Welcome to the winter edition of the Marine Science newsletter

With spring light at the end of the tunnel, we are in the midst of the final throws of winter. There has been plenty of field work across the Marine Science community over the past few months, with students and academics out in all weather collecting data for research projects and teaching activities. Some of our academic teams were even lucky enough to escape to the Indian Ocean for some sun (and serious oceanography of course!)

We hope you enjoy this latest insight into the activities of the Plymouth University Marine Science community.

Tim Scott  Follow us!  @MarineSciPlym
Students wanting to pursue a career in the marine sciences now have greater opportunity to get a first-rate education after Plymouth University launched four new degree programmes.

The courses, now open for applications with the first intake in September 2015, are designed to enhance the University's contribution to the UK's marine science sector.

There will be three three-year BSc programmes: Ocean Exploration and Surveying, Oceanography and Coastal Processes, and Ocean Science and Marine Conservation, alongside a four-year MSci programme in Ocean Science.

The programmes deal with conventional topics such as oceanography and ocean exploration, but also address current issues such as marine ecosystem functioning, coastal processes and management, and human interactions with the marine environment.

The Marine Science group at Plymouth University comprises world-leading researchers addressing a wide range of issues in the marine environment, including ocean mixing, marine renewable energy, storm impacts, coastal erosion, ocean exploration, coastal zone management and marine conservation.

Dr Tim O'Hare, Marine Science Admissions Tutor, says:

“This is an exciting time to be starting a career in the marine sciences, which represent a growing market due to increased pressures and opportunities in coastal, ocean and marine environments. The UK Marine Science Strategy 2010-2025 highlighted the importance of the sector in terms of its significant role in employing Marine Science graduates and postgraduates. But it also indicated one of the key barriers to growth for the sector was skills shortages in science graduates, which our new courses are specifically designed to

Dr Sarah Bass, Marine Science undergraduate scheme manager, added:

“As Britain’s Ocean City, Plymouth provides an unrivalled location for studying in the marine sciences. Our brand new £4.85 million Marine Station, located right on the shores of Plymouth Sound, provides the only waterfront campus of its kind in the UK, housing laboratories, state-of-the-art oceanographic equipment and an academic diving centre. The University’s flagship oceanographic teaching and research vessel, the Falcon Spirit, also operates from the Marine Station so students can take their samples from the boat straight into the laboratory for analysis.”

Professor Gerd Masselink, Head of Marine Science at Plymouth University, said:

“The issues we are addressing are all of great societal significance, and incorporating this material into the new degree courses makes them cutting edge, as well as highly relevant. The overarching aim of the new set of degree programmes is to produce highly-skilled and employable graduates with the knowledge and expertise to sustainably manage marine environments. We place great emphasis on learning by doing and, in fact, a third of our modules are practically-based, using Plymouth Sound and the southwest coast of England as a natural laboratory for many of our field-based activities.”
Sarah Gall is a third year PhD student from the Centre for Marine and Coastal Policy Research and the Marine Biology and Ecology Research Centre. Her research is strongly interdisciplinary, spanning ecological, economic and social aspects relating to the effectiveness of integrating fisheries and conservation management. Funded by Devon & Severn Inshore Fisheries and Conservation Authority, Sarah seeks to ensure that her research is strongly applied to management of our marine environment and works with local fishers to better understand the potential impacts of the South Devon crab industry on rocky reef ecosystems.

Recently, Sarah has developed a short film ‘A day in the life of a crab pot’ which has been shown at conferences, meetings and to local fishers and is intended as an outreach and policy tool providing an insight into the crab potting industry in South Devon.

See the film at http://1drv.ms/1kyTldU

**NEW REMOTELY OPERATED VEHICLES**

The School of Marine Science and Engineering has recently taken delivery of two micro-ROVs (Remotely Operated Vehicles) to support Marine Science research and student project work. The DeepTrekker systems are self-contained and highly portable making them ideal for deployment from small boats or in remote locations without mains power supplies (as shown here during trials at our inland testing site). Their first use will be in Svalbard in March, when physical oceanographer Dr Alex Nimmo-Smith will be conducting measurements of tidal currents and turbulence under sea-ice in a frozen fjord. The DeepTrekkers will be used to survey the roughness of the underside of the ice (an important controlling factor in the turbulence and mixing generated within a tidal current beneath it).

**MARINE CONSERVATION OUTREACH**

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MarCoPol members contribute to UK marine planning

Gillian Glegg from MarCoPol attended a workshop in February organised by the Marine Management Organisation to discuss the development of marine planning for the southern region of England. Marine planning is a new marine management initiative which aims to deliver the Government’s vision of ‘clean, healthy, safe, productive and biologically diverse oceans and seas’. Marine plans set out priorities and directions for future development within the plan area, inform sustainable use of marine resources and help marine users understand the best locations for their activities, including where new developments may be appropriate. Dr Glegg was really pleased to meet Stephanie and Phil, two marine graduates from Plymouth University, attending the meeting representing their employers. Stephanie Clarke was there as the officer representing the Exe Estuary Management Partnership – details of the work they do can be found at www.exe-estuary.org. Stephanie graduated with a BSc in Marine Biology and Oceanography and a postgraduate diploma in Coastal and Ocean Policy and has been working in the local authority on estuary and coastal management since. Phil Sheppard was exploring how his company and clients could benefit from the introduction of marine planning. A short graduate profile and career history of Phil Sheppard can be found on page 5.

Map of the Marine Plan areas for southern England. Marine graduate Phil Sheppard of Coastal Scince Ltd. As Exe Estuary officer, Stephanie has very varied responsibilities, she is pictured here sharing her enthusiasm for marine ecology with a group of youngsters.

Graduate tips

When Stephanie and Phil were asked for their top tips to getting a job in marine science and management they both highlighted the importance of experience and said that relevant summer jobs or voluntary work were key to further developing their skills, knowledge of work and contacts.
The English Channel is one of the busiest shipping lanes in the world, with more than 500 ships passing through each day. The Channel is also used intensively for a diverse range of activities, including energy production; aggregate extraction; commercial fishing; tourism; and recreational pursuits, all of which compete for limited marine space. Traditionally, the UK and French governments have employed different strategies for governing their national waters, which is a risk to the long-term viability of the Channel ecosystem and threatens social and economic blue growth opportunities. PEGASEAS is an INTERREG IVa cross Channel capitalisation project which is led by MarCoPol and has 11 other partners across the South of England and North of France between France and the United Kingdom. Building on the results of a range of recent projects its aim is to promote the efficient governance of the the Channel ecosystem and it will offer important new insights into effective Channel governance and provide clear, powerful, communicable and compelling advice to support improved governance of the Channel marine ecosystem. Central to this was the document 'Pathways to effective governance of the English Channel' which was launched in the House of Commons in November last year. Local MP for Plymouth Sutton and Devonport welcomed representatives of the project to the House of Commons and highlighted the importance of such
After graduating from Plymouth University with a BSc (Hons) in Ocean Science in 1997, I went to work for Hyder Consulting in Cardiff, as a Graduate Coastal Modeller. Much of my work during the first couple of years was associated with water quality predictions for the Cardiff Bay development, which was at that time in the process of being impounded, turning the tidal areas into a freshwater lake. I also worked on numerous studies relating to discharges to the marine environment from large power stations and from waste water treatment works. All of the modelling work was underpinned by marine surveys to gather tidal and dispersion data. My role involved specification of the surveys and going out to sea with the survey contractors as the client representative, to ensure that the work met our requirements.

In 2005 I left Hyder to work as an independent consultant, setting up Coastal Science Ltd in the process (www.coastalscience.co.uk). The range of projects I have worked on continues to expand, and currently includes survey management for the Swansea Bay Tidal Lagoon Project, peer review of modelling undertaken for the Suez Extension project, resource assessment modelling for Fair Head Tidal Power, and one-to-one training for the Environment Agency.

At the start of my degree all I knew was that I was drawn to the sea. It worked out well, I have thoroughly enjoyed my career to date and am looking forward to whatever it brings me next.
Chagos Expedition 2015

... by Dr Kate Adams

Kate is a Postdoctoral Research Fellow in the Marine Physics Research Group (www.marinephysics.org).

In January Kate joined Marine Science lecturer Dr Phil Hosegood, also a member of the Marine Physics Research Group (MPRG), on a 16-day research cruise to the tropical British Indian Ocean Territory (BIOT). The Chagos Marine Protected Area established in 2010 is the largest contiguous MPA in the world, rich in biodiversity and biomass. Funded by the Bertarelli Foundation and the Foreign Commonwealth Office, Chagos Expedition 2015 involved several scientific teams collecting baited underwater videos, acoustic and oceanographic data in multiple locations around BIOT. Phil and Kate, the first physical oceanographers to join the research effort in the MPA, collected over 200 turbulence and CTD casts and the first moored continuous time series of in situ water properties and velocity measurements in BIOT with the goal of understanding how the physical oceanography influences the distribution and diversity of marine life throughout the archipelago.

The in-line mooring that we deployed consisted of 3 CTDs, 2 ADCPs and 20 temperature loggers. Data was successfully recovered from all instruments. Sampling at 1 Hz yielded 1.3 million data points per sensor!

The results shown above represent the first continuous temperature profile time series recorded in the British Indian Ocean Territory (BIOT) Marine Protected Area (MPA). The data were sampled from the western edge of the Sandes seamount in 100 m of water.

During the two week deployment, cold water intrusions of below 18°C were observed at 90 m. From MSS (microstructure sensing system) profiles taken adjacent to the seamount, the 18°C isotherm lies around 130-m depth. This means that the physical processes responsible for delivering this cold water up onto the seamount, most likely internal waves, have a vertical magnitude of 40 m. Oxygen levels at 130 m are approximately 30% saturation, which is close to hypoxic threshold of 20%. It’s possible oxygen is not the only biogeochemical property that is different in this upwelling water. The nutrient concentrations of this deeper water are likely much greater than over the seamount where the photic zone penetrates.

During the cruise Marine Biologists were tagging Manta rays with GPS tracking devices.
PhD student Claire Earlie used seismometers and laser scanners to reveal storm damage to the cliffs of Porthleven.

The violent winter storms that rocked the country in 2014 had the power to physically shake cliffs to a degree in excess of anything recorded previously, say marine scientists. Claire, supported by the Rapid Coastal Response Unit at Plymouth University, used seismometers, laser scanners and video cameras to evaluate the impact of the massive waves – up to eight metres high – that struck the cliffs in Porthleven, West Cornwall, during January and February. In a paper accepted for publication in Geophysical Research Letters, the team from the Coastal Processes Research Group found that the level of shaking was of an order of magnitude greater than ever previously recorded. They also recorded 1,350 cubic metres of cliff face being eroded along a 300-metre stretch of coastline in just two weeks – a cliff retreat rate more than 100 times greater than the long-term average.

Claire Earlie, who is a member of the Coastal Processes Research Group, said:

“Coastal cliff erosion from storm waves is observed worldwide but the processes are notoriously difficult to measure during extreme storm wave conditions when most erosion normally occurs, limiting our understanding of cliff processes. Over January-February 2014, during the most energetic Atlantic storm period since at least 1950, with deep water significant wave heights of 6–8 metres, cliff-top ground motions showed vertical ground displacements in excess of 50–100μm (microns), an order of magnitude larger than observations made previously anywhere in the world.”

See video footage of the wave impacts at https://www.youtube.com/watch?feature=player_detailpage&v=B3fxbVVDZ9Q

This work was published in Geophysical Research Letters (http://onlinelibrary.wiley.com/doi/10.1002/2014GL062534/abstract)

Claire installing cliff-top video cameras to record wave events and using laser scanner to monitor cliff erosion.
Top tweets

Gard Masselink @gmasselink 12 Dec
Experiment at Lelystad finished. Thanks to the two Timmies, Oliver and Pedro for collecting a great WASP data set. pic.twitter.com/wJjiWpliyG

Paul Aldersley @PaulAL011y 10 Dec
Great conditions for first day of @PlymUni @MarineSciPlym field week

R/V Falcon spirit @MarineSciPlym - Dec 7
Students deploy a Rosette to measure conductivity, temperature and depth during a Global Ocean module field week.

Plymouth University @MarineSciPlym - Dec 5
Possible break through channel found in western channel into Plymouth Sound using a Sub-Bottom Profiler. @MarineSciPlym

Plymouth Sound - Dec 5
You like the beach? Plymouth University launches a new Marine Science research programme. plym.ac.uk/gy which is a...

MINI BLACK

Tim Scott @TScottPlym 10 Dec
Waves nearing their peak west of Hebrides with a huge 10 m & 20 at pic.twitter.com/9hFU4QA8cK

Unlocking the secrets of Plymouth Sound: @MarineSciPlym students create inspiring free event: plym.ac.uk/news/unlocking...
Undergraduate impressions...

What do Stage 1 undergraduates think of Marine Science at Plymouth?