Intergovernmental Oceanographic Commission

Reports of Governing and Major Subsidiary Bodies

IOC-WMO Intergovernmental WOCE Panel

Third Session

Paris, 8-9 June 1995

UNESCO

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1. OPENING

1 The Third Session of the IOC-WMO Intergovernmental WOCE Panel (IWP) was held in Paris, June 8-9 1995. Leonard Otto, Chairman of the IWP, opened the session and welcomed the participants. They included 13 Panel Member nations, two observer nations and representatives from NASA, ESA, and the US WOCE Interagency Office. The full list of participants with addresses, phone numbers, etc., is included as Annex II. Otto explained the circumstances leading to the postponing of the IWP-III meeting scheduled initially in October 1994. He encouraged the participants of IWP-III to join the discussion on the status, achievements and prospects for WOCE in 1995 to ensure the continuity and completion of WOCE in 2002.

2 Gunnar Kullenberg, Secretary IOC, also welcomed the Panel. He noted that WOCE is now entering its second phase and underscored the importance of convincing the IOC Member States that WOCE has to be completed and that further support is needed in the future. He mentioned that the support provided from the IOC might be only small but should be used in a constructive way.

3 Valery Detemmerman, addressed the meeting on behalf of Hartmut Grassl, Director WCRP and congratulated the WOCE scientists on the success of the Programme up to the present stage. She noted that it is widely recognized that WOCE is well on its way toward successful completion of the intensive observation phase and that it has already produced many new results. The WCRP administrators have let it be known that the WOCE Scientific Steering Group (SSG) set a good example for other WCRP programme managers for implementing and managing a large international scientific experiment as well as recognizing when it is timely to modify the management infrastructure to changing tasks and challenges. She emphasized that links between different components of the WCRP must be maintained in order to meet the overall WCRP goals.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 ADOPTION OF THE AGENDA

4 The Panel adopted the Agenda as given in Annex I.

2.2 DESIGNATION OF RAPPORTEUR

5 The Panel adopted the proposal by the Netherlands to elect Isabel Ambar (Portugal) as Rapporteur for the session.

2.3 ESTABLISHMENT OF A WORKING GROUP

6 A working group was established to work in conjunction with the session and to summarise the discussion and conclusions arising from Agenda Items 3 and 4. The members appointed to the working group were: Mario Caceres (Chile), Klaus-Peter Koltermann (Germany) and Richard Lambert (USA).

3. STATUS AND PROSPECTS FOR WOCE

3.1 REVIEW OF ACTION ITEMS FROM IWP-II

7 The main action Items resulting from IWP-II were reviewed by the Chairman Otto. IWP-II formulated four recommendations:

(i) To hold a WOCE mid-term conference in 1994. This recommendation asked for a mid-term international conference that could be helpful in attracting the necessary resources for further continuation of the programme. The conference was not organized in the intersessional period. Because of its timing, it was considered too heavy a burden for those responsible for organizing and conducting it. Moreover, other ways for attracting support were considered more efficient. This being so, the Chairman agreed to the postponement of such a conference to a later date. The WOCE International Conference is now planned for 1998, and will be important in attracting resources for the implementation of the Analysis, Interpretation, Modelling and Synthesis Phase of WOCE.

(ii) To establish a network of international contacts. This second recommendation proposed the establishment of an informal network to assist in solving unforeseen contingencies. Otto informed the Panel he was aware that there have been occasional exchanges of messages in this framework, but he could not indicate whether problems had been solved.

(iii) WHP Office to encourage technical visits. This third recommendation was of a technical nature, asking for expertise in conducting CTD operations where necessary. Here also, Otto's impression was that no major problems had occurred, but the effect of the recommendation in this connection is not sure.

(iv) Help to complete the one-time WHP sections in each ocean basin. This recommendation asked for maximum synopticity of sections in a given ocean basin, with special reference to the work in the Atlantic and Southern Oceans which has been spread over the whole 1990-1997 period. Using the French national report to illustrate the difficulty for action in cases where capacity in scientific resources is limited, Otto pointed out that some sections in the South Atlantic were completed in 1993 but others weren't completed until early 1995. The planned intensive survey in the North Atlantic in 1997 will address some of the problems caused by the time-spread of observations.

8 During IWP-II, delegates from Member States discussed efforts to fill major gaps in the implementation of the WOCE programme. Otto noted that the extent to which such gaps could not be filled subsequently, could be judged from the review documents provided. Otto concluded by informing the meeting that in response to a request from the Panel, he had written to the oceanographic communities in the Russian Federation, Ukraine and Estonia, to investigate the possibilities for further support for WOCE. He noted with satisfaction the presence of a delegate from the Russian Federation at this meeting.

3.2 REVIEW OF WOCE SCIENCE

9 John Church, Co-Chair WOCE SSG, used overhead transparencies to provide the Panel with a review and update of WOCE accomplishments as of mid 1995. He referred to WOCE Report 126/95, published January 1995 titled "An Overview of WOCE Activities" which had been made available to the Panel as a meeting document. Church presented some of the early WOCE results to come out of the WOCE Programme that had been successfully used to support a request to the WCRP Joint Scientific Committee (JSC) to safeguard the continuation of WOCE to 2002. Of particular interest were oceanic heat flux estimates obtained from high-quality WOCE observations. These estimates differed significantly from estimates obtained from models that are being used to provide forecasts of global climate change. Additionally, direct estimates of vertical diffusivity yielded values much lower than those used in numerical models. Clearly, WOCE measurements will provide important constraints on model- derived future global heat and fresh water flux estimates.

10 Church listed the tasks that he considered to be the key challenges facing WOCE now:

(i) Carry out analysis, interpretation, modelling and synthesis of WOCE results;
(ii) Produce a dynamically consistent description of the global ocean in the 1990s;
(iii) Produce improved models for climate and climate-change studies that will accurately reproduce the ocean circulation and its resultant fluxes.

11 In order to achieve these objectives, Church stated that the following actions by countries/agencies will be required:

(i) Decide where the overall synthesis will be carried out and safeguard the funding;
(ii) Enlarge the community of scientists working on data assimilation;
(iii) Define the lifetimes of WOCE DACs and SACs and secure their funding;
(iv) Ensure the continuation of TOPEX/POSEIDON-quality altimeter data;
(v) To obtain maximum benefit from the altimeter data, commission a dedicated gravity mission.

12 Required actions by the scientists are:

(i) Complete the WOCE global survey;
(ii) Speed data flow from Principal Investigators (PI);
(iii) Refine the WOCE synthesis strategy - a task of the new Synthesis and Modelling Working Group in collaboration with the Data Products Committee.

13 The meeting was informed that the transparencies used in the presentation by John Church would be improved by the WOCE International Project Office (IPO) and sent out to all national WOCE Committees, so that they can use them for presentations in their countries. Panel Members were encouraged to submit their best results to the WOCE IPO so that they might be added to the presentation pack.

3.3 STRATEGY FOR WOCE FROM THE PRESENT TO 2002

14 John Gould, Director of WOCE IPO, brought the Panel's attention to WOCE Report 130/95 titled "Status, Achievements and Prospects for WOCE (1995)" published in May 1995. He reviewed the schedule WOCE is working under and showed how WOCE had changed its scientific oversight structure to one that was appropriate for moving from the Intensive Observation Phase to the Analysis, Interpretation, Modelling and Synthesis Phase. The number of committees was drastically reduced and a new Synthesis and Modelling Working Group (SMWG) was established for the task of refining the WOCE synthesis strategy. The extent, nature and time-line of these activities are detailed in Annex III.

15 The planning for meetings and publications is underway. Several workshops, dealing with particular ocean basins, are planned. Except for the Southern Ocean workshop, which will be held in Australia, the others still need to identify a host/supporting, country/institute. The mid-1998 International WOCE Conference will be held in Canada. Gould was pleased to announce that the Canadian Meteorology and Oceanography Society (CMOS) will host this conference in Halifax. (Note: Subsequent to the meeting it was learned that the U.S. has agreed to host the Pacific workshop and France the South Atlantic workshop.)

16 Gould announced that the WOCE IPO is assured host support through the end of WOCE and, at present, is adequately staffed and supported by contributions from a number of nations. He cautioned, however, that none of the present staff secondments run beyond the next 2.5 years. Gould added that the IPO now has a bibliography of 1100 citations that is steadily increasing. WOCE data products are beginning to appear, many of them now available on the World Wide Web.

17 In the discussion that followed it was pointed out that links have to be established to transfer the results and achievements of WOCE to other WCRP Programmes in particular CLIVAR. A question was also raised as to how to assure that WOCE results get into the GOOS planning. GOOS is still in its early stages, but to make sure that scientific input to GOOS takes place, links have to be built up. It was suggested that these links should be made through CLIVAR and the WCRP. The IPO will be the primary link between WOCE, the WCRP and GOOS Support Office for this purpose.

3.4 WOCE DATA FLOW

18 Eric Lindstrom, Chairman of the WOCE Data Products Committee (DPC), presented a review of WOCE data issues. He highlighted the fact that WOCE, the largest oceanographic experiment undertaken and involving 29 countries, had developed a data management structure that embodied Data Assembly (DAC) and Special Analysis Centres (SAC). These were coming to grips with the enormous task of collecting the data from WOCE scientists, subjecting it to quality control and assembling coherent, basin-wide data sets.

19 He identified thirteen data streams which ultimately are fed into the WOCE Archive. All of them are accessible via the World Wide Web. The only data stream not yet established is the one for managing model results. There are presently 21 functional units in the WOCE data system in 6 countries; soon there will be 22 in 7 countries when the new ADCP DAC in Japan is established. The annual cost of the WOCE data system is $2.2 million and 20 person-years. This sum represents only 2% of the total annual WOCE costs. Lindstrom observed that this is a relatively small amount compared to many other programmes, which spend up to 10% - 20% of their budgets on data management. The funding for the DAC managers is generally insufficient to allow for the needed "outreach" activities, those aimed at bringing data into the WOCE data and information system. The elements of the WOCE data and information system, the location of the DACs and SACs as well as figures on their annual costs are listed in Annex IV.

20 The issue that most concerned Lindstrom was the data flow from scientists to the DACs; it has been slower than planned. If the data flow continues at this present slow rate, the central achievement of WOCE, the assembly of individual contributions into an internally consistent high-quality global data set will not be reached by 2002. Resources, particular manpower, available in the Data Assembly Centres are inadequate and secondments that could be provided by Member States would be welcomed. He emphasized that the data centres can benefit greatly from assistance provided by even short-term (3-6 months) secondments. This was demonstrated by the speeding up of the quality control process of hydrographic data through the secondment of a Russian scientist to the WOCE Hydrographic Project Office. Similar secondments are seen as being very valuable and were encouraged.

21 Another reason for the slow data flow is the reluctance of some scientists to release their data sets. He stressed the importance of delivering data sets to a DAC as soon as it is practicable in order to assure the integrity of the inventory and to assure against data loss. He underscored the point that an investigator submitting his data to a DAC does not surrender control, and does not constitute a release to the wider oceanographic community. As a matter of policy no data can be released without permission from the PI.

22 Lindstrom illustrated the extent of the problem with two lists. One was a list of countries known to be holding WHP data that was overdue for submission. He noted that every participating country is on that list, so there are no special delinquents. The second list gave the number of delayed-mode XBT data which have been submitted for 1992. It showed that only 13% of all real-time data have been submitted as delayed-mode, which means full-resolution-profile data. This number is too small to even start the quality control process, so further steps in data processing are held up.

23 The ensuing discussion focussed mainly on the problem of the slow data flow. Richard Lambert found in looking into this matter that though the problem is generic the causes are not. Each situation seems to have a different cause, often difficult to identify. There is a tendency for the PIs and the DACs to blame each other. On the DAC side he pointed out that the people running the data centres are doing other things as well and don't have time to run down each delinquent case. Yet, it seems there are so many reasons for the PI's not submitting their data in a timely fashion, that they have to be approached on an individual basis. It was suggested that the timetable might be too ambitious in the first place; the scientists are still busy with processing data and writing articles on their findings and are therefore reluctant to make the data publicly available. Lindstrom agreed that this would be a valid point for the XBT data which are public domain once submitted to the DAC. But this did not hold for other WOCE data. He reiterated, so that there would be no misunderstanding on this point, that no data sets will be released from the WOCE data system without the prior permission of the scientist submitting them. But it is important that the data go into the WOCE data system so that they can be quality controlled and processed and protected from loss. Once the PI decides to make the data publicly available they can go out to the scientific community without delay.

24 The shortage of manpower in processing and analysing data was mentioned by other Panel members too. It is the same people who collect, process and analyse the data. It was suggested that those scientists, who do submit their data on time, should be acknowledged and encouraged to continue to be timely with their submissions in the future.

25 It was concluded that the most effective way of determining why some data are submitted, and others not, is to handle each situation on a case-by-case basis. This needs to be done by the DAC managers. Additionally, the Panel agreed to encourage Member States to second scientists to WOCE Data Assembly Centres (DACs) and Special Analysis Centres (SACs). Lindstrom stated that even short-term secondments, for periods as short as 2-6 months can make valuable contributions. This will support the synthesis of the WOCE results, enhance the capabilities of a wider community of nations to utilise the WOCE data set to their advantage, assist the DACs and SACs in maintaining the current high quality of the data sets, allow the DACs to improve data flow and assist scientists in carrying out their own research more effectively.

3.5 ESA SATELLITES IN RELATION TO WOCE

26 The Panel was provided with an update on the ESA satellites and sensors by J.A. Johannessen, Earth Sciences Division of ESA. ERS-1 will be completing 4 years of successful operation in July 1995. ERS-2, launched 20 April 1995, is working fine except for the scatterometer. After the commissioning phase is complete, a Tandem Mission of the two satellites is planned that will allow targets on the ground to be observed with only a 24-hour separation. ENVISAT, with a dual-frequency altimeter and an imaging spectrometer, is scheduled for late 1998 or early 1999 launch. METOP-1, scheduled for launch in 2001, will carry an advanced scatterometer, an AVHRR and a multifrequency imaging radiometer. The latter will provide coincident measurements of sea surface temperature and near-surface wind speed at about 60 km spatial resolution.

27 The first Earth Explorer mission is planned for launch in 2003/2004. A dedicated gravity and ocean-circulation mission is among a list of 3-4 candidates under consideration for the Earth Explorer mission. If selected it would advance knowledge of the geoid to 2-5 cm (present accuracy is 100 cm).

28 A more complete summary of Johannessen's presentation is provided in Annex V.

4. NATIONAL STATEMENTS

29 All attending IWP members gave presentations and submitted written reports summarising the status of WOCE in their countries and, whenever possible, on future plans/ funding for carrying out the Analysis, Interpretation, Synthesis and Modelling phase of WOCE. Written reports were also available from Spain, New Zealand, Korea and Brazil, countries which could not send representatives. All the written reports are included in Annex VI.

5. ISSUES ARISING FROM AGENDA ITEMS 3 AND 4

5.1 UNRESOLVED OBSERVATIONAL ISSUES

30 At this point, ship schedules are firmly fixed and there is not much the Panel can do to influence what will go on until the end of 1997 in terms of filling gaps in the programme. But Church and Gould underscored that there are still high priority scientific needs for obtaining access to territorial waters to complete the transoceanic hydrographic sections. Some of the WHP lines have had to stop before reaching the coast, and therefore critical observations are missing in the important region of the boundary currents.

31 Many of the Panel noted that WOCE had not succeeded in establishing the time-series stations called for in the Implementation Plan. Nevertheless, these are still seen as important and critical for determining ocean variability. Countries were encouraged by the Panel to press for the establishment and maintenance of time series stations to address WOCE and CLIVAR objectives.

32 Similarly, though Topex-Poseidon is expected to last to the end of WOCE observations in 1997, a follow-on mission of similar quality is required to determine long-term variability. Moreover, the need still exists for a dedicated gravity mission to determine the geoid at sufficiently small scales. The Panel Members were encouraged to exert their collective influence on the space agencies to fly a gravity mission that would provide the data required to do this, and to maintain the time series of high-quality altimeter observations.

5.2 DATA FLOW AND DATA SUBMISSION ISSUES

33 The structure for managing the WOCE data has been successfully set up. To make the system function effectively as planned, it is clear that further support, financial as well as manpower, is needed by the DACs and SACs. Panel Members were requested to do what they could to persuade PIs in their countries to submit their data into the WOCE data system as soon as possible, and to remind them as well of the protective WOCE policy that prevents distribution of data until the PI submitting them authorizes it. Overdue data sets will be dealt with by the DAC managers on a case-by-case basis, manpower permitting.

5.3 SUPPORT/HOSTS FOR PLANNED WORKSHOPS

34 The IWP anticipates holding workshops for each of the following major oceanic basins: The Pacific in 1996, the Southern Ocean in 1997, the Indian Ocean in 1998, and the North Atlantic in 1999. Except for the Southern Ocean Workshop, which will be hosted by Australia, the others are uncommitted. Members were requested to encourage their governments to consider hosting one of the uncommitted workshops.

6. RECOMMENDATIONS OF IWP-III TO THE IOC ASSEMBLY

35 By 1998 the WOCE field phase will conclude, having collected an ocean data set of unprecedented quantity and quality. Many nations have invested both material and human resources in obtaining these data, and in order to realize the maximum return on them, analysis, interpretation, modelling and synthesis will continue until 2002. **The Panel noted** with appreciation the contributions of Member States to continue their efforts through the observational period of WOCE in order to fully meet the planned objectives. Particular notice was taken of the offer by some member states to continue support for the WOCE International Project Office in the UK throughout the Analysis and Synthesis phase.

36 To accomplish its mission, WOCE successfully established an infrastructure which integrates the experience and interests of both the research and operational communities. Because of benefits already derived for long-term climate research, **the Panel concluded** that the main elements of this infrastructure should be maintained throughout WOCE and beyond. In deciding on a set of appropriate recommendations to be passed on to the sponsors, **the Panel considered** matters important to the satisfactory completion of WOCE, the need for further research on the ocean's role in long-term climate variability, and the potential transition of WOCE-like activities to CLIVAR - the WCRP programme that is being organized to undertake this research.

6.1 RECOMMENDATIONS RELATED TO COMPLETING WOCE

37 The following three recommendations refer to specific issues raised during the discussion in IWP-III, and relate to specific needs for completing WOCE.

(i) **The Panel recommends** that Member States pay favourable attention to granting requests from WOCE observational programmes for access to areas under national jurisdiction. **The Panel noted** that access to these areas is fundamental to deriving the full scientific value of WOCE hydrographic sections, since these sections must be continuous from the deep ocean into shallow water in order to accurately determine transports in boundary currents.

(ii) **The Panel invites** and **encourages** Member States to second scientists to WOCE Data Assembly Centers (DACs) and Special Analysis Centers (SACs). Even short secondments for periods of as little as 2-6 months will be valuable. This will support the synthesis of the WOCE results, enhance the capabilities of a wider community of nations to utilize the WOCE data set to their advantage, assist the DACs and SACs in maintaining the current high quality of the data sets, allow the DACs to improve data flow, and assist scientists in carrying out their own research more effectively.

(iii) **The Panel invites** and **encourages** Member States to host and support WOCE scientific workshops, particularly those that apply to their regions of interest. The WOCE IPO and SSG have put forward a strategy for bringing together scientists to synthesize their results and share them with the broader scientific community. Major workshops and conferences will be required for a number of geographical areas and science topics. Present commitments are for a major WOCE Conference hosted by Canada in mid-1998, and a Southern Ocean Workshop to be hosted by Australia in 1997. Remaining requirements are for workshops on the South Atlantic, Pacific, Indian, and North Atlantic Oceans. (Note: Subsequent to the meeting it was learned that the U.S. has agreed to host the Pacific workshop and France the South Atlantic workshop).

6.2 RECOMMENDATIONS RELATING TO ACTIVITIES AFTER WOCE

38 The following set of recommendations relate to activities, the value of which was demonstrated in WOCE, and which will be needed for long-term research on the role of the ocean in climate. They may be continued as part of CLIVAR or other major programmes.

(i) **The Panel recommends** that the IOC take a strong stand to support continuation of the series of satellite altimeters, to endorse the urgent need for a dedicated satellite gravity mission to improve the altimeter data, and to support the continuation of global scatterometer coverage. **The Panel recognized** the very successful demonstration of satellite altimetry to provide unprecedented and extremely accurate global data sets of the ocean circulation and its changes.

(ii) **The Panel recommends** that the IOC take a strong stand to support the continuation of the management of in-situ data as embodied in the WOCE DACs and SACs. **The Panel recognized** the need for well-managed, high-quality in-situ data for climate variability studies and **commended** the WOCE data system to CLIVAR and other evolving ocean-climate programmes after WOCE.

(iii) **The Panel recommends** that Member States support the continuation of existing open-ocean time-series observations,and consider addition of new ones as important elements in the transition from WOCE to those programmes that will investigate long-term climate variability. The few existing open-ocean time-series observations, established before and during WOCE, have highlighted significant changes in ocean variability on long time scales. Technological developments now make it economically feasible to establish a much-needed broader network of these time-series observations.

7. THE FUTURE OF IWP

39 **The Panel agreed** that its functions under the WOCE programme must continue until the end of WOCE. **The Panel also noted** that, in view of the increased inter-relationships of many climate programmes and the foreseen transfer of WOCE achievements into longer-term continuing programmes, the terms of reference of the Panel may need to be reconsidered. **The Panel requested** its chairman to communicate with the IPO and the WOCE to develop a strategy to ensure an optimum role for the Panel in the future.

40 Some discussion was devoted to the idea that the WOCE Intergovernmental Panel could metamorphose into a broader WCRP Intergovernmental Panel which would also act on behalf of other WCRP programmes. This raised the question was as to whether it was necessary to have a Panel related only to WOCE. Arguments against this proposal were that WCRP is global climate research and the ocean is only one part of it. Since IWP is, at present, the only existing Intergovernmental Panel dealing with the ocean, the consensus was that it should continue to exist until an effective transition to CLIVAR has been established.

8. ELECTION OF CHAIRMAN

41 **The Panel unanimously elected** Isabel Ambar (Portugal) as new Chair of the IWP to replace retiring Chairman Otto.

9. DATE AND PLACE OF NEXT SESSION

42 **The Panel agreed** to schedule its next meeting in association with the next IOC Assembly in 1997 in Paris.

ANNEX I

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ANNEX II

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ANNEXES III TO VI ARE NOT INCLUDED IN THE PDF FILE