December 2023

Challenger Wave

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

NEWS

Professor Stephanie Henson awarded prestigious Fridtjof Nansen Medal

The National Oceanography Centre (NOC) is proud to congratulate Professor Stephanie Henson, NOC Principal Scientist, on being awarded the European Geosciences Union's (EGU) 2024 Fridtjof Nansen Medal for distinguished research in oceanography. Professor Henson has made an outstanding contribution to a topic of fundamental significance to Earth's carbon cycle: how phytoplankton populations and subsequent carbon fluxes, respond to climate variability and climate change.

Professor Henson's work has revealed new insights into the long-standing question of the processes driving phytoplankton blooms, through the combination of satellite data, global biogeochemical models and autonomous underwater vehicle data. Recognising that some of the outstanding questions in the field centre around how planktonic ecosystems will respond to climate change, she designed work to address this through analysis of both observations and model output. This work has led to new insights into the multiple stressors affecting planktonic communities, and climate change-driven trends. Professor Henson has established an influential body of work examining the observational requirements for distinguishing climate-change driven trends and natural variability in phytoplankton populations. This work challenged the notion that trends in phytoplankton productivity were detectable in the relatively short satellite record, instead identifying the apparent trends as a response to natural variability, and quantifying the length and characteristics of a time series needed to truly identify a climate change trend. These works had a profound impact on the field.

Her work on the magnitude and variability of organic carbon fluxes has challenged existing paradigms from the outset. For example, she developed, on the basis of observational data, a new algorithm to estimate carbon export, which predicted the magnitude of the biological carbon pump to be just half of previous estimates. The insights to be gained by her unique approach of combining observations and modelling were again illustrated when she was able to develop spatially-resolved estimates for the flux of carbon in to the deep ocean on the basis of empirical algorithms. Professor Henson also was not afraid to challenge her own earlier work; when a later study found a contradictory result, she worked together with the researchers to develop a new paradigm for how remineralisation depth is determined in the twilight zone. This work revealed a seeming paradox in global patterns of biological carbon pump efficiency, which prompted numerous data- and model-based studies to attempt to resolve the discrepancies highlighted by her work.

You can read the full citation about all 2024 awards on the EGU website, www.egu.eu/news/987/egu-announces-its-2024-awards-and-medals, listen to Professor Henson's Into the Blue podcast, www.youtube.com/watch?v=C0ew_8nnhO0, or further read about Professor Henson's outstanding scientific contributions through her role as a lead author on the latest IPCC Assessment Report on the 'Carbon and other biogeochemical cycles and feedbacks' chapter, noc.ac.uk/news/noc-contributes-latest-ipcc-report-assessing-impacts-climate-change.

ISSN 0306-7335

No link between salmon farming and harmful algae blooms

Marine scientists investigating the formation of harmful algal blooms (HABs) in Scottish waters have found no link between salmon farming and the likelihood of a bloom forming. Such blooms can have devastating effects on aquaculture sites. Humans eating shellfish that have absorbed these toxic phytoplankton can become ill and blooms can also be fatal to farmed fish. In a paper published in the journal Harmful Algae, doi.org/10.1016/j.hal.2023.102512, researchers from the Scottish Association for Marine Science (SAMS) in Oban concluded that farmed salmon biomass alone had no significant effect on cell abundance of any of the studied phytoplankton.

The study used farmed salmon biomass in Scottish marine waters to calculate nutrient load added to the water column from fish farms

Prof. Keith Davidson, a co-author on the paper said: "It would be a reasonable assumption to make that excess nutrients from fish farms could have the potential to 'feed' nearby phytoplankton, increasing their abundance and, therefore, an intensification of HABs. However, our mathematical model-based analysis indicated that farmed salmon biomass had a non-significant effect on cell abundance of any of the studied phytoplankton taxa. In contrast, location or time of the year had a much greater influence on cell abundance. Overall, the analyses suggest that current levels of salmon farming activities do not markedly impact the abundance of routinely monitored biotoxin producing or fish killing phytoplankton taxa in Scottish waters."

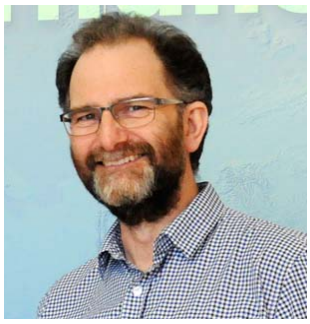
The findings came partly from the analysis of data from the Food Standards Scotland regulatory biotoxin monitoring programme that has generated weekly harmful phytoplankton reports from a range of locations around the Scottish coast, stretching back 15 years. The paper's lead author Dr Fatima Gianella said: "A possible explanation for the lack of a significant relationship between farmed salmon and harmful phytoplankton cell abundance is that aquaculture farms are generally located in hydrodynamically energetic locations where recurrent flushing likely allows efficient dilution of nutrients."

The research team examined blooms among the algal species that most frequently impacted shellfish farms and human health in the region: Dinophysis spp., Alexandrium spp. and Pseudo-nitzschia spp. and studied the cell abundance of one phytoplankton species of particular concern to the salmon farming industry (Karenia mikimotoi).

Unmanned vessel data collection marks new era in oceanography

Heralding a new zero-carbon era for ocean observations, a wave-propelled uncrewed surface vessel (USV) has for the first time successfully recovered scientific data from a sensor moored 1,800 metres deep in the Rockall Trough. The USV, deployed by the Oban-based Scottish Association for Marine Science (SAMS) and manufactured by AutoNaut in the UK, remotely collected data from the Sonardyne Fetch AZA bottom pressure recorders (BPRs), before sending it back to oceanographers on shore via satellite.

Scientists say the successful mission is a step change in how oceanographic data are collected and reduces the reliance on ships for deep sea fieldwork. Prof. Mark Inall, senior SAMS oceanographer, said: "This is an incredible achievement by the team at SAMS and our partners at AutoNaut and Sonardyne.



ISSN 0306-7335

We believe it is the first example of through-water communications of ocean climate research data to an autonomous vehicle, and instant transmission of data to shore. It has never been more important to have accurate and up-to-date measurements about what is happening in our ocean, which is undergoing major and rapid changes in the face of climate change. While traditional ship-based observations provide the most reliable data, such scientific cruises take some time to organise, are expensive and produce a large carbon footprint. This Autonaut mission feels like a major milestone for oceanography as it opens up a new way of collecting more data, more regularly, which is key to improving climate predictions and helping us to prepare for what the future may hold."

Last year SAMS deployed two BPRs on the seabed of the Atlantic Ocean: in the Rockall Trough, west of the UK, and in the Labrador Sea, east of Canada. Based on the weight of the water above it, the instrument can detect a change in pressure that is the equivalent to a sea-surface height change of one centimetre. By comparing the sea surface height on the western and eastern flanks of the Atlantic Ocean, oceanographers can calculate the speed and strength of vast ocean currents that dictate much of Earth's climate.

As the BPRs will remain on the seabed for up to 10 years, the previously held expectation was that ship-based cruises would be the only way to remotely retrieve their data. However, by equipping the five-metre long AutoNaut USV, named Jura, with a Sonardyne HPT 3000 transceiver it was able to link to the acoustic through-water communications transmitter on the bottom of the mooring to successfully retrieve the data recorded so far. After analysis of the data, scientists sent Jura back and over several days fine-tuned the calibration of the bottom sensor.

AutoNaut founding Director Mike Poole said: "This is the first time in the 10 years of AutoNaut's experience we have been asked can we get zero carbon data, not the cheapest data. It is a practical and positive response to climate change. As wave propelled USVs that are self-righting in the event of capsize, AutoNauts are well suited to very long endurance missions in the open ocean. Importantly, this will probably become much cheaper than sending manned, diesel-fuelled ships."

The mission was part of the Future Marine Research Infrastructure (FMRI) programme, funded by UK Research and Innovation's Natural Environment Research Council (UKRI-NERC). Through the FMRI programme, NERC is considering what mix of technologies will be required in the next decade; this may include sustainably fuelled 'green' research ships, autonomous robots fitted with novel marine sensors and the digital infrastructure required to optimise their use. Extensive engagement with the science community, ongoing trials of new technology and early engagement with UK industry will be prioritised over the next 12 months.

NOC scientist announced as new Future Leaders Fellow

The National Oceanography Centre (NOC) congratulates Dr Anna Lichtschlag who has been awarded the UK Research and Innovation's (UKRI) Future Leaders Fellowship. Dr Lichtschlag is amongst 75 promising research leaders awarded by UKRI, who will benefit from £101 million to tackle major global issues. The Future Leaders Fellowship allows universities and businesses to develop their most talented early career researchers and innovators.

Dr Lichtschlag will use the award to lead on project SANDMAN, which will develop a new instrument to measure gradients of important biogeochemical compounds directly within seafloor sediments. These sediments form one

ISSN 0306-7335

of the largest bioreactors on Earth and play a crucial role in the state and health of the marine environment as they convert, store and release chemical compounds that affect and control life.

Prof. Doug Connelly, NOC Associate Director of Science and Technology, said: "NOC are extremely pleased and proud that one of our talented research scientists, Dr Anna Lichtschlag, has received a prestigious Future Leaders Fellowship. Anna is a highly talented scientist who is thoroughly deserving of the fellowship. We look forward to supporting her at NOC and seeing the ground-breaking work we know she plans to do over the time of the award." Professor Dame Ottoline Leyser, UKRI Chief Executive, said: "UKRI's Future Leaders Fellowships provide researchers and innovators with long-term support and training, giving them the freedom to explore adventurous new ideas, and to build dynamic careers that break down the boundaries between sectors and disciplines."

The UKRI has also confirmed two additional forthcoming rounds of over £100 million each, with deadlines expected in summer 2024 and 2025. A pre-announcement for round nine will be published in the coming weeks.

How healthy is the North-East Atlantic? Findings from the 2023 OSPAR Quality Status Report

OSPAR Quality Status Reports (QSR) provide a comprehensive assessment of the NE Atlantic and its adjacent shelves, fulfilling international policy obligations to report on the health of our seas. This is important as OSPAR is the mechanism by which 15 Governments and the EU cooperate to protect the marine environment of the North-East Atlantic. Their aim is to assess the environmental status of the North-East Atlantic against baseline indicators, to find out whether offshore waters in Europe are of 'Good Environmental Status', to support EU member state obligations under the Marine Strategy Framework Directive (MSFD).

The objective of the MSFD is to have a clean, healthy and biologically diverse North-East Atlantic Ocean, which is productive, used sustainably and resilient to climate change and ocean acidification. 400 scientific experts from the EU and UK have contributed to 120 assessment reports on the health and status of the North-east Atlantic and its fringing European shelf seas, oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/, with a significant number of Plymouth Marine Laboratory (PML) scientists playing leading roles such as chapter co-leads and contributing expert scientific evidence across a range of issues.

The Western Channel Observatory (WCO) time series, www.westernchannelobservatory.org.uk/, a marine dataset situated in the Western English Channel, has been a vital source for the monitoring and assessment of trends in these subject areas, enabling our scientists to contribute expertise from a wealth of data. The WCO is the longest, near-continuous marine dataset in the world - data collection began back in 1903. The data and knowledge generated at the WCO allows us to better understand the causes and consequences of some of the largest environmental issues we are currently facing, such as climate change, ocean acidification, biodiversity loss and pollution.

The main conclusions from our scientists' reports are as follows:

- Eutrophication still persists in some river plumes and coastal areas of the North-east Atlantic, and in some catchments, it has even increased. Nature-based solutions to controlling eutrophication are being explored through the use of wetlands that filter and capture nutrients.
- Plankton are impacted in pelagic habitats. Phytoplankton and zooplankton form the base of the marine food web and support species higher in the food web including birds, fish and marine mammals. The new report shows that there has been a decrease in the abundance and biomass of phytoplankton and key zooplankton groups, due to changes in water column dynamics (mainly increased stratification linked to the rise in global temperatures).
- Ocean acidification puts marine ecosystems at further risk. Ocean acidification occurs because at least a quarter of the CO2 released into the atmosphere by human activities is being absorbed by the ocean, changing its carbon chemistry through an increase in acidity, and reduced availability of carbonate ions. This change in the prevailing chemical environment affects marine organisms, with direct effects

ISSN 0306-7335

especially for calcareous habitats and calcifying organisms, threatening indirect consequences for entire marine ecosystems.

- The state of the marine food web is of great concern. Shifts in nutrient inputs have affected primary production and fisheries, while shipping and maritime infrastructure have impacted higher level organisms. Specifically, demersal fish did not achieve good environmental status in the Greater North Sea and Celtic Sea.
- The effects of climate change are clearly seen. Climate change is causing ocean warming, ocean acidification, decreased oxygen, marine heatwaves and sea level rise, all of which have a negative impact on marine ecosystems. These can result in increased storm intensity, increased risk of flooding, and changes in rainfall patterns. Climate change has shifted species distributions, changed primary productivity and altered trophic interactions.

Dr Gavin Tilstone, Bio-optical Oceanographer,

PML, commented: “This is the first pilot assessment of primary production, which we have shown to be a more sensitive indicator of disturbance in the marine environment compared to Chlorophyll-a biomass alone. The decrease in phytoplankton productivity in many areas of the North-east Atlantic will inevitably have knock-on effects higher up the food chain and may affect the abundance of fish, birds and marine mammals.”

Dr Angus Atkinson, Marine Ecologist at PML, added, "This assessment is based on a network of time series from multiple laboratories across the UK and rest of Europe. It shows some worrying declines in some of the key plankton groups, and while the scale of the decline points to large scale climatic warming as the ultimate cause, we still need to understand why some species and regions are changing faster than others."

Given the multidisciplinary requirements to produce such a comprehensive report, three of our ocean acidification experts also contributed to the OSPAR QSR, including our Director of Science, Professor Steve Widdicombe, Biological Oceanographer, Professor Helen Findlay, and Marine Ecosystem Modeller, Dr Yuri Artioli.

Challenger Society EDIA Article

The (CSMS) Challenger Society’s Equity, Diversity, Inclusion, and Accessibility (EDIA) working group have had an article, led by PhD student Ben Fisher, at the University of Edinburgh, published in a special issue of the The Oceanography Society’s journal, Oceanography, on Diversity, Inclusion and Equity in Ocean Sciences, https://doi.org/10.5670/oceanog.2024.110.

CSMS members have been interested in improving the representation of a diverse range of identities in UK marine science, largely driven by their own experiences of inequity in the discipline, such as the challenges faced by women (Hendry et al., 2020, challenger-society.org.uk/oceanchallenge/2020_24_2.pdf). The structural exclusion of individuals by race, sex, ethnicity, social class, disability, sexuality, and the compound sum of these factors can result in a lack of diversity during recruitment and poor retention. Since 2021, CSMS has formed the first UK-wide EDIA working group for marine scientists, with the aim of coordinating action to address the causes of exclusion and to improve representation across the discipline. The group of 25 volunteers meets each month to discuss a topical agenda, and the chair of the working group sits on the council of CSMS, providing EDIA input from the working group on society-wide strategic decisions.

VIEWS

Discovering the Depths: SEAMOR and Voyis Collaborative Technology

SEAMOR, seamor.com/, renowned for its innovation in remotely operated vehicles (ROVs), and Voyis, voyis.com/, a leading provider of cutting-edge underwater optical sensors, are pleased to announce their exciting new collaboration. This partnership brings together

ISSN 0306-7335

the powerful capabilities of the SEAMOR Mako ROV and the precision of the Voyis Discovery Stereo Camera, to transform underwater inspection and exploration across various industries.

SEAMOR has built a sterling reputation for designing, developing, and delivering reliable, versatile, and robust ROVs. The Mako ROV is a testament to their commitment to excellence. Its portability and adaptable design make it the ideal choice for a wide range of underwater applications, like aquaculture, port security, marine research, pipe inspection and hydro dams. The Mako ROV boasts an impressive depth rating of 600 metres (~2,000 feet) and can be remotely operated using standard umbilical lengths of up to 950 metres (~3,000 feet).

Voyis, has garnered acclaim for its innovative underwater imaging solutions, including the highly regarded Discovery Stereo Camera. This state-of-the-art camera system delivers unparalleled clarity and precision in capturing underwater environments, with real-time 3D models, setting a new standard for high-quality underwater imaging. The integration of the Voyis Discovery Stereo Camera with the SEAMOR Mako ROV opens a world of possibilities for various industries. Two key sectors that stand to benefit immensely from this collaboration are aquaculture and hydro-electric.

With SEAMOR's expertise in the aquaculture industry, where efficiency and cost-effectiveness are paramount, the SEAMOR ROV equipped with the Voyis stereo camera will improve:

- Routine net inspections
- Regulatory compliance work
- Mort recovery
- Inspection of cages, docks, pipes, cables, and moorings
- Recovery of expensive lost equipment
- Surveying and sampling of seabed

These tasks, among others, can now be easily completed without the need for expensive commercial dive teams, resulting in significant cost savings. Environmental specialists can leverage the capabilities of the SEAMOR ROV and the Voyis Discovery Stereo Camera to conduct high-resolution photographic surveys and other ocean bottom deployments. The result is a more comprehensive understanding of underwater environments, facilitating early detection of issues such as seabed pollution, fish disease, or fish pen leaks.

In the realm of hydro dams, the collaboration between SEAMOR and Voyis addresses the critical need for secure power supplies. Hydroelectric companies worldwide prioritize the reliability of their systems, and the SEAMOR ROV, equipped with the Voyis stereo camera, is now an invaluable tool for ensuring system integrity. These ROVs perform routine underwater inspections and tooling tasks, ensuring the consistent and secure supply of electricity and gas to millions of users. With their reasonable pricing, lightweight design, and ease of deployment, SEAMOR ROVs are becoming the preferred choice for hydro companies looking for a versatile solution for underwater inspections. The Discovery Stereo enables users to capture high resolution stills images, as well as real-time 3D models of critical structures, for more precise decision-making.

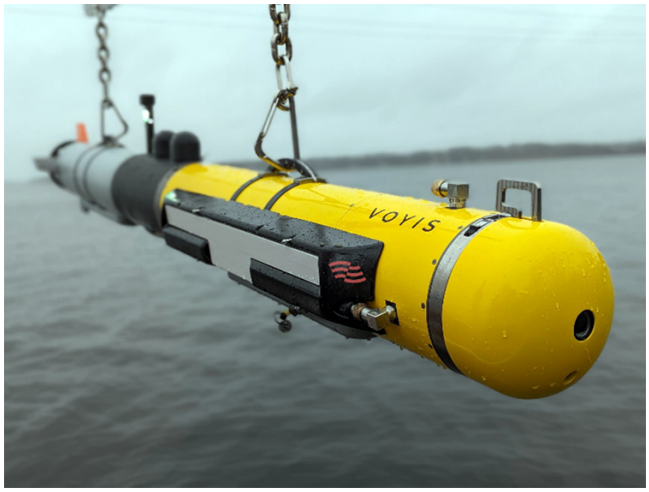
L3Harris, Voyis and Wavefront Collaborate to Enhance NATO Navy's AUV Capabilities

L3Harris, Voyis and Wavefront collaborate to deliver advanced technology to enhance NATO Navy's autonomous underwater vehicles (AUV) capabilities. L3Harris' area of expertise is the development of AUVs for a variety of maritime applications. AUVs are designed to operate in harsh environments, including deep water and can be used for a range of missions, including search and rescue, surveillance, mine countermeasures and oceanography. L3Harris is at the forefront of AUV development and continuously advances its technology to meet critical evolving defence mission needs. To further improve L3Harris' Iver4 900 AUV

ISSN 0306-7335

capabilities, the global defence company integrated a Voyis Recon LS and the Wavefront Solstice 3000 multiple-aperture sonar (MAS) Combined AUV payload, voyis.com/recon-payloads/, onto the Iver4 900 platform to support defence missions.

The Voyis Recon LS/WaveFront Solstice Combined AUV payload offers a solution for autonomous underwater vehicles to covertly detect, classify, and identify mine-like objects (MLOs), reducing risk to divers. The system uses the multi-aperture side-scan sonar, 4K digital still-camera and high-resolution laser scanner to carry out this task. The L3Harris' Iver4 900 vehicle provides the payload with both stability and endurance to make the most of the payload.



MCM (Mine Counter-Measures) operations involve four stages: detection, classification, identification, and disposal/neutralization. Currently, side-scan sonar is used for mine detection and sometimes for classification. However, visual identification requires a clearance diver or remotely operated vehicles to enter the minefield, which is time-consuming and risky, especially in areas with complex seabed. This requires multiple resources to be deployed into a potentially hazardous environment to complete a successful operation, which is inefficient when relying on lower-quality sensor data and dangerous if humans are mobilizing the assets. The Recon LS/WaveFront Solstice MAS Combined AUV payload is designed to rethink how mine counter-measure (MCM) operations are conducted today and enable single assets to complete complex missions without deploying additional resources within the minefield.

SALTS

Challenger – Christmas 1873

On December 17th 1873, HMS Challenger sailed from Simonstown in South Africa where she had been since 28th of October. She then headed south into the Southern Ocean en route to Melbourne which she reached on 17th March. **– my thanks to John Gould, History SIG.**

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

ISSN 0306-7335

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 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.

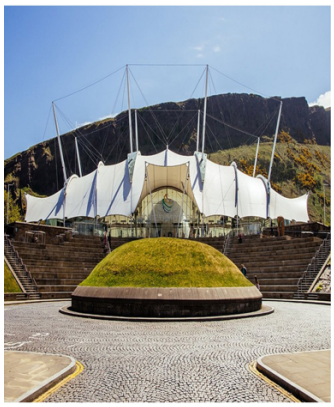
Oceanology International is one of the largest ocean tech, science, and engineering conferences globally. "Speaking at Oi provides you with a perfect platform to connect with new and exclusive contacts, it's like a VIP pass to your part of the ocean science and technology community.", Dr. Ralph Rayner,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

ISSN 0306-7335

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 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).

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

ISSN 0306-7335

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 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. More information about the planned format and additional features of the EGU24 General Assembly will be available soon.

The Call for Abstracts opened on the 1st November. The Programme is online, meetingorganizer.copernicus.org/EGU24/provisionalprogramme. Submit your regular abstract to the session of your choice by 13:00 CET, on the 10th January 2024. You can apply for financial support if you submit your abstract by 13:00 CET, on the 1st December 2023.

If you work on any form of blue or sedimentary carbon, please consider submittng an abstract to the “Blue Carbon: The role of coastal and marine sedimentary organic carbon in the global carbon cycle” session. The session will explore the pivotal role of coastal and marine sedimentary systems in global carbon cycling and climate regulation and discuss the challenges these ecosystems face and how multidisciplinary research is advancing our understanding.

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.

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.

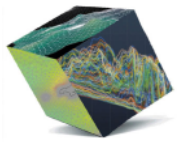
The conference promises to be an engaging platform for sharing insights, addressing challenges, and shaping the future of this field. We plan for presentations, workshops, poster sessions, and networking opportunities. The planning team will return to you with event registration, hotel suggestions, and more information about financial support during the coming months. In the meantime, I encourage you to mark the dates in your calendar.

ISSN 0306-7335

8th-12th July 2024: AMEMR Conference 2024

Plymouth, UK

Welcome to the 7th AMEMR conference, we are pleased to announce Abstract Submission is now open, with a submission deadline of the 15th December 2023; 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.

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 29th December.

ISSN 0306-7335

JOBS and OPPORTUNITIES

There are jobs in the MASTS newsletter

New vacancies:

- Open Position for Director of the Biological Marine Station In Roscoff – 29/02/24
- Associate Professor in Biological Oceanography – NTNU – 01/02/24
- Fisheries Scientist – UHI Shetland – 07/01/24
- Computer Vision AI Researcher (KTP Associate), CSEE – University Of Essex – 19/01/24
- Senior Data Engineer - JNCC – 14/01/24
- 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
- Chief Scientific Adviser, Marine – Scottish Government – 08/01/24

Still open vacancies:

- **LAST CHANCE:** Marine Monitoring Manager – JNCC – 03/01/24
- Chief Scientific Adviser (Marine) – Scottish Government – 08/01/24
- **LAST CHANCE:** Marine Support Officer x2 – JNCC – 03/01/24
- **LAST CHANCE:** Assistant/Associate Professor In Marine Biology – College Of Marine Sciences And Aquatic Biology – 28/12/2023

PhD Opportunities:

- 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
- Fully funded 2-year scholarships for the Erasmus Mundus Coastal Hazards MSc (**deadline for UK applicants - 8th January 2024**)
- Assembling Functionally Stable Microbial Communities Under Fluctuating Environments – Imperial College London – 08/01/24

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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

- Scholarships: Erasmus Mundus Coastal Hazards MSc Programme, Apply by **8 January 2024**
- Postdoc: Climate adaptations is aquatic ecosystems, SANBI, Cape Town, South Africa. Apply by **12 January 2024**
- Postdoc: Climate and early human development in coastal southern Africa, University of Bergen, Bergen, Norway. Apply by **15 January 2024**
- Postdoc: Marine natural product chemistry, University of Bergen, Bergen, Norway. Apply by **15 January 2024**
- Postdoc: Informatics for marine sustainability, University of Bergen, Bergen, Norway. Apply by **15 January 2024**
- Assistant/Associate Prof: Fisheries Oceanography, University of Massachusetts Dartmouth, USA. Apply by **15 January 2024**

In case you missed it...

- Visiting Fellowship Program: Ocean Frontier Institute, several locations in Canada. Apply by **15 January 2024**
- Postdoc: Climate and blue food, Stanford Center for Ocean Solutions,CA, USA. Submit **now**, assessed as received
- Assistant Prof (tenure-track): Oceanography, University of Alaska, Fairbanks AK, USA. Open **until filled**
- Call for applications: SCOR Visiting Scholar Program, Apply by **29 December**
- Assistant Prof: Marine chemistry. University of South Mississippi. Stennis Space Center, MI, USA. Apply by **8 January 2024**
- PhD: Sustainable restoration of the European Oyster in the face of environmental change. University of Plymouth, Plymouth, UK. Apply by **16 January 2024**
- PhD: Southern Ocean biological pump, University of Tasmania, Hobart, Australia. Apply by **1 February 2024**
- PhD: Southern Ocean iron sources and fluxes, University of Tasmania, Hobart, Australia. Apply by **1 February 2024**
- PhD: Paleo-modelling of the Red Sea, University of Manchester, Manchester, UK, **Open until filled or April 2024**

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