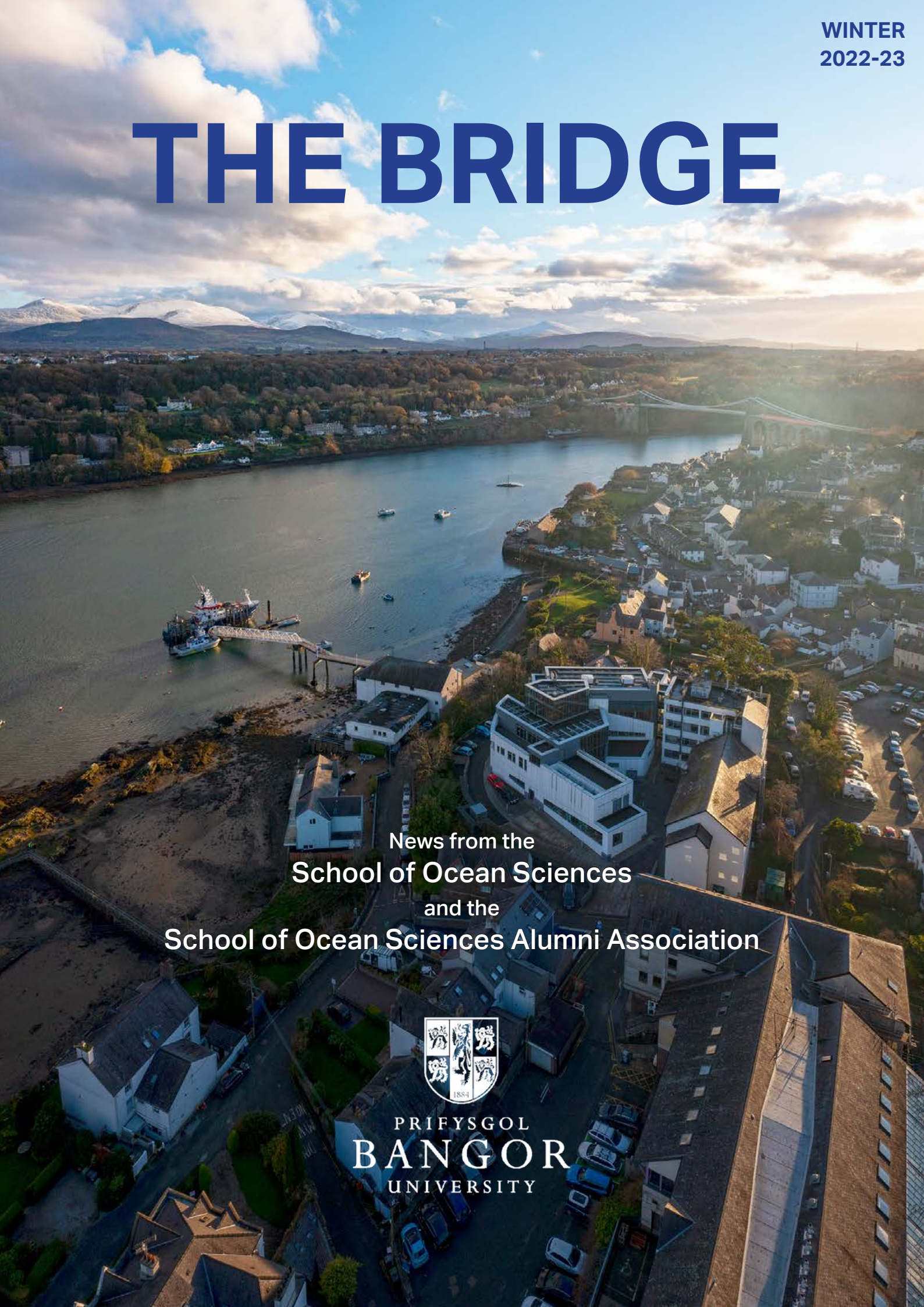
WINTER
2022-23

THE BRIDGE



News from the
School of Ocean Sciences
and the
School of Ocean Sciences Alumni Association

PRIFYSGOL
BANGOR
UNIVERSITY

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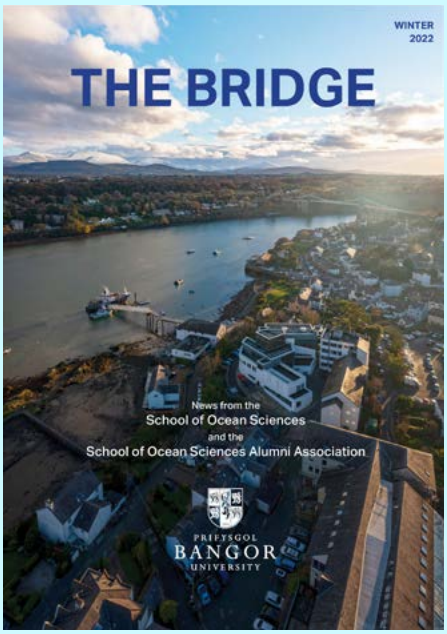


Please send your news to:
l.haggett@bangor.ac.uk

THE BRIDGE

The newsletter of the School of Ocean Sciences and our alumni.

Aiming to keep all those interested informed of developments both in the School in Menai Bridge and globally through our vast network of alumni. By linking past, present and future potential students we hope to facilitate a network of marine scientists in support of pushing back the frontiers of our science and in providing a bridge between academic research and the offshore industry.

Don't forget that you can catch up on previous editions of "The Bridge" online by visiting:
https://www.bangor.ac.uk/oceansciences/newsletter.php.en

MESSAGE FROM THE EDITOR

Welcome to the Winter 2022 edition of the Bridge. In this edition we celebrate the achievements of our students in the face of the very difficult circumstances in the past couple of years due to COVID. We also mark the sad passing of a key ocean sciences staff member, Sinclair Buchan.

We also introducing a "new" research application which is the examination of the environmental impacts of off-shore wind farms funded through 2 recently awarded research grants.

In the 20 years since the first off-shore wind turbine was deployed off the northeast coast of England the off-shore wind sector has grown massively and was estimated to have provided 24% of total UK electricity requirement in 2020. It is a major industry success story with a turnover of £6 billion and employing over 7,000 people.

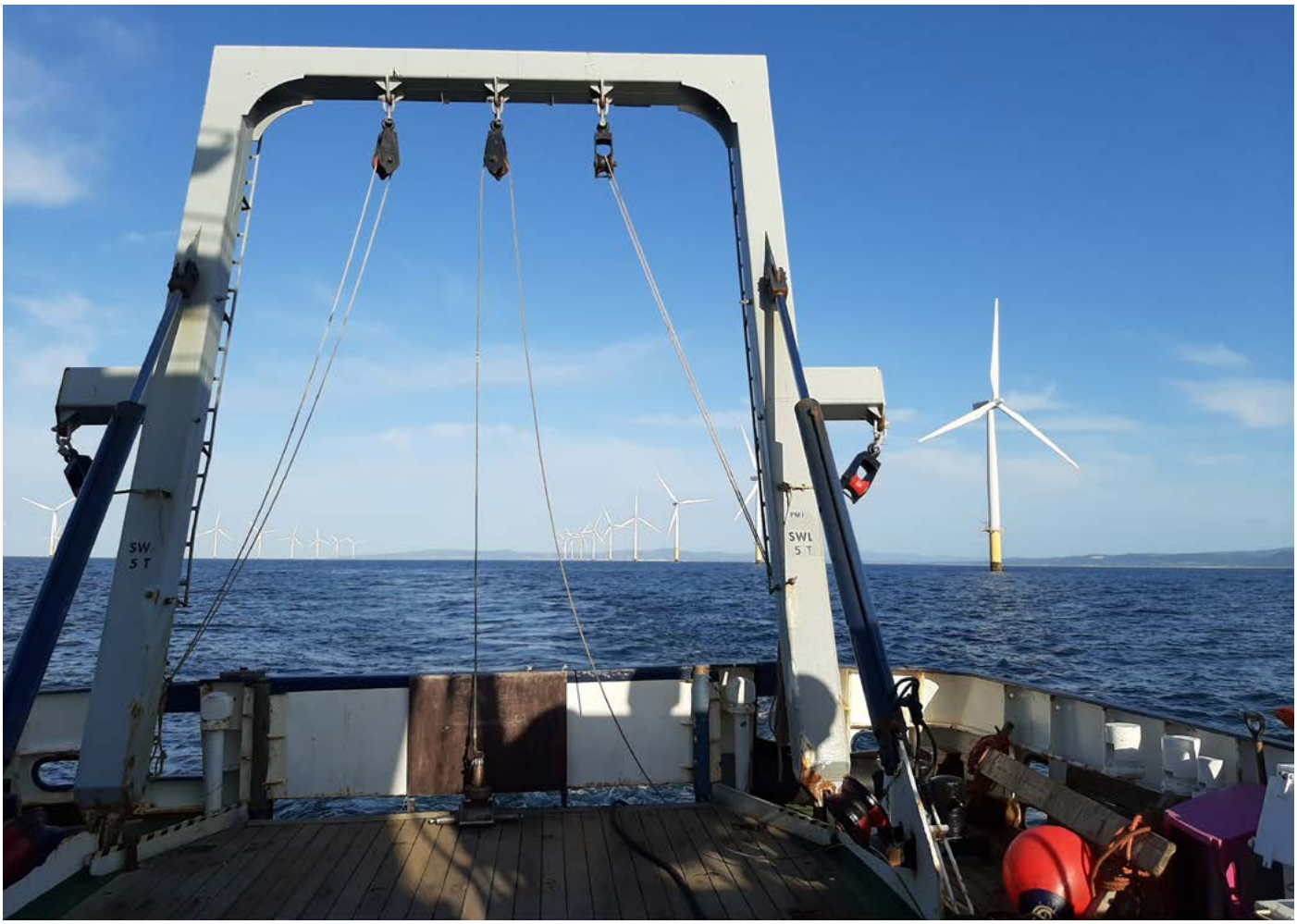
Moreover, off-shore wind is increasingly seen as the backbone to the UK (and many other coastal nations) pathway to achieving NetZero by 2050. For the UK this equates to over 20,000 new wind turbines and requires the creation of 100,000 new jobs nationwide.

These developments provide a tremendous opportunity for our students, past, present and future, and we look forward to welcoming alumni back to our careers fair in the spring to help our students realise these opportunities.

If you have any news you would like to share please contact Laura Haggett using the e-mail address l.haggett@bangor.ac.uk.

Best wishes,

Tom Rippeth, Editor



MESSAGE FROM THE CHAIR OF SOSA

It is with great sadness that I remember Sinclair Buchan in this Chairman's letter. Sadly, Sinclair passed away in September of this year after an illness that severely constrained his latter months of life. Sinclair hailed from Fraserburgh in the north-east of Scotland and began lecturing in marine geosciences at the Marine Science Laboratories (as they used to be called) in Menai Bridge in 1969. And many readers of The Bridge will fondly remember Sinclair's help and support during their time in North Wales. Sinclair was a great communicator and a great character who treasured his students.

Amazingly, Sinclair kept in touch with alumni many years after they departed Menai Bridge, and it is testament to him that he hand-wrote 100+ letters to former students every Christmas. I for one used to look forward to my letter that was always full of news and good cheer.

Some of you may not know that Sinclair, together with George Floodgate, founded the School of Ocean Sciences Alumni Association (SOSA) in 1994. I have had the great honour of Chairing SOSA for the past 12 years and Sinclair has been a rock in supporting everything we did and have achieved. I, and I am sure many others will miss Sinclair's cheery smile and 'how you doin' Mick?' greeting delivered in his broad Scottish brogue each time we met. My only regret is that Sinclair failed to covert me to the delights of Scotch Whisky during his full life; despite trying very hard to do so!

My wife Christine and I have just returned from a very pleasant week in North Wales. Despite the inclement weather forecast, we were not prevented from enjoying the beautiful countryside that the area has to offer. Whilst there I took the opportunity to meet up with Taryn Rock and Bethan Perkins of the Alumni and Development Department and with Head of School, John Turner. All were interested to hear of my plans to resurrect the SOSA committee after the constraints of COVID these past 30 months. Since we last met in 2019, a lot has happened. People have retired, some have moved away and sadly Sinclair has passed away. Over the past 12 months or so, I have been successfully canvassing alumni to ask if they are interested in joining the committee; especially now we can hold hybrid face-face and online meetings thereby precluding the need to be located close to Menai Bridge. I am just in the process of putting the new committee together and our first two activities will be to organise a 30th anniversary alumni reunion in 2024 and to work with the Graduate Employment and Work Experience department to assist current students.

In my own work-life, the Energy Transition is now in full swing and the demand for marine science graduates is ever-increasing. In this respect, my presentation to the Oceanology International Exhibition & Conference in London earlier this year (referred to in my previous letter) highlighting the impacts of the Energy Transition on offshore site investigation provoked a reaction and I am currently working with The Crown Estate to address the issues raised in my presentation; the most significant of which is the lack of marine science personnel resource.

If you are interested in getting involved in any of the activities raised above, please contact me mick@mickcook.com +44 7593 233633. I always look forward to hearing from you.

Best wishes,
Mick Cook

Chairman - School of Ocean Sciences Alumni Association (mick@mickcook.com)

SCHOOL NEWS

University Council visits the School of Ocean Sciences

We were pleased to welcome the University Council to the School in September. It is the first of a series of planned visits to schools across the University. The council is the supreme governing body of the University and is made up of independent members drawn outside of the University together with senior University managers including the Vice-Chancellor and deputy Vice-Chancellor.

The council members saw a presentation of the work going on across the School of Ocean Sciences and had the opportunity to meet staff and students, as well as visiting the Prince Madog. The occasion also saw the first visit of the new Vice-Chancellor **Professor Edmund Burke** to the School.

Dei Huws *talks to Council Chair* ***Mrs Marian Wyn Jones*** *about teaching innovations going on across the school.*

Katrien van Landeghem *tells Council member* **Vice-Admiral Sir Paul Lambert** *about her new ECOWIND research proposal.*

Yueng-Djern Lenn *tells the new Vice-Chancellor,* ***Professor Edmund Burke****, about her current research on invasion of the Arctic Ocean by the Atlantic Ocean.*

School of Ocean Sciences student becomes an Arctic Explorer

Climate-Critical World Record Attempt to Reach the #LASTPOLE in February 2023

George Reese, a Bangor University student from Lugwardine, near Hereford has been selected to undertake one of the world's most ambitious unconquered challenges: to reach the Northern Pole of Inaccessibility.

World renowned explorer, Jim McNeill, has chosen Marine Biology & Zoology student George, to take part in one of the most important and ambitious polar expeditions of our time; to be the first expedition in history to reach the Northern Pole of Inaccessibility, collecting vital climate change data on route.

Defined as the furthest point from land on the Arctic Ocean and therefore its centre, the Northern Pole of Inaccessibility remains the last truly significant place in the Polar Regions, yet to be reached by humankind and is over 270 miles further than the Geographic North Pole. The whole journey will be near to 800 miles from the northern shores of Canada.

The expedition is not only a record-setting adventure but will be gathering "crucial datasets" to benchmark the condition of the ocean for the NASA funded National Snow and Ice Data Center (NSIDC) scientists, led by Nobel Prize winning scientist, Walt Meier. These, along with weather data, measurements of pollution and counting polar bears that may be encountered, deliver the reality of climate change and make the whole endeavour worthwhile and purposeful.

Having been selected for the Ice Warrior #LASTPOLE Expedition George, who has taken a year out from his studies, is undergoing a comprehensive and intensive training programme (from February 2022 – January 2023) to take on one of four 20-day legs, pushing the route across the Arctic Ocean.

A life-changing challenge

George said,

"*I have a passion for the natural world, a keen interest in climate change and its effect on the planet. I decided to study at Bangor University for its world-renowned reputation, and for the amazing schools of Natural and Ocean Sciences.*

When introduced to the Ice Warrior Project I knew I wanted to get involved. I felt I could play a part in the collection of data and contribute to scientific research which will have a direct impact on the understanding of the effects of climate change in the polar regions. I have always dreamed of being a polar explorer and taking part in a big expedition such as this. Being a part of this expedition will deepen my understanding of my scientific studies whilst collecting scientific data along the way.

By taking on a life-changing challenge such as this, it's sure to broaden my career prospects within the natural history film-making industry. My comprehensive training so far has consisted of rigorous first aid and expedition core skills, over the last twelve months and I am now preparing for Polar and Advanced Polar training in Svalbard come January 2023. I feel like my path and past challenges have brought me to a point where I'm looking forward to taking on a challenge such as the Last Pole Expedition.

The Last Pole expedition aims to depart for the Pole of Inaccessibility in February 2023."

Explorer, expedition leader and Founder of Ice Warrior, Jim McNeill said "I'm delighted to have George in the expedition team and look forward to training him in every aspect which will make him a competent polar traveller."

Professor John Turner, Head of the School of Ocean Sciences said:

"*We are all very proud of George for undertaking this adventure. Ocean Sciences is by its very nature an adventurous subject, so we were very excited to hear that George wanted to take part in such an important expedition. We will be watching his progress with great interest. Good luck to George, Jim and the rest of the Ice Warrior team.*"

Gaining Research Experience on an Icelandic Cruise – by Francesca Fehlberg (BSc Marine Biology and Zoology) and Thea Moule (MScRes Marine Biology)

Alongside academic studies it is important to gain external research experience to enhance employability. The marine research industry is becoming an ever-increasingly competitive field, and such experiences provide the opportunity to advance data collection and analytical skills obtained during the Marine Biology undergraduate course. Additionally, the chance to network with other researchers in the field can allow for new opportunities to arise and interdisciplinary knowledge to be shared. Francesca and Thea, both SOS students and former Gavin Borthwick Prize recipients, were fortunate enough to be part of **James Waggitt**'s research team on a recent Eurofleets cruise in Iceland.

Francesca graduated this summer with a BSc in Marine Biology and Zoology and she will continue her studies at Bangor University in September on the MSc Marine Environmental Protection course. Currently, Francesca is a Student Reviewer for the University as well as a Student Trustee for UNDEB Bangor. Additionally, this Summer, she received the Ecology Resources Ltd. Bursary award to support her work as a Lead Technical Assistant on the Skylark project for the Swiss Ornithological Institute in Switzerland. Thea Moule graduated last summer with a BSc in Marine Biology and is currently an Athena Swan Scholar recipient and MScRes postgraduate, researching the impacts of coral bleaching on reef fish body-size distributions among distinct coral habitats. Alongside her master's she has presented her research at the International Coral Reef Society conference in Bremen, funded by ICRS European Chapter and Challenger Society grants, and received a full scholarship to attend the Coral Reef Ecology course at the Bermuda Institute of Ocean Sciences.

The Research Cruise, onboard the *Arni Fridriksson*, lasted from the 18th until the 25th of June, and it followed along 45 predetermined transects between Faxaflói and Breiðafjörður, collecting data to determine the energetic landscape of seabirds. The tasks were conducted over an 18-hour period and Francesca and Thea worked on two shifts, the first shift was from 4:00 until 9:00 and the second shift lasted from 14:00 until 19:00. For the duration of their time on board, they assisted on scribing and observing during Seabird surveys as well as sorting through plankton-, pelagic- and demersal trawls in the wet-room. The different marine species were then identified and grouped into length classes so that they could measure the organisms' weights. In order to pick up on plankton or fish schools to trawl for underneath the boat the Simrad EK80 echosounder system was used. Some of the highlight species that were caught were a 15kg Atlantic Cod (*Gadus morhua*) and Atlantic Wolffish (*Anarhichas lupus*). Additionally, Thea and Francesca were able to gain further experience using a CTD and learn about how it can be used to measure conductivity, temperature, and depth in the water column.

This fully funded opportunity allowed Francesca and Thea to gain invaluable hands-on experience surveying wildlife, identifying species and using different sampling techniques in a professional setting. They were able to greatly profit from the international team and their knowledge that accompanied them on board. This Cruise had been delayed for two years due to the COVID-19 pandemic. It made this experience extremely special to all who were able to be a part of it. Therefore, everyone would like to say a huge thank you to James Waggitt for awarding us this opportunity.

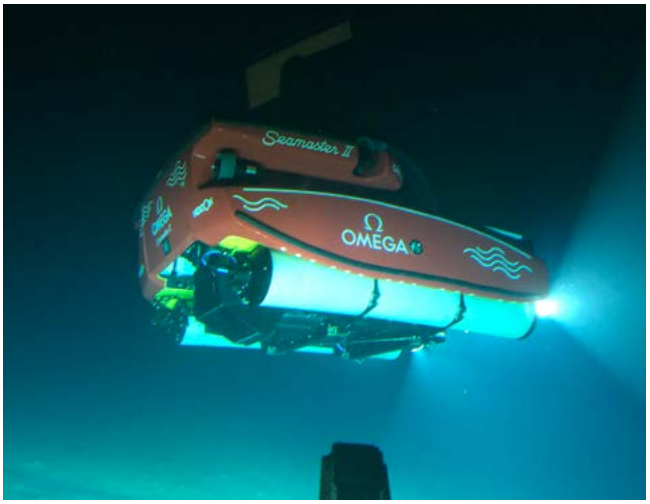
500m below the Indian Ocean

Last October, **Jyodee Sannnassy Pilly**, PhD researcher from the School of Ocean Sciences joined REV Ocean and OCEEF to explore the twilight zone on of the most remote reefs in the Central Indian Ocean.

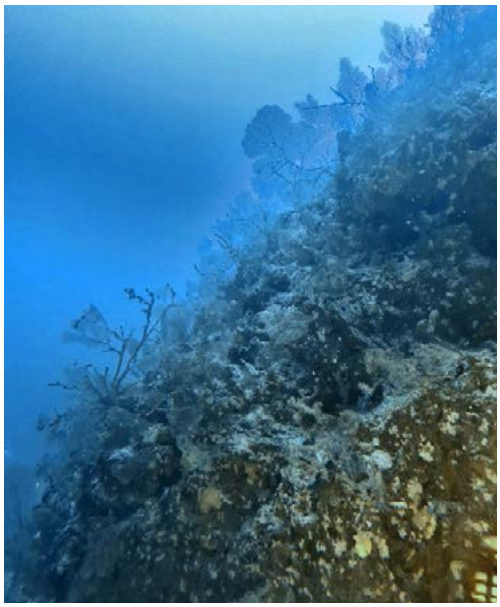
Jyodee in Omega submersible observing her first Tinselfish at 500m in central Indian Ocean

Jyodee participated in this first deep-sea mission in the Chagos Archipelago in two Triton submersibles, where they conducted daily dives to document the seafloor and fish communities to at least 500m deep.

Jyodee's research in the archipelago focuses on depth zonation in shallow coral reef communities and their changing structure due to climate change. This expedition gave her the opportunity to see the reefs as well as observe potential indirect anthropogenic impacts on the ecosystem below diving depths. Using state-of-the-art video and sampling equipment on the submersibles, the team were able to collect data on hard coral, fish, seaweed, soft coral and echinoderm populations from 60 – 500 m deep across the archipelago. While providing early career scientists like Jyodee training in deep water ecology and conservation management, the data generated from this expedition will provide a better understanding of the unique deep-sea ecosystem of the central Indian Ocean.

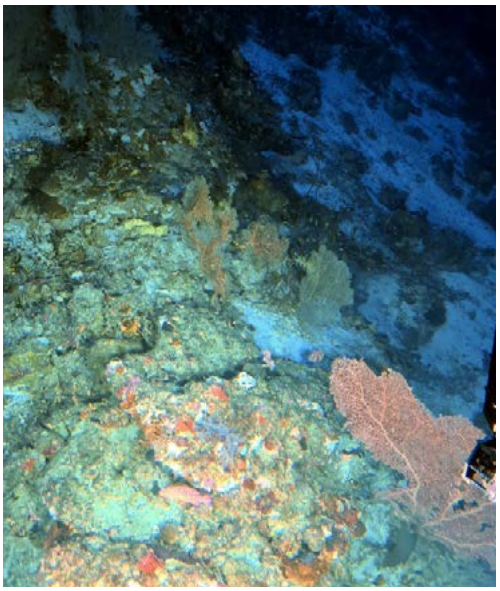


Omega submersible at 500m starting video transect in central Indian ocean



Glimpses of the reef structure at 250m and 120 m in Central Indian Ocean

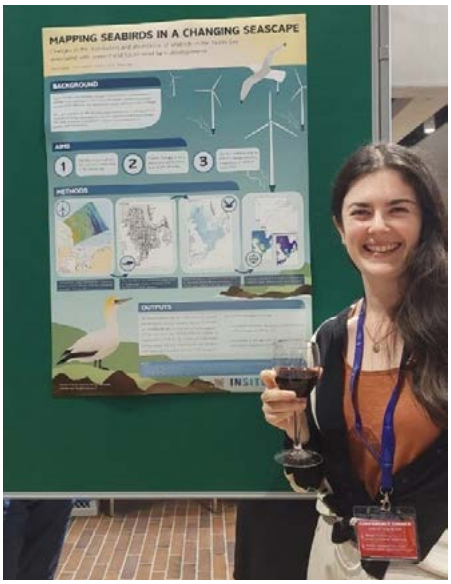
REV Ocean team with scientists from Bangor University, Plymouth University and Oxford University



SOS Students Attending Conferences

A few months ago, 4 current students and 1 recent student attended the International Seabird Conference on 22-25 August in Cork, Ireland.

Claire Carrington and **Sophie Crouch** presented their PhD research, **Rhys Gadd** presented his MRes research, and **Orla Van der Noll** presented her MSc research. **Natalie Robinson** was also in attendance, providing opportunities to discuss her MRes research with peers. Whilst she unfortunately couldn't attend, **Eleanor Falch** MRes research was presented by her peers. Aside from attending the presentations, all students benefited greatly from the Early Career Research Events which the Seabird Group conferences are renowned for.



Congratulations to INSITE PhD student Sophie Crouch whose poster presentation received a 'highly commended' award at the International Seabird Conference in Cork (22-25 August) and then the 'best poster' award at the Environmental Impacts of Marine Renewables (EIMR) conference (4-6 October).

Sophie's research focusses on impacts of offshore wind on seabirds and marine mammals in the North Sea and is supervised by **Simon Neill**, **Matt Lewis**, and **James Waggitt**.

Giulia Cecchi, from Italy, a 2nd year BSc student in Marine Biology and Oceanography here in Ocean Sciences recently gave a presentation at the WEEN conference (Welsh Ecology and Evolution network).

This an annual student-led conference aiming to create a networking platform for early-career scientists at Welsh Universities. She gave a speed talk on the natural variability of tidal mixing fronts. The topic is part of SHEAR, a NERC funded project at Bangor University focusing on the impact of the physical environment on the foraging energetics of shearwaters and the consequences for breeding success.

Challenger Society celebrates the 150th Anniversary of Challenger Expedition

The UK Challenger Society and biannual Challenger Conferences are named after Charles Darwin's 1872 HMS Challenger expedition and exists to bring together UK marine scientists and international colleagues to discuss the latest science and inspire new generations of ocean researchers.

This year the biannual Challenger Society Conference marked the 150th anniversary of the Challenger expedition and celebrates the birth of international and interdisciplinary oceanography with the meeting held at the Natural History Museum in London.

The conference brought together over 400 scientists to take stock of where marine science has arrived at in UK, as well as providing the opportunity to consider the future of open, international, collaborative, inclusive and diverse marine science

Congratulations to Bangor University Physical Oceanography PhD student **Katie Sieradzen** on winning the Challenger Society **Cath Allen** Prize at conference. Katie's poster described her ENVISION PhD research into the impact of tidal mixing on shelf sea flushing times in a global climate model.

Katie's poster was selected for the prize from over 100 posters at the conference. The Prize is named in honour of Bangor alumni Cath Allen, who studied for a PhD on shelf sea fronts with Prof John Simpson in the 1980s before passing at a tragically young age in 1991. Cath came to Bangor to study for her PhD having undertaken a BSc and MSc at Liverpool University. Following completion of her PhD she took up an academic position at Lancaster University.

Amongst the keynote speakers at the conference were **Professor Gary Carvalho**, Emeritus Professor of Molecular Ecology here at Bangor University, where his research has focused on employing genetic markers to address major questions in ecology and evolution.

The Challenger Society and Bangor University

The biannual Challenger Society conference series started in Bangor in 1984. The first conference was held at the School of Ocean Sciences in the (now demolished) Westbury Mount Lecture room, abit a squeeze for the 120 delegates! It was organised by **John Simpson**, along with **Steve Thorpe** (then at Southampton), **Paul Linden** (Cambridge) and **Roy Chester** (Liverpool) with important jobs like operating the slide projector (this was before overheads!) taken on by Bangor PhD students including **Ed Hill** (now head of the National Oceanography Centre and **Bill Turrell** (now head of Environment Monitoring and Assessment Programme with Marine Scotland Science).

Other Bangor participants included PhD student **Meg O'Hara** *who made the most of the location of the conference in the Natural History Museum to check out some of the exhibits!*

Student Prizes and Awards

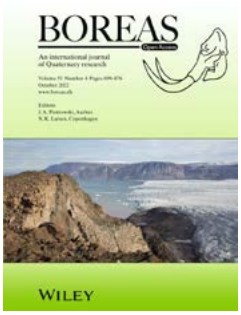
Jennifer Hewitt, Darbyshire Award for Best BSc Student in Marine Physical Oceanography

Jennifer was also the recipient of the 2022 Undergraduate sedimentology award of the British Sedimentological Society Research Group.

Ever wondered what Europe looked like 21,000 years ago as the Snowdonia mountains were carved?

A team of UK geologists including Ocean Sciences Drs **Katrien van Landeghem** and **Margo Saher** have created the most realistic reconstruction yet of the extent of the last ice age over Europe and how it retreated, leaving behind the landmasses that today are Great Britain and Ireland.

The new reconstruction has already thrown up a few surprises including estimating that the maximum extent of the ice age, about 24,000 years ago, was about 30% larger than previously estimated. It also shows that the ice sheet retreat started before climate started to warm and that it's collapse was surprisingly abrupt.



To find out more from their new paper: Growth and retreat of the last British–Irish Ice Sheet, 31 000 to 15 000 years ago: the BRITICE-CHRONO reconstruction - Clark - 2022 - Boreas - Wiley Online Library

"At times during the last glacial period, Marine Isotope Stage 2: c. 29–12 ka, Britain, Ireland and the adjacent continental shelf were almost completely covered by a kilometres thick ice sheet.Over much of the 20th century, landform and sedimentary evidence of glaciation was interpreted to reconstruct an ice sheet covering around 70% of terrestrial Ireland and Britain and with the maximum ..."

PROF CRAIG KENSLER STUDENTSHIPS

Ruth Wills Applied Marine Biology
Hi I'm Ruth and I have been at Bangor University for the past 4 years studying Applied Marine Biology. I am a grateful recipient of the Professor Craig Kensler studentship, which I will be using for a MscRes researching the population biology of dab in our local waters. I will be using data collected from the RV Prince Madog's annual fishing trips to investigate the current population biology of dab. I have almost 25 years of data to work with, so I will be able to see how population biology has changed over time, and how a change in mesh size in the fishing gear has affected size and abundance of catch.

Simon Wills
Hi, my name is Simon, I'm from Shropshire, and this year I will be doing an MScRes on parasites in UK cephalopods. I'll be identifying and counting parasites in cephalopod tissue, as well as measuring and weighing cephalopod specimens. I also will be trying to refine the techniques involved in the histological process of parasite ID in cephalopods, as it is quite nuanced. I'm really enjoying the year so far, and greatly look forward to learning and applying more knowledge and techniques throughout the year.

Amy Ewing
Only one semester into my MSc in Applied Marine Geoscience, and I'm already in love with all the course has to offer! As Secretary of Bangor University's Mountain Walking Club, an avid climber, and a general mud-and-sand enthusiast, I've always wanted a future career which will take me into the great outdoors rather than tethered to a desk. I really feel my MSc has given me a taste of that freedom! On the RV Prince Madog, I had the opportunity to assist in the acquisition of real-world data, from the refined information of a MBES, to the primitive sediment grabber, and I couldn't be more grateful for the opportunity.

Francesca Fehlberg
My name is Francesca, and I am currently studying on the MSc Marine Environmental Protection course. I am extremely grateful to have recently received the Craig Kensler studentship to support my further studies. This studentship has encouraged me to become more self-confident and has motivated me to step outside of my comfort zone. I feel that this award has recognized my strong work ethic along with the many hours and hard work I have put into my studies since starting at Bangor University in 2019. It has made me determined to continue to pursue my dream of undertaking a PhD and becoming a recognised, and well-established female scientist in STEM. Additionally, I am thankful to have also received the Society for Underwater Technology's Educational Support Fund to further support my educational goals. I couldn't have achieved either of these awards without the encouragement and support of Bangor University and the professors I have worked with whilst undertaking my studies and work experiences in Wales, England, Switzerland, Iceland and Germany.

Last year, having received the support of the Santander mobility grant, I was able to work as a Field Assistant on the Red Kite project based in Fribourg Switzerland, for the Swiss Ornithological Institute. Furthermore, I was lucky enough to be chosen to be part of the team that, after 140 years, reintroduced the first two Bearded Vultures back into the National Park of Berchtesgaden, Bavaria, Germany. In summer 2022, I was awarded the BES Ecology Resources Ltd. Bursary which enabled me to work as a Lead Technical Assistant on the Skylark Project, conducting drone surveys to determine more ecologically beneficial agricultural practices, in Bern, Switzerland. After a long wait, in July 2022 I was finally able to join James Waggitt on a Eurofleets research ship to Iceland, studying the energetic landscape of seabirds which was spectacular. All of these experiences have allowed me to consistently grow and broaden my outlook in professional environments and have led to me being able to take part in an important research project, focusing on critically endangered farmland birds - Corn Buntings, for my dissertation. Currently, I am preparing my manuscript for publication, and I am very excited to have had my research findings presented at the Corn Bunting Conference in Brussels. None of this would have been possible without the amazing staff at Bangor University and I am incredibly grateful for this support in my both my professional and academic careers. I am looking forward to the next new adventure and would encourage everyone to follow their goals, as you never know where you are going to end up next.

UNIVERSITY NEWS

Bangor University well positioned in new sustainability rankings

The first QS World Sustainability Rankings - designed to measure the way universities are responding to the global Environmental, Social and Governance challenges - have ranked Bangor University in the 181-190 range, out of 700 institutions internationally.

This places us in the top 26% of institutions that have been ranked by QS. In the UK, Bangor is ranked 28th out of 68 institutions.

Universities are ranked in two categories, that each contribute 50% to the overall institutional ranking: Environmental Impact and Social Impact. Bangor has been ranked 98th globally, and 19th in the UK, for Environmental Impact. For Social Impact we are ranked 414th globally, and 51st in the UK.

A number of performance indicators make up each category, and our best relative performance is for Sustainable Education where we have achieved a top 30 global position, and a top 10 position in the UK.

#1
University in Wales
Student Crowd, 2022

Top 5
UK University of the year
WhatUni? Student Choice Awards, 2022

15th
in the world for Sustainability
UI GreenMetric, World University Rankings, 2021

#1
most affordable university town
Totally Money, 2019

IN MEMORIAM

Dr Sinclair Buchan 1936-2022

It is with great sadness that we report the death of a highly-respected and long-serving staff member of the School of Ocean Sciences.

Sinclair Buchan worked at 'the labs' in Menai Bridge for nearly 40 years. He enjoyed his role as a teacher and he loved to get to know his students, delighting in their various characters. In 2014, with George Floodgate, he established the School of Ocean Sciences Association in order to maintain links between The School and its graduates. Even after his retirement, Sinclair regularly attended graduation ceremonies and he kept in touch with many of his former students with Christmas Cards full of hand-written news.

Sinclair was born and grew up in the fishing port of Fraserburgh in the north-east of Scotland. He was an active young man, keen on football and cycling. He would tell you that he had cycled abroad – to England! As a young man, he played for Fraserburgh football club. Buchan was a common name in the area and, for a while, the whole team had the surname of Buchan. One year, Fraserburgh did well in the Scottish Cup and were drawn away to a first division team – one that had a PA system at the ground, a rarity in those days. The crowd roared as the team ran onto the pitch and the announcer called their names: number 1, Buchan, number two, Buchan...

Sinclair studied mathematics and geography at Aberdeen University and began his working life on the trawling fleet in his home town. Docking one day after a fishing trip in the early 1960's, he was told of a job that might suit his interests and qualifications, in far-away Menai Bridge. At that time, you could travel by train to Menai Bridge Railway Station, which was near the Antelope pub. When Sinclair arrived, the station porter let him use the staff room to smarten up. It had been a long and tiring journey and he relied on his wits to get through the interview. He got the job.

To begin with, Sinclair's role was as a researcher, working with George Floodgate with whom he developed an enduring friendship. He carried out fundamental research on suspended sediments in coastal waters, work which is still relevant today. As the student body at the Marine Science Laboratories grew, Sinclair's lecturing duties took up more of his time. He was a versatile teacher, running courses in soil science and geotechnics at undergraduate and postgraduate level. Most students passing through Bangor, though, would first come across Sinclair on his famed meteorology course, the highlight of which was the fabled field trip up Snowdon. This field course lasted a full week, coach loads of students being bussed to Llanberis every day. There would be a brief stop at Bangor pier to 'zero the altimeters' and it was at this point that Sinclair would divide the class into groups – the better dressed and shod being given the more challenging higher stations on the mountain. Weather conditions on Snowdon at Easter could still be wintry. Sinclair remembered one group of Malaysian students, who had never seen snow, struggling to hold their whirling anemometers to measure the wind speed in a blizzard. Another, hardy, group at one of the top stations carefully measured the lake temperature as 2 degrees Centigrade before stripping off and taking a swim in the water. An annual event that Sinclair revelled in was the Marine Management symposium. This was a two-night residential course at Gregynog in mid-Wales. Students gave talks about managing the resources of the sea and there was plenty of opportunity for staff and students to chat together over meals and in the bar. Sinclair liked to treat his personal tutees to a 'wee dram' on these occasions. After the Gregynog bar had closed, the wee drams multiplied themselves into the night. Remarkably, Sinclair was always bright-eyed the next morning although some of his tutees were not so keen on their breakfast the next day.
Sinclair's engagement with his classes was legendary. It meant that his name was carried far and wide as his students found employment around the country – and indeed the world. One story tells of a former Bangor student turning up to register at the dole office in Aberdeen. The official behind the encounter went through his form and when he came across the fact that the applicant had studied at Bangor he looked up and asked 'And did you come across a Sinclair Buchan?'. Sinclair never found out who that official was.

Sinclair's natural good humour and positive attitude made him a well-liked – loved, even – member of the university. He was a reliable and kind colleague with a wise head on his shoulders. He was good company, with a dry sense of humour and a fine selection of stories. There is a word that is not so very often used today but it is appropriate on this occasion, nevertheless. Sinclair Buchan was a gentleman.

Early in his time at Bangor, Sinclair struck up a friendship with a fellow Scot who was going out with a nurse from the Caernarfon and Anglesey Hospital. When a mutual friend was visiting from Scotland, Sinclair asked the nurse if she could bring a couple of colleagues along to make a party for a night out. That's how he met Sarah, whom he married soon afterwards. Sinclair and Sarah had a son, Andrew, who tragically died while still a young man.

Sinclair was a keen golfer, squeezing in a few holes at Bangor's course whenever his lecture timetable allowed. He was an active member of St Deiniol Golf Club for many years, as a player and administrator. He carried on playing after retirement, working on his handicap and was proud to say that he played with a group who were mostly aged in their 80's – except for those who were in their 90's. He was also keen on do-it-yourself and kept his house in Bangor immaculate inside and out. His golf, DIY, interest in whisky and communicating with his old students kept him happily busy almost to the end.
Text by Dave Bowers; photo supplied by Keith Wevill.

To honour Sinclair's memory we have set up a fund to support an undergraduate student award.
If you would like to contribute please do so via:
https://www.bangor.ac.uk/giving/how-to-give

Prof. Alice Newton (Marine Biology & Oceanography, 1981 / Marine Biology MSc 1987)

"It was with great sadness that I learned that Sinclair Buchan has died.
He was my teacher in the first year of my undergraduate course (1978), but more importantly, he was my tutor.
I started attending his classes and had quite a struggle understanding him, as I was more familiar with foreign accents than regional accents.
I sat next to a Scottish student which helped, as I could look at their notes.
Sinclair was a spirited lecturer with animated gestures, so there was no dozing off!

A few weeks into the first term, I was hospitalized, in the old C and A hospital, which became a supermarket.
I was quite seriously ill and on painkillers that kept me sedated and I was not very aware of my surroundings.
There were no mobile phones and my contact with my parents was through letter writing. Since it was the first year, I had not yet made the lifelong friends that I made later at UCNW. So no-one knew that I was in hospital.

Sinclair was a busy scientist and lecturer, but he realised that one of his tutees was 'missing'. He inquired from the other lectureres, the students, at the residence, he asked around and finally he contacted the hospital, where he found me. He came to visit and was hugely supportive. He got lecture notes from the other lecturers and helped me catch up on the missed lectures.
I was always grateful to him and have never forgotten. When one of my students 'disappears' I always track down what is going on. Sinclair taught me that being a tutor is an important part of University life.
I am not a whisky drinker, but everytime I see someone with a single malt, I think of Sinclair, and always will."

Rick Nunes-Vaz (PhD, physical oceanography 1982)
Sad news of Sinclair. He was a lovely character at the labs and I'm sure I wouldn't have enjoyed it there nearly as much if he hadn't got me involved in the meteorology practicals, including on Snowdon.

The love for Sinclair amongst former students is clearly evidence from comments from our Facebook page following Sinclair's passing, a few of which are reproduced here:"

So sorry to hear this. Sinclair's meteorological lectures were legendary and memories of these stay with me to this day...
Jim Pyrah

I am so very sorry to hear this - Sinclair was an inspiration throughout my 3 years at SOS and we remained in contact ever since after my graduation. In his initial lectures in meteorology - I barely understood his accent but he was always kind enough to go through the notes again. Also introduced me to 'cullen skink'. Loved his wicked sense of humour. Rest in peace Sinclair
Pui-Leng Tay

I'm not sure who coined the phrase "The Menai Bridge Mafia" for all those of us who have gone into the offshore industry but Sinclair certainly played a pivotal role in leading us to follow that route. I've wonderful memories of Sinclair and Jack Darbyshire when I did my M.Sc. back in 69-70.
Colin Charley

I'm so sad to hear this news of Sinclair Buchan's passing. He was the first person I spoke to from SOS - I had dropped a grade and called Bangor to see if I could take my insurance place. He was so friendly and reassuring that any upset I had from receiving a terse response from my first choice just melted away! These things happen for a reason, and I'm glad I didn't end up doing three years of geophysics at a different Uni! After graduation, Sinclair and I remained in contact on Facebook, where we had a yearly check in when we wished each well on our shared birthday! I have very fond memories of Sinclair: dragging us up Snowdon for the meteorological field trip on a dreary day (John Roach, Jon Rollinson, Martin Drabble, Christian Thompson, Tarik Hassan, Ken Chan, Ashley Shilton; Matt Sydenham); panicking trying to get all the info from the Shipping Forecast down; a huge group of us lining up whiskies in the Gregynog bar to see if we could get him drunk, only to see him striding out for his morning walk whilst we were all dying in our rooms (Caroline Culshaw!). What a man! What a legend! One of my favourite lecturers. I'll miss him. Much love to his family and friends.
Alix Cage

CONGRATULATIONS

To all our graduating students of 2020, 2021 and 2022


PRIFYSGOL
Carfan
Class of
2020

To **Laura Grange**, **Sarah Zylinski** and **Dei Huws** on being awarded Bangor University teaching scholarships at this summer's graduation.

To Marine Biology and Oceanography graduate **Zaha Waheed** on her award on an honorary degree by Bangor University. Zaha is currently a minister in the Government of the Maldives and visited Bangor to receive her degree this summer. You can find out more about Zaha's career from the Winter 2021/22 edition of the Bridge.

To TV wildlife star and Bangor Zoology and Conservation graduate **Hamza Yassin** on being awarded an honorary degree at this summer's Ocean Sciences graduation and on his sterling performance, winning Strictly Come Dancing!

To **Yueng-Djern Lenn** on being awarded the American Geophysical Union Cryosphere Division John F Nye Lecture honour. The honour is presented annually and recognizes recent accomplishments and outstanding ability to present exciting scientific research and findings. Yueng was nominated for this honour by Professor Sheldon Bacon of the National Oceanography Centre (UK), Professor Mary-Louise Timmermans of Yale University (US) and Professor Ilker Fer of Bergan University (Norway).

To **Brian Scannell** on his appointment as an honorary lecturer. Brian is a Bangor Ocean Electronics graduate who 'retired' back to Menai Bridge to complete an MSc and then PhD in Physical Oceanography. His research interests include using state-of-the-art acoustic doppler current profilers to measure turbulence parameters.

To **Antonio Hoguane**, who studied Physical Oceanography and Mathematics as an undergraduate at Bangor and then completed (in 1997) a PhD supervised by **Ed Hill** has followed in Ed's footsteps by being appointed Director General of his nation's Oceanographic Institute. The appointment was made by the Prime Minister of Mozambique who is seen here with Antonio (who is on the right).

WELCOME (BACK!)

Dr Natalie Hold who has been appointed to a lectureship in Marine Biology.

Natalie gained an MSc in Marine Environmental Protection at Bangor University in 2008 with a research project on the population genetics of the Caribbean spiny lobster in the western Antilles going on to complete PhD in 2012 which focused on the connectivity and spatial structure of the scallop fishery around the Isle of Man, funded by the Isle of Man Government. The project involved surveys on the research vessel *Prince Madog* as well as collaboration with stakeholders including fishermen and processors. Work included population genetics of scallops around the Isle of Man and across the wider European range, statistical modelling of environmental and anthropogenic drivers of spatial variation in scallop reproductive status and modelling of the impact of hatchery reared scallop seed on wild populations.

Her Post-doctoral research at Bangor University (2012-2015 and 2019- present) has focused on inshore, data poor, shellfish fisheries across Wales, requiring active engagement with the fishing industry for collaborative data collection. All research aims are closely aligned with fisheries management and policy evidence requirements in order to deliver meaningful research to impact sustainable fisheries management. A key framework for our sustainable fisheries research is to provide evidence for the management of key commercial fisheries within the Ecosystem Approach to Fisheries Management (EAFM), ensuring that single species approaches (such as stock assessment and single species reference points) are complemented with wider ecosystem evidence such as appropriate spatial scales, adjacent effects and longterm effects.

She also spent three years working as a fisheries scientist for a consultancy (2016-2019) working on a range of projects including environmental baseline studies for energy developments, intertidal aquaculture developments and coastal realignment schemes. she worked in collaboration with fishers and statutory conservation agencies to develop fisheries management plans for several order fisheries and to carry out annual stock status surveys on the fishery.

She is currently the project manager for the EMFF sustainable fisheries in Wales project. As well as project management she is the lead researcher for the component of the project using our long-standing relationships with the industry to develop innovative technology for maximising high quality, high resolution fishery-dependant data collection.

Dr Innes MacCarthy who joins the School of Ocean Sciences as research fellow in Marine Archaeology.

Innes has a long career of exciting shipwreck discoveries. These include the wreck of HMS Indefatigable, sunk at the Battle of Jutland. Innes has worked in collaboration with Dr **Mike Roberts** of CAMS in the identification of 273 shipwrecks surveyed by the *Prince Madog* over the years including a number of submarines, including U-87 reported in the Summer 2020 edition of the Bridge. Many of Innes discoveries are documented in his new book, *Echoes of the Deep*, which is featured in this newsletter.

Dr Gary Caldwell, a Senior Lecturer in Applied Marine Biology at Newcastle University, who gave a research seminar in the School in October.

Gary is Bangor University Marine Biology graduate and his main research interests cover algae biotechnology, chemical ecology, ecotoxicology and marine venoms.

NEW GRANTS

£2m Project Will Assess the Impact of Offshore Wind Farms on the Ecosystem

School of Ocean Sciences Dr **Katrien van Landeghem** is leading a new £2m ECOWind-ACCELERATE research project.

The research will identify opportunities that benefit the conservation of species and biodiversity net gain around windfarms formed from seabed fixed wind farms. It will also support windfarm developers in the design their environmental monitoring strategies which go on beyond the lifespan of this project.

ECOWind-ACCELERATE is a four-year project funded by the Natural Environment Research Council (NERC), the Crown Estate and the Department for Environment, Food and Rural Affairs (Defra).

With offshore wind farms developing at an accelerated schedule under fast-track plans to switch away from fossil fuels and the cumulative effects of climate change, it is critical that we understand the impact of seabed fixed wind turbine foundations in modifying the seabed.

The seabed supports ecosystems that deliver a wide range of services, providing us with seafood, material for aggregates, storing carbon, recycling nutrients and protecting our coastlines for example.

When natural currents in the sea deviate around the wind turbine foundations or anchors, the forces on the seabed enhance, making sediments move and stay in suspension. This can change the shape and sediment composition of the seabed, alter the location of fish preyed on by seabirds and reduce the clarity of the water, potentially affecting areas far beyond the infrastructure. The climate crisis will exacerbate this, and it will extend to coastal zones, as future storm waves and rising sea levels will alter the ways energy from the sea is transferred to the seabed.

All these changes combined can have a wide-reaching effect on organisms that live on or in the seabed, potentially changing biodiversity (species richness) and the delivery of some of these ecosystem services. Consideration should also be given to the aggregation of fish strongly associated with particular seabed properties. If displaced, an impact on the food chain would be observed, as seabed-dwelling fish are consumed by seabirds and cetaceans.

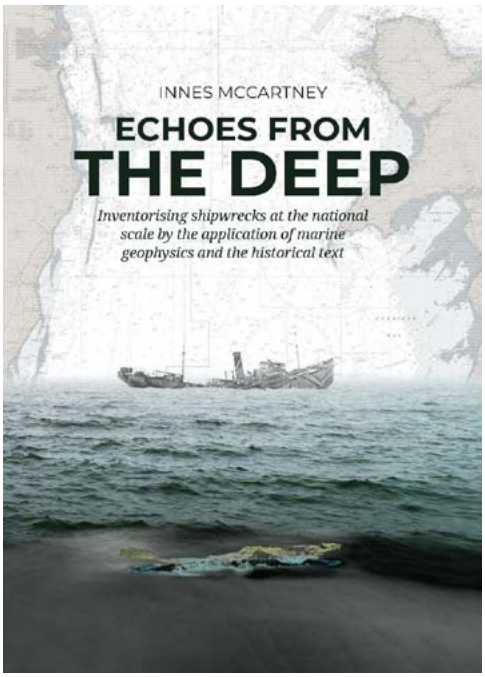
During this pivotal time of energy transition and national security, it is important to understand and unlock the potential of the marine environment solution for a renewable energy transition whilst at the same time safeguarding the ecosystem.
The Project lead **Katrien Van Landeghem** explains:

"*We will test, model, observe and compare the differences on the seabed where no windfarms are present, where small windfarms are in place and where large windfarms are soon to be built. We will use the natural and laboratory environment to test all these scenarios with the wind farm developers. We will be looking at the way animals use the seabed today and in the past, and will then predict how animals will use the changed seabed in the future. Some animals might be affected negatively, some positively. We will look at how seabed habitats change and how they are used via video images, samples and soundwaves. The seabirds will be tracked with GPS to understand how they spend their energy when foraging for food near the seabed and DNA analyses of their faeces will reveal their diet.*"

The new project is led by **Katrien Van Landeghem** and with colleagues **James Waggitt**, **Line Cordes**, **Martin Austi**n and **Stuart Jenkins** with **Chris Unsworth**, **Vahid Seydi**, **Noel Bristow**, **Dave Mills**, **Ben Powell** and **Karen Tuson** providing technical and clerical support.

The project also involves partners from the National Oceanography Centre, HR Wallingford, University of Liverpool, JNCC, RSPB, and NIOZ and industry partners currently planning to use the seabed of the Eastern Irish Sea to help the Energy Transition and mitigate against the effects of the climate crisis.

NEW BOOKS



Echoes of the Deep

A new book chronicling the discovery of 273 wrecks in the Irish Sea has been published by SOS Marine Archaeologist **Innes MacCarthy**.

It includes the fascinating tail of the discovery of the wreck of the ship which sent an iceberg warning to the RMS Titanic, before the ocean-liner sank, lying in the Irish Sea.

In 1912 the merchant steamship SS *Mesaba* was crossing the Atlantic and sent a warning radio message to the RMS Titanic. The message was received, but never reached the bridge. Later that night, the supposedly unsinkable Titanic hit an iceberg and sank on her maiden voyage, taking 1,500 lives and becoming the world's most infamous shipwreck.
The SS Mesaba continued as a merchant ship over the next six years before being torpedoed whilst in convoy in 1918.

State-of-the art multibeam sonar

Using state-of-the art multibeam sonar, researchers at Bangor University have finally been able to positively identify the wreck and have revealed her position for the first time.

For the marine archaeologist, multibeam sonar has the potential to be as impactful as the use of aerial photography was for landscape archaeology. Multibeam sonar enables seabed mapping of such detail that superstructure details can be revealed on the sonar images.

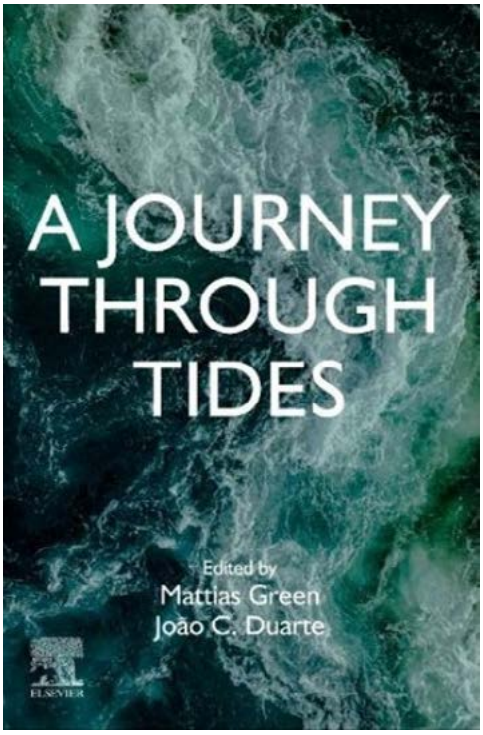
The SS *Mesaba* was one among 273 shipwrecks lying in 7500 square miles of Irish Sea, which were scanned and cross-referenced against the UK Hydrographic Office's database of wrecks and other sources.

It was thought that 101 wrecks were unidentified, but the number of newly identified wrecks was far higher, as many, the SS *Mesaba* included, had been wrongly identified in the past.

Innes commented: "*The results of the work described in the book has validated the multidisciplinary technique employed and it is a 'game-changer' for marine archaeology.*

"Previously we would be able to dive to a few sites a year to visually identify wrecks. The Prince Madog's unique sonar capabilities has enabled us to develop a relatively low-cost means of examining the wrecks. We can connect this back to the historical information without costly physical interaction with each site. It should be of key interest to marine scientists, environmental agencies, hydrographers, heritage managers, maritime archaeologists, and historians."

Dr **Michael Roberts** of the School of Ocean Sciences led the sonar surveys explained:
"*The expertise and unique resources we have at Bangor University, such as the 'Prince Madog' enable us to deliver high quality scientific research in an extremely cost-effective manner. Identifying shipwrecks such as those documented in the publication for historical research and environmental impact studies is just one example of this. We have also been examining these wreck sites to better understand how objects on the seabed interact with physical and biological processes, which in turn can help scientists support the development and growth of the marine energy sector.*"



Journey through Tides

Ocean Science's Professor **Mattias Green** and Professor Joao Duarte, a geologist from the University of Lisbon have edited a new book which provides a fully comprehensive text on the history of tides.

It brings together geology and oceanography and discusses new ideas that have emerged about how plate tectonics and tides interact.

The book covers the history of the planet Earth and the key impact that tides have had on everything from global climate to evolution of life on Earth, and even the potential for life on other planets. It includes contributions from many scientists well known in the School of Ocean Sciences. These include **Dave Bowers**, **Yueng-Djern Lenn**, **Sophie Ward** and **Sophie Wilmes**. SOS alumni have also contributed including **Jenny Brown** and **Elizabeth Bradshaw** (now at the National Oceanography Centre) and **Hannah Davies** (now at the Helmholtz Center Potsdam).

Music from the Waves

Andrew Lewis, Professor of Composition here at Bangor, has created a new electroacoustic piece inspired by climate change.

The music was created using ocean wave frequency data provided by Dr **David Christie**, Research Fellow in Ocean Renewable Energy Modelling at the School of Ocean Sciences.

The new work, '*Three Storms*', focuses on the month of February this year, which saw three named storms batter the UK in the course of a single week. Data from the from the English Channel which represents the frequencies of ocean waves at different UK locations, sampled every half hour. These have then been shifted up into the range of human hearing, so that the audible 'vibrations' of UK coastal waters become the foundation of the music.

Dr Christie commented, "*Being able to hear real, measured ocean wave spectra as audio gives us an exciting new perspective on the data, and brings to life the power of coastal storm events, which are becoming more frequent as the climate changes.*"

The piece will be premiered at Electroacoustic Wales' '*Sounds of Change*' concert, forming part of a programme of electroacoustic works dealing with climate change the environment, which will also includes pieces by Ocean Sciences electronic engineer and electronic music composer **Ben Powell** (Manky Music).

Ben adds
My music was included in a programme of electroacoustic music put together by Prof Andrew Lewis, Head of Music, the theme of the programme was climate change.

Two of my tracks were played through Electroacoustic Wales's 32 speaker system in the Bryn Terfel theatre.

The tracks were taken from my latest album Du Y Moroedd, it has a nautical theme, a lot of the music was made while I was on the Prince Madog and is very much inspired by the scientific field work I carry out, many, if not all, of the field recordings used on the album were made while I was carrying out my job.
https://llynycwn.bandcamp.com/album/du-y-moroedd

ALUMNI NEWS

Bill Lart (Marine Biology and Oceanography BSc 1980, MSc 1987)

I graduated in 1980 a time of difficult economic conditions and relatively limited employment for Marine Biology graduates. After some sailing adventures and consideration of which subjects I found most inspiring at Bangor, I decided that I was interested in a career in fisheries. The attractions of fisheries are their social and economic importance, ecological significance and my interest in sailing had given me skills in ropework, seamanship and boat building.

I had a look around and found that Grimsby College of Technology offered courses in Fisheries Management and Gear Technology. However, it was clear that these were post experience courses, and the fees were well beyond my pocket. I wrote to them expressing an interest in research, and their Director of Research (it turned out they had quite a large research group, mostly in Food Technology, although later in Gear Technology) wrote back asking if I could visit and discuss possible projects.
When I got there, they showed me round the gear technology school, where trawls of various types were laid out in the yard. Just what I needed. We agreed that I should study for an MSc in fish population dynamics. They offered me some part time teaching to keep some money coming in and I would also be able to take courses in Gear Technology and Statistics. They also arranged external supervision from MAFF (now Cefas) in Lowestoft. Grimsby was a cheap place to live, so it all looked a sensible proposition.

I moved to Grimsby in late 1981, a cold winter, just after the Humber Bridge was opened. I based my MSc (external to the University of Wales) on the population dynamics of flounders in the Humber Estuary. I went out with the fishermen, trawling and eel trapping, eventually catching flounders from the open sea to the inland drains as well as the beach. I collected basic demographic information, growth rates, age at maturity, fecundity and modelled yield and egg production per recruit. I remember seeing large numbers of deep-sea trawlers laid up in Grimsby Docks. This was a result of the second cod war that had ended in the previous decade, which had pushed the British fleet out of Icelandic waters.

It took me some time to complete my MSc; I had a brief diversion into analytical chemistry. So, by 1986 I was once again looking round for an opportunity. When we were on a sailing holiday on the West coast of Scotland we came across mussel farmers, growing mussels on suspended culture. This looked interesting and I wanted to know more. I found a 'Graduate start your own business' course at Teesside Polytechnic, which consisted of a three-week intensive course on business followed by around a month in the field, researching one's chosen business, reporting back with a business plan in a final week. I drafted a business plan and researched the market for mussels cultivated on Scotland's west coast. After this I had a short job with Seafish (see below), researching how to ensure that mussels shucked (opened) when cooked.

The following year (1987) I started work building a mussel farm with a company of shellfish traders whose main business was in exporting winkles, crabs and lobsters. The idea was to provide a mussel production side of the company, making use of the extensive leases which they held in the adjacent sea loch. We built a trial mussel farm, using suspended culture on longlines. This took most of the summer. By October it was clear that my job would be watching the mussels grow and packing crabs all winter. Therefore, I started looking round for another job.

I contacted Seafish and they said come and see us. The Sea Fish Industry Authority (Seafish for short) is a public body financed by statutory levy on fish landed and imported into the UK. Over the years it has acted as a development organisation for the Seafood Industry, in fields as diverse as research and development, fishing vessel standards and safety, training, food and gear technology, marketing and advertising and more recently fisheries management. Some will remember the Seafish advertisements of the 1980s featuring Lulu's song 'Shout'. It has offices in on Humberside (initially in Hull, but in Grimsby from 2008) and in Edinburgh, plus a set of regional managers around the country. When I joined Seafish had a 'Flume Tank', containing 750 tonnes of water which circulated past a set of glass windows, designed to enable training of fishers using model trawls, also used in research and development, for example modelling various selectivity devices.

My first two pieces of work were to reflect the subsequent themes of my career. I researched and wrote a profile of the

environmental interactions of Thames Estuary fisheries and reviewed the consequences of microbiological contamination of bivalve shellfish. I had walked in the door at Seafish when it was becoming recognised that environment and fisheries would be important.

For the next 16 years I worked on applied research and development within Seafish's Marine Technology Department based at the Seafish Flume tank in Hull. Projects were centred around understanding fisheries' environmental effects, and development and trials of measures to improve selectivity of gear. For example, using active acoustic deterrents ('pingers') to reduce bycatches of cetaceans. One of the largest of these was the EU ECODREDGE project, in which we researched environmental effects of scallop dredging. We commissioned an instrumentation package which enabled estimates of seabed penetration of the dredge teeth and estimation of some of the forces on the gear. We also carried out selectivity trials and used video observations to build an understanding of how scallop dredges catch scallops. Our partners in Port Erin Marine Laboratory (University of Liverpool) on the Isle of Man and at Cork University studied the effect of dredging on scallop and other species' behaviour and mortality, whilst IFREMER in France investigated the potential for modifying dredge designs to reduce scallop dredge impacts. Our colleagues in Portugal and Italy studied similar aspects for clam dredge fisheries.

Since the mid-2000s, more of my work has been involved in interpretation of fisheries and environmental science for stakeholders, particularly with the increasing demand for understanding of sustainability by the seafood supply chain. An important issue which has emerged in the last 14 years has been the need to develop data-limited stock assessment. This is stock assessment when there are insufficient data to run a full population assessment. ICES has run a series of workshops on this subject, which I have participated in and written a guidance note in this important area.

In recent years I have been involved in advising Fisheries Improvement Projects (FIPs) in UK fisheries. These projects sponsored by stakeholders from across the supply chain, often aimed at certification under the Marine Stewardship Council's ecolabel scheme. Much of this involves bringing together information on fisheries environmental effects and bycatch mitigation, which I am well placed to do having spent the past 35 years in research and development in this field. Since Brexit, Seafish has become involved in facilitating Fisheries Management Plans under the UK Fisheries Act and I have been involved in giving background advice in this area.

It has been a long and varied career, with a wide range of partners, which have included Bangor University. Prospects for marine science in graduates in fisheries have been transformed out of all recognition over this time, both within industry and government, with the understanding that sustainability is a key element for both government and commerce. I think it is fair to say that the training I received all those years ago has stood the test of time, having used the full range of subjects (updated of course) which I studied, and more, over the years. Remember, in many organisations you will be the only marine biologist, so you need to have knowledge across all disciplines.

Pete Harrison (Marine Biology, 1994)

Congratulations to Pete Harrison on his new position with the Environmental Defense Fund (EDF), an environmental organisation that works to protect the climate, natural ecosystems and human health.

Pete joined the EDF in April as Executive Vice President for Regions, a new role in which he will support the US-based organisation's global expansion, overseeing teams in China, Europe, India and the United States.

Based in Brussels, Pete has spent the last decade at the European Climate Foundation (ECF), which is Europe's largest philanthropic funder of initiatives to tackle climate change. Since 2018, he has been the ECF's executive director for EU policy during a period that included preparations for the EU Green Deal, with the goal of making Europe the world's first climate neutral continent. Prior to that, he spent four years as director of the ECF's Transport Program, where he deployed strategies that have contributed to Europe's rapid advances toward phasing out combustion engines and bringing in an era of e-mobility.

Pete also serves as vice chair of the Buildings Performance Institute Europe, which is accelerating the transition to zero-carbon buildings, and on the sustainability board of aviation fuels producer SkyNRG.

Elliott Corke

I gained my university place through clearing, so the first time I saw Bangor was the day my parents dropped me off at Neuadd Reichel in September 1995 after a six-hour drive from Kent.

I can honestly say I've never felt so scared in my life, but I quickly made friends at Reichel and got settled into what was to become five years amongst what I consider some of the most stunning scenery in the world. Alongside my marine biology studies, I joined the fencing and mountain walking clubs as well as the Christian union where I made lifelong friends and also met Lucy who studied German and has now put up with me for 27 years!

Although I really enjoyed my degree work, carrying out my dissertation under the supervision of Dr ***John Latchford****, I wasn't sure what to do after graduating, so I spent a year working at an outdoor centre near Bala and then, having discovered a love for education, came back to Bangor to complete a PGCE specialising in biology. When we left Bangor, I applied for various teaching posts and got a job teaching biology in Norwich, moving from one of the most mountainous areas of the UK to one of the flattest. I taught biology and environmental science in several secondary schools in Norfolk for 10 years before leaving teaching and it was in 2011 that a friend introduced me to drones. I did a bit of research which resulted in me starting my drone company HexCam, using the new technology to obtain quite basic aerial photography and video at that point. Due to my background, I quickly gained clients such as the Broads Authority and the Norfolk Wildlife Trust, who were beginning to use drones to monitor their environmental sites across Norfolk. I also carried out filming work for various documentaries and corporate films.*

However, as I was early in the industry, people started asking me to train them; so I used my teaching background to set up another business that eventually became Global Drone Training whilst passing the reins of HexCam on to two other drone pilots. Global Drone Training has allowed me to pass my love of the many uses of drone technology on to hundreds of people and given me the opportunity to travel widely in the UK, Europe and Africa. We have training bases in Senegal and Tanzania, collaborating with WeRobotics to develop local expertise. One of my highlights so far was to visit The Gambia to train the National Disaster Management Agency (NDMA) in the use of drones for mapping to assess flood risk and increase flood resilience. HexCam has developed a specialism in 2D and 3D mapping and modelling, and most of our operational work is on large infrastructure projects such as monitoring the onshore and nearshore elements of the growing East Anglian offshore renewables sector. In Global Drone Training we have environmentally-focused clients such as CEFAS, Norfolk Rivers Trust, NIAB and various universities and I am always happy to talk about the application of drones in different sectors and how to get the best out of them.

Lucy and I visited North Wales and Bangor last year with our sons and it was great to take a walk to the end of the pier and up to Roman Camp and reminisce about the amount of time I spent on and in the Menai Strait. It was such a formative and wonderful time for me, and I am glad that I can now put my degree knowledge to good use in my chosen career. I'll leave you with two bridges. The first is the Lady Bay Bridge in Nottingham, with the Environment Agency offices on the right, which is one of the first I photographed using a drone. The second is the politically important Senegambia Bridge in The Gambia, photographed during our NDMA training project.

Mike Piggott (Geological Oceanography, 1997)

I last contributed to The Bridge in 2019 and a lot has happened in the world in the intervening years.

Since then I made a further move in my career to Nuclear Waste Services as Director of Sites & Operations, essentially the Director of one of the UKs Nuclear Decommissioning Authority's seventeen Nuclear Licensed Sites, the Low-Level Waste Repository in West Cumbria. In the meantime, during the lockdown in March 2020, I was working with Sellafield as the Programme & Project Partners (PPP) Transformation Director. PPP is a 20-year relationship between Sellafield and 4 organisations, to deliver the site's infrastructure to enable the site's 100-year decommissioning programme, it will deliver 25 major projects ~£7bn. My role was to facilitate establishing the partnership and act as the conscience of the client to embed and realise the business case benefits of enhancing delivery capability, from demonstrating value for money, to improving reputation, and contributing positively to social impact in Cumbria and beyond. What I didn't expect was an approach to take on my current role, and although I wasn't planning a move so soon, it felt like the opportunity to bring together all aspects of my career from geology to project management, cultural development, collaboration, and pursuit of a greater cause.

Nuclear Waste Services brings together the UK's leading nuclear waste management capabilities, providing an integrated way of tackling waste of the past, while offering more sustainable and efficient services to waste producers, now and in the future. My role is to manage our operating sites, like the repository, and my day-to-day focus is on the safe, secure and environmentally compliant operation of the nuclear licensed site, and responsible stewardship for future generations.

Disposal is a highly responsible aspect of our industry, enabling nuclear decommissioning, and continued educational, medical and research industries, much like we saw at the Edinburgh Fringe Festival this year where the people who empty the bins were on strike - if waste isn't well managed, the impact is quickly felt by waste consignors with waste backing up and detrimentally impacting their missions. The good news is a key aspect of our innovation is applying a strict waste hierarchy, in 2009 some 95% of waste volume coming from the industries we support was disposed of, today that number is 2%!

My facility must operate successfully on its mission protecting people and the environment until 2130, this means our understanding of the waste, how it is treated, how the facility performs, the development of future disposal capacity and how we construct the final cap over the waste, is a tremendously exciting challenge working with highly capable operators, scientists, and engineers, to deliver a key capability to the UK. Although the lectures with Dei Huws and Sinclair Buchan don't feel that long ago, this feels like a high point on a 25-year career and the future looks exciting. Of course, I should mention how sad I was to hear Sinclair passed away recently, someone for whom I hold fond memories - he leaves a tremendous legacy.
https://www.gov.uk/government/people/mike-pigott
https://www.linkedin.com/in/pigottmike

Scott Gudrich (Marine Environmental Protection MSc, 2018)

After our successful project "Talking the Coast 2021", our focus this year shifted towards the inclusion of art into the climate change discourse and coastal conservation.

*We launched our **"Mindfully re-wilding ourselves" Poetry Workshops** at this year's Portishead Salt Marshes Day, an event we helped set up for the first time last year and which has already succeeded to put the salt marsh onto the local political agenda, and we had some great feedback from participants which encouraged us to pursue this format further in the future. I am also including it within my work as a project manager for a community climate change literacy project.*

During these workshops, we head out into nature and as we walk, I talk about the ecosystem we are visiting, its inhabitants and functions, its hidden secrets and overt wonders. Then we find a place to settle down and I take the group through some guided contemplation and present an easy to follow outline to get everyone writing poetry based on their sensory and emotional experiences. Through this emotional engagement, people get the chance to perceive nature on a deeper level and strengthen their emotional connection with their surroundings. Some more information and participant feedback is here: https://www.plover-rovers.com/poetry-walks

Apart from this work, I have been very busy with my band and we have recently released new music which - among other things - touches on many aspects of marine life and coastal conservation: For example, we have two songs about the migration of the European eel and a song about nightjars, which frequently breed in coastal dune systems. Two of the songs were written during my time studying at the School of Ocean Sciences and heavily feature the nature on the Isle of Anglesey. Here are links to the songs in case you are interested.

Smash the Dam (eel migration): https://www.the-lurxx.com/smash-the-dam

Part of it All (eel migration / Menai Strait / cormorants): https://www.the-lurxx.com/part-of-it-all

Slow (marine nature Isle of Anglesey): https://www.the-lurxx.com/slow-children-slow

Nightjar: https://www.the-lurxx.com/nightjar

Here are some pictures from the Portishead Salt Marshes Day and a picture of my band, the Lürxx.
Our band website is www.the-lurxx.com"

Kevin Black SOS Post-doc 1990-1994

It was with some irony that I started at Menai Bridge in 1990 as I had originally gone to Bangor for a UCCA open day with a view to doing my degree there.

I remember it rained down all day during my visit, whereas during my visit to Swansea University it was glorious sunshine! I rest my case – Swansea it was. I did a degree in Oceanography; it's funny because many people think I did my PhD in Bangor but in fact that was at Swansea too, and it was only after that that I got a post-doc contract with Colin Jago to study geophysical controls on mud erosion in a laboratory flume. The flume we designed and built during that time is still there and still used for teaching and research! I had a great time in Menai Bridge – what a stunning place – did all sorts of interesting things and made some good friends. Following post-doc stints in St Andrews University (estuarine processes) and Scottish Association for Marine Science (deep ocean biogeophysical processes), and a trip to the Arctic with the Ocean Drilling Programme (climate change research), I eventually surfaced to find a desert in terms of academic jobs and opportunities.

It was then I nervously moved into industry. Within a year (2003) I found myself with 2 relatively new colleagues founding Partrac Ltd, originally a specialist marine contractor with a niche operation in measurement of the physical marine environment (waves, currents, sediments and sediment transport, bathymetry and some geophysics). Partrac has now grown from such humble beginnings to be one of the leading global metocean survey and consulting firms, 30 strong with a capable, motivated and enthusiastic team behind operations. It's not been all plain sailing, to be sure, and anyone who has started a company never really feels removed from the profound, pervasive pressure of providing first your own, and then the salary of others, every week, month and year! But we've done it, and in the processes completed many cool and challenging projects which include measuring sediment movements on Hawaii'an coral reefs, 3 summer's of work in the Florida Everglades with alligators all around, pioneering offshore wind profile measurements in Europe and developing morphodynamic modelling tools to support asset integrity assessment for offshore wind developers. We now also have a consulting division, which complements and works with the survey side of the business, but also operates as a standalone body available for a range coastal projects.

Partrac was recently acquired by Venterra Group, an appropriate complement for all the hard work not only by the 3 Directors but by all those who have contributed to our success. For me, I look back now and whether academia or industry it's all been about 'people and places'; I have met, and worked with and for, many wonderful and inspiring people; at the same time I have had the distinct privilege of travelling the world, seeing life from a different perspective. When I was 18 I got a D in A-level chemistry which stopped me from going into medicine; thankfully – it's been quite an adventure in oceanography (and one that continues)!

Kevin Black
Director

PARTRAC

Vital Data | Valuable Decisions

The Mexican invasion of Ocean Sciences

*It all started in the late 1970s with the first arrival of **Steven Czitrom** in graduated with a PhD in Physical Oceanography in 1982.*

*He was followed by the arrival of **Maria Luisa Argote** and **Miguel Lavin** who graduated with PhDs in Physical Oceanography in 1983 and 1984 respectively.*

*Around the same time, **Des Barton** was working in CICESE (the Center for Scientific Research and Higher Education at Ensenada), Mexico, in 1975-1979 before moving to Menai Bridge as a "young blood" lecturer in 1983. He started planning a project to study the wind-driven circulation in the Gulf of Tehuantepec, together with Oregon State University and CICESE. This collaboration started with his visit to CICESE in 1986, with a further visit by **John Simpson** in 1988.*

I (Alex Souza) met Des and John during their visits, and they made the School of Ocean Sciences look like such an avantgarde institution and Menai Bridge such a brilliant place to live that they convince me to go there although I already had acceptance letters to other universities in the USA. I suspect that we all thought that it was a great opportunity.

*These visits enticed not only me, but several of us to pursue our MScs and PhDs in Menai Bridge. As part of this group, the first wave consisted of **Armando Trasviña**, **Victor Camacho-Ibar**, **Héctor Vélez** and **Adán Mejía**, followed by **Rubén Morales** and **Alex Souza**, with the final arrival of **Reginaldo Durazo**. In 1989, Armando and Héctor were working on their PhD on the Tehuantepec Project with **Des Barton**, meanwhile, Victor was working on pollutants on Liverpool Bay sediments with **Jim McEvoy**, and Adán was working on his PhD modelling the Arabia Sea with **Alan Elliot**.*

*In 1989 Alex and Rubén started their MSc studies leading to projects on internal wave mixing in the Gulf of California (with Simpson) and water masses in the Indian Ocean (with Barton), respectively. In 1990, Reginaldo started his PhD working on the Irish Sea Gyre with **Ed Hill CBE**. Subsequently, Ruben and Alex stayed at SOS undertake PhDs on the Ocean Surface Mixed layer (with Barton) and Stratification in the Rhine ROFI (Simpson).*

*The last two students of this wave were **Fernando Perez Castillo** (with **Paul Tett**) and **Miguel Angel Rio Portilla** (**Andy Beaumont**) undertaking more biological PhDs. On completion of their PhDs all the Mexicans, with exception of Alex, returned to Mexico, to take up a range of different jobs at government institutions and universities.*

*Presently, **Armando** is a Senior Researcher at CICESE at La Paz, BCS; **Héctor** is a Lecturer at the Metropolitan Autonomous University (UAM-Iztapalapa) in Mexico City; **Victor** and **Adán** are at the Instituto de Investigaciones Oceanológicas (IIO-UABC) at Ensenada, BC; **Reginaldo** at Facultad de Ciencias Marinas (FCM-UABC) at Ensenada, BC; and **Rubén** at Instituto Mexicano de Tecnologia del Agua (IMTA) in Jiutepec, Morelos.*

***Alex Souza** finished his PhD in 1994 staying as a postdoc in SOS until December 1997 moving on to the Department of Earth and Planetary Sciences at Harvard University, subsequently returning to the UK to the then Proudman Oceanographic Laboratory, now the National Oceanography Centre where he remained until 2017. He then returned to Mexico and is Acting Head of the Department of Marine Resources at the Centro de Investigacion y Estudios Avanzados (CINVESTAV).*
Following the initial wave many more Mexicans have come to study in Menai Bridge.

By Alex Souza and Rubèn Morales

Rubén and Héctor doing deployment and CTD casts in Acapulco Bay (2008)

Héctor after an ADCP deployment in the Manzanillo Port (2009)

Adán Mejia in Ixtapa-Zihuatanejo, México doing some ADCP measurements (2006)

Hector and Rubén in Ixtapa-Zihuatanejo, Mexico recovering and ADCP (2006)

Alex Souza and Reginal Durazo Working hard

A few Years back

Armando Trasviña in a student viva

Luis G. Alvarez (PhD Physical Oceanography, 2003)

*As a researcher at CICESE in Ensenada since 1979, I met **Toby Sherwin** (from Unit of Coastal and Estuarine Studies, now CAMS) during his visit in 1989.*

*He was invited by SOS alumni **Miguel Lavín** to teach a short course on pollutant transport in coastal waters. A couple of years later I spent a sabbatical year at UCES, at Toby's invitation. It was here, under the supervision of **Alan Elliott**, that I got my first training in numerical modelling of the circulation in tidal waters. I met **Des Barton** again, who had been a researcher at CICESE a few years before, and John Simpson who had also visited CICESE.*

*At the time of my sabbatical, the first wave of Mexicans were already finishing their PhDs. By the end of my stay in Menai Bridge I had the opportunity to enroll as an external PhD student alongside my research position at CICESE. Sediment dynamics in the Gulf of California looked to be an interesting topic, since the Upper Gulf and the seas around UK had similarly strong tidal currents and resuspension of fine estuarine sediments. **Sarah Jones** and **Colin Jago** would be my supervisors. CICESE and Mexico's Research Council (CONACYT), funded a research project in the Upper Gulf of California in 1996. The observations took place in summer of 1997 onboard CICESE's research vessel.*

Sarah Jones taking suspended sediment samples from the settling tubes.

***Sarah Jones** and two Bangor undergraduate students (**Dave Probert** and **Neil Fisher**) participated in the 3 week cruise. Bangor transmissometers, settling tubes, particle analyser and filtering equipment were shipped to México (not an easy task!) to be deployed together with CICESE's current meters, pressure sensors, CTDs and optical backscatters. It was an exciting experience for everybody onboard the crowded small vessel, under summer temperatures around 38 ºC, but pleasant water temperatures of around 30 ºC. The intense work at sea was interrupted once in a while by inspections by navy boats looking for illegal fishermen and smugglers in these waters, which are part of an ecological reserve area.*

Dave and Neil wrote their BSc projects and I defended my PhD dissertation in 2003. Ocean Sciences provided good friends and an inspiring academic and natural environment which are unforgettable for me and my family (my children were students at Ysgol David Hughes). Back at CICESE, I continued data analysis of data gathered on our cruise. Additional BSc and a MS dissertations were also completed by CICESE students. My work remained focused on the Upper Gulf, including tidal flat sedimentation, gravity currents, seabed morphology, inverse estuarine processes and oceanographic assessment for artificial reef projects until my retirement from CICESE in 2017.

Sarah and Dave Probert collecting water samples from the CTD frame.

Dave Probert deploying a settling tube.

Professor Stuart A. Cunningham (M.Sc. Physical Oceanography, 1990)

Reading the Alumni news in The Bridge the affection we all have for SOS and the life it made possible for us is very clear.

I came to Menai Bridge in 1989 to work on my M.Sc. thesis (Hydrography of the Clyde Sea and the Clyde Sea Front), supervised by ***Dave Bowers*** *and held to account by* ***Des Barton****. I had my first ever research cruise on the R/V Madog sailing from Menai Bridge to the Clyde Sea for a week of oceanography. Principle Scientist* ***Tom Rippeth*** *our illustrious editor was one of those tutoring me, keeping me safe and probably trying to keep my enthusiasm to realistic levels. They set me ashore in Loch Striven and I hiked over the hills to the main road and caught a bus to Glasgow! I thought then and still do that being a seagoing oceanographer is the most exciting and adventurous thing I could do with my life.*

This set me up for my first professional job as a Research Assistant working at the Institute of Oceanographic Sciences Deacon Laboratory which I started on 5th November 1990. This was at the start of the World Ocean Circulation Experiment – a defining step change for the subject of physical oceanography. Thinking back, it was an incredible opportunity to sail the world's oceans contributing to a global experiment. I completed a Ph.D. part time with the University of Liverpool during that time, working my way up the ranks as a NERC scientist. In 2012 I moved back to Scotland to work at the Scottish Association for Marine Science. I have now participated on 35 deep-sea research cruises (leading about half of those) on 14 different research ships from all over the world. I have worked in the Antarctic and crossed the Southern, Indian, Pacific, South and North Atlantic oceans. Strangely, one of my most enjoyable cruises was in 2020 when I led RRS Discovery Cruise DY120 in the midst of COVID restrictions. Lots of hassle to plan but once we got safely to sea it was a real touch of the normal.

For the past two decades the science I have pursued is measuring and understanding the Atlantic Meridional Overturning Circulation. The AMOC is a central component of Earth's climate and moves heat and property fluxes around the globe. One of the major predictions of climate change in the 21st Century is a slowing of this circulation and this will have profound impacts on how Earth's climate changes. I was one of three PIs who proposed RAPID mooring array programme (https://rapid.ac.uk/) and I managed the array from 2003-2012. Now I am PI as part of the international OSNAP programme (https://www.o-snap.org/) measuring the AMOC from Newfoundland to Greenland to Scotland. The goal of these arrays is to provide the fundamental observations of the changing AMOC so we can better understand the physics of the circulation and to constrain models of climate (Figure 1).

I am inspired to work on large multi-national programmes and no life could be more fun or let me meet and collaborate with so many brilliant people – and it all started in Menai Bridge.

Professor Stuart A. Cunningham
Scottish Association for Marine Science & The University of the Highlands and Islands
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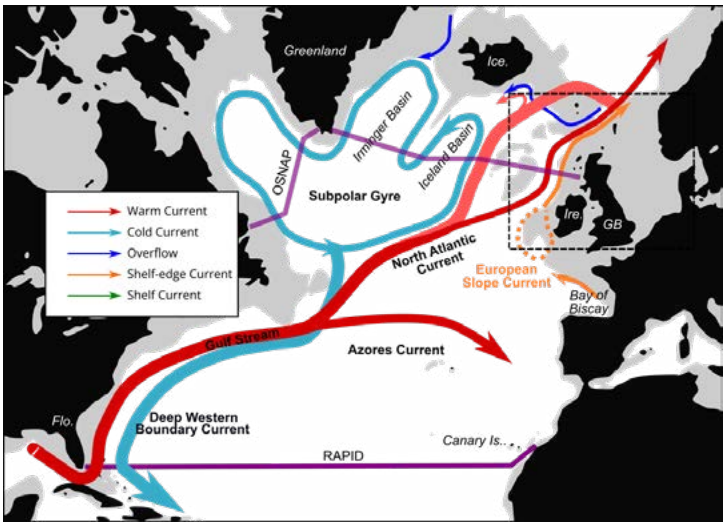


The large-scale circulation in the North Atlantic. A system of warm, northward flowing currents and cold southward flowing currents is known as the Atlantic Meridional Overturning Circulation or Gulf Stream System. The location of Stuart's RAPID and OSNAP arrays of moored instruments for observing the AMOC are shown in purple.

RESEARCH AND IMPACT HIGHLIGHTS

World's Lakes Experience Excess Warming

More than half the world's 117 million lakes experience ice cover for part of the year. But with the rise in global temperatures, the timing of seasonal ice formation and loss are changing at rapid rates.

More than half the world's 117 million lakes experience ice cover for part of the year. But with the rise in global temperatures, the timing of seasonal ice formation and loss are changing at rapid rates. Since 1979, the average timing of lake ice break-up across the Northern Hemisphere has advanced by 8 days. This 8-day advancement has resulted in excess lake warming with numerous implications for lake ecosystems.

A new paper published in Nature Communications by Dr **Iestyn Woolway** of Bangor University and colleagues at Peking University has concentrated on Northern Hemisphere lakes, using satellite images to study nearly a thousand lakes and modelling over 100,000 to calculate the effects of the increased ice-free days on the water temperature.

They also suggest how changing temperature profiles within lakes might affect the processes within the lakes as well as the plants and animals living within the lake environments.

"*Projecting future lake warming due to changes in ice cover is important for understanding how these changes could affect ecological processes within lakes, and how that will affect all the ways we, and other animals and plants use lakes in the future,*" explained Dr **Iestyn Woolway** of the University's School of Ocean Sciences.

"*Higher lake surface-temperatures due to shorter periods of ice cover can impact processes within the lakes, leading to effects such as increasing or earlier plankton blooms, and increase in cyanobacteria and an increase in layering of different water temperatures. Water stratification could lead to lake deoxygenation [low oxygen concentrations] at depth, and loss of habitat for oxygen-sensitive fish*," he added.

Iestyn and his fellow researchers estimate that lakes will be ice-free around a month earlier (15-45 days in the northern hemisphere), which may lead to an increase of between two and six degrees additional surface temperature (during the ice-off month, the time of year in which dormant species begin to thrive once again) this century. They have also estimated that the 8-day advancement in ice break-up has resulted in an excess warming of 1.1 ± 0.9 °C during the month of ice-off.

Smart Technology Aids Research Into A Nationally Important Seabird Colony

UK scientists are rolling out an array of technology to understand if a charismatic seabird species will thrive or suffer under future climate change and extreme weather events.

The research, led by scientists from Bangor University, focuses on a national important colony of European shag (*Gulosus aristotelis*) on Puffin Island, near Anglesey. Numbers of European shags have been declining in recent years, putting them onto the red list of birds under the highest threat of extinction in the UK.

GPS trackers, accelerometers, miniature bird-borne cameras and time-lapse photography are some of the technologies being used by the team, which includes researchers from Lancaster University and the Universities of Liverpool and Cumbria.
The footage from the miniaturised cameras captures the birds diving for fish, providing data to help researchers understand how weather conditions may affect the foraging behaviour and success of a diving seabird species. The research is the first time this technology has been used on seabirds on Puffin Island.

The accelerometers – a kind of speedometer – record how fast the bird is moving and how it twists and turns in the sea in pursuit of prey.

Ocean Sciences PhD student **Claire Carrington**, presented the research at the International Seabird Group Conference in Cork. Commenting she said: "W*e piloted the technologies on European shags on Puffin Island this year and they worked really well, so we're aiming to fit them to more birds next year. We've chosen to work with the European shags, as they are particularly vulnerable to the impacts of extreme weather and remain in coastal areas year-round. The data we're collecting will give us insights for both shags and similar diving birds such as the Great cormorant.*"

They hope that the data will help them to understand how the European shag and Great cormorant, will respond to different weather conditions and predict whether they will be resilient enough to cope with the more extreme weather brought on by climate change.

Time-lapse cameras which take photos every 30 minutes are also installed all year round at key roosting sites around the North Wales coast, where the shags and cormorants dry their feathers off after fishing. Neither bird has totally waterproof plumage. This helps them to dive, by reducing their buoyancy, but means that they have to dry their wings after diving. The researchers are collaborating with computer scientists from Bangor University to develop bespoke software to automate the counting of seabirds, in thousands of images.

Lead researcher Dr **James Waggitt** said: "*Cormorants and shags are very recognisable, and many people will have seen them around the coast, drying their wings out on the rocks. But although they are a common sight, their populations are still at risk in the UK, which is why it's so important to better understand the threats they face and how they are responding.*"

During the breeding season, other time-lapse cameras, taking pictures every ten minutes, have also been installed at nests on Puffin Island to see how regularly the birds are returning to feed their chicks.

Protecting and Regenerating Tropical Mangroves

Dr **Martin Skov** is involved in carbon offsetting work in Kenya.

Mangroves from the air
photo credit: Vanga Blue Forests Project, GRID-Arendal.

This work builds on a long-term partnership between Dr James Kairo of the Kenyan Marine and Fisheries Research Institute (KMFRI), Prof Mark Huxham of Edinburgh Napier University, Dr Martin Skov of Bangor University, and other colleagues. The partnership set up the world's first carbon-trading projects arising from the protection of a marine system. The Mikoko Pamoja (meaning Mangroves Together in Swahili) community project in southern Kenya was accredited in 2013 and has won multiple awards. A second project, Vanga Blue Forests, has since been created and more are under way. The team set up the ACES charity to manage the trading of carbon credits arising from the protection of mangroves and to promote conservation projects with coastal ecosystems in Africa. For more information, see the ACES website.

Mangroves occur worldwide in the tropics, especially within 5 degrees as the equator, known as blue carbon ecosystems, they are home to saltwater marshes, seagrass prairies, and marine forests. Mangroves are vital to climate change. They cover only 0.1% of the earth's surface but capture and store almost 5 times more carbon than rain forests. When trees on land due they release carbon into the atmosphere, with mangroves however, carbon is trapped in the roots and mud where it can stay, under water for thousands of years.

Mangroves were once seen as inhospitable malarial swamps and were among the fastest disappearing habitats in the world. Now thanks to investment and projects such as Mikoko Pamoja organisations are paying for the Planting and conservation of mangroves, in order to offset their carbon. This doesn't only help the mangroves; it helps local communities thrive and is an example of the world-changing work done at Bangor University.

'Water Point' This photo exemplifies a community benefit from the Mikoko Pamoja project: public water points installed in the village. Women and children used to have to walk a long distance for water, and then the original well system collapsed. There was no water at the School in Gazi. The project has helped with that as well.
photo credit: Vanga Blue Forests Project, GRID-Arendal.

Understanding How Extreme River Flows and Sea Levels Could Provide Early Flood Warning

New analysis of exactly how long extreme rainfall takes to drain from catchment to coast could lead to better identification of the coastal areas most likely to flood and provide timely flood-warnings in the future.

A new research paper in Estuaries and Coasts published by Post Doc Researcher **Charlotte Lyddon**, her supervisor **Pete Robins**, and others, provides the first step in improving coastal flood risk by analysing in detail, how long different UK rivers take to discharge to the coast following heavy storm rainfall. This is combined with an analysis of differing estuary types, to see which estuaries are most likely to impede the floodwaters from entering the sea, due to their shape and size. Finally, the paper considers the likelihood of the river flood-waters coinciding with a storm surge (a storm often produces both heavy rain and strong winds that drive the surge) or high tide at the coast.

Matching flood flow speeds and timings in different rivers with an understanding of which estuaries are most likely to experience storm surges, or when they might coincide with spring tides, could inform future flood protection measures. Such analysis could be valuable as the UK anticipates future extreme rainfall to intensify in the coming decades.

Previously, flooding has been investigated using daily-mean river flows, but this new work has shown that the many short and steep river catchments on Britain's west coast drain rapidly, within a matter of hours, meaning that the daily-means mask out the extreme river behaviour that drives the flooding. This information will help climate modellers to produce future river flow projections at the appropriate temporal scales to predict changes in flood risk.

Peter Robins, Senior Lecturer in physical oceanography explains,

"*Most heavy storms and winds track-in from the Atlantic and hit the west and northwest coasts of Britain. In addition, the west coast catchments are mostly small and mountainous. This means that they fill up and drain out to the sea remarkably quickly, perhaps within a few hours. These catchments therefore tend to experience several potential 'compound flooding' events each year, with the chance of flooding actually happening being sensitive to the subtle timings of the combined river and sea level behaviour.*

Over in the east, the catchments are often large and flat and take several days to drain. Here, flooding tends to be driven by either prolonged periods of heavy rain, or from easterly storm surges, but rarely both combined. These extreme events are less common and more predictable than in the west."

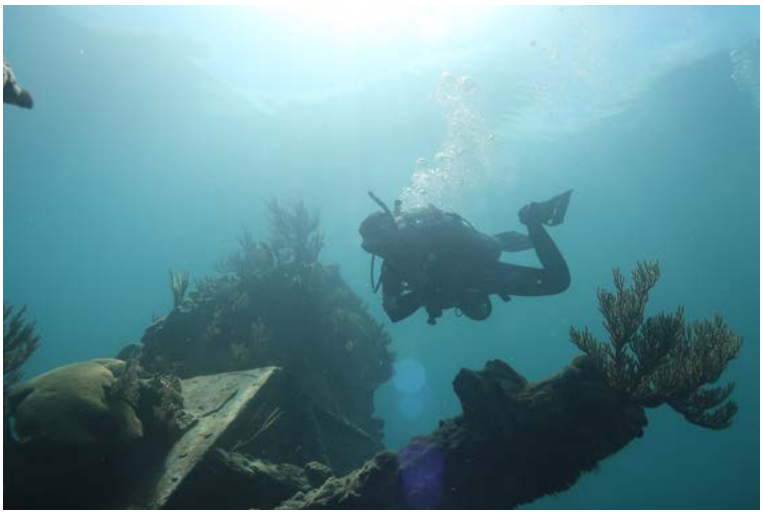
A classic local example is the Conwy Valley, where this autumn the BSc Physical Geography and Oceanography students got to see river flooding, and flood mediation efforts in full force on a visit to Llanrwst during their Geohazards Flooding field trip

Attending the Coral Reef Ecology course at BIOS – by Thea Moule (MScRes Marine Biology student)

Before entering academia, I worked across the world in the SCUBA diving industry, from Australia to Mexico.

During this time, I experienced first-hand anthropogenic and climate impacts on tropical coral reefs, igniting my passion for a research career focused on coral reef ecology. I later enrolled on a BSc in Marine Biology and an MScRes in Ocean Sciences at Bangor University, completing an undergraduate dissertation and postgraduate thesis centred around tropical coral reefs. Since my research was desk-based and my academic studies took place in a temperate region, I was eager to obtain relevant field and laboratory experience on tropical coral reef systems. Therefore, I was immensely grateful to my sponsor through the U.K. Associates of BIOS for the full scholarship, supporting my attendance on the Coral Reef Ecology Course (CRE) at the Bermuda Institute of Ocean Sciences (BIOS). Here, the Director of University Programs & Associate Scientist at BIOS, Dr **Andrew Peters**, was a former undergraduate student from Bangor University.

The CRE course, held from August 8th to 26th, was co-led by distinguished researchers at BIOS, Dr Eric Hochberg and Dr Yvonne Sawall, and taught around twenty international students, ranging from undergraduate to doctorate level. The evening before the course started, an icebreaker session held at the onsite bar, 'The Wind', provided a relaxed setting to meet faculty staff and the other students while enjoying a few drinks. Throughout the course, our schedule was filled with lectures, underwater visual census surveys, experiments in the field and lab, and delicious food freshly made by the onsite chefs. The practicals included a gas flux experiment in the flume, gradient flux equipment in the field, and various underwater survey techniques (e.g., imaging for photomosaics, quadrats, and point-intercept transects) to record benthos composition. During data collection, we were organised into groups and allocated specific tasks, including shifts on the flume, and alternating between the underwater survey techniques. Although all the practical elements were interesting, my favourite was photogrammetry. This approach involved repeatedly swimming up and down, both the length and width of a marked area, with an underwater camera, collecting hundreds of images of the benthos. The images were uploaded onto a system in the dry lab, creating a point cloud, a dense cloud, and photomosaic. It was a very satisfying process that produced beautiful images of the coral reef. During the last week, we collaborated in groups to conduct data analysis based on a research topic of interest from the data collected. We presented our research findings to the class on the final day of the course. For example, in the group I was a part of, our presentation was titled 'Benthic community assemblages of functional reef groups'. Overall, the course was an incredible opportunity to advance my knowledge in reef-functional ecology, obtain fundamental skills in data collection of reef community processes, and network to establish industry connections for future opportunities.



Outside the CRE course, I took the opportunity to explore Bermuda, which was readily accessible by bus. Activities included recreational SCUBA trips with the local dive shops, snorkelling at the pristine white beaches, swimming in caves, and enjoying the architecture in Hamilton. I also attended the infamous Harbour Nights held in Hamilton, a fabulous evening full of music, local dance performances, and an array of market stalls and food trucks. During evening visits to Whalebone Bay, a short walk from BIOS, I was fortunate to encounter two eagle rays swimming near the shoreline and witnessed the phenomenon of the marine glow worms, who make an appearance two nights a year. These were all incredible experiences alongside the course.

Each year, BIOS offers a variety of ocean science courses aimed at undergraduate and postgraduate students, including Ecology of Reef Fish, Marine Pollution and Ecotoxicology, Modern Observational Oceanography, and Research Diving Methods, to name a few. Typically, the summer courses are advertised on the BIOS website at the beginning of the year. During the application process, students from the U.K. are eligible to apply for a scholarship through the U.K. Associates of BIOS to support their attendance. Overall, I highly recommend SOS students consider applying for such an incredible opportunity to advance professionally.

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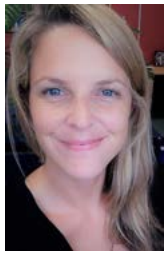
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