

Partnership for Observation of the Global Ocean (POGO)

Report to SCOR Annual General Meeting 2020

Introduction

POGO was established in 1999 by a group of directors of marine research institutions who met to discuss ways in which they could work together more effectively in support of global oceanography, and in particular ocean observations. Members value POGO as a forum in which they can meet their peer-directors at least annually, in well-attended meetings, to discuss matters of common interest.

POGO's vision is to have by 2030, world-wide cooperation for a sustainable, state-of-the-art global ocean observing system that serves the needs of science and society.

POGO's mission is to:

1. Lead innovation and development of the crucial components of the ocean observing system.
2. Identify and contribute to the development of the key skills, capabilities and capacities needed to achieve the vision.
3. Work with governments, foundations and industry, to articulate the benefits to society and required funding to build and sustain the system.

More information on POGO can be found at www.ocean-partners.org.

Collaboration with SCOR

SCOR is the leading international organisation in the marine science arena, and POGO has always enjoyed good relations with it. Examples of joint activities include the following:

- POGO funds jointly with SCOR a Visiting Fellowship programme that enables early-career scientists from developing countries to study for up to three months in a major oceanographic institution of their choice. The programme is now in its 20th year, and a total of 172 fellowships have taken place to date (see statistics on gender, geography etc in Fig. 1). The programme is administered by the POGO Secretariat. Candidates are selected by a committee in which both POGO and SCOR are represented.
- SCOR also runs a Visiting Professorship modelled on the POGO one, and on several occasions the two programmes have complemented one another (for example, in Southern Africa).
- POGO and SCOR have collaborated in assessing capacity building in marine science at the global level and coordinate their respective capacity-building programmes. This was conducted initially through a series of workshops convened and funded by SCOR, and more recently, SCOR and POGO Secretariats have been working on impact evaluation questionnaires sent to past trainees and trainers of their respective and joint programmes. They have been analysing the data obtained for inclusion in joint publications on the POGO-SCOR fellowship and professorship programmes, the latter of which has been submitted to *Oceanography*.

- SCOR established, jointly with POGO, the International Quiet Ocean Experiment (IQOE). This is a programme aimed at the acoustic background in the ocean, including its anthropogenic and natural components. The Science Plan was published in 2015. The Sloan Foundation was instrumental in starting up this initiative, and in providing seed funding for coordination. POGO funded a Working Group to support the IQOE, which was instrumental in getting an Acoustic Essential Ocean Variable (EOV) accepted by GOOS. POGO has also earmarked funds for an Acoustic EOV Implementation Workshop, which was due to take place in 2020 (plans are being reviewed in light of COVID-19). POGO also encouraged its members to consider hosting an International Project Office (IPO) for the programme, which led to the Alfred Wegener Institute recruiting 2 data managers to support IQOE and its Data Working Group in 2019/20. A special issue of ECO Magazine on ocean sound was co-sponsored by SCOR and POGO in 2019, which featured an overview article on IQOE, as well as many contributions from the IQOE community.
- POGO contributed to the establishment, and continues to support the development of the SCOR-SCAR Southern Ocean Observing System (SOOS). For example, POGO provided funding to support a workshop on “Observing and understanding the ocean below the Antarctic sea ice and ice shelves” (OASIIS) in 2016.
- Both POGO and SCOR support the Global Alliance of Continuous Plankton Recorder Surveys (GACS). In 2019, POGO provided support for a Workshop on “eDNA Tools for the CPR Survey” and also for training 2 scientists (from South Africa and Brazil) on “Continuous Plankton Recorder silk analysis methods, from cutting the silk to statistical data analysis and interpretation”. Both events were held in Australia in Dec 2019.
- POGO has an interest in contributing to the activities planned under the International Indian Ocean Expedition 50th anniversary (IIOE-2), an initiative of SCOR and IOC.

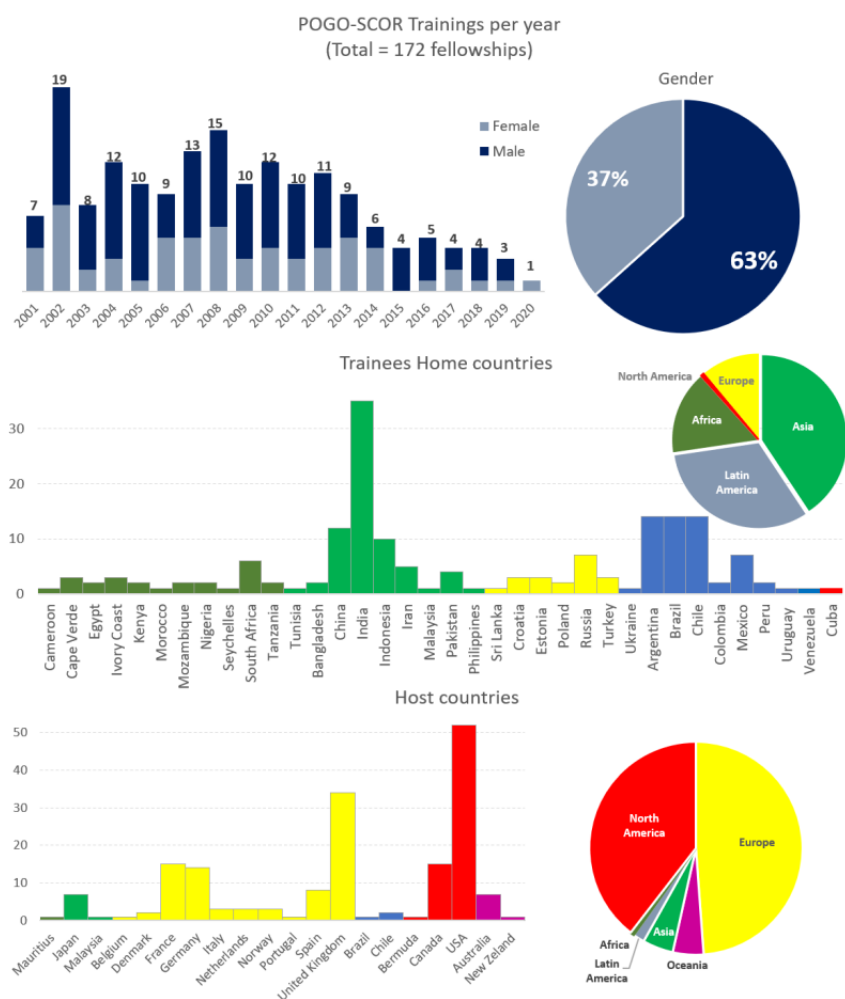


Fig. 1. Statistics relating to the POGO-SCOR Visiting Fellowships funded since 2001. Note: the 2020 figure does not include fellowships agreed for 2020/21 that have not yet taken place.

Current POGO activities

Capacity development

Over the last 20 years, POGO has provided training in ocean observations to over 900 early-career scientists, mostly from developing countries. The main capacity development programmes are:

- The Nippon Foundation-POGO Centre of Excellence, a ten-month graduate-level training programme in observational oceanography, hosted by the AWI since 2013, and previously hosted by BIOS in Bermuda (2008-2012); associated with this is a Regional Training Programme of 2-3 weeks duration, held annually (usually in a developing country);
- A shipboard training programme, which has its origins in the Atlantic Meridional Transect (AMT) Visiting Fellowship on-board a research cruise (initially co-funded by SCOR?); the programme, now funded by NF, provides opportunities for any cruise PI to offer a spare berth for training, and POGO provides a “match-making” service between potential fellows and suitable shipboard training opportunities; shipboard training cruises have also been funded through this programme,

providing hands-on training to over 20 students each, notably the North-South Atlantic Training transects (NoSoAT, 2015 and 2016)) and South-North Atlantic Training transect (SoNoAT, 2019), on-board the German ice-breaker *RV Polarstern*, and which also comprised a substantial shipboard outreach element involving schools in Brazil, Germany, Ireland, Japan and UK;

- The NF-POGO Alumni Network for Oceans (NANO), which is made up of all the alumni from past NF-POGO training programmes, and offers further support and opportunities for those alumni, ranging from the communication/sharing of training, conference and job opportunities via the NANO website and social media, to the opportunity to publish articles in, and serve on the Editorial Board of the NANO newsletter, to possible involvement in the collaborative NANO global projects;
- The POGO-SCOR Visiting Fellowship Programme (mentioned above);
- Training Initiatives organised by POGO members, who are successful in applying for partial funding from POGO (those selected for 2020/21 are listed below).

Projects and Working Groups

OpenMODs:

In 2017, POGO issued a call to its members for a collaborative ocean observing project to be funded to the level of 50K USD. The successful proposal was “Open Access Marine Observation Devices (OpenMODs). The goal of this project is to conceive an “easy-to-use” flexible and affordable oceanographic class of equipment and to prepare an international realization programme through a series of concerted workshops. The proposal is to start from the experiences and expertise brought in by the members of the consortium but to be underpinned and enhanced by interaction with potential users (to be found also among POGO Alumni) and private companies/consortia (e.g. 4H-JENA engineering GmbH) and organisations (e.g. UNESCO/ICTP) interested in this activity. The proposed approach will be cost-effective, flexible and modular and the equipment will be tailored to meet with diverse user needs and deployment purpose. Two workshops were held in 2018 and 2019 to assess the state-of-the-art in low-cost ocean observing technology, agree on priority applications and parameters that would need to be measured and on a few “pilot” locations for testing the system, engaging with local stakeholders and so on. Some preliminary ideas for the system design were also discussed, and a manuscript on the subject is being published. The next step is a workshop bringing together engineers and technology developers from various POGO member institutions to discuss further the design specifications and start working on some prototypes. Again, the workshop has been delayed by COVID-19.

Biological Observations WG:

This WG has set an agenda for collaboration, and has ensured that POGO is informed on the state of development of ocean biological observing systems. This group has worked on behalf of POGO to partner with other organizations to foster workshops and other activities and works to ensure that POGO is represented in international discussion of ocean biological observing capabilities and systems, with the aim of enabling the community to move from ocean biological observation to ecosystem understanding.

In May 2019 a workshop was held on Machine Learning and Artificial Intelligence (ML/AI) in Biological Oceanographic Observations, funded by the Lounsbery Foundation and hosted by the POGO member

institute, Flanders Marine Institute, to educate the POGO community about AI/ML as it is currently being applied in biological oceanography and jump start analysis efforts with new machine learning and artificial intelligence tools. This type of capacity building is critical as ML/AI techniques become more pervasive. Moreover, the WG views ML/AI approaches to data analysis as a necessary building block for future biological observations as hardware tools collect even larger data sets. The workshop covered state-of-the-art analysis techniques applied to acoustics, imaging and genomics, and included hands-on tutorials with a focus on data pre-processing and organisation. The workshop concluded with discussions on the direction of ocean observation in the age of big data. Plans are being discussed for replicating this workshop in the future, possibly in different regions, and also for sharing the tutorials via OceanTeacher. The WG held a 1-day meeting in Honolulu, Hawaii, after the OceanObs'19 conference, to discuss the outcomes of the ML/AI workshop and future directions for the WG and for POGO.

Some residual funds left over from the AI/ML workshop have been ear-marked for a workshop on eDNA, which was originally to be held jointly with SCOR. Since the workshop did not take place during the financial year for which SCOR had ear-marked the funds, and subsequently COVID-19 made it impossible to hold the workshop in-person in 2020, the workshop is now being held virtually in late 2020. The landscape for eDNA methods and applications has been evolving rapidly since POGO's Biological Observations Working Group original suggestion for a workshop on eDNA. On May 11 2020 an eDNA Workshop Science Advisory Group met to provide information and advice to the WG regarding how to frame a useful and successful workshop given the many activities related to eDNA that are taking place and proposed. Efforts related to using eDNA for both science and management fall into three general categories: development of measurement protocols, bioinformatics/taxonomy, and development of science/management strategies and products. The measurement category includes issues related to sampling, laboratory processing and sequencing of eDNA. The eDNA community has organized to synthesize ideas related to these methodological issues and a virtual workshop planned for late summer by the Alliance for Coastal Technologies in coordination with US IOOS and MBON. In addition, GLOMICON is undertaking an intercalibration-based study of methodological issues. By fall these efforts will have advanced the measurement issues regarding eDNA substantially. The bioinformatics/taxonomy category is developing from the activities of registries like GenBank and the efforts to get taxonomic information into databases like OBIS and INSTG. The third category is one that is very important to POGO. It focuses on how to generate useable products from eDNA studies (whether for science purposes or for management purposes) and how to use the results of these initial eDNA studies to design effective field campaigns (again, for both scientific or management purposes). For example, nations that are aware of the potential power of eDNA are asking scientists to develop field studies that will answer important societal questions related to water quality (e.g., HAB prediction), fishery management (e.g., new ways to conduct stock assessment), MPA management (establishing baselines and studies of change) and other topics. Scientists are excited about the potential of eDNA to answer longstanding questions related to biodiversity, climate impacts, etc. The Bio Obs WG proposed that POGO focus its eDNA workshop on the third category of issues, and this was agreed by the POGO Board in June 2020.

Other future directions for the POGO Bio Obs WG, and thus for POGO, include (1) inexpensive technologies for biological observing (also linked to OpenMODs topic above), (2) data archaeology for critical marine biodiversity observations, (3) interoperability of marine biological data, and (4) capacity development for biological observing.

Initiatives funded by POGO for 2020-21

Working Groups:

- WG on “Women in Science: ERIKA (Empowerment /Employment of female researchers in Key Assignments”, led by Karen Wiltshire, Alfred Wegener Institute for Polar and Marine Research, Germany.

Projects:

- Acquisition of Oceanographic Data for Sustainable Resources Management in the Gulf of Guinea, led by NIOMR, Nigeria;
- **B**uilding Capacity in **O**cean Acidifica**T**ion Moni**T**oring in the Gulf of Guine**A** (BIOTTA), led by the University of Ghana.

Training initiatives:

- Training on Subsurface Mooring Design, Recovery and Deployment, organised by IOCAS, China;
- Support for SOLAS Summer School.