

Partnership for Observation of the Global Oceans (POGO)

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1. Project Summary

International Cruise Information Database

The aim was to develop, update and maintain an international cruise information database to facilitate resource sharing and information exchange related to past and planned research cruises (see <http://www.pogo-oceancruises.org>). Benefits include:

- Helping scientists from different countries coordinate future funded research through information about research vessels of opportunity;
- Aiding in retrospective ability to find data in regions of interest;
- Enabling projects to conduct joint work and to fill empty berths;
- Creating capacity-building and training opportunities;
- Aiding in tracking and distributing data;
- Allowing cost sharing among institutions, projects, and nations;
- Enabling intercomparisons, intercalibrations, and validation among different data types (e.g. CTD vs. Argo, in situ vs. remote sensing)

Support of activities of the POGO Secretariat

The Partnership for Observation of the Global Oceans (POGO, <http://ocean-partners.org>) was founded in 1999 as a consortium of the major oceanographic institutions around the world, represented by their Directors. As stated at the founding of POGO, the objective of POGO is to make a major contribution to the attainment of sustained *in situ* observations of the global ocean that meet the requirements of international research and operational programs. As a means of attaining this objective, POGO:

- Initiates key actions to enable effective coordination, integration, and implementation of international ocean observing strategies;
- Establishes collective agreements among institutions to promote timely developments in ocean science;
- Develops and promotes coordinated views of ocean institutions concerning ocean observation and science to governments, international bodies, and others;
- Facilitates linkages between oceanographic research and operational institutions in relation to their goals, plans, and programs;
- Undertakes capacity building;
- Promotes sharing of facilities and infrastructure;
- Encourages interdisciplinary use of observing infrastructure;
- Conducts public outreach.

POGO provides a forum for Members to meet with their peers, and with senior officials of partner organisations, to discuss issues of mutual concern. It also serves as a credible voice for the marine science community, through its leadership role in the informal grouping Oceans United (<http://www.oceans-united.org>), and as an advocating body for the establishment of an integrated, global ocean observing system. The activities supported by NOAA include:

- Execution of the annual meetings of POGO;
- Selection process for the Visiting Fellowship and Professorship programmes; and
- Communication with the POGO community (newsletter and websites).

2. Scientific and Observing System Accomplishments

2.1. *International Cruise Information Database*

The POGO Cruise Information Database (www.pogo-oceancruises.org) was launched in May 2007 and is maintained by the British Oceanographic Data Centre (BODC). The website focuses on vessels greater than 60m in length and incorporates three major databases, including a research vessel directory, a cruise programme database and a database of Cruise Summary Reports. These are completed at the end of a cruise and describe the measurements made. They are quite widely used in Europe and Japan, but not in North America. They were developed by IOC's International Oceanographic Data and Information Exchange (IODE) programme.

The priorities for the remainder of 2013 and for 2014 are:

- Continue requesting cruise programmes and enter into database, including updates to 2013 programmes and 2014 (and beyond) cruise programmes
- Continue to work with operators to improve timeliness and content of cruise programme information
- Develop links with POGO members not currently supplying information, through POGO contacts and also ship operators (ISOM), making a special effort to contact and obtain information from Brazil, Canada, India, South Korea, and Russia
- Utilise spreadsheet input for preliminary Cruise Programme from CCHDO, IOCCP and GO-SHIP and other sources
- Improve links with other projects and programmes including Argo, OceanSITES, IMBER, SOLAS, GEOTRACES and EURO-BASIN
- Advertise to other organisation and request links on their web-sites (e.g. IOC/IODE, ISOM, ESOM, GOSIC, national ship operator sites, UNOLS, R2R, SeaDataNet)
- Develop links with JCOMMOPS (in particular the Ship Logistics Coordinator) possibly leading to exchange of information through Web Map Services (WMS)
- Routine maintenance of the system and web-site – including ensuring the research vessels database is kept up to date
- Synergy from working with EU EUROFLEETS-2 project, including:
Encourage more automatic input of cruise programme information by using software developed by SeaDataNet (Mikado). This allows one to map the fields of a database into the agreed standard fields. When this has been done once, it is a simple matter of running the software to generate the information in the required format, including using the standard codes/dictionaries. Simple checks can also be incorporated (e.g. checking that the end of the cruise is after the start). This should improve efficiency and remove the need for most of the manual checking and editing.

2.1.1. Cruise Programme Database

The cruise programme database currently includes details of about 2700 cruise programmes covering 60 research vessels from 20 countries. The table below indicates the content by year since 2007 when the project began. Since the start of the project cruise programmes have been regularly supplied by Australia, Belgium, France, Germany, Japan, Netherlands, Norway, Sweden, UK and USA (UNOLS including Bermuda); more recently Greece, Ireland, Italy, Portugal, Romania and Spain have provided input. Some cruise programmes have also been provided by China, Finland and Iceland. Work has continued with UNOLS to finalise a more automatic flow of cruise programme information (~150 cruises for large ocean going vessels, plus further regional cruises) which can be regularly updated during the year. A similar approach is being established for UK vessels. Requests for new information have also been sent to the following countries: Argentina, Bahamas, China, Ecuador, Malaysia, Mexico, NATO, New Zealand, Pakistan, Panama, Peru, Russia, South Africa, South Korea, Taiwan, Thailand, and Ukraine.

| Year | No. of programmes | No. of Countries | No. of vessels |
|------|-------------------|------------------|----------------|
| 2007 | 537 | 13 | 32 |
| 2008 | 494 | 13 | 40 |
| 2009 | 357 | 14 | 35 |
| 2010 | 392 | 14 | 32 |
| 2011 | 474 | 12 | 33 |
| 2012 | 450 | 14 | 37 |
| 2013 | 213 (+208 UNOLS) | 13 | 26 |
| 2014 | 22 | 2 | 5 |

Table 1. Number of cruise programmes received per year

Ship operators are provided with a blank spreadsheet and guidance notes to assist in completion of the spreadsheet. Wherever possible they are encouraged to extract from their own databases rather than re-type information. The ship operators who have replied are cooperative but, in general, do not have a lot of time to spend on this or have other more pressing priorities. The databases maintained by the various ship operators are all different and where information is provided on their websites it is often in the form of pdf files with variable amounts of detail, so this is not suitable for software (e.g. web services) to automatically access. We request that the SeaDataNet vocabularies are used in the spreadsheet, but even when the BODC vocabularies are listed, these are not often used – although this has improved for European contributors with the EUROFLEETS projects. This means that work has to be done at BODC translating the information into the appropriate codes.

Software has been developed to enable smooth flow of cruise programme information from UNOLS with little manual intervention (and include all their ships). Although this software is operational, a decision by the US Navy not to publically release information about the region to be visited by forthcoming cruises has hampered implementation. UNOLS information for 2013 has not been loaded to the database. It might be possible to acquire some geographic information if the ship name is not provided. This will be followed up with UNOLS.

When contacting information suppliers the importance of providing information to the Cruise Programme Database to better meet Argo needs has been underlined. For the Cruise Programme Database to be of maximum use to Argo the following is required: information available at least 6 months ahead (preferably 1 year), improved information about working area for the cruise (e.g. image of planned cruise track), name of PI/Chief Scientist and contact details. The name of the research vessel is not necessary at this time, and it is understood that the information may be preliminary, especially if it is provided a long time in advance. We are continuing to work with Argo, in particular with the international Argo Data Management Team and European Argo projects, to improve the Cruise Programme Database.

To improve the flow of information in a more automated way to the cruise programme database, the SeaDataNet Mikado software has been adapted and extended for use with cruise programme information. The Mikado software allows one to map the fields of a database (e.g. in this case that maintained by a ship operator) into the agreed standard fields. When this has been done

once, it is a relatively simple matter of running the software to generate the information in the required format (as XML files), including the use of the standard codes/dictionaries, which can be forwarded to BODC. Checks can also be incorporated (e.g. checking that the end of the cruise is after the start). This should improve efficiency and remove the need for most of the manual checking and editing.

The website includes an initial browse facility giving summary information on the left hand side of the web page; this shows the number of cruises undertaken by vessel name, country of operator, discipline (e.g. physical, chemical, biological), sea area and cruise status (planned, underway, completed). It also provides a quick link to search by geographic area (latitude/longitude range) and time period. A more advanced search facility, which allows searching by a combination of items is also available. Coloured dots indicate whether a cruise is planned, currently taking place, or has been completed. There is also an option to show if the cruise has been cancelled. This is updated automatically for the in progress and completed cruises.

One of the continuing problems encountered is the lack of geographic information – most operators will provide some general description of the area to be visited, but do not have latitude-longitude ranges available in their own systems. BODC add these in, but this is a time-consuming exercise. Some cases are reasonably straightforward, others may only have a text description (e.g. Porcupine Abyssal Plain, Off Omaezaki, Sagami Bay). The latitude/longitude range is important to the cruise programme database as it is the basis for the geographic searching, and this information is viewed on a map. Provision of good geographic information has been stressed when requesting information for the Cruise Programme Database.

The online Content Management System (CMS) for the cruise programme information, established in 2008, is in regular use by NIOZ, Netherlands, for *RV Pelagia* cruises, and in 2013, has been adopted by Germany for their 7 vessels. The CMS can be reached at the POGO International Cruise Information Database web-site (www.pogo-oceancruises.org) and selecting “Planned Cruise Programmes” and “Updating Cruise plans via the online Content Management System” or directly at: www.pogo-oceancruises.org/vu_cruises/welcome.asp

Until this year the system had been designed so that:

- Each operator can only manage its own records AND for a fixed set of vessels
- Where a vessel is shared and thus operated by two (or more) operators, each operator manages and sees only its own records (see e.g. Argos in Sweden)
- The CMS works on the basis that the account holder is also the operator - thus they cannot change the operator.

During 2013, the CMS was upgraded to allow more flexibility for updating and to allow a national contact rather than the ship operator to enter and update records. So now BSH, Germany, can add and update the cruise programmes for the 7 vessels for which it provides information even though they belong to different operators. This should also encourage more regular updating.

Regular checks are made on the GO-SHIP site to look for new information. GO-SHIP receives and disseminates information about forthcoming cruises from the International Ocean Carbon Coordination Project (IOCCP) and the Climate Variability and Predictability Program (CLIVAR). These details may be quite sparse, and will be initially marked preliminary, and updated with more detailed information as plans are confirmed, and care taken that duplicate entries are not created.

The EU-funded ‘EUROFLEETS: Towards an Alliance of European Research Fleets’ (www.eurofleets.eu) is a four year Integrated Infrastructure Initiative (I3) FP7 project running from September 2009-August 2013, with 24 partners and coordinated by Ifremer, France. One work package, WP2: Virtual research fleet platform, which is led by Maris (our partner for the POGO work) and including BODC, is based on the same databases (programmes, vessels, cruise summary reports) as the POGO system, and includes regional vessels as well as ocean-going ones. The system utilises and builds on the developments carried out for POGO, and POGO in turn will benefit from an enhanced system. In particular the EUROFLEETS project will develop more automatic harvesting from the operator databases and refresh the information at regular intervals using the SeaDataNet Mikado software (described above). These developments are beginning to improve information provision from the project partners. A follow-on EUROFLEETS project began in 2013, with an increased number of partners, which will continue to develop the virtual research fleet platform, including the cruise programme database for European research vessels.

2.1.2. Global Directory of Ocean-going Research Vessels

The Global Directory of Ocean-going Research Vessels has been operational since early July 2007. It has been developed by EurOcean with support of MARIS and it contains characteristics, owners and operators’ information for ocean-going research vessels. The content format conforms to the Oceanic database, operated by the University of Delaware. This global directory has been developed as a special version online research vessel directory for all European vessels previously developed by EurOcean, which can be found at the EurOcean portal (www.eurocean.org). It contains up-to-date information on ocean-going Research Vessels, operated worldwide, and is accessible from the www.pogo-oceancruises.org website.

The Directory software was upgraded to enable research vessel operators to maintain the vessel information themselves by an online Content Management System. During the second half of 2007 European operators were invited by EurOcean to validate and improve the entries for their vessels. Subsequently the identified operators of the non-European vessels have been invited to validate and update their entries, using the online Content Management System.

The Research Vessel Directory now contains facts and figures of approximately 170 Research Vessels. The Research Vessels are provided with a ship code, identifying a unique hull, through cooperation with ICES, US NODC and BODC. These ICES ship codes are used in each of the 3 databases in the full POGO system as linking pin. There are nine vessels in the database which are less than 60m in length of which Belgica is the shortest at 50.90m. Cruise programmes for vessels less than 60m unless have not been specifically requested unless it was deemed useful to do so (e.g. Bermuda with Atlantic Explorer at 51m), or the operator requested it (e.g. Finland, with Aranda at 59.80m, Belgium with Belgica).

2.1.3. Cruise Summary Reports database and Content Management System

The Cruise Summary Report (CSR) database has been developed by BSH/DOD, Germany. It focuses on details of completed cruises and provides a first level inventory of oceanographic measurements made and samples taken. The ROSCOP (Report of Observations/ Samples Collected by Oceanographic Programmes) was conceived by IOC/IODE in the late 1960s in order to provide an inventory for tracking oceanographic data collected on Research Vessels. The ROSCOP form was extensively revised in 1990, and was re-named the Cruise Summary Report (CSR). Most marine disciplines are represented in the CSR, including physical, chemical, and biological oceanography, fisheries, marine geology/geophysics, marine contamination/pollution, and marine meteorology. Traditionally, it is the Chief Scientist's obligation to submit a CSR to his/her National Oceanographic Data Centre (NODC) not later than two weeks after the cruise. In the past these have been periodically transmitted to the ICSU World Data Centres for Oceanography and to ICES.

The CSR activity gained new momentum in Europe during EU-funded marine data management projects EURONODIM and Sea-Search under the lead of BSH/DOD, Germany. The combined ICES and Sea-Search/SeaDataNet CSR database now comprises details of approximately 40,000 oceanographic research cruises primarily from Europe and North America, some information extending back over the last 40 years. This ongoing CSR database can be found *via* the POGO research cruises website at www.sea-search.net/roscop.

As part of the POGO-CoML-NOAA initiative BSH/DOD has developed a special version of the CSR database, that gives access to Cruise Summary Reports of all ocean-going vessels worldwide larger than 60 metres. It is directly accessible from the www.pogo-oceancruises.org website. There is an online Content Management System (CMS) to allow Chief Scientists and NODCs of countries outside Europe to prepare and deliver their Cruise Summary Reports. This is now available and linked into the International Research Cruise Information system. It can be found at: http://seadata.bsh.de/csr/online/pogo_index.html. The general login/password is csonline/jellyfish. A short User Guide is available.

Retrieval software has also been developed in line with that used for SeaDataNet, but with the POGO “look and feel” and limited to POGO ships. This allows searching of all cruise summary reports provided to BSH, including those supplied before the POGO system was developed, but restricted to the larger research vessels. Links have also been implemented between the cruise programme part of the system and the CSR database.

The Cruise Programme Database continues to be operational and contains approximately 2700 cruise programmes from 20 countries. Requests and reminders for 2013 cruise programmes are underway. Further links are being developed with Argo and Euro-Argo to ensure that the Cruise Programme Database meets their needs.

The Research Vessels Database continues to be operational and updates and amendments have been made during the year. Vessel operators have access to the database and are able to update details of their own vessels.

The Cruise Summary Report (CSR) database is operational for input of new CSRs and searching of existing ones. It is linked into the POGO Cruise Information site.

2.2. *POGO Secretariat Activities*

2.2.1. *Annual meetings of POGO*

POGO is a consortium of major oceanographic research institutions worldwide, typically represented at the Director level. POGO members have the opportunity to meet once a year during 3-day meetings hosted by a member institute. These meetings provide the opportunity for reporting on activities carried out during the previous year and discussions of strategic issues related to global ocean observations, and forward planning for POGO.

The 14th POGO Annual Meeting was hosted by the South African Consortium, consisting of the Marine Research Institute (MA-RE) of the University of Cape Town, the South African Earth Observation Network (SAEON), and the Applied Centre for Climate and Earth System Science (ACCESS), from 22 to 24 January 2013. Some 21 of the 39 POGO member institutions were represented, as well as representatives from other organisations such as the Group on Earth Observations (GEO) and the Intergovernmental Oceanographic Commission (IOC).

Action items from the meeting included:

- To continue to support and reinforce POGO's on-going capacity building activities, in particular the establishment of Phase 2 of the Nippon Foundation-POGO Centre of Excellence.
- To continue developing the Blue Planet Task of the Group on Earth Observations (GEO) including the Blue Planet White Paper and Book based on the Kick-Off Symposium.
- To support the development of the Southern Ocean Observing System (SOOS), the Global Alliance of CPR Surveys (GACS) and the International Quiet Ocean Experiment (IQOE).
- To put outreach data (for example, materials for use by schools) on the POGO website with seal of approval in respect of quality.
- To promote the collation, and improved accessibility, to existing time-series data, building on on-going activities, notably at the Alfred Wegener Institute and in OceanSITES, facilitated by a time-series data working group.



Figure 1. Participants at the 14th POGO Annual Meeting

2.2.2. Selection process for the Visiting Fellowship and Visiting Professorship programmes

Lack of trained personnel is considered to be a major obstacle to development of a global ocean observing system. Therefore, a central element of the POGO agenda is capacity building and training. POGO has developed an extensive array of training and education activities targeted primarily at scientists from developing countries and those with economies in transition. In partnership with the Scientific Committee on Oceanic Research (SCOR), POGO has developed a Visiting Fellowship programme on Oceanographic Observations (<http://ocean-partners.org/training-and-education/pogo-scor-fellowship>) under which young professionals from developing countries can spend up to three months training in their speciality at a major oceanographic institution. This programme has been very successful in providing training for scientists and students from developing countries as well as in developing collaborations between institutes.

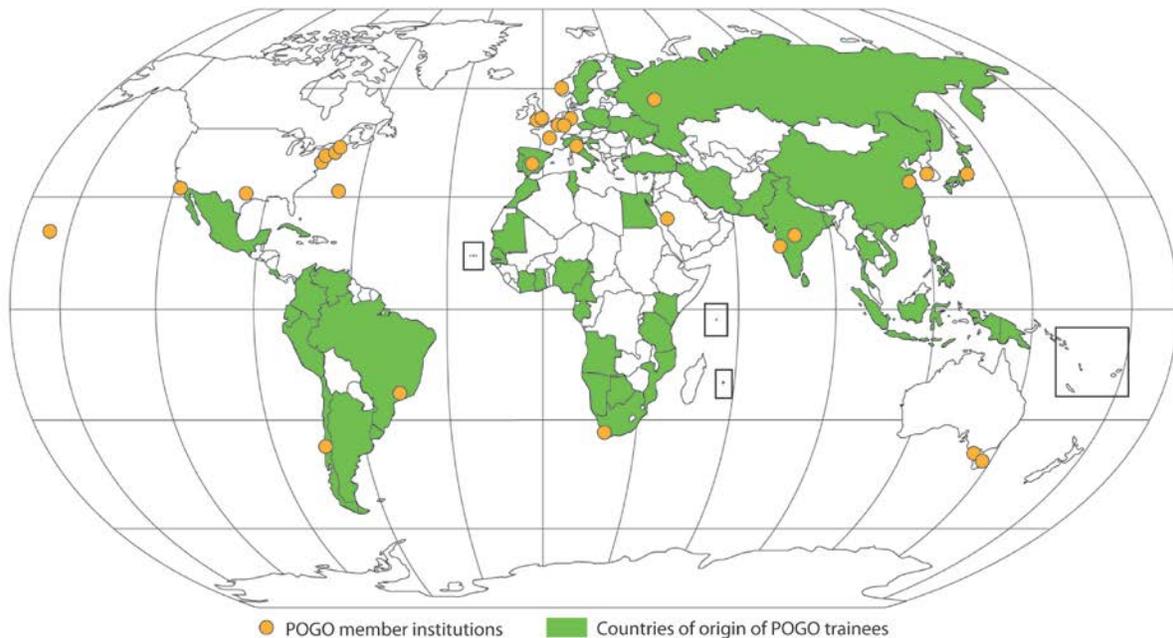


Figure 2. Map showing the countries of origin of trainees from the whole suite of POGO training programmes, as well as the locations of the POGO member institutes.

The fellowship programme has just completed its thirteenth year. This year saw a total of 42 applications from 22 countries, fewer than the previous year but more than the number of applicants in 2011, possibly as a result of the shorter application period.

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

Ten candidates were selected 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). See <http://ocean-partners.org/index.php/training-and-education/pogo-scor-fellowship/fellowships-2013> for further information.

In addition, a new POGO research cruise fellowship was initiated in 2013 in partnership with the EU project GreenSeas, and the Porcupine Abyssal Plain (PAP) Site cruise programme. Two

fellows (from Columbia and Turkey) were selected to participate in the PAP cruise in May/June 2013, spending approximately one month prior to the cruise receiving training and preparing for the cruise at the host institutes (in Denmark and UK, respectively), and one month after the cruise processing samples and analysing the data with their host supervisors. See <http://ocean-partners.org/index.php/training-and-education/research-cruise-training/pap-fellowships> for further information.

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 December, but those received so far have been very 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 very useful purpose.

POGO also runs a Visiting Professorship Programme (<http://ocean-partners.org/index.php/training-and-education/pogo-visiting-professorship>), under which marine scientists of international standing teach at marine institutions in the developing world for periods of up to three months. This exposes young scientists, particularly from developing countries, to the best oceanographers world-wide and facilitates the formation of professional contacts, invaluable in the development of their scientific careers.

Six applications were received for the POGO Visiting Professorship programme. The successful candidate was Dr Hans Verheye (Department of Environmental Affairs, South Africa) who will host Dr Declan Schroeder (Marine Biological Association, UK), to conduct a training course on “Molecular Mining of the Continuous Plankton Recorder and other archived datasets” in November-December 2013.

2.2.3. Communications with the POGO community (newsletter and websites)

The POGO Secretariat produced its quarterly newsletter in October 2012, January, April and July 2013. The four- to eight-page electronic newsletter is distributed to the POGO members and wider community, and includes updates on POGO activities and news from the POGO members. The aim is to keep the members informed between annual meetings of progress made on issues that were discussed during the meetings, such as participation in the Group on Earth Observations (GEO), outreach, capacity building, partner programmes and so on. Another objective is to inform the wider community, and in particular funding agencies and scientists within the POGO member institutions, of POGO’s achievements. These newsletters are always very well received. Occasionally, the newsletters are printed for distribution at special events.

The POGO Secretariat maintains the POGO website (www.ocean-partners.org). This involves posting information on POGO meetings, announcements, news from the members, job vacancies, a conference/meeting calendar, and training opportunities, to name but a few. The Secretariat has created and maintains a number of other websites for associated activities, namely the NF-POGO Alumni Network for Oceans (NANO) website (www.nf-pogo-alumni.org), the Oceans United website (www.oceans-united.org) and the new Blue Planet website (www.oceansandsociety.org).

3. Outreach and Education

POGO is very active in the areas of public outreach and training and education. Capacity building is a central element of POGO's agenda (see previous section), with a suite of programmes that have so far trained around 500 scientists from over 65 countries. Public outreach is conducted through participation in international exhibitions, including GEO Ministerial Summits (Cape Town 2007, Beijing 2010 and Geneva 2014), United Nations Climate Change Conferences (e.g. Doha in 2012), and World Expo (e.g. Yeosu, Korea in 2012). POGO is also becoming involved in enhancing "Ocean Literacy" through the educational system, and participated in the First Conference on Ocean Literacy in Europe, held in Bruges in October 2012, and the Second Conference in Plymouth in September 2013. POGO regularly issues press releases and "declarations" in conjunction with major events such as GEO Summits and POGO annual meetings to raise public awareness of the importance and societal relevance of ocean observations (see <http://ocean-partners.org/index.php/products/pogo-documents>). POGO published an article in the Research Europe publication *International Innovation Environment* in late 2012 (Platt & Seeyave, 2012). The POGO website also includes links to on-line educational resources for the general public that can be used for example by teachers (<http://ocean-partners.org/index.php/outreach>).

4. Publications and Reports

4.1. *Publications by Principal Investigators*

- Published
Platt, T., and S. Seeyave, 2012. Partnership for Observation of the Global Oceans. *International Innovation Environment*, Dec 2012, <http://www.research-europe.com/index.php/2013/01/dr-trevor-platt-executive-director-and-dr-sophie-seeyave-scientific-coordinator-partnership-for-observation-of-the-global-oceans/>.

4.2. *Other Relevant Publications*

n/a