**10.057**
Comprises:			
Resource	**351.446**	**341.377**	**10.069**
Capital	***31.846***	***31.842***	***0.004***

Capital expenditure in italics

SCIENCE BUDGET EXPENDITURE IN RESEARCH ORGANISATIONS

Expenditure £k	BLUE SKIES AWARDS										
	Grants	PhD students	Masters	Fellowships	JIF grants	Knowledge transfer	Directed grants	Directed PhD students	Research contracts/ programmes	Collaborative Centres	TOTAL
Birkbeck College	76	12									88
Brunel University	35	10									45
Cardiff University	503	469		75			332	49	3		1,431
Cranfield University	4						33	6			43
Durham University	315	235		165		95	137	72	1		1,020
Glasgow Caledonian University							136				136
Heriot-Watt University		11	86			1	10	24	7		139
Imperial College London	1,094	868	343	278		17	557	122	395	662	4,336
Keele University	52	80					43		10		185
Kings College London	38	86	73				83				280
Kingston University	4								145		149
Lancaster University	468	487	100			101	78	61			1,295
Liverpool John Moores University							29				29
London School of Economics & Political Science						41					41
Loughborough University	3										3
Manchester Metropolitan University	1										1
Open University	302	232		49	6		10	34	22		655
Oxford Brookes University	22	21									43
Queen Mary, University of London	438	147		123		78	83	38			907
Queen's University of Belfast	146						14				160
Roehampton University	40								6		46
Royal Holloway, University of London	42	234	206	23			103	17	34		659
Scottish Universities Environmental Research and Reactor Centre	296	29			145		48		1,235		1,753
University College London	1,348	700	75	-4		1	579	154	863		3,716
University of Aberdeen	555	430	246	173		64	233	15			1,716
University of Bath	171	41									212
University of Birmingham	814	423	255	122		99	388	87	17		2,205
University of Bradford	22	42	100	49			-11				202
University of Bristol	1,342	883	44	242			762	152	700		4,125
University of Cambridge	2,225	1,167		117	816	86	630	260	953		6,254
University of Dundee	114	10	41					21	278		464
University of East Anglia	1,582	676	96	321	132	71	991	126	211	2,790	6,996
University of Edinburgh	2,693	967	215	394	15	88	324	26	645		5,367
University of Essex	384	127		48		11	70	22			662
University of Exeter	510	323	82	36			301	80			1,332
University of Glasgow	268	222		159			86	30			765
University of Greenwich		21									21
University of Hertfordshire	140	30					23	8			201
University of Huddersfield	2										2
University of Hull	139	97		90							326
University of Kent		19					7	43			69
University of Leeds	1,776	897	388	181	5	9	407	113	947		4,723
University of Leicester	194	288		65		78	27	95	251		998
University of Liverpool	1,324	657		117			346	63	53		2,560
University of Manchester	1,851	567		218	69	12	1,266	76	242		4,301
University of Newcastle upon Tyne	320	517	317	9	455	16	14	16	11		1,675
University of Nottingham	74	105	60	45		34	86	34	98		536

Expenditure £k	BLUE SKIES AWARDS										
	Grants	PhD students	Masters	Fellowships	JIF grants	Knowledge transfer	Directed grants	Directed PhD students	Research contracts/ programmes	Collaborative Centres	TOTAL
University of Oxford	1,812	996		360		85	550	163	188		4,154
University of Plymouth	404	207	72				3	31			717
University of Portsmouth									3,518		3,518
University of Reading	1,181	680	240	223		81	842	136			3,383
University of Salford	28	25				19					72
University of Sheffield	1,033	501		130	55	5	583	111	605		3,023
University of Southampton	1,122	838	62	176	261	81	1,353	235	681	11,125	15,934
University of St Andrews	656	418	73	45		118	93	49	10	640	2,102
University of Stirling	23	222				48	171	9			473
University of Strathclyde	16	79		72			23	15			205
University of Surrey	6	2					7				15
University of Sussex	21	27									48
University of Ulster	70										70
University of Wales Swansea	296	233		118			11	33	698		1,389
University of Wales, Aberystwyth	99	140		58			61	6	5		369
University of Wales, Bangor	593	337	133	60		67		23			1,213
University of Warwick	426	165		47			143				781
University of York	1,044	351	196				177	68	557		2,393
BBSRC Institute of Arable Crops Research	17										17
BBSRC John Innes Centre	77						168				245
CCLRC	424					2	349		1,606		2,381
CEFAS							30				30
Fisheries Research Services Marine Laboratory							35				35
Macaulay Institute							8		12		20
Marine Biological Association	155					54				1,179	1,388
Medical Research Council							21				21
National Inst of Agricultural Botany	123										123
Natural History Museum	103					56	17				176
Plymouth Marine Laboratory	977	176				5	551		547	4,487	6,743
Policy Studies Institute							3,311				3,311
Rothamsted Research							32				32
Royal Botanic Gardens - Edinburgh				21							21
Royal Botanic Gardens Kew	27						18				45
Scottish Agricultural College		9					2				11
Scottish Association For Marine Science	2	180					29		92	2,533	2,836
Sir Alister Hardy Foundation for Ocean Sciences	19					23	2				44
The British Museum	2										2
The Institute for European Environmental Policy							8				8
Zoological Society of London	68	94		64							226
TOTAL	**32,551**	**17,810**	**3,503**	**4,469**	**1,959**	**1,546**	**16,823**	**2,723**	**15,646**	**23,416**	**120,446**

GRANTS AWARDED IN 2005-06

	RESEARCH GRANTS									
	BLUE SKIES								DIRECTED	
	Small Grant		Standard Grant		AFI		Consortium Grant		Directed	
	Number	Value £k	Number	Value £k	Number	Value £k	Number	Value £k	Number	Value £k
Brunel University			1	238						
Cardiff University			3	503					1	28
CCLRC			1	55						
Cranfield University										
Durham University	1	25	6	1,066					2	227
Heriot-Watt University							2	1,499		
Imperial College London	3	135	4	486						
Keele University										
Kings College London			2	247						
Lancaster University	2	82	1	52			1	521	3	216
Liverpool John Moores University			1	222						
London School of Economics & Political Science										
Loughborough University			1	40						
Natural History Museum			2	153						
NERC British Antarctic Survey			1	123	1	84	1	163	1	34
NERC British Geological Survey										
NERC Centre for Ecology & Hydrology	2	79	3	240			2	452	4	1,004
Open University	1	80	3	417					2	338
Oxford Brookes University										
Plymouth Marine Laboratory	1	29	1	330					8	1,514
Proudman Oceanographic Laboratory									2	241
Queen Mary, University of London										
Queen's University of Belfast	1	90	1	99						
Rothamsted Research									1	61
Royal Botanic Gardens - Edinburgh										
Royal Botanic Gardens Kew			1	50						
Royal Holloway, University of London			4	451					1	174
Scottish Agricultural College										
Scottish Association For Marine Science			2	66					2	184
The Institute for European Environmental Policy										
University College London	2	82	8	1,557					2	230
University of Aberdeen			5	1,344					3	469
University of Bath			1	205						
University of Birmingham			4	666					3	358
University of Bradford										
University of Bristol	1	40	9	2,737			1	434	4	1,139
University of Cambridge	3	166	5	874			3	593	6	557
University of Dundee										
University of East Anglia			6	834			1	190	5	754
University of Edinburgh	2	89	7	1,319			1	270	4	911
University of Essex	1	65	1	267					2	338
University of Exeter			3	468						
University of Glamorgan										
University of Glasgow	1	18	2	306					1	150
University of Hertfordshire										
University of Hull	1	64								
University of Kent			1	50						
University of Leeds	1	43	14	2,801			4	1,299	9	1,024
University of Leicester	1	42	2	327			1	166	1	66
University of Liverpool			6	1,418			1	73	3	569
University of Manchester	1	32	7	1,715			1	174	3	337
University of Newcastle upon Tyne	1	26	3	192					2	222
University of Nottingham										
University of Oxford	1	57	5	357			2	331	5	448
University of Plymouth	2	107	3	148						
University of Reading			6	817			2	743	3	382
University of Sheffield			6	898			2	1,033	6	890
University of Southampton	4	181	9	1,209			2	1,141	15	2,471
University of St Andrews			4	920			1	260	1	11
University of Stirling									1	211
University of Strathclyde										
University of Surrey										
University of Ulster			1	12						
University of Wales Swansea			3	469					1	92
University of Wales, Aberystwyth	1	23								
University of Wales, Bangor	1	62								
University of Warwick			2	494					1	194
University of York	2	88					1	191	3	267
Zoological Society of London			2	415						
TOTAL	37	1,705	163	27,657	1	84	29	9,533	111	16,111

RESEARCH GRANTS				RESEARCH FELLOWS		RESEARCH STUDENTSHIPS								MASTERS
						BLUE SKIES					DIRECTED			
Knowledge Transfer		TSEC		Post Doc Fellow	Adv Fellow	Centres of Excellence	EMS-Blue Skies PhD	Blue Skies Tied PhD	Blue Skies Ind CASE	Blue Skies PhD	Directed PhD	Directed Tied PhD	E-Science Dir PhD	Blue Skies Masters
Number	Value £k	Number	Value £k	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
										1				
									1	5	1			
		1	124									1		
1	134					1		1		2				
		1	91							1				7
		2	1,013	3				3	2	10		5		29
									1	2				
										2				10
3	380						1			5				7
1	153													
										2				
		1	199	1										
		1	98							10				
								1		1				
										1				
		1	185							3				
1	5									1		1		
				1						2				
		1	188											
				1										
				1					2	1				23
		1	26					1						
										2				
		1	162											
		1	62							9				10
2	173	2	255						1	5				21
2	120	1	49							4	1			27
										1				9
				2				1	2	14			1	5
		1	130	2		1		1	1	16			2	
														4
					1			3	1	11		2		11
1	383	1	116	2				2	1	14				22
				1						1				
				1					2	4	2			7
		1	108											
1	68	1	58	1						2				
										1	1			
										2				
		1	145	2				1		11	1		2	40
1	66							2		3	1			
1	167			1				1	1	5	1			
		1	258	1				1		7	2			
		1	125	1				1	2	6		2		36
		1	134	1						2				5
1	146			2				2		15	3			
								2		1				8
		1	78	1	2			1	1	14	1	2	1	26
1	5									7	2			
1	45	1	213	1	1			3	1	9		4		6
										6				4
1	204									4		1		
										1				
		1	411							1				
										2				
										3				
										4	1			11
										3				
								1		2	1			14
										2				
18	2,049	25	4,228	26	4	2	1	28	19	243	18	18	6	342

Financial review

Management commentary

Background

The Natural Environment Research Council (NERC) was established by Royal Charter on 1 June 1965, under the Science and Technology Act 1965. NERC funds and carries out impartial scientific research in the sciences of the environment. NERC trains the next generation of independent environmental scientists. NERC's mission is to gather and apply knowledge, create understanding and predict the behaviour of the natural environment and its resources, and communicate all aspects of our work.

NERC's strategic priorities are:
SCIENCE – to prioritise and deliver world-class environmental sciences to understand the Earth system;
USING KNOWLEDGE – to use NERC-funded science to identify and provide sustainable solutions to environmental problems;
SKILLED PEOPLE – to train and develop skilled individuals to meet national needs;
LEADERSHIP – to provide effective national and international leadership for the environmental sciences, including our role in promoting the interface between science and society;

and, to deliver the above four priorities:
ORGANISATION – to ensure that NERC is a flexible, fit-for-purpose organisation, and to achieve excellence in service delivery and customer focus.

NERC supports research and training in UK universities, collaborative centres and wholly-owned research centres. Its research centres are the British Antarctic Survey (BAS), the British Geological Survey (BGS), the Centre for Ecology & Hydrology (CEH), and the Proudman Oceanographic Laboratory (POL).

Statutory basis

These accounts have been prepared in accordance with the Accounts Direction, issued by the Secretary of State for Trade and Industry pursuant to Section 2(2) of the Science and Technology Act 1965, which is available from NERC Corporate Finance, Polaris House, North Star Avenue, Swindon SN2 1EU. The 2005-06 accounts have been prepared on an accruals basis, whereby income and expenditure is credited or charged to the Income and Expenditure Account when the goods or services have been provided. The balance sheet shows the assets and liabilities at the year-end.

Financial summary

In addition to the Science Budget of £295,977,000 in 2005-06, NERC won external support from Government Departments, other UK and overseas public sector bodies, the European Union and industry. In 2005-06 this totalled £54,700,000, 16.3% of NERC's total income, and an increase of 11% on other income from last year.

The Income and Expenditure Account records a total income of £336,357,000 and a total expenditure of £364,223,000 resulting in an operating deficit in the year of £27,866,000 and a total retained deficit carried forward of £39,030,000. The total net book value of the fixed assets is £264,711,000. The Government Funds at 31 March 2006 amounted to £211,071,000.

Following the necessary accounting policies, the accounts show a deficit for the year. Whilst accurate this deficit is calculated on a different basis from the figures used by NERC and OSI/DTI to monitor its performance. On this basis, NERC showed a surplus for the year that will be carried forward into the 2006-07 financial year.

Reconciliations can be found in the tables overleaf. The tables show that capital expenditure was almost exactly to plan, with a significant proportion of this being related to the building of the new research vessel, the RRS *James Cook*. NERC made a resource surplus of £10,069,000, less than 3% of budget, but slightly more than was desired. The surplus was partly due to the management action, and staff support, in avoiding adverse consequences from the CEH restructuring activity in 2005-06, the rest was the result of minor programme slippage.

Review of activities

NERC published its strategic and scientific priorities for UK environmental sciences in *Science for a sustainable future 2002-2007* (www.nerc.ac.uk/publications/strategicplan/) in April 2002. During 2005-06 we have advanced knowledge of Earth system science through our strategic priority areas. A review of our scientific and organisational achievements are covered on pages 4-43.

Reconciliation between outturn and annual accounts 2005-06

	Resource £000	Capital £000
Income and expenditure account		
Total expenditure	364,223	
Add:		
Notional Cost of Capital	7,272	
CEH restructuring	21,379	
Financing Lease Interest	1,475	
Interest receivable	(22)	
Unwinding of Discount	462	
Change in Discount Rate	855	
Loss on disposal of fixed assets	146	
Total I&E expenditure	**395,790**	
Less other income	(54,700)	
Net I&E expenditure	**341,090**	
Capital (Note 9 - Annual Accounts)		**32,040**
Reconciling items		
Add:		
EU DEL	1,121	
Cost of capital credit on PFI lease creditor balance (i)	619	
Less:		
Change in the discount factor (i)	(855)	
PFI finance interest below 3.5% (i)	(597)	
Net book value on disposal of fixed assets		(198)
OSI Outturn (resource and capital)	**341,378**	**31,842**
OSI Science budget	351,447	31,846
Surplus reported to OSI	**10,069**	**4**

Notes:
(i) Items outside the scope of OSI reporting.
(ii) Resource surplus comprises £10,774k near-cash surplus and £705k non-cash deficit.

Reconciliation of operating deficit in annual accounts to outturn 2005-06

	£000	£000
Deficit for the year as reported in the annual accounts (page 75)		**(59,433)**
Difference between the way income is recorded in the annual accounts and in the return to OSI		
Departmental Expenditure Limit (accrual based in OSI return)	351,447	
Parliamentary Grant-in-Aid (cash based in accounts (page 75))	(263,937)	
Release of Government Grant Reserve - in accounts (page 75)	(17,720)	69,790
Includes:		
Non-cash (i)	44,608	
Utilisation of cash at bank and in-hand (ii)	16,522	
Other accrual / working capital movements	8,660	
Reconciling cost items		
Add:		
Change in the discount factor (iii)		855
PFI finance interest below 3.5% (iii)		597
Less:		
EU DEL (iv)		(1,108)
Cost of capital credit on PFI lease creditor balance (iii)		(632)
Surplus reported to OSI		**10,069**

Notes:
(i) Includes depreciation, notional cost of capital and movement on provisions, which are not cash transactions, and therefore do not form part of GIA.
(ii) Movement between the closing balances on 31 March 2005 and 31 March 2006.
(iii) Items outside the scope of OSI reporting.
(iv) Repayment of income from the EU.

For the purposes of statutory accounts NERC is funded by cash grant-in-aid. Non cash items (note (i)) are included in OSI budgets but not included in cash grant-in-aid income. This technicality within government accounting systems accounts for the deficit of £59,433,000.

Organisational changes

Business Performance Management Framework: In 2004, DTI introduced a new performance system for the research councils with a renewed focus on measurable outputs. These outputs originated in *The Ten Year Science & Innovation Investment Framework 2004 – 2014* a key document which set out a ten year strategy for UK science. In 2005, NERC implemented this system in conjunction with the Office of Science and Innovation (OSI).

An important part of performance management is concerned with the information used to measure an organisation's progress towards its objectives. We have identified indicators of performance (output and performance measures) that we collect annually. These are reported in full in the NERC Delivery Report (www.nerc.ac.uk/aboutus/planning/deliveryplan/).

Centre for Ecology & Hydrology: NERC Council decided that a major re-structuring of the Centre for Ecology & Hydrology (CEH) was essential to enable it to position itself as a world-leading centre that is sustainable both from scientific and financial viewpoints (see page 5). This decision will require action over the next four years, but had an effect on the accounts in 2005-06 because NERC has to provide for redundancy and decommissioning costs which totalled £19.4m (see Note 5 and Note 12 in the annual accounts) and to write down the site values (see Note 9 (a) in the annual accounts) by £2m, total costs of restructuring incurred in 2005-06 were therefore £21.4m. Total costs of restructuring to be incurred are £43.7m.

Halley VI: A futuristic design by Faber Maunsell and Hugh Broughton Architects won the competition for the new British Antarctic Survey Halley Research Station. It features improved environmental strategies for fuel, waste and material handling. Construction will begin in 2007 and is due for completion by 2010. As a consequence of the creation of a joint project with Halley V decommissioning, costs savings will accrue and therefore the decommissioning provision reduced accordingly by £5.8m (see Note 12 of the annual accounts). Total costs of the joint projects Halley V and VI are expected to be £38m.

Council members

A list of NERC Council members in 2005-06 is given in the Remuneration report (page 67). The Council consists of the Chairman, the Chief Executive (and Deputy Chairman) and between 10 and 18 other members. Council members are appointed by the Secretary of State for Trade & Industry and are drawn from both academic and industrial communities. Two of the members are also appointed from Government departments. In addition to the listed members, a representative of the Secretary of State for Trade and Industry, Mr Paul Williams, attends Council meetings.

The Council is NERC's top-level decision making body. Council decides on all issues of major importance, including corporate strategy, key strategic objectives and targets and major resource decisions. It is also accountable for its stewardship of NERC's budget and the extent to which key performance objectives and targets have been met.

The Council Secretariat holds a Register of Interests, which can be viewed on the NERC website at www.nerc.ac.uk/secretariat-council/register.asp

Forward look

Issues or projects that will affect us or we will deliver on from 2006 onwards include the following:

- **Research council shared services:** Research councils and their institutes are working together to deliver most administrative support services on a shared basis by 2009. This will improve the overall performance of the research councils and provide better and more efficient services.

- **Economic impact of investments in research:** A priority activity for NERC in 2006-07 is to maximise the impact of its funded research on the economic, social and environmental well being of the UK, through active knowledge transfer. This will be progressed by working closely with Research Councils UK and the Office of Science and Innovation.

- **NERC strategy:** NERC is currently in the process of developing its new strategy due to be published in mid-2007. NERC is developing the science themes and strategies for people, organisation, scientific infrastructure and knowledge, to meet some of the key challenges facing society, policy makers and the economy. The new strategy will form the major input from NERC to the Government's Comprehensive Spending Review 2007.

- **RRS *James Cook*:** The new NERC research ship – the *James Cook* – is being fitted out and named in 2006. The *James Cook* will operate worldwide from the tropics to the edge of the ice sheets carrying out leading edge, multidisciplinary research. The vessel will support both continental margin and deep ocean projects.

- **Earth observation:** NERC committed €205m on behalf of the UK to EOEP-3, the main instrument for implementing the Living Planet Strategy of the European Space Agency, which covers the period 2008-2012.

- **National Oceanography Centre, Southampton (NOCS):** From 2006 NERC begins a new agreement with the University of Southampton for funding and managing the National Oceanography Centre, Southampton.

- **Economic impacts study:** In a report to be published in 2006, NERC will receive confirmation that its research has a positive impact on the UK economy. This study is timely, and the first of its kind for the research councils, as the government now requires the research councils to realise and demonstrate benefits from its investments.

2006 Budget announcement and The Science and Innovation Investment Framework 2004-2014 – next steps consultations:

Science and innovation investment framework 2004-2014: next steps sets out the Government's thoughts on the long-term challenges facing UK science and innovation. The document sets out a range of new proposals designed to create a more effective science and innovation system in the UK, and maximise the impact of public investment in research on the economy. The document includes planned consultations on the following issues that impact on the research councils:

- supporting interdisciplinary and 'high risk' research
- getting the most out of large facilities
- options for a simpler (QR) allocation system
- supporting world-class health research.

Staff communications

Effective two-way communication with staff is essential to ensuring everyone in NERC is fully involved with and can influence its current and future activities and developments. The Chief Executive is committed to continuing to improve communications and participates in the Whitley arrangements with staff representatives.

NERC provides staff with information through a variety of channels including the extranet, regular newsletters and staff notices, staff meetings and workshops. We consult staff on key issues, such as the ethics policy and the future of CEH, by opening consultations on the NERC website. A new, NERC-wide corporate communication system was proposed by the NERC executive Board (NEB) in 2005, based on similar systems existing in many large public sector organisations. The NEB Team Briefing, as it has been named, aims to provide a regular update on key issues relevant across NERC staff and centres, encourage dialogue by staff and offer a clear route for feedback to NEB.

Equal opportunities

It is NERC policy that everyone has an equal opportunity for employment and advancement within the Council on the basis of their abilities, qualifications and fitness for work. We do not tolerate discrimination against anyone on grounds of sex, race, religion, religious beliefs or sexual orientation; this applies in recruitment, training, promotion and to all aspects of employment within NERC. Nor do we unlawfully discriminate on the basis of disability, but prefer to offer each candidate or member of staff the opportunity to demonstrate their ability to carry out the work required. NERC is committed to the Two Ticks scheme as approved by The Employment Service.

Payment policy

NERC observes the Confederation of British Industry Code of Practice regarding prompt payment, making payments when due in accordance with the contract or within 30 days of receipt of goods or services or the presentation of a valid demand for payment. During 2005-06 86% of payments were made within 30 days of the invoice date (2004-05: 86%). In accordance with the guidance given in Statutory Instrument 1997/571 the figure for creditor days is 23 (2004-05: 21 days).

Risk

NERC has adopted a risk management strategy that conforms with the principles of the HMT *Orange Book*, DAO (Gen) 13/00 and DAO (Gen) 09/03.

A description of NERC's capacity to handle risk and its control framework can be found in the Statement on Internal Control (SIC) that has been included in the 2005-06 Annual Accounts (page 71).

Going concern

The Accumulated Income and Expenditure carried forward at 31 March 2006 shows a deficit of £39,030,000. This reflects the inclusion of liabilities due in future years which may be met by future grant-in-aid from NERC's sponsoring department, the Department of Trade and Industry. This is because, under the normal conventions applying to parliamentary control over income and expenditure, such grants may not be issued in advance of need.

Grant-in-aid for 2006-07, taking into account the amounts required to meet NERC's liabilities falling due in that year, has already been included in the department's estimates for that year. These have been approved by Parliament, and there is no reason to believe that the department's future sponsorship and future parliamentary approval will not be forthcoming. It has accordingly been considered appropriate to adopt a going concern basis for the preparation of these financial statements.

Internal Audit and Audit Committee

The Research Councils' Internal Audit Service undertakes an agreed programme of internal audits for NERC. Council's Audit Committee is comprised of three Council members and one independent member, and is attended by the Chief Executive, and the director of finance. The Committee currently meets four times a year to review internal and external financial statements, the effectiveness of NERC's internal control systems, the management of business critical projects, governance issues, internal audit reports and any other matters at the request of Council or the Chief Executive.

Auditors

NERC's accounts are audited by the Comptroller and Auditor General in accordance with paragraph 3(3) of Schedule 1 to the Science and Technology Act 1965. The charge for the year is £50,000. All of this cost relates to audit services. There was no auditor remuneration for non-audit work.

So far as the Accounting Officer is aware, there is no relevant audit information of which the NERC's auditors are unaware. The Accounting Officer has taken all the steps that he ought to have taken to make himself aware of any relevant audit information and to establish that NERC's auditors are aware of that information.

Events since the end of the financial year

There have been no events since the end of the financial year which impact on this commentary.

Professor Alan Thorpe
Chief Executive & Accounting Officer
Date: 30 June 2006

Remuneration report

Remuneration Policy

The Remuneration Committee is responsible for agreeing the pay and allowances of senior managers, ie directors. The committee members are listed below:-

Mr R Margetts, Chairman NERC
Mr E Jenner, Council Member
Professor A Halliday, Council Member
Professor A Thorpe, Chief Executive
Mrs J Timberlake, Director, People Skills and Communication who attends in an advisory capacity only

The Remuneration Committee works in accordance with its policy on senior staff pay which is designed to reward senior staff on the basis of individual skills, experience and performance set against the market median for their role. A market related pay point is determined by survey evidence obtained from relevant comparator organisations in the public, higher education and voluntary sectors and is increased annually.

In accordance with NERC's appraisal system, performance is assessed against pre-set objectives for individual roles with input in the assessment process from individual reviewees, reviewers and the Chief Executive.

From 1 April 2006 all pay movement for senior employees is performance related. Prior to that date the non-consolidated element of senior pay was performance related.

It should be noted that no senior managers are on a service contract. No significant awards have been made to senior staff this year.

Employment Contracts
NERC staff are not civil servants but the organisation makes its appointments in accordance with the broad principles set out in the Civil Service Commissioners' Recruitment Code, which requires appointments to be on merit on the basis of fair and open competition but also includes the circumstances when appointments may otherwise be made.

All senior employees covered by this report, apart from the Chief Executive, hold appointments, which are open-ended until they reach the normal retiring age of 60. Open-ended staff who are made compulsorily redundant or who leave on voluntary redundancy during a pre-redundancy or formal redundancy exercise will be eligible for compulsory early retirement/severance terms, as defined under the rules of the Research Councils' Compensation Scheme. These payments are in line with those that would be due under the Civil Service Compensation Scheme.

The notice period for all senior employees is three months.

Remuneration of the Chief Executive
Professor Sir John Lawton completed his tenure on the 31 March 2005. From 1 April 2005, a new Chief Executive was appointed, Professor Alan Thorpe. His initial contract is for a period of four years from 1 April 2005.

The emoluments of the Chief Executive, including taxable benefits, were £94,618 (2005: £125,521). This included basic salary of £94,618 (2005: £109,140) and no performance related bonus (2005: £16,381 calculated as a percentage of basic salary). A charge of £20,154 (2005: £11,023) was also incurred in respect of employer's pension contributions. This was assessed as 21.3% of basic salary (2005: 10.1%). The Cash Equivalent Transfer Value for the Chief Executive at 31 March 2006 was £754,000, including a lump sum transfer from previous employment made during the year. The real increase in the cash equivalent transfer value for the period is £66,000. The Chief Executive is an ordinary member of the Research Councils' Pension Scheme.

Comparatives are for the previous Chief Executive's total emoluments.

Audited Information

Remuneration of Senior Employees

Other members of the council's senior management team received emoluments during the year, including taxable benefits as below, these individuals are all ordinary members of the Research Councils' Pension Scheme.

Table 1: Remuneration of senior employees 2005-06

Name	Note ref.	Total emoluments 2005-06 £	Total emoluments 2004-05 £	Pension increase in real terms £000	Accrued pension at 31/03/06 £000	Lump sum at 31/03/06 £000	Cash equivalent Transfer value as at 1/04/05 £000	Cash equivalent Transfer value as at 31/03/06 £000	Cash Equiv. transfer value increase in real terms £000	Other benefits £000
J Lawton		-	125,521	-	-	-	-	-	-	-
A Thorpe	1	94,618	-	0 - 2.5	0 - 5	-	-	754	66	-
D Falvey		103,740	104,627	0 - 2.5	5 - 10	29	180	231	24	-
C G Rapley	2	-	-	-	-	-	-	-	-	-
P Nuttall		84,589	94,190	0 - 2.5	25 - 30	99	516	676	23	-
A Willmott	3	48,750	-	0 - 2.5	0 - 5	-	-	398	37	-
J Hansford		78,126	73,735	0 - 2.5	25 - 30	113	696	868	24	-
A E Hill	4	91,071	77,782	0 - 2.5	5 - 10	70	234	382	64	-
D Bloomer		84,750	81,027	0 - 2.5	0 - 5	-	43	76	12	-
J Timberlake		71,922	67,850	0 - 2.5	0 - 5	-	14	35	12	-
S Wilson		82,231	75,094	0 - 2.5	5 - 10	29	71	117	11	-

Notes

1 Professor Thorpe became CEO of NERC with effect from 1 April 2005. The previous CEO, Professor Sir John Lawton left the organisation at 31 March 2005.

2 Professor Rapley has chosen not to allow disclosure of information in the above table in 2005-06.

3 Professor Willmott became Director of POL with effect from 1 July 2005.

4 Professor Hill became Director of NOCS with effect from 1 July 2005. From 1 April 2006, he will become an employee of the University of Southampton.

Total Emoluments

Total emoluments include gross salaries and performance related bonuses. From 1 April 2004 basic pay rates for senior staff incorporate all existing allowances including a supervisory and responsibility allowance and any contribution awards.

Pension benefits

All Senior Employees are ordinary members of the Research Councils' Pension Scheme (RCPS) which is a defined benefit scheme funded from annual grant-in-aid on a pay-as-you-go basis.

Further details about the RCPS can be found in Note 4(d) of the Annual Accounts.

The Cash Equivalent Transfer Value (CETV)

A Cash Equivalent Transfer Value (CETV) is the actuarially assessed capitalised value of the pension scheme benefits accrued by a member at a particular point in time. The benefits valued are the member's accrued benefits and any contingent spouse's pension payable from the scheme. A CETV is a payment made by a pension scheme or arrangement when the member leaves a scheme and chooses to transfer the benefits accrued in their former scheme. The pension figures shown relate to the benefits that the individual has accrued as a consequence of their total membership of the pension scheme, not just their service in a senior capacity to which disclosure applies. The CETV figures include the value of any pension benefit in another scheme or arrangement which the individual has transferred to the Research Councils' pension arrangements and for which the CS Vote has received a transfer payment commensurate with the additional pension liabilities being assumed. They also include any additional pension benefit accrued to the member as a result of their purchasing additional years of pension service in the scheme at their own cost.

The real increase in the value of the CETV

This reflects the increase in CETV effectively funded by the employer. It takes account of the increase in accrued pension due to inflation, contributions paid by the employee (including the value of any benefits transferred from another pension scheme or arrangement) and uses common market valuation factors for the start and end of the period.

Remuneration of Council Members

Members of Council receive an Honorarium of £6,280 per annum to cover all work for the Council including membership of Council's Boards and Science Management Audits. Board chairmen receive an honorarium of £8,370 per annum. These rates are effective from 1 October 2005 and are formulated by Department of Trade and Industry.

Council members are normally employed on fixed term contracts not exceeding four years.

Honoraria are not payable to members who are:

- civil servants
- employees of NERC
- full time employees of organisations whose funds are derived from Votes of Parliament (eg Government Departments, UK Atomic Energy Authority, British Broadcasting Corporation and other Research Councils).

Members of Council may not receive fees in addition to honoraria. University academic staff and retired civil servants are eligible to receive honoraria or fees.

Table 2: Membership of the NERC Council (2005-06)

Name	Affiliation	Period of appointment	Total Emoluments £'000 2005/06	2004/05	Note Ref
Mr R Margetts	Chairman	01 Jan 2001 - 31 Dec 2006	10 - 15	10 - 15	
Professor A Thorpe	Chief Executive and Deputy Chairman	01 Apr 2005 - 31 Mar 2009	0	n/a	1
Professor M Anderson	Professor of Physical Geography and Assistant Director, Institute for Advanced Studies, University of Bristol	01 Aug 2001 - 31 Jul 2007	5 - 10	5 - 10	
Professor J Beddington	Department of Environmental Science & Technology, Imperial College	01 Aug 2000 - 31 Jul 2006	5 - 10	10 - 15	
Professor H Dalton	Chief Scientific Adviser (CSA), Department for the Environment, Food and Rural Affairs (DEFRA)	01 Apr 2002 - 31 Mar 2006	0	0	1
Professor H Davies	Institute of Atmospheric & Climate Science, EHT	01 Aug 2005 - 31 Jul 2008	0 - 5	n/a	
Professor T Davies	School of Environmental Sciences, University of East Anglia	01 Nov 2001 - 31 Jul 2008	5 - 10	5 - 10	
Professor M Depledge	Head of Science for the Environment Agency	15 Sep 2003 - 31 Jul 2007	0	0	1
Professor A Fitter	Department of Biology, University of York	01 Aug 2005 - 31 Jul 2008	0 - 5	n/a	
Professor A Glover	Department of Molecular & Cell Biology, University of Aberdeen	01 Aug 2001 - 31 Jul 2007	5 - 10	5 - 10	
Professor A Halliday	Department of Earth Sciences, University of Oxford	22 Nov 2004 - 31 Jul 2008	5 - 10	0 - 5	
Mr P Hazell	Chairman of the Argent Group, Non-executive Director of UK Coal Plc, BRIT Insurance Plc and Smith & Williamson, member of the Competition Commission, Chair of Audit Committee	22 Nov 2004 - 31 Jul 2008	5 - 10	0 - 5	
Dr C Hicks	Director General of the British National Space Centre and Director-Space in the Department of Trade and Industry	04 Dec 2002 - 30 Apr 2006	0	0	1
Mr E Jenner	Technology and business consultant, formerly of AstraZeneca Plc, Chair of the Science and Innovation Strategy Board	01 Apr 2002 - 31 Jul 2008	10 - 15	10 - 15	2
Mrs K Morgan	Deputy Chairman of WaterAid, Chairman of the University of the West of England and a Director of Wessex Water	01 Aug 2002 - 31 Jul 2008	5 - 10	5 - 10	
Mrs S Parkin	Programme Director at Forum for the Future	01 Aug 2003 - 31 Jul 2006	5 - 10	5 - 10	
Professor J Petts	Head of School, School of Geography, Earth & Environmental Sciences, The University of Birmingham	01 Aug 2000 - 31 Jul 2006	5 - 10	5 - 10	
Professor D Read	Department of Animal & Plant Sciences, University of Sheffield	01 Jan 2000 - 31 Jul 2005	0 - 5	5 - 10	
Professor D Roberts	Distinguished Advisor at BP Explorations	01 Aug 2003 - 31 Jul 2006	5 - 10	5 - 10	

Notes

1 Honoraria are not payable to members who are civil servants, employees of NERC or full time employees of organisations whose funds are derived from Votes of Parliament.

2 Mr E Jenner received standard Council member rate and additional remuneration in respect of activities undertaken as the Chair of the Science and Innovation Strategy Board.

Professor Alan Thorpe
Chief Executive & Accounting Officer
Date : 30 June 2006

Annual accounts 2005-06

Statement of Council's and Chief Executive's Responsibilities with Respect to the Financial Statements

Under Paragraph 3 of Schedule 1 to the Science and Technology Act 1965 the Council is required to prepare a statement of accounts for each financial year in the form and on the basis directed by the Secretary of State for Trade and Industry, with approval of the Treasury. The accounts are prepared on an accruals basis and must show a true and fair view of the Council's state of affairs at the year end and of its income and expenditure, recognised gains and losses and cash flows for the financial year.

In preparing the accounts the Accounting Officer is required to comply with the requirements of the Government Financial Reporting Manual and in particular to:

- observe the accounts direction issued by the Secretary of State for Trade and Industry, including the relevant accounting and disclosure requirements, and apply suitable accounting policies on a consistent basis
- make judgements and estimates on a reasonable basis
- state whether applicable accounting standards as set out in the *Government Financial Reporting Manual* have been followed, and disclose and explain any material departures in the financial statements and
- prepare the financial statements on the going concern basis.

As the senior full-time official, the Chief Executive carries the responsibilities of an Accounting Officer for the Council. His relevant responsibilities as Accounting Officer, including his responsibility for the propriety and regularity of the public finances and for the keeping of proper records, are set out in the Non-Departmental Public Bodies' Accounting Officers' Memorandum, issued by the Treasury and published in 'Government Accounting' (The Stationery Office).

Statement on Internal Control

1. Scope of responsibility

As Accounting Officer, I have responsibility for maintaining a sound system of internal control that supports the achievement of the Natural Environment Research Council's policies, aims and objectives, whilst safeguarding the public funds and departmental assets for which I am personally responsible, in accordance with the responsibilities assigned to me in Government Accounting.

The powers, roles, responsibilities and membership of NERC Council are defined in its Royal Charter. The nature of the relationship with the sponsor department, the Office of Science and Innovation of the Department of Trade and Industry, is defined in the OSI/NERC Management Statement (2005)and Financial Memorandum (2005).

NERC Council has established three bodies to support it in discharging its responsibilities:

i the NERC Executive Board (NEB)
ii the Science & Innovation Strategy Board (SISB)
iii the Audit Committee.

The responsibilities of the Chief Executive, who is also the Accounting Officer of the Council, are set out in the OSI/NERC Management Statement and Financial Memorandum. I may delegate the administration of these responsibilities to Council's employees but may not assign any of the responsibilities absolutely to any other person.

2. The purpose of the system of internal control

The system of internal control is designed to manage risk to a reasonable level rather than to eliminate all risk of failure to achieve policies, aims and objectives; it can therefore only provide reasonable and not absolute assurance of effectiveness. The system of internal control is based on an ongoing process designed to identify and prioritise the risks to the achievement of departmental policies, aims and objectives, to evaluate the likelihood of those risks being realised and the impact should they be realised, and to manage them efficiently, effectively and economically. The system of internal control has been in place in NERC for the year ended 31 March 2006 and up to the date of approval of the annual report and accounts, and accords with Treasury guidance.

3. Capacity to handle risk

Overall responsibility for risk management in NERC lies with the Chief Executive, who as the NERC Accounting Officer signs this annual Statement of Internal Control as part of the audited Annual Accounts. Currently I delegate the task of implementing and maintaining the risk management policy and strategy to the Director Finance and Information Systems who fulfils the role of Director Responsible for Risk. The Director Responsible for Risk's responsibilities include overseeing the activities of the Risk Management Network (see para 5) and reporting on risk management to the NERC Executive Board (NEB). NERC Directors have a responsibility to ensure the effective application of NERC's risk management strategy and policy. These arrangements ensure risk management is an integral part of NERC's management style and is tied to core activities and Operating Plan targets and milestones.

NEB is the owner of the NERC Risk Management Strategy and is responsible for reporting issues relating to risks and their management to Council, and for receiving assurance from NERC staff that risks are managed appropriately and passing this assurance to Council.

In executing these responsibilities the role of NEB can be characterised as follows:

Monitor:	i	overseeing the process
	ii	noting business critical risks
	iii	noting mitigation strategies
	iv	reviewing audit output
	v	carry out an annual review of risk and the risk management systems in place
Decide:	i	setting and communicating the NERC level risk appetite
Direct:	i	setting delegated authority levels
	ii	solving risk management dilemmas (when asked to do so).

The NEB will review specific, high risk, matters on a monthly basis together with issues relating to any risks that are referred upwards by Research Centre Directors and others via the agreed escalation procedures.

NEB encourages sound properly managed risk taking and recognises that effective risk management, rather than risk avoidance, is an essential ingredient for successful business operations.

NEB Directors appoint 'owners' for all risk threats as they emerge. These risk owners are most likely to be middle / senior managers within NERC Swindon Office and the Research Centres /Laboratories. Risk owners have responsibility for the practical day to day management of risks and are responsible for ensuring that appropriate management plans are

prepared and that risk response actions are carried out effectively. Responsibility for managing key business risks is retained at a senior level.

Risks are managed by trained and experienced people. All staff in NERC participate in an annual appraisal, where individual training needs and personal development requirements are identified and assessed. Specific risk management training is provided in response to ad hoc requests.

The NERC Risk Management Network, which currently meets twice each year, helps promote best practice in risk management across NERC by sharing lessons learnt and monitoring compliance with (and continued relevance of) the NERC Risk Management Strategy and Policy (which are available to all staff via the NERC extranet).

4. The risk and control framework

The purpose of the NERC Risk Management Strategy is to describe at a high level how NERC will implement its Risk Management Policy, setting out the necessary organisation, roles and responsibilities, along with the framework and underlying principles of the control system.

NERC Directors have a responsibility to ensure the effective application of NERC's risk management strategy and policy. Directors must satisfy themselves that the following issues have been adequately addressed within their areas of responsibility:

- the requirements of corporate governance – these include developing more focused and open ways of managing risk and ensuring that all NEB decisions on managing risk are implemented
- the need to identify appropriate 'risk owners' at a sufficiently senior level for all identified risks
- the adequacy of reporting arrangements that ensure the timely escalation of major risk issues internally within their area of responsibility; and, where appropriate externally to NEB. And that these arrangements are in line with delegated authority levels and the provisions of Research Centre Management Statements (where these apply)
- the need to ensure a shared understanding of risk management principles, thereby ensuring a consistent approach to the treatment of risks at all levels
- deciding the overall risk tolerance level, or 'risk appetite' for areas that they have a responsibility for (mindful of the NERC level risk appetite determined by NEB).

During 2005-06 NERC developed and introduced a web-based database to host the NERC risk register. The system is known as STAR (System for Targets and Risks).

STAR is the cornerstone of NERC risk management process and provides a single system for recording business risks, business critical projects and delivery plan targets /milestones. In addition to attaching scores to risks and identifying mitigation tactics, STAR also records information concerning quarterly progress against plan by way of a 'traffic light system'. Reports from STAR are considered by NEB (delivery plan targets/milestones exception report) and the NERC Audit Committee (business critical projects status report). STAR also provides the quarterly report to OSI that details progress towards achieving NERC delivery plan targets and milestones.

5. Review of effectiveness

As Accounting Officer, I have responsibility for reviewing the effectiveness of the system of internal control operating within NERC. My review of the effectiveness of the system of internal control is informed by:

- Director's Annual Statements on Internal Control (DASIC)
- the advice of the Audit Committee
- the advice of the Risk Management Network
- the work of the internal auditors
- comments made by the external auditors in their management letter and other reports
- feedback from other consultancy and review activities.

The DASIC exercise provides the main evidence informing the nature of my own assurance on internal controls as these assurances come from senior managers responsible for the development and maintenance of the NERC internal controls framework.

The Audit Committee has a duty to monitor NERC's internal control systems. The Audit Committee receives reports, directly and through internal audit and may refer any matter within its terms of reference to the NEB or Council and make recommendations concerning actions to be taken.

A network of managers responsible for the practical implementation of the NERC Risk Management Strategy in each of NERC's business units has been established and is known as 'the Risk Management Network'. The Network also includes members with special relevant expertise, for example the NERC Health and Safety Adviser and Security Adviser. The Network is chaired by the NERC Swindon Office Business Manager for Finance and Estates, and meets at least twice a year. Ad hoc meetings may be convened to discuss and prepare advice on issues of urgency.

As part of its governance responsibilities, the NERC Executive Board (NEB) undertakes an annual review of the risks to which NERC is exposed. To help discharge this responsibility, NEB has approved a Risk Management Policy and Risk Management Strategy; agreed to the creation of a Risk Management Network; and to the appointment of a Risk Management Co-ordinator. The purpose of this post is to support the Director Responsible for Risk and Chair of the Risk Management Network in carrying out their responsibilities; and to focus management attention to risk management and provide a central reference point for risk management issues within NERC.

I have been advised on the implications of the result of my review of the effectiveness of the system of internal control by the NERC Executive Board, the Audit Committee and the Director Responsible for Risk.

6. Significant internal control problems (if applicable)

My review did not identify any significant internal control weaknesses.

Professor Alan J. Thorpe
Chief Executive & Accounting Officer
Date: 30 June 06

The Certificate and Report of the Comptroller and Auditor General to Houses of Parliament

I certify that I have audited the financial statements of the Natural Environment Research Council for the year ended 31 March 2006 under the Science and Technology Act 1965. These comprise the Income and Expenditure Account, the Balance Sheet, the Cashflow Statement and Statement of Total Recognised Gains and Losses and the related notes. These financial statements have been prepared under the accounting policies set out within them.

Respective Responsibilities of the Council, Chief Executive and Auditor

The Council and Chief Executive are responsible for preparing the Annual Report, the Remuneration Report and the financial statements in accordance with the Science and Technology Act 1965 and Secretary of State for Trade and Industry directions made thereunder and for ensuring the regularity of financial transactions. These responsibilities are set out in the Statement of Council and Chief Executive's Responsibilities. My responsibility is to audit the financial statements in accordance with relevant legal and regulatory requirements, and with International Standards on Auditing (UK and Ireland).

I report to you my opinion as to whether the financial statements give a true and fair view and whether the financial statements and the part of the Remuneration Report to be audited have been properly prepared in accordance with the Science and Technology Act 1965 and Secretary of State for Trade and Industry directions made thereunder. I also report whether in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. I also report to you if, in my opinion, the Annual Report is not consistent with the financial statements, if the Natural Environment Research Council has not kept proper accounting records, if I have not received all the information and explanations I require for my audit, or if information specified by relevant authorities regarding remuneration and other transactions is not disclosed.

I review whether the statement on page 71 to 73 reflects the Natural Environment Research Council's compliance with HM Treasury's guidance on the Statement on Internal Control, and I report if it does not. I am not required to consider whether the Accounting Officer's statements on internal control cover all risks and controls, or form an opinion on the effectiveness of the Natural Environment Research Council's corporate governance procedures or its risk and control procedures.

I read the other information contained in the Annual Report and consider whether it is consistent with the audited financial statements. This other information comprises World class science, Review, Science Highlights, Science for Society, Skilled people, Leadership, the Organisation, Vital statistics, the unaudited part of the Remuneration Report and the Management Commentary. I consider the implications for my report if I become aware of any apparent misstatements or material inconsistencies with the financial statements. My responsibilities do not extend to any other information.

Basis of audit opinions

I conducted my audit in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board. My audit includes examination, on a test basis, of evidence relevant to the amounts, disclosures and regularity of financial transactions included in the financial statements and the part of the Remuneration Report to be audited. It also includes an assessment of the significant estimates and judgments made by the Council and Chief Executive in the preparation of the financial statements, and of whether the accounting policies are most appropriate to the Natural Environment Research Council's circumstances, consistently applied and adequately disclosed.

I planned and performed my audit so as to obtain all the information and explanations which I considered necessary in order to provide me with sufficient evidence to give reasonable assurance that the financial statements and the part of the Remuneration Report to be audited are free from material misstatement, whether caused by fraud or error and that in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them. In forming my opinion I also evaluated the overall adequacy of the presentation of information in the financial statements and the part of the Remuneration Report to be audited.

Opinions

In my opinion:

- the financial statements give a true and fair view, in accordance with the Science and Technology Act 1965 and directions made thereunder by the Secretary of State for Trade and Industry, of the state of the Natural Environment Research Council's affairs as at 31 March 2006 and of its deficit for the year then ended;
- the financial statements and the part of the Remuneration Report to be audited have been properly prepared in accordance with the Science and Technology Act 1965 and Secretary of State for Trade and Industry directions made thereunder; and
- in all material respects the expenditure and income have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them.

I have no observations to make on these financial statements.

John Bourn
Comptroller and Auditor General
Date: 6 July 2006

National Audit Office
157-197 Buckingham Palace Road
Victoria, London SWIW 9SP

Income and Expenditure Account for the year ended 31 March 2006

		2006	2005
		£000	£000
Income	Note		
Parliamentary Grant-in-Aid	2	263,937	280,669
Release of Government Grant Reserve	14	17,720	12,619
Other income	3	54,700	49,469
Total income		**336,357**	342,757
Expenditure			
Staff costs	4(b)	106,640	91,752
Staff early retirements	5	1,767	870
Grants and Training	6	116,235	103,643
Other operating costs	7	120,149	115,609
Depreciation	9 (a)	18,840	16,909
Exceptional Item -Impairment of fixed assets	9(a)	592	-
Total Expenditure		**(364,223)**	(328,783)
Operating (Deficit)/Surplus for the Year		**(27,866)**	13,974
Notional Cost of Capital	13	(7,272)	(6,983)
CEH restructuring	9(a), 12	(21,379)	-
Financing Lease Interest		(1,475)	(1,544)
Interest receivable	8	22	32
Unwinding of Discount	12	(462)	(572)
Change in Discount Rate	12	(855)	-
Loss on disposal of fixed assets		(146)	(175)
(Deficit)/Surplus for the Year		**(59,433)**	4,732
Reversal of notional cost of capital	13	7,272	6,983
Accumulated Income and Expenditure brought forward		10,432	(3,856)
Transfer from Reserves	14	2,699	2,573
Accumulated (Deficit)/Surplus carried forward		**(39,030)**	10,432

Accumulated Income and Expenditure reserves are shown at note 14.

All activities are continuing.

Balance sheet as at 31 March 2006

	Note	£000	31 March 2006 £000	£000	31 March 2005 £000
Fixed Assets					
Tangible assets	9	264,349		240,885	
Investments	9 (c)	362		398	
			264,711		241,283
Current Assets					
Debtors	10	32,914		34,105	
Cash at bank and in hand		10,640		27,162	
		43,554		61,267	
Current Liabilities					
Creditors falling due within one year	11 (a)	(45,274)		(30,654)	
Net current (liabilities)/assets			**(1,720)**		30,613
Total assets less current liabilities			**262,991**		271,896
Creditors falling due after more than one year	11 (b)		(16,322)		(17,257)
Provisions for liabilities and charges	12		(35,598)		(18,766)
Total Assets Less Liabilities			**211,071**		235,873
Capital and Reserves					
Government Grant Reserve	14		183,313		168,993
Capital Land Reserve	14		4,075		4,075
Revaluation Reserve	14		62,301		52,373
Accumulated Income and Expenditure Account	14		(39,030)		10,432
Donated Asset Reserve	14		412		-
Total Government Funds	14		**211,071**		235,873

Professor Alan Thorpe
Chief Executive & Accounting Officer
Date: 30 June 2006

Cash flow statement for the year ended 31 March 2006

	Notes	£000	2006 £000	£000	2005 £000
Net cash (outflow)/inflow from operating activities	15		(14,260)		11,594
Returns on investments and servicing of finance					
Interest Received	8	22		32	
Interest Element of Finance Lease Payments		(1,475)		(1,544)	
			(1,453)		(1,512)
Capital Expenditure					
Payments to acquire tangible fixed assets		(32,040)		(27,915)	
Receipts from disposal of tangible fixed assets		52		164	
			(31,988)		(27,751)
Net cash outflow before financing			**(47,701)**		(17,669)
Financing					
Capital Grant-in-Aid received	14	32,040		27,915	
Capital Element of Finance Lease Payments		(861)		(790)	
			31,179		27,125
(Decrease)/Increase in Cash	16		**(16,522)**		9,456

Statement of total recognised gains and losses for the year ended 31 March 2006

	2006 £000	2005 £000
(Deficit)/Surplus for the year	(59,433)	4,732
Capital Grant-in-aid received	32,040	27,915
Release of Government Grant reserve	(17,720)	(12,619)
Impairment of assets recorded through revalution reserve	(2,681)	-
Assets donated to NERC in year	412	-
Gain on revaluation of fixed assets	15,308	6,805
Reversal of Notional Cost of Capital	7,272	6,983
Total recognised losses and gains during the year	**(24,802)**	33,816

Notes to the Accounts

1. Accounting Policies

a. *Basis of Accounting*

(i) The accounts have been prepared under the historical cost convention, modified to include revaluation of fixed assets. The accounts have been prepared in accordance with a direction given by the Secretary of State for Trade and Industry, with the approval of Treasury, in pursuance of Section 2(2) of the Science and Technology Act 1965.

(ii) The accounts meet the accounting and disclosure requirements of the Companies Act 1985 and accounting standards issued or adopted by the Accounting Standards Board in as far as these requirements are appropriate. The Council is exempted from producing a note of historical cost profits and losses normally required by Financial Reporting Standard Number 3.

(iii) The accounts of all NERC owned establishments have been incorporated into these accounts.

b. *Fixed Assets and Depreciation*

Tangible Fixed Assets

Expenditure on fixed assets includes the purchase of land and buildings, construction and services projects, and equipment valued at £5,000 or more.

Tangible fixed assets are stated at the lower of depreciated historical cost or valuation. Costs of acquisition, comprising only those costs that are directly attributable to bringing the asset into working condition for its intended use, are capitalised. Land, buildings, ships and aircraft are independently and professionally revalued every five years. These assets are subject to annual indexation when a full revaluation is not completed.

Polaris House, which is jointly owned by the Research Councils, was revalued in 2005-06 by Powis Hughes Associates. All other land and buildings were valued by Powis Hughes Associates during 2002-03 in accordance with SAVP and RICS guidance notes. The basis of valuation was open market value for either existing or alternative use where this could be established or depreciated replacement cost in the case of specialised scientific buildings.

RRS *James Clark Ross* and RRS *Ernest Shackleton* were revalued in 2001-02 by Mr Bruce Buchan M.A., F.C.I.Arb. and the aircraft by the International Bureau of Aviation Group Limited. RRS *Charles Darwin* and RRS *Discovery* were independently and professionally revalued by Mr Bruce Buchan M.A., F.C.I.Arb in 2005-06.

Plant and Equipment and Motor Vehicles are revalued using relevant indices.

Surplus or deficit on revaluation is taken to a Revaluation Reserve, except that any permanent diminution in value is charged to the Income and Expenditure Account in the year in which it is recognised.

Increased depreciation charges arising from the revaluation are matched by annual transfers from the revaluation reserve to the Income and Expenditure Account. On the disposal of a revalued asset, that element of the Revaluation Reserve which becomes realised as a result is transferred directly to the Accumulated Income and Expenditure Account.

Freehold land is not depreciated. All other tangible fixed assets are depreciated in order to write off the value of the asset less its estimated residual value over their estimated useful economic lives using straight-line depreciation methodology. These lie within the following ranges :-

Leasehold land	-	over the terms of the lease
Freehold buildings	-	up to 50 years or valuer's estimates of economic life
Long leasehold buildings	-	up to 50 years (or the length of the lease if less)
Short leasehold buildings	-	over the length of the lease
Plant and machinery	-	10 to 15 years
Ships and aircraft	-	minimum of 20 years for ships, 15 years for aircraft
Scientific equipment	-	5 to 10 years
Office and major computing equipment	-	5 to 10 years
Personal computers	-	3 years
Motor vehicles	-	3 to 7 years
Assets under construction	-	not depreciated until brought into use

Fixed assets are not depreciated in the month of acquisition and are depreciated by a full month in the month of disposal.

In accordance with the provisions of FRS 15 paragraph 83, the components of assets with substantially different economic lives are accounted for separately for depreciation purposes and depreciated over their individual useful economic lives.

Donated Assets
Assets which are gifted by third parties are classified as donated assets. These are shown at the lower of current value on receipt or the value of the service provided where the asset is overspecified for its intended use. Donated assets are revalued, depreciated and subject to impairment reviews in the same way as other assets. The amount capitalised is credited to the donated asset reserve. Each year, an amount equal to the depreciation charge on the asset and any impairment will be released from the donated asset reserve to the Income and Expenditure Account. No cost of capital charge is imposed.

Investments
Investments are shown at market value. Any surplus or temporary deficit on revaluation is taken to the revaluation reserve. Any permanent impairment in value is charged to the income and expenditure account in the year that its arises.

c. Ownership of Equipment Purchased with NERC Research Grants
Equipment purchased by an Institution with research grant funds supplied by the NERC belong to the Institution and are not included in NERC's tangible fixed assets. Through the Conditions of Grant applied to funded Institutions, NERC reserves the right to determine the disposal of such equipment and how any disposal proceeds are to be utilised.

d. Government grants receivable
Grant-in-aid is recognised in the Income and Expenditure Account when received.

Grant-In-Aid applied for the purchase of land is credited to the Capital Land Reserve and that applied to the purchase of other fixed assets is credited to the Government Grant Reserve and released to the Income and Expenditure Account over the expected useful economic lives of the related assets.

e. Research and Development
As an organisation wholly engaged in research, NERC does not classify research and development expenditure separately in the accounts. It is reported under operating costs in the Income and Expenditure account.

Intellectual property rights arising from the Council's research and development have not been included in these accounts as their market value cannot be readily estimated. The anticipated annual income generated from such rights is not material in value and is credited to the Income and Expenditure Account on receipt.

f. Insurance
In line with Government policy, NERC carries its own risks in respect of employment of staff, buildings, equipment, stocks, etc, except where there exists a statutory requirement to insure or where commercial insurance represents better value for money.

g. Foreign Currencies
Assets and liabilities denominated in foreign currencies are expressed in pounds sterling at the rate(s) of exchange ruling at the balance sheet date. Transactions in foreign currencies are recorded at the rate ruling at the time of the transaction. All exchange differences are taken to the Income and Expenditure Account.

h. Value Added Tax
As NERC is partially exempt for VAT purposes, irrecoverable VAT is charged to the relevant expenditure category or included in the capitalised purchase cost of fixed assets. Where output tax is charged or input tax is recoverable the amounts are stated net of VAT.

i. Stocks, work-in-progress and long term contracts
The net realisable value of stocks is minimal and the costs of additions to stock are charged to the Income and Expenditure Account in the year of purchase. Amounts recoverable on long term contracts are stated at cost plus attributable profits less provision for any known or anticipated losses and payments on account.

j. Pension and Early Retirement Costs
Payments are made to the Research Councils' Pension Scheme in respect of superannuation benefits for Council staff. The cost of early retirements are charged to NERC's accounts in the year in which the decision is taken to release staff and a provision for early retirement cost created. This provision is released to fund early retirement costs when they are paid.

The provision for these costs is discounted at the HM Treasury rate of 2.8% (2004/05: 3.5%). The unwinding of the discount is charged to the Income and Expenditure Account.

Payments by the Council of early retirement lump sums are recoverable from the Research Councils' Pension Scheme when recipients achieve normal retirement age. Recoverable amounts are recognised as debtors in these accounts and offset against annual staff restructuring costs.

k. Notional Costs

In line with HM Treasury requirements, a notional interest charge is included in the accounts to reflect a charge for the use of capital in the business in the year, as the Council has no specific interest bearing debt. In accordance with Treasury guidance, the calculation is based on a 3.5% rate of return on average net assets employed (2004/05: 3.5%) less amounts held with Paymaster General and donated asset reserve.

l. Provisions

Provisions are recognised when it is probable that NERC will be required to settle a present obligation and a reliable estimate can be made of that obligation. The obligation is normally the amount that the entity would rationally pay to settle the obligation at the balance sheet date or to transfer it to a third party at that time.

This may require estimating the future cash flows in current-year prices (i.e. at the price level prevailing in the year covered by the accounts) and, where the time value of money is material, discounting them at the standard public sector real rate set by HM Treasury- currently 2.8% for pension provisions and 2.2% for all other provisions.

m. Finance Lease

NERC has the use of a ship for which substantially all risks and rewards of the asset are transferred to the Council. The asset is capitalised and is subject to the same revaluation policy as other tangible fixed assets and is depreciated over the shorter of its estimated useful economic life or the lease period with the outstanding lease obligations (net of interest) shown in creditors. Finance charges are charged to the Income and Expenditure Account over the period of the agreement in accordance with the interest rate within the contract.

n. Operating Leases

Operating lease rentals are charged to the income and expenditure accounts on a straight line basis over the period of the lease.

2. Parliamentary Grant-in-Aid

	2006 £000	2005 £000
Amounts paid by the Department of Trade and Industry	295,977	308,584
Amount provided for capital expenditure (note 14)	(32,040)	(27,915)
Amount for revenue activities credited to the Income and Expenditure Account	**263,937**	280,669

3. Other Income

	2006 £000	2005 £000
(a) Income from Government Departments		
Department for Environment Food and Rural Affairs	4,319	4,476
Department of Trade and Industry	2,904	3,369
Ministry of Defence	608	389
Department for International Development	1,532	1,279
Other Departments	5,556	5,198
Total Income from Government Departments	**14,919**	14,711
(b) Income from Other Bodies		
European Community	2,686	4,138
Other Research Councils	5,698	2,262
Other Public Sector	3,065	1,988
Private Sector	16,266	16,206
Total Income from Other Bodies	**27,715**	24,594
(c) Other Operating Income		
Software and data sales	1,694	1,493
Scientific publications	522	579
Library and administrative services	1,021	1,546
Property and equipment rentals	1,251	1,199
Sales of products	77	80
Lecture fees, seminars and training courses	118	274
Promotional items	173	152
Royalties and licence fees from intellectual property	1,804	1,452
Reimbursement of expenditure	2,827	2,074
Other income	2,579	1,315
Total Other Operating Income	**12,066**	10,164
Total Other Income	**54,700**	49,469

4. Salaries and Wages

(a) Staff Numbers

Staff numbers that have been capitalised during the year have been estimated as 18 full time equivalents.
The average staff numbers employed during the year was made up as follows:

	2006 No.	2005 No.
Administrative	615	610
Scientific	1,353	1,346
Professional and Technical	394	390
Marine and Antarctic Contract	274	282
Staff on inward secondment/loan	5	5
Agency/temporary and contract staff	74	59
	2,715	2,692

Note: the total numbers of staff reported on pages 35 and 48 in the Annual Report of 2,736 includes all starters and leavers in year, whereas the above figures are an average for the year.

(b) Staff Costs

In 2005-06 staff on secondment/loan/temporary and contract staff totals £4,000,000 (2005: £4,061,000) and are included in the figures below. Agency costs of £1,118,000 (2005: £1,067,000) have been included in operating costs.

Staff costs	2006 £000	2005 £000
Salaries and wages	82,259	77,785
Social Security costs	6,713	6,350
Other pension costs (note 4e)	17,668	7,617
	106,640	91,752

In addition, the total amount capitalised for staff costs in 2005/06 is £697,837 (2005: £1,253,268).

(c) *Remuneration to Council and Committee Members/Peer Review College*

The following are included in Staff Costs, note 4(b), Other Operating Costs, note 7 and Staff Costs, note 4(d) (pensions).

	2006	2005
	£000	£000
Council Members' fees	103	90
Committee Members'/Peer Review	335	213
Other emoluments	114	99
Pensions	2	6
	554	408

Committee members may receive £160 (2005: £150) per day.

Committee Chairman may receive £215 (2005: £200) per day.

British Geological Survey Programme Board members receive £3,000 per annum (2005: £3,000).

British Geological Survey Programme Board Chairman receives £4,000 per annum (2005: £4,000).

British Antarctic Survey Independent Board member received £5,000 per annum (2005 : £5,000)

Chairmen of Boards of Council receive £8,160, £8,370 with effect from 1/10/05 (2005: £8,160).

All emoluments are non-pensionable.

Peer Review College members receive honoraria of £1,000 per annum. The Peer Review College Associate members receive honoraria of £500 per annum.

Peer Review College Members are initially employed for 1 year commencing 1 June.

Number of Council, Committee and Board Members

	2006	2005
	No.	No.
Council Members*	18	17
Committee/Peer Review College and Board Members	267	254
	285	271

** includes Chief Executive and Chairman*

Council/Committee and Peer Review College Members' emoluments fell into the following bands:

£0 to £5,000	273	254
£5,001 to £10,000	10	10
£10,001 to £15,000	2	7
	285	271

(d) *Superannuation*

Pension scheme payments

	2006	2005
	£000	£000
Payments in respect of the Research Councils' Pension Scheme (RCPS)	15,963	7,171
Payments to pension schemes other than the RCPS:-		
Merchant Navy Officers' Pension Fund	143	43
Merchant Navy Officers' Pension Plan	6	6
Merchant Navy Ratings' Pension Fund	1,476	349
Merchant Navy Ratings' Pension Plan	5	5
Partnership Pensions	75	43
	17,668	7,617

Most employees of NERC are members of the Research Councils' Pension Scheme (RCPS) which is a defined benefit scheme funded from annual Grant-In-Aid on a pay-as-you-go basis. The pension scheme is non-contributory and the benefits are analogous to the Principal Civil Service Pension Scheme, except that while the scheme provides retirement and related benefits based on final emoluments, redundancy and injury benefits are administered and funded by the Council. The pension scheme is administered by the Research Councils' Joint Superannuation Services, and the finances administered by the Biotechnology and Biological Sciences Research Council(BBSRC). The scheme is a multi-employer scheme, for which a separate Research Councils' Pension Scheme Account is published. The Council are unable to identify their share of the underlying assets and liabilities.

From 1 April 1996 the Council has paid employer's contributions to the Research Councils' Pension Scheme, at a percentage of scheme members' pensionable pay as assessed by the Government Actuary's Department on a periodical basis. The current contribution rate is based on an assessment for the year ending 1997/98. An actuarial valuation for the scheme was carried out on 31 March 2002 and reported a required increase from 10.1% to 21.3% effective from 1 April 2005. NERC paid costs in the year of £15,963,334.

With effect from 1 October 2002, in line with arrangements throughout the Civil Service, a new RCPS sub-scheme was introduced. Employees were given the option of remaining in the existing 'Classic' scheme with an employee contribution of 1.5% of pensionable pay; joining the new 'Premium' scheme with their existing pension entitlement converted into the new scheme with an employee contribution of 3.5%; or joining the 'Classic Plus' scheme for future service only, with an employee contribution of 3.5% of pensionable pay, with existing pension benefits prior to 1 October 2002 being broadly calculated on the 'Classic' scheme.

All new employees with effect from 1 October 2002 were given the option of joining the Premium scheme or alternatively a Partnership Pension Account. This is a stakeholder-type defined contributions scheme where the employer pays a basic contribution of between 3% and 12.5% (depending on the age of the member) into a stakeholder pension product. The employee does not have to contribute but where they do make contributions, these will be matched by the employer up to a limit of 3% (in addition to the employer's basic contribution). NERC also contributes a further 0.8% of pensionable salary to cover the cost of risk benefit cover (death in service and ill health retirement).

The Council also paid contributions during the year to a number of other multi-employer Pension Schemes for specific groups of employees, details of these schemes are shown below:-

Scheme	Rate of Contribution	Year of Last Valuation
Falkland Island's Government Service Pension#	£34 per week	N/A
Merchant Navy Officers' Pension Fund^	11.9%	2004
Merchant Navy Officers' Pension Plan	5.1%	2000
Merchant Navy Ratings' Pension Fund*	8%/2%	2002
Merchant Navy Ratings' Pension Plan	5.1%	2000

 # The Falkland Island's Government Service Pension is a coin of the realm scheme, for which contributions are set at defined levels rather than as a percentage of pensionable emoluments.

^ The Merchant Navy Officers' Pension Fund last year was subject to an actuarial valuation and was showing a deficit overall. NERC held a provision for our share amounting to £408,000 last year and made a one off payment this year in full settlement of £497,733.

**The Merchant Navy Ratings' Pension Fund closed on 31st May 2001. This Fund has a deficit, the liability for which is shared between members' employing organisations, we currently hold a provision for our share amounting to £1,579,000. This is an increase from £106,000 as at 31 March 2005, which has arisen from the requirement to fund the deficit identified by the 2005 actuarial valuation of the pension scheme, and from one of the voluntary employers declining to extend their contributions beyond 2005/06. On closure of the fund members transferred to the RCPS or the new Merchant Navy Ratings' Pension plan which is a money purchase scheme. 2% of the residual employers contributions are still paid to the closed scheme for members who opted for section 148 revaluation of accrued pension.*

5. Staff Restructuring/Early Retirements

	2006	2005
	£000	£000
Annual Compensation Payments	39	58
Redundancy Compensation Payments	399	786
Early Retirement Lump Sums	563	296
Provision for Early Retirement Liability (Note 12)	1,353	234
Recoverable Early Retirement Lump Sums	(587)	(504)
	1,767	870

6. Grants and Training

	2006 £000	2005 £000
(a) Research Grants - Analysis by Scientific Area		
Atmospheric Science	15,064	10,186
Earth Science	8,754	7,870
Marine Science	12,041	10,649
Terrestrial and Freshwater Science	17,112	17,593
	52,971	46,298
(b) Research Contracts - Analysis by Scientific Area		
Atmospheric Science	8,148	5,274
Earth Science	1,847	1,861
Earth Observation Science	4,215	3,102
Marine Science	11,217	12,099
Terrestrial and Freshwater Science	2,898	2,172
Scientific Services	6,309	6,516
	34,634	31,024
(c) Post Graduate Training Awards		
Research Masters	3,518	3,481
Research Studentships	20,623	19,268
Research Fellowships	4,489	3,572
	28,630	26,321
Total Grants and Training Awards	**116,235**	103,643

7. Other Operating Costs

	Note	2006 £000	2005 £000
Rent and Rates		3,330	3,012
Maintenance, Cleaning, Heating and Lighting	(ii)	(539)	3,106
Office Supplies, Printing and Stationery		3,018	2,954
Laboratory Supplies, Computing and Field Equipment		13,312	11,865
Postage, Telephone and Other Telecommunications		1,549	1,727
Hospitality		731	733
Audit Fee		50	48
Travel and Subsistence		7,777	7,026
Ships and Aircraft Operations		9,208	8,629
External Training		966	963
Professional and Research Services by Outside Bodies	(i)	80,744	75,428
Operating Leases		153	148
(Decrease) in provision for bad debt		(150)	(30)
		120,149	115,609

Note:
(i) NERC was the host Council for the Joint Training Section and also host to the Research Councils' Procurement Organisation. The total operating expenses for these services are included within the Other Operating Costs above. The contributions from other Councils, which exclude any RCPO and JTS staff costs met directly by each Council, were £753,354 (2005:£600,577). These receipts are included under Other Operating income at note 3c.
(ii) Includes a write back of BAS Decommissioning provision of £5,838,000 this year (see note 12).

8. Interest Receivable

	2006 £000	2005 £000
Interest on bank balances	22	32

9(a). Tangible Fixed Assets

Cost or Valuation	Land and Buildings[i][iv] & [vi] £000	Plant and Equipment [v] £000	Ships and Aircraft [iii] & [iv] £000	Motor Vehicles [ii] £000	Total £000
At 1 April 2005	244,373	75,281	144,572	5,837	470,063
Additions	5,512	11,440	14,757	331	32,040
Revaluation	10,398	1,863	3,857	259	16,377
Disposals	(57)	(3,378)	-	(487)	(3,922)
Impairment	(5,522)	-	(705)	-	(6,227)
At 31 March 2006	254,704	85,206	162,481	5,940	508,331
Depreciation					
At 1 April 2005	95,864	46,421	82,338	4,555	229,178
Charge for the year	4,465	9,652	4,184	539	18,840
Revaluation	537	134	19	3	693
Disposals	(12)	(3,329)	-	(455)	(3,796)
Impairment	(885)	-	(48)	-	(933)
At 31 March 2006	99,969	52,878	86,493	4,642	243,982
Net Book Value At 31 March 2006	**154,735**	**32,328**	**75,988**	**1,298**	**264,349**
At 1 April 2005	148,509	28,860	62,234	1,282	240,885

Notes:
(i) Cost / Valuation includes £13,083,146 in respect of Freehold Land which is not depreciated (2005: £12,890,826)
(ii) Including specialised Antarctic Vehicles.
(iii) The NBV of the leased ship is £26,252,498 following revaluation (2005: £26,274,241). The annual depreciation charge on this asset held under the finance lease was £2,125,840 for the year (2005: £1,968,637).
(iv) The exceptional item of £592,000 in the Income and Expenditure Account relates to impairment following a professional revalution of the RRS Charles Darwin and RRS Discovery ships. In addition, CEH sites to be disposed were also impaired and are included in the CEH restructuring line in Income and Expenditure Account. In accordance with FRS 11 the balance of £2,681,000 has been debited to the revaluation reserve and has been included in the Statement of Total Recognised Gains and Losses.
(v) Donated assets (£411,561) were gifted to NERC from PPARC and Leicester University as at 31 March 2006 at the current value on receipt. There is no restriction on the use of these assets.
(vi) Polaris House was revalued by Powis Hughes as at 31 March 2006 to £19,800,000. The NERC share (27.4%) amounts to £5,425,200.

9(b). The net book value of land and buildings comprises:

	2006 £000
Freehold	38,978
Long leasehold	96,940
Short leasehold	1,877
Antarctic buildings	6,054
Under Construction	10,886
Total Net Book Value	**154,735**

9(c). Fixed Asset Investments

	2006 £000
Valuation as at 1 April 2005	398
Revaluation	(36)
Valuation as at 31 March 2006	**362**

Notes :
The Council holds 252,000 shares in Evolutec Group PLC, a company engaged in the commercial development of NERC inventions and know-how. This equity provision was received in return for company access to NERC intellectual property. The shares are publicly traded on the Alternative Investment Market of the London Stock exchange and had a current open market value of 143.5 pence per share at 31 March 2006. NERC's shareholding represented 1.07% of the issued capital of Evolutec Limited at 31 March 2006.

10. Debtors

	£000	2006 £000	£000	2005 £000
(a) Amounts falling due within one year:				
Trade debtors		4,607		5,172
Intra Government				
Central Government bodies	4,745		4,464	
Local Authorities	114		92	
		4,859		4,556
Other debtors		588		804
Early retirement lump sum repayments		1,231		795
Pre-payments		11,950		12,520
Accrued income		5,570		5,655
Provision for bad debts		(213)		(363)
		28,592		29,139
(b) Amounts falling due after one year:				
Early retirement costs in respect of former employees due from Pension Fund on normal retirement date.		**4,322**		4,966
Total Debtors		**32,914**		34,105

11. Creditors

	£000	2006 £000	£000	2005 £000
(a) Amounts falling due within one year:				
Trade Creditors		7,451		3,038
Intra Government				
Central Government bodies	1,640		555	
Local Authorities	585		13	
		2,225		568
Other Creditors		20,115		12,989
Taxation and Social Security		-		1,087
Early Retirements		1,869		2,025
Accruals & Deferred Income		10,477		8,399
Obligation under finance leases		933		859
Monies held on behalf of EC Programme Collaborators		2,204		1,689
		45,274		30,654
(b) Amounts falling due after more than one year:				
Obligation under finance leases		16,322		17,257

12. Provisions for Liabilities and Charges

	Note	Antarctic Treaty Costs[2] £000	Early Retirements £000	Other Liabilities[3,5] £000	Total £000
At 1 April 2005		12,194	4,447	2,125	18,766
Change in discount rate	1	680	106	69	855
Write back of provisions not required	4	(5,838)	-	-	(5,838)
Amounts provided in year	4	480	18,543	5,737	24,760
Unwinding of discount		283	127	52	462
Provision utilised in year		(554)	(2,080)	(773)	(3,407)
Provision at 31 March 2006		7,245	21,143	7,210	35,598

Notes :

1. *The discount rate changed from 3.5% to 2.8% for pension provisions and 2.2% for all other provisions.*
2. *Antarctic Treaty Costs represents the Council's Liability to remove the items no longer used from the Antarctic, payments are likely to be made against this provision over the next three years.*
3. *Other liabilities includes claims made against NERC and commitments to onerous operating lease payments, these have been estimated on the likelihood of the leases being assigned during the remainder of their term.*
4. *CEH Restructuring provisions created this year and the Antarctic Treaty write back are reported in the Management Commentary in the Annual Report in detail.*
5. *The pension provision for MNRPF has been increased by £1.47m to reflect the additional contribution to NERC as a result of the voluntary contributor P&O ceasing future contributions.*

13. Notional Cost of Capital

	2006 £000	2005 £000
Notional cost of capital	7,272	6,983

In accordance with Treasury guidance the reversal of the cost of capital charge has been written back to the Income and Expenditure account (note 1k refers).

14. Government Funds

	Government Grant Reserve £000	Accumulated Income & Expenditure Reserve £000	Revaluation Reserve £000	Capital Land Reserve £000	Donated Asset Reserves[1] £000	Total Government Funds £000
Balance at 1 April 2005	168,993	10,432	52,373	4,075	-	235,873
Deferred grant-in-aid received	32,040	-	-	-	-	32,040
Revaluation in year	-	-	15,308	-	412	15,720
Impairment of fixed asset	-	-	(2,681)	-	-	(2,681)
Reversal of notional cost of capital	-	7,272	-	-	-	7,272
Deficit for year	-	(59,433)	-	-	-	(59,433)
Released to income and expenditure account	(17,720)	-	-	-	-	(17,720)
Transfer between reserves	-	2,699	(2,699)	-	-	-
Balance at 31 March 2006	183,313	(39,030)	62,301	4,075	412	211,071

Note
(1) The donated asset reserve relates to assets which were donated as at 31 March 2006 and were valued at current value on receipt and included in note 9.

15. Reconciliation of the operating (deficit)/surplus to net cash (outflow)/inflow from operating activities

	2006 £000	2005 £000
Operating (deficit)/surplus	(27,866)	13,974
Depreciation charge	18,840	16,909
Impairment	592	-
Transfers from Government Grant reserve	(17,720)	(12,619)
(Decrease) in provisions	(3,843)	(11,355)
Decrease in debtors	1,191	1,460
Increase in creditors	14,546	3,225
Net cash (outflow)/inflow from operating activities	(14,260)	11,594

16. Reconciliation of movements in cash to movements in net funds/(debt)

	2006 £000	2005 £000
(Decrease)/Increase in cash	(16,522)	9,456
Capital element of finance lease payment	861	790
Change in net debt resulting from cash flows	(15,661)	10,246
Net funds/(debt) at 1 April	9,046	(1,200)
Net (debt)/funds at 31 March	(6,615)	9,046

Analysis of net debt

	At 1 April 2005 £000	Cash Flows £000	At 31 March 2006 £000
Cash at bank	27,162	(16,522)	10,640*
Finance Lease	(18,116)	861	(17,255)
	9,046	(15,661)	(6,615)

*Note: * Figures includes £6,895,000 which relates to balance held at Office of Paymaster General as at 31 March 2006 (£23,677,000; 2005).*

17. Forward Commitments on Approved Research Grants, Research Contracts and Studentships

	£000
2006-2007	97,070
2007-2008	68,457
2008-2009	32,350
2009-2010	8,578
2010-2011	1,559
2011-2012	59
	208,073

18. Amounts Payable under Finance Lease Obligations

	2006 £000	2005 £000
Within one year	933	859
Within two to five years	4,611	4,245
Greater than five years	11,711	13,012
	17,255	18,116

19. Related Party Transactions

The Natural Environment Research Council (NERC) is a Non-Departmental Public Body (NDPB) sponsored by the Department of Trade and Industry (DTI).

The DTI is regarded as a related party. During the year, NERC has had various material transactions with the DTI and with other entities for which the DTI is regarded as the parent Department, viz: Engineering and Physical Sciences Research Council, Biotechnology and Biological Sciences Research Council, Particle Physics and Astronomy Research Council, Council for the Central Laboratory of the Research Councils, Medical Research Council, Economic and Social Research Council and the Arts and Humanities Research Council.

In August 2005, DTI transferred to NERC the responsibility for the National Core Store (located at Gilmerton, Edinburgh). There is a minimum 5 year lease agreement in place where NERC lease the property in Edinburgh from the DTI at an annual peppercorn rent. The property remains on DTI's balance sheet. NERC are responsible for maintaining and running the Core Store and has received part year funding of £245,000 (full year funding of £420,000) from the DTI. In addition NERC has had various material transactions with other Government departments and other central Government bodies.

During the year, NERC entered into the following material transactions with Council members in respect of payments under awards or contracts funded by NERC.

Council Member	Number of Awards or Contracts	Amount £
Professor D Read	3	55,256
Professor A Fitter	1	187

None of the above mentioned related parties were involved in the approval of awards to the Institution where he/she is a senior member of the staff.

In addition, NERC made the following aggregated payments in respect of NERC funded awards or contracts to Institutions where Council members are also senior members of staff.

Related Party	Institution	Number of Awards or Contracts	Amount £000
Professor J Beddington	Imperial College	44	1,801
Professor K Morgan	Plymouth Marine Laboratory	31	1,416
Professor A Glover	University of Aberdeen	26	793
Professor J Petts	University of Birmingham	34	1,431
Professor M Anderson	University of Bristol	38	2,420
Professor T Davies	University of East Anglia	66	2,720
Professor A Halliday	University of Oxford	68	2,378
Professor A Thorpe	University of Reading	52	1,883
Professor D Read	University of Sheffield	51	1,862
Professor A Fitter	University of York	25	1,144

20. Losses and Special Payments

During the year there were 54 losses totalling £359,341. This included writing off of two significant debtor balances totalling £236,399, of which £90,152 was offset by bad debt provision created in previous years.

21. Shareholdings

The council holds 249 shares in Wallingford Hydrosolutions Ltd, a specialist technology transfer company. Wallingford Hydrosolutions Ltd is a leading research centre in the area of hydrology, water resources and environmental modelling. The shares are not publicly traded and currently have no open market value. At 31 March 2006 NERC's shareholding represented 24.9% of the issued share capital of Wallingford Hydrosolutions Ltd.

The council holds 1,000 shares in Cybersense Biosystems Ltd. Cybersense Biosystems Ltd is a biosensor company based at Oxford's Centre for Ecology & Hydrology which is adapting the latest bioluminescent biosensor technology for industrial applications. The shares are not publicly traded and currently have no open market value. At 31 March 2006 NERC's shareholding represented 0.25% of the issued share capital of Cybersense Biosystems Ltd.

22. Capital and Lease Commitments

Capital Commitments

As at the date of these accounts, NERC is committed to a sum of £18,144,000 in respect of capital contracts. This includes the building of a ship, the *James Cook* for £12,295,000 due to be completed in 2006-07, the development of Rothera base in the Antarctic for £2,280,000 due to be completed in 2007-08, and the building of the Environmental Centre for Wales for £2,123,000 due to be completed in 2007-08. It is anticipated that the remaining capital contracts will be completed in 2006-07.

Lease Commitments

NERC have an operating lease for the hire of an aircraft and for hire of scientific equipment. The annual commitments under non cancellable operating leases are as follows :-

	2006 £000	2005 £000
Operating leases which expire		
- in under 1 year	119	-
- in two to five years	43	190

23. Contingent Liabilities

The British Geological Survey (BGS), a constituent part of NERC, has received notice of a claim being made against it by a number of Bangladeshi residents who allege that BGS was negligent in not testing for the presence of arsenic while carrying out some research for the Overseas Development Administration into certain characteristics of water in Bangladesh in 1992. The research was carried out under contract to the British Government.

The Court of Appeal decreed that there was no case to answer and dismissed the claim. However, the Judicial Committee of the House of Lords gave leave to the solicitors acting for the Banglashesi claimants to bring an appeal against the decision of the Court of Appeal to strike out the claim, which was subsequently successful. The results of a full hearing in the House of Lords which took place in May 2006 have not yet been promulgated. No reliable estimate of the value of the claim is available at this time.

24. Post Balance Sheet Events

There are no post balance sheet events which need to be disclosed in the financial statements for the year to 31 March 2006.

25. Financial Instruments

Financial Reporting Standard Number 13, Derivatives and Other Financial Instruments, requires disclosure of the role which financial instruments have had during the period in creating or changing the risks an entity faces in undertaking its activities. Because of the largely non-trading nature of its activities and the way it is financed, the Council is not exposed to the degree of financial risk faced by business entities. Moreover, financial instruments play a much more limited role in creating or changing risk than would be typical of the listed companies to which FRS 13 mainly applies. The Council has limited powers to borrow or invest funds and except for the finance lease contract (details of which are given in notes 1(m), 9(a) and 20) and relatively insignificant forward purchases of foreign currency, financial assets and liabilities are generated by day-to-day operational activities and are not held to change the risks facing the Council in undertaking its activities.

Liquidity risk

The Council's net revenue resource requirements are largely financed by Grant In Aid from its sponsor department. The capital expenditure, with the exception of the ship financed under the Finance Lease referred to above, is also financed through grant in aid. The Council is not therefore exposed to significant liquidity risks.

Interest rate risk

The Council is not exposed to any interest rate risk

Foreign currency risk

The Council's exposure to foreign currency risk is not currently significant.

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