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DBCP-VIII/3
Paris, 18 December 1992
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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of UNESCO)

WORLD METEOROLOGICAL ORGANIZATION

Eighth Session of the Drifting-Buoy Co-operation Panel
Paris, France, 14-17 October 1992

SUMMARY REPORT

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SUMMARY REPORT

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1. ORGANIZATION OF THE SESSION

1.1 OPENING OF THE SESSION

1 The Eighth Session of the Drifting-Buoy Co-operation Panel (DBCP) was opened by the Chairman of the Panel, Mr. D. Painting, at 10 a.m. on Wednesday 14 October 1992 at UNESCO headquarters in Paris. After welcoming the participants, Mr. Painting called on the Representative of the IOC Secretariat to address the Panel.

2 On behalf of the Secretary IOC, Dr. G. Kullenberg, who was unable to open the session himself, and of the Secretary-General of WMO, Prof. G.O.P. Obasi, the Representative of the IOC Secretariat welcomed the participants to the session, to the "Maison de l'UNESCO" and to Paris. He pointed out that the present session was facing a large amount of work: as foreseen at the previous session, it would have to take important administrative and financial decisions to go on with securing the services of the Technical Co-ordinator; it would have to express precise recommendations regarding its relationships with the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS); it would have, as usual, to discuss various technical matters, among which the procedures for quality control of drifting-buoy data, decisions relating to the new Argos GTS processing chain and developments regarding the low-cost combined meteo-oceanographic drifting buoy are not the least; according to the proposal made by one Delegation, it also might recommend changes in its terms of reference and name. All that is a sign of the good health of the Panel and attributable to its numerous achievements. None of those would have been made possible without the efforts of the Technical Co-ordinator, to whom a special tribute should be paid, the full support of Panel members and the guidance of its Chairman. The IOC Representative concluded in wishing the participants a successful meeting and an enjoyable stay in Paris.

1.2 ADOPTION OF THE AGENDA

3 The US Delegation proposed to add to the Provisional Agenda an item entitled: "Terms of Reference and Name of the Panel". The Panel unanimously agreed on the proposal. The Agenda, as adopted by the Panel, is given in Annex I. The List of Participants is given in Annex XX.

1.3 WORKING ARRANGEMENTS

4 Under this agenda item, the Panel decided on its hours of work and other working arrangements for the session. The List of Documents for the session, including the agenda items to which they referred, was also introduced by the Secretariats.

2. REPORTS

2.1 REPORT BY THE CHAIRMAN OF THE DRIFTING-BUOY CO-OPERATION PANEL

5 The Chairman briefly summarized the work of the Panel through the intersessional period, noting that detailed reports and discussion would follow in the appropriate agenda items.

6 He drew particular attention to the following achievements:

(i) Phase one of the work to implement the new Argos processing chain was almost complete and undergoing tests prior to becoming operational (on schedule).

(ii) The second Action Group of the Panel, the International Arctic Buoy Programme (IABP), had commenced operational deployments.

(iii) The new, delayed mode, quality control system, proposed by the Panel at its last session was introduced in January 1992.

(iv) Deliveries of the new low-cost combined meteorological-oceanographic drifter have commenced and operational testing started.

7 The Chairman further reported on some specific tasks undertaken on behalf of the Panel. These included attending the Surface Velocity Programme (SVP) Planning Meeting (April 1992, Bermuda), accompanied by the Technical Co-ordinator. Also in April the Chairman and Technical Co-ordinator visited the Meteorological Service of Mauritius to give technical and logistic advice to the South-West Indian Ocean drifting buoy project.

8 In conclusion, the Chairman expressed his sincere thanks to the Technical Co-ordinator, the Secretariats of WMO and IOC, and all Panel Members who had given their valuable support to Panel activities over the past year.

2.2 REPORT BY THE TECHNICAL CO-ORDINATOR

9 The Technical Co-ordinator presented his activities for the Panel during the last intersessional period. He was based at Service Argos Inc., Landover, USA, and employed by the University Corporation for Atmospheric Research (UCAR). Good contacts with drifting and moored buoy users (Principal Investigators -PI's-, meteorological centres, archive centres) have been maintained worldwide and, upon request, some have been provided with technical assistance for solving specific problems. PI's have been encouraged and assisted to make their drifting-buoy data available onto the Global Telecommunication System (GTS). In September 1992, nearly 50% of the 1188 drifting buoys processed at the Argos centres were distributed on GTS from this source or Local Users' Terminals (LUT's).

10 In December 1991, the Technical Co-ordinator visited the Norwegian Meteorological Institute (Oslo) and OCEANOR (Trondheim). In April 1992, he attended the Fifth Session of the SVP (Bermuda) and, in conjunction with the Chairman of the DBCP, visited the Meteorological Services of Mauritius for assisting in the development of a South-West Indian Ocean drifting-buoy programme. In June, he attended the Second Session of the IABP.

11 A substantial amount of work was done on the new Argos GTS processing chain, since the Technical Co-ordinator spent approximately one fourth of his time for the project and traveled several times to Collecte Localisation Satellites (CLS)/Service Argos, Toulouse, for project review meetings and related work in conjunction with CLS/Service Argos and Digital Equipment, France. In September, he presented the new system at the Argos System Technical Exchange, Halifax, Canada. To date, phase 1 is fully developed and being tested in Toulouse using actual data. It is still planned to be operational for the 1 January 1993. The issue is detailed under Agenda Item 6.3.

12 As decided by the Panel at its seventh session, quality control guidelines for drifting-buoy data were implemented in January 1992. Thanks to enthusiastic participation of Participating Meteorological or Oceanographic Centres (PMOC's), the guidelines started operating efficiently immediately. Indeed, for the period 20 January to 20 August, for a total of 771 buoys having reported onto the GTS, more than 300 status change proposals were sent by PMOC's to the BUOY.QC bulletin board, and 122 buoys had their status changed consequently. The Technical Co-ordinator spent approximately 20% of his time operating the guidelines. This topic is detailed under Agenda Item 6.1.

13 The Technical Co-ordinator liaised with the Global Drifter Centre (for SVP) (GDC), Atmospheric Environment Service (of Canada) (AES), United Kingdom Meteorological Office (UKMO), Australian Bureau of Meteorology (ABOM), Météo France, National Data Buoy Center (of NOAA, USA) (NDBC) regarding the development of a barometer port for Lagrangian SVP drifters. Six drifters were deployed in August and three more are now reporting on GTS. Nineteen other prototypes are planned to be tested at sea.

14 The Technical Co-ordinator also worked out other issues, such as rationalization of GTS bulletin headers, implementation of the new DRIFTER code (1 November 1991) and the availability of TOGA Coupled Ocean-Atmosphere Response Experiment (COARE) ATLAS buoy data onto the GTS. Various documents, reports and statistics were produced and sent to interested bodies. The WMO-Argos numbers list is issued monthly together with the list of Principal GTS Co-ordinators (PGC's).

15 The Technical Co-ordinator drew the attention of the Panel to drifting and moored buoys reporting wind measurements from non-standard heights, and to remote automatic weather stations in altitude distributing air pressure at station level on GTS and using the "surface" DRIFTER code for that purpose, since this is presently the only technical possibility using the Argos system.

16 The full report of the Technical Co-ordinator is given in Annex II.

17 The Panel expressed its deep appreciation of the amount and quality of work the Technical Co-ordinator had performed on its behalf. Discussion on any of the topics dealt with was deferred to further agenda items.

2.3 REPORT BY THE SECRETARIATS

18 The WMO Secretariat Representative reported to the session that the major activities of the WMO Secretariat during the past year in support of the Panel had continued to be concerned with the management of the Panel's funds and related administrative support. Full details of these are discussed under Agenda Item 3. In addition to these, the WMO Secretariat had also undertaken a variety of other administrative and technical tasks in support of the work of the Panel, or of drifting-buoy programmes generally. These included various actions related to the new GTS chain; assistance in the establishment and early work of the IABP; continuing support for EGOS; development and implementation of DRIFTER modifications; maintenance of the WMO buoy identifier number system; production and sale of the DBCP ties; liaison with TOGA, WOCE, SCAR and other relevant WMO bodies such as CBS; and liaison with national Meteorological Services on behalf of the Panel. Finally, the WMO Representative noted the continuing strong support for the Panel and its work expressed by the WMO Executive Council at its forty-fourth session (June 1992).

19 The Representative of the IOC Secretariat reported that the IOC Executive Council, at its twenty-fifth session (Paris, March 1992), was provided with the Annual Report of the DBCP for 1991. Due to a very tight schedule and on the grounds that the Panel achievements are nothing but commendable, the Council did not discuss any matter regarding the Panel activities. With regard to the Global Ocean Observing System (GOOS), the Council decided through Resolution EC-XXV.3 to replace the Committee on Ocean Processes and Climate by the IOC Committee for GOOS, and to establish a GOOS Technical and Scientific Advisory Panel to: (i) advise the IOC Committee for GOOS on all scientific and technical aspects of GOOS; (ii) collaborate with the Joint WMO-IOC-ICSU Scientific and Technical Committee for GCOS and other appropriate bodies. With regard to the legal status of Ocean Data Acquisition Systems (ODAS), the Council considered there was a need to: (i) protect automated equipment, drifting or moored, surface or sub-surface based, against vandalism and theft; (ii) take into account the rights of coastal states, through relevant legal provisions to be introduced in the future Convention on the Legal Status of ODAS.

20 The Panel acknowledged with appreciation the report by the Secretariats. Discussion on any of the topics dealt with was deferred to further agenda items, as necessary.

2.4 REPORTS BY THE ACTION GROUPS OF THE PANEL

European Group on Ocean Stations (EGOS)

21 The Icelandic Delegate, Mr. F. Sigurdsson, Vice-Chairman of the European Group on Ocean Stations (EGOS), gave an oral report on EGOS, the first action group of the DBCP. He referred to and highlighted several items of a written report on EGOS (EGOS Techn. Doc. No. 62) and added some newer information. He informed that 12 drifting buoys were now operational in EGOS North and 3 in EGOS South. In addition, an agreement had been reached with the Plymouth Marine Laboratory for the continued operation of four of their buoys in EGOS South, the Argos fees being paid from an Irish contribution to EGOS. He also commented on the operation of 5 UK/EGOS moored buoys located west of

the British Isles, between 12 and 15 degrees west. He further informed on the benefit of using three Local Users' Terminals in EGOS North and on the good results of data quality control of EGOS buoys. Finally, he demonstrated the scarcity of ship observations and the great impact of buoy observations in EGOS North by showing 8 actual North-Atlantic weather maps for a single day in June 1992 and one weather map from 7 October 1992. The full EGOS report will be published in the DBCP Annual Report for 1992.

22 The Panel thanked Mr. Sigurdsson for his presentation and commended EGOS for its achievements so far, whilst reiterating its intent to assist EGOS as and when requested to do so, within the limits of its terms of reference.

International Arctic Buoy Programme (IABP)

23 The Canadian Delegate, Dr. D. O'Neill, gave an oral report on the International Arctic Buoy Programme (IABP), which had been formally established as a regional action group of the Panel at the seventh session of the DBCP in October 1991. He noted that the IABP was proving to be an effective vehicle for the co-ordination of international buoy deployments in the Arctic Basin with over 20 organizations already participating and an additional 6 agencies having expressed interest in becoming involved in the Programme. On behalf of the Chairman of the IABP, he expressed thanks to the DBCP for the support which the Panel has provided to this important programme.

24 The Panel thanked Dr. O'Neill for his presentation and again expressed its readiness to assist IABP in its work within the limits of its terms of reference.

3. FINANCIAL AND ADMINISTRATIVE MATTERS

3.1 FINANCIAL SITUATION

25 The Panel considered statements of account provided by WMO as follows:

(i) finalized statement for the DBCP for the biennium 1 January 1990 to 31 December 1991;

(ii) interim statement for the DBCP for the period 1 January 1992 to 30 September 1992;

(iii) finalized statement for the GTS chain fund, to 30 September 1992;

(iv) interim statement for the sale of DBCP ties, to 30 September 1992.

These statements are reproduced in Annex III.

26 The Panel accepted and approved the statements. In addition, it:

(i) agreed that the surplus in the GTS chain fund account of US$892 should be transferred to the main DBCP account;

(ii) noted that a surplus of around $2,000 was likely to be available at the end of May 1993 in the DBCP account, to be transferred to the 1993/94 budget;

(iii) agreed that WMO should proceed with a new order for DBCP ties, if possible 50 of each type and in any case not to exceed 75 of each type, for sale as before at a price of SFR 15 or equivalent in other currencies.

27 The Panel also considered and approved the financial statement provided by UCAR relating to the employment of the Technical Co-ordinator during 1991/92, and accepted the interim statement for 1992/93. This statement is given in Annex IV. In doing so, the Panel expressed its continuing appreciation to UCAR for the excellent service which it was providing in employing the Technical Co-ordinator on its behalf.

3.2 REVIEW OF CONTRACTS

28 The Panel reviewed the two contracts which had been established by WMO on its behalf, respectively with UCAR for the employment of the Technical Co-ordinator and with Service Argos Inc. for the logistic support of the Technical Co-ordinator. Copies of these contracts are given in Annex V. The Panel agreed that the texts of both these contracts were in conformity with what it had agreed at its seventh session and that these contracts satisfied its requirements regarding employment and logistic support for the Technical Co-ordinator.

29 Under this agenda item, the Panel also reviewed the contract established by WMO on its behalf with CLS/Service Argos for the Panel's contribution to the development and implementation of the new Argos GTS Processing Chain (see Annex VI). It agreed that this contract conformed with the specifications laid down at its seventh session. It expressed its appreciation to both CLS/Service Argos and to the Technical Co-ordinator for the excellent work which had been accomplished within the terms of this contract. Further discussion on the new Argos GTS Processing Chain is recorded under Agenda Item 6.3.

3.3 FUTURE EMPLOYMENT STATUS OF THE TECHNICAL CO-ORDINATOR AND COMMITMENTS FOR FUTURE FUNDING

30 The Panel recalled that, at its seventh session, it had already foreseen that, should Mr. Charpentier remain its Technical Co-ordinator for at least a fifth year of employment (1993-1994), he would have to be moved from USA to France, for various reasons. The Panel first considered that it had been remarkably fortunate in its present Technical Co-ordinator and that it should request him to go on with the position, which Mr. Charpentier agreed to do.

31 Solutions for the Technical Co-ordinator's employment in France had been studied by the Secretariats during the intersessional period. In short, two alternatives were found possible: (i) Mr. Charpentier could be recruited by SOFREAVIA SERVICE, a French non-profit government-owned company aimed at supplying various types of technical assistance and specialist training services, both in France and on site; (ii) he could also be recruited as a staff member of IOC or WMO, as already suggested at previous Panel sessions.

32 After having examined the financial implications of the two possibilities, the Panel unanimously decided to retain the second one. Since the Technical Co-ordinator would be located in France, it was felt more convenient to retain IOC/UNESCO rather than WMO as the employer, since the former has an official agreement with the Government of the French Republic regarding *inter alia* the Privileges and Immunities of UNESCO on the French territory.

33 The Panel next addressed CLS/Service Argos regarding its willingness to provide for the logistic support of the Technical Co-ordinator at its headquarters in Toulouse. Mr. M. Taillade, General Manager of CLS/Service Argos, kindly agreed to do so on the basis of a contract for FF75,000 or to a maximum of US$15,000. The Panel noted with thanks that any costs incurred by CLS/Service Argos in providing such support, over and above this contractual amount, should be regarded as a contribution by CLS/Service Argos towards the work of the Panel. It further agreed that the contract for 1993-1994 should be the same as that for 1987-1988, when the Technical Co-ordinator was hosted by CLS/Service Argos in Toulouse, apart from necessary changes in dates and contract amount.

34 The Panel recalled it will have to face other expenses during 1993-1994, viz: Technical Co-ordinator's installation grant, Technical Co-ordinator's travel, sundries and WMO costs. This last item has to be maintained since it is felt convenient to keep on invoicing contributors, which are mostly national meteorological services, directly by WMO. The Panel agreed that the Secretariats will take care of how the contributions will be transferred from WMO to IOC. The Panel further agreed on estimates of the above expenses, as given in Annex VII. In so doing, it highlighted that the figures were estimates only and subject to modifications, depending *inter alia*

upon the fate of the exchange rate between the US dollar and the French Franc.

35 The Panel next considered how best to achieve the required amount. As they have been requested to do at the seventh session of the Panel, Members had explored, during the intersessional period, the possibility of increasing their contributions towards the Panel fund. As a result of their efforts, the draft table of contributions for 1993-1994 as given in Annex VIII appeared to meet the cost requirements and was therefore adopted as a basis for invoicing existing contributors. In so doing, the Panel reiterated its request to the Secretariats to seek new contributions from other Member States of IOC and Members of WMO, stressing in particular that the results of the work of the Panel in increasing the quantity and quality of data from the world ocean benefit all countries and not only the small number which contribute to the Panel fund.

36 The Panel noted it was making a considerable financial effort to secure the services of Mr. Charpentier as its Technical Co-ordinator. It therefore required him to state how long he might expect to remain in the position and expressed satisfaction to his answer that this would be for a three-year minimum period of time.

37 Finally on this topic, the Panel wished to express its deep appreciation to UCAR and SAI for their support in securing the services of the Technical Co-ordinator. It requested the Chairman to write on its behalf to UCAR in that respect. Mr. Charpentier wished to join his personal thanks to both organizations to those of the Panel.

4. RELATIONSHIP WITH INTERNATIONAL PROGRAMMES/ORGANIZATIONS

4.1 WORLD CLIMATE RESEARCH PROGRAMME (WCRP)

Surface Velocity Programme (SVP)

38 The Surface Velocity Programme (SVP) is continuing to deploy surface drifters in support of its goals to measure surface currents and temperatures in the global ocean. An update on the status of SVP and the primary actions taken during the past year was given by Dr. J. Paduan on behalf of the Global Drifter Center (GDC) at Scripps Institution of Oceanography. Recent actions taken by the GDC have focused on two issues: (i) overseeing deployments in the whole of the Pacific Ocean and in the north Atlantic Ocean, and (ii) continuing technical developments of the SVP drifter. In connection with the first issue, 370 SVP drifters were deployed as of October 1992 and 241 more drifters are expected to be deployed by the end of 1992. The technical developments have been the successful adaptation of air deployment capabilities, salinity and air pressure measurements to the SVP drifter. The latter of these developments is discussed further in Agenda Item 6.4 and in the detailed status report which is provided in Annex IX to this report.

Other WCRP aspects

39 The Panel questioned the fate of the TOGA observing system after TOGA has come to an end, especially as far as data buoy networks are concerned. It was informed that, within the USA, a dedicated panel was studying this question from the US standpoint and that the Ocean Observing System Development Panel (OOSDP) was also engaged in a more or less similar study from the international standpoint. The Panel expressed the wish to get more information on this topic at its forthcoming ninth session, since it considers it as of a crucial importance for the future of GOOS and GCOS (see also para. 51 on this topic).

4.2 WORLD WEATHER WATCH (WWW)

40 The Panel noted that the WMO Commission for Basic Systems (CBS), which is the body responsible for overseeing the operation of the World Weather Watch (WWW), would meet in Geneva in early November 1992, and would specifically consider two matters brought to it by the DBCP, viz the QC operating guidelines and revisions to DRIFTER. With regard to the former, CBS is firstly being informed of details of the first few months of operations of

the guidelines, and secondly being requested to include the guidelines formally in the WMO Guide on the Global Observing System, as an integral part of the GOS. With regard to the DRIFTER modifications, CBS is being requested to approve these, for later implementation. It is expected that CBS will agree with both proposals. Further details on these two topics are considered later under Agenda Items 6.1 and 6.2.

41 Under this agenda item, the Panel also considered three issues arising from the report of the Technical Co-ordinator which impact the operations of the WWW, viz the validity of buoy air temperature measurements; the height of anemometers on drifting buoys; and the fact that some buoys are deployed on the Antarctic continent, sometimes at heights well above sea level, and reporting atmospheric pressure in DRIFTER i.e. as though it is sea level pressure instead of station level.

42 With regard to buoy air temperature measurements, it was agreed that these may often be substantially erroneous, for a variety of reasons (water on sensor, different buoy interior temperatures, etc.). Potentially, these temperatures remain valuable information nevertheless, and it was recognized that it would not be appropriate to remove this sensor data from GTS distribution in a general way. The Panel therefore decided not to take any action on this matter, except to make the problem as widely known as possible.

43 With regard to variable anemometer heights on drifting buoys, and the need to correct buoy wind measurements to a standard level (10 m), the Panel agreed that the Technical Co-ordinator should collect the necessary height information for each wind buoy already deployed, and provide this to the WMO Secretariat, which should publish a consolidated list in the WWW Monthly Letter. For subsequent wind buoy deployments, the required information should, if possible, be made available in advance of deployment to operational centres through appropriate means. The full list should also be updated regularly.

44 With regard to the Antarctic continent deployments, it was agreed that these platforms should ideally report in SYNOP code (since they are effectively fixed land stations). The Panel therefore requested the Technical Co-ordinator to implement SYNOP in the new GTS chain as a matter of priority. In addition, the Panel requested the WMO Secretariat to publish a list of these platforms, with their locations and heights above sea level, so that users of the data will be aware of the problem. This information should also be put in the WWW Monthly Letter.

4.3 INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS) AND INTERNATIONAL OCEANOGRAPHIC DATA AND INFORMATION EXCHANGE (IODE)

45 The Panel was presented with the reports of the IGOSS Specialized Oceanographic Centre (SOC) and the IODE Responsible National Oceanographic Data Centre (RNODC) for drifting buoys, which are reproduced as Annexes X and XI respectively. It expressed appreciation to the work of the centres, while recognizing that there may be some overlapping in their responsibilities and activities, which might lead to the preparation and maintenance of two different drifting-buoy data sets. The Panel therefore requested Mr. J. Poitevin and Mr. P.A. Bolduc, responsible for, respectively, the IGOSS/SOC and the IODE/RNODC for drifting buoys, to get in touch with each other in order to ensure consistency in data sets (including data quality) and avoid duplication of effort as much as possible.

46 Regarding the problem of a few bad locations being reported onto GTS using the DRIFTER code, the Technical Co-ordinator explained that it might be due to unstable oscillators of buoys transmitting to the satellites associated with low quality position fixes requested by Principal Investigators (typically for requested index = 1). This could lead to image positions or bad positions to be sometimes transmitted onto GTS. Ways to solve this problem can be: (i) Principal Investigators to request higher quality position fixes so that image positions would more likely be removed from GTS thanks to Argos Automatic Quality Control Checks, and (ii) to recommend GTS users to monitor carefully buoy positions and alert Principal Investigators of possible problems by the mean of the Omnet BUOY.QC bulletin board (see Agenda Item 6.1 for details) so that buoys concerned could be quickly removed from GTS distribution.

4.4 GLOBAL OCEAN OBSERVING SYSTEM (GOOS) AND GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

47 The Panel received with appreciation the reports on the states of development of the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS), which are reproduced as Annexes XII and XIII respectively.

Global Ocean Observing System (GOOS)

48 The Panel noted the structure adopted for GOOS development by the IOC Executive Council at its twenty-fifth session, which had already been reported to it under Agenda Item 2.3 (see paragraph 19). It expressed the wish that its Chairman (or a representative designated by him) might be able to attend the sessions of the IOC Committee for GOOS and strongly recommended that its Technical Co-ordinator be *ex officio* considered as a member (at least with an observer status) of the GOOS Technical and Scientific Advisory Panel. The latter recommendation is based on the recognition that there is a need to provide some substance to the concept following which GOOS and GCOS should "build upon" existing systems/programmes/bodies: the Advisory panel for GOOS could only benefit from the experience already gained by the Panel and its Technical Co-ordinator in the field of data buoys in general.

49 The Panel further agreed on practical measures to collaborate with GOOS, namely in entrusting the Technical Co-ordinator with: (i) providing the basic information needed to compile the 1992 GOOS status report, as far as data buoys are concerned; and (ii) answering on its behalf to the questionnaire sent out by the OOSDP on Enabling Technologies for GOOS, even if, in so doing, the general answer from the Panel might more or less duplicate answers already provided by some Panel members.

Global Climate Observing System (GCOS)

50 The Panel noted that the JSTC for GCOS had established a number of task groups, to deal with different components of the global climate system (atmosphere, ocean, etc.), and these task groups are expected to, *inter alia*, define requirements and priorities for data for climate monitoring and prediction as well as assess both present and future techniques available for acquiring these data. With regard to ocean data, both the Atmospheric Task Group and the OOSDP were addressing the problem, in a co-ordinated way.

51 The JSTC for GCOS has already identified ENSO prediction, based essentially on maintenance of the existing TOGA observing systems, as a first priority for GCOS. In this context, the ocean data requirements include SST, surface winds (in particular from the tropical oceans) and upper ocean heat content. The Panel noted that standard drifting buoys (including in particular the new SVP drifter) will continue to be an essential source of *in situ* SST data to support the satellite-derived SST fields. In addition, more specialized drifting buoys will be important sources of both *in situ* surface wind data and also sub-surface temperatures (from thermistor chains), while the TOGA/TAO array in the tropical Pacific remains essential to ENSO analysis and prediction. The Panel therefore agreed that it had a continuing important role to play in support of this GCOS priority activity.

52 The Panel noted further that the Atmospheric Processes Task Force of the GCOS JSTC had identified both the South Atlantic and Indian Oceans as severely deficient areas for surface atmospheric pressure data, and had requested the DBCP to examine ways of overcoming the problem. The Panel agreed that it should indeed attempt to respond to this request, and identified the South Atlantic as its first priority, since there still remained a possibility for the implementation of the South-West Indian Ocean drifting-buoy project (see Agenda Item 6.5). The Panel agreed in particular that it should actively work towards the formation of an Action Group for the South Atlantic. Specific actions to be taken in this regard are recorded under Agenda Item 6.5.

5. REPORT ON CURRENT AND PLANNED DRIFTING-BUOY PROGRAMMES

53 The Panel was informed that written reports had been received by the Secretariats from Australia, Canada, France, Iceland, Japan, United

Kingdom, USA and SCAR. In addition, it listened to oral presentations by the French and US Delegates.

54 The Panel recalled that a standard format had been suggested for reports, according to its request at its sixth session. It expressed the hope that the reports would follow the suggested format, while making clear that this format was to be considered as guidelines rather than as a mandatory presentation. As in previous years, the Panel agreed that the reports should be included as annexes to the DBCP Annual Report.

55 The Panel received with appreciation the statement by the Delegate of China that his country intended to initiate a drifting-buoy programme next year and expressed readiness to provide this country with all the technical assistance it could.

6. CO-ORDINATION ACTIVITIES

6.1 QUALITY CONTROL OF DRIFTING-BUOY DATA

56 The Technical Co-ordinator presented the Quality Control Guidelines for drifting-buoy data as implemented by the Panel on a trial basis. A small expert group designated by the DBCP at its seventh session proposed a standard format for exchanging status change proposals by means of an electronic bulletin board. In addition, the Ocean Products Center kindly accepted to pay for expenses related to the use of an Omnet/ScienceNet BUOY.QC bulletin board. The Chairman of the DBCP could then make a formal decision regarding the implementation of the Guidelines on 1 January 1992.

57 The Guidelines (which are reproduced in Annex XIV) worked effectively on 20 January 1992 and have given very good results since the beginning. For example, for the 771 buoys that transmitted onto the GTS during the period 20 January 1992 to 20 August 1992, 326 status change proposals were issued by PMOCs which resulted in 122 buoys to have their status changed accordingly. Various monthly monitoring statistics were also distributed on the bulletin board regularly (ECMWF: bi-weekly, the Centre de Météorologie MarItime (CMM), the Ocean Product Center (OPC) and UKMO: monthly). Two IOC-WMO circular letters were issued and three activity reports produced.

58 PMOCs presently participating are the European Centre for Medium-range Weather Forecasts, the United Kingdom Meteorological Office, Météo France, the National Data Buoy Center, the Ocean Products Center, the Meteorological Service of New Zealand Ltd., the Australian Bureau of Meteorology and the Icelandic Meteorological Office. The participation of the Japanese Meteorological Agency and of the South African Weather Bureau is still desired.

59 The Technical Co-ordinator pointed out that the Ocean Products Center, the National Data Buoy Center and Météo France could efficiently replace him, in his capacity as focal point between GTS users and PI's, while he was on mission or vacation, provided that the list of WMO/Argos numbers and PGC's is available.

60 Considering the success of operating the Guidelines so far and the impact they have on the quality of the buoy data distributed onto the GTS, the Panel took the following decisions:

(i) to thank OPC for continuing to take care of expenses related to the use of the Omnet BUOY.QC bulletin board;

(ii) to continue operating the Guidelines with no modification;

(iii) to continue using an Omnet bulletin board rather than a dedicated application on Argos computers;

(iv) to continue making feedback information available on the bulletin board manually.

61 Regarding the implementation of automatic quality control checks on the Argos system, considering that operational centres are able to operate

such tests on their own systems and that they would probably not use flag information potentially available from GTS messages, the Panel decided that tests such as "time continuity", "climatological" and "beached platform" should not be developed on the new Argos GTS processing chain. Hence associated flags would not be coded in GTS messages either. The Panel however recognized that automatic quality control checks related to raw data telemetry (e.g. "sensor blockage", "all bits identical") are useful and should be developed. Sensor data failing such tests should automatically be removed from GTS distribution.

6.2 CODE MATTERS

62 The Panel recalled the discussions and decisions taken at its seventh session (Toulouse, October 1991) regarding proposed modifications to the new DRIFTER code (which was implemented formally on 1 November 1991), and noted the follow-up actions which had been taken, viz:

(i) The DBCP Sub-group on Codes had prepared a consolidated set of modifications, which had been submitted to WMO by the Sub-group Chairman, Dr. D. O'Neill, in early 1992.

(ii) These modifications were subsequently further modified slightly by R. Keeley and A. Hernhuter, in consultation with the WMO Secretariat and in the light also of additional proposals made by France.

(iii) The consolidated set of modifications were then considered by the CBS Sub-group on Codes, at a special meeting in June 1992. This meeting prepared a finalized proposal for consideration by CBS-X (Geneva, November 1992).

(iv) CBS-X is expected to approve the modifications (including name change to "BUOY"), for implementation in late 1993 or early 1994.

63 The Panel expressed its appreciation to all concerned for their efforts in developing the modified BUOY code and submitting it for approval. The Panel agreed that the new BUOY, while still not perhaps perfect in every detail, nevertheless well satisfied its requirements for GTS transmission of data from both drifting and moored buoys. The Panel therefore agreed that it would not consider any further possible modifications to BUOY for at least the next 2-3 years. At the same time, the Panel also recognized that BUFR would eventually be widely implemented and in this case would fully satisfy both present and future requirements for buoy data exchange. The Panel therefore requested the Technical Co-ordinator to work towards the implementation also of BUFR in the new GTS chain.

64 Finally on this topic, the Panel emphasized the importance of widely publicizing the new BUOY code changes (including the availability of BUOY for use with moored platforms) as well as the exact implementation date, when available. The Panel therefore urged the WMO Secretariat and all its members to undertake this publicity, both internationally and nationally.

6.3 NEW ARGOS GTS PROCESSING CHAIN

65 Regarding the development of the new Argos GTS processing chain, phase 1, the Panel was pleased to be informed that the system was actually running in Toulouse using real data and producing GTS bulletins containing DRIFTER messages. It recognized that the new chain should have a dramatic impact on the quantity of data distributed on GTS since, on one hand, buoys previously not compatible with Argos for GTS purposes could now be processed (20 to 50 buoys), and, on the other hand, the number of GTS messages produced for certain buoys measuring and storing on-board previous hour or last synoptic hour data (e.g. TOGA buoys, US Navy buoys, EGOS buoys) could be increased significantly. There is also now the opportunity to transmit new variables on GTS such as salinity, sub-surface currents, wave heights and wave periods.

66 The new Argos GTS processing chain, phase 1, now being tested at the French Argos Global Processing Centre (FRGPC, Toulouse), will be implemented and tested at the US Argos Global Processing Centre (USGPC,

Landover) in mid-November 1992. It should be operational in early January 1993.

67 As far as development of stage 2 is concerned, the Panel agreed that all specifications should be realized so that: (i) ATLAS moored buoys can be processed, and (ii) the system will be flexible enough to deal with as many as possible different kinds of PTT message formats and sensor transfer functions. Stage 2 is planned to be operational in October 1993.

68 As for stage 3, the Panel decided to postpone any decision until the next DBCP session, except for the QC specifications already taken care of under Agenda Item 6.1.

69 Regarding the cost of developing stages 2 and 3 of the GTS chain, the Panel recognized that no further financial commitment on its behalf would be possible at this stage. It agreed that if there remained a problem for CLS/Service Argos for financing this work, then this problem should be addressed by CLS to the Argos Joint Tariff Agreement (JTA) Meeting.

6.4 COMBINED METEOROLOGICAL/OCEANOGRAPHIC DRIFTING BUOYS

Low-cost combined meteorological/oceanographic drifting buoys

70 The Panel recalled that a small booklet had been prepared by the Technical Co-ordinator with the assistance of the GDC to inform national meteorological services of the potentialities offered by such a drifter, and expressed its appreciation to CLS/Service Argos for kindly having published this booklet.

71 The Panel was presented with the outcomes of the Informal Meeting on the Evaluation of Low-cost Combined Meteo-oceanographic Drifting Buoys, which had taken place just prior to its eighth session, on 13 October 1992. Upon the twenty-five prototypes planned for testing (see Annex XV to this report), six had already been deployed and the preliminary results were felt encouraging. The Panel agreed that further deployments should, as previous ones, be in the open ocean and that all data (using AIR pressure sensor) should be exchanged over the GTS

72 The Panel agreed on the following evaluation programme and timetable:

(i) Pressure sensor intercomparison should be carried out by Scripps for all buoy operators using data made available on tape from Service Argos.

(ii) The Technical Co-ordinator DBCP should co-ordinate GTS distribution of prototype data as well as routine quality evaluations from the PMOCs. Météo France offered to process and distribute onto the GTS those platforms not compatible with Argos for GTS purposes.

(iii) Individual participants should prepare reports on operational matters, including pre-deployment calibration and physical handling and deployment.

(iv) The evaluation phase should be completed in time for a well structured workshop to be held in early May 1993 (most likely at Scripps). The outcome of the workshop would be to finalize the engineering, design, data processing and operational procedures for the drifter to enable commercial production to begin as soon as possible.

(v) A full presentation should be given at the next Panel session, especially aimed at encouraging the operational agencies to deploy the combined meteo-oceanographic drifter, provided that the aims of low-cost and high performance have been demonstrated.

73 The Panel noted with concern that communication costs could limit the potential expansion of drifting-buoy deployment since these costs are

likely to exceed equipment costs in the near future. It decided to bring this problem to the attention of the forthcoming Eleventh Meeting on Argos JTA.

Drifting buoys equipped with thermistor strings and wind sensors

74 The Panel was informed of the results obtained by Marisonde GT buoys operated by Météo France. These buoys, equipped with a thermistor string, are also measuring the wind speed and direction thanks to a profiled mast topped with an anemometer. In addition to sea-surface temperature, 10 sub-surface temperature measurements are provided down to 100 or 150 m. At present, 6 buoys are operating off Portugal and Azores and they are reporting their data in real time onto the GTS in DRIFTER code. Next year, 35 buoys of that type will be deployed in the same area. Before, at the end of the year, 4 buoys will be deployed in the TOGA/COARE experiment. More details on the buoys and the programme in which they are used are given in the Panel Annual Report for 1992.

75 The Panel recognized that data provided by Marisonde buoys have a high level of priority in the Global Ocean Observing System and the Global Climate Observing System, mainly at low latitudes, and encouraged France to go on with deploying these buoys.

6.5 FORMATION OF OTHER ACTION GROUPS

76 Three specific activities were considered under this Agenda Item: South-West Indian Ocean project, a possible South Atlantic programme and a new International Antarctic Drifting-Buoy Programme (IAntDBP).

South-West Indian Ocean Project

77 With regard to the South-West Indian Ocean Project, the Panel noted with appreciation the actions taken by its Chairman and Technical Co-ordinator to assist the development of the project, as well as the offer of further assistance made by Météo France. It expressed disappointment that so far this project had not got underway, for a variety of reasons, and reiterated its belief in the importance of the project to the provision of badly-needed data from this ocean area. It therefore agreed to maintain its offer of support for the project, and requested its Chairman to continue to follow developments and to take action as appropriate.

Possible South Atlantic Programme

78 The Panel recalled its discussions under Agenda Item 4.4 on the need for a co-ordinated drifting-buoy programme in the South Atlantic. It therefore agreed on the following immediate actions which should be taken to initiate work towards such a programme:

(i) The Secretariats should immediately and informally canvass organizations, institutions and individuals, who might be interested to participate actively in such a programme, to assess likely support for its initiation.

(ii) Provided sufficient support is expressed, the Secretariats, with the help of the Panel Chairman and Technical Co-ordinator, should convene a first planning meeting for such a programme, it being understood that participation in such a meeting should be open to all interested, provided that participants are self-funded. Such a meeting should take place as soon as possible, and in any case prior to DBCP-IX.

(iii) The Secretariats should work closely with the GCOS and GOOS Planning Offices, both in investigating potential support and also in convening the first planning meeting.

(iv) A report on progress should be made to DBCP-IX.

International Antarctic Drifting-Buoy Programme

79 The Panel was informed of steps being taken, on an initiative of the WCRP, to develop an International Antarctic Drifting-Buoy Programme. It noted that the concept of this new programme would be similar to that of the now successfully established IABP, and agreed that this is an important new development which it should support as much as possible. The Panel therefore requested the Chairman to arrange for the Panel to be represented in the first planning meeting for the IAntDBP (Hobart, April 1993), if possible either by himself and/or the Technical Co-ordinator, and that the services of the Panel should be offered to assist, as appropriate, in the establishment and development of the programme. The Panel finally expressed the hope that the new programme, when operational, might be formally recognized as a new Panel Action Group.

6.6 OTHER CO-ORDINATION ACTIVITIES

Special buoy data transmission performed in France

80 The Panel was presented by Mr. P. Blouch with the data transmission on GTS from Brest. Since November 1991, the Centre de Météorologie Marine of Météo France has been operating a special procedure to transmit buoy data which are not compatible with the existing processing system at CLS/Service Argos. The principle is based on a compatible PC computer linked to the French network TRANSPAC. Data are regularly collected from the Argos computer in Toulouse (every 20 minutes at present), then coded after determining the appropriate date-time group and applying a quality control check, and send over the GTS through Météo France in Toulouse (see also para. 72, (ii)).

81 At the beginning of October 1992, the data received from 21 buoys were sent over GTS in this way. Headers are SSVX51 and SSVX55. Wave spectrum data provided by French drifting buoys will be sent shortly as WAVEOB reports. Even when the new Argos GTS processing chain is operational (phase 1 and 2), there may remain some particular buoy data which need a special processing. Such a flexible system could provide a satisfactory solution in this context.

82 The Panel thanked Mr. Blouch for his presentation and agreed it should keep in mind the possibility of implementing this kind of solution to cope with very specific problems unforeseen within the specifications of the new Argos GTS processing chain. In a broader context, the Panel considered it should make a generalized study of communication systems either actually or potentially available for the collection, processing and on-forwarding to the GTS of data from ocean buoys. It therefore requested Panel members, in particular the Chairman, P. Blouch, M. Szabados and J. Paduan, to forward to the Technical Co-ordinator whatever information they had available on this subject, for compilation and analysis in a single document, which should be available for consideration at the 1993 Panel session.

Co-ordination of buoy operations

83 The Panel noted that there were increasing requirements for internationally co-ordinated actions to assist in buoy deployments throughout the world. This will become even more important as buoy programmes become operational, where continuing long-term support will be required for deployments in all ocean basins of platforms which may be provided by countries located far from these ocean areas. The types of logistic support required include:

(i) identification and recruitment of research vessels or VOS to deploy buoys;

(ii) assistance to facilitate equipment entry into deploying countries (including customs clearance), and transport to deployment vessels;

(iii) assistance to obtain landing rights and refuelling facilities for air deployments.

84 The Panel agreed that it might be useful to establish a specific Action Group, based on a set of focal points in different countries, to co-ordinate these logistic resources required for buoy deployments. At the same time, this Group could assist in identifying and proposing solutions to communications problems which may delay or prevent entirely the return of buoy data to countries near to their origin. The Panel therefore requested the Secretariats, as a first step, to attempt to identify appropriate focal points in interested Member countries, it being made clear that these focal points should be in a position to directly ensure or locally co-ordinate the required logistic support. Such identification may take place through the existing national focal points for drifting buoys, as well as other national contacts available to the Secretariats and/or the Technical Co-ordinator. After identification, the Action Group of focal points will work normally through correspondence, although it may be necessary from time to time to organize regional meetings in support of specific deployment programmes.

7. PUBLICATIONS

Annual Report

85 The Panel agreed that the 1992 Annual Report should have the same basic format as in previous years. It noted that this year's report would be produced by WMO, and that the cut-off date for contributions, including in particular those national reports not yet available to the Secretariats, will be the end of the second week in November 1992. The Panel encouraged inclusion of reports on technical developments in the Annual Report, and in particular suggested that reports from Météo France and from Scripps, on the Marisonde and SVP pressure drifters, respectively, should appear in the 1992 report.

Guide to Moored Buoys

86 The Panel noted with appreciation that, thanks to kind offers by Chile and France, respectively, the Guide to Moored Buoys and Other ODAS was to be published by WMO in Spanish and French as well as English. Such publication was expected in late 1993 or early 1994.

Brochure

87 The Panel discussed the possibility of preparing a glossy brochure on the DBCP. Such a brochure, which might be funded either partially or entirely through the inclusion of advertising from equipment and communications suppliers, would be addressed to existing or potential users of ocean data buoys, with the objective of:

(i) publicizing the Panel and its work;

(ii) encouraging increased participation in the Panel from existing buoy deployers, which may eventually lead to increased financial resources for the Panel;

(iii) encouraging increased use of both drifting and moored buoys generally to obtain meteo-oceanographic data from remote ocean areas.

88 The Panel requested the Chairman, in collaboration with the Secretariats, to make a cost/benefit study for such a brochure, covering also potential target audience, distribution and advertisers. If the results of such an analysis prove satisfactory, the Panel authorized the Chairman and Secretariats to proceed with the preparation and distribution of such a brochure.

8. REVIEW OF THE PANEL'S NAME, TERMS OF REFERENCE AND OPERATING PROCEDURES, AND OF THE TECHNICAL CO-ORDINATOR'S TASKS

89 Under this agenda item, the Delegate of the USA explained that at the seventh session of the Panel in Toulouse, there was some informal discussion on expanding the terms of reference of the Panel and modifying its name. The Panel members for some time have, in fact, concerned themselves with

moored platforms. With the increased importance of moored arrays (such as the ATLAS array), it seems appropriate to recognize such networks and to more formally address relevant issues. A discussion of the above item could lead to a recommendation to expand the terms of reference of the Panel to include moored buoys, and to change the name of the Panel to Data Buoy Co-operation Panel.

90 The Panel unanimously agreed to the proposal. It decided to express it in the form of a draft resolution to be submitted to the next sessions of the IOC and WMO governing bodies for adoption. The full text of the draft resolution and its annexes is given as Annex XVI.

91 The Panel next considered it was not in a position as yet to modify its operating procedures as confirmed at its seventh session to put them in line with the above recommended changes, since there is explicit reference to IOC and WMO Resolutions establishing the Panel within those operating procedures. It therefore decided to go on with the present ones (which are reproduced in Annex XVII) and that a new version, as reproduced in Annex XVIII, would automatically enter into force if and when the governing bodies of IOC and WMO have adopted the proposed draft resolution.

92 The Panel further reviewed its workplan as adopted at its seventh session. In the light of the changes it recommended in its terms of reference, of discussions under previous agenda items, of achievements during the past intersessional period and of future expected developments, it undertook the revision of some items listed in the workplan and introduced adequate references for its new terms of reference. The revised workplan is given in Annex XIX.

9. ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMAN OF THE PANEL

93 The Panel unanimously re-elected Mr. D. Painting as its Chairman for the coming intersessional period. Since Dr. D. O'Neill was unable to continue as Vice-Chairman, the Panel asked for some other nomination and unanimously elected Mr. M. Szabados as its Vice-Chairman for the coming intersessional period. The Panel expressed its sincere appreciation to Dr. O'Neil for his substantial contribution to its work both before and during his period of office as Vice-Chairman.

10. DATE AND PLACE OF THE NEXT SESSION

94 The Panel was informed that Greece was offering to host the ninth Panel session in Athens. It welcomed this kind offer and agreed that the session should be held in conjunction with the Thirteenth Meeting on Argos Joint Tariff Agreement. Subject to agreement by the Twelfth Meeting on Argos Joint Tariff Agreement, the dates for the ninth Panel session should be 19 to 22 October 1993.

11. CLOSURE OF THE SESSION

95 In closing the session, the Chairman thanked all participants for their valuable contributions to the numerous achievements of the session which appears to have been very dense and fruitful. He thanked the Secretariats for their continuing support to the work of the Panel and for providing its sessions with very convenient facilities.

96 The Eighth Session of the Drifting-Buoy Co-operation Panel closed at 11.30 a.m. on Saturday 17 October 1992.

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ANNEX I

AGENDA

1. **ORGANIZATION OF THE SESSION**

   1.1 OPENING OF THE SESSION

   1.2 ADOPTION OF THE AGENDA

   1.3 WORKING ARRANGEMENTS

2. **REPORTS**

   2.1 REPORT BY THE CHAIRMAN OF THE DRIFTING-BUOY CO-OPERATION PANEL

   2.2 REPORT BY THE TECHNICAL CO-ORDINATOR

   2.3 REPORT BY THE SECRETARIATS

   2.4 REPORTS BY THE ACTION GROUPS OF THE PANEL

3. **FINANCIAL AND ADMINISTRATIVE MATTERS**

   3.1 FINANCIAL SITUATION

   3.2 REVIEW OF CONTRACTS

   3.3 FUTURE EMPLOYMENT STATUS OF THE TECHNICAL CO-ORDINATOR AND COMMITMENTS FOR FUTURE FUNDING

4. **RELATIONSHIP WITH INTERNATIONAL PROGRAMMES/ORGANIZATIONS**

   4.1 WORLD CLIMATE RESEARCH PROGRAMME (WCRP)

   4.2 WORLD WEATHER WATCH (WWW)

   4.3 INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS) AND INTERNATIONAL OCEANOGRAPHIC DATA AND INFORMATION EXCHANGE (IODE)

   4.4 GLOBAL OCEAN-OBSERVING SYSTEM (GOOS) AND GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

5. **REPORT ON CURRENT AND PLANNED DRIFTING BUOY PROGRAMMES**

6. **CO-ORDINATION ACTIVITIES**

   6.1 QUALITY CONTROL OF DRIFTING-BUOY DATA

   6.2 CODE MATTERS

   6.3 NEW ARGOS GTS PROCESSING CHAIN

   6.4 COMBINED METEOROLOGICAL/OCEANOGRAPHIC DRIFTING BUOYS

   6.5 FORMATION OF OTHER ACTION GROUPS

   6.6 OTHER CO-ORDINATION ACTIVITIES

7. **PUBLICATIONS**

8. **REVIEW OF THE PANEL'S NAME, TERMS OF REFERENCE AND OPERATING PROCEDURES, AND OF THE TECHNICAL CO-ORDINATOR'S TASKS**

9. **ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMAN OF THE PANEL**

10. **DATE AND PLACE OF THE NEXT SESSION**

11. **CLOSURE OF THE SESSION**

ANNEX II

REPORT BY THE TECHNICAL CO-ORDINATOR

1. Introduction

This report covers the period 1 October 1991 to 30 September 1992 during which the Technical Coordinator of the DBCP was based in Landover at Service Argos Inc., and was employed by the University Corporation for Atmospheric Research (UCAR). The time the TC DBCP spent on his tasks could be estimated as following:

Topic	days	%
New GTS Chain (travel excepted):	65	25.0
Monitoring, Quality Control, Bulletin board :	45	17.3
Travel, Missions (+prepare):	50	19.2
User assistance :	35	13.5
Requests for GTS :	19	7.3
Combined Oceano-Meteo drifting buoys:	12	4.6
TC monthly report, statistics, regular letters (e.g. WMO list) :	4.6	12
Vacation :	10	3.8
Quarterly report :	4	1.5
Argos monthly report :	3	1.1
Miscellaneous DBCP	5	1.9
Total (52 weeks) :	260	100%

The following paragraphs describe in detail the various activities of the TC DBCP during the period.

2. Missions, Visits, Meetings

2.1. 2 October 1991, meeting with Paul Julian regarding how Operating Guidelines for drifting buoy data quality control could be implemented.

2.2. 10-11 October 1991, Toulouse, meetings with CLS and Digital Equipment, to discuss the new Argos GTS Processing Chain, and QC guidelines.

2.3. 15-18 October 1991, Toulouse, Seventh session of the Drifting Buoy Cooperation Panel.

2.4. 21-23 October, Toulouse, Eleventh session of the Joint Tariff Agreement.

2.5. 18 November 1991, Washington DC, meeting at the Ocean Products Center to discuss availability of ATLAS GTS data. Not all the data supposedly distributed onto the GTS seemed to be actually disseminated.

2.6. 17-18 December 1991, trip to Norway to visit the Norwegian Meteorological Institute (Oslo), OCEANOR (Trondheim), and the Norwegian Hydrotechnical Laboratory (Trondheim).

2.7. 20 December, Toulouse, meeting with CLS and Digital Equipment regarding the development of the New Argos GTS Processing Chain.

2.8. 13 - 19 March 1992, Vacation.

2.9. 6-8 April 1992, Bermuda, Fifth session of the Surface Velocity Programme. Discussions on various topics interesting the DBCP: GOOS, GTS, QC guidelines, SVP drifters equipped with barometer ports, new Argos GTS Processing chain.

2.10. 23-29 April 1992, Mauritius, visit the Meteorological Services with the Chairman of the DBCP regarding the implementation of a South-West Indian Ocean Drifting Buoy Programme.

2.11. 3-4 June 1992, Oslo, Second meeting of the International Arctic Buoy Programme. The TC DBCP did a presentation on the newly established Quality Control guidelines for drifting buoy data.

2.12. 29 June - 3 July 1992, tests on the New Argos GTS Processing Chain (mainly for testing the Users' Interface named "GTS Manager").

2.13. 6-10 July 1992, Vacation.

2.14. 14 - 18 September 1992, Toulouse, France, formal acceptance trial of the New Argos GTS Processing Chain, phase 1.

2.15. 23-25 September 1992, Halifax, Nova Scotia, Canada, Argos System Technical Exchange. Presentation of the New Argos GTS Processing Chain.

3. Monitoring

Until the 20 January 1992, the TC DBCP undertook similar monitoring activities as for the previous intercessional period (i.e. check Argos files, GTS data, and monitoring statistics in order to detect platforms reporting bad data onto the GTS). Beginning with the implementation of the quality Control Guidelines for drifting buoy data, the 20 January 1992, the TC DBCP undertook the following monitoring activities instead:

3.1. To check the BUOY.QC bulletin board on Omnet, and to read status change proposals as stated by Participating Meteorological or Oceanographic Centres responsible for drifting buoy data quality control (PMOC). In order to rationalize their management, the proposals read are stored in a data base.

3.2. After normally waiting 7 days for each proposal, the TC DBCP contacts the Principal GTS Coordinator (PGC), and then suggests him to implement the proposed change. The PGC should normally contact Service Argos and/or LUT operators for requesting to implement the proposed change. In case the PGC disagrees, the TC DBCP immediately deposits a denial message on the bulletin board.

3.3. To check Argos files and/or GTS data in order to ascertain whether suggested modifications have actually been implemented or not.

3.4. Possibly to deposit feed back information on the bulletin board on behalf of Service Argos for sensors actually recalibrated.

3.5. On a bi-weekly basis, to check for bad "User limits" introduced in the Argos system, in order to automatically remove certain bad sensor data from GTS.

3.6. To resolve specific problems related to GTS for given buoys, such as looking carefully at the data and the transfer functions. For example, I could be investigating why delays are too important, or find why only a few messages are received at Meteorological Centers...

3.7. To update TC files: list of the operational platforms and programs (on GTS or not), new programs, WMO numbers, ECMWF statistics...

4. User assistance

As usual, the TC DBCP answered specific questions and resolved specific problems as needed or requested by users.

4.1. Principal Investigators (PI):

4.1.1. In order to facilitate GTS distribution of certain buoys, the TC DBCP obtained WMO numbers on behalf of Principal Investigators, and studyed in detail Argos message formats and transfer functions of the platforms and their sensors.

4.1.2. At several occasions, PIs requested the TC DBCP to look at specific problems regarding one of their buoys.

4.2. Local User Terminals: From time to time, LUT operators asked the TC DBCP to provide them with the transfer functions used with specific platforms so that they can also report to the GTS via their LUT.

4.3. Meteorological Centers contacted the TC DBCP when they needed information on given platforms drifting in an area which they are interested in.

4.4. Directly or through the BUOY.QC bulletin board, the TC DBCP acted as a focal point between the Meteorological Centres and the Principal Investigators when a specific action was needed on a buoy reporting to the GTS (e.g. remove the data from the GTS, recalibrate a sensor...).

4.5. Provide CGC focal point with comments on the COSNA report as prepared by Mr. Leo Rannaleet, the COSNA network consultant.

4.6. Provide IOC secretariat with documents and graphs for inclusion in the GOOS status report for 1991.

4.7. Other: Provide users with documentation or status reports concerning a specific program or experiment; answer specific questions concerning the Argos System...NOAA/NESDIS, WCRP.

5. Drifting Buoy Quarterly Report

Unfortunately, errors were included in the April 1992 version of the report: some of the indicated "Last positions" were bad. A problem was found in the automatic application generating the report, and was fixed for the following issues. No problem has been reported later.

6. Global Telecommunication System

6.1. Status for drifting buoys reporting onto the GTS:

In July 1991, 718 buoys were operational, 264 of these reporting on GTS (i.e. 36.8%).

In July 1992, 1162 buoys were operational, 474 of these reporting on GTS (i.e. 40.8%). A status report on drifting buoys reporting onto the GTS in August 1992 is given in figures 6.1.1 to 6.1.8.

This dramatic increase in both the number of buoys reporting through Argos and the number of these reporting on GTS is mostly due to the implementation of the WOCE and TOGA programs.

Although the TC DBCP did not complete, as for the previous intercessional period, a detailed survey for understanding why certain buoys did not report onto the GTS, an estimation valid for July 1992 is listed below:

On GTS	41%
Confidentiality	20%
No geo-physical sensor	7%
Tests or poor quality	20%
Not compatible	5%
Unknown	7%

Total	100%

6.2. New buoys reporting to the GTS. Among new institutes allowing the distribution of their buoy data onto the GTS, one could list the following:

* IFREMER (for TOGA), Brest, France,
* the Institute of Ocean Sciences, Sidney, Canada,
* the Korean Ocean Research and Development Institute, Korea,
* the Maritime Safety Agency, Tokyo, Japan,
* the SACLANT NATO center, La Spezia, Italy.
* the Science Applications International Corporation, Ralleigh, North Carolina, (USA)

* the Scripps Institution of Oceanography (GDC, for SVP), La Jolla, California, USA,

* the Texas A&M University (for the LATEX program), Texas, USA,

* the University of Helsinki, Finland,

6.3. GTS bulletin headers:

Since certain drifting buoy data being distributed onto the GTS from Local User Terminal Sources did not use standard bulletin headers as defined during DBCP-V session, Geneva, October 1989, the TC DBCP has been working on the issue in conjunction with the WMO secretariat and concerned LUTs.

So far, only the Oslo Local User Terminal, the Centre de Meteorologie Marine, and the FRGPC and USGPC Argos centres use standard GTS bulletin headers for distributing drifting buoy data onto the GTS.

See annex 6.3 for a complete list of GTS bulletin headers used to date.

6.4. Quality Control.

The work of the TC DBCP concerning Drifting Buoy data Quality Control was related to the following topics:

- Liaise with the sub-group of experts designated at DBCP VII session for proposing standard formats for messages delivered onto the BUOY.QC bulletin board.
- Study cost issues in conjunction with Archie Shaw and provide the chairman of the DBCP with a report.
- Develop specific tools for managing the bulletin board.
- Assist in the implementation of the guidelines.
- Actually monitor the bulletin board, and contact PGCs accordingly.
- Produce activity reports on the QC guidelines.
- Assist CLS in developing a specific application for dealing with the bulletin board.
- Reformat the monthly WMO/Argos numbers cross reference list that the TC DBCP regularly issues, in order to include the names of the PGCs.
- Ask certain centers to replace the TC while he is in mission or in vacation (e.g. OPC, NDBC, Meteo-France).
- Present the Guidelines at various meetings.

6.5. A Status on Drifting Buoys reporting to the GTS, valid for August 1992 has been produced. The maps on figures 6.5.1 to 6.5.8 show the positions of the drifting buoys that reported data on GTS during August 1992 (at least once) and the positions of these reporting certain variables (Air Temperature, Air Pressure, Air Pressure Tendency, Sea Surface Temperature and Wind). To summarize, one could express the needs as follow:

Sea Surface Temperature: Thanks to the WOCE programme we have now a very good coverage over the entire Pacific Ocean. The North Atlantic Ocean is also very well covered. A lack of data appears in the Equatorial and South Atlantic Ocean, the Indian Ocean, and the Southern Ocean.

Air Pressure and Air Pressure Tendency: There is a real lack of data in the Western Pacific Ocean, the South Atlantic Ocean, and the Indian Ocean.

Wind: Only a few drifting buoys are making wind measurements. A total of 27 buoys are reporting wind data on GTS from the North Atlantic, the North-East Pacific Ocean, the Tasman Sea, off the South African coasts, and the Arctic Ocean. No drifting buoy is reporting wind data from equatorial ocean areas where this kind of data would be mostly needed. However, not indicated in the maps are the ATLAS TOGA-COARE moored buoys which are, among other variables, reporting wind data at two meters heights from the Equatorial Pacific Ocean. Hence, the need of wind drifting or moored buoy data could mostly be expressed in the Equatorial Atlantic and Indian Oceans.

Air Temperature: As indicated in paragraph 6.7, is there really a need of drifting buoy air temperature data?

6.6. As scheduled, the 1 November 1991, the DRIFTER code was implemented at the USGPC, and the FRGPC. In order to simplify the developments, the TC DBCP wrote a FORTRAN programme in order to convert the old DRIBU messages generated by the Argos system into DRIFTER messages. CLS, implemented the programme into the system. The Oslo Local User Terminal, and AES LUTs of Edmonton and Toronto also modified their coding procedures very quickly. The Sondre Stromfjord LUT did it later.

6.7. According to discussions with Roger Colony (Applied Physics Laboratory, Seattle), Paul Julian (NOAA, NMC, Quality Insurance Group), and Ray McGrath (ECMWF), it appeared that drifting buoy air temperature data distributed onto the GTS are not used by most of the major weather forecast models (e.g. ECMWF, NMC). At least, air temperature data might be used for climatological and archive purposes. In addition, it is probably difficult to make reliable air temperature measurements from a drifting buoy due to actual conditions at sea and the difficulties in designing a reliable radiation shield, and protect the sensor from spray.

6.8. Non-standard wind sensor heights:

Standard height for installing wind sensors on platforms reporting onto the GTS using the SYNOP or SHIP codes is 10 meters.

It seems that no standard is presently recommended by WMO for placing sensors on-board buoys. However, since in DRIFTER messages most of the drifting buoy wind data distributed onto the GTS are coded using the same symbolic letters "ddff" as for the SYNOP or SHIP codes, many users assume a height of 10 meters. Of course, no drifting buoy is actually making measurements at such heights, but sensors might be placed at different heights from one programme to another (e.g. 1 meter, 1.5 meter, 2 meters...). On the other hand, moored buoys also reporting onto the GTS

using the DRIFTER code make measurements at heights varying from 1 meter to 10 meters.

I would suggest that the DBCP makes the following recommendation:

Taking into account the wide variety of different kind of buoys deployed worldwide, and especially non-standard heights being used for placing wind sensors on-board drifting or moored buoys reporting onto the GTS, request the TC DBCP to maintain an updated list of wind sensor heights and buoy numbers, and request WMO secretariat or the DBCP to regularly publish it.

6.9. Problem of non-standard air pressure measurements for stations in altitude.

Similarly, certain remote land stations reporting their data through the Argos system are presently making use of the DRIFTER code because this is the only code form available with the system. With DRIFTER, air pressure is assumed to be measured at sea level. If the altitude of the station is low, it is acceptable to apply a correction to sea level, but for higher stations the error would be too important. Hence, certain stations deployed in Antarctica are currently reporting air pressure at station level using the DRIFTER code with altitudes ranging from 50 to 1000 meters above sea level.

Considering the very data sparse area where the stations are reporting from, and the good quality of the data, it would definitely be a loss for the Users' community if these stations did not report onto the GTS. Possible solutions are as following:

(1) Wait until the new Argos GTS Processing chain deals with the SYNOP code.

(2) Publish regularly the list of stations reporting air pressure at station level using the DRIFTER code, and indicate their positions and altitudes.

(3) Request Principal Investigators to remove these data from GTS distribution until an acceptable solution is found.

(4) Request Service Argos, and the Technical Coordinator of the DBCP to consider developing in the New Argos GTS Processing Chain, the SYNOP code as a priority.

7. Combined Meteorological and Oceanographic Drifting Buoys

The work of the Technical Coordinator concerning combined Meteorological and Oceanographic Drifting Buoys is mostly related to the following topics:

- Follow the development and tests on an air pressure port being mounted on SVP drifters. These are being operated by the Global Drifter Center at Scripps Institution of Oceanography, La Jolla, California.

- Follow the development and tests by the NDBC on a cheap air pressure sensor.
- Liaise with Principal Investigators of Meteorological Services participating in the field-test of SVP drifters equipped with barometers (AES, BOM, UKMO, Meteo-France).
- A workshop was tentatively scheduled in conjunction with SVP-5 meeting, April 1992. Due to delays in providing the PIs with the prototypes, the chairman of the DBCP decided to postpone the meeting in conjunction with DBCP VIII session.
- Update, and issue the booklet on low cost meteorological measurements from data sparse ocean area. CLS kindly accepted to produce 500 copies of the booklet so that the WMO Secretariat could then formally publish it.
- Attend SVP-5 meeting, Bermuda, 6-8 April 1992, and discuss the issue at the meeting.
- First 3 drifters delivered to France in July 1992 and deployed in the North Atlantic at the end of August. The Global Drifter Center also deployed 3 drifters in the California Currents System during August 1992.

8. New Argos GTS Processing Chain

The work of the Technical Coordinator concerning the New Argos GTS Processing Chain is mostly related to the following topics:

- Liaise with Service Argos and Digital Equipment Corporation, France, and answer specific questions raised during the development of the chain.
- Attend project review meetings with CLS and DEC.
- Study the GTS Manager function, and propose specific tools. Liaise with the Argos User offices in Landover and Toulouse. Write "help pages" to be included in the GTS Manager.
- Study how to keep compatibility between the existing Argos system and the new chain, and how to deal as efficiently as possible with this compatibility, especially regarding the User interface.
- Prepare a "Tests document" in order to validate the chain once developed. 100 different configurations have been proposed.
- Draft a "Technical file for GTS platforms" and submit it to CLS. This file, in its final form will be filled out by Principal Investigators willing to make their Argos data available onto the GTS.
- Start working on the development of the other GTS codes (SYNOP, SHIP, HYDRA, BATHY, TESAC).
- Write specifications of phase 2 (in french) for the development staff.
- Make formal presentations to SAI and CLS staffs.
- Run simulations and test on the actual new chain.
- Present the GTS Chain at various meetings, including at the Argos System Technical Exchange, Halifax, Canada, 23-25 September 1992.

9. South West Indian Ocean drifting buoy programme.

The work of the Technical Coordinator concerning the South West Indian Ocean drifting buoy programme is mostly related to the following topics:

- Liaise with the Centre de Meteorologie Marine of Meteo-France, Brest, to study how Meteo-France could assist in the implementation of the programme.
- Prepare documents and compute specific graphs regarding orbital delays, probabilities to get locations in area of interest of the programme.
- With the chairman of the DBCP, visit Meteorological Services, the Indian Ocean Commission, and the European Economic Community Delegation in Mauritius.
- Provide Meteorological Services of Mauritius with references and prices of drifting buoys manufactured in Europe and in the USA.

10. TC statistics

10.1. Using Argos files and data provided by LUT operators, compute on a monthly basis, by country and by organization, graphs showing the distribution of GTS and non-GTS drifting buoys. It is particularly useful to see the evolution of the total number of drifting buoys deployed by the various countries involved, and the percentage of these reporting to the GTS. See figures 10.1.1 and 10.1.2.

10.2. Compute on a monthly basis, the graph showing the distribution of the RMS (of Observation minus First Guess Field) of Air Pressure data according to ECMWF monthly monitoring statistics. This graph, which uses 6 months of data, gives a good estimate of the quality of the drifting buoy Air Pressure data. The graph is included in the TC monthly report. See figure 9.2.

10.3. Compute the graphs showing the distribution of life times of Air Pressure measurements, using the ECMWF monthly monitoring statistics. See figure 9.3.

10.4. Produce a status on drifting buoys actually reporting onto the GTS in August 1992 (see paragraph 6.1, figure 6.1, and figures 6.1.1 to 6.1.8).

11. Miscellaneous

11.1. Check the Quarterly Report on Drifting Buoy and give approval before CLS sends it to WMO and IOC.

11.2. Assist CLS in preparing the Argos monthly status report to WMO.

11.3. Update TC files on a PC, using a data base management system (Paradox) and getting the data from Argos files, and various status reports. Update an history file on each Argos drifting buoy programme (contacts

with PIs, PI authorizing GTS distribution, information on types of sensor installed, etc...).

11.4. Issue, on a monthly basis, the WMO/Argos cross reference list, and send it to various Meteorological Centers. Send a floppy disk containing the list to the MEDS, Canada. It also includes the WMO numbers managed by the Oslo and Edmonton Local User Terminals (LUT) and indicates for each WMO number, the Argos number, the drifting buoy owner, and the dates the WMO numbers have been introduced and removed from the system (Argos or LUT). Attached to it is now included the list of Principal GTS Coordinators (PGC) designated by Principal Investigators for asking Service Argos to implement status changes on buoys reporting onto the GTS.

11.5. Provide the South African* Weather Bureau (SAWB) and European Group on Ocean Stations (EGOS) technical secretariat with ECMWF statistics, or graphs regarding their respective buoys.

11.6. Prepare the TC monthly report

11.7. Prepare the various TC missions

11.8. Prepare documents and the TC reports for the DBCP VI session:

- Report of the Technical Coordinator
- Report on drifting buoy data Quality Control
- Report on Combined Meteorological/Oceanographic Drifting Buoys.
- Review the report on the New Argos GTS Processing Chain prepared by CLS.

* The Government of the Republic of South Africa has been suspended by Resolutions 38 (Cg-VII) and 2/74/4 (Twentieth Session of the General Conference of Unesco) from exercising its rights and enjoying its privileges as a Member of WMO and Member State of IOC, respectively.

Table 6.3. List of GTS bulletin headers being used for drifting buoy data.

1. Buoy data processed at the Argos US Global Processing Centre (USGPC) of Landover, USA.

Bulletins are routed to the National Weather Service, Silver Spring, Maryland, and actually distributed globally from this source.

$T_1T_2A_1A_2ii$	Approximate region or Programme
SSVX02 KWBC	Buoys deployed in the Southern Hemisphere and Quality Controlled by the National Data Buoy Center (NDBC, Mississippi);
SSVX04 KARS	Buoys deployed in the North Atlantic;
SSVX06 KARS	Buoys deployed in the Northern Hemisphere;
SSVX08 KWBC	Buoys deployed in the Northern Hemisphere and Quality Controlled by the NDBC;
SSVX10 KARS	Buoys deployed in the Southern Hemisphere;
SSVX12 KARS	Buoys deployed in the Arctic Ocean;
SSVX14 KARS	Buoys or platforms reporting from or around Antarctic area;
SSVX15 KARS	Buoys deployed in the Arctic Ocean (USA-JIC for IABP);
SSVX16 KARS	Specific experiments. Buoys from various ocean area;
SSVX40 KARS	ATLAS moored buoys in the Equatorial Pacific Ocean;
SSVX96 KARS	Specific experiment conducted by the NDBC.

2. Buoy data processed at the Argos French Global Processing Centre (FRGPC) of Toulouse, France.

Bulletins are routed to the Service Central d'Exploitation de la Meteorologie (SCEM of Meteo France), Toulouse, and actually distributed globally from this source.

$T_1T_2A_1A_2ii$	Approximate region or programme
SSVX01 LFPW	Buoys deployed in the North Atlantic;
SSVX03 LFPW	Buoys deployed in the Southern Hemisphere;
SSVX05 LFPW	Buoys deployed in the Northern Hemisphere, excluding North Atlantic;
SSVX07 LFPW	Buoys deployed in the Arctic Ocean;
SSVX09 LFPW	Buoys or platforms reporting from or around Antarctic area.

3. Buoy data processed at the Centre de Meteorologie Marine, Brest, France.

Bulletins are routed to the Service Central d'Exploitation de la Meteorologie (SCEM of Meteo France), Toulouse, and actually distributed globally from this source.

$T_1T_2A_1A_2ii$	Approximate region or programme

SSVX51 LFPW	Buoys deployed in the North Atlantic;
SSVX55 LFPW	Buoys deployed in the Equatorial Pacific Ocean;

4. Buoy data processed at the Oslo Local User Terminal, Norway.

Bulletins are routed to the Norwegian Meteorological Institute, Oslo, and actually distributed globally from this source.

$T_1T_2A_1A_2ii$	**Approximate region or programme**
SSVX01 ENMI	Buoys deployed in the North Atlantic;

5. Buoy data processed at the Edmonton Local User Terminal, Canada.

Bulletins are routed to the Atmospheric Environment Service, Edmonton, and actually distributed globally from this source.

$T_1T_2A_1A_2ii$	**Approximate region or programme**
SSVD2 CWEG	Buoys deployed in the Arctic;
SSVD4 CWEG	Buoys deployed in the Pacific Ocean;
SNVD3 CWEG	Moored buoys in Hudson Bay, Winnipeg lake, etc..;
SNVD4 CWEG	Moored buoys in the Pacific Ocean;

6. Buoy data processed at the Toronto Local User Terminal, Canada.

Bulletins are routed to the Atmospheric Environment Service, Toronto, and actually distributed globally from this source.

$T_1T_2A_1A_2ii$	**Approximate region or programme**
SNVD1 CWTO	Moored buoys in the North Atlantic;

7. Buoy data processed at the Sondre Stromfjord Local User Terminal, Greenland.

This Local User Terminal is operated by the Danish Meteorological Institute.

$T_1T_2A_1A_2ii$	**Approximate region or programme**
SSVX1 BGSF	Buoys deployed in the North Atlantic for the EGOS programme;

Figure 6.1. Status on Operational GTS buoys for drifting buoys that reported via Argos in August 1992:

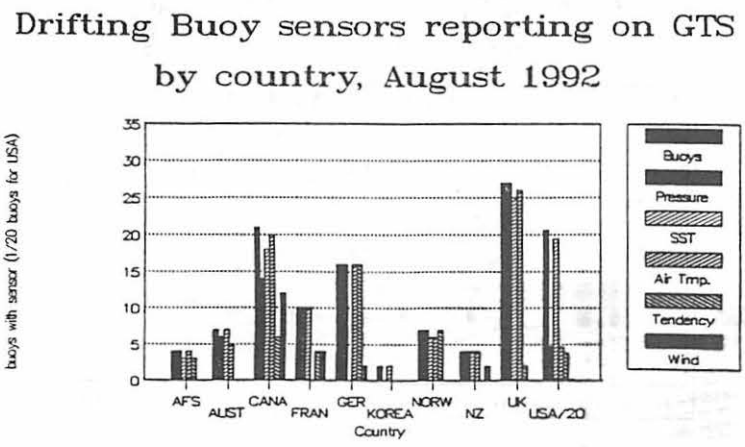


Figure 6.1.1. Distribution by country and by variable

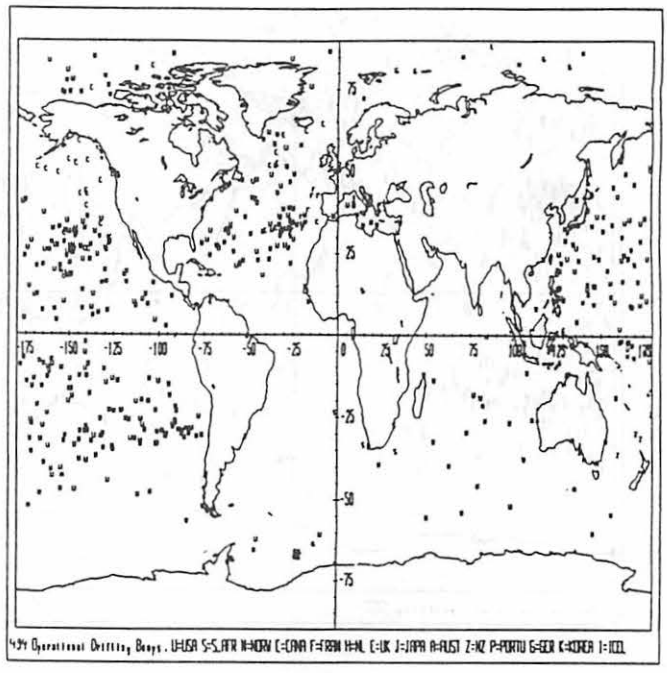


Figure 6.1.2. Positions by country

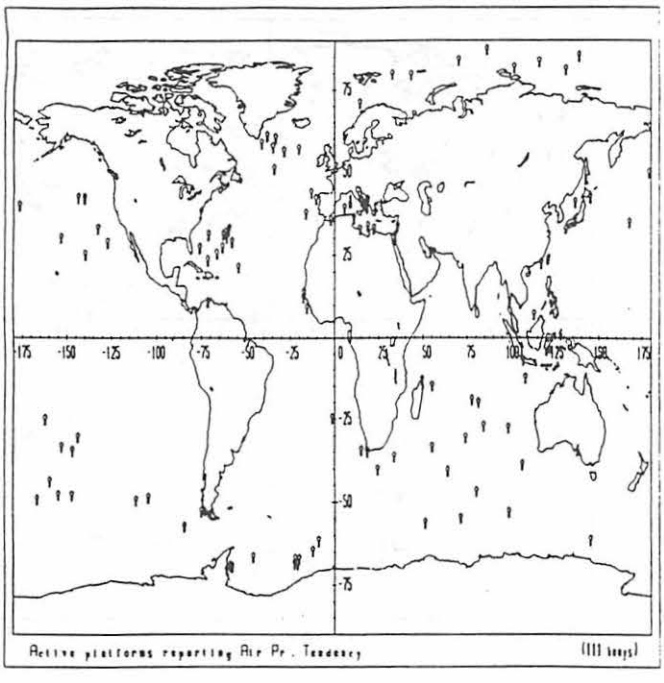


Figure 6.1.3. Positions for Air Pressure Tendency data

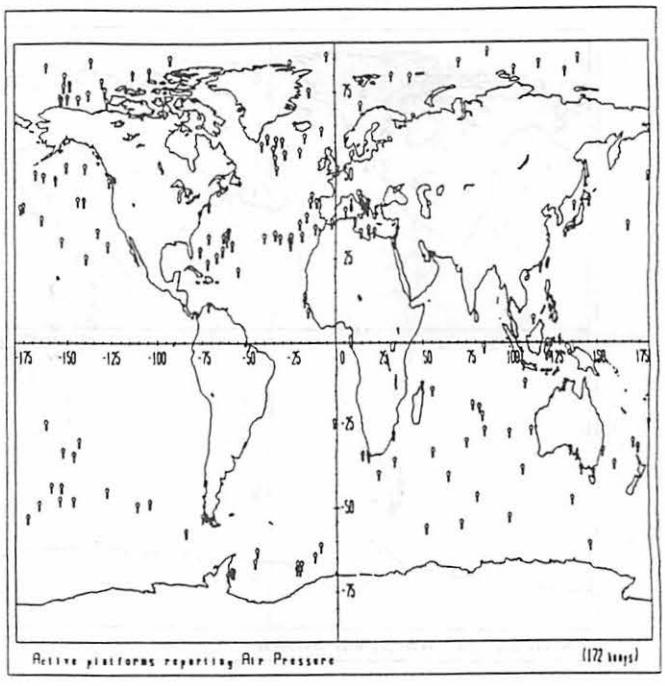


Figure 6.1.4. Positions for Air Pressure

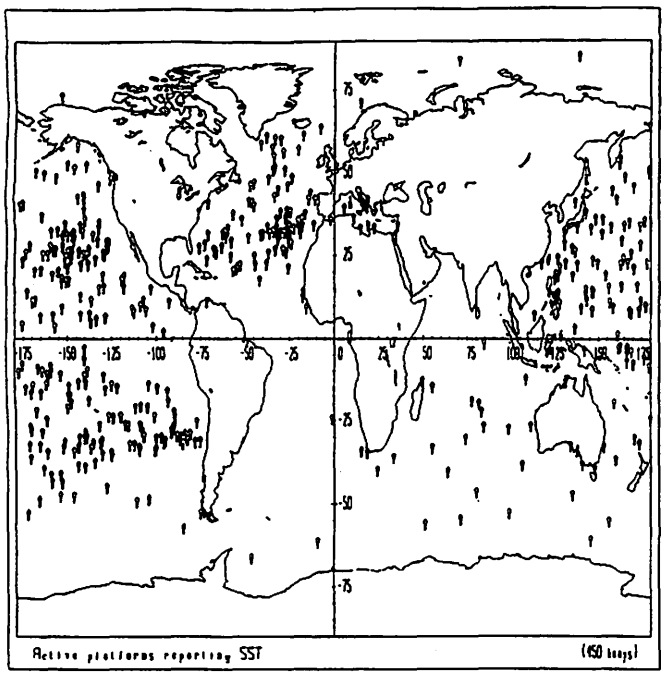


Figure 6.1.5. Positions for Sea Surface Temperature

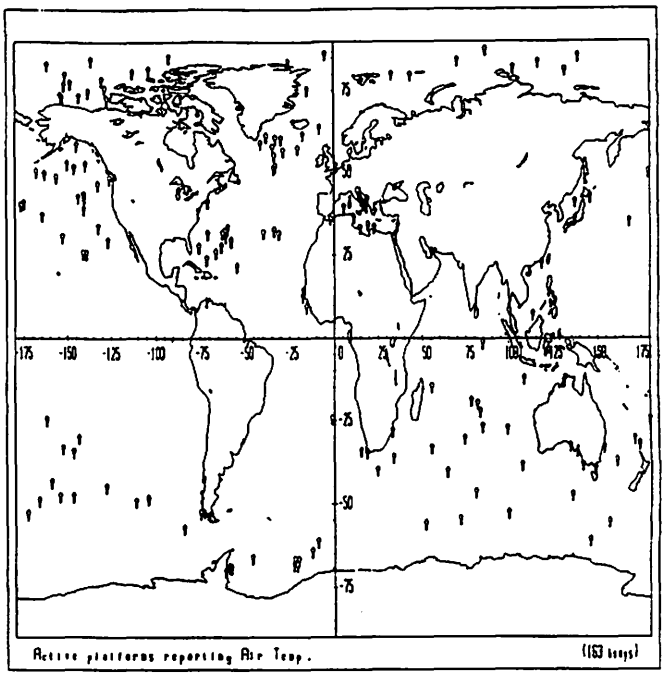


Figure 6.1.6. Positions for Air Tempe.

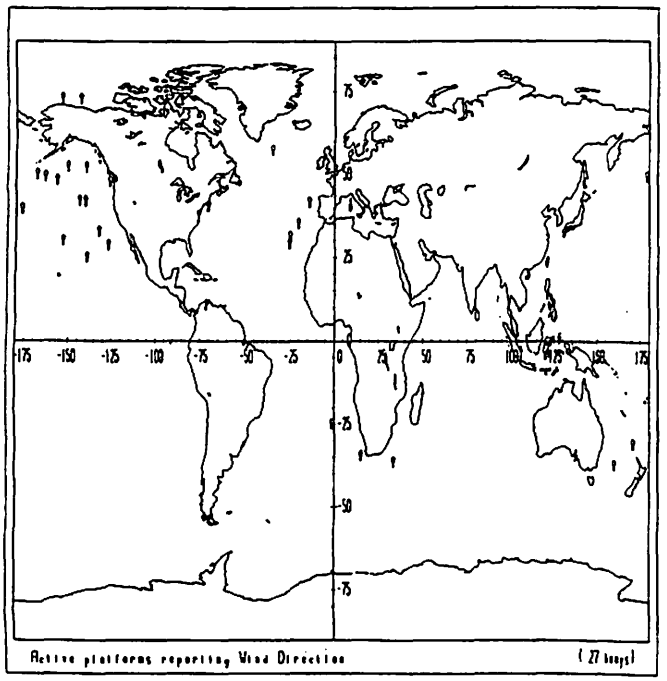


Figure 6.1.8. Positions for Wind Direction

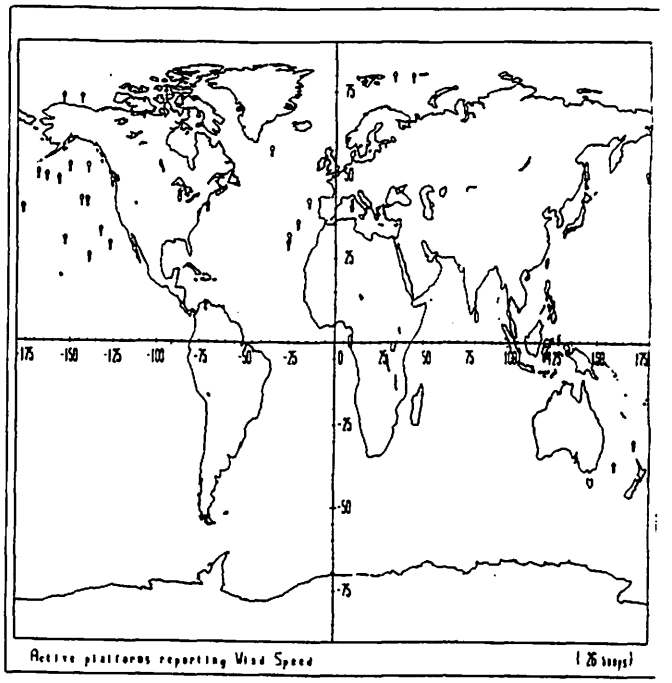
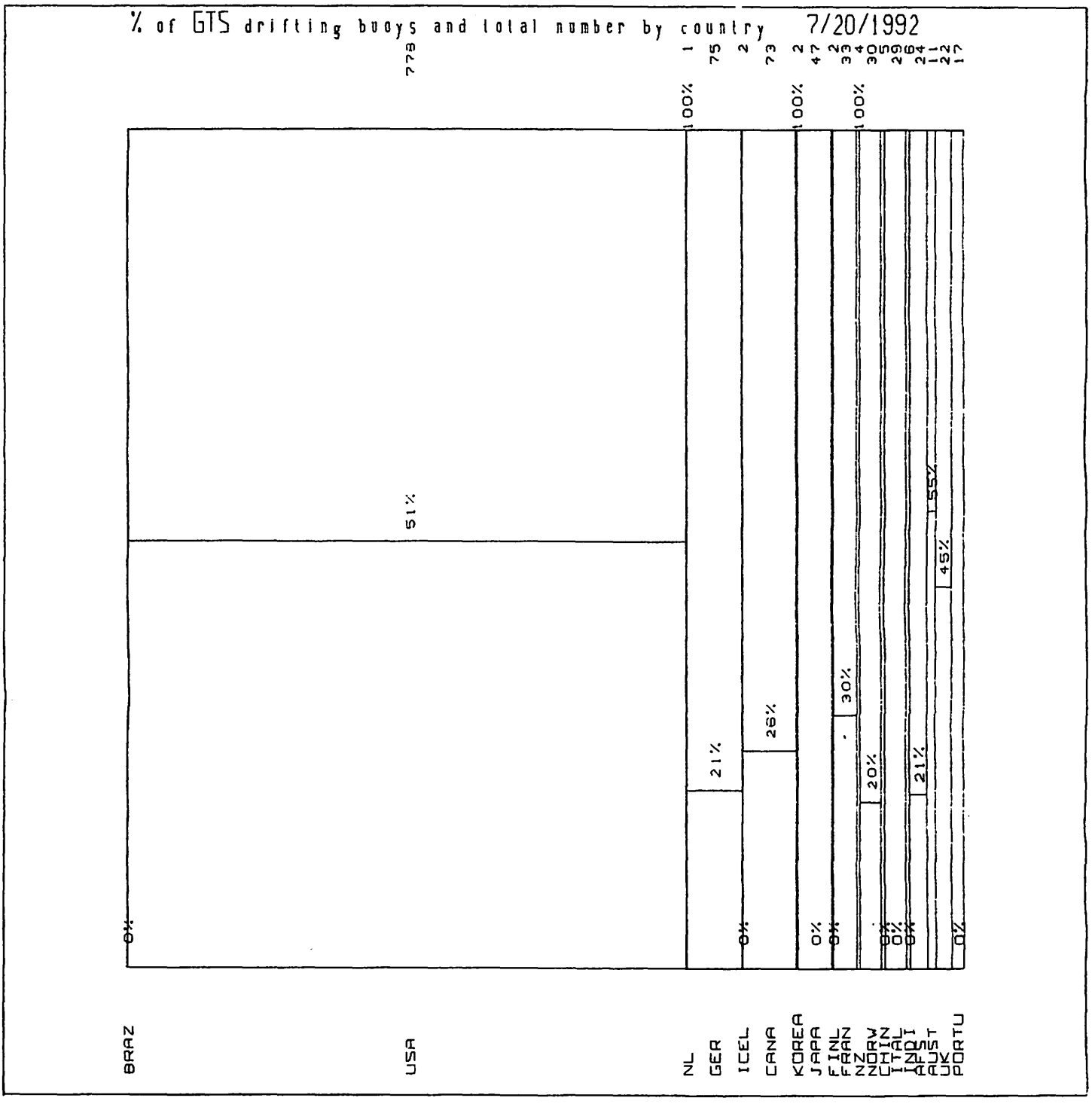


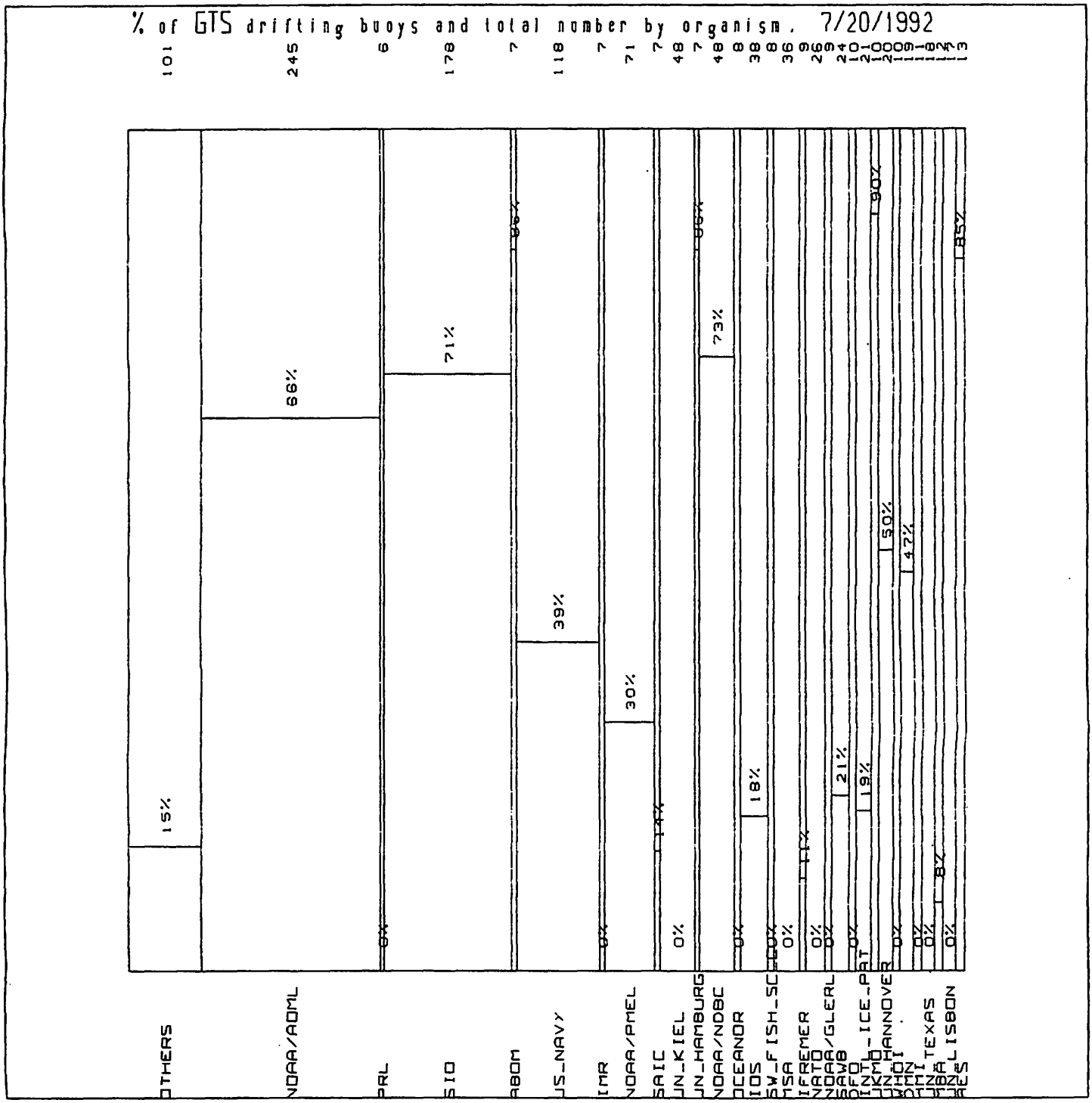
Figure 6.1.8. Positions for Wind Speed

Figure 10.1.1. Distribution of GTS and non-GTS platforms by country:



Total number of drifting buoys : 1162
Total number of meteo buoys : 474 = 40.8%

Figure 10.1.2. Distribution of GTS and non-GTS platforms by organization:



Total number of drifting buoys : 1162
Total number of meteo buoys : 474 = 40.8%

Figure 10.2. Distribution of RMS (Obs. - First Guess Field, for Air Pressure data:

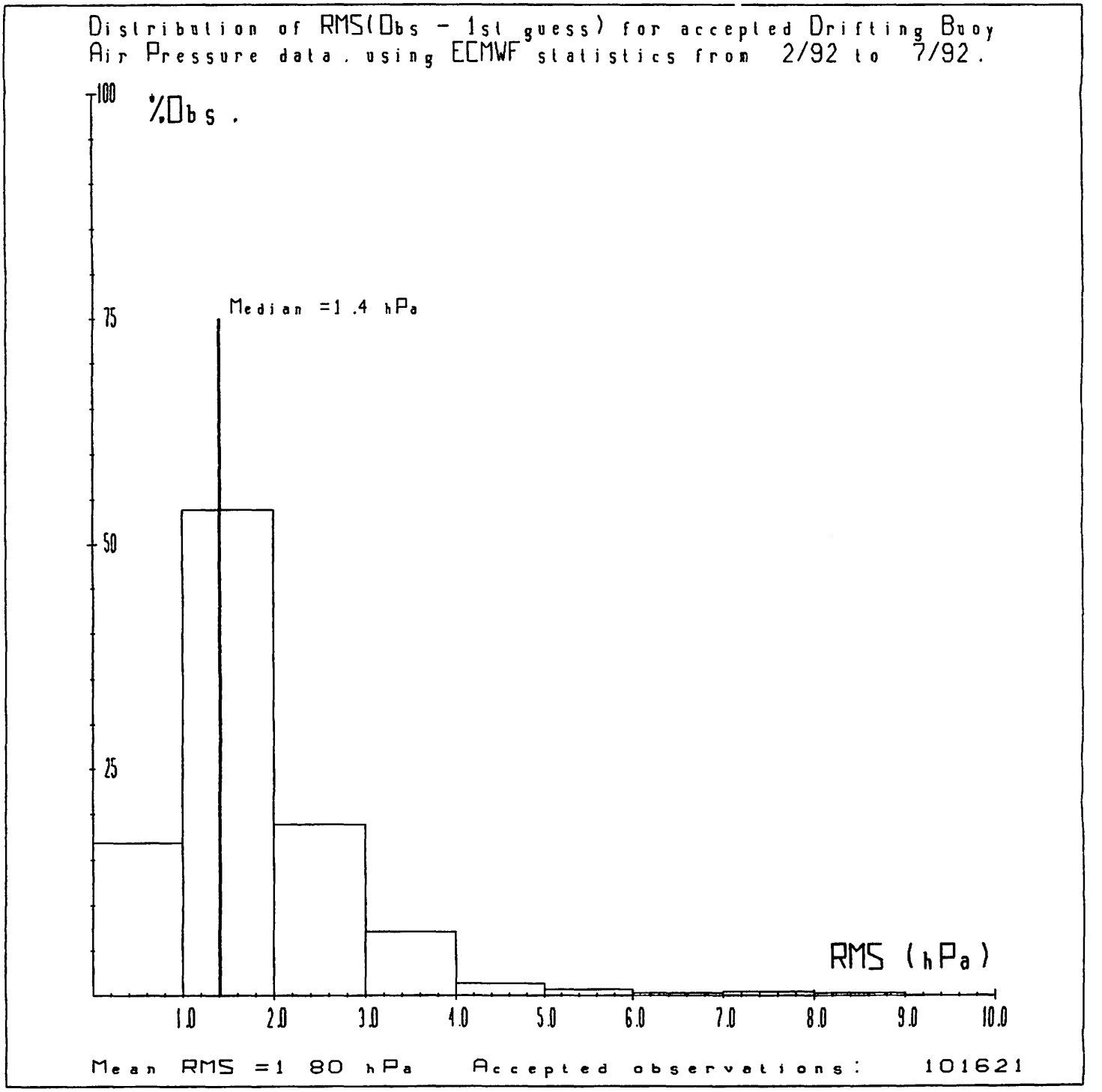
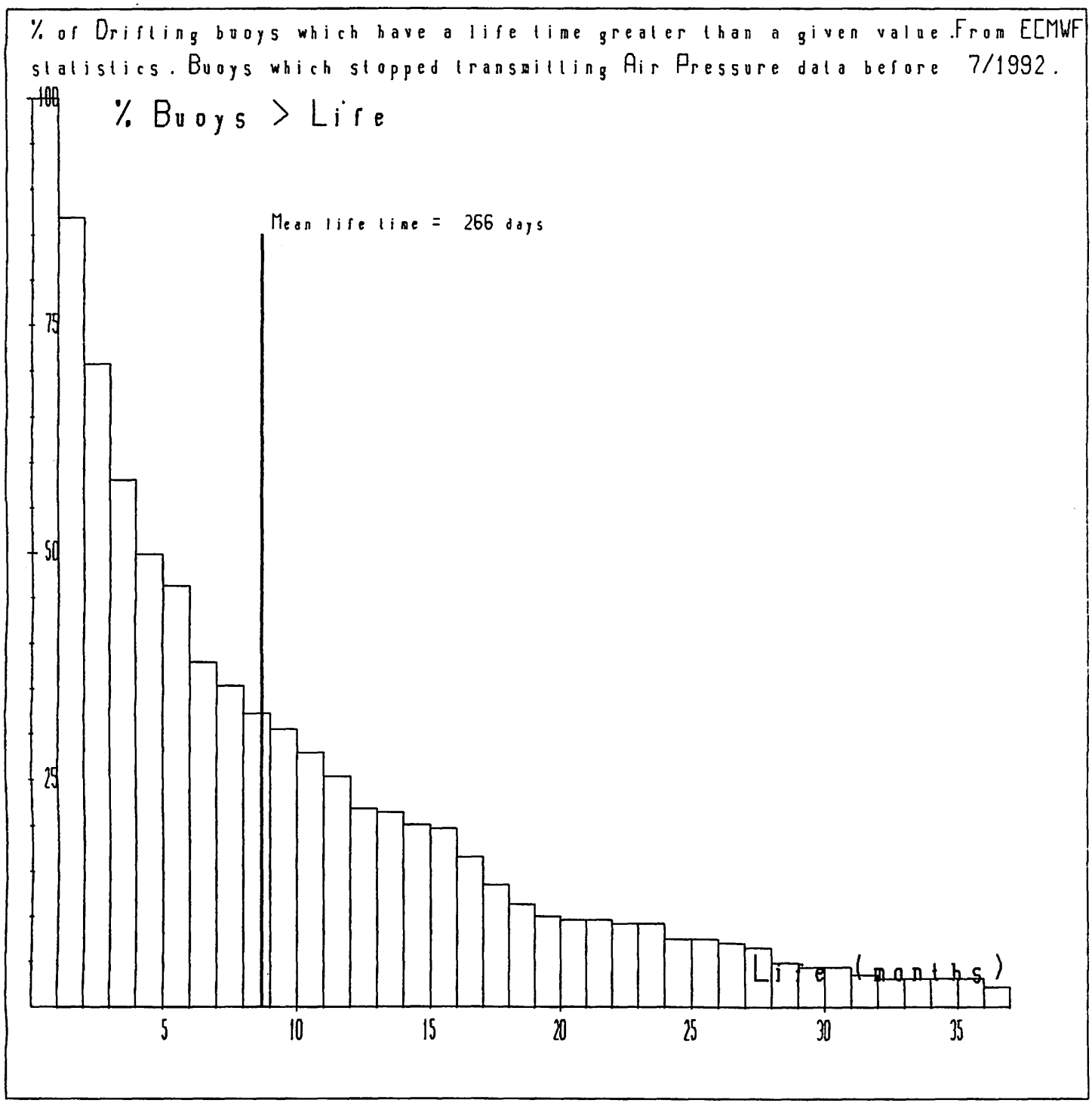


Figure 10.3. Distribution of the Life Time of the Air Pressure sensor:



ANNEX III

FINANCIAL STATEMENTS

World Meteorological Organization

Drifting Buoy Co-operation Panel
Account as at 31 December 1991

	US$		US$
Balance from 1989			7,589
Contributions Paid for Prior Biennium			19,875
Contributions Paid for Current Biennium			191,619
Total Funds Available			219,083
Obligations Incurred			
UCAR	161,000		
SMBA	3,350		
Service Argos	39,500		
Experts	872		
Travel	6,942		
DBCP Ties	827		
Administration direct	7		212,498
Balance of Fund at 31 December 1991		US $	6,585
Represented by.			
Cash at Bank			21,585
less: Unliquidated Obligations			15,000
		US $	6,585

Contributions received for prior years		
Canada		2,122
France		17,753
	US $	19,875

World Meteorological Organization

Drifting Buoy Co-operation Panel
Interim Account as at 30 September 1992

	US$		US$
Balance from 1991			6,585
Contributions Paid for Prior Biennium			15,000
Contributions Paid for Current Biennium			112,862
Total Funds Available			134,447
Obligations Incurred			
UCAR	109,000		
Service Argos	14,500		
Experts	1,035		
Travel	6,023		
DBCP Ties	(961)		
Administration direct	14		129,611
Balance of Fund		US $	4,836
Represented by.			
Cash at Bank			23,836
less: Unliquidated Obligations			19,000
		US $	4,836

Contributions received for prior years		
Canada	US $	15,000
Contributions		Received
Australia	US $	11,000
Canada		16,500
France		11,513
Greece		2,100
Iceland		2,100
Ireland		499
Netherlands		1,575
Norway		1,575
UK		11,000
USA		55,000
TOTAL		112,862

World Meteorological Organization

GTS Chain Fund
Account as at 31 December 1991

		US $
Contributions Paid		70,892
Less Obligations		55,892
Balance of Fund	US $	15,000

Represented by:

Cash at Bank	US $	15,000

Contributions outstanding

United States of America	US$	20,000

World Meteorological Organization

GTS Chain Fund
Account as at 30 September 1992

	US $		US $
Balance from 1991	15,000		
Contributions Paid	20,000		35,000
Less Obligations			34,108
Balance of Fund		US $	892

Represented by:

Cash at Bank		892
Unliquidated oblig		0
	US $	892

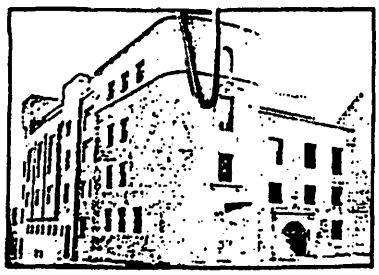
Contributions received

United States of America	US$	20,000

DBCP TIES

Account as at 30 September 1992

	US dollars
Purchase cost (see attached invoices) (99 blue, 102 red/green)	1680.00
Receipts:	
o Deposited DBCP account 29/11/1991	853.00
o Deposited DBCP account 22/7/1992	961.00
o Cash in hand (approximately)	20.00
TOTAL	1834.00
Ties remaining	
Red/green: 14	
Blue: 5	
Expected receipts	190.00
GRAND TOTAL	2024.00
Profit to DBCP	344.00



MADDOCKS & DICK Ltd.
ESTABLISHED 1949
231 Canongate, Royal Mile,
Edinburgh EH8 8BJ
TELEPHONE: 031-556 6012 (6 Lines)
Sales Fax: 031-556 7924
Art Dept. Fax: 031-556 1592
Accounts Fax: 031-557 4392

Manufacturers of Corporate and Club Ties in Polyesters and Silks, Ladies Scarves and Bows, Embroidered Pullovers and Badges.

WORLD METEOR ORGAN
41 AVENUE GIUSEPPE-MOTTA
CH1211 GENEVE 20
CASE POSTALE NO5
SWITZERLAND

AS INVOICE

21387 30-10-91 69962 WA1749

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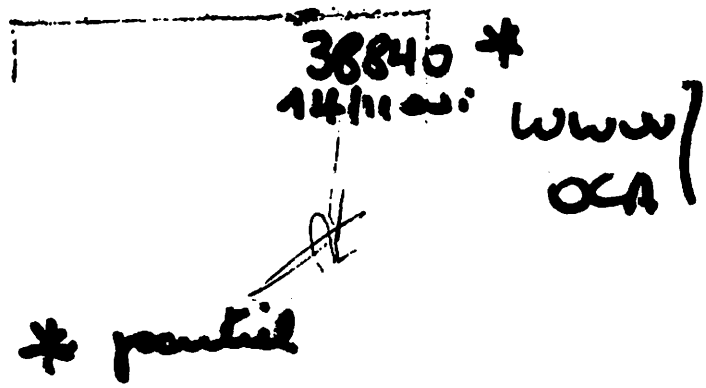
J/WO	JACQUARD WOVEN	102	4.50	459.00



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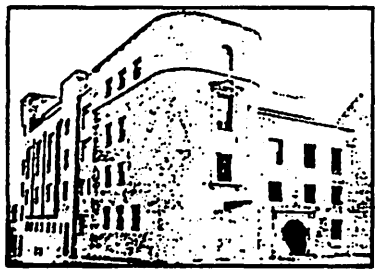
TIES WERE SENT AIR MAIL



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WORLD METEOR ORGAN
41 AVENUE GIUSEPPE-MOTTA
CH1211 GENEVE 20
CASE POSTALE NO5
SWITZERLAND

AS INVOICE

21387 18-11-91 70392 WA1750 38840

J/WO	JACQUARD WOVEN	99	4.45	440.55

Bon de commande no. 38840
Marchandise reçue
Travail effectué
Contrat annuel
date 25 NOV. 1991

à liquider pour WWW / OCR

14.85

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455.40

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ANNEX IV

Financial Report

For Year 1 June 1991 - 31 May 1992

C030-WMO - DRIFTING BUOY TECHNICAL COORDINATOR

	91-92 Effective Budget	91-92 Expense	Year End Balance	92-93 Funding	92-93 Effective Budget
TC Salary	43,119	45,309	-2,189	46,695	44,506
UCAR Salary	976	382	594	1,250	1,844
Benefits	14,735	11,225	3,510	13,664	17,174
M & S	70	0	70	25	95
PS	1,579	376	1,203	764	1,967
Relocation	10,573	0	10,573	0	10,573
Travel	14,593	14,674	-81	13,972	13,891
Indirect	17,028	17,259	-230	17,630	17,400
Interest Credit	838	-2,815	3,653		3,653
Total	103,511	86,409	17,103	94,000	111,103

Previous Year, 1990-'91

	90-91 Effective Budget	*90-91 Expense*	*Year End Balance*	*91-92 Funding*	*91-92 Effective Budget*
TC Salary	*39,273*	*40,048*	*-776*	*43,895*	*43,119*
UCAR Salary	*690*	*964*	*-274*	*1,250*	*976*
Benefits	*12,397*	*10,529*	*1,869*	*12,866*	*14,735*
M & S	*46*	*1*	*45*	*25*	*70*
PS	*949*	*178*	*771*	*808*	*1,579*
Relocation	*15,660*	*5,087*	*10,573*	*0*	*10,573*
Travel	*11,569*	*10,436*	*1,133*	*13,460*	*14,593*
Indirect	*14,161*	*14,829*	*-668*	*17,696*	*17,028*
Interest Credit		*-838*	*838*		*838*
Total	***94,746***	***81,234***	***13,511***	***90,000***	***103,511***

Notes:

TC Salary and UCAR administrative salaries are shown separately. TC Salary for the year was agreed at $43,895. Actual expense of $45,309 exceeds stated salary because UCAR vacation entitlement is charged as accrued. (Assume a UCAR employee with annual salary of $52,000 and vacation entitlement of three weeks. If the employee takes three weeks of vacation, total salary expense would be $52,000. If, however, the employee defers vacation, total salary expense for the year would be $55,000, being

$52,000 salary for time worked plus $3,000 reserve to pay for vacation earned. The expense shown here suggests that the TC had several days of unused vacation entitlement remaining at the end of the year.) UCAR policy is to pay employees for any unused vacation upon termination. Such payment has the potential to cause salary expenses to exceed sums budgeted.

UCAR salaries are down significantly for two reasons. First, the actual time required to support the TC is down due to experience on both sides. Second, personnel changes within UCAR appear to have resulted in time spent on TC support being charged elsewhere.

Benefits apply equally to the TC and UCAR salaries. This is budgeted slightly in excess of actual expense estimates, which produces the remaining surplus despite the minor deficit in Salaries themselves. Any surplus here is intended to offset *possible* unbudgeted termination vacation pay.

Materials & Supplies remain inconsequential, and Purchased Services continue to run below budget estimates.

Travel is separated into Relocation and Business Travel. There was no expenditure in the Relocation category during this year. Business travel has been entirely travel by the TC as authorized by Peter Dexter. A summary of TC travel is attached; note that costs as listed in the summary vary from the actual expenses reflected above. This is because some advance expenses for current year trips were paid and accounted in the previous year.

Indirect costs were applied to all expenditures in FY91 (ended 30 Sep 91) at the rates shown for FY91 in the budget--20.85% and 3% fee. During FY92, Indirect costs were calculated as 19.5% plus 3% fee. This modest reduction alleviated the deficit in the indirect cost category occasioned by previous increases.

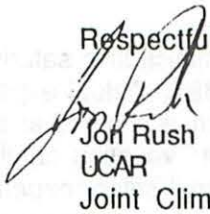
UCAR credits the WMO DBCP TC account with interest UCAR receives on WMO funds on deposit in UCAR's name. This credit amounted to $2,815 during the year, for a cumulative total of $3,653. It is shown here as a credit to expenses rather than an addition to funds in order to avoid confusing it with funding received from WMO under the contract.

The end result at 31 May 92 was a positive balance in most categories. Exceptions are TC Salary, Travel and Indirect Costs. Incremental funding for the year was $90,000 against expenditures of $86,409 for a 1991-'92 year-end surplus of $3,591. The cumulative total surplus of funds (including interest credits) over expenditures at the end of the year was $17,103.

Adding the year-end balance in each category to the $94,000 WMO funding for the fourth year of UCAR support gives an Effective Budget for 1992-'93 totaling $111,103.

Additional detail on any of these expenditures is available upon request.

Respectfully submitted,



Jon Rush
UCAR
Joint Climate Projects/Planning Office

15 September 1992

DBCP Technical Coordinator Travel, 1991-'92

	Trip	Purpose	Begin	End	Approx. Cost
1.	DC-Seattle-return	Int'l Arctic Buoy Programme	9/1/91	9/21/91	935
2.	DC-Toulouse, France-ret	DBCP Mtg & ARGOS JTA mtgs	10/8/91	10/25/91	3,927
3.	DC-Norway-Toulouse-DC	Visit Norw. Met Inst & Norw. Ocean firm	12/14/91	12/21/91	3,866
4.	Wahington, DC - Bermuda RT	TOGA/WOCE SVP Session	4/5/92	4/9/92	1,817
5.	Washington, Dc - Maritius, RT	Buoy Program for SW Indian Ocean	4/21/92	4/30/92	5,200
					$15,744

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ANNEX V

CONTRACTS BETWEEN WMO AND UCAR, WMO AND SERVICE ARGOS INC.

APPENDIX A

MODIFICATION NO. 3
TO
SUPPORT AGREEMENT
BETWEEN
WORLD METEOROLOGICAL ORGANIZATION
AND
UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH

This Modification No. 3 entered into and effective on this 22 day of April 1992 between the University Corporation for Atmospheric Research (hereinafter referred to as "UCAR") and the World Meteorological Organization (hereinafter referred to as "WMO") WITNESSETH THAT:

Whereas, on July 17, 1989 UCAR and WMO entered into a Support Agreement for the Technical Coordinator to coordinate .e drifting buoy programmes of the Member countries and other organizations; and

Whereas, UCAR and WMO now desire to modify said Support Agreement to extend the period of performance and provide a new budget for the extended performance period;

NOW THEREFORE, in consideration of the premise and of the agreements hereinafter set forth UCAR and WMO hereby agree as follows:

a. The period of performance of the Agreement is hereby extended one year from May 31, 1992 to May 31, 1993.

b. Exhibit A is hereby amended by adding the attached Exhibit A, dated March 1, 1992. The attached Exhibit A shall apply to the period June 1, 1992 through May 31, 1993.

c. The first sentence of paragraph 4.01 is hereby deleted and the following is substituted in its place: "WMO's funding obligation hereunder for the period June 1, 1992 through May 31, 1993 shall not exceed actual contributions received from the panel Members up to the total estimated cost of U.S. $94,000.

IN WITNESS WHEREOF UCAR and WMO have executed this Modification No. 3 as of the date first above written.

Witness

BY: _____
Maggie Miller

TITLE: Administrative Assistant

UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH

BY: _____
Robert Greenwald

TITLE: Director
Contracts and Risk Management

Witness:

BY: _____
Vera Schwarz

TITLE: Administrative Assistant

WORLD METEOROLOGICAL ORGANIZATION

BY: _____
Director

TITLE: Administration Department

EXHIBIT A

March 1, 1992

University Corporation for Atmospheric Research

Joint Climate Projects/Planning Office
UCAR Account #C030
Drifting Buoy Cooperation Panel - Technical Coordinator
1 June 92 - 31 May 93
World Meteorological Organization

	Estimated Budget February 25, 1992	
Salaries		
UCAR Administrative	1,250	
Technical Coordinator	46,695	
Subtotal		**$47,945**
Benefits @ 28.5%		**13,664**
Materials & Supplies		**25**
Purchased Services		
Office Space	350	
Email, Express Service, Etc.	414	
Subtotal		**764**
Travel		
Domestic Airfare		
7 Trips @ $600	4,200	
21 Nights Lodging @ $90	1,890	
28 Days Per Diem @ $34	952	
Ground Transport @ $75/trip	525	
Communication & Fees @ $75/trip	525	
Foreign Airfare		
USA-Europe, Australasia, RT		
2 Trips @ $1500	3,000	
14 Days Per Diem @ $170	2,380	
Ground Transport @ $150/trip	300	
Communication & Fees @ $100/trip	200	
Subtotal		**13,972**
TOTAL Direct Costs		**76,370**
Indirect Costs		
Administrative Support @ 19.5%	14,892	
Fee @ 3%	2,738	
TOTAL Indirect Costs		**17,630**
TOTAL Proposed Budget		**$94,000**

TC Salary is 1991-92 salary plus 4.1% inflation increase plus $1,000.
Indirect costs shown are proposed FY 92 rates, subject to negotiation and approval by the National Science Foundation. Indirect cost rates for FY 93, undetermined at this time, will be applied as approved to expenditures under this budget in FY 93.

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APPENDIX B

CONTRACT

between

World Meteorological Organization (WMO)

and

Service Argos Inc.
1801 McCormick Drive, Suite 10
LANDOVER, MD. 20785
USA

The following has been agreed:

I. Service Argos Inc will provide to the Technical Coordinator of the WMO/IOC Drifting Buoy Cooperation Panel, for the period 1 June 1992 to 31 May 1993 inclusive, the following logistic support :

(a) An office and appropriate furniture;

(b) Necessary secretarial support;

(c) Free access to all telecommunications facilities currently available (telephone, telex, telegram, electronic mail etc..);

(d) Access to the computing facilities of Service Argos Inc, including free use of (i) a terminal giving access to the Argos processing centre; (ii) a micro-computer with standard software;

(e) Normal office supplies and facilities (including mail services and photocopies etc.).

II. WMO will pay to Service Argos Inc. for the services noted in I above the sum of US $ 14,500, such payment to be effected within 30 days of the finalization of this contract.

III. Except if specifically agreed otherwise, Service Argos Inc will bear all costs relating to the execution of the services noted in I above.

IV. Neither Service Argos Inc, nor any person employed by it in undertaking the agreed services, is to be considered as an agent or employee of WMO; nor can they claim any advantage, immunity, payment or recompense other than expressly provided for in the present contract; nor are they authorized to engage WMO in any additional expenses or obligations.

V. Service Argos Inc assumes full responsibility for whatever measures it deems necessary to take to insure itself against any loss or damage incurred during the execution of the agreed services.

For the WORLD METEOROLOGICAL ORGANIZATION

Signature : J. K. Murithi

Title : Director, Administration Department

Date : 15 May 1992

For SERVICE ARGOS INC.

Signature : A. E. Shaw III

Title : President

Date : July 23, 1992

ANNEX VI

CONTRACT

between

WORLD METEOROLOGICAL ORGANIZATION (WMO)

and

COLLECTE LOCALISATION SATELLITE (CLS)

18, Av. Belin
31055 Toulouse Cedex
France

The following has been agreed:

I. CLS will implement, within the Argos data management and processing system, new data management software commonly entitled "New Argos GTS Processing Chain", according to specifications agreed between CLS and the Drifting Buoy Co-operation Panel (DBCP) at the seventh session of the DBCP (Toulouse, 15-18 October 1991), recorded in the final report of this meeting, and given in outline in Attachment 1 to this Agreement.

II. CLS will complete implementation of Stages 1 and 2 of the New Argos GTS Processing Chain, as defined in I above, according to a timetable which is also recorded in the final report of the seventh session of the DBCP and given in Attachment 2 to this Agreement.

III. WMO will pay to CLS for the work defined in I and II above all monies received from DBCP Member countries and specifically designated as being for the New Argos GTS Processing Chain, up to a maximum of US$90,000.-, a pre-payment of US$55,892.- to be made before 31 December 1991 and the balance as the monies are made available to WMO.

IV. The DBCP will contribute to the work defined in I above, in addition to the sum defined in III above, the services of its technical co-ordinator, to an extent to be mutually agreed among CLS, the chairman of the DBCP and the technical co-ordinator of the DBCP.

V. Except if specifically agreed otherwise, CLS will bear all costs relating to the execution of the services noted in I above.

VI. Neither CLS, nor any person employed by it in undertaking the agreed services is to be considered as an agent or employee of WMO; nor can they claim any advantage, immunity, payment or recompense other than expressly provided for in the present contract; nor are they authorized to engage WMO in any additional expenses or obligations.

VII. CLS assumes full responsibility for whatever measures it deems necessary to take to insure itself against any loss or damage incurred during the execution of the agreed services.

For the World Meteorological Organization

Signature:

J.K. Murithi

Title: Director, Administration Department

Date: 14 February 1992

For Collecte Localisation Satellite

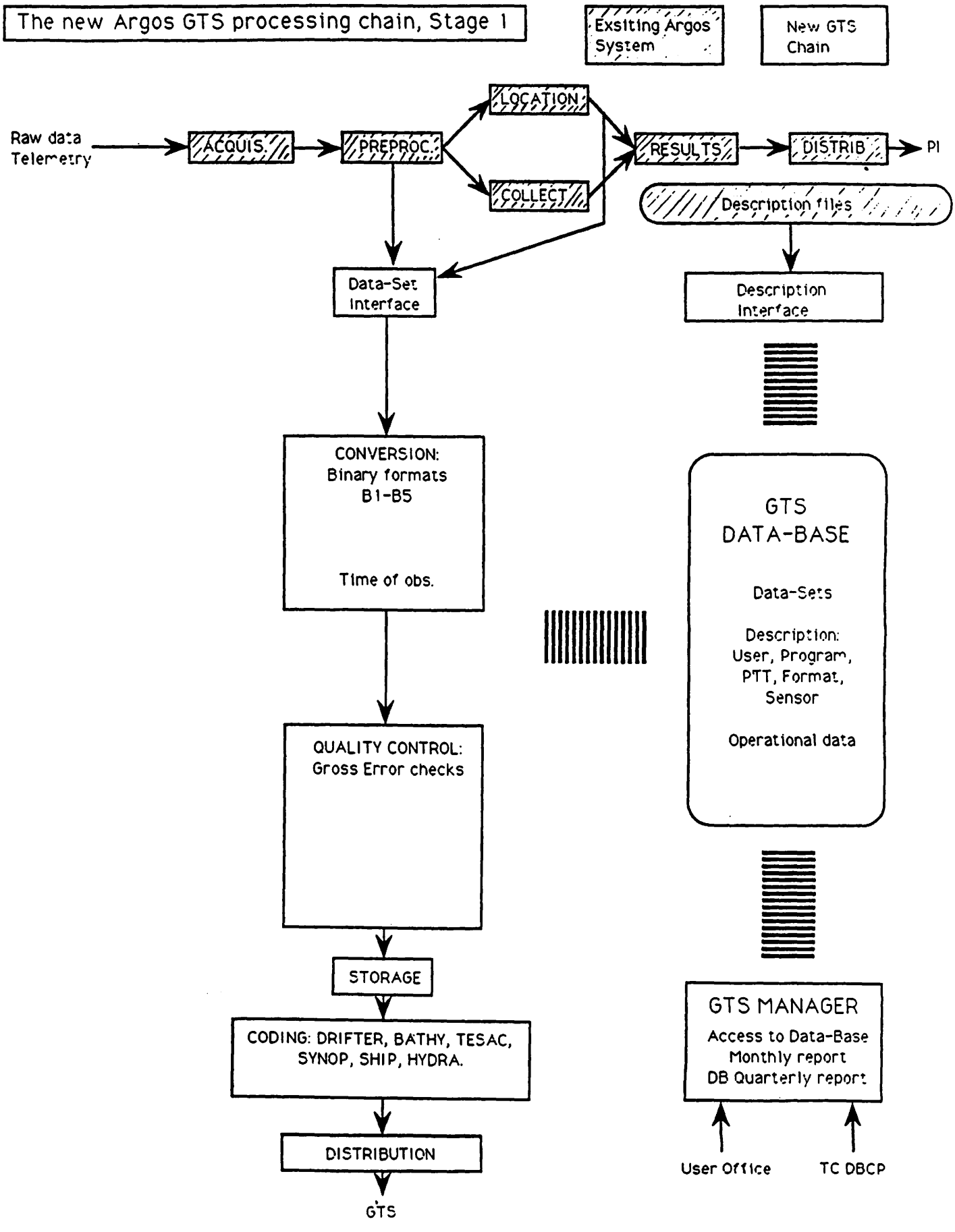
Signature:

Title: DIRECTEUR

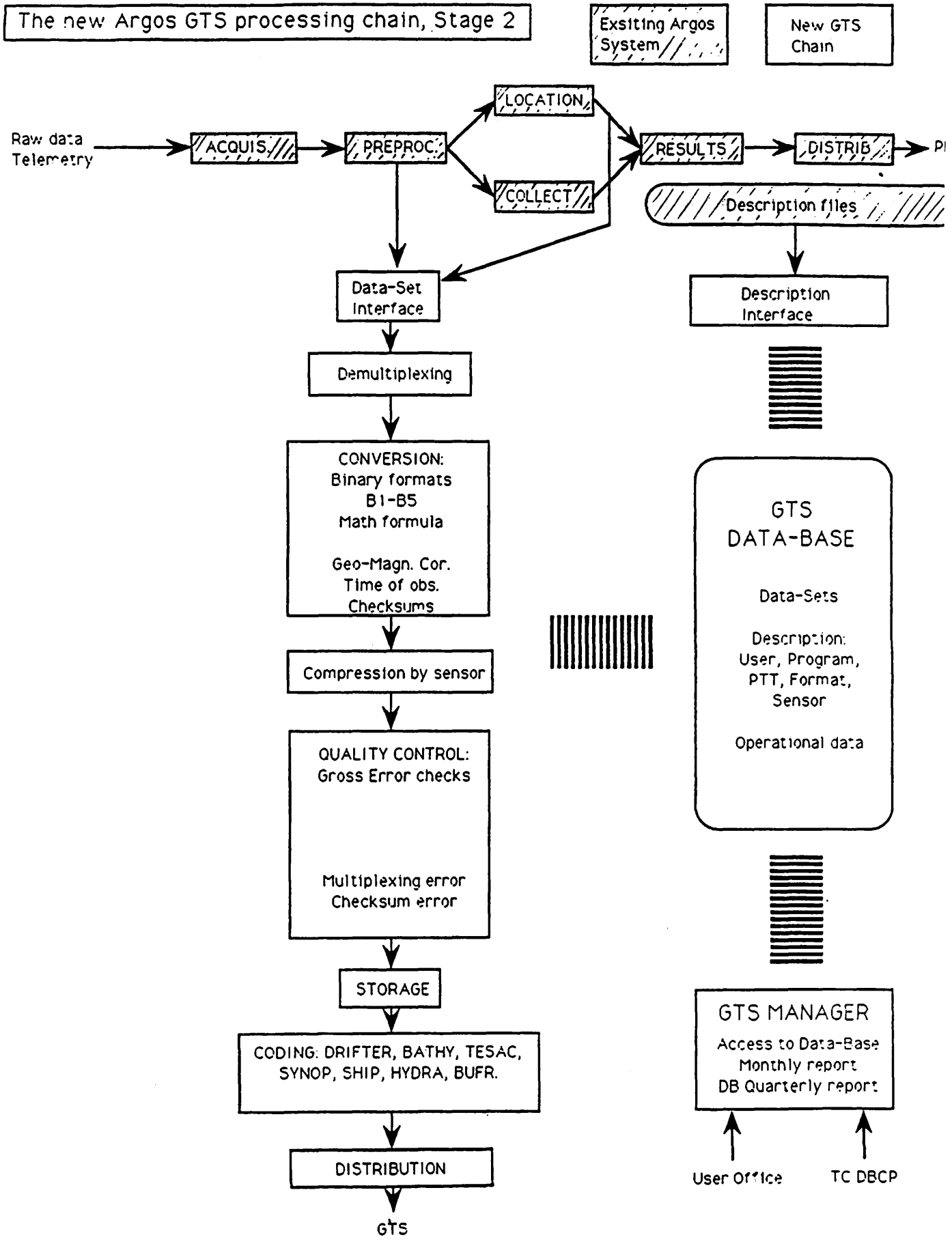
Date: GENEVE

25/2/92

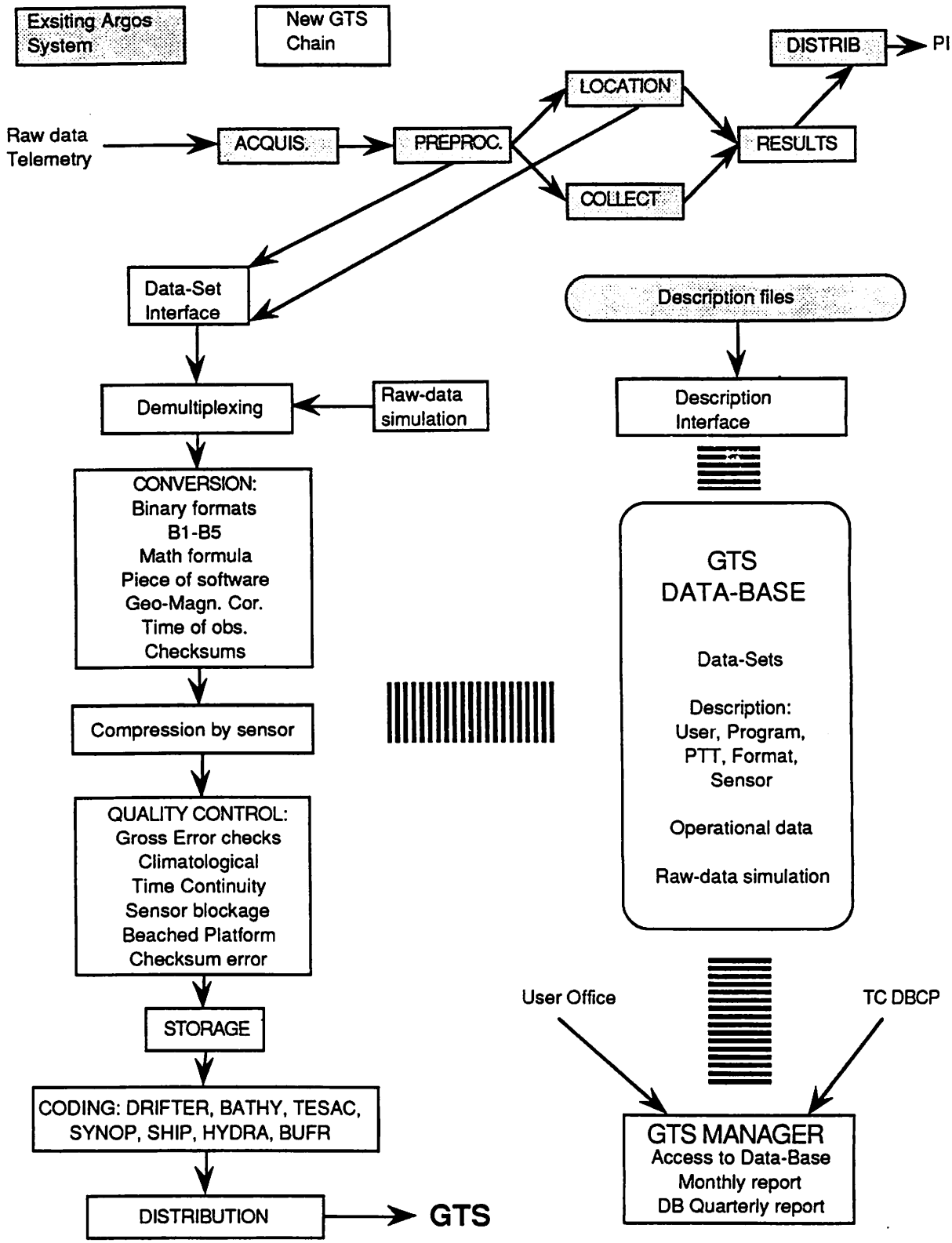
Attachment 1



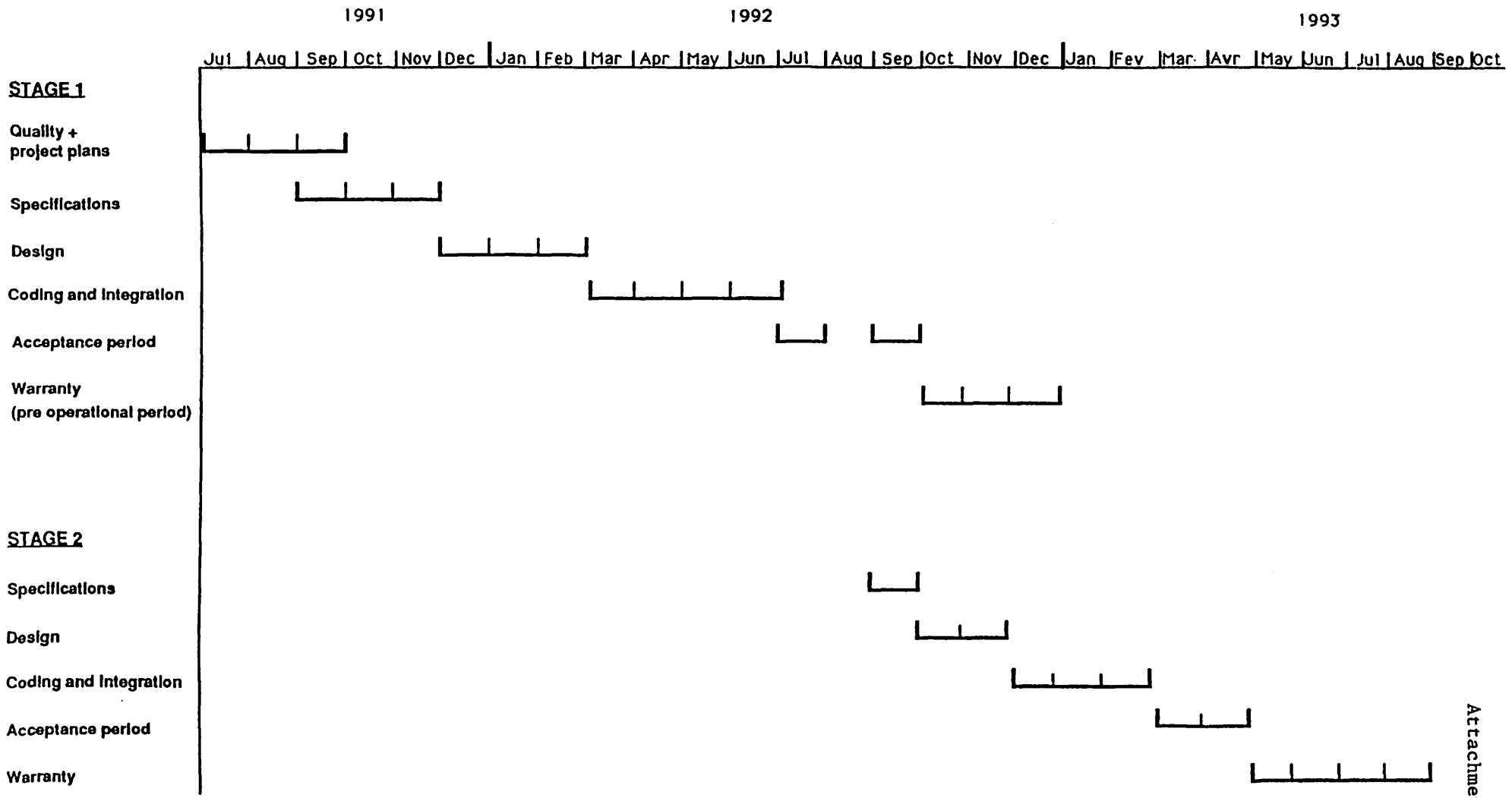
Attachment 1, p. 2



The new Argos GTS processing chain, Stage 3



DEVELOPMENT PLAN



ANNEX VII

ESTIMATES OF EXPENDITURES FOR 1993-1994
(in US$)

IOC salary	89,700
Installation grant	10,500
Travel Technical Co-ordinator	15,000
CLS	15,000
WMO costs	300
Sundries	5,000
T O T A L	**135,500**

[Basis: official UN rate in July 1992; $1 = FF5.18]

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ANNEX VIII

DRAFT TABLES OF CONTRIBUTIONS FOR 1993-1994
(in US$)

	1992-1993	1993-1994
Australia	11,000	12,500
Canada	16,500	18,000
France	11,513 (FF63,000)	~15,000 (FF75,000)
Greece	2,200	2,200
Iceland	2,100	2,100
Ireland	499 (IR£ 315)	500
Netherlands	1,575	1,575
Norway	1,575	1,575
United Kingdom	11,000	15,000
USA	55,000	68,000
T O T A L	**112,962**	**136,450**

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ANNEX IX

THE WOCE-TOGA SURFACE VELOCITY PROGRAMME (SVP)

I OVERVIEW

The Surface Velocity Program (SVP) is jointly-sponsored by the World Ocean Circulation Experiment (WOCE), the Tropical Ocean Global Atmosphere Experiment (TOGA), and the Atlantic Climate Change Program (ACCP). It also receives support from many other international agencies. The Program is deploying satellite-tracked surface drifters to obtain a Lagrangian measure of current in the ocean mixed layer as well as Sea Surface Temperature (SST), salinity, and atmospheric pressure. Summaries of SVP activities can be found in the reports of the 6th and 7th Sessions of the Drifting Buoy Cooperation Panel. This progress report focuses on the technical activities undertaken by SVP during 1991 and 1992.

SVP operations are organized into a Global Drifter Center (GDC) at Scripps Institution of Oceanography, San Diego, California, a Drifter Data Center (DDC) at NOAA's Atlantic Oceanographic and Meteorological Laboratory in Miami, Florida and a data archival center at Marine Environmental Data Service (MEDS) in Ottawa, Canada. GDC activities consist primarily of drifter deployments, technical developments and distribution of technical assistance to SVP members and the oceanographic community at large. DDC is tasked with collecting and processing the data supplied through Service Argos and MEDS is tasked with storing the data and, ultimately, distributing it to the wider scientific community.

II DEPLOYMENTS

During the past year, SVP has begun to fulfill its mission to sample other ocean basins outside of the tropical Pacific, which is the site of the most comprehensive drifter measurements to date. Table 1 summarizes all drifter deployments performed by the GDC in the Pacific and Atlantic from January 91 to August 92.

Table 1. Drifters Deployed in 1991-1992

OCEAN BASIN	DEPLOYED	TO BE DEPLOYED BY END OF 1992
Equatorial Pacific	108	48
Mid-latitude Pacific	181	85
North Atlantic (general)	48	72
North Atlantic (SUBDUCTION area)	33	36

Figures 1 and 2 show the deployment locations of the instruments deployed during this time period for the Pacific and Atlantic Oceans, respectively. The majority of drifter deployments are accomplished using one of the following methods:

- From ships within the Voluntary Observing Ship (VOS) network.
- From oceanographic research vessels.
- From aircraft operated by U.S. Navy Oceanographic Command (NAVOCEANCOM).

GDC oversees the distribution of drifters to volunteer and research ships. In the case of the VOS network, various offices of the National Oceanic and Atmospheric Administration (NOAA) maintain the network and actually great the ships. The Center is attempting to achieve uniform coverage of ocean basins according to the original SVP guidelines. It is also helping to oversee deployments in specific areas funded by other research programs, such as the deployments funded by the U.S. Office of Naval Research (ONR) in the northeast Atlantic Ocean. These deployments are part of an upper ocean study called the SUBDUCTION Experiment.

III TECHNICAL DEVELOPMENTS

Overall Survivability

Since late 1990, drifters designed with the principles described in the "WOCE-TOGA Lagrangian Drifter Construction Manual" have been released by the GDC in the Pacific. Data on their survivability over the past 450 days is now available. Figure 3 shows the survivability data for drifters deployed by the Tropical Instability Wave Experiment (TIWE) in 1990 in the tropical Pacific, Figure 4 shows a composite of survivability data for WOCE-quality drifters constructed by the Clearwater Consultants company, and Figure 5 shows survivability data for drifters constructed by Technocean Associates and deployed in the northeast Atlantic by the SUBDUCTION Experiment. Each of the plots presents the number of instruments deployed and the number of instruments still transmitting and the number of instruments with good drogues as a function of days since deployment. They also show the fraction of drifters still transmitting with good drogues. These results illustrate that drifter survivability has attained a half life on the order of 360 days for the WOCE-quality instruments, which is up from about 220 days, or less, from the results obtained with drifters in the early stages of the TOGA Experiment.

Salinity Measurements

Following GDC's at-sea tests in June 1991, drifters fitted with SEACAT salinity sensors are now being manufactured by Clearwater Consultants. Twenty-eight of the 48 drifters scheduled to be deployed in the equatorial Pacific by December 1992 will be equipped with salinity sensors. The first 8 of these will be deployed in the TOGA COARE region in early November 1992 by the RV *Moana Wave*. The other 20 salinity-equipped drifters will be deployed on research cruises sponsored by the French Government and ORSTOM, Noumea.

Air Pressure Measurements

GDC has designed an air pressure port for the WOCE/TOGA Lagrangian drifter and has been adapting two barometers (AIR and SENSYM) on 25 prototype drifters. By the end of August, 6 units were deployed. All 6 drifters have been operating correctly for over 2 weeks. Another 16 units are fully assembled. Table 2 shows the status of the prototype pressure drifters.

Table 2. SVP Prototype Pressure Drifter Status, October 1992

Number	User	Status
3	Scripps (USA)	Deployed 18 August, 1992 off California
3	France	Deployed by French in Golfe de Gascogne
3	Canada	At NDBC for calibration
5	UK	En route from Scripps (not calibrated)
3	Australia	En route from Scripps (not calibrated)
5	Scripps (USA)	En route to NDBC for calibration
3	Scripps (USA)	Under construction
25		

The trajectories followed by three of the prototype pressure drifters deployed off California are shown in Figure 6. Air pressure data during the same time period is shown in Figure 7 for instrument number 1365. The pressure measurements are stable. The two sensors have an offset of about 4 mb, which remains constant over the 40 days of available data.

Air Deployments

The development of air deployment capability has proceeded with the cooperation of the US Naval Oceanographic Office. These air-deployed drifters show no degradation of survivability over those deployed from ships. To date, 22 drifters have been deployed and 21 have had normal operating lifetimes. The technique used for air-deployment is to place the drifter into a water-soluble cardboard box and strap it to a pallet, which is covered with a 3/8" thick plywood sheet. An inexpensive 12-foot-diameter marker chute is attached to the box with nylon tubing. The box dissolves rapidly upon deployment and the drifter slides into the water. Several times, deployment airplanes have circled the drifter, finding the box riding with 1/4 freeboard out of the water with the chute over to one side.

Air deployment of SVP drifters is now a possibility. This development is important because there are many hard-to-reach ocean areas that can now be seeded from aircraft, particularly parts of the Southern Ocean.

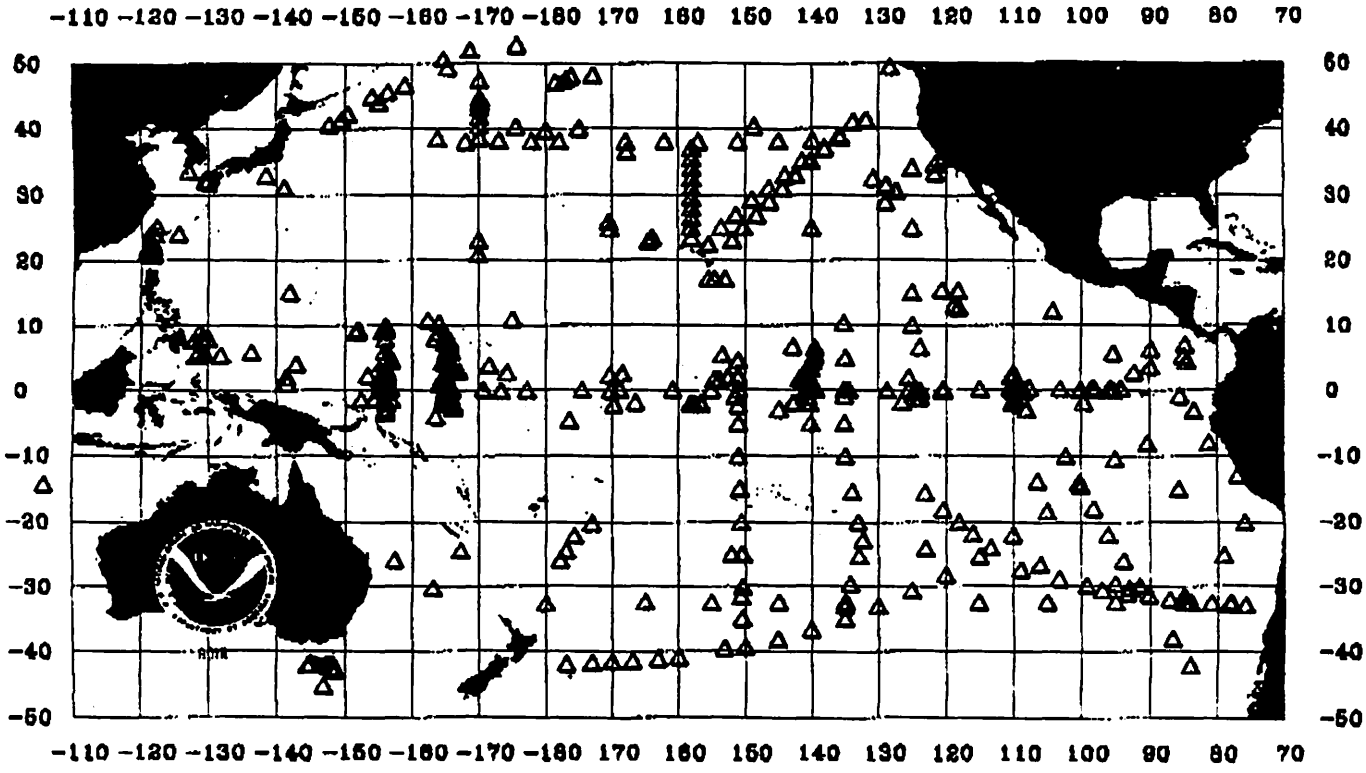


Figure 1. Locations of drifter deployments in the Pacific Ocean between January, 1991 and August, 1992.

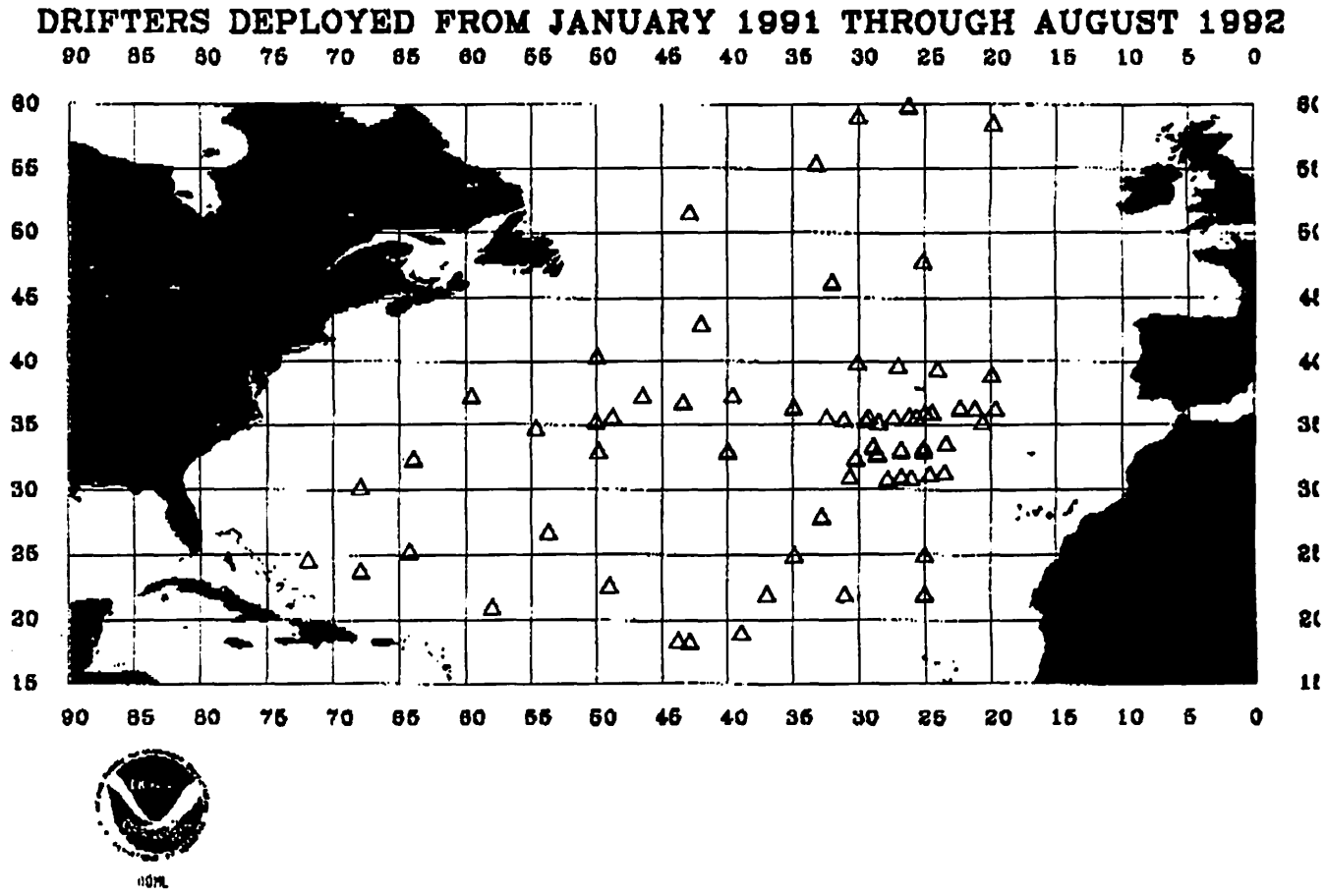


Figure 2. Locations of drifter deployments in the Atlantic Ocean between January, 1991 and August, 1992.

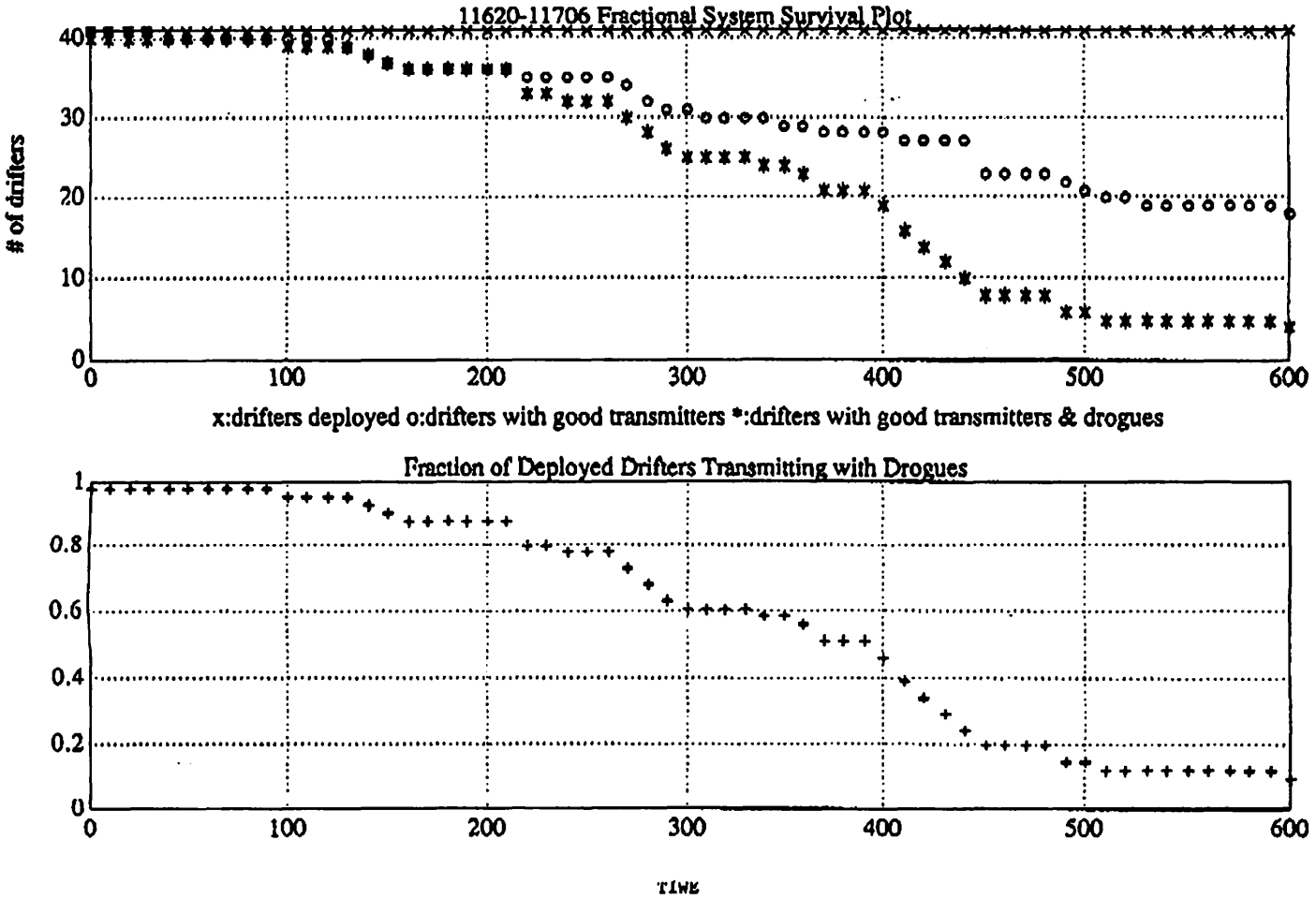


Figure 3. Survival data for drifters deployed in the tropical Pacific Ocean as part of the Tropical Instability Wave Experiment (TIWE). The number of drifters in the water (X), the number of drifters still transmitting (O), and the number of drifters still transmitting with functioning drogues (*) are all shown as a function of days since deployment (upper panel). The ratio of the number of drifters still transmitting with functioning drogues to the number of drifters in the water (+) is also shown (lower panel). This trace can be used to estimate the half-life of the instruments, which for these instruments is about 360 days.

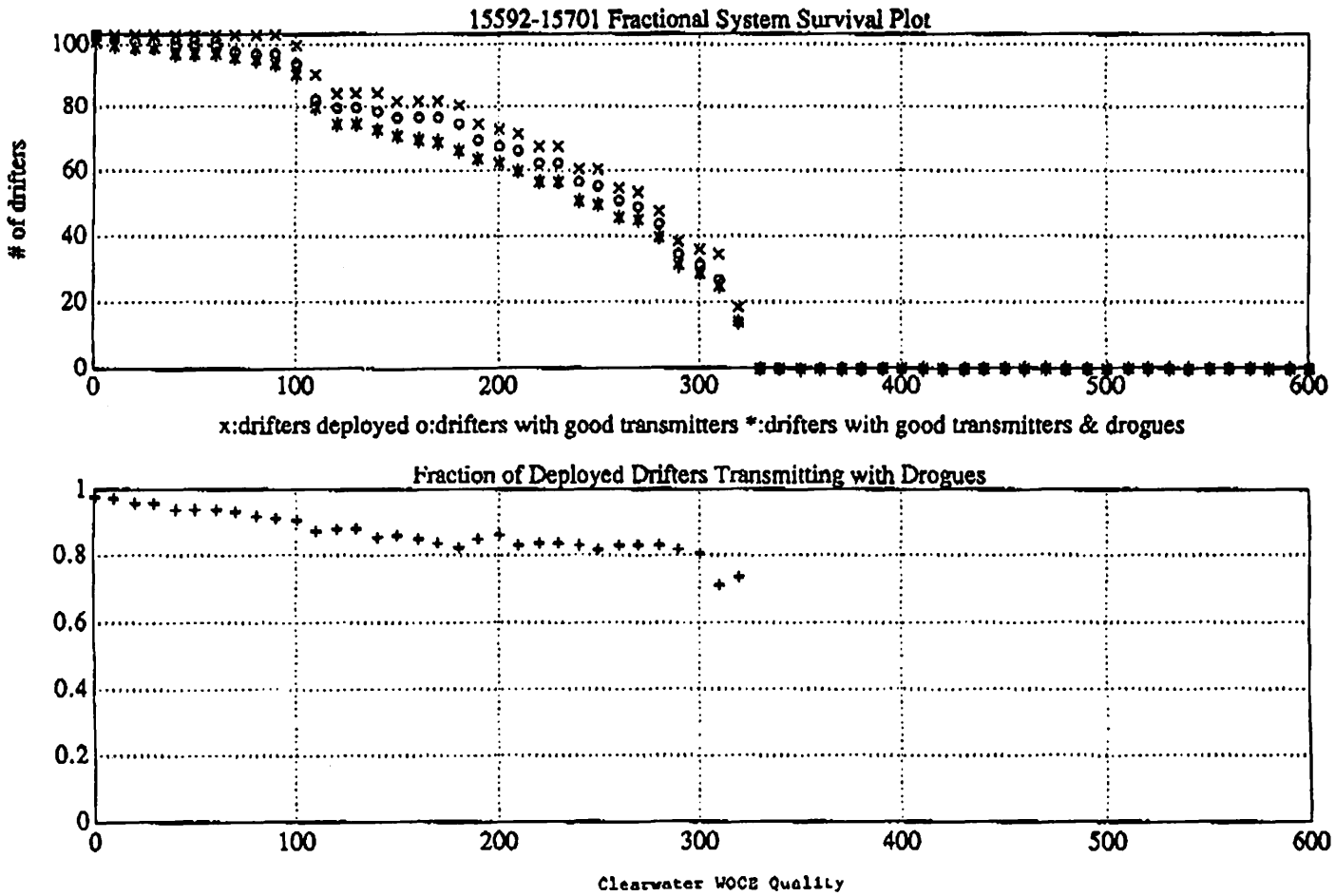


Figure 4. Same as figure 3 except for a composite of drifters manufactured by Clearwater Consultants. The half life of these instruments has not been reached yet after 300 days.

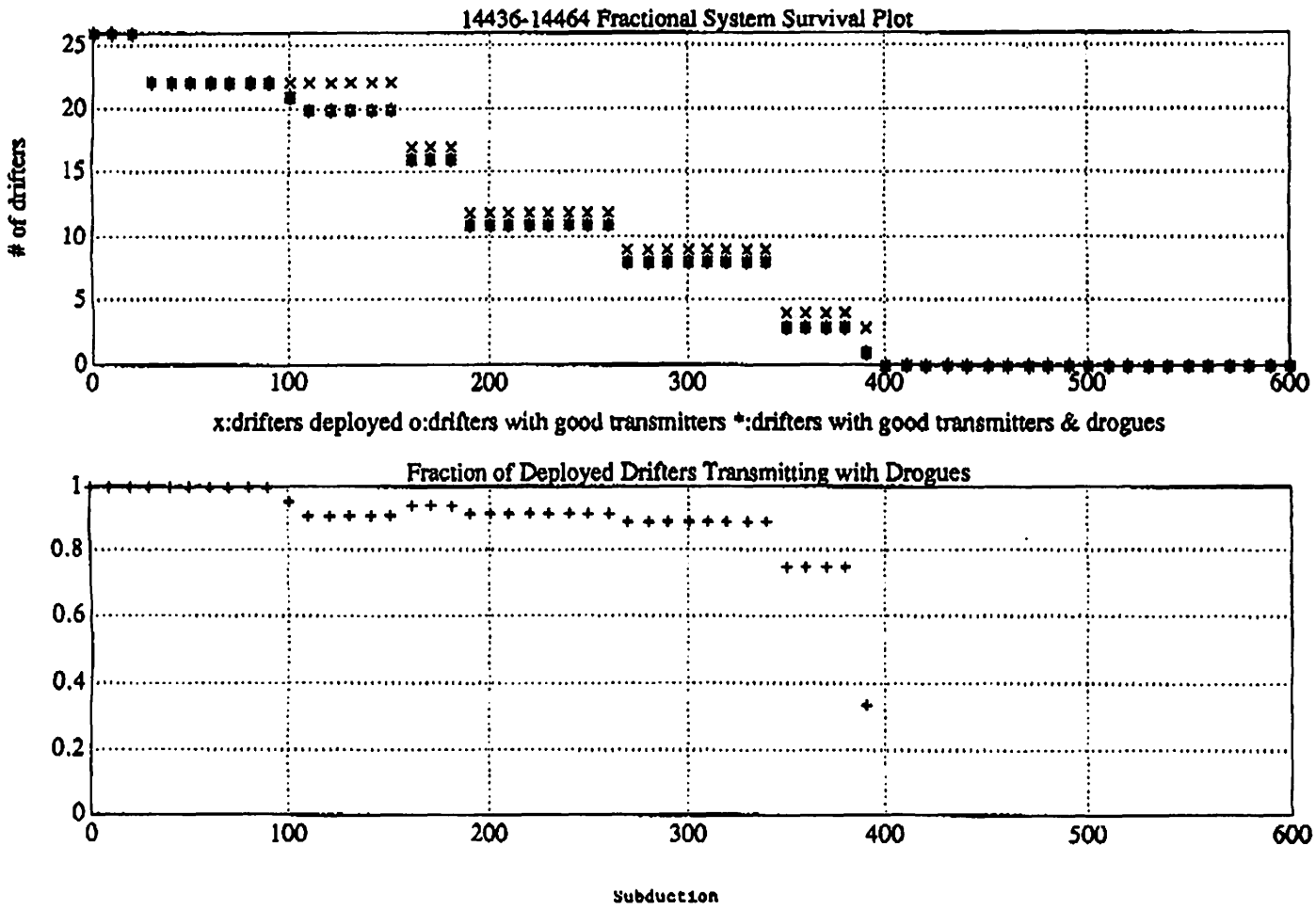


Figure 5. Same as figure 3 except for drifters deployed in the northeast Atlantic as part of the SUBDUCTION Experiment. These instrument were manufactured by Technocean Associates and have a half life over 360 days.

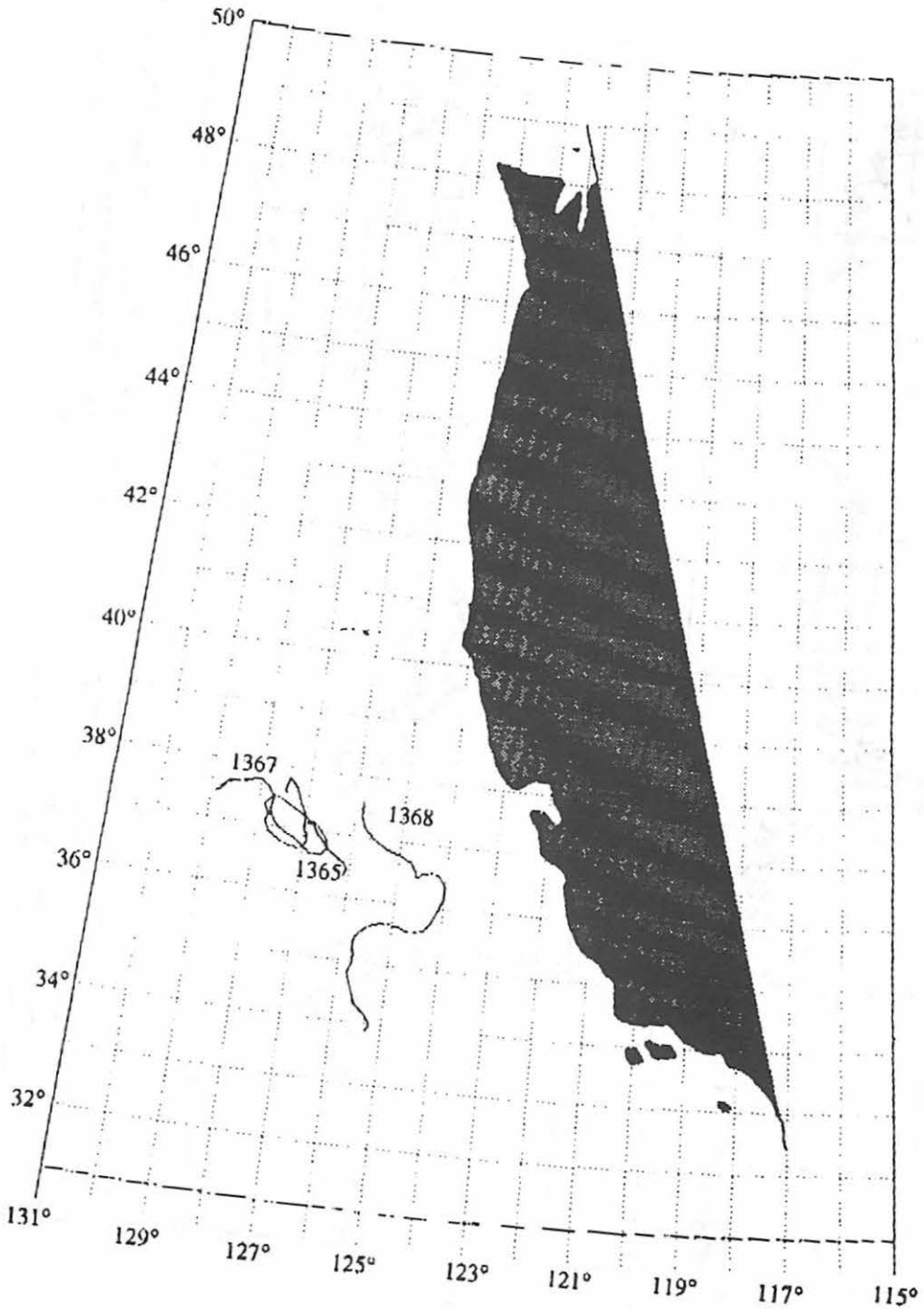


Figure 6. Trajectories of three SVP pressure drifters off the west coast of the United States between 18 August and 27 September, 1992.

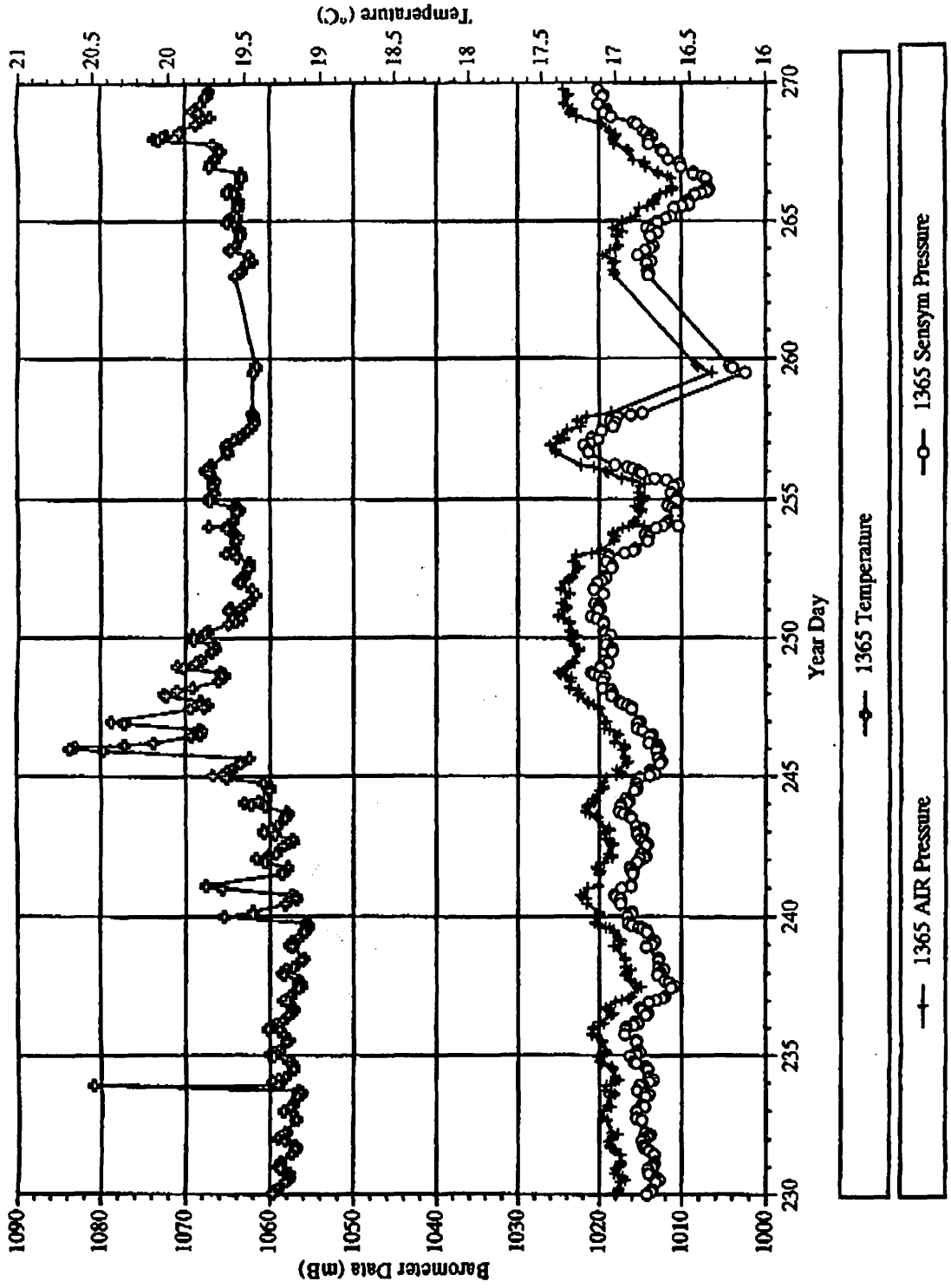


Figure 7. Sensor data from SVP pressure drifter number 1365. Sea surface temperature is shown together with atmospheric pressure from each of two pressure sensors onboard the drifter, one manufactured by AIR and the other manufactured by Sensym. There is 4 mb offset between the two pressure sensors, which remains constant over the 40 days shown.

ANNEX X

REPORT BY THE IGOSS SPECIALIZED OCEANOGRAPHIC CENTRE (SOC) FOR DRIFTING BUOYS 1991-1992

A daily collection and archiving of buoy reports from the world ocean is performed by the French Meteorological service.

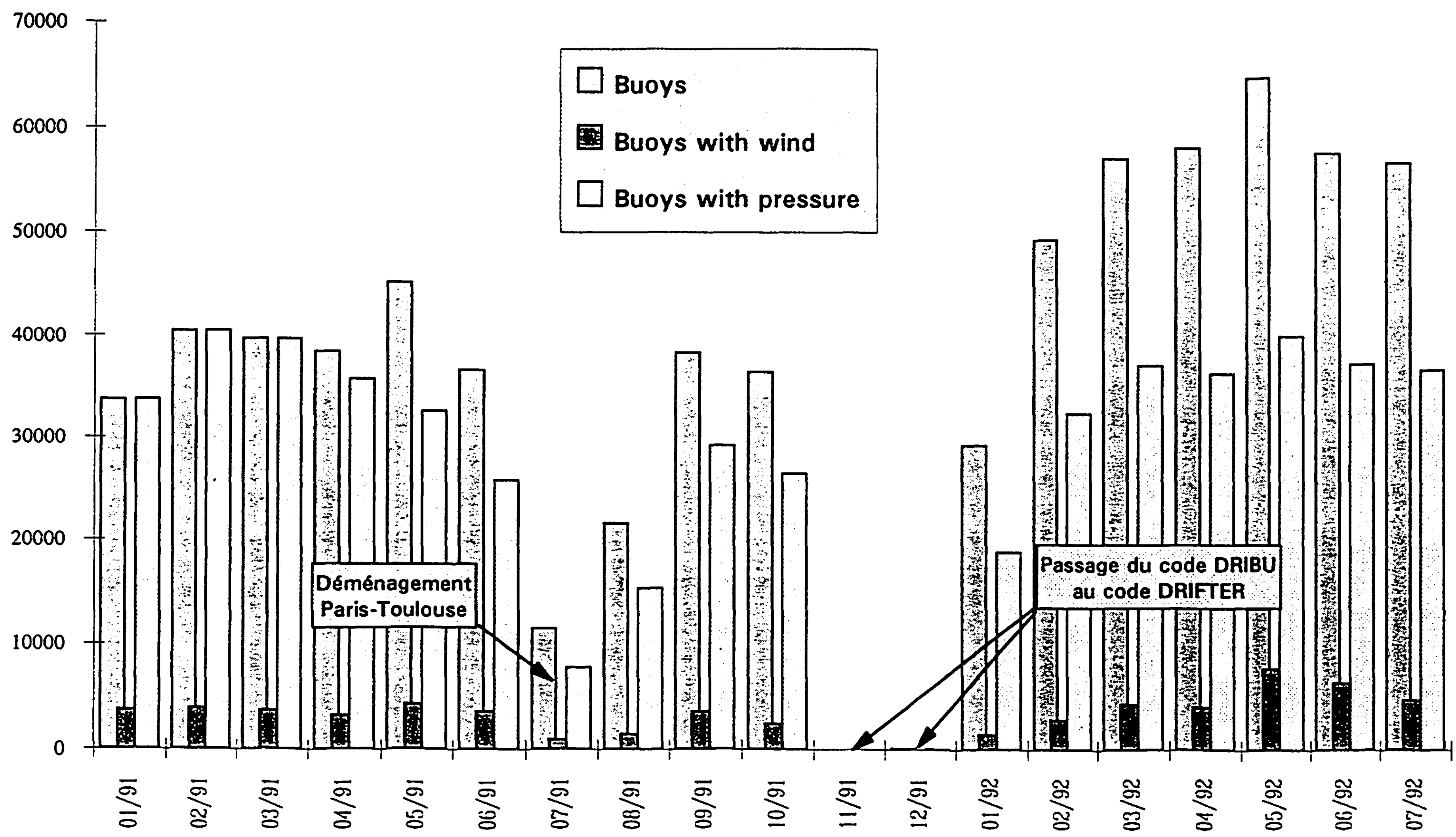
As shown on Figure 1 we noticed two problems since January 1991 :

- one is due to the computer moving in July 1991
- the other one is due to the change of the code DRIBU/DRIFTER. This problem was solved by the end of last year.

After the SOC has moved to TOULOUSE, a microcomputer was used in order to produce quality control and graphic reports. It was then possible to produce monthly graphic products for buoys, drifting buoys, moored buoys and ships statistics. Figures 1, 2, 3, 4 show the time evolution of reports for wind (direction and speed) and for pressure respectively for all buoys, moored buoys, drifting buoys and ships since the 1st of january 1991.

It was also possible to carry out new quality control testing: For last June, Figure 5 shows monthly plot charts end each month to 70 correspondants. This product was obtained without any quality control. Figure 6 shows the same product obtained by linking each consecutive reports, which led to observe some anomalies. So we decided to list all anomalies, to throw out all false position reports and we obtained Figure 7 which represents only good position DRIFTER reports. In fact 1307 reports was thrown out.In tables I, II, III, IV are underlined some examples of bad successive reports. Mr LUDJET IGOSS-OTA responsible spent four days to do this last study.

The SOC has increased its activities and more products are available now. We will get an omnet mail box soon (MFPM), so it will be easier to exchange information.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30000
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Buoys
Buoys with wind
Buoys with pressure
Déménagement
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03/91
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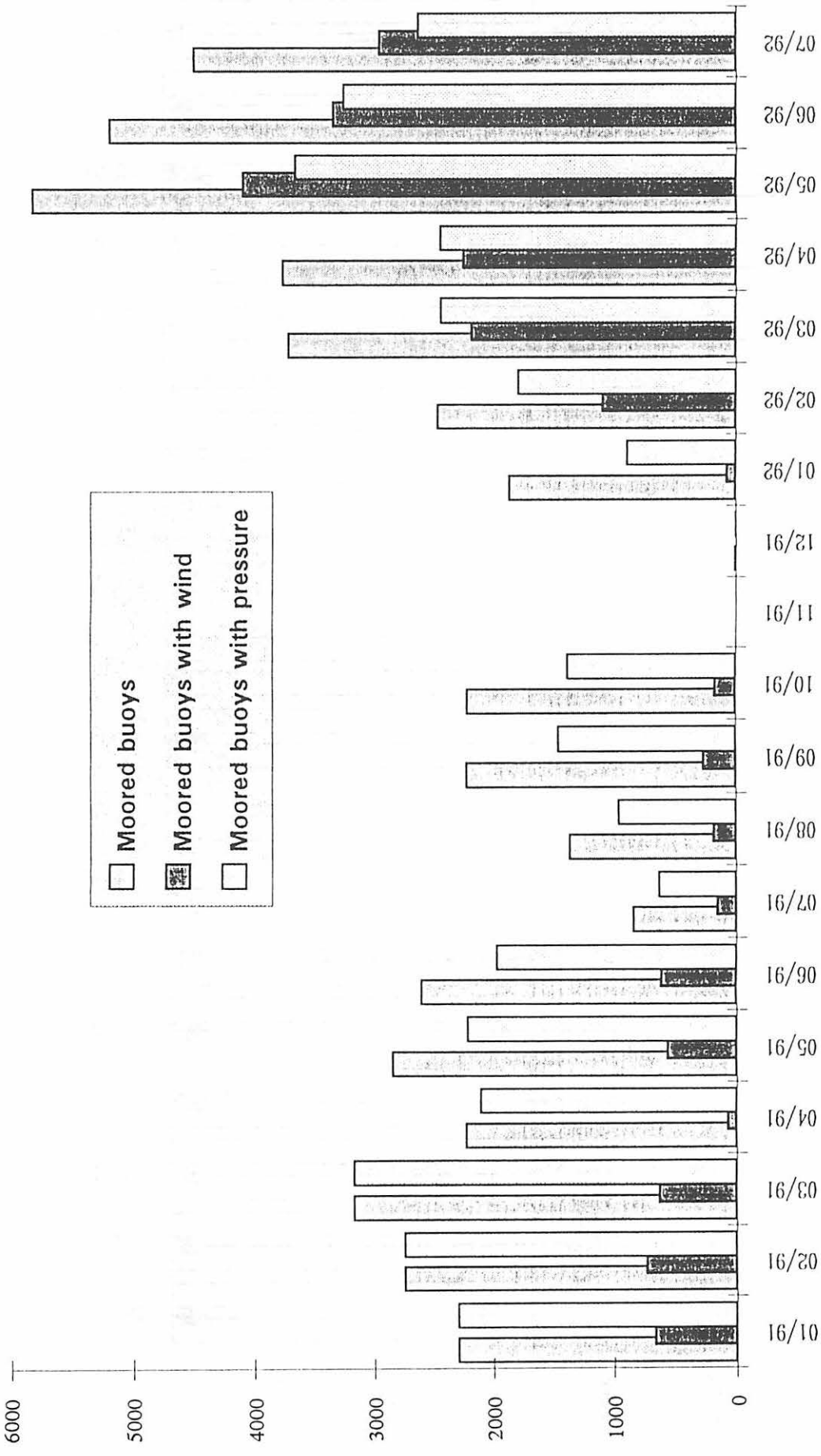
Figure 1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Moored buoys with wind
Moored buoys with pressure
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4000
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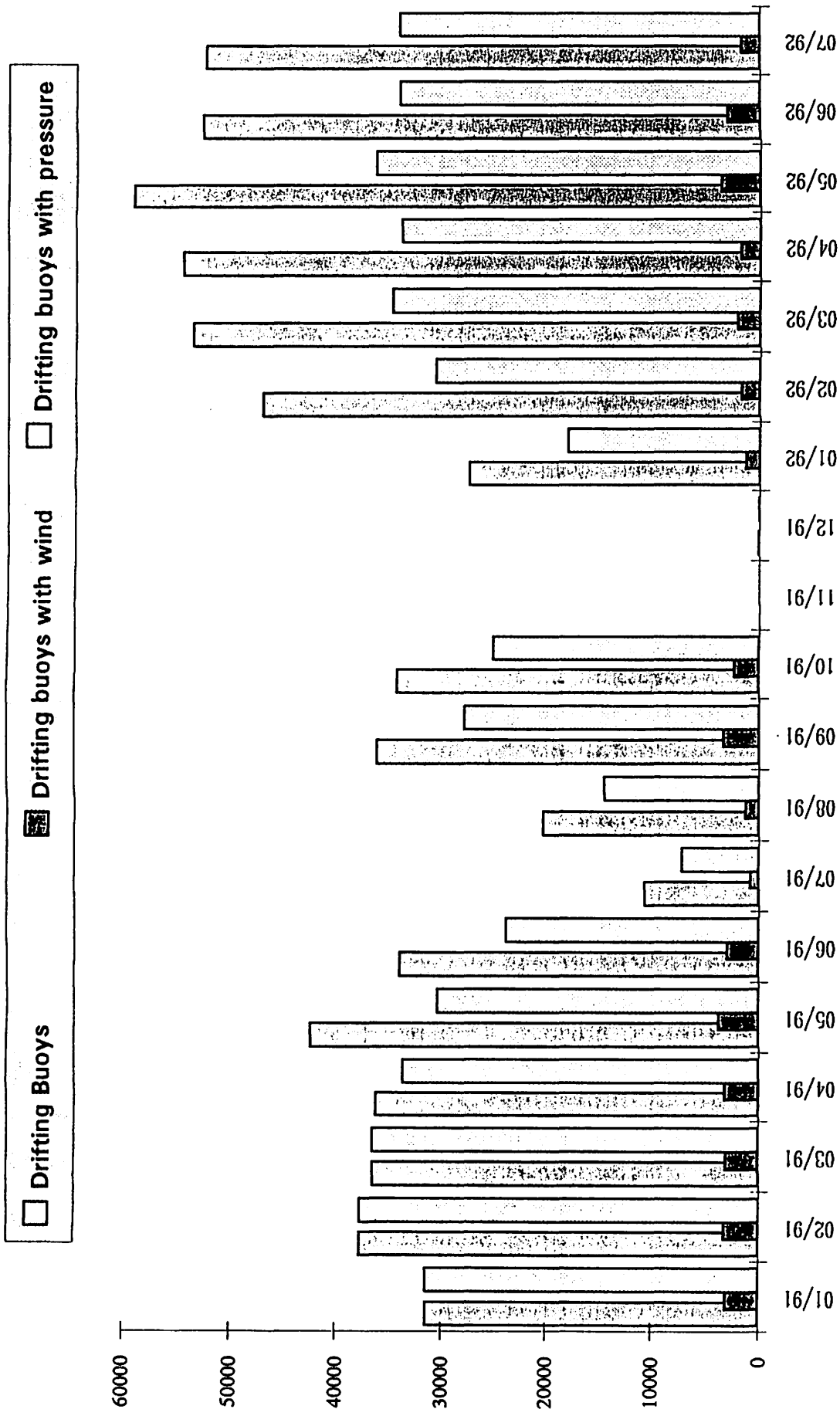
07/92

Figure 2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Drifting buoys with wind
Drifting buoys with pressure
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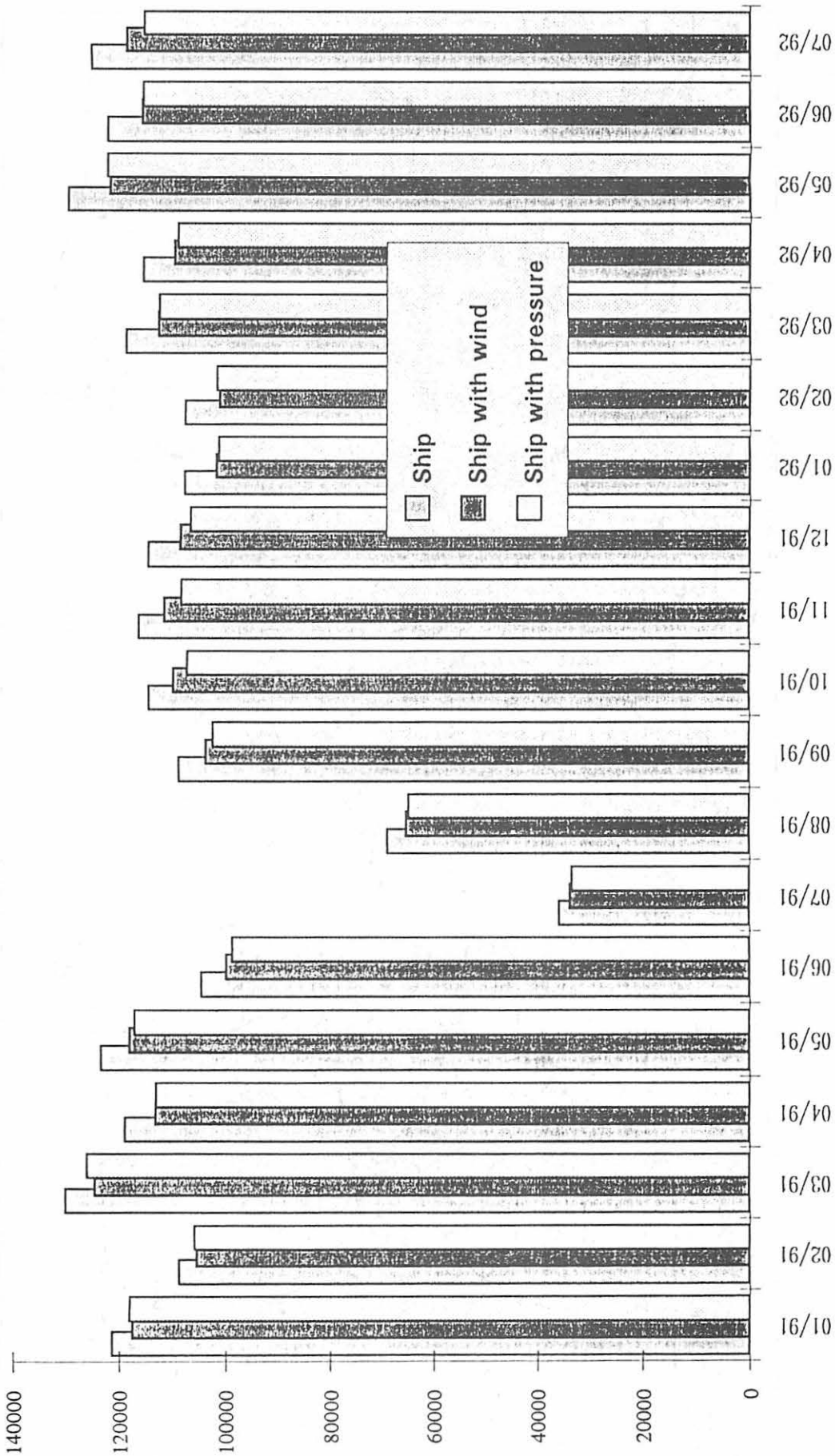
Figure 3


Ship
Ship with wind
Ship with pressure
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80000
60000
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05/91
06/91
07/91
08/91
09/91
10/91
11/91
12/91
01/92
02/92
03/92
04/92
05/92
06/92
07/92

Figure 4

Mapping position plot chart of data received during June 1992

Messages : DRIFTER

Total : 52584

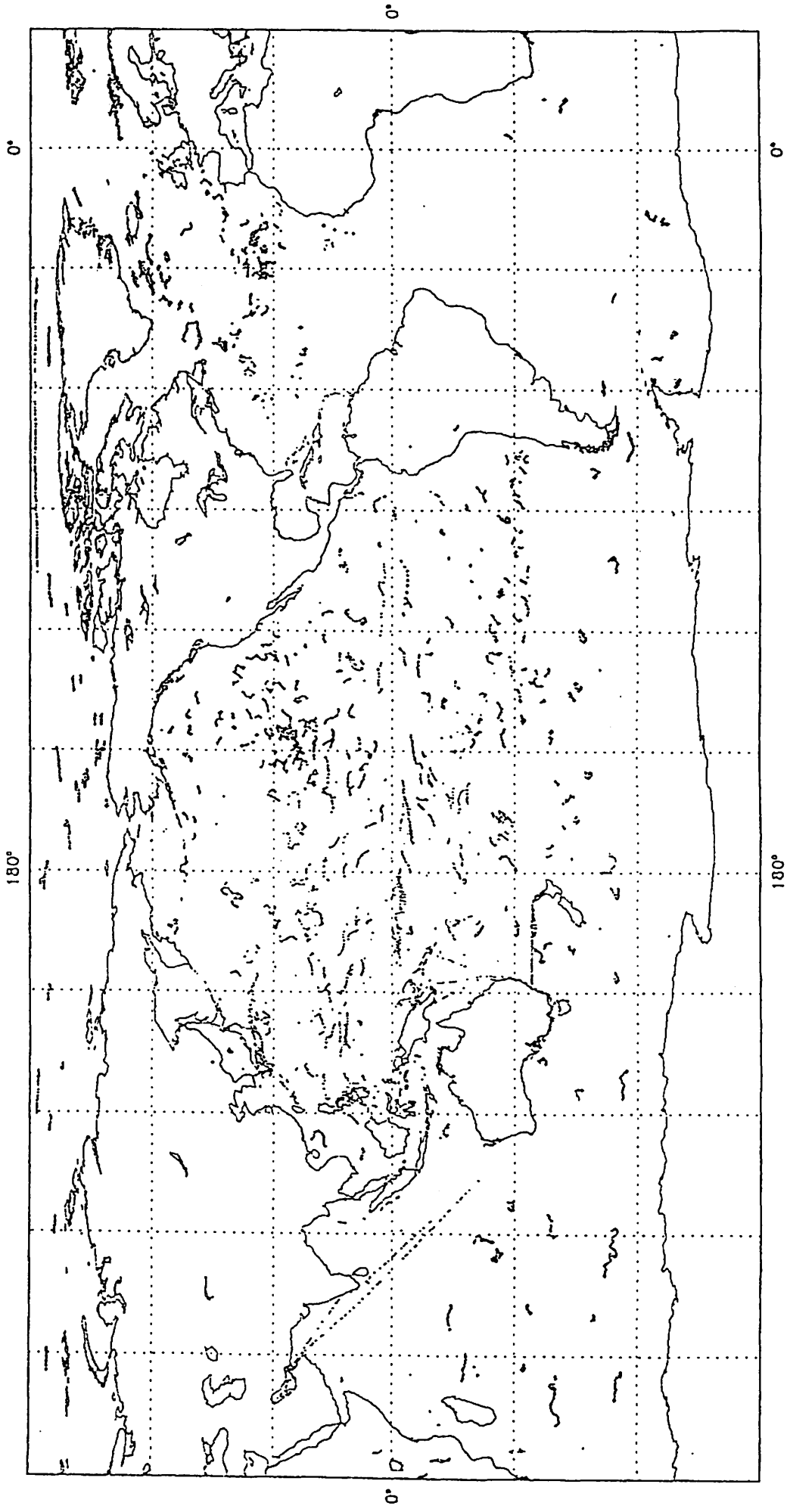


Figure 5

Mapping position plot chart of data received during June 1992

Messages : DRIFTER

Total : 52584

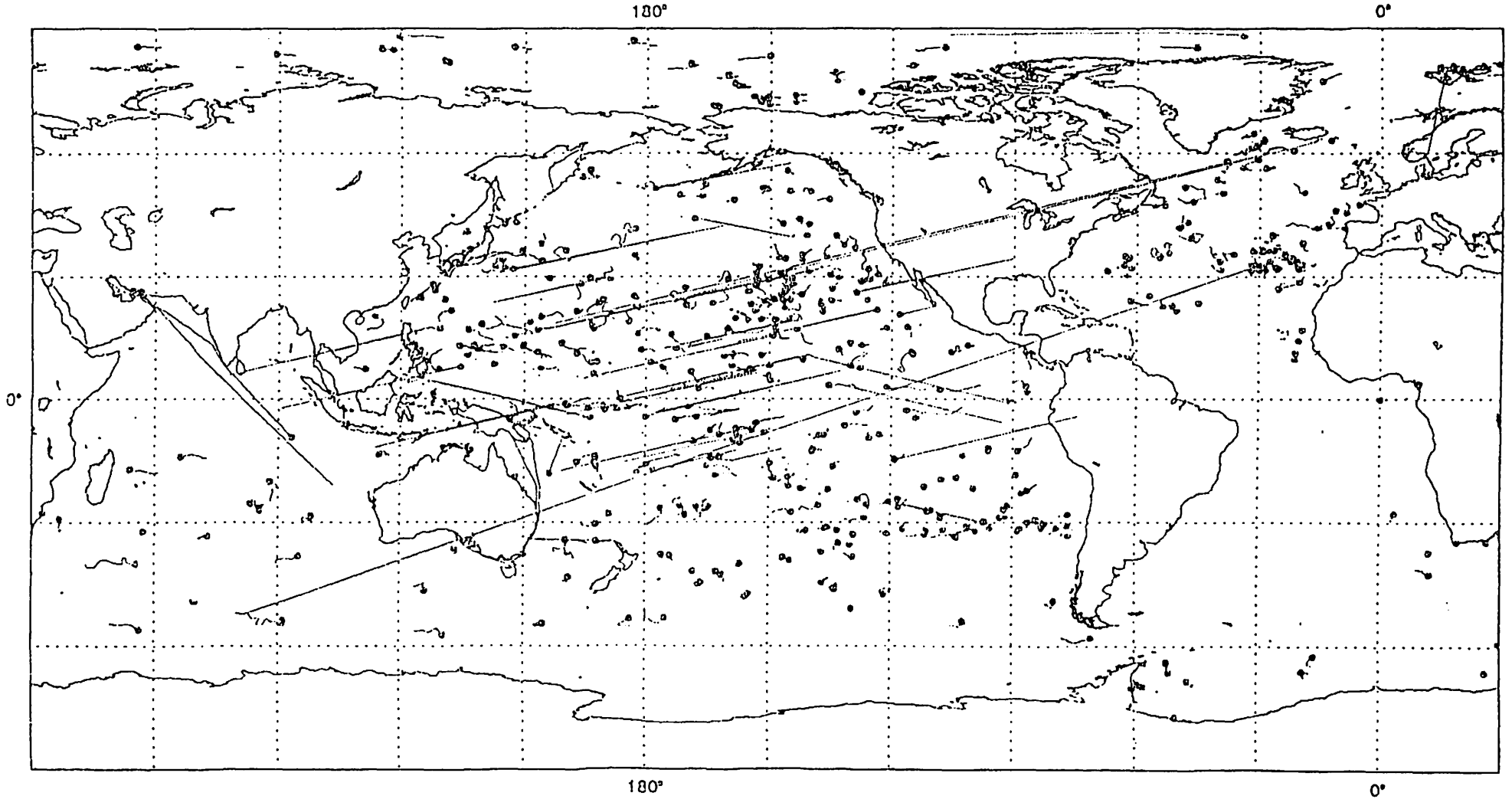


Figure 6

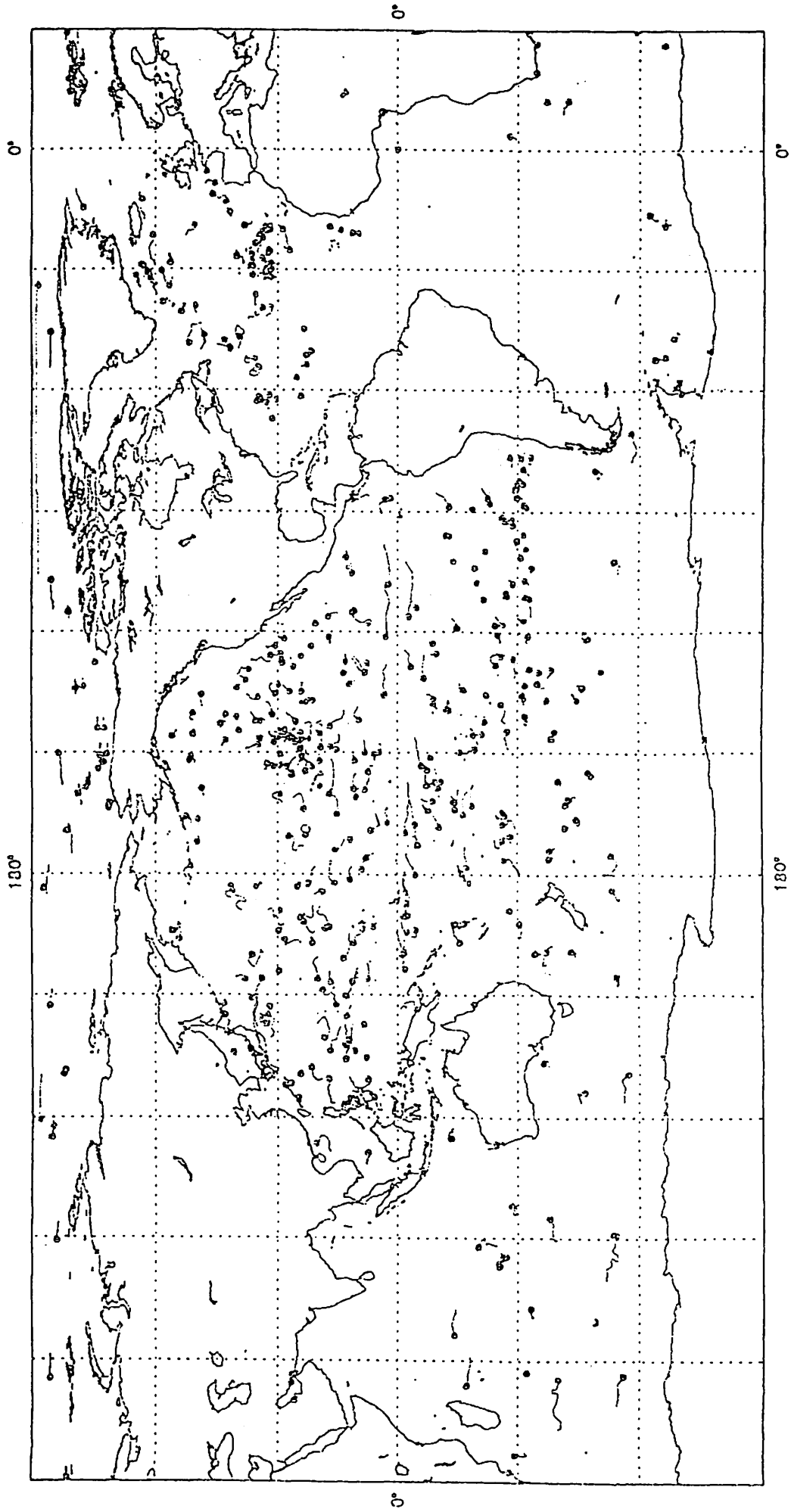

Mapping position plot chart of data received during June 1992
Messages : DRIFTER
Total : 51278
0°
180°

Figure 7

Exemples de positions incohérentes

Date-Heure	Latitude	Longitude	Indicatif	Vitesse en Kts
199206111116	31.35	142.55	21530	
199206111922	31.35	142.55	21530	
199206112339	31.35	142.55	21530	
199206120318	42.38	198.40	21530	742.78
199206120453	42.38	198.40	21530	
199206120919	30.97	143.58	21530	603.88
199206121055	30.98	143.73	21530	
199206121731	31.02	143.98	21530	
199206121903	31.02	143.98	21530	
199206202210	29.95	169.82	21902	
199206210311	29.95	169.82	21902	
199206230429	23.65	142.42	21902	
199206230703	29.77	170.45	21902	600.91
199206260559	29.77	170.67	21902	
199206260921	29.77	170.68	21902	
199206261756	29.70	170.70	21902	
199206201424	-17.23	183.13	32525	
199206201559	-17.23	183.13	32525	
199206201903	-17.20	183.08	32525	
199206230235	-12.70	201.93	32525	
199206230652	-17.20	182.42	32525	271.30
199206260721	-17.18	182.07	32525	
199206261833	-17.18	181.93	32525	
199206290801	-17.10	181.58	32525	
199206271114	-14.68	241.28	32533	
199206271454	-14.68	241.30	32533	
199206271630	-14.68	241.30	32533	
199206292145	-4.47	285.78	32533	50.64
199206300105	-4.47	285.78	32533	
199206300241	-14.88	241.03	32533	1696.02
199206300422	-14.88	241.03	32533	
199206301041	-14.87	241.00	32533	
199206260416	26.45	231.90	46550	
199206261247	26.45	231.90	46550	
199206261820	26.48	231.82	46550	
199206282205	34.38	269.48	46550	
199206282353	34.38	269.48	46550	
199206290455	26.28	231.45	46550	400.54
199206291400	26.27	231.38	46550	
199206291721	26.27	231.37	46550	

Table I

Exemples de recalages de positions

Date-Heure	Latitude	Longitude	Indicatif	Vitesse en Kts
199206141159	32.90	136.90	22602	
199206151001	32.90	136.90	22602	
199206151137	33.37	138.47	22602	52.36
199206160754	33.37	138.47	22602	
199206251559	27.40	335.10	13905	
199206272044	28.18	339.37	13905	
199206272230	28.18	339.37	13905	
199206280544	27.22	335.02	13905	32.92
199206281054	27.25	334.97	13905	
199206120807	42.32	341.62	13912	
199206121127	42.23	341.73	13912	
199206121516	42.15	341.80	13912	
199206121656	41.90	342.28	13912	15.68
199206121750	41.90	342.28	13912	
199206121929	41.78	342.72	13912	12.69
199206122108	41.65	342.90	13912	
199206150313	41.98	349.12	13912	
199206150703	42.03	349.75	13912	
199206150844	42.03	349.75	13912	
199206151023	42.12	350.30	13912	15.20
199206151300	42.12	350.30	13912	
199206151439	42.18	351.10	13912	21.68
199206151621	42.18	351.10	13912	
199206180552	42.23	351.27	13912	
199206081137	7.32	243.08	32528	
199206101112	7.60	242.98	32528	
199206101403	7.60	242.98	32528	
199206111101	7.60	242.98	32528	
199206111237	8.28	242.52	32528	30.69
199206121050	8.67	242.47	32528	
199206121228	8.68	242.45	32528	
199206131212	8.97	242.33	32528	
199206141020	9.35	242.28	32528	
199206061952	35.23	304.38	41903	
199206062322	35.18	304.42	41903	
199206070058	35.18	304.42	41903	
199206090603	35.18	304.42	41903	
199206090752	34.70	305.57	41903	34.94
199206091048	34.70	305.57	41903	
199206091239	34.70	305.57	41903	
199206091912	34.70	305.85	41903	
199206092035	34.70	305.85	41903	

Exemples de positions alternées

Date-Heure	Latitude	Longitude	Indicatif	Vitesse en Kts
199206270914	69.45	9.27	44761	
199206271028	69.47	9.22	44761	
199206271200	69.40	9.79	44761	
199206271206	69.49	9.18	44761	139.39
199206271221	69.40	9.79	44761	55.76
199206271236	69.50	9.17	44761	57.48
199206271535	69.54	9.14	44761	
199206271715	69.53	9.04	44761	
199206211941	35.54	321.08	44764	
199206212124	35.55	321.07	44764	
199206212258	35.57	321.07	44764	
199206220905	34.00	322.00	44764	
199206221114	35.65	321.12	44764	50.27
199206221634	34.00	322.00	44764	
199206222056	35.72	321.13	44764	
199206222236	35.73	321.15	44764	
199206230442	34.00	322.00	44764	
199206230623	35.80	321.21	44764	68.19
199206231021	35.76	321.32	44764	
199206231049	34.00	322.00	44764	237.38
199206231238	35.73	321.28	44764	60.38
199206231622	35.76	321.32	44764	
199206231807	35.77	321.28	44764	
199206182222	31.93	327.89	62805	
199206190711	31.95	327.83	62805	
199206190906	31.95	327.85	62805	
199206192011	32.43	328.24	62805	
199206192023	*31.94*	*327.83*	62805	180.13
199206192201	32.43	328.24	62805	
199206200517	32.07	327.59	62805	
199206200530	*31.94*	*327.83*	62805	66.88
199206200836	*31.94*	*327.83*	62805	
199206200952	32.13	327.84	62805	
199206201015	32.10	327.92	62805	
199206012146	67.69	10.38	65591	
199206020213	67.70	10.28	65591	
199206020352	*67.80*	*9.77*	65591	
199206020358	67.70	10.28	65591	130.48
199206020449	67.70	10.28	65591	
199206020541	67.71	10.27	65591	
199206020600	*67.79*	*9.76*	65591	
199206020600	67.71	10.27	65591	*******
199206020634	*67.79*	*9.76*	65591	
199206020720	*67.79*	*9.76*	65591	
199206020854	67.80	10.26	65591	

Exemples de bouées "hors-bord"

Date-Heure	Latitude	Longitude	Indicatif	Vitesse en Kts
199206151126	60.20	11.08	63562	
199206151634	60.20	11.08	63562	
199206152318	60.20	11.08	63562	
199206160059	60.20	11.08	63562	
199206160244	60.20	11.08	63562	
199206161112	78.25	15.50	63562	128.31
199206161313	78.25	15.50	63562	
199206161624	78.25	15.50	63562	
199206161807	85.00	119.03	63562	482.05
199206162003	85.00	119.03	63562	
199206162306	85.00	118.95	63562	
199206162323	85.02	118.75	63562	
199206170046	85.02	118.75	63562	
199206170600	85.02	118.75	63562	
199206151444	60.20	11.08	63563	
199206151653	60.20	11.08	63563	
199206151814	60.20	11.08	63563	
199206152137	60.20	11.08	63563	
199206152317	60.20	11.08	63563	
199206152341	60.20	11.08	63563	
199206160609	78.25	15.50	63563	167.99
199206161259	78.25	15.50	63563	
199206161442	82.02	130.47	63563	585.03
199206161624	82.00	130.58	63563	
199206161805	82.00	130.67	63563	
199206162002	82.00	130.75	63563	
199206162306	81.98	130.90	63563	
199206162322	82.00	130.88	63563	

ANNEX XI

REPORT BY THE IODE RESPONSIBLE NATIONAL OCEANOGRAPHIC DATA CENTRE (RNODC) FOR DRIFTING BUOYS 1991-1992

Introduction

The Marine Environmental Data Service (MEDS) in Canada became a Responsible National Oceanographic Data Centre (RNODC) for Drifting Buoy Data on behalf of the Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO) in January 1986. The purpose of this report is to describe the activities of the RNODC-MEDS in acquiring and making drifting buoy data available to the scientific community during the last twenty months (January 91 - August 92).

Data Flow

We show in the table which is displayed at the end of the report various statistics derived for this 20-month period. The first column of the table gives the month and year number, the second column provides the number of messages received by MEDS for this particular month-year. The next two columns provide the statistics on the buoys themselves; it shows first the number of buoys reporting on the GTS and for which MEDS is receiving the data while the second one gives the number of buoys according to Service ARGOS. The last column gives an estimate of the success by MEDS in acquiring the drifting buoy data. Figure 1 is an illustration of the same information as it displays on the left Y-axis the number of buoys for which MEDS receives the data (continuous line) while the right Y-axis illustrates the number of messages received each month (bar chart) by MEDS.

During this time period, MEDS received a total of 1,030,305 messages transmitted from drifting buoy platforms and sent through the GTS. The average number of messages per month (51,513) for the eight months being reported for 1992 has increased by 32.9 % from the 1991 average which shows that more and more drifting buoy data are being transmitted through the GTS.

The number of buoys reporting data through the GTS has also increased significantly during the first months of 1992. The average number of buoys reporting on the GTS (according to ARGOS statistics) has increased from 621 to 914, a 47.2 % increase. The percentage of data for which MEDS receives the data through the GTS has also increased as shown by Figure 2 of this report. The upward trend is very encouraging and shows that more and more Principal Investigators choose the GTS route for transmitting their data.

As part of the Data Management Plan for WOCE projects on Drifting Buoys, MEDS has also received from the Atlantic Oceanographic and Meteorological Laboratory (AOML) Drifting Buoy data for the 1985-1990 period. This data was processed and archived by MEDS and finally submitted to the Jet Propulsion Laboratory for inclusion in the latest CD-ROM presently being prepared for TOGA.

Following a recommendation made by the Data Management Committee on WOCE, MEDS has also recently received Drifting Buoy data from AOML for a 6-month period (July to December 1991). This latest submission is the first one being done under the auspices of the Data Management Committee. The tape is now being processed by MEDS and it contains the original ARGOS data, the P-file which is the edited buoy position file, the S-file which is the edited temperature file, the KRIG-file which is the 6-hour interpolated position being performed by AOML using their latest algorithm and one more administrative file relating buoy numbers together.

Historical Data Acquisition

From the FGGE program and since January 1986 when MEDS became the RNODC for Drifting Buoy data, the archive has grown constantly. It now contains a total of 5,281,662 messages from 3,841 different drifting buoys of which more than 85.4 % has passed MEDS critical quality control procedures. Figure 3 shows the geographical distribution by slice of 30 degrees of latitude the entire Drifting Buoy Data Base.

Services

MEDS issues an annual report summarizing the data received and processed during the previous year and showing the locations of the buoys. Every month, global maps are issued displaying the location for the buoys reporting over the GTS. In addition MEDS can also deliver data for a user specified area, time and range of buoys on computer magnetic tape in GF-3 format. If the volume of data requested is small enough, it can be obtained on computer diskette (5 1/4 or 3 1/2-inch). Displays of buoy tracks can be made for any ocean area and time frame.

MEDS has just completed the development and installation of a computer file containing information about the operators of the buoys as well as the program under which the buoy has been deployed. Other information, such as the program manager or organization and characteristics of the buoy are also kept if this information is available.

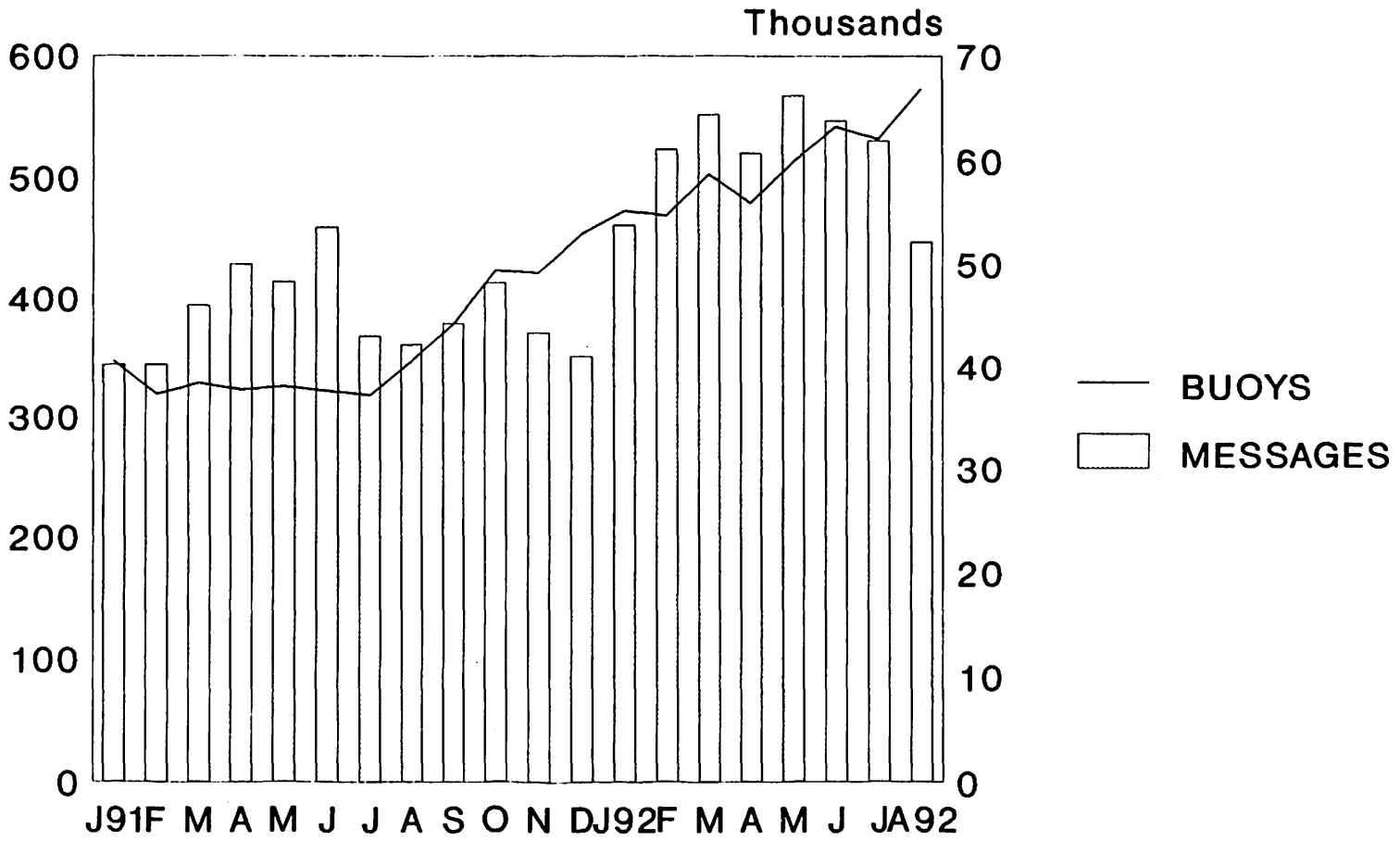
MEDS has developed an archiving mechanism for the Drifting Buoys Bulletin Board messages available each day on ScienceNet. For a particular buoy or set of buoys, all messages (if any) regarding its operational behaviour are available upon request on paper or computer diskette.

Table: Monthly statistics on number of buoys and number of messages received at MEDS from Jan 91 to Aug 92

Month/Year	# Messages received in MEDS	# Buoys reporting on GTS	# Buoys according to ARGOS	% received in MEDS
Jan 91	40106	347	612	56.7
Feb 91	45935	319	628	50.8
Mar 91	49950	328	615	53.3
Apr 91	48281	323	628	51.4
May 91	53556	326	637	51.2
Jun 91	42927	322	598	53.8
Jul 91	42093	318	634	50.2
Aug 91	44150	347	?	----
Sep 91	48127	378	745	50.7
Oct 91	43232	423	726	58.3
Nov 91	40923	421	791	53.2
Dec 91	47035	453	833	54.4
Jan 92	53787	473	848	55.8
Feb 92	61099	469	900	52.1
Mar 92	64377	503	893	56.3
Apr 92	60659	479	896	53.5
May 92	66232	513	904	56.7
Jun 92	63820	542	983	55.1
Jul 92	61904	532	925	57.5
Aug 92	52112	573	965	59.4

Drifting Buoys

of Buoys vs # of Messages

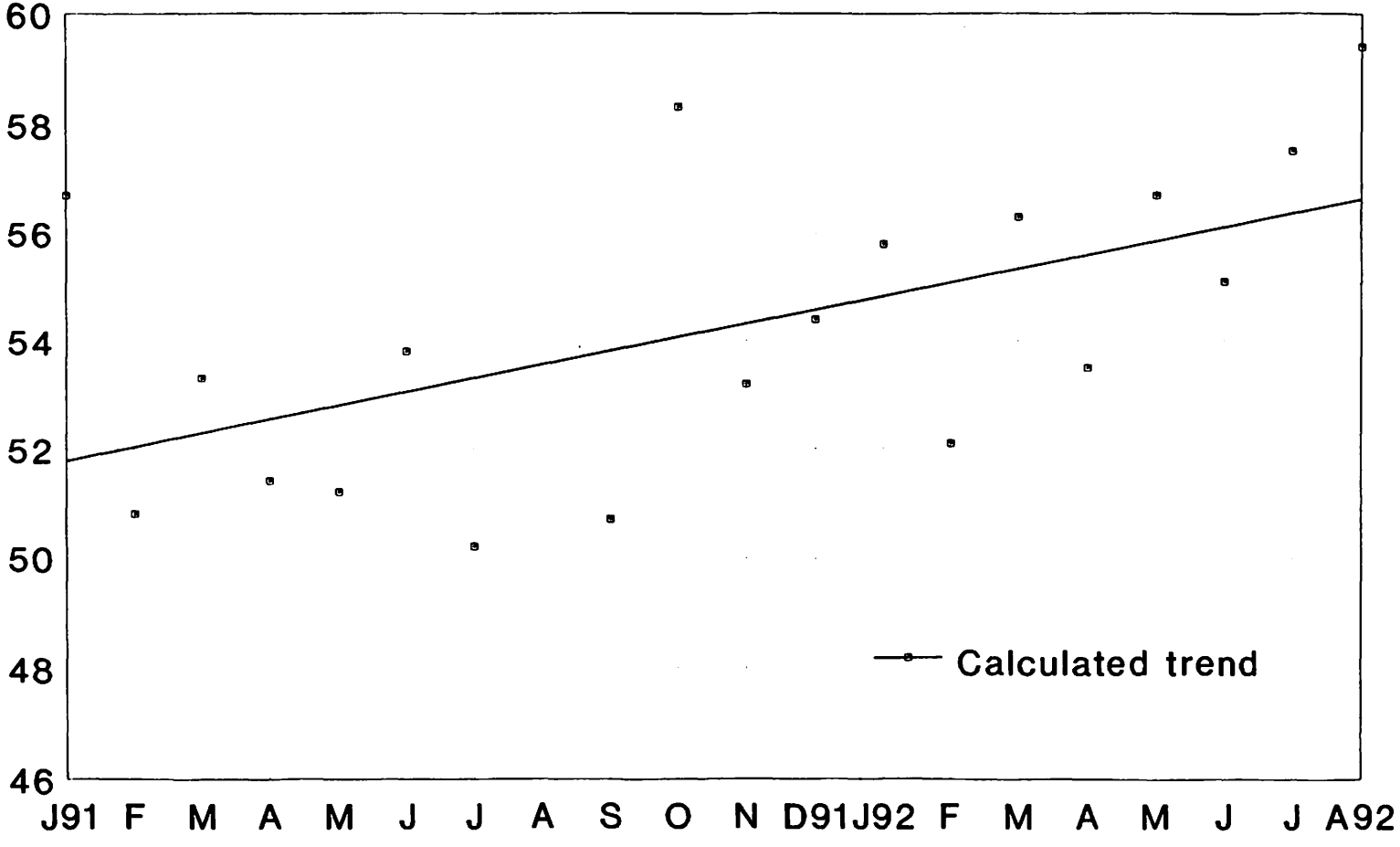


DBCP Paris 92

FIGURE 1

% buoys data received at MEDS

From January 91 to August 92

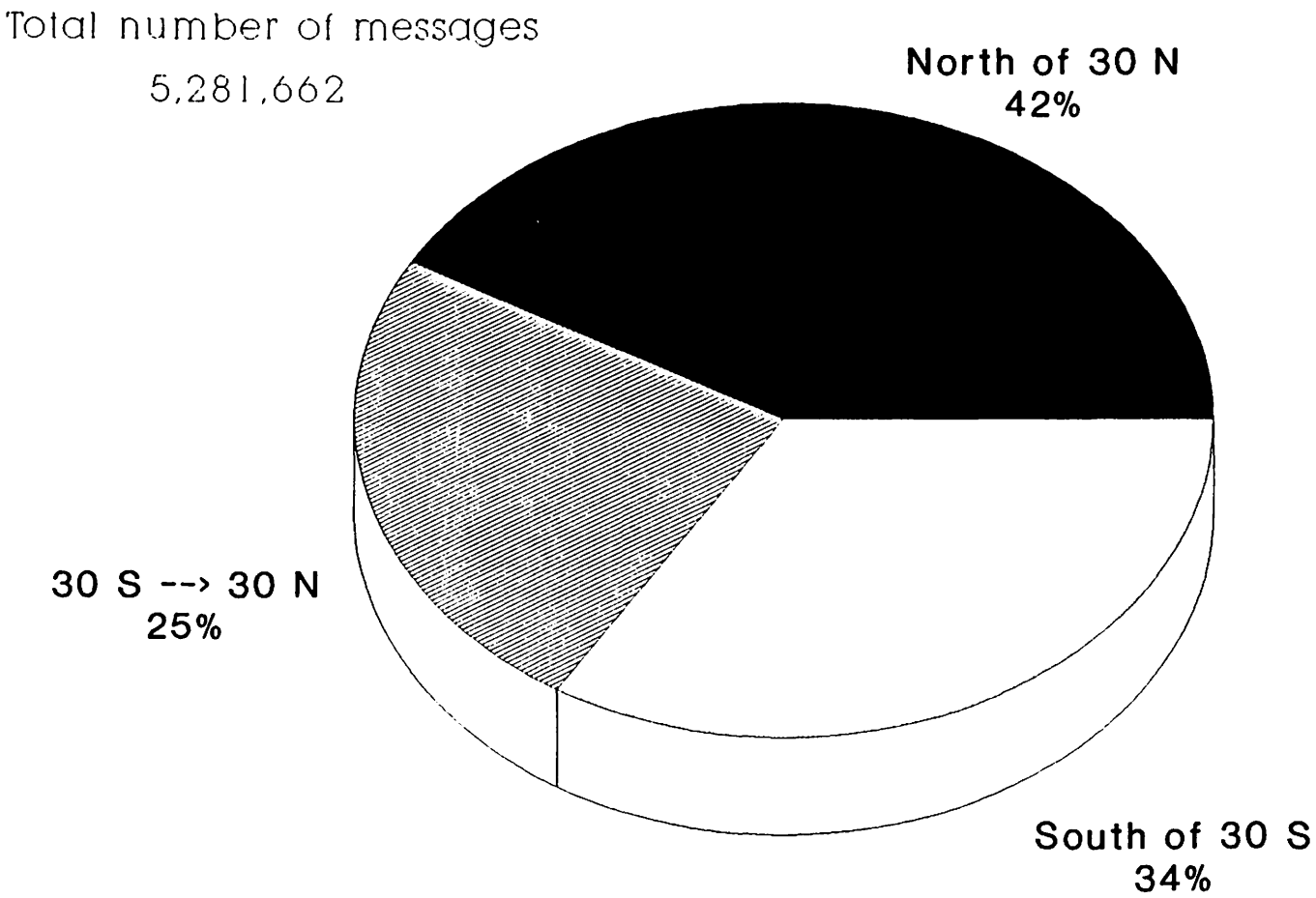


DBCP Paris 92

FIGURE 2

MEDS Historical Data Base Size

by Geographical Region



DBCP Paris 92

FIGURE 3

ANNEX XII

GLOBAL OCEAN OBSERVING SYSTEM (GOOS)

1. BACKGROUND

The Intergovernmental Oceanographic Commission has long recognized the need to increase ocean observations and data exchange. To that end, the IOC Assembly at its Fourteenth Session agreed to accelerate the development of ocean observing systems and at its Fifteenth Session adopted Resolution IOC-XV-4 to initiate development of a Global Ocean Observing System (GOOS). The WMO at its Forty-First Executive Council in 1989 adopted a resolution to cooperate with the IOC on this initiative. Additionally, the Second World Climate Conference concluded that there is an urgent need to create a Global Climate Observing System building upon existing systems to the extent possible, in particular the Integrated Global Ocean Services System and the World Weather Watch, and the establishment of a Global Ocean Observing System.

At its Sixteenth Assembly in March 1991, the IOC re-confirmed its decision to undertake development of a Global Ocean Observing System (GOOS). As a result of decisions by the WMO Congress and the UNEP Governing Council in May 1991, climate-related components will be developed jointly with the WMO as the ocean component of a Global Climate Observing System, and coastal monitoring components will be developed jointly with UNEP and WMO.

The United Nations Conference on Environment and Development (Rio, June 1992) has also called for GOOS- in Agenda 21, the blueprint for action that was adopted at Rio. In two chapters- those on Atmosphere and Oceans- the document stresses the importance of addressing the uncertainties-- improving the scientific basis for decision-making. Chapter 17 includes the following:

> from Section E, Chapter 17, Agenda 21
>
> **ADDRESSING CRITICAL UNCERTAINTIES FOR THE MANAGEMENT OF THE MARINE ENVIRONMENT AND CLIMATE CHANGE**
>
> *"States should consider...supporting the role of the IOC in cooperation with WMO, UNEP and other international organizations in the collection, analysis and distribution of data and information from the oceans and all seas, including as appropriate through the proposed Global Ocean Observing System (GOOS), giving special attention to the need for IOC to develop fully the strategy for providing training and technical assistance for developing countries through its training, education and mutual assistance programme."*
>
> *"The developed countries should provide the financing for the development and the implementation of the GOOS system."*

GOOS will also contribute to the other two agreements reached at Rio-- the Framework Convention on Climate Change and the Convention on Biodiversity.

2. DESCRIPTION

A Global Ocean Observing System, which uses a globally-coordinated, scientifically-based strategy, will allow for coordinated monitoring and subsequent prediction of environmental and climate changes globally, regionally and nationally. As envisaged, this comprehensive and integrated system will provide a mechanism for the coordinated management of data generated from regular satellite and *in situ* observations of major physical, chemical and biological properties of the ocean, including the coastal zone and enclosed and semi-enclosed seas. It will involve the coordination and distribution of data, information and products to allow for the understanding of ocean processes, in particular those relevant to global

climate change and climate variability, research and prediction, as well as to global environment changes and the management and protection of ocean and coastal resources. The system will be based on the principle of free and open exchange of data and the resulting information and benefits. Figure 1 depicts a hypothetical GOOS system array in the future (see Appendix 1).

GOOS will foster the collection and dissemination of ocean data. It will be implemented and managed through national and regional services and facilities. Adequately funded national organizations that cooperate actively with international organizations are required. Today there are few of these, but support is growing.

3. STATUS

GOOS will take full advantage of the findings of global research programmes. An initial priority is the climate module. To satisfy the ocean monitoring needs of the proposed Global Climate Observing System, this module of GOOS is envisioned to become operational over the next two decades. Initial results of the Tropical Oceans-Global Atmosphere Research Programme, being implemented between 1985 and 1994, indicate that an operational observing system for selected tropical regions can be implemented by the year 2000.

Close interaction is taking place with scientific groups in order to insure a sound scientific design. A joint CCCO-JSC Ocean Observing System Development Panel is formulating the design of the aspects of the system which will contribute to climate prediction and is slated to complete its work in December 1994. Other GOOS sub-systems will be designed and developed with the assistance of the IOC-UNEP Committee for GIPME (particularly to conduct coastal monitoring and to assess the health of the ocean) and the joint IOC-FAO Scientific Steering Group on OSLR (particularly to contribute to our knowledge on living marine resources and to make more informed decisions concerning coastal zone protection, management and development). A Joint GOOS Scientific and Technical Committee is being formed in co-operation with ICSU's Scientific Committee on Oceanic Research. The IOC Committee on GOOS will hold its first meeting 16-19 February 1993.

Actions have been taken by UNEP, IOC and WMO to initiate pilot activities for a long-term global monitoring system of coastal and near-shore phenomena related to climate changes. Six phenomena to be monitored during the initial phase are:

- Coral reef ecosystems
- Mangrove communities
- Organic carbon accumulation in surface coastal sediments
- Coastal circulation
- Sea level changes and coastal flooding
- Plankton structure

4. RELATIONSHIP TO EXISTING PROGRAMMES

GOOS will be built as far as possible on existing activities and bodies such as IGOSS, GLOSS, IODE, DBCP and MARPOLMON as well as on the progressive implementation of new elements and capabilities. It will be updated and improved in response to results of programmes such as TOGA, WOCE and JGOFS and the development of new technology. It is important to note that the present national and international infrastructures and mechanisms that are the result of many years of effort and co-operation will be used. Because the experience of those who have developed present systems is a critical requirement, it is anticipated that representatives of present programmes will be asked to advise the IOC Committee for GOOS, for example.

5. EXAMPLE OF BENEFITS

The most well-known example of climate variability is the "El Niño" phenomenon which causes large variations in global climate patterns. Significant changes in sea surface temperature identified in the central and eastern tropical Pacific together with variations in atmospheric pressure in the Southern Hemisphere have been termed "El Niño" Southern Oscillation (ENSO) events. In 1982-83 effects of the strongest ENSO event of this century were felt world-wide. Droughts and floods caused crop failures in many countries.

There were huge drought-related fires in Borneo and Australia, drought-related eradication of sea-bird populations on islands in the Pacific, drought-related famines in India and east Africa, and flooding on the east coast of equatorial South America, in the Rocky Mountain region of the United States and in Brazil

Under the Tropical Oceans-Global Atmosphere Programme, an extensive ocean observing network has been set up in the region off Peru in an effort to predict the onset of El Ninos. Peru, concerned with the impact of El Niño events on its economy because of extensive losses suffered in previous El Niño periods, is making certain crop decisions based on these climate forecasts in order to maximize crop yields. This national experiment is an example of the need for adequate ocean data on a permanent and a global basis.

6. ACTIONS TO BE TAKEN

Initial emphasis will be on strengthening IGOSS and other IOC activities. A major commitment needs to be made by all countries to effectively implement GOOS. Governments must be encouraged to:

- Make existing data available
- Distribute data products
- Facilitate data exchange
- Develop data networks
- Support the collection of satellite and *in situ* data
- Support data collection by volunteer ships and data buoys

Because all countries must be involved, substantial training and assistance must be provided to developing countries. Partnerships between developed and developing countries are encouraged. The IOC acts as a catalyst to stimulate and coordinate a range of specific assistance activities that support the capacity building needed on national levels for the effective operation of GOOS.

Close collaboration is also required among relevant international organizations for proper implementation. By definition, GOOS will meet multiple needs.

The Drifting Buoy Co-operation Panel will be invited to:

(a) Advise the IOC Committee for GOOS and the IOC Assembly as to how the number of observations taken by drifting buoys can be increased for international exchange. Although GOOS needs for spatial and temporal coverage, data quality and timeliness have not yet been defined, it is certain that continuous, accurate, global observations using drifting buoys will be required.

(b) Provide guidance to the Ocean Observing Systems Development Panel (OOSDP) concerning present technologies and plans for drifting buoys, in particular by responding to the OOSDP questionnaire on enabling technologies for GOOS (see Appendix 2).

(c) Recommend further ways and means of contributing to GOOS development, in view of 4 above

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Toward a Global Ocean Observing System: A Strategy (IOC-XVI/8 Annex 3) 25 November 1990
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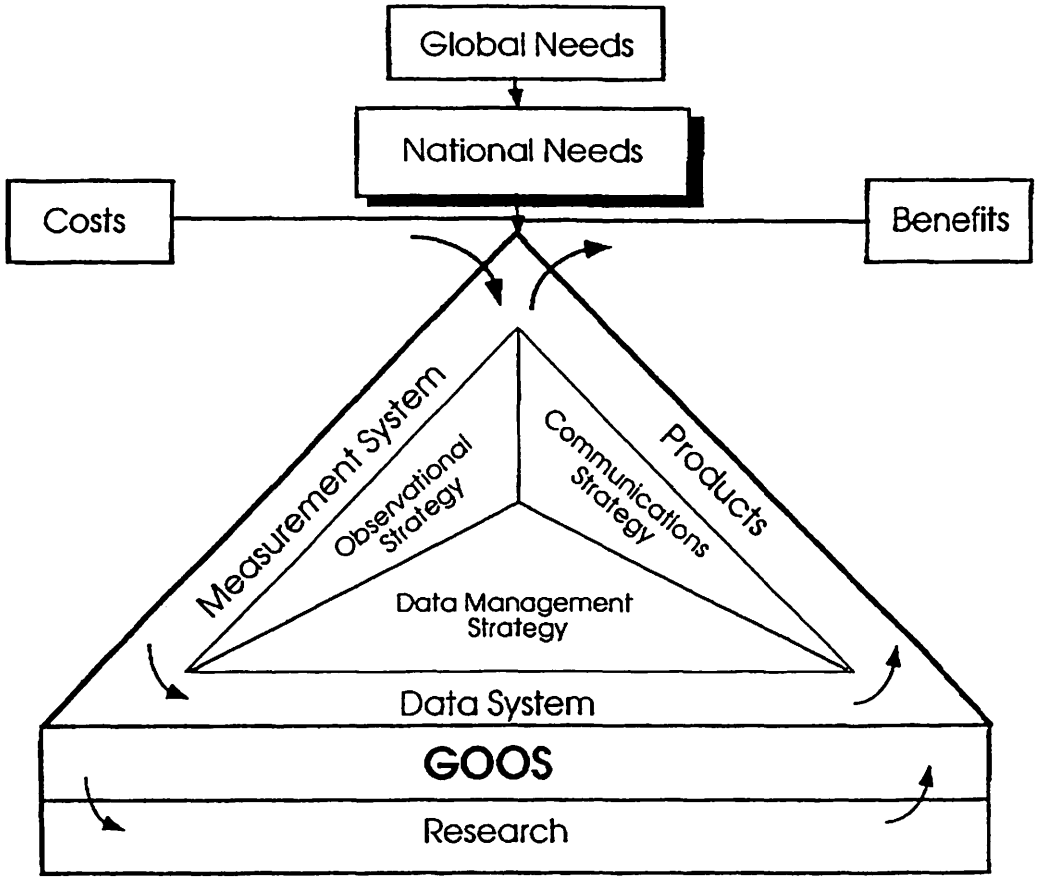
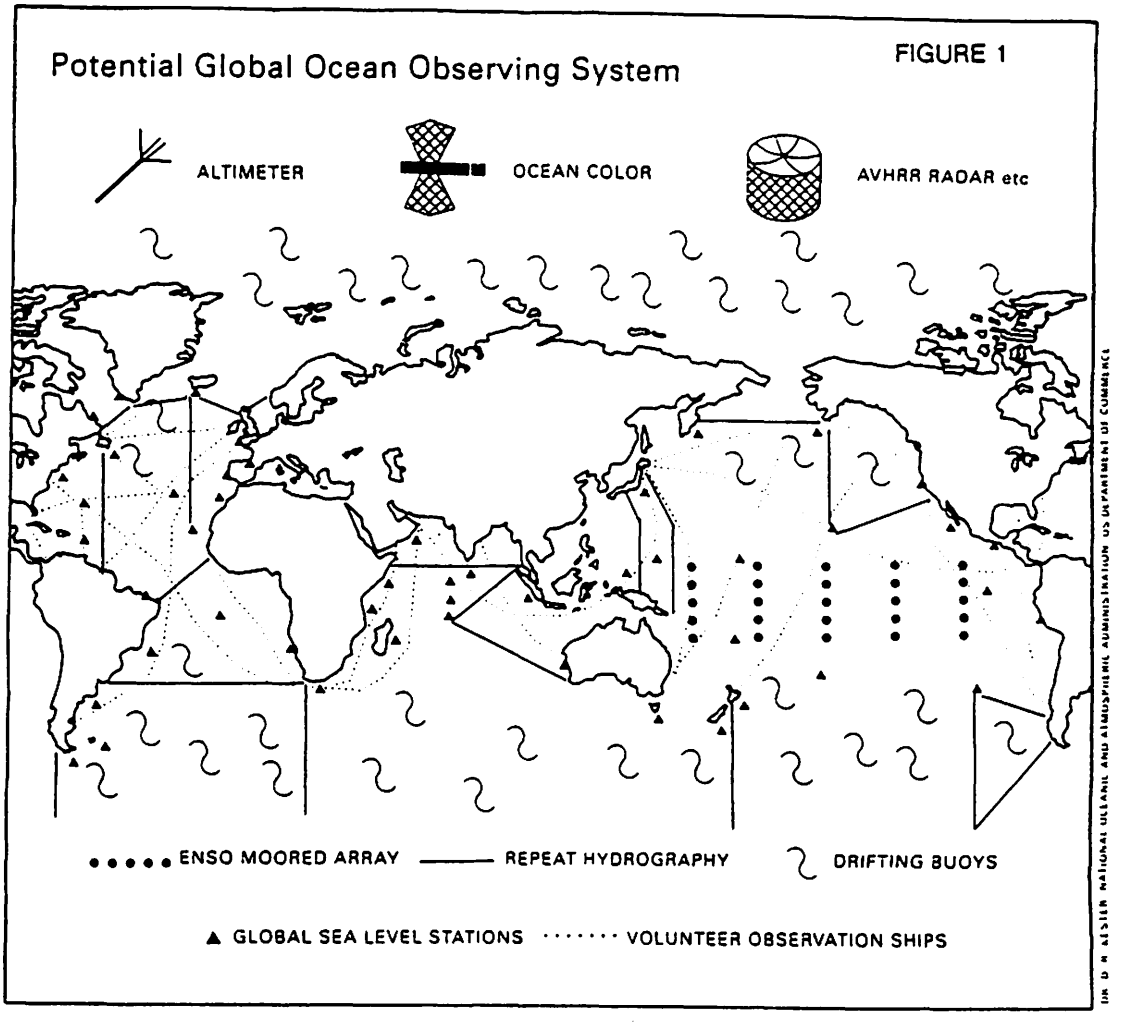
The Oceans and Climate: A Guide to Present Needs, IOC Technical Series No. 38
Global Ocean Observing System, Draft Development Plan (IOC/EC-XXV/8 Annex 1) 6 January 1992
IOC Resolution XVI-8, Global Ocean Observing System
IOC Resolution XV-4, Global Integrated Ocean Observing System Development
WMO Resolution 11 (EC-XLI), Development of a Global Operational Observing System
WMO Resolution 21 (Cg-XI), WMO's Involvement in the Development of a Global Ocean Observing System
WMO Resolution 9 (Cg-XI), Global Climate Observing System.

APPENDIX 1

General Concept of GOOS





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APPENDIX 2

ENABLING TECHNOLOGIES FOR A GLOBAL OCEAN OBSERVING SYSTEM

In recognition of the pressing societal need to understand the Earth's climate system and the potential for human impact on that system, there is wide interest in greatly expanding our capabilities to monitor the ocean. In response to this, the Committee on Climate Change and the Oceans (CCCO) and the Joint Scientific Committee (JSC) have established the Ocean Observing System Development Panel (OOSDP). One task of the OOSDP is:

> *"To formulate the conceptual design of an operational observing system to monitor physical and other properties that determine ocean circulation and the response of the ocean to climate change and to provide initial- value inputs for climate predictions."*

This is a formidable task, and one that is potentially open-ended, as it is expected that the elements of a "Global Ocean Observing System" (GOOS) will evolve in response to improving technology and increasing understanding of ocean climate processes. The attached statement more clearly defines our conception of observations within GOOS.

The attached list contains parameters which might be measured in a GOOS. It is not necessarily complete, and we encourage additional suggestions. Our objective is to obtain information on accuracy, calibration, drift, operation and maintenance requirements, cost, redesign costs, potential replacement technologies, shortcomings, and status as an operational (as opposed to research) device. Our interest includes sensors, platforms and data telemetry technology. This information will be evaluated by the OOSDP and other reviewers with the goal of identifying the most promising technology for inclusion in GOOS.

Based on this information, a background document will be prepared and distributed widely for comment. Inputs received will be incorporated into future reports of the OOSDP.

The attached questionnaire is designed to facilitate your input to this process. Please complete and return to Dr. D. James Baker, Jr. (Joint Oceanographic Institutions, Inc., 1755 Massachusetts Ave. NW, Washington, DC 20036-2102) by October 31, 1992.

Observations for a Global Ocean Observing System

The Ocean Observing System Development Panel (OOSDP) is working to develop a plan for a Global Ocean Observing System (GOOS) and for the Global Climate Observing System (GCOS) that addresses the role of the oceans in seasonal to decadal climate change. The plan is based on the belief that the observations required for such a GOOS should be:

* long-term

  Measurements, once begun, should continue into the indefinite future. Continuity in the observed quantity is sought, rather than in the method; and it is anticipated that more effective methods may become available with time.

* systematic

  Measurements should be made in a rational fashion, with spatial and temporal sampling tuned to address the issues of climate change. Further, measurements should be made with the precision, accuracy, and care in calibration required to provide continuity in the quality of the data in space and time even though different methodology may be used.

* relevant to the global climate system

  Measurements should be made either to document the role of the ocean in the climate system or to provide data needed to initialize and validate models that describe and predict seasonal to decadal climate change.

Because of the global scope and intended longevity of GOOS it is realized that there are further practical constraints on the measurements. They should be:

* cost-effective

  Repeat observations are required at many locations. To maximize the return possible using the available resources (financial and manpower), efforts should be made to use observational methods in GOOS that are economical and efficient.

* routine

  The observations should be considered as part of the normal work load, with the acquisition, quality control, and dissemination of products able to be carried out with regularity. Thus for some variables, the collection of observations and related work may be integrated into agencies capable of making a long-term commitment; for other variables, the desired quality of the routine observations may be best achieved by providing long-term support to research organizations capable of ensuring the quality and continuity of the measurements. This may vary from nation to nation.

Measurement Parameters for a Global Ocean Observing System

Atmospheric	cloud cover precipitation short wave radiation long wave radiation humidity air temperature barometric pressure wind
Ocean Surface	SST surface salinity ice cover and thickness sea surface topography sea state pCO2 gas fluxes
Upper Ocean Layer	temperature surface currents depth of mixed layer near surface optics optical properties chlorophyll

Full Ocean Depth	temperature
	salinity
	currents - horizontal
	vertical velocity
	turbulent mixing rates
	chemical tracers
	nutrients
	oxygen
	pCO2, pH, alkalinity
	dissolved organic carbon
	particulate flux
Bottom Boundary Layer	geochemistry
	turbulent transfer rates

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ATTACHMENT

QUESTIONNAIRE ON ENABLING TECHNOLOGIES FOR GOOS

We (James Baker, Ray Schmitt, and Worth Nowlin) are asking your help with this task. As a developer and/or user of ocean instrumentation, we need your advice on promising technologies that may contribute to the GOOS. We are interested in both simple measurements that might be widely, cheaply and routinely made as well as more sophisticated field measurements which, because of their importance, can be justified for GOOS. We are especially interested in identifying those fledgling technologies whose cost/benefit ratio would improve with mass production.

Based on this information, a background document will be prepared and distributed widely for comment. Inputs received will be incorporated into future reports of the OOSDP.

The attached questionnaire is designed to facilitate your input to this process. Please complete and return to Dr. D. James Baker, Jr. (Joint Oceanographic Institutions, Inc., 1755 Massachusetts Ave. NW, Washington, DC 20036-2102) by October 31, 1992.

QUESTIONNAIRE

ENABLING TECHNOLOGIES FOR THE GLOBAL OCEAN OBSERVING SYSTEM

Complete one questionnaire for each instrument

Instrument _____

Originator _____

Type: ( ) Sensor ( ) Platform ( ) Telemetry
Complete: 1.a 1.b 1.c

1.a Sensor Specifications
For each parameter list

Parameter Measured	Range	Resolution	Accuracy	Drift	Calibration	Sample Frequency Rate

1.b Platform Specifications

Type (mooring, drifter, float, autonomous vehicle, etc.)

Depth range

Power consumption

Compatible measurements

Longevity

1.c Telemetry Specifications

Type (Satellite, Acoustic, Undersea cable etc.)

Baud rate (active)

Duty Cycle

Monthly Baud rate (Megabytes/month)

Power consumption

Longevity

2. Operation: What training or special skills are require for use of this instrument?

3. Maintenance: What is required to maintain the instrument? (power consumption, supplies etc.)

4. Post processing: What is required to convert raw measurement to desired variable? (additional measurements, field calibrations, etc.)

5. Cost:

Present unit cost _____

Estimated cost if mass produced _____

Estimated cost of redesign effort for mass production _____

6. Status:

a. Existing ( )
Operational ( ) Research ( )

b. In development ( )

Estimated completion date _____

Development costs _____

c. Proposed ( )

Agency _____

Required development time _____

Development costs _____

7. Problems: Identify shortcomings of instrument for widespread, systematic use.

8. Application notes: Please provide any additional information you think relevant to the use of this instrument, especially with regard to its use in an operational (rather than research) mode.

9. Replacement technology: What alternative technology might better measure this parameter if developed?

10. References

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ANNEX XIII

GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

Few issues have captured our attention as has the prospect of climate change. Scientists have shown that the climate has undergone many extremes in geologic history, but in recent decades, man has potentially modified the climate. For example, by adding radiatively active gases (carbon dioxide, CFCs, etc.), we have altered the "Greenhouse" effect and may produce climate change. Unfortunately we do not have sufficient understanding of the complex processes at work to either document the climate or to measure our impact on it. What is needed is an appropriate data base for analysis, for modeling, and ultimately for prediction.

At the second World Climate Conference in Geneva in 1990, this realization prompted participants to urge the creation of GCOS to meet the needs for :

- Climate system monitoring, climate change detection and response monitoring, especially in terrestrial ecosystems;
- Data for application to national economic development;
- Research toward understanding, modeling and prediction of the climate system.

A Memorandum of Understanding was signed this spring by the World Meteorological Organization, the Intergovernmental Oceanographic Commission (of UNESCO), the United Nations Environment Programme and the International Council of Scientific Unions, establishing GCOS, setting up a Joint Scientific and Technical Committee and a Joint Planning Office for its operation.

At its first meeting in Geneva, the JSTC provided the impetus to plan and implement GCOS and take a systematic approach to observations needed to understand global change uncertainty. The Committee identified key issues:

- Identifying and selecting the essential observational elements to understand climate change, climate variability and climate prediction.
- Making full use of existing programmes (such as the World Weather Watch and the Global Atmospheric Watch), enhanced as necessary.
- Improving understanding of the role of clouds and aerosols and their influence on the earth radiation budget.
- Developing a comprehensive climate module of the Global Ocean Observing System being planned by IOC.
- Securing comprehensive observation systems for the land surface, the hydrological cycle, the biosphere and the cryosphere.
- Enhancing the utilization of existing data relevant to regional climate variability and change, and in particular assisting developing countries to acquire and utilize data over their territories.

Of particular importance are observations from space platforms that will provide major contributions to many of these components of GCOS, and GCOS will work closely with national and international space agencies.

The planning process has been initiated using experts and advisory groups to define requirements for the observations, to address data issues, and to outline resource needs.

The second JSTC meeting in Washington in january should see the adoption of a draft plan for the early phases of GCOS.

In parallel to GCOS, a Global Ocean Observing System (GOOS) has been developed jointly by IOC and WMO. Both IOC and WMO agreed that the climate module of GOOS provides the ocean component of GCOS.

In this context the DBCP will provide effective technical support for the development of future ocean drifting-buoy programmes in the perspective of an enhanced ocean observing system for climate.

The Panel is invited to advise on how present technical constraints, including the problems of communication systems, quality control, code, and international coordination can be transcended in the perspective of the development of a more extensive and massive deployment of drifting buoys to meet the new requirements which are emerging from GCOS and the climate module of GOOS. Of particular importance is the need for DBCP participation in implementing a strategy to deploy drifting buoys in the South Atlantic and Indian Oceans as will be recommended by the GCOS Atmospheric Task Group of the JSTC.

ANNEX XIV

OPERATING GUIDELINES FOR DRIFTING-BUOY DATA QUALITY CONTROL

These are principles adopted during previous DBCP sessions:

(i) Meteorological Centres are in the best position to undertake data Quality Control (DBCP VI).

(ii) Principal Investigators and Meteorological Centres share the responsibility of data Quality Control (DBCP VI).

(iii) The Technical Co-ordinator is in the best position to act as a focal point between GTS users and Principal Investigators (DBCP V, VI).

(iv) Argos is responsible for assuring that gross errors are automatically eliminated from reports distributed on GTS (DBCP VI).

In order to realize these principles, the following operating procedures or actions are suggested:

1. PGCs

Each Principal Investigator (PI) of an Argos Programme reporting data on GTS, to designate a person responsible for making changes on PTT or sensor information present in the Argos System. Let us call this person the Programme GTS Co-ordinator (PGC). The PGC can, of course, be the PI himself but could also be a designated programme Technical Co-ordinator, as is done for the EGOS programme. If such a person does not exist as yet, for a given Argos Programme, the Technical Co-ordinator of the DBCP would contact the Principal Investigator and discuss the issue in order to find one. In a few cases, when a PI allows his platforms being distributed on GTS but does not want to be involved in the process, the Technical Co-ordinator could act as a PGC (i.e. the Technical Co-ordinator of the DBCP can directly ask Argos to make a change).

2. PMOCs

If possible, the DBCP to request one or more Agencies or Institutions to volunteer as being Participating Meteorological or Oceanographic Centre responsible for controlling Argos GTS data on an operational basis (PMOC), for given physical variables, either regionally or globally. Presently, at least the following centres which are operating Quality Control Procedures either in real time or deferred time, locally and/or globally, express the desire to act as PMOCs:

- The Centre de Meteorologie Marine (METEO FRANCE/CNRM/CMM, Brest, France);

- The European Centre for Medium Range Weather Forecasts (ECMWF, Reading, United Kingdom);

- The National Data Buoy Center (NOAA/NDBC, Stennis Space Center, Mississippi, USA);

- The Ocean Product Center (NOAA/OPC, Camp Spring, Maryland, USA);

- The United Kingdom Meteorological Office (UKMO, Bracknell, United Kingdom).

The participation of the following centres is desired for acting as PMOC:

- The Australian Bureau of Meteorology (ABOM, Melbourne, Australia);

- The Japan Meteorological Agency (JMA, Tokyo, Japan);

- The New Zealand Meteorological Service (NZMS, Wellington, New Zealand);

- The South African Weather Bureau (SAWB, Pretoria, South Africa*).

National Focal Points for Drifting Buoy Programmes would be requested to designate National PMOCs, and possibly to act themselves as PMOCs.

3. Bulletin Board.

After cost estimates which will be performed by Service Argos Inc. and the Technical Co-ordinator, the Chairman of the DBCP will propose a mechanism for creating a bulletin board (Omnet, Argos, others). The Panel proposed to name the bulletin board "BUOY.QC".

3.1 ECMWF, OPC, METEO FRANCE, and UKMO monitoring statistics will be delivered on the bulletin board.

3.2 Any suggestion for modification (i.e. recalibrate or remove sensor from GTS) or any problem noticed (e.g. bad location) on a drifting buoy reporting data on GTS should be placed on the bulletin board. Meteorological Centres would be encouraged to make such suggestions.

3.3 Any feed back available on a recalibration actually implemented shall be placed on the bulletin board.

3.4 Basically, any information deposited on the Bulletin board shall remain for 30 days only.

* The Government of the Republic of South Africa has been suspended by Resolutions 38 (Cg-VII) and 2/74/4 (Twentieth Session of the General Conference of Unesco) from exercising its rights and enjoying its privileges as a Member of WMO and Member State of IOC, respectively.

4. Operating Procedures for dealing with Potential Problems on GTS (Drifting Buoy data, see diagram)

4.1 PMOCs noticing potential problems on GTS would suggest an action via the bulletin board. A standardized, telegraphic format is proposed (see Appendix): one message per platform or per sensor, showing the WMO number and the proposed change, directly in the "subject" line, with additional comments appearing in the text itself, using a free format if felt necessary by the PMOC (see example in Appendix). The format will soon be finalized by a sub-group of experts before these procedures are actually implemented.

4.2 PMOCs noticing bad location or bad sensor data episodically appearing on GTS message would copy the message on the bulletin board, indicating from which source the message was transmitted. Although it is recommended that LUT operators access to the bulletin board as well, if not possible, the Technical Co-ordinator of the DBCP or the responsible PGC or a designated PMOC (see paragraph 4.7.2) would keep them informed by telefax.

4.3 A 7-day delay will be respected by the Technical Co-ordinator of the DBCP before he actually contacts the PGC to propose the change, so that other meteorological centres may also have the opportunity to comment on the suggestion and, in that case, the Technical Co-ordinator of the DBCP is given the responsibility to decide which request to consider. Other data users who access the bulletin board are encouraged to check its content regularly.

4.4 Then, if the PGC accepts the modification, he will request Argos to make the change. In order to keep the GTS user community informed, Argos (CLS or SAI) will announce the change by means of the bulletin board (a standardized message is proposed in the Appendix) between 24 and 48 hours before it is actually implemented and also will effect the change as prescribed. It is recommended that the PGC also requests appropriate LUTs to implement the same changes. Before the New Argos GTS Processing Chain is implemented, messages could be deposited by Argos within 48 hours a change is implemented.

4.5 If the PGC is not willing to go ahead with a proposed change, the Technical Co-ordinator of the DBCP will deposit a standardized message on the bulletin board (see Appendix) in order to inform PMOCs.

4.6 Local User Terminals are urged to adopt these Quality Control Operating Guidelines.

4.6.1 It is desirable that LUTs not willing to participate should distribute drifting buoy data on GTS only to local users (i.e. no global GTS distribution).

4.6.2 LUT operators participating and having access to the bulletin board would be encouraged to inform the bulletin board back each time a change is implemented, using the same format as Argos (see paragraph 4.4). If LUTs have no access to the bulletin board, they would be encouraged to inform the Technical Co-ordinator of the DBCP of actual changes so that he can inform the bulletin board.

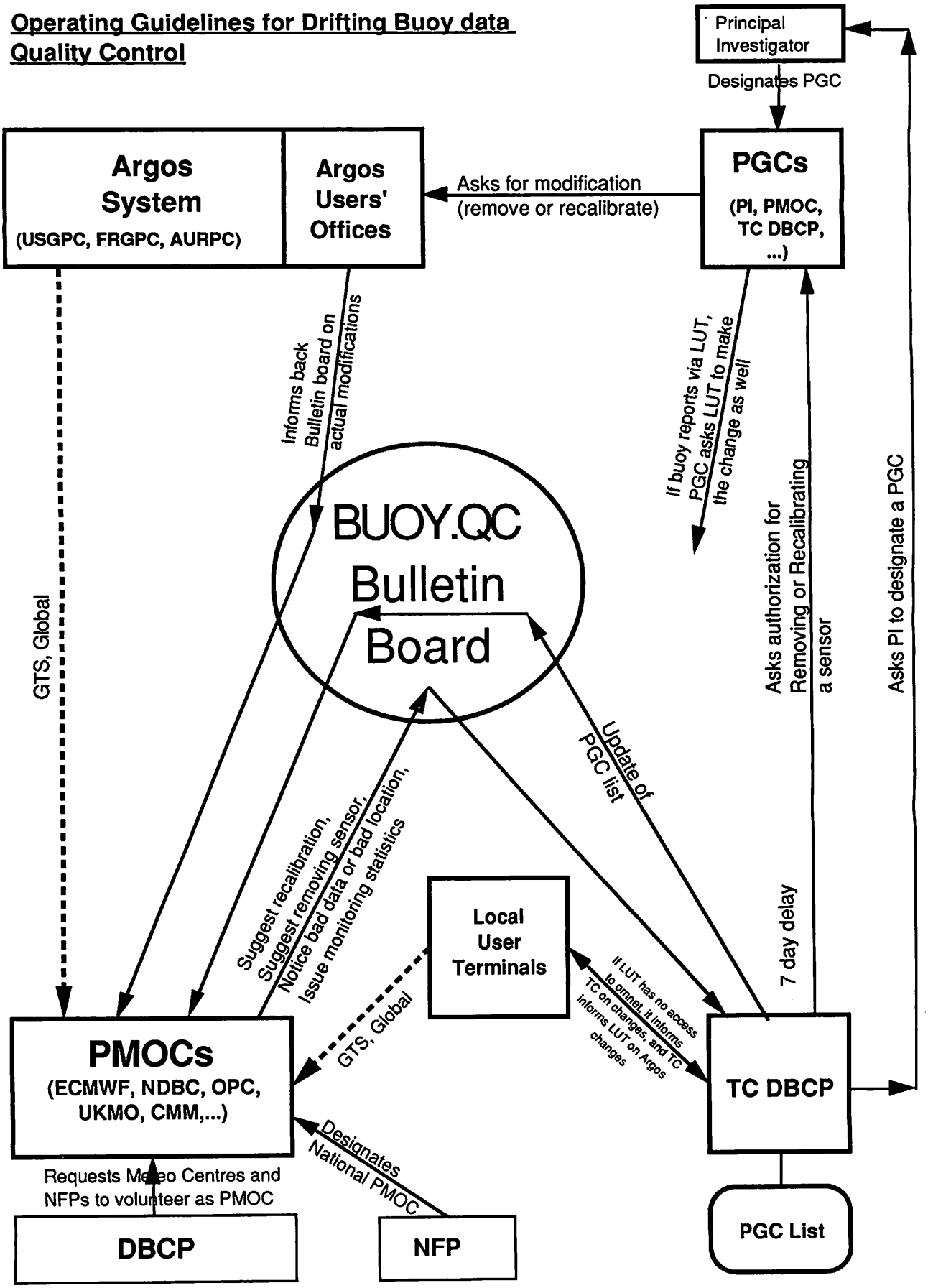
5. List of PGCs

This list will be published by the Technical Co-ordinator of the DBCP on a monthly basis via the bulletin board or regular mail.

6. DBCP, WMO and IOC Secretariats

They will promote these Quality Control operating guidelines and encourage participation in this scheme.

Operating Guidelines for Drifting Buoy data Quality Control



Appendix

Standardized Format for Information Deposited on the Bulletin Board

Notations:

- 1 - UPPERCASES in **bold** are constant field values and will appear "as shown" in the subject line; e.g. **ASK** will appear as the 3 characters 'ASK' in the subject line.

- 2 - Lowercases are used to designate variable data fields; If the name of the field is on 5 characters, then the field value must be coded using 5 characters (completed with spaces if necessary); e.g. ttt can be coded as '**AP** ' to indicate Air Pressure or as '**SST**' to indicate Sea Surface Temperature.

- 3 - The line 12345678901234567890123456789012 is just here to indicate the number of characters used (32 maxi) and their position; It has no other specific meaning.

1 . **Proposals for status change** (by Meteo Centres, i.e. PMOCs):

When detecting bad data circulating on GTS, Meteorological Centres can propose changes on buoy status (remove or recalibrate sensor) via the bulletin board. Proposals are done using a standardized telegraphic format in the subject line. Comments can be added in the body text.

Format:

```
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
h A S K   t t t   w m o # #   p p p   o v a l u e
```

Meaning:
It is proposed to remove or recalibrate one or more sensors for one given buoy.

h : One figure, **1** to **9**, to indicate the number of the request for the same buoy, for example, the first proposal would be coded **1ASK**..., and if another Meteo Centre feels necessary to comment on the same proposal, it can suggest another action and name it **2ASK**, etc...

ttt : Type of proposal:
- **RMV** : for removing sensor data from GTS
- **REC** : for recalibrating a sensor
- **CHK** : for checking data carefully; in that case, it is recommended to add in the body text of the message: (1) Example(s) of the suspicious or erroneous GTS message(s), (2) the GTS bulletin header that was used (i.e. originating centre for the bulletin), (3) a description of the problem and (4) if possible, proposed action to solve it.

wmo## : WMO number of the buoy ($A_1b_wn_bn_bn_b$)

ppp : Physical variable (sensor) to consider:
- **AP** : Air Pressure (coded as '**AP** ')
- **AT** : Air Temperature (coded as '**AT** ')
- **SST** : Sea Surface Temperature
- **WD** : Wind Direction (codes as '**WD** ')

WS : Wind Speed (coded as '**WS** ')
APT : Air Pressure Tendency
POS : Position of the buoy
TZ : Subsurface temperatures (coded as '**TZ** '): The depths of the probes and proposed actions should be placed in the body text, not in the subject line (not enough room)
ALL : All buoy sensors (e.g. remove all buoy data from GTS)
Blank : (coded as 3 space characters, i.e. ' ') Informations are detailed in the body text.

o: Operator to use for proposed recalibration (mandatory and used only when ttt='**REC**'):
+ : Add the following value to the calibration function
- : Subtract the following value from the calibration function
* : Multiply the calibration function by the following value (e.g. rate for recalibrating wind speed sensor)

value: Value to use for proposed recalibration (mandatory and used only when ttt='**REC**'); the value is coded on 5 characters and completed with space characters if necessary. It is provided using the following physical units:

Air Pressure :	Hecto Pascal
Temperatures :	Celsius degrees
Wind speed :	m/s
Wind Direction :	Degrees
Air Pressure Tendency :	Hecto Pascal
Positions :	Degree + Hundredth
Rate :	No unit

Examples:

No.	Delivered	From	Subject					Lines
1	Oct 15 10:53	NDBC.CENTER	1ASK	REC	17804	AP	+2.2	0
2	Oct 15 13:15	NDBC.CENTER	1ASK	RMV	62501	ALL		5
3	Oct 16 8:02	J.ANDRE	2ASK	REC	17804	AP	+2.4	4
4	Oct 17 7:34	TOGA.ECMWF	1ASK	CHK	44532	POS		5
5	Oct 17 10:18	J.ANDRE	1ASK	REC	44704	WS	*1.5	0

Message1: NDBC proposes to recalibrate Air Pressure sensor of buoy 17804 by adding 2.2 hPa.

Message2: NDBC proposes to remove buoy 62501 from GTS distribution. Explanations are given in the body text (5 lines).

Message3: Meteo France comments (**2ASK**) on NDBC proposal for recalibrating air pressure sensor of buoy 17804. Meteo France suggests to add +2.4 hPa instead of +2.2 hPa. Argumentation is provided in the body text (4 lines).

Message4: ECMWF suggests to check positions of buoy 44532. Details are given in the body text (5 lines), including copy of one suspicious GTS message, the GTS bulletin header, and a description of the error.

Message5: Meteo France proposes to recalibrate Wind speed sensor of buoy 44704, by multiplying data by 1.5.

2. Argos or LUT answer for changes actually implemented

When a change is implemented on GTS platforms, a message shall be deposited the bulletin board, by Argos or the LUT considered, no later than 24 hours after the change was implemented. All the information will be encoded into the subject line, the body text being empty. the format of the subject line is as follow:

Format:

```
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
c c c c   t t t   w m o # #   p p p   o v a l u e   h h : m m
```

Meaning:

Argos (i.e. the French Global Processing Center of Toulouse (FRGPC) or the US Global Processing Center of Landover (USGPC)) or Local User Terminals (LUT) inform the bulletin board each time a change is actually implemented on a buoy status.

cccc: Originating Center:

- **LFPW** = FRGPC, Toulouse
- **KARS** = USGPC, Landover
- **ENMI** = Oslo LUT
- **BGSF** = Sondre Stromfjord LUT
- **CWEG** = Edmonton LUT

ttt, wmo##, ppp, ovalue: Same as for paragraph 1. In addition, for recalibrations, when the transfer function has been completely modified, ovalue can be coded as a question mark followed by 5 space characters, i.e. '? ' , to indicate that the change is not as simple as a +X, -X or *X transformation.

hh:mm: UTC time the change is implemented in hours and minutes. The date is the date the message is deposited on the bulletin board and is therefore given by the mail system itself.

Example:

```
No.  Delivered        From      Subject                                  Lines
  6  Oct 15 18:15     A.SHAW    KARS REC 17804 AP  +2.3   12:16  0
  7  Oct 15 18:15     A.SHAW    KARS REC 33809 AP  ?      13:06  0
```

Message6: Buoy 17804 Air Pressure sensor was recalibrated by adding +2.3 hPa. the change was implemented at 12h16 UTC the 15 October. As you may notice, two proposal had been made for this buoy: NDBC proposed +2.2 hPa and Meteo France proposed 2.4 hPa. The Technical Co-ordinator of the DBCP contacted both agencies and it was then decided to apply a 2.3 hPa correction.

Message7: Buoy 33809 Air Pressure sensor was recalibrated. The change was implemented at 13h06UTC the 15 October. The question mark '? ' indicates that the transfer function was completely modified.

3. PGC Answer if the proposal was denied

Format:

```
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2
D E N I   t t t   w m o # #   p p p   o v a l u e
```

Meaning:

The proposal was denied by the Principal GTS Co-ordinator (PGC) of the drifting buoy programme. No action was taken. Complementary information can be included in the body text.

ttt, wmo##, ppp, ovalue: same meaning as in paragraph 1. ovalue is mandatory and used only when ttt='**REC**'.

Example :

No.	Delivered	From	Subject	Lines
8	Oct 15 19:12	J.ANDRE	DENI RMV 62501 ALL	0

Message8: In the body text: Data were sent on GTS before deployment by mistake. The buoy is now deployed and data look good. There is therefore no need for removing data from GTS distribution.

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WOCE Surface Velocity Program (SVP) Prototype Pressure Drifters, October 1992

Number	User	Status
3	Scripps (USA)	Deployed 18 August off California
3	France	Deployed in Golfe de Gascogne
3	Canada	At NDBC for calibration
5	UK	En route from Scripps (not calibrated)
3	Australia	En route from Scripps (not calibrated)
5	Scripps (USA)	En route to NDBC for calibration
3	Scripps (USA)	Under construction
25		

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ANNEX XVI

DRAFT RESOLUTION

The (Executive Council [of WMO]) (Assembly [of IOC]),

Noting:

(i) WMO EC Resolution 10 (EC-XXXVII) - Drifting-Buoy Co-operation Panel,

(ii) IOC Resolution EC-XIX.7 - Drifting Buoys,

(iii) final report, Eighth Session of the Drifting-Buoy Co-operation Panel (Paris, October 1992),

Noting further:

(i) IOC Resolution XVI-8 - Global Ocean Observing System (GOOS),

(ii) World Meteorological Congress Resolution 21 (Cg-XI) - WMO's Involvement in the Development of a Global Ocean Observing System (GOOS),

Recalling with appreciation that the Drifting-Buoy Co-operation Panel and its activities are supported entirely through voluntary contributions by Panel Member countries,

Considering:

(i) that data from both drifting and fixed automated platforms on the high seas contribute directly to a number of major programmes of WMO and IOC, including the WWW and WCRP,

(ii) that such platforms will form an important component of the Global Ocean Observing System (GOOS) and of the Global Climate Observing System (GCOS),

(iii) that international co-operation and co-ordination will be required for the future long-term maintenance of many fixed data-collection platforms on the high seas which are now deployed for research purposes,

(iv) that the Technical Co-ordinator for the Drifting-Buoy Co-operation Panel already provides significant and essential support to the collection of data from such platforms,

(v) that the Drifting-Buoy Co-operation Panel is a well-established and appropriate body to provide the support required for the international co-ordination and maintenance of fixed data-collection platforms on the high seas in support of WMO and IOC programmes,

Decides:

(i) that the name of the Drifting-Buoy Co-operation Panel should be changed to the Data Buoy Co-operation Panel,

(ii) that the terms of reference for the Data Buoy Co-operation Panel and for its Technical Co-ordinator should be as given in the annexes to this resolution;

Requests (the Secretary-General [of WMO]) (the Secretary [IOC]) to continue to provide the necessary Secretariat support to the Panel, within the available budgetary resources.

Note: This Resolution replaces ([WMO] Resolution 10 (EC-XXXVII)) ([IOC] Resolution EC-XIX.7), which is no longer in force.

Annex I to Resolution ...

Terms of Reference for the Data Buoy Co-operation Panel

The Data Buoy Co-operation Panel shall:

1. Consider the expressed needs of the international meteorological and oceanographic communities for real-time or archival data from ocean-data buoys on the high seas and request action from its members, Technical Co-ordinator or action groups to meet these needs;

2. Co-ordinate activity on existing programmes so as to optimize the provision and timely receipt of good quality data from them;

3. Propose, organize and implement through the co-ordination of national contributions, the expansion of existing programmes or the creation of new ones to supply such data;

4. Support and organize as appropriate such action groups as may be necessary to implement the deployment of data gathering buoys to meet the express needs of operational oceanographic and meteorological communities;

5. Encourage the initiation of national contributions to data buoy programmes from countries which do not make them;

6. Promote the insertion of all available and appropriate buoy data into the Global Telecommunication System;

7. Promote the exchange of information on data buoy activities and encourage the development and transfer of appropriate technology;

8. Ensure that other bodies actively involved in buoy use are informed of the workings of the Panel and encourage, as appropriate, their participation in the Panel deliberations;

9. Make and regularly review arrangements to secure the services of a Technical Co-ordinator with the terms of reference given in Annex II;

10. Submit annually to the Executive Councils of the WMO and the IOC a report which shall include summaries of the existing and planned buoy deployments and data flow.

Annex II to Resolution ...

Terms of Reference for the Technical Co-ordinator of the Data Buoy Co-operation Panel

The Technical Co-ordinator of the Data Buoy Co-operation Panel shall:

1. Under the direction of the Data Buoy Co-operation Panel take all possible steps within the competence of the Panel to assist in the successful achievement of its aims;

2. Assist in the development, implementation and management of quality control procedures for data buoy systems;

3. Assist in setting up suitable arrangements for notifying the appropriate user communities of changes in the functional status of operational buoys;

4. Assist in the standardization of buoy data formats, sensor accuracy, etc.;

5. Assist when requested with the development of co-operative arrangements for buoy deployment;

6. Assist in the clarification and resolution of issues between Service Argos and buoy operators;

7. Assist in promoting the insertion of all available and appropriate buoy data into the Global Telecommunication System;

8. Supply information about buoy developments and applications to the WMO and IOC Secretariats and assist the Data Buoy Co-operation Panel to promote an international dialogue between oceanographers and meteorologists;

9. Co-ordinate and monitor the flow of buoy data into appropriate permanent archives.

ANNEX XVII

OPERATING PROCEDURES FOR THE DRIFTING BUOY CO-OPERATION PANEL

1. To the extent that the panel is a formally established body of the WMO and IOC, panel members will be the representatives of Members of WMO or Member States of IOC which expressed a willingness to participate in the panel activities.

2. The panel will meet annually. Representatives of any institution or programme actively involved in the use, development or deployment of drifting buoys, or which specifically require drifting buoy data, may participate in the meetings.

3. The panel will elect a chairman and vice-chairman, from among panel members, to carry out the work of the panel between sessions. The chairman will prepare reports for the WMO and IOC, as required, and act as the focal point for communications amongst the panel members.

4. The chairman may call on individual panel members for assistance in matters such as representing the panel at meetings of other bodies, preparing of reports on specific topics, etc..

5. The panel requires the support of a full-time technical co-ordinator. The costs associated with this position will be supported through voluntary contributions to a trust fund specifically designated as being for the purpose. These arrangements will be reviewed annually.

6. The panel requires support from the Secretariats of WMO and IOC in the dissemination of invitations to panel meetings and the preparation of documents and reports related to meetings.

7. The terms of reference for the panel are those given in WMO Executive Council Resolution 10 (EC-XXXVII) and IOC Executive Council Resolution EC-XIX.7. The panel also adopts as terms of reference for its technical co-ordinator those suggested by the WMO Executive Council in Resolution 10 (EC-XXXVII) and the IOC Executive Council in Resolution EC-XIX.7.

8. The working language of the panel, including for correspondence, will be English.

9. The panel's operating procedures will be revised as required at the annual meeting. The chairman will prepare recommendations to be distributed before the meeting.

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ANNEX XVIII

OPERATING PROCEDURES FOR THE DATA BUOY CO-OPERATION PANEL

1. To the extent that the Panel is a formally established body of the WMO and IOC, Panel Members will be the representatives of Members of WMO or Member States of IOC which expressed a willingness to participate in the Panel activities.

2. The Panel will meet annually. Representatives of any institution or programme actively involved in the use, development or deployment of data buoys, or which specifically require buoy data, may participate in the meetings.

3. The Panel will elect a Chairman and a Vice-Chairman, from among Panel members, to carry out the work of the Panel between sessions. The Chairman will prepare reports for WMO and IOC, as required, and act as the focal point for communications amongst the Panel members.

4. The Chairman may call on individual Panel members for assistance in matters such as representing the Panel at meetings of other bodies, preparing of reports on specific topics, etc.

5. The Panel requires the support of a full-time Technical Co-ordinator. The costs associated with this position will be supported through voluntary contributions to a trust fund specifically designated as being for the purpose. These arrangements will be reviewed annually.

6. The Panel requires support from the Secretariats of WMO and IOC in the dissemination of invitations to Panel meetings and the preparation of documents and reports related to meetings.

7. The terms of reference for the Panel are those given in WMO Executive Council Resolution ... (EC-XLV) and IOC Assembly Resolution XVII-... The Panel also adopts as terms of reference for its Technical Co-ordinator those suggested by the WMO Executive Council in Resolution ... (EC-XLV) and the IOC Assembly in Resolution XVII-...

8. The working language of the Panel, including for correspondence, will be English.

9. The Panel's operating procedures will be revised as required at the annual meeting. The Chairman will prepare recommendations to be distributed before the meeting.

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ANNEX XIX

DATA BUOY CO-OPERATION PANEL WORKPLAN AND OBJECTIVES FOR THE EIGHTH YEAR

PART A

Summary of the tasks

1. Maintain summary of requirements for buoy data to meet expressed needs of the international meteorological and oceanographic communities.

2. Maintain a catalogue of existing on-going ocean data buoy programmes.

3. Maintain a list of focal points for national contributions and within other relevant bodies with potential for involvement in buoy programmes.

4. Identify sources of buoy data not currently reported on the Global Telecommunication System and determine the reason for their non-availability.

5. If deemed necessary, make proposals to the Panel for co-ordination activity as a result of the above actions to address items 2 to 6 and 8 in the terms of reference for the Data Buoy Co-operation Panel.

6. Arrange for the circulation of information on the Panel's activities, current and planned buoy programmes and related technical developments.

7. Arrange for the implementation of a new GTS processing system to be established in the Argos processing centres.

8. Continue the arrangements (including finance) to secure the services of a technical co-ordinator.

9. Review programme and establish working priorities of the technical co-ordinator.

10. Prepare annual report of the Data Buoy Co-operation Panel.

11. Assist the South-west Indian Ocean Tropical Cyclone Committee to implement a planned drifting-buoy programme in the South-west Indian Ocean.

12. Initiate planning for a drifting-buoy programme in the South Atlantic.

13. Assist in the planning and implementation of the ocean data buoy component of the Global Ocean Observing System and of the Global Climate Observing System.

14. Keep up-to-date with the latest buoy technical developments and in particular participate in the evaluation of the new low-cost drifter developed under WOCE.

15. Co-ordinate operating guidelines for buoy data quality control as agreed by the Panel at its seventh session.

PART B

Task	Carried out by*	Supported/ assisted by	Reported to/ action by	Relevant terms of reference of the Panel
1	Technical Co-ordinator (1, 8)	Panel members and WMO/IOC Secretariats	Chairman for presentation to the Panel	1, 2
2	Technical Co-ordinator (1, 3, 8)	Panel members and WMO/IOC Secretariats	Chairman and Panel for information	1, 2
3	Technical Co-ordinator (1, 3, 5, 8)	Panel members and WMO/IOC Secretariats	Chairman and Panel for information	1, 2, 8
4	Technical Co-ordinator (1, 7)	Panel members and WMO/IOC Secretariats	Chairman and Panel for information	6
5	Technical Co-ordinator and Chairman (1, 3, 4, 5, 8, 9)	WMO/IOC Secretariats and others as appropriate	To Panel for consideration and appropriate action or for direct action by Chairman	1, 2, 3, 5
6	Technical Co-ordinator (1, 3, 4, 5, 8, 9)	Chairman, WMO/IOC Secretariats and CLS/Service Argos	Wide circulation by WMO/IOC Secretariats and CLS/Service Argos	7, 8
7	Chairman and Technical Co-ordinator (1, 2, 3, 7)	WMO/IOC Secretariats and financing Member countries	Panel and users	1, 2, 6
8	Chairman and Sub-committee	WMO/IOC Secretariats	WMO/IOC Secretariats	9
9	Chairman/Panel		Panel (at next session)	9
10	Chairman	Technical Co-ordinator	Executive Councils of WMO and IOC	10
11	Chairman	Technical Co-ordinator and WMO/IOC Secretariats	Panel	3, 5, 6, 7
12	Chairman and WMO/IOC Secretariats	Technical Co-ordinator (1, 5, 8)	Panel	4
13	Chairman	WMO/IOC Secretariats	Panel	1
14	Technical Co-ordinator (1, 4, 5, 8)	Chairman and Panel members	Panel	7, 8
15	Operational services	Panel members and Technical Co-ordinator (1, 2)	Panel	2, 3, 6

* When the Technical Co-ordinator is involved in carrying out a task, the figures in parenthesis relate to the terms of reference for the Technical

ANNEX XX

LIST OF PARTICIPANTS

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ANNEX XXI

LIST OF ACRONYMS

ABOM	Australian Bureau of Meteorology
ACCP	Atlantic Climate Change Programme
AES	Atmospheric Environment Service (of Canada)
AOML	Atlantic Oceanographic and Meteorological Laboratory (of USA)
ATLAS	Autonomous Temperature Line Acquisition System
BUFR	Binary Universal Form for the Representation of meteorological data
CBS	Commission for Basic Systems (of WMO)
CCCO	Committee on Climatic Changes and the Ocean (of IOC and SCOR)
CLS	Collecte Localisation Satellites (Service Argos)
CMM	Centre de Météorologie Marine (of CNRM)
CNRM	Centre National de Recherches Météorologiques (of Météo France)
COARE	Coupled Ocean-Atmosphere Response Experiment (of TOGA)
COSNA	Composite Observing System - North Atlantic
DBCP	Drifting-Buoy Co-operation Panel
DDC	Drifter Data Center (of SVP)
ECMWF	European Centre for Middle Range Weather Forecasts
EGOS	European Group on Ocean Stations
ENSO	El Niño/Southern Oscillation
FRGPC	French Global Processing Centre (of Argos)
FY	Fiscal Year
GCNSMS	[Long-Term] Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change (of IOC, IUCN, UNEP and WMO)
GCOS	Global Climate Observing System
GDC	Global Drifter Center (of SVP)
GIPME	Global Investigation of Pollution in the Marine Environment (of IOC)
GLOSS	Global Sea Level Observing System (of IOC)
GOOS	Global Ocean Observing System
GTS	Global Telecommunication System (of WWW)
IAntDBP	International Antarctic Drifting-Buoy Programme
IABP	International Arctic Buoy Programme
ICSU	International Council of Scientific Unions
IGOSS	Integrated Global Ocean Services System (of IOC and WMO)

IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange (of IOC)
IUCN	International Union for the Conservation of Nature and Natural Resources
JIC	Joint Ice Center (of US Navy and NOAA)
JMA	Japan Meteorological Agency
JSC	Joint Scientific Committee [for WCRP]
JSTC	Joint Scientific and Technical Committee [for GCOS]
JTA	[Argos] Joint Tariff Agreement
LATEX	Texas-Louisiana Shelf Circulation Program
LUT	Local User Terminal
MARPOLMON	Marine Pollution Monitoring (of GIPME)
MEDS	Marine Environmental Data Service (of Canada)
NATO	North Atlantic Treaty Organization
NDBC	National Data Buoy Center (of NOAA)
NESDIS	National Environmental Satellite Data and Implementation Service (of NOAA)
NFP	National Focal Points
NOAA	National Oceanographic and Atmospheric Administration (of USA)
NZMS	New-Zealand Meteorological Service
ODAS	Ocean Data Acquisition Systems, Aids and Devices
OOSDP	Ocean Observing System Development Panel (of CCCO and JSC)
OPC	Ocean Product Center (of NOAA)
ORSTOM	Institut Français de Recherche Scientifique pour le Développement en Coopération
PGC	Programme GTS Co-ordinator (of DBCP)
PI	Principal Investigator
PMOC	Participating Meteorological or Oceanographic Centre (for DBCP)
QC	Quality Control
RMS	Root Mean Square
RNODC	Responsible National Oceanographic Data Centre (of IODE)
SACLANT	Supreme Allied Command, Atlantic (of NATO)
SAI	Service Argos Inc.
SAWB	South-African Weather Bureau
SCAR	Scientific Committee on Antarctic Research (of ICSU)
SCEM	Service Central d'Exploitation de la Météorologie (of Météo France)
SCOR	Scientific Committee on Oceanic Research (of ICSU)

SMBA	Scottish Marine Biological Association
SOC	Specialized Oceanographic Centre (of IGOSS)
SST	Sea Surface Temperature
SVP	Surface Velocity Programme (of TOGA and WOCE)
TAO	Tropical Atmosphere-Ocean (of TOGA)
TC	Technical Co-ordinator (of DBCP)
TIWE	Tropical Instability Wave Experiment
TOGA	Tropical Oceans and Global Atmosphere (of WCRP)
UCAR	University Corporation for Atmospheric Research
UKMO	United Kingdom Meteorological Office
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USGPC	United States Global Processing Center (of Argos)
VOS	Voluntary Observing Ship (of WMO)
WCRP	World Climate Research Programme
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (of WCRP)
WWW	World Weather Watch (of WMO)