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1. OPENING

1.1 OPENING OF THE WORKSHOP

1.1.1 The workshop to develop an Implementation Action Plan for Global Ocean Observations for GOOS/GCOS opened in the Arcade Room, University of New South Wales, Sydney, Australia, at 0930 hrs on Wednesday 4 March 1998. Mr Ben Searle, representative of the host organizations (Australian Oceanographic Data Centre (AODC) and the University of New South Wales (UNSW)), welcomed participants to the workshop, to Sydney and to the UNSW. He then introduced Professor Merilyn Sleigh, Dean of Life Sciences, UNSW.

1.1.2 On behalf of the University, Prof. Sleigh also welcomed participants to the workshop and to the University. She noted that the hosting of the workshop was just one manifestation of the University's commitment to marine sciences in Australia. The University was particularly interested in developing mechanisms for implementing marine data measurement systems for marine resources. It therefore strongly supported the aims of the workshop. Prof. Sleigh concluded by wishing all participants a successful workshop and an enjoyable stay in Sydney.

1.1.3 The Director of the GOOS Project Office welcomed participants on behalf of IOC and WMO. He thanked the two host institutions (UNSW and AODC) most sincerely, on behalf of participants and of the sponsoring organizations for the workshop, for the excellent facilities and warm hospitality provided. He then noted that the workshop had been convened to consider in particular global physical and related observations to support the common GOOS/GCOS module, ocean services and some other parts of GOOS. The expected outcome was a concrete action plan to lead to the implementation of networks to obtain these observations, in particular through existing mechanisms.

1.1.4 The list of participants in the workshop is given in Annex I.

1.2 ELECTION OF CHAIRMAN

1.2.1 Participants elected Dr A.McEwan (Australia), chairman of the Intergovernmental Committee for GOOS (I-GOOS), as chairman for the duration of the workshop. He invited participants to introduce themselves.

1.3 ADOPTION OF THE AGENDA

1.3.1 The workshop adopted its agenda on the basis of the annotated provisional agenda. This agenda is given in Annex II.

1.4 WORKING ARRANGEMENTS

1.4.1 The workshop agreed its hours of work and other logistic arrangements. The documentation was introduced by the Secretariats.

2. REVIEW OF GOOS/GCOS PLANNING AND REQUIREMENTS

2.1 The workshop noted existing planning documents for GOOS and GCOS, to provide a contextual framework for the development of the implementation action plan. These documents included:

- GOOS Strategic Plan and GOOS Principles
- GOOS 1998
- GOOS services review
- Plan for the Global Climate Observing System (GCOS), version 1.0
- OOSDP Report
- GCOS Data and Information Plan
- IGOSS/IODE Data Management Strategy for GOOS

2.2 The workshop recalled the stated requirements of the Conference of Parties (COP) to the Framework Convention on Climate Change (FCCC) for observational data to support its needs for monitoring and assessing climate change and its impacts as well as the effectiveness of amelioration actions. In this context, it noted the report being prepared by GCOS for the Subsidiary Body for Scientific and Technical Advice (SBSTA) of the COP, which will analyze existing climate observing networks and mechanisms in the context

of COP requirements, identify deficiencies and establish priorities for maintaining and/or augmenting networks. The report is intended for eventual consideration of and support by the COP. The participants recognized that the structure and objectives of this report were directly relevant to the present workshop, and that its results would provide essential input to the report relating to global physical ocean observations.

2.3 The workshop then reviewed detailed requirements for global ocean physical observations for GOOS and GCOS, as expressed by the Ocean Observations Panel for Climate and based primarily on those given in the OOSDP report. It recognized that these requirements form the basis for the action plan and the allocation of responsibilities for implementation. The requirements are detailed in Annex III and in Section 2 of the Action Plan.

3. EXISTING IMPLEMENTATION MANAGEMENT STRUCTURES

3.1 Since the primary objective of the workshop was to assign implementation responsibilities and actions to existing implementation bodies and mechanisms, participants carefully reviewed the present status and capabilities of these bodies, specifically the WMO Commission for Marine Meteorology (CMM) and its voluntary observing ships (VOS) scheme; the IOC/WMO Integrated Global Ocean Services System (IGOSS) and its Ship-of-Opportunity Programme Implementation Panel (SOOPIP); the IOC International Oceanographic Data and Information Exchange (IODE); the Global Temperature and Salinity Profile Programme (GTSPP) of IGOSS/IODE; the WMO/IOC Data Buoy Cooperation Panel (DBCP); the IOC Global Sea-Level Observing System (GLOSS); and the TAO Implementation Panel (TIP) and the PIRATA pilot programme. The review was done on the basis of documented summaries of capabilities and management procedures available at the meeting, together with interactive presentations made by the chairs of the different groups or their representatives.

3.2 As a result of this review and the ensuing discussions, a number of important issues were noted, relating to the operations of the existing mechanisms, which would need to be taken into account, and resolved where possible, in developing the action plan. These included:

- regulatory powers
- resources
- the role of the sponsors
- distributed management and management rationalization
- assessment and incorporation of new observing systems and techniques
- standards and formats
- duplication of effort
- regionalization
- GOOS/research interface
- ongoing evaluation of techniques
- reporting procedures
- PR and information services
- enhanced cooperation and coordination in capacity building

These issues are addressed in detail in the next section.

4. EXISTING IMPLEMENTATION PLANS AND STRATEGIES

4.1 Several of the existing implementation bodies have already prepared implementation plans and strategies for their specialized activities, which are in various stages of finalization. Copies of these were available at the workshop and short presentations were made of their main features. These included in particular those for GLOSS, IGOSS, IODE, SOOP and the DBCP. Following a review and general discussion, the workshop agreed on the value of convening one or more workshops (beginning with one for upper ocean thermal data), involving representatives of science design bodies, operators, users and data management mechanisms, to address, **inter alia**, network design and integration questions. It further agreed on the need for a pilot project for surface marine data.

4.2 In summary, the following specific actions were noted stemming directly from the discussions on this and the preceding item:

(i) Existing implementation bodies need to urgently review their implementation plans, and adjust them where necessary in the light of the requirements given in Annex III, to provide the necessary support for GOOS/GCOS. **(Action: GLOSS, DBCP, SOOPIP, CMM/VOS, GTSPP)**

(ii) Workshops are needed to refine requirements for surface (meteorological and oceanographic) and upper ocean subsurface data, based on interaction between science designers and implementers. **(Action: GPO and WMO Secretariat with OOPC, SOOPIP and others)**

(iii) Technical coordination support is essential for each implementation activity, but resources may be shared. **(Action: Secretariats and DBCP, SOOPIP, GLOSS, CMM, later others)**

(iv) GLOSS requires a science advisory group. **(Action: GLOSS and IOC Secretariat)**

5. IMPLEMENTATION ACTION PLAN

5.1 The primary output of the workshop was a plan recommending specific actions and identifying individuals and/or bodies to take them forward in a specified time frame. This represents essentially the first step towards a detailed implementation plan for one set of GOOS/GCOS requirements, those which address the climate module primarily, but also some of the needs identified by other GOOS module panels.

5.2 The workshop agreed that the tabulated requirements discussed under agenda item 2 and given in Annex III provided the initial basis for implementation by existing groups. It therefore invited these bodies to adjust their own implementation plans to specifically address these requirements. At the same time, the workshop recognized that there were still a number of missing elements which would be essential to a complete implementation plan, including no obvious existing mechanisms for some of the variables in the requirements table. In addition, it was recalled that this table covered only physical and some related chemical variables required for the GOOS/GCOS ocean climate module and important also to GOOS services and (partially) to other modules, especially coastal. It also noted the complexity of trying to map the requirements onto the large and disparate range of existing bodies. It recognized that the action plan should contain both:

- a detailed analysis of requirements, designed to highlight actions;
- a synthesis of these, as a production line concept, to highlight the methodology for producing user-oriented/user-defined products.

5.3 The workshop therefore agreed, as a first step, to categorize the requirements under three main types:

- surface
- upper ocean/sub-surface
- global sea level

For each of these categories, it then addressed in detail, and with direct reference to existing systems where possible, questions relating to a number of specific and common topics directly relevant to GOOS implementation. Stemming directly from the list of issues identified under agenda item 3 (para 3.2), these included:

- science support
- observing networks
- data and information flow
- archives/standards
- quality assurance
- resources
- regulatory powers
- technical support
- administrative structures
- capacity building
- affiliated drivers
- products
- special issues.

A tabulated analysis of the status, capabilities and deficiencies of the existing systems, as a function of these categories and topics is given in Annex IV and also reproduced in Section 5 of the action plan.

5.4 During the development of this matrix tabulation, a number of specific and immediate actions were identified, to be implemented by existing implementation bodies, the OOPC and the Secretariats. These **actions are detailed in Annex V** and reproduced in Section 5 of the action plan. Finally, the workshop identified a set of cross-cutting, generic issues relating to all the existing observing systems. These are tabulated in Annex VI and addressed in more detail in Section 6 of the action plan.

5.5 The detailed action plan will be finalized by the interim Implementation Advisory Group (see next agenda item) and published separately to this meeting report. After wider community review, it will form the blueprint for initial action by the different implementation bodies, and will also eventually be submitted for formal acceptance by these bodies in session, as well as by the governing bodies of the sponsoring organizations. The workshop stressed that the action plan should be clearly focussed on actions to get implementation underway on the basis of the specified requirements, as well as to integrate the work of the existing bodies in support of GOOS/GCOS. At the same time, it acknowledged that planning was far as yet from complete, and that this action plan itself was only the first (though essential) step in overall implementation process.

6. IMPLEMENTATION COORDINATION PROCEDURES

6.1 The workshop recognized that some mechanism was required to coordinate and provide oversight of implementation of the action plan. In the short term, it agreed that this should be done through the establishment of a small Interim Implementation Advisory Group, comprising representatives of the different implementation bodies and the OOPC, to report to the GOOS Steering Committee and the GCOS/JSTC, as well as the implementation bodies themselves. The terms of reference and membership of this advisory group are given in Annex VII. It was agreed that the group should work by correspondence to **finalize the action plan as a priority task**. It also recommended that the group should meet ideally before the end of 1998, in order to review the status of actions already underway and to prepare an ongoing work programme.

6.2 The workshop was informed that, in the longer term, a more formal, single joint IOC/WMO mechanism is under consideration, based on an amalgamation and rationalization of existing bodies (CMM and IGOSS), to form an implementation coordinating and regulatory body for physical oceanography and marine meteorology. This approach was strongly endorsed by the workshop as being directly relevant to and supportive of GOOS implementation and coordination requirements. The workshop recommended some small modifications to the proposed terms of reference for the new body, to properly reflect the close GOOS linkages as well as the collaboration required with IODE. It further recommended that the DBCP, TIP, GLOSS and GTSPP should be affiliated with the new body, as a reporting and integrating pathway, while retaining their independent operating status; and that an approach be developed to ensure full coordination of IODE with the new body in the short term, with a view to possible future integration. A diagram illustrating the proposed new structure, and its relationship to GOOS, is given in Annex VIII. In addition, the workshop agreed that the cross-cutting, generic issues listed in Annex VI should be addressed by both the Implementation Advisory Group and eventually the new body. It is likely that a formal proposal for the new body will be considered by the WMO Congress and IOC Assembly in 1999. (**Actions: Secretariats and Implementation Advisory Group**)

6.3 Issues relating to coordination and management of GOOS implementation are addressed also in Section 7 of the Action Plan.

7. FOLLOW-UP ACTIONS

7.1 The workshop agreed a set of actions to ensure that the implementation action plan is published, presented in appropriate fora, and actually implemented according to a specified time-table. These actions are given in Annex IX.

8. CLOSURE

8.1 In closing the workshop, the chairman thanked all participants for their very constructive input and for the harmonious and positive way in which they had approached what was a vital step in GOOS development. He particularly thanked Neville Smith for his work in preparing the detailed requirements, which provided the essential driver and focus for the workshop and for implementation. Finally, the chairman thanked the host organizations and in particular the local secretariat for their willing and efficient support and hospitality, which had contributed substantially to the success of the workshop.

8.2 The workshop closed at 1200 hours on Saturday 7 March 1998.

ANNEX I

LIST OF PARTICIPANTS

Rick **Bailey**
Scientist-in-Charge
Ocean Observing Networks
CSIRO
Division of Marine Research
G.P.O. Box 1538
Hobart, Tasmania 7000
Australia
Tel: (61 3) 6232 5222
Fax: (61 3) 6232 5000
Email : rick.bailey@marine.csiro.au
(Chairman of IGOSS/SOOPIP)

Graeme **Brough**
Superintendent
Instrument Engineering
Bureau of Meteorology
G.P.O Box 1289K
Melbourne, VIC 3001
Australia
Tel: (61 3) 9669 4163
Fax: (61 3) 9669 4168
Email: g.brough@bom.gov.au
(Chairman of DBCP)

Peter **Dexter**
Chief, Ocean Affairs Division
World Weather Watch
WMO
41 Avenue Giuseppe Motta
CH-1211 Geneva 2
Switzerland
Tel: (41 22) 730 8237
Fax: (41 22) 733 0242/
734 0954
Email: dexter@www.wmo.ch
(WMO Secretariat representative)

François **Gérard**
Chef du Département réseau DGO/RE
Météo-France
1, Quai Branly
75340 Paris Cedex 07
France
Tel: (33 1) 45 56 70 24
Fax: (33 1) 45 56 70 05
Email: françois.gerard@meteo.fr
(Vice-chair of I-GOOS)

Johannes **Guddal**
Manager Marine Forecast Services
Norwegian Meteorological Institute
Allegt. 70
5007 Bergen
Norway
Tel: (47 55) 23 66 26
Fax: (47 55) 23 67 03
Email: j.guddal@dnmi.no
(President of CMM)

Bob **Keeley**
Marine Environmental Data Service
200 Kent St.
Ottawa, Ontario KIA OE6
Canada
Tel: (1 613) 990 0246
Fax: (1 613) 993 4658
Email: keeley@ottmed.meds.dfo.ca
(Representative of GTSPP)

Dieter Kohnke
Bundesamt für Seeschiffahrt und Hydrographie
Postfach 301220
D-20305 Hamburg
Germany
Tel: (49 40) 31 90 34 00
Fax: (49 40) 31 90 50 00
Email: kohnke@bsh.d400.de
(Chairman of IGOSS)

Angus **McEwan**
Senior Science Adviser Oceanography
GPO Box 727G
Hobart, Tasmania 7001
Australia
Tel: (61 3) 6221 2090
Fax: (61 3) 6221 2089
Email: a.mcewan@bom.gov.au
(Chairman of I-GOOS)

Linda **Mangum**
TAO Project Manager
NOAA/PMEL
7600 Sand point Way NE
Seattle, WA 98115
USA
Tel: (1206) 526 6740
Fax: (1206) 526 6744
Email: mangum@pmel.noaa.gov

David **Meldrum**
Group Leader, Marine Technology
Dunstaffnage Marine Laboratory
PO Box 3
OBAN PA34 4AD
Scotland
United Kingdom
Tel: (+44 1631) 567873
Fax: (+44 1631) 565518
Email: dtm@dml.ac.uk
(Vice-chair of DBCP)

George **Needler**
Bedford Institute of Oceanography
1 Challenger Drive
P.O. Box 1006
Dartmouth, N.S. B2Y 4A2
Canada
Tel: (1 902) 426 3145
Fax: (1 902) 426 7827
Email: g.needler@bionet.bio.dfo.ca
(CLIVAR/OOPC representative)

Worth **Nowlin**
Texas A and M University
Dept. of Oceanography
College Station, TX 77843-3146
USA
Tel: (1 409) 845-3900
Fax: (1 409) 847 8879
Email: wnowlin@tamu.edu
(Chairman of GSC)

Phil **Parker**
National Coordinator
Marine & Oceanography Services
Bureau of Meteorology
P.O. Box 1289K
Melbourne 3001
Australia
Tel: (613) 9669 4510
Fax: (613) 9669 4695
Email: P.Parker@bom.gov.au

Sachooda **Ragoonaden**
Meteorological Services
St Paul Road
Vacoas
Mauritius
Tel: (230) 686 1031
Fax: (230) 686 1033
Email: meteo@intnet.mu

Richard **Reynolds**
National Centers for Environmental Prediction
(NCEP)
World Weather Building
5200 Auth Rd, Room 807
Camp Spring, MD 20746
USA
Tel: (1 301) 763 8396
Fax: (1 301) 763 8125
Email: rreynolds@sun1.wwb.noaa.gov
(Representative of CLIVAR/UOP)

Ben **Searle**
Chairman IODE,
Australian Oceanographic Data Centre
Maritime Headquarters
Wylde St. Potts Point NSW
Australia
Tel: (61 2) 9359 3139
Fax: (61 2) 9359 3120
Email: ben@aodc.gov.au
(Chairman IODE)

Neville **Smith**
Bureau of Meteorology Research Centre
150 Lonsdale Street
Box 1289K
Melbourne, VIC 3001
Australia
Tel: (61 3) 9669 44 34
Fax: (61 3) 9669 46 60
Email: nrs@bom.gov.au
(Chairman OOPC)

Keisuke **Taira**
Director
Ocean Research Institute
University of Tokyo
1-15-1, Minamidai, Nakano-ku
Tokyo 164-8639
Japan
Tel: (81 3) 5351 6417
Fax: (81 3) 5351 6418
Email: taira@ori.u-tokyo.ac.jp
(Chairman WESTPAC)

Marcio **Vianna**
Programa Oceanografia/Projeto
Pirata Instituto Nacional de Pesquisas
Espaciais - INPE
Caixa Postal 515
CEP 12201-970
São Jose dos Campos
São Paulo
Brazil
Tel: (55 12) 345 6477/6446
Fax: (55 12) 345 6460
Email: mvianna@ltid.inpe.br
(PIRATA representative)

Robert **Weller**
Woods Hole
Oceanographic Institution
Woods Hole, MA 02543
USA
Tel: (1 508) 289 2508
Fax: (1 508) 457 2181
Email: rweller@whoi.ed **(OOPC member)**

Philip **Woodworth**
Chairman, Group Experts on GLOSS
Proudman Oceanographic Laboratory
Bidston Observatory
Birkenhead, Merseyside L43 7RA
United Kingdom
Tel: (44 151) 653 8633
Fax: (44 151) 653 6269
Email: plw@pol.ac.uk
(GLOSS representative)

Colin **Summerhayes**
Director, GOOS Project Office
Intergovernmental Oceanographic
Commission of UNESCO
1, rue Miollis
75732 Paris, Cedex 15
Tel: (33 1) 45 68 40 42
Fax: (33 1) 45 68 58 12
Email: c.summerhayes@unesco.org
(IOC/GPO representative)

ANNEX II

AGENDA

1. **OPENING**

   1.1 OPENING OF THE WORKSHOP

   1.2 ELECTION OF CHAIRMAN

   1.3 ADOPTION OF THE AGENDA

   1.4 WORKING ARRANGEMENTS

2. **REVIEW OF GOOS/GCOS PLANNING AND REQUIREMENTS**

3. **EXISTING IMPLEMENTATION MANAGEMENT STRUCTURES**

4. **EXISTING IMPLEMENTATION PLANS AND STRATEGIES**

5. **IMPLEMENTATION ACTION PLAN**

6. **IMPLEMENTATION COORDINATION PROCEDURES**

7. **FOLLOW-UP ACTIONS**

8. **CLOSURE**

ANNEX III

Table A A summary of the sampling requirements for the global ocean, based largely on OOSDP (1995), but with revisions as appropriate. These are a statement of the required *measurement network* characteristics, not the characteristics of the derived field. The field estimates must factor in geophysical noise and unsampled signal. Some projections (largely unverified) have been included for GODAE.

Sampling Requirements for the Global Ocean							
Code	**Application**	**Variable**	**Hor. Res.**	**Vert. Res.**	**Time Res.**	**#samples**	**Accuracy**
A	NWP, climate, mesoscale ocean	Remote SST	10 km^2	-	6 h	1	0.1-0.3°K
B	Bias correction, trends	*In situ* SST	500 km^2	-	1 week	25	0.2-0.5°C
C	Climate variability	Sea surface salinity	200 km^2	-	10 day	1	0.1 PSU
D	Climate prediction and variability	Surface wind	2° x 2°	-	1-2 day	1-4	Dirn: 20% 2 m/s
E	Mesoscale, coastal	Surface wind	50 km^2	-	1 day	1	1-2 m/s
F	Climate	Heat flux	2° x 5°	-	month	50	Net: 10 W/m^2
G	Climate	Precip.	2° x 5°	-	daily	several	5 cm/month
H	Climate change trends	Sea level	50-1000 km^2	-	monthly means	30-50 gauges + GPS with altimetry or several 100s + GPS	1 cm, giving several * 0.1 mm/yr accuracy trends over 1-2 decades
I	Climate variability	Sea level anomalies	100-200 km^2	-	month	~ 10	2 cm
J	Mesoscale variability	Sea level anomalies	25-50 km^2	-	2 days	1	2-4 cm
K	Climate, short-range prediction	sea ice extent, concen.	~ 30 km	-	1 day	1	10-30 km 2-5%
L	Climate, short-range prediction	sea ice velocity	200 km^2?	-	Daily	1	cm/s?
M	Climate	sea ice volume	500 km^2	-	monthly	1	~ 30 cm
N	Climate	surface pCO_2	25-100 km^2	-	daily	1	0.2-0.3 µatm
O	ENSO prediction	T(z)	1.5° x 15°	15 m over 500 m	5 days	4	0.2°C
P	Climate variability	T(z)	1.5° x 5°	~ 5 vert. Modes	1 month	1	0.2°C
Q	Mesoscale ocean	T(z) for large-scale	500 km^2	~ 5 modes	10 days	1	0.2°C
R	Climate	S(z)	large-scale	~ 30 m	monthly	1	0.1 PSU
S	Climate, short-range prediction	U(surface)	600 km^2	-	month	1	2 cm/s
T	Climate model valid.	U(z)	a few places	30 m?	Mon. means	30	2 cm/s

Table B Requirements (threshold and optimal) for global ocean circulation studies, with particular reference to the Global Ocean Data Assimilation Experiment (GODAE) and the space-based observation program. The specifications are based on the OOSDP Report (Compilation by Michel Lefebvre and colleagues.).

Global Observations of Ocean Circulation - Space-based data Requirements										
Details			Optimized requirements				Threshold requirements			
Code	Application	Variable	HR(km)	Cycle	Time	Accuracy	HR(km)	Cycle	Time	Accuracy
ALTIMETRY										
A	Mesoscale variability	sea surface topography	25	7 d	2 d	2 cm	100	30 d	15 d	10 cm
B	Large scale variability	sea surface topography	100	10 d	2 d	2 cm	300	10 d	10 d	2 cm
C	Mean SL variations	sea surface topography	200	> 10 yr	10 d	1 mm/yr	1000	> 10 yr	10 d	5 mm/yr
D	Circulation, heat transport	sea surface topography	100	NA	NA	1 cm	500	NA	NA	5-10 cm
REMOTE SALINITY										
E	Circulation water transport	surface salinity	200	10 d	10 d	0.1 PSU	500	10 d	10 d	1 PSU
SCATTEROMETRY										
F	Wind-forced Circulation	surface wind field	25	1 d	1 d	1-2 m/s 20°	100	7 d	7 d	2 m/s 30°
SEA SURFACE TEMPERATURE										
G	NWP; climate, mesoscale models	Sea surface temperature	10	6 h	6 h	0.1°K (relative)	300	30 d	30 d	1°K
SEA ICE										
H	Ocean-ice coupling warnings	sea ice extent, concentration	10	1 d	3 h	2%	100	1 d	10 d	10%
OCEAN COLOR										
I	Biogeochemistry, transparency	ocean color signal	25	1 d	1 d	2%	100	1 d	1 d	10%

Footnotes:

A requires wave height + wind (EM bias correction) measured from altimeter, water vapor content measured from on board radiometer, and ionospheric content / measured from 2 frequency altimeter.
B requires precise positioning system with an accuracy of 1-2 cm for a spatial resolution of 100 km.
C requires precise monitoring of transit time in the radar altimeter.
A, B and C require repeat track at ± 1 km to filter out unknowns on geoid.
A requires adequate sampling which implies at least 2, and preferably 3, satellites simultaneously.
A, B and C require long lifetime, continuity, cross calibration.
D requires absolute calibration.
F: The requirements on the wind field for sea state determination normally exceed sampling requirements for wind forcing
G: High resolution SST from new geostationary satellite + combination with low satellite

ANNEX IV

SYSTEM ANALYSIS

Observation Types → / Implementation Topics ↘	Global Sea Level	Surface	Upper Ocean/Subsurface
1. Science support	Science WG	SCOR/WCRP Air-SeaFlux Working Group;review charge, addexpertise, refine ownership (resources,ice, waves, currents)	-OOPC -CLIVAR UOP -Workshop?
2. Observing networks	GLOSS Impl. Plan	Develop strategy to pull together parts (only parts relevant to GOOS) of existing networks - VOS, buoys, SOOP, TAO, satellite (operational + future); benchmarks	SOOP, TAO, Profiling Floats "Synthetic" XBTs from altimeter/AVHRR, Moving Vessel Profilers (MVPS); time series; repeat hydrography
3. Data & Information flow	UH/PSMSL	Problems in distribution, acquisition, need to integrate data flows - flux quantities a good example require several basic obs, should be able to recompute	Adopt GTSPP/Best of TAO, etc.
4. Archives/Standards	PSMSL/UH	Problems - for some, like waves, no general archive; QC, keep metadata in archives; for some - multiple archives - standardized formats?	Adopt GTSPP/Best of TAO, etc. -"Standards" presently recommendations
5. Quality Assurance	High Level Product	QC by people close to data streams; keep information about quality decisions; develop scientific level quality control - capture + blend in expertise from DACs	-Science centre concept -GTSPP Monitoring -Instrument/technique evaluation/calibration (STT/IQC good model) -Need throughout "production" line

Observation Types → / Implementation Topics ↘	Global Sea Level	Surface	Upper Ocean/Subsurface
6. Resources	National	Focus & coordinate; prioritize; new resources + attention for archiving	-Review after Workshop? -Optimize through prioritization/feasibility -Workshop results too late for Agreements meeting? -Research/operations mix ➜ operations stability
7. Regulatory powers	Technical Secretary	Who sets standards? No one regulatory body.	Needed to ensure consistency (presently good will which can be overridden by resource issues)
8. Technical support	Consultants	Coordinate existing technical efforts; get people in operational agencies involved	-More formal/funded support required (instrument evaluations, etc.) ➜ presently voluntary -Coordinator required
9. Administrative structures	I-GOOS/GSC	Nightmare	-Structures for SOOP + TAO exist (relation?) -Presently no formal management structure for profilers (implementing) ➥incorporate?
10. Capacity building	Training	Build on existing infrastructure for in-situ; develop awareness of use of data to determine fluxes; learning curve on variables like waves	-Expand "information" on programme to attract more users <u>and</u> contributors -Expand ship greeting network through PMOs, etc. -Biological/Chemical Observations -Surface & subsurface salinity -More automated instrumentation?
11. Affiliated drivers	LOICZ/GTOS	WMO; (CLIVAR) research; IPCC; safety of life at sea; space agencies (CEOS); governments	-Research, fisheries, navies, etc.; (CLIVAR?); National requirements
12. Products	Science datasets; Service Products (SS, floods, extremes); IPCC	Many products exist, but for some variables not working, people not getting what they want	-Exist -Coordination/delivery system under GOOS "banner"?

Observation Types → / Implementation Topics ↘	Global Sea Level	Surface	Upper Ocean/Subsurface
13. Special issues	Coastal panel; Commercialization; Security; Altimeter continuity; Dedicated gravity measure; Network upgrades	-Which variables (sea ice-extent, waves, ...) -New methods - radar -Priorities change with focus, user (coastal vs. Open ocean; location) -How to communicate with and influence existing impl. structures -Funding for observing system research -Space/time variability is large, how to determine sampling -Some quantities are derived from several basic observables -Sampling bias - don't go where weather is bad -Funding/coordination of technology development	-Resource support for intercalibrations, instrument development, etc. -Greater feedback loops -Maintaining existing networks until new systems proven -Maintain strong links between science, data collection, data management, users -Profilers ➜ Research/ operational -Logistical constraints of sampling from SOOP + Profilers (+ moored systems?) -Time series stations? -Acoustic tomography -Cables, etc.

ANNEX V

IMPLEMENTATION ACTION ITEMS

Sea Level Measurements

1. Establish a science steering group for sea level. (**Action:** GLOSS, OOPC and IOC Secretariat)
2. Re-establish technical secretary for GLOSS in IOC. (**Action:** IOC Secretariat)
3. Input coastal module requirements to GLOSS. (**Action:** Coastal Panel)
4. Upgrade network according to design purpose. (**Action:** GLOSS and IOC Secretariat)

Surface Measurements

1. SCOR/WCRP Air-Sea Flux Working Group to be asked to broaden remit to become the *science steering group* for surface measurements. (**Action**: Chair/OOPC, P.Taylor and eventually Secretariats)
2. Develop an integrating strategic plan for surface measurements. (**Action**: science steering group, OOPC and implementers)
3. Develop and implement a *pilot project* (c.f. GTSPP) to integrate surface data management, quality assurance, archives, standards, regulations, and product preparation, involving ship and buoy operators, centres like COADS, WOCE DACs, plus analysis groups, etc. (**Action**: science steering group, OOPC, centres, implementers)
4. Study development of a high-quality subset of VOS for GOOS/GCOS purposes. (**Action**: P.Taylor, R.Weller, CMM/VOS group)
5. P.Taylor and R.Weller to participate in VOS group meeting, Athens, March 1999, to begin dialogue. (**Action**: WMO Secretariat)
6. Enhance technical support for surface observation systems and rationalize administration. (**Action**: Secretariats, CMM, Member States)
7. Build on existing capacity-building structure to include awareness of data applications to flux determination, integration of satellite and surface fields; develop an overall GOOS strategy for capacity-building. (**Action**: Secretariats)
8. Dialogue with CEOS on the need for enhanced *in situ* observations. (**Action**: Secretariats, GSC)
9. Promote R&D for operational measurements of CO2, precipitation, surface salinity from satellites, plankton sampling. (**Action**: GSC)
10. Prepare a status report on HF radars for GSC. (**Action**: J.Guddal and G. Needler)
11. Assess existing sea-ice observing and data management system; prepare recommendations for enhancement to meet requirements. (**Action**: OOPC and Secretariats)

Sub-surface Measurements

1. Prepare and hold a workshop to refine requirements for upper ocean thermal data, based on strategic assessment of these requirements from OOPC and in the light of likely available resources. (**Action**: OOPC, SOOPIP and Secretariats)
2. Assess need for possible second workshop on data management, quality assurance, "duplication" of GTSPP, etc. (**Action**: IGOSS, IODE, OOPC, Secretariats)
3. Re-establish Operations Coordinator position to support SOOP. (**Action**: Secretariats, IGOSS, Member States)
4. Evaluate mix of operational and research funding for SOOP, and work to decrease dependence on research programmes. (**Action**: Operations Coordinator, SOOPIP, Secretariats, Member States)
5. Improve coordination in implementation management among SOOP, TAO and DBCP; investigate incorporation of "operational" management of floats into existing structures; investigate also any requirement for technical coordination for float operations. (**Action**: SOOPIP, TIP, DBCP with Secretariats and float operators)
6. Propose products from the Electronic IGOSS Products Bulletin as GOOS products. (**Action**: D. Kohnke)

General

1. All implementation groups to adopt *General Principles of Long-Term Climate Monitoring*, as developed and agreed under GCOS. These principles first elaborated by T. Karl in *Long-Term Climate Monitoring by GCOS*, Special Issue of *Climatic Change*, 1995, to be finalized at J-DIMP meeting, Hawaii, April 1998 and then annexed to Implementation Action Plan. (**Action**: Secretariats and implementation groups)
2. All implementation groups to adjust implementation plans to accommodate GOOS/GCOS requirements as specified in Annex III and in Implementation Action Plan. (**Action**: DBCP, SOOPIP, GLOSS, VOS, TIP)

ANNEX VI

CROSS-CUTTING AND GENERIC ISSUES FOR EXISTING BODIES

1. Merging existing activities into a new management/coordination structure.
2. Retaining competencies and expertise within existing bodies.
3. The need for clear messages on GOOS/GCOS requirements to be passed to existing bodies (IGOSS, IODE, CMM, DBCP, etc.).
4. Preserving the science → data stream links (e.g. WOCE DACs).
5. The eventual status of IODE vis-à-vis the new structure, separate but strongly linked.
6. Undertaking/maintaining the lead role on standards and formats.
7. The manipulation of both management and operational resources, which is an art, and far from trivial.
8. The respective roles of global and regional implementation and coordination, including joint concerns and experiences.
9. Coercing and encouraging participation in implementation.
10. An *ocean CBS* is premature, but will eventually be required.
11. The eventual implementation of the non-physical parts of GOOS.

ANNEX VII

INTERIM IMPLEMENTATION ADVISORY GROUP

Terms of Reference

1. Finalize the Implementation Action Plan and update as required.

2. Identify and provide oversight to actions and ensure implementation.

3. Develop/refine integrating strategies for global surface marine observations and for upper ocean observations; suggest and coordinate changes within and among the observing systems, designed to improve the efficiency of the overall system and the quality of the required products derived therefrom.

4. Coordinate implementation of these strategies by implementation bodies; provide an interim evaluation of the system efficiency and use of the observations and products.

5. Report to the GSC and the implementation bodies.

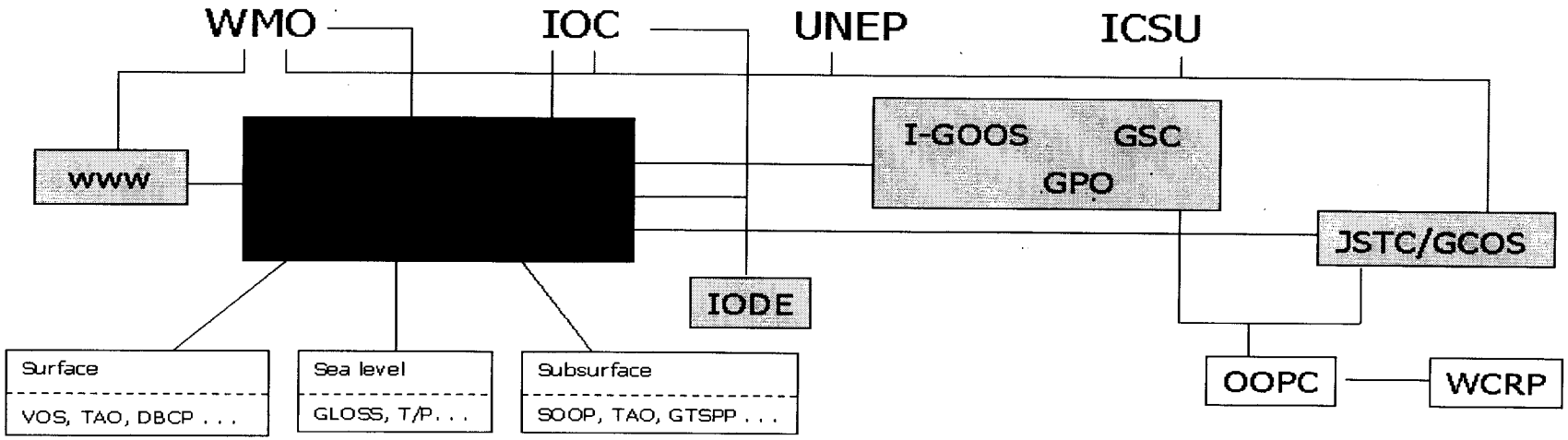
Membership

Chairman
OOPC representative
CMM/IGOSS (SOOP and VOS) representatives
IODE representative
DBCP/TIP representatives
GLOSS representative

Secretariats

ANNEX VIII

GOOS/GCOS IMPLEMENTATION STRUCTURE



INTERIM IMPLEMENTATION ADVISORY GROUP

IGOSS, CMM, IODE, DBCP, GLOSS, TIP, OOPC

ANNEX IX

FOLLOW-UP ACTIONS

	Action	By Whom	Time scale
1.	Finalize workshop report and distribute for review	WMO	GSC-I
2.	Table report at GSC-I	GPO	GSC-I
3.	Table draft Action Plan at GSC-I	WMO,GPO	GSC-I
4.	Prepare formal proposal on CMM/IGOSS merger for Executive Councils of WMO/IOC	WMO, GPO	mid-April
5.	Establish Implementation Advisory Group (IAG)	GPO, WMO	mid-April
6.	Finalize Action Plan	IAG, WMO, GPO	end 1998
7.	Circulate, review, revise and publish Action Plan	GPO, WMO, GSC	mid-1999
8.	Revise implementation plans for buoys, SOOP, VOS, GLOSS	DBCP, SOOPIP, CMM/VOS, GLOSS	mid-1999
9.	Undertake all implementation actions as specified in Annex V.	All	ongoing

ANNEX X

LIST OF ACRONYMS

AODC	Australian Oceanographic Data Centre
CBS	Commission on Basic Systems (of WMO)
CEOS	Committee on Earth Observation Satellites
CLIVAR	Climatic Variability Programme
CMM	Commission for Marine Meteorology
COP	Conference of Parties
DACS	Data Acquisition Centres
DBCP	Data Buoy Cooperation Panel
ENSO	El Niño-Southern Oscillation
FCCC	Framework Convention on Climate Change
GCOS	Global Climate Observing System
GLOSS	Global Sea-Level Observing System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GPO	GOOS Project Office
GSC	GOOS Steering Committee
GTOS	Global Terrestrial Observing System
GTSPP	Global Temperature and Salinity Profile Programme
GTSPP	Global Temperature and Salinity Profile Programme
I-GOOS	Intergovernmental Committee for GOOS
IAG	(Interim) Implementation Advisory Group
ICSU	International Council for Science
IGOSS	Integrated Global Ocean Services System
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange
IPCC	Intergovernmental Panel on Climate Change
JSTC	Joint Scientific and Technical Committee (of GCOS)
LOICZ	Land Ocean Interaction in the Coastal Zone
NWP	Numerical Weather Prediction
OOPC	Ocean Observations Panel for Climate
OOSDP	Ocean Observing System Development Panel
PIRATA	Pilot Research Array in the Tropical Atlantic
PSMSL	Permanent Service for Mean Sea-Level
SBSTA	Subsidiary Body for Scientific and Technical Advice
SCOR	Scientific Committee on Oceanic Research
SOOP	Ship-of-Opportunity Programme
SOOPIP	Ship-of-Opportunity Programme Implementation Panel
SST	Sea Surface Temperature
TAO	Tropical Atmosphere Ocean (buoy array)
TIP	TAO Implementation Panel
UH	University of Hawaii
UNEP	United Nations Environment Programme
UNSW	University of New South Wales
UOP	Upper Ocean Panel
VOS	Voluntary Observing ships
WCRP	World Climate Research Programme
WG	Working Group
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment
WWW	World Weather Watch
XBT	Disposable Bathythermograph