MINUTES

EXPLORATORY MEETING ON

A PARTNERSHIP FOR OBSERVATION OF THE GLOBAL OCEANS

March 8-10, 1999
Paris, France

DAY ONE

SIO, WHOI, and SOC convened the exploratory meeting for a possible new global ocean partnership at the headquarters of the IOC on March 8, 1999. The participants list is attached as Document 1. The agenda is given as Document 2. Dr. John Shepherd, Director of SOC, chaired the first day. The purpose of the meeting was to determine if it would be fruitful to establish a regular forum for ocean institutions to meet and work together, and if so, to define terms of reference, membership criteria, and some initial tasks. Day 1 provided an opportunity for all the participants to hear a current overview of major international coordination initiatives involving ocean observations and related activities; to hear from the GOOS program, and to make opening comments giving their agency perspectives on the proposal to form a coordination mechanism. The organizers of the meeting stressed the informal and exploratory nature of the session, encouraging creative discussion and not seeking formal commitments at this time.

After Dr. Shepherd's welcome, and a review of logistical matters, Dr. Jesse Ausubel, representing the Alfred P. Sloan Foundation, which provided funding support for the meeting, gave some welcoming comments. The Sloan Foundation is pleased to work with and support the oceanographic community. A group such as proposed can help the research community in work that can lead to practical applications as well as advancing scientific understanding. The Census of Marine Life, which he described later in the meeting, could benefit significantly from the creation of such an organization.

Dr. Shepherd gave some background on the genesis of POGO concept, which arose from informal discussions between Dr. Kennel, Gagosian, and Shepherd about how to get things done globally. The view was that there could be merit in a partnership of marine institutions that carry out research on a global scale. Some nations coordinating mechanisms for research institutions, but on a global scale there is no association of marine institutions--just intergovernmental organizations. At the same time, there are issues like data policy, education, etc. for which institutions working together can make things happen. So they convened a meeting to discuss a possible new organization.

Dr. Shepherd stressed that there are a set of questions to be addressed in this meeting involving the purpose and structure of an organization if we think it would be useful to form one. He noted that draft Terms of Reference had been prepared, borrowing from existing terms of reference for other organizations. One fundamental question is who should be parties to any new organization. The participants in this meeting were selected by a somewhat ad hoc process to represent the larger community while keeping the number of participants relatively small. The hope is that the participants would serve a broader set of

institutions and would communicate the results of this meeting to their affiliated organizations as well as representing broad community views during the meeting.
The organizers proposed that the meeting produce a high level summary document for widespread distribution and a more detailed set of minutes for the use of the participants. Both documents would be publicly available and each would serve a different purpose. Both would be distributed in draft for participants to review and comment on before final dissemination. (Action 0.1)
The question was raised about the scope of a proposed organization &endash; whether it would be limited to physical oceanography or would be broader in scope. This issue was deferred until later in the program.

VIEWS FROM INTERNATIONAL ORGANIZATIONS
Dr. Patricio Bernal, Director of the Intergovernmental Oceanographic Commission (IOC), welcomed the group to Paris. He stressed the pleasure of IOC in hosting this meeting, which he sees as a very positive development. He noted that the oceanographic community is relatively small, and that the world has evolved to the point that oceanography is not just a science-driven pursuit, but a necessary endeavor to answer questions of importance to society. At a time of decreasing budgets in the United Nations system, it is important to build on the potential contribution of oceanographic research and operational activities.
Dr. Bernal stressed the value of synergy among marine institutions. He noted that some may find the proposed organization to be somewhat threatening, since the organizations in this meeting represent a substantial portion of the global capabilities in oceanography. Therefore, he advised the group to be mindful of the responsibility of working on behalf of the entire community, stressing particularly the need for capacity building in developing countries. Unlike some other major research initiatives, we are not building a single facility or studying a single issue, but attempting to observe and predict the complex ocean system. This is a challenge that may call for new social arrangements to offset or moderate historical competition between institutions. The IOC views this initiative as complementary, not competitive with IOC and its goals. He stressed the strong support of IOC and its willingness and eagerness to work together with any new organization that might be formed.
Dr. Jean-Francois Stuyck-Taillandier gave a summary of the International Council for Science (ICSU) and its interest in the integrated global observing strategy. He gave a brief overview of ICSU, noting its role as a co-sponsor of the global observing systems and research programs such as WCRP, IGBP and IHDP. ICSU participates in the IGOS Partnership group and strongly supports the IGOS effort. He indicated ICSU's support for the POGO initiative.
Dr. Shepherd recalled that the Committee on Earth Observation Satellites (CEOS) was one of the strong inspirations for the concept of an ocean coordination group in order to have a partner to interact with space agencies providing global ocean observations. Dr. Tillmann Mohr, Director of EUMETSAT, the current Chairman of CEOs, gave an overview of CEOs, its structure, accomplishments, and the status of the Integrated Global Observing Strategy process. (Document 3)
He noted that CEOs was created through an initiative of the G-7, and in its early years focussed on technical coordination, moving in the last five years to a more strategic view of mission planning. There are two permanent working groups (calibration/validation and

information systems and services) as well as ad hoc groups created for specific limited tasks. There is a permanent secretariat, which includes representatives for Japan, Europe, and the US. The chairmanship rotates each year, with the past, present, and next chairman participating in the leadership for continuity.

Dr. Mohr summarized the accomplishments of CEOs, which include an on-line international directory network, publications including a newsletter and a dossier of all satellite missions and instruments, and a set of data exchange principles. He then described the IGOS partnership process. Although the idea was first presented in CEOs, it was recognized that the concept required the participation of users and of in situ data providers in addition to space agencies. Therefore, CEOs stimulated the creation of a partnership group, which has now adopted "ownership" of the IGOS concept. Dr. Mohr noted the absence of an organized representative group for in situ ocean data providers and encouraged the creation of a group such as proposed here to serve that role.

He then made some observations on the lessons learned by the CEOs experience that might be relevant to the deliberations of the current meeting. CEOs operates as a best efforts group without formal voting or obligations. This can be positive or negative, depending on the commitment of the individuals and organizations that participate. Similarly, not having a formal link to any political body or intergovernmental organization can limit the visibility of CEOs work, but also gives CEOs more flexibility. Dr. Mohr stressed the importance of Directors actually participating personally in meetings if a group is formed, so that they can make commitments and the group can do more than just discuss and debate.

There were questions about CEOS's role in stimulating or nurturing funding for additional capabilities and sparking international partnerships in sharing of platform resources. Dr. Mohr, Dr. Kennel, and Dr. Shaffer responded that CEOs provides a forum in which agencies can exchange information and become knowledgeable about other organizations' interests and capabilities and this has made bilateral and trilateral cooperation easier. It has also provided additional justification and context for national entities to seek funding and get approval of new missions.

The contrast was noted between space agencies, which are relatively few and relatively big, and ocean research institutions which are quite numerous and generally much smaller. This will inevitably call for a somewhat different approach for POGO than CEOs uses. The point was also made that any technical coordination that a POGO might undertake was likely to cut into existing groups and activities. These points were noted for later discussion during the meeting.

The question of whether we are addressing a Strategy or a System was raised, and Dr. Shepherd suggested that the translation of a strategy into a system is the area where a POGO might contribute as a catalyst or lubricant, focusing on the implementation, rather than the strategic planning.

Dr. Jean-Francois Minster gave some initial observations from the perspective of INSU (Document 4). He noted that although INSU addresses all aspects of Earth system science, he views the POGO concept as being most effective if it is limited to physical oceanography rather than attempting to do potentially too much and achieving nothing. He described the range of complexity involved just in physical oceanography, noting that there are many challenges in implementation plans; even in satellite observations where the community

sometimes wrongly assumes that all is well. Issues of precision and timeliness are still to be resolved, as is assuring continuity of altimetry from satellites. The issue of who has responsibility for operational oceanographic observations is still a major unresolved question. Dr. Minster gave some examples of areas where important progress is being made, integrating observations and models, such as salinity in the Mediterranean. High resolution models will drive the need for improved data assimilation and must engage groups beyond research agencies. In the French MERCATOR program, eight French institutions are involved and working well together.

Dr. Minster identified areas of challenge in the long-term suite of in situ data, including maintaining the XBT lines; extending the TAO array to the Indian and Tropical Atlantic oceans; renewing surface floats (ARGOS); reducing the cost of new instruments (PALACE-PREVOR, EMMA); completing ARGO. We need to achieve GODAE and think already now about the post-GODAE period. He made the analogy between GODAE and FGGE. However, there are also differences between oceanography and meteorology. The drivers for information have different origins and sources of support, and the meteorological community has been organized for a longer period of time. Nonetheless, there are lessons to be learned from the meteorological experience, particularly in demonstrating societal benefits. He also noted a difference in timeframes: we want to do something next year, while meteorological cooperation has been growing over more than a century

Dr. Minster advocated the involvement of operational agencies in any organization we consider because of their capability and experience in long-term sustained observations, and the desirability to free the research community from the "burden" of routine operations. He also noted the relatively strong influence of academic institutions in oceanography compared to meteorology where there are more operational entities.

Dr. Stuart Godfrey noted a specific opportunity for a group like POGO to help with research campaigns in the Indian Ocean, by (e.g.) inviting the Directors of Lembaga Oceanographic National (Indonesia) and National Institute of Oceanography (India) to participate in POGO meetings. Dr. Flemming indicated that there may be stronger customer interest already evident for oceanographic data and information that Dr. Minster suggested.

On behalf of Dr. John Gould, Dr. Trevor Guymer gave an overview of CLIVAR Requirements for Global Sustained Observations (Document 5). CLIVAR is a research program that depends on the continued availability of sustained observations, and serves in return as a customer/user for the global observing systems. Dr. Guymer stressed the importance of the observation community and the climate research community seeing themselves as partners and not competitors. He reviewed CLIVAR objectives. He noted the CLIVAR view that both operational needs, such as real-time data access, and research needs such as high accuracy, need to be addressed in any long-term sustained observing networks. There is recognition that the community will benefit from both quick access, even at reduced quality, and off-line access to higher precision products. Dr. Guymer also gave some interesting examples of CLIVAR activities and results. He stressed that a POGO-type organization could be very valuable to CLIVAR.

Dr. Shepherd noted that the acronyms POGO and AMIGO were meant to stimulate discussion and as suggestions, but are open for discussion and have no particular special implications or distinctions in terms of the words Partnership or Association.

Dr. Colin Summerhayes gave a GOOS Status report (Document 6), summarizing the status of the different GOOS elements and identifying areas where a POGO-type organization could contribute to the achievement of GOOS objectives? He noted the new GOOS Prospectus (Document 7). GOOS covers a wide range of objectives and user communities. Dr. Summerhayes summarized the coordination across the 3 Global Observing Systems, and described some of the GOOS pilot projects now underway.

One notable development is the impending agreement between WMO and IOC to create a Joint Technical Commission on Marine Meteorology (JCOMM). This is significant because it demonstrates the recognition by both institutions of their common interest and the need and desirability to become more closely integrated and more efficient in marine observations.

GOOS addresses biology as well as physics and chemistry, even though the communities are not at comparable levels of capability in terms of observing technologies and sensor systems. Nonetheless, he stressed the importance of anticipating biological observation needs in the design of any long-term ocean observing strategy. The need to be able to demonstrate the benefits to society, and thus provide the justification for government investments, is extremely important to the success of global ocean observations.

The GOOS view is that a POGO could help by: engaging major users and data suppliers; performing or contributing to pre-operational R&D, such as is underway in GODAE, in the ARGO program, and in CLIVAR; providing quasi-operational observing systems (e.g., the TAO array); conducting sensitivity studies and experiments to improve system efficiency; providing infrastructure (labs, ships, instruments); and facilitating training and capacity building especially in developing countries.

Dr. Summerhayes identified some incremental next steps: testing and developing biological and chemical sensors on buoys and floats; demonstrating the El Nino forcing of biology and chemistry in the Eastern Pacific; make technology better and cheaper; improve data and information management; and develop advanced training for developing countries. A new paradigm is needed for data management to ensure widespread, easy and timely availability of all data. He proposed a workshop on data system architecture and product interfaces, and a possible pilot project in the Gulf of Mexico to demonstrate integration of data systems.

The Global Observing Systems data management strategy has been released recently and GOOS is just beginning to discuss how to implement the strategy for GOOS. Dr. Flemming noted that EuroGOOS will have its data and information system ready by the end of this year, based on the EUMETNET approach.

Dr. Kennel noted the question of whether we should aspire to define a data and information system or strategy, given the diversity of existing capabilities and of user requirements. Dr. Gagosian observed that some of the GOOS products described have a geological component relative to ports and sedimentation.

There was discussion of who actually will or does produce GOOS products. Many existing operational and research institutions are evolving their data products to include GOOS products based on improved understanding of user needs and system capabilities.

In response to a question of how additional resources would be used if available, Dr. Summerhayes responded that increased national commitments to GOOS, implementation of GODAE, and deployment of the entire ARGO network would be the GOOS priorities.

Dr. Shepherd suggested that developing and deploying biological sensors would be a high priority for new investments. Dr. Roe commented that present technologies are prohibitive because the amount of space and power required for biological sensors is not compatible with floats and buoys. Others observed that some use of floats is feasible now, but clearly there is a need for technology development.

Dr. Neville Smith then gave an overview of the development of an ocean observing system for climate and GODAE (Document 8) and how a partnership, POGO, could contribute. He stressed the idea that we should look at operational AND research; not make hard distinctions between them; noting that there is no clear line between long-term observations. This should be a partnership, not a form of discrimination. He reinforced the significance of the expected WMO/IOC decision to form a Joint Commission as a model for restructuring in the broader operational/long-term ocean observing communities.

We need to work globally to build a community with multiple strategies, building on existing programs. He noted fundamental requirements for space-based SST, precision altimetry, and scatterometer winds, even though all the issues of precision and resolution are not yet resolved. Complementary global direct measurements are also needed. He stressed the importance of surface radiation.

The variety of techniques for upper ocean temperature were listed, with the question of how do we determine the appropriate balance between these different sensor approaches. Good experiments are needed to evaluate the value from, and sensitivities to, each technique to enable wise choices. Dr. Smith gave an example of sea level analysis where the value of integrating satellite and direct measurements has been clearly demonstrated, and has brought previously competing groups together for a better result than either could achieve alone.

Dr. Smith gave some of the history of GODAE, which is an attempt to bring together all the pieces in an extended demonstration and to keep valuable observing systems going beyond project-by-project deployments. One key to GODAE is that all data products must be available to everyone in real-time and cannot be retained by limited groups for exclusive scientific use.

He also stressed that data assimilation needs good science to understand variability. The apparent incompatibility of some data with some models shows that we need to put enough energy into data assimilation to enable the value of observations to be realized by models and used to improve predictions. One pilot activity in GODAE is high resolution SST derived from multiple sources to support high-resolution models. Dr. Smith also noted that technological progress has enabled the ARGO concept to move from being a "global ocean data dream" to a reality by reducing the costs. While ARGO will not solve all ocean observing needs, it is an important and exciting development.

GODAE has identified a "commons" where data and other resources are shared among all. GODAE has patrons and partners. The period of 1999-2002 is a preparatory period for pre-operational testing and prototype activities, leading to an intensive period of 2003-2005 for full implementation.

There will be a major conference October 18-22, 1999 in Saint Raphaël, France, on "Ocean Observing Systems for Climate" which aims to draw consensus and integrate the various communities and seeks a commitment to a more open real-time data sharing regime.

Dr. Smith noted the absence of an institutional structure for long-term ocean observations to serve the role that the TOGA Board played for that program. The operational community will have the new JCOMM and the space agencies have CEOs, but the ocean research community does not have a group. We need scientific innovation and evolution; better techniques for climate change; practical assimilation; capacity building; and research into data and information management to define a new paradigm. We need to be able to demonstrate economic and societal value from ocean research. In summary, sustained research needs a new partnership. He also noted the eventual need for a group focused on developing applications, comparable to the IRI for seasonal climate predictions.

The group noted that planning should already be underway for the post-GODAE period as well. Dr. Smith's comments on the variety of techniques for ocean temperature were noted and discussed &endash; who will make the intercomparisons and propose the proper mix. Dr. Smith presented a matrix used in OOSDP and OOPC to evaluate the contribution of different observations to defined project objectives that has been used in several OOPC workshops to help evaluate the value of particular techniques for particular uses. He said this has been surprisingly uncontroversial and very useful in debating and quantifying such questions.

Dr. Ausubel gave a summary of the Census of Marine Life (Documents 9 and 10). He described the scarcity of knowledge today about marine biodiversity. The Marine Census aims to answer the questions of what did; what does; and what will live in the oceans on a global basis. The concept and strategy were developed through a series of workshops and feasibility studies involving some 300 scientists over the last two years. These studies concluded that there is a tremendous amount to learn; that it is feasible to conduct such a survey although very difficult; that the cost could be comparable to other major oceanographic programs; and that most of the constituencies, including industry and the general public, seemed to want it (as evidenced by the amount of media interest).

A ten year program is envisioned to describe and explain the diversity, distribution, and abundance of marine life. In the coming year, a scientific steering committee and small secretariat will be established, and the community of participants will be expanded.

There was strong interest among meeting participants, noting the exciting potential for new knowledge and the importance of understanding marine life. Dr. Ausubel stated that an organization like POGO will be absolutely essential for the success of the Census of Marine Life.

DISCUSSION: WHAT DO YOU WANT FROM THIS MEETING/THE CREATION OF POGO?

Dr. Jarmache suggested we needed to understand what exists today in order to reach agreement on what else might be needed. Today there are intergovernmental organizations, scientific groups, and informal cooperative activities. There is no group of marine research institutions. There are examples of the potential benefit of a new forum, enabling more coordination such as took place in support of the ARGO project. Dr. Roe noted that this group has to focus on implementation to make it different from a talking club. Otherwise we shouldn't proceed. The group could provide a "one-stop-shop" to enable users and other groups to efficiently address the in situ ocean providers at one time, which can create new synergies and increase the results for all participants.

Dr. Rogers emphasized the coordination and/or sharing of resources, using ship time as an example. Dr. Send elaborated, suggesting that a forum for providing and sharing equipment at cost among institutions, rather than for a profit, would be very valuable. There are obstacles presently due to different funding mechanisms and organizational structures, and a group could provide a forum where these issues could be addressed and overcome. Dr. Rogers added that technology could be shared among participants and with developing countries in need of capacity building.

Dr. Bray said a forum could validate decisions on how to spend available resources &endash; to gain confidence that investments are effective in the broader global context, and that the efforts can be leveraged. It would help to show the value of the investments for funding agencies.

There was discussion of the need to have "dreams" of what might be desirable so that as/if resources do become available, there are well-defined and commonly shared plans to take best advantage of opportunities.

Dr. Hotta noted that JAMSTEC is very committed to international cooperation and has many partnerships in place. He expressed the desire to consider not just surface observations but deep ocean research needs as well and his concern whether or not a new partnership organization is necessary in addition to existing organizations and networks. He informed us of the integration of Monbusho and STA, planned in 2001, which will result in significant changes in the Japanese oceanography establishment, in particular oceanographic observations.

Dr. Taira observed that if the ocean community is going to undertake an intensive program comparable to FGGE, we need to work with the operational community to be sure that the capacity for telecommunications and data management are in place to take advantage of the initiative.

Dr. Shepherd summarized the organizational questions as follows: should we include research and/or operational institutions; a few big institutions and/or many small ones; should there be "lead agencies" in each country; is GOOS more than just physics; and do we need a new partnership? He indicated his own thinking that we will need both research and operational entities from what he sees as a spectrum. What we need is the tools for the job. We also need to recognize that each country may have a different internal structure and thus there is not one solution that applies everywhere. Several examples were given by participants of the relationships between research and operational entities. The concept of "operational science" was proposed to describe the interface. The thing to avoid, it was agreed, is to allow the operational meteorological community to "invent" operational oceanography without the involvement of the research community.

What is the added value of this group? Dr. Bernal noted the scale factor: a group like this can speak of things that no one can do alone. Funding may be available to an organized community effort that could not be obtained by an individual institution. He mentioned the Global Environment Facility as an example. Dr. Mohr gave his views on the organizational question stating that there is a clearly defined need for an organization to address in situ ocean observations, and that it should include whichever institutions participate in that process, whether research or operational and whether large or small.

DAY TWO PREVIEW

Dr. Gagosian previewed the second day's agenda and noted the possible expansion of the range of observations and research to include geophysics in addition to physical, biological, and chemical oceanography, especially in light of the strong public interest in earthquakes and tsunamis. He said that while the different disciplines are at different stages of maturity with respect to coordinated global observations, we need to move in a way that allows for a modular approach and anticipates evolution of the community in the future. He pointed out the shift in funding sources and research priorities in the last 10 years in response to the end of the Cold War and increased awareness of global climate issues. We must be flexible with respect to future evolutions of this sort. He also stressed the importance of public understanding and education.

DAY TWO

The second day began with Dr. Gagosian reviewing the questions for discussion &endash; do we want to set up a group, and if so, what unique role can it play. The functions of the group should inform the discussion of structure, size, and membership criteria. Gagosian recognized the need to address the question of operational organizations and how they would relate to our group.

DISCUSSION: OBSERVATION AND TECHNOLOGY

To stimulate some of the discussion, David Rogers and Bob Weller presented some thoughts on how such a group might contribute in the area of observations and technology (Document 11). They reviewed the existing global observational programs. Dr. Rogers noted that, even for already defined and approved programs such as ARGO, there are still questions of implementation. There are other projects which are not as mature in terms of approval and funding, such as a global eulerian observing systems of moorings and a seismic array called the Deep Earth Observatory System (DEOS). Developments in technology have enabled consideration of capabilities that would have been impossible 10 years ago. The constraints primarily involve getting power down and data up from deep sensor systems. Additional technologies being developed and demonstrated include acoustic thermometry.

The challenge is for institutions and scientists to step back from their parochial commitments to individual solutions to consider a system-level view and to develop the optimized mix of different technologies best suited to the information needs of research and operational users. There was discussion of the extent to which synergy is possible &endash; the location for observations is driven by both technical and scientific considerations (localities for biological process studies may not be optimal for atmospheric measurements), as well as political and social concerns among participating institutions. To some extent, competing groups have impeded progress but it is imperative to integrate the observing technologies. The different parts of the community have to come together and talk and be willing to consider new approaches.

The potential POGO participants are organizations that in some ways represent capabilities, comparable to a "plug" in the ocean, providing telecommunications and power for many users and uses. This can be a powerful contribution and allows for leverage in integrating observing activities.

A related area for POGO attention is the sharing of broader infrastructure, including ship time, moorings, and other observatories. POGO could provide the forum to learn of opportunities and to enhance the efficient use of such investments. Agencies attempting to secure funding for observing activities could seek technical guidance or find complementary capabilities that could be incorporated in a proposal. Those with specialized technology could share more easily within a POGO forum, consistent, of course, with appropriate laws and regulations. The group was not aware of any significant profits from sale of marine observation technology; rather there are significant benefits obtained from more openly sharing it and improving capacity around the world. The group noted that Eulerian observing platforms are expensive and require substantial supporting infrastructure. With the synergies a forum like this can provide are we more likely to be able to get the necessary resources and commitments to sustain long-term observations.

In discussing possible interdisciplinary use of time series observatories that could be deployed in the near future, the group noted the need to carefully consider technical constraints in terms of size, power, data rate, as well as the readiness of the research community to define its observing requirements. Not all platforms can or should be used for biological and chemical measurements in addition to physical observations. However, there are opportunities for synergies. One example was in Australia where CSIRO used supplemental funding to put additional sensors on ships of opportunity already making routine cruises in the region. This was done in cooperation with the Bureau of Meteorology and benefited both institutions. Dr. Bray noted that getting started is important, even if the ultimate system solution is not ready.

Participants expressed interest in using the forum to improve regional planning for such activities as ARGO deployment. This group can help identifying a gap and then find leadership to meet a particular need. If an agency with a mission or capability lacks one particular component or wants to open opportunities for others, this forum can foster better communication and connections to fill such gaps and take advantage of opportunities. POGO could help in upgrading the technology used for observations on ships of opportunity, working with the operational community.

Participants discussed the importance of viewing sustained observations as serving both research and operational objectives, and are working to blur the line between the two sets of requirements and foster the closest possible relationships between "wet" and "met" organizations. The group also noted that research and preoperational experiments cannot all be expected to become operational; rather there is a critical screening process to define what measurements are really essential, sustainable, and affordable for operational implementation. This transition from research to operational capabilities is a major area of POGO interest, and we need to be anticipating operational needs in the design of prototype observing systems because of the long lead-times for system development and approval, and to maximize the value of the research investments. The ultimate operational users should be engaged in the design of pre-operational observing systems where possible. In many countries there are still crucial gaps in institutional structure and mandates and it is not clear which organizations, if any, have the responsibility for sustained ocean observations at national or regional levels.

The discussion concluded with a consensus that the time is right to proceed with implementation of time series observing stations in support of CLIVAR and other objectives. Each interested organization has considered participation but they are reluctant to proceed alone and need the assurance that their individual investments will significantly contribute to a broader network. POGO can serve this integrating function. Workshops have been held and reports written, but for various reasons, time series observatories have not yet been established. The group recognized that this could be an exciting and useful pilot project for POGO to support and undertake, in conjunction with OOPC and other groups (Action 0.12)

The group agreed to the following conclusions regarding global ocean observing system:

The meeting recognized the importance of the development of the global ocean observing system via pilot projects and other strategic initiatives.

For the potential partners the are of particular importance:

· GODAE

· Argo
· Time-series observatories
· Communications and telemetry
· Repeated hydrographic and biogeochemical sections

As a specific initiative, the meeting recognized the importance of rapidly developing a project for ocean time series/observatories. The meeting requested OOPC to develop a plan for consideration at the next meeting of the participants. This plan should consider the effective sharing of information, technology and experience among participants in the project.

ORGANIZATIONAL STRUCTURE

The discussion then moved to the scope and structure of the proposed organization. The essential debate was whether the group should concentrate on global observations or on global-scale oceanography. Many views were expressed, and in the end, the consensus was that the initial scope should concentrate on observations as a real area where such a forum could have an impact, and that over time, the scope and activities could be expanded as the group evolves. There was agreement that the concept of partnership was essential. We want the flexibility of an organization that is not formal and intergovernmental. We need to be able to distinguish the unique contributions of this new group from the mandate and work of already existing organizations.

The discussion resulted in a Charter and Mission Statement (Document 12).

DATA AND INFORMATION MANAGEMENT

In the area of data and information management, the group reviewed areas of possible POGO involvement. Discussion ranged from data access policies to the adequacy and cost of telecommunications requirements for data relay from remote observing platforms. The participants discussed areas where the proposed group could be useful in addressing data and information issues. There was agreement that this area needed additional consideration before any action plans could be defined. Work is being done for deep ocean observing systems (DEOS) that would be of use to the group (Action 0.13).

Therefore, it was agreed that, as a first step, each organization would identify a point of contact with expertise in data and information issues related to ARGO and time series observatories. These experts would assess, for their organizations and related communities, the adequacy of protocols, bandwidth, data retrieval from repositories, and understanding of costs, as well as any other issues they identify, to recommend future activities for the group. Dr. Weller offered to serve as the focal point for developing this area for consideration at subsequent meetings (Action 0.11).

DAY THREE

PUBLIC UNDERSTANDING AND EDUCATION

The third day began with a discussion of public understanding and education. Dr. Gagosian presented some of the public outreach strategy and activities of Woods Hole. He described the motivations for these activities, including sharing the exciting discoveries from ocean exploration and the need to maintain and expand government support and interest in funding ocean research. WHOI and other US institutions are also emphasizing the value of ocean education at primary and secondary levels as a way of interesting children in science overall.

In the area of media relations, WHOI has been successful in working with public television and cable networks as well as print media. The mass media are in search of content for their educational and documentary programs and welcome contact with research institutions. WHOI identifies target audiences where effort is most likely to be productive, for example, key political actors and writers for major publications. They focus on what is understandable and try to make it a personal story of exploration and discovery rather than a dry, impersonal science presentation. He stressed, and others confirmed the value of media training for scientists who will be interacting with the public and the media to improve the effectiveness of public communication.

Another area of great impact is the use of research vessels for public relations. Most of the participants shared their experiences with making their ships available for students, journalists, and politicians, and the tremendous interest there is in ships. Direct relationships with interested and objective journalists can be very effective in getting coverage in the mass media, and this, in turn, can help get the attention of government officials.

There was agreement that by working together, POGO participants could learn from each others' experience and could enhance everyone's public outreach by sharing and encouraging contacts. Journalists often want both a local and a global angle to a story, so when a reporter contacts one institution, the story might be of more interest if the institution also refers the reporter to one or more partner institutions involved in the same or related programs. Similarly, since the media often wants to check with multiple sources, it would be useful if the POGO institutions media relations staffs were in contact to ensure consistent approaches to sensitive stories.

There was strong and enthusiastic support for initiating some cooperation in this area. CSIRO offered to take the lead and participants agreed to identify their media relations point of contact so that a communications subgroup could be formed (Action 0.14). Southampton offered to use residual funding previously provided by the Sloan Foundation to support a meeting of this subgroup in the near future.

One specific suggestion was an international competition for the best media story on an international ocean issue, with the prize being the opportunity to go on a research vessel. POGO participants could rotate which ship was used. Contact with associations of science writers such as the Nieman Fellows and the Knight Fellows could be very fruitful if done collectively. The subgroup will take responsibility for development of a POGO website if possible, and will consider including such information as ship schedules and observing platform plans, as well as POGO documents and links to individual websites of the participants. Coordination of opportunities for journalists to participate in cruises when there are empty berths is another area where POGO might help. Participants were encouraged to provide their ideas to their organization's communications point of contact for consideration by the subgroup.

Another area for collaboration is in the preparation of educational materials for ocean education at different levels, particularly pre-university. The work needs to involve both scientists and experts in education and children's literature. Museums are also very important, including aquariums. Even in non-

coastal areas, ocean exhibits can attract millions of people and have an enormous impact. The group discussed the possibility of working together and sharing materials prepared for museum exhibitions. These can be quite expensive, and sometimes provide opportunities for industrial partnerships. There was a caution noted, however, that this kind of material must be available in languages other than English for non-English speaking countries of POGO participants and on a worldwide basis. JAMSTEC mentioned a summer camp and summer school they offer involving use of their ships and facilities for students and science teachers that has been very popular. They also run a children's art competition.

Overall, it was clear there was great value from enhanced collaboration in this area, and enthusiasm for moving forward. The discussion then turned to community outreach. Dr. Kennel invited participants to describe how they would communicate with their local and regional communities about the results of our meeting. In the US, there will be a report to the "Ocean-7" in a telecon, and then when the report is available, they will provide it to the Consortium for Ocean Research and Education (CORE). Dr. David mentioned the need to do something at the European level (Brussels) as well as the national level. There was discussion of the European Federation for Marine and Polar Science (EMAPSS) and the European Science Foundation as mechanisms for reaching the broader European community. The UK has an InterAgency Committee for Marine Science and Technology to which David Pugh will report on POGO. Dr. Shaffer encouraged participants to provide guidance on how to make a POGO report most useful for each of their agencies in public and community outreach. One suggestion was to be sensitive to the need to reassure non-participants of the openness of POGO, and our goal of serving the needs of the broader community by improving implementation of global observations as expressed through such programs as GOOS.

Several participants described their intentions in communicating within their regions, and anticipated the need for a clear set of guidelines for POGO membership so that organizations can understand who participates and why. The newly formed IOC office in Perth was mentioned as a possible resource in communicating in the Asia-Pacific region. IOC as a whole provides another avenue for community outreach. This was confirmed subsequently when IOC Executive Secretary, Dr. Bernal, rejoined the discussion.

Dr. Smith listed some of the international scientific groups he will be participating in within the near future, including the GOOS steering committee, OOPC, GODAE, and the CLIVAR Ocean Panel. The group agreed that to supplement the communication by POGO participants, a letter should go from the organizing committee to additional international groups, initially SCOR, IOC, WCRP, UNEP, CEOs, the IGOS Partnership, and FAO (Actions 0.15, 0.16)

Dr. Shepherd proposed that POGO consider working in the coordination of oceanographic education at the graduate level to maximize the opportunities for students to get international experience at an early stage of their education. The other participants agreed this would be a useful and interesting area to pursue, and invited Dr. Shepherd to propose some activities in the near future. There was recognition that the need for bilateral MOUs might be reduced by having a collective forum in which to transact business on a more comprehensive basis.

FUTURE ACTIVITIES, PLANS FOR NEXT MEETING

Dr. Smith described the upcoming OceanObs99 Conference to be held in Saint Rafael, France, October 18-22, 1999. It is expected that this meeting will generate proposals for implementation activities that might be appropriate for POGO to undertake. (see www.oceanobs99.cls.fr for more details).

With this background, there was discussion of whether the first formal POGO meeting should be planned for September, before Saint Rafael, so that there could be a firmer identity of a new group and its mandate to present to the community; or whether it would be more realistic to meet relatively soon afterwards in order to be able to respond to proposals that come out of the conference. There were strong reasons to support both approaches. In the end, it was agreed that the Organizing Committee would propose 2 or 3 dates and venues, at least one before and at least one after the OceanObs99 meeting, and see which would be preferred by the most organizations, in light of these considerations and other schedule conflicts (Action 0.4).

In either case, participants recognized that there would need to be much communication and work between now and October (Action 0.3, 0.9). It was suggested that Dr. Shaffer might participate in the upcoming planning meeting for Saint Raphael at WHOI in May to facilitate coordination between POGO and the conference organizers.

The group agreed that the three sponsoring institutions (SIO, SOC, WHOI) should continue to serve as an interim secretariat. There was agreement that ultimately, participants would be expected to contribute financially to the cost of maintaining a POGO secretariat (perhaps on the order of $10k/institution). In the interim, the Organizing Committee would seek funding support from private foundations or other sources for an initial 3-5 years of operations. Such support would require a credible transition plan to show how the organization would move to self-sufficiency.

Several participants noted the difficulty of securing formal funding commitments for formal organizations, and encouraged the group to keep the process as informal as possible to provide maximum flexibility for participants to work within their respective funding systems. They stressed the importance of having a few years to get started before having to make financial contributions, because this would enable POGO to demonstrate its value to prospective contributors.

The funding proposal will have to describe the size, structure, and functions of the Secretariat. This proposal will be drafted by the Organizing Committee and circulated to participants for review and comment in advance of being submitted to any funding organizations.

REVIEW OF ACTION ITEMS

Dr. Kennel led a review of the proposed action items, which are attached. It was agreed that if the designated lead person for a given action does not hear back from a participant by the deadline specified, it can be assumed that there is agreement with whatever was sent out.

MEMBERSHIP CRITERIA

There was extensive discussion of POGO membership. Several organizational structures were considered with different categories of participation. The group was trying to balance the desire to keep the group small and focused, with only those at the table who are capable and willing to make a substantial contribution to the achievement of common goals, and the desire to be inclusive and welcoming to organizations with valuable, but more limited resources and mandates.

A list of possible new organizations was developed and discussed. Actions were agreed to reach a consensus on who to invite to the first full POGO meeting (Action 0.5). The criteria for participation refer to civilian institutions (or consortia thereof) which have demonstrated capability to undertake basin-scale oceanographic observations and research or are capable and willing to make substantial contributions in other forms to the POGO objectives. The expectation is that such criteria will result in a somewhat broader group than attended this meeting, but still manageable in size. The group felt strongly that the

Directors or comparable official with authority to commit resources on behalf of their organizations must be willing to participate personally for POGO to have maximum value.

The group agreed that active participation in WOCE observation would be one possible indicator of potential eligibility and interest in POGO. It was agreed that the question of membership criteria needs to be clearly understood and agreed before effective community outreach can be done.

There was further discussion of draft elements that might be included in POGO Terms of Reference. The group agreed that the Organizing Committee would take the results of this meeting and develop a revised draft for consideration by the participants (Action 0.2).

BRAINSTORM WITH DR. BERNAL/IOC

Dr. Bernal joined the group. He congratulated the participants for their success in coming together for a very important purpose and in agreeing to form an ongoing group. He described our function as one element supporting a larger societal effort which must ultimately involve a business partnership, a governmental partnership, and an intellectual and implementation partnership. He stressed the importance of creating new social institutions to deal with the changing needs of society, and noted the need for radical innovation to overcome cultural difficulties. What POGO is doing is very important in creating the right social or human institutions in this area.

Dr. Bernal noted that this group will not replace anything, but it will help to create synergy. He described the Global Environmental Facility and encouraged POGO to become informed about opportunities to obtain and apply GEF funds for global ocean observing systems, consistent with GEF interest in international waters.

Dr. Bernal reiterated IOC's strong support and enthusiasm for the POGO initiative, and his desire to work closely together as POGO develops. IOC emphasizes capacity building and education, areas in which POGO can make an important contribution. Dr. Bernal indicated that he would present any information he receives about POGO to the GOOS Intergovernmental Panel and the IOC Assembly, for information, and if appropriate, for advice on potential interactions. He would do his best to respond to any requests made by POGO of IOC.

The meeting ended with agreement on a plan for future actions, and with thanks to the IOC for its hospitality.