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DBCP-III/3
Paris, 4 December 1987
English only

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of Unesco)

WORLD METEOROLOGICAL ORGANIZATION

Third Session of the Drifting-Buoy Co-operation Panel

Paris, 21 - 24 October 1987

SUMMARY REPORT

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1. ORGANIZATION OF THE SESSION

1.1 OPENING OF THE SESSION

1.1.1 The Third Session of the Drifting-Buoy Co-operation Panel was opened by the Panel Chairman, Mr. C. Billard, at 10.00 a.m., on Wednesday 21 October 1987 at Unesco Headquarters, Paris. Mr. Billard welcomed participants to the session and pointed out that, for the first time, the Panel would benefit from the presence of a Technical Co-ordinator and of his work during the past four months. He expressed confidence that the session would be successful in solving the numerous problems it would be confronted with. He then called on the Secretary IOC, Dr. M. Ruivo, to address the Panel.

1.1.2 On behalf of IOC and WMO, Dr. Ruivo welcomed participants to the session, to the House of Unesco and to Paris. He recalled that the substance the Panel had to deal with, viz drifting buoys, was a promising technology to enhance both meteorological and oceanographic activities. It was emerging as an essential tool to the World Climate Research Programme, the World Weather Watch of WMO, the joint IOC-WMO Integrated Global Ocean Services System and the network of New Ocean Observing Systems being developed and consolidated by IOC. It was also the basic element of regional experiments, such as COST-43 and others that were going to develop.

1.1.3 Dr. Ruivo pointed out that arrangements made to secure the appointment of a Technical Co-ordinator for the Panel proved useful and would most likely be considered as a requisite for future Panel's work, even if some practical aspects of these arrangements had to be further studied for the long term. He took this opportunity to thank Member States that had agreed to provide funding to support the position. With regard to technical questions that had to be dealt with by the Panel at this session, he expressed the view that some of them were emerging from past diverging requirements by the scientific and the "operational" communities; ideas regarding timeliness of data were evolving rapidly and scientists were more and more conscious of the benefits to be derived from a rapid access to any data gathered.

1.1.4 Finally, the Secretary IOC assured the Panel of the full and continuing support of the Secretariat in its work and wished the session every success in its undertakings.

1.1.5 The list of participants is given in Annex I.

1.2 ADOPTION OF THE AGENDA

1.2.1 The Panel adopted the agenda for the session as given in Annex II to this report, on the understanding that new proposals for discussion would be taken care of under Agenda Item 6.3 - Other co-ordination activities.

1.3 WORKING ARRANGEMENTS

1.3.1 Under this Agenda Item, the Panel decided on its working hours and other working arrangements for the session.

2. REPORTS

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

2.1.1 The Chairman reported that one of his main activities during the intersessional period had been the preparation for recruiting the Technical Co-ordinator. This task came to a happy end on 1 June 1987 when Mr. D. Meldrum was appointed and took up his functions at CLS/Service Argos in Toulouse. The most effective part of the Drifting-Buoy Co-operation Panel work could then be undertaken by the Technical Co-ordinator under the Chairman's guidance.

2.1.2 The Chairman pointed out the arrangements made in co-operation with the Chairman of the Joint IOC-WMO Working Committee for IGOSS and in consultation with the Chairman of the IOC Technical Committee for IODE to prepare an IGOSS Guide to Drifting Buoys. Mr. G. Hamilton had agreed to act as rapporteur on this topic and to prepare a draft document for consideration by Panel members, before it be submitted to the Joint IOC-WMO Working Committee for IGOSS.

2.1.3 The Chairman also mentioned a number of activities relating to different topics, such the use of LUTs, the quality control of drifting-buoy data, the preparation of the Panel's annual report, etc. He also attended several meetings on behalf of the Panel, such as sessions of IOC subsidiary bodies, CONA and COST-43 Management Committee.

2.1.4 The full report of the Chairman is given in Annex V.

2.2 REPORT BY THE TECHNICAL CO-ORDINATOR

2.2.1 The Panel was informed of the activities undertaken by the Technical Co-ordinator since taking up his post in Toulouse on 1 June 1987, and their relation to the work plan and objectives laid down by the Panel at its previous session. Activities have included the preparation of reports on the possibilities for a global data quality control procedure and an assessment of problems concerning the GTS. Collection has begun of relevant user and programme data which will form the basis of a catalogue of drifting-buoy information to be made available to Panel members and other interested bodies. Monitoring exercises have been initiated in co-operation with the United Kingdom and French Meteorological Offices to allow the diagnosis of problems concerning GTS data dissemination. The Panel's attention was drawn to the implications for the Technical Co-ordinator's tasks of the imminent division of processing work-load between the French and US Argos processing centres. Finally mention was made of the contacts already established with users and manufacturers, and of the monthly reporting procedure whereby the Chairman and the Secretariats are kept informed of the detailed work of the Technical Co-ordinator.

2.3 REPORT BY THE SECRETARIATS

2.3.1 The Representatives of IOC and WMO Secretariats reported briefly on the decisions of their respective governing bodies with regard to the Panel, and in particular conveyed to the Panel members their warm thanks to the countries who were contributing to the support of the position of Technical Co-ordinator. IOC and WMO governing bodies had similarly supported the implementation of the major drifting-buoy programmes being developed, especially in presently data sparse ocean areas, and urged buoy deployers to make their data available as widely as possible by inserting them onto the GTS.

2.3.2 The Representatives of the Secretariats reported also on the miscellaneous activities undertaken as secretariat support to the Panel and as a follow-up of the decisions regarding the management of funds provided for the position of Technical Co-ordinator. They stressed in particular the necessity that official focal points for drifting-buoy activities be designated in each country participating in the Panel's work and urged the Representatives of those countries which had omitted to do so to provide the Secretariats with the required information as soon as possible.

3. FINANCIAL AND ADMINISTRATIVE MATTERS

3.1 FINANCIAL SITUATION

3.1.1 The Panel reviewed the Statement of Accounts that had been prepared by the Secretariats and which is reproduced as Annex VI to this report. It took the view that, as far as financial questions were concerned, the wording "first year" or "second year" had to relate to the period of time during which a Technical Co-ordinator was appointed and therefore that "first year" meant the period 1 June 1987 - 31 May 1988. The Panel considered that the Statement of Accounts did actually reflect its decisions with regard to the use of funds provided for the position of Technical Co-ordinator for the Panel.

3.2 REVIEW OF CONTRACTS

3.2.1 The Panel was presented with the contracts signed by Unesco and the Technical Co-ordinator, on the one hand, and CLS/Service Argos, on the other hand. It considered that the contracts did actually reflect its decisions with regard to the position of Technical Co-ordinator for the Panel.

3.3 COMMITMENTS FOR FUTURE FUNDING

3.3.1 Participants in the session were invited either to confirm national commitments to the funding of the Technical Co-ordinator for the second year of operation (i.e., for the year 1 June 1988 to 31 May 1989), as foreshadowed at the Second Panel Session, or to make new or modified commitments, as appropriate. As a result, the following status of financial support for the Technical Co-ordinator position for 1988/1989 was noted:

Country	Commitment	Status
Australia	$5,000	Paid
Canada	$10,000	Paid
France	FF45,000	Confirmed
Iceland	$2,000	Subject to final approval
United Kingdom	$5,000	Paid
USA	$38,000	Confirmed

3.3.2 The Panel noted that this level of committed (plus proposed) funds, of around US$67,000 at present exchange rates, was sufficient to cover:

(a) employment of the Technical Co-ordinator on a similar contract as at present; i.e., US$38,000 for one year;

(b) conclusion of a similar contractual agreement with CLS/Service Argos for ancillary services as at present; i.e., US$13,200 for one year;

(c) provision of an enhanced, but more appropriate, travel budget for the Technical Co-ordinator, of approximately US$16,000 for one year.

The Panel also noted that if an offer was made by a particular institution or organization to second the Technical Co-ordinator for the second year, rather than for his employment on a consultancy as at present, then the sum of US$38,000 was available to pay the seconding institution or organization for this service.

3.3.3 In order to safeguard a possible third year (and then future years) of employement of a Technical Co-ordinator, the Panel requested that its members make statements of intent with regard to their contributions for the third year beginning 1 June 1989. These statements of intent were found to be identical to commitments made for the second year (see para. 3.3.1 above), with the exception of that of the USA that amounted to "up to half of the total cost incurred by the position". In addition, the Representative of COST-43 stated that it was hoped that the "future COST-43" would be in a position to contribute to the Technical Co-ordinator's funding. It also noted that, if a surplus of payments above budget was acquired in any one financial year, this surplus would be taken into account in setting the payments required for the following year's budget.

3.3.4 Finally, the Panel reconfirmed the procedures to be used for the payment of the outstanding committments, as laid down at the Second Panel Session, viz:

(a) Cheques should be made payable to the Intergovernmental Oceanographic Commission and sent to the IOC Secretary under a covering letter specifying that the money is to be "deposited in the IOC Trust Fund for the purpose of the Joint WMO-IOC project for co-operation in drifting-buoy activities";

(b) If payment is made by bank transfer, this transfer should clearly carry the reference: "IOC Trust Fund - 412 INT 43";

(c) Payments should be made in due time, and in any case at least three months before the date on which the new contracts must be signed, i.e., by 1 March of every year at latest.

3.4 FUTURE EMPLOYMENT STATUS OF THE TECHNICAL CO-ORDINATOR

3.4.1 Under this Agenda Item, the Panel was faced with two different sets of questions which appeared to be linked but had to be treated separately in order that clear decisions could be taken. These concern: (i) the second year of employment of the Technical Co-ordinator, and (ii) the longer term.

Second year of employment of the Technical Co-ordinator

3.4.2 The contract under which Mr. D. Meldrum was appointed as Technical Co-ordinator for the Panel is to come to an end by 31 May 1988. Mr. Meldrum had for the time being been authorized by the Executive Council of the Scottish Marine Biological Association (SMBA) one year of leave-of-absence. But he was unable to foresee if his leave might be prolonged in order that he eventually could fill the position of Technical Co-ordinator for a second year. Likewise, he was unable to foresee if SMBA would eventually agree to second him to fill the position provided it be reimbursed of the costs associated with his position in the laboratory. Mr. Meldrum, nevertheless, expressed confidence that he might be able to provide the Panel with trends regarding the answers to these questions by the end of November 1987. The Panel therefore decided on the following:

(a) If Mr. Meldrum discovers that the trends in SMBA's decision prove encouraging and if he himself would agree to pursue his present work, SMBA would be approached officially with the view to getting its approval to either a one-year prolongation of Mr. Meldrum's leave-of-absence, or a one-year secondment of Mr. Meldrum as Technical Co-ordinator for the Panel. In the latter case, it would be made clear that the Panel would not be in a position to reimburse more that US$38,000 to SMBA;

(b) if, for any reason, it appeared that Mr. Meldrum was not able to fill the position of Technical Co-ordinator for a second year, new candidatures should be sought. This should be done through a Joint IOC-WMO Circular Letter requesting Member States of IOC and Members of WMO to either seek individual candidatures to the position, or to consider the possibility of a national organization to second one of its staff members to fill the position, provided it be partly or totally reimbursed of the relevant costs. Again, in the latter case, it would be made clear that the Panel would not be in a position to spend more than US$38,000 for this purpose.

Longer-term employment of the Technical Co-ordinator

3.4.3 The Panel agreed that it should consider the question of long-term employment of the Technical Co-ordinator as if the two-year period of assessment of the position had proved beneficial and if it had decided to employ a Technical Co-ordinator on a continuing basis for an indefinite period of time. Recognizing that the wording "indefinite period of time" would appear meaningless with regard to commitments that States Member of the Panel or any incumbent could make, it agreed to consider that commitments, or at least serious statements of intent, should cover a minimum period of three years.

3.4.4 Going to the practicalities, the Panel considered that viable solutions for the long-term employment of the Technical Co-ordinator might be either a secondment by a national organization, or a recruitment as a staff member of IOC or WMO. In both cases, the cost to the Panel would be of approximately the same amount (account being taken that, if a national organization was not claiming for full reimbursement of the cost incurred, the remaining amount would be claimed by the country of the organization as a national contribution "in kind" to the Panel). The Panel agreed that the solution of a secondment was workable, but that ideally the solution of recruiting a staff member of IOC or WMO would be preferable. The yearly costs incurred were roughly estimated as follows:

- cost of employment.....	US$70,000
- operating costs (travel, logistics, etc.).....	US$40,000
	US$110,000

The Representative of the USA stated that his country was ready to fund half the total cost incurred by the position.

3.4.5 The Panel requested the Secretariats to explore the possibility of recruiting a staff member to act as a Technical Co-ordinator for the Panel and to provide information on terms and conditions under which such a recruitment could be made. The Panel further urged the States Member of the Panel to seek ways and means to meet the afore-mentioned financial requirements and requested the Secretariats to assist in this effort to the best of their abilities.

4. RELATIONSHIP WITH INTERNATIONAL PROGRAMMES/ORGANISMS

4.1 WORLD CLIMATE RESEARCH PROGRAMME (WCRP)

4.1.1 The Panel noted that the requirements of the WCRP/TOGA project for drifting-buoy data remained essentially unchanged from those given at the Second Panel Session. The Panel also noted that the WCRP/WOCE project implementation plan, which was presently being prepared, would include additional, well-specified requirements for drifting-buoy data, which would need to be taken into account in the future.

4.1.2 Under this Agenda Item, the Panel was informed by the representative of CCCO of the activities of the SCOR Working Group 88 in the field of drifting buoys. It noted that this Working Group was concerned particularly with the comparison and intercalibration of buoys as ocean current sensors, both for undrogued and drogued buoys. In this connection, the Panel further noted questions raised by SCOR WG 88 concerning the need for clear indication in buoy instrumentation of the continued presence or otherwise of a drogue, and the possibility of meteorological buoys including drogues and/or thermistor chains as part of their instrument packages.

4.1.3 While agreeing on the need to maintain communication between oceanographers and meteorologists on the question of drogues, preferably through the Technical Co-ordinator, the Panel nevertheless felt that it could not at present recommend their inclusion on meteorological buoys in view of the technical difficulties still remaining with the drogues themselves, the problems they created for other buoy measurements, and the costs involved. With regard to thermistor chains, the Panel noted that the performance reliability of such instruments was continually improving, that there was already provision for such data to be transmitted on the GTS in the DRIBU code, and that these data were valuable in real time or near real-time for IGOSS purposes. It therefore encouraged meteorologists and oceanographers to collaborate wherever possible, both to include thermistor chains on meteorological buoys and also to ensure that such data were properly transmitted and processed so as to allow their transmission on the GTS in the DRIBU reports.

4.1.4 While considering this question of collaboration between meteorologists and oceanographers on drifting-buoy programmes, the Panel also discussed the possibility of the inclusion of atmospheric pressure sensors on purely oceanographic buoys. It agreed that such sensors were only valuable if they had a standard of accuracy and reliability equivalent to that applicable during the Global Weather Experiment, viz with pressure measurements accurate to $\pm$ 1 hPa for sensors deployed in mid and high-latitudes. (For tropical buoys, the accuracy requirements are higher, in view of the weaker pressure signal to be measured). The Panel felt that the inclusion of such pressure sensors was extremely valuable and also realistic in many cases, despite the extra costs involved, and it therefore encouraged collaboration in this regard also.

4.1.5 On the general topic of collaboration between meteorologists and oceanographers in buoy instrumentation, the Panel adopted Recommendation 1 (DBCP-III) (Recommendations adopted by the Panel are given in Annex IV).

4.2 WORLD WEATHER WATCH (WWW), INCLUDING THE OPERATIONAL WWW SYSTEMS EVALUATION FOR THE NORTH ATLANTIC (OWSE-NA)

4.2.1 The Panel noted that one of its essential goals was the contribution of drifting-buoy data in support of the requirements of the WWW of WMO for such data. It further noted that these requirements were clearly specified in the Second WMO Long-Term Plan, Part II, Vol. I, in particular in the implementation objectives of the Global Observing System (GOS), which considered the GOS as a fully integrated observing system, including drifting buoys as one component of many. The Panel agreed that every effort should be made to meet these requirements as a matter of on-going concern.

4.2.2 The Panel further noted the opinion of the Advisory Working Group of the WMO Commission for Basic Systems concerning the quality of drifting-buoy data on the GTS. It agreed that efforts should be made to ensure that the quality (and quality control) of these data complied with WMO standards and procedures as laid down in the Manual on the GOS (WMO-No.544), the Guide on the GOS (WMO-No.488), the Manual on the GDPS (WMO-No.485) and various documents of the WMO Commission for Instruments and Methods of Observation (see also Agenda Item 6.2).

4.2.3 The Chairman of the Panel introduced the topic of the OWSE-NA, in particular its requirements for drifting-buoy systems and data evaluations, and the commitments which the Panel had made in this regard at its previous session. It was noted that OWSE-NA had two specific requirements:

(a) for regular (six-monthly) reports, beginning from January 1987, of details of the status of buoys operating in the North Atlantic;

(b) for a contribution to the preparation of the final report of OWSE-NA relating to drifting buoys, including the identification of a Panel focal point for this work.

4.2.4 In noting that COST-43 was contributing to the OWSE-NA for its own area of responsibility, the Panel agreed that it had primary responsibility for the provision of the required information, to the extent possible, in the regular six-monthly reports for those areas of the North Atlantic (and those platforms) not covered by COST-43. It agreed that, in as much as the compilation of this information was part of the on-going tasks of the Technical Co-ordinator, he should act (in consultation with the Chairman of the Panel and in co-ordination with COST-43) to prepare these reports, with input in particular being provided by the regular weekly NDBC Platform Status Reports (USA), and by Canada for the Canadian LUT and any Canadian platforms in the North Atlantic.

4.2.5 With regard to the final report of the OWSE-NA, the Panel agreed that it could again contribute to this report in terms of data compilation for drifting buoys in the North Atlantic (in co-ordination with COST-43), since this was in keeping with its terms of reference and with the normal work load of the Technical Co-ordinator. It also agreed that the Technical Co-ordinator would act as the formal Panel focal point for this work, and that this should be communicated to the Committee on the OWSE-NA (CONA). However, the Panel wished to stress very strongly that it should not, and could not, be involved in any data evaluation exercises, as were also required as part of the OWSE-NA final report, since these were outside its terms of reference, and would in any case impose an unacceptable work load on the Technical Co-ordinator. The Panel therefore instructed that a letter of agreement on this matter from its Chairman to the Chairman of CONA should clearly specify exactly what commitments the Panel was making, and what time limits were being set on this work.

4.3 EUROPEAN CO-OPERATION IN THE FIELD OF SCIENTIFIC AND TECHNICAL RESEARCH - PROJECT 43 (COST-43)

4.3.1 The Chairman of the Management Committee of COST-43 described to the Panel the present status of the COST-43 Agreement, and the status of plans to replace this Agreement with a further, on-going structure, following its formal termination on 1 December 1988. It was noted in particular that there were several aspects to the proposed future structure:

- a relatively loose agreement between the parties concerned, through "letters of intent", "letters of agreement", and a "summary of arrangements";

- an umbrella organization to act as an international parent for the new body and to manage its funds;

- a formal affiliation with the Drifting-Buoy Co-operation Panel in the area of drifting-buoy activities.

4.3.2 With regard to the umbrella or parent organization, it was noted that COST-43 had formally approached WMO, IOC (the Panel's parent bodies), ECMWF, EUMETSAT and the European Commission, and that a final decision on this matter was to be made by mid-1988. As far as the Drifting-Buoy Co-operation Panel was concerned, the Chairman of COST-43 formally proposed to the Panel that COST-43 be affiliated to the Panel as an action group for drifting buoys in the COST-43 area of interest. It was further proposed that this affiliation should occur immediately, and continue after the new COST-43 structure was established on 1 December 1988. Finally, the Chairman of COST-43 indicated that it was hoped that the new COST-43, in its capacity as an action group, would make a financial contribution, on behalf of its constituent parties, to the Panel in support of the Technical Co-ordinator position, this contribution to commence at the earliest from financial year three of the Technical Co-ordinator (i.e., 1989-1990).

4.3.3 The Panel noted that the formation of action groups, both regionally based for specific ocean areas or globally based in support of specific projects, was within both the spirit and the letter of its own terms of reference. It considered that such action groups could contribute significantly to meeting the Panel's objectives whether regionally or globally, and that their formation should be actively encouraged. The Panel therefore accepted with pleasure the offer of COST-43 to be a Panel action group, and adopted Resolution 1 (DBCP-III) on this topic. (Resolutions adopted by the Panel are given in Annex III).

4.3.4 The Panel then discussed the formal status of action groups vis-à-vis the Panel itself. It noted that Panel Member countries were, by definition, Member States of WMO or IOC, that therefore members of the Panel were the Representatives of these Member States. In this context, it agreed that action groups of the Panel would be somewhat akin to the subsidiary bodies of WMO and IOC - a combination of a technical group and a regional association. As such, therefore, while Panel members would continue to be national Representatives, the action groups would participate by right, normally through their chairmen, in Panel sessions. These chairmen would report formally to the Panel, would make recommendations to the Panel where

these require appropriate international action, and would in turn receive guidance from the Panel with regard to their own field of competence or interest. They would also contribute directly to fulfilling the overall global objectives of the Panel. At the same time, the action groups would remain independent to the extent of managing their own finances (if any) and programmes.

4.4 INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS)

4.4.1 The Panel was informed by the Chairman of the Joint IOC-WMO Working Committee for IGOSS of the requirements of IGOSS, in particular the IGOSS Observing System (IOS), for surface and sub-surface oceanographic and surface meteorological data from drifting buoys in support of the needs of the user-community (both operational and research) for such data. It noted that these requirements covered in particular the obvious data-sparse areas of the Indian and Southern Oceans, that they involved data collection and distribution in real time, and that the data were being used to prepare real-time surface and sub-surface oceanographic products.

4.4.2 The Panel agreed that its major objectives included meeting the requirements of the oceanographic community, through IGOSS, for real-time oceanographic data. In noting that a large proportion of drifting-buoy deployments at present were specifically to make oceanographic measurements (e.g., surface and sub-surface currents, surface and sub-surface temperatures) which would be of considerable value for the preparation of IGOSS products if they were made available in real time over the GTS, the Panel strongly urged oceanographers involved in drifting-buoy activities to make efforts to ensure the distribution of their data over the GTS. It adopted Recommendation 2 (DBCP-III) on this topic.

4.4.3 Finally, the Panel noted with appreciation the efforts now underway within IGOSS and IODE in support of drifting-buoy activities. These include:

(a) the IGOSS Specialized Oceanographic Centre for drifting buoys established by France, now disseminating regular monthly buoy products;

(b) the RNODC for drifting-buoy data established by the Canadian Marine Environmental Data Service (MEDS);

(c) the preparation of the IGOSS Guide to Drifting Buoys, jointly with IODE and the Panel itself (see Agenda Item 7).

5. REPORTS ON CURRENT AND PLANNED DRIFTING-BUOY PROGRAMMES

5.1 Under this Agenda Item, participants in the session gave brief presentations of their countries or organizations present and/or future drifting-buoy activities. Such presentations were made by Canada, China, Greece, France, Iceland, the Netherlands, Norway, Turkey, United Kingdom, USA, COST-43 and SCAR. In addition, some countries who were unable to attend the session, viz Australia, Portugal and Saudi Arabia, had provided written

statements of their future plans. Summaries of a number of these presentations and these statements are collected and attached as an appendix to the Panel's Annual Report (see Agenda Item 7, paragraph 7.2).

6. CO-ORDINATION ACTIVITIES

6.1 PROBLEMS RELATING TO THE USE OF LOCAL USERS' TERMINALS (LUTs)

6.1.1 Local User Terminals (LUTs) are satellite data receiving stations which allow their operator (the local user) to collect, store and process data from data acquisition platforms (including drifting buoys) which report through the Argos system when both the platforms and the LUT are simultaneously within the field of view of the satellite. As such they have a particular advantage in timeliness over the standard data collection and location process operated through the Argos global system, which is of value to operational meteorology and other real-time users of the data. Problems may arise, however, when LUT operators insert the data received through their LUTs onto the GTS for global distribution. These problems relate to:

(a) possible duplication on the GTS of the same buoy reports received via one or more LUTs and/or via Argos global processing;

(b) the sometimes poor quality of LUT reports, especially for platform location for which the LUT is not particularly well-suited;

(c) a combination of (a) and (b), i.e., effectively two versions of the same report, with different position and sometimes parameter values;

(d) lack of knowledge of correspondences between Argos and WMO platform identifier numbers;

(e) lack of up-to-date information on which LUTs are regularly inserting reports, from which platforms, onto the GTS.

6.1.2 The Panel discussed this question in some detail. While noting and agreeing with the problems given above, the Panel nevertheless felt that the advantage of timeliness of LUT reports was indeed a crucial one. It further noted that much of the data currently put onto the GTS by LUT operators were unique, in the sense that they were not subsequently inserted also by CLS/Service Argos. At the same time, it also agreed that the duplication problem should not be solved by restricting data insertion by CLS/Service Argos, since these data, while not necessarily so timely, were generally of higher quality than LUT data (and more accessible to quality control procedures, see Agenda Item 6.2), and in any case this would certainly result in lost data.

6.1.3 As a result of these considerations, the Panel generally agreed that the present situation should continue, with in particular the possibility of duplicate reports on the GTS. To alleviate the problems, however, the Panel agreed on the following actions:

(a) that data users, in particular data processing centres, be informed by the Secretariats of the possibilities both of data duplication and of errors inherent in LUT reports, particularly for platform location. It is nevertheless a matter for the data users themselves to decide what to do with individual reports;

(b) that the Panel Chairman and the Secretariats urge LUT operators to make every effort to improve the quality of LUT reports before insertion onto the GTS, particularly with regard to platform locations (see also Agenda Item 6.2 below).

6.2 QUALITY CONTROL OF DRIFTING-BUOY DATA

6.2.1 The Panel discussed at length the proposal made by the Technical Co-ordinator for quality control of drifting-buoy data (see Annex VII). It also noted the very considerable progress that has been made in the USA in implementing a scheme of real-time quality control of US drifting-buoy data (see Annex VIII).

6.2.2 The Panel recommended that the procedures developed by the NOAA National Data Buoy Center (NDBC) and the NOAA Ocean Products Center (OPC) for quality control of US drifting-buoy data be implemented with the following modifications.

(i) A procedure must be developed and implemented for notifying the Technical Co-ordinator of any changes which are made to the status and calibration coefficients of sensors supplying data to the GTS, so that this information may in turn be communicated to LUT operators and other interested agencies.

(ii) A similar procedure needs to be developed to ensure that any scaling changes entered at USAPC are communicated to NOAA.

6.2.3 In view of the existence of two Argos Processing Centres (USA and France) as well as a number of LUTs, all inserting buoy reports onto the GTS (often from the same buoy), the Panel recognized the urgent need for co-ordinated world-wide implementation of quality control procedures based on the proposals of the Technical Co-ordinator. In this connection, the Panel requested the Technical Co-ordinator to liaise with drifting-buoy operators on a world-wide basis to encourage the adoption of standard procedures for quality control. In the first instance, the aim should be to eliminate gross errors from data circulating on the GTS. The long-term aim would be to develop (for all drifting-buoy data) a system similar to that already in operation in the USA.

6.2.4 The Panel considered that an essential requirement of any world-wide scheme would be the introduction of a method for the identification of GTS data that had been subjected to quality control procedures, in particular the need to alert users of the presence of data of questionable quality.

6.3 OTHER CO-ORDINATION ACTIVITIES

6.3.1 A variety of topics were discussed by the Panel under this Agenda Item, and these are reported under appropriate sub-headings below.

Use of WMO platform identifier numbers

6.3.2 In noting the procedures to be employed for the allocation and use of the WMO platform identifier numbers, together with the system of ocean areas used in assigning such identifiers, as given in Annex IX, the Panel agreed that these procedures were not necessarily well known to buoy deployers and buoy operators, particularly oceanographers, and that this lack of knowledge of the system may often prevent operators from arranging for their data to be inserted on the GTS. To help to alleviate this difficulty, and therefore hopefully to improve data availability on the GTS, the Panel agreed on the following actions:

(a) that national focal points for drifting-buoy programmes be requested to act as national contacts for identifier allocation, for communications both within a particular country and with the WMO Secretariat;

(b) that national focal points be informed by the WMO Secretariat of the procedures for identifier allocation and of the WMO Secretariat contact point for such allocation;

(c) that the Technical Co-ordinator inform buoy deployers and operators wherever possible both of the procedures and of the appropriate national contact point(s);

(d) that CLS/Service Argos be requested to insert a note on these procedures in the next Argos Newsletter.

6.3.3 The Panel noted that, whereas the possibility had always existed of a saturation in the usage of available serial identifier numbers (presently 500) in each geographical sea area, this possibility was now approaching reality in certain areas. As a first step in ameliorating this problem, Panel members were therefore asked to carefully examine the current allocations as given in Annex IX - Appendix C, and to immediately notify the WMO Secretariat of any allocated numbers or blocks of numbers which were no longer required, to enable a possible reallocation to meet more immediate requirements. This applied in particular to numbers allocated for specific time-limited experiments or similar exercises.

6.3.4 In seeking other measures to relieve the saturation problem, the Panel noted that the rules for assignment of serial numbers to platforms within a given sea area require the number 500 to be added to the original allocated number to signify a drifting buoy or other mobile platform. This creates an obvious redundancy, since the originally allocated serial number remains effectively unused. In noting that this redundancy may soon no longer be tolerated in certain areas, the Panel agreed that, in cases where an allocated identifier number is used for a mobile platform (and 500 added), the original allocated number should remain available for use by the country to which it is allocated, with a fixed platform. Provided that

the correct procedures are followed, no confusion should result in reports circulating on the GTS from two such platforms. The Panel stressed, however, that no attempt should be made to reallocate the original number to a second country, since this would probably require a restructuring of the whole identifier system.

6.3.5 The Panel noted that a recent decision of the WMO CBS Extraordinary Session in 1985 required the identification of observing stations located on drilling rigs or oil and gas platforms by a number allocated according to the buoy identifier system instead of by the terms PLAT or RIGG. In addition to putting further pressure on the availability of such numbers in certain areas, this has raised another question relating particularly to semi-mobile platforms such as drilling rigs, which must move relatively often according to operational needs. At the present time, the procedures allow for a mobile platform to retain the original identifier applicable to the sea area in which it was first activated. This is essential for drifting buoys, where it is important to maintain a unique identity throughout the buoy lifetime. Drilling rigs, on the other hand, are only "semi-mobile" platforms; they will spend relatively long periods in various "fixed" locations and may therefore be regarded as fixed sea stations. For this reason, the Panel agreed that these types of platforms should follow the same procedures as for fixed sea stations, i.e., be allocated a new identifier number, appropriate to the new geographical sea area, whenever location is changed from one area to another.

Code requirements

6.3.6 The Panel noted with concern the problems which had been (and were being) caused by the distribution on the GTS in DRIBU code of reports received by CLS/Service Argos form platforms which were clearly not drifting buoys (yachts and other ships, fixed automatic stations, etc.). At the same time, it also noted that, at present, no WMO code other than DRIBU existed which could accurately report observation time for asynoptic reports such as those from the above platforms.

6.3.7 The Panel agreed that, in the long term, a proper solution to this problem may require a substantial modification to DRIBU and SHIP codes or even the creation of a new code form. At the same time, it noted other deficiencies in the DRIBU code which would also necessitate code changes. These related particularly to the inability of the present code to report certain ocean parameters, for which there are growing capabilities and growing requirements, e.g. wave data, wind gusts, ice temperature, etc.

6.3.8 In noting and agreeing with these various requirements for code changes, the Panel also felt that there may be additional requirements involving the DRIBU or other codes which had not yet been identified. In order to present a unified, and therefore more credible, set of code requirements to the appropriate IGOSS and WMO code experts, and in view of the need to undertake reasonably prompt action in this regard, the Panel decided to establish a small sub-group on code requirements. This group was composed of G. Hamilton (convenor), K. Bjorheim, D. O'Neill and D. Painting, together with other experts co-opted by the convenor. It was instructed to prepare a consolidated set of Panel requirements for new or modified codes (including a possible reactivation of the ODAS code

proposal), for consideration by Panel members prior to and at the next Panel session. The Panel also requested that the IGOSS Group of Experts on Operations and Technical Applications be informed by the Secretariats of this activity.

6.3.9 In view of the delays inherent in the above procedure, the Panel considered that there were short-term measures which might be undertaken to overcome the particular problem relating to the use of the DRIBU code for reports from ships, yachts or fixed land stations. These measures involved the retention of the use of the DRIBU code form, with its inherent advantage relating to asynoptic reports, but with an allocated identifier which would clearly show the origin of the report as being other than drifting or moored buoy or other fixed or slow-moving ocean platform. In particular, it noted that the identifier numbers 80000 to 99999 were presently unused in the WMO identifier system, since there were no sea areas with numbers 80 to 99, and that these numbers were potentially available for other purposes. The Panel therefore requested the WMO Secretariat to devise an appropriate scheme to allow the use of these numbers to identify ships, yachts, fixed land stations, etc., reporting through the Argos system, to obtain the approval of relevant WMO bodies for such a usage, and to notify all concerned (including CLS/Service Argos) of the new identifier usage and of its date of implementation.

GTS data distribution from the two Argos Processing Centres

6.3.10 The Panel was requested by CLS/Service Argos to advise on the most efficient and effective way of dividing the distribution onto the GTS of data received through the two Argos Processing centres (in Landover, USA and Toulouse, France). The Panel noted that, while the two centres were each capable of handling all the data processing in the event of failure of either, nevertheless in general the US centre would handle North American data only while the French centre would process data from the rest of the world. The Panel agreed that, under the circumstances, this was also an appropriate pattern for GTS data distribution. It therefore requested the WMO Secretariat to follow up this question as a matter of urgency with the national Meteorological Services concerned,in order that data distribution from the US centre could begin as soon as possible.

Utilization of all active drifting buoys

6.3.11 The Panel noted a problem which had been raised both by the Technical Co-ordinator and by SCOR Working Group 88, concerning the fate of certain drifting buoys, and their reports, once they were no longer required by their principal investigators (PI). This problem occurred, for example, when buoys drifted out of the ara of interest of the PI, at which time the PI may cease funding the collection and processing of their reports by CLS/Service Argos (and hence also GTS distribution). These reports nevertheless often remained of considerable value to the wider meteorological/oceanographic community. The Panel therefore instructed the Technical Co-ordinator to investigate means for the continued funding of the collection, processing and GTS insertion of these data, and to report on the matter to the next Panel session.

Miscellaneous

6.3.12 The Panel agreed on the following co-ordination-related actions:

(a) The creation by the Technical Co-ordinator of an electronic mail "bulletin board" to publicize matters such as deployment opportunities, co-operative purchases, Argos news, hardware problems, etc.;

(b) The maintenance by the Technical Co-ordinator of an up-to-date list of Argos-WMO identifier number correspondences. To this end, it urged all national focal points and/or Panel members to ensure that LUTs reporting from within their country regularly send a list of such correspondences to the Technical Co-ordinator.

(c) The compilation by the Technical Co-ordinator of all available technical information from buoy operators on the functioning of their programmes and the results generally of their experience. To this end, it urged such operators to document and retain such information for the benefit of others.

7. PUBLICATIONS

7.1 Under this Agenda Item, the Panel had to deal with the first issue of its Annual Report, the question of a logo for the Drifting-Buoy Co-operation Panel, the IGOSS Guide to Drifting Buoys, the Guide to Data Collection and Location Services Using Service Argos (WMO Report No.10 in the Marine Meteorology and Related Oceanographic Activities series) and the DBCP Newsletter. The results of the discussions are recorded in the respective paragraphs which follow.

First issue of DBCP Annual Report

7.2 The Panel reviewed the preliminary draft of its first Annual Report as prepared by the Chairman in collaboration with the Technical Co-ordinator. It agreed that the document was a good basis to come out with the desired Annual Report. It considered that, in general, the Report should be short and concise and that all detailed information should appear in Appendices. One of these appendices should contain a listing of messages abbreviated headers in order to assist in future monitoring exercises. One of the appendices should also be made up of the consolidated set of reports on current and planned drifting-buoy programmes, currently attached as an annex to the reports of the Drifting-Buoy Co-operation Panel sessions. The Panel considered that such an annex or appendix should appear once only in the Drifting-Buoy Co-operation Panel documents and decided to remove it from being attached to the sessions reports.

7.3 The Panel considered that, at the present stage, its Annual Report was lacking several useful information. It nevertheless agreed that any new piece of information provided after the end of the present session should be considered as pertaining to next year's Report. It therefore decided that gaps in information that should have been provided in the Report should be highlighted in the final version in order that future issues be more

comprehensive in those respects. It finally agreed that, in the present issue, the question of quality control of drifting-buoy data should deserve a special treatment in order to reflect as well as possible one of its main preoccupations at the present session and one of the highest priority tasks given to the Technical Co-ordinator during the time he worked for the Panel.

Logo for the Drifting-Buoy Co-operation Panel

7.4 The Panel reviewed the proposals received so far for a logo for the Drifting-Buoy Co-operation Panel. It considered that none of them would answer its wish in that:

(i) the design of the buoy was far from being either realistic or even suggestive of an actual drifting buoy;

(ii) there was no mention anywhere of IOC and WMO as parent organizations of the Panel;

(iii) they do not appear simple enough to be considered as real logos.

The Panel therefore decided to seek new proposals for a logo. It welcomed the offers by Canada, the Netherlands and USA to collaborate in proposing, at an early date and in any case well before its next session, some new designs that would better fit what it had in mind.

IGOSS Guide to Drifting Buoys

7.5 The Panel welcomed the draft of the IGOSS Guide to Drifting Buoys as prepared by Dr. G. Hamilton who had been appointed as a rapporteur for that topic by the Chairman of the Joint IOC-WMO Working Committee for IGOSS, in consultation with the Panel's Chairman and the Chairman of the IOC Technical Committee for IODE. It urged its members to study the proposed draft and to send their comments to Dr. Hamilton by 1 February at the latest, in order that a final version of the draft could be submitted to the Joint IOC-WMO Working Committee for IGOSS at its next session. The Panel also requested its members to provide Dr. Hamilton with information regarding their programmes, as already requested in the Joint IOC-WMO Circular Letter Sp. No.87-45 dated 22 April 1987.

Guide to Data Collection and Location Services Using Service Argos

7.6 The Panel was informed that the Guide (WMO Report No. 10 in the Marine Meteorology and Related Oceanographic Activities series) had to be updated and republished. The Representative of CLS/Service Argos stated that the updating proposed by CLS/Service Argos would be made available to WMO by the end of October 1987. The new version of the Guide would therefore be availaible in early 1988.

DBCP Newsletter

7.7 The Panel recognized that, since he was appointed, the Technical Co-ordinator had had little time to deal with the DBCP Newsletter. It nevertheless agreed that such a Newsletter was an important means of publicizing its work and that it should be prepared and published on a

quarterly basis beginning as soon as possible. It also agreed that SCOR Working Group 88 should be invited to publish the results of its work in the Newsletter, in order to show up the close relationship between the Panel and Working Group 88.

8. REVIEW OF PANEL OPERATING PROCEDURES AND TASKS OF TECHNICAL CO-ORDINATOR

8.1 The Panel recalled that it agreed to review its operating procedures at every session. It decided that those that were agreed upon at the previous session (October 1986) were still convenient and need not be modified.

8.2 The Panel expressed the wish that major documents for its future sessions be forwarded to participants before the session, in order that they could study them, seek advice in their countries and come to the session with a well-prepared argumentation. It nevertheless recognized that the present session was probably a special case in that the Technical Co-ordinator had been appointed recently and had had little time to get acquainted with the problems he had to solve and therefore to provide the required input to documentation. The Secretariats ascertained that they would do their best to forward major documents in advance of future sessions.

8.3 The Panel recognized that the work plan established for its second year was still valid, for if certain tasks had been initiated, none of them could be considered as completed. It therefore decided to keep the substance of its previous work plan as it stood and to slightly modify its wording in order to show up that some of the tasks had begun to be implemented. In so doing, the Panel considered that the record of its decisons as contained in the present Report should be taken as detailed explanations of the tasks listed in the work plan, as the case may be.

8.4 The Panel's workplan and objectives for the third year are given in Annex X. A list of acronyms is given in Annex XI for convenience.

9. ELECTION OF PANEL CHAIRMAN

9.1 The Panel unanimously elected Mr. C. Billard as its Chairman for the coming intersessional period. In so doing, the Panel congratulated Mr. Billard for his activities as Panel Chairman during the last two years, especially when faced with the difficult task of dealing with the Panel's duties without the support of a Technical Co-ordinator. It expressed confidence that Mr. Billard would work for the Panel to the best of his abilities for at least the year to come.

10. DATE AND PLACE OF NEXT SESSION

10.1 The Panel agreed that experience derived from the present session did demonstrate that a three-day session was too short to consider in depth the technical issues emerging from the Technical Co-ordinator's work. It

therefore decided that its next session, while kept to a minimum duration, should last for four days.

10.2 The Panel welcomed the offer by the Representative of USA to host the Fourth Panel Session at NDBC in Bay St Louis, MS. It agreed that the session should be held in conjunction with the Eight Meeting on Argos Joint Tariff Agreement and that, subject to agreement by the Seventh Meeting on Argos Joint Tariff Agreement on dates and place, the dates for the Fourth Panel's Session would be 18 to 21 October 1988.

11. CLOSURE OF THE SESSION

11.1 Under this Agenda Item, the Panel wished to pay tribute to Mr. D. Meldrum, its Technical Co-ordinator, for the excellent work he had achieved in a short period of time. In about four months, Mr. Meldrum had been able to point out, solve or assist in solving or propose ways and means to solve, numerous problems relating to the international co-ordination of drifting-buoy activities. This led to great confidence in his ability to carry on his tasks as long as he might.

11.2 In his closing remarks to the session, the Chairman, Mr. C. Billard, paid tribute to all members of the Panel for the friendly and co-operative spirit in which the session had been conducted. He also thanked the Secretariats for their continuing and valuable support to the Panel and its activities.

11.3 The Third Session of the Drifting-Buoy Co-operation Panel closed at 12.40 on Saturday 24 October 1987.

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ANNEX I

LIST OF PARTICIPANTS

PARTICIPANTS FROM MEMBER STATES

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PEOPLE'S REPUBLIC OF CHINA	Prof. Yang Hua-Ting Deputy Director Department of Ocean Monitoring and Forecast SOA 1, Fuxingmenwai Avenue Beijing

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	Mr. B. Voituriez IFREMER 66, avenue d'Iéna 75116 Paris
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UNITED STATES OF AMERICA	Mr. T. Bryan Meteorologist NOAA - R/CAR 6010 Executive Boulevard Rockville, MD 20852
	Dr. G. Hamilton Physical Scientist National Data Buoy Center NSTL, MS 39529
	Dr. K. Mooney Scientist NOAA 6010 Executive Boulevard Rockville, MD 20852
	Mr. W. Woodward NOAA/NOS Office of Ocean Services WSC-I, Room 108 6001 Executive Boulevard Rockville, MD 20852

REPRESENTATIVES AND OBSERVERS OF ORGANIZATIONS

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	Mr. C. Ortega Project Engineer CLS/Service Argos 18, av. E. Belin 31055 Toulouse France
	Mr. C. Vassal CLS/Service Argos 18, av. E. Belin 31055 Toulouse France
Commission for Basic Systems (CBS) of WMO	Mr. Y. Durant Météorologie Nationale SCEM/PREVI/NUM 2, avenue Rapp 75340 Paris Cédex 07
Commission for Marine Meteorology (CMM) of WMO	Mr. F. Gérard Chairman, CMM Direction de la Météorologie nationale 77, rue de Sèvres 92106 Boulogne-Billancourt Cédex France

COST-43	Dr. W.A. Oost Chairman, COST-43 KNMI Wilhelminalaan 10 P.O. 201 NL-3730 AE DE BILT Netherlands
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Drifting-Buoy Co-operation Panel (DBCP)	Mr. D. Meldrum Technical Co-ordinator DBCP c/o CLS/Service Argos 18, av. E. Belin 31055 Toulouse France
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Service Argos Inc.	Mr. J.L. Bessis President Service Argos Inc. 1801 McCormick Drive, Suite 10 Landover, MD 20785 USA

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Joint IOC-WMO Working Committee for the Integrated Global Ocean Services System (IGOSS)	Dr. Y. Tourre Chairman, Joint IOC-WMO Working for IGOSS ORSTOM/LODYC Université de Paris VI 4, place Jussieu Tour 14-15, 2e étage 75230 Paris Cédex 05 France

SECRETARIAT

WMO	Dr. P. Dexter Chief, Ocean Affairs Division World Weather Watch World Meteorological Organization Case postale n° 5 CH-1211 Geneva 20 Switzerland
IOC	Dr. M. Ruivo Secretary IOC Unesco 7, place de Fontenoy 75700 Paris France
	Mr. Y. Tréglos Assistant Secretary IOC
	Mr. J. Withrow IGOSS Operations Co-ordinator
	Mr. A. Alexiou Assistant Secretary IOC
	Ms. K. Ries IOC intern

ANNEX II

AGENDA

1. ORGANIZATION OF THE SESSION

   1.1 OPENING OF THE SESSION

   1.2 ADOPTION OF THE AGENDA

   1.3 WORKING ARRANGEMENTS

2. REPORTS

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

   2.2 REPORT BY THE TECHNICAL CO-ORDINATOR

   2.3 REPORT BY THE SECRETARIATS

3. FINANCIAL AND ADMINISTRATIVE MATTERS

   3.1 FINANCIAL SITUATION

   3.2 REVIEW OF CONTRACTS

   3.3 COMMITMENTS FOR FUTURE FUNDING

   3.4 FUTURE EMPLOYMENT STATUS OF THE TECHNICAL CO-ORDINATOR

4. RELATIONSHIP WITH INTERNATIONAL PROGRAMMES/ORGANISMS

   4.1 WORLD CLIMATE RESEARCH PROGRAMME (WCRP)

   4.2 WORLD WEATHER WATCH (WWW), INCLUDING THE OPERATIONAL WWW SYSTEMS EVALUATION FOR THE NORTH ATLANTIC (OWSE-NA)

   4.3 EUROPEAN CO-OPERATION IN THE FIELD OF SCIENTIFIC AND TECHNICAL RESEARCH - PROJECT 43 (COST-43)

   4.4 INTEGRATED GLOBAL OCEAN SERVICES SYSTEM (IGOSS)

5. REPORTS ON CURRENT AND PLANNED DRIFTING-BUOY PROGRAMMES

6. CO-ORDINATION ACTIVITIES

   6.1 PROBLEMS RELATING TO THE USE OF LOCAL USERS' TERMINALS (LUTs)

   6.2 QUALITY CONTROL OF DRIFTING-BUOY DATA

   6.3 OTHER CO-ORDINATION ACTIVITIES

7. PUBLICATIONS

8. REVIEW OF PANEL OPERATING PROCEDURES AND TASKS OF TECHNICAL CO-ORDINATOR

9. ELECTION OF PANEL CHAIRMAN

10. DATE AND PLACE OF NEXT SESSION

11. CLOSURE OF THE SESSION

ANNEX III

RESOLUTION ADOPTED BY THE SESSION

Resolution 1 (DBCP-III)

ESTABLISHMENT OF COST-43* AS AN ACTION GROUP
OF THE DRIFTING-BUOY CO-OPERATION PANEL

The Drifting-Buoy Co-operation Panel,

Noting (i) that the formation of action groups of the Drifting-Buoy Co-operation Panel, either regionally based or in support of specific projects, was considered at the time of creation of the Panel as an integral part of the future Panel structure; (ii) the request from COST-43 to become affiliated as an action group of the Drifting-Buoy Co-operation Panel;

Considering that the formation of action groups could contribute substantially to achieving the global objectives of the Panel through specific regional or project activities;

Considering further that COST-43 was a well-established, on-going regional activity which fitted very clearly with both the overall objectives and modes of action of the Panel in the area of drifting buoys;

Decides (i) that COST-43 should be affiliated as an action group of the Drifting-Buoy Co-operation Panel; (ii) that, as an action group, COST-43 should, through its Chairman: (a) be represented at Panel sessions; (b) report regularly to the Panel on its activities; (c) make recommendations to the Panel where these may involve in particular intergovernmental or similar actions; (d) receive guidance from the Panel regarding activities in its particular region or field of competence;

Requests the Secretariats to convey the text of this Resolution to the governing bodies of WMO and IOC and to the Management Committee of COST-43.

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* Project 43: Setting up of an Experimental Network of Ocean Stations, of COST: European Co-operation in the field of Scientific and Technical Research

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ANNEX IV

RECOMMENDATIONS ADOPTED BY THE SESSION

Recommendation 1 (DBCP-III)

COLLABORATION BETWEEN METEOROLOGISTS AND OCEANOGRAPHERS ON DRIFTING-BUOY INSTRUMENTATION

The Drifting-Buoy Co-operation Panel,

Noting (i) that meteorologists normally deployed drifting buoys making surface meteorological and sea-surface temperature measurements, but no sub-surface ocean measurements; (ii) that oceanographers often deployed buoys simply as current drifters or for making sub-surface measurements, but without meteorological instrumentation; (iii) the request of SCOR Working Group 88 to the Panel to consider the inclusion of some oceanographic sensors on meteorological buoys; (iv) the requirements of the World Weather Watch of WMO for surface pressure data; (v) the requirements of IGOSS for sub-surface ocean temperature data;

Considering (i) that both the WWW and IGOSS would benefit considerably through the availability of additional surface atmospheric pressure data, and sub-surface ocean temperature data respectively; (ii) that oceanographic research programmes would benefit from additional sub-surface temperature data;

Bearing in mind that additional costs may be incurred to both meteorological and oceanographic drifting-buoy programmes through the inclusion of additional sensors;

Recommends (i) that meteorologists and oceanographers involved in drifting-buoy programmes should collaborate and co-ordinate nationally wherever possible to effect the inclusion of both atmospheric pressure sensors and thermistor chains on as many buoys as possible deployed under their respective programmes; (ii) that collaboration and co-ordination between meteorological and oceanographic buoy programmes on the matter of buoy sensors should be effected internationally through the Technical Co-ordinator of the DBCP;

Requests (i) the Technical Co-ordinator to bring this Recommendation to the attention of buoy programme managers and other relevant people concerned in such programmes; (ii) the Secretariats of IOC and WMO to bring this Recommendation to the attention of national meteorological and oceanographic services and to communicate its contents to SCOR Working Group 88.

Recommendation 2 (DBCP-III)

REAL-TIME DISTRIBUTION AND ARCHIVING OF OCEANOGRAPHIC DATA FROM DRIFTING BUOYS

The Drifting-Buoy Co-operation Panel,

Noting (i) the requirements of IGOSS for real-time oceanographic data from drifting buoys in support of both operational and research users; (ii) the value of long-time series of oceanographic data for climatological studies;

Considering (i) that many oceanographers now deploy drifting buoys which make both surface and sub-surface measurements of oceanographic parameters of great potential value to IGOSS; (ii) that most of these measurements are not presently being made available in real-time over the GTS; (iii) that the DRIBU code already contains provision for the distribution of sub-surface data in real time on the GTS;

Recommends (i) that oceanographers and others involved with drifting-buoy deployments for the collection of both surface and sub-surface oceanographic data should make every effort to ensure the distribution of these data in real time over the GTS in DRIBU code; (ii) that, wherever possible, oceanographic data from drifting buoys should also be made available to the RNODC for drifting-buoy data for permanent global archival;

Requests the Secretariats, the Technical Co-ordinator, the Panel Chairman and Panel Members to bring this Recommendation to the attention of those reponsible for oceanographic drifting-buoy programmes.

ANNEX V

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

1/ An important activity of the chairman of the Drifting Buoy Cooperation Panel (DBCP) during the last intersessional period was again the preparation of the Technical Coordinator's recruitment, a task which was conducted in close liaison with both Secretariats of IOC and WMO. The different applicants to the position were successively requested to officially confirm their willingness to take it, according to the results of the ranking previously established. The first positive answer was given in early January by Mr. D. Meldrum (UK), who gave further details two months later when expressing his availability for one year starting June 1st, 1987. The two contracts could then be signed, between UNESCO and the new Technical Coordinator on one hand, UNESCO and CLS company on the other one. By a letter of May 18th, I informed the national focal points for drifting buoy programmes as well as participants in DBCP sessions that the procedure for selection and recruitment of the Technical Coordinator has at last come to favourable end, and that the most effective part of the Panel's work could start.

2/ I met the Technical Coordinator in Paris during his visit to IOC Secretariat in early June. I defined priorities among tasks to be undertaken until October 1987, as exposed in DBCP work plan and objectives for its second year. For the first one, I chose the preparation of a catalogue of drifting buoy programmes and the identification of relevant focal points in different countries or bodies involved in such activities. This step seems indeed quite necessary before dealing with the other actions. I also briefly presented to him the work in the field of drifting buoy data processing done at Central Operational Service of french Meteorological Office where I am located. Lastly, I arranged with IOC Secretariat for the participation of the Technical Coordinator in the COST-43 Seminar held in Brest, which was a good opportunity to meet in the same time a lot of people interested in using drifting buoys and further, any kind of ocean data acquisition system. The Technical Coordinator is now in Toulouse since the middle of June, and issues on a monthly basis a report about his activities, which allows me to follow progress in his work and to provide him if possible with some guidance for the near future.

3/ The preparation of an IGOSS Guide to techniques for the management, processing and archival of drifting buoy data is in progress. Mr. G. Hamilton (USA) was nominated to serve in the IGOSS Group of experts on scientific matters in order to act as rapporteur on this subject. I then consulted the chairmen of IGOSS and IOC working committee for IODE so as to finalize the lay-out of the Guide. I met their agreement about the proposed outline defined at DBCP-II and Mr. Hamilton could undertake this work from early March. He has provided a tremendous effort in this task and I am pleased to

warmly thank him for the almost complete draft we have now and we will discuss at this DBCP session.

4/ Several participants in previous DBCP sessions draw my attention about some difficulties encountered when using Local User Terminal (LUT) devices for acquisition of ARGOS data. I can here identify two problems: the first one is the direct consequence of a lack of coordination between LUT users together with a deficient standardization of materials employed; there is also a second induced problem, less immediatly perceptible but now very acute, namely the poor quality control of those data which enter onto the GTS. Since the promotion of drifting buoy data exchange is an important task of the Panel, I think we have to carefully consider these problems during the coming session, with the view to solve them soon by an appropriate action. Of course, we have to work in this matter in close connection with the parent bodies of the Panel, especially WMO that finally has the entire responsability for regulations concerning data circulating on the GTS.

5/ As proposed by the US delegation at the second session of our Panel in Geneva, the National Data Buoy Centre of this country transmitted me a draft for a specific DBCP logo. I requested the WMO Secretariat to send it to the national focal points for drifting buoys programmes for comments on this proposal to be discussed at the next session in Paris.

6/ Concerning the relationships with COST-43, I attended its Management Committee meeting in Brussel, December 1986, where I expressed the position of the Panel about the possible integration of this structure as one of its "action groups" after 1988. I also participated in COST-43 Seminar on operational ocean stations networks, which took place in Brest from June 16th to 18th, and made here a presentation of the activities or the Panel.

7/ I attended as well three meetings of IOC bodies during this intersessional period, namely the second session of the Programme Group on Ocean Processes and Climate (Paris, 10-13 March 1987), followed by the fourteenth session of the Assembly (Paris, 17 March--1 April), and the fifth session of the Regional Committee for the Southern Ocean (Paris, 9-12 June).

8/ After all, I represented DBCP at the third CONA meeting in Geneva, late August 1987, and I confirmed there the agreement of the Panel for providing of all available information about drifting buoys in the adequate form as defined in OWSE-NA operational evaluation plan, together with some contribution for the preparation of the final report of this experiment.

ANNEX VI

STATEMENT OF ACCOUNTS

1. STATEMENT OF ACCOUNTS ON 15.10.1987

Description	Date (Unesco)	Amount (US $)	Comments
Contributions			
Australia	11.06.86	5,000.00	
Australia	09.10.86	5,000.00	For 2nd year
Canada	28.10.86	10,000.00	
France	30.10.86	6,338.02	45,000 FF
Iceland	26.12.86	2,000.00	
USA	24.02.87	38,000.00	
Canada	10.87	10,000.00	For 2nd year
UK	10.87	5,000.00	For 2nd year
TOTAL.....		81,338.02	
TOTAL FOR 1st YEAR.....		61,338.02	
Expenditures			
Remuneration TC	01.07.87	3,144.00	June
	30.07.87	3,144.00	July
	01.09.87	3,144.00	August
	28.09.87	3,144.00	September
		12,576.00	
Travel TC	01.07.87	1,612.72	Paris/Geneva
	16.07.87	765.07	Brest
	10.87	4,982.10	USA/UK
		7,359.89	
Contract CLS	10.87	3,343.71	June-August
TOTAL.....		23,279.60	
Balance for 1st year on 15.10.1987		38,058.42	

2. ESTIMATES FOR END OF FIRST YEAR (UP TO 31 MAY 1988)

(Figures are round to the nearest US $ and in some cases dependent on the exchange rate)

Committed expenditures

Remuneration TC	(3,144 x 8)	25,152
Contract CLS	(3 quarters)	9,856
Travel TC	(DBCP-III/JTA-VII)	1,220
		36,228
Funds available	(e.g., for future travel)	1,830

3. COMPARISON WITH PANEL'S DECISIONS (FIRST YEAR)

(Figures are round to the nearest US $ and in some cases dependent on the exchange rate)

		Committed/agreed	Actual/possible
Contributions	(incl. Iceland)	60,000	61,338
Expenditures			
Remuneration TC		38,000	37,728
Travel TC (incl. Icelandic funding)		8,800	10,410
Contract CLS		13,200	13,200
		60,000	61,338

Comments:

The relative flexibility appearing for future travel of the Technical Co-ordinator is mainly due to the evolution in the exchange rate of the US $ against the French Franc (see "Contributions" from France).

ANNEX VII

PROPOSAL FOR A CO-ORDINATED UNIVERSAL SYSTEM FOR QUALITY CONTROL OF DRIFTING-BUOY DATA

1. INTRODUCTION

Drifter data offers the possibility of frequent, accurate, operational observations from data-sparse areas. For these data to be used in the present generation of numerical weather forecasts they need to be available and timely, as well as accurate. The Argos global system has inherent restrictions resulting from the satellite orbital configuration and orbital delays which lead to much of the data being unavailable or too late for operational forecasting. Local User Terminals (LUTs) offer improved performance in this respect for platforms within their range; seemingly, however, the quality of the data suffers. A few bad LUT reports have coloured the whole attitude to drifter observations in some quarters. Nonetheless drifter reports from all sources contain a number of errors and this had prompted the pioneering work being done in the USA to fill the quality control vacuum.

The Panel is invited to consider the follwoing notes that tend to propose a co-ordinated universal sytem for quality control of drifting-buoy data exchanged over the GTS.

2. CONCEPTUAL APPROACH

QC of GTS data can logically be divided into three parts:

1. Immediate real-time analysis leading to suppression of bad data.

2. More detailed near-real-time analysis on a time-scale of days or weeks leading to flagging of suspect sensors and subsequent suppression of corresponding data.

3. Long-term comparisons with model fields, etc., which may permit recalibration of suspect sensors and renewed use of their data.

2.1 REAL-TIME ANALYSIS

This includes at present acceleration checks, gross range and time continuity checks, but not climatological checks. In this context, I take "climatological checks" to mean range test which are specific to the geographical location of the platform and the time of year, and which could indeed be applied in real-time. Real-time checks can also be subdivided into two logically distinct categories:

a - Stand-alone checks. These can be performed on a single observation without recourse to previous data or observations

from other platforms. Such checks include gross range, climatology, land/sea masking and comparison with first-guess fields.

b - Continuity checks. These test continuity in both time and space and require access to other observations.

At present, Argos explicitly implements gross-range checks (type a), but also implicitly verifies position because of the nature of the location algorithm (type b). Data which fails these tests can and should be immediately suppressed without consulting the relevant principal investigator (PI).

2.2 NEAR-REAL-TIME ANALYSIS

This can include more stringent versions of the above, comparison with duplicate sensors if available, checking for "stuck sensors" and other analyses. Comparisons can be performed with model fields within this category. The main use of this class of analysis is in diagnosing sensor unreliability or failure, followed by black-listing or suppression of the corresponding data, possibly in consultation with the relevant PI. No checking of this kind is presently performed routinely by Argos.

2.3 LONG-TERM ANALYSIS

Several months of comparison of sensor data with model first-guess and/or analysis fields may show that a sensor is reliable but out of calibration. For example, statistics clearly show many pressure sensors which suffer from a constant bias over several months. With care, this analysis can be used to re-calibrate the sensor and re-instate its data.

3. A CO-ORDINATED UNIVERSAL SYSTEM - PROPOSAL FOR DISCUSSION

The goals of such a system are:

1. Universal applicability, independent of source of observation.

2. Central co-ordination of any changes in sensor calibration or status to promote simultaneous, global implementation.

3. Speed.

I believe that these goals are best achieved by the introduction of a standard real-time QC procedure at each reporting centre (FRGPC, USGPC, LUTs) so that data is verified at source, supplemented by near-real-time feedback of sensor status and long-term feedback of sensor re-calibration data from other QC agencies (NMCs, ECMWF, NDBC, etc.).

I propose for discussion the following outline of an initial scheme, where "co-ordinator" refers to an unspecified QC co-ordinator, who might, in the first instance at least, be the TCDBCP.

3.1 REAL-TIME QC (FRGPC, USGPC, LUTs)

- Universal stand-alone gross error checks, similar to those presently used by Argos.

- Climatological checks using an agreed "standard climatology". LUTs need of course only use a subset of these checks appropriate to their field-of-view, but may wish to expand the geographical resolution.

- Position verification (LUTs).

Data which fail these tests should be immediately excluded from the GTS and logged in an error file. Persistently bad sensors should be notified to the co-ordinator who may inform the PI and request permanent deletion of the sensor. I leave aside the question of velocity/acceleration and land/sea tests because of the unresolved issue relating to the use of DRIBU code for non-drifter observations.

3.2 NEAR-REAL-TIME VALIDATION (NMCs, ECMWF, NDBC, etc.)

- More stringent versions of the above.

- Time continuity tests.

- Comparison with model fields and neighbouring observations.

- Comparison with duplicate sensors if available.

- Other analyses.

Sensors flagged by the above tests and considered worthy of deletion are notified to the co-ordinator for action at all stations reporting the data. A small snag here is that once a sensor has been deleted it is no longer available via the GTS for further consideration and possible re-instatement, although of course the data are still available from the Argos distribution system. I note also that time continuity tests could ultimately form part of the true real-time QC, as could comparison with model fields, etc., where these data are available on the GTS.

3.3 LONG-TERM VALIDATION (NMCs, ECMWF, NDBC, MEDS, etc.)

This offers the possiblity of re-calibration of reliable but inaccurate sensors in a co-ordinated way. The time-scale to be used must be long enough to allow confidence in the proposed action and to prevent an excessive level of intervention, but short enough to make realistic use of the platform lifetime. Somewhere between 3 and 6 months is probably right. Let us suppose a figure of 4 months in the following example of how the system might work.

- 1 May. Monthly comparisons of sensor values with model fields for Jan, Feb, Mar, Apr are examined and candidate

sensors for re-calibration selected. If the sensor has been active for less than 4 months, a decision can be taken whether to proceed, re-consider in mid-term, or hold over until next term-end.

- ear May. Co-ordinator informs PIs of desired re-calibration and requests approval with cut-off date in late May.

- late May. Re-calibration files prepared by co-ordinator and forwarded to centres reporting the platform and to other interested bodies.

- 1 June. Re-calibrations implemented at reporting centres.

Tests are already being conducted by the TCDBCP to implement such a procedure at Argos using ECMWF statistics. A valuable enticement being offered by Argos is that such re-calibrations for GTS data which are channelled via the TCDBCP will be free of charge.

3.4 PROCEDURE IN THE EVENT OF ARGOS PROCESSING CENTRE FAILURE

The dual-centre philosophy adopted by Argos is intended to allow either centre to hand over its workload to the other in the event of failure. The proposed universal QC system allows real-time range checks to be applied in this event without problem. It will, however, be necessary to ensure that all sensor files are automatically updated and continuously available in both centres so that sensors flagged as bad by near-real-time procedures (section 3.2) can be processed correctly after handover.

4. CONCLUSION

This proposal is based on the firm belief that improved QC at source is the only way to achieve a co-ordinated,universal and fast real-time system, and that specialist agencies have a major role to play in off-line QC, where they have strength and expertise which cannot be matched by most reporting centres. In view of the importance attached to drifter observations, and to the bad feelings about their quality being expressed in some quarters, I think that it is very important that prompt action is taken to initiate a global policy on quality control.

ANNEX VIII

QUALITY CONTROL OF DRIFTING-BUOY DATA

David B. Gilhousen
National Data Buoy Center

ABSTRACT

Until recently, drifting buoy data entered on the Global Telecommunications system (GTS) have not been quality controlled. On occasion, bad sea level pressure reports have impacted operational numerical analyses at several meteorological centers. Reported positions determined by Local User Terminals (LUTs) frequently differ from the more accurately determined Argos positions by several tenths of a degree latitude, and occasionally differ by more than several degrees. Also, bad data have been entered on the GTS from buoys while on board ships or aircraft before and after deployments.

Recognizing these quality control problems, the National Data Buoy Center (NDBC) has started to quality control North American drifting buoy reports that enter the GTS in Washington, DC. These observations are placed in DRIBU format by the U.S. Argos Processing Center (USAPC) and are sent to the National Weather Service's (NWS) IBM 4341 computer system. There, NDBC-established software performs gross range and time-continuity checks on the data before dissemination on the GTS. More stringent checks are being performed at NDBC via a man-machine mix within the next 24 hours. These checks include comparisons with climatology and National Meteorological Center (NMC) analyses and 12-hour forecasts fields. When errors are identified, NDBC updates a status file to subsequently remove bad data from GTS distribution. NDBC is also cooperating with the National Ocean Service (NOS) Ocean Products Center (OPC) where additional quality control will be performed before the data are used for numerical weather prediction.

DRIFTING BUOY DATA PROBLEMS

Though extensive arrays of drifters were deployed by NDBC for the First GARP Global Experiment (FGGE) in 1978 and beginning in 1985 for the Tropical Ocean Global Atmosphere (TOGA) program, no data quality effort was funded. Bad sea level pressures from drifters have, on occasion, wreaked havoc with analyses used for numerical weather prediction. One example is the initial analysis at 1200 Universal Coordinated Time (UTC), October 22, 1986, performed by the U.S. Navy Fleet Numerical Oceanographic Center (FNOC) shown in Figure 1. A low pressure report from a drifter located between New Zealand and Australia resulted in an intense, small, low-pressure area. Six hours later, when no report was received from the drifter, no low-pressure area was produced, and the analyzed pressures were about 14 hPa higher. This analysis is shown in Figure 2. Six months earlier, the U.S. National Meteorological Center (NMC) reported that a similarly erroneous report from a drifter east of Tahiti produced a fictitious easterly wave. The bad data were discovered by a researcher studying how to improve the quality of the analyses, not by an operations meteorologist. Postanalysis showed that the pressures had been at least 10 hPa low for the previous 2 weeks.

Several other problems have been noted with drifting buoy data. One problem concerns position fixes transmitted on the Global Telecommunications System (GTS) from Local User Terminals (LUTs). These are less accurate than the fixes obtained by CLS Service Argos, frequently differing by several tenths of a degree latitude. Data from the same drifter are often transmitted on the GTS from both an LUT and Service Argos, then archived without recording its source. Oceanographers then have difficulty reconstructing the tracks. Occasionally, positions reported by LUTs are in gross error. Table 1 contains an example of reports from the same drifting buoy from duplicate sources. The observation times are within 10 minutes of each other. Positions differ by many degrees longitude. Sea level pressure observations are also given, and the reports transmitted by the Norwegian LUT are obviously in error. These large position errors are remarkable because many LUTs are capable of locating a buoy within 1 to 2 kilometers. Perhaps human error in entering the ephemeris data or

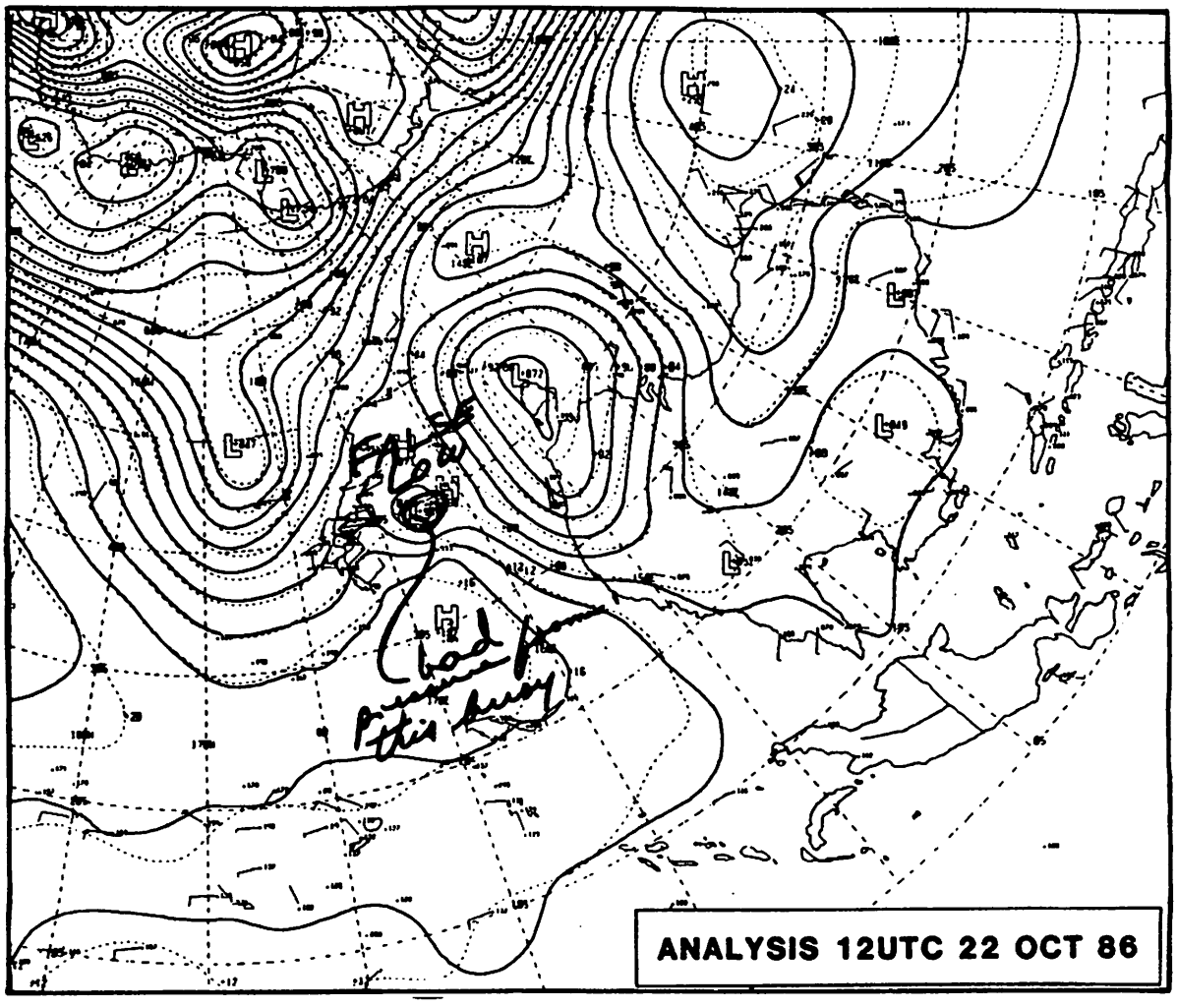

Figure 1. The FNOC initial analysis of sea level pressure at 1200 UTC on October 22, 1986. The small, low-pressure center between New Zealand and Australia resulted from a bad drifting buoy report.

encoding the DRIBU (real-time) message is an error source. It is also possible that LUTs attempt to assign a position based on an inadequate number of reports when the satellite is low on the horizon. These large errors occurred frequently enough that an FNOC meteorologist spent considerable time in diagnosing the problems. FNOC eventually decided to not use any data transmitted by several LUTs.

AN APPROACH TO DATA QUALITY CONTROL

Recognizing these quality control problems, NDBC has begun quality controlling North American drifting buoy reports that enter the GTS in Washington, DC. By "North American," I mean reports from drifters sponsored by North American countries, even though the buoys may be deployed in the Southern Hemisphere. These observations are being placed in DRIBU code by the U.S. Argos Processing Center (USAPC) and sent to the National Weather Service (NWS) IBM 4341 computer system. The approach used for quality control is similar to the one used for moored buoys. In real-time on the IBM 4341, gross checking is being performed

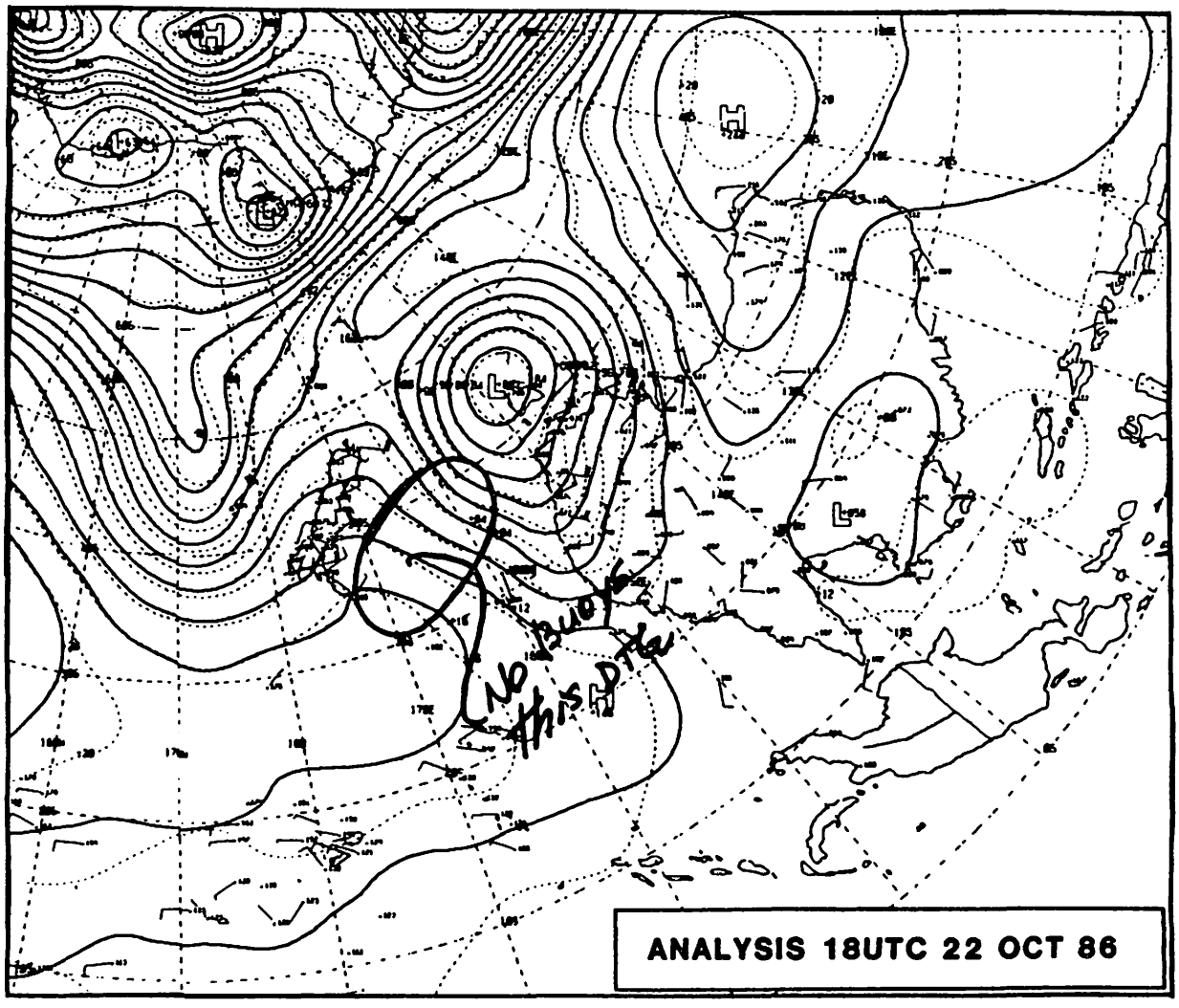

Figure 2. The FNOC initial analysis 6 hours later showing the removal of the spurious low.

before the data are disseminated on the GTS. More stringent checks are being performed at NDBC via a man-machine mix within the next 24 hours. When errors are identified, NDBC updates a status file on the IBM 4341 to subsequently remove bad data from GTS distribution. NDBC can also use this status file to scale or adjust measurements if other nearby observations support this action. These unacceptable sensor data are being transmitted as slashes or missing groups depending on the coding convention. The "61616" group provided for data quality information in DRIBU is not used.

Real-time quality control checks consist of range and time-continuity checks for environmental measurements and an acceleration check to validate the position. The environmental measurements consist of sea level pressure, air temperature, water temperature, and wind speed and direction (though no drifters currently report wind direction). The formula used for performing the time-continuity check is,

$$M = 0.58\,\sigma\sqrt{\Delta T}, \qquad (1)$$

where M is the maximum allowable difference, σ is the standard deviation of each measurement, and ΔT is the time difference in hours since the last acceptable observation. ΔT is never greater than 3 hours, regardless of the actual time difference. This limits the maximum allowable difference and reduces the chance of disseminating bad data.

The time-continuity algorithm is based on a formula that relates the time rate of change of a normally distributed measurement to an autocorrelation coefficient. NDBC obtained a variety of time-rate-of-change statistics for sea level pressure at several of our moored buoys. We discovered that the autocorrelation was proportional to the $\sqrt{\Delta T}$. The coefficient, 0.58, was then determined empirically, and represents a time change likely to be seen only once every 2 to 3 years at any given site.

The limits and standard deviations (used for the time-continuity check) are data base entries for each station, which we can quickly change from NDBC. Drifters located outside tropical cyclone belts and in high latitudes have broader limits and higher standard deviations, like most of our moored buoys. Table 2 lists the upper and lower limits that the data must fall between and the standard deviation for each element for all high latitude drifting buoys. All limits are removed well ahead of tropical storms because the maximum change of pressure allowed in one hour, 12.2 hPa, can easily be exceeded near the eye. Obviously, no range or time-continuity checks are performed on wind direction.

Table 1. Concurrent Reports from the Same Drifting Buoy from Duplicate Sources Revealing LUT Position Errors

DRIFTER	SOURCE	LATITUDE	LONGITUDE	PRESSURE (hPa)
17807	S. AFRICAN LUT	40°27'S	4°16'W	1019.3
	ARGOS	40°48'S	24°25'W	1019.4
25525	CANADIAN LUT	85°16'N	140°00'E	1031.4
	NORWEGIAN LUT	85°22'N	127°32'E	950.0
25523	CANADIAN LUT	84°19'N	168°23'E	1032.8
	NORWEGIAN LUT	85°31'N	161°00'E	950.0

Table 2. Limits Used for Range Checks and Standard Deviations Used for Time-Continuity Checks for Real-Time Validation of High Latitude Drifters

MEASUREMENT	UNITS	LOWER LIMIT	UPPER LIMIT	STANDARD DEVIATION
SEA LEVEL PRESSURE	hPa	905.0	1060.0	21.0
AIR TEMPERATURE	°C	−14.0	40.0	11.0
WATER TEMPERATURE	°C	−2.0	40.0	8.6
WIND SPEED	m/s	0.0	60.0	25.0
SIGNIFICANT WAVE HEIGHT	m	0.0	15.0	6.0
DOMINANT WAVE PERIOD	s	1.95	26.0	31.0

Accelerations are being computed in both the north-south and east-west directions to validate locations. Acceleration was chosen because locations that are slightly in error result in high accelerations, but may not result in high velocities. If the acceleration exceeds about 4 knots per hour (0.0006 m/s^2) in either component, that report will be removed from distribution and will not be used in subsequent acceleration computations.

If any drifter reports subsurface temperatures, we delete that section because we do not have the extensive water mass climatology needed to quality control them. However, in the future, subsurface temperatures will be passed to the National Ocean Service's (NOS) Ocean Products Center (OPC) who will quality control and disseminate the data.

These real-time checks have been very effective at removing the large errors caused by intermittent data transmission problems between the station and the Geostationary Operational Environmental Satellite (GOES) system for moored buoys. These errors typically account for 0.5 percent data loss and our checks remove over 99 percent of these errors. On the other hand, these checks do a poor job of catching errors caused by sensor degradation. An example of sensor degradation includes cases where the pressure gradually drops 5 hPa due to decreasing battery voltage. Only about 25 percent of these problems are caught by our real-time checks, yet these problems cause persistently bad data. In order to remove these bad data from distribution, more stringent quality control is performed at NDBC within 24 hours via a man-machine mix. When sensor deficiencies are detected, the status file on the IBM 4341 is updated to withhold release of that sensor's data.

At NDBC, additional validation efforts fall into two broad categories. First, more stringent range, acceleration, and time-continuity limits are being applied. Second, the observed pressures and temperatures are compared to NMC analysis and "first guess" fields. Ponting and Sarson (1984) have pioneered this approach in comparing automatic weather station data to analysis data in the United Kingdom

The range and time-continuity limits were provided by the National Climatic Data Center. They are the mean values plus and minus four standard deviations for each 2.5-degree, latitude-by-longitude cell and are based on their archive of ship data. Time-continuity limits will be computed using equation (1) with the standard deviation set to 0.12 times the difference between the range limits. The position check is identical to the one performed in real-time, but with a maximum acceleration of half the real-time limit.

The NMC sea level pressure, air and water temperature analysis fields valid at 0000 and 1200 UTC are being acquired for comparison with drifting buoy data. These fields are sent on a 2.5-degree-latitude by 5-degree-longitude grid. If a drifter observation time is within 2 hours of 0000 or 1200 UTC, a spatial interpolation is performed on the relevant fields to obtain an analysis value at that drifter location. These analysis values are then compared to the drifter observations.

One problem that clouds this comparison is that the analysis could be contaminated by a bad drifter observation. We plan to overcome this problem by using 12-hour forecasts from the previous model run as an alternate analysis field. This is somewhat analogous to using a "first guess" field. If a bad observation contaminated the surface analysis, 12 hours of model time would tend to reduce the error. On the other hand, a bad forecast could ruin the comparison. However, this is primarily limited to areas of cyclogenesis. Hard copies of both the analysis and forecast fields as well as drifter data will be plotted to help the analyst determine these errors. These forecasts are not available for sea surface temperature.

Small daily differences between the analysis and the observation are probably not meaningful. They could result from the analysis being too smooth in areas of troughs or ridges or not being capable of capturing tight gradients, such as the edge of the Gulf Stream. For this reason, monthly differences and standard deviations between the analysis and observation are being computed.

EXPERIENCE IN USING NMC ANALYSIS FIELDS

Some failures are easy to detect by comparing the observations with analysis and short-range forecast values. One such failure is depicted in the time-series plot shown in Figure 3. The sea level pressure observed by 54814 is about 14 hPa lower than both the NMC 12-hour sea level pressure forecasts and analysis values.

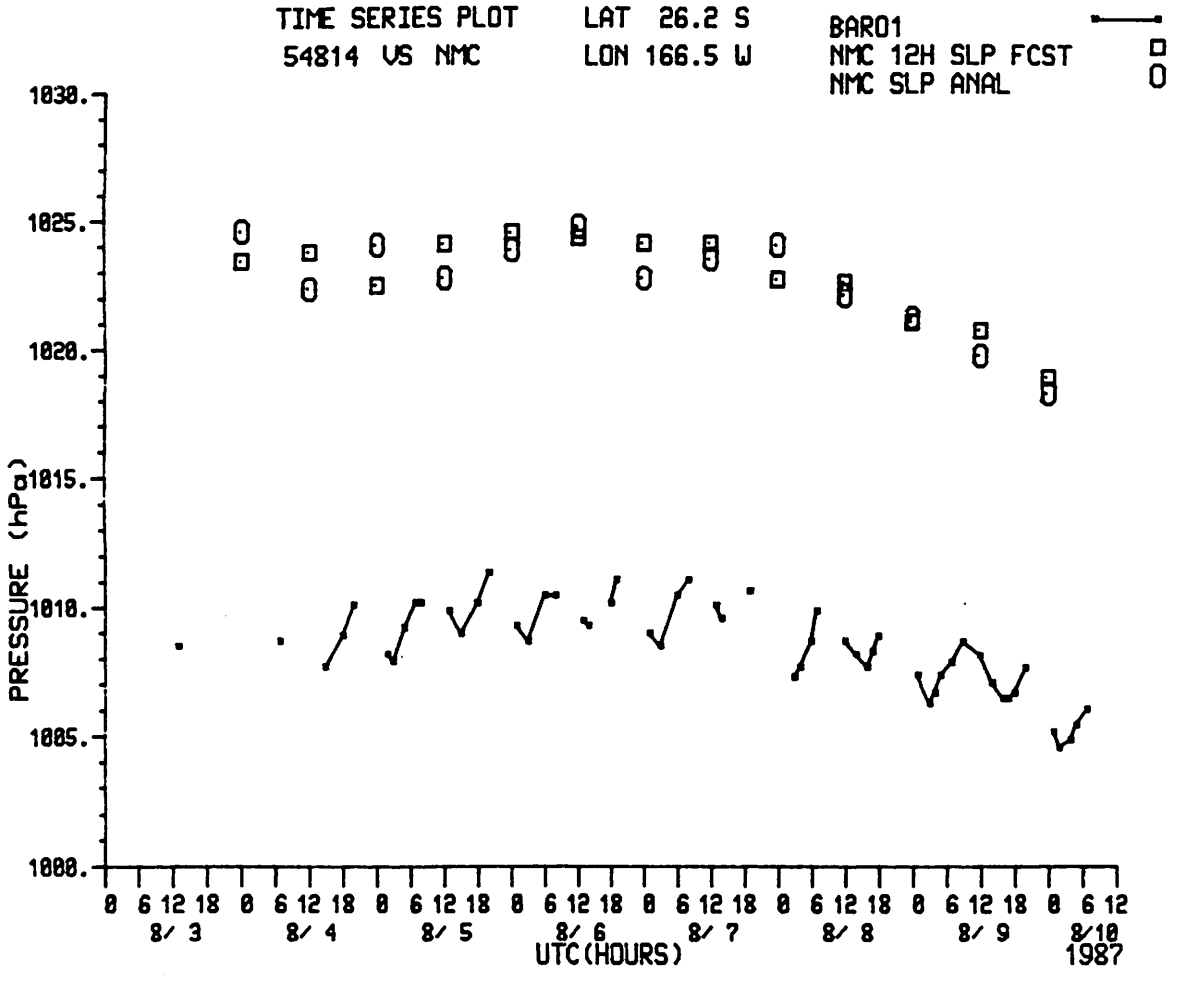

Figure 3. Sea level pressures reported by drifter 54814 are compared to NMC analyses and 12-hour forecasts.

Other, less dramatic, failures are more difficult to detect, especially in deep, low-pressure areas south of 40°S. The NMC fields are often too conservative. The pressures are too high in cyclones and too low in anticyclones. This is especially apparent in the 12-hour forecasts. The time-series plots, given in Figure 4, illustrate this point by comparing drifter 33807, located at 52°S, 69°E, with the NMC analysis and forecast values. These 5- to 10-hPa differences between the NMC values and the observations are typical of many drifters in this latitude. Clearly, individual differences would have to exceed 10 hPa to be flagged as suspicious.

Failures of magnitudes less than this would be detected by looking at statistical summaries or scatterplots showing these comparisons over at least a 2-week period. Figure 5 shows a scatterplot comparing the sea level pressure observation minus analysis versus the sea level pressure observation. Data plotted are from 22 selected buoys located in a variety of different latitudes in both hemispheres during 2 weeks of July 1987. The general pattern shows good agreement between the buoys and analysis values at higher pressure and increasing scatter at low pressures. Two buoys, 54810 and 33802, have a large number of outliers, some of which are at higher

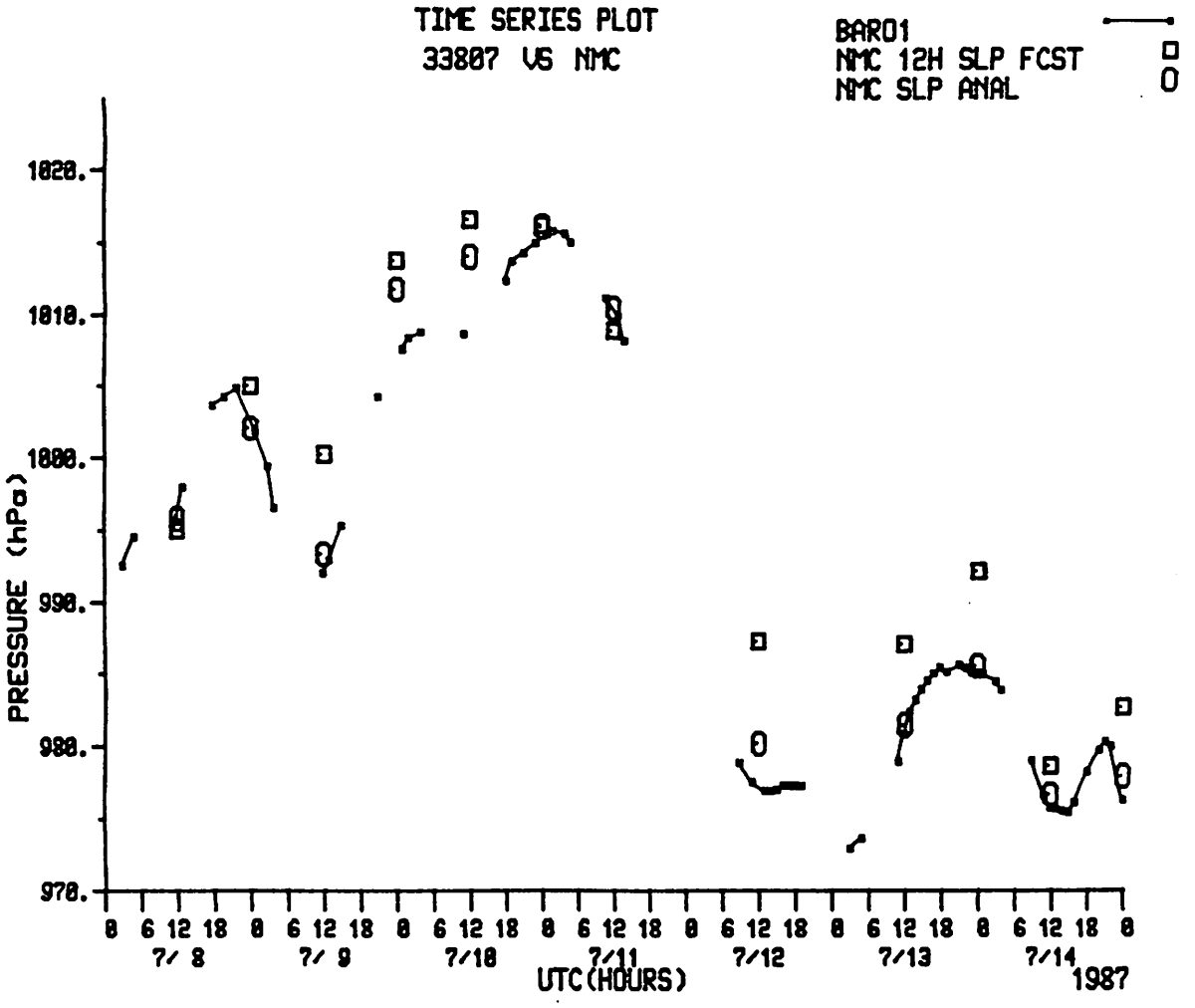

Figure 4. Sea level pressures reported by 33807 are compared to NMC analyses and 12-hour forecasts.

pressures. Therefore, these drifters appear to be reporting erroneous pressures. The time-series plot shown in Figure 6 confirms that pressures reported by 54810 are 2 to 7 hPa higher than the NMC values. As a supplemental check, biases and root mean square error computed against "first guess" fields used at the European Centre for Medium Range Weather Forecasts are also sent to us monthly. The biases and RMS error for 54810 and 33802 were considerably higher than for most drifters.

Systematic biases in other measurements can be detected with these type graphics. Figure 7 shows a plot of sea surface temperature observations minus analysis values versus latitude. Two groups of outliers located in the upper left and lower right corner of the plot represent data from 52821 and 55825. Both drifters were reporting water temperatures beyond the range observed by ship data in the climatic atlases.

Use of the NMC 1000-hPa air temperature analyses and forecasts posed a problem. The fields were not in good overall agreement with either the moored or drifting buoy observations. The analysis was 3.5°C warmer than the observations with a standard error of estimate of 1.8°C. The NOS OPC reports similar problems

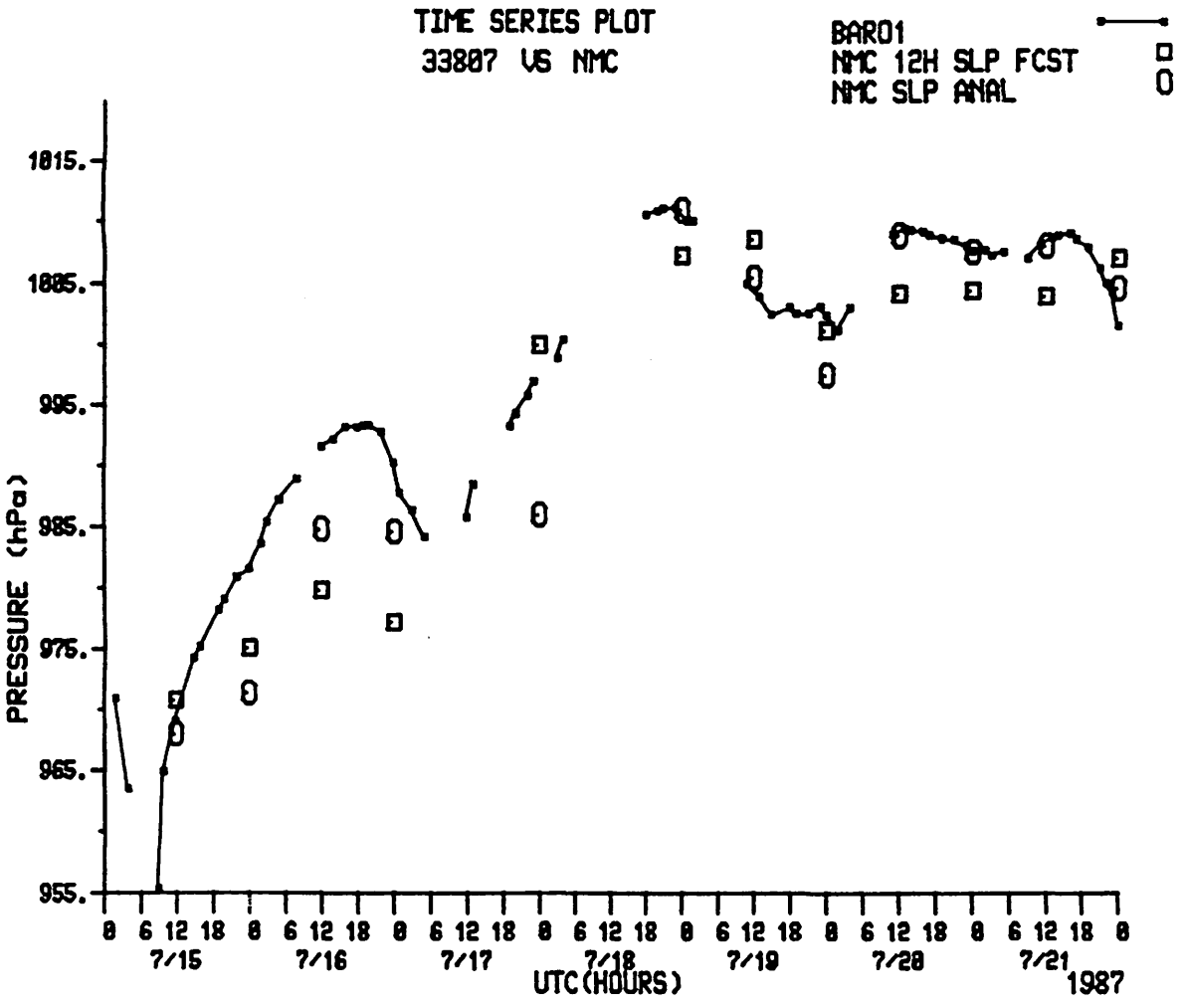

Figure 4. Sea level pressures reported by 33807 are compared to NMC analyses and 12-hour forecasts. (Continued)

with this field and uses a diagnostic boundary layer model to provide an estimate of the surface air temperature based on the 1000-hPa air temperature analyses, observed sea surface temperatures, and sea level pressures. Obviously, erroneous data were discarded before developing the regression. The estimated temperatures had a standard error of estimate of 1.3°C.

Based on this experience, we have established some comparison limits shown in Table 3. If the observation differs from the analysis by more than these limits, the data will be flagged for manual review.

SUMMARY

Within the last month, NDBC has started to quality control North American drifting buoy reports entering the GTS at Washington, DC. This quality control delays real-time dissemination by a maximum of 20 minutes. The quality controlled data are transmitted under communications headers SSVX2 KWBC, SSVX6 KWBC,

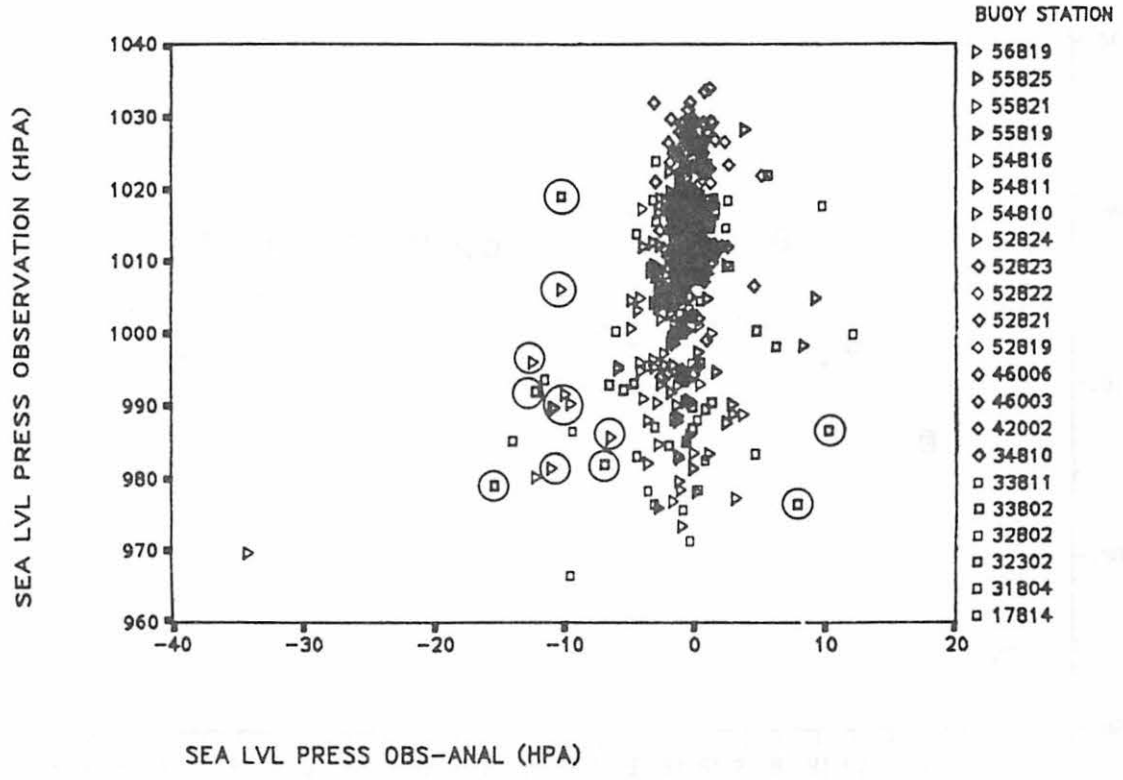

Figure 5. Sea level pressure observations minus analyses values plotted against the sea level pressure observation for 22 selected buoys during July 1987.

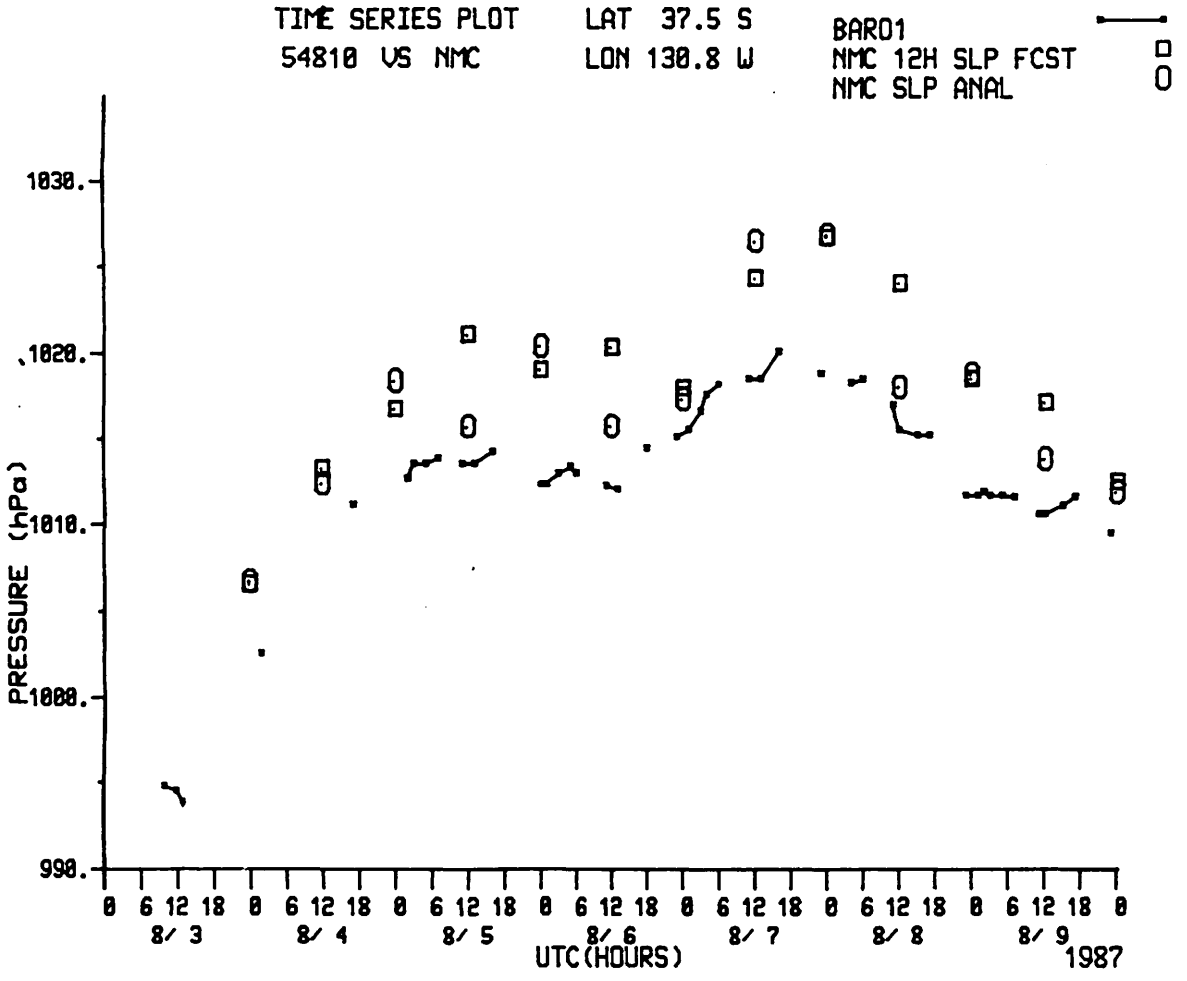

Figure 6. Sea level pressures reported by drifter 54810 are compared to the NMC analyses and forecast values.

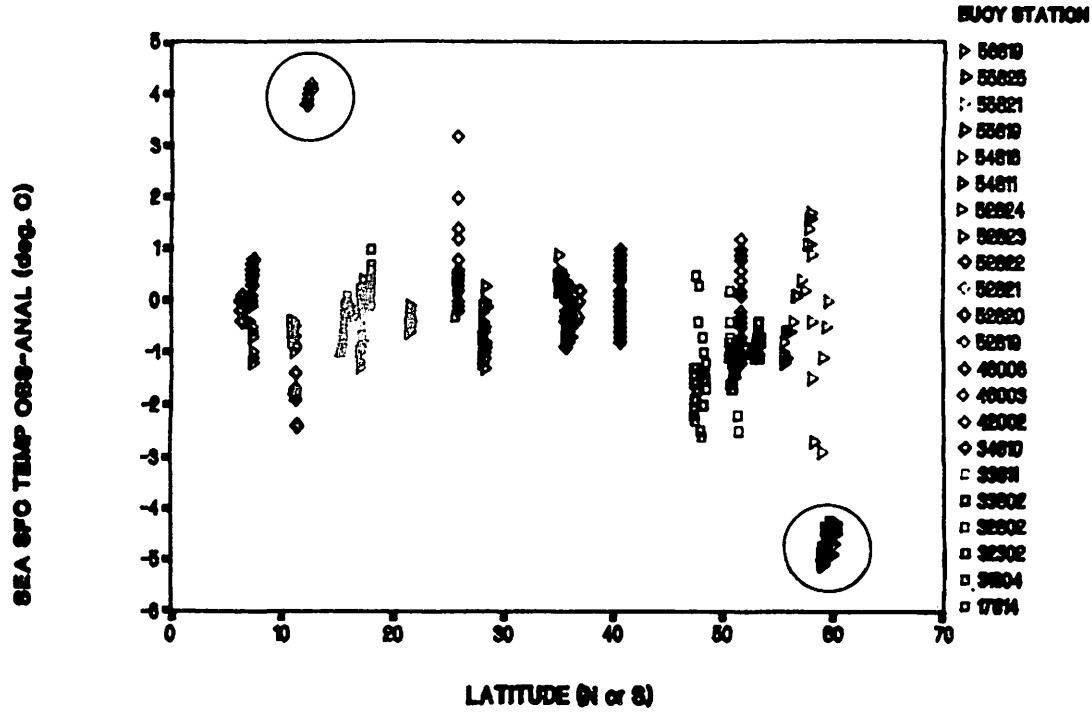

Figure 7. The sea level pressure observation from 22 selected buoys minus the NMC analysis during July 1987.

Table 3. Limits Used to Compare Drifting Buoy Measurements with NMC Analyses

MEASUREMENT	INDIVIDUAL COMPARISON	COMPARISON LIMITS WEEKLY BIAS	WEEKLY DRIFT
SEA LEVEL PRESSURE	4.0-10.0 hPa[1]	2.0 hPa	4.0 hPa
AIR TEMPERATURE	3.5°C	2.0°C	3.0°C
WATER TEMPERATURE	2.5°C	1.5°C	2.0°C

[1]VARIES WITH LATITUDE AND SEA LEVEL PRESSURE OBSERVATION.

and SSVX8 KWBC. Data received under headers SSVX90 KDCA - SSVX99 KDCA contain DRIBU data originating at the U.S. Argos Processing Center that have not been quality controlled.

REFERENCES

Ponting, J.F. and Sarson, M. A. 1984. Operational Quality Evaluation of Surface Observations. WMO Instruments and Observing Methods Report No. 15, pp. 239-244.

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ANNEX IX

USE OF WMO BUOY ID NUMBERS FOR GTS REPORTS

International identifier system

1. The international identifier system for environmental data buoy stations (the "international buoy identifiers") was first adopted by Recommendation 8 (CBS-Ext.(76)) of the extraordinary session of the WMO Commission for Basic Systems in 1976 (see reference 1). The primary objective of the system is to provide buoys and other related automatic ocean data stations with an identifying number in a way similar to the "station index number" of land meteorological stations for both operational and storage and retrieval purposes. Details of the identifier itself and of procedures for its use and allocation are given in Appendix A. The system of ocean areas used in assigning buoy identifiers is shown in Appendix B and the current allocations are given in Appendix C.

2. A number of aspects of this system deserve some further elaboration or explication. This is given in the following paragraphs.

3. Blocks of identifier numbers are normally allocated to WMO Members, at their request, in the areas of their choice (sometimes geographically far distant, according to their particular requirements). Members may then reallocate some of these numbers to other national institutions as they see fit. However, it is then the responsibility of the Member concerned to ensure that these identifier numbers are used correctly, for the insertion of data onto the GTS. Occasionally, identifier number blocks may be allocated directly by the WMO Secretariat to national institutes or organizations other than national Meteorological Services (e.g. universities or research institutes) who wish to have their data distributed on the GTS, and the Members concerned informed appropriately.

4. Following the receipt of allocated WMO identifier numbers, Members who have their data collected, processed and inserted onto the GTS by CLS/Service Argos inform CLS of this allocation and in particular of the correspondence between WMO identifier and Argos PTT number. This allows for correct processing and conversion of the report into the appropriate code (DRIBU, SHIP, BATHY) for GTS distribution. It also allows CLS to provide WMO with the monthly status report for publication in the WWW Operational Newsletter. Unfortunately, because of the proliferation of LUTs, and particularly of the direct insertion by Members of data collected via LUTs onto the GTS, there now exist many platforms for which the correspondence WMO number / Argos number is unknown to CLS or WMO. This creates, inter alia, considerable difficulties for data monitoring exercises such as are being carried out by the technical co-ordinator. The panel is therefore invited to ensure that all national Meteorological Services and institutions concerned always inform CLS/Service Argos, or the technical co-ordinator, of all WMO number / Argos number correspondences (and of any changes in these as they occur) to enable a central register of these correspondences to be maintained, for monitoring and other purposes.

5. It should be noted that WMO identifier numbers remain with the country to which they were originally allocated, irrespective of geographical location, until such time as a request for a reallocation is made to the WMO

Secretariat. In particular, Members or other institutions should not reallocate blocks of numbers to other Members or institutions in other countries without first clearing this with the Secretariat. This is essential to maintain an orderly system and minimize the possibilities of confusion and duplication.

Problems with identifier system

Saturation

6. The possibility has always existed of saturation or exhaustion of the available serial identifier numbers in each geographical area. This possibility is now approaching reality in certain areas, e.g. areas 62 and 64 in the North Atlantic. In order to ameliorate this potential problem, panel members are therefore requested to notify the WMO Secretariat of any allocated numbers or blocks which are no longer required (at present and in the near future), to allow reallocation to meet immediate requirements. Such applies particularly to numbers allocated to specific time - limited experiments or other similar exercises. In this regard, panel members are invited to examine carefully the allocations listed in Appendix C, to check for possible discrepancies and to identify those numbers no longer required.

"Double" usage of serial numbers

7. The rules for assignment of serial numbers to platforms within a given sea area require the number 500 to be added to the original allocated number to signify a drifting buoy or other mobile platform (see reference 1 and Appendix A). If such an addition is made, this creates an obvious redundancy since the originally allocated serial number remains effectively unused (e.g. in arbitrary area A_1b_w, an allocated serial number 015 becomes 515 for a drifting buoy, leaving 015 unused). Although no explicit mention is made of this redundancy in reference 1, it appears to be the intention to allow the redundancy to remain (see, for example, paragraph 4 of Appendix A, which is quoted directly from reference 1).

8. In view of the potential saturation problem in certain areas, however, (see paragraph 6 above) it may no longer be possible to tolerate this redundancy. It is therefore proposed for the consideration of the panel that, in cases where an allocated identifier number is used for a mobile platform (and 500 added), the original allocated number should remain available for use, by the country to which it is allocated, with a fixed platform. Provided that the correct procedures are followed (and it remains the responsibility of the country concerned to ensure this), no confusion should result in reports circulating on the GTS from two such platforms. It is also important that, at least during a trial period of, say, one year, no moves should be made to reallocate the original number to a second country (which would probably require a restructuring of the whole system).

Rigs and platforms

9. A recent decision of CBS/Ext.(85) (see reference 2) requires identification of observing stations located on drilling rigs or oil and gas platforms by a number allocated according to the identifier system in Appendix A, instead of by the terms PLAT or RIGG. In addition to putting further pressure on the availability of such numbers in certain areas, this

has raised another question relating particularly to semi-mobile platforms such as drilling rigs, which in fact must move relatively often, according to operational needs. At the present time, the procedures (see Appendix A, paragraph 5) allow for a mobile platform to retain the original identifier applicable to the sea area in which it was first activated. This is essential for drifting buoys, where it is important to maintain a unique identity throughout the buoy lifetime, for tracking and data monitoring purposes.

10. In principle, this rule may also be applied to drilling rigs: if the rig is given an identifier as a mobile platform it may retain this same identifier independent of geographical location (actual location is, in any case, given in all reports, whether in SHIP or DRIBU code). On the other hand, a drilling rig is only semi-mobile: it will spend a substantial proportion of its time in (various) fixed locations and therefore may be regarded as a fixed sea station. With such stations, it is expected that if they are relocated to a different sea area they should be given a new identifier appropriate to that area (cf. relocated land stations). This latter approach is favoured also for drilling rigs, as a more effective way of handling such data collection platforms (which are clearly not mobile in the sense of ships or drifting buoys). The panel is therefore invited to agree to the treatment of drilling rigs as fixed platforms, or to otherwise advise the Secretariat as appropriate.

Yachts

11. From time to time, blocks of identifier numbers are allocated to different countries for automatic observing stations and Argos PTTs placed on board yachts, particularly those engaged in races. Sometimes these races are limited to relatively small ocean areas (e.g. trans-Atlantic), sometimes almost unlimited (e.g. round-the-world); in any case the meteorological and oceanographic data obtained from such platforms and distributed over the GTS are valuable and reports from yachts should be encouraged. Nevertheless, there are certain problems with the present system, in particular:

(a) Yacht reports received by CLS/Service Argos are transformed into DRIBU code for GTS transmission, whereas these platforms are clearly not drifting buoys;

(b) Identifier number blocks are allocated according to geographical area in which a particular race commences and these numbers are then retained for the lifetime of the race, according to the rules for mobile platforms. However, occasionally the same identifier blocks are retained by the countries concerned for the same (or other) yachts taking part in races commencing in quite different geographical areas. This is at best confusing and also goes against the spirit of the procedures adopted for these identifiers.

12. To overcome these problems it is proposed, firstly, that CLS/Service Argos be requested to transform all reports from yachts, whether taking part in races of otherwise, to SHIP code for GTS distribution. Within the SHIP code, there are two possibilities for identifying the platform in the second group of Section 0 of the code (see reference 3), viz:

(a) D . . . . D = ship's call sign, or SHIP if no call sign exists;

(b) $A_1b_wn_bn_bn_b$ which is the international platform identifier.

In the case of yachts, either possibility is reasonable (with the yacht being, of course, a mobile platform) except for the situation in which the yacht is removed to a new sea area for any reason (e.g. a race). In this case, an identifier appropriate to the new area should be requested. On balance, the use of the identifier SHIP is favoured, as this also helps with the saturation problem (see above). However, the panel may wish to provide further advice to the Secretariat on this matter also.

References: 1. Recommendation 8 (CBS-Ext.(76)) - International identifier system for environmental data buoy stations

2. Recommendation 5 (CBS-Ext.(85)) - Amendments to FM 12-VII SYNOP and FM 13-VII SHIP

3. WMO-No. 306, Manual on Codes, Vol. I, International Codes.

Appendices: A. International identifier system for environmental data buoys

B. Chart of sea areas for use in assigning buoy identifiers

C. Current allocation of buoy identifier numbers.

APPENDIX A

INTERNATIONAL IDENTIFIER SYSTEM FOR ENVIRONMENTAL DATA BUOYS

Particulars of an indentifier

2. The international identifier system for environmental data buoy station (or commonlly called: international buoy identifier) was first adopted by Recommendation 8 (CBS-Ext. (76)). The primary objective of the system is to provide buoy stations with an identifying number in a way similar to the "station index number" of land meteorological stations for both operational and storage and retrieval purposes.

3. The symbolic form of the identifier is $A_1 b_w n_b n_b n_b$ and is used in FM 13-VII SHIP and FM 14-VIII DRIBU. Specifications of symbolic letters are as follows:

A_1	WMO Regional Association area in which buoy has been deployed
b_w	Sub-area belonging to the area indicated by A_1
$n_b n_b n_b$	Type and serial number of buoy

4. Serial numbers to buoys within each maritime sub-area identified by A_1 and b_w shall be alloted from the series 000 up to 499 but in the case of drifting buoys and other mobile platforms, 500 shall be added to the original $n_b n_b n_b$ number.

Examples

14015 = No. 15 buoy, deployed in sub-area 4 in Region I, stationary
46673 = No. 173 buoy, deployed in sub-area 6 in Region IV, drifting.

Procedures for the use and allocation of identifiers

5. The identifier may be allocated to fixed as well as drifting buoy stations, mobile ship stations and, in some cases, land-based remote stations. In the case of drifting buoys (and similarly other mobile platforms), a buoy will retain the original identifier applicable to the WMO Region and sub-area in which it was set adrift.

6. The allocation of identifier numbers is carried out by the WMO Secretariat, as necessary, in consultation with the IOC Secretariat:

(a) On request by interested Members, the WMO Secretariat allocates a block or blocks of identifier numbers. When submitting requests, the geographical positions and nature of platforms should be specified (the position of initial deployment in the case of drifting buoys);

(b) Members register with the WMO Secretariat platforms deployed together with identifier numbers actually assigned to them. It is also recommended that parameters measured and transmitted be notified. Stations thus registered will be included in the monthly letter on the operation of the WWW and Marine Meteorological Services.

APPENDIX B

CHART OF SEA AREAS FOR USE IN ASSIGNING BUOY IDENTIFIERS

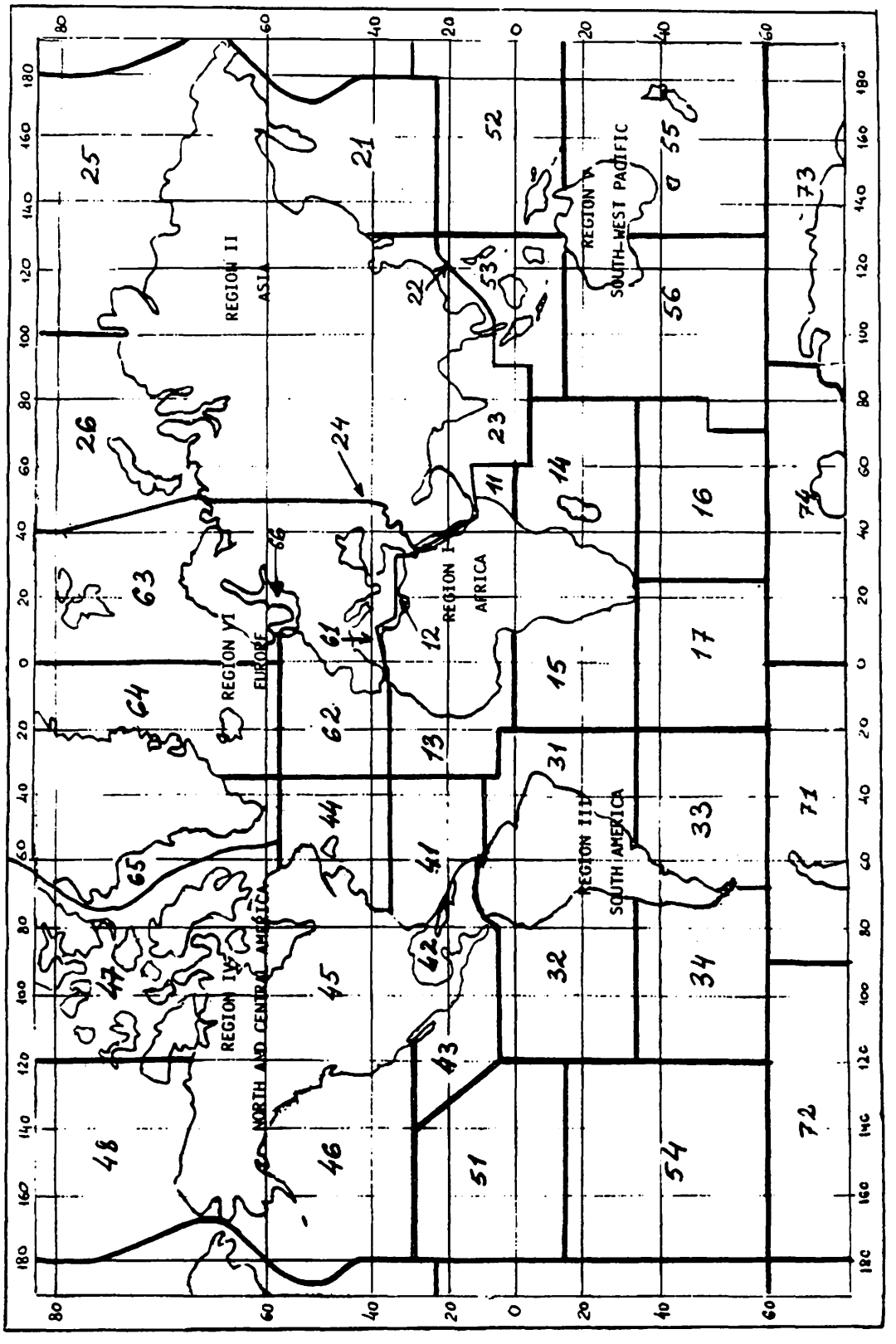

CHART OF WATER AREAS (A_1b_w) FOR USE IN ASSIGNING BUOY IDENTIFIERS

APPENDIX C

CURRENT ALLOCATION OF BUOY IDENTIFIER NUMBERS

COUNTRY	NUMBERS	DATE OF ALLOCATION
AUSTRALIA	55011 to 55060 56001 to 56050	10.05.1983
CANADA	14001 - 14010	25.10.1977
	16001 - 16010	"
	32001 - 32010	"
	44131 - 44160	"
	44161 - 44210	30.01.1984
	44211 - 44220	11.02.1987
	44231 - 44232	11.02.1987
	45131 - 45160	25.10.1977
	46131 - 46160	"
	46161 - 46210	30.01.1984
	47031 - 47060	25.10.1977
	48021 - 48030	28.02.1978
	54001 - 54010	25.10.1977
	55001 - 55010	"
	65031 - 65060	"
GERMANY, FEDERAL REPUBLIC OF	74006 - 74012	18.06.1986
	74013 - 73018	"
	71014 - 71021	"
FRANCE	13031 (Anchored buoy/Golf of Guinea)	08.06.1983
	43101 - 43105 (position 11N - 109W)	20.07.1981
	44101 - 44105	06.06.1984
	61001 - 61010	15.01.1982
	61011 (Anchored buoy/Mediterranean)	05.07.1982
	62001 - 62020(drifting)	20.07.1979
	62021 - 62022	05.05.1983
	62051 - 62090 (race)	05.05.1983
	62081 (Anchored buoy/Atlantic)	05.08.1982
	62093 (Anchored buoy/Channel 49°30' 00°09')	06.10.1982
	62091 - 62092 (drifting)	21.07.1982
	62200 - 62299	04.12.1984
	64021 - 64023 (drifting)	21.07.1982
	65011 - 65015	06.06.1984
	64024 - 64027	02.07.1986
	63051 - 63053	02.07.1986
	23041 - 23042	06.10.1986

COUNTRY	NUMBERS	DATE OF ALLOCATION
ICELAND	64070 - 64071	12.09.1986
JAPAN	21001 - 21010	20.04.1978
	22001 - 22010	"
NETHERLANDS	44111 - 44120	13.12.1984
	62096 - 62100	14.08.1986
	64060 - 64064	"
	65070 - 65074	"
NORWAY	17001 - 17005	20.02.1984
	25001 - 25010	01.10.1985
	26021 - 26030	01.10.1985
	32101	07.03.1985
	44121 - 44125	07.03.1985
	63001 (Automatic station 80.6°N-20.8°E)	20.08.1980
	63002 - 63015 ("Seaberge and Seamer projects)	12.11.1980
	63016 - 63035 (drifting buoys east of 0°)	19.02.1980
	63036 - 63039	07.03.1985
	64001 - 64020	17.05.1984
	65016 - 65020	07.03.1985
	71001 - 71005 (position 60S - 50W); (Norwegian Polar Research Institute)	08.12.1981
	71006 - 71010	20.02.1984
	74001 - 74005	20.02.1984
PORTUGAL	62031 - 62050	09.04.1980
	(38 00 07 N-29 16 22 W)	
	(37 14 42 N-24 46 05 W)	
	(37 03 54 N-26 37 01 W)	
	(39 31 30 W-28 00 00 W)	
SAUDI ARABIA	23021 - 23040	18.10.1985
UNITED KINGDOM	44221 - 44225	24.10.1985
	62026 - 62030	15.03.1983
	62101 - 62110	08.11.1983
	64041 - 64045	28.03.1983
	62301 - 62305	24.10.1985
	64046 - 64050	24.10.1985
	65061 - 65065	24.10.1985
	71011 - 71013	01.11.1985
	62111 - 62150	31.07.1987
	63101 - 63120	31.07.1987
	64051 - 64055	31.07.1987

COUNTRY	NUMBERS	DATE OF ALLOCATION
USA	13001 - 13020	09.02.1983
	15001 - 15010	"
	23001 - 23020	09.08.1983
	26001 - 26010	05.12.1984
	31001 - 31010	09.02.1983
	32011 - 32060	"
	41001 - 41100	12.10.1977
	42001 - 42100	"
	43001 - 43100	"
	44001 - 44100	"
	45001 - 45100	"
	46001 - 46100	"
	47001 - 47010	09.02.1983
	47101 - 47125	28.05.1985
	48001 - 48020	16.09.1983
	48031 - 48060	09.02.1983
	51001 - 51020 (near Hawaiian Islands)	17.07.1980
	63040 - 63050	09.02.1983
	64031 - 64040	"
	65001 - 65010	"
	73131 - 73150 (Polar Science Centre(Polex)	15.07.1980
	73151 - 73170 (Polar Science Centre(Polex)	17.06.1981
	25021 - 25025	24.09.1986

Allocation for TOGA

TOGA — 300 - 399 (for drifting buoys 800 - 899) — 24.04.84

	Basic allocation	Drifting buoys (+ 500)	
USA	11301 - 11310	11801 - 11810	06.12.1985
	11311 - 11330	11811 - 11830	29.08.1986
	14301 - 14315	14801 - 14815	09.07.1984
	15301 - 15320	15801 - 15820	"
	16301 - 16325	16801 - 16825	"
	17301 - 17325	17801 - 17825	"
	23301 - 23325	23801 - 23825	06.12.1985
	31301 - 31315	31801 - 31815	09.07.1984
	32301 - 32330	32801 - 32830	"
	33301 - 33320	33801 - 33820	"
	34301 - 34330	34801 - 34830	"
	52301 - 52325	52801 - 52825	06.12.1985
	53301 - 53325	53801 - 53825	06.12.1985
	54301 - 54360	54801 - 54860	09.07.1984
	55301 - 55330	55801 - 55830	"
	56301 - 56350	56801 - 56850	"
	71301 - 71310	71801 - 71810	05.12.1984
	72301 - 72320	72801 - 72820	"
	73301 - 73320	73801 - 73820	"
	74301 - 74310	74801 - 74810	"

ANNEX X

DRIFTING-BUOY CO-OPERATION PANEL WORK PLAN AND OBJECTIVES FOR THE THIRD 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 on-going 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 GTS 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-operaton Panel.

6. Initiate and arrange for the circulation of quarterly newsletter containing 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. Pursue tasks appropriate to satisfy the requirements of the OWSE-NA of WMO with regard to drifting buoys.

8. Develop proposals for the implementation of global real-time quality control procedures for drifting-buoy data processed by the Argos processing centres.

9. Continue the arrangements (including finance) to secure the services of a Technical Co-ordinator.

10. Review programme and establish working priorities of the Technical Co-ordinator.

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

PART B

Task	Carried out by *	Supported / Assisted by	Reported to / Action by	Relevant terms of reference of the panel
1	Technical co-ordinator (1, 8)	Panel members and WMO/IOC Secretariats	Chairman for presentation to 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)	Chairman and WMO/IOC Secretariats	Wide circulation by WMO/ IOC Secretariats	6, 7
7	Technical co-ordinator (1, 5, 7)	Chairman, WMO Secretariat, COST-43 Technical Secretary	Chairman for presentation to Committee for the OWSE-NA	1, 3 7
8	Technical Co-ordinator (1, 2)	Panel members, WMO Secretariat	Chairman and panel	1, 2
9	Chairman and sub-committee	WMO/IOC Secretariats	WMO/IOC Secretariats	8
10	Chairman/panel		Panel (at next session)	8
11	Chairman	Technical Co-ordinator	Executive Councils of WMO and IOC	9

* 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.

ANNEX XI

LIST OF ACRONYMS

CBS	Commission of Basic Systems (WMO)
CCCO	Joint SCOR-IOC Committee on Climatic Changes and the Ocean
CLS	Collecte-Localisation-Satellites
CONA	Committee on the OWSE-NA (WMO)
COST-43	European Co-operation in the Field of Scientific and Technical Research - Project 43 (Setting up of an experimental network of ocean stations)
DBCP	Drifting-Buoy Co-operation Panel (IOC-WMO)
ECMWF	European Centre for Medium-range Weather Forecasting
EUMETSAT	European Meteorological Satellite Organization
FRAPC	French Argos Processing Centre
FRGPC	(see FRAPC)
GDPS	Global Data Processing System (WWW)
GOS	Global Observing System (WWW)
GTS	Global Telecommunication System (WWW)
hPa	hecto Pascal
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange (IOC)
IOS	IGOSS Observing System
JTA	Joint Tariff Agreement (Argos)
LUT	Local User Terminal
MEDS	Marine Environmental Data Service (Canada)
NDBC	National Data Buoy Centre (NOAA)
NMC	National Meteorological Centre (GDPS)

NOAA	National Oceanographic and Atmospheric Administration (USA)
OPC	Ocean Product Centre (NOAA)
OWSE-NA	Operational WWW Systems Evaluation for the North Atlantic
PI	Principal Investigator
PTT	Platform Transmitting Terminal
QC	Quality Control
RNODC	Responsible National Oceanographic Data Centre (IODE)
SCAR	Scientific Committee on Antarctic Research
SCOR	Scientific Committee on Oceanic Research
SMBA	Scottish Marine Biological Association
TC, TCDBCP	Technical Co-ordinator for the Drifting-Buoy Co-operation Panel
TOGA	Study of the Tropical Ocean and Global Atmosphere (WCRP)
Unesco	United Nations Educational, Scientific and Cultural Organization
USAPC	US Argos Processing Centre
USGPC	(see USAPC)
WCRP	World Climate Research Programme
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WWW	World Weather Watch (WMO)