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Report on the 2020 POGO-SCOR Fellowship 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 building leading towards a global observation scheme for the oceans. The Programme has been a success for over 20 years, with more than 170 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.

There is tremendous interest in the fellowship programme at all levels, both in the oceanographic institutions of the developing nations, as well as among leading scientists who are eager to contribute to this initiative. It is seen to be filling a niche in capacity building through specialised training that is not filled by intensive courses or by participation in scientific meetings. It helps improve the esprit de corps among oceanographic institutions around the world, and serves as a stepping stone to building collaborations.

Furthermore, the POGO-SCOR fellowship scheme is increasingly seen by other organisations as a model in capacity development, and similar schemes have been set up by other programmes based on the success of the POGO-SCOR model (e.g. EU projects, the Europe-Africa Marine Network, EAMNet; and the EUROMARINE consortium of European Networks of Excellence). The POGO Secretariat is often approached for help/advice on setting up similar fellowship schemes, or proposals to partner up with other organisations.

Selection process in 2020

The announcement for the 2020 POGO-SCOR Fellowship Programme was posted on the 17th February 2020, with a closing date of 31st March, subsequently extended to 30th April 2020 due to the COVID-19 pandemic, which may have impacted prospective host institution's ability to provide acceptance letters and to commit to receiving a foreign visitor.

A total of 45 valid applications were received this year, 40% of which were from female candidates. Applications were received from 24 countries in all continents, except Oceania. Most candidates selected host institutes located in at Europe and North America (Figure 1).

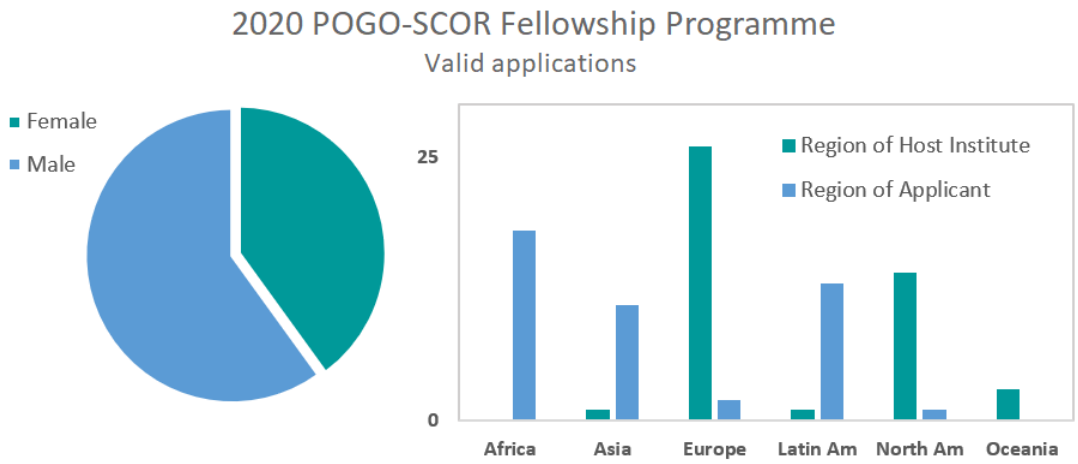

Figure 1 – Gender and regional distribution of valid applications to the 2020 POGO-SCOR Fellowship programme.

The applications were evaluated independently by a committee of six with equal representation from SCOR & POGO. In making the selection the evaluation panel, the following criteria were scored:

- quality of the application;
- relevance of the application to the priority areas identified in the fellowship announcement;
- evidence that the training will lead to improved sustained observations in the region, or improved applications of such data;
- evidence that the training would lead to capacity-building with potential lasting impact on regional observations.

The evaluation process also considers regional and gender balance.

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.

All the people involved in each fellowship (the fellowship holder or trainee, the supervisor at the parent institute and the supervisor at the host institute) have been requested to contribute to a short report at the end of the training period. The reports that here follow are from the 2020 fellowships.

Due to COVID-related international travel restrictions fellows appointed in 2020 have undertaken partial online trainings and/or initiated training in 2021 or 2022.

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Reports from 2020 Fellows and their Host Supervisors

Report from fellow: Ana Carolina Peralta Brichtova

Country of Origin: **Host Country:**

Parent supervisor and institute: Universidad Simón Bolívar, Venezuela
Host supervisor and 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
Training period: 25th January - 9th April 2021 (online) and 24th September - 14th December 2021 (in person)

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 process 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 (Figure 2), 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 (Figure 3). 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, 1 current meter recovery from inshore Tampa Bay, 1 SUNA nitrate station deployed in 50 meter water depth and one 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.

Figure 2 - Final mosaic for seagrass classification using Sentinel 2.

After all these experiences and training I'm looking forward to generate a seagrass map for Venezuelan coast and more after escalate 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 has been arisen.

What applications of the training received do you envision at your parent institution?
I envision using all of 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.

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 les 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.

Report from Host Supervisor: Dr. Enrique Montes Herrera, Institute for Marine Remote Sensing, University of South Florida

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 continue 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-SCOR'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 is 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 is a global leader in making these collective efforts possible.

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Report from fellow: Andrés Fernando Orejarena Rondón

Country of Origin: **Host Country:**

Parent supervisor and institution: Juan Camilo Restrepo López, Universidad del Norte, Colombia.
Host supervisor and institution: Alejandro Orfila Förster, Instituto Mediterráneo de Estudios Avanzados, Spain.
Training topic: Global change impacts on the Colombian Caribbean coasts: analysis and risk of wave climate and sea level.
Dates of Training: 25th January - 9th April 2021

Please provide a brief description of activities during the training period.
During the training period at the Mediterranean Institute of Advanced Studies (hereinafter IMEDEA) the following tasks have been carried out: - Configuration and maintenance of tide gauges: frequency sampling; aliasing; data processing (time domain vs. frequency domain); sensor configuration. - Configuration and maintenance of wave buoys and ADCP (Acoustic Doppler Current Profiler) sensors: frequency setting; data processing; maintenance; communications. - Wave modelling (SWAN and XBeach models) for wave propagation from deep to shallow waters. - Long term wave modelling for climate studies. Generation of a 60 year wave hindcast over the Caribbean Sea (see attached document). - Short curse on gliders. Use, perspectives, data processing of Slocum glider.

What applications of the training received do you envision at your parent institution?
The use and application of the SWAN and XBeach models is possible to train students in the Universidad del Norte. Similarly, for training peers in other institutions in the country. These models could be used with the aim to characterize the wave parameters in deep and shallow waters and their affectation in the coastal zone. The use and application of these models is crucial due to the lack of wave parameters recorded by devices in the Colombian coastal zone. On the other side, the use and settings of the devices for recording waves, learned during the training, will be used for the validation of numerical models. The implementation of real time monitoring programs in Colombia in coastal and marine areas would be of great benefit for mitigation of global change effects as well as to provide scientific response to societal needs (coastal harmonization, coastal uses, beach and coastal erosion, marine safety, oil spills, among others. Besides, the use of new technologies such as the Gliders for monitoring purposes, could provide autonomous and relatively cheap observations in both of the Colombian oceans with a large improvement in the availability of data for the scientific community. My objective is to promote the use and setting of these technologies at the national level involving my parent institution and the National Authority as well as involving other higher teaching institutions (Universidad Nacional, INVEMAR, etc.) to generate the basis of a coastal observing system.

Please provide your comments on the Fellowship Programme.
I am very happy to have had the opportunity to train in the IMEDEA/SOCIB institute with one of the world leading groups in coastal and ocean sciences thanks to the POGO-SCOR Fellowship Program. This approach between institutes opens the possibility to future cooperation of training peer-to-peer support and exchange of experiences. The financial support was enough for the maintenance during the training and the traveling to Bogota -Palma de Mallorca -

Bogotá. The communication and support by email with the administrative coordinator was always clear and very helpful to support when was necessary.

Report from Host Supervisor: Alejandro Orfila Förster, Instituto Mediterráneo de Estudios Avanzados

Please provide your comments on the performance of the trainee
The PhD. candidate Andrés Orejarena performance has been very satisfactory. He has been working in different topics related to ocean data modelling and data analysis, working with different instruments and techniques. He was able to apply different approximations to solve complex problems through wave models in deep and shallow waters. I strongly think that he can take profit from all the knowledge that he has acquired to his future career in Colombia. At the personal level I found him a very pleasant person. He was always able to interact with different scientists at all levels (pre, postdocs and senior researchers) in many different topics. I am convinced that we will continue collaborating in the future to address many scientific problems.

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, we can collaborate with the parent institution in the planning and implementation of monitoring platforms to collect oceanographic data in the Caribbean Sea or the implementation of beach monitoring systems. Furthermore, we could train students and professors for the operation and maintenance of these devices.

Please provide your comments on the Fellowship Programme.
This is the second time that we hosted a Trainee from this Programme and the results have been excellent. We will host in the future Fellows from POGO-SCOR since this is a unique opportunity to teach foreign pre and post-doctoral researchers for short term periods in a different environment. The economic conditions for the trainee were good for the period of his stage. I would like to have more information for future calls.

NOTE: As an output of this fellowship, Andrés has published a peer-reviewed article with his parent and host supervisors at the Data in Brief Journal (see here).

Report from fellow: Hajar Idmoussi

Country of Origin:  **Host Country:** 

Name of Supervisor (Parent Institution): Prof. Errhif Ahmed, Hassan II university, Morocco
Name of Supervisor (Host Institution): Dr. Franz Peters, Institut de Ciències del Mar (CSIC), Spain.
Training topic: Trends in phytoplankton groups in the Mediterranean continental shelf off Morocco
Dates of Training: 18th January - 14th April 2021

Please provide a brief description of activities during the training period.
During the training period, I learned how to determine Phytoplankton Functional Types (PFT) and Phytoplankton Size Classes (PSC) based on satellite remote sensing data and contrast them to *in situ* measured data. I also learned how to calculate phytoplankton biomass from microscope counts and size measurements. This is necessary in order to contrast satellite data for my research in biological oceanography. I have learned a wide variety of practical skills such scaling the microscope ocular ruler with a calibrated microscope slide to get the physical measurements of phytoplankton and using ImageJ software with microscope images. I have also learned to handle satellite and other .nc files with Panoply and have started to learn Matlab scripting. I have also learned to use several statistical tools (e.g. PCA). In addition, I have gained experience with ODV to visualize surface plots, sections and profiles of oceanographic data. I have also been working on writing a scientific paper, under the supervision of my advisors, to publish the work that I have done during my stay in Barcelona.

I have also participated in two sampling efforts done in the NW Mediterranean coast in order to gain experience with several analyses protocols. One such effort consisted in the participation in a multiyear monthly survey in the coast of Barcelona. A second coastal sampling was done after a major Saharan dust intrusion in a coastal area north of Barcelona. Analyses consisted in the extraction of pigments for total chlorophyll a determination, processing water with muffled (450 °C, 4 h) GFF filters for particulate organic carbon (POC) analyses, filtration with 0.4 µm cellulose ester filters for total suspended solids (TSS), inorganic nutrients, total phosphorus, Scanning Electron Microscope X-Ray Microanalyses, and fixation with formol-hexamine for phytoplankton identification.

What applications of the training received do you envision at your parent institution?
Many satellite products are freely available and allow for all kinds of synoptic and long-term studies of the marine environment, including the important primary production components that are subject to climate change. I envision many possible applications of the skills acquired during my stay to study the Mediterranean Sea ecosystems and other seas worldwide and compare remote sensed data with *in situ* measurements in order to have a better comprehension of the systems and hence now and in the future.
In my parent institution, the extraction of chlorophyll a is the only method used for the approximation of biomass. Now, with this training, I am able to calculate the autotrophic carbon biomass to understand either the phytoplankton composition, or the primary productivity of the ecosystem. Also, from chlorophyll and POC, one can calculate the heterotrophic carbon.
I will disseminate and share all these skills to whoever is interested at my home institution for the economic growth and sustainable management for our country.

Please provide your comments on the Fellowship Programme
This fellowship programme is the best opportunity to build capacity in both host and parent institutions and to establish international long-lasting scientific collaborations. I highly recommend to everyone that want to develop his or her professional career.

Report from Host supervisor: Dr. Franz Peters, Institut de Ciències del Mar

Please provide your comments on the performance of the trainee.
Ms. Idmoussi is an open-minded fast learner. She is a hard worker and her collaboration has not only given her new skills but has provided me with the opportunity to work with data from the Alboran Sea, a highly interesting region that I had not studied in detail before. I would like to

think that one of the added benefits from her stay is that her approach to oceanographic questions is now beyond descriptive and more hypothesis-driven, answering questions of general interest that have an added value.

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.
Ms Idmoussi has started to write a scientific paper in which I am also collaborating. This paper will be soon ready to be sent to a peer-review journal with a good impact factor. From this work, some further questions arise that we plan to continue pursuing together, each at his/her own institution and communicate through videoconferencing and the like. Ms Idmoussi has asked me to be part of her PhD thesis committee. This will also keep us further connected.

Please provide your comments on the Fellowship Programme.
I think this is an excellent opportunity for students to be trained in skills at other institutions, in addition to generate scientific collaborations between scientists and institutions in different countries. A possibility for a longer placement (4 to 6 months) would be desirable if this fits the students' purposes. Also, in retrospective, I understand from talking to Ms Idmoussi that the monthly allowance has been a bit on the short side, which may be a heavy burden for some students.

Report from fellow: Mahi Mankeshwar

Country of Origin:  **Host Country:** 

Parent supervisor and institute: Independent researcher
Host supervisor and institute: Dr Joaquim Goes, Lamont Doherty Earth Observatory at Columbia University, USA
Training topic: Changing habits with changing seas: habitat study of marine megafauna in the Arabian Sea
Training dates: 12th August - 10th November 2022

Please provide a brief description of activities during the training period.
My work during my training in New York revolved around using the EASy software to understand how environmental variables were influencing turtle migrations in the Western Indian Ocean. Using the software and its data ingesting capabilities I was able to make fine scale observations on the movements of Loggerhead turtles and draw hypotheses towards the strategies that these turtles use to navigate high velocity waters. Since I was also testing the Track Analysis Module (TAM) of the software, it was a steep yet satisfying learning curve for me. My weekly progress with the software and the study was discussed with senior researchers and software developers in intense brain-storming sessions. These meetings have not only helped clarify important oceanographical concepts for me but have also helped our team develop newer hypotheses which we plan on investigating this year.

Apart from the focused training, another highlight of being associated with the LDEO at Columbia University were the multiple opportunities where I was able to participate in highly

impacting talks and seminars on GIS applications and Climate Change.

What applications of the training received do you envision at your parent institution?
In India, I belong to a group of researchers who undertake studies on marine mammal populations in the country. My training under Dr Joaquim Goes and Dr Helga Gomes and their extended team has helped develop an important skill set of incorporating environmental data to better understand population dynamics of marine megafauna. Having received hands on learning on the EASy software I am hoping to incorporate it in on-going studies in India. The software helps visualization and analysis of datapoints with high-resolution overlays of oceanographic data and am hoping to use it on the pre-existing and future data compilations. Being associated with my advisors who have decade long experience in the climate change phenomenon in the Arabian Sea has opened channels for long-term engagement with them. I have commenced studies on the blooms of Noctiluca scintillans in India and will continue delving into its ecological and economic repercussions under their guidance.

Please provide your comments on the Fellowship Programme.
The POGO-SCOR fellowship exposed me to a very global learning experience in a subject important for fulfilling my career goals and for advancing marine megafaunal research in India. I am grateful for the fully funded nature of the program without which I would not have been able to visit the lab. The POGO team from the start were flexible and easy to communicate with and I am thankful for the patience they showed during the processing of my VISA.
My visit to the Goes-Gomes Lab at LDEO has led to long-term collaborations which would not have been achieved solely based on remote communications, and I am thankful to POGO and SCOR to have allowed me to complete the visit despite the delays caused by the pandemic.

Report from Host supervisor: Dr Joaquim Goes, Lamont Doherty Earth Observatory at Columbia University

Please provide your comments on the performance of the trainee.

Mahi Mankeshwar's work was focused on the migration patterns of logger head turtles, an exercise that involved integrating turtle movement data with earth's magnetic field data, and additionally, with large scale oceanographic data sets derived from circulation models and satellites. The study was intense but Mahi did admirably well. Her work has yields new insights on turtle migration in the western Indian Ocean which is clearly unlike the long-distance migration of tutrles in the Pacific and Atlantic Ocean. Mahi's first manuscript, currently in an advanced stage of development quantifies the roles played by the monsoonal wind driven ocean currents and active swimming by turtles in their effort to reach their destination. We anticipate Mahi' will be submitted her manuscript to a peer reviewed journal within the next two months. Thereafter we hope she will start working on the second manuscript on the role of earth's magnetic fields in turtle migration.

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.
As part of her study, Mahi interacted with Dr. Helga Gomes (Biological oceanographer, Columbia University), Prof. Dale Kiefer (Oceanographer, University of Southern California), Dr. Sergio de Rada (Ocean Modeller, Naval Research Laboratory), Frank O'Brien and Zach Siegrist (System Science Analysis (GIS data specialists). Our plan moving forward is to work very closely with Mahi and her colleagues to extend her work to other species of turtles and also to whales. Together

with researchers from India, Oman and La Reunion, we plan to submit a proposal to NASA Biodiversity RFP due later this year. We will continue to pursue other avenues to NOAA as well.

Please provide your comments on the Fellowship Programme.

We are extremely grateful to POGO-SCOR for the opportunity to host a woman scientist from India, and for the many accommodations that were made to facilitate her arrival to my lab despite delays due to the pandemic and my own travel at sea. POGO-SCOR Fellowship Programme is without doubt an excellent program allowing students from developing countries to access data and tools and master skills over a short while. Mahi was our first fellow and knowing that time was a premium for her, she was really focused on capitalizing on the opportunity. She put in long hours, which had helped her immensely advance her work rapidly every week. If there is one recommendation, I would make is for POGO-SCOR to make allowances for the trainee to revisit the host lab.