

Autumn 2012 | 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 articles describing the achievements and experiences of our current students, the cutting edge research of our world-renowned scientists, and updates from our talented alumni. Enjoy!

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# Geology and Geophysics receive 100 per cent satisfaction ratings in 2012 National Student Survey

Students who graduated from Geology and Geophysics degrees at Southampton this year awarded their degrees (both BSc and MSci programmes) the highest accolade possible: a score of 100 per cent when it came to their overall satisfaction rating! This not only made Ocean and Earth Science one of only four in the university to secure such top marks (alongside French, German and Ship Science), but also meant that the University of Southampton had the top marks nationally for the widest number of degree programmes.

Dr Ian Harding, Senior Lecturer in Palaeontology and Programme Admissions Tutor for Ocean and Earth Science says: "This result is a terrific acknowledgement of the high esteem in which our students view our Geology and Geophysics degree programmes at Southampton, and echoes the same sentiments expressed by those companies who are employing our graduating students: of our 2012 graduates, 100 per cent of our geophysicists and some 65 per cent of our geologists are already in work or further study, the vast majority of them in the Earth Science sector - and in less than three months after Graduation!"

# Year Abroad in Svalbard

By Lexi Mackee



For my year of study abroad, I spent the year studying at UNIS, the northernmost university in the world. Situated in the Arctic archipelago of Svalbard, Longyearbyen, a settlement of 2000 inhabitants lies at 78°N.

With 4 months of 24 hour sunlight and 4 months of 24 hour darkness and temperatures rarely rising above 0°C for 10 months, Svalbard is one of the most extreme but beautiful places in the world. It remains one of the last untouched wildernesses, home to the king of the Arctic, the polar bear.

Within a week, we were thrown into the Arctic environment on our first cruise, out of Adventfjorden and into the wilderness. We were getting off the boat every day to carry out terrestrial field work in areas inaccessible by any

other means, and sailing to our next destination at night. Our stops included Magdalena Fjorden, the main whaling station used by the British during the 1600s, where we saw one of the most beautiful sights. A very shallow and bright blue sea, it could have been tropical except for the massive glacier at the end. While we were standing there we were lucky enough to see the glacier calve! We even managed post cards at the northern-most post office in the world, at the scientific base of Ny Alesund. Another treat was a visit to Moffen, an





island inhabited by walrus, where we watched the walrus playing in the sea during a hailstorm until we were too cold to stand on the bow of the ship anymore.

Later, on another cruise, we circumnavigated the archipelago, reaching 81°N, where we all decided to jump in the water and have an icy swim, but at a temperature of 3°C, we did not stay in there long! The stops we made at stations around the islands allowed us to dredge, trawl and collect plankton. It was a great deal of hands on marine biology as we identified, dissected and counted the fish, invertebrates, zooplankton and phytoplankton. One morning we were lucky enough to see a polar bear was walking along the shore: for many of us our first sight of this magnificent animal.

Back in Longyearbyen, the 24-hour daylight rapidly became 24-hour darkness, one of the strangest things I have ever experienced. The sky was

the clearest I have ever seen and on some days/nights it was possible to see the Milky Way, shooting stars and the spectacular Northern Lights. As the sun did not rise above the horizon for 4 months, the only light was from the moon, and so when the moon was full it started to feel like the sun was back - you were even able to go skiing without a headlamp! When the sun returned in March, the beauty of Svalbard was clear to see, the now snow-covered mountains went on for miles. With the sun came the chance to go on trips by skis and snowmobiles. Having a snowmobile you could cover a large distance in a very short space of time, and allowed us to travel to the east coast to the sea ice to watch a family of polar bears playing, as well as going to a frozen waterfall and visiting ice caves. This year has been an absolutely amazing experience and I would highly recommend Svalbard as a place to spend for your study abroad year!

## Graduate's achievement gains recognition in prestigious SET Awards



Joe Emmings, a Geology MSci graduate was one of three Earth Science students from the UK shortlisted for the 2012 SET Awards, which recognise outstanding students in science, engineering and technology. The best undergraduates in 14 different subject areas received their prizes in front of an audience of leading academics and industrialists at a ceremony at Kensington Town Hall. More than 500 entries were received from 100 universities.

As part of his four year Master of Science (MSci) degree in Geology, Joe's final year independent research project investigated how effectively organic carbon was buried in deep water turbidites, sediments deposited as a type of underwater avalanche from offshore western Africa, determining where and what types of organic carbon were found in individual horizons, and what factors might control the carbon burial process.

"Joe's results were very significant, as they have provided us with our first detailed understanding of organic carbon burial and its breakdown into carbon dioxide in this type of deep sea sediment, meaning that in future we can determine the implications this may have for a warming world and for modelling future climate change," says one of Joe's project supervisors, Senior Lecturer in Palaeontology, Dr Ian Harding. "Joe proved himself an exceptional student, after he presented his work at a national conference, I then presented his work at an international conference in the United States this summer."

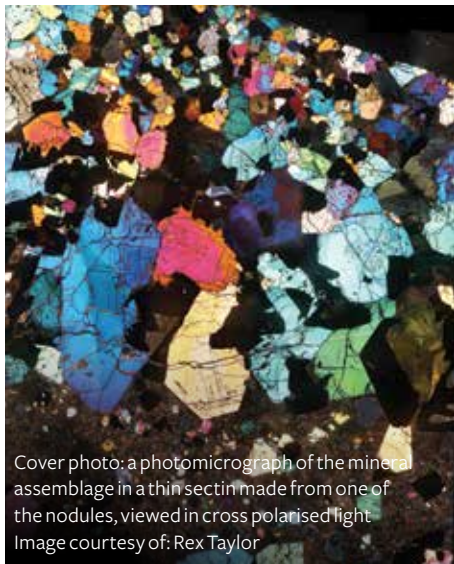
Joe was delighted to reach the SET Awards final and was accompanied to the ceremony by his very proud mother, Vicky, as his guest. "It was a wonderful opportunity to network with senior people in science and engineering, and I was able to meet both the Vice-President of the Geological Society of London and Rio Tinto's head of mineral exploration in Europe," he says. Joe is now working with Fugro GeoConsulting analysing submarine geohazards related to offshore structures.



# OES scientists identify trigger for explosive volcanic eruptions

Students examine volcanic rocks produced by El Teide on the Third Year fieldtrip to Tenerife. Image courtesy of: Barry Marsh

Scientists from Ocean and Earth Science have identified a repeating trigger for the largest explosive volcanic eruptions on Earth, results which have been published in the journal *Nature's* online 'Scientific Reports', with former MSci Geology student Mike Stock the lead author.



Cover photo: a photomicrograph of the mineral assemblage in a thin section made from one of the nodules, viewed in cross polarised light. Image courtesy of: Rex Taylor

Much of the fieldwork was completed during the third year undergraduate volcanology fieldcourse to Tenerife, with analytical and petrological studies still continuing in the form of independent research projects by MSci students.

The study focuses on the Las Cañadas volcano on Tenerife, in the Canary Islands, which has generated at least eight major eruptions during the last 700,000 years. These catastrophic events have resulted in eruption columns of over 25km high and expelled widespread pyroclastic material over 130km from the volcano. By comparison, even the smallest of these eruptions expelled over 25 times more material than the 2010 eruption of Eyjafjallajökull, Iceland.

By analysing crystal cumulate nodules (igneous rocks formed by the accumulation of crystals in magma) discovered in the pyroclastic deposits of major eruptions, the scientists found that pre-eruptive mixing within the magma chamber, where older cooler magma mixed with younger hotter magma, appears to be the repeating trigger in large-scale eruptions.





## A wildlife in Hampshire - the intern's story

'In the summer term of 2012 I successfully applied for the summer internship organised between Ocean and Earth Science and the Hampshire and Isle of Wight Wildlife Trust 'marine team'. I spent half my time in the trust's headquarters to experience the work members of the marine team undertake on a daily basis and the rest of my time out in the field.

The marine team undertakes a variety of biological surveys in the county. I joined the fish conservancy in Chichester Harbour on their summer analysis of fish species and size measurements and participated in marine mammal and bird observing across the area. I assisted at beach cleans, underwent routine checks of seagrass beds and helped document changes seen due to anthropogenic impacts on the local marine environment. However, the main surveying I took part in was one of the charity's biggest projects, Shoresearch. Interacting with the public, data is taken from specific locations as part of the ongoing record of diversity in the local area.

Shore search data was central to the project I was given to complete over the summer. The wildlife trust has accumulated a very large data set about diversity in the area from Shoresearch and its sister project, Seasearch (diving surveys of the underwater fauna). Using knowledge gained from courses at OES earlier in the year, I offered to analyse and produce, from their data, an interactive Google Earth, file that could be placed on their website. This was aimed at informing the general public about what species are found on their local beaches or under local seas.

Finally, I asked to become involved in the outreach work the charity does as part of their aim to inform the public about the environment and its protection. I went into local schools and helped at many other events around the county with the objective of giving information about local protected areas as well as ones not yet under legislation.

I have improved my knowledge of local fauna and flora throughout all the surveying work, learnt some new methods of data analysis and gained confidence in speaking to people about marine biology and the environment in general. The original advertised internship lasted for 6 weeks, however having enjoyed my time there so much and loving the opportunities to get some hands on experience in the marine field outside of university, I ended up continuing my internship for an extra month, and still volunteer at major events the charity holds.

I would recommend that anyone interested in a conservation/marine biology career considers applying for this Summer internship; it was a great experience.

**Ros Putland,**  
final year MSci Marine Biology student.

These nodules trapped and preserved the final magma beneath the volcano immediately before eruption. Dr Rex Taylor, Senior Lecturer in Ocean and Earth Science at the University of Southampton, investigated nodules and their trapped magma to see what caused the eruptions. He found that the nodules provide a record of the changes occurring in the magma plumbing right through to the moment the volcano erupted.

Dr Taylor says: "These nodules are special because they were ripped from the magma chamber before becoming completely solid - they were mushy: like balls of coarse wet sand. Rims of crystals in the nodules grew from a very different magma, indicating a major mixing event occurred immediately before eruption. Stirring young hot magma into older, cooler magma appears to be a common event before these explosive eruptions"

Co-author of the study Dr Tom Gernon, who works with Dr Taylor in Ocean and Earth Science at the University of Southampton, says: "The analysis of crystal nodules from the volcano documents the final processes and changes immediately prior to eruption - those triggering the catastrophic eruptions. The very presence of mushy nodules in the pyroclastic deposits suggest that the magma chamber empties itself during the eruption, and the chamber then collapses in on itself forming the caldera."

The Las Cañadas volcano is one of 16 'Decade Volcanoes' - identified by the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) as being worthy of particular interest and focussed study in light of their history of large, destructive eruptions and proximity to populated area.

Dr Gernon adds: "Our findings will prove invaluable in future hazard and risk assessment on Tenerife and elsewhere. The scale of the eruptions we describe has the potential to cause devastation on the heavily populated island of Tenerife and would have major economic repercussions for the wider European community."





# Sixth form students immerse themselves in University life

By Jo Wooles

During August, the National Oceanography Centre (NOC) played host to 120 AS Level students from across the country interested in pursuing science at university.

Summer School students working on RV *Callista*.

The two summer schools, led by Dr Simon Boxall, were designed to demonstrate the opportunities available in Ocean and Earth Science at Southampton providing an insight into university life by living in university residences and attending lectures.

Organized by Headstart and Exsitec (the latter funded by the BG Group), the summer schools offered the students a view of what it is like to study science, technology, engineering and maths (STEM) subjects at university, explicitly trying to encourage and enthuse younger people about science and exposing them to the opportunities that Oceanography, Marine Biology, Geology and Geophysics have to offer.

The students were given a real taste of the university learning experience, from lab work to fieldwork. Using the University's research vessel, RV *Callista*, students were able to operate numerous pieces of oceanographic equipment to investigate how temperature

and salinity changes through the water column and throughout the Solent estuary. Many were delighted and amazed at the incredible biological diversity found in the zooplankton samples collected. The geology field trip to the Isle of Wight allowed students to encounter dinosaur footprints, and search for fossils and minerals in order to reconstruct ancient environments from the sediment record left behind.

The learning curve was steep but exciting for many participants, analysing the data they collected back at NOC to produce a group presentation on their findings - much like undergraduate students! The presentations, watched by staff, parents and fellow students, were scientifically insightful and interesting and demonstrated clearly how much the students had learnt in such a short period of time, the audience being impressed with the standard and confidence with which the talks were delivered.

Students were also given the opportunity to grill the admissions tutors, ask current students about university life and opportunities beyond university were highlighted by talks from recent graduates now in industry.

As a prize for winning an evening quiz, 16 students from each group were given the exciting opportunity of a tour around the Royal Research vessel *James Cook*, docked outside the NOC. Hosted by the Captain, the students visited the impressive bridge, the working labs and the recreational facilities, and had the opportunity to ask questions about life at sea. These experiences left the students enthusiastic about their future university careers, showing them opportunities that many did not know existed.

*Jo graduated with a MSci in Oceanography in July 2012 and now works for Natural England as a coastal marine scientist. The summer schools were staffed extensively by our undergraduates.*



# Tom Goode examines ‘The Great Dying’ in Spitsbergen

## Fancy spending your summer vacation doing research in the Arctic?

When Tom Goode heard that there might be an opportunity to undertake geological fieldwork in Spitsbergen during a chance conversation with his tutor, he didn't have to be asked twice!

Tom was chosen from many applicants from around the UK to participate in a project part funded by the Norsk Polarinstitut and the University of Southampton to undertake fieldwork examining the sediment record of the Permo-Triassic extinction event, sometimes referred to as ‘The Great Dying’. For five and a half weeks Tom found himself transported around Spitsbergen to localities such as Festningen on Isfjorden and Ny Alesund in the far north, both by helicopter and more conventionally wrapped in an exposure suit for seaborne landings.

The work that Tom undertook will form the basis for his MSci Independent Research Project, and he says that, “The summer fieldwork in Spitsbergen provided me with invaluable insights into the sedimentology of the Permian rock record. The project involved only a small group of geologists, so I felt extremely fortunate to be in a position to receive one-to-one supervision and guidance from the other scientists, which included recognised world experts in the study of the end-Permian mass extinction event. This experience has enabled me to hone my skills as a field geologist and further develop my knowledge. When combined with the adventures of helicopter flights, rifle training (to cope with the polar bears!), Arctic field camps, boat trips and the spectacular scenery and wildlife, this made the trip a real once-in-a-lifetime opportunity. I can't thank the University of Southampton and The Norsk Polarinstitut enough!”



Tom on fieldwork in Arctic Spitsbergen.  
Photo: Tom Goode



Alex Coleman, Geology MSci student helping to collect photomosaic imagery in Spain

## ‘Virtual fieldwork’ project receives £38k funding

Rex Taylor and Ian Harding have been awarded a Student Centredness Fund award of £38k by the University of Southampton, to develop teaching resources to enhance the learning experiences of mobility impaired Geology students. The project will develop an online resource of ‘virtual fieldtrips’ built around very high resolution photo-mosaic images which will permit visualisation of field geology at a variety of scales, supplemented by hand specimens and thin sectioned samples to permit students with certain learning differences a similar experience of fieldwork activities as that of other students. The teaching materials developed during this project will later be made available to all students as a method of reinforcing their learning after a fieldtrip has been completed. The project has just collected its first dataset from SE Spain, the team being assisted in the field by a student who had recently completed the field course, and who provided a very valuable student-driven perspective on the project.

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