

# nano news

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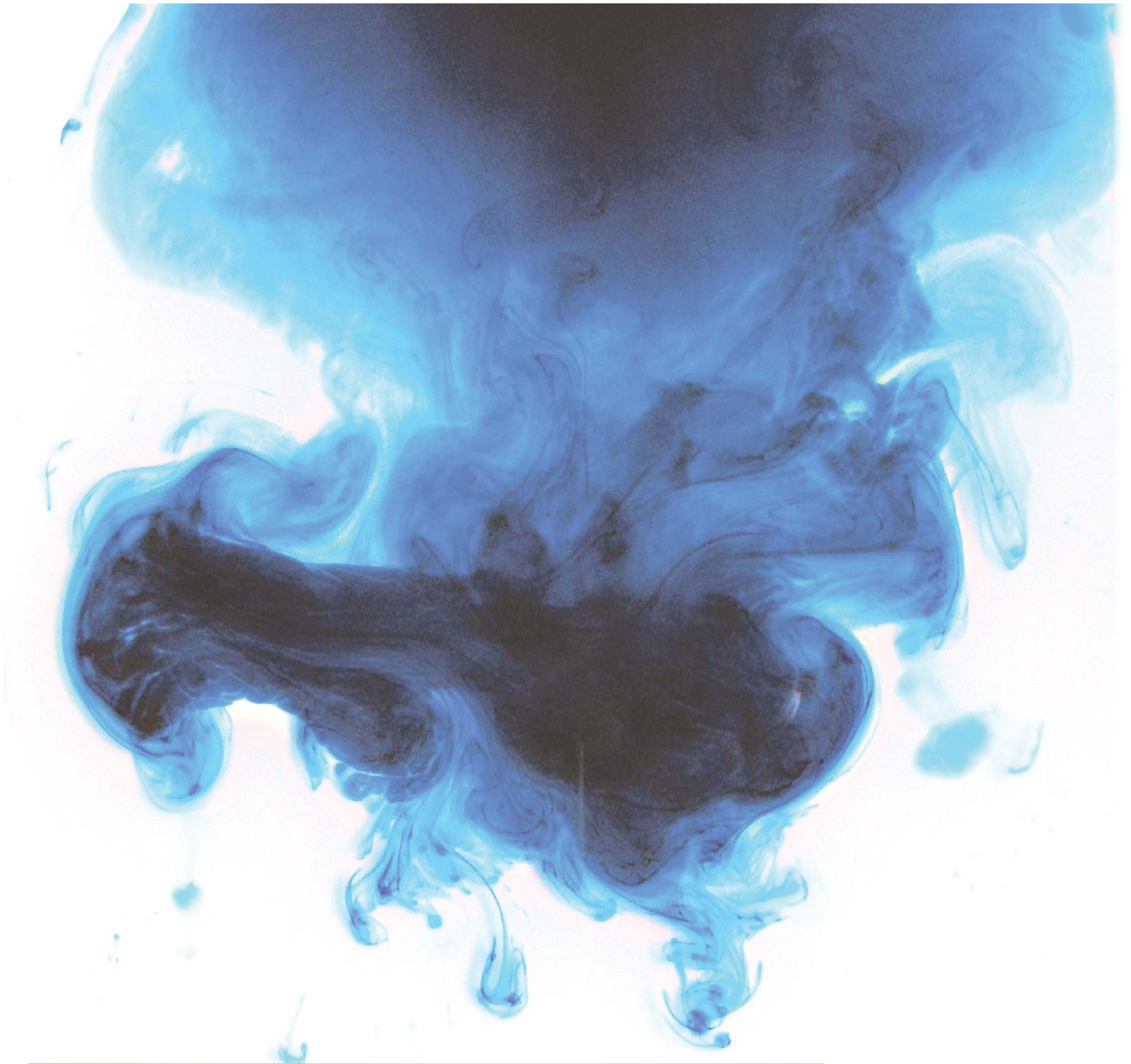
- NF-POGO Alumni Network for Oceans -

NF-POGO Alumni E-Newsletter – Volume 11, December 2016



Reaching out to the  
global oceans





Cover photo  
Alumnus Gerry Salamena caught this beautiful sunset during an oceanographic cruise at the Banda Sea (June, 2016)  
Photo Credits: Gerry Salamena



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LET US SHOW YOUR ART

Have any nice photos or figures to share? E-mail us your seascapes, underwater photos or photos of field work and we'll include them in NANO News!

## *From the Editorial Board*

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In this, the 11<sup>th</sup> issue of the NANO News, it can be seen that the NANO network is spread across the globe with alumni pursuing all disciplines of oceanography. From studies of chemical and physical oceanography to sedimentary analyses, which give an insight into climate changes over geological time to biological impacts of pollution, the research being conducted by the NANO members gives a holistic view to the inter-connected oceanographic processes that occur.

POGO, as the lead organisation for the Blue Planet Initiative, is pleased to inform the ocean observing community, that the Implementation Plan was officially approved by the Group on Earth Observations (GEO) Programme Board for inclusion as an Initiative in the GEO 2017-2019 Work Programme. To the NANO network this means that the work that the NANO members conduct, can contribute to the Blue Planet Initiative, which aims to ensure the sustained development and use of ocean and coastal observations for the benefit of society. As GEO is an intergovernmental body, this is a way in which the scientists can share their findings with the policy-makers.

As part of the regional projects undertaken this year, there was emphasis on the need to conduct outreach activities to educate and engage with the public. A variety of outreach activities conducted by members of the NANO Southeast Asia group are reported upon this issue. Moving forward from 5 years of these successful regional projects, the Nippon Foundation and POGO feel that it is time to change the format of the research conducted by NANO alumni. We are now making a call for project proposals that are global and can involve alumni from any country, regardless of their geographical location. Therefore the projects are to be more topic-focused rather than regionally-focussed. All NANO members should have received the call for proposals announced recently. This and the ongoing International Indian Ocean Expedition-2 (IIOE-2) could be excellent opportunities for young and mid-career researchers to pursue their research interests.

An issue this rich and vibrant can not be possible with many volunteers and helping hands. I would like to thank Cassia, Akinnigbagbe, Jesus and Nguyen for having been very efficient editorial committee members. The issue in its present form wouldn't have happened without critical inputs from Olga, Sophie and Victoria. My most sincere gratitude is to Lilian whose untamed designing skills make every next issue better than ever before.

Without holding you on this page further, season's greetings and a very happy new year to you all in advance! See you with many more updates in 2017...

Nimit Kumar  
Editor-in-chief



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## Monitoring of chemical and physical water quality parameters for aquaculture: is aquaculture reconcilable with mining in Cote d'Ivoire?

**Lazare Kouamé Akpetou**

University Jean Lorougnon Guédé Daloa, Cote d'Ivoire

Alumnus profile: <http://nf-pogo-alumni.org/profile/lakpeto/>

I am recruited as chemistry lecturer in the University Jean Lorougnon Guédé in Daloa (West of Cote d'Ivoire). I have been in the academic for about four years (since December 2012). It is an exciting work profile as it allows interaction with students and colleagues. Therefore, my interests in research parallel between chemistry and remote sensing techniques. The latter faces difficulties in progress due to the lack of facilities in the university. Thus, we took some initiatives towards the monitoring of water quality in aquaculture fields.

Indeed, most of our protein requirements are provided through aquatic resources; and fish is of commercial importance in Cote d'Ivoire. Mainly, freshwaters fish species are cultivated. The ubiquitous tilapia is one the most favoured fish in this region as it's cheaper and more palatable when compared to most of the marine fish. Furthermore, tilapia has shown a remarkably high capacity for resistance and adaptation to stressors such as salinity and oxygen depletion for instance. Due to these two factors, this species is favoured above all investments and projects in aquaculture in Cote d'Ivoire.

The government provides the agreements for running culture projects to the farmers only under scientific investigations; as a result, we are tasked with monitoring water quality. Firstly, activities consist of assessing water quality relating to the local environments. We focus on chemical and physical parameters in order to agree the projects. In general, water fields (rivers and lakes) seem to provide good aquaculture requirements to the farmers. Number of such projects increases yearly supporting marine fishing for protein-production for human consumption. Thus,

we do the monitoring of water quality afterward the deliverance of projects agreement. These research activities are run currently in Bandama and Sassandra rivers and in Aby and Ebrié lagoons.

As an economic activity, mining is also of importance in Cote d'Ivoire. Unfortunately, artisanal activities are overwhelmed by the industrial one. If mining endangers plantations and villages, the insidious concern is river pollution by heavy metals (e.g., mercury, arsenic, copper). Wastewaters are discharged into rivers with no preliminary treatments. In addition to metal pollution, rivers are seemingly muddy threatening depths and fish habitats.

River chemical and physical parameters data have been collected for about four seasons since December 2013. Further use of these data is under the responsibility of the minister with regard to the demands in aquaculture projects and tourism activities. As far as we are concerned, we will keep working on data construction for scientific and economic purposes.



Lazare and colleagues in action: Fieldwork on an aquaculture farm in Taabo (Top) and on the Bandama River in Kossou (Bottom).



Discover what motivates the team of researchers lead by Dr Jesus Ledesma to pursue marine sciences in Peru. Page 9



## The health of Ghanaian coastal waters

### Lailah Gifty Akita

Post doctorate Fellow, Department of Marine and Fisheries Sciences, University of Ghana

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*"Water is the earth's eye, looking into which the beholder measures the depth of his own nature".*

Henry David Thoreau

### Introduction

Water sustains all life-forms. Coastal waters (estuaries, lagoons, ocean beach front, etc.) serve economical, social, culture, aesthetic, recreational and research value (Fig. 1). The coastal waters support both aquatic and human life. Coastal ecosystems are under pressure due to rapid population growth and industrialization.

*"But man is part of nature, and his war against nature is inevitably a war against himself."*

Rachel Carson

Human impacts on coastal waters include fishing, air pollution, solid and plastics waste disposal, misuse of pesticides, industrial discharge and release of untreated waste water. Pollution is the direct or indirect introduction of contaminants into the water body. The introduction of foreign substance into the water is detrimental to humans, plants, animals and the health of the ecosystems. The effects include habitat degradation, environmental stress (physical, chemical, biological etc), and disruption of the structure and function of aquatic ecosystems. Holistic assessment of the health of the ecosystem is the integration of multiple indicators (chemical, physical and biological) to be able to evaluate the wellness of the water body. Physical parameters can be directly measured, while chemical analysis is instantaneous but expensive. On the other hand, biological analysis is less expensive, but labour-intensive. The use of biological indicators to evaluate tropical coastal waters especially in West Africa is limited. The project focuses on "Biological assessment of Ghanaian coastal waters" sponsored by Volkswagen Foundation, Germany. The primary aim is to identify key indicator benthic species for water quality monitoring in Ghana.

### Benthic organisms



Figure 1 - Korle lagoon and beach front. Coastal activities at Tema Harbour, Ghana



Benthic organisms (e.g. snails, clams, crabs etc, Fig. 2) live on or near the bottom of water bodies (fresh to marine) or in the intertidal zone of the ocean beach front. They burrow into or can live on the bottom of sediments. Invertebrates are the most common benthic organisms. There are two kinds of benthic invertebrates: epifauna and infauna. Epifauna are organisms that live on the sediment or are attached to rocks, shell, vegetation, intertidal and shallow sub tidal zones. Infauna are the organisms that dwell within or borrow into the sediment, sand, mud suitable surface. Benthic organisms (Figs. 3 and 4) regulate nutrient cycling, tidal exchange (e.g. estuarine, lagoons and near shore waters) and energy flow through the food web (e.g. food for fishes, sea shore birds, coastal communities and bait for fishing).



Figure 2 - Typical benthic organisms include amphipods, polychaete worm, snail, and chironomid midge larva. Source: Wikipedia.

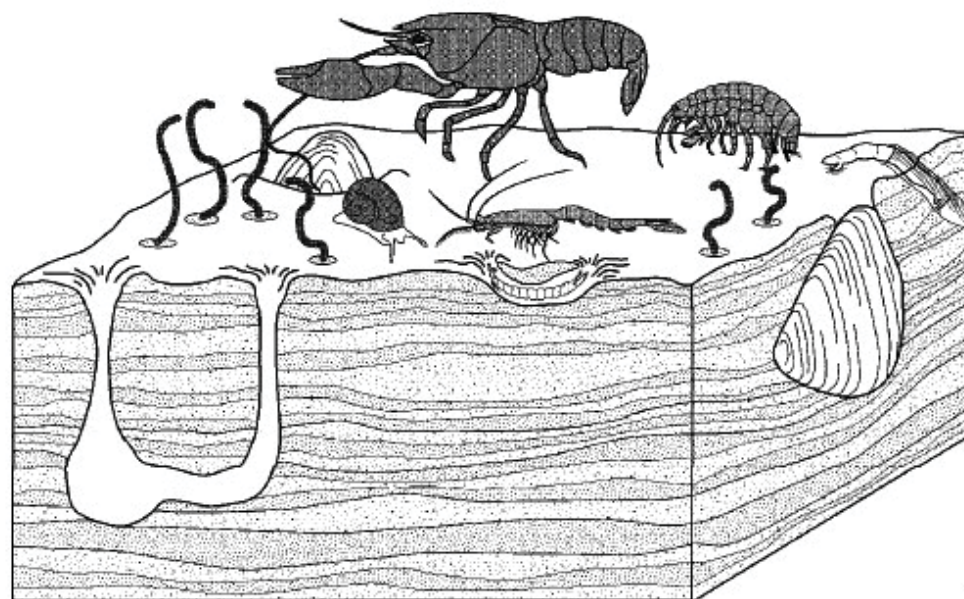


Figure 3 - Benthic macro invertebrates burrow deeply into layered sediments and accelerate nutrient cycling. Burrowing bivalves, crayfish, tubificid worms, and aquatic insect larvae mix the sediments, aerate deeper layers of sediments, and increase rates of recycling of macronutrients (nitrogen, phosphorus, and organic carbon) and micronutrients (trace elements) by bioturbation and fecal production. Mysid shrimp, amphipods, and gastropods enhance microbial growth and nutrient cycling through their mixing of surface sediments and breakdown of organic detritus. Source: Covich et al., 1999.



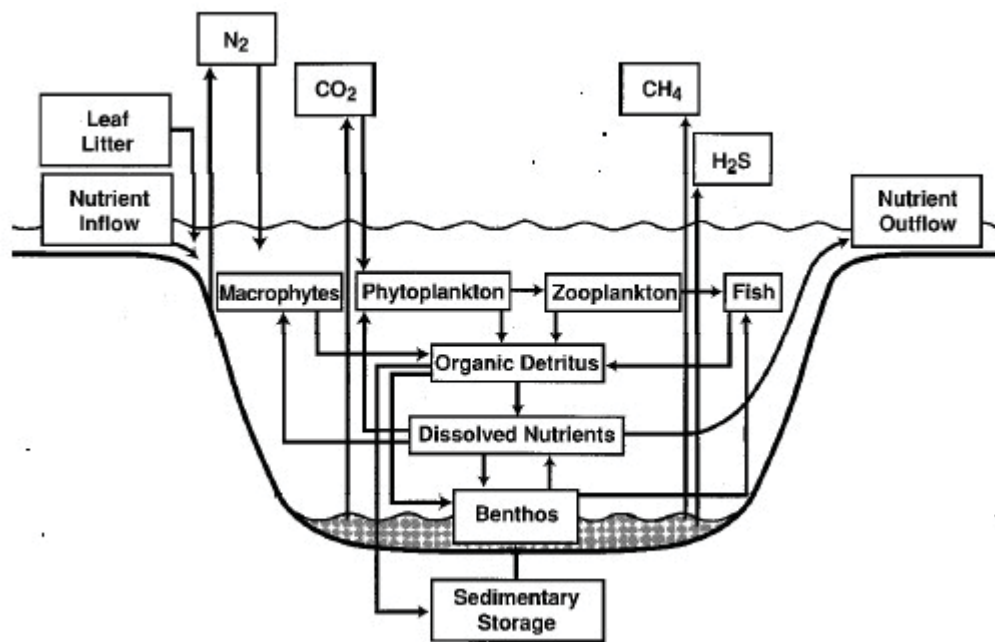


Figure 4 - Benthos and the food chain. Benthic macro invertebrates play an important role in nutrients cycling and outflows from ecosystems. The benthos transforms organic detritus from sedimentary storage into dissolved nutrients that can be mixed into overlying waters and used by macrophytes (rooted plants) and phytoplankton (algae) to enhance the primary productivity. Some benthic species are omnivores and feed on macrophytes, algae and zooplankton. Many benthic species are consumed by fishes. Through their mixing of sediments and consumption of diverse resources, benthic invertebrate directly and or indirectly, influence microbial production and the release of greenhouse gasses (carbon dioxide -  $\text{CO}_2$ , methane -  $\text{CH}_4$ ), toxic gases (hydrogen sulphide -  $\text{H}_2\text{S}$  and ammonia -  $\text{NH}_4$ ) and nitrogen -  $\text{N}_2$ . Source: Covich et al., 1999

### Bio-monitoring

Benthic macro invertebrates can be used to assess the health of aquatic ecosystems. Indicator species can be used to classify water bodies with different kinds of pollution. Benthic invertebrates are useful for monitoring of water quality due to their sedentary life and species-specific ecological sensitivity. The distribution of benthic organisms (e.g. presence or absence of certain invertebrates) is an indicative of water quality. Spatial variability of benthic invertebrates in coastal waters is useful to identify a particular environmental stress. Biological water quality is essential to assess the local condition of the coastal ecosystem and its management.

### General approach

Epifauna is sampled using a known area of surface (e.g. Erman grab, box corer and PVC pipes). Infauna can be sampled using sediment cores (e.g. gravity corer). The benthic communities display a patchy spatial difference in food distribution, substrate (e.g. sediment particle size), physico-chemical requirements (e.g. dissolved oxygen, salinity, nutrients) and water quality.

*"The more clearly we can focus on the attention of the wonders and realities of the universe about us, the less taste we shall have for destruction."*

Rachel Carson

### Conclusion

No water, No life. The oceans, rivers, lakes, estuaries, lagoons all contain water with different physical, chemical and biological properties.

Benthic invertebrates are organisms that live in or on the bottom sediments of fresh and marine habitats. Understanding the basic components of aquatic ecosystems and the interaction among living organisms and their environment can lead to better management of human impacts on aquatic ecosystems.

Need for environmental monitoring are to:

- Understand the state of coastal waters, habitats and ecosystems.
- Provide ecological data to guide biodiversity conservation and sustainable use of coastal resources.
- Influence policies for aquatic ecosystems protection and sustainable management.

*"Love nature, protect the aquatic ecosystems."*

Lailah Gifty Akita

### Project partners and mentors:

Dr PD. Peter Frenzel, Friedrich Schiller University, Germany.  
 Dr Jürgen Laudien, Alfred-Wegener Institut, Germany.  
 Dr Mariano Lastra, University of Vigo, Spain.  
 Prof. Dr John W. Farrington, Woods Hole Oceanographic Institution, USA.  
 Dr Charles Biney, Volta Basin Authority, Burkina Faso.  
 Prof. Dr Takada Hideshige, Tokyo University of Agriculture and Technology, Japan  
 Prof. Dr Elvis Nyarko, Regional Maritime University, Ghana.  
 Prof. Kwasi Appeaning-Addo, University of Ghana.  
 Mr. Kojo Ayaa Armah, University of Ghana.  
 Dr Emmanuel Lamptey, University of Ghana.  
 Sponsor: Volkswagen Foundation, Germany.

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## Distribution of major elements in Eastern Equatorial Atlantic Marine Core and its environmental significance

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Time series measurements of terrigenous source elements (Silicon - Si, Potassium - K, Titanium - Ti and Iron - Fe) and the biogenic element (Calcium - Ca) from Core DY26III-Nig-S60-GC2 recovered from the deep-sea of Eastern Equatorial Atlantic record variations in riverine sediment discharge over the past 120 thousand years (kys). We present the short report from the studied core. The study area is in the tropical region of Western Africa in the Gulf of Guinea. Gulf of Guinea runs from the west coast of Ivory Coast to the Gabon estuary (Fig. 1). Core sample DY26III-Nig-S60-GC2 shows a continuous, 350 cm long sediment sequence collected on the Eastern Equatorial Atlantic off Nigeria (3°33'36.61"E, 4°32'30.02"N; 2946 m water depth; Fig.1), onboard the Chinese vessel 'Da Yang Yi'. The lithology is dark mud between 0-65 centimeters below sea floor (cmbsf) intervals, grayish gritty mud between the range of 65-225 cmbsf, dark mud between the intervals of 225-325 cmbsf, and the final layer 225-350 cmbsf is that of grayish mud with yellowish stains.

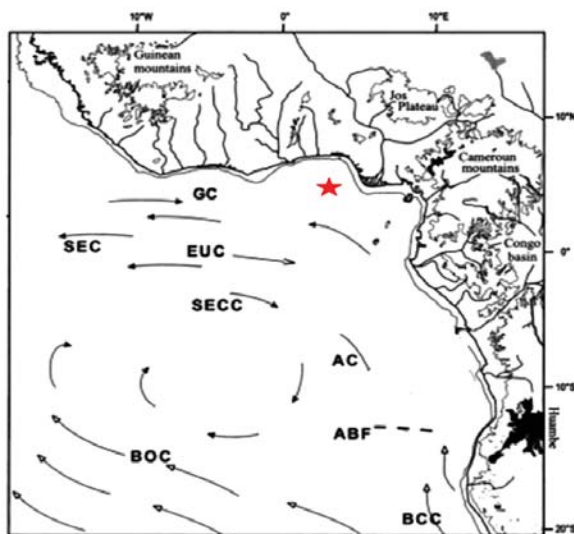


Figure 1 - Location of the core (red star) and the main surface currents of the Atlantic. The Angola-Benguela Front (ABF) marks the boundary between warm waters of the Angola Current and the cold waters of the Benguela Coastal Current. Modified after (Dupont, Jahns, Marret, & Ning, 2000).

The elements used for this study were subjected to principal component analysis (PCA). PCA was done to trace the origin of the elements and factors with eigenvalue greater than 1 are considered as significant. According to the factor loading it is clear that factor 1 has a significant positive factor loading with the elements K, Ti and Fe, whereas a negative factor loading was observed for Si. Factor 2 has a positive factor loading with the elements Ca and Si, and negative loading for Ti and Fe. Ca as an element useful for climatic modulation of productivity leads to low Ca during glacials and higher values during interglacials. Lower Ca may cor-

relate with carbonate dissolution or dilution by terrigenous materials. Ca variation in marginal environment may reflect dilution by terrigenous materials rather than productivity changes. Revel et al. (2010) found low Ca during pluvial periods in a core from Nile margin, which is interpreted as due to terrigenous dilution.

Fe is prone to diagenetic remobilization in pore waters but Ti is inert therefore, good correlation of Fe and Ti suggest little diagenetic influence. K is generally associated with terrestrial siliclastics such as illite clays (Potassium mica) and potassium feldspar (microcline, orthoclase and sanidine). Illite is the K's main mineralogical carrier present in fine grained sediments. Therefore, high K depicts high illitic content. Based on the result of the data set from DY26III-Nig-S60-GC2 sediment core, we deduced three different units. The upper unit downcore is from 0-65 cm (MIS 1-2), the middle unit is from 65-225 cm (MIS 3, 4 and late part of 5) and last unit with range of 225-350 cm (MIS 5). The magnetic susceptibility is positive and the possible mineral content is magnetite, which is distributed through the core. From the spectra result of electrical resistivity, the upper unit display a silty clay lithology type with a resistivity values ranging from 0.0 ~ 130 ohm-m. The middle interval has a higher resistivity values  $\geq 200$  ohm-m which is a lithology of clayey sand and the last unit is similar to that of unit A that is silty clay. Unit upper unit and middle unit have the possibility of housing fresh water why Unit B has the possibility for gas hydrate due to its high resistivity.

The gamma density confirmed the interpretation of the electrical resistivity. During the late Holocene, all the elements for the study have high values. By implication, this means high values of both terrigenous and carbonate input occurred in the sediment. This is contrary to the record from central Africa, where it was reported lower values of both terrigenous and carbonate inputs. Increase in river runoff and coastal erosion due to high precipitation in the drainage areas would have increased the terrigenous material into the Gulf of Guinea with similar changes recorded in the Congo fan. The Ca increase is linked to higher productivity in the surface ocean at that time. In the middle Holocene all the elements reduced in our records, this reduction in the terrigenous and carbonate input observed might be due to abrupt sea level change during the stadials. This might cause materials to be left on the shelf without transportation.



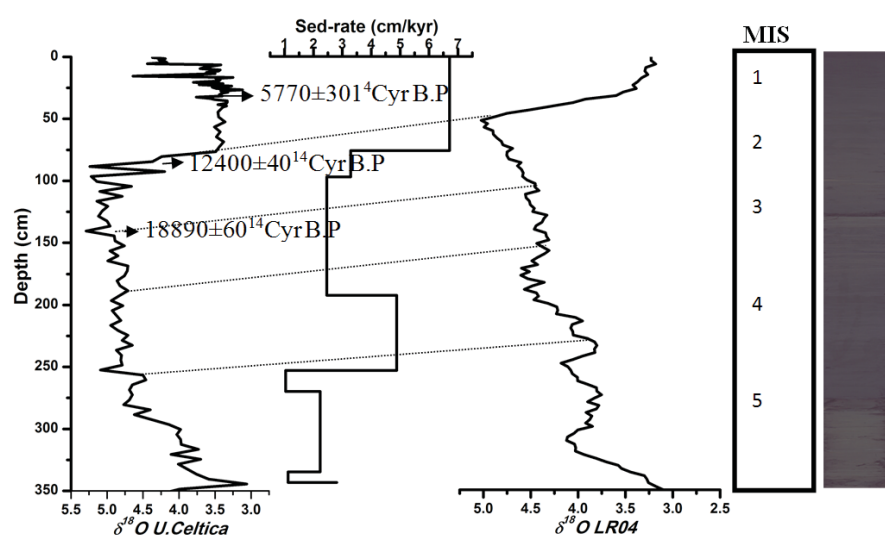


Figure 2 - Stratigraphy model of core 26111-Nig-S60-GC2. The stable Oxygen isotope values ( $\delta^{18}\text{O}$ ) of the epibenthic foraminifera *Uvigerina celtica* correlated with LR04. Inscribed are the values for marine isotopic events used as stratigraphic control points for the correlation. Arrows are indicating carbon 14 age points. Included also, the core picture.

For the early Holocene, Si dropped and other elements increased. This might be due to the biogenic origin of the Si. For the MIS 2 stage, Si is high at this stage but rapidly decreased at the boundary of MIS 3 and 4 stages. For other elements such as K, Ca, Ti, and Fe were greatly reduced. Si part of terrigenous material is the only component high at this stage; this is also contrary to high terrigenous and calcareous material sourced from Central Africa during the glacial periods. MIS 3 stage marks a reduction in Ca and Si and not too noticeable change in other elements. This marks the dominance of terrigenous input over biogenic during this stage. This trend follows that of Central Africa. This is likely due to the effect of strong winds during this period. MIS 4 stage is really a steady period of terrigenous input dominating over the biogenic which is noticeable in the signals of terrigenous elements over Ca. MIS 5 marks a little increase which is noticeable in all the terrigenous elements. The spikes correspond to the interstadials of MIS 5 period. The Ca still maintain its subdued response by the terrigenous materials. The terrigenous signals at this stage are

not as strong as the ones recorded during the Holocene period. The amplitude of oscillations is shorter. The results show variation in West African climate during the Holocene period with short intervals of aridity. The increase in Ca deposition and productivity of the ocean can be linked to warmer climate. Our results demonstrate that the African climate shows a close similarity with Greenland ice core records during the Holocene period, confirming the close link between the climate systems of the two regions at millennial time scales. This indicates that West Africa climate variability is controlled not only by precessional changes in insolation, but also by factors such as solar radiation and atmospheric circulation possibly driven by internal changes in the climate system which may occur at shorter timescales.

Terrigenous input suppressed biogenic material supply during glacial periods. This is due to the prevalence of strong winds that are characteristic of glacial periods. The coarser sediments during the stage are also a confirmation of stronger winds. Elevated input of dissolved silica has already been established in the Gulf of Guinea and our data displayed that during the MIS 2 stage in our record. In summary, we can conclude that the mixture of terrigenous and biogenic materials supplied during Holocene period in our study area is due to dilution factor.

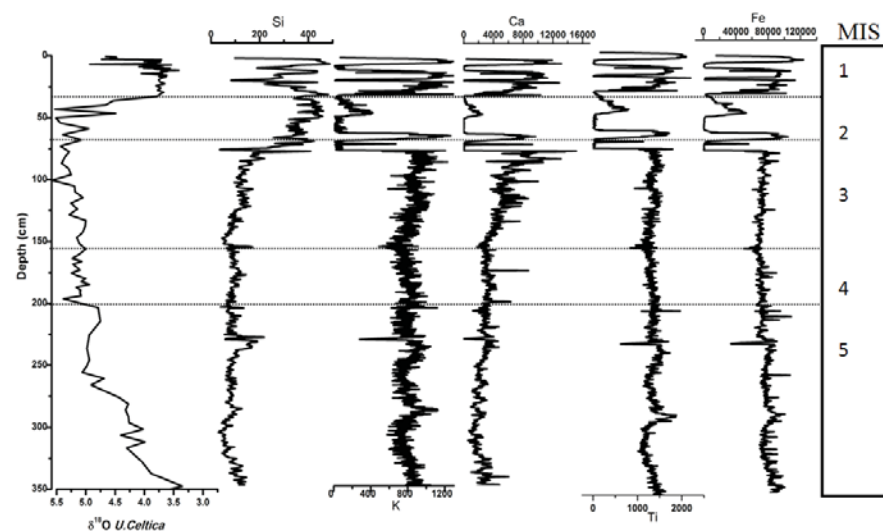


Figure 3 - Benthic foraminifer  $\delta^{18}\text{O}$  records and those of elemental input parameters for core DY26111-Nig-S60-GC2 including their isotopic stages (MIS).

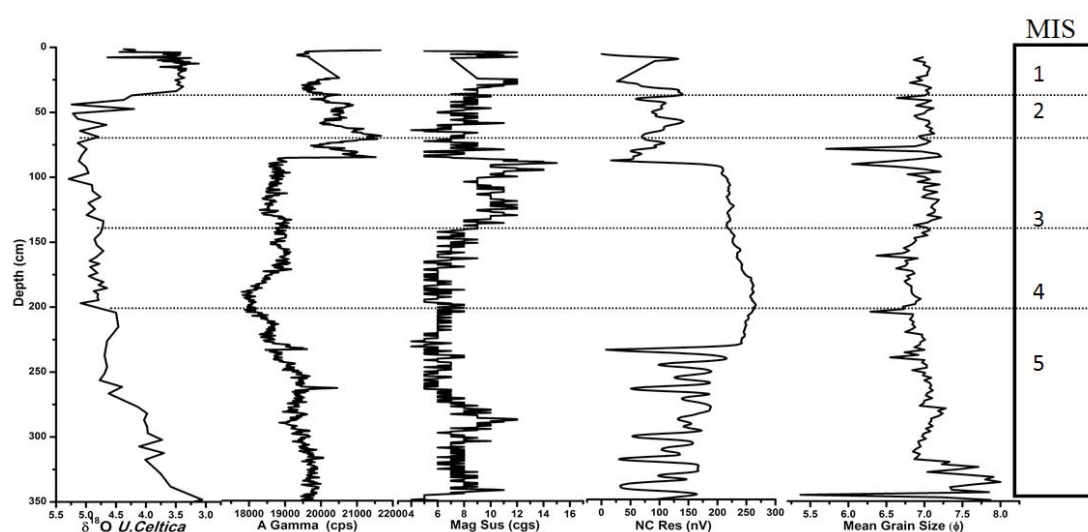


Figure 4 - Benthic foraminifer  $\delta^{18}\text{O}$  records and those of physical parameters for core DY26111-Nig-S60-GC2 including their isotopic stages (MIS).



## Visualization of the marine animal forest concept

Meri Bilan

University of Açores, DOP/IMAR, Portugal

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I am Meri Bilan, a young scientist from Croatia currently working in the Azores, Atlantic archipelago. My area of interest is the deep sea environment. At the moment that mainly includes the distribution of corals and associated fauna of the Mid Atlantic Ridge.

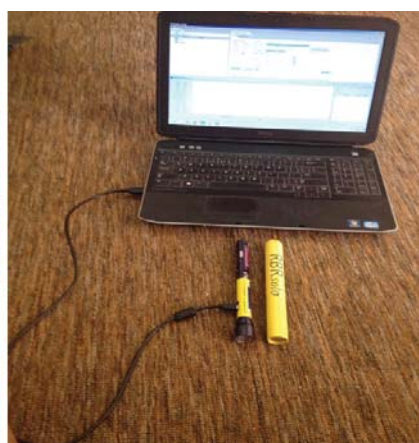
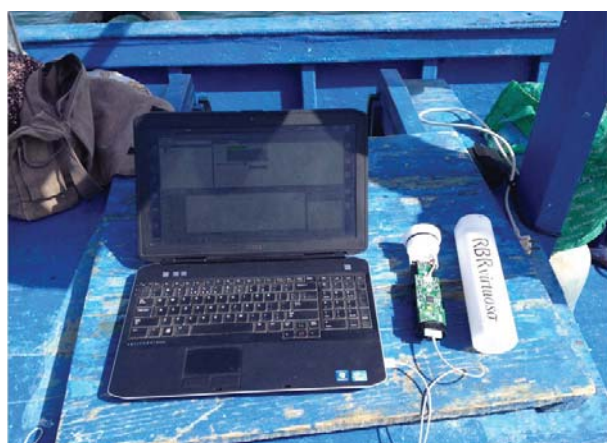
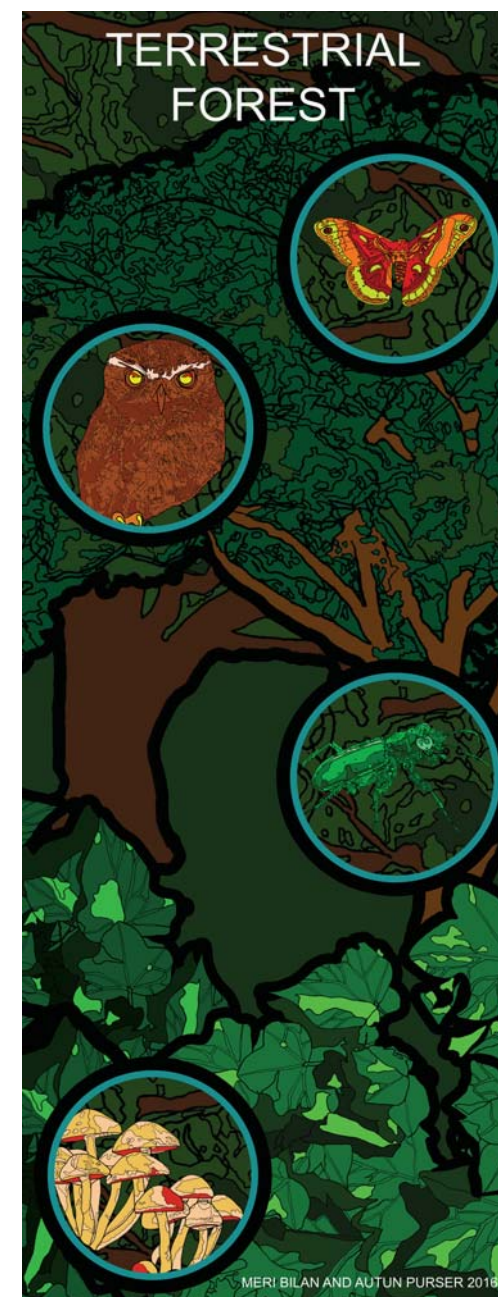
My first work in deep sea research was done with Dr Autun Purser (AWI, Bremenhaven) within the NF-POGO CoFE at AWI Helgoland in 2015/2016. The focus of the project was to determine the abundance of species that were not yet quantified but are related to the *Lophelia pertusa* reefs on the Norwegian margin. With this work we want to broaden the available knowledge of fauna that lives near or on the reefs.

While working on this project, Dr Purser and I came up with an idea of visualizing the concept that we were building our work on, the animal forest. This concept has been known in the science community and from our perspective is quite picturesque for the general public to understand what an animal forest is and why is it important.

A marine animal forest is a relatively high density of coral species in one place. These species can be reef building like we commonly find in the tropical waters or the *Lophelia pertusa*, one of the few cold water corals that build reefs. Unlike the tropical ones where one reef can be built by sometimes hundreds of different coral species, the cold water coral reefs are usually built by one or two species. An animal forest can be a relatively high dense aggregation of coral species that are not reef builders such as gorgonians, soft corals or sea pens.

The ecological concept of the marine animal forest revolves around the ecological function that the corals have in the deep sea environment. This function is derived from their structure that resembles the structure of the terrestrial forests. Both marine animal and terrestrial forests have a supporting role in the ecosystem. They are three dimensional solid structures that can be branched and occupy large areas. As such they provide suitable habitats for other species that can live on them or can be a shelter from larger predators that cannot progress into the microhabitats among the branches. Sometimes the animal forests are nurseries for juveniles or breeding grounds for some fish. In general, one can say that the animal forests are biodiversity hotspots much like the terrestrial forests.

This brief explanation we put into two posters that depict the structures of a coral and a tree and some fauna that can be found in each habitat.



Scenes of another successful deployment of submersible wave and tide gauges by NANO-Africa regional Project. More at page 10.

Photo credits: H. Smeti and A. Atoui



### Motivation of marine research in Peru

Jesus Ledesma

Instituto del Mar del Peru, Peru

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*The source of motivation for my team of researchers is given by our history, fishing wealth and oceanographic processes that reach climate impact, which I want to share in this edition NANO News*



Peru has an ancient history with marine tradition since Caral civilization, considered the oldest in America with records on year 3000 BC, with a diet based on marine organisms such as anchovy that stands great fishery productivity. Centuries later, around year 100 AD, Moche Culture stands out because of its fishing capacity and worship to the bivalve called Spondylus. Both civilizations used boats made of Totorá plants (*Schoenoplectus californicus*), which have been used since 3000 BC for fishing operations as well as recreation. At this time, we maintain a great fishing activity, capturing about 10% of worldwide fisheries. Besides, we have to face the climate phenomenon known as El Niño Southern Oscillation (ENSO). Some of the major marine research conducted at 'Instituto del Mar del Peru' (IMARPE) are related with these two thematic aspects: climate and fisheries. In this sense, two research vessels (RV) are used by our institute: RV Jose Olaya, in honour of a Peruvian fisherman and RV Humboldt in honour of a German scientist and naturalist, whose names reaffirm our research.

On the other hand, the scientific community has been able to demonstrate that the Humboldt Ecosystem is an intense upwelling system, with climate variability related to ENSO. This phenomenon affects productive activities such as fishery and agriculture. That is why, it is studied by various scientific worldwide institutions, for impacts regarding climate and economic activities. Part of high biological activity off the coast of Peru is due to fertilization caused by upwelling and trade winds. Optimal wind speed between 3 to 6 m s<sup>-1</sup>, cause cold and nutrient-rich subsurface waters to reach the euphotic zone, despite being at latitudes between 3°S - 20°S. The organic matter generated by high rates of photosynthesis have their reverse process called remineralization, placing the top edge of the Oxygen Minimum Zone less than 22 µM concentrations, close to depths of 25 m depth. These low concentrations are a result of balance between the consumption of oxygen by remineralisation of organic matter and poor ventilation.



Ledesma team sampling along the Peruvian coast



## Meteorological and hydrodynamic observations in the Boughrara lagoon (Tunisia)

Progress of the NANO Africa regional project

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Alumnus profile: <http://nf-pogo-alumni.org/profile/aatoui/>



### Overview

The NANO Nearshore Hydrodynamics Group (NHG) brings together young researchers from Brazil, Ivory Coast, Mauritius and Tunisia, participating in the 2016-2017 NANO-Africa project. This project has been running since January 2013 with the aim of promoting observations of nearshore hydrodynamics in Ivory Coast, Mauritius, Tunisia and promote long-term collaboration between the members of NANO-Africa and other NANO sub-groups. The current research project focuses on the observation and numerical simulation of nearshore hydrodynamics with possible applications to study shoreline erosion and water quality. In this research communication we present the progress achieved in Tunisia.

### Study zone

The Boughrara lagoon has a surface area of 500 km<sup>2</sup>, making it the largest lagoon in Tunisia, and communicates with the Mediterranean Sea through two channels (Fig. 1). Our goal during the 2016-2017 NANO-Africa project is to study water circulation in the Boughrara lagoon by means of field measurements and numerical modeling and monitor the seasonal changes of its water quality. The field measurements task is currently on-going after the successful deployment of the equipments acquired during the 2014 and 2015 projects (i.e. tide-wave-gauge and portable weather station) and the new equipment acquired recently (i.e. tide gauge).

In addition to monitoring the meteorological (wind speed and direction, atmospheric pressure) and hydrodynamic (sea level, wave characteristics) conditions, it is planned to measure the basic water quality parameters (temperature, salinity and dissolved oxygen) in order to address ecological issues facing marine life in the Boughrara lagoon (e.g. eutrophication, anoxia).

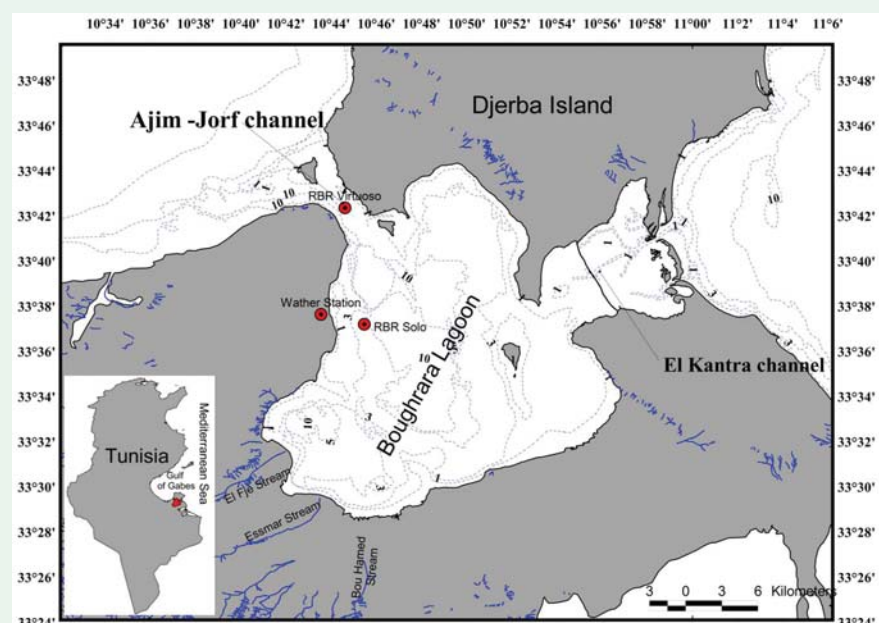


Figure 1 - The Boughrara lagoon and the location of the deployment sites of the tide and wave sensors and the meteorological station.



### Observatory setup

The observatory equipment will provide concurrent measurements of the sea level, wave height and period and the wind speed and direction.

#### • Equipment specification:

- Tide-wave gauges: RBR-Virtuoso D-Wave
- Tide gauge: RBR-Solo D-Tide
- Weather station: Gill Metpak

#### • Field work:

The instruments were successfully deployed on 21 August 2016 (Figs. 2 and page 8); the tide and wave gauges were programmed to start sampling at the same time. They will be retrieved after a three months sampling period.

Figure 2 - Setup and deployment of the meteorological station (photos credit to H. Smeti and A. Atoui).



## Numerical modeling

Delft-Flow, the hydrodynamic engine of the Delft3D numerical modeling suite, was used to investigate the flow and the sea level variability in the gulf of Gabes (Fig. 3) during low and high tides. For the flow simulation we used water level (astronomical) time-series from our national sea level data base including data from the NANO tide-wave gauge (RBR-virtuoso D-wave).

The modelled hydrodynamics reproduced the observed amplification of the sea level in the gulf of Gabes leading to a tidal resonance of the semi-diurnal tidal constituents (M2, S2, Fig. 4) as reported in the literature for our study site (Sammari et al, 2006). Although other modeling studies also found this tidal resonance, our model has a higher spatial resolution compared to what is available in the literature (Abdennadher and Boukthir, 2006).

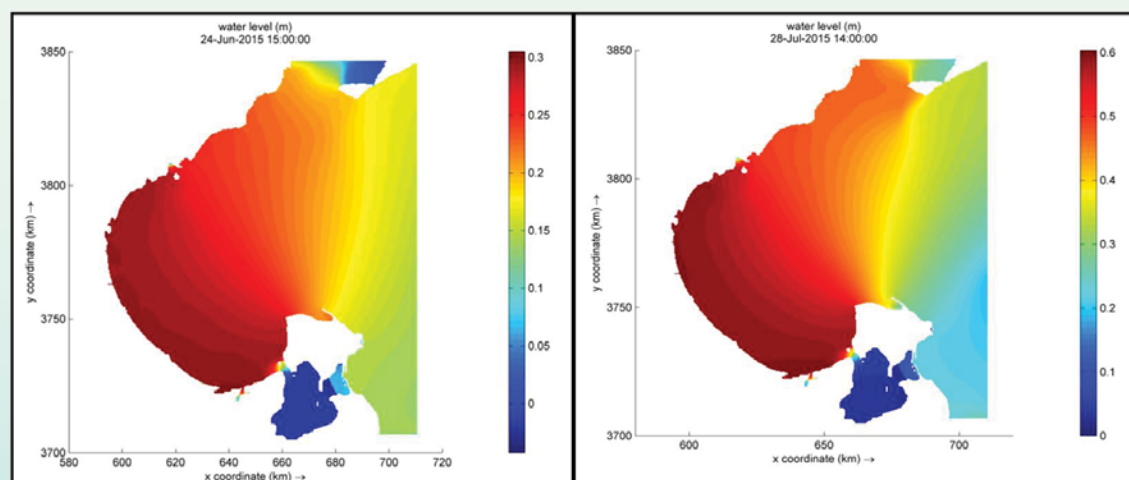


Figure 4 - Simulated tidal amplification induced by the M2 (right) and S2 (left) tidal constituents during high tide.

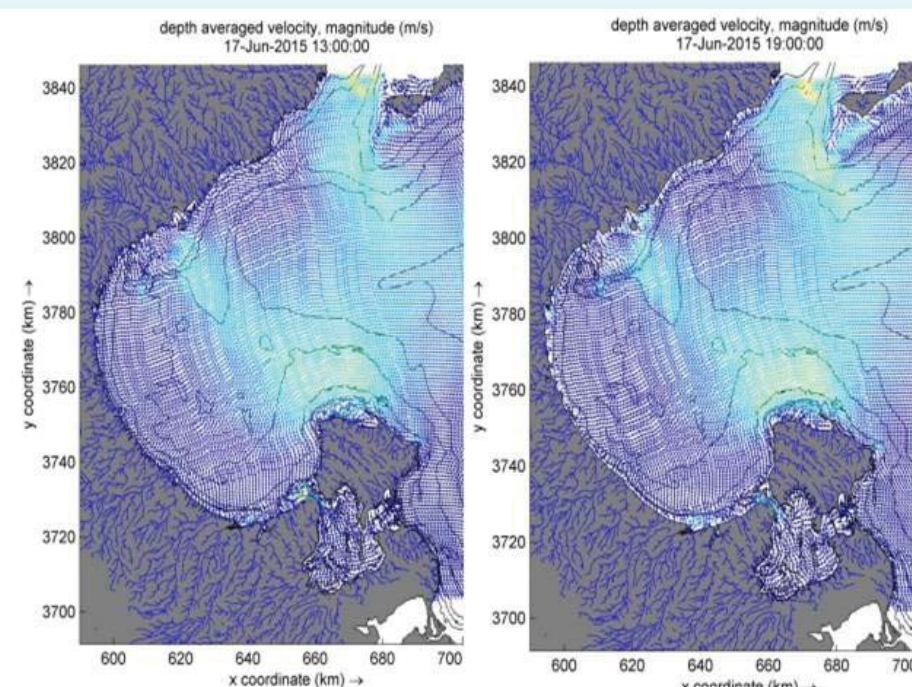


Figure 3 - Simulated velocity field during high tide (left) and during low tide (right) in the gulf of Gabes.

## References

- Sammari C., Koutitonsky V.G., Moussa M. (2006). Sea level variability and tidal resonance in the Gulf of Gabès. *Tunisia, Continental Shelf Research*, 26, pp 338-350. doi:10.1016/j.csr.2005.11.006.
- Abdennadher J., Boukthir M. (2006). Numerical simulation of the barotropic tides in the Tunisian Shelf and the Strait of Sicily. *Journal of Marine Systems*, 63, pp 162-182. doi: 10.1016/j.jmarsys.2006.07.001.

Read more about the NANO-Africa regional project and its participants at <http://nf-pogo-alumni.org/projects/africa/>



NANO members conducted outreach activities in the beaches of Indonesia. Read more at page 17.



## NANO REGIONAL PROJECTS

### NANO South-East Asia regional project: Delft-3D training and writing workshops

Progress on the South-East Asia regional project (NANO-SEA)

Suriyan Saramul<sup>1</sup> and Jitraporn Phaksopa<sup>2</sup>

<sup>1</sup>Department of Marine Science, Chulalongkorn University, Thailand

Alumnus profile: <http://nf-pogo-alumni.org/profile/ssuriyan/>

<sup>2</sup>Department of Marine Science, Kasetsart University, Thailand

Alumnus profile: <http://nf-pogo-alumni.org/profile/jphakso/>



A 5-day workshop for Delft-3D training and writing, was hosted by the Department of Marine Science, Faculty of Science, Chulalongkorn University, Bangkok, Thailand during 8 - 12 August 2016. The objectives of the workshops were to train NANO South-East Asia members on the application of Delft3D-FLOW and to work on writing a collaborative manuscript for publication in a peer-reviewed journal. This enabled the group to build human capacity in environmental management and expand the NANO network in South-East Asia countries by transferring knowledge. There were about 19 attendees from Asian countries (Indonesia, Malaysia, Philippines, Thailand and Vietnam) participating in the workshops.

The first 3-day workshop was an introductory course on ocean modelling. It was run by NANO alumni Dr Suriyan Saramul from Chulalongkorn University and Dr Jitraporn Phaksopa from Kasetsart University. We would like to acknowledge and thank "NANO Friend" Dr Christo Rautenbach for his tuition at the NANO Delft 3D workshop in South Africa last year. Delft3D-FLOW open source model, a state of the art of ocean modeling software, was introduced to the attendees. A basic knowledge about numerical ocean model was first introduced and then all attendees had a chance to explore the Delft3D-FLOW software through a hands-on practical session using Cook Inlet, Alaska as an example for the whole 3 days workshop. At the end, an estimation of a residence time from hydrodynamics model Delft3D was presented. This parameter is one of the important factor for the South-East Asia regional project on the evaluation of eutrophication that has been conducted over the last 2 years.

The second workshop was a writing workshop, to prepare research manuscripts on eutrophication in the coastal waters of SE Asia: An assessment - Joint research project. This 2-day workshop was chaired by Dr Victoria Cheung. A draft collaborative paper among the 5 countries was initiated while additional individual papers will be prepared by researchers from each country. Comments on a draft collaborative paper were also provided by Dr Gerald Plumley (CofE former coordinator) and Dr Sutaporn Bunyajetpong (CofE alumna).



Clockwise

All participants of the workshop.

Practical sessions of Delft3D-FLOW modelling software and writing of a collaborative research paper.

A visit to Chulalongkorn University Museum of Natural History, Faculty of Science, Chulalongkorn University.



## NANO REGIONAL PROJECTS

### Study of Harmful Algal Blooms and other Aspects of Sardine Habitats around the Indian sub-continent (SHABASHI)

Progress on the Indian sub-continent project

Nandini Menon<sup>1</sup>, Ravidas Naik<sup>2</sup>, Rajdeep Roy<sup>3</sup>, Kanthi Yapa<sup>4</sup> and Grinson George<sup>5</sup>

<sup>1</sup>Nansen Environmental Research Centre (India), Kochi, India

Alumnus profile: <http://nf-pogo-alumni.org/profile/nmenon/>

<sup>2</sup>National Centre for Antarctic and Ocean Research, Goa, India

Alumnus profile: <http://nf-pogo-alumni.org/profile/rnaik/>

<sup>3</sup>India National Remote Sensing Centre, Hyderabad, India

Alumnus profile: <http://nf-pogo-alumni.org/profile/rroy/>

<sup>4</sup>Department of Physics, University of Ruhuna, Matara, Sri Lanka

Alumnus profile: <http://nf-pogo-alumni.org/profile/kasyapa/>

<sup>5</sup>Central Marine Fisheries Research Institute, Kochi, India

Alumnus profile: <http://nf-pogo-alumni.org/profile/ggeorge/>



Understanding the causes and consequences of harmful algal bloom (HAB) formation requires a deeper understanding of all physical, biological and chemical factors, and the interactions that influence these processes. Occurrences of blooms in oceans in particular, have a very important role in overall primary productivity, carbon cycling and fishing activities. The study parameters for the coastal field campaigns in this project were designed with a view to incorporate all the possible variables related to bloom formation and post bloom consequences. The aim of the project was to monitor coastal waters of India and Sri Lanka for HABs and their characteristic features. Biological and chemical methods were adopted for taxonomic and toxin characterization of HAB species, respectively. Efforts were made to understand the influence of harmful as well as non-harmful algae on the fishery of sardines. Work was carried out simultaneously in the coastal waters of Kochi, Goa, Veraval and Sri Lanka. The project was initiated in March 2015 and completed on 31<sup>st</sup> March 2016.



*In situ* data sampling along the coastal waters of India and Sri Lanka were under the responsibility of following team members

#### Sites off West Coast of India

Veraval: Grinson George and Mini Raman

Goa: Rajdeep Roy and Ravidas Naik

Kochi: Nandini Menon and Shaju, S.S.

#### Sites off East Coast of India:

Mandapam: Grinson George

#### Sites off Sri Lanka

Galle, Mirissa, Tangalle: Kanthi Yappa

At the onset of the project, a training programme was conducted to standardize the sampling and analytical protocols to be followed in the project and to provide training to all the participants in the laboratory procedures for the analyses. Field sampling helped in understanding the phytoplankton composition, nutrient profile and associated bio-optical features of the coastal waters of India and Sri Lanka.

For the creation of the bio-optical spectral library, pure cultures of phytoplankton species were analyzed for their absorption spectra. The reason for conducting such a study was that the properties of phytoplankton spectral absorption form an integral part of a variety of bio-optical algorithms to estimate phytoplankton biomass and other constituents. Phytoplankton spectral absorption can vary as a consequence of composition and concentration of pigments as well as of pigment packaging.

*P. rathymum*, a lesser known, potentially toxic, bloom-forming species was isolated for the first time from coastal eastern Arabian Sea.

Veraval coastal waters were sampled as per the Ocean colour advisories obtained from SAC, mainly to study the spatial extent of the winter bloom of *Noctiluca scintillans* that normally occurs in the open ocean regions of the Arabian Sea. This was because Veraval has continental shelves that show characteristics of both case I and case II waters. This region is highly productive and an important fishing ground of the state. Thus studies on bloom formations are crucial for this region.

An attempt was made to link the inter-annual variability of Indian oil sardines with the regular occurrence of algal blooms. The breeding and recruitment phase of the sardine is well timed to match the initiation of upwelling bloom in May and its propagation and termination. A mismatch in the bloom initiation month is highly detrimental to sardines. The bionomics of Indian oil sardine reveals that the species is vulnerable to expansion and



Shaju S. S. sampling in coastal waters of Mandapam, India





NANO SHABASHI team members

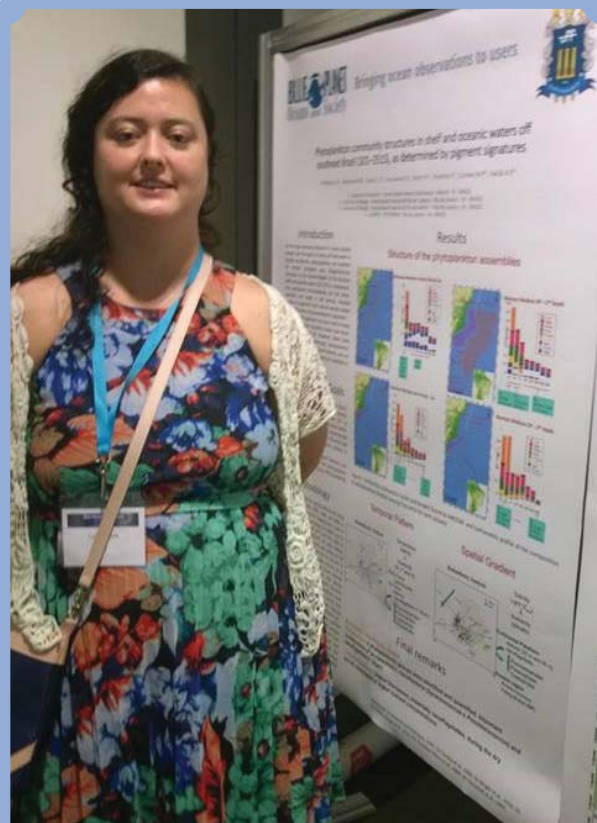
retraction in its stock in the northern Indian Ocean depending on the environmental perturbations. The high fecundity and fluctuating survival rates support the fact that despite being fished to the fullest extent, the species will continue to sustainably replenish its stock and the fluctuation in its inter-annual production is controlled more by the environmental variables which have an influence in the food production chain that is upwelling.

Along with the scientific work, outreach programmes were also carried out by all the team members to create awareness among the students on problems like HABs, marine pollution etc.

Results were presented in international and national symposia and scientific journals. A book chapter was also contributed by the NANO team to a Springer publication:

D'Coasta, P.M., D'Silva, M.S. and Naik, R. K. (2016), Impact of pollution on phytoplankton and implications for marine econiches. In: Marine Pollution and Microbial Remediation (M.M. Naik and S.K. Dubey, Eds.), Springer Science Business Media Singapore Pvt. Ltd., 205 – 222 p. DOI 10.1507/978-981-10-1044-6.

Outreach activities of SHABASHI. Dr Kanthi Yapa, Sri Lanka (left) and Dr Ravidas Naik (right) seminars



Cassia Jonck during poster session at the Blue Planet Meeting, 2015

Cassia, Amrit and Maziar tell us how NF-POGO initiatives have supported their career in ocean sciences. Pages 20-22.



Amrit Mishra during the N-S Atlantic Transect onboard the RV Polarstern



Maziar Khosravi during the NANO workshop in South Africa, 2015





## Outreach activities

Suriyan Saramul

Department of Marine Science, Chulalongkorn University, Thailand

Alumnus profile: <http://nf-pogo-alumni.org/profile/ssuriyan/>



### Marine Camp # 36 “Sustainable Natural Resources Return Life to the Sea”

**M**arine Camp is a camp designed for high school students in Thailand to learn about marine physical and biological resources. It was established in 1979 by undergraduate students in the marine science program, Faculty of Science, Chulalongkorn University. The camp comprises many activities both inside and outside of the campus, such as lectures by faculty members and public mind activities (mangrove planting, beach cleaning, etc.) by staff members and campers. In this year, Marine Camp#36 under the theme “Sustainable Natural Resources Return Life to the Sea” was held at Chulalongkorn University, Bangkok and at Thai Island and Sea Natural History Museum, Chonburi during 21 - 27 May. The theme of the camp changes every year, so the program in the camp will follow the camp’s theme. In total, there were 92 participants (campers 45 and staff members 47) in this year’s camp. There were 2 public mind activities for campers to do 1) mangrove planting at Tung Plong Bay, Chonburi and 2) Releasing young turtles to the sea at Sea Turtles Conservation Centre Royal Thai Navy, Chonburi. These two activities will help campers to understand why marine resources are so important for humans. There was a session where former campers could come to the camp and share their own experiences to the new campers. Some of former campers came into the Department of Marine Science, Chulalongkorn University and ran the Camp. This demonstrates how the Marine Camp is so important for the young generation to learn how to save our ocean. NANO South-East Asia was part of the Camp as providing support such as camper kits for the camp participants.



Clockwise: (1) All campers at the Marine Camp#36 opening ceremony; (2) Formal campers shared their experiences to new campers; (3) Mangrove planting at Tung Plong Bay, Chonburi; (4) Releasing of young turtles during a visit to the Sea Turtles Conservation Centre Royal Thai Navy, Chonburi.







## Outreach activities

Jitraporn Phaksopa

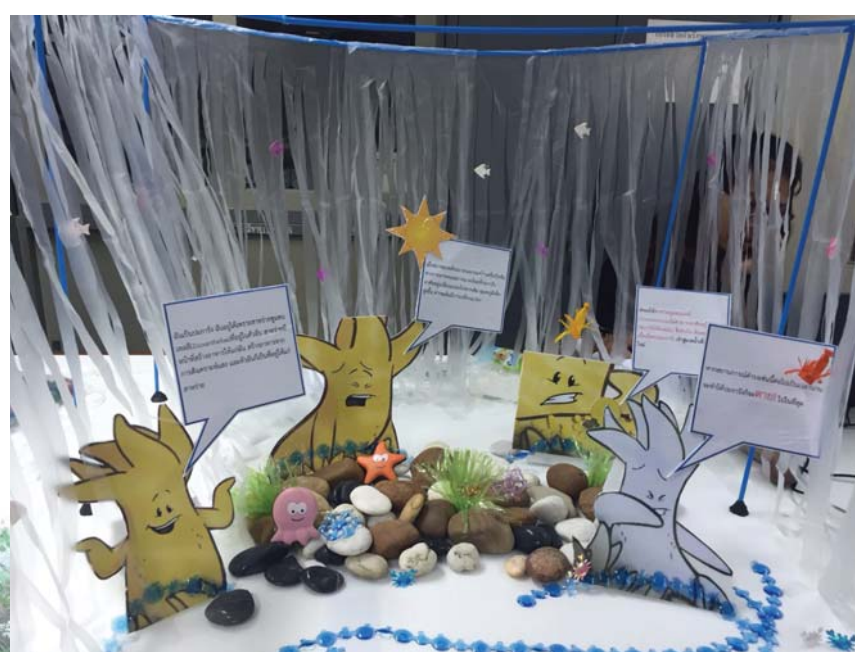
Department of Marine Science, Kasetsart University, Thailand

Alumnus profile: <http://nf-pogo-alumni.org/profile/jphakso/>



### Exhibition of “POGO-NANO” and “Coral Bleaching”

An outreach program was conducted during the 5<sup>th</sup> Marine Science Conference at Bangkok, Thailand that took place on June 1-3, 2016. At this conference, there were about 900 participants who are working on marine science including researchers, professors, and students from various universities, and institutes in Thailand. There were two main activities including poster exhibits and a 3D-model of “Coral Bleaching” display. For the first part, four posters were presented. The posters were aimed to announce the information, missions, and activities of POGO and the NANO. Moreover, we promoted 7 NANO members in Thailand, the South-East Asia regional projects on the eutrophication and next coming activity in the region “Delft3D-FLOW Introduction Workshop” held later in August 2016. Additionally, we established the small 3D-model of “Coral Bleaching” display because some areas are being seriously affected by coral bleaching. This activity gave some scientific information on coral bleaching such as what is the main cause of coral bleaching and the effect of coral bleaching on marine ecosystem. To be more attractive, we also prepared Q&A game with small gifts for those who visited our booth.



Activities in “POGO NANO” exhibition during the 5<sup>th</sup> Marine Science Conference at Bangkok, Thailand.



**nano**  
Global Ocean  
Education

**NANO Outreach** *Dissemination of knowledge, raising public awareness of threats to the Ocean and spreading good habits regarding marine environmental protection should be part of the job of every Ocean scientist.*

More at <http://nf-pogo-alumni.org/outreach/>







## Outreach activities

Zakiyah, U., D. Kurniawan and Mulyanto\*

Brawijaya University, Indonesia

Alumnus profile: [http://nf-pogo-alumni.org/profile/umi zakiyah/](http://nf-pogo-alumni.org/profile/umi%20zakiyah/)



### Indonesia NANO-SEA outreach program

**Discussion and dissemination the negative impact of chemical pollutant on to coral reef beds in Clungup Mangrove Conservation (CMC) park, Malang, east Java, Indonesia**

#### Background

Clungup Mangrove Conservation (CMC) is one of the largest coastal conservation parks in Malang regency that covers an area of 72 hectares (Ha). The park includes Mangrove habitats in an area of 58 Ha, coral reef areas and coastal low land vegetation, tidal flat areas and turtle landing beach areas. The management of these areas is undertaken by Community Guardian Groups or in Indonesian known as the Kelompok Masyarakat Pengawas (POKMASWAS), named Gatra Olah Alam Lestari (GOAL). The area of CMC is located in Tambakrejo village, Sumbermanjing Wetan district, Malang regency, East Java province. In this village, the Bhakti Alam foundation gathered the local communities to be involved in sustainable environmental management program, especially for the CMC area. CMC Park was established in 2014, and was managed with an ecotourism based management system and within a relatively short period of time become one of the pilot projects for conservation programs in surrounding areas. These were implemented with the application of major principles of the ecotourism and conservation management, such as (1) natural based, (2) minimum impact, (3) using financial contribution for conservation, (4) financial contribution for the community, (5) environmental education for the tourist and local community and (6) raising the values of local culture (TIES, 2000).

At the beginning, CMC developed a management system using voluntary ecotourism, assisted by several lecturers and researchers as well as students from faculty of Fisheries and Marine Science and other universities. This concept was aimed to maintain the system implemented inline with the ecotourism concept as stated in the Government regulations. The activities that were undertaken gave information regarding this regulation to visitors during their stay in CMC area, so that they can follow these CMC regulations.

In line with the NANO SEA programme in the year of 2015 about the coastal water quality management, these outreach activities were conducted in the CMC area in Malang. These activities targeted most of the ecotourism management staff and the local tourist guides, so that they have a basic understanding of scientific knowledge regarding the negative impact of the chemicals substances on coral reef environments, especially during the time they act as guides and assist the visitors of the area.

#### Methods of the Program Implementation

The activities of this outreach program were conducted as a group discussion session with the management staff and the local guides. This was a one day activity that took place in the main hut of the CMC office nearby the front gate of the CMC area. This activity involved about 20 CMC management staff as well as the local guides. The topic of this seminar and discussion was for the transfer of knowledge. The methods used were seminars, discussion and the distribution of brochures as well as interviews with visitors regarding the negative impact of chemical substances towards coral reef environments.

**Date and location** 17<sup>th</sup> January 2016 at the Clungup Mangrove Conservation, Malang, East Java, Indonesia

**Participants** Lecturers and researchers of Faculty of Fisheries and Marine Sciences, Brawijaya University; Management staff and local guides; Visitors (Tourists)

#### Reference

The International Ecotourism Society (TIES), 2000. A Simple Guide To Certification For Sustainable Tourism and Ecotourism. Hand-Book 1. CESD-Washington DC. USA







Gatra Beach as one of the Beaches in the CMC area



The NANO Team (Umi Zakiyah, Mulyanto and Dhira Kurniawan) and Friends (Asminal Rahmi and Sulastri Arsyad).



Participants after the discussion session at the front of the Main Hut of The CMC area



Scenes of the SEA NANO regional project Outreach activity at the Clungup Mangrove Conservation, Tiga Warna beach





# NANO Profile - Q&A

## Ngozi Oguguah

Principal Research Officer, Marine Biology section, Dept of Fisheries Resources, Nigerian Institute For Oceanography and Marine Research

Alumnus profile: <http://nf-pogo-alumni.org/profile/Ngozi/>

*Ngozi holds a prestigious Borlaug Women in Science Fellowship. Ngozi joined the NANO Alumni Network for Oceans after she participated in the first Floating Summer School 2015 on-board the R/V Polarsten. Ngozi has a strong background in science and outreach, and was asked to share some of her most valuable experiences with readers of NANO News.*



**NN**

Congratulations, you have just been awarded the prestigious ASLO Global Outreach Initiative Award. Can you tell us more about your project? What does this award mean for you personally and professionally?

**NO**

The project is "Practical skills transfer to undergraduate students; on physico-chemical and biological parameters as an indication of Lagos Lagoon health status".

Objectives

The project will involve;

- 1) imparting practical skills to 480 undergraduate students from 24 universities on an industrial work experience scheme.
- 2) determine physico- chemical and biological parameters of Lagos Lagoon health status.

Personally, I will be able to impact positively on the lives of future scientists/researchers. It is a mentoring opportunity. Professionally, my scope is widened and my network is widened.

**NN**

In your opinion, how does the Floating Summer School contribute to the development of global oceanography?

**NO**

It enables practical application of the theoretical aspect of oceanography. The hands on shipboard training is incomparable! Skills acquired during the training can then be used when one goes on field trips to carry out research.

**NN**

Please tell us more about your current research. What issues are you presently focusing on? How does your project benefit Nigeria?

**NO**

My research is on heavy metal pollution monitoring in the Lagos lagoon. The focus is on heavy metals in fish in particular those caught in the Lagos lagoon. We have been experiencing indiscriminate dumping of sewage, industrial effluent and garbage into our waterways and these have a negative impact on the marine ecosystem. This will determine if the fish is good for human consumption or not. The result will enable us to advise the policy makers on what to do.

*Would you like to propose someone to be profiled as a prominent alumnus?*

Send us a name and a reason and we take care of the rest!

Send an e-mail to [lilian.krug@nf-pogo-alumni.org](mailto:lilian.krug@nf-pogo-alumni.org)

**NN**

You were one of the participants of the Floating Summer School 2015 on-board the R/V Polarsten. What was the most valuable experience from this program? What do you consider to be the most challenging experience?

**NO**

The most valuable experience from the programme was interacting and exchange of ideas between the faculty and students from over twenty countries in the world. The network continues on and a lot of collaborations have been going on since then. The most challenging experience was learning to work as a group because we all came from different cultures. At the end of the day what started out as a group of individuals ended up as a team!

**NN**

Can you recall how did you become interested in ocean science? Describe briefly your career path after that.

**NO**

I work with Nigerian Institute for Oceanography and Marine Research Lagos Nigeria. I have found out in the course of my PhD research that activities carried out on the land have an impact in our oceans.

**NN**

From your experience, what advice would you give to a young scientist from a developing country starting his/her career in oceanography?

**NO**

One has to be committed, hardworking, straight forward and diligent. It is an exciting field to work in. There are a lot of great opportunities there.

**NN**

As a new NANO member could you please describe your experience with the network so far, and your vision for the future of the network.

**NO**

My experience so far has been very positive. The network is awesome. I love the way opportunities are shared. I am so glad to be part of this network!



### An Experience of a Lifetime with POGO

Amrit Kumar Mishra

PhD student, University of Plymouth, UK and University of Algarve, Portugal

Alumnus profile: <http://nf-pogo-alumni.org/profile/Amrit%20Mishra/>



I am in my third year Erasmus Mundus Doctoral Research on Marine Ecosystem Health and Conservation (MARES) program at the Marine Biology and Ecology Research Centre, University of Plymouth, UK and Centre for Marine Sciences, University of Algarve, Portugal. My research work is focused on “Global change effects on seagrass ecosystem and their role as carbon dioxide (CO<sub>2</sub>) sinks”, where I investigate the effects of high CO<sub>2</sub> on seagrass (*Cymodocea nodosa*, *Posidonia oceanica* and *Zostera noltii*) net community production, their biochemical changes, effects of trace elements on their physiology and total C and N content. In my research natural CO<sub>2</sub> vents of Greece and Italy representing future conditions are used as analogues to better understand the effects of high CO<sub>2</sub>.

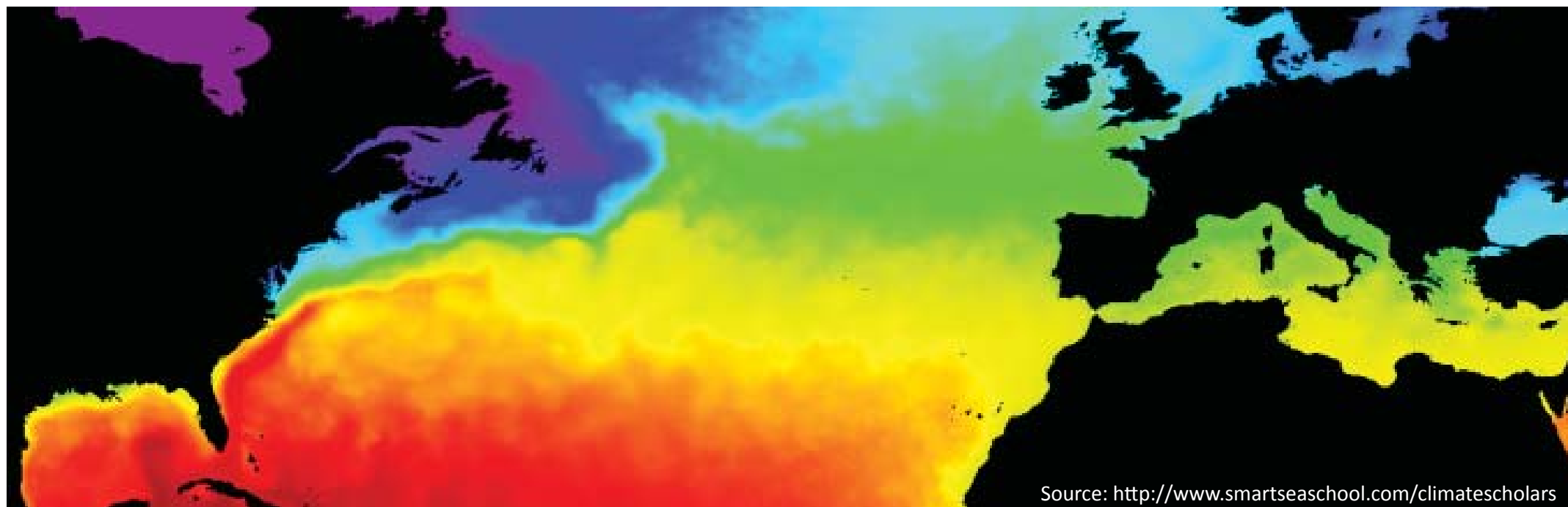
In these scenarios of carrying out research on climate change, the need to get adequate trainings is highly important and this is where I am thankful to Nippon Foundation (NF)-Partnership for Observation of Global Oceans (POGO) for providing me with such opportunities. The most amazing training experience for me was “North to South Atlantic Transect, 2015 on RV POLARSTERN”. It was not directly related to climate change research, but it provided me various inputs in the techniques used in climate change research. The hands on training provided on board experience in oceanography, was quite amazing and I learned a lot also by handling the equipment such as Conductivity Temperature Depth sensors, Expendable Bathythermographs, Ferry box etc., which I had never used before. I also learned about various water masses in the ocean, their interaction and their effects on the climate and functioning of ocean ecosystem through analysis of the water samples from CTD on board. Similarly, I learned about remote sensing techniques, plankton sampling using various nets, collection, preservation and identification of planktons. I was part of an experiment on board where we manipulated CO<sub>2</sub> and nutrients for planktons from various depths to look into the effect of global CO<sub>2</sub> change in the oceans and the results were fascinating, which gave us an idea about the effects of high CO<sub>2</sub> in future ocean conditions for planktons. The plankton sampler from SAHFOS was a unique experience to handle and study.

Overall the training was a life changing experience for me: meeting with other international students, learning from experienced and best teachers on the field and currently using all the experience gained on the research cruise to further my research career in climate science.

Secondly I was part of the recently concluded “Atlantic Ocean Climate Scholars Program, 2016, National University of Ireland, Galway, Ireland” part of NF-POGO training. Eight days long scientific presentation, lab works, field work and group discussions was part of the training focused on climate change effects on the Atlantic Ocean ecosystem and both Polar regions. The role of POGO and Nippon foundation in training and increasing capacity in marine science especially in ocean observations, modelling and tools were discussed. It was an amazing experience in terms of learning from the best scientific minds of our generation under one roof and enhancing my knowledge base. The importance of combination of different fields of science to understand, study and mitigate climate change was discussed.

The training was great platform for climate science students and being part of it, I gained valuable knowledge and experience, which I will use in my research career to work for the benefits of the human society as a whole.

I would like to thank Nippon Foundation and POGO for providing me these opportunities and supporting me to bring the best out of me.



Source: <http://www.smartseaschool.com/climatescholars>



## NF-POGO alumni appreciation

Cassia Jonck

Instituto de Química, Universidade Federal Fluminense, Brazil

Alumnus profile: <http://nf-pogo-alumni.org/profile/ccubasj/>



If someone had told me at 10 years ago that in 2016 I would be a researcher in the oceanographic area working in a big network of coral conservation I would not have believed it. Additionally, if they also had told me before that I would be working offshore on a research vessel as a manager and seeing whales, dolphins, sea turtles, and also traveling to Australia to meet with a lot of important people who work in ocean observations, I certainly would never believe it. But indeed it was to become true!

In 2006 I got married and planned to finish my Bachelor and Licensing on Chemistry; looking forward to live my marriage and dreaming of having kids and teaching chemistry to the children. It was a reasonable view for my future considering my traditional background: I was born and raised in the country south of Brazil, in the state of Paraná, but I had to move to the state of Rio de Janeiro to finish my undergraduate there. At Universidade Federal Fluminense (UFF) I met Dr Silvana Vianna Rodrigues, and I had the opportunity to learn about High Performance Liquid Chromatography (HPLC) applied to the study of pigments in sediments. At that time I really just wanted to learn about HPLC and I considered this as a good opportunity. Working in network with other professionals I could see that chemistry was just one tool to solve bigger questions.

Dr Vianna invited me to do a master degree program in chemistry, to work with taxonomy of phytoplankton using its pigments composition. I readily accepted the challenge, so the big journey began. Dr Vianna ensured to provide all my needs for this opportunity. She was also invited to teach in the course of “Phytoplankton Community Structure: From the Molecular to the Global Scale”, a NF-POGO Regional Centre of Excellence training course organized by the Instituto Nacional de Pesquisas Espaciais (INPE) on the 21<sup>st</sup> September – 07<sup>th</sup> October 2009; in Arraial do Cabo, Brazil. I was in the middle of my master course, so I didn’t have too much to offer but I learned a lot. It was definitely a change of perspective for me. It gave me an interest in HPLC techniques and analytical chemistry; I was eager to understand the meaning of integration of these analyses.

Despite the fact I have done my master degree in Chemistry I did my best to write the observations about the environmental interpretation of the results. After the end of my masters I got some experience working in another big project in oceanography, working offshore on a research ship. Simultaneously I did some courses in forensic toxicology and chemistry and phytocosmetics. In 2015 I came back to work into Dr Vianna’s lab, and I submitted my application to the Blue Planet Symposium (<http://geoblueplanet.com/>) in which I got the financial support of NF-POGO and WMO/ GEO, I could go to the symposium and additional events: the NANO Meeting (25 May - <https://www.flickr.com/photos/67971980@N02/sets/72157654553795811>) and the ChloroGIN/SAFARI Workshop (26 May).

Again indeed I did participate in two big unprecedented projects in oceanic characterization, with financial support of Petrobras. Both projects were to evaluate the request for a license to explore oil and gas and the financial support now is over. Working offshore depends on expensive logistical procedures which the majority of research centers do not have, and when they have a partial structure the money to support staff and equipment maintenance doesn’t come in the ideal frequency.

So in an overview, the financial support to work in oceanography research in Brazil depends on a fragile condition for the universities and it is difficult to invest in personal and professional development in the field.

But, despite this scenario, when I had the opportunity to go to the Blue Planet Symposium, I could see the big picture of the international politics of oceanic environmental research and YES! We have conditions to grow in this direction. Brazil tends to follow the international politics, but in general, not at the same speed. This gave my trust and hopes to believe that it could be a good thing to devote my professional life to oceanic research. So in January 5<sup>th</sup>, 2016, I told Dr Vianna about my interest in applying to do my PhD. At the same day, five professors were talking with her about pigments in coral reefs, inviting her to join this network project. Dr Catia Barbosa was just asking about a student to join on this project to do the pigments when I arrived and decided to analyse the proposal. I was approved at the first place at the Geochemistry Graduation Program candidature and now I have been working under the supervision of Dr Barbosa and Dr Silvana Rodrigues as my advisors. We had a lot of problems with the financial support from the former project and now we had to change and remodel my proposed project to fit within the new conditions of financial support and the network. In reality I have more than five professors helping me to push through the difficulties of lost of financial support. The scenario in Brazil is not favorable to research financing. I have to mention one more person, who is making possible my work, Dr Raquel Peixoto, which has open the possibility to keep my project in the coral reefs subject and organized a network with Dr Barbosa and Dr Vianna. Finally I cannot forget to be thankful to my husband, Celio Jonck, who supported me in my scientific carrier.

So the benefits of the POGO scholarship all over the world, creating this opportunity really makes the difference, and a change of mentality about networking, and it builds the identity and creates a space to express the passion in the field of environmental science.



## NF-POGO alumni appreciation

Maziar Khosravi

PhD student in Physical Oceanography, Iranian National Institute for Oceanography and Atmospheric Sciences

Alumnus profile: <http://nf-pogo-alumni.org/profile/mkhosra/>



I have received a bachelor degree in Math from University of Lorestan, Iran in 2006. Then I completed a master degree in Physical Oceanography at University of Marine Science and Technology, Khorramshahr, Iran in 2008. My thesis was a numerical study of air-sea surface heat fluxes from the Persian Gulf by COHERENCE model. Due to my strong background in mathematics and also physics, after my masters program I was working as a lecturer for general math, general physics, differential equations and statistics at Payame Noor University of Khuzestan for 4 academic terms. During these two years I was also working with Oceanic and Atmospheric Science Research Centre of Khuzestan.

In 2010-2011 I was accepted as scholar for the NF-POGO Centre of Excellence, spending the 10 months-long postgraduate program at Bermuda Institute for Ocean Sciences, Bermuda.

Since I have been back to Iran I am working for the Iranian National Institute for Oceanography and Atmospheric Sciences; I also started my PhD in this institute in 2013. Here in our home institute we mostly engaged with the field observation and data analysis of currents and physical parameters of seawater through ADCP/RCM measurements and CTD cast.

In December 2015 I also participated in a two week long training course on wave and current modelling through employing DELFT 3D in CSIR, South Africa. This program was also funded by NF-POGO.

On my PhD thesis it is worth mentioning that, it is regarding observation and numerical study of tidal currents within a channel through vessel mounted ADCP surveys and FVCOM modelling.

Additionally, I recently have participated in a two week international course on data analysis at Indian National Centre for Ocean Information Services (INCOIS) which was supported by POGO. This support from POGO covered the cost of my flight and enabled me to participate in this esteemed course, the remaining cost was kindly covered by INCOIS.

My experience at INCOIS was regarding a course on data analysis. The course was given in a high level and covered much needed knowledge for a young oceanographer. Cooperation between both visiting professors from WHOI and University of Washington and Indian scientists made a really applied and useful course on this regard. INCOIS was a pleasant place to hold and set up training courses in oceanography. The Indian scientists were really major in this area and all was organized in a good manner. I strongly recommend to the other young scientist to visit this centre and take advantage of the facilities and opportunities offered.



Participants of the **Pan-Ocean Remote Sensing Conference (PORSEC) 2016**, in Brazil. Our invited collaborator Ankita Misra tell us about her experience in this conference at page 24.



Arvind Singh<sup>1</sup> and Nimit Kumar<sup>2</sup>

<sup>1</sup>Physical Research Laboratory, India

Alumnus profile: <http://nf-pogo-alumni.org/profile/asingh/>

<sup>2</sup>Indian National Centre for Ocean Information Services, India

Alumnus profile: <http://nf-pogo-alumni.org/profile/jnimit/>



## Second International Indian Ocean Expedition (IIOE-2)

The first International Indian Ocean Expedition (IIOE) in the early sixties was truly the first of its kind multidisciplinary and multinational collaborative research expeditions that has left a great legacy. Indian Ocean has been an ignored ocean since then, barring a few exceptions during the US Joint Global Ocean Flux Study (JGOFS) program in the eighties that has done tremendous work in terms of carbon flux estimates but mainly limited in the Arabian Sea part of the Indian Ocean.

To resume its legacy and to meet the demand of interdisciplinary research, IIOE-2 was launched in December last year. IIOE-2 is a major global scientific program that engages the international scientific community in oceanographic and atmospheric research from coastal environments to the deep sea over the next five years. IIOE-2 aims to discover impact of ocean physics on our climate with special emphasis on marine ecosystems, which is fundamental for sustainability and expansion of the Indian Ocean's economy. Around 500 scientists from all over the world - the US to Australia, South Africa to Norway, as young as bachelor students and as old as in their late nineties came to participate in the IIOE-2 symposium that was hosted by the National Institute of Oceanography (NIO) Goa in December last year. Symposium was followed by the launch of the first expedition of IIOE-2 from Goa to Mauritius on the research vessel Sagar Nidhi.

IIOE-2 activities includes a significant focus on building the capacity of all the nations around the Indian Ocean to understand and apply observational for their own socio-economic requirements and decisions. Within the IIOE-2 symposium, a workshop was conducted by early career scientists during an afternoon. There was a lot of enthusiasm among these scientists, which has resulted in creating a network of more than 50 people (and counting on!), probably named as early career scientists network (ECSN). ECSN is presently finalizing meeting reports and creating their website, and more importantly planning their involvement in IIOE-2 in accordance with the overarching six scientific themes of the expedition. Interested young researchers may keep a watch on IIOE-2 website (<http://www.iioe-2.incois.gov.in>) for more updates.

We recognize that the Indian Ocean is a complex ocean because of seasonal reversing wind patterns that result in creating the monsoon. Monsoon is the source of important socio-economic resources. IIOE-2 research programs will result in an improved understanding of the ocean's physical and biological oceanography, and biogeochemical cycling of important nutrients.

## IIOE-2 Science Themes

Theme 1 - Human impacts

Theme 2 - Boundary current dynamics, upwelling variability and ecosystem impacts

Theme 3 - Monsoon variability and ecosystem response

Theme 4 - Circulation, climate variability and change

Theme 5 - Extreme events and their impacts on ecosystems and human populations

Theme 6 - Unique geological, physical, biogeochemical, and ecological features of the Indian Ocean



Credits: IIOE-2 website



## Invited collaboration by POGO alumni

### Ankita Misra

Indian Institute of Technology – Bombay (IIT-B), Mumbai, India  
e-mail [ankitamisra1987@gmail.com](mailto:ankitamisra1987@gmail.com)



I am a 2<sup>nd</sup> year doctoral student at the Indian Institute of Technology- Bombay (IIT-B), India with research interests in remote sensing (RS) and its application in coastal oceanography. At IIT-B, I am mostly involved in using optical as well as microwave remote sensing for a plethora of applications like bathymetry estimation, oil spill detection, shoreline change analysis, land-use/land-cover etc. My group has a very strong background in the field of coastal engineering and I bring in diversity with my expertise in the field of satellite oceanography which I apply to various projects pertaining to coastal management.

As an early career researcher, I always seek to improve my existing skill set and knowledge in this field by attending relevant workshops and conferences. Most recently, I was part of Pan-Ocean Remote Sensing Conference (aka PORSEC) 2016 conference at Fortaleza, Brazil from 3<sup>rd</sup> Nov – 11<sup>th</sup> Nov 2016, which was a very enriching experience both professionally and personally, for me. I had previously participated in PORSEC-2012 at Cochin, India and was particularly impressed by the technical sessions which were related to the various aspects of ocean remote sensing. Moreover, I had heard very positive reviews about the pre-conference tutorial (PCT) which was a very strong component of this conference. Extremely motivated, I submitted an abstract for an oral presentation and applied for the PCT and was selected for both.

For an Indian student, travelling as far as Brazil can be quite an arduous task, especially from the financial point of view. In my case, I was fortunate to secure travel support from Science and Engineering Research Board (SERB), Department of Science and Technology, Government of India, known as International Travel Support Scheme (ITS). This is a competitive travel grant which provides from the return airfare, registration fees and visa charges to Indian early career researchers who wish to attend conferences abroad. For my lodging and food, I was partially supported by my department at IIT-Bombay. I have to add that I was immensely helped by the conference organizers, especially Dr. Antonio Geraldo Ferreira (LABOMAR, UFC) to manage my Brazilian visa, which was quite a task in itself. So after a month of trying hard to secure enough funding and everything else, I finally made it to Fortaleza, Brazil to attend PORSEC 2016.

The capacity building student tutorial was held from November 3-7, 2016, wherein the students were provided exposure to various facets of ocean remote sensing such as application of ocean color studies to fisheries, to study extreme events, algal blooms etc; utilizing SAR and altimetry data for estimating wind and waves, oil spill detection and satellite data assimilation. The participants were also taught to access data from ERRDAP and Giovanni using ArcGIS and R scripts. At the end of the tutorial, all the students were asked to make a presentation of a small project carried out by us during this tutorial. This was an interesting experience for me as I got a chance to work on ocean color and use altimetry data to understand the effect of a typhoon event on chlorophyll. The PCT also gave us a chance to interact with senior scientists from USA, Canada, Brazil, France, Italy and Russia which was also very beneficial. The PCT was the main highlight of this conference for me, as I was particularly enthusiastic about learning and updating myself about the latest in ocean remote sensing. This was followed by the conference which had some very good sessions lined up, apart from a very interesting poster competition that was carried out in parallel to all the oral presentations.

As an aspiring researcher in this field, I particularly find PORSEC as a very good conference to attend, mainly because it specifically deals with the niche field of ocean remote sensing. I got an opportunity to discuss my research with established researchers from NOAA, IFREMER, and ESA to name a few, which I think is a golden opportunity for many students like me. Apart from this it's often hard to discount the fact that through these conferences you get a chance to visit some of the most exotic locales in the world, make new friends, and learn about new cultures.

I for once, love Brazil. The people are extremely warm, and pretty much make up for the language barrier caused due to the limited interaction in English. During the conference, we got a chance to visit some beaches around Fortaleza, taste their exquisite cuisine and witness their different dance forms. As an Indian student it was extremely fascinating to learn about a very different and open minded culture and be a part of it.

For me, PORSEC-2012 was a good experience, but PORSEC-2016 was a very rewarding experience both academically and culturally. The next PORSEC is proposed to happen in South Korea, I and my new Brazilian friends are extremely excited about it. Maybe we would meet again to have an exciting round of scientific exchange as well as a chance to make new friends and extend our fraternity of satellite oceanographers.



## Scientific events announcements

### **Maritime Spatial Planning, Ecosystem Approach and Supporting Information Systems** **Las Palmas de Gran Canaria, Spain** **24 - 28 April 2017**

This conference aims to bring together professionals, policy&decision makers, researchers and other stakeholders that are included in legal frameworks, to discuss issues, methodologies, best practices and finally integrate maritime with environmental planning using open data Infrastructures.

Deadline  
20 Jan 2017

Contact: [andrej.abramic@uplgc.es](mailto:andrej.abramic@uplgc.es)  
<http://ecoaqua.ulpgc.es/mapsis>

### **Blue Planet Symosium** **College Park, USA** **31 May – 2 June 2017**

The Symposium will serve as a forum for discussion of societal information needs resulting from the important role the oceans play in Earth's life-support system and the challenge of minimizing the impacts of human activities on the oceans while utilizing the resources of the oceans to meet our needs. The symposium will also be a platform for the participating communities to exchange information on their activities and identify potential pilot and prototype projects for Blue Planet to focus on in the coming years.

Registration opens  
January 2017

Contact: [info@oceansandsociety.org](mailto:info@oceansandsociety.org)  
<http://symposium.geoblueplanet.com/>

### **Ecosystem Studies of Subarctic and Arctic Seas - Open Science Meeting** **Tromsø, Norway** **11 – 15 June 2017**

This 3<sup>rd</sup> Open Science Meeting (OSM) is intended to attract an interdisciplinary group of scholars who will be prepared to discuss their research in the Subarctic, in both the North Atlantic and the North Pacific, and the Arctic Ocean. The title of the OSM is Moving in, out and across the Subarctic and Arctic marine ecosystems: shifting boundaries of water, ice, flora, fauna, people and institutions.

Deadline  
15 Jan 2017

Contact: [lisa.maddison@imr.no](mailto:lisa.maddison@imr.no)  
[http://www.imr.no/essas/international\\_conference\\_on\\_subarctic\\_and\\_arctic\\_science/en](http://www.imr.no/essas/international_conference_on_subarctic_and_arctic_science/en)

### **International Congress for Conservation Biology** **Cartagena, Colombia** **23 – 27 July 2017**

The 28<sup>th</sup> International Congress for Conservation Biology (ICCB 2017) will focus on Insights for sustaining life on Earth, responding to the need for conservation science to help create a better tomorrow for both biodiversity and people who depend upon it.

Deadline  
6 Feb 2017

Contact: [iccbprogram@conbio.org](mailto:iccbprogram@conbio.org)  
<http://conbio.org/mini-sites/iccb-2017/>

### **10th International Carbon Dioxide Conference** **Interlaken, Switzerland** **21 – 25 August 2017**

The 10th anniversary International Carbon Dioxide Conference will provide participants with an integrated, interdisciplinary view of the global carbon cycle and its perturbation by humans.

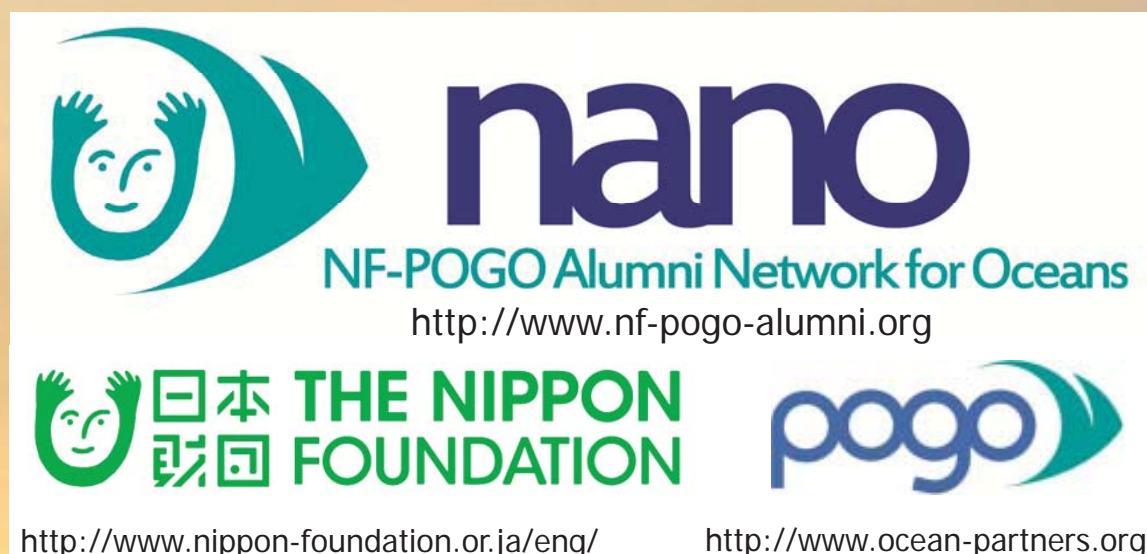
Deadline  
28 Feb 2017

Contact: [icdc10@oeschger.unibe.ch](mailto:icdc10@oeschger.unibe.ch)  
<http://www.icdc10.unibe.ch/>

**For more opportunities in Ocean Sciences visit <http://www.nf-pogo-alumni.org/Opportunities>**

**Have any opportunity you would like to announce here? Contact [lilian.krug@nf-pogo-alumni.org](mailto:lilian.krug@nf-pogo-alumni.org)**





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