INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

WORLD METEOROLOGICAL
ORGANIZATION

DATA BUOY CO-OPERATION PANEL

Eleventh session

(Pretoria, 17 to 20 October 1995)

FINAL REPORT

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION (agenda item 1)

1.1 Opening of the session (agenda item 1.1)

1.1.1 The eleventh session of the Data Buoy Co-operation Panel (DBCP) was opened by the chairman of the panel, Mr D. Painting, at 09.00 hours on Tuesday 17 October 1995 in the conference room of the Department of Environmental Affairs and Tourism, Pretoria, Republic of South Africa. After welcoming participants, Mr Painting introduced the Deputy Director-General of the Department of Environmental Affairs and Tourism, Dr Francois Hanekom.

1.1.2 On behalf of his Department and of the South African Government of National Unity, Dr Hanekom welcomed all participants in the session to South Africa. He recalled the continuing dire need for both atmospheric and oceanographic data from the vast ocean areas of the world, and stressed the particular importance to South Africa of the buoy programmes being co-ordinated by the DBCP, in contributing substantially to the organization of such data. In this context, Dr Hanekom noted with appreciation the continuing increase in buoy data available globally, and commended both the panel and its regional action groups for their efforts. He then expressed the hope that the new South Africa would play its full share in the work of the DBCP and similar important international scientific activities, and in general contribute its scientific and technological expertise to help solve the many problems evident in a rapidly changing world. Finally Dr Hanekom wished participants a succesful meeting and a very enjoyable stay in South Africa.

1.1.3 On behalf of the Secretary-General of the World Meteorological Organization, Professor G.O.P. Obasi, and the Executive Secretary of the Intergovernmental Oceanographic Commission, Dr G. Kullenberg, the WMO Secretariat Representative thanked Dr Hanekom most sincerely for his kind words of welcome, for hosting the meeting in Pretoria, and for providing such excellent facilities and hospitality. He expressed the gratitude of the two organizations for the substantial support being provided by South Africa for the activities of the panel, and for the programmes of WMO and IOC in general, and in particular noted the contributions of Mr P. LeRoux and Mr E. Burger of the South African Weather Bureau in this regard. Finally, the WMO representative expressed the hope that the work of the panel, with the support of South Africa, would contribute materially to enhancing the capabilities in particular of African countries in the provision of meteorological and oceanographic services as well as in other aspects of the major programmes of WMO and IOC.

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

1.2 Adoption of the agenda (agenda item 1.2)

1.2.1 The panel adopted unchanged the provisional agenda. The final session agenda is given in Annex II. It was noted that, following a recommendation of the tenth session of the DBCP, a number of scientific and technical papers would be presented during this and future panel sessions. The presentation of these papers would take place during the second day of the session, with the texts to be published subsequently in the DBCP Technical Document series.

1.3 Working arrangements (agenda item 1.3)

1.3.1 Under this agenda item the panel decided on its hours of work and other relevant arrangements for the session. The list of documents for the session was introduced by the Secretariats.

2. REPORTS (agenda item 2)

2.1 Report by the chairman of the Data Buoy Co-operation Panel (agenda item 2.1)

2.1.1 The chairman recalled that the previous session of the panel had drawn up a comprehensive and challenging workplan for the intersessional period. Consequently it was pleasing for the chairman to note that action was complete or continuing, as appropriate, on all the listed topics, thanks to the hard work of panel members and especially through the efforts of the technical co-ordinator and the Secretariats of WMO and IOC.

2.1.2 The chairman drew special attention to a number of achievements:

(a) The production of three technical documents in the DBCP series, covering respectively guidance on Argos data collection and location services, guidance on the Argos GTS Sub-system and construction details for the SVP-B drifter;

(b) The transfer of the DBCP near real-time buoy quality control system from Omnet to Internet;

(c) Initial action to determine the level of interest for an Indian Ocean buoy programme.

2.1.3 The chairman reported that he had represented panel interests at three international meetings during the intersessional period and had assisted CLS/Service Argos in organizing an Argos Users Conference in Cambridge, United Kingdom, in September in 1995.

2.1.4 The panel expressed its appreciation to the chairman for his report and for his actions on behalf of the panel. Discussion on issues raised is recorded under the relevant agenda items.

2.2 Report by the technical co-ordinator (agenda item 2.2)

2.2.1 The technical co-ordinator presented his activities during the past intersessional period. He was employed by IOC/UNESCO and based in Toulouse, France. Compared to the previous intersessional period, he spent more time travelling and preparing the missions on behalf of the panel. In particular, he travelled to Washington D.C. in early 1995 for the implementation of an Internet World Wide Web server at NOAA/NOS headquarters.

2.2.2 As far as quality control was concerned, the technical co-ordinator assisted in switching from Omnet to Internet for the DBCP quality control guidelines. This was effected on 1 December 1994. In mid-1995 the technical co-ordinator co-ordinated standardization of the buoy monitoring statistics.

2.2.3 As requested by the panel at its previous session, the technical co--ordinator conducted a comprehensive study for the possible implementation of the BUFR code within the Argos GTS Sub-system. This was to be decided later during the session. The technical

co-ordinator also presented a study on GTS delivery delays as well as overall delays between time of observation and time of insertion on the GTS by Service Argos: onboard delays, orbital delays, data processing delays, GTS delivery delays. This study was conducted in early 1995 with the support of various GTS routing centres. This study would be included in the 1995 DBCP Annual Report.

2.2.4 The technical co-ordinator also informed the panel of the work he did regarding the development of the SVP barometer drifter, and of the work related to small improvements within the Argos GTS Sub-system. Finally, the technical co-ordinator completed the GTS Sub-system Reference Guide and provided assistance in updating the Guide to Data Collection and Location Services using Service Argos. These two guides have recently been published by WMO within the DBCP Technical Documents series.

2.2.5 The full report of the technical co-ordinator is given in Annex III. The panel expressed its appreciation to the technical co-ordinator for his substantial achievements on its behalf. Discussion on various issues raised is recorded under appropriate agenda items.

2.3 Report by the Secretariats (agenda item 2.3)

2.3.1 The representative of the WMO Secretariat reported to the session that the major activity 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. Details of this are discussed under agenda item 3. In addition, the WMO Secretariat had also undertaken a variety of other administrative and technical tasks in support of the work of the panel, or of data buoy programmes generally. In particular, the report of the DBCP had been submitted to Twelfth World Meteorological Congress, which had expressed its continuing high appreciation for the work of the panel, and urged as many WMO Members as possible to support the DBCP, both financially and in other ways. In addition, WMO Secretariat activities during the past year included maintenance of various lists (buoy identifier numbers, national focal points, logistic support focal points); support for the action groups of the panel; liaison with other organizations and bodies (especially WCRP, GCOS and SCOR); preparation of material for the WWW monthly newsletter, WMO Bulletin, etc; liaison with CBS on code matters; initial preparation for a possible Indian Ocean programme.

2.3.2 The representative of the IOC Secretariat reported that the IOC Assembly, at its eighteenth session (Paris, June 1995), had briefly reviewed the panel's activities and commended it upon its various achievements during the last few years. It once more urged as many Member States as possible to contribute to the funding of the panel. The actions taken by the IOC Secretariat to manage the employment of the technical co-ordinator are reported under agenda item 3.

2.3.3 The IOC representative presented to the panel a proposal under which the panel might consider funding the missions of the IOC and/or WMO officers in-charge to attend its sessions. That proposal was put forward to provoke thoughts on the part of panel members during the intersessional period, and not for immediate discussion or decision.

2.4 Reports by the action groups of the panel (agenda item 2.4)

2.4.1 The panel had before it written reports by the International Arctic Buoy Programme (IABP), the International Programme for Antarctic Buoys (IPAB) and the European Group on Ocean Stations (EGOS). Those reports will be published in the Annual Report of the panel as usual, together with a report from the International South Atlantic Buoy Programme (ISABP).

The chairman briefly introduced the IABP and IPAB reports and gave the floor to the EGOS representative.

European Group on Ocean Stations

2.4.2 Mr F. Sigurdsson, Iceland, vice-chairman of the European Group on Ocean Stations (EGOS), gave an oral report on its activities and on the status of drifting and moored EGOS buoys in the North Atlantic. He highlighted items from a written report on EGOS available in the session documentation and noted that the operational status of the EGOS programme had remained relatively stable over the past three years, with some 15-20 drifting and six to seven moored buoys in operation at any one time. Thus the EGOS buoys created a very useful network of observations in the North Atlantic. The EGOS programme has usually been providing some 50-60% of the meteorological drifting buoys in the North Atlantic, the remainder being provided mainly by France and the USA.

2.4.3 Mr Sigurdsson noted that 28 drifting EGOS buoys had been deployed in 1994 and 18 so far in 1995. He commented on the generally very good quality of the pressure observations from the EGOS buoys and the satisfactory quality of other observed variables.

2.4.4 Towards the end of his presentation Mr Sigurdsson drew special attention to a useful EGOS publication issued in June 1995: ***Minimum specifications and guidelines for the operation of EGOS drifting buoys*** (EGOS Technical Document No. 88).

2.4.5 Finally, he mentioned plans for an EGOS meeting in the United Kingdom during the early summer of 1996, at the same place and during the same week as a planned meeting of the International Arctic Buoy Programme. The plan is to have a joint one day meeting of both action groups, for discussion of technical and operational matters.

International South Atlantic Buoy Programme

2.4.6 Mr Piet LeRoux, chairman of the ISABP Programme Committee, reported on the programme activities since its establishment in 1994. It began with the deployment of some 41 SVP-drifters, 24 deployed by the South African Navy and 17 deployed by the USA Navy. Unfortunately, due to budget cuts and the resultant effect thereof on shiptime, this relatively high deployment rate was not maintained. Fortunately, however, the mortality rate amongst these buoys has been very low, but the displacement from west to east out of the South Atlantic into the South Indian Ocean is high.

2.4.7 During the remainder of the year till October 1995, five drifters were deployed during three voyages of opportunity. Ironically, buoys to be deployed were always in supply but deployment opportunities lacking. During the austral spring, however, plans were eventually finalized for a deployment voyage to place 25 SVP-B drifters in the South Atlantic between 10°E and 30°W, 34°S and 55°S. Also during this voyage the automatic Argos stations at Southern Thule and Zavodovski of the South Sandwich Island group will be serviced. During February and March 1996, the automatic station on Bouvet will be serviced on behalf of Norway.

2.4.8 Further plans for the foreseeable future were the installation of a DCP station on Tristan da Cunha Island, as well as looking into possible anchored Atlas buoys along the mid-Atlantic ridge.

3. FINANCIAL AND ADMINISTRATIVE MATTERS (agenda item 3)

3.1 Financial situation (agenda item 3.1)

3.1.1 The panel considered the financial statements provided by WMO and IOC as follows:

(a) Finalized IOC account June 1994-May 1995;
(b) Interim WMO account January 1994-31 August 1995;
(c) Provisional WMO statement of estimated income and expenditure to 31 May 1996.

These statements are reproduced in Annex IV.

3.1.2 The panel accepted and approved the various statements. It was noted that, subject to a satisfactory outcome to the acquisition of a workstation for the technical co-ordinator, to implement the proposed co-operation with Meteo France (see agenda item 3.3) later), an operating surplus of up to USD10,700.- was expected for the year 1995-1996, and that this should be transferred to the 1996-1997 budget, as in the past.

3.2 Review of contracts (agenda item 3.2)

3.2.1 The panel reviewed and approved the terms of the IOC-UNESCO employment contract for the technical co-ordinator, as well as of the contract between IOC-UNESCO and CLS/Service Argos for logistic support. The panel took this opportunity to place on record its gratitude to CLS/Service Argos for their continuing support for the work of the panel, and also for accepting to sign the contract only when the funds to cover it are finally available to the Secretariats. It formally thanked CLS/Service Argos for their kind understanding of the situation.

3.3 Employment status of the technical co-ordinator and commitments for future funding (agenda item 3.3)

3.3.1 The panel recalled the agreement made with Mr Charpentier at the end of 1994, that he would be willing to remain as technical co-ordinator, located in Toulouse and employed by IOC/UNESCO, until at least 31 May 1997. It therefore decided to continue the existing arrangements for the next financial period, 1 June 1996 to 31 May 1997, subject to the availability of funds. With regard to future years (beyond May 1997) and bearing in mind the long lead-time required to recruit a new technical co-ordinator, the panel noted the agreement of Mr Charpentier to inform the chairman, by the end of December 1995, whether or not he may wish to continue as technical co-ordinator beyond 31 May 1997. In the event of a decision to continue on the part of Mr Charpentier, it was agreed by the panel that it would retain him as technical co-ordinator, subject to the availability of funds.

3.3.2 The panel then reviewed draft estimates provided by UNESCO for the cost of the technical co-ordinator's contract for 1996-1997 and 1997-1998, which are reproduced in Annex V. It noted the uncertainties inherent in these estimates, and therefore agreed that it should budget a total of USD90,000.- for the technical co-ordinator's employment contract for 1996-1997. Any difference (shortfall) between this and the actual cost of employment of the technical co-ordinator by UNESCO for this year should be made up from the surplus accumulated by UNESCO from previous years (around USD18,000.- in total).

3.3.3 The panel further agreed that it should include in the 1996-1997 expenditure budget:

(a) USD15,000.- for official travel for the technical co-ordinator (unchanged now for several years);

(b) USD15,000.- to cover a logistic support contract with CLS/Service Argos. Recalling that the 1995-1996 contract was for FRF79,000.-, that the present inflation rate in France (around 1.3%) was lower than previously anticipated, and bearing in mind the large fluctuations in the USD-FRF exchange rate, the panel decided that the 1996-1997 contract with CLS/Service Argos should be for FRF 80,000.- or the FRF equivalent of USD15,000.-, whichever was the greater. With the agreement of CLS/Service Argos, it was also decided that this should continue to be the contract sum for subsequent years, or at least until the exchange rate and inflation situation had changed substantially;

(c) A total of USD20,000.- to cover travel of the chairman and/or vice-chairmen on panel business, publications, consultancies and possible costs of leasing a computer workstation for the technical co-ordinator;

(d) USD300.- to cover direct WMO costs;

(e) USD7,750.- for various small items of expenditure and for contingencies such as unexpected cost increases and unfavourable exchange rate fluctuations.

The table of expected expenditures for 1996-1997 is given in Annex VI (A).

3.3.4 In recalling the expected carry-over from 1995-1996 of around USD10,700.-, the panel noted that a total of USD137,350.- would be required to be recouped from Member countries' contributions in 1996-1997 to cover the estimated expenditures. The table of estimated income for 1996-1997 is given in Annex VI (B).

3.3.5 On the basis of provisional offers of contributions made by representatives at the session, and of other information available, the panel established a draft table of contributions for 1996-1997, which is given in Annex VII. It was noted that the contributions from previous contributing Member countries had remained essentially unchanged since 1993-1994. The proposed new contributions for 1996-1997 from New Zealand and South Africa were very much welcomed by the panel.

3.3.6 The panel recalled the request made at the tenth session of the DBCP, for Mr F. Gerard (France) to investigate terms and conditions for a possible future working arrangement between the technical co-ordinator and Meteo France. In this context, the panel noted with appreciation the letter from Mr Gerard to the panel chairman containing a proposal for such an arrangement (see Annex VIII). It was agreed that the collaboration proposed would be in the interests of the DBCP, of WMO and IOC, and of all Member States, in particular in facilitating monitoring and simulation studies by the technical co-ordinator using data in the Meteo France data banks. The panel therefore accepted with appreciation the kind offer of Meteo France, and requested the chairman to respond to Mr Gerard to this effect. It was further noted that the proposed arrangement incurred no direct costs to the panel, except for that involved in the acquisition of an appropriate computer workstation for the technical co-ordinator, to allow connection to the Meteo France network. In this regard, the panel accepted with appreciation the kind offer of Mr W. Woodward (USA) to investigate the possibilities for

the donation/loan by the USA of an appropriate workstation to the panel, for use by the technical co-ordinator. If such a donation/loan was not possible, the panel requested the technical co-ordinator to work with the chairman and the Secretariats to find some other suitable and cost-effective arrangement, such as donation/loan by another country, or leasing of the workstation locally.

3.3.7 Finally under this agenda item, the panel noted that the costs for employment, travel and logistic support for the technical co-ordinator continued to increase naturally, but that contributions (and the overall income budget) had remained unchanged now for several years. It recognized that some increase in the income budget would almost certainly be required in 1997-1998. This increase would have to come from either new contributing Member countries or increased contributions from existing contributors, or both. The panel therefore requested its officers, members and the Secretariats to continue their efforts to recruit new contributing Members to the panel. At the same time, it indicated to existing contributors that some small increase in contributions would probably be required in 1997-1998, in order to maintain the position of the technical co-ordinator, which all agreed was essential to the successful implementation of the panel's work programme.

4. RELATIONSHIP WITH INTERNATIONAL PROGRAMMES/ORGANIZATIONS (agenda item 4)

4.1 World Climate Research Programme (WCRP) (agenda item 4.1)

4.1.1 The Director of the International CLIVAR Project Office, Dr M. Coughlan, made an oral presentation to the session. He noted that over the next decade, CLIVAR (Climate Variability & Predictability Programme) will become the principal research component of the World Climate Research Programme, with an ongoing interest in the continued development and implementation of data buoy programs. Building on the experience and successes of TOGA and WOCE, it was expected that CLIVAR will institute major research projects addressing the monsoon systems of the world, *e.g.* the Asian/Australian Monsoon and the American Monsoon. As WOCE moves into its synthesis and modelling phase, it is anticipated also that new initiatives on ocean/climate research will be developed under the CLIVAR umbrella. The Scientific Steering Group for CLIVAR has appointed an Upper Ocean Panel to assess and evaluate current upper ocean observing systems, to determine the upper ocean observational requirements for CLIVAR, and to develop and implement an evolving strategy for an upper ocean observing system in support of CLIVAR. From the outset, it is recognized that CLIVAR will need to coordinate its requirements for *in situ* ocean observations with the emerging requirements being specified under GCOS/GOOS, and with the ongoing observing needs specified under the World Weather Watch and IGOSS. It is anticipated that additional pointers to future CLIVAR needs for ocean observations will emerge from two workshops planned for the third quarter of 1997 addressing ocean circulation and ocean/atmosphere interactions respectively on decadal to centennial timescales. The need for effective communication between CLIVAR and the DBCP on programme development should be noted by the appropriate working group and panel chairs, while the task of ensuring effective co-ordination at a practical level is a joint responsibility of the DBCP technical co-ordinator and the Director of the International CLIVAR Project Office.

4.1.2 The panel expressed its appreciation to Dr Coughlan for his participation in the session and for his presentation. It reiterated its willingness to co-operate closely with CLIVAR whenever appropriate and possible, and requested that CLIVAR requirements for buoy data should be passed to it, through the technical co-ordinator and the Secretariats, as they are

developed. It also noted and endorsed the proposal of Dr Coughlan for co-ordination on practical issues to be effected between the International CLIVAR Project Office and the technical co-ordinator.

4.2 World Weather Watch (WWW) (agenda item 4.2)

4.2.1 As requested by the tenth session of the DBCP, the session was presented with the final decisions of Twelfth World Meteorological Congress regarding WMO policy and practice for the exchange of meteorological and related data and products. These decisions are contained in section 11.4 of the general summary of the abridged final report of Cg-XII, and in Resolution 40 (Cg-XII). Of particular interest to the panel were:

(a) General summary, paragraph 11.4.7(a), which requests WMO technical bodies (including, *inter alia*, the DBCP) to assume the responsibility for acquiring and studying the views of their members on technical impacts (of the policy and practice);

(b) The **policy** and **practice** as adopted by Cg-XII in Resolution 40 (Cg-XII) under **ADOPTS;**

(c) Data and products to be exchanged without charge and with no conditions on use, contained in Annex I to the resolution under **Contents**, and which include, *inter alia*, **all *in situ* marine data;**

(d) General summary, paragraph 11.4.5, on the importance of WMO co-ordinating with other organizations (*inter alia*, IOC) on data exchange issues.

4.2.2 The panel expressed its complete satisfaction with the decision of Congress to include buoy data for free and unrestricted exchange, which reflected its own long-standing policy. With regard to the request from Congress given in paragraph 4.2.1(a) above, the panel noted that the WMO Commission for Basic Systems (CBS) was to continue to take the lead on this issue, and it therefore agreed to respond to any request from CBS for assistance in the area of buoy data and products, if and when required.

4.3 Integrated Global Ocean Services System (IGOSS) and International Oceanographic Data and Information Exchange (IODE) (agenda item 4.3)

4.3.1 The panel was presented with the reports of the IGOSS Specialized Oceanographic Center (SOC) for buoys, maintained by Meteo France, and the IODE Responsible National Oceanographic Data Centre (RNODC) for buoys, maintained by the Marine Environmental Data Service (MEDS) of Canada, and expressed its appreciation to both centres for the work undertaken. As far as the first report was concerned, the panel noted a significant decrease in the number of air pressure measurements coming from moored buoys. The panel requested the technical co-ordinator to attempt to clarify this question.

4.3.2 As far as the MEDS report was concerned, the panel expressed appreciation for the efforts of the RNODC-Buoys and the technical co-ordinator to try and find a common approach/methodology to deal with buoy statistics, and therefore obtain comparable figures. Some work was still needed to reach that goal, since there are various ways of counting the buoys ("active" in Argos words, "on the GTS", "emitting at least once a month", " having been located at least once a month" etc,). In addition, the technical co-ordinator had noted that

MEDS probably did not receive all the buoy data available on the GTS and that this problem should be solved.

4.3.3 The panel considered that its aim was to assess the actual evolution in the numbers of "useful" buoys and of those transmitting data over the GTS, with a view to encouraging the GTS distribution of all useful buoy data. It recognized that such an exercise was not straightforward, because of the accounting problems noted above, as well as of the difficult question of duplicates and quasi-duplicates circulating over the GTS. It therefore encouraged the RNODC to pursue its efforts, together with the technical co-ordinator, to try and find an acceptable solution to those problems.

[**Note:** Useful buoy data are defined as any reliable geophysical variable measurements that can be obtained from a data buoy and used by either the oceanographic or meteorological community in support of their programmes.]

4.4 Global Ocean Observing System (GOOS) and Global Climate Observing System (GCOS) (agenda item 4.4)

Global Ocean-Observing System

4.4.1 The panel was presented with a report on contributions to GOOS progress during the last 12 months, which included the publication by the WCRP of the Ocean Observing System Development Panel (OOSDP) final report: **An ocean observing system for climate**; the first session of the Strategy Sub-Committee (SSG) of the IOC-WMO-UNEP Committee for GOOS (I-GOOS) (Geneva, March 1995); the second session of the Joint IOC-WMO-ICSU Scientific and Technical Committee for GOOS (J-GOOS) (Paris, April 1995); and the second session of I-GOOS (Paris, June 1995). It requested clarifications regarding EuroGOOS (a "consortium" of European agencies wishing to develop GOOS activities in the waters of interest to Europe) and the North-East Asian Regional (NEAR) GOOS (an attempt to implement GOOS on a regional basis in the seas bordering China, Japan, Korea and Russia). It considered it was mainly concerned with the OOSDP report, which addressed observational data requirements for climate. With regard to its own relationship to GOOS, it considered that its terms of reference were already appropriate to assisting in the implementation of GOOS. Other developments in that field are reported under agenda item 6.5.

Global Climate Observing System

4.4.2 The panel was presented with a report on GCOS progress during the last 12 months and noted especially the excerpt from the GCOS Plan relating to ocean components, mainly based on the OOSDP report. It recognized that GCOS had always been very supportive of the work of the panel, in particular in co-sponsoring the establishment of action groups (e.g. the ISABP and hopefully the future Indian Ocean group). As in the case of GOOS, GCOS has not yet developed specific requirements relevant to the activities of the panel, but general support for the panel by GOOS and GCOS was considered important, since it will then be reflected at the level of the national committees which try to co-ordinate GOOS, GCOS and other similar activities. In particular, the establishment of pertinent action groups is an appropriate way for the panel to assist the global observing systems.

5. REPORT ON CURRENT AND PLANNED BUOY PROGRAMMES (agenda item 5)

5.1 The panel noted that written reports were received from Australia, Brazil, France, Hong Kong, Iceland, Iran, Japan, Netherlands, New Zealand, Republic of Korea, South Africa, United Kingdom and USA, in addition to the already quoted reports by its action groups. The panel requested that these reports, as well as others received in the standard format, be included as usual as annexes to its annual report.

6. CO-ORDINATION ACTIVITIES (agenda item 6)

6.1 Quality control of buoy data (agenda item 6.1)

6.1.1 The technical co-ordinator reported on operating the quality control guidelines during the intersessional period. Ten Principal Meteorological or Oceanographic Centres responsible for Quality Control of GTS buoy data (PMOC) are now participating, including the South African Weather Bureau which started acting as such during the last intersessional period. Compared to the previous year, the level of activity of the QC guidelines remained similar. For a total of 1202 buoys that reported on the GTS during the period 1 July 1994 to 30 June 1995, following 669 status change proposals from PMOCs related to 292 buoys, 187 buoys had their status changed. Nearly 60% of the modifications were implemented within eight days.

6.1.2 The guidelines successfully switched from Omnet to the Internet on 1 December 1994, thanks to the support of the Icelandic Meteorological Office. The mailing list address is **buoy-qc@vedur.is** Nineteen centres or individuals are presently registered on the list and automatically receiving QC messages posted by the PMOCs. The technical co-ordinator also co-ordinated the standardization of the format of the buoy monitoring statistics produced by the ECMWF, Météo France, NOAA National Centre for Environmental Prediction (USA), and the United Kingdom Meteorological Office. Statistics are now available via the mailing list in the new format, starting in July 1995. Criteria used are now similar and the statistics can easily be loaded in standard data base management systems.

6.1.3 The technical co-ordinator showed that, while the number of GTS air pressure observations used by the numerical weather prediction models had increased steadily since 1988 from about 15000 to about 80000 per month (ECMWF), the mean RMS difference between observation and ECMWF first-guess model field dropped from about 4 hPa to about 1.8 hPa per month (see Annex IX).

6.1.4 The panel recognized the effectiveness of the QC guidelines in improving the quality of buoy data disseminated on the GTS but stressed that principal GTS co-ordinators should react as quickly as possible to status change proposals as posted by PMOCs, in order to maintain a high level of reliability of GTS buoy data.

DBCP Internet World Wide Web (WWW) server

6.1.5 As requested by the panel at its tenth session, thanks to the kind support of the NOAA National Ocean Service a DBCP server had been implemented in February 1995 with the assistance from the technical co-ordinator of the DBCP. The server is still in its development phase but useful information can already be found:

- general information regarding the DBCP
- connection to other servers such as the IABP, NDBC, SAI and Meteo France

- quality control information including description of the QC guidelines, connection to the IMO for accessing archived QC messages on individual buoys, and connection to Meteo France for accessing the buoy monitoring statistics
- Information on technical developments (*e.g.* SVP-B)
- data collection and location services
- GTS distribution of the data, including the GTS sub-system reference guide and the list of WMO/Argos identification numbers
- types of buoys
- points of contact, including the list of national focal points for data buoy programmes and the list of national focal points for logistic support.

The Internet address of the server is **http://dbcp.nos.noaa.gov/**

6.1.6 The panel requested the technical co-ordinator to look at possible improvements such as links to action group servers (*e.g.* possible ISABP server) and including the list of meetings and events of interest to the panel. It also recommended that members of the panel interested in adding information in the server regarding their activities should forward adequate information to the technical co-ordinator.

6.2 Code matters (agenda item 6.2)

6.2.1 At its tenth session the DBCP requested the technical co-ordinator to prepare an analysis of the technical and costing aspects of implementing BUFR in Argos, for presentation to the eleventh session of the DBCP. The BUFR code has the advantages of being (*i*) universal; (*ii*) flexible; and (*iii*) binary (shorter messages). However, it is not a human readable format; for certain GTS users it will be necessary to continue distributing the data in BUOY format if BUFR has to be used; and no strong requirement has been expressed yet from the users' community.

6.2.2 As far as implementing BUFR within the Argos GTS sub-system is concerned the technical co-ordinator studied NOAA and ECMWF encode/decode software. He recommended that, if BUFR had to be implemented, a complete encoder be developed instead of interfacing either of the ECMWF or NOAA encoders. In any case, BUFR tables have to be incorporated and managed within the GTS sub-system. Standard decoders should however be used for test and monitoring purposes. The technical co-ordinator therefore wrote specifications for implementing BUFR within the Argos GTS sub-system. CLS/Service Argos submitted the specification to Digital Equipment, France (DEC), for development cost evaluation. DEC established the work required: about 124 man/days, *i.e.* about 450 KF.

6.2.3 The technical co-ordinator stressed that the DBCP should precisely define the requirements for GTS distribution of buoy data and decide whether buoy or sensor status information, quality control, engineering information, or any metadata should be included in BUFR reports. In that regard the relevant BUFR tables should be updated and the DBCP decided to establish a sub-group to prepare recommendations to CBS to this effect. The sub-group comprised the technical co-ordinator, Mr Etienne Charpentier, Mr David Gilhousen (NDBC) and Mr Pierre Blouch (Meteo France). Noting the comments provided by the CBS Expert Meeting on Data Representation and Codes (Silver Spring, September 1995) on this issue, the panel requested the technical co-ordinator to contact the chairman of the CBS Sub-group on Data Representation and Codes, Dr C. Dey, as soon as possible, to fully co-ordinate the work of the DBCP sub-group with the relevant CBS experts. Finally on the issue of BUFR encoding of buoy data, the panel requested the WMO Secretariat to inform CBS of its views and proposals on

the subject, and to seek further clarification of the present requirements for GTS distribution of buoy data in BUFR.

6.2.4 The panel noted the decision of the same CBS expert meeting to recommend the addition of a national section to the existing BUOY code, to enable the inclusion of certain types of buoy data required for purely national distribution purposes. It encouraged panel members to make use of this new facility, as appropriate, for their own national requirements. It also stressed that, if there were such national requirements which required actions by Argos to include other data in GTS BUOY messages, then national services should approach either CLS/Service Argos, or the technical co-ordinator, individually to implement such actions, since this was not an issue for the DBCP as a whole.

6.3 New Argos GTS processing sub-system (agenda item 6.3)

6.3.1 The technical co-ordinator reported on the Argos GTS sub-system, which is flexible and permits data processing and quality control of almost any kind of Argos message format. The flexible nature of this system also makes it more complex to use, so the panel stressed that any member of the panel can rely upon the technical co-ordinator for assistance and co-ordination with Service Argos for implementing new buoys on the GTS.

6.3.2 A few improvements had been implemented in the system during the last intersessional period, including implementation of the BUOY code to replace DRIFTER, a dedicated time-tag algorithm for NDBC WAAP stations, automatic feed-back onto the BUOY-QC mailing list for some of the implemented status changes, dedicated software modules for dealing with specific types of transfer functions (*e.g.*dedicated air pressure module for the Alfred Wegener Institute, computation of air dew point temperature for the South African Weather Bureau), new data groups in the SYNOP and SHIP code not previously handled, data processing of location (*e.g.* GPS) information encoded in the Argos messages. A few problems had also been reported and fixed rapidly.

6.3.3 The panel recognized that it might be useful, in order to convince new operators to place their buoy data on the GTS, to promote the system by sending a documentation package to all Programme Managers of Argos stations potentially reporting on the GTS. The package would include a letter from the chairman of the DBCP, the GTS Sub-system Reference Guide (DBCP technical document No. 2), the DBCP Guide to Data Collection and Location Services Using Service Argos (DBCP technical document No. 3), a summary on the GTS sub-system as written by the technical co-ordinator (English and French), and the dedicated technical file. The panel therefore requested its technical co-ordinator to implement this action.

6.4 Combined meteorological/oceanographic drifting buoys (agenda item 6.4)

6.4.1 The panel noted with interest that the report of the DBCP/SIO Workshop on the SVP barometer drifter evaluation (New Orleans, May 1995) had recently been finalized, and agreed that this report should be published in the DBCP technical document series. The panel considered that the co-operation between itself and SIO on the development and evaluation of the SVP-B drifter had been particular fruitful, and commended all concerned for their efforts. In noting that evaluation of the SVP-B was still ongoing, the panel agreed that another such workshop should be convened, in approximately 12 months, if possible in conjunction with the twelfth session of the DBCP.

6.4.2 The panel further noted with interest the ongoing work by Meteo France to develop and refine a drifter with both wind and sub-surface temperature sensors, as well as the early

development work by SIO of an SVP-B drifter with wind and/or air temperature sensors. It commended and encouraged both activities, and agreed on the need to maintain a technical sub-group, to facilitate collaboration between the DBCP and these development activities, in particular in the area of drifter/sensor evaluation. It therefore decided to re-establish the technical sub-group, with the following membership: the chairman of the DBCP, P. Blouch (France), G. Jones (Australia), P. LeRoux (South Africa) and D. Meldrum (United Kingdom). Overall, the panel agreed that existing and developing drifters and sensors now largely satisfied requirements of both meteorologists and oceanographers for this type of *in situ* ocean platform.

6.5 Formation of other action groups (agenda item 6.5)

Indian Ocean Buoy Programme

6.5.1 The panel noted with interest and appreciation that, following a proposal made at the tenth session of the DBCP, the chairman had written (in August 1995), to a large number of individuals and institutions worldwide, seeking expressions of interest in the possible establishment of an International Buoy Programme for the Indian Ocean (IBPIO). At the time of the session, a number of institutions had indicated such an interest, either verbally or in writing. It was therefore agreed that a first preparatory meeting for such a possible programme should be convened, in early 1996, at a venue in the region yet to be decided, co-sponsored by the DBCP and GCOS. Depending on the results of this first preparatory meeting, it was possible that the programme could be formally established prior to the twelfth DBCP session. The panel commended the chairman and the Secretariats for their efforts so far, and reiterated its view on the potential importance of such a programme, both regionally and globally. It therefore wished the first preparatory meeting every success.

Possible DBCP Global Programme

6.5.2 The panel noted with interest a discussion paper prepared by the technical co-ordinator, on the possible establishment of a DBCP Global Buoy Programme. This discussion paper is given in Annex X. During the subsequent discussions, the following points were made:

(a) A global programme would not seek to define requirements for buoy data, but would rather provide a focal point and co-ordination mechanism for implementing the requirements of global programmes such as WWW, GOOS, GCOS and CLIVAR;

(b) A global programme would provide a mechanism to coordinate the work of regional action groups and other specific programme activities such as SVP and TAO, in support of global requirements. As such, the global programme would not seek to manage the activities of these various groups, but rather integrate them in a global context, in order to identify gaps and propose (and sometimes implement) solutions to fill these gaps;

(c) A global programme would greatly facilitate co-ordination between meteorologists and oceanographers in buoy deployment strategies, as proposed at DBCP-X;

(d) A global programme would assist to clarify the role of the DBCP vis-a-vis global programmes such as GOOS, GCOS and CLIVAR; it would provide a new focus for the overall work of the panel, and assist to publicize this work as well as that of the action groups;

(e) Structurally, a global programme could be managed by a programme sub-group, which would meet in conjunction with and report to the annual sessions of the panel; the global programme would be supported by the technical co-ordinator of the DBCP, and thus should involve no additional cost to the panel, nor any additional meeting overheads.

6.5.3 The panel agreed that the proposal was a very interesting one, and worthy of further development. It therefore requested the chairman and the technical co-ordinator, together with the Secretariats, to prepare a more detailed and specific proposal for a global programme. This should be distributed to panel members and national focal points for the DBCP as soon as possible for discussion and consideration at the national level, so that more feedback can be obtained and a decision on the possible implementation of a global programme made at the next session.

6.6 Co-operation between operational and research programmes (agenda item 6.6)

6.6.1 The panel recalled that there were four action items on this subject identified at DBCP-X. The results of these actions are:

(a) The Sub-group on Technical Developments had worked with SIO on SVP-B evaluations, and would continue this work as well as other buoy technical development activities (see item 6.4 above);

(b) A technical and scientific session at DBCP-XI had been organized (see item 7 below);

(c) The proposed global programme (see item 6.5) would provide a mechanism for co-ordinating deployment strategies;

(d) The National Meteorological Centre, NWS, NOAA, USA had agreed to undertake a study on the variation in impact on numerical weather analyses of various buoy array and reporting configurations; this study would be focused initially on the South Atlantic, and results should be available by DBCP-XII. The Bureau of Meteorology Research Centre, Australia, had also agreed to consider a similar study for the Southern Ocean.

6.6.2 The panel expressed its appreciation for these actions, and noted with satisfaction that co-operation among operational/research and meteorological/oceanographic buoy programmes was now at a healthy level, and increasing all the time. It reiterated its desire to continue to co-operate as closely as possible with other data buoy groups and programmes, and noted that the proposed global programme should provide a good mechanism for such co-operation.

6.7 New communication techniques and facilities (agenda item 6.7)

6.7.1 The panel listened with interest to a detailed presentation by CLS/Service Argos on planned enhancements to the Argos system. The developments are to take place in three stages:

(a) The introduction of the new Argos-2 equipment onboard NOAA-K, -L, -M and -N, beginning with the launch of NOAA-K in 1996. The new equipment effectively increases the data throughput of the system by doubling the number of receiver

channels and by widening the frequency band available to Argos PTTs. System sensitivity is also increased;

(b) The addition of an Argos payload to the Japanese satellite ADEOS-II, with a planned launch date of 1999. An important innovation will be the availability of a downlink channel allowing limited two-way communication with suitably-equipped PTTs. Data timeliness is also likely to improve through the use of a geostationary satellite for the near real-time downloading of a significant proportion of the Argos data;

(c) The development of a greatly enhanced system, Argos-3, which is expected to fly from 2001 onwards, onboard the next generation of NOAA satellites and the ESA/EUMETSAT METOP series. The design of Argos-3 has yet to be finalized, and will depend heavily on the perceptions of user needs. Options to be explored include two-way communication for platform control and message acknowledgement, and the use of a range of frequency channels with data rates and sensitivities matched to individual classes of application (*e.g.* animal tracking, high data-volume buoys, etc.).

6.7.2 The panel thanked CLS/Service Argos for their invitation to help produce a detailed specification for Argos-3, and urged individual members to ensure that their user community responded to the questionnaire that had been circulated by CLS/Service Argos. While the panel felt that it would not be appropriate or possible for it to express a single view on the priorities for Argos-3, it noted with interest the assessment made by its technical co-ordinator on the basis of his expert knowledge of users' requirements. This personal analysis is attached as Annex XI and the panel encouraged the technical co-ordinator to submit this to CLS/Service Argos.

6.7.3 Moving to the question of alternative satellite communication technologies, the panel noted that some of the Low Earth Orbit (LEO) systems currently being developed might be of great interest to buoy operators. Two LEO operators (Orbcomm and SAFIR) had launched satellites since the last panel session, and many more were at an advanced stage of planning. Most systems offered two-way communication, as well as positioning to the same order of accuracy as Argos. Recognising the importance of developments in this area, the panel requested Mr D. Meldrum (United Kingdom) to prepare an updated table of satellite systems for inclusion in its Annual Report, and asked that it be kept informed of progress in satellite communication technology.

6.7.4 Finally, the panel noted a suggestion by Mr M. Bushnell (USA) regarding the communication by Argos of buoy-derived GPS locations via a LUT. This system might prove particularly attractive to operators engaged in relatively near-shore studies, and would overcome difficulties previously experienced with LUT location accuracies. Other advantages such as a saving in Argos costs, and the availability of accurate GPS time onboard the buoy for observation and transmission scheduling, would accrue from the adoption of such an approach.

6.8 Other co-ordination activities (agenda item 6.8)

6.8.1 Under this item, the panel was informed that certain commercial interests had expressed a desire to be partners and participate in the IABP, but did not wish to pay the full Argos commercial tariff for such participation. The panel recalled that, under the rules of the JTA, commercial organizations were not permitted to participate in the JTA. It was further informed, however, that CLS/Service Argos had tentatively agreed to apply the JTA tariff to

platforms deployed by commercial organizations for the express purpose of contributions to the IABP or other formal DBCP or related programmes, on the advice of the chairmen of these programmes, although these platforms could still not be counted under the JTA. The panel noted that this agreement would be formalized at the fifteenth Meeting on the Argos Joint Tariff Agreement and considered that such an arrangement was the most appropriate under the circumstances.

7. SCIENTIFIC AND TECHNICAL PRESENTATIONS (agenda item 7)

7.1 As agreed at the tenth session of the DBCP, a full-day session at the meeting was devoted to contributed scientific and technical presentations on topics related to buoy technology and the processing, distribution and applications of buoy data. The panel regarded this innovation as being very successful, and expressed its appreciation to all contributors for their presentations. It agreed that the texts of all papers presented should be compiled as consolidated technical session proceedings, and published in the DBCP technical document series. It therefore requested all contributors to provide these texts, in camera-ready form and on diskette, to the technical co-ordinator by 30 November 1995 at the latest. Finally, the panel agreed that a similar technical session should be held in conjunction with the twelfth session of the DBCP, with the general theme to be decided by the chairman and technical co-ordinator. The list of presentations made to this session if given in Annex XII.

8. PUBLICATIONS (agenda item 7)

8.1 The panel recalled that, at its tenth session, it had established its own technical documents series, self-funded and incorporating a distinctive cover with the DBCP logo. The first three such technical documents had already been published as numbers 1 through 3, respectively: the 1994 Annual Report; The Guide to Data Collection and Location Services using Service Argos (finalized by the chairman and the technical co-ordinator); and the Guide on the Argos GTS Processing Sub-system (prepared by the technical co-ordinator). A fourth will be published before the end of the year as No. 4, *viz* the Construction Manual for the Low-cost Lagrangian Barometer Drifter (prepared by Mr D. Meldrum, together with the technical co-ordinator and the Scripps Institution of Oceanography).

8.2 The next documents to be published in the series will be:

(a) The Proceedings of the technical session (see agenda item 7);

(b) The 1995 Annual report; and

(c) The final report of the SVP-B workshop (New Orleans, May 1995).

As far as the second was concerned, the panel agreed on the proposed draft table of contents, with a few amendments, including:

(a) Keeping consistency with its new name of **Data** Buoy Co-operation Panel, as well as with the new code form BUOY, and

(b) Introducing as a new and permanent annex the guidelines for action groups of the panel, upon which it agreed at its tenth session.

The panel further agreed on the proposed schedule for the preparation for the Annual Report, *viz* the deadline for submission of material for the report to the IOC Secretariat as 1 December 1995 and finalization of the report by 1 February 1996, before its publication by WMO.

8.3 The panel further considered that the time was ripe to update the Guide to Moored Buoys and other ODAS, prepared several years ago by Dr G. Hamilton of NDBC, USA. It welcomed with appreciation the offer by Mr E Meindl (USA) to undertake the work and to have it completed within a year, for publication again in the DBCP technical document series. The question of maintaining a list of moored buoys was raised. The panel considered that the Regular Information Service Bulletin on Non-Drifting ODAS, published yearly by the Secretariats on behalf of IGOSS, was a very useful document in this context and requested IGOSS to continue its publication.

9. REVIEW OF THE PANEL'S OPERATING PROCEDURES AND OF THE TECHNICAL CO-ORDINATOR'S TASKS (agenda item 9)

9.1 The panel first reviewed its operating procedures as agreed at its previous session. It had not noted any need to amend them, except for adding a second vice-chairman to No. 3, and therefore decided to retain them for the next intersessional period. The panel's operating procedures are reproduced in Annex XIII.

9.2 The panel next reviewed its workplan as adopted at its tenth session. In the light of discussions under previous agenda items, of achievements during the past intersessional period and of future expected developments, it decided to modify and/or eliminate some items listed in the workplan and to introduce a few new ones that would, *inter alia*, take care of code problems, of the proposed new DBCP global programme and of publication updating. The revised workplan is given in Annex XIV.

10. ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMAN OF THE PANEL (agenda item 10)

10.1 The panel noted with regret that its outgoing chairman, Mr D. Painting, was unable to stand for re-election for the coming year, because of his planned retirement from his position in the United Kingdom Meteorological Office in December 1995. The panel expressed its considerable appreciation to Mr Painting for his work on its behalf in the years since his first election in 1988. This period had seen the panel grow from very modest and uncertain beginnings to being a major and highly successful technical body of WMO and IOC, as well as the achievement by the panel of all its major initial objectives. These achievements were due in large part to the work of Mr Painting and of the two technical co-ordinators during that period, and the panel therefore once more expressed its thanks to Mr Painting for his work, and wished him every success for the future, including hopefully a continued involvement with the panel in the role of a WMO consultant.

10.2 The panel unanimously elected Mr G. Brough (Australia) as its chairman, to hold office until the end of its next session.

10.3 The panel further noted with regret that Mr M. Szabados (USA) was unable to stand for re-election as vice-chairman, because of his transfer to new duties within NOAA. The panel expressed its considerable appreciation to Mr Szabados also for his work on its behalf over the past two years, and wished him all success in his future activities.

10.4 The panel considered that its ever-expanding global activities, together with its increasing involvement with other programmes and bodies, called for increasing time and effort to be devoted to panel work by its elected officers. It therefore agreed that it would be appropriate in future to have two vice-chairmen, to allow a good geographical distribution of officers and to hopefully decrease the workload on each individual officer. It therefore unanimously elected Mr D. Meldrum (United Kingdom) and Mr W. Woodward (USA) to serve as its vice-chairmen until the end of the next session.

11. DATE AND PLACE OF THE NEXT SESSION (agenda item 11)

11.1 The panel accepted with appreciation the offer by the United Kingdom to investigate the possibilities for hosting its twelfth session. In the event that it was not possible to have the meeting in the United Kingdom, the panel accepted with appreciation the offer by France to host the session in La Reunion. If the twelfth session did take place in the United Kingdom, the panel agreed tentatively that its thirteenth session (1997) should be in La Réunion, subject to confirmation by France and by the twelfth session of the DBCP.

11.2 Subject to agreement by the fifteenth meeting on the Argos Joint Tariff Agreement, the panel decided to hold its twelfth session from Tuesday 22 to Friday 25 October 1996, with the exact venue to be conveyed to panel members as soon as it was decided. It was further decided that the session should be preceded by a one-day SVP-B evaluation workshop (Monday 21 October 1996), at the same venue.

12. CLOSURE OF THE SESSION (agenda item 11)

12.1 In closing the session, the chairman offered his very heartfelt thanks, on behalf of the panel and of all the participants in the meeting, to the South African Weather Bureau, to the Chief Director, Mr G. Schultze, Mr P. Le Roux, Mr E. Burger and to all the local staff who had supported the meeting so ably and had thereby contributed to its success and to the enjoyment by participants of their stay in South Africa. Mr Painting also thanked the staff of the two Secretariats for their continuing support for the panel. Finally, he thanked all the participants for their input to the meeting and particularly noted the success of the technical session which, he hoped, would now be an ongoing feature of DBCP sessions.

12.2 The eleventh session of the DBCP closed at 10.30 hours on Friday 20 October 1995.

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ANNEX II

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 Data 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 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 BUOY PROGRAMMES

6. CO-ORDINATION ACTIVITIES

   6.1 Quality control of buoy data
   6.2 Code matters
   6.3 Argos GTS processing sub-system
   6.4 Combined meteorological/oceanographic drifting buoys
   6.5 Formation of other action groups
   6.6 Co-operation between operational and research programmes
   6.7 New communication techniques and facilities
   6.8 Other co-ordination activities

7. SCIENTIFIC AND TECHNICAL PRESENTATIONS

8. PUBLICATIONS

9. REVIEW OF THE PANEL'S OPERATING PROCEDURES AND OF THE TECHNICAL CO-ORDINATOR'S TASKS

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

11. DATE AND PLACE OF THE NEXT SESSION

12. CLOSURE OF THE SESSION

ANNEX III

REPORT OF THE TECHNICAL CO-ORDINATOR

1. Introduction

This report covers the period 1 October 1994 to 30 September 1995. During this period the Technical Co-ordinator (TC) of the Data Buoy Co-operation Panel (DBCP) was based in Toulouse at CLS, Service Argos, and was employed by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The time the TC DBCP spent on his tasks could be estimated as following:

Topic	days	%
Monitoring, Quality Control Guidelines	40	15.4
User assistance	35	13.5
Vacation, holidays	34	13.1
Missions	34	13.1
Preparation of missions (including DBCP sessions)	20	7.7
GTS Sub-System (small improvements, codes)	20	7.7
BUFR	15	5.8
TC monthly report, stats., regular letters (e.g. WMO list)	12	4.6
Requests for GTS	7	2.7
Action Groups	5	1.9
BUOY.QC on INTERNET and standardize monitoring stats.	5	1.9
Publications (DBCP guides, articles in Argos bull...)	5	1.9
Miscellaneous DBCP	5	1.9
Combined Oceano-Meteo drifting buoys	4	1.5
DB Quarterly report	4	1.5
DBCP server (mission excluded)	3	1.2
Argos monthly report	3	1.2
TC Tools	2	0.8
Misc. Administrative	2	0.8
GTS codes	2	0.8
AWS in SYNOP and Ships in SHIP	2	0.8
Anemo. Heights, misc. rationalization	1	0.4
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) 3-5 October 1994, Buenos Aires. Preparatory meeting for an International South Atlantic Buoy Programme and first meeting of the Programme Committee. The meeting was very successful since the ISABP is now created with strong commitments from the participants for the end of 1994 and for 1995. Piet Le Roux was elected Chairman of the ISABP. Eugene Burger (SAWB) was hired as Programme Co-ordinator.

2.2) 10 October 1994, Wellington, New Zealand. Visit of the Meteorological Service of New Zealand, Ltd. I had discussions with Julie Fletcher regarding the SVP Barometer drifter, GTS distribution of buoy data and Quality Control.

2.3) 11 October 1994, Melbourne, Australia. Visit of the Bureau Of Meteorology. I basically discussed the issue of transferring the Melbourne LUT data in real time to Toulouse via Internet in order to have more timely data for the global GTS users.

2.4) 12-13 October 1994, Hobart, Australia. Argos Users Regional (Australia) Conference. I presented the Argos GTS sub-system and the SVP Barometer drifter. This was also a good opportunity to provide direct assistance to buoy programme managers for GTS distribution of the buoy data.

2.5) 1-4 November 1994, La Jolla, USA. Tenth session of the DBCP.

2.6) 7-9 November 1994, La Jolla, USA. Fourteenth session of the JTA.

2.7) 4-12 February 1995, Silver Spring, USA. Establishment of a DBCP World Wide Web Internet server at the NOAA National Ocean Service.

2.8) 27-28 February 1995, Bergen, Norway. Visit of the Christian Michelsen Research and NIVA. I met with the new EGOS Technical Secretary, Mr. Lars Golmen. We discussed practical working procedures between ourselves especially as far as Quality Control is concerned.

2.9) 27-29 March 1995, Reading, UK. I attended the expert meeting on the monitoring of the COSNA. This mission was fully paid by the COSNA trust fund. I also took the opportunity of being at ECMWF to meet with Mr. Milan Dragosavac who is an expert in the BUFR code.

2.10) 4-6 April 1995, Landover, USA. 5th annual meeting of the IABP.

2.11) 9-10 May 1995, New Orleans, USA. DBCP-SIO Workshop for the evaluation of the SVPB. The general design was not questioned but a few problems have been identified, especially with the barometer port (humidity). Solutions have been proposed and quality of new series will be monitored carefully.

2.12) 11 May 1995, Stennis Space Center (Mississippi), USA. Visit of the NOAA National Data Buoy Center (NDBC) and the US Naval Oceanographic Office.

2.13) 7-8 June 1995, Bergen, Norway. EGOS Technical Sub-Group and Management Committee meetings.

2.14) 27-28 June 1995, Kiel, Germany. Argos Users Regional (Germany) Conference. The meeting was held at the Institute Für Meereskunde an der Universität Kiel (IFM-Kiel). As for the Australian conference, I presented the Argos GTS sub-system and the SVP Barometer drifter.

3. Monitoring

Below are detailed the different monitoring activities that the TC DBCP undertook during this intercessional period:

3.1. Quality Control Guidelines

3.1.1. To read the QC messages from the BUOY-QC Internet mailing list as posted by the Principal Meteorological or Oceanographic Centres responsible for buoy data quality control (PMOC). For rationalization purposes, all the proposals are stored and archived in a data base.

3.1.2. To contact the PGCs: After normally waiting for 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 Local User Terminal (LUT) operators and request implementation of the proposed change. In case the PGC disagrees, the TC DBCP immediately deposits a denial message on the bulletin board.

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

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

3.2. Specific problems. 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 no or only a few messages are received at Meteorological Centers...

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

3.4. SVPBs: more closely monitor the quality of the SVP Barometer drifters (SVPB).

4. User assistance

As usual, I answered specific questions and resolved specific problems as needed or requested by users. I spent about 15% of my time working on user assistance issues.

4.1. Principal Investigators (PI) or buoy programme managers:
PIs regularly requested the TC DBCP to look at specific problems regarding their buoy data or requested assistance for GTS distribution of the data. In that regard I studyed in detail Argos message formats and sensor transfer functions. At several occasions, I obtained WMO numbers on their behalf.

4.2. Local User Terminals (LUT): From time to time, LUT operators asked me 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 me when they needed information on given platforms drifting in an area of interest.

4.4. Secretariats: Upon request, I provided WMO or IOC secretariats with graphs and documentation.

4.5. Focal point. Directly or through the BUOY-QC Internet mailing list, I acted as a focal point between the Meteorological Centres and the Principal Investigators when a specific action was required for a buoy reporting onto the GTS (e.g. remove the data from the GTS, recalibrate a sensor...).

4.6. Investigate various data loss problems.

5. Drifting Buoy Quarterly Report

As for the previous intercessional periods the Drifting Buoy Quarterly Report was issued , and distributed widely by CLS, Service Argos.

6. Global Telecommunication System (GTS)

6.1. Status for drifting buoys reporting onto the GTS:

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

In July 1992, 1162 drifting buoys were operational, 474 of these reporting on GTS (i.e. 40.8%).

In early August 1993, 1269 drifting buoys were operational, 548 of these reporting on GTS (i.e. 43.2%).

In early September 1994, 1246 drifting buoys were operational, 587 of these reporting on GTS (i.e. 47.1%).

In early September 1995, 1429 drifting buoys were operational, 631 of these reporting on GTS (i.e. 44.2 %).

Compared to last year, although the percentage of drifting buoys reporting on GTS decreased slightly, the total number of buoys operational increased as well as the number of these reporting on GTS. In the last few years, the total number of buoys reporting on GTS increased steadily.

See also figures 2 (distribution of active buoys by country), 3 (by organization), and figure 6 (evolution of the number of buoy air pressure reports since 1987).

Météo-France provided me with Data Availability Index Maps on a monthly basis. The maps are useful to identify the data sparse ocean area for each kind of geo-physical variable and therefore to assist the various data buoy programmes in adjusting deployment strategies. A set of these maps valid for August 1995 is shown in figure 1. The maps show clearly the impact of

the TAO array ATLAS moored buoys (wind) or of DBCP regional action groups such as the ISABP (air pressure).

6.2. GTS bulletin headers:

All Local User Terminal sources comply with WMO regulations regarding GTS bulletin headers.

See Table 1 for a complete list of GTS bulletin headers used to date.

Due to a problem at the NWS Gateway in Washington DC, bulletins with header SSVX10 KARS (southern hemisphere) have not been received in Europe for a while. This problem has then been fixed.

6.3. Quality Control.

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

- On the 1 December 1994, the QC Guidelines switched from an Omnet Bulletin Board to an Internet Mailing List.

- Actually monitor the Internet Mailing List, and contact PGCs accordingly.

- Propose and coordinate standardization of the format in which the buoy monitoring statistics are exchanged (ECMWF, UKMO, NOAA/OPC, CMM).

- In conjunction with Mr. Ray McGrath of ECMWF, work on possible new types of monitoring statistics. So far the new methods are too delicate to use and have therefore not been proposed for implementation.

While the Technical Coordinator was in mission or in vacation the following PMOCs could replace him very effectively on a rotating basis:

- The Centre de Météorologie Marine (CMM), Brest.
- The Ocean Products Center (OPC).
- The National Data Buoy Center (NDBC).

Refer to DBCP session agenda item number 6.1 (Quality Control) for details.

6.4. Non-standard wind sensor heights:

A list of drifting buoys making wing measurements and reporting on GTS using the BUOY code was prepared in August 1995 and later published in the WWW Operational Newsletter. This list is kept up to date by the Technical Coordinator and can be issued regularly. The list includes the WMO and Argos ID numbers, the height of the anemometers and whether or not a correction to 10 meters is applyed.

6.5. Land stations reporting in SYNOP. The TC DBCP continued spending time to convince owners of Argos land stations (e.g. Antarctica) to make these report on GTS using the adequate code format (i.e. SYNOP). 14 of these stations are presently doing so.

6.6. Non-standard air pressure measurements for stations in altitude.

Since it was not possible to convince every owner of Argos land station to use SYNOP (or he needed extra time in order to adjust to the new code form), some of the stations continued to report in BUOY format (6 stations).

Hence the list of fixed stations reporting Air Pressure data at station level using the BUOY code was also prepared in August 1995 for publication in a following issue of the WWW operational newsletter. This list includes the WMO, and Argos ID numbers, the Position and Altitude of the stations and whether or not Air Pressure is reduced to sea level.

6.7. New buoys on GTS. I regularly contacted buoy programme managers of new programmes in order (i) to convince them to authorize GTS distribution of their buoy data, and (ii) to offer assistance for that purpose. I have also been directly contacted by programme managers who spontaneously authorized GTS distribution of their buoy data but still required assistance from the TC DBCP.

The new GTS sub-system permits to process the data provided that adequate information is precisely implemented in the system. I therefore studied in details technical files of buoys with complicated Argos message format. In some instances I obtained WMO numbers from National Focal Points or WMO secretariat on behalf of the programme managers. Many buoys can now transmit the back hour and the synoptic data on GTS.

6.8. BUOY code replaced DRIFTER on the 2 November 1994.

6.9. BUFR code. As decided by the DBCP at its tenth session, I started an analysis of the technical and costing aspects of implementing BUFR within the Argos GTS sub-system. I have therefore been working on the following issues:

- Understanding BUFR.
- Writing specification for developing BUFR within the Argos GTS sub-system.
- Studying and testing both NOAA/NOS and ECMWF BUFR softwares.
- Initiate an analysis regarding possible requirements for new BUFR table entries related to buoy data.

Refer to DBCP session agenda item number 6.2 (code matters) for details.

6.10. GTS Delivery delays. As decided at the first meeting of the International South Atlantic Buoy Programme Committee I coordinated and conducted a study on assessment of GTS delivery time from Toulouse and Landover to Buenos Aires and Pretoria. This study has been made possible thanks to the active participation of several GTS routing centers who

monitored GTS bulletins containing buoy data during the period 17 to 23 January 1995. I am very grateful of their respective efforts

This study was also a good opportunity to evaluate GTS delivery times of buoy data in general. So other centers than Landover (Service Argos Inc.), Toulouse (CLS, Service Argos), Buenos Aires (SMN), and Pretoria (SAWB) participated: Bracknell (Met. Office), Melbourne (Bureau of Meteorology), Ottawa (MEDS), Tokyo (Japan Meteorological Agency), Washington DC (National Weather Service), and Toulouse (Météo France). Also other types of delays than delivery times such as on-board delays, orbital delays, and data processing times have been considered.

Full report of this study is given in the annex of this report.

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 mounted on SVP drifters. These are being operated by the Global Drifter Center at the Scripps Institution of Oceanography, La Jolla, California.

- Make sure that the GTS sub-system can handle SVP Barometer drifter (SVPB) data.

- Provide David Meldrum with documentation for inclusion in the SVPB construction manual.

- Provide the Global Drifter Center (GDC) with graphs showing the impact (Data Availability Index Maps) of the SVPBs deployed in the South Atlantic Ocean.

- Liaise with Peter Dexter (WMO) regarding possible impact study regarding SVPBs and options on duty cycles.

- Attend the DBCP-SIO workshop on the evaluation of the SVPB (9-10 May 1995, New Orleans).

- Keep track of QC information and monitoring statistics regarding SVPBs.

Refer to DBCP session agenda item number 6.4 (combined meteorological and oceanographic drifting buoys) for details

8. Argos GTS Sub-System

The work of the Technical Coordinator concerning the Argos GTS Sub-System is mostly related to the following topics:

- Monitor the system and look for possible problems.

- Make sure the problems are corrected.

- Write dedicated software modules for specific types of sensors (e.g. computation of the air dew point temperature based on air relative humidity and air temperature).

- Make sure that specific types of platforms can be handled by the GTS sub-system (e.g. SVPB, NOAA/NDBC WAAP and DWSD, AWI GPS buoys). Required developments have either been sub-contracted by CLS to Digital Equipment, France, or directly written by myself.

- Modify the encoding routines of SYNOP and SHIP codes to allow inclusion of (i) probe type for SST and Wet Bulb temperature sensors, (ii) wind gust data, and (iii) exact time of observation (group 9GGgg in section 1).

- Update the GTS Sub-system Reference Guide.

- Write a summary document on the GTS sub system (in English and French).

- Training of the Argos Users' Guidance Office.

- Work in conjunction with CLS on a dedicated GTS Technical File.

- Development and/or modification of several tools to access the system and make modifications on the description data base.

Refer to DBCP session agenda item number 6.3 (Argos GTS sub-system) for details.

9. DBCP World Wide Web Internet server

The work of the Technical Co-ordinator concerning the newly established DBCP World Wide Web (W3) server is mostly related to the following topics:

- Establish a DBCP server in conjunction with the NOAA/NOS at NOS in Silver Spring. The TC DBCP travelled to NOS in early February 1995 (1 week) for that purpose.

- Provide NOS with documentation for inclusion within the DBCP server. When required, provide NOS with regular updates.

- Make sure the W3 products developed by other agencies concerning buoy data Quality Control are accessible via the DBCP server (Icelandic Meteorological Office, Météo-France).

Refer to DBCP session agenda item number 6.1 (Quality Control of buoy data) for details.

10. TC statistics and graphs.

10.1. Active drifting buoys. Using Argos files and data provided by LUT operators, I computed on a monthly basis, by country and by organization, graphs showing the distribution of active 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 2 and 3 (distribution of active buoys by country and organization) and figure 6 (evolution of the number of buoy air pressure data distributed on GTS since 1987).

10.2. Quality of air pressure. I Computed 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 4.

10.3. Air pressure from drifting buoy life time. I Computed the graphs showing the distribution of life times of Air Pressure measurements, using the ECMWF monthly monitoring statistics. See figure 5.

11. Action Groups, Regional actions.

11.1) EGOS: I attended the EGOS Management Committee and Technical Sub-group meetings and particularly assisted the program in the following topics:

- Liaise with the EGOS Technical Secretariat (i.e. Thor Kvinge and then Lars Golmen) regarding QC issues;

11.2) IABP: I attended the fifth annual meeting of the International Arctic Buoy Programme in Landover, 4-6 April 1995. I assisted the Program in the following topics:

- Quality Control in conjunction with the Principal Investigators;

- Double check the Program status map issued by Roger Colony.

11.3) IPAB: International Program for Antarctic Buoys. I provided assistance for GTS distribution of the data.

11.4) ISABP I attended the preparatory meeting for the implementation of an International South Atlantic Buoy Programme, and provided assistance in the following topics:

- Liaise with CLS, Service Argos, SMN, and SAWB regarding possible implementation of an LUT in Buenos Aires and/or Cape Town.

- Coordinate a study on GTS delivery delays (January 1995) which involved routing centres at Buenos Aires, Washington DC, Ottawa, Bracknell, Toulouse, Melbourne, Tokyo, and Pretoria (see the annex of this report).

- Assist the SAWB for GTS distribution of land stations reporting in SYNOP code and deployed on islands in the South Atlantic for the ISABP.

11.5) COSNA

I prepared various documents and attended the expert meeting on the monitoring of the COSNA (ECMWF, Reading, UK, 27-29 March 1995).

12. Miscellaneous

12.1. Drifting Buoy Quarterly Report. I checked the Quarterly Report on Drifting Buoy and gave approval before CLS could send it to WMO and IOC.

12.2. Argos monthly status report. I checked the Argos monthly status report to WMO which was prepared by CLS, Service Argos.

12.3. TC DBCP files. I updated my files on a PC, using a data base management system (Paradox) and getting the data from Argos files and various status reports. I kept up to date an history file on each Argos drifting buoy programme (contacts with PIs, PI authorizing GTS distribution, information on types of sensor installed, etc...).

12.4. WMO/Argos number cross reference list and PGC list. I issued, on a monthly basis, the WMO/Argos number cross reference list, and sent it to various Meteorological Centers and interested individuals. The list is also available via the BUOY-QC Internet mailing list. The list 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 also 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.

12.5. TC DBCP bimonthly report. I provided the Chairman of the DBCP as well as the WMO and IOC Secretariats with my bimonthly report.

12.6. Documentation, assistance. I provided users with documentation or status reports concerning specific programs or experiments; I answered specific questions regarding the Argos System.

12.7. TC DBCP missions. I prepared the various missions or meetings I had to attend.

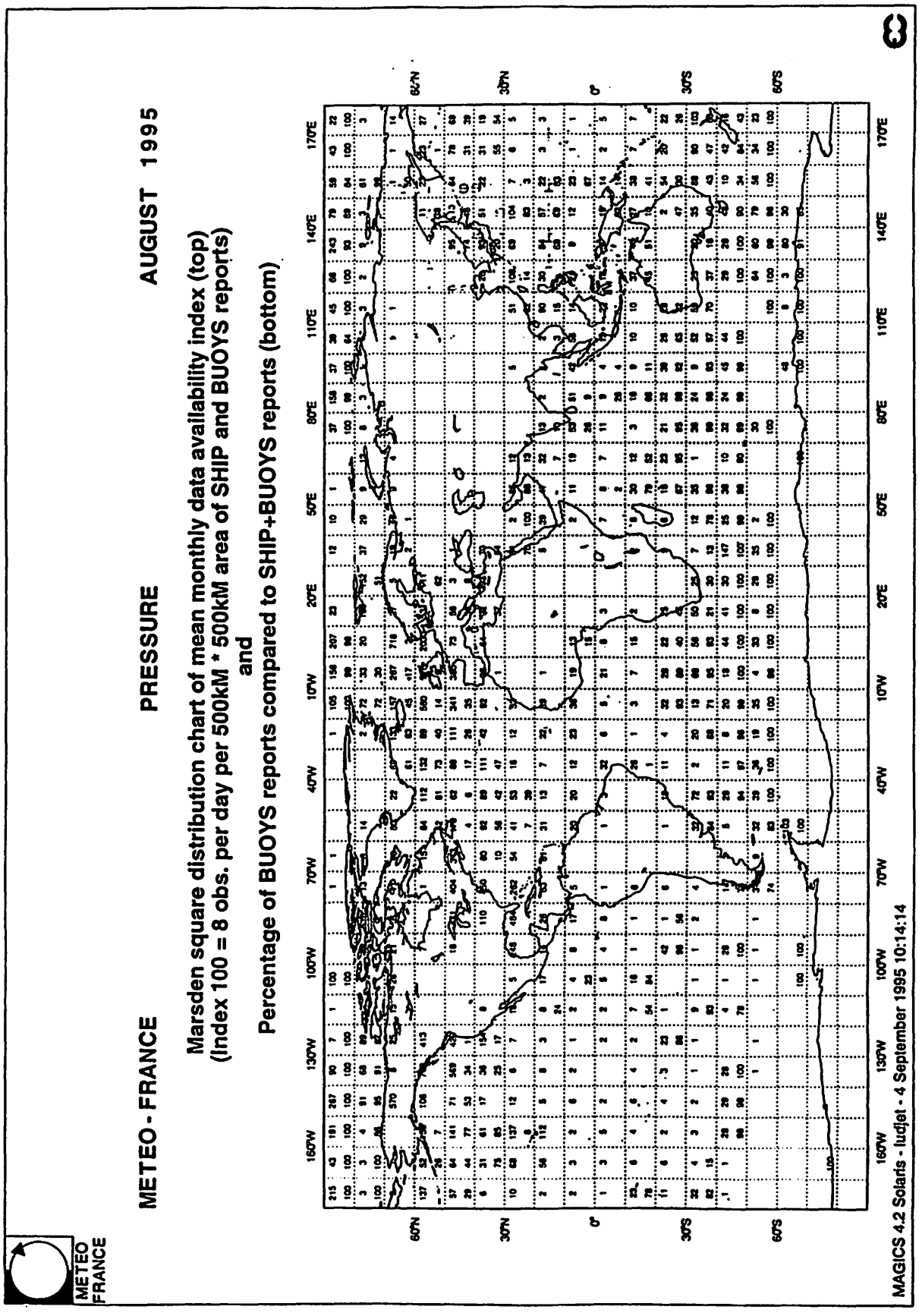
12.8. DBCP-XI. I prepared specific documents and the TC report for the DBCP XI session:

- Report of the Technical Coordinator;
- Report on drifting buoy data Quality Control;
- Report on the New Argos GTS Sub-System;

- Technical session on improvements in buoy sensor technology (collect abstracts);
- Code matters (BUFR);
- DBCP W3 Internet server.

12.9. WMO guide to Argos. I assisted finalizing the updated version of the DBCP guide on data collection and localization services using Service Argos.

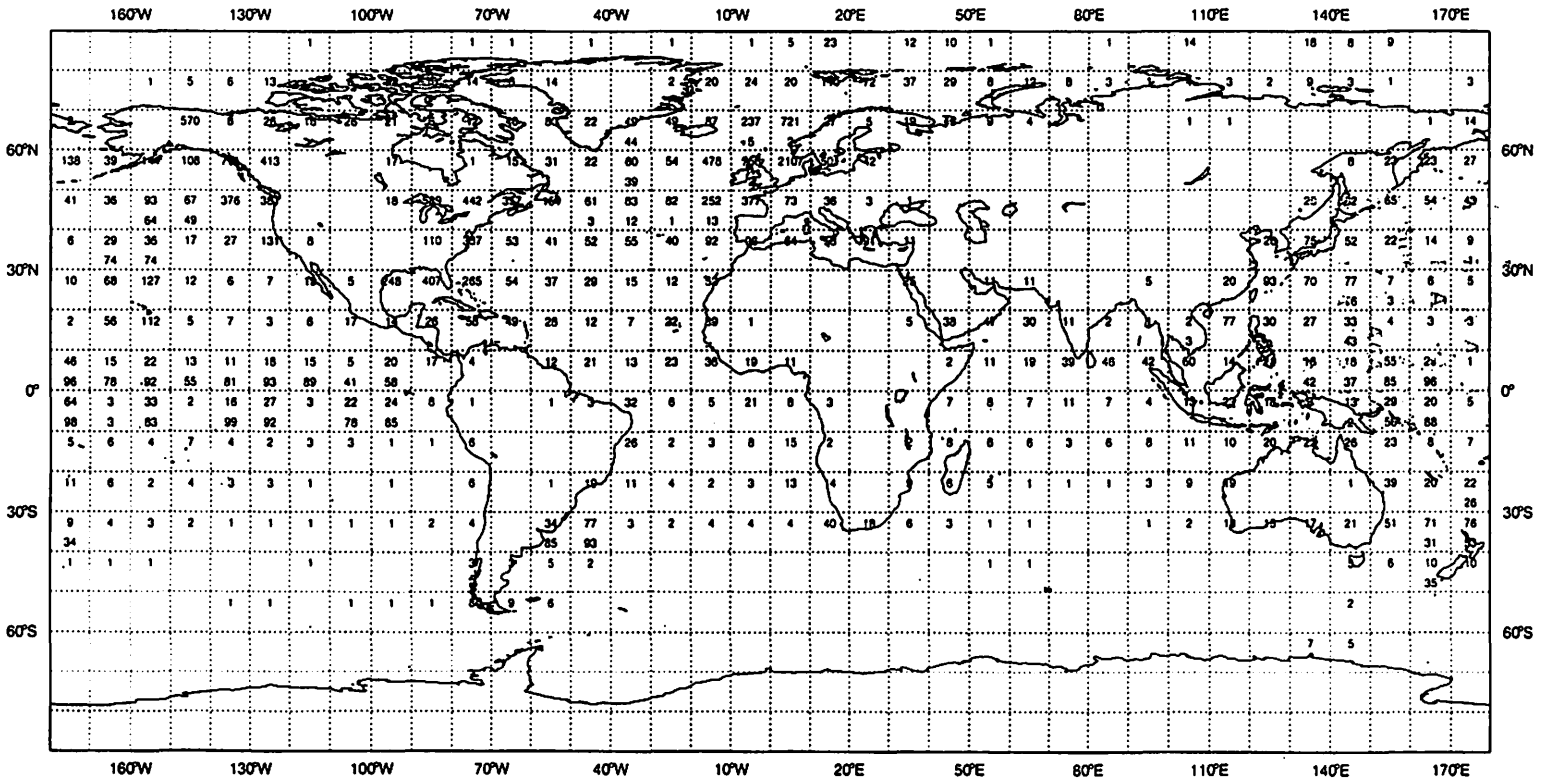
Figure 1. Météo France August 1995 data availability Index maps by geophysical variable for SHIP and BUOY GTS reports (Air Pressure, Air Temperature, Sea Surface Temperature, Wind)



METEO FRANCE

METEO - FRANCE **WIND** **AUGUST 1995**

Marsden square distribution chart of mean monthly data availability index (top)
(Index 100 = 8 obs. per day per 500kM * 500kM area of SHIP and BUOYS reports)
and
Percentage of BUOYS reports compared to SHIP+BUOYS reports (bottom)

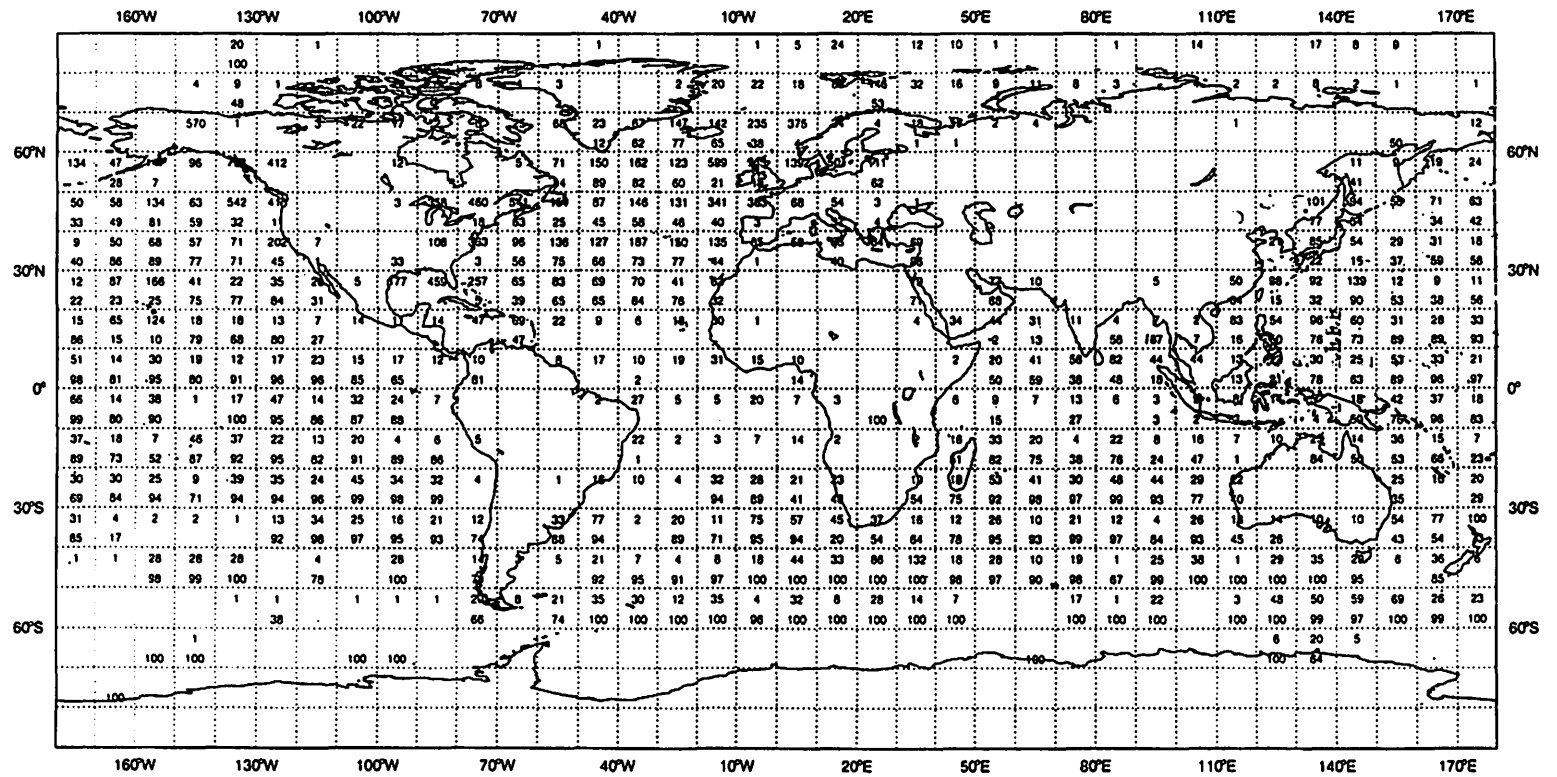


MAGICS 4.2 Solaris - ludjet - 4 September 1995 10:14:23

METEO FRANCE

METEO - FRANCE **SEA SURFACE TEMPERATURE** **AUGUST 1995**

Marsden square distribution chart of mean monthly data availability index (top)
(Index 100 = 8 obs. per day per 500kM * 500kM area of SHIP and BUOYS reports)
and
Percentage of BUOYS reports compared to SHIP+BUOYS reports (bottom)

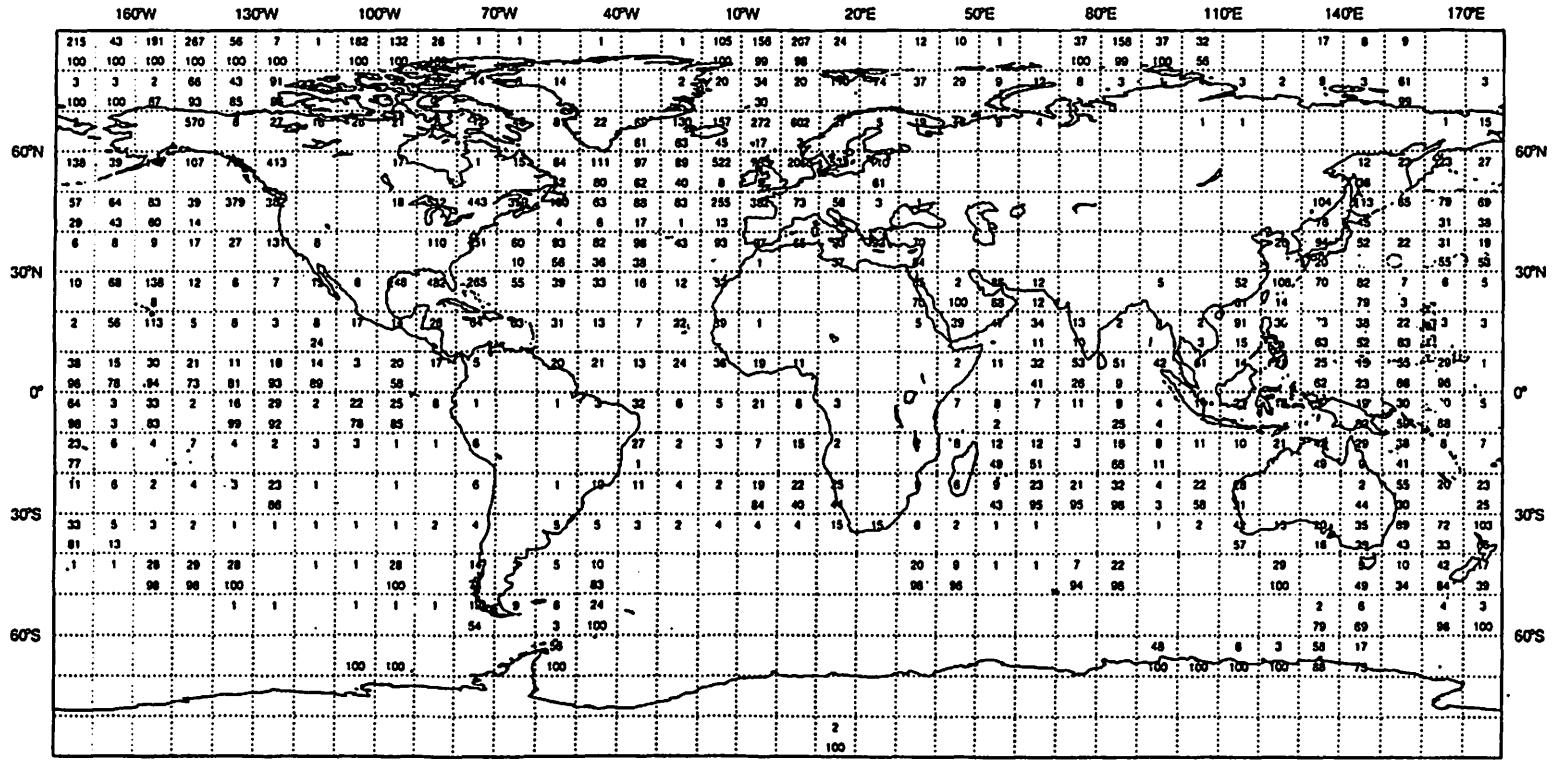


MAGICS 4.2 Solaris - ludjet - 4 September 1995 10:14:19

METEO FRANCE

METEO - FRANCE **TEMPERATURE** **AUGUST 1995**

Marsden square distribution chart of mean monthly data availability index (top)
(Index 100 = 8 obs. per day per 500kM * 500kM area of SHIP and BUOYS reports)
and
Percentage of BUOYS reports compared to SHIP+BUOYS reports (bottom)



MAGICS 4.2 Solaris - ludjet - 4 September 1995 10:14:28

Table 1. List of GTS bulletin headers being used for drifting buoy data.

$T_1T_2A_1A_2ii$	Approximate region of deployment or Programme
USGPC (Service Argos Inc., Landover, USA):	
SSVX04 KARS	North Atlantic Ocean;
SSVX06 KARS	Northern Hemisphere;
SSVX10 KARS	Southern Hemisphere;
SSVX12 KARS	Arctic Ocean;
SSVX14 KARS	Antarctic area;
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.
QC by NDBC (Mississippi, USA) based on data from the USGPC:	
SSVX02 KWBC	Southern Hemisphere;
SSVX08 KWBC	Northern Hemisphere.
JIC (Washington-DC, USA) based on data received from the USGPC:	
SSVX18 KWBC	Arctic Ocean.
FRGPC, (CLS, Service Argos, Toulouse, France):	
SSVX01 LFPW	North Atlantic Ocean;
SSVX03 LFPW	Southern Hemisphere;
SSVX05 LFPW	Northern Hemisphere;
SSVX07 LFPW	Arctic Ocean;
SSVX09 LFPW	Antarctic area;

Oslo LUT (NMI, Oslo, Norway):

SSVX01 ENMI North Atlantic Ocean (for the EGOS Programme);

Sondre Stromfjord LUT (DMI, Greenland).

SSVX01 BGSF North Atlantic Ocean (for the EGOS programme);

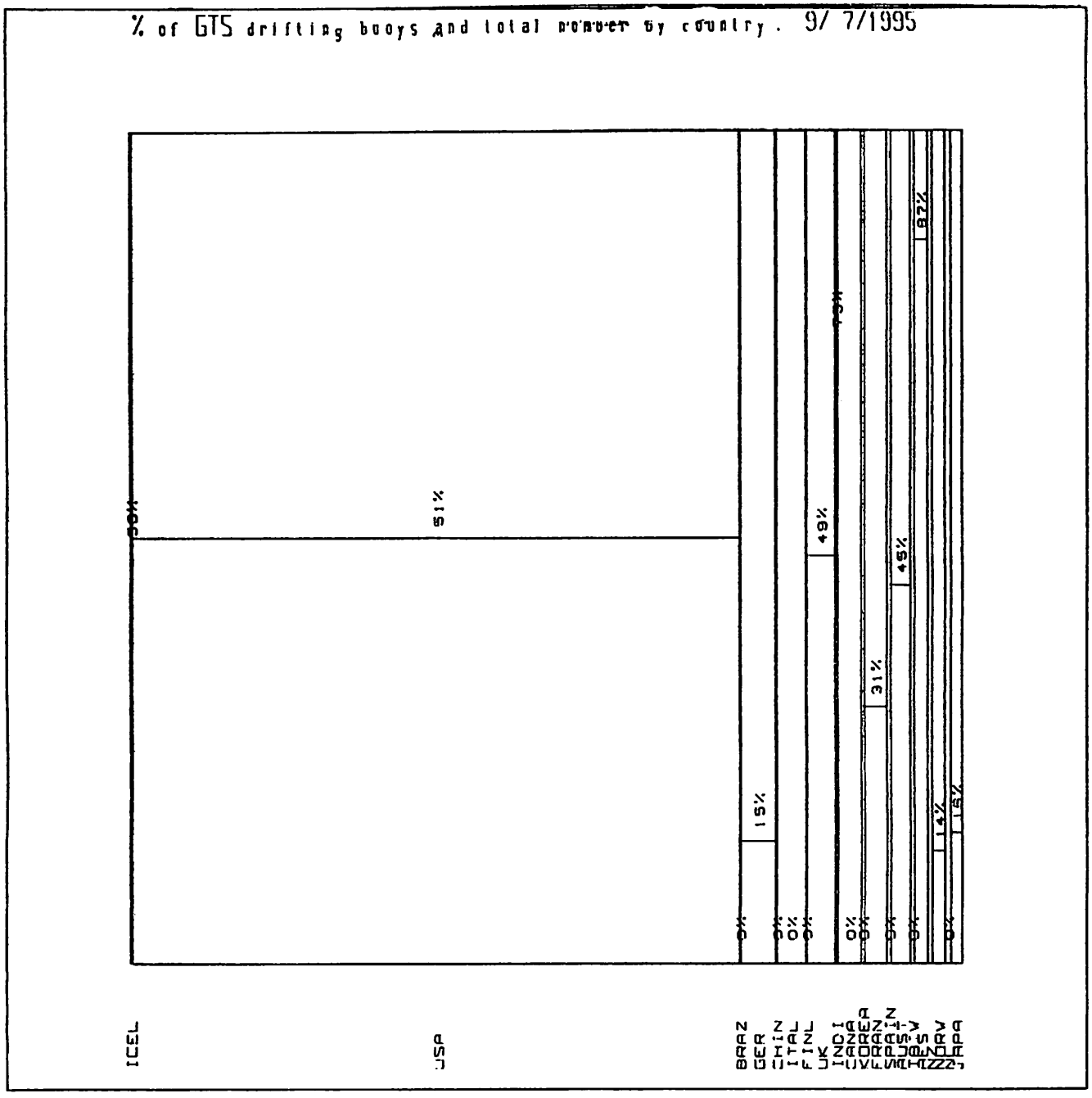
Halifax LUT (Environment Canada):

SSVX01 CWHX North-West Atlantic Ocean.

Edmonton LUT (Environment Canada):

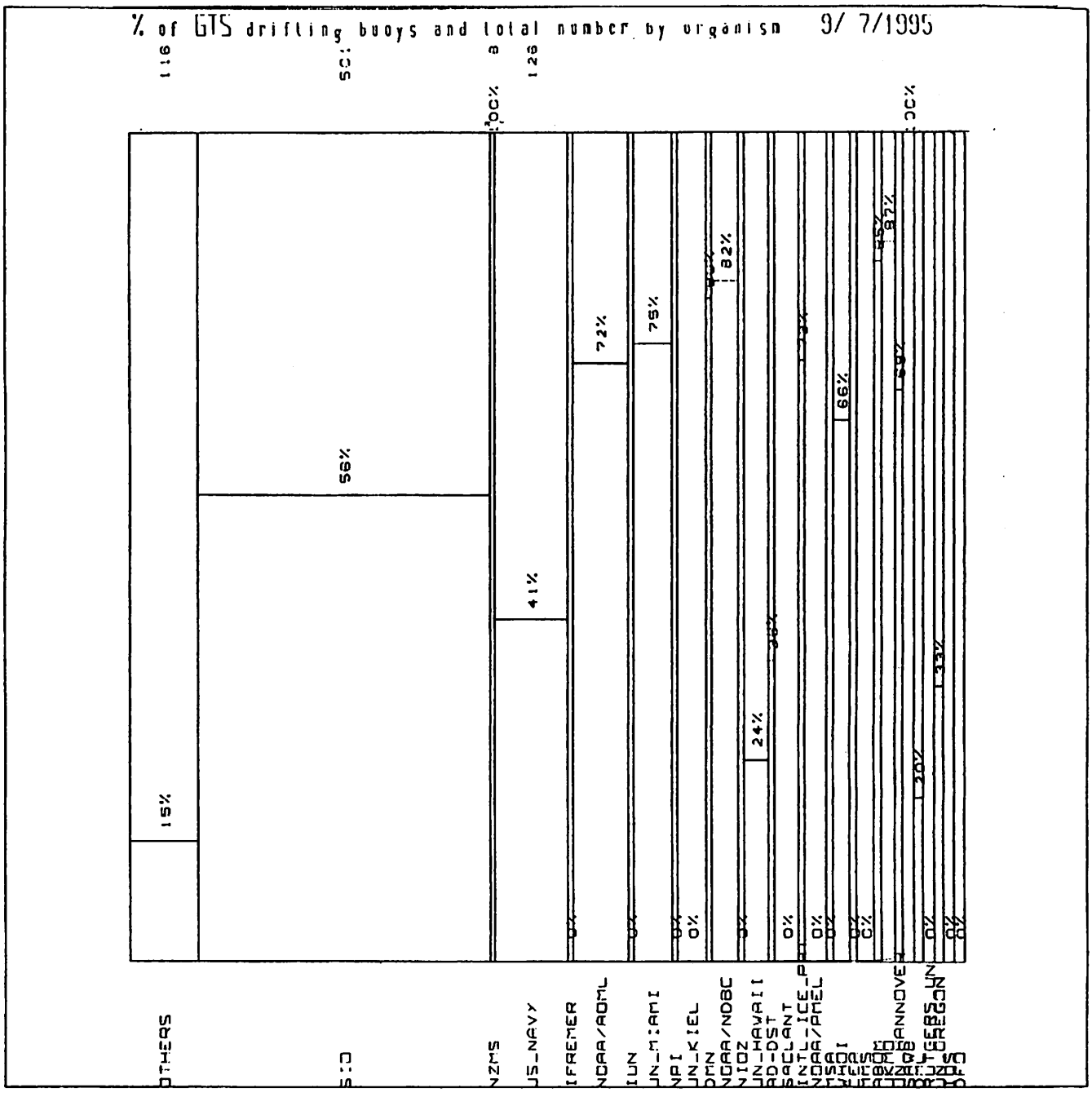
SSVX02 CWEG Arctic Ocean;
SSVX03 CWEG Hudson Bay;
SSVX04 CWEG NorthEast Pacific Ocean.

Figure 2. Distribution of GTS and non-GTS platforms by country:



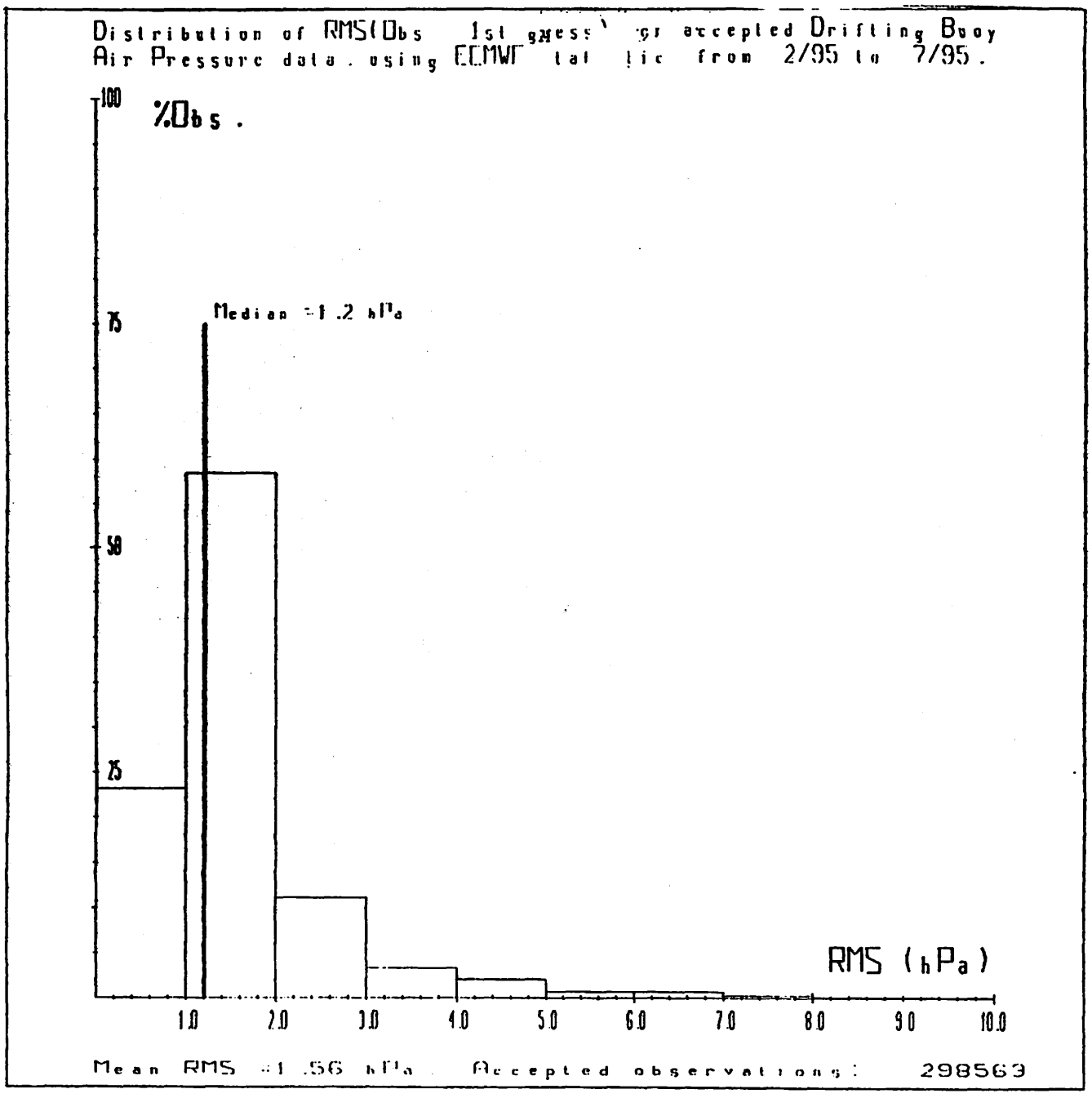
Total number of drifting buoys: 1429
Total number of drifting buoys reporting to the GTS: 631= 44.2%

Figure 3. Distribution of GTS and non-GTS platforms by organization:



Total number of drifting buoys: 1429
Total number of drifting buoys reporting to the GTS: 631= 44.2%

Figure 4. Distribution of RMS (Obs. - First Guess Field, for Air Pressure data:



Global data

Figure 5. Distribution of the Life Time of the Air Pressure sensor:

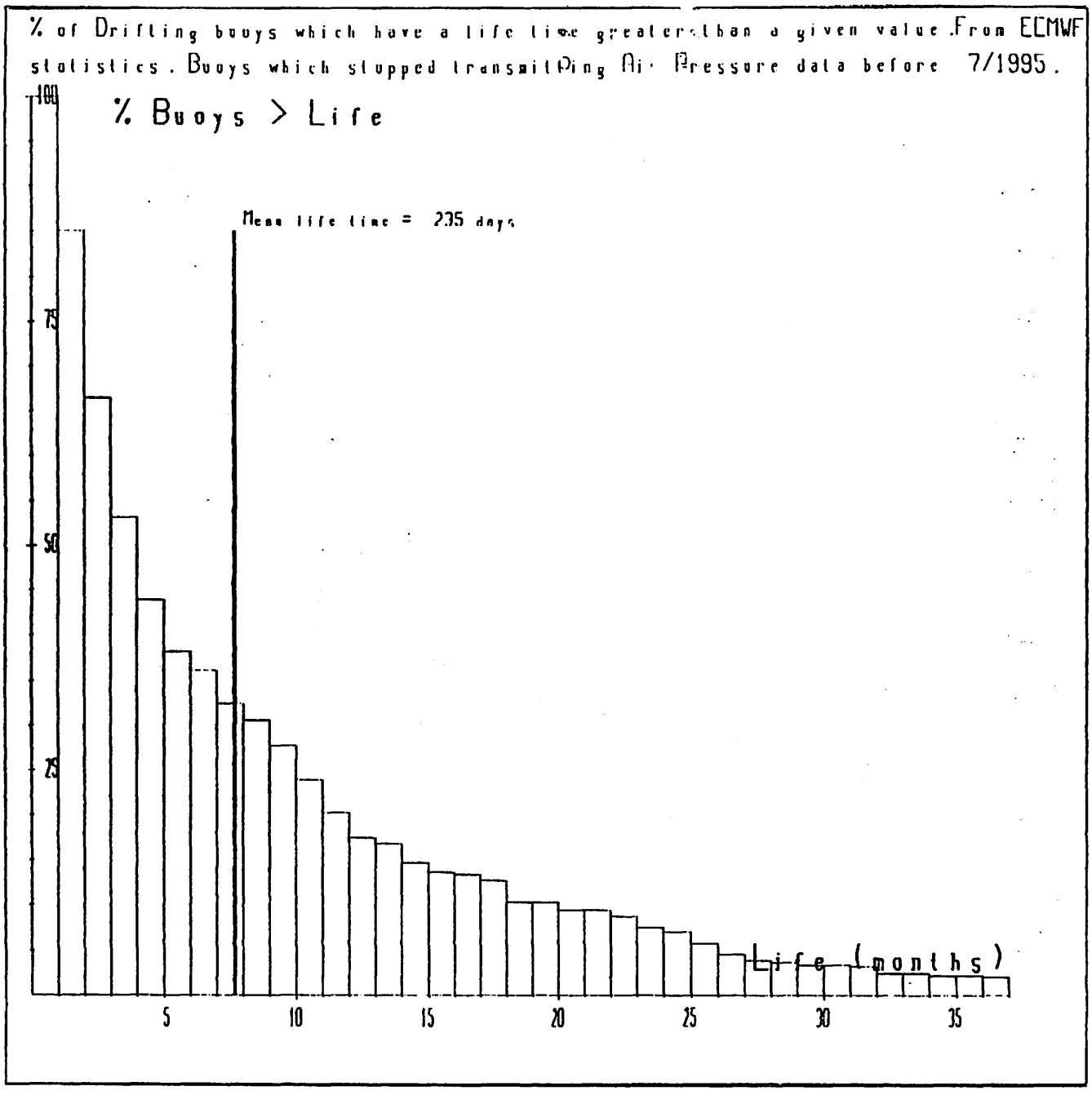
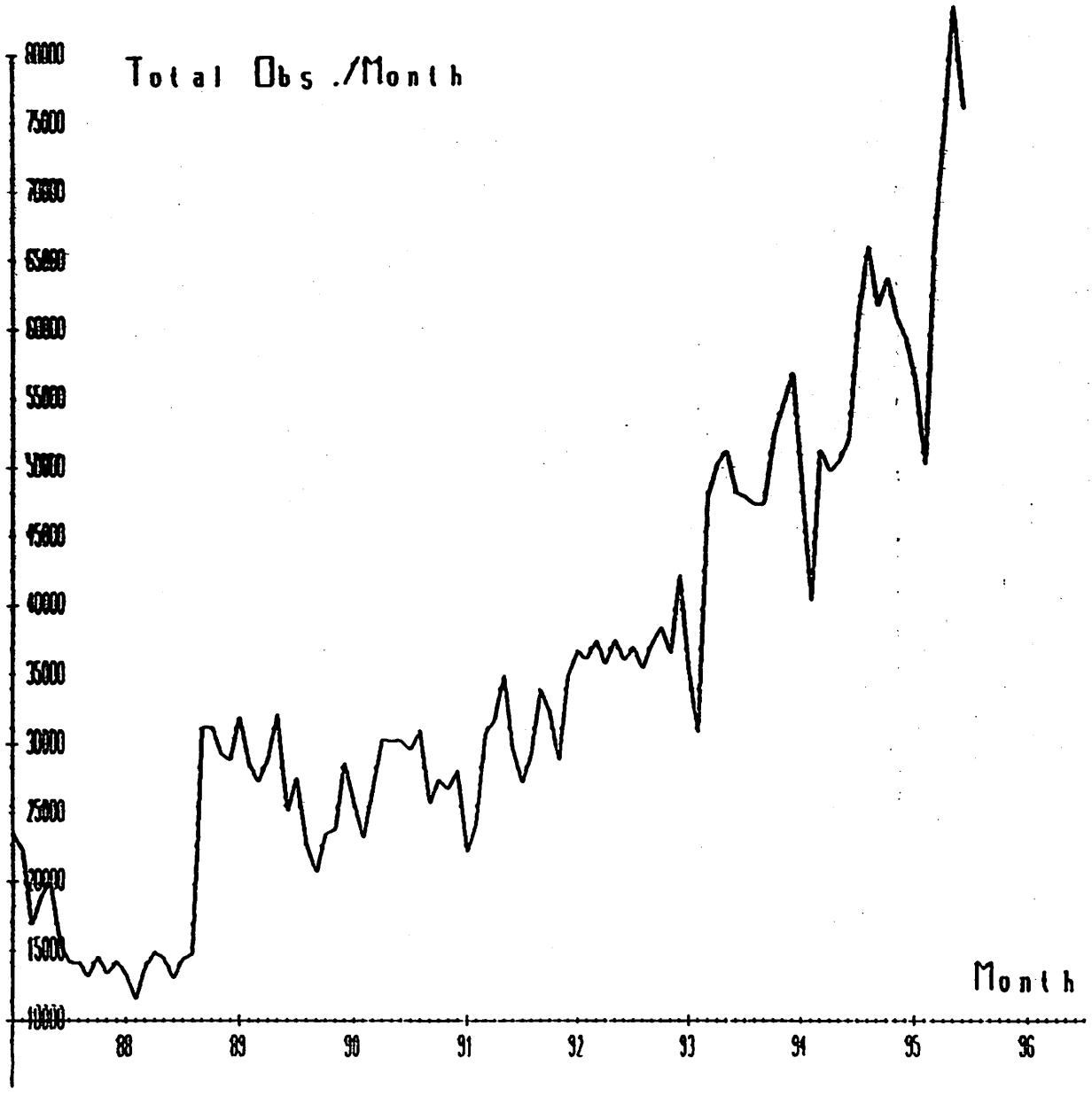


Figure 6. Evolution of the number of air pressure GTS reports since 1987 (from ECMWF statistics)



Annex

GTS delays for buoy data

As requested by the International South Atlantic Buoy Program, the Technical Coordinator of the DBCP coordinated a GTS delivery time study for the period 17-23 January 95 included (i.e. transit time on the GTS). All requested centers agreed to participate and record reception time and GTS bulletin header information for all the drifting buoy GTS reports transmitted on GTS during the period (i.e. SSVX bulletins). Results of this study are detailed in paragraph 1.

In addition, I conducted another study on delays between time of observation and distribution of the data onto the GTS. Results of this study are detailed in paragraph 2.

1) Transit time on the GTS for buoy data.

The study was conducted for the period 17-23 January 1995. The following centers participated in the study:

* UKMO, Bracknell, United Kingdom,
* SMN, Buenos Aires, Argentina,
* SAI, Landover, USA,
* BOM, Melbourne, Australia,
* MEDS, Ottawa, Canada,
* SAWB, Pretoria, South Africa,
* JMA, Tokyo, Japan,
* CLS, Toulouse, France,
* LFPW (Météo France), Toulouse, France,
* NWS, Washington DC, USA.

Some of the KWBC bulletins (bulletins generated in Landover, then forwarded towards NDBC, then Quality Controlled at NDBC, then forwarded to the NWS for insertion on GTS) have not been considered because the original KARS (SAI, Landover) bulletins could not be identified. Bulletins from Local User Terminals have not been considered because the insertion date on GTS was unknown.

Hence only the following GTS bulletin headers have been considered:

SSVX01 LFPW :	North Atlantic, Bulletins inserted from Toulouse
SSVX03 LFPW :	Southern Hemisphere, Bulletins inserted from Toulouse
SSVX04 KARS :	North Atlantic, Bulletins inserted from Landover
SSVX05 LFPW :	Northern Hemisphere, Bulletins inserted from Toulouse
SSVX06 KARS :	Northern Hemisphere, Bulletins inserted from Landover
SSVX07 LFPW :	Arctic Ocean, Bulletins inserted from Toulouse
SSVX09 LFPW :	Antarctic area, Bulletins inserted from Toulouse
SSVX10 KARS :	Southern Hemisphere, Bulletins inserted from Landover
SSVX40 KARS :	Equatorial Pacific Ocean, ATLAS moored buoys, Bulletins inserted from Landover

Results presented in annex A show that the data are received rather quickly.

Annex A graphs are summarized here in Table 1 (centers are listed from the most timely to the less timely (based on % within 5 minutes)):

Table 1: Delays by routing center and number of bulletins (17-23 Jan 95):

Received within	5 min	10 min	20 min	Total number of bulletins from Argos sources
Washington	87%	97%	98%	3228
Tokyo	83%	92%	97%	3414
Melbourne	79%	92%	98%	3479
Bracknell	79%	85%	97%	2989
Buenos Aires	77%	88%	96%	2112
Toulouse	72%	88%	98%	3266
Pretoria	60%	85%	92%	3304
Ottawa (MEDS)	43%	63%	84%	3048
Argos Centers	100%	100%	100%	3504

Although delays are quite acceptable when the bulletins get through, many reports are missing. Buenos Aires admitted that the link with Washington was shut down during a substantial period which explains why only 2112 reports have been received.

In order to estimate the percentage of bulletins missing by routing center and by type of bulletin, and to eliminate side effects, I worked on the sub-period 18-22 January 1995 included. Results are summarized in Table 2 (percentages of missing bulletins are indicated):

Table 2: Percentage of BUOY GTS bulletins missing by header and routing center.

	Center	SAWB	MEDS	BOM	LFPW	JMA	NWS	SMN	UKMO
Header	Nb bulletins transmitted								
All headers	1944	3.1%	10.8%	1.0%	0.9%	1.1%	0.2%	40.4%	13%
SSVX01 LFPW	440	3.2%	14.5%	0.9%	0.7%	1.1%	0.9%	10.5%	13.2%
SSVX03 LFPW	311	3.2%	4.2%	0.0%	0.0%	0.0%	0.0%	10.0%	9.3%
SSVX04 KARS	152	2.6%	7.9%	2.0%	0.0%	2.0%	0.0%	13.2%	18.4%
SSVX05 LFPW	66	3.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%	12.1%
SSVX06 KARS	441	2.7%	7.7%	1.8%	0.0%	1.8%	0.0%	100%	13.2%
SSVX07 LFPW	134	3.7%	1.5%	0.0%	0.0%	0.0%	0.0%	6.7%	6.0%
SSVX09 LFPW	244	4.1%	5.7%	0.4%	0.0%	0.4%	0.0%	11.5%	10.2%
SSVX10 KARS	14	0.0%	0.0%	0.0%	100%	0.0%	0.0%	0.0%	100%
SSVX40 KARS	142	2.8%	50%	2.8%	0.0%	2.8%	0.0%	100%	17.6%

From the figures in Table 2, it appears that:

-1- Bulletins generated from Service Argos in Toulouse and inserted on GTS from Météo France in Toulouse are well distributed towards LFPW, UKMO, NWS, JMA, and BOM. A few bulletins (0.7%) are missing at source (LFPW). Although UKMO figures tend to show that about 10% are missing, they cannot be missing because the bulletins have been received at NWS (link is LFPW => UKMO => NWS). Hence files submitted by UKMO to the TC DBCP are not representative of what was actually received in Bracknell.

-2- Bulletins generated from Service Argos in Landover and inserted on GTS from the National Weather Service in Washington are well distributed towards LFPW, UKMO, except SSVX10 bulletins which are missing entirely. Some bulletins are missing in Tokyo (1 to 2%). Consequently these missing bulletins are missing in Melbourne.

-3- Because the number of bulletins missing in Tokyo and Melbourne are very close, the link Tokyo => Melbourne is very efficient.

-4- About 1 to 2% of the bulletins are lost in link Washington => Tokyo.

-5- The link Washington => Buenos Aires has not been working correctly during the period.

-6- A substantial number of bulletins are lost in the link Washington => Ottawa => MEDS.

-7- About 3% of the bulletins are lost in the link Washington => Pretoria.

2) Delays between time of observation and insertion on GTS.

Before the data are inserted on GTS, delays after the actual time of measurement of the data can be expressed as the sum of :

-1- On board data processing delays. For example if a buoy memorizes measured data and transmits back hour data at the time the Argos message is transmitted towards the satellite, then such data are already old at the time of transmission. This is the case for SVP Barometer Drifters which keep in memory and transmit the last 24 hours of data. Hence at the time of the transmission, some of the data are already up to 24 hours old.

-2- Orbital delays and Argos acquisition delays. If the satellite sees a buoy and a receiving station at the same time (e.g. LUT) orbital delays are null (i.e. regional data). Data from the Argos global system include orbital delays because the satellite records the data before being able to download them towards a global receiving station (Lannion, Wallops Island, Fairbanks). Delays are also added for data processing and

transmission of the raw data sets from the ground stations towards the Argos Global Processing Centers (acquisition delays).

-3 Argos location and data processing delays (Argos system at the Argos Global data Processing Centers) Once received at an Argos Global Center, the Argos System must compute the locations and do some pre-processing before the GTS sub-system can handle them.

-4- GTS data processing and encoding delays (Argos GTS sub system). Based on the raw data and the Argos locations the GTS sub-system must convert the data into physical units, sort the observations out, do some Quality Control checks, and encode the data according to WMO regulations.

For the period 21 and 22 May 1995, and for data processed in Toulouse only, I estimated the above delays. The summation of all these delays is equivalent to the time of GTS dissemination minus time of observation.

Results are presented in annex B and annex C. They show that :

13% of the data are disseminated on GTS within 1 hour after the observation time,
46% within 2 hours,
59% within 3 hours,
71% within 4 hours,
85% within 5 hours,
100% within 30 hours.

Conclusion

-1- GTS data processing delays are always very small (GTS sub system).

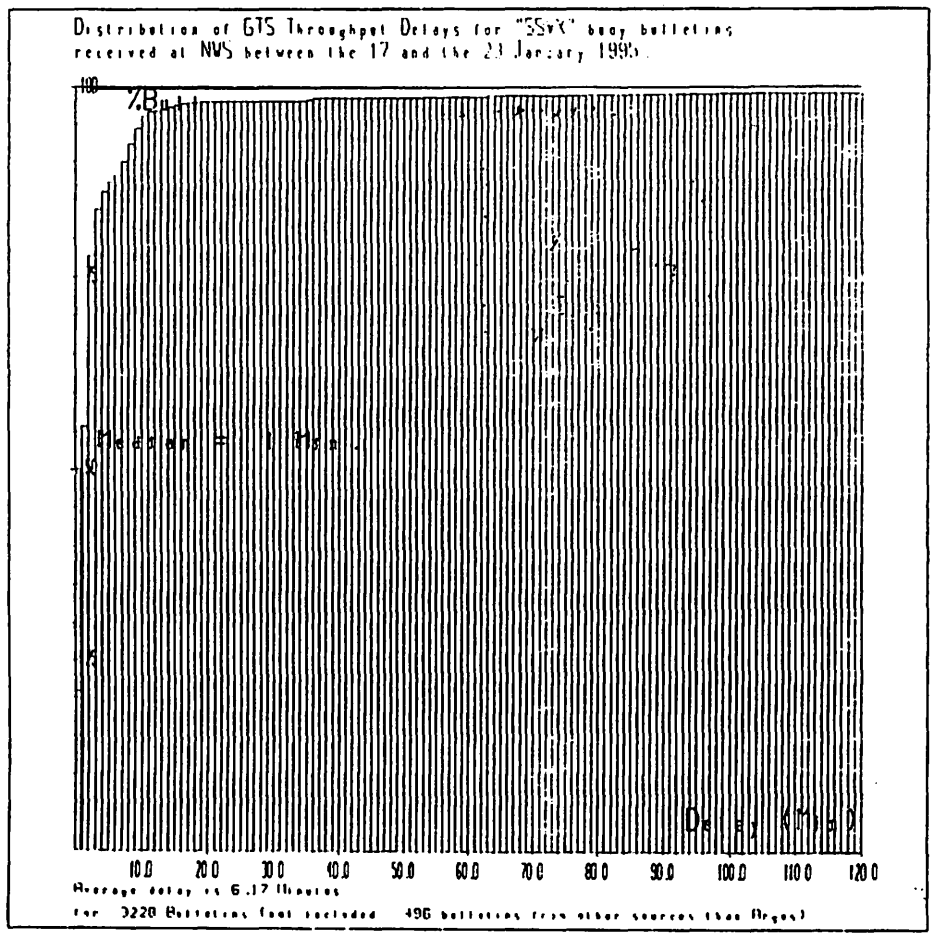
-2- For data received within 1 hour, most of the delays are due to orbital delays, Argos acquisition delays, and Argos data processing delays.

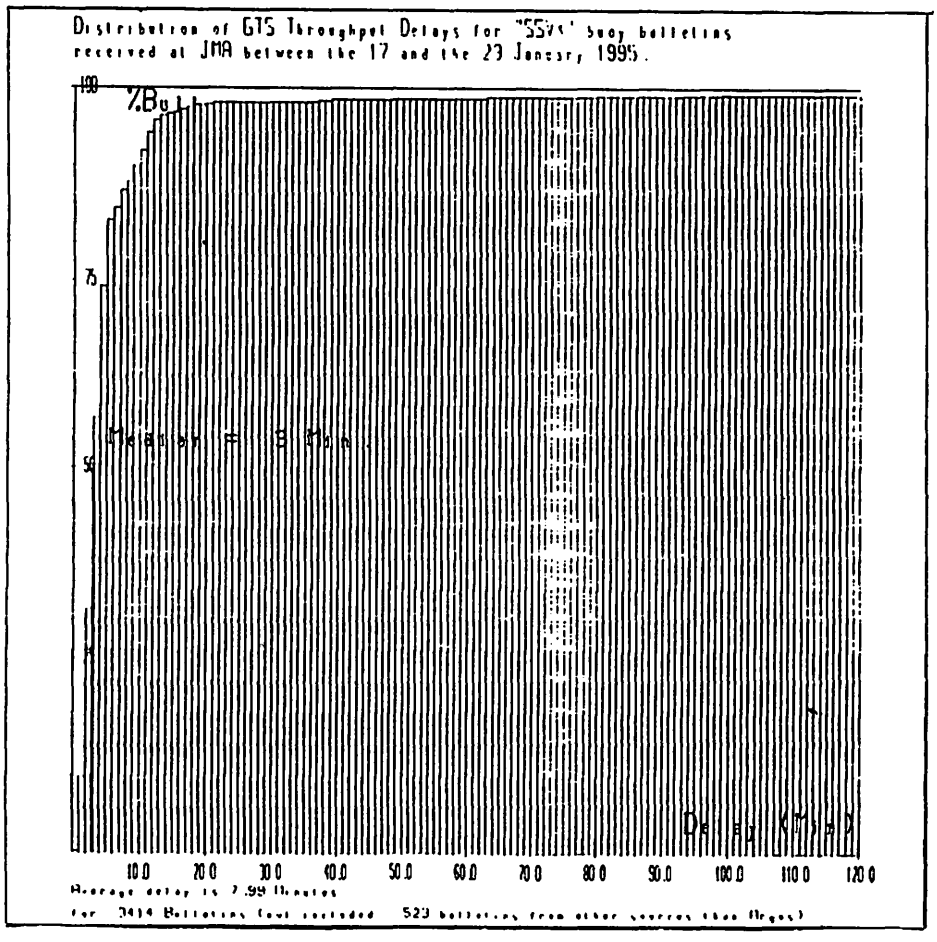
-3- For data received after 1 hour and within 4 hours, most of the delays are due to orbital delays, and Argos acquisition delays.

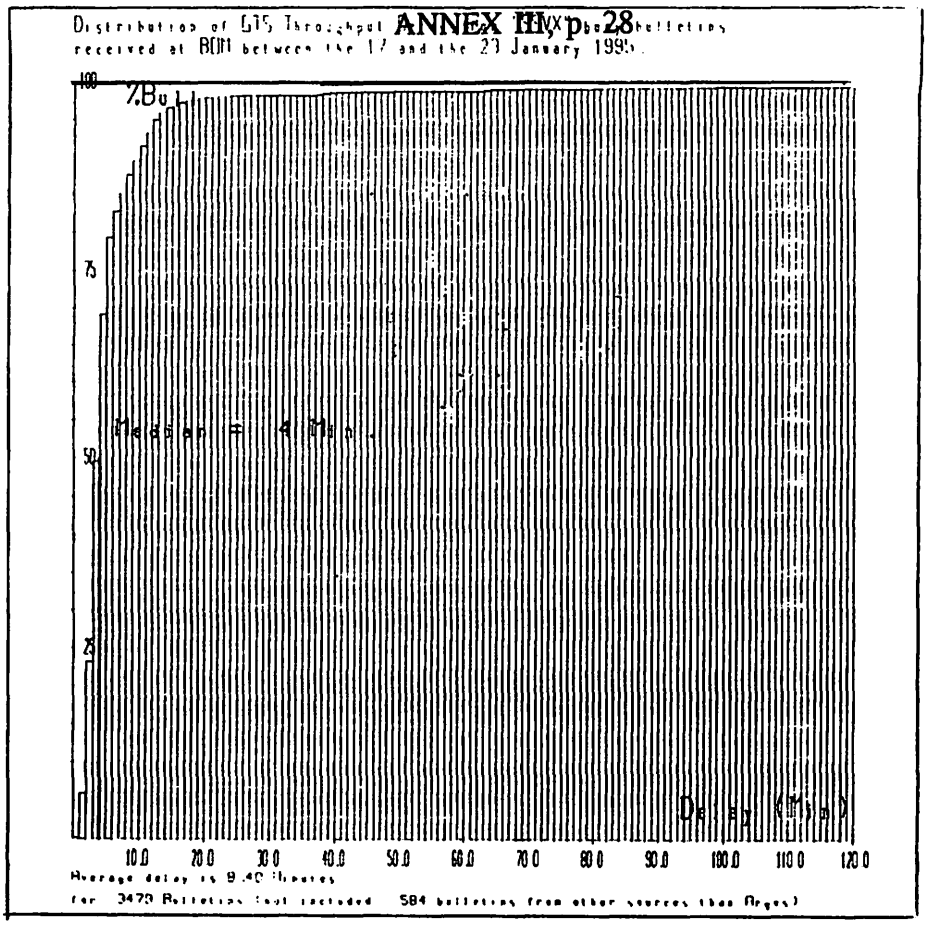
-4- For data received after 4 hours and within 10 hours, most of the delays are due to on-board delays, orbital delays, and Argos acquisition delays.

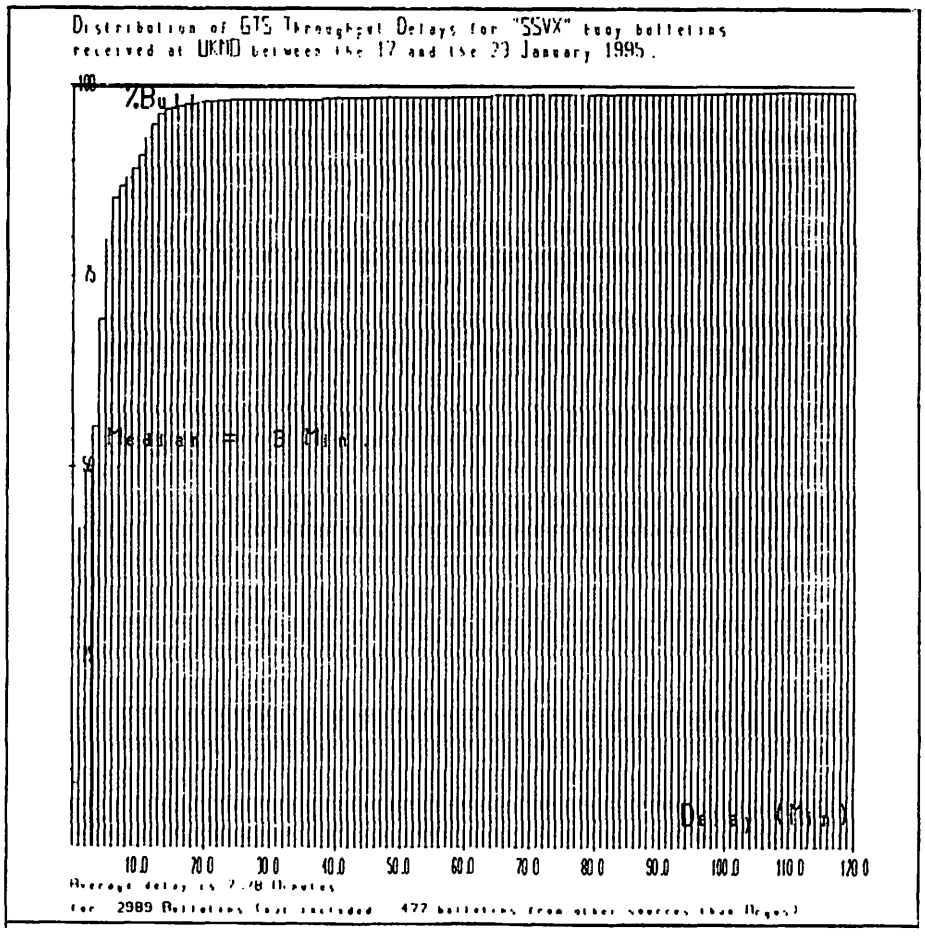
-5- For data received after 10 hours, most of the delays are due to on-board delays (back hour data).

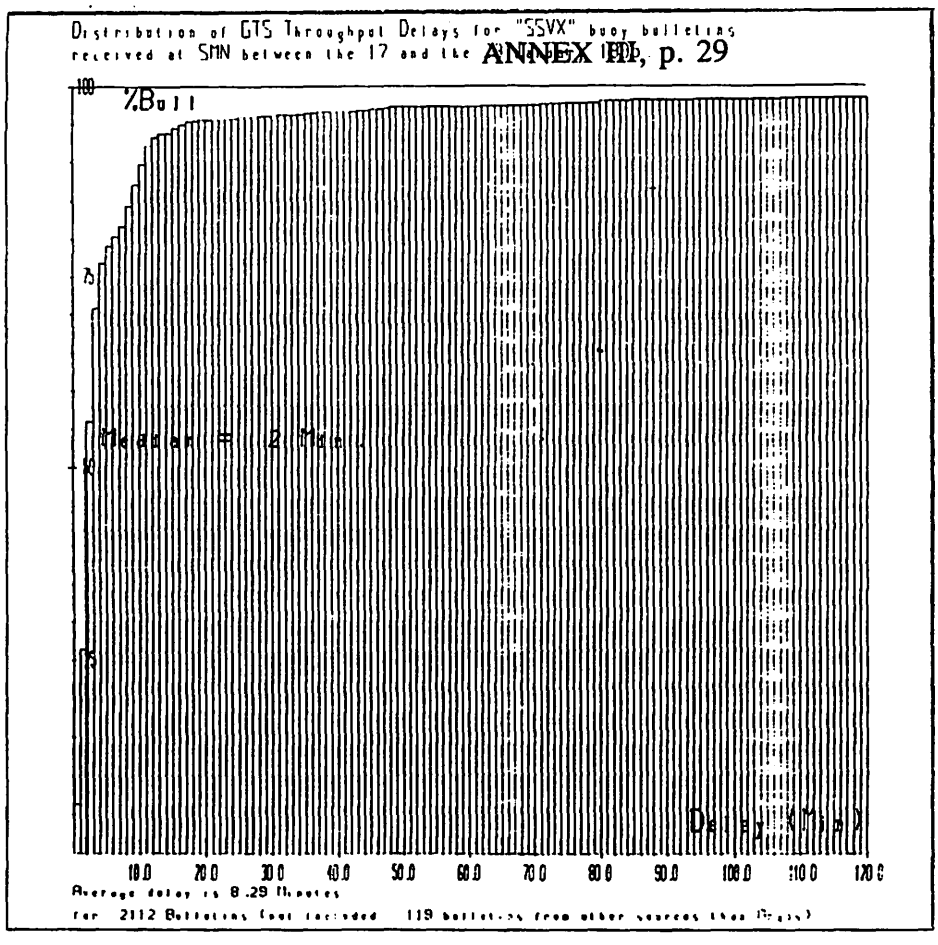
Annex A : Transit delays on GTS by center

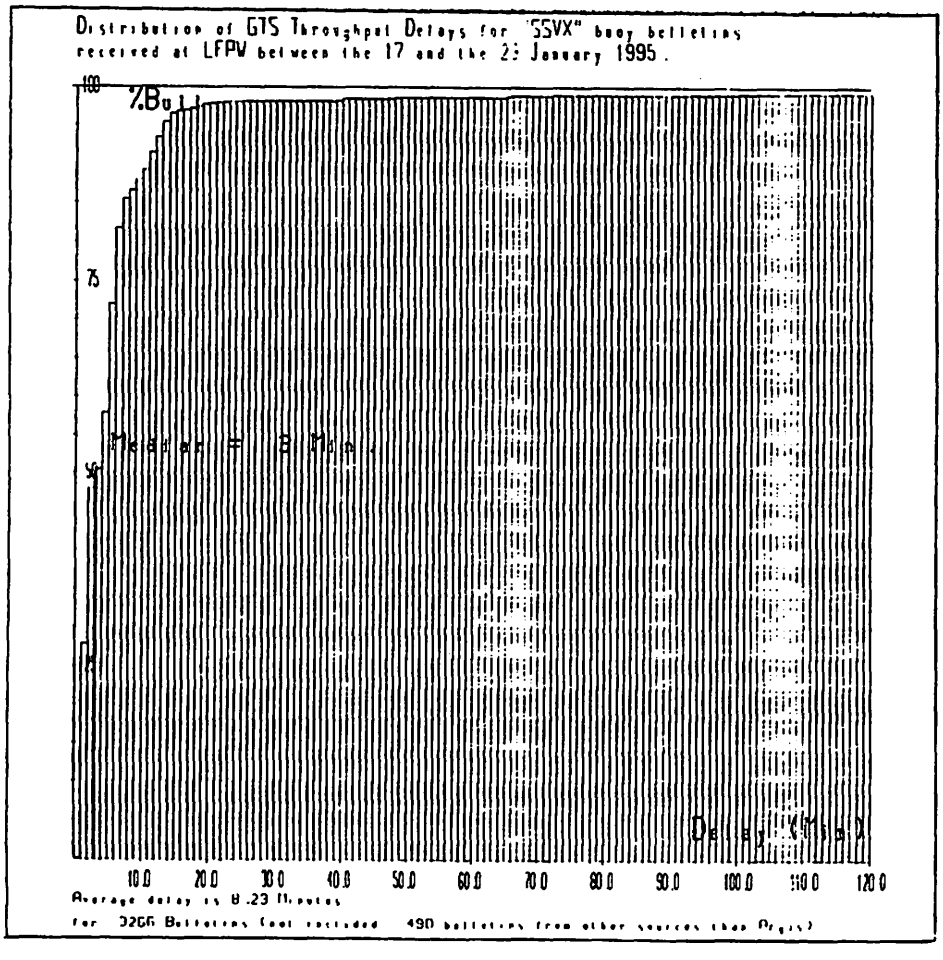


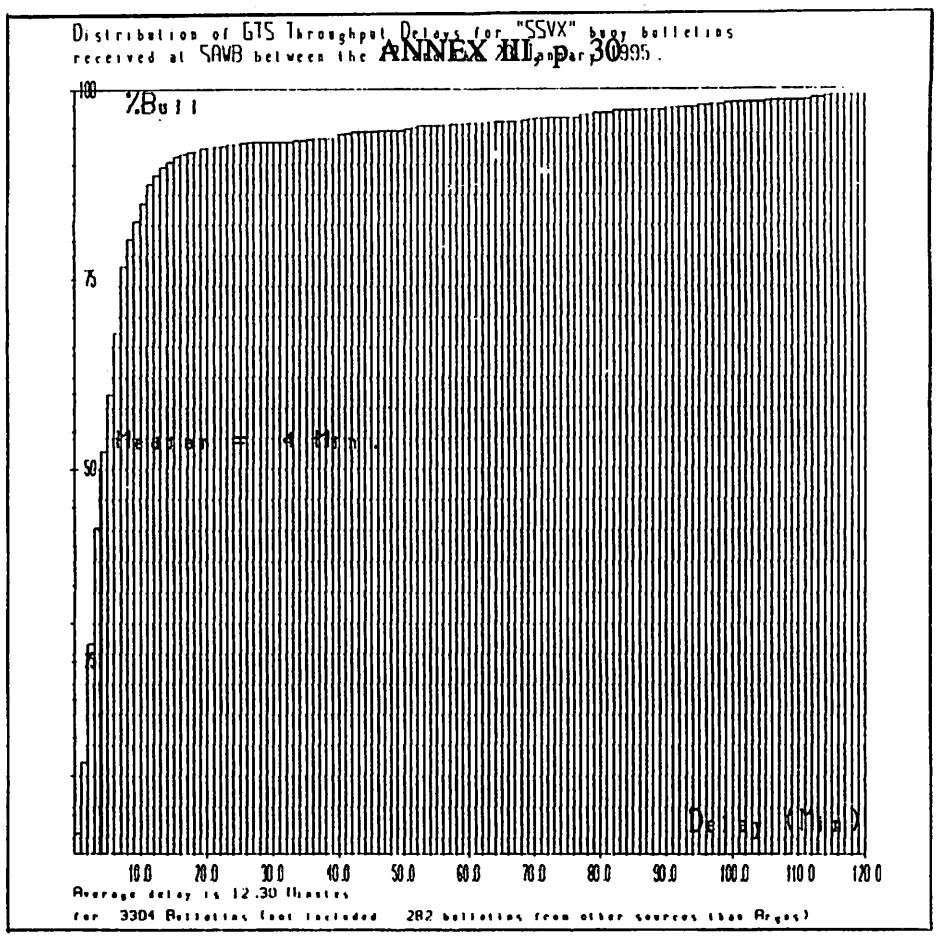


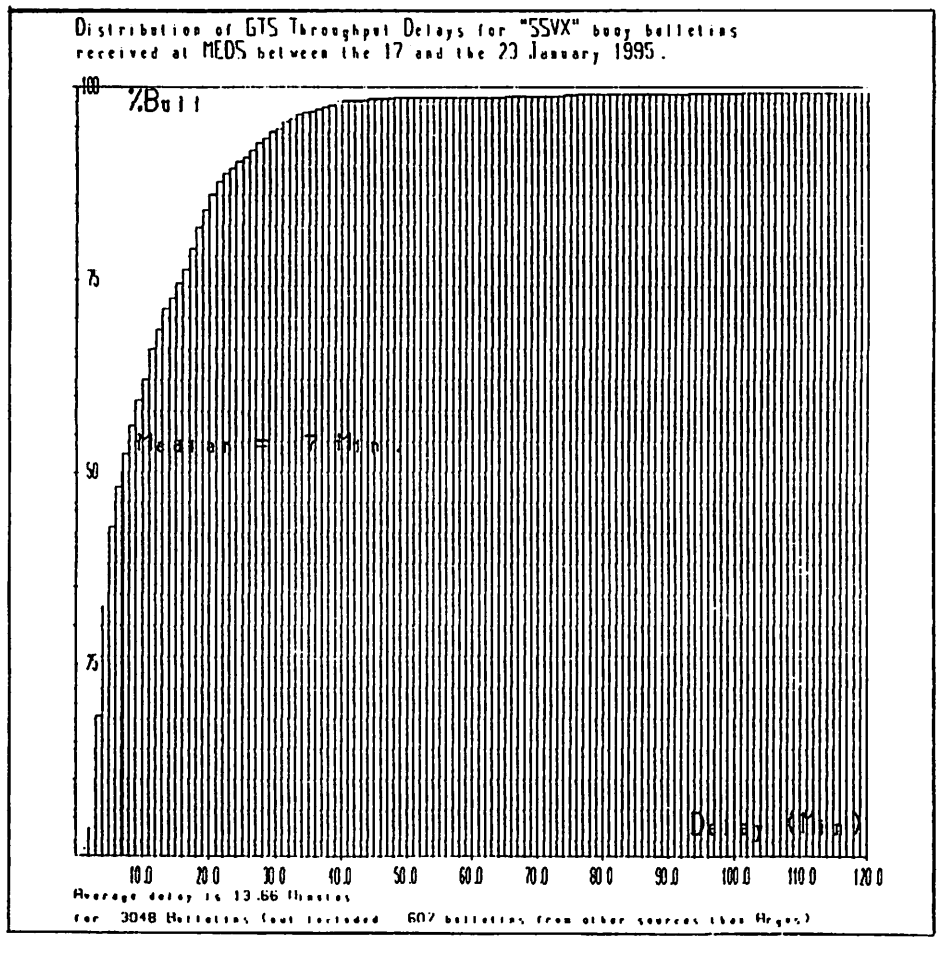

Distribution of GTS Throughput Delays for "SSVX" buoy bulletins
received at BOM between the 17 and the 23 January 1995.
%Bulls
100
75
50
25
Median = 4 Mins.
Delay (Mins)
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
Average delay is 9.40 Minutes
for 3479 Bulletins (not included 584 bulletins from other sources than Argos)


Distribution of GTS Throughput Delays for "SSVX" buoy bulletins
received at UKMO between the 17 and the 23 January 1995.
%Bulls
100
75
50
25
Median = 8 Mins.
Delay (Mins)
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
Average delay is 7.78 Minutes
for 2989 Bulletins (not included 472 bulletins from other sources than Argos)


Distribution of GTS Throughput Delays for "SSVX" buoy bulletins
received at SMN between the 17 and the
%Bull
100
75
50
25
Median = 2 Min.
10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
Average delay is 8.29 Minutes
for 2112 Bulletins (not included 119 bulletins from other sources than Argos)


Distribution of GTS Throughput Delays for "SSVX" buoy bulletins
received at LFPW between the 17 and the 23 January 1995.
%Bull
100
75
50
25
Median = 8 Min.
10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
Average delay is 8.23 Minutes
for 3266 Bulletins (not included 490 bulletins from other sources than Argos)

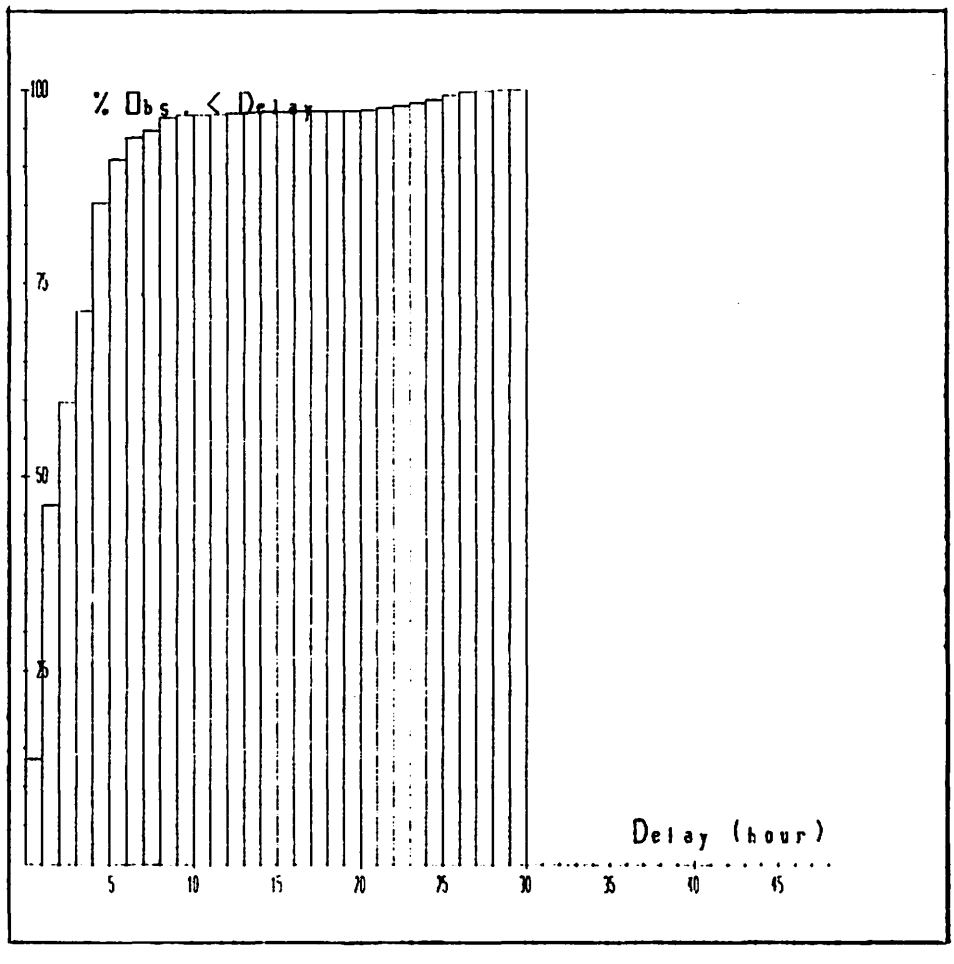

Distribution of GTS Throughput Delays for "SSVX" buoy bulletins
received at SAWB between the 17 and the 23 January 1995.
%Bull
100
75
50
25
Median = 4 Mins.
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
Delay (Mins)
Average delay is 12.30 Minutes
for 3304 Bulletins (not included 282 bulletins from other sources than Argos)


Distribution of GTS Throughput Delays for "SSVX" buoy bulletins
received at MEDS between the 17 and the 23 January 1995.
%Bull
100
75
50
25
Median = 7 Mins.
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
Delay (Mins)
Average delay is 13.66 Minutes
for 3048 Bulletins (not included 607 bulletins from other sources than Argos)

Annex B : Delays before insertion on GTS

Data processed in Toulouse during the period 21 and 22 May 1995.

Total of On-board, orbital, Argos acquisition, Argos data processing, and GTS data processing delays (i.e. Insertion time - Observation time).



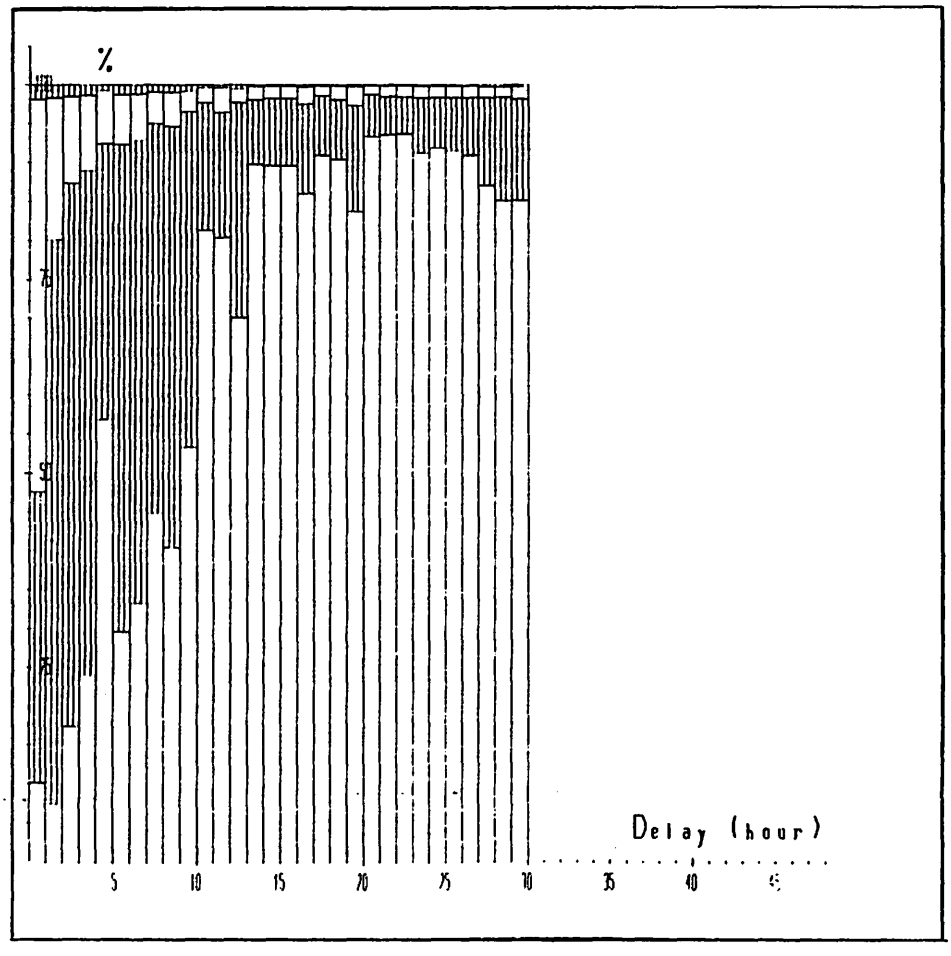
Annex C : Breakdown of delays before insertion on GTS

Data processed in Toulouse during the period 21 and 22 May 1995.

For each delay period of one hour, delays are broken down in

-1- Top : GTS data processing delays
-2- Below : Argos data processing delays
-3- Below : Orbital and Argos Acquisition delays
-4- Bottom : Onboard data processing delays

The sum of these delays makes 100% : they explain 100% of the delay period.



ANNEX IV

FINANCIAL STATEMENTS

Financial statement by IOC for the year 1 June to 31 May 1995

(all amounts in US $ unless otherwise specified)

BALANCE (from previous year)			**$ 20 419**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
90 000	(27.04.94)		
15 000	(15.09.94)		**$ 105 000**
FF 77 000	(03.03.95)		**FF 77 000**
EXPENDITURES			
Technical Co-ordinator's employment:			
- Salary:		62 575	
- Allowances:		17 276	
- Relocation (yearly provision):		3 260	**$ 83 111**
Technical Co-ordinator's missions:			
- Copenhagen/Kiel/Hamburg/Helsinki (14-24 June 1994):		4 186	
- Buenos Aires/Wellington/Melbourne/Hobart (3-13 October 1994):		7 765	
- La Jolla (1-9 November 1994):		1 272	
- Silver Spring (4-12 February 1995):		2 807	
- Bergen (27-28 February 1995):		2 460	
- Reading (27-29 March 1995) *[funded by COSNA]*		-	
- Landover (4-6 April 1995):		2 840	
- New Orleans (9-11 May 1995):		2 424	**$ 23 754**
Contract with CLS/Service Argos:			**FF 77 000**
BALANCE (at 1 June 1995)			**$ 18 554**

Interim statement by WMO for the period 1 January 1994 to 31 August 1995

	US$	US$
Balance from 1993		30,580
Contributions Paid for Current Biennium	256,840	
Less: Received in 1993	22,650	234,190
Total Funds Available		264,770
Obligations Incurred		
Technical Co-ordinator	227,933	
Prep Meeting South Atlantic Buoy System	4,750	
First planning meeting Baltic Observing System	1,094	
Experts	0	
Reports	5,789	
Administration direct	0	239,566
Balance of fund	US$	25,204
Represented by:		
Cash at Bank		26,581
Less: Unliquidated obligations		1,377
	US$	25,204

Contributions	Received In 1993	Received 1994/1995		US$
	1994	1994	1995	Total
Australia		12,500	12,500	25,000
Canada	18,000		15,000	33,000
France			14,351	14,351
Greece		4,200	2,100	6,300
Iceland	1,500		1,500	3,000
Ireland		1,409	1,480	2,889
Netherlands	1,575	1,575		3,150
Norway	1,575		1,575	3,150
U.K.		15,000	15,000	30,000
U.S.A.		68,000	68,000	136,000
Total	22,650	102,684	131,506	256,840

Provisional estimate of income and expenditure until 31 May 1996

	USD	*FRF*
Income		
Balance of fund from interim account	25,204.-	
Contribution from France		75,000.-
TOTAL	25,204.-	75,000.-
Expenditure		
CLS/Service Argos contract		79,000.-
Publications	7,000.-	
Additional DBCP ties	1,500.-	
Additional travel of chairman	5,000.-	
WMO costs	200.-	
TOTAL	13,700.-	79,000.-
Anticipated balance to transfer to 1996-1997 account	10,700.-	

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ANNEX V

ESTIMATED COSTS OF THE TECHNICAL CO-ORDINATOR'S CONTRACT

(Figures in USD)

USD1 = 5.05 FRF (Sept. 1995)	1 June 1995/ 31 May 1996	1 June 1996/ 31 May 1997	1 June 1997/ 31 May 1998
Salary	64 000	69 000	74 500
Allowances	25 200	27 200	29 400
Relocation	?	[~10 000]	?
TOTAL	89 200	106 200	103 900

NOTES: (1) As a reminder, the figures considered by the panel in the past for the exchange rate between the USD and the FRF were as follows:

July 1992	USD1 = FRF 5.18
September 1993	USD1 = FRF 5.85
September 1994	USD1 = FRF 5.38

(2) The *uncertainties* highlighted in the row *relocation* are due to the fact that it is impossible to compute the relevant amounts unless the incumbent's term of office is definitely known. The assumption here is that Mr Charpentier might leave his position by 31 May 1997, as he is now entitled to do. In this case, the last column would be meaningless and the *relocation* item in case of a recruitment of a new technical co-ordinator might be of the order of USD 30 000 or more depending of the new incumbent's country of origin and family situation.

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ANNEX VI

TABLE OF ESTIMATED EXPENDITURES (A) AND INCOMES (B) 1996-1997

A. Expenditures

	USD
IOC salary	90,000.-
Travel of the technical co-ordinator	15,000.-
CLS/Service Argos	15,000.-
WMO costs	300.-
Travel of chairman, publications, consultancies, and possible computer-leasing costs	20,000.-
Contingencies and other small items	7,750.-
TOTAL	148,050.-

B. Income

Contributions	137,350.-
Carry-over 1995-1996	10,700.-
TOTAL	148,050.-

(**Note:** Official UN exchange rate in September 1995, USD1 = FRF 5.05)

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ANNEX VII

TABLES OF PROVISIONAL CONTRIBUTIONS FOR 1996-1997

	1995-1996	1996-1997
AUSTRALIA	12,500	12,500
CANADA	15,000	15,000
FRANCE	~ 15,000 (FRF 75,000)	~ 15,000 (FRF 75,000)
GREECE	2,200	2,200
ICELAND	1,500	1,500
IRELAND	1,500 (IR£1,000)	1,500 (IR£1,000)
NETHERLANDS	1,575	1,575
NEW ZEALAND	-	500
NORWAY	1,575	1,575
SOUTH AFRICA	-	3000
UNITED KINGDOM	15,000	15,000
USA	68,000	68,000
TOTAL	133,850	137,350

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ANNEX VIII

LETTER FROM MR F. GERARD (FRANCE) TO THE CHAIRMAN OF THE DBCP

Mr. Derek PAINTING
Chairman DBCP
UKMO, Operational Instrumentation Branch
Beaufort Park, East Hampstead
Wokingham, Berkshire RG11 3DN
Royaume Uni

Affaire suivie par: *François GERARD*
Téléphone: *(33) (1) 45 56 70 24*
Référénce à rappeler: *DGO/RE/* 45679
Votre référence:

Objet: **Facilities for the DBCP technical Co-ordinator**

PJ:

Dear Derek,

As you remember, during DBCP-X meeting, I have been asked to define the support Météo-France can afford to the Technical Co-ordinator. This letter is to inform you that we can propose the following arrangements :

a) the co-ordinator works part-time at Meteo-France,

b) an office is allocated to the co-ordinator at Météo-France premises in Toulouse,

c) this office includes power and computer networkt access on which a dedicated computer can be plugged.

We are not in a situation to provide the computer (X-terminal or Workstation), which will have to be funded by the DBCP trust fund. I hope that these proposals can be agreed by the Panel Members.

I have also the pleasure to inform you that Météo-France is ready to launch drifting buoys in the Indian Ocean around La Reunion. Details will be given by delegates to DBCP-XI, to which I am unable to attend, due to a Workshop I am organising at the same dates.

With my best regards,

L'Ingénieur en Chef de la Météorologie
Chef du Département Réseau

François GERARD

CC: Peter DEXTER, WMO Secretariat

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ANNEX IX

GTS AIR PRESSURE OBSERVATIONS

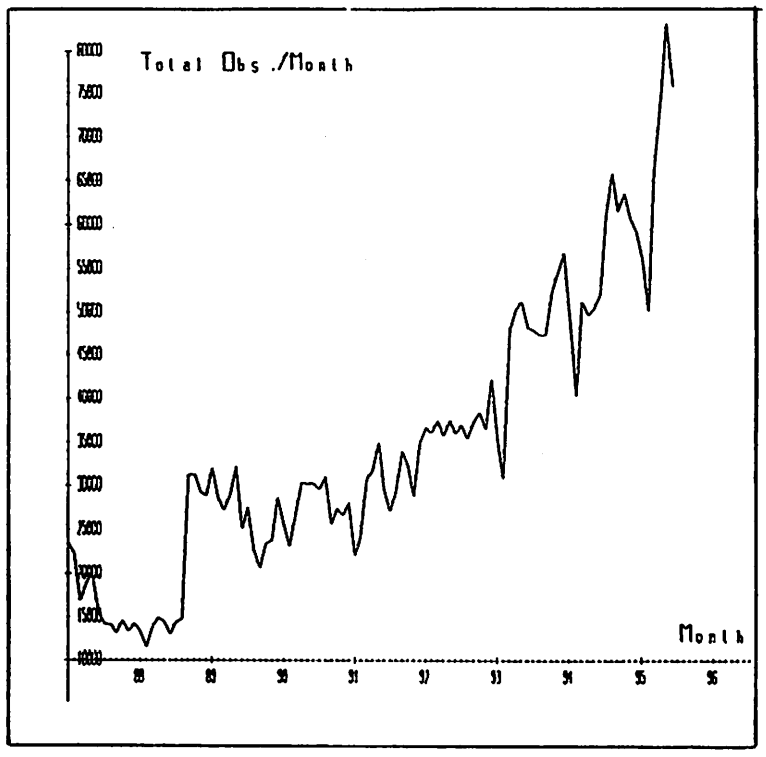

Figure 1 Evolution of the number of drifting buoy air pressure observations received at ECMWF per month between January 1987 and June 1995

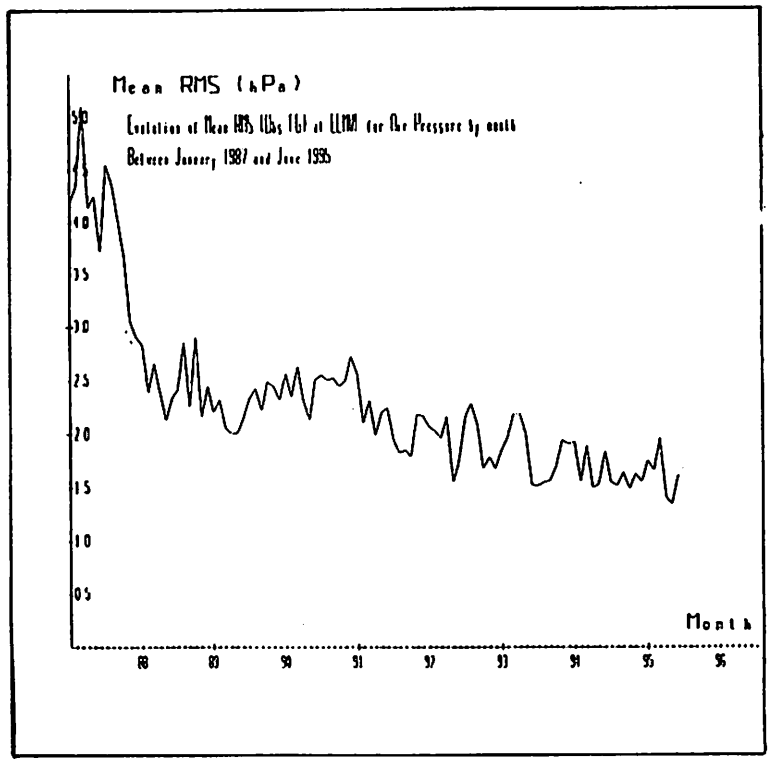

Figure 2 Evolution of mean RMS (Obs/FG) per month for drifting buoy air pressure data (from ECMWF buoy monitoring statistics)

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ANNEX X

DISCUSSION PAPER ON A GLOBAL BUOY PROGRAMME

The DBCP was created in 1985 for the coordination and co-operation in the implementation of drifting buoy programmes. At DBCP-8, the Panel changed its terms of reference to include moored buoys on the high seas.

The idea of an International Global Data Buoy Programme is not new and has particularly been originally debated at the time of the creation of the Drifting Buoy Co-operation Panel but was rejected as being unworkable at that stage. A lot has been achieved since then and the Panel is much more mature now: more than 600 drifting buoys on GTS, flexible dedicated GTS sub-system implemented within the Argos system, strong co-operation between oceanographers and meteorologists (SVP Barometer drifter), Quality Control guidelines formally incorporated as part of the WWW with 10 PMOCs participating, many action groups (EGOS, IABP, IPAB, ISABP and soon IBPIO). Although not formally implemented, an International Global Data Buoy Programme is practically a reality now. Maybe the time has come for the DBCP to formally recognize this. Creating an IGDBP is both in the spirit and the letter of the DBCP terms of reference (1, 2, 3, 4, 5, 6, 7, 8). Below are general initial ideas proposed for the establishment of such a programme which can be debated at DBCP-11 in the view of possibly establishing an IGDBP at DBCP-12.

-1- **Formal purpose** : Supporting WWW, GOOS, GCOS, CLIVAR by providing in situ oceanographic sea surface and atmospheric surface data as a complement to existing in situ data from other sources (e.g. ship) but also as a complement to satellite data (validation, calibration, mixed products).

-2- **Plus**: incentive for GTS distribution, consistent instrumentation for ocean/met purposes. Hopefully this would convince a number of buoy programme managers to authorize GTS distribution by participating in the programme which would be very important in size since the beginning.

-3- **Defined as the combination of**

- DBCP action groups (EGOS, IABP, IPAB, ISABP, IBPIO)
- TAO array
- National programmes meeting certain conditions (e.g. US Southern Hemisphere , NZ, Australia, France, Canada)

» Responsibilities of action groups remain: deployments strategies, purchase, calibration...

» Specific responsibilities of the IGDBP are basically those presently undertaken by the TC DBCP (e.g. GTS distribution, QC, coordination among action groups). In addition the IGDBP would be responsible for coordinating buoy deployments in ocean area not covered by the action groups (e.g. South Pacific Ocean). The IGDBP would be a mechanism for effective coordination between the GDC and the operational programmes.

» No duplication of efforts with DBCP since DBCP is a technical body to discuss general ideas related to DB technology (e.g. should we use BUFR?). IGDBP would be an implementation programme (which is not the case for DBCP).

» IGDBP could be placed under DBCP as a DBCP programme.

-4- **Advantages:**

- Easier to advertise one programme than several action groups. Action groups would be advertised also via the IGDBP.
- Good visibility. Programme managers can refer to the IGDBP for claiming commitments from their governments.
- Strong example for GOOS, GCOS. Can be claimed by GCOS and GOOS as a component. For example GOOS refers to the DBCP but the DBCP is not an implementation programme.
- No additional funds would be required for a co-ordinator in case it is coordinated by the TC DBCP.

- With existing action groups (including IBPIO) the IGDBP exists de facto and is important in size.
- Focal point between the action groups.
- Annual session in conjunction with DBCP, so no extra travel funds required.

-5- **Example of requirements** to meet to belong to the programme:

- Belonging to an action group of the DBCP (which means that action groups support the following requirements) or
- GTS distribution
- Data to DAC, RNODC for Drifting Buoys (MEDS).
- Certain types of buoys preferable (e.g. SVPB outside the tropics or FGGE+Wind or ATLAS, SVP drifters inside the tropics etc...)
- Calibration procedures
- Designate PGC for QC

-6- **Possible names:**

Combination of the following letters:

I	International
W	World
G	Global
D	Data
B	Buoy
P	Program
O	Ocean or Observational
M	Meteorological
N	Network

IGDBP	IDBP	GDBP	WBP
WBN	WDBP	WDBN	WOMBP

-7- How?

- Strongly advertised by DBCP, WMO, IOC, etc...
- Formally recognized by GOOS, GCOS, CLIVAR, WWW.
- Coordinated by the DBCP.
- Status of the programme available via the DBCP W3 server.
- Annual report published:
  - ◊ Reports from chairmen of action groups plus TAO Array, GDC, US SHDBP.
  - ◊ List of benefactors
  - ◊ Maps
- Possibly if funds are available, preparation and issue of a glossy brochure.

-8- Proposed workplan for the intercessional period

- The IGDBP must recognize both scientific and operational requirements. Certain procedures might be defined in that regard in cooperation between meteorologists and oceanographers. This is a way to implement DBCP/SVP co-operation as discussed at DBCP-10 (e.g. DBCP-10 proposed to establish a special SVP/DBCP Sub-group on Buoy Deployment Strategy, centered on the Global Drifter Center; this Sub-group can be fully incorporated in the IGDBP).
- The Programme must be supported by the following bodies before it can be formally implemented. Each of these bodies must therefore be contacted possibly by the Chairman of the DBCP in the view to obtain support and identify any new requirement.
  - ◊ SVP
  - ◊ DBCP
  - ◊ GOOS
  - ◊ GCOS

- ◊ CLIVAR
- ◊ WMO (WWW)
- ◊ IOC

- Since the IGDBP would rely upon the following centers we must also obtain their support (e.g. formal request from the Chairman of the DBCP):

  - ◊ GDC (SVP deployments, QC)
  - ◊ SVP DAC (research quality data base)
  - ◊ RNODC for Drifting Buoys (MEDS, archive)
  - ◊ PMOCs (GTS QC)

- A name and terms of reference for the Programme must be defined.

- A logo and letterheads for the programme must be defined and drafts produced.

- It is proposed that the TC DBCP coordinates the Programme. Decision of principle must be taken in that regard by the DBCP. If otherwise decided, a coordinator must be found, contractual policy defined, and possibly funds collected to contract him. In any case, terms of reference of the programme coordinator must be defined.

- A draft document presenting the IGDBP must be prepared, possibly by the TC DBCP with assistance from the Panel members and the secretariats. This document could include the following information and once formally endorsed by the DBCP hopefully at DBCP-12 would be included in the DBCP document series and widely distributed:

  (i) General presentation by the Chairman of the DBCP.

  (ii) Requirements of the oceanographers and meteorologists expressed by the mean of several scientific articles.

  (iii) Other articles from CLIVAR, GOOS, GCOS, WWW.

  (iv) Reports from the chairmen of the Action Groups of the DBCP plus reports from the programme managers of the TAO Array, the US Southern

Hemisphere drifting buoy programme, and the Global Drifter Center.

(v) Description of existing Data Collection and Location services including Service Argos (by NOAA/NOS and Service Argos).

(vi) Description of the Argos GTS sub-system (by TC DBCP).

(vii) Quality Control of GTS buoy data (by TC DBCP).

(viii) Data Acquisition Center (by SVP).

(ix) RNODC for Drifting Buoys (by MEDS).

(x) Status Report including maps (by TC DBCP).

(xi) List of benefactors (by TC DBCP).

(xii) Presentation of the DBCP server (by TC DBCP).

ANNEX XI

PERSONAL ANALYSIS BY THE DBCP TECHNICAL CO-ORDINATOR OF ARGOS-3

The paper prepared by CLS/Service Argos regarding the proposed enhancements of the Argos system adequately addresses the issues interesting the DBCP. This document tentatively summarizes the technical co-ordinator's point of view although it largely repeats the ideas developed in the CLS paper.

The enhancements described are:

(*a*) Wider frequency bandwidth;
(*b*) Increased onboard capacity (doubling of DRUs)
(*c*) Increased receiver sensitivity;
(*d*) More satellites processed;
(*e*) Downlink messaging;
(*f*) Relay of the data in real-time via geostationary satellite.

The DBCP is interested in the achievement of the following requirements (***in brackets are indicated the enhancements capable of achieving these goals***):

(1) Saving overall buoy programme costs

1.1 Increasing buoy lifetime by increasing battery lifetime. This can be realized through:

1.1.1 Less powerful transmitters (*c*)
1.1.2 Activation of transmitters only when a satellite is in view of the buoy (*e*)
1.1.3 Activation of transmitters only in events when data are required from the buoy (*e*); the buoy is in an area of interest, or this is an "alarm" buoy in adequate weather/oceanographic conditions
1.1.4 Optimized duty cycles (*e*) through downloding of pass predictions.

1.2 Saving Argos costs by recovering only the required data (*e*). Solutions may differ depending upon the evolution of JTA rules. In turn JTA rules could well evolve depending upon the solutions found by the users to save on Argos costs! For example, by downloading the buoy position and pass prediction data, cycles or repetition periods could be adapted to the buoy latitude (*i.e.* less transmissions in high latitudes). Paragraph 1.1.3 however definitely permits to save on Argos costs.

(2) Shorter delays (*d*) Buoys presently store data onboard and transmit the back hour data when a satellite is in view. Processing more satellites therefore means that some data instead of being transmitted later can be transmitted immediately through an additional satellite as is proposed for ADEOS-II.

(3) Higher data rates through

3.1 Data transfer protocols between the buoy and the satellite (*e*). This avoids useless repetition of identical messages
3.2 Dedicated bandwidth for high data rates (*a*)
3.3 Shorter repetition periods (*b*)
3.4 Higher probability of receiving error free messages (*c*)
3.5 Larger number of satellites being processed (*d*).

(4) **Remote tuning of onboard buoy parameters** (*e.g.* calibration) (*e*). Buoys are increasingly using onboard computer power. This leads to more calibration and engineering information being stored onboard. This information is not necessarily constant and may require modification during the buoy operational lifetime.

Of course, in the context of Argos-3, issues such as (i) JTA rules and (ii) Data transfer protocols, require further consideration and might lead to a formal proposal from the DBCP. It is may be premature to formulate any precise proposal on these two issues at this time. The DBCP may decide the creation of one or more dedicated working group for making precise proposals.

ANNEX XII

PRESENTATIONS AT THE TECHNICAL SESSION

AGENDA

Morning session

8h30 David A. Benner, National Ice Center, Gerald F. Appell, NOAA National Ocean Service, USA
FIELD PERFORMANCE TESTS OF ARCTIC DRIFTING BUOYS

8h55 Pierre Blouch, Centre de Meteorologie Marine of Meteo-France
OPERATING MARISONDE-GT BUOYS IN THE LAST TWO YEARS

9h20 Andy Sybrandy, Scripps Institution of Oceanography, USA
SVP BAROMETER DRIFTER AND SVP METEOROLOGICAL DRIFTER

9h45 Sergey Motyzhev, Marine Hydrophysical Institute, Ukraine
MARINE, AIR, AND GROUND AUTOMATIC OBSERVING STATIONS DEVELOPED AT THE MARINE HYDROPHYSICAL INSTITUTE

10h10 *Coffee break*

10h45 Derek Painting, Meteorological Office, United Kingdom
IMPROVED AIR TEMPERATURE MEASUREMENTS FROM DRIFTING BUOYS

11h10 Julie Fletcher, John Burman, Meteorological, Service of New Zealand, Ltd.
DRIFTING BUOY CALIBRATION AND TESTING AT METSERVICE NEW ZEALAND

11h35 Richard W. Reynolds, William J. Emery, NOAA, National Meteorological Center, USA
IN SITU AND SATELLITE SST COMPARISONS

12h00 Alex Papij, Turo Technology Pty Ltd, Australia
T-700 BAROMETER DRIFTERS, MULTIPLE PARAMETERS AND SOFTWARE MANAGEMENT

12h25 End of the morning session

Afternoon session

14h00 Eric A. Meindl, National Data Buoy Center (NOAA/NWS), USA
ENVIRONMENTAL BUOY DATA: THE HISTORICAL RECORD AND FUTURE POSSIBILITIES

14h25 David Meldrum, Dunstaffnage Marine Laboratory, Scotland
INTEGRATION OF GPS AND DRIFTING BUOYS

14h50 Merritt Stevenson, Instituto de Pesquisas Espaciais, Brazil
DEPLOYING SEA ICE BUOYS WITH THERMISTOR CHAINS IN ANTARCTICA AREA

15h15 Eugene Burger, South African Weather Bureau
THE SVP-B DRIFTER - THE SAWB EXPERIENCE IN DEPLOYMENT AND DATA-USE FROM THIS TYPE OF DRIFTER

15h40 End of the technical session and

Coffee break

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ANNEX XIII

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, the panel members will be the representatives of Members of WMO or Member States of IOC which expressed a willingness to participate in the panel's 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 two vice-chairmen, from among the 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 9 (EC-XLV) and IOC Assembly Resolution XVII-6. The panel also adopts as terms of reference for its technical co-ordinator those suggested by the WMO Executive Council in Resolution 9 (EC-XLV) and the IOC Assembly in Resolution XVII-6.

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 XIV

DATA BUOY CO-OPERATION PANEL WORKPLAN AND OBJECTIVES FOR THE ELEVENTH 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 ongoing ocean data buoy programmes.

3. Maintain a list of national contact points for the DBCP and within other relevant bodies with potential for involvement in DBCP activities.

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 for co-ordination activity as a result of the above actions to address item 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/evaluations, including the distribution of a document package to promote the new GTS processing sub-system and the panel in general.

7. Monitor the operation of the new Argos GTS processing sub-system and arrange for modifications as necessary.

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. Follow on actions taken to establish an Indian Ocean Data Buoy Programme.

12. Support, as required, existing DBCP action groups (EGOS, IABP, IPAB and ISABP) and, on request, provide assistance to other internationally co-ordinated buoy programme developments.

13. Investigate requirements for initiating new co-ordinated buoy deployments in other ocean areas.

14. Assist in the planning and implementation, as appropriate, of the ocean data buoy component of the Global Ocean Observing System, of the Global Climate Observing System and of CLIVAR.

15. Keep up-to-date with the latest buoy technical developments.

16. Co-ordinate amended operating guidelines for buoy data quality control as agreed by the panel.

17. Update and amend, as necessary, the Internet server for the DBCP.

18. Investigate new developments in communication technology and facilities, relevant to the collection of sensor and/or location data from buoys.

19. Update the Guide to Moored Buoys and Other ODAS.

20. Develop and implement co-operative buoy deployment strategies, in particular with the SVP, to provide buoy networks which serve both research and operational applications.

21. Arrange for scientific/technical presentations at panel sessions.

22. Pursue the impact assessment study of networks of buoys with differing transmission duty cycles.

23. Develop requirements for and the design of new BUFR tables to exchange additional required buoy data and/or metadata.

24. Prepare and send answers to CLS/Service Argos' questions on the future of Argos.

25. Prepare a detailed proposal on a DBCP global programme and distribute this for comment and feedback from panel members and national focal points prior to DBCP-XII.

PART B

TASK	CARRIED OUT BY*	SUPPORTED/ASSISTED BY	REPORTED TO/ACTION BY	RELEVANT TOR 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	WMO/IOC Secretariats	Panel members	Chairman and panel for information	1, 2, 8
4	Technical co-ordinator, CLS/Service Argos (1, 7)	Panel members and WMO/IOC Secretariats	Chairman and panel for information	6
5	Chairman and technical co-ordinator (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	Technical co-ordinator (1, 2, 3, 7) and chairman	WMO/IOC Secretariats	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	1
13	Chairman and WMO/IOC Secretariats	Panel members	Panel	4
14	Chairman and technical co-ordinator (1, 4, 5, 8)	Panel members	Panel	7, 8
15	Operational services, chairman, technical co-ordinator (1, 4, 5, 8) and technical sub-group	Panel members	Panel	1, 2, 3, 7. 8
16	Technical co-ordinator (1, 2)	Panel members and operational services	Panel	2, 3, 6
17	NOAA National Ocean Service	Technical co-ordinator (1, 3, 8)	Panel	6
18	Vice-chairman and technical co-ordinator (1, 7, 8)	Chairman and panel members	Panel	1, 2, 6, 7
19	E. Meindl	Secretariats	Panel	7
20	Regional action groups, GDC	Technical co-ordinator, panel members (5)	Panel, SVP	1, 2, 3
21	Chairman	WMO/IOC Secretariats	Panel	7
22	Technical co-ordinator, WMO Secretariat, national Meteorological Services (5, 7)	Chairman	Panel	2, 6
23	Working group	Technical co-ordinator (7), WMO Secretariat	CBS WG on Data Representation	6
24	Panel members and technical co-ordinator (6, 7)		Panel, CLS/Service Argos	6
25	Technical co-ordinator and chairman (5)	WMO/IOC Secretariats	Panel	1, 2, 3, 4

* 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 co-ordinator