DRAFT MINUTES OF POGO-11
MOSCOW, RUSSIA
January 26 to 28, 2010

Tuesday, 26 January

The POGO Executive Committee met at Shirshov Institute of Oceanology in the morning to finalise plans for the POGO-11 plenary meeting. At the same time, the other POGO-11 participants made a guided tour of the Shirshov Institute and attended a series of presentations on ocean research carried by various divisions of the Shirshov Institute. After lunch, the participants assembled at Hotel Sputnik for the start of the meeting proper.

Inauguration: Chair Robert Nigmatulin

Prof. Robert Nigmatulin welcomed all participants to Moscow. He inaugurated the meeting with a few words about the prestigious Shirshov Institute of Oceanography, which was hosting the meeting. He introduced Sergei Shapovalov, who provided logistical information to the participants.

Dr. Suyehiro, Chairman of POGO asked all participants to introduce themselves. On behalf of POGO and other participants, Dr. Suyehiro thanked Dr. Nigmatulin, Dr. Shapovalov and colleagues from the Shirshov Institute for hosting the meeting. He was pleased by the number of attendees. He provided a brief history of POGO. The organisation has been actively interacting with IOC, GEO and other organisations for many years, and has always had a strong programme in capacity building. During the 10-year life span of POGO, the general public had become more sensitive to ocean-related issues, and should be more receptive to the POGO message. The Oceans and the Earth below it were so under-sampled that unexpected phenomena continue to be discovered. He gave two examples related to volcanic activities underwater. Such discoveries can be made only from studies of the ocean floor, and not by any other means. Thus, POGO and its members have a heavy load of observation and advocacy.

Approval of the Minutes of the Tenth Meeting of POGO: The minutes of POGO-10, which were available beforehand from the Background Documents and the POGO website, were approved without amendments by consensus.

Adoption of Agenda: Kiyoshi Suyehiro informed the participants of last-minute changes to the agenda.

Action Items from POGO-10: A table of action items from POGO-10 and current status of those actions had been distributed. Dr. Suyehiro urged participants to approach him or Dr. Trevor Platt for any clarifications or questions regarding the status of the action items.

Infrastructure for Ocean Observations: Chair Mike Purdy

Time Series – OceanSITES: Dr. Tony Knap delivered the presentation prepared by Uwe Send, who could not attend the meeting. The OceanSITES group now has a modest secretariat, which has been a great help. The group, however, needs additional funds. The MOIN network (i.e. Minimalist OceanSITES Interdisciplinary Network) has been established. At OceanObs'09, a number points relevant to OceanSiTES were highlighted: (1) a need to focus on applications that society cares about; (2) usefulness of sites to reduce model errors; (3) a need for global coverage with a set of key variables observed; (4) the importance of making data and information available in a timely and free fashion; (5) a need for co-located observations; (6) the essential but difficult need to maintain funding over long periods of time.

Proposed actions: POGO help was requested through the following actions: (1) facilitate sharing of ships for servicing mooring sites; (2) advocate MOIN network of core/backbone multidisciplinary sites; (3) encourage other biogeochemical, ecosystem, fisheries, CoML communities to collaborate actively and share resources with OceanSITES; (4) encourage national funding contributions to OceanSITES project office (via JCOMM or IOC).

Karen Wiltshire enquired about free access to data, noting that AWI was also involved in making time-series measurements. Tony Knap responded that free and timely access to data was essential to ensure long-term viability of the data produced by the sites. Dr. Wiltshire noted that at present there was no single repository from where data regarding time-series sites from various sites could be accessed. Jan Seys suggested the use of NODCs in this context. Steve de Mora pointed out that there were three aspects to the work: collect data, archive data, and use data. It was relatively easy to get funding for the first, and may be also for the second, but it was difficult to get funding for the third aspect. Antoine Dosdat emphasised the need for POGO to act on the important point of enhancing data accessibility. Boram Lee noted that the ICID (International Cruise Information Database) was an important resource for the entire ocean observing community, and that IOC was promoting its use broadly. Regarding the OceanSITES project office that belongs to the JCOMMOPS, she noted that there was an urgent need to identify new resources, to supplement the contributions to JCOMMOPS through IOC and WMO, so as to maintain the technical support for OceanSITES, as the currently dedicated funds from NOAA to OceanSITES will discontinue soon.

Ocean Observatories Initiative in the USA: Dr. Susan Avery reported that the OOI had finally been initiated, after a long period of gestation and planning. She described OOI as a system of systems that will document for 25-30 years air-sea, water column and seafloor processes, across full ocean depths, using the best technical solutions. The rationale was to gain insight previously constrained by the lack of temporal resolution across various spatial scales into ocean processes. OOI would provide a framework to support sustained, high-resolution measurements. A number of science themes and foci have been identified, including: (a) ocean-atmosphere exchange; (b) climate variability,

ocean circulation, and ecosystems; (c) turbulent mixing and biophysical interactions; (d) coastal ocean dynamics and ecosystems; (e) fluid-rock interactions and the sub-seafloor biosphere; (f) plate-scale, ocean geodynamics; (g) ocean ecosystem health; (h) climate change; (i) carbon cycling; (j) ocean acidification. The design elements included four global sites, three regional cabled sites in the NE Pacific, two coastal arrays in the Mid-Atlantic and Pacific North West. Each scale incorporated mobile assets. The cyber infrastructure allowed for adaptive sampling, custom observatory view, collaborative analysis and interfaced with education users. Dr Avery explained the structure of the coastal and global scale nodes. The OOI assets off Pacific North West coast were unique. Cables provided high power and bandwidth to instrumented nodes. Core sensors included engineering, physical, biological, chemical, and geochemical/geological. Sensors were distributed over the entire water column, and included surface and bottom observations. The installations were complex and the first data streams were expected to flow in 2013-14. International collaboration was solicited. Schedule required cruises to four global sites every 12 months, which may not be feasible through US resources alone. Coordination and integration were provided by Ocean Leadership. url: http://ooi.oceanleadership.org

Peter Herzig asked if OOI incorporated Neptune and ORION, and Dr. Avery responded in the positive. The total funding plus operational maintenance was $400 Million over 10 years plus $300 Million for construction. Dr Dosdat asked about the source of funding. Dr Avery declared that it was NSF long-term commitment. The construction money was new money, associated with American stimulus funding, a new line item in NSF. Dr. Suyehiro invited collaboration with IODP and enquired about the necessity to visit the sites so frequently (i.e. every 12 months)? It was related to operational issues such as anti-fouling. Bob Weller was concerned about servicing stations in the Southern Hemisphere. Collaboration with partners in the Southern Hemisphere was desirable. Catherine Constable asked for the use of OOI data. The applications of the data were going to be driven by proposals submitted to NSF from the scientific community to use the data. Science information workshops were planned to increase awareness of the capabilities of the observatories and to solicit promote applications of the data.

Time Series – Station M: Dr. Einar Svendsen spoke about Station M, located off Norway, which was in a key location from an oceanographic perspective. Data have been collected at this site since 1948. The site developed into a multi-disciplinary site. Temperature time series data show pronounced increase in temperature since 1990. There was a corresponding decrease in dissolved oxygen. The CO_2 data collected at the site since 1981 showed similar trend with the Hawaii time-series. Since 2000, DIC showed much variability in near-surface water, which is also observed in the pH. Some of the ship-based observations were now replaced by observations from a mooring divided into two rigs (Regionally Important Geological and Geomorphological Sites) for deep-ocean and for near-surface observations. The Norwegian Sea Deep Water temperature has been increasing by 0.01°C per year since 1990 and will soon reach the temperature of the Arctic Ocean Deep Water. Sustained funding for maintaining the site was an unsolved problem.

Karen Wiltshire pointed out that *Polarstern* went to the site frequently, and there was scope for collaboration here. Trevor Platt enquired about the level of funding that had been refused? Dr Svendsen declared the weather ship cost for running proposal was half. Antoine Dosdat asked if NRC supported the construction of the site? Dr Svendsen answered positively.

PML Observing Programme: Stephen de Mora spoke about the PML contributions to global observing systems from near-shore to the ocean basin. He introduced the Western Channel Observatory (WCO) which was initiated in 1903, long before PML was established, thanks to the Marine Biological Association. He and Andrew Willmott had grave concerns about continuing funding for time-series observations. There was a 3-4 window in which funding had to be secured. He welcomed help and partnership from POGO members. The Atlantic Meridional Transect (AMT) on the other hand, ran from 50°N to 50°S, and started in 1995. Both are coordinated by PML, offering unique datasets and collaborative opportunities to the international community. The work was achieved in close partnership with other institutions from the UK such as SAFOS, MBA and NOCS. Historically, there has been a context of international collaboration in implementing the observations. AMT has delivered improved characterisation of oceanic provinces, and other scientific areas. He provided some examples of excellent scientific results from AMT cruises. WCO sampled the boundary region between coastal and open shelf. It straddled bio-geographical provinces. WCO can address multiple issues, from environmental change to operational oceanography, using multiple techniques and platforms. These observations have also led to many excellent scientific papers. The observations were complemented by modelling exercises. These observing programmes contribute to science, policy, and to socio-economics.

Shelf Seas Observing Systems: Andrew Willmott spoke about maintaining sustained shelf sea observing systems in a recessionary climate. In the current financial climate in the UK, it was anticipated that science budget might be cut in the near future. What Andrew was looking for from POGO or PICO (Panel for Integrated Coastal Observations, technical subcommittee of the GOOS Scientific Steering Committee) was international endorsement for sustained observations of key variables in the coastal waters of England. It was important to emphasise that these observations formed part of an integrated global observation system. Coastal shelf sea marine science has come of age. The deep ocean marine science was carried out mainly with a science pull. Coastal and shelf sea marine science has a user pull. EU maritime strategy directive called for shelf seas to be on the path of “good environmental status”. UK government had acknowledged the importance of shelf seas marine science, and was about to launch UK Marine Science Strategy. The Marine Management Organisation was setup in the UK as a one-stop licensing authority. Issues under discussion included marine renewable energy, aggregates, hydrocarbons, fisheries, marine conservation zones and the general “quality of life”. The UK marine Science Strategy had three high-level overarching themes: (1) understanding how marine ecosystem functions; (2) responding to climate change; and (3) sustaining and increasing ecosystem benefits. It was necessary to make the process for selecting long-term observation systems for funding more transparent and to provide secure, longer-term and cross-cutting funding for these data sets. POL has

been maintaining the Irish Sea Coastal Observatory for the last seven years. SAMS (Scottish Association for Marine Science) maintained an observatory off western Scotland. PML maintained an observatory off western Channel. NOCS provided further European Western Shelf monitoring with the Ferry boxes. A single web portal for accessing data from all three UK coastal observatories was being developed. It was necessary to develop a mechanism to establish "sentinel" sites for coastal observations. He asked POGO and IOC to rise to the challenge. He mentioned analogy with the IPY initiative.

Mike Meredith mentioned the need to identify gaps in the elements of the observing systems that had been proposed. Andrew Willmott noted that in a climate of financial constraint, it was important to consider scaling down in a systematic, planned and coordinated way, rather than in an ad hoc manner. Antoine Dosdat pointed out to the need to be professional and thoughtful about how the endorsements were made. Steve de Mora noted that GOOS relied on developed countries to transfer capacity to developing countries. If such capacity were not maintained in the developed countries, then there would be no capacity to transfer. The working group that was constituted after OceanObs'09 could be requested to make recommendations on such issues as endorsement and prioritisation.

Summary of session on Infrastructure for Ocean Observations: Chair Mike Purdy thanked for all presentation. In summarising, Mike brought out four themes that were common to presentations: sharing of resources (e.g., ships), cyber infrastructure, advocacy for sustained ocean observations and finally, the issue of international endorsement of observatory activities. Endorsement had to be against high standards to have credibility.

Andrew Willmott pointed out that one of the major challenges in ICID (International Cruise Information Database) was keeping the information up to date. Antoine Dodsat drew attention to the European initiative which took ship-sharing beyond sharing of information to sharing resources and swapping time. NSF also had a similar model for sharing ship time. Antoine Dodsat also suggested that POGO members could consider sharing investments planned for in the future.

Issues such as data access, cyber infrastructure and data interoperability were important. In this context, Boram Lee mentioned the Ocean Data Portal maintained by IOC/IODE (International Oceanographic Data and Information Exchange). She urged that this portal be used more extensively, and noted that any input from or interaction with POGO would be welcomed. Karen Wiltshire emphasised the importance of the database including coastal and shelf waters and ice.

POGO can get the word out broadly on the importance of ocean observations, and this could be achieved through the POGO website. Some ideas were needed on how this could be achieved. Iconic images, for example, of the kind showed by Einar Svendsen, showing the value of sustained observations, could be highlighted on the front page of the POGO website. Carlo Heip noted the need for taking advocacy beyond websites, to

brochures and articles with a broad public outreach. Howard Roe spoke about the success of POGO advocacy at the Cape Town Ministerial Summit of GEO. Trevor Platt noted that another opportunity was coming up in November 2010, at the GEO ministerial in China. Jan Seys and Trevor Platt urged members to contribute pieces to the POGO website. Jan Seys reminded that the importance of advocacy was discussed at all POGO meetings, and that it was important to act on it. He recommended that a press release could be produced after each POGO meeting, highlighting the importance of ocean observations.

Endorsement was another powerful vehicle, and the idea needed to be taken forward and fleshed out further. Jan Seys suggested that this might be achieved through a working group established by the POGO Executive Committee.

Ocean Observations: Chair Susan Avery

KORDI Observing Programme: Jae Hak Lee presented the 10 years (2009-2019) GAIA programme of KORDI. He began by highlighting important issues that could only be addressed through new observations. The target area for monitoring and modelling is the Pacific Ocean. Scientific issues were identified in parameterization and monitoring. Parameterization is essential for climate models. Cloud and ocean mixing (i.e. surface mixed layer and thermocline) have proved to be challenging to parameterize. Under the GAIA programme, CTD observations were envisaged in the upper 400 m depth along the TAO/TRITON line. The observations serve to monitor major currents in the area. The RAMA equatorial observation system for the Indian Ocean was under construction. Planning phase would start in 2010, and the field campaign in 2013. KORDI was collaborating with NOAA on the project. He also briefed the participants about INSTANT and NPOCE programmes. Many POGO members (including IOCAS, CSIRO, JAMSTEC, LDEO and NOAA) were partners of NPOCE. There was also the programme SPICE being planned for Southern Pacific.

Both Susan Avery and Shiro Imawaki emphasised the importance of the work being carried out by KORDI. During the following discussions, the importance of capacity building was noted.

Observing Programmes and Capacity Building at First Institute of Oceanography, China: Gongke Tan highlighted that FIO was established in 1958, and carried out extensive observations in the China Sea. He gave an overview of the history, structure and research fields of FIO. Research fields included (a) Marine Environmental Science and Numerical Modeling; (b) Marine Sedimentology and Environmental Geology; (c) Marine Ecology and Environment Science and Engineering; (d) Modern Analytical Technology and Bio-active Substances; (e) Ocean Remote Sensing Technology and Theory and (f) Engineering oceanography. Gongke informed the participants of several observational programmes such as the WESTPAC Rose project (which official plan can be downloaded from IOC website) and the DY115 project (for which FIO has a major component in the programme, but they are not the organiser). FIO has carried out 26

cruises to the Antarctic since 1984, and had also carried out 3 cruises to the Arctic since 2008. The institute is also contributing to the RAMA programme in the Indian Ocean. The institute had a staff of over 500 people, in addition to graduate students in oceanography. They had institutional agreement with other institutions, with whom they shared ship time and other resources. They provided certificates for various coastal engineering operations.

Peter Herzig drew attention to the excellent work carried out by FIO in the area of manganese nodule exploration.

Wednesday, 27 January

Ocean Observations (continued): Chair Susan Avery

Venice Meeting and Sequel: Boram Lee provided an update on OceanObs'09 and follow up activities. She communicated greetings from the new Executive Secretary of IOC, Dr. Wendy Watson-Wright, who was keen for IOC and POGO to work closely together in the future. The OceanObs09 vision was provision of routine and sustained global information on the marine environment sufficient to meet society's needs for describing, understanding and forecasting marine variability (including physical, biogeochemical, ecosystems and living marine resources), weather, seasonal to decadal climate variability, climate change, sustainable management of living marine resources, and assessment of longer term trends. The conference was attended by 640 participants from 34 countries. There were 47 plenary papers and 99 community white papers, and 280 additional contributions. Conference statement was negotiated and adopted by the community. Conference proceedings will be published soon. The challenges facing us today included (a) sustaining core existing systems, and building on progress; (b) filling major gaps (ice-cover areas and deep oceans, marginal seas and coasts, developing new technologies); (c) reconstructing the climate record by retrieving past data: data archaeology, digitisation, quality-control, bias removal; (d) transitioning/integrating systems built for single/limited purpose to service multiple purposes, to meet the needs of society; (e) to provide clear and timely information on the state of the ocean and climate system. As for the way forward, an integrated approach was advocated, combining data and model dynamics to provide an "integrated" description of the ocean state. She gave examples illustrating the advantages of the integrated approach. The OceanObs'09 called on all nations and governments to implement fully by 2015 the initial physical and carbon global ocean observing system originally envisioned at OceanObs'99 and refined at OceanObs'09. It called for enhancement of the initial system with biological observations and for acceptance of a framework for planning and moving forward with an enhanced global sustained ocean observing system over the next decade. The need to increase efforts in capacity building and education were also emphasised. Boram Lee then reported on the progress in establishing the post-OceanObs'09 working group, with the goal of recommending a framework for moving global sustained ocean observations

forward in the next decade and of fostering continued interaction between organizations. The IOC provides technical secretariat support to this working group (Albert Fischer) The post-OceanObs'09 working group had many advocates, including POGO. Each of these advocates was invited to nominate members to the Working Group. The current list of members (see POGO-11 Background documents) had many members from the USA and UK whereas many other countries and regions were under-represented or not represented at all, an issue of concern for POGO. Boram Lee described the timeline of the group's work; the WG planned to have its first conference call on 4 February to decide on the membership and further workplans, will report back to its sponsors with a set of recommendations by 1 October 2010, and be disbanded. She urged POGO members to provide input to the WG process, and to implement the recommendations of the WG within their work of ocean observations

Tony Knapp enquired about the selection criteria for the WG, which was answered by Boram Lee and other participating members to the WG, that each sponsor/stakeholder of the WG recommended an expert representing key component of the ocean observation systems; the geographical balance was considered secondarily. Although POGO members understood the general criteria, they noted that a balance in geographical representation should be carefully sought to ensure global participation in implementing the recommendations by the WG in the future. It was decided that the POGO would provide general comments and input to the WG process by 4 February for the first teleconference.

Shubha Sathyendranath mentioned the need to develop the OceanObs framework by a mechanism or structure that would integrate all the participants of Community White Papers. She highlighted that the papers were coming from a limited number of participating countries. Trevor Platt commented on the last question of Boram's presentation: Will POGO take WG recommendations and implement? Dr Platt noted that implementation vehicles are the institutions not POGO. Einar Svendsen pointed out that it is the POGO members who implement the global observing systems in national and international levels, and suggested that POGO could advocate and support the recommendations by the WG to a broader community including its members, to facilitate the work of institutions. Shubha Sathyendranath suggested that the report of the WG could prioritise the actions required so that it would help POGO as a group to endorse, and POGO members individually to implement, these actions.

Baker Report to IOC: Howard Roe presented the planning and implementation for GOOS. It was a user-driven study to examine the cooperation and interactions between the IOC and WMO with a view towards improving, streamlining, and making the planning, implementation, and governance of the GOOS more cost-effective. The overarching issues included the societal need for better ocean information and the essential role of international institutional oversight. The context was a full business plan incorporating organisation, customers and funding. Many elements of GOOS already existed, but long-term commitments were weak, and additional funding was needed to bring implementation to 100%. To address these issues, a business plan was needed which identified products, users, benefits and costs. First recommendation was that "IOC

and its partners complete the development of and implement a business plan for the operations and delivery of services of GOOS as a whole (coastal and global)." Broadening activities in capacity building was recommended, in partnership with other organisations, such as POGO, SCOR and GEO. According to the report, the responsibility for completion of the business lay with the GOOS Project Office, in consultation with relevant organisations. Governance in GOOS is via several UNESCO/IOC/WMO/ICSU/UNEP sanctioned bodies. UNESCO is not necessarily a compatible home for routine and operational activities, but IOC resides within UNESCO, and so has to deal with this mismatch. It was recommended that IOC and WMO must enhance their support of sustained ocean observations. IOC needed to work with UNESCO to make the case for GOOS, make its membership more aware and responsive to GOOS needs, and to enhance capacity building. The report noted that I-GOOS was not working: few actions had been taken, many members were not experts and were not able to make commitments. It was specifically recommended that I-GOOS should be replaced with a body that could help make member states aware of its role in implementing GOOS. Its members should have appropriate expertise and, to the extent possible, the ability to make binding funding commitments. This new body should be responsible for GOOS and its implementation, and take advice from other groups. Despite being under-resourced JCOMM had been effective in bringing together the ocean parts of GOOS. Nevertheless, its value might not be recognised by all member states within IOC. National support is often lacking. JCOMM restructuring needed the support of IOC and WMO; it should identify its role in implementing coastal GOOS, and make member states in both IOC and WMO aware of its role in GOOS overall. The report indicated that the GSSC panels OOPC and PICO have been effective and active. In contrast, the central GSSC was no longer effective and should be replaced; many members were unclear about roles and responsibilities. It was specifically recommended that GSSC should be dissolved and reformed from its panels with the existing three chairs acting as the executive. IOC should lead on strengthening relationships between IOC and other relevant organisations so that GOOS is made more visible to both the public and decision makers. The report also contained recommendations on streamlining, implementation and resources. User pull will be essential to ensure success of GOOS. Planning and coordinating GOOS requires permanent staff, secondments and also external experts whose activities are often not supported by their host institutions. To facilitate secondments, additional resources should be found by IOC and WMO. Decentralising functions from Paris was recommended as a way to reduce costs and leverage funds. The report recommended that IOC secretariat should consider convening a series of strategic coordination meetings involving existing bodies and new groups to help GOOS meet these various challenges. These meetings could form the basis for consideration of a larger, regular Ocean Davos conference to bring together all the constituencies of the ocean community.

Gregorio Parrilla and Jacky Wood recommended consultation of the UK-comments on Baker report. The report was available from IOC website http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=4651. Dr Parrilla mentioned that the report was supported by the Spanish delegation. Peter Herzig enquired how we could advocate the development of a more effective cooperation

between POGO, IOC, for realisation of GOOS. He mentioned management details to reduce the costs: Do we need the meetings? Peter suggested writing to IOC about the Baker report to show that POGO is ready to engage the conversation and move forward. Trevor Platt suggested that this could be an action of the POGO-11 Meeting: to identify what POGO would like to communicate to IOC on GOOS about the Baker report. Boram Lee noted that the Baker report was a review on the intergovernmental structure for GOOS (I-GOOS and its scientific advisory functions provided by GSSC), not the GOOS itself as a system of ocean observing system, where improvement is required to support GOOS implementation by countries in a more efficient and effective manners. In the meantime, Boram Lee noted that recommendations on future global ocean observing systems might come out of the post-OceanObs'09 WG. She appreciated valuable input from POGO to complete the Baker report, and welcomed POGO's continuing involvement to the follow up to the recommendations by this report.

Summary of session on Ocean Observations: Chair Susan Avery asked for questions and comments before she gave her summary. Antoine Dosdat asked about the differences between the recommendations of the Baker report to IOC, that was also submitted to WMO, and the direction that the post-OceanObs'09 WG would take. For this question, Boram Lee clarified the recommendations for the intergovernmental process (Baker Report), and for the ocean observing systems in the next decade (proposed work of the post-OceanObs'09 WG), as detailed in the previous paragraph. Howard Roe mentioned that a more detailed set of actions within the GOOS programme would be desirable.
Susan Avery summarised the presentations. There was a need to build modelling capacity, in addition to observing capacity. POGO's expectations of, and responses to the OceanObs09 meeting and the Baker report needed a lot of attention. Tony Knap highlighted the importance of the POGO contribution in carrying the message about the oceans to COP-15. Tony Knap, Stephen de Mora and Susan Avery acknowledged the leadership and support from Scripps that facilitated POGO participation in COP-15. Shubha Sathyendranath pointed out that getting accreditation at an event like COP-15 remained difficult for an organization like POGO. Howard Roe emphasized the importance of the relation between POGO and GEO. He reminded members that the next Ministerial Summit will be in Beijing next November. Dosoo Jang spoke about the role that POGO can play in advocating the user perspective internationally. Maybe there was a need to revitalise the national committees of IOC to facilitate the implementation of the recommendations. Shubha Sathyendranath noted the need to broaden the vision/scope of OceanObs09. The list was much longer and broader compared with what is presented in POGO Annual Meeting. Peter Herzig reminded members that this point would be discussed in the session on Wednesday morning. Boram Lee briefly reported on the ongoing discussion about the future of IOC. The meeting took note of several initially presented options to strengthen the IOC and ocean issues within UN, during the discussion by the IOC working group on the future of IOC. Several participants expressed their interest in the idea of an ocean summit.

Proposal for International Quiet Ocean Experiment: Jesse Ausubel explained the concept of the Quiet Ocean Experiment. A workshop on the topic would be organised jointly by SCOR and POGO. The idea was to choose one day or part of one day when

humanity would radically reduces its additions of noise to the oceans and scientific experiments would be carried out to study the impact of the change in noise on the marine environment. The rising trend in ambient sound was recognised, and variations in local sources of sound have been analysed. As users of the ocean increase, ambient noise is increasing. Noise producers include drilling vessels, shipping vessels and wind turbines. Ships of greater than 100 gross tons have tripled in the last three decades. Shipping routes are spreading and intensifying, but there are still some areas of the ocean that remain un-impacted by shipping. Offshore oil and gas sub-sea operations are increasing in size, and they are extending to greater depths. Gas-rich continental margins are expected to become a source of yet more deep noise. Drilling at depths greater than 200 m have already commenced. Available data on trends in shipping show that since 1950, the shipping noise has increased over ambient natural noise, and it continues to grow. Concerns so far have concentrated on the effect of sound on marine mammals. The workshop will examine: how would such an experiment be done, could it be done, and would it be done? An important question was whether stakeholders (Navy, industry) would cooperate. The workshop was scheduled tentatively for May 2010, in La Spezzia, Italy. What could be benefits to ocean science of an international day of ocean observation under low ambient noise? They were manifold. The experiment was not focussed only on marine mammals. Guidance on the workshop was welcome.

David Farmer wondered what experiments could be carried out during only a day or half a day. He thought that one of the benefits would be to observe natural noises that would normally be drowned by man-made noises. Jan Seys added that there was a link between ocean acidification and sound transmission in the ocean. High capability for observing sound underwater was essential for the experiment, and experts on sound measurement would be invited to the workshop.

New Oceanographic Facilities: Chair Jung-Keuk Kang

KAUST – Red Sea Research Center: Georgiy Stenchikov presented King Abdulla University for Science and Technology (KAUST). The university had only been open for four months and it was a graduate-level research university, with a faculty of some 75 and more than 300 students. It had excellent laboratory and computer facilities. The divisions included mathematics, computer sciences and engineering, physical sciences and engineering, chemistry, life sciences and engineering. The university was located on the coast of the Red Sea. The Centre's research strategy was developed in collaboration with WHOI, and with Susan Avery in particular. The director of the Research Centre was Prof. James Luyten, physical oceanographer, formerly from WHOI. Targeted research topics included evolutionary biology of Red Sea marine life; coral reef ecosystem studies; coral genome; marine microbial environment; extremophiles and deep brines; pelagic environment; fisheries and aquaculture; Red Sea oceanography; coastal meteorology and air sea interaction and interaction of regional and global scales and downscaling. He gave examples of issues that would be the focus of studies at KAUST. Long-term goals of KAUST were oriented towards various applications. WHOI was a partner with KAUST on many applications.

Susan Avery noted that the facilities were remarkable and still growing. Peter Herzig informed the participants of German work in the area: there was scope for enhanced collaboration.

Observing capacity building in China: Sun Song was from the Institute of Oceanology Chinese Academy of Sciences (IOCAS). In recent years, there have been a number of developments in China, related to gathering information on turbulent coastal ecosystems and ecological disasters, marine biological resource exploitation and ecosystem health as well as climate change. Fishermen were concerned about climate change: they needed to know if they should shift from harvest fisheries to aquaculture. Local governments were also concerned about the economic impact of changes in the marine environment. It was important to learn to deal with coastal management, and they needed ecological and environmental information. They all supported the development of a multi-disciplinary observation system. The observing system included near-shore and coastal elements in the South China Sea. The open-ocean component of the observing system focussed on the North West Pacific Region. Fixed observing components and repeat transects were planned. Chinese Academy of Sciences had already developed the elements of the observing system for the South China Sea. Some sensors are to be mounted on fishing vessels. They had some Argo floats that were used to track a bloom of green algae in 2009. NSFC and CAS were jointly supporting the cruises. They had built two new research vessels in the last three years, and another new research vessel was under construction.

Developments in Australia: Mark Gibbs from CSIRO spoke of recent developments in sustained ocean observations in Australia, which had set up the Australian Integrated Marine Observing System (IMOS). It had coverage in waters around Australia and in the Southern Ocean. Core funding was from the Australian government, and was worth some 100$ dollars over six years. Co-investment from partners amounted to an additional 78 million $ (in cash and in kind). IMOS worked as a matrix of regional nodes and national facilities. Nodes represented the scientific opinion of the research community and facilities owned and operated the designated equipment and made data streams available to the whole community. The blue water and climate node had an open-ocean focus, and the rest were state-based regional nodes. Research themes included multi-decadal ocean change, climate variability and weather extremes, major boundary currents and inter-basin flows, continental shelf processes, biological responses. Facilities included Argo Australia; ships of opportunity; deepwater moorings; ocean gliders; autonomous underwater vehicles; national mooring network; coastal radar network; acoustic tagging and monitoring; wireless sensor network; satellite remote sensing; and electronic marine information infrastructure. All data were discoverable and accessible, for free. There was a focus on enhanced monitoring in the Southern Ocean. A good start had been made but the task was a big one. The main contact for IMOS was University of Tasmania. Mark Gibbs would be happy to provide additional information. Australia was building a new research vessel. A new Institute of Marine and Antarctic Research was recently set up in Tasmania and an Indian Ocean Centre was planned for Western Australia. The design of the observing network was developed in collaboration with modellers.

Cruise Information Database: Andrew Willmott updated participants on the status and plans of the International Cruise Information Data Base. Lesley Rickards is the scientist in charge of the programme. The funding from POGO, CoML and NOAA was gratefully acknowledged. The database had three parts. Cruise plans for 2009 were not put in the database until June 2009. This had to be improved. He pointed out countries and organisations that were not contributing yet to the database. There were some technical developments in 2009: the cruise programme content management system was operational, and the cruise summary reports and search was linked to the ICIS (International Cruise Information Systems). Cruise programme database was upgraded to show cruise status (planned, current, completed), and the status was automatically updated. Planned cruise track was an option. The ports gazetteer (from SeaDataNet) was incorporated, which uses standardised names for ports. An information piece on ICIS was published in EOS. An abstract for poster was submitted to IMDIS conference. The information was disseminated to EU Eurofleets project. A "web-crawl" system for automatic update was being incorporated on. Some organisations supply information readily, but some are slow. Some organisations do not reply to messages requesting cruise information. Often incomplete information is supplied. There was often lack of geographic detail in the information provided, which makes it necessary to extract useful information manually. Future activities, including plans to develop more automatic input of cruise programme information and improve the website were noted. IOCCP and Clivar offices had offered to upload their information on cruises directly to the ICIS website.

Extreme environments: Chair Sergei Shapovalov

Deep Carbon Observatory: Jesse Ausubel explained that the plan was being developed mainly from the geology and geophysical perspective. The DCO vision was to achieve transformational understanding of carbon's chemical and biological roles in Earth's interior. Multi-disciplinary, international decade-long effort, stable core funding provided by Sloan Foundation if project went well. The initiative came from Robert Hazen and Russell Hemley at the Geophysical Laboratory of the Carnegie Institute in Washington. There was a DCO Founders Committee with membership from USA, China, France, UK, Canada, Japan and Russia. Science teams would address the following topics: (a) deep carbon reservoirs and fluxes addressing questions such as the carbon phases in the mantle? Trace amounts C, ppm, in mantle silicates? C-O-H-N fluids? Carbon in the core?); (b) deep life (addressing questions such as what lives where very deep? How do they survive? Did deep biochemistry play a role in life's origins?); (c) energy, environment and climate (addressing questions such as Deep source of hydrocarbons or other organic species? Is methane a renewable resource?). In a recent paper published in *Nature Geoscience*, Kutcherov *et al.* have found that ethane and heavier hydrocarbons can be synthesized under pressure-temperature conditions of the upper mantle. Alternate vision proposes that complex hydrocarbons are synthesised at extreme pressures. Chinese Academy will host international conference on Deep Carbon Cycle in April 21-25, 2010 in Beijing, China (http://dcc.geochem-model.org/). A joint workshop was being planned with IODP, which was yet to be scheduled. The workshop may consider a new Project

Mohole. The Deep Carbon Observatory has a website (http://dco.ciw.edu). The plans were in the initial stages, there was a chance for scientific revolutions, and POGO members were welcomed to participate.

Dr. Suyehiro provided further details regarding IODP's plans in this area.

Polar Seas: Arctic Observations and IPY follow-up: Sergei Pisarev from Shirshov Institute provided a historic perspective, which is a long history of international collaboration. The meteorological stations established in the Arctic during the first IPY were maintained by Russia and USA, Finland, Germany, Austro-Hungary, Great Britain, Sweden, Denmark, Norway and Holland. Observational changes, many of which have regional and global implications, are under way in the Arctic atmosphere, hydrosphere biosphere, cryosphere and geosphere. At the end of 2006, there were 48 existing and 12 planned international and national networks. Some of the proposed systems became real during the IPY 2007-2009, while previously existing activities continued. There were efforts underway to create an integrated Arctic Observing Network. A vertical stack of observations from satellites to seabed would be necessary to monitor the Arctic environment. Ice was a particular problem of observing the polar environment. He provided examples of exciting new technology that was being deployed and new research being carried out in the Arctic.

Polar Seas: Southern Ocean Observing System (SOOS): Mike Meredith mentioned that many organisations, including POGO had contributed to the development of SOOS. He provided rationale for Southern Ocean Observation System, including its global reach, being a critical part of the thermohaline circulation, key region of carbon sink, and important term in global heat budget. Yet the Southern Ocean was still under-sampled compared with the rest of the World Ocean. The Southern Ocean heat content was changing rapidly (more than anywhere else in the world). Krill stocks in key parts of the Southern Ocean were in steep decline (70% decline in the Atlantic sector). There was a need to understand the causes and the implications. SOOS was being designed to address six key challenges: (1) role of the southern ocean in global freshwater balance; (2) stability of southern ocean overturning; (3) stability of Antarctic ice sheet and future contribution to sea-level rise; (4) future of Southern Ocean carbon uptake; (5) future of Antarctic sea ice; and (6) impacts of climate change on Antarctic ecosystems. Challenges were used to identify key variables to be measured and the platforms that can measure them. Potential users of a SOOS included the research community, resource managers, policy makers, IPCC, local planners (sea-level rise), Antarctic tourism, shipping operations, weather climate forecasters, education, ect. Repeat hydrography with 5-10 year interval with carbon observations was planned, and many countries had already signed on to these. Ships of opportunity lines were in place, with some of the lines being occupied several times a year. Argo had provided a wealth of data previously unavailable. Conventional Argo, however, cannot operate under ice-covered areas. Argo-under-ice was now deployed, and it was fantastic, but very expensive. Tagged animals were particularly useful in the Arctic region. Continued funding was a problem. One of the most difficult environments to measure was the waters under the deep ice shelf (several hundred metres thick). Sampling was very expensive. Continuous plankton recorder has

been in operation for some years. Ice-covered regions were still poorly sampled, despite progress. By March 2010 the full draft SOOS plan would be on the web for consultation. Implementation required continued commitment from those already involved. SOOS starting design was in place and feasibility was demonstrated during IPY. But it needed maintaining and building up, in financially-difficult times. Dr Meredith called upon more nations and institutes to participate. The design of SOOS will change and evolve as science and technology progress. It was important to demonstrate the value of SOOS scientifically, economically and societally.

Science Underpinning Policy: Chair Stephen de Mora

Observing requirements related to Ocean Acidification: Einar Svendsen mentioned that Norway had two carbon stations in 2002 and 2009. Observations showed large variability in time and space. Historically, ocean pH was around 8, today's values are down to 7.6. Saturation concentration for aragonite, predicted using models for years 2100, 1795 and 1994, showed big changes in the depth at which the critical value of aragonite of 66 µmol kg^{-1} was found. Acidification might affect calcium carbonate shell formation in marine organisms, ranging from phytoplankton, zooplankton and corals. He suggested that the main part of the primary production in the Nordic Seas consisted of shell-forming (silicate and carbonate) phytoplankton. *Calanus finmarchicus* was the key zooplankton in the Nordic Seas transforming primary production into fish. Changes in production and distribution of major fish stocks were partly a direct response to changes in climate variables and partly indirectly due to changes in *Calanus*. The *Calanus* overwintering strategy made it especially vulnerable to under-saturation of calcium carbonate. This might lead to irreversible changes in the marine ecosystem. Norway had not decided on its chemical/biological monitoring strategy, but would give priority to experimental studies of *Calanus finmarchicus* related to acidification

Observing requirements related to Ecosystem-based Management: Einar Svendsen reported that the new Norwegian Marine Resource Act advocated an ecosystem-based approach to fisheries management and adopted the precautionary principle. In this context, it was important to recognise the role of fishing, natural variability and pollution. On large scales there was a close relationship between primary production and fisheries. There was a northward migration of warm-water species over the years, according to Continuous Plankton Recorder data. Within multi-decadal time scales, there was not an ecological balance. Marine monitoring was essential to produce indicators of change. Observations had to be combined with modelling. He briefed participants about Barents Sea ecosystem survey. He concluded that fish stocks are strongly influenced by the ocean climate both directly and indirectly through other levels of the food web. Multi-decadal ocean climate oscillation might substantially contribute to modulate anthropogenic climate change through the 21st century. Management advice was about predicting the (potential) future. The ecosystem approach to sustainable management of the oceans was a major challenge requiring good leadership, new ideas, new technology. We did not yet know what should be the observing strategy to satisfy the needs of ecological research and monitoring as input to sustainable ecosystem management. He wondered if we would

be always severely under-sampled, or if this could be fixed with new technology? Do we have the right models and the critical input data to predict (early warning) changes in recruitment, growth, mortality and distribution?

Biological Observations Meeting, Venice (SCOR/CoML): Jesse Ausubel delivered the basic message from the Workshop on Ocean Biology Observatories: it was now time to deploy new technologies. The workshop discussed molecular and genetic attributes, benthic ecosystems, indicator within marine communities, Sound (acoustic monitoring), physical measurements. The strategic tension at the workshop was between global coverage of selected variables using expendable and cheap sensors versus locally focussed, comprehensive, often re-deployable but not-so-cheap sensors. Strong endorsement for SmartBuoys, CTD sled on fishing trawl, in-situ Imaging Flow Cytobot, in-situ Autonomous Microbial Genosensor, in-situ Environmental Sample Processor, Ecological Acoustic Recorder, Neptune Benthic System, Bio-logging, etc. Examples of systems ready for deployment included Ocean Tracking Network. John Gunn had prepared a chart summarising readiness of various technologies for application in GOOS. He drew attention to the need to prepare biological version or layer of GOOS map showing the status of implementation of the physical observing system. Technology existed for doing many things, but financial constraints would demand that we prioritise an implementation plan.

Mark Gibbs expressed the view that many of the existing technologies dealt with abundance and not fluxes, and it was essential to observe fluxes as well. Jesse Ausubel also highlighted the importance of observing microbial organisms. He expressed the view that although the ocean community assembled in Venice, but it was disappointing that the next steps were not well articulated yet.

GEOBON (GEO Biodiversity Observation Network): Carlo Heip focused on Working Group 5. A GEO-BON Steering committee was formed in January 2008. The GEO-BON Steering Committee met for the first time in June 2009 in Geneva. The next GEOBON implementation meeting would be in February 2010 in Monterey. Issues in the implementation plan included defining ocean realms and ecosystems. Marine biodiversity was still largely unknown. Ecosystem services from the oceans were not well defined in economic terms. Bottom-up and top-down regulation of marine food webs co-occured and this had implications for ecosystem services such as productivity, ecosystem health. Implementation was initially Eurocentric. A European network of Marine Institues and Stations, called MARS was created as an umbrella for NoE's and MarBEF and MGE. A virtual European Institute for the Study of Marine Biodiversity and Ecosystem Functioning was envisaged. It covered (a) biodiversity from genes to ecosystems; (b) major players in biodiversity research in Europe; (c) coastal areas, shelf seas; (d) deep sea stations covering abyssal plains; and (e) pelagic systems (e.g. SAHFOS and Ferrybox systems). A need for coordination between EU, EuroMarine and MARS was raised. There were plans to discuss implementing the network beyond Europe.

Core Observations and Rationalising Committees: Gregorio Parrilla stated at the outset that he had no solution to the problem. The ocean world, with respect to the matter

at hand, had three main characteristics: (1) naturally complex environment; (2) subject of different competences and jurisdiction, distributed among a myriad of bodies and agencies, local, national, regional and international ones; and (3) the Law of the Sea. At the 3rd session of JCOMM (November 2009, Marrakesh), participants were handed a document with some 400 acronyms. It took nine years to create the prospectus for GOOS. Creation of GEO had led to further confusion. It was noted by some countries in I-GOOS that the numbers of programmes, systems, organisations, committees as well as their complexity and apparently overlapping mission statements have made participation in the global systems a bewildering experience. It was necessary to develop strategies to obtain a firm and solid support from national administrations. It was important o consolidate a permanent funding, especially for the "in situ" observing infrastructure, and to find means to finance activities in, and of, less developed countries. It was essential to solve the bifurcation between coastal and open ocean observing systems. An important part of science was "maximising the resources of "available money, time, thought and energy".

Summary of session on Science Underpinning Policy: Chair Stephen de Mora noted that the presentations emphasised how science responds to policy, but not so much how science influences policy. One of the goals of the observing system must be to advise policy makers.

Thursday, 28 January

Future Developments in POGO (next ten years): Chair Peter Herzig

Peter Herzig placed POGO into context and gave a brief overview of current core and strong points of the organization. Historically, POGO had a strong focus on ocean observation and oceanography. POGO mission was to promote global oceanography particularly the implementation of an international and integrated global ocean observing system. POGO was a forum for leaders of major oceanographic institutions around the world. POGO currently had 35 member institutions in 18 countries (budget 230 k€ p.a.). POGO had developed an international network of collaborators. POGO had promoted observations to underpin ocean and climate science. POGO had realized that global oceanography is only part of today's research agenda of major marine research institutions around the world. POGO was aware of the fact that research activities and major infrastructure investments also focus on disciplines other than oceanography and in particular on important overarching research topics. POGO acknowledged that major overarching research topics include: (a) role of the oceans in climate change; (b) human impacts on marine ecosystems; (c) living and non-living marine resources; and (d) plate tectonics and geological hazards. Dr Herzig gave examples of human impacts on marine ecosystems: ocean acidification & the fate of coral reefs, environmental pressure on fish stock, fishing and overfishing, and loss of biodiversity. He identified some living and non-living marine resources: genetic resources of the sea, massive sulfide deposits, manganese nodules & crusts, and methane (gas) hydrates. Plate tectonics and geological

hazards involved: earthquakes, volcanic eruptions, submarine slides and tsunamis. He presented a list of questions for discussion: Is it appropriate to broaden the scope of POGO? Do we intend to include other communities in POGO? Which are those communities: biologists, chemists, geologists, petrologists, geophysicists – or IODP, ESF Marine Board…? Do we intend to grow, do we intend to add more members? Does it make sense to speak with one (POGO) voice when it comes to marine sciences in an international context? Do we intend to develop POGO further into a World Ocean Research Organisation (for example, based on Ocean United, already formed by POGO) that becomes more visible at decision maker levels? Should future POGO meetings be organized along the lines of the four major overarching research topics mentioned above? Should we invite keynote speakers to up-date us on those topics? Should POGO directors present short up-dates on major developments and large-scale projects or infrastructure activities in their institutions? Should future meetings be shorter – 2.5 days instead of 3 days? Should we prepare an international press release after each annual meeting as a way to become more visible in the public (start in Moscow)? Should we try to repeat the success of Cape Town at the upcoming GEO Ministerial Summit in Beijing? Should we increase the budget for the Secretariat in order to make it more effective in terms of member service and outreach? What else should we do in order to improve the performance and the international visibility of POGO (70 % of the marine research community have never heard of POGO, not to mention decision makers that we like to reach)? Finally, Dr Herzig made some suggestions on the future of developments in POGO. After a successful first decade, POGO had now to make sure that the interest in POGO was not diminishing (keep the members and get new ones). The scope should be broaden as major ocean research communities were currently not represented in POGO (speak with one voice & more power). Secretariat should play a more active role in updating members on POGO issues together with the Executive Board, public outreach needed to be improved, budget needed to increase. The Executive Board should meet between annual meetings in order to follow-up on previous and to prepare future meetings. Meetings should be shorter to make it easier for directors to attend. The organization of a World Ocean Summit with IOC should be discussed. POGO should attend and be clearly visible at the GEO Ministerial Summit in Beijing.

General discussion. Tony Knap noted that so far we do not have an ocean observation system, so we have to be careful about expanding POGO. Expanding POGO capacity building would imply a greater burden on secretariat and expanding membership. Peter Herzig reminded that expanding the scope of POGO did not mean giving up on original scope. Trevor Platt enquired about the interest in the geologist community. Peter Herzig declared there was interest for geologists to come and see what they could do to make the organisation more powerful. Trevor Platt mentioned that POGO had written to the international Seabed Authorities but they had not been very responsive. Peter Herzig explained that authorities are interested but they want to know more about POGO first. Mike Purdy supported the idea of broadening the scope of POGO to include geologists and geophysicists. He proposed not to make judgments as to include or not different areas: the term ocean observations was to be taken very broadly and the sea floor was not a boundary. Susan Avery mentioned that science and societal applications assumed that

seafloor and geology were included as well as genetic in ocean observations. Susan noted that justification for research was more and more focused on societal benefits rather than the scientific interests. Cathy Constable remarked that the representatives of major director of Institutes present at the POGO Meeting were not just oceanographer, but there were also marine geophysicists and geologists. Shubha Sathyendranath reminded that POGO had been created in response for the need in implemented ocean observations. The initial status emphasized on observation system for the physical component. In concept, POGO had always been inclusive. There was a mismatch between what was perceived as GOOS and what members think of broader scope. Howard Roe declared that POGO was a forum for discussion of area of interest between directors of major Institutes. He mentioned the British Geological Survey and the US GS. Peter Herzig suggested inviting the head of those GS that had an ocean research programme to join POGO. Mark Gibbs added that the definition of the scope would then become more attractive to physicists and that the profile of the organisation would be increased. Shubha Sathyendranath stated that POGO was a forum for directors of Institutes. POGO was talking to other agencies such as IOC, however these agencies were not invited to become members of POGO. Shubha raised the point that if GS organizations became members, we might lose the focus of a directors meeting. Peter Herzig clarified that he had in mind the directors of the surveys who would get the message of POGO across. Andrew Willmott agreed on the broadening of POGO. He remarked that it would be difficult to shorten the meeting if we were to broaden the agenda. Peter Herzig stated that the length of the meeting should be maintained at three days. He noted that other Polar Institutes such as AWI were not well enough represented and we should try to get a better coverage.

Trevor Platt enquired whether POGO should pursue the institutions and whether a recruiting campaign agency was needed. Shiro Imawaki suggested the need for a distinctive clear and focused identity of POGO. He mentioned that there were many international organisations such as AGU which represented specialised areas of research. Peter Herzig responded that the identity and status of POGO was clearly stated from the website. Carlo Heip agreed that the definition of the status was very important. He enquired what was POGO going to deliver that would be different from other organisations such as GOOS. Carlo felt that he had not significantly changed the view of his institute nor he had significantly influenced POGO over the last two annual meetings he had attended. Jacky Wood noted that decisions of directors were not taken in isolation, but rather were taken in a broader context and that would be a good enough reason to participate in POGO.

Antoine Dosdat wondered on the issue of increasing the scope of POGO. Was POGO a group addressing discussion and recommendation to itself, and members would go home with new ideas to implement on their own level? Or did POGO want to have a message to the external world to institutions that were non-members (i.e. decision maker, politicians, larger public)? He pointed out that the way POGO would deliver was very different: for the first case (i.e. exchange of ideas or data amongst members), the type of annual meeting like POGO-11 was satisfactory, for the second case (i.e. outreach), POGO would have to edit a message on typical issues, to set up a WG to produce documents that would have an impact on the world and policy making. Kiyoshi Suyehiro recognised that

perhaps it was not very explicitly written what POGO was delivering. He acknowledged that POGO meeting had been extremely valuable to attend. He gave two examples of direct outcomes of having this forum: (1) POGO had permitted his predecessor from JAMSTEC to make the BEAGLE cruise happened; and (2) following the Sumatra Earthquake, Dr Suyehiro was able to pull instantly world colleagues to find out if there were ships scheduled in the immediate months after the Earthquake to do research and to coordinate effort in the most effective way to learn about the Earthquake Sumatra Epicentre. Karen Wiltshire wondered about exclusivity. She believed that if she did not come to the POGO Annual Meeting, she would be disadvantaged. She came to the conclusion that the meetings were all inclusive: polar research, coastal research, long-term datasets, oceanographic monitoring, European/Worldwide science were all on the agenda. If directors wanted to contribute, they would be welcomed. She agreed that a three days meeting was adequate. She appreciated that the atmosphere at the meeting was not stressful. She suggested that it might be more effective if we chose beforehand points that would be critical to consider. She noted that members themselves might need to be more organised to enhance the planning and organisation done by the Secretariat. Members might be a bit chaotic in their answers to mails and documents that were sent. She discussed the possibility to set up a workshop during the meeting on a very hot topic or to identify three critical topics that would be discussed over half a day.

Peter Herzig approved the idea to act more pro-actively for the next agenda and to decide on a workshop or major presentation that would be discussed over a half-day session. He gave the example of OOI as a major initiative, representing the future of marine sciences globally and including oceanography, geology, and so on. Peter Herzig summarised that: (a) the meeting length should be kept at three days; (b) we should not advertise POGO worldwide to various institutions but if there were a GS or polar institute that is interested in joining POGO, they would be welcomed.

Howard Roe commented on the niche that POGO had: POGO was a useful forum; it had a great capacity building programme; and it was independent and could respond rapidly, as shown with the spectacular success of BEAGLE. He pointed out that it might be a mistake to involve political organisations as it would dilute the programme and he believed and that POGO worked because it insisted on the people who were experts. Dr Herzig re-focused the discussion on what POGO could do better? Tony Knap highlighted the extraordinary job that had been done on capacity building and that it needed to remain in the POGO theme. He reminded that 2/3 of the oceans were in the Southern Hemisphere and that most of the oceanographic institutions were above the Equator. POGO had greatly helped training people and developing institutions. He noted that there was a political agenda: masters of global ocean observing were likely a little bankrupt. One of the reason members had come together was to try to solve that problem, and so far it had not been solved. He suggested that POGO help IOC to achieve a global ocean observing system. It would imply stepping on the political side for directors and implementers of ocean observing. This would be a specific target for the next 2-3 years. Jesse Ausubel gave a brief history of the meeting/social network formation of POGO. The opportunity of meeting had created potential for action. Susan Avery highlighted the extreme importance to meet with other leaderships. She wondered what POGO was

achieving as an advocacy group. She cautioned that if POGO opened to GS, then it could also open to other agencies such as the space agency for instance. Dr Herzig summarized that we did not advertise for POGO but we would look at next applications in a positive way, and that we did not want to develop POGO into a membership that included all relevant or non-relevant institutions. The intention was to be open to others who might like to join POGO. Gregoria Parrilla understood POGO has an organization to promote and support ocean observations. He remarked that observations would have different priorities depending on the epoch, for instance now observations were largely related to global change. He wondered if POGO endeavour was similar to a lobby.

Stephen de Mora shared the concerned of Susan Avery and Andrew Willmott in terms of losing focus. He noted that all institutes had common problems whether it was financial, scientific problems, turning science into policies, policies influencing science. He brought attention to the geographical gaps in POGO, for example Canada, New Zealand and Greece were not represented at the meeting. In terms of disciplines, he thought that chemist where under-represented. POGO as an ocean observing network was still fragile. He agreed that it would appropriate to dedicate part of the meeting to another theme and this would allow focusing on other suggestions such as a declaration that would be proposed from the meeting. He recognised that it would take too much time for all directors to give presentations on their institutes at the meeting; instead, he thought that it would be useful if each director could write one page on the burning topic(s) that their institutes were dealing with. He acknowledged the usefulness of the background documents provided for POGO-11.

Shubha Sathyendranath replied to some comments from relatively new POGO members. First comment from Dr Svendsen on the fact that POGO change the way that directors make their business: Shubha acknowledged the collective effort that directors had put in to promote ARGO. POGO in the past had made declarations or statements that emerged from the annual meeting. For example from the POGO meeting in Brazil in 2000, POGO made the São Paulo Declaration drawing attention to the fact that the SH was largely under-sampled. The declaration helped JAMSTEC to mount their highly successful BEAGLE circumpolar expedition in the Southern Hemisphere. At the Yokohama Meeting in 2003 and Brest Meeting in 2004, there were declarations made that helped POGO to promote ocean observations within the context of GEO. Arguably, without POGO taking the lead as a collective voice, oceans would most likely still be invisible within the GEO system and less heard at the ministerial level that GEO had access to. There were ways in which a collective action from POGO had had influence within the institutes or outside in the political atmosphere, but there was more that could be done along those lines.

Dr Herzig enquired whether the members would be in favour of a press release that would be issued in Seoul next year. Jan Seys declared that it was very important for member institutes to keep generating and delivering state of the art research, and then decide at the POGO annual meeting to do something with that ocean science. Jan expected that directors of major institutes should be able to deliver a clear message for the world ocean observations at the end of the meeting. He suggested hiring a very good

journalist and mentioned the name of Terry Collins who had done tremendous work for Census of Marine Life as well as at the Cape Town Ministerial Summit. Jan explained that Terry would start his work weeks before the Meeting. The theme and major points of the meeting would be discussed beforehand: (a) within the Executive Committee and Secretariat and maybe other members; (b) members would give input via email or a forum. Journalist would then come at the meeting with a draft of press release. Journalist would take the time over the three days of the meeting to talk to all members to find real stories and iconic examples and to end with a very good press release with a very clear message that would be sent all over the world. The cost was suggested to be in the order of magnitude of 10,000 euros or more. Jan recognised that it would be probably the most cost effective way to spread POGO news. Mike Purdy strongly supported the idea of the press release however he made the precision that it would be fundamental to have extensive preparation before the meeting so that members did not spend the three days of the meeting discussing what would go in press. He pointed out that we probably all agreed on a simple and clear message to go out, and it would be using the weight of members name and institution to get the word out much broadly than it would otherwise. Peter Herzig supported the idea of a press release with a simple message. He acknowledged that it would be worth the money.

Shiro Imawaki commented on the geographical gaps in POGO memberships. He thought of three selection criteria for new POGO members: (1) scientific research capabilities; (2) ship time and sharing capabilities; (3) the geographic location was important as a ground platform (e.g. Indonesia, Peru as an upwelling region). It would be extremely valuable to obtain collaborations with such countries. He suggested that when preparing for the agenda and background document of the POGO annual Meeting, it might be better if the papers and presentations concerned provocative proposals rather than introducing, exchanging information about institutes programmes. Peter Herzig reminded the list of selection criteria proposed by Shiro Imawaki. Susan Avery shared her thought that POGO could go out of existence if there was a functioning IOC. Antoine Dosdat had the impression that participants were on the way to decide that they wanted the annual meeting to be more focus and well prepared, meaning work would have to be done in between sessions to organise the meeting. An implementation process should be decided for this. He also mentioned that a Secretariat would be needed to stir the activities. Peter Herzig summarised that the Executive committee should meet between the annual meetings to better prepare and organise the annual meeting. Trevor Platt suggested that the selection process for the NF-POGO Centre of Excellence in Bermuda would be a good opportunity for an EC meeting. Peter Herzig mentioned that the Annual Meeting should focus on certain issues (he gave OOI as an example) and that keynote speakers (e.g. Jim Cowles and Bob Weller) were invited to give a good overview on progress on ocean science. Tony Knap thought it would be essential for the new head of the Executive Secretary of IOC to attend the next POGO Meeting. He reminded members of the importance to consider the comments from the Baker report to IOC. Tony highlighted the importance to meet with the Executive Secretary of IOC before the next annual meeting to ensure that POGO had the governance and connectivity with the international world of how we could implement GOOS. Tony declared that a critical practical issue was to work together with IOC to see how POGO could best help them. Peter Herzig

declared that he and Kiyoshi Suyehiro would go to Paris in the next 2 to 3 months to invite Wendy Watson-Wright personally to the POGO-12 meeting. Trevor Platt was positive about IOC representation at the POGO meeting.

Peter Herzig then moved on the discussion to POGO Secretariat. He noted that EC needed to provide further support to the secretariat because a person was needed at least part-time for administrative duty, communication with members. Another part-time person might be needed for the website development. Trevor Platt explained that the present constitution of the secretariat was himself for half-time and Shubha for approximately 10% of her time. He commented that on paper the Secretariat did not seem to be such a big fraction of time but in fact it took much more time. When the Secretariat was moved to the UK at PML in Plymouth, the additional support requirement appeared to be of clerical nature. This view had been revised, and a full-time support person was needed for communication, international business, promotion of POGO, and website support. A draft job description was under review at PML. Members were welcome to comment and suggest possible candidates. Dr Platt noted that the position would be advertised and that certainly on the European scale there would be no discrimination on nationality. Peter Herzig enquired about the cost of the Secretariat. Karen Wiltshire asked for clarification as to where the interaction between the news and information group and the Secretariat would be in the future. Trevor Platt acknowledged that the Flanders Institute had designed up the POGO website, however the website needed daily feeding and maintenance. Jan Seys described that one of the tasks of the news and information group in VLIZ had been to provide a website that was prone to be filled with information. The latter task had to be done regularly. He remarked that the person who would be hired by the Secretariat would need to have a mixture of communication skills and a science background.

Jan Seys reminded that the website was not the only task of the news and information group. He noted that since the 2006 meeting when the group had 5-6 people, active participation to the meetings had decreased. Jan hoped that POGO would be looking into a new future of outreach, advocacy and communication. Then, it would not be enough to have one additional person in the Secretariat, and there was still a role for news and information group but as an advisory panel on communication. Trevor Platt clarified that PML would handle the recruitment of the new secretariat person. POGO would not act as a recruitment contractor. Shubha Sathyendranath further explained that POGO had a contract with PML and in consequence pension for the job would be assured by PML. Andrew Willmott enquired whether POGO membership dues would be increased for the new position or whether it would be covered somewhere else. Trevor Platt stated that there would be no increase in subscription, but rather a re-alignment of funding inside the Secretariat at PML. Peter Herzig declared that in order to have a news and information group that is functional; directors and head of institutions would need to be prepared to ask their public relation officers to attend the annual meeting. Margaret Pauls thought that it was important for the news and information group to have some activities during the meeting and also to keep in touch during year. She suggested remaining in contact via emails and teleconference for preparation of the next annual meeting. It would stimulate

public relation officers to participate in the annual meeting and have a group meeting of the news and information group.

Peter Herzig enquired whether there was still a chair of the news and information group. Trevor Platt further explained that, in the past, the chair of that group had moved as the POGO chair rotated, but that when the POGO chair went to Japan, the News and Information was taken on by the Secretariat, a situation that was seen as an interim measure, because at the time there was a proposal that POGO hired a full time publicity person, but that this hiring was seen then as being outside the scope of the POGO budget. The EC had been apprehensive about this proposal, and decided to take the action out. Dr Platt mentioned that the news and information group currently relies on members to send information that would eventually appear on the website. Beyond that, it was expected that the directors would help getting the ammunition (i.e. nice information about their programs and successes) that could be used on the website. He pointed out that the response from the directors on this action had not been good. Jan Seys suggested that the news and information group creates a template or framework advising clearly which information the institutes would need to provide (i.e. one page, one title, one graph, 5 lines of explanation and a nice message referring to one publication). Trevor Platt approved the idea. Jacky Wood was stricken by Peter's comment that probably 70% on the marine community did not know enough about POGO. She clarified that it was not just about improving the website, but also about getting the awareness of the website and what was POGO trying to achieve.

Karen Wiltshire remarked that AWI had written numerous press releases about the *Polarstern* cruises and made it obvious that they were POGO cruises. However, Karen was not aware that other institutions were doing the same. She suggested asking the other member institutions which had ship and cruises to take a more active role in writing press release and advertizing POGO. Peter Herzig stated that the Secretariat should put a news and information group meeting on the agenda on the next annual meeting. Susan Avery approved the idea of having a template for the website and for sending public relation officers to the POGO meeting. She suggested the use of videoconferencing in case the institutions could not bring their public relation officers. She also noted that it would be very useful to know ahead of time the goals and expected accomplishments of the annual meeting that would justify the cost of travelling.

Peter Herzig thought it would be important for a start to have at least one meeting in Seoul where people actually meet around the table. The Secretariat should invite the public relation officers of the members institutions. Trevor Platt pointed out that they had been invited for the POGO-11 meeting. Shubha Sathyendranath clarified that the news and information group over the years had had mixed success depending largely on the level of importance that the directors gave to the activity. She also explained that members of the news and information group found that it was a time-demanding activity. Because they have limited time to spend on this activity, it became a low priority. Shubha remarked that if directors gave a different message to their public relation officers, it would change participation dramatically: the activity would not be seen as a burden but rather as a mechanism for communicating collectively and more effectively. Peter Herzig

stated that we should take care to invite the public relation officers and that there would be a separate meeting on the agenda for them to have the justification for travel. Trevor Platt remarked that directors should agree to dedicate a specific time for the news and information group meeting. Lunch time would not be satisfactory. The time would be half a day at the beginning or at the end of the meeting, but not during the actual meeting because there was no spare time nor as a parallel session because the new Secretariat would not be able to be present in both meeting at the same time. Mike Purdy clarified that the secretariat would be issuing an open invitation to all public relations officers to attend the next meeting.

POGO Business: Chair Kiyoshi Suyehiro

The NF-POGO Centre of Excellence: Tony Knap informed the participants of status and progress at the NF-POGO Centre of Excellence. The program was in its second year of existence, but Tony was optimistic that the program could go on in future years. He reminded that even if BIOS was hosting the program, faculty members from other organisations were invited to come and teach in Bermuda; expertise in physical oceanography, biogeochemistry, mooring development for instance were welcomed. He mentioned that Juliet Hermes had been teaching during the first year. Trevor Platt and Shubha Sathyendranath had been active in both years. Tony explained that currently the program was accepting ten students for ten months. The time-series program at BIOS made it easy for pogonian students to go sampling at sea. They had built up a classroom on board of the sampling ship. Tony gave an overview of the countries that had been represented in year 1 (2008-2009): Brazil, Ghana, Philippines, Venezuela, Angola, India, Nigeria, Pakistan, Portugal, and Tunisia and year 2 (2009-2010): Brazil, Ghana, Philippines, Venezuela, China, Japan, Russia, Sri Lanka, Ukraine, VietNam. Tony detailed the applicant pools of year 1: 102 applications were received from 39 countries, 36 applications came from developing countries and 2 from developed countries; and year 2: 69 applications were received from 36 countries, 34 applications came from developing countries and 2 from developed countries. For year 3, they had received more than 100 applications from various countries, including for instance Angola, Cote d'Ivoire, Egypt, Equator, Philippines, Tanzania, Ukraine, and Russia.

Dr Knap highlighted that they also accepted participants from developed countries to help creating the network with developing countries. He gave an update on current scholars. The positive points included (a) a great group of students; (b) scholars were good friends, colleagues, it helped creating a network; (c) lots of time spent at sea; (d) modules were well received (scholars spent many hours studying); and (e) independent projects were excellent in quality – wonderful pedagogy as they enhanced network. Negative points and follow-up actions included: (a) staggered arrival of students, this would be resolved by earlier completion of "preliminaries"; (b) scholars wanted/needed more hands-on lab work, longer modules with lab work would be proposed; and (c) lots of hand-holding were required at start-up (scholars have had little experience with 'open' projects), students would start thinking/working earlier on their projects and topics could be more

directed. Dr Knap finished his presentation by highlighting issues and questions about the future of the Centre of Excellence. First issue was about keeping the regional coverage versus getting the best students. He enquired whether the program should keep aiming for students with MS/PhD or whether it should focus on the 'technical pool'. He mentioned the issue of gender balance. He also pointed out the unbalanced ration between applications from developing versus developed countries: there were too few applications from developed countries (too many other opportunities?). He indicated the sites of NF-POGO Workshop in Developing Country: Brazil, Fall 2009 (Robert Frouin and Milton Kampel); South Africa, Fall 2010 (Stewart Bernard, John Field, Frank Shillington). Tony Knap mentioned the issue of the renewal proposal for year 3 activities, and noted that they were progressing on other revenue streams.

Juliet Hermes highlighted the importance of network that had been created. Mike Purdy suggested keeping the level of study of participating student to MS or PhD. Shubha Sathyendranath explained that one of the objectives from the Nippon Foundation was to identify potential leaders amongst the applicants, so she reinforced the need to keep the level of PhD and MS. Trevor Platt reminded that the rules Nippon Foundation recommended only one participants per countries. This would justify why a less qualified person might come. It was mentioned that AGU had funds for people from developing countries, which might be worth further investigating. Juliet Hermes gave the perspective from a developing country. She explained that students who were doing a PhD or MS where really fortunate and well advanced. But what they were lacking was really capacity within technical abilities. The opportunity for technicians to go to Bermuda should be considered. Tony Knap suggested the possibility to organise a three-weeks side course designed for technicians to gain skills by going on cruise. A BIOS-POGO-Nippon Foundation Centre of Excellence Certificate was delivered to the participants. A degree could not be delivered to the participants; however the certificate should be well recognised because the community knew how rigorous the course was. Tony mentioned career opportunities for the students: some were offered to do PhDs at institute such as SAEON and Princeton University. Tony noted that the students had to return to their home countries at some point to transfer all the knowledge and skills that they had acquired. One module of the program was to develop an observing program for their countries. Trevor Platt commented on the large number of applicants from Brazil: there were to be a proposal internal to Brazil to develop a Southern Hemisphere Centre of Excellence. Tony highlighted the huge coastal development in Africa.

Venue and Dates of POGO-12: KORDI would hold the next POGO Annual Meeting in Seoul, Korea, 25-28th January 2011. KORDI headquarters were located in Ansan on the West Coast of Korea. KORDI had different branches of research: (a) the Maritime & Ocean Engineering Research Center (MOERI) was located in Daejeon in the Central part of Korea; (b) the Southern Sea Institute was located on Geoje Island on the South Coast of Korea; and (c) the East Sea Institute was located in Uljin on the East Coast of Korea. Research ship capacity of KORDI included: (a) R/V Onnuri (capacity of 41 scientists and crew, cruising in Pacific Ocean and High Seas); (b) R/V Eardo (capacity of 32 scientists and crew, cruising in Coastal waters and adjacent seas; (c) R/V Jangmok (capacity of 15

scientists and crew, cruising in Inner coastal waters and adjacent seas; and (d) Ice Breaker Araon (capacity of 84 scientists and crew, cruising in Antarctic and Arctic area). Additional information about KORDI can be found at http://www.kordi.re.kr/english/

Yeosu Expo 2012: Kyu-Yearn Hwang general director of the organizing committee introduced "The Living Ocean and Coast" theme of the exposition that would be held from May 12 to August 12, 2012. The committee expected 8 million visitors from over 100 countries. Kyu-Yearn Hwang gave a brief historical review of Expos and their legacy; he then reviewed some post-modern Expos and their themes. Yeosu Expo's vision was divided in three core areas: (1) innovation and harmony for ocean and coast; (2) new opportunities for blue economy; and (3) ocean as smart solution for climate issues. The Yeosu Expo's theme would be divided in sub-theme pavilions including climate and environment, marine creatures, marine industry and technology, marine civilization and city and marine arts. Promotion of international participation was confirmed by 35 countries (including Japan, Spain, China and Germany) and 3 international organisations (including the OECD, IPCC and PEMSEA). The Yeosu Declaration was on global commitments towards enhancing awareness and specifically included (a) accompanying practical financial commitment; (b) capacity building for developing and small islands countries; (c) international co-operation with Intergovernmental Organization, participating or relevant countries; and (d) special agenda on marine eco-friendly management. The Yeosu project focused on implementation measures of Yeosu Declaration. Example measures were given for the ocean-related issues to be addressed for developing and small islands countries: (1) bridge ocean divide between developed and developing countries; (2) build capacity for meeting challenges of climate change; and (3) assistance for research, study and education. Key attention was given to Ocean and Coast Best Practice Area (OCBPA) to share diverse ideas and expositions. Kyu-Yearn Hwang highlighted the areas of co-operation with POGO: (a) to participate in the OCBPA with the theme of ocean observation; (b) to participate in the International Organization Pavilions; and (c) active co-operation on the occasion of the POGO-12 in Korea.

Mike Purdy enquired about the participation of the United States in the Expo. Kyu-Yearn Hwang commented that Yeosu had not had any answers from US government. However, Yeosu had some positive answers for collaborations from institutions and government organisation like NOAA. Kiyoshi Suyehiro suggested going to consortium for Ocean Leadership. Gregorio Parrilla enquired who had been contacted in Spain. Kyu-Yearn Hwang explained that usually they had contacted the ministry of foreign affairs in each government and the foreign embassy. Trevor Platt explained that a committee was in place to select participants to the exhibition in the pavilion of best practice for ocean. A suggestion for POGO exhibition would have to be submitted in March. Kyu-Yearn Hwang clarified that there would be a designatory and a voluntary exhibition in that pavilion. The Yeosu committee suggested that POGO would be interested to participate in the designatory exhibition and the international pavilion. Selection would be in May and notification would be in November.

POGO Budget: Shubha Sathyendranath presented the provisional POGO Budget for 2009. The budget had been distributed to all participants of the meeting. POGO was a non-profit organization registered in Canada. POGO had a contract with PML in th UK for the secretariat. To maintain the legal status of a non-profit organization, POGO needed to have some activities in Canada. Shubha Sathyendranath described each section of the budget.

Inflation was taken into account in preparation of the budget. Kiyoshi Suyehiro approved the numbers.

Proposed Action items from POGO-11 - draft

Session 1: Infrastructure for Ocean Observations

1. Data sharing, cyber infrastructure.
    a. Secretariat to create a page on the POGO website, listing time-series stations that have on-line data. Action: Secretariat.
    b. Encourage use of national oceanographic data centres, ocean data portal and IODE facilities by POGO member institutions. Action: POGO Member Directors.

2. Promote sustainability of existing observations
    a. Advocacy: through website, through outreach, through collective effort of member directors. Action: all.

3. Sharing of resources-which?
    a. Explore further development of resource sharing (ships and heavy equipment), building on existing examples in Europe and USA. Action: POGO Member Directors.

Session 2: Ocean observations

1. Given the major concerns about the composition of the working group that is following up on the OceanObs'09 meeting, write to OceanObs'09, suggesting additional members from Asia. Action: Executive Director.

2. Write to IOC suggesting Working Group should include WMO because of its expertise in sustained international observing systems. Action: Executive Director.

3. Bring to attention of Executive Secretariat of IOC importance of Baker Report and its recommendations, and that POGO is keen to participate in any future discussions to take the various recommendations forward. Action: Executive Committee.

4. Members of POGO Executive to visit Dr. Wendy Watson-Wright, to promote fresh dialogue between POGO and IOC and emphasise POGO's willingness and enthusiasm to work closely with IOC on all areas of mutual interest. Action: Executive Committee.

5. POGO members, who are also part of the national delegations to IOC, to communicate the same message to IOC, regarding the Baker report. Action: POGO Member Directors.

6. Develop outreach strategies, e.g. at GEO Ministerial Summit in Beijing in November 2010, IOC 50th Anniversary Celebrations in 2010 -11 and possibly COP-16 in 2010 in Mexico City, perhaps under Ocean United banner. Action: Executive Committee.

7. POGO Executive will review the recommendations of the Ocean Obs'09 Working Group when it appears and transmit this and their views to POGO members for their use as appropriate. Topic will be placed on agenda for POGO-12. Action: Executive Committee.

8. International Quiet Ocean Experiment: POGO members to support the workshop planned on this topic. Action: Executive Committee.

Session 3: New Oceanographic Facilities

1. International Cruise Information Database: POGO members to encourage timely and informative inputs on upcoming cruises to the cruise information system. Action: POGO Member Directors.

Session 4: Extreme Environments

1. POGO to support the proposed workshop on Deep Carbon Observatory. Action: All.

Session 5: Science and Policy

1. Core observations and committees: POGO member directors to take the list of some 400 committees that are related to ocean observations, and to assess their institutional interest. Based on the response, POGO to produce a list of those groups (and their acronyms) that are seen as being of interest and value to the members, collectively. Action: Secretariat.

Sessions 6 and 7: Development of POGO

1. Outreach and communications
    a. POGO Secretariat to strengthen in-house capacity for communications and outreach, including web maintenance and development. Action: Secretariat.
    b. POGO News and Information Group to be convened in Seoul on the occasion of POGO-12. Action: Secretariat.

2. Planning for POGO-12
    a. POGO Secretariat and POGO Executive to develop (work jointly towards) the agenda for POGO-12. Action: Secretariat.
    b. POGO Executive to meet once inter-sessionally, to facilitate planning. Action: Chairman.

c. POGO-12 to be hosted in Seoul by KORDI during 25-28 Jan 2011. Action: Secretariat.

Capacity Building

1. POGO to continue its various capacity building activities, including the POGO/SCOR fellowship programme, the bursary (at University of Cape Town), ASI (University of Concepción), Visiting Professorship, and the NF-POGO Centre of Excellence in Bermuda. Action: Executive Committee.

Appendix 1:
Expansion of Acronyms

AGU	American Geophysical Union
AMT	Atlantic Meridional Transect
AWI	Alfred-Wegener Institute
BEAGLE	Blue Earth Global Expedition
BIOS	Bermuda Institute of Ocean Sciences
CAS	Chinese Academy of Sciences
CoML	Census of Marine Life
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCO	Deep Carbon Observatory
DIC	Dissolved Inorganic Carbon
FIO	First Institute of Oceanography, China
GEO	Group on Earth Observations
GOOS	Global Ocean Observing System
I-GOOS	Intergovernmental Committee for GOOS
GS	Geological Survey
GSSC	GOOS Scientific Steering Committee
ICID	International Cruise Information Database
ICIS	International Cruise Information Systems
ICSU	International Council for Science
IFM-GEOMAR	Leibniz Institute of Marine Sciences
IMDIS	International Conference On Marine Data and Information Systems
IMOS	Integrated Marine Observing System
IPCC	Intergovernmental Panel on Climate Change
IOC	Intergovernmental Oceanographic Commission
IOCAS	Institute of Oceanology , Chinese Academy of Sciences
IOCCP	International Ocean Carbon Coordination Project
IODE	International Oceanographic Data and Information Exchange
IODP	Integrated Ocean Drilling Program
IPY	International Polar Year
JAMSTEC	Japan Agency for Marine Earth Science and Technology
JCOMM	Joint WMO-IOC Technical Commission on Oceanography and Marine Meteorology
JCOMM-OPS	JCOMM in-situ Observing Platform Support Centre
KAUST	King Abdulla University for Science and Technology
KORDI	Korean Ocean Research and Development Institute
LDEO	Lamont-Doherty Earth Observatory
MarBEF	Marine Biodiversity and Ecosystem Functioning
MarBEF NoE	MarBEF Network of Excellence
MBA	Marine Biological Association
MGE	Marine Genomics Europe

MOIN	Minimalist OceanSITES Interdisciplinary Network
NOAA	National Oceanic and Atmospheric Administration
NOCS	National Oceanographic Centre, Southampton
NODC	National Oceanographic Data Centre
NPOCE	Northwestern Pacific Ocean Circulation Experiment
NRC	National Research Council
NSF	National Science Foundation
OceanSITES	Ocean Sustained Interdisciplinary Time series Environment
OCBPA	Ocean and Coast Best Practice Area
OECD	Organization for Economic Co-operation and Development
OOI	Ocean Observatories Initiative
OOPC	Ocean Observations Panel for Climate
ORION	Ocean Research by Integrated Observation Networks
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PICO	Panel for Integrated Coastal Observations
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PML	Plymouth Marine Laboratory
POGO	Partnership for the Observation of the Global Oceans
POL	Proudman Oceanographic Laboratory
SAEON	South African Environmental Observation Network
SAFOS	Sir Alister Hardy Foundation for Ocean Science
SAMS	Scottish Association for Marine Science
SeaDataNet	Pan-European infrastructure for Ocean and Marine Data Management
SCOR	Scientific Committee on Oceanic Research
SH	Southern Hemisphere
SOOS	Southern Ocean Observing System
TAO	Tropical Atmosphere Ocean
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
VLIZ	Vlaams Instituut voor de Zee
WCO	Western Channel Observatory
WG	Working Group
WHOI	Woods Hole Oceanographic Institution
WMO	World Meteorological Organization