Restricted distribution

DBCP-XVI/3
Paris, 15 May 2001
English only

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of UNESCO)

WORLD METEOROLOGICAL ORGANIZATION

Sixteenth Session of the Data Buoy Co-operation Panel
(Victoria, BC, Canada, 16-20 October 2000)

SUMMARY REPORT

(SC-2001/WS/25)

TABLE OF CONTENTS

D. CONCLUDING COMPONENT

ANNEXES

A. ORGANIZATIONAL COMPONENT

1. ORGANIZATION OF THE SESSION

1.1 OPENING OF THE SCIENTIFIC AND TECHNICAL WORKSHOP

1 The Scientific and Technical Workshop associated with the sixteenth session of the Data Buoy Cooperation Panel (DBCP) was opened by the chairman of the panel, Mr Graeme Brough, at 08.50 hours on Monday, 16 October 2000, in the conference room of the Laurel Point Inn in Victoria, B.C., Canada. He welcomed all participants to the session and to the workshop, noting with satisfaction that participation in the panel session and workshop had increased once more, testimony to the value of the workshop and to the strength and importance of the panel, as well as to the undoubted attraction of Victoria as a venue. Mr Brough expressed his sincere thanks, on behalf of all participants as well as of the sponsoring organizations, WMO and IOC, to the Meteorological Service of Canada, and particularly to Mr Ron McLaren and his co-workers, for hosting the meetings and for providing such excellent facilities and support. He then passed the floor to Mr Brian O'Donnell, Regional Director, Pacific and Yukon Region, Meteorological Service of Canada.

2 On behalf of the Minister of the Environment of Canada, The Hon. David Anderson, and of the Government of Canada, Mr O'Donnell expressed his pleasure at being able to welcome participants in the DBCP workshop and meeting to Canada, to British Columbia and to the provincial capital of Victoria. He noted that Minister Anderson had hoped to be able to open the session in person, but had unfortunately been recalled to Ottawa unexpectedly. He had, however, passed on his personal greetings and best wishes for a successful meeting and workshop. In doing so, the Minister had noted the importance of meteorology and oceanography to Canadians, particularly those living in ocean coastal areas. He commended the DBCP for its successful efforts to implement cooperative, cost-effective programmes to gather the data from the oceans required to provide services and activities for responsible environmental management and societal well-being.

3 Mr O'Donnell concluded by recognizing the work of Mr Ron McLaren in the coordination and preparation of the logistics for the workshop and meeting. As a Director of the Meteorological Service of Canada, Mr O'Donnell then added his own personal welcome, and wished all participants a successful meeting and enjoyable stay in Victoria.

4 On behalf of the Secretary-General of WMO, Professor G.O.P. Obasi, and the Executive Secretary IOC, Dr P. Bernal, the WMO Secretariat representative also welcomed participants to the meeting. In doing so, he offered the very sincere appreciation of both Organizations to the Government of Canada, and especially the Meteorological Service of Canada, for hosting the meeting and for providing such excellent facilities, support and hospitality. He offered particular thanks and appreciation to Mr McLaren, for his support for the meeting and for the work of the DBCP in general. He recognized the ever increasing importance of the panel and its work, in particular now in the context of integrated ocean observing systems to be coordinated under the new Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM). The WMO representative concluded by assuring the panel of the on-going full support of both Secretariats in its work.

5 The list of participants in the workshop is included in the workshop proceedings, which are published as a separate DBCP Technical Document.

1.2 OPENING OF THE SESSION

6 The sixteenth session of the Data buoy Co-operation Panel was called to order by the chairman, Mr Graeme Brough, at 14.00 hours on Tuesday, 17 October 2000, in the same location as the scientific and technical workshop. The list of participants is reproduced as *Annex I*.

1.3 ADOPTION OF THE AGENDA

7 The agenda as adopted by the session is reproduced in *Annex II*.

1.4 WORKING ARRANGEMENTS

8 Under this agenda item, the panel decided on its working hours and other arrangements for the conduct of the session. The Secretariats introduced the documentation for the session.

B. IMPLEMENTATION COMPONENT

2. IMPLEMENTATION REPORTS

2.1 REPORT BY THE TECHNICAL COORDINATOR

9 The technical coordinator of the DBCP, Mr. Etienne Charpentier, reported on his activities for the panel during the intersessional period. As for the previous years, he was based in Toulouse and employed by the Intergovernmental Oceanographic Commission (IOC). As agreed by the panel at its 14th session, the technical coordinator worked part time (35%) as Coordinator of the Ship-of-Opportunity Programme (SOOP).

10 He attended a number of meetings and made a few visits representing the panel or JCOMM, including:

- Two meetings of the WMO/CBS Expert Team on Observational Data Requirements and Redesign of the Global Observing System (Geneva, November 1999, and June 2000), representing JCOMM.
- EGOS Management Committee meeting, Paris, December 1999.
- Mission to Washington-DC in February 2000 to discuss the southern ocean SVPB issue with NOAA.
- Argo Science Team meeting, Southampton, March 2000, representing JCOMM.
- CBS Implementation Coordination Team on Data Representation and Codes, Geneva, April 2000, for discussing the BUOY code issue.
- Argo Pacific implementation meeting, Tokyo, April 2000, representing JCOMM.
- 2nd transition planning meeting for JCOMM, Paris, June 2000, representing the panel and SOOP.
- Argo Atlantic implementation meeting, Paris, July 2000, representing JCOMM.

11 He provided the following persons with DBCP reports for representing the panel at other DBCP Action Group meetings:

- EGOS, Brest, June 2000: Pierre Blouch, Météo France
- IPAB, IABP, Fairbanks, June 2000: Elizabeth Horton, Navoceano
- ISABP, Salvador, July 2000: Eric Meindl, NOAA/NDBC

12 The DBCP chairman agreed that the technical coordinator should follow the developments of Argo since a lot of interaction is expected among the DBCP, SOOP, and Argo (sub-surface floats) in the future, especially regarding managing deployment opportunities, telecommunications systems, GTS distribution, etc. An Argo coordinator would soon be recruited and placed under the TC DBCP's supervision to work on Argo matters. JCOMM also was building an integrated system so more interaction was expected to occur between the different marine observing systems. In this context, the technical coordinator spent some time on JCOMM issues, including attending meetings representing JCOMM, suggesting a mechanism for coordinating deployment opportunities, and writing a proposal to establish a JCOMM *in situ* Observing Platform Operations and Support Centre (JCOMMOPS).

13 A large number of buoy operators had agreed to authorize GTS distribution of their data (about 60% of the transmitting buoys are reporting on GTS). However, it was becoming increasingly difficult to convince the remaining ones to do so or of the practicability of doing so (short duration programmes, confidentiality, not relevant). Thus priority had now been given to direct technical assistance in facilitating GTS distribution of buoy data for those buoy programmes which gave authorization, and were relevant. User assistance was therefore an important issue which was being dealt with by the technical coordinator with support from Fernand Cid of CLS, Service Argos. Quality of buoy data continued to be monitored and coordinated through the DBCP QC guidelines.

14 The technical coordinator worked on a number of other issues which were to be discussed during this DBCP session such as BUOY and BUFR/CREX code issues, upgrading the Argos GTS sub-system to process sub-surface floats, updating the DBCP web site (e.g. adding information on vandalism, metadata, impact studies), coordinating and submitting DBCP views on the metadata issue to the JCOMM Sub-group on Marine Climatology, writing a document on vandalism to be submitted to the meeting of the International Hydrographic Organization (IHO) Commission on the Promulgation of Radio Navigational Warnings (CPRNW), Monaco, 27-29 June 2000.

15 The full report of the TC DBCP is given in *Annex III*. The panel expressed its appreciation for the substantial work accomplished on its behalf by the technical coordinator during the past year.

2.2 REPORTS BY THE ACTION GROUPS AND RELATED PROGRAMMES

16 Under this agenda item, the panel was presented with reports by its action groups, viz. the European Group on Ocean Stations (EGOS), the International Arctic Buoy Programme (IABP), the International Programme for Antarctic Buoys (IPAB), the International South Atlantic Buoy Programme (ISABP), the International Buoy Programme for the Indian Ocean (IBPIO), the Global Drifter Programme (GDP) and the Tropical Atmosphere Ocean (TAO) array Implementation Panel (TIP). As usual, the full reports of the action groups will be reproduced in the panel's annual report.

The European Group on Ocean Stations (EGOS)

17 Mr D. W. Jones, chairman of the EGOS management committee, gave an oral presentation on EGOS activities and on the status of moored and drifting buoys in the North Atlantic. In introducing the EGOS intersessional report (EGOS technical document number 218, available at http://www.cmr.no/conmar/egos/) covering the 12 month period from 1st September 1999 to 31st August 2000, he was pleased to report that the number of drifting buoys operational in the area had again increased, varying between 36 and 55 at the end of each month. There were 55 operational drifting buoys at the end of the period. 62 buoys, including 23 buoys air deployed by NAVOCEANO, had been deployed in the year, and 47 had ceased to function. The operational lifetime of buoys in the EGOS programme that had failed was 210 days; however if the buoys that suffered very early failure were excluded, the average operational lifetime increased to 251.

18 Maintaining a high data availability rate with minimum time delay between time of observation and insertion onto the GTS remained a high priority for the Group. In this respect he was pleased to report the continued operation of the LUTs in Oslo operated by Norway and in Sondre Stromfjord operated by Denmark. On average the data were received in the NMCs about 20 to 30 minutes after the observations were made.

19 In addition to the drifting buoys, the group also operated 13 moored buoys. This included 2 buoys operated in the North Sea by the Met. Office, and a buoy 'POMME' operated by Meteo France in support of an ocean/atmosphere scientific research project north of the Azores. He was also pleased to report a new moored buoy programme being developed by Ireland.

20 EGOS met twice during the period. In December in Paris (hosted by IOC), Mr Jones was re-elected chairman and Mr W. van Dijk was re-elected vice-chairman. Mr P. Blouch was appointed technical coordinator, and Mr Torleif Lothe of Christian Michelson Research, Bergen, was appointed technical secretary. KNMI hosted the second meeting in May in De Bilt. As a formalisation of its recent deployment strategies the Management Committee agreed to extend the EGOS primary area of

interest to cover the sea area from the European coastline out to 50°W, between 30°and 65°N, including adjacent seas, such as the Baltic and Mediterranean Seas. It also agreed that for a programme to be included in EGOS the data must be available on the GTS and have relevance for NWP forecasting over, at least, Europe or a significant part of it. At the summer meeting 2000 the review of the EGOS basic documents was completed. These now enabled the meteorological and oceanographic organizations of States, other than European, bordering the EGOS area of interest to participate formally in the programme as associate participants.

The International Arctic Buoy Programme (IABP)

21 This report focused on the challenges facing the International Arctic Buoy Programme (IABP) and its efforts to meet these challenges. The report also outlined activities that have occurred since the report filed August 1999 for the 15th session of the Data Buoy Cooperation Panel. Members of the IABP met 26-28 June in Fairbanks, Alaska, for the tenth annual business meeting. The meeting was held concurrently with the biennial meeting of the International Programme for Antarctic Buoys. There was one joint afternoon session. Host for the year 2000 meeting was the International Arctic Research Center (IARC), University of Alaska. In addition to hosting the meeting, IARC was the newest member to join the IABP.

22 The report noted that maintaining the IABP network was a challenge. Batteries came to the end of their life cycle, buoys failed, and ice on which the buoys resided broke up, melted or exited the Arctic basin. The key re-seeding of the buoy array across the Arctic Basin occurred annually, courtesy of the Naval Oceanographic Office (NAVOCEANO). In the August 2000 WHITE TRIDENT exercise, seven ICEXAIR buoys were deployed. These buoys were provided by: Environment Canada (EC), the Met Office (U.K.), Alfred Wegener Institute (AWI), Norwegian Meteorological Institute, Norsk Polarinstitutt, US National Ice Center (NIC) and NAVOCEANO. Getting the 7 buoys required for this key re-seeding was an ongoing challenge. The chairman, the coordinator, and participants of the IABP were eager to meet those who would commit to providing such buoys on an ongoing basis. The Meteorological Service of Canada annually flew (late March / early April) from a high arctic site to deploy buoys via Twin Otter landings on ice. Typically there were one or two flights during which 1 to 4 buoys were deployed. The Twin Otter flights of the past few years have been done from Eureka. To date, the buoys have been buoys belonging to the NIC and/or buoys assembled in-house by EC. EC planed to continue these annual flights and were receptive to deploying buoys for others. There was aircraft and ship activity in the spring to the North Pole to support "tourist" purposes. The Arctic and Antarctic Research Institute (AARI), for one, piggy backed on such activity to have 2 buoys deployed near the pole in April 2000. The North Pole Environmental Observatory research project started up and was used to deploy 2 AWI buoys April 2000 in addition to deploying their own buoys. The net result was a "rich" array of buoys near the North Pole, an area from which it took the ice about a year to make its way out of the Arctic Basin through Fram Strait.

23 During the IABP June 2000 Meeting, participants discussed a WCRP ACSYS/CLIC Scientific Steering Group request for an extension of buoy coverage into the seasonal ice zones of the Arctic. Specifically mentioned were the Sea of Okhotsk, the Bering Sea, Hudson Bay and the marginal seas adjacent to the Arctic Basin. At this time, no IABP Participants had a strong interest in expanding their programmes to monitor ice motion in the seasonally covered seas. It was noted that the IABP was a self-supporting programme based on a collection of participants who contributed actively to the Arctic Basin programme. Meeting the objective and principles of the IABP was in itself a challenge to the IABP and its participants. The IABP participants would however cooperate and share resources with related programmes.

24 The full report of the IABP for DBCP XVI can be obtained from their web server: IABP.APL.WASHINGTON.EDU. The IABP data are also available on CD-ROM's, from their web page and are distributed on the GTS.

25 The elected IABP executive and appointed coordinator remained:

Chairman	Tim Goos, Environment Canada, Canada	tim.goos@ec.gc.ca
Vice-chairman	Thor Kvinge, Christian Michelsen Research, Norway	thkvinge@online.no
Member	Ivan Frolov, Arctic and Antarctic Research Institute, Russia	aaricoop@aari.nw.ru
Member	Dave Benner, U.S. National Ice Centre, U.S.A.	bennerd@natice.nooa.gov
Coordinator	Ignatius Rigor, Polar Science Centre, U.S.	ignatius@apl.washington.edu

The International Programme for Antarctic Buoys (IPAB)

26 The IPAB was launched in 1995 for a period of 5 years, to coordinate drifter deployments in the Antarctic sea ice zone, to optimize buoy distribution and create a central data archive. The programme was reviewed at the third biennial meeting in Fairbanks, Alaska, in June this year. It was resolved to continue the programme indefinitely, and as of September 2000, 14 participants had reconfirmed their commitment to the IPAB action group.

27 Deployments during 2000 were less than during earlier years, and in October there were only 10 active buoys contributing to IPAB. Although the exact situation was as yet uncertain, it would appear that deployments next year would be much improved. At least 10 to 12 high latitude deployments were expected, with the possibility that more than 20 buoys might be ultimately deployed.

The International South Atlantic Buoy Programme (ISABP)

28 The intersessional period had been another good year. Data coverage in the ISABP area of interest was fairly good in some places but more deployments were necessary. During the period 1999-2000, the ISABP deployed 84 SVP, 27 SVPB and 3 WOTAN by ship and 17 WOTAN drifters by air in the Tropical Atlantic. In the South Atlantic, 15 SVP and 14 SVPB drifters were deployed by ship.

29 Alaor Moacyr Dall' Antonia Jr, was elected as Chairman and Louis Vermaak as Technical Coordinator during the last meeting in Brazil.

30 The Programme Committee expressed their concern that no progress was made on the establishment of an LUT in South America to cover the mid South Atlantic Ocean region. However, everything possible had been done to place the data from the LUTs on Gough and Marion Islands and the Falklands/Malvinas on the GTS. It was also pleasing to note that connection had been established between the Argos centres and an LUT in Cayenne, French Guyana.

31 The panel supported the Programme Committee view that, given the fact that the weather was coming from west in the region, Chile and Peru should be invited to attend future ISABP Programme Committee meetings.

The International Buoy Programme for the Indian Ocean (IBPIO)

32 IBPIO had no meeting during 2000. However, participants maintained an on-going awareness of the respective activities within the programme area. The fifth Programme Committee meeting would possibly be held in Perth in October 2001.

33 More than 100 drifting buoys had been deployed from July 1999 to June 2000. Ninety per cent of the buoys were Lagrangian drifters and 55% were measuring air pressure. By the end of July 2000, 39 buoys out of 105 were carrying out atmospheric pressure measurements. Only two of them were providing in addition wind data.

34 The Department of Ocean Development (DoD), Government of India, through the National Institute of Ocean Technology (NIOT), operated a network of 12 moored buoys. Eight of the buoys were operational on 31 August 2000. The data were circulating onto the GTS in FM 18 BUOY code, under the bulletin heading SSVX01 DEMS. Besides that, DoD, through National Institute of Oceanography, deployed 11 SVP-B and 2 SVP in the tropical Indian Ocean.

35 Efforts were mainly aimed at filling data gaps in the tropical region, especially during the cyclone season. IBPIO participants were still encouraged to increase their buoy contributions, or to fund barometers to equip SVP drifters provided by GDC.

36 IBPIO information was available on the World Wide Web at: http://www.shom.fr/meteo/ibpio, and a promotional leaflet had been published.

The Global Drifter Programme (GDP)

37 Since last year's meeting in Wellington, New Zealand, the Global Drifter Center (GDC) had been fully integrated into NOAA's Global Ocean Observing System (GOOS) Center in Miami, Florida. It had continued to meet the goals of deploying approximately 400 drifters per year, maintaining the existing network and gradually increasing the overall global coverage in all three ocean basins.

38 Over the next 12 months the GDC planed to deploy 419 drifters, 205 into the tropical Pacific, 87 into the tropical Atlantic, 50 into the tropical Indian and 77 into the southern ocean, or about 35 drifters per month. The GDC planed to work closely with DBCP colleagues to deploy these drifters in the most efficient, effective and mutually beneficial manner as possible.

39 During the past 12 months the GDC had worked with the following organizations: the Met Office (U.K.), Australian BOM, Meteo France, IRD Noumea, Met Service New Zealand, South African Weather Bureau, University of Cape Town, Brazilian Navy, Instituto Nacional de Investigacion y Desarrollo Pesquero - Argentina, Korea, Instituto Canario de Ciencias Marinas - Canary Islands, CICESE - Mexico, U.S. Naval Oceanographic Office, Scripps Institution of Oceanography, University of Washington, Harbor Branch Oceanographic Institution, NOAA OMAO and several different Voluntary Observing Ships and their parent companies.

40 The GDC still supported the upgrading of SVPs to SVPBs by any country which desired to do so and it would work closely with those countries in coordinating the shipping and deployment of those upgraded drifters.

41 The GDC and its related Data Assembly Center (DAC) continued to develop new and improve existing products that were available on the following web site: "www.aoml.noaa.gov/phod/dac"

42 The GDC encouraged other drifter programmes to contribute their data to the DAC if those data were collected by the SVP WOCE type drifter with drogues set between 10 and 15 meters.

43 The GDC still encouraged the use of standard data formats for all new deployments, which reduced the problems of having to write new de-coders for a minimal number of drifters. As drifters evolved (depart from the original area of interest) from other nation's or organization's programmes and were then added to the GDC tracking responsibilities, it was most important that the individual specifications for those drifters were known. The flow of this information in a timely manner could thus be encouraged.

44 Plans were to continue to work closely with national and international colleagues to increase communication thereby improving the efficiency and effectiveness of all drifter deployments as well as their tracking and insertion onto the Global Telecommunications System.

The Tropical Atmosphere Ocean (TAO) array Implementation Panel (TIP)

45 In January 2000 the TAO Array was renamed TAO/TRITON reflecting the transition of sites west of 165°E longitude from ATLAS moorings, designed and built by PMEL (Pacific Marine Environmental Laboratory), to TRITON moorings, designed and built by JAMSTEC (Japan Marine Science and Technology Center). The transition to TAO/TRITON required the assembly of data processed by both PMEL and JAMSTEC into a unified data set available on the World Wide Web from both PMEL and JAMSTEC. Data from all sites continued to be disseminated on the GTS. A new data distribution page provided a wider range of data types, more varied temporal sampling and options on formats. Data return remained good. The overall value for real-time data availability from ATLAS moorings was 89% for the past year. Damage to moorings and sensors due to fishing activity continued to be of concern. This damage accounted for a significant amount of data loss, especially in the far eastern and far western portions of the Pacific basin. The array was expanded for NOAA's EPIC (Eastern Pacific Investigation of Climate Processes) Programme (http://www.pmel.noaa.gov/tao/epic/) with 3 additional moorings along 95°W in the eastern Pacific. Moreover, all moorings along this line were enhanced with additional sensors to provide real-time telemetry of long- and short-wave radiation, rainfall, barometric pressure, salinity, and ocean currents. A two-month long, land-based intercomparison of TAO, TRITON and WHOI-IMET surface instrumentation was conducted this summer. Initial examination indicated that data from the three systems compared well. A detailed description of the intercomparison and analysis of the data would be published as a technical report.

46 PIRATA (Pilot Research Moored Array in the Tropical Atlantic) was completing its pilot phase and was about to enter a 5-year (2001-2006) consolidation phase during which data from the array would be evaluated for its utility in support of research and operational forecasting. The number of moorings in the array would be reduced from 12 to 10, due to larger than expected losses due to vandalism.

47 Plans were underway to reorganize TIP in terms of its membership and terms of reference. This was in part in response to the fact that TAO was now fully implemented and in an operational phase. TIP would become the Tropical moored buoy Implementation Panel and would function as a technical advisory committee for existing or future mooring programmes in any of the tropical oceans. The scientific design and scope of future moored arrays would be addressed by the sponsors of TIP, the COOP (CLIVAR Ocean Observation Panel) and OOPC (Ocean Observations Panel for Climate). The next TIP meeting would be held 16-17 November 2000 in Perth, Australia.

The Peruvian project (NAYLAMP)

48 CLS informed the panel about the status of the Peruvian NAYLAMP project. NAYLAMP was an ocean observing pilot project in the South East Tropical Pacific primarily in an area adjacent to the northern coast of Perú, one of the areas most affected by "El Niño". NAYLAMP consisted of a network of 4 met-oceanographic buoys and 10 tide and meteorological stations spread along the coast of Perú (see fig. 1).

49 The buoys were Seatex-type moored buoys equipped with a CTD line and Argos transmission, manufactured by Norwegian company Oceanor. The 4 buoys were deployed at the end of September 2000. Coastal stations would be transmitting their data via GOES geostationary satellite. The network of buoys and stations was operated jointly by *the Instituto del Mar del Peru*, IMARPE, and *Hidrografia de la Marina del Peru*. These institutes planed to transmit data from the network onto the GTS.

50 The panel praised Peruvian institutes for the success of the implementation of the NAYLAMP network. It recognized the interest of the data collected by this network for the international community and urged Peruvian organizations involved to proceed with the transmission of relevant data onto the GTS. The panel brought to their attention that the technical coordinator was ready to help them in this task, should they need it.

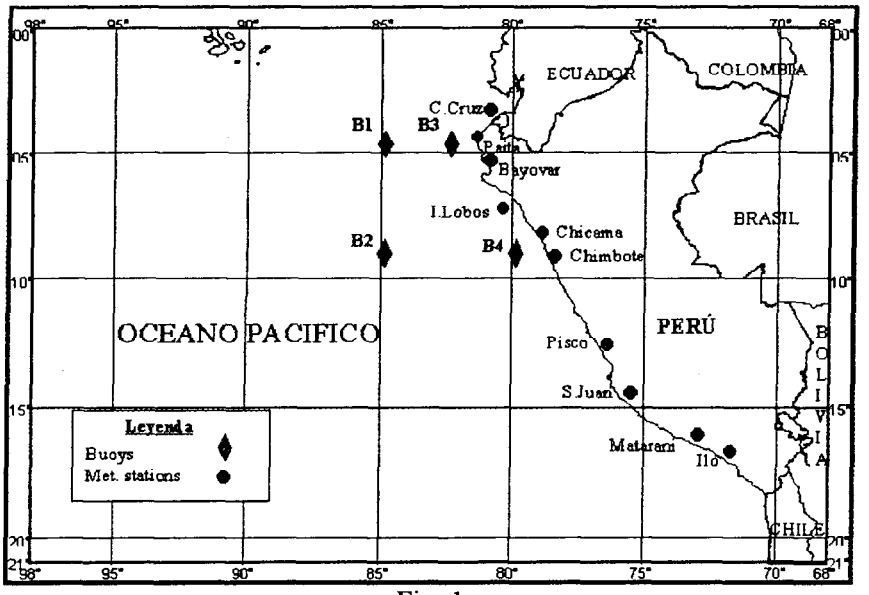


Fig. 1

2.3 NATIONAL REPORTS

51 The panel had received written reports on current and planned buoy programmes from Australia, Brazil, Canada, France, India, Japan, Netherlands, New Zealand, South Africa, USA. As usual, these reports, as well as others submitted to the Secretariats before 30 November 1999, would be published in the panel's annual report.

2.4 REPORT BY THE ARGO SCIENCE TEAM

52 The panel recalled that a detailed update on the implementation status of Argo had been presented by Dr Howard Freeland, a member of the Argo Science Team, in the form of a paper to the preceding workshop. This paper would, as usual, be published in the formal proceedings of the workshop. The panel noted with interest that an embryo Argo Information Centre (AIC) had been established by the technical coordinator, accessibly through the JCOMMOPS web site (see agenda item 8), which included a mechanism for automatically notifying official national Argo focal points of all impending float deployments under the programme. Such notification was required under the terms of an IOC Assembly resolution on the subject. In addition, a position of Argo coordinator was to be established, to work with, and under the general supervision of the DBCP/SOOP coordinator, based on voluntary contributions by Argo participants to the IOC Trust Fund. This position had recently been advertised as a half-time consultancy with IOC, and details of the position were available through the JCOMMOPS web site. The panel recognized the importance of this position to Argo, and requested Member States to consider making additional contributions to the IOC/Argo trust fund, to ensure that the position was properly supported in terms of salary, logistics and travel funds.

2.5 REPORT BY THE EVALUATION SUB-GROUP

53 The panel noted that this had been a busy year for the SVP drifter community. Météo-France set up a metadata base containing information on approximately 800 SVPB drifters and their variants to study drifter mortality rates. A number of factors influenced life expectancy, including message length, transmission repeat period, battery capacities, type of barometer and manufacturer. There had been improvements, including greatly reduced infant mortality, 100% air deployment success rate, decrease in Argos message length, elimination of gross errors and increase of data available onto the GTS. Several specific areas were investigated, including tests of different types of barometers (Météo-France), analysis of barometer ports (Marlin) and continuous development of a digital WOTAN drifter (Pacific Gyre). Several recommendations were suggested: that QC tools had been made available on the DBCP web page and buoy operators should take advantage of those tools to check their data onto

the GTS; that manufacturers should be careful with drogue attachments, construction of barometer ports and electrical connections between the hydrophone and the hull on WOTAN drifters.

54 The panel thanked the sub-group and its chairperson for the impressive amount of work accomplished so far. It agreed that the sub-group should continue its work on SVP drifters and that Elisabeth Horton of the US Navy would continue as chairperson.

3. REVIEW OF THE DBCP IMPLEMENTATION STRATEGY

55 The panel recalled that it had developed its Implementation Strategy in order to provide an overall framework for its work, in the light of developing requirements for buoy data to support operational meteorology and oceanography, marine scientific research and global climate studies. At the same time, this strategy should facilitate the work of panel Member States in reacting appropriately to future developments in both requirements and buoy technology. In this context, it was agreed that the strategy should be a dynamic document, to be updated frequently in line with such developments.

56 The panel recalled that the first edition of the strategy was adopted in October 1998 (DBCP-XIV, Marathon, USA), and subsequently published both in hard copy form as a DBCP Technical Document (no. 15) and on the DBCP web site. At the same time, it had been agreed that the strategy should be revised and updated at least every two years. Consequently, a draft revised second edition of the strategy had been prepared by the vice-chairman, David Meldrum, and the technical coordinator. This draft in particular took note of the emerging consensus on the requirements for marine observations to support global climate studies and operational marine forecasting, as well as new institutional developments such as JCOMM and emerging regional programmes.

57 The panel expressed its appreciation to the vice-chairman and technical coordinator for their efforts in preparing this revised draft. It reviewed the draft briefly during the session, and agreed that panel members should also be given additional time to review it more thoroughly after the session. Members were thus requested to pass any additional comments and proposed revisions to the vice-chairman, David Meldrum, by 30 November 2000. Mr Meldrum, in conjunction with the technical coordinator and the Secretariats, would then prepare a finalized second edition of the strategy, which would be published as before in both hard copy form and electronically on the DBCP web site.

4. SCIENTIFIC AND TECHNICAL WORKSHOP

58 Under this agenda item, the panel reviewed briefly the results of the preceding workshop. The panel expressed its appreciation to Mr Wynn Jones for his excellent work in organizing and chairing the workshop. It agreed that, as before, the proceedings should be published in the DBCP Technical Document series, and also made available via the DBCP web site. To this end, all presenters were requested to make the full versions of their papers available to Mr Jones, in both hard copy and electronic form (preferably word format), by 30 November 2000 at the latest. The panel further agreed that the 2001 workshop should focus in particular on applications of buoy data, and should include at least three main sections:

- research applications
- operational applications
- buoy technology and communications

The panel accepted the kind offer of Mr Ron McLaren to undertake the organization of this workshop.

5. DATA AND INFORMATION EXCHANGE

5.1 REPORTS BY BUOY DATA MANAGEMENT CENTRES

59 Under this agenda item, the panel reviewed the reports of the IOC International Oceanographic Data and Information Exchange (IODE) Responsible National Oceanographic Data Centre (RNODC) for drifting buoys, operated by the Marine Environmental Data Service (MEDS) of Canada; and of the JCOMM Specialized Oceanographic Centre (SOC) for drifting buoys, operated by

Météo-France. As usual, the full reports of the data management centres would be published in the panel's annual report.

60 Ms Estelle Couture presented the RNODC report. During the last year, the average number of messages archived per month had increased from 141,000 to 194,000. A number of improvements had been added to the RNODC web site, including the development of regional drift track maps and the issuing of the Regular Information Bulletin on non-drifting ODAS in electronic form. A twenty-year CD of IABP GTS data and interpolated data from the University of Washington would be available from MEDS by the end of 2000. MEDS had also released version 2 of the WOCE SVP data. Requests for these items should be addressed to Ms Couture at MEDS. The panel took the opportunity to welcome Ms Couture who replaced Mr André Bolduc and to pay a warm tribute to the latter for his efforts towards the development of the panel's activities.

61 Mr François Gérard presented the report of the SOC, which performed a daily collection and archiving of buoy reports from the world ocean. As usual, the SOC produced monthly graphic products for drifting buoys, moored buoys and ships. Data were delivered on request or on a regular basis. In his presentation, Mr Gérard highlighted the fact that now, and even within the maritime zones well covered by voluntary observing ships, the numbers of data coming from the buoys were in general higher than those obtained through the VOS scheme.

5.2 INFORMATION EXCHANGE

DBCP web site (http://dbcp.nos.noaa.gov/dbcp/)

62 The technical coordinator reported on improvements and changes realized with the DBCP web server during the intersessional period. These particularly included current DBCP activities and highlights, a new web site directory, a list of impact studies, information on vandalism on data buoys including advice to fishermen and mariners, a specific page on buoy deployment and recovery including information on air deployments, information on metadata, and information regarding the SVPB upgrade opportunity.

63 The panel recalled that national reports and Action Group reports available in electronic form were placed on the DBCP web site. Panel members and Action Groups were therefore requested to submit their reports in electronic form to the Secretariats.

64 Since information on buoy deployment opportunities was now placed onto the JCOMMOPS web site (http://www.jcommops.org/), panel members were encouraged to regularly provide JCOMMOPS (i.e. the technical coordinator) with related information.

DBCP technical forum (http://www-dbcp.cls.fr)

65 The technical coordinator reported that the DBCP forum, which was implemented at CLS/Service Argos in May 1999, was not being used to its full potential. He stressed that this tool was excellent for sharing information with other people in the buoy community. Anybody could upload documents (e.g. Word, Excel, Graphics, Messages, Links, etc.) onto the forum. The panel recommended to its members to make better use of this facility basically for discussing technical issues during intersessional periods.

DBCP technical document series

66 The DBCP recently published the following documents within its Technical Document series:

- DBCP Document No. 16: DBCP Annual Report for 1999
- DBCP Document No. 17: October 1999 DBCP Workshop Proceedings (Wellington)

67 The panel agreed that the following DBCP documents needed to be updated and requested the technical coordinator to coordinate the required work:

- No. 1: Guide to data collection and location using Service Argos. To be updated in conjunction with CLS/Service Argos.
- No. 2: GTS sub-system reference guide (new version almost ready).
- No. 15: DBCP Implementation Strategy (DBCP-14 decided that the Implementation Strategy should be updated every other year) according to discussions at this panel session (agenda item 3).
- DBCP Document No. 4 (SVPB construction manual). The panel agreed that it was not necessary to update the document and that it was preferable to produce a new "SVPB specification manual" which would be shorter and whose goal would be to assist manufacturers in producing consistent instrumentation. Some construction details would still be included in the manual. The manual should hopefully be available by the next panel session (work to be coordinated by the TC with assistance from Craig Engler, Peter Niiler, and Andy Sybrandy).

68 The panel agreed that the following new documents, at least, should be published in the Technical Document series in the coming year:

- Proceedings of the 2000 Technical Workshop
- 2000 Annual Report (with format the same as for previous years)

DBCP Brochure

69 At its XVth session in Wellington, the panel decided that the DBCP brochure should be updated every other year, starting from DBCP-16. The panel therefore reviewed its brochure and decided to implement the following changes:

- Update graphics
- Update area of interest of DBCP action groups
- Add information about the new mailing lists (as decided by the panel at this session, see paragraph below)
- Update DBCP references and email address
- Replace 1996 picture of DBCP meeting (Henley) by a new picture taken in Victoria in 2000

70 The panel invited its members to provide in kind commitment for publishing the new version of the brochure in English, French, and Portuguese. Australia agreed to publish the new version of the brochure. The panel thanked Australia for this kind offer.

Establishing DBCP mailing lists

71 The panel discussed the opportunity to establish a DBCP electronic mailing list for distribution of information (email) by anybody from the list to everybody on the list. The technical coordinator informed the panel that this was technically simple and that CLS/Service Argos would accept to operate the mailing list on behalf of the panel. After discussion, the panel agreed that it would be useful to establish two mailing lists, one for the exchange of general information to all panel members (e.g. dbcp@jcommops.org), and another one for the exchange of information on technical matters to all buoy operators (e.g. buoys@jcommops.org). The panel therefore requested the technical coordinator to coordinate establishment of such mailing lists with CLS/Service Argos, and thanked CLS/Service Argos for its kind offer.

6. TECHNICAL ISSUES

6.1 QUALITY CONTROL

72 The technical coordinator reported regarding quality control (QC) of buoy data and how the DBCP QC guidelines had been operated during the intersessional period. Activity of the QC guidelines had remained stable when compared to the previous year but slightly decreased when compared to previous periods. More buoys were now reporting on the GTS than ever and it was suggested that the meteorological centres were now more confident in the data hence not commenting

upon their quality as often. Comparisons with numerical weather prediction models indeed showed that models (first guess fields) and observations agreed very well:

Variable	RMS	Distribution	Model
Air Pressure	1 hPa	95% < 2 hPa RMS	ECMWF
Air Pressure (SVPBs)	1.1 hPa	92% < 2 hPa	ECMWF
Air Temperature	2C	83% < 3C	NCEP
SST	1C	81% < 1C	NCEP
Wind speed	2 - 3 m/s	78% < 3 m/s	ECMWF

73 For a total of 1696 buoys that reported onto the GTS during the period 1 August 1999 to 31 July 2000, following 211 status change proposals from PMOCs related to 169 buoys, 71 buoys had their status changed (i.e. 4.2% versus 4.0% last year, 9.6% in 1998, and 11% in 1997). All 71 buoys were removed from the GTS, or had one of their sensor's data removed, and no buoy was recalibrated.

74 While agreeing that the QC guidelines were efficient in avoiding GTS distribution of bad data, and recognizing the role played by all actors in the guidelines, especially all active Principal Meteorological or Oceanographic Centres responsible for GTS buoy data Quality Control, the panel stressed that even small participation was useful. It encouraged the following centres to act as PMOC by regularly commenting upon the quality of buoys in their areas of interest:

- The Australian Bureau Of Meteorology (BOM),
- The Meteorological Service of Canada,
- The Icelandic Meteorological Office (IMO),
- The South African Weather Bureau (SAWB),

75 The technical coordinator also reported that new tools were now available via the DBCP web site (see http://dbcp.nos.noaa.gov/dbcp/0qc.html):

- Access to graphical QC tools, including time series of (Obs.-First Guess), developed by Météo France
- "manual surface marine QC flags" and "surface marine monthly statistics", developed by NCEP (CREWSS (Collect, Review, and Edit Weather data from the Sea Surface) system).

Also, access to archived QC mails (status change proposals by PMOCs) was possible thanks to tools made available by MEDS.

76 As reported at the 14th DBCP session, efforts had been made to standardize and make the buoy monitoring statistics produced by the various centres more consistent. During the intersessional period, changes were made for the statistics produced by the Met. Office (UK). The Servicio Meteorológico National, Argentina, started producing buoy monitoring statistics for air pressure from ISABP buoys. On the other hand, the South African Weather Bureau (SAWB) stopped producing statistics for air pressure of South Atlantic buoys. The panel recommended that SMN took steps to eventually produce the statistics according to the recommended format. A report describing the buoy monitoring statistics and specifics of those produced by each centre was available via the web at http://dbcp.nos.noaa.gov/dbcp/monstats.html.

77 The panel agreed that it would be useful to produce RMS (Obs.-FG) graphics specific to buoys equipped with conventional anemometers and others for those equipped with WOTAN anemometers in order to distinguish between the quality of those two measurement systems. It therefore requested the technical coordinator to produce such graphics.

78 The panel noticed that certain good buoy data might not be assimilated by the models because of the way data were being assimilated (e.g. weight given to buoy data in data assimilation schemes as compared with other observational data). After discussion, the panel agreed that it would be useful to invite scientists involved with data assimilation and/or modelling to future DBCP workshops, in order

to have more precise information regarding data assimilation schemes, how data are being flagged, filtered, weighted, etc. It was agreed that support should be given to GODAE as a means to demonstrate the value of observational data assimilation into all models.

6.2 CODES

BUOY code

79 The technical coordinator presented the outcome of the work of the *ad hoc* intersessional DBCP sub-group on the BUOY code. Eric Meindl presented the conclusions of the contractor who was hired by NDBC to work on the issue. The *ad hoc* sub-group submitted a proposal for a modification of the BUOY code to CBS. The proposal was two-fold: (i) adding new groups in Section 4 to include a limited number of metadata (e.g. anemometer height, buoy type, drogue type), and (ii) adding new fields and a new Section 5 to deal with all variables measured by moored buoys. The proposal was discussed at the meeting of the CBS Implementation Coordination Team on Data Representation and Codes (ICT/DRC), Geneva, 10-14 April 2000, and defended by the technical coordinator who attended the meeting. Since CBS was now reluctant to make changes to character codes because it was encouraging GTS distribution in table driven codes such as BUFR or CREX, it was very difficult to convince the team that changes were required. The team eventually accepted to make a small modification of the BUOY code to deal with metadata but rejected adding new fields in Section 1 and adding a new Section 5. These changes had been accepted under the following conditions:

- BUOY code would be frozen afterwards. In other words, the DBCP would not suggest any more modifications of the code.
- The DBCP would commit itself to implementing BUFR or CREX for all buoy data as soon as possible. Once BUFR or CREX were implemented, distribution of buoy data in BUOY format would still be permitted and encouraged during a transition period of about 5 years

80 The panel discussed the above conditions and agreed that they were reasonable and acceptable. It therefore decided that it was now time to seriously consider implementing table driven codes such as BUFR or CREX.

81 The accepted modifications of the BUOY codes would be proposed to CBS for endorsement and implementation on 7 November 2001. Those modifications only related to Section 4 and are detailed in *Annex IV*.

BUFR/CREX table driven codes:

82 The latest changes to BUFR (Binary Universal Form for the Representation of meteorological data) tables proposed by the DBCP had been adopted by CBS and implemented in May 2000. CREX (Character form for the Representation and EXchange of data) was also considered by the ad hoc sub-group during the intersessional period because it offered human readability.

83 The meeting of the CBS Implementation Coordination Team on Data Representation and Codes (ICT/DRC), Geneva, 10-14 April 2000 had proposed a migration strategy from character codes to table driven codes. Basically, according to the plan, all operators capable of distributing observational data in BUFR or CREX may do so as of 2002.

84 Meanwhile the ICT/DRC would be working on defining specific templates for GTS distribution in BUFR or CREX of data from different types of platforms. Buoy data were of course included. The technical coordinator of the DBCP had already provided the ICT/DRC with input on variables potentially collected from drifting and moored buoys and suggested how to group them to form specific templates.

85 The panel discussed the opportunity to develop CREX instead of BUFR as suggested by Eric Meindl, since human readability was a requirement for specific field offices, at least in the USA. After discussion, the panel agreed that BUFR was preferable because (i) CBS was committed to BUFR in

the long term, and (ii) dual distribution of buoy data in both BUFR and BUOY/SHIP code during a sufficiently long transition period would ensure human readability.

86 The Panel finally agreed:

- to take steps for developing table driven encoding capability within the Argos GTS sub-system;
- that BUFR was preferable to CREX;
- to make a recommendation to the JTA to include in the Argos development programme developments required to ensure BUFR encoding capability;
- that early 2003 should be regarded as a target for implementation and actual distribution of buoy data in BUFR.

The panel agreed that once BUFR was implemented, buoy data should continue to be distributed in BUOY/SHIP code in parallel to BUFR distribution and recommended that this should be the case for the foreseeable future after implementation of BUFR.

87 The panel further decided that the list of variables to be distributed in BUFR as well as proposed templates should be circulated to members by means of the mailing list that the panel agreed to establish. Panel members would be invited to provide the technical coordinator with comments before the end of March 2001.

6.3 ARGOS SYSTEM

88 The technical coordinator presented the few improvements which had been implemented with regard to the GTS sub-system. These included direct GTS distribution of Argos platform data to Argos users using a new format called STD (non-GTS format). They also included how the housekeeping parameter data were encoded in BUOY reports so that buoy data users decoding the reports could identify every parameter with no ambiguity. Location time was now systematically encoded in BUOY reports.

89 The technical coordinator reported regarding developments conducted at Service Argos for GTS distribution of profiling sub-surface float data. This followed requirements expressed by Australia, UK, France, and Japan (refer to the previous DBCP session final report for details). The new system was put in place operationally in March 2000. Tests were conducted until July 2000 using Japanese, UK, and Australian floats. Specific aspects of those early generation floats led to additional minor developments. Basically, the new system was profile oriented and permitted: (i) to process a large number of profile points (presently up to 120), (ii) delayed mode GTS distribution to ensure that all the profile data received through several satellite passes were collected before a GTS report was actually generated, and (iii) new specific transfer functions (data processing modules). The new system was capable of processing sub-surface float data provided the data were encoded in Argos messages according to specific formats. Older generation floats were not compatible with the new system.

90 With regard to possible new developments within the Argos GTS sub-system, the question of implementation of the TAO array mooring algorithm was abandoned, as suggested by PMEL.

91 The following issues are discussed under specific DBCP session agenda items:

- GTS distribution of buoy data collected through commercial satellite systems (agenda item 6.8)
- GTS distribution of buoy data in BUFR or CREX (agenda item 6.2)

92 Under this agenda item, the panel was presented with a report by CLS/Sercice Argos on new developments in the Argos system (see *Annex V*). The panel noted in particular the need for the PTTs to use frequencies other than the central one, to avoid system saturation. That should be associated with the use of these other frequencies for up-link receivers. It noted further the discussions taking

place between the Brazilian space agency (INPE) and the French space agency (CNES) regarding the possible availability for Argos users of the Brazilian satellite, which was fully Argos-compatible.

6.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES

93 Under this agenda item, the panel vice-chairman, Mr David Meldrum, presented a review of those commercial satellite communication systems which might ultimately be of use to buoy operators. Although most systems under review offered attractive facilities, such as two-way communications, reliable high data throughput rates and near real-time coverage, the panel was concerned that in many cases the future of the systems was uncertain. This concern was compounded by the lack of influence that the panel considered it would have with the satellite operators. In the particular case of the Orbcomm system, which had been implemented with good results by a number of panel members, serious doubts as to its financial viability were expressed from several quarters. Although the panel was not unanimous in this view, it was clear that panel members should be especially cautious before committing to a new communication system.

94 The panel, in recognising its duty to remain abreast of developments in communications technology, thanked Mr Meldrum for his report (see *Annex VI*), and asked that he present a similar review at its next session. The panel further requested the 2001 workshop organizer to ask the satcomm operators to make presentations to the workshop.

6.5 METADATA

95 The technical coordinator reported that panel members and Action Groups had provided him with comments regarding a proposed metadata catalogue during the intersessional period. The technical coordinator prepared a synthesis which was submitted to the JCOMM Sub-group on Marine Climatology in January 2000. The sub-group met in early 2000 and took the DBCP recommendations into account.

96 To assist in preparing the compilation of the final catalogue, the panel urged its members and the Action Groups to compile their own metadata catalogues, with a view to submitting them when required in a format as close as possible to the one that would be proposed by the JCOMM sub-group.

97 For drifting buoys, the panel noted that a good way to collect most of the metadata was to ask buoy manufacturers to fill out a standardized sheet each time a new drifting buoy was being delivered. The panel requested the coordinator to discuss the issue with the GDC in order to suggest a standard form as well as how and to whom it should be submitted. The JCOMM Sub-group on Marine Climatology would be the overall repository of metadata for all ocean observing systems.

98 Regarding inclusion of metadata in GTS reports, the meeting of the CBS Implementation Coordination Team on Data Representation and Codes, Geneva, 10-14 April 2000, finally accepted to recommend inclusion of certain metadata (e.g. anemometer height, buoy type, drogue type) in the BUOY code for implementation on 8 November 2001 (see discussion in paragraph 6.2.3, code matters). The final decision would be taken by the CBS in November 2000.

99 The panel also stressed that calibration procedures for buoys should be adequately documented and archived. It therefore urged its members to provide the JCOMM Sub-group on Marine Climatology with related calibration information as well.

6.6 SOUTHERN HEMISPHERE BAROMETER DRIFTERS

100 At its last session, the DBCP had been informed that under budgetary pressures coupled with increasing prices for expendables, and considering other priorities, AOML had decided to stop purchasing barometers for drifters deployed in the southern oceans. AOML had previously deployed about 80 barometer drifters in the southern oceans for research purposes. At the same time, AOML kindly offered to assist in the upgrade of standard drifters (SST only) with barometers for $US 1000 per unit.

101 Following discussion on the subject at the last DBCP session, the Secretary-General of WMO and the Permanent Representatives of Australia, New Zealand and South Africa, wrote to the USA Permanent Representative with WMO to raise the concerns of Member States about the issue. The technical coordinator also visited NOAA in Washington DC in February 2000 and particularly met with Mike Johnson (OGP), David Evans (Director, OAR), and Steve Piotrowicz (OAR) to discuss the issue.

102 The US considered the issue internally, including with scientists involved in climate variability and predictability studies. The *in-situ* sea surface barometer data from drifters in the southern oceans were in fact essential for climate related studies, e.g. for (i) validation/calibration of altimeters, (ii) estimating fluxes (by deriving wind fields from surface pressure field), and (iii) studies regarding Antarctic circumpolar waves (White and Peterson, 1996, *Nature*).

103 The US representative informed the panel that AOML would upgrade 30 drifters to barometer drifters for deployment over the coming year from July 2000, and would attempt to maintain this commitment into the future. The panel noted with appreciation efforts by NOAA to respond positively on this issue in the face of ongoing budget constraints. It also thanked WMO and several Member States for their efforts in negotiating with NOAA.

104 In this perspective, the panel noted that concerted efforts by all southern hemisphere countries were needed in the future in order to develop a common approach to ensure maintenance of a reasonable network of SVPBs in the southern ocean. The technical coordinator suggested that it would be effective to include a Southern Ocean Buoy Programme (SOBP) (south of 40°S) directly as part of the implementation strategy, not as a new Action Group, and to clearly state what contributions could be offered by the various countries with interest in deploying buoys in the southern oceans. Presently, about 90 SVPB and FGGE type buoys were reporting pressure data from the Southern Hemisphere (Australia: 22, France: 15, India: 6, New Zealand: 10, South Africa: 10, U.K.: 1, USA: 30), including about 70 SVPBs. About 60 of these Southern Hemisphere buoys were actually in the southern ocean. The panel suggested that good coordination of the deployment strategies plus a small number of additional SVPBs split among a few countries should do as well as the southern ocean SVPB programme in place before 1999, i.e. about 80 drifters per year. The panel invited its members to consider slightly increasing their contributions in the southern ocean by way of purchasing SVPB upgrades. The panel agreed that a total of at least 20 extra SVPB upgrades (i.e. about $20 000) were required in the region when compared to the present commitments. Most of the countries presently deploying barometer drifters in the region accepted to increase their contributions to achieve that goal. Australia, New Zealand, South Africa, USA (NOAA), and France offered deployment opportunities. The panel agreed that a coordinated approach was needed for the deployments.

105 The panel further agreed that creating a specific Action Group for the southern ocean would not be particularly helpful, considering that most of the deployments in the region were made through existing DBCP Action Groups, namely the ISABP, the IBPIO, the IPAB, and the GDP. It however agreed to specifically take a Southern Ocean Buoy Programme (SOBP) into account within its implementation strategy and have related discussions during panel sessions where all concerned Action Groups were normally represented. SOBP would meet as a sub-group each year at panel sessions to review the past year's activity and coordinate the following year's deployments. If necessary during the intersessional period, discussions would take place through email, the DBCP internet forum (with the TC DBCP acting as a focal point) and the work of the concerned Action Groups. The technical coordinator was requested to produce a table with all national commitments in the region for the next panel session.

106 Regarding the barometer upgrade offer, it was proposed that upgrades should be handled directly by the contributors and the manufacturers. It was noted that for practical reasons it was preferable to make purchases around May and June. Such purchases should be reported by buoy operators to the GDP by email. The GDP would reply with advice on which manufacturer was presently constructing buoys. The manufacturer should then be paid directly by the contributor. A dedicated web page providing details on the practicalities of how to take advantage of the offer was

available on the DBCP web site (see http://dbcp.nos.noaa.gov/dbcp/svpb_upgrade.html). All panel members were encouraged to take advantage of it.

107 The panel was pleased to hear that (i) the large early failure rates of SVPBs seemed no longer to be the case particularly after the re-design of the air deployment package; and that (ii) although the quality of the pressure data was good, a new design with the barometer port, including filter membrane could potentially increase the quality of the data (see report from the evaluation sub-group).

6.7 INTEGRATION OF DEPLOYMENT OPPORTUNITIES WITH SOOPIP AND ARGO

108 During the intersessional period, available details on buoy deployment opportunities had been integrated in a specific web page on the DBCP web site.

109 At the same time, it was noted that a number of marine meteorology and oceanographic activities required similar logistic support or could provide support for the deployment of drifting buoys and floats. Such activities included drifting buoy deployments (by ship or aircraft), sub-surface float deployment (by ship or aircraft), moored buoy servicing (by ship, e.g. for TAO or PIRATA), Voluntary Observing Ships (by ship), deployment of XBTs (by ship), and Automatic Shipboard Aerological Programme (by Ship). It was particularly noted for example that the Argo programme planed to deploy about 3000 sub-surface floats by 2005 and that the DBCP could provide substantial support with the deployments.

110 During the intersessional period, consistent with the JCOMM integration process, it was proposed to integrate all opportunities concerning deployment of drifting buoys and sub-surface floats and servicing of moored buoys within JCOMM. The goal was to centralise available information and make it available via the web (i.e. JCOMMOPS web site). SOOP, VOS, and ASAP Panels would also provide assistance in this regard. A joint WMO-IOC JCOMM circular letter was sent out in July 2000 to seek information about such opportunities from WMO and IOC Member States.

111 The panel agreed that this approach would greatly facilitate the work of the buoy and float operators in identifying potential deployment opportunities and establishing direct contacts with key people in order check feasibility and, if realizable, to agree the details with them. The approach should also eventually enhance cost-effectiveness of related programmes.

112 The panel particularly noted that it was important to provide information on ships which carry dedicated personnel (e.g. SOOP, ASAP, research, Antarctic supply).

113 Practically, the list would be maintained and made available via the JCOMMOPS web site (http://www.jcommops.org). The panel agreed that the list should replace the existing DBCP list of National Focal Points for Logistic Facilities.

114 The panel therefore urged its members to provide the technical coordinator with adequate information concerning deployment opportunities that they coordinate at the national level and to make sure that the references of national contact points were correct (see *Annex VII*).

6.8 OTHER TECHNICAL ISSUES

6.8.1 GTS distribution of buoy data collected through commercial satellite systems

115 The panel discussed the issue of GTS distribution of buoy data for data collected via commercial satellite systems. These systems did not presently offer GTS data processing capability such as the GTS sub-system which was operated by CLS/Service Argos. Since a few buoy operators were now using such commercial satellite systems for data collection of their buoy data, the question of GTS distribution of the data was raised. There was presently no recommended solution and buoy operators had to process the data themselves, do the quality control and encoding, and routinely submit the data in real time to their national meteorological services for insertion onto the GTS. This situation was not ideal because (i) GTS access was not particularly easy in every country and sometimes led to difficult negotiations with the national meteorological service involved (it might

even be impracticable is some instances), (ii) there was no homogeneity in the way the data were being processed at the various centres involved, (iii) quality control procedures might differ between these centres, and (iv) it was more difficult to make sure that code changes were implemented properly and in a timely fashion at these centres.

116 The panel agreed that for an efficient use of the buoy data made available in real time to meteorological services, the following conditions should be met, i.e. (i) the buoy data should delivered via the GTS (and not via a web site), (ii) the data should be formatted according to the GTS regulations (e.g. presently FM 18-X BUOY format for buoy data), and (iii) real-time quality control procedures should be consistent with the minimum DBCP requirements which were:

- Specific location quality checks similar to those performed by Service Argos (location class)
- Gross error check (limits for each type of variable)
- Specific limits check for each individual sensor
- Satellite message integrity check (e.g. checksum, duplication)
- Sensor blockage (same value reported during a period and for a number of times)

Additional optional QC tests could be:

- Climatological tests
- Time continuity checks
- Beached platform test
- Platform speed test

117 Taking this into account, the panel considered several options, including (i) keeping the present situation, (ii) one or more meteorological services to develop a capability regionally or globally, (iii) commercial satellite operators to develop the capability provided that their customer base was wide enough in this regard, (iv) Service Argos to upgrade its GTS sub-system to accept data from other satellite systems, and (v) contracting a private company to make the required developments and provide the service.

118 The panel agreed that there were existing and likely future requirements for the GTS distribution of data collected through such commercial satellite systems, as well as on the potential value to all concerned of using the existing data processing facilities of the Argos GTS Subsystem to effect such distribution. The panel therefore requested CLS/Service Argos to undertake a feasibility study of the main issues involved. Such a study should involve also the technical coordinator, the chairman of the JTA and Mr Rob Bassett, representing the Argos Operations Committee, and should have three distinct components:

- The extent and possible complexity of the present and likely future requirements for such a facility;
- Technical aspects of the question, including possible procedures for transferring data to the Argos GTS Subsystem as well as any necessary modifications required to the system;
- Policy issues involved, including possible impacts on the JTA and Argos operating agreement, a new Argos service category to accommodate such processing, and an estimate of eventual end-user charges for this service.

119 The panel agreed that the study should be limited to existing satellite systems known to be used already by buoy operators (Orbcomm, Inmarsat, Globalstar), and that it would not necessarily involve any interaction by CLS/Argos with the satellite operators themselves. It requested that the study should be available in time for review and further discussion at DBCP-XVII. At the same time, the panel decided that the issue should be brought to the attention of the forthcoming JTA, but with no action to be proposed.

6.8.2 Lagrangian drifter drogue status

120 The panel then discussed the issue of real time GTS distribution of drogue status information. While drogue depth and status could be encoded in BUOY reports, it was noted that the drogue status

could not easily be derived automatically based upon submergence data which were transmitted by the drifters. The panel recommended that buoy operators contact Service Argos as soon as they were aware that a drogue was lost. However, not all operators were in a position to analyze submergence data to derive drogue status. The GDP Data Acquisition Center, Miami, which was doing the exercise routinely offered to check the drogue status for all Lagrangian drifters equipped with a 15 meters holey-sock drogue, and to contact Service Argos each time a drogue status change was noticed. The panel thanked the GDP DAC for this kind offer.

121 Since the delay to derive the drogue status based upon submergence data could be substantial (e.g. 2 months), the panel recommended that submergence data be transmitted in BUOY reports as well. However, the BUOY code did not provide for the encoding of submergence data, and the panel had agreed that it would not request any further BUOY code modification. The panel therefore agreed that a recommended practice should be adopted for all Lagrangian drifters for which data were being distributed on the GTS under the GDP GTS bulletin headers (i.e. SSVX02 KARS, and SSVX13 LFPW). The proposed practice was to encode submergence data as a percentage value (percentage of time the drifter was submerged) using the second housekeeping parameter of Section 4 of buoy reports (group 8). The panel urged all buoy operators to adopt the proposed practice for GTS distribution of Lagrangian drifter data.

6.8.3 Deployment of oceanographic observation devices in Antarctic waters

122 Finally under this agenda item, the panel was informed that a potential problem relating to the deployment of oceanographic observation devices (including drifting buoys) in Antarctic waters had been brought to the attention of the recent third session of the JCOMM SOOP Implementation Panel (La Jolla, March 2000). The problem involved a possible restriction to such deployments resulting from a strict application by national governments of the Madrid Protocol to the Antarctic Treaty if any environmental dangers were perceived in these deployments. Since the full extent of this problem was unclear, as well as possible responses, the JCOMM interim Management Committee had requested WMO to bring the issue to the attention of SCAR for review and advice. This action had been undertaken at the July 2000 session of SCAR, whose Executive Committee had promised to follow up on the issue and keep WMO informed of any outcome. The panel noted this information with interest, and also requested to be kept abreast of developments.

7. NEW ACTION GROUPS

123 The panel noted with interest a short presentation from Dr Sergey Motyshev (Ukraine) on the pressing requirements for and possibilities to implement an operational programme of drifting buoys in the Black Sea. It recognized in particular the present lack of all types of marine data from the Black Sea, which were required to support maritime safety, operational meteorology and oceanography, ocean research and climate studies, as well as the important potential role for drifting buoys in providing such data. The panel therefore agreed on the likely value of implementing a Black Sea Buoy Programme, and recommended to Black Sea States and other interested countries to develop a specific proposal for such a programme, perhaps within the context of Black Sea GOOS, for further consideration by DBCP-XVII.

124 The panel recognized the potential to expand the deployment and maintenance of a network of drifting buoys in the North Pacific through a cooperative programme involving countries on both sides of this important ocean region. It therefore supported the proposal by Canada to survey all potentially interested countries in the region, in order to assess interest in the establishment of a North Pacific Buoy Programme (and possible eventual action group). It requested Canada to present a report on developments in this regard to DBCP-XVII.

8. COORDINATION AND REPORTING PROCEDURES

125 The new Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) was established by WMO Congress and the IOC Assembly in 1999 as the reporting and coordination mechanism for all operational marine bodies and activities of the two organizations. It was also now the primary implementation mechanism for GOOS and the ocean component of GCOS.

The panel noted with interest a report on the status of implementation of JCOMM, including the position of the DBCP within the proposed new JCOMM structure. A schematic diagram of this new structure is given in *Annex VIII*, with the panel providing the major component of the new Data Buoy Observations Team, which is one of the three primary components of the Observations Programme Area. This team will also include any future data buoy implementation groups as they become established (e.g. a possible separate group for PIRATA and/or a new international Indian Ocean moored buoy array). The terms of reference of the team will be those of the existing DBCP, TIP and other action groups. All groups will, in the medium term at least, continue to function as now, with the primary global coordination of buoy programmes continuing to be effected through the DBCP and its technical coordinator. Coordination and integration of buoy operations with other components of the overall ocean observing system will be effected through the Observations Coordination Group, whose membership will include, *inter alia*, the chairs of the DBCP and TIP and the DBCP/SOOP Technical Coordinator. The panel supported this overall concept, as well as its own role within it.

126 The panel reaffirmed its belief that JCOMM represents a very significant and potentially far reaching step on the road to truly operational oceanography. The integrating role of JCOMM was again acknowledged as being of primary importance, with the panel itself providing an excellent model as a forum and mechanism for coordination and integration in a specific field among meteorologists and oceanographers, research and operations. In addition, the technical coordinator, particularly in his dual role as DBCP/SOOP coordinator, now offered an example and basis for the future technical coordination of all operational ocean observing systems under JCOMM.

127 In this context, the panel noted with interest the proposal from the technical coordinator and Secretariats for the establishment of a JCOMM Observing Systems Operations Support Centre (JCOMMOPS), based initially on the DBCP/SOOP and Argo coordinators. A schematic of the JCOMMOPS concept and its operations is given in *Annex VIII*. The panel agreed that the technical coordinator position had been an essential element in its own success, and recognized that similar considerations would most likely apply in the future to other components of an operational ocean observing system. An added incentive would be the overall system integration which could be achieved through a single operations support centre. The panel therefore supported the JCOMMOPS concept, on the understanding that implementation of the centre would not adversely affect the services provided by its technical coordinator to panel members. The panel agreed that the concept should be formally presented to JCOMM-I for adoption, with the draft terms of reference as given in *Annex IX*. In doing so, the panel urged the Secretariats to make every effort to identify the necessary funding to allow for expansion of the JCOMMOPS staffing and resources in the future, so that it could also adequately service other operational observing system components.

128 The panel noted that the first session of JCOMM would take place in Akureyri, Iceland, in June 2001. Documentation for the session relating to the DBCP would be required in the form of both a formal report from its chairman and also more technical information under the appropriate agenda items. The panel agreed that such documentation should be prepared by the chairman and technical coordinator, with the assistance of the Secretariats, and submitted in line with the specified timetable. The panel further agreed that it should be formally represented at the session, and requested the chairman to make the necessary arrangements for this representation, in consultation with the technical coordinator and Secretariats.

129 Finally under this agenda item, the panel was informed by its chairman that he had recently received an invitation from Dr John Gould, Director of the International CLIVAR Project Office, to become a member of the CLIVAR Ocean Observations Panel (COOP). The panel understood that this invitation was both a recognition of the major role now played by the DBCP in global oceanography and in support of global climate studies, and also an opportunity to further reinforce international coordination and integration in ocean observing networks. It therefore agreed that the chairman should respond to Dr Gould and to the chairman of the COOP, Dr Chet Koblinsky, accepting the invitation.

C. ADMINISTRATIVE COMPONENT

9. REPORTS

9.1 REPORTS BY THE CHAIRMAN AND THE VICE-CHAIRMEN

Report by Mr Graeme Brough, Chairman of the Data Buoy Co-operation Panel

130 The chairman reported that his fifth year of chairmanship of the DBCP had continued to be most interesting and challenging. The main activities during the year are summarised in the following paragraphs.

131 The chairman noted that progress has been made on most items in the intersessional work plan and action was in hand on all the remaining matters. The chairman wished to record his appreciation for the work of panel members and especially the efforts of the two vice-chairmen, the technical coordinator, and the Secretariats of WMO and IOC in advancing the work plan.

132 The chairman noted that his activities during the intersessional period had been at a relatively low level this year, but nonetheless there were a number of important issues that required attention throughout this period. The chairman reported that he took the opportunity, while on other business, to visit both Geneva and Toulouse during the year for discussions on a range of matters relating to the panel's activities. In particular, he held discussions with Peter Dexter, Etienne Charpentier and various CLS/Argos representatives. The chairman was ably assisted by the vice-chairmen and technical coordinator in handling a number of the current issues.

133 The chairman brought members' attention to the progress with the establishment of the Joint Committee for Oceanography and Marine Meteorology (JCOMM). This new commission will amalgamate WMO's former Commission for Marine Meteorology (CMM) and the joint IOC/WMO Integrated Global Ocean Services System (IGOSS). He noted that the Second Transition Planning Meeting for JCOMM was held in Paris in June to continue the work on developing details of the commission's operations and plans. The panel was represented by the technical coordinator, Mr Etienne Charpentier.

134 The chairman also noted that the co-operation between marine programmes was continuing to mature and that the technical coordinator was now being shared between the DBCP and the Ship of Opportunity Programme Implementation Panel (SOOPIP). Indications were that the sharing of Mr Charpentier's time had been most successful, especially for the SOOPIP community, but without any serious impact on the DBCP's programmes. Details of the arrangements would be presented under another agenda item. This type of co-operation was going to become increasingly important in the future with the realigning and overlapping of the oceanographic and marine meteorology communities.

135 The chairman reported that there had been a range of very important issues involving the DBCP's Action Groups over the year. These groups had enjoyed another successful and productive year, and had continued to contribute to the on-going success of the panel in their respective advancement of buoy matters. The chairman also noted that the forthcoming closer co-operation of various oceanographic operational panels would provide further opportunities for the panel and its members.

136 The chairman noted that he had participated in the biannual Australian Argos User's Conference in June. Issues arising from the conference were dealt with under the appropriate agenda items.

137 The chairman highlighted the continuing production of technical documents in the DBCP series - covering the Annual Report for 1999 and the Technical Presentations made at the Fifteenth Session.

138 The chairman expressed his appreciation for the assistance of the two vice-chairmen during the intersessional period, particularly with respect to representing the panel at various international meetings. He also expressed his thanks to the technical coordinator and the two Secretariats.

Report by Mr Eric Meindl, vice-chairman of the Data Buoy Co-operation Panel

139 During the past 12 months, Mr. E. Meindl, vice-chairman, participated in the following activities on behalf of the DBCP:

- Around April 1, 2000, he provided an analysis and recommendation document to members of the DBCP and others involved in buoy data dissemination regarding FM18 BUOY. This document could be used as a starting point for discussions at DBCP XVI. The report noted some shortcomings in ability to disseminate operational data in FM18 relative to FM13 SHIP. The report identified FM18 Section 5 as a possible means of disseminating data. It recommended continued reporting in FM18 and FM13, but with additional reporting in BUFR or CREX codes. If human readability was an issue, then CREX should probably be considered. A reasonable time period could be established to allow participating countries to gradually convert without an undesirable impact on participants' programming resources.
- From July 31 to August 4, 2000, he represented the panel at the 7th session of the International South Atlantic Buoy Programme (ISABP) which was held in Salvador, Brazil. He provided two presentations. One summarized material presented at the Technical Workshop of DBCP XV; the other was a report on the activities at the DBCP XV meeting. The DBCP Technical Coordinator, Mr. Etienne Charpentier, assisted significantly by providing information and visual aids.
- During the course of the year, he communicated with several panel members by telephone and e-mail regarding miscellaneous buoy matters.

Report by Mr David Meldrum, vice-chairman of the Data Buoy Co-operation Panel

140 During the intersessional period, the main DBCP-related activities in which Mr D. Meldrum was involved were as follows:

- *Mobile satellite systems.* A close watch was kept on developments in this area, and an updated information paper produced for DBCP-XVI (See *Annex VI*). As noted on previous occasions, many of the new systems were unlikely to offer satisfactory oceanic coverage. Many were also experiencing financial difficulties which may impact on their ability to offer a suitable service. Considerable operational experience had been gained with the Orbcomm system in the course of research projects at Dunstaffnage Marine Laboratory, and the results of these trials were included in the above paper.
- *DBCP Implementation Plan.* This was updated to reflect the consensus that was developing regarding the requirements for marine observations in support of climate modeling and operational marine forecasting, as stated at the 1st International Conference of the Ocean Observing System for Climate (OceanObs 99), and the emergence of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM). Other aspects of the plan, which was to be reviewed by the panel at this session, were updated by the technical coordinator, Mr Etienne Charpentier.

9.2 REPORT BY THE SECRETARIATS

Report by the WMO Secretariat

141 The WMO Secretariat representative reported to the session on the various activities undertaken by WMO in support of the panel during the past 12 months. The panel noted with satisfaction that its proposal for modifications to its terms of reference had been accepted by the WMO EC. Panel members were urged to check carefully the lists made available by WMO of national focal points for the DBCP and of the WMO buoy ID assignments. These latter now include assignments made under the new scheme for profiling floats agreed at DBCP-XIV, which were so far working satisfactorily, with 1000 numbers potentially available for assignment in each WMO region. However,

the panel noted a request from the Argo Science Team to develop as soon as possible a modification to the float allocation scheme, to allow for two orders of magnitude expansion in the numbers available for allocation in each area. The objective of the request was to ensure that each float deployed in the foreseeable future could be identified through a unique number (i.e. no reallocations, as was the case with surface drifters).

142 The panel agreed that this request could most easily be accommodated through retaining the existing numbering concept, but expanding the serial numbers to be allocated to five digits, i.e.:

A9xxxxx

Adoption of this approach would, however, mean that the float ID would now involve seven characters rather that the five at present. Bearing in mind that CBS was now not approving any further modifications to character codes, including BUOY and TESAC (see also agenda item 6.2), the panel recognized that such a change would almost certainly not be accepted for implementation in such codes, despite the fact that platform identifiers of more than five characters already existed (e.g. some ship call signs). On the other hand, the proposal would certainly have no problems in acceptance if undertaken as part of BUFR. The panel therefore agreed that this provided another incentive to proceed with the implementation of BUFR encoding within the Argos GTS Subsystem. Specific action in this regard is taken under agenda item 11. Until the implementation of such a facility was completed, the panel considered that the present float ID allocation scheme would remain adequate for Argo purposes.

143 The panel further noted that a new, consolidated list of focal points for logistic support (covering DBCP, SOOP and Argo) was being compiled by the technical coordinator, on the basis of responses to a joint circular letter issued by the Secretariats. This list was being made available on the JCOMMOPS web site. The panel urged its members to ensure that the list was as complete as possible, that it was regularly updated, and that it was consulted and utilised when planning future deployments.

144 The panel expressed its appreciation to both the technical coordinator and to the WMO Secretariat for their efforts to bring to the attention of the global maritime community, through the International Hydrographic Organization (IHO), the problem of vandalism of buoys, both deliberate and inadvertent. As a result of these efforts, the IHO had issued a special "Hydrogram" on the subject (dated 5 August 2000) which, following normal practice, would be published by national Hydrographic Services at least once per year in their "Notices to Mariners". The text of the information note attached to the Hydrogram is given in *Annex X*, and is also available on the DBCP web site. The panel urged its members to contact their respective Hydrographic Services to reinforce the message in the Hydrogram and to ensure that it was reissued as often as possible.

Report by the IOC Secretariat

145 The IOC Secretariat representative reported to the session that, since the fifteenth session of the panel, the IOC Executive Council has held its thirty-third session (Paris, 20-30 June 2000). The Council noted and endorsed progress with and developments in the DBCP, noted the resource implications, especially regarding the problem of the barometer drifters in the southern hemisphere, and urged Member States to fully support this and related ocean observing systems. The Council further approved the new terms of reference for the DBCP and its technical coordinator.

146 As had been reported to the panel at its fifteenth session, work was undertaken within IOC to try and define an IOC oceanographic data exchange policy. An *ad hoc* Working Group on Oceanographic Data Exchange had been established and the Council reviewed the outcome of its work. Basically, the Council:

(i) recalled and strongly endorsed the statement: "Full and open sharing of a wide spectrum of global international data sets for all ocean programmes is a fundamental objective";

(ii) noted that the increased collaboration between IOC and WMO through bodies such as JCOMM called for compatibility between the data policies. In this regard reference was made to Annex 1 to Resolution 40 (Cg-XII) of which the purpose is to "identify a minimum set of data and products which are essential to support WMO Programmes and which Members shall exchange without charge and with no conditions on use." It was observed that these include "all available *in situ* observations from the marine environment";'

(iii) requested that IOC Subsidiary, Technical and Regional Bodies and programmes on which the IOC data policy might have an impact, should review and assess the implications of the possible modifications of the policy and be invited to participate in the process of policy formulation;

(iv) decided to establish an intersessional intergovernmental Working Group on IOC Oceanographic Data Exchange Policy, with the purpose of drafting a resolution that defines the way forward on this issue and that can count on the unanimous support of the Council. The Group shall be open to participation to all Member States of the Executive Council. The Council elected Dr A. McEwan as Chairperson of this Group;

(v) observed that the distinction between "data" and "products" is difficult to establish and, accordingly, called upon the group to provide a clear definition of the data which would be required to be exchanged so as to avoid ambiguity which might effect the economic and sovereign interests of the nations providing the data.

147 As usual, the IOC Secretariat had also managed the position of the technical coordinator from the administrative standpoint. These issues are dealt with under other agenda items.

10. FINANCIAL AND ADMINISTRATIVE MATTERS

10.1 FINANCIAL SITUATION

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

(i) Finalized IOC account 1 June 1999 - 31 May 2000;

(ii) Finalized WMO account for the biennium 1998-1999;

(iii) Interim WMO account 1 January - 3 October 2000;

(iv) Provisional WMO statement of estimated income and expenditure to 31 May 2000.

These statements are reproduced in *Annex XI.* The panel approved and accepted these various statements as appropriate.

10.2. CONTRACTS

149 The contracts established by IOC/UNESCO for the employment and logistic support for the position of the technical coordinator were considered and approved by the panel.

10.3 FUTURE COMMITMENTS

150 The panel recalled the agreement made with Mr Charpentier at the end of 1999, that he would be willing to remain as technical coordinator, located in Toulouse and employed by IOC/UNESCO, until at least May 2002. It therefore decided to continue the existing arrangements for the next financial period, 1 June 2001 – 31 May 2002, subject to the availability of funds. With regard to future years, the panel noted the agreement of Mr Charpentier to inform the chairman and the Secretariats, as early as possible, and in any case before 31 May 2001, of his desire to continue as technical coordinator beyond 31 May 2002. In the event of a decision to continue on the part of Mr Charpentier,

it was agreed by the panel that it would retain him as technical coordinator, subject to the availability of funds.

151 The panel recognized that all panel Member States were continuing to experience severe financial constraints, and that this situation was likely to continue for some time. At the same time, it agreed that the technical coordinator position was essential to the on-going success of the panel, and that a budget for other activities (publications, travel, special studies, etc.) was also essential if the panel was to play its full role in facilitating buoy programmes worldwide and in contributing to the development of operational oceanography. It also noted and agreed on the importance of further expanding the role of the panel in encouraging and facilitating the involvement of developing countries in buoy programmes and the use of buoy data. It therefore agreed on the necessity of maintaining a budget appropriate for these purposes.

152 The panel then reviewed likely expenditure requirements for 2001-2002 in the light of anticipated income. In this context, it noted with appreciation the past and anticipated contributions from SOOPIP participants, which reflected the work being undertaken by Mr Charpentier in support of SOOP, but which also provided a valuable addition to the overall support budget for both programmes. In the light of requirements for expenditure in support of both DBCP and SOOP, the 2001/2002 expenditure estimates are shown in *Annex XII*. On the basis of provisional commitments made at the meeting or otherwise, as well as anticipated contributions from SOOP participants, the panel therefore drew up a table of provisional contributions for 2001-2002, which is also given in *Annex XII*. The panel expressed its appreciation to all contributing Member States for their continuing support for the work of the panel. It requested the Secretariats, as in past years, to ensure that the invoices for these contributions were issued as soon as possible, and in any case before the end of 2000. At the same time, it reiterated the need for a budget fully appropriate to its role and requirements, and therefore urged the Secretariats and all members to make additional efforts to recruit additional contributors to the trust fund, no matter how small their contributions might be. In this connection, the panel noted with appreciation the proposal by Japan to contribute financially to both the DBCP and SOOP in 2001, in particular to support the promotion and expansion of buoy and SOOP activities in developing countries.

10.4 REVIEW OF THE TASKS OF THE TECHNICAL COORDINATOR

153 Under this agenda item, the panel reviewed the existing arrangements for the employment of the technical coordinator, as well as the sharing of his activities between the panel and the Ship-of-Opportunity Programme. The panel decided that these arrangements were suitable for the foreseeable future, subject to review at each panel session.

D. CONCLUDING COMPONENT

11. RECOMMENDATIONS TO THE ARGOS JTA

154 The panel reconfirmed the importance of connecting additional LUTs to the Argos processing centres in support of the ISABP, as discussed at DBCP-XV, and requested its chairman to inform the JTA of its continued interest in completing the communications connections as soon as possible.

155 Under agenda item 6.2 the panel had discussed the need to introduce BUFR encoded buoy messages following a proposal by the CBS Implementation Coordination Team on Data Representation and Codes (Geneva 10-14 April 2000) for migration from character codes to table driven codes. The panel therefore requested its chairman to recommend to the JTA that a BUFR encoder be developed for incorporation into the Argos GTS processing sub-system by 2003 as part of the Argos development programme.

156 Finally the panel asked its chairman to inform the JTA on the panel discussion concerning possible enhancement of the Argos GTS processing sub-system to include buoy data from alternative commercial satellites.

12. WORKPLAN

157 As in previous years, the panel reviewed and updated its operating procedures, as well as the overall work plan for itself and the technical coordinator for the coming intersessional period. The work plans are given in *Annex XIII* and the action sheet on DBCP-XVI decisions in *Annex XIV**.

13. ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMEN OF THE PANEL

158 The panel re-elected Mr Graeme Brough as its chairman, to serve until the end of the next panel session. It also re-elected Mr Eric Meindl and Mr David Meldrum as its vice-chairmen for the same period.

14. DATE AND PLACE OF THE NEXT SESSION

159 The panel recalled its agreement at DBCP-XV that, in principle, the session in 2001 would take place in Perth, Australia. It was therefore pleased to accept the confirmation from the Australian Bureau of Meteorology to host DBCP-XVII in Perth, subject as always to a similar agreement by JTA-XX. Tentative dates for the session were agreed as 22-26 October 2001. The panel also noted with appreciation the tentative offer from France to host the 2002 session, as usual towards the end of October.

15. CLOSURE OF THE SESSION

160 The panel noted with regret that Mr Michel Taillade, General Manager, CLS/Service Argos, would be retiring during the coming intersessional period. It therefore took the opportunity to express to Mr Taillade its sincere appreciation for his longstanding support for the panel and its work, for his cooperative and positive approach to addressing the panel's concerns and problems relating to telecommunications, and for the friendship which he had offered to all panel members throughout.

161 In closing the session, the chairman offered once more his sincere thanks to the Meteorological Service of Canada, and particularly to Mr Ron McLaren, for hosting the meeting and providing such excellent hospitality and support. He also thanked the technical coordinator and all panel members for their very positive contributions to the work of the panel, both during the session and throughout the intersessional period.

162 The sixteenth session of the Data Buoy Co-operation Panel closed at 12.00 hours on Friday, 20 October 2000.

---

* The work plans and the action sheet do overlap and complement each other in so far as actions to be taken during the next intersessional period are concerned.

ANNEX I

LIST OF PARTICIPANTS

I PARTICIPANTS FROM MEMBER STATES

AUSTRALIA

Mr Graeme Brough
Chairman, DBCP
Bureau of Meteorology
G.P.O. Box 1289 K
Melbourne, Vic. 3001
Tel: (61)(3) 96 69 41 63
Fax: (61)(3) 96 69 41 68
E-mail: g.brough@bom.gov.au

Mr David K. Evans
Bureau of Meteorology
150 Lonsdale Street
Melbourne, Vic. 3000
Tel: (61)(3) 96 69 42 05
Fax: (61)(3) 96 69 41 68
E-mail: d.evans@bom.gov.au

BRAZIL

Mr Alaor Moacyr Dall' Antonia Jr
Head, Meteorological and
Agrometeorological General Coordination
Instituto Nacional de Meteorologia-Inmet
Eixo Monumental - Via S1
70610-400 Brasilia, DF
Tel: (55)(61) 344 99 55
Fax: (55)(61) 343 14 87
E-mail: alaor@inmet.gov.br.

CANADA

Ms Estelle Couture
Marine Environmental Data Service (MEDS)
12W082 - 200 Kent St.
Ottawa, ON K1A 0E6
Tel: (1)(613) 990 0259
Fax: (1)(613) 993 4856
E-mail: couture@meds-sdmm.dfo-mpo.gc.ca

Mr Brian Day
Campbell Scientific (Canada) Corp.
11564 149 Street
Edmonton, AB T5M 1W7
Tel: (1)(780) 454 2505
Fax: (1)(780) 454 2655
E-mail: brian@campbellsci.ca

Mr Timothy Goos
Chairman, IABP
Director, Meteorological Service of
Prairie & Northern Region
Room 200 4999 - 98 Avenue
Edmonton, AB T6B 2X3
Tel: (1)(403) 951 8847
Fax: (1)(403) 951 8634
E-mail: tim.goos@ec.gc.ca

Mr Ron McLaren
Head, Marine Services
Meteorological Service of Canada
Pacific and Yukon Region
Environment Canada,
Suite 700 - 1200 West 73rd. Avenue,
Vancouver, B.C., V6P 6H9
Tel: (1)(604) 664 9188
Fax: (1)(604) 664 9195
E-mail: ron.mclaren@ec.gc.ca

Mr Brian O'Donnell
Regional Director
Meteorological Service of Canada
Pacific and Yukon Region
Environment Canada
Suite 200, 1200 West 73rd Avenue
Vancouver, B.C., V6P 6H9
Tel: (1)(604) 664 9090
Fax: (1)(604) 664 9004
E-mail: brian.o'donnell@ec.gc.ca

Mr Val Swail
Climate Research Branch
Meteorological Service of Canada
4905 Dufferin St.
Downsview, ON MCH 5T4
Tel: (1)(416) 739 4347
Fax: (1)(416) 739 5700
E-mail: val.swail@ec.gc.ca

Mr Al Wallace
Manager, Meteorological Operations
Meteorological Service of Canada
Pacific and Yukon Region
200 - 1200 West 73rd Avenue
Vancouver, BC V6P 6H9
Tel: (1)(604) 664 9333
Fax: (1)(604) 664 9004
E-mail: al.wallace@ec.gc.ca

Mr David Watson
Manager, Atmospheric Monitoring
Meteorological Service of Canada
Pacific and Yukon Region
700 - 1200 West 73rd Avenue
Vancouver, BC V6P 6H9
Tel: (1)(604) 664 9187
Fax: (1)(604) 664 9195
E-mail: dave.watson@ec.gc.ca

FRANCE

Mr François Gérard
Vice-chairman, Joint IOC-WMO-UNEP
Intergovernmental Committee for GOOS
Chef du Département océan
Direction générale Météo-France
1,quai Branly
75340 Paris Cédex 07
Tel: (33) 1 45 56 7024
Fax: (33) 1 45 56 7447
E-mail: francois.gerard@meteo.fr

Mr Jean Rolland
Météo-France
13, rue du Chatellier
29273 Brest Cedex
Tel: (33 2) 98 22 18 53
Fax: (33 2) 98 22 18 49
E-mail: jean.rolland@meteo.fr

INDIA

Mr K. Premkumar
Programme Director
National Data Buoy Programme
National Institute of Ocean Technology
(Dept. Of Ocean Development,
Govt. of India)
Pallikaranai, Chennai
P.C. 601302
Tel: (1)(91)(44) 2460678
Fax: (1)(91)(44) 2460661
E-mail: prem@niot.ernet.in

JAPAN

Mr Tetsuya Uwai
Oceanographical Division
Climate and Marine Department
Japan Meteorological Agency
1-3-4, Otemachi, Chiyoda-ku
Tokyo 100-8122
Fax: (81)3 3211 3047
E-mail: uwai@met.kishou.go.jp
E-mail: buoyunit@hq.kishou.go.jp

NETHERLANDS

Mr A.T. Frank Grooters
Observations and Modelling Department
Royal Netherlands Meteorological Institute
P.O. Box 201
3730 AE De Bilt
Tel: (31)(30) 220 6691
Fax: (31)(30) 221 0407
E-mail: frank.grooters@knmi.nl

NEW ZEALAND

Ms Julie Fletcher
Marine Meteorological Officer
Meteorological Service of NZ Ltd.
P.O. Box 722
Wellington
Tel: (64)(4) 4700 789
Fax (64)(4) 4700 772
E-mail: fletcher@met.co.nz

SOUTH AFRICA

Mr Louis Vermaak
Technical Coordinator, ISABP
South African Weather Bureau
Private Bag X97
Pretoria 0001
Tel: (27)(12) 309 3834
Fax: (27)(12) 309 3020
E-mail: vermaak@weathersa.co.za

UKRAINE

Dr Sergey Motyzhev
Marine Hydrophysical Institute NASU
2, Kapitanskaya Street,
Sevastopol, 99000
Tel: (380)(692) 540450
Fax: (380)(692) 540450
E-mail: marlin@stel.sebastopol.ua

UNITED KINGDOM

Mr D. Wynn Jones
Chairman, EGOS
The Met. Office
Beaufort Park, Easthampstead
Wokingham, Berkshire, RG40 3DN
Tel: (44)(1344) 855 603
Fax: (44)(1344) 855 897
E-mail: dwjones@meto.gov.uk

Mr David Meldrum
Vice-chairman, DBCP
Programme Leader, Technology Development
Dunstaffnage Marine Laboratory
Dunbeg
Oban PA37 1QA
Scotland
Tel: (44)(1631) 559273
Fax: (44)(1631) 565 518
E-mail: dtm@dml.ac.uk

USA

Mr Stephen J. Auer
NOAA Office of Global Programs
Office of Oceanic and Atmospheric Research
1100 Wayne Avenue, Suite 1210
Silver Spring, MD 20910
Tel: (1)(301) 427 2089 ext. 153
Fax: (1)(301) 427 2222
E-mail: Stephen.Auer@noaa.gov

Mr Robert Bassett
National Environmental Satellite, Data,
and Information Service (NESDIS/NOAA)

Route: E/SP3, BLDG FB4, RM 3320
5200 Auth Road
Suitland, MD 20746-4304
Tel: (1)(301) 457 5681
Fax: (1)(301) 457 5620
E-mail: Robert.Bassett@noaa.gov

Ms Deborah Bird
Naval Oceanographic Office, N32 (NAVOCEANO)
1002 Balch Blvd
Stennis Space Center, MS 39522-5001
Tel: (1)(228) 688 5677
Fax: (1)(228) 688 5514
E-mail: BirdD@navo.navy.mil

Mr Steve Cook
NOAA/OAR/AOML
GOOS Center
8604 La Jolla Shores Dr.
La Jolla, CA 92037
Tel: (1) (858) 546 7103
Fax: (1) (858) 546 7185
E-mail: SKCOOK@UCSD.EDU

Mr Craig Engler
Manager, Global Drifter Center (GDC)
Physical Oceanography Division
Atlantic Oceanographic and Meteorological
Laboratories (AOML/OAR/NOAA)
4301 Rickenbacker Causeway
Miami, FL 33149-1026
Tel: (1)(305) 361 4439
Fax: (1)(305) 361 4366
E-mail: Craig.Engler@noaa.gov

Mr H. Paul Freitag
TAO - Project Manager
Tropical Atmosphere Ocean (TAO) Array
Pacific Marine Environmental Laboratories
(PMEL/OAR/NOAA)
7600 Sandpoint Way NE
Seattle; WA 98115-6349
Tel: (1)(206) 526 6727
Fax: (1)(206) 526 6744
E-mail: freitag@pmel.noaa.gov

Ms Elizabeth Horton
Naval Oceanographic Office, 010 (NAVOCEANO)
Stennis Space Center, MS 39529
Tel: (1)(228) 688 5725
Fax: (1)(228) 688 5514
E-mail: hortone@navo.navy.mil

Dr Edward Johnson
Engineering Manager
SAIC (TSC/NDBC)
Stennis Space Center, MS 39529
Tel: (1)(228) 688 1733
Fax: (1)(228) 688 3489
E-mail: j.edward.johnson@saic.com

Mr Michael Johnson
NOAA Office of Global Programs
1100 Wayne Avenue, Suite 1210
Silver Spring, MD 20910
Tel: (1)(301) 427 2089 ext. 62
Fax: (1)(301) 427 2073
E-mail: johnson@ogp.noaa.gov

Mr Eric A. Meindl
Vice-chairman, DBCP
Chief, Operations Branch
National Data Buoy Center (W/OPS52)
(NDBC/NWS/NOAA)
Stennis Space Center, MS 39529
Tel: (1)(228) 688 1717
Fax: (1)(228) 688 2869
E-mail: Eric.Meindl@noaa.gov

Dr Peter Niiler
Scripps Institution of Oceanography (SIO)
La Jolla, Ca. 92093-0213
Tel: (1)(619) 534 4100
Fax: (1)(619) 534 7931
E-mail: pniiler@ucsd.edu

Ms Mayra C. Pazos
Drifter Data Assembly Center (DAC)
Physical Oceanography Division
Atlantic Oceanographic and Meteorological
Laboratories (AOML/OAR/NOAA)
4301 Rickenbacker Causeway
Miami, FL 33149-1026
Tel: (1)(305) 361 4422
Fax: (1)(305) 361 4412
E-mail: pazos@aoml.noaa.gov

Dr Stephen R. Piotrowicz
Office of Oceanic and Atmospheric Research
NOAA
1315 East West Highway
Silver Spring, Maryland 20910
Tel: (1)(301) 713 2465 ext. 124
Fax: (1)(301) 713 4023
E-mail: Steve.Piotrowicz@noaa.gov

Mr Ignatius Rigor
Coordinator of the IABP
Polar Science Center
Applied Physics Laboratory
Univ. of Washington
1013 NE 40th
Seattle, WA 98105
Tel: (1)(206) 685 2571
Fax: (1)(206) 616 3142
E-mail: ignatius@apl.washington.edu

Mr. Andy Sybrandy, President
Pacific Gyre Inc.
7460 Capstan Drive
Carlsbad, CA 92009
Tel: (1)(760) 918 9798
Fax: (1)(760) 476 9170
E-mail: asybrandy@pacificgyre.com
website: www.pacificgyre.com

Dr Sidney W. Thurston
NOAA Office of Global Programs
Level 14, Hibiya Central Building
1-2-9 Nishi-Shinbashi Minato-ku
Tokyo
JAPAN 105-0003
Tel: (81) 3 5532 7249
Fax: (81) 3 5532 7373
E-mail: thurston@ogp.noaa.gov

II. INTERNATIONAL ORGANIZATIONS AND PROGRAMMES

CLS/Service Argos

Mr Christian Ortega
CLS/Argos
8-10 rue Hermes
Parc Technologique du Canal
31526 Ramonville St. Agne
FRANCE
Tel: (1)(33) 561 39 47 29
Fax: (1)(33) 561 39 47 97
E-mail: christian.ortega@cls.fr

Mr Michel Taillade
General Manager, CLS/Service Argos
8-10 rue Hermes
Parc Technologique du Canal
31526 Ramonville St Agne
FRANCE
Tel: (33)(5) 61 39 47 02
Fax: (33)(5) 61 75 10 14
E-mail: michel.taillade@cls.fr

Mr William E. Woodward
Service Argos Inc.
1801 McCormick Drive, Suite 10
Largo, MD 20774
USA
Tel: (1)(301) 925 4411
Fax: (1)(301) 925 8995
E-mail: woodward@argosinc.com

DBCP

Mr Graeme Brough
Chairman DBCP
Bureau of Meteorology
GPO Box 1289K
Melbourne, Victoria 3001
AUSTRALIA
Tel: (61)(3) 96 69 41 63
Fax: (61)(3) 96 69 41 68
E-mail: g.brouch@bom.gov.au
(also representing Australia)

Mr Etienne Charpentier
Technical Coordinator, DBCP and SOOP
Jeonnops
c/o CLS/Service Argos
8-10 rue Hermes
Parc Technologique du Canal
F-31526 RAMONVILLE SAINT-AGNE
FRANCE
Tel: (33)(5) 61 39 47 82
Fax: (33)(5) 61 75 10 14
E-mail: charpentier@cls.fr

Mr Eric A. Meindl
Vice-chairman, DBCP
Chief, Operations Branch
National Data Buoy Center (W/OPS52)
(NDBC/NWS/NOAA)
Stennis Space Center, MS 39529
USA
Tel: (1)(228) 688 1717
Fax: (1)(228) 688 2869
E-mail: Eric.Meindl@noaa.gov
(also representing USA)

Mr David Meldrum
Vice-chairman DBCP
Programme Leader, Technology Development
Dunstaffnage Marine Laboratory
Dunbeg
Oban PA37 1QA
SCOTLAND
Tel: (44)(1631) 559 273
Fax: (44)(1631) 565 518
E-mail: dtm@dml.ac.uk
(also representing United Kingdom)

JTA

Mr Derek J. Painting
Chairman, Argos JTA
5 The Sycamores
Darby Green
Blackwater
Camberley GU17 OEE
UNITED KINGDOM
Tel: (44)(1252) 876804
Fax: (44)(1252) 654612
E-mail: djpainting@compuserve.com

III. OTHER PARTICIPANTS

Mr Geoffrey Holland
2WE Associates Consulting Ltd.
24 - 295 Lower Ganges Rd.
Salt Spring Island, BC V8K 1T3
CANADA
Tel: (250) 537 4472
Fax: (250) 537 4850
E-mail: hollandg@2weassociates.com

METOCEAN

Mr Bernie Petolas
METOCEAN Data Systems Ltd.
21 Thornhill Dr.
Dartmouth, NS B2W 4A5
CANADA

Tel: (1-902) 468 2505
Fax: (1-902) 468 4442
E-mail: bpetolas@metocean.ns.ca

TECHNOCEAN, INC.

Mr Jeffrey L. Wingenroth
General Manager
Technocean, Inc.
820 NE 24th Lane, Unit 112
Cape Coral, FL 33909
USA
Tel: (1)(941) 772 9067
Fax: (1)(941) 574 5613
E-mail: jw@technocean.com

V. SECRETARIATS

IOC

Mr. Yves Tréglos
Assistant Secretary
Intergovernmental Oceanographic Commission
UNESCO
1, rue Miollis
75732 Paris Cedex 15
FRANCE
Tel: (33)(1) 45 68 39 76
Fax: (33)(1) 40 56 93 16
E-mail: y.treglos@unesco.org

WMO

Dr P.E. Dexter
World Weather Watch-Applications Department
World Meteorological Organization
7 bis, Avenue de la Paix
Case postale No 2300
CH-1211 Genève 2
SWITZERLAND
Tel: (41) 22 730 82 37
Fax: (41) 22 730 80 21
E-mail: dexter@www.wmo.ch

ANNEX II

AGENDA

A. ORGANIZATIONAL COMPONENT

1. ORGANIZATION OF THE SESSION

1.1 OPENING OF THE SCIENTIFIC AND TECHNICAL WORKSHOP
1.2 OPENING OF THE SESSION
1.3 ADOPTION OF THE AGENDA
1.4 WORKING ARRANGEMENTS

B. IMPLEMENTATION COMPONENT

2. IMPLEMENTATION REPORTS

2.1 TECHNICAL COORDINATOR
2.2 ACTION GROUPS AND RELATED PROGRAMMES
2.3 NATIONAL REPORTS
2.4 REPORT BY THE ARGO SCIENCE TEAM
2.5 EVALUATION SUBGROUP

3. REVIEW OF THE DBCP IMPLEMENTATION STRATEGY

4. SCIENTIFIC AND TECHNICAL WORKSHOP

5. DATA AND INFORMATION EXCHANGE

5.1 REPORTS BY BUOY DATA MANAGEMENT CENTRES
5.2 INFORMATION EXCHANGE

6. TECHNICAL ISSUES

6.1 QUALITY CONTROL
6.2 CODES
6.3 ARGOS SYSTEM
6.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES
6.5 METADATA
6.6 SOUTHERN HEMISPHERE BAROMETER DRIFTERS
6.7 INTEGRATION OF DEPLOYMENT OPPORTUNITIES WITH SOOPIP AND ARGO
6.8 OTHER TECHNICAL ISSUES

7. NEW ACTION GROUPS

8. COORDINATION AND REPORTING PROCEDURES

C. ADMINISTRATIVE COMPONENT

9. REPORTS

9.1 CHAIRMAN AND VICE-CHAIRMEN
9.2 SECRETARIATS

10. FINANCIAL AND ADMINISTRATIVE MATTERS

10.1 FINANCIAL SITUATION
10.2 CONTRACTS
10.3 FUTURE COMMITMENTS
10.4 REVIEW OF THE TASKS OF THE TECHNICAL COORDINATOR

D. CONCLUDING COMPONENT

11. RECOMMENDATIONS TO THE ARGOS JTA

12. WORKPLAN

13. ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMEN OF THE PANEL

14. DATE AND PLACE OF THE NEXT SESSION

15. CLOSURE OF THE SESSION

ANNEX III

REPORT BY THE TECHNICAL CO-ORDINATOR

1 Introduction

This report covers the period 1 October 1999 to 30 September 2000. During this period the Technical Co-ordinator (TC) of the Data Buoy Co-operation Panel (DBCP) was based in Toulouse at CLS, Service Argos, and was employed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). The time spent on TC DBCP tasks could be estimated as following:

Topic	days	%tot. TC
SOOP (excluding travel time)	72.0	27.7
Missions (SOOP), effective meeting time	14.0	5.4
Missions (SOOP), travel time on working days	1.5	0.6
Argo (excluding missions)	5.0	1.9
Missions (Argo), effective meeting time	9.0	3.5
Missions (Argo), travel time on working days	2.0	0.8
Missions (DBCP), effective meeting time	23.0	8.8
Missions (DBCP), travel time on working days	1.5	0.6
Missions, preparation (incl. DBCP)	17.0	6.5
User assistance	30.0	11.5
TC Vacation, holidays	26.0	10.0
GTS Sub-System & floats on GTS issue	7.0	2.7
Miscellaneous DBCP	5.0	1.9
Requests for GTS	5.0	1.9
Action Groups	5.0	1.9
JCOMM (GOS, JCOMMOPS, depl. Opportunities)	5.0	1.9
Misc. Techn. (e.g. meta-data, monitoring stats, formats)	5.0	1.9
DBCP web server & new technical forum	4.0	1.5
GTS Bulletin headers, code matters (BUFR, BUOY)	4.0	1.5
TC monthly report, stats., regular reports	3.0	1.2
Météo France (data flow control, impact studies)	2.0	0.8
Metadata	2.0	0.8
Vandalism	2.0	0.8
Monitoring, Quality Control Guideleines	2.0	0.8
TC Tools & Y2K	2.0	0.8
Misc. Administrative	2.0	0.8
Impact studies (collect information, web document)	0.5	0.2
Southern Hemisphere SVPBs	1.0	0.4
GTS sub-system monitoring	1.0	0.4
SVPB,SVPBW evaluation	1.0	0.4
DB Quarterly report	0.5	0.2
Publications (e.g. articles in Argos bull...)	0.0	0.0
Total (52 weeks)	**260.0**	**100.0**

During the period, I also worked for SOOPIP part time (about 35%) and spent a small amount of time on Argo (about 5%) mainly in missions where I represented the DBCP and SOOP. In total, I spent about 72 working days on SOOPIP issues during the intersessional period, including 14 days spent in SOOPIP missions, some of which being shared DBCP&SOOPIP missions where I represented

JCOMM. During the period CLS provided some staff support for routine tasks on DBCP related issues:

Topic (by CLS)	days	%
User assistance	30.0	11.5
Monitoring Quality Control Guidelines	10.0	3.8
Requests for GIS	10.0	3.8
Argos monthly report, statistics, graphics, regular reports	9.0	3.5
GIS sub-system monitoring	4.0	1.5
Argos monthly report	3.0	1.2
Total	66.0	25.4

The following paragraphs describe in detail the various activities of the TC DBCP during the period. Paragraph 2 highlights recent DBCP activities. Paragraph 3 describes specific non regular tasks undertaken by the TC DBCP during the considered period while paragraph 4 describes regular tasks normally undertaken during any intersessional period.

2 DBCP highlights (As of August 2000)

1.1. Present status of buoy programmes

Graphs summarizing present status of buoy programmes are given in annex B.

Among the drifting and moored buoys which are reporting on GTS, the following variables are being measured (valid for buoy data received from GTS at Météo France during the period 25-31 July 2000):

Variable	Buoys	Reports/day	Remark
Air pressure	225	4255	Most are SVPBs
Sea Surface temperature	769	6669	Most are GDP standard drifters
Air temperature	132	1441	Moored buoys and FGGE type buoys
Wind	100	693	Mainly moored buoys
Air pressure tendency	171	2679	
Air relative humidity or dew point temperature	67	217	Mainly TAO Moored buoys
Sub-surface temperatures	79	209	Mainly TAO array moored buoys; small number of drifting buoys with thermistor strings
Waves			Small number of buoys

1.2. Global Implementation

1.2.1. JCOMM

1.2.1.1. GOS

Representing JCOMM, I attended two meetings of the Expert Team on Observational Data Requirements and Redesign of the Global Observing System (Geneva, 29-30 November 1999, and Geneva, 19-23 May 2000). Following the second meeting, I prepared a document providing details about estimates of marine instrument performances for specific ocean area and specific variables (horizontal resolution, time resolution, accuracies, delays).

1.2.1.2. GOOS/GCOS Implementation plan and JCOMM

Final version of the "Global Physical Ocean Observations for GOOS/GCOS, an Action Plan for Existing Bodies and Mechanisms" document was presented and discussed at the first transition planning meeting for the Joint WMO-IOC Commission for Oceanography and Marine Meteorology (JCOMM), St. Petersburg, 19-23 July 1999. The Action Plan is however considered as a dynamic document which will be updated as requirements and implementation status develop. Implementation of the plan as a whole will be undertaken under JCOMM, which would thus be the mechanism for integrating the DBCP's work into an overall ocean observing system. The DBCP agreed to regularly update its own implementation strategy to be consistent with the GOOS/GCOS Action Plan. The strategy will be updated during the coming intersessional period, for consideration by DBCP-16.

Since the DBCP is now reporting to JCOMM, it changed its terms of reference consequently (http://dbcp.nos.noaa.gov/dbcp/1dtor.html).

1.2.1.3. Proposal for the creation of a JCOMM Observing Platform Operations Center (JCOMMOPS)

It is proposed to group DBCP, SOOP, and Argo coordination activities in a new structure called the JCOMM Observing Platform Operations Center (JCOMMOPS). A proposal was written and JCOMMOPS concept was recently discussed and strongly endorsed at the second JCOMM transition planning meeting which was held in Paris, 14-16 June 2000. Pending formal endorsement from the DBCP and SOOP which will provide the resources to operate the centre, and from the first JCOMM meeting, Akureyri, Iceland, 19-29 June 2001, JCOMMTRAN-2 meeting agreed that the centre could operate immediately on an interim basis.

See specific DBCP session agenda item and preparatory documents for details.
See also text of JCOMMOPS proposal at
http://dbcp.nos.noaa.gov/dbcp/jcommops_proposal.html

1.2.2. Argo programme

During the intersessional period, I've been involved with the Argo programme to some extend. Argo (http://www-argo.ucsd.edu/) plans to deploy about 3000 sub-surface floats in the world oceans during the period 2000-2005. Argo will among other things establish an Argo Information Center in Toulouse and will hire a half time coordinator. The Argo Science Team proposed to place the Argo coordinator under the TC DBCP's supervision. I therefore suggested that a DBCP/SOOP/Argo coordination unit should be operated in the context of the proposed JCOMMOPS center (see previous paragraph). A lot of interaction is expected to happen between the DBCP, SOOP, and Argo in the future, especially regarding managing deployment opportunities, dealing with various telecommunication systems, and distributing the data on GTS. Having DBCP, SOOP, and Argo coordinators work together at the same place will therefore facilitate interaction and cooperation between those programmes so it was useful for Argo, the DBCP, and SOOP, especially in an integrated JCOMM perspective that I spent some time working on Argo related issues. The Chairman of the DBCP therefore authorized that I spent some time on Argo for:

- Discussing Argo Information Center and Argo Coordinator issues with WMO, IOC, and Argo representatives.
- Establishment of an interim mechanism for Argo float deployment notification, including dedicated Internet forum (http://argo-forum.jcommops.org).
- Attending the Argo Science Team meeting in Southampton, 7-9 March 2000.
- Attending the Argo Pacific Implementation meeting in Tokyo, 13-14 April 2000.
- Attending the Argo Atlantic Implementation meeting in Paris, 10-11 July 2000.

1.2.3. Deployment opportunities

I created a web page on deployment opportunities (http://dbcp.nos.noaa.gov/dbcp/1bdr.html). Information on air deployment was provided by Elizabeth Horton, Navocean (http://dbcp.nos.noaa.gov/dbcp/airdepl.html) .

In an integrated JCOMM perspective I drafted a joint WMO-IOC JCOMM circular letter on the issue in order to better coordinate deployment opportunities for the DBCP, SOOP, and Argo. See related DBCP session agenda item and preparatory document for details.

1.2.4. Southern Hemisphere barometers

After the DBCP session, I visited NOAA/OAR and NOAA/OGP in Washington-DC, February 2000 to discuss the issue of NOAA deployments of SVPBs in the Southern Hemisphere. See related DBCP session agenda item and preparatory document for details.

1.2.5. Vandalism on data buoys

As requested by the DBCP at its 15th session, WMO wrote to the International Hydrographic Organization (IHO) with a view that IHO promulgates navigational warning messages on the presence of data buoys in the seas and the necessity of their safety for assistance to mariners, in particular during bad weather times.

IHO replied that it would discuss the issue at the next meeting of the IHO Commission on the Promulgation of Radio Navigational Warnings (CPRNW), Monaco, 29-19 June 2000.

I therefore prepared a document on vandalism on data buoys (http://dbcp.nos.noaa.gov/dbcp/vandalism.pdf) which includes proposed text for promulgation to mariners. The document was written based partly upon input from the TAO array. The document will be submitted to the CPRNW meeting. A web version (http://dbcp.nos.noaa.gov/dbcp/vandalism.html) is available for DBCP members to use as needed.

1.2.6. DBCP Action Groups

1.2.6.1. EGOS

- **Chairman**: Wynn Jones, UK Met. Office
- **Vice-Chairman**: Wil. van Dijk, KNMI, Netherlands
- **Technical Secretary**: Torleif Lothe, Christian Michelsen Institute, Norway
- **Technical Coordinator**: Pierre Blouch (deployment co-ordination and GTS matters), Meteo France
- **Meetings**: Last EGOS meeting was held 30-31 May 2000 in De Bilt, Netherlands (DBCP represented by Pierre Blouch, I provided him with a DBCP report).

  At the December 1999 EGOS meetings in Paris, the EGOS Technical sub-group was merged with the Management Committee so only one meeting was held this time.
- **Status**: In June 2000, a total of 55 buoys were operating in EGOS (24 in EGOS North, 31 in EGOS South) and transmitting Air Pressure. EGOS continues operating two LUTs in Sondre Stromfjord and

Oslo. This permits to reduce GTS delays significantly. On average the data are received in the NMCs about 20 to 30 minutes after the observations are made.

- **EGOS operational area** includes adjacent seas such as the North Sea, Baltic Sea, and the Mediterranean Sea.

- **Metadata:** EGOS provided me with comments regarding format of the metadata catalogue prepared by the JCOMM sub-group on Marine Climatology. Comments have been included in DBCP report to JCOMM sub-group (http://dbcp.nos.noaa.gov/dbcp/metadata.html).

1.2.6.2. IABP

- **Chairman**: Tim Goos, Environment Canada
- **Vice-Chairman**: Thor Kvinge, Norway
- **Coordinator**: Ignatius Rigor, University of Washington
- **Last IABP meeting:** Fairbanks, Alaska, 26-28 June 2000 (DBCP represented by Elizabeth Horton, I provided her with a DBCP report).
- **Status:** In July 2000, 35 buoys were operational in the Arctic basin.

1.2.6.3. ISABP

- **Chairman**: Alaor Moacyr Dall'Antonia Jr. , MHS, Brazil
- **Co-ordinator**: Louis Vermaak, SAWB, South Africa
- **Last ISABP meeting** (ISABP-VII), Salvador, Brazil, 31 July - 4 August 2000 (DBCP represented by Eric Meindl, I provided him with a DBCP report).

1.2.6.4. IBPIO

- **Chairman**: Graham Jones, BOM, Australia
- **Co-ordinator**: Pierre Blouch, Météo France
- **Status**: In July 2000, 66 standard SVP buoys were operational in the Indian Ocean, plus 37 SVPBs and 2 wind buoys.

1.2.6.5. IPAB

- Chairman: Christoph Kottmeier, Univ. Karlsruhe
- **Coordinator**: Peter Wadhams, SPRI, UK
- **Last IPAB meeting** (IPAB-III), Fairbanks, Alaska, 26-28 June 2000 (DBCP represented by Elizabeth Horton, I provided her with a DBCP report.

1.2.6.6. GDP

- **Chairman**: Mark Swenson, AOML, USA
- **Manager, GDC**: Craig Engler, AOML, USA
- **Status**: During the one year period August 1999 to July 2000, GDP deployed 604 drifters, including 184 SVPBs. GDP is offering interested meteorological services to purchase, deploy, and operate SVPB drifters for them in agreed deployment area for only the cost of the barometer (i.e. $US 1000).

1.2.6.7. TAO

- **Chairman**: Mike McPhaden, PMEL, USA
- **Coordinator**: Paul Freitag, PMEL, USA
- **Next TIP meeting**: 16-17 November 2000, Perth, Australia.

- **Status**: About 70 buoys in the equatorial Pacific (ATLAS plus TRITON). 85% data return. Is modernizing electronics and sensors. New sensors added on some moorings (shortwave and longwave radiation, rainfall, air pressure, conductivity, current meters). Cooperation and coordination with TRITON and PIRATA (12 buoys). Damage to moorings and sensors continues to be of concern, which accounts for a significant amount of data loss, especially in the far eastern and far western portions of the Pacific basin, presumably due to a higher density of fishing activity.

1.3. Information exchange

1.3.1. DBCP Web server (http://dbcp.nos.noaa.gov/dbcp)

I regularly updated the DBCP web site and added specific new documents and pages. See related DBCP session agenda item and preparatory document for details.

I'm still working on ways to make the DBCP database available online via the web.

1.3.2. DBCP Internet technical forum

In May 1999, the DBCP did open an Internet technical forum (http://www-dbcp.cls.fr) as a mean of debating on technical issues, answer technical questions, and exchange information among buoy operators or actors. The forum is a good complement to the DBCP web site and is directly linked to it. Documents, questions and answers can be exchanged over the forum while being accessible to anybody in the buoy community.

1.3.3. DBCP publications:

The DBCP recently published the following documents within its Technical Document series:

- DBCP Document No. 16: DBCP annual report for 1999
- DBCP Document No. 17: October 1999 DBCP Workshop's report (Wellington)

The following DBCP documents need to be updated:

- No. 15: DBCP implementation strategy
- DBCP Document No. 4 (SVPB construction manual) is being updated. New version will be available via the web.

1.4. Buoy monitoring statistics

Algorithms for computing the buoy monitoring statistics produced by ECMWF, NCEP, UKMO, and Météo France have been substantially modified for greater consistency. A comprehensive report describing algorithms and remaining discrepancies is available via the DBCP web site at http://dbcp.nos.noaa.gov/dbcp/monstats.html. Recently, statistics from SMN, Argentina have been added.

1.5. SVPBW evaluation group

A DBCP sub-group on SVPBW/Minimet has been created by the DBCP. Purpose of the sub-group is to deploy test drifters in all sorts of sea conditions, evaluate data, suggest hardware/software design changes, share experience, etc...

Sub-group works mainly through mail exchange and use the newly established DBCP technical forum (http://www-dbcp.cls.fr) for basic open discussion, record of those discussions and publication of intermediary or final results.

A "SVPB/SVPBW evaluation" sub-forum has been created in the DBCP technical forum where only sub-group participants can upload discussion topics and documents while all documents posted are available to everybody.

The sub-group met at the DBCP workshop in Wellington, October 1999.

Sub-group presently includes the following people:

- Elizabeth Horton, Navoceano (Chairperson)

- Pierre Blouch, Météo France
- Wynn Jones, UKMO
- Graeme Brough, BOM
- Peter Niiler, SIO
- Etienne Charpentier, DBCP
- Ray Mahr, Metocean
- Jeff Wingenroth, Technocean
- Gary Williams, Clearwater Instrumentation
- Sergey Mothyzev, MARLIN
- Louis Vermaak, SAWB

The group is open to anybody who can provide something for the evaluation, namely:

- Drifters to deploy
- Deployment opportunities
- Archived data
- Expertise
- Software development (e.g. by buoy manufacturer)
- Design suggestions according to evaluation

Any other person interested in participating in the evaluation group should contact Elizabeth Horton.

Report from the evaluation sub-group presented at the DBCP-15 workshop in Wellington, October 1999, can be found on the DBCP technical forum at http://www-dbcp.cls.fr under "SVPB/SVPBW evaluation sub-group".

1.6. Impact studies regarding data buoys:

As requested at the 15th DBCP session, I compiled a list of impact studies regarding data buoys. The list is available through the DBCP web site (http://dbcp.nos.noaa.gov/dbcp/impact.html).

Recently, at the CGC/WMO workshop on the impact of various observing systems onNumerical Weather Prediction, it was shown noticeable impact from SH drifters (p), in particular in short range, with improvements in Southern Hemisphere scores equal to half a day in forecast skill (study undertaken in response to OPAG-IOS ET-ODRRGOS request). Also, PAOBS and drifters combined provide positive impact in SH, over and above the effect coming from the drifters alone (one study by BMRC).

Anybody with information on past, present or future studies which are not listed in the web document is invited to submit details to the Technical Coordinator.

1.7. GTS

1.7.1. BUOY code, BUFR, CREX

At the 15th DBCP session in Wellington, the issue of adding new fields in the BUOY code for dealing with specific metadata such as anemometer height was discussed. Also, since a number of moored buoys are reporting on GTS in SHIP code instead of BUOY because there is no provision in the BUOY code to encode certain variables, the issue of adding those variables in the BUOY code was discussed.

At its 15th session, the DBCP urged its members to provide the technical coordinator with feedback before 1 March 2000 regarding proposed BUOY code modifications. A draft proposal was then reviewed and finalized by an **ad hoc** subgroup, chaired by Eric Meindl and including representatives from Australia, Canada, Netherlands, U.K, and USA, in close consultation with an appropriate expert from CBS (Cliff Dey).

To defend the proposal, I attended the meeting of the CBS Implementation Co-ordination Team on Data Representation and Codes (ICT/DRC), 10-14 April 2000. Details about the outcome are provided in the related DBCP session preparatory document.

1.7.2. New GTS bulletin headers

New list of GTS bulletin headers was implemented on 13 October 1999 at 15 UTC. See annex A for details.

1.7.3. GTS Sub-system

1.7.3.1. Data processing of sub-surface float data for GTS distribution:

Developments had been conducted at CLS, Service Argos, to upgrade the Argos GTS sub-system for processing sub-surface float data for GTS distribution in real-time. New system was operationally implemented on 20 March 2000 but some tests with actual floats (UK, Japan, Australia) were conducted until July 2000. New system permits to process more complex Argos message formats and to deal with a high number of sensors (e.g. profiles). I was involved with the development and test of the new system. I updated the Argos GTS sub-system reference guide (DBCP document No. 4) accordingly.

1.8. Meta-data

I collected comments from DBCP members and Action Groups regarding Metadata catalogue for buoys. I also liaised with DBCP sub-group on codes to consider inclusion of specific variables such as anemometer height in the BUOY format. See related DBCP session agenda item and preparatory document for details. See also DBCP proposal on the issue which was posted on the DBCP web site at http://dbcp.nos.noaa.gov/dbcp/metadata.html.

1.9. Data collection and location systems

1.9.1. Argos

1.9.1.1. Argos message formats

The DBCP decided to publish a list of recommended Argos formats via its web server, and encouraged new buoy operators looking for advice or expertise to use one of those. Advantages of listed formats are detailed. Although buoy operators are free to develop and use their own formats, usage of existing formats permits to substantially speed up insertion of buoy data onto the GTS through the Argos users' guidance offices.

Present list is available on the DBCP web site and includes the following formats:

22. DBCP-M1: Format proposed by Météo France
23. DBCP-O2: SVPB so called 2-page format
24. DBCP-O1: SVP standard drifter (SST only)

1.9.1.2. Argos Joint Tariff Agreement

The 19th session of the Argos Joint Tariff Agreement meeting was held in Wellington, 1-3 November 1999.

25. The JTA supported proposed DBCP recommendations and requested CLS, Service Argos to take necessary actions in response to the needs identified, in conjunction with appropriate bodies.
26. Regarding Argos Tariff, the meeting agreed on the following:
27. To continue the bonus system. 60% of the countries could take advantage of the bonus in 1999. This represented about 26% of the 82% compound bonus.
28. To put a 5 year plan in place (2000-2004) to eliminate the annual operating deficit, and to effectively remove the accumulated losses. This will be realised during the period 2000 to 2004 through an allowed 2% inflation increase in Argos operating costs, a JTA share of these costs to decrease from 58% in 2000 to 52% in 2004, a monthly active platform fee to phase in from FRF 10 in 2000 to FRF 50 in 2004, the basic PTT*Year cost to increase from FRF 26200 in 2000 to FRF 27000 in 2004, the unused ID charge to be phased out over the period, and free access to the third satellite immediately for animal trackers and possible introduction for all users later.

29. For year 2000, basic tariff for standard location and data collection is therefore slightly increased to FRF 26200 and a small FRF 10 monthly active platform fee introduced.

1.9.2. Other telecommunication systems

The Panel is continuing to review and report on new developments in telecommunication systems potentially useful for buoy programmes.

A paper written by David Meldrum which outlines these developments is available on the DBCP web site at http://dbcp.nos.noaa.gov/dbcp/1smms.html.

3 Specific TC DBCP non regular tasks undertaken during the intersessional period

1.10. October 1999

1. **Visit:** 8 October 1999, visit of Stan Wilson of NOAA to discuss Argo coordination issue.

2. **Mission (DBCP & SOOP)**: 18-21 October 1999, Saint Raphael, France, OceanObs99 conference. I represented the DBCP and SOOP at the conference. I addressed DBCP and SOOP issues with the people I met. Apart from the conference, I had also a meeting with the Argo Science team to discuss the issue of Argo international coordination (the DBCP was regarded as an example in this regard) especially with regard to the issue of Argo floats entering one country's Exclusive Economic Zone.

3. **Mission (DBCP)**: 26-29 October 1999, Wellington, NZ, DBCP 15th session

4. **DBCP**. I wrote a memo on DBCP efficiency and achievements.

5. **GTS bulletin headers**. New list of GTS bulletin headers was finally implemented as scheduled on the 15 October. Minor problems were reported by the South African Weather Bureau and the Meteorological Service of New Zealand. Problems have been corrected within a couple of day. Considering the extensive change of the list, I consider the change occurred smoothly.

6. **BUFR code**. I submitted a small number of proposed new BUFR table entries to CBS, to include certain variables in BUFR reports (e.g. anemometer height, hydrostatic pressure, height above station with higher accuracy). These modifications had been proposed for discussion at the October 1999 "fast-track" CBS meeting, for implementation in May 2000. Modifications have finally been accepted by CBS except the one related to high accuracy for sensor height since this can actually be solved using BUFR data description operator for a change of scale.

7. **GTS sub-system**. Working in conjunction with CLS and contractor on upgrading the GTS sub-system to process sub-surface floats.

1.11. November 1999

1. **Mission (DBCP)**: 1-3 November 1999, Wellington, NZ, JTA-19th session

2. **Mission (DBCP & SOOP)**: 4-5 November 1999, Melbourne, Australia, visit BOM. This was primarily a SOOP mission although I also discussed DBCP priorities with Graeme Brough: SVPB drifters in the Southern Hemisphere, SVPB/SVPBW evaluation, and code matters. It might be required for me to travel to Washington DC in early 2000 to discuss Southern Hemisphere SVPB drifter issue with NOAA/OAR (David Evans).

3. **Vacation**: 8-12 November 1999.

4. **Mission (DBCP & SOOP)**: 29-30 November 1999, Geneva, Meeting of the expert team on observational data requirements and redesign of the Global Observing System. I only attended the first two days of the meeting, i.e. 29-30 November which were dedicated to presentations and general discussion. During the following 3 days, the meeting planned to work through small

working groups dealing with specific issues. Meeting was chaired by Paul Menzel, University of Wisconsin, USA. I represented JCOMM and did report on the status of buoy (DBCP) and ship of opportunity (SOOP) programmes. While being at WMO, I also discussed BUOY code issue with Joel Martellet, and DBCP and SOOP issues with E. Sarukhanian.

5. **BUOY code**. I worked on the modification of the BUOY code in conjunction with the relevant DBCP sub-group.

6. **Metadata**. I am collecting comments from DBCP members regarding the proposed format. I am preparing a synthesis which I will submit to the JCOMM Sub-group on Marine Climatology in January. The sub-group will meet in early 2000 and take the DBCP recommendations into account.

7. **Advertising GTS**. A web page inviting new GTS users to authorize GTS distribution of their data has been substantially modified (http://dbcp.nos.noaa.gov/dbcp/1gtsinfo.html).

8. **GTS sub-system**. Working in conjunction with CLS and contractor on upgrading the GTS sub-system to process sub-surface floats.

1.12. December 1999

1. **Mission (SOOP)**: 6 December 1999, Paris, IRD: Meeting with J.P. Rebert regarding SOOP issues.

2. **Mission (DBCP)**: 7-8 December 1999, Paris, EGOS Management Committee meeting.

3. **Mission (DBCP, SOOP, Argo)**: 9 December 1999, Paris, IOC headquarter. Discuss JCOMM with Yves Tréglos. Discuss Argo coordination issue with Colin Summerhayes.

4. **Vacation**: 27-31 December.

5. **Argo**. I provided Colin Summerhayes with cost estimates for establishing an Argo Information Center in Toulouse at CLS, including hiring a half time coordinator. Position and center would be funded through voluntary contributions from Member States ($74000 first year, $54000 following years). USA is willing to pay 1/3rd of the total cost.

6. **GTS sub-system**. I followed sub-contracted developments with Argos GTS sub-system to process sub-surface floats.

7. **Update DBCP web site**

   (i) SVPB upgrade opportunity document (http://dbcp.nos.noaa.gov/dbcp/svpb_upgrade.html)
   (ii) DBCP highlights document (http://dbcp.nos.noaa.gov/dbcp/highlights.html)
   (iii) Web site directory (http://dbcp.nos.noaa.gov/dbcp/site_directory.html)
   (iv) Data collection and location systems (update from David Meldrum
   http://dbcp.nos.noaa.gov/dbcp/1smms.html)

1.13. January 2000

1. **Argos Y2K** : no problem.

2. **Y2K**: I updated some of my tools to correct Y2K problems. I did not find more problems than expected.

3. **DBCP Database**. Work on tools to make DBCP database available on-line via the web (DBCP implementation strategy): Java, JDBC, Paradox

4. **Metadata**: I summarised comments from DBCP members and provided Joe Elms with DBCP report (http://dbcp.nos.noaa.gov/dbcp/metadata.html).

5. **IOC**. Provide Yves Tréglos with status maps for IOC annual report.

6. **GTS sub-system**. Developments with Argos GTS sub-system to process profile data are done. I tested the new system. New system should become operational in mid-March 2000.

7. **Plan meetings in Washington DC** in February to discuss Southern Hemisphere drifter, data assimilation, QC, Argo, and GTS-sub system issues at NOAA offices (NCEP, OGP, OAR, NODC) and SAI.

8. **News from Gulf of Trieste moored buoy project** (Slovenia): Manufacturers replied to tender offer. Cost was higher than EU available funds. Slovenia plans to pay for the difference. Buoy should be deployed in 2000.

9. **Crete moored buoy** (MFSPP, OGS) was deployed on 30 January 2000. However, there seems to be problems with the Argos transmitter. Data can still be collected via GSM but are not distributed on GTS.

10. **QC**. Pierre Blouch developed new QC tools particularly useful to show/find specific sensor problems for buoys reporting on GTS (e.g. time series of Obs-FG). I advertised Pierre's tools. See http://www.shom.fr/meteo/qctools/

1.14. February 2000

1. **Mission (DBCP & SOOP)**: 9-18 Feb: Visit to Washington

   10 Feb. : For DBCP, OGP (am: Mike Johnson, Steve Piotrowicz, Mike Hall)
   - Southern Hemisphere drifter issue

   10 Feb. : For SOOP, NODC (pm: Doug Hamilton)
   11 Feb. : For DBCP&SOOP, NCEP (Chris Caruso, Ming Ji, Dick Reynolds, Diane Stokes)
   - Discuss data assimilation and requirements for SOOP and DBCP data in NCEP ocean model.

   14 Feb. : For DBCP, Service Argos, Inc. (am), OAR (pm: David Evans)
   - OAR: Southern Hemisphere drifter issue
   - GTS sub-system

   15-18 Feb.: For DBCP/JCOMM, CBS meeting on Internet Practices

2. **BUOY code** issue

3. **GTS sub-system**. Testing new version of GTS sub-system. Operational implementation of new system planned on 15 March 2000.

4. **SOOP**. Jocelyn Charvet (student) begins to work on SOOPIP data base and web at MEDIAS. He'll work on it for 5 months (last month devoted to writing his thesis).

5. **IABP, IPAB meeting**. Since I will be attending the JCOMMTRAN-2 meeting in Paris, 14-16 June, I proposed that Elizabeth Horton represents the DBCP at the IABP and IPAB meetings, Fairbanks, 26-28 June.

1.15. March 2000

1. **Visit:** 2-3 March: Visit from Graeme Brough in Toulouse.

2. **Mission (DBCP)**: 6 March, Météo France, Toulouse: I attended the fist day of the CGC/WMO Workshop on the Impact of Various Observing Systems on Numerical Weather Prediction.

3. **Mission (Argo)**: 7-9 March, Southampton, UK: Argo Science Team meeting, Southampton Oceanographic Centre. I did a presentation on GTS and the proposal for the creation of an Argo Information Center.

4. **Mission (DBCP)**: 27 March, La Jolla, USA: SIO, discussion with Andy Sybrandi regarding SVPB construction manual. Andy provided me with the most recent version but a few pictures are still missing. We may propose to produce ac simplified version of the manual to improve consistency among SVPB drifter designs.

5. **Mission (SOOP)**: 28-31 March, La Jolla, USA: 3rd meeting of the SOOP Implementation Panel

6. **GTS sub-system**. New version of GTS Sub-system to process sub-surface floats implemented on 20 March 2000. I have been discussing implementation details with CLS subcontractors. I have

been involved in the testing of the new system. Fernand Cid is implementing/testing specific technical files for UK and Japanese floats.

1.16. April 2000

1. **Mission (DBCP)**: 10 April, Geneva, Switzerland: Meeting of the CBS Implementation Coordination Team on Data Representation and Codes. I defended the DBPC proposal for a modification of the BUOY code (see http://dbcp.nos.noaa.gov/dbcp/highlights.html#buoy).

2. **Mission (DBCP & SOOP)**: 10 April, Geneva, Switzerland: Meeting of the Atmospheric Observation Panel for Climate. I did a presentation on the status of drifter programmes in data-sparse regions.

3. **Mission (DBCP & SOOP)**: 13-14 April, Tokyo, Japan: Argo Pacific Implementation meeting. I represented the DBPC and SOOP. I explained what the two Panels could offer in terms of deployment opportunities, and presented the proposal for the establishment of an Argo Information Center in Toulouse.

4. **Vacation**: 24-28 April

5. **BUOY code**. Discussions with DBCP working-group on modification of the BUOY code.

6. **Deployment opportunities**. Contact with DBCP members regarding deployment opportunities. Elizabeth Horton provided me with detailed information regarding air deployments. Information on deployment opportunities should be integrated within JCOMM for DBCP, SOOP, Argo, TAO, etc (see http://dbcp.nos.noaa.gov/dbcp/highlights.html#Deployment). I wrote a dedicated web page on the DBCP server (http://dbcp.nos.noaa.gov/dbcp/1bdr.html).

7. **Southern Hemisphere SVPBs**. Continue following Southern Hemisphere barometer issue (see http://dbcp.nos.noaa.gov/dbcp/highlights.html#SH_BARO)

8. **DBCP National Focal Points**. I edited the DBCP lists of National Focal Points and National Focal Points for Logistic Support to reflect a few recent changes (http://dbcp.nos.noaa.gov/dbcp/1nfpfbp.html and http://dbcp.nos.noaa.gov/dbcp/1nfpfls.html).

9. **IPAB**. I provided Ian Allison with a list of buoys in the Antarctic Region for him to contact owners in the view to have them join IPAB.

1.17. May 2000

1. **EGOS meeting**. 30-31 May 2000, Brest, France: EGOS meeting. DBCP was represented by Pierre Blouch. I provided him with a DBCP report for presentation at the meeting.

2. **BUFR**. I prepare a list of BUFR descriptors corresponding to variables measured by buoys in order to propose lists of common sequences to be used for encoding buoy data in BUFR.

3. **IABP, IPAB meetings**. Prepare DBCP report to IABP and IPAB plus transparencies for Elizabeth Horton who will represent the Panel at the meetings.

4. **JCOMM**. Write a proposal for the establishment of a JCOMM Operations Centre (JCOMMOPS) in Toulouse (written document for 2nd JCOMM transition planning meeting) that will basically include all activities of the DBCP, SOOP, and Argo coordinators plus a web site (http://www.jcommops.org).

5. **Argo**. Establishment of an interim Argo float deployment notification mechanism (IOC resolution XX-6), including a dedicated Internet forum (http://argo-forum.jcommops.org).

6. **GOS**. Prepare document on proposals for the redesign of the marine part of the Global Observing System for the meeting of the Expert Team on Observational Data Requirements and redesign of the GOS, Geneva, 19-23 June 2000.

7. **Vandalism**. I wrote a document on vandalism to be presented at the next meeting of the International Hydrographic Organization (IHO) Commission on the Promulgation of Radio

Navigational Warnings (CPRNW), Monaco, 27-29 June 2000. It is proposed to include appropriate information on ocean data buoys in broadcasts under the World Wide Navigational Warning Service and/or Notices to Mariners, together with other means of communication as might be proposed. Information is also available via the web at http://dbcp.nos.noaa.gov/dbcp/vandalism.html.

8. **Buoy monitoring statistics**. Argentina providing buoy monitoring statistics and information on how they are produced. Details on DBCP web site (http://dbcp.nos.noaa.gov/dbcp/monstats.html#SMN).

9. **GTS sub-system**. Work with CLS and sub-contractor on the implementation of a new version of the GTS sub-system to (i) deal with specific checksum computation for Argo floats, (ii) make necessary changes for the new code versions of BATHY and TESAC, and (iii) implement specific calibration curves needed for processing Argo floats.

10. **Argo**. Provide information to Physics Today on Argo float deployment notification and EEZ issue for an article which will be published in the magazine.

1.18. June 2000

1. **Vacation**: 2 June.

2. **Mission (DBCP & SOOP)**: 14-16 June, Paris, France: Second JCOMM transition planning meeting, Paris. I presented the proposal for the creation of a JCOMM Operations Centre. Concept was strongly endorsed by the meeting although it was proposed that the name should be changed. Pending agreement from the DBCP, SOOP, and Argo, the meeting agreed that the centre could work on an interim basis and could retain the obtained Internet URL of jcommops.org.

3. **Mission (DBCP, SOOP, Argo)**: 19-20 June, Geneva, Switzerland: I attended the 3rd meeting of the Expert Team on observational data requirements and redesign of the Global Observing System (19-23 June). I represented JCOMM and presented proposal for the redesign of the marine part of the GOS (DBCP, SOOP, Argo, VOS, ASAPP).

4. **IABP and IPAB meetings**, 26-28 June, Fairbanks. DBCP was represented by Elizabeth Horton. I provided her with a DBCP report to present at the meeting.

5. **GTS sub-system**. Testing the new version of the GTS sub-system (Argo checksum and curves, BATHY & TESAC new versions). 7 June: implementation of the new version.

6. **TAO**. PMEL plans to equip TAO moorings with barometric pressure sensors.

7. **GTS sub-system documentation**. Update GTS sub-system reference guide.

11. **Non drifting ODAS**. Yves Treglos proposed that MEDS maintains the non drifting ODAS catalogue in electronic form and make it available via the web. MEDS kindly agreed and will offer some resources on this issue.

12. **JCOMM**. Draft JCOMM circular letter to update DBCP list of National Focal Points for Logistical facilities and seek information on potential deployment opportunities. This is being done in an integrated approach to consider drifting buoy deployments, moored buoy servicing, and Argo float deployments by using ships of opportunity (of SOOP), VOS, ASAPP ships, and aeroplanes.

1.19. July 2000

1. **Mission**: 10-11 July, Paris: Argo Atlantic implementation planning meeting. I made a presentation on DBCP deployment opportunities and XBT lines which could be used to deploy Argo floats in the Atlantic Ocean.

2. **GOS**: Collect and Compute estimates of marine system performances (space/time resolution, accuracies, delays in all ocean areas for DB, MD, XBTs, Argo) for the Expert Team on observational data requirements and redesign of the Global Observing System. Provide information to WMO.

3. **Vacation**: 17-28 July.

4. **ISABP meeting** was held 31 July - 4 August in Salvador, Brazil. DBCP was represented by Eric Meindl. I provided him with a report on DBCP activities to present at the meeting.

1.20. August 2000

1. **DBCP session**. Preparation of the DBCP session:
   - TC report
   - Information exchange
   - Quality Control
   - Codes
   - Argos System
   - Metadata
   - Southern Hemisphere SVP-B
   - Integration of deployment opportunities with SOOPIP & Argo
   - GTS distribution for other satellite systems
   - JCOMMOPS

2. **GOS**: Continue computing estimates of marine system performances (space/time resolution, accuracies, delays in all ocean areas for DB, MD, XBTs, Argo) for the Expert Team on observational data requirements and redesign of the Global Observing System. Provide information to WMO.

3. **Visit:** Visit of Johannes Guddal, co-Chairman, JCOMM to discuss JCOMMOPS issue.

1.21. September 2000

Remark: This paragraph written in August 2000.

1. **DBCP session**. Preparation of the DBCP session (transparencies)

4 Regular or normal tasks

1.22. Monitoring

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

1.22.1. Quality Control Guidelines

1.22.1.1. Reading QC messages

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

1.22.1.2. Contacting PGCs

To contact the PGCs: The QC guidelines have been automated, so most of the time status change proposals are automatically forwarded to the Principal GTS Co-ordinator (PGC) provided that he has an email address. In case the PGC has no email address, the TC DBCP contacts the PGC directly, and suggests him to implement the proposed change. The PGC should normally contact Service Argos and/or Local User Terminal (LUT) operators and request implementation of the proposed change. In case the PGC disagrees, the TC DBCP immediately deposits a denial message on the bulletin board.

1.22.1.3. Checking Argos files

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

1.22.1.4. Feed back.

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

1.22.2. Specific problems.

To resolve specific problems related to GTS for given buoys, such as looking carefully at the data and the transfer functions. For example, I could be investigating why no or only a few messages are received at Meteorological Centres...

1.22.3. TC DBCP files.

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

1.23. User assistance

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

1.23.1. Principal Investigators (PI) or buoy programme managers:

PIs regularly request the TC DBCP to look at specific problems regarding their buoy data or request assistance for GTS distribution of the data. For example, I could be studying in detail Argos message formats and sensor transfer functions or I could obtain WMO numbers on their behalf. I could also simulate satellite orbits in order to estimate orbital delays.

1.23.2. Local User Terminals (LUT):

From time to time, LUT operators ask me to provide them with the transfer functions used with specific platforms so that they can also report to the GTS via their LUT.

1.23.3. Meteorological Centres

Meteorological Centres may contact me when they need information on given platforms drifting in an area of interest.

1.23.4. Secretariats:

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

1.23.5. Buoy manufacturers.

Buoy manufacturers regularly contact me to be included in the DBCP list of drifting buoy manufacturers (http://dbcp.nos.noaa.gov/dbcp/11obm.html). I may also discuss technical issues with them.

1.23.6. Individual users

Individual users contact me to obtain buoy information and/or seek information on how to obtain buoy data. I usually redirect them to adequate institution(s) (e.g. RNODC/DB).

1.23.7. Acting as a Principal GTS Co-ordinator

e.g. When the regular PGC is in vacation, I can replace hem/her and act as a PGC.

1.23.8. Focal point.

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

1.23.9. Investigate various data loss problems.

1.24. Drifting Buoy Quarterly Report

The Drifting Buoy Quarterly Report was issued , and distributed widely by CLS, Service Argos.

1.25. Global Telecommunication System (GTS)

1.25.1. Status for drifting buoys reporting onto the GTS:

Year	Operational drifting buoys	On GTS	% on GTS
July 1991	718	264	36.8%
July 1992	1162	474	40.8%
August 1993	1269	548	43.2%
September 1994	1246	587	47.1%
September 1995	1429	631	44.2 %
September 1996	1180	638	54.1%
September 1997	1159	581	50.1%
August 1998	1230	543	44.1%
July 1999	1270	728	57.3%
July 2000	1385	807	58.3%

See also graphs, tables, and maps in annex B
Météo-France provided me with Data Availability Index Maps on a monthly basis. The maps are useful to identify the data sparse ocean area for each kind of geo-physical variable and therefore to assist the various data buoy programmes in adjusting deployment strategies. The maps show clearly the impact of the TAO array ATLAS moored buoys (wind), of DBCP regional action groups such as the ISABP (air pressure), or of specific national programmes such as MSNZ (air pressure).

1.25.2. GTS bulletin headers:

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

See Annex A for a complete list of GTS bulletin headers used to date.

1.25.3. Quality Control.

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

- Actually monitor the Internet Mailing List, and contact PGCs accordingly when those cannot be reached automatically.
- Act as a PGC upon request.

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

1.25.4. Non-standard wind sensor heights:

I keep up to date the list of drifting buoys making wing measurements and reporting on GTS using the BUOY code (updated on a semestrial basis). The list includes the WMO and Argos ID numbers, the height of the anemometers and whether or not a correction to 10 meters is applied. List is available via the DBCP web site at http://dbcp.nos.noaa.gov/dbcp/1wb.html.

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

A few land stations reporting via Argos continue to report on GTS in BUOY code instead of SYNOP. I am therefore keeping up to date the list of such stations. This list includes the WMO, and Argos ID numbers, the Position and Altitude of the stations and whether or not Air Pressure is reduced to sea level. List is available via the DBCP web site at http://dbcp.nos.noaa.gov/dbcp/llsribc.html (updated on a semestrial basis).

1.25.6. New buoys on GTS

I am regularly contacting buoy programme managers of new programmes in order (i) to convince them to authorise GTS distribution of their buoy data, and (ii) to offer assistance for that purpose. Programme managers who spontaneously authorise GTS distribution of their buoy data, may regularly contact me for assistance.

The new GTS sub-system permits to process the data provided that adequate information is precisely implemented in the system. I am therefore studying in details technical files of buoys with complicated Argos message formats. In some instances I obtain WMO numbers from National Focal Points or WMO secretariat on behalf of the programme managers.

1.26. Argos GTS Sub-System

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

- Monitor the system and look for possible problems.
- Make sure the problems are corrected.
- Training of the Argos Users' Guidance Office and work in conjunction with it regarding complex problems.

Refer to related DBCP session agenda item (Argos) for details.

1.27. DBCP World Wide Web Internet server

The regular work of the Technical Co-ordinator concerning the DBCP web site is mostly related to the following topics:

- Keep regular files on the Web. Server up to date (transfer files).
- Tentatively keep links to other servers up to date.
- Refer to related DBCP session agenda item (Information exchange) for details.

1.28. TC statistics and graphs.

1.28.1. Active drifting buoys.

Using Argos files and data provided by LUT operators, I computed on a monthly basis, by country and by organisation, graphs showing the distribution of active GTS and non-GTS drifting buoys. It is particularly useful to see the evolution of the total number of drifting buoys deployed by the various countries involved, and the percentage of these reporting to the GTS. See graph-1 in annex B (distribution of active buoys by country), graph-2 (distribution of GTS buoy data by country and variable), and graph-3 (Evolution of number of air pressure observations distributed on GTS per month since 1990 (from ECMWF monitoring statistics)).

1.28.2. Quality of air pressure.

I Computed on a monthly basis, the graph showing the distribution of the RMS (of Observation minus First Guess Field) of Air Pressure data according to ECMWF monthly monitoring statistics. This graph, which uses 6 months of data, gives a good estimate of the quality of the drifting buoy Air Pressure data. See graph-4 in annex B (evolution of mean RMS (Obs.-First guess) per month since 1990 for global GTS air pressure data (from ECMWF monitoring statistics)), and graph-5 (histogram of distribution of RMS (Obs. - First Guess) for the period 02/2000 to 07/2000).

1.28.3. Air pressure from drifting buoy life time.

I Computed the graphs showing the distribution of life times of Air Pressure measurements, using the ECMWF monitoring statistics.

1.29. Action Groups, Regional actions.

1.29.1. Action Groups.

I liaise with DBCP Action Group co-ordinators and reply questions from them, prepare DBCP reports for AG meetings (to be presented by the DBCP representative at the meeting), and possibly attend those meetings on behalf of the DBCP.

1.30. Miscellaneous

1.30.1. Drifting Buoy Quarterly Report.

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

1.30.2. Argos monthly status report.

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

1.30.3. TC DBCP files.

I updated my files on a PC, using a data base management system (Paradox) and getting the data from Argos files and various status reports.

1.30.4. WMO/Argos number cross reference list and PGC list.

I issued, on a monthly basis, the WMO/Argos number cross reference list, and sent it via the BUOY-QC mailing list to various Meteorological Centres and interested individuals. The list also includes the WMO numbers managed by the Oslo and Edmonton Local User Terminals (LUT) and indicates for each WMO number, the Argos number, the drifting buoy owner, and the dates the WMO numbers have been introduced and removed from the system (Argos or LUT). Attached to it is also included the list of Principal GTS Co-ordinators (PGC) designated by Principal Investigators for asking Service Argos to implement status changes on buoys reporting onto the GTS.

1.30.5. TC DBCP bimonthly report.

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

1.30.6. List of buoy user requirements.

I am keeping this list up to date according to comments or information from buoy users.

1.30.7. Documentation, assistance.

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

1.30.8. TC DBCP missions.

I prepared the various missions or meetings I had to attend.

1.30.9. Preparation of the DBCP session.

I prepared specific documents and the TC report for the DBCP annual session:

Annex A:
GTS bulletin headers being used for GTS distrib. of buoy data in BUOY code

This new list was implemented on the 13 October 1999 at 15 UTC.

- Table 1: Data distributed from the US Argos Global Processing Centre, Largo, USA

Bulletin header	Deployment area	Remark
SSVX02 KARS	GDP	New
SSVX04 KARS	North Atlantic and EGOS	Same
SSVX06 KARS	Northern Hemisphere	Same
SSVX08 KARS	TAO, PIRATA	Was SSVX40 for TAO
SSVX10 KARS	Southern Hemisphere and ISABP	Same
SSVX12 KARS	Arctic, Antarctic, sea ice	Arctic, Antarctic merged
SSVX14 KARS	Indian Ocean and IBPIO	New
SSVX16 KARS	Navoceano	Same
SSVX18 KARS	Pacific Ocean	New
SSVX20 KARS	Navoceano	Same
SSVX22 KARS	Mediterranean sea	New
SSVX42 KARS	NOAA/NDBC, Southern Hemisphere	Was SSVX02
SSVX44 KARS	NE Pacific Ocean (USA, and Canada)	Was SSVX18
SSVX48 KARS	NOAA/NDBC, Northern Hemisphere	Was SSVX08
SSVX96 KARS	NDBC	Same

- Table 2: Data distributed from the French Argos Global Processing Centre, Toulouse, France

Bulletin header	Deployment area	Remark
SSVX01 LFPW	North Atlantic and EGOS	Same
SSVX03 LFPW	Southern Hemisphere and ISABP	Same
SSVX05 LFPW	Northern Hemisphere	Same
SSVX07 LFPW	Arctic, Antarctic, and sea ice	Arctic, Antarctic merged
SSVX09 LFPW	Indian Ocean and IBPIO	New
SSVX11 LFPW	TRITON	New
SSVX13 LFPW	GDP	New
SSVX15 LFPW	Pacific	New
SSVX21 LFPW	Mediterranean Sea	New
SSVX39 LFPW	French West Indies	Was SSVX19

Backup procedure:

Backup procedure in case one of the two Argos global processing centres fails does not change. If one centre fails, the other centre processes all the data, i.e. the data it normally processed plus the data the other centre normally processes. Hence, when an Argos centre is in backup mode, it will generate bulletins with even and odd numbers (in normal mode, only even numbers are used by Largo, and odd numbers by Toulouse). In other words:

- In case the French Argos Global Processing Center in Toulouse fails, the US Argos Processing Center in Largo is switched to backup mode. In that case, GTS bulletins normally distributed from Toulouse under TTAAii LFPW bulletin headers are distributed from Largo under TTAAii KARS bulletin headers (e.g. SSVX01 LFPW becomes SSVX01 KARS and is sent out from Largo).

- In case the US Argos Global Processing Center in Largo fails, the French Argos Processing Center in Toulouse is switched to backup mode. In that case, GTS bulletins normally distributed from Largo under TTAAii KARS bulletin headers are distributed from Toulouse under TTAAii LFPW bulletin headers (e.g. SSVX04 KARS becomes SSVX04 LFPW and is sent out from Toulouse).

Remark concerning GDP:

Since GDP drifters deployed world-wide may also participate in a DBCP regional action groups (e.g. ISABP if deployed in the South Atlantic), we have to agree on a policy on what GTS bulletin header to choose. Considering that GDP header was created basically for tracking Lagrangian drifters, it sounds reasonable to recommend to have all Lagrangian drifters participating in GDP report under GDP bulletin header and not under the other DBCP Action Group it is participating in. For example, a Lagrangian drifter participating in both GDP and ISABP (South Atlantic) and which data are distributed from the French Argos Global Processing Center would report under SSVX13 LFPW (i.e. GDP) bulletin header, and not under SSVX03 LFPW (i.e. Southern Hemisphere).

- Table 3: Data routed from the National Data Buoy Center (NDBC),Mississippi, USA, based on data received from Service Argos Inc. (SAI), Landover MD, USA

Bulletin header	Deployment area	Remark
SSVX42 KWBC	NOAA/NDBC, Southern Hemisphere	Was SSVX02 KWBC
SSVX48 KWBC	NOAA/NDBC, Northern Hemisphere	Was SSVX08 KWBC

- Table 4: Data routed from the National Ice Center (NIC), Washington DC, USA, based on data received from Service Argos Inc. (SAI), Landover MD, USA

Bulletin header	Deployment area	Remark
SSVX18 KWBC	Arctic Ocean, data Quality Controlled at NCEP	

- Table 5: Data routed from Edmonton Local User Terminal (LUT)

Bulletin header	Deployment area	Remark
SSVX02 CWEG	Arctic Ocean	
SSVX03 CWEG	Hudson Bay	
SSVX04 CWEG	NorthEast Pacific Ocean	

- Table 6: Data routed from Halifax Local User Terminal (LUT)

Bulletin header	Deployment area	Remark
SSVX01 CWHX	NorthWest Atlantic Ocean	

- Table 7: Data routed from Oslo Local User Terminal (LUT)

Bulletin header	Deployment area	Remark
SSVX01 ENMI	North Atlantic Ocean (EGOS)	

- Table 8: Data routed from the Centre de Meteorologie Marine, Brest

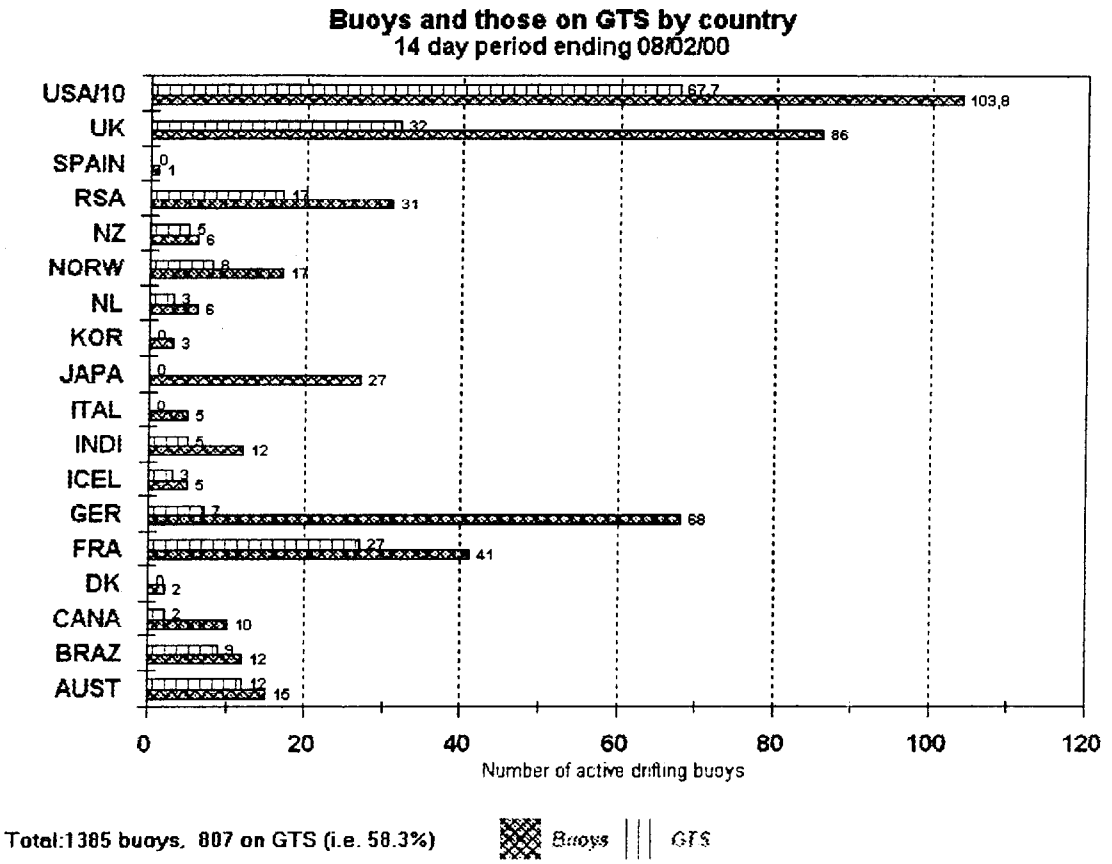
Bulletin header	Deployment area	Remark
SSVX51 LFPW	North Atlantic Ocean (Bodega-TOGA)	
SSVX55 LFPW	Equatorial Pacific Ocean (Bodega-TOGA)	

- Table 9: Data routed from the Sondre Stromfjord Local User Terminal (LUT)

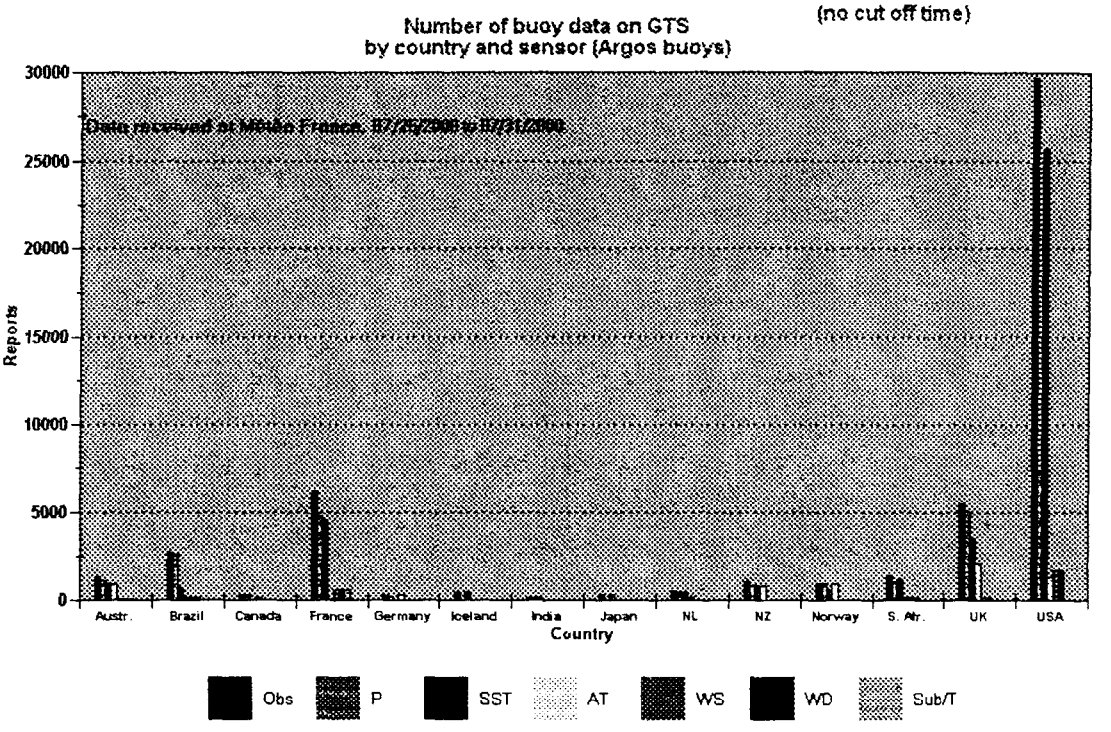
Bulletin header	Deployment area	Remark
SSVX01 BGSF	North Atlantic Ocean (EGOS)	

Annex B: Graphs

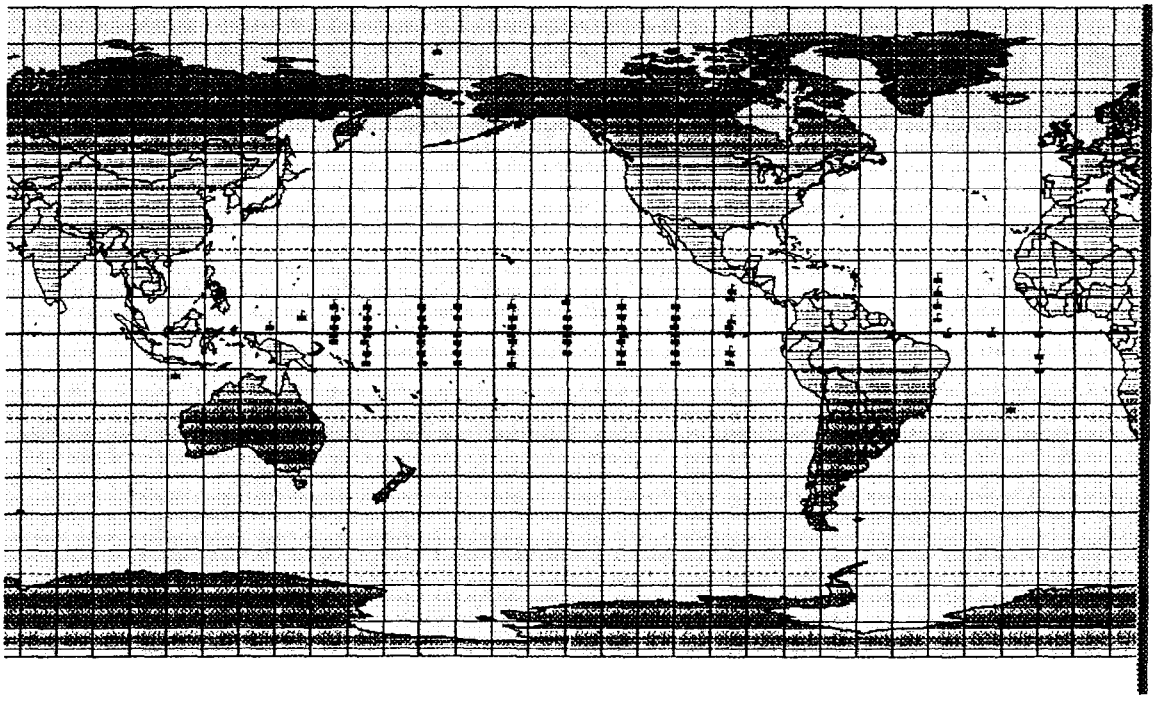
Graph-1: Buoys and those on GTS by country:



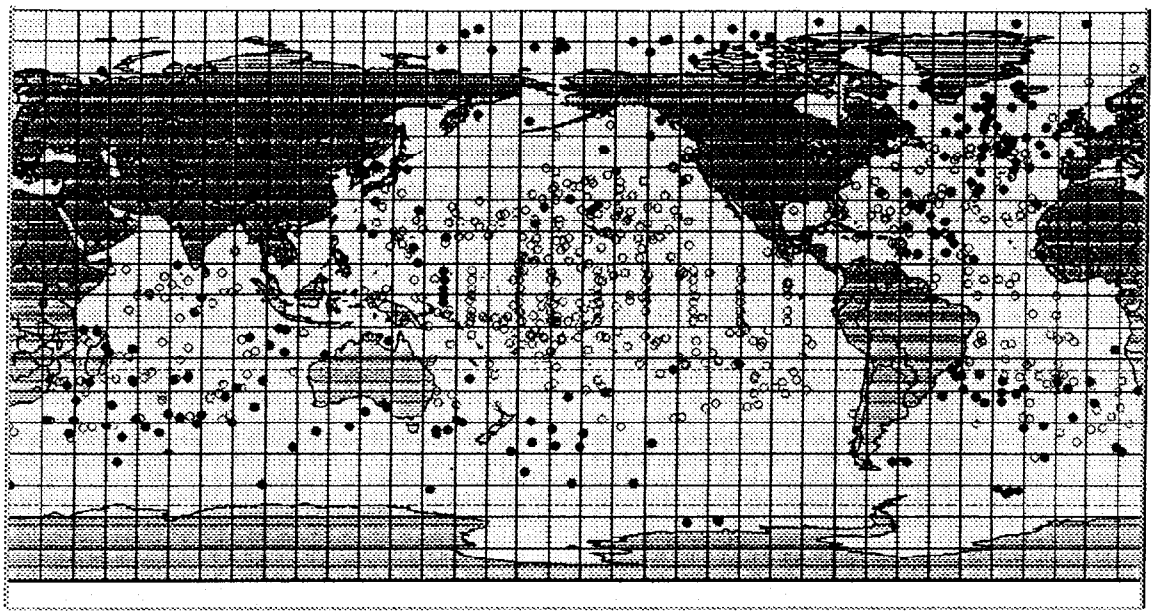
Graph-2: Number of drifting buoy data on GTS by country and sensor:



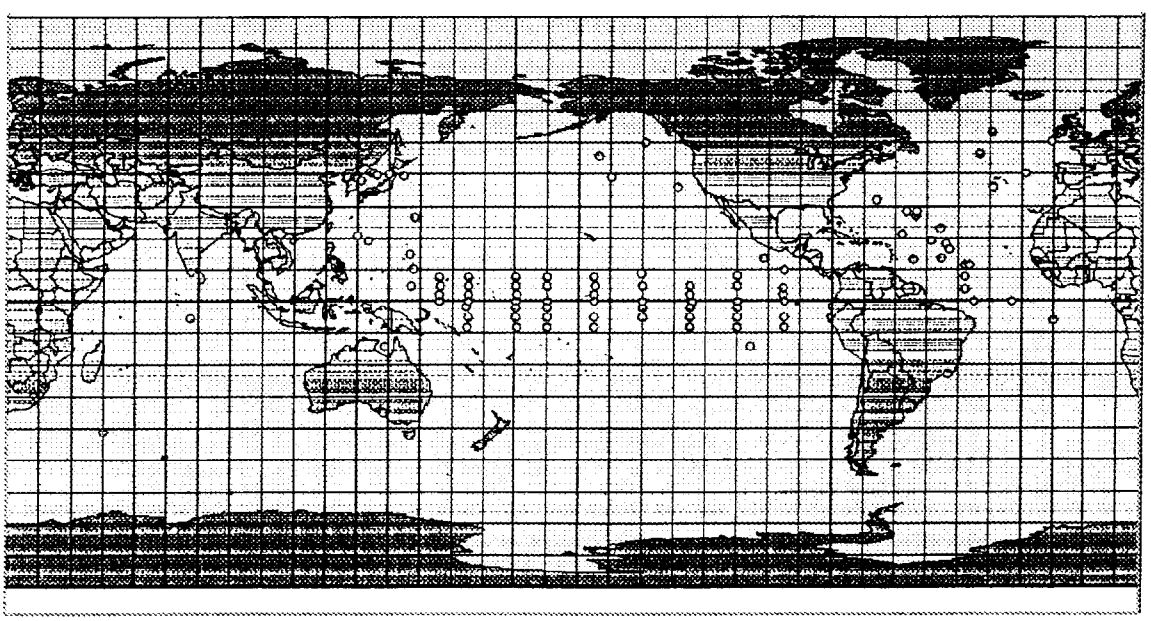
Map 1: **Moored buoys** reporting in BUOY code on GTS during the period 25-31 July 2000:



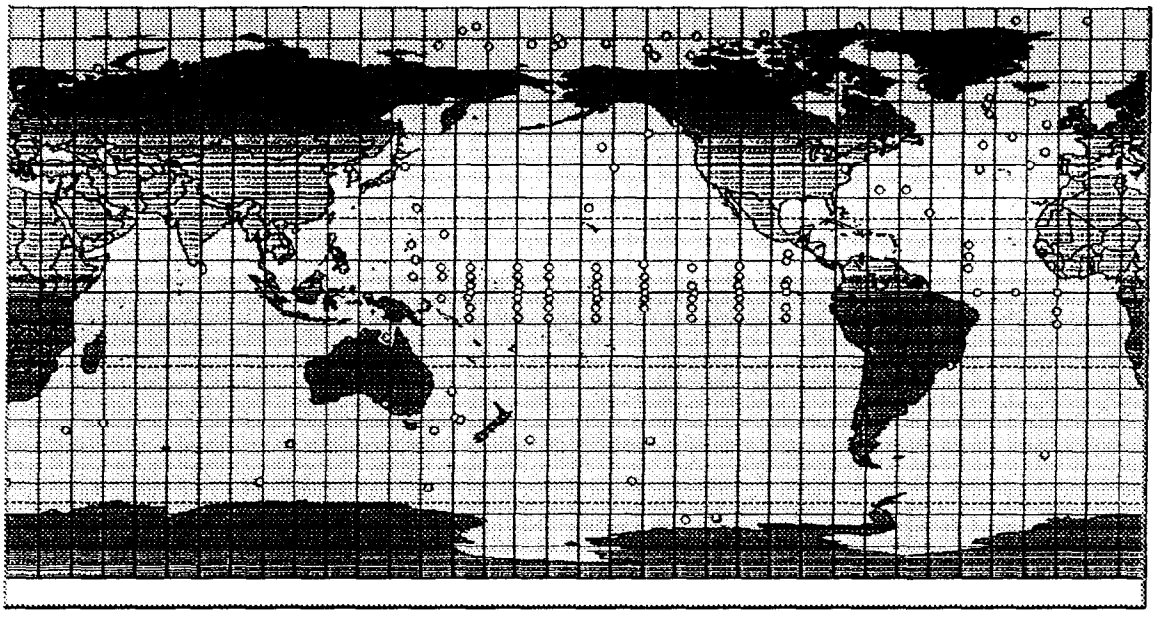
Map 2: Drifting and Moored buoys reporting in BUOY code **Air Pressure (plain circle) and SST (circle)** on GTS during the period 25-31 July 2000:



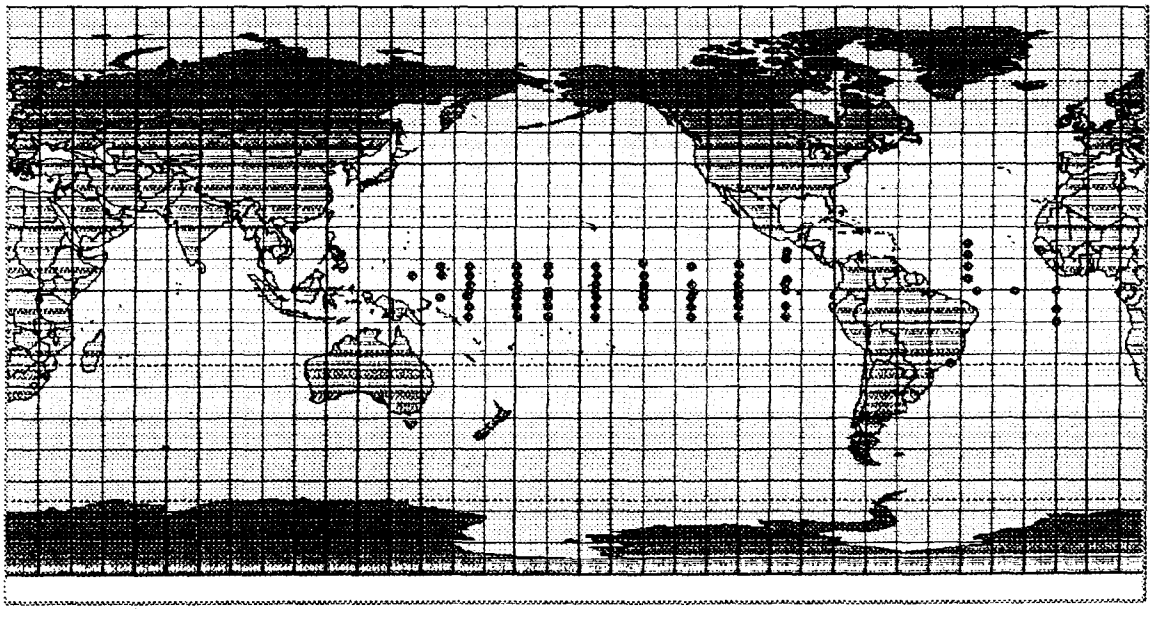
Map 3: Drifting and Moored buoys reporting in BUOY code **Wind** on GTS during the period 25-31 July 2000:



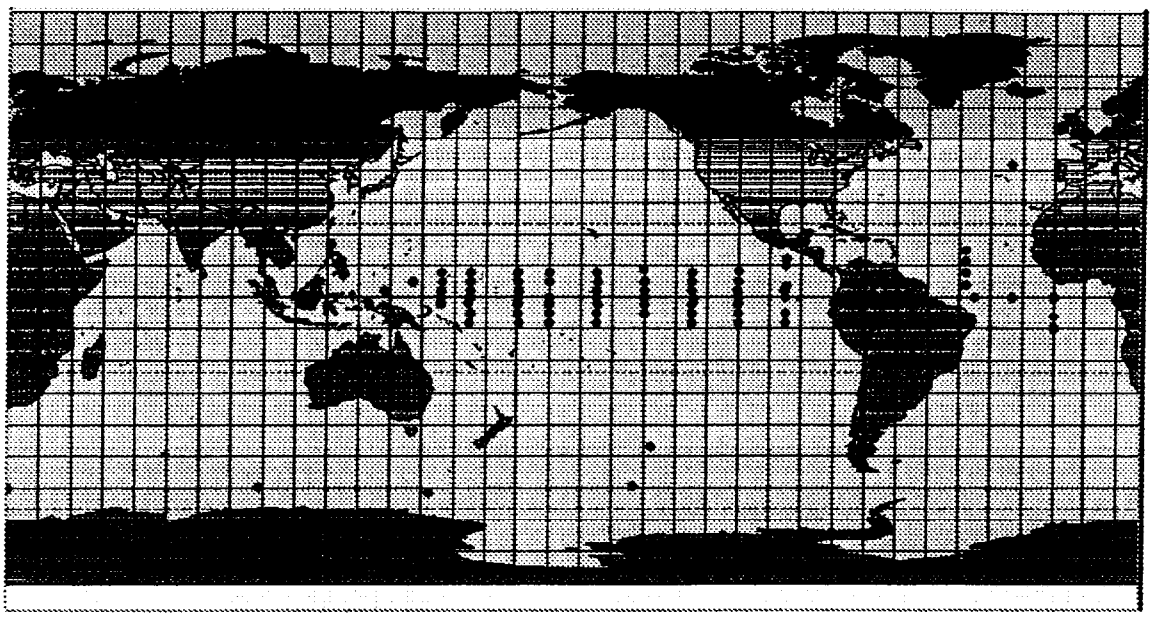
Map 4: Drifting and Moored buoys reporting in BUOY code **Air Temperature** on GTS during the period 25-31 July 2000:



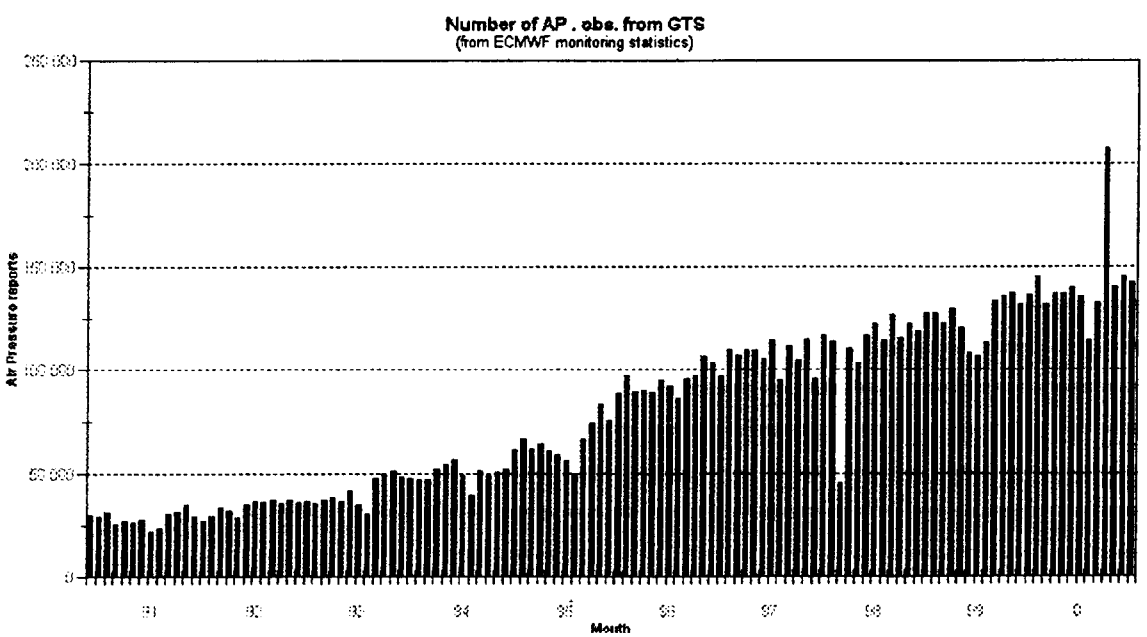
Map 5: Drifting and Moored buoys reporting in BUOY code **Air Relative Humidity** on GTS during the period 25-31 July 2000:



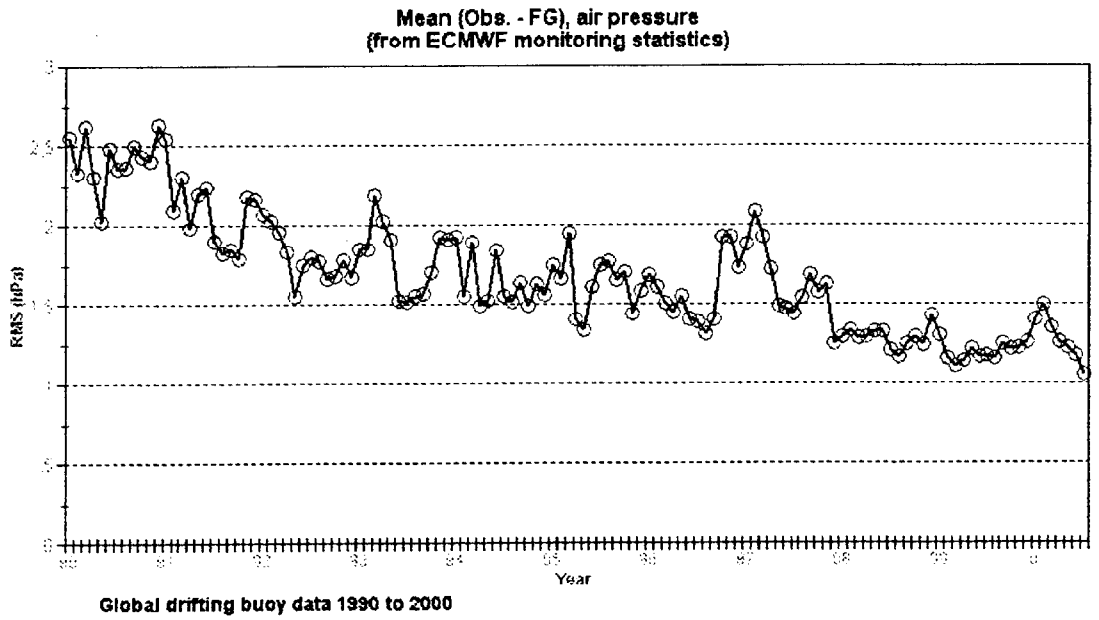
Map 6: Drifting and Moored buoys reporting in BUOY code **Sub-surface Temperature** on GTS during the period 25-31 July 2000:



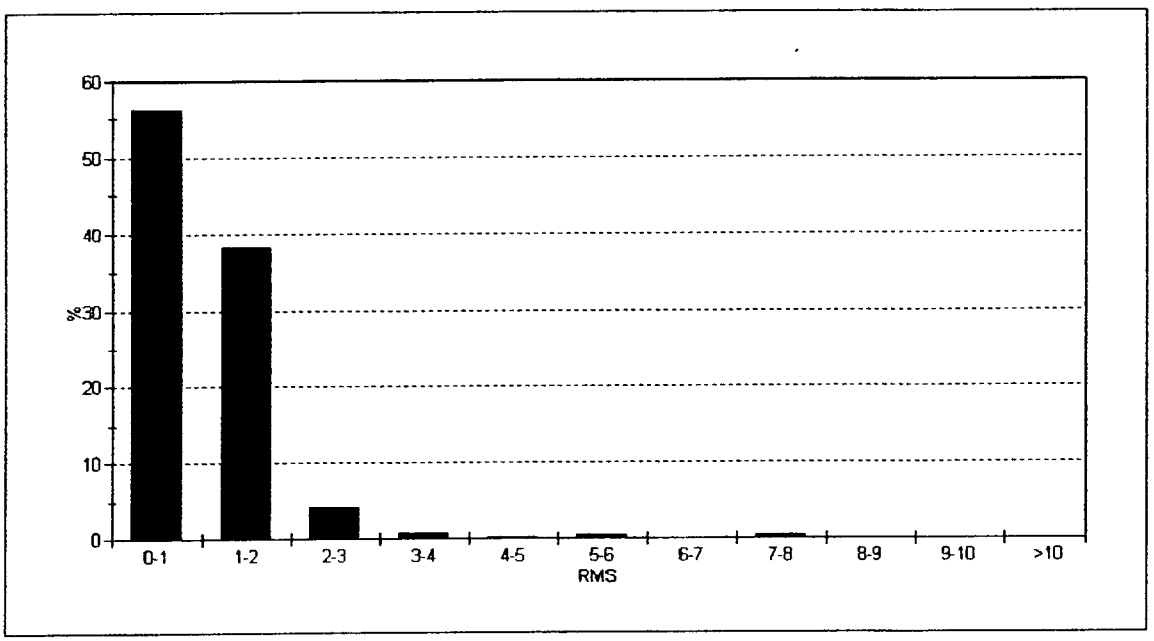
Graph 3: Evolution of number of air pressure observations distributed on GTS per month since 1990 (from ECMWF monitoring statistics)



Graph 4: Evolution of mean RMS (Obs.-First guess) per month since 1990 for global GTS air pressure data (from ECMWF monitoring statistics)



Graph5: Histogram of distribution of RMS (Obs. - First Guess) for the period 02/2000 to 07/2000.



RMS Histogram (Obs - FG) - Global Drifting GTS buoy data - 02/00 to 07/00 - Air Pressure (hPa) - from ECMWF statistics

ANNEX IV

Modifications of the BUOY code proposed for implementation on 7 November 2001

Modifications of the BUOY code listed below were accepted by the meeting of the CBS Implementation Co-ordination Team on Data Representation and Codes (ICT/DRC), Geneva, 10-14 April 2000 and will be proposed for endorsement by CBS and implementation on 7 November 2001. These only concern Section 4 of the BUOY code.

New fields indicated in red, existing field which will no longer be used are indicated in blue.

SECTION 4 444 ($1Q_pQ_2Q_{TW}Q_4$) ($2Q_NQ_LQ_aQ_z$)
{($Q_cL_aL_aL_aL_aL_a$) ($L_oL_oL_oL_oL_oL_o$) or (YYMMJ Gggg/)}
($3Z_hZ_hZ_hZ_hZ_h$ $4Z_cZ_cZ_cZ_cZ_c$) ($5B_tB_tZ_tZ_t$)
($6A_hA_hA_hA_t$) ($7V_BV_Bd_Bd_B$) ($8V_iV_iV_iV_i$) ($9i_dZ_dZ_dZ_d$)

Remark: Existing i_d field (drogue type) will be coded "/" because a new 2 character field (Z_tZ_t) was proposed for drogue type.

Explanation of new groups and fields:

- **Q_z**: Depth correction indicator. Indication whether probe depths as reported in Section 3 are corrected using hydrostatic pressure or not.

Code figure	Z_{z}
0	Depths are not corrected
1	Depth are corrected
/	Missing

- Group3 (**$3Z_hZ_hZ_hZ_h$**) Hydrostatic pressure of lower end of cable. Pressure is expressed in units of 1000 Pa (i.e. centibars). If group 3 is present, then group 4 is mandatory.

- Group4 (**$4Z_cZ_cZ_c$/**) Length of cable in meters (thermistor strings).

- Group 5 (**$5B_tB_tZ_tZ_t$**) would be omitted if buoy type and drogue type information is not available.

  B_tB_t Buoy type:

  A new code table (0-02-150, «Type of data-buoy») was proposed for encoding buoy type in BUFR reports. We suggest to use the same entries:

Code figure	Buoy type
00	Unspecified drifting buoy
01	Standard Lagrangian drifter (Global Drifter Programme)
02	Standard FGGE type drifting buoy (non Lagrangian meteorological drifting buoy)
03	Wind measuring FGGE type drifting buoy (non Lagrangian meteorological drifting buoy)
04	Ice float
05-07	Reserved
08	Unspecified sub-surface float
09	SOFAR
10	ALACE
11	MARVOR
12	RAFOS

Code figure	Buoy type
13-15	Reserved
16	Unspecified moored buoy
17	Nomad
18	3 metres discus
19	10-12 metres discus
20	ODAS 30 series
21	ATLAS (e.g. TAO area)
22	TRITON
23	Reserved
24	Omnidirectional wave-rider
25	Directional waverider
26-62	Reserved
//	Missing value (coded 63 in BUFR)

Z_tZ_t Drogue type

A new code table (0 02 034, « Drogue Type ») was proposed for encoding drogue type in BUFR reports. We suggest to use the same entries:

Code figure	Drogue type
0	Unspecified drogue
1	Holey sock
2	TRISTAR
3	Window shade
4	Parachute
5	Non Lagrangian sea anchor
6-30	Reserved (to be developed)
//	Missing value (coded 31 in BUFR)

- Group 6 ($\underline{6}A_hA_hA_hA_t$) would be omitted if the buoy is not reporting wind or the information is not available for both anemometer height and anemometer type.

$A_hA_hA_h$ Anemometer height above station level:

Height is expressed in decametres. For drifting and moored buoys, station level is assumed to be sea level. /// can be used for unknown values. A value of 999 can be used to say that anemoter height is artificially corrected to 10 meters by applying a formula.

A_t Anemometer type

A new BUFR table will have to be proposed for encoding Anemometer type.

Code figure	Anemometer type
0	Cup rotor
1	Propeller rotor
2	Wind Observation Through Ambient Noise (WOTAN)
/	Missing value (coded 15 in BUFR)

ANNEX V

CLS REPORT ON 1999-2000 OPERATIONS

1 - SYSTEM OPERATIONAL STATUS

1.1 - Ground receiving stations

1.1.1 - Global receiving stations

During the course of 1999, Fairbanks stopped sending us STIP data sets from NOAA-12 (D). At the same time, Wallops Island only delivered two STIP orbits a day for this satellite.
Consequently, instead of receiving 24 hours of data we now only have three hours, which is not nearly sufficient for the precise orbit determination for NOAA 12 (D), required to supply our users with good location data.

Since NOAA-15 (K)'s frequency was changed, Lannion is no longer able to provide STIP data sets for this satellite.

Figure 1.1.1 shows STIP data set arrival times at the Toulouse and Largo processing centers.

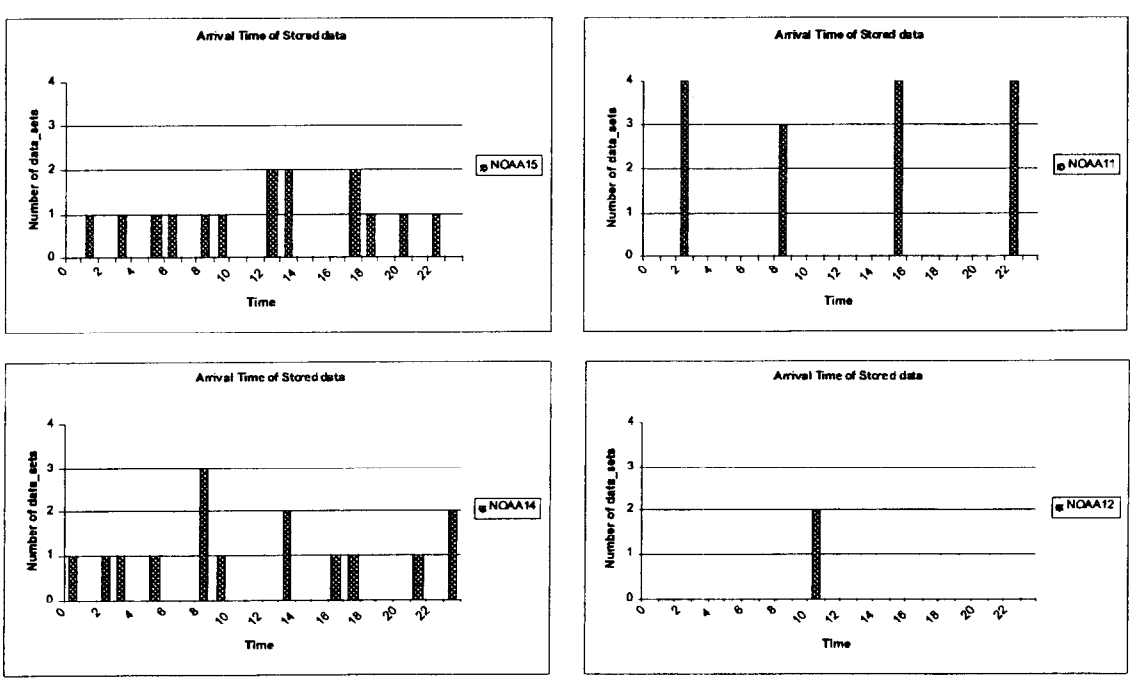


figure 1.1.1.a:

1.1.2 Regional receiving stations

CLS and Service Argos Inc. pursued their efforts in 1999 and 2000 to secure new cooperation agreements with a number of organizations to increase the number of receiving stations able to provide TIP data sets from the NOAA satellites.

Today, 21 stations deliver TIP data sets to CLS and Service Argos Inc. This is an increase of 3 stations from last year.

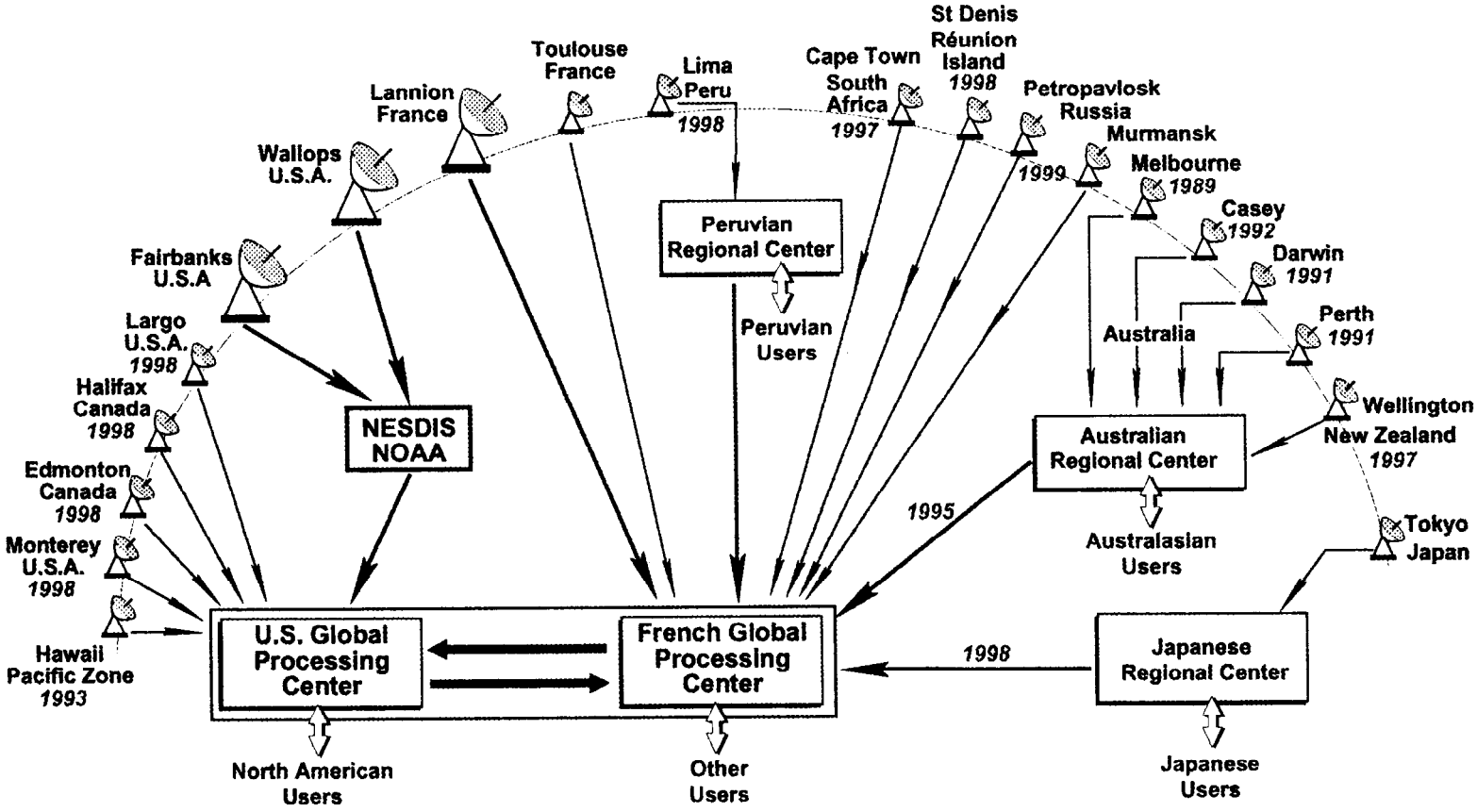
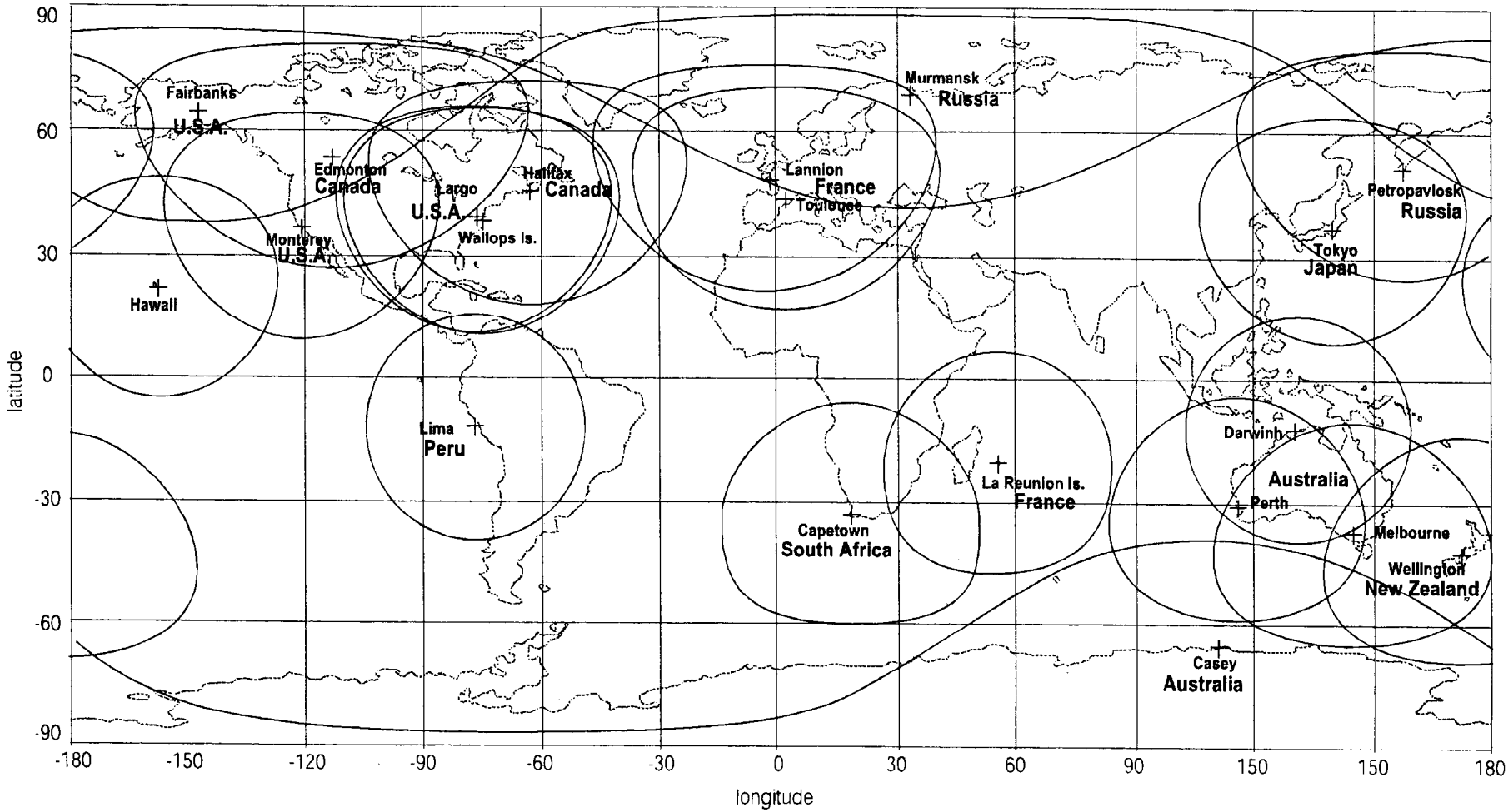


figure 1.1.2.a: Regional receiving station network



1.1.2.b Argos regional coverage

2000 **Regional stations**	**Country**	**Operator**	**Satellites**
Cape Town	South Africa	CLS/SAWB	NK, NJ, ND, NH
Melbourne	Australia	BOM	NK, NJ, ND
Darwin	Australia	BOM	NK, NJ, ND
Perth	Australia	BOM	NK, NJ, ND
Casey	Australia (Antarctica)	BOM	NK, NJ, ND
Lannion	France	Météo France	NK, NJ, ND
Reunion Island	France	Météo France	NK, NJ, ND
Wellington	New Zealand	Met Office	NK, NJ, ND
Gilmore	USA	NOAA	NK, NJ, ND
Wallops	USA	NOAA	NK, NJ, ND
Miami	USA	NOAA	NK, NJ
Toulouse	France	CLS	NK, NJ, ND, NH
Largo	USA	SAI	NK, NJ, ND, NH
Lima	Peru	CLS perù	NK, NJ, ND,NH
Murmansk	Russia	Complex System	NK, NJ, ND,NH
Petropavlosk	Russia	Rybradion	NK, NJ, ND,NH
Tokyo	Japan	Jamstec	NK, NJ, ND, NH
Halifax	Canada	Environment Canada	NJ, ND
Edmonton	Canada	Environment Canada	NJ, ND, NH
Hawaï	USA	National Weather Serv.	NK, NJ, ND
Monterey	USA	National Weather Serv.	NJ, NK

figure 1.1.2.c

Table 1.1.2.c gives the list of regional receiving stations with their location, the organisation responsible for operation and which satellitesare received.
Unfortunately, not all these regional stations receive data sets from all four satellites (NOAA-15, NOAA-14, NOAA-12 and NOAA-11).
For example, many do not receive data from NOAA-11 because the AVHRR instrument is inoperative.
Other stations can no longer receive data from NOAA-15 since the frequency of the HRPT channel was changed.

1.2 Processing centers

1.2.1 General

Each of the five Argos processing centers in Toulouse, Largo, Melbourne, Tokyo, and Lima operated without a major hitch in 1999.

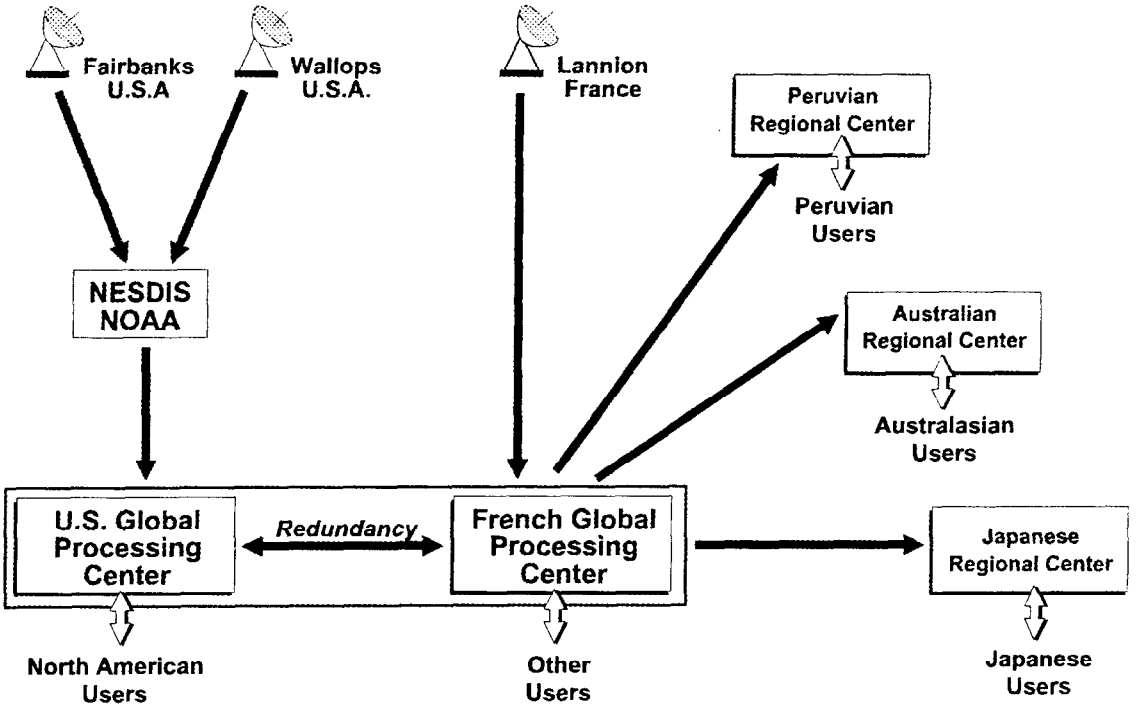


figure 1.2.a: Argos processing facilities NOAA satellite global coverage

1.2.2: Operations

In Toulouse, we have resolved the problems encountered with our backup power supply in 1998. The system is now working perfectly.
The two global processing centers in Toulouse and Largo continue to process data sets from all receiving stations, which is a total of 270 data sets per day

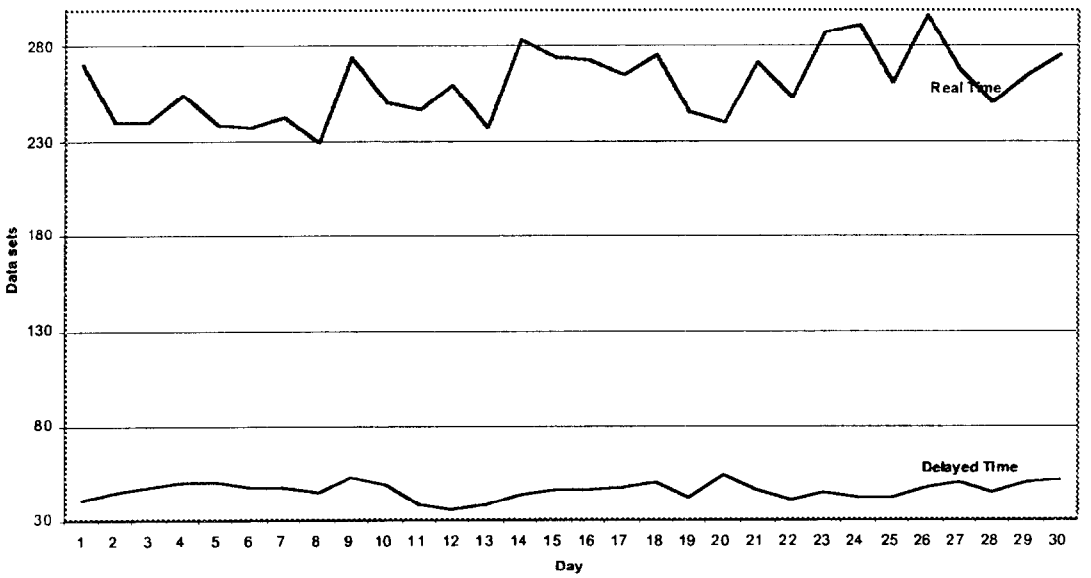


figure 1.2.2.a

Due to the large number of receiving stations and because each station tracks three or four satellites, the global processing centers in Toulouse and Largo are now having to process more and more regional real time data sets (ie data received during the 10-12 minutes of a satellite pass over a receiving station.)

Figure 1.2.2.a shows the number of regional real time data sets and global stored data sets processed every day by the Toulouse and Largo centers.

1..3 Space segment

1.3.1. Operational satellites

NOOA-16 (L) was launched on sept. 20, 2000 and will replace NOAA-14 (J) as one of the two NOAA operational satellites.
NOAA-15 (K) and NOAA-14 (J) have been operating nominally, as primary satellites, since December 1st , 1998 and December 30, 1994, respectively (see table 1.3.2a)

1.3.2. Others Satellites

NOAA 11(H) is the secondary satellite. Its global data is transmitted according to the " third satellite " transmission characteristics
NOAA 12(D) is on " stand by " status, with a nominal Argos equipment operating in direct transmission mode.
NOAA 9 (F) and 10 (G) were decommissioned.

table 1.3.2.a

Satellite status	May 98	December 98	October 99	2000	
Under Test		15 - NOAA K			
Operational	14 - NOAA J (1) 12 - NOAA D (1)	14 - NOAA J (1) 12 - NOAA D (1)	15 - NOAA K (1) 14 - NOAA J (1)	15 - NOAA K (2) 14 - NOAA J (1)	15 - NOAA K (2) 14 - NOAA J (1)
Back up Third satellite	11 - NOAA H (3) 10 - NOAA G (4)	11 - NOAA H (3) 10 - NOAA G (4)	11 - NOAA H (3) 12 - NOAA D (3) 10 - NOAA G (4)	11 - NOAA H (3) 12 - NOAA D (4)	11 - NOAA H (3) 12 - NOAA D (4)
Decommissioned	9 - NOAA F	9 - NOAA F	9 - NOAA F	9 - NOAA F	9 - NOAA F 10 - NOAA G

1) global data collected with 3 global stations
2) global data collected with 2 global stations (Lannion inoperative)
3) global data transmitted daily when possible - Global delays: 4 to 8 hours

4) regional data collection - regional orbitography
no data available

1.4 System performances

1.4.1 Throughput time for delivery of results

CLS throughput times for delivery of results are calculated in terms of the time taken to reach end users.
For each message received by the satellite, we compute the time elapsed between the recording of the message on board the satellite and the delivery of the results to the end user.
Table 1.4.1.a shows throughput time for delivery of results for stored data from NOAA-14 and NOAA-15, the two operational satellites.

	NOAA 14 - 15	NOAA 11-12
1 H	17%	3%
2 H	37%	15%
3 H	64%	30%
4 H	85%	55%
5 H	92%	70%
> 5 H	100%	100%

Table 1.4.1.a: Stored data throughput time

37 % of the data are available within two hours while 64 % of the data are available within three hours.

Only 30 % of the data are available within three hours from NOAA-11 and NOAA-12
as opposed to 64 % for the two operational satellites. This delay is due to the data set delivery times.

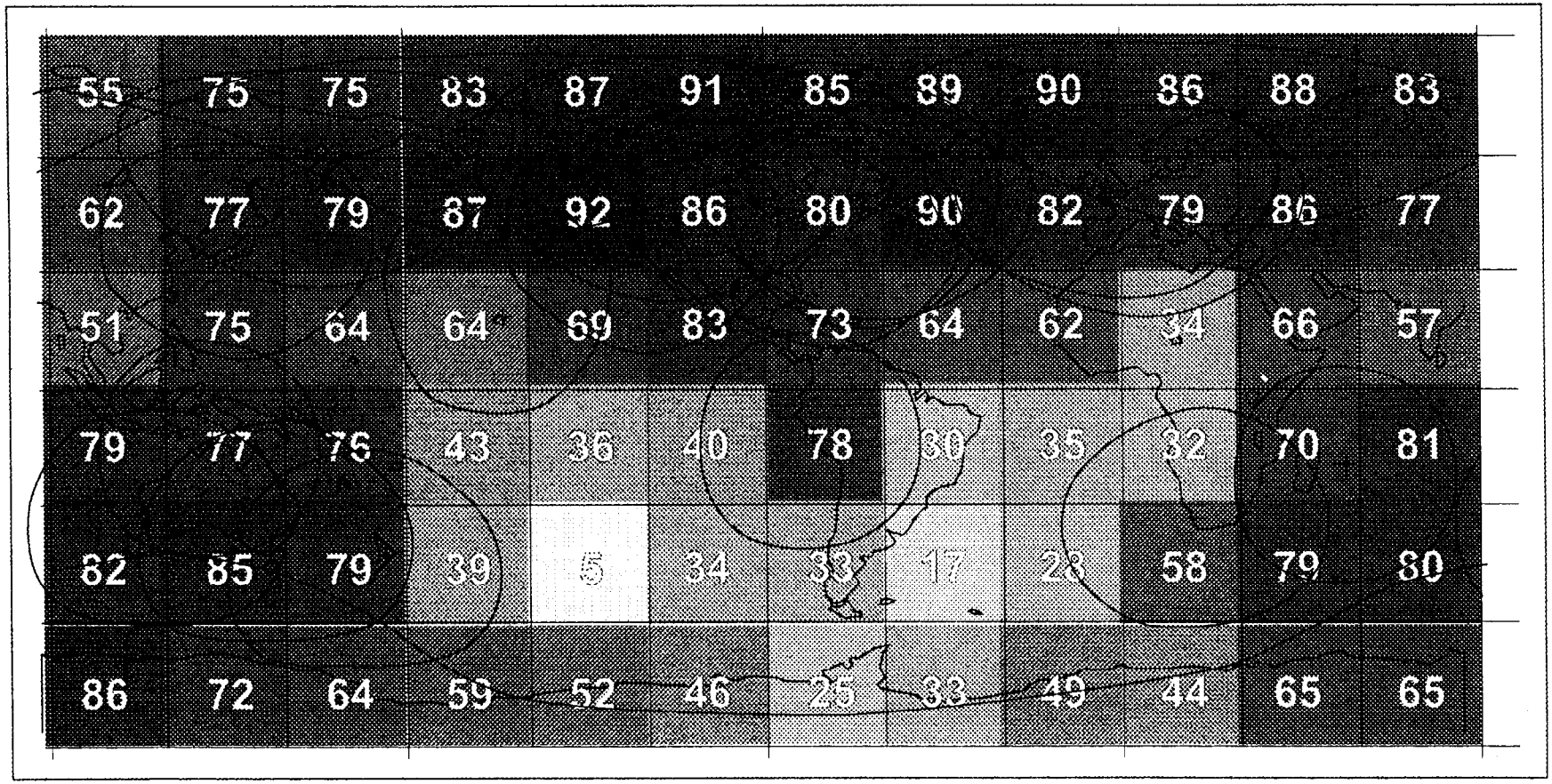
Figure 1.4.1.b shows the throughput time for delivery of results for real-time data from NOAA-15, NOAA-14, NOAA-12 and NOAA-11 and acquired by the 21 HRPT receiving stations.
85 % of these real-time data are available within 30 minutes.

	NOAA 14 - 15 NOAA 11-12
10mn	3%
15 mn	21%
20 mn	43%
30 mn	85%
45 mn	97%
60 mn	99%
> 60 mn	100%

figure 1.4.1.b: Real time data throughput time

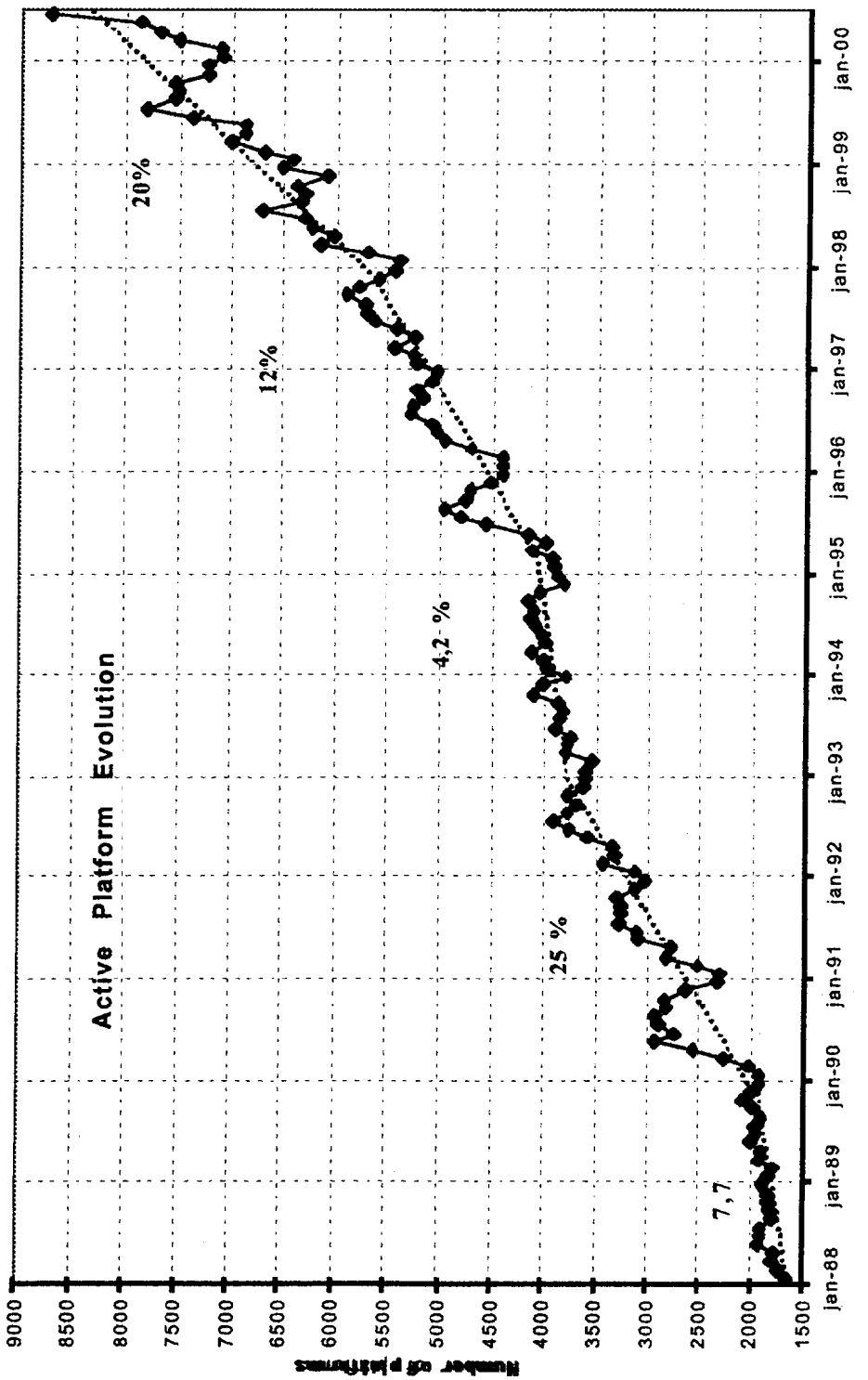
The throughput time for delivery of results for real-time data includes three main delays:
- the satellite pass duration, because we have to wait for the end of the pass to transfer and process the data set;
- the time taken to transfer the data set to the global processing centers. Most transfers go over the Internet. The transfer rate is getting better and better.
- The time taken to process the data set by the global processing centers, which is not significant (less than 30 seconds).

Percentage of real time data received in each geographical square (june 2000)



Active platform number evolution since 1988

An active platform is a platform seen at least once per month by the Argos system.



SYSTEM IMPROVEMENTS

1 - HARDWARE CONFIGURATION

Two new HRPT stations joined our network of ground receiving stations in 1999, in Murmansk and Petropavlosk, Russia. They are helping to improve Argos data throughput times.
The station in Hawaii, operated by the University of Hawaii, was replaced by the National Weather Service's receiving station.
The Monterey station, previously operated by the US Navy, was also replaced by the National Weather Service station.
Other projects are underway and we hope they will come to fruition this year. For example, we are discussing data reception agreements with Miami, Cayenne, and Singapore.

2.SOFTWARE CONFIGURATION

A great deal of work was done in 1999 to ready our software for the Y2K transition. This task involved checking over two million lines of code.
Two new services were added to enhance ADS data distribution:
- automatic transmission of data from a platform as soon as it enters a specified zone, and
-secure data transmission via a PGP protocol.
In addition to these software activities, work continued on two major projects to improve Argos system performance: Argos 2001 and Argos/Next.

3 - PROJECTS

3.1 Argos 2001

The purpose of the Argos 2001 project is to upgrade the entire Argos processing system. This ambitious project is vital for the long-term continuity of the Argos system and to better serve users.
This project is scheduled in three phases:

Phase I: development and implementation of a new user interface allowing users to access data and view and update technical files via a Web server. The System Use Agreements database will also be implemented during this phase. Data will be stored and managed by a database management system designed to be responsive to users' needs. Our objective is to give users more versatility in using the systemS. Consequently, we will be expected to offer them quick and efficient support.

Phase II: Improvement and development of value-added services.
Phase III: Redesign of the Argos processing system.

Current status:
Phase I began at the end of 1998 and is underway.
The user management application is operational.
Development of the User Office application has been completed and rollout is scheduled for the end of 2000.
The Web user interface is in development and rollout is also scheduled for the end of this year.

3.2: Argos/Next project

The downlink messaging capabilities provided by the ADEOS II/Argos DCS equipment requires the addition of two new components to the current Argos ground segment:

A Downlink Message Management Center (DMMC)
located at CLS premises in Toulouse, France.
The DMMC's role is to centralize, validate, and schedule downlink message requests from users before transmitting downlink messages to the satellite (via a Master Beacon).

The Argos Web server developed within the scope of the Argos 2001 project will allow users to:
- enter requests and compile downlink messages for platforms carrying an Argos Next/Argos 3 receiver;
- monitor request status until completion.Note: a backup DMMC will be installed at

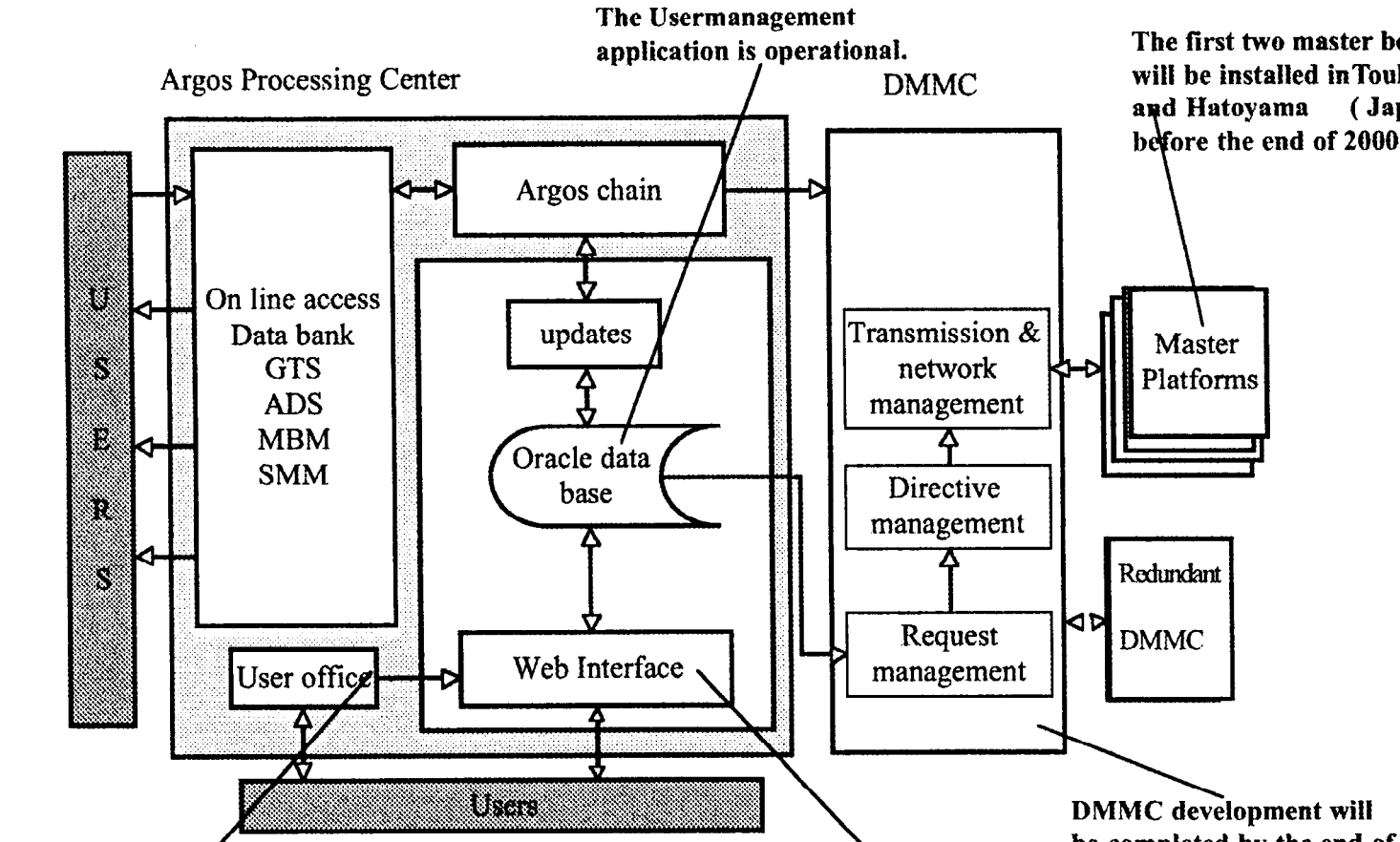


Figure 3: Argos 2001 and Argos Next projects

SAI Largo (USA).
DMMC development will be completed by the end of 2000.

A network of four master beacons,
located at strategic points around the globe, acting as the link between satellites and the DMMC.
The four locations foreseen for these beacons are:
Toulouse, Hatoyama, Fairbanks, and Spitsberg (TBC).

Development of the prototype is complete. The first two master beacons will be installed in Toulouse and Hatoyama (Japan) before the end of 2000.

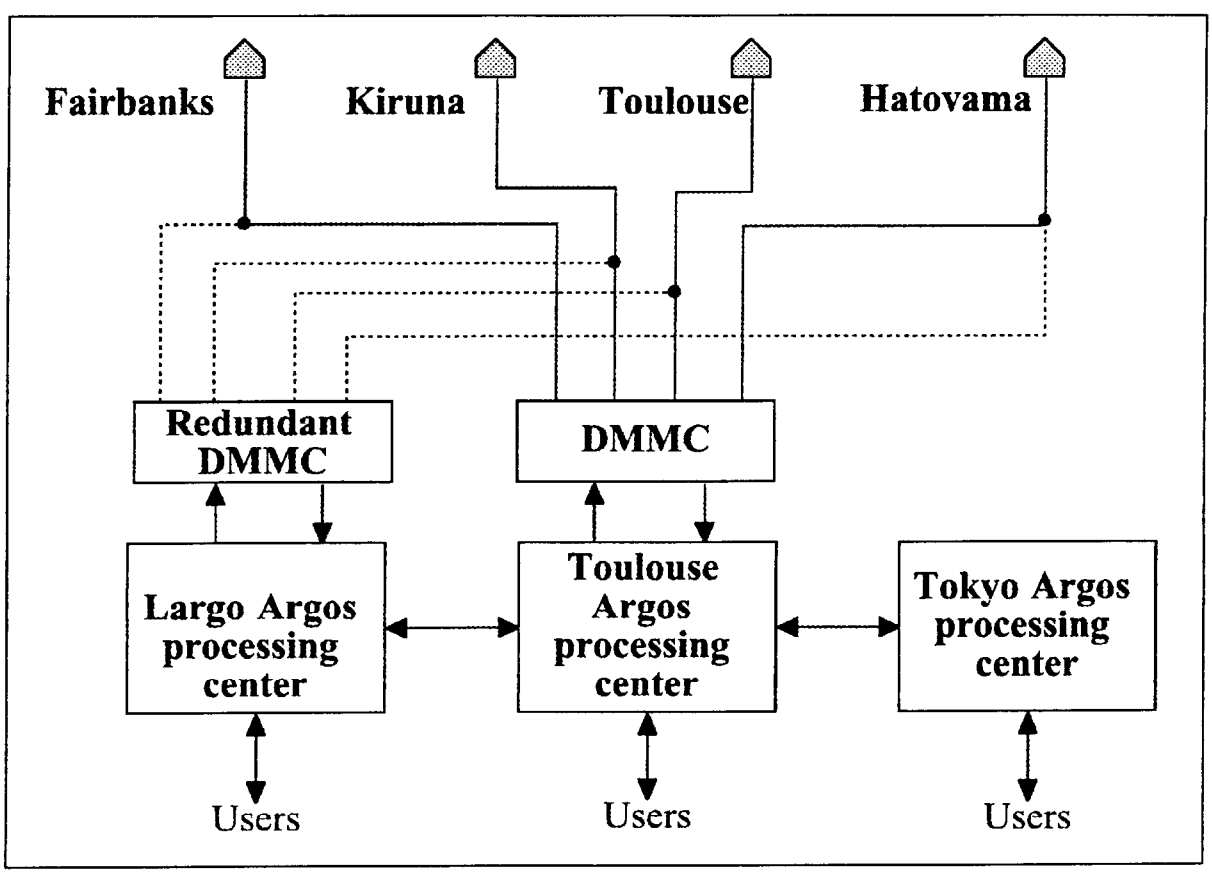
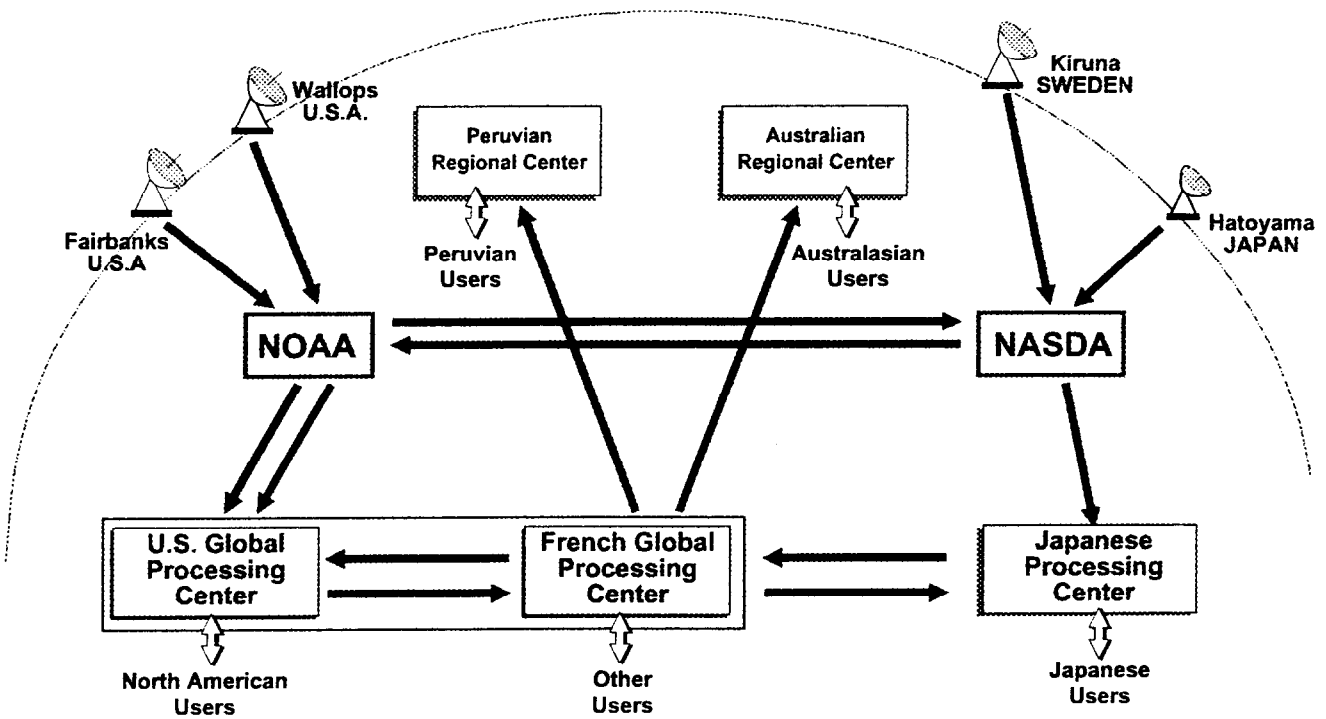


figure 3.2.a: Masterplatforms and Downlink Messaging Management Center

This project is also managing the current Argos software upgrade to support:

- file exchanges with the ADEOS II ground segment;
- ADEOS II spacecraft maneuvers in computing the User platforms locations;
- ADEOS II/Argos DCS Level-0 data and Housekeeping telemetry processing;
- processing of Argos messages related to the downlink messaging service;
- 28-bit ID numbers.

All these modifications have now been completed. The launch of ADEOS-II, previously scheduled for November 2000, has now been pushed back to November 2001.



4. FREQUENCY SPREADING

Action Item N° 32-2-C from the Operation Committee (june 1998)

The Argos Operations Committee, recognizing the need to optimize the use of the frequency bandwidth, currently allocated to the Argos System 401.650 MHZ +/- 12 KHz, resolves:

1) that the central frequency to be used by future Argos Data Collection Platforms be 401.650 MHZ, 401.648 MHZ and 401.652 MHZ. All three frequencies being equally used,

2) that CLS shall take the necessary measures for manufacturers to develop corresponding Argos DCPs,

3) that CLS should undertake the necessary studies to further optimize the utilization of the band allocated to the Argos System.

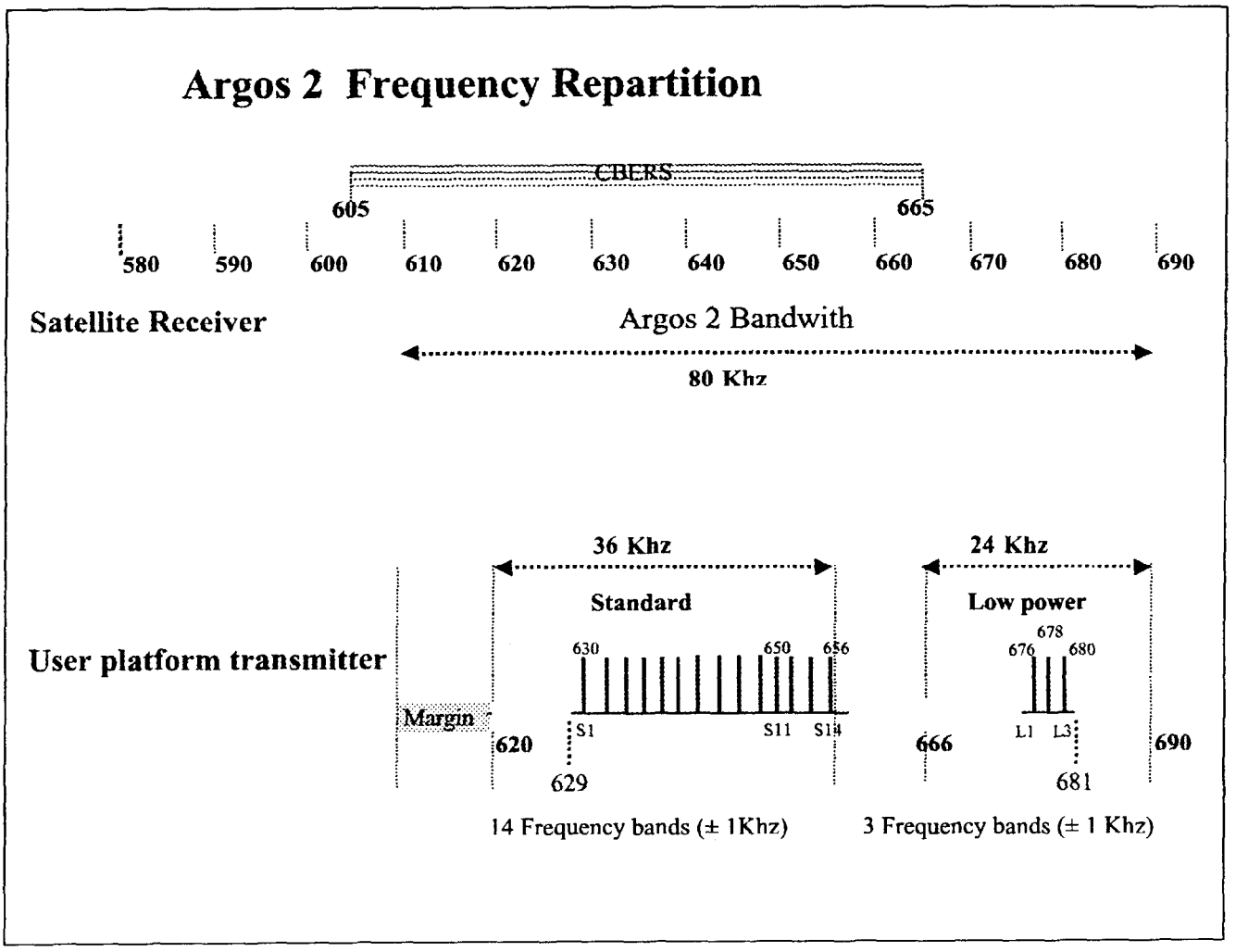
Transmitted frequency distribution

Taking advantage of the wider bandwith available with Argos 2 (80 KHz), a PTT transmitted frequency can now be set inside the Argos bandwidth between 401.629 MHz and 401.681 MHz.
In that bandwidth, we define 17 channels. Each channel is 2 kHz width.

According to the transmitter power, the transmitted frequency shall be set to:

- Channels S1 to S14 for transmitters which transmitted power is less than 3W but more than 500mW;
- Channels L1 to L3 for transmitters which transmitted power is less than 500mW.

Name of the Channel	Center Frequency MHz
S1	401.630
S2	401.632
S3	401.634
S4	401.636
S5	401.638
S6	401.640
S7	401.642
S8	401.644
S9	401.646
S10	401.648
S11	401.650
S12	401.652
S13	401.654
S14	401.656
L1	401.676
L2	401.678
L3	401.680



Periodic monitoring

1) CLS periodically monitors all PTT's in the system and the frequencies used by each one. The results show that a majority of PTTs are still using a frequency of ± 1 kHz with respect to the central frequency of 401,650 kHz.
However, following CLS action the percentage of platforms using this bandwith has been decreasing:

88% in 1997
78% in 1998
67% in 1999
58% in 2000

Unfortunatly during the four last years the total number of active platforms increased by 94 %. The result in still divergent.

Actions

CLS sent a letter to each transmitter manufacturer requesting that they take the necessary steps to move away from the central frequency at least as far as ±2 kHz.
This letter was followed by visits in May 1998 and April 2000 to each of the major manufacturers (those representing a significant share of production). The purpose of these visits was to pursue a dialog with them, collect first reactions and encourage a response to the letter.A general meeting was also convened in September 99.

Meeting summary on the spreading of transmitter frequencies across the available bandwidth:

The need for spreading the Argos transmit frequencies across the available is based on the fact that the majority of transmitters in service today are operating at the central ARGOS frequency of 401.650MHz, and that spreading the transmit frequencies across the bandwidth will enable a higher the number of messages to be received.

There was general agreement among the participants that the concept of frequency spreading is acceptable. It was also felt that this would very likely have some impact on the cost of building a transmitter.
The timing of the spreading will be in phases that are not yet defined, although manufacturers are strongly encouraged to begin using frequencies S10 and S12 (which are +/- 2 kHz about the center frequency of 401.65 MHz) immediately then eventually spread frequencies across the entire available band.
The timing of the frequency spreading over the Argos-2 bandwidth will most likely be applications dependent and will be driven by, among other things, **the launch of NOAA L** and the total number of satellites that are available for use.
For low power applications it is expected that using only three frequency channels (401.676, 401.678 and 401.680 MHz) will be adequate for the mid-term future since these applications typically have long duty cycles.

The overall process of frequency spreading will be implemented cooperatively between Argos and the manufacturers. Progress will be monitored.

3) Next step should be to take decisions to accelerate the frequency spreading process after the launch of NOAA L.

5: REVIEW OF USER'S REQUIREMENTS

Data Buoy Cooperation Panel (1999)

5.1 The chairman of the DBCP reported on the main conclusions of the fifteenth session of the panel (including the technical workshop), Wellington, 26-29 October 1999, which were of interest to the JTA.

5.2 The following specific recommendations were made by the panel session to the JTA:

(i) There is a need to improve data reception and dissemination within the International South Atlantic Buoy Programme (ISABP), which could be effected through the establishment of connections between existing S-band stations potentially available to support the programme and the Argos processing centres. CLS should undertake this work as part of the Argos development programme;

Action:

Three LUTs are in operation in South-Atlantic:

- Two LUTs provided by Navoccano are installed on Marion and Gough Islands. They are operated by SAWB. Datasets are relayed to SAWB in Cape Town. Navoceano sent Y2K updated equipment early this year and the stations are operating properly locally. There are still some communication problems to be resolved before getting the data to Argos centers.
- A LUT has been installed in Falklands but there are no lines connecting it (yet) to the Falklands-UK data (internet) link.

Item open.

(ii) An agreement should be concluded between the Argos Operations Committee and the Brazilian Space Agency (INPE) to integrate the planned Brazilian 3-satellite system with Argos-type equipment into the Argos system, in view of the potential benefit of such integration to DBCP programmes:

The Operations Committee endorsed these actions as part of the Argos development programme.

C . Gal (Operations Committee Co-chairman made a brief presentation on on-going discussions with the Brazilian space agency INPE, regarding a possible cooperation between the Brazilian DCS and the Argos DCS.

The Argos Operations Committee, confirmed its interest in continuing these discussions.

The Operations committee proposes to take the opportunity of the next CEOS meeting to review the progress made in the discussions. In order to inform INPE of this proposal, the co-chairs will send a letter to his INPE Director, Mr. Barbosa.

(iii) The JTA should continue to emphasize cost control, increased system efficiency and greater usage of data collection and distribution systems within Argos, in view of the likelihood that there would be few new sources of funding for ocean observing networks in the forseeable future.

Item open.

5.3 The JTA supported these recommendations. CLS/Service Argos was requested to take the necessary actions in response to the needs identified, in conjunction with appropriate bodies.

Argos GTS sub-system developments (see the report of the DBCP Technical Coordinator)

The following developments have been conducted with regard to the GTS sub-system:

Small improvements

STD format:
BUOY code, housekeeping parameters:
BUOY code, location date:

Specific algorithm for TAO moorings

No decision has been made by PMEL in this regard yet so CLS did not evaluate required developments.

GTS distribution of sub-surface floats

ANNEX VI

DEVELOPMENTS IN SATELLITE COMMUNICATION SYSTEMS
Update - October 2000

David Meldrum and Oli Peppe
Dunstaffnage Marine Laboratory, PO Box 3, Oban, Argyll, Scotland.

---

1. INTRODUCTION

Mobile satellite systems (MSS) may be classified according to orbit altitude as follows:

- GEO - geostationary earth orbit, approx altitude: 35 000 km
- MEO - mid-altitude earth orbit, approx altitude: 10 000 km
- LEO - low earth orbit, approx altitude: <1 000 km

LEOs can be further sub-divided into Big LEO and Little LEO categories. Big LEOs will offer voice, fax, telex, paging and data capability, whereas little LEOs will offer data capability only, either on a real-time direct readout ('bent pipe') basis, or as a store-and-forward service.

Since the satellite footprint decreases in size as the orbit gets lower, LEO and MEO systems require larger constellations than GEO satellites in order to achieve global coverage and avoid data delays. Less energy is, however, generally required for LEO and MEO satellite communication because of the shorter average distance between transmitter and satellite. Some systems implement several high-gain antennas to generate 'spot beams' and so reduce the requirement of the mobile to have a complex antenna and/or high output power. A key feature of several MSS currently under development will be their inter-operability with existing public switched telephone and cellular networks, using a dual-mode handset, for example.

Because of the commercial forces which are driving the implementation of the new systems, many will primarily focus on land masses and centres of population, and will not offer truly global or polar coverage. These systems will not in general be acceptable for global ocean monitoring. Furthermore, while the technical capabilities for the new MSS do currently exist, delays are inevitable due to problems with spectrum allocation, licensing (in each country where the service will be offered), company financing, and availability of launch vehicles and ground stations. It is unlikely that all of the planned systems will overcome all of these hurdles. Indeed, major financial difficulties have hit a number of systems, with Starsys having been cancelled, Iridium having collapsed, and both Orbcomm and New ICO having filed for Chapter 11 bankruptcy protection in the US.

Some systems do offer significantly enhanced capabilities compared with existing methods. Potential advantages include two-way communication, more timely observations, and greater data rates and volumes. Some systems may also prove to be considerably less expensive than existing channels, although this is as yet unclear. However, dangers will exist for data buoy users of most MSS, in that they will generally be small minority users of the system, with consequent lack of influence in regard to pricing. The arrangements for data distribution are also unlikely to be tailored towards data buoy applications, in particular those that require data insertion on the GTS.

2. DESCRIPTION OF CANDIDATE SATELLITE SYSTEMS

The following paragraphs describe the salient features of those systems that might have a data buoy application. In many cases systems are at an early planning stage, and reliable technical information on which to base an evaluation is unavailable. This section is summarised in tabular form in at the end of the document.

2.1 Little LEOs

2.1.1 Argos

Argos has been used by the oceanographic community for more than two decades, and is a dependable, true polar, operational data collection and platform location system. Communication is one-way only, at 400 baud, with practicable data rates of the order of 1 kbyte per day. Transmissions by the mobile are unacknowledged by the system and therefore have to incorporate some form of redundancy if data transfer is to be assured. The system enjoys a particularly clean part of the spectrum (401.65 MHz), with minimal interference from other users. Traditionally, Argos has flown as an attached payload on the NOAA 'TIROS' weather satellites, but future launches will also use the Japanese ADEOS and European METOPS platforms

Enhancements to the Argos on board equipment ('Argos-2') include increased receiver bandwidth and sensitivity, with two-way communication ('downlink messaging') to be piloted aboard ADEOS-II in late 2001. Next generation Argos equipment ('Argos 3') will fly from 2004 onwards, and will offer order of magnitude increases in data rates, as well as two-way communications. The system is one of the few that offers true global coverage, and currently has no commercial requirement to recover the cost of the launch or space segment equipment. Proposed changes to the rules within the US regarding fair competition by fully commercial satellite systems may impact the service that Argos will ultimately be able to offer.

The first of the Argos-2 satellites, NOAA-K (NOAA-15) was launched in May 1998 and is now operational, replacing NOAA-D (NOAA-12) as the morning satellite. This will followed by NOAA-L (NOAA-16) in September 2000. Several new direct readout stations have been commissioned recently, including Murmansk, Petropavlosk, Halifax, Edmonton, Monterey, Réunion, Cape Town, Lima, Tokyo and Largo. This continues the programme of improving data timeliness by exploiting use of Argos in 'bent-pipe' mode. Further enhancements to the on board equipment (Argos-3) and to the ground processing centres are at the planning stage.

2.1.2 Orbcomm

This company was awarded the first FCC Little-LEO licence in late 1994. Satellites consist of discs about one metre in diameter prior to deployment of solar panels and antenna. Two satellites were launched into polar orbit during 1995, using a Pegasus rocket piggy-backed on to a Lockheed L-1011 aircraft. After a prolonged period of launcher problems, 35 satellites are now in orbit, making up the complete constellation – although Orbcomm have been awarded a licence for an expansion to a 48 satellite constellation. Of these satellites, 32 have been declared operational. The A, B, C and D planes are at 45° inclination and therefore have poor coverage at high latitudes: only three satellites, in the F and G planes (70°), offer a near-polar service. A further launch, possibly to an equatorial orbit, is planned for late 2000.

The system offers both bent-pipe and store-and-forward two-way messaging capabilities, operating in the VHF (138-148 MHz) band. User terminals are known as 'Subscriber Communicators' (SCs). Although there have been significant problems with interference close to urban areas, this is not expected to impact offshore operations, and trials of the system have been encouraging. Operational experience of the system is growing rapidly, although it remains difficult to obtain detailed technical information from Orbcomm.

The message structure currently consists of packets transmitted at 2400 bps (scheduled to rise to 4800 bps), and coverage is now global and near-continuous between the polar circles. Messages are acknowledged by the system when correctly received and delivered to a user-nominated mailbox. The

platform position is determined, if required, using propagation delay data and doppler shift, or by an on-board GPS receiver. Position accuracy without GPS is similar to that offered by Argos, i.e. km-scale.

The limitations on the store-and-forward mode messages (known as globalgrams) have become apparent, with SC originated messages limited to 229 bytes and SC terminated messages limited to 182 bytes. Each SC can theoretically have a maximum of 16 globalgrams stored on each satellite. Currently, satellites will not accept or process globalgrams when in view of a ground ('gateway') station. As messages have to be designated as globalgrams or bent-pipe by the SC at the moment of origination, this presently limits the flexibility of the system to adapt to different coverage situations. Work-arounds do, however, exist, and it is expected that the next generation of SCs will be able to adapt more readily to changes in satellite communications mode.

Authorised transceiver manufacturers include Panasonic, Elisra (Stellar), Torrey Science, Magellan and Scientific Atlanta. Elisra were the first to offer a transceiver with a fully integrated GPS engine, although Panasonic now also have one available. Scientific Atlanta have made a chip-set available to third-party integrators. Prices of most units are between $600 - $1000.

The ground segment has started to expand, and there are now active stations in Italy, Argentina, Brazil, Japan and Korea in addition to the four in the US. However the Japanese and Korean stations are not available for international registrations. Further stations are under construction in Malaysia, Morocco, and Brazil, and potential sites have been identified in Russia, Ukraine, Philippines, Botswana, Australia and Oman. 16 international service distribution partners have been licensed. Non-US customers have faced considerable difficulties because of the absence of ground stations, lack of spectrum licensing and the presence of other in-band users. However the situation is improving rapidly. Currently subscription costs are on a fixed cost per unit with two bands of usage (above and below 4kbytes per month with a typical monthly rate for the higher band being $70). A fully metered billing system based on users' actual data throughput was to be implemented in July 2000 but was postponed, officially due to technical problems. If this billing system is implemented with the planned charges ($6/kbyte) then it will result in a massive increase in airtime costs for any user with data rates over 0.5 kbytes/day.

Orbcomm have been suffering financial difficulties, and recently (Sept 2000) filed for 'Chapter 11' bankruptcy protection. The outstanding debts are believed to stem largely from the system rollout phase, with net running costs being of much smaller concern. Industry opinion is that Orbcomm will prevail, largely because of the commitment of many third-party equipment and system manufacturers to the success of the system, and evidence of increasing service take-up by a diverse range of customers.

2.1.3 Starsys

This system was to have been broadly similar to Orbcomm, except that it offered bent pipe mode only, thus limiting its usefulness to coastal areas. Further work on the system, in which the operators of the Argos system were closely involved, has been suspended because of difficulties in securing financial backing. The FCC licence was returned in late 1997.

2.1.4 Iris/LLMS

This European-led system appears to be similar to Argos, using two polar-orbiting satellites with store-and-forward capability. However, terminals are alerted by the satellite downlink signal, and two-way communications and message acknowledgement are supported. Location is by doppler and ranging, and message lengths of up to a few kilobytes are permitted. Some provision is planned for terminal-terminal communication within the satellite footprint. A single satellite is now in orbit and is being used for system tests.

2.1.5 Vitasat/Gemnet

This was a 36 + 2 satellite constellation proposed by CTA Commercial systems. Their experimental satellite was the failed Vitasat launch in 1995. CTA is reported to have been taken over by Orbital Science Corporation, the parent organisation of Orbcomm, and the 36-satellite Gemnet component has been cancelled. However, the volunteer VITA organisation still exists and currently has one satellite in orbit, with plans to rent bandwidth on two other existing satellites, HealthSat-2 and UoSat-12. The main mission is to offer low-cost messaging services to developing countries.

2.1.6 Faisat

The Final Analysis company have planned this 32 (+ 6 spare) satellite constellation to provide data messaging services, principally aimed at small messages (~ 100 bytes), but with support for larger messages as well. It will operate in both bent-pipe and store-and-forward modes. The first satellite launch, on the Russian Cosmos vehicle, was scheduled for early 2000, but nothing has been reported. Further launches are expected to occur roughly twice a year. The system received FCC authorisation in April 1998. A test satellite (also part of the Vitasat system) was launched in 1997.

2.1.7 Leo One

This US-designed system consists of a planned 48 satellite constellation offering store-and-forward two-way messaging at up to 9600 bps. An FCC license was granted in February 1998, and a spectrum sharing agreement has apparently been signed. Commercial operation is expected to start in 2002, although no details are known regarding the launch schedule. Orbit inclination will be 50°, giving useful coverage up to latitudes of about 65°.

2.1.8 Gonets

Two GONETS LEO messaging systems have been proposed by the former Soviet Union, using both UHF and L/S-band communications channels. Both will offer true global coverage from high inclination 1400 km orbits. One system, GONETS-D already has 8 satellites in orbit with a further 36 planned. No operational experience has been reported to date.

2.1.9 Other Systems

Six E-Sat satellites are planned, launches to start in 2001. The system is aimed principally at the US utility industry for remote metering. The Italian based Temisat is another planned system which is intended to offer global coverage. Little further has been heard of the European SAFIR store-and-forward messaging system, which has two satellites in orbit, but has yet to relaunch a service after major technical problems with its first satellite.

2.2 Big and Broadband LEOs

2.2.1 Iridium

Iridium filed for Chapter 11 bankruptcy protection in August 1999, and underwent financial restructuring. Financial difficulties continued and the system ceased operation in April 2000. Iridium had its complete constellation of 66 satellites plus spares in orbit, and offered a true global service through a network of ground stations backed up by inter-satellite links. Of particular interest to data buoy operators was the Motorola L-band transceiver module, which was designed to be easily integrated with sensor electronics via a standard serial interface.

2.2.2 Teledesic

This 'Internet in the Sky' system plans a 288 (originally 840) LEO constellation to carry global broadband services such as video conferencing, the Internet, etc. It recently merged with Celestri, another proposed broadband LEO system. Since then there has been some doubt over the actual makeup of the combined constellation. Teledesic has suffered because of the financial difficulties of Iridium, as Motorola, one of Teledesic's primary investors and head of the industrial partnership developing the system, transferred engineering effort and funding to prop up Iridium. Teledesic has received FCC licensing for operations in the USA. Latest news is that Teledesic have joined forces with New ICO and are revising the proposed scope of both systems.

2.2.3 Globalstar

Globalstar was Iridium's main competitor in the mobile satellite telephony market. After a bad start in September 1998 when 12 satellites were lost in a single launch failure, Globalstar now has its complete 48 satellite constellation in space, and commenced a limited commercial service in the US in October 1999. Service has since been expanding to other regions and was available in the UK in mid 2000. Globalstar differs significantly from Iridium in that for a call to be made the user must be in the same satellite footprint as a gateway station. There is no inter-satellite relay capability as in Iridium. This means that coverage will not be truly global, especially in the short term as far fewer gateways have been built than originally planned. However Globalstar is currently in a much stronger financial position than any of its competitors and voice quality has been reported to be superior to the Iridium system.

Data services at 9600 bps are planned to be commercially available sometime in the near future. As with Iridium this is likely to be very dependent on the initial success of the basic voice service. Globalstar also has a second generation system planned, said to involve 64 LEO satellites and 4 GEO satellites. Little else is known about the planned enhancements of this system.

2.2.4 Other Systems

Other planned big LEOs include Ecco (by the owners of Orbcomm), Ellipso (a hybrid elliptical LEO/MEO system), LEO SAT Courier (a German led system which was originally a much smaller little LEO system), Signal and SkyBridge.

2.3 MEOs

2.3.1 New ICO

New ICO (formerly ICO Global Communications) is the third of the three main players in the global satellite telephony market. However it also has suffered severe financial difficulties and filed for Chapter 11 bankruptcy protection in August 1999, just two weeks after Iridium. The system, formerly known as Inmarsat-P but now fully autonomous, will use a constellation of 12 MEO satellites backed by a 12-station ground segment to provide a truly global voice, fax, data and messaging service. The aim is to complement and be inter-operable with existing digital cellular telephone networks. Prior to filing for bankruptcy protection, the first launch was planned for late 1999 with commercial service roll out scheduled for the third quarter of 2000. The company emerged from Chapter 11 protection in May 2000, and the first satellite launch is now planned for late 2000, with service scheduled to start in 2003.

When the complete constellation is in service two satellites will always be visible from any point on the earth's surface. The space segment is being built by the Hughes Corporation. Data rate will be 9600 bps. Many large manufacturers are engaged in developing dual mode ICO/cellphone handsets. An ICO 'engine', is to be defined for the benefit of third-party equipment manufacturers (OEMs).

New ICO are joining forces with Teledesic (both owned by ICO-Teledesic Global), with major revisions to the scope of both systems. In particular New ICO is now putting a far greater emphasis on data services, rather than voice services which are now widely recognised as holding smaller potential.

2.3.2 West

Little is known about this system, being designed by Matra Marconi Space, except that 9 MEO and GEO satellites were planned, with multimedia-like services scheduled to begin in Europe via West early Bird in 2003.

2.4 GEOS

2.4.1 Inmarsat D+.

This is an extension of the Inmarsat D service using the new (spot-beam) Inmarsat Phase 3 satellites and small, low-power user terminals. The system was initially designed as a global pager or data broadcast service, with the return path from the mobile used only as an acknowledgement. D+ permits greater flexibility, but the uplink packets are still limited to 128 bits. The first ground station has been implemented in the Netherlands by the existing Inmarsat service provider (Station 12), but useful technical information has been difficult to obtain.

D+ transceiver manufacturers include JRC, Calian, STK-Atlas and Skywave. The JRC unit features an integral GPS receiver and combined GPS/Inmarsat antenna, and is the first to receive type approval. The Skywave unit includes an integral antenna and is specifically designed for low power applications.

The service may prove particularly attractive to national meteorological services as protocols already exist with Inmarsat service providers for the free transmission of observational data to meteorological centres for quality control and insertion on to the GTS. Inmarsat, given its assured multinational backing and established infrastructure, is also extremely unlikely to disappear.

2.4.2 ODL

Oceanographic DataLink (ODL)[3] is a US Office of Naval Research sponsored demonstrator system that uses Intelsat C-band transponders to communicate with small oceanographic packages. New signal processing techniques allow such transponders to be used in low energy applications. Both antenna and transceiver size are small (the complete package is expected to be video cassette size), and data costs are expected to be low. Successful bench trials have been completed, and the results of field evaluations are now awaited with interest.

3. REFERENCES

1. Hanlon, J (1996). Emerging LEOs telemetry options for use in scientific data buoys - a marine instrument manufacturer's perspective. In: *Proceedings of the DBCP Technical Workshop, Henley on Thames, October 1996*. DBCP Technical Document No 10, WMO, Geneva.

2. Hoang, N (1999). Data relay systems for drifting buoys utilizing low-earth orbit satellites. In: *Proceedings of the DBCP Technical Workshop, Hawk's Cay, October 1998*. DBCP Technical Document No 14, WMO, Geneva.

3. Gamache, K A and Fogel, P E (2000). Oceanographic DataLink. *Sea Technology*, May 2000, pp 23-31.

Many interesting articles and status reports may be found in: *International Space Industry Report*, Launchspace Publications, Washington (see below).

4. USEFUL WEB SITES

4.1 General information

Little LEO status, launch dates	*http://www.ee.surrey.ac.uk/CSER/UOSAT/SSHP/const_list.html*
Constellation overview	*http://www.ee.surrey.ac.uk/Personal/L.Wood/constellations/*
MSS constellation news	*http://www.spacedaily.com/constellations.html*
The Satellite Encyclopaedia	*http://www.tbs-satellite.com/tse/online/*
Communications business news	*http://www.silicon.com*
General satellite news/gossip	*http://www.hearsat.org*

4.2 Specific operators

Argos	*http://www.cls.fr/* *http://www.argosinc.com/*
Ellipso	*http://www.ellipso.com/*
E-SAT	*http://www.dbsindustries.com/*
Final Analysis	*http://www.finalanalysis.com/*
Globalstar	*http://www.globalstar.com/*
GOES	*http://www.goes.noaa.gov/*
Inmarsat	*http://www.inmarsat.org/*
Iridium	*http://www.iridium.com/*
IRIS	*http://www.saitrh.com/land/systems/iris.asp*
LEO One	*http://www.leoone.com/*
LEO SAT Courier	*http://www.satcon-de.com/*
METEOSAT	*http://www.esoc.esa.de/external/mso/meteosat.html*
New ICO	*http://www.ico.com/*
Orbcomm	*http://www.orbcomm.com/*
Ocean DataLink (ODL)	*http://www.viasat.com/government/advprograms/odl.htm*
SAFIR	*http://www.fuchs-gruppe.com/ohb-system/*
Skybridge	*http://www.skybridgesatellite.com*
Teledesic	*http://www.teledesic.com/*
VITA	*http://www.vita.org/*
West	*http://www.matra-marconi-space.com/*

Appendix A

Overview of mobile satellite systems with possible data buoy applications

System	Status*	Date (if known)	Orbit type	Buoy position	Message type	Terminal size	Power (watts)	Comments
ARGOS	Operational		Little LEO	Doppler Shift	data: 32 bytes	Handheld	1	Various enhancements, incl 2-way messaging, are scheduled
ECCO (CCI Global)	Planned	2002+	LEO	GPS Required	voice/data	Handheld	TBD	12 equatorial satellites planned by 2003 Status questionable (website gone)
ELLIPSO	Licensed	Service 2002+	Big LEO	GPS required	voice/data	Handheld	TBD	17 satellites in highly elliptical orbits, serving major land masses
EYESAT	Experimental		Little LEO	GPS Required	data: 60 bytes	Handheld	5	1 satellite 1995, principally for radio amateurs
E-SAT	Licensed	Launch 2001+	Little LEO	GPS Required	data: TBD	TBD		6 satellites for utility metering (aimed at Continental US only initially)
FAISAT	Licensed	Service 2002+	Little LEO	GPS Required	data: 128 bytes	Handheld	10	38 satellites 2000+ Test satellite launched 1997
GEMNET	Cancelled (pre-op)		Little LEO	GPS Required	data: no maximum	'laptop'	10	1st satellite 1995 - launch failure 36 satellites by ???
Globalstar	Operational	1999	Big LEO	GPS Required	voice/data: no maximum	Handheld	1	48 satellites + spares (constellation complete) Limited coverage due to lack of ground stations.
GOES, Meteosat, GMS	Operational		GEO	GPS required	data: various options	□laptop□	10	4 satellites; directional antenna desirable NOAA / ESA / Japanese met satellites.
GONETS-D	Pre-operational		Little LEO	GPS/ Glonass	Data	Handheld	TBD	8 satellites in orbit, 36 more planned

System	Status*	Date (if known)	Orbit type	Buoy position	Message type	Terminal size	Power (watts)	Comments
GONETS-R	Planned		Little LEO	GPS/ Glonass	Data	Handheld	TBD	48 satellites planned
INMARSAT-C	Operational		GEO	GPS required	data: no maximum	5.5 kg	15	Steered antenna not required
INMARSAT-D+	Operational		GEO	GPS required	data: 128bytes uplink, 8 bytes downlink	Handheld	1	global pager using existing Inmarsat-3 satellites Note very oriented to downlink
ICO (New ICO)	Licensed	Service 2003	MEO	GPS required	voice/data: no maximum	Handheld	1	global voice and packet data services. Recently merged with Teledesic to form ICO Teledesic Global
Iridium	Cancelled (post-op)	Ceased 2000	Big LEO	GPS required	voice/data: no maximum	Handheld	1	72 satellites in orbit– due to be de-orbited late 2000 / 2001
IRIS/LLMS	Experimental		Little LEO	Doppler + ranging	data: up to few kbytes	Handheld	1	1 satellite in orbit. Belgian messaging system part of an ESA research prog.
LEO One	Licensed	Service mid 2003	Little LEO	GPS required	data uplink 9600bps, downlink 24000bps	Handheld	Max 7	48 satellite constellation, store and forward + 8 spares. No polar sats
LEO SAT Courier	Planned	Service 2003+	Big LEO	GPS required	Data / voice	Handheld	1-5	72 satellites
OCEAN-NET	Experimental		GEO	Moored	no maximum	Large		uses moored buoys + Intelsat
Ocean DataLink (ODL)	Experimental		GEO	GPS	no maximum	Handheld	TBD	uses Intelsat
Odyssey	Cancelled (pre-op)		MEO	GPS required	voice/data: no maximum	Handheld	1	12 satellites were planned

System	Status*	Date (if known)	Orbit type	Buoy position	Message type	Terminal size	Power (watts)	Comments
Orbcomm	Operational	1998	Little LEO	Doppler or GPS	data: no maximum	Handheld	5	35 satellites in orbit+ spares expansion to 48 sats licensed
SAFIR	Pre-operational		Little LEO	Doppler or GPS	data: no maximum	□laptop□	5	2 satellites in orbit
Signal	Planned		Big LEO		voice/data			48 satellites planned
SkyBridge	Licensed	Service 2002+	Big LEO	GPS required	Broadband	Larger than handheld		80 satellites planned. Re-utilising GEO spectrum allocations
Starsys	Cancelled (pre-op)		Little LEO	Doppler + ranging	data: 27 bytes multiple msgs	Handheld	2	12 satellites 1998+ 24 satellites 2000+
Teledesic	Licensed	Service Late 2004	Big LEO	GPS required	Broadband			288 satellites planned FCC licence granted
Temisat	Experimental		Little LEO		Data			7 satellites planned for environmental data relay. 1 satellite launched 1993.
Vitasat	Pre-operational		Little LEO	GPS required	Data			2 satellites in orbit, 2 more planned
WEST	Planned	Service 2003+	MEO	GPS required	Broadband			9 satellites planned

* Status of systems is categorised into one of six groups:

Planned: Little is known about the system except a name, notional type, and services to be offered. Mostly not licensed, although some may be.
Licensed: System has been licensed by a national or international regulatory agency (in most cases the FCC), but no satellites have been launched.
Experimental: System has one or more satellites in orbit for experimental purposes (not usually part of the final constellation). Includes new systems planning to use existing satellites.
Pre-operational: System is in process of launching, or has launched, its constellation but is not yet offering full services. Some limited evaluation service may be available.
Operational: System has full or nearly full constellation in place and is offering readily available service to external users (not necessarily commercial).
Cancelled: System has been cancelled, either before satellites launched (pre-op) or after (post-op).

ANNEX VII

DBCP list of national focal points for logisitc facilities

AUSTRALIA

Graeme S. Ball
Marine Observations Unit
GPO Box 1289K Melbourne
Vic 3001, Australia
Tel: +61 3 9669 4203
Fax:+61 3 9669 4168
email: g.ball@bom.gov.au

BRAZIL

Diretoria de Hidrografia e Navegação
Departamento de Serviços Oceânicos
Divisão de Informações Ambientais
Rua Barão de Jaceguay, s/no.
CEP 24.048-900 - Niterói - Rio de Janeiro
tel +55 21 6202626
fax +55 21 6200073
email: 24@dhn.mar.mil.br

CANADA

Ron McLaren
Head, Marine Operations
Pacific and Yukon Region
Atmospheric Environment
700-1200 West 73rd Avenue
Vancouver, BC V6P 6H9
tel +604 664 9188
fax +604 664 9195
Email ron.mclaren@ec.gc.ca

CHILE

Lcdr Alejandro Cabezas
Head, Department of Oceanography
Servicio Hidrográfico y Oceanográfico de la Armada
Errázuriz 232, Playa Ancha
Valparairo
tel +56 32 282697
fax +53 32 283537
Email shoa@huelen.reuna.cl (Internet)

CHINA

Mr Ye Renmiao
Director, Department of Marine Monitoring and Services
State Oceanic Administration
1, Fuxingmenwai Ave.
Beijing 100860
tel -
fax +86 1 853 3515

CHINA

Mr Qu Qiang
Deputy Chief, Division of Station and Forecast
Department of Marine Monitoring and Service
State Oceanic Administration
1, Fuxingmenwai Ave.

Beijing 100860
tel -
fax +86 1 853 3515

ECUADOR

Instituto Oceanografico de la Armada
Av. 25 de julio (Base Naval Sur)
Casilla 5940
Guayaquil
tel
fax 593 4 442 151

FRANCE

Pierre Blouch
Météo-France
Centre de météorologie marine/Brest
13, rue du Chatellier
BP 7302
F-29273 Brest Cédex
tel +33 298 221852
fax +33 298 221849
Email: pierre.blouch@meteo.fr

GAMBIA

Director
Department of Water Resources
7 Marina Parade
Banjul
tel +220 228216
fax +220 225009

IRELAND

Ms Evelyn Murphy
Marine Unit
Irish Meteorological Service
Glasnevin Hill
Dublin 9
tel +353 1 842 4411
fax +353 1 375 557

JORDAN

Dr Ahmad Abu-Hilal
Director
Marine Science Station
P.O. Box 195
Aqaba
tel +962 3 315144 and 315145
fax +962 3 313674

KUWAIT

Dr Abdullah Al-Salem
Manager, Hydraulics and Coastal
Engineering Department
Kuwait Institute for Scientific Research (KISR)
P.O. Box 24885
13109 Safat
tel +965 4847093
fax +965 4815192

MAURITIUS

Mr S. Ragoonaden
Marine Meteorologist
Meteorological Services
Vacoas

tel +230 686 1031/32
fax +230 686 1033

NETHERLANDS

Mr Jan Schaap
PMO
Royal Netherlands Meteorological Institute
P.O. Box 201
NL-3730 AE De Bilt
tel +31 30 2206911
fax +31 30 2210407

NEW ZEALAND

Ms Julie Fletcher, Marine Meteorological Officer
Meteorological Service of NZ Ltd
PO Box 722
Wellington
New Zealand
tel +64-4-4700 789
fax +64-4-4700 772
email: fletcher@met.co.nz

RUSSIAN FEDERATION

Mr S.V. Vasiliev
Roscomhydromet
Novovaganikovsky Street
Moscow 123242
tel +095
fax +095 253 9484
telex 411117 RUMS RF

SOUTH AFRICA

Mr Louis Vermaak
South Africa Weather Bureau
Private Bag X097
Pretoria
tel +27 12 309 3834
fax +27 12 309 3020
Email: vermaak@cirrus.sawb.gov.za

SPAIN

César Belandia
Head, Observations and Instruments
Instituto Nacional de Meteorología
Apartado 285
28070 Madrid
tel +34 1 5819651
fax +34 1 5819846
Email cesar.belandia@inm.es

UNITED ARAB EMIRATES

H.E. Mohamed Yahya Al-Suweidi
Assistant Undersecretary for
Civil Aviation
Ministry of Communications
P.O. Box 900
Abu Dhabi
tel +971 2 662 908 (ext 227)
fax +971 2 651 691

UNITED KINGDOM

Wynn Jones
Meteorological Office
Beaufort Park

Easthampstead
Wokingham, Berkshire RG11 3DN
tel +44 1344 855 897
fax +44 1344 855 603
Email: dwjones@meto.gov.uk

URUGUAY

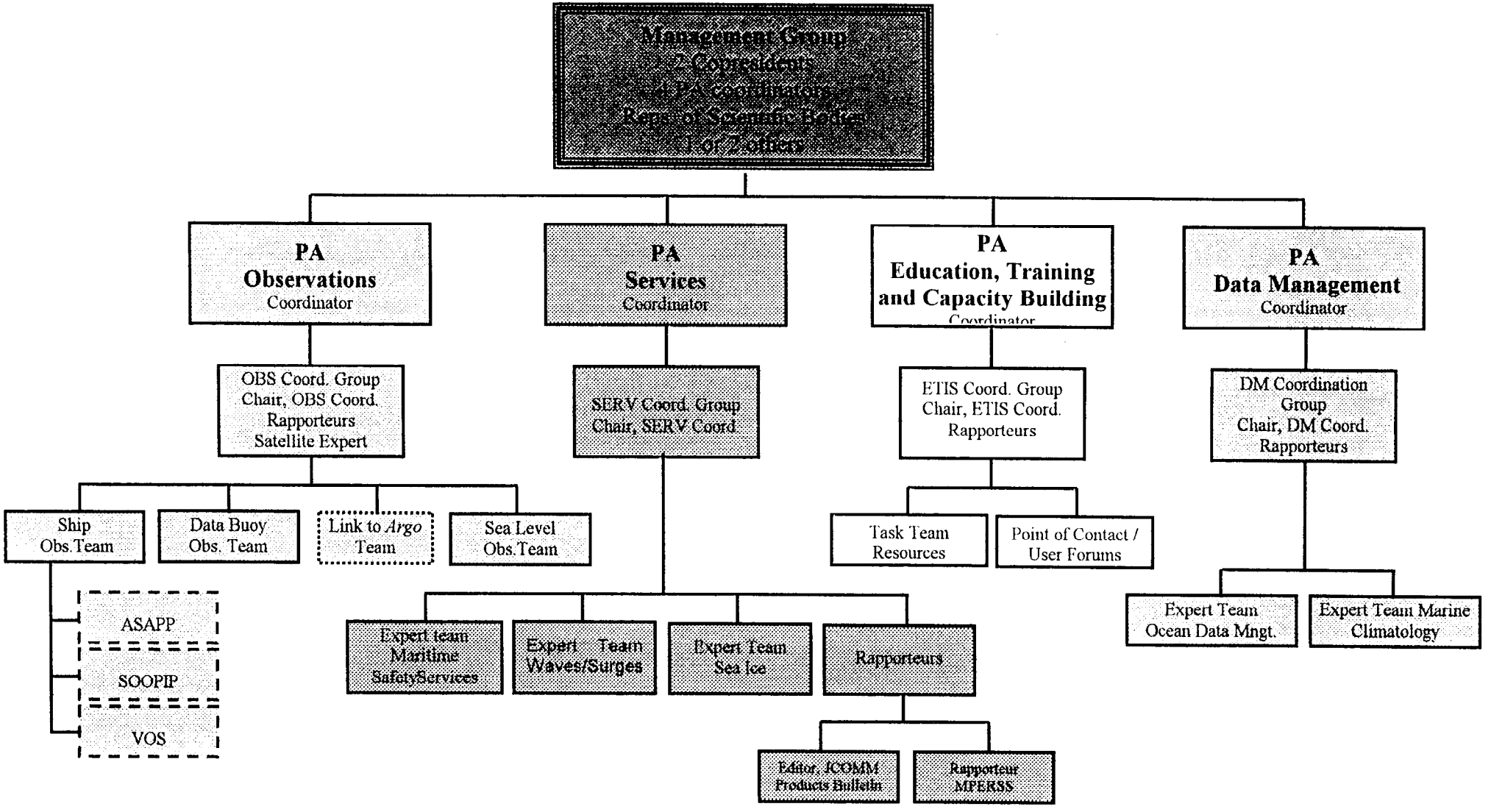
Capitán de Navío (C.G.) Don Guillemo Ramis
Direccíon Nacional de Meteorología
Javier Barrios Amorín 1488
Casilla de Correo 64
11200 Montevideo
tel +5982 405177
fax +5982 497391

USA

Steve Cook
Manager, Global Drifter Center
NOAA/AOML
4301 Rickenbacker Causeway
Miami FL 33149
tel +1 305 361 4455
fax +1 305 361 4448
Email skcook@ucsd.edu
Email cook@aoml.noaa.gov
Or contact Craig Engler, Email engler@aoml.noaa.gov

ANNEX VIII

PROPOSED JCOMM STRUCTURE



ANNEX IX

The JCOMM Observing Platform Operations and Support Centre (JCOMMOPS)

Under the general guidance of JCOMM, and specifically under the direction of the Data Buoy Cooperation Panel (DBCP), the Ship Of Opportunity Programme (SOOP), the Volunteer Observing Ships Programme (VOS), and the Argo Science Team (AST), JCOMMOPS shall:

1) Assist in the implementation of operational in-situ ocean observing systems which require coordination at the international level in support of GOOS, GCOS, and the WWW. Such systems, referred below as relevant observing platforms, presently include drifting buoys, moored buoys in the high seas, sub-surface floats, XBTs from ships or opportunity, and meteorological observing systems from VOS.

2) Act as a focal point on all aspects of implementation and operation of relevant observing platforms.

3) Provide information on data requirements in support of GOOS, GCOS, and the WWW.

4) Provide information on the status of networks of relevant observing platforms as compared with above requirements.

5) Assist as appropriate with the development of cooperative arrangements for buoys and sub-surface float deployments, and for the servicing of moored buoys in the high seas. Provide a single point of entry for information on deployment opportunities.

6) Assist as appropriate in the operation of quality control procedures for relevant observing platforms.

7) Assist in the standardisation of data formats, etc.

8) Provide information on various telecommunication systems which can potentially be used for real-time data transmission of data from relevant observing platforms (e.g. Argos, Inmarsat, Orbcomm, GOES, METEOSAT...); Assist in the clarification and resolution of issues between Service Argos and operators.

9) Assist in promoting the insertion of all available and appropriate data into the Global Telecommunications System.

10) Coordinate and monitor the flow of data into appropriate permanent archives.

11) Provide information as required on the functional status of relevant observing platforms.

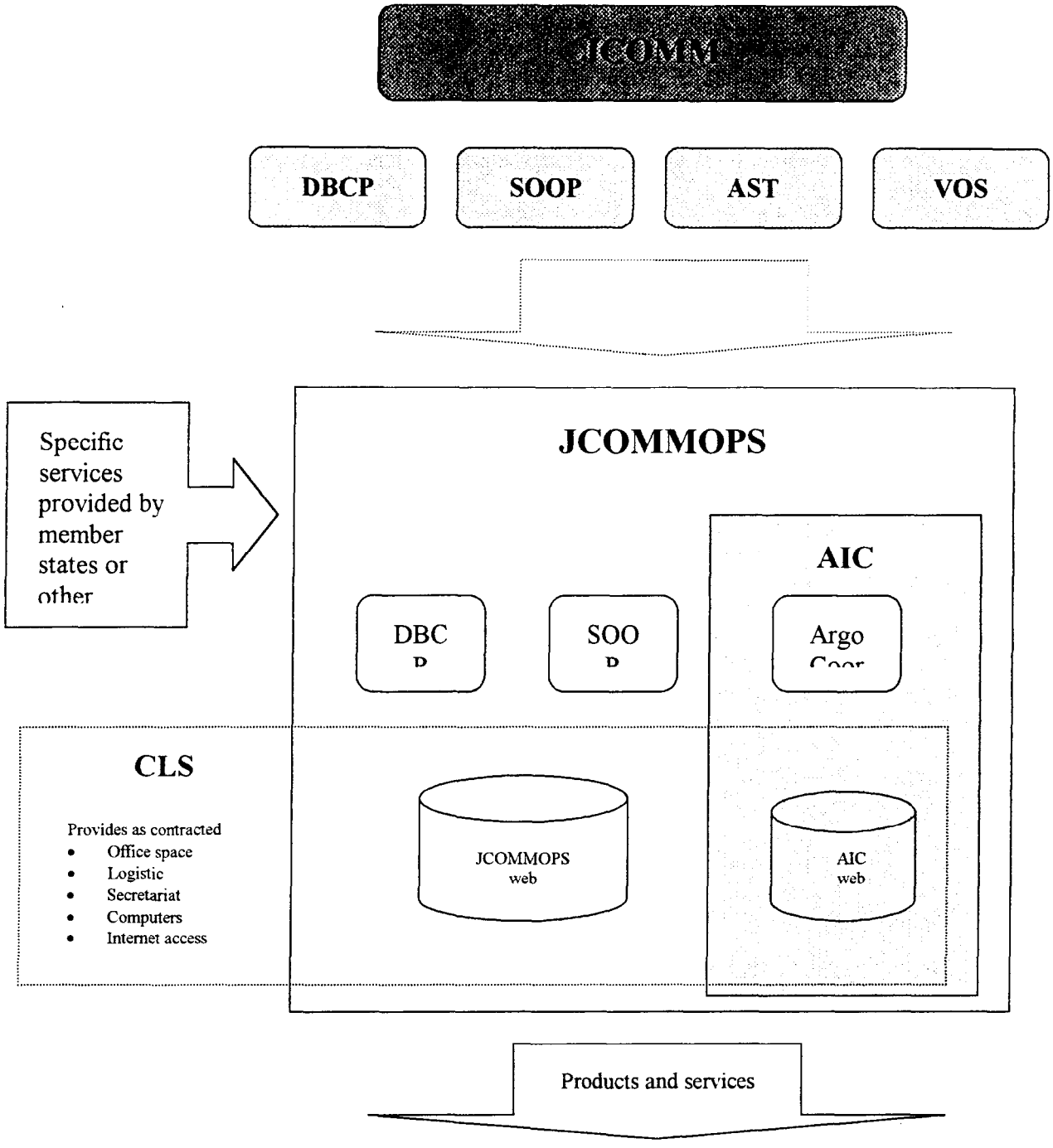
12) Operate a web site which shall deliver information on

- Deployment opportunities, including contact points
- Requirements for in-situ ocean data in support of GOOS, GCOS, and the WWW.
- Current programme status (e.g. maps, quality)
- Information on telecommunication systems
- Links to DBCP, SOOP, and Argo Information Centre web sites
- Links to other relevant JCOMM products (e.g. JCOMM Electronic Products Bulletin)

Structure of JCOMMOPS

JCOMMOPS is located in Toulouse, France. Office space, logistical and secretariat support as well as computer support, including Internet access is provided by CLS as contracted between CLS and the DBCP, SOOP, and the AST.

JCOMMOPS operates a web site, includes the Argo Information Centre, and the services of the Argo, DBCP and SOOP Coordinators. It is managed by the Technical Coordinator of the DBCP.



ANNEX X

INFORMATION OF SPECIAL INTEREST OR IMPORTANCE TO MARINERS

NM 32/00

HYDROGRAM

National Imagery and Mapping Agency
Bethesda, MD 20816-5003

SPECIAL ANNOUNCEMENTS

NEW PRODUCTS OR SERVICES

IMPORTANT CHANGES

5 August 2000

METEOROLOGICAL AND OCEANOGRAPHIC DATA BUOYS

THESE DRIFTING AND MOORED BUOYS MAKE ROUTINE MEASUREMENTS USED FOR WEATHER FORECASTING, ASSISTING FISHERIES, SAFETY AT SEA, CLIMATE PREDICTION AND METEOROLOGICAL AND OCEANOGRAPHIC RESEARCH. SEE SECTION III.

Adobe Photoshop Clip Image is too big to be exported

SECTION III

32/00

MARINE INFORMATION

METEOROLOGICAL AND OCEANOGRAPHIC DATA BUOYS

The Data Buoy Cooperation Panel working under the auspices of the World Meteorological Organization and the Inter-governmental Oceanographic Commission maintains arrays of instrumented drifting and moored buoys in the world oceans. These automated buoys make routine measurements and transmit their data in real-time through satellites. Such measurements include wind speed and direction, air temperature, air humidity, atmospheric pressure, currents, sea surface temperature, but also water temperatures at various depths to 500 meters. All buoys transmit their positions along with the data.

Both drifting and moored buoys provide valuable information to many communities, including fishermen and mariners.

What are the buoys used for?

Weather forecasts. Meteorological models routinely assimilate observations from various sources (including satellites, weather balloons, land stations, ships, and data buoys) around the planet to make their national forecasts. Buoy data are crucial because they are deployed in ocean areas where no other source of valuable data is available.

Marine forecast. For similar reasons, buoy data are essential for producing improved marine forecasts.

Assistance to fisheries. Sea surface temperature is an important tool to find many different species of fish. The buoys provide this information to weather centres, which produce charts of sea surface temperature and distribute them to fishermen. Knowing where to look for fish saves both fuel and time. Using data buoys and other instruments such as sub-surface floats, oceanographic models now permit the prediction of the impact of El Niño events and other signals on the ocean environment; these predictions can help fishermen to plan their operations in advance.

Safety at sea. Several nations have successfully used surface wind and ocean current information from the buoys to help locate missing or overdue boats.

Climate prediction, meteorological and oceanographic research. Researchers use the data from the buoys to learn how to predict future changes in the world's climate. For example, buoys were deployed to learn how to predict the El Niño/Southern Oscillation phenomenon which causes disruptions in the ocean surface winds and the upper ocean temperature pattern and leads to seasonal climate variations and changes in fish migration patterns in many areas of the world oceans.

Advice to fishermen and mariners

DO NOT pick up drifting buoys. Buoy operators do not refurbish the drifting buoys once deployed. They would continue to transmit their position along with erroneous meteorological and oceanographic data from the deck of the ship.

DO keep watch for the moored buoys at sea; they should be visible on radar and can be avoided. During fishing operations keep a safe distance from the buoys in order to avoid entanglement of your net with the buoy.

DO NOT moor to, damage, or destroy any part of the buoys.

DO educate your fellow community about the use of data buoys.

ANNEX XI

Financial Statement by IOC
for the year 1 June 1999 to 31 May 2000
(all amounts in US $ unless otherwise specified)

BALANCE (from previous year)			**$ 21 929**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
$ 118 000	(28.04.1999)		**$ 118 000**
FF 80 000	(16.12.1999)		**FF 80 000**
	TOTAL RECEIPTS		**$ 139 929**
			FF 80 000
EXPENDITURES			
Technical Co-ordinator's employment:			
	- Salary:	69 572	
	- Allowances:	25 762	
	- Relocation (yearly provision):	4 456	**$ 99 790**
Technical Co-ordinator's missions:			
	- Bremerhaven (1-4 June 1999)	0i	
	- Oban (12-15 June 1999)	2 982	
	- Saint Petersburg (18-23 July 1999)		
	- Saint Raphael (18-21 October 1999)	1 155	
	- Wellington/Melbourne (23 October – 6 November 1999)	3 868	
	- Geneva (28-30 November 1999)	1.312	
	- Paris (5-9 December 1999)	965	
	- Washington (9-19 February 2000)	1 988ii	
	- Southampton (6-9 March 2000)	1 435	
	- San Diego (24March - 2 April 2000)	2 051	
	- Geneva/Tokyo (9-15April 2000)	3 770	
	- Regularization (previous year 's missions)iii	640	**$ 20 166**
Contract with CLS/Service Argos:			**FF 80 000**
	TOTAL EXPENDITURES		**$ 119 956**
			FF 80 000
BALANCE (at 1 June 2000)			**$ 19 973**

i The cost of the mission to Bremerhaven was taken into account under the mission to Brest (26-28 May 1999), already accounted for in the previous financial statement

ii The mission was partly paid for by WMO/CBS

iii Some mission-related expenses were taken into account too late within the administrative system to appear in last year's financial statement.

World Meteorological Organization

Data Buoy Co-operation Panel
Final Statement of Account as at 31 December 1999

	US$	US$
Balance from 1997		33,645
Contributions Paid for Current Biennium		300,072
Total Funds Available		333,717
Obligations Incurred		
Technical Co-ordinator	249,211	
Experts	3,845	
Consultants	5,490	
Travel	16,559	
Reports	12,194	
Administrative costs	8,620	
		295,919
Balance of Fund	US $	37,798
Represented by:		
Cash at Bank		46,395
Unliquidated obligations		8,597
	US $	37,798

CONTRIBUTIONS	Received 1998	Received 1999
Australia	25,000	13,500
Canada	10,000	10,000
France	11,400	11,210
Germany	-	5,000
Greece	2,200	2,200
Iceland	1,500	1,500
Ireland	1,377	1,460
Japan	5,000	-
Netherlands	1,575	1,575
New Zealand	500	500
Norway	-	1575
South Africa	3,000	6,000
UK	17,000	16,000
USA	68,000	83,000
TOTAL	146,552	153,520

World Meteorological Organization

Data Buoy Co-operation Panel
Interim Statement of Account as at 3 October 2000

	US$	US$
Balance from 1999		37,798
Contributions Paid for Current Biennium		112,456
Total Funds Available		150,254
Obligations Incurred		
Consultants	100,000	
Travel	24,752	
Bank charges	18	
		124,770
Balance of Fund	US $	25,484
Represented by:		
Cash at Bank		40,833
Unliquidated obligations		15,349
	US $	25,484

CONTRIBUTIONS	Received 2000
Canada	10,000
France	9,863
Germany	5,000
Greece	2,200
Iceland	1,500
Ireland	1,243
Netherlands	1,575
Norway	2,075
USA	79,000
TOTAL	112,456

PROVISIONAL ESTIMATE OF INCOME AND EXPENDITURE UNTIL 31 MAY 2001

Income		**USD**
Balance of fund from interim account		25,484
Expenditure		
Publications	*Existing obligations*	
	New publications	7,000
Obligations		11,000
Travel of chairman/vice-chairmen/JTA chairman		6,239
Experts		
Total		24,239
Anticipated balance to transfer to 2001/2002 account		1,245

ANNEX XII

EXPENDITURES AND INCOME FOR 1998-2002

	Actual 1998 and 1999 (2 years)	Estimated 2000/01 (1 year)	Estimated 2001/02 (1 year)
		USD	
Expenditures			
Technical Coordinator (Salary, Travel and Logistics)	249,211	126,000	126,000
Travel (chair, vice-chairs DBCP and SOOP and JTA chair)	16,559	10,000	10,000
Experts	3,845		2,000
JTA chairman	5,490	5,000	5,000
Programme development DBCP and SOOP			5,000
Publications	12,194	6,000	6,000
WMO	8,620	2,000	2,000
Contingencies			1,495
TOTAL	295,919	149,000	157,495
Income			
Contributions	300,072	112,456	156,250
Carry forward	33,645	37,798	1,245
Carry over	-37,798	-1,245	
TOTAL	295,919	149,000	157,495

TABLE OF PAST AND PROVISIONAL CONTRIBUTIONS

DBCP

	1999-2000	**2000-2001**	**2001-2002**
AUSTRALIA (including JTA chair support)	13,500	13,500	13,500
CANADA (including brochure in 1999)	10,000 C$ 9,687.5	10,000	10,000
FRANCE	11,210 (FRF 70,000)	9,863 (FRF 70,000)	11,000 (FRF 70,000)
GREECE	2,200	2,200	2,200
ICELAND	1,500	1,500	1,500
IRELAND	1,460 (IR£ 1,000)	1,243 (IR£ 1,000)	1,400 (IR£ 1,000)
JAPAN			5,000
NETHERLANDS	1,575	1,575	1,575
NEW ZEALAND	500	500	500
NORWAY	1,575	2,075	1,575
SOUTH AFRICA	3,000	3,000	3,000
UNITED KINGDOM (including JTA chair support)	16,000	16,000	16,000
USA (including JTA chair support)	68,000	69,000	69,000
TOTAL	**128,520**	**130,456**	**136,250**

SOOPIP

	1999-2000		**2000-2001**		**2001-2002**
Germany	5,000		5,000		5,000
Japan	5,000				5,000
USA	15,000		10,000		10,000
TOTAL	**25,000**		**15,000**		**20,000**

ANNEX XIII

DBCP IMPLEMENTATION & TECHNICAL WORKPLAN FOR THE 16th YEAR

PART A - Summary of tasks

1. Analyse programme information & other data as appropriate & in particular in accordance with DBCP global programme implementation strategy.

2. Assist in the planning & implementation, as appropriate, of the ocean data buoy component of GOOS, GCOS & CLIVAR.

3. Tentatively implement database of buoy programme information on DBCP WWW server.

4. Update & amend, as necessary, the DBCP World Wide Web server, including up to date information on existing & planned data telecommunication systems.

5. Continue investigation regarding developments in communication technologies & facilities, relevant to the collection of sensor &/or location data from buoys.

6. Update & publish new versions of DBCP publications No. 1, 2 & 15. Produce new publications: 2000 Annual Report, Workshop Proceedings & SVPB Specification Manual.

7. Develop & implement co-operative buoy deployment strategies, in particular with the GDP, to provide buoy networks which serve both research & operational applications.

8. Organize scientific & technical workshop at DBCP-XVII

9. Update & publish new version of DBCP brochure

10. Establish new "DBCP general interest" as well as "buoy operators" mailing lists

11. Monitor & evaluate quality of pressure & wind data from SVPB & SVPBW drifters.

12. Assist in implementing new buoy programmes as required.

13. Encourage other centres to act as PMOC

14. Produce graphics showing quality of WOTAN drifter data as compared with conventional anemometers

15. Begin implementation of BUFR within Argos GTS sub-system (provided JTA-20 agrees for inclusion of required developments in the Argos development project).

16. Check out list of variables & templates for encoding of buoy data in BUFR (by March 2001).

17. Document calibration procedures

18. Provide the Technical Coordinator with deployment opportunities (maps & point of contact) for inclusion on the JCOMMOPS web server.

19. Produce table of national commitments in the Southern Ocean (by next Panel's session).

20. Buoy operators to develop their metadata catalogues & submit information to the JCOMM sub-group on Marine Climatology

21. Define a st&ard format for manufacturers to provide metadata when delivering buoys.

22. Contribute to the feasibility study for implementing GTS distribution of data from other commercial satellites through the Argos GTS processing sub-system.

DBCP IMPLEMENTATION & TECHNICAL WORKPLAN FOR THE 16th YEAR

PART B

TASK	CARRIED OUT BY*	SUPPORTED/ ASSISTED BY	REPORTED TO/ ACTION BY
1	TC	Vice-chairmen	Chairman for presentation to the panel
2	DBCP	Panel members	Panel
3	TC		Panel
4	NOAA/AOML & TC	Vice Chairman (Meldrum)	Panel
5	Vice-chairman (Meldrum) & TC	Chairman & Panel members	Panel
6	TC, Secr.	Service Argos (No. 1, 2), Scripps Institution of Oceanography (No. 4), Panel Members (No.15)	Panel
7	Regional action groups, GDC	Panel members, TC	Panel, GDP
8	Mr. Ron McLaren	Secr.	Panel
9	Secr.	TC, Australia	Panel
10	TC	Service Argos	Panel
11	SVPB/SVPBW evaluation s.-group		Panel
12	Support team (USA, UK, Brazil, Canada)	TC, Secr.	Panel
13	Panel Members	TC	Panel
14	TC		Panel
15	CLS, Service Argos	TC	Panel, JTA
16	Panel Members	TC	Panel
17	Panel Members		JCOMM sub-group on MC
18	Members		Panel
19	TC	Panel Members	Panel
20	Buoy operators		JCOMM –MC
21	GDC & TC		Panel, JCOMM SG-MC
22	CLS	TC, JTA chairman, Argos OPSCOM	Panel

DBCP ADMINISTRATIVE WORKPLAN FOR THE 16TH YEAR

PART A - Summary of tasks

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

2. Maintain a catalogue of existing ongoing ocean data buoy programmes

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

4. Identify sources of buoy data not currently reported on the GTS & determine the reason for their non-availability.

5. If deemed necessary, make proposals for co-ordination activity as a result of the above actions to address items 2 to 6 in the terms of reference of the DBCP.

6. Arrange for the circulation of information on the Panel's activities, current & planned buoy programmes & related technical development/evaluations, including via distribution of existing DBCP publications to potential Argos GTS users.

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

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

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

10. Prepare annual report of the DBCP.

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

12. Investigate requirements for initiating new co-ordinated buoy deployments in other ocean areas including the Black Sea, the North Pacific & the Southern Ocean.

13. Survey all potential interested countries to assess interest in establishing a North Pacific Buoy Programme (possibly as a new Action Group)

14. Make every effort to recruit new contributors to the trust fund.

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

16. Co-ordinate operation of DBCP QC guidelines.

17. Follow up & possibly assist in implementing requirements expressed by the buoy users within the Argos system.

18. Provide technical workshop papers to WMO Secretariat (end November) & publish proceedings (mid 2000).

19. Submit national reports & Action Group reports in electronic form to the technical coordinator for inclusion in the DBCP server.

20. Prepare & distribute revised budget estimates for 2001-2002

21. Secr. & members to identify necessary funding to allow for expansion of JCOMMOPS & AIC staffing & resources.

22. Review proposed changed for the DBCP implementation strategy & suggest possible further changes (by 30 Nov. 2000).

23. Continue development of JCOMMOPS, including making deployment opportunities available via the web.

DBCP ADMINISTRATIVE WORKPLAN FOR THE 16TH YEAR

PART B

TASK	CARRIED OUT BY*	SUPPORTED/ ASSISTED BY	REPORTED TO/ ACTION BY
1	TC	Panel members & Secr.	Chairman for presentation to the panel
2	TC	Panel members & Secr.	Chairman & panel for information
3	Secr.	Panel members	Chairman & panel for information
4	TC, CLS	Panel members & Secr.	Chairman & panel for information
5	Chairman & TC	Secr. & others as appropriate	To Panel for consideration & appropriate action or for direct action by chairman
6	TC	Chairman, Secr. & CLS	Wide circulation by Secr. & CLS
7	TC	CLS	Panel & users
8	Chairman & sub-committee	Secr.	Secr.
9	Panel/chairman		Panel (at next session)
10	Chairman & Secr.	TC	Executive Councils of WMO & IOC
11	Chairman & Secr.	TC	Panel
12	Chairman & Secr.	Panel members	Panel
13	Canada	Panel Members	Panel
14	Chairman	Panel members	Panel
15	Operational services, chairman, vice-chairmen & TC	Panel members	Panel
16	TC	Panel members & operational services	Panel
17	CLS	TC	Panel, meeting on JTA
18	Panel members, WMO Secr.		Panel
19	Panel members, AG, TC		Panel
20	Secr.		Panel
21	Secr. & panel members		
22	Panel members	TC, Secr.	Vice-chairman (Meldrum)
23	TC	Panel members	Panel

ANNEX XIV

Action Sheet on decisions of DBCP-XVI
(Victoria, BC, Canada, 16-20 October 2000)

Ref.	Subject	Action proposed	Resp.	Target date	Comments
para. 31	**ISABP**	To invite Chile and Peru at future ISABP meetings	ISABP chairman & technical coordinator	Programme Committee mtgs	
para. 50	**NAYLAMP**	1. To urge Peruvian organizations to transmit their data onto the GTS	Panel chair & TC, Secr.	ASAP	
		2. To propose the assistance of TC			
para. 52	**Argo trust fund**	To request Member States to make additional contributions	Secr.	continuous	
para. 54, wrk./impl. 11	**Evaluation sub-group**	To continue working with Elisabeth Horton as chair	Sub-group	continuous	
para. 57, wrk./adm. 22	**Implementation strategy**	1. To pass comments & proposed revisions to D. Meldrum	Panel members	30 Nov. 2000	
		2. To prepare & publish a finalized 2nd edition	D. Meldrum, TC, Secr.	ASAP	
para. 58, wrk./impl. 8	**Scientific & Technical Workshop**	To organize the DBCP-XVII workshop	Ron McLaren, Secr.	mid-2001	
para. 63	**Information exchange**	1. To submit reports in electronic form to Secr. & TC	Panel members & action groups	ASAP	
paras. 64 & 114, wrk./impl. 18		2. To provide TC with information on deployment opportunities	Panel members	continuous	
para. 65		3. To make better use of the DBCP forum	Panel members	continuous	

Ref.	Subject	Action proposed	Resp.	Target date	Comments
paras. 67-68, wrk./impl. 6		4. Docs. to be updated / produced: - Guide to data collection & location using Service Argos - GTS sub-system reference guide - DBCP Implementation Strategy - SVPB specification manual	TC and: - CLS; - CLS; - panel members; - Scripps	ASAP	
paras. 69-70? wrk./impl. 9		5. To update & publish the DBCP brochure	Secr., TC, Australia	ASAP	
para. 71, wrk./impl. 10		6. To establish DBCP mailing lists	TC, CLS	ASAP	done
para. 74, wrk./impl. 13	**Quality control**	1. To act as PMOCs	Australia, Canada, Iceland, South Africa	continuous	
para. 76		2. To produce monitoring statistics	Argentina	continuous	
para. 77, wrk./impl. 14		3. To produce separate graphics for WOTAN & conventional anemometers	TC	continuous	
para. 78		4. To invite scientists involved with data assimilation/modelling to future workshops, and support GODAE	Secr., Ron McLaren	mid-2001	
para. 86-87, wrk./impl. 15, 16	**Codes**	1. To begin implementation of BUFR within the Argos GTS Sub-system	JTA, CLS	JTA-XX / early 2003	agreed in principle
		2. To define list of variables to be distributed in BUFR	Panel members, TC	March 2001	
para. 94, wrk./impl. 5	**New communications techniques and facilities**	To continue reviewing the state of the art and present review at next session	David Meldrum	DBCP-XVII	
para. 96 & 99, wrk./impl. 20, 17	**Metadata**	1. To compile metadata catalogues & document calibration procedures	Panel members, action groups, TC	ASAP, continuous	
para. 97, wrk./impl. 21		2. Develop a standard format for manufacturers to provide metadata when delivering buoys	GDC, TC, JCOMM Sub-group on Marine Climatology	ASAP	

Ref.	Subject	Action proposed	Resp.	Target date	Comments
para. 105, wrk./impl. 19	**Southern hemisphere barometer drifters**	To produce a table with all national commitments in the region	TC	DBCP-XVII	
para. 118, wrk./impl. 22	**GTS distribution of data from commercial satellite systems**	To undertake a feasibility study	CLS, TC, JTA chair, Rob Bassett	DBCP-XVII	
para. 123, wrk./adm. 12	**New action groups**	1. To develop a specific proposal for a Black Sea Buoy Programme	Black Sea States	DBCP-XVII	
para. 124, wrk./adm 12, wrk./adm. 13		2. To assess interest in the establishment of a North Pacific Buoy Programme	MEDS	DBCP-XVII	
para. 127, wrk./adm. 23	**JCOMMOPS**	1. To continue development of JCOMMOPS	TC, Argo coordinator	continuous	
para. 127		2. To present the concept to JCOMM-I for adoption	DBCP representative at the session	JCOMM-I	
para. 127, wrk./adm. 21		3. To identify necessary funding for JCOMMOPS staffing & resources	Secr., panel members	continuous	
para. 128	**JCOMM-I**	1. To prepare documents for the session	Chairman TC Secr.	Dec. 2000 Feb. 2001	
		2. To be represented at the session	Chairman, TC, Secr.	ASAP	
para. 129	**CLIVAR Ocean Observations Panel**	To accept the invitation of becoming member of COOP	Chairman	ASAP	
para. 142	**Float allocation scheme for Argo**	To solve the problem at everybody's satisfaction	All concerned	ASAP	done
para. 144	**Vandalism**	To contact Hydrographic Services to reinforce the message in the Hydrogram and ensure that it is reissued as often as possible	Panel members	continuous/ periodically	
para. 152	**Future commitments**	1. To issue invoices for 2001 contributions	Secr.	end 2000	

Ref.	Subject	Action proposed	Resp.	Target date	Comments
+ wrk./adm. 14		2. To make efforts to recruit additional contributors	Panel members, Secr.	continuous	
para. 159	**DBCP-XVII**	1. To make local arrangements	Australian BOM	ASAP	
		2. To prepare agenda, annotated agenda & documentation plan; to issue invitation letter	Secr., chairman	June 2001	

[**Note**: *wrk./impl. xx* = task xx in the DBCP implementation and technical workplan for the 16th year
wrk./adm. yy = task yy in the DBCP administrative workplan for the 16th year]