



Using knowledge

Informing policy and driving economic growth.



Left to right:

Tsunami damage.

Albatross caught on a long-line fishing hook.

Rag worms.

HMS *James Clark Ross* and HMS *Endurance* at the Discover Antarctica! exhibition.

Sir Nicholas Stern. © Alistair Grant/AP/PA Photos

Structural damage due to mining subsidence.

Science into policy: the Intergovernmental Panel on Climate Change and the Stern Review

All NERC's research centres, and many other scientists employed and funded by NERC, made major contributions to two landmark reports published this year: the Intergovernmental Panel on Climate Change Fourth Assessment Report and the Stern Review on the economics of climate change.

These reports, which generated headlines around the world, will form the basis of global climate change policy in the next decade.

Indian Ocean tsunami early warning system

The Indian Ocean tsunami monitoring system became operational in August 2006. Scientists at the Proudman Oceanographic Laboratory played an integral role in designing and installing crucial parts of the system around the coast of Africa and the Arabian Peninsula. Work to complete the warning system, and extend it to the Atlantic and Mediterranean, will continue throughout 2007.

Phil Woodworth said, 'The central part is getting information off the instruments and back to warning centres as quickly as possible. Tsunami travel times in the Indian and Atlantic Oceans are much shorter than in the vast Pacific, so we realised we needed an alert system that would be substantially faster than the Pacific Tsunami Warning System.'

As well as rapidly responding to a tsunami threat, the system will constantly monitor sea-level rise.

Professor Philip Woodworth
plw@pol.ac.uk

Fall in albatross deaths

Policies based on British Antarctic Survey (BAS) research have reduced the numbers of albatrosses killed by long-line fishing around South Georgia to zero in 2006, compared with 6000 deaths in 1997.

Long-term monitoring and extensive tracking programmes using satellite technology clearly showed that foraging trips, particularly those of male albatrosses, overlapped widely with local fisheries. The risk to the birds increased in the mid-1990s when fishermen started long-lining for Patagonian toothfish around South Georgia.

The Commission for the Conservation of Antarctic Marine Living Resources, which regulates fishing in the Southern Ocean, used BAS data to decide on mitigation measures.

Dr Keith Reid
k.reid@bas.ac.uk
Dr Richard Phillips
r.phillips@bas.ac.uk



Marine science provides solution to CO₂ emissions

Marine scientists have announced a viable, natural way of reducing greenhouse gas emissions by using algae to absorb carbon dioxide from power stations.

Plymouth Marine Laboratory scientists have built a piece of equipment – a photobioreactor – to cultivate large quantities of microscopic marine plants known as microalgae. By coupling these instruments with power stations the team are able to use waste carbon dioxide to boost growth of the microalgae.

Biochemist Steve Skill said, ‘The system has the potential to absorb all the carbon dioxide coming out of power stations and other industrial processes.’

But what happens to all the excess microalgae?

Marine chemist Carole Llewellyn said ‘The beauty of this technology is that once we’ve grown the microalgae we can harvest them to produce natural products for the healthcare industry.’

The researchers are now looking at several propositions for more large-scale pilot schemes.

*Dr Carole Llewellyn
call@pml.ac.uk
www.pml.ac.uk*



In search of oil – and illegal steroids

Oil exploration and steroid abuse don’t usually appear in the same sentence, but Colin Snape and colleagues at the University of Nottingham have developed a revolutionary technique for oil exploration that can also detect illicit steroid use by athletes and horse trainers.

The Ocean Margins LINK team took a technique called hydrolysis, which breaks down samples for analysis, and applied it to geochemical studies. This allowed the team to reconstruct the history of ocean basins to determine where it was worth drilling for oil. With some lateral thinking the team realised you could use the same process for detecting illegal steroids in the bloodstreams of athletes or race horses.

*Professor Colin Snape
colin.snape@nottingham.ac.uk*

Better predictions of dangerous gusts at airports

After a decade of work, scientists at the National Centre for Atmospheric Science (NCAS) and the Met Office have at last seen the fruits of their labour: a new

weather forecast system for airports that can predict turbulence and dangerous gusts. The Met Office have already adopted the system which came into operation in November 2006.

The research centred around one question: what drives the acceleration and increased turbulence of near-surface flow of air in the lee of hills? To find answers to this question NCAS joined forces with the Met Office, the British Antarctic Survey, the Royal Air Force, the Royal Navy, and the Forestry Commission.

The system is in use at four airfields in the UK and the Falkland Islands.

*NCAS director Professor Stephen Mobbs
stephen@env.leeds.ac.uk*

Monsoon variability targeted by researchers

A UK-India partnership has successfully secured funds for a four-year project to rapidly improve ways of predicting monsoon variability on timescales of weeks to decades. The team based in the UK at the Walker Institute, the University of Reading, and in India at the Institute of Tropical Meteorology in Pune will also establish a firm scientific



Left to right:

A solution to the emissions challenge? Plymouth Marine Laboratory's photobioreactor.

A new system to detect illegal steroids used by the racing community.
© Brand X /Alamy

Monsoon flood in India.
© Paolo Koch/Science Photo Library

Ground hazards such as mining can destroy a home.

Managing risk: insurance companies meet atmospheric scientists

One of the world’s biggest reinsurance companies, the Willis Group, has hooked up with researchers from the National Centre for Atmospheric Science (NCAS). The scientists will work on the frequency, severity and impact of hurricanes, floods and storms to contribute to the financial evaluation of these events. They will become part of the Willis Research Network, the largest-ever collaboration between academic and financial communities.

This type of knowledge transfer partnership allows investment into academic research and improves atmospheric modelling, while translating the outputs into useful information.

*Dr Louisa Watts
NCAScomms@nerc.ac.uk*

Ground stability report for all UK homebuyers

Anyone buying a property in the UK will benefit from a new ground stability service launched this year. The report, produced by the British Geological Survey, provides essential information for assembling the new Home Information Packs (HIPs). It gives property-specific information in simple language on the potential hazards related to natural subsidence, the impact of mining and the risk of damage from brine extraction.

Advantages to the homebuying public include a one-stop low-cost electronic report.

*Dr Ian Jackson
ij@bgs.ac.uk*

foundation for applying those predictions at local and regional levels.

The research, which is one of six awards from the UK-India Education and Research Initiative (UKIERI), will be achieved through a series of exchange visits, workshops and PhD studentships.

The projects, totalling £5 million, involve five institutes in India as well as the University of East Anglia, the European Centre for Medium-Range Weather Forecasts, the Hadley Centre and the University of Reading.

www.reading.ac.uk/about/newsandevents/releases/PR383.asp

Out of the blue

A DVD entitled ‘Out of the Blue’ which highlights the variety, function and commercial potential of marine and freshwater microbes, was launched in 2006. NERC’s BlueMicrobe knowledge transfer network, an offshoot of the Marine and Freshwater Microbial Biodiversity programme, produced the film, which has been distributed to around 1500 policy-makers, businesses and educators. Clips can be downloaded from www.bluemicrobe.com.

*Dr Phil Williamson
p.williamson@uea.ac.uk*



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

	2002-03	2003-04	2004-05	2005-06	2006-07
Private sector	6.4	5.5	8.1	13.3*	9.3
Total at 2006-07 prices	7.1	5.9	8.5	13.6	9.3

* Figure includes Integrated Ocean Drilling Program income to BGS of £4.5m. This is a change of classification on 2004-05.

Patents filed

2002-03	13
2003-04	13
2004-05	6
2005-06	7
2006-07	6

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

Bird-ringing stresses birds

Bird-ringing techniques used to track wild birds can cause stress and lead to erratic behaviour, according to research at Cardiff University.

Following release, many birds temporarily stopped foraging for food in their usual locations and failed to return to their nests for several hours. During these long absences nest temperature fell, leading to slower embryo development.

NERC Fellow Rob Thomas said, 'It's important to consider these effects in the design of ethical and scientifically rigorous field experiments.'

Rob is now working with the British Trust for Ornithology to develop this research and to revise regulations for bird ringers.

Dr Robert Thomas
thomasrj@cardiff.ac.uk

Protecting whales and dolphins from seismic surveys

Researchers are developing a new device to locate marine mammals, further protecting them from seismic survey equipment that uses very loud noises to



Rag worms fuel biotech industry in the north-east

Research from NERC's recently completed Environmental Genomics programme is spurring the growth of the biotechnology industry in the north-east of England and has led to licensed production of marine worms globally.

Peter Olive from Newcastle University and colleagues at Leicester University looked at how the tidal and 24-hour clocks function on a genetic level within some marine organisms, in particular rag worms such as *Nereis virens*. In tightly controlled environments these worms and the lugworm *Arenicola marina* can produce many omega three fatty acids and giant haemoglobin molecules, the red protein that transports oxygen.

Seabait Ltd, a spin-out from Newcastle University, is using this biotechnology to generate aquaculture feeds and, in collaboration with the French company Hemarina SAS, to create production systems for a new generation of human blood substitutes and other medical products.

Professor Peter Olive
p.j.w.olive@ncl.ac.uk

map subsea geology.

Hydrographic surveyor Victor Abbott from the University of Plymouth said, 'The device will aid mammal detection at night, in bad weather and while they are below the surface – a major advance on using human observers.'

Industry partners, Westland GeoProjects, who carry out seismic

surveys, want to permanently install the device on their ship, Geolog Dmitri Nalivkin.

The work is funded through the Knowledge Transfer Partnership scheme that NERC supports.

Poppy Leeder
fvl@nerc.ac.uk

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

Data centre income	2003-04	2004-05	2005-06	2006-07
British Oceanographic Data Centre	26	18	23	26
Environmental Information Centre / National Water Archive	311	343	340	500
National Geosciences Data Centre / National Geosciences Information Service	1,642	1,341	2,092	1,278
NERC Earth Observation Data Centre				236
Total	1,979	1,702	2,455	2,040

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

Trends in publications with industry

Funding type	2003			2004			2005			2006		
	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)	903	34	4	833	26	3	1,392	39	3	1,455	37	3
Core strategic	1,314	83	6	1,462	61	4	1,671	75	4	1,713	71	4
Directed	326	18	6	280	13	5	397	25	6	446	22	5
Infrastructure	234	10	4	187	9	5	236	3	1	293	11	4
Unclassified							88			3		
Total	2,777	145	5	2,762	109	4	3,784	142	4	3,910	141	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	2005-06	2006-07
BAS	10	13
BGS	1,394	1,692
CEH	305	197
POL	42	75
Swindon Office	53	10
Total	1,804	1,987

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

Centre	2005-06	2006-07
BAS	738	1,475
BGS	22,521	19,468
CEH	11,400	9,463
NOC	n/a	1,065
POL	1,672	1,346
Swindon Office	796	5,120
Total	37,127	37,937

NB: In 2005-06 income generated by the Research Ships Unit (now part of NOCS) was included in the Swindon Office total. Due to the interpretation of non grant-in-aid funding where there is no exchange of transactions, income of £5,137k for 2006-07 is now classified as financing. In 2005-06 this figure was £6,446k.



Engaging the public

Left to right:

Planet Earth magazine is now available in Chinese.

The Springwatch team of Simon King, Bill Oddie and Kate Humble. © BBC

Leafcutter ants. © David M Dennis/OSF

Tony Blair meets Laura Williams from the British Geological Survey.

© Crown copyright material is reproduced with the permission of the Controller of HMSO and Queen's Printer for Scotland.



Major BBC documentaries

David Attenborough's high-profile documentaries *Is Planet Earth Changing?* and *Can We Save Planet Earth?* both featured our scientists in action. Viewers watched the veteran broadcaster discuss the evidence with Peter Cox, director of NERC's Climate and Land Surface Interaction Centre, and David Reay from the University of Edinburgh, as well as many other NERC-funded researchers.

David said, 'It was a complete thrill. Ever since I was a child I'd always dreamed of working with David Attenborough.'

The NERC communications team worked with producers to identify the major areas of climate change research.

NERC scientists were also featured on other programmes, including *Coast* and *Real Stories: What Is Under Your Home?* The latter netted four million viewers and resulted in 370,000 hits on the British Geological Survey website within 90 minutes of the broadcast.

Three documentary crews traipsed to the Afar Depression in Ethiopia with NERC-funded scientists (see p9) to film the aftermath of a series of violent earthquakes and what some are describing as the birth of an ocean.

Three more camera crews jostled for space onboard NERC's research aircraft, following Ian Renfrew and colleagues as they embarked on one of the first International Polar Year expeditions – the Greenland Flow Distortion Experiment.

Around 100 NERC staff and students are registered as Science and Engineering Ambassadors.

Springwatch

Centre for Ecology & Hydrology scientist Tim Sparks' enormous contributions to the BBC's *Springwatch* series has helped generate a huge revival of interest in phenology (how climate affects biological cycles) in the UK, and brought into people's homes the impacts of climate change on the natural world.

Discover Antarctica!

A two-week festival to bring life in the freezer to the people of Edinburgh attracted more than 12,000 visitors to over 20 events. Tourists, residents and schoolchildren experienced Antarctica through film, art, performances and hands-on activities at museums, galleries and science centres across Edinburgh. The star attractions were the two ice ships, the British Antarctic Survey's *James Clark Ross* and HMS *Endurance*.

Climate change online debate

Climate change sceptics from around the world participated in NERC's first online debate – the climate change challenge –

Royal Society Summer Exhibition

Three NERC projects featured prominently at the prestigious Royal Society Summer Exhibition, held in London in July. Escaping from the summer heat, thousands of schoolchildren, scientists and policy-makers were wowed by the displays.

The breathing forest

As carbon dioxide in the atmosphere rises, forests under certain conditions start to release more of the greenhouse gas than they absorb. This was the message from Phil Ineson and colleagues from NERC's Centre for Terrestrial Carbon Dynamics, whose infectious enthusiasm for their work captured the hearts and minds of the visitors.

Go to the ant and be wise

Francis Ratnieks from the University of Sheffield and colleagues brought a living, working ant colony to the Royal Society to demonstrate the tropical American leafcutter ants' complex and hygienic waste-disposal system.

Earthquake alert

Following the devastating Boxing Day earthquake in the Indian Ocean in 2004, John McClosky from the University of Ulster and colleagues calculated the likelihood of similar events along two faults on Sumatra.

querying, probing and even dismissing climate research. NERC Chief Executive Alan Thorpe, who initiated the idea, said, 'I believe that it is hugely important that we address the sceptics' views.'

'We need to reflect properly the scientific uncertainties in communicating the outcomes of NERC-funded research,' he added.

www.nerc.ac.uk/about/consult/debate

New websites

NERC and our collaborative centre the National Oceanography Centre, Southampton both launched new websites this year, offering more news, features, imagery and science highlights.

The British Antarctic Survey also launched an online photo library to market its stunning collection of images.

On tour

Global-change scientist Dave Reay juggled a hectic schedule of research and public engagements on climate change. The author of *Climate Change Begins at Home* gave interviews on TV and radio and spoke at the Cheltenham and Bristol science festivals, the Edinburgh Book Festival, the Royal Institution, the Natural History Museum and in ten countries around the world (via climate-friendly video-conferences with the British Council).

Planet Earth scoops award

NERC's magazine *Planet Earth*, which now has a circulation of 18,000, won the 'Best External Magazine 2006' award at a ceremony hosted by Siân Lloyd in London and organised by the Chartered Institute of Public Relations.

Mountain maps

A new set of maps covering Britain's mountain regions features extensive geological information from the British Geological Survey. The outdoor press have enthusiastically reviewed the new maps and they recently won the coveted 'Best Folded Map' award at the International Map Trade Association.

National Science and Engineering Week

The Prime Minister Tony Blair greeted Laura Williams, manager of the British Geological Survey's Cardiff office at a reception in Downing Street for National Science and Engineering Week. The reception celebrated the achievements of Science and Engineering Ambassadors

who work with schools to stimulate and inspire children's interest in science.

NERC centres and Swindon Office organised ten events during the week. The events ranged from using giant hornets to explain selfish behaviour to a competition for a school to win a seismometer to measure earthquakes around the globe.