

Challenger Wave



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

NEWS

In memory of Professor William (Bill) Ritchie OBE

For over forty years Professor Ritchie made a major contribution to the understanding of the physical geography of the Scottish coastline, and last year Mark James and Alistair Dawson helped to bring this to life with an initiative to digitise and publish a large photographic archive. Professor Ritchie will be remembered by many as a valued colleague and friend, a brilliant researcher, and an inspiring leader. Prof Ritchie was a fantastic supporter of MASTS (Marine Alliance for Science and Technology Scotland) and will be missed.



For over forty years Professor Ritchie made a major contribution to the understanding of the physical geography of the Scottish coastline, and last year Mark James and Alistair Dawson helped to bring this to life with an initiative to digitise and publish a large photographic archive. Professor Ritchie will be remembered by many as a valued colleague and friend, a brilliant researcher, and an inspiring leader. Prof Ritchie was a fantastic supporter of MASTS (Marine Alliance for Science and Technology Scotland) and will be missed.

Artificial Light At Night (ALAN)

Artificial light at night, produced by any human-made source, can propagate into the marine environment causing light pollution, an excess of light that disrupts the natural patterns of wildlife, contributes to rising carbon dioxide levels, harms human health, and obscures the stars. Light pollution threatens ocean ecosystems by disrupting natural light-driven cycles that regulate marine life. Examples of this are its effect on the reproductive cycles of coral species and the behaviour and biological function of copepods.

Plymouth Marine Laboratory (PML) provided the first evidence that light pollution affects trophic interactions within coastal communities and has led the development of the first global atlas of ALAN under the sea. Research, led by Prof. Tim Smyth, has shown how far light pollution can reach the ocean's depths and which marine species are the most likely to exhibit a biological response. The research has been underpinned

by PML's extensive expertise in ocean colour satellite Earth observation, social science and ecological responses. We work collaboratively with many research organisations on this threat, in particular Dr Tom Davies at the University of Plymouth.

PML's research can enable light pollution to be considered in a range of policies and management processes for the first time. It facilitates practical action that can be taken to reduce the impact, such as using warmer bulbs, directing lights towards the ground and using shielding. We work with various practitioners in coastal and maritime industries and policy, to co-develop solutions that limit sound and light pollution.

PML is a founding member of the [Global Ocean Artificial Light at Night Network \(GOALANN\)](#), an international network of the world's leading experts in marine light pollution. Our mission is to conserve the oceans by improving knowledge and awareness of marine light pollution, its ecological and societal impacts, and management options. For more information, watch the video, [Artificial light at night \(ALAN\)](#), and/or read the four page [research brief pdf](#).

Centuries of weather data give new insight into Europe's stormy past

A [brand-new study](#) published in *Communications Earth and Environment*, led by the National Oceanography Centre (NOC) has given new insight into the long-term changes in storm patterns across Europe. Windstorms are one of the most damaging natural hazards across Europe, having severe impacts on people and property. In the past decade, northwest Europe has experienced several stormy autumn-winter seasons. The 2021/2022 season was particularly severe with a sequence of intense low-pressure systems crossing the region that caused wind damage, transport disruption and coastal storm

surges. The winter of 2013/2014 was also significant, with data indicating that the conditions experienced were unprecedented in the last 150 years.

For years, based on historical accounts and other sources, scientists have known that the 1790-1820s was also a particularly stormy period in Europe. However, knowledge of how this relates to today's storm patterns and insight into what's causing them has been lacking. To gain a clearer understanding of Europe's changing storm climate, scientists used barometric pressure data from sites around the English Channel, reaching as far back as the late stages of the Little Ice Age (a period of cooler climate in the North Atlantic Region between the 14th and 19th centuries) to construct the longest ever instrumental-based storm series.

The study revealed for the first time that the increased winter storminess experienced over the last 30 years was similar in frequency and intensity to that experienced in the late 19th Century. However, it also revealed crucial differences between the periods. The study showed that there has been an increase in storminess since the 1990s has been confined to the winter season, which is correlated with a strengthening and north-eastward shift of the North Atlantic jet stream.

This contrasts with conditions during the early nineteenth century where increased storminess extended into the spring and autumn seasons. There were even significant stormy summer seasons during that time - such as the notorious year-without-a-summer of 1816 - which have become much less likely to occur in modern times.

Dr Richard Cornes, Marine Climatologist at NOC and Lead Author of the study said: "Further work is required to determine the potential mechanisms responsible for the observed changes. A particularly important line of investigation, in light of the findings of our paper, is the relative impact of natural versus anthropogenic aerosols on storminess across Europe. We hope that understanding these mechanisms will



ultimately lead to improvements in the predictions of storm patterns."

Climate change exacerbated June 2023 marine heatwave

The coastal waters of northwest Europe experienced unprecedented surface temperatures in June last year, with some locations experiencing sea-surface temperatures of up to 5°C higher than normal, classified as category 5 (extreme). This was followed by another marine heatwave in September 2023 and according to the UK Met Office, we are currently experiencing a category I (+1-2°C) marine heatwave with pockets of category II (+2-3°C). Moving towards the Norwegian part of the North Sea, it is reaching category III/IV (>+4°C) in areas.

The study, led by Met Office scientists with a consortium of British and Irish institutions including Plymouth Marine Laboratory (PML), showed the UK experienced its longest recorded category II marine heatwave (16 days), with temperatures around the British Isles reaching a 16°C peak in June 2023 instead of the typical 13.5°C. The marine heatwave developed quickly due to high-pressure weather conditions including reduced levels of cloud cover, strong sunshine levels, weak winds and tropical air. Additionally, the high pressure suppressed wave activity resulting in little mixing through the water column, allowing the sea surface water to warm quickly. The feedback from the warmer sea to the land contributed to record-breaking mean temperatures for the UK and heavier rainfall through stronger, warmer and more moist sea breezes.

The 2023 findings come as UK seas experience another marine heatwave (since 16th May). 2024, like 2023, is still considerably warmer than average, and scientists have confirmed that any weather variability bringing prolonged anticyclonic conditions is generating a marine heatwave. The authors have concluded that although the study shows climate change was not the direct driver, the warming trend for sea-surface temperatures over the last two decades exacerbated the scale of the marine heatwave, making it reach category II instead of I.

Prof. Tim Smyth, Head of Science for Marine Biogeochemistry and Observations at PML and co-author on the study, highlighted the

importance of sustained long-term monitoring, “Meteorological events, such as marine heatwaves and storms, highlight the importance of having autonomous instruments in the water measuring when we cannot get out to our sampling stations on boats, and at a high enough frequency (hourly), to capture data on these phenomena. For



this study we provided data from the gliders we had deployed off NE Scotland and long-term data from our E1 and L4 sampling stations in the Western English Channel. E1 has the longest hydrographical data series in the world, with depth-resolved measurements of temperature and salinity stretching back to 1903; a period of 120 years where we have seen considerable change to the marine environment. It is only with regular, high-frequency and high-quality data that we can begin to contextualise the marine heatwaves that are occurring”.

Dr Juliane Wihsgott, Digital Oceanographer and co-author on the study, commented, “Using autonomous robots has enabled us to collect high-resolution in-situ data within of the hotspots of the June 2023 marine heatwave in northern North Sea. This has helped us look beyond the sea surface and understand the impacts of the marine heatwave on the whole water column. We saw how changes in surface mixing due to reduced wind and waves led to this extra heat being concentrated near the surface, which explains the record-breaking sea surface temperatures we observed.”



Looking at the future, the authors suggest that such high sea surface temperatures will become commonplace by the middle of the century without strong mitigation to slow the rise of greenhouse gas emissions. **The study** involved a consortium of scientist from the Met Office, Plymouth Marine Laboratory, the University of Exeter, National Oceanography Centre, Scottish Association for Marine Science, Marine Institute (Ireland), the Marine Directorate of the Scottish Government and the University of Bristol.

Looking at the future, the authors suggest that such high sea surface temperatures will become commonplace by the middle of the century without strong mitigation to slow the rise of greenhouse gas emissions. **The study** involved a consortium of scientist from the Met Office, Plymouth Marine Laboratory, the University of Exeter, National Oceanography Centre, Scottish Association for Marine Science, Marine Institute (Ireland), the Marine Directorate of the Scottish Government and the University of Bristol.

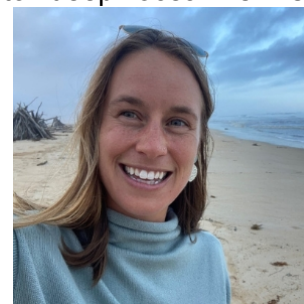
Seaweed forests an overlooked ally in carbon removal

A groundbreaking study by an international team of researchers has revealed seaweed forests to be significant contributors to oceanic carbon removal. Their research found that the world’s seaweed forests transport 56 million tonnes of carbon to deep ocean sinks. This discovery, published in the prestigious journal *Nature Geoscience* (<https://doi.org/10.1038/s41561-024-01449-7>) highlights a considerable contribution of macro-algae to oceanic carbon sinks. The estimate represents a baseline contribution of macro-algae which, if unchanged, has a net-zero contribution to climate change mitigation. An increase in the macro-algal area through the preservation and restoration of macro-algal forests could potentially increase this contribution.



Seaweed forests, primarily composed of large brown macro-algae like kelps and rockweeds, are the most extensive and productive vegetated coastal ecosystem on the planet. These forests can grow as rapidly as terrestrial forests and are efficient in capturing carbon, which they store in their biomass. Part of the biomass is subsequently exported to deep ocean sinks, especially along coasts close to the deep sea.

The study, spearheaded by **Dr Karen Filbee-Dexter** at the Norwegian Institute of Marine Research and the University of Western Australia, reveals that underwater forests export about 15% of this captured carbon into deep ocean waters each year, where it can remain trapped for centuries.



The international team, which includes [Prof. Michael Burrows](#) of the Scottish Association for Marine Science (SAMS), used state of the art global ocean models to track the fate of seaweed carbon from the coast to the deep ocean. “The study also identified the seaweed forests of Australia, the USA, New Zealand, Indonesia and Chile as having high carbon removal capacity,” said Dr Filbee-Dexter.

Historically, seaweed forests have been excluded from the ‘blue carbon’ toolbox due to uncertainties about their ability to remove carbon in the long-term. This study closes this critical knowledge gap and reveals new opportunities for climate change mitigation in polar and temperate areas, where carbon removal options by coastal ecosystems are currently limited. Prof. Burrows, a co-author of the study, said: “Our work shows that damage to seaweed forests could reduce this drawdown of carbon. Conservation and restoration of such habitats for their role in carbon storage in the ocean should be a key priority.”



The study underscores the urgent need to act more quickly to protect, manage and restore seaweed forests, which are being lost at alarming rates in many regions of the world due to a variety of human pressures such as ocean warming, marine heatwaves, nutrient pollution, and overfishing.

FMRI Science Requirements Framework Virtual Meetings

Through the Future Marine Research Infrastructure (FMRI) programme, NERC is seeking to design and commission a new generation of research infrastructure that will enable the UK to continue delivering world-leading marine science to 2040 and beyond. The shape of this future infrastructure will be informed by the evidence NERC receives on the science priorities. It is therefore important to articulate these science requirements clearly, enabling priorities, interdependencies, synergies, trade-offs and consequences to be considered in context.

The FMRI Science Requirements Framework (SRF) ‘Marine Science in 2040’ that will be

www.challenger-society.org

presented to the FMRI Board will capture the vision for marine science in 2040 and the capabilities that are needed to deliver this. The SRF document is structured around 5 Grand Challenges for marine science: Climate, Biodiversity, Pollution, Hazards and Blue Economy (see fmri.ac.uk/science for more information). These chapters are being prepared by the FMRI Lead Scientist, Dr. Katy Hill, with the support of the Grand Challenge Champions who have been facilitating focused discussions at the FMRI Roadshow workshop in Edinburgh, Liverpool, Exeter and London.

The FMRI team were pleased to announce a new series of virtual workshops hosted by the Champions offering additional opportunities for engagement. A separate online session will be held for each of the Grand Challenges.

- Hazards, Friday 7th June 10:00-12:00
- Blue Economy, Monday 17th June 12:00-14:00
- Climate, Monday 17th June 10:00-12:00
- Pollution, Monday 17th June 14:00-16:00
- Biodiversity, Friday 21st June 10:00-12:00

To participate, please [register now](#).

Royal Society Publishing Photography Competition 2024

The Royal Society Publishing Photography Competition highlights the power of photography in capturing the scientific phenomena around us, and the role great images play in making science accessible to a wide audience. We are thrilled to announce that this year's competition will be held in collaboration with the Royal Photographic Society. The competition is now open to entries until August 23, 2024.



Participants have the chance to win an overall prize of £1,000, a full Article Processing Charge (APC) waiver, and the opportunity to be featured on the cover of a Royal Society journal. All category winners will receive a certificate from

the Royal Photographic Society and a one-year Royal Photographic Society Membership. Find out [more here](#), or via [Twitter/X](#).

Major boost for oceanic research as Challenger 150 joins forces with Seabed 2030

Coinciding with World Oceans Day (8th June 2024), two major international marine initiatives announced the signing of a landmark agreement to work together on ocean research and exploration.

Challenger 150, which coordinates a global effort to map life in the deep-sea, has signed a memorandum of understanding (MoU) with The Nippon Foundation, GEBCO **Seabed 2030** Project, a global initiative dedicated to inspiring and coordinating the global effort to map the entire ocean floor by the end of the decade. Consolidating the physical and biological ocean data being identified and produced by the two separate initiatives will greatly advance our understanding of the ocean.

A collaborative project between The Nippon Foundation and the General Bathymetric Chart of the Oceans (GEBCO), Seabed 2030 is officially recognised as a flagship programme of the UN Decade of Ocean Science for Sustainable Development (2021-2030), with its mission actively supporting UN Sustainable Development Goal 14: to conserve and sustainably use the ocean, seas and marine resources for sustainable development.

Meanwhile, Challenger 150 is a global scientific cooperative under the Deep Ocean Stewardship Initiative (DOSI), developed to respond to the needs of the Ocean Decade, building capacity for global deep-sea research, expanding biological observations and the understanding of deep-sea ecosystems, and supporting their sustainable management.

VIEWS

Challenger Society History Special Interest Group (SIG)

Between 2022 and 2026 much focus has rightly been given to the 150th anniversary of the HMS Challenger voyage, the archetypical “old men with beards” expedition. However, arguably, the most exciting important and sociologically

significant period in marine science history has been since 1950. The progress we have made since then has resulted from technological advances and from the foresight, innovation and determination of scientists backed by dedicated technical support at sea and ashore.

Our present-day understanding is such that with a reasonable degree of confidence we can predict how the oceans will change under natural and human influences. Marine science history is about how these advances came about. What were the life stories of the people involved? How did they collaborate nationally and internationally? What technological avenues were tried and failed? Are there key measurements buried in archives that have never been analysed?

The Challenger Society's **History Special Interest Group** (SIG) presently has 50 members who share an interest in exploring and documenting how Marine Science has developed. The SIG provides a means for them to interact with one another, share ideas and ask questions. If you think you would like to join that group please [get in touch](#) stating your area of interest.

Challenger Website Redesign: call for ideas

Dear Challenger members, the Challenger Society is planning to redesign the website (<https://www.challenger-society.org.uk/>) in the near future. We have designed a short survey (<3 mins) to gather input from you, the membership, of features and functionality that you may like to see on the site.

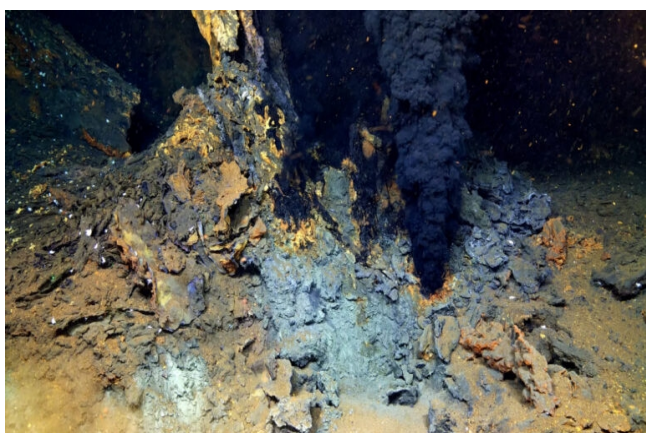


The survey will be open until the 5th of July. There will be some constraints and we cannot promise to deliver everything that is suggested but we do want to hear your ideas: here is the link to the short survey, <https://forms.office.com/e/wK1ds4VP1r>. -:
Chelsey Baker, Membership Portfolio Officer

SALTS

Ocean Census Arctic Deep: Expedition launched to reveal undiscovered life in the Arctic depths

The Ocean Census Arctic Deep Expedition is set to redefine our understanding of the biodiversity of the deepest Arctic Ocean marine habitats. Led by The Nippon Foundation-Nekton Ocean Census Alliance, UiT (The Arctic University of Norway), and REV Ocean, this groundbreaking expedition brings together a multidisciplinary team of 36 scientists and media experts from 15 leading academic institutions to discover, research, and document this under explored region.



Prof. Alex Rogers, Science Director at Ocean Census, said: "Ocean Census has a rare opportunity to delve into some of Earth's most extreme and uncharted habitats – from hydrothermal vents, abyssal plains, and mid-ocean ridges to seamounts and gas and oil seeps. These remarkable environments harbour an abundance of undiscovered life forms, and we anticipate uncovering hundreds of new species, ranging from sponges to corals, sea anemones, snails, small crustaceans and animals which feed off chemical energy like beard worms."

"In our relentless pursuit to unveil the mysteries of the ocean depths, the Ocean Census Arctic Deep Expedition stands as a testament to our commitment to marine discovery and conservation. Through collaborative efforts and cutting-edge technology, we strive to shed light on the undiscovered life thriving in the Arctic depths, paving the way for a deeper understanding of our planet's precious ecosystems," said Yohei Sasakawa, Chairman of The Nippon Foundation.

Having departed from Tromsø, Norway, on May 3rd aboard the Institute of Marine Research's RV Kronprins Haakon, the Ocean Census Arctic Deep Expedition is the first leg of UiT's EXTREME24 mission. Equipped with REV Ocean's 6000-metre-rated ROV Aurora, the expedition will sample and film the remote and enigmatic marine environment of the Fram Strait passage between Greenland and Svalbard. The research area encompasses a wide range of deep-sea habitats, including the Knipovich Ridge, Dumshaff Abyssal Plain, Jøtul vent field, Svyatogor Ridge, Alta Seamount, and Molløy Deep, the deepest point in the Arctic Sea at 5550 metres. Some of these unique habitats are being targeted for deep sea mining.

Prof. Giuliana Panieri, Professor at UiT and expedition leader, said "I am excited to collaborate with a team of scientists and students from across the globe and with important institutions during this expedition, and proud that the knowledge we've gathered at UiT thus far has been instrumental in meticulously planning this voyage. The insights we gain will not only advance scientific understanding but will also be crucial for developing strategies to protect our planet."



Following the expedition, in October 2024, a taxonomic workshop will be hosted by Ocean Census and UiT at their university labs in Tromsø to accelerate the species discovery and taxonomic work from the specimens collected. The resulting curated collection will be housed at the Arctic University Museum of Tromsø, providing a valuable resource for future research endeavours and contributing to the global understanding of marine biodiversity in the region.

Nina Jensen, CEO of REV Ocean, said "We are excited to support UiT and Ocean Census on the Extreme24 cruise to the Arctic and Barents Sea. This is a unique opportunity to explore some of the most remote and uncharted regions of our planet, while making the best use of REV Ocean's Aurora ROV."

Ocean Census, a 10-year international scientific endeavour endorsed by the UN Ocean Decade, is dedicated to transforming the discovery of

ocean life. Spearheading collaborative efforts with partners such as UiT, REV Ocean, and the Ocean Census Science Network community, this initiative was founded to address the critical knowledge gap surrounding marine biodiversity. Launched in 2023 by The Nippon Foundation and Nekton, Ocean Census operates as an open Alliance of scientists from over 280 institutes and numerous government, scientific, business, technology, civil society, and philanthropic partners, working collectively to use pioneering technological advancements to tackle an issue with profound global significance.

With an estimated 1-2 million marine species awaiting discovery, Ocean Census champions and coordinates a diverse, global network to enhance oceanic exploration and understanding. Using innovative techniques, such as 'cyber taxonomy' to accelerate species discovery, Ocean Census has set an ambitious milestone of 100,000 species discoveries over the next 10 years. Entering its second year, The Arctic Deep expedition promises to build on the momentum of previous expeditions to areas like the Bounty Trough in New Zealand and the Macaronesian Archipelago, which have led to over 350 new species discoveries and counting.

With an emphasis on immersive and inclusive storytelling, Ocean Census will have an award winning team of videographers, photographers and visual artists onboard. For regular expedition news throughout, follow [@oceancensus](https://twitter.com/oceancensus) on social media.

A new technology detects trace amounts of oxygen in an environment where previously these life-supporting molecules were below the limit of detection.

Using a new technology called a mini trace analyzer insitu logger, or mTail, an international team of scientists, including Woods Hole Oceanographic Institution's (WHOI) [Maria Pachiadaki](#), on a Schmidt Ocean Institute expedition has found sporadic pockets of water with trace amounts of oxygen in an area of the Southeast Pacific where oxygen has historically been below the limit of detection. The discovery revises the understanding of microbes and nutrient cycling in a little-studied but important ecosystem, the [Oxygen Minimum Zone](#) (OMZ). Traditional oceanographic sampling equipment has been unable to detect oxygen in the core of the Southeast Pacific OMZ, leaving gaps in

scientific knowledge on how this globally important ecosystem functions.

Pachiadaki, an associate scientist of biology at WHOI, led the science team on the 34-day expedition, which included scientists from Chile, Spain, Mexico, the United Kingdom, Sweden, and Denmark. The mTail device is a trace oxygen profiler that the scientists attached to a rosette, that carries Niskin bottles, and a mooring, standard pieces of oceanographic research equipment. Drs. Morten Larsen and Bo Thamdrup of the University of Southern Denmark developed the device alongside Dr. Laura Bristow of the University of Gothenburg, Sweden. Traditional sampling equipment for studying oxygen is relatively low-resolution compared to the mTail, resulting in inaccurate oxygen measurements in the OMZ.



WHOI's Maria Pachiadaki and Lizt Osorio Pando prepare the Microbial Sampler for deployment. (Photo by: Alex Ingle, Schmidt Ocean Institute)

OMZs extend from 100 to 1000 meters depth and are considered areas where oxygen concentration is beyond the detection limit for traditional equipment. The scientists' application of multiple, custom-built technologies specifically designed for the OMZ offers a new paradigm for studying this globally important environment and new insights into how it functions.

"Life started on our planet without oxygen," said Dr. Osvaldo Ulloa of the Instituto Millenio de Oceanografía, Chile, a principal investigator on this expedition, "While no large animals like fish and whales live here, the OMZ is thriving with microbes. This microbial ecosystem is likely the most analogous marine environment to the ancient ocean. By researching these invisible organisms and their ecosystem, we unlock key insights into what our planet likely looked like

millions of years ago and how this environment may respond to a changing climate.”

The Southeast Pacific OMZ is a naturally occurring ecosystem off the west coast of South America. The Ocean’s physics and biology create a region with weak ocean circulation and high productivity, resulting in a large quantity of organic matter for microorganisms to consume. OMZs are likely growing due to climate change. Most large animals cannot live permanently in the OMZ due to insufficient oxygen, however, the zone is home to a vast thriving microbial ecosystem. When oxygen is unavailable, microbes use molecules like ammonia and nitrate for energy, releasing nitrous oxide as a by product, a greenhouse gas 245 times more potent than carbon dioxide.



Josh O'Brien and Annabelle Adams-Beyea remove Niskin bottles from the CTD rosette prior to a re-deployment. Highly sensitive oxygen sensors were mounted on the CTD rosette which were used to make measurements of the extent of the oxygen minimum zone. (Photo by: Alex Ingle, Schmidt Ocean Institute)

“The impacts of finding trace oxygen have potentially far-reaching consequences for the OMZ microorganisms,” said Bristow. “When the oxygen appears, it supplies the microbial community with small but significant amounts of oxygen, which can impact the turnover of greenhouse gases in these systems, reshaping our conceptual understanding of how the oxygen minimum zone actually works.”

To study the microbial activity in the OMZ, the science team used another technology known as a [Submersible Incubation Device](#) (SID). The SID is an autonomous laboratory that measures microbial activity in the environment, allowing scientists to measure nutrient cycling under the

conditions in which they naturally occur rather than attempting to simulate them back in the lab. The equipment is built with only glass and titanium, preventing oxygen contamination during experimentation. This particular SID was developed through an international collaboration of Drs Bristow, Thamdrup, and Larsen, as well as the lab of Dr. Pachiadaki of WHOI.

Other cutting-edge technologies tested during the expedition included a HyperPro multi-wavelength optical sensor, and a Pump Profiling System developed by Dr. Ulloa’s lab at the Instituto Millenio de Oceanografica. These new technologies allowed the team to collect multiple types of data about an ecosystem invisible to the human eye. Data from the expedition will be further analyzed in onshore labs to determine the implications of sensing oxygen in the OMZ core.

“Until now, scientists have been challenged to measure low levels of oxygen in the ocean due to sampling limitations. This expedition was an exciting test of novel technology that pushed a critical boundary of detection and highlights the need for continuing innovation in Ocean research,” said Schmidt Ocean Institute Executive Director Dr. Jyotika Virmani. “The suite of technologies developed by Dr. Pachiadaki and her colleagues open the doors to an increased understanding of microbial processes and phenomenon in these expanding Oxygen Minimum Zones.”

RRS James Cook departs for the Porcupine Abyssal Plain

The global oceans are affected by climate change and other anthropogenic impacts but the ecological consequences are poorly understood, particularly in the deep ocean. To research these questions, the RRS *James Cook* research expedition JC263 has set sail to the Porcupine Abyssal Plain Sustained Observatory (PAP-SO) in the North East Atlantic to make the latest observations at the world’s longest-running abyssal ecology time-series station. Research at the PAP-SO is focused on observation of long-term change in the water column, at the seabed, and the connections between them. By studying seafloor ecology at PAP-SO since 1985, water column particle flux since 1992, and surface ocean and atmosphere parameters since 2003 the objective is to understand the causes and consequences of multidecadal change in NE Atlantic ecosystems.

CALENDAR

JC263 is the first research expedition of the new NERC funded AtlantiS programme and will deliver the latest observations and data to monitor essential ocean variables such as ocean temperature and salinity, carbon dioxide, oxygen, nutrient content, particulate matter, and the abundance of phytoplankton, zooplankton and seafloor invertebrates. The research will use a combination of traditional approaches and cutting-edge technology to ensure the highest quality scientific data, and comparability with the earliest observations in the time series.

In a busy programme the multidisciplinary team of scientists, engineers and ship's crew will maintain autonomous in situ infrastructure equipped with a range of sensors and imaging systems, take new samples throughout the water column and seabed, and make new observations with seabed cameras. The autonomous infrastructure includes a surface ocean mooring operated in collaboration with the Met Office, sediment trap moorings in mid-water and seafloor time-lapse cameras.



RRS James Cook departs for the Porcupine Abyssal Plain Sustained Observatory

The team aboard will collect data for AtlantiS but also contribute to programmes such as [Integrated Carbon Observing System \(ICOS\)](#), [OceanSITES](#), and [Minke](#). The expedition team is supported [NEODASS](#) who provide satellite data daily giving an overview of the sea surface temperature, sea surface height and chlorophyll concentration. Look out for updates on this blog, [@PAP_observatory](#) and [@NOCnews](#) on X / Twitter and the National Oceanography Centre on LinkedIn throughout our research expedition.

19th June 2024: Marine Measurement Forum 66

Southampton, UK

The Marine Measurement Forum (MMF) is a series of one-day, non-profit making events that has been running since 1983 which provides excellent opportunities for networking and the informal exchange of ideas, knowledge, techniques and developments across an extensive range of marine scientific measurement activities.

During an MMF 'day' a series of short presentations on diverse marine measurement topics are interspersed with refreshment breaks that offer delegates the chance to network with like-minded colleagues. Attendees typically include scientists, surveyors, engineers and business people from a variety of organisations including research centres, academia, manufacturers, defence organisations, survey companies, consultancies, monitoring authorities, dredging companies, port authorities, energy companies and trade associations. Registration to attend the event is £45.00 per person this includes access to the meeting, refreshments and working lunch. To register to attend please [click here](#).

8th-12th July 2024: AMEMR Conference 2024

Plymouth, UK



Welcome to the 7th AMEMR conference; full details at www.amemr.com/. The AMEMR (Advances in Marine Ecosystem Modelling Research) Symposium series provides an opportunity to present, discuss and learn about a wide variety of marine modelling challenges, methods, applications and outcomes.

Over the years AMEMR has grown into the forum to present and absorb the latest developments in marine (eco)system modelling and discuss new challenges and opportunities. It is a great place to develop networks and we encourage Early Career Researcher involvement. Check out

the Themes and sessions for AMEMR 2024 at www.amemr.com/themes-and-sessions.html.

You can also follow us on Twitter [@amemr_updates](https://twitter.com/amemr_updates).

9th July 2024: IMarEST Annual Conference 2024

Southampton, UK

[Register](#) for our Annual Conference, returning for 2024, where once again we'll bring together engineers, scientists, technologists and other professionals from across our membership for a day of debate, exploration and discovery. If you would like to present your work at the conference, provide the Events Team with some details and a copy of your presentation, events@imarest.org.

We've [designed the day](#) with three streams, making it easy for you join the discussions most important to you:

Technology - Demystifying fuel options and scrutinising the diverse fuel landscape, analysing available technologies, infrastructure capabilities, and long-term viability.

Human Contributions - Achieving emission targets and deconstructing the intricate web of regulations and political landscapes impacting them and the crucial role of state-led support.

Environment - Looking at the ripple effects of new fuel productions and evolving emission targets on the maritime industry's wider sustainability footprint.

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

Oban, Scotland

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 & submit your Congress paper [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>, registration will open in early June.



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. The deadline to propose [sessions](#) is 15th July 2024.

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

Glasgow, Scotland

Can you believe that the MASTS ASM is only a little over 6 months away ? The event will take place at the Technology & Innovation Centre, and we have officially opened the call for special session and workshop ideas.

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](#).

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 take part in 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. The abstract submission deadline is the 30th June, download the [call for papers](#).

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 28th June.

JOBS and OPPORTUNITIES

Postdoctoral Research Fellow in Ocean Tracer Dynamics @ University of St Andrews, UK

We are seeking a postdoctoral research fellow to work on the broad topic of ocean tracer dynamics and their impact on climate, with a particular focus on the high-latitude oceans. Questions of interest include, but are not limited to:

- What processes set the mean-state and temporal variability (annual to centennial) of mixed layer tracer budgets (e.g. heat, carbon) in the high-latitude oceans, and what is their impact on global climate?
- What is the role of circulation features such as transient eddies, meanders, and gyres in the vertical and horizontal transport of tracers in the ocean subsurface (for example, moving heat toward the Antarctic ice sheet)?
- What is the residence time of tracers in the ocean mixed layer, what processes impact this, and is it likely to change in a warming climate?
- What is the relationship between watermass transformation, overturning circulation, passive tracer subduction/ventilation, and heat and carbon uptake at high latitudes?

The postdoc will have the opportunity to address these questions using a range of different approaches, including novel analysis of observational data and Earth System Models, running idealized numerical simulations or climate model experiments, or developing new theory. They will join an enthusiastic team dedicated to addressing similar questions and, as part of the [COASt](#) (Climate, Ocean, and Atmosphere @ St Andrews) group, will share thoughts, ideas, and expertise with a diverse team of scientists studying past, present, and future climate.

For more information, and to submit an application, follow [this link](#). Informal enquiries, including to discuss potential projects, can be addressed to Graeme MacGilchrist gam24@st-andrews.ac.uk.

There are jobs in the MASTS newsletter

New vacancies:

- Offshore Wind Team Recruitment (UK) – [SMRU](#) – 30/06/24
- Sustainability Adviser (Coastal Evidence and Monitoring) – [NatureScot](#) – 24/06/24
- Director Of Projects – [OSC](#) – 06/24
- Graduate/Junior Consultant – [OSC](#) – 06/24
- Senior Marine Consultant – [OSC](#) – 06/24
- Chief Executive Officer – [Sniffer](#) – 01/07/24
- Marine Consenting And Assessment Consultant (Senior To Principal Roles) – [NIRAS](#) – 30/06/24

Still open vacancies:

- **LAST CHANCE:** Senior Specialist Scientist (Coastal Flood Modeller) – [SEPA](#) – 16/06/24
- Senior Acoustician – [CEFAS](#) – 01/07/24

PhD Opportunities:

- Impact Of Climate Change On Coastal Integrated Multi-Trophic Aquaculture (IMTA) - [University Of Stirling](#) – 24/06
- Sustainable Transition to Nature-Based Solutions For Coastal Defence – [University Of Essex](#) – 06/24
- Apply now for the **2025 placement scheme with the Open Innovation Team (OIT)**. Applications are open until **11:59pm on 14 June 2024**. We encourage candidates from underrepresented groups to apply, as diversity of thought and experience strengthens our team. Our PhD placements offer a unique opportunity to work on policy projects across various sectors, contribute to impactful evaluations, and gain insight into government policymaking processes. Successful applicants will receive training, mentorship, and the chance to make significant contributions to our work. Don't miss this chance to gain valuable experience and shape future policies. [Find out more about this opportunity](#).
- The **Society for Underwater Technology (SUT) offers Educational Support Fund scholarships for talented students in marine science, underwater technology, and subsea engineering**, addressing the industry's need for qualified professionals. Undergraduate and postgraduate students worldwide can apply, with awards ranging from £2,000 to £4,000 annually. Applications for the 2024-2025 academic year are open until **June 30th 2024**. For more information and application details, check out the [SUT Webpage](#). Don't miss this opportunity to advance your education and career in these critical fields.
- The **NERC Research Experience Placement (REP) scheme offers exciting internship opportunities for undergraduates in environmental science**. Find out more and apply [here](#).
 - ❑ Insights into contemporary population connectivity of the Atlantic black-legged kittiwake: A snapshot at the ocean-basin scale - University of Aberdeen.
 - ❑ Developing database solutions for the management and analysis of marine passive acoustic recordings. University of St Andrews.
 - ❑ Greenhouse gas emissions from a restored Scottish saltmarsh. University of St Andrews.
 - ❑ The role of Iceland's sedimentary environments in climate regulation. University of St Andrews.
 - ❑ Training and testing a minke whale vocalisations deep learning detector. University of the Highlands and Islands-Scottish Association for Marine Science (SAMS).

There are jobs on the IMBER web site

<https://imber.info/category/news/>

- Professional Development Series for Students and Early Career Scientists: More details [here](#).
- SCOR opened the call for applications for an Early-Career Scientist to join the SCOR Executive Committee, with a deadline of June 28, 2024. More details [here](#).

- PhD opportunity on BioSurfactants from underexplored sources and potential for heavy metal bioremediation (SOFIA): for students interested in marine biotechnologies and bioremediation application. The closing date for applications is June 21st, 2024. More details [here](#).
 - SOLAS Early Career Scientist Day on 10 November 2024. The deadline for applications is 10 July 2024. More details [here](#).
 - The 2024 EuroMarine Calls for funding will be published soon. Several calls will be organised by both EuroMarine and the Early Career Researcher Working Group OYSTER (Orienting Young Scientists of EuroMarine), funded by EuroMarine. More details [here](#).
 - Applications for the 2024 Scientific Committee on Antarctic Research (SCAR) Fellowships are now open. The aim of the scheme is to encourage the active involvement of early-career researchers in Antarctic scientific research and to build new connections and further strengthen international capacity and cooperation in Antarctic research. The deadline for applications is 31 July 2024. More details [here](#).
 - The Northern Gulf Institute at Mississippi State University is hiring two Postdoctoral Associates based at National Oceanic and Atmospheric Administration (NOAA)'s Atlantic Oceanographic and Meteorological Laboratory (AOML) in Miami, Florida. Open until filled. More information [here](#).
 - The Ocean Carbon & Biogeochemistry Ocean-Atmosphere Interactions Committee has compiled relevant ROSES 2024 proposal opportunities and deadlines for air-sea research. More details [here](#).
 - Collaborative Network for Valuing Earth Information (CONVEI) will award multiple grants ranging from \$100,000 - \$125,000 each OR fellowship hosted by World Wildlife Fund (WWF) for one year that will advance the application and/or application of socioeconomic assessment methods of Earth Science Information (ESI) through case studies. To apply, please view the full solicitation guidelines and apply through our online form. Applications must be submitted by June 17, 2024 by 11:59 PM US Eastern Time. More details [here](#).
 - Conservation International-University of California Santa Barbara (UCSB) Climate Solutions Collaborative (CSC) is looking for a Project Manager, Conservation Science to oversee multiple science projects as part of our partnership with UCSB. More details [here](#).
 - EuroMarine Call for ECR fellowships 2024. Apply by **25 June**
 - Nominations for Editor of the journal *Estuaries and Coasts*. Apply by **1 July**
 - 2024 NF-POGO Open Call for Shipboard Training Fellowships is now open
-