nano news

nano shinbun ナノ新聞

- NF-POGO Alumni Network for Oceans -

NF-POGO Alumni E-Newsletter – Volume 19, October 2020

日本財団 THE NIPPON FOUNDATION

pogo Partnership for Observation of the Global Ocean

nano news

NF-POGO Alumni E-Newsletter – Volume 19, October 2020

In this issue:

Cover photo designed by Freepik
http://www.freepik.com

ERRATUM

CofE scholar full name is Dieu Anh Dihn (page 2).

From the Editorial Board

Welcome to the 19th NANO Newsletter.

It all started in the ocean and, although we can consider ourselves a terrestrial species, we atrongly depend on its resources and on its fundamental role as the regulator of our planet's climate. Taking care of the ocean is equivalent to taking care of ourselves, our future, and our children.

The pandemic continues beyond our expectations and an unimagined future appears on the horizon. We are facing a unique opportunity to observe and evaluate what is happening with the human being and its interaction with the environment, as consequence of such abrupt interruption in our daily activities. Cultural changes are perceived, reinforcing our solidarity, caring for the environment, looking for sustainable actions, healthy eating, among many others needed to ensure a better future. In our case, our contribution must focus on observe and measure changes in human-ocean interaction and be able to transmit them both to the younger generations and to those responsible for political solutions. We believe we are on this path.

In this issue, we will travel to Germany, to the Centre of Excellence in Observational Oceanography, where the 10 NF-POGO scholars will tell us about their final scientific projects after successfully completed the 10-month course at the Alfred Wegener Institute. Then we will enjoy reading about what it is like to be part of an oceanographic campaign crossing the entire Atlantic Ocean. We will read about an amazing shipboard training experience, visiting the UK and the Southern Sea. We will fell in love with Antarctica reading a story about "the empty and silent landscape of the white land". We will meet two citizen science initiatives that are carried out by colleagues from Argentina and Russia under the NANO global projects. Also, there is a space for reflection on how is to work in marine sciences for early carrier researchers in time of pandemic. Finally, a scientific report about microplastic contamination in a coastal area of Argentina. To conclude this issue, some scientific events of interest are advertised.

Yours sincerely,

Rodrigo Hernández Moresino

Editor-in-chief

NANO was founded by:

Shubha Sathyendranath and Trevor Platt - Former Executive Directors of POGO

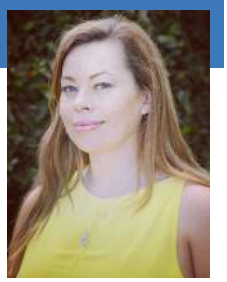
Sophie Seeyave - Chief Executive Officer of POGO

NANO and NANO News are supported by:

Partnership for Observation of the Global Ocean (POGO)

The Nippon Foundation (NF)

NF-POGO Centre of Excellence in Observational Oceanography



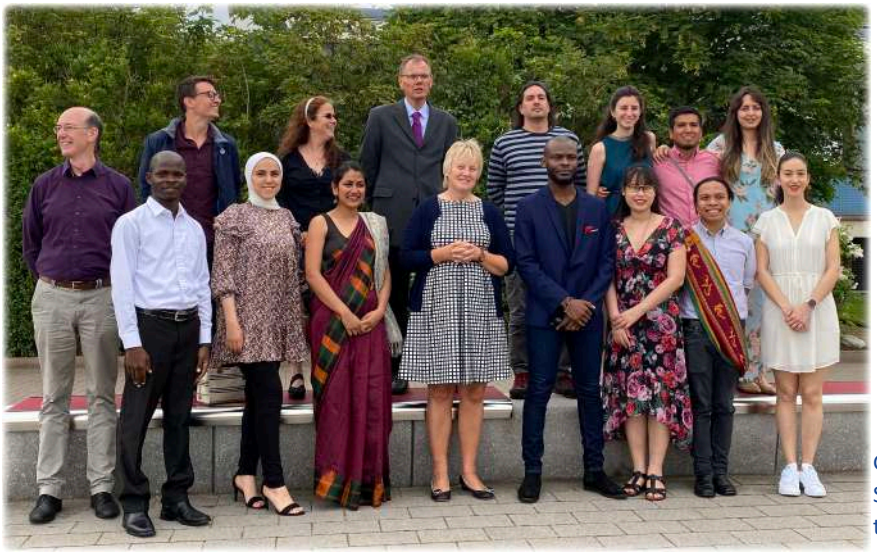
Lilian Krug
POGO Scientific Coordinator
Alumnus profile: https://nf-pogo-alumni.org/profile/Lica%20Krug/

The 11th cohort of NF-POGO Centre of Excellence (CofE) in Observational Oceanography scholars have successfully completed the training and graduated on 2nd July in Helgoland, Germany. The event was attended in person by scholars and a few members of Alfred Wegener Institute (AWI), while friends, families, and representatives of the NF and POGO Secretariat attended virtually. The graduation ceremony began with speeches by Prof Karen Wiltshire (Director, NF-POGO Centre of Excellence at AWI), Ms Vicky Maki Honda (Ocean Affairs Division, Nippon Foundation), Prof Nick Owens (POGO Chair) and Dr Sophie Seeyave (POGO CEO). Then, the scholars presented their individual research project and answered questions from both in-person and virtual audiences.

It was delightful to meet and interact with Adreeja, Andréa, Antonella, Dieu Ahn, Gabriel, Hadeer, Jeffrey, Manfred, Pedro, and Sharloth during these past months. On behalf of the POGO team, I wish great success in their future endeavours.

The CofE programme will continue to provide training to international scholars in the well-equipped AWI facilities on the islands of Sylt and Helgoland, Germany. This 10-month programme includes three major components: shipboard training, theoretical and laboratory modules related to shelf/basin interactions and open ocean sciences, and independent research projects.

For the next year of training (2020-2021), a team of nine evaluators from AWI and POGO analysed and ranked a total of 106 eligible applications, from 37 countries. The highest-scored candidates were interviewed via Skype and, from these, ten successful candidates were selected and notified. The future new scholars will be introduced in the next issue of NANO News.



Graduation day: Scholars pose with Dr Sophie Seeyave on screen (above) and part of AWI's teaching team (left).

2019-2020 CofE Scholars individual projects abstracts

As part of the CofE training, the scholars must propose, conduct, and present individual research projects under the supervision of CofE faculty and collaborators.

Next, the 2019-2020 CofE scholars present the abstracts of their individual projects.

Who rides the heat wave? Effect of marine heat waves on the survival and development of larvae *Carcinus maenas*

Adreeja Chatterjee, Luis Gimenez and Gabriela Torres

Alumnus profile: https://nf-pogo-alumni.org/profile/Adreeja+Chatterjee/

The mean ocean temperature has been rising since 1970's at the rate of 1.1°C per decade. The intensity of marine heat waves has doubled over the past decade. It is not just the increasing temperature, but also the increase in the frequency of the heat waves, that raises the question of organisms' ability to adapt and survive. We are still uncertain of the effects of marine heatwaves in the early developmental stages of marine organisms. In this study experiments were carried out on early life stages of the shore crab *Carcinus maenas*, to study the effects of variability and temperature regime on the survival and development of freshly hatched larvae up to Zoea III.

A laboratory experiment was conducted, simulating heat waves during the natural seasonal increase in temperature, during spring in Helgoland. Effect of additional stressors, e.g. lower salinity (20ppm), and limited food availability (6h/day) were also tested on the larvae under the different temperature conditions. Variability (variable or constant) and condition (temperature per day in the incubator) of temperature negatively affected both survival and the duration of development of the larvae, but to different degrees in different treatments. The interactive effect of food limitation, and variability and condition of temperature resulted in increased mortality to Zoea II, but salinity also strongly affected the survival to Zoea III. Development took longer, in general, at lower temperatures and the combined effect of it with limited food and salinity delayed it further. These impacts on the initial development of the larvae suggests that there may be considerable implications to its survival, in case of such events of heat wave in their natural habitats.

Spatio-temporal variability of salinity at the Eastern James Bay eelgrass Bed

Manfred Desire Bonga Nyetem, Monica Ionita, Urs Neumeier and Cédric Chavanne

Alumnus profile: https://nf-pogo-alumni.org/profile/MANFRED+DESIRE+BONGA/

Seasonal variability of salinity along the East coast of James Bay between summer 2018-2019 and winter 2018 was analysed using data from the World Ocean Database. The dataset included data obtained from moorings and CTD casts in over one hundred stations. During both seasons salinities were the lowest at the mouth of the rivers, especially around the river La Grande (<7 PSU) and Eastmain (<14 PSU). These lowest salinity values also spread northeastward due to centrifugal acceleration, Coriolis force, and baroclinic pressure gradient. However, we noted a seasonal difference in salinity distribution patterns between summer and winter along the coast. It appears that water is less saline and stratification is more constant during winter in comparison to summer. These may be linked to the seasonal difference in river discharges and ice cover, which limits the effect of climatic factors such as wind and air-sea flux. During summer, data indicate a less stable stratification of the water column in the shallow area due to tides. Also, a short-term variation of salinity at the offshore stations would be associated with the mixing of waters due to climatic events such as storms. On the other hand, the comparison of salinities before and after the period of hydroelectric developments built in the 1990s at river La Grande shows a significant difference in salinity ($p < 0.05$), probably compromising the health of local ecosystems, especially of eelgrass.

fCO_2 patterns and their drivers in the surface waters of the Weddell Sea using *in situ* data from the Surface Ocean CO_2 Atlas (SOCAT) for the period 1984–2017

Andréa Ferreira Cussolim Mesquita and Mario Hoppema
Alumnus profile: https://nf-pogo-alumni.org/profile/deiamesq/

Air-sea fluxes of carbon dioxide (CO_2) are influenced by biochemical activity and oceanographic processes. Some parts of the Weddell Sea are covered by sea ice throughout the year, which reduces the air-sea fluxes of CO_2 and influences biological activity on a regional scale. The Southern Ocean is marked by strong seasonality and regional variability, but relatively few studies are available, some of which rely on a modelling approach. This study aimed to describe the partial pressure (or fugacity) of CO_2 using *in situ* data from the Weddell Sea related to temperature, salinity and sea ice extent. Surface oceanic fugacity (fCO_2) was obtained from the Surface Ocean CO_2 Atlas (SOCAT), while data on sea ice extent were acquired from the University of Bremen repository. Ocean Data View software was employed to plot the available data, spanning from 1984 to 2017. Higher values of fCO_2 corresponded to the end of winter, when the saturation also increased, and lower values were found at the end of summer. The minimum fCO_2 values were found in the east of the Antarctic Peninsula, associated with environmental conditions favouring high primary productivity, while high fCO_2 values were related to the outflux of water masses to Bransfield Strait. The maximum values of fCO_2 were related to high salinity and low temperature of the water. A positive trend observed in the sea ice extent could have contributed to shifting the southern Weddell Gyre from over- to undersaturated relative to the atmosphere. Anthropogenic increase in atmospheric CO_2 levels and a relative decrease of the ocean surface saturation in the Weddell Sea enhanced the CO_2 sink in this sector. The Weddell Sea contributes the most to the formation of Antarctic Bottom Water as part of the largest subpolar cyclone in the Southern Ocean, thus understanding its role in the CO_2 budget is important to both regional and global scales of the carbon cycle.

Distribution of the fugacity of CO_2 (fCO_2) in the Ross Gyre, Antarctica

Dieu Anh Dinh and Mario Hoppema
Alumnus profile: https://nf-pogo-alumni.org/profile/dieuanh/

The Ross Gyre, located in the Pacific Sector of the Southern Ocean, has high primary productivity and seasonally varying sea ice cover. It plays a vital role in atmospheric carbon dioxide (CO_2) sinks in the Southern Ocean region. The sea-air CO_2 exchange and CO_2 flux in the Southern Ocean were analysed in recent studies; however, there is still uncertainty about the trend, magnitude and drivers of the fugacity of CO_2 (fCO_2) in the Ross Gyre. This study aims to analyse the distribution of fCO_2 on the seasonal timescale in relation to other variables such as sea surface temperature, salinity, and sea ice cover in the Ross Gyre, as well as to compare the CO_2 in the atmosphere. The research hypothesis is that fCO_2 trends in the surface water show seasonal changes during the observed period that are affected by the studied physical factors. In this research, we use data from the global surface carbon dioxide (Surface Ocean CO_2 Atlas, SOCAT) database, which include fCO_2 measurements from 1961 to 2018 in the Ross Gyre. In addition, ODV software will be used to interpret and assess the CO_2 data and the relationship with other variables. The results provide a better understanding of fCO_2 in the Ross Gyre.

Sea water nutrient analysis and comparison at Helgoland Roads, North Sea

Sharloth Fernandez and Anja Kamp
Alumnus profile: https://nf-pogo-alumni.org/profile/Sharloth/

The German Bight has important ecological considerations due to the dynamics of the Atlantic Ocean's fluids and the freshwater inputs flowing to the North Sea. Knowledge of water quality and hydrodynamics are essential, and measurements have been carried out at Helgoland Roads since 1962, contributing to a long-term nutrient dataset. This study aims to perform nutrients (nitrite, nitrate, phosphate, silicate, and ammonium) and chlorophyll-a analyses on water samples, compare them to previous data (sampled in 2019), and analyse the influence of the tide on the variation and transport of these parameters. Samples were obtained from 26 to 28 February 2020, in the German Bight near Helgoland (54°10′ N, 7°53′ E). Two transects (Elbe and Eider) and a 16-hour fixed station were established and 55 water samples were collected using a multi-sampler rosette. Temperature and salinity were measured using a Seabird CTD, while nutrients, salinity, and chlorophyll-a were measured at the laboratory. The results revealed that the distribution of nutrients during 2019 and 2020 has similar patterns. The discharge of freshwater from the Elbe and Eider Rivers were the main cause for the observed values, which are reflected in the salinity and chlorophyll-a levels. The 16h-fixed station indicated that the distribution of nutrients can be affected by the tide; however, in deeper areas, the impact is minimal and depends more on the wind pattern.

Contact us: info@nf-pogo-alumni.org
NANO website: www.nf-pogo-alumni.org

Tolerance of the cold-water coral *Caryophyllia huinayensis* to hypoxia in northern Chilean Patagonia

Hadeer Ismail, Jürgen Laudien and Doris Abele

Alumnus profile: https://nf-pogo-alumni.org/profile/Hadeer+Ismail/

The cold-water coral (CWC) *Caryophyllia huinayensis* is a habitat-building scleractinian coral in the cold-water system of the Patagonian Comau Fjord region. They serve as biodiversity hotspots with many benthic organisms associated with it. However, there is no much information about its autoecology. This study measured the respiration rates of nine individuals of the CWC *C. huinayensis*. The results indicate that this coral species is oxygen conforming and there is no critical partial pressure of oxygen under which the respiration rate of 0.12 ± 0.03 [µmol L^{-1} afDM min^{-1}] changed. Furthermore, the mass-specific (ash-free dry mass) was also measured as a reference to the respiration rate of each coral individual. The respiration rate of *C. huinayensis* was compared to that of *Desmophyllum dianthus* to test the hypothesis that *C. huinayensis* is respiring at a lower rate than *D. dianthus* and that this could be the reason why this species survived a mass die-off in Comau fjord (2012), when 99% of the *D. dianthus* individuals died. This experiment indicates that *C. huinayensis* has a high potential physiological adaptation potential and a conformal respiration rate as *D. dianthus* in Comau Fjord 0.10 ± 0.07 [µmol L^{-1} afDM min^{-1}].

Alternative causes for the mass mortality are discussed. Hence, this study provided knowledge of the potential susceptibility of this CWC to natural and anthropogenic stressors to support protective measures of this habitat building species that could be implemented to achieve sustainable management of the Patagonian fjord ecosystems.

Assessing glacio-isostatic and tectonic components of relative sea level records in the Philippine archipelago

Jeffrey Munar and Evan Gowan

Alumnus profile: https://nf-pogo-alumni.org/profile/jeffreymunar/

Sea level records differ around the globe due to variations in the combined effect of human impacts, climatic forcing, tectonics, and glacio-isostatic adjustment (GIA). GIA refers to the response of the earth's body due to ice mass and water mass redistribution caused by glacial cycles. The effect of this process is not yet constrained in the far-field records of the Philippine archipelago. In this study, relative sea level (RSL) records in Cagayan, Ilocos, La Union, Pangasinan, Cebu, Bohol, Palawan, Samar and Davao Oriental were compiled into one standardised format using the HOLSEA database standard. The standardised record takes age, elevation, sampling and geological context into account along with the geodetic datum and calculated uncertainties. Numerical modelling using PaleoMIST paleo-topography and ice sheet model is done to determine the influence of GIA in each location. Analysis of the standardised sea-level compilation and modelled sea level shows the variable and compound effect of both GIA and tectonics in each region. The effect due to GIA is more variable on the western coast of the Philippines at the range of 5.1 m compared to the eastern coast at 2.1 m during 10 ka. Estimated Holocene uplift rates at sites along Manila Trench are estimated to be between 1 – 1.4 mm yr^{-1}. Along the Philippine Trench the estimated rates are between 1 – 1.5 mm yr^{-1}. Vertical movement due to uplift in relatively stable parts of the archipelago is estimated at 0.09 – 0.4 mm yr^{-1}. This research may provide insights for understanding the factors used to assess coastal vulnerability and long-term changes caused by sea level rise in the Philippines.

Species composition and abundance shift at the East Frisian Islands, new reality or natural variability?

Pedro M. Carrasco De La Cruz and Eva-Maria Brodte

Alumnus profile: https://nf-pogo-alumni.org/profile/PedroCarrasco/

The East Frisian Islands are part of a coastal ecosystem in the Wadden Sea holding a long story of human utilisation. Subject to centuries of human influence and modifications, this area faces the threat of climate change, which is triggering shifts in community composition and species distribution. To evaluate the variation in species composition and its relation to the increasing trends in sea surface temperature, we analysed a time series of fish abundance, collected at 17 stations in the Wadden Sea area of the East Frisian Islands for the period from 1996 to 2007. A total number of 81 species were found, including 47 fishes (58%), 15 mollusc species (18.5%) and 17 crustacean species (20.9%). The α-biodiversity indices (Shannon Index, Hill number N2) presented a negative trend in the last years of the 1990's decade, whereas an increasing trend was found from 2002 to 2005. A strong interannual variability was found associated to the increasing minimum temperature in winter and the average summer temperature, having high impacts on the variation in community composition during spring and summer, respectively. Commercial species like *Crangon crangon* and *Pleuronectes platessa* were recognised as typifying species of each season, whereas some fish species decreased in abundance during the 2000's decade.

The acclimation effect to low-frequency noise on development and predatory responses of the copepod *Acartia tonsa*

Gabriel Akoko Juma and Nelly Tremblay

Alumnus profile: https://nf-pogo-alumni.org/profile/Gabriel+Juma/

Crustaceans constitute a keystone taxonomic group in biochemistry and productivity of marine ecosystems. Noise has a major influence on marine systems, however, it remains largely unaccounted for in marine studies. Negative effects of underwater noise (shipping, airgun, etc) observed on holo- and pelago-benthic crustaceans include a reduction of burying and bioirrigation behaviours, disturbances in feeding behaviours and antipredator responses, malformations and delays during larval metamorphosis, as well as immunological tolerance loss. Life-history theory predicts adaptive shifts in response to stress, including earlier reproduction, smaller age/size at maturity, and higher relative investment into reproduction. Such shifts could cause reduced life expectancy. Using small-scale controlled experiments on the model copepod species *Acartia tonsa*, this project aimed to support the hypothesis that low frequency noises could also affect pelagic secondary production. *In vivo* highspeed videography was used to assess the predatory movements of copepodite copepods that were grown and acclimated at 18°C and 21°C towards the marine algae *Rhodomonas salina* with and without low-frequency noise. The developmental rate and stage distribution complemented the information to assess feeding efficiency. Results revealed that copepods grown under noise conditions recorded a significantly lower development rate. Most of the copepods grown in noise at 21°C did not reach the two last copepodites stages, C5 and C6. Copepodite stages C3 and C4 were found to be the most abundant stages for both temperatures and noise acclimation treatments with C3 copepods grown at 18°C showing significantly higher mean length. Additionally, C4 copepods acclimated to noise at 21°C recorded significantly higher mean length when compared to controls and other temperature conditions. During observation of their feeding behaviour, copepods that were exposed to noise during the trial recorded significantly higher mean swimming speed and mean net displacement when compared to controls. Our results document an alteration of copepods' predatory responses that may explain the lower development observed when acclimated to low-frequency noise. This work furnishes new data to consider for the establishment of tolerance threshold levels of anthropogenic noise in marine environment.

Seasonal succession of phytoplankton traits throughout the year in the southern North Sea

Antonella De Cian, Cédric Meunier and Julien Di Pane

Alumnus profile: https://nf-pogo-alumni.org/profile/Antonella+De+Cian/

In temperate seas, the gradual shifts in environmental conditions at the winter–summer transition lead to succession of species in plankton communities and to a constantly changing trophic arrangement. Functional ecology is an appropriate approach for understanding the complex changes occurring in the species assemblages. The functional approach uses bio-ecological traits defined as any morphological, physiological or phenological feature that reflects fitness indirectly via its effects on growth, reproduction and survival. This study aims to investigate which functional traits are dominant in the phytoplankton community throughout the year in the southern North Sea, and to determine which environmental parameters those traits are particularly related to. Long-term *in situ* data from Helgoland Roads were processed. For the analysis, the identification of the main functional traits was made by a principal coordinate analysis and a principal component analysis, while the selection of the environmental parameters was made with a redundancy and cross-correlation analysis. Results showed that cell size, harmfulness and trophic mode were recognised as the main functional traits that differentiate the phytoplankton community. Traits such as harmfulness, mixotrophic mode, theca and lack of silica dominated the functional community during winter and summer; seasons during which light or nutrients are limiting. While traits such as autotrophic mode, chain formation, blooming and silica content, dominated the functional community during spring and autumn; seasons during which there are nutrient-rich and enough-light conditions, along with silicate availability. The temporal functional successions were driven by changes in water temperature and transparency, nitrite, nitrate, silicate, and dissolved inorganic nitrogen. The trait-based approach along with time series analysis could be applied for identifying and explaining the changes in the functional ecology of the phytoplankton community at Helgoland Roads.





NF-POGO Visiting Fellowship for Shipboard Training

RRS Discovery

AMT29 cruise, Southampton (UK) to Falkland Islands

NF-POGO-PML Atlantic Meridional Transect Shipboard training fellowship on board the *RRS Discovery* (12 September to 21 December 2019)

Paul Strubinger
Alumnus profile: https://nf-pogo-alumni.org/profile/Paul/

The NF-POGO-PML Atlantic Meridional Transect Shipboard training has been one of the most fulfilling experiences of my professional and academic life. It was conducted on board the RRS Discovery during the 29th Atlantic Meridional Transect (AMT-29). We departed on the 13th October 2019 from Southampton, UK and arrived on the 25th November 2019 to Punta Arenas, Chile, covering an extensive range of oceanographic regimes during 43 days and over a distance of more than 14,000 km.

I was part of the optics group which included Dr Giorgio Dall'Olmo, Dr Francesco Nencioli, and Dr Carolina Sá. I gained valuable insight into the planning, preparation and execution of an open-ocean research expedition while receiving essential training in a range of instruments used to collect bio-optical measurements. I was involved in a range of activities, including the assembly, deployment, and maintenance of the optics rig system, assembly and maintenance of underway optical data collection system (hyperspectral absorption and attenuation, backscattering and CTD), deployment of Core-Argo floats, and assembly, and maintenance of HyperSAS radiometers used for satellite ocean colour validation.

This fellowship programme is a great opportunity for capacity building and a great platform to widen a professional network with colleagues from international institutions. After the fellowship concluded, I got a fixed-term appointment at Plymouth Marine Laboratory. I worked as an E-Arise scientist in the department of Earth Observations Science & Applications (EOSA) alongside Dr Dall'Olmo on the relationship between the particulate backscattering (bbp) coefficient and the particulate organic carbon (POC) across the Atlantic Ocean.

I highly recommend this and any NF-POGO programmes, especially for early-career scientists who are looking for improving their knowledge about the latest ocean science methodologies and techniques.

Scenes from the AMT29 cruise and Paul's activities during his training. Image credits: Francesco Nencioli and Gavin Tilstone

Shipboard Training programme: An amazing experience

Rodrigo D. Hernández Moresino

Centro para el Estudio de Sistemas Marinos (CESIMAR-CONICET), Puerto Madryn, Argentina
Alumnus profile: https://nf-pogo-alumni.org/profile/RodrigoHM/

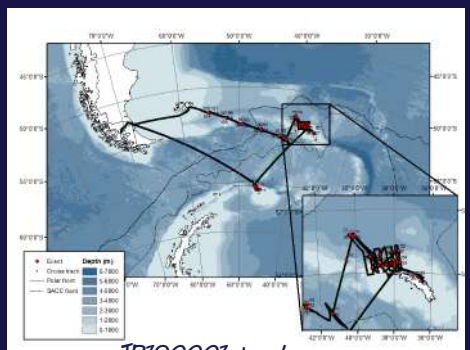
The experiences we live cannot be replaced by videos, photographs, or stories told by other people. In my case, the 3-months I spent with the training on-board programme represents a before-and-after in my life. To be honest, I didn't expect that this could happen at my age. After I finish my bachelor's in biology, I had to work in different jobs for four years before getting a fellowship to complete my PhD. Things went faster after that and now I am a researcher at CONICET (National Council for Scientific and Technology Research in Argentina) since 2015. Last year, at 40 years old, with my children somewhat bigger, and with the support of my wife, I tried to pursue my dreams and applied to the NF-POGO shipboard training fellowship program.

To my surprise, and after two interviews, I was selected to join an expedition organised by the British Antarctic Survey (BAS). The programme consisted of three months away from home. During the first month in Cambridge, under the supervision of Dr Sophie Fielding, I learned how to employ acoustic techniques to study the abundance and distribution of Antarctic krill. Next, I joined the scientific crew on board the *Royal Research Ship James Clark Ross* (or JR) for about 40 days sailing the Southern Ocean, alongside colleagues from different parts of the world who were there to conduct a variety of research projects. Lastly, I returned to Cambridge for the remaining month to process data and analyse the results.

Cambridge city centre

Cambridge: a dream city

Getting to meet my supervisor was quite a challenge for me. I live in Puerto Madryn, a city 1400 km south of Buenos Aires (Argentina). I took a direct flight from Buenos Aires to London and a bus on the way to Cambridge. About 16 hours after I left my country, I arrived at a Cambridge square and with no clue where to go. My cell phone did not have coverage in the UK and so far I did not know how to use the off-line Google Maps app (a great tool by the way!). I got into the first taxi I saw and asked the driver to take me to the house where I had a room. The next day, I went to the BAS and I have to say without hesitation that I could not have a supervisor better than Dr Fielding. Immediately we made a tour of the Institute, she invited me to dinner at her house with her partner (Jeremy) and a colleague (Gaby), and even lent me a bicycle for my entire stay! The days passed through and I learned a lot about acoustic techniques and data processing. Riding a bicycle around Cambridge was the best and thanks to that I visited almost every corner of this amazing city: schools with huge castles, squares, the Cam River with its rowing boats, and a variety of beautiful aquatic birds, peaceful people, and green colour everywhere…..perfect.



JR190001 track

Ship, Southern Ocean, Antarctica, what else?

Again, a long trip to get aboard the JR. I went back to the south by flight, but this time to the neighbouring country Chile, where the ship would be waiting for us. We headed to London by bus and joined the remaining BAS scientific team at the airport. From there, we took a flight to the final destination Punta Arenas (Chile), a small town at the southern end of South America.

The *RRS James Clark Ross* combines science and logistic voyage, carrying supplies and personnel to the scientific bases. The logistics involved the opening of the summer base Signy (South Orkneys) and resupply of bases King Edward Point (South Georgia) and Bird Island. We departed from Punta Arenas to the South Orkney Islands, where we officially reached Antarctica when crossing the 60° S barrier! Two days later, we sailed north-eastward to Bird Island, and to King Edward Point base where there is an old abandoned Norwegian whaling station (Grytviken). It is difficult to say which place was more beautiful because they all had their charm: high biodiversity, incredible landscapes, mountains, white snow, and the people who work and live there have great stories and a supreme respect for the environment.

After all this voyage, we sailed a few kilometres to the northwest of South Georgia Island to the sampling area called Polar Ocean Ecosystem Time Series – Western Core Box (POETS-WCB): a consistent unique time series of mesoscale distribution and abundance of macro-zooplankton and micronekton, and understanding of the physical environment (1996 – current). The research activities during 18 days consisted of running acoustic transects, net trawls (target and stratified fishing trawls), CTD deployments, refurbishing and redeployment of a long-term deep-water biological mooring, and processing of fishing samples, among others.

Although I already had two years of on-board experience working as quality control for a fishing company, life on a research ship is very different from that on a fishing ship. There were 42 days full of happiness, sometimes missing my family, but always grateful for such an opportunity in life. The best human atmosphere, with wonderful people working as a team. I also enjoyed a special Christmas Eve at sea, with a delicious banquet, guitars, songs, a decorated bar for the occasion, nothing was missing.

Some bad weather

my old friend mate

Back to Cambridge

Having already said goodbye to the *RRS James Clark Ross* ship crew, whio continued with the next expedition sailing to the Southern Ocean and Antarctica, and to some of the colleagues at different airports on the way back to the UK, I was in Cambridge again. Then, with the quietness of having completed the campaign, I could enjoy the peace and beauty of the city even more than before, and started thinking about the return to my home. Back at BAS, Dr Fielding and I completed the data processing, creating an excellent working relationship. Closing my stay in Cambridge, I had a farewell party in a traditional tavern with a lot of colleagues from BAS that I will never forget! And also with my wife who had travelled from Argentina one day before for a small European tour: London, Paris, and Barcelona.

My training is over….but the story continues….

Forever grateful

I must thank everyone who took part in my experience, to a greater or lesser extent. Of course and in the very first place to the awesome Dr Sophie Fielding, a great professional and excellent person. To Gaby, Jeremy, Petra, Anna, Iliana, Bjorg, Chis, Clara, Ricardo, Jose Xavier, Martin, Eugene, and many more. Thanks to all the NF-POGO team and BAS who made this possible and were close to me throughout my stay away from home. Many thanks!!! Muchas gracias!!!

Me + my supervisor, Dr Fielding

RMT deployment

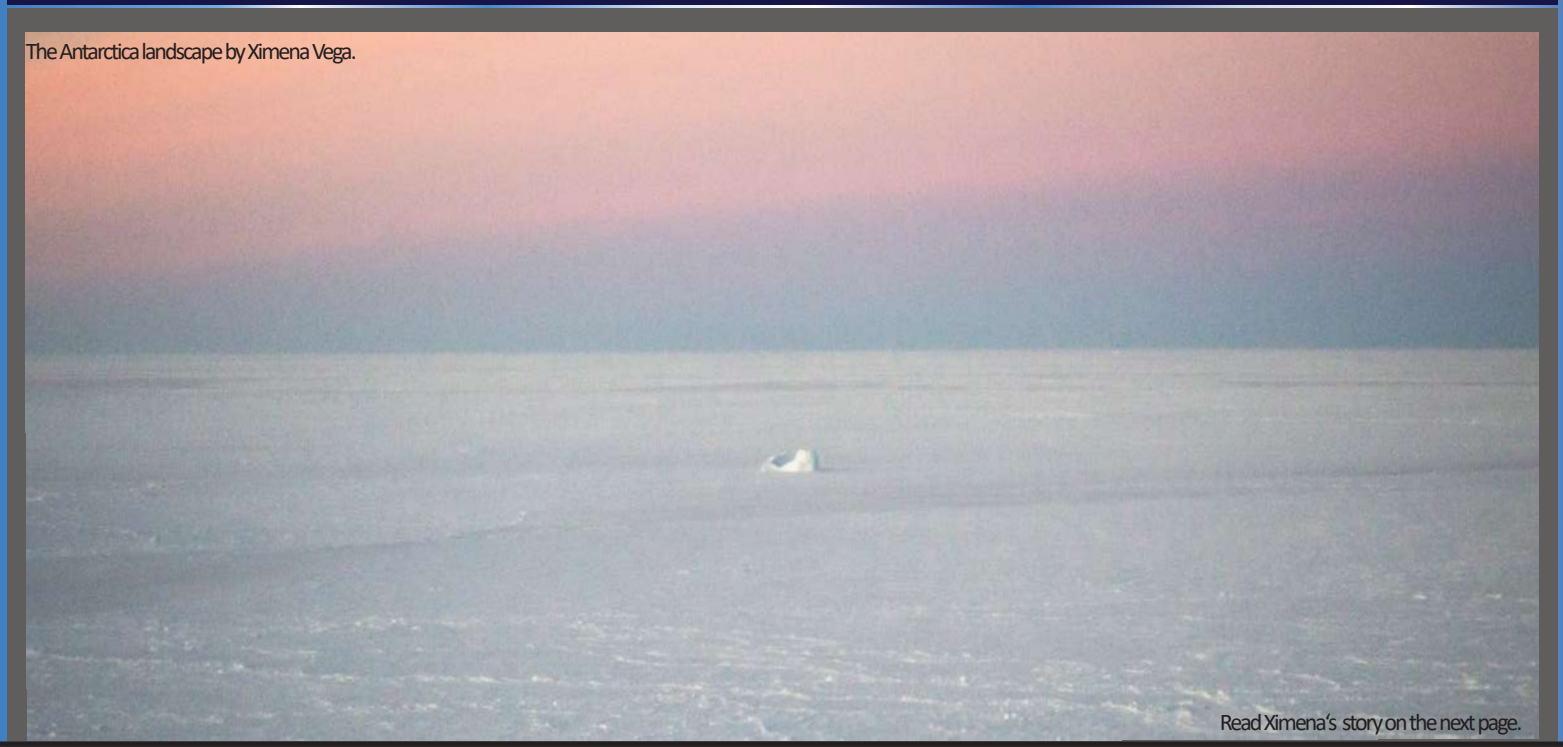
With new friends

In the lab

@ South Orkneys

The sci crew

Signy base



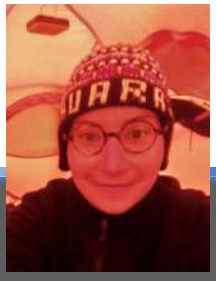
The Antarctica landscape by Ximena Vega.

Read Ximena's story on the next page.

What has this white land done to me that there is no day without dreaming about feeling its winds again?

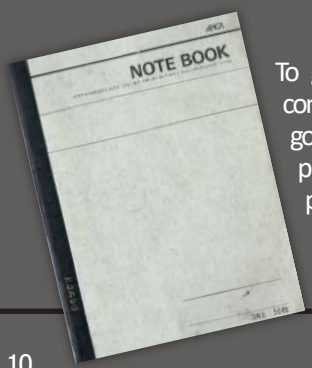
Ximena Aguilar Vega

Agencia Mexicana de Estudios Antárticos; Universidad de Magallanes, Chile
Alumnus profile: https://nf-pogo-alumni.org/profile/Marea/

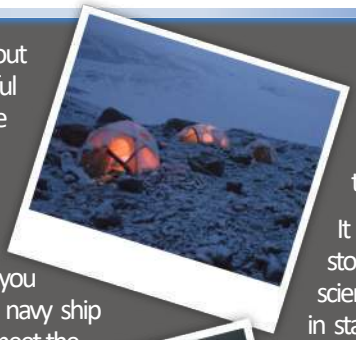


Jan 17, 2019, 23:00 The sky is sinking into the sea; I am sure you will not believe me, but here in Antarctica, the sky mixes with the sea during summer nights. There are giant blocks of white ice everywhere, as if floating - stealthily - between the sea and the sky, or is it between the sky and the sea? The tent has withstood at least three days of strong winds, and a couple of intense snowstorms have forced us to shelter in these temporary houses made of rods and orange cloth; luckily, everyone sleeps in their tent, we meet three times a day in the kitchen-tent to eat, and from time to time we find each other running towards the bathroom-tent, which undoubtedly has the best view of all: the sea. Despite my little experience setting up camps in extreme environments, it seems that until now I have mastered it; the rocks that cover the base of the tent have been enough to save us - me and the tent - from being swept away by these very strong winds that do not give truce. Despite the intense cold and salty dried meals, I wish these white storms do not stop, and I hope this white curtain covering us would not move away from the coast where we have decided to sleep. Extend our time on this strange rock at least a few more days; -please-, just a few more weeks...

This is one of the notes I came upon, scattered among each of the three notebooks that I always carry to Antarctica. Yes, three, and just as you might be wondering why so many, I still do not understand the point of taking all of them- with no exception - with me. I suspect, now that I think about it, that perhaps it is an attempt to sneak away bits of the continent hidden as ink between the notebooks' paper; however, a few days ago when I returned to them to write this text, I found few lost notes, some of them without much sense. Still above all, I came upon blank pages: pages and pages as white and silent as Antarctica itself.



To get to the white continent, you need a good ship or a good plane. I will always prefer the Ocean, even if it means crossing the dreaded Drake Passage. Throughout this opening crosses the most powerful oceanic current on planet Earth: the Antarctic Circumpolar Current, and although this time I will not delve much into how great and fundamental this current is for the climate system of our planet, I can tell you that since we boarded the Chilean navy ship "Aquiles", I had only a few hours to meet the scientists of the Antarctic scientific expedition #55 before the strong movement of the ocean forced almost everyone to put up with seasickness in their respective cabins; actually, I did not see many of them again after three days at sea. The maritime "survival" test can last more than seven days if the weather during the crossing becomes difficult enough to divert the ship's route; Fortunately, we sighted land four days after leaving the port of the City of Punta Arenas, although to be honest, I would not have minded spending a few more days sailing rough waters on the beautiful Southern Ocean.



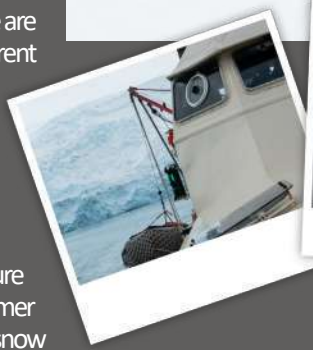
Antarctica is pure improvisation and adrenaline. I would love to tell you that I felt excited when we were told that we would be transferred to the study area by helicopter; but due to my pre-existing acrophobia and an inordinate distrust of aircraft inherited from my father, fear came before excitement. The snowbank in front of us was becoming denser and denser as the turbulence began to intensify, so much that Barlobento -the pilot- informed us that if he could not find a window in the fog as soon as possible, we would have to return to the ship and wait for a clear sky. Time in this extreme place is twice as valuable as anywhere else; with every second that passes, you waste precious time to achieve the objectives of the expedition. The window appeared out of the fog and we were able to descend - abruptly - on the site that was going to be our home for approximately three weeks.

It is not strange to hear stories about entire teams of scientists who were stranded in stations, or on-board ships that transported them from Punta Arenas or Ushuaia (among many other ports) to the Antarctic continent without being able to take a single sample due to abrupt changes in weather or some logistical failure. Some less fortunate have had to return on stretchers, and others never even returned. In our case, none of us suffered accidents or returned empty-handed; instead, we only activated the maximum alert that exists in the entire Antarctic territory: we mobilized the Peruvian, Brazilian and Polish rescue teams. The alert even reached the Peruvian embassy. All this happened while we measured the beacons installed on the glacier; we were completely incommunicado, not even the powerful radios provided by the logistics team worked in this

place, nothing but the InReach (a GPS and satellite emergency device) worked, which is used exclusively in cases of deadly situations. Perhaps if the radios had worked, everything would have been cleared up sooner, but it was not until we saw - many kilometres away and metres high - a group Peruvian colleagues trying to communicate through signs to warn of something. We did not understand a thing, we even answered with friendly hellos and signs. But after a few minutes, we realized that something was not right. As fast as we could, we looked for a place where the radio signal was strong enough to communicate with them. Finally, everything was clear: the maximum emergency alert had been activated, and it came from our position, our chief scientist had mistakenly pressed the InReach's emergency button. Everyone was losing their minds. Later, at the Peruvian scientific station, they confessed that they were almost sure that I was the one in trouble (who else but the woman?); they were almost sure that I had fallen into a crevasse.

Jan 25, 2020, 11:00

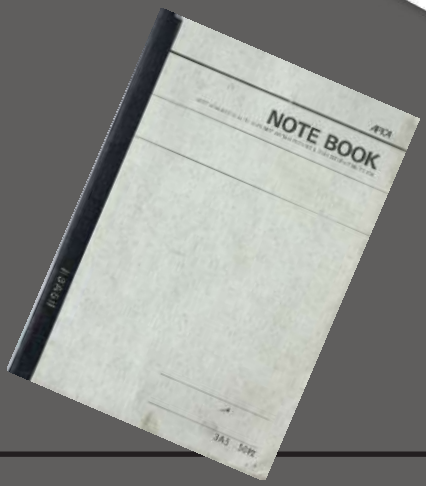
We are sailing from the Chilean scientific station "Eduardo Frei Montalva" to Lange glacier on-board the INACH´s (Instituto Antártico Chileno) scientific boat "Karpuj". All the equipment is calibrated and ready: CTD, Fast Repetition Rate Fluorometer, USSIMO radiometers, Niskin bottles; checked, checked, checked. I can't believe that just a year ago we were at Camp Lange conducting velocity measurements and looking at the cameras to complete the photogrammetric data for this project. Today, we are sailing back to the same place, but this time feels a bit different because now I'm in charge of analysing the colour of the ice and the ocean, and of measuring the basic oceanographic parameters as part of my master's thesis project.



I continue to wonder...how has colour been put aside for so long to study this continent of multiple contrasts?

Now, a year after I first set foot on the Antarctic territory, I assure you: Antarctica's colour is changing. Now, during the summer nights, the sky not only mixes with the ocean but also with the snow that once escaped from the gloom. The surface of Antarctica is losing its whiteness at an incredible pace, now there are green and red patches everywhere, but mostly brown and black spots that are rapidly melting the white camp where I first saw those big blocks of ice floating between the sky and the sea.

I don't know, but maybe in a year from now, I won't find that -almost- dreamlike spectacle anymore. Fortunately, I still keep these three notebooks with the empty and silent landscape of the white land that I once knew.



NANO Global Project (NANO-DOAP)
Citizen science activities at NANO-DOAP "El Veril" station (Argentina)

Carla Florencia Berghoff

Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), Argentina
Alumnus profile: https://nf-pogo-alumni.org/profile/cberghoff

Ocean absorption of anthropogenic carbon dioxide (CO_2) plays a key role in moderating climate change, however, this capture affects its carbonate system (CS) chemistry by a reduction in pH and carbonate ion concentration, a phenomenon called ocean acidification (OA). OA has substantial impacts at a global scale on marine ecosystems and the services that the ocean provides, hence, the need to tackle it through enhanced scientific cooperation at all levels, as denoted by United Nations Sustainable Development Goal 14-target 14.3.

Given that different regions of our vast and diverse ocean respond differently to the increase in CO_2 and that CO_2 absorption/CS variability in several coastal regions are still poorly understood, the NANO Global Project (NANO-DOAP) "A global study of deoxygenation, ocean acidification and productivity at selected sites" promotes *in situ* and remotely sensed observations on essential variables in coastal sites of 13 countries. Argentina's contribution to the NANO-DOAP project involves two sites within the "*Dinámica del Plancton Marino y Cambio Climático*" programme (DiPlaMCC-INIDEP): *Estación Permanente de Estudios Ambientales* (EPEA, 38°28'S 57°41'W) and *El Veril del Banco de Afuera* (38°10'S 57°25'W). While EPEA, running since 2000, is a well-established INIDEP ecological research time series, "El Veril" (Figure 1) was later incorporated in a citizen science context. "El Veril" is a coastal site with ~20 m depth and is usually visited by divers due to its good visibility and the abundance of fish and other marine organisms.

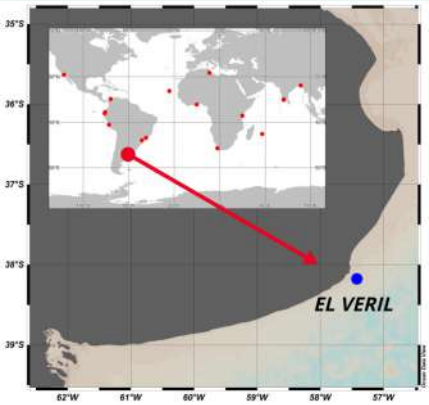


Figure 1 - El Veril study site. Insert: NANO-DOAP study sites.

The idea behind "El Veril" lies in celebrating the long tradition of collaboration in collecting information on the marine environment between INIDEP and the diving club *Centro de Actividades Submarinas Escualo* (CASE), to coordinate an integrated monitoring effort towards the evaluation of possible OA-linked changes in the Mar del Plata coast. CASE scuba divers disinterestedly agreed to collect discrete seawater samples during their recreational outings to "El Veril". The samples are used for the analysis of pH and total alkalinity (TA), salinity, dissolved oxygen (DO), chlorophyll-a (Chla), phytoplankton (Phyto) and bacterioplankton (Bac) abundance, along with the required metadata in the sampling site (i.e. GPS coordinates, date-time, depth of sampling, diver's computer temperature profile, and sea conditions). The activity of collecting samples does not entail any risk to the scuba divers neither require any instruments other than the sampling bottles. It only demands training for a proper sample collection and transportation, to meet the quality required for accurate results. That is why several meetings were held between DiPlaMCC members, the scientific commission of CASE and different groups of scuba divers from the club. Since the end of 2018, more than 20 scuba divers carried out 2 feasibility tests and 6 successful sampling visits at "El Veril" (Figure 2).

Due to the wide range of variables that are being collected at "El Veril" and the fact that most of the analysis techniques are certainly complex, several researchers from DiPlaMCC are involved (Figure 2). Upon arrival to DiPlaMCC-INIDEP lab, pH samples are analysed by the spectrophotometric method with the m-cresol purple, whereas DO and TA samples are preserved until analysis with Winkler and spectrophotometric method with bromocresol green, respectively. Filtered Chla samples are kept in ultrafreezer until analysis with the fluorometric method while the preserved Phyto and Bac samples are analysed by epifluorescence and flow imaging microscopy (FlowCAM) in the former case. INIDEP physical oceanography cabinet measure salinity with an Autosal salinometer. The collected data do not

Figure 2 - Scenes of sample collection by divers from CASE at "El Veril" and analysis by the DiPlaMCC researchers Carla, Constanza Hozbor and Ricardo Silva.

cover a complete annual cycle yet, as samplings mostly occurred during the summer season. Nevertheless, it is a very promising starting point, which we envision will continue growing in the near future. This first data set will be available soon for the NANO-DOAP participants.

Unfortunately, the COVID-19 pandemic has put scuba diver visits to "El Veril" on standby for the time being. In this unprecedented scenario, the Argentine Federation of Underwater Activities (FAAS) sponsored a series of webinars to communicate the ongoing activities among the diving clubs affiliated with FAAS. As part of the CASE webinars, I was invited to give a talk about the citizen science activities carried out at "El Veril", within the framework of the NANO-DOAP. The webinar included an interactive space for questions and discussion among the 120 attendees. As a twist the event benefited from the participation of a visual thinker expert (Adriana Fainstein from *Ojo que Piensa* Instagram account), who integrated all the topics discussed in an enjoyable design resource (Figure 3). The dissertation (in Spanish) and the visual thinking design (in Spanish and in English) were later shared on social media.

Figure 3 - CASE-FAAS OA Webinar Series' banner and the visual thinking design created during the webinar.

Both CASE citizen science contribution to the NANO-DOAP and the virtual outreach event are expanding actions with great benefits to the society: by empowering divers with knowledge on how anthropogenic CO_2 emissions threaten the health of the ocean and which challenges the global ocean faces. Our aim is that 'the message' will be spread to all the people and help the development of friendly behaviours with the environment. The end result is an effective commitment and an integrated effort to mitigate climate change-CO_2 consequences in marine ecosystems.

NANO Global Citizen Science Project
Social AGITation for Temperature Analysis (SAGITTA)

Kirill Kivva[1] and Alexander Rakhman[2]

[1]Head of Division, Russian Federal Research Institute of Fisheries and Oceanography, Moscow, Russia
Alumnus profile: https://nf-pogo-alumni.org/profile/kkivva/
[2]Engineer at LLC "PC ENERGIA", Moscow, Russia


About the project

The Social AGITation for Temperature Analysis (SAGITTA) project aims to implement a citizen science approach for consistent and regular temperature profile data collection in the coastal ocean. Compared to the deep ocean, the coastal region is more variable, biologically diverse, and provides a wider variety of ecosystem services than the deep ocean. Yet many coastal areas are insufficiently covered with reliable oceanographic data which largely limits their sustainable use, protection and management. Thus, collection of regular oceanographic data would significantly improve scientific understanding of processes in many coastal areas and, consequently, allow better informed management or conservation actions. Furthermore, SAGITTA will simultaneously foment ocean literacy among the general public.

SAGITTA has been supported by POGO and NANO since 2017. The aim for the first year was planning the project implementation, while the main goal since 2018 has been the development of the system (probe, smartphone application, and web portal), mainly focusing on the design and manufacture of the temperature probe. Information on the early days of the project has been published in NANO News 14 (p. 11) and focused mostly on hardware and software development. It is time to introduce SAGITTA's current status and achievements.

Ocean citizen science

Citizen science is a powerful concept not only in terms of data collection, but also in terms of public education. Oceanographic citizen science (OCS) projects are not very numerous at the moment as virtually any oceanographic research requires special equipment. Those technical means are often relatively expensive and not always easy to use by those without scientific or engineering background.

Sagitta
Social Agitation for Temperature Analysis

Despite this, the citizen science concept in oceanographic research is being developed at governmental, intergovernmental and non-governmental levels (e.g., Garcia-Soto et al., 2017; Makino & Perry, 2017). Although OCS projects usually contribute to ocean biodiversity studies, they are mostly aimed to physical measurements. Great examples of those efforts are Secchi disk study and Smartfin initiative. Both rely on relatively simple equipment (especially in case of the Secchi disk) and smartphone applications. There are also some examples of ocean structure studies which involve elements of citizen science (Gawarkiewicz and Mercer, 2019). However, all such efforts, at least to the best of our knowledge, have originated in developed countries.

Attending several POGO Annual Meetings in order to report updates on the project allowed us to meet and communicate with many representatives of developing countries and countries with economies in transition. An urgent necessity and growing demand in oceanographic research is strikingly obvious. There are qualified personnel and support from the community, so the only issue restricting ocean observations in general and citizen ocean observations seems to be funding and equipment availability. Therefore, SAGITTA's cost-effective yet scientifically reliable temperature-depth (TD) probe can potentially facilitate oceanographic research in developing nations.

Previous achievements

The same equipment issue mentioned for many ocean citizen science projects above is valid in our case. Namely, TD-probes available on the market are too expensive and make the implementation of our idea impossible when counting only on the already existing instruments. Therefore, similar to the Smartfin initiative, we are focused on building an innovative system to solve this issue. We believe that involving the general public in ocean observating will increase data collection efficiency, data coverage, ocean literacy, and awareness of ocean care. The system would consist of a cost-effective TD probe, a simple smartphone application (app), and a web portal. Ideally, the probe should cost about 100 USD. The smartphone app is designated for probe control, instant data visualization and data transmission to the web. The web portal is necessary for data storage, access, and dissemination; but it will also be useful for training and outreach.

Probe design

A previously reported version of the TD-probe was based on the STM32 microcontroller unit (MCU) and required multiple external devices (such as Analog-to-Digital signal Converter and controller systems). Instead of using a separate MCU and wireless interface, we implemented an integrated chip ESP32 (Figure 1). The Tensilica Xtensa LX6 version of the ESP32 chip is now being used (Espressif Systems Co., Ltd.). This chip has two cores with timing frequency up to 240 MHz and it is equipped with Wi-Fi and Bluetooth 4.2.

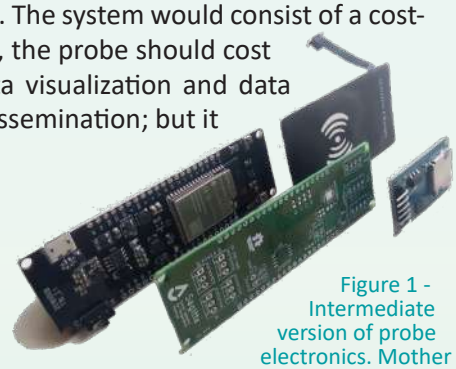


Figure 1 - Intermediate version of probe electronics. Mother board TTGO T - Energy, wireless charging pad, custom printed circuit board, and SD-card reader unit.

The autonomous power supply system consists of two parts: a standard battery (type 18650) and a Qi wireless charge pad. The latter allows the exclusion of wires and connection ports from the hardware. This is especially efficient for our device as any external wire connection would require special waterproof solutions. It also provides better usability. In this package, the device battery may be recharged with standard wireless chargers available on the market.

Temperature measurements are performed by a resistance temperature detector (RTD) of type pt100. An oil-filled piezoresistive pressure transducer capsule, SS100, is now used for pressure measurements. Both sensors are available in scientific-grade versions. They are analogue, so their signals are converted into digital form by custom Analog-to-Digital Signal Converter (ADC) units placed on the custom printed circuit board (PCB, Figure 2). The PCB also holds a micro-SD card reader, LED indicators and connections to wireless magnetic switcher (reed switch).

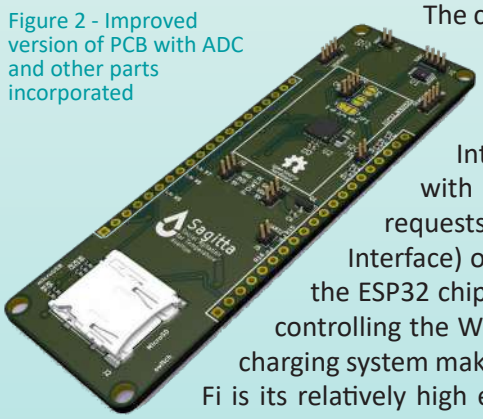


Figure 2 - Improved version of PCB with ADC and other parts incorporated

The connection between the probe and the smartphone is achieved via a Wi-Fi Access Point (Wi-Fi AP) with an HTTP-server. This implementation has high performance, minimal realization cost from the smartphone side, and allow for communication control at the level of the Transmission Control Protocol/ Internet Protocol (TCP/IP) stack. It may also be used with PCs or any other device with HTTP-client and Wi-Fi support. It allows for simple control through HTTP-requests to REST-API (REpresentational State Transfer Application Programming Interface) of the device (i.e. probe). At the same time, the use of Wi-Fi is more efficient for the ESP32 chip, as one of its two cores is designed to work in background mode, permanently controlling the Wi-Fi connection so not to interrupt other software work. Moreover, the wireless charging system makes the charging process quite simple and efficient. The main disadvantage of Wi-Fi is its relatively high energy consumption rate (about 130 mA at maximum data transmission rate). However, the use of a ~3000 mAh battery would allow more than 20 hours of Wi-Fi connection.

Contact us: info@nf-pogo-alumni.org
NANO website: www.nf-pogo-alumni.org

Housing

Housing is a crucially important part of the device, but it is surprisingly hard to develop. One can imagine that deploying oceanographic equipment to the depth of, say, 100 metres simply requires proper water impermeability. And this is the main issue – this apparent simplicity is untrue. At the very beginning of SAGITTA we wanted the device to be attractive and compact. So we started to work with a professional industrial designer who suggested several nice-looking shapes for the housing such as 'biomorph' shapes (Figure 3) inspired by the spotted box fish outlook. However, those were just concepts, and we were unable to reach the required waterproofness. After this small backstep, we consulted a professional ocean equipment engineer who suggested a not so good-looking but more robust shell for the electronics (Figure 3). Primarily, we aim to demonstrate the workability of the concept, so improved attractiveness of the housing may be introduced later.

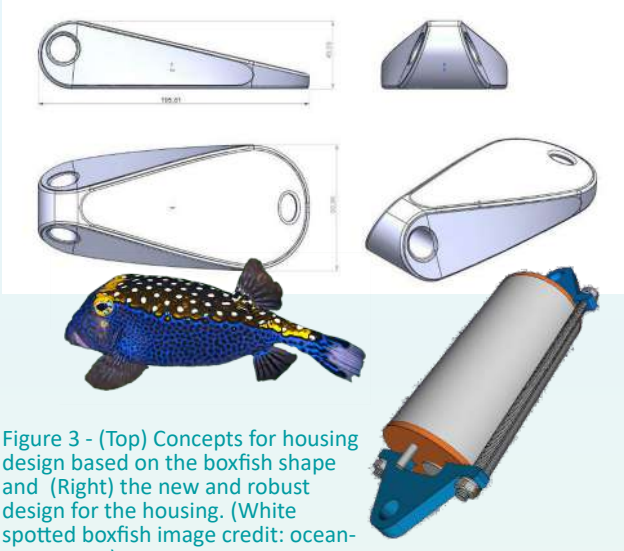


Figure 3 - (Top) Concepts for housing design based on the boxfish shape and (Right) the new and robust design for the housing. (White spotted boxfish image credit: ocean-aware.com)

Test app

To test the prototype, we also developed a test app. It allows (1) the connection of a smartphone to the probe through Wi-Fi; (2) geolocation record; (3) measurement start/end; (4) probe to smartphone data transfer; and (5) a simple visualization of measurement results (Figure 4). The visualization function is still very basic and requires substantial improvement which may be implemented in the final version of the smartphone application. We hope to produce this final version of the app very soon as detailed technical specifications have already been discussed with an application development company.

The test version of the web portal needs to be improved. The current version of the app is unable to transfer data to the web server: to store, manage and disseminate the data. The final version will definitely need to provide those options.

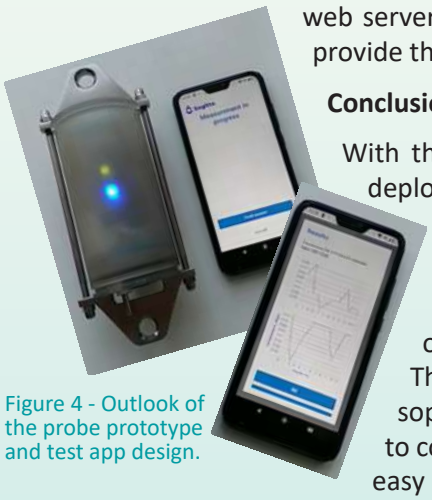


Figure 4 - Outlook of the probe prototype and test app design.

Conclusion

With the support from POGO and NANO, we have already created and presented the first deployable working prototype of the suggested cost-effective TD-probe for empowering citizen science in oceanography. We continue the development and anticipate the first units to be ready for the field tests by the end of 2020.

The citizen science concept is getting more and more acknowledged in the field of oceanography. It allows substantial improvement in data coverage and public outreach. The contemporary electronics development made it possible to implement relatively sophisticated measurements in citizen science. We suggest all NANO members and friends to consider this approach for their research, especially if it is based in the coastal ocean with easy access for the local community members.

Citation

Garcia-Soto C., van der Meeren G.I., Busch J.A., Delany J., Domegan C., Dubsky K., Fauville G., Gorsky G., von Juterzenka K., Malfatti F., Mannaerts G., McHugh P., Monestiez P., Seys J., Węsławski J.M., Zielinski O. (2017) Advancing Citizen Science for Coastal and Ocean Research. French, V., Kellett, P., Delany, J., McDonough, N. [Eds.] Position Paper 23 of the European Marine Board, Ostend, Belgium. 112pp. ISBN: 978-94-92043-30-6

Gawarkiewicz G. and Mercer A.M. (2019) Partnering with fishing fleets to monitor ocean conditions. Annual Review of Marine Science. 11:1, 391-411.

Makino M., Perry R.I. (2017). Marine Ecosystems and Human Well-being: The PICES-Japan MAFF MarWeB Project. PICES Scientific Report, (52), I-234.

How are early career researchers in marine science tackling the pandemic?

Juan C. F. Pardo[1], Debra Ramon[2], Gabriel Stefanelli-Silva[3], Isa Elegbede[4], Luciana S. Lima[5], Silas C. Principe[6]

[1]Center for Coastal Research, University of Agder & Norwegian Institute for Water Research, Norway
Alumnus profile: https://nf-pogo-alumni.org/profile/pardojcf/
[2]Department of Marine Biology, Leon H. Charney School of Marine Sciences, University of Haifa, Israel
Alumnus profile: https://nf-pogo-alumni.org/profile/dramon/
[3]Laboratório de Ecologia e Evolução de Mar Profundo, Instituto Oceanográfico, Universidade de São Paulo, Brazil
[4]Brandenburg University of Technology, Germany
[5]Lab. Estudos do Oceano e da Atmosfera, Divisão de Sensoriamento Remoto, Instituto Nacional de Pesquisas Espaciais, Brazil
Alumnus profile: https://nf-pogo-alumni.org/profile/lushilima/
[6]Laboratório de Biologia Recifal, Instituto Oceanográfico, Universidade de São Paulo, Brazil

Due to the COVID-19 pandemic, many of us are facing big challenges trying to adapt to uncertain times. Likewise, many young researchers are undergoing problems related to their academic careers. The field of marine science has been impacted in many ways, from the impossibility to conduct in-person experiments to the cancellation of field activities. Given the current situation, we recently published a perspective article in the journal Frontiers in Marine Science (see publication here), where we gathered information about the challenges, solutions, and opportunities for postgraduate researchers in our field (Figure 1), and discussed the relevant short- and long-term challenges brought about by the pandemic. We have explored how the abrupt interruption of in-person activities at university centres and scientific gatherings has affected the academic life of marine researchers, especially for those at the early stages of their careers.

Our new scenario presents challenges at different levels: changes in personal or family dynamics, rescheduling of projects, and the demotivation in carrying out research in these uncertain times. Supportive actions from universities and research foundations vary, with the best cases involving project and salary extensions. However, not all universities and funding agencies have taken these measures. Uncertain times like these affect each individual in a unique way and it is complicated to measure and consider each case individually. It is clear that such unexpected interference can result in negative impacts on the career of marine graduate researchers, regardless of the field of study.

As solutions and immediate actions to continue academic activities, online support through work meetings and conferences has been widely used since the beginning of the isolation period. Online work tools, both for communication and project management, have shortened distances and made it possible to work remotely. The increase in the courses offered via distance learning has allowed to continue studying and specializing even in these times. The combination of these tools can increase productivity and allow projects to continue. They can be used even after the pandemic, making research more open and inclusive. However, these solutions imply that internet access is universal, which is not a simple matter in many parts of the world.

Finally, we have compiled some opportunities in the marine area (courses, scientific events, academic positions), which can, even remotely, assist in the development and dissemination of science. Collaborative actions can thus minimize the consequences of the problems we are facing. Also, as a contribution to this work, we have launched a Twitter account (Marine Graduate Opportunities - @mar_opps) to serve as an online repository of opportunities in marine sciences. We would also like to invite you to post and share opportunities on social media with the hashtag #marineopps so that they will be reposted in our account. Despite being a small contribution, we hope that this will increase efforts to advance the academic career of marine graduates during this period!

	Personal	Academic	Team	Research
CHALLENGES	Frustration of plans Mental health problems Work from home: child/familiar issues	Delay of classes Postponement of conferences and courses Unavailability of tech tools (computer/internet)	Keep teamwork on track during isolation Enable collaboration Keep motivation	Delay of fieldwork and experiments Pause in long-term experiments Delay in funded research (grant period)
SOLUTIONS	Supervisor support University/institute support Collaborative groups Use of online tools	Online conferences Online classes Collaborative groups	Use of online tools for project management Use of online tools for communication	Extensions by funding agencies and universities Create connections with other researchers Amend projects/establish new objectives
OPPORTUNITIES	Improvement of self-organizing Enhancement of collaboration between graduate researchers	Increase attendance of low-income researchers in conferences New research ideas	Incorporate project management tools in lab work Enhance collaborative work	Isolation will produce non-disturbed periods that can be used for experiments/ research. Development of new potential academic positions in marine science

Summary of the challenges, solutions, and opportunities for graduate researchers in marine science.

Juan: Marine biologist and coastal manager interested in species interactions, ecosystem dynamics and a keen interest in ocean and coastal literacy initiatives. PhD Research Fellow aiming to better understand how climate change-related stressors (e.g., increased terrestrial organic material) have been affecting the benthic communities, with focus on their functional traits and influence on carbon fluxes.
Twitter ResearchGate

Isa: Background in environmental sciences and resource management, marine and coastal resources, and sustainability sciences including food security and fisheries. He currently works on ecological and social systems as a holistic sustainability approach on seafood. He is a visiting fellow at the Ocean Frontier Institute and Robin Rigby Trust at the Dalhousie University (Canada) and a diaspora expert with the GIZ (Germany). Isa is member of the IUCN-CEESP, YESS, IUCN-CEM, and of the Blue GEO planet working group.
Twitter ResearchGate

Luciana: Water Resources Engineer and modeler, pursuing a Ph.D. in Remote Sensing, and studying the freshwater influences over the ocean in High Latitudes.
Twitter ResearchGate

Debra: Marine biologist with a background in environmental science currently working on my Ph.D. which explored the bioaccumulation behaviours of heavy metals, persistent organic pollutants, and microplastics in marine fishes. Additionally, I am on the board of WeSea, a non-profit NGO, working on raising awareness of the marine environment in the Northern Red Sea.
ResearchGate

Gabriel: Marine biologist and ecologist pursuing a PhD in oceanography. Currently seeking to understand the trophic transfer of pollutants along deep-sea food webs and the role of microplastics as vectors for persistent organic pollutants.

Silas: Marine biologist with a keen interest for ecophysiology and modelling techniques. Now pursuing a PhD in Oceanography, exploring how climate change will impact the distribution of keystone species associated to coral reefs from the Atlantic, from reef builders to fishes.
Twitter ResearchGate

New POGO Website

As part of POGO's 20th Anniversary Celebrations, POGO have launched a brand new, improved, and interactive website.

"The past few months of lockdown, with most of the Secretariat limited to online meetings and interactions, has been a perfect opportunity to redesign and relaunch the POGO website.

The last version of the website - generously designed, hosted and supported by VLIZ - was more than ten years old, and so we felt it was time to give it a fresh new look, with more interactive features, and better support for mobile devices.

As well as all the normal content you would expect to find - news, training calls, background materials, etc - we are delighted to present a more holistic view of POGO activities, including features such as an interactive membership list, with a zoomable map, and summaries of how our members contribute to GOOS.

We are particularly excited to share our interactive timeline of POGO's history, which inlcudes stories and memories from our alumni and more."

Visit www.pogo-ocean.org!

View an interactive timeline of POGO's history here.

A summary of Members' GOOS contribution here.

And a fresh, interactive Members' map here.

Contact us: info@nf-pogo-alumni.org
NANO website: www.nf-pogo-alumni.org

Microplastic pollution assessment in Puerto Madryn (Patagonia Argentina)

Rodrigo D. Hernández Moresino

Centro para el Estudio de Sistemas Marinos (CESIMAR-CONICET), Puerto Madryn, Argentina
Alumnus profile: https://nf-pogo-alumnining i.org/profile/RodrigoHM/

Around 9.5 million tons of plastic are thrown into the oceans each year, according to the International Union for Conservation of Nature (IUCN). This fact makes plastic pollution in the oceans a global problem with many ecological implications that are still under study. However, its documentation is increasing exponentially and globally.

Plastics can be classified by their size, shape, colour, and origin, which may indicate ecosystem implications. Microplastics (MPs) are defined as plastic debris smaller than 5 mm long. They are easily mistaken for food by small organisms, with potential biomagnification throughout the food web. This poses a problem not only for marine ecosystems as a whole, but also for human health. MPs can be purposefully produced as micron-sized particles for pharmaceutical and industrial products, but most are fragments from the breakdown of larger plastic debris.

Only a small portion of plastics discharged to the sea are found floating in the water. The remaining are expected to continue on one of the following trails: 1) fragmentation to undetectable sizes, 2) ingestion by organisms and assimilation into the tissues, 3) deposition in beaches, or 4) sinking to the seabed. The proportions of MPs into each system are difficult to predict and depend on the hydrological conditions of the study area.

Our work is the first survey on plastic pollution in the coastal areas of the city where I live (Puerto Madryn). The city is located within a relatively small (approximately 2000 km^2) and semi-enclosed gulf (San José Gulf) that has a restricted exchange of water with the open ocean. Furthermore, the industrial activities carried out in the area represent another source of plastic discharge on its coasts (Figure 1).

To carry out this work, bottom water, mussels, and 3 species of small benthic fishes were collected from 3 sites along the Puerto Madryn coasts (one site in front of the city and the remaining two located 7-8 km northward and southward). A digestion protocol was undertaken to destroy organic matter in soft tissues of the mussels and in digestive tracts of fishes. Later, water and biotic pre-digestive samples were filtrated, and filters were used for further inspection under a microscope with 50X magnification. The items resembling MPs were photographed, measured, and classified according to the shape and colour. Finally, some representative items were selected and analysed using scanning electron microscopy/energy-dispersive X-ray spectrometry (SEM/EDS) to further differentiate particles. Items with elemental composition almost exclusively made of carbon (C) and oxygen (O) are included as possible plastics. However, there are synthetic particles such as polyvinyl chloride (PVC) that also present strong chlorine (Cl), or glass fibers with silicon (Si) peaks (Figure 2).

Results

MPs were present in the three matrices for all the sampling sites, with no significant differences in the abundance between the three sampling sites, neither in fish nor in mussels. Differences in MPs abundances in water samples were not tested due to the absence of replicates. Even so, the highest average abundance of MPs was found in the northern site (Punta Arco) for both biotic matrices (fish and mussels), which can be explained by the clockwise circulation of the residual currents of the gulf (Figure 3).

Both biotic matrices showed MPs larger than those in the surrounding bottom waters (Figure 4). This difference may be caused by the active ingestion of the largest particles or by the differential retention of the largest particles in the gastrointestinal tract. Furthermore, small fish select MPs by colour as evidenced by the high proportion of blue particles they ingest. In contrast, mussels filter and retain MPs particles regardless of their colour because they have a similar proportion of the particles' colour to those found in the bottom water samples (Figure 5).

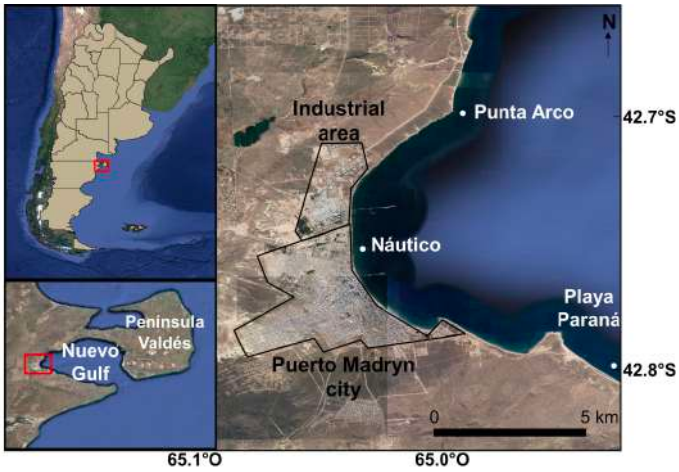


Figure 1 - Sampling area. The three sites are pointed in white.

It should be noted that microfibres were the prevailing shape in all matrices (around 90%), with white/transparent as the most frequent colours (around 50%). The colour proportions of the MPs ingested by fish differ from that available in the water, reinforces the hypothesis of the active ingestion of MPs by fish. These results highlight the importance of sampling in more than one matrix to asses MPs pollution in marine ecosystems.

Our results suggest that the coastal waters of Puerto Madryn present similar values to other coastal areas with moderate pollution pressure. However, this does not mean that MPs discharges by the city are low. Particles can be removed and transported to distant coastal areas inside or outside the gulf, or being accumulated in deeper areas in the centre of the gulf, as has been documented in the great ocean gyres. Future studies have to be done to elucidate this issue, expanding the sampling area and the number of biotic and abiotic matrices, bringing some light to the real pollution pressure that coastal low-exchanged basins such as this gulf could tolerate.

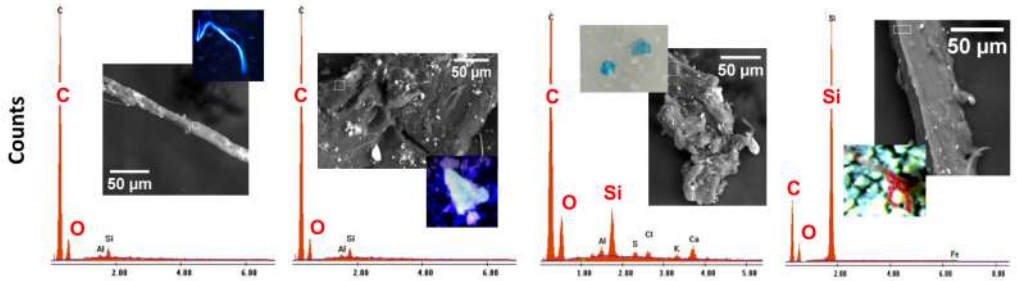
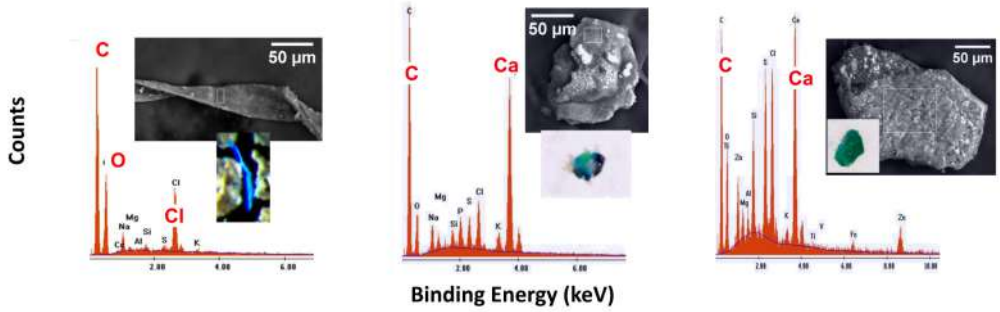


Figure 2 - Identification of MPs with SEM (grey photos) and EDS (graphs). Particles first identified with optical microscope using visible or UV light are also shown (colour photos). White and grey panels are particles classified as MPs and non-MPs, respectively.



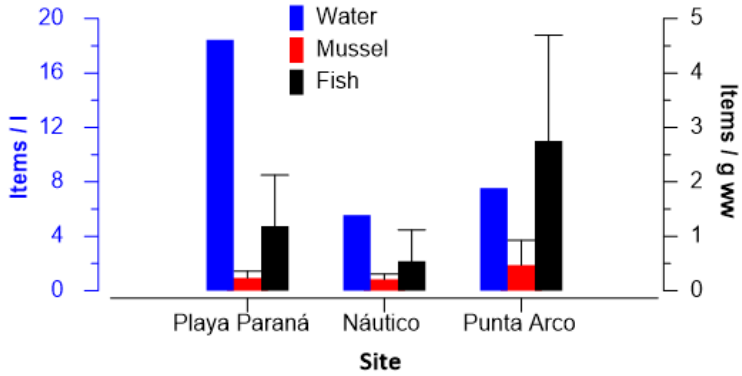


Figure 3 - Abundance of MPs in three matrices of the benthic habitat.

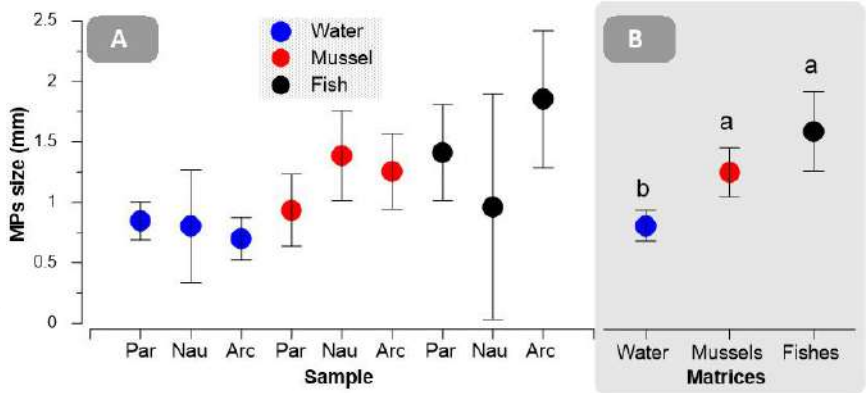


Figure 4 - Microplastic size. Panel A and B show different arrangements from the same data. Par = Playa Paraná; Nau = Náutico; Arc = Punta Arco.

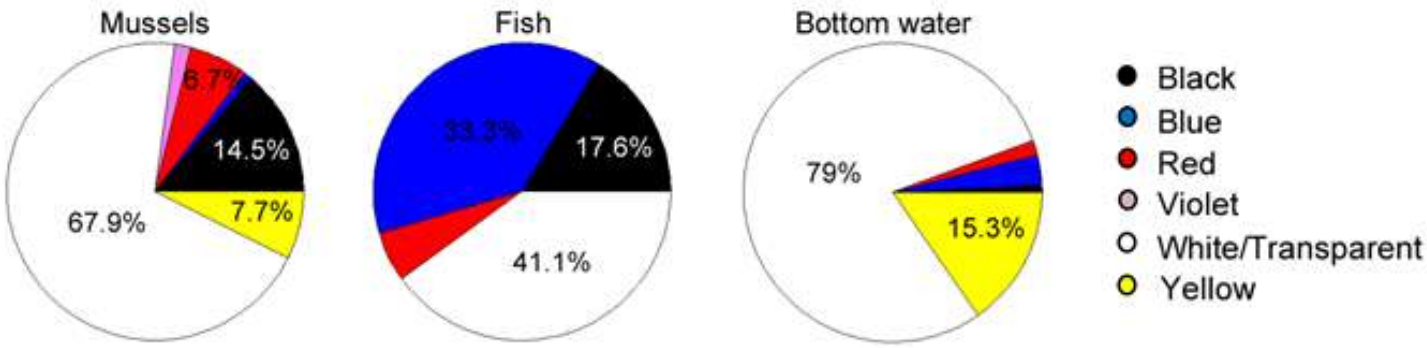


Figure 5 - Proportion of each colour of MPs found in the three matrices.

Contact us: info@nf-pogo-alumni.org
NANO website: www.nf-pogo-alumni.org

Scientific events announcements

CommOCEAN 2020
online
1-2 December 2020

The conference was launched by the European Marine Board Communications Panel (EMBCP) and focuses on a target audience of young marine scientists and communicators who want to be trained in science communication skills. This year's conference will see some of the programme split between marine scientists and professional communicators ensuring the programme is relevant, challenging and inspiring.

Deadline
09 Nov 2020

https://www.commocean.org/

ASSEMBLE Plus Conference
online
18-19 January 2021

The conference, "ASSEMBLE 2021 - Marine biological research at the frontier", will showcase recent developments in marine biology and ecology; state-of-the-art technologies available at marine stations and institutes; how to access biological resources and marine research infrastructure; how to improve services provided by marine stations; and, the impact of the services provided on industry and society. In addition, it will provide an opportunity to celebrate the project's research on genomic observatories, cryobanking marine organisms, functional genomics, instrumentation, and scientific diving.

Deadline
TBC

www.assembleplus.eu

International conference on Time Series and Forecasting (ITISE 2021)
Gran Canaria, Spain
7-9 August 2021

The 7th edition of the International conference on Time Series and Forecasting (ITISE 2021), which will take place in Gran Canaria (Spain) in April 7th-9th, 2021. ITISE 2021 seeks to provide a discussion forum for scientists, engineers, educators and students about the latest ideas and realizations in the foundations, theory, models and applications for interdisciplinary and multidisciplinary research encompassing disciplines of computer science, mathematics, statistics, forecaster, econometric, etc. in the field of time series analysis and forecasting.

Deadline
10 Oct 2020

http://itise.ugr.es/

8th SOLAS Summer School 2021
Mindelo, Cape Verde
7-18 June 2021

The SOLAS Summer School is a biennial, international event that aims to teach the skills and knowledge of the many disciplines needed to understand the nature of ocean-atmosphere interactions and how to link ocean-atmosphere interactions with climate and people.

Deadline
6 Nov 2020

https://www.solas-int.org/news/events/summer-school-21.html

For more opportunities in Ocean Sciences visit **https://nf-pogo-alumni.org/Opportunities/**
Have any opportunity you would like to announce here? Contact **info@nf-pogo-alumni.org**

nano

NF-POGO Alumni Network for Oceans

https://nf-pogo-alumni.org/

THE NIPPON FOUNDATION

http://www.nippon-foundation.or.ja/eng/

pogo

http://www.pogo-ocean.org

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 19 Chief Editor: Rodrigo H. Moresino

Layout Design Editor: Lilian Krug

https://nf-pogo-alumni.org/about/newsletters/