

James Cook naming ceremony

THE PRINCESS ROYAL formally named the Royal Research Ship *James Cook* at a ceremony at the National Oceanography Centre, Southampton.

The £40 million research ship is the latest addition to NERC's fleet and replaces the ageing RSS *Charles Darwin*. The new ship, built in Poland by Norwegian company, Flekkefjord Slipp & Maskinbrikk AS, will carry scientists to some of the Earth's most challenging environments, from tropical oceans to the edge of the ice sheets.



The Princess Royal with Captain Robin Plumley in the wheelhouse.

Challenging the sceptics

CLIMATE CHANGE sceptics from around the world participated in NERC's online debate, querying, probing and even dismissing climate research. Around 60 contributors voiced their concerns that the peer review process was flawed, that climate models negate natural factors such as sun cycles, and that past climate records show that rises in atmospheric carbon dioxide levels generally follow a rise in temperature, not the other way around.

A team of experts, including Chief Executive Alan Thorpe, individually addressed many of the 365 postings and provided two summary reports.

Alan said, 'I believe that it is hugely important that we address the sceptics' views because there are people with real concerns about the science. We need to reflect properly the scientific uncertainties in

communicating the outcomes of NERC-funded research on climate change – to say what we know with confidence and what still requires further research.'

The full debate and a summary are available online: www.nerc.ac.uk/about/consult/debate/debate.aspx?did=1
More debates will follow.

Airport growth policy clash

GOVERNMENT policy on airport expansion contradicts their carbon reduction policies, according to a critical report from the Tyndall Centre for Climate Change Research.

'The government must reconcile its existing policy for airport expansion plans with its own carbon reduction target and recognise that rising aviation emissions will force all of the other sectors to make even deeper cuts,' said report co-author, Alice Bows from

Manchester University.

'Policy clash: Can projected aviation growth be reconciled with the UK Government's 60% carbon-reduction target?' is available online at www.tyndall.ac.uk

Traffic lights go green

OUTLAWING old-style traffic lights and replacing them with new LED lights would reduce UK carbon emissions by 57,000 tonnes, say scientists at the UK Energy Research Centre.

The move would not only help the UK meet emissions targets, it also saves money: LEDs are three times more efficient and last over three times longer, reducing maintenance costs.

'At a cost of £600-700 per traffic light, compared to £150 for conventional lights, councils will need encouragement from the government to adopt the new technology,' says research director Jim Skea.

Oceans 2025

YOU would be forgiven for thinking Oceans 2025 was some distant sequel to George Clooney and Brad Pitt's lucrative film franchise *Oceans 11*, but it is in fact a new multi-million pound marine strategic research programme starting in April and funded by NERC.

Seven of the UK's leading marine centres will jointly implement the £120 million proposal, but a key part of Oceans 2025 is the new Strategic Ocean Funding Initiative (SOFI), which will allow universities and other partners to bid for funds.

Oceans 2025 will also support several national facilities including the British Oceanographic Data Centre, the Permanent Service for Mean Sea Level and the Culture Collection for Algae and Protozoa.

www.oceans2025.org



The Pinatubo eruption: a gift to climatologists.

Volcanic eruption sheds light on climate uncertainties

THE MOUNT PINATUBO volcanic eruption in June 1991 is now providing vital clues as to how water vapour and clouds, two remaining climate change uncertainties, respond when the climate system is pushed. Scientists from Imperial College London suggest this eruption, which spewed ten cubic kilometres of ash, gas and other materials into the upper atmosphere, is a gift to climate researchers as it provides an important test of the accuracy of climate models.

The researchers used Earth observation satellites to measure precisely how the eruption changed atmospheric humidity and the global heat balance – the difference between how much energy the Earth system absorbs and the amount radiated back to space.

The scientists found that the atmosphere reacted quickly to the eruption, which threw large quantities of sulphur dioxide skyward. These small particles block sunlight from reaching the Earth's surface and so have an immediate cooling effect on the planet. This effect rose to a maximum within four months and consequently global humidity dropped – a warmer atmosphere holds more water vapour. Eighteen months later the climate had settled back to equilibrium.

These results show how feedback mechanisms in the climate, like water vapour and clouds, respond to a climate forcing such as an eruption.

John Harries from Imperial College said, 'This will be valuable as an extra test to ensure that climate models predict the correct rates of change of such processes.' It also provides a snapshot of how the Earth's radiation balance fluctuates once it has been perturbed.

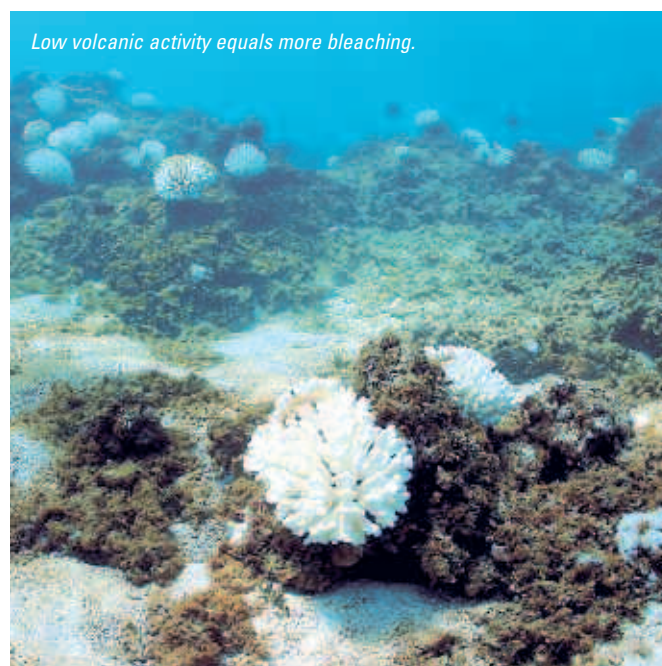
The paper appeared in *Geophysical Research Letters*, Vol 33, 15 December 2006.

Volcanoes protect coral reefs

RECENT volcanic eruptions have protected Caribbean coral reefs from bleaching, according to researchers from the University of East Anglia and the Tyndall Centre for Climate Change Research.

The team demonstrated that bleaching, caused by rising sea surface temperatures, is linked to a large weather system, the El Niño-Southern Oscillation (ENSO), but also the amount of aerosols in the atmosphere. Aerosols are small particles from volcanic eruptions, sea salt spray, wild fire, sand and dust, as well as from man-made emissions.

The findings, published in the *Proceedings of the National Academy of Sciences*, show that when aerosol levels are low, bleaching is largely determined by El Niño strength (a system is already developing this year in the Pacific Ocean), but high aerosol levels mitigate the effects of a severe El Niño. It seems high aerosol levels, largely from recent volcanic activity – El Chichon in Mexico (1982) and Mount Pinatubo in the Philippines (1991) – have protected Caribbean reefs from more frequent widespread bleaching, but cannot be relied on to provide similar protection in the future.



Low volcanic activity equals more bleaching.

Opposites attract

FEMALE Antarctic fur seals will travel across a colony, and risk losing their own pups, to seek males which are genetically diverse and unrelated, rather than mating with local, dominant males.

Scientists from the University of Cambridge and the British Antarctic Survey studying a colony of Antarctic fur seals on the island of South Georgia found that only

a quarter of the females conceived to their nearest male.

Studies have shown that more genetically diverse individuals tend to be more resistant to disease, carry fewer parasites, and in the case of males, are more aggressive and father more offspring.

'Female fur seals show active choice for males that are heterozygous and unrelated' *Nature*, doi:10.1038, February 2007.



Female fur seals and pup.

Ice sheet existed 34m years ago

THE GREENLAND ice sheet existed in a world with much higher atmospheric carbon dioxide levels than today, according to researchers at the National Oceanography Centre, Southampton, reporting in the journal *Nature*.

The team used sediment drilled from the Norwegian-Greenland Sea to show that an ice sheet existed on Greenland 20 million years earlier than

previously thought. Carbon dioxide levels at the time were believed to be between 1000 and 1500 parts per million by volume – much higher than today (383ppm). The team now want to uncover the extent and stability of the ice sheet.

Co-author Ian Harding explained, 'We have good information on southern hemisphere ice sheets, but essentially we didn't have anything on the northern hemisphere, so this is really the first indication as to what exactly was going on.'

Super marine plants reduce carbon emissions

PLYMOUTH Marine Laboratory (PML) researchers have developed a method of absorbing carbon dioxide from power stations and turning it into a useful product. The scientists have built a piece of equipment – a photobioreactor – which uses excess carbon dioxide to cultivate small floating marine plants known as microalgae.

But what to do with all the microalgae grown? The team believe there is commercial potential.

Marine chemist Carole Lewellyn 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.'

PML researchers are investigating its potential as a biofuel.

The laboratory has also launched a new project called the Integrated Green Peninsula which will identify the commercial potential of marine science. Technical Manager Bob Huggins said, 'There is no shortage of extremely valuable intellectual property that we could develop commercially.'

'It is really inspiring to see teams of people, who normally have no contact, working together for mutual rewards,' he added.

For more information: www.pml.ac.uk



Scientist Steve Skill with photobioreactor.

Indian Ocean: new piece in global circulation jigsaw

SCIENTISTS have pieced together a 65,000-year temperature history of the tropical Indian Ocean and found close ties with Antarctic currents. The work by researchers at Cambridge University slots another piece into the jigsaw that is the global thermohaline circulation – the ocean current that distributes heat around the world.

The team compared sedimentary cores drilled from beneath the Indian Ocean to ice cores drawn from Antarctica and discovered that the deep water temperature in the Indian Ocean closely followed variations in surface temperature in the Antarctic from one millennium to the next.



The global thermohaline circulation.

'We were able to reconstruct past temperatures for the surface water and deeper water using foraminifera microfossils,' says co-author Harry Elderfield from Cambridge University. Different species of foraminifera, tiny floating marine organisms, have evolved to live in waters of different temperatures.

'We can say the heat transport is in the water, not the atmosphere,' he added. The prime suspect for this coupling is a current known as the Subantarctic Mode Water, which sinks down in the Southern Ocean then slowly arcs north into the Indian Ocean where it upwells off the coast of Africa.

The authors conclude, 'Our

findings may be of more than local significance because this current contributes to the thermohaline overturning circulation in the Atlantic Ocean.'

The paper appears in *Geophysical Research Letters*, Vol. 33, 30 December, 2006.

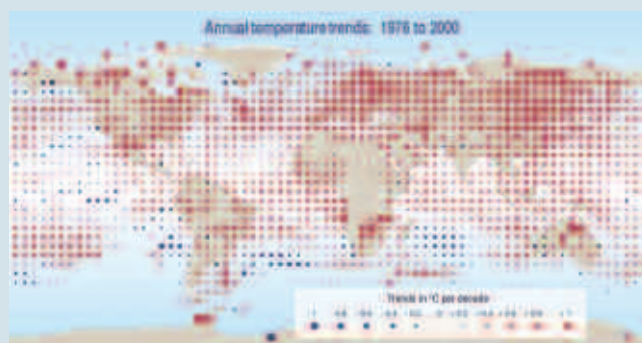
Satellites protect fisheries

SCIENTISTS from the Plymouth Marine Laboratory (PML) have built a working satellite system to provide fisheries with an early warning of potential harmful algal blooms. The system was first put to the test last year when ocean colour data from sensors on NASA and European Space Agency satellites clearly showed exceptionally high concentrations of chlorophyll-a and a greenish-brown tinge to the water around the coasts of Cornwall, the Hebrides and the Orkney islands.

The scientists immediately notified the Environment Agency in Cornwall and the Marine Laboratory in Aberdeen who warned the fishing industry.

PML plans to provide a routine monitoring service for algal blooms and water quality around the UK coast.

Climate report: 'scientists must provide useful guidance'



UNEQUIVOCAL: the word used by the world's media to describe the Intergovernmental Panel on Climate Change Fourth Assessment Report released in February. Many scientists funded or employed by NERC contributed to the landmark document which went much further than all previous reports in blaming human activities for the

observed warming and set out the case for urgent policies to reduce emissions. One of the many lead authors, and director of NERC's CLASSIC centre, Peter Cox, told an Earth observation conference that scientists must provide useful guidance to policy makers. 'That means providing accurate forecasts on timescales they can use – the next 20 years. What matters to

policy makers is reducing the risk.'

NERC Chief Executive Alan Thorpe supported these comments and added that producing regional forecasts of environmental change is also a key challenge (see Leader, page 1).

Head of Sustainable and Renewable Energy at the British Geological Survey, Nick Riley said, 'The IPCC report makes it clear that we have little time left to achieve deep cuts in greenhouse gas emissions. It is vital that the emphasis is on avoiding further risk in this narrow window of opportunity now left to the world.'

'Should we fail to reduce emissions at the appropriate rate,' he warned, 'I doubt we will ever adapt to many of the consequences of global warming and ocean acidification,' he added.

Robotic sub returns from Antarctica

THE UK'S deep-sea robotic vehicle, Isis, based at the National Oceanography Centre, Southampton, successfully completed its first Antarctic mission in February.

Scientists onboard the research ship *James Clark Ross* were thrilled to receive the first images from the craft

as it sank like a polished stone 3.5 kilometres to the seafloor.

Julian Dowdeswell from the Scott Polar Research Institute who led the expedition said, 'When you are sat there in the control room, surrounded by monitors, you really feel that you are down on the seabed. You have to pinch yourself to remember that you are not.'

Isis made 15 separate dives to examine the seafloor geology and document the diversity of life.



Isis off the coast of Antarctica.

Ice sheets linked to tides

SCIENTISTS have discovered that tides affect the rate of flow of relatively fast-moving ice streams, which channel ice from the centre of the Antarctic continent to the sea.

The Rutford ice stream, which is larger than Holland and grounded in the shallow waters of the Antarctic continental shelf, varies its speed by as much as 20 percent every two weeks. This coincides with the large spring, and smaller neap tides, according to the researchers reporting in the journal *Nature*.

British Antarctic Survey (BAS) glaciologist Hilmar Gudmundsson said, 'We've never seen anything like this before. The discovery that the spring-neap tidal cycle exerts such a strong influence on an ice stream tens of kilometres away is a total surprise.'

Scientists believe the phenomenon is probably widespread, and so it is another factor to incorporate into computer models to improve their accuracy in predicting sea level rise.

Ancient bones not our ancestors

RESEARCHERS have dismissed claims that a skeleton discovered in a cave complex in South Africa is part of the ancestral line which led directly to modern humans. Scientists from the universities of Leeds and Liverpool dated the sediment layers above and below the extremely well-preserved ancient remains, named 'Little Foot', and established the bones are around 2.2 million years old, more than a million years younger than earlier estimates. The team used a dating

method based on the presence of lead in the sediment, which accumulates as uranium decays.

The skeleton, which is only 130 centimetres high, caused a stir in the scientific community when it was first uncovered 50 kilometres north-west of Johannesburg in 1997. This area is dubbed the Cradle of Humankind because it has produced about one-third of the world's known early hominid fossils.

'U-Pb Isotopic Age of the StW 573 Hominid from Sterkfontein, South Africa' *Science*, Vol. 314. no. 5805, pp. 1592-1594.

Cape Verde – desert island data

A NEW observatory to provide continuous, long-term measurements of atmospheric composition, as well as investigating how the oceans and the atmosphere interact, opened in January on Cape Verde in the Atlantic Ocean.

The Cape Verdean Minister of Infrastructure, Transport and the Sea, Manuel Inocência Sousa, formally opened the centre on 8 January 2007. The centre is joint-funded by NERC, the Leibniz Institute of Marine Sciences in Germany and other European Union programmes.

Phil Newton, who represented NERC at the launch, said, 'Carbon dioxide measurements on Hawaii show the importance of long-term monitoring. The Cape Verde Observatory will fill a knowledge gap in the tropical Atlantic, with benefits not only to Africa but also to the UK and the rest of the world.'

NERC's directed programme, the Surface Ocean-Lower Atmosphere Study (UK-SOLAS), will be one of the initial users of the observatory.

Data are available at www.york.ac.uk/capeverde

Google Earth locates marine equipment

RESEARCHERS from NERC's Surface Ocean Lower Atmosphere Study, UK-SOLAS, used Google Earth, linked to a satellite system, to track their expensive research equipment which had blown off course in storms and heavy seas around Scotland.

Gales drove the kit towards Harris but the researchers' hopes were dashed when the signal faded. Two weeks later a new



Skipper Heddle Costic (left) returns equipment to Malcolm Woodward.

signal, from a pier on the Orkney islands, rekindled their interest. They tracked the signal overland to its final destination: the lock-up of a local skipper.

In brief

Gene for ocean's smell located

Researchers have extracted the single gene responsible for the chemical that gives the ocean its distinctive smell, dimethyl sulphide, also known as DMS. Marine microbes across the world's oceans release tens of millions of tonnes of DMS, and scientists believe it plays an important role in cloud formation over the oceans (see Ocean Odour, *Planet Earth* winter 2006). 'Structural and Regulatory Genes Required to Make the Gas Dimethyl Sulfide in Bacteria', *Science*, Vol. 315, 2007, p.666

New Year's Honours

Congratulations to all those who received awards in the New Year's Honours list: NERC Council member and Defra Chief Scientific Advisor, Professor Howard Dalton received a Knighthood; former director of the British National Space Centre and former Council member, Dr Colin Hicks received a CB; David Highley, now retired from the British Geological Survey received an MBE; and Ed Jenner, chairman of NERC's Science and Innovation Strategy Board, received an MBE.

Open consultation on NERC's new strategy

Chief Executive Alan Thorpe and NERC Council discussed the new NERC strategy with the environmental scientific community, policy makers and industry at an open event at the Institute of Physics, London on 31 January.

The event showcased recent scientific breakthroughs as well as announcing a consultation period for the strategy, 'Next generation Science for Planet Earth 2007-2012', which is open until 16 April 2007. See: www.nerc.ac.uk

Join NERC's Science and Innovation Board

NERC is looking for self-nominations from a wide range of people in universities and the user communities to join NERC's Science and Innovation Strategy Board. The board is particularly interested in applications from those with expertise in Earth Sciences, Ecology/Biology and Knowledge Transfer. Deadline for applications: 4 June. Email jmck@nerc.ac.uk or visit www.nerc.ac.uk/secretariat-sisb/nominations.asp

Go with the floe – International Polar Year

THE LARGEST scientific programme in 50 years, International Polar Year (IPY), kicked off on 1 March with fanfares and celebrations around the globe. The International Programme Office, funded by NERC, will coordinate projects involving 50,000 people from 63 nations.

The IPY team, based at the British Antarctic Survey, Cambridge, has approved 170 scientific projects and 57 educational and outreach plans.

The Princess Royal attended the UK launch, hosted by the Royal Society in London.

Well-wishers included broadcaster Sir David Attenborough who said, 'Today

the polar regions are changing faster than any other part of the world. They can provide us with early warnings of what is likely to happen in the near future. I have no doubt that IPY will not only provide those answers, but reveal some very important questions.'

As launch events unfolded across the world one of the first IPY projects got off the ground. The NERC/Met Office scientific aircraft circled Iceland and Greenland gathering data for the Greenland Flow Distortion Experiment which researchers hope will improve long-range weather forecasting in Britain.

For more information see www.ipy.org

Host population mixing affects virus infection rates

THE WAY organisms move and interact might influence how infectious or virulent certain diseases can become according to research in *Science*.

An experiment using moth larvae has revealed that viruses evolve differently in host populations where there is a lot of movement compared to those that remain relatively stationary. In the latter, the virus's infectivity became significantly reduced after about 18 months of natural selection.

A reduced rate of infection might allow enough time for new susceptible moths to reach those already infected. Rapidly infecting all the moths in the local area would have left the virus with nowhere to go.

Michael Boots from Sheffield

University who developed this research said, 'Theoretical models have suggested that this pattern of selection might happen, but it has rarely been tested. Our results suggest that changes in the way that organisms within a population mix with each other may well have important implications – not only to the spread of disease, but also to the evolution of the agents which cause disease.'

With the rise of globalisation, human populations are increasingly mixing and we might expect the potential emergence of more infective strains of parasites.

'Local interactions select for lower pathogen infectivity' M Boots and M Meador, *Science*, Vol. 315, no. 5816, pp 1284-6