WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of Unesco)

DRIFTING BUOY CO-OPERATION PANEL

Fifth session

Geneva, 17-20 October 1989

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 fifth session of the Drifting Buoy Co-operation Panel was opened by the acting chairman of the panel, Mr. D. Painting, at 10 a.m. on Tuesday 17 October 1989 in the WMO headquarters, Geneva. After welcoming participants to the session, Mr. Painting called on the Deputy Secretary-General of WMO, Dr. D. Axford, to address the panel.

1.1.2 On behalf of the Secretary-General of WMO, Professor G.O.P. Obasi, Dr. Axford welcomed the participants to the session, to WMO and to Geneva. In noting the considerable progress made by the panel since its first session in Toulouse in 1985, Dr. Axford paid tribute to the inaugural panel chairman, Mr. C. Billard and the technical co-ordinator Mr. D. Meldrum, for their expertise, hard work and enthusiasm for the panel, which had contributed substantially to its success to date. Dr. Axford then turned to the challenges and tasks facing the panel for the future. These include in particular ensuring the distribution of all available drifting buoy data on the GTS with quality and timeliness appropriate to the requirements of WMO and IOC programmes; assisting in the most effective use of available buoy technology; and developing and implementing a plan to ensure the future operational maintenance of existing research-oriented buoy deployments. In this latter context, he noted with satisfaction the participation in the panel session of representatives of the World Ocean Circulation Experiment (WOCE). Dr. Axford also stressed the potential role of developing countries in drifting buoy activities and encouraged the panel to assist in the development of this role as much as possible, in particular through the support for regional action groups in various ocean regions. Finally, Dr. Axford wished the participants a successful meeting and an enjoyable stay in Geneva.

1.1.3 On behalf of the Secretary IOC, Dr. G. Kullenberg, the representative of IOC also welcomed the participants to the session. He also wished to pay tribute to the past chairman and former technical co-ordinator of the panel for the invaluable job they had accomplished during the first few years of the panel's existence. He then highlighted the three main items on which IOC was putting special emphasis: proper quality control of drifting buoy data; regionalization of the panel's activities through the establishment of action groups; and efforts to convince oceanographers to make their data available to the world community in a timely fashion. He concluded in wishing the panel a very fruitful and successful session.

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 the agenda for the session which was unchanged from the provisional agenda. This agenda is given in Annex II.

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 working arrangements for the session. The list of documents for the session was also introduced by the Secretariats.

2. REPORTS (agenda item 2)

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

2.1.1 The acting-chairman reported that Mr. C. Billard, who was elected panel chairman at the fourth session of the panel had to relinquish the post in March 1989 due to changed work commitments, consequently the vice chairman became acting panel chairman. During the intersessional period the chairman and acting chairman were involved in a number of panel activities, the most important of which included the participation in an ad hoc expert consultation on ocean observing systems development held in Paris in March 1989 and various actions in connexion with the selection, work plan and supervision of the new technical co-ordinator.

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

2.2.1 The new technical co-ordinator, Mr. E. Charpentier, began his contract with the University Corporation for Atmospheric Research (UCAR) and Drifting Buoy Co-operation Panel (DBCP) on 1 June 1989. He travelled in Europe during June to meet the people involved in drifting buoy matters (e.g. WMO, IOC, the United Kingdom Meteorological Office, the European Centre for Medium-Range Weather Forecasts (ECMWF), the Institute of Oceanographic Sciences (IOS), the Institut français de recherche pour l'exploitation de la mer (IFREMER), the Centre de la météorologie maritime (CMM), CLS/Service Argos. He stayed two weeks in Toulouse to meet the former technical co-ordinator Mr. D. Meldrum. During the following months, the main part of his work was to gain experience on drifting buoys and the Argos system since he had never worked with them before. An application has been developed using a microcomputer to collect both data sent to the Global Telecommunication System (GTS) from the Argos Global Processing Centres (GPC) and data received from the GTS in the French Meteorological Service in Paris. Using this application he is able to check all the GTS drifting buoy data on a daily basis: the speed of the buoys is computed to detect beached platforms or the ones caught by fishing vessels; the data are also compared with climatological limits (e.g. to find failed sensors). Action has been undertaken each time a problem has been detected and the user has always been contacted; bad data have been removed from GTS diffusion. The technical co-ordinator now has access to the National Weather Service (NWS) gateway in order to check all the drifting buoy GTS messages circulating there.

2.2.2 Another activity of the technical co-ordinator has been to work on a quarterly report on drifting buoys in collaboration with CLS/Service Argos as requested during the previous session of the panel. A questionnaire has been sent to all the drifting buoy operators asking them to allow the panel to publish, on a quarterly basis, a report containing information (such as the list of the sensors, WMO and Argos identifiers, name of the user ...) for each buoy existing in the Argos system. On 15 September 1989, answers had been

received from 2/3 of the operators representing 50% of the total number of buoys. CLS/Service Argos is now studying with Digital Equipment Corporation (DEC) an application capable of updating this file automatically using Argos data. This will also allow the technical co-ordinator to do the same and to manipulate the file in various ways. This file can be used to determine the Platform Transmitter Terminals (PTT) that could be compatible with the GTS if the user agrees. The technical co-ordinator began a study on the quality conrol that could be implemented in the Argos system since all the information needed to do this is available there.

2.2.3 Work has also begun to make contacts with many users and on preparing the technical co-ordinator monthly report and the DBCP-V session. The technical co-ordinator visited the US National Data Buoy Center (NDBC) at the beginning of October and attended the WOCE surface velocity programme session in Toulouse just before DBCP-V. Contacts were made on this occasion with oceanographic researchers involved in drifting buoy matters to whom the activities of the panel have been presented. The full report of the technical co-ordinator is given in Annex III.

2.2.4 The panel was then informed of the activities undertaken by the former technical co-ordinator (Mr. David Meldrum) during the intersessional period and their relation to the work plan and objectives established by the panel at its previous session. Although, as Mr. Meldrum had only been engaged on a part-time basis during the period, the available effort had been smaller than before, it had nonetheless proved possible to achieve most of the aims expected and to further strengthen the panel's position internationally with regard to drifting buoy affairs. Furthermore, with the active co-operation of CLS/Service Argos, it had been shown to be possible for many of the routine operational tasks of the technical co-ordinator to be performed from his parent institute in Scotland by means of remote access to CLS/Service Argos and French Météorologie nationale computers.

2.2.5 As previously, the major part of the technical co-ordinator's time had been spent in encouraging and assisting Argos users to make their data available globally via the GTS. This has continued to be a serious source of difficulty for the majority of non-operational users, largely because of the inflexibilities inherent in the present Argos system. However, the technical co-ordinator has been in the unique position of being able to guide users through the various complexities and thus to increase the flow of useful data on the GTS. In this context, further guidance had also been given to CLS/Service Argos in the drawing up of a specification for a new and more flexible Argos GTS processing chain.

2.2.6 As instructed by the panel, the technical co-ordinator had continued to monitor closely the flow of data on the GTS. In general, the quality of drifting buoy data had improved noticeably in the inter-sessional period through the efforts of quality control agencies, notably NDBC and ECMWF, both acting in co-ordination and co-operation with the panel, its technical co-ordinator and CLS/Service Argos. Nonetheless, there had been occasions where serious losses of data had occurred on the GTS, largely through events outside the control of CLS/Service Argos. In these cases, the technical co-ordinator had been able to offer specialist advice in the resolution of problems, although he continued to be hampered by the lack of an adequate real-time link to the GTS.

2.2.7 Amongst other activities which are recorded later in this report, the technical co-ordinator had undertaken missions to the USA, New Zealand and Australia. These proved invaluable in strengthening user contacts within the drifting buoy community, in resolving many issues relating to Argos and the GTS and in promoting the role of the panel. An important finding had been that most research users, especially within the oceanographic community, were not unwilling to release operational data to the GTS provided that the procedure could be simplified and provided that their own data sets were not altered. The full report of the former technical co-ordinator is given in Annex IV.

2.2.8 Both the panel and CLS/Service Argos took this opportunity to place on record their considerable and sincere appreciation to Mr. Meldrum for the work which he had undertaken during his two years as technical co-ordinator. This work had contributed substantially to the viability and success of the panel, as well as to the capability of CLS/Service Argos to offer a high quality service to its drifting buoy users. The panel also expressed its appreciation to Mr. Charpentier for the very valuable work which he had undertaken in the short time since his appointment and offered him its full support for the future.

2.3 Report by the Secretariats (agenda item 2.3)

2.3.1 The WMO Secretariat's representative reported to the panel on activities undertaken by the WMO Secretariat in support of the panel during the past intersessional period. He noted that the forty-first session of the WMO Executive Council (Geneva, June 1989) had received the annual report of the panel with appreciation and had expressed its particular thanks to both Mr. Billard and Mr. Meldrum for their work for the panel and in support of WMO programmes. The Council had also approved and encouraged the panel's plans for the development of regional co-operative programmes for buoy deployment and had adopted a resolution calling for active WMO participation in the planning and implementation of an operational global ocean observing system in which the DBCP will be expected to have a key role. The tenth sesion of the WMO Commission for Marine Meteorology (Paris, February 1989) had similarly expressed strong support for the panel and its work and urged that attention be given to ensuring the continuing future operational status of drifting buoys.

2.3.2 The major activity of the WMO Secretariat on behalf of the panel during the past year had involved the selection and appointment of the new technical co-ordinator, together with associated fund management and establishment of contracts. Other activities included the preparation, publication and distribution of various reports, documents and circular letters; liaison with various other organizations and bodies on behalf of the panel; and co-ordination with CLS/Service Argos on matters related to the GTS distribution of buoy data.

2.3.3 The representative of the IOC Secretariat reported on activities undertaken by the IOC Secretariat in support of the panel during the past intersessional period. In particular he recalled the decisions by the IOC Assembly at its fifteenth session (Paris, July 1989) with regard to the establishment of a future global operational ocean observing system, to be based on the accelerated development of existing systems and the phased integration of various new technologies. The Assembly further had welcomed

with special emphasis the idea of devising and eventually implementing an entirely separate and modular processing chain for GTS data within the Argos Global Processing Centres (GPC) to allow these data to be transmitted over the GTS while not being affected when made available to the scientists. The Assembly had finally endorsed a set of actions relating to the study of the legal status of Ocean Data Acquisition Systems (ODAS), based on the preparation by Prof. A. Kolodkin, from the Soviet Maritime Law Association, of a documentary analysis of prior steps taken in this field since the early 1970s. Other activities of the IOC Secretariat included the management, up to 31 May 1989, of the funds provided for the employment of the technical co-ordinator and participation in the process of recruiting a new person to fill the position.

2.4 Report by the chairman of EGOS (agenda item 2.4

2.4.1 The panel was informed that the inaugural meeting of the European Group on Ocean Stations (EGOS) was held in Brussels on 1 December 1988, following the final COST-43 meeting of 30 November 1988. Twelve countries have institutes or organizations participating in EGOS. The EGOS agreement is rather less formal than the COST-43 agreement, its main purpose being to continue the co-ordination activity established under COST-43 and in particular to ensure the continuation of the joint drifting and fixed buoy programmes especially the SOBA and SCOS projects.

2.4.2 At the inaugural meeting in December 1988 the essential step of agreeing to the Rules of Procedure for EGOS was taken and at the second meeting held in Dublin on 20 June 1989, it was agreed to establish a Technical Sub-group of EGOS charged with the implementation of the joint programmes. Also, in principle, it was agreed to establish a common fund to enable EGOS to secure, at least on a part-time basis, the services of a Technical Secretary.

2.4.3. It is anticipated that the position of EGOS as an Action Group of the panel will ensure the future success of the EGOS joint drifting buoy programmes in a wider international framework.

3. FINANCIAL AND ADMINISTRATIVE MATTERS (agenda item 3)

3.1 Financial situation (agenda item 3.1)

3.1.1 The panel first considered the final accounts for the period 1 June 1988 to 31 May 1989 and gave the Secretary IOC formal discharge from his administration of the panel's finances for that period. The detailed accounts as administered by IOC up to 31 May 1989 are given in Annex V and include a detailed winding-up of the contract with the Scottish Marine Biological Association (SMBA), a statement of accounts, and a full list of contributions to the position of technical co-ordinator.

3.1.2 The panel then considered the interim statement of accounts, as presented by the WMO Secretariat, which covered the period 1 June 1989 to 30 September 1989. This statement is given in Annex VI. It noted and agreed with the various assumptions and actions made by WMO in its management of the funds during this period and approved the interim statement of accounts as given.

3.2 Review of contracts (agenda item 3.2)

3.2.1 Under this item, the panel reviewed the three contracts which had been established by WMO on its behalf - with UCAR for the employment of the technical co-ordinator; with Service Argos Inc. for the logistic support of the technical co-ordinator; and with SMBA for short-term employment of the former technical co-ordinator, Mr. D. Meldrum.

UCAR contract

3.2.2 A copy of the UCAR contract is given in Annex VII. The panel approved the text of this contract as established for 1989/90 and agreed that the contract met its requirements for the employment of the technical co-ordinator as determined at DBCP-IV. It also approved the decision taken by the WMO Secretariat to include the management of the travel budget within the terms of this contract. Finally, the panel approved the UCAR budget for 1989/90 which is Annex VII to this contract.

Service Argos Inc. contract

3.2.3 A copy of the Service Argos Inc. contract is given in Annex VIII. The panel approved the text of this contract and agreed that the terms of the contract, including the total contract sum of US$12,000, were in accordance with its decisions at DBCP-IV concerning logistic support of the technical co-ordinator.

SMBA contract

3.2.4 The panel approved the decision by the panel chairman to use part of the savings from 1988/89 to establish a contract with SMBA to enable the former technical co-ordinator, Mr. D. Meldrum, to prepare documents for and attend the present (fifth) panel session. A copy of this contract is given in Annex IX and the panel approved the text of this contract.

3.2.5 The panel noted with concern that delays in the receipt of contributions by the WMO Secretariat had resulted in considerable delays in the finalization of both the UCAR and Service Argos Inc. contracts (UCAR in mid-July and Service Argos Inc. not yet finalized at the time of the session), since WMO financial regulations forbid the signing of any contract unless funds to cover the contract are actually held by WMO. Nevertheless, both UCAR and Service Argos Inc. had made arrangements for the new technical co-ordinator to begin work on 1 June 1989 as requested by the panel, which had enabled continuity and momentum to be maintained in this work. The panel expressed its considerable appreciation to UCAR and Service Argos Inc. for the generosity and spirit of co-operation shown by this action. At the same time, it urged all contributors to make every effort to ensure that contributions for 1990/91 are forwarded to WMO in a timely manner following the receipt of invoices to ensure that the 1990/91 contracts may be finalized prior to 31 May 1990.

3.3 Commitments for future funding (agenda item 3.3)

3.4 Future employment status of the technical co-ordinator (agenda item 3.4)

3.3.1 The panel acknowledged that these two items are closely interconnected and therefore should be treated together in the meeting

report. In this regard, the panel first agreed that the employment arrangements in 1989/90 (through UCAR) had proved to be entirely satisfactory in providing the type of employment it required, within the available funds. Secondly, the panel also agreed that Service Argos Inc. had provided logistic support for the technical co-ordinator which also fully met its requirements. Nevertheless, the panel did review again the various advantages and disadvantages relating to the location of the technical co-ordinator in Landover: on the one hand an enhanced facility to interact closely with the large number of drifting buoy users in North America; on the other, a separation from the people undertaking software development of the Argos system in Toulouse.

3.3.2 On balance, the panel concluded that it was desirable to maintain the technical co-ordinator in Landover, at least for one further year. It therefore requested the WMO Secretariat to proceed with the negotiation of employment and support contacts, respectively with UCAR and Service Argos Inc., for 1990/91, on the basis of those which it had already approved for 1989/90 (see Annexes VII and VIII). The only small modification to these contracts which it desired was for the UCAR contract to clearly specify that the annual leave entitlement for the technical co-ordinator should be four weeks, in conformity with European standards.

3.3.3 Finally on the question of employment status and location for the technical co-ordinator, the panel noted the (informal) opinion of UCAR that it would prove both difficult and more expensive for UCAR to continue to employ the technical co-ordinator on its behalf if he were permanently located outside the USA. In view of the possible desirability of a future relocation of the technical co-ordinator to Toulouse, the panel therefore requested the Secretariats to investigate the potential for his future employment through a European-based organization and report on this at its next session

3.3.4 The panel next looked at the likely level of contributions in 1990/91 which could be used as a basis for determining an expenditure budget for that year. As a result of verbal statements made by participants in the session, as well as information provided by countries not represented, the panel drew up a table of provisional contributions which is given in Annex X. While noting that many of these contributions remained to be confirmed, the panel nevertheless agreed that the total of approximately US$99,500 represented an adequate basis on which to proceed.

3.3.5 The panel therefore proceeded to the establishment of an expenditure budget for 1990/91. It first agreed that, in view of continuing limitations in contributions, it should endeavour to maintain as close as possible a zero growth in expenditures. In this regard, the panel then examined a draft budget for the technical co-ordinator's employment in 1990/91 prepared by UCAR, for a total sum of US$86,000, the same as for 1989/90. This draft budget is given in Annex XI. To achieve this zero total growth, the panel noted the following features:

- A salary increment for the technical co-ordinator of US$1,000
- Some small modifications to administrative and other charges by UCAR
- Continuing provision for technical co-ordinator re-location expenses (US$10,000) as a separate budget line.
- A small reduction in the travel budget.

3.3.6 The panel agreed that this draft budget continued to meet its requirements for employment of the technical co-ordinator and therefore requested the WMO Secretariat to proceed with the negotiation of a contract with UCAR on the basis of this budget.

3.3.7 The panel next considered the cost of the logistic support to be provided for the technical co-ordinator by Service Argos Inc. It first noted that, from the total contributions, a maximum of between US$12,000 and US$14,000 would be available to fund such support. The panel also agreed that the real cost to Service Argos of such support was probably substantially higher than this (though difficult to determine exactly). At the same time it was acknowledged that the technical co-ordinator also provided valuable support to the Argos system in the improvement of the service which it could offer to its users (including the drifting buoy community).

3.3.8 After considerable discussion, the panel eventually agreed that its chairman should continue negotiations with Service Argos Inc. on the value of the logistic support contract, with support from the Secretariats and other panel members as appropriate, with a view to reaching an agreed figure before 31 May 1990. In noting that this agreed figure would fall short of actual costs to Service Argos Inc., the panel agreed that this difference, although indeterminate, should be regarded as a direct contribution by Service Argos Inc. to the work of the panel. The panel thanked Service Argos Inc. for its generosity and requested that this contribution should be explicitly recorded in the table of contributions. The panel also noted with appreciation the offer of Service Argos Inc. to maintain the logistic support contract total fixed for three years, provided that this total was US$14,000.

3.3.9 Finally under this agenda item, the panel considered what action should be taken with savings which may arise at the end of any particular annual budget (e.g. through the UCAR contract; in the travel funds for the technical co-ordinator; or through additional unexpected contributions). The panel agreed that, in principle, these funds (which in any case would always be relatively small) should not be redistributed to contributing Member countries, but should be made available for use in support of the panel's work the following year, at the discretion of the panel chairman. Possible specific uses to which such funds could be put include:

- Participation in the implementation of the global ocean observing system (see agenda item 6.6)
- Support for the drifting buoy programmes in the South-west Indian Ocean (see agenda item 6.7)
- Publicity for the panel, including a panel brochure
- Enchancing contacts with oceanographic institutes
- A contribution to travel of the chairman on behalf of the panel
- To supplement the travel budget of the technical co-ordinator
- To contract for work to be undertaken by outside bodies on behlaf of the panel.

3.3.10 The panel requested the chairman to study these possibilities during the intersessional period and to prepare some specific proposals for considèration at its next session. In the meantime, with regard to the potential surplus of between US$6100 and US$9600 from 1989/90, the panel agreed that this should be transferred to the 1990/91 budget for use on some or all of the items noted above in paragraph 3.3.9, at the discretion of the chairman. The panel therefore adopted a draft expenditure budget for 1990/91 and this is given in Annex XII.

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

4.1 World Climate Research Programme (agenda item 4.1)

4.1.1 The panel noted with interest the presentation by the Director of the WOCE International Project Office, Dr. K.P. Koltermann, on the proposed WOCE surface drifter programme. The World Ocean Circulation Experiment (WOCE) is designed to develop global ocean models for the prediction of climate change and to collect data sets necessary to test them. One of its main field components is the surface velocity programme. It will, on a global scale, collect drifting buoy tracks such that in any given 600x600 km box there will be five years of data.

4.1.2 A programme this size depends in the relaxing of some severe constraints. One is the availability of a drifter platform that meets the specifications to measure surface velocities at an accuracy of 1 cm/sec. These drogued drifters with a very low drag ratio are available now, have been tested in the field and promise a life-time of around two years. At the number of drifters required for WOCE, some 600 platforms at any time, the unit price then comes down, compared to the older FGGE-type buoys to about US$3000-3500 for two years of operation.

4.1.3 Besides this drogued drifter design, WOCE has addressed the required sensor design for SST and surface pressure measurements. In a joint effort between Weller (WHOI) and Niiler (Scripps), an air pressure sensor development for air/sea flux measurements on surface buoys is being tested and subsequently adapted for the new low-cost drifters. It is designed for a $\pm$ one hPa accuracy at a cost of US$ 1000. As WOCE needs global air/sea flux fields, this sensor development was encouraged to improve numerical meteorological forecasts for open ocean areas. As to the operational deployment of these sensors in WOCE/TOGA drifters, WOCE encourages to use them in 20-30% of its 600 platforms. After an initial field test scheduled for 1992-1993 the non-WOCE comunity and national agencies are strongly urged to make commitments to deploy and operate this surface pressure array.

4.1.4 On the other hand, the presence of these low-cost drifters with good water following characteristics will make older drifter design obsolete, if only for cost reasons. Nevertheless, the oceanographic community strongly advises the operators of meteorological drifting buoys to reappraise their techniques and attach drogues to their drifters. Only adequate drogueing can result in a reliable measurement of surface velocity. Only in this symbiosis of multi-purpose meteorological and oceanographic sensors in platforms will an adequate cost/benefit ratio be achieved, which in due course will be one of the stepping stones to a future global ocean observing system.

4.1.5 Concluding, Dr. Koltermann emphasized that during and for WOCE a very significant increase in platform numbers will occur. These low-cost drifters will to some extent be instrumented with newly designed surface pressure sensors. These data will be available on the GTS without degradation of either data or location. All this is paid out of research funds. After WOCE nothing may be left in place. Therefore these developments and their implications should be brought to the attention of operational agencies who are invited to share in the developments in order to extend the WOCE deployments into an operational global observing system.

4.1.6 The panel agreed that these are indeed exciting developments. In particular, if the proposed low-cost drifter proves operationally effective, it will be very attractive to operational services and play a major part in increasing operational buoy deployments in support of a global ocean observing system. The panel therefore agreed to continue to co-ordinate closely with the WOCE community, through its chairman and technical co-ordinator on the one hand and the WOCE IPO on the other, in the development and deployment of the WOCE low-cost drifter. In addition, the panel urged its members, in particular those involved in the deployment of operational meteorological buoys, to look carefully at the feasibility of attaching drogues and/or thermistor chains to their buoys, with a view to possible operational deployment of such combined systems in the future.

4.2 World Weather Watch, (WWW including the operational WWW systems evaluation for the North Atlantic (OWSE-NA)) (agenda item 4.2)

4.2.1 Mr. Meldrum reported on the activities he had performed at the panel's request in support of the OWSE-NA. These had comprised a substantial data collection and analysis effort, attendance at an OWSE-NA workshop for section analysts and completion of the section analyst's report for drifting buoys. The scope of this report, which was tabled at the meeting and which will be made available to national focal points for drifting buoy programmes, had been somewhat widened beyond its original objectives so as to include a global perspective whenever possible.

4.2.2 In the discussion of the report that followed, the panel's attention was drawn to a number of the findings and recommendations. In particular, it was noted that drifters deployed in the North Atlantic had performed less well, in terms of lifetime and quality of pressure data, than the rest of the GTS-reporting drifter population. This was felt to be partly due to the extensive use of prototype designs in some of the European drifter programmes.

4.2.3 A further observation noted in the report was that consideration should be given to the use of air-deployable mini-drifters to allow seeding of data-sparse areas. Such drifters are also available with cheaper pressure sensors, the savings from fitting such sensors permitting a dramatic increase in the number of buoys that might be deployed. The panel expressed a considerable interest in this development, but it was reported that the initial deployments of these buoys had been disappointing and that their long-term performance remained to be evaluated.

4.2.4 The possibility of fitting inexpensive pressure sensors with less certain drift characteristics stimulated a wider discussion of the possible use of the good quality pressure tendency information which should nonetheless be available from such sensors. It was felt that present numerical analyses do not adequately exploit such data, which should in principle give reliable indications of departures of the true pressure field from first-guess values. Accordingly, the chairman undertook to initiate a study within his own organization of the potential improvements in surface pressure analyses which might result from the use of pressure tendency data.

4.3 Integrated Global Ocean Services System (IGOSS) (agenda item 4.3)

4.3.1 The panel was informed that the Joint IOC/WMO Working Committee for IGOSS, at its fifth session (Paris, November 1988), shared the concern

expressed by the panel in Recommendation 2 (DBCP-III) relating to real-time distribution and archiving of oceanographic data from drifting buoys. The Joint Working Committee therefore adopted Recommendation 2 (JWC-IGOSS-V) which basically extends the panel's recommendation to all oceanographic data. The panel recalled that, de facto, it had very close links with IGOSS since, for example, in the past the group which would have had to deal with drifting buoy activities was proposed to be included within IGOSS. It therefore welcomed the excellent and quite natural co-operation between IGOSS and itself, IGOSS being, in this framework, considered as a major user of drifting buoy data. In particular, it was made clear that IGOSS was already making use of SST data from drifting buoys. Nevertheless, the main improvement that IGOSS is requesting from drifting buoy operators is the possibility to measure sub-surface variables (temperature and if possible salinity) which are substantially lacking in many parts of the world ocean.

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

5.1 Under this agenda item, brief reports were provided to the session on present and/or future drifting buoy activities from Australia, Brazil, Canada, China, France, Greece, Italy, Japan, Netherlands, New Zealand, Turkey, United Kingdom, USA and the Scientific Committee on Antarctic Research (SCAR). Summaries of these reports will be attached to the panel's annual report for 1989, as agreed at the panel's third session, together with written reports received from Member countries not represented at the session..

6. CO-ORDINATION ACTIVITIES (agenda item 6)

6.1 Quality control of drifting buoy data (agenda item 6.1)

6.1.1 As at its previous sessions the panel carefully studied the arguments relevant to the quality control of drifting buoy data and reviewed the developments that had taken place during the intersessional period. In order to assist the panel in this task, a number of short presentations were made.

6.1.2 Mr. D. Meldrum reminded the panel that gross errors in data circulating on the GTS were unlikely to pose significant problems for numerical forecasters because of the controls applied by each centre prior to data assimilation. However, confidence in the general quality of drifter data had in the past been eroded by such errors and it was still important to exclude them. A more important task, and one in which the specialist quality control agencies had a major role to play was the identification of the more subtle medium-scale errors that might well elude conventional error checks and so cause significant problems for forecasters. In this context, the panel listened with pleasure to the presentations made by Dr. G. Hamilton of the U.S. National Data Buoy Centre (NDBC) and by Mr. M. Szabados of the U.S. Office of Ocean Services (OOS) noting the significant progress that was being made in this respect both by these centres and by its own technical co-ordinator. At the same time, it was concerned to hear that funding restrictions had forced NDBC to reduce its effort in this direction, so that now only about one quarter of all drifting buoy reports emanating from the U.S. Argos processing centre were being quality controlled by NDBC.

6.1.3 Moving to the question of timeliness, the panel was reminded that, because of the orbital delays inherent in the Argos system, much data already risked failing cut-off times and that the time penalties introduced by quality control, especially for atmospheric variables, needed to be carefully watched. The panel was pleased to hear, therefore, that a request from its chairman had resulted in NDBC throughput times being substantially reduced and it thanked Dr. Hamilton for this action on its behalf. It also welcomed an assurance from Service Argos that data delays would be further reduced following the implementation of new communications hardware for collection of the Argos satellite telemetry. Nonetheless, the panel recommended that careful attention should continue to be given to this issue.

6.1.4 As regards the activities of the OOS Ocean Products Center (OPC) in the field of quality control. the panel noted that full operational status had yet to be achieved. At present only global barometric pressure data and North Atlantic SST data were being routinely controlled, although it was planned that global coverage would be realized for oceanic variables in due course. The panel welcomed the developments that were taking place, but asked OPC to take due note of the timeliness question, particularly in regard to data that might be withheld for manual review.

6.1.5 Finally, the panel welcomed the proposal by the representative of WOCE that a quality-controlled WOCE SST data set would be released to the GTS in real-time, the necessary controls being performed on the Argos computers by the intervention in delayed mode of a WOCE expert.

6.2 Code matters (agenda item 6.2)

6.2.1 The panel noted that the sub-group of experts, comprising Mr. A. Hernhuter (USA, convenor), Mr. J.R. Keeley (Canada) and Dr. A.D.J. O'Neill (Canada) had completed a detailed revised proposal for SHIP code modifications in accordance with the wishes of the fourth session of the panel. The proposal was distributed under a joint DBCP IOC/WMO circular letter to members of the panel and national focal points for drifting buoy programmes for comment.

6.2.2 After careful consideration of the responses to the proposal so far received the panel decided to forward the SHIP code amendments as proposed, together with the comments received, to the appropriate WMO bodies. The panel also requested that the CBS Working Group on Codes offer an alternative way forward in the event that the revisions to the SHIP code are not acceptable.

6.2.3 The panel further noted that the new BUFR code form (recently adopted) would be capable of accommodating all requirements for drifting buoy sensor data and it would be essential for the panel to make its wishes known during the development of BUFR parameter tables. The panel requested Mr. J.R. Keeley (Canada) to act for the panel in liaising with the CBS Sub-group on data representation which is responsible for developing and maintaining the BUFR code. The panel also requested Mr. Keeley to take account of its coding requirements during the development of the IGOSS Flexible Code (IFC). (IFC is to be a table-based character code for data transmission on the GTS and compatible with the data archival format GF3 and also with the tabular form of BUFR, BTAB, which is being developed by ECMWF).

6.3 New Argos GTS processing chain (agenda item 6.3)

6.3.1 The panel was asked to consider a proposal for a new GTS processing chain presented by Mr. M. Taillade of CLS/Service Argos. The proposal (see Annex XIII) was developed in response to a request of the DBCP at its fourth session in New Orleans and is aimed at increasing the quantity and quality of data sent onto the GTS by providing a separate GTS processing chain after data have been passed into the Argos data bank. The panel noted that some 120 platforms, not now sent onto the GTS, reported in physical units and are therefore suitable for applying to the proposed processing chain. However, it was further noted that data from many more platforms (approximately 500) were only available in binary form and that these could not be processed by the proposed new system unless conversion algorithms could be applied, which might add considerably to the cost of processing. In this context, the former technical co-ordinator reported that many research operators of drifting buoy programmes would be willing to allow such conversions to be performed provided that they could continue to have access to the raw binary data. The panel asked CLS/Service Argos to take note of this issue when finalizing the specifications for the new GTS chain.

6.3.2 Although the panel expressed some concern that the potential addition to the numbers of buoys reporting on the GTS might be modest, it nevertheless agreed in principle that the proposal (with some changes in details of the specification such as the elimination of the proposed degradation of data for GTS insertion) should be implemented as soon as possible. The panel therefore agreed that the technical co-ordinator should liaise with CLS/Service Argos and panel members to finalize specifications for the new processing system.

6.3.3 The panel was informed that CLS/Service Argos was prepared to meet a significant proportion of the cost of implementing the proposed GTS processing system but that the cost of sub-contracting for software development would have to be met by the users. A number of panel members expressed the willingness, in principle, to fund the necessary work and it was agreed that the final arrangements would be left to those members, in negotiation with CLS/Service Argos, with the assistance of the panel chairman and the Secretariats.

6.3.4 The panel noted with appreciation that, on the basis of the discussions and decisions so far made by the panel, CLS/Service Argos was willing to go ahead with preparing specifications for the scheme, to facilitate early implementation. The panel expressed the desire that a final go-ahead for the development of the software should be given by the chairman within three months of this meeting.

6.4 Rationalization of GTS bulletin headers (agenda item 6.4)

6.4.1 The panel's attention was drawn to a problem regarding the correct use of the data designator group $T_1T_2A_1A_2ii$ in the abbreviated header of drifting buoy reports on the GTS. As had been noted at the previous session, the current practice adopted by centres inserting such reports on the GTS seldom conformed with the rules relating to the GTS. This was largely because there was no clear provision in the regulations for global satellite-collected data such as the reports assembled from drifting buoy observations. In particular, the use of the A_2 symbol to denote the geographical extent of the data within the bulletin has caused considerable

difficulty, as the regulations were mainly appropriate to the collection of ship reports by coastal radio stations. As a result, free but irregular use had for many years been made of the ii symbols as geographical designators.

6.4.2 The panel carefully considered the issues involved and decided on the following actions:

(a) In recognition of the fact that an established practice for the use of the ii group exists amongst centres inserting drifting buoy data on the GTS and that that practice more logically reflects the geographical sub-division of the data, to request WMO to alter the rules relating to the use of the $T_1T_2A_1A_2ii$ group for drifting buoy data;

(b) To assist Argos in the choice of values for ii for global drifting buoy data by making suitable recommendations as to these values. See Annex XIV for the agreed list;

(c) Realizing that the current catalogue of meteorological bulletins published by the WMO does not accurately describe the abbreviated headers for drifting buoy data and that this poses problems for potential users of the data, to request that the WMO, by means of the Monthly Letter of the WWW, publish an up-to-date list of such headers.

6.4.3 The panel then reviewed a problem relating to the date-time group in asynoptic reports from automatic stations which are reported on the GTS using the SHIP code form. Once again, the regulations did not properly cater for this class of observation and numerous reports had been rejected as corrupt by the automated format-checking software at the Paris Regional Telecommunication Hub. The panel, having considered the matter, decided that WMO should be asked to define more precisely the regulations for automatic stations. In recognition that this might take some time, it was further agreed that CLS/Service Argos should be asked to modify their coding of such reports to circumvent the apparent inconsistencies in the date-time groups.

6.5 Combined meteorological/oceanographic drifting buoys (agenda item 6.5)

6.5.1 The panel noted that at its third session it had adopted a recommendation calling for enhanced collaboration between meteorologists and oceanographers in the development of low-cost drifting buoys for combined met/ocean purposes. In this regard, it recalled the presentation and discussions which had taken place under agenda item 4.1 concerning the development of a low-cost drifter for WOCE purposes. It agreed once again that this was an activity of major significance, in which panel members should become closely involved. It also urged members to undertake, and follow-up whenever possible, feasibility studies on adapting standard meteorological buoys to carry oceanographic sensors (drogues and thermistor chains).

6.6 Future operational maintenance of drifting buoy programmes (agenda item 6.6)

6.6.1 Under this agenda item, the panel concentrated on its relationship with a future operational global ocean observing system, the establishment of which had been considered as of a high priority by both WMO and IOC governing

bodies (notwithstanding slight differences on the terminology used). The panel considered it of utmost importance that it participate in building up such a system as far as drifting buoys are concerned. It therefore agreed that, in the first instance, its chairman and/or technical co-ordinator, as appropriate, should participate in the expert consultations that were to take place to develop a plan for the system. As for the longer term, it considered that the best way to proceed in an operational fashion was to establish a sub-group of major buoy deployers, which would be entrusted with devising practical strategies and plans for buoy deployments, either on a regular basis or as needed, in order to maintain the required network of drifting data buoys throughout the world ocean.

6.7 Formation of other regional action groups (agenda item 6.7)

6.7.1 The panel discussed the role of regional action groups in the implementation of the global ocean observing system. The experience of COST-43 and its successor EGOS has amply demonstrated the value of regional co-operative action in combining individual (often very limited) national contributions into a substantive buoy deployment programme of considerable value to the countries concerned, as well as to the major programmes of WMO and IOC.

6.7.2 The panel was informed of the initiative now underway, under the auspices of the South-west Indian Ocean Tropical Cyclone Committee, for the deployment of some 12 meteorological drifting buoys in the South-west Indian Ocean. Details of this proposal were presented to the panel in a letter from Mr. Y. Valadon, the Permanent Representative of Mauritius with WMO.

6.7.3 The panel noted in Mr. Valadon's letter that he specifically seeks the assistance and advice of the panel on certain technical and administrative matters. The panel therefore considered how best it might assist in the implementation of this project and decided to offer the assistance of the chairman, technical co-ordinator and/or other panel members as appropriate to provide the necessary technical and administrative expertise. The panel also expressed the view that the proposed project could provide the basis of a regional action group for the South-west Indian Ocean.

6.8 Other co-ordination activities (agenda item 6.8)

Drifting buoy wind direction

6.8.1 Drifting buoys that measure wind direction give the direction with respect to magnetic north when they report through the NOAA polar-orbiting satellite. Service Argos encodes the data for distribution in DRIBU code in Section 1 for wind speed and direction. This wind direction is defined with reference to true north. The difference between true and magnetic north can be quite significant in certain areas of the world and cause a serious misrepresentation of the reported wind direction. Because buoy location cannot be computed aboard the buoy, this correction must be done in the shore side processing. After discussions with Service Argos personnel, NDBC submitted the attached letter (see Annex XV) to Service Argos on 19 June 1989 which requested Service Argos to seriously consider developing a means to convert magnetic wind direction into true direction. The panel urged Service Argos to consider implementing this modification as a matter of urgency and possibly include it in the specifications of the new GTS processing chain.

Global processing centre outages

6.8.2 Service Argos was requested to review its guidelines for the back-up of the global processing centres when one gives down. Service Argos replied that their policy had been expressed in several recent Argos Bulletins. The normal procedure is that if one centre goes down the other centre will not provide backing service for processing all the global data unless the outage exceedes eight hours. Thus there will be a loss of real-time data for that period on the GTS, although no loss of data will occur in the data bank. The panel also noted the need to inform users about scheduled outages as far in advance as possible.

7. PUBLICATIONS (agenda item 7)

Annual report

7.1 The panel was presented with a new layout for its annual report (see Annex XVI), aimed at making the report more consistent with its actual activities than previously (the first layout of the annual report had indeed been designed before the technical co-ordinator had begun his work on behalf of the panel). The new layout was agreed, with the assumption that the list of annexes was to be adapted to fit with the material available to prepare the report. Due to practical time constraints, the panel agreed that the final version of the annual report should reach the IOC Secretariat by 1 December 1989 at the latest.

Drifting Buoy Co-operation Panel logo

7.2 The panel recalled that, pursuant to the procedure adopted at its fourth session, it had finally adopted a DBCP logo (which is reproduced as Annex XVII). It was agreed that the logo will be printed on the letterhead used by the panel chairman, the technical co-ordinator, or the Secretariats for official correspondence on behalf of the panel. Other possible uses of the logo might be proposed to a further panel session upon any panel member's initiative.

DBCP circular letters on administrative matters

7.3 The panel recalled that a first such letter was prepared by the Secretariats and forwarded to the national focal points for drifting buoy programmes and panel members on 19 May 1989. Due to particular circumstances, and mainly the time needed to appoint a new technical co-ordinator, only one such letter had been issued during the past intersessional period. The Secretariats were requested to do their best to issue the letter at least twice a year during the intersessional period to come.

Guide to Moored Buoys and other ODAS

7.4 The panel recalled it had recommended the preparation of a Guide to Moored Buoys and other ODAS at its second session, to serve as a companion to the Guide to Drifting Data Buoys. Dr. G. Hamilton was nominated by CMM-X as rapporteur to prepare the guide. In under six months, Dr. Hamilton had provided a first draft of the guide, but was now seeking inputs from other countries in order to make the guide as international as possible. The panel therefore requested its members to make any relevant information available to the rapporteur as soon as possible.

Quarterly information service bulletin on drifting buoys

7.5 The panel recalled that such a bulletin had been requested by the IGOSS community, as the IGOSS information service bulletin on ocean data buoys and other ODAS had been restricted to non-drifting ODAS since its twelfth issue (August 1987). CLS/Service Argos reported on measures taken to prepare the bulletin, including an enquiry among drifting buoy operators to seek authorization to disseminate the relevant information. CLS expressed confidence that the first bulletin would be ready for distribution before the end of the year (see also paragraph 2.2.2).

8. REVIEW OF THE PANEL'S OPERATING PROCEDURES AND THE TASKS OF THE TECHNICAL CO-ORDINATOR (agenda item 8)

8.1 Following established procedures, the panel reviewed its operating procedures as adopted at its fourth session. It did not see any need to change these operating procedures, which are given in Annex XVIII.

8.2 The panel further reviewed its workplan as adopted at its fourth session. In the light of discussions under previous agenda items and of achievements during the past intersessional period, it considered that the plan, together with the tasks entrusted to the technical co-ordinator, had to be significantly modified. The revised workplan is given in Annex XIX

9. ELECTION OF THE CHAIRMAN AND VICE-CHAIRMAN OF THE PANEL (agenda item 9)

9.1 The panel unanimously elected Mr. D. Painting, its previous vice-chairman and acting chairman, as its chairman for the coming intersessional period. The panel further unanimously elected Dr. A.D.J. O'Neill as its vice-chairman, following the procedure adopted at its fourth session.

10. DATE AND PLACE OF THE NEXT SESSION (agenda item 10)

10.1 The panel agreed that its sessions should continue to be of four days. It welcomed the kind offer by Australia to host the sixth panel session at the Australian Bureau of Meteorology in Melbourne. It agreed that the session should be held in conjunction with the tenth Meeting on Argos Joint Tariff Agreement and that, subject to agreement by the ninth Meeting on Argos Joint Tariff Agreement, the dates for the panel's sixth session should be 16 to 19 October 1990. In this respect, the panel noted that provision should be made between its sixth session and the tenth Meeting on Argos Joint Tariff Agreement for two days devoted to an Argos Users' Conference especially dedicated to the southern hemisphere users.

11. CLOSURE OF THE SESSION (agenda item 11)

11.1 In closing the session, the acting chairman of the panel, Mr. D. Painting expressed his thanks to all the participants for their contributions to what had been a very successful meeting. He noted that, after the initial settling-in period the panel was now successfully carrying

out work as originally envisaged by the Executive Councils of WMO and IOC and thus making a substantial contribution in support of the Organizations' programmes. He then expressed his particular thanks to the inaugural panel chairman, Mr. C. Billard, and to the two technical co-ordinators, Mr. D. Meldrum and Mr. E. Charpentier, as well as to the two Secretariats, for their contributions to the panel and assistance during the present session.

11.2 On behalf of the participants, Dr. G. Hamilton expressed his appreciation to the chairman for his very effective handling of the session and for his important work during the intersessional period. He also offered thanks to the Secretariats for their support of the panel.

11.3 The fifth session of the Drifting Buoy Co-operation Panel closed at 12.30 p.m. on Friday 20 October 1989.

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AGENDA

1. ORGANIZATION OF THE SESSION

   1.1 Opening of the session
   1.2 Adoption of the agenda
   1.3 Working arrangements

2. REPORTS

   2.1 Report by the chairman of the Drifting Buoy Co-operation Panel
   2.2 Report by the technical co-ordinator
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4. RELATIONSHIP WITH INTERNATIONAL PROGRAMMES/ORGANIZATIONS

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5. REPORTS ON CURRENT AND PLANNED DRIFTING BUOY PROGRAMMES

6. CO-ORDINATION ACTIVITIES

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

10. DATE AND PLACE OF THE NEXT SESSION

11. CLOSURE OF THE SESSION

REPORT OF THE TECHNICAL CO-ORDINATOR

1 Introduction :

1.1 This report covers the period 1 June 1989 - 13 October 1989. The new technical coordinator began his contract with UCAR on June first 1989. During June 1989, he traveled in Europe to visit :

1st, 2nd : WMO, Geneva
5th : IOC, Paris
6th : MO of UK, Workingham and ECMWF, Reading
7th : IOS, WOCE, Wormley
8th, 9th : IFREMER, CMM, Brest
12th, 22nd: CLS/Argos, Toulouse

He arrived in Landover, Maryland, USA on June 26th 1989.

He visited the NDBC, INO and CNOC in New Orleans on October 2nd and 3rd and attended to the WOCE SVP session in Toulouse (9-11 October). After that he spent two days in CLS/Toulouse before attending to the 5th session of the DBCP in Geneva.

2 Activities during the period :

The main work of the Technical Coordinator in July, August and September has been to learn the Argos System and its principles, since he had never worked with CLS before the 1st of June.
This has been done by writing an application on a PC connected to the Argos Vax computer. The others activities were :

- Quarterly report on Drifting Buoy
- GTS, monitoring
- Quality Control
- Argos GTS application
- DBCP
- CLS

3 Knowledge of the Argos system, PC application :

3.1 Functionality of the PC application :

3.1.1 Collect all the DRIBUs sent to the GTS from either the FRGPC (French Global Processing Center) or the USGPC (United States Global Processing Center).

3.1.2 Collect all the DRIBUs received from the GTS in the French Meteorological Office.

3.1.3 Decode those messages and store them in a Database, which can accept Buoy data for all buoys during the last 16 days. The data stored are :

- WMO number of the buoy
- Date of observation
- Difference between the time of observation and the time the message was received in Paris (late).
- Position of the buoy
- Atmospheric Pressure
- Air Temperature
- Sea Surface Temperature
- Pressure Tendancy
- Wind Direction
- Wind Speed

3.1.4 For all the messages of the DataBase :

3.1.4.1 Computes the mean speed of the buoy for the current day, and compares it with a lower and a higher limit (usually, 0m/s and 1.5 m/s). Computes also the RMS in order to see the bad locations and the abnormal speeds. If the speed is out of the limits, compute the mean speed during the last 16 days and do the same checks.

3.1.4.2 Compares the value of Atmospheric Pressure, Air Temperature and Sea Surface Temperature with the climatological limits using the position of the buoy and the time of observation. The climatological limits file has been sent by NDBC to the technical coordinator and contains the limits for each month of the year in a zone of 5 degrees per 5 degrees.

3.1.4.3 List all the buoys and the data associated for which the speed is abnormal or the data are out of the climatological limits.

3.1.5 The application is able to give curves of variation of P, T and SST during the 16 days period.

3.1.6 It is able to show the track of the buoy during this same period.

3.1.7 It is able to list all the buoys in one given zone, to compare the data of buoys close to one other.

3.2 Using this application many bad values have been detected (about 2 or 3 per day), and many actions have been taken to change the Argos parameters of the buoys (e.g. limits) in order to improve the quality of the data sent to the GTS.

4 Quarterly report on Drifting Buoys :

4.1 As requested by the DBCP (see 4.3.2 of DBCP IV report), CLS with the support of the Technical Coordinator, decided to send a questionnaire to all the Argos drifting buoy users, in order to maintain a drifting buoy file on a quarterly basis, that will be widely disseminated to the IGOSS community. A letter, signed by Bernard Pontoizeau (CLS) and by the Technical Coordinator, has been sent to all the drifting buoy users. This file should be usefull to evaluate the number of buoys that could potentially emit to the GTS if the user agrees, to know the repartition of the buoys in different areas and to make an history of those drifters.

4.1.1 For each buoy (if the user wants this information to be published) the file (updated every three month) will contain :

- 1- the Argos identification number.
- 2- the WMO identification number.
- 3- the first position of the buoy (with the date of deployment).
- 4- the last known position.
- 5- if the emission is every day or every other day or every three day...
- 6- the list of the sensors used with their numbers and the type of processing used (binary or physical value available).
- 7- if there is a drogue (depth of the drogue).
- 8- the type of meteo code used (if there is one, e.g. DRIBU).
- 9- the type of the program (operational, experimental, planned).
- 10- Any comments the user considers useful for the compilation of the drifting buoy table.

4.1.2 On September 15th 1989, We had received an answer for about 50% of the buoys; 2/3 of the users answered to the questionaire.

4.1.3 Service Argos asked DEC to evaluate an application to maintain this file. DEC should answer before the end of October. The application should be operational before the end of the year. The file will be updated automatically using the data available in the Argos system and also with the data provided by the operators. A history of all the changes to the file will be kept and it will be possible to surch the file in various ways (e.g. sorting all the buoys mesuring SST data above 30 degrees south). The technical coordinator or CLS will be able to access to the file from either Toulouse or Landover.

5 GTS, Monitoring :

The technical Coordinator has been in contact with many users about problems with some buoys.

5.1 Bad data detected using the PC application : The GTS data were collected on a daily basis to make a check for the previous day. Much Pressure, Temperature or SST data were out of the climatological limits. Some buoys have been removed from the GTS diffusion, in some cases, just the data of one given sensor have been removed. But in most of the cases, just the limits of the sensors needed to be changed. We are now able to list all the buoys for wich the limits are correct or not. Argos and the Technical Coordinator have begun an action to correct those limits with the agreement of the Operators. They have been contacted each time an action had to be taken on a buoy.

5.2 The buoy position checking showed a couple of buoys that were drifting too quickly (e.g. one was emitting before being deployed) or were fixed (e.g. one was caught by a fishing vessel and brought to a small island).

5.3 Users contacted the Technical Coordinator to provide them with some technical information (e.g. calibration curves..).

5.4 Monthly reports : some pressure sensor have been recalibrated using the ECMWF statistics.

5.5 Is is quite important for the Technical Coordinator to be informed of the modifications that are made on the calibration curves of the buoys treated by the LUTs. Presently, many messages can be sent to the GTS for one Observation (e.g. one from CLS/Landover and one from a LUT). If the calibration curves are different in the two centers, the data sent to the GTS are different and the

statistics computed by ECMWF or another organization can be pertubed because two different biases could appear for a single buoy : the result is that the bias computed by the ECMWF can be wrong since it do not take into account the origin of the messages (wich processing center), and so the recalibration introduced can be wrong.

5.6 The Technical Coordinator is not allways able to know the origin of the data reported via LUTs because the headers of the messages collected are not available. This problem will find a solution with the acces provided to the TC in the National Weather Service Gateway (Acces to the GTS in NWS).

6 Quality Control :

6.1 Quality control must be implemented as closely as possible to the source of the diffusion because the data sent to the GTS must be the best possible. This is obvious but this is not a reality. As we can not implement QC on the buoys themselves, the closest source is CLS/Argos. Making those QC checks there will also improve the timelyness of the diffusion : the whole information to do them is available in CLS, so the delays can be reduced since the number of processing centers involved in the QC chain can be reduced (no communication between centers...).

6.2 The PC application has been written partly to execute many controls on the data sent to the GTS : Gross error checks, Climatologic checks, curves, tracks...

6.3 Those controls have been used on a daily basis to improve the monitoring activities of the Technical Coordinator (see 5.1..).

6.4 Those controls have been useful for the Technical Coordinator to gain experience in those kind of problems.

6.5 QC in CLS/Argos

6.5.1 A whole quality control processing should incude (E: existing in CLS, I: to be implemented) :

6.5.1.1 Real time :

E: On the messages received from the PTTs : test for two messages to be identical before accepting them (compression index). This exists in CLS but not in all LUTs.

I: We could improve this by testing the sensor fields instead of the whole message and introduce a compression index for each sensor.

I: Checksums could be added to the PTT message in order to test the quality of the transmission. Checksums could be useful to accept messages that have been received only once by the Argos Processing Center. This supposes a standardization of the way to compute the checksum for all the new buoys manufactured.

I: On the messages received from the PTTs : test for each sensor if all the bits are 1 or all the bits are 0 (be careful with some sensors because all bits can be 0 for a given physical value, e.g. wind speed = 0 m/s).

E: Gross error checks

E: User limits (Gross limits given by the User, usualy corresponding with all the bits 0 and all the bits 1). Those limits are used in the Argos Processing Centers to detect the data for which all the bits are 1 or 0. In fact they are sometimes out of the limits of variation of the sensor. This is why it could be useful to check the bits too.

I: Climatological limits : comparison of the sensor value with the climatological limits in the same area (5 x 5 degrees) during the same period (month). A list of the data out of the limits could be sent automatically to the Technical Coordinator to help him to reject the sensors that have failed or to contract the limits.

I: When duplicate sensors are present on the buoy, their values can be compared. We can compare also, the variation of the atmospheric pressure (if a P sensor is present) with the value of the Pressure Tendancy sensor (if there is one).

I: Position checking, detect beached platforms or those caught by fishing vessels and brought to a port. The mean speed of the buoy can be computed during a given period. The RMS of the speed can be used to detect the bad locations.

I: Time continuity, same tests as those computed in NDBC (see DBCP IV report).

I: Comparison with models (values of the 6 hours forecast field with the sensor value). CLS/Argos

could receive P,T,SST,DD,FF fields on a daily basis from ECMWF or the French Meteorological Office and compare them with the buoy data. The number of observations available in the area could be useful to know if an action (e.g. change the sensor limits) has to be done or not.

6.5.1.2 Regulary

E: The different Drifting Buoys monthly reports (NDBC, ECMWF..) are used to recalibrate some sensors or remove bad data from the GTS diffusion. The problem discribed in 5.5 can be solved in computing those statistics directly in CLS/Argos if the first guess of one model is available in CLS : they would be computed using one source only.

E: Direct contacts of the Technical Coordinator with the Users.

6.5.2 Quality controls such as climatological ones or time can be implemented without difficulties on the Argos GTS application.

7 Argos GTS Application :

7.1 CLS and DEC had studied a new Argos GTS processing chain. This proposal is described in Annex ..

7.2 The new functions are :

7.2.1 Climatological checks

7.2.2 Let the user use any order he wants for the sensors. The data will be sent to the GTS correctly.

7.2.3 Corrections could be done on the buoys parameters (e.g. recalibrate an atmospheric pressure easily).

7.3 Those implementations should be studied in more detail in order to add easily the whole QC processing in the chain when we want to do so. Controls like comparison with models will not be able to be implemented this year but we must foresee for instance the structure of the data as if such a treatment existed.

8 DBCP :

8.1 Gain experience on drifting buoys and on the Argos system.

8.2 Prepare the DBCP V session

8.3 Preparation of the Technical Coordinator monthly report.

9 CLS :

9.1 Help CLS in preparing the Argos monthly report

9.2 Work with CLS on the Argos GTS application

9.3 Work with CLS on the quarterly report on drifting buoys

10 Magnetic Declination :

The TC worked on this problem submitted to SAI by Dr. Glenn Hammilton (NDBC). He wrote a letter explaining the problem to Michel Taillade from CLS with a copy of Dr Hammilton's letter asking CLS to study the possibility of implementing in the Argos system the magnetic declination correction for buoys mesuring wind direction. This problem is described in annex ..

REPORT OF THE FORMER TECHNICAL CO-ORDINATOR

1. INTRODUCTION

1.1 Formally, this report covers the period 1 October 1988 - 31 May 1989, during which time I was employed as part-time technical coordinator (TC) to the DBCP by means of a contract with my parent institute, the Scottish Marine Biological Association (SMBA). Some working days were informally held over after 31 May so that a little time might be spent overlapping with and helping the new TC, Mr Etienne Charpentier. In addition, of course, activity has not ceased abruptly with the termination of the contract, and informal assistance still continues to be given with Panel business and to the various agencies and personnel involved. My attendance at the present session, and the associated document preparation, are being covered by a Special Service Agreement between the WMO and the SMBA.

1.2 During the formal reporting period the allocation of working days was as follows:

17 days at SMBA,
33 days at CLS,
38 days on mission,
9 days in transit between SMBA and CLS.

A further 5 days were spent working with the new TC at CLS in June.

1.3 The days spent on mission include both attendance at the last Panel and JTA sessions and an OWSE-NA workshop, and pursuit of the Panel's aims by contact with the user communities in USA, New Zealand and Australia. The latter journies are detailed in Annex 1.

2. ACTIVITIES DURING THE PERIOD

2.1 As previously, activities directly related to the GTS account for the major portion of the effort (62%). The fraction of time devoted to formal DBCP matters (e.g. document preparation and attendance at Panel sessions) has increased substantially to 22%, although of course the actual number of working days was virtually the same as last year. In practice, despite initial doubts, it transpired that much of the day-to-day support work of the TC could be performed perfectly efficiently from the SMBA through the use of privileged on-line access to the Argos computers in Toulouse and Landover, and to the Météo Nationale databank in Paris. The breakdown of time according to class of activity is shown in Figure 1. Each category is then described separately in the following paragraphs.

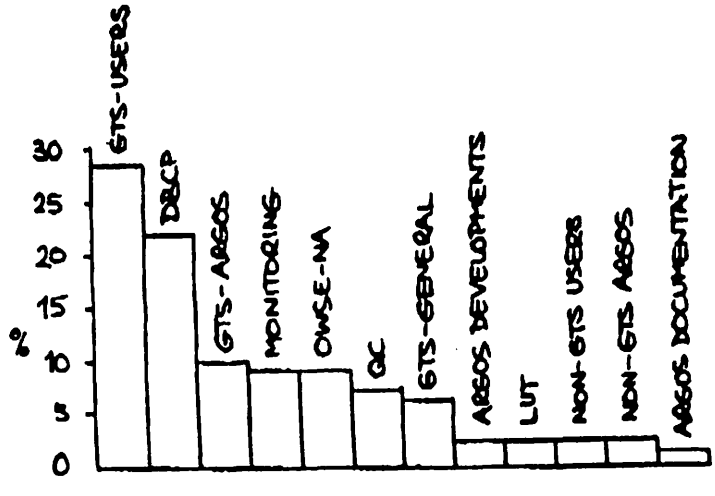

Figure 1. Breakdown of TC's time, 1 October 1988 - 31 May 1989.

3. GTS USER ASSISTANCE

3.1 The category 'GTS User' refers largely to individuals or agencies, operating Argos platforms, whose data is destined (at least partially) to be routed to the GTS. Also included are the Marine Environmental Data Service (MEDS) of Canada, and manufacturers of drifting buoy systems with GTS applications. European users whose programmes are part of COST-43 are included in that sub-category. The percentage breakdown of the TC's time within the 'GTS User' classification is shown in Figure 2.

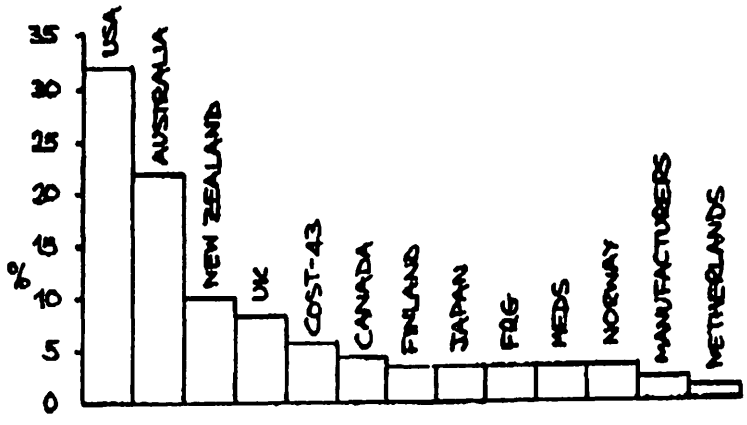

Figure 2. Breakdown of user assistance by country/organisation.

As might be expected, the US accounts for the largest fraction, although this is proportionately much less than their typically 75% share of active GTS drifters. Normally user assistance was in one of the following areas.

3.2 Generation of Argos 'Technical Files'. This typically included the formatting (or re-formatting) of sensor descriptions to suit the recommended order specified by Argos. This can be quite a complex operation and has not been a service normally offered by Argos. Further complexities dealt with comprised the formatting of interlaced message structures in a way that would ensure the correct coding of the GTS component by the Argos software.

3.3 Generation of suitable transfer functions to convert raw sensor data to the requisite physical values, incorporating calibration corrections and limits as necessary. Once again, Argos have not usually had the resources available to provide this service. Particular cases included the computation of best-fit polynomials for thermistors and the compensation of wind direction sensors to take account of the local magnetic declination.

3.4 Attempting to resolve the difficulties besetting the transmission on the GTS of data from particular programmes or areas, e.g the Arctic.

3.5 Assistance with the procurement and correct use of drifting buoy identifiers (WMO numbers).

3.6 Performance analysis of problem drifters in order to diagnose and, where possible, circumvent defects in transmitter or sensor behaviour.

3.7 Verification of correct GTS transmission of sensor data after coding by Argos and subsequent intervention by QC agencies.

3.8 Assistance with the repatriation of a drifter prematurely recovered on the high seas by a foreign vessel.

3.9 Arranging simulations of the effects of Argos GTS processing on particular user data files, as a way of encouraging the user to allow GTS dissemination of his data.

3.10 Provision of transfer functions to meteorological agencies in Australia and New Zealand for those buoys which are clearly in the public domain; i.e. are already on the GTS. This is mainly to allow these agencies to have more timely access to data via their LUTs, but could in principal increase the global flow of timely data if such agencies were prepared to route this data to the GTS.

4. DBCP

4.1 This section includes a number of functions in support of the Chairman and Secretariat, and in the fulfilment of contractual obligations.

4.2 Preparation of documentation for and attendance at Panel sessions.

4.3 Publicising the DBCP's rôle while on mission and when in contact with actual and potential Argos users and others involved in oceanography, meteorology and climatology.

4.4 Familiarisation of the new TC with his duties and with the tools and procedures already established.

4.5 Compilation and circulation of a catalogues of drifter programmes, platforms and WMO numbers in use, together with an associated address list of programme owners.

4.6 Drafting of letters for signature by DBCP Chairman.

4.7 Assisting the Secretariat in contractual negotiations with the SMBA.

4.8 Circulation to working contacts of copies of WMO/TD 262 (formerly WMO Guide 10), relating to the use of the Argos system.

5. GTS - ARGOS

5.1 This is a wide-ranging category which covers most of Argos's GTS activities, both in France and in the USA. As for the User Assistance section, the TC was in the unique position of having the time, the facilities and the authorisation to study carefully defects in the system, to pinpoint their sources and to propose remedies. Argos continued to give this activity their full support. Some of the work is difficult to classify, but the following headings cover the major aspects.

5.2 Software errors ('bugs') have, as far as I know, now been eradicated from the main GTS processing chain. However, bugs were identified in some special processing modules at Landover, and in certain monitoring software. Also, it was found that the Argos monitoring software kept no log of those US platforms which underwent special processing.

5.3 Testing of modifications to the GTS processing chain. Both the TC and Argos were hampered in this work by not having real-time access to data circulating on the GTS. However, invaluable help was provided by the TC's link to the Météo Nationale databank, and by informal contact with the telecommunications section of the UK Meteorological Office.

5.4 Coordination of changes to routeings and headers resulting from rationalisation of Argos programme files, re-working of the interface between Landover and NDBC, and during the strike at the Météo Nationale, Paris.

5.5 Management of the monthly procedure for the removal of unused WMO identifiers from Argos real-time files after 3 months of inactivity.

6. MONITORING

6.1 Extensive use was made of ECMWF statistics to extract performance data for the GTS drifter population, special software being written as needed. Much of this data was used in compiling the OWSE-NA Section Analyst's Report on Drifting Buoys, as described in DBCV Doc. xx.

6.2 Regular inspection and comparison of GTS output from Toulouse and Landover to check for anomalies, and as a basis for particular quality controls.

6.3 Use of on-line facilities at the French Météo Nationale to monitor GTS reports originating elsewhere than at Argos. Similar monitoring has been performed from time to time by contact with the UK Met Office.

6.4 Routine inspection of transfer functions on file for GTS platforms to identify and rectify obvious shortcomings such as inappropriate limits or mis-selection of correct physical units for GTS use.

7. OWSE-NA

7.1 This comprises attendance at the OWSE-NA Section Analysts' Workshop, scrutiny of drifter data submitted by OWSE-NA reporting centres and compilation of the Section Analyst's Report on Drifting Buoys. A fuller account appears in DBCP-V Doc. xx.

8. QUALITY CONTROL

8.1 In this category I mainly include the day-to-day quality control (QC) of data from individual platforms, coming to my attention through my own monitoring activities, or by means of the regular data quality reports produced by ECMWF. Use has also been made in this context of the reports sent to the TC by the NDBC, COST-43 and the UK Met Office.

8.2 QC of individual platforms. Day-to-day activity included:

- checking for failed sensors which have not been trapped by limits tests;
- deletion of unserviceable platforms;
- identification, and rectification where possible, of platforms with poor location update performance;
- checking for beached platforms on the basis of locations and 'water' temperature;
- comparison of NDBC status reports, listing failed sensors etc, with corresponding status of Argos platform files;
- initiation of action on the basis of ECMWF monthly pressure statistics, including re-calibration of pressure sensors where appropriate (5 cases during the period);
- relaying of QC information from GTS users to appropriate agencies, such as LUT operators.

8.3 A list was maintained of those GTS platforms with pressure sensors known to have been re-scaled. This list was circulated to relevant agencies on a regular basis.

8.4 On the basis of the ECMWF pressure statistics, CLS was alerted to consistent errors in the pressure values reported in SHIP code by their yacht

platforms.

8.5 In collaboration with Service Argos Inc, a number of problems were identified relating to the GTS messages compiled for the moored ATLAS buoys.

9. GTS - GENERAL MATTERS

9.1 WMO rules regarding the coding of the date-time group in SHIP reports from automatic stations are ambiguous. This has led directly to many SHIP reports from Toulouse being rejected as corrupt by RTH Paris. The issue is discussed more fully in DBCP-V Doc. xx.

9.2 A number of manipulations were made to the headers originating at Toulouse and Landover, and at NDBC. The latter proved to be a complex matter, and assistance was given with the implementation and subsequent checking of the alterations.

9.3 A small number of enquiries relating to the GTS transmission of non-standard parameters (e.g sea-level data) by Argos were attended to.

10. ARGOS DEVELOPMENTS

10.1 Continued assistance and encouragement was given with the specification and development of new facilities at Argos to meet the needs of the GTS and VOCE communities.

10.2 As a result of user requests and research by the TC, Argos have been asked to study a number of possible system enhancements, such as

- making good the loss of the majority of Gilmore Creek real-time datasets;
- releasing the full-precision results from location calculations to assist in relative motion studies (e.g. ice dynamics);
- altering a particular test on transmission frequency made by the location algorithm, which commonly causes locations to be rejected for several hours after the deployment of a buoy.

11. LOCAL USER TERMINALS

11.1 LUTs posed less problems than previously, and contacts consisted mainly of the exchange of calibration data in the interests of consistency, along with the occasional notification of aberrant LUT data on the GTS.

12. NON-GTS USER ASSISTANCE

12.1 Assistance was given on a small number of occasions with the production of technical files and transfer functions, such as for the conversion of logarithmic wave amplitude functions to polynomial forms suitable for Argos.

13. ARGOS (NON-GTS)

13.1 A few bugs were identified in the user distribution and in the management of calibration files.

14. ARGOS DOCUMENTATION

14.1 A memorandum, which aims to encourage all Argos users to release

their data to the GTS, was re-drafted in collaboration with CLS staff. Additionally, some suggestions were made regarding the latest user documentation.

MISSIONS TO USA, NEW ZEALAND AND AUSTRALIA

1. USA, 27 October 1988 - 3 November 1988

1.1 NDBC (Meindl, Gilhousen, Dagnall, Michelena, Clayton, Fields). Discussions on how and when to implement a rationalisation of header changes. How best to tackle to problem of data delays introduced by QC. Preparation of guidelines outlining actions to be taken by QC agencies and Argos in the event of sensor failure or re-scaling. Review of engineering developments and problems. Sharing of practical QC information.

1.2 NAVOCEANO (Partridge, Brown). Release of Arctic buoy data on the GTS. Behaviour of air dropped mini-drifters. Preparations in hand for the ERICA programme.

1.3 Scripps (Luther, Cornuelle). 'Major players' (Niiler, Davis) regrettably absent. Discussions on correlation of buoy motion with drogue loss, release of buoy data to the GTS.

1.4 Polar Science Center (Colony, Meneaan). Problems associated with Arctic buoy data on the GTS stem rather from lack of an agreed focal point or responsible agency than from deep-seated unwillingness to cooperate.

1.5 PMEL (Pease, Overland, Salo, Freitag, Schumacher, Mangum). Arctic buoys go on GTS via Edmonton because of problems with Argos. ATLAC (mid-Pacific) buoys performing well, though little data seen on the GTS. Other moored and island platforms could go on the GTS if suitable processing were available.

2. New Zealand, 21 - 25 February 1989

2.1 NZ Defence Science Establishment (Guthrie, Hall, Bannister). Main interest in acoustic surveillance and temperature profile data via drifters. Would agree to putting profile data on the GTS if programme ever established.

2.2 NZ Meteorological Service (Pannett, Kidson, Uddstrom, Fletcher, Burman). Expanding use of buoys, all on the GTS via Argos as well as being locally processed. Extensive but not wholly satisfactory reporting of windspeed and direction. Interest in data at synoptic hours, and calibration data for all drifters in field-of-view of Wellington LUT.

2.3 NZ Oceanographic Institute (Stanton, Wilkin, Greig). Interest in drifter deployment W of NZ, but no immediate plans. Willing to put data on GTS.

2.4 US Antarctic Research Program, Christchurch (La Count). Several land AWS report to McMurdo LUT. Could go on the GTS via Argos if suitable processing existed.

2.5 University of Otago (Dowden, Squire). Former Argos users. Likely to make new Antarctic deployments once sea-ice programme established. Data would go to GTS.

2.6 Buxton, Tuder and Waugh (Burton). Oceanographic consultants with wide-ranging interests. GTS activity might result from a proposal to require foreign fishing vessels to carry yacht-type Argos platform for meteorology and surveillance.

3. Australia, 7 - 17 March 1989

3.1 Australian Bureau of Meteorology (Coleman, Stearne, Pierrehumbert, Shav, Evans, Sclesnew, Jones, MacKenzie, Sanders, Coe, Parker, Whittby). Active users of drifters; also one fixed island station. Many developments in hand, especially in AWS field. Interest in Antarctic AWS data via the GTS. Need for calibration data for drifters in LUT field-of-view. Strong views about need for SYNOP coding at Argos. Very satisfied with quality of drifter data.

3.2 Service Argos Australasia (Dyson, Hildebrandt, Panjkov). Assistance with GTS matters, especially in relation to the Bureau of Meteorology. Advice and user feedback about drifter applications.

3.3 CSIRO (Cresswell, Papij, Meyers). Help with GTS questions. Willing to put SST data on GTS; also XBT data if interfacing between their Sippican system and Argos can be devised.

3.4 Antarctic Division (Burton, Morrissy). Assistance with GTS formatting for next generation of Antarctic AWSs, and for drifters.

3.5 University of Melbourne (Allison). Collaboration with Antarctic Division on AWSs and sea-ice drifters. Willing to put all data on GTS. Exchange of information on Southern Ocean drifter operators.

3.6 Moonraker Technology (Edwards). Manufacturer of drifting buoy systems, including one featuring novel barometer port. Alert regarding present pitfalls of GTS coding at Argos. Information will be relayed to future customers.

3.7 Lawson and Treloar (Trenaman, Rice). Oceanographic consultants to Esso. Discussion of GTS problems. Regular drifter deployments and one moored buoy, all on the GTS via Argos.

3.8 Royal Australian Navy, Hydrographic Department and SOC (Low, Searle). Mainly users of XBT data, but very interested in air-deployable drifters. Willing to put drifter data on GTS.

4. CONCLUSIONS

4.1 The main conclusion I draw from all of these missions is that the idea of GTS dissemination of useful data is well received. The main drawback of the present Argos system which cannot be tolerated by the majority of research users is the requirement for user data files to be altered as a consequence of GTS processing. If this restriction can be removed, and if the TC can continue to act as the interface between the user, Argos and the GTS community, then I feel sure that there would be a much improved flow of drifter data on to the GTS.

STATEMENT OF ACCOUNTS - IOC

Contract SMBA: Detailed winding up

1. BASIC FIGURES (in US $)

* SMBA requirements

1 working day at the Dunstaffnage Marine Laboratory (DML), Oban 452

1 working day away from the DML 230

* Additional expenditures

Living expenses per day when away from the DML (not in mission) 90

Travel expenses Oban - Toulouse or back (car and ferry) 620

(Each travel Oban - Toulouse or back is assumed to take 3 working days)

2. DETAILED ANALYSIS OF WORKING/TOTAL DAYS

	DML	CLS	MISSION	TRAVEL DML-CLS	TOTAL
June 1988	4/4	0	0	0	4/4
July	4/4	0	0	0	4/4
August	5/5	0	0	0	5/5
September	0	15/21	0	3/3	18/24
October	0	10/14	11/17	0	21/31
November	3/3	10/14	4/6	3/3	20/26
December	3/3	0	0	0	3/3
January 1989	4/4	0	0	0	4/4
February	2/2	0	8/10	0	10/12
March	2/2	0	11/17	0	13/19
April	2/2	1/5	4/4	3/3	10/14
May	1/1	12/16	0	3/3	16/20
June	0	5/9	0	0	5/9
TOTALS	30/30	53/79	38/54	12/12	133/175

3. FUNDS SPENT (in US $)

Working days at DML :	30 x 452	=	13 560
Working days away from DML :	103 x 230	=	23 690
Living expenses when away from DML (not in mission) :	91 x 90	=	8 190
Travels Oban - Toulouse or back :	4 x 620	=	2 480
Total :			47 920

(in US $)

Period : 1 June 1988 - 31 May 1989

CONTRIBUTIONS (received by IOC)

Australia	(09.10.86)	5 000.00		
Canada	(07.10.87)	10 000.00		
UK	(07.10.87)	5 000.00		
France	(26.11.87)	4 784.15		
UK	(19.01.88)	6 134.83		
Australia	(10.02.88)	5 000.00		
Iceland	(10.02.88)	2 000.00		
USA	(30.06.88)	38 000.00		
Iceland	(16.02.89)	2 000.00	77 918.98	
Unspent during previous period			1 259.99	79 178.97

EXPENDITURES

Contract SMBA		47 920.00	
Travel technical co-ordinator			
USA/UK (15.10-07.11.88)	4 451.08		
Austr/NZ (13.02-19.03.89)	8 776.03		
Geneva (24-28.04.89)	603.00		
Toulouse (18-27.06.89)	498.00	14 328.11	
Contract CLS/Service Argos		3 600.00	65 848.11

BALANCE (unspent, to be transferred to WMO) 13 330.86

Contributions to the position of the technical co-ordinator (US$)

Australia	(11.06.86)		5 000.00		
Australia	(09.10.86)	(2nd year)	5 000.00		
Canada	(28.10.86)		10 000.00		
France	(30.10.86)		6 338.02		
Iceland	(26.12.86)		2 000.00	28 338.02	
USA	(24.02.87)		38 000.00		
Canada	(07.10.87)	(2nd year)	10 000.00		
UK	(07.10.87)	(2nd year)	5 000.00		
France	(26.11.87)	(2nd year)	4 784.15	57 784.15	86 122.17
UK	(19.01.88)	(3rd year)	6 134.83		
Australia	(10.02.88)	(3rd year)	5 000.00		
Iceland	(10.02.88)	(2nd year)	2 000.00		
USA	(30.06.88)	(2nd year)	38 000.00	51 143.83	137 257.00
Iceland	(16.02.89)	(3rd year)	2 000.00	2 000.00	139 257.00

as received by IOC on 31 May 1989

viz :	for the 1st year	61 338.02
	for the 2nd year	64 784.15
	for the 3rd year	13 134.83
		139 257.00

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STATEMENTS OF ACCOUNT - WMO

Account as at 30 September 1989

	US$		US$
Advances Received *			85,289
Obligations Incurred			
UCAR **	86,000		
SMBA	4,900		90,900
Balance of Fund		US $	(5,611)

Represented by.

Cash at Bank		10,289
less: Unliquidated Obligations		15,900
	US $	(5,611)

* Contributions	Assessed	Paid	Due
	US $	US $	US $
Australia	10,000	10,000	0
Canada	15,000	12,878	2,122
France ***	10,000		10,000
Greece	2,000	2,000	0
Ireland	411	411	0
United Kingdom	10,000	10,000	0
United States of America	50,000	50,000	0
	97,411	85,289	12,122

** The sum of $ 75 k has already been paid. The balance of $ 11 k will be paid when funds become available.

*** Pledged FF 60,000

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UCAR CONTRACT

WORLD METEOROLOGICAL ORGANIZATION (WMO)

/

UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH (UCAR)

SUPPORT AGREEMENT

This Agreement, entered into and effective this _____ day of _____ 198__, by and between the University Corporation for Atmospheric Research (UCAR) and the World Meteorological Organization (WMO), WITNESSTH THAT:

WHEREAS the WMO, in conjunction with the Intergovernmental Oceanographic Commission (IOC), supports the Drifting Buoy Co-operation Panel (DBCP), whose Member countries are engaged in the global deployment of oceanic observational platform facilities which require the services of a Technical Co-ordinator to co-ordinate the drifting buoy programmes of these countries and other organizations; and

WHEREAS UCAR is willing to employ said Technical Co-ordinator for the purpose of providing those services necessary to co-ordinate drifting buoy programmes of WMO/IOC Member States and other organizations.

NOW, THEREFORE, in consideration of the premises and of the agreements hereinafter set forth, the parties hereto agree as follows:

1.00 SCOPE OF SERVICES

1.01 In order to obtain the services of a most highly-qualified candidate for the position of Technical Co-ordinator, UCAR and WMO shall assume the following responsibilities:

A. WMO will handle all advertizing for the position and solicitation of candidates. WMO will use its best efforts to begin the interviewing and selection of candidates by March 1989.

B. Selection of the Technical Co-ordinator will be made by a Selection Committee consisting of the WMO/IOC Secretariats, Drifting Buoy Co-operation Panel Members contributing to the position and UCAR. UCAR will be notified of the Committee's selection not later than April 30, 1989.

C. Upon notification of the Committee's selection, UCAR will contact the selected candidate and negotiate an employment contract, including salary. UCAR will offer the candidate a one-year appointment as a long-term visitor to UCAR, which appointment shall commence on June 1, 1989. The appointee will be offered the same benefits as UCAR offers to other long-term visitors.

D. The Technical Co-ordinator will be based at Service Argos, Inc. in Landover, Maryland, USA. Aside from required documentation from UCAR concerning the candidate's employment the candidate will be responsible for obtaining passports, visas and other travel and work-related papers. UCAR will provide for the appointee's re-location in Landover, in accordance with UCAR's then current policy and procedures, provided that such re-location can be accomplished with UCAR's budget of estimated costs, a copy of which is attached hereto and incorporated herein as Exhibit A. Any additional costs incurred by UCAR to accomplish the re-location will be covered by re-allocating funds from other budget items as UCAR deems appropriate.

E. The Technical Co-ordinator will be under the direct supervision of the Chairman of the DBCP, in consultation with the WMO/IOC Secretariats, but will be responsible to UCAR on administrative matters. Travel requests will be processed by UCAR only after approval and authorization by the Chairman of the DBCP and the WMO Secretariat. Travel will be in accordance with UCAR policy except that non-USA carriers may be used if determined more cost-effective.

F. UCAR will provide quarterly financial statements for this programme to the chairman of the DBCP and the WMO Secretariat. As a minimum, such financial reports will account for funds expended, funds obligated and funds available.

G. Six months prior to the end of the Technical Co-ordinator's appointment, UCAR will contact the WMO and request an extension to this Agreement and request that WMO/IOC and the DBCP determine whether it wishes to renew the appointment of the incumbent for an additional year or initiate another search process for a new candidate.

2.00 PERIOD OF PERFORMANCE

2.01 This Agreement shall commence on the date of execution set forth above and shall continue in effect through May 31, 1990. Upon execution of an amendment to this Agreement by authorized representatives of both parties, the parties shall have multiple options to extend this Agreement for additional one-year periods.

3.00 COMPENSATION

3.01 Exhibit A sets forth UCAR's estimated budget for the services required hereunder. WMO agrees to make progress payments, as and when funds become available, up to the total budget amount in US dollars to UCAR. The first such progress payment shall be made within thirty (30) days after the execution of this Agreement. It is agreed and understood that UCAR will only proceed with the work hereunder to the extent possible within funds made available to UCAR. Upon completion and close out of this Agreement, UCAR will remit any unexpended funds to WMO.

3.02 As set forth in Exhibit A, UCAR will pay the Technical Co-ordinator's salary, benefits, travel and re-location expenses in accordance with UCAR's then current policies and procedures, provided that such costs and expenses can be accommodated within the approved budget. UCAR may re-programme individual amounts up to US$1,000 each (to a maximum of US$10,000) within this budget without prior approval by WMO. Any additional costs or expenses incurred by UCAR hereunder, which have been authorized by WMO and the Chairman of the DBCP, will be reimbursed by WMO within thirty days after the submission of an invoice therefor by UCAR. UCAR will not be responsible for expenses related to the Technical Co-ordinator's housing, secretarial or office support, office space, supplies, telephone expenses, postage, computer equipment, computer services such as E-mail, or any other expenses not defined in Exhibit A.

4.00 LIMITATION OF OBLIGATIONS

4.01 WMO's funding obligation hereunder shall not exceed actual contributions received from the panel Members up to the total estimated cost of US$ 86,000. UCAR shall notify WMO when it has expended or obligated 75 per cent of the funds provided hereunder excluding salary and benefits and shall further advise WMO as to whether, in its opinion, the services required hereunder can be accomplished and/or completed with the remaining available funds. In the event UCAR determines that it cannot complete the work set forth in this Agreement with the remaining available funding, the parties shall immediately develop a plan, and modify this Agreement accordingly, to either reduce the scope of work or terminate this Agreement prior to the anticipated end date.

5.00 REPRESENTATIVES

5.01 UCAR's Programme Representative under this Agreement is Ms. Karyn Sawyer-Crouch. The Programme Representative is responsible for the programmatic, technical and/or scientific aspects of this Agreement. UCAR's Programme Representative will act as the programmatic liaison with WMO but shall not authorize any change which affects the total budget, or the terms and conditions of this Agreement.

5.02 UCAR's Administrative Representative under this Agreement is Mr. Jeff D. Reaves. The Administrative Representative is responsible for all administrative aspects of this Agreement and is authorized by UCAR on its part to make any change which may increase or decrease the total budget, or amend the terms and conditions.

5.03 WMO's Programme Representative under this Agreement is the Director, World Weather Watch Department. The Programme Representative is responsible for the programmatic, technical and/or scientific aspects of this Agreement. WMO's Programme Representative will act as the programmatic liaison with UCAR but may not authorize any change which affects the total budget, or the terms and conditions of this Agreement.

5.04 WMO's Administrative Representative under this Agreement is the Director, Administration Department. The Administrative Representative is responsible for all administrative aspects of this Agreement and is authorized by WMO on its part to make any change which may increase or decrease the total budget, or amend the terms and conditions.

6.00 ADDITIONAL PROVISIONS

6.01 Should any part of this Agreement be held unenforceable, or in conflict with the laws of any jurisdiction, the validity of the remaining part or provisions shall not be affected by such holding.

6.02 A waiver of breach of any provision of this Agreement shall not be construed as a continuing waiver of other breaches of the same or other provisions of this Agreement.

6.03 This Agreement and the Exhibits attached hereto embody the entire understanding between the parties, and there are no prior representations or agreements between the parties relating hereto which are not contained in this Agreement, and this Agreement is executed and delivered on the basis of this understanding.

6.04 This Agreement may be modified only by written documents signed by authorized representatives of both parties.

6.05 This Agreement may not be transferred or assigned without the prior written consent of the other party.

6.06 The parties agree that if a dispute arises between them regarding this Agreement, the parties will meet no later than ten (10) business days after receipt of notice of the dispute and they shall enter into good-faith negotiations to resolve the matter. If the parties are unable to resolve the dispute in a satisfactory matter within thirty (30) business days following the commencement of negotiations, the parties may submit the dispute to mediations by a mutually-acceptable mediator.

6.07 UCAR shall have no liability either directly or indirectly, whatsoever, to WMO, IOC, DBCP or any Member for the performance or lack of performance of the Technical Co-ordinator under this Agreement.

IN WITNESS WHEREOF, THE PARTIES HAVE EXECUTED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

UNIVERSITY CORPORATION FOR ATMOSPHERIC RESEARCH

By: _____

Title: _____

Attest: _____

WORLD METEOROLOGICAL ORGANIZATION

By: _____

Title: _____

Attest: _____

DBCP technical co-ordinator
1 June 1989 - 31 May 1990

Estimated budget on 8 May 1989

Salaries		
UCAR administrative	1,000	
Technical co-ordinator	38,000	
Sub-total		39,000
Benefits at 27.5%		10,725
Material and supplies		25
Purchased services		
Office space	250	
Phones	80	
UCAR E-mail, DHL, etc.	400	
Sub-total		730
Travel		
Relocation expense	10,000	
Co-ordinator travel		
- Airfare	6,125	
- Lodging	3,921	
- Per diem	2,188	
- Miscellaneous	1,000	
Sub-total		23,334
Total direct costs		73,814
Indirect costs		
Administrative support at 10.41%	7,684	
G & A at 2.45%	1,997	
Fee at 3%	2,505	
Total indirect costs		12,186
TOTAL PROPOSED BUDGET		86,000

Indirect costs are FY 89 figures: FY 90 indirect cost rates will be applied to FY 90 expenditures under this budget.

SERVICE ARGOS INC CONTRACT

CONTRACT

between

World Meteorological Organization (WMO)

and

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

The following has been agreed:

I. Service Argos Inc will provide to the Technical Coordinator of the WMO/IOC Drifting Buoy Cooperation Panel, for the period 1 June 1989 to 31 May 1990 inclusive, the following logistic support :

(a) An office and appropriate furniture;

(b) Necessary secretarial support;

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

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

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

II. WMO will pay to Service Argos Inc. for the services noted in I above the sum of US $ 12,000, such payment to be effected within 30 days of the finalization of this contract.

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

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

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

For the World Meteorological Organization

Signature :

Title :

Date :

For Service Argos Inc

Signature :

Title :

Date :

ANNEX IX

SMBA CONTRACT

No.: 21.547/A/CNS

Geneva, 25 September 1989

SPECIAL SERVICE AGREEMENT

This agreement, made between the World Meteorological Organization and the Scottish Marine Biological Association (SMBA), whose address is: P.O. Box 3, Oban, Argyll PA34 4AD, United Kingdom, establishes the conditions under which the SMBA will make available to the World Meteorological Organization the services of a Consultant, Mr. David MELDRUM.

1. NATURE OF SERVICES

The services to be performed by the Consultant are given below :

(A) In consultation with the Chief, Ocean Affairs Division, to prepare five documents for the fifth session of the Drifting Buoy Co-operation Panel (Geneva, 17 to 20 October 1989);

(B) To participate as an invited expert in the above session of the DCBP.

2. DURATION OF AGREEMENT

This agreement is effective for the period from (a) the 25th day of September 1989 to the 13th day of October 1989 (for five working days during this period; and (b) the 15th day of October 1989 to the 21st day of October 1989. Each of the parties may at any time cancel the present contract by providing three days' notice in writing. In case of cancellation, the SMBA will be compensated prorata for the work which has been effectively completed by the Consultant and which the World Meteorological Organization has judged to be satisfactory.

3. CONSIDERATION

The cost of the services provided by the SMBA under the terms of this agreement is US$ 4,900.- (four thousand nine hundred dollars).

The World Meteorological Organization will pay the SMBA upon presentation of an invoice and upon completion of the work of the Consultant to the satisfaction of the World Meteorological Organization.

./.

4. STATUS OF THE SUBSCRIBER

The designated Consultant will not be considered, in any respect, as being a staff member of the World Meteorological Organization. During the term of this agreement the Consultant will continue to be a staff member of the SMBA which will continue to pay him his emoluments.

5. RIGHTS AND OBLIGATIONS OF THE SUBSCRIBER

The rights and obligations of the SMBA are strictly defined by the present agreement. Therefore, the SMBA and the Consultant, acting jointly or separately, will not be entitled to any benefit, payment, subsidy, compensation or entitlement except as expressly provided under the terms of this agreement.

6. TITLE RIGHTS

The title rights, copyrights, and all other rights of whatsoever nature in any material produced under the provisions of this agreement shall be vested exclusively in the World Meteorological Organization.

7. UNPUBLISHED INFORMATION

Any unpublished information made known to the Consultant by the World Meteorological Organization in the course of the performance of his duties shall not be communicated to any person or other entity except upon authorization by the World Meteorological Organization.

IN WITNESS WHEREOF, the parties hereto have executed this agreement.

WORLD METEOROLOGICAL ORGANIZATION	SCOTTISH MARINE BIOLOGICAL ASSOCIATION (SMBA)
(G.O.P. Obasi) Secretary-General	(Director)
Date: 28 September 1989	Date:

TABLE OF PROVISIONAL CONTRIBUTIONS FOR 1990/91
(to be confirmed)

	US$
Australia	10,000
Canada	15,000
France (FF 60,000)	10,000
Greece	2,000
Iceland	2,000
Ireland (Ir£300)	500
United Kingdom	10,000
USA	50,000
Sub-total	99,500
Savings transferred 1989/90 (approximately)	6,600
TOTAL	106,100

Note: Service Argos Inc. also contributes to the DBCP budget by an amount representing the difference between actual logistic support costs and the value of its contract with the panel.

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DRAFT UCAR BUDGET FOR THE EMPLOYMENT OF THE TECHNICAL CO-ORDINATOR FOR 1990/91

Estimated budget

		US$	
Salaries			
UCAR administrative		1,000	
Technical co-ordinator		39,000	
	Sub-total		40,000
Benefits at 29%			11,600
Materials and supplies			23
Purchased services			
Office space		250	
Phones		80	
E mail, express service		200	
	Sub-total		530
Travel			
Relocation expenses		10,000	
Technical co-ordinator travel (airfare - 10 trips at $500)		5,000	
Lodging - 40 nights at $80		3,200	
Per diem - 40 at $26		1,040	
Miscellaneous		767	
	Sub-total		20,007
Total direct costs			72,160
Indirect costs for the year 1990			
Administrative support at 11.86%		8,558	
G and A at 3.44%		2,777	
Fee at 3%		2,505	
Total indirect costs			13,840
TOTAL PROPOSED BUDGET			86,000

The indirect costs are FY 1990 provisional figures; the actual costs FY 90 and FY 91 cost rates will be applied to expenditures under this budget.

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DRAFT EXPENDITURE BUDGET FOR 1990/91

	US$
Employment of technical co-ordinator (UCAR)	86,000
Logistic support for technical co-ordinator (Service Argos Inc.)	10,000 - 14,000
WMO administrative expenses	500
Miscellaneous (contracts for specific tasks; contingencies)	9,600 - 5,600
TOTAL	106,100

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PROPOSAL FOR A NEW ARGOS GTS PROCESSING CHAIN

1. INTRODUCTION

At the request of the DBCP (New Orleans meeting, 18-21 October, 1988), this proposal deals with the development of a new GTS processing chain at CLS/ARGOS. This new service aims to meet two requirements:

1 - Increase the quantity of data sent onto the GTS, by permitting more platforms to be compatible, with the fewest possible constraints for users.

2 - Enhance the quality of the transmitted data by permitting corrections to be made and doing quality control just before handing off to the GTS.

The GTS, indeed, has special requirements in terms of format and sensor order. At the end of sensor data processing (centralizing identical messages and converting raw data into physical values using the calibration curves supplied by the users) and the location calculation, all the data is stored in the Argos data bank. Before storage, the data to be routed through the GTS is sent, in parallel, to a dedicated processing chain (figure 1). However, the encoding algorithm requires that the sensor order be, by this stage, compatible with that stipulated by the WMO code used (DRIBU for drifting buoys). If the requirements are met, gross limit checks are then done before the final transmission. However, it is not possible to correct or flag certain data at this stage, and there are currently no climatological or time continuity checks.

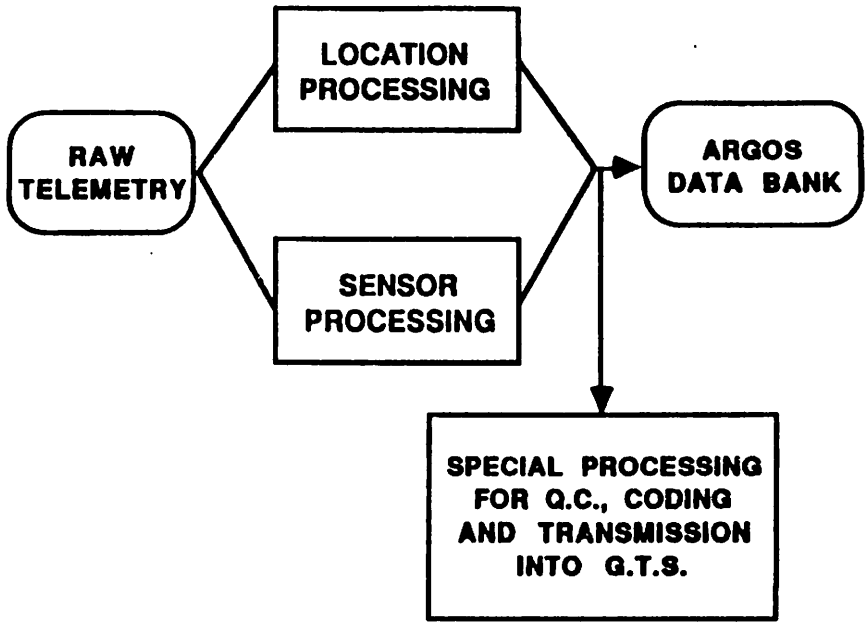

FIGURE 1 : ARGOS GTS PROCESSING CHAIN

2. TECHNICAL PROPOSAL

The principle of the new GTS service (figure 2) is to place the fewest possible constraints on users, particularly with respect to sensor order. It will also introduce the possibility of climatological type quality control (i.e comparison with climatological data by zone and periods of year), time continuity checks (i.e. comparison with previous sensor values) and correction without modifying the user's data in the Argos data bank. The time continuity checks could be similar to those developed by NDBC. All these checks could be used to reject or flag data (flags already exist in the DRIBU code), as appropriate .

This follows NDBC quality control procedures already implemented at the National Weather Service. With our proposal, however, these procedures will be applied, to all GTS platforms. This new GTS processing chain will be implemented on the three existing Argos centers (Toulouse, Landover, Melbourne). This will take advantage of the redundancy by the two main centers (Toulouse, Landover).

The correction values (e.g. bias on pressure) could be obtained from the user or from organizations performing retrospective quality control similar to that already implemented at the NDBC or ECMWF, i.e. comparing the results with models. Such control and corrections would be done under the responsibility of the Technical Coordinator of the Drifting Buoy Cooperation Panel (TCDBCP).

With the new service, it would thus be possible to send more, and better, data onto the GTS. However, only data expressed in physical values would be sent, i.e. data for which the user had previously supplied the Argos User Offices with the necessary calibration curves. This means that it would also be possible to increase the volume of data by enhancing the sensor data processing part of the main Argos chain. This would be a natural development of our system, and work has already started .

After these modifications, only the following types of data would not be routed through the GTS:

•Data for which calibration curves cannot be provided in advance, as they are adjusted during the course of the program. This concerns non-operational programs which are therefore not relevant to the GTS. Only after a certain time will it be possible to obtain accurate calibration curves from the users and thus send their data via the GTS. However, even then, it may be possible to obtain approximate calibration curves, with sufficient accuracy for GTS needs.

Nevertheless, to avoid modifying the user's data, two completely independent Argos sensor processing chains would have to be established (GTS chain and main Argos chain). The fairly high additional cost must be offset by an appreciable gain.

•Proprietary data, i.e. data which the user does not wish to distribute to insure that he retains exclusive rights. This is probably the main problem to resolve. The GTS was set up to meet the particular needs and problems of meteorologists, which are different from those of oceanographers. Thus, for meteorological type data, the realtime aspect (assimilation into models) is crucial, which is not true for oceanographic data, while oceanographers are more demanding in terms of accuracy. It may thus be possible to degrade data accuracy sufficiently for the data to be unusable for oceanographic applications but near-optimal for meteorologists. So we could propose to degrade the positional accuracy to 50 km for "confidential" programmes and to flag corresponding data. This would still be lower than the mesh used in weather models and would thus assure quality in accordance with meteorological requirements.

DESCRIPTION OF THE NEW ARGOS GTS PROCESSING CHAIN

This new GTS service will be implemented on the three existing Argos Centers (Toulouse, Landover, Melbourne). This will take advantage of the redundancy by the two main centers (Toulouse, Landover). The main new functions of the Argos GTS processing chain will be (see technical proposal) :

-Changing sensor order : to be compatible with DRIBU coding

-Time continuity checks : comparison with previous sensor values

-Climatological tests : comparison with climatological data by zones and periods of year

-Possibility of data corrections without modification of Argos data bank

-Setting up of a "Meteo Manager" module

(The Meteo Manager application will be coordinated by the TCDBCP)

-managing sensor order, climatological and correction files

-managing files updates at all Argos centers

-archiving and access to GTS data

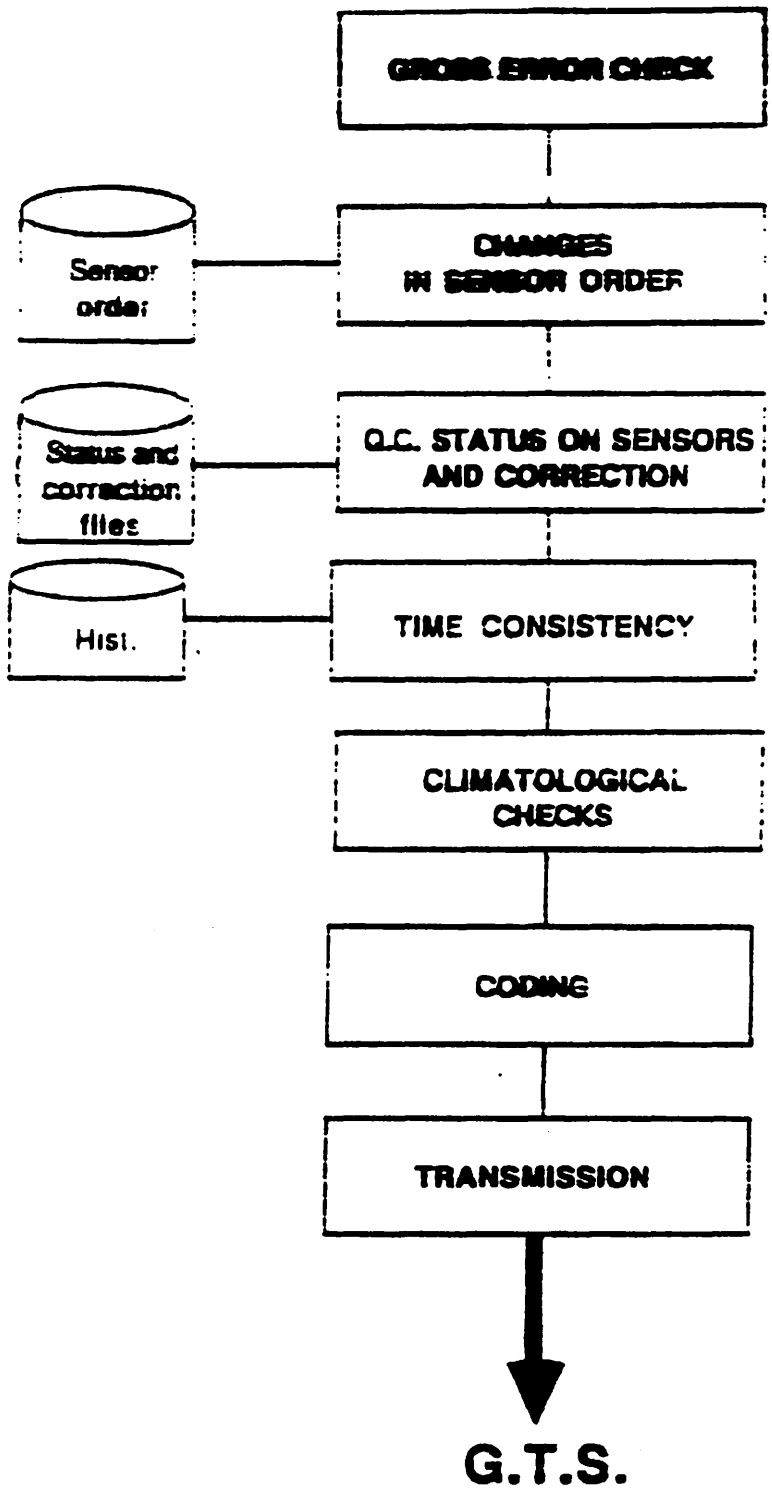

FIGURE 2 : NEW ARGOS GTS PROCESSING CHAIN

FINANCIAL PROPOSAL

The estimated cost of implementating such a new service is around 415 kF which comprises :

Specifications drafting : 60 kF (1 CLS engineer - month)

Subcontracting of software development : 295 kF

Project management (service qualification) : 60 kF (1 CLS engineer - month)

PROPOSED SCHEDULE

Minimum lead time : 4 months from approval of proposal.

-DBCP approval of CLS proposal = T0

-CLS drafting of detailled design specification = T0 + 1 month

-DBCP approval of detailled design specification = T1

-Coding, integration and tests = T1 + 3 months

.Meteo manager documentation furnishing T1 + 2 months

During the last month of this period a formation of the TCDBCP to the Meteo Manager application should be envisaged.

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PROPOSED LIST OF DRIFTING BUOY ABBREVIATED HEADERS FOR USE BY ARGOS

1. Buoy data processed at Toulouse and routed via RTH Paris (LFPW)

$T_1T_2A_1A_2ii$	Approximate region
SSVX01	North Atlantic
SSVX03	Southern hemisphere
SSVX05	Northern hemisphere, excluding North Atlantic
SSVX07	Arctic
SSVX09	Antarctic

2. Buoy data processed at Landover and routed to the GTS either directly (KARS) or via NDBC and NMC Washington (KWBC)

$T_1T_2A_1A_2ii$		Approximate region
SSVX02	KWBC	Southern hemisphere via NDBC QC
SSVX06	KARS	All drifting buoys without NDBC QC
SSVX08	KWBC	Northern hemisphere via NDBC QC

Note: In the event of failure at one Argos processing centre, the full load is taken by the other centre. It is therefore vital that GTS routeings exist both at Paris and Washington for all the headers in use by either centre.

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COPY OF LETTER FROM THE NATIONAL DATA BUOY CENTER TO SERVICE ARGOS INC.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Data Buoy Center
Stennis Space Center, Mississippi 39529-6000

June 19, 1989

F1804-04.07-06
DB3:89-0325
EAM:mfm

Mr. Archie E. Shaw III
Executive Vice President
Service Argos, Incorporated
1801 McCormick Drive, Suite 10
Landover, Maryland 20785

Dear Mr. Shaw:

As you know, measurement of wind direction by drifting buoys is being tested by NDBC. Preliminary results indicate that it can be measured with reasonable accuracy, and operational certification on drifters appears likely in the near future.

Raw drifting buoy data are encoded for distribution by Service Argos into FM 14-IX DRIBU code, which permits transmission in Section 1 of wind speed and direction. The reported wind direction is defined with reference to true north; however, the buoy reports it with reference to magnetic north. Because buoy location cannot be computed aboard the buoy, this correction must be done in the shoreside processing.

The difference between true and magnetic north is quite significant at certain areas of the earth, and drifting buoys which report wind direction will be used increasingly for operational modelling and research programs. To support requirements of the WMO and the world meterorological community in general, it is requested that Service Argos seriously consider developing a means to convert magnetic wind direction reported by drifting buoys into true direction for coding and dissemination. I know that Dr. Michael Uddstrom of the New Zealand Meteorological Service is also very concerned about this need.

Sincerely,

G. D. Hamilton
Chief
Data Systems Division

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NEW LAYOUT FOR DRIFTING BUOY CO-OPERATION PANEL ANNUAL REPORT 1989

DRAFT CONTENTS

FOREWORD

SUMMARY (four languages)

1. Current and planned programmes
   (reference to national reports)

2. Real-time data flow
   Statistics by technical co-ordinator / France

3. Data quality
   Statistics by technical co-ordinator / United Kingdom / ECMWF

4. Data archival
   MEDS report

5. Technical developments
   United Kingdom - wind sensor
   France thermistors /wind sensor
   NDBC

6. Communication system status
   CLS - summary of Argos system status 1989

7. Administrative matters
   Subsidiary bodies (EGOS, South-west Indian Ocean)
   Membership
   Finances

ANNEXES

I National reports

II Graphs on data flow plus report of the Météorologie nationale October 1989

III Graphs on data quality

IV National focal points

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DRIFTING BUOY CO-OPERATION PANEL LOGO

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OPERATING PROCEDURES FOR THE DRIFTING BUOY CO-OPERATION PANEL

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

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

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

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

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

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

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

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

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

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DRIFTING BUOY CO-OPERATION PANEL WORKPLAN AND OBJECTIVES FOR THE FIFTH YEAR

PART A

Summary of the tasks

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

2. Maintain a catalogue of existing ongoing drifting buoy programmes.

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

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

5. If deemed necessary, make proposals to the panel for co-ordination activity as a result of the above actions to address items 2 to 5 and 7 in the terms of reference for the Drifting Buoy Co-operation Panel.

6. Arrange for the circulation of information on the panel's activities, current and planned drifting buoy programmes and related technical developments, including the results of the work undertaken by SCOR Working Group 88.

7. Arrange for the implementation of a real-time quality control system as part of a new GTS processing system to be established in the Argos processing centres.

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

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

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

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

12. Assist in the planning and implementation of the drifting buoy component of the global ocean observing system to be included in the proposed system for global climate monitoring.

13. Keep up-to-date with the latest drifting buoy technical developments, in particular the new low-cost drifter being developed under WOCE.

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

* 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.

LIST OF ACRONYMS

COST-43	European Co-operation in Science and Technology
DBCP	Drifting Buoy Co-operation Panel
ECMWF	European Centre for Medium Range Weather Forecasts
EGOS	European Group of Ocean Stations
FGGE	First GARP Global Experiment
GARP	Global Atmospheric Research Programme
GPC	Argos Global Processing Centres
IFC	IGOSS Flexible Code
IFREMER	Centre de la météorologie maritime (CMM)
IOS	Institute of Oceanographic Sciences
NDBC	U.S. National Data Buoy Center
OOS	Office of Ocean Services
OPC	Ocean Products Center
OWSE-NA	Operational WWW systems Evaluation for the North Atlantic
PTT	Platform Transmitter Terminals
SCAR	Scientific Committee on Antarctic Research
SCOS	Southern COST-43 Operational (Drifting Buoy) System
SMBA	Scottish Marine Biological Association
SOBA	System of Operational Buoys in the Atlantic
SST	Sea-surface temperature
UCAR	University Corporation for Atmospheric Research