April 2025

Challenger Wave

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

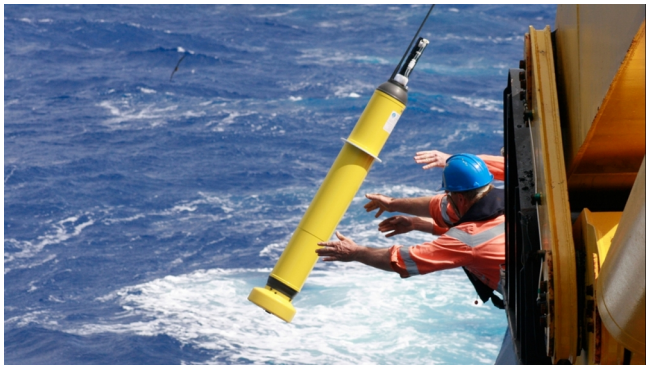
NEWS

Effects of Climate Change on Scottish Deep Seas

The Marine Alliance for Science and Technology for Scotland (MASTS) are excited to announce that their Working Group "Effects of Climate Change on Scottish Deep Seas" has finalised its Story Map and Policy Brief. The Story Map is an interactive, virtual tool explaining climate change drivers and highlighting case studies from corals to sponges, emphasizing the importance of deep-sea environments around Scotland. The Map was commissioned by MASTS and produced by the talented Emily Hague. Working Group members represented several institutions, including the University of Edinburgh, NatureScot, Heriot-Watt University, the University of Liverpool, the Robert Gordon University, SAMS and JNCC. The group also created a short Policy Brief based on the Story Map. Please share this news around your own networks.

Argo ocean observing system, turns 25

Somewhere in the middle of the ocean, a merchant mariner lowers a cylindrical robotic ocean observing instrument from a ship into the sea to record ocean temperature and salinity. Another instrument is deployed from a plane into the eye of a hurricane to take the pulse of the ocean during the storm. In Antarctic waters, a rounder float is released that will sink far deeper than the others, down to 6000 metres below the sea surface. These three robotic floats are part of a fleet of nearly 4,000 that make up what is known as the global Argo “array.” It is now 25 years since Argo floats began drifting with currents and diving for data. The array has helped scientists to better understand changes in the ocean, improve climate and weather forecasts and ultimately help society prepare for environmental change.



Researchers deploy an Argo float into the sea to gather data throughout the water column. (Image credit: Commonwealth Scientific and Industrial Research Organisation (CSIRO))

Once deployed into the ocean, Argo floats dive to their programmed depths to collect data and drift with currents. Every 10 days, the floats surface to transmit a “data profile” a snapshot of ocean information captured by the floats during that period. Those data are transmitted by satellite to global data centres, where the information collected by the floats is publicly available for free offsite link. On average, floats last five years on battery life, collecting ocean information from hard-to-reach parts of the globe, and weather events that are too dangerous for humans to venture to, like hurricanes.

The Argo Program is named after the Greek mythical ship Argo, which was captained by Jason, leader of the Argonauts. Argo was named to emphasize the complementary relationship between Jason satellite products and Argo floats. These floats have collected global ocean temperature and salinity data since the program’s inception in 1999. In the course of 25 years, that equates to more than three million data profiles, and four times the amount of ocean information than collected from all other ocean

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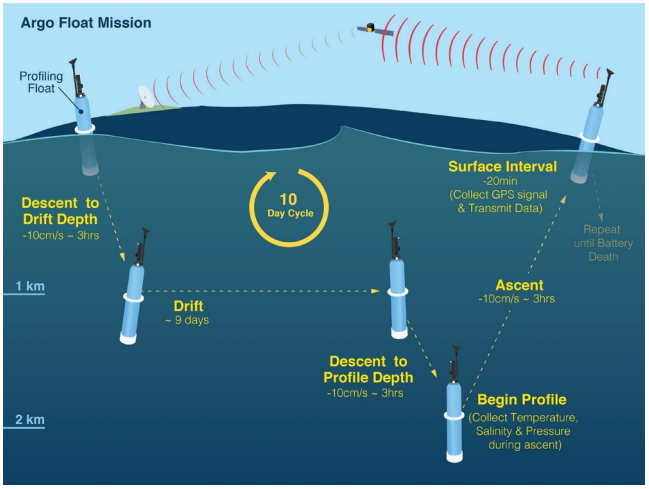
observing tools, like ships and moored buoys, combined.



Graphic showing an Argo float's 10 day mission cycle. (Image credit: Woods Hole Oceanographic Institution)

The original Argo array consisted of core floats measuring temperature and salinity in the upper 2,000 metres of the ocean. In recent years, scientists and engineers have developed new capabilities and new types of floats that, together, make up an ambitious expansion of Argo's first design. Biogeochemical Argo floats include more sensors to measure ocean variables that are critical for understanding and addressing environmental issues, like low oxygen levels and ocean acidification. Deep Argo floats extend the robots' depth range to 6000 metres below the ocean surface. The deep ocean is a place of significant data scarcity. Deep Argo's missions will allow scientists to better understand what controls deep ocean flows and then to track changes there.

Argo data is used in nearly 600 of the USA's National Oceanic and Atmospheric Administration (NOAA) products, touching all of the goals in NOAA's strategic plan (except for those related to space weather). The data are also used in more than 500 scientific publications annually, which means more than one scientific paper is published using Argo data every day. 26 countries participate in Argo's international program, and NOAA is the leader among them.

New study reveals long-term impacts of deep-sea mining and first signs of biological recovery

A new study led by the UK's National Oceanography Centre (NOC) has revealed the long-term impacts and the first signs of biological recovery in seabed mining tracks, 44 years after deep-sea trials in the Pacific Ocean. The findings, published on Wednesday 26 March in the scientific journal Nature, provide critical evidence to the global deep-sea mining debate. The concerns around deep-sea mining and the impact on the marine environment are heightened by a lack of evidence and understanding of the long-term recovery of the ecosystem. A team of scientists, led by Professor Daniel Jones at NOC and co-led by the Natural History Museum, recently visited a previously mined site in the Clarion Clipperton Zone (CCZ) to investigate if recovery is possible and what impact remains 44 years after the machines left.

Scientists visited a previously mined site in the Clarion Clipperton Zone (CCZ). Credit, National Oceanography Centre and Trustees of the Natural History Museum, with acknowledgement to the NERC SMARTEX project

The international team of researchers found that mining has clearly caused long-term changes to the sediments, but the effects on the animals living at these depths are more variable. Lead author and expedition leader, Professor Daniel Jones of the National Oceanography Centre, explains: "To tackle the crucial question of recovery from deep-sea mining, we need first to look to the past and use old mining tests to help understand long term impacts. 44 years later, the mining tracks themselves look very similar to when they were first made, with an 8-metre-wide strip of seabed cleared of nodules and two large furrows in the seafloor where the machine passed. The numbers of many animals were reduced within the tracks but we did see some of the first signs of biological recovery. We found some recovery of small and mobile animals living on the

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sediment surface. A type of large amoeba-like xenophyophore, creatures commonly found everywhere in the CCZ region, had recolonised the track areas. However, large-sized animals that are fixed to the seafloor, are still very rare in the tracks, showing little signs of recovery."

The team also discovered that sediment plumes, previously considered to be a likely major impact on the seafloor community, had limited long-term physical impacts and no detectable negative effects on animal numbers in the study. "The evidence provided by this study is critical for understanding potential long-term impacts. Although we saw some areas with little or no recovery, some animal groups were showing the first signs of recolonisation and repopulation." said Prof. Jones.

Co-author, Dr Adrian Glover, from the Natural History Museum, said: "General ecological theory will predict that following disturbance, any ecosystem will go through a series of successional stages of recolonisation and growth. However, until this study, we had no idea of the timescales of this critical process in the deep-sea mining regions, or how different parts of the community respond in different ways. Our results don't provide an answer to whether deep-sea mining is societally acceptable, but they do provide the data needed to make better informed policy decisions, such as the creation and refinement of protected regions and how we would monitor future impacts."

Deep-sea mining is increasingly being considered as a potential solution to supply the crucial metals required for advancing global technology and driving the transition to a net-zero energy future. A key area of interest for mining is the CCZ, a vast region in international waters of the Central Pacific Ocean. Spanning over 6 million square kilometres, approximately 25 times the size of the UK. It is home to unique and biodiverse deep-sea creatures, many yet to be described by science, as well as a rich mineral resource of polymetallic nodules, highly enriched in metals. At depths of nearly 5000m on the seabed of the CCZ, the abundant potato-sized rocks represent one of the most promising deep-sea mineral resources. The International Seabed Authority (ISA), established in 1994 under international law, is deciding whether to allow deep-sea mining in the region and under what conditions. A key question in this decision, is whether deep-sea ecosystems can recover from mining disturbances.

The CCZ is home to unique and biodiverse deep-sea creatures. Credit National Oceanography Centre and Trustees of the Natural History Museum, with acknowledgement to the NERC SMARTEX project

In the 1970s, the first industrial trials of deep-sea mining were carried out in the Pacific. It was this site that Prof. Jones and his team visited in 2023, onboard the world-class Royal Research Ship *James Cook*, equipped with the cutting-edge underwater robot submersible Isis, to explore and study the aged mining tracks deep beneath the ocean's surface. The study forms part of the NOC-led Seabed Mining and Resilience To EXperimental Impact (SMARTEX) project, funded by the Natural Environment Research Council (NERC). All the data collected is made available to all stakeholders in order to guide future policy decisions by the ISA and the nation states involved. Read the full study in Nature.

Scientists discover deep-sea microplastic hotspots created by fast-moving underwater avalanches

Fast-moving underwater avalanches, known as turbidity currents, are responsible for transporting vast quantities of microplastics into the deep sea, according to research published this month in the journal Environmental Science and Technology. The study, led by The University of Manchester and co-led by the UK's National Oceanography Centre (NOC) shows that these powerful flows could be capable of traveling at speeds of up to eight meters per second, carrying plastic waste from the continental shelf to depths of more than 3200 m. Over 10 million tonnes of plastic waste enter the oceans each year. While striking images of floating debris have driven efforts to curb pollution, this visible waste accounts for less

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than 1% of the total. The missing 99%, primarily made up of fibres from textiles and clothing, is instead sinking into the deep ocean.

Scientists have long suspected that turbidity currents play a major role in distributing microplastics across the seafloor. The University of Manchester were among the first to demonstrate this through their research on 'Microplastic Hotspots' in the Tyrrhenian Sea, published in the journal Science. However, until now, the actual process had not been observed or recorded in a real-world setting. This latest study, also involving researchers from the University of Leeds (UK), and the Royal Netherlands Institute for Sea Research provides the first field evidence showing the process. The findings pose a significant threat to marine ecosystems and highlight the urgent need for stronger pollution controls. Dr Peng Chen, lead author on the study at The University of Manchester, said "Microplastics on their own can be toxic to deep-sea life, but they also act as 'carriers' transferring other harmful pollutants such as PFAS 'forever chemicals' and heavy metals, which makes them an environmental 'multistressor' which can affect the entire food chain."

Dr Ian Kane, Geologist and Environmental Scientist at The University of Manchester, who designed and led the research, said: "These turbidity currents carry the nutrients and oxygen that are vital to sustain deep-sea life, so it is shocking that the same currents are also carrying these tiny plastic particles. These biodiversity hotspots are now co-located with microplastic hotspots, which could pose serious risks to deep-sea organisms. We hope this new understanding will support mitigations strategies going forward."

The research focused on Whittard Canyon in the Celtic Sea, a land-detached canyon over 300 km from the shore. By combining in-situ monitoring and direct seabed sampling supported by the RRS James Cook and RRS Discovery as part of the NERC-funded Climate Linked Atlantic Sector Science (CLASS) programme, the team were able to witness a turbidity current in action, moving a huge plume of sediment at over 2.5 m per second at over 1500 m water depth. The samples directly from the flow revealed that these powerful currents were not only carrying just sand and mud, but a significant quantity of microplastic fragments and microfibres. Further analysis found that the microplastics on the seafloor are mainly comprised of fibres from textiles and clothing, which are not effectively filtered out in domestic wastewater treatment plants and easily enter rivers and oceans.

Dr Mike Clare of the National Oceanography Centre, who was a co-lead on the research, added: "Our study has shown how detailed studies of seafloor currents can help us to connect microplastic transport pathways in the deep-sea and find the 'missing' microplastics. The results highlight the need for policy interventions to limit the future flow of plastics into natural environments and minimise impacts on ocean ecosystems." The study team are now focusing on efforts to better understand the effect that microplastics have on marine organisms, for example sea turtles and deep-sea fauna. Read the paper in full here: Environmental Science and Technology.

NOC launches new Innovation Hub to power ocean tech and blue economy

The UK's National Oceanography Centre (NOC) has unveiled an ambitious new Innovation Hub in Southampton, designed to accelerate advances in ocean technology and support sustainable growth across the blue economy. Backed by a £200,000 investment, the state-of-the-art facility will serve as a catalyst for innovation in marine autonomous systems (MAS), the blue economy and beyond, bringing together researchers, businesses and entrepreneurs to drive progress across the ocean and maritime sectors. The new hub features state-of-the-art meeting, conference and hot desking space, break out rooms and dining zones, traditional office spaces, and cutting-edge soundproof acoustic smart pods over 304 sq m floor space.

A launch event was held at the new facility during the Ocean Business conference and exhibition, with more than 50 representatives from across

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the UK and beyond across the commercial, research and academic sectors attending. Mark Hamson, Innovation Hub Manager, says, “Our mission is to foster innovation and innovative organisations in a collaborative environment, supporting and advancing commercial opportunities in the blue economy by creating connections between industry and science. This will help to harness the potential of the ocean for sustainable economic development, driving innovation and creating jobs and value in sectors such as fisheries, aquaculture, tourism, maritime transport and renewable energy to a wider pool of innovators. With our amazing new facilities, our connections across the ocean and maritime sectors, regular seminars, networking events, access to the deep expertise and research at NOC, as well as our ability to identify collaboration and partnering opportunities, it truly is an exciting time for innovation across the sectors we support.”

Mark Hamson, Innovation Hub Manager

The hub, run under NOC Innovations, being NOC’s enterprise arm, takes the former Marine Robotics Innovation Centre (MRIC) at NOC and its offering, to a new level. This includes extending the services and facilities provided, supporting a wider range of organisations across the ocean and maritime sectors, with a goal to double Innovation Hub membership from the more than 40 currently. It is already attracting new members, including a global Ocean conservation charity, The Ocean Conservation Trust. CEO Ian McFadzen says, "NOC’s new Innovation Hub offers us an impactful network that champions economic resilience, innovation and sustainability. It has long been a driving force in bringing businesses together to create a prosperous and sustainable future and we’re pleased to be part of its growth to drive further value for society."

To support the widest range of businesses and innovators, the Innovation Hub has tiered memberships to suit all organisations, from start-ups to multi-nationals, onsite or remote. Leader of Southampton City Council, Lorna Fielker, performed the official opening. She said, “I’m pleased to launch NOC’s new Innovation Hub. It will provide crucial support to strengthening a growing community of innovative companies developing, marketing and using technology for MAS and related ocean and maritime operations. The wide range of specialist teams at NOC, across key growth areas such as marine autonomous systems, will undoubtedly bring deep benefits to this critical community to the UK.” Further information is available at https://noc-innovations.com/innovation-hub/.

looking for benthic invertebrate isotope data from Scotland

Anna Kebke, a Post Graduate Researcher (PGR) at the University of Glasgow is looking for some benthic invertebrate isotope data from Scotland, particularly that from sponges in northeast Scotland. If anyone has any such data that you would be willing for Anna to take a look at, which would be helpful in writing up the final chapter of her PhD (looking at tissues of mass-stranded pilot whales), please contact Anna directly by email.

NOC Association (NOCA) AGM 2025

The 14th AGM of the NOC Association will be held on Thursday 15th and Friday 16th May 2025. This free, on-line event will take place on Zoom, across two consecutive mornings, each starting at 10:00 BST and ending at 12:30. The agenda will focus on national capability (NC) science, ships, and autonomous vehicles, and how the community can engage. There will be an update on AtlantiS and on the new marine science scoping group. All are warmly welcome to participate - please complete your registration here and if you have any enquiries, please contact Jackie Pearson, jfpea@noc.ac.uk, Secretary to NOCA for any other information.

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VIEWS

The Ocean Census discovers over 800 new marine species

The Nippon Foundation-Nekton Ocean Census, the world's largest collaborative effort to accelerate the discovery of marine life, has announced the discovery of 866 new marine species. This is a significant step in advancing our understanding of ocean biodiversity, with discoveries expected to grow as the programme continues. "The ocean covers 71% of our planet, yet it is said that only around 10% of marine life has been discovered so far, leaving an estimated 1–2 million species still undocumented," said Executive Director Mitsuyuki Unno of The Nippon Foundation representing the founding partner of the Ocean Census. "These latest findings demonstrate how international collaboration can advance our understanding of ocean biodiversity."

The identification and official registration of a new species can take up to 13.5 years, thus some species may go extinct before they are even documented. To address this, The Nippon Foundation and Nekton jointly launched the Ocean Census in April 2023 to transform species discovery, accelerating the identification of marine life to close critical knowledge gaps before it's too late.

Guitar Shark © The Nippon Foundation-Nekton Ocean Census / Sergey Bogorodsky, 2025

The Ocean Census global alliance has conducted 10 global expeditions and hosted 8 Species Discovery Workshops, awarding 19 Species Discovery Awards to taxonomists worldwide. New species of shark, sea butterfly, mud dragon, bamboo coral, water bear, octocoral, sponge, shrimp, crab, reef fish, squat lobster, pipehorse, limpet, hooded shrimp, sea spiders and brittle stars, encompassing dozens of taxonomic groups, have been registered to the Ocean Census Biodiversity Data Platform (formerly referred to as the Cyberbiodiversity System). The beta version, developed in partnership with the UN Environment Programme World Conservation Monitoring Centre, is now accessible to researchers and the public alike.

Using divers, submersibles, and remotely operated vehicles (ROVs), new species have been identified from depths of 1 to 4,990 meters, with analysis conducted by collaborating scientists from the Ocean Census Science Network.

Scientists frequently encounter species that are new to science, but a species is only officially recognised once it has been formally described and published in a scientific journal. This process can take years, meaning many remain undocumented before they can be studied. Prof. Lucy Woodall, Head of Science at Ocean Census, said "Too many species remain in limbo for years because the process of formally describing them is too slow. We urgently need to change that and adding the Species Discovery step gives us a way to rapidly start the process. Every new species, whether a shark or a sponge, deepens our understanding of marine ecosystems and the benefits they provide for the planet."

When the Ocean Census first launched, the project envisioned a Biodiversity Centres framework. The strategy has since evolved into a decentralised network of scientists participating from over 400 institutions worldwide, a more agile framework that unites diverse skills and resources globally. "The past two years have been transformative for the Ocean Census: we've pioneered new methods, forged key partnerships, established a global network of participating scientists, and overcome the hurdles of a truly global mission," said Oliver

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Steeds, Director of the Ocean Census. “Our estimates suggest that discovering 100,000 new species could require at least US$1 billion. We are laying the groundwork to make large-scale species discovery a reality, but our impact will ultimately be determined by how this knowledge is used to support marine protection, climate adaptation, and biodiversity conservation.”

Endorsed under the United Nations Ocean Decade, the Ocean Census has formed strategic partnerships with national marine research institutes, museums, universities, philanthropic organisations, and technology partners. These alliances amplify research efforts in uncharted ocean regions, filling critical gaps in our understanding of marine life. “Schmidt Ocean Institute is proud to be a partner of the Ocean Census, whose strength lies in its vast network. By uniting governments, philanthropic supporters, and leading marine research organisations, we can accelerate the discovery of ocean life at an unprecedented scale,” said Jyotika Virmani, Executive Director of Schmidt Ocean Institute.

Building on the initial findings, the Ocean Census will provide dozens more Species Discovery Awards, undertake 10 new expeditions, and host 7 additional Species Discovery Workshops in 2025 across the Pacific, Indian, and Southern Oceans. All further data will be added to the Ocean Census Biodiversity Data Platform.

Enabling scientific discovery through cutting-edge marine capabilities

The future of our ocean is uncertain, but one thing is clear: understanding and managing the rapid changes in marine environments is critical to addressing some of the most pressing challenges facing society today. As we look to the future of ocean research, I am delighted to have an opportunity to tell you more about NERC’s Future Marine Research Infrastructure (FMRI) programme, who we are and what this means for the UK science community. Over the coming months we will provide updates both here and in Challenger Wave, and hope to answer your questions about the vision, opportunities and delivery of FMRI.

I'm accountable for leading a programme that works with the science community to build a compelling business case for a transformative investment in the UK’s marine research infrastructure. Together, we can enable global collaboration and groundbreaking discoveries through next-generation, integrated and accessible infrastructure. The FMRI mission is to equip you with the cutting-edge technologies and expertise needed to deliver the science that will shape a resilient future for us all.

We recognise the importance of sustained observations for ocean and climate science, and the need for long-term investment in research infrastructure. That’s why the FMRI programme is building the case for a strategic investment in the UK’s marine research infrastructure. Using feedback gathered from the community, we will design capabilities that enable science to address urgent environmental and societal issues as well as meeting the critical success factors set by NERC. The challenges of climate change, biodiversity loss, pollution, natural hazards and a growing blue economy demand a modern, adaptable and sustainable research infrastructure. These priorities will be explored further in the Science Requirements Framework that will be published this summer. This is the first stage in an ongoing conversation to design an infrastructure capable of supporting both sustained observations and discovery science. We look forward to receiving your feedback when the framework is published.

It is also an exciting time for technological innovation. The rapid advancement of marine autonomous systems and Artificial Intelligence has the potential to revolutionise the way we collect and process high quality data. By integrating new capabilities with proven platforms, we can create opportunities for new and different science. By investing in our people, the UK can lead the way in using these emerging technologies to generate new understanding of the ocean and remain a partner of choice for global scientific endeavour.

Our priority is to ensure that the design of the future capability is a collaborative process, informed by insights and expertise from across the marine science community. A new FMRI podcast, hosted by Dr Helen Czerski, invites you to consider the future of marine science, priorities for research over the next 30 years, the process

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of securing national investment and the opportunities ahead. For alerts to episodes launching later this month, please sign up to the FMRI newsletter, where you will also have an opportunity to submit questions for a dedicated Q&A episode that will wrap up the series.

Marine research has never been more important than it is today. As we look to the future, the FMRI team will work with you to advocate for investment in vital marine research infrastructures. We aim to secure the technologies and skills that will enable the UK to lead the way in future marine research. By delivering a strategic investment in the UK's marine research infrastructure, we can continue exploring the mysteries of the ocean and unlocking solutions for our planet's most urgent issues. ***:- Leigh Storey, Future Marine Research Infrastructure, Senior Responsible Owner***

European research institute to acquire NOC autonomous underwater vehicles

A leading European research, technology and innovation organisation has chosen cutting edge underwater robotics from the UK's National Oceanography Centre (NOC) to help advance its marine research capabilities. The agreement will see Madeira Island's Regional Agency for the Development of Research, Technology and Innovation, ARDITI, acquire two NOC Autosub Long Range (ALR) autonomous underwater vehicles, for use in ocean science offshore Portugal and beyond.

NOC's ALRs have been developed to a high level of capability, autonomy and endurance for nearly three decades by the centre's world leading engineering and robotics teams. They are able to significantly advance ocean research supporting unprecedented data collection capabilities, from mapping to marine biogeochemical sensing, down to 6000 m water depth over durations from multiple weeks to months. To date, the ALRs have been available for use by the UK marine science community. Agreements with overseas science organisations such as ARDITI opens their use to the international marine science community, but also helps to further develop the vehicles' capabilities and availability, through funding and collaboration.

Dr Alex Phillips, head of the Marine Autonomous and Robotic Systems (MARS) Group at NOC, says, "We have been developing Autosub AUVs for the past 30 years to support the UK science community make measurements in the Ocean. The ALR, with its multi-month endurance and proven ability to operate without the need for a research vessel, is a major advance in our capabilities. It is very exciting to be able to provide access to this technology to the broader global marine science community."

Madeira Island is uniquely placed to explore the deep ocean. The island is in the middle of the Atlantic Ocean, 1,000 km southwest of Lisbon, on mainland Portugal. It's waters quickly deepen to around 1000 m within just 10 km of the shoreline, and go to beyond 3000 m water depth beyond 15 km. Rui Caldeira, Principal Scientist, at ARDITI, says, "At ARDITI, we're at the forefront of promoting research, technological development and innovation in Madeira Island. With NOC underwater vehicles, we're pleased to expand our capabilities, leveraging their compact size, endurance and modularity for applications from coastal monitoring and seabed mapping to full water column oceanographic data gathering.

The data they gather will support our and our partners' research and help regional and national governments enforce EU Directives. Combined with uncrewed surface vessels (USVs) and traditional ships, they will also help to make Madeira Island an attractive ultra-deep-sea location for testing for international partners."

NOC's ALRs have been built to be operated on a common, open-source operating system, which makes them ideally suited to any marine science organisations keen to fast-track their marine observation and monitoring capabilities. The system removes the major learning curve that can be involved in adopting new technologies or robotics, with the vehicles having the flexibility to adopt a huge array of sensors which have already been integrated into the platform. Both of ARDITI's vehicles will come with an

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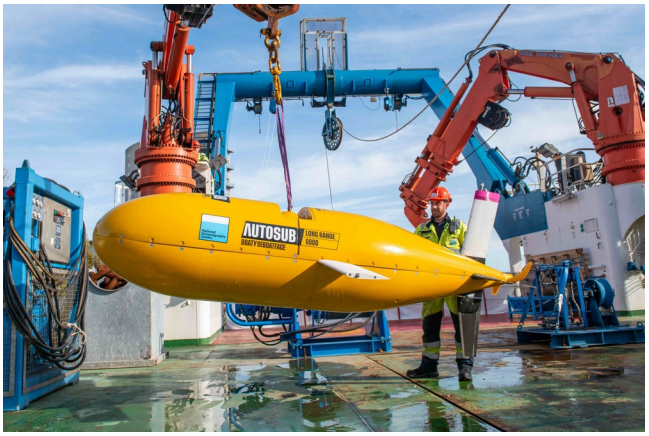
impressive full suite of sensors. One will be 1500 m rated and focused on the oceanography and biogeochemistry of the water column. The second will be 6000 m rated and focused on seabed mapping.



NOC's Autosub Long Range (ALR) autonomous underwater vehicle (AUV). Photo from NOC.

The agreement, through agency Casco Antiguo, will see the MARS group support ARDITI's in-house robotics capabilities growth, while they will also bring insight into the wider ALR technology eco-system as it continues to advance. The ALRs have been developed by NOC, in part funded through the UK's Natural Environment Research Council (NERC), and made available for use by the UK marine science community through NERC's National Marine Equipment Pool (NMEP). The acquisition by ARDITI comes as NOC is also building additional vehicles for its own fleet, owned and operated by NOC, in addition to those already available for use by UK marine research organisations. By the end of 2026, there will be a total of eight ALRs at NOC, with four residing in the NMEP.

Sonardyne teams up with Echoview Software to deliver a comprehensive picture of marine environmental data from its Origin® ADCPs.

Sonardyne, a global leader in underwater technology solutions, today announced the addition of the innovative echosounder feature to its Origin acoustic Doppler current profilers (ADCPs), significantly enhancing their ability to collect comprehensive marine environmental data in a single deployment. This new capability enhances offshore environmental monitoring by enabling simultaneous measurement of water velocities and biological activity, with the echosounder working alongside the ADCP's existing functionality to record detailed insights into marine environments. This data is then brought to life through post processing in Echoview.

"Echosounder is a fantastic addition to our Origin ADCPs. In echosounder mode, Origin sends much shorter pulses of sound into the water, allowing it to produce very high resolution profiles of backscatter intensity. We can interleave echosounder and ADCP pulses in the same schedule, enabling simultaneous collection of both data types. This means we can collect measurements of water velocities and the scatterer environment, to cover both hydrodynamic and ecological aspects of a deployment site" explained Eleanor Stanton, ADCP Associate Product Manager, Sonardyne.

The echosounder feature collects detailed backscatter measurements from objects in the water column, including gas bubbles, biological organisms, fish shoals and physical processes such as internal waves and sediment plumes. When combined with the ADCP's water velocity measurements, users gain unprecedented insight into the complete marine environment from a single instrument. Echoview is advanced echosounder and sonar data processing software, offering capabilities that range from easy data visualisation to sophisticated target detection and analysis. It is widely recognised as the industry standard for water column active acoustic data processing and is trusted by professionals worldwide for environmental assessments and scientific research. Echoview Software and Sonardyne have worked closely together to ensure that Origin ADCP users can begin processing their echosounder data with Echoview from day one.

"We are committed to implementing the latest advancements in hydroacoustic technology in our software to support scientific endeavours worldwide. By providing compatibility with echosounder data from Sonardyne's Origin ADCPs from launch, we ensure that users can efficiently and seamlessly process data from innovative deployments, helping to drive progress in environmental monitoring and facilitating research across diverse applications. The quality of echosounder data that Origin ADCPs can collect will be used to extract all manner of useful metrics, particularly from a temporal perspective. As technology evolves, we look forward to expanding our capabilities further,

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providing even greater flexibility and support for future innovations in the field" reported Briony Hutton, Chief Scientist and Product Manager, Echoview Software.

Pictured L-R. Will Reis, Sales Manager, Sonardyne, Brett Merritt, CEO, Echoview and Mike Palin, Regional Sales Manager (Europe), Echoview with an Origin 65 ADCP

The Origin ADCP echosounder and data processing partnership represents Sonardyne's and Echoview Software's shared commitment to providing advanced solutions for marine environmental monitoring, supporting sustainable offshore developments with comprehensive data collection and analysis tools. "Recognising the benefit of delivering Origin echosounder mode supported by a hydroacoustic data processing software programme, there was no other choice than Echoview. As the world's premier software package for processing hydroacoustic data, Echoview provides powerful and comprehensive capability for processing and analysis of echosounder data collected by Origin ADCPs. We're delighted to embark on the collaboration with Echoview Software and we look forward to seeing where the solution of Origin echosounder combined with Echoview will be applied in future" said Michelle Barnett, Business Development Manager, Ocean Science, Sonardyne

Successful Collaboration between Gold Standard Partners

Planet Ocean Ltd is pleased to announce a collaboration with Sonardyne International Ltd resulting in the successful integration and deployment of three, gold standard instruments from its reseller partners, Sea-Bird Scientific, Sequoia and 4H-Jena. The Sonardyne team have integrated a Sea-Bird Scientific HydroCAT-EP V2 sensor with pressure, dissolved oxygen concentration, chlorophyll and turbidity, a CONTROS HydroC Dissolved CO_2 Sensor and a LISST-200X particle size analyser with their Origin 600 ADCP.

The individual sensors can stream data directly into the Origin 600 external sensor port or together can be connected via the Origin E-Mux multiplexor, which can receive measurements from up to four sensors and pass their data to the ADCP. The Origin E-Mux also provides additional power to the ADCP and any external sensors, allowing for extended deployments. All sensor data is logged on Origin 600 for download post-deployment but can also be fused with ADCP measurements within the Sonardyne Edge computing environment. Fused data can then be transmitted to the surface via Origin 600's integrated acoustic modem. The entire payload can be housed in Sonardyne's Origin Seabed Lander bedframe.

This integration provided a good example of the above process: The Sensor Suite were preconfigured to produce measurements at a fixed rate to Origin, which powered the sensors and logged the received data. The data was fused with ADCP current measurements in Origin's Edge computing environment, allowing in-situ combination of multiple parameters into a NMEA-style string. This string was transmitted acoustically to the surface every five minutes using Origin's integrated acoustic modem. The NMEA data was then further distributed to a Cloud account, allowing users to view live updates of current speed, current bearing, conductivity, temperature and pressure. A further benefit to the collaboration is the ability of the Planet Ocean ecoSUB Robotics AUV's to communicate with the Origin system since they can operate in the same Sonardyne 6G acoustic ecosystem.

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SALTS

RRS *James Cook* over the mid-Atlantic ridge

Scientists aboard the RRS *James Cook* are investigating the role of internal waves over the mid-Atlantic ridge in shaping plankton communities and carbon export. The expedition, led by Jonathan Sharples, involves scientists and engineers from the University of Liverpool, University of Southampton, Heriot-Watt University, the National Oceanography Centre, Bangor University, Oxford University, and the MBA (Marine Biological Association), along with the University of Seville, the Scripps Institution of Oceanography, MIT, and Annamalai University India.

The ship left Rio de Janeiro on February 19th, dropped off a few Argo floats on the way to the mid-Atlantic ridge, and has been working over the ridge at 16 degrees south and in the Brazil Basin.

The main aim is to determine how turbulent mixing caused by internal tidal waves over the ridge lead to increased upward flux of nutrients, which may alter the plankton community structure to be made up of larger species. Ultimately, we want to determine if features such as the mid-Atlantic ridge are regions of enhanced carbon export out of the base of the deep chlorophyll maximum.

The expedition is very multi-disciplinary, ranging from measurements of turbulent microstructure, nutrients and dissolved organic matter, through phytoplankton photosynthesis, uptake rates, nutrient requirements and phytoplankton epigenetics, to zooplankton and particle characteristics.

As I write this, we have retrieved one of our gliders and are recovering one of our two main moorings. We will head eastward later to recover another mooring, glider, wirewalker mooring and a turbulence float. Then we are off to a final station in the Angola Basin before finishing the expedition In Walvis Bay at the end of the month. Further details online here:
https://jonathanatsea.wordpress.com/
https://www.arianwen.com/fieldworkdiaries

CALENDAR

27th April - 2nd May 2025: European Geophysical Union General Assembly.
Vienna, Austria
The EGU General Assembly 2025 brings together geoscientists from all over the world to one meeting covering all disciplines of the Earth, planetary, and space sciences. The EGU aims to provide a forum where scientists, especially early career researchers, can present their work and discuss their ideas with experts in all fields of geoscience.

The Provisional Programme is online. Prepare your calendar with all the EGU25 important

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dates by checking our Deadlines and Milestones page. Curious about who organizes the EGU25 General Assembly? Meet the Programme Committee.

13th-16th May 2025: IMBeR future Oceans 3
Shanghai, China
IMBeR (Integrated Marine Biosphere Research) approaches the conclusion of its transformative journey (2016–2025) and is excited to host the IMBeR Synthesis and Future Planning Conference (Future Oceans3, FO3). This pivotal event will bring together IMBeR's diverse science teams, representatives from international organizations, policymakers, and early career researchers to reflect on the past decade-long achievements, share rich collaborative experiences, and shape the future of marine biosphere research.

IMBeR organizes the FO3 around three major themes:

- Looking Inward: Reflecting on IMBeR's scientific achievements over the past decade (2016-2025).
- Looking Outward: Reviewing IMBeR's interactions with relevant scientific projects, programs, organizations, and initiatives.
- Looking Forward: Envisioning the future of marine biosphere research post-IMBeR.

IMBeR Synthesis and Future Planning Conference (Future Oceans 3) is an endorsed United Nations Decade of Ocean Science for Sustainable Development activity; Visit the web site. Early bird registration deadline is the 20th April and late registration for on-site attendance closes on the 2nd May.

28th-29th May 2025: The MARTECH Workshop 2025
Pasaia, Spain
The Martech Workshop 2025 is an excellent platform for showcasing innovations and collaborating with marine technology experts. MARTECH 2025 is organized by the Marine Technologies team of AZTI located at the Pasaia AZTI Headquarters and the Universitat Politècnica de Catalunya (UPC – SARTI). Further details about the workshop are available on their website: http://www.martech-workshop.org/.

4th-6th June 2025: The One Ocean Science Congress
Nice, France
The One Ocean Science Congress will feature a mix of plenary sessions, including opening and keynote speeches, alongside parallel oral and poster presentations. The One Ocean Science Congress is organised by CNRS and IFREMER and it is a special event of the 3rd United Nations Conference on the Ocean Endorsed by the United Nations Decade of Ocean Science for Sustainable Development. Please see more information on their website: https://one-ocean-science-2025.org/home.html

11th-12th June 2025: Townhall on the UK Arctic Ocean contribution to the International Polar Year 32/33
Southampton, UK
The Arctic is one of the most rapidly-changing regions on our planet, with impacts on global sea-level rise, changes to our climate and weather patterns, and threats to our shared biodiversity and ecosystem services. With the international community rapidly mobilising towards the International Polar Year 32/33, and with new international programmes and initiatives now being shaped, it is timely for the UK Ocean Science community to come together and articulate what its unique offerings could be to Arctic research and technology.

This hybrid 2-day meeting, to be held at the National Oceanography Centre (NOC) Southampton, is intended to start this process. Recognising the Arctic Ocean role in global Earth and Human systems, anticipated outcomes include a high-level shaping of what the UK Arctic Ocean community would like to achieve over the course of the IPY, stimulation of new collaborations and proposals for grand Arctic

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challenges and a baseline from which wider integration with terrestrial, atmospheric and cryosphere communities, both in the UK and overseas, can be built.

Discussions will continue in diverse forums, including the UK Arctic Science Meeting in September and at Challenger 2026. This action is supported by the UK Arctic Office and UK Arctic and Antarctic Partnership. Further details and meeting registration link will be circulated in April together with a questionnaire to help shape the agenda and discussion. In the meantime, please save the date.

23rd-24th June 2025: Advances in Marine Biogeochemistry (AMBIO) conference
Edinburgh, UK
The MASTS Marine Biogeochemistry Forum are delighted to be partnering with the Challenger Society to host the next Advances in Marine Biogeochemistry (AMBIO) conference. AMBIO provides a technical forum for students, educators, researchers, and governmental and industrial partners with shared interests in marine biogeochemistry.

The meeting will be held in Edinburgh at the Edinburgh Climate Change Institute https://edinburghcentre.org/. Submission of abstracts can be made here before the **2nd June**. There will be prizes for best ECR poster and presentation. Registration can be made here and will also close on the 2nd June (or sooner if spaces filled). The event is limited to 60 attendees only, so don't delay. Registration costs will cover attendance to the conference, including lunch both days, tea and coffee and a poster drinks reception on Monday 23rd (1630-1800). Please feel free to share

23rd-24th June 2025: Structures in the Marine Environment (SIME) 2025 conference
Edinburgh, UK
Call for presentation and poster abstracts. The INSITE Programme and OCF are pleased to announce SIME conference will be held once again at the National Museum of Scotland. Abstract submission will be open until the **28th of April**. Please submit your abstracts for the following four sessions:

- Long-term environmental impacts of contaminants & breakdown materials;
- Estimating biomass associated with structures;
- Social Attitudes to Marine Artificial Structures;
- Monitoring, Evidence and Innovation surrounding Marine Artificial
- Structures and Decommissioning.

23rd-25th June 2025: Turbulence Grey Zone Workshop
Exeter, UK
Highlighting the opportunity to attend or participate in a workshop about advances in turbulence modelling/parametrisations, which is taking place at the University of Exeter next summer. Turbulence parametrisation is a common challenge in the modelling of fluids, including Earth's ocean and atmosphere, so the conference aims to take an interdisciplinary approach.

24th-25th June 2025: Machine Learning for Ocean Modelling workshop
Reading, UK
Announcing a new workshop taking place at the University of Reading; this will be an in-person event with the option to attend remotely for some of the sessions. The workshop, organised by colleagues from NCAS, NOC, BAS, and the Met Office, will take place over two full days. There will be keynote talks, short talks, and posters presented across some important themes, such as hybrid modelling and benchmarking.

As many of you will be aware, the space surrounding machine learning is fast evolving, so it is important that we come together as a community to identify current challenges and opportunities, particularly within the UK. For now, please save the date in your calendar if you are interested in taking part in this new workshop. We will be in touch soon to provide more concrete details and open the registration.

30th June 2025: Wind Waves Special Interest Group meeting
Liverpool, UK
The 2025 meeting of the Challenger Society Special Interest Group (SIG) on Wind Waves will take place at the National Oceanography

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Centre in Liverpool. The SIG aims to promote research in ocean surface waves and of their interactions with oceanographic, atmospheric and climatic processes. We provide a forum for cross-disciplinary exchange of information, and to encourage early-career researchers in this field by providing an informal platform for presentations and interactions. If you want to receive information about future events, please contact Dr Lucy Bricheno (luic@noc.ac.uk) to be added to the mailing list.

More details of our special interest group here: https://projects.noc.ac.uk/windwavesSIG/, and details of previous meetings can be found here: https://projects.noc.ac.uk/windwavesSIG/meetings.

1st-3rd July 2025: 2nd UK Coastal Research Conference
Liverpool, UK
Coastal zones are of high ecological and societal value, but as the dynamic interface between land, sea, and air, they are heavily impacted by a combination of climate-driven environmental change and human interventions. Approaches to sustainably manage the coastal zone increasingly seek to provide co-benefits such as risk mitigation, climate regulation, biodiversity gain, and supporting coastal community resilience. These require working across sectors and disciplines to better manage the UK coast in a changing climate.

The second UK Coastal Research Conference welcomes all those with an interest in UK coastal science, including academia, policy makers, practitioners and industry professionals. Our aim is for the conference to promote conversations around national coastal research strategies and coastal knowledge, connecting researchers with those involved in managing our coasts, and thereby inform sustainable future management of our coast.

Following on the first UK Coastal Research Conference, the programme will include one day with optional site visit / training course / workshops and two days for the conference including keynote, oral and poster presentations. Social activities are planned to include an icebreaker drink reception and a conference dinner. Abstract submission now open. For further information and submission form click HERE.

15th-16th July 2025: Deep-Sea Ecosystems Special Interest Group meeting
Newcastle, UK
The 2025 meeting of the Deep-Sea Ecosystems SIG will be hosted by Will Reid at Dove Marine Lab on the outskirts of Newcastle. This year, the SIG is pleased to announce they've been given some funds from the Challenger Soc. This is going to be split to cover some of the food and drink, and to provide a travel bursary for an ECR to attend the meeting.

The registration link for the 2025 DSE-SIG meeting is now live. Registration closes on the 9th of May. As with previous years, we will look to provide remote attendance for people who are unable to attend in person.

11th-15th August 2025: Aquatic Stressors Forum
York, UK
This Forum would like to highlight an opportunity for PhD students and Early Career Researchers (ECRs), interested in ecotoxicology, to present their work in a friendly and supportive environment as well as network with like minded individuals. The University of York will be hosting SETAC's (Society of Environmental Toxicology and Chemistry) Young Environmental Scientist (YES) conference this August. Find out more here.

15th-18th September 2025: The ICES 2025 Annual Science Conference
Klaipeda, Lithuania
The ICES (International Council for the Exploration of the Sea) 2025 Annual Science Conference (ASC) taking place at Klaipeda University in Lithuania. The ASC will bring together marine scientists from around the world to share innovative research, ideas, and build lasting collaborations. The conference will feature a dynamic programme, covering key areas of ICES Science, including ecosystem science, human impacts, emerging technologies, and conservation.

23rd-25th September 2025: 8th Euro-Argo Science Meeting
Crete, Greece
We are pleased to inform you that a call for abstracts for the 8th Euro-Argo Science Meeting

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is now open. The event is open to everyone, and the call for abstract will close on **Friday 25 April.**

More information is available on the Meeting webpage: https://www.euro-argo.eu/News-Meetings/Meetings/Euro-Argo-Users-Meetings/8th-Euro-Argo-Science-Meeting

The direct link to the Call for abstracts can be found at: https://www.euro-argo.eu/News-Meetings/Meetings/Euro-Argo-Users-Meetings/8th-Euro-Argo-Science-Meeting/Call-for-abstract

9th October 2025: 6th Maritime Transport Efficiency Conference (MTE Conference)
Geneva, Switzerland
To take place at the Hotel President Wilson, Geneva. Held annually, the MTE Conference uniquely bridges the maritime and commodity trading sectors, addressing the shared challenges and opportunities of decarbonising the global shipping industry. Focusing on the commercial and operational aspects of decarbonisation and offering actionable strategies to reduce emissions across the maritime value chain, the event caters to shipowners, cargo owners, charterers, operators, fuel suppliers, regulatory bodies, and technology innovators.

This diverse mix of stakeholders ensures comprehensive discussions on navigating the evolving regulatory landscape, adopting sustainable procurement practices, and embracing emerging technologies, while promoting cross-industry collaborative efforts to decarbonise.

16th-18th October 2025: Arctic Circle Assembly 2025
Reykjavik, Iceland
The Arctic Circle Assembly will be held in the Harpa Concert Hall and Conference Centre, and registration will open in early June. The annual Arctic Circle Assembly brings together governments, organizations, corporations, universities, think tanks, environmental associations, Indigenous communities, citizens and others for a comprehensive and democratic Arctic dialogue. The Assembly is the largest gathering on Arctic affairs. It is a place for international engagement, cooperation, and celebration.

Governments, universities, companies, research institutions, organizations, associations and others are invited to submit Session proposals for the 2025 Arctic Circle Assembly. The deadline for submitting proposals is 23:59 on May 1st, 2025, Alaska Standard Time (AKST).

The Polar Dialogue will return in October. It consists of a series of sessions, consultative meetings, workshops and high-level Plenary Sessions taking place during the Assembly. The initiative aims to facilitate science and research cooperation in the Arctic, Antarctic and Himalaya-Third Pole region, as well as other ice-covered areas of the world. Chaired by H.E. Katrín Jakobsdóttir, Prime Minister of Iceland 2017-2024, the Polar Dialogue unites global experts and policymakers to address scientific challenges and foster collaboration.

The Business Forum will take place again during the 2025 Assembly at the Reykjavik Edition Hotel (located within the Assembly Area). It consists of a series of Sessions, consultative meetings, workshops and high-level Plenary Sessions. The Business Forum will delve further into areas of interest including tourism, the blue economy, infrastructure, innovation and more. Additionally, the assembly program has Business Forum Sessions that are open to all participants.

In addition, the Frederik Paulsen Arctic Academic Action Awards will be awarded for the fifth time at the 2025 Arctic Circle Assembly.

8th-10th September 2026: Challenger Society for Marine Science Conference
Bangor, UK
Save the dates for the next biennial Challenger conference, which will be in Bangor, 42 years on from the first modern Challenger conference which was also held in Bangor; then organised by John Simpson, Paul Linden, Steve Thorpe and Roy Chester, and run by amongst others a very junior Ed Hill and Bill Turrell.

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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 30th April.

JOBS and OPPORTUNITIES

Lecturer in Marine Sciences at UEA and Cefas

The University of East Anglia invites applications for a Lectureship in Marine Science based in the School of Environmental Sciences. You will have developed strong expertise in an area of marine science research and will be excited by the opportunity to develop your research interests in the rich interdisciplinary environment the School offers.

This joint post is part of a strategic alliance between the University of East Anglia and the Centre for Environment, Fisheries and Aquaculture Science (Cefas; https://www.cefas.co.uk/), the primary research agency responsible for advising government on marine environmental and fisheries management. The post will involve developing research and teaching in the area of marine and/or coastal ecosystem services, plus enhancing the UEA-Cefas link through an active participation in the Collaborative Centre for Sustainable Use of the Seas (CCSUS; https://www.uea.ac.uk/ccsus/home).

You will be based at UEA in Norwich, but will be expected to spend part of your time at the Cefas laboratory in Lowestoft (Suffolk), where you will have access to key facilities (including the research vessel Cefas Endeavour), and benefit from interactions with teams of government scientists. You must have a PhD in Marine Science (or equivalent qualification) or a related discipline and will be able to fulfil all essential elements of the person specification. This full-time post is available from 1 August 2025 on an indefinite basis. UEA offers a variety of flexible working options and although this role is advertised on a full-time basis, we encourage applications from individuals who would prefer a flexible working pattern including annualised hours, compressed working hours, part time, job share, term-time only and/or hybrid working. Details of preferred hours should be stated in the personal statement and will be discussed further at interview. We strongly encourage applicants from women and all those from Black, Asian or other minority ethnic backgrounds and welcome applications from all protected groups as defined by the Equality Act 2010. Appointment will be made on merit. Closing date: **2 May 2025**

https://vacancies.uea.ac.uk/vacancies/1122/lecturer-in-marine-science-atr1697.html

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There are jobs in the MASTS newsletter

New vacancies:

Visit our Vacancy Webpage to find all the positions listed below.

- ✔ Recreational Disturbance Programme Manager - RSPB - closing 05/5/25
- ✔ Industry Engagement Manager, Wales - Seafish - closing 06/5/25
- ✔ Head of Global Ocean Team - IUCN - closing 01/6/25

There are jobs in IMBeR's newsletter

- Scientific Project Manager (m/f/d) -GEOMAR Helmholtz Centre for Ocean Research Kiel. Apply by **20 April 2025**. More information here.
- Lecturer in Marine Science, School of Environmental Sciences, The University of East Anglia. Apply by **2 May 2025**. More information here.
- PhD Project Opportunity - ISMER-UQAR & VLIZ. Apply by **5 May 2025**. More information here.
- Research Associate in Oceanic Blue Carbon. This post is funded by UKRI and is part of a large Horizon Europe consortia, SeaQUESTER, which aims to better understand marine carbon cycling and storage in polar ecosystems, and how climate change may produce new or novel blue carbon ecosystems as sea-ice melts. Looking for an enthusiastic Research Associate to join the team, and develop computational approaches to assess blue carbon transit and stocks. More information here.
- Postdoctoral Fellowship: Climate Change Impacts on Northwest Atlantic Marine Ecosystems & Fisheries, Memorial University, St. John's, Canada. Position will remain open until filled.
- Postdoctoral Fellowship: Transforming Climate Action - Uncertain Seas, Memorial University, St. John's, Canada. Open until filled.
- **Anthropocene Coasts Recruiting Position: Associate Editors.** Applications will continue until the position is filled. Anthropocene Coasts is a Golden Open Access journal hosted by East China Normal University, and published by Springer. The journal publishes multidisciplinary research addressing the interaction of human activities with our estuaries and coasts. To help build on the success of Anthropocene Coasts and to expand the opportunities for international collaboration and contributions to the work of the journal, the journal is seeking more international Associate Editors.

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