5.0 CAPACITY-BUILDING ACTIVITIES

CAPACITY-BUILDING ACTIVITIES

5.1 SCOR Committee on Capacity Building — Urban

Terms of Reference

The primary purpose of the SCOR Committee on Capacity Building is to oversee all of SCOR's capacity-building activities and to help the SCOR Secretariat manage these activities, specifically to

- Provide direction for all of SCOR's existing capacity-building activities: participation of scientists from developing countries and countries with economies in transition in SCOR activities, POGO-SCOR Fellowship Program, travel grants, and provision of reports to libraries in developing countries.
- Guide and assist SCOR Executive Director in development of new capacity-building activities, particularly the Regional Graduate Schools of Oceanography activity.
- Assist SCOR-sponsored projects in developing their capacity-building activities.
- Help SCOR arrange funding for existing and new capacity-building activities.
- Assist SCOR in interacting with regional and international groups related to capacity building in ocean sciences, such as the ICSU regional centers, START, IOC regional programs, etc.

Chair:
Claudia Benitez-Nelson (USA)

Other Members: Mary (Missy) Feeley (UK), Vanessa Hatje (Brazil), Venu Ittekkot (Germany), Prasanna Kumar (India), Margareth Kyewalyanga (Tanzania), Sun Song (China-Beijing), Jennifer Verduin (Australia)

Liaisons: Hal Batchelder (PICES), Jim Costopulos (Global Oceans), Julius Francis (WIOMSA), Peter Pissierssens/Claudia Delgado (IODE/IOC), Eric Raes (IIOE-2 Early Career Scientists Network), and Sophie Seeyave (POGO)

In the past year, the committee reviewed two sets of requests for travel support to scientific meetings and also reviewed the 2019 SCOR Visiting Scholar applications. The committee helped compile information on examples of capacity-building activities carried out by SCOR working groups (see https://scor-int.org/work/groups/capacity-dev-examples/).

The committee is also discussing potential new sources of funding for SCOR capacity-building activities.

5.2 SCOR Visiting Scholars

Urban

SCOR began a program in 2009 to enlist the services of ocean scientists from the SCOR community, from both developed countries and developing countries, both recently retired and active, to teach short courses and to provide more extended on-site education and mentorship at developing country institutions. Some countries and/or individual institutions have requirements for their scientists to retire at a given age, sometimes as early as 60 years of age. Many retired ocean scientists are still interested in teaching and mentoring, and are supported by pensions after their retirement, so do not need salary support. Some active scientists can also use some of their already-supported work time to work in a developing country.

Hosting visiting scientists, whether retired or active, can have many benefits to host institutions also, such as inspiring, motivating, and informing students and faculty, and leading to future collaborations between the visiting scientist and the host institution.

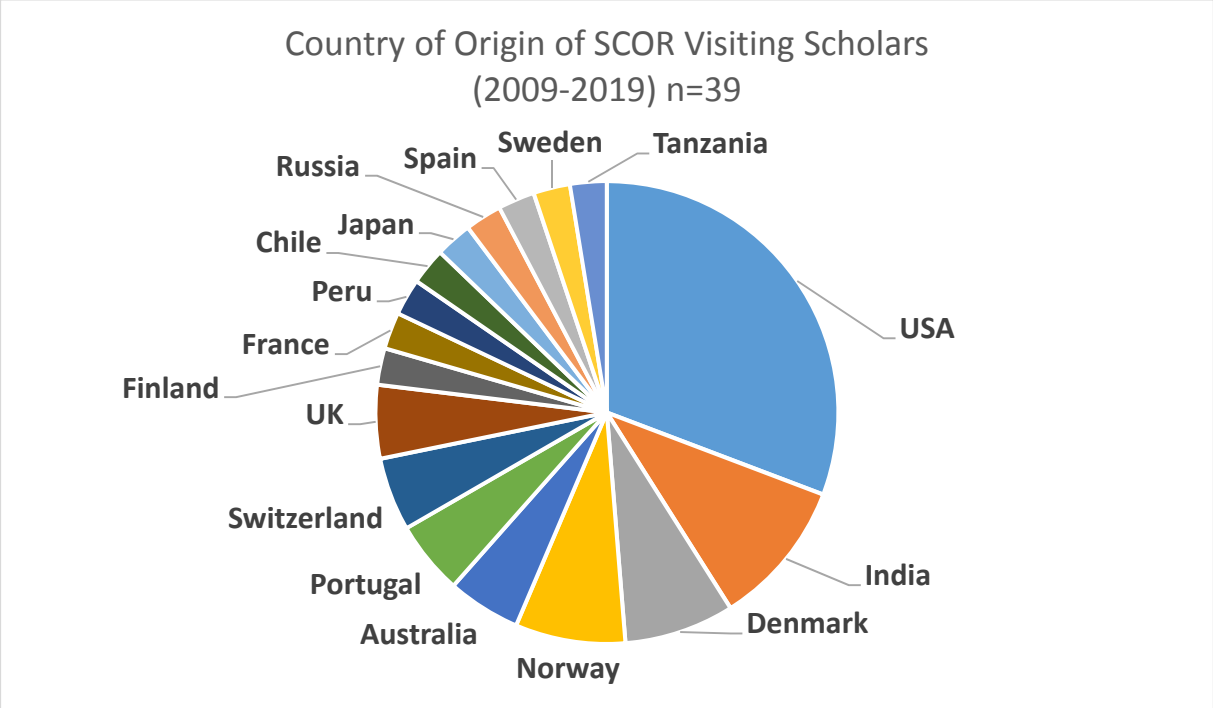
The program is a partnership, with the host institution providing local accommodation and SCOR finding resources to pay for airfares and other local expenses, as necessary. The participating scientists donate their time. SCOR Visiting Scholars might be onsite for as little as two weeks to as long as visa requirements would allow. Applicants may already have selected a host institution or SCOR will help identify hosts. Information about the program is available at https://scor-int.org/work/capacity/visiting-scholars/.

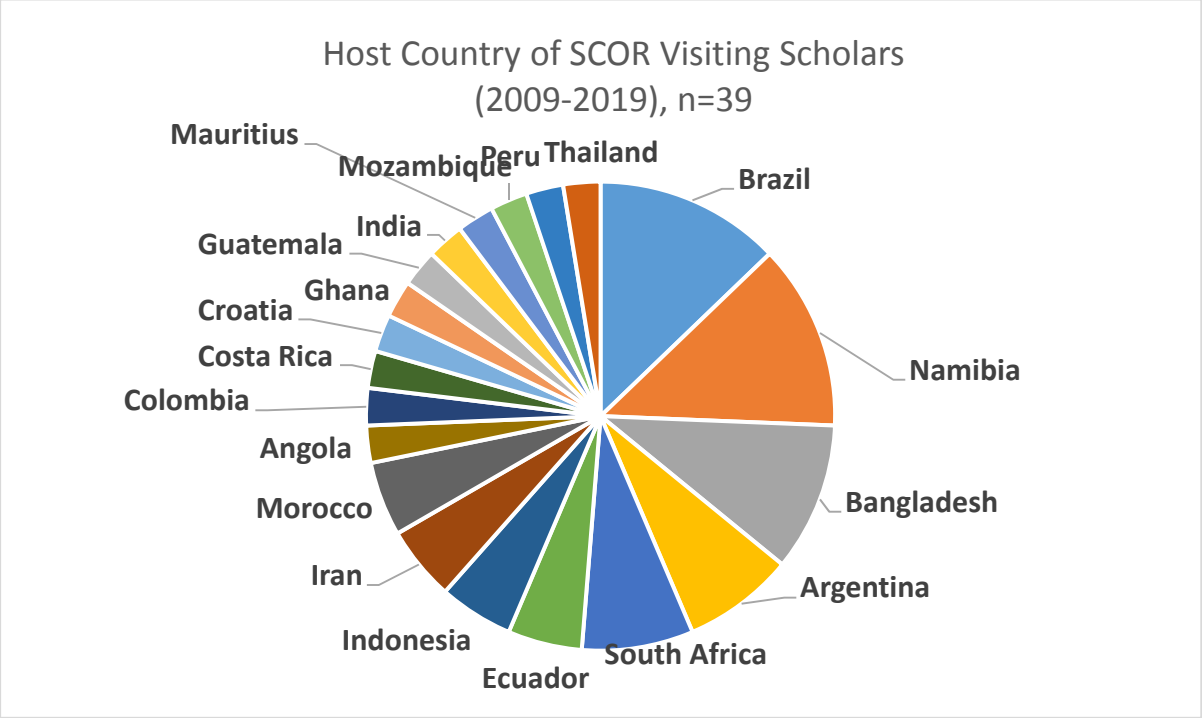
The number of Visiting Scholars approved each year has increased from 1 in 2009 to 6 in 2019. The SCOR Visiting Scholars who were approved in 2019 are shown below.

SCOR Visiting Scholars Approved in 2019

Name	Scholar Country	Host Country	Dates of Visit	Topic of Training
Brian Helmuth	USA	Argentina	Sept.-Dec. 2019	Anthropogenic stressors on marine ecosystems
Adina Paytan	USA	Brazil	Fall 2019	Applications of isotopes in Earth and environmental science
Pere Masque	Australia	Brazil	Aug.-Sept. 2019	Applications of radioisotopes in marine sciences
Teresa Cerveira Borges	Portugal	Angola	29 May - 27 June 2019	Marine resources
Jorma Kuparinen	Finland	Ecuador	Oct.-Nov. 2019	Marine planktonic systems
Mridula Srinivasan	USA	Mauritius	March-Dec. 2019	Marine ecology

The 6 SCOR Visiting Scholars approved in 2019 will be supported by US$7,500 from the U.S. National Science Foundation, $5,000 from the main SCOR budget, $1,975 from the Committee on Capacity Building's budget, and $525 from crowdfunding. This is the first year that SCOR Visiting Scholars were sent to Angola and Mauritius.





The call for applications for 2020 Visiting Scholars will be made after the SCOR Annual Meeting in Toyama. We will attempt to increase the crowdfunding portion in 2020. Ed Urban and Sophie Seeyave (POGO Executive Director) are preparing an article on the SCOR Visiting Scholar Program and POGO Visiting Professor Program for submission to *Oceanography* magazine.

Starting in 2018, Visiting Scholars were asked to distribute online surveys to their trainees, to help evaluate the program. The survey is available in English and French. So far, 37 responses have been received in English and 12 in French. To summarize the results:

- 55% of the trainees were female, 43% of the trainees were male, and 2% preferred not to answer
- 59% of the trainees were students, 26% were researchers, and the other 15% were research assistants, technicians, or professors
- The most common age was the 21-25 year range
- Most trainees were at the master's degree level
- 58% of the trainees felt that their training was the right length, 37% felt that the training was too short, and 5% thought it was too long
- 64% of the trainees thought that the training was at the appropriate technical level, 23% of trainees thought that the training was too advanced, and 14% thought their training was too simple.
- 82% of the trainees felt that their expectations had been met and 18% felt that their expectation were not met.
- 95% of the trainees felt that the trainers knew their subject matter and enthusiastic
- 82% of the trainees felt that the Visiting Scholar was easy to understand and the same percentage felt that the trainee was easy to understand.

Continued efforts will be made to get surveys from trainees who have not yet responded.

5.3 POGO-SCOR Visiting Fellowships for Oceanographic Observations Urban

www.ocean-partners.org

Report on the 2018 POGO-SCOR Fellowship Programme and summary of selected candidates for the 2019 POGO-SCOR Fellowship Programme

2019 Program

This year the nineteenth fellowship programme has been launched, jointly supported by POGO and SCOR. As the POGO Members had to be consulted on this year's budget expenditure at POGO's annual meeting at the end of January 2019, the announcement was posted on the 6 March 2019, with a closing date of 30 April 2019**.**

A total of 29 valid applications were received this year (exactly the same number was received in 2018). Applications were received from 18 countries (15 countries in 2018). The highest number of applications (5) was received from India.

With the combined available budget from POGO and SCOR, 5 candidates were selected from: Cameroon, Cote d'Ivoire, India, Iran and South Africa.

The applications were screened independently by a committee of four, with representation from SCOR, POGO and partners of POGO (including host supervisors of fellows from 2018). In making their selection, the committee considered the following factors:

- 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; and
- the need to maximise regional distribution of the awards.

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.

5-6

Demography of Fellowships for 2019

Parent Institutions:

Cameroon	The University of Yaoundé
Cote d'Ivoire	Centre Universitaire de Recherche et d'Application en Teledetection (CURAT) / Universite Felix Houphouet-Boigny
India	National Centre for Coast Research (Ministry of Earth Sciences)
Iran	Iranian National Institute for Oceanography and Atmospheric Sciences
South Africa	Nelson Mandela University

Host Institutions:

France	Laboratoire d'Etudes en Géophysique et Océanographie Spatiales
Canada	Université du Québec à Rimouski
UK	Scottish Association for Marine Science
France	Université de Bretagne Occidentale (UBO)
UK	National Oceanography Centre

Gender distribution
Male: 3
Female: 2

2018 Program
All the people involved in each fellowship for the 2018 cohort (the fellowship holder, the supervisor at the parent institute and the supervisor at the host institute) have been requested to submit short reports at the end of the training period. The reports that here follow are from the 2018 fellowships. Both host and parents supervisors, as well as the fellows themselves, have indicated that these exchanges lead to effective capacity building at the host institute and facilitate longer term collaborations between the institutes concerned. All have concluded that the programme serves a useful purpose.

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 building, 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.

Demography of Fellowships from 2018

During 2018, four candidates were selected and they came from Turkey, India, Colombia and Indonesia. The host institutions included:

- Helmholtz-Zentrum Geesthacht, Institute for Coastal Research, Germany
- Plymouth Marine Laboratory, UK
- Mediterranean Institute for Advanced Studies (IMEDEA), Spain
- Lamont-Doherty Earth Observatory, Columbia University, USA

Reports from 2018 Fellows and their Host Supervisors

Sevil Deniz Yakan Dündar - Turkey
Parent supervisor and institution: Prof. Dr. Oya Okay, Istanbul Technical University.
Host supervisor and institution: Dr. Rüdiger Röttgers – Helmholtz-Zentrum Geesthacht, Institute for Coastal Research, Germany.
Fellowship period: 4 October - 31 December 2018
Topic: The effect of local currents and eddies in the Istanbul Strait by means of the bio-optical parameters of phytoplankton collected from the coastal waters.

Report from Fellowship holder, Sevil Deniz Yakan Dündar:

A brief description of activities during the training period:
SNAP (Sentinel Application Platform) software is used to evaluate the images of OLCI sensor installed on Sentinel 3A satellite. Bio-optical parameters of the region of interest were examined. Absorption measurements, an important parameter of inherent optical parameters, were followed at the laboratory. General preparation for the ship campaigns, equipments used on board and experiments performed afterwards were investigated.

What applications of the training received do you envision at your parent institution?
To mention about the SNAP software at the under-graduate level oceanography lectures; to prepare homeworks about remote sensing and its applications like evaluation of the general characteristics of the marine environment by using the satellite images; to propose collaboration projects with the researchers in other institutes of my university (e.g., Euroasia Earth Sciences Institute), with the researchers in other universities (e.g., Middle East Technical University, Marine Sciences Institute), and with the researchers of the host institute (Helmholtz Zentrum Geesthacht).

Your comments on the Fellowship Programme:
I have benefited from many advantages of the fellowship. I got familiar with observational aspects of marine sciences; I have seen different research environments and working styles. I have contacted with many researches, and that gave me the opportunity to have future collaborations. I have gained lots of information about the subject I have trained, and I would like to transfer this knowledge to the younger generation. Thus, I believe that the number of the

projects and interested people related with the observational oceanography will increase each year.

Report from host supervisor, Dr. Rüdiger Röttgers, Helmholtz-Zentrum Geesthacht Institute for Coastal Research Remote Sensing, Germany.

A brief description of the activities during the training period:
In the first weeks, the trainee learned to use a common software tool (BEAM/SNAP) to process, view and work with optical satellite data. In the second period she learned to access the different satellite data from a number of independent sources (NASA, ESA, Eumetsat) and collected and downloaded data for her area of interest (Maramara Sea, Black Sea, Strait of Istanbul). Here the focus was on Sentinel-2 and Sentinel-3 Level 1 and Level 2 data. Further on she processed data for different, common parameters like chlorophyll, suspended matter and CDOM and checked plausibility of obtained concentrations and possible local oceanographic structures and patterns. She also looked for and compared with level-3 and level-4 ocean colour data from the GlobColour project and Ocean-Colour CCI with regard to climatological annual cycles in her regions of interest. In a second phase she went through most of our laboratory methods, measuring optical and radiometric properties and familiarized herself with common optical in situ instrumentation, with a focus of future applicability at the home institution.

Is this exchange likely to lead to future collaboration with the trainee's parent institution?
Yes, I think there is a very good chance for future collaboration, and exchange of students.

Please provide your comments on the Fellowship Programme:
It was a nice experience with the trainee and a rather easy way to take part on the Fellowship programme from our side. I will be happy to do it again.

Dr. Martin G.D – India
Parent supervisor and institution: Dr. Anu Gopinath – Kerala University of Fisheries and Ocean Studies, India.
Host supervisor and institution: Dr. Andy Rees, Plymouth Marine Laboratory, UK.
Fellowship period: 24-09-2018 – 21-12-2018.
Topic: Regulation of Greenhouse gases (N_2O and CH_4) at a coastal time series station (Western Channel Observatory, UK): Stable Isotopic approach.

Report from Fellowship holder, Dr. Martin G.D – India:

A brief description of activities during the training period:
The main objective of the training was sample preparation and analysis of stable isotopes ^{15}N and ^{18}O in N_2O in sea water using Stable Isotope Mass Spectrometry (SI-MS) and N_2O & CH_4 by Gas Chromatography. We conducted different experiments in sea water and in air samples (outside atmospheric air) for standardizing the method. Analytical hardware and software were used for data processing. During the training period we visited Rothamstead Research at North Wyke, an agricultural research centre, which too is working on similar measurements and

calibrations. We developed a reliable system of work and collected samples of sea surface water, weekly from the Western Channel Observatory. We also conducted a study in different estuarine regions like Millbrook, River Lynher, Cargreen, Tauy, Davis Point and Plym from the Western Channel.

What applications of the training received do you envision at your parent institution?
I got training to use SI-MS and gas chromatography for greenhouse gas measurements. I also gained knowledge on, how to process and interpret data from these instruments. These instruments and methodologies are entirely new for my institution and me. I will share this experience and knowledge to the researchers in my university. In the near future, I will try to develop new studies in the university.

Your comments on the Fellowship Programme.
POGO-SCOR visiting fellowship is an excellent programme that gives opportunity to visit and acquire knowledge from the leading oceanographic and marine sciences institutes from around the world. It is a very useful programme for the early career researcher to gain knowledge from leading scientists in the oceanographic research. I was very glad to work with Dr. Andy Rees, who was my host supervisor. Working under him was enjoyable as he was an extremely helpful and patient supervisor with profound subject knowledge. I also thank Ian Brown, Lisa Al-Moosawi and Dr. Rachael Beale, our team members for all their help. I would also like to thank the Pogo Secretariat, particularly Dr. Sophie Seeyave, and Ms. Laura Ruffoni for giving me this wonderful opportunity and for their help during my stay in PML.

Report from host supervisor, Dr. Andy Rees, Plymouth Marine Laboratory, UK:

A brief description of the activities during the training period:
The training was organised into 3 components:

a) Familiarisation with stable isotope mass spectrometry (SI-MS) and gas chromatography and sample preparation. During which time Martin was instructed in or shadowed PML colleagues in the use of these instruments with respect to analytical hardware and the software used to control them and for data processing. During this time we visited Rothamstead Research at North Wyke, an agricultural research centre where colleagues were working on similar measurements and introduced myself and Martin to their procedures and calibration regime.
b) Method development. The SI-MS system is designed to provide analyses of N_2O in gaseous samples. Martin spent a good part of his time at PML in refining our existing methodology in order to develop a protocol that provides high precision analyses of ^{15}N and ^{18}O in N_2O dissolved in seawater.
c) Sample analysis. Once a reliable system of work was developed Martin then spent time in the collection and analysis of samples from the local River Tamar and Plym estuaries and coastal waters forming the Western Channel Observatory. For the time that he was here Martin found that the isotopic signature of coastal waters was very much in equilibrium with the overlying atmosphere, though samples collected in local estuaries showed great peculiarity in terms of river and position sampled.

2) Is this exchange likely to lead to future collaboration with the trainee's parent institution?

I would like to think that Martins visit has provided a great opportunity for the two institutes to collaborate in the future. Certainly the research arenas of both have overlapping concerns and there should be great potential for shared expertise to be used in addressing future research projects. On a personal basis I wholeheartedly offer my mentorship and support to Martin whenever this may be required.

3) Please provide your comments on the Fellowship Programme.
This experience proved what a great opportunity the fellowship programme offers. Not only to the fellow who I believe learned and experienced a great deal but hopefully to the capacity building potential that he might now offer to his university and greater geographic region. There is also considerable benefit to myself and host institute who learned and grew from this shared experience.

Juan David Osorio-Cano – Colombia
Parent supervisor and institution:– Dr. Andrés F. Osorio, Universidad Nacional de Colombia at Medellín, Colombia.
Host supervisor and institution: Dr Alejandro Orfila Förster - Mediterranean Institute for Advanced Studies (MEDEA), Spain.
Fellowship period: 08/09/2019 to 18/11/2019
Topic: Observation and Modeling of hydrodynamic processes along Balearic Islands.

A brief description of activities during the training period:
In order to deal with different observing approaches to understand the main physical processes at different scales from the nearshore to the shelf, the main activities during the training period were focused on field activities as follows:

- Maintenance of tidal sensor at Pollensa port: Cleaning and re-installing of the tidal sensor to allow on-line data of tidal level and water temperature. Communication system was also checked to verify data transmission.

- Assistance in a mooring line recovery using the vessel from SOCIB. The activity was complemented with the measurement of several CTD profiles close to Cabrera Island to allow the calibration of the data provided by the sensors attached to the mooring line.

- Maintenance of the wave buoy at Palma Bay: Assistant as a scuba diver during the wave-buoy revision as part of the protocol to confirm that all the components from the structure (buoy, CTD sensor, ADCP sensor, weather station, mooring line) were working properly.

- Field campaign at Cala Millor as part of the Beach Risk project where different activities were carried out: bathymetry using a Multihaz ecosounder, sediment sampling and

habitat mapping to determine areas where *Posidonia* is located, HF-radar measurements and recovery and deployment of a new ADCP sensor to measure waves and currents.

- Cruise SOCIB-Canales: Assistance during CTD measurements across the Ibiza and the Mallorca Channel. The purpose of those profiles was seasonal calibration points for the near continuous Glider monitoring of the Ibiza Channel. Measurements were made with the SeaBird SBE9 + instrument and the oceanographic Niskin bottle rosette for water samples at different depths. The collected water was used to: salinity analysis with a PORTASAL salinometer, analysis of dissolved oxygen using the Winkler titration method (on board), Nutrient analysis, determination of chlorophyll concentration and study of the phytoplankton community. The cruise also included the deployment of a glider and a drifter as a support of a Lagrangian experiment.

What applications of the training received do you envision at your parent institution?
After the training programme, new methodologies and innovative measuring techniques were identified in order to improve the amount and quality of marine data at my parent institution and country. The ones I envision the most are related with:

- Glider measurements including web based glider command-control and a real time data delivery system.

- Real-time monitoring platforms including HF-radar systems, wave buoys and weather stations. All this sensors must be measuring in real time bringing data to all the community, which is missing so far at my parent institution and even my country since not all the information taken by DIMAR (Maritime General Division from the Army) is available.

- The acquisition and use of a Multihaz Eco sounder to get more accuracy and useful information of the sea bottom surface to help understand the role of the coastal ecosystems (e.g., coral reefs, sea beds) and the ecosystems services provided by them.

It is clear that this envision will require a very big investment from the government and to look for external resources, but also the transfer of knowledge to our students and colleagues in order to have more people in Colombia prepared to face future challenges in combination with marine technologies.

Your comments on the Fellowship Programme.
I'm very satisfied with the Fellowship programme since the terms and conditions were very clear from the beginning and the financial support was good enough for traveling and maintenance. The communication by email was also very fluid and all the doubts were clarified in a timely manner. In conclusion, I'm very happy to have had the opportunity to be part of the Fellowship Programme and all the experience within IMEDEA/SOCIB which definitely helped me to gain more knowledge about ocean observations system, opening the possibility to stablish cooperation with other colleagues from Spain. At the moment I'm still in contact with Professor Alejandro Orfila from IMEDEA and the idea is to keep this collaboration in future, looking for new opportunities of researching/working together.

Report from host supervisor, Dr Alejandro Orfila Förster, Mediterranean Institute for Advanced Studies (MEDEA), Spain:

A brief description of the activities during the training period:

The main activities performed by the Trainee have been:

- Development of software for bottom type-classification. Data from a multi-beam echo sounder.
- Introduction to the use of gliders.
- Maintenance of in-situ tidal sensors.
- Assistance in a mooring line recovery in a NSF Project.
- Maintenance of the wave buoy at Palma Bay: Assistant as a scuba diver during the wave-buoy revision as part of the protocol to confirm that all the components from the structure (buoy, CTD sensor, ADCP sensor, weather station, mooring line) were working properly.
- Risk Beach experiment in Cala Millor. Multisensory implementation using video cameras, microwave radar, ADCP, ADV and echo-sounding. Processing of data and data filtering.
- SOCIB-Canales experiment. CTD measurements and water sample analysis.
- Introduction to Lagrangian techniques: drifting buoys and Finite Size Lyapunov exponents.

Is this exchange likely to lead to future collaboration with the trainee's parent institution?
Yes.

4) Please provide your comments on the Fellowship Programme.
This is the first time that we hosted a Trainee from this Programme and the results are better than expected. 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.

Arief Wibowo Suryo – Indonesia
Parent supervisor and institution: Nelly Florida Riama, M.Si (Center of Meteorology Maritime of Indonesian Agency for Meteorology, Climatology, and Geophysics/BMKG), Indonesia.
Host supervisor and institution: Prof. Arnold L. Gordon (Lamont-Doherty Earth Observatory of Columbia University).
Fellowship period: 05/11/2018 - 06/01/18- 6/12/2018
Topic: "Investigate the relationship of the eastern tropical Indian Ocean surface mixed layer to MJO events in February – April, 2015, 2017 and 2018".

Report from Fellowship holder, Arief Wibowo Suryo:

A brief description of activities during the training period:
I received several phase of training during my stay in Lamont-Doherty Earth Observatory. First phase was familiarizing with the CTD data of INAPRIMA cruise that I brought. The raw data need to be processed and changed to format that readable in MATLAB and ODV. With guidance from Arnold and his PhD student, I created the script in MATLAB to make the files imported to MATLAB and ODV.

After all the data successfully imported, then I check the quality of each cruise using TS diagram. Because it spikes showed different shape than the previous years, it appears that 2018 data was fault due to the error in CTD equipment. So I only focused on the 2015 and 2017 CTD data.

The next phase was looking into the ARGO float data near the area and the time of INAPRIMA cruise. Also from Arnold suggestion, I looked into the GO-SHIP data from CLIVAR program and found the IO9N ship was collecting CTD data near the INAPRIMA cruise in 2016.
Then in the last place I discussed with Arnold what to do with the data I've collected. We conclude that I will look into the water mass analysis during cruises of 2015 to 2017. Soon this will lead to paper publication in Indonesia.

What applications of the training received do you envision at your parent institution?
The skill I gathered during the training will be really useful for myself and my colleagues at work. I intend to do small training to my colleagues on how to use MATLAB and ODV. The training I will conduct in a week to all my colleagues. Besides that, in 2-3 months I will look more into the water mass analysis in eastern tropical Indian Ocean and write paper about it. For the next projects, I will look into the relationship between ITF and MJO or IOD. As these phenomena affecting weather and climate in Indonesia, I'm hoping we can enhance our Ocean Forecast System that was in initial development in BMKG.

Please provide your comments on the Fellowship Programme:
I'm very grateful to POGO-SCOR to give me opportunity to train with some of the best minds in oceanography fields in Lamont-Doherty Earth Observatory. It was the best experience learning from Arnold and his team. The insights I got from them was invaluable as I was in early stage learning about oceanography. I intend to pursue higher degree in oceanography field, and this training is perfect opportunity for me to experience first-hand studying with a professor and experts in oceanography. The program that Arnold and his team laid out for me to follow during the training was easy to follow. I was able to finish my training in time with their guidance.

Report from host supervisor, Prof Arnold L. Gordon, Lamont Doherty Earth Observatory, USA:

A brief description of the activities during the training period.
The primary activity was to quality control the CTD oceanic data set obtained by BMKG within the period 2017-2018 in the eastern tropical Indian Ocean. This included comparison of those data with historical archived data sets, mainly the data collected as part of the WOCE and

CLIVAR programs. We began the task of comparing the BMKG data to the Makassar Strait throughflow time series. Arief Suryo plans to expand on that task upon his return to BMKG.

Is this exchange likely to lead to future collaboration with the trainee's parent institution?
Yes, the plan is to relate the BMKG data in the eastern tropical Indian Ocean to ITF variability

Please provide your comments on the Fellowship Programme:
I really think the POGO-SCOR model is very effective, not just during the period of the visit, but in building longer term collaborative activities.

5.4 NSF Travel Support for Developing Country Scientists Urban

SCOR has received support from the U.S. National Science Foundation (NSF) since 1984 to provide funding for SCOR capacity building activities. Most of the funds are used for travel grants for scientific meetings, although a portion are used for SCOR's contribution to the POGO-SCOR Fellowship Program and the SCOR Visiting Scholars program. Travel grants are awarded to ocean scientists from developing countries and the former Soviet Union, Eastern Europe, and other countries with economies in transition, to enable them to attend international scientific meetings. A new three-year grant was approved in July 2017, running from 1 August 1 2017 to 31 July 2020. The amount of the award from NSF is $75,000 per year. A proposal for renewal of the grant will be submitted to NSF in early 2020.

About 77% of the grant funds are devoted to supporting the travel of scientists from developing countries and countries with economies in transition to ocean science meetings. The SCOR Committee on Capacity Building evaluates requests from meeting organizers for such support several times each year. After a meeting is approved, the organizers run a selection process and propose individual recipients for support. The PI checks the names of proposed recipients to ensure they are from eligible countries and have not received similar support from SCOR for the past two years. Priority is given to applicants who are presenting a paper or poster at the meeting or to those who have some special expertise or regional knowledge to bring to a workshop or working group. Preference is also given to younger scientists. In general, care is taken to ensure that the recipients of SCOR/NSF funds are *active* scientists, and that they have not received similar support from SCOR in the previous two years. All travel grant recipients are informed that their support comes from SCOR and that it is made possible through NSF funding.

Requests come in throughout the year and the SCOR Committee on Capacity Building considers new requests between meetings. Forty-three students and scientists from 13 countries were supported during the reporting period to attend 12 scientific meetings and summer schools.

The following requests were approved since the 2018 SCOR Annual Meeting:

Name of Event	Dates	Location	Approved Amount
SCOR Visiting Scholars	Various	Various	$7,500
POGO-SCOR Fellowships on Operational Oceanography	Various	Various	$10000
International Ocean Institute	22 May-19 July 2019	Halifax, Canada	$3,000
IMBeR Open Science Conference	17-21 June 2019	Brest, France	$7,500
11th WIOMSA Scientific Symposium	1-6 July 2019	Mauritius	$3,000
BIARRITZ – Bridging International Activity and Related Research Into the Twilight Zone	22-26 July 2019	Southampton, UK	$2,000
Goldschmidt 2019	18-23 Aug. 2019	Barcelona, Spain	$3,000
International Conference on Paleoceanography	2-6 Sept. 2019	Sydney, Australia	$3,000
Global Ocean Oxygen Network International Summer School	2-7 Sept. 2019	Xiamen, China	$3,000
WG 157 Associate Member from the Philippines to attend WG 157 meeting	13-14 Sept. 2019	Gothenburg, Sweden	$2,500
InterRidge Working on Seamounts and Islands Near Mid-Ocean Ridges	19-21 Sept. 2019	Lisbon, Portugal	$5,000
GEOTRACES Summer School	23-27 Sept. 2019	Cadiz, Spain	$7,500
PICES-2019	16-27 Oct. 2019	Victoria, BC, Canada	$5,000
IOCCG Training	21-25 Oct. 2019	Hangzhou, China	$3,000

The next review of requests will be conducted by the SCOR Committee on Capacity Building after the SCOR Annual Meeting.

5.5 Research Camps at University of Namibia **Urban**

SCOR has supported "Research Camps" at the University of Namibia Henties Bay campus for the past 6 years, through funding from the Agouron Institute and more recently through funding from the Simons Foundation. The 6th Camp was held on 28 April-24 May 2019. These camps have brought together graduate students, post-doctoral fellows, and instructors from Namibia, other African countries, and other countries of the world to learn ocean science through doing research together. The camps bring together resources from the University of Namibia, the national fisheries agency, participants, and the Agouron Institute and Simons Foundation.

Report from 2019 Camp

Figure 1: RGNO class 2019 visiting the Walvis Bay salt works Oyster farm during an excursion.

Biogeochemical Oceanography in Upwelling Ecosystems: An African Ocean Discovery Camp

Do you know that the largest bacterium known to man was discovered in Namibia?

Do you ever wonder why Namibia's ocean water is generally dark green-brown and murky instead of clear and blue like the Indian Ocean?

Have you ever wondered how Namibia acquired high enough phosphate deposits to contemplate commercial marine mining?

Have you ever wanted to spend a month at the coast and a fun group of people that have a passion for marine science?

The annual discovery camp was hosted during 22 April-23 May 2019 by the Sam Nujoma Campus (SNC) and covers these questions and so much more. It forms part of the Regional Graduate Network in Oceanography (RGNO) and is geared towards Ocean Discovery in the

Benguela Upwelling System (BUS). Local and international trainers aid in providing research-based training on the Sustainable Use and Scientific Management of Marine Ecosystem. This is done in conjunction with our local collaborators from the Ministry of Fisheries and Marine Resources (MFMR). This year's course consisted of the following activities:

1. **BUS Introductory symposium**

This year's course consisted of a diverse group of international Post-graduate students from various institutions. In order to give students an overview of the BUS, an introductory symposium was held with both regional and international experts. Their presentations were based on nine key areas identified to give an understanding of the BUS from the water column right down to the sediment (summarized in Figure 2 and Table 1).

Students then identified the thematic areas their projects would feed into, in consultation with project leaders. Furthermore, developing sampling strategies that include the equipment and consumable requirements and sampling stations were drawn up.

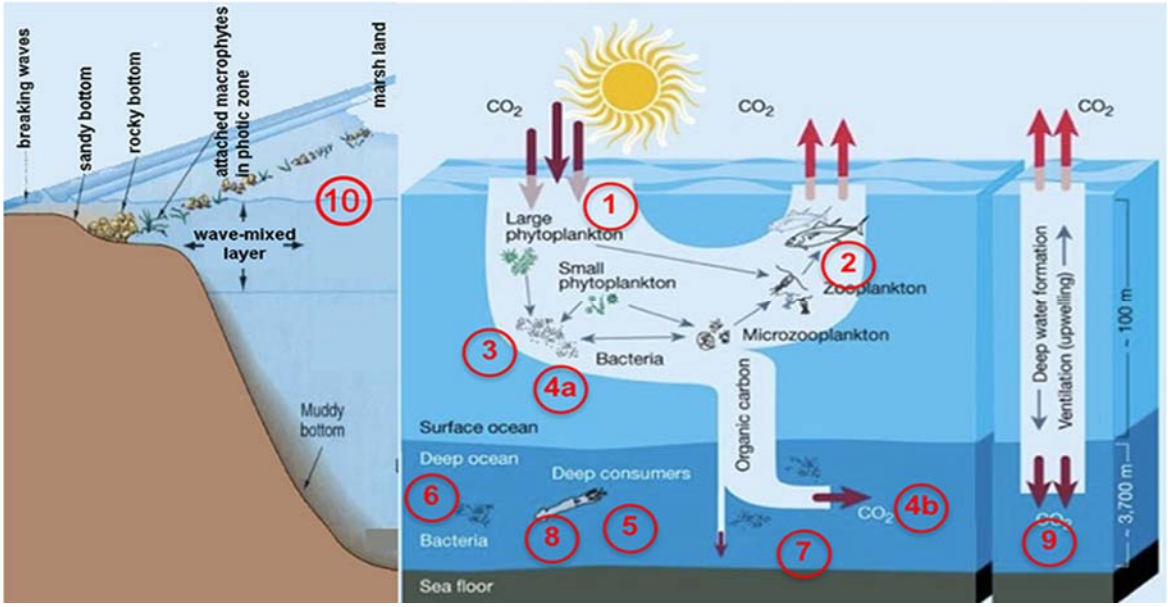


Figure 2: The edited Biological Pump, taken from Chisolm et al., 2000 (Nature) with number notations corresponding to the various RGNO projects.

Table 1: Corresponding titles of RGNO projects highlighted in Figure 2.

Project number	**Project title**
1	The roles of phytoplankton blooms in organic carbon cycling and changes in acid neutralizing capacity
2	Trophic ecology in Northern Benguela Upwelling regions: The role of dominant, small copepods in carbon (mostly lipid) transfer
3	Regulators of microbial community changes during degradation in sedimenting marine micro-aggregates across geochemical redox gradients
4	Trace metal interactions with organic ligands and their incorporation into organic carbon in sedimenting aggregates and in sediments.
5	The role of carbon-mineral-interactions in degradation and deposition processes of land-derived and autochthonous organic matter
6	Bacterial interactions with larger bacteria: The *Thiomargarita* case
7	The trace element pump between the water column and sediments in the Benguela Upwelling Ecosystem
8	Responses of benthic fauna-microbe symbioses in fluctuating and disturbed sediment habitats in the Benguela Upwelling Ecosystem
9	Dynamic responses of pelagic and benthic ecosystems to physical forcing: Continuous observations from local mooring stations

2. Research cruise on the RV *Mirabilis*

Students and instructors embarked on one of two legs of research cruises on the RV *Mirabilis* (i.e., either the 20º or 23º line transects). Samples were collect from the water column or sediment (i.e., depending on which project they were working on). This ranged from the deployment of the speed boat to collect Jelly fish, CTD casts (to collect water samples at specific depths), plankton net (to collect both phytoplankton and zooplankton samples) and the multicorer (to collect discrete sediment samples to facilitate depth profiles of the top 40cm) (Figure 3).

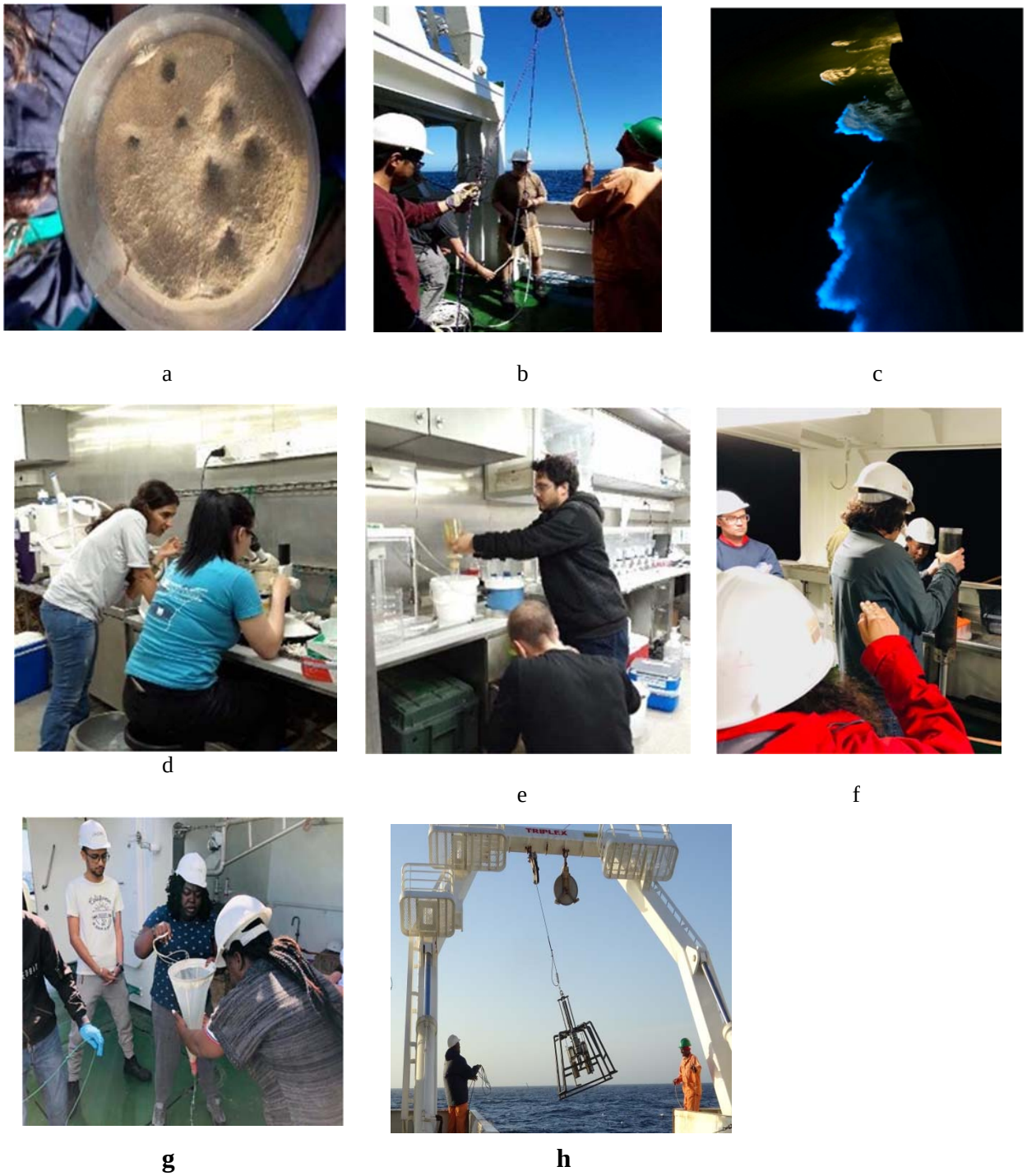
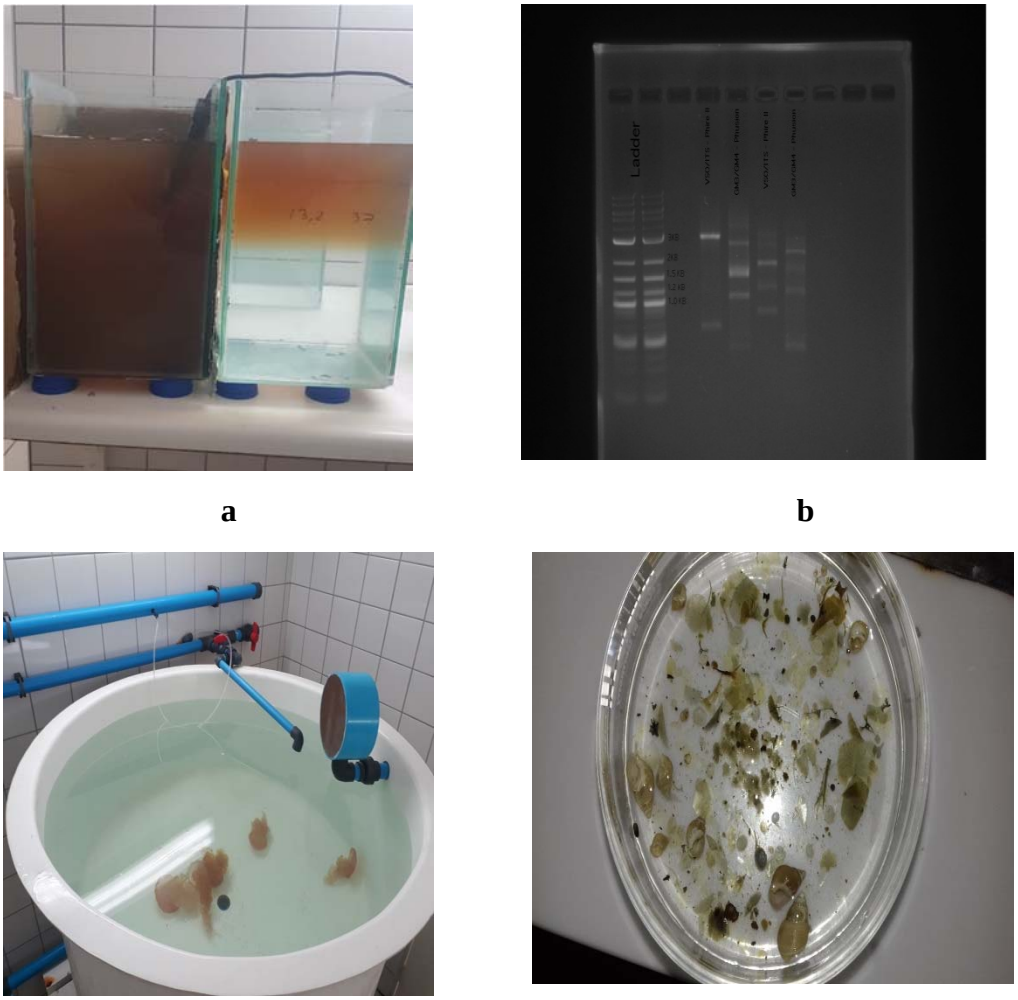


Figure 3: a) Surface area of a sediment core with a microbial film. b) sampling for Ni in the water column to reduce contamination c) a bioluminescent bloom of *Noctiluca scintilans* d) observing benthic species from sediment samples e) filtering water samples to determine the microbial composition at different depths f) preparing a sediment core for sectioning g) concentrating a surface water sample for phytoplankton species identification h) deploying the multicorer for sediment collection.

3. Lab work and experimental set up

After the cruise, students would process their samples at the SNC laboratories. This was in addition to morning lectures. Students were trained on activities ranging from analysing seawater for dissolved nutrients, collecting samples of *Thiomargarita* endobionts for characterization (Figure 4), designing growth media for specialized marine microbes, characterizing the benthic community from sediment cores to setting up experiments to determine the effects of zooplankton (sampled from the vessel) migration on the mixing of two water bodies of varying salinity and jelly fish-microbe interactions (Figure 4).



a **b**

c **d**

Figure 4: a) experimental set up to determine the effects of mixing by zooplankton from the cruise on two water bodies with varying salinity b) DNA extracted from *Thiomaragrita* endobionts c) collected jelly fish that will be used in a series of experiments d) benthic organisms from an offshore station

4. One-day symposium

This year, another outreach activity was included. This one-day symposium hosted by the SNC highlighted ocean research and looked at new and exciting developments in the field of oceanography. Thus invited speakers were sourced from the region and beyond (Figure 5).

a b c

d e f

g

Figure 5: Guest speakers- a) John Compton (UCT) b) Sandy Thomalla (CSIR) c) Volker Morholtz (IOW) d) Jake Bailey (UoM) e) Bronwen Currie (MFMR) f) Johannes Iitembu (SNC) g) Kurt Hanselmann (ETH)

5. Final student symposium

The work done by the students culminated into a final symposium (22 May 2019) hosted by MFMR. Students were able to showcase all their hard work (detailed in Table 2) and answer a range of questions from the audience.

Table 2: Presentations from the final RGNO symposium with respective speakers as well as the country of their host institutions.

Speaker / Affiliation	**Presentation title**
Ndamononghenda Mateus (Namibia) and Katherine Amorim (Germany)	Responses of benthic fauna-microbe symbioses in fluctuating and disturbed sediment habitats in the Benguela Upwelling System
Nathan Hubot (England)	The impact of jellyfish associated nitrifiers on nutrient cycling in the Benguela Upwelling System
Mohamed Reda Benallal (Morocco)	Effects of zooplankton diurnal vertical migration in the northern Benguela.
Andrés Sanchez Quinto (Mexico)	Identification of Bacteria and Archea using 16S RNA in seawater and sediments along two transects offshore Namibia
Dalton Leprich (USA)	Steps toward determining endosymbionts associated with *Thiomargarita*
Euphemia Kaunongwa (Namibia)	Isolation of *Thiomargarita namibiensis* endobionts
Lebogang Matlakala and Tebatso Martin Moloto (South Africa)	The roles of phytoplankton blooms in organic carbon cycling and changes in acid neutralizing capacity
Bayoumy Mohamed (Egypt)	Distribution of current and hydrographic parameters in the Benguela upwelling system, Namibia
Tzu-Hao Wang (David) (England)	Behavior of Ni between water column and sediments: the example of the northern Benguela off Namibia
Sümeyya Eroglu (Germany)	Changing molybdenum and sulfur cycling under different depositional and redox conditions on the Namibian shelf

This work was made possible by the following sponsors:

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RGNO - Regional Graduate Network in Oceanography

RGNO

Integrated Earth Systems Sciences - Oceans

Biogeochemical Oceanography in Upwelling Ecosystems

6th African Ocean Discovery Camp for research-based Training on the Sustainable Use and Scientific Management of Marine Ecosystems

April 28 – May 24, 2019
at the University of Namibia's Sam Nujoma Research Center in Henties Bay and Namibia's National Marine Information and Research Center in Swakopmund

For dedicated early career researchers who care about the Oceans: PhD candidates and honors MSc students majoring in one of the ocean science fields, professors, lecturers and active young scientists holding an equivalent advanced degree with specialization in oceanography.

What are Ocean Discovery Camps	Opportunities to collaborate in an interdisciplinary research project with guidance and supervision by local and international scientists at the Sam Nujoma Campus and possibly in internships abroad.
Goals	To learn about current research projects and to develop future research directions for a better understanding of the consequences of local and global environmental alterations for the functioning of the Benguela Current Upwelling Ecosystem.
Scope	Interactions between chemical, biological, physical and geological topics related to marine biogeochemistry and ecosystem research. Molecular and other modern techniques applied to understanding biogeochemical processes. Environmental variability and regulation of microbiologically driven geochemical nutrient cycles and consequences for ecosystem sustainability.
Course Structure	Work at sea and along the coast and analyses in the laboratory. Sampling, sample preservation, designing and executing experiments, computer-supported exercises, lectures, paper discussions, model development. Symposium day: Presenting research findings, sharing knowledge, collaborating in further project developments.
Course Location	1-3 days "Floating University" on the R/V MIRABILIS (operated by the Namibian Ministry of Fisheries and Marine Resources). Three weeks on land at the Sam Nujoma Campus, the University of Namibia's regional Center for Research and Training in Oceanography in Henties Bay, and at Namibia's National Marine Information and Research Center in Swakopmund.
Language	English
Course Costs	9500 NAM$ or equivalent in US$. A limited number of fellowships is available for qualified and passionate applicants from economically developing countries.
Application	Follow instructions given on the Course Website. http://www.microeco.ethz.ch/rgno_namibia_18-21/RGNO_Namibia.html
Application Deadline	March 10, 2019. Acceptance letters will be sent electronically within 10 days.
Further Information	From the Course Website (see above) From the Course Coordinator Dr. Chibo Chikwililwa chibochikwililwa@yahoo.co.uk

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