Welcome to the winter edition of the Marine Science newsletter

Our new undergraduate programmes are fully underway and the new cohort of students are getting stuck in to lots of fieldwork activities and developing exciting new skills. Meanwhile, a team of our final year Ocean Science students returned from South Africa with some unforgettable experiences and great scientific data from the wild open coasts and estuaries of the Eastern Cape.

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

Tim Scott

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**Contents**

- NEWS: 1
- SOUTH AFRICA: 5
- RESEARCH SPOTLIGHT: 6
- CMAR: 7
- TOP TWEETS: 8

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Front cover: Setting out ground control network for South African field experiments at Sundays River (photo: Tim Scott)

Contents page: Sand ripples over dune system in South Africa (photo: Tim Scott)
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 running with the first intake of students, are designed to enhance the University's contribution to the UK's marine science sector.

There are 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, Associate Head of Marine Science (Teaching and Learning) 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 address.”

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.”

Prof. Gerd Masselink, Professor of Coastal Geomorphology 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.”
NEW LECTURING STAFF
Join the Plymouth Marine Science community

**Dr Abigail McQuatters-Gollop Lecturer in Marine Conservation**

Abigail is a marine conservation ecologist whose research focuses on the generation of national and international impact through the integration of scientific results into the policy process. Her key areas of interest are the separation of climate responses in the plankton from those due to anthropogenic disturbances, ecosystem responses to the combined effects of policy measures and climate change, and the linking of ecological changes to manageable human pressures.

Abigail's work actively creates impact through science-policy knowledge exchange, working closely with policy makers at the UK, European and international levels, to deliver policy informed by sound scientific evidence. She is leading the UK's and OSPAR's implementations of the Marine Strategy Framework Directive for pelagic habitats, which includes the coordination, development and management towards operationalisation of pelagic indicators and environmental targets. This work is a direct response to UK and EU policy needs and is required by EU and UK decision makers to support marine management and conservation; She currently holds a NERC Fellowship to fund this impact work.

Abigail will be teaching Marine Conservation to undergraduate and post graduate students here within Marine Science at Plymouth University. She has a passion for teaching and tries to encourage her students to see why plankton are key ecosystem indicators, to develop an understanding of the practical policy process, and to understand how and why scientific research should be applied and used in a policy and conservation context. Abigail was the winner of the Seavision UK My Maritime World Competition in 2013 for enthusing and informing the next generation of marine scientists with her two minute video entry 'From plankton to policy' (https://youtu.be/YKCIHcdqNm4).

**Dr Tim Scott Lecturer in Ocean Exploration**

Tim is a coastal and submarine geomorphologist and has been actively contributing to internationally recognised research in fields of beach and submarine geomorphology, rip current dynamics and coastal hazards. His recent research has focused on storm impacts, rip current circulation and coastal hazards in SW England, and has been published in high-quality international journals. Tim has more than 10 years experience in the collection and analysis of coastal morphological, hydrodynamic and hydrographic data and has been actively involved in national and international collaborations with external partners (e.g., RNLI, UK Met Office, local and regional councils and external/international universities). His academic research has resulted in 15 peer-reviewed international journal articles and numerous conference papers, technical reports, invited lectures, workshops and media outputs.

Tim's research has involved field data collection throughout the coastal zone, including: intertidal and nearshore oceanographic instrument deployment (Eulerian and Lagrangian), surf zone circulation tracking (GPS surf-zone drifters), topographic surveying using RTK-GPS, total station, laser scanner and UAV SFM, nearshore single- and multi-beam bathymetric surveying, video remote sensing (surf zone and seabed ROV), as well as bed classification using shallow water sidescan sonar and sub-bottom profiler. His work in the commercial offshore surveying industry involved the acquisition of shelf- and deep sea seismic, ROV-based video, multibeam and sidescan sonar data.

Tim will be teaching on the Ocean Exploration and Surveying and Hydrography under- and postgraduate programs. Tim strives to instill a level of passion, intrigue and purpose about his subject that will provide students with the motivation to learn, the skills needed for independent critical thinking, information literacy and a strong theoretical and practical underpinning of research and practice in Marine Science.
STORM IMPACT CASE STUDY

The Coastal Processes Research Group published an article on the coastal impacts of the 2013/14 storms which made the front cover of the latest issue of ‘Geography Review’ (see attached pics). This magazine is distributed nationally to 60,000 A level Geography students. Analysis showed that, following extreme storms, it may take several years for beaches to recover and there can be permanent changes to the coast through processes such as cliff recession, the collapse of natural arches and the destruction of sea stacks.

Below: The natural arch at Porthcothan Bay, North Cornwall, before (bottom) and after the extreme storms.

ARTICLE:
‘Where has our beach gone, impact of the UK’s 2014 storms’
Paul Russell, Gerd Masselink, Tim Scott, Daniel Conley and Mark Davidson
Geography Review, Volume 26, Number 2, pages 2-6, November 2015.

RESEARCH DIVE TEAM UPDATE

The Dive Team here at Marine Station have had a busy few weeks. Along with supporting students through the MASC201 Academic Diving module and various 3rd year dissertations, we have worked with colleagues at the MBA on collaborative MSc projects, coordinated diving for the Community Seagrass Initiative in association with the National Marine Aquarium and trained the latest batch of adventurers heading off to Antarctica to dive with the British Antarctic Survey – one of whom was an ex-Plymouth University student who learned to dive here.

In addition to all the day-to-day activities, one of our Diving Specialists, Bex Harris has been awarded a Scientific Diving Supervisory Committee bursary to attend the 2nd European Conference on Scientific Diving at the Sven Lovén Centre for Marine Sciences in Sweden. Bex will be presenting a poster and talking on the "Effectiveness of various survey techniques to assess the distribution of seagrass beds (Zostera marina) within Plymouth Sound, England”

In February, Dr Phil Hosegood and Dr Alex Nimmo Smith of the Marine Physics Research Group will be undertaking a 3-week research cruise around the Chagos Archipelago in the central Indian Ocean. Working alongside marine biologists from the Zoological Society of London, they will be studying the physical oceanographic processes in this remote part of the ocean and how these might control the distribution of top-level predators, such as sharks.

They’ll also deploy an aerial drone from the ship to measure ocean colour (to ground-truth satellite images) and assist with the location and tagging of manta rays.

CHAGOS

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Founded in 2015, the **UPSU Marine Science Society** takes on the challenge of promoting the broad spectrum of marine and atmospheric sciences, along with marine conservation, to the entire Plymouth University student body. Throughout the year the society hosts a variety of events ranging from talks to trips, as well as partaking in events hosted by other marine and atmospheric based organisations. As a society we are not afraid of getting our hands a bit mucky, and enjoy getting involved with local community projects. A recent example of this is the Polhawn beach clean and survey, which some of our members soldiered through the wind and rain to attend, with an impressive end volume of rubbish removed from the beach. Of course, for those who might prefer something a little less exposed to the elements, we regularly offer opportunities for our members to attend talks related to our area of focus. We host guest speakers from a variety of backgrounds, giving a mixed insight into how the marine and atmospheric disciplines exist outside of the university. We also regularly attend talks hosted by others. This month we are pleased to say we have the National Lobster Hatchery coming to talk about their work. We are also constantly looking for input from our members to find out what they want to see, or hear about.

We aim to promote a friendly and welcoming environment within the society. Whether you are currently studying a marine or atmospheric discipline, or if you are keen to discover more about the marine environment we are always open to new members, the more people we have the more we can do, so please do come and take a look at what we do, and feel free to get in touch with us if you want to know more.

**Contact Information:**

- **Email:** marinescience.plymuni@outlook.com
- **Twitter:** @MarineSciSoc
- **Facebook:** https://www.facebook.com/MarineSciSoc/
- **Website:** http://www.upsu.com/societies/7817/

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*Coastal walk from Cremyll to Kingsand*

*Our members volunteering at Polhawn beach clean that was run by Rame Peninsula Beach Care*

*Coastal walk from Mt Batten to Bovisand*
One week before the start of 2015/16 academic year, a group of 10 Ocean Science Students and 4 Marine Science staff went to Sundays River, Eastern Cape, South Africa, for a 1-week field trip. This first-ever Marine Science residential field trip was co-organised with marine science staff from the Nelson Mandela Metropolitan University (NMMU) in Port Elizabeth, and 8 NMMU students joined our students and worked together.

The first two days of the trip served as an introduction to the study site and involved a visit to ADDO Elephant Park and a show-and-tell walking tour of the Sundays River estuary/dune/beach system. Assessed student presentations took place in the evening, where students briefly discussed a relevant scientific paper pertaining to the Sundays River area.

The third day was led by the NMMU staff and consisted of a comprehensive marine ecological sampling programme, involving netting for surf zone fish, sampling benthic fauna, catching ‘swash riders’ and trapping dune insects.

During the second part of the field trip, students conducted a comprehensive research project, using a variety of research methods and deploying some sophisticated instrumentation that we had shipped in from Plymouth. The two research projects included (1) estuarine circulation and dynamics and (2) surf zone circulation, and students worked in groups of 5.

Despite the hard work and long hours, this field trip was a hugely rewarding experience for both students and staff. For students, it was very instructive to see the lecture material come to life in the field and to be given the opportunity to deploy research-grade instrumentation to collect publishable data. It was also great to experience South Africa and interact with staff and NMMU students (there were tears when we left!). For staff, it was a privilege to get to know the students and being able to take them to a place like Sundays River and provide them with a unique life and learning experience. And staff were very relieved no-one got hurt and everyone returned back home in one piece. The Sundays River trip will run again next year, hopefully with a few more students and with involvement of NMMU.
Plymouth University has been awarded a two-year multi-agency grant of £340,000 by the Engineering and Physical Sciences Research Council (EPSRC). The grant is funding an international project working with Bangor University (Wales), University of Auckland (New Zealand) and Deltares research Institute (Holland) exploring wave processes across rocky platforms.

The WASP project aims to take capture a unique dataset of detailed wave measurements across a range of rocky platforms around the UK coastline. Using the latest pressure sensors and ADV current meters, remote digital video, profiling LiDAR, UAV photogrammetry and laser scanners the project will map the decay in wave energy across intertidal rocky platforms. These measurements will be used to improve existing models which aim to provide a predictive tool for examining wave energy reaching our coastline which can cause erosion and cliff falls.

Coastal research over the past few decades has focussed on hydrodynamics, sediment transport and morphodynamic processes in depositional coastal environments (beaches, shoreface and estuaries). However, a large proportion of the world’s coastlines, perhaps as high as 80%, are rocky and characterised by cliff and/or intertidal shore platform topography. In large tidal environments, such as the UK, these platforms tend to be gently-sloping seaward (<5°), wide to very wide (100–500 m) and characterised by rough and dissipative surfaces. Cliffs and shore platforms are linked dynamically because shore platform characteristics (elevation, gradient, width and surface roughness) directly control the transformation processes of waves propagating across the platform, and thus the impact on the cliff. These shore platforms extend into the subtidal zone and represent very rough surfaces. As a result, considerable wave energy losses occur as waves propagate across shore platforms. In combination with the water level, this wave transformation determines how much open-ocean wave energy is allowed to reach the base of the cliff, but this process is virtually unstudied within coastal engineering. These wave transformation processes must be understood quantitatively to be able to predict coastal processes along rocky shores.

As part of the project in 2015 the WASP team and an army of Plymouth University CPRG (Coastal Processes Research Group) volunteers have undetaken field deployments in Doolin, Ireland and Freshwater West in South Wales. Doolin is located on the west coast of Ireland adjacent to the stunning Cliffs of Moher south of Galway, and Freshwater West is a popular wild Pembrokeshire sandy beach. Both sites were chosen for the unique rocky platforms that are found in the areas and their exposure to large Atlantic waves providing excellent datasets to add to three UK sites already captured as part of the WASP project.

For more information about the project or to contact the team please email Dr Tim Poate at timothy.poate@plymouth.ac.uk.
CMAR
Coastal Marine Applied Research
New in-house consultancy is open for business

Coastal Marine Applied Research (CMAR) is a research-informed consultancy group focusing on coastal processes and marine physics, based in the School of Marine Science and Engineering. The group formed in October and is quite unique in that they can draw on the expertise of a large collection of internationally recognised researchers, specifically, in the University’s Coastal Processes Research Group (CPRG) and Marine Physics Research Group (MPRG), as well as other academics within the University’s Marine Institute (MI) and collaborating universities.

They aim to provide a first-class data collection, analysis and synthesis service to help address important issues in the coastal and marine environment. Dr Kit Stokes, lead investigator for CMAR, said: “We strive to understand and predict the behaviour of coastal, marine and estuarine systems to support the appropriate management of resources and activities in these environments. This is particularly relevant at the moment, with increasing levels of storminess, sea level rise, and related coastal change”. As they have a dedicated consultancy team they aim to undertake consultancy projects on the sort of time-scale that is more common of commercial consultancies found outside of academia.

They specialise in the collection, analysis and interpretation of air-, land- and sea-based coastal survey data, as well as making in-situ measurements of hydrodynamics (waves, currents and tides) and sediment transport processes in coastal, estuarine, nearshore and shallow marine environments. They also undertake numerical modelling of coastal processes and marine physics and conducting advanced analysis and interpretation of coastal data.

Professor Gerd Masselink, from the Coastal Processes Research Group, said: “CMAR is a relatively small consultancy group and our intention is not to compete with the larger coastal/marine consultancies; rather, we see ourselves collaborating with other consultancies, and bidding for relatively small and more specialised contracts”. For further information, and for examples of the work that CMAR is undertaking, visit their website (https://www.plymouth.ac.uk/research/cmar) or contact them on cmar@plymouth.ac.uk. They also tweet about recent fieldwork and research from @pu_cprg.

Surf-zone GPS-tracked drifters provide synoptic insights into rip currents and surf zone Lagrangian flows for coastal hazard assessment.
Top tweets

First year marine science students enjoying a talk given by @gmasselink at the @BBSRiPlymouth. @MarineSciPlym

Our 2013/2014 winter storm paper is now freely available: onlineibrary.wiley.com/doi/10.1002/es... (graph)

We see Dolphins a fair bit when we do our field work. #oceanscience #oceanexploration @PlymUni @MarineSciPlym

Mobilisation of kit today for MSC hydrography field week. A sub bottom profiler, side scan and magnetometer.

Attention to detail... No problem identifying our pallets in Chagola!

Thank you to @ValeportLtd for a great talk and tour around their facilities, also thanks to SW Hydrographic society.

Ocean science students @MarineSciPlym on Sunday’s River field trip (South Africa) - trip current experiment.

Land crew, Stage 1 about to deploy home made light sensors w Arduino data loggers.

Big N Atlantic storms mean big swell waves for Sweden. @prussellrst Xmas 2015, Canary Islands

RV Falcon Spirit. @FalconSpirit - 8 Dec 2015

Final MSC Hydrography practical for me this year. Windy! #mapping #geography