

SOES NEWS



Students volunteer at the
Charles Darwin Foundation
Galápagos Islands, Ecuador

SPOTLIGHT ON:
Boaty McBoatface
returns home with
unprecedented data

ALUMNUS PROFILE:
Southampton sparked
Alumnus passions

RESEARCH IN THE NEWS:
Removing CO₂ from the
atmosphere to counteract
global warming



Geoscience at Southampton
Oceanography at Southampton



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Ocean and Earth Science

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In Brief

STUDENTS VOLUNTEER AT THE CHARLES DARWIN FOUNDATION GALÁPAGOS ISLANDS, ECUADOR



After their graduation last summer, Tom Hannam-Penfold, Jess Howard and Bede Davies left for the Galápagos Islands. Jess and Bede had visited the island before on a tropical marine biology field course as part of their Marine Biology studies. For Tom, an oceanography graduate, it was his first time. Tom, Jess and Bede share their experiences with us.

Tom and Jess's story

We lived and worked at the Charles Darwin Research Station on Santa Cruz island on the edge of Puerto Ayora town. Day to day our duties and work was very changeable. Sometimes we assisted visiting scientists, worked on maintenance and improvements of the facilities, or worked on our own project. Every day, however, included a reminder of why we had decided to study natural and environmental sciences. On the walk down to our office we saw amazing bird life, the famous Marine Iguanas, sometimes Sea Lions, Rays and Turtles.

Most of our time was spent on our own project, looking at plastic marine debris as a vector for invasive species. Visiting scientist Jim Carlton, who had picked up some samples and found some exciting results, inspired this project. We walked on beaches, collected the plastic samples and processed it in the lab. Normally we only surveyed the beaches near to the town, but we were lucky enough to be invited on a week-long cruise with National Geographic-Lindblad around the Eastern part of the archipelago. This gave us a valuable opportunity to visit beaches with less touristic impact and engage with the guests and guides on the boat. The public interaction allowed us to appreciate our work more and spread conservation, environmentalism and scientific knowledge with all kinds of people.

We found ourselves to be useful and appreciated members of the team at the station, in no small part due to our experiences and skills developed during our time as undergraduates at the University of Southampton. From this trip we have fallen in love with the Galápagos and the people we met there. We're looking for funding to return to the paradise of natural history and continue our project.

Bede's story

I first became aware of being able to volunteer here while on a research field-course in September of 2015. On this field-course a group of students and I carried out research in the Archipelago alongside the then PhD student Inti Keith. We travelled between islands working on scheduled coursework and also had a few days of sightseeing. During this field course, Inti expressed that should any of us want to volunteer at the station then she would be glad to have us. Having thoroughly enjoyed myself, being amazed by the beauty of both the wildlife and the landscape, I was very reluctant to leave. So when I graduated in 2016 I decided that the opportunity to volunteer would not only be an amazing experience, but also would be a great learning opportunity to put into practice all the skills I had learned during my degree. Since arriving here I have been part of a couple of different projects. The projects include: assessing beach plastic for biofouling to assess plastics as a vector for bio-invasions to the islands (the methodology for which is travelling to beautiful beach locations and collecting plastic rubbish); mapping an invasive Macro algal species around multiple sites in the archipelago (methodology of which is snorkelling in amazing locations) and using a ROMS model to map ocean currents to assess areas of the ETP that are high risk for the introduction of invaders to Galápagos (methodology is R computer work). Over the six months, I have been lucky enough to go on four lots of week-long boat trips around the islands to research for the different projects. Alongside the research I have carried out here I have also been able to progress my diving experience from PADI Advanced Open Water to PADI Rescue Diver. I have thoroughly enjoyed my time here and want to continue helping Galápagos conservation in any way that I can in the coming years.



Watch highlights from the 2015
Galápagos field trip by our students
youtu.be/y2e17yyubmQ

GEOLOGY STUDENTS SECURE RESEARCH GRANTS TO INVESTIGATE FREQUENCY OF SUBMARINE LANDSLIDES

Dom Lee Dade and Mike Sims, 4th Year MSci Geology students have recently secured research grants to undertake radiocarbon dating analyses as part of their Advanced Independent Research Project.

Dom Lee Dade and Mike Sims are investigating sediment cores drilled from the seafloor of the Lofoten Basin off the west coast of Norway, and will be attempting to date a series of submarine landslides penetrated by their cores that have occurred in this region since the Last Glacial Maximum (LGM).

The interest in these landslides stems from the fact that the largest of them could be capable of generating a damaging tsunami that would affect northern European shorelines. The students are working with the Arctic Landslide Tsunami Project team at National Oceanography Centre Southampton, which is examining the frequency of submarine landslides in the Northern North Atlantic, a project led by Professor Peter Talling.

The wider research project has focused on some of the largest submarine landslides from the region, including the Storegga Slide, the largest slide of its type known on the planet, involving the collapse of some 2500km³ of material from the continental shelf of Norway. This would be enough to bury Scotland in mud to a depth of 100m, and an event that would have generated a devastating tsunami. Research suggests that the tsunami wave was 25m high when it reached the Shetland Islands, and 5m high in Scotland. Sediments from this slide have been mapped across Europe, and a repeat of this event would be one of the most destructive geological events that could affect the UK. Previous work in the region has shown that the Storegga region generates one giant submarine landslide every 100,000 years (once every glacial cycle). The research

Dom and Mike are doing as part of their 4th Year MSci Geology Advanced Independent Research projects will assess whether more northerly submarine slide complexes behave in the same manner and with the same frequency.

This is a considerable achievement for an undergraduate masters student, as only six such awards are made each year. The students' successes mean that they will have made a real contribution to the wider research project goals. Both students have sent their samples to the ¹⁴C Chrono Centre at Queen's University Belfast for analysis, and each will write a report about their research to be published in QRA Newsletter next year. Following this, their work will be included in a research paper considering the risks of tsunamigenic landslides in the Lofoten Basin.

Mike says that "Writing this application has been incredibly useful, and has provided unique insight into that aspect of a research career. Over the course of producing and reviewing my drafts I greatly improved my writing style, through learning how to produce an engaging yet succinct research proposal. I am really excited by the opportunity to contribute to a major research project at NOCS, and as this project has a broad basis I am constantly learning new techniques to study the cores, ranging from simple logging techniques to SEM use and radiocarbon sampling. Through participation in this project I look forward to becoming a more competent sedimentologist, and one with a good understanding of research processes, and cementing my future in academia!"



Sampling a core section for paleomagnetic analysis. Mike Sims (left) and Dom Lee Dade (right). Credit: Millie Watts



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Mike Sims
MSci Geology, 4th Year



The cruise team retrieving a core from the Lofoten Basin aboard the RV *Pelagia*, July 2014. Cores were collected using a 1.5 tonne weighted piston core, before being cut into 1.25 m long sections and split on board. Credit: Millie Watts

SOUTHAMPTON SPARKED ALUMNUS' LIFETIME PASSION

Southampton alumnus Ben Burville has recently featured on national TV including The One Show and Countryfile, with his research investigating the lives of grey seals. Here he recalls his time at Southampton and how his study sparked the flames of his passion for marine life.

"I look back with fond memories on my days in the late 80s at the University of Southampton where I studied for a BSc in Oceanography and Biology. The course was enjoyable and I juggled my degree with being in the Army reserve forces."

"One of the highlights of my degree was the field work conducted from Plymouth aboard

a university research ship, where classroom lectures were put into practice at sea."

"My final year dissertation involved bottlenose dolphins that were kept in captivity at Brighton aquarium. I deplore all cetacean captivity, but the aquarium's head keeper was keen to do all he could to provide stimulation for the dolphins and felt I could help. The dolphins were later returned to the wild."

"My interest in marine mammals had been fired."

"After graduating I took an unusual career path into the chemical industry and undertook two tours of duty with the army in Bosnia. I then decided to go back to university to study medicine."

"Now 18 years later, I am a GP working in a Northumberland coastal town, with a visiting researcher post in the School of Marine Science, at Newcastle University."

"Throughout, I have always kept my passion for marine life burning and have spent more time underwater with grey seals than anyone in the world."

"This interest in grey seals (that probably borders on obsession) has featured in various TV programmes such as Coast, Springwatch, Autumnwatch, Countryfile, The One Show and Tales from Northumberland, and in magazines such as the BBC Wildlife Magazine."



“My degree from Southampton provided some valuable opportunities and without it I would not be in the fortunate position I am in today.”



To see Ben’s work visit

www.youtube.com/watch?v=9X98BJQGYmo&t=54s



The largest tagged shark was a 2.5m female
Credit: Dmitry Sharomov

SHARK SPOTTING IN SOUTH AFRICA

Marine Biology graduate Zofia Drapella, joined the famous explorer Mike Horn and the scientists from Shark Spotters to study sevengill sharks in South African waters.

Zofia was one of 10 young people from across the world who were invited to take part in the Shark Awareness Project. It was the first socio-environmental project that forms part of Horn's Pole2Pole 360 expedition.

The 115 feet long yacht 'Pangaea' that belongs to Horn proved to be a great platform not only to circumnavigate the planet, but also to study large ocean predators. The team worked with sharks as large as 2.5m from the stern of the boat.

The enigmatic sevengill sharks, also known as cowsharks, are still poorly understood. In fact, so little is known about the

broadnose sevengill shark that it has been classified as Data Deficient on the IUCN Red List of Threatened Species.

During the expedition, 15 sevengill sharks were captured, tagged and released. The tagging process involved a small surgical procedure in which an internal acoustic tag (which has a battery life of around 10 years) was implanted into the shark's abdominal cavity. As part of the surgery, tissue samples for isotopic analysis and fin clips for genetic study were collected.

The tagged sharks will now be detected by a substantial array of acoustic receivers placed in the waters surrounding South Africa.

The Shark Awareness project helped to show that sharks themselves are more misunderstood than malevolent and the data collected will hopefully aid future management strategies.



Find out more

www.facebook.com/pole2poleprojects

PHD STUDENT TURNS DETECTIVE TO TRACK DOWN EXACTLY WHERE FISH COME FROM

Postgraduate marine biologist Katie St John Glew is using science to develop a tool to help fisheries inspectors know where fish landed at ports have actually been caught.

Katie described her PhD research in just 180 seconds in a heat of the popular Three Minute Thesis (3MT) competition and represented the Faculty of Natural and Environmental Science at the final of the University of Southampton's 3MT contest.

Katie is using isotopes of elements detected in fish caught in the North Sea to identify where they were harvested; this valuable information could support European Union efforts to conserve stocks and manage trawler fleets.

"This application has emerged from my work to investigate foraging areas of marine creatures," she explains. "We know seabirds breed on land in colonies but they feed out at sea and we are not sure where. However, we can measure isotopes in their feathers acquired from the fish they consume and track where they forage. The next step is to use these techniques to discover where trawled fish come from across the UK's continental shelf."

3MT challenges PhD students to summarise their thesis in ordinary language. Katie uses a 'CSI Southampton' theme for her presentation and compares her research to a detective story: "I enjoy communicating science and was inspired to apply after a friend entered last year. It takes a lot of practice but it's good fun."

A final year PhD student, Katie studied for her first degree, Master of Science in Marine Biology, at the National Oceanography Centre Southampton and wants to stay in research after graduating.



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3D CHIRP SYSTEM ON THE HUNT IN RIVER THAMES

What do you do when you unexpectedly discover a World War II mine in the River Thames close to the London Eye? Call in technology developed at the University of Southampton to check whether there are likely to be any more potentially explosive surprises in the sub-surface.

This recently happened in an area between Charing Cross and Westminster Bridges in London when a company clearing mud on the riverbed of the Thames came across the 50lb World War II device. This discovery on 19 January 2017 created chaos in the capital as bridge and roads were shut until the bomb was safely taken away by explosives experts.

At short notice, a survey was completed using technology developed by Southampton and licensed to Kongsberg Ltd (Geochirp 3D). 3D Chirp is a surface-towed sub-bottom profiling system capable of imaging the upper tens of metres of the sub-surface in three dimensions with decametric horizontal and centimetric vertical accuracy. This system produces 3D

images of the sub-surface using sound waves and these image volumes can be used to identify sub-surface objects. In complex settings such as the river Thames in central London, this technology is much more effective than other sensing techniques, such as magnetic surveying, which can return many false positives due to many magnetic features in the urban environment.

The survey had another University of Southampton link. Sand Geophysics Ltd set up by four University of Southampton geophysics graduates, was commissioned by the Port of London Authority to complete the 3D Chirp survey. The University of Southampton team led by Dr Justin Dix, Professor Jon Bull, Professor

Tim Henstock, Dr Mark Vardy (NOC) and co-workers, continue to develop the 3D Chirp technology with Kongsberg and currently have two PhD students (Michael Faggetter, and Calum Fry) working to further improve the system. One particular research avenue that is being pursued is 4D Chirp, or time lapse imaging – looking for changes in the sub-surface with time.



Find out more

www.theguardian.com/uk-news/2017/jan/20/unexploded-wwii-second-world-war-bomb-pulled-river-thames



The 3D Chirp system being towed by the POLA vessel *Maplin* in front of the London Eye.
Credit: Magnus Rew

FINAL YEAR SPONSORSHIP FOR GEOLOGY STUDENT

Southampton Geology student Stephen White is celebrating securing sponsorship for the final year of his MSci Geology degree.

Stephen applied for sponsorship funding from MinSouth – a UK mining and minerals society based in the south east and was delighted when he heard he had been successful.

He said: "My fourth year project is linked to mineral ores and focuses on the geochemical variation across the Troodos Ophiolite, in Cyprus."

"I am extremely grateful for the £500 financial support from MinSouth. It has already helped me cover travel costs to conferences. I also got to attend the annual MinSouth Christmas Quiz, in London, where I got the opportunity to network and learn from professionals who are currently working in the mining industry."

"The sponsorship fund runs every year, so I would encourage future final year geology students to apply if you have an interest in mining and mineral resources."

Stephen was also fortunate enough to be selected by CASP (formerly known as the Cambridge Arctic Shelf Programme) to spend a month as a field assistant in the Arctic Circle last summer.

CASP is a charitable trust that carries out field, literature and analysis-based geological research in prospective hydrocarbon basins. It launched the Cambridge Arctic Shelf Programme in 1975.

Stephen worked alongside two CASP geologists – tectonics specialist Dr Michael Flowerdew and sedimentologist (former Southampton student) Dr Edward Fleming - as part of the Barents Shelf Project, in Svalbard, exploring sedimentological and proxy provenance.

He says one of the highlights of his trip was seeing the transgressive and regressive movements from river to lagoon, showing that no environment stays the same as sea level, tectonism and climate interlink.

"I loved my experience in Arctic Svalbard. I am extremely thankful to the two geologists Ed and Michael for providing me with the opportunity to work with them as a field assistant."

"I will always remember the trip and the amazing views. Nature will never cease to amaze me."



Stephen White on Bertilryggen peak, Svalbard. Credit: Stephen White



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BOATY MCBOATFACE RETURNS HOME WITH UNPRECEDENTED DATA

Researchers at the University of Southampton have captured unprecedented data about some of the coldest abyssal ocean waters on earth, known as Antarctic Bottom Water (AABW), during first voyage of the yellow robotic submersible known as Boaty McBoatface.

The team, which also involved scientists from British Antarctic Survey and engineers from the National Oceanography Centre, captured data on temperature, speed of water flow and underwater turbulence rates of the Orkney Passage, a region of the Southern Ocean which is around 4,000m deep and roughly 500 miles from the Antarctic Peninsula.

In order to visualise the progress of Boaty and place the data in the context of the complicated terrain in the region, the team have created an animated fly-through of the Orkney Passage. The information collected will now be analysed to understand the complex process of ocean mixing and how it affects climate change.

The information was gathered as part of the DynOPO (Dynamics of the Orkney Passage Outflow) seven-week expedition funded by a grant from the Natural Environment Research Council (NERC).

It was the first Antarctic voyage of Boaty McBoatface, one of the Autosub Long Range (ALR) class of unmanned submersibles, the latest type of autonomous underwater vehicle (AUV) developed by the National Oceanography Centre. The Autosub was

named following last year's campaign by the NERC to name the UK's new polar research ship. While the ship will be named after famous naturalist and broadcaster Sir David Attenborough, the popular suggestion of the contest – Boaty McBoatface – lives on in the form of an unmanned submersible that will support the research ship to explore parts of the polar regions inaccessible to humans.

Welcoming Boaty McBoatface back from its first mission, Universities and Science Minister Jo Johnson, said: "Fresh from its maiden voyage, Boaty is already delivering new insight into some of the coldest ocean waters on earth, giving scientists a greater understanding of changes in the Antarctic region and shaping a global effort to tackle climate change."

"Future Boaty missions and the new RRS *Sir David Attenborough* research vessel will ensure the UK continues to punch above its weight and lead the way in polar science, engineering and technology as part of our Industrial Strategy."

Researchers used a combination of specialised instruments including those deployed from the ship as well as instruments moored to the seafloor and measurements made by Boaty.

The submersible completed three missions during the expedition, the longest lasting three days, travelling more than 180km and reaching depths of nearly 4,000m. It travelled back and forth through an abyssal current of Antarctic Bottom Water along the Orkney Passage, sometimes in water colder than 0°C and in currents up to 1 knot, while measuring the intensity of the turbulence.

This current forms off the coast of Antarctica as cold winds off the ice sheet cool the sea surface. The resulting cold, dense water sinks and moves northwards, forming an important part of the global circulation of ocean water. The Orkney Passage is a key chokepoint that AABW has to navigate on its way from Antarctica's Weddell Sea to the Atlantic Ocean.

Current evidence suggests that changing winds over the Southern Ocean affect the speed of seafloor currents carrying AABW. The speed of these currents determines how turbulent their flow around underwater mountain ranges (submarine topography) is. Faster flow is more turbulent, and in this turbulence more heat is mixed into AABW from shallower, warmer ocean layers – thus



warming the abyssal waters on their way to the Equator, affecting global climate change.

Professor Alberto Naveira Garabato from the University of Southampton, the lead scientist of DynOPO, said: "The Orkney Passage is a key chokepoint to the flow of abyssal waters in which we expect the mechanism linking changing winds to abyssal water warming to operate. Our goal is to learn enough about these convoluted processes to represent them (for the first time) in the models that scientists use to predict how our climate will evolve over the 21st century and beyond."

"We have been able to collect massive amounts of data that we have never been able to capture before due to the way Boaty (Autosub Long Range) is able to move underwater. Up until now we have only been able to take measurements from a fixed point, but now, we are able to obtain a much more detailed picture of what is happening in this very important underwater landscape. The challenge for us now, is to analyse it all!"

But the expedition was not without its challenges. Povl Abrahamsen, Physical Oceanographer at the British Antarctic

Survey, explained: "At the start of one mission, whilst diving, Boaty encountered a swarm of krill so dense that the sub's echo sounders thought it was approaching the seabed although it was only at 80m depth, and returned to the surface. However, the upside was that we did see lots of whales near the ship! In spite of the occasional hiccup, and in increasingly cold and dark conditions, Boaty has gathered a unique and exciting dataset that we look forward to studying in more detail in months and years to come."

Steve McPhail, Head of the AUV Development at the National Oceanography Centre, added: "Although these recent deployments tested the technological capabilities of Autosub Long Range, we are extremely pleased with the results and the data that we have been able to provide to the scientific community. In the near future, we are looking forward to expanding and developing the fleet on the success of this last mission."

UNIVERSITY OF SOUTHAMPTON RECEIVE ROYAL WARRANT

The UK's Minister for the Constitution, Chris Skidmore MP, formally presented the University of Southampton with a Royal Warrant signed by Her Majesty the Queen, officially conferring Her Majesty's recognition with the title of the Regius Professor of Ocean Sciences.

Regius Professorships are rare and prestigious awards. This award was bestowed by Her Majesty the Queen in recognition of the University's international leadership in ocean science and the maritime economy to mark her 90th birthday.

Mr Skidmore said: "It is my great pleasure to present the Royal Warrant establishing the Chair of the Regius Professorship of Ocean Sciences at the University of Southampton. The Royal Warrant is an historical document conferring Her Majesty The Queen's official recognition of exceptionally high quality in research and teaching."

"The award of the Regius Professorship of Ocean Sciences is recognition of the University of Southampton's global status in ocean and earth science and the maritime economy. The National Oceanography Centre Southampton and the Southampton Marine and Maritime Institute represents a research and teaching environment with real critical mass that is based on core principles of outstanding scientific endeavour, education and training of the next generation of talent for the UK and beyond, and the application of research knowledge for societal and industrial benefit. All of these qualities are represented through this Regius Professorship."



REMOVING CO₂ FROM THE ATMOSPHERE TO COUNTERACT GLOBAL WARMING

Researchers in Ocean and Earth Science have been awarded funding to develop innovative methods to capture CO₂ from the atmosphere to counteract global warming and climate change.

Large-scale removal of greenhouse gases, alongside drastic reductions of emissions, will be essential to restrict global temperature rise well below 2°C by the end of this century as proposed by the 2015 Paris Agreement. This award is part of a £8.6 million UK research programme on Greenhouse Gas Removal.

The Southampton team, Professor Rachael James, Dr Juerg Matter, Dr Phyllis Lam and Professor Damon Teagle, are major players in a successful consortium led by Oxford University together with the universities of Cambridge and Cardiff. The Southampton research will investigate whether waste mine tailings from metal and diamond extraction can be harnessed to remove greenhouse gases.

Rachel explains, “The metals we need for modern society are mined at very low concentrations, from a few per cent down to parts per million.

Consequently, mining produces huge amounts of freshly ground waste rock, but these waste rocks contain high concentrations of elements such as calcium and magnesium that if dissolved can capture CO₂. On geological time scales, this is the natural process of chemical weathering that the Earth uses to regulate CO₂ in the atmosphere and maintain our planet’s habitability. The question is, can we use mine tailings to accelerate carbon dioxide uptake? We will investigate the availability of suitable materials and mechanisms to speed up their chemical breakdown. The key will be to develop processes that can be up-scaled to make a difference. This requires capturing multi-gigatonnes of CO₂.”

Consequently a major part of this project will be to assess the impacts on the environment, society and public attitudes.



Heaps of mine tailings from copper mining in Cyprus. Credit: Damon Teagle



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SCIENTISTS HIGHLIGHT ANTARCTIC ICE UPHEAVAL

A team of scientists led by the University of Southampton has found that the Antarctic ice cap underwent dramatic cycles of expansion and melt-back millions of years ago when carbon dioxide levels were similar to those experienced today.

The research, led by palaeoclimatologist Dr Diederik Liebrand as part of an International Ocean Discovery Program collaboration, suggests that 20 to 30 million years ago the Antarctic periodically gained and lost huge ice caps – equivalent in size to the entire modern-day East Antarctic Ice Sheet.

Diederik said: “Our research shows that even slow, naturally forced climate change is capable of driving rapid large-scale changes in ice volume in Antarctica – and therefore global sea levels.”

“This is of particular interest to scientists because humans are now the main agents of climate change, and the rates of change today are much faster than those that occurred millions of years ago during the interval that we studied.”

“Increasingly we are understanding that the Antarctic ice cap is not some enduring monolithic block but a much more slippery ephemeral beast – and the implications of that realisation for the future of Antarctic ice sheets in a very rapidly warming world have not escaped us.”

The scientists examined oxygen isotopes in fossilised micro-organisms – found in a drill core of marine sediments taken from a water depth of 2.5km in the South Atlantic – to reach their findings, published in the journal Proceedings of the National Academy of Sciences of the United States of America (PNAS).

Large swings in isotopic composition suggest that the Antarctic lost and regained almost all of its ice in numerous 110,000-year cycles between the Oligocene and early Miocene epochs.

“At that time, large ice sheets had not yet developed in the northern hemisphere, so the cycles that we observe mean that Earth was switching back and forth between a unipolar glacial state and a largely deglaciated state,” comments Diederik.

Professor Paul Wilson, a Southampton colleague also involved in the study, added: “All of this happened during an interval when atmospheric carbon dioxide levels ranged between today’s human-influenced value and those that, at current rates of fossil fuel-burning, we will experience in 50 to 100 years from now.”

“The Antarctic ice cap was incredibly dynamic – it underwent repeated large-scale expansion and melt-back in the twinkling of a geological eye.”



Credit: Diederik Liebrand



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IN BRIEF

PHD STUDENT NOMINATED FOR NATIONAL AWARD

Daniel Wohlgemuth has been nominated for a British Ecological Society (BES) Aquatic Ecology Group award.

Daniel was nominated by his PhD external examiner Nessa O'Connor, Co-secretary of the BES Aquatic Ecology Group after completing his thesis in the area of biodiversity and ecosystem functioning. She nominated him for the early career researcher award in aquatic ecology. The award winner will be invited to give a keynote at the group's annual meeting in September.

Daniel said: "I am delighted with the nomination, it feels great that my work has been appreciated. It will be good for my future career in the field that I have left a positive impression on Nessa, one of the leading researchers in the field."

"My work in Southampton gave me the opportunity to participate at international scientific conferences and meet many other researchers that will give me a good foundation for a scientific career."

Daniel is hoping to secure a post doc position in this research field.

'SNOWBALL EARTH' THEORIST, PROF PAUL HOFFMAN, LECTURE TO UNDERGRADUATES

Ocean and Earth Science recently welcomed Professor Paul Hoffman from Harvard University for a three-day visit. Paul is arguably one of the world's most influential geologists, famous for developing the theory of 'Snowball Earth', when in the late Proterozoic (~700 Ma) the oceans froze and our whole planet was covered in ice.

On Monday 20th March, Paul presented a short course on the 'Snowball Earth', at the University's Friday Seminar Series. Paul focused on the geology, climate dynamics, geochemistry and geobiology of Snowball Earth. The attendees were delighted to gain a first hand insight from a leading spokesman and authority on Neoproterozoic geology, with over 20 years of field experience on six continents. Paul synthesized the current state of knowledge in the above areas, and highlighted outstanding problems—which promoted much discussion. On Tuesday 21st March, Paul presented a summary lecture to over 150 people, including undergraduates. The lectures were all recorded and can be used and enjoyed by current and future cohorts. Paul found his visit "enjoyable and highly stimulating".

UNDERSTANDING CORAL REEFS. UNIQUE NEW MODULE FOR 2018

A new module, unique to the University of Southampton, will give Marine Biology students an insight into how coral reefs function and how the symbiotic corals cope with the effects of climate change. It will allow students to contribute to the conversations about coral reef future happening now at Southampton, a world-leader in coral reef research.

Key features will include:

- Share the experience of active coral reef researchers
- Learn about coral reefs of the past, present and future
- Understand the interdependence of humans and reefs
- Discuss coral reef management strategies

- Identify major groups of corals in hands-on exercises
- Gain practical skills and software knowledge required for reef habitat mapping.

Through dedicated lectures and practical work students will develop skills in identifying major reef building corals and understand how they interact with other species to form coral reefs.

The module will be available in 2018 for Year three students of MSci Marine Biology, MSci Biology and Marine Biology and the BSc Marine Biology and Oceanography degree programmes.





Find out more:
[www.southampton.ac.uk/
oes](http://www.southampton.ac.uk/oes)



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