

CLIVAR Scientific Steering Group Report of the Eighth Session
Southampton, UK, 10-14 May 1999

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1. INTRODUCTION

CLIVAR SSG held its 8th session at the site of the International CLIVAR Project Office (ICPO) in the busy waterfront location of the Southampton Oceanography Centre (SOC). The meeting was opened by Trevor Guymmer, head of the SOC's James Rennell Division for Ocean Circulation and Climate, who welcomed all the participants to SOC which had opened its doors almost 5 years ago. He lauded CLIVAR for its emphasis on expanding our understanding of the ocean's role in climate and noted that many SOC scientists were addressing climate-related problems. He reiterated the UK commitment to CLIVAR and, in particular the ICPO, which it would continue to support at least through 2005.

Kevin Trenberth, CLIVAR SSG co-chair, led off the meeting welcoming participants and noting that the main task for the SSG that week would be to make working arrangements for CLIVAR implementation. John Gould, Director of the ICPO, presented what he saw as some of the major challenges which lay ahead for CLIVAR in the immediate future. These included, (1) How do we define what is CLIVAR research, or what is the value-added that CLIVAR provides?, (2) How can we make CLIVAR more visible?, and (3) How can we work most effectively with GCOS and GOOS? He noted that the CLIVAR Conference in December had spurred nations to develop a framework for CLIVAR activities and that the challenge for the ICPO would be to capitalise on this structure and to build the national contributions to CLIVAR into a coordinated international programme.

The main highlights of the twentieth session of the Joint Scientific Committee (JSC) for the WCRP were reviewed by K. Trenberth. The CLIVAR presentation at JSC focussed on the outcomes of the International CLIVAR Conference and on three scientific topics, namely VAMOS, synthesis of reconstructions of climate of the past millennium as supported by CLIVAR-PAGES, and an update on the 97-98 El Niño event. CLIVAR's impact was immediate because the meeting room was decorated with Andreas Villwock's "PRA Posters" which were much admired. Several issues of coordination with CLIVAR arose, including the need for interaction with ACSYS and the new Climate and Cryosphere Project (CLIC) and planning for the proposed GEWEX Co-ordinated Enhanced Observing period (CEOP). CLIVAR was asked to report to the next JSC on links with IGBP and cooperation was envisaged on a proposed session on ENSO during an IGBP science conference in 2001. CLIVAR joined WOCE in composing a letter on the importance of altimetry and scatterometry for both projects.

The Co-chairs noted with regret the announced resignation of Prof H. Grassl as Director of WCRP as of September 1999, and encouraged SSG members to solicit candidates for this post.

2. CLIVAR CONFERENCE REVIEW

The SSG expressed great satisfaction concerning the International CLIVAR Conference, both in its organisation (special thanks were extended to J. Gould and D. Carson, Chair of the Organizing Committee) and in the level of interest expressed by the many nations participating. Members concurred that the challenge now was to exploit this interest to move CLIVAR implementation forward. F. Semazzi presented a matrix summarizing contributions to various CLIVAR PRAs based on national statements at the Conference. The SSG recognized that this could be a very useful planning tool and recommended that the ICPO should continue to develop the matrix, including information about requirements as well as contributions. The matrix should be updated annually prior to the CLIVAR SSG meeting by asking countries to distinguish between ongoing activities, funded proposals and future intentions. It was recommended that the ICPO should contact other countries not represented at the Paris conference with a view to broadening commitments to, and interest in, CLIVAR. The ICPO should also seek to determine whether existing national contacts represent all agencies within their nation interested in CLIVAR, or whether additional contacts need to be found. Presentations at the Conference by many countries pointed to the need to better coordinate activities which were on-going or planned in various

sectors. Particularly in the Atlantic, many of the PRAs and global aspects of CLIVAR had common or overlapping interests in activities such as the multi-national PIRATA moored array (VAMOS, Africa, Tropical Atlantic, etc.) or in PALACE float deployments in the North Atlantic (Thermohaline circulation, NAO, etc). Similar activities of interest to multiple aspects of CLIVAR were noted in the Pacific, amongst them the proposed Oceanic South East Pacific Array (OSEPA) of offshore moorings, or the Japanese Triton programme.

There was considerable discussion on what constituted the need for further implementation panels, and whether to form new panels, especially since adequate funding for their operation was not currently available from international sources. The SSG suggested criteria that it should take into account when considering whether to establish implementation panels. These were :

- When there are multiple national activities in a geographical or science area relevant to CLIVAR and where co-ordination would improve the deployment of resources and the achievement of science objectives.
- Where there is a need for an advocacy group for the implementation of CLIVAR science and/or to increase and direct funds to best carry out activities to achieve CLIVAR objectives.
- Where a specific request is made to the SSG from a country or science group to provide some international CLIVAR co-ordination

It was decided that the criteria for forming a panel were met in the Atlantic (See 4.1). For the Pacific, the SSG asked that a task team be formed to consider the need for a workshop to focus on requirements and the need for coordination in the region (See 4.2). The SSG instructed the ICPO to work with the organizers of a proposed S. Ocean workshop in the hope that this meeting could serve the interest of CLIVAR implementation (See 4.3). Concerning the Indian Ocean sector, the SSG felt that the AA monsoon panel, in cooperation with the UOP, should continue to coordinate activities in this region.

The SSG considered once again the need for /desirability of an intergovernmental panel for CLIVAR, similar to the ones for TOGA and WOCE. The general sense was that CLIVAR was such a broad programme involving so many nations and different interests, that a single panel might be too large to be effective. Instead, the SSG asked the ICPO to form ad hoc resource panels to bring together representatives of the agencies directly concerned in a given region or for a certain PRA as was already being done for PIRATA. The SSG also agreed to keep the matter of an intergovernmental panel under review.

3. GLOBAL ISSUES

3.1 UOP and related issues

Dr C.Koblinsky, chair of the CLIVAR Upper Ocean Panel (UOP), gave an in depth report on the Panel's activities. He noted that in its early years, the Panel had concentrated on the observing system in the tropical Pacific in support of ENSO predictions. More recently, the focus had shifted to the gaps in global temperature and salinity coverage. The ARGO concept for a global array of profiling floats had been endorsed, jointly with the Ocean Observations Panel for Climate (OOPC), and an ARGO Science Team had been formed and an implementation plan written. Koblinsky reported that there was general optimism that the global array would be implemented. He noted that one of the major justifications for the array was to support real-time 4-dimensional data assimilation and prediction systems. The SSG urged the ARGO Science Team to ensure that there was good communication between them and other groups interested in ocean data assimilation, such as the WGSIP and GODAE. The SSG noted the Panel's desire to expand its membership in order to have more expertise in DecCen and high latitude topics and agreed to take appropriate action.

Dr A. Busalacchi gave an overview of the US, French and Brazilian PIRATA programme. He identified a clear need for co-ordination with other programmes and noted that efforts were underway to design a more coherent observing strategy.

Dr. A. Alexiou of the Intergovernmental Oceanographic Commission (IOC) reported on plans for the Oceanobs 99 Conference to be held 18-22 October 1999 in Saint-Raphael, France. The Conference was being convened by the OOPC and UOP to define an optimum mix of measurements needed to meet the goals of climate programmes such as CLIVAR, GCOS and GOOS. The SSG looked forward to the outcome of this important meeting. Dr. Alexiou also noted that there were tentative plans for a two-day GOOS commitments meeting during the IOC Assembly which would be held in June and July of this year.

3.2 WGSIP/WGCM

Dr Zebiak, Chair of the WGSIP, gave an in depth report on the Group's activities and raised some issues for consideration by the SSG. He noted that despite the new emphasis of WGSIP on prediction, there is a clear need to continue to address issues of seasonal-to-interannual variability and predictability; these are fundamentally connected to further developing predictive capability and are not the focus of any other group (including WGCM). He went on to note that given the future focus on prediction, there was potential for significant overlap with the UOP regarding impacts of initialization and ocean assimilation. The need for coordination between WGSIP and the monsoon panels was raised, particularly to avoid overburdening modelling groups. Some areas of overlapping interest existed also with WGCM, WGNE and the IRI. Zebiak pointed to the desirability of more co-ordination of experiments among the different working groups, and the need for common evaluation criteria, output standards, etc.

Drs Trenberth and Nicholls commented on the success of climate forecasts for the 97/98 ENSO period. Trenberth reported on a recent evaluation of the performance of a number of models (not including ECMWF) throughout the 1997-98 event which showed that none of the schemes or models predicted the magnitude of the event until it was well developed. This was supported by Neville Nicholl's report on experiences in Australia. He concluded that coupled model El Nino forecasts did not help operational forecasts very much, largely because by time most models predicted a moderate El Nino, the event was already underway. The models also provided little assistance with operational prediction at the end of the El Nino. Many of the models were slow at predicting the collapse of the event. A "forecast" based on historical observations provided better guidance than many models for timing the end of the event. Dr Nicholls also reported on some of his own work analysing the effect of cognitive illusions in the preparation and use of forecasts. Some of the anecdotes were humorous, but clearly this is a very serious matter which those involved in preparing, disseminating and using operational forecasts must take into consideration to reduce the incidence of these illusions on decision making. The SSG thanked Drs Trenberth and Nicholls for these illuminating reports. The Group urged the WGSIP to place high priority on analysing failure modes of the models involved in ENSO prediction so that improvements could be made. The SSG also encouraged the WGCM, WGSIP and UOP together to consider the need for improved data assimilation, for instance in support of GODAE.

Dr J. Mitchell reported on the latest CMIP results. Based on various presentations at a CMIP Workshop in October 1998, it appeared that the absence or the inclusion of flux adjustments in models was not a major factor in the representation of such aspects as the seasonal cycle or Pacific variability. In many models, although several phenomena seen in the coupled ocean-atmosphere system such as the North Atlantic Oscillation, El Nino-like variability, and the Antarctic Circumpolar Wave are reproduced, the simulation of high and low frequency climate variations is generally less than observed. He described a set of IPCC model runs using greenhouse gas only and greenhouse gas with aerosol forcings. There was better agreement between the same model using different forcings than between different models with the same forcing. The IPCC Third Assessment Report is underway. Unfortunately there appears to be political pressure to run new scenarios rather than to make scientific assessments. The SSG reiterated the importance of

understanding natural variability when studying ACC. Dr Mitchell noted that based on conclusions and recommendations from the Workshop on "Ocean Modelling for Climate Studies", held in Boulder, CO, USA, in August 1998 the resolution required in an ocean model satisfactorily to represent ocean eddy heat transport and to resolve key processes such as overflows and deep ocean convection continues to be an outstanding issue. To encourage investigations of the effect of model formulation on ocean simulations, requiring organization of sensitivity studies and model intercomparisons, a joint WGCM/WOCE ocean modelling group has been set up. A new WGCM effort, in co-operation with WGSIP, to investigate decadal climate variability, based on experimentation with global coupled atmosphere/ocean models, had been proposed. An ensemble of at least three, but preferably more, forecasts of at least 50 years in length would be performed (probably from identical ocean states but with atmospheric states separated by at least one full day). A range of predictability measures would be collected. There was considerable debate about what the outcome might be of such an exercise, but Group members agreed that it was a worthwhile effort and encouraged the organizers to formulate a workshop programme to consider design of an initial coordinated experiment on this topic. SSG re-emphasized the need for the WGCM to deal with natural variability on all times scales. SSG members agreed to discuss with the WGCM Chair and the JPS recommendations for the rotation of WGCM membership with this in mind, prior to September 1999.

3.3 Air Sea Fluxes

Peter Taylor reported on progress by the SCOR/WCRP Working Group on Air-Sea Fluxes. A major report was in preparation which would discuss the state-of-the-art for a full range of variables and would, for example, compare model-derived fluxes with buoy data. Evaluation of the flux products would be the most important part of the report. He noted, however, that the report would address mean fields but not the variability. Plans were to complete the report by the end of 1999 so that it might be considered by the JSC at its next meeting.

3.4 CLIVAR PAGES

Dr J. Jouzel reported on the many ongoing activities related to CLIVAR PAGES. He noted that there was great commitment in reconstructing climate of the last millennium. A meeting on paleo data had been held in Boulder, CO, USA, earlier in the year and a major CLIVAR-PAGES workshop was planned for November in Venice.

3.5 WG CCD

The SSG noted with interest a report by N. Nicholls on the recent meeting on climate indices (Hadley Centre, UK, 2-4 September 1998) organized under the auspices of the joint CCL/CLIVAR Working Group on Climate Change Detection (WGCCD). The outcome of this meeting contributed to the provision of analyses of indices of climate change, especially for the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2001), but also for subsequent research and to contribute to wider efforts on climate extremes. The SSG felt that the Working Group as a whole should meet in the near future to discuss the results of work initiated at the September meeting and to plan the future activities of the Working Group. The ICPO/JPS was charged to approach the WG Chair, T. Peterson, about the possibility of scheduling such a meeting before the end of this year. It was also suggested that the WG consider the use of ocean observations in its discussions and in determining future membership.

3.6 Coordinated Enhanced Observing Period (CEOP)

K. Trenberth presented an overview of plans for a Co-ordinated Enhanced Observing Period (CEOP) as presently proposed by GEWEX for the period 2001-2002. The SSG expressed concerns about the timing, and particularly the availability of satellite platforms during this period, and the readiness of global models to assimilate the variables to be measured. The SSG agreed that the general concept was good and that CLIVAR and particularly the monsoon studies would benefit and should therefore make every reasonable effort to co-operate. The ICPO was charged

to compile a summary of CLIVAR activities that would likely fall within the presently planned CEOP timeframe

3.7 Data Management

P. Holliday of the WOCE Project Office summarised the establishment of the CLIVAR DataTask Team and in so doing presented the concept of data management based on a "data wholesaler" which would facilitate access to data sets of interest to CLIVAR researchers. The "wholesaler" would provide a search and data retrieval service across the wide range of CLIVAR data sources, making more data available to more researchers. The SSG discussed at length the benefits and potential pitfalls of such an approach. Several members had had negative experiences with similar data management projects in the past and warned that CLIVAR should not launch itself into an exercise which could be extremely costly without first being assured that it had a reasonable hope of working. The SSG recommended that the CLIVAR DTT should focus its attention on PI-originated data rather than data from operational sources. With regard to the organisation of operational meteorological, satellite data and model output, use should be made to the full extent possible of existing structures which are already in place or being considered by other groups. In order to test the feasibility of the data warehouse concept, it was suggested that the DTT identify a small user group, such as a subset of the VAMOS investigators, and develop a pilot project to meet their data requirements. The DTT was also asked to explore the feasibility of defining a set of CLIVAR standards for data delivery. J. Jouzel agreed to act as SSG liaison with the DTT.

4. REGIONAL ISSUES

4.1 Atlantic

Based on presentations at the CLIVAR Conference in December and subsequent discussions with the community, the SSG decided to form an Atlantic sector Implementation Panel for CLIVAR and agreed that it should cover both ocean and atmosphere components. The following suggested terms of reference were drawn up:

- To oversee the implementation of observations in the Atlantic Ocean, in order to meet the objectives outlined in the Science and I.I. plans, particularly with respect to the PRA's D1, D2 and D3.
- To collaborate with WGCM and WGSIP, in order to design appropriate numerical experiments, and to be aware of requirements set by these groups for data sets needed to validate models.
- To liaise with the relevant CLIVAR panels, in particular UOP and PIRATA SG, to ensure that best use is made of resources from the global and equatorial research programs.
- To liaise with OOPC and other relevant groups to ensure that CLIVAR benefits from and contributes to observations in GOOS and GCOS.
- To report to the CLIVAR SSG.

A list of proposed members was developed and the SSG asked the ICPO to approach potential members and to take the opportunity afforded by the WOCE N Atlantic workshop (August 1999) to start to prepare an Atlantic sector implementation strategy for CLIVAR that could be considered at SSG-9.

4.2 Pacific

As a prelude to the formation of a Pacific sector panel, it was suggested that a Pacific CLIVAR workshop might be hosted by the IPRC in Hawaii as a means of exploring the wide

interests in all aspects of CLIVAR science throughout the Pacific. The ICPO was charged with forming a small organising committee to develop a workshop planning group, consisting of representatives of the (1) SSG, (2) US Pacific panel, (3) AA Monsoon panel, and (4) Decen modelling community. The ICPO was charged to work with US CLIVAR to identify an appropriate time and venue

4.3 Southern Ocean/Cryosphere

Doug Martinson presented an overview of the draft science plan for the newly proposed WCRP programme on Climate and the Cryosphere (CLIC). The document was already well in hand, and would be officially submitted to the JSC in March 2000 for approval. Martinson expressed the view that CLIVAR should take the lead in all aspects of cryosphere science which were of direct relevance to global climate. The details of the CLIC/CLIVAR interaction still remained to be worked out and the SSG saw a need to develop an effective means to deal with CLIC/CLIVAR overlap/interaction on a wide range of issues. It was suggested that this could be in the form of a common member of SSGs and WGs.

The SSG welcomed the initiative from CSIRO, Australia, to host a workshop on the Southern Ocean, and encouraged the organizers to consider all CLIVAR-related issues in the Southern Ocean, including coordination with the proposed CLIC programme. The ICPO was charged to work with D. Martinson and the organizers to develop objectives for the workshop.

4.4 VAMOS

Professor C.R. Mechoso reported on the many ongoing and planned VAMOS activities. The SSG identified the need for an effective regional co-ordination mechanism in South and Central America to advance implementation of VAMOS and other aspects of CLIVAR research requiring participation from the region. They concluded that such co-ordination would be most effective if an ICPO staff member could have specific responsibilities for S and Central American issues and furthermore if that person could be located in the region and asked the ICPO and the Joint Planning Staff for the WCRP to explore such a possibility.

The SSG noted that the VAMOS Panel's work in identifying climate problems of concern to the Americas, and in promoting co-ordination of programmes to address those problems particularly in South America, was an excellent example of a regional focus for CLIVAR. The SSG considered that certain aspects of VAMOS pointed to the need for strong coordination with GEWEX activities in the region and with other WCRP groups concerned with these problems. J. Mitchell pointed out that the questions of stratus parameterization being addressed by EPIC were of great concern to WGCM and that every effort should be made to ensure that the results from the VAMOS activities were fully translated to other aspects of CLIVAR. The SSG also noted that certain elements of the VAMOS Implementation Plan, such as the LLJ programme, on which much emphasis has been placed, were perceived by many as primarily addressing GEWEX rather than CLIVAR objectives. The SSG was reassured that the VAMOS Panel was aware that some of its programmes would have both CLIVAR and GEWEX elements, but that the inter-programme co-ordination was ongoing and duplication of effort was being avoided. The SSG asked to be kept informed of developments.

Professor Mechoso noted that he had been approached by members of the GEWEX community to consider how VAMOS efforts could be coordinated with an eventual GEWEX Co-ordinated Enhanced Observing Period (CEOP) which was being proposed for 2001-2. (See 3.6).

Rotation of membership on the Panel was discussed and it was recommended that M. Wallace and H. Fuenzalida be asked to step down and that J. Paegle and J. Ruttlant be invited to join the Panel.

4.5 AA Monsoons

C. Haas of the Joint Planning Staff (JPS) in Geneva gave a brief overview of some of AA Monsoon the activities, in particular the JASMINE pilot now taking place in the Indian Ocean. Mention was also made of the Indian national monsoon project known as BOBMEX, which might become an international CLIVAR project if questions related to data availability could be resolved. Dr. Li, a member of the AAMP, reported on activities in the Western Pacific and in China. Some SSG members were concerned that certain aspects of the Panel's mandate might not be being adequately addressed. The SSG expressed interest in being briefed more fully on AAMP activities at future SSG meetings. Similar questions to those raised for VAMOS concerning co-ordination with GEWEX arose in reviewing the AA monsoon panel activities. The SSG saw a general need to strengthen links with GEWEX and asked the ICPO and the Co-chairs to explore with GEWEX and the JPS for the WCRP what mechanisms might be appropriate.

The SSG welcomed the AA Monsoon Panel initiative led by I. Kang to perform an intercomparison of various atmospheric models' ability to reproduce monsoon events during the 97/98 ENSO. It noted, however, that in order to ensure the maximum benefit and minimum of overlap, all proposed intercomparison efforts should be discussed first with the WGSIP, WGCM and/or WGNE. To facilitate coordination, they also asked that the ICPO compile an electronic index of modelling activities and model intercomparisons in CLIVAR and link this with the related WCRP inventory which was in the making.

4.6 Africa

Professor F. Semazzi, member of the CLIVAR Africa Study Group and who had recently joined the ICPO, reported on the Group's progress. He presented extracts of the draft Science strategy which was currently under review. He noted that the lack of observational data was the single most critical obstacle to advancement in this region. Most members of the SSG had not yet been able to review the document as a whole and asked the ICPO to put the draft report on the WWW for SSG review and comments no later than end June. Once the review process was complete, the final version should be widely distributed to interested parties, particularly WGCM, WGSIP, AA Monsoon Panel and GEWEX, so they might identify activities of common interest. It was noted in particular that the AAMP has Africa in its mandate. The SSG recommended the formation of a small ad hoc CLIVAR Africa Task Team to begin developing an implementation strategy. The Task Team would also be charged to explore links with IGBP and to seek to broaden the base of funding support for CLIVAR Africa activities.

5. NATIONAL/ MULTINATIONAL PROGRAMMES

Jim Hurrell and Mike Patterson reviewed developments in US CLIVAR, noting the formation of the US CLIVAR Scientific Steering Committee and an Interagency Group including NASA, NOAA, NSF and DOE. Several national meetings and workshops had taken place in preparation for the international CLIVAR Conference and subsequently implementation panels had been formed for the Atlantic, Pacific and Americas. The US agencies are planning to establish a US CLIVAR Office in Washington, DC. Kimio Hanawa reported on several major Japanese initiatives in support of CLIVAR, including the Frontier Research System for Global Change supported by JAMSTEC and NASDA. Japanese-led climate investigations were also underway in the Kuroshio (JEBAR) and in the Western Pacific and Indian Oceans using the Triton array and PALACE floats. Hanawa also noted that Japan was preparing to participate actively in the CEOP and had formed a CEOP Committee. Chongyin Li began his presentation by remarking on the importance influence of the CLIVAR Conference in bringing coherence to the Chinese CLIVAR programme. He outlined major programme elements for understanding mechanisms and predicting severe climate-related disasters in China and the study of decadal and interannual climate variability in the western Pacific and East Asia. Other thrusts were in the areas of climate change and water resources and improved climate prediction. Gerbrand Koman gave a report on European funding and outlined a

proposal to continue the Euroclivar project. Steve Zebiak reviewed activities of the International Research Institute for Climate Prediction (IRI).

The SSG decided that in the future, in order to provide effective co-ordination with national activities, as many as possible national representatives and/or programme managers should be invited to submit written national reports in time for them to be considered under an appropriate action item at SSG meetings. Based on these reports invitations would be extended to attend the SSG meeting.

6. ICPO

Dr. Gould briefly reviewed the current staffing situation at the ICPO and the Office budget. He noted that Fred Semazzi, who had been selected as Senior Scientist after an extensive international search, was being fully supported by the USA, and that Andreas Villwock would continue to work for the ICPO from Hamburg supported by Germany through 1999. He expressed his deep appreciation to Anne Stephan, who had left her post as CLIVAR Administrator in Hamburg at the end of 1998. Katherine Bouton, currently at the WOCE Data Information at the University of Delaware, will be supported by the USA to spend half of her time working in the ICPO on the development of CLIVAR data issues. She will start work at the ICPO in July 1999.

Looking to the future, Dr Gould noted that his salary would be provided by the UK through to his scheduled retirement date in 2002, and that the UK was nominally committed to supporting the ICPO through 2005. The SSG wanted to know exactly what would be entailed in such support, eg. would the Director's salary continue to be provided, and asked Dr. Gould to clarify the situation. At present operating funds for the office were being provided by the UK, Japan and Australia. However, these fell far short of the budget which was required to run a full-fledged international project office for a programme the size and scope of CLIVAR. Dr. Gould noted that additional funds were needed to buy computers, support travel, and for outreach and promotional activities such as increasing the number of pages, frequency of publication or mailing list size of Exchanges or producing new CLIVAR publicity material. Requests for additional support to the Office had been made to France, Canada and Australia. No formal replies had yet been received, but apparently France was considered the secondment of one staff person.

E. Sarachik asked Dr. Gould to elucidate the division of responsibilities of the staff he currently manages, ie. that of both the WOCE International Project Office and the ICPO. Dr. Gould explained that particularly in the last nine months, taking into account the preparations and follow up from the CLIVAR Conference and the establishment of the CLIVAR Data Task Team, several members of the WOCE team had been spending considerable time working on CLIVAR. He did not see this as a problem as long as the situation did not continue indefinitely.

The SSG recognized that the resources of the ICPO, both financial and human, were stretched very thin at present, and that if CLIVAR were to develop as it would like, more resources would have to be found to develop the necessary infrastructure, to hold planning meetings, to improve coordination with the many related programmes, etc. They urged the ICPO itself, and the Joint Planning Staff for the WCRP, to explore all opportunities for increased support.

There was a general discussion about outreach activities and what might be most desirable. All agreed that the CLIVAR Web site should be one which people regularly consult to find out about not just CLIVAR, but also other climate research topics. The ICPO undertook to increase the links to other climate-related sites and to encourage reciprocal links.

John Gould suggested that it might be time for Exchanges to take on a slightly new look, given that many aspects of the programme were well underway and there was a need to communicate scientific results across the many disciplines and research interests represented within CLIVAR. The Group agreed and recommended that future issues should include scientific highlights of preliminary research results and summaries of recent publications. It should also feature reports of national activities and the availability of data sets. Dr. Gould noted that since

both the WOCE and CLIVAR newsletters would soon be produced at SOC, one could envisage merging them. The SSG felt that such a move would be premature, but agreed to reconsider this in the future.

7. NEXT MEETING

SSG members expressed their sentiment that were closer contact to be kept amongst them and with the ICPO during the year, the annual meeting could be shorter. It was suggested that SSG members should be assigned to panels as liaisons, but should remain as observers and keep a distance from the internal panel debates. It was also recommended that Panels should publish summaries of the main conclusions of their meetings on the World Wide Web soon after their meetings.

N. Nicholls offered to host SSG-9 at the Australian Bureau of Meteorology in Melbourne. An initial suggestion for the week 7-11 Feb 2000 was made. Dr Nicholls was to confirm availability of meeting rooms and in the meantime the ICPO would poll SSG members on suitable dates between January and May 2000 and advertise dates when agreed.

8. CLOSURE

At the close of the meeting, the SSG thanked the ICPO (notably John Gould and Sandy Grapes) for hosting the meeting and for organizing such an interesting programme of lectures, visits to ships and laboratories and dinner in the 900-hundred year old New Forest. The SSG also took time to express its deep appreciation to Dr Allyn Clarke, who was stepping down as SSG Co-chair as of this meeting, for all he had done for CLIVAR as Co-Chair for the past four years. They welcomed Juergen Willebrand as the new Co-chair.

APPENDICES

- A. Agenda**
- B. List of participants

APPENDIX C. LIST OF ACTION ITEMS

Conference follow up/ National commitments

1. ICPO and JPS to refine the matrix of Conference contributions. The matrix should initially be use only for planning purposes (Action - ICPO and JPS).
2. The matrix to be updated annually; ask countries to distinguish between ongoing activities, funded proposals and future intentions (Action - ICPO).
3. ICPO to contact countries not represented at the Paris conference; ICPO should also seek to determine whether existing national contacts represent all agencies within their nation interested in CLIVAR, or whether additional contacts need to be found. (Action - ICPO).

National co-ordination

4 National representatives and/or programme managers to be invited to submit written national reports in time for them to be considered under an appropriate action item at SSG meetings (Action - ICPO to contact countries ahead of SSG meetings).

Intergovernmental CLIVAR Panel

5. The SSG decided that at this time it would be more effective to form, if appropriate, ad hoc resource panels bringing together representatives of the agencies directly concerned in a region or with a particular PRA, rather than establish a formal CLIVAR-wide Intergovernmental Panel. However the SSG should reconsider the issue of Intergovernmental mechanisms at later stage (Action - Co-chairs to inform JSC).

Modelling

6. WGSIP to give high priority to the analysis of the failure modes of model predictions of the 1997/8 ENSO event (Action - ICPO to inform chair WGSIP).

Data assimilation

7. WGCM and WGSIP and UOP together are to be encouraged to consider ocean data assimilation, for instance in support of GODAE, in their deliberations (Action - ICPO to write to WGCM and WGSIP Chairs).

Decadal prediction

8. The SSG encouraged WGSIP/WGCM initiative on decadal variability; the proposed workshop should be used to design initial co-ordinated experimentation on this topic (Action - ICPO to contact Boer/Latif).

Co-ordination of modelling

9. CLIVAR groups considering model intercomparison experiments should first interact with WGSIP, WGCM and/or WGNE to ensure the proper co-ordination with existing related activities; the A-A Monsoon intercomparison experiments should be considered by WGSIP at their next meeting (Action - ICPO to inform Chairs of WGSIP and AA Monsoon Panel).

10. ICPO to work with JPS on the compilation of an electronic index of modelling activities and model intercomparisons in CLIVAR and WCRP (Action - Co-chairs/ICPO to contact JPS).

WGCM members

11. SSG members to recommend rotation of WGCM membership before September 1999. Membership and activities of WGCM should reflect the importance of natural climate variability. The views of the CLIVAR SSG should be conveyed to Gates and Bengtsson (Action - ICPO, Co-Chairs).

WG CCD

12. Frequency of meetings of the WG CCD should increase; WG should consider the use of ocean observations in its discussions and in determining its future membership (Action - ICPO to contact Chair WG CCD).

VAMOS

13. ICPO, R Mechoso, IOC, WMO to work towards the establishment of a CLIVAR Regional Co-ordinator for the Americas (Action - ICPO, Mechoso, IOC and JPS to pursue).

Vamos Panel Membership:

14. Julia Paegle and J Ruttlant to be invited to join; Mike Wallace and H Fuenzalida to step down (Action - Letters from ICPO).

CEOP

15. ICPO to compile a summary of CLIVAR activities that would likely fall within presently-planned CEOP period (Action - ICPO).

GEWEX

16. The ICPO and Co-chairs to explore with GEWEX and WCRP what mechanisms might be appropriate to strengthen links with GEWEX (Action - ICPO/Co-Chairs to contact GEWEX).

Africa Panel

17. Following final approval by SSG the African Panel Report should be widely distributed especially to GEWEX, WGCM, WGSIP for them to identify activities relevant to CLIVAR Africa (Action - ICPO).

18. A small Africa Task Team to be formed to develop an Implementation strategy, exploring links with IGBP and, seek funding and collaboration to aid implementation (Action - ICPO).

CLIC

19. Common membership of CLIC and CLIVAR SSGs and WGs should be encouraged to deal with CLIC/CLIVAR overlap/interaction. Proposed S.Ocean workshop should also address these issues (Action - Martinson and Clarke to advise).

20. The TOR and organising committee for a Southern Ocean workshop on CLIVAR implementation to be drawn up in collaboration with CLIC; workshop to address all CLIVAR-related issues in the S Ocean sector (Action - Martinson and Church to make recommendations to SSG).

Atlantic

21. Atlantic sector Implementation Panel for CLIVAR to be formed to cover both ocean and atmosphere components; membership should reflect the role of the S Atlantic. (Action - ICPO to issue invitations to Panel members)

Pacific

22. The ICPO to form a small organising committee to develop plans for a Pacific CLIVAR workshop. The ICPO to work with US CLIVAR to identify an appropriate time and venue (Action - ICPO, Co-Chairs).

CLIVAR DTT

23. The CLIVAR DTT to focus its attention on PI-originated data and review and comment on the appropriateness for CLIVAR research objectives of presently available operational data systems for meteorological, satellite data and model products (Action - ICPO to inform DTT Chair).

24. The DTT to identify a small user group e.g. VAMOS, and to develop a pilot project to meet their data requirements (Action - ICPO to inform DTT Chair).

- 25. The DTT to advise the SSG on whether the definition of a set of CLIVAR standards for data delivery was a worthwhile undertaking (Action - ICPO to inform DTT Chair).
- 26. Jean Jouzel to monitor DTT activities for the SSG (Action - ICPO to inform DTT Chair).

ICPO funding and activities

- 27. ICPO/JPS to explore new funding sources for CLIVAR infrastructure e.g. with World Bank and Global Environment Fund and national governments. ICPO to prepare a comprehensive staffing plan and budget identifying high priority requirements for additional funds to finance CLIVAR infrastructure (Action Director - ICPO).
- 28. CLIVAR Exchanges should include scientific highlights of preliminary research and summaries of new publications. It should also feature reports of national activities and the availability of data sets. (Action - ICPO).
- 29. CLIVAR WWW site links to other climate-related sites increased and updated through the annual pre-SSG contact with national contacts (Action - ICPO).

Date and place of next meeting

- 30. It was proposed to hold SSG-9 at BoM Melbourne the week 7-11 Feb 2000; (Neville Nicholls to confirm availability of meeting rooms). ICPO to poll SSG members on suitable dates between January and May 2000 and advertise dates when agreed (Action - ICPO).
