UNIVERSITY OF Southampton

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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!

National Oceanography Centre Southampton

Holly Elliot.

Student scoops award

Many congratulations to Holly Elliott who scooped the best student talk award at the annual Volcanic & Magmatic Studies Group Meeting at the University of Bristol in early January. This year's meeting was the largest on record, with 230 delegates and more than half of the talks (~25) given by students at various stages in their PhDs. The judges noted that the overall standard of student presentations was particularly high this year. Holly's PhD. project on "Pb-Zn mineralization within the Limerick Basin (SW Ireland): A role for volcanism?", supervised by Dr. Tom Gernon and Professor Steve Roberts, is partly supported by the international mining company, Teck. Teck's exploration manager for Europe and Africa, Dr. Patrick Redmond, says "Holly's research is of a very high quality and is contributing lots of new and interesting data and ideas'.

Mapping marine gas hydrates and free gas in the Arctic

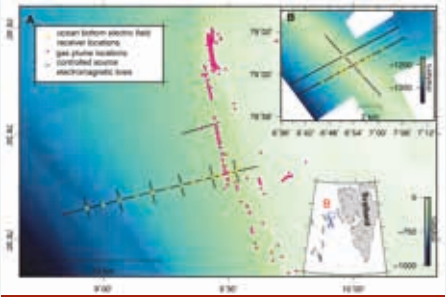
The Svalbard continental margin has become an area of extensive international research since the discovery of about 250 methane plumes along the 400m bathymetric contour of the West Svalbard continental margin. The location of these methane seeps at the predicted landward edge of the methane hydrate stability zone has led to suggestions that warming of West Spitsbergen current by approximately 1oC over the past three decades could have released methane from the melting of hydrate in the area. If bottom water warming stimulates the

Credit: Karen Weitemeyer

Seafloor receiver on the back deck of the RRS *James Clarke Ross* waiting to be deployed, with backdrop of Prince Charles Foreland.

Credit: Karen Weitemeyer

Thanks to the entire crew of scientific expedition JCR269B (photographed in Reykjavik port) for the success of the experiments. Without the support and funding of NERC and BAS, this survey would not have been possible.



Location of the two marine controlled source electromagnetic surveys collected in the summer of 2012 off shore Svalbard, Norway. The first location (A) is in a place with numerous gas plumes emanating from the seafloor, while the second location is in deeper water with pockmarks and at least one gas plume documented (pink circles). The stars are ocean bottom electric field receiver locations and the black lines are the tow lines for the controlled source electromagnetic transmitter.

release of substantial amounts of methane, a potent greenhouse gas, this may have a major influence on global temperatures. In the summer of 2012 a research expedition on board the British Antarctic Survey ship *James Clarke Ross* carried out a controlled source electromagnetic (CSEM) survey in the West Svalbard continental margin with a team of scientists from the National Oceanography Centre (led by Ocean and Earth Science's Tim Minshull, Martin Sinha, Graham Westbrook and Karen Weitemeyer, and including PhD student Bedanta Goswami). The research was funded by the National Environmental Research Council, and is part of a larger initiative by the University of Southampton, IFREMER (France), and research groups in Norway and Germany to understand the dynamics of methane hydrates in the West Svalbard continental margin. The aim of this research is to use electrical resistivity obtained from CSEM data to place better constraints on concentrations of gas hydrates and free gas in the seabed and consequently improve the interpretations of how free gas migrates within the seabed in light of high resolution seismic data previously collected.

Jane and 'pet' ammonite in Antarctica.

Former student to be the new Director of the British Antarctic Survey

Jane Francis, who completed both her geology BSc and PhD in Southampton's former Department of Geology (now part of SOES) has recently been appointed to Director of the British Antarctic Survey in Cambridge. For her PhD Jane studied the late Jurassic fossil flora of Dorset, supervised by the now-retired Ian West, before completing post-docs at Bedford College, London, the British Antarctic Survey, Cambridge, and then Adelaide University. She was appointed to a lectureship at the University of Leeds in 1991, and her research has focussed on using plants to understand the past climatic conditions of the polar regions. These interests have involved her in many scientific expeditions to the Arctic and Antarctic, in collaboration with research teams from many other countries. Jane was later made Professor of Palaeoclimatology, and then Dean of the Faculty of Environment at Leeds.

Jane was awarded the Polar Medal by HM the Queen in 2002, becoming only the fourth woman to receive the award (first bestowed in 1857, and since 1968 specifically in recognition of personal achievements in polar studies). Soon after the announcement of Jane's appointment she returned to Southampton to deliver our Friday Seminar, and gave us an opportunity to congratulate her on her new appointment - a role which will see her working closely with NOC's Executive Director, Ed Hill.

Credit: NERC and Isis and the ROV team

Beebe vent chimneys at 5km depth.

Into the abyss: the Cayman Trough expedition

For a month through February and March, Southampton scientists were the focus of much media attention as they investigated the world's deepest known hydrothermal vents, associated with the ultraslow spreading mid-Cayman ridge in the Caribbean Sea. The team, led by SOES marine biologist Dr. Jon Copley aboard Southampton's Royal Research Ship *James Cook*, were investigating the effects the great depth has on the physics and chemistry of the hydrothermal fluids emitted by the volcanic vents, and in turn, the organisms that use chemicals in the vent waters as energy sources. The focus of their attention were vent fields named Von Damm (at a depth of 2,300 m), and Beebe (at 4,968 m), the latter of which emits copper-enriched fluids at >400°C. Jon was a member of the scientific cruise which discovered the vents in 2010, but this year's expedition returned equipped with the deep-diving remotely operated vehicle *Isis*, high definition cameras and sampling equipment to investigate the vents more closely.

'Team Biology' collected vast amounts of video and still images of the creatures living around the island-like vent field oases, cataloguing a diverse array of animal life, including blind vent shrimps, echindoderms, tubeworms, squat lobsters, fragile sponges, corals and anemones. They have a vast set of data to collate but will then be able to elucidate the biodiversity at the vents. The 'Geo-team' mapped the hills and valleys surrounding the vent sites, discovering a landscape of volcanoes and lavas, where snow-like pelagic sediment sat on the rocky surfaces. At the astonishing depth of 5080 metres, in the bottom of the deepest valley, they found a carpet of bright orange mud; iron, spewed from the hydrothermal waters at over 400°C, had oxidised rapidly and over thousands of years had collected as rust on the seabed around the vent site. Elsewhere copper was literally leaking out of the rocks to form green coatings of the mineral atacamite, which stained the rocky overhangs. 'Team Chemistry', meanwhile stunk the ship out with the hydrogen sulphide from the hot, metal-rich vent fluids they collected in water samplers. They also filtered over a tonne of sea water to extract different sized particles to understand how metals from the vents are dispersed in the ocean, and collected mud to extract the fluids that ooze through the edges of the sulphide mounds, to understand the impact of these deepest vents on ocean waters.

The team were joined by the BBC's Science Editor, David Shukman, who broadcast live from the expedition's ship, and in addition to the expedition's own blogs on their website (**www.intothecaymanabyss.blogspot.co.uk**), there were also live webcasts produced with the Natural History Museum in London, and Jon Copley made several daily Skype calls to schools in the UK, fostering great interest in the expedition's findings with his boundless enthusiasm for his team's work.

On an expedition where marine biologists, geologists and chemists collaborated to generate new views of the deepest known vents on the planet, expedition members lauded another of their colleagues, Professor Paul Tyler, for his vision and commitment to deep sea biological exploration: this was Paul's last of some 60+ expeditions – here's to a long and happy (semi-) retirement, Paul!

The science party and ROV technical team on the foredeck.

Published undergraduate authors galore...

Four of our undergraduate Geology students have recently had peer-reviewed scientific papers published whilst still studying for their first degrees – two of them setting a new record, by becoming authors whilst still completing their Second Year of study!


Jen and Kim in DC.

Credit: Kim Dunn

Jen Saxby and Kim Dunn were indeed only half way through the second year of their Master of Science degrees in Geology before they had their paper printed! Ever enterprising, Jen and Kim secured internships at the University of Oregon's College of Earth, Ocean and Atmospheric Sciences last summer at the end of their *first year* of study. Kim recounts "We were fortunate enough to be given the opportunity to work with Professor Greg Retallack, a palaeobotanist and an expert in fossil soils to help prepare a research paper on an enigmatic Precambrian fossil, *Horodyskia*, also known as the "string-of-beads" due to the fossils comprising chains of circular impressions." Working on material from Glacier National Park, Montana, they were "honoured to be named" as two of the three authors of the paper in the journal Precambrian Research.

The 4th Year Advanced Independent Research Project work undertaken by two of our 4th Year Master of Science Geology students, Heather Jones and Geoff Thiemann, had been incorporated into a paper published in Nature Geoscience even before the two students had had submitted their project reports. Supervised by Dr. Samantha Gibbs and her PhD student Sarah O'Dea, the pair worked on fossils of microscopic marine plankton called coccolithophores, which, because their tiny calcium carbonate shells are well preserved on the seafloor after death, for example in the vast chalk cliffs of Dover. Because of their important role in the marine ecosystem and the carbon cycle what happens to this group of plankton when environmental conditions change is of great interest. The carbonate shells of these organisms are potentially sensitive to ocean acidification, a phenomenon which occurs when rising atmospheric carbon dioxide is absorbed by the ocean, increasing its acidity. Heather and Geoff's work found that coccolithophore response to environmental change varies between species in terms of how quickly they grow, and has provided clues about the impact of climate change during a rapid climate warming event that occurred 56 million years ago and has implications for what might happen in the near future too.

Celebrating excellence

The University of Southampton Students' Union recently held its first ever Excellence in Teaching Awards (ETAs), giving students the opportunity to highlight, recognise, and celebrate their favourite lecturers. We are very pleased to announce that Dr. Ian Harding, from Ocean and Earth Science, was named runner up in the 'Overall Outstanding Lecturer' category across the whole university. The Outstanding Lecturer Award was the most highly regarded award and was voted for by the students teaches every day. In the nominations Ian was described by his students as, 'Someone whose enthusiasm shines through and has the ability to interest students regardless of subject', and 'An amazing lecturer, he always tries to involve everyone in the lectures and the practicals. If you need help understanding something he is always there to give it. His enthusiasm for his subject shines through and makes you feel the same too.'

This award truly represents Ian's enthusiasm and passion for teaching, ensuring his students receive an intellectually challenging experience that motivates and inspires. On receiving the award Ian said 'I find the job extremely rewarding and I think trying to challenge the students on a daily basis is really what makes it all worthwhile. As long as you can show enthusiasm and passion for your own subject, I think it conveys itself to the students you teach'.


Credit: Barry Marsh

The CTD and bottle firing rosette on the back deck of RV *Callista*.

Alumni donations support equipment purchase

A new Sea Bird CTD system for the RV *Callista* was purchased in June 2012 costing £45,000, partly funded by generous donations received from University of Southampton Alumni via the Annual Giving programme. The CTD is a fundamental instrument for investigating the vertical temperature and salinity structure of seawater and is used extensively during local boat work teaching sessions on RV *Callista* and during field trips in the waters off Falmouth each summer.

The CTD control box mounted in the dry lab aboard RV *Callista*.

Industry experts sharing knowledge with Ocean and Earth Science students.

Looking to the future. Ocean and Earth Science students meet potential employers

Students seized their opportunity to talk to industry experts and gain valuable advice in terms of employability at a specially designed careers day for Ocean and Earth Science at the National Oceanography Centre, Southampton (NOCS).

More than 20 companies and organisations, including Mott MacDonald, Tullow Oil, IBM, the Royal Navy, Schlumberger and Fugro attended the day to seize the opportunity to meet potential future employees, offer valuable advice and discuss career pathway options with the students. Many of the representatives from the companies who attended were alumni from NOCS themselves or had already employed previous graduates.

The focus for the day was career pathways and the best way to prepare for your future in the world of ocean and Earth Science. Students found the two panels made up of Ocean and Earth Science alumni of particular benefit. This made the talks meaningful to the students who attended. Some had graduated in the last 2 years and others had graduated up to 8 years previously so there was a great range of experience on offer and really valuable relevant advice. Guidance was given in terms of skills development, CV writing, importance of fieldwork, work experience paid or unpaid, subject specific or life-skills that would add value to their employability and the importance of networking.

Each of the panels was subject-specific. In the morning the speakers were Oceanography and Marine Biology graduates and in the afternoon the panellists comprised of Geology and Geophysics graduates. There were some great stories from the panellists on their own experiences in interviews and on-the-job work experience. The content of each talk was very engaging and the advice throughout was to be ambitious in every element of your career pathway towards employment.

Alumni Dr. George Tuckwell and Tom Chamberlain from RSK, a multidisciplinary environmental consultancy, said. “There was a lot of interest from people who wanted to know more about joining us. While we are mainly UK-based, we also work with Shell in Europe and in Iraq with BP which proves that graduates can frequently work abroad.”

Neil Crossouard, who graduated from Southampton with a Msci in Geophysics in 2008, now works at the civil engineering and hydraulics consultancy HR Wallingford: “My advice to students is to take full advantage of events like this. Talking to employers will give you real insights into what’s really involved in working in their sector.”

Ocean and Earth Systems Science BSc graduate Holly Barker (2011) now works at specialist software company Senergy: “I suggest students get up to speed with the latest technologies during their studies as it will give them a real advantage when it comes

Credit: Barry Marsh

Credit: Barry Marsh

Students discussing career pathways with University of Southampton alumni.

to finding a job, whatever their discipline."

Among the students thronging the corridors was first year BSc Geology student Zoe Wakeford "Although I won't be looking for a job for a couple of years, I wanted to come along and find out more about the kinds of companies that recruit graduates." Second year MSci Oceanography student Matthew Truell says he was encouraged to attend by his tutors.

The event was organised by Career Destinations and managed by Jade Martin, a third year BSc Oceanography student at Southampton.

Bronze success for undergrads in Prague

This year a team of MSci students from Southampton were awarded Bronze at the European Final of the American Association of Petroleum Geologists Imperial Barrel Award in Prague.

The students were the highest placed undergraduate team in a closely fought competition which was designed to mimic an industry exercise. The students were rewarded for their efficient teamwork, which investigated the hydrocarbon potential of a 128 km^2 site offshore Nova Scotia using 2- and 3-D seismic and geological well log data.

The team continued Southampton's strong record in the competition, having placed third or better in four of the five years since we first entered the competition. Two years ago the Southampton team won the European finals in Prague and came second in the World Final in Houston.

Southampton geophysicist Mark Vardy, advisor to the team, said, "Ranking so highly amongst teams of specialist petroleum geoscience students is a credit to both the students for all their hard work and the degree programmes here at Southampton."

Team member Rich Turner added, "It's definitely the most valuable course I've taken. It has been excellent preparation for graduate employment in the petroleum sector."

The Southampton team were (L-R) geologists: Alex Gillespie, Alexandra Cookson, Rich Turner, Tom Goode and geophysicist Ben Hannam (middle).


Credit: Mark Vardy

Fieldtrip frenzy

Southampton now has two very active Student Chapters of professional geological associations, and both have recently organised extra-curricular fieldtrips for their student members.

AAPG Chapter in Dorset.

In what has now become an annual event, the Southampton Student Chapter of the American Association of Petroleum Geologists and Abingdon-based Neftex staff organised a one-day fieldtrip to Osmington Mills on the Dorset coast in April for a group of enthusiastic geology and geophysics students ranging from 1st to 3rd years. The trip was led by Oliver Ralph, David Weeks and Keiran Bowen, all Southampton alumni now working for the Earth science research company Neftex, one of the largest employers of Earth Science graduates in the UK. The exercise focused on the Upper Jurassic successions with the aim of introducing the students to the concept of sequence stratigraphy, a key technique in oil exploration, as well as the importance of certain rock types to hydrocarbon generation and storage. As David said, it was "an all-round great trip, and we look forward to running the trip again in 2014."

Bornite mineralisation in one of the cores at Lundin.

The SEG group at Silvermines with Karl Cashen and Eibhlin Doyle, leading the tour.

The following month the Society of Economic Geologists (SEG) Student Chapter, which was only formally established earlier this academic year, ran its first overseas field trip over the Easter period. Fourteen 3rd and 4th year students went to visit mines in Ireland to study lead-zinc (Pb-Zn) deposits and understand how mine sites are remediated during and after closure. The trip was entirely organised and run by SEG committee members Sam Spence, Elle Lashko, Fay Pearce and John Fitzgerald, facilitated by generous donations of $1000 from each of the SEG, SOES and Anglo American. The trip began with a tour around the old Silvermines site led by Karl Cashen from North Tipperary Council. Some of the original mine buildings still stand, preserving the historic mining practises, and many of the old features have been remediated since closure, including the Gortmore Tailings Facility which covers an area of 140 acres. On the second day the group were joined by the SEG Student Chapter of Geneva and together we studied some of the cores obtained by Lundin Exploration, aided by Lundin's project geologists. The company are currently undertaking exploration in East Clare for new Pb-Zn deposits, and spectacular mineralisation was evident in the cores we were able to examine. The final day was spent 800m down underground, having descended the New Boliden-owned Tara Pb-Zn mine, where the group were guided through the world-class mineral deposit, providing a real insight into the dark world of underground of mining, including a workshop servicing 50-tonne trucks, and experiencing the extreme humidity only found at such great depths. To round off the field trip, the group spent their final night in Dublin, taking in some of the culture and having a taste of some proper Irish Guinness!

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