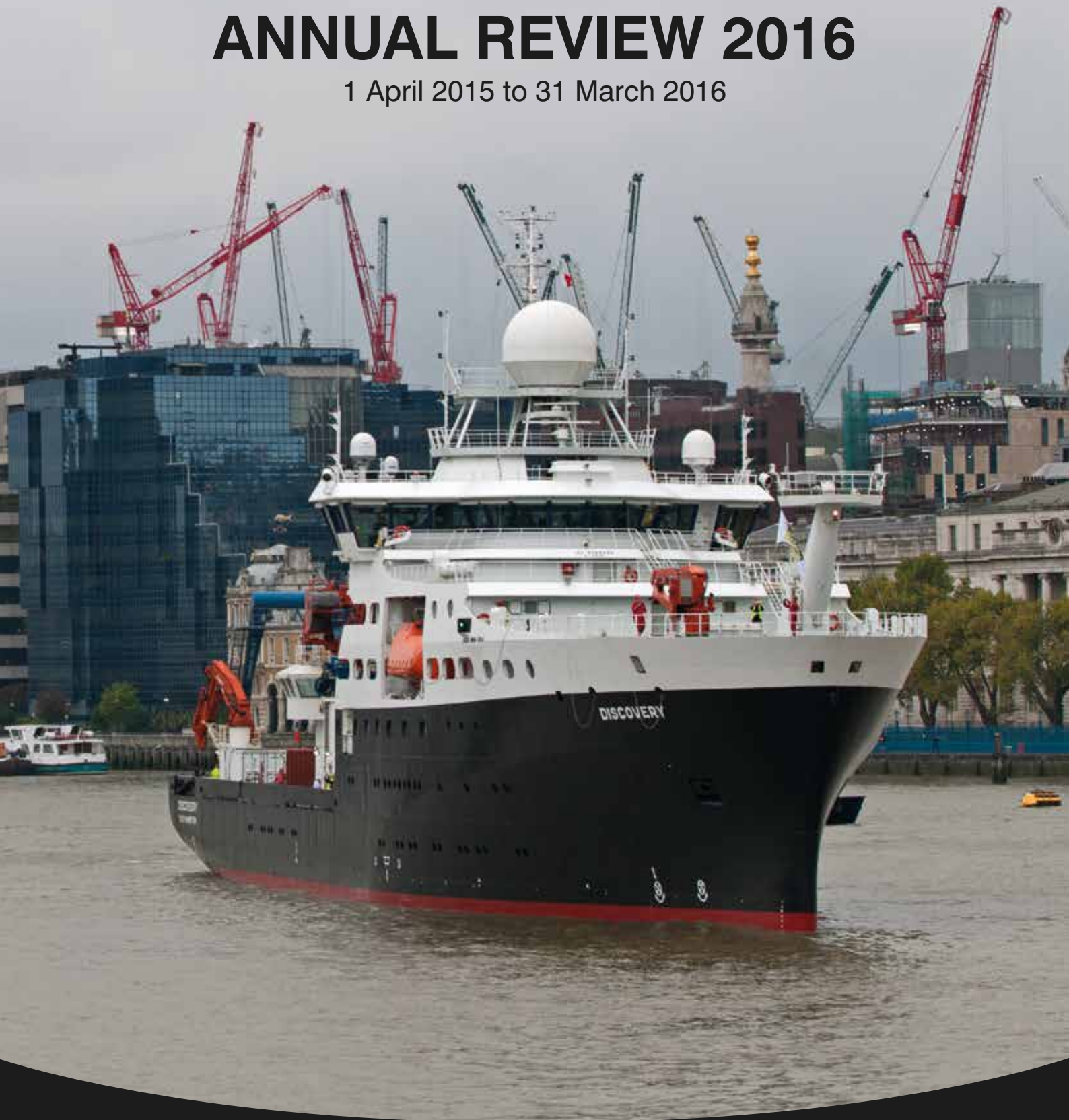


National Oceanography Centre

ANNUAL REVIEW 2016

1 April 2015 to 31 March 2016



**National
Oceanography Centre**
NATURAL ENVIRONMENT RESEARCH COUNCIL

NERC SCIENCE OF THE
ENVIRONMENT



Ed Hill, Executive Director
National Oceanography Centre

FOREWORD

I am delighted to welcome you to our 2016 Annual Review. This review will give you insight into what the NOC and our collaborators have achieved over the past year both nationally and internationally. One of our greatest moments was in November when the Minister of State for Universities and Science, Jo Johnson, visited the NOC in Southampton to open our new Marine Robotics Innovation Centre, where science meets business. The Innovation Centre is now home to SME's through to larger organisations who are collaborating with the NOC to use our state of the art facilities to research national and global challenges linked to the Ocean.

This year has also seen significant interest by the G7 group of nations in the importance and influence of the Ocean and the impact it has on people, the economy and resources. We expect this interest to grow and with it, the NOC becoming more involved in advising Government on a growing swathe of ocean-related policies.

Within the review you will read stories of how our research has addressed some key global challenges and how we are working to develop our capacity to help shape a better future for everyone with a greater understanding of the Ocean, its features and the affect they can have on our World. The NOC has also continued to enable and support the work of the UK science community not least through provision of major national facilities such as ships, marine equipment and data assets.

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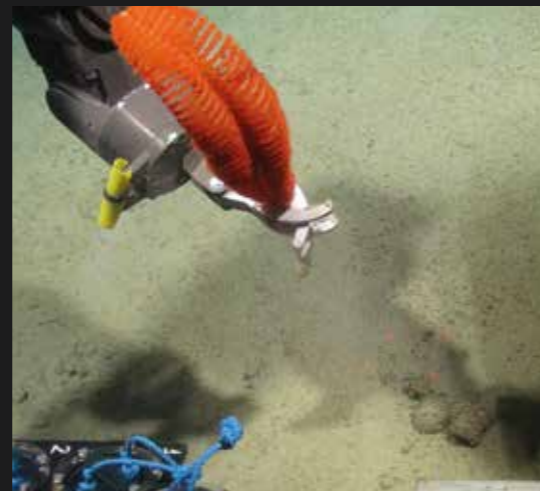
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OUR NATIONAL ROLE

The NOC is the UK's national centre of excellence for large scale oceanographic research. Core National Capability Long-term science is, and will remain, the key foundation of our research base.

We have many partners in the UK, and internationally, with whom we work to support marine science research. Using our knowledge and expertise, we are able to inform government and policy makers on a range of issues such as carbon capture and storage, ocean acidification, deep-sea minerals and biodiversity.

We continue to provide national research infrastructure and access to national Ocean data assets.



- With the help of the NOC, the UK Marine Industries Alliance launched an industry Code of Conduct in respect of surface Maritime Autonomous Systems. The aim of the Code is to establish pan-industry agreement on aspects of marine autonomous systems development, design, production and operation in advance of and alongside the establishment of governing regulations.

The NOC attended the UK Space Conference in Liverpool in July in partnership with the National Centre for Earth Observation.

Over 1000 people attended and the NOC's Chris Banks and Val Byfield were on hand to demonstrate the range of satellite products available for ocean monitoring including: mature technologies such as sea surface temperature and sea surface height; the relatively new measurements of sea surface salinity; and novel methods such as measuring winds from reflected GNSS (GPS) signals.

- The NOC and the University of Liverpool entered into a new strategic partnership creating the Liverpool Institute for Sustainable Coasts and Oceans (LISCO) - formed as a centre of excellence for multi-disciplinary research in marine science with a focus on societal impact.
- The NOC became a partner in a new £2.5m Centre for Doctoral Training in the use of 'robotic' systems for environmental sciences. The NOC component of the centre is focused on innovative marine robotics and sensors, which can be used to address key scientific challenges such as; climate change, deep-sea exploration, and identification of biodiversity 'hotspots'.

OUR INTERNATIONAL ROLE

The National Oceanography Centre is active on the international stage at many forums, and as partners across UK government and European programmes.

Our work with partners in the UK, and also internationally, is part of our National Marine Capability. The NOC works with the UK and international marine science community and a variety of marine and maritime partners, in the private and government sector, to improve dialogue and sustained interaction in an inclusive, impartial way.

We focus on international engagement and the development of international partnerships, representing the UK marine science community at the European Marine Board, and leading the UK's input to the Intergovernmental Oceanographic Commission.



- Representatives from Japan, the UK, Italy, Germany, France, the USA, Canada and the European Commission met at the NOC for a two day workshop aiming to help develop proposals as part of the G7 Future of the Oceans initiative.

Executive Director of the NOC, Professor Ed Hill said,

“I very much welcome the interest the G7 is taking in the importance of the ocean and seas and I am pleased that the NOC has been able to play a positive role in facilitating scientific and technical discussions that will help inform the next G7 Science ministers Meeting in Japan in May this year.”

A computer model that aims to provide physical information on the Bangladesh delta to policy makers there, received the 'impact' award from the national super-computing facility, ARCHER. This is the first model to link the open ocean with the limit of tidal interaction in Bangladesh, and has been produced by NOC's scientist Dr Lucy Bricheno using the ARCHER facility.

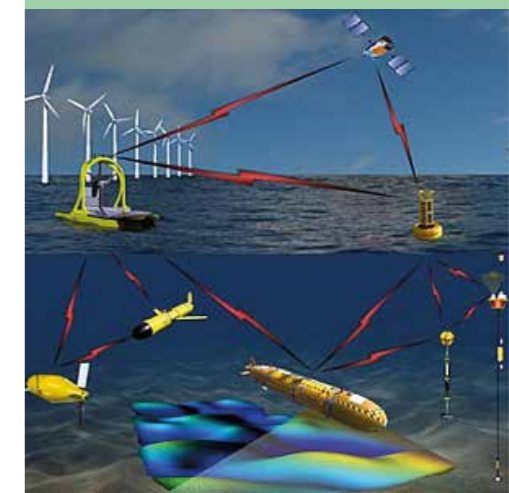
- In June the NOC's research into ocean currents, and knowledge of barnacles, helped provide clues to the path taken by the missing Malaysian Airways MH370 flight through the Indian Ocean. The Indian Ocean contains a mixture of cold and warm waters, with different barnacle species living in each. The speculated crash site, in the South East Indian Ocean, spans a junction between the habitat of two species. Professor Richard Lampitt, from the NOC, said "The crucial analysis to be done now is to determine the species of all of the barnacles on the wreckage. In addition, the size of each specimen should be noted as it is possible that the larger and older specimens will have settled when the wreckage was in a different region." This story appeared in the national, as well as international news – from BBC's Today program to Qatar Day.
- The London International Youth Science Forum visited the NOC in Southampton. The group of 40 consisted of young scientists from China, Brazil, Germany, South Africa, Taiwan, New Zealand, Australia, Mexico, Argentina and many European countries. This collaborative visit formed part of the wider youth event held in London, which played host to 460 international students.
- At the 28th Session of the Intergovernmental Oceanographic Commission (IOC) Assembly in June, Steve Hall, Head of the NOC's International and Strategic Partnerships Office, was elected as Vice-Chair of the Intergovernmental Commission of UNESCO. The IOC acts as the custodian of ocean science within the UN system through a number of global programmes and has also established international tsunami warning systems amongst many other activities.
- In August, 28 international scientists and engineers joined the RRS *James Cook* for a five week expedition to map and profile submarine canyons in the Whittard Canyon. These are some of the most complex deep-sea environments on the planet and until recently were out of reach for traditional types of marine equipment, which made them the 'forgotten habitats' of the deep sea. By using the NOC's Remotely Operated Vehicle and Autosub6000, the CODEMAP expedition was able to collect exceptionally detailed data for the first time in these hotspots of biodiversity.



- To assess how the scientific requirements of South Georgia will best be facilitated, the NOC joined others from institutes around the world in the Falklands. Professor Richard Sanders, from the NOC said "This meeting was an excellent opportunity to be part of a global collaboration of scientists aiming to improve our understanding of this under-studied and important part of the world. The area around South Georgia is home to the most concentrated phytoplankton bloom in the Southern Ocean, which absorbs atmospheric CO2 as well as forming the base of the food web, feeding krill."
- US oceanographer and astronaut, Dr Kathryn Sullivan, visited the NOC in Southampton and met with young scientists starting out in their research careers. The former astronaut is now the head of NOAA – the National Oceanic and Atmospheric Administration based in the US. She also discussed with NOC scientists ways the US and UK oceanographers can work together to learn more about the global ocean.
- The Partnership for Observation of the Global Oceans (POGO) presented its new strategy ahead of the annual meeting which brought together directors of 40 oceanographic institutions from around the world, including the NOC's Executive Director Ed Hill. POGO's vision is to have by 2030, world-wide cooperation for a sustainable, state-of-the-art global ocean observing system that serves the needs of science and society. The NOC along with other major ocean institutions provide the scientific expertise, technical capability, technology innovation and infrastructures to support such a system.

April saw the Natural Environment Research Council invest £15m into Marine Autonomous Systems (MAS) and sensors over a five-year development programme. £10m of this investment was made through the NOC to ensure the UK remains at the forefront of global marine science and technology innovation by developing a new 1500m depth-rated Autosub Long Range (ALR1500) and a new 6000m depth-rated autonomous underwater vehicle (Autosub6000 Mk2). This will support future under-ice and deep-ocean science, including a number of upcoming major marine research programmes such as the Changing Arctic Ocean programme.

In addition, there was also an investment into command-and-control systems for efficient fleet management, and new equipment to support the NERC-EPSCRC Centre for Doctoral Training in 'Smart and Autonomous Observing Systems', called NEXUSS – 'NEXT generation Unmanned System Science'.



SCIENCE & TECHNOLOGY ACHIEVEMENTS



Exploring Ocean Fronts

August saw the start of the latest phase of our Exploring Ocean Fronts project, another pioneering multi-vehicle mission, this time in partnership with the World Wildlife Fund. The project involved a submarine glider and an autonomous surface vehicle working together over three weeks in the Celtic Deep area of the Celtic Sea to investigate why this area is particularly attractive to marine predators such as dolphins and seabirds. BBC Wales were at the launch in Milford Haven.





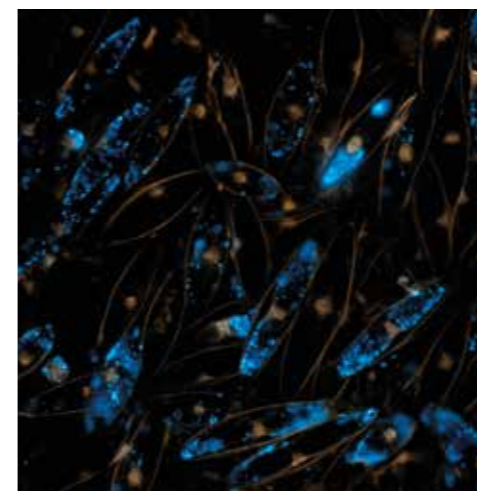
New polar shipping routes predicted

A paper published in Marine Policy in May by NOC scientist, Dr Yevgeny Aksenov, revealed that commercial summer shipping across the North Pole may be possible by the end of the century, with the first potential crossings feasible for ice-strengthened ships around 2040. A simulation using NOC ocean models suggests that approximately 40% of Arctic summer sea-ice cover will consist of broken-up ice by the 2040's. This will allow certain classes of ice-strengthened ships to move directly through the high Arctic, saving time and fuel relative to travelling up the Siberian coast.



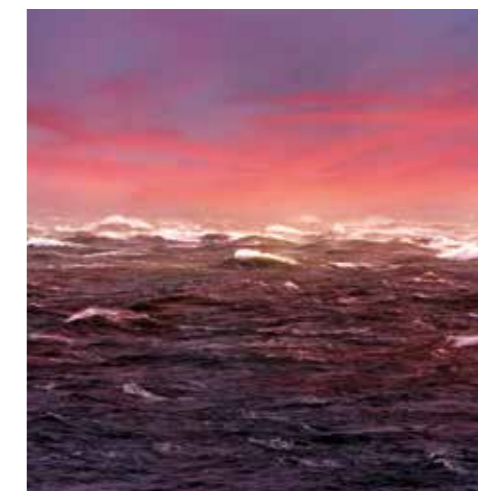
Whale-eating deep-sea shrimp discovered

Two new species of submarine shrimp-like creature, capable of 'stripping' a pig carcass in a matter of days, were discovered by a team of scientists from the NOC. These 3mm long scavenging crustaceans, known as amphipods, live in depths of up to 4500 metres in the North Atlantic Ocean. They act in swarms to strip the carcasses of dead marine animals, including whales, fish and seabirds. The lead author of this study, published in Zootaxa, Dr Tammy Horton said "Amphipods are incredibly diverse and adaptable; there are currently around 10,000 species known to science. They live in all marine environments, from shallow waters to the ocean's deepest trenches, on land and in fresh water." A video on YouTube shows similar creatures in action.



Down to the twilight zone

In May the NOC was awarded £3.7million from NERC to investigate the ocean's 'twilight zone', which plays a key role in absorbing anthropogenic carbon from the atmosphere. This 'twilight zone' is the volume of the ocean between 100m and 1000m below the surface of the sea, where a small amount of light from the sun can still penetrate. It is currently known that the efficiency of carbon transport from the atmosphere through this zone has an impact on atmospheric conditions. However, it is not known what factors affect this efficiency. The project, called COMICS, will build the first model of carbon transport in the 'twilight zone' based on direct ecological measurements. Once complete, in 2020, it will help make predictions of environmental change more accurate.



NOC investigated the global warming hiatus

To investigate why the global warming trend varies from decade to decade, scientists from the NOC started working alongside those from nine other research organisations as part of a major new multidisciplinary research project that started in March.

Over the last decade a slowdown, or hiatus, has been observed in the global warming of the earth's surface. Although it is important to note that heat is still accumulating in other parts of the climate system, such as the deep ocean. Potential causes for these variations include; the effects of volcanic activity, solar radiation, greenhouse gases and atmospheric aerosols and atmospheric and ocean circulation. The project, Securing Multidisciplinary Understanding and Prediction of Hiatus and Surge events (SMURPHS), will investigate the impact of each of these factors on the observed variation in global warming.



Serpent's "Flying Spaghetti Monster"

In August the NOC's Dr Daniel Jones identified this bizarre looking marine creature as a Siphonophore.

It belongs to a group of aquatic animals that include corals and jellyfish, some specimens have reached lengths of 40m! Filmed by a Remotely Operated Vehicle (ROV) at a depth of 1325m off the Angola coast it was nicknamed the "Flying Spaghetti Monster" before Daniel and Dr Philip Pugh, working collaboratively on the SERPENT project, identified it as a specimen of *Bathypphysa Conifer*.

Daniel was amazed by the media reaction, "this unusual creature sparked a huge reaction on the internet with over a quarter of a million people watching the video over the last week! The video was sent to me by oil industry ROV pilots through the SERPENT network. It is a great example of how collaboration with industry can allow us to see much more of the deep sea and its strange and wonderful marine life."

SERPENT is a collaborative project of ROV operators researching the exciting undersea environment through unique and innovative deep sea exploration. You can watch the siphonophore on the SERPENT YouTube channel.



AXA and NOC collaborated on European weather extremes

At an event in Paris in May AXA Insurance showcased a project led by NOC scientist, Dr Aurélie Duchez, in collaboration with the UK Met Office, which aims to investigate the role of the ocean on European weather extremes.

Using real observations and coupled ocean-atmosphere model output from the NOC and the Met Office, this two year project aims to shed light on the influence of the ocean on extreme weather events, such as heat waves, droughts, floods and severe winters.



New centre opened to help link satellites with robot-sub

In February the NOC formed part of the new Centres of Excellence in Satellite Applications. This centre is developing the technologies to help robot-sub use live satellite data to inform their route through the ocean, not unlike drivers using live traffic updates. By allowing the robot-sub to avoid storms or directing them to sites of scientific interest, these technologies will enable more effective exploration of the ocean as well as acting as a major stimulus for economic growth in the Solent region.



Biological insights to help protect coastlines

In April the first ever project to investigate the role of biological processes on the future evolution of the UK coastline was launched. This NOC led project, called BLUEcoast, is expected to produce valuable insights that will shape coastal protection policy.

The research will better enable scientists to accurately predict regional sediment budgets on time scales of years to decades. Professor Alejandro Souza from the NOC who is leading the project said "BLUEcoast will help create a step-change in coastal management strategies."





Sea levels in extreme environments

The South Atlantic Tide Gauge Network has been measuring sea levels in some of the most remote places on Earth for 30 years. Over the last three decades, data from the South Atlantic gauges have improved estimates of global sea level change, including those reported by the Intergovernmental Panel on Climate Change (IPCC). This year, NERC provided funding for the system to be upgraded with customised radar gauges and GPS sensors. These sensors will allow scientists to distinguish changes in absolute sea level from changes in land level, both of which are contained in tide gauge records.



Global climate on verge of multi-decadal change

In May, a NOC led paper published in Nature demonstrated that ocean circulation is the link between weather and decadal scale climatic change. These findings imply that the global climate is on the verge of a broad-scale change that could last for a number of decades.

The change to the new set of climatic conditions is associated with a cooling of the Atlantic, and is likely to bring drier summers in Britain and Ireland, accelerated sea-level rise along the northeast coast of the United States, and drought in the developing countries of the Sahel region. Since this new climatic phase could be half a degree cooler, it may well offer a brief reprise from the rise of global temperatures, as well as resulting in fewer hurricanes hitting the United States.



New storm database to help future flooding prediction

Scientists at the NOC helped to compile a new database of coastal flooding in the UK which provides crucial information to help prevent future flooding events. The SurgeWatch database contains information on 96 large storms, taken from tide gauge records going back to 1915. The storm characteristics listed include the highest sea level recorded during any particular storm and a description of the coastal flooding it caused. The database was produced by a team of researchers from the NOC and the British Oceanographic Data Centre (BODC), led by the University of Southampton.



WORKING WITH BUSINESS

Through collaborative working the NOC translates its world class science and technology development into benefit for UK businesses.

We work with businesses of all sizes, from SMEs to multinationals and our science is applicable for many industries including renewable energy, shipping, water management, oil and gas and defence.

The NOC is where science meets business, and our Marine Robotics Innovation Centre in Southampton is shared with SMEs working alongside the NOC on a range of projects. The centre also has an active community of Associate Members from global businesses.

The UK's most comprehensive tide and current information became available in April of 2015, in the form of the latest version of the NOC's 'anyTide' app.

anyTide is a mobile tidal prediction app that combines observation data with model data to produce tidal height and current predictions around the North Western European Shelf, with particular focus on the British Isles.

Pins show the locations of tide gauges in the UK National Tide Gauge Network, from which real-time data is available.



- In November, the Marine Robotics Innovation Centre was official opened by Minister of State for Universities and Science, Jo Johnson, who said:

“I was honoured to open the new Marine Robotics Innovation Centre at the UK’s world class National Oceanography Centre in Southampton. The UK is leading the way in marine science and this new facility will help to put wind in the sails of our marine industry.”



The centre welcomed it first Partners and Associate Members; Sonardyne International Ltd, ASV, SeeByte, Planet Ocean, BP, Shell and Quinetiq.



- The NOC exhibited at several high profile stakeholder events and conferences throughout the year including Seawork (May), Innovate UK (November) and Oceanology International (March).
- In April, we hosted Ocean Business at our Southampton site which attracted 5,000 visitors from around the world, and Captain Barnacles from CBeebies The Octonauts!
- The Small Business Research Initiative competition to develop a novel Adaptive Autonomous Ocean Sampling Network (AAOSN) reached its final phase with two consortia moving to the final stage of development.
- The NOC hosted the 56th Marine Measurement Forum in July welcoming 50 delegates to the Foresight Centre, adjacent to our Liverpool site. Speakers from a range of industrial, academic and professional bodies gave presentations and there were opportunities for delegates to visit our workshops where our engineers spent time showcasing their broad ranging capabilities.

SHIPS SUMMARY



RRS JAMES COOK ●



RRS DISCOVERY ●

The NOC's National Marine Facilities (NMF) draws together a wide range of services and capabilities to support marine scientific research in an impartial and transparent way. The NMF mission is to develop, co-ordinate and provide major platforms, observing systems and technical expertise required by the UK's marine science community.

The NMF manages the National Marine Equipment Pool, the largest centralised marine scientific equipment pool in Europe suitable for studying a range of scientific disciplines and provides scientists with access to skilled marine technicians, engineers and technologists. As part of our national capability remit, the NMEP delivers professional technology support to enable the marine science community to carry out world-class research.

This year the NMF supported 24 science expeditions and three trial expeditions. These included eight scientific expeditions on the RRS *Discovery*, nine scientific expeditions on the RRS *James Cook*, four scientific expeditions on the RRS *James Clark Ross*, and a further four scientific expeditions on other and barter vessels.

The full NMF annual report is available to download from our website noc.ac.uk



BODC

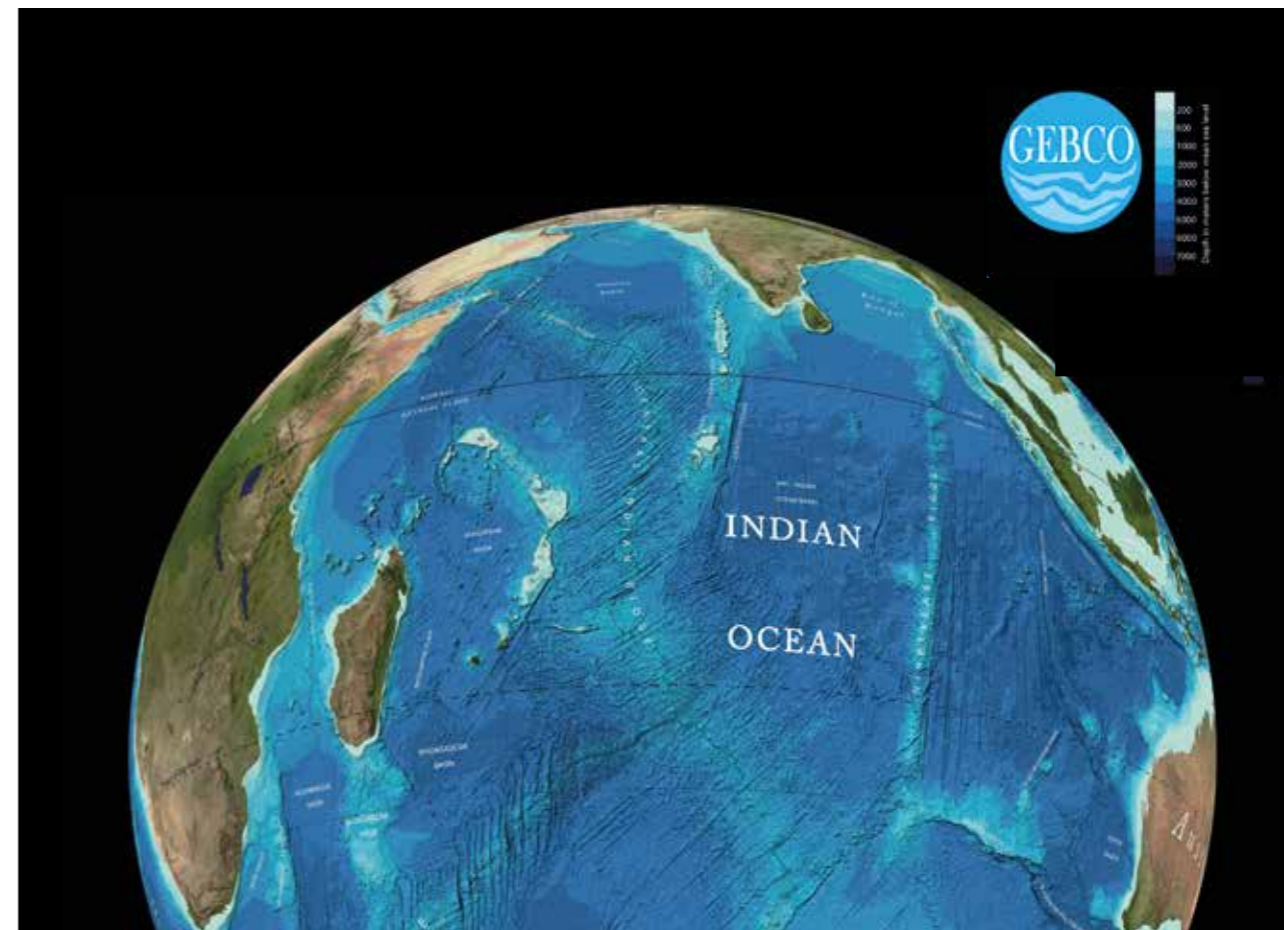
British Oceanographic Data Centre

The British Oceanographic Data Centre (BODC) is a national facility for looking after and distributing data concerning the marine environment.

The NOC's BODC deals with biological, chemical, physical and geophysical data, and the databases contain measurements in excess of 25,000 variables. BODC has direct experience of marine data collection and analysis and works alongside information technology specialists to ensure that data are documented and stored for current and future use.



- The 4th Ocean Data Interoperability Platform (ODIP) workshop, to discuss and share progress in the solving the 'patchwork data' problem, was hosted by BODC in Liverpool. The ODIP project aims to establishing a means of sharing and managing marine data seamlessly between the EU, USA and Australia. The approach is to develop interoperability between existing regional marine e-infrastructures to create a global framework for marine data management. Such is the importance of interoperability, funding to continue the transcontinental ODIP collaboration for a further three years has been approved by the EU.
- A database and online tool called 'SurgeWatch,' which provides a systematic UK-wide record of high sea level and coastal flood events over the last 100 years, was launched by BODC and the University of Southampton. The sea level data comes from BODC, which archives and distributes data from the UK Tide Gauge Network.



- BODC continues to support and develop the Web Map Service of the General Bathymetric Charts of the Oceans (GEBCO), on behalf of the international GEBCO community. The latest WMS of global gridded bathymetric data can be found at bodc.ac.uk.
- BODC announced the release of its search client for the NERC Vocabulary Server, NVS2.0. This tool provides easy access to nearly 200 controlled vocabularies, describing over 100,000 environmental metadata terms. It enables powerful search options for both lay users and the environmental data community worldwide.

Datasets downloaded: 101,187
(an annual increase of 37%)

Datasets available online: 97,674
(an annual increase of 13%)

Calls to the NERC Vocabulary Server: 570,950
(an annual increase of 63%)

Calls to the GEBCO Web Map Service: 4,018,361
(an annual increase of 69%)

Hits to the website: 979,686
(an annual increase of 6%)

BOSCORF

British Ocean Sediment Core Research Facility

BOSCORF is the UK national deep sea core repository which stores marine sediment cores collected by NERC ships and NERC funded researchers.

Deep sea sediment cores are a unique resource of immense scientific importance. The NOC's BOSCORF provides specialised facilities for the long-term storage and curation of cores with the aim of making the material available to scientists, and to promote secondary usage amongst the scientific community.



- Investigations of sediment geochemistry and interstitial water chemistry show the characteristics and depth range of contamination in Venice Lagoon sediments correlated to dredging operations. The BOSCORF Itrax XRF-scanner was utilised to evaluate the nature of the depth distributions of targeted elements within the sediments.

- Sea ice plays a major role in controlling the energy budget at the Earth's surface by reflecting a significant part (90%) of incoming radiation. Biomarker analysis of surface and down core sediment material from across the Barents Sea aligns well with observational sea ice records covering the last few hundred years. The technique can be used to reconstruct temporal variations in the position of the maximum (winter) Arctic sea ice extent during the late Quaternary. BOSCORF provided surface sediment samples from key locations to assist the study.
- Processes that control the hydrological balance in eastern South Africa on orbital to millennial timescales remain poorly understood due to the lack of high resolution proxy records. Researchers have produced a high resolution Fe/K proxy record to provide new insight into climate variability over the past 270,000 years within this region. The Fe/K record, derived from the BOSCORF Itrax XRF-scanner, utilised as a water runoff indicator and its link to rainfall in shifting climatic regimes.

- August saw the publication of a new book on Micro-XRF Studies of Sediment Cores - Applications of a non-destructive tool for the environmental sciences, edited by Ian Croudace (University of Southampton) and Guy Rothwell (BOSCORF).

This is the first book of its kind, dedicated to studies of sediment cores using micro-XRF core scanners, which have revolutionised palaeoenvironmental research over the past two decades. It contains papers, eight from BOSCORF staff, discussing use of XRF core scanners in a broad range of studies and presents an in-depth assessment of instrument capability and potential future developments. The book is a major academic contribution by BOSCORF, which will help both experienced and novice users of XRF core scanners to take full advantage of one of the most powerful geochemical screening tools now available to environmental scientists.



Core's logged: 2825.5m
(an annual increase of 200%)

New cores:

205, totalling 498m acquired

Samples taken: 5,286

Visitor numbers: 186

Number of data files reached:
3,391,908

Journal publications referencing BOSCORF: >21

Ph.D thesis referencing BOSCORF: >14

PUBLIC ENGAGEMENT

The National Oceanography Centre plays an important role in the education and training of future generations of scientists and informed citizens.

The centre is committed to providing excellent resources and opportunities for education and has a close working relationship with local schools and with its delivery partners, the University of Liverpool and the University of Southampton.



- The family-focused Ocean and Earth Day event was held on Saturday 25 April 2015 at the National Oceanography Centre in Southampton, attracting over 2,100 visitors, including adults, children and organised groups from as far afield as Surrey, Wiltshire and Dorset. Visitor numbers were up 24% on last year.
- In October the RRS *Discovery* sailed into the heart of London for a showcase of science events. Over 1,000 visitors were hosted by tours and events on board the ship, including 230 members of the public and students from schools around the borough. A BBC news crew boarded the ship on her journey up the Thames and conducted interviews with the Master and NOC Director Geraint West. These were broadcast live on BBC Breakfast News to 1.5 million viewers bringing crowds of people to see the ship.
- NOC's 'Professor Particle' (Richard Sanders) and Dr Elizabeth Kent took to the stage at Southampton's micro brewery, The Dancing Man, for a series of science lectures over a beer. Alongside the main 'Pint of Science' talks, the evenings included a range of fun science related activities including live experiments, quizzes and engaging stories.
- Our 'Exploring Ocean Fronts' and 'Heti the Yeti Crab' displays were enjoyed by over 1,400 visitors to the British Geological Survey's Open Day in July. One happy parent said in a kind letter of thanks, "My seven year old son was constantly changing his mind about what kind of scientist he wanted to be when he grows up. At the end of the day he made the tough choice to become an oceanographer. It is extremely rare to find such excellent open science events, but they are so important for creating future scientists and gaining support for science."

STAFF ACHIEVEMENTS



- Mike Clare picked up the Harold Reading medal for his paper in Geology on 'Distal turbidites as a record of mega-landslides'.
- Dr James Hunt coordinated the effort to collect a record breaking number of sediment cores during a research cruise to the Nordic Seas.
- Dr Claire Evans was awarded a prestigious NERC fellowship to study the role of the microbial carbon pump in planetary carbon sequestration, and how it may be influenced by ongoing climate change. The project is part of the NOC's sustained research into global biogeochemical cycles, and will build on our understanding of the cycling of organic matter through the ocean.
- The discovery of a new fundamental rock property will improve estimates of underground resources, such as hydrocarbons and drinking water, as well as CO₂ storage reservoir capacity. This discovery, made by Dr Laurence North and Dr Angus Best, was published in the journal Geophysical Prospecting in November. This study was awarded the EAGE's Loránd Eötvös prize for the 'best research paper in 2014' due to its ground breaking nature.
- Captain Robin Plumley and Gwyn Griffiths, both former colleagues at the NOC, became MBEs for their services to marine science in the Queen's birthday honours. Captain Robin Plumley was recognised for his consistently outstanding contribution to advancing the scientific effectiveness of NERC's ships and the people that crew them. Gwyn Griffiths' award recognises a distinguished 36-year career as an ocean engineer with the NOC, and he remains an active world-leading authority in the field of ocean technology.
- The biographies of several prominent NOC scientists were featured in the 'Women in Oceanography: a decade later' special issue of The Oceanography Society magazine. Dr Stephanie Henson, Dr Penny Holliday and Dr Margaret Yelland, were amongst the two hundred female oceanographers from around the globe who contributed autobiographies to the issue.

Dr Peter Thorne was invited to be a H. Burr Steinbach Scholar at Woods Hole Oceanographic Institution in early August. Peter hopes to interest and entertain staff and students with talks on 'solutions to acoustic scattering problems' and 'understanding boundary layer sediment transport processes'.

FINANCE

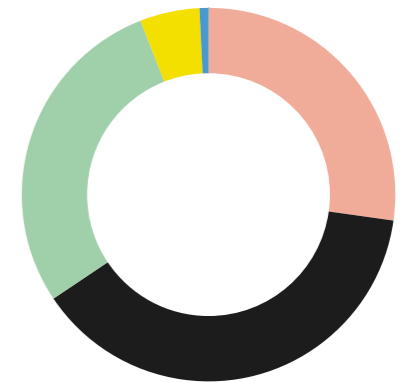
The National Oceanography Centre is one of six centres supported by the Natural Environmental Research Council (NERC).

Included in the programme of funding from NERC is National Capability (NC) which enables the UK to deliver world-leading environmental science, research facilities and data, as well as support national strategic needs and respond to emergencies. It incorporates the research and development activities which keeps this capability at the cutting edge.

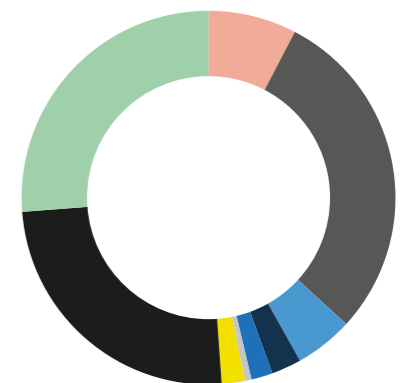
Funding for the work we undertake is also secured from other sources including NERC competitive funding, EU grants and from commercial organisations.



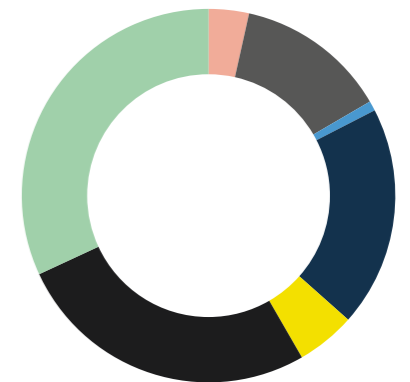
NOC Total Expenditure 2015/2016	£Ms
• Directorate of Science and Technology	(12.35)
• National Marine Facilities	(17.42)
• Science support	(12.92)
• British Oceanographic Data Centre	(2.34)
• International and Strategic Partnerships Office	(0.35)



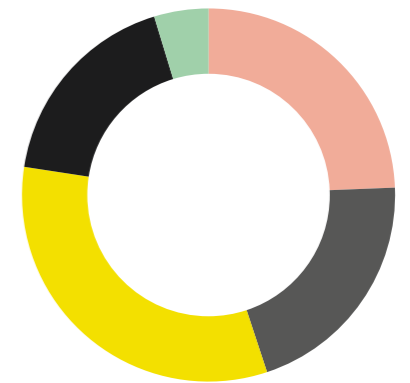
NOC Total Income 2015/2016	£Ms
• NC long term science	(3.46)
• NC large research infrastructure	(13.19)
• NC service, facilities and data	(2.28)
• NC research programmes variable element	(1.17)
• National and public good	(0.84)
• NERC knowledge exchange	(0.27)
• NERC admin	(0.90)
• Internal income from NERC	(11.27)
• External income (EU, UK Government, industry)	(11.85)



NOC External Income Breakdown 2015/2016	£Ms
• Government Depts	(0.41)
• Other public sector	(1.55)
• Charitable sources	(0.10)
• UK private sector	(2.26)
• Foreign (other than EC contracts)	(0.61)
• European community	(3.13)
• Other external income	(3.78)



NOC Capital Funding 2015/2016	£Ms
• Scientific equipment	(1.50)
• National marine equipment pool	(1.27)
• Ship's capital	(2.00)
• Robotics	(1.10)
• Long term maintenance	(0.29)





MARINE ROBOTICS INNOVATION CENTRE

WHERE SCIENCE MEETS BUSINESS

Collaborative working space and specialist engineering
and test facilities for the development of marine technology



