January 2024

Challenger Wave

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

NEWS

G7 Future of the Seas and Oceans Initiative Working Group meeting 2023

The G7 Future of the Seas and Oceans Initiative (G7 FSOI) Working Group meeting was held from 14th to 16th November 2023 under the Japanese G7 Presidency. The FSOI Working Group, created by the G7 in 2016, has been engaged in a wide variety of actions related to the promotion of ocean science and its contribution to society, including the strengthening of ocean observing systems. This meeting marked the full cycle of the G7 Presidency with exactly seven years since 2016.

The meeting took place at the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in Tokyo. Day 1 of the meeting was organised in a workshop style, serving to discuss two new emerging issues of 'Arctic Ocean Observing' and 'Marine Research Infrastructures Integration and Harmonization' within the context of the ocean-climate-biodiversity nexus in the legacy of the 2022 G7 FSOI Working Group Berlin meeting, www.g7fsoi.org/g7-fsoi-working-group-meeting-2022/.

Dr Yutaka Michida, Chair of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, Dr Joanna Post, Global Ocean Observing System (GOOS) Director, and Dr Enrique Alvarez, Coordinator of the Decade Collaborative Centre on Ocean Prediction, shared their insights as guest speakers. Days 2 and 3 were dedicated to the business meeting, reviewing the progress of the topics of the G7 FSOI Work Plan 2023, with presentations by the leads on each topic and discussions. They included 'Digital Twin Ocean Capability', 'OneArgo', 'Ocean Carbon', 'Augmented Observing and Forecasting for Marine Life', 'Global Ocean Monitoring Indicator Framework', 'World Ocean Assessment', and 'Governance, Coordination, and Sustained Funding for the Observing System'. Subsequently, the G7 FSOI Working Group members discussed the revision of the five Action Areas established seven years ago, and the development of the FSOI Work Plan and coordination arrangement for 2024.

This Working Group meeting was organised and financed by the Ocean and Earth Division of MEXT with significant support from the G7 FSOI Coordination Centre supported by the UK and the European Union.

Coastal Futures Conference 2024, 24-25th January, London and online

Held at The Royal Institution, Coastal Futures provides the most comprehensive annual review, briefing and pointer to future trends for coastal and marine practitioners across the UK. Leaders from Defra, the Environment Agency, Joint Nature Conservation Committee and OSPAR are responding to the question: How will we drive action in response to the latest evidence and assessments ?

Helen Wakeham, Director of Water Transformation (Environment Agency) on *Source to sea*, Dr Gemma Harper, Chief Executive Officer (JNCC) on *The ocean is calling us…are we listening?* and Dominic Pattinson, OSPAR on *The evidence we need for the NE Atlantic we want.* They will be followed by speakers from

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across the UK: Natural England (NE), Natural Resources Wales (NRW), Department of Agriculture, Environment and Rural Affairs (DAERA) Northern Ireland, who will offer solutions to deliver marine restoration and a nature-positive approach to decision-making.

Day One Sessions, Wednesday 24th January
- Community Aspirations
- Capitalising on Values
- Delivering a Sustainable Blue Economy

Day Two Sessions, Thursday 25th January
- Evidence Assessment into Action
- Restoration Prioritisation
- Mobilising Equitable Management

Download the full programme at coastal-futures.net/programme.

The IMarEST welcomes new Chief Executive

The Institute of Marine Engineering, Science & Technology (IMarEST) has announced the appointment of Chris Goldsworthy as the new Chief Executive. Chris replaces Gwynne Lewis who is retiring, having been in the position since 2020. Chris is a Fellow of the IMarEST and former Cyprus Branch Chair. He embarked on his career as an Engineer Cadet with P&O Containers, where he spent 16 years at sea, achieving the rank of Chief Engineer Officer. He transitioned to shore-based roles in 2005 as a Technical Superintendent, and his journey has led him to technical, fleet, management and director positions. Throughout his career, he has overseen diverse fleets, nurtured strong teams, and provided strategic leadership to boards and executives, exemplifying his technical acumen and leadership prowess.

Chris Goldsworthy, IMarEST Chief Executive said: “It’s an honour to take on this role for the Institute that I have been a passionate member of since I started my career. The Institute is unique in bringing together engineers, scientists and technologists in the sector and I am looking forward to working with our members to solve some of the biggest challenges we have ever faced, to shape a more sustainable future for the marine sector.”

Kevin Daffey, Chair of the IMarEST Board of Trustees, said: “I am delighted to welcome Chris to the role of Chief Executive of IMarEST and working with him and the team over the coming years. I would also like to thank Gwynne who has been an exceptional CEO, serving with dedication since mid-2020. Under his leadership, we have witnessed remarkable achievements, including the recruitment of a talented executive team, and the successful implementation of new IT infrastructure. Gwynne’s instrumental role in revitalising our Institute’s finances and fostering operational excellence cannot be understated. The Trustees express our heartfelt gratitude for his contributions and wish him a fulfilling and well-deserved retirement.”

The IMarEST is a registered charity and the international professional body and learned society for all marine professionals. It is the largest marine organisation of its kind and promotes the scientific development of marine engineering, science and technology, providing opportunities for the exchange of ideas and practices, aiding in the development and upholding the status, standards and knowledge of marine professionals worldwide.

Woods Hole Oceanographic Institution researchers say accounting for plastic persistence can minimize environmental impacts

With plastic pollution posing a significant threat to ecosystems and human health, various strategies to lessen this type of pollution include reducing the production of plastic, decreasing the generation of plastic waste, and improving the material and product design of plastic items. Now, researchers have developed a sustainability metric for the ecological design of plastic products that have low persistence in the

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environment. Adhering to this metric could provide substantial environmental and societal benefits, according to a new study led by researchers at the Woods Hole Oceanographic Institution (WHOI), and published in the journal ACS Sustainable Chemistry & Engineering, doi.org/10.1021/acssuschemeng.3c05534.

"While plastic pollution threatens ecosystems and human health, the use of plastic products continues to increase. Limiting its harm requires design strategies for plastic products informed by the threats that plastics pose to the environment. Thus, we developed a sustainability metric for the eco-design of plastic products with low environmental persistence and uncompromised performance," according to the study.

Designing single-use plastics using this approach can have a substantial impact. Analyses in the study say switching to alternative materials for single-use coffee cup lids, such as cellulose diacetate and polyhydroxyalkanoates, could reduce the environmental costs to society by hundreds of millions of dollars. In general, products are designed to be environmentally friendly primarily by balancing the trade-offs between various environmental concerns, such as greenhouse gas emissions and resource depletion, because there are some frameworks and data sets to estimate these types of impacts. Selecting one kind of plastic over another is often used to accomplish this goal. However, to date, no material selection framework has considered or quantified environmental persistence, or the time that a plastic item remains in the environment as pollution, as a key environmental concern.

"What's important to determine is how can we design functional, sustainable, and benign materials, products, and processes that embody all of the principles of green materials engineering into the future world that we are going to live in," said lead author Dr Bryan James, directory.whoi.edu/profile/bjames/, a materials scientist and engineer who is a postdoctoral investigator in WHOI's Marine Chemistry & Geochemistry Department. "What are the next set of strategies and tools that engineers, product designers, and even the average consumer can use to make the best choices for the environment, while not having to sacrifice on product performance?"

To develop the sustainability metric, the researchers "integrated the environmental degradation rate of plastic into established material selection strategies, deriving material indices for environmental persistence. Our analysis identifies the materials and their properties that deserve development, adoption, and investment to create functional and less environmentally impactful plastic products," the study notes.

Establishing and implementing a sustainability metric for persistence has been challenging because of the lack of sufficient data for the wide range of plastics used in consumer goods. Only recently have scientists had sufficient data on realistic environmental degradation rates of different types of plastic so that they can better consider different types of plastic properties and implement them in design. With this data, the researchers now show that while switching one plastic material for another can reduce a product's cost and embodied greenhouse gas emissions, that switch could provide a far greater benefit in terms of minimizing environmental lifetime, persistence. For example, if a product designer only considered cost and greenhouse gas emissions, polylactic acid would be a good choice. Yet, this material persists in the ocean. Comparatively, cellulose diacetate and polyhydroxyalkanoates, while currently only a bit more expensive than polylactic acid, can have lower greenhouse gas emissions and do not persist in the ocean.

As an example, the researchers applied the metric to the redesign of an everyday single-use plastic item, coffee cup lids. Currently, billions of disposable coffee cup lids are used each year, accounting for about five percent of all plastic debris collected by coastal cleanup efforts worldwide. With three different coffee cup lids currently in use, including lids made from polylactic acid, polypropylene, and polystyrene, researchers evaluated which on-the-market lid material reduces the environmental impact the most. "Which is better: a lid that has a bit more greenhouse gas emissions but persists less in

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the environment or a lid that has fewer greenhouse gas emissions but will persist for a longer time ? To answer this, we put a dollar value on both options in terms of cost to make the product and cost to the environment and ecosystem services," said Dr James. "Simply making products that persist less by virtue of not being there, or going away faster, reduces that cost to society tremendously." Dr James noted that through thoughtful strategies to make good design decisions, "scientists, engineers, and designers have an opportunity to make a significant impact in the plastic pollution crisis. The metrics and methods developed in this study can direct design decisions and research priorities to reach this goal."

This work was supported by the Postdoctoral Scholar Program at WHOI, with funding provided by the Weston Howland Jr. Postdoctoral Scholarship. Additional support was provided by the WHOI Ocean Vision Fund 2030, the U.S. National Science Foundation, The Seaver Institute, and The March Marine Initiative (a program of March Limited, Bermuda) through WHOI's Marine Microplastics Innovation Accelerator program.

£6.5million flood research centre launched to combat climate change

Four new Natural Environment Research Council (NERC)-funded centres, www.ukri.org/news/nerc-invests-in-a-new-generation-of-environmental-scientists/, will educate the next generation of PhD students who will go on to build careers in research, business and public service. Each centre will be supported with £2.6 million funding.

The National Oceanography Centre (NOC) will play an integral role in the FLOOD Centre for Doctoral Training, that intends to better understand and manage flooding which has caused havoc across the UK this month. The hub will work to develop a talent pool of environmental experts invested in protecting against rising river, rainfall and sea levels. It aims to make the UK more resilient to flooding. The FLOOD centre includes experts from the universities of Southampton, Bristol, Loughborough and Newcastle, National Oceanography Centre, UK Centre for Ecology and Hydrology and British Geological Survey, with an additional 37 partner organisations.

The FLOOD centre will be led by Professor Ivan Haigh of the University of Southampton. He said:

"Flooding is the most destructive natural hazard that humanity faces with nearly two billion people exposed to its risk. We need to act now and come together to improve the way we manage the large and growing threat of flooding in the UK and elsewhere in the world. We will train experts to best understand how to tackle the challenges of floods in future years, not only for the UK but countries globally who are facing extreme problems from climate change."

Currently one in six households in the UK are located in flood-prone areas. "The biggest drivers of flooding are increased river flow, surface runoff, storm surges and waves", said Professor Haigh, "which are compounded by climate change and shifting populations". "The new hub will work to combat these growing challenges" said its deputy director Dr Jennifer Brown, NOC Coastal Oceanographer. She added: "This is a great opportunity to focus science research directly around the challenges faced by those managing and responding to flooding."

Funding for the multimillion-pound centre has been provided by the Natural Environment Research Council (NERC) together with the seven centres and other partners. Scientists will work to improve their understand of flooding using advanced monitoring and new forms of computer modelling, artificial intelligence and machine learning to map and forecast future flooding risks. It is supported by 37 organisations in the flood sector across the UK, encompassing local authorities, national government, water, energy and infrastructure companies, environmental, engineering and management consultancies, regulators, finance and (re)insurance companies and charities.

News of the centre has been welcomed by industry. Applications for students to enrol into the centre open in February, read more at

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www.southampton.ac.uk/study/postgraduate-research/ocean-earth-science.

VIEWS

Why the ocean could be our greatest ally in tackling climate change

In this op-ed, Peter de Menocal, president and director of the Woods Hole Oceanographic Institution, and Margaret Leinen, vice chancellor for marine science and director of the Scripps Institution of Oceanography/University of California San Diego, explain why the ocean can be seen as our greatest ally in tackling climate change. Together, the two institutions were organising partners of the Ocean Pavilion at COP28, where they issued the Dubai Ocean Declaration, oceanpavilion-cop.org/dubai-ocean-declaration/, calling for enhanced ocean observations.

As land dwellers, we have a blind spot when it comes to appreciating the vital importance of the ocean to our lives and livelihoods. Yet, the ocean may represent our greatest opportunity in responding to the many threats climate change presents to all of humanity. Few people know or appreciate the fact that the ocean, our ally, is the largest active carbon reservoir on Earth, www.sciencedirect.com/topics/earth-and-planetary-sciences/global-carbon-cycle. The deep ocean, for example, holds more than 50 times as much carbon as the atmosphere, and mangrove forests sequester carbon more than ten times faster than mature terrestrial forests. Since the dawn of the Industrial Age, it has absorbed almost all the heat, and around a third of the carbon that humans have generated, www.ipcc.ch/srocc/headline-statements/. The ocean is also the largest single living space on Earth and integral to governing flows of water and nutrients that are critical to the health of all life on the planet.

As immense and seemingly immutable as it is, the ocean as our ally is remarkably sensitive to the widespread changes that humans are inflicting on our planet. As carbon dioxide levels in the atmosphere have soared, so too have the ocean's as it equilibrates with our rising fossil fuel emissions, www.pmel.noaa.gov/co2/file/Hawaii+Carbon+Dioxide+Time-Series. Whole ocean ecosystems, many of which provide critical economic benefits to us on land, are changing in drastic, unpredictable ways, oceanographicmagazine.com/features/indigenous-wisdom-in-fiji-and-samoa/, or are in danger of disappearing entirely as a result of this and many other pressures. In just the last 15 years, an estimated 14% of coral reefs have disappeared as a result of warming water, overfishing, and unchecked development, climate.nasa.gov/explore/ask-nasa-climate/3273/vanishing-corals-part-one-nasa-data-helps-track-coral-reefs/.

Thankfully, the ocean can also come to our rescue as an ally. In fact, at this critical moment of rising global temperatures and increasingly extreme weather, the ocean could be our greatest ally. But this can only be true if we act with care and urgency and we let science be our guide. Because, for as much as we don't know about the ocean, we have learned quite a bit over the 150 years since the Challenger Expedition ushered in the era of modern oceanography, divediscover.whoi.edu/history-of-oceanography/the-challenger-expedition/. We have critical data and insight because, for decades, scientists have been deploying instruments into the ocean to measure critical vital signs of marine health. But we need more. **:- Reproduced from the Oceanographic Magazine,** oceanographicmagazine.com/features/the-ocean-our-greatest-ally-in-tackling-climate-change/.

SALTS

Can seaweed help store CO_2 on the ocean floor ?

Scientists from the UK's National Oceanography Centre (NOC), noc.ac.uk/, in collaboration with Seafields, www.seafields.eco/, Integrated Environmental Solutions (INES), ines-solutions.eu/, and the University of the West Indies, Cave Hill Campus Barbados (UWI), www.cavehill.uwi.edu/cermes/home.aspx, have started a project in the Caribbean to improve our understanding of the potential effects of using seaweed to store carbon dioxide from the atmosphere.

The project is co-funded by the UK Foreign, Commonwealth and Development Office. The Evaluating the Effects of Seaweed Sinking in the Caribbean (SeaSINC) project aims to conduct the first pilot study of seaweed deposition in the Caribbean to better understand how it affects

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deep-sea ecosystems and environments. The knowledge gained from this study will be critical for assessing whether burying seaweed can be used as a marine carbon dioxide removal (mCDR) technique in the battle against climate change.

The first phase of the project, a thorough assessment of the experimental sites that will be used in Barbados, has just been completed onboard the UK's RRS *James Cook*. Scientists from all organisations participated in the research expedition, which mapped and sampled the seafloor and overlying water column at depths of 1000 m and 4000 m. The next phase of the project, to be conducted in spring 2024, will deposit a small amount of Sargassum (a type of seaweed found throughout the Caribbean region) on the seafloor with equipment that will continuously monitor and record any changes in the environmental conditions.

SeaSINC reception held onboard the RRS James Cook upon the ships arrival alongside in Barbados on completion of the expedition

Speaking on the groundbreaking study, Dr Christopher Pearce, Principal Marine Geoscientist at NOC and project lead, said: "SeaSINC aims to address critical knowledge gaps in our understanding of the effects of sinking seaweed in the deep ocean and its ecosystems. It will provide the information required to help decide if, where, and how the deposition of seaweed in the deep ocean can be used as a marine carbon dioxide removal approach in support of climate mitigation requirements."

Seaweed deposition is one of several mCDR approaches believed to have the potential to help fight against climate change. The harmful CO_2 particles in the atmosphere dissolve into the oceans and get locked into the seaweed's organic structure. Burying the seaweed in deep, cold marine environments before it decomposes may then enable that CO_2 to be locked away for thousands of years. However, the effects of this sequestered carbon on the deep sea environment is currently unknown, which is what the SeaSINC project aims to address.

Commenting on the study, John Auckland, co-founder and CEO of Seafields, said: "By mapping the oceans, which cover 70 per cent of the Earth's surface, we can amplify and increase the speed at which they can store excess carbon. Scientists agree that the Sargassum seaweed problem is a symptom of climate change and human activity. Sargassum sinks naturally at the end of its life cycle, and it is crucial to better understand what happens when this natural process is enhanced by the controlled deposition of Sargassum at selected sites on the deep-sea floor. This method has great potential to be a viable, safe, and scalable way to remove significant carbon from the atmosphere."

Sargassum seaweed is found naturally in the Atlantic and Caribbean, with the greatest concentrations found in the Great Atlantic Sargassum Belt (GASB). Large quantities of the seaweed frequently inundate Caribbean coastal regions and wash up on beaches where they can interfere with local ecosystems and fishing areas. They also negatively impact tourist spots, as the washed up sargassum produces an unpleasant sight and smell when it rots on beaches. The results of this project will help assess whether the deposition of sargassum could be an appropriate solution for Caribbean islands with limited land space to deal with these inundations.

Scott Furssedonn-Wood, British High Commissioner to Barbados and the Eastern Caribbean, said, "Sargassum is a major problem for the Caribbean. The UK is delighted to be co-funding this research which will help our Caribbean partners find solutions to the regional inundations of Sargassum of recent years." SeaSINC is a non-commercial project developed by the NOC and Seafields, together with the other partners. The study is expected to last for three years, with a visual inspection of the study sites and collection of the deposited sargassum and scientific instruments scheduled to take place in 2025.

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What happens to biodegradable plastics if they enter the sea?

When the first full synthetic plastic was invented in 1906 - over 100 years ago - widespread use of the material for consumer products soon arose in the post-war period. Plastic was cheaper to produce than the more expensive paper, glass and metal materials used in throwaway items, such as consumer packaging, and was also stronger, lighter, safer and more durable, and it shifted the way that we use materials forever. However, the properties of plastic that make it such an attractive material, such as durability and strength, also make it a lasting problem once it reaches the end of its useful life. Some types of plastic can take thousands of years to degrade, and it is estimated that a truckload of plastic enters the ocean every minute.

In response to such concerns, biodegradable plastics, that is, plastics that can break down or 'biodegrade', have been in development since the end of the last century, to achieve similar usage and convenience of traditional plastics, but with the goal of breaking down quickly and harmlessly. But, as the global production of biodegradable plastics increases, from 1.5 million metric tons in 2023 to almost 5.3 million in 2028, www.european-bioplastics.org/market/, it is critical that we understand the impacts of these materials on the environment. As such, a 12-week study has been underway in the laboratory in our Mesocosm, www.pml.ac.uk/science/Facilities/Mesocosm, a facility that enables scientists to conduct research in a controlled aquatic environment, which closely simulates natural conditions.

The experiment aims to understand the impact of biodegradable plastic on marine coastal ecosystem processes, and to determine what exactly happens to the plastic once it enters the marine system. It is a collaboration between Plymouth Marine Laboratory, the University of Plymouth, and the University of Bath, and funded with thanks to a NERC Highlight Topic grant. Dr Rachel Coppock, www.pml.ac.uk/People/Dr-Rachel-Coppock, Marine Ecologist at PML and overseeing the experiment, said: "Our understanding about the impacts of biodegradable plastics is really in its infancy. Whilst biodegradable plastics pose the potential to reduce the longevity of plastic pollution in the environment, any additives in the plastic may leach out during degradation, and we don't fully understand what impact that may have on fauna or ecosystems."

"Many biodegradable plastics are not designed to break down in the natural environment, but rather under specific conditions, like industrial composters. So, when these types of biodegradable plastics end up in the sea, they may take a long time to degrade. In fact, one study by colleagues at University of Plymouth found that a biodegradable carrier bag could still hold a full bag of shopping after being submerged in the sea for 3 years, pubs.acs.org/doi/10.1021/acs.est.8b06984. "Our experiment in the Mesocosm began by collecting seawater, sediment and animals from the Plymouth Sound on our research vessel the Quest. We then divided these into separate tanks, which have controlled conditions to closely resemble the real conditions in the water column. And then, we began exposing each tank to particles of either biodegradable plastics or traditional plastics."

"There are three key ecosystem processes that we will be evaluating. The first is the microbial community, which is hugely important in determining biodiversity and ecosystem health." The Aquatic microbial community can be defined as a mix of co-occurring, and potentially interacting, microbes, present in a defined habitat in space and time. Despite the small size, microorganisms are key elements for the ecological dynamics of the biosphere, contributing fundamentally to the biogeochemical processes on Earth. "Secondly, we will be evaluating the downward flux of carbon, from the water column to the ocean depths and seabed. This is known as the biological carbon pump - evaluated here by measuring sinking rates of zooplankton faeces after exposure to each plastic type.", Dr Coppock continued. "And lastly, we'll be evaluating bioturbation, or the mixing of sediment by burrowing animals, which is important for oxygenating sediments, nutrient cycling, sediment stability and carbon sequestration. All of these are critical ecological processes that contribute to the health and functioning of ocean ecosystems."

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"We will also be investigating the fate of the plastics. Once the plastics enter the marine system, where do they end up? To answer this, we will be analysing the animals, water and sediment with our colleagues from the University of Plymouth to work out where the plastic particles end up. "The experiment concluded in December, and now we will be evaluating the findings. We hypothesize that both biodegradable and conventional plastic particles will be found in all compartments of the system, including buried in the sediment, within the animals, and in the water. We may see altered sinking rates of copepod faeces (biological carbon pump) and a shift in microbial community composition." Plymouth Marine Laboratory (PML) will be sharing updates on this study at a later date so please stay tuned.

CALENDAR

24th - 25th January 2024: Coastal Futures 2024

London, UK

Coastal Futures is the annual gathering for coastal and marine practitioners across the UK. The 2024 programme will include six sessions across two-days, covering current issues and illustrating future trends. For more information, the full programme, and to register, visit site.corsizio.com/c/64f747394cd9942d94b8ffef.

26th February–1st March 2024: CLASS Modelling Workshop

Southampton, UK

The Climate Linked Atlantic Sector Science project (CLASS) is a 6-year NERC-funded project that provides world-leading science to improve our understanding of the Atlantic Ocean. Involving a team of scientists from across the UK's marine institutions, CLASS builds upon sustained ocean observational science, state-of-the-art technology and world-class modelling.

CLASS
CLIMATE LINKED ATLANTIC SECTOR SCIENCE

As the CLASS project concludes, the National Oceanography Centre (NOC) is running a workshop / hackathon to showcase its modelling activities. This will provide an opportunity for marine researchers in the UK to become familiar with a broad range of model simulations, including high-resolution regional and global modelling, integrated ecological and biogeochemical processes, and simulations spanning from the near-present day to the end of the 21st century. Supported by NOC modelling experts, workshop attendees will to learn how models can complement observational or data-based analysis. Workshop activities will include:

- An introduction to the basic principles underlying ocean physical and biogeochemical dynamics, and how modelling approaches support novel research questions.
- Guided analysis of model outputs using Python, with an introduction to tools such as COAsT.
- A collaborative group analysis based on attendee-run Lagrangian simulations.
- An icebreaker event where attendees can share their own research
- and an off-site activity (TBC).

Applicants must be PhD students or early career researchers (within 5 years of PhD award). Applicants should have a basic familiarity with Python and gridded data products. Workshop attendees will need to bring a laptop with prerequisites installed/set-up (e.g., may include access to services such as JASMIN). Details will be announced in due course.

Accommodation (4 nights) and meals will be provided at no cost. Attendees are responsible for arranging and paying for their own travel to Southampton. Please complete the application form to register for the workshop, docs.google.com/forms/d/13dbyKJIDNbbhKL9dk3LkHCulfWfJhev10JfFRh91Ly8/viewform?edit_requested=true. Registration closes on 22nd January 2024 and places are limited and will be allocated on a first come, first served basis so please register early. The course organisers are

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A. Yool (NOC Southampton), J. Jardine, R. Patmore (NOC Liverpool)

12th-14th March 2024: Oceanology International 2024
London, UK

Topics on the agenda for 2024 include:

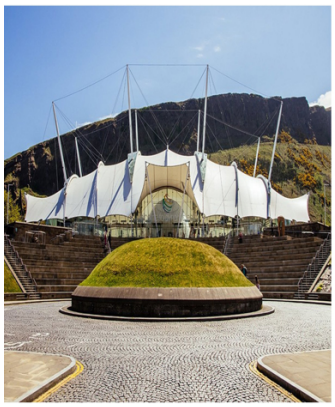
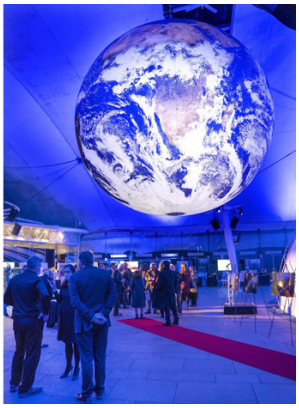
- Asset Integrity & Monitoring
- Coastal Zone & Shallow Water
- Data Interpretation & Ai
- Hydrography, Geophysics & Geotechnics
- Marine Pollution Mitigation & Environmental Stressors
- Plus, many more.

Oceanology International brings together 500+ exhibitors in the only event that links the three key players in the industry: businesses, academics and government. Visit us in 2024 for innovative live on-water demonstrations and interactive seminars looking into the future of our industry, www.oceanologyinternational.com/london/en-gb.html. With over 8,000 attendees targeted for 2024, it is a must-attend event for those involved in exploring, monitoring, developing or protecting the world's oceans, from seabed to surface and beyond. Join us at ExCel London to discover game-changing innovations and solutions transforming the future of ocean technology.

Oceanology International is one of the largest ocean tech, science, and engineering conferences globally. "Speaking at Oi provides you with a perfect platform to connect with new and exclusive contacts, it's like a VIP pass to your part of the ocean science and technology community.", Dr. Ralph Rayner, Conference Chairman.

26th March 2024: ASSW 2024 Science Day
Edinburgh, Scotland
The Arctic Science Summit Week (ASSW) 2024 Science Day will be held at the Dynamic Earth, www.dynamicearth.co.uk/. The day's theme of "Arctic Coasts" encompasses all International Arctic Science Committee (IASC) Working Group areas, iasc.info/our-work/working-groups.

There will be a mixture of invited talks on the day's theme from each working group, panel discussions on net zero arctic research aspirations and on effects of arctic environmental change on coastal communities, and a public facing Keynote presentation. Abstract submission for poster presentations will be open to all ASSW attendees.

"Our Dynamic Earth" is a public facing science centre focussed on the natural history of planet Earth. Alongside the IASC working group talks and panel discussions, there will be public displays related to scientific community research activities in the Arctic. We invite ASSW participants to get in touch with the local organising committee about bringing their displays to this space, assw.info/program/science-day-2024.

10th-12th April 2024: UN Ocean Decade Conference
Barcelona, Spain
The calls for posters and oral presentations, oceandecade-conference.com/home.php, are now open. Applications for the two calls must be submitted before 23.59h CET on the 1st December 2023.

Three years after the start of the UN Decade of Ocean Science for Sustainable Development (2021-2030), oceandecade.org/, this global conference will bring together the Ocean Decade community and partners to celebrate achievements and set joint priorities for the future of the Decade. Hosted by Spain and co-organized with UNESCO's Intergovernmental Oceanographic Commission (IOC/UNESCO), it will be a 3 day, in-person event co-led with a range of partners: Government of Catalonia and the Barcelona City Council through the

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Barcelona Capital Náutica Foundation, and the Spanish National Ocean Decade Committee, which is led by the Ministry of Science and Innovation through the Spanish Research Council (CSIC).

This three-day, in-person event will be a key moment for a wide range of stakeholders to take stock of the achievements of the first three years of the Ocean Decade and formulate a shared vision for the years ahead. We express our heartfelt gratitude to all the amazing individuals who have shown tremendous enthusiasm and interest in participating. Whether you are from governments, maritime sectors, philanthropy, universities, private sector, NGOs and more, your support and commitment have left us truly inspired.

We are now delighted to invite you to take the next step and submit your request for registration, oceandecade-conference.com/registration.php. By participating in this pivotal event of the Ocean Decade journey, you will play a crucial role in shaping the future of our ocean and making tangible strides towards a sustainable planet. Please note that, due to the high expected demand and the limited number of places in the Conference venue, you should wait for confirmation that your registration has been approved before advancing with any travel plans.

The conference will be a key moment for governments, leaders, maritime sectors, philanthropy, universities, private sector, NGOs and more, to take stock of the achievements of the first three years of the Ocean Decade and define a collective vision for the coming years. Participants will benefit from concrete examples and best practices in ocean science to deliver "the science we need for the ocean we want". A key outcome of the 2024 UN Ocean Decade Conference will be the publication of a set of white papers related to the 10 Decade Challenges, oceandecade.org/challenges/, that will identify future priorities for the Ocean Decade to generate the knowledge needed for science-based solutions related to global challenges, such as climate change, food security, biodiversity conservation, sustainable ocean economy, pollution and natural hazards.

A number of related high-level national and international events will take place before and after the main conference and there will also be scope for partners to propose and lead side events, exhibitions and networking events relevant to the conference themes on the days before the conference and in the sidelines of the conference itself.

To provide partners with the opportunity to present their activities, foster knowledge-sharing and strengthen collaboration, a small number of booths will also be available at the Conference venue. Stay tuned for information on calls for posters and for presentations during the parallel sessions. If you would like to receive updates, please sign up here, www.surveymonkey.com/r/OceanDecade24_updates. For more information, please contact, the Ocean Decade Team at oceandecade@unesco.org.

14th-19th April 2024: EGU General Assembly 2024

Vienna, Austria

To keep you up to date, we will be sending you important EGU24, egu24.eu, information 'EGU24 Updates' at least once per month, at the

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beginning of the month. You will still receive direct emails when tasks have a specific deadline, so make sure you check your spam folders and settings so that you don't miss anything. The Programme is online, meetingorganizer.copernicus.org/EGU24/provisionalprogramme.

7th-8th May 2024: Arctic Circle Berlin Forum
Berlin, Germany
The Arctic Circle Secretariat is accepting Session Proposals for the 2024 Arctic Circle Berlin Forum, hosted by the Federal Ministry of Education and Research and co-organized with the German Arctic Office at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research.

Proposals will be considered for Sessions running a maximum of 60 minutes. Proposals must include the following:

- The Session's proposed name (80 characters maximum)
- Organizing body/bodies
- Contact person and contact details
- Description of the Session (250 words maximum)
- List of speakers and speaker topics, indicating confirmation status

At least half of the proposed speakers must be confirmed by the time of submission. Diversity among speaker backgrounds, affiliations and nationalities is strongly encouraged. Governments, institutions, organizations, universities, think tanks, companies and other such bodies are eligible to submit Proposals. Proposals received from individuals will be considered to the extent that integrating them into existing Sessions is possible. Proposals must indicate the Session topic's relevance to the Forum's theme: The Arctic at Crossroads. The deadline for submitting proposals is February 1st, 2024, www.arcticcircle.org/berlin-forum-proposal-guidelines. Please direct any further inquiries about the Berlin Forum to berlin@arcticcircle.org.

15th-18th May 2024: 6th Euro-Mediterranean Conference for Environmental Integration (EMCEI)
Marrakesh, Morocco
In partnership with the editorial office of the Euro-Mediterranean Journal for Environmental Integration (co-published by Springer and University of Sfax, Tunisia) and in collaboration with the Cadi Ayyad University (Morocco), Mohammed VI Polytechnic University (UM6P), and other Euro-Mediterranean universities, Performer organizes the 6th EMCEI. On this occasion, the 6th EMCEI Steering and Organizing Committees are pleased to invite you to take part in the conference (in person or virtually) and share/discuss your latest research findings from various fields of environmental sciences.

Breaking News: Due to many requests, the submission deadline has been extended to: 31st January 2024

The 6th EMCEI will focus on a wide range of research topics. Visit our website, www.emcei.net, to learn more about the event.

- The 6th EMCEI will go ahead in person, but there will be a possibility to present online.
- EMCEI is one of the largest international gatherings of environmental science in the Mediterranean (400-500 participants).
- EMCEI aims to provide a forum where scientists, especially early career researchers, can present their findings and discuss their ideas with experts in all fields of environmental sciences.

10th-14th June 2024: The 9th EGO meeting International Underwater Glider Conference
Gothenburg, Sweden
The International Underwater Glider Conference aims to bring together leading researchers, innovators, and experts from around the globe to exchange knowledge, share discoveries, and foster collaborations in the exciting realm of underwater gliders.

The conference promises to be an engaging platform for sharing insights, addressing challenges, and shaping the future of this field. We plan for presentations, workshops, poster sessions, and networking opportunities. The

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planning team will return to you with event registration, hotel suggestions, and more information about financial support during the coming months. In the meantime, I encourage you to mark the dates in your calendar.

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.

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). Submit an abstract to one of the three workshops to be considered as a participant in IMBIZO7. Attendees will be selected on the relevance of their abstracts to the workshop topic.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. So, choose a workshop and submit an abstract by

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the 19th February, imber.info/event/imbizo-7-transitioning-towards-sustainable-ocean-governance-by-2030-commitments-and-challenges/.

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

Sicily, 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.

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

The call for session proposals is now open, the deadline is the 1st May. Diversity among speaker backgrounds, affiliations and nationality is strongly encouraged. To submit, please visit www.arcticcircle.org/assemblies/2024-arctic-circle-assembly-call-for-proposals, following the guidelines provided. For more information, http://www.articcircle.org.

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ARCTIC CIRCLE 2024
OCTOBER 17-19

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

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JOBS and OPPORTUNITIES

There are jobs in the MASTS newsletter

New vacancies:

- Relationship Manager in Marine, Agricultural & Environmental Science – University Of East Anglia – 30/01/24
- Scientist (Marine Ecology) – SEPA – 29/01/24
- Lecturer/Associate Professor In Marine Conservation And Management – University Of Southampton – 22/01/24
- Associate Lecturer (Education Focused) In Sustainable Aquaculture – University of St. Andrews – 26/01/24
- Seaweed Nursery Technician – SAMS – 19/01/24

Still open vacancies:

- Open Position for Director of the Biological Marine Station In Roscoff – 29/02/24
- **LAST CHANCE:** Computer Vision AI Researcher (KTP Associate), CSEE – University Of Essex – 19/01/24
- **LAST CHANCE:** Fisheries Data Collection Manager – Scottish Government – 01/24
- Thematic Research Lead On Climate And Environment – House Of Commons – 03/04/24
- Halley Science Coordinator – British Antarctic Survey – 31/01/24
- Tenure-Track Assistant Professor, Associate Professor Or Full Professor In Marine Biology – University Of Copenhagen – 21/01/24

PhD Opportunities:

- PhD/NERC SUPER DTP Funded Studentship – University of St. Andrews – 09/02/24
- A Next Generation Risk Assessment of Fishing Associated Seabed Carbon Disturbance – University of St. Andrews – 09/02/24
- Global Doctoral Scholarship (Geography And Earth Science) – University Of St. Andrews – 31/03/24
- World-Leading Scholarship in Geography & Sustainable Development and Earth & Environmental Sciences – University Of St. Andrews – 02/02/24
- SGSD Edwards Scholarship – PhD Geography (Science) – 09/02/24
- Fully funded PhD Scholarships from University of Hull as part of the Ocean Literacy PhD Cluster. **Deadline in 15/02/24**
  - Seawalls As Habitats – Engaging Communities In Ocean Citizen Science: A Vehicle For Enhancing Ocean Literacy
  - Using Animal Psychology To Promote Pro-Environmental Attitudes And Enhance Wider Ocean Literacy
  - Microplastics And Ocean Literacy – Empowering Rural Communities To Manage Plastic Pollution
  - Cultural Geographies Of Ocean Literate Citizens

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There are jobs on the IMBER web site

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

IMBeR Integrated Marine Biosphere Research

Jobs and opportunities

New

- PhD: Extracting Essential Ocean Variables for benthic habitats and fishes from existing mature imaging protocols. Ifremer, Brest, France. Apply by: **24 January**
- PhD: A strategic assessment approach to evaluating interactions between offshore wind energy and commercial fisheries. Ifremer Brest, France. Apply by: **24 January**
- PhD: Understanding and predicting seagrass decline in lagoonal environment, Ifremer, Brest, France, Apply by: **24 January**
- Civic Science Fellowship: Improve understanding of the role of documentary film in engaging the public with science, Science Communication Lab (SCL). Remote work in USA. Apply by **31 January**
- ECRS and students: Join M.A.R.E. (Marine Adventure for Research & Education) and do your research in the western Med Sea. Apply by **15 February**
- Scholarships for Brazilian PhDs/Postdocs to work on: Climate and anthropogenic changes in the Arctic, at University of Bologna, Italy. Apply by **11 March**
- 3 Postdocs: Ecosystem Modelling, Montpellier University, Montpellier, France, Apply by: **1 May**

In case you missed it...

- PhD in Sustainability science: Brock University, Saint Catharines, ON, Canada. Apply **now**
- Master of Sustainability: Brock University, Saint Catharines, ON, Canada. Apply **now**
- Assist/Assoc Prof: Marine and Environmental Sciences, Northeastern University, Boston MA, USA. Open **until filled**
- 10 PhDs: CIIMAR, Porto,Portugal. Apply by **24 January 2024**
- Royal Society Career Development Fellowship: for STEM researchers from underrepresented backgrounds to work in the UK. Apply by **24 January 2024**
- Project manager: National marine wildlife trade, Project Seahorse, UBC, Vancouver, Canada. Apply by **31 January 2024**
- Postdoc: Physical oceanography and modelling (BRICS). SAEON, Cape Town, South Africa. Apply by **31 January 2024**
- PhD: Giant crab's dietary analysis as a proxy, IMAS University of Tasmania, Australia. Apply by **1 February 2024**
- Postdoc: Biogeochemical cycling of trace metal micronutrients by marine

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plankton, Bigelow Lab, East Boothbay. Maine, USA. Apply by **1 February 2024**

- Assoc Prof: Biological oceanography, NTNU, Trondheim, Norway. Apply by **1 February 2024**
- At-sea on-board training opportunities (2) for applicants from developing states: Ifremer. Apply by **9 February 2024**
- Director: Biological Marine Station, Roscoff, France. Apply by **29 February 2024**
- Seeking International researchers/innovators for ERA Chairs in maritime and marine research, innovation and technology development, Cyprus Marine and Maritime Institute, Larnaca, Cypress. Apply by **7 March 2024**

imber@imr.no

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