

# Deep-Sea Life

Issue 19, August 2022

Are you sitting comfortably? I hope so as there is a wealth of deep-sea wonder to explore in Deep-Sea Life Issue 19! Our colleagues have been busy exploring, sampling, analysing, translating, writing and meeting so that we can learn even more about the deepest parts of our planet. Many colleagues also ensure that they disseminate their important scientific work to those that need it to make sound decisions about the future management of our ocean, and to those who are purely interested and inspired!

Over the past few months, research ships have transported our colleagues to investigate canyon systems off northern Spain, features and associated biology of the Mid Atlantic Ridge, the Azores Plateau and the Argentine deep-sea. They have explored abyssal and hadal depths of the south-east Indian Ocean, seamounts of the Pacific Remote Islands Marine National Monument, the Porcupine Abyssal Plain in the north Atlantic, the depths of the Southern Ocean and the life associated with the wreck of the Titanic.

It is increasingly important that the critical role of deep-ocean biodiversity reaches public audiences far and wide. The photo of the issue shows an impressive example of interactive education in action through *Discover the Deep* – a new permanent exhibition at Dynamic Earth in Edinburgh, Scotland. Read more about this creation to connect people with the deep on page 19.



Visitors can explore some of the 4,700 new species discovered by Charles Wyville Thomson and the crew of HMS Challenger via an interactive that uses original illustrations from the Challenger Reports etched on to acrylic jars especially created for *Discover the Deep*.

Thanks again for sending along your news which we all enjoy reading in Deep-Sea Life. We are already looking forward to reading your submissions for our 20th edition in 6 months time!

Thanks to the editorial team: Drs Abi Pattenden (University of Limerick, Ireland), Bhavani Narayanaswamy (SAMS, Scotland), Franck Lejzerowicz (University of Oslo), Michelle Taylor (University of Essex, UK) and Eva Ramirez-Llodra (REV Ocean, Norway).

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A DOSI and DSBS collaborative publication.



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# Cruise News

## The INTEMARES-C20422 survey

### Setting up new methodologies for systematic monitoring of deep vulnerable habitats in the context of marine Natura 2000 network

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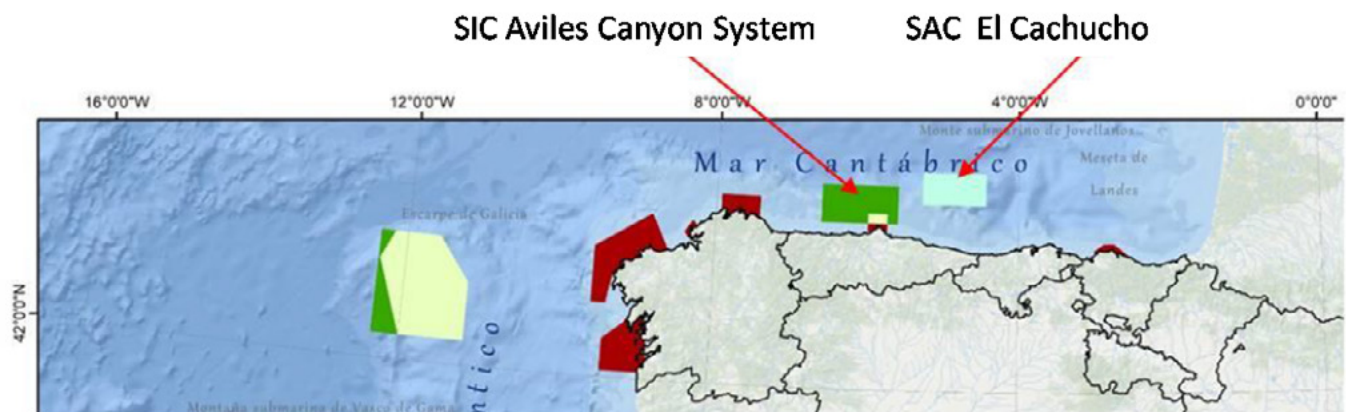


Figure 1. Study area covering two marine EU Natura 2000 sites in the Cantabrian Sea

During 08-19 April 2022 the ECOMARG (<https://www.ecomarg.com>) research group from the Spanish Institute of Oceanography (IEO) carried out the INTEMARES-C20422 survey onboard the R/V *RAMÓN MARGALEF* in the EU Natura 2000 sites Aviles Canyon System, Site of Community Importance (SIC) and El Cachucho, Special Area of Conservation (SAC) (Fig. 1). The survey, under the scope of the LIFE IP INTEMARES project (Integrated, innovative and participatory management of the Natura 2000 Network in the Spanish marine environment), was included in the pilot action “Systematic monitoring methodologies for deep vulnerable habitats in the context of marine RN2000”. In this context, different operations were carried out during the survey to test new technologies and methodologies for monitoring vulnerable species and habitats and their conservation status. Among these actions, it is worth mentioning the fine-tuning of image acquisition techniques using the ROTV *Politolana* at fixed sampling stations considered biodiversity

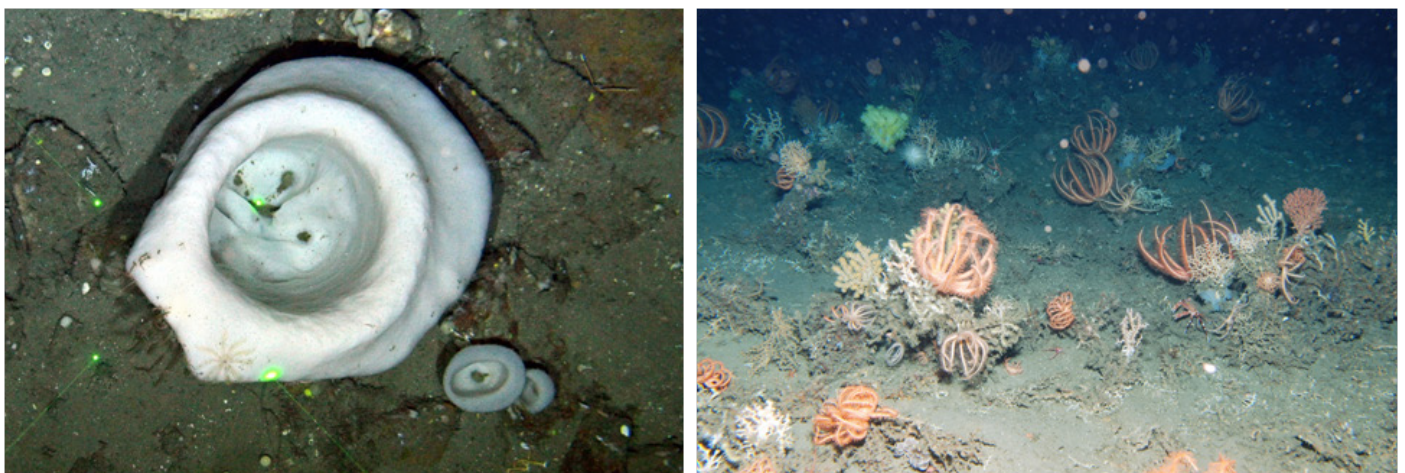
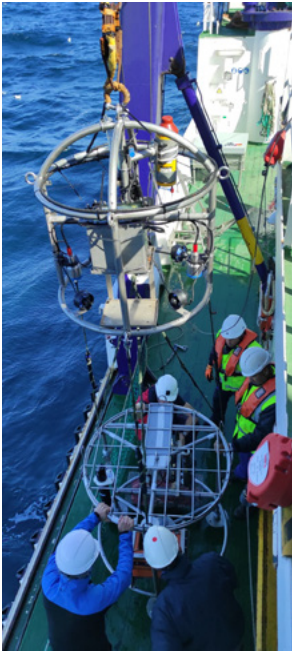


Figure 2. *Asconema setubalense* specimens taken by the ROTV *Politolana* (left) and coral field with brisingids image from the lander *Asconema* (right).





hotspots that will serve as future monitoring stations for the Aviles Canyon System once declared a SAC. An emblematic species, the hexactinellid sponge *Asconema setubalense* (Fig. 2 left), received special attention for the analysis of population parameters. Other actions involved the mooring of landers for image (Fig. 2 right) and hydrographic data acquisition using the newly developed Landerpick system (<http://hdl.handle.net/2117/356433>) in collaboration with startup EDRONICA, Spain (Fig. 3); this included sea trials of a long-term (6 months) image acquisition system under development by the ECOMARG marine technology department. Also, a new method for tagging deep-sea sharks through the precise anchoring (through the Landerpick system) of a pot specifically designed for this purpose was tested. All these advances and adjustments developed by the ECOMARG crew (Fig. 4) during the survey have made it possible to outline the state-of-the-art methodology for monitoring marine protected areas, a fundamental element included in the management plans within the EU Natura 2000 network.

Figure 3. Deployment of the lander *Asconema* using the Landerpick high precision mooring system



Figure 4. ECOMARG team at the R/V *Ramon Margalef* during the INTEMARES-C20422 survey.

## Voyage to the Ridge 2022: NOAA Explorers Dive Into the Mysteries of the Mid-Atlantic Ridge

By [NOAA Ocean Exploration](#)

May through September 2022, NOAA and partners are conducting [Voyage to the Ridge 2022](#), a series of three telepresence-enabled ocean exploration expeditions on NOAA Ship *Okeanos Explorer* featuring mapping operations and remotely operated vehicle (ROV) dives to collect baseline information about unexplored and poorly understood deepwater areas of the Charlie-Gibbs Fracture Zone, Mid-Atlantic Ridge, and Azores Plateau.



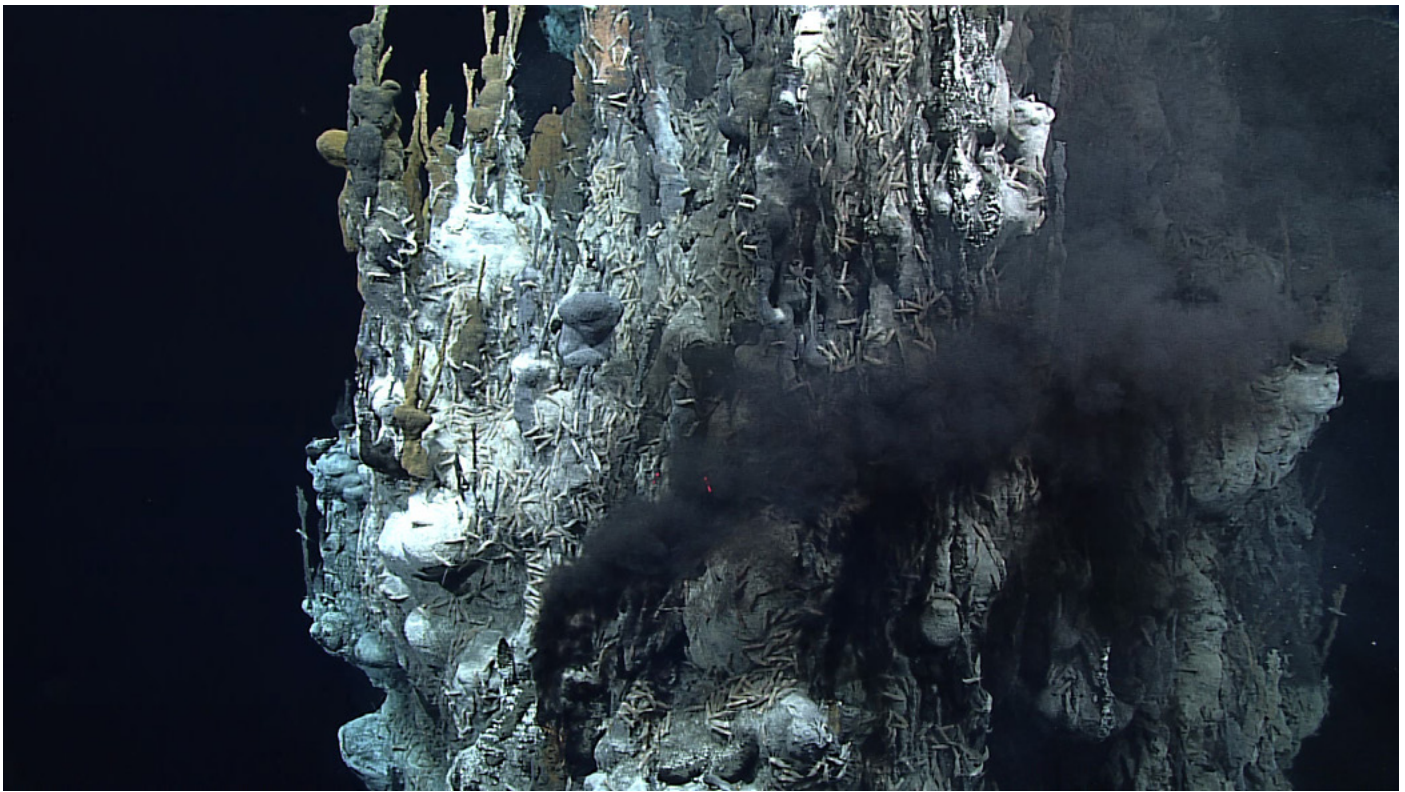


Figure 1. During Voyage to the Ridge 2022, NOAA will explore hydrothermal vents via mapping, remotely operated vehicle dives, and CTD (conductivity, temperature, and depth) casts. This spectacular hydrothermal vent was imaged during the 2016 Deepwater Exploration of the Marianas. Credit: NOAA Ocean Exploration, 2016 Deepwater Exploration of the Marianas

Like all [NOAA Ocean Exploration](#) expeditions on *Okeanos Explorer*, Voyage to the Ridge 2022 is open to the broad science community, and scientists are invited to participate in dives by watching live high-resolution, low-latency video feeds over any computer and internet connection and by joining ongoing ship-to-shore science conversations through a teleconference line and instant messaging, and contributing annotations to video data with [SeaTube](#). Additional information about [how to participate](#) in expeditions and [how to join the expeditions](#) this summer is available on the NOAA Ocean Exploration website. At the conclusion of each expedition, data will be made publicly available in open source formats, typically within six months following the conclusion of an expedition.

Voyage to the Ridge 2022 operations include use of the ship's deepwater acoustic systems (Kongsberg EM 304 multibeam sonar, Simrad EK60 and EK80 split-beam fisheries sonars, Knudsen 3260 chirp sub-bottom profiler sonar, and Teledyne acoustic Doppler current profilers), NOAA's two-body deepwater ROV, and a high-bandwidth satellite connection for real-time ship-to-shore communications. ROV dives include high-resolution visual surveys of water column and seafloor habitats as well as biological and geological sampling.

The first Voyage to the Ridge 2022 expedition took place May 14 - June 7 and included mapping operations to collect acoustic data of seafloor and sub-seafloor geomorphology and water column habitats of the Charlie-Gibbs Fracture Zone. July 9 - July 30, NOAA will conduct mapping operations and dives to explore the Mid-Atlantic Ridge (north of the Azores) and the Azores Plateau. And

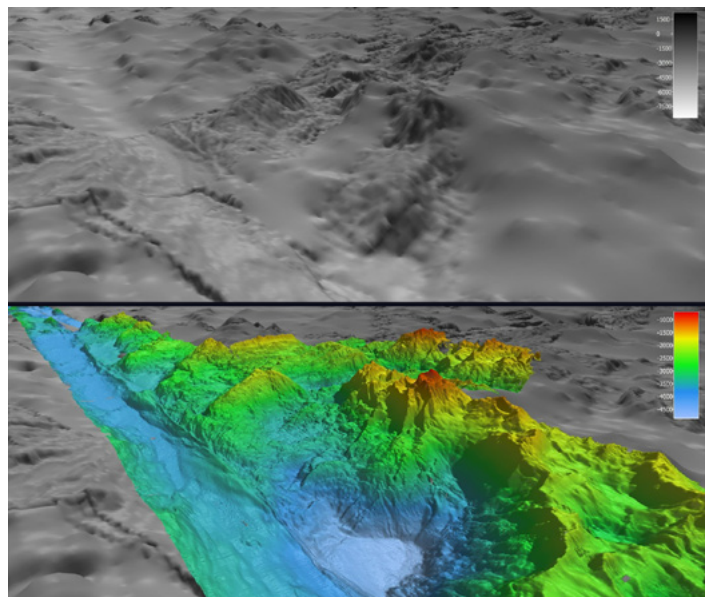


Figure 2. In May, during the first Voyage to the Ridge 2022 expedition, NOAA Ocean Exploration completed the largest continuous mapping survey effort to date over the Charlie-Gibbs Fracture Zone, collecting bathymetric data along this geologically fascinating and ecologically exceptional region. This image shows satellite-derived bathymetry data (top) in comparison to the high-resolution bathymetry data (bottom) collected during Voyage to the Ridge 2022 using the multibeam system on NOAA Ship *Okeanos Explorer*. Credit: NOAA Ocean Exploration, Voyage to the Ridge 2022



finally, from August 6 - September 2, ROV and mapping operations will be conducted, focusing on the Azores Plateau and the Mid-Atlantic Ridge (south of the Azores).

Despite the fact that the Mid-Atlantic Ridge (MAR) is part of the longest mountain range in the world and is one of the most prominent geological features on Earth, it remains largely unexplored. Voyage to the Ridge 2022 data will increase our understanding of the region's geological context and past and future geohazards, the diversity and distribution of biological communities, and how populations of deep-sea species are related across this region and throughout the deepwater Atlantic basin.

Video from ROV dives will be [streamed online](#) in real time from approximately 6:45 a.m. to 5 p.m. ET, July 17 - July 29 and August 7 - August 28.

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## First steps towards a Regional Environmental Baseline in the Argentine deep sea

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Figure 1. Pycnogonida collected with epibenthic dredge at cold-water coral reefs at 800 m depth during the cruise YTEC-GTGM 05 on board "R/V A.R.A. Austral"

In an unexplored area of the Argentine deep sea (between  $-37^{\circ}\text{S}$  and  $-41^{\circ}\text{S}$ ), we conducted the first multidisciplinary oceanographic expedition designed to contribute to an environmental baseline study to inform management decisions. Our expedition "YTEC - GTGM 05" aboard the R/V "A.R.A. Austral" took place between May 20 and June 14. It was framed on the Y-TEC - National Scientific and Technical Research Council - Argentina (CONICET-Argentina) agreement. Our group, the Extended Marine Geology Working Group GTGM-A of Pampa Azul, met researchers working in different disciplines of marine sciences in CONICET. We aimed to study the physical, chemical and biological baseline conditions of the ocean

floor, water column and air-water interface from our study area. More specifically, high-resolution seafloor mapping addressing the Plio-quadernary seismo-stratigraphic framework; study of non-renewable natural resources; detection and mapping of vulnerable marine ecosystems; ecology and biodiversity of plankton, benthos, microbials, birds and marine mammal communities; water and sediment contamination (heavy metals and microplastics) and its assimilation by planktonic and benthic fauna; measurement of environmental parameters affected by climate change together with paleoclimatic and paleoceanographic indicators. We obtained 35,000 km<sup>2</sup> of high-resolution bathymetric sweep with multibeam echosounder and 544 km of high-resolution seismic with Sparker, 13 corings with gravity corer, 4 box corers and 5 epibenthic dredges, hydrographic profiles (CTD and ADCP) and samples of the water column with CTD-rosette at 15 stations and with plankton nets at 14 stations, and bird and marine mammal censuses along the 3413 NM covered.



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## 2022 Titanic Expedition – mid-expedition updates and first successful dives to RMS *Titanic* wreck of 2022 season

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The 2022 Titanic Expedition season has been a great success for OceanGate Expeditions and the OceanGate Foundation. We have already completed three successful dives to the RMS *Titanic* wreck by the end of the third mission of the expedition using OceanGate Inc.'s 5-person submersible, *Titan*. Two more missions this season should add additional dives. The science team of the expedition includes marine biologists, archaeologists, cartographers and eDNA specialists from the University of Edinburgh, University of NC at Wilmington, University of Rhode Island, and eDNatec. Scientific objectives of the operations are focused on collecting biological and oceanographic data through



Figure 1. Submersible and research vessel Horizon Arctic at the end of the dive, photo by Anna Gebruk





Figure 2. Crew of the manned submersible *Titan* before the dive, photo by OceanGate

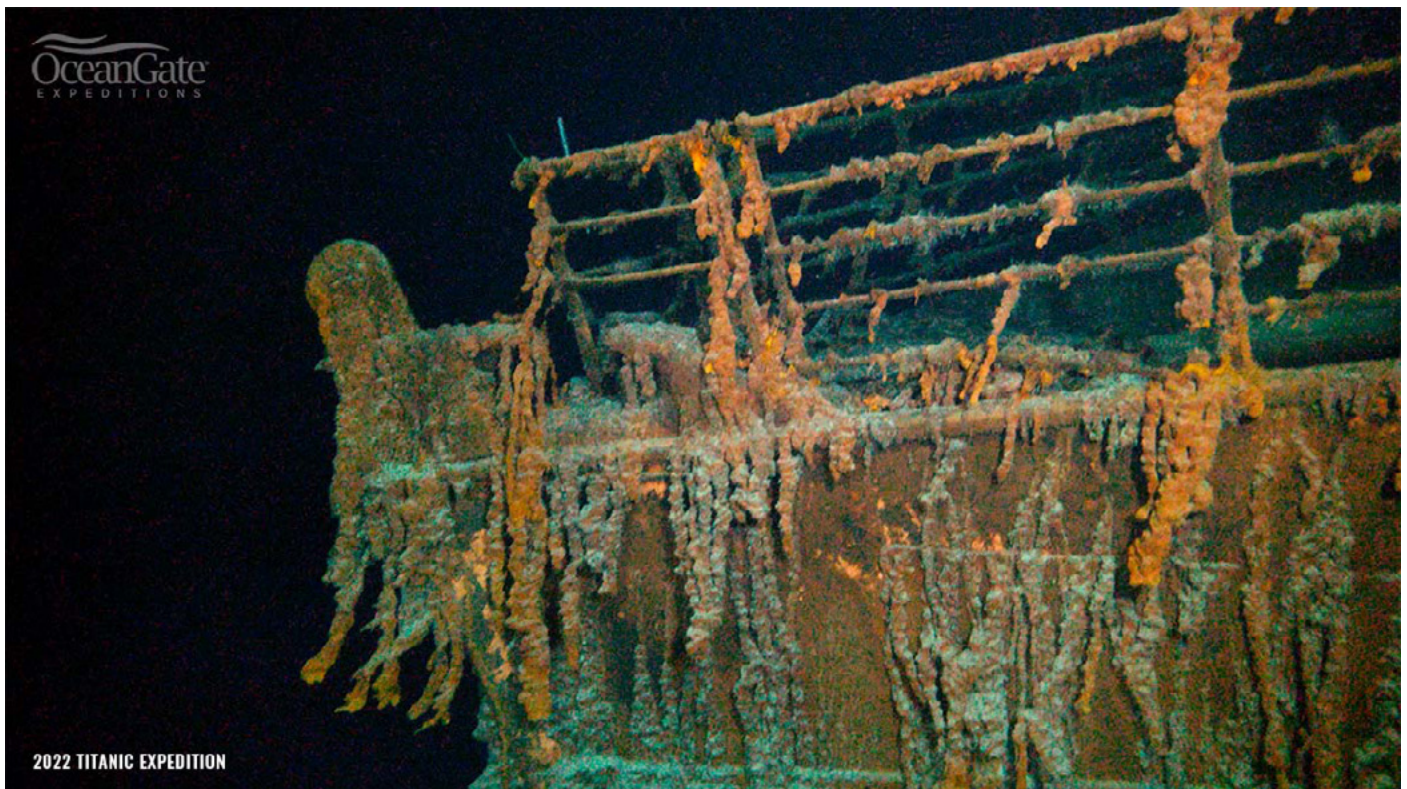


Figure 3. The bow of the *Titanic* wreck with rusticles and cold-water corals, photo by OceanGate

observations, video analysis, water sampling, CTD profiling and bottom current measurements. These data will help to improve our understanding of the state of the wreck and impacts of the wreck on deep-sea biodiversity, including modelling the dispersal of cold-water coral larvae to and from the wreck, ultimately addressing the question to what extent the wreck of the *Titanic* is now acting as a source of larvae for populations of cold-water corals?

First images from the bow and the mast of the wreck show abundant colonies of soft corals, including *Chrysogorgia* and *Lepidisis*, and *Munidopsis* squat lobsters, which agrees with the earlier observations from the wreck in 1990s-2000s; however, the size and particular locations of the colonies change, which can give important insights into the development of deep-sea biofouling.



As the expedition continues, we plan to collect more water samples near the wreck to enhance visual observations of biodiversity with environmental DNA analyses. We are also setting up several long-term monitoring stations on the wreck, which will be visited in future cruises for both biological and archaeological objectives.

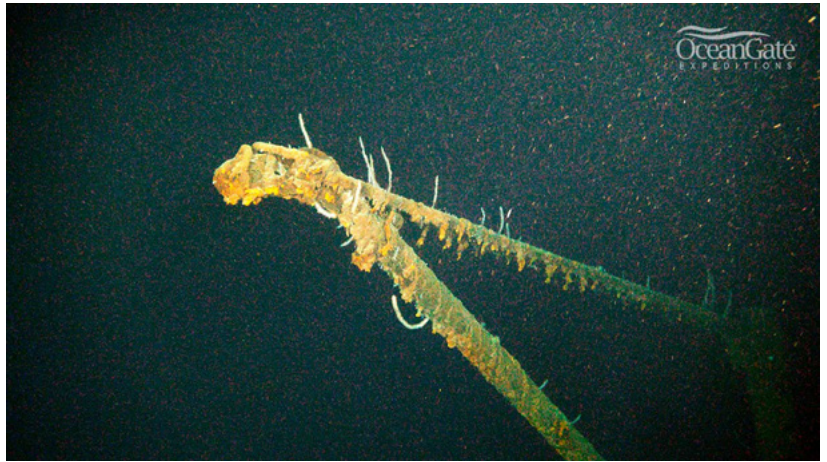


Figure 4. Davit of the *Titanic* wreck with colonies of bamboo corals, photo by OceanGate

## A look back at the Momarsat 2022 cruise

Jozée Sarrazin and Marjolaine Matabos

*Ifremer, France*

The Momarsat 2022 cruise was held from 6 -27 June 2022 onboard the French research vessel *Pourquoi pas?* at the Lucky Strike vent field - northern Mid-Atlantic Ridge - to carry out the yearly maintenance of the EMSO-Azores observatory.

Once again and despite a few Covid cases on board, we ensured the turnover of the full platform and sensor array and started another year of data acquisition! The team of 30 scientists from Ifremer, CNRS (IPGP, GET, MIO, LPO), University of Western Brittany (UBO) and University of the Azores worked together during the 15 *Nautilé* dives to achieve the substantial sampling plan paramount to the long-term monitoring of the vent field. A novelty this year, in order to



Figure 1. The Momarsat 2022 full team beside the R/V *Pourquoi pas?* in the port of Horta in the Açores.



reduce our environmental footprint on the seafloor, a collaboration with the submersible and ship crews enabled the development of new procedures to limit the amount of weights left at the bottom. Instead of free fall elevators that release 500 kg of weights on the bottom, a few were deployed using the deep-sea cable. In addition, one dive was dedicated to the recovery of lost weights using the *Nautilie* and the ship deep-sea cable. This procedure will be reconducted in the following cruises. Visit the Facebook page (<https://www.facebook.com/CampagneMomarsat/>) for more detailed information of scientific and technological achievements.

The presence of a cartoonist on board during the cruise contributed to reinforce the synergy between all the people onboard. Through hundreds of illustrations, Damien Roudeau described and shared the adventure of scientists, pilots and crew members working together towards a common objective: enhance our knowledge about deep-sea ecosystems. After this month-long journal, a comic book story will be prepared (to be released at the end of 2024) to embody the scientific, environmental and financial stakes of the quest for rare earths and strategic minerals through this mission.

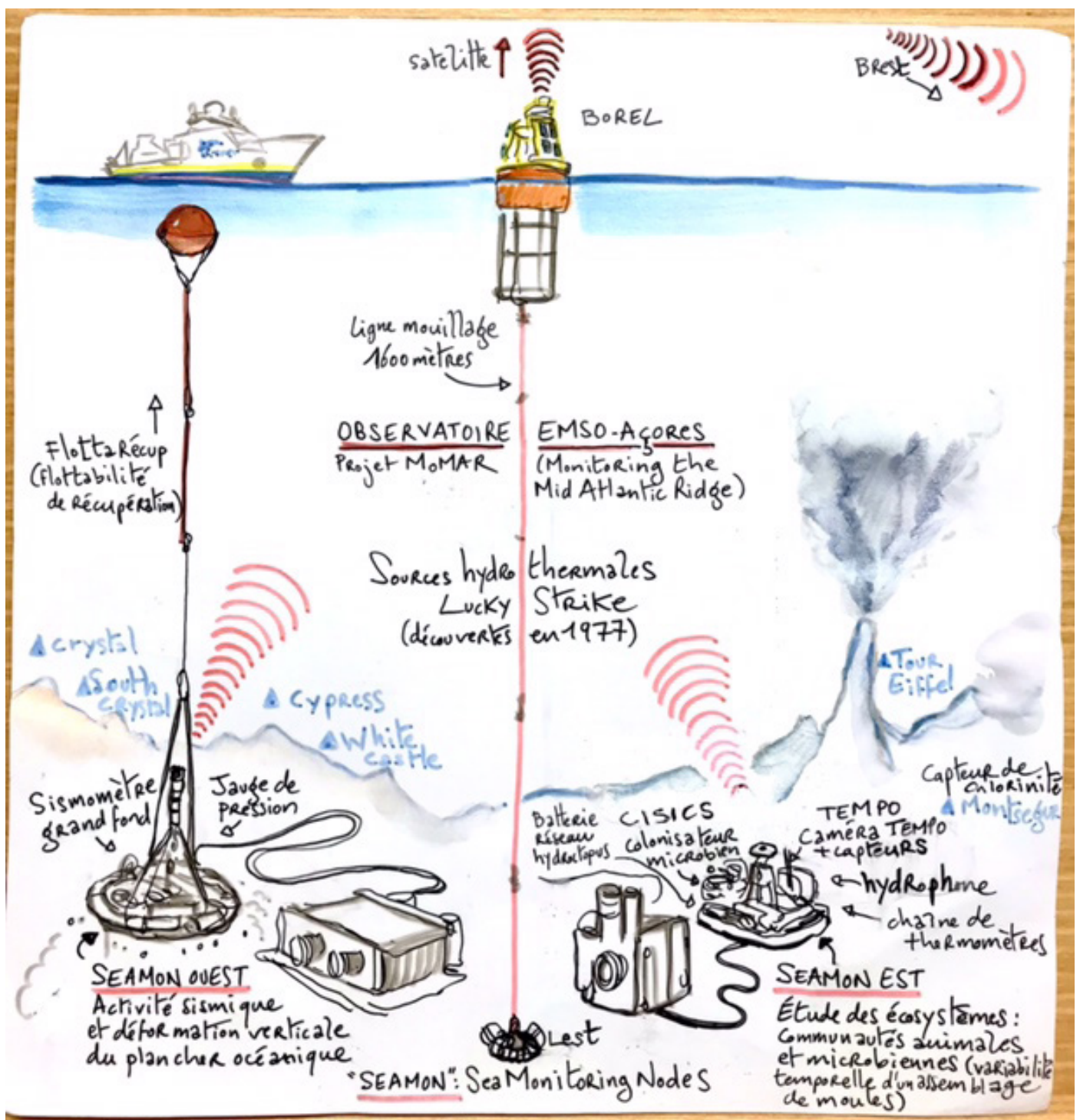


Figure 2. Sketch of the EMSO-Azores observatory © Damien Roudeau/Ifremer

This journey was initiated several years ago by researchers M. Matabos and J. Sarrazin during a conversation with N. Le Roy, a seaman of the *Pourquoi pas?* concerned by environmental issues related to the sea. You can have a look at the Instagram pages ([Momarsat](#)) to get a sketched overview of the cruise.

The EMSO-Azores observatory is part of the One Ocean Network for Deep Observation action of Ifremer endorsed by the UN Ocean Decade program (<https://www.oceandecade.org/actions/one-ocean-network-for-deep-observation/>).

## The Abyssal and Hadal Depths of the Southeast Indian Ocean

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Figure 1. Centre director Professor Alan Jamieson and senior postdoctoral researcher Dr. Todd Bond with one of the three baited remote operated landers they designed and assembled for the cruise.

In March 2022 the Minderoo-UWA Deep-Sea Research Centre embarked on a 14-day voyage aboard the *Pangaea Ocean Explorer* to explore the abyssal and hadal depths of the Diamantina Fracture Zone and Naturaliste Plateau in the Southeast Indian Ocean. The cruise was led by centre director Professor Alan Jamieson who was accompanied by UWA fellows Dr Todd Bond and Dr Prema Arasu. They were joined by PhD researcher Jürgen Valckenaere from the UWA Wernberg Lab and OceanOmics research assistant Marcelle Ayad.

Three full ocean depth-rated landers were designed, constructed and used for the first time on this voyage. Each one was equipped with a baited HD video camera, current meter and CTD-O2 instrument, a baited amphipod trap and bottom water samplers. A total of 19 lander deployments were conducted over the duration of the cruise, resulting in >130 hours of video

footage, hundreds of amphipods for genomic analysis, and two likely new species of snailfish (Figure 1) captured in the easternmost part of the Diamantina Fracture Zone at 6177 m deep.

The Diamantina Fracture Zone is a 3400 km-wide area of ocean trenches and ridges which were formed as the Australian and Antarctic continents separated. The deepest part is the Dordrecht Deep 1400km west of Fremantle at over 7000m. The snailfish were caught within the easternmost part of the fracture zone and within the bounds of the Australian EEZ, south of the Naturaliste Plateau. At around 6200m, this point is believed to be the deepest point off the Australian mainland.



Bathymetric data collected using *Pangaea Ocean Explorer's* multibeam sonar is being processed and analysed by the centre's new geoscientist Yakup Niyazi. Geneticist Paige Maroni is currently running phylogenetic analysis of the biological samples.

Figure 2. Prema Arasu



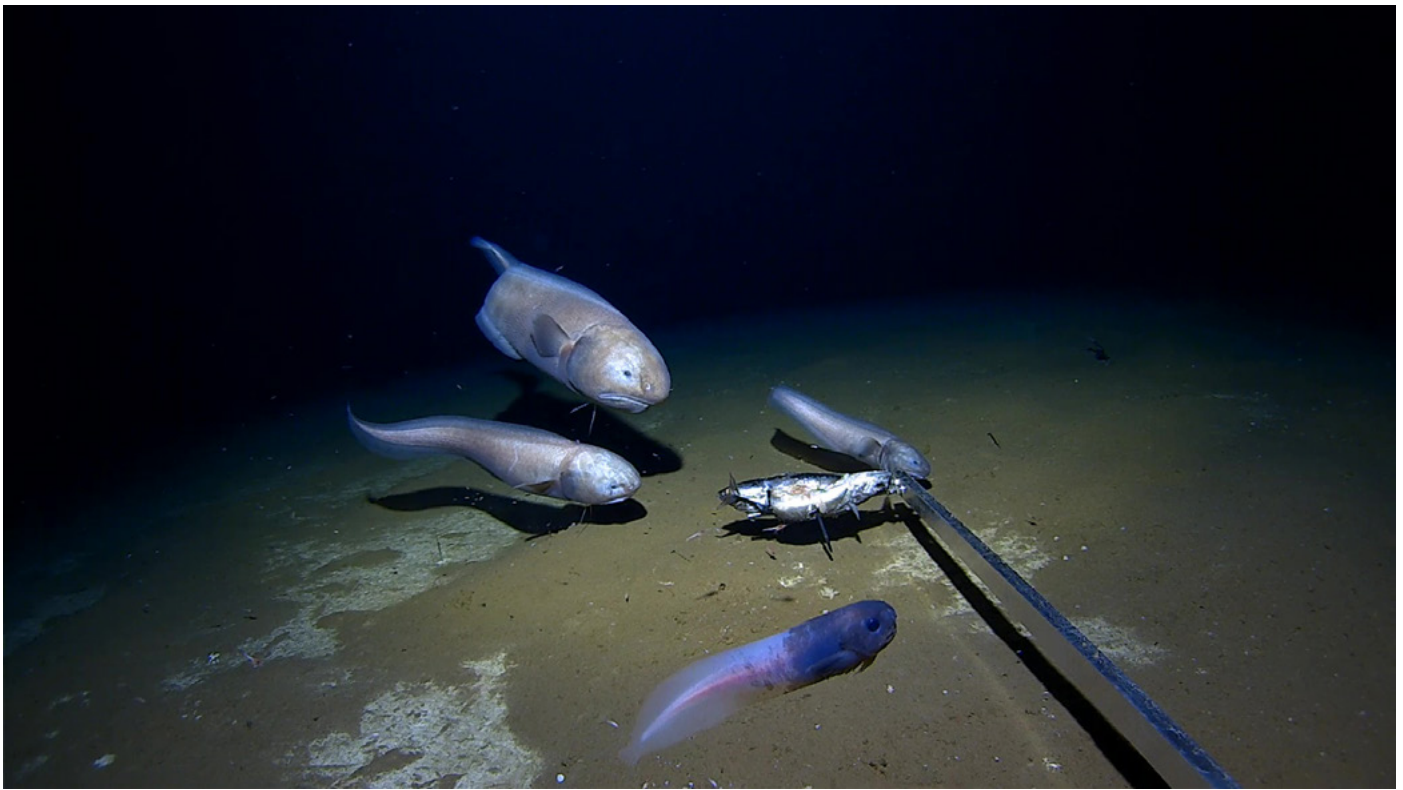


Figure 3. Cusk eels (*Ophidiidae* sp.) and snailfish (*Liparidae* sp.)

The team will soon depart on cruises to the Mariana, Palau and Yap trenches in July, and the Japan, Izu-Bonin, and Ryukyu trenches in August. This September, Professor Jamieson will be giving a keynote at the Challenger 150 Conference about the evolution of hadal science and exploration.

The Minderoo-UWA Deep Sea Research Centre is kindly supported by the Minderoo Foundation.

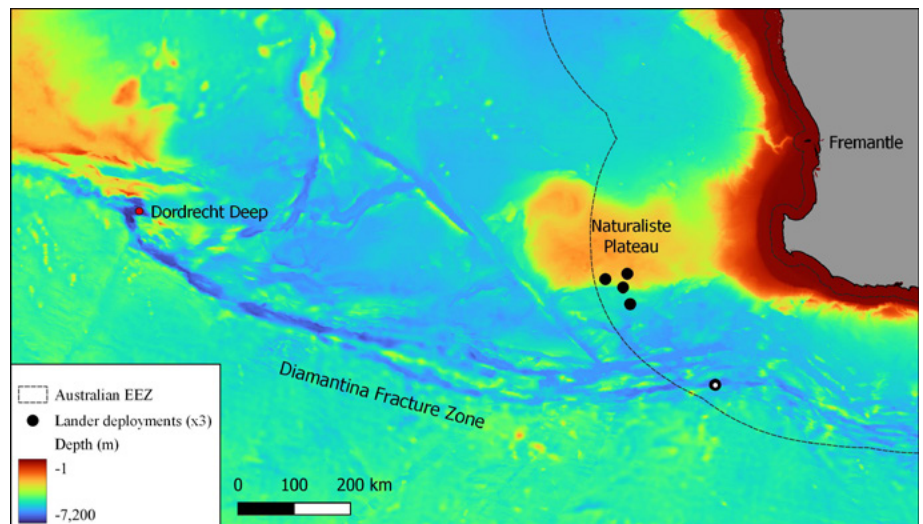


Figure 4. Bathymetry of the south-east Indian Ocean (data sourced from GEBCO, 2020). Black circles identify sites with three lander deployments. Black circle with white inner circle identifies the location where two snailfish were collected at 6177m.

## Mapping and Exploration of Deep Seamounts around Johnston Atoll: 2022 Expeditions aboard E/V *Nautilus*

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Between May 25 and July 13 2022, the Ocean Exploration Trust and partners conducted two telepresence-enabled expeditions aboard E/V *Nautilus* to collect critical baseline information about unknown deep-water areas inside the Johnston Unit of the Pacific Remote Islands Marine National Monument (PRIMNM). Funded by NOAA Ocean Exploration

via the [Ocean Exploration Cooperative Institute](#), these two expeditions explored the deep-water geology and biology of the region in order to provide a foundation of publicly-accessible data to stimulate further exploration, research, and management activities.

During a combined 47 days at sea, the two expeditions mapped over 55,275 km<sup>2</sup> of seafloor using the sonars of E/V *Nautilus*. Seafloor mapping focused on filling multibeam gaps around seamounts towards the southwestern extent of the Johnston Unit of PRIMNM, as well as the Mid-Pacific Mountains towards the northern extent. These mapping data were key to planning and executing remotely operated vehicle (ROV) dives during the second expedition. Using E/V *Nautilus* dual-body ROV system, the expedition completed 13 successful ROV dives at depths ranging from 40 to 3,878 m that explored a wide diversity of habitats and geological features, including the deeper flanks of Johnston Atoll, as well as those of offshore seamounts and guyots. Noteworthy ROV observations included recording basalt atop most guyots, and the occurrence of basalt morphologies overlying limestones. This suggests that some guyots in the region experienced multiple, discrete phases of volcanism. Overall, hundreds of species were observed, including several potentially undescribed species and several range extensions. Throughout the ROV dives, 115 biological, 100 geological, and 63 eDNA water samples were collected to support studies on the deep-water biodiversity, geological age, and volcanic history of the region.

In addition to ROV and mapping operations, these expeditions deployed 10 open-ocean buoys during transits to and

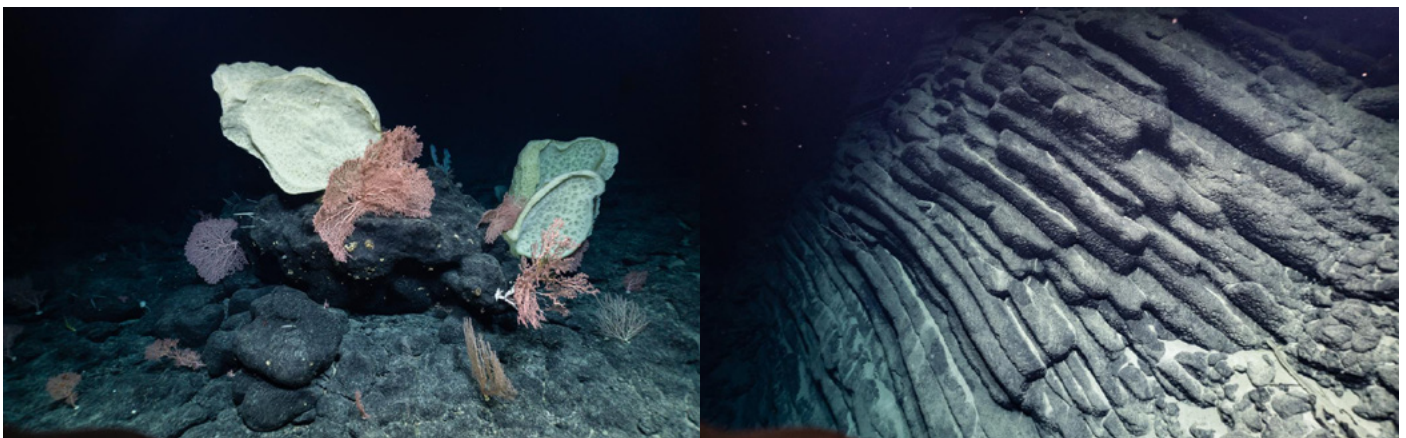


Figure 1. Topography Laying the Foundation for Deep Sea Diversity

from Honolulu. These solar-powered surface buoys will collect data on surface waves, winds, currents, and sea surface temperature, and transmit their data via satellites. Data and samples collected during these expeditions, including video and environmental data collected on every ROV dive, physical samples, mapping data, oceanographic and meteorological data, will be [archived](#) in publicly-available repositories in the coming months. Highlight images, videos, and educational materials are already available to the public via the expedition websites ([NA141](#) & [NA140](#)), with live streaming and discovery highlights already reaching over 350,000 views. Thirteen students and six educators joined these expeditions onboard *Nautilus*. A total of 54 scientists and students from 33 institutions participated in these expeditions as [scientists ashore](#) through telepresence technology.



## Continued deep-sea observations at the PAP Sustained Observatory

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Figure 1. The next generation researchers on JC231 (from left to right): Alice, Jack, Emma, Eloïse, Olmo, Raphaela and Chris just before spotting the first pod of common dolphins – that was good timing.

In May 2022, a team led by Dr Susan Hartman, joined the RRS James Cook to carry out the annual sampling programme and servicing of moorings at two of the UK's [Climate Linked Atlantic Sector Science \(CLASS\)](#) fixed-point observatory sites, the Porcupine Abyssal Plain Sustained Observatory (PAP-SO) and Whittard Canyon.

In the canyon, the team replaced a mooring that monitors current velocity and sediment transport, ahead of a major cruise to the canyon in August, led by Dr Veerle Huvenne. This work has substantially changed our understanding of sediment transport in land-detached submarine canyons

– [they may be much more active than previously believed.](#)

At the PAP-SO, the science was as broad as ever with many collaborations integrated into the regular operations dedicated to monitoring multidecadal change in open ocean and abyssal plain ecosystems. Sediment trap time series observations continued with the recovery and re-deployment of the mooring, increasing the duration of particle flux data to 30 years. The ERC Horizon 2020 funded ANTICS project team, led by Dr Sari Giering, joined the cruise to sample and observe sinking particles with optical instruments, as well as test new equipment, in order to better quantify ocean carbon storage. A UK Met Office biogeochemistry Argo float was deployed to gather greater resolution water column measurements while in the vicinity of PAP-SO.

Dr Brian Bett and his team continued the longest individual time series at PAP-SO by sampling the benthic megafauna (33-years) and scavenging amphipods (37-years) at 4850 m depth. Gaining added value from the benthic operations, Christopher Fletcher from the Natural History Museum sampled these catches for the [Darwin Tree of Life Project](#), extending that programme to the abyssal plain. Additional benthic studies focussed on bioturbation were carried out by Olmo Miguez-Salas (Senckenberg Research Institute, Frankfurt), on a CLASS fellowship award.

In the surface ocean, the long-running collaboration with the UK Met Office continued with servicing of the autonomous full ocean depth mooring that collects meteorological data and a series of essential ocean variables. These data help interpret observations deeper in the water column and provide an important monitoring site for the carbonate system in the upper ocean and atmosphere in their own right. Data from CTDs and underway sampling from the vessel further support this work.

A highly rewarding aspect of JC231 was the engagement with several local schools through a series of video calls before departure. The enthusiastic young scientists were excited to hear about the science at the PAP-SO and had a series of insightful questions which they sent as letters and pictures for the scientists to answer during the cruise.

The blog from JC231 can still be viewed online: <https://papobservatory.wordpress.com/blog-posts/>. Look out for more activity in the Whittard Canyon and at the PAP-SO in August during cruise JC237.

## Akademik Mstislav Keldysh in the Southern Ocean

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From December 2021 to April 2022, 87<sup>th</sup> cruise of the R/V *Akademik Mstislav Keldysh* was organized by P.P. Shirshov Institute of Oceanology RAS (IORAS) to the South Atlantic and Atlantic sector of the Southern Ocean. The cruise started from and ended in Kaliningrad (Russia) and due to COVID restrictions no ports were called. Since 19 January - 14 February 2022, 53 scientists from ten research institutions of the Russian Academy of Sciences and VNIRO Branches studied benthic and pelagic ecosystems in the Bransfield Strait, the Powell Basin of the Weddell Sea, the Orkney and Laurie Troughs. New materials have been collected to characterize the state and biodiversity of pelagic and benthic communities, and also spatial and temporal variability of the key abiotic factors.



Figure 1. Selection of photos from the cruise.



# Project Focus

## Microbial Harmonics in Deep-Sea Sediments in response to Astronomical Cycles: A case study with calcareous oozes

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The microbial 'Earthlings' on-board the Solar journey, are embedded in a strange space-ship, the Geobiosphere. Acknowledged by scientific work world-wide (including our own increments), the fine microbial matrix is designed and governed by Planetary processes and cyclic harmonics. The microbial dynamics appears to reflect astronomical cycles and necessitates further thought. The influences of the Jovian Schwabe cycle, solar sunspot cycle and quasi-biennial oscillations (QBO) in maneuvering the microbial matrix in the abyssal Central Indian Basin (CIB) is in purview. Monitoring a decadal scale microbial data under the aegis of Polymetallic Nodules Programme showed the superimposition of the 12 year solar sunspot cycle potentially serving as a proxy for Schwabe Cycle of gas-giant Jupiter with microbial count and Adenosine Triphosphate (ATP). A deep-energy derived dynamo apparently rotates circulating sea-floor fluids. Microbial and allied geodynamic parameters revealed non-Newtonian fluid rotation of pore fluids at a time-scale of about 3.5 years. The apparent mirror-images of down-core profiles in consecutive samplings were indicative of fluid rotation completing one 360° rotation in 3.5 years, highlighting a scale similar to QBO. While certain downcore microbial functions like carbon fixation, methanogenesis and ATP are corroborated with extreme geochronological and climatic events, the real-time environmental monitoring from 2003-2015, revealed the potential influence of the Jovian Schwabe cycle and QBO.

A subtle sulphur oxidation and disproportionation involving P, Fe and H cycles reflected features of Venusian analogy in CIB in an otherwise near-Martian structure similar to Mount Sharp on Gale Crater. However, we have not yet deciphered a component that could reflect the 22-year Hale Cycle of Venus, mainly due to inadequacy of continuous geomicrobial proxies on similar sediment cores. Very slow sedimentation rates of CIB cores do not permit down-core resolution of the Hale Cycle either. One approach to solving this issue could be looking for analogues with higher sedimentation rates.

The position of the substellar point dictates the release of CO<sub>2</sub> from the lithosphere, in tidally-locked exoplanets. In similar analogy, an enhanced heat-regime coded on a sediment core would also demarcate extents of C-fixation and release. Just above the Calcite Compensation Depth (CCD), the rotation of the pore fluids occurs in reverse direction due to magnetic anisotropy caused by magnetocrystalline, magnetoelastic, shape and exchange anisotropy. Arranging all available patches of the puzzle, a prominent linkage of the Jovian impacts on the microbial ballet via the sunspot cycle,

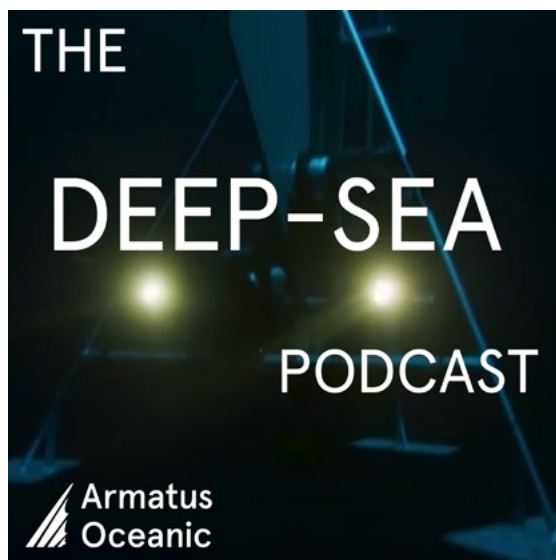
QBO and magnetic anisotropy has surfaced. The CIB separates the siliceous ooze realm and red clays distinctly. Getting calcareous oozes (above CCD) in CIB is rare. The only calcareous ooze at hand is located on a seamount top in the red-clay realm [3]. Exploring seamount tops above CCD, within siliceous ooze realm with a relatively higher sedimentation rates would help exemplify the contrast in magnetic anisotropy and fluid rotations along with astronomical cycle like Hale Cycle. A potential carbonate-silicate cycle in biogenic ooze systems could complement the inorganic carbonate-silicate cycle [4], a very crucial “Goldilock” marker of planetary habitability.

#### References:

1. Das et al (2021) Venus Science Conference 2021, Physical Research Laboratory, Ahmedabad, India, 23rd-24th September, 2021, pg 67.
2. Das et al (2021) Symposium on Meteoroids, Meteors and Meteorites: Messengers from Space (MetMeSS-2021), Physical Research Laboratory, Ahmedabad, India, 29th -30th November 2021, pgs 37-41.
3. Nath et al., (2013) Boreas, [DOI 10.1111/j.1502-3885.2012.00304.x](https://doi.org/10.1111/j.1502-3885.2012.00304.x).
4. Edson A.R. et al., 2012 Astrobiology 12: 6 562-571. <http://doi.org/10.1089/ast.2011.0762>

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## The Deep-Sea Podcast Reaches Global Success!



The Deep-Sea Podcast has grown steadily over the last two years and has just cracked the top 3% of global podcasts! Charting under Life Sciences in the UK, USA, Canada, Australia and Germany.

What started out as a lockdown project, is an attempt to bring the real deep-sea to more and more people... whilst having fun on the way. The show hosts a range of incredible guests, from researchers and artists to film directors and royalty, all with one common thread – a fascination for the deep-sea.

Hosted by Thomas Linley and Alan Jamieson, with regular guest Don Walsh (pilot of the first dive to Challenger Deep and all-round oceanic-legend), the show keeps you up to date, providing commentary on the latest deep-sea discoveries and tales of life at sea - without taking

things too seriously. The show acts as a bridge, putting creatives in touch with collections to meet their inspirations, connecting specialists from other sectors with members of the deep-sea community, and involving the public in scientific contributions. There's also been a surprising amount of consultancy given on biological accuracy for tattoo designs.

In an age of misinformation and mistrust of science, the show aims to show the human side of scientists. Not a cold ivory-tower elite but passionate people working hard. Whilst not perfect, co-host Thom Linley considers it one of the most rewarding outputs of his career.

It's been a fun ride so far, with only more adventures to come, so tune in to your favourite podcast provider and get in touch!

Email - [podcast@armatusoceanic.com](mailto:podcast@armatusoceanic.com)





Instagram - [@DeepSea\\_Podcast](https://www.instagram.com/DeepSea_Podcast)

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Website - <https://www.armatusoceanic.com/the-deepsea-podcast>

## Metal impacts on deep-sea microbial communities and function (MIDFun)

Miguel Semedo

*University of Porto, Portugal*

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Deep-sea mining of earth minerals is expected to grow in the next decades. The increase in deep-sea mining activities may lead to the release of toxic concentrations of metals into the surrounding seabed. Increased concentrations of metals can disturb important ecosystem services provided by microbial communities, such as nutrient cycling activity and microbial diversity. Another important ecosystem function performed by some bacteria is the reduction of  $N_2O$ , a potent greenhouse gas, to the inert  $N_2$  gas. This reduction may also be impacted by increased metal exposure. However, the consequences of metal exposure on microbial ecosystem functions in deep-sea conditions are currently unknown.

The overarching goal of the MIDFun project is to evaluate the impacts of heavy metal exposure on microbial growth, metabolism, and diversity in deep-sea conditions. We propose the following specific objectives:

1. Determine the effects of heavy metal exposure on growth and  $N_2O$  reduction metabolism in a model bacterial culture, under deep-sea conditions.
2. Examine the effects of heavy metal exposure on the transcriptome of a model bacterial culture, under deep-sea conditions.
3. Determine the impacts of heavy metal exposure



Figure 1 (top). High-pressure bioreactors for the experimental work with deep-sea bacterial isolates. Figure 2 (bottom). Leonor Pizarro (MSc student) preparing the bioreactors for inoculation with a piezotolerant strain.

on overall N<sub>2</sub>O fluxes from deep-sea sediments.

- Evaluate the impacts of heavy metal exposure on the biological and functional diversity of deep-sea complex microbial communities.

This research will apply a mixed experimental approach in controlled conditions to address the stated objectives. We will combine the use of bacterial pure cultures of deep-sea isolates with the study of complex microbial communities under deep-sea conditions (high hydrostatic pressure). We will use pressurized bioreactors and hyperbaric chambers to test the effects of two representative metals (copper and cadmium) on piezotolerant bacterial growth, metabolic reduction of N<sub>2</sub>O, expression of functional genes, and functional diversity.

We are currently working on objectives 1 and 2, with two deep-sea isolates that are capable of N<sub>2</sub>O reduction. So far, we performed a series of pilot cadmium exposure experiments with *Shewanella loihica* PV-4, a denitrifying gamma-Proteobacteria. Our preliminary results suggest that net N<sub>2</sub>O production/reduction may be impacted in this organism when exposed to environmentally realistic concentrations of dissolved cadmium. We are still working on resolving the expression patterns behind this impact but stay tuned for news soon!

We are also looking for collaborations around the topic of this project, so please contact us if you're interested in similar research questions. Since we don't have specific cruises already planned to collect deep-sea sediments, we would also be very interested if you would like to share deep-sea sediment samples and collaborate with someone that would explore their microbial potential and/or microbial responses to metal exposure.

The mining of the deep seafloor is still at an early stage of implementation. This research presents a rare opportunity to assess the environmental risks of an anthropogenic activity before it begins to shape the ecosystem.

## Taxonomic News

Professor Les Watling

University of Hawaii at Manoa

Contact: [watling@hawaii.edu](mailto:watling@hawaii.edu)

We all know that good taxonomy is the key to scientific and conservation projects in the deep sea. Most people sampling on seamounts or the continental slope have encountered what are often called «bamboo corals» due to their central axis consisting of organic nodes alternating with calcareous internodes. The creating the appearance of «bamboo», at least if you stretch your imagination far enough.

Bamboo corals have been known from the deep sea since the 1860s, and all have been assigned to the Family Isididae due to their resemblance to the type species of the family, *Isis hippuris*, named by Linnaeus in 1758 for a specimen collected in the shallow waters of Indonesia. As more deep-water forms were discovered, the various genera were distributed among several subfamilies with their jointed axis being the one feature they had in common.

Unfortunately, as we showed using molecular genetic methods in the first paper in our bamboo coral revision series, none of the subfamilies are related to each other, and most are very distantly related to *Isis*, the type

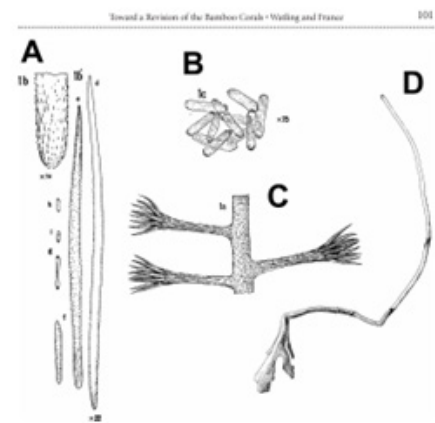


FIGURE 2. *Leptidion corallophylla*, modified from original figure in Verrill (1863). A. Sclerites of the pedip body. B. Sclerites from the coxostylites. C. Portion of the axis with three pedips. D. Lower portion of the axis with most like bases. Calcopy size approx. 15 cm.



of the family. And in fact, the construction of the axis in *Isis* is quite different from those in the other subfamilies.

So, the first thing for deep-sea biologists to know is that the family Isididae is restricted to the shallow tropics. The deep-sea bamboo corals have all been split up with most subfamilies elevated to the level of family, a new subfamily created, and one subfamily erased because the two specimens it contained were both mis-identified.

The papers can be found in *Zootaxa* with the exception of the second part which was published in the *Bulletin of the Yale Peabody Museum*. Copies of parts 1-4 can be found at this [dropbox](#). Part 5, describing several new genera is in press and will be added to the dropbox when available.

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***Discover the Deep:***  
**A new permanent exhibition opens at Dynamic Earth in Edinburgh highlighting Scotland's deep-sea and its role in understanding the ocean.**



Blair Watson, *Discover the Deep* Project Officer

*Dynamic Earth, Edinburgh*

Edinburgh's science centre, Dynamic Earth, is excited to announce the opening of *Discover the Deep*, a new £1 million exhibition dedicated to engaging people with the magnificence of Scotland's deep sea, the work of marine scientists, and threats to the future health of the ocean.

The new exhibition is the result of 5 years of work collaborating with researchers across the country to bring the story of Scotland's deep sea to new audiences via spectacular imagery, models, and cutting-edge audio-visual interactives. The exhibition has been funded by the National Lottery Heritage Fund and other generous trusts, foundations and individuals.



*Discover the Deep* highlights the contribution of Scottish

Figure 1. Visitors can explore some of the 4,700 new species discovered by Charles Wyville Thomson and the crew of HMS Challenger via an interactive that uses original illustrations from the Challenger Reports etched on to acrylic jars especially created for *Discover the Deep*.



Figure 2. An immersive digital experience take visitors down to the depths of the NE Atlantic to explore the biodiversity of the Mingulay Reef and the Hebrides Terrace Seamount where they can direct a light to find out the names of species.

scientist Charles Wyville Thomson who's pioneering work 150 years ago led to the first global expedition to study the ocean onboard HMS *Challenger*. Visitors can explore the stories, techniques and beautiful illustrations from the Challenger Reports thanks to support from the National Museum of Scotland and the Scottish Association for Marine Science.

A large-scale interactive allows visitors to descend into the North East Atlantic, firstly to explore the cold-water corals of the Mingulay Reef Complex, and then the spectacular biodiversity of the Hebrides Terrace Seamount. The content of this new immersive experience has been developed with assistance from the Changing Oceans Group at the University of Edinburgh.

The final gallery enables people to explore modern techniques via an ROV simulator and other interactives about marine acoustics, seabed mapping, deep-sea technology, microplastics, and threats to the deep. Real scientists are introduced through videos, explaining their current research and how it is addressing pressing issues facing the marine environment.

Alongside the new exhibition, visitors to Dynamic Earth can enjoy a newly created present-led planetarium show called "Under Pressure" that showcases technology used to study the deep as well as stunning examples of life in the deep sea.

*"At a time when the health of the ocean is in steep decline, it's vital that people feel a connection to the marine environment and understand how important it is to our future. We hope Discover the Deep will inspire visitors by revealing the wonderful deep-sea habitats just off the coast of Scotland, as well as the central role that Scottish scientists have played and continue to play in how we understand the deep ocean.*

*"We hope it prompts an interest, or even a passion, for the ocean, along with an understanding of what we can all do*



to protect it.” Dr Hermione Cockburn, Scientific Director, Dynamic Earth.

As part of the science outreach programme linked to the new exhibition, staff at Dynamic Earth will be taking deep-sea science to audiences across Scotland at science festivals, schools and community events. If you are interested in developing your public engagement or digital communication skills and volunteering with us, please get in touch with [Blair.Watson@dynamicearth.co.uk](mailto:Blair.Watson@dynamicearth.co.uk).

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## Namibian Deep-Sea Benthos Collection Project: History and Progress

Sarah Paulus<sup>1</sup>, Maria Baker<sup>2</sup>, Bronwen Currie<sup>3</sup>, Kerry Howell<sup>4</sup>, Paulus Kainge<sup>5</sup>

<sup>1</sup>Ministry of Fisheries and Marine Resources, Namibia; <sup>2</sup>University of Southampton, UK; <sup>3</sup>Retired Marine Ecologist, Swakopmund, Namibia; <sup>4</sup>University of Plymouth; <sup>5</sup>Chief Scientist, Ministry of Fisheries and Marine Resources, Namibia



Images of Namibian benthic invertebrate fauna collected from between 280 and 550m depth during biomass survey in February 2021. Credit Sarah Paulus, NMFMR

Fisheries researchers from the Namibian Ministry of Fisheries and Marine Resources are working to establish a deep-sea benthos collection which will be housed at the Namibian National Museum. During the 2021 monk fisheries survey and 2022 hake fisheries survey, about 99% of the invertebrate fauna sampled were identified to species level and quantified.

One of the main drivers for this programme is to satisfy the Marine Stewardship Council standards for certification, one of which concerns generating information on baseline data of the benthic invertebrate fauna associated with the deep Namibian fisheries, including Vulnerable Marine Ecosystem habitats. This is now an urgent priority. A further key driver is that a Namibian deep-sea benthic curated collection, based in Namibia and looked after by Namibian Fisheries scientists, will be a great asset for use in any future activities that may affect Namibian deep waters, and also for increasing knowledge and inspiring wonder in this little-studied realm. Namibian deep-sea benthic diversity data collection is underway on a regular basis in conjunction with fisheries assessment cruises. The deep-sea work undertaken by Namibia has great potential for establishing a long-lasting Namibian skilled benthic workforce and will be an excellent case study for others to aspire to.

Read about history and progress in this [report](#).

## Challenger 150 Programme – Update



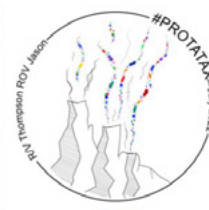
The UN Decade Programme [Challenger 150](#) – a consortium of over 200 members from 38 nations - is committed to mapping the biological knowledge gaps in the deep ocean. In the first year of the Ocean Decade the programme has:

- Set out a blue-print for the programme
- Carried out 15 research cruises in 4 ocean basins (Arctic, North Atlantic, South Atlantic, North East Pacific) providing a strong start to the Ocean Decade.
- Established partnerships with research ship providers REV Ocean and Schmidt Ocean Institute

### Research Cruises



July 2022  
AleutBio - Aleutian Trench Biodiversity Studies (Studien zur Biodiversität im Aleutengraben)

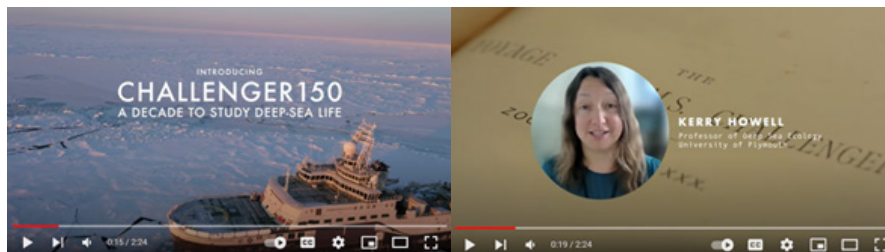


July 2022  
PROT-ATAX: Characterizing and quantifying the impact of phagotrophic protists at hot spots of primary production at Axial Seamount



July 2022  
Sur Ridge Deep Sea Coral Studies

- Obtained commitments of dedicated ship time for capacity building every year for 10 years from REV Ocean
- Established 12 regional scientific working groups to manage activities locally and to review current regional knowledge status & funding opportunities etc.
- Placed 12 early career researchers in co-chairing roles with a mentor to help build generational capacity.
- Established cross cutting technical working groups developing standards for monitoring deep sea litter, identifying and counting animals and habitats in sea floor image and video acquired by robots and other new non-destructive sampling methods, and documenting animal traits.
- Grown our partnership through actively seeking new members from developing nations to help build deep-ocean science capacity globally, so no-one is left behind.
- Welcomed 5 formally endorsed projects – more to come.



Watch the latest [Challenger 150 promotion video](#) narrated by Prof. Kerry Howell (University of Plymouth) and edited by University of Southampton Marine Biology student [Leo Richards](#). Please share it widely!





## News from the DEEPEND: July 2022



Tracey Sutton, Director

*Guy Harvey Oceanographic Research Center, Nova Southeastern University*

The [DEEPEND Program](#) continues its research on pelagic ecosystem structure and dynamics in the Gulf of Mexico, with a busy first half of 2022. Some of our work has been featured in previous DOSI Deep-Sea Round Ups, such as our papers on mesopelagic carbon export ([here](#)), population genomic dynamics ([here](#)), a decal assessment of *Deepwater Horizon* and the open-ocean Gulf ([here](#)), and as a DOSI/DOOS “[lightning talk](#).” We would also like to congratulate the recent defenses of 16 PhD and MS students whose projects encompassed DEEPEND research. They are the engine that drives the ship!

Our recent focus has been on the translation of empirical, scientific information into products useful for the resource management, conservation, and end user sectors. To this end, we recently held an All-Hands Meeting at the NSU Oceanographic Center, where the 67 current DEEPEND projects were placed in a resource management framework (see Figure). This distillation has helped us incorporate existing resource management needs in the Gulf into our next scheduled DEEPEND cruise, which will occur late July/early August. Of note is a growing emphasis on the interactions of the open-ocean pelagic fauna and deep-slope coral reef complexes in the Gulf. We are all quite excited about this new direction, and as always, we welcome new collaborations!

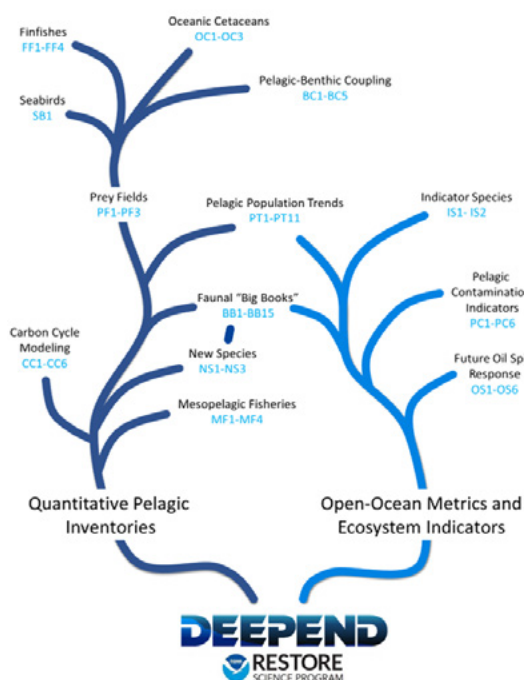


Figure 2 (right). *Vampyroteuthis infernalis*. Credit: Heather Judkins (University of South Florida)

## Survey of Deep-Dwelling Red Coral (*Corallium Rubrum*) (Linnaeus, 1758) off Thoothukudi Coast, Southeast Coast of India (08° 36.220'n 78° 28.095'e) 240m

Dr T. Vaitheeswaran Thiruvengadam M.Sc., Phil., Ph.D., Project Manager,

*International University of East Africa, Uganda*



The occurrence of Pavalam (Red Coral) of *Corallium rubrum* (Linnaeus, (1758) off Thoothukudi landing centre, South-East coast of India. *C. rubrum* was collected as an incidental catch in the deep sea trawl fisheries off Thoothukudi coast of Gulf of Mannar, 08° 36.220'N 78° 28.095'E long at a depths between 220 of 240 m. The present record from Thoothukudi coast of Gulf of Mannar is the recorded specimen from the coast of main land. The first information on the spatial and vertical migration of *C. rubrum* and its fauna and flora status in the Gulf of Mannar seas and stock conservation, it is strongly recommended that an international research programme be set-up, along with the good enforcement measures are very essential in this zone.

The valuable red coral *C. rubrum* inhabits a variety of deep sea substratum habitats in the off Thoothukudi coast of Gulf of Mannar, Southeast Coast of Indian Ocean, have reported from depths at 210-240 m. Deep-water red coral populations is very occurrence in this region and poorly known specimen. According to (Henn *et.al.*, 2006; Rolandi, 1981; Tsounis *et.al.*, 2010) have reviewed that the genus *Corallium*, family Corallidae belongs taxonomically to the Anthozoa class is divided into three subclasses (Octocorallia, Hexacorallia and Ceriantharia). In Octocorallia are three species, viz., the red coral *Corallium rubrum*, soft coral *Dendronephthya gigantea*, and the blue coral *Heliopora coerulea*. The occurrence of



Figure 1. Red coral, *Corallium rubrum* collected from Gulf of Mannar.

endemic to the Mediterranean sea, is notable an immense intense red color and its produces two distinct biomaterials, the axial skeleton and sclerites. While examining the by-catches landed by larger trawlers, which operated in deeper waters off Thoothukudi, red coral was obtained. The present study provides first documented report of *C. rubrum* in the Thoothukudi, Gulf of Mannar coast, India.



# Summary: A Review of Impact Assessments for Deep-Sea Fisheries on the High Seas

## Against the FAO Deep-Sea Fisheries Guidelines



The intensity of deep-sea fisheries on the high seas and the impacts on the marine environment call for effective measures to ensure that fishing does not compromise the commitments established for protecting biodiversity in the deep ocean by the United Nations. In order to prevent significant adverse impacts (SAIs) on vulnerable marine ecosystems (VMEs), high seas fishing nations agreed to stop fishing activities where VMEs are known or likely to occur unless the fishing can be managed to prevent SAIs on VMEs. To determine whether fishing activities can be conducted in a sustainable manner that prevents impacts on VMEs, States agreed on criteria for conducting impact assessments (IAs) for deep-sea fisheries through a set of Guidelines negotiated under the auspices of the United Nations Food and Agriculture Organisation (FAO Guidelines). The FAO Guidelines were adopted in 2009 (FAO 2009) and later that year the UN General Assembly (UNGA) expressly committed States to ensuring that bottom fishing is prohibited unless prior impact assessments consistent with the FAO Guidelines have been carried out. Despite progress made by States and Regional Fisheries Management Organisations and Agreements (RFMO/As) to conduct IAs, there remain significant gaps in the implementation of the IAs following the FAO criteria and commitments in the UNGA resolutions.

This report describes the results of a review of a selection of IAs for deep-sea fishing on the high seas conducted by members of the Fisheries Working Group of the Deep-Ocean Stewardship Initiative (DOSI), consisting of a multidisciplinary group of deep-sea ecology, fisheries and policy experts. The nine selected IAs have either been submitted by States to RFMO/As, have been conducted by the RFMO/A itself, or represent an independent evaluation prepared by a fishing nation. The overall goal of the review was to evaluate the content and consistency of the selected IAs against the science-based criteria established in the FAO Guidelines in light of the UNGA resolutions committing States to conduct the assessments consistent with the Guidelines.

The specific objectives of this study were to:

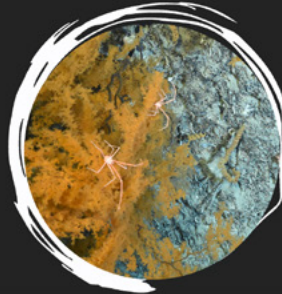
- 1) Review the IAs for deep-sea fisheries on the high seas and compare their contents to the IA criteria in the FAO Guidelines.
- 2) Through this review, identify any major issues with the current IAs and, where necessary, suggest ways to improve the effectiveness of future IAs in order to comply fully with the UNGA resolutions on deep-sea fishing.

**The results of this review demonstrate that the IAs vary considerably in quality and detail, with little consistency in format and methodological approaches. Data availability, especially with regards to the spatial distribution of VMEs and their composite species, is the key factor impeding comprehensive impact assessments.** The resulting shortcomings across all reviewed IAs are the inadequate presentation of sources of data and the unexplained rationale underpinning the assessments of the impacts of fishing.

# Meetings & Workshops

## 4<sup>th</sup> Marine Imaging Workshop

3 - 6 October 2022 in Brest - France  
On-site & on-line



### Marine Imaging Workshop 2022

3 - 6 October 2022, Brest, France

Ifremer will be the host of the 4<sup>th</sup> Marine Imaging Workshop from October 3-6 in Océanopolis in Brest, France, with both on-site and online attendance available. The 4<sup>th</sup> Marine Imaging Workshop [website](#) has been updated, here is the news:

- [Registrations](#) are open for a few days, please note that the early bird deadline is August 25!
- If you are a student planning to participate in-person, have a look at the [travel grants](#) call which offer support for student attendance (deadline July 31).
- The program is under construction and will be updated gradually. Information on the Wednesday's hands-on sessions will come after the (French) summer break. However, we are already pleased to announce the talks of two amazing [keynotes](#): Dr. Edie Widder and Prof. Chris Lintott!
- Guidelines for presenters are available [here](#).
- And last but not least... the [Photo Competition](#) is launched!

For any questions please write to [miw22@ifremer.fr](mailto:miw22@ifremer.fr).





## The UN Ocean Conference 2022

### Theme: Scaling up ocean action based on science and innovation for the implementation of SDG 14: Stocktaking, partnerships and solutions.

Maria Baker, DOSI Executive Director

*University of Southampton, UK.*



Figure 1. Delegates gather for the conference opening ceremony.

Over 4,000 delegates, including multiple Heads of State and Government, Intergovernmental organisations, Non-governmental organisations and others, gathered for the second [UN Ocean Conference](#) from 27 June to 1 July in Lisbon, Portugal. This conference was co-hosted by the Governments of Kenya and Portugal and included special events and [side events](#) taking place all over the city.

Why did so many congregate (including many members of our deep-ocean community)? Because, according to the science, ocean health is in severe decline owing to anthropogenic-induced threats including deoxygenation, ocean acidification, marine pollution and overfishing and delegates know that action needs to be taken to halt this deterioration and to prevent further destructive developments.

From the outset, there was a sense of urgency during these proceedings with UN Secretary-General António Guterres opening the Conference and recommending movements to help mitigate the emergency facing our planet. There was also a real energy in and around the conference all week – not least exuded by the youth groups and early career ocean professionals in attendance, who clearly need to be central to these discussions and actions around deep seabed mining, fisheries, plastics, MPAs, ocean literacy – the list goes on. By the end of the conference, numerous pledges and commitments had been made by many states and organisations. Time will tell if these actions will be enough. The next UN Ocean Conference is due to take place in 2025.

Read full conference summary report here: <https://enb.iisd.org/2022-un-ocean-conference-summary>





## 2022 United Nations Ocean Conference Side Event

### Biodiversity for a Resilient Planet: A Deeper Look

June 28, 2022 1:15pm – 2:45pm, Pavilion of Knowledge

Organized by: The Deep Ocean Stewardship Initiative (DOSI), The University of California San Diego, The University of Aveiro, IUCN, Challenger 150, IOC-UNESCO, Ciência Viva, the Deep Ocean Observing Strategy (DOOS), and Okeanos.

#### Background on the event:

The deep ocean contains over 90 percent of the living space for life on Earth, and its remarkable biodiversity is critical for human well-being. While it can seem remote and unchanging, this deep-sea biodiversity faces clear and increasing threats from climate change, mining, fishing, and pollution. To make sure deep-ocean life can keep supporting a liveable planet, we need new partnerships and policy solutions that make good use of the latest ocean science. This panel, moderated by DOSI Director of Communications, Brandon Gertz, and designed for all audiences, gathered top experts to share ideas for scaling up effective management and conservation of the deep sea. [The event recording is available here.](#)

#### Key Issues discussed:

- Important benefits provided by deep-sea biodiversity
- Current threats facing deep-sea life





Figure 1. The panelists from left to right- Brandon Gertz (DOSI Director of Communications); Diva Amon; Angeliq Pouponneau; Lisa Levin; Ricardo Santos; Anna Metaxas; Ana Hilario; Kristina Gjerde

- The current state of deep-ocean policy
- Steps we can take in policy or science to conserve deep-ocean biodiversity equitably
- The importance of building connections between science, policy, and legal experts

#### Key recommendations for action:

- A robust section on capacity building is needed in the BBNJ agreement, and current commitments must be carried out.
- Think of our ocean as one ocean that works best when it works together, overcoming artificial divisions in policy and science.
- Build a commitment to marine scientific research including both national waters and the high seas, especially before considering extractive activities. We need a “digital revolution” for information in the ocean.
- To invest in science, we need to invest in people, especially in Small Island Developing States. We need a more diverse deep-sea workforce. Do more to create a more inclusive environment that allows new people to lead research, both through funding and fairer approaches to partnerships.
- Tackle and solve the climate change problem, as this is incredibly important to vulnerable states and the deep sea.
- Effective coordination, like that pursued by the Challenger 150 program, is needed. There need to be close ties between ocean scientists, lawyers, and policymakers. Those with scientific knowledge, especially of the younger generation, should consider going into politics and using their platforms to communicate deep-ocean challenges and solutions clearly.

#### Voluntary Commitments

During the event, DOSI highlighted its voluntary commitments to projects like [Challenger 150](#), a project born from the DOSI Decade Working Group, which is working to coordinate deep-ocean research to inform management. These commitments are ongoing and, especially in the case of Challenger 150, are preparing to launch into new and exciting phases.

For further information, contact Brandon Gertz, DOSI Communications Director: [dosicomms@gmail.com](mailto:dosicomms@gmail.com) or Maria Baker, DOSI Executive Director: [mcb3@soton.ac.uk](mailto:mcb3@soton.ac.uk)



## Workshop Report:

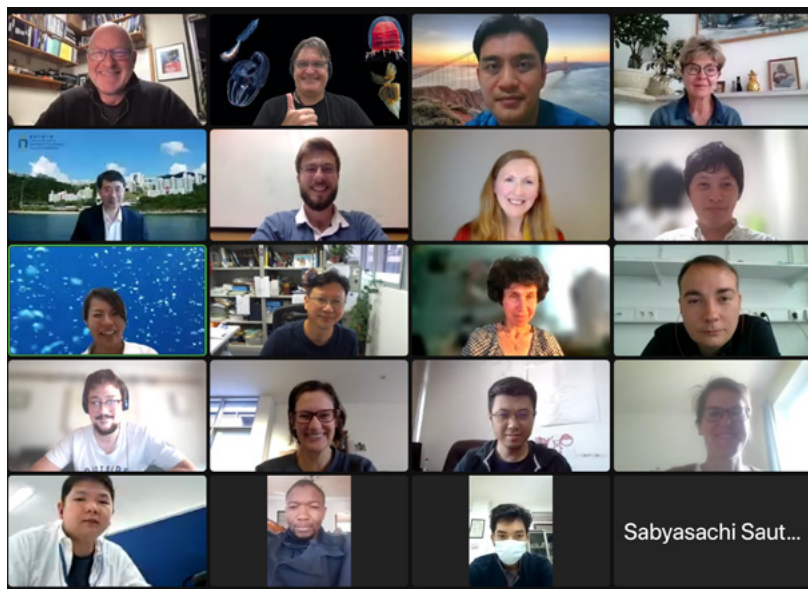
### NW Pacific Working Group, Challenger 150 Program

Hiromi Kayama Watanabe<sup>1</sup>, Rachel Downey<sup>2</sup>, Dhugal Lindsay<sup>1</sup>, Pierre Methou<sup>1</sup>, Benny K. K. Chan<sup>3</sup>, Angelika Brandt<sup>4</sup> and workshop participants

<sup>1</sup>X-star, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), <sup>2</sup>Australian National University, <sup>3</sup>Academia Sinica, Taiwan, <sup>4</sup>Senckenberg Research Institute and Natural History Museum, Germany

On 6 July 2022, the Northwest Pacific regional scientific working group of the Challenger 150 Program organized an online workshop, which showcased expert talks on the regional biodiversity of hadal trenches by Prof. Angelika Brandt (Senckenberg Research Institute and Natural History Museum), molecular approaches to deep-sea hydrothermal vent and cold seep fauna by Prof. Pei-Yuan Qian (Hong Kong University of Science and Technology), and the biogeochemical cycle in abyssal plains by Dr. Hidetaka Nomaki (Japan Agency for Marine-Earth Science and Technology). More than 25 people participated in the talk session, although not all the participants appear in the group photos.

In the discussions following these talks, one topic raised was where/what should we define as the border of the NW Pacific. The consensus was that there may be biogeographical border supported by scientific evidence, but the research community should not be separated, especially because some researchers work on or around large-scale geological structures throughout the western Pacific, such as trenches and hydrothermal vents. We also exchanged information about funding, cruise proposals, various aspects of research collaborations including standardized data acquisition and Material Transfer Agreements, and capacity building for deep-sea research in this region. A web-based platform to share information will be launched.



The time was quite limited to exhaustively discuss all the subjects, so we will keep discussing mainly using online platforms. However, we hope we can work on board together in the near future. We welcome people to join our working group. Please contact Hiromi ([hwatanabe@jamstec.go.jp](mailto:hwatanabe@jamstec.go.jp)) or Rachel ([rachel.v.downey@gmail.com](mailto:rachel.v.downey@gmail.com)).





## FINAL abstract deadline extension

**8 August 2022**

Dr Rachel Hale

*National Institute of Water & Atmospheric Research Ltd (NIWA)*

Over the last two weeks, several colleagues have reached out to us requesting another extension to the abstract submission deadline. We understand this is a tricky time particularly for those of you in the Northern Hemisphere being on, or planning, summer holidays. Therefore, we are pleased to announce that the abstract submission deadline has been extended to 8 August, 12pm NZT. Please note that there will be no further extension beyond this.

### ***Session times and timezones – don't worry!***

We have also received queries regarding the timing of the sessions during 18IMCO, with some of you worried that they would take place in New Zealand time, which would make it difficult for people in Europe and the Americas, in particular, to participate. Don't worry! We will set sessions in time zones that will make it as easy as possible for everyone to present and attend. A final decision on timing will be made once we have received all the abstracts and have a better idea of the geographic spread among conference participants.

### ***Support available for students***

We are pleased to announce that there will be support for students wanting to attend the conference, thanks to the Swedmark fund. **There will be 10 Swedmark Travel Awards to Masters/PhD students** that will cover registration costs. Candidates for these awards should provide a motivation letter (max 1 page) and a CV by **10 September** ([18imco@confer.co.nz](mailto:18imco@confer.co.nz)). The 10 students with the best letters and CV will be awarded. The awarded students will present their research by means of a poster or an oral presentation during the virtual conference.

PeerJ are sponsoring two awards at 18IMCO. The awards, focussed on supporting students or early career researchers, will be given for the Best Presentation and Best Poster. **Each winner will receive a free publication in any PeerJ journal (subject to peer review) and a feature on the PeerJ blog.**

### ***Meioscool – free registration will open soon***

Meioscool is back and it is **free** to take part! See [18IMCO2022](https://www.18imco2022.com) for a preliminary programme and list of experts. This is a great opportunity for students and researchers who want to learn about how to identify meiofauna and some of the latest imaging and AI techniques being developed to study them. As with 18IMCO, the timing of the live sessions will be determined once we have a full list of participants and we will make it as easy as possible for all to attend. Meioscool will take place online the week before 18IMCO.

## Why attend 18IMCO?

- IMCO is the world's only meiofauna-focused conference and has a long, proud history since 1969
- It only takes place once every 3 years, so don't miss out!
- When you register, you get a document with all of the abstracts
- Hear from our great range of keynote speakers, we have eight lined up this year, including some of the most well-known researchers worldwide on meiofauna and other related research fields
- Raise the profile of your research and meet the experts in your field. Grow your network and learn about research and funding opportunities.
- Contribute to the future direction of the International Association of Meiobenthologists (IAM) and IMCO by attending the Annual General Meeting and voting on important issues
- Contribute to the PeerJ 18IMCO special issue (this opportunity is only offered to participants)
- Get inspired by the variety of topics being discussed, from taxonomy, morphology, ecology to evolution and Artificial Intelligence – new ideas for your next proposal, thesis, or paper!
- Add to your CV by presenting your research – why not submit more than one abstract?

## Virtual format: what to expect

### Oral Presentations

All presenters will be offered the option to present live or use a pre-recorded presentation. You will also be invited to take part in a live Q&A session on your paper. As technology can sometimes let everyone down, all presenters will be asked to send us a recording of their presentation as a back-up.

### Poster Presentations

Poster presentations will be uploaded into the virtual poster gallery of the conference platform and will be visible throughout the conference. All poster presentations will have a 1-minute pre-recorded introduction as well as a pdf of the poster. Delegates will submit questions on the platform and presenters will be able to reply to each of them directly.

[Conference Website](#)

[Read More and Submit](#)

[Contact Us](#)

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**For all our crustacean-loving colleagues, please join us at the 10<sup>th</sup> International Crustacean Congress in Wellington, New Zealand, in May 2023 for our first international in-person meeting in a long time (visit [www.icc10.org](http://www.icc10.org) for more information).**

We currently accept suggestions for special sessions and symposia ([Call for symposia + complete short survey to enter prize draw](#) and be in to win a free registration if you complete a short survey!), a call for abstracts will be made later this year. Meet the co-hosts Kareen and Rachael as we invite you to Wellington in this short fun video [here!](#)

See you in Wellington next year! Ngā mihi nui from Kareen & Rachael



YOU ARE INVITED TO ATTEND

# 10<sup>th</sup> INTERNATIONAL CRUSTACEAN CONGRESS

22–26 May 2023  
Wellington, New Zealand



In May 2023 the ICC10, the 10<sup>th</sup> International Crustacean Congress, will bring together carcinologists at the National Museum of New Zealand Te Papa Tongarewa in Wellington.

Check out this [video](#) to see what you can expect when you come to New Zealand!  
[Express your interest now.](#)

## ICC10 Organising Committee

**Rachael Peart**

NIWA, co-host

**Kareen Schnabel**

NIWA, co-host

**Shane Ah Yong**

Australian Museum

**Mark Fenwick**

NIWA

**Diana Macpherson**

NIWA

**Andrew Hosie**

Western Australian Museum

**Kelly Merrin**

Monash University

**Rick Webber**

National Museum of New Zealand Te Papa Tongarewa

Love [#carcinology](#)? Help us share!

Full details of the [#ICC10](#) 2023

Congress here: [www.ICC10.org](http://www.ICC10.org)

[#crustacea](#) [#newzealand](#)

## Conference Organisers

**Kerry South**

Conference Manager

**Conferences & Events Ltd**

**P** +64 4 384 1511

**E** [ICC10@confer.co.nz](mailto:ICC10@confer.co.nz)



Register now at [www.icc10.org](http://www.icc10.org)

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# Scientist Profiles

## Laisa Branco

Geneva Graduate Institute, Switzerland

Contact: [laisa.branco@graduateinstitute.ch](mailto:laisa.branco@graduateinstitute.ch)



My name is Laisa Branco, I am Brazilian and an incoming PhD Student in International Law at the Geneva Graduate Institute (IHEID). I hold a Bachelor Degree in Law from the University of Bahia, Brazil. Recently, I have concluded my Master Degree in International Law at the IHEID, Geneva. My PhD Proposal focuses on the intersections between Deep-sea mining and international law, and it aims to contribute to further developments in the legal framework in the international spectrum. Environmental law and strict liability rules are some legal aspects of the topic. I am a former member of the Brazilian Institute for the Law of the Sea (BILOS) and the Center of Law of the Sea Studies at the University of São Paulo (CEDMAR), Brazil. For three consecutive years, I have represented the University of Bahia at the international rounds of the Stetson Environmental Law Moot Court Competitions, being awarded twice the prize for best oralist and best memorial. Currently, I am a member of the Deep-Ocean Stewardship Initiative (DOSI) Minerals Working Group.

### Recent Contributions:

1. Master Thesis in International Law at the Graduate Institute of Development and International Studies (IHEID): Available in September at the IHEID Repository Portal

Title: Role of Strict Liability Rules in Deep Seabed Mining Activities

Abstract: After over 50 years of the approval of the United Nations Convention on the Law of the Sea (UNCLOS), commercial mining on the deep seabed floor is on the verge of becoming a reality. This dissertation explores the rules of the international liability regime and the deep seabed legal framework (Known as “The Area”). The liability rules in the Area are underdeveloped in international law, and different standards of liability apply to the operators. This study aims to contribute to the discussions on the role of strict liability in deep seabed mining. The author concludes that the absence of strict liability rules for sponsoring states and the ISA undermines the promotion of the preservation of the marine environment.

2. Participation at the 2022 Oslo International Environmental Law Conference (WCEL): 3-6 of October 2022, University of Oslo and IUCN partnership

Title: Defying the “Dual Mandate” of the International Seabed Authority: Structural Challenges in Imposing a Strict Liability Rule for Environmental Damage

Abstract: The transition from exploration to commercial exploitation of the mineral resources on the deep seabed floor is in motion. In my proposed presentation, I discuss the dual mandate of the International Seabed Authority (ISA) considering the liability rules under the law of the sea. The ISA is both a party to an exploitation contract and the



custodian of the mineral resources in the Area. Our first main point focuses on the application of strict liability rules to the ISA when exercising its functions as a private entity in commercial exploitation. Under the 2019 Draft Exploitation Guidelines, as part of the Mining Code, the ISA has primary and residual liability for its wrongful acts or third-party contractors operating under their institutional command, which includes damages to the marine environment. However, the current regime is underdeveloped. One point I shall discuss is whether the ISA should be insured as an additional assured to the contractor, covering the situations in which the Authority owes the compensation, or as an independent private contractor. Our second point discusses the structural challenges in shifting the liability rules. The 2011 Advisory Opinion of ITLOS arguably does not refute applying a strict liability to the ISA, but limits its scope to sponsor states' subsidiary responsibility in respect of private operators. In conclusion, revisiting the decision of the Tribunal is a necessary condition in light of ISA expansionism and its latest policy developments. The strict policy on liability rules could be an alternative path to enhance environmental protection of the deep-sea floor, compliance, and enforcement.

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## Leila Nefdt

MSc student and Marine Science Communication Officer

*University of Cape Town, South Africa*

Contact: [leilaneft0@gmail.com](mailto:leilaneft0@gmail.com) or on social media: [Twitter](#), [LinkedIn](#)



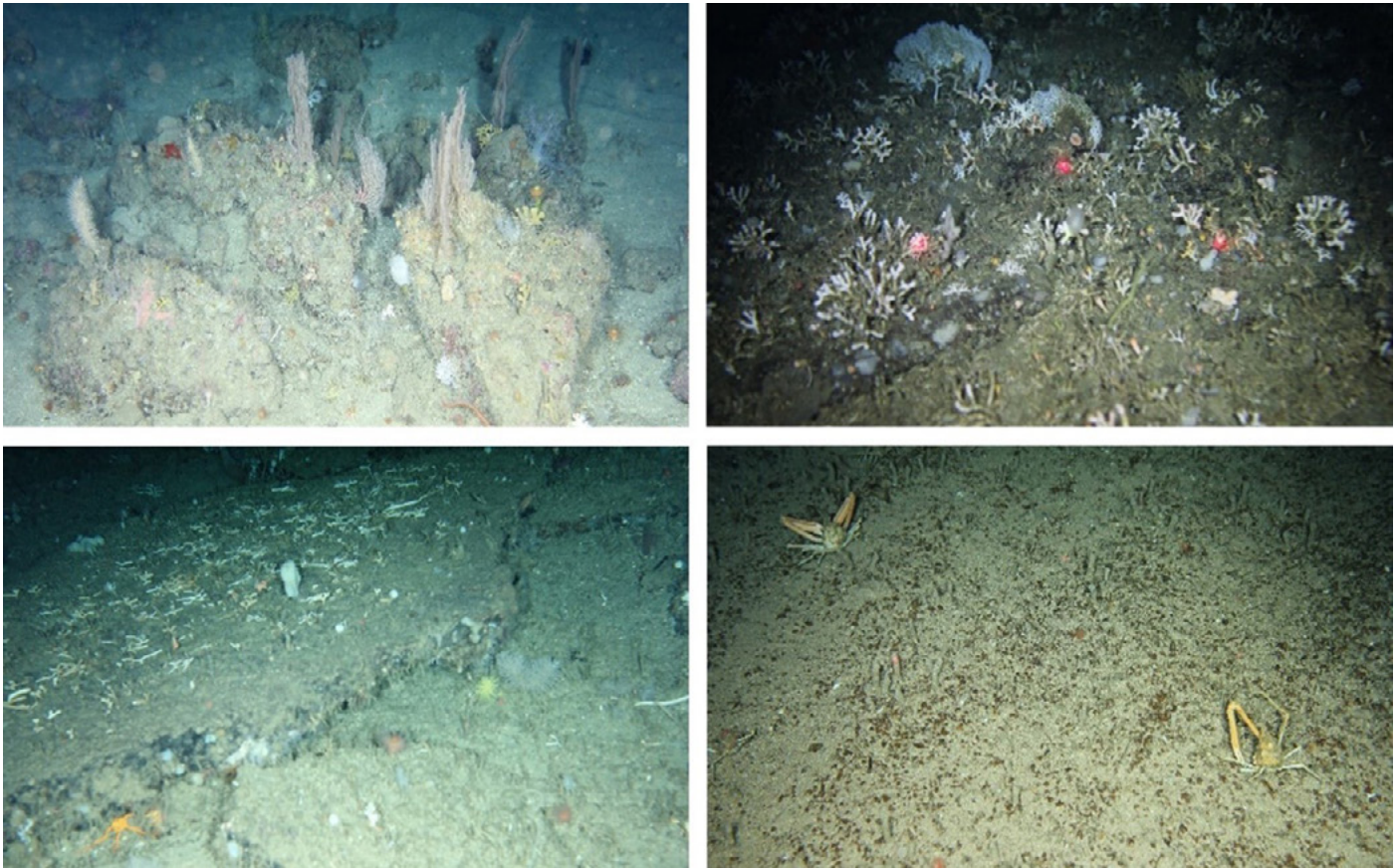
From a young age, I have always been fascinated and curious about what was found beyond the coastline. I always dreamed of travelling and discovering the mysteries of the underworld while finding new species, as well as learning how to conserve marine life. My love and curiosity for the ocean has led me to become a marine benthic ecologist. I am currently completing a Masters in [Biological Sciences](#) at the [University of Cape Town](#), focusing on offshore marine benthic ecology. My research focuses on using underwater imagery taken from the [Deep Secrets Cruise](#) in September-October 2016 (run by the [African Coelacanth Ecosystem Programme](#)) to 1) [classify offshore marine benthic epifaunal communities](#) ranging from 120 – 700m deep along the

continental shelf edge and slope off the south coast of southern Africa and 2) set conservation targets for these benthic ecosystems. In doing so, we [aim](#) to increase offshore marine research capacity, our knowledge base and understanding of our offshore environment so that we can better inform management practices as well as protect these areas.

I honestly love what I do, it excites me because this is the first time that the continental shelf and edge of southern Africa has been explored like this; providing new insights into South Africa's poorly studied deep-sea ecosystems. Knowing that there will be more information to turn to and having a better understanding of our deep-sea ecosystems will aid us in moving forward with [South Africa's National Biodiversity Assessment \(NBA\)](#) and improving our marine management as well as contributing toward South Africa's emerging Marine Spatial Planning processes. My favourite thing about the deep-sea is the uncertainty of it all; knowing that there is still so much to explore and learn about in the deep-sea really excites me. I am still fascinated with the wonders of deep-sea benthic ecosystems, and I look forward to seeing what else is out there and contributing within this field.

Since March 2022, I have been fulfilling the role as Marine Science Communication Officer for the [Marine and Antarctic Research for Innovation and Sustainability \(MARiS\)](#) centre based at the University of Cape Town. The UCT-

MARIS centre aims to enhance the production of knowledge and human capacity in Marine and Antarctic research through involving multiple departments within the University of Cape Town: Biological Sciences, Chemical Engineering, Civil Engineering, Electrical Engineering and Oceanography to collaborate and develop technological and innovative solutions to interdisciplinary marine problems and for extreme conditions like the polar environment. My role as a science communicator is to bring [awareness](#) of the importance of what we as marine researchers are working on in marine science and the importance of our oceans to the general public.



Images from deep-secrets project, funded by South Africa's National Research Foundation.

I am both passionate about taking care of our oceans and empowering the youth by giving back what I have learnt through my studies and experiences over the last few years. This has led me to become involved through volunteering at the [Two Oceans Aquarium](#), through various beach clean ups, education outreach activities run by various institutions and ocean initiatives. My most recent and current involvement is Directing the Cape Town-based non-profit organisation called [Sea the Bigger Picture](#) (#STBP, NPO), where I am assisting with running beach clean ups and the youth citizen science programme called “Defenders of the Blue”. We aim to uplift and encourage the younger generation by teaching them to take care of the ocean by learning to understand and respect it and in doing so, we hope that they can pass on the knowledge and share their experiences with the rest of their communities.

### Biography:

2022 – current: MARIS Marine Science Communication Officer, University of Cape Town, South Africa.

2022 – current: Director of NPO, [#Sea the Bigger Picture Ocean](#) Initiative based in Cape Town, South Africa.

2017 – 2022: MSc in Biological Sciences (University of Cape Town, South Africa), to graduate in December 2022.

2016 – 2017: [DST-NRF](#) Intern at [South African Environmental Observation Network \(SAEON\)](#), Egagasini Node (Marine Offshore Systems) in Cape Town, South Africa.



2015 –2017: Research Assistant for “Benthic trawl exclusion experiment along the West Coast of South Africa” (University of Cape Town and [South African National Biodiversity Institute \(SANBI\)](#)).

2015 – 2016: BSc Honours in [Biodiversity and Conservation Biology](#) ([University of the Western Cape, South Africa](#))

2011 – 2014: BSc in Biodiversity and Conservation Biology (University of the Western Cape, South Africa)

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## Bethany Fleming

PhD student

*National Oceanography Centre, Southampton (NOCS).*

Contact: [bff1n21@soton.ac.uk](mailto:bff1n21@soton.ac.uk)



I am a PhD student studying spatial and temporal variation in megafaunal biodiversity in the abyss. Having long held the ambition to be a marine biologist, my passion for the deep-sea really took hold during my time at university. I was and still am fascinated by this weird and wonderful environment, where so many questions remain to be answered. At WHOI, I studied hydrothermal vent ecosystems, exploring questions relating to larval dispersal and connectivity between vent fields. This placement allowed me to develop my interest in larval biology, marine invertebrates and deep-sea benthic ecology more generally. I was also fortunate enough to go down in DSV Alvin and see hydrothermal vents with my own eyes. Needless to say this was a life-changing experience that cemented my love for all things deep-sea and fuelled my desire to continue to work in this field.

For my PhD project, I will be using images of the seafloor collected using AUV or ROV to assess patterns of megafauna biodiversity in the Clarion-Clipperton Zone (CCZ). The abyss provides a unique environment to study diversity patterns over broad spatial scales as most environmental variables are relatively stable over large areas. I will be exploring megafaunal biodiversity on the scale of kms-100kms, specifically looking at the influence of habitat heterogeneity on diversity patterns over these scales. I will also be assessing short-term temporal variation in this region and long-term recovery from disturbance. As the CCZ is of interest for polymetallic nodule mining, this work will also have implications for future monitoring. I was lucky enough to take part in a cruise early in my PhD and am looking forward to future opportunities for data collection as part of the SMARTX project.

I am excited to be working within the deep-sea community and look forward to any opportunities to collaborate with other researchers. If you have any questions about my work, please get in touch.

### Biography:

2021- PhD National Oceanography Centre (NOC), Southampton & University of Southampton; Supervisors: Dr Daniel Jones, Dr Erik Simon-Lledó, Dr Jon Copley

2018-2019 Guest Student, Woods Hole Oceanographic Institution (WHOI)

2015-2020 MMarBiol Integrated Masters in Marine Biology, University of St Andrews

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## Justine Réveillias

Postdoctoral Researcher (Environmental Law)

*Littoral Environnement et Sociétés (LIENSs), La Rochelle Université in France*

Contact : [justine.reveillias1@univ-lr.fr](mailto:justine.reveillias1@univ-lr.fr)



The ocean is an environment that has fascinated me since my childhood, because it appeals to the imagination with its great depths, its immensity, but also the idea that it is still impossible to know all the species it contains. It was this fascination that led me to study this environment as early as my Master's degree in environmental law, where I wrote a research paper on the protection of the biodiversity of the sea bed. However, at the end of my thesis, I had a feeling of incompleteness, because I realised that mining was only one of the many activities that can affect the marine environment, but also that the Area is not the only part of the ocean to be affected by human activities. It was then that the idea of continuing my work by extending my field of research to the open sea made sense. I therefore pursued my research work with a doctoral thesis on the protection of the marine environment beyond national jurisdictions. This thesis was an opportunity to demonstrate the extent to which the international law of the sea is currently out of step with the ecological reality of the marine environment, marked by

continuity and the phenomenon of ecological connectivity, while proposing solutions to remedy this. Today I remain passionate about the deep seabed and closely follow the evolution of mining activity in the Area and the ongoing negotiations at the International Seabed Authority.

### Biography:

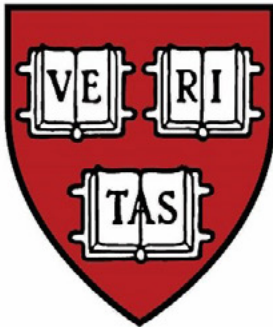
2022 - Post-doctoral researcher in environmental law, La Rochelle University

2018-2022 - PhD in International Environmental and Maritime Law, La Rochelle University

2016-2018 - Master's degree in environmental and urban planning law, University of Limoges



# Opportunities



Harvard University

The Girguis Laboratory  
for Ecophysiology, Biogeochemistry, and Engineering

## Instrumentation Engineer

The Girguis lab at Harvard University is looking to hire a part-time instrumentation engineer. The position is focused on the maintenance and operation of our deep-sea sensors, incubators, and sampling systems (both lab and field units). The candidate must have an Associates, Bachelors, Masters, or Ph.D. in ocean engineering or sciences (or any adjacent field). They will have solid experience in running and maintaining custom oceanographic sensors (e.g., assembling underwater landers, integrating instruments, etc.) and associated components (e.g., charging and maintaining lithium batteries). The position also requires strong organizational and communication skills. The ideal candidate will also have experience in systems design and integration and be capable of assembling packages that integrate a diversity of custom and commercial sensors into a single platform. Experience with SolidWorks or equivalent is also preferred. Finally, we hope that candidate would be open to going on research expeditions to lead deployments.

We are ready to hire for part-time work on-campus or, when appropriate, remotely in the states of MA, NH, CT, or NY. That said, we are also open to other employment/engagement models (e.g. if you have a small company and want us to consider hiring you for this effort, etc.). Salary and compensation will be commensurate with experience.

If you have an interest in this position, please send:

- ½ to 1 page statement that describes your previous experience and their relevance to this position
- Your curriculum vitae
- The names and contact info for three references to [pgirguislab@oeb.harvard.edu](mailto:pgirguislab@oeb.harvard.edu) and [jthomson@oeb.harvard.edu](mailto:jthomson@oeb.harvard.edu)

NOTE: If we receive a sufficient number of applications, we will post a formal job advertisement and ask you to apply accordingly. Harvard is an equal opportunity employer.



<https://nektionmission.org/about/our-team/join-the-team>

## Research Assistant

Nekton is looking for a Research Assistant to join our dynamic team and to help generate scientific data, with a specific focus on annotating video surveys, communicate novel findings and plan future work.

This is an exciting role for someone who enjoys careful analytical thought and documentation as well as someone with an interest in thinking about scientific challenges in a novel way.

The role will also provide assistance to science team and will also be required to support expedition logistics when necessary.

Nekton's success is based on inspiring and leading a multi-disciplinary and energetic team and working with mutually beneficial partnerships. You will be instrumental in that success in delivering scientific research and that will support more sustainable management of the ocean.

**Contract type:** Consultancy/freelance contract

**Start:** 1 September 2022

**Duration:** Fixed term (16 months)

**Location:** Maldives Marine Research Institute, Maldives

**Salary:** MVR 793–1163 per day (dependent on experience and education)

**Hours of work:** Contract, full time (37.5 hours per week)

**Reporting to:** Prof. Lucy Woodall (Nekton), Dr Paris Stefanoudis (Nekton), Mohamed Ahusan (MMRI)

**Staff reporting to this post:** None

**Working with:** Science and Communications Teams at Nekton and MMRI

**The position is open to Maldivian Nationals only.**

Find out more about the job [here](#).





## Research Assistant

Nekton is looking for a Research Assistant to join our dynamic team and to help generate scientific data, with a specific focus on annotating video surveys, communicate novel findings and plan future work.

This is an exciting role for someone who enjoys careful analytical thought and documentation as well as someone with an interest in thinking about scientific challenges in a novel way.

The role will also provide assistance to science team, and will also be required to support expedition logistics when necessary.

Nekton's success is based on inspiring and leading a multi-disciplinary and energetic team and working with mutually beneficial partnerships. You will be instrumental in that success in delivering scientific research and that will support more sustainable management of the ocean.

**Start:** 1 November 2022

**Duration:** Fixed term (14 months)

**Location:** Begbroke Science Park, Oxford; part-time remote working available

**Salary:** £26,000–30,000 per annum (dependent on qualifications / experience)

**Hours of work:** Full time (37.5 hours per week)

**Reporting to:** Prof. Lucy Woodall (Principal Scientist, Nekton), Dr Paris Stefanoudis (Senior Postdoctoral Researcher, Nekton)

**Staff reporting to this post:** None

**Working with:** Science and Communication Teams at Nekton and MMRI.

**The position is open to any nationals subject to the provision of proof of the right to work in the UK. We will not be able to sponsor a VISA for this position.**

Find out more about the job [here](#).

# Wanted

## DEEP-SEA TELEOSTS AND/OR THEIR GI TRACTS

### Good Wishes Colleagues & Fellow Members of the Deep-Sea Biology Society

I am a Parasitologist and Permanent Scholar in Residence in the Natural History Collections at the Corpus Christi Museum of Science & History in Corpus Christi, Texas (U.S.A.). For 30 years my main research focus has been describing new taxa of deep-sea helminth (worm) parasites including digeneans, cestodes, nematodes, monogeneans and acanthocephalans infecting teleosts collected at 200+ m depths.

I am looking for deep sea benthic and benthopelagic teleosts and/or their GI tracts which I can examine to collect, describe and publish new taxa of parasitic helminths to document deep-sea parasite biodiversity. I am happy to reimburse mailing costs as well as include you as a co-author on all publications produced from your material.

Please contact me and I would be happy to discuss with you in more detail my ongoing research, project logistics and desired teleost taxa of interest. You may also keyword search “Charles Blend” and “parasites” on Google Scholar to sample, see and learn more about my work.

With Sincere Thanks,

***Whatever Your Terms, We Want Your Worms,***

Charles (Chuck) Blend Ph.D., M.S., B.S. (Email: [ilovethesea@att.net](mailto:ilovethesea@att.net); Phone/Voice Mail: 011-1-361-218-5276)

Corpus Christi Museum of Science & History (Website: [www.ccmuseum.com](http://www.ccmuseum.com))

Laboratory of Parasitology, Biodiversity & Teaching Collection, Texas A&M University, College Station, Texas

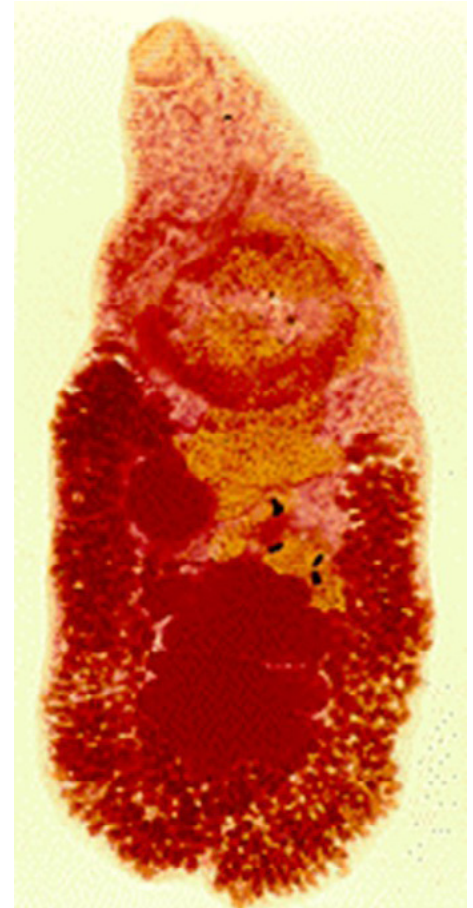


Figure 1. *Podocotyle nimoyi* Blend, Dronen & Armstrong, 2016 (Trematoda: Digenea: Opecoelidae) from the pugnose grenadier, *Sphagemacrurus grenadae*, and the common Atlantic grenadier, *Nezumia aequalis* (Gadiformes: Macrouridae), from the deep Gulf of Mexico.

## Special Issue “Deep-Sea Fish and Fisheries”

### An invitation from Guest Editors

Dear Colleagues,

This is to let you know that the open access journal, Journal of Marine Science and Engineering (IF: 2.744, ISSN 2077-1312) is pleased to announce the launching of a new Special Issue entitled “Deep-Sea Fish and Fisheries”, for which we are serving as Guest Editors.

For further reading, please follow the link to the Special Issue Website at:

[https://www.mdpi.com/journal/jmse/special\\_issues/FishandFisheries](https://www.mdpi.com/journal/jmse/special_issues/FishandFisheries)

The submission deadline is 20 January 2023. You may send your manuscript now or up until the deadline. Submitted papers should not have been published previously, nor be under consideration for publication elsewhere.

Manuscripts should be submitted through the online manuscript submission and editorial system. Each new submission will be processed as quickly as possible and published on acceptance.

In case of questions, please feel free to contact us. We look forward to hearing from you.

Kind regards,

Dr. Alexei M. Orlov

Dr. Michael Maia Mincarone

Guest Editors

#### **Short description of the issue:**

Deep-sea fishes are a very diverse group of chondrichthyans and teleosts widely distributed in the world's oceans from the Arctic to Antarctic and inhabiting the water column and seabed of continental slopes, seamounts and high seas at depths greater 400 m. Despite the long period of studies of deep-sea fishes and commercial exploitation of their resources, their importance in the ecosystems is still poorly understood. Our knowledge of their taxonomy, zoogeography, evolution, phylogeny, basic biological traits, and conservation needs remain scarce. This Special Issue will provide an overview of the current status of knowledge on the variety of topics related to deep-sea fish and fisheries, including taxonomy, zoogeography, phylogeny, molecular biology, evolution, life history, role in the ecosystem, conservation, stock assessment, fisheries and management worldwide. The present Special Issue will comprise collected papers, the majority of which provide new or previously unpublished data. This collection will give readers the opportunity to find a lot of useful information on deep-sea fish and fisheries in a single reference.

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## **Special Issue in Diversity**

### **Taxonomy, Systematics And Diversity of Deep-Sea Benthic Isopods**

Dr. Brenda Doti<sup>1</sup>, Dr. Patricia Esquete<sup>2</sup>, Dr. Stefanie Kaiser<sup>3</sup>



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**Dear colleagues,**

For this Special Issue, we welcome contributions that will help deepen our knowledge and understanding of deep-sea isopod crustacean biodiversity. In addition to taxonomic examination of isopods, as the cornerstone of any biological research, we welcome further phylogenetic work elucidating their origins in the deep sea up and the analysis of biodiversity patterns aiming to achieve a more comprehensive picture of the general drivers of deep-sea benthic biodiversity. Descriptions and new evidence of the distribution of individual species will only be considered if they are placed in a broader context and thus contribute significantly to the understanding of the biogeography and diversity of



the deep sea. We are particularly interested in new approaches and methodologies that advance diversity research in this taxon, and look forward to receiving studies from poorly known regions and habitats that help to fill biogeographical gaps.

Paper submission is now open until April 20 2023. For further information on the SI and submission guidelines please check out: [https://www.mdpi.com/journal/diversity/special\\_issues/Benthic-Isopods](https://www.mdpi.com/journal/diversity/special_issues/Benthic-Isopods).

Many thanks for your consideration. We are looking forward to your contributions!

Kind regards,

Brenda, Patricia & Stefanie

Guest Editors

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## Deep-sea anglerfish specimens for DNA and RNA sequencing



Figure 1. *Melanocetus johnsonii*. 75 mm female, with a 23.5 mm attached male on the belly of the female. Photo: Edith A Widder.

We are looking for samples from anglerfish specimens of the suborder Ceratioidei to support our ongoing attempts to understand the immunogenetics of this family of fish. Our work aims to investigate links between immune system evolution and the utilisation of parasitic mating strategies.

To advance our studies we are on the lookout for new specimens for genomic DNA and/or RNA sequencing. Particularly valuable for our project would be snap-frozen samples for the extraction of high molecular weight DNA, and tissue biopsies preserved in RNAlater for RNA-sequencing. Ethanol-fixed samples are also helpful for our project.

If you already have specimens that may be suitable for our project, or have up-coming cruises/expeditions planned where anglerfish may be encountered, we'd love to hear from you to discuss potential collaborations and/or collection opportunities. Please don't hesitate to get in touch with us by sending an email to: [swann@ie-freiburg.mpg.de](mailto:swann@ie-freiburg.mpg.de).

A non-specialist overview of our project can be found in [this article](#) in ECO magazine, and for a detailed description of our findings so far please refer to the following reference:

Swann, JB., Holland, SJ., Petersen, M., Pietsch, TW., and Boehm, T. (2020). The immunogenetics of sexual parasitism. *Science* 369, 1608–1615. [DOI: 10.1126/science.aaz9445](https://doi.org/10.1126/science.aaz9445).

# Hot off the Press

## Benthic megafauna of the western Clarion-Clipperton Zone, Pacific Ocean

Guadalupe Bribiesca-Contreras, Thomas G. Dahlgren, Diva J. Amon, Stephen Cairns, Regan Drennan, Jennifer M. Durden, Marc P. Eléaume, Andrew M. Hosie, Antonina Kremenetskaia, Kirsty McQuaid, Timothy D. O'Hara, Muriel Rabone, Erik Simon-Lledó, Craig R. Smith, Les Watling, Helena Wiklund, Adrian G. Glover

*ZooKeys 1113: 1-110*

There is a growing interest in the exploitation of deep-sea mineral deposits, particularly on the abyssal seafloor of the central Pacific Clarion-Clipperton Zone (CCZ), which is rich in polymetallic nodules. In order to effectively manage potential exploitation activities, a thorough understanding of the biodiversity, community structure, species ranges, connectivity, and ecosystem functions across a range of scales is needed. The benthic megafauna plays an important role in the functioning of deep-sea ecosystems and represents an important component of the biodiversity. While megafaunal surveys using video and still images have provided insight into CCZ biodiversity, the collection of faunal samples is needed to confirm species identifications to accurately estimate species richness and species ranges, but faunal collections are very rarely carried out. Using a Remotely Operated Vehicle, 55 specimens of benthic megafauna were collected from seamounts and abyssal plains in three Areas of Particular Environmental Interest (APEI 1, APEI 4, and APEI 7) at 3100–5100 m depth in the western CCZ. Using both morphological and molecular evidence, 48 different morphotypes belonging to five phyla were found, only nine referable to known species, and 39 species potentially new to science. This work highlights the need for detailed taxonomic studies incorporating genetic data, not only within the CCZ, but in other bathyal, abyssal, and hadal regions, as representative genetic reference libraries that could facilitate the generation of species inventories.

Link to article: <https://doi.org/10.3897/zookeys.1113.82172>

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## Macro- and megafauna on the slopes of the Saya de Malha Bank of the Mascarene Plateau

Odd A. Bergstad, Konstantin Tabachnick, Elena Rybakova, Gilberte Gendron, Andrew Souffre, Ranjeet Bhagooli, Sundry Ramah, Magne Olsen, Åge S. Høines, Tatjana Dautova

*WIO Journal of Marine Science Special Issue 2/ 2021 129-158*

A first characterization of the distribution and composition of benthic and demersal macro- and megafauna was derived based on video records sampled along five pre-determined transects up the slope on the western, northern and eastern sides of the Saya de Malha Bank on the Mascarene Plateau, starting at a maximum depth of 1000 m. Abundance was highest in the upper parts of eastern slope locations, primarily reflecting a relatively higher abundance of black corals (*Antipatharia*) than in other locations. A consistent feature of several transects, but most prominent in eastern and northern slopes, was the occurrence of patchy coral and sponge aggregations along the margin where the substrate was mostly hard. In some cases, these aggregations might be considered 'gardens' but reefs were not observed. Higher-level taxonomical composition of the fauna is presented. Demersal fish were widespread but not abundant, and within the depth range studied, there was a transition from a marginal shallow fish assemblage to

a deepwater assemblage. Fishes were in most cases only assigned to family level, and 49 families were recorded. To thoroughly assess the biodiversity and abundance of fauna of the slopes of Saya de Malha Bank, further studies conducting more detailed video transects and sampling of specimens are warranted.

Link to article: <https://www.ajol.info/index.php/wiojms/article/view/200240>

## The Biodiversity of Calcaxonian Octocorals from the Irish Continental Slope Inferred from Multilocus Mitochondrial Barcoding

Declan Morrissey, Candice B. Untiedt, Karen Croke, Aisling Robinson, Eva Turley, and A. Louise Allcock

*Diversity 2022*

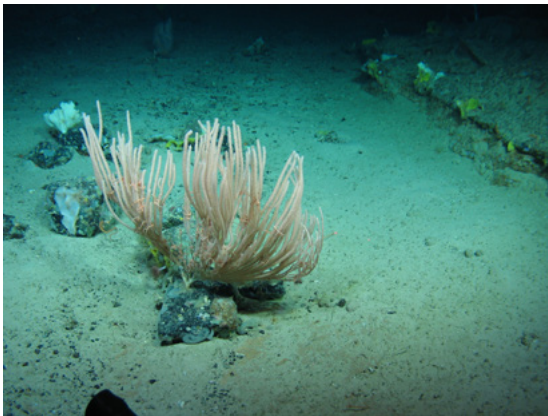


Figure 1. *Narella bellissima*

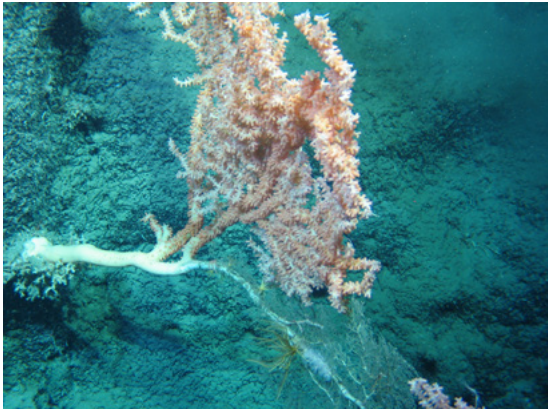


Figure 2. *Keratoisididae* sp.

Deep-sea corals are important benthic inhabitants that support the biodiversity and function of the wider faunal community; however, their taxonomy is underdeveloped and their accurate identification is often difficult. In our study, we investigated the utility of a superextended (>3000 bp) barcode and explored the effectiveness of various molecular species delimitation techniques with an aim to put upper and lower bounds on the estimated number of calcaxonian species in Irish waters. We collected 112 calcaxonians (70 Keratoisididae, 22 Primnoidae, 20 Chrysogorgiidae) and one chelidonisid from the Irish continental slope and sequenced a 3390 bp DNA barcode comprising four mitochondrial regions (mtMutS, COI + igr1, 16S rRNA-ND2, and igr4), recovering 38 haplotypes. Individuals that shared a haplotype were often morphologically distinct, and we thus undertook detailed morphological work, including SEM of sclerites, on one representative of each morphotype within each haplotype. GMYC, bGMYC, and mPTP returned incongruent estimates of species numbers. In total, there are between 25 and 40 species, although no definitive number could be assigned, primarily due to poorly defined keratoisidid species boundaries. As expected, the superextended barcode provided greater discrimination power than single markers; bGMYC appeared to be the most effective delimiter. Among the identified species were

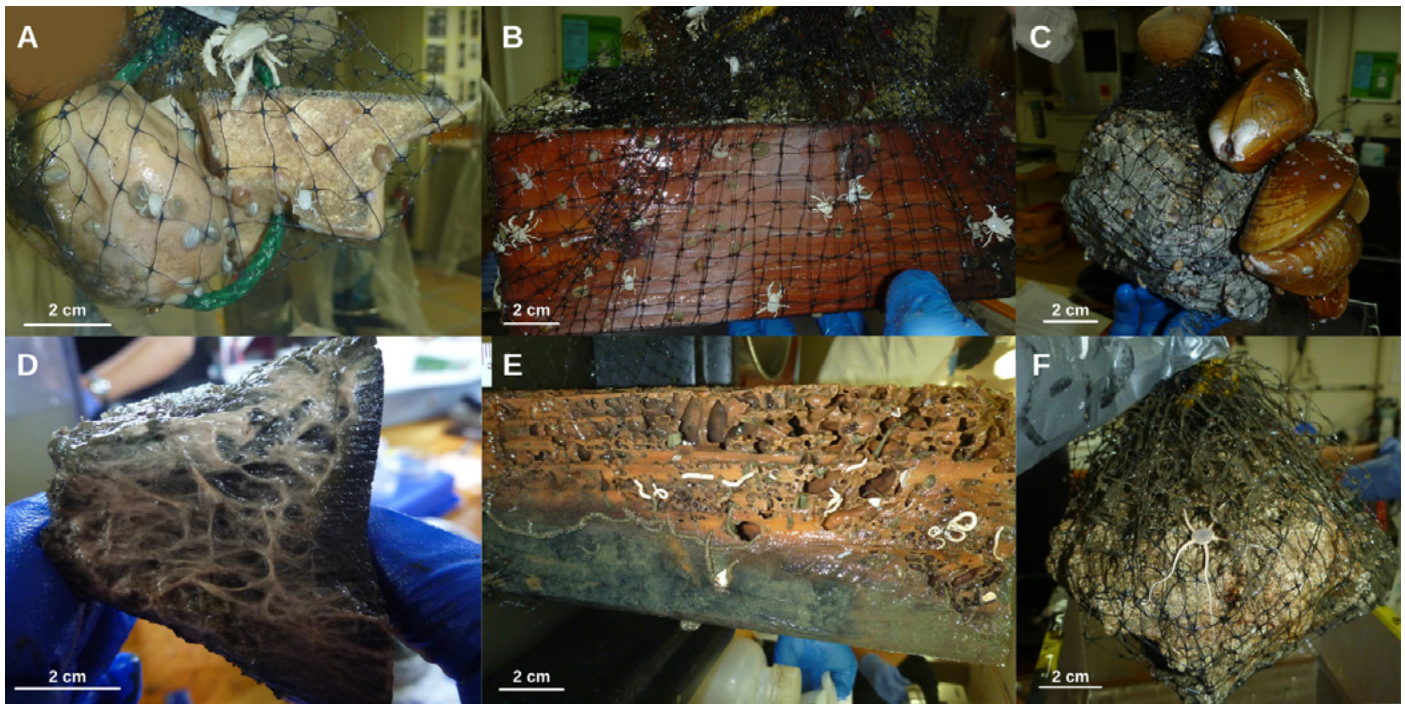
*Chelidonisis aurantiaca*, collected deeper than previously known at 1507 m, and *Calyptrophora clinata*, recorded for the second time from the Northeast Atlantic. A full understanding of the diversity and distribution of calcaxonians requires substantial taxonomic work, but we highlight the Irish continental slope as harbouring significant diversity.

Link to article: <https://doi.org/10.3390/d14070576>

## Does substrate matter in the deep sea? A comparison of bone, wood, and carbonate rock colonizers

Olívia S. Pereira, Jennifer Gonzalez, Guillermo Mendoza, Jennifer Le, Madison McNeill, Jorge Ontiveros, Raymond W. Lee, Greg W. Rouse, Jorge Cortés, Lisa A. Levin





Continental margins host methane seeps, animal falls and wood falls, with chemosynthetic communities that may share or exchange species. The goal of this study was to examine the existence and nature of linkages among chemosynthesis-based ecosystems by deploying organic fall mimics (bone and wood) alongside defaunated carbonate rocks within high and lesser levels of seepage activity for 7.4 years. We compared community composition, density, and trophic structure of invertebrates on these hard substrates at active methane seepage and transition (less seepage) sites at Mound 12 at ~1,000 m depth, a methane seep off the Pacific coast of Costa Rica. At transition sites, the community composition on wood and bone was characteristic of natural wood- and whale-fall community composition, which rely on decay of the organic substrates. However, at active sites, seepage activity modified the relationship between fauna and substrate, seepage activity had a stronger effect in defining and homogenizing these communities and they depend less on organic decay. In contrast to community structure, macrofaunal trophic niche overlap between substrates, based on standard ellipse areas, was greater at transition sites than at active sites, except between rock and wood. Our observations suggest that whale- and wood-fall substrates can function as stepping stones for seep fauna even at later successional stages, providing hard substrate for attachment and chemosynthetic food.

Link to paper: <https://doi.org/10.1371/journal.pone.0271635>

## Deep learning-assisted high resolution mapping of vulnerable habitats within the Capbreton Canyon System, Bay of Biscay

Alberto Abad-Uribarren, Elena Prado, Sergio Sierra, Adolfo Cobo, Augusto Rodríguez-Basalo, María Gómez-Ballesteros, Francisco Sánchez

*Estuarine, Coastal and Shelf Science*

The Capbreton Canyon System is an area currently under study for its proposal as a Site of Community Importance under the EU Habitats Directive in the context of the LIFE IP INTEMARES project. Identifying and mapping benthic Vulnerable Marine Ecosystems (VMEs) plays a key role in this process. Although obtaining information on species distribution in deep-sea rocky habitats has traditionally been a complicated task, the development of underwater

remote sensing techniques resulted in a massive increase in the collection of digital imagery; however, processing all this information has led to another bottleneck due to the time-consuming nature of biota manual annotation. At this point, the use of computer vision and deep learning to automate image processing has substantial benefits but has rarely been adopted within the field of marine ecology. This study presents the integration of deep learning techniques for benthic fauna identification, high resolution multibeam echosounder (MBES) data and Species Distribution Models (SDMs), to map the potential habitat of the yellow coral *Dendrophyllia cornigera*, a representative species of the VME 1170 Reef habitat, on the circalitoral area of the Capbreton Canyon System. The localization and identification of the coral colonies was based on more than 7500 photographs taken during the INTEMARES-Capbreton 0619 and 0620 surveys using the photogrammetric ROTV Politolana. For the automatic annotation of the image set a deep learning based framework was developed by testing two different deep neural networks architectures; a FasterRCNN+Resnet101 model, accomplishing a precision of 100% over human expert annotation for presence/absence discrimination, was selected. Environmental data included different quantitative terrain attributes derived from high resolution MBES bathymetry data. A presence-only species distribution model, Maximum Entropy (MaxEnt), was used to infer the spatial distribution of *D. cornigera* over the study area. Predicted occurrences corresponded mainly to relevant topographic structures with significant slope, mainly associated to the edge of the continental shelf. These results are consistent with the ecological knowledge on the species and validate the use of deep learning tools to assist in the identification and mapping of VME for management and conservation purposes. This study provides a baseline for the protection of vulnerable habitats of the Capbreton Canyon System in the context of the Natura 2000 Network.

Link to article: <https://doi.org/10.1016/j.ecss.2022.107957>

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## Diversity of Deep-Sea Echinoderms From Costa Rica

Alvarado JJ, Chacón-Monge JL, Azofeifa-Solano JC and Cortés J

*Front. Mar. Sci.* 9:918878

Echinoderms are a highly diverse group and one of the most conspicuous in the deep sea, playing ecological key roles. We present a review about the history of expeditions and studies on deep-sea echinoderms in Costa Rica, including an updated list of species. We used literature and information gathered from the databases of the California Academy of Sciences, the Benthic Invertebrate Collection of the Scripps Institution of Oceanography, the National Museum of Natural History, the Museum of Comparative Zoology and the Museo de Zoología from the Universidad de Costa Rica. A total of 124 taxa (75 confirmed species) have been collected from the Costa Rican deep sea, 112 found in the Pacific Ocean, 13 in the Caribbean Sea, and one species shared between the two basins. We report 22 new records for the Eastern Tropical Pacific, 46 for Central American waters, and 58 for Costa Rica. The most specious group was Ophiuroidea with 37 taxa, followed by Holothuroidea (34 taxa), Asteroidea (23 taxa), Echinoidea (17 taxa), and Crinoidea (11 taxa). The highest number of species (64) was found between 800 m and 1200 m depth. Only two species were found deeper than 3200 m. Further efforts on identification will be required for a better comprehension of the diversity of deep-sea echinoderms. Limited research has been done regarding the biology and ecology of deep-sea echinoderms in Costa Rica, so additional approaches will be necessary to understand their ecological functions.

Link to article: <https://www.frontiersin.org/articles/10.3389/fmars.2022.918878/full>

## Towards Incorporation of Blue Carbon in Falkland Islands Marine Spatial Planning: A Multi-Tiered Approach

Bax N, Barnes DKA, Pineda-Metz SEA, Pearman T, Diesing M, Carter S, Downey RV, Evans CD, Brickle P, Baylis AMM, Adler A, Guest A, Layton KKS, Brewin PE and Bayley DTI

*Front. Mar. Sci.* 9:872727

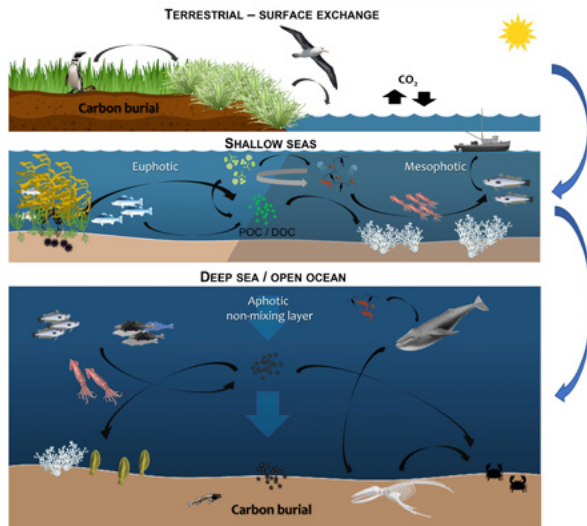


Figure 1. Juvenile *Astrotoma agassizii*

This paper by Bax *et al.* considers what is still required before blue carbon can be used as a conservation management tool integrated in national Marine Spatial Planning (MSP) initiatives. Their research indicates that the data and information gathered has enabled baselines for a number of different blue carbon ecosystems, and indicates potential threats and vulnerabilities that need to be managed. However, significant knowledge gaps remain across habitats including mesophotic zones and the deep sea, which hinders meaningful progress on the ground where it is needed most. They suggest a multi-layered approach encompassing both marine and terrestrial carbon cycles, and known or potential CO<sub>2</sub> pathways to sequestration and loss. Such an approach can provide a robust framework for future blue carbon research and ecosystem-based management, allowing marine protected areas (MPAs) to be more meaningfully defined and managed. The steps to achieve this are outlined for the major terrestrial and marine habitats, and a similar approach could be used for assessing blue carbon stocks of other island nations. This paper further includes: 1) the first overall estimates of carbon stock across the Falklands Conservation Zones; 2) the first specific discussion of Falkland Islands mesophotic ecosystems and knowledge gaps in the region; 3) the most up-to-date offshore synthesis of multibeam bathymetry data and Vulnerable Marine Ecosystem (VME) distribution and areal extent for the Falkland Islands. Bax *et al.* provide a foundation for future

work on proposed Marine Managed Areas (MMAs) undergoing consultation in the Falklands Islands in 2022 - including: a proposed offshore MMA encompassing part of the eastern Burdwood Bank (a submerged plateau hosting unique mesophotic and deep-sea VMEs from ~50 - 3000 m), and a proposed nearshore MMA at Bird Island where large aggregations of *Errina* spp. Stylasteridae (lace) corals were discovered at mesophotic depths (40+ m) in 2020 and 2021.

Link to article: <https://www.frontiersin.org/articles/10.3389/fmars.2022.872727/full>

### Little Monkfish Makes a Wish – Children’s Book

Our DOSI colleague, Dr. Victoria Ndinelago Erasmus from the Fisheries Observer Agency, Namibia has recently published this children’s book that you may wish to share with your friends and family.

The story talks about Little Monkfish, a curious little fish who lives at the bottom of the Atlantic Ocean – a place endowed





with various spectacular creatures, but unfortunately also afflicted with troubles mostly from human activities. Little Monkfish wanted to escape these troubles by becoming someone else. This book creates awareness of the marine environment. It also talks about overfishing and plastic pollution among other threats facing the marine environment.

Amazon Link: [Little Monkfish Makes A Wish](#)

Linkedin: <http://www.linkedin.com/in/victoria-ndinelago-erasmus-5a041137>

## Temperature Controls eDNA Persistence across Physicochemical Conditions in Seawater

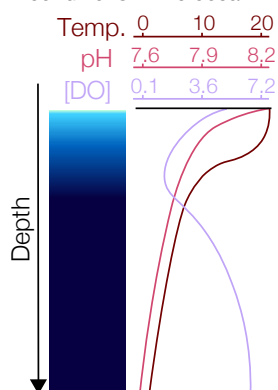
Luke J. McCartin, Samuel A. Vohsen, Susan W. Ambrose, Michael Layden, Catherine S. McFadden, Erik E. Cordes, Jill M. McDermott, and Santiago Herrera\*

*Environmental Science & Technology*. 56(12): 8629-8639

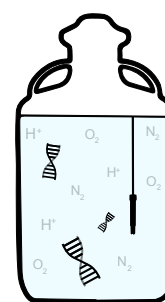
Contact: \*[santiago.herrera@lehigh.edu](mailto:santiago.herrera@lehigh.edu)

Environmental DNA (eDNA) quantification and sequencing are emerging techniques for assessing biodiversity in marine ecosystems. Environmental DNA can be transported by ocean currents and may remain at detectable concentrations far from its source depending on how long it persists. Thus, predicting the persistence time of eDNA is crucial to defining the spatial context of the information derived from it. To investigate the physicochemical controls of eDNA persistence, we performed

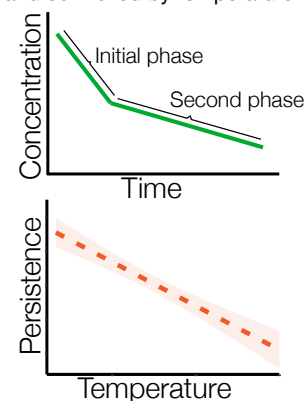
A) Physicochemical conditions in the ocean



B) eDNA experiment apparatus



C) Degradation is biphasic and controlled by temperature



degradation experiments at temperature, pH, and oxygen conditions relevant to the open ocean and the deep sea. The eDNA degradation process was best explained by a model with two phases with different decay rate constants. During the initial phase, eDNA degraded rapidly, and the rate was independent of physicochemical factors. During the second phase, eDNA degraded slowly, and the rate was strongly controlled by temperature, weakly controlled by pH, and not controlled by dissolved oxygen concentration. We demonstrate that marine eDNA can persist at quantifiable concentrations for over 2 weeks at low temperatures ( $\leq 10^\circ\text{C}$ ) but for a week or less at  $\geq 20^\circ\text{C}$ . The relationship between temperature and eDNA persistence is independent of the source species. We propose a general temperature-dependent model to predict the maximum persistence time of eDNA detectable through single-species eDNA quantification methods.

Link to paper: <https://doi.org/10.1021/acs.est.2c01672>

# Revisiting procedural requirements for the assessment of environmental impacts arising from the different stages of deep seabed mining: Current practices at the International Seabed Authority and recommendations for improvement

Maila Guilhon, Pradeep Singh, Sabine Christiansen, Alexander Turraa

*Environmental Impact Assessment Review, Volume 96, 106846*

More than five decades ago, Environment Impact Assessment (EIA) emerged in domestic legislation as a tool to respond to increased human pressures on the natural realm. Although the theory and practice of conducting EIAs have evolved over the years, several shortcomings for an effective implementation remain, hampering it from consolidating as a tool to promote Ecosystem-based Management (EBM). The challenges undermining an effective implementation of EIAs are magnified when considered under the scope of offshore extractive activities taking place in areas beyond national jurisdiction, such as deep seabed mining (DSM) on the international seabed (or 'the Area'), which is governed by an international organization known as the International Seabed Authority (ISA). DSM activities are anticipated to cause extensive environmental harm, which may compromise the still poorly understood processes, functions, and services in the deep ocean. Since its inception, the ISA has taken measures to address the assessment of environmental impacts arising from DSM activities at the various stages of the mining process, which range from prospecting, exploration, and future exploitation. Nevertheless, a detailed description of the procedures to assess impacts at different stages of mining is absent in the literature, remaining a puzzled topic. This paper seeks to clarify the ISA's procedural framework for the assessment of environmental impacts arising from the different mining stages and reveals that its current practices do not represent a comprehensive, transparent, or participative EIA process that conforms with EBM. Consequently, the ISA's existing approach to the EIA process and its potential to support informed decision-making is doubtful. Based on the identified shortcomings, this paper provides some recommendations for improvement of EIA practices at the ISA.

Link to article: <https://www.sciencedirect.com/science/article/pii/S0195925522001123?dgcid=author> (link provided above will allow access for 50 days)

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## New Carnivorous sponge species (Demospongiae: Cladorhizidae) from the Seamounts of the Central Indian Ridge

Periasamy Rengaiyan and Baban Ingole. National Centre for Polar and Ocean Research (NCPOR), Ministry of Earth Sciences (MoES), Headland Sada, Vasco-da-Gama, Goa, India—403804

*Zootaxa 5162 (5): 451–486*

Contact: [babaningole@ncpor.res.in](mailto:babaningole@ncpor.res.in)

Deep-sea sponges are an imperative component of benthos. They accumulate the suspended organic matter by filtering large quantities of water and, with their intricate structures, provide the most suitable habitats for various associated organisms. We describe three new cladorhizid sponges from the Central Indian Ridge (CIR), Indian Ocean. The sponges are part of the benthic sledge collection conducted onboard the MGS Sagar in the CIR region. A detailed taxonomic description of two novel species, *Asbestopluma (Asbestopluma) indiyansis* sp. nov., and *Asbestopluma (A.) bhartiya* sp. nov. are provided based on the morphological and molecular (mtCOI and 28S) markers. In addition, another new carnivorous species *Chondrocladia sagari* sp. nov. is described based on the morphological and mtCOI marker. The systematic and descriptions of new species are discussed based on the structural and phylogenetic analysis. Our study

shows that the cladorhizid fauna of the seamounts from the CIR are unique and represent regionally endemic benthic habitats.

Link to article: <https://doi.org/10.11646/zootaxa.5162.5.1>

## *Gorgoniapolynoe caeciliae* revisited: The discovery of new species and molecular connectivity in deep-sea commensal polynoids from the Central Atlantic

Jamie Maxwell, Sergi Taboada, Michelle L. Taylor

*Deep Sea Research Part I: Oceanographic Research Papers, Volume 185, 103804*

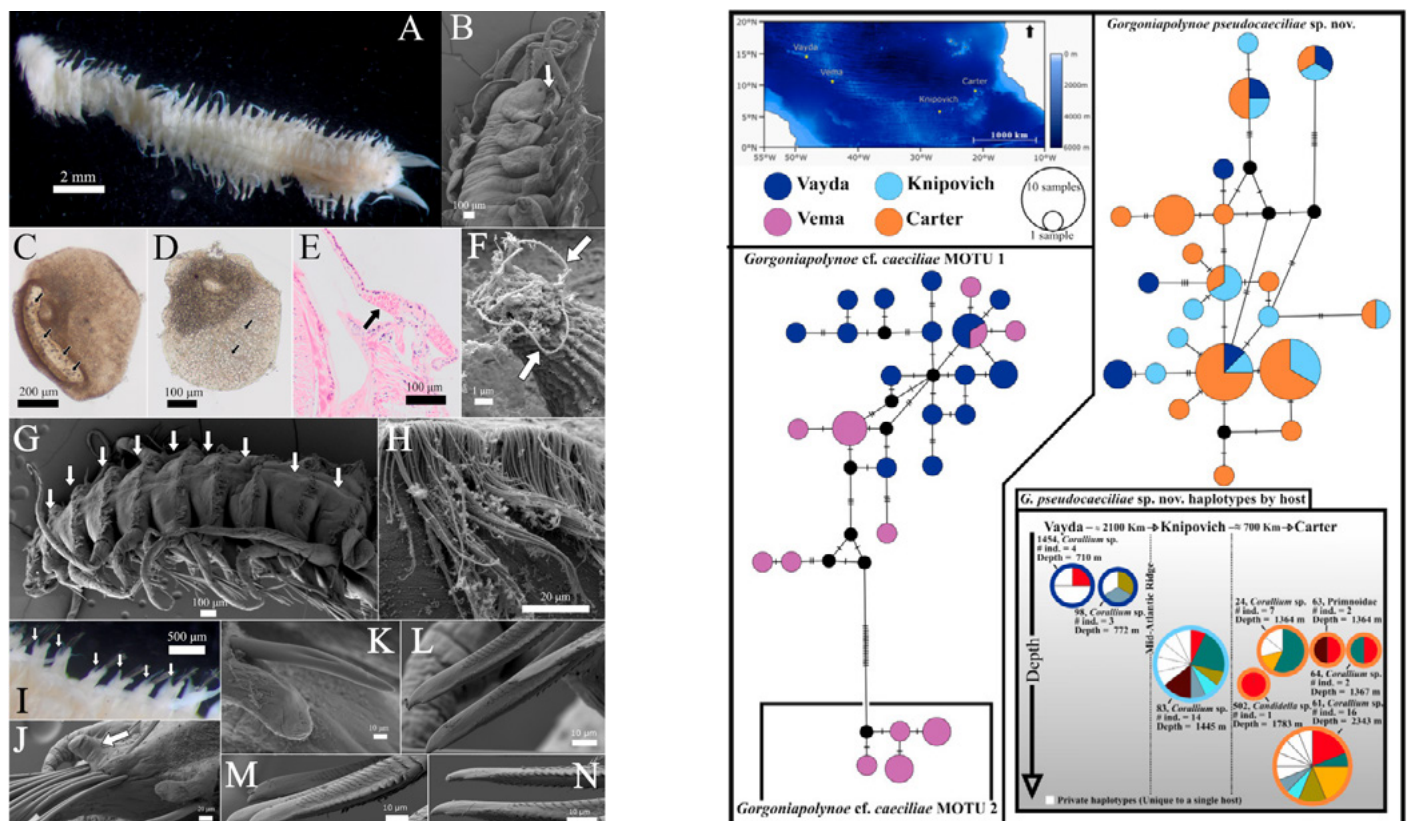


Figure 1 (left). The morphological characters of the newly described polynoid *Gorgoniapolynoe pseudocaeciliae* sp. nov. Figure 2 (right). COI haplotype networks for 2 species *Gorgoniapolynoe* sampled from corals on four Central Atlantic seamounts.

*Gorgoniapolynoe caeciliae* (Fauvel, 1913) is a deep-sea commensal polynoid that lives in association with several genera of octocorals from the order Alcyonacea. The species has been recorded in the Caribbean and in both Atlantic and Indian Ocean basins. The wide geographic range of *G. caeciliae*, coupled with it having multiple host coral species and the evolution of its taxonomic description, hints that it could potentially be a species complex. This study investigated the morphological and genetic differentiation in 82 specimens of *G. cf. caeciliae*, sampled from four seamounts in the Central Atlantic separated by thousands of kilometres. Our combined morphological and molecular analyses, including species delimitation models (ABGD and bPTP) using COI and a phylogenetic approach using four molecular markers (COI, 16S, 28S, and 18S), agreed in identifying three distinct species; two supported by morphological and molecular data and a third species, using molecular data only, from the Indian Ocean which had been previously identified as *G. caeciliae*. We formally describe a new species in the genus, *Gorgoniapolynoe pseudocaeciliae* sp. nov., the most common taxa found in our study. Our morphological analyses of some members of the genus *Gorgoniapolynoe* revealed the presence of elytra with possible photocytes (bioluminescent cells) and conspicuous macropapillae with long cilia emerging from them, whose function is discussed here. Our demographic analysis using COI for two *Gorgoniapolynoe*



sp. detected a high potential for dispersal for *G. pseudocaeciliae* sp. nov., with sites approximately 3000 km apart being well connected. Unusually there was also no genetic differentiation across their bathymetric range of over 1500 m. All in all, our study highlights the importance of applying integrative taxonomy to poorly studied deep-sea species.

Link to article: <https://doi.org/10.1016/j.dsr.2022.103804>

## Sea spiders (Arthropoda, Pycnogonida) from ten recent research expeditions to the Antarctic Peninsula, Scotia Arc and Weddell Sea – data

Jamie Maxwell, Yi Ming Gan, Claudia Arango, Jana S Doemel, A. Louise Allcock, Anton P. van de Putte, Huw Griffiths

*Biodiversity Data Journal 10: e79353*

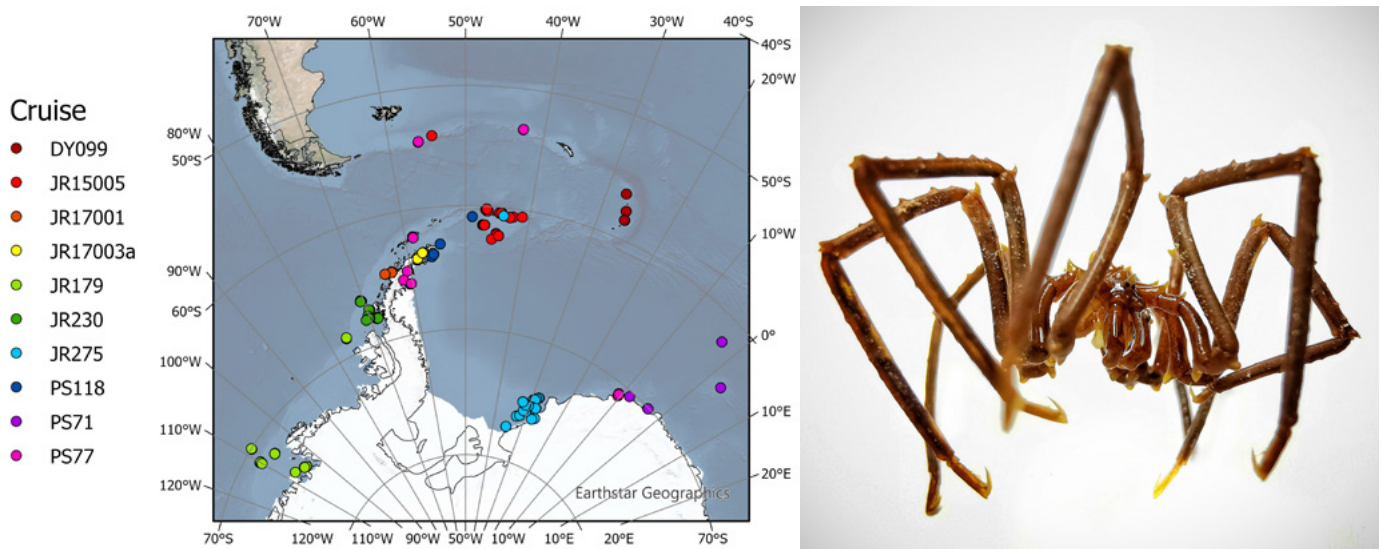


Figure 1 (left). The location of the sampling stations and the cruises during which they were conducted from which the pycnogonid dataset was compiled. Figure 2 (right). *Pallenopsis spicata* sampled from the Eastern Weddell Sea (580 m)

This dataset adds vital occurrence and abundance data for pycnogonids from 10 previously unexamined research cruises from the Weddell Sea, Antarctic Peninsula and the islands of the Scotia Arc. It includes the first pycnogonid data from the Prince Gustav Channel. The 197 sampling stations within this dataset represent an 11% increase in the number of stations where pycnogonids have been recorded in the Southern Ocean, southern South America and New Zealand waters and an 18% increase for above 60 degrees latitude. The 5664 individuals in the dataset come from eight families, in 15 genera and with 81 species plus 16 morphotypes which could not be identified with 100% certainty (i.e. sp. inc., gen. aff. or sp. aff.). *Nymphon austral* was recorded most often and was also the most numerous species in with 3,004 individuals recorded. Presence data for any observed epifauna are also included.

Link to paper: <https://doi.org/10.3897/BDJ.10.e79353>

## Characterization and spatial variation of the deep-sea fish assemblages on Pioneer Bank, Northwestern Hawaiian Islands

Mejía-Mercado, B. E., Baco, A. R.

*Marine Ecology Progress Series 692:99-118*

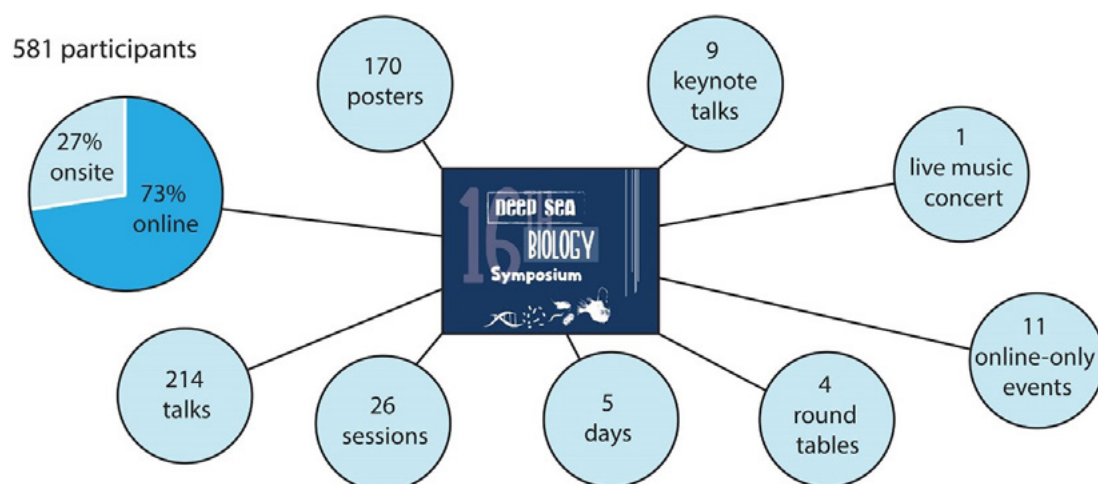
Knowledge of the spatial variation of deep-sea fish assemblages is a critical gap in understanding seamount ecology. Pioneer Bank in the Papahānaumokuākea Marine National Monument (Hawaii, USA) has a history of hook-and-line fishing but not trawling; thus, it is a good location to further describe deep-sea fish assemblages. From replicated autonomous underwater vehicle transects at 300, 450, and 600 m on 3 sides of Pioneer Bank, we observed 4190 fish representing 81 species. Fish assemblages were dominated by Gadiformes, Perciformes, and Stomiiformes. The relative abundance of fish was significantly different among sides of the seamount and the interaction of side and depth, with the NW side having the highest relative abundance at 450 m. Species richness, rarefaction estimates of expected species richness, Shannon diversity, and Simpson dominance showed significant differences by side, but not by depth. These differences were between the S and NW sides, with the S side having the lowest diversity and high dominance. The structure of the fish assemblage was significantly different among both sides and depths, with depth as the most important factor. Fish assemblage structure was most strongly correlated with salinity, % rugosity, chlorophyll a, and mean direction of substrate. These scales of spatial variability both with depth and across short horizontal distances on a single seamount are similar to those found on nearby Necker Island, which reaffirms the spatial heterogeneity in deep-sea fish assemblages on seamounts. This study provides an ecological baseline for the management and conservation of seamounts.

Link to article: <https://doi.org/10.3354/meps14071>

## Hybrid conferences: opportunities, challenges and ways forward

Puccinelli, E., Zeppilli, D., Stefanoudis, P., Wittische-Helou, A., Kermorgant, M., Fuchs, S., Lénaïck, M., Easton, E.E. and Weber, A.A.T.

*Frontiers in Marine Science*, 9:902772



Hybrid conferences are in-person events that have an online component. This type of meeting format was rare before the COVID-19 pandemic but started to become more common recently given the asynchronous global progression of the pandemic, the uneven access to vaccines and different travel regulations among countries that led to a large proportion of participants being unable to attend conferences in person. Here we report the organization of a middle-sized (581 participants: 159 onsite, 422 online) international hybrid conference that took place in France in September 2021. We highlight particular organizational challenges inherent to this relatively new type of meeting format. Furthermore, we surveyed both in-person and online participants to better understand their conference experience and to propose improvements based on the feedback received. Finally, we compare the advantages and disadvantages of three types of conferences (onsite-only, online-only and hybrid) and suggest that hybrid events should be favoured in the future.

because they offer the most flexibility to participants. We conclude by proposing suggestions and ways forward to maximize accessibility and inclusivity of hybrid conferences. Our study brings novel insights on the challenges and opportunities created by hybrid conferences, by reporting not only the organizing committee experience but also by considering the participants' perspective.

Link to article: <https://doi.org/10.3389/fmars.2022.902772>

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## So Close Yet So Far: Age and Growth of Blue Antimora *Antimora rostrata* (Moridae, Gadiformes, Teleostei) off New Zealand and Macquarie Island (Southwestern Pacific Ocean)

N.B. Korostelev, D.C. Welsford, V.V. Belyakov, A.G. Bush, A.M. Orlov

*Journal of Marine Science and Engineering* 10 (7): 956

Age and growth of blue antimora *Antimora rostrata* were examined in the waters off New Zealand and Macquarie Island (southwestern Pacific). Samples off Macquarie Island were collected from bycatch in the Patagonian toothfish longline fishery. Individuals between 20 and 44 years in age measured between 37.6–71.1 cm in total length. Bottom trawl catches from New Zealand waters consisted of smaller and younger fish (11 to 38 years), measuring 22.5–52.5 cm long. The age classes with the greatest numbers in the former area were represented by fish aged 33–34 years (25.7%). In the latter area, the most numerous age classes were 21–23 years (12.1%), 28–29 years (17.6%), and 32 years (6.6%). The blue antimora from off the Macquarie Island show similar growth rates to those of individual fish from the Ross, Lazarev and Weddell Seas, waters off the Kerguelen and Crozet Islands, and southeastern Greenland. Individuals from New Zealand waters demonstrate the slowest growth rates compared to other parts of the species' range but are quite similar to individuals from the Flemish Cap area. Further research to identify the stock structure of this broadly distributed species is warranted to provide context to differences in growth rates observed between populations.

Link to article: <https://doi.org/10.3390/jmse10070956>

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## Lipids and Fatty Acids in Some Mesopelagic Fish Species: General Characteristics and Peculiarities of Adaptive Response to Deep-Water Habitat

V.P. Voronin, D.V. Artemenkov, A.M. Orlov, S.A. Murzina

*Journal of Marine Science and Engineering* 10 (7): 949

The lipid and fatty acid composition of muscles of mesopelagic fish species *Lampanyctus macdonaldi*, *Bathylagus euryops*, *Serrivomer beanii*, *Scopelogadus beanii* in the Irminger Sea at deep range were studied. The contents of the total lipids (TLs), total phospholipids (PLs), monoacylglycerols (MAGs), diacylglycerols (DAGs), triacylglycerols (TAGs), cholesterol (Chol), Chol esters, non-esterified fatty acids (NEFAs), and wax esters were determined by HPTLC; the PL classes were determined by HPLC; and fatty acids (FAs) were determined using GC. It was found significant differences in lipid profile of the studied fishes: Chol esters and waxes were dominant in *L. macdonaldii* and *S. beanii*, fish species with diel vertical migrations (DVM), while TAGs were prevalent in *B. euryops* and *Sc. beanii* – non-migratory species. It was revealed the species-specific differences in FAs profiles of the studied fish. Along with this, it was detected the similarity of FAs in fish, which is associated with food sources. A comparative analysis of lipids and FAs among *L. macdonaldi* and *S. beanii* collected in the Irminger Sea and *L. alatus* and *S. beanii* collected in the Tropic Seamount



revealed similar biochemical strategies for the accumulation of certain lipids characterized the mesopelagic inhabit despite latitude differences of the area of study.

Link to article: <https://doi.org/10.3390/jmse10070949>

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## Hard life in cold waters: Size distribution and gonads show that Greenland halibut temporarily inhabit the Siberian Arctic

A.N. Benzik, L.K. Budanova, A.M. Orlov

*Water Biology & Security* 1 (2): 100037

The range of the Greenland halibut *Reinhardtius hippoglossoides* (Walbaum, 1792) includes vast areas in the northern parts of the Atlantic and Pacific oceans, as well as the seas of the Arctic Ocean. Despite its commercial importance and decades of study, many aspects of its life cycle and reproduction remain poorly understood. Here, we evaluate the size distribution of Greenland halibut in the catches of research surveys in the Barents, Kara, and Laptev seas and conduct micro- and macroscopic studies of their gonads in the Laptev Sea. The size of Greenland halibut individuals increases from west to east, which is associated with the settling of pelagic juveniles and the subsequent residency of growing individuals near their settling sites. To the greatest extent, this size imbalance is manifested in the areas most remote from spawning grounds, i.e. the Kara and Laptev seas. The process of maturation in large individuals of Greenland halibut in the Arctic seas is characterized by a state of inhibition-waiting in the early stages of gametogenesis (previtellogenesis). The data obtained indicate that Greenland halibut in the North Atlantic and the Siberian Arctic have a continuous range. The continental slope of the Barents Sea is a spawning and maturing ground, while the northern parts of the Barents and Kara seas, as well as the continental slope of the Laptev Sea, are feeding grounds for juveniles. The results of this study might serve as a necessary basis for monitoring condition of halibut stocks as well as for reallocation of the total allowable catch between countries that exploited them in the Norwegian and Barents seas.

Link to article: <https://doi.org/10.1016/j.watbs.2022.100037>

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## *Eustomias securicula* sp. nov.—the Second Representative of the Subgenus *Biradiostomias* (Melanostomiidae) in the Pacific Ocean

A.M. Prokofiev, A.M. Orlov

*Journal of Ichthyology* 62 (2): 316–319

*Eustomias securicula* sp. nov. from the area of the Northwestern (Emperor) seamount chain, the second species of the subgenus *Biradiostomias* known outside the Atlantic Ocean, has been described. It differs well from the only previously known Pacific species, *E. ioani*, in the structure of the terminal part of the chin barbel, the smaller number of branchiostegal photophores, and the absence of dorsal subcutaneous spots. The new species has not been found to be closely related to any of the Atlantic representatives of the subgenus. The specific range of the subgenus *Biradiostomias* (Atlantic, North Pacific) may be due to the prochoresis of the ancestral forms of the Pacific species through the Strait of Panama.

Link to article: <https://link.springer.com/article/10.1134/S0032945222020151>

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## Polymorphism of Walleye Pollock *Gadus chalcogrammus* Mitochondrial DNA Control Region in the Asiatic Part of the Range and its Phylogeographic History

S.Yu. Orlova, A.A. Sergeev, D.M. Shchepetov, D.S. Kurnosov, E.A. Chikurova, A.M. Orlov, M.K. Glubokovsky

*Journal of Ichthyology* 62 (2): 266-279

The phylogeographic analysis of *Gadus chalcogrammus* from the Asian part of the range (the western part of the Bering Sea, the Sea of Okhotsk and the Sea of Japan, the Pacific waters of the Kuril Islands and Kamchatka) based on data on the polymorphism of the mtDNA control region fragment (D-loop, 526 bp) was performed for the first time using large-scale material (1162 individuals from 38 samples). The obtained results indicate the existence of two large groups in the surveyed water area: one is localized in the western part of the Bering Sea, and the other is formed by samples from the Sea of Japan and the Sea of Okhotsk and from the Pacific waters of the Kuril Islands and Kamchatka. An unusually low level of polymorphism in the mtDNA control region of *Gadus chalcogrammus* was revealed, which was also previously found in *G. macrocephalus* and is probably due to similar microevolutionary processes that took place in the past in both species.

Link to article: <https://doi.org/10.1134/S0032945222020126>

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## Ontogenic Changes in Coloration of Rare Deepwater Richardson's Ray *Bathyraja richardsoni* (Arhynchobatidae, Rajiformes, Chondrichthyes)

A.M. Orlov, N.I. Rabazanov, A.I. Nikiforov

*Russian Journal of Developmental Biology* 53 (1): 27–40

The features of the coloration of the dorsal and ventral sides of the rare deep-sea Richardson's ray *Bathyraja richardsoni* (Arhynchobatidae) in the length range from 14 to 146 cm have been studied and its ontogenetic changes have been traced. New data on the coloration of embryos, immature, maturing, and sexually mature individuals are presented. It is shown that variations in the coloration of the dorsal side are insignificant, while the coloration of the ventral side can vary significantly. The data obtained can be used in taxonomic and population studies, in the development of keys for species identification, in the preparation of faunal summaries and determinants, to facilitate understanding the features of coloration and its changes in deep-sea animals living in constant darkness, and to expand knowledge about certain aspects of macro- and microevolution of deep-sea rays.

Link to article: <https://doi.org/10.1134/S1062360422010052>

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## Mesopelagic Micronekton and Macroplankton and the Conditions of Its Habitat in the Northeastern Pacific Ocean

A.S. Kurnosova, A.A. Somov, A.N. Kanzeparova, M.A. Zuev, S.Yu. Orlova, D.S. Kurnosov, A.M. Orlov

*Oceanology* 62 (1): 68-69

The article analyzes differences in the vertical structure of waters and hydrochemical parameters at three oceanic stations in the northeastern Pacific. Data on the species composition of mesopelagic fishes, squids, and gelatinous organisms making diurnal vertical migrations to the epipelagic zone are given. Differences in their ratio and size composition at

different stations are analyzed. The species ratio and size and total biomass of micronekton and macroplankton change in the southwestern direction, which is primarily determined by the variability of the oceanological characteristics of the subsurface layer.

Link to article: <https://doi.org/10.1134/S0001437022010076>

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## **Contemporary Ichthyological and Fisheries Research of Deepwater Fish: New Advances, Current Challenges, and Future Developments**

A.M. Orlov

*Journal of Marine Science and Engineering 10 (2): 166*

Deepwater fishes are a very diverse group of chondrichthyans and teleosts widely distributed in the world ocean from the Arctic to the Antarctic and inhabiting the water column and seabed of continental slopes, seamounts, and high seas usually at depths greater than 400 m. In some groups, only certain species and genera are deepwater, but whole families and orders are also known, representatives of which live at great depths. Despite the long period of studies of deepwater fishes and commercial exploitation of their resources, their role in marine ecosystems is still poorly understood. Our knowledge of their taxonomy, biogeography, evolution, phylogeny, basic biological traits, physiology, condition of stocks, fisheries, management, and conservation needs remain scarce. Present Special Issue entitled “Deepwater Fishes” provides an overview of the current status of knowledge on the variety of topics related to fishes inhabiting deep waters worldwide. Additionally, research needs and perspectives for further advancement in this field are identified.

Link to article: <https://doi.org/10.3390/jmse10020166>



# It's Your Opinion



WORLD TRADE  
ORGANIZATION

## New multilateral Agreement in the World Trade Organization, regarding subsidies to fishing and fishing related activities

Nicolas Palau and Lorena Rivera

1. On June 17, the World Trade Organization (WTO) adopted a new multilateral agreement that creates disciplines on the government subsidies to fishing and fishing related activities in the ocean.
2. In general terms, the agreement provides a new trove of data for science-based policy discussions regarding fisheries activities in the ocean.
3. The Agreement has three main pillars that discipline governmental subsidies to certain fishing activities, it creates a new set of binding rules subject to dispute settlement mechanisms in the WTO system, and it crafts a new global architecture on fisheries policies including a repository for information, and a scenario for dialogue. Before delving into more detail, it is worth clarifying that this agreement does not regulate or limit fishing activities per se. Its objective is to create new disciplines for government subsidies, meaning public money destined to support, promote, or enhance fishing and fishing related activities. Equally important to clarify is that the scope of this instrument is fishing activities in the ocean, excluding inland fisheries and aquaculture.
4. Having clarified the scope, in a nutshell the new multilateral agreement of fisheries subsidies: i) prohibits to grant or maintain subsidies to vessels or operators who have been engaged in illegal, unreported or unregulated fishing or fishing activities; ii) prohibits to grant subsidies to fishing stocks that are determined to be overfished, according to the best scientific evidence available; iii) prohibits subsidies to fishing in unregulated areas (outside of the jurisdiction of a coastal state or the competence of an RFMO); and iv) calls on all the parties to take special care and exercise due restraint when granting subsidies to fishing activities regarding stocks which status is unknown.
5. Beyond these specific disciplines, and probably of most importance to DOSI, is that the agreement has important elements on transparency, allowing for enhanced access to information on countries' fisheries regimes, data on stock status, catch data, fisheries management programmes and techniques, conservation measures, among others.
6. Equally, the agreement creates a new multilateral forum for discussion, focused on fisheries. This new architecture will allow discussion, information sharing and will bring light on science-based discussions on fisheries policies and practices.
7. A particular element to highlight is the relevant and central role that RFMOs will play in the implementation of this agreement, and the transparency elements involved, which will certainly contribute to a better scrutiny and a better functioning of these organizations, on top of improving communication and enhanced collaboration with them and among them. To our knowledge, besides the Law of the Sea Convention, this is the first multilateral – binding agreement where RFMOs have specific functions, obligations and transparency requirements.
8. This agreement is hot off the press and in our opinion it is of interest to the scientific community for the new areas of collaboration and cooperation that it opens, and for the contribution it can make to more science-based fisheries management and policies. The instrument is a step in the right direction regarding a complementary relationship between trade policy, ocean governance and science.
9. Finally, the WTO fisheries subsidies agreement is indeed a new piece in the global ocean governance that contributes to fill certain gaps and brings an element of coherence and harmonization in the context of these complex regimes.
10. The DOSI community has gained a new platform of useful information, and a new forum to elevate science-based discussions to a political arena.

Information and a link to the agreement can be found here: [https://www.wto.org/english/tratop\\_e/rulesneg\\_e/fish\\_e/fish\\_e.htm](https://www.wto.org/english/tratop_e/rulesneg_e/fish_e/fish_e.htm)

**Lorena Rivera and Nicolas Palau work at the Colombian Mission to the WTO in Geneva, although this article has been produced in their personal capacity.**

# Obituaries

## A tribute to Myriam Sibuet by the deep-sea lab at Ifremer



Myriam Sibuet passed away on 26<sup>th</sup> July. She was 76.

Myriam was born far from the sea but felt the call of the sea during studentships when she was studying Natural Science in Strasbourg. In 1969, after she graduated, she was hired by Lucien Laubier to join a nascent research team on abyssal ecology in Brest. While Lucien Laubier tried to initiate her to the taxonomy of polychaetes, she rather decided to focus on echinoderms. A long learning process for Myriam who was so meticulous. It took her ten years to become a good taxonomist she said. But Myriam couldn't stop learning and once a good taxonomist she soon turned her interest to ecology. Meanwhile she was always pushing for methodological improvements and technological innovations from beam trawl to submersibles. Myriam first dived in a submersible in 1976 during a technical test of Cyana, and she later contributed to the specifications of the submersible Nautile and the ROV Victor 6000.



Myriam was open minded and eager for collaborations. Pluridisciplinarity and international relations have always been very important for her. She soon joined international research projects, and in 1988 she organised the 5th Deep Sea Biology Symposium at Ifremer in Brest. Towards the end of the 80's, the discovery of cold seeps on continental margins has been a turning point in her career. She will be among the pioneers studying these new ecosystems. She then realized that the deep sea is much more heterogeneous than previously thought and at a variety of spatial scales. A theme that she will put forward and that will become a leitmotiv for her involvement in the the Census of Marine Life.

Myriam has also been among the pioneering women in

Science. She led numerous cruises and led the deep-sea lab at Ifremer for years. In 2002 Myriam was awarded the insignia of Chevalier de la Légion d'honneur, in particular for her efforts to demonstrate the relationship between deep-sea assemblages and their physical and chemical environment. For the two last years of her career at Ifremer



Myriam and friends

she was seated right next to the CEO as scientific and technical adviser. While retiring from Ifremer, Myriam was as passionate as ever by deep-sea science and immediately became involved in the Census of Marine Life as a member of the Steering Committee and as the lead of the COMARGE project.

Myriam has been instrumental for the development of deep-sea science, in France and beyond. She was an example who marked us with her curiosity, her dynamism, her team spirit and her humanity. She has been as inspired by all the scientists she met, as she has been inspiring for generations of scientists. Myriam loved to share and pass on her knowledge; she has been of great support to many of us. During the past years, with no more student to accompany on the path of science, she shared her passions to her grandchildren. She will be much missed.



# Deep-Sea Biology Society News

## Deep-Sea Biology Society Update

Dear Deep-sea Biology colleagues,

It's my great pleasure to tell you that your trustees are now very much embedded in their roles and are doing a great job in supporting our wonderful deep sea biology science community in many and varied ways – as a committee we've made some important steps forward in diversity training, renewing the mentoring network, initiating a global seminar series to give our early career researchers more opportunities to showcase their work, we have given out grants and awarded members for their excellent science outputs. More specifics are listed below. It's all go!

The committee bids a fond farewell to the marvelous Dr Andrea Quattrini – a long-standing DSBSoc committee member. We will be forever grateful for the time and dedication she committed to helping make the Society the supportive, collegiate and efficient (mostly!) beast it is today. We also wish her well on the new adventures she has afoot and can't wait to see the subsequent illuminating research that will no doubt emerge. At the same time we welcome Dr Franck Lejzerowicz who has taken over as our communication officer. Franck has already appointed a crack team of social media wizards who have really overhauled our outputs in recent months. Check out the new look Instagram and Twitter ([@dsbsoc](https://twitter.com/dsbsoc)) for posts about grant awardees, upcoming seminars, conferences etc.

One frustrating aspect of our academic lives that keeps being raised by both committee members, through the mentoring networks, and our members is the extraordinary, and exclusionary, cost of academic publication for our members. Behind the scenes we have been discussing possible support we could offer our members – access to finance for lower income countries to publish? Collaboration with established publishers to secure reduced publication fees? Or even creating our own “at cost” community publication route? Should you have thoughts, or even experience, in this field we would like to hear from you. We will be testing the waters and talking to DSBSoc members soon about this so watch out for messages in the coming months.

The summer season of conferences is well underway and the last few days have seen an enormously useful publication from the DSBS16 team about the opportunities and challenges of running hybrid conferences. You can read it in *Frontiers in Marine Science* here: <https://www.frontiersin.org/articles/10.3389/fmars.2022.902772/full>

We all know that hybrid conferences are likely here to stay and their results suggest they do offer participants the most flexibility – great news for DSBS17.

It is with excitement that I tell you the preparations for DSBS17 in Hong Kong (hybrid and in late 2024 / early 2025) are well underway. The local organising committee, lead by Dr. Pei-Yuan Qian, Director of the Hong Kong Branch of Southern Marine Science and Engineering Guangdong Laboratory (Guangzhou) at Hong Kong University of Science and Technology, are progressing in leaps and bounds – the conference facilities have been secured, fundraising is on the way (contact us if you know suitable partners to include please), and a panel of deep-sea experts is being gathered to support oversight and scientific strategic direction.

Looking to more immediate society matters – the AGM this year will be held online in Sept (likely the 8th) in coordination with the Challenger Society conference ([https://www.challenger-society.org.uk/Challenger\\_conference\\_2022](https://www.challenger-society.org.uk/Challenger_conference_2022)). Anyone in attendance at NHM is welcome to join us in person (location TBD – emails will go out closer to the time) but there will be Zoom links sent out in advance, the occasion will be recorded, and any voting will be open for at least 24 hours

to ensure global participation is possible. I look forward to giving you an overview of our latest activities there. In the meantime enjoy the summer of science.

All the best,

Michelle

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## Deep-Sea Biology Society Early-Career Support

Pierre Methou, Early Career Officer

Contact: [early\\_career@dsbsoc.org](mailto:early_career@dsbsoc.org)

I am very glad to have had the opportunity to join the Deep-Sea Biology trustee board last September and after a little less than a year as Early Career trustee for the society, I hope I finally get my bearings in this role.

This year saw the start of our series of deep biology seminars, with the first on May 17 and a second on June 25. I am particularly grateful to the four speakers, Guilherme Siqueira Toledo de Carvalho, Melissa J. Betters, Beatriz Lopes da Silva Dias Mano and Emilie Chagny who embarked on this experience with us. In the absence of the major meetings in 2022 that are our symposiums, I think that this series of seminars was a new and welcome opportunity to meet and discuss between members on various subjects covering as much as possible the diversity of themes in our society. With three other upcoming seminars scheduled for September, November and early December, I hope that this adventure will continue and lead to fruitful and exciting exchanges.

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## Deep-Sea Biology Society Diversity

Alycia Smith, Diversity Officer

Contact: [diversity@dsbsoc.org](mailto:diversity@dsbsoc.org)

I am honored to have taken on the role of Diversity Officer at DSBS, to continue the phenomenal founding work of Raissa, and want to thank past and present trustees, and the DSBS community for your commitment and efforts so far.

Since coming together in September last year, we have begun to recognise and champion Equity, Diversity and Inclusion (EDI) in the society, including designing our Religious Holidays Survey, building on our Plan Of Action (POA) and attending our initial diversity training session. The survey data have enabled us to collate important religious holidays into one calendar, so that any future DSBS events can be scheduled with inclusivity in mind, avoiding times where our members may be observing wherever possible. This calendar has also been made available to all our society members to use. Our initial diversity session, provided by the fantastic Lara Lalemi of Creative Tuition Collective, provided a better understanding of what diversity encompasses and how our EDI work can blossom. We hope to continue this working relationship and to grow our efforts over time with actionable short-, mid- and long-term goals for the society, expanding our POA (including feedback comments from the religious holidays survey). These efforts will also feed into our planning for upcoming events such as the ISDSC in May 2023 and the Deep-Sea Biology Symposium in January 2024, to make these events accessible for all.

If you have any suggestions, concerns or just want to reach out - please feel free to contact me at [diversity@dsbsoc.org](mailto:diversity@dsbsoc.org), anytime. I look forward to meeting you all in upcoming DSBS events!

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## Deep-Sea Biology Society Awards

Julia Sigwart, Awards Officer

Contact: [awards@dsbsoc.org](mailto:awards@dsbsoc.org)

I am delighted to have the opportunity to take over the role of Awards Officer after serving DSBS as the first Development Officer for 4 years. In the last year we have reviewed the awards and prizes supported by the Society and streamlined the application process. Please mark your calendars for the new annual deadlines!

Participation Awards - deadline 31 October - these awards replace former conference support awards, and are intended to be a more inclusive approach to supporting members make use of any networking opportunities. Society members who do not currently have permanent employment can apply for financial support to allow them to participate in conferences, workshops, or other related networking events, whether that means travel funding, registration fees, childcare costs, or even a quiet workspace to join an online event.

Research Support Awards - deadline 30 April - these replace former student research awards, cruise bursaries, and the "dive deeper" bursaries, to support the research activities of any members without permanent employment. There is an annual deadline but applications for cruise support on short notice can be submitted any time.

Prizes for outstanding papers - deadline 31 January - nominations are welcome from any members to recognise outstanding papers in deep sea biology published in the last 3 years. There is a special category for papers that were published as part of a PhD thesis.

For our first round of Research Support Awards we received an outstanding group of applications and I am delighted that we were able to make two awards to exciting projects:

- Leonel Ivan Pacheco (Museo Argentino de Ciencias Naturales (MACN) "Bernardino Rivadavia") – Taxonomy of Septibranchia and Protobranchia bivalves from the southern Southwestern Atlantic deep sea
- Vanessa Stenvers (Smithsonian National Museum of Natural History; GEOMAR Helmholtz Centre for Ocean Research) – The evolution of visual systems in the holopelagic Oxycephalidae (Amphipoda, Hyperiidea)

Look out for more information about our winners on social media channels this year! I look forward to your applications and nominations to the upcoming deadlines!

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## Deep-Sea Biology Society Communications

Franck Lejzerowicz, Communications Officer

Contact: [communications@dsbsoc.org](mailto:communications@dsbsoc.org)

The Deep-Sea Biology Society office is almost entirely renewed and thus navigates the sea of possibilities with new compasses, indicating the cardinal points of diversity, networking, professional support, and scientific dissemination. It is enthusiastically daunting to carry on with the heavy-lifting work done by Drs. Holly Bik, Paris Stefanoudis and Andrea Quattrini, as new possibilities open for our community.

As a new Communication Officer since March, I am excited to share that several engaging activities are just getting started. Following the incentive from Andrea, we established a Social Media team, composed of Janet Ferguson-Roberts (Twitter: @DSBSoc), and Ariane Buckenmeyer (Instagram: @dsbsoc). Many thanks to Ariane and Janet for



keeping our membership and followers updated with the latest deep-sea biology discoveries and with the various achievements of our dear members. The website is being refreshed with a few conference updates as we discuss the organization of the 17th Deep-Sea Biology Symposium in Asia, and with contributions for you to know about Life After PhD, and soon, to Meet the Next Generation of Deep-Sea Researchers. Our plans for the next semester are to develop new online solutions for our members to discover each other and on-going projects, and to interact more readily to build professional networks and fruitful collaboration.

If there are news, achievements or announcements you would like to share within and beyond our Society, please do contact us. We are particularly eager to promote our junior, student and early-career members through social media coverage and the publication of individuals' contributions. Be in touch!

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## Deep-Sea Biology Society Finances

Neus Campanyà-Llovet, Treasurer

Contact: [treasurer@dsbsoc.org](mailto:treasurer@dsbsoc.org)

As the new treasurer of the DSBSociety, I am overseeing the financial support to our members and to international deep-sea research while keeping our annual accounts in check. It is a privilege to work with this new team of trustees and to take part in this new adventure.

The society enables deep-sea biology community networking through sponsorship of scientific meetings, such as the next 17th DSBSymposium in Hong Kong. At the individual level, we facilitate deep-sea research and attendance to various events (i.e., cruises, conferences, and workshops) through grants and recognise excellence in research with annual prizes. We also participate in training such as the DEI course (Diversity, Equity and Inclusion) to provide the best service to our members and meet our constitutional goals. As a charity, we are sustained by donations, memberships, and merchandising. An active membership allows our members to enjoy discounts in conferences and become beneficiaries of the mentioned support among other things. I am excited to see the society growing and keep encouraging our members to network and accomplish their research goals in this unique and diverse field.

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## Deep-Sea Biology Society Development

Erik Cordes, Development Officer

Contact: [development@dsbsoc.org](mailto:development@dsbsoc.org)

I am excited for my new role as the Development Officer for the DSBS, following my election in September 2021. I have been in touch with the organizers of the next few deep-sea conferences, the International Symposium for Deep-Sea Corals (ISDSC) in Edinburgh in May 2023, the Chemosynthesis-Based Ecosystems (CBE) meeting in Brazil in Aug 2023, and the Deep-Sea Biology Symposium in Hong Kong in January 2024. The DSBS will be helping to coordinate the fund-raising efforts to try to keep the costs of all of the conferences to a minimum. The conference schedule is back to its usual hectic pace and we look forward to seeing all of you at one or more of these meetings! As always, the Society will be here to provide assistance for the participation of students, early career professionals, and scientists from developing nations. If any of you have thoughts about potential sources of funding for the Society to support these efforts and/or these conferences, please feel free to reach out to me directly.