

Challenger Wave



Monthly newsletter of the Challenger Society for Marine Science (CSMS)

NEWS

Challenger undergraduate student award

Nominations are now open for the Marine Science Student Award. The Society offers an annual award for undergraduate students who have demonstrated excellence in Marine Science research through final year undergraduate dissertations or projects. University departments in the UK are invited to submit suitable dissertations from final year undergraduate students, and this year's deadline is July 31st 2024.

Students can only be entered by the Convenor of the final year dissertation module from universities located within the U.K. Only one submission will be accepted from each department and it should be of outstanding quality. Prizes are awarded after consideration by a panel drawn from the Challenger Society's Council.

For full criteria and details, see https://www.challenger-society.org.uk/Student_award. The winning student will receive a cheque for £500. In exceptional circumstances, the Award may be shared. All winning students will receive one year's complimentary membership of the Society. Documents should be submitted to kathen@bas.ac.uk using "Challenger Society Student Award" in the email subject line.

PML's Professor Angus Atkinson awarded MBE in the King's Birthday Honours

Plymouth Marine Laboratory (PML) is delighted by the announcement that Marine Ecologist Professor Angus Atkinson has been made a Member of the Order of the British Empire (MBE) in the King's Birthday Honours, which mark "the extraordinary contributions and service of people across the UK". Professor Atkinson has been recognised for his services to Polar Marine

Research and Conservation, at the same time his father Anthony Atkinson was also awarded an MBE for his services to Wildlife and Ecology.

Angus is a well-respected merit scientist, interested in all aspects of marine ecology and biogeochemistry, but with main focal areas on plankton and krill species, and particularly in polar regions and in the north Atlantic. He has had a long-standing interest in the generation of long time series which show clues into how real-world zooplankton assemblages



have already responded, over multiple decadal timescales, to rapid climate change. One of his latest publications discovered a hidden amplifying mechanism within the ocean's food web, with climate change silently eroding the ocean's ability to provide fish, with even small declines in plankton leading to much bigger drops in fish stocks.

The MBE is further recognition of Angus's outstanding contributions to marine science. Earlier this year, Angus was awarded an Honorary Professorship from the University of Plymouth. An Honorary Professorship is conferred on a person who has academic standing equivalent to that of a Professor, and who maintains regular, significant and impactful involvement in the University. Angus commented on the news: "It is a real honour to receive this award. It is also an amazing coincidence, with my Dad also getting the MBE award letter on the same day, but for a totally different topic, terrestrial ecology and conservation."

Angus developed an interest in marine biology from an early age, going out on his father's trawler from Plymouth. They were catching over 100 tons of mackerel in a single night and selling

them for fishmeal, in a fishery that was very badly managed. The fishery soon collapsed, and Tony had to get out of fishing, and this avoidable catastrophe cemented an ambition in Angus to be a marine biologist. Angus's MBE was awarded for research and provision of a database to help towards sustainable management of the fishery for Antarctic krill. Meanwhile Tony, originally a farmer, was equally aware of how destructive farming and fishing can be to the environment. In a true "poacher-turned gamekeeper" role, he devoted his massive amounts of energy to natural history, conservation and terrestrial recording. While Tony's interest and knowledge is exceptionally broad, he has maintained a lifelong interest in the ecology and conservation of bats.

This wonderful news comes in the same week as PML's Dr Shubha Sathyendranath received an MBE at a ceremony in Buckingham Palace in recognition of her services to oceanography. The award serves as testament for her outstanding contribution to marine science.



Pioneering Ocean Carbon Removal technique proves successful in pilot study

Scientists from Plymouth Marine Laboratory (PML) and its commercial subsidiary PML Applications, have confirmed the viability, and potential scalability, of a novel "ocean" or "marine" carbon dioxide removal (oCDR or mCDR) technique designed to remove carbon dioxide from the atmosphere by enhancing the alkalinity of treated wastewater before it is discharged out at sea. In a [first-of-its-kind study](#), the PML team was commissioned to provide independent and impartial monitoring and analysis of a field trial carried out off St Ives Bay (Cornwall, UK) in September 2022 by Canada-based carbon removal specialists Planetary Technologies.

The trial, which followed a series of lab-based tests and modelling, involved adding a diluted form of the alkaline mineral magnesium hydroxide to the wastewater flow at the nearby wastewater treatment plant in St Erth. The treated water was then released four miles offshore through the existing outflow. Planetary Technologies was seeking to investigate whether

this form of ocean alkalinity enhancement (OAE) (which is likened to adding an "antacid" to seawater) is a safe and effective way of de-acidifying seawater, which will then draw down atmospheric carbon dioxide (CO₂). Seawater naturally absorbs CO₂ so the process, which changes the pH of the water, is designed to enhance its carbon removal capacity.

The analysis provided by PML and PML Applications, and now published in the peer-reviewed journal 'Communications Earth & Environment' ("[Magnesium hydroxide addition reduces aqueous carbon dioxide in wastewater discharged to the ocean](#)"), confirms that:

- Adding magnesium hydroxide to the wastewater increased its alkalinity (the pH increased from 7.4 to 7.8) and reduced dissolved CO₂ levels by up to 74%
- The alkalinity and pH returned to normal levels quickly after stopping the addition, showing it can be easily reversed if needed.
- Near the offshore discharge site, lower CO₂ and higher pH levels were detected up to a few meters away, confirming the alkalization worked but was limited by the small scale of the trial.

Dr Vassilis Kitidis, Senior Scientist at PML and the paper's lead author, said: "this pilot study successfully demonstrated the potential for using alkaline materials like magnesium hydroxide to enhance the ocean's natural ability to absorb

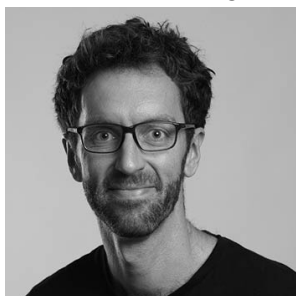


excess carbon dioxide from the atmosphere. We took a phased and gated approach to the project, examining all of the evidence to make sure the trial could be carried out safely at each stage. I'm excited by the results and how this science might now be taken forward sustainably, and alongside much-needed cuts in greenhouse gas emissions, for the benefit of society and the environment".

During the trial in 2022, concerns were raised by the local community about potential environmental impacts. Dr Kitidis highlights that environmental considerations must remain front of mind during the planning and deployment of any ocean-based carbon dioxide removal technology or process: "while this study

demonstrates the CDR potential of alkalinity enhancement using magnesium hydroxide, it is imperative to consider potential ecosystem impacts, especially in terms of the scaling up of any such process. During the pilot, the alkalinity was only added for a few hours per day and we were very confident there would be no adverse environmental effects, based on our investigations. Magnesium hydroxide is a well understood mineral which is used in many household products and the levels at which it was being used in the trial were nowhere near anything that might have had a negative effect on marine life. We carried out monitoring throughout the trial and confirmed that Planetary Technologies adhered to all of its environmental permits".

Will Burt from Planetary Technologies, which is currently carrying out trials in other geographic locations including Halifax, Canada, said: "this is



hugely significant, a major milestone for ourselves but also for the growing carbon removal industry. The process has previously been studied in the lab but it has never been demonstrated in the field

before. It was vital to us that the project underwent rigorous scientific scrutiny and we're very pleased that the published study, which is the culmination of two and a half years' work, confirms the success of the trial. It's a proof of concept and a really important step in terms of showing that OAE can be delivered using the existing wastewater treatment process".

Ocean carbon removal expert [Sam Fawcett from PML Applications' Centre for Coastal Technologies](#), which carried out the monitoring of the St Ives trial, said: "there is huge potential for the increased use of the ocean and marine environment for carbon dioxide removal but this has to be done responsibly. From initial modelling to chemistry analysis and environmental impact assessment we use our expertise to ensure that projects such as this are underpinned by high quality science. This is essential in order to accurately confirm effectiveness, understand any potential knock-on



consequences, optimise techniques and ultimately to build trust".

In terms of tackling global warming and mitigating climate change, emission reductions remain paramount, but ocean alkalinity enhancement and other carbon removal solutions are widely accepted as having a key part to play. Carbon dioxide removal is, for example, explicitly included in the UNFCCC Paris Agreement. In 2023, PML, alongside a group of international ocean policy and conservation experts from North America and Europe released recommendations for ocean carbon dioxide removal (oCDR) research and there is ongoing discussion globally around regulation for the practice and the requirements for monitoring, reporting and verification (MRV).

UK ocean institutes to answer climate change questions

SAMS (Scottish Association for Marine Science) has joined other leading UK marine science centres on a collaborative research programme to explore the ocean's role in mitigating climate change. The Atlantic Climate and Environment Strategic Science (AtlantiS) programme, funded by UKRI, Natural Environment Research Council, supports the UK's ambition for healthy, biologically diverse, and resilient marine environments, a sustainable blue economy and keeping communities safe from natural hazards. The project will be led by the National Oceanography Centre (NOC) and involve SAMS, Plymouth Marine Laboratory (PML) and the Marine Biological Association (MBA). It will deliver sustained ocean observations to support national and international research and policy, delivering long-term data and understanding to inform decisions and responses to on key climate change effects such as marine heatwaves, sea level rise and increasing storminess.

The ocean has already substantially mitigated climate change in the atmosphere and on land by absorbing 90% of excess heat as well as more than a quarter of carbon resulting from human-caused greenhouse gas emissions. However, excess heat and carbon in the ocean has consequences for biological diversity, the magnitude and frequency of hazards along the coast, and for UK climate and weather. AtlantiS is delivering tools and observational evidence to respond to these consequences, which is needed to inform global policy. NOC will be

presenting AtlantiS at the [Royal Society's Summer Science Exhibition](#), an annual celebration of cutting-edge research that has hosted displays and discussions of the latest scientific research since the early nineteenth century.

SAMS will play a pivotal role in leading the analysis of high-quality ocean observations. These observations are essential for monitoring and understanding climate change impacts on the ocean ecosystem. [Dr Kristin Burmeister](#), lead scientist at SAMS for AtlantiS, said: "High-quality,



long-term ocean observations are a fundamental part of AtlantiS and crucial to our understanding about climate change and its impact on society. Through the integration and extension of autonomy in long term ocean observation, AtlantiS will take

a leading role in the international research community."

Marine Directorate appoints Chief Scientific Adviser

Leading marine physicist Professor Mark Inall has been appointed as Chief Scientific Adviser to Scottish Government's Marine Directorate. With a distinguished career in physical oceanography spanning more than three decades, Mark's links to the wider scientific community will ensure that Marine Directorate policy continues to be underpinned by the best scientific evidence available. Drawing on his extensive academic experience and networks, he will further embed scientific evidence at the centre of decision-making and provide oversight and assurance which delivers maximum impact for Scotland's seas.

Mark will continue part time in his role as Marine Physicist at the Scottish Association for Marine Science (SAMS) in Oban, maintaining valuable industry links. He will carry out the Chief Scientific Advisor Marine role for three years. The role of the Chief Scientific Adviser Marine is to provide independent challenge to our science advice and evidence, which informs our work across marine and freshwater policy areas. The Chief Scientific Adviser Marine will also work with the Chief Scientific Advisor for Scotland and the Scottish Science Advisory Council to help ensure that Scottish Government has access to the best

scientific advice to inform its work across all policy areas. The Chief Scientific Adviser Marine will also be an advocate, across Scotland and further afield, of our world-leading marine and freshwater science and its potential to benefit our economy, people and environment.

The Marine Directorate has a key role to play in tackling the twin crises of climate change and biodiversity loss. Mark's input will be significant in mitigating their impact on the marine environment and improving marine ecosystem resilience. We are delighted to welcome him and know his experience and expertise will provide a strong scientific lens through which to deliver the Blue Economy Vision for Scotland.

Mark said: "Scotland has such a rich marine heritage, and a bright but complex marine future. The Scottish Government acknowledges the vital



role scientific evidence plays in guiding our current and future uses of the diverse waters that surround us and the role of Chief Scientific Adviser Marine will contribute an important role in delivering that for Scottish Government. It is a great privilege to

take up the role of Chief Scientific Adviser Marine. I look forward to the challenge and will put all my energy into it!"

MASTS NEHM Open Forum Session on "Particle Tracking"

The MASTS (Marine Alliance for Science and Technology Scotland) Numerical and Experimental Hydrodynamic Modelling (NEHM) Forum is excited to host a free Open Forum Session on "Particle Tracking" on the 21st August, online 10-11 am. The session will include talks from members of the NEHM Steering Group who will share insights into particle tracking as a powerful and versatile technique for modelling dispersion in the ocean and provide a practical demonstration using OceanParcels.

- Particle Tracking: A Powerful and Versatile Technique for Modelling Dispersion in The Ocean. Speaker: Dr Philip Gillibrand, Oceanographer and Hydrodynamic Modeller at the Mowi Scotland Ltd Environment Team

- Particle Tracking Modelling: A Practical Demonstration Using OceanParcels.
Speaker: Soizic Garnier, Research Officer at the School of Ocean Sciences, Bangor University

There will be plenty of time for discussion and Q&A, so we hope you can join us. Please feel free to spread the word. For more information and to register [please click here](#).

MASTS ASM Blue Carbon Workshop call for abstracts

As part of the MASTS Annual Science Meeting, Prof William Austin (University of St Andrews) and Prof Hilary Kennedy (Bangor University, Emeritus) are hosting a workshop on “Filling knowledge gaps and identifying priorities for Blue Carbon”. This workshop will take place in-person in Glasgow on Thursday 7th November (1030-1600).

Part of the workshop will be dedicated to talks on blue carbon, and abstracts are now invited for short talks (10-15mins) that illustrate the growing power or constraints of current data sets, modelling or mapping that can advance or limit the evidence base, conceal or reveal the priorities needed to support Blue Carbon (BC) Ecosystems inclusion in national and international policy as well as carbon accounting.

A current grouping of BC ecosystems (BCE), based on the evidence available to support climate mitigation, are termed “actionable” and include seagrass, tidal marsh and mangrove. Another group of BCEs, termed “emerging” include macroalgae, tidal flats and subsurface sediments, while a third grouping are termed “non-actionable” (sometimes also referred to as “supporting” BCEs) and include corals, shellfish and maerl.

If you would like to submit an abstract for this workshop, please submit your abstract using [this form](#) before close on Tuesday 1st October. You will need to register to attend this workshop. Registration costs will include refreshments and lunch. Early bird registration will open w/c 19th August. Find out more about the ASM and registration [here](#).

VIEWS

Sonardyne confirms next phase of On Demand Ocean Bottom Node project with Shell, Petrobras and SENAI CIMATEC in Brazil.

Sonardyne is proud to announce the next phase of the pioneering On Demand Ocean Bottom Node (OD OBN) development project in Brazil. The project, which began in 2018, involves a collaboration between industry partners including Shell Brasil Petróleo Ltd, Petrobras and SENAI CIMATEC and is supported under the Research Development and Infrastructure funding clause of the Brazilian National Agency for Petroleum, Natural Gas and Biofuels (ANP). These highly innovative nodes might lead to the next generation of geophysical monitoring systems in the offshore oil and gas industry. Using Sonardyne’s proprietary optical and acoustic communications technologies, and drawing on its extensive experience of seabed monitoring, OD OBN expects to provide a versatile, lower cost, more resilient solution for time-lapse seismic and subsidence monitoring of producing reservoirs with better data and the capacity to be placed on the ocean floor for up to five years without human intervention.



An On Demand Ocean Bottom Node (OD OBN), showing its acoustic and optical communication interface on top.

The idea is that data from these nodes can be extracted using Sonardyne’s through water optical communications system to a nearby Autonomous Underwater Vehicle such as ‘Flatfish’ which was developed by Saipem and

SENAI CIMATEC under another ANP funded program sponsored by Shell and Petrobras. This latest phase was confirmed by the signing of contracts between SENAI CIMATEC and Petrobras in August 2023 and between Shell, SENAI CIMATEC, and Sonardyne in April 2024, to produce a pilot array of 600 prototype nodes expected to be deployed towards the end of 2025 at a preselected field offshore Brazil.



Field test image of the Saipem FlatFish placed above the OD OBN harvesting data using optical communications.

This pilot array is planned to be manufactured at a newly created pilot plant facility constructed by SENAI CIMATEC at CIMATEC PARK, in an industrial region called Camaçari, close to the city of Salvador in Brazil. The pilot plant has a design capacity to produce 600 nodes per year, featuring state of the art facilities including specialist parts machining and metals treatment, surface mount electronics production, a large and flexible manufacturing area and various environmental and functional testing apparatus, all of which are required to turn raw materials into completed nodes.

Shaun Dunn, Projects Director, Sonardyne, welcomed this latest project phase and commented "We have been developing the enabling technologies for semi-permanent seabed seismic and subsidence monitoring nodes for over a decade and are therefore naturally delighted that they will soon be used in the world's first large scale field wide test. Our sincere thanks go to our research partners in Shell, Petrobras and SENAI CIMATEC for supporting this program since its inception several years ago."

Shell and Petrobras have been trialling OD OBN prototypes during conventional OBN seismic campaigns, including at Sapinhoá and Itapu, in

over 2,000 metres of water off the coast of Brazil. "It is a great milestone to see that this technology, made in Brazil, with the support from ANP and in collaboration with national, international, and the two leading offshore operators, is closer to being deployed to monitor the large Brazilian Pre-salt fields.", says Jorge Lopez, Shell Brazil Subsurface Technology Manager.

The involvement of Petrobras, the state-owned Petroleum company of Brazil, has played a key part in the development of OD OBN and they intend to take delivery of the pilot array on completion for deployment at a jointly operated offshore field in the pre-salt region to the south of Rio de Janeiro. "The OD OBN technology will be important in the reduction of greenhouse gas emissions during our seismic acquisition operations offshore. Besides that, it will provide a higher level of automation in our seismic field activities which will lead Petrobras and partners to be more efficient in reservoir seismic monitoring processes in the Brazilian pre-salt area.", says Alexandre Silva, Senior Geophysicist Advisor of the Research Centre of Petrobras (CENPES).

Production of the pilot array at CIMATEC PARK is expected to commence later in 2024 and to involve the employment of a new workforce that will be recruited mainly from the local area and trained in the specialist skills required for high-volume manufacturing and testing of nodes that will be deployed and used for prolonged periods in the harshest of marine environments. "Our partnership with Shell, Petrobras and Sonardyne has successfully developed this innovative node from a simple proof of concept towards readiness for full commercial production at CIMATEC PARK. We are therefore very excited to be moving on to the next phase of this challenging programme that will create hundreds of nodes for the upcoming field scale deployment. We have invested significant capital and intellectual resources to ensure that this phase is successful.", states Valter E. Beal, SENAI CIMATEC Innovation Projects Leader.

Fluidion® Launches Live 2024 Olympics Seine Water Quality Data as Part of Open Data Initiative

One month prior to the 2024 Olympic opening ceremony, Fluidion is proud to

announce the launch of the live water quality data broadcast for the Seine River. This initiative is part of Fluidion's [Open Data Initiative](#). With the 2024 Olympics set to host several water-based events in the Seine River, addressing water quality concerns has become crucial.

As a leader in rapid microbiology instrumentation and a deep-tech company founded on scientific expertise, Fluidion is deploying the state-of-the-art ALERT technology to provide up-to-date water quality insights for the Olympic venue. Fluidion has maintained an intensive monitoring program in the Seine River since 2016. As athletes and spectators from around the world gather in Paris for the 2024 Olympic Games, Fluidion is committed to transparently informing the public about water safety using accurate and scientifically validated data.

"We are excited to support the 2024 Olympics by transparently providing live water quality data for the Seine River." said Dr. Dan Angelescu, CEO of Fluidion. "Our mission is to develop scientifically-validated automated monitoring solutions that promote a healthier environment and reduce the public health impacts of pollution."



Fluidion invites the public, athletes, and environmental enthusiasts to visit the [Open Data Initiative](#) website to monitor the Seine's water quality in the run-up to and during the Olympics. This transparency not only enhances safety but also promotes environmental awareness and responsibility.

Voyis Announces New OASIS Project with Canada's Ocean Supercluster

Voyis, a leading provider of ocean imaging solutions, is thrilled to announce its latest venture, the OASIS Project. Funded by Canada's Ocean Supercluster's UK Collaborative Ocean Innovation Solutions program, in partnership with Innovate UK, this initiative aims to revolutionize marine environmental surveys through the collaboration of Canadian and UK ocean technology experts. The OASIS Project, short for Over-horizon Awareness of Seafloor Imaging Surveys, addresses the pressing need for efficient and cost-effective monitoring solutions in the face of escalating demands for sustainable ocean resource management. With both Canadian and UK governments committed to defining Marine Protected Areas (MPAs) and bolstering environmental regulations, the need for advanced monitoring technologies has never been more urgent.

The project brings together a consortium of esteemed partners, including Voyis, the University of Southampton, AutoNaut, and the National Oceanography Center (NOC). In partnership with the University of Southampton Voyis will enhance its imaging products with onboard machine learning and remote survey awareness capabilities. This cutting-edge technology will be integrated into the NOC's Autosub autonomous underwater vehicle, enabling remote over-the-horizon seafloor image surveys through the AutoNaut wave-powered USV.



"Our collaboration with esteemed partners from the UK marks a significant milestone in our efforts to enhance the cost-effectiveness of ocean monitoring with innovative optical technologies," said Chris Gilson, CEO of Voyis. "The OASIS Project embodies our commitment to developing solutions that not only meet the evolving needs of the commercial sector but also contribute to the sustainability of our oceans."

The OASIS Project aims to address the limitations of existing ocean monitoring methods, which often rely on costly crewed surface vessels and tethered remotely operated vehicles. By harnessing the power of long duration autonomous underwater vehicles and advanced imaging sensors with data automation technologies, the project seeks to reduce costs, minimize environmental impact, and enhance the scalability of marine environmental surveys.

In addition to its implications for marine conservation, the OASIS Project holds significant commercial potential. Voyis plans to offer a range of services and software products, including autonomous environmental survey and data analysis services, as well as new software products for data interpretation and remote awareness. These offerings will not only benefit marine researchers and environmental agencies but also industries such as offshore wind, oil and gas, and marine construction, which are beginning to embrace remote survey operations. The OASIS Project represents a collaborative effort to address the critical challenges facing our oceans today. By bringing together expertise from Canada and the UK, Voyis and its partners are poised to make meaningful strides towards a more sustainable future for our marine ecosystems. For more information about the OASIS Project and Voyis' innovative solutions, visit www.voyis.com

SALTS

Underwater Starfield, a swimmer's encounter with creatures of the open ocean

Cornwall, swimming in Mount Bay with a local group, five of us swimming and a guide on a bright yellow paddleboard. We start in the fishing village of Mousehole, where a hillside of stone cottages overlooks a harbour sheltered by two piers. Outside these walls, the bay is known for a

thriving fishing industry, a castle once inhabited by monks, and violent winter storms. We enter the harbour, swimming over a sandy bottom and scores of mooring lines bright with green algae.

The water is 16°C. It's cool enough that I'm glad for my wetsuit, but this is the warmest this area gets all year. We are out of the harbour mouth quickly; the bottom changes from sand to black rock. It is so clear underwater that I can see my companions stroking from meters away. It is so still that the first jellyfish I encounter seems fixed in place, its tentacles barely moving. Then, below me, I see something else: a host of gleaming creatures, catching the daylight, shining in relief against the black bottom. These long, translucent chains look like ocean pea pods, flecked with orange. There are more than I can count, and they are layered along the bottom in every direction.

I surface to see if anyone else has noticed and so does another swimmer. "What are those things underwater? Do they sting?" she asks the guide. It takes me a moment to remember what they are called, but I recognize them as creatures that usually live far out at sea. I know they filter the water and poop out carbon, and I am confident that they aren't going to sting us. They're **salps**. We are swimming through a bloom of the salp species *Salpa fusiformis*, which washes up on beaches across Cornwall for the next few days, makes UK national news, and then vanishes.

Encountering salps near the coast is rare. Scientists who study them usually board research vessels and venture past the continental shelf to find them. Salps prefer open water and live in every ocean except the Arctic. Some salp species are part of the great company of marine creatures that migrate to the surface each night and return to the half-darkness of the twilight zone, 200 meters deep and beyond, when the sun rises. Other species live only in the upper waters.

Another swimmer dives down and brings a chain of salps to the surface. She hands it to me. Each individual *Salpa fusiformis* is about the size of a walnut, made of a firm, clear, gelatinous substance. They have a brain, a mouth, a stomach, muscles that contract to propel them through the water, and a heart that can beat in two directions. They are part of the phylum

Chordata, distantly related to humans, fish, and many other animals found on land and sea. Their life cycle is brief, a matter of weeks. A single salp buds off of a chain of asexually produced clones that can contain as many as 100 individual salps. Each salp in the chain gestates another, releases it as a solitary creature, and the cycle continues.

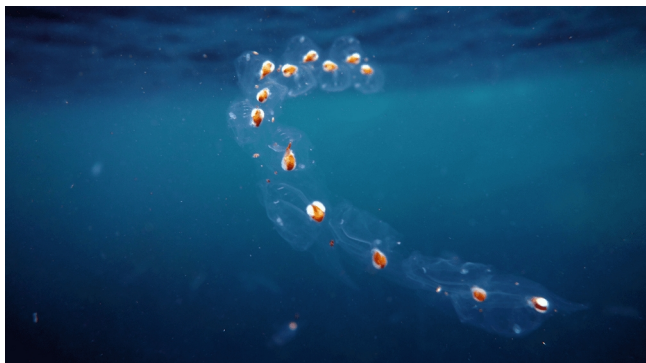


Photo by Heather Hamilton © Cornwall Underwater

Our swim continues around a ragged black rock a few meters long named St. Clement's Isle. We are told to look out for seals, but there are none here today. Just a few cormorants are fishing. We make our way back toward the harbour, covering about 1,600 meters (nearly a mile).

Salps have been found as deep as 2,000 metres and tracked swimming up to 500 metres in a day. But even with these skills, it's unlikely they reached this coastal area by swimming alone. Wind and currents swept them into shallow water. Abundant plankton and other matter nourished them. And they bloomed into a dazzling starfield, a rare view for swimmers, just below the surface. More pictures and text at [underwater-starfield-salps](#):- **Hannah Piecuch**, staff writer for Woods Hole Oceanographic Institution's (WHOI's) *Oceanus* magazine, in consultation with WHOI scientist Larry Madin

Greenland science expedition to unveil critical climate insights

A team from SAMS (Scottish Association for Marine Science) will be on board the RRS *Sir David Attenborough* this week (Friday 19 July) as the UK's polar research vessel makes its first science expedition to the Arctic. The research ship is bound for south-east Greenland to help advance our understanding of the region's rapidly decaying ice sheet and its impacts on ocean and global climate systems. Led by an interdisciplinary team of 40 scientists and support staff from renowned research institutes

worldwide, including SAMS, the KANG-GLAC project will embark on a six-week mission to study Greenland's glaciers and life in coastal waters around the edge of the world's largest island.

The Greenland Ice Sheet is decaying at an accelerating rate in response to climate change. Warm Atlantic waters moving through fjords eventually meet the ice fronts of marine-terminating glaciers, increasing melting and causing icebergs to break off. In turn, the injection of increased fresh meltwater into the ocean is altering both ocean currents and marine ecosystems around Greenland and farther afield in the North Atlantic, with potential effects on UK weather systems.



The Greenland Ice Sheet is decaying at an accelerating rate in response to climate change. Photo: Dave Roberts

The KANG-GLAC project aims to determine the intricate processes driving these changes by studying what is happening now and during warm climatic periods in the past. Researchers can help anticipate future ice-ocean-marine ecosystem changes by extending the modern observational record back through the last 11,700 years, a period known as the Holocene. This includes a time when summer temperatures in Greenland were 3-5°C warmer than today: the Holocene Thermal Maximum. While some records of 20th-century iceberg calving and warm water inflows exist around Greenland, records of how glaciers then decay and the effects on marine productivity over many decades to millennia are lacking.

This three-and-a-half year project will generate records of glacier, ocean, and ecosystem change for the Holocene era at key sites close to Kangerlussuaq Fjord in SE Greenland. The team

includes a mix of researchers, including oceanographers, biologists and geologists, who will collectively use a range of instruments to retrieve samples from rocks on land, from the ocean, and from the seafloor to gain a comprehensive picture of this region and its current and potential future response to environmental change.

Dr Kelly Hogan, a marine geophysicist from British Antarctic Survey is Co-lead on the project.

She says: “our expedition is extremely timely as we are seeing every day in the news how the Arctic is changing, and we know there will be knock-on effects for the rest of the planet. We need to understand how the



Greenland Ice Sheet is likely to decay over the coming decades to centuries, and what the subsequent effects will be on both ocean currents and marine food webs. This is now urgent information for us to gather so policymakers can understand what will happen in the North Atlantic and set out appropriate adaptation and mitigation plans.”

Using state-of-the-art capabilities of the RRS *Sir David Attenborough* and deploying advanced underwater robotics such as the Gavia, operated by the Scottish Association for Marine Science (SAMS), the team will investigate modern interactions between meltwater expelled from glaciers and the inflowing warm ocean waters, as well as how this affects primary productivity in Greenland’s fjords and coastal seas. In parallel, marine sediment cores from the seafloor and terrestrial rock samples collected using helicopters deployed from the ship will reveal changes in glacier size, ocean temperatures, and how carbon storage at the seafloor all changed during the Holocene. Follow the [expedition](#) on social media: X/Twitter: [@KANG_GLAC](#) Instagram: [@KANG_GLAC](#) Facebook: [/KANGGLACExpedition](#)

CALENDAR

2nd-6th September 2024: Challenger Society for Marine Science conference 2024
Oban, Scotland

www.challenger-society.org

Details of the conference are on the Challenger 2024 website: <https://challenger2024.co.uk>. Oban is a beautiful coastal location, but as a tourist destination accommodation gets booked up very quickly. If you are interested in attending, it is advised that you book accommodation as soon as you can. Accommodation options can be found on the conference website and there may also be an option for free camping at SAMS for those who would like to reduce costs, details to follow shortly.

10th-12th September 2024: ICOS Science Conference 2024, from GHG observations through science to services.

Versailles, France

ICOS (Integrated Carbon Observation System) is pleased to open the Call for Abstracts with the overarching theme “From GHG observations through science to services”, the sessions cover ICOS’s three domains, Atmosphere, Ecosystem and Ocean.

More information can be found here: <https://www.icos-cp.eu/news-and-events/science-conference/icos2024sc/call-for-abstracts>.

The ICOS Science Conference logo can be downloaded for this purpose [here](#). Keep up-to-date with the latest ICOS Science Conference news on our channels:

- ICOS Science Conference website: <https://www.icos-cp.eu/news-and-events/science-conference/icos2024sc>
- ICOS Science Conference newsletter: <https://www.icos-cp.eu/news-and-events/newsletters>
- X (formerly Twitter): https://twitter.com/ICOS_RI
- LinkedIn: <https://linkedin.com/company/integrated-carbon-observation-system>
- Instagram: <https://www.instagram.com/icosri/>

23th-26th September 2024: IMBIZO7, Transitioning towards Sustainable Ocean Governance by 2030, Commitments and Challenges

Rabat, Morocco

IMBeR will hold its seventh IMBIZO (the Zulu word for ‘a gathering’) at the Institut Agronomique et Vétérinaire Hassan II (IAV) in Rabat, Morocco. IMBeR aims to promote and enable transdisciplinary marine research towards ocean sustainability and its governance. Topics

addressed during IMBIZO7 will showcase current and emerging research, and explore potential solutions towards sustainable ocean governance by 2030, the target of multiple global sustainability initiatives.



We will follow the usual IMBIZO format of three distinct but interacting workshops. To optimise discussions, the number of IMBIZO7 participants will be limited to about 120 people (around 40 per workshop). The workshop topics are:

1. Science based adaptive management and policy responses to the causes and consequences of eutrophication.
2. A framework for development of social-ecological models of transformative change for sustainable ocean management.
3. Governance transformations for resilient fisheries and aquaculture: Progressions, challenges and opportunities, imber.info/imbizo7-workshop-3/.

Plenary keynote presentations and poster sessions will enable you to learn about the work of participants in other two workshops.

14th-18th October 2024: 43rd CIESM Congress: Marine and Cultural Heritage in the Heart of the Mediterranean

Palermo, Italy

Join us after a 2-year hiatus imposed by the global pandemic and subsequent issues, we are excited to resume our traditional marine research showcase. This event will foster scientific excellence and promotes peaceful dialogue across the Mediterranean and Black Sea basins. Sicily, the chosen location for our next congress, offers a stunning backdrop, combining marine science with rich coastal heritage in a region steeped in cultural and historical significance.

Dive deep into the realm of open science with our first morning plenary panel. This strategic discussion will explore the benefits and

challenges of open science practices, towards more sustainable and reliable scientific publication policies. Join leading experts debating on popular science, unbalancing and distorting science, incentives versus regulations, science marketing and non commercial licences, and ethical use of AI.



You can now register [online](#). Please, do not hesitate to contact us if you need any additional information, but be sure to check first our [Congress webpages](#).

Our 2024 CIESM (The Mediterranean Science Commission, headquartered in Monaco) Congress will explore a wide range of marine disciplines, featuring multidisciplinary scientific sessions and contextual side events that will immerse you in the unique Sicilian atmosphere. Save the date and stay tuned for regular updates on the rich scientific and cultural programme throughout 2024.

17th-19th October 2024: Arctic Circle 2024 Assembly

Reykjavik, Iceland

For more information, <http://www.articcicle.org>.



A new initiative, the [Business Forum](#) will be announced at this assembly. Participants will benefit from a wide range of connections, opportunities and networking events, along with discussions on future trends, entrepreneurship and finance.

5th-7th November 2024: Marine Alliance for Science and Technology, Scotland (MASTS), annual science meeting

Glasgow, Scotland

The MASTS ASM will take place at the Technology & Innovation Centre, and we have officially opened the call for special session and workshop ideas. Stay up to date with all the latest news on our [ASM webpage](#).

Abstracts for talks and posters are now invited for our general science sessions or one of our five special sessions. Abstract submission deadline is 22nd August.

Abstracts are invited for sessions on:

- General Science Sessions (any field of study related to marine science)
- Multiple Stressors
- Sea Lice Surveillance and Monitoring
- Deep Sea
- Marine Biogeochemistry
- Marine Mammals in an Ocean of Change

Special sessions (focussing on a specific topic or area of science) can take place on either Tue 5th or Wed 6th November. They would be in plenary in one of the large lecture theatres, may have the option of remote viewing and are generally 2 hours long. Special session organisers can have a call for abstracts or devise a programme of invited talks.

We are pleased to confirm our first special session for the 2024 MASTS ASM. Pitcairn's MPA (Marine Protected Area) is the 3rd largest in the world, is a platinum level Blue Park Award winner, and its purity as a fully intact marine ecosystem provides an important scientific reference point in measuring the impact of climate change. The session will cover the ambition of the new Marine Science Base on Pitcairn, scientific evidence on the health of marine biodiversity through recent science expeditions and the efforts of the Pitcairn Islands Government in protecting such a large MPA, with the support of the Blue Belt Programme.

Workshops are to be held on Thurs 7th November, and can be anything from a half to a full day. These allow an opportunity for breakout sessions/small group working/discussion etc. We have access to [8 conference rooms](#) and an [Executive Suite](#) for workshops. The rooms are of different sizes and can accommodate a variety of delegate numbers depending on the format of the room and the type of workshop you may wish to run. MASTS provide the room, catering, registration etc, but the actual programme and running of the workshop would be down to the workshop organiser. If you would be interested in hosting a special session or running a workshop as part of the event, please contact Emma Defew via [email](#).

As part of the MASTS Annual Science Meeting, Prof William Austin (University of St Andrews) and Prof Hilary Kennedy (Bangor University, Emeritus) are hosting a workshop on "Filling knowledge gaps and identifying priorities for Blue Carbon". This workshop will take place in-person in Glasgow on Thursday 7th November (1030-1600). Part of the workshop will be dedicated to talks on blue carbon, and abstracts are now invited for short talks (10-15mins) that illustrate the growing power or constraints of current data sets, modelling or mapping that can advance or limit the evidence base, conceal or reveal the priorities needed to support Blue Carbon (BC) Ecosystems inclusion in national and international policy as well as carbon accounting.

A current grouping of BC ecosystems (BCE), based on the evidence available to support climate mitigation, are termed "actionable" and include seagrass, tidal marsh, and mangrove. Another group of BCEs, termed "emerging" include macroalgae, tidal flats and subsurface sediments, while a third grouping are termed "non-actionable" (sometimes also referred to as "supporting" BCEs) and include corals, shellfish and maerl. If you would like to submit an abstract for this workshop, please submit your abstract using [this form](#) before close on Tuesday 1st October.

25th-28th November 2024: The 4th Mediterranean Geosciences Union Annual Meeting.

Barcelona, Spain

The 4th MedGU Annual Meeting will be held this year in-person and online. Visit our website (www.medgu.org) to learn more about the event.

On this occasion, we are pleased to invite you to attend the conference and share/discuss your latest research findings. Your participation in-person or virtually will support MedGU's mission of ensuring a sustainable future for humanity in the region and for the planet. Due to many

requests, the abstract submission deadline has been extended to the 25th July 2024.

The CSMS email address is challenger.society@gmail.com. Contributions for next month's edition of Challenger Wave should be sent to: john@myocean.co.uk by the 31st July.

JOBS and OPPORTUNITIES

There are jobs in the MASTS newsletter

New vacancies:

- Head Of Enterprise and Commercial Services – [SAMS](#) – 31/07/24
- Chairperson – [FIS](#) – 12/08/24
- Shellfish Stock Assessment Scientist – [The Scottish Government](#) – 08/08/24

Still open vacancies:

- Marine Ecology Technician – [University of Southampton](#) – 31/07/24
- 3-Year Postdoc on Passive Acoustic Monitoring of Cetaceans – [Aarhus University](#) – 28/07/24
- Fisheries Acoustician – [Scottish Government](#) – 28/07/24
- Compensatory Measures And Nature Positive Science Lead – [Scottish Government](#) – 28/07/24
- Renewables Science Projects Lead – [Scottish Government](#) – 28/07/24
- Passive Acoustic Monitoring Technician – [Scottish Government](#) – 28/07/24
- Renewables Science Advice & Projects Co-Ordinator – [Scottish Government](#) – 28/07/24

PhD Opportunities:

- How are seminatural environments affected by climate change? A study of climate impacts and future challenges to heathland soils. [29/07/24](#)
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