

Challenger Wave



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

NEWS

Warning as oceans reach near permanent heat wave

In a new paper, doi.org/10.1038/d41586-023-02730-2, published in the journal *Nature*, an international team of researchers, including Prof Michael Burrows of the Scottish Association for Marine Science (SAMS) in Oban, have called for increased monitoring of ocean temperatures in order to improve marine heat wave forecasting. Marine heat waves are defined as at least five consecutive days when sea temperatures are in the top 10% of temperatures for that day of the year. They can have devastating effects on ocean life, particularly corals and other species that are fixed in one location. Heat waves also have an impact on aquaculture and fishing industries, which would benefit from accurate forecasting.

Prof Burrows said: “We are seeing an increase in the occurrence and intensity of marine heat waves all over the world, not just in the more tropical regions. Off northern UK, we had a marine heat wave that lasted 237 days, from August 2022 to April 2023. Then, after a brief period of more normal temperatures, there was a rapid and intense 39-day heat wave in June and July that saw sea surface temperatures nearly three degrees Celsius higher than normal. We have seen marine heat waves becoming more common as the years pass; this is not a one-off. With nearly 80% of the last year as a marine heat wave in the UK, there is now a debate about whether we should shift the baseline from which we detect marine heat waves. The baseline on which we based the



definition of a heat wave was taken from the average temperatures between 1980 and 2013. Just 10 years on from the end of that period, it seems we may have entered a ‘new normal’ of ocean temperatures.”

The warning comes as the planet looks likely to enter a period of El Niño, a climate phenomenon seen every few years, further increasing ocean temperatures. It occurs when winds over the tropical Pacific falter and the warmest waters in the western Pacific flood eastwards, disrupting atmospheric circulation. Marine heat waves are more common in El Niño years. On previous occasions this has led to detrimental impacts on major fisheries, changes to the habitat of certain marine species, and severe coral bleaching.

Prof Burrows added: “Aquaculture may need to change husbandry practices and change harvesting to be in advance of anticipated damaging heat waves. Fisheries may need to reduce catch limits to protect heat-stressed stocks, and change practices during climate-enforced reduced activity. To really understand the impacts of marine heat waves, we should scale-up monitoring efforts to characterize conditions before, during and after an event, including physical, chemical, and biodiversity measurement at multiple temporal and spatial scales.”

The paper’s lead author, Dr Alistair Hobday of Australia’s Commonwealth Scientific and Industrial Research Organisation (CSIRO), said: “If we’re coming up to a period of time where we are forecasting there are going to be impacts on the Great Barrier Reef, for example, that gives you the opportunity to ask



yourself what you might do about it. As a politician, as a researcher, or as an industry manager, if the information is there but you choose not to take steps to prepare, then really you are neglecting to look after your future. Australia's efforts around identifying bushfire risks, preparing for those events and planning for the recovery stage have improved greatly in recent years," Dr Hobday continues. "Now we need to see the same level of co-ordination around extreme events in the ocean. With more information available, we have the opportunity to provide much better support for our marine industries and the blue economy."

Arctic sea ice continues to decline in response to climate change

Scientists from the National Oceanography Centre (NOC) have contributed to the latest report published in the UK Marine Climate Change Impacts Partnership (MCCIP). The report, www.mccip.org.uk/sea-ice, led by the UK Meteorological Office, highlights the rapid warming and decline of sea ice in the Arctic, an area that plays a key role in Earth's climate system. It shows that over the satellite period 1979–2022, the September sea ice extent has reduced by about 79,000 km² per year on average. Dr Marilena Oltmanns and Dr Yevgeny Aksenov contributed to the report, supporting our strategic goal to translate research into action and positive change.



According to the report, it is virtually certain that Arctic sea ice will continue to decline in response to global warming – half of which is attributed to greenhouse gas emissions created by humans. It is likely that the Arctic will become practically ice-free at the seasonal minimum at least once before 2050, regardless of the levels of emissions released in the future. Scientists say this loss is not irreversible however, and Arctic summer sea ice could recover if Arctic temperatures reduce. The fast Arctic warming

reduces the temperature gradient to lower latitudes, which can potentially affect the course of the jet stream and, in turn, the weather in northwest Europe. However, the size of this potential effect is unknown. It is also not clear to what extent the observed changes in the jet stream are related to Arctic climate change or other factors such as internal variability.

Another way, in which the rapidly changing Arctic could affect lower latitudes, occurs through freshwater outflows into the North Atlantic. These freshwater outflows could change the ocean circulation and sea surface temperature in the subpolar North Atlantic. This would have implications for the large-scale atmospheric circulation and weather events. Current research activities at the NOC are investigating these potential risks. Furthermore, the reduction in sea ice cover is expected to shift the base of primary production towards an increasing dominance of phytoplankton over ice algae, with uncertain consequences for the health of marine life and ecosystems. MCCIP provides a co-ordinating framework for the UK, delivering high quality evidence on marine climate change impacts, and guidance on adaptation advice, to policy advisors and decision-makers.

Double Blue Funding granted to the tune of €10 million

Following on the welcome news that the UK is rejoining Horizon Europe, www.science.org/content/article/uk-finally-rejoins-horizon-europe-research-funding-scheme, the world's largest research collaboration programme, the University of St. Andrews is delighted to report that the University's Blue Carbon Research Centre, which launched at the Scottish Oceans Institute on Friday 22nd September, has secured a share of funding through new awards worth €10 million across two major European consortia.

The Centre is a collaboration between the Schools of Biology, Chemistry, Earth, and Geography & Sustainable Development and led by Professor Bill Austin, who commented, "I am delighted, as the St Andrews Principal Investigator on both these awards, to see the growing international



interest in blue carbon science and policy. This is particularly welcome news in my role leading the United Nations Decade of Ocean Science for Sustainable Development Programme for Blue Carbon in the Global Ocean. Blue Carbon offers a powerful message of hope for climate, people and nature.”

The Horizon Europe projects will focus on emerging ecosystems in a rapidly warming Arctic, working closely with partners in Canada; and a pan European study of carbon sequestration in Blue Carbon Ecosystems; the latter partnering closely with a parallel project in the People’s Republic of China.

PML funded to become Secretariat for the UN-endorsed 'OARS' programme

As part of the High Level Event for Nature and People that took place at the UN General Assembly in New York, the UK Secretary of State Therese Coffey has announced £120k funding from the Department for Environment, Food and Rural Affairs (Defra) to support Plymouth Marine Laboratory (PML) becoming the secretariat for the Ocean Acidification Research for Sustainability (OARS) programme.

Heads of State and Government gathered at the UN’s New York headquarters to review the implementation of the 2030 Agenda and its 17 Sustainable Development Goals (SDGs) and provide high-level political guidance on transformative and accelerated actions leading up to the target year of 2030. Building on the work of GOA-ON (the Global Ocean Acidification Observing Network), the OARS programme which is part of the UN Ocean Decade, is designed to provide society with the evidence needed to not only identify and monitor ocean acidification, but also to mitigate and adapt to its impacts, in line with UN Sustainable Development Goal 14.3.1 and target 8 of the Kunming-Montreal Global Biodiversity Framework.

The term ‘ocean acidification’ is used to describe the ongoing decrease in ocean pH caused by human CO₂ emissions, such as the burning of fossil fuels. Ocean acidification is already having an adverse effect on many important marine species such as corals, oysters, crabs and plankton. Furthermore, due to the unprecedented rate of acidification, these vulnerable organisms may not have time to evolve mechanisms to

cope with the changing chemistry of the ocean.

As such, the OARS programme aims to:

- provide systematic evidence of the impacts of ocean acidification on the sustainability of marine ecosystems
- enhance ocean acidification capacity
- increase observations of ocean chemistry changes
- enhance the communication to policy-makers and communities by providing the information needed to mitigate and adapt to ocean acidification and;
- facilitate the development and evaluation of strategies to offset future impacts.



The difference between urchins exposed to normal and acidified conditions.

The funding from DEFRA will enable the OARS programme to have an administrative base and dedicated resource at PML, which is internationally-renowned for its work on ocean acidification science. In addressing a panel question on tackling common challenges, the Secretary of State announced: “I’m pleased to say that the UK will be funding Plymouth Marine Laboratory as secretariat to the Ocean Acidification Research for Sustainability (OARS) programme [which will] help make sure the science from around the world is recognized and put to good use.” You can watch the recording of the High-Level Event for Nature and People at media.un.org/en/asset/k1q/k1q0t4c7sm

PML’s Director of Science, Professor Steve Widdicombe, who is also Co-Chair of GOA-ON, said, “Ocean acidification represents a major threat to the health of the Ocean, the species and eco-systems within it, and the many societies and economies which depend upon its resources. It is vital that we increase our ability to



monitor and understand the effects of ocean acidification is already having, build collaboration and transparency of scientific data at international level, and ensure policy-makers are better-equipped to make choices that will support a sustainable ocean future. As such, we welcome this funding announcement from Defra, and also call on others to help support the needs and ambitions of the vital OARS programme and its secretariat.”

Award win is kick-start for SAMS spin-out company

A new spin-out company from SAMS that uses marine worms to clean up waste from fish farms, has won a prestigious national business competition. N-ovatio-N™ CEO Dr Georgina Robinson, www.sams.ac.uk/people/researchers/robinson-dr-georgina/, a Research Associate at SAMS, received the Converge Challenge prize at the Converge Awards ceremony in Glasgow on Wednesday 11th October. The Converge Challenge prize was the premier award presented on the night and is given to the company that shows the greatest growth and innovation potential.

N-ovatio-N™ offers an environmentally friendly solution to the issue of organic waste in the aquaculture industry. The scalable biotechnological approach can convert waste into high value, sustainable feed ingredients in the form of marine worms, rich in protein, lipid and omega-3 fatty acids. The technology can be co-located at aquaculture production facilities to deliver circular aquaculture. This innovative approach enables N-ovatio-N™ to grow high quality polychaete worms year-round for UK and global export markets. In doing so, the technology creates a circular economy, reducing waste disposal costs and impacts, and creates low-carbon alternate feed ingredients.

Dr Robinson said: “I was thrilled to be a finalist and win the Converge Challenge award. We participated in Converge 2023 for the entrepreneurial training to support our spin-out journey and I want to thank Converge for its incredible support. I am driving the spin-out of N-

ovatio-N™ to deliver impact and help meet Scotland’s Net Zero targets through a circular economy solution that up-cycles waste into high value feed ingredients in the form of marine worms. Our solution centres around net zero solutions for the Scottish salmon farming sector and global aquaculture industry. We will use this cash prize to leverage non-dilutive grant funding to further build our IP portfolio.”



Since launching the SAMS spin-out company, Dr Robinson has secured placements on a range of accelerator programmes, as well as £75,000 from Scottish Enterprise High Growth Spin-Out Support Programme.

Converge Challenge applications are judged on their growth and innovation potential. Successful applicants must demonstrate their prospective business’s competitive advantage, market potential, and expected team and resources. SAMS Director Prof Nicholas Owens said: “We are absolutely thrilled that N-ovatio-N™ and Georgina’s efforts have been recognised in this way. Our emerging blue economy needs innovative and creative thinkers, but the marine science knowledge behind these ideas is crucial. Georgina is an excellent example of that. I look forward to seeing the evolution of N-ovatio-N™ and the impact it will make on aquaculture. This award, thanks to the backing of Converge, is a fantastic start.”

Professor Neil Simco, University of the Highlands and Islands’ (UHI) Deputy Principal Academic and Research, said: “It’s fantastic to see Georgina’s innovative and important work recognised in the 2023 Converge Awards. UHI’s 2030 strategic plan sets out our commitment to driving sustainability and net zero initiatives so I’m delighted that our researchers are being recognised for their valuable contributions in this area. Georgina is a credit to SAMS and the UHI partnership. We look forward to supporting Georgina as she continues to develop her groundbreaking enterprise.”

Funded by the Scottish Funding Council, South

of Scotland Enterprise, Creative Scotland and a network of eleven corporate partners, Converge works in partnership with all of Scotland's universities. Since its launch in 2011, the programme has trained over 700 aspiring founders, contributed to the creation of more than 330 companies which have raised in excess of £320 million in follow-on funding.

Richard Lochhead MSP, Innovation Minister, said: "Entrepreneurship and innovation are at the heart of our National Strategy for Economic Transformation, and academia-industry collaboration helps fulfil Scotland's potential to nurture many more inventive new start-up companies. We recently published our National Innovation Strategy; which sets out our vision for Scotland to become one of the most innovative small nations in the world over the next decade. The strategy includes how we can support the creation and growth of more university spinouts and innovative businesses and products. With a focus on tackling environmental and societal challenges, this year's winners have demonstrated outstanding talent and creativity and I congratulate all those that took part in this year's awards for their efforts."

Call for nominations for new expert members of the UN Ocean Decade Advisory Board is open

As part of the Decade Advisory Board, the new expert members will play a key part in building the Ocean Decade roadmap to 2030 and have a strong presence at high-level events such as the 2024 Ocean Decade Conference and the 2025 United Nations Ocean Conference. The Decade Advisory Board (DAB), oceandecade.org/decade-advisory-board/, is a multi-stakeholder advisory body that assists the Secretariat of the Intergovernmental Oceanographic Commission (IOC) of UNESCO in performing its function as coordinator of the UN Decade of Ocean Science for Sustainable Development, 2021-2030 (the 'Ocean Decade').

The Board reports both to the IOC Governing Bodies and the IOC Executive Secretary. The Board's advice to the IOC Governing Bodies concerns strategic elements of the Decade implementation, such as reviews of the Decade progress in moving towards the Decade societal outcomes and on the research work in the domains of Decade challenges, oceandecade.org/challenges/, identifying gaps

and opportunities, advising on data stewardship strategies, the development of resource mobilisation strategies, and supporting broad engagement and outreach. This includes a strategic role in the Vision 2030 process that will be a centrepiece of the 2024 Ocean Decade Conference, oceandecade-conference.com/home.php. The Board also provides advice and operational support regarding endorsed Ocean Decade Actions, identifying major priorities to scope future Calls for Actions and gaps in regional and national coordination structures.

The new expert members of the Board will be selected through a call for nominations which is open until the 30th October 2023. The new Board will be named with due consideration to expertise, geographic, generational, and gender balance and will provide assistance on a voluntary basis. The members will serve a two-year term from 1st January 2024 to 31st December 2025 which is a critical time for the Ocean Decade as both the 2024 Ocean Decade Conference and the 2025 United Nations Ocean Conference, sdgs.un.org/conferences/ocean2025, will take place in this period.

Proposals for nominations can be put forward by Member States of IOC-UNESCO, United Nations or United Nations entities, as well as by intergovernmental organizations. Self-nominations will also be possible to encourage nominations from non-governmental entities. The nomination form for membership of the Decade Advisory Board can be found at www.surveymonkey.com/r/2024_DAB. The full Terms of Reference for the Board, the eligibility criteria for expert members, and information on how to apply can be found in the Circular Letter which can be downloaded from drive.google.com/file/d/1ED0WGOTWAH3-B_yo4MxxtaDfRrZncXe/view. For more information, please contact: oceandecade@unesco.org.

IEWS

Sonardyne welcomes MSDS Marine as UK reseller

Marine technology company, Sonardyne, is expanding its reach by appointing MSDS Marine as their latest UK reseller. MSDS Marine are a specialist marine and coastal contractor

specialising in providing scientific and archaeological support across a variety of sectors including; offshore development, archaeological and ecological surveys, and asset monitoring and recording. Their work includes the use of Remotely Operated Vehicles (ROVs), divers, and geophysical and hydrographic survey and they offer a complete package from planning to execution, and subsequent processing, visualisation, and interpretation. MSDS Marine are now able to provide additional support to their customers through the supply of the latest marine technology from Sonardyne, not only by continuing to use the technology during projects, but also as an official re-seller.



An MSDS Marine diver prepares to dive holding a Nano transponder.

Mark James, MSDS Marine Operations and Technical Manager, said “MSDS Marine rely on technology for the majority of our underwater operations, with reliability being crucial to works in the marine environment. As a company we have used Sonardyne acoustic tracking for a number of years, tracking divers, ROVs, and geophysical equipment. Not only have we found the technology to be incredibly reliable and easy to use, but we have always been very impressed with the level of support that Sonardyne offer.

We are proud to be able to continue to promote the systems as a re-seller, using our firsthand experience in the scientific and archaeological sector to do so.”

MSDS Marine have used Sonardyne technology for a number of years, and the SCOUT, Micro and Mini Ranger USBL systems have played an important part in the recent investigations of the archaeologically significant designated sites of the Rooswijk (sunk 1740), heritagecalling.com/2023/07/12/the-discovery-of-the-rooswijk-shipwreck/, the London (sunk 1665), msdsmarine.com/projects/diving-projects/ssde-and-diver-tracking-on-the-london/, and the Bronze Bell wreck (sunk in the 18th Century), msdsmarine.com/projects/diving-projects/bronze-bell-protected-wreck/. The precise, reliable positioning, along with the ease of use, have allowed for the accurate mapping and survey of the sites.

“It’s great to have MSDS Marine as resellers for our shallow water USBL systems. It is quite unusual to have a reseller who also uses the equipment to the extent that MSDS Marine do. They bring a wealth of experience and expertise that will allow them to support customers from initial enquiry through to frontline support. We’re delighted to have such a strong advocate on board as a reselling partner” said Duncan Rigg, Sonardyne Sales Manager

Consultation Café: Strategic Environmental Assessment Scoping for NMP2

The decisions that govern our oceans are vital to the future of our planet. We require a new National Marine Plan (NMP2) that reflects the significant challenges and opportunities of today. The National Marine Planning team are delivering a public consultation on the scoping of the Strategic Environmental Assessment (SEA). It is part of the sustainability appraisal, which is required to deliver the new NMP2. It will assess the likely impact of the plan on the environment, both positive and negative, and seek ways to minimise any likely significant negative effects on the environment.

The first stage in the SEA is a scoping exercise culminating in the production of a scoping report for consultation. The report sets out the remit of the SEA, including determining the level of detail to be covered, and an early consideration of potential environmental impacts. The SEA

scoping report includes background on NMP2, outlines the broad policy context and environmental baseline, and proposes a draft methodology for assessment.

The consultation of the SEA scoping report is running from 25th September to 30th October 2023. Do you want to find out more about the SEA scoping consultation? If so sign up to one of our Consultation Café sessions to meet with NMP2 representatives who will answer questions related to the Scoping Report, www.eventbrite.com/e/consultation-cafe-strategic-environmental-assessment-scoping-for-nmp2-tickets-699640041197?aff=oddtcreator.

The aim of these sessions is to support stakeholders who are interested in taking part in the consultation, so they can make a valuable and informed contribution.

Underwater living: Deep dive site to become £100m research hub

DEEP, an ocean technology and exploration company, is investing £100m in the former National Diving and Activity Centre (NDAC) in Tidenham, Gloucestershire. It says its aim is for a “permanent human presence” under oceans from 2027. The quarry will also be used to test out equipment like submersibles. DEEP said the Tidenham site, which covers 50 acres, will be a “core part of a regional ecosystem in the South West of England” for development exercises for the company and others. Steve Etherton, DEEP President, said: “We need to preserve the oceans. To do that we need to understand them. Through our innovative technology DEEP will enable scientists to operate at depth for extended periods of time and we hope, in some small way, will contribute to our understanding of this life-giving environment.”



The company said it initially wants to develop technology that will allow scientists to live

underwater at depths of up to 200 m for up to 28 days at a time. The company says it wants to develop “habitats” which could allow humans to live under the oceans. The Tidenham location was selected because of the “unique cluster of relevant marine-engineering, diving, hyperbaric and submersible expertise, and links with the wider UK commercial and technical diving industry,” it added.

When consulted over the plans, Forest of Dean District Council was told DEEP wanted to employ 100 people. The site had originally opened as the NDAC in 2003 and offered a range of above-ground activities but was best known for its many underwater attractions, installed at a range of depths down to 76m. The quarry’s maximum depth of 80m made the location popular not only with recreational scuba divers but also with technical, free and military divers. But the site closed permanently last year, following enforced periods of inactivity during the Covid-19 pandemic.

Developing the site at Tidenham is “just the beginning” the company said. DEEP believes it will have established a system of “semi-permanent” underwater human habitats by 2027. Mike Shackelford, President, Global Services of DEEP said: “DEEP’s facilities already house our prototyping and pre-production capabilities as well as advanced material testing infrastructure not found elsewhere in the UK, and this is just the beginning.” The company said it hoped the Tidenham campus would be “fully operational” by 2027. – *Ocean Business, General Ocean News, by Neysan*

Sonardyne appoint Aquatic Sensors as resellers in expanding US market.

Sonardyne Inc. are delighted to announce the appointment of Aquatic Sensors as resellers as part of their growth in the US marine technology market. Making the announcement whilst exhibiting at OCEANS 2023 in Mississippi, Sonardyne welcomed Aquatic Sensors as their latest US resellers. Aquatic Sensors initial focus will be on the Origin 600 and providing the latest intelligent ADCP technology to the North American market.

Commenting on the appointment, Sonardyne Inc. Vice President Simon Reeves said, “We’re thrilled to welcome Aquatic Sensors onboard as our North American resellers. Having worked

with Chelsea Technologies for so many years, their knowledge of the industry is second to none, as is their experience of the North American market. We are confident that they will provide our customers with the best possible support and service.”



(L-R) Sonardyne Inc Sales Manager, Kim Swords and Aquatic Sensors Sales and Marketing Director, Andrea Zappe celebrate the news of the appointment at OCEANS 2023 in Biloxi.

Andrea Zappe, Sales and Marketing Director for Aquatic Sensors said, “Aquatic Sensors is excited to partner with Sonardyne and to offer their cutting-edge environmental monitoring technologies to our customers in the USA and Canada. Having partnered with their sister company, Chelsea Technologies, over the past twenty years; we have had a strong awareness and appreciation of the level of quality that Sonardyne brings to the industry. From next-generation ADCPs and acoustic releases, to high-quality USBLs and DVLs, we are excited to assist our marine, coastal, and freshwater customers in new and innovative ways.”

Discovery Camera and REVOLUTION ROV: Canadian Integration Triumph

Two Canadian underwater technology powerhouses, Voyis, voyis.com/, and Deep Trekker, have joined forces to achieve an exceptional integration; the successful fusion of Voyis' cutting-edge Discovery camera with Deep Trekker's REVOLUTION ROV (Remote Operating Vehicle). This landmark collaboration showcases the prowess of Canadian innovation and ingenuity, propelling the field of underwater surveys and inspections into an unprecedented era of advancement.

Deep Trekker's REVOLUTION ROV stands as a testament to Canadian engineering excellence. This robust underwater vehicle, designed to

conquer the most unforgiving aquatic conditions, boasts unparalleled stability and maneuverability. With a unique rotating head facilitating optimal positioning of attachments such as imaging sonar and grabbers, the REVOLUTION ROV is poised to excel across a spectrum of tasks. Capable of descending to depths of up to 305 metres, the ROV employs six powerful thrusters for precise control in both vertical and lateral movements, even in challenging currents. This adaptable thruster configuration not only ensures stability but also fine-tuned adjustments during inspections and surveys. Its rugged construction, featuring a carbon fiber shell, anodized aluminum, stainless steel body, and sapphire lens cover, underscores its durability and reliability.

Voyis' Discovery Cameras, voyis.com/discovery-camera/, enhanced by the Nova Mini Lights, bring a new dimension to underwater exploration. These cutting-edge cameras capture 4K video with minimal latency while simultaneously generating high-resolution still images and IMU data. The resulting assets can be processed through edge computing to produce intricate 3D models. These capabilities find applications in intelligent ROV piloting and comprehensive inspections. The cameras produce clear stills suitable for advanced machine vision and 3D modeling, complemented by real-time image enhancement, an ultra-wide field of view (130° x 130°), and distortion correction for comprehensive situational awareness. Designed with compactness in mind and incorporating integrated lights, along with DDS data architecture and ROS2 support, the cameras streamline vehicle integration, particularly for autonomy-driven applications.

The collaboration between Voyis and Deep Trekker was tested and proven successful during trials in Tobermory, Ontario. Both teams worked together to achieve this success and test the ROV capabilities for piloting and inspection, with the Discovery Camera. By seamlessly integrating the Discovery Camera with the REVOLUTION ROV, professionals gain access to a suite of unparalleled tools for underwater surveys, inspections, and explorations. The amalgamation of the REVOLUTION ROV's ruggedness and maneuverability with the Discovery Camera's imaging precision and increased situational awareness opens new horizons for industries spanning marine research, aquaculture, defense

and security, infrastructure inspection, and offshore energy asset inspection.

"We are excited to achieve this successful integration with Deep Trekker's REVOLUTION ROV, representing a significant stride in Canadian technology collaboration," said Chris Gilson, CEO at Voyis. "Together, we are pushing the limits of imaging technology and creating solutions that empower professionals to navigate and explore the underwater world with unmatched clarity."

Sam Macdonald, Managing Director at Deep Trekker, echoed this sentiment: "The seamless integration of Voyis' Discovery camera with our REVOLUTION ROV signifies a new chapter in underwater exploration. This harmonious blend of leading-edge technologies will reshape how professionals navigate and inspect underwater environments."

SALTS

No news from sea this month I'm afraid

I know that this is a favourite section for many readers, where we get the inside information about life at sea, its thrills and spills. So please the next time you are at sea or carrying out any fieldwork, please remember that a simple paragraph or two will get you published here. –

Ed

CALENDAR

7th-8th November 2023: Beyond the Ocean's Depths: Revisiting the Challenger Expedition

Revisiting the Challenger Expedition (1872-1876)

Interdisciplinary Conference,

www.rmg.co.uk/whats-on/national-maritime-museum/beyond-oceans-depths-revisiting-challenger-expedition-1872-1876. This event is in

part sponsored by the Challenger Society for Marine Science and the UCL Department of Science and Technology Studies, www.ucl.ac.uk/sts/science-and-technology-studies.

With the environmental threat of global warming, rising seas and biodiversity loss, knowledge of the ocean is more important than ever. The

Challenger Expedition, www.rmg.co.uk/stories/topics/hms-challenger-expedition-oceanography-trailblazer, named after the British Royal Navy vessel *HMS Challenger* which circumnavigated the globe from 1872 to 1876 with the aim to explore the deep sea, has been celebrated as a foundational moment in the history of modern oceanography. Data and specimens obtained from the expedition are actively studied by scientists today, and provide a historical benchmark for climate change and species distribution. Meanwhile, historians are increasingly calling for the voyage's imperial context to be recognised, and are bringing attention to people and places that have previously been given little attention in the expedition's historiography. How do we tell more inclusive and holistic histories of *Challenger*, while engaging with its scientific importance today? Looking forwards, what can we learn from the past while considering the future of ocean science?

'Beyond the Ocean's Depths' will provide a welcoming interdisciplinary forum for historians, scientists, museum curators, and coastal and island communities to share ideas and their work. The two days will bring together a variety of perspectives on 19th-century ocean science and voyages of exploration in a broad sense, especially:

- The use of *Challenger* materials in modern scientific research
- *Challenger*-related objects in museum collections
- Public engagement and education
- Colonial legacies
- Untold histories
- Local knowledge and expertise
- Links between oceanography past, present and future

On the 7th and 8th of November 2023, the conference will bring together 25 speakers from a variety of disciplines including museum curators, marine scientists, historians, artists, independent researchers and filmmakers to consider the enduring historic, colonial and scientific legacies of this ground-breaking voyage. Keynote talks will be given by Sujit Sivasundaram, University of Cambridge, and Helen M. Rozwadowski, University of Connecticut.

This conference will be held in person at the National Maritime Museum, Greenwich and online. It will consist of four panels, each consisting of three 15-minute papers and a Q&A, and a guided visit to the Caird Library, www.rmg.co.uk/collections/caird-library, to view *Challenger* archives, photographs and ship plans. We will also have time to view relevant gallery spaces. If you have any queries, please contact the organisers at research@rmg.co.uk.

7th-9th November 2023: The Nansen Legacy symposium, Towards a new Arctic Ocean – Past, Present, Future

Tromsø, Norway

During this science conference, www.nansen-legacy-symposium.com, the current understanding of the Arctic Ocean across disciplines and regions will be presented and discussed. In the mornings we will have plenary sessions with invited key-note presentations, dedicated presentations on the use of science for societal needs, and panel discussions to stimulate interdisciplinary discussion and involve user perspectives.

During the afternoons, we welcome the pan-Arctic research community across the natural science disciplines, and stakeholder representatives interested in knowledge status and future perspectives, to contribute to a vibrant symposium to build bridges across disciplines, regions, and from natural sciences to societal needs.

Details about registration are here: <https://www.nansenlegacy-symposium.com/registration/> Feel free to also check out the program overview <https://www.nansenlegacy-symposium.com/program/program-overview/> (more details will be added soon) and our compilation of practical details <https://www.nansenlegacy-symposium.com/practicalities/>.

7th-9th November 2023: Marine Autonomy and Technology Showcase 2023

Southampton, UK

MATS has grown over the last nine years to become a key event in the marine technology calendar, attracting delegates from around the world. This year's event will feature a packed three-day programme of exhibits, presentations, panel discussions and networking, offering a unique and valuable opportunity to discover the latest developments in marine autonomous

technology and how this exciting field is set to develop in the years to come. The event also provides a platform for organisations to engage directly with NOC to explore opportunities around funding, sharing ideas and getting those ideas in front of influential, high-profile users from the marine and maritime sector.



Huw Gullick, Managing Director of NOC Innovations, said: “After the huge success of last year’s event, I am delighted that we are hosting MATS 2023 once again in our iconic dockside marquee. MATS continues to be a key event in the marine autonomy calendar with collaboration at its heart, sharing the incredible developments in technology and innovation from the last 12 months as well as giving us a sneak peek into the future. It is always fascinating to look forward at how marine technologies will continue to progress and to tackle some of the biggest challenges of our time.”

The full programme and session chairs will be announced in the coming weeks. The event will feature a broad range of expert speakers from across academia, industry and government organisations and will shine a spotlight on five key themes relating to marine autonomous technology. The latest innovation and advancements in Sustainability and Net Zero Capability, User Requirements and Applications, Autonomous Platforms and Supporting Technology, and Data Collection and Information Generation will all be discussed. The final theme for this year is an exploration into the Applications of Artificial Intelligence and Machine Learning and will look at the latest trends and emerging technologies in this field as well as the challenges and opportunities that lie ahead.

Learn more about MATS and register now, noc-events.co.uk/mats-2023.

15th-17th November 2023: The 11th Annual World Congress of Ocean

Sapporo, Hokkaido, Japan

Following the success of the previous events, we are honored to launch The 11th Annual World Congress of Ocean-2023 (WCO-2023). WCO-2023 is intended to provide a platform for professionals around the world to exchange state-of-the-art research and development and identify research needs and opportunities in the field of the Oceans. It covers a wide range of topics related to Ocean Economy, Maritime Law, Ocean Engineering, Ocean Energy, Green Port, Shipping and Modern Shipbuilding, Marine Management and Environment Protection, Ocean Science, etc. Over the conference period, you will have opportunities to share information and come face to face with business leaders, academic researchers and government agents around the world. It serves as a great opportunity to find global partners and build up research and business relations.

The three-day conference has an effective series of activities such as plenary lectures, parallel symposiums, oral communications and lively poster sessions etc. Currently Programmed activities at a glance include:

- Opening Ceremony and Keynote Forum
- Track 1: Ocean Economy and Finance
- Track 2: Maritime Law
- Track 3: Coastal and Ocean Engineering
- Track 4: Ocean Energy Development and Utilization
- Track 5: Emerging Ocean Science and Technology
- Track 6: Marine Management and Environment Protection
- Track 7: Smart Port, Green Shipping & Shipbuilding
- Track 8: Marine Biotechnology
- Track 9: Aquaculture and Fisheries

Sapporo, the capital of Hokkaido, Japan's northernmost island, draws international visitors for its annual Snow Festival and its world-famous ramen. Those seeking out the full diversity of Japanese cuisine will want to visit: a city with a ramen-inspired theme park is one that embraces and pampers foodies. For more information about the conference, please visit www.bitcongress.com/wco-2023/default.asp.

27th-30th November 2023: 3rd Mediterranean Geosciences Union annual meeting

Istanbul, Turkey

The annual meeting of the Mediterranean Geosciences Union, association.medgu.org/, will be held this year at the Congress Center of Istanbul Technical University. Visit our website, www.medgu.org, to learn more about the event.

The MedGU Annual Meeting is one of the largest international geoscience meetings in the Mediterranean region. It aims to provide a forum where geoscientists, especially early career researchers, can present and discuss their findings with experts in all fields of geosciences. It will feature talks and panels covering a diverse range of geoscience and geoscience-society topics. Contact us, if you need more information, contact@medgu.org.

5th-7th December 2023: MASTS Annual Science Meeting (ASM), Science, Sustainability and Society – valuing and protecting our marine systems

Glasgow, Scotland

Join us as we celebrate our thirteenth annual conference in-person at the Technology & Innovation Centre, University of Strathclyde, Glasgow. The Marine Alliance for Science and Technology Scotland (MASTS) Annual Science Meeting is a cross-disciplinary event that brings together members of the marine science community, with the aim of promoting and communicating research excellence and forging new scientific collaborations.

The first two days will bring together expert plenary speakers and contributed talks, panel sessions and posters outlining the latest research and management practices that address key topics related to marine science and management in the face of global climate change. Alongside our general science sessions, the event will include special topic sessions, and plenty of opportunity to enjoy networking with your peers and making new contacts. The first day will also host the annual "Decommissioning & Wreck Removal" workshop. The third day will be devoted to workshops and we already have some confirmed (more details soon).

Talks will be followed by a live group Q&A session within which all the speakers will be panel members.

Sessions are included on the following topics:

- General Science sessions (any field of study related to marine science)
- Multiple Aquatic Stressors
- Artificial Intelligence
- Deep Sea
- Climate Change
- eDNA
- Blue Carbon

For further details about the sessions, please visit our dedicated webpage, masts.ac.uk/annual-science-meeting/. Don't forget to stay up to date on the ASM by following us on Twitter, www.twitter.com/mastscot, or LinkedIn, www.linkedin.com/company/masts-scotland, #MASTSasm2023. If you would like to get involved or have a query about the ASM, please drop us an email, masts@st-andrews.ac.uk. We would love to hear from you if you would like an exhibit space at the ASM. Finally, it may be worth booking accommodation now. It's a busy month in Glasgow and places get booked up quickly.

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
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Plus, many more. 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.dynaminearth.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

Three years after the start of the UN Decade of Ocean Science for Sustainable Development (2021-2030), oceandecade.org/, a 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, oceansdecade.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.

On-site Satellite Events will take place at the Conference venue on 10th-12th April 2024 during the lunch breaks of the Conference, while off-site Satellite Events will be organized in a variety of locations around Barcelona starting from 8th April. To learn more about Satellite Events and to submit your application, please

www.challenger-society.org

visit oceansdecade-conference.com/satellite-events.php. Deadline for submission is 30th October 2023.

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 oceansdecade@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 will open on the 1st November. If you are looking for a head start the Provisional Programme is now online, meetingorganizer.copernicus.org/EGU24/provisio

nalprogramme, though keep in mind that this list is not finalized until after 24 October.

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.



SAVE THE DATE

We are excited to announce that we will be part of hosting the next International Underwater Glider Conference.

 **Gothenburg, Sweden**
June 10 - 14 / 2024

- ▶ Registration form to be sent out separately
- ▶ Call for abstract open on **September 2023**

 **Get excited by:**

- Cutting edge science
- Plenary, workshops, and training sessions
- Scientists and industry gathered in one place

If you have any questions, don't hesitate to contact:

louise.biddle@voiceoftheocean.org -or- vturpin@ocean-ops.org



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.

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](https://twitter.com/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 31st October.

JOBS and OPPORTUNITIES

There are jobs on the IMBER web site

<http://www.imber.info>



Integrated Marine Biosphere Research

Jobs and opportunities

New

- Postdoc: Data science and machine learning intersection with marine and climate systems, Portland, ME, USA. Apply **now**
- Assistant/Associate Prof, Marine and Environmental Sciences, Northeastern University. Boston MA, USA. Open until filled
- Postdoc: In biological, chemical or physical oceanography, marine geology or engineering, MBARI, Moss Landing, CA, USA. Apply by: **30 November**
- Call for early career IPBES Fellows: Scenarios and models. Apply by **19 December**

In case you missed it...

- Call for nominations for the UN Ocean Decade Advisory Board. Submit by **30 October**
- Assistant Prof: Oceans, Stanford University, Stanford, CT, USA. Apply by **30 October**
- Call for applications: Future Earth 2023 Early-Career Fellowship (ECF). Apply by **31 October**
- Postdoc: Hi-Res modelling of coupled air-sea interactions, Princeton University, Princeton, NJ USA. Apply by **31 October**
- PhD: Blue Carbon Research, Nelson Mandela University, Pretoria, South Africa. Apply by **3 November**
- Programme specialist: Global Ocean Observing System), IOC, Paris, France. Apply by **18 November**

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