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Report on the 2020 & 2021 POGO-SCOR Fellowship Programme and Perspectives on the 2022 Programme

***Context**: The programme jointly funded by the Partnership for Observation of the Global Ocean (POGO) and the Scientific Committee on Oceanic Research (SCOR) is designed to promote training and capacity development leading towards a global observation scheme for the ocean. The Programme has been a success for over 20 years, with circa of 190 fellowships awarded since 2001.*

The fellowship program is open to scientists, technicians, postgraduate students (preferably of PhD level) and post-doctoral fellows of developing countries and countries with economies in transition and involved in oceanographic work. The main purpose of the program is to advance sustained ocean observations and their applications by supporting training in oceanographic observations. Selected fellows are offered the opportunity to visit other oceanographic centre for a short period (1 to 3 months) for training on any aspect of oceanographic observations, analyses, and interpretation.

At the end of the training period, the fellowship holder and both parent and host supervisors are requested to contribute to a short report in order to receive the certificate of completion.

1) Fellowships awarded during the POGO-SCOR 2020

Due to COVID imposed international travel restrictions, the fellows have delayed theirs in person training dates while taking parts of the training remotely. Since the past report, one fellow has completed her in person training while the other is finally able to initiate the in person training:

1.1) Ana Carolina Peralta Brichtova (completed)

Country of Origin:  **Host Country:** 

Parent institute: Universidad Simón Bolívar, Venezuela
Host Institute: Institute for Marine Remote Sensing, University of South Florida, USA
Training topic: Seagrass Assessment using optical satellite images: a case study at the Ocumare Cienaga.
Dates of Training: September 24th - December 14th 2021

Final report on POGO-SCOR training by Ana Carolina Peralta Brichtova

Please provide a brief description of activities during the training period.
The research focus of the Institute for Marine Remote Sensing at the University of South Florida is the analysis of digital data obtained by satellite sensors to enable a better understanding of historical and current changes occurring in the world's oceans on a large spatial and temporal scale. Under this scenario, the training objective was to learn the basics use of Google Earth Engine (GEE), a computing platform that allows performing satellite imagery assessments. The training process included steps and methods to classify seagrasses from optical satellite images. Knowing about the platform environment, the language and basic scripts for GEE were part of the training process. Subsequently several processes within GEE were implemented like 1) exploring images from different sensors: Landsat 4, 5, 7 and Sentinel 2 for

different locations along Venezuelan coast and 2) selecting which images are the best for performing the seagrass classification.

After having a better understanding on how GEE works, a Sentinel 2 imagery collection pre-processing scheme was implemented, in which the training process took place and subsequently an automated classification could be implemented. All these processes were done for a specific location in Venezuela known as La Ciénaga de Ocumare, used as a case study. Testing the scripts developed by Luis Lizcano (IMaRS - USF PhD student) was a big part of the process and after getting few good outputs a final mosaic for year 2020 was created, with a preliminary view of the seagrass classification in the selected location.

As a complementary activity for the current visiting fellowship, a 3-day cruise in the Gulf of Mexico aboard the Florida Institute of Oceanography's R/V Hogarth was executed. The College of Marine Science's Ocean Circulation Lab (OCL) studies ocean circulation and its ecological impacts in the Gulf via direct observations and models. The cruise plan included the deployment and recovery of sensors used in circulation studies related to Harmful Algal Blooms (HABs). Getting the opportunity of becoming part of the scientist team on board and having the experience with CTD water sampling, current meter recovery from inshore Tampa Bay, SUNA nitrate station deployed in 50 meter water depth and surface drifter for circulation model verification deployed, brought a wider view of best practices in ocean observation programs, the use of different tools and equipment.

After all these experiences and training I'm looking forward to generating a seagrass map for Venezuelan coast and more after escalating into new challenges such as performing seagrass assessments for the Caribbean Region. I'm sure that this could be done in collaboration with the USF team for which some discussions already have been arisen.

What applications of the training received do you envision at your parent institution?
I envision using all the tools and methods learned during the training. It includes mostly open source software and images collections which work perfectly for my research goals, for my student's thesis and for future projects within my lab and institution.

Please provide your comments on the Fellowship Programme.
I think the current Fellowship Programme is very useful for getting trained in new methods and to have an overview of different approaches and possibilities to perform some specific research tasks. Getting in touch with colleagues from other institutions create environment for discussions about how to approach some challenges and which could be the best way to proceed. And the last, but not less important point, is the connection for future collaborations which nowadays is very valuable and helpful. After my experience I can tell that I will take back home a valuable and rewarding results for producing publications and also a new network for future collaboration works. I feel that I can grow as a professional, in terms of escalating a better position in my home institution; I have better tools to contribute to my Department, my Laboratory and my students.

Ana's Host supervisor

Please provide your comments on the performance of the trainee
Carolina was an outstanding trainee and far exceeded my expectations in what she accomplished during her relatively short visit. She achieved an excellent level of proficiency in programming skills needed to perform complex satellite data analysis for seagrass mapping, which is quite difficult to do and a challenging research area even for experts in the field. Carolina is now able to use publicly available satellite observations and cloud computing applications to better understand where seagrass habitats are located along the Venezuelan coastline and how they change over time. This type of work has thus far not been done for the region. This is an impressive accomplishment for someone without previous training in satellite remote sensing analysis within such a short amount of time. Her visit our lab will likely result in several peer-reviewed publications and the development of collaborative proposals to expand seagrass geospatial analysis and monitoring capabilities to the broader Caribbean Sea and globally.

Is this exchange likely to lead to future collaboration with the trainee's parent institution? If so please give example(s) of how this collaboration may be pursued.
There are mutual interests in assessing the extension and coverage changes through time of different coastal ecosystems present in the Caribbean and Golf of Mexico such as seagrass, mangroves and coral reefs. In this sense, the Caribbean region has been poorly represented, especially with the seagrasses for which only few studies have been performed in the last decades. Venezuela is a good way to start to approach these goals, after this exchange experience. We plan to continue working in collaboration, trying to gather more data to amplify the scope in order to cover a bigger geographical area and finally get the outputs we need to visualize the changes in the ecosystems' coverage in a regional scale.

We are looking forward to continuing communicating and supporting each other tasks through video calls which nowadays are very common and feasible. We have planned to prepare some scientific articles with the upcoming results, and we are willing to share all of our work and experience in any outreach activity that comes up in the near future.

Please provide your comments on the Fellowship Programme.
The POGO-SCOR Fellowship provided Carolina with a unique opportunity to receive training in sophisticated remote sensing techniques otherwise difficult to obtain, advance her research skills, expand her collaborative network, and learn from an enriching culture experience. This was primarily possible with POGO's financial and logistical resources made available to her. The programme guides the fellow through a careful process of developing his/her training goals and ensures that resources are fully available at the host institution. As an outstanding institution, POGO and SCOR are enabling capacity-building and technology transfer across countries with emerging economies, and facilitating the development of communities of practice dedicated to addressing critical issues challenging the ocean's ability to provide resources to society. POGO and SCOR are global leaders in making these collective efforts possible.

Ana's Parent supervisor

Do you agree with the above comments, and do you have any additional feedback you wish to provide?
I fully agree with Dr. Peralta's report. The training carried out will be of great importance in the academic and research performance for our university. We are very proud of Dr. Peralta and very thankful for all the support received by the University of South Florida under the POGO-SCOR Fellowship.

1.2) Mahi Mankeshwar (underway)

Country of Origin:  **Host Country:** 

Independent researcher from India
Host Institute: Lamont Doherty Earth Observatory at Columbia University, USA
Training topic: Changing habits with changing seas: habitat study of marine megafauna in the Arabian Sea
Dates of In Person Training: August 12th - November 10th 2022

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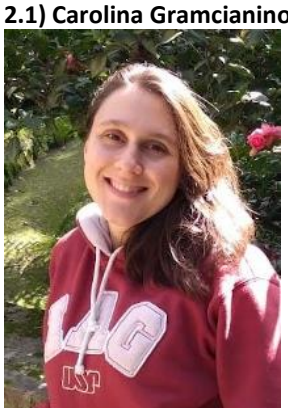
2) Fellowships awarded during the POGO-SCOR 2021

2.1) Carolina Gramcianinov (completed)



Country of Origin:  **Host Country:** 

Name of Supervisor (Parent Institution): Pedro Leite da Silva Dias, University of São Paulo, Brazil.
Name of Supervisor (Host Institution): Joanna Staneva, Institute of Coastal Systems Analysis and Modeling - Helmholtz Centre Hereon, Germany.
Training topic: Integrated wave modelling and observation system in the South Atlantic Ocean.
Dates of Training: September 1st - November 30th 2021

Final report on POGO-SCOR training by Carolina Gramcianinov

Please provide a brief description of activities during the training period.
At the begging of my fellowship, I was trained on data analysis, covering data acquisition, processing, and visualisation. I used different data sources, such as buoys, satellites, and vessel measurements of parameters, such as significant wave height (swh), mean wave direction, peak period, and wind speed. I learned how to produce quality control checking, suitable graphical presentation, etc. As a second part of the internship, I was trained to set up and run the wave model (WAM). Several sensitivity tests were done to produce model outputs that better represent the waves of the Brazilian coast. In this step, I learned how to make model validation against in-situ and satellite observations, error metrics, etc. Finally, I learned how to perform the data assimilation of swh altimetry data into the model. In this step, all what I had learned so far were combined, since each observation data source need to be checked before being assimilated into the model. Ongoing work is assessing the results and writing a publication. The manuscript will present the results of the high-resolution wave hindcast for the Southeastern Brazilian Coast and the impact of data assimilation, with focus on extremes event.

Besides that, I was able to interact with many researchers in the field of data analyses, modelling and data assimilation, increasing my networking for future works and collaborations. I have learned a lot about the upcoming on methods and approaches on costal research from attending the Modelling and Data Assimilation department (KSD) weakly meeting and Institute of Coastal Systems (KS) weakly seminars. I also had the opportunity to participate as a guest on the Institute's retreat, which was a 3-day event dedicated on the state-of-the-art of coastal system research.

What applications of the training received do you envision at your parent institution?
As a result of this internship, we intent to produce one of the first high-resolution wave hindcasts with data assimilation for the SE Brazilian coast. The data will be available to the scientific community and hopefully will be used by other research groups. This effort is essential to building up an open access operational wave product that focuses on the increase in the synergy between observation and modelling. I intent to support the development of this wave operational system at the University of Sao Paulo, engaging other students and researchers that may be interested in combining model and observational data to improve the coastal hazard understanding and prediction in Brazil. In the future, this continuous effort can help in the training of students and researchers to support the maintenance of the system and can improve the development of new methods of assimilation to use better the Brazilian observational network.

Please provide your comments on the Fellowship Programme.
The internship brought to me not only practical training but also professional and personal experience that surely improved my skills as an early-stage researcher. Since the KSD department works with state-of-

art costal models observational data and approaches for their integration into advanced end-products, I was able participate in many scientific discussions that enrich my perception on these subjects. Regarding the waves, I worked closely with Dr. Arno Behrens, who is one of the current developers of open sources WAM. Dr. Anne Wiese and Dr. Marcel Ricker, who work with wave model parametrization improvements and operational production, also supported me all the time. I received routines for pre- and post-processing of the model and observation data, as well as the codes for wave model and data assimilation. During my internship I was able to produce my own toolkit needed to start working independently. Dr. Joanna Staneva supervised me, following every step and included me in all department activities. It was an amazing experience.

Carolina's Host supervisor

Please provide your comments on the performance of the trainee
Carolina Barnez Gramcianinov showed a remarkable understanding of different methods for data analyses, wave-modelling and assessing the synergy between different data. She worked in learning how to set-up independently the wave model for the SE Brazilian coast using nested-modelling approach, and produce combined analyses of the wave model simulations with satellite based products and in situ measurements. She has proven to be a responsible person who can successfully followed the Internship plans and was able to implement her tasks carefully and successfully. Carolina carried out every aspect of her work to the highest possible standard.

Is this exchange likely to lead to future collaboration with the trainee's parent institution? If so please give example(s) of how this collaboration may be pursued.
Collaboration between HEREON and University of San Paolo in Brazil in the field of operational oceanography, wave data analyses and data assimilation will be pursued. In addition of producing join papers, Carolina, together with scientists from Hereon, will work together on implementing the downscaled system and in the training early career researchers in using the already developed in the frame of POGO-SCOR fellowship toolkits.

Please provide your comments on the Fellowship Programme.
During the Fellowship Carolina was trained on wave and wind data analyses, coastal modelling, and synergies between different types of observations and model simulations. This training gave her unique opportunity to learn and follow closely activities in the framework of coastal ocean operational system running at Helmholtz Centre Hereon and initiate her own developments. The results produced within and beyond the lifetime of this fellowship can be of great value to both scientifical and coastal management and decision makers, particularly on Brazilian coast.

Carolina's Parent supervisor

Do you agree with the above comments and do you have any additional feedback you wish to provide?
Yes, I agree with the comments. In addition, I should emphasize my appreciation for Carolina's dedication to the research program and how much she achieved during the training period. During our recent interaction, it became evident her progress in understanding not only the technical issues about data processing but the physical nature of the problem. The results certainly exceeded my expectations.

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2.2) Stella Patricia Betancur Turizo (completed)

Country of Origin: **Host Country:**

Name of Supervisor (Parent Institution): Natalia Burgos Uribe, Center for Oceanographic and Hydrographic Research of the Caribbean (CIOH), Colombia
Name of Supervisor (Host Institution): Jose Martin Hernandez Ayon, Instituto de Investigaciones Oceanologicas, Mexico.
Training topic: Biogeochemical parameters analysis at Antares Cartagena station and its climatic variability in the Colombian Caribe region.
Dates of Training: October 11th - December 11th 2021

Final report on POGO-SCOR training by Stella Patricia Betancur Turizo

Please provide a brief description of activities during the training period.
The training was focused on the application of laboratory practices and management of autonomous measurement equipment (Example: MinFet for pH measurements in the ocean). For those of us interested in the implementation of pH measurements, Total Alkalinity (AT) and Dissolved Inorganic Carbon (DIC) measurements, it is not only enough 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, I learned how to measure TA using a titration automatic system, DIC by a coulometric instruments and pH by a potentiometric closed cell system, using the laboratory equipment of Dr. Hernández-Ayón, all of these under the guidance of qualified personnel in each parameter. After the instruction I was allowed to apply what I had learned and assess my skills until I achieved precision in the measurements and finally, I was able to read my own samples.

In the final weeks of training, I learned how to set up by my own a TA and pH measurement system. The first variable using a closed manual titration cell and for the second with a close cell. Both system I learned to set up it was with similars instruments that I have in the CIOH laboratory, which implied greater care and control of each stage of the process, since we do not have an automated system of measurement. This was the most important thing about my stay, seeing that despite the technical limitations of my laboratory, I can measure these variables and contribute data to the international community.

In parallel to the process of laboratory measurements of the mentioned variables, I had the support of Dr. Orion Norzagaray, who is part of the team of experts in Dr. Hernández's laboratory, and with his advice, I learned to manage and maintain the equipment of pH measurement (MinFet) acquired with resources from the NANO-DOAP project. Dr. Norzagaray shared his experience in the handling of this type of sensors and the application of good care practices and handling of the data generated by these instruments, through the application of verification and calibration protocols. Likewise, I work in private meetings with Dr. Hernández-Ayón, with the aim of formulating a joint project that allows us estimate a climatological TA and pH baseline from satellite data. These results will allow us to understand the Caribbean basin and focus monitoring efforts on those areas of significant variability.

What applications of the training received do you envision at your parent institution?
Everything I learned was focused on the implementation of TA and pH measurements in the CIOH laboratories, as well as the correct installation of the equipment acquired by the project for the generation of quality pH time series.

We hope to formulate a joint research project and continue with the support and advice of Dr. Hernández-Ayón's laboratory, contributing to the global data of the variables of the carbonate system.

Please provide your comments on the Fellowship Programme
This type of program allowed me to work in a laboratory of high scientific quality, with experts in the study of the carbonate system in the oceans. Without this scholarship, I would not have had the opportunity to gain skills and knowledge in these measurements.

In our countries, we always have financial limitations that prevent us from having the resources to visit laboratories like these and to be able to interact with experts on topics of interest such as my research stay. Presence is important, because there are exercises and instructions that cannot be carried out virtually and that merit direct physical interaction. For this reason, I hope that this type of scholarship will continue to develop.

Stella's Host supervisor

Please provide your comments on the performance of the trainee.
Stella did a very good job. During this period Dra. Stella worked extensively on three projects. The training was the first mainly focused on the best laboratory practices and management of autonomous measurement equipment "MinFet for pH measurements in the ocean". We teach her the protocols for preparation before and after to go to the sea. She also learned the protocols and details of discrete samples used for pH validations of autonomous measurements. The of these was to develop techniques for the assessment the Total seawater alkalinity and pH to get insitu values for seawater measurements but also for calibrations purpose. The third was to set up a system and the methodology used for total alkalinity measurements in the laboratory.

In my opinion Stella did and excellent performance and I'm sure she will do an excellent job in all her endeavours in Colombia and she will get benefit from this fellowship.

Is this exchange likely to lead to future collaboration with the trainee's parent institution? If so please give example(s) of how this collaboration may be pursued.
We will further work to comparison for coastal ocean measurements to broader oceanographic and social applications for the Caribbean region. This experience for Stella was an important contribution for collaborate in the project Dynamics of Marine Plankton and Climate Change, which includes the time-series station of Antares. Likewise, Stella and me have a meeting plan with the aim of formulating a joint project that allows us to estimate a climatological TA and pH baseline from satellite data. These results will allow us to understand the Caribbean basin and focus monitoring efforts on those areas of significant variability.

Please provide your comments on the Fellowship Programme.
I´m very pleased with the support from POGO-SCOR for Dra. Stella Patricia Betancur Turizo to be in our laboratory, at the Instituto de Investigaciones Oceanologicas at the University of Baja California, Mexico. My laboratory has a tradition of strong interaction with the Latin-American Ocean Acidification Network (LAOCA). We have developed and implemented a laboratory with infrastructure for CO_2 measurement in coordination with the LAOCA network. I strongly support such international capacity building efforts and especially support the POGO-SCOR efforts. The training of this young professional will serve to spread the knowledge of an important technology.

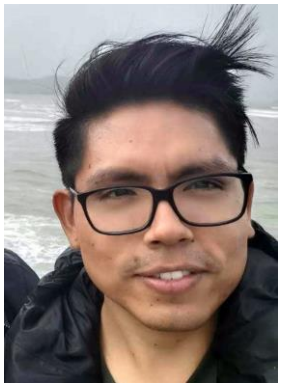
Stella's Parent supervisor

Do you agree with the above comments and do you have any additional feedback you wish to provide?
For the General Maritime Directorate (DIMAR), the participation of its researchers in postdoctoral

programs such as the POGO-SCOR 2021 scholarship is very important. The activities developed by Dr. Betancur-Turizo, are part of the institutional goals and projections, so we are very happy and satisfied with the results achieved and with the proposals made by Dr. Hernández-Ayón.

From DIMAR we will support the formation of the proposed project as a result of the stay developed by Dr. Stella, which seeks to estimate a climatological TA and pH baseline from satellite data, we appreciate the trust given to our institution and We hope to continue contributing from our role as Colombian Maritime Authority in this type of initiatives and collaborations.

2.3) Cristhian Asto (completed)



Country of Origin: **Host Country:**

Name of Supervisor (**Parent Institution):** Dimitri Gutiérrez Aguilar, Instituto del Mar del Peru
Name of Supervisor (**Host Institution):** Anthony Bosse, Mediterranean Institute of Oceanography & Mediterranean Institute of Oceanography, France.
Training topic: Glider training for coastal monitoring in the Peruvian upwelling system.
Dates of Training: January 26th - February 25th 2022

Final report on POGO-SCOR training by Cristhian Asto

Please provide a brief description of activities during the training period.
The training addressed different topics ranging from theoretical and practical about the management and real time data transfer gathered from automated underwater vehicles (also known as gliders). Over the 1-month training period at the Mediterranean Institute of Oceanography (MIO, Marseille, France), I managed to replicate the good practices established by the experts of the OceanGlider program endorsed by UNESCO (https://github.com/OceanGlidersCommunity). For instance, Dr. Anthony Bosse provided an introduction regarding all the past and current deployments in the Mediterranean Sea made possible by French National Research Center (CNRS) since 2007, as well as the piloting and maintenance database tools. In addition, we checked two of the CNRS's gliders that were in operation at sea and observed the data sent since the beginning of the mission. Moreover, Dr. Anthony Bosse gave recommendations to optimize the data collected by the gliders that my institution had in operation at that time. Finally, we were able to make use of the tools developed by the glider community for the real time data transfer (edition of json file for the metada and ftp transfer to the Global Data Assembly Center Coriolis) that are highly valuable for monitoring the ocean.

What applications of the training received do you envision at your parent institution?
The Eastern Pacific is a complex region with highly variable conditions. The Peruvian Marine Research Institute (IMARPE) is trying to establish an operational monitoring network using state of the art instruments such as gliders. Currently, IMARPE has 4 operational gliders that will be used to that purpose. This training will help to better operate and automatize the data transfer sent in real time by those instruments. Furthermore, having learned different practices recommended by Dr. Anthony Bosse, our gliders will be optimized to collect high quality data and share them in real time with Coriolis. This will make our activity visible and our data open, as well as available for assimilation in operational forecasting models and reanalysis. Finally, all the acquired knowledge will be passed on to my colleagues at IMARPE.

Please provide your comments on the Fellowship Programme
This fellowship programme allowed me to travel and learn more about the operation of gliders. I am very grateful to be given the opportunity to stay for a month in France and learn from an expert in the field at

MIO, Dr. Anthony Bosse. I believe this Fellowship Programme is an excellent initiative for young scientists who want to develop an expertise in ocean sciences.

Cristhian's Host supervisor

Please provide your comments on the performance of the trainee.
Mr Cristhian Asto has been a very motivated and skilled trainee. Being in charge of technical duties with a glider being at sea, Cristhian has proved to be completely capable of handling his everyday commitments with the ongoing glider activity of his institution, and learn and apply new knowledges to expand the data stream. Communication was very easy since Cristhian is proficient in English. To conclude, I greatly appreciated hosting Mr Cristhian Asto at MIO, he was an outstanding trainee.

Is this exchange likely to lead to future collaboration with the trainee's parent institution? If so please give example(s) of how this collaboration may be pursued.
Yes, indeed this exchange will be the starting point of a future collaboration. With the co-supervision by colleagues in France and Peru, the trainee has been endorsed into a French PhD program. It will allow him to spend 18 months in France in the next 3 years in order to prepare for a PhD degree. The trainee will spend more time at MIO with me to develop scientific questions linked to glider data collected off Peru. Moreover, we stay in touch in order to keep sharing best practices around the data stream from the glider, as well as the maintenance data base that will become an open tool in the framework of H2020 GROOM-II project (design of a future European glider infrastructure, PI L. Mortier LOCEAN, France).

Please provide your comments on the Fellowship Programme.
The POGO-SCOR fellowship was very useful for me in order to start an important collaboration with Mr Cristhian Asto. It was very positive from both the scientific and human aspect.

Cristhian's Parent supervisor

Do you agree with the above comments, and do you have any additional feedback you wish to provide?
Yes, I agree with the positive reports given by Dr Bosse and Mr Asto. This training is of great benefit for improving the capacities at our institution, and we are confident that Mr Asto will apply his acquired knowledge to train other colleagues and help to develop a research line based on glider data.

2.4) Pranav Pulukkayi (completed)

Country of Origin:  **Host Country:** 

Name of Supervisor (Parent Institution): Grinson George, Central Marine Fisheries Research Institute, India
Name of Supervisor (Host Institution): Shubha Sathyendranath, Plymouth Marine Laboratory (PML), UK
Training topic: Use of sentinel satellite data for mangrove mapping and conservation.
Dates of Training: February 20th - May 20th 2022

Final report on POGO-SCOR training by Pranav Pulukkayi

Please provide a brief description of activities during the training period.
Geospatial mapping of mangrove patches along selected Indian coastal states is one of the major objectives of my ongoing PhD programme in India. Mangroves in Indian states are not scientifically

mapped due to their scattered locations, vast coverage, and lack of expertise in the field. The major objective of my visit to Plymouth Marine Laboratory (PML) with the support of the POGO-SCOR Fellowship was to learn new scientific tools and techniques to standardise a satellite-based methodology for mangrove mapping and monitoring, to achieve one of the objectives of my PhD work, and to facilitate my long-term goal of working on mangrove conservation.

By availing the POGO-SCOR fellowship, I was able to execute the following activities:
2.4.1. Sentinel-2 satellite-based mapping of Indian coastline states: Sentinel-2 satellite-based mapping of two Indian coastal states, viz., Kerala and Andhra Pradesh, was initiated before the fellowship tenure started. This method of classification was suggested by Dr Shubha Sathyendranath; my supervisor at PML. Based on this, and with help from experts at PML, all the contiguous mangrove patches in these states were mapped and delineated using a random forest classification algorithm using the software package SNAP, during my sojourn at PML. To confirm the correctness of the methodology and the outputs generated, a presentation on “Delineating mangrove patches along the coastal regions of Kerala and Andhra Pradesh using Geographical Information System, satellite data and field validation” was given at PML during the monthly meeting of habitat mapping experts at PML on 30/03/2022. The methodology and results were discussed within the group and improved by incorporating their comments and suggestions.

2.4.2. Artificial intelligence (AI) Machine Learning (ML) method for the classification: Katie Awty-Carrol, Scientist at PML, introduced me to AI and ML-based methods as a promising methodology for coastal habitat mapping. Remote Sensing and GIS Software Library (RSGISLib) and Atmospheric and Radiometric Correction of Satellite Imagery (ARCSI) were the two python packages recommended for conducting the classification. Accordingly, ARCSI was used for the atmospheric correction of Sentinel-2 and Landsat-8 data were used with the PML software library RSGISLib for further classifications. I learnt these techniques with the support of Katie Awty-Carrol, Emma Sullivan and Dan Clewley, scientists in the remote sensing lab at PML. The method was tested for mangroves in the Coringa wildlife sanctuary (India), the validation coordinates of which were gathered during earlier field surveys.

2.4.3. Attended the training course on ‘NEODAAS AI for Earth Observation’ during 3-4th May conducted at PML: Students from Exeter university also participated in the two-day programme. The programme gave me an insight into various AI-ML techniques used with Earth observation satellite data, such as Convolutional Neural Networks for Land Cover Mapping and also the MAGEOHub for the bulk data process.

2.4.4: Techniques learned: I learnt various tools and techniques such as python packages (RSGISlib and ARCSI) and Jupyter notebook which could be applied for the classifications as well as visualisation of the data generated as part of my PhD research. I also familiarised myself with the Linux operating system, Python packages for plotting scientific figures and making plots using the Jupyter notebook.

2.4.5: The skill of scientific writing: The skill of scientific writing is another important aspect that I learned from Dr Shubha. Under her efficient guidance, I was able to write the main chapters of PhD thesis which I would not have been able to complete otherwise.

2.4.6. Proposal submitted: I was able to contribute inputs to a proposal on mangrove restoration as a measure to protect the coastal population of Kerala from storm surges and flooding, and consequent exposure to the population from water-borne diseases. The project proposal was submitted to a funding agency by PML, with the help of James Lord, fundraiser at PML. This, if funded, could be an extension of my ongoing outreach programme "Mangrove Aided Restoration of Kerala coastline at Selected sites (MARKS) funded by Trevor Platt Science Foundation (TPSF)", and will facilitate future collaborations with Dr. Shubha and colleagues in the Remote Sensing Group at PML.

What applications of the training received do you envision at your parent institution?

The new techniques for mangrove mapping that I learned from PML during the fellowship period can be used to map the entire mangrove patches in India. Central Marine Fisheries Research Institute (CMFRI), the parent institute at Cochin, would be willing to facilitate me in extending the study with the high-performance computing (HPC) capabilities available there. The methods for processing Sentinel-3 and Sentinel-2 can be utilised to integrate my studies with the fisheries data, because CMFRI is the institution in charge of overseeing marine fishery of India.

Please provide your comments on the Fellowship Programme.
POGO-SCOR Fellowship is a prestigious fellowship which gave me a great opportunity to advance my career. It helped me to learn and update my skills and techniques. People from developing countries would always benefit from international exposure, training, and interaction with experts and students. Throughout the period, POGO-SCOR officials have been very cooperative and helpful. Sincere thanks to Sofie, Laura, Karolina and Lica.

Pranav's Host supervisor

Please provide your comments on the performance of the trainee.
Pranav made the most use of his time here at PML. He worked hard and learned a lot. He interacted with many experts here in PML on mangrove mapping and on artificial intelligence (AI) techniques. I understand that the work he has done in PML will figure prominently in his PhD thesis. I received good reports from his other colleagues at PML, including Emma Sullivan and Katie Awty-Carroll. Pranav also made an effort to learn about English culture and enjoyed outdoor activities in the weekends, including sightseeing, going for walks and playing cricket with regional teams (where I understand his talents were very much appreciated). Seeing how useful his visit was and the relevance of his work for some of our ongoing projects, I extended his visit by one month using funds from one of my projects. The work he is engaged in, that of mapping mangroves using satellites, combined with outreach activities to inform and educate the general public on the value and importance of mangroves, I believe that his fellowship will have a long-lasting impact.

Is this exchange likely to lead to future collaboration with the trainee's parent institution? If so please give example(s) of how this collaboration may be pursued.
From my side, I would certainly be interested in continuing the collaboration with Pranav and with CMFRI. In fact, through the Trevor Platt Science Foundation, he now has a small outreach project on mangroves, that he is executing with support from CMFRI and other institutes.

I do not know what his position at CMFRI would be once he completes his PhD. I trust that CMFRI also values his talents and his expertise as highly as I do, and that his association with CMFRI will continue, in one form or another, after completion of his PhD.

Please provide your comments on the Fellowship Programme.
The long-standing nature of the programme is a testament in itself on its quality and the need that it fills. My experience with the programme in general, and with Pranav in particular, has been very positive. It is a valuable mechanism for facilitating hands-on training and promoting collaborations between countries and between institutions engaged in ocean observations. I sincerely hope that POGO and SCOR will continue this programme. Thank you very much for giving us the opportunity to host Pranav. I also thank all at the POGO Secretariat, for their unfailing and courteous help and support throughout the implementation of this fellowship.

Pranav's Parent supervisor

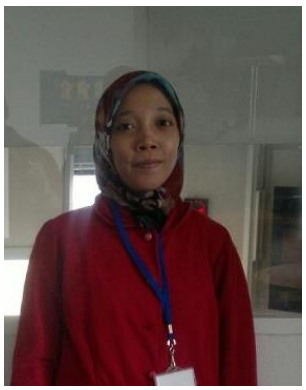
Do you agree with the above comments and do you have any additional feedback you wish to provide?
I agree with the above comments. It was a great opportunity for my PhD scholar, Mr. Pranav. As a supervisor, I felt that the scholarship provided by POGO and SCOR is a big leap for the researchers, in their

effort to improve themselves in the pursuit of the science they follow. Pranav's research is sure to add value towards our vision on sustainability and blue economy. Restoring the global marine ecosystem with the capacity to use carbon, such as mangrove forests, require effective schemes. To strengthen expertise in marine science, develop science-based policy and management tools and create educational resources for coastal communities, there are platforms /partnership/programme to support countries that tackle marine pollution, sustainable seafood, and marine biodiversity. The POGO-SCOR is one such global effort.

Various restoration projects are required to effectively utilise the functioning of ecosystem types including mangroves and strengthening of such ecosystems will improve the socio-economic fabric which will provide livelihood opportunities such as fishing, and sustainable tourism, as wells as cultural and coastal protection benefits. I am happy that Pranav is able to continue his efforts using the competitive grant from Trevor Platt Science Foundation he secured during the fellowship. Further, he is in the process of applying for many more. At CMFRI, he will be able to continue those efforts in addition to his project responsibilities. Furthermore, he will be better equipped to compete for regular positions at CMFRI by enrolling in the recruitment process. In the case of international funds, I am hopeful that our partner NERCI, Kochi will be able to host him as they can receive the grants.

I express my sincere thanks to all those who supported him during this scholarship. Special thanks to Dr. Sophie Seeyave, Executive Director, POGO and Dr. Shubha Platt, Mentor at PML, UK.

2.5) Dava Amrina (completed)



Country of Origin:  **Host Country:** 

Name of Supervisor (Parent Institution): Nelly Florida Riama, Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG), Indonesia.
Name of Supervisor (Host Institution): Janet Sprintall, SCRIPPS Institution of Oceanography, USA.
Training topic: Karimata Strait Variability in relation to Northeasterly Cold Surges and their Impact on Regional Rainfall.
Dates of Training: May 31st - July 30th 2022

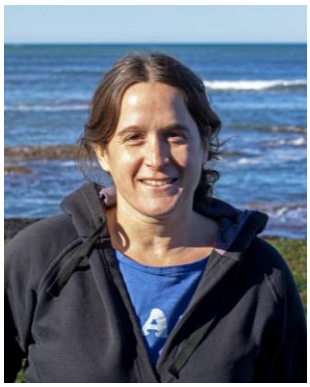
Testimonial on POGO-SCOR training by Dava Amrina

Briefly explain how you benefitted from the program
Have an opportunity and this training was an excellent opportunity for me to expand my scientific career. First of all, I had the opportunity to work with Dr. Janet Sprintall, who already has a great deal of experience in the field of ocean-atmosphere and ocean observation. I also had an opportunity to visit and become a part of Scripps Institution of Oceanograhy (SIO), UCSD which is the best university with oceanography majors in the world. I got many experiences for join as student exchange activities and also make a discussion for research and knowledge. Being under supervisor of Dr. Janet Sprintall, I learned a lot about how ocean observation very useful, especially in the development of weather predictions in Indonesia region. I was able to use the tools to make some analysis based on observation data (temperature, wind, precipitation, salinity and ocean currents) and organizing it into Interesting and useful information for operational forecast. Moreover, Besides developing hard skills, I also learned about soft skills to get to know other cultures in different weather conditions from my country.

What are your aspirations for the future?
Through POGO-SCOR fellowship program, I got some insight about ocean and atmosphere have a great connection for weather and climate in Indonesia. So many researcher also interest about those topic and I hope we could be increase amount of ocean observation in our region. And also I hope able to enroll into

PhD program at SIO and and can provide benefits to improve the accuracy of weather predictions in Indonesia through the development of information on the couple ocean-atmosphere.

2.6) María Mendez (underway)



Country of Origin:  **Host Country:** 

Name of Supervisor (Parent Institution): Gregorio Bigtti, Instituto de Biologí-a de Organismos Marinos (IBIOMAR), Argentina.
Name of Supervisor (Host Institution): Celia Olabarria, Universidade de Vigo, Spain.
Training topic: Effects of increased environmental stress on coastal biodiversity.
Dates of Training: May 30th - August 31st 2022

3) The POGO-SCOR 2022 Fellowship Programme

3.1) Application process

The 22nd round of the POGO-SCOR fellowship programme was announced in 14 April 2022 with an initial deadline for 8 May 2022, postponed to 18 May 2022. The call was announced via mailing list (see here) and social media (see here). The application documents required consisted of an application form, quotes for flights, and letters of support from the parent institute (where the applicant is located) and from the prospective host institute.

A total of 29 valid applications were received this year (less than the average of 45 applications/year), with 45% female and 55% male candidates. Applications were received from 13 countries from Latin America (41%), Africa (28%), Asia (28%) and Europe (3%). Applicants proposed trainings of one, two or three months in oceanographic centres in Europe (48%), North America (28%), Oceania (10%), Africa (7%), Asia (3%) and Latin America (3%). Applicants were asked where they heard about the programme call and 46% indicated POGO/SCOR mailing list, social media or websites, 36% indicated hearing from friends, supervisors and home institutions and 15% indicated receiving from POGO/SCOR alumni.

3.2) Review Process

Applications were evaluated independently by a committee of three representatives of SCOR and POGO Secretariat and two independent reviewers (former host supervisors). Each application was reviewed by three member of the Review Committee and received scores according to: quality of applicant, quality of proposal, adequacy of host institute/supervisor, relevance to POGO-SCOR and priority areas identified in the call for proposals, and potential for sustained capacity development in the parent institute/country. The scores are then totalled and the budget for top-ranked applicants are calculated. The six top-ranked applicants were selected according to the budget available (see below).

POGO and SCOR commend the efforts from all the supervisors and colleagues at the various host institutions who agreed to devote time and energy required for the training. The programme would not have been viable without such efforts from prominent scientists and their teams.

www.pogo-ocean.org

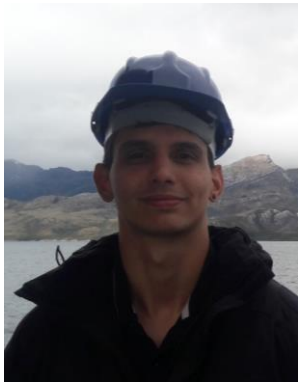
3.3) Fellowships holders for the POGO-SCOR 2022

3.3.1) Maria Emília Bravo

Country of Origin:  **Host Country:** 

Parent Institute: National Scientific and Technical Research Council, Argentina.
Host Institute: SCRIPPS Institution of Oceanography, USA.
Training topic: First taxonomic (molecular/morphological) analysis of polychaetes associated with recently discovered methane seeps off-Argentina (SW Atlantic Ocean).
Proposed start date: November 2022

3.3.2) Brendon Yuri Damini



Country of Origin:  **Host Country:** 

Parent Institute: Federal University of Rio Grande, Brazil
Host Institute: University of East Anglia, UK
Training topic: Autonomous underwater vehicles as a tool to improve Antarctic shelf regions studies: From acquiring to understanding SeaGlider data.
Proposed start date: September 2022

3.3.3) Isabelle Maria Vilela de Oliveira

Country of Origin:  **Host Country:** 

Parent Institute: Federal University of Pernambuco, Brazil
Host Institute: University of Bergen, Norway
Training topic: Ocean-Atmosphere processes in response to climate change in the tropical South Atlantic
Proposed start date: December 2022

3.3.4) Sangeeta Naik

Country of Origin:  **Host Country:** 

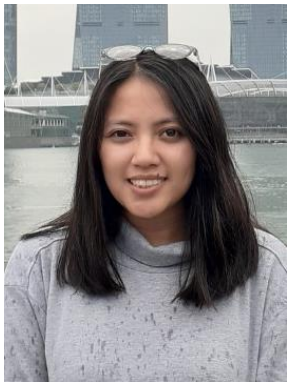
Parent Institute: Goa University, India
Host Institute: Cardiff University, UK
Training topic: Bacterial farming by mixoplankton in the global oceans; an integrated in vivo & in silico training programme
Proposed start date: October 2022

3.3.5) Anwesha Ghosh

Country of Origin:  **Host Country:** 

Parent Institute: Indian Institute of Science Education and Research Kolkata
Host Institute: Plymouth Marine Laboratory, UK
Training topic: Integrating coastal observations to explore the biological impacts of climate change
Proposed start date: March 2023

3.3.6) Maya Eria Sinurat



Country of Origin:  **Host Country:** 

Parent Institute: Institut Pertanian Bogor University, Indonesia
Host Institute: Institute of Biophysics Operating Unit, Italy
Training topic: Altimetry Data Processing Training for Sea Level Trend and Variability Studies
Proposed start date: September 2022