Partnership for Observation of the Global Oceans

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International Council for Science SCOR Scientific Committee on Oceanic Research

Report on the 2015 POGO-SCOR Fellowship Programme

This year saw the fifteenth fellowship programme implemented using POGO funds with supplementary financial support from SCOR. As the POGO Members had to be consulted on this year's budget expenditure at POGO's annual meeting at the end of January, the announcement was posted on 2 February 2015, with a closing date of 31 March 2015.

This year saw a total of 50 applications, which was slightly greater than the previous year. This was possibly a result of a wide distribution of the announcement for applications as the POGO network widens. Applications were received from 21 countries.

Since the budget from POGO was reduced this year, four candidates were selected and come from Chile, China, Ivory Coast and India. This year's host institutions included Georgia Institute of Technology (USA), Colorado Center for Astrodynamics Research (CCAR) - University of Colorado at Boulder (USA), NorthWest Research Associates (NWRA) in collaboration with NOAA/Pacific Marine Environmental Laboratory (PMEL) (USA) and Plymouth Marine Laboratory (UK).

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

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) have been requested to submit short reports at the end of the training period. Many of the fellowships are currently in progress or yet to be completed and their reports are expected to be received by the end of the year. From previous fellowships, both host and parents supervisors as well as the fellows themselves have indicated that these exchanges should lead to effective capacity building at the host institute and facilitate longer term collaborations between the institutes concerned. All have previously concluded

that the programme serves a useful purpose.

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

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

Demography of Fellowships

Parent Institutions:

Chile	University of Concepcion
China	South China Sea Institute of Oceanology (SCSIO), Chinese Academic of Sciences (CAS)
Ivory Coast	Centre Universitaire de Recherche et d'Application en Télédétection (CURAT) / Université Félix Houphouët-Boigny (Côte d'Ivoire)
India	Inter University Centre for Development of Marine Biotechnology, School of Marine Sciences, Cochin University of Science and Technology

Host Institutions:

USA	Georgia Institute of Technology
USA	Colorado Center for Astrodynamics Research (CCAR) - University of Colorado at Boulder
USA	NorthWest Research Associates (NWRA) in collaboration with NOAA/Pacific Marine Environmental Laboratory (PMEL)
UK	Plymouth Marine Laboratory

Gender distribution
Male: 4

2015 Fellows

Jose David Donoso – Chile

Parent supervisor and institution: Prof. Ali Belmadani – Department of Geophysics, University of Concepcion.
Host supervisor and institution: Prof. Emanuele Di Lorenzo – Georgia Institute of Technology.
Fellowship period: 22nd August-20th November 2015 (3 months)
Topic: Advanced numerical ocean modeling by means of high-performance computing.

David Donoso is currently working as a research assistant on the project “Dynamics of striations and eddies off central Chile” (www.chilejets.com) lead by Dr. Ali Belmadani, assistant professor at the Department of Geophysics (DGEO), University of Concepcion (UDEC), Chile. His duties are to process and analyze atmospheric and oceanographic data from the Eastern South Pacific (ESP) in order to get the forcing and initial conditions for a series of high-resolution numerical simulations using the Regional Ocean Modeling System (ROMS). While the control simulation that has been developed is comparable to the real ocean, future sensitivity experiments will reveal the contributions of various generation mechanisms for a new kind of oceanic currents called striations. The large number of sensitivity runs to be carried out requires an extensive computational resource. Thus, the training requirements are to acquire the necessary skills to configure, use and take advantage of high performance computing (HPC) applied to ROMS. The training was on data assimilation and the advanced use of ROMS in the framework of Partnership for an Advanced Computing Environment (PACE), which is a HPC environment located at the Georgia Institute of Technology (GATech), Atlanta, USA. It will benefit the fellow’s current research by using the central Chile ROMS model configuration as a benchmark to run and contrast the sensitivity experiments on the PACE cluster at GATech. In the medium-term future, the acquired skills will allow the fellow to implement data assimilation of ESP regional observations in ROMS at the National Laboratory for High Performance Computing (NLHPC), located at the Center for Mathematical Modeling (CMM), Universidad de Chile, Santiago, Chile. In addition to the benefits of this visit for the long-term research partnership between Dr. Di Lorenzo and Dr. Belmadani, it will also reinforce the institutional collaboration between GATech and UDEC.

Qingyang Sun – China

Parent supervisor and institution: Prof. Danling Tang – South China Sea Institute of Oceanology, Chinese Academic of Sciences.

Host supervisor and institution: Dr. Gad Levy – NorthWest Research Associates (NWRA) in collaboration with NOAA/Pacific Marine Environmental Laboratory (PMEL) (POC Dr. Nicholas Bond).

Fellowship period: 08th July to 24th September 2015 (2.5 months)

Topic: Data analysis, assimilation, and integration of Fixed-Point Time-Series Observations (floats, moorings and buyos) with new satellite ocean observations.

Qingyang Sun’s current work focuses on air-sea carbon dioxide (CO_2) interaction in response to typhoons and on the variability of the aerosol optical thickness (AOT) over the ocean due to monsoon evolution using ship-collected and satellite data. Basing his research on ship-collected and satellite datasets poses some problems, especially for typhoon research as the ship data can only be collected after the typhoon passage and the satellite data are then not available (due to cloud cover and precipitation). To extend this work beyond case studies to climate applications, globally, to model implementation, and for comparing oceanic changes between pre- and post-typhoon passage, sustained, long-time series ocean observations are needed and their integration with ship-collected and satellite data is required. Training in data analysis, assimilation, and integration of long time-series observations with ship-collected and with new satellite ocean observations is required for the fellow’s current work and future research.

The fellow received training in data acquisition, requirements and management of long-time series of Fixed-Point observations (floats, moorings and buoys), including their analysis, assimilation and integration with new satellite ocean observations, as well as the data management and model implementation aspects of such observations. The training provided a good opportunity to discuss these topics and learn from the expert scientists and engineers at

NWRA and PMEL, and to gain experience and develop Qingyang's understanding of the global observational data process and model implementation, which will help both the fellow and the parent institution tremendously in future work. The training will lead to more cooperation between SCSIO and NWRA/PMEL on (1) applying of the technology (especially for the pCO_2 mooring) in the observing system in SCSIO, (2) developing the oceanic CO_2 products in SCS through cooperation and integration of datasets with the Global Ocean Observing System.

Abaka Brice Hervé Mobio – Ivory Coast

Parent supervisor and institution: Prof. Kouadio Affian – Centre Universitaire de Recherche et d'Application en Télédétection (CURAT) / Université Félix Houphouët-Boigny (Côte d'Ivoire).

Host supervisor and institution: Prof. William J. Emery – Colorado Center for Astrodynamics Research (CCAR) - University of Colorado at Boulder.

Fellowship period: 1st September 2015 – 29th November 2015 (3 months)

Topic: Spatial and temporal monitoring of the ivorian continental shelf surface current fronts: Maximum Cross-Correlation (MCC) technique application

Brice Mobio is currently a researcher and lecturer in remote sensing and oceanography at CURAT at Université Félix Houphouët-Boigny (Cote d'Ivoire). Brice is a member of oceanography staff of CURAT. Since his thesis, he has dealt with estimation and mapping of ocean surface currents (Ivorian continental shelf). The Maximum Cross-Correlation (MCC) technique used to estimate ocean surface current has provided us with interesting results. However, better understanding and control of the Maximum Cross-Correlation (MCC) technique is needed to efficiently understand the Ivorian continental shelf surface current system. Training at Colorado Center for Astrodynamics Research (CCAR) will allow the fellow and his parent institute to reach that goal. W. Emery at CCAR originated this method and has considerable experience applying MCC to different types of satellite data (Sea Surface Temperature, Ocean Color, Synthetic Aperture Radar) to estimate sea surface currents, thus building capacity in that field.

During training, the fellow performed MCC program with better understanding in order to estimate more precisely the two currents of Ivorian continental shelf and locate more accurately the area where the two currents meet. He monitored those convergence areas spatially and temporarily, and carried out an analysis of temperature, chlorophyll, salinity and wind data on this area. This training allowed Brice to develop skills to conduct studies on variability of oceanic parameters, especially in areas where the eastward current meets the westward current. This study will then be extended to the entire Gulf of Guinea to allow regional study. At CCAR, skills were developed for modelling surface currents to predict and assist economic activities such as fisheries. CURAT and CCAR hope to establish collaboration with common research programmes. They will involve students and researchers exchange along with experience in ocean surface currents monitoring.

Deepulal Parenkat Mony – India

Parent supervisor and institution: Prof. Chandramohanakumar N.– Inter University Centre for Development of Marine Biotechnology,School of Marine Sciences, Cochin University of Science and Technology.

Host supervisor and institution: Dr. Mingxi Yang, Plymouth Marine Laboratory, UK.

Fellowship period: 15th September to 15th December 2015 (3 months)

Topic: How variability in atmospheric CO2 and CH4 concentrations impact the air-sea fluxes of these Greenhouse Gases in a coastal region.

Deepulal Parenkat Mony is currently working on the carbon sequestration potential and methane fluxes in the mangrove ecosystem and adjacent coast zones. The proposed work at PML focuses on the atmospheric variability of CO_2 and CH_4, and their impact on the air-sea fluxes in coastal regions. So the data validation and interpretation will help to develop skills and gives hands on experience with latest instruments installed at host institute.

Observations of CO_2 and CH_4 in the ocean and in the overlying atmosphere are important for understanding the carbon cycle. Globally, the open ocean is a net sink of atmospheric CO_2 and a small source of CH_4. Coastal regions are often influenced by estuarine inputs (which carry elevated dissolved CH_4 concentrations) and demonstrate large seasonality in biological productivity. CO_2 and CH_4 in the coastal atmosphere are influenced by terrestrial emissions and uptake as well as meteorology and dynamics of the marine boundary layer. These factors are expected to cause rapid changes in air-sea CO_2 and CH_4 fluxes in the coastal region. The proposed study focussed on the atmospheric variability of these two greenhouse gases and its impact on the air-sea fluxes. The main aims of study are as follows: 1) Evaluating of the performance of two state-of-the-art CO_2/CH_4 analysers installed at the field station of Penlee Point Atmospheric Observatory (PPAO); 2) Explaining the atmospheric variability of CO_2 and CH_4 with co-collected environmental parameters; 3) Estimating the air-sea fluxes of CO2 and CH4 in this coastal environment based on dissolved concentration measurements at the nearby L4 station. This training helped the fellow to understand the rapid changes in the air-sea fluxes of CO_2 and CH_4. After successful completion of training, with the help of Plymouth Marine Laboratory, the fellow plans to do more research on the air-sea fluxes of CO_2 and CH_4, which have not been studied in the south west coast of India.