UNIVERSITY OF Southampton

Summer 2015 | Ocean and Earth Science

SOES News

Welcome to SOES News – the magazine for current and prospective students, alumni and friends of Ocean and Earth Science. We look forward to sharing exciting updates on our world-renowned scientists, features on cutting-edge research, profiles about our talented alumni, and fun stories about our students. Enjoy!

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National Oceanography Centre Southampton

A week in the life of a student at our Waterfront Campus

Kirsty Bradley, 4th year MSci Marine Biology student talks about life at our Waterfront Campus, the National Oceanography Centre Southampton (NOCS), including lectures, fieldwork, the learning experience, NOCS social life and so much more.

Monday

Lectures: Learning from the best!

There might be an expectation that lectures can be a little dry, but the majority are eye opening. The most refreshing thing about the lectures here is that the staff presenting them are at the top of their careers – they live and breathe the science you are learning. The majority of the work is new and exciting and many of our lecturers have publications to their name and expertise and tangible knowledge that is respected across the world. At Christmas you might even drop your mulled wine when one of your lecturers turns up talking about their research on BBC news – it's a frequent occurrence! One thing you learn at university is that science is dynamic and always changing, and you can be part of a unique community that gets to hear about it first.

> "You can't learn this type of degree from a whiteboard or a textbook."

Tuesday

RV *Callista*: Hands on experience

When choosing a University, for me our research vessel *Callista* was one of the biggest draws and she is a hefty madam, a 22m catamaran. RV *Callista* is at the heart of the practical learning at Ocean and Earth Science (OES) and those in Oceanography or Marine Biology should expect to be aboard for a variety of modules from 1st to 3rd year, even 4th year if you take up a project based in Southampton Water. The equipment is not only relevant but the crew are great. RV *Callista* is so important to OES that she gets driven down on the open seas to Falmouth in Cornwall for your 2nd and/or 3rd year field course – which is one of the best field experience trips there is. Last year this was a real highlight for me, we not only collected our data using complex kit like a huge CTD rosette, but we saw basking sharks, sun fish and common dolphins all kindly pointed out by the Skipper, who slowed the boat for us all to point and fuss over this wildlife we so closely study. That is RV *Callista's* real value in my opinion, she takes you to the subject material and lets you experience it hands on with very little interference by the crew. You can't learn this type of degree from a whiteboard or a textbook, it's impossible; you've got to get elbow deep in sediment or doused in seawater and plankton samples. Science is hands-on and fuelled by curiosity, you've got to keep that curiosity alive.

Wednesday

Library : Three levels of study, encouraging focus

NOCS has an extensive collection of library material available (this is an understatement). If you like the smell of books, you're in luck. While books are generally used second to journals in this industry, they are still good for breaking down a difficult principle or theory. There are also collections of past Masters, Undergrad and PhD theses on file for you to peruse. If paper isn't cool anymore then there is a large variety of e-journals available on the library online resources, all can be accessed outside the Southampton network via the invaluable VPN. The library 'vibe', (check out my nineties slang), is my favourite aspect, it has large spaces and three floors of bookshelves interspersed with study areas, it induces focus. I love to spend time in our library.

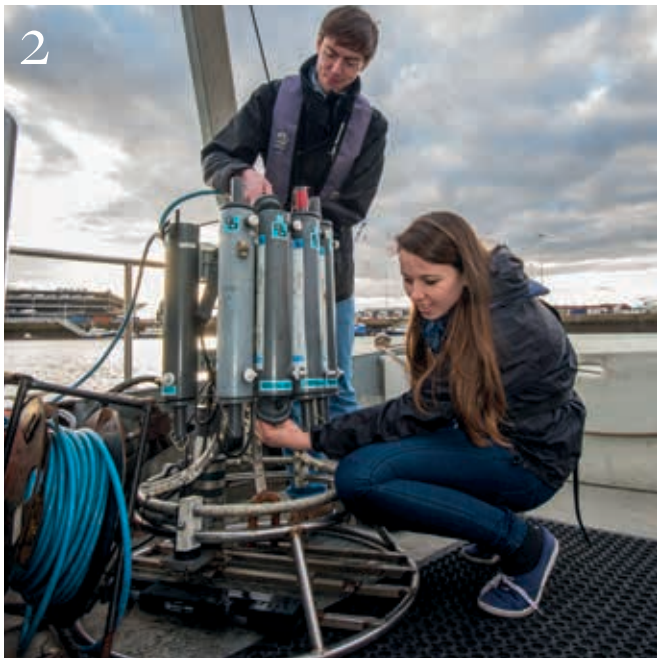
"I am in my 4th year and taking part in isotopic research of Atlantic salmon, sounds cool right? That's because it is!"

Thursday

Labs : Year 1: Fish dissection or Year 3: Schelerochronology and Isotope Demo Labs

In your 3rd or 4th year you will undertake independent research, aka your dissertation; cue sharp intake of breath. I am in my 4th year and taking part in isotopic research of Atlantic salmon, sounds cool right? That's because it is! Seeing as NOCS is in the hub of the industry there are load of first hand research topics you can get involved with. They are not just a repetition of coursework, like you will have been used to at school. It is proper data which is collected by you and holds real scientific value. The fact that it actually matters fuels my interest in my project.

Throughout your degree you are often in labs to help you develop core skills for scientific research, spanning PCR molecular studies and dissections. PhD students demonstrate the science and this is very useful to provide an honest and helpful support to your learning. They are happy to help and of course they've been in your shoes fairly recently which helps, and they are there to give you some friendly advice, as well as their own research perspective of course.



Pictured (clockwise)

1. Kirsty with fellow students at NOCS
2. Fieldwork onboard RV *Bill Conway*
3. Student Centre at NOCS
4. Kirsty at the National Oceanographic Library (NOL)

National Oceanographic Library (NOL)

Fridays and so much more

Field trips : The opportunities!

Ocean and Earth Science often instils pure jealousy among my friends from other campuses, it offers a great variety of field courses for all the degree disciplines. My top two were Sea Survival and Bermuda. Sea Survival is an important aspect of fieldwork when you leave University and enter the big wide world. So this field course (although hosted in Southampton) is a good supportive stepping stone into pursuing practical jobs.

Now, Bermuda is a field course in the 4th year of the MSci Marine Biology course which was absolutely brilliant. Now don't misinterpret me, it's a lot of hard work but the location was fantastic, the pairing with Bermuda Institute of Ocean Sciences (BIOS) means we have access to superb facilities across the Atlantic. We snorkelled among striking ancient purple sea fans and upside down jellyfish. The assessed work for this trip was directly based on the practical work we undertook, which is true throughout your degree here. What I enjoyed most about this trip is being submerged, it's not often that this is possible in the chillier climate we live in.

> "That is what I find special about this campus and through my work, I'm contributing, I'm not merely a passenger."

Ocean and Earth Science Community

NOCS is in a great location; the segregation between campuses can be seen as a pain, but NOCS is in a great location; it's close to the subject material, environmentally friendly and has a strong student community. There are transport links between all campuses with uni-link buses or a refreshing cycle from Portswood. In my opinion, the NOCS campus is a destination and it's great to eat lunch opposite your lecturers while the RRS *Discovery* docks at the quay right outside your window literally! NOCS is its own little mesocosm (look it up), there is a high quality of work, but it's more of a community. We have our own events such as Marine Life Talks and NOCSoc socials. There is a level of comradery especially between students and the location is not only essential but adds value, we can lead two lives between two campuses.

Now, here's a secret: what I really enjoy doing is walking around the corridors of the NOC and seeing through people's open office doors. They show different insights into scientific research, every door a different scientist beavering away at untangling the complex scientific questions of the future. That is what I find special about this campus and through my work I'm contributing, I'm not merely a passenger.

Kirsty Bradley
MSci Marine Biology

Find out more:
www.southampton.ac.uk/oes/marinebiology

Marine Conservation in Mozambique

Final year MSci of Marine Biology student Francesca Trotman has a passion for marine conservation and in particular sharks. The sleek predators have intrigued her since childhood. Now she is continuing her lifelong interest by establishing a non-for-profit, marine conservation organisation in Mozambique called 'Love the Oceans' which is dedicated to preserving many of the local marine life including sharks from the damaging overfishing.

Through Love the Oceans Francesca recruits volunteers to monitor the fisheries in Guinjata Bay, recording the catches of sharks and rays, teaching children about conservation at the local school and diving to find and log the various species and create a biodiversity log. Francesca then plans to use the results of their research to lobby for change and encourage ecotourism in the area.

"Since whale sharks, tiger sharks, humpback whales, manta rays and dolphins are common in these coastal waters, there is a huge opportunity to increase ecotourism and provide a financial incentive for the fishermen to value the animals alive rather than dead," she explains. "Local people are uneducated, they're not dumb, and they are keen to learn more about why their actions could be damaging their environment. For example, we want to encourage and support them to exchange their gill nets that capture everything in their path for more sophisticated fishing equipment."

Francesca first went out to the country in 2013 on an underwater photography internship. The unspoiled coastline and amazing wildlife caught her imagination but she could hardly fail to notice the threat to the shark population and was inspired to do something to make a difference on her return to the UK. Through her research and engagement with the local community Francesca hopes one day they will achieve a Marine Protected status for the coastal waters of Inhambane Province.

"More and more sharks are being killed to satisfy the demand in China for their fins which are used in traditional medicines and eaten by the privileged," she explains. "They are an important part of the food chain in the Indian Ocean and their disappearance could threaten the marine ecosystem on the coast."

Back at the National Oceanography Centre Southampton, coastal ecology specialist Dr Ken Collins supported her initiative and encouraged her to write her final year dissertation on the project. He has had first-hand experience of conservation on the Galapagos Islands as part of an early Darwin Initiative project. Francesca delivered a lecture on the subject to second year students and was pleased when three of them wanted to help her with the work. Another visit to Guinjata Bay in summer 2014 crystallised their ideas. Now she heads up the organisation with Oceanography graduate Oscar Dunn and third year marine biologists Pippa Fitch, Chloe Bentley and Zoe Holbrook as part of the team and the 2015 volunteer recruitment programme is well underway.

"Studying at the University of Southampton has given me the knowledge and contacts to set up Love the Oceans and everyone has been very supportive. We are planning to take our first large group of volunteers out this summer, after my dissertation has been handed in. Although many of our new recruits are students, we are keen to hear from anyone over the age of 18 who shares our passion for our beautiful oceans."

For more information visit: **lovetheoceans.org**

© Kyra Kalageorgi

SEG Trip to visit Zinc Mines in Ireland

Over the Easter break, the SEG (Society of Economic Geologists) committee organised a fantastic four day trip to Ireland to visit two zinc-lead mines on the outskirts of Dublin.

The first day was an introduction to the city. We visited all the key sights including the Guinness Factory and a few pubs before returning to the hostel for an early start the next morning.

The Core Analyst explaining to the group how to use cores to identify minable ore

The first mine we visited was Lisheen, which is a lead-zinc mine two hours south-west of Dublin. After receiving a short talk of the complex geology of the mine, we were shown geological maps the mine geologists have created and given some small samples of the ore. Following lunch we were taken to a huge warehouse which was the core store. Due to the complexity of the mine, many cores have to be drilled and analysed. Here the core analyst explained how the cores are studied and how to identify key features or indication of ore.

The second lead-zinc mine was Tara which is located an hour NW of Dublin-Europe's largest Pb-Zn producer and 9th largest in the world. The head geologist provided a short talk explaining the processes of the mining and a quick overview of the geology. We were supplied with the full mining attire and driven 1km down into the mine, where it reached 20°C! We were shown the machinery at work, ore in situ and even the workshop where the machines were fixed. After a whistle-stop tour underground we were then taken around the processing plant, where we walked through the multiple processes from crushing to floatation. Finally, to end an incredibly insightful day, we were driven to the tailings pond to see the management of environmental effects of mining.

The group sightseeing, outside the Guinness factory, Dublin

The final day was a brief walk through the city and back to the airport to catch a flight home. Although this was an intense four day break, the experience and first-hand knowledge we gained was so valuable. It's so great that we have the opportunity to be able to go on these trips that are organised by the student societies at Ocean and Earth Science. The field trips are already some of the best I know of but these additional trips add another layer of expertise and experience to our degrees. It's also a great social activity and way to meet other students.

Jane Kelsey
MSci Geology

Find out more:
www.southampton.ac.uk/oes/geology

The group in the mechanical workshop deep within the Tara Mine

A family evacuated in Whitstable, Kent, during the 'Great Storm' of 1953. These floods killed 307 people in eastern England and were the catalyst for the construction of the Thames Barrier. (© Canterbury City Council 2015)

Improving our understanding of coastal flooding for the UK

A study, led by Dr Ivan Haigh, lecturer in Lecturer in Coastal Oceanography has created a new database of coastal flooding for the UK over the last 100 years, that will provide crucial information to help prevent future flooding events.

A team of researchers, led by the University of Southampton, and including scientists from the National Oceanography Centre and British Oceanographic Centre, have spent the last 18 months compiling a new database of coastal flooding going back 100 years, called 'SurgeWatch' (**www.surgewatch.org**).

"The UK coastline has been subject to terrible storms and floods throughout history, including in 1607 when more than 2,000 people were killed around the Bristol Channel, and in January 1953 when 307 people were killed in the UK", says Dr Ivan Haigh, lecturer in coastal oceanography at the University of Southampton and former OES graduate.

"More recently, the widespread disruption that can be caused by flooding was demonstrated dramatically during the 2013-14 winter when the UK experienced a series of very severe storms and coastal floods. To effectively plan for the future, better information is required on the occurrence, causes, and consequences of coastal flooding."

Robert Nicholls, Professor of Coastal Engineering at the University of Southampton, adds, "Coastal flooding remains a threat to life and to economic and environmental assets. Today there are 2.5 million people and £150 billion of assets at risk from coastal flooding in the UK. This new database allows us to identify which historic storm events results in flooding, where it occurred and the extent and severity of impacts. It will provide useful information for coastal engineers, managers and planners who are concerned with changes to extreme sea levels and flooding."

The research in this study is referenced in our teaching through the unique Engineering in the Coastal Environment MSc degree, for which Ivan Haigh and Robert Nicholls are programme leaders, and in our modules, such as 'Coastal and Estuaries' that form part of our Oceanography and Marine Biology undergraduate degree programmes.

There is a growing demand for coastal scientists with a broad understanding of environmental, engineering and oceanographic issues in the coastal zone, such as rapidly growing populations and threats including sea-level rise change, and coastal flooding.

To find out more about our postgraduate degrees visit:
www.southampton.ac.uk/oespg

A new "family" of deep-sea starfish named after Ocean and Earth Science Professor

Quite a few famous people have had species named after them, such as John Cleese, Kate Winslet, Prince Charles and even Beyonce! This accomplishment ensures a place in the history books, but there is an even more exclusive club that involves having a whole 'family of animals' named after you.

We are delighted to announce that one of our eminent researchers, Professor Paul Tyler, a world-leading deep-sea biologist, and inspiration to many of our students over the years, has had a whole branch of life named after him. The new family of species will be called "Paulasteriidae". This new family of starfish are unusual in that they have seven arms - and they can grow to around 20 cm across. The ones we are most familiar with usually have five arms and live in rock pools on the seashore.

Finding new species of animals is actually fairly common when exploring the deep-ocean, but finding a new "family" of animal life is much rarer. This new family of starfish has been found living near hydrothermal vents in the Antarctic and the northeast Pacific. Paul Tyler led the Antarctic research programme investigating the deep-sea vents that are home to these starfish, and previously played a key role in creating the UK's Isis deep-diving remotely operated vehicle (ROV) facility. Professor Tyler has spent more time than any other British biologist in history directly observing marine life in the deep ocean, and this new family of marine life includes the first starfish species known to thrive at deep-sea volcanic vents. Previously, people have found brittlestars, which are cousins of starfish - at vents but not starfish species. This discovery shows that there is still plenty of our world to explore, particularly in the deep ocean.

Image Credit: NERC ChEsSo Consortium

National Oceanographic Library
Credit: Barry Marsh

National Oceanographic Library attains 100 per cent in NSS scores

The National Oceanographic Library is the largest Marine Science library in Europe and our students are aware of what a unique opportunity it is for them to have access to it. This was confirmed last year when the National Student Survey results were published and the Library received top marks from many courses for its learning resources. In particular the BSc Oceanography, MSci Geophysics and MSci Oceanography students rated its quality as 100 per cent. This was followed closely by MSc Marine Biology and MSc Geology 97 per cent and 95 per cent respectively.

Comments from students included, 'excellent library resources and quiet workspace at National Oceanography Centre Southampton' and 'very good library resources'.

The National Oceanographic Library benefits from the partnership between the University of Southampton, Ocean and Earth Science and the Natural Environmental Research Council, National Oceanography Centre. Last year there were 93227 recorded visits of staff and students entering the library to use the excellent resources and facilities, and meeting rooms.

It's a great space to work in and hosts many areas for quiet working, break out rooms as well as access to a scientific journal room.

A Dinosaur Encounter in Southampton's city centre

I grew up in Southampton and it is a great pleasure of mine to be involved in bringing dinosaurs from the Natural History Museum to Southampton's SeaCity Museum exhibit 'Dinosaur Encounter'. The south coast and the Isle of Wight have some of the most studied fossil beds in the world and have been critical in understanding animals from the "age of dinosaurs", the Mesozoic. It has also been a fantastic opportunity to showcase the ground breaking research we do at Ocean and Earth Science at the University of Southampton.

Working with the SeaCity team has been a lot of fun and I really think their enthusiasm to learn about modern research into palaeontology has made Dinosaur Encounter into an informative, exciting and entertaining exhibition. Over the last few months I have been working with the team at SeaCity and advising them on the research covered by the Vertebrate Palaeontology group at the University of Southampton with the aim of building an overview of what we do and how we are changing our understanding of the past.

We developed the narrative for the exhibition by using examples of our research. It was astonishing to actually put on to paper the diversity of projects we have and the number ways we collaborate with different disciplines.

The team have managed to pack the space with exhibits currently used in research with seamonsters from the arctic circle, giant pterosaurs from Transylvania, an armoured polocanthus from the Isle of Wight and a huge icthyosaur from Lyme Regis. We have built a very modern unique exhibit that represents cutting edge vertebrate palaeontology.

My highlight was been working with Dan Matthews and Stuart Rhodda from SeaCity Museum to reconstruct and mount a display specimen from the Natural History Museum of the animals I study for my PhD (elephant birds). I really hope that the sheer size and shape of this recently extinct giant bird demonstrates to the public how birds have evolved from dinosaurs.

The exhibit will be on at Southampton's SeaCity Museum from 13 June - 27 September 2015.

James Hansford
Vertebrate Palaeontology, PhD Student
Ocean and Earth Science

A local from the Bougainville Island looks intently as Saikiran Tharimena (University of Southampton) and Mr. Ronald Verave (Mineral Resources Authority of Papua New Guinea) align and deploy a seismometer in Arawa, a small town in the Autonomous Region of Bougainville.

Seismic Imaging in Papua New Guinea

Researchers from the University of Southampton travelled across the world to Papua New Guinea at the start of an 18 month project funded by the Natural Environment Research Council (NERC) and the National Geographic Society to study the deep structure of a large igneous province, its interaction and reversal of subduction beneath Papua New Guinea. This international collaboration also involved scientists from Japan and the United States. Principal Investigator Dr Catherine Rychert, Dr Nicholas Harmon, Dr Derek Keir and PhD student Saikiran Tharimena from Southampton use seismometers as part of their fieldwork to record earthquakes in the South Pacific.

Dr. Nicholas Harmon (centre left) and Saikiran Tharimena (right) from the University of Southampton and Mr. Ronald Verave (centre right) from the Mineral Resources Authority of Papua New Guinea with school children and locals from Lasu, a remote village on the New Ireland Province.

Saikiran writes: "After months of preparation, we arrived in Port Moresby in November 2014 for an assignment that would take us across the country in three weeks to carry out surveys and place our seismometers to record data for the next 18 months. We started in the Bougainville Island, working with the Disaster Management Office set up to cope with crises such as tsunamis and earthquakes. Our first task was to deploy seismometers at Arawa and Buin as well as on the nearby island of Buka. Next, we set off for New Ireland Province; in Lasu we stayed in a hut at an elementary school and were helped in a stamp test by a group of enthusiastic pupils jumping up and down to provide tracings. Another seismometer was placed on the island of Lihir, an area of geothermal activity with an important gold mine before we travelled on to Rabaul on New Britain, another island with volcanoes and hot springs. As well as working, we learned about this island's role in the second world war when it had been the headquarters of Japan's Admiral Yamamoto. Our final stop was at Kiriwina, part of the Trobriand Islands."

"Six months later, in May 2015, we went back to Papua New Guinea to service the instruments we left behind and download the data. Dr Rychert will be distributing the data to fellow researchers to analyse but unfortunately I will not be involved this time as I have my PhD to finish but I look forward to working with the project again after I graduate."

"While we worked hard throughout the trip, we did get some time off to relax on some beautiful islands. As this was the first time that scientists have brought seismometers, our trip was covered by the local press and we were interviewed by reporters. I am an avid photographer and took some amazing shots and even interviewed people in the second visit and was pleased that, as part of the National Geographic Society grant, we were given a camera to capture stills and video footage from the trip. It was a successful expedition and we learned a great deal about the science and also the way of life of people in Papua New Guinea."

Saikiran Tharimena

Find out more about geophysics degrees: **www.southampton.ac.uk/oes/geophysics**

Drifting neutrally buoyant sediment traps being deployed from a ship.

Credit: Richard Sanders (NOCS)

New project to reveal the secrets of the ocean's 'twilight' zone

Ocean and Earth Science at the University of Southampton is to share in a £3.7m grant to investigate the ocean's 'twilight' zone, which plays a key role in storing carbon, keeping atmospheric CO2 30 per cent lower than it would otherwise be.

This 'twilight zone' is the part 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 composition. However it is not known what factors affect this efficiency.

The project, led by the National Oceanography Centre (NOC) is called COMICS – Controls over Ocean Mesopelagic Interior Carbon Storage – and it will build the first model of carbon transport in the 'twilight' zone based on direct ecological measurements. By 2020, once this project is complete, COMICS will have helped make predictions of climate change more accurate.

Until last year it appeared that the animals living in the 'twilight' zone required six times more carbon to survive and grow than was being supplied to them. However, scientists at the NOC revealed a new method that might bring the 'carbon budget' in this zone closer to balance. Professor Richard Sanders from the NOC, who is leading COMICS, said: "This was made possible by world-leading technology developed here at the NOC. The sediment traps we built enabled us to measure the amount of carbon entering the 'twilight' zone much closer to the surface than has been previously possible, which meant our measurements were more accurate."

The COMICS project will use this new methodology to make more accurate and direct measurements of carbon transport. It will involve comparing the amount of carbon entering the 'twilight' zone (taken from samples of the sediment that sinks, often referred to as 'marine snow' owing to their appearance as they fall down through the ocean) with the amount of carbon consumed by biological processes within the system, calculated by measuring the rate that microbes and animals, such as jellyfish and krill, breathe.

The lead University of Southampton investigator on the project, Dr Phyllis Lam, from Ocean and Earth Science is particularly interested in what tiny microscopic organisms do in the marine snow. She said: "These marine snow particles are major vehicles for carbon delivery into ocean interior and they are teaming with diverse microscopic life – the major recyclers in the ocean. However, these tiny microbes don't just sit there; they feed on the available carbon, where some can break the marine snow apart, while others glue pieces together, some release nutrients from the snow while others make new food-like plants that are independent on sunlight. In other words, these microbes can substantially change the size and composition of marine snow and, in turn, carbon export. To what degree and in which direction, however, we have yet to find out."

Once COMICS has built an understanding of how the 'twilight' zone works, a simple mathematical model of the zone will be created and used in larger global environmental models. Dr Mark Moore, from Ocean and Earth Science, University of Southampton, added: "COMICS represents a fantastic opportunity to bring together multiple organisations and approaches in tackling a key problem in our understanding of the oceanic carbon cycle."

COMICS has received funding from the National Environmental Research Council (NERC) and is a collaboration between the universities of Southampton, Queen Mary London, Liverpool and Oxford, NOC and the British Antarctic Survey.

Observing the Ocean

Before starting my PhD in 2012, I worked at the Bermuda Institute of Ocean Sciences. In Bermuda I was in charge of the processing and quality control of the data collected as part of the Bermuda Atlantic Time-Series Study. I also participated in and ran the monthly research cruises out of Bermuda. I would call myself an observational physical oceanographer, and working in Bermuda gave me excellent experience in all aspects of observing the ocean. My decision to start a PhD was based on the need to build on my experience in Bermuda, and develop the tools needed as a physical oceanographer to really understand the processes we observe in the ocean.

At Ocean and Earth Science I have been able to be part of small group of researchers developing exciting new methods for understanding changes in temperature and salinity in the ocean. Early in my PhD, I took part in a research cruise to the Southern Ocean as part of the international Diapycnal and Isopycnal Mixing Experiment in the Southern Ocean DIMES project. The stimulating environment aboard the RRS *James Clark Ross* and the data collected during this cruise eventually led to my first publication in a research journal.

More recently I was given the opportunity to work at the Woods Hole Oceanographic Institution near Boston, Massachusetts as part of an exchange programme. The three months I spent in Woods Hole led to collaborations with researchers at WHOI and also MIT. More importantly, I was able to focus on the development of the tools and analysis that will form the major part of my thesis. The skills I've learned as part of my PhD and the collaborations made, on top of my experience from Bermuda, will undoubtedly serve me well as I progress through an academic career in oceanography.

Gwyn Evans

Gwyn Evans in South Georgia showing RRS *James Clark Ross* alongside King Edward Point in the background.

Credit: Gwyn Evans

National Oceanography Centre Southampton

Opening our doors to the future. July Open Days

We were very pleased to welcome prospective future students and their families to our Waterfront Campus, the National Oceanography Centre, Southampton (NOCS) on the first weekend in July. We hope everyone enjoyed meeting the students and staff that make up the community here at Ocean and Earth Science (OES).

On display were examples of our high impact research as well as subject specific rooms that included degree module information, fieldwork photographs, student projects and case studies. We took great pleasure in being able to showcase the exciting science that happens here at NOCS and how our undergraduate students are able to get involved as part of their learning experience.

Our student ambassadors also enjoyed sharing with the potential future students what it's like to be a student here at NOCS, elaborating on the coastal lifestyle, information about the city and importantly the opportunities that being a student at OES presents from work experience to future career prospects.

Southampton geoscience in the news

University of Southampton alumnus Dr Ross McGowan, who graduated in 2002, is part of a team which has just been awarded a major international award for the discovery of the important Kamoa deposit of copper in the Central African Copperbelt.

Ross, who was one of Professor Steve Roberts' PhD students, is Chief Executive of Armada Exploration Ltd. The Ivanhoe Mines Kamoa Discovery Team has been awarded the prestigious 2015 Thayer Lindsley International Discovery Award by the Prospectors and Developers Association of Canada (PDAC). This annual prize recognises an individual or a team credited with a recent significant mineral discovery or series of discoveries anywhere in the world. It honours the memory of Thayer Lindsley who founded or was involved in the development of many famous Canadian mining companies.

The Kamoa copper deposit in the Democratic Republic of Congo (DRC) was found in the Central African Copperbelt on the western edge of the Katangan basin, approximately 25 km west of the Kolwezi district. This area had been written off by other explorers because of its lack of mines series rocks or surface mineralisation. However, independent experts have ranked Kamoa as Africa's largest high-grade copper discovery and the world's largest undeveloped high-grade copper discovery.

"This recognition of the efforts of key members of the Ivanhoe exploration team in the extraordinary Kamoa discovery is an honour and a proud achievement for our company," says Robert Friedland, Executive Chairman of Ivanhoe Mines.

"Kamoa was formed more than 500 million years ago and was subsequently hidden under a thin layer of Kalahari sand for an estimated tens of millions of years.

"The discovery, first announced in April 2009, was the collaborative effort of a global team of exceptionally talented geologists, mine finders and financiers – creative thinkers and doers – with a deep esteem for science, technology and grass-roots exploration.

"The largest major copper discovery in the DRC since the early 1900s, Kamoa represents the discovery of a previously unrecognised and richly endowed district within the Central African Copperbelt – geologically distinct, yet geographically next door to the well-known Kolwezi deposits. We have a strong belief that the Copperbelt in DRC holds the potential for additional world-scale discoveries."

Surveys at Kamoa indicate mineral resources of 739 million tonnes grading 2.67 per cent copper and containing 43.5 billion pounds of the metal alongside another area with inferred mineral resources of 227 million tonnes grading 1.96 per cent copper, containing 9.8 billion pounds of copper.

Ivanhoe's current and past Thayer Lindsley Award winners – (from left to right) Dr. David Broughton; Thomas Rogers; David Edwards; Charlie Forster and Douglas Kirwin, winners of 2004 Thayer Lindsley Award; and Dr. Ross McGowan.

It all started with an Oceanography degree

Jonathan Lauderdale is a postdoctoral researcher at the Massachusetts Institute of Technology in Cambridge, Massachusetts.

Studying at the Waterfront Campus was instrumental in drawing me towards a science research career. I was at Ocean and Earth Science as an undergraduate studying MSci Oceanography, graduating in 2006 and then as a PhD student, graduating in 2011. Probably the most inspiring thing was to be taught and mentored by the very people actively trying to tease apart how the ocean works.

I am interested in interactions between ocean physics and biogeochemistry using model simulations of the global ocean circulation and carbon cycle. A model is like an impressionist's painting: recognisable details, but also many simplifying brush strokes. The models I use contain the fundamentals of seawater fluid dynamics with simplifications of processes that are incompletely understood or would require an excessive amount of computing power, such as deep-ocean mixing or the myriad species of floating microscopic animals and algae. I can use these models for experiments that would be impossible in the real world, like blowing stronger winds over the Southern Ocean, growing large sheets of sea ice around Antarctica or emitting large quantities of carbon dioxide into the atmosphere (OK, we are doing that one for real).

I have also been lucky enough to take part in several research cruises: a voyage to Cape Farewell off the southern tip of Greenland (undergraduate), a transect across the Atlantic sector of the Southern Ocean (PhD student) and a cruise in the Equatorial Atlantic (postdoc). This kind of work poses different challenges, but is the most reliable way to collect high quality measurements from a remote and sometimes hostile environment. There are personal highlights too such as seeing the Northern Lights, schools of flying fish or watching penguins waddling around on icebergs.

These observations and model experiments often lead to unexpected surprises and my understanding of the ocean is always being challenged, which is sometimes stressful, but definitely exciting. I feel privileged to be contributing to understanding the natural world and closer to nature as a result.

Find out more about oceanography degrees: **www.southampton.ac.uk/oes/oceanography**

Jonathan Lauderdale in Norway;
Credit: Jonathan Lauderdale

Hannah conducting a coral recruitment survey

Discovering Madagascar

In June 2014, graduation from the MSci Marine Biology programme was approaching too quickly for my liking. I had no plans and the idea of starting a new life apart from my close friends at university was very daunting. I wanted to travel but knew that there was no way I could afford to do so properly. On a whim I applied for a field scientist position with Blue Ventures - A London based NGO with sites in Madagascar and Belize. I was called for interview and after a few weeks of fretting I was offered a year-long position at their Madagascar site a few days before my graduation.

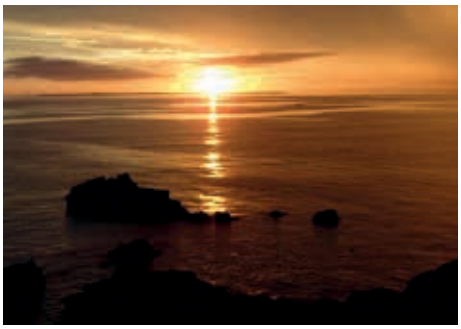

Hannah exploring the reef flats at low tide

For the last 10 months I have been living in a small village in south west Madagascar called Andavadoaka. It is a village central to the Tulear Barrier Reef and is home to a pioneering locally managed marine area (LMMA) named Velondriake, or "being with the sea". Velondriake consists of a series of no-take-zones along with locally enforced fishing gear restrictions. There is also an annual octopus fishery closure beginning in August and lasting a few months.

My job mostly involves teaching volunteer data collectors about marine science and how to identify the fish and benthos of the region. I conduct reef surveys and have learnt a huge amount about coral taxonomy through my position. I help to run trips to other villages to get volunteers involved in sea cucumber and seaweed aquaculture and have been lucky enough to help conduct a mark and recapture programme on the endangered spider tortoise.

But how did I get this wonderful job? Partially in that I have lived abroad before and that I am a qualified scuba diving instructor. But mostly due to what I have learnt through my degree. The MSci Marine Biology programme taught me to think critically and taught me how to present my ideas effectively, both through writing and also through oral presentations. These are skills I use every day. It also gave me the ability to design methodologies and provided me with hands-on reef surveying experience, without which I would not have been hired.

The main thing I have taken from my incredible year is the importance of proper natural resource management. In Andavadoaka we are almost completely cut off from the outside world. During storms the roads flood and we can't get out. This means no food deliveries, no clean water, no electricity and no internet. Just the roofs over our heads, rice, beans and anything that can be caught fishing or gleaning. The people of this region are called the Vezo, which in English simply means "row". This is what they do; they row or sail out to sea and fish for their livelihoods. As this region develops and the Vezo population grows, more stress will be put upon the fish stocks and coral of the Tulear Barrier Reef. Without proper conservation and marine management, future generations will struggle. In the end, I am grateful that I have had the opportunity to be involved in helping a small community work towards a future with healthy children and healthy coral reefs.


The view over Andavadoaka Rock (right) after the biggest storm of the year

Hannah Gilchrist
MSci Marine Biology graduate 2014

First ever Mineral Identification book

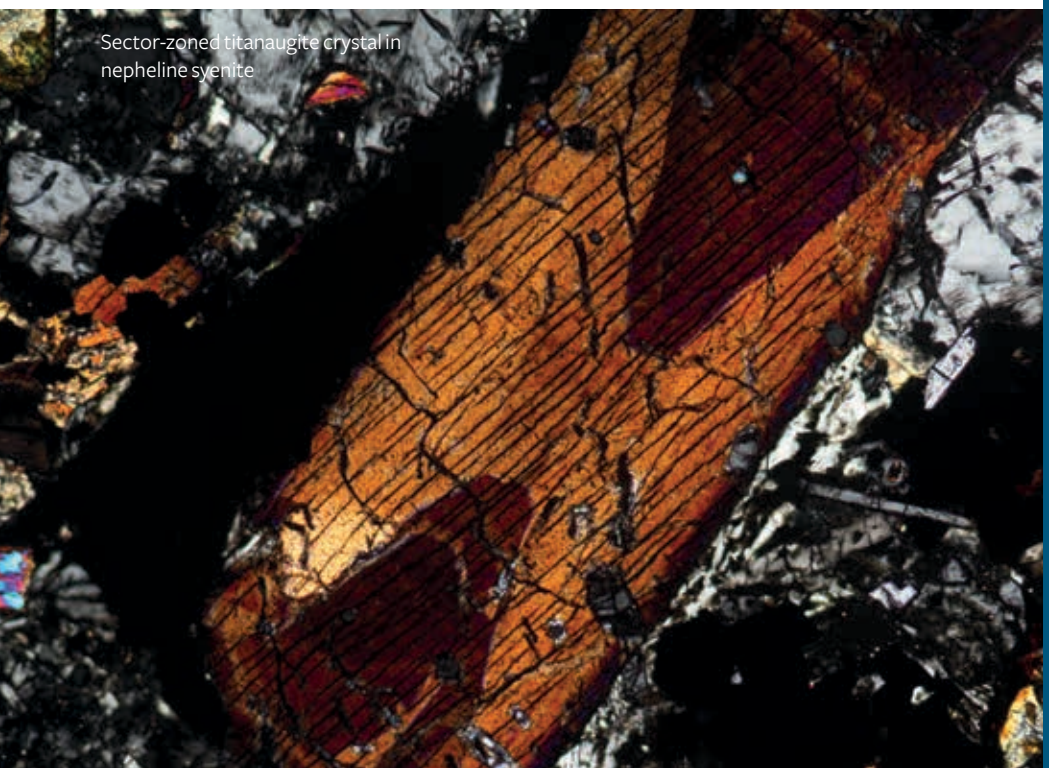
Identifying rock-forming minerals in thin-section using a petrological microscope is a challenging prospect for anyone new to geology, and even the experienced petrologist will encounter new and difficult minerals that prove tricky to identify. With reference to its optical properties, coupled with a knowledge of associated minerals, it is usually possible for the experienced geologist to narrow down the possibilities to make an identification, but how does the beginner get started?

I remember as a student being faced with the prospect of trying to identify minerals using Deer, Howie & Zussman's excellent, but seemingly impenetrable text, "An Introduction to Rock-forming Minerals". Although packed with detailed information on each mineral there was no systematic way to guide you from what you had observed to the mineral with those specific properties. In the 1990s a series of beautifully illustrated colour-identification guides were published, but had less detail on mineral properties. In practical classes these provided a welcome aid to mineral identification, but for many students it became a case of flicking through the pages until a likely mineral was found. This wasn't entirely scientific, and didn't always yield the correct answer. This gave me the idea of producing "A key for identification of rock-forming minerals in thin-section". Structured in the form of a dichotomous key, comparable to those widely used in botany, the aim was to provide an efficient and systematic approach to identifying minerals in thin-section by answering a series of questions about the mineral's optical properties.

The initial concept for this publication was developed in the 1990s, but because of other priorities did not reach its final form until nearly 20 years later! Following testing and feedback by 1st and 2nd year Ocean and Earth Science geology students, for which I, as the author am very grateful for, it was further refined, and eventually published in November 2014. It is the first mineral key of its kind, and covers 150+ rock-forming minerals, coupled with 330+ colour photomicrographs to further aid mineral recognition. Only time will tell whether it is as user-friendly as hoped for, but initial student feedback has been positive, so hopefully it is already making a useful contribution to developing mineral identification skills.

Dr Andy Barker
Senior Tutor, Ocean and Earth Science

The Book: *A Key for Identification of Rock-forming Minerals in Thin-Section*, published by CRC Press/ Taylor & Francis Group, London, November 2014: ISBN 978-1-138-00114-5



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Vice Chancellor Teaching Awards

Each year the University of Southampton recognises and celebrates individual staff or teams whose teaching is inspirational, innovative or of a particularly high standard with the Vice-Chancellor's Teaching Awards. These awards celebrate the dedication of those nominated and encourage the sharing of excellent practice and any practice from teaching, fieldwork to mentoring that has a specific positive impact upon the student learning experience.

We are very pleased to announce that Dr Antony Jensen, Associate Professor in Marine Ecology and Dr Eleanor Frajka-Williams, Lecturer of Physical Oceanography were both winners of the award.

Dr Antony Jensen during a recent oyster survey. Photo: Patrick Cooper

Dr Jensen said: 'I'm delighted that all of the 'behind the scenes' work that has gone on to revise and relaunch the Natural Sciences degree has been recognised by the University'

Dr Eleanor Frajka-Williams on the RRS *James Clark Ross*. Photo: Povl Abrahamsen

Dr Frajka-Willams added: "I've been trying new approaches in my teaching, which is always risky. Thanks to the students' willingness to work with me and to provide feedback about what works and why - at least a few of the new approaches have been useful. I'm dedicated to improving their learning experience, and so am delighted and honoured to receive a VC teaching award"

Antony and Eleanor are highly thought of by students and the academic community. We would like to congratulate them on this well-deserved award.

My journey through Oceanography

The day I was accepted into the MSci Oceanography programme at the University of Southampton, I burst with excitement at the prospect of moving to the UK and growing into an adventurous scientist collecting data in remote seas. My experience as a student was shaped by the distinctive nature of the National Oceanography Centre Southampton where most of the lectures and courses included in my degree were held. I gradually developed a particular interest in physical oceanography, which uses mathematics to explain the structure and movements of the oceans, and a passion towards programming software to analyse oceanographic data. While planning the topic of my Master's dissertation, I was offered the unique opportunity to participate in a six-week research cruise to the subtropical North Atlantic. This experience, together with my advanced skills in data handling, later proved to be crucial in obtaining an exciting position as a sea-going research technician in programming and data processing at the Bermuda Institute of Ocean Sciences (BIOS), where I moved to shortly after graduating.

During my two years at BIOS I worked in a team to maintain the historic Bermuda Atlantic Time-series Study (BATS) and Hydrostation 'S' projects, joining numerous cruises to collect a wide range of oceanographic data in the Sargasso Sea. Moreover, my professional growth was further enriched by relevant training opportunities, networking with visiting scientists and the unique chance to present a poster at an Ocean Science international conference in Hawaii. I have recently moved back to the U.K. to work as a Data Scientist for the British Oceanographic Data Centre (BODC) at the National Oceanography Centre site in Liverpool. As my early ambition of sampling the oceans has been extensively fulfilled, I am now looking at the next steps following data collection: archiving, managing and sharing high-quality marine data.

Violetta Paba

Starting the day at BODC, Credit: Violetta Paba


Dr Gareth Dyke, Associate Professor in Vertebrate Palaeontology

Excellence in Teaching Awards

This year again Ocean and Earth Science featured in the University of Southampton Students' Union (SUSU) annual Excellence in Teaching Awards (ETAs). Students were invited to submit nominations through the SUSU website for academic staff within five categories: Outstanding Lecturer, Teaching and Learning Lifetime Achievement, Innovative Teaching, Best Feedback Provision and Contribution to Academic Support. This year we are pleased to announce and would like to congratulate Dr Gareth Dyke who was awarded 'Best Feedback' winner.

www.southampton.ac.uk/oes

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