Partnership for Observation of the Global Ocean

# ANNUAL REPORT

September 2023 – March 2025

# FOREWORD

Captain Francisco Arias Isaza

POGO Chair
Director, Instituto de Investigaciones Marinas y Costeras (INVEMAR), Colombia

It is with great pleasure that I present this year's POGO annual report serving as POGO Chair. This 19-month period covered by the report has been a journey: I have witnessed first-hand the challenges that were addressed and the new opportunities that have been embraced for the consolidation of our three pillars. Before we dive into the details of the report, it is important for me to once again express my appreciation to Professor Nick Owens for continuing as Chair when our dear friend Kim Juniper was unable to take on the role due to health issues and his subsequent passing, and for all his insights and valuable advice during handover period. His vision, leadership and commitment to POGO have been instrumental in shaping and strengthening its mission. I would also like to say I am truly honoured to have been re-elected Chair for another period; I look forward to continuing building on what we've achieved and with your support, and that from the POGO Secretariat, we are aiming for greater progress.

Looking back, there are so many accomplishments I'd like to highlight that it's hard to know where to begin. However, one thing I must emphasise is that every milestone is the result of the dedication and hard work of everyone involved. The first thing worth noting is we carried out the First POGO External Review process. In a time of strong changes, new institutional arrangements, international shifts, and operational challenges, we achieved very positive outcomes and the formulation of an action plan in response to the recommendations provided. POGO will continue a steady course over safe waters.

I would also like to refer to the successful closing Phase III of the NF-POGO Centre of Excellence (CofE) in Observational Oceanography, hosted for 10 years by the Alfred Wegener Institute in Germany and the launching of Phase IV of the NF-POGO CofE in Canada, led by the Ocean Frontier Institute. None of this would have been possible without the continued support of the Nippon Foundation, which has upheld a strong collaboration with POGO for over 20 years and the immense impact of the young ocean science professionals trained within this effort.

Speaking of partnerships, thanks to the establishment of new strategic alliances that strengthen ocean science capacity building, the OceanQuest-OceanX Around Africa Expedition took place between January and April 2025, extending from the Islands of Comoros to Gran Canaria. This major research and capacity-sharing mission advanced deep-sea exploration in Africa and also included a shipboard training component

# FOREWORD

for Early Career Ocean Professionals (ECOPs) from the region, funded by OceanQuest and implemented by OceanX in partnership with POGO.Also, POGO's Western Pacific Regional Node was established, the first of its kind, playing a key role in promoting international collaboration and connecting regional efforts with the UN Ocean Decade. As we continue to grow and expand our global network, we're pleased to welcome two new members from two new countries to the POGO family! A warm welcome to the Department of Fisheries & Aquaculture Sciences at the University of Liberia, and to South Africa's NRF-SAEON. We look forward to continuing bringing other members to be part of POGO.

In alignment with its mission, POGO actively engaged in key global discussions through its newly established Advocacy Working Group — a group I'm proud to be part of — by contributing to the development of statements bringing the message on ocean observation at four major international events: the UN Ocean Decade Conference (April 2024), the COP28 and COP29 Climate Conferences (December 2023 and November 2024), and the COP16 Biodiversity Conference (October 2024). As a Latin American and a Colombian, I would like to highlight POGO's outstanding participation in the COP16, which took place in Cali, Colombia, as an accredited observer NGO for the first time. POGO's contributions in these high-level fora have raised the importance of ocean observation as a means to develop strategies for cooperation, coordination, financing and access to data in order reach the needs of reliable information about the ocean.

Amongst other actions, OBON with the leadership of POGO members, has paved a way to bring biological observations to a higher level. Whereas, historically, physical and chemical variables have been the core of ocean observing, new technologies such as e-DNA, are being promoted and implemented by cooperative alliances, such as LAC-OBON of the Latin American and Caribbean region, for the observation and availability of ocean "bio data".

POGO as a designated Ocean Decade Implementation Partner, is an active developer of activities to contribute to the Decade agenda bringing to a high level the participation of POGO in the international context in coordination with the relevant departments within IOC-UNESCO, such as GOOS.

Let me express my recognition to all members for their contributions and commitment to POGO, to the Secretariat for all the work and assistance, and to PML and CCMAR for hosting and providing administrative support.  Finally, a respectful call on all the members to continue support to POGO: no other time has ocean data been so urgently needed to reach the sustainable development goals of a planet depending on a healthy ocean.

# FOREWORD

You may be wondering why this “annual report” actually covers a 19-month period – well, the main reason is that we decided to move away from trying to publish our report during the hectic run-up-to-Christmas period, which is usually taken over by preparations for Climate (and sometimes Biodiversity) COPs, the OBON Annual Meeting, and the POGO annual meeting. We also wanted to align our public-facing annual report with our more formal Trustees’ Annual Report, which gets submitted to the UK Charity Commission. From next year onwards, our reports will cover the period 1st April to 31st March, which is our financial year.

We have tried to keep this report as short as possible, but as you will see POGO has been very busy! We have expanded into new activities and partnerships – with highlights including the launch of the new Phase of the NF-POGO Centre of Excellence in Canada (hosted by the Ocean Frontier Institute, Dalhousie University, Memorial University, and Hakai Institute), our first participation in the Convention on Biological Diversity (CBD) COP, a new partnership established with foundations OceanQuest and OceanX for shipboard training, and welcoming new members from two new countries: Liberia and South Africa. We have of course also remained committed to, and grateful for, our long-term partnerships with the Nippon Foundation, SCOR, and IOC-UNESCO.

In terms of POGO’s governance and procedures, there have also been quite a few new developments. In January 2024, we welcomed our first POGO Chair from Latin America, Captain Francisco Arias (Director of INVEMAR, Colombia), who has steered POGO towards new horizons (and navigated the odd patch of choppy seas)! His first 18 months saw the launch of the first POGO Regional Node, established in Qingdao, China; the first POGO External Review; and the trial of a new “Directors’ Meeting” format. Sadly, during this period, we lost our colleague Kim Juniper, who was one of our trustees and due to step into the role of Chair in 2023. His presence in POGO and on the Board are sorely missed.

I would like to thank all the trustees, past and present, as well as all the members who dedicate their time to attending POGO Meetings, providing training, serving on our Committees and Working Groups, and generally being active members of the POGO community.

Dr. Sophie Seeyave
POGO Chief Executive Officer

# CONTENTS



Visit our website

# THE YEAR IN NUMBERS

## POGO 25TH ANNIVERSARY

December 2024 marked the 25th anniversary of the first POGO Annual meeting. A special session was held to celebrate at POGO-25.

## MEMBERSHIP

**2** new members

University of Liberia

NRF National Research Foundation 25 | SAEON South African Environmental Observation Network

**55** institutions **31** countries

**2** new countries

Liberia and South Africa

## TRAINING

**80** Fellowships conducted

**SEP 2023–MAR 2024**

- 10 graduating scholars in April 2024
- 5 POGO-SCOR fellowships
- 1 Shipboard trainee

**APRIL 2024–MAR 2025**

- New intake of 10 scholars in Canada
- 5 POGO-SCOR fellowships
- 49 shipboard trainees

**TOTAL**

- 20 NF-POGO CofE
- 10 POGO-SCOR
- 50 Shipboard

### Training courses

Funding provided for training courses held in Bangladesh, China, Cote d'Ivoire, India and Togo for a total of

**103** trainees

### TOTAL 183 ECOPS

from 38 countries received training

**1,343**

Total number of trainees since 2001

## OUTREACH

**2** major declarations on the importance of ocean observations signed by a total of 80 organisations

- Barcelona Biomolecular Ocean Observation Declaration
- POGO Statement on Sustained Biological Ocean Observations in Support of the Global Biodiversity Framework

## OBSERVATIONS

Time-series measurements conducted during

**380** sampling events at

**33** stations in

**18** countries

(NANO-DOAP project)

# MAJOR ACHIEVEMENTS


**POGO celebrated its 25th anniversary during the 25th POGO Annual Meeting in Ensenada, Mexico**

**Ocean Biomolecular Observing Network (OBON) Strategy released**


**First POGO External Review conducted, with positive results**

**NF-POGO Centre of Excellence successfully concluded 10-year run at the Alfred Wegener Institute in Germany and new phase launched in Canada**

**Launch of first POGO Regional Node, hosted by IOCAS, FIO and ODCC in Qingdao**



**Ocean Sound Essential Ocean Variable became the first GOOS EOV to have an Implementation Plan**

# POGO EXTERNAL REVIEW

In 2023, the POGO Board of Trustees appointed an External Review Panel consisting of 6 experts. The Panel members were selected to represent a range of POGO stakeholders including the marine science community (POGO members and non-members), representatives of other international or regional organisations, and other stakeholders.

The Panel met several times on-line, as well as during a hybrid meeting in Plymouth, UK, where they also had the opportunity to interact with the POGO Secretariat and former Chair. One member of the Panel also attended the POGO Annual Meeting to interact with the POGO community (members, trustees, alumni, partners…).

The POGO Board of Trustees was presented the External Review Panel's report by the Panel Chair, Wendy Watson-Wright, on 20 June 2024. The report and its recommendations were discussed by the Board during the subsequent meeting, and some proposals were put to the membership on 29 August 2024, during an on-line meeting attended by over 30 members.

The Panel's recommendations focussed on the following areas:

- Governance/leadership – e.g., strengthening member engagement, particularly at the Director level
- Funding – e.g., reviewing POGO's funding model and elaborating a long-term funding strategy
- Pillars/focus areas – e.g., strengthening Pillar 1 (Innovation in ocean observing) and particularly the focus on ocean technology
- Collaboration – e.g., working more closely with GOOS to define respective roles and enhancing complementarity/collaboration
- Diversity, Equity, and Inclusion – e.g., producing materials in more languages and seeking collaboration with indigenous and coastal communities.

The Board of Trustees and members agreed that the review had produced some valuable insights and recommendations, almost all of which will be (and are already being) actively addressed. In particular, a new format for the POGO Annual Meetings was implemented in 2025. POGO's response to the review has been shared with the Panel and with POGO members.

The POGO Board and members are very grateful to Wendy Watson-Wright, Elva Escobar, Grinson George, Steve Hall, Juliet Hermes, and Howard Roe, for their commitment to the review process and for their efficient and insightful work.

# MEMBER ENGAGEMENT

**100%** actively engaged in at least one area of POGO activity (53% involved in at least 3 of the 4 areas below)

**55%** involved in observation-related activities (Projects, Working Groups)

**49%** involved in training and capacity development initiatives (providing or receiving training)

**84%** involved in POGO outreach (case studies, COP27, Oceanography supplement) and communications (newsletter)

**79%** involved in other areas (governance, annual meetings)

# POGO ANNUAL MEETINGS

## POGO-25, ENSENADA, MEXICO

The 25th POGO Annual Meeting (POGO-25) was hosted by the Center for Scientific Research and Higher Education (CICESE) in Ensenada, Baja California, Mexico, from 23 to 26 January 2024. The meeting was very well attended, bringing together 85 delegates from 16 countries, plus 17 on-line speakers. The meeting was sponsored by Nortek, Ocean PowerTech, SeaOrbiter and SOS Mares (gold sponsors), as well as Casco Antiguo (silver sponsor).

Day 1 included a "Showcase of oceanography and ocean observing in Mexico", including presentations from CICESE, as well as the Autonomous University of Baja California (UABC), and the Autonomous University of Mexico (UNAM); updates on POGO activities, presentations by the sponsors on their ocean observing-related activities, brief and informal introductions by members on new initiatives taking place at their institutions.

Three thematic sessions were held over 2 days, on the topics of (1) Towards more environmentally sustainable ocean observing, (2) Ocean observations of contaminants and their impacts on marine ecosystems, and (3) Implementation of the Ocean Sound EOV. The outcomes from these sessions were discussed during the AGM on Day 3 by the members, who agreed a plan for follow-up actions.

In addition, a special session was held to celebrate POGO's 25th Anniversary. Short presentations/statements were given by a number of POGO members, former Chairs, and alumni, as well as POGO co-founder Jesse Ausubel. The audience then participated in an interactive session where they were invited to provide feedback on POGO's history, on the annual meetings, and on the Strengths, Weaknesses, Opportunities and Threats for POGO. The results from this session were summarised for the POGO External Review Panel to use for its report.

Finally, a Signing Ceremony was held for the establishment of a new Western Pacific POGO Regional Node.

At the end of the second day, the POGO Chair, Prof. Nick Owens, handed over to the incoming Chair, Capt Francisco Arias (Director of INVEMAR, Colombia). Prof. Owens was thanked by Capt. Arias and the Secretariat, on behalf of all the members, for the 5 years he dedicated to chairing the POGO Board of Trustees, and which had been an extremely productive time for POGO.

The Plenary Meeting was followed by the Annual General Meeting (AGM) of the POGO Charitable Incorporate Organisation. One new trustee was elected (Fei Chai, Xiamen University, China) and one trustee was reappointed for a second term (Francisco Chavez, Monterey Bay Aquarium Research Institute, MBARI, USA). In addition, the Board appointed two trustees (as per POGO's Constitution): Dr. Yara Rodrigues (Instituto do Mar, IMar, Cabo Verde) and Dr. Olivier Pringault (Institut de Recherche pour le Developpement, IRD, France).

The final agenda and participants' list can be downloaded from the POGO website, and the presentations (slides and recordings) have been made available to all the delegates.

# POGO ANNUAL MEETINGS

## POGO-26, PENANG, MALAYSIA

The 26th POGO Annual Meeting (POGO-26) was hosted by the Centre for Marine and Coastal Studies (CEMACS), Universiti Sains Malaysia (USM) in Penang, Malaysia, from 25 to 27 February 2025, followed by the POGO Annual General Meeting (AGM) and Board Meeting on 28 February. The meeting brought together 92 delegates from 27 countries, plus 7 on-line speakers.

As part of the opening session, the delegates were treated to a cultural performance, showcasing the rich and diverse cultural heritage of Malaysia. The first day continued with a “Showcase of oceanography and ocean observing in Malaysia”, followed by updates on POGO activities. Introductions were also given by some of the newer members of POGO: National Research Foundation’s South African Environmental Observation Network (SAEON) and the Algarve Centre of Marine Sciences (CCMAR), Portugal, which hosts the POGO Secretariat “satellite office”. The meeting featured Thematic Sessions on the following topics: (1) Biomolecular Observations and eDNA, (2) Towards more environmentally sustainable ocean observing, (3) Ocean observations of contaminants -towards indicators or EOVs?, (4) Blue carbon, (5) Digital Twins, (6) Marine heatwaves, and (7) Coastal impacts of El Niño and La Niña.

The Plenary Meeting was followed by the Annual General Meeting (AGM) of the POGO Charitable Incorporated Organisation. One new trustee was elected (Anya Waite, Ocean Frontier Institute, Canada) and one trustee was reappointed for a second term (Carmen Paniagua, CICESE, Mexico). In addition, three new members of the Finance Committee were elected: Alvin Jueseah (University of Liberia), Adelino Canario (CCMAR, Portugal), and Suzan El Gharabawy (NIOF, Egypt).


The delegates also had the opportunity to visit CEMACS, which is located within the Penang National Park, and only accessible on foot (25-45 min hike through forest) or by boat!

The final agenda and participants’ list can be downloaded from the POGO website, and the presentations (slides and recordings) have been made available to all the delegates.

# POGO WESTERN PACIFIC REGIONAL NODE

This year has seen the launch of POGO's Western Pacific Regional Node, the first POGO Regional Node set up to support the delivery of POGO's mission, and extend our network in under-represented regions. The Regional Node is jointly hosted by the Institute of Oceanology, Chinese Academy of Sciences (IOCAS), the First Institute of Oceanography, Ministry of Natural Resources (FIO-MNR), and the Ocean Decade International Cooperation Centre (ODCC).


Following signature of the formal Agreement during POGO-25 in Ensenada, Mexico, in Jan 2024, the Node was officially launched in Sep 2024, during the East Asia Marine Cooperation Platform Qingdao Dialogue. The Director and Deputy Director of the Regional Node have been appointed for the first two years: Dr. Hui Zhou (IOCAS), and Dr. Zheng Wei (FIO), respectively. An Advisory Committee has been established, with members from China, Indonesia, and Malaysia.

The role of the Regional Node includes promoting international collaboration and marine observation in the Western Pacific and addressing ocean-climate data gaps; communicating and coordinating with other regional organisations and members in the Western Pacific; raising public awareness of the importance of ocean observation; regional capacity building; and acting as a channel for regional activities of the UN Decade to communicate/coordinate with POGO.

## 2024-25 Activities:

- A website has been created.
- A training course on Subsurface Mooring Observations was conducted in Sep 2024, as a follow-up to the POGO-funded initiative held in 2023. The training was attended by 50 participants from 14 countries, and covered theoretical knowledge, latest advances, and hands-on training in the deployment and retrieval of subsurface moorings. The intention is for this to remain an annual event supported and delivered by IOCAS and the Regional Node.
- The Western Pacific Node has led the submission of two Decade Project proposals: Health of Ocean under Multiple Ecosystem Stressors (HOMES), and "Addressing Global Warming Threats through Marine Observation Systems and AI Customizability" (MOSAIC). These projects will collaborate with other POGO-led initiatives, such as OBON, and seek to develop capacity within POGO member institutions in the Global South.
- The Regional Node assisted the Secretariat with identifying and inviting speakers for the POGO-26 Meeting in Penang, Malaysia, and organized a HOMES Workshop as a side-event.

# PARTNERSHIPS

## Nippon Foundation

The year 2024 marked 20 years of the successful partnership between POGO and the Nippon Foundation. In April, the 10th and final cohort of scholars graduated from the NF-POGO Centre of Excellence (CofE) in Observational Oceanography at the Alfred Wegener Institute in Germany. Later in October, Phase IV of the NF-POGO CofE was successfully launched, hosted by the Ocean Frontier Institute and its partners in Canada. The NF-POGO partnership continued to support shipboard training fellowship and activities of the NF-POGO Alumni Network for the Ocean (NANO), in addition to the NF-POGO CofE.

See Pillar 2 section

THE NIPPON FOUNDATION

nano NF-POGO Alumni Network for the Ocean


## Scientific Committee on Oceanic Research (SCOR)

POGO has continued to co-sponsor with SCOR the International Quiet Ocean Experiment (IQOE), particularly on the launch of the Ocean Sound Essential Ocean Variable (EOV) Implementation Plan, and planning for the implementation of EOV observations beyond the end of the IQOE project.

See Pillar 1 section

POGO and SCOR partnered for the 23rd year running on the joint POGO-SCOR Visiting Fellowship programme, and have collaborated on the preparation of a manuscript analysing the impacts of the programme.

See Pillar 2 section

International Science Council SCOR Scientific Committee on Oceanic Research

IQOE International Quiet Ocean Experiment

# PARTNERSHIPS

## UN Decade of Ocean Science for Sustainable Development

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

POGO submitted its first annual report as a UN Decade Implementing Partner in 2024, and continues to lead the Ocean Biomolecular Observing Network (OBON), as well as supporting the development of new Ocean Decade Actions.

## IOC-UNESCO

POGO has continued to work closely with IOC, for example on the Ocean Info Hub project and its connection to Oceanscape, collaboration with the Global Ocean Observing System (GOOS), the Ocean Best Practices System, the Ocean Biodiversity Information System (OBIS) (particularly through OBON), and capacity development via the Ocean Teacher Global Academy.

unesco Intergovernmental Oceanographic Commission

GOOS Global Ocean Observing System

IODE

New partnerships have been initiated with the Minderoo Foundation, OceanQuest, and OceanX.

See Pillar 1 and Pillar 2 sections

# OBJECTIVES

Our goal is to have by 2030, world-wide cooperation for a sustainable, state-of-the-art global ocean observing system that serves the needs of science and society. To achieve this, we will:

1. Lead innovation and development of the crucial components of the ocean observing system.
2. Identify and contribute to the development of the key skills, capabilities and capacities needed to achieve the vision.
3. Work with governments, foundations and industry, to articulate the benefits to society and required funding to build and sustain the system.

Read and download POGO's full Strategy in several languages

Shaju S. S.

## OUR VISION AND MISSION

*Ocean observations available on-line to all*

OBJECTIVES

# WORKING FOR THE PUBLIC BENEFIT

The charity brings together the world's major oceanographic institutes to plan joint actions to advance sustained ocean observations for societal benefit. POGO institutes believe that advancing scientific understanding of the ocean is rooted in making systematic, high quality measurements. This understanding and its wise use are critical to enabling humanity to develop a sustainable relationship with a healthy, productive and biologically diverse ocean. Our vision can only be realised by working together across the world, to achieve together what none of us could do alone.

The ocean produces half of the world's oxygen, most of its fresh water and much of its food. It regulates climate and weather, is critical to the cycling of heat, water and carbon. It is the source of huge biodiversity. However, far too little is known about the state and functioning of the ocean. Scientifically sound study of the ocean and support and advocacy for such study are of vital importance to humankind. POGO seeks to expand international support for ocean observing, through innovation of the ocean observing system, capacity development and outreach/advocacy.


David White

# STRATEGIES FOR ACHIEVING OUR OBJECTIVES

In terms of innovation, POGO members are at the forefront of oceanographic methods and technology development, often in partnership with industry. Thus, POGO is in a critical position to identify the emerging methods and technologies that POGO members are developing and using, and highlighting those that can be expanded and deployed on a global scale to achieve global datasets of specific parameters measured using comparable methods. POGO also focusses on the affordability issues associated with ocean observing, particularly for developing countries, and is therefore engaged in projects to develop low-cost sensors and systems for coastal ocean observing.

POGO also recognises that the expertise for conducting ocean observations is not evenly distributed between countries, and therefore the ocean is unevenly observed, with a much higher density of observations conducted in the North Atlantic and North Pacific, than in, for example, the South Atlantic, South Pacific and Indian Oceans. POGO therefore provides professional training opportunities for early-career scientists, mainly from coastal developing countries, to expand the worldwide capacity for conducting sustained ocean observations, data collection, analysis and management, and interpreting the scientific results for the benefit of society.

POGO highlights the societal need for ocean observations, as well as the key issues facing global ocean observing, and the obstacles hampering the completion of a global ocean observing system and brings these issues to relevant public and policy fora.

National Oceanography Centre

OBJECTIVES

# SHORT-TERM AND LONG- TERM OBJECTIVES

In the short term, POGO aims to provide training for early-career scientists, to develop the next generation of scientists and ocean observers, as well as to raise the levels of awareness and education about the importance of the ocean and ocean observing for society. Measures of success include numbers of trainees, numbers of countries having received training, numbers of website visits and downloads of outreach materials, mentions on social media and other statistics.

The longer-term vision is to develop the capacity of research institutions in developing countries to conduct ocean observations, by (1) integrating the trained scientists and their institutions into the POGO network and having them actively participate in POGO projects, (2) sharing best practices among POGO member institutions, and (3) contributing to the development and dissemination of low-cost instrumentation for coastal ocean observing. Measures of success include numbers of POGO members and numbers of new (developing) countries being added to the network, establishment of new ocean observing systems in those countries, and demonstrated long-term impacts of the training programmes (e.g. >5 years after the training, on institutional capacity and continued knowledge-transfer).

# INNOVATION IN OCEAN OBSERVING

## OCEAN BIOMOLECULAR OBSERVING NETWORK

POGO is the lead organisation for OBON, a UN Ocean Decade programme endorsed in 2021. OBON's Vision is to accelerate informed decision-making to restore the health of our ocean using the universal signatures of life on Earth: biomolecules. OBON's core pillars are: to *Innovate* technology and methodologies, delivering frameworks to advance biomolecular observations from the coastal to the open ocean, thus enabling broad-scale interpretations and scientific discovery; to *Develop* resources, networks and strengthen capacity globally, to advance observations and analyses while ensuring equitable access; and to *Enhance* the use and interpretation of these observations through agreed data practices and model integration, and the creation of ocean knowledge. Together, this work *Informs* ocean users and managers, ensuring sustainable interactions in support of a healthy ocean.

This year POGO has continued to support the development of OBON, through Secretariat support, as well as financial support for communications products and the annual meeting of the OBON Scientific Advisory Council (SAC) and OBON projects in Nov 2024 (mostly funded by a grant from Scripps Institution of Oceanography). The Scripps funding was also used to cover some staff costs, enabling OBON to have a part-time Programme Manager, provided by Plymouth Marine Laboratory, from July 2024.

OBON
OCEAN BIOMOLECULAR OBSERVING NETWORK

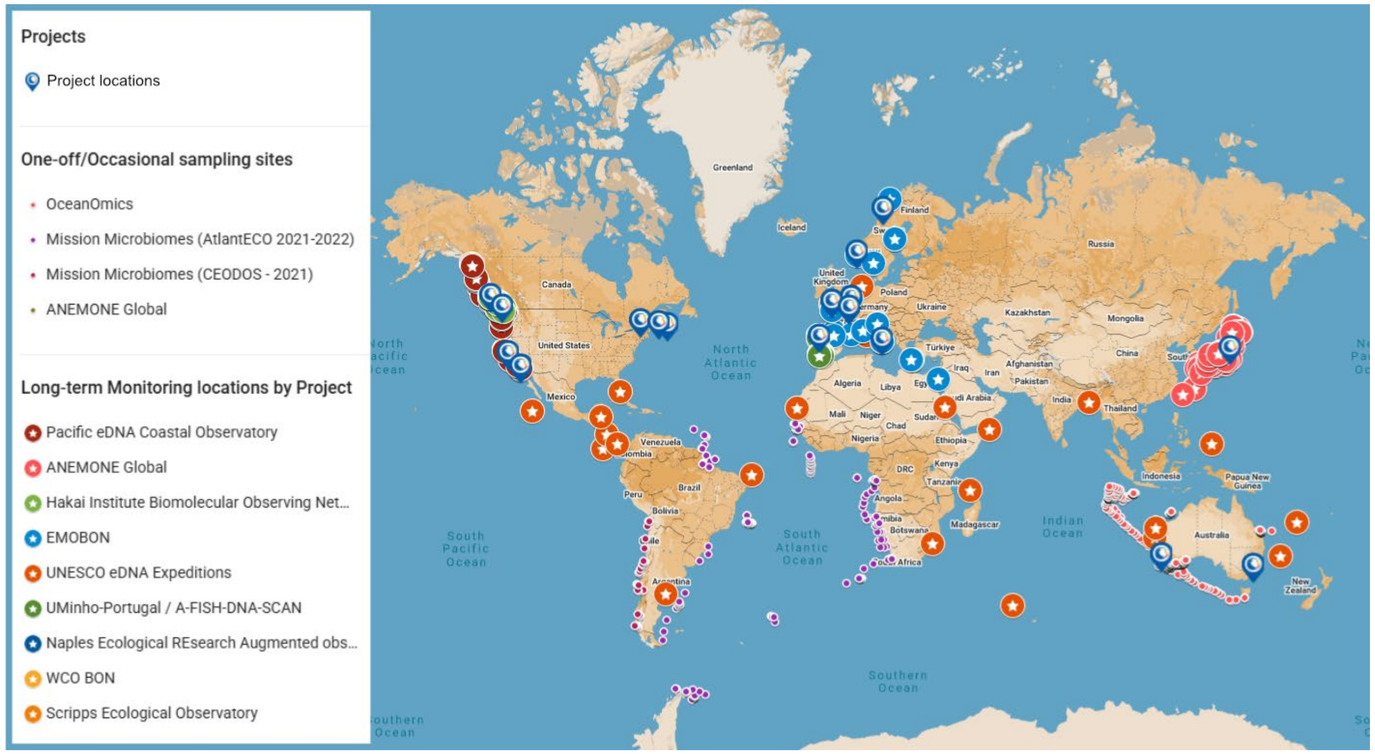

OBON Website

INNOVATION IN OCEAN OBSERVING

# OCEAN BIOMOLECULAR OBSERVING NETWORK

## Highlights

- Further development of SAC, with new members appointed via an open call for nominations; the SAC has now reached its maximum capacity of 22 members, and new countries represented include Bangladesh, Canada, China, Colombia, France, and Mexico.
- Endorsement of another 7 UN Decade Projects (see www.oceandecade.org/actions/ocean-biomolecular-observing-network-obon)
- Webinar series to introduce new projects and provide updates on existing ones (Sept-Oct 24)
- Project meeting held in hybrid mode in Plymouth, UK (Nov 24).
- Satellite event at the UN Ocean Decade Conference (Apr 24) in collaboration with the Marine Life 2030 programme
- Exhibit at Biodiversity COP16 in Colombia (Oct 24)
- Launch of OBON Strategy and new website; regular schedule of newsletters established, with issues in May, Aug, Nov and Feb.




INNOVATION IN OCEAN OBSERVING

# INTERNATIONAL QUIET OCEAN EXPERIMENT

POGO and SCOR have been co-sponsoring the International Quiet Ocean Experiment (IQOE) since 2011, with seed funding from the Sloan Foundation and subsequent support for activities provided by the Richard Lounsbery Foundation. IQOE is an international scientific programme to promote research, observations, and modelling to improve understanding of ocean soundscapes and effects of sound on marine organisms. IQOE is nearing the end of its 10-year life span and the IQOE Science Committee (SC) has been focussing this year on assessing IQOE's progress against the original objectives, as well as discussing what IQOE should aim to achieve in its last 2-3 years, and what the project's legacy should be.


## Highlights

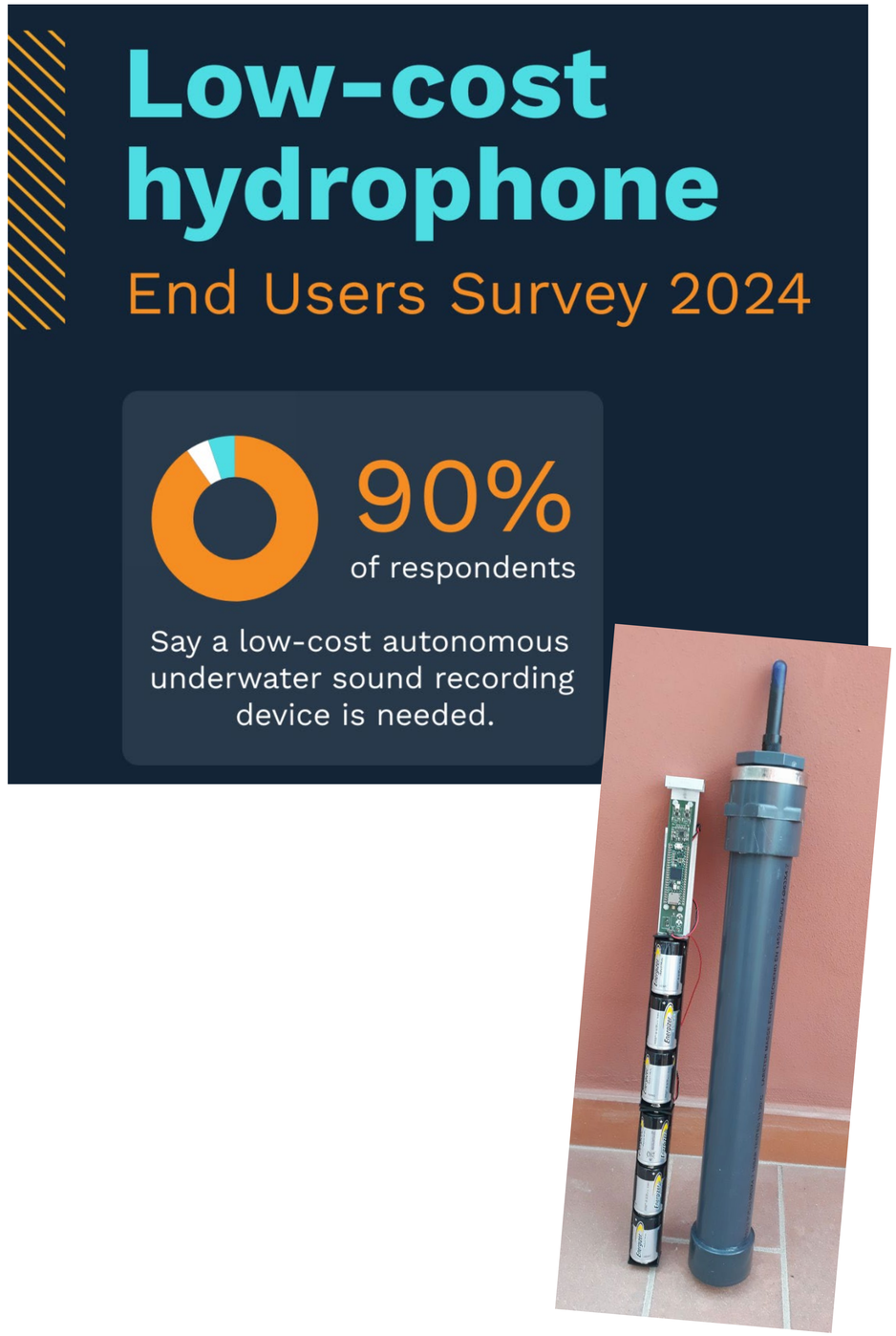
- The IQOE SC meeting was held in hybrid mode on 20–22 Nov 2024 in Reykjavik, Iceland, chaired by Peter Tyack. Meeting participants reviewed ongoing IQOE activities, evaluated the progress of IQOE, and planned for the project sunset and legacy. A major outcome of the meeting was a decision to develop a project to follow IQOE that will focus on implementation of the Ocean Sound Essential Ocean Variable (EOV). The EOV specification sheet and Implementation Plan were developed by a POGO-IQOE Working Group and supported by POGO funding, respectively.
- Discussions have begun with the Global Ocean Observing System (GOOS) of UNESCO's Intergovernmental Oceanographic Commission (IOC) to apply for Emerging Network status for a global ocean sound observing system.

IQOE Website

INNOVATION IN OCEAN OBSERVING

# INTERNATIONAL QUIET OCEAN EXPERIMENT

- The Working Group on Low-Cost Hydrophones for Research, Education and Citizen Science, chaired by Lucille Chapuis (La Trobe University, Australia), has received a grant from POGO to design and produce prototypes of the low-cost hydrophones (see later section).
- Global Library of Underwater Biological Sounds (GLUBS): The GLUBS mission is to develop and merge novel technologies with existing bioacoustics resources to make the exploration of biological sounds more accessible to researchers, managers, educators, and enthusiasts. GLUBS has 5 Working Groups: (1) cyberinfrastructure, (2) artificial intelligence, (3) known sounds, (4) unknown sounds, and (5) public engagement. GLUBS has been endorsed by the UN Ocean Decade, and submitted information to the World Register of Marine Species (WoRMS). The GLUBS-inspired Research Focus in Frontiers in Remote Sensing has now accepted the manuscripts.
- Open Portal to Underwater Soundscapes (OPUS led by the Alfred Wegener Institute) now features 58 long-term acoustic datasets, and further passive acoustic datasets are currently being prepared for display through collaborations with the Flanders Marine Institute (VLIZ) and Zurich University of Arts.



INNOVATION IN OCEAN OBSERVING

# WORKING GROUP ON BUILDING CAPACITY IN OCEAN ACIDIFICATION MONITORING IN THE GULF OF GUINEA (BIOTTA)

BIOTTA
Building Capacity in Ocean AcidificaTion MoniToring in the Gulf of GuineA

## Grant awarded to University of Ghana

The BIOTTA working group was set up to equip graduate students, early career ocean scientists, and other marine science professionals in the Gulf of Guinea (GoG) with skills for sustainable ocean acidification (OA) data acquisition. Its goal is to expand our understanding of the threats, risks, and impacts of OA on marine ecosystems while supporting pathways for the sustainable management of vulnerable marine resources. This working group hopes to also bridge national, regional and international data gaps in ocean acidification.

BIOTTA aims to complement global efforts such as the Global Ocean Acidification Observing Network (GOA-ON) and the International Ocean Carbon Coordination Project (IOCCP) by convening a series of virtual regional workshops and webinars to train young and professional scientists in setting up and maintaining OA observation systems in the GoG and other African coastal waters.

The BIOTTA working group objectives are to:

- Develop a coordinated network for observing OA in the GoG
- Develop capabilities to undertake analysis of seawater OA parameters using low-cost, readily available and easy-to-use equipment.
- Map OA hotspots in BIOTTA member countries for long-term OA monitoring.
- Initiate OA monitoring activities in BIOTTA member countries after successful mapping of hotspots in these countries, making use of OA observation kits developed by GOA-ON and the International Atomic Energy Agency (IAEA).
- Integrate into global OA observing networks, such as GOA-ON, with the goal to share and make data available to the global ocean observing community.

## Members Involved

ZMT LEIBNIZ-ZENTRUM für Marine Tropenforschung

Curat
Centre Universitaire de Recherche et d'Application en Télédétection

IRHOB CBRST

INNOVATION IN OCEAN OBSERVING

# WORKING GROUP ON BUILDING CAPACITY IN OCEAN ACIDIFICATION MONITORING IN THE GULF OF GUINEA (BIOTTA)

## Highlights

- 100K USD obtained from The Ocean Foundation (TOF) to purchase equipment to set up the monitoring stations. Orders for equipment and consumables have been placed, and one kit has been sent to the University of Ghana.
- The Ocean Foundation has continued to fund a Coordinator at the University of Ghana to support BIOTTA.
- The BIOTTA PI has been appointed Co-Chair of the new GOA-ON Sub-Hub for West Africa, with a colleague in Liberia.
- The University of Ghana, in partnership with POGO and The Ocean Foundation (TOF), delivered the BIOTTA GOA-ON in a Box Training Workshop from 15 to 19 July 2024. The workshop brought together various experts and trainees including scientists and students from Ghana, Côte d'Ivoire, Cameroon, Nigeria, Benin, and the USA, demonstrating a strong regional commitment to addressing this pressing environmental issue.
  The training workshop provided the West African attendees with a better understanding of ocean acidification, through a comprehensive curriculum covering both theoretical and practical aspects of ocean acidification.
- One of the training workshop participants (from Cameroon) participated as an instructor in the OceanX-OceanQuest-POGO Around Africa shipboard training expedition, supporting trainees to collect and analyse samples on a voyage from Namibia to Cabo Verde.

Read more about BIOTTA

INNOVATION IN OCEAN OBSERVING

# OPEN ACCESS MARINE OBSERVATION DEVICES (OPENMODS)

## Grant awarded to National Institute of Oceanography and Applied Geophysics (OGS), Italy, Alfred Wegener Institute (AWI), Germany, and Instituto do Mar (IMar), Cabo Verde

This project has the overarching goal “to devise ocean sensors and monitoring devices, globally available to all and not just to a privileged few”. The 2nd phase of the project was completed in Dec 2022. The objective of Phase 2 was to realize a prototype of a versatile low-cost ocean observing platform ready to be tested and equipped with a variety of sensors, to consolidate and enlarge the potential user community and to narrow the data and knowledge gaps between “advanced” and “developing” countries. Phase 3 of the project was initiated in Jan 2023, with the following objectives:

- To continue working on the platform (drifter mode) to produce a system to deploy during the 2023 NF-POGO CofE training, to instruct the scholars on the use of the platform and give them all the tools and elements to produce their own system to be used in their waters.
- To produce, for demonstration purposes, a completely disassembled drifter platform and a 1:10 scale drifter to be used in an aquarium to demonstrate the effectiveness of the instrument in following the currents.
- To take advantage of 3D printing technology and create a three-dimensional file of these components that the end user will be able to produce independently.

## Members Involved

OGS Istituto Nazionale di Oceanografia e di Geofisica Sperimentale

AWI ALFRED-WEGENER-INSTITUT HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

IMar INSTITUTO DO MAR

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

Read more about Open MODs

INNOVATION IN OCEAN OBSERVING

# OPEN ACCESS MARINE OBSERVATION DEVICES (OPENMODS)

## Highlights

- Two OpenMODs platforms (drifters) severely damaged during the construction testing phases of OpenMODs2 were repaired.
- The platforms were equipped with a satellite transmission system to guarantee a full offshore coverage all around the world. The system was chosen from the existing low-cost products currently available on the market for recreational purposes. A one-year subscription to the data plan was also provided.
- One completely disassembled OpenMODs platform (drifter) was produced for educational purposes.
- A 3D file of the most complex structures of the platform (joining elements) was realized. These elements until now were made on the lathe by specialized personnel and the 3D file allows all users to make these parts themselves using 3D printing technology.
- Several outcomes and products generated within the OpenMODs project (best practice/instruction videos, 3D file) were collected and made available for the community at https://prezi.com/view/Uxu3ImYn6vN1Onxo4xmX/.

INNOVATION IN OCEAN OBSERVING

# COASTAL OBSERVING LAB IN A BOX (COLaB)

## Grant awarded to the University of Ghana

Many countries worldwide face a significant hurdle in obtaining the necessary resources and knowledge to effectively monitor the coastal ocean. There is a common misconception that high end, expensive equipment is needed to monitor and study the coastal oceans. COLaB breaks this belief by using cost effective oceanographic instruments and methods backed by ocean best practices to collect a wide range of precise and accurate data. COLaB's modularity allows the user to tailor the package to fulfil their needs and to assist answering their questions. Instruments will consist of essential hydrographic instruments (current meter, CTD) as well as equipment for collecting water samples and analysing crucial biogeochemical parameters (such as nutrients, chlorophyll, alkalinity, dissolved oxygen, etc.). It will also include plankton nets and other tools for conducting biological observations. In addition, COLaB offers data handling and access solutions and downstream applications in the form of regional coastal modelling.

Using various combinations of these packages, these observations have played a crucial role in monitoring eutrophication and harmful algal blooms, supporting fisheries management, establishing marine protected areas, and providing valuable validation and verification for models and remote sensing data. Whenever feasible, these packages will incorporate open-source or homemade sampling gear and instruments, both in the field and for analysis purposes. COLaB comes with training suitable for the needs of the user.


## Members Involved

Read more about COLaB

INNOVATION IN OCEAN OBSERVING

# COASTAL OBSERVING LAB IN A BOX (COLaB)

## Highlights

- The grant from POGO supplemented funds obtained through an Experiment.com crowd funding bid and enabled a first COLaB "proof-of-concept" field exercise in Ghana in July 2024. Scientists from the COLaB team, from the UK and South Africa, joined a team from the University of Ghana in a study of the Pra River-estuary system. The Pra River, and other Ghanaian rivers, have been heavily affected in recent years by illegal gold mining being carried out upstream, which has resulted in massive sediment loads and mercury contamination that are heavily impacting downstream ecosystems and the welfare and health of fishing communities.
- The objectives of the field exercise were to use a subset of COLaB instruments and methods to demonstrate and provide training in the assessment of river discharge and circulation (within the river and offshore), as well as sediment transport and physical and biogeochemical processes occurring across the estuarine salinity gradient.
- Over 8 days, river discharge was determined by conducting a flow and bathymetry river transect using simple hand-held flow meters and depth finders. Current measurements were made with drifters and acoustic current meters (fixed-depth and profiling) and water structure and mixing were assessed through CTD profiling across the estuarine salinity gradient. Several chemical analyses (nutrients, pigments, and dissolved organic matter) were conducted on water samples collected across the same gradient. Finally, suspended sediment samples were collected to determine mercury concentrations.
- Notably, the field and lab work also allowed the WG to test newly developed affordable instruments (CTD, colorimeter, and fluorimeter) against commercial counterparts.
- Most analyses have been completed, and the WG is now in the process of working up the CTD, discharge, and current data. These, alongside sediment load and mercury results, will be modelled to provide a first assessment of the fate of sediment and mercury discharged from the Pra. This should be completed by July 2025.

INNOVATION IN OCEAN OBSERVING

# GULF OF MEXICO OCEANOGRAPHIC AND METEOROLOGICAL OBSERVATION GROUP (GMOMOG)

## Grant awarded to CICESE, Mexico

Monitoring is key to numerical modelling efforts for predicting hurricanes and frontal systems, assessing and sustaining ecosystem health and function, managing marine resources, optimising restoration efforts and assessing anthropogenic impacts from climate change, eutrophication, loss of biodiversity, deoxygenation, acidification, overfishing and sea level rise. However, when in situ monitoring efforts are examined at a basin or ocean level, they can vary widely, particularly when multiple surrounding countries are involved. This is due to differences in the extent of sustained government funding, the presence/absence of agencies tasked with data collection, curation, storage and distribution, and dissimilarities in human and infrastructure capacities.

### Members Involved

CICESE

IRD Institut de Recherche pour le Développement FRANCE

GEOCHEMICAL AND ENVIRONMENTAL RESEARCH GROUP TEXAS A&M UNIVERSITY

Read more about GMOMOG

The Gulf of Mexico (GoM) covers about 1.6 million km$^2$ and is surrounded by Mexico, the United States, and Cuba. Historically, most of the continuous in situ monitoring efforts have been limited to coastal areas and US waters, with the notable exception of moorings within the deep water region of the Mexican EEZ and Yucatan Channel as well as government-mandated environmental monitoring of oil exploration and exploitation leases in the southern Gulf. Recently, the capacity to monitor Mexican waters was expanded through the execution of the CIGOM (Gulf of Mexico Research Consortium) project, which was funded by the National Council for Science and Technology (CONACYT) and the Ministry of Energy (SENER) Hydrocarbon Fund so as to build scientific capacity toward oil spill preparedness.

The goals of the Gulf of Mexico Oceanographic and Meteorological Observation Group funded by POGO are to (1) survey existing monitoring efforts and gauge their permanence through time, (2) evaluate the spatial and temporal scales over which they operate, (3) detect key data gaps and compare current measurements with the Global Ocean Observing System (GOOS) essential ocean variables and essential climate variables, (4) prioritise monitoring data needs and identify agencies or sectors that would benefit, and (5) outline a plan for engagement of entities responsible for monitoring efforts, stakeholders and users of information. The scope of the survey will focus on the continental shelves and deep water region of the Gulf of Mexico, and the work group will include participants from the US, Mexico and Cuba.

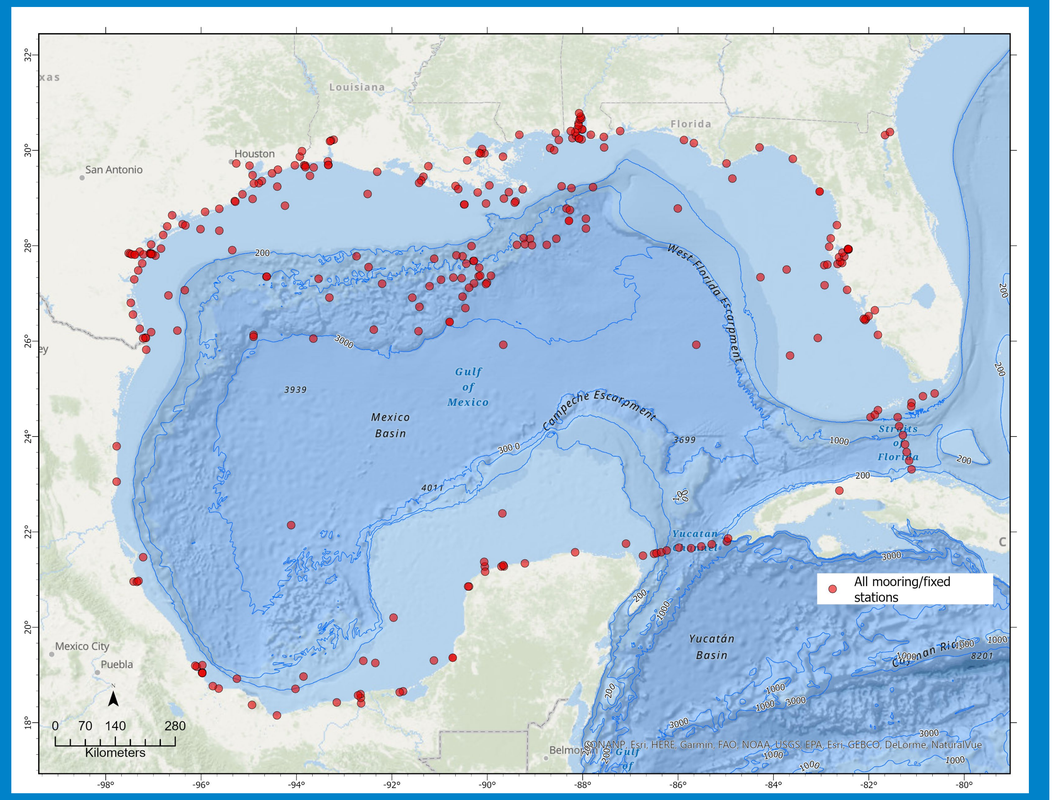
An up-to-date assessment of the ocean monitoring efforts currently in place throughout the GoM will provide the basis for advising government agencies regarding their availability and conditions of use, prioritising the most pressing data needs, and working toward a basin-wide integrated ocean observing system that could be linked to global efforts.

INNOVATION IN OCEAN OBSERVING

# GULF OF MEXICO OCEANOGRAPHIC AND METEOROLOGICAL OBSERVATION GROUP (GMOMOG)

## Highlights

- The GMOMOG met in Ensenada, Mexico, from 26 - 27 April 2023 to survey existing monitoring efforts and gauge their permanence through time, evaluate the spatial and temporal scales over which they operate, detect critical data gaps, and categorize present-day measurements to GOOS Essential Ocean Variables and Essential Climate Variables.
- The workgroup defined monitoring as recurrent and structured observations of oceanographic or meteorological variables focused on ongoing in situ measurements. It also decided to focus the survey and gap analysis on the shelves and deep-water region and current, meteorological, and sea-level stations near or on the coast.
- Twenty-seven in-person and four remote participants affiliated to Mexican (CICESE, UABC, UNAM, IMN-UNAM, Cuban (INSMET), and USA (GCOOS, TAMU, UM, USF) institutions presented summaries of ongoing ocean observations in the Gulf of Mexico.
- A detailed survey of fixed stations (including moorings) that provide public data was compiled and variables were classified as GOOS Essential Variables. The operation of these stations was confirmed between February and April. A total of 284 stations were identified Gulf-wide, with the majority operating in US waters. Most of the measurements made at these stations were meteorological, hydrographic, sea levels, and currents, and that analysis indicates ocean physics makes up most of the ongoing observational efforts.
- The GMOMOG is preparing a detailed report of their survey and the recommendations for expanding fixed stations to the central and southern Gulf of Mexico, as well as identifying agencies or sectors that would benefit.



INNOVATION IN OCEAN OBSERVING

# CEODOS CHILE: A CONSORTIUM FOR SURVEYING THE COASTAL OCEAN IN THE EASTERN SOUTH PACIFIC

Read more about CEODOS

## Grant awarded to COPAS, University of Concepcion, Chile

- The CEODOS program (co-coordinated by the COPAS Centre) is a Chilean initiative that follows the present and future status of the biological pump along the entire coast of Chile every 5 years.
- The first expedition, in the frame of TARA MICROBIOME (a 2-year campaign covering South America and Africa) was held in 2021. Genomics and biogeochemical samples will be analysed and results integrated into AI algorithms in order to get a better understanding and prediction capacity of the future of carbon sequestration in the eastern south Pacific.

CEODOS Chile

## Members Involved

COPAS COASTAL — Centro de Investigación Oceanográfica en el Pacífico sur Oriental

SCRIPPS INSTITUTION OF OCEANOGRAPHY, UC San Diego

DEPARTAMENTO DE OCEANOGRAFÍA, UNIVERSIDAD DE CONCEPCIÓN

## Highlights

- First workshop at Universidad de Concepción: This meeting was held at the COPAS Centre and was in hybrid mode. The CEODOS Consortium met in order to establish a plan for future actions and sample analysis. A common declaration was signed and published after the workshop.
- Second workshop at Universidad de Concepción: A key focus of cooperation among the participants centred on future observation programmes in the Eastern South Pacific Ocean. This was addressed during the workshop, where the WG coordinated further actions for integrated experimental observation as well as programs for human capital training.
- Cruises for carbon fixation monitoring: Based on the engagement of the Chilean community to map and observe the Chilean coastal ocean in its entirety every 5 years.
- Metadata opening task force meetings: This smaller group has been meeting weekly for the last 4 months to work on the genomic and oceanographic data of the TARA MICROBIOME expedition. This data will be open upon the publication of a paper currently under preparation.
- Summer Schools: Austral Summer Institute (ASI) at Universidad de Concepcion in January 2024; GOOD OARS CLAP COPAS Summer School at Universidad Catolica del Norte Coquimbo November 2023.

INNOVATION IN OCEAN OBSERVING

# COASTAL MARINE HEATWAVES INTERDISCIPLINARY RESEARCH GROUP (CMHIR)

## Grant awarded to the Institute of Marine and Antarctic Studies (IMAS)

Marine heatwaves (MHWs) have become an urgent issue regarding climate risks due to their proliferation in frequency, duration, magnitude, and spatial extent. These phenomena have a strong impact at the global, regional, but also local levels. MHWs have become an increasingly serious threat not just from the perspective of pelagic and benthic ecology on the continental shelf but also for coastal aquaculture and fisheries, as demonstrated by many reports of fisheries closures from around the world caused by MHWs. Estuaries, in particular, represent environments with high productivity and biodiversity that sustain important economic activities like aquaculture and fisheries.

While our understanding about the causes, impacts, duration and extension of MHWs has increased significantly during the last 10 years, this information has largely come from large scale studies of the global or regional oceans. This large-scale perspective is informed by climate models and remote sensing as the main data sources, which are unable to spatially resolve smaller coastal systems such as estuaries and bays. To gain insight into the coastal response to MHWs, this group proposes a different approach, combining in-situ observations, remote sensing and high-resolution modelling in the coastal zone. The geographic intercomparison will contribute to a better understanding about the impact of MHWs on the global coastal areas and the potential implications under climate change scenarios.

The WG aims to develop an active collaboration and coordination to highlight the importance and necessity of studying the implications and consequences of MHWs in coastal areas. So far, the impact of MHWs in coastal areas has been evaluated in few recent papers; however, our WG is multidisciplinary, including coastal ecologists, coastal modellers and climate scientists. Hence, the distinctive feature of this group is its special focus on the shallow continental shelf, its interdisciplinarity, and its interesting geographical diversity (North America's east and west coasts, South America's west coast, Australia's southeast coast, Mediterranean Sea, Antarctica's glacial embayments).

CMHIR

INNOVATION IN OCEAN OBSERVING

# COASTAL MARINE HEATWAVES INTERDISCIPLINARY RESEARCH GROUP (CMHIR)

## Highlights

- The Coastal Marine Heatwave Interdisciplinary Research group (CMHIR) successfully organized the Workshop: Marine heatwaves dynamics and impacts on coastal and estuarine ecosystems at the University of Concepción (Chile), from 9-11 April 2024. This activity gathered 42 attendees in person and 76 on-line, from 14 countries (Australia, Belgium, Brazil, Canada, Chile, Colombia, Cuba, France, Germany, Italy, Peru, South Africa, Spain, and UK).
- The workshop generated an active discussion on the impact of marine heatwaves on ecosystems, communities, and organisms, sharing with academics, students, and the community the different aspects of marine heatwaves, covering topics like global and regional events, drivers, and local impacts. Experts presented studies focused on the consequences of these marine extreme events on seaweeds (kelps), phytoplankton, zooplankton, and benthic organisms.
- The event included an internal POGO WG meeting.
- The WG organised a webinar on the impacts of MHW on aquaculture (22 Aug 2024), in collaboration with the Chilean Salmon Farmers' Association (Salmon Chile).
- The WG has been working on a joint manuscript, which they plan to publish in 2025.
- The WG leader attended the POGO Annual Meeting in Penang, Malaysia, where he gave a presentation on the WG activities, as part of a session on MHW.

## Members Involved

IMAS INSTITUTE FOR MARINE & ANTARCTIC STUDIES

COPAS COASTAL Centro de Investigación Oceanográfica en el Pacífico sur Oriental

Marine Biological Association

imo Instituto Milenio de Oceanografía

Read more about CMHIR

INNOVATION IN OCEAN OBSERVING

# CONSUMER-GRADE DRONES AS TOOLS FOR TROPICAL MARINE AND COASTAL RESEARCH

## Grant awarded to the Leibniz Centre for Tropical Marine Research (ZMT)

From 26-28 June 2024, the Leibniz Centre for Tropical Marine Research organised and hosted the scientific workshop Unlocking the potential of consumer-grade drones in marine research. The workshop took place in a hybrid format and all presentations were recorded. Key partners in this workshop included three POGO members, namely the EuroMediterranean Centre on Climate Change (CMCC, Italy), Institut de recherche pour le dévelopment (IRD, France), and Instituto de Investigaciones Marinas y Costeras (INVEMAR, Colombia). The workshop aimed to bring together marine scientists who use drones for their research as well as representatives from drone manufacturing or commercialisation sector, experts in the legislation of drone use (in and outside the EU), and teams that offer concrete applications of drone-derived information.

A total of 25 speakers were invited, 17 of whom accepted to give in-person presentations and four confirmed on-line participations. Presentations were arranged in three sessions according to scope: *Session 1:* What do coastal and marine researchers use/need drones and machine learning for? *Session 2:* What is the state of the art in drone technology/capabilities and machine learning and how do these support or limit scientists aims and needs? and *Session 3:* What is the current status of the legislation regulating drone use in EU projects and in the tropics?

Across the work sessions the presenters and organisers came together to discuss possible outlines for a joint publication based on the background laid by the presentations. By the end of the workshop, a comprehensive “brainstorming” document was assembled on which each presenter contributed concrete ideas. Each participant outlined the main knowledge gap from their perspective and area of expertise, as well as specific contributions they could share to the concepts put forward in the perspective paper (e.g., datasets, case studies, expert insights). In parallel, we prepared a draft manuscript document in a shared folder, crafted a tentative title as well as tentative subtitles for six subsections, each with a designated leading writer. The first draft is planned by September 2025 and submission is planned no later than December 2025. Ultimately, this manuscript will consolidate the collaboration between and within writing teams and will facilitate the identification of knowledge gaps and potential future directions to work on joint proposals.

## Members Involved

ZMT LEIBNIZ CENTRE for Tropical Marine Research

cmcc Centro Euro-Mediterraneo sui Cambiamenti Climatici

IRD Institut de Recherche pour le Développement FRANCE

Colombia 50% Mar INVEMAR Instituto de Investigaciones Marinas y Costeras "José Benito Vives de Andréis" Vinculado al Ministerio de Ambiente y Desarrollo Sostenible

Read more about the Project

INNOVATION IN OCEAN OBSERVING

# AGULHAS CURRENT OBSERVING SYSTEM DESIGN WORKSHOP

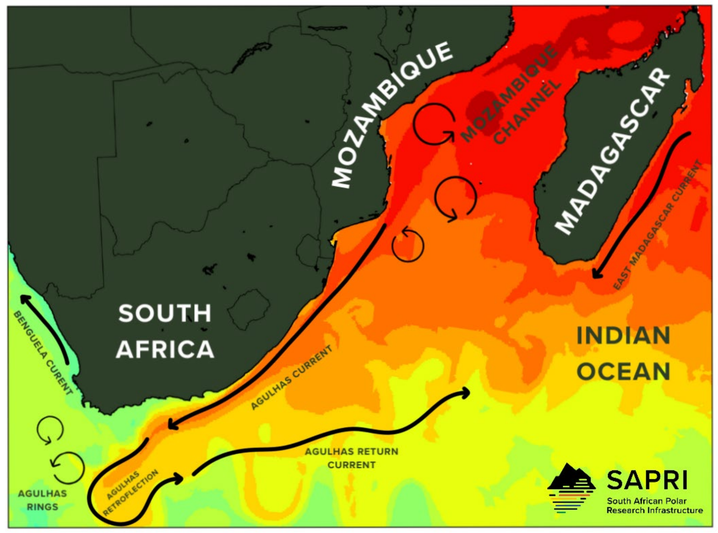
## Grant awarded to the South African Environmental Observation Network (SAEON)

The Agulhas Current Observing System Design Workshop took place at the President Hotel in Cape Town from 09 - 12 September 2024, and brought together experts from research, industry, and early-career researchers (ECRs) to develop an efficient and sustainable backbone observing system for the Agulhas Current. Participants discussed current gaps in observations, identified potential new technologies for data collection, and brainstormed strategies for long-term monitoring and sustainability. The workshop provided a platform for sharing knowledge, fostering interdisciplinary partnerships, and ensuring that young researchers are integrated into the design and implementation of the ocean observing system.

Highlights from the workshop included key discussions on observational needs within the Agulhas Current region, not only for the sake of scientific understanding of the system and to validate ocean and operational models, but also to benefit users of the system such as fisheries, port authorities, search and rescue, and the general public. Challenges were identified in terms of the processes needing to be studied in greater detail, technology and means of deploying these into arguably the most powerful western boundary current in the Southern Hemisphere, and the possible solutions to try to map a way forward.

The event was co-sponsored by the NRF-SAEON, the National Oceanic and Atmospheric Agency of the US (NOAA); the University Corporation for Atmospheric Research of the US (UCAR); the UN Ocean Decade Decadal Coordination Centre for Ocean Climate Nexus (DCC-OCC); the Partnership for Observation of the Global Ocean (POGO); and the Global Ocean Observing System (GOOS) Co-Design Program.

AGULHAS CURRENT DESIGN WORKSHOP OBSERVING SYSTEM
9–12 SEPTEMBER 2024
CAPE TOWN, SOUTH AFRICA




## Members Involved

NRF National Research Foundation | SAEON South African Environmental Observation Network

National Oceanography Centre

GEOMAR Helmholtz Centre for Ocean Research Kiel

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# CAPACITY DEVELOPMENT

## NF-POGO CENTRE OF EXCELLENCE IN OBSERVATIONAL OCEANOGRAPHY

### Final year of CofE in Germany – the end of an era

Funded by the Nippon Foundation since 2008, the 10-month, postgraduate-level training programme concluded its 10th and final year of hosting by the AWI in Germany, having trained 100 scholars from 47 countries. On 25 April 2024, the ten fellows of the tenth year of the CofE at AWI celebrated their graduation in the Sauriersaal of the Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Research in Berlin. This event not only honoured the tenth anniversary of the NF-POGO Centre of Excellence at AWI and the successful training of the past decade, but also thanked the high-ranking teaching staff and supporters from all over the world who have made this excellent training possible. Around 70 alumni and 50 teachers and supporters from over 40 countries attended the celebrations. The farewell to the last group was therefore also a big reunion with the former scholarship holders.

Prof Karen Helen Wiltshire hosted the evening. The evening began with speeches from Museum Director Prof. Dr Joachim Vogel, Mr Mitsuyuki Unno, the Executive Director of the Nippon Foundation (NF) Ocean Affairs Department, Prof. Dr Antje Boetius, as AWI Director, Dr Sophie Seeyave, representative and CEO of the Partnership for Observation of the Global Ocean (POGO), and State Secretary Mario Brandenburg of the Federal Ministry of Education and Research.

Three former participants of the programme reported on their career paths after their participation in the NF-POGO Centre of Excellence at AWI. Finally, graduation certificates were handed out to the scholars of the current and last year of the programme. At the end of the event, all guests received a special brochure about the programme, its alumni, and the highly dedicated faculty, coupled with a cookbook of recipes shared by scholars from all over the world during their time in Germany.

In addition to the 10-month programme in Germany, a 2-week Regional Training Programme was conducted in Togo, in November 2023. During Phases 1-3, the NF-POGO RTP was conducted most years in association with the CofE, often hosted and organised by an alumnus of the CofE itself.

CAPACITY DEVELOPMENT

# NF-POGO CENTRE OF EXCELLENCE IN OBSERVATIONAL OCEANOGRAPHY

## New beginnings - launch of Phase IV in Canada

Phase IV of the NF-POGO Centre of Excellence in Observational Oceanography (CofE) formally launched on 24 October 2024, hosted by the Ocean Frontier Institute, in partnership by the Faculty of Open Learning and Career Development, Dalhousie University, the Fisheries and Marine Institute of Memorial University, and the Hakai Institute. Selected from a pool of 147 applications, this year's scholars were from Bangladesh, Brazil, Cuba/ Mexico, Egypt, Ghana, India, Indonesia, Kenya, Philippines and Senegal.

From October to December, the scholars attended an 'Oceanography Bootcamp', a comprehensive curriculum covering core topics such as ocean observation, physical oceanography and instrumentation, thermohaline circulation, tides and water levels, waves, marine weather, and the role of the ocean in climate change. Fieldwork was a key component of the 'Oceanography Bootcamp,' with scholars engaging in dockside and on-vessel training.

The ten scholars initiated 20 distinct 10-month projects: each scholar led a Project A (ocean science research topic) and a Project B (home country observational oceanography evaluation). Project A topics, supported by mentors from MI, the Canadian Government, and Hakai, saw scholars addressing diverse challenges such as net primary production estimation, coastal current variability studies, space-based phytoplankton bloom and kelp forest mapping, and ROV-based assessments of deep-sea corals and associated fish near the Galapagos Islands. Project B, primarily supervised by Dr. Sean Mullan (CofE Coordinator), was focused on evaluating national contributions to the Global Ocean Observation System (GOOS) across the scholars' home countries.

Between January-April 2025, the scholars pursued a graduate-level Ocean Observation course, plus one other ocean technical elective of their choosing. They also continued to participate in field experiences in St. John's.

OCEAN FRONTIER INSTITUTE

DALHOUSIE UNIVERSITY

MARINE INSTITUTE

Hakai
Science on the Coastal Margin

CAPACITY DEVELOPMENT

# REGIONAL TRAINING PROGRAMME

The 2023 NF-POGO Regional Training Programme on Marine Pollution and Biogeochemistry in coastal environments was hosted by the Department of Physics at University of Kara, Togo, from 12 to 25 November 2023. The training was organised by Dr Essowe Panassa, a former CofE scholar, NANO member and faculty member at the University of Kara. Two other former scholars and NANO members (Subrata Sarker, Bangladesh, and Houssem Smeti, Tunisia) participated as instructors. A total of 20 trainees (10 females and 10 males) from Nigeria (7), Togo (4), Senegal (3), Ghana (2), Benin (2), Liberia (1) and Côte d'Ivoire (1) participated in the training.

The intensive 12-day training included lectures, hands on exercises and a field trip focusing on Marine pollution, Numerical modelling of pollutants/microplastics transport, Statistics for marine pollution and biogeochemical data analyses, and Monitoring of EOVs and microplastics on surface sea water and sandy beaches. A webinar by Prof Greg Cowie, leader of the CoLab introduced the training participants to the projects objectives and activities in West Africa.

CAPACITY DEVELOPMENT

# POGO-SCOR FELLOWSHIPS

During this period, ten POGO-SCOR Visiting Fellowships were awarded to early-career scientists from developing countries to spend up to 3 months at another research institute receiving individual training and supervision on a research topic of their choice.

*"I consider the POGO-SCOR Fellowship Programme a great opportunity for early-career researchers to learn and improve their skills in Ocean Sciences. In addition, it is an amazing opportunity for the host institution to receive a trainee from abroad, with all the multiculturalism and multidisciplinarity it involves." Ana Luzia Lacerda, host supervisor, Sorbonne University, France.*

## Roma Varghese

Country of origin 

Host country 

**Parent Institution:** Indian Institute of Technology Kharagpur, India

**Host Institution:** Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokohama, Japan

**Training topic:** Detection and prediction of Marine heatwaves in the Indo-Pacific region using advanced AI techniques

**Duration:** 2 months (Sep–Nov 2023)

## Tobias Sérvulo

Country of origin 

Host country 

**Parent Institution:** University of São Paulo (USP), Brazil

**Host Institution:** Laboratoire d'Oceanographie de Villefranche, Sorbonne University, France

**Training topic:** Oceanographic instrumentation and DNA-metabarcoding techniques applied to the Mediterranean plastisphere

**Duration:** 1 month (Nov–Dec 2023)

## Kranthikumar Chanda

Country of origin 

Host country 

**Parent Institution:** Centre for Marine Living Resources and Ecology, Ministry of Earth Sciences, India

**Host Institution:** CSIRO Environment, Hobart, Australia

**Training topic:** Application of Underwater acoustics for mesopelagic fish identification and Biomass estimation in tropical ecosystems

**Duration:** 3 months (Jan–Mar 2024)

CAPACITY DEVELOPMENT

# POGO-SCOR FELLOWSHIPS

## Daniel Bernal

Country of origin 

Host country 

**Parent Institution:** Universidad Nacional de Colombia, Colombia

**Host Institution:** LOCEAN Laboratoire d'Oceanographie et du Climat: Experimentations et Approches Numeriques - Sorbonne University, France

**Training topic:** Advanced Automatic Techniques based on Artificial Intelligence for Phytoplankton Counting and Identification

**Duration:** 2 months (Oct–Dec 2023)

## Esther Karo Oghenede

Country of origin 

Host country 

**Parent Institution:** Nigerian Institute for Oceanography and Marine Research, Nigeria

**Host Institution:** University of Ghana, Ghana

**Training topic:** Investigating the Sources, Distribution, and the Impacts of Microplastic Pollution in Coastal Waters: Ghana Coastal Waters as a Case Study

**Duration:** 3 months (Sep–Dec 2024)

## Toufik Zeghloul

Country of origin 

Host country 

**Parent institution:** National Research Center for the Development of Fisheries and Aquaculture (CNRDPA), Algeria

**Host Institution:** Leibniz Centre for Tropical Marine Research (ZMT), Germany

**Training topic:** Modelling of multi-source data for the study of the exploitation and the spatiotemporal distribution of small pelagics from the Algerian coasts.

**Duration:** 2 months (Mar–Apr 2024)

*"The POGO-SCOR Fellowship Programme has been an invaluable experience, providing a platform for young researchers like myself to gain advanced training and build international networks. […] The programme offers high-quality, hands-on training from leading experts in the field, significantly enhancing participants' research skills and knowledge; […] It fosters meaningful collaborations between institutions, which can lead to long-term partnerships and impactful research outcomes; […] and the exposure to different research environments and methodologies is crucial for the professional growth of young scientists, preparing them to tackle global marine science challenges effectively." - Toufik Zeghloul.*

CAPACITY DEVELOPMENT

# POGO-SCOR FELLOWSHIPS

## Michelle Glory Jonik

Country of origin

Host country

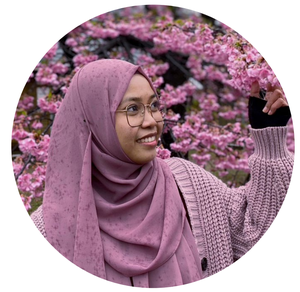
**Parent Institution:** Universiti Sains Malaysia, Malaysia

**Host Institution:** Department of Oceanography National Sun Yat-sen University, Taiwan

**Training topic:** Understanding Symbiodiniaceae Culture Protocols and Lipid Production to Assess Coral Stressors: Evaluating Nutrient Limitation Through Nutrient-Induced Fluorescence Transients (NiFTs) and Thermal Stress

**Duration:** 1 month (Nov 2024)

## Amirotul Bahiyah



Country of origin

Host country

**Parent Institution:** Sriwijaya University, Indonesia

**Host Institution:** Scripps Institution of Oceanography, USA

**Training topic:** Heat Budget Analysis using Argo Float and Ocean-Atmosphere Satellite Data

**Duration:** 3 months (Oct 2024–Jan 2025)

*"Being a POGO-SCOR fellow has been an incredibly rewarding experience, and I am truly honoured to have had this opportunity. This fellowship has not only enriched my academic and professional growth, but has also provided me with invaluable connections and experiences. I will wholeheartedly recommend this programme to my colleagues, as it has been an inspiring and formative journey." - Fernando Becker.*

## Gabriel Gallegos Diez Barrosco

Country of origin

Host country

**Parent Institution:** Centro de Investigación y de Estudios Avanzados del IPN, Mexico

**Host Institution:** Institute for Earth System Predictions, Italy

**Training topic:** The Yucatan Shelf circulation under climate change

**Duration:** 3 months (Jan–Apr 2025)

## Fernando Becker

Country of origin

Host country

**Parent Institution:** Servicio de hidrografía Naval - CONICET, Argentina

**Host Institution:** Mediterranean Institute of oceanography (MIO), France

**Training topic:** Analysis of sub-mesoscale structures in the north-western Mediterranean by comparing in-situ and satellite data

**Duration:** 3 months (Jan–Apr 2025)

CAPACITY DEVELOPMENT

# SHIPBOARD TRAINING

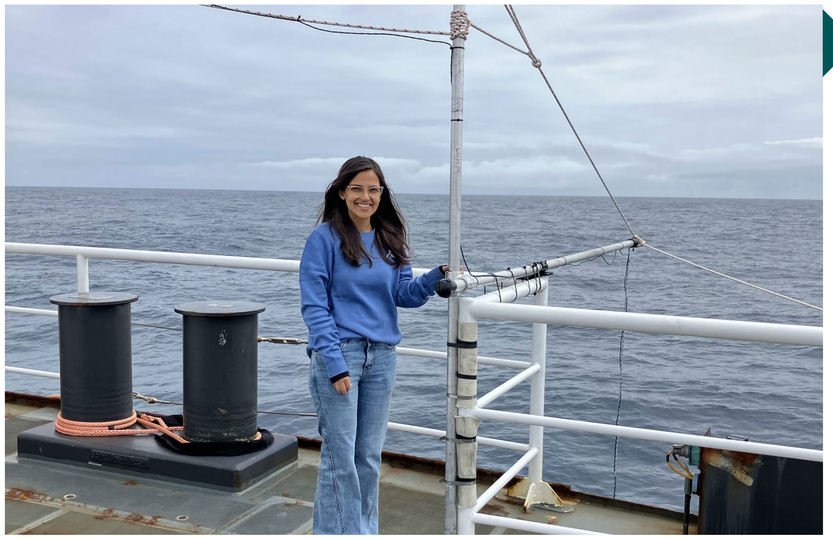
During this period, 11 fellowships were awarded for training on-board research expeditions, thanks to funding from the Nippon Foundation and OceanQuest, and the invaluable collaboration and support of partner institutions from around the world, including research and academic institutions, as well as the philanthropic foundation OceanX.

The fellowships provide hands-on training in sampling and analysis techniques, and in some cases a one-month stay at the host research institute prior to the cruise and a further month after the cruise to analyse the data and interpret the results.

In addition, this year we facilitated 3 dedicated training expeditions - one in a tropical estuary in Brazil (organised by the Federal University of Para and funded by NF), and two other on-board the OceanX vessel OceanXplorer, between Namibia and Cabo Verde and between Cabo Verde and Gran Canaria (funded by OceanQuest).

**Yan Weber Mesquita** (Brazil) participated in the University of Ghent (Belgium) NORSEAT cruise in Sep 2023, receiving training on marine geology in the vicinity of the Shetland Islands.


**Ulrich Joel Bilounga** (Cameroon) and **Pamoda Sewwandi** (Sri Lanka) joined the University of Cape Town (South Africa) SEAmester programme (June 2024), which is an annual floating summer school, where a large group of graduate students join lectures and practicals in Oceanography.



**Aditi Sharma** (India) received training in May/June 2024 at Woods Hole Oceanographic Institute (WHOI, USA) prior to joining an Ocean Observatories Initiative (OOI) expedition in the Gulf of Alaska, focussing on ocean dynamics and subsurface mooring/glider deployment.

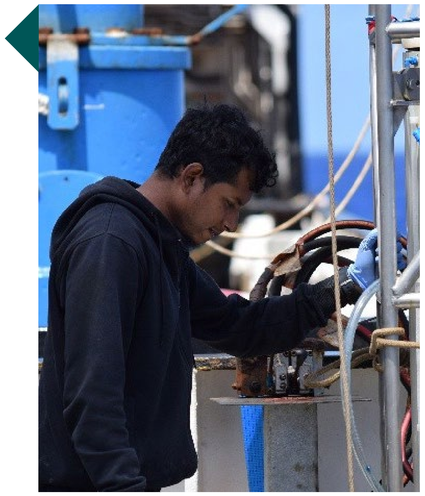
CAPACITY DEVELOPMENT

# SHIPBOARD TRAINING

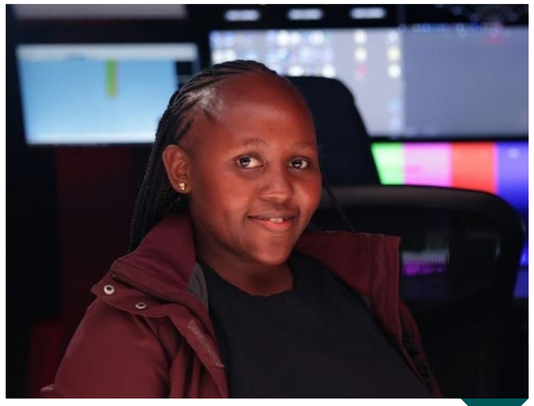
**Francielle Nogueira de Lima Holtz Santos** (Brazil) received training on-board the Atlantic Meridional Transect (AMT) cruise, led by Plymouth Marine Laboratory (UK), between the UK and Uruguay in Nov-Dec 2024, where she was sampling for eDNA, carbonate chemistry, nutrients, aerosol deposition and flow cytometry.

**Louwin Anand** (India) joined the National Oceanography Centre (NOC, UK) research cruise CarTRidge (Jan-Mar 2025) to gain hands-on experience in at-sea routines, setting up and deploying sensors, as well as processing samples and data.

**Victor Ebolo Nkongo** (Cameroon) received training on-board the Institut de Recherche pour le Developpement (IRD, France) PIRATA F-35 (Feb-Apr 2025) expedition to service the PIRATA moored array or met-ocean buoys.



**Johana Ermelinda Lucero** (Argentina) received training on-board Japan Agency for Marine-Earth Science and Technology's R/V Mirai while traversing the western end of 10°N line (P4W) in the tropical northwest Pacific Ocean. Between January and May 2025, Johana participated in operations with CTD rosette, radiosondes for atmospheric data, ARGO floats and XCTD.

As part of the Around Africa Expedition (see p. 45), shipboard training fellows were placed on-board two science legs: two fellows (**Doreen Walter Mushi**, Tanzania, and **Sinothando Shibe Silungile**, South Africa) on-board the leg from Comores to Cape Town, South Africa (29 Jan to 24 Feb 2025), led by the South African Environmental Observation Network (SAEON), and one fellow (**Jaquelino Lopes Varela**, Cabo Verde) on-board the leg from Mindelo to Mindelo, Cabo Verde (26 Mar to 1 April 2025), led by the Instituto do Mar (Cabo Verde).

CAPACITY DEVELOPMENT

# NF-POGO-UFPA TRAINING ON TROPICAL ESTUARY MONITORING

The NF-POGO-UFPA training on Tropical Estuary Monitoring provided an introduction to techniques for monitoring physical and chemical parameters in the highly dynamic Marajó Estuary (Amazon Gulf), in northern Brazil. Over the course of five days, 14 trainees from six countries (Argentina, Brazil, Colombia, Ecuador, Mozambique and Uruguay) participated in both theoretical and hands-on shipboard activities, including the operation of oceanographic instruments, as well as the sampling and analysis of water, sediment, and plankton. The training was co-organised by POGO and the Federal University of Pará (UFPA) with funding from the Nippon Foundation, and was hosted by UFPA in Belém, Brazil.

CAPACITY DEVELOPMENT

# AROUND AFRICA EXPEDITION

As part of the OceanX–OceanQuest Around Africa Expedition (January–April 2025), which travelled from the Comoros to Gran Canaria, Early Career Ocean Professional (ECOP) shipboard training was supported by OceanQuest and delivered by POGO, OceanX, and OceanQuest. In addition to placing trainees on scientific legs of the expedition (see p. 43), POGO recruited 25 participants from African countries for two training-dedicated legs.

The first training leg, from Namibia to Cabo Verde (6–25 March), included 13 participants from 10 African countries (Ghana, Kenya, Madagascar, Morocco, Namibia, Nigeria, Senegal, South Africa, Tanzania, and Tunisia), along with two OceanQuest Student Participants from KAUST, Saudi Arabia. The intensive, multidisciplinary programme combined lectures, seminars, workshops, shadowing, and independent project work. Participants developed skills in carbonate chemistry, oceanography, phytoplankton community classification, eDNA, acoustic mapping, ship operations, onboard technology, science communication, and media work. Guest faculty, recruited through POGO with support from The Ocean Foundation, the Global Ocean Acidification Observing Network (GOA-ON), and the Ocean Biomolecular Observing Network (OBON), delivered specialised sessions in carbonate chemistry and eDNA. Instructors included Carla Berghoff (INIDEP, Argentina) and Ulrich Bilounga (University of Douala, Cameroon) for carbonate chemistry, and Nathan Hubot (NOC, UK) for eDNA.

The second training leg, from Cabo Verde to Gran Canaria (3–8 April), involved 12 participants from 8 countries (Cameroon, Côte d'Ivoire, Ghana, Namibia, Nigeria, South Africa, Tanzania, and Tunisia), with a focus on science, media, and ship operations.

Throughout the Around Africa Expedition, the scientific crew conducted eDNA sampling, seafloor mapping, CTD profiling, and data collection in support of NASA's PACE satellite mission. ECOPs were actively involved in these activities, with team members providing hands-on instruction and context throughout the operations.

CAPACITY DEVELOPMENT

# POGO-FUNDED MEMBER TRAINING INITIATIVES

## Training course on Principles and Applications of BGC-Argo (Nov 2023)

### Grant awarded to Second Institute of Oceanography

The international training course on "Principles and Applications of BGC-Argo" opened on 15 November 2023, in Hangzhou, China, organized by POGO Member, Second Institute of Oceanography (SIO, China). This training course had four invited instructors from the Institute of Oceanology of the Polish Academy of Sciences, and three other POGO members, including Monterey Bay Aquarium Research Institute (MBARI), Pacific Marine Environmental Laboratory (NOAA), and Xiamen University.

The six-day course was delivered to 19 trainees, 10 Chinese students from six different institutions, and nine overseas students from seven countries, including Philippines, Malaysia, Bangladesh, India, Saudi Arabia, Egypt, and Morocco.

The training was intended to help graduate students and early-career scientists from China and other developing countries understand the principles of Argo and BGC-Argo, data access and visualisation, and provide basic knowledge for data analysis and applications in oceanography.

### Members Involved

CAPACITY DEVELOPMENT

# POGO-FUNDED MEMBER TRAINING INITIATIVES

## Training course on Ocean Observations for Coastal Applications (29 Jan – 7 Feb 2024, India)

### Grant awarded to Indian National Centre for Ocean Information Services (INCOIS)

**Members Involved**

The ITCOocean (a UNESCO Category-II Centre) at INCOIS, Hyderabad, India hosted a POGO-funded international training program 'Ocean Observations for Coastal Applications' from 29 Jan to 7 Feb, 2024. The gender-balanced pool of 30 participants belonged to 11 countries. This was the first professional training ever for at least two young researchers from outside the host country.

The training was coordinated by POGO alumnus Dr. Nimit Kumar, with the support of regional POGO partners, including fellow POGO alumni Dr. Subrata Sarker (SUST, Bangladesh) and Dr. Sourav Maity (VU-COOC, India), as well as Dr. Sachinandan Dutta (SQU, Oman), Dr. TVS Udaya Bhaskar (ITCOO coordinator), and POGO trustee Dr. Aileen Tan (CEMACS, Malaysia). The training featured invited talk by Dr. Eric Raes who leads OceanOmics project of Minderoo Foundation, which is part of a POGO-led endorsed Ocean Decade action OBON.

With the support extended by INCOIS, the trainees participated in the first ever in-person regional Ocean Decade conference IO-Con 2024, organized by DCC-IOR from 1-3 Feb 2024. Some of the trainees were invited speakers and panellists. This provided a unique opportunity to introduce them to the UN Ocean Decade.

Following on from the theory and conference, the trainees were taken to the eastern port city of Visakhapatnam (Vizag), along with another batch of international trainees which provided not only a hands-on field campaign experience but also wider international networking opportunities beyond the pool of this training.


POGO – ITCOocean Training Program : Ocean Observations for Coastal Applications (29 Jan - 07 Feb 2024)
Organized by International Training Centre for Operational Oceanography (ITCOocean), INCOIS, Hyderabad, India
in collaboration with CEMACS (Malaysia), SUST (Bangladesh), SQU (Oman) and Andhra Uni., Visakhapatnam

CAPACITY DEVELOPMENT

# POGO-FUNDED MEMBER TRAINING INITIATIVES

## Hands on MinION: Generating reference DNA barcodes for West African marine fishes (Sep 2024, Côte d'Ivoire)

### Grant awarded to Institut de Recherche pour le Développement (IRD), France

**Members Involved**

ZMT LEIBNIZ-ZENTRUM für Marine Tropenforschung

IRD Institut de Recherche pour le Développement FRANCE

The September 2024 "Hands on MinION training" for third generation sequencing in biodiversity monitoring was offered as a combined effort of the Institut de recherche pour le développement (IRD), France, the Leibniz Centre for Tropical Marine Research (ZMT), Germany, and the Université Nangui Abrogoua (UNA), Cote d'Ivoire. The overall goal was to improve reference databases, which are in urgent need for eDNA monitoring in West Africa.

The training empowered 23 scientists and multiplicators from Fisheries Science (Universities) and governmental institutions from France and eight West African countries: Morocco, Mauritania, Senegal, Cote d'Ivoire, Ghana, Benin, Nigeria and Cameroon with skills and knowledge to implement third generation sequencing at their home institutions. Within a one-week lab training and networking event at UNA (Abidjan, Cote d'Ivoire) participants gained expertise in DNA extraction, index PCR and library construction plus simple bioinformatics, covering the end-to-end process of MinION sequencing for reference barcodes.

Following a warm welcome from UNA President Prof. Tano Yao, participants dove into parallel activities involving wet lab work and theory. Each participant was involved in DNA extraction, MinION budget calculations for proposal writing, indexed primer and demultiplexing workflows, as well as a series of introductory discussions in English and French. The sequencing from related lab activities produced nearly 171 COI barcodes from marine fish. After the successful conclusion of the training, participants underscored the practical value of hands-on sequencing training, while some participants expressed their wish for more in-depth bioinformatics training which the organizers currently plan to pick-up in a webinar.

CAPACITY DEVELOPMENT

# POGO-FUNDED MEMBER TRAINING INITIATIVES

## Training course on Statistical Analysis of Oceanographic Data (Dec 24 – Jan 25, Bangladesh)

### Grant awarded to Shahjalal University of Science and Technology (SUST)

The POGO training on "Statistical Analysis of Oceanographic Data" was organised by the Department of Oceanography at Shahjalal University of Science and Technology (SUST), in collaboration with the Nigerian Institute for Oceanography and Marine Research, the Marine Research Center for Policy Research at Universiti Sains Malaysia, and the Indian National Centre for Ocean Information Services (INCOIS). All instructors involved in the training were POGO alumni affiliated with these institutions.

The training program took place over 10 days, with five days of online sessions (from December 6th to 20th, 2024), followed by five days of in-person sessions (from January 5th to 9th, 2025) at SUST. A total of 21 participants (11 females and 10 males) attended, representing Bangladesh (16), India (2), Malaysia (1), Sri Lanka (1), and Indonesia (1). The training included both theoretical and hands-on sessions on oceanographic data analysis and scientific writing.


### Members Involved

CAPACITY DEVELOPMENT

# NANO GLOBAL PROJECTS

## A global study of productivity, deoxygenation and ocean acidification at selected coastal sites (NANO-DOAP)

Research grants awarded to 17 participating institutions in the following countries: Argentina, Bangladesh, Brazil, Colombia, Ghana, India, Indonesia, Kenya, Lebanon, Mexico, Nigeria, Senegal, Thailand, Togo and Tunisia.

The NANO global project has three major components:

1. Promote in situ and remotely sensed observations of the ocean at selected coastal sites in order to contribute to the global effort of monitoring the levels of ocean acidification and deoxygenation;
2. Provide opportunities to the project participants for: i) capacity building to strengthen their efforts to monitor levels of acidification and oxygenation; ii) join larger observation networks of ocean acidification and deoxygenation;
3. Organize workshops and webinars dedicated to share experiences in i) monitoring levels of productivity, acidification and oxygenation; ii) training on marine data management; iii) compare results from fieldwork and produce a biogeographic distribution of the stations.

Field work was conducted in all countries, for a set of variables (e.g., temperature, chlorophyll-a, pigments, bio-optical variables, conductivity, nutrients, total alkalinity, pH, dissolved oxygen, phytoplankton) varying from station to station. The budget was allocated depending on the local sampling costs, so as to enable each country to sample on a bimonthly basis (up to a maximum of 3K EUR per station). Project participants also develop outreach activities to raise awareness of the importance of the ocean and ocean observations.

nano–DOAP
A global study of Deoxygenation, Ocean Acidification and Productivity at selected sites

CAPACITY DEVELOPMENT

# NANO GLOBAL PROJECTS

## Fishing Vessels of Opportunity Network (FVON) Pilot Projects

The NANO-associated Pilot Projects are part of an innovative initiative which integrates oceanographic sensors onto fishing nets and canoes, capturing crucial data during routine fishing activities. By turning fishing gears into data collection platforms, they have the potential to revolutionize coastal ocean observation. This approach empowers local fishers to contribute to scientific research seamlessly and aids marine scientists in unravelling the complex processes influencing fish distribution.

This project is set to establish a proof of concept, paving the way for scalable fishing vessel-based observation networks. This collaboration merges local knowledge with cutting-edge technology, fostering sustainable fisheries management and enhancing our understanding of marine ecosystems.

During this period, two new sites have been added to the first one established in Ghana in 2023: Tanzania and Bangladesh. Hellen Kizenga (NANO member, Institute of Marine Sciences at University of Dar es Salaam) and Subrata Sarker (NANO-DOAP and SAGITTA coordinator, Shahjalal University of Science and Technology) have been collaborating with POGO and ODN to create new FVON pilot sites.

CAPACITY DEVELOPMENT

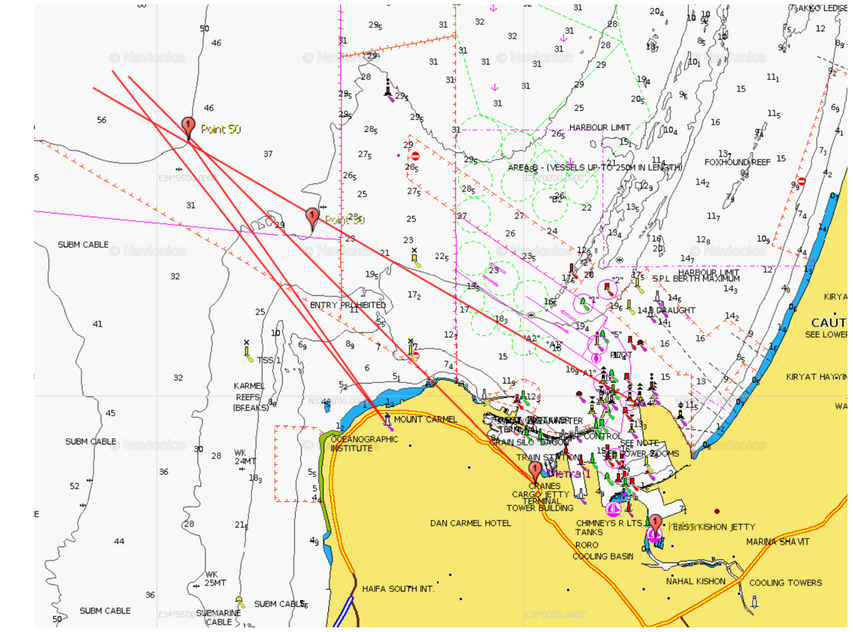
# NANO GLOBAL PROJECTS

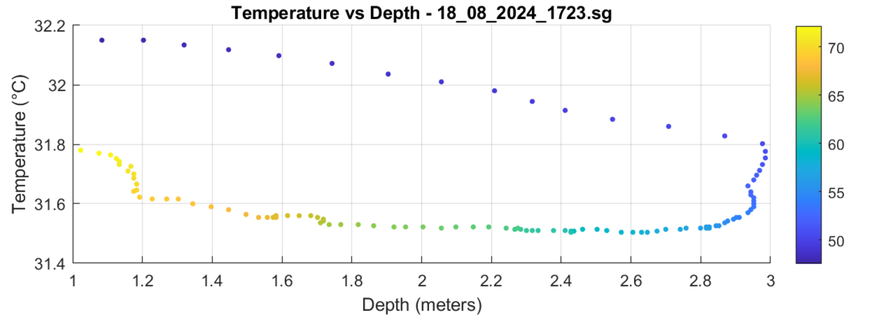
## Social AGITation for Temperature Analysis (SAGITTA)

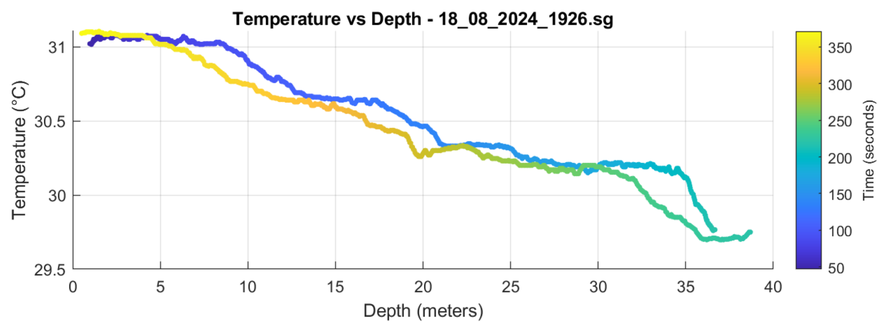
The project aims to implement a citizen science approach for consistent and regular temperature profile data collection in the coastal ocean. This requires distribution of cheap and simple temperature-depth (TD) probes among the general public. Though suitable equipment is present on the market, it is very expensive (5,000-9,000 USD per probe) and relatively complex for users without specialised training. Therefore the project aims to create a low-cost TD probe, simple smartphone application and web portal to make this idea possible. The probe should be inexpensive (about 100 USD), yet scientifically reliable. The smartphone app will be used for probe control, instant data visualisation and data transmission to the web. The web portal will serve for data storage, access and dissemination; it will also be useful for training and outreach.

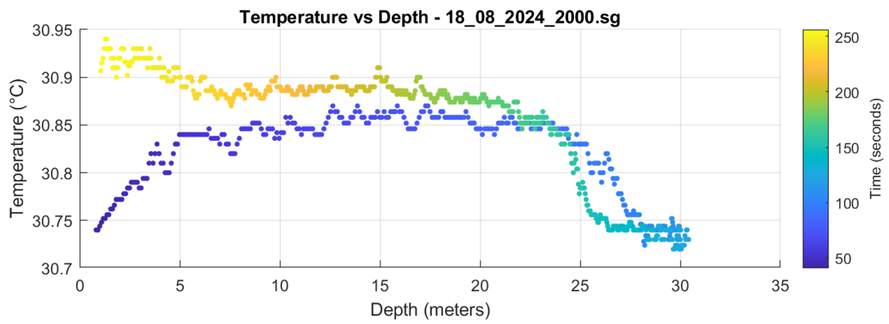
During the first semester of 2024 it was agreed that the project leadership should be transferred to Dr. Subrata Sarker, NANO-DOAP coordinator, bringing NANO-DOAP and SAGITTA projects together.

A field test of the water temperature profiler was conducted in August 2024 in Haifa Bay, Israel. The instrument was deployed using a 60-metre rope and a 3 kg anchor at depths of 50 metres and 30 metres at different locations. Temperature readings were recorded at intervals of 220 milliseconds. Overall, the profiler successfully captured temperature profiles at varying depths. However, no thermocline was detected, contrary to initial expectations. For future deployments, it will be important to address the noise generated by the pressure sensor and improve its calibration. Enhancing sensor calibration and reducing associated noise will contribute to greater measurement accuracy and provide more reliable data for future sea trials.



# OUTREACH AND ADVOCACY

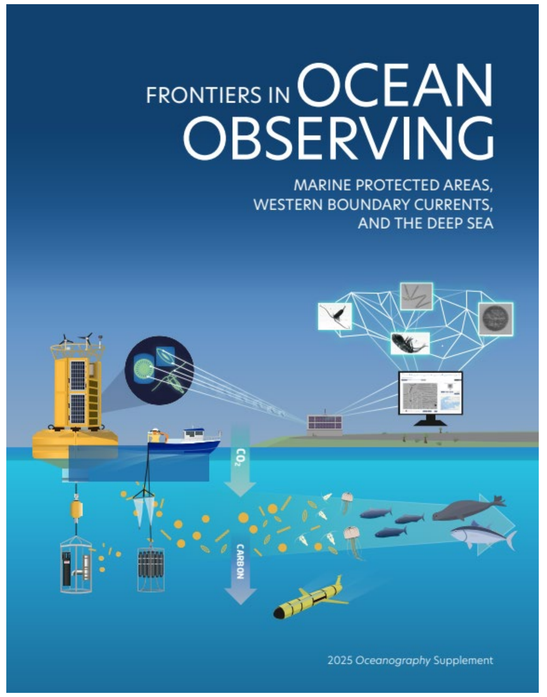
## PUBLICATIONS AND STATEMENTS

All of POGO's brochures, leaflets and other written products are available as digital versions online. POGO has now moved away from printed (paper) materials, with the exception of small quantities of postcards to distribute, otherwise favouring the display of laminated 'hard copies' of leaflets on our booths, and of QR codes on our promotional banners to give mobile device users quick and easy access to digital copies.

POGO had two papers published in a Special Issue of Oceanography Magazine Vol 38 on 'A Vision for Capacity Sharing in the Ocean Sciences'. Two other papers published in the same issue involved POGO trainings, activities and working groups. POGO's CEO was also a named author on two UN Ocean Decade-related papers published in ICES Journal of Marine Science (Vol 82, Issue 1, Jan 2025).

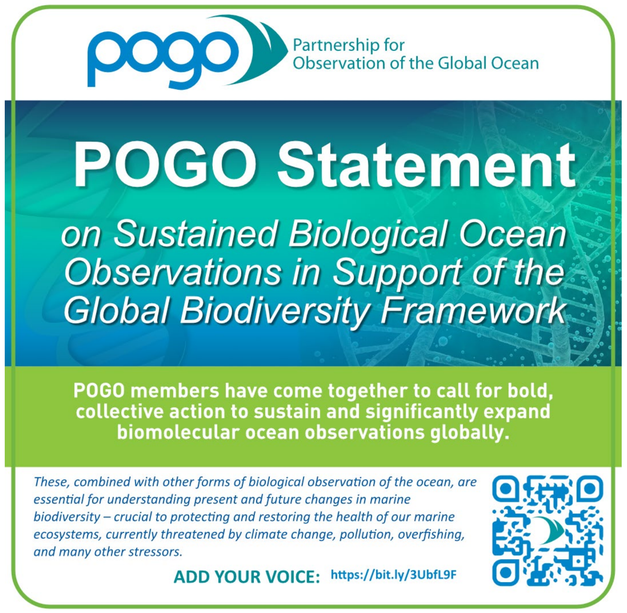
POGO partnered once again with the US National Oceanic and Atmospheric Administration (NOAA) and Ocean Networks Canada to sponsor a third supplement of Oceanography magazine on "Frontiers in Ocean Observing". The supplement aims to help explain the scientific and societal importance of ocean observing to funders, policymakers, and the general public.

The POGO Secretariat was represented on the Executive Committee, and contributed to defining the scope and themes of the supplement, issuing the call for contributions, and selection of invited articles. This third and final supplement, entitled "Frontiers in Ocean Observing: Marine Protected Areas, Western Boundary Currents, and the Deep Sea", was published in April 2025 and is available as an open-access publication.

# PUBLICATIONS AND STATEMENTS

In 2023, POGO established an Advocacy WG, which has drafted or contributed to statements for 4 major international events: the UN Ocean Decade Conference (Apr 2024), the COP28 and COP29 Climate Conferences (Dec 2023 and Nov 2024), and the COP16 Biodiversity Conference (Oct 2024). The Barcelona Biomolecular Ocean Observation statement and the POGO Statement on Sustained Biological Ocean Observations in Support of the Global Biodiversity Framework were circulated to the POGO membership for signature and shared with other organisations for their endorsement. In addition, POGO produced an Open Letter on Ocean Drilling, advocating for the importance of scientific ocean drilling for ocean – and in particular climate-research and education.


OUTREACH AND ADVOCACY

# POGO AT BIODIVERSITY COP16

For the first time, POGO was accredited as an observer NGO for the 16th Meeting of the Conference of the Parties to the Convention on Biological Diversity (COP16), which took place in Cali, Colombia, from 21 October to 1 November 2024.

POGO actively participated by organising an exhibition stand focusing on biological ocean observations, and showcasing eDNA as an important tool for biodiversity monitoring in the context of the Kunming-Montreal Global Biodiversity Framework (KMGBF), in collaboration with OBON and other partners: INVEMAR, Monterey Bay Aquarium Research Institute (MBARI), Plymouth Marine Laboratory (PML), and Marine Biodiversity Observation Network (MBON).

POGO also organised a side-event at COP16, with the same partners, as well as the Global Ocean Observing System (GOOS), Ocean Biodiversity Information System (OBIS), and Fugro. The side-event ("Observing biology and ecosystems in the ocean for effective biodiversity conservation") shared the latest developments, including capacity development opportunities and challenges, concerning existing, new and emerging technologies and methods for observing biology and ecosystem Essential Ocean Variables (EOVs). It aimed to stimulate a dialogue between academics, policy makers, NGOs, and industry, bringing together the key stakeholders required to effectively tackle the issues we face, such as Marine Protected Area management, fisheries and aquaculture, Harmful Algal Bloom and invasive species monitoring, and the synergistic effects of climate change, through cross-sectoral collaboration.

OUTREACH AND ADVOCACY

# POGO AT BIODIVERSITY COP16

Other related events included a side-event organised by INVEMAR on the “Marine biodiversity monitoring network based on environmental DNA in Latin America and the Caribbean” (with participation from Spygen and POGO) and the ‘Science and Technology for Action’ session of the Ocean Day in the KMGBF Pavilion, which included Sophie Seeyave (POGO CEO) as a panellist.

POGO also issued a Statement on “Sustained Biological Ocean Observations in Support of the Global Biodiversity Framework”, highlighting the potential of eDNA and other biological observation techniques to provide actionable data allowing us to better manage marine protected areas, evaluate the success of conservation efforts, and confront the escalating threats of biodiversity loss and ecosystem degradation.

OUTREACH AND ADVOCACY

# POGO AT CLIMATE COP28 & COP29

POGO has participated as an Observer at a number of United Nations Climate Change Meetings over the years. The conferences attract a variety of delegates – policy makers, business leaders, research institutes, NGOs, media – giving POGO a wide potential audience.

For COP28, which took place in Dubai, United Arab Emirates, from 30 Nov - 12 Dec 2023, the POGO Secretariat participated via several channels, with full description on our COP28 webpage.

Through the official UNFCCC application process, POGO partnered with *Plymouth Marine Laboratory (PML), International Coastal and Ocean Organization (ICO), and University of Plymouth* to host an exhibit booth, entitled "**Why the Ocean Matters in Climate Negotiations** – sharing the latest developments in climate challenges, impacts & options towards sustainable ocean development connecting science, industry, policy & society on ocean action in the UNFCCC processes and strengthening NDCs" during the first week of the conference. Two members of the NANO network were invited to join the POGO delegation, contributing actively to the manning of the booth and gaining valuable first-hand experience of the UNFCCC process and international climate dialogue.

POGO also partnered with Woods Hole Oceanographic Institution (WHOI) to co-host an official UNFCCC side event, entitled "**Global ocean observations for equitable knowledge-based decision-making**". This included representatives of WHOI, Scripps, PML, INVEMAR and NOC, who discussed how the technological revolution offers a growing list of tools to address climate-forced changes to the ocean, but purposeful observation, collaboration, capacity building & stakeholder engagement are necessary to address challenges effectively and equitably.



OUTREACH AND ADVOCACY

# POGO AT CLIMATE COP28 & COP29

For COP29 in Baku (11-22 Nov 2024), Azerbaijan, an overview of POGO's participation is available on our COP29 webpage, including links to session recordings where available.

Through the official UNFCCC application process, POGO partnered with *Plymouth Marine Laboratory (PML), International Coastal and Ocean Organization (ICO), and University of Plymouth* to host an exhibition booth, entitled "**Why the Ocean Matters in Climate Negotiations** – sharing the latest developments in climate challenges, impacts & options towards sustainable ocean development connecting science, industry, policy & society on ocean action in the UNFCCC processes and strengthening NDCs" during the first week of the conference.

POGO also partnered with *Woods Hole Oceanographic Institution (WHOI), American Geophysical Union (AGU), Ocean Visions, and University of California* to co-host an official UNFCCC side event, entitled "**Three COPs, One Ocean**". Speakers included Ambassador Peter Thomson (UN SG Special Envoy for the Ocean), Lídia Bulcão (Secretary of State for Maritime Affairs, Portugal), Cecilia Kinuthia-Njenga (UNFCCC), Tiago Cunha (Oceano Azul), and representatives from each partner organisation.


OUTREACH AND ADVOCACY

# SOUTH EAST ASIA PROJECT FOR GENERAL REGIONAL AWARENESS OF SEAGRASS BY SOCIETY (SEAGRASS)

## Grant awarded to the Centre for Marine and Coastal Studies (CEMACS) of Universiti Sains Malaysia (USM)

The Straits of Malacca is the second busiest ocean maritime trade route in the world with a passage of over a thousand ships a day transiting its waterways. Naturally, this brings with it a lot of environmental pressure and risks to existing natural habitats. However, there are still very special pockets of marine habitats that possess high diversities of marine life such as shallow seas, intertidal mudflats, uninhabited islands and seagrass beds. The Middle Bank (northern Straits of Malacca) - an area of rich seagrass community – was chosen to study its changing evolution in an evolving climatic and anthropogenic influence. The Middle Bank seagrass meadow serves as nursery ground for many commercially important fish and mollusc species, supporting small-scale fisheries using artisanal fishing gears by local coastal communities. CEMACS has been working closely with Penang State Government to gazette this area as ecologically important, serving as a carbon sink (complementing adjacent mangrove area) to mitigate climate change and offset the state's carbon emission.

The proximity of the Middle Bank to a World Heritage Site can help drive awareness and education on the value of these marine habitats to the general public. The objective is to encourage the local government and agencies to set up a marine protected area for research, monitoring and education.

OUTREACH AND ADVOCACY

# SOUTH EAST ASIA PROJECT FOR GENERAL REGIONAL AWARENESS OF SEAGRASS BY SOCIETY (SEAGRASS)

## Highlights

- CEMACS conducted the Marine Field Course: Biodiversity & Conservation for a group of college students in Feb 2024. 35 students were introduced to ecological techniques, microscopy skills, aquaculture basics and introduced to the seagrass ecosystem. This experiential learning opportunity broadened students' understanding of marine ecosystems and fostered an appreciation for the need to preserve and protect these habitats. Moreover, the visit provided a chance for students to actively participate in local conservation efforts, contributing to the sustainable management of Pulau Gazumbo's marine resources.
- A book, "Tides of Change: The Middle Bank Marine Sanctuary and the Quest for a Resilient Penang" was published, underscoring the collaborative efforts of scientific, governmental, and community stakeholders in the environmental restoration and protection of the Middle Bank. The book aims to inform, inspire, and call for action to preserve Penang's treasured natural sanctuary.
- A stakeholder engagement workshop was held in two phases: the first with fishermen and operators, and the second with government agencies and other stakeholders. The workshop addressed activities allowed and prohibited within the sanctuary, adhering to IUCN guidelines for protected area management categories. A field visit to the Middle Bank was organized for Executive Council (EXCO) for Environment for Penang State, YB Sundarajoo and the state government team to familiarize them with the upcoming establishment of the marine sanctuary. This visit fostered a positive response towards the sanctuary's establishment, reinforcing the commitment to environmental conservation.
- A beach cleanup activity is planned at the Middle Bank area, aiming to engage the community and stakeholders in preserving the sanctuary's natural beauty and ecological health. Complementing these efforts, a brochure detailing the Middle Bank seagrass and its associated biodiversity is in its final draft, serving as an educational resource to raise awareness and promote the importance of seagrass ecosystems and their conservation.

OUTREACH AND ADVOCACY

# COLLABORATIONS WITH OTHER ORGANISATIONS

## UN Decade of Ocean Science for Sustainable Development

- The POGO CEO was a member of the “Vision 2030” Working Groups for Challenges 2 and 9, and provided comments on the draft White Paper for Challenge 7. She was also a co-author on the “Food for Thought” articles that were published on the themes of Challenges 2 and 9 White Papers.
- POGO participated in the UN Ocean Decade Conference in April 2024, organising a satellite event in partnership with OBON and Marine Life 2030 (2 Ocean Decade programmes), and with participation from IOC, Fugro, and WWF, as well as other Decade Action representatives. We also presented posters on OBON and on POGO’s capacity development programme.
- As a Decade Implementing Partner (DIP), POGO has participated in on-line meetings between DIPs focussed on ocean observation.
- As a DIP, POGO has supported the creation of new Decade Actions, such as the OceanX-OceanQuest Around Africa Expedition; “Global Sounds: Low-Cost Hydrophone Project”; and the POGO Western Pacific Regional Node-led Projects “Health of Ocean under Multiple Ecosystem Stressors” (HOMES), “Addressing Global Warming Threats through Marine Observation Systems and AI Customizability” (MOSAIC), and the Fishing Vessel Observing Network (FVON).
- Via the NF-POGO Alumni Network for the Ocean (NANO), POGO has initiated a collaboration with the UN Decade Early Career Ocean Professionals Programme; in addition to webinars agreed, opportunities provided by POGO are now also shared by the ECOP network.

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OUTREACH AND ADVOCACY

# COLLABORATIONS WITH OTHER ORGANISATIONS

## Continuation of COLLECT

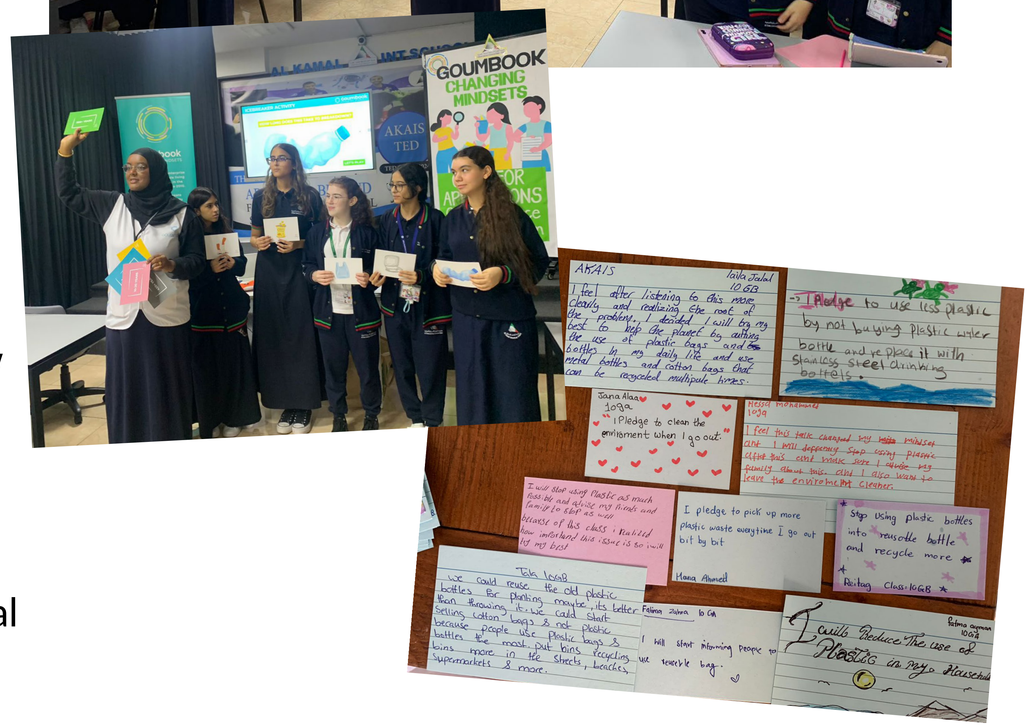
POGO has started collaborating with a Dubai-based social enterprise, Goumbook, to implement the COLLECT protocols (from our previously-funded beach litter monitoring citizen science project) in the UAE. This is the first time the methodology is being applied outside of its original project scope, marking a key milestone in expanding citizen-led data collection for marine protection across different geographies.

In collaboration with Al Kamal American International School (AKAIS) and the American University of Sharjah (AUS), Goumbook's UAE pilot project engages female high school and university students to gather and analyse plastic debris from a Sharjah beach. Activities kicked off on 11 November 2024 with an ocean literacy and fieldwork preparation workshop attended by 50 AKAIS students and their teachers, 22 of whom participated as citizen scientists in two upcoming field sampling trips, beginning on 22 November 2024.

Plastic samples collected are being analysed in AUS's lab, allowing environmental science students to gain practical research experience. The findings will be shared with POGO and Goumbook's partners at the Ocean Conservancy, contributing data from an underrepresented region to global ocean pollution databases.

Funded by the Atlantis Atlas Project, this UAE-based initiative showcases how internationally proven methodologies can be utilized to foster environmental stewardship, enhance understanding of marine pollution, and empower youth as active contributors to conservation science.

Goumbook have translated the materials into Arabic, adding to the multilingual collection of resources in English, French, Portuguese, and Spanish.

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