

Challenger Wave



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

NEWS

In Memoriam of Raymond Pollard

It is with great sadness that I report Raymond Pollard passed away on the 14th December 2021. Raymond was a towering figure in oceanography who made major contributions to the subject, and who inspired and mentored many young scientists, including your Editor. To celebrate his career his colleagues at the NOC have compiled the following synopsis of Raymond's life in science, which can also be found at, [noc.ac.uk/files/documents/downloads/Raymond Pollard In Memoriam.pdf](http://noc.ac.uk/files/documents/downloads/Raymond%20Pollard%20In%20Memoriam.pdf).

Raymond completed an honours degree in mathematics at the University of Cape Town before studying at Cambridge University for his doctorate. He followed his thesis, on the theory of near surface inertial oscillations, by a period with the Woods Hole Buoy Group making the first high quality observations of the structure of inertial oscillations and their propagation of wind energy into the upper ocean. Later he returned to the UK, first to the University of Southampton and then to the Institute of Oceanographic Sciences (IOS), Wormley in 1976.

Raymond exemplified the transition to big cooperative programmes and his early career saw leadership of the multi-national JASIN (Joint Air Sea Interaction) Programme involving multi-ship and aircraft studies off northwest Scotland. He went on to lead the UK contribution to WOCE (World Ocean Circulation Experiment) and numerous other major seagoing expeditions, not least around the Crozet Islands and in the Southern Ocean and Southwest Indian Ocean.

His interest in meso-scale process like ocean eddies stimulated a strong and lasting collaboration with biological oceanographers linking the physics of mesoscale upwelling processes to nutrient injection into surface waters

and the associated space-time patchiness of oceanic plankton.



Raymond 'inspecting' the ice conditions during the first Marine Productivity programme cruise in the Irminger Basin, April 2002 – photo courtesy of Alex Mustard MBE.

The ocean mesoscale (10's-100'km, and days to weeks) required new measurement techniques were to sample at the relevant scales. Raymond was an innovator, and he played a crucial role in the development and use of towed undulating CTDs (Seasoar particularly), he was an early user of Acoustic Doppler Current Profilers (ADCPs) from which he pioneered extracting vertical

velocities by inference from the horizontal fields, and he played a critical role in bringing scientific computing onboard ships, notably RRS Discovery, to process the vast quantities of data quickly.

The new, rapid, first analysis and interpretation of data at sea was very important for the science but it had effects beyond that. Many of us remember several 'straight off the ship' presentations given by Raymond where he would arrive off RRS Discovery on an aeroplane and present his first plots at a scientific conference bringing the immediacy, insight and excitement of new results to audiences in an inspiring way.

Raymond played a critical role in forming and developing the big scientific teams we work in today. He spearheaded the move to Southampton when in 1989 he led the formation of the James Rennell Centre for Ocean Circulation, set up to deliver WOCE, which integrated observations and ocean modelling. That group was the vanguard for the move of IOS to Southampton, relocating from Wormley to the Chilworth Science Park before moving into the then newly built Southampton Oceanography Centre in 1995.

Raymond spent many years leading multi-disciplinary and multi-national research into the way physical zonation in the ocean controls the broadscale distribution of biological phenomena. Questions raised by early programmes in the Southern and North Atlantic oceans led the Crozet Experiment (CROZEX); a major UK field programme that addressed the role of natural iron fertilization on carbon export in the Southern Ocean.

Raymond was a great scientist, fine colleague, mentor and inspiration to many and his loss will be felt by his former colleagues in the UK and around the world, and all those he worked with at sea including mariners, technicians and engineers. Raymond had huge energy and demand to extract every drop of information out of the data and days at sea, and sometimes he was hard to keep up with. As a colleague at the NOC has said, his way of working at sea is a legacy even today, "extreme attention to detail, maximising the time at sea, but at the same time being cheerful, kind, patient and understanding with people; all these were taught to us by Raymond".

In his latter period at Wormley and at Southampton, Raymond worked closely with his wife Jane Read and their strong bond in science and companionship made a formidable team. Sadly, Jane also passed away in August 2021. They are survived by their son Harry.

In Memoriam of Philip Roy Pugh

It is again with great sadness that I report that Emeritus Professor Philip Roy Pugh passed away on the 24th November 2021. To celebrate his significant contributions to the global marine community, and his title as world authority on siphonophores, his colleagues at the NOC have compiled the following synopsis of Phil's life in science, downloadable at [noc.ac.uk/files/documents/downloads/Phil Pugh In Memoriam.pdf](http://noc.ac.uk/files/documents/downloads/Phil_Pugh_In_Memoriam.pdf).

Prof. Angus Best, Head of Ocean BioGeosciences at the NOC, said "Phil Pugh was a lifelong dedicated scientist and valued Emeritus Professor at the NOC, recently becoming a member of the Ocean BioGeosciences Research Group in 2020. His discovery and charting of the richness of biodiversity in the oceans will be a lasting legacy in our rapidly changing world, and is a fitting tribute to his life and work."



Phil in the laboratory, courtesy of the National Oceanography Centre

During his incredible career, and even after his retirement in 2004, most of Phil's work was on a group of cnidarians, known as siphonophores.

The Portuguese Man O' War is perhaps the famous example known outside science. Phil described a quarter of all known siphonophores (43 new species), more than anyone who has ever lived. His reviews and taxonomic syntheses were extremely important as they brought order to several confused siphonophore families, stimulating further discovery. The Antarctic siphonophore, *Sphaeronectes pughii* (Grossmann, Lindsay & Fuentes, 2012), was named after him.

When Phil first started at the National Oceanography Centre in 1971 (then known as the National Institute of Oceanography, followed by the Institute of Oceanographic Sciences and then the Southampton Oceanography Centre) he worked on collections from the RMT net, which tended to break the fragile siphonophores into many pieces. Phil became aware of the true splendour of a complete siphonophore specimen when he joined US-based SCUBA diving and later deep-water submersible collecting expeditions. It was on one of these expeditions that Phil met his wife, Vicki. More recently, Phil's research transformed again when he began to collaborate with researchers using molecular techniques, placing what was known about siphonophore diversity in this new phylogenetic context. A video of Phil describing his encounters with siphonophores can be found at noc.ac.uk/news/memoriamphilip-roy-pugh.

During his long career, Phil took part in over 50 research expeditions and published more than 100 papers and reports, becoming the world authority on his beloved siphonophores (a title he retains to this day). He was a much-loved character, who like all taxonomists continued his work long after retirement. He will be greatly missed by all those who knew him and worked closely with him. He leaves behind his loving wife Vicki, his daughter Emily, son-in-law James, and granddaughter, Nina.

Dr Tammy Horton, Research Scientist and Manager of the Discovery Collections at the NOC said "Phil was not only a great friend, but an excellent taxonomist. His research legacy will live long in the siphonophore literature, and I will remember him fondly as I work to preserve the many samples and specimens he collected for the Discovery Collections, ensuring this immense and valuable collection remains available for scientists to study now and into the future."

Ancient Shipwreck Supports Diversity of Underwater Life

On March 10, 241 BC, a sea battle took place near the Aegadian Islands off northwestern Sicily. A fleet equipped by the Roman Republic destroyed a fleet from Carthage, ending the First Punic War in Rome's favour. But scientists have now shown that this destruction and carnage ultimately made a rich flowering of marine life possible.

In a recent study in *Frontiers in Marine Science*, they reported finding no fewer than 114 species of animals, coexisting in a complex community, on a ship's ram from a Carthaginian ship sunk in the battle. This is the first study of marine life on a very ancient wreck. The ram is not only a priceless archaeological find, but also a unique window into the processes by which marine animals colonize empty sites and gradually form mature, stable, diverse communities.



The ram being investigated in the laboratory. Image credit: Istituto Centrale per il Restauro (ICR), Laboratory of Biological Investigation

"Shipwrecks are often studied to follow colonization by marine organisms, but few studies have focused on ships that sank more than a century ago", said co-author Dr Sandra Ricci, a senior researcher at Rome's Istituto Centrale per il Restauro (ICR). "Here we study for the first time colonization of a wreck over a period of more than 2,000 years. We show that the ram has ended up hosting a community very similar to the surrounding habitat, due to 'ecological connectivity', free movement by species, between it and the surroundings."

For more information, see the full news article in *Marine Technology News*, www.marine

technologynews.com/news/ancient-shipwreck-supports-diversity-615965.

Current Vacancies on Challenger Council

The Challenger Society is looking for its next Honorary Secretary, to take up the post at the AGM in September 2022. The Secretary normally serves a 4-year term on council. The Secretary's tasks include (but are not necessarily limited to)

- Act as one of the Officers of the society and ensure the society's records with the Charity Commission and Companies House are up to date
- Act as the holder of the official postal address of the society
- Organising council meetings three times per year
- Organising and leading the Annual General Meeting
- Keep minutes of the council meetings
- Supporting council with general administration

This is an excellent opportunity to gain insight into the functioning and working of the Council and develop connections and oversight across the breadth of activity that Challenger undertakes. It would suit an organised and positive society member who seeks to expand their sphere of vision across the full range of UK marine science. The role will be especially prominent as we approach the Challenger 150 celebrations in 2022.

The Challenger Society is working towards being a fully equitable and inclusive organisation (see EDI statement, www.challenger-society.org.uk/EDI_Statement). The Society encourages applicants from under-represented and/or diverse backgrounds to apply for the role of Secretary.

To apply, please submit a 1-page document, outlining your background and motivation for the position, to the current Secretary, Mattias Green, at m.green@bangor.ac.uk.

VIEWS

Blue-Cloud Hackathon

The Blue-Cloud Hackathon, 7th - 9th February 2022, is an open invitation to marine scientists

www.challenger-society.org

and researchers, data scientists, ICT experts, innovators, students, and anyone who is passionate about the Ocean to explore and test Blue-Cloud: A new, Open Science platform for the marine domain offering a wealth of data, analytical tools and computing power to support you in developing solutions for a safe, healthy, productive, predicted and transparent Ocean.



EMODnet colleagues are actively participating as technical advisors to the Hackathon package and as coaches: Participate and Decode the Ocean, www.blue-cloud.org/news/setting-sail-blue-cloud-data-discovery-access-service.

SALTS

Mission begins to Antarctica's remote Thwaites Glacier

On the 100th anniversary of the polar explorer Sir Ernest Shackleton's death, a research mission using a fleet of underwater robots to determine the impact of Thwaites Glacier on global sea-level rise, departs from Punta Arenas, Chile (6 January 2021). A team of 32 international scientists set sail on the U.S. National Science Foundation icebreaker Nathaniel B. Palmer bound for the remote glacier in West Antarctica. This mission forms part of the International Thwaites Glacier Collaboration (ITGC), a five-year, \$50 million joint U.S. and U.K. mission to learn more about Thwaites Glacier, its past, and what the future may hold.

Thwaites Glacier, covering 192,000 square kilometres (74,000 square miles), an area the size of Florida or Great Britain, is particularly susceptible to climate and ocean changes. Computer models show that over the next several decades, the glacier may lose ice rapidly, as ice

retreats. Already, ice draining from Thwaites into the Amundsen Sea accounts for about four percent of global sea-level rise. A run-away collapse of the glacier would contribute around an additional 65cm (25 inches) to sea-level rise over the coming centuries.



US research ship Nathaniel B. Palmer at the ice front of Thwaites Glacier, taken by drone. Credit Alex Mazur

The 65-day voyage, led by scientists from the University of East Anglia (UEA), along with researchers and engineers from Sweden and the U.S., will investigate atmospheric and oceanic conditions close to Thwaites ice shelf, the floating part of Thwaites Glacier where it meets the sea. The state-of-the-art Autosub Long Range (ALR) vehicle operated by the National Oceanography Centre, will travel under the ice shelf along with Ran, a Hugin robot, from University of Gothenburg in Sweden, while six ocean gliders patrol the entrances and exits to the ice shelf cavity. The fleet will explore largely uncharted territory, to measure geometry and melting processes, the seafloor below, the ice thickness above and water properties in between.



Chief Scientist, Dr Rob Hall, UEA.

Dr Rob Hall, from UEA, is the Chief Scientist in charge of the voyage. He says: "It's very exciting, though also daunting, to be leading this campaign to make critical measurements of the ocean under and around this vulnerable ice shelf. The team have completed a month of quarantine to ensure everyone is safe, and now we're looking forward to putting our wide range of scientific instruments into the water to see what we will learn about how the ocean melts the ice shelf from below. We're already monitoring the sea ice extent carefully to devise the best way to access the area, because even this powerful icebreaker ship can't get through thick sea ice."

Follow the mission at thwaitesglacier.org/news/mission-begins-antarcticas-remote-thwaites-glacier.

CALENDAR

18th-19th January 2022: Arctic Circle Abu Dhabi Forum

Abu Dhabi, United Arab Emirates

* POSTPONED*, new dates will be announced when circumstances allow. For more information, visit www.arcticcircle.org/forums/arctic-circle-abu-dhabi-forum.

18th-20th January 2022: Coastal Futures - REACH Conference 2022; Innovation for Ocean Recovery

Online

COP26 and the UN Biodiversity conference have highlighted the need to move beyond the status quo and become much more active about recovering what we have lost. The urgency of the challenge over the next few years is the key message, we need to take the good ideas, innovation, and turn them into routine practice. We hope this conference will inspire you to play your part and will brief you on wide range of work currently underway.



Images: ZSL, The Crown Estate, Environment Agency

There will be Six Keynotes presentations and twenty one sessions with over 60 speakers, who are leaders in this work. The full programme can be accessed at, coastal-futures.net/programme. Booking is open, you can book online and download the booking form from, site.corsizio.com/c/6155c182f21e281e93c586a7.

24th-26th January 2022 and 10th-12th May 2022: Pre-Conference Workshops & African Kickoff Conference for the Ocean Decade

Alexandria, Egypt and online

Due to Covid-19 restrictions, the Pre-Conference workshops and the Ocean Decade Kick-off Conference in Africa have been postponed to January 2022 and May 2022, respectively.



We thank you for your understanding and invite you to follow the event pages below for more information.

Pre-Conference Workshops: bit.ly/3pkTSEb

African Kick-off Conference: bit.ly/3deH4K6

For more information, please contact: Mika Odido m.odido@unesco.org.

7th - 9th February 2022: Blue-Cloud Hackathon
Online



The Blue-Cloud Hackathon is an open invitation to marine scientists and researchers, data scientists, ICT experts, innovators, students, and

anyone who is passionate about the Ocean to explore and test Blue-Cloud: A new, Open Science platform for the marine domain offering a wealth of data, analytical tools and computing power to support you in developing solutions for a safe, healthy, productive, predicted and transparent Ocean.

EMODnet colleagues are actively participating as technical advisors to the Hackathon package and as coaches: Participate and Decode the Ocean, register here, hackathon.blue-cloud.org/.

14th–16th February 2022: International Ocean Data Conference 2022 - The Data We Need for the Ocean We Want

Sopot, Poland

Since IODE-XXII (2013) every Session of the IOC Committee on International Oceanographic Data and Information Exchange (IODE) has been preceded by a Scientific Workshop or Conference. This was also planned for IODE-XXVI in 2021 but due to the Covid19 pandemic this was not possible: the IODE-XXVI Session was held as a fully online event.

The original host of IODE-XXVI (Poland) has kindly offered to host instead the "**International Ocean Data Conference 2022 - The Data We Need for the Ocean We Want**". The Conference will be held as a hybrid event with a number of participants on-site while others will participate through video conference.



For more information: www.iode.org/index.php?option=com_content&view=article&id=645:first-international-ocean-data-conference&catid=74&Itemid=100407.

27th February – 4th March 2022: Ocean Sciences Meeting 2022

Honolulu, Hawaii, USA



The session list for the Ocean Sciences Meeting 2022 scientific program is now available, www.aslo.org/osm2022/scientific-sessions/.

The Ocean Sciences Meeting 2022 will be held in Honolulu, but with virtual components. Attendees will have the option of participating in-person or remotely.

15th–17th March 2022: Oceanology International (OI)

London, UK

Oceanology International (OI) is the leading global event connecting industry, academia and government with the ocean technology community. It has a 50 year legacy as market leader in the oceanographic sector. A Truly global event with 8,000 attendees from 90 countries representing 15 diverse end-user sectors. It is the largest exhibition/trade show in this sector, with 480+ exhibiting companies.

Oceanology International London 2022 will connect you with 7,500 buyers and influencers from more than 80+ countries looking for innovative solutions to improve strategies for exploring, monitoring, developing and protecting the world's oceans. For 50 years, no other event has provided such a perfect global platform to showcase your solutions, from technical to strategic professionals from academia, government and over 15+ key industries, all unified by their use of ocean technology.

Demonstrate and promote your company's capabilities, generate qualified leads and strengthen and develop your networks both face-to-face in London, and digitally throughout the year. For more information and register, please visit www.oceanologyinternational.com/london/en-gb.html.

3rd–8th April 2022: The General Assembly 2022 of the European Geosciences Union (EGU)

Vienna, Austria

The EGU General Assembly 2022 will bring together geoscientists from all over the world in one meeting covering all disciplines of the Earth, planetary, and space sciences. The EGU aims to provide a forum where scientists, especially early career scientists, can present their work and discuss their ideas with experts in all fields of geoscience.

The last two General Assemblies, Sharing Geoscience Online in 2020 and vEGU21: Gather Online, were organized as virtual meetings due to the Covid-related restrictions. In 2022, the EGU aims to provide an on-site experience again for those attending in-person, while at the same time introducing new concepts to include virtual attendees as much as possible. The EGU General Assembly 2022 (EGU22) will be a conference with a virtual component where everybody is welcome, in person or online. We plan for the format of the conference to be flexible, giving us the opportunity to more easily adapt to the uncertain global context.

The assembly is open to the scientists of all nations. The entire congress centre is fully accessible by wheelchairs. For more information regarding the programme and registration please visit egu22.eu/.

9th–12th May 2022: Fourth ICES PICES Early Career Scientist Conference

St. John's, Newfoundland, Canada

Hosted by Fisheries and Oceans Canada (DFO), www.dfo-mpo.gc.ca/index-eng.html, The International Council for the Exploration of the Sea (ICES), www.ices.dk/about-ICES/Pages/default.aspx, and North Pacific Marine Science Organization (PICES), meetings.pices.int, welcome you the fourth conference of this series, where early career scientists will have the opportunity to meet colleagues from around the globe who share similar interests and an enthusiasm to improve equality and diversity in marine science. The conference aims to foster the development of contacts, collaborations, and associations among early career scientists that will persist for decades and to establish personal and institutional networks that will help to advance our understanding of the marine environment.

The scientific sessions will be organized around the following themes:

Ecosystem and ocean processes

1. Biodiversity and ecosystem functions
2. Understanding food webs and biogeochemical cycles
3. Developments in taxonomy and systematics
4. Connecting biological, oceanic, and atmospheric processes of different scales

Inclusive, interdisciplinary, and transparent ocean sciences

1. Human–ocean interactions
2. Science, management, and policy for a sustainable and productive Blue Economy
3. Science communication, inspiration, and engagement

Emerging technologies and techniques for ocean science

1. Using remote and *in situ* technologies to inform marine science
2. Advances in techniques and technologies: from ‘omics to gear modifications to data analysis
3. Towards open-source science: freely available methods and data in the marine research

Visit the ECSC4 website, www.ices.dk/events/symposia/ecsc4/Pages/default.aspx, to read more about the conference and the theme sessions and stay up-to-date by following us on Twitter @ECSC_4 for announcements of keynote speakers, the programme, and important dates. Registration and call for abstracts will open in.

16th–20th May 2022: 53rd International Liège colloquium on Ocean Dynamics, and GO2NE oxygen conference

Liège, Belgium

Oxygen is critical to the health of the planet. It affects the cycles of carbon, nitrogen and other key elements, and is a fundamental requirement for marine life from the seashore to the greatest depths of the ocean. Nevertheless, de-oxygenation is increasing in the coastal and open ocean. This is mainly the result of human activities that are increasing global temperatures (CO2-induced warming) and increasing loads of nutrients from agriculture, sewage, and industrial waste, including pollution stemming from power generation using fossil fuels and biomass.

The 53rd Liège colloquium will investigate new developments and insights related to de-oxygenation in open and coastal waters. It is jointly organized with the Global Ocean Oxygen Network (GO2NE) and is a contribution to the Global Ocean Oxygen Decade (GOOD) program endorsed by IOC-UNESCO. The following sessions are considered:

- De-oxygenation: understanding causes and attributing changes

- Assessing open ocean and coastal de-oxygenation variability and trends
- De-oxygenation: observing and modelling
- De-oxygenation and ocean life
- De-oxygenation and co-stressors: understanding, monitoring and mitigating deoxygenation in the context of multiple stressors
- Ocean De-oxygenation - how the past can inform the future?
- Microbial Communities and their controls on biogeochemical feedbacks and interactions
- De-oxygenation, water quality and the climate system: understanding processes and feedbacks and developing actionable indicators
- De-oxygenation: ecosystem services, economic and societal consequences.
- Confronting de-oxygenation and its impacts: translating science to management and policy



Call for travel grants application open; deadline for Abstract submission: January 16th 2022. Further details (scientific committee, submission, registration, deadlines, venue etc...) are available on the web site <https://www.ocean-colloquium.uliege.be/>.

5th-9th September 2022: Challenger Society Biennial Meeting – celebrating the 150th anniversary of the Challenger Expedition
London, UK

To be hosted by the National History Museum, just a ‘date for the diary’, stay tuned.

19th-23rd September 2022: Open Science Conference on Eastern Boundary Upwelling Systems (EBUS): Past, Present and Future and the Second International Conference on the Humboldt Current System

Lima, Peru

January 2022



understand, review, and synthesize what is known about dynamics, sensitivity, vulnerability and resilience of Eastern Boundary Upwelling Systems and their living resources to climate variability, change and extreme events. For more information, visit www.ebus-lima2022.com/.

The meeting will bring together PhD students, early career scientists and world experts to

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

JOBs and OPPORTUNITIES

There are jobs on the IMBER web site

<http://www.imber.info>



Integrated Marine Biosphere Research

Jobs and opportunities

New

- Marine Research Internship, Bazaruto Center for Scientific Studies, Mozambique. No deadline given; **apply now**
- Postdoc: Blue Carbon science, National University of Singapore. No deadline given; **apply now**
- Research Assistant: Vessel tracking analysis, Stanford University, Palp Alto, USA. Open until filled; **apply now**
- Sighting Network Coordinator & GIS Specialist, The Whale Museum, Friday Harbor, WA, USA. No deadline given; **apply now**
- Environmental Data Center Operations Specialist, Chesapeake Bay Natural Estuarine Research Reserve, Virginia Institute of Marine Science, Gloucester, Virginia. No deadline given; **apply now**
- Adjunct Faculty: Oceanography, Rider University, Lawrenceville, NJ, USA. No deadline given; **apply now**
- Tenure track scientist (ten positions), Woods Hole Oceanographic Institution, USA. Apply by **18 January**
- PhD: investigating the status of sensitive species within Irish waters and their vulnerability in relation to fishing and discarding practices, Marine Institute (Galway), Ireland. Apply by **21 January**
- Postdoc: Nippon Foundation Ocean Nexus Program , Dalhousie University, Halifax, Canada. Apply by **31 January**
- Postdoc: Information governance responses in a changing ocean, Memorial University, Newfoundland, Canada. Apply by **31 January**
- Postdoc: Economic security after public social safety measures and policy solutions, Dalhousie University, Halifax, Canada. Apply by **31 January**
- Research Scientist: Quantitative Coastal Ecologist, CSIRO, Brisbane or Perth, Australia. Apply by **20 February**
- Dungeness Crab Manager, Department of Fisheries and Oceans Canada, Prince Rupert, BC, Canada. Apply by **31 March**

In case you missed it...

- **PhD: Industry-connected PhD studentship in marine vessel drag reduction with smart coatings, Memorial University of Newfoundland, Canada. Open until filled; apply now**
- 2023 John A. Knauss Marine Policy Fellowship Program now open
- Call for Shipboard Training Fellowships, Nippon Foundation and POGO
- Informational video: NOAA Pacific Islands Ocean Acidification Master's Student Fellowship: requirements, application process and important dates
- Postdoc: Marine genomics, Okinawa Institute of Science and Technology, Okinawa, Japan. No deadline given; **apply now**
- Postdoc: Predictability of Earth system and ecosystem models, UC San Diego, USA. Open until filled; **apply now**
- Postdoc: Marine system-based stakeholder process, University of Cape Town, South Africa. Open until filled; **apply now**
- Postdoc: Integrated marine ecosystem assessment, University of Cape Town, South Africa. Open until filled; **apply now**
- Research Assistant: Statistical Analysis for Global Deep Sea Capacity Assessment, short term contract with Ocean Discovery League. Open until filled; **apply now**
- Research Technician: San Francisco State University, San Francisco, CA USA. Open until filled; **apply now**

- Call for applications: US Carbon program leadership Award for North American Carbon Science Community. Rolling submissions through April 2022; **apply now**
- Junior Program Associate, International Ocean Acidification Initiative, The Ocean Foundation, Washington, DC. No deadline given; **apply now**
- Senior Consultant in Environmental Policy, ICF, UK or Belgium. No deadline given; **apply now**
- Tenure track Scientists (up to ten positions), Woods Hole Oceanographic Institution, Massachusetts, USA. Apply by **18 January**
- Fisheries Scientist, National Institute of Water and Atmospheric Research, Central Wellington and Nelson, New Zealand. Apply by **20 January**
- Research Scientist: Quantitative Coastal Ecology, CSIRO, Australia. Apply by **20 February**
- Study at 4 of Europe's leading institutes in aquaculture / International Master of Science. Apply by **1 March**

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