Report on the 2013 POGO-SCOR Fellowship Programme

This year saw the thirteenth fellowship programme implemented using POGO funds with supplementary financial support from SCOR. The announcement was posted on 7 November 2012, with a closing date of 23 December 2012.

This year saw a total of 42 applications, which was fewer than the previous year but more than the number of applicants in 2011. This was possibly a result of a shorter application period. Applications were received from 22 countries.

Ten candidates were selected hail from around the world, namely Argentina, Brazil, China, Croatia, India, Nigeria and Tanzania. This year's host institutions included GEOMAR (Germany), LOCEAN (France), Plymouth Marine Laboratory (UK), University of East Anglia (UK), University of Maryland (US) and University of South Florida (US).

The applications were screened independently by a committee of four, with representation from SCOR and POGO. 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.

One successful candidate from India subsequently received an offer of a permanent research position, therefore he was no longer able to accept the POGO-SCOR visiting fellowship so soon into the new post. The POGO Executive decided that by the time that they were informed, it was too late by that stage to offer the fellowship to another candidate.

One candidate who was selected was from a country that since last year has moved on to the World Bank's list of high-income countries, therefore was unable to be supported by SCOR funds, however, following discussions between POGO Executives and SCOR, it was decided that the fellowship would still be offered to the applicant, but would be only funded by POGO.

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

All the people involved in each fellowship (the fellowship holder, the supervisor at the parent institute and the supervisor at the host institute) were requested to submit short reports at the end of the training period. A number of fellowships are yet to be completed and their reports are expected to be received by the end of the year, but those received so far have been enthusiastic. They indicate that these exchanges should lead to effective capacity building at the host institute and facilitate longer term collaborations between the institutes concerned. All conclude 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

Parent Institutions of Successful Candidates:

Argentina	Insituto Nacional de Investigación y Desarrollo Pesquero
Brazil	Federal University of Rio Grande
China	Xiamen University
Croatia	Institute of Oceanography and Fisheries
India	Nansen Environmental Research Centre
	National Institute of Oceanography (cancelled)
	Space Applications Centre (SAC) of Indian Space Research Organisation
Nigeria	Nigerian Institute for Oceanography and Marine Research
Russia	Russian State Hydrometeorological University
Tanzania	University of Dar Es Salaam

Host Institutions:

Germany	GEOMAR Helmholtz Centre for Ocean Research Kiel
UK	University of East Anglia
France	LOCEAN, Université Pierre et Marie Curie
UK	Plymouth Marine Laboratory (four different supervisors)
USA	University of South Florida
USA	University of Maryland Center for Environmental Science

Gender distribution
Female: 5
Male: 4

2013 Fellows

Smitha Ammamkuzhiyil – India

Parent supervisor and institution: Prof. Ravindranatha Menon – Nansen Environmental Research Centre, India.

Host supervisor and institution: Prof. Trevor Platt, Plymouth Marine Laboratory, UK.

Fellowship period: October 2013 (1 month)

Topic: Satellite data processing, interpretation and the modelling of primary production

Smitha Ammamkuzhiyil is currently working in an EU FP7 programme entitled "Indo-European Research Facilities for studies on marine ecosystem and climate in India (INDO-MARECLIM)", within which she is involved in the work package "Marine Ecosystem studies including algal blooms". It comprises the synergistic utilization of ocean color and other EO data to study eddy induced algal blooms and elucidate changes in productivity in relation to climate change by way of ecosystem models. Smitha is part of a team working to design a suitable marine ecosystem model for the coastal and open ocean waters of Indian EEZ to study variations in the marine productivity. The work also includes the modelling of ocean primary production using satellite and in situ data. The candidate needs to learn the processing of satellite data that will be required as input to ecosystem models and be introduced to primary productivity modelling.

Olubunm Nubi – Nigeria

Parent supervisor and institution: Dr Emmanuel Adegboyega Ajao – Nigerian Institute for Oceanography & Marine Research, Nigeria.

Host supervisor and institution: Prof Martin Visbeck – GEOMAR Helmholtz Centre for Ocean Research, Germany.

Fellowship period: 8th of April to 5th of July 2013 (3 months)

Topic: 1. Analysis and interpretation of Oceanic data (Temperature, Salinity, Dissolved Oxygen,Currents, Nutrients, Chlorophyll Fluorescence, etc.) for full description of Oceanic physical, chemical, and biological conditions, and their interconnectivity.

2. Modern / Advanced techniques for Ocean Observation / monitoring

Olubunm's present work focuses on the reassessment of the role of Equatorial UnderCurrent (EUC) in the Eastern Equatorial Atlantic upwelling systems using past and recent cruise data from various programs. He is also studying the influence of equatorial upwelling on nutrient variability and its implications on the biological productivity along 10W and 2E in the eastern equatorial Atlantic (EEA).

The outline:

•Study on nutrients and biological productivity in the EEA for years 2005, 2006, and 2007; (Onset and final phase situations) and Seasonal variability along 10W in June and December using EGEE data set.

•Study on nutrients distribution and biological productivity at different longitudes (10W and 2E);

•Inter-annual variability along 10W with respect to the onset of the equatorial upwelling periods between 2005 and 2007.

•Comparison with past data from the region for observable trends linkable to climate change.

Olubunm received training in:

- MATLAB on handling NetCDF data: Since most oceanographic data are available in netCDF file, he was extensively taken through the use of MATLAB, ODV, and FERRET in handling netCDF data.
- Accessing ARGO data via CORIOLIS and other websites.
- Analyses and interpretation of ARGO data using MATLAB and OCEAN DATA VIEW (ODV)
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The fellow also attended a week ISOS short course on "WRITING LAB" at Christian-Albrechts Universität zu Kiel, Germany. This gave him a better insight into writing and reviewing oceanographic reports/documents. He also attended seminars on SFB 754 projects (particularly on Oxygen Minimum Zone), and also accessed materials on proposals for the project. The fellow took up the opportunity to visit another laboratory within IFM-GEOMAR where the disciplines of chemical oceanography and biogeochemistry are the focus, and with the help of various experts in different fields of oceanography, Olubunm was able to achieve the main goals of the training in line with POGO-SCOR framework: Analysis and interpretation of Oceanic data and their interconnectivity and modern and advanced techniques in ocean observation / monitoring; and using his present research data, was able to produce a manuscript that has been sent out for reviews.

Olubunm also gave a presentation titled "Investigating the hypothesis of surface enrichment due to zonal advection in the eastern equatorial Atlantic" using the application of his newly acquired skills and working data.

Zhiyu Liu – China
Parent supervisor and institution: Dr Hao Wei – Tianjin University of Science and Technology, China.
Host supervisor and institution: Dr Marina Lévy - LOCEAN, Université Pierre et Marie Curie, France.
Fellowship period: December 2013 to January 2014 (3 months)
Topic: The Study of Internal Wave-Submesocale Eddy Interactions

Since 2004 when Zhiyu started his PhD project on internal waves and turbulent mixing in tidally energetic shelf seas, my research has been focusing on the study of oceanic internal waves. Recent studies suggest that the coupling between internal waves and mesoscale/submesoscale structures are vital to regional ocean dynamics as well as several biogeochemical processes. The South China Sea, where internal waves are among strongest of the world's oceans and mesoscale & submesoscale processes are very energetic, is apparently a perfect natural laboratory for studying the coupling of the two distinct types of processes. However, Zhiyu's research expertise so far is mainly on internal waves, experience on the study of mesoscale & submesoscale processes is largely lacking. The applicant is to learn the art of ocean dynamics study at submesoscale regime from Dr. Marina Lévy, a world leading scientist in the field.

Gunjan Motwani – India
Parent supervisor and institution: Ms Mini Raman – Space Applications Centre (SAC) of Indian Space Research Organisation, India.
Host supervisor and institution: Dr Ruth Airs, Plymouth Marine Laboratory, UK.
Fellowship period: 31st of May to 29th of August 2013 (3 months)
Topic: Phytoplankton pigment analysis by HPLC and its application in the

development of phytoplankton functional type (PFT) algorithms.

As a research fellow of SAC-Gujarat University collaborative project on measurement of inherent optical properties (IOP) of coastal-offshore waters of the Arabian Sea for development of satellite based inversion algorithms, Gunjan's main work involves:

1. Measurement of spectral absorption properties of particulate and dissolved organic matter of water samples obtained from various cruises using UV-VIS spectrophotometer.

2. Measurement of Chlorophyll-a concentration using standard protocols for ocean colour validation.

3. Collection, preservation and taxonomic identification of phytoplankton samples obtained from various cruises in the Arabian Sea.

4. Analysis of phytoplankton biodiversity, community structure and its spatial and temporal distribution in the Arabian Sea.

5. Analysis of spectral absorption characteristics of phytoplankton and its relation to phytoplankton composition and community structure in the Arabian Sea.

The candidate requires training in HPLC techniques for separation and quantification of various phytoplankton pigments from sea water samples, calibration of standard pigments, various methods using HPLC for the analysis of pigments, their merits and disadvantages and maintenance and calibration of HPLC system.

Marina Azaneu - Brazil

Parent supervisor and institution: Prof Rodrigo Kerr Duarte Pereira – Federal University of Rio Grande, Brazil.
Host supervisor and institution: Prof Karen HeywoodUniversity of East Anglia, UK.
Fellowship period: 23rd of July to 30th of September (2 months)
Topic: Using seagliders as an important tool for observing ocean shelf regions.

In Marina's master dissertation the applicant used a Southern Ocean in situ dataset to assess a reanalysis product in representing dense water masses. Part of the in situ data was obtained by the Brazilian Group of Oceanography of High Latitudes (GOAL). The applicant not only analysed the in situ data, but also contributed to obtaining and processing those data. The correct processing and management of hydrographic data is essential for the maintenance of datasets, and the seaglider is a new tool that will expand the GOAL data collection and improve the understanding of the Southern Ocean shelf areas . The study of Antarctic continental shelf regions is extremely important for better understanding of ocean processes, which is essential for the applicant's research.

The training will consist of analysis, processing and the management of data from seagliders obtained in the northwestern Weddell Sea under the GENTOO (Gliders: Excellent New Tools for Observing the Ocean) project, aiming the investigation of physical oceanographic processes occurring in the region. Moreover, a cruise is planned to recover/deploy gliders in the North Atlantic, where the applicant will have the opportunity to be trained in the field how to deal with the equipment. The training will reinforce the ongoing FURG-UEA collaboration, in which is planned to use seagliders to monitoring ocean process in the continental shelf and slope of Brazilian and Antarctic coast. Acquire knowledge of seaglider data processing and management will be an important key in the implementation of this new tool at FURG and highly complement the dataset and studies carried by the GOAL. The data that will be analysed during the training and the data that will be obtained using the training capabilities acquired will contribute to

understanding the Southern Ocean process and will possibly contribute to the dataset that will be evaluated in the applicant's PhD thesis.

Žarko Kovač – Croatia

Parent supervisor and institution: Dr Mira Morović – Institute of Oceanography and Fisheries, Croatia.
Host supervisor and institution: Dr Shubha Sathyendranath, Plymouth Marine Laboratory, UK.
Fellowship period: 4th of August – 4th of November (3 months)
Topic: Modeling primary production of the Adriatic Sea.

Zarko's research topic is modeling of marine primary production. This is a part of the national research project: "Cooscilations of atmosphere and the sea important for the ecosystem of the Adriatic Sea". The goal of the topic is formulating a dynamic biooptical model of primary production for the Adriatic Sea focusing on the primary production module. Phytoplankton interacion with light, nutrients and zooplankton will be considered, as they determine spatio-temporal dynamics of primary production. Spectral distribution of underwater solar radiation will be taken into account by the optical model and the link will be made to growth rates of phytoplankton. The topology of the ecosystem food web and it's structure, which determines the resulting time dynamics of the system will also be studied. The idea is to use mesured data of temperature, salinity, solar radiation, underwater light field, nutrients, phytoplankton and zooplankton biomass and to incorporate them into the dynamic model. This will be performed through optimization of the model parameters on the measured data. Further goals are to establish a connection with the hydrodynamical model and to make a coupled hydrodynamic and ecological model.

Ezequiel Cozzolino – Argentina

Parent supervisor and institution: Dr Vivian Lutz – Instituto Nacional de Investigación y Desarrolllo Pesquero, Argentina.
Host supervisor and institution: Prof Frank Müller-Karger – University of South Florida, USA.
Fellowship period: 1st of October to 30th Of November (2 months)
Topic: Advanced training in the processing of remote sensed oceanographic data (e.g., SST and chlorophyll concentration) for the Argentine Sea; for its use in oceanographic and fisheries studies.

Ezequiel is receiving some training with the aim of being incorporated to the Remote Sensing Laboratory at INIDEP. In this period I have learned some basics about the theory of obtaining oceanographic information through remote sensing, and its applications in fisheries research. I collaborate in different projects at my institute which require satellite information to complement fisheries evaluations. I have put together a first report on the kind of ocean remote sensing information available on public internet sites (e.g., NASA, NOAA, ESA, CONAE), providing a tutorial on how to easily download this information for researchers not experts in the subject. At this point it will be extremely valuable to enhance my knowledge about all the detailed steps involved to process raw satellite data to obtain refined products (e.g., SST, Chlorophyll concentration, fluorescence peak height).

The project/training should focus on acquiring the necessary knowledge to process full resolution (1.1 km) daily Level 1A data (sea surface temperature and reflectance) from

MODISAqua, and if possible from VIIRS, sensors. Learning how to use SeaDAS software in the most efficient way, getting acquainted with the versions of the algorithms used for the different properties (chlorophyll, PAR, etc.), as well as the best decisions regarding quality control of the pixels taking into consideration possible contaminations (flags due to clouds, negative radiance, sunglint, etc.), to arrive to final products. I would be interested in learning also about the most efficient way to calculate, in order to be incorporated automatically in a web-page, time series of these results. These will be useful to study climatologies and anomalies. These tools will be relevant for environmental studies for fisheries applications, as well as for the long-term monitoring of possible plankton changes at the Antares centers.
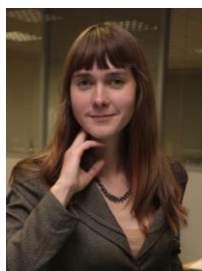
Dubrava Kirievskaya – Russia
Parent supervisor and institution: Prof Mikhail Shilin – Russian State Hydrometeorological University, Russia.
Host supervisor and institution: Dr Jacqueline Grebmeier – Chesapeake Biological Laboratory, USA.
Fellowship period: 25th of July to 26th of October 2013 (3 months)
Topic: The Chukchi Sea benthic data synthesis: contribute to the assessment of a potential vulnerability of the ecosystem.

Dubrava's PhD thesis is devoted to the assessment of vulnerability of biogeocenosis of the Chukchi Sea. Biogeocenosis is the main indicator of the ecosystem conditions as well as its vulnerability to climate change and anthropogenic influence (Pogrebov et.al, 1994). For completion of this research the applicant is collecting data from the Chukchi Sea such as biological data (taxonomy of benthos, abundance, biomass) and oceanological data (ocean temperature, currents, granulometric and geochemical compositions of the bottom sediments). Synthesis of benthic data and data of physical characteristics of the environment, (especially the sediments) allows us to make the assessment of vulnerability of biogeocenosis (to oil contaminations, particularly). Assessment of the potential vulnerability of such systems is very important for the future sustainable development of the area (e.g., the construction of the oil wells, shipping activities). The proposed assessment is based on special algorithms identified from the literature (WWF, 2011) and specific software being created with a GIS specialist that will map the current status of biogeocenosis of the Chukchi Sea and information about potential vulnerability of biogeocenosis. The main constraint of this research is a deficiency in access of available data sets, especially for the US part of the Chukchi Sea. The proposed collaboration with Dr. Grebmeier in the USA will allow access to both publically-available datasets in the US and ones being organized in her laboratory as part of a multi-institutional synthesis activities she is leading in this complex ecosystem. Drs. Jackie Grebmeier and Lee Cooper at CBL/UMCES (the host institution) have three decades of experience working in the Pacific Arctic and Chukchi Sea, including multiple US-Russian collaborative programs since the 1980s to the present. Interactions during my visit, both in the laboratory at CBL and on an Arctic cruise, will allow me to learn from their longterm efforts in the Chukchi Sea, be training in their laboratory benthic sorting and sediment analysis activities, and exchange data sets for the overall goal of this project.

Joeline Ezekiel – Tanzania
Parent supervisor and institution: Dr Yohana Shaghude – Institute of Marine Sciences, Zanzibar, Tanzania.
Host supervisor and institution: Dr Marie-Fanny Racault, Plymouth Marine Laboratory, UK.
Fellowship period: 29th of April to 29th of July 2013 (3 months)

Topic: Seasonal and spatial variations of phytoplankton in Rufiji Delta, Southern Tanzania, based on ocean colour remote-sensing and in-situ data.

Joeline is currently working on a dissertation under the title "Assessment of Seasonal and spatial variations of phytoplankton distribution and abundance off Rufiji Delta, southern coast of Tanzania by the use of satellite data". Her objectives are to upgrade her skills with respect of remote sensing data analysis and interpretation and on ecological modelling which eventually will allow the extrapolation of the data in relation to productivity of the ocean. Joeline would also like to further analyse the data using advanced analysis methods so as to reveal in detail the dynamics of phytoplankton in the ocean.

Joeline is interested in the study of phytoplankton productivity comparing in situ, remote sensing data and simulations. Phytoplankton play an important role to marine ecosystem in fixing atmospheric carbon and providing the primary food source for the zooplankton, together forming the base of the oceanic food chain. She would like to be trained in the following areas;
• Creating a seasonal record of ocean color products for my region including Chl-a and Total Suspended Matter(TSM).
• Comparing data from different satellites e.g. MODIS/MERIS
• Comparing different algorithms for Chl-a and Total Suspended Matter to choose an optimal product.
• Extracting information for comparison of in situ data