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- NF-POGO Alumni Network for the Ocean -

NF-POGO Alumni E-Newsletter – Volume 22, August 2022

Ocean science rising again

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THE NIPPON FOUNDATION
pogo Partnership for Observation of the Global Ocean

NF-POGO Alumni E-Newsletter – Volume 22, August 2022

In this issue:

Cover photo
"El Palmar beach, Spain"
by Lilian Krug

From the Editorial Board

"The only way to make sense out of change is to plunge into it, move with it, and join the dance." - Alan Watts

In 2021 we had to learn how keep ocean science going again. Far from throwing up arms, our generation learnt to swim with the current without losing sight of the shore; a sustainable and healthy ocean. This issue celebrates our resilience and the rise of ocean science again.

In this issue, we will go through the journey of NANO alumni, at different stages of their careers, and on different continents who continued with scientific projects amid the pandemic. Notably, new members will give us an account of their research projects and interests. In addition, we will also hear about what "old members", former NF-POGO scholars, have been up to following their training.

NANO NEWS 22 is also dedicated to a member of our family that left us too soon, Mimoy this one is for you too!

With the current unrest in the world, we also need to highlight the essence of NANO in bringing together scientists and students of different countries through their projects and training programmes, thereby fostering values such as international collaboration, respect, tolerance and living together despite differences. Special thoughts to NANO alumni affected by wars and conflicts.

Yours sincerely,

Yohan D. Louis

Editor-in-chief

NANO was founded by:

Shubha Sathyendranath and Trevor Platt - Former Executive Directors of POGO

Sophie Seeyave - Chief Executive Officer of POGO

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Meet the new Pogonians

POGOnians year 13 (2021-2022)

Profiles available at https://nf-pogo-alumni.org/programs/centre-of-excellence/cofe-2022/

Since 2008, ten young scientists have been selected every year to take part in the 10-month NF-POGO Centre of Excellence in Observational Oceanography. The 2021-2022 cohort began the training in February 2022 in the Alfred Wegener Institute Biological Station in Helgoland, Germany. In this setting, the scholars are trained in core skills and topics which will help to level-up their scientific knowledge and capacity to carry out research on the ocean, its ecosystems, processes, and human-related activities. As their final assignment of the course, they conduct independent research projects guided by mentors from the AWI.

Lucas H. Gimenez (Argentina)

Lucas is interested in how abiotic and biotic factors drive ecological processes of intertidal and shallow subtidal benthic ecosystems and has experience with multiple taxa (e.g., sea anemones, mollusks, sea sponges, tunicates). He started his scientific journey with a Marine Biology degree at Universidad Nacional del Comahue (Argentina). During his undergraduate research project, he focused on a local system in San Matias Gulf (Northern Patagonia) linking the growth anomalies of marine bivalves and environmental factors. After this experience, he wanted to expand the scope of his research and explore other systems. He then pursued and earned a Master of Sciences degree in Marine Ecology at Universidad Católica de la Santísima Concepción (Chile). He focused on the invasion ecology of sea anemone species with successful worldwide introductions. He used ecological niche modelling to assess whether non-native populations develop in similar environments as those from the native range (i.e., climatic match hypothesis of invasions). Additionally, he projected potential distributions as an invasion risk assessment to detect likely scenarios for new introductions and spread.

With the NF-POGO Centre of Excellence programme, Lucas wants to deepen his oceanography background and link it with ecological processes. He sees his participation as a way to keep on exploring new systems and expanding the scope of his research into new topics. He would like to improve his current skills and develop those that he has not had the opportunity to learn yet, such as ocean data collection in cruise surveys, time series analysis and ocean modelling. He would also like to acquire more experience in planning and conducting projects and collaborations, as well as more experience in science communication and outreach. This CofE will also provide an opportunity for networking, as he wants to be part of multidisciplinary studies in the near future. Overall, being part of the NF-POGO CofE at the Alfred Wegener Institute provides all the ingredients he needs to continue growing as a young researcher. In addition, being in Germany and sharing this adventure with people from all over the world is a unique opportunity. He would like to learn about multiple cultures and social scenarios, as they determine different perspectives as to how we see the world and how we can face the environmental challenges we are experiencing globally.

Gérard Zinzindohoué (Benin)

Gérard did not start his studies directly with oceanography. With no faculty or department fully dedicated to marine science at his university, he had to find a related discipline that could later lead him to oceanography to fulfil his dreams. He therefore began his career with a Bachelor's degree in Agronomy, specialising in animal production. This enabled him to do a Master's degree in Fisheries and Aquaculture Management at the University of Abomey-Calavi, which allowed him to experiment with oceanography tools and techniques. The objective was to identify possible areas of concentration of *Pentanemus quinquarius* populations for the purpose of implementing a Geographic Information System for fisheries monitoring and management. In parallel to his studies, he worked as a research assistant in the Geographic Information System and Remote Sensing laboratory of the Faculty of Agronomic Sciences at the University of Abomey-Calavi. The different knowledge and skills he acquired definitely motivated him to pursue a career as a researcher in observational oceanography and related fields. Thus, after his Master's degree, he obtained a further Master's degree in Climate Change and Marine Sciences from the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) programme in Cabo Verde. Passionate about Marine Technologies and Observations, his research focused on the development of low-cost instrumentation for advanced underwater ecology observations. This research work was also part of the objectives of the MeerWisse - African-German Partners for Ocean Knowledge and Coastal Ecosystem Monitoring in Cabo Verde (CEM_CV) project, in which he worked.

Gérard is the first CofE scholar from Benin and he believes that the programme is in line with his professional aspirations. In addition, participating in this programme will help him to sharpen his knowledge, update his skills, and acquire additional know-how to be more efficient and proactive in the field of observational oceanography. In the future, he expects to become an expert in the fields of marine technologies and observations for the development of a more integrated and sustainable ocean observing system.

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Tania Sultana (Bangladesh)

Tania did her Bachelor's and Master's degrees in Geography and Environment at the Shahjalal University of Science and Technology in Bangladesh. During her undergraduate studies she had an Introduction to Oceanography course and decided to pursue a career on this field, focusing her undergraduate and master's thesis on ocean sciences. Her undergraduate thesis was focused on microplastic pollution in marine fishes and her master's thesis was focused on the eco-hydrology of tropical estuaries. She also worked as a research assistant in the NANO-DOAP sampling station Meghna River Estuary (Bangladesh). For Tania, the CofE programme is a multidisciplinary research training where she is going to learn from excellent international teachers. Therefore, it is a great opportunity for her to gather in depth knowledge in the field of oceanography. Firstly, she expects that this programme will develop her ability to think outside the box. This will help her to formulate research problems. Secondly, she wants to develop her scientific communication skills to help her ask questions to researchers and talk about her research in public. Thirdly, she is interested in learning analysis of oceanographic data using R, scientific writing techniques and the good scientific practices in oceanography research. Finally, she would like to develop international networks with her fellow scholars and teachers. This will help her for the next step of her career, which is pursuing a PhD in the field of Oceanography.

Jorvin A. Z. Hinestroza (Colombia)

Jorvin is the first Colombian scholar of the NF-POGO CofE programme at the Alfred Wegener Institute (AWI) in Germany. Jorvin holds a Bachelor's degree in Ecology of Coastal Areas from the University of Antioquia (2019) and a Master's degree in Coastal Oceanography from the Autonomous University of Baja California (UABC), México (2021). His research life started with assessing the population structure of the Blue Land Crab (*Cardisoma guanhumi*) in four coastal locations of Turbo, Colombia. *Cardisoma guanhumi* is categorized in Vulnerable state according to the Red Book of Marine Macroinvertebrates of Colombia. With this work, Jorvin was able to do environmental education around the protection of this important species, and more than 100 high school students learned about the ecological importance and sustainable consumption of this Blue Land Crab. Since then, the love for outreach and environmental education has become a pillar in Jorvin's life. That is why Jorvin enrolled in a two-month long environmental education project, which included teaching over 1000 high school students about the importance of the coastal and marine ecosystems they have in their surrounding area.

For his postgraduate education, he joined the Phytoplankton Ecology Group (POPEYE) at UABC, and worked with the Diffuse Attenuation Coefficient of the Photosynthetically Available Radiation ($Kd_{(PAR)}$) and its calculation through remote sensing satellites ($Kd_{(490)}$). He collected a global dataset and performed three regional models to estimate $Kd_{(PAR)}$ through $Kd_{(490)}$ for *in situ* data, and also for $Kd_{(490)}$ satellite data.

The CofE programme has been an invaluable experience for Jorvin, since he never imagined to be in Europe, being trained in a top research institute, by top professors, staff, and hinteracting on a daily basis with many people from around the world. Jorvin believes that this programme will not only give him the necessary tools to be a better scientist in his research field, but also help him to grow in the understanding of new perspectives/ways of working internationally, and of course on a personal level. Jorvin is grateful to all the institutions, NGOs, sponsors, and people who make every day of this training programme possible. *Danke Schön*.

Roger Enrique Manay-Torres (Peru)

Roger was born in Chiclayo, a coastal city in Northern Peru. Since childhood, he has known about the negatives impacts and consequences of the El Niño-Southern Oscillation (ENSO) events not only in his own hometown but also in all of his country. After completing his basic studies, he moved to the Peruvian capital, Lima, where he graduated from the Marine Sciences' Master programme of Universidad Peruana Cayetano Heredia. Since then, he has directed his efforts and time to study the dynamics of the Humboldt Currents System, in particular, physical processes such as the Ekman transport and pumping and coastal upwelling.

He works as a research assistant at the Oceanography department of the Instituto Geofísico del Perú (IGP), making data analysis of coupled ocean-atmosphere processes from observations and regional models. In addition, he is focusing on investigating past and future trends related to El Niño and La Niña events. In this last case, he collaborates with the Biogeosciences laboratory from the Universidad Peruana Cayetano Heredia, working with ocean-atmosphere general circulation model simulations to improve understing of the remote influence and potential changes in precipitation patterns in northern Peru, Amazon, southeastern Brazil and western Pacific.

After a successful application to the Nippon Foundation – POGO Centre of Excellence (CofE), Roger is currently based in Helgoland, with nine other fellows from different countries around the world. From the very beggining it was a real challenge for Roger and his colleagues, due to the weather conditions (three-in-a-row storms) and the pandemic limitations on face-to-face classes. The high quality facilities of the Alfred Wegener Institute (AWI) and the excellent professors who have directed the classes, the CofE programme has largely exceeded all expectations for the benefit of all fellows. Now, Roger is very excited about the new classes at other AWI stations in the upcoming weeks, likewise the *in situ* oceanographic training on the scientific vessel Heincke.

Basma Abdelmeneam (Egypt)

Basma is an assistant lecturer at Port Said University. She is interested in marine biology and ecology. Basma has a Master's on the spawning aggregation of coral reef fish, where she investigated the spawning

aggregation of fish species belonging to the *Lethrindae* family in the Red Sea. During her Master's, she assessed the abundance and distribution patterns of Lethrinids along the Red Sea coast. She also examined the genetic distance within and between the aggregated individuals and individuals from other countries to determine whether they were migratory or not. She is now enrolled as a PhD student at the Port Said University, researching the biological and ecological characteristics of *Traidacna* spp. Basma is dedicated to environmental conservation volunteer work in her country, she is participating in projects established by HEPCA – an Egyptian conservation and environmental education NGO - for the aquaculture and restoration of marine invertebrates in the Red sea. Basma believes that taking part in the NF-POGO CofE at AWI this year will help her to become a better researcher, increasing her knowledge and understanding in different scientific areas and help her to be opened to different cultures around the world, expanding her vision and widening her horizons.

Hridya Krishnakumar (India)

Hridya completed her Master's (M.Sc in Marine Chemistry, 2021) from Kerala University of Fisheries and Ocean Studies (KUFOS), India. In 2019, she completed her Bachelor's degree in Chemistry from Sree Neelakanta Govt. Sanskrit college (SNGS College, Pattambi) Kerala, India. She did her P.G. Dissertation at Centre for Water Resources Development and Management (CWRDM) in the biogeochemistry department on the topic "Distribution of Radon in sediment pore waters and coastal ground waters along Kozhikode district, Kerala". Her dissertation work is based on the radioactive element Radon, a naturally occurring noble gas, which contributes to the radioactivity of groundwater. She handled instruments such as Rad-7, Gas chromatograph-mass spectrometer, Ion chromatograph, Refractometer, UV-Visible Spectrophotometer, Flame photometer and Nephelo turbidity meter during her dissertation work. Her academic achievements include INSPIRE Scholarship for Higher Education Scheme (2015) for securing full marks in higher secondary examinations and ASPIRE Scholarship (DCE) for PG students (2021) for best dissertation. Since the CofE programme by NF-POGO covers the different fields of oceanography, she hopes that it will help her to improve her knowledge in marine sciences. She also hopes to develop good command of communication and scientific writing skills, to help her to publish her research effectively and disseminate the knowledge acquired.

Mujeeb Akanbi Abdulfatai (Nigeria)

Mujeeb holds a Master's degree in Physical Oceanography and Applications from the Paul Sabatier University (France) funded by the French Institute for Research and Development. Having had a background in Marine Geosciences, he aims to understand how the interdisciplinary ocean branches connect during his Master's programme by delving into physical oceanography. Working with Professor Emmanuel Cosme on the BOOST-SWOT project of NASA and CNES, Mujeeb successfully created a new image filtering method that efficiently removes small-scale noises/errors from the simulated Sea Surface Height (SSH) images of the future Sea Water and Ocean Topography (SWOT) satellite and recovery of its SSH data. The SWOT satellite, set to be launched in late 2022, will observe altimetric measurements of the ocean at high resolution (2 km) in along-track and across-track directions.

He also has a Bachelor's degree in Marine Science and Technology from the Federal University of Technology Akure, Nigeria. His bachelor's thesis focused on studying the spatial and temporal chemical change of the Nigerian transgressive mud coastal waters (Ondo coast, SW Nigeria) from river-ocean interactions.

Mujeeb identifies himself as an exploration ocean scientist who aims to increase ocean literacy in Nigeria by mentoring young oceanographers. Aside from academic life, he has given back to the community by volunteering to teach the 17 UN Sustainable Development Goals in high schools and rural communities. The OpenMODs module, among other imminent courses taken so far, represents the hands-on experience he aimed to gain from the NF-POGO CofE programme. He is now looking forward to the RV Heincke cruise, which is part of the observational training. He intends to share the knowledge gained and hopefully secure a PhD position after the programme.

Joey Cabasan (Phillippines)

Joey is a marine scientist from the Philippines. Living in one of the world's most diverse marine regions, her research works were focused on diversity and ecology of marine organisms. In particular, she does research on coral reefs with questions that relate to coral reef interactions, fish biology, and animal migration. She is also interested in learning new methods and the application of emerging scientific techniques to questions requiring multi-disciplinary approaches. Outside of work, she enjoys playing sports and a good conversation over coffee.

Joana González Rejón (Mexico)

Joana is an oceanologist from the Autonomous University of Baja California and has a Master's degree in Physical Oceanography from the Center for Scientific Research and Higher Education of Ensenada (CICESE), both in Mexico. Joana's research has focused on the observational study of the surface ocean circulation in the Gulf of Mexico. She worked within the Research Group with Lagrangian Observations (GIOLA) in the Megaproject funded by the Mexican Ministry of Energy to study oil spills in the Gulf of Mexico through the Gulf of Mexico Research Consortium (CIGOM). In addition, she worked within the Remote Sensing, Autonomous and Unmanned Vehicles Laboratory (SERVANT) of CICESE, analysing and evaluating the ocean energy potential from currents and thermal gradient in the Gulf of California. Joana is very passionate about marine science outreach and is the cofounder of Pro Oceano, a social collective for environmental education and

scientific dissemination of information on marine resources in Mexico. She is looking forward to creating professional connections for future collaborations in research projects within the POGO network.

The CofE scholars in Helgoland, Germany. Photo credits: Uwe Nettelmann (AWI)

ECOP
Early Career
Ocean Professionals

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

ECOP Africa is calling

The **Early Career Ocean Professional (ECOP) Network Programme** is established to empower ECOPs, who self-identify as being early in their career in any field related to the ocean. The Programme is at the heart of the UN Decade of Ocean Science for Sustainable Development, and was endorsed by the UN Ocean Decade as a network programme in 2021.

ECOP Africa goal is to foster ocean sustainability by creating capacities for ECOPs in Africa to network and actively engage in the ocean conservation agenda beyond the decade.

NANO members who are from, studying, and/or working in the African region are invited to join ECOP Africa.

How to join: Write an email to **africa@ecopdecade** indicating your area of interest, nationality or country of operation and ideas/projects that they would be involved in, which may include training and ongoing webinars.

Gabriel Akoko Juma, NANO member and ECOP Africa Coordinator, has a message for you!

Subscribe to the newsletter or check for more information at **https://www.ecopdecade.org/**.

NF-POGO Visiting Fellowship for Shipboard Training

RV DANA

Baltic International Trawl Survey (2021)

NF-POGO-Eurofleets+ Shipboard Training Fellowship on board the *RV DANA* (2 - 17 November 2021)

Joseph Sebastian
Alumnus profile: https://nf-pogo-alumni.org/profile/JosephSebastian/

I am studying for a Master of Science in Geomatics (with specialisation in Hydrography), acquiring more exposure in marine research where hydrographic applications are involved.

I used one hydrographic instrument (Echosounder) and one oceanographic instrument (CTD) during the shipboard training. Both instruments are essential in my profession. The training was an excellent platform to apply the theoretical knowledge that I received from the current course. The professional experience I gained will be beneficial in my future studies in hydrography.

The CTD is an oceanographic instrument used to determine the physical properties of water. The unit consists of sensors to measure Conductivity, Pressure and Temperature. The goal of descriptive physical oceanography is to obtain a clear and systematic description of the ocean - sufficiently quantitative to permit us to predict with reasonable certainty some aspects of their behavior in the future. During the training, I learned how to obtain a systematic, quantitative description of the character of the ocean waters, their geographic distribution, and their movements. In the field of hydrographic surveying, it is imperative to understand the physical properties of the water before deploying any underwater equipment.

I have further investigated the research topic 'How does change in oxygen level in the water affect the marine species?' using the CTD data.

The other hydrographic instrument I used onboard is an echosounder. It is an instrument used to measure the physical and biological components of water. We collected the data with an echosounder at each acoustic station which I used to identify the objects in the water column (fish and plankton). I used the sounding data for analysing the presence, abundance, distribution, and acoustic characteristics of different variables. Echosounder data is the tool I used for understanding the ocean terrain. It was useful to understand the bottom substrate class (e.g., sand, mud, rock). The resulting analysis can generate GIS data layers for these variables.

The expedition onboard RV DANA was an outstanding opportunity and provided me with a deep knowledge of hydrographic/oceanographic equipment, CTD and Echosounder. Also, it is an excellent opening for me to do research in the future. I am grateful to my parent supervisors and the tremendous support of POGO members. I would like to point out there was excellent rapport between POGO and me during the entire period of the fellowship. The training environment onboard RV DANA was outstanding – friendly, supportive and motivating.

The training helped me explore and enhance my skill and professional knowledge. Moreover, I firmly believe that the training and the experience I gained during this fellowship programme will be a milestone in my career. I am grateful to everyone who supported my professional endeavors.

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NANO website: www.nf-pogo-alumni.org

Massive algal blooms tint the seas of Rio de Janeiro this Summer: should we worry?

Priscila Kienteca Lange[1]*, Silvia Nascimento[2], Gleyci Moser[3]

[1]Departamento de Meteorologia, Universidade Federal do Rio de Janeiro (UFRJ), Brazil
[2]Instituto de Biociências, Universidade Federal do Estado do Rio de Janeiro (Unirio), Brazil
[3]Faculdade de Oceanografia, Universidade do Estado do Rio de Janeiro (UERJ), Brazil

*Alumna profile: https://nf-pogo-alumni.org/profile/plange/

In November 2021, Rio de Janeiro (Brazil) had the largest and longest algal bloom ever recorded in Brazil, covering more than 150 km of coast, and lasting for more than 60 days! Phytoplankton specialists in Brazil are trying to unveil the causes and consequences of this anomalous phenomenon.

Sporadic and small algal blooms are recurrent in Rio when heat waves hit the city. Under usual conditions, a coastal upwelling (South Atlantic Central Water mass) in Arraial do Cabo – the eastern tip of the continent (*Figure 1*) – starts in September/October (austral spring) when Northeasterly winds pick up and induce (due to Coriolis effect) the transport of coastal surface waters away from the continent. This nutrient-rich deep water fertilizes the surface ocean, where there is plenty of light for photosynthesis, supporting the sudden increase in primary production, mainly of small diatoms which are quickly grazed by zooplankton and fish larvae. This productive water mass is usually dragged west, often reaching the coast of Rio in Spring.

A few days after reaching the surface, when it arrives in Rio, this cold and now turbid water is dominated by small flagellates because of ecological succession. This seasonal phenomenon is crucial for supporting the local marine life, fisheries, tourism and the local economy. It is also the reason why scuba diving in Arraial do Cabo in Spring is beautiful but so incredibly cold.

In 2021, something unusual happened in September/October: instead of strong Northeast winds and clear skies, Rio faced over six cloudy weeks of constant rain and darkness. Rio's beaches had very cold, clear blue waters, similar to those usually observed in Arraial do Cabo. In early November, the sun finally showed up. There were long days, clear skies, clear and nutrient-rich waters, and no wind. Rio's waters quickly stratified as the surface layers warmed up, creating the perfect conditions for a dinoflagellate bloom. Thus, the water became darker, and a vast red foam formed (*Figure 1*). At this point, it was not a big issue for Rio's citizens because this happens occasionally. But this time, instead of fading, the red tide spread. The sunny days of calm seas lasted for weeks as coastal currents pushed the bloom east. One month after it started, the bloom darkened the waters of Rio's most pristine scuba dive paradise: Arraial do Cabo. On December 5th, the bloom covered more than 150 km of the coastline (*Figure 2*).

Figure 1 - Red foam formed in the phytoplankton bloom seen at Ipanema (Rio de Janeiro, 4th December 2021).

Figure 2 - True colour satellite image (Sentinel-3A, OLCI), showing the dark algal bloom along the coast of Rio de Janeiro, on 5th December 2021

As weather conditions changed, with more cold fronts from the South bringing rain and clouds, the bloom was slowly pushed away from the coast in December. The dark swirl that left Rio's shores gave rise to a massive offshore bloom which, on 27th January, had a length of over 600 km (*Figure 3*). In 2014, a similar massive bloom covered the South Brazilian Bight, and was also apparently linked to a high frequency of observations of harmful algal blooms in Rio de Janeiro.

A team of local phytoplankton specialists (Priscila Lange from UFRJ, Gleyci Moser and Domenica Lima from UERJ, Silvia Nascimento from Unirio, Lohrengrin Fernandes from IEAPM and Silvana Rodrigues from UFF) combined efforts to assess the bloom (*Figure 4*). Water was sampled from several locations inside Guanabara Bay and along the coast of the cities of Rio de Janeiro and Arraial do Cabo. Phytoplankton species composition was primarily assessed using microscopy and pigment analysis (HPLC). Unfortunately, we did not have the financial and logistical support to collect more samples, so it was impossible to survey the bloom properly.

What was in the bloom?

The local news first reported the bloom on 8th November 2021. The first water sample was taken from the Recreio beach in Rio, on 16th November. The dark-red water was dominated by the ciliate *Mesodinium rubrum*, combined with the flagellate Tetraselmis sp., which is always abundant in Rio's coastal waters.

Two weeks later (early December), when the bloom reached Arraial do Cabo, the water became dark-brown. Water samples were taken from several beaches in Rio (Urca, Copacabana, Leblon, São Conrado) and from Arraial do Cabo. Samples from Rio showed the

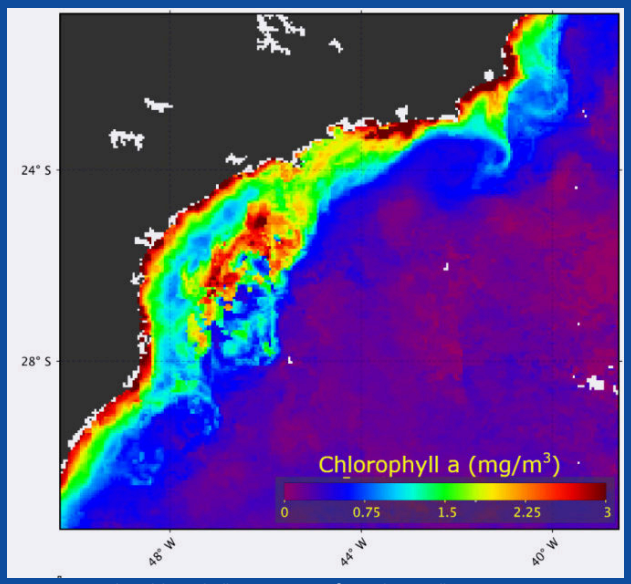


Figure 3 - 28-day Chlorophyll-a composite from the satellite MODIS-Aqua

dominance of two dinoflagellates: Scrippsiella sp. (*Figure 5*), and one unidentified species of the family Kareniaceae. Conversely, Scrippsiella sp. was the only dominant species in Arraial do Cabo.

Patches of dark orange-glowing water (*Figure 6*) were still observed on 21st December, in calm inlets around Rio de Janeiro city. These water patches were warm (28 °C compared to the surrounding 20 °C waters) and infested with a diverse community of dinoflagellates, the ciliate *Mesodinium rubrum*, along with small flagellates (Criptophytes and Tetraselmis). We speculate that these calm inlets could have possibly been the source of the massive offshore red tide, but further image and data analysis needs to be conducted.

Later in the summer (26th-29th January 2022), the satellite images recorded a massive green bloom on the beaches. The bloom was composed of a variety of diatom species which are indicative of the presence of upwelled waters, as confirmed by the low water temperatures. Beach diatoms such as Asterionellopsis spp. also bloomed as a cold front increased the turbulence on the beaches. Dinoflagellate blooms and flagellate blooms merged with this diatom bloom, forming a beautiful and productive bloom mosaic. A bloom of gelatinous organisms (several species of jellyfish) formed around the phytoplankton patches.

New blooms are expected to happen before the end of summer, in late February.

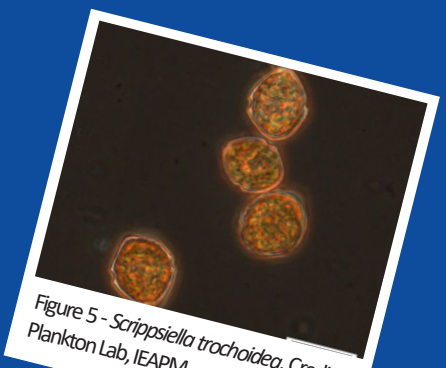


Figure 5 - *Scrippsiella trochoidea*. Credits: Plankton Lab, IEAPM.

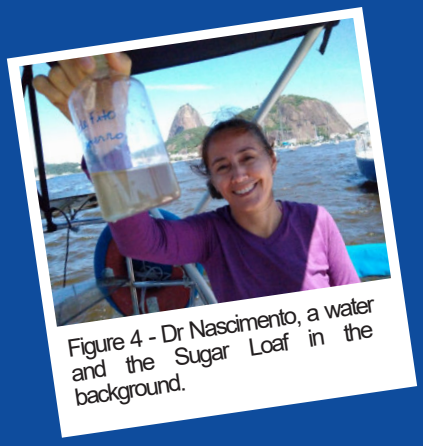


Figure 4 - Dr Nascimento, a water and the Sugar Loaf in the background.

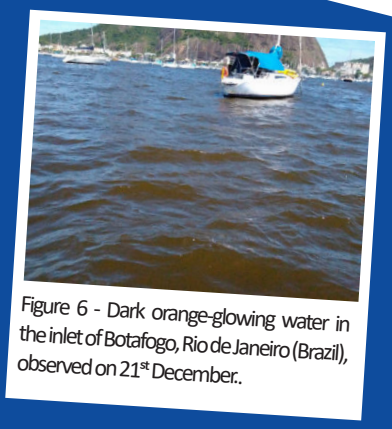


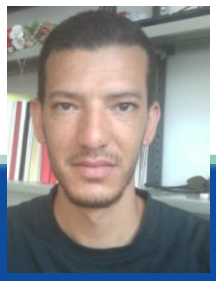
Figure 6 - Dark orange-glowing water in the inlet of Botafogo, Rio de Janeiro (Brazil), observed on 21st December..

ALUMNI IN THE FIELD

Update on current project and research interests

Houssem Smeti

Preparatory Institute for Engineering Studies of Tunis, Tunisia
National Institute of Marine Sciences and Technologies, Carthage, Tunisia
Alumnus profile: https://nf-pogo-alumni.org/profile/hsmati/



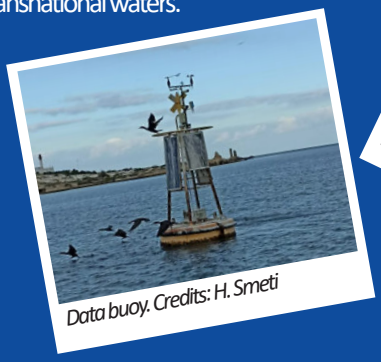
I am a postdoctoral research scientist affiliated with the National Institute of Marine Sciences and Technologies (INSTM in Carthage, Tunisia) and the Preparatory Institute for Engineering Studies of Tunis (IPEIT, Tunisia).

After working with NANO as a project coordinator for the Africa regional project (2013-2017) and the DOAP global project (2017-2020), I took on a researcher position jointly at IPEIT and INSTM, under the mentorship of Prof Moncef Boukthir (IPEIT), Prof Malika Belhassen (INSTM) and Prof Cherif Sammari (INSTM).

For this new assignment, I am responsible for maintaining and deploying a data buoy equipped with meteorological and biogeochemical sensors. I am also working on setting up the data transmission system from the buoy to a land-based server (at INSTM's Observatory of the Sea) and preparing the processes that will be applied for data quality control and subsequent analyses. Another aspect of my work involves the validation of hydrodynamic numerical models outputs with observation data (temperature, salinity, current, sea level, chlorophyll concentration) from *in situ* measurements and satellite altimetry.

In 2022, I will participate in the European project SHAREMED, led by the Italian National Institute of Oceanography and Experimental Geophysics (OGS), in collaboration with colleagues from the Mediterranean Institute of Oceanography in Marseille, INSTM and IPEIT. The project objective is to develop a cost-effective Lagrangian drifter (floating buoy) equipped with a GPS to track water mass circulation and measure subsurface temperature and salinity. SHAREMED project focuses on increasing the capabilities to assess and address hazards related to pollution and environmental threats in Mediterranean transnational waters.

Lagrangian drifter. Credits: S. Ben Slima



Data buoy. Credits: H. Smeti

NANO Global Project (NANO-DOAP) Cartagena and CIOH Pier (Colombia) stations

Cooperative work experience for the implementation of the Best Practices for Ocean CO_2 measurements

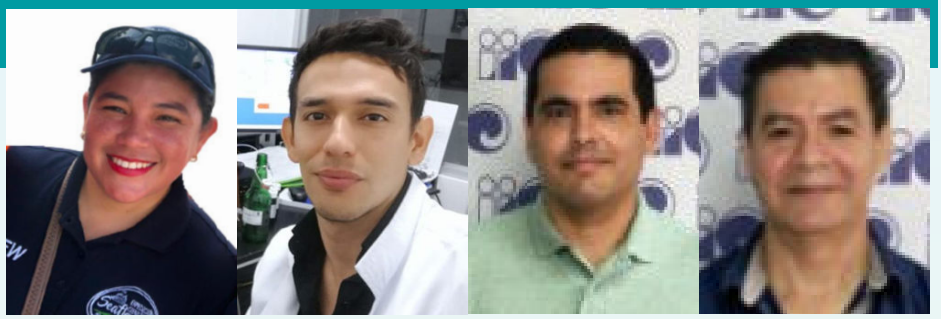
Stella P. B. Turizo[1]*, Cesar A. Bernal[2], Orion Norzagaray[3], Jose M. Hernández-Ayón[3]

[1]Centro de Investigaciones Oceanográficas e Hidrográficas del Caribe, Ministerio de Defensa, Dirección General Marítima (DIMAR), Colombia

[2]LABCAM, Instituto de Investigaciones Marinas y Costeras "José Benito Vives de Andréis", Colombia

[3]Instituto de Investigaciones Oceanológicas, Universidad Autónoma de Baja California, Mexico

*Alumna profile:https://nf-pogo-alumni.org/profile/sbetanc/



The guide to best practices for ocean CO_2 measurements was the product of a joint effort of scientists who have shared their experiences and have integrated them into a document that contains the most up-to-date information available on the chemistry of CO_2 in sea water and the methodology of determining carbon system parameters (Dickson et al., 2007). This type of initiative of joint work and standardisation of methods arises from the need to collect extensive and reliable data on oceanic carbon. Sustained observations of CO_2 chemistry provide critically needed data for understanding not only ocean acidification (OA), but spatiotemporal variability and magnitudes of air-sea CO_2 fluxes for use in regional and global carbon budgets (Sutton et al., 2017; Takahashi et al., 2002).

However, some questions arise, mostly related to its viability. For example, what happens when we apply these protocols in Latin American Laboratories (LALs)? Do we have access to recommended materials, reagents or advisors? But the main question, and perhaps a generality for LALs, on this topic is: How do we begin? In 2014, the *Instituto de Investigaciones Marinas y Costeras José Benito Vives de Andréis* (INVEMAR) started ocean acidification research with the regional project RLA/7/020 funded by the International Atomic Energy Agency (IAEA). Through this project, INVEMAR received the first technical and analytical capabilities for continuous carbonate system measurement. And through projects RLA/7/022 and RLA/7/025, capabilities for measuring discrete variables were strengthened. In 2018, the determination of Dissolved Inorganic Carbon (DIC) using a Marianda AIRICA was implemented, and, in April 2019, the determination of total alkalinity using a manual open titration system was implemented, with the accuracy required for the Sustainable Development Goal indicator "Average marine acidity (pH) measured at an agreed suite of representative sampling stations" (SDG14 Indicator 14.3.1). In 2019, the Marine - Coastal Stressors Research Network in Latin America and the Caribbean (REMARCO) was consolidated. From that moment, INVEMAR became a member of the executive committee responsible for the ocean acidification component. The analytical capabilities acquired have allowed INVEMAR to lead the organisation of several workshops, courses and international events focused on ocean acidification, and from 2021 INVEMAR has been reporting to SDG14 Indicator 14.3.1, positioning INVEMAR as a reference at national and regional levels.

Meanwhile, in Cartagena, these questions were formulated for the Center for Oceanographic and Hydrographic Research of the Caribbean (CIOH), one of the two General Maritime Directorate research centres in the country. The CIOH has led a monitoring programme for over a decade at a fixed station located 10 miles from the Tierra Bomba Island named Antares Cartagena station. During this period, CIOH measured key oceanographic variables: Temperature, oxygen, salinity and fluorescence have been obtained using a CTDO with fluorometer and multiparameter equipment. Water transparency is measured using a Secchi disk and water samples are collected using a Niskin bottle to measure nutrients, chlorophyll-a, absorption coefficients, total suspended solids, and to identify the planktonic community.

In 2018, the Antares station was invited to be part of the NANO Global Project (NANO-DOAP). The main objective of NANO-DOAP is to obtain field-based observations to assess and compare productivity, acidification, and deoxygenation levels of the ocean among several similar stations around the world. NANO-DOAP has motivated CIOH to take on the challenge of implementing measurements of the carbonate system in its laboratories. At that time, the main question was asked:

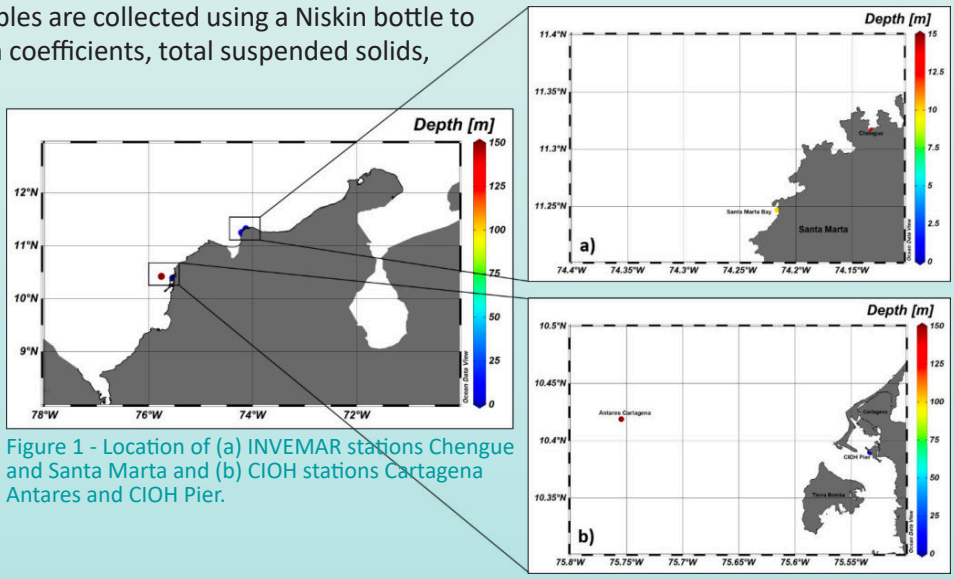


Figure 1 - Location of (a) INVEMAR stations Chengue and Santa Marta and (b) CIOH stations Cartagena Antares and CIOH Pier.

How do we begin? The natural response was: We needed to establish collaborations with institutions with experience in these matters; thus, the cooperative work between CIOH and INVEMAR was born. Since both institutions are leaders in scientific research in Colombia, they understood the importance of cooperative work and have encouraged joint efforts in training and data collection. This collaboration focuses on the respective monitoring programmes that each institution has developed with its own resources and capacities. INVEMAR collects data and samples at Chengue and Santa Marta Bay stations (*Figure 1a*), while CIOH is responsible for Antares and CIOH Pier stations (*Figure 1b*).

Figure 2 - INVEMAR Training participants (from left to right) Halbín Serrano, Kelvin Varela, Yoselin Nieto, Cesar Bernal, Stella Betancur, Katiana Martinez, Juan Sebastian Murillo and Joaquin Rivero.

The first step began with a training course at INVEMAR, for three days (16-18 September 2021) funded by the NANO-DOAP Project (*Figures 2 and 3*). The main objective of this instructional course focused on teaching the sampling and measurement protocols of carbon parameters (DIC and TA) to the CIOH's staffs, and supporting INVEMAR's staff on how to take samples for analysing the absorption coefficients.

During the training, Cesar Bernal emphasised the importance of quality controls and the correct handling of certified standards. He shared his experiences acquired during the implementation process of TA and DIC measurements at INVEMAR and drew attention to the difficulties they faced while measuring carbonate system variables and in acquiring the standards of Dickson certificates and materials and supplies.

Finally, in this capacity-building process, Stella Turizo took part in the 2021 POGO-SCOR Visiting Fellowship Programme, during which she visited the Institute of Ocean Sciences of the University of Baja California, in Mexico, for a 2-month training under the leadership of Dr. Martín Hernández-Ayón, an international expert in marine CO_2 and marine biogeochemical processes. The training focused on applying laboratory practices and management of autonomous measurement equipment (i.e., MinFet pH and temperature sensor). For those of us interested in the implementation of pH measurements, such TA and DIC measurements, it is important not only to follow the protocols of Dickson et al. (2007), but also to understand the approach and small details for each variable and all the instruments behind each measurement, so that we can measure with precision and accuracy.

For the first weeks, the training was based on the measurement of DIC by coulometric techniques, TA using an open-cell titration automatized system, and pH by a potentiometric closed cell system (*Figure 4*), all of these under the guidance of qualified personnel for each parameter. After the instructions, applied exercises were carried out with an evaluation of skills until precision was achieved in the measurements and finally to read the participants' own samples. In the final weeks of the POGO-SCOR training, activities focused on reading TA and pH samples using basic procedures. The first variable uses an open manual titration cell and the second with a closed cell. Both systems were configured in a way to resemble the instruments of the CIOH laboratory, which require greater care and control of each stage of the process since we do not have an automated measurement system.

In parallel, under the guidance of Dr. Orion Norzagaray, protocols and procedures for handling and maintaining autonomous sensors for pH measurements were revised in order to learn the process of laboratory measurements. During her stay in Mexico, Stella made the most of the experience and relied on the guidance of Dr Hernández-Ayón group to acquire equipment for CIOH with resources from the NANO-DOAP project (*Figure 5)*. The team shared their experience in handling this type of sensor, applying good practices and managing the data generated by these instruments through calibration and validation protocols.

Figure 3 - Scenes from INVEMAR training

We are so pleased with the support from NANO-DOAP and POGO-SCOR, because the combination of data management and emerging technologies for ocean observations allow expansion of the fixed-point field time-series observations. The Antares network counts already with valuable oceanographic data, from an area of the world ocean that has been poorly studied, and its goal is to continue and improve the in situ observations together. Applying emerging technologies for assessing carbonate systems will allow us to expand the fixed-point field time-series observations. With the training we received, the CIOH team is now able to determine shifts in the

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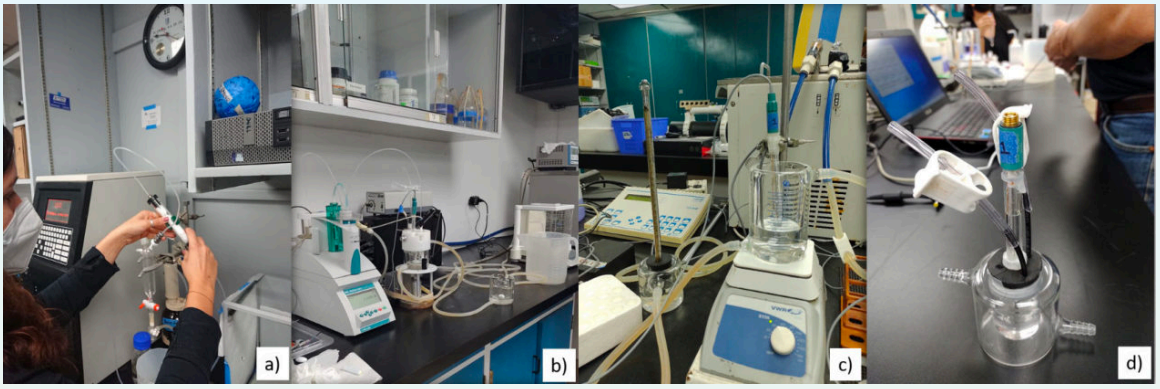

Figure 4 - Analyses and equipment at Dr. Hernández-Ayón's laboratory includes (a) DIC using coulometric instruments, TA with (b) a titration automatic system and (c) closed manual titration cell, and (d) pH by a potentiometric closed cell system.

ocean carbonate chemistry composition in response to changing environmental and biological conditions. The CIOH group is using the training obtained at INVEMAR and IIO to develop and apply it in the studies at the ANTARES and NANO-DOAP networks.

These efforts are critical to advance generation of new OA knowledge in the region. We believe that the different networks, foundations or entities that support ocean acidification research should join efforts to overcome weaknesses in the region such as the low availability of certified reference material for TA and DIC, TRIS buffer standard and purified m-cresol for pH analysis.

Figure 5 - With support of the NANO-DOAP Project, the CIOH team purchased a MinFet instrument for measurement of temperature and pH in the water column. Dr Betancur received training on how to calibrate and operate the instrument with Dr Ayón-Fernández.

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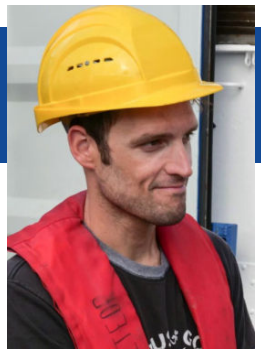
How the semidiurnal tidal cycle conditions the dynamics of the water column of the San Jorge Gulf, Patagonian Shelf

Juan Cruz Carbajal

Centro para el Estudio de Sistemas Marinos, Centro Científico Tecnológico, Consejo Nacional de Investigaciones Científicas y Tecnológicas, Centro Nacional Patagónico (CENPAT), Puerto Madryn, Chubut, Argentina.
Alumnus profile: https://nf-pogo-alumnining i.org/profile/jccarbajal/



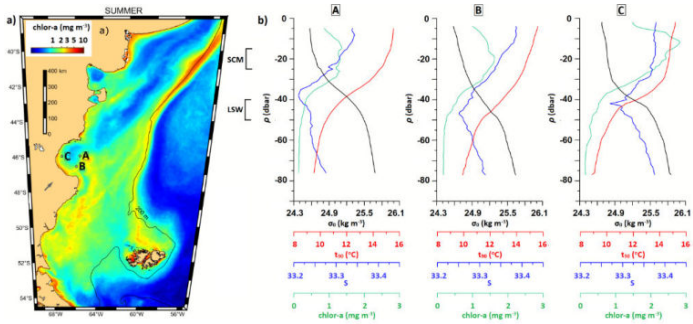


Figure 1 - a) Summer climatology of the surface chlor-a concentration in the Patagonian Shelf obtained from the L3 (4 km) product VIIRS Suomi-NNP. The grey arrow points to the San Jorge Gulf. b) February climatology vertical profiles of density (black), temperature (red), and salinity (blue) in three locations of the San Jorge Gulf obtained from INIDEP's Base Regional de Datos Oceanográficos (BaRDO).

Brief of the study

The Patagonian Shelf (Large Marine Ecosystem N° 14), located between 38° S and 55° S, and between the coast and the 200-m isobath, is identified in general terms as a highly productive region (Rivas et al., 2006), in particular, the San Jorge Gulf (*Figure 1a*).

During the Austral Summer, the San Jorge Gulf presents a hydrographic feature in its southern portion that can be identified in the vertical profile of salinity. The vertical gradient sign changes at the pycnocline depth, meaning that it presents a minimum of salinity (*Figure 1b*). A numerical simulation of the seasonal circulation of the Gulf highlights the influence of the Patagónica current towards the inside of the Gulf during the summer, penetrating 1/3 of its transport cyclonically into the Gulf, affecting the thermohaline structure of the waters due to its low salinity and less temperature (Matano and Palma, 2018). Associated with this, a Subsurface Chlorophyll-a Maximum (SCM) located at 12-20 dbar occurs in the mixed layer reaching values of 2.8 mg m-³ in the interior of the Gulf (*Figure 1b*). Several authors understand that the SCM is an effective source of new primary production as well as a critical link in the global carbon cycle (Sharples et al., 2001; Steinbuck et al., 2009). Nevertheless, in our case, the contribution of the SCM to the net primary production of the Gulf is not clear. The hydrographic feature suggests that the low salinity waters (LSW) transport a moderate amount of nutrients towards the interior of the Gulf, which in summer would give rise to the SCM (general hypothesis). This short contribution to NANO Newsletter was part of my PhD thesis, carried out at the Centro para el Estudio de Sistemas Marinos and funded by the Consejo Nacional de Investigaciones Científicas y Técnicas of Argentina. The focus was to determine the influence of the semidiurnal tide in the evolution of the water column vertical structure during the summer period and in the intrusion of the nurtient-rich LSW that favor the existence of the SCM.

Material and methods

A time series of 13 Conductivity-Temperature-Depth (CTD) profiles collected approximately every two hours was carried out in a quasi-Fix Station (FS) located in the center of the Gulf (*Figure 2a*; 45°56.7' S, 65°34.1' W), with a mean depth of 92 m. The time series began on 6th February, 17:04 UTC and ended on 8th February, 04:02 UTC, 2014 and was part of the surveys carried out onboard of the R/V Coriolis II during the second leg of expedition MARES (St-Onge and Ferreyra, 2018). Between the profiles FS03 and FS04, there was a four-hour time step, and between FS07 and FS08 a time gap of nearly ten hours where no hydrographic data were collected. The time series analysis was split into two groups according to the tidal cycles (*Figure 2b*).

Ocean currents measurements were acquired through a hull-mounted acoustic Doppler current profiler (ADCP) Teledyne RDI 150 kHz for 1.46 days. Full-depth CTD profiles were acquired with a SBE911plus equipped with a fluorescence and other sensors. Water samples were collected every four hours to determine nitrate+nitrite and chlorophyll-a (Chl-a) concentrations in the water column, and used to calibrate the CTD ancillary sensors. Chl-a concentrations were determined near the surface, in the SCM and below the seasonal pycnocline, while nitrate+nitrite concentrations were accomplished with the

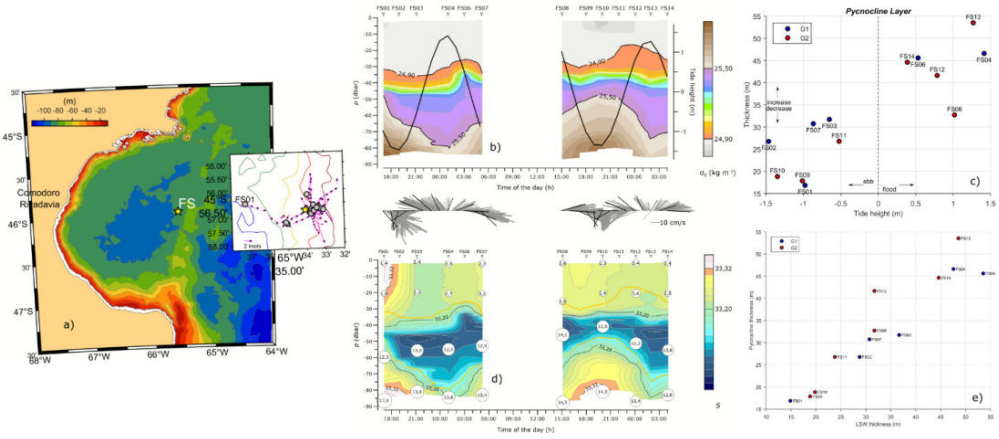


Figure 2 - a) Quasi-Fix Station (FS, yellow star) location, CTD profiles (grey circles) iand the vessel velocity vector (magenta arrows). b) Vertical structure of σ0. c) Thickness of the pycnocline vs tide height. d) Vertical structure of salinity showing the values of nitrate+nitrite in mmol m-³. e) Thickness of the pycnocline vs LSW thickness. Between b) and d) is the hourly prediction of tidal current (black vector) and the mean velocity vector in the vertical computed from the ADCP (grey vector) every 3 minutes.

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same sequence plus bottom samples (*Figures 2d and 3b*). A total of 651 vertical profiles of horizontal velocities were acquired during the time series ranged from 12 m (bin 1) in surface to 68 m (bin 15) and 76 m (bin 17) in-depth (*Figure 3a*). Group one (G1) integrated by FS01, FS02, FS03, FS04, FS06 and FS07 covered the first cycle of 12 hours 06 minutes, and group two (G2) integrated by FS08, FS09, FS10, FS11, FS12, FS13 and FS14 covered the third one of 12 hours 57 minutes. G1 and G2 occupied a complete semidiurnal tidal cycle of amplitude 2.9 m and 2.6 m, respectively [hourly prediction of the tide height and tide current from the barotropic model OSU TPXO (Egbert, and Erofeeva, 2002).

Results and discussion

The consecutive collection of CTD profiles revealed a characteristic σ0 structure of a temperate shelf sea region: an upper layer of light waters (σ0 < 24.90 kg m^{-3}) and a bottom layer of heavy waters (σ0 > 25.50 kg m^{-3}) separated by a sharp seasonal pycnocline (*Figure 2b*). The contours of σ0 boundaries of the pycnocline layer essentially provided qualitative evidence of an internal wave associated with the flood/ebb tidal variability. The isopycnals of that layer spread upward into the upper layer and downward into the bottom layer during the flood tide while a constriction towards the shallowest pycnocline depth appeared during the ebb tide (*Figure 2b*). The good correlation between the thickness of the pycnocline layer and the tide height (R^2 = 0.75) indicated that there was a decrease (increase) of the thickness towards the ebb (flood) (*Figure 2c*). The LSW tends to spread depthward during flood tide due to the upper stability of the pycnocline (*Figure 2d*). The thickness of the LSW (S < 33.20) varied linearly with the pycnocline thickness (R^2 = 0.88) reaching a minimum value in FS01 (14.9 m) and FS09 (18.8 m), and a maximum value in FS06 (53.5 m) and FS13 (48.6 m) for G1 and G2, respectively (*Figure 2e*). The maximum stability of the water column was located within the pycnocline during the FS. The stability of the water column increased when the waters left the Gulf and decrease when the waters entered. The semidiurnal cycle as the main forcing at this time scale conditions its stability. When the waters leaves the Gulf, it increase the stability of the column by reducing the thickness of the pycnocline layer (the isopycnals are compacted) while entering the water, its stability decreases as a consequence of the increase in the thickness of the pycnocline layer (the isopycnals are spread apart) (*Figures 2c and 3*). The LSW that enters through the pycnocline layer with a very good amount of nutrients softens the stability and tends to reach the upper layer due to its increased thickness (*Figures 2d and 3*), and would make nutrients available there to be used by planktonic organisms in later semidiurnal cycles. With adequate levels of light, this mechanism could be one of those responsible for maintaining the SCM observed in the Gulf during summer.

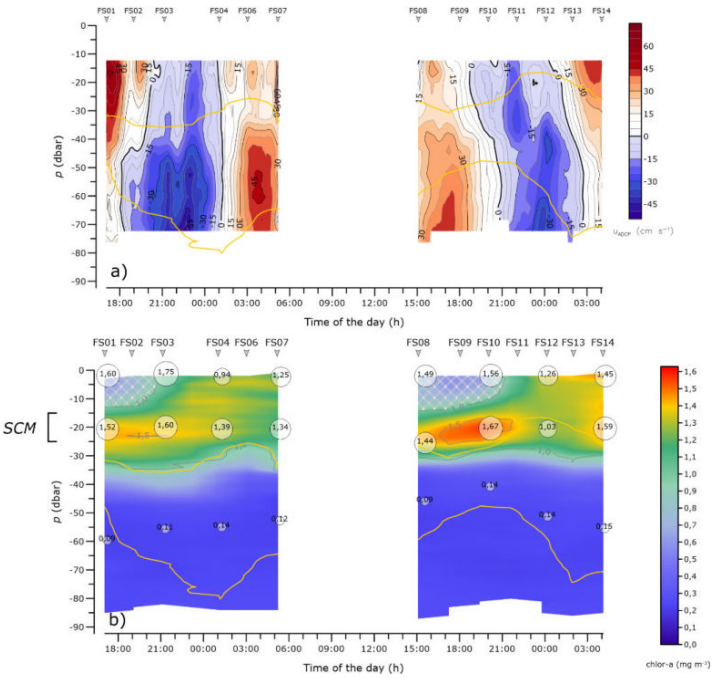

Figure 3 - a) Current zonal component (U, cm s^{-1}) time series. b) Vertical structure of chlorophyll-a concentration (Chl-a, mg m^{-3}). Yellow contours indicate the isopycnals of 24.90 kg m^{-3} and 25.50 kg m^{-3}.

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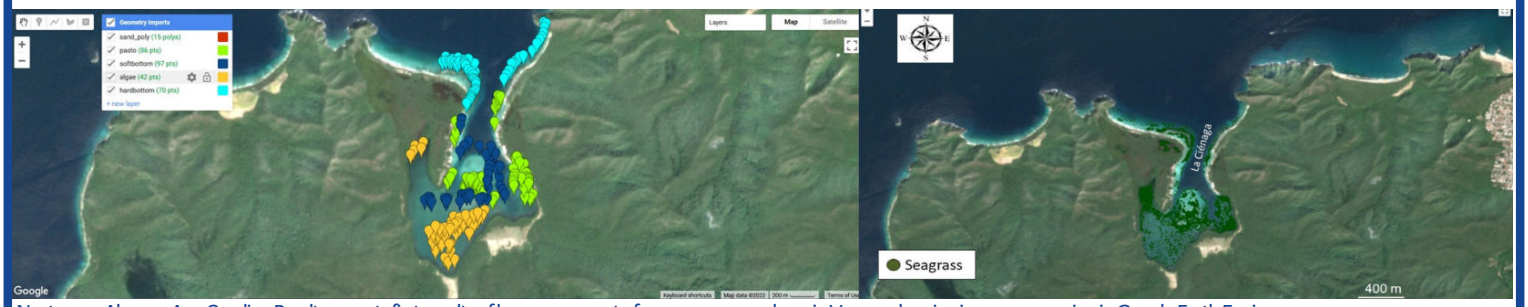
Acknowledgments

My sincere gratitude to Dr. Lilian A. Krug and Editor-in-Chief Yohan Louis for giving me the space to make this contribution.

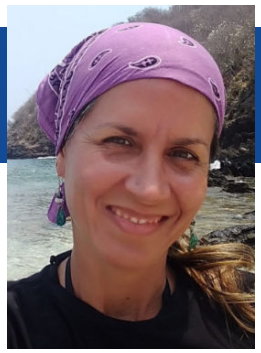


Next page: Alumna Ana Carolina Peralta reports first results of her assessment of seagrasses meadows in Venezuela using image processing in Google Earth Engine.

Seagrass Assessment using optical satellite images: a case study for Venezuelan coastline

Ana Carolina Peralta

Marine Biology Laboratory, Environmental Department, Simón Bolívar University , Venezuela
Alumna profile: https://nf-pogo-alumni.org/profile/aperalt/



Seagrasses are flowering plants that live submerged in the sea, rooted in the coastal seabed. There are about 60 species of seagrasses around the world, growing in shallow waters up to a depth of about 70 m. Below-ground parts of seagrasses typically consist of roots for anchoring and rhizomes for mechanical support and propagation. Above-ground parts usually consist of shoots that bear several leaves and occasionally flowers (*Figure 1*). In general, the appearance of most seagrasses is very similar to that of terrestrial grasses.

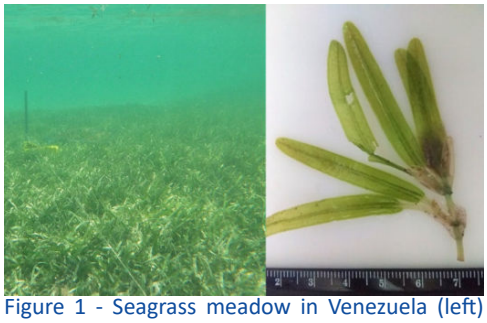


Figure 1 - Seagrass meadow in Venezuela (left) and shoot (right)

Seagrass beds provide food and shelter for various animals, including crabs, molluscs, turtles, and fishes, some of which are critical to local economies. Seagrasses provide oxygen and fix carbon from their aquatic environment through photosynthesis, just like vegetation on land. This fixed carbon accumulates as biomass and as organic matter in the sediment as seagrasses die. Therefore, they serve as a mechanism to retain carbon that enters the water from the atmosphere. This form of carbon sequestration helps mitigate the increase of CO2 in the atmosphere. Because this natural process is important in the carbon cycle and in understanding climate change, seagrasses are an important element of “blue carbon”. Seagrasses also protect against local coastal flooding and erosion because they attenuate wave energy near the shore.

Like tropical forests, seagrasses are disappearing from the earth's surface rapidly as a result of human activities such as unplanned and unsustainable coastal development and water pollution, among many, simultaneously with rising water temperatures.

The extent of seagrass cover is an important metric of ecosystem health, which is being considered by the Convention on Biological Diversity for its post-2020 goals. It is one of the Essential Ocean variables promoted by the Global Ocean Observing System (GOOS) because of its relevance to local and regional economies and the well-being of communities that depend on them. Tracking of seagrass extent can be done using optical satellite images. The products derived from satellite images analysis are helpful for spatial planning and conservation strategies and for assessing their vulnerability.

In 2021, I was selected for a POGO-SCOR Visiting Fellowship. In this training, I used the location of La Ciénaga de Ocumare, off central Venezuela in the Caribbean Sea, as a case study for seagrass cover assessments based on satellite data and a supervised classification algorithm.

La Ciénaga inlet is a system with an extension of 294.48 ha, located in a touristic and fishing region called Ocumare de La Costa (*Figure 2*). It is a site with mangrove habitats and areas of sandy bottom, coral reef, and seagrass meadows, thus providing several ecological, cultural, social, and economical ecosystem services, representing the natural capital of the area. Historically, there has been little knowledge about the bio–ecological attributes of this site. Further, the lack of regulations is an actual problem. There is a high risk that changes to the local habitats and biodiversity may impact these ecosystem services, affecting the local activities, the economy and human well-being.

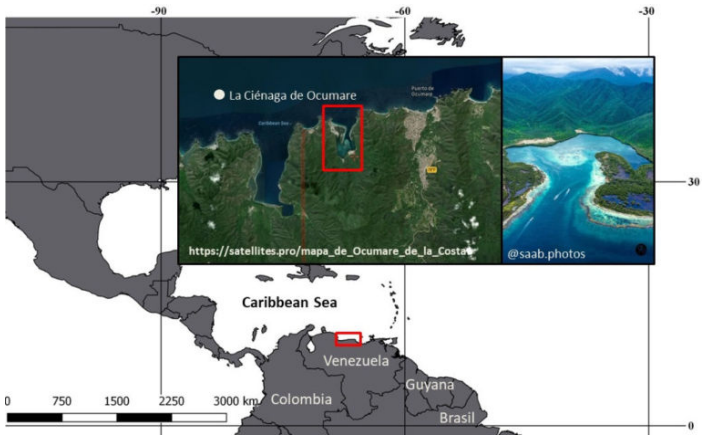


Figure 2 - La Ciénaga de Ocumare inlet

During the three-month visiting fellowship at the Institute for Marine Remote Sensing located in the University of South Florida, I worked with Dr Frank Muller-Karger, Dr Enrique Montes and Dr Luis Lizcano-Sandoval to learn the required skills and tools to classify seagrasses from optical satellite images (see example on previous page).

As a preliminary result, a seagrass habitat map has been created for La Ciénaga de Ocumare using Sentinel 2 images from the year 2020 and Google Earth Engine. There are two known seagrass species in this area: Thalassia testudinum, a native species, and Halophila stipulacea, an invasive species native to the Indian Ocean and the Red Sea that has spread throughout the eastern Caribbean since it was first recorded in Grenada in 2002.

One product we expect to generate is an estimation of the first detection of the invasive Halophila stipulacea at La Ciénaga. This will be assessed by examining the historical occurrence and location of each species recorded by GPS directly in the field over time since 2010, combined with concurrent historical satellite images. Another product we expect to generate is a seagrass map for the entire Venezuelan coast and subsequently evaluate changes (increase or decrease in coverage) in space and time.

The team thanks POGO and SCOR for the support to spend three months receiving training in optical satellite images analyses and interpretation, and the collaborations established thereof, that will lead to further assessments and scientific publications.

Phytoplankton and zooplankton community compositions within biogeochemical provinces and at the Ampère seamount in the North-East Atlantic Ocean

Angelee Pavanee Annasawmy

University of Washington, USA
Alumna profile: https://nf-pogo-alumni.org/profile/pannasa/

Background

I am grateful to NF-POGO and the Alfred Wegener Institute (AWI), Germany for having chosen me to take part in the first floating summer school along the North-South Atlantic Transect (NoSoAT) from Germany to South Africa in November-December 2015. I feel honored for being the first Mauritian trainee at the NoSoAT, where I was among 32 students from 19 countries. Having completed a PhD degree on seamount ecosystems of the Indian Ocean, I wanted to investigate the Ampère seamount ecosystem relative to continental shelf areas in the Atlantic Ocean. This research communication will shed new light on the Ampère seamount's topography and community structure.

Introduction

The Earth's ocean has been partitioned into several provinces based on physical, chemical and biological properties such as bathymetry, surface currents, hydrography and chlorophyll concentrations (Longhurst 1998; Reygondeau et al. 2013). Partitioning the world's ocean into provinces can aid in understanding complex oceanic processes even though the boundaries underlying these provinces are not fixed in space and time due to seasonal and annual fluctuations in the environmental descriptors (Longhurst 1998; Li and Harrison 2001). The physical and biological properties of two provinces in the North-East Atlantic Ocean, the North Atlantic Drift Province (NADR), located between 60°N and ~40°N, and the North Atlantic Subtropical Gyral Province (NAST), located between 40°N and 25°N (Marañón et al. 1999; Hardman-Mountford et al. 2008) (*Figure 1a*), were investigated in this study. The European continental shelf, where thermal fronts occur from 45°N to 49°N, is considered as the eastern boundary of the NADR province (*Figure 1b*). The continental shelf area is characterized by upwelling events and the inflow of Atlantic water into the English Channel. The NAST province is characterized by the presence of island platforms of Bermuda on the western side and the Azores and Canary Islands on the eastern side. Unlike the NADR province to the north, NAST is characterized by weaker winter mixing due to lower wind stress at the sea surface, leading to a shallower mixed layer (Longhurst 2007).

The Ampère seamount is part of the Horseshoe Seamount chain, located within the NAST in the North-East Atlantic Ocean. The seamount has a conical shape rising from an elongated base at ~4500 m below the sea surface (*Figure 1d*). At 110-200 m, the seamount breaks off to a small, rough summit plateau with a narrow peak reaching 55 m below sea level (Christiansen et al., 2015). The eastern flank of the Ampère seamount is very steep and abrupt relative to the western flank, which breaks into plateaus. Ampère is connected to the Coral Patch seamount along its eastern edge (Weinberg et al., 2013). Seamounts are important features of the worlds' oceans since, being topographic obstacles, they may influence the prevailing ocean currents and create local perturbations in the physical environment, which impact the availability of nutrients and hence affect the distribution and aggregation of marine communities along the food web (Beckmann and Mohn 2002; Pitcher et al. 2007; Lavelle and Mohn 2010; Santos et al. 2013). Available phytoplankton and zooplankton community compositions from the RV Polarstern cruise PS95 were analysed, in conjunction with satellite bathymetry, chlorophyll, sea level anomaly and absolute dynamic topography data, to investigate the influence of the environment and topography on the abundance of phytoplankton and zooplankton taxa at Ampère Seamount in the NAST relative to the NADR province.

Materials and Methods

The PS95 cruise was carried out onboard RV Polarstern from 29 October to 2 December 2015 along a north-to-south transect from Bremerhaven (Germany) to Cape Town (South Africa). For this study, data collected from stations conducted only in the NADR and NAST provinces from 1 to 8 November, will be analysed.

To provide an overview of the topographic elevation at Ampère seamount, the Shuttle Radar Topography Mission (SRTM) bathymetry product was acquired for the delimited Area of Interest (34°N-36°N; 14°W-10°W). Bathymetry from

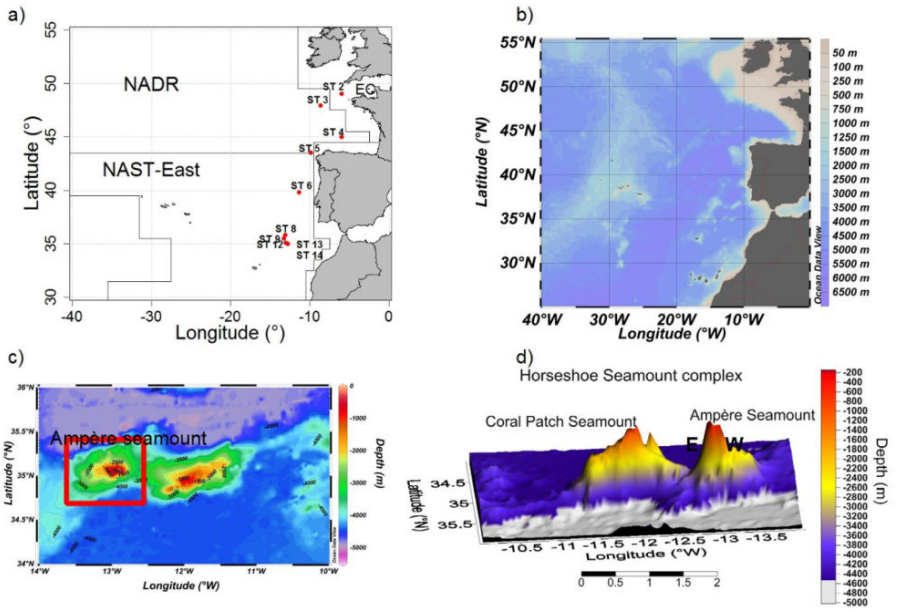


Figure 1 - The North-East Atlantic Ocean (a) Longhurst's biogeochemical provinces boundaries (black lines), English Channel (EC) and hydrographic stations (red dots); (b) GEBCO bathymetry (m) with continental shelf areas in beige; (c) Ampère seamount SRTM bathymetry (m) and (d) Ampère and Coral Patch seamounts 3-d bathymetry (m) showing the Horseshoe Seamount complex with western (W) and eastern (E) flanks of the Ampère pinnacle.

The General Bathymetric Chart of the Oceans (GEBCO) gridded data (GEBCO Compilation Group, 2020) was obtained for Ocean Data View (ODV, v. 5.3.0, Schlitzer 2020). Daily satellite chlorophyll-a product version 3.0 was downloaded from GlobColour at 4 km spatial resolution and used to provide an overview of surface Chl-a at NADR and NAST provinces for the studied period. The product chosen is based on CHL1 algorithm, applicable for Case 1 waters (phytoplankton-dominated inherent optical properties) and commonly used as a proxy for phytoplankton biomass in open waters (GlobColour 2020). Delayed-time Sea Level Anomalies (SLAs) and Absolute Dynamic Topography (ADT) at a daily and 1/4° resolution, were obtained at the Copernicus Marine Environment Monitoring Service portal to describe the mesoscale eddy field within the NADR and NAST provinces during the studied period. The ADT is the sea surface height for the Earth's geoid, while the SLA is the difference between the actual sea surface height and an average sea surface height for this time of the year.

Water samples collected from buckets and Niskin bottles at surface and deep chlorophyll maximum depth were preserved with Lugol's iodine and stored in brown glass bottles in a cool, dark and dry environment. The phytoplankton analysis followed the same method as in Taylor et al. (2011). The samples were introduced into a settling chamber, and the cells were allowed to settle for 48 hours. The cells were then identified and counted by the Utermöhl method (Utermöhl 1958) using a Zeiss IM35 inverted microscope equipped with phase-contrast and 400x magnification. The different phytoplankton species were broadly categorized into different groups based on characteristics specific to each group, such as siliceous external skeleton and presence of two valves for diatoms; solitary cells with flagella for flagellates; the presence of two dissimilar flagella and theca made up of a series of cellulose plates or athecate for dinoflagellates; the presence of cilia and tintinnids with shells for ciliates; spherical cells with calcite scales for coccolithophores.

Zooplankton samples were collected with horizontal and vertical Bongo nets (200 µm, 150 µm and 100 µm mesh sizes) and CalCoFi nets (500 µm, 80 µm and 20 µm mesh sizes) towed at a ship speed of 1.5 knots for 10 minutes within the NADR and NAST provinces. All trawls were conducted during the day except for one night trawl on the western flank of the seamount. The horizontal Bongo net was deployed at 15 m depth, while the vertical Bongo and CalCoFi nets were deployed 50 m below the depth of the chlorophyll maximum. When the nets were hauled in, they were washed with seawater into a collecting receptacle. The collected zooplankton was concentrated by sieving out excess water and stored in formalin for further investigations. Individuals were identified to the lowest possible taxon and counted.

Results

Environmental characteristics of NADR and NAST provinces

The satellite composite shows high Chl-a off the European continental shelf within the NADR province (stations 3 and 4) relative to the Ampère seamount located in more oligotrophic waters within the NAST province (station 13) (*Figure 2*). *In situ* measurements also showed the blue/green ratios at the shelf stations on 2nd-3rd November ranging from 1.21 to 2.06, which is an indicative of productive waters. On the other hand, the blue/green ratios at the seamount stations on 6th-8th November ranged from 1.60 to 4.59, which indicates oligotrophic waters with hardly any constituents in the water column (*Figure 3*).

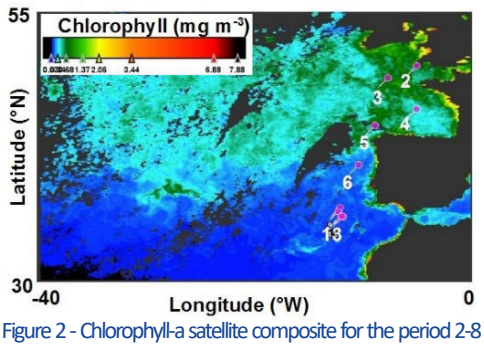


Figure 2 - Chlorophyll-a satellite composite for the period 2-8 November 2015. Pink dots indicate hydrographic stations.

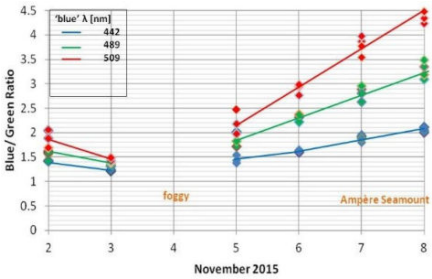


Figure 3 - *In situ* reflectance of the sea surface showing the blue/green ratio (green wavelength 555 nm).

As for topography, the eastern NAST province showed higher ADT heights than the eastern NADR and the Ampère seamount showed moderate SLA relative to the European continental shelf during the studied period (*Figure 4*).

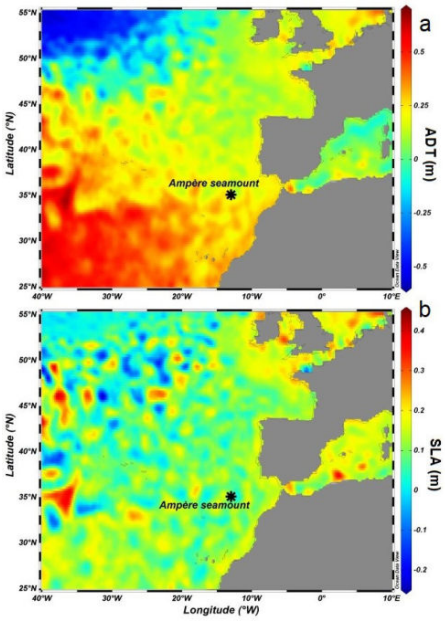


Figure 4 - Satellite-derived (a) Absolute Dynamic Topography (m) and (b) averaged Sea Level Anomaly (m).

Phytoplankton types within the NADR and NAST provinces

The Bray-Curtis similarity plots and tridimensional ordination plots resulting from non-metric multidimensional scaling (MDS) analysis show that phytoplankton taxa clusters are sharply defined based on shelf stations (*Figure 5a*). NADR stations were grouped at 60% similarity and those at the seamount stations within the NAST being grouped at 55% similarity. The stress values of the 3D MDS plots are 0.03 which indicate a near-perfect representation of the high-dimensional phytoplankton assemblage structure at these sites. Phytoplankton communities found at open ocean (station 8) were not different from those at the Ampère seamount in the tridimensional space, probably due to the close proximity of these stations (*Figure 5b*).

Phytoplankton groups at all analysed stations are mainly dominated by flagellates, with dinoflagellates being the second most abundant group within both NAST provinces (*Figure 6*). Coccolithophores were collected in greater proportions at Ampère seamount and the open ocean whereas diatoms were collected in slightly higher proportions at the Ampère seamount in comparison to the other locations. While similar numbers of phytoplankton taxa were collected within the NADR and NAST provinces, more individuals were collected in the NADR (82 730 individuals) relative to the NAST (34 860 individuals).

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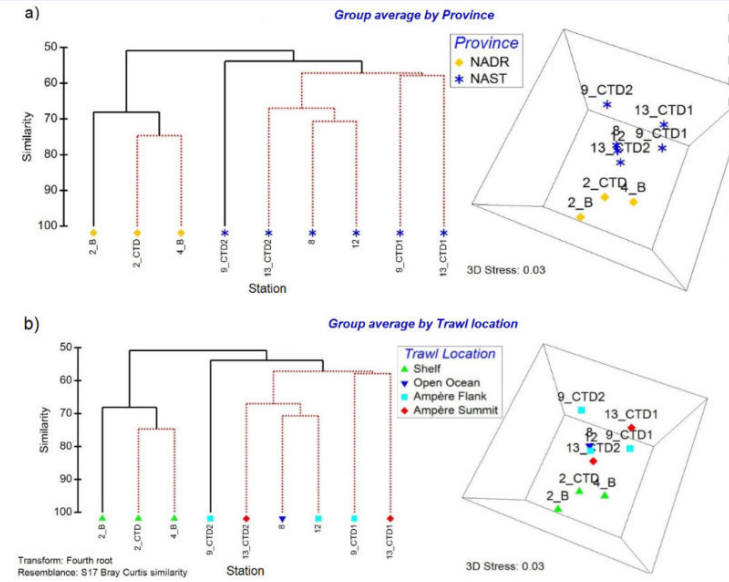

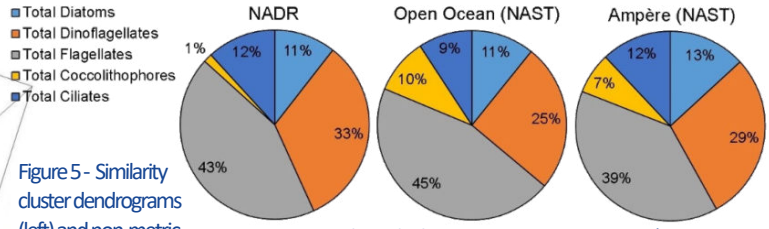

Figure 5 - Similarity cluster dendrograms (left) and non-metric multidimensional scaling 3D ordination plots (right) of phytoplankton species abundance at hydrographic stations (Bucket and CTD) according to (a) Province and (b) trawl location.

Figure 6 - Phytoplankton groups present at NADR (stations 2 and 4); and NAST provinces . NAST province is further divided into open ocean (station 8) and Ampère seamount flanks (stations 9, 12 and 13).

Zooplankton abundances within the NADR and NAST provinces

Zooplankton taxa at the shelf stations within the NADR were also segregated from those at the seamount stations within the NAST at 30% similarity (*Figure 7*). Zooplankton collected at Ampère's near field (stations 11 and 12) and far-field (stations 14) sites showed 50% similarity with no significant differences observed in total abundance between the eastern and western flanks (W=4, p > 0.05) (*Figure 7*). While a greater diversity of zooplankton taxa were recorded in the NAST relative to the NADR province, overall zooplankton counts were greater in the NADR (*Figure 8*). Calanoid copepods, cyclopoids and gastropods were the most abundant mesozooplankton taxa (55.9%, 10.7% and 6.3%, respectively) collected in the NADR. In the NAST province, calanoid and harpacticoid copepods and ostracods (45.5%, 11.2% and 1.1%, respectively) were the most abundant taxa. All other taxa contributed less than 1% to the total counts in the NAST.

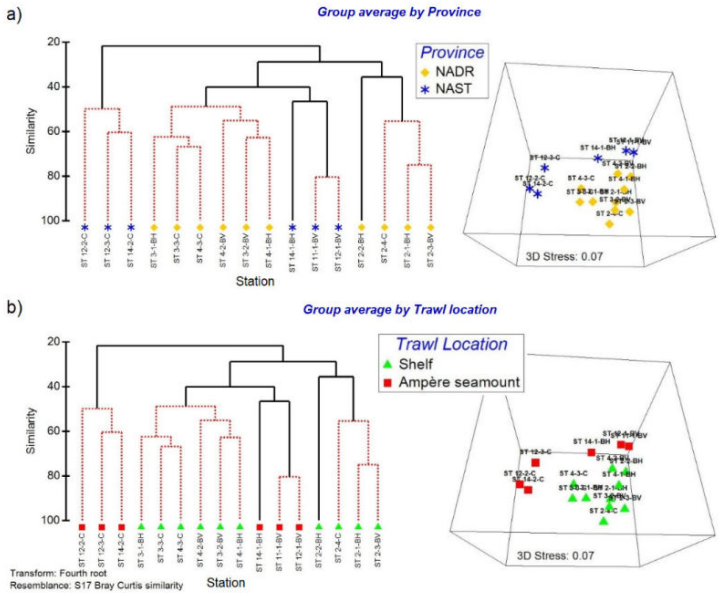

Figure 7 - Similarity cluster dendrograms (left) and non-metric multidimensional scaling 3D ordination plots (right) of zooplankton taxa abundance at stations according to (a) Province and (b) trawl location.

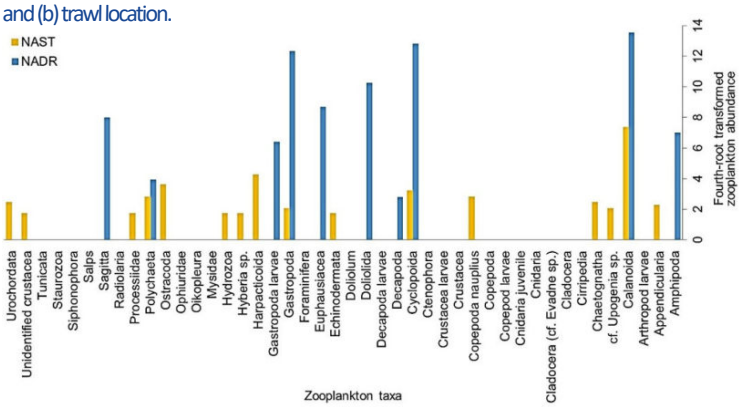

Figure 8 - Fourth-root transformed abundance of zooplankton taxa within NADR and NAST.

Discussion and Conclusion

This research work investigated the phytoplankton and zooplankton community compositions at Ampère seamount in the NAST province and its relation to the NADR province. Results has proven to be contrary to the general paradigm that seamounts show enhanced abundances compared to surrounding oceanic areas. In our investigation, other factors such as upwelling at continental shelf seem to have a greater influence on productivity than the Ampère seamount topography, bathymetry and current field. This is in line with previous studies showing high chlorophyll biomes in seasonally-stratified shelf seas of the NADR and intermediate chlorophyll biomes with the NAST province (Hardman-Mountford et al., 2008). The low phytoplankton and zooplankton abundances found at Ampère seamount within the NAST relative to the NADR maybe because of the oligotrophic conditions prevailing in the former province. Alternatively, a higher number of predators over the Horseshoe seamount complex may reduce zooplankton communities measured directly over the pinnacle. Large fish aggregations, some of which are zooplanktivorous, were observed at the Coral Patch seamount adjacent to the Ampère seamount (Weinberg et al., 2013). The eel *Synaphobranchus kaupii*, known to feed on amphipods, gastropods and polychaetes (Marques 1998), was dominant in trawl catches conducted on the middle and lower slopes of Ampère seamount (Christiansen et al. 2010), likely explaining the lower number of these zooplankton preys recorded over the pinnacle.

Although diatoms and dinoflagellates were believed to show higher growth rates in more productive waters (Denda et al. 2016), these two groups were found in similar concentrations within the NADR and NAST. The predominance of coccolithophores at the Ampère seamount in the NAST province is likely a consequence of the oligotrophic environment prevailing in this region since these organisms are known to occur at high diversities in nutrient-poor environments (Christiansen et al. 2010). The relatively low recorded zooplankton abundances were also in line with previous studies conducted during the same season (Christiansen et al. 2010; Denda and Christiansen 2014; Denda et al. 2016) and are typical of the oligotrophic NAST province. Higher zooplankton biomass at upwelling zones than open ocean areas was also observed in the Eastern South Pacific (González et al., 2019). Zooplankton

abundances are hypothesized to show a certain degree of seasonality with higher concentrations in May compared to winter due to nutrient replenishment after winter mixing (Denda and Christiansen 2014). Like previous studies, calanoid copepods were the most abundant taxa recorded at Ampère seamount, with no significant differences in total abundance of all zooplankton between the two flanks (Denda and Christiansen 2014).

This study further advances knowledge of the ecosystem functioning within the NADR and at the Ampère seamount. No phytoplankton and zooplankton enhancements were observed over the seamount, although the seamount phytoplankton and zooplankton communities were distinct from those sampled over the European continental shelf. With the global rise in sea temperature and carbon dioxide levels, the community structures in the North-East Atlantic provinces should be regularly monitored by conducting multi-disciplinary research cruises like the PS95 to detect any change in temperature, salinity, species composition and biodiversity.

Acknowledgements

I acknowledge the work and support of the scientific and non-scientific staff on board the PS95 cruise (AWI_PS95_00), chief scientists Rainer Knust and Karin Lochte and scientists Maarten Boersma, Claudia Hanfland, Birgit Heim, Therese Keck, Alexandra Kraberg, Pauhla McGrane and Karen Wiltshire. I thank Karin Lochte for her useful suggestions and comments in helping improve this manuscript. I further thank all 2015 NoSoAT trainees who helped count phytoplankton and zooplankton communities: Muhammad Abdullah, Karla Alujević, Dominik Auch, Eleni Bintoudi, Sarah Cosgrove, Monica Demetriou, Elvita Eglite, Lowri Evans, Maria Gkaragkouni, Friederike Grimmer, Minna Katariina Hovi, Jacqueline Jerney, Patricia Kaiser, Mohammed Kajee, La Daana Kanhai, Guillaume Le Gland, Seàn Lynch, Edem Mahu, Hugo Maxwell, Donal McGee, Amrit Kumar Mishra, Ngwako Rabodiba Adam Mohale, Rosemary Murphy, Ana Navarro Campoy, Ngozi Oguguah, Zo Tsihoarana Rasoloarijao, Hanna Scheuffele, Andrew Ward, Philipp Wenta, Annette Marget Wilson and Amy Wright.

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Reconstructing the migration of the Antarctic Polar Front at the Southern Indian Ocean across the Pleistocene Glacial-Interglacials

Emma Kilcoyne

Utrecht University, The Netherlands
Alumna profile: https://nf-pogo-alumni.org/profile/Emmak/

It has been almost three years since I graduated with a Bachelor of Marine Science and began my journey as an early career scientist. Equipped with a passion for learning and a keen interest in the Earth's Ocean and climate system, I participated in the NF-POGO shipboard training South-North Atlantic Transect (SoNoAT) onboard the RV Polarstern. While onboard, I was introduced to the prominent and novel research areas in Marine Sciences. Surrounded and supported by passionate peers, this expedition opened my eyes to what I wanted to study and achieve: a multifaceted approach to climate studies.

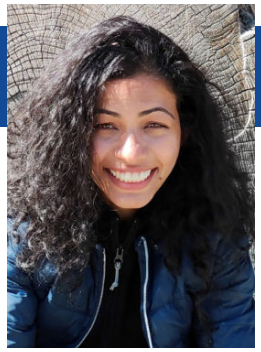
I am fascinated by the Earths' climate system and the fluctuations it has experienced over geological timescales, with a particular interest in the role of ocean dynamics in climate change. This led me to the 'Earth Life and Climate' Master programme at Utrecht University and my current thesis project. My thesis aims to reconstruct the Antarctic Polar Frontal System during the Pleistocene epoch. I am currently processing samples for palynology from the core MD19-3576, taken during the CROTALE cruise (MD218) in the Southern Indian Ocean, north of the present-day location of the subantarctic front.

The deep ocean holds the greatest CO_2 reservoir/budget on the planet. The Antarctic Circumpolar Current (ACC)- with its associated upwelling branches and frontal system- is fundamental in the redistribution of water masses, heat, and deep-sea sequestered CO_2 to the surface ocean. Covarying Antarctic temperatures and pCO_2 levels during the Pleistocene pertain to the role of the Southern Ocean in millennial-scale climate oscillations. Marine Isotope Stage 5 (MIS5) and Marine Isotope Stage 11 (MIS11) both occur in the Pleistocene and are the closest analogues to modern climate forecasts and predictions outlined by the Shared Socioeconomic Pathways-Representative Concentration Pathway. Investigating how the Southern Ocean responded to these interstadials may offer us insight into the dynamics and response of the climate system and how the earth may respond in the future to climate change and allow us to anticipate and prepare for these responses.

Giving the Wind Industry a Climate Science Upgrade

Anjana Aravind

Wind Pioneers, India
Alumna profile: https://nf-pogo-alumni.org/profile/Anjana/



What does the wind energy industry rely on the most? You guessed it, wind! For most of the academic world, it would seem natural that the industry should look at well-known atmospheric oscillations and even ocean-atmosphere coupled mechanisms like the El Niño, right? Sadly, this is not the case today; hardly any companies in this space are actively studying climate mechanisms and their effects on wind farms in the long term. A typical wind farm is expected to last around 20-25 years before the turbines need replacement. On a climatic scale, this is a short blip, but climate mechanisms like the North Atlantic Oscillation and ENSO have oscillation periods that are a fraction of the lifespan of the wind farms. Currently, the industry assumes that the future 20 years on a wind farm would look similar to the past 20 years' wind patterns, which is proving to be a misguided approach.

As any good climate scientist will tell you, there's bound to be an atmospheric reaction to significant oceanic phenomena, and these reactions are reflected in wind patterns across the world. These patterns can be loosely forecast using existing climate models, but this is still new territory for the industry. I work as a climate researcher for a wind energy consultancy, and my job is to break into this territory; the company is called Wind Pioneers, after all. We are primarily an engineering consultancy that deals with site finding, measurements, design, wind resource assessments and energy production assessments. The latest in this mix is climate research.

Most of my work revolves around studying the effects of long-term climatic phenomena on wind farm sites and finding methods to quantify these impacts. A majority of the input data for this comes from common reanalysis datasets such as ERA5. Observed data for the sites themselves come from data collection conducted by placing meteorological masts on site for a period called the measurement campaign. Most wind farm developers and investors only have the time/budget to carry out short measurement campaigns, usually ranging from a few months to a couple of years. These periods are too short to study the effects of climate mechanisms, and hence, climate data are crucial in forming a good understanding here.

Currently, the industry lacks sophisticated and robust tools to carry out climatic analyses on sites. Apart from climate mechanisms that have already been modelled, climate change is another crucial factor which has barely been studied in terms of its impact on wind farms. It is quite exciting to be working on these problems, and I believe the industry would benefit from having more people in such roles.

My work involves creating algorithms and code-based solutions to answer these questions. My background in Physics helped me understand oceanic and atmospheric circulations. In addition, the programming knowledge I

developed during my time in academia also proved to be an advantage. My first exposure to R programming was onboard the RV Polarstern, where I was a shipboard trainee in the 2019 SoNoAT. The introduction to the language during one of the modules on the ship helped greatly in creating tools for the company to study variations in climate mechanisms. Apart from R, I also learned Python programming while working as an intern on climate models such as CMIP5 and sea ice models such as PISM-PIK, which comes in handy.

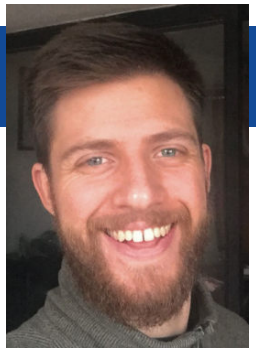
Wind speed measurement masts and turbines themselves are constantly updating parameter data in near real-time to logger systems. Most of the behind-the-scenes work in developing and maintaining a wind farm relies heavily on these data. This is also the case for my research. There are several industry-specific software tools to process and analyse these data. Right now, the best method that these tools have for creating any kind of prediction about wind patterns in the near future is the Measure-Correlate-Predict process. Essentially, the observed data from the measurement campaign are correlated with reanalysis data sets, and a hindcasted time-series is created for the site. In the 'Predict' step, the mean of the hindcasted time-series is considered the long-term mean wind speed for the site. This method does not take into account any of the regional climate variations in the site location, which is a disadvantage. This is one way among many in which the industry falls behind in creating accurate predictions for the future of their wind farms. As a climate researcher in a world of wind engineers, I hope to be a part of driving that change.


Credits: Pixabay

From field scientist to computer rat, who would have thought?

Lucas de la Maza Fernández

Center for Climate and Resilience Research, University of Concepción, Chile
Alumnus profile: https://nf-pogo-alumni.org/profile/LucasDLM/



I am a Marine biologist who lost his way and somehow ended up working in physical-ish observational oceanography (and loving it!). My main interest is how physical processes interact with population/community dynamics and how these interactions shape marine ecosystems. The last two years have been crazy for all of us, but fortunately despite all the difficulties, science has carried on.

In January 2020, I received a call from a colleague offering me the opportunity to participate in the pilot stages of a project in Antarctica. Of course, this news was bittersweet; the reason I've been offered this job was due to an accident that occurred a few days prior the call, a plane with 38 people on board had disappeared. Some people that were supposed to go to set up the initial parts of the project were, quite understandably, wary of hopping on a plane to Antarctica and decided not to go. This caused a delay in the scheduled activities of the expedition, so they needed people able to work as a jack of all trades and set up everything in the time we had left. This new crew was composed of Juan Faundez (UdeC / PUC, Chile), Robert Izzet (UBC, Canada) and myself.

The challenge was to implement a continuous water pumping system able to carry water for around 400m to a laboratory and withstand the harsh climatic conditions of the austral continent (this was the job of the first crew) during the summer months and eventually year-round (but that's for the future) at the Arturo Prat base in Greenwich Island (Southern Shetland islands). This water was then distributed among a wide assortment of instruments

measuring fluorescence, O_2, CH_4, N_2O and N_2, among other variables, with enough pressure for the instruments to function properly. We also had to deploy a CT mooring at the water intake and set up the automated valve system for a gas spectroscopy equilibrator while identifying and adjusting for any problems with the measurements being taken. All of this with very limited internet access and not too many options to get spare materials if needed. Easy peasy, right?

I learned a lot on the go, and the expedition was a success thanks to the great team formed between the resident crew at the base and our group. It was not without its setbacks, but even then, we had time to hike around the island, and we even took a short trip on a boat to look around. One of the most amazing things that I experienced there was the behavior of the wildlife; they were not scared of humans, most likely due to the absence of land predators and the strict regulations regarding human-wildlife interaction. I was able to see whales (which my camera was not able to capture, unfortunately), many species of seals and penguins, among others. There was a particularly curious group of penguins that were always poking their noses in our work. At one point, they approached me like a trio of clumsy and very well-dressed gangsters as if they demanded an explanation for what were we doing to their home.

During 2021, I've been working on two projects at different research centres, one of which deals with the exploration of Temperate Mesophotic Ecosystems (TMEs), also referred to as the twilight zones, which are located between 30 and 100 m deep (ranges vary between different regions). In this project, called NUTME (yes, I know) at Pontificia Universidad Católica de Chile, my role was to give the first insight into the physical conditions of TMEs and to do a preliminary assessment of their potential as a refuge from climatic variability. Spoiler alert: they are not as sheltered as it is usually thought. They are quite sensitive to climatic variability, such as El Niño. We have a publication in preparation on that subject for those who are interested to know more. Besides my work which ended in December 2021, there is a lot more being done, like the implementation of moored sensors to establish a baseline of time series including salinity, temperature and oxygen; the training of a team of divers to reach mesophotic depths with rebreather; a ROV is being conditioned to operate at depth to record and sample, and much more. You can visit the NUTME website or instagram account to see images and more detailed information about the project.

The other project I was involved is affiliated to the Center for Climate and Resilience and the University of Concepción (UdeC) and deals with long term variability at an upwelling region off the coast of Concepción, Chile. UdeC maintains a time-series site with over 20 years of physical, chemical and biological data. My work here focuses mainly on analysing oxygen dynamics, from long term to high-frequency variability, understanding the mechanisms and quantifying the expansion of coastal hypoxic waters over the last 20 years. Here we dig deep into upwelling, seasonal variability, interannual variability (ENSO) and decadal trends combining data from different sources such as satellite, *in situ* observations from the time series site and and meteorological stations. We describe all these scales of variability in light of previous studies and explain how and why the environmental conditions off the coast are changing, and what consequences this may have in a manuscript, currently under review. There is also a published work with preliminary results from this project, but only available in Spanish (except for the abstract).

Credits: Lucas de la Maza Fernández

In loving memory of

Kathleen (Mimoy) Silvano

On 29th November 2021 we lost our dear Mimoy to COVID.

Scholar at the 2008-2009 NF-POGO Centre of Excellence at the Bermuda Institute of Ocean Sciences, Mimoy was present at the meeting where NANO was born and actively engaged in NANO activities, participating in meetings and contributing to the Southeast Asia project and the NANO Newsletter.

Mimoy was a University Research Associate II at the Marine Science Institute, University of the Philippines.

We ask some of her many friends in NANO to make their tribute to her memory.

"Mimoy and I met at the Biological Oceanography which was headed by Dr. Liana Talaue-McManus. We later became classmates in grad school, colleagues to numerous environmental projects, and the best of friends all the years after. She was constantly away for numerous fieldworks or abroad pursuing her PhD but it didn't really matter how long she was gone, we would always pick up right where we left off anytime we were together-usually over a cup of coffee or a can of beer.
Mimoy was the kind of friend who would expect the best version of you and will make sure that you're doing fine. She was into Ocean Color Remote Sensing and her skills went beyond merely sensing the corals, mangroves, plankton, and seagrasses in the ocean. She had this built-in algorithm to effectively sense your condition too. Near or far and in good or bad times she had my back no matter what. I will never forget our WWF consultancy project in Tubbataha Reef Natural Park where we dove into the shark infested water to install the tide gauge, ADCP, and thermistor. She held two dive knives, strategically kept herself in an attack position behind my back and waited for any surprise shark attack while I mounted the moorings. She literally was in character as one of those 'Charlie's Angels' at that time. I think her feisty attitude drove away the curious sharks lurking around us.
She was the first to congratulate me over a memorable video call right after I defended my PhD dissertation early last year and we were looking forward to meet and celebrate for many reasons after having our covid vaccines. Even though the passing of Mimoy was sudden, her impact cannot be contained in this short writeup of mine. Her memory will live on with me, her fellow Pogonians, colleagues, family, and friends. In her emails and text messages, she constantly included 'Mimoy Ganda or Mimoy Beautiful' as her signature. Her radiant beauty, indeed, has made life so beautiful in those shared moments. I am so grateful to have known Mimoy."
- JD Palermo

Credits: Joseph Parlermo

""Such a joyful and loving soul will forever spark a tender smile in our hearts. Rest in peace!"
- Cátia Matias

Credits: Kentaro Suzuki

"Almost 12.5 years ago,
we met in a dusk at "WIND"
your bright eyes with cheerful smile
made me comfortable and serene
in a unknown small island
thousands miles away from home

Yes! you are such a true friend
always ready to help others
and make to laugh
even in difficult time
and academic phobia

Yes you are such a strong lady
among longstanding POGOnians
who loves satellites and played
with their orbits to see
the ocean as it is,
for the sake of science

you had long way to go....
and cherish among renowned
but, like a devil in deep blue sea
covid pandemic grasped your breath
and separated you from us and the
world

so, now you are a small star
in this milky way
one day we will meet as galaxy
until then, keep smiling
darling buddy "MIMOY"

My heartiest Tribute to MIMOY

Your Sri Lankan Friend"
- W.N.C. Priyadarshani

Credits: Tin Hoang Cong

Credits: Houssem Smeti

"I first heard about Mimoy from her colleague and close friend Joseph Domenic Palero (JD), when we were attending the 2008-2009 NF-POGO Center of Excellent in Observational Oceanography held at BIOS, Bermuda. He told me she was a very sweet and kind soul and also very though in fieldwork and research.
It was a great pleasure to meet her in person during the NF-POGO-organized Network Planning Meeting in October 2010, at the Royal Society in London, which laid the foundations for the establishment of NANO. She was so kind, always smiling and super positive. Although we saw each other for only a few days, even today I still have a very fond memory of her.
May your Beautiful Soul Rest in Peace, MIMOY."
- Houssem Smeti

Credits: Tin Hoang Cong

Credits: Tin Hoang Cong

"It is with sadness that I heard of Mimoy's passed away. I was lucky to spend many happy, inspiring days with Her in BIOS, Bermuda. She won't be forgotten. We will miss and love you forever."
- Hoang Cong Tin

"Hey Mimoy! You were always fun and "weird" for me. I loved your big smiles and loud laughter. I was shocked by your strong interests on phallic symbols. I was happy to know we had the same manner of eating fish (eating not only fillet, but also head meat or even eyes), though people from other countries might think we were "weird".

When I take bullet trains for field observations, the scenery of Mt. Fuji from the windows, which you really wanted to see, always reminds me your memory. Can you see Mt. Fuji from your current place? Can you see the Japanese traditional festival about phallic symbols, which you wanted to join?

I will gather funny and "weird" stories to make you laugh until we will meet again.
See you later!"

Your Japanese friend,
- Kentaro Suzuki

Credits: Lilian Krug

Credits: Lilian Krug

"Remembering Mimoy, because memories are all we have of her now.

I remember her smile that would lighten her whole face,
the twinkle in her eyes.
I remember her irrepressible personality,
the laughter that seemed to bubble up from inside her.

Above all, I remember her kindness to her friends, the way she would always go the extra mile when a friend was in need.

Let us turn to her for inspiration, to make us kinder towards our near and dear ones.

Remembering Mimoy."
- Shubha Sathyendranath

Credits: Lilian Krug

"Several years have passed since we last met with Mimoy. Despite this I still remember her contagious smile which always made any situation easier and life of all surrounding people a bit happier. She had a gift to simplify difficulties and cheer up people. It is truly a bereavement for our NF-POGO group, and it is hard to believe she passed away so early. We will always remember her as a great friend and a reliable mate. And we will miss her a lot."
-Kirill Kivva

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NANO website: www.nf-pogo-alumni.org

"Mimoy and I became instant best friends when we met.
We where colleagues, flatmates and partners in crime during our time in Bermuda.
Her friendship was so important that I did not pass the opportunity of bringing her to Portugal when a research assistant position was made available.
Here again we share the lab and the condo, the friends and the adventures.
Mimoy missed her family and friends back home and returned to the Philippines. Time, distance, work and life made us drift apart, but the love was still there.
Mimoy was so kind and generous to everyone. There is no single person who knew her that could say different or stay indifferent to her goofy, shining, smart and attentive character.
The world is a little less brighter now. We lost her physical presence but we will always have her in our memories and hearts.
Too soon, Mimoy, way too soon.
Love you forever."
- Lilian Krug

"I first came to know Mimoy in my first year working for POGO as Scientific Coordinator (2010), when we invited a select number of NF-POGO alumni to attend the first planning meeting for what would become the NANO network. She had recently completed the NF-POGO Centre of Excellence training in Bermuda and been identified by Gerry Plumley (at the time CofE Coordinator), Trevor Platt and Shubha Sathyendranath (at the time POGO Executive Director and Assistant Director, respectively, and both instructors for the CofE Remote Sensing module) as a potential key contributor to the establishment of NANO. Not only did she become a key contributor, but she lit up every meeting room she was in with her huge smile and infectious laughter. Trevor used to refer to her fondly as being "cheeky", which I think was a good description - she had a great sense of humour and mischievous personality, which were impossible not to like. After the inaugural NANO Meeting, Mimoy went on to attend subsequent NANO Coordination Meetings in 2011 and 2013, which formally established NANO and its activities: communications, outreach, and most importantly the regional (and now global) research projects. I am forever grateful to Mimoy for her contributions towards the creation of NANO, and will always keep fond memories of my interactions with her. I'm sure her smile continues to live on in the memories of all who knew her :) ."
- Sophie Seeyave

Scientific events announcements

EBUS & the Humboldt Current System Conference 2022

Lima, Peru (hybrid event)

19-23 September 2022

The Open Science Conference on Eastern Boundary Upwelling Systems (EBUS): Past, Present and Future and the Second International Conference on the Humboldt Current System will bring together PhD students, early career scientists and world experts to understand, review, and synthesize what is known about dynamics, sensitivity, vulnerability and resilience of Eastern Boundary Upwelling Systems and their living resources to climate variability, change and extreme events.

Deadline for Early bird registration

30 Aug 2022 https://www.ebus-lima2022.com/

6th Xiamen Symposium on Marine Environmental Sciences (XMAS)

Xiamen, China

9-12 January 2023

In its sixth iteration, XMAS-VI will be held with the theme focusing on Multidisciplinary and Solution Sciences for a Sustainable and Healthy Ocean. The symposium will consist of various interconnected sessions covering physical oceanography, marine biogeochemistry, biological oceanography, geological oceanography, and marine ecotoxicology along with workshops and other events for emerging topics in marine environmental sciences such as ocean-based carbon removal, ocean sustainability, etc.

Deadline for abstracts

30 Sep 2022 https://melmeeting.xmu.edu.cn/xmas/index.asp

39th International Symposium on Remote Sensing of Environment

Antalya, Turkey

24-28 April 2023

This symposium is entitle From Human Needs to SDGs and the main topics include Climate, Weather and Atmosphere (SDG 13); Agriculture and Food Security (SDG 2); Forest, Biodiversity and Ecosystems (SDG 15); Water Resources and Water Cycle (SDG 6); Marine and Coastal Environment Resources and Dynamic (SSDG 14); Development of Sustainable Societies and Human Heritage (SDGs 8 and 11); Public Health (SDG 3) and more.

Deadline for abstracts

14 Oct 2022 https://isrse39.com/Default.aspx

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Partnership for Observation of the Global Ocean (POGO)
Plymouth Marine Laboratory, Prospect Place
Plymouth PL1 3DH
United Kingdom

POGO Secretariat
Tel. +44 (0)1752 633424
E-mail pogoadmin@pml.ac.uk

NANO News 21 Chief Editor: Yohan D. Louis

Layout Design Editor: Lilian Krug

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