POGO Partnership for Observation of the Global Oceans

Report on the 2011 POGO-SCOR Fellowship Programme

This year saw the eleventh fellowship programme implemented using POGO funds with supplementary financial support from SCOR. The announcement was posted on 9 March, with a closing date of 15 April. On 14 April the deadline was extended for another 2 weeks because the number of applications appeared to be very low. In fact, most of the applications were received on 15 April and only 8 were submitted during the extension period. This year saw a total of 37 applications, which was 15 more than the previous year and 11 more than in 2009. Applications were received from 21 countries (Argentina, Bangladesh, Brazil, China, Columbia, Croatia, Estonia, India, Indonesia, Kenya, Madagascar, Mexico, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Sri Lanka, Tanzania and Thailand).

The applications were screened independently by a committee of five, 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.

This year, ten fellowships were offered to oceanographers from developing countries and economies in transition. The host institutions include Australia, USA, UK and France. One successful candidate from Argentina had to cancel due to a change in job. Rather than finding a replacement fellow at short notice, the POGO Executive decided to award a travel grant for a scientist from a developing country to attend the SAHFOS-MBA International Phytoplankton Identification Workshop in July 2012.

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 reports are expected to be received by the end of January, 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.

Demography of Fellowships

Parent Institutions of Successful Candidates:

Argentina	Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP) -cancelled
Brazil	National Institute of Space Research (INPE)
Brazil	Federal University of Parana (UFPR)
Croatia	Institute for Oceanography and Fisheries
Estonia	Estonian Marine Institute
India	Central Institute of Fisheries Technology
India	Indian Space Application Centre (ISPRO)
India	National institute of Oceanography (NIO)
Peru	Instituto del Mar del Peru (IMARPE)
Sri Lanka	National Aquatic Resources Research and Development Agency (NARA)

Host Institutions:

Australia	Curtin University
France	Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS)
UK	British Oceanographic Data Centre (BODC) - Liverpool
UK	Plymouth Marine Laboratory (PML)
UK	University of Edinburgh
USA	Department of Earth & Ocean Science, Bowdoin College - Maine
USA	Naval Research Laboratory - Mississippi
USA	Atlantic Oceanographic and Meteorological Laboratory (NOAA-NOML/PHOD)
USA	Scripps Institution of Oceanography (SIO) -University of California San Diego
USA	University of Notre Dame - Indiana

Gender distribution
Female: 4 (1 cancelled)
Male: 6

2011 Fellows

Adolfo Chamorro – Peru

Parent supervisor and institution: Dr Jorge Tam, Instituto del Mar del Peru (IMARPE), Lima, Peru
Host supervisor and institution: Dr Katerina Goubanova, Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), Toulouse, France
Fellowship period: 26 Sept 2011 to 25 Nov 2011 (2 months)
Topic: Modelling response of coastal upwelling-favorable winds off Peru simulated by the WRF model to SST forcing.

Adolfo Chamorro graduated in Physics and is currently Professor at the National Engineering University of Peru, teaching Computational Physics and Computational Programming courses. He is participating in a joint project between IMARPE and the Institute of Research for Development (IRD) called "Dynamics of the Humboldt Current System". The training aimed to understand the response of upwelling-favorable winds to regional SST anomalies based on regional atmospheric modelling. The objective was to set up the configuration of the atmospheric model WRF for the region off Peru using idealised or realistic SST forcing, during contrasting periods of warm and cold SST anomalies. Dr Goubanova's team is one of the few groups in the world working on the WRF model, therefore the fellowship provided a unique opportunity for training.

Arvind Sahay – India

Parent supervisor and institution: Dr Prakash Chauhan, Indian Space Research Organisation, Ahmedabad, India
Host supervisor and institution: Dr Collin Roesler, Dept of Earth & Ocean Science, Bowdoin College Maine, USA
Fellowship period: 02 Nov 11 – 01 Feb 12 (3 months)
Topic: Techniques of Linear Matrix Inversion (LMI) for retrieving Inherent Optical Properties (IOPs) and its applications in identifying phytoplankton size classes.

Arvind Sahay has an MSc in Geophysics and a PhD in Marine Optics from the University of Gujarat, India. He has participated in over ten cruises, working on bio-optical measurements, and skills in ocean color data handling and programming.

The objectives of the training project were:

- Learning techniques of Linear Matrix Inversion (LMI) for retrieving IOPs using *in-situ* data collected by Satlantic underwater radiometer in the coastal waters of Arabian Sea off Veraval, Gujarat-India.
- Use of inversion algorithms for retrieving the seawater IOPs, the absorption and backscattering coefficients, from *in-situ* spectral radiance reflectance data.
- Implementation of the inversion algorithm to Oceansat-2 OCM data for retrieving multispectral seawater IOPs.
- Applying published IOP inversion models to the retrieved absorption or backscattering coefficients to quantify phytoplankton size classes.

Birgot Paavel – Estonia

Parent supervisor and institution: Dr Tiit Kutser, Estonian Marine Institute, Tallinn, Estonia

Host supervisor and institution: Dr Mervyn Lynch, Curtin University, Australia

Fellowship period: 3 Oct 11 – 3 Jan 12 (3 months)

Topic: Recognising phytoplankton functional groups in coastal and inland waters by means of optical signatures.

Birgot Paavel graduated in Physics at Tartu University and has a Masters in optical properties of the water of Lake Peipsi. In 2008 she completed her Ph.D. thesis on "Bio-optical properties of turbid lakes". The group lead by Prof. Lynch has made significant advances in remote sensing identification of phytoplankton functional groups. The training is to learn from the experience of this group in order to transfer the knowledge to the conditions of the Baltic Sea and semiboreal lakes. The aim is to develop algorithms for detecting blooms of harmful algae from their optical signatures.

Bruno Moreira – Brazil

Parent supervisor and institution: Dr Maurício Noernberg, Federal University of Parana, Curitiba, Brazil.

Host supervisor and institution: Dr Richard Gould, Naval Research Laboratory, Mississippi, USA

Fellowship period: 24 Sept 11 – 22 Dec 11 (3 months)

Topic: Recognising phytoplankton functional groups in coastal and inland waters by means of optical signatures.

Bruno Moreira completed his master's in ocean color radiometry using Aqua-MODIS images and its light-absorption coefficients. During this previous work remote sensing data were collect to the study area since the Aqua sallite data were avaiable to the public on May of 2002 to July of 2010.

The objectives of the training were:

- To partition the *adg* Aqua- MODIS product into light-absorption coefficients of sediment (*as*), detritus (*ad*) and gelbstoff (*ag*) through a new ocean color algorithm, developed by Gould and Arnone (2003).
- To estimate total suspended particulate matter (SPM) and partition it into particulate organic matter (POM) and particulate inorganic matter (PIM).
- Use all these parameters to implement the optical classification of Case 2 water masses, producing red-green-blue (RGB) orbital images and triangular diagrams.
- To collect *in situ* data, learning the filtration techniques.
- To learn satelllite image processing and analysis software (including the NRL Automated Processing System), and receive an introduction to NRL's hyperspectral sensor on board the International Space Station.

The knowledge gained will be applied to the study area which is the Paraguá's Estuarine Complex (PEC), Paraná, Brazil, during his PhD (2011-2015).

Damir Ivankovic – Croatia

Parent supervisor and institution: Dr Vlado Dadic, Institute for Oceanography and Fisheries, Split, Croatia

Host supervisor and institution: Dr Lesley Rickards, British Oceanographic Data Centre (BODC), UK

Fellowship period: 2 Aug 11 – 30 Aug 11 (1 month)

Topic: Oceanographic relational database – tools and management.

Damir Ivankovic has a degree in Computer Engineering from the University of Zagreb, Croatia, and 14 years' experience working with relational database systems and programming, 12 of which were at the Institute of Oceanography and Fisheries. He is currently working as head of the computer centre.

The aim of the training was to utilise the British Oceanographic Data Centre (BODC) expertise and experience to enable knowledge transfer in key aspects of oceanographic data management and dissemination including:

- Oracle RDBMS as the core of Oceanographic data management
- Fixed-Point Time-Series Observations in real time - automatic load and processing of data
- Database structure and procedures for managing oceanographic data (physical, chemical and biological data)
- Organisation and usage of taxonomic data and data vocabularies
- Data visualisations and web publishing
- Oceanographic and ecological models – interaction with database – tools and procedures
- Discuss many aspects of data management with BODC data scientists and IT specialists.

Madhu Vettiyatil – India

Parent supervisor and institution: Dr Meenakumari Bharatiamma, Central Institute of Fisheries Technology, Cochin, India

Host supervisor and institution: Dr Shubha Sathyendranath, Plymouth Marine Laboratory (PML), UK

Fellowship period: 06 Oct 11 – 23 Dec 11 (3 months)

Topic: Deriving ecological indicators from visible spectral radiometry and its application in Fisheries Resource Management.
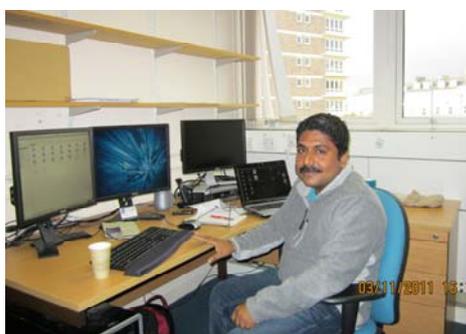
Madhu Vettiyattil has a Bachelors and Masters in Fisheries from the College of Fisheries, Kerala and Central Institute of Fisheries Education, Mumbai respectively. He recently completed his Ph.D. on "Bycatch generated by trawlers along Gujarat coast, India". Since 2004, he has been working with Fishing Technology Division of CIFT on the development of responsible fishing systems and their experimental evaluation along the Gujarat coast. He is also involved with the SAC and INCOIS for validation of PFZ and for the new projects which involves collection of in-situ data of physico-chemical parameters for developing case 2 algorithms. He is also working with Scientists from SAC on developing a model for secondary production estimates along the coastal waters off Gujarat and in-situ data on zooplankton abundance and concurrent physico-chemical parameters are being collected from

2010 as input for the model. Experience in using remotely sensed data for deriving ecological status of the area under study will help the works related to the project.

The aim of the training is the processing of open-access time-series databases of remotely sensed data for deriving important ecological indicators and correlating these with already studied fisheries with good catch database and designing of in-situ observations for validating these results. The experience gained can be used to implement these studies in the Indian scenario where in-situ data on catch statistics and other parameters affecting fish stocks are available.

Natalia Rudorff – Brazil
Parent supervisor and institution: Dr Milton Kampel, National Institute of Space Research, SP, Brazil
Host supervisor and institution: Dr Robert Frouin, University of California San Diego, USA
Fellowship period: 01 Nov 11 – 05 Feb 11
Topic: Variability in ocean-color properties during the R/V Melville MV1102 cruise.

Natalia Rudorff has a Masters degree on Geography from the Federal University of Santa Catarina (Brazil). Now she is undertaking a PhD at INPE since March 2009. She has been participating in the ANTARES Ubatuba Brazilian program, with in situ and satellite collections since 2009. In the beginning of 2011, she joined an oceanographic expedition through the Southern Atlantic Ocean on board the R/V Melville (SIO), where she was trained on radiometric measurements and collection of water samples for bio-optical analysis.

The fellowship was to provide training on data processing and ocean colour analysis using data from the cruise. The proposed activities were:
• Comparison of marine reflectance measured by different instruments and methods: above water SIMBADA and hyperspectral radiometer; underwater profilers (Satlantic HyperOCR, Biospherical PRR, and Ramses Trios); and modelled from measurements of particle backscattering and absorption by particles, detritus, and dissolved substances.
• Validation of satellite-derived products against in-situ measurements (AOT, Rrs, chlorophyll-a, backscattering and absorption coefficients, POC, PIC, PFTs).
• Analysis of the bio-optical variability along the cruise track and its implications for ocean-colour remote sensing.
• Analysis of the contribution of sub-micron particles to backscattering from fractionation experiments.

Priyantha Jinadasa – India
Parent supervisor and institution: Dr Kanpathipillai Arulananthan, National Aquatic Resources Research and Development Agency, Colombo, Sri Lanka
Host supervisor and institution: Dr Harindra Fernando, University of Notre Dame, Indiana, USA & Dr Jossif Lozovatsky, Shirshov Institute of Oceanology (Russia)
Fellowship period: 23 Aug 11 – 23 Nov 11 (3 months)
Topic: Management and data analysis of fixed-point time series observations (ADCP, ADV, and CTR7 moorings) in coastal ocean.

Priyantha Jinadasa has a Masters in Advanced Ocean Mapping and has won several awards, including the Professor P.G. Cooray Medal for the most outstanding young geoscientist in Sri

Lanka, 2004. He has attended various international training courses, including the NF-POGO Visiting Professorship in Sri Lanka (2006).

The fellowship involves training to manage extensive data sets of velocity, temperature, conductivity and microstructure measurements (processing, calibration, error analysis) and in the use of modern statistical and mapping capabilities to characterize the patterns of circulation (eddies, filaments, topographic wakes), tides, and internal waves. Long term mooring deployments off Sri Lanka are being planned, and the applicant will play a key role in their deployment and data analysis. A new bilateral collaboration between USA (University of Notre Dame) and Sri Lanka (National Aquatic Resources Agency, NARA) is now being formulated, focussing on the oceanographic component of Indian Monsoons in the Bay of Bengal and mesoscale dynamics in the Sri Lanka coastal zone.

Shital Godad – India

Parent supervisor and institution: Dr Divakar Naidu, National institute of Oceanography, Dona Paula, India
Host supervisor and institution: Dr Raja Ganeshram, University of Edinburgh, UK
Fellowship period: 02 Sept 11 – 29 Sept 11 (1 month)
Topic: Fixed-Point Time-Series Observations based on Ca/Mg on planktonic foraminifera sediment trap samples

Shital Godad is a post-graduate in Marine Chemistry, currently working as a Project Assistant and registered for a PhD at Goa University. She is using planktonic foraminifera as a proxy to study winter cooling, Mg/Ca variability and minor elements in the Arabian Sea.

The training is in the use of sophisticated instruments such as isotope ratio mass spectrometer and ICPMS to study calibration of Mg/Ca and temperature by using a time-series of planktonic foraminifera samples from sediment traps deployed during 1995 to 2000 in the central Bay of Bengal. Currently, no calibration equation for Mg/Ca and temperature for various planktic foraminifer species is available in the Indian Ocean. Hence SST estimates in the Indian Ocean have been using calibration equations derived from Atlantic or Pacific Oceans, but it is not clear at present whether these calibrations are valid for Indian Ocean in general and Bay of Bengal in particular, where salinity is highly variable. Therefore, it will be highly beneficial to establish a Mg/Ca and temperature algorithm unique to the Bay of Bengal for various species of planktic foraminifera.