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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of UNESCO)

WORLD METEOROLOGICAL ORGANIZATION

Fourteenth Session of the Data Buoy Co-operation Panel
(Marathon, Fl, USA, 12-16 October 1998)

SUMMARY REPORT

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 fourteenth session of the Data Buoy Cooperation Panel (DBCP) was opened by the chairman of the panel, Mr G. Brough, at 0900 hours on Monday 12 October 1998 in the conference room of the Hawk's Cay Resort Hotel, Marathon, FL, USA. He welcomed all participants to the session and to the workshop, noting with satisfaction that the participation in this present session was the largest ever, testimony to the value of the workshop and the ever-increasing interest in the work of the panel, as well as to the undoubted attractiveness of the venue. The chairman expressed his sincere thanks, on behalf of all participants as well as of the sponsoring organizations WMO and IOC, to NOAA/AOML, and in particular to Mr Mark Bushnell and his co-workers, for hosting the session and workshop and for providing such excellent facilities and support and generous hospitality.

2 The Deputy Director of AOML, Dr Judy Gray, welcomed participants to the workshop and to Florida on behalf of her laboratories and of NOAA. In doing so, she stressed to participants that the recent adoption by the US Government of the Oceans Act signified a renewed interest by the President and his government in the global ocean, which was important for all concerned. She underlined the continuing commitment of AOML to supporting the Global Drifter Center, and thereby data buoy programmes worldwide as well as the work of the panel. Dr Gray noted with relief that the recent hurricane Georges had fortunately not disrupted the hosting of the session, and concluded by wishing participants a very successful workshop and session and a pleasant stay in the Florida Keys.

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

1.2. OPENING OF THE SESSION

4 The Fourteenth Session of the Data Buoy Co-operation Panel was called to order by the panel's chairman, Mr Graeme Brough, at 14.00 hours on Tuesday, 13 October 1998, in the conference room of Hawks Cay Resort and Marina in Marathon, Florida, USA. The chairman thanked once again all involved in the practical arrangements for the session, and more especially Mark Bushnel and Warren Krug of the Atlantic Ocean and Atmosphere Laboratory of the US National Oceanographic and Atmospheric Administration.

5 The list of participants is reproduced in Annex XI and a list of acronyms and other abbreviations is given in Annex XII.

1.3. ADOPTION OF THE AGENDA

6 The agenda as adopted by the panel is reproduced in Annex I.

1.4. WORKING ARRANGEMENTS

7 Under this agenda item, the Panel decided on its working hours and other arrangements for the conduct of the session. The documentation was introduced by the Secretariats.

B. IMPLEMENTATION COMPONENT

2. IMPLEMENTATION REPORTS

2.1 TECHNICAL COORDINATOR

8 Mr. Etienne Charpentier reported on his activities as technical coordinator of the DBCP (DBCP/TC) during the last intersessional period. He was employed by IOC/UNESCO and located at CLS/ Service Argos in Toulouse, France.

9 As agreed at the XIIIth DBCP session, the DBCP/TC spent some time (52 days), including training, on so called Argos 2001 development project. In exchange, CLS provided the equivalent of 32 person*days for working on DBCP issues. Hence, a balance of 20 person*days is due by CLS in favour of the DBCP. Time offered by CLS was used to draft the DBCP brochure (Nigel Greenwood), for monitoring purposes, for producing lists of wind buoys and land stations reporting in BUOY code, and recently to advertise GTS distribution of buoy data with buoy users (Fernand Cid).

10 The technical coordinator spent less time (5%) at Météo France than during the previous intersessional period (12%) because of the difficulty to run case studies by spending only one day a week there (i.e. substantial amount of time spent caching up with model, software, or computer mainframe evolutions). He therefore suggested that the DBCP provides guidance regarding priorities, time spent, and tasks he must undertake at Météo France. Having an office at Météo France remains however useful because of good contacts established with people involved with buoy issues at Météo France and availability of numerous tools.

11 The DBCP/TC attended various meetings, including the TAO Implementation Panel meeting in Reading, November 1997, where he advocated TIP joining the DBCP as one of its action groups. He also attended EGOS, IPAB, and IABP meetings where he presented the DBCP Implementation Plan and called for comments prior to DBCP-XIV. The IABP conference called "The Arctic buoy programme, scientific achievements from the first 20 years" was sponsored by the DBCP and was held in Seattle, 3-4 August 1998. The DBCP/TC attended the conference and presented the panel and its activities. He spent one week at Scripps Institution of Oceanography in June 1998 to update the SVPB construction manual and make it available through the web.

12 Substantial amount of time was spent working on user assistance, the DBCP Web Server, and on the Argos GTS sub-system. He provided assistance for initiation of several drifting buoy programmes (e.g. Qatar, Portugal). The DBCP Web server was switched to a more powerful computer and related tools (e.g. data flow monitoring) had to be upgraded. Many other topics had been added on the server, including various status graphics, application of buoy data menu item, buoy deployment methods menu item, action groups and national reports. The GTS sub-system has been upgraded at several occasions to deal with specific user requirements (e.g. new Qa field in BUOY code, relative humidity for TAO, water salinity). A new geo-magnetic variation model valid for the period 1995-2000 was implemented.

13 The DBCP/TC prepared a comprehensive document to detail why and how inserting buoy data on GTS. The document is available via the DBCP web server or directly at:
http://dbcp.nos.noaa.gov/dbcp/1gtsinfo.html.

14 Thanks to excellent support from ECMWF, NCEP/NCO, UKMO and Météo France, he could coordinate harmonization of the buoy monitoring statistics produced by those monitoring centres. Comprehensive report is available via the web at : **http://dbcp.nos.noaa.gov/dbcp/monstats.html.**

15 Report on DBCP views on BUFR was formally submitted to CBS by the chairman of the DBCP, and discussed at the CBS Sub-group on Data Representation and Codes, and CBS Working Group on Data Management. The proposal was formally adopted at the CBS extraordinary session in Karlsruhe, October 1998.

16 The full report of the technical coordinator is given in Annex II, which also includes the list of normal tasks undertaken by him during any intersessional period and which are not detailed above. The panel expressed its appreciation to the technical coordinator for the amount of work accomplished on its behalf during the past intersessional period, as well as in previous years. Discussion on various issues raised is recorded under appropriate agenda items.

2.2 ACTION GROUPS AND RELATED PROGRAMMES

17 Under this agenda item, the panel received verbal presentations 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)

18 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 177) covering the 12 month period ending July 1998, he was particularly pleased to report that the number of drifting buoys operational in the area had continued to increase, having reached a peak of 50 in April and May of this year, with 38 operating at the end of the period. 47 buoys had been deployed in the year, and 44 had ceased to function. The operational lifetime of buoys in the EGOS programme that had failed was 297 days compared to 252 days in 1997 and 336 days in 1996. Although this figure is comparable to the average for the previous 3 years, the group remained concerned about the continued early higher failure rate of the SVP-B drifters compared to TOGA style buoys.

19 Mr Jones was particularly pleased to inform the panel of the excellent collaboration that had been established with the US Naval Oceanographic Office. Two air deployment missions had been undertaken by NAVOCEANO, the first in April 1998 on which 8 EGOS buoys were air deployed, and secondly in August when 6 buoys were deployed. This collaboration has extended significantly the areas where EGOS buoys can be deployed giving an improved spatial distribution to benefit all drifting buoy data users.

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

21 In addition to the drifting buoys, the group also operates 8 moored buoys, this number having increased in July with the deployment of the Gascogne buoy in the bay of Biscay.

22 The Group has continued to investigate technical developments which may improve the buoy performance or make for efficiencies within the overall buoy operation. These have included the incorporation of a GPS receiver into one design of buoy, and a number are now on trial. All drifting buoys operated by the group now contain a 'checksum' to improve data quality evaluation before insertion onto the GTS, and the Technical Subgroup chairman has undertaken a study of buoy message formats to investigate the possibilities for standardisation.

23 EGOS met twice in the period, in December in Paris, hosted by IOC, at which Mr Jones was elected to chairman, Mr W. van Dijk was elected to vice-chairman, Mr P. Blouch to chairman of the technical sub-group and Mr Torleif Lothe of Christian Michelsen Institute Bergen was appointed technical secretary. The Icelandic Meteorological Office hosted the second meeting in June.

The International Arctic Buoy Programme (IABP)

24 In 1991, the International Arctic Buoy Programme (IABP) was established and accepted as an action group of the panel. The IABP has grown to include twenty-four participating governmental and non-governmental organizations representing Arctic interests from eight countries. The IABP is autonomous with funding and management provided by its Participants. The objectives of the IABP are to establish and maintain a network of drifting buoys to collect and distribute surface atmospheric pressure, surface air temperature and sea ice drift data for real-time operational and research purposes. With fourteen successful deployments in 1998, the Arctic buoy network presently (October 1, 1998) consists of 34 buoys with 95% of those reporting data in real-time via the GTS. The Marine Environmental Data Service (MEDS) of Canada is responsible for the operational archival of data available on GTS. The Polar Science Center (PSC), University of Washington, performs additional data management functions including the production and distribution of a research quality archive and numerous derived products. These data are available via the IABP web site: **http://iabp.apl.washington.edu** or from the World Data Center-A/National Snow and Ice Data Center (NSIDC) located in Boulder, CO, USA. 1998 represents the 20th anniversary of the Arctic Buoy Program. In celebration of this anniversary, the IABP hosted a DBCP-sponsored conference entitled "The Arctic Buoy Programme - Scientific Achievements from the first 20 years" in Seattle, Washington on August 3-4, 1998. Conference presentations highlighted the use of IABP data in various scientific research areas including: the role of the Arctic Ocean on climate, decadal changes in large-scale atmospheric forcing and sea ice drift, transport of pollutants entrained in ice, global model verification and studies on structural changes to polar oceanographic phenomena such as the Arctic Cold Haline Layer and North Atlantic Deep Water formation.

The International Programme for Antarctic Buoys (IPAB)

25 The 2nd meeting of the International Programme for Antarctic Buoys (IPAB) was held 9-14 May 1998 at the Istituto Universitario Navale, Naples, Italy. IPAB activity decreased substantially during 1997 reaching a low level of 5 buoys reporting from Antarctic area in December as compared to 14 buoys in January 1997. Planned figures for 1998 are however more promising: 15 to 20 drifting buoys equipped with geophysical sensors should be deployed in 1998. However, the drifting buoys deployed on the sea ice shelf around the Antarctic continent escape the area relatively rapidly to eventually sink when reaching the open ocean. Besides, a much larger number of buoy deployments would be required to approach WWW and WCRP requirements. IPAB is therefore looking for new commitments (e.g. buoys, telecommunication costs) in the Programme and particularly from operational meteorological agencies. Prof. Kottmeier, IPAB Chairman, wrote a letter to the DBCP Chairman in this regard asking the DBCP to debate the issue at its XIVth session and attached evidence of positive impact of buoy data upon operational analysis fields (Antarctic First Regional Observing Study of the Troposphere (FROST) Project, analysis of synoptic scale low pressure systems within the Antarctic Peninsula sector of the circumpolar trough). More research institutes than operational agencies do in fact participate in IPAB, and data are useful to both communities. In addition Antarctic area is a well known data sparse area for Numerical Weather Prediction (NWP).Of course, IPAB makes sure that the data are distributed over the GTS.

26 The panel debated the issue, agreed indeed that Antarctic area was a data sparse area, and therefore urged its members, and especially those with regional interest and those running global models to make commitments in the IPAB. Members willing to participate are invited to establish direct contacts with the Programme Coordinators (Ian Allison and Peter Wadhams). Brazil (Diretoria de Hidrografia e Navegação - DHN) offered deployment opportunities. United Kingdom re-affirmed its contribution of 2 PTT-years of Argos costs to the programme.

27 IPAB information can be found on its web server at:
http://www.antcrc.utas.edu.au/antcrc/buoys/buoys.html

28 MEDS recalled the decision by IPAB to discontinue submitting its database to RNODC/DB since it is already being submitted to WDC for Glaciology. The panel requested its chairman to write to IPAB chairman and coordinators to ask the Programme to review its decision.

The International South Atlantic Buoy Programme (ISABP)

29 The fifth Programme Committee meeting of the ISABP was held in Buenos Aires, Argentina, from 10 to 14 August 1998. It was hosted by the Naval Hydrographic Office (Dept. of Meteorology and Oceanography). The following organizations were represented: NAVOCEANO; NOAA/OAR/AOML; NDBC; CLS/Service Argos; Marine Hydrophysical Institute, Ukrainian Academy of Sciences; U.K. Met. Office; SAWB; Sea Fisheries Research Institute (South Africa); Instituto Antartico Argentino (Argentina); Instituto Nacional de Investigacion y Desarollo Pesquero (Argentina); Servicio Meteorológico Nacional (Argentina); Servicio de Hidrografia Naval – Departamento de Meteorologia y Oceanografia de la Armada Argentina (Argentina); Comission Nacional de Atividades Espaciales (Argentina); Instituto Nacional de Pesquisas Espaciais – INPE (Brazil); Diretoria de Hidrografia e Navegação – DHN (Brazil). The programme started the intersessional period with 59 operational buoys. In March 1998, that figure had decreased to 55 and then increased to 68 at present approximately. Towards the end 1998 and beginning of 1999, DHN – PNBOIA intend to deploy 13 SVP-B drifters, just bought. The reception and dissemination of the data will be made trough INPE's LUT, CLS-Argos and GTS. South Africa will be deploying a further 30 drifters in the South Atlantic before the end of 1998. Ten of these are donated by AOML. The ISABP was also pleased to record a collaboration project with the UKMO and the US Naval Oceanographic Office to install an LUT in the Falklands/Maldives early in 1999.

30 The ISABP Operating Principles and general information may obtained at the ISABP world wide web site at: **http://www.dbcp.nos.noaa.gov/dbcp/isabp**

31 At this stage, the panel received a message of warm support and best wishes from the past ISABP chairman, Mr Piet Le Roux, who had recently retired. The panel in turn paid a special tribute to Mr Le Roux for his invaluable contribution to its work since its establishment.

The International Buoy Programme for the Indian Ocean (IBPIO)

32 The third annual meeting of the IBPIO was held in Kuala Lumpur, Malaysia, from 7 to 9 July 1998. Five organizations have formally participated in IBPIO: Bureau of Meteorology - Australia; Global Drifter Centre of NOAA/AOML - USA; Météo-France; National Institute of Oceanography - India; South African Weather Bureau. The meeting noted with interest the implementation of an important new programme of moored buoys managed by the Department of Ocean Development, through the National Institute of Ocean Technology - India. Forty-five drifting buoys have been deployed during the 97-98 intersessional period. The number of buoys providing air pressure is relatively stable. More than eighty drifting buoys should be deployed during the next intersessional period. Some areas and particularly the tropical cyclone one (Arabian Sea, Gulf of Bengal, and South of the Equator) were clearly identified as having a lack of data. IBPIO participants are encouraged to give priority to deployment of buoys in these areas.

33 IBPIO information is available on the World Wide Web at: **http://www.shom.fr/meteo/ibpio.**

The Global Drifter Programme (GDP)

34 The GDP has continued to cooperate with a large variety of national and international programs and institutions during the past year. With their assistance, over 400 SVP, SVP barometer, or SVP barometer/wind drifters were placed in all ocean basins.

35 Specific new or renewed cooperative agreements in 1998 are:

- US National Oceanographic Partnership Program Year of The Ocean drifting buoy program. Purchase 140 drifters, over 50 deployed in the Caribbean Basin by October 1998,
- Canary Islands ESTOC hydrographic time series station deployments. Eight monthly deployments, with continued deployment plans,
- US NWS west coast drifter array, Phase 2. Continued deployments, but upgraded to 100% duty cycle drifters using multi-satellite coverage and use of the new LUT at Monterey,

36 A major effort to update and improve the drifter metadata has resulted in a comprehensive metadata file, which has been distributed to a variety of users. Updates of this file are available via FTP from the GDP program coordinator. All relevant information may be found on the web at the address:

http://www.aoml.noaa.gov/aoml/phod

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

37 A new action group of the panel, the TAO Implementation Panel, is jointly sponsored by CLIVAR, GOOS and GCOS. TIP was formed to ensure uninterrupted and long-term maintenance of the TAO, an array of about 70 moorings in the tropical Pacific Ocean. The membership of TIP was described and a summary of the most recent annual meeting (TIP-6, November 1997) was presented. TIP recommendations for additional measurements and inclusion of additional data onto the GTS have been successfully acted upon. Plans for the FY99 field season were presented. Data issues, including the percent of available TAO data which are submitted to the GTS, benefits and costs of 3 satellite data processing, and the temporal distribution of TAO GTS data were discussed. During the past 4 years, TAO data return has generally been good, with many sites having data return rates of 90% or more. Data losses at a few sites with significant lower data return were primarily the result of vandalism. Actions by TAO to decrease the level of vandalism were presented. Information relevant to TIP may be found on the web at the address:

http://www.pmel.noaa.gov/toga-tao/home.html

38 The Pilot Research Moored Array in the Tropical Atlantic (PIRATA) was begun in 1998 with the deployment of 5 ATLAS moorings in the tropical Atlantic. This programme, a collaboration between TAO, Brazil (Instituto Nacional de Pesquisas Espacials - INPE, and Directoria de Hidrografia e Navegacao - DHN) and France (L'Institut Francais de Recherche pour le Développement en Coopération - ORSTOM), will be expanded to 12 moorings in 1999.

2.3 NATIONAL REPORTS

39 The panel had received written reports from Australia, Brazil, Canada, France, Iceland, India, Japan, Netherlands, New Zealand, Portugal, South Africa, United Kingdom and USA. As usual, these reports, as well as those that will be submitted in due time to the Secretariats (viz, before 30 November 1998), will be published in the panel's annual report.

3. REQUIREMENTS

3.1 WORLD WEATHER WATCH (WWW)
3.2 WORLD CLIMATE RESEARCH PROGRAMME (WCRP)

40 The panel noted that the requirements of data from the air-sea interface in support of the World Weather Watch, of operational meteorology and of the provision of services for marine users continued to be expressed clearly in the WWW component of the WMO Long-Term Plan, and that these had not changed substantively in recent years. These requirements are summarised in the DBCP Implementation Strategy (see agenda item 4), and are reproduced for information, along with relevant requirements of GOOS/GCOS (see item 3.3) in Annex III.

41 The panel recognized that detailed requirements for air-sea interface data in support of CLIVAR were still under development, and that in any event, these were likely eventually to be coordinated in some way with the requirements of GOOS/GCOS for ocean physical data for global climate studies. The panel requested the Secretariats and the technical coordinator to keep it informed of relevant developments in this area.

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

42 The panel was first presented with the main outcome of the Workshop on the Implementation of Global Observations for GOOS/GCOS (Sydney, Australia, March 1998). Those are detailed under agenda item 4. It then was given a brief introduction to the ARGO programme, explaining how that programme, which encompassed the release of a great number of PALACE and PALACE-like profilers, would fit in within the Global Data Assimilation Experiment (GODAE) and the Climate Variability and Predictability (CLIVAR) experiment.

43 The panel considered those items were fully relevant to its implementation strategy, on the one hand, and to its future work programme, on the other. It therefore decided to discuss them under the appropriate agenda items.

44 The panel noted that NOAA has established a Global Ocean Observing System (GOOS) Center at its Atlantic Oceanographic and Meteorological Laboratory. One of the primary objectives of the Center is to maximize the quality and quantity of real-time oceanographic and marine meteorological data for a wide range of users and applications. Data "pipelines" have been identified that define the pathways for the data from the observing platform to the user. Real-time monitoring at selected points or nodes in those pipelines has begun in order to quantify the amount of data being collected and to ensure their throughput to the users. A variety of products are now available from the Center's GOOS database that provide graphic displays of the monitoring results. These products will soon be available on the GOOS Center website.

4. IMPLEMENTATION STRATEGY

45 The panel noted with interest a report by the Secretariats on the results of the Sydney Workshop, in which the panel had been represented by the chairman, Mr G. Brough, and one of the vice-chairmen, Mr David Meldrum. The primary objective of this workshop was to enlist the coordinated support of existing operational ocean observing system implementation and data management mechanisms for the implementation of specified requirements for global ocean physical data for seasonal and interannual climate monitoring and prediction (see Annex IV). The workshop had reviewed and analysed the status and capabilities of these mechanisms in the context of the stated requirements, assessed a number of cross-cutting issues for all existing systems, and developed a set of immediate implementation action items. To oversee the implementation of these actions, finalize a detailed Implementation Action Plan for GOOS/GCOS, and begin the specification of coordination strategies, the workshop established an interim Implementation Advisory Group, chaired by the chairman of I-GOOS and including representatives of all existing mechanisms (the technical coordinator for the DBCP). This IAG would hold its first meeting in Paris, on 30 November 1998, hosted by Météo France.

46 The panel recognized the importance of this workshop, of the actions taken there, and of the follow-up mechanisms put in place, to the development of a fully coordinated approach to the implementation of GOOS/GCOS and ultimately to the development of truly operational oceanography. It therefore offered its full support for this effort, approved the participation of the technical coordinator in the IAG, and requested that the chairman, vice-chairmen and all members should be kept full informed of and involved in future developments. In the context of the proposed GOOS/GCOS Implementation Action Plan, the panel recognized the value of its own Implementation Strategy. It therefore reviewed the most recent draft of the strategy, prepared by Mr David Meldrum on the basis of comments offered at DBCP-XIII and of the results of the Sydney workshop. It approved this draft and requested that it should be published as a report in the DBCP technical document series, as well as made available on the DBCP web site.

47 With regard to the coordinated implementation and management of operational oceanographic observing and data management systems and the provision of marine services in general, the panel noted with interest the proposals within WMO and IOC to merge the existing WMO Commission for Marine Meteorology (CMM) and the IOC/WMO Integrated Global Ocean Services System (IGOSS) into a new joint Commission for Oceanography and Marine Meteorology (JCOMM), which would also be the reporting and coordinating mechanism for the DBCP and other existing bodies such as GLOSS (IOC), SOOPIP, etc. The JCOMM was designed to be the intergovernmental technical mechanism for coordinating,

regulating and managing the implementation and operation of oceanographic observations, data management and services, somewhat equivalent to the WMO Commission for Basic Systems in relation to operational meteorology. The concept of JCOMM had been strongly endorsed by the GSC for GOOS, the JSTC for GCOS and the JSC for the WCRP, and its implementation had been recommended by the WMO Executive Council. The proposal was to be considered by the IOC EC in November 1998, and hopefully submitted to the WMO Congress and the IOC Assembly for final approval in mid-1999.

48 The panel gave its full support to the concept of JCOMM, and agreed that it should eventually use JCOMM as the overall coordinating and management mechanism for its input to and support for GOOS and GCOS. At the same time, it stressed the value of retaining the existing independence and structure of the panel, within the larger scale intergovernmental mechanisms, as well as the interests of panel members in a whole range of operational and research activities outside the concerns of GOOS/GCOS, and climate studies in general.

5. SCIENTIFIC AND TECHNICAL WORKSHOP

49 Following the pattern established over several years, the scientific and technical workshop has become an integral part of the annual DBCP sessions. Fifteen papers were presented to the 1998 workshop, which attracted the participation of more than 50 scientists from interested agencies, institutions and companies worldwide. As usual, the papers covered a range of topics related to ocean data buoy systems, including issues such as buoy technologies, communication systems and the applications of buoy data. The panel expressed its considerable appreciation to the workshop convener, Mr Eric Meindl, for the excellent programme which he had compiled, as well as for the very efficient organization of the workshop. It further thanked the three session chairs for their valuable support. The panel agreed that, as usual, the proceedings of the workshop should be published as a report in the technical document series, and requested all paper presenters to have their final manuscripts for publication submitted to Mr Meindl by 30 November 1998 at the latest.

50 The panel agreed that the workshop should continue to be an integral part of its annual sessions. It considered that the range of topics for the 1999 workshop should be similar to that for 1998, but that, if possible, papers should have an emphasis on the southern hemisphere, in view of the likelihood of the session being convened in New Zealand. The panel accepted with appreciation the offer of Mr Ron McLaren to undertake the organization of the workshop.

6. DATA AND INFORMATION EXCHANGE

6.1 REPORTS BY BUOY DATA MANAGEMENT CENTRES

51 The panel reviewed the reports by the Responsible National Oceanographic Data Centre (RNODC) for drifting buoys, operated by the Canadian Marine Environmental Data Service (MEDS), and the Integrated Global Ocean Services System (IGOSS) Specialized Oceanographic Centre (SOC) for drifting buoys, operated by Météo-France. The panel expressed appreciation to the work of both centres. Their reports will be published, as usual, in the panel's annual report.

6.2 INFORMATION EXCHANGE

The DBCP Web. Server

52 The Technical coordinator presented the DBCP web server which has been substantially upgraded during the last intersessional period. The DBCP is operating the server: **http://dbcp.nos.noaa.gov/dbcp/** since February 1995. The server home page is physically implemented at the NOAA Atlantic Oceanographic and Meteorological Laboratories (AOML) in Silver Spring, Maryland. Among improvements realized, the following are worth noting:

- New application of buoys menu item with links to typical web sites

- Draft DBCP Implementation plan
- Deployment opportunities
- Recovery methods
- Report on buoy monitoring statistics
- Why and how inserting buoy data on GTS
- Data flow monitoring tools
- Status graphics, including maps, and regarding quantity and quality of buoy data
- DBCP Publications No.2 and 3 in electronic form
- Document describing existing and planned data collection and/or location system potentially available for buoy applications

53 The panel discussed the issue of how to easily maintain the DBPC list of buoy manufacturers which is available via the web. The panel agreed on the following policy:

> *Only manufacturers of meteorological or oceanographic instrumented buoys are intended to be listed here. Buoys can either be drifting buoys, drifters, moored buoys, ice floats, or sub surface floats. List is not comprehensive. Any manufacturer willing to be listed here (or deleted) must submit a request to the technical coordinator of the DBCP (charpentier@cls.cnes.fr) and will be added (respectively deleted) shortly at no fee. In order to keep this list up to date, we ask manufacturers to provide us with their exact references on a yearly basis. Names will automatically be deleted from the list if we don't hear from the company during a calendar year. The manufacturers are listed by alphabetic order.*

54 Among possible improvements to the DBCP web site, MEDS, Canada, offered to provide access to archived QC messages produced by PMOCs in the context of the DBCP QC Guidelines. MEDS suggested that the technical coordinator submits its own archive of the QC messages to MEDS. The panel asked its technical coordinator to do so.

55 The panel reminded and/or encouraged the following actors to submit information in electronic form for inclusion in the DBCP web site:

What	Who	to whom	Format
National reports	National Focal Points	WMO Secretariat	Electronic+Paper
Deployment opportunities (ship line maps, points of contact)	National Focal Points	TC	Electronic
AG annual reports	action group coordinators	WMO Secretariat	Electronic+Paper
Deployment methods	Experienced members	TC	Electronic
Recovery methods	Experienced members	TC	Electronic

DBCP Publications

56 DBCP Technical document No.4, "WOCE Surface Velocity Programme, Barometer drifter construction manual", is being updated to reflect latest changes in the design of the SVP Barometer drifter (e.g. removal of sub-surface float, reduction of drogue size, ABS plastic hull instead of fibreglas, 3 alternative pressure sensors proposed instead of one, new Argos message format...). Final version of the document should be available shortly since a few minor changes remain to be done. It is planned to make the document available via the web before the end of 1998.

57 The following publications had been published during the intersessional period:

No. 11: Annual report for 1997
No. 12: October 1997 Workshop report (La Réunion)

58 The panel also agreed to publish the DBCP implementation strategy within its document series.

DBCP Brochure

59 At its 13th session, the DBCP considered again the possibility of publishing a brochure for publicizing its work and the action groups. The Brochure had to be mainly oriented towards the use of data buoys. The panel decided to tentatively produce the brochure for DBCP-XIV.

60 The technical coordinator worked in conjunction with Nigel Greenwood (Technical writer sub-contracted by CLS) for producing a draft version and suggesting pictures and graphs. Nigel wrote the draft brochure. Draft was submitted to Peter Dexter at the WMO Secretariat for review and amendments and a WMO editor produced a draft colour version which was available at DBCP-XIV for review, discussion, and possible amendments.

61 The panel reviewed the draft DBCP brochure, and proposed a few amendments which will be incorporated after the DBCP session. It decided that the brochure should be available in English (6,000 copies), Spanish (1,000 copies), French (1,000 copies), and Portuguese (1,000 copies). Brazil offered to produce the Portuguese language text. Canada offered to publish the brochure as a contribution in kind. The panel thanked both countries for their kind offers.

Internet Forum

62 The technical coordinator raised the issue of developing an Internet DBCP forum as a means of debating on technical issues, answer technical questions, and exchange information among buoy operators or actors. A forum can be a good complement to the DBCP web site and would be directly linked to it. Documents, questions and answers would be accessible to anybody in the buoy community. The technical coordinator would be responsible of the forum and would be a key player in it. The panel felt that it was interesting to pursue the idea further and asked whether there would be a DBCP member willing to host the forum. The technical coordinator informed the panel that it would be preferable for practical and performance reasons to have the forum hosted either by Météo France or by CLS, Service Argos since he has an office in both organizations and access to their respective networks. Météo France and CLS both accepted to further study feasibility and estimate costs involved in order to provide the DBCP with an answer hopefully in early 1999. The panel thanked both organizations and decided that such a forum should be established on a trial basis and reviewed at the next panel session if a technical solution is found.

7. TECHNICAL ISSUES

7.1. QUALITY CONTROL

63 The technical coordinator reported on the DBCP quality control guidelines. The guidelines worked very efficiently during the period. Activity was a bit lower than for the previous years and fewer buoys had their status changed (132 this year (Aug 97 to July 98) versus 171 in 1997 and 210 in 1996). It can be assumed that monitoring centres (PMOCs) rely increasingly on buoy data and are more confident in the quality of the data.

64 For a total of 1376 buoys that reported onto the GTS during the period 1 August 1997 to 31 July 1998, following 292 status change proposals from PMOCs related to 188 buoys, 132 buoys had their status changed (i.e. 9.6% versus 11% last year): 155 buoys or buoy sensors were removed from GTS distribution, 2 buoy sensors were re-calibrated.

65 The technical coordinator showed evidence that data quality of air pressure (including SVPB), and sea surface temperature, from drifting buoys is excellent. Mean RMS (Obs-FG) for air pressure using ECMWF model is now in the order of 1.3 hPa. 44% of the RMS values are now lower than 1 hPa; and another 47% between 1 and 2 hPa. For SST, 65% of the data are within 1 Celsius, and 85% within 2 Celsius. Mean RMS (Obs.-FG) using NOAA/NCEP model is in the order of 1 Celsius. Improvements in the first guess model fields have now increased confidence in the excellence of the buoy data, and remaining differences are of the same order as errors in the FG model fields.

66 The Global Drifter Centre expressed desire of having similar statistics produced to estimate quality of wind data from SVPBW drifters. The panel asked its technical coordinator to monitor those drifters, provide GDC with related information, and report at the next DBCP session.

67 As reported at the previous DBCP session in La Réunion, buoy monitoring statistics produced by ECMWF, NCO, UKMO, and CMM were not consistent for various reasons. Although not possible to have perfectly consistent statistics produced by those centres, the technical coordinator contacted the four centres involved and suggested to achieve better consistency. Centers replied favourably and much has been achieved. Comprehensive report is available via the web at:

http://dbcp.nos.noaa.gov/dbcp/monstats.html.

68 Christine Caruso (NOAA/NCEP) offered to add "number of observations accepted by the model" into the statistics for SST data and to use better "1°x1° resolution GDAS model output" for computing the statistics. The panel thanked Christine Caruso as well as other monitoring centres producing the statistics for their efforts in increasing consistency among statistics produced.

7.2. CODES

BUFR

69 The document prepared by the DBCP sub-group (David Gilhousen, Pierre Blouch, Etienne Charpentier, plus contacts with Cliff Dey, Bob Keeley, Madeleine Céron, and Joel Martellet) on requirements for GTS distribution of buoy data, including in BUFR was finally adopted at the 13th DBCP. In February 1998, the report was formally submitted to CBS by the Chairman of the DBCP via Mr Kashiwagi, chairman of the CBS Working Group on Data Management. In April 1998, Bob Keeley attended the WMO sub-group on data representation and codes in Montreal and presented the report. The meeting accepted recommendations from the DBCP proposal. The CBS Working Group on Data Management met in June 1998 in Geneva and did not comment the proposal any further. Changes have then been submitted to CBS extraordinary session, 30 September - 9 October 1998, Karlsruhe, Germany, for approval and adopted for implementation in May 2001.

BUOY code

70 As discussed at the XIIIth session of the DBCP, implementation of a new Q_a field in place of an existing slash (/) in group 6 of section 0 and group 2 of section 4 in FM-18 BUOY code was due for implementation as of 5 November 1997. Qa field reflects Argos location quality class (new code Table 3302, 0: = 1500 m, 1: = 500 m and < 1500 m, 2: = 250 m and < 500 m, 3: < 250 m, /: not available). The group in Section 0 became: $6Q_lQ_tQ_a$/ and in Section 4: $2Q_NQ_LQ_a$/.

71 For practical reasons, Service Argos could not implement the change as of 5 November 1997. Change was actually implemented on 16 December 1997. BUOY reports distributed on GTS by Service Argos between 5 November and 16 December were actually compatible with the new format because Qa indicator provides for a slash (/) which was the original constant value of that field prior to 5 November 1997. Local User Terminals (Edmonton, Halifax, Oslo, Søndre Strømfjord) continued reporting as before hence reporting a slash value for Qa meaning that location quality class information is not available.

7.3. ARGOS SYSTEM

Argos

72 Following DBCP action and recommendations, including a survey among Argos users, a series of specific software developments has been included by the Argos Joint Tariff Agreement (JTA-16) within the Argos development programme. Priority list was proposed for the developments. Some of these developments have been implemented prior to the 13th session of the DBCP in October 1997. At its 13th session, the DBCP decided that providing Argos users with their Argos data on CD-ROMs was a top priority. This was

implemented by Service Argos in May 1998. Other remaining developments have been included by Service Argos within their Argos 2001 project.

73 Christian Ortega gave a presentation on the year 2000 compliance actions undertaken for the Argos system and on the various enhancements achieved or under development. Year 2000 compliance was investigated for both space and ground segments. No potential problem is expected from the space segment as the Argos instrument on-board clock is not dependent on UTC time and NOAA certifies to be Y2000 compliant. This is also the case for global telemetry stations operated by NOAA and positive answers from the other operators are expected. At the Argos processing centers, (i) main Argos software don't use classical date formats, (ii) a significant part of the software is being rewritten within the scope of Argos-2001 project, (iii) the current code is being checked and up to 30% of it is already in compliance, with total compliance by September 1999. As for the Argos platforms, it is recommended to check this with manufacturers when ordering new equipment. It is to be recalled that most current platforms use timers and no date at all.

74 As per the enhancements of the Argos system, in addition to the ones listed by the DBCP/TC above, time has been devoted this year to develop, test and implement the new data formats delivered by the first Argos-2 equipment on -board NOAA-K satellite, which was launched in May 1998. This instrument features 3 to 4 times greater capacity and better sensitivity. New links with regional stations and a new receiving station were implemented (Edmonton, Halifax, Monterey, Tokyo, La Réunion Island and Largo) thus increasing the real-time response of the system and facilitating the collection of data from back up satellites.

75 On medium to longer term enhancements, effort was put into the development of the Argos Downlink Messaging function. This function will allow users to send messages to their PTTs, better control their power budget and facilitate the transfer of large volume of data (data acknowledgement function). The on-board equipment derived from an Argos-2 unit is now completed. It will fly on ADEOS-II satellite in year 2000. Masters beacons and the ground software including the user interface are being developed and are to be completed in 1999. The panel recognized that, at present, only three X-band antennas were planned to be available worldwide for downloading Argos data from ADEOS. The panel therefore recommended to the JTA for Argos to be requested to investigate the possibilities for accessing additional X-band download stations. Panel members were requested to inform on potential availability of X-band antennas in their regions.

76 The development of the Argos-3 instrument as been approved by CNES in July this year. This instrument features larger bandwidth (110 kHz), high data rate channel of 4.5 kbps and better sensitivity for low power transmitters.

77 Argos is also rebuilding the processing chain and the user interface in a three step project called Argos-2001. First step encompasses the transfer to a Data Base Management System of all Argos data, the rebuilding of the User interface using Web technology and the development of the Downlink Messaging software. This first step is to be completed in September 1999. Second step deals with rebuilding auxiliary services such as automatic data distribution and sensor monitoring (Y2000) whereas third step will see the transfer of an upgrade of the GTS sub-system to the new system (Y2001).

GTS sub system - Improvements

78 The technical coordinator reported on the various improvements which have been realized with the GTS sub-system during the last intersessional period according to requirements expressed by users. Improvements include:

- GTS Technical file read and write access via E-mail,
- direct distribution of data from the GTS sub-system to Argos users,
- data processing of BOM shipboard data and distribution in SHIP format,
- computation of water salinity based upon water conductivity, temperature, and pressure,
- implementation of new Qa field in BUOY reports,
- implementation of an up to date geo-magnetic variation model for buoys measuring wind direction using compass,
- data processing of relative humidity for TAO buoys,
- new Quality Control automatic test for Argos XBTs,

- specific algorithm for computing air pressure tendency based upon P(H) and P(H-3),
- data processing of JAMSTEC TRITON moored buoys.

GTS sub-system - Problems with GTS distribution of buoy data and real time data-flow monitoring

79 Several GTS outage problems have been encountered in 1998. Causes lay with CLS/Service Argos, and with inconsistencies within NOAA/NWS, and UKMO GTS routing directories. Data were lost in certain occasions, or resulting in longer delays. In certain occasions, Service Argos was not aware of the problem until alerted by the user community several hours later, so the other Argos Global Processing Centre could not be switched to backup mode in a timely fashion.

80 Problems with NWS and UKMO routing directories have been fixed.

81 Service Argos has taken steps to avoid problems in the future, i.e. (i) automatically switch to backup mode the other centre if GTS disruption occurs for more than 30 minutes, (ii) inform users of problems via Service Argos web server, (iii) set up a monitoring system to detect GTS outage and therefore react more quickly, (iv) review their operational procedures to make them more efficient.

82 BOM offered to monitor GTS data and alert Service Argos and LUTs in case of a disruption lasting for more than 6 hours. The technical coordinator provided Bruce Sumner with names and E-mail addresses of persons to contact at Service Argos and LUTs in that case. NWS is doing so with Service Argos Inc, since several years ago alerting them in case of outage lasting more than 3 hours.

Distribution of PALACE data onto the GTS

83 A number of PALACE sub-surface floats deployed by Institute of Ocean Sciences (IOS, Canada), Scripps Institution of Oceanography, Woods Hole Oceanographic Institute (WHOI) and NOAA/AOML are already reporting on GTS via NOAA/NWS or MEDS, Canada. All the floats are reporting via Argos and measure temperature profiles while popping up and/or down. They have cycles of 5 to 15 days and a life time of about 100 cycles. They can dive as deep as 1500 meters. Some floats are capable of measuring water conductivity hence salinity and may be deployed in large quantities in the future. The ARGO programme plans to deploy about 3000 PALACE floats in the world oceans.

84 The floats presently reporting on GTS are using FM 64-IX TESAC (KKXX) format which is adequate provided that the number of profile points does not exceed 20 significant points in the upper 500 meters. FM 63-X Ext. BATHY (JJYY) would be suitable for floats reporting temperature profiles only and is also limited to 20 points in the upper 500 meters. FM 18-X BUOY (ZZYY) code is also adequate and is not limited to 20 points in the upper 500 meters.

85 A series of WMO numbers has been allocated to floats for GTS distribution (block 350 to 399) and are presently being used by Canada, and USA. Float data on the GTS are being archived by MEDS.

86 The Argos GTS sub-system is not presently capable of processing PALACE float data for GTS distribution purposes. Considering that having multiple GTS insertion points for PALACE float data would make it difficult for GTS users to deal with potential problems related to specific floats (QC); considering further that consistency of produced float data, and of quality control schemes, is less likely to be guaranteed when dealing with various data processing systems than with a single one; considering that code changes or encoding practice are easier to implement at a given date on a single centre than on multiple centres; the panel recommended that capability of processing PALACE float data for GTS purposes should be developed at a single dedicated centre.

87 Considering that Service Argos has (a) presently access to all necessary data, (b) experience and (c) potential capability of processing PALACE float data for insertion of the data on GTS, including Quality Control and encoding of the data, as a preferred approach, in the context of the ARGO programme, the panel proposed that Service Argos be requested to investigate how the capability of processing PALACE float data for GTS purposes could be developed at Service Argos Global Processing Centres.

7.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES

88 The panel recalled that, at its last session, it had requested Mr. D Meldrum to continue to review and report on new developments in the communications field, relevant to data buoy operations. A paper informing on these developments is in Annex V and this information is available on the DBCP web site. The topic was also discussed in the Scientific and Technical Workshop immediately preceding the session. The panel noted that the new systems identified previously as worthy of more detailed investigation did not offer the global end-to-end communications and ground system facilities that were available from the Argos system and were required for most operational buoy applications. However an analysis of the characteristics of satellite systems expected to come into operational service in the near future indicated that a few promised, at least, a suitable space communication segment provided that suitable platform hardware was developed.

89 The panel agreed that it should continue to monitor progress and that the information on the DBCP web server should be kept up to date. As regards the prospects for the eventual use of alternative satellite systems, the panel observed that little progress was likely to be made for many operational activities until service providers were able to offer communication and data processing services equal or superior to those offered by the current GOES, METEOSAT, GMS and Argos systems.

7.5 OTHER TECHNICAL ISSUES

US Government policies for DCS use

90 Rob Bassett (NOAA/NESDIS) presented an update on changes to the system use policies for the satellite-based NOAA Data Collection Systems (DCS). The new policies for the DCS on the Geostationary Operational Environmental Satellite (GOES) and the Polar-orbiting Operational Environmental Satellite (POES) / Argos became effective on June 5, 1998. The text of the new policy can be obtained at the NOAA Satellite Information System web site:
http://140.90.207.25:8080/EBB/DCS.html. The new Argos System Use Agreement form (Annex VI) to replace the Argos Program Application form was presented and discussed. The new system use policies appeared to have a minimal impact on the Governmental/Environmental users represented by the DBCP membership and feedback from the members was solicited.

91 The panel noted this information with interest. It recognized that all Argos users would need to submit new Argos System Use Agreements at some stage during the next 3 years. However, for existing programmes, this would involve a renewal of these programmes, while even for new programmes, at least within the context of the DBCP and its activities, the new policy should cause no difficulties. A question was raised concerning the international applicability of the new policy to the International Data Collection System (IDCS) operated on the geostationary meteorological satellites, and NOAA was requested to ensure that this issue was discussed at a future session of the Coordination Group on Geostationary Meteorological Satellites (CGMS).

Restructured bulletin headers for buoy data on the GTS

92 The panel noted with interest a proposal from the NOAA GOOS center for a restructuring of the system of bulletin header assignment for buoy data distributed on the GTS. The present system essentially groups buoy reports into bulletins based on the geographical location of the buoys, which is advantageous particularly for small forecast centres concerned only with limited areas. The proposal was for reports to be grouped into bulletins based on specific programmes and/or action groups, which would greatly facilitate programme monitoring and remedial action to correct any problems detected. It was recognized that the proposal was technically feasible, that global processing centres would not be affected one way or the other since they took all the data in any case, and that programmes and action groups were usually regionally based, except for the GDP, for which two bulletin headers could be assigned under the proposal, one for each of the hemispheres. The panel therefore considered that the concept had merit, and requested the technical coordinator and Mr W. Woodward to prepare a specific proposal for a new set of bulletin headers within this concept, making as much use as possible of the existing header assignments. This proposal should be circulated to panel members and WMO for consideration and agreement, with a view to providing at least 3 months advance notice to users and GTS centres of an implementation date prior to DBCP-XV.

North Atlantic climate study group

93 The panel noted with interest a suggestion from Mr Svend-Aage Malmberg (Iceland) on the value of forming an international study group, within the context of the DBCP, to undertake cooperative research on the climate of the North Atlantic Ocean. It recognized the value of this proposal, which related to ocean areas largely within the responsibility of EGOS. It therefore requested EGOS to consider the possibility of forming such a study group, involving also researchers and buoy programme operators from NOAA and other North American and/or European institutions.

Year 2000 problem

94 Following a report from MEDS and UKMO, the panel recognized the importance, to both operations and research, of ensuring year 2000 (Y2K) compliance in all aspects of ocean data buoy operations and data management. It noted that major efforts were now underway within national Meteorological Services, other national agencies and institutions, and WMO, to establish such compliance, including within the GTS, well before 31 December 1999. CLS/Argos assured the panel that it was now in the process of checking Y2K compliance in all aspects of the Argos system, and expected to have this completed, and the system fully Y2K compliant, by September 1999 (see also para. 71 above). The panel stressed to CLS the absolute importance of this work, and requested it, if possible, to complete the checking process even earlier, to guard against any unexpected problems.

Third satellite availability

95 The panel recalled its discussions at previous sessions regarding the value to all Argos system users of having data available operationally from three or more satellites, rather than from only two as at present. It noted that, with the imminent operational commissioning of NOAA K, there were potentially 4 satellites available for Argos users, two of which were, however, maintained only in back-up mode by NOAA. The panel reiterated its earlier statements concerning the value of additional satellites, and requested NOAA to reconsider the possibility of making at least one of the back-up satellites available for data collection and distribution through Argos.

Argos message formats.

96 Météo France presented a new Argos message format, initiated at the request of EGOS, which could be proposed as a standard for buoy operators designing or planning their buoy programme. Proposed format permits flexibility and transmission of historical as well as real time data. Age of observation is encoded in the message and one message contains only one observation. Historical data are split among consecutive Argos messages. Message length is optimized in order to limit its size as much as possible so that power budget permits extension of buoy operating life time.

97 Considering past experiences in this regard, the panel decided that it was not in a position to recommend a particular standard format but recognized the advantages of standard formats as developed by Météo France, EGOS, GDP, and other buoy operators. It therefore decided that it was worthwhile to publish a list of available formats via its web server, including those listed above, and encouraged new buoy operators looking for advice or expertise to use one of those. Advantages of listed formats should also be 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.

New ATLAS moorings

98 Paul Freitag reported that possible modification of ATLAS moorings, from a taut-line to a reverse catenary design, would result in a potential offset in measurement depths. Pressure measurements from a few of the deepest sensors would be used to correct the reported depth of all sub-surface measurements. Such a correction algorithm is under development at PMEL.

99 The technical coordinator recalled that the Argos GTS sub-system was not presently capable of dealing with such corrections. The panel therefore recommended that related developments be included by the JTA within the Argos development programme, should the TIP decide to go forward with deploying new mooring design.

8 NEW ACTION GROUPS

100 The panel recalled with satisfaction that the TAO Implementation panel (TIP) had been formally accepted as an action group during the past intersessional period. No proposals for the establishment of additional action groups were received at the present session. However, the panel noted with interest that a loose, cooperative agreement among a number of agencies in Canada and the USA existed to maintain a drifter array in the north-east Pacific. It recognized the value of this agreement to all concerned, and expressed the hope that the agreement might eventually involve also agencies in countries such as China, Japan and the Republic of Korea interested in buoy deployments in the western and central North Pacific, perhaps leading to the equivalent of an action group in this important ocean basin.

101 The panel further noted with interest a proposal from Mr Prem Kumar (India), concerning the possibility of extending the TAO array into the Indian Ocean, and incorporating an offer by India to make available ship time and human resources for servicing such an extended array. The panel recognized the merit of the proposal, in particular in view of the importance of the equatorial Indian Ocean to seasonal and interannual climate variability and monsoon prediction, as well as the present lack of data from this region. It therefore requested the TIP to formally consider the proposal at its next session.

C. ADMINISTRATIVE COMPONENT

9 REPORTS

9.1 CHAIRMAN AND VICE-CHAIRMEN

Report by the chairman, Mr Graeme Brough

102 The chairman summarized his activities on behalf of the panel during the past year. The main highlight was the Workshop on the Implementation of Global Ocean Observing Systems for GOOS/GCOS held in Sydney in March 1998. The panel was represented by one of the vice-chairmen as well as by the chairman. The Workshop was very useful in bringing together virtually all the players involved in the WMO/IOC operational oceanographic areas. The chairman was also pleased to report the affiliation of the TAO Implementation Panel (TIP) as a new action group during the intersessional period.

Report by Mr David Meldrum

103 During the intersessional period, the main DBCP activities in which Mr Meldrum was involved were as follows:

- *DBCP Implementation Plan*. During the intersessional period, this was revised and updated to take account of the recommendations of the panel at DBCP-XIII. The document was then presented to the GOOS/GCOS implementation workshop in Sydney in March 1998, where important practical steps were made towards planning the GOOS/GCOS operational networks. A full report of this meeting will be presented elsewhere at this session.

- *Mobile Satellite Systems*. A watch was kept on developments and operational experience within this area which might benefit data buoy operators, and an updated status document produced as an information paper for the panel.

Report by Mr William Woodward

104 During the intersessional period since DBCP-XIII, Mr Woodward was involved in the following activities on behalf of the DBCP:

- Provided encouragement and assistance to the TAO Implementation Panel in the process of their becoming a DBCP action group.
- Provided the financial and technical resources to maintain the operation of and assist the technical coordinator in the upgrades to the DBCP website.
- Represented the DBCP at the fifth meeting of the International South Atlantic Buoy Program (ISABP) in August, 1998 in Buenos Aires, Argentina. At the meeting, he continued to promote the importance of monitoring and assessing the quantity and value of the buoy data for specifically defined applications.
- Joined with the technical coordinator in representing the DBCP at the International Arctic Buoy Program (IABP) Workshop co-sponsored by the DBCP in August, 1998 in Seattle, Washington.

9.2 SECRETARIATS

WMO Secretariat report

105 The representative of the WMO Secretariat reported to the session on the various activities undertaken by WMO in support of the panel during the past 12 months. Panel members were urged in particular to check carefully the lists made available by WMO of national focal points for the DBCP and for logistic support, as well as the WMO buoy ID assignments, and to inform the WMO Secretariat of any errors or discrepancies. The WMO representative also brought to the attention of the panel the need for a special category of buoy ID numbers for the various float programmes, in particular the planned ARGO programme under which up to 3000 deployments were possible. The panel eventually agreed to a small variation on the present number assignment system to be used for the floats, in which the 5 digit number would be derived as follows:

Abnnn where:

A = WMO region (as for other buoys)
B = 9 to identify the floats
nnn = a number 0 to 999, to be assigned sequentially to floats deployed within area **A**.

This system will allow for the eventual assignment of 7,000 float IDs for GTS distribution, covering all regions. It will apply immediately, with floats already on the GTS retaining their existing ID allocations.

IOC Secretariat Report

106 The representative of the IOC Secretariat reported that the IOC governing bodies had not met since the previous panel's session. He stressed the necessity that the funds to support the position of technical coordinator be provided in due time in order that the latter receive his salary in a timely fashion.

10 FINANCIAL AND ADMINISTRATIVE MATTERS

10.1 FINANCIAL SITUATION

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

(i) finalized IOC account 1 June 1997 - 31 May 1998;
(ii) finalized WMO account 1996/97;
(iii) interim WMO account 1 January 1998 - 30 September 1998;
(iv) provisional WMO statement of estimated income and expenditure to 31 May 1999.

These statements are reproduced in Annex VII. The panel approved and accepted the various statements, as appropriate.

10.2 CONTRACTS

108 The panel reviewed and approved the terms of the IOC/UNESCO employment contract for the technical coordinator, as well as the contract between IOC/UNESCO and CLS/Service Argos for his logistic support.

10.3 FUTURE COMMITMENTS

109 The panel recalled the agreement made with Mr Charpentier at the end of 1997, that he would be willing to remain as technical coordinator, located in Toulouse and employed by IOC/UNESCO, until at least 31 May 2000. It therefore decided to continue the existing arrangements for the next financial period, 1 June 1999 to 31 May 2000, subject to the availability of funds. With regard to future years, the panel noted the agreement by Mr Charpentier to inform the chairman and the Secretariats, by 1 December 1998, of his desire to continue as technical coordinator beyond 31 May 2000. 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.

110 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 ongoing 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 therefore agreed on the importance of maintaining, if at all possible, a budget appropriate for these purposes.

111 The panel then reviewed likely expenditure requirements for 1999/2000, in the light of anticipated income. In this context, it recognized that the expected income from existing contributors, while adequate for the basic requirements for the technical coordinator and some additional activities, was nevertheless likely to fall short of full anticipated expenditure requirements. These requirements were therefore scaled down appropriately, and the revised 1999/2000 expenditure estimates are shown in Annex VIII, as before in comparison with actual expenditure and income for 1996/97 and estimates for 1998/99. On the basis of provisional commitments made at the meeting or otherwise, the panel drew up the table of provisional contributions for 1999/2000, which is also given in Annex VIII. This table also shows contributions in kind (as an approximate cash value equivalent) made by Member States to support panel activities. The panel expressed its appreciation to all contributing Member States for their continuing support for the work of the panel, and requested the Secretariats, as in past years, to ensure that invoices for these contributions were issued as soon as possible, and in any case before the end of 1998. At the same time, it reiterated the need for a budget appropriate to its role and requirements, and urged the Secretariats and all members to make additional efforts to recruit new contributors to the trust fund, no matter how small their contributions might be.

10.4 REVIEW OF THE TASKS OF THE TECHNICAL COORDINATOR

112 Under this agenda item, the panel first reviewed the agreement made at its 1997 session with CLS/Argos, under which the technical coordinator would work part-time on aspects of Argos development relevant to the panel, in return for which CLS would make available the services of a staff member to undertake certain routine monitoring activities of the coordinator. It noted that this CLS staff member had now been recruited and trained, and was proposed by CLS to continue the monitoring work indefinitely. The panel expressed its appreciation to CLS for this undertaking. At the same time, the development work by the technical coordinator in support of Argos would be largely completed in the first half of 1999, with only irregular consultations required after that, thus freeing the coordinator to undertake other duties.

113 The panel was then presented with a proposal, under which the DBCP technical coordinator would act also as technical coordinator for the operational Ship-of-Opportunity Programme (SOOP), which is

coordinated by a SOOP Implementation Panel (SOOPIP) and is concerned with the operational collection and management of upper ocean temperature and salinity measurements from XBTs deployed from merchant and other vessels, in support primarily of seasonal and interannual climate analyses and predictions. It recognized that SOOP operations and requirements for technical support were very similar to those of buoy programmes (including in some cases data collection through Argos), that SOOP success was just as critically dependent on such support, and that in addition many panel member organizations were also involved closely with the SOOP. In view also of the support by CLS for routine monitoring work as noted in paragraph 10.4.1 above, the panel therefore gave its approval to the proposal, on the basis of an approximate combined work programme for the technical coordinator as given in Annex IX, and with the following provisos:

- the support provided by the technical coordinator to the panel is not adversely affected;
- supplementary contributions are obtained from SOOPIP members, to fund the additional activities, to provide for the additional travel required and, if possible, to appropriately reflect the new division of duties;
- the new arrangements will be reviewed first at DBCP-XV, and more thoroughly at the 2000 session, by which time any impacts on the work of the panel, either positive or negative, should be fully apparent.

114 With regard to the budgetary requirements for the new arrangements, the Secretariats were requested to prepare a revised table of proposed income and expenditures, following the forthcoming SOOPIP session (Noumea, 26-30 October 1998) and hopefully showing planned additional contributions from SOOPIP member institutions. This table should be distributed to all panel members for review and approval, if possible before the end of 1998. Assuming that sufficient funds were available for the purpose, the panel approved a proposed promotion for Mr Charpentier within the IOC/UNESCO system, from P3 to P4, to take effect as from 1 June 1999.

11 PUBLICATIONS

115 The panel agreed to retain the existing format and table of contents for its 1998 Annual Report, with contributors of national reports being urged to adhere as strictly as possible to the agreed format for such reports. All contributors (chairman, members, action groups, data management centres, etc.) were requested to make their contributions available to the WMO Secretariat (attention Peter Dexter) by 30 November 1998 at the latest, wherever possible in electronic form, to enable timely compilation of the report, for publication by WMO if possible in the first quarter of 1999. The report would also be made available through the DBCP web server.

116 The panel noted that, in addition to the 1998 Annual Report, the following publications in the technical document series were scheduled to date for 1999:

- proceedings of the 1998 workshop
- revised SVP-B construction manual
- DBCP Implementation Strategy

In addition, as discussed under item 6.2, the brochure would be published by Canada as an in-kind contribution to the work of the panel. No additional requirements for publications were identified at the session.

D. CONCLUDING COMPONENT

12 RECOMMENDATIONS TO THE ARGOS JTA

117 The panel had discussed under previous agenda items a number of issues that related to the use of the Argos system. These were:-

a. The need to improve data reception and dissemination within the International South Atlantic Buoy programme (ISABP) through the provision of a link between an existing LUT in Brazil and the Argos processing centres and the establishment of a LUT in Argentina using an existing S-band ground station.

b. As a consequence of likely changes to the mooring design of some ATLAS (TAO array buoys) there was a potential need to develop a new Argos module to process sub-surface profile data.

c. The desirability to investigate the development of the Argos GTS subsystem to process PALACE float data, primarily to ensure a single GTS insertion point.

d. CLS/Service Argos should investigate the possibilities for accessing additional X-band download stations, in relation to the launch of ADEOS.

118 The panel requested its chairman to bring these issues to the attention of the JTA and specifically to request CLS/Service Argos to study the possibility of taking positive action in response to the needs identified in (a) and (c) above in conjunction with appropriate bodies. The panel further requested the chairman to ask that the required TAO module (item b) be developed as part of the Argos development programme.

13 WORK PLAN

119 As in previous years, the panel reviewed and revised its operating procedures and work plan for the coming intersessional period. As it had agreed at its thirteenth session, the work plan is divided into two components: Implementation and Technical and Administrative. These work plans are given in Annex X.

14 ELECTION OF THE CHAIRMAN AND THE VICE-CHAIRMEN OF THE PANEL

120 The panel re-elected Mr Graeme Brough as its chairman, to hold office until the end of its next session. Taking into account that Mr William Woodward was retiring from the Federal Service within USA, it elected Mr Eric Meindl as one of its vice-chairmen, and re-elected Mr David Meldrum as its other co-vice-chairman. In so doing, the panel expressed its appreciation and thanks to Mr Woodward for the work accomplished on its behalf during his term of office.

15 DATE AND PLACE OF THE NEXT SESSION

121 The panel accepted with appreciation the offer of the Meteorological Service of New Zealand Ltd to hold the 1999 session in Wellington, New Zealand. Subject to agreement by the eighteenth meeting on the Argos Joint Tariff Agreement, it decided that the dates for the fifteenth session would be 11-15 October 1999. The panel reiterated its decision under agenda item 5 that a scientific and technical workshop would take place during the first 1.5 days of the session, with the exact format and times to be determined by the organizer, Mr Ron McLaren, in consultation with the chairman and the secretariats.

16 CLOSURE OF THE SESSION

122 In closing the session, the chairman reiterated his thanks to the local organizers for such very convenient facilities. He further thanked all participants for their spirit of cooperation and their contributions to the debates, which had produced an excellent session of the panel.

123 The fourteenth session of the Data Buoy Co-operation Panel closed at 1220 hours on Friday, 16 October 1998.

ANNEX I

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 CO-ORDINATOR
2.2 ACTION GROUPS AND RELATED PROGRAMMES
2.3 NATIONAL REPORTS

3. REQUIREMENTS

3.1 WORLD WEATHER WATCH (WWW)
3.2 WORLD CLIMATE RESEARCH PROGRAMME (WCRP)
3.3 GLOBAL OCEAN OBSERVING SYSTEM (GOOS) AND GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

4. IMPLEMENTATION STRATEGY

5. SCIENTIFIC AND TECHNICAL WORKSHOP

6. DATA AND INFORMATION EXCHANGE

6.1 REPORTS BY BUOY DATA MANAGEMENT CENTRES
6.2 INFORMATION EXCHANGE

7. TECHNICAL ISSUES

7.1 QUALITY CONTROL
7.2 CODES
7.3 ARGOS SYSTEM
7.4 NEW COMMUNICATION TECHNIQUES AND FACILITIES
7.5 OTHER TECHNICAL ISSUES

8. NEW ACTION GROUPS

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 CO-ORDINATOR

11. PUBLICATIONS

D. CONCLUDING COMPONENT

12. RECOMMENDATIONS TO THE ARGOS JTA

13. WORKPLAN

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

15. DATE AND PLACE OF THE NEXT SESSION

16. CLOSURE OF THE SESSION

ANNEX II

REPORT BY THE TECHNICAL COORDINATOR

1. Introduction

This report covers the period 1 October 1997 to 30 September 1998. 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 the TC DBCP spent on his tasks could be estimated as following:

Topic	days by TC	days for DBCP	% tot. TC
TC Training for CLS	29.0	0.0	11.2
TC Work for CLS	23.0	0.0	8.8
CLS work for TC (monitoring, brochure, lists)	0.0	32.0	0.0
User assistance	40.0	40.0	15.4
Vacation, holidays	30.0	30.0	11.5
Météo France (data flow control, impact studies)	13.0	13.0	5.0
Missions, effective meeting time	26.0	26.0	10.0
Missions, travel time	6.0	6.0	2.3
Missions, preparation (incl. DBCP)	18.0	18.0	6.9
DBCP web server	17.0	17.0	6.5
GTS Sub-System	13.0	13.0	5.0
Monitoring, Quality Control Guideleines	8.0	8.0	3.1
TC monthly report, stats., regular reports	10.0	10.0	3.8
Code matters (BUFR, BUOY)	1.0	1.0	0.4
Miscellaneous DBCP	5.0	5.0	1.9
Requests for GTS	5.0	5.0	1.9
Action Groups	4.0	4.0	1.5
Argos monthly report	3.0	3.0	1.2
GTS routing	1.0	1.0	0.4
DB Quarterly report	1.0	1.0	0.4
Publications (e.g. articles in Argos bull...)	2.0	2.0	0.8
TC Tools	2.0	2.0	0.8
Misc. Administrative	2.0	2.0	0.8
Combined Oceano-Meteo drifting buoys	1.0	1.0	0.4
Total (52 weeks)	**260.0**	**240.0**	**100.0**

Topics Training for CLS, TC work for CLS, and CLS work for TC correspond to the DBCP/CLS agreement which is detailed in paragraph 2.8.3. There is a deficit of 20 days for the DBCP because of insufficient staff support provided by CLS, Service Argos during the period. Deficit should be recovered during the next intersessional period.

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

2. Specific tasks undertaken during the intersessional period

2.1. Missions, Visits, Meetings

Dates indicated are affective meeting dates, i.e. not including travel time.

2.1.1. 13-17 October 1997, 13th session of the DBCP and Scientific and Technical Workshop, La Réunion

At the workshop, I presented "a methodology for case studies of impact of buoy data upon numerical weather prediction using adjoint model technique" per work I am conducting at Météo France.

2.1.2. 20-22 October 1997, 17th session of the JTA, La Réunion

2.1.3. 23 October 1997: Vacation

2.1.4. 4-5 November 1997: 6th session of the TAO Implementation Panel, Reading, UK.

The meeting was held at ECMWF. I only attended the fist two days of the TIP meeting, i.e. 4-5 November. I presented the DBCP and its activities and advocated TAO joining the DBCP as one of its Action Groups. TAO eventually decided to be an Action Group of the DBCP to recognise and formalise the good level of co-operation which has been taken place between TIP and DBCP in the last few years.

Many scientific presentations showed the importance of maintaining TAO in the long term (understanding El Niño Southern Oscillation, studying seasonal to inter-annual climate variability and predictability). TAO has been instrumental in observing the 1997 El Niño event.

TAO is being extended towards western equatorial Pacific ocean thanks to the Triangle Trans-Ocean Buoy Network (TRITON) project. 4 buoys were deployed in 1998. A total of 9 TRITON buoys is planned for 1999, 13 for 2000, 15 for 2001, and finally a total of 18 buoys should be maintained in 2002. These include 2 buoys planned for deployment in year 2000 in the Indian Ocean on the equator. TRITON is a Japan Science and Technology Centre (JAMSTEC) project.

The Pilot Research Moored Array in the Tropical Atlantic (PIRATA) is a similar project for the equatorial Atlantic Ocean. PIRATA is a co-operation between Brazil (INPE), France (ORSTOM), and USA (NOAA/PMEL). 6 buoys have already been deployed. New buoys will regularly be deployed and existing buoys maintained or replaced to reach a maximum of 12 buoys in 2000.

Bill Woodward and I also took the opportunity of being at ECMWF to meet with Antonio Garcia-Mendez, ECMWF, to discuss buoy monitoring statistics issues.

2.1.5. 2-3 December 1997, Paris, EGOS Management Committee and Technical Sub-group meetings.

Spain intended to join EGOS at the time of the meeting but finally decided not to participate afterwards (9 moored buoys in the context of the RAYO project). EGOS deployments for 1998 will remain at a similar level as for 1997. Lars Golmen resigned as Technical Secretary of EGOS. As of 1 January 1998, Torleif Lothe, Christian Michelsen Research, Norway has been appointed as new EGOS Technical Secretary. Torleif Lothe will work closely with Pierre Blouch, Centre de Météorologie Marine, France. Wynn Jones has been elected Chairman of the Management Committee. Pierre Blouch has been elected Chairman of the Technical Sub group.

I provided Sondre Stromfjord and Oslo Local User Terminals (LUT) with a geo-magnetic variation matrix for implementation of an automatic correction for wind direction data. I provided Cesar Belandia (National Meteorological Institute, Spain) with automatic quality control procedures that can be used for moored buoys before insertion on GTS.

2.1.6. 8,9,10, and 12 December 1997: Training on Object Modelling Technique (OMT).

Offered by CLS in the context of the Argos 2001 project.

2.1.7. 22 December 1997 - 2 January 1998: Vacation

2.1.8. 19-23 January 1998: Training on Oracle Designer 2000 software

Offered by CLS in the context of the Argos 2001 project.

2.1.9. 2-6 February 1998: Training on Oracle Designer 2000

Designing an Oracle data base, automatic generation of tools. Offered by CLS in the context of the Argos 2001 project.

2.1.10. 9-12 March 1998: Training on Oracle Forms

Editing interfaces and tools (screens) with Oracle data base. Offered by CLS in the context of the Argos 2001 project.

2.1.11. 16-19 March 1998: Training on Oracle Web. Server

Web .server applications based upon Oracle data base. Offered by CLS in the context of the Argos 2001 project.

2.1.12. 26-27 March 1998: Training on Oracle Reports

Producing reports based upon data extracted from an Oracle data base. Offered by CLS in the context of the Argos 2001 project.

2.1.13. 14-17 April 1998: Vacation.

2.1.14. 11-13 May 1998, Naples, Italy: Second IPAB biennial meeting.

The 2nd meeting of the International Programme for Antarctic Buoys (IPAB) was held at the Istituto Universitario Navale. I reported on DBCP activities since the last biennial session and stressed upon the DBCP implementation strategy plan calling for comments or amendments prior to the next DBCP session in October 1998.

I also presented user requirements which had been implemented within the Argos System thanks to DBPC survey and action vis à vis Service Argos. The programme was particularly pleased to hear that IPAB data are now available on CD-Roms instead of tapes.

IPAB activity decreased substantially during 1997 reaching a low level of 5 buoys reporting from Antarctic area in December as compared to 14 buoys in January 1997. Planned figures for 1998 are however more promising: 15 to 20 drifting buoys equipped with geophysical sensors should be deployed in 1998. All buoys should report on GTS although feasibility remains to be studied for Italy, and Japan.

US will now participate in IPAB activities via the University of Alaska at Fairbanks, Geophysical Institute (6 buoys), and the Jet Propulsion Laboratory although the latter will not deploy buoys but will study feasibility of producing optimal analysis combining buoy trajectories and satellite-derived ice drift fields.

Studies by FROST programme showed positive impact of buoy data deployed in the sea-ice zone on operational analysis fields.

Action: Considering that more research institutes than operational agencies participate in IPAB, and considering that data are useful to both communities, and that Antarctic area is a data sparse area for NWP, IPAB is seeking participation from more operational meteorological agencies. IPAB chairman will write a letter to the DBCP chairman in that regard, asking DBCP to ask its members to consider such participation in IPAB. Materials from FROST showing positive impact of buoy data should be attached to the letter. Similar action will be undertaken with WMO congress via WCRP JSC via ACSYS.

New elected executive committee:

Dr. Christoph Kottmeier, Chairman
Dr. Andrea Pellegrini, Vice-Chairman
Mr. Piet Le Roux
Dr. Shuki Ushio

IPAB Co-ordinator: joint co-ordination with Ian Allison and Peter Wadhams during a transition period. Peter Wadhams may replace Ian Allison in the future as IPAB Co-ordinator.

2.1.15. 8-12 June 1998: C++ training for Argos 2001 project (DBCP/CLS deal)

2.1.16. 22-26 June 1998, La Jolla, updating SVPB construction manual.

I worked with Andy Sybrandy on the issue. Andy detailed all modifications with the barometer drifter since the last issue of the construction manual. Most important modifications to the drifter design are:

- Removal of sub-surface float.
- Reduction of drogue size.
- ABS plastic hull instead of fiberglas.
- Reduction of the tether diameter.
- Three pressure sensors proposed instead of one: AIR (SB-2A), Vaisala (PTB 101C), Honeywell (still being designed, no ref. yet).
- Two designs proposed for the installation of the sea water switch.
- More latitude is left for the design of the barometer port provided that outside design is unchanged and certain requirements followed (e.g. submersible port, sufficient backing volume, water trap, desiccant ...).
- New Argos message format.
- New instructions for installing the antenna.

I edited the text of the manual accordingly. Andy has still to work on the pictures and produce electronic versions of them before we can publish the manual and make it available via the web. I would estimate that about 90% of the work is done.

Mr. Pekka Järvi of Vaisala was visiting Scripps Institution of Oceanography while I was there. We had a joint meeting with him and Andy Sybrandy and discussed a new candidate for the pressure sensor. New Vaisala BAROCAP silicone capacitive sensor would be less expensive at about $400 and would according to Mr. Pekka still achieve an accuracy of less than 0.5 hPa with less than 0.1hPa drift per year. New sensor should be released this year by Vaisala.

I discussed DBCP issues with Peter Niiler. 4 Minimet drifters (SVPB plus wind using WOTAN) will be deployed in July in the California currents. Comparisons of the data with nearby moored buoys should be possible. It is not planned to produce a Minimet construction manual for the moment because we do not have sufficient field data yet. Field data for WOTAN observations is extremely important because we cannot reproduce open ocean natural acoustic environment in the laboratory.

2.1.17. 1-24 July 1998, Vacation

2.1.18. 29-31 July, Seattle, IABP 8th annual meeting; 3-4 August, Seattle, IABP conference "International Arctic Buoy Programme, scientific achievements from the first 20 years".

IABP 8th annual meeting was held at the Applied Physics Laboratory of the University of Washington in Seattle. I presented DBCP activities since the last IABP meeting, St. Petersburg, June 1997, plus the draft DBCP implementation plan. I called for comments prior to the next DBCP session in Marathon. Network of buoys in the Arctic is well maintained and future seems to be insured. A total of 22 IABP buoys are presently reporting onto the GTS from the Arctic Ocean. IABP Operating Principles have been reviewed slightly amended and approved. IABP Participants reported on their specific activities for the Programme.

Connections with the International Programme for Antarctic Buoys (IPAB) were discussed and respective Coordinators will discuss ways of making closer connections between the two programmes (e.g. creating a common data base). MEDS is offering to produce a CD-ROM containing data about the Programme. The need for access to more real-time LUT data was discussed.

DBCP also sponsored the IABP conference, "the Arctic Buoy Programme, scientific achievements from the first 20 years", which was held at Battelle conference center. I presented the Panel and its activities at the conference. 15 presentations, including mine, were made at the IABP conference. The conference was sponsored by the DBCP and included mainly presentations on applications of buoy data in the Arctic Ocean (Ice cover dynamics, operational weather forecast, ice and upper ocean measurements across the Beaufort Sea, comparisons of observed and modelled ice motion...). Discussions were held regarding the following issues:

- Continued service to research/operational communities: participants agreed that IABP should continue its activities since data produced by the Programme are instrumental for those applications.
- Climate monitoring: participants agreed that Arctic buoy data as a complement to satellite data are useful for climate monitoring purposes.
- Ocean monitoring: Efforts should be made on this issue. However, ocean monitoring stations are more complex systems which are deployed manually and are therefore more costly to deploy and operate. A network of 6 to 8 Polar Ocean Profiling Buoys (POP) deployed off the shelf and costing about $40000 each would be required for Arctic ocean monitoring purposes. Roger Colony called for somebody to make a proposal for funding such a programme.
- Joint Arctic/Antarctic buoy programme: This issue was debated, and participants agreed that merging the products of IABP and IPAB was more important than merging the two programmes.

2.2. GTS

2.2.1. Advertising GTS

I prepared a comprehensive document to detail why and how inserting buoy data on GTS. This document is available via the DBCP web site at http://dbcp.nos.noaa.gov/dbcp/1gtsinfo.html

2.2.2. GTS sub system

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

- GTS Technical file access via Email (http://www.argosinc.com/docs/gts/gts_tf.html) plus technical file available via the web for downloading a paper version (http://dbcp.nos.noaa.gov/dbcp/gtsfile.html).
- The GTS sub-system is now capable to process, encode and disseminate the data to other destinations than the GTS (data sharing facilities).
- Processing JAMSTEC TRITON moored buoys.
- The GTS sub system is now capable of processing the BOM ship board data and distributing the data in SHIP format.
- New algorithm to compute salinity based upon conductivity, water pressure, and water temperature was implemented (for US Naval Oceanographic Office).
- Implementation of Q_a field in BUOY code for Argos location quality class.
- Problems with GTS distribution of buoy data.
- New geomagnetic variation model implemented.
- Relative Humidity and daily SST (in subsurface reports) for TAO buoys
- Specific Quality Control for Argos XBTs
- Improving polynomial software module.

Refer to DBCP session agenda item number 7.3 (Argos System) for details.

2.2.3. Buoy monitoring statistics:

I liaised with ECMWF, NCEP/NCO, Météo France/CMM, and UKMO regarding the monthly buoy monitoring statistics. As debated at the 13th DBCP session in La Réunion, there was a need for greater consistency among the statistics produced. Although consistency cannot be perfect because models and data assimilation schemes are different, some better and acceptable level of consistency has now been achieved thanks to excellent cooperation from the four centres. Comprehensive report regarding the buoy monitoring statistics is available via the web at http://dbcp.nos.noaa.gov/dbcp/monstats.html.

Refer to DBCP session agenda item 7.1 (Quality control) for details.

2.2.4. BUFR

The document reflecting DBCP views on encoding buoy data in BUFR has been formally submitted to CBS by the chairman of the DBCP. The CBS Sub-group on data representation and codes met in Montreal in late April and the BUFR representation of BUOY was on the agenda. Bob Keeley who was part of the DBCP sub-group on the issue presented the DBCP document at the meeting. The meeting accepted recommendations from the DBCP proposal. The CBS Working Group on Data Management met in June in Geneva and did not comment the proposal further. Changes should therefore be submitted to CBS extraordinary session, 30 September - 9 October 1998, Karlsruhe, Germany, for approval.

Refer to DBCP session agenda item number 7.2 (Code matters) for details.

2.2.5. BUOY code

Implementation of new Qa indicator (Argos location class) in group 6 of section 0 and group 2 of section 4 of BUOY reports was effective at the Argos Global Processing Centres as of 16 December 1997. Implementation was due for 5 November 97 but late implementation did not normally impact the users because the field was optional. LUTs do not code its value.

Refer to DBCP session agenda item number 7.2 (Code matters) for details.

2.2.6. SHIP

2.2.7. GTS routing

I found out that NWS switching directory was not consistent as far as routing buoy GTS bulletins is concerned. Particularly, Landover backup bulletins (e.g. SSVX01 KARS) were not routed to Bracknell. European users were therefore missing part of the data (i.e. buoy data normally processed at the FRGPC and especially EGOS data) when Landover ran in backup mode. I contacted Bracknell to alert them that they may also start receiving those bulletins occasionally and they had indeed to add them to their own switching directory as well. Directories in Washington and Bracknell have been updated accordingly.

Specific procedures exist for SSVX02 and SSVX08 KARS bulletins which are directly and only forwarded to NDBC for QC purposes. Those bulletins are then re-injected by NDBC as KWBC. I asked Bracknell to only route those bulletins to NDBC when Toulouse is in backup mode (LFPW) so that they may also apply QC procedures and re-inject them as KWBC. This is to avoid having QC'ed and non QC'ed bulletins circulating on the GTS at the same time.

2.2.8. LUTs

- Cape Town and Halifax LUTs are now connected to the Argos GTS sub-system since mid December 1997. For technical reasons, La Réunion LUT is not yet connected.
- As requested by EGOS at its December 1997 meeting, I prepared a study and report on advantages of connecting LUTs to the Argos Global Processing Centres. Pierre Blouch who represented the DBCP at the June 98 EGOS meeting presented it on my behalf. Full report is given in annex A.

2.2.9. PALACE

On 30 April 1998, Dean Roemmich (SIO), Bob Molinaro (AOML), and Brechner Owens (WHOI) visited CLS. I took this opportunity to have a meeting with them and discuss the ARGO project, present the DBCP, and discuss GTS distribution of PALACE data. Since mid March 1998, PALACE floats of WHOI and AOML are reporting on GTS via NOAA/NWS under GTS bulletin header SOVX10 KWBC. Data are processed at WHOI or AOML and inserted on GTS directly from AOML.

Refer also to DBCP session agenda item number 7.3 (Argos system) for the issue of distributing PALACE data from Service Argos.

2.3. User assistance

User assistance deals mainly with assisting in the insertion of buoy data on GTS, answering question, solving problems, or providing users with information. I listed a few typical examples below:

- Sergey Motyzhev, MHI, Ukraine: Propose technical solutions for Argos message format. Check the data. Receive publications from Sergey and pass it to the DBCP for publication. Assist him for accessing Argos data via Internet.
- Linda Mangum, TAO: Study feasibility of disseminating relative humidity and SST daily data on GTS for ATLAS buoys.
- Inform Ming Ji of NCEP that he could obtain a TESAC code decoder via ECMWF.
- Inform Alaor Moacyr Dall'Antonia (DHN, Brazil) of bulletin headers used with the PIRATA buoys (SSVX40). Provide him with information on SVPB, including SVPB construction manual.
- Tony Baxter, BOM, assist in making BOM shipboard Argos instruments report in SHIP code instead of BUOY code. Monitor the data, investigate data loss problem.
- Mark Bushnell, GDC, resolve specific problems regarding GTS distribution of the data.
- Pierre Blouch, Météo France, provide him with satellite pass duration simulations and investigate new proposed Argos message format.
- JAMSTEC: GTS distribution of TRITON moored buoys (TAO).
- Debbie Bird, Naval Oceanographic Office, add salinity measurements from buoys on GTS
- Fernando Carvalho, Instituto de Meteorologia, Portugal, assist in initiating buoy programme and inserting buoys on GTS
- Henrik Hartman, DMI, Denmark, assist in obtaining format of NOAA-K satellite for Sondre Stromfjord LUT.
- Charlotte O'Kelly, Marine Informatics, Ireland, provide DBCP publications
- Alexander Keplikov, AARI, Russia: provide him with information on how to obtain drifting buoy data.

Etc.

2.4. User requirements

Argos data on CD-Roms are available to Argos users since May 1998.

Refer to DBCP session agenda item number 7.3 (Argos System) for details.

2.5. Quality Control guidelines

I coordinated QC guidelines and redirected QC messages to buoy operators.

Refer to DBCP session agenda item number 7.1 (Quality Control) for details.

2.6. Global and regional actions

2.6.1. Global implementation

- I provided WMO and IOC Secretariats with my comments regarding DBCP implementation strategy plan prepared by David Meldrum.
- I provided WMO Secretariat with a document regarding DBCP Existing Operational Implementation Mechanism.
- I presented DBCP Implementation Plan at the Action Group meetings I attended and called for comments prior to DBCP 14th session. Draft DBPC Implementation Plan is also available on the DBCP web site.
- GCOS/GOOS Implementation Workshop on Ocean Observations, 3-6 March 1998, Sydney, Australia, has been a success. An action plan is being prepared and rationalisation is underway for integrating all in situ surface and sub-surface ocean data within GOOS. It is being proposed to merge IGOSS and CMM into a Joint WMO/IOC Committee for Oceanography and Meteorology (JCOM) which would be regarded as the primary implementation body for GOOS. DBCP should in this context report to JCOM.
- I accepted participating in the GOOS Implementation advisory group.

2.6.2. DBCP Action Groups

I prepared DBCP reports for the DBCP Action Group meetings (either for myself or officers representing the DBCP): TIP, EGOS, IPAB, IABP, IBPIO, ISABP.

I represented the Panel at the following meetings:

- 4-6 November 1997, Reading, UK, 6th session of the TAO Implementation Panel (TIP);
- 2-3 December 97, Paris, EGOS Management Committee and Technical Sub-Group meetings;
- 11-13 May 1998, Naples, Italy 2nd session of the IPAB;
- 29-31 July 1998, Seattle, Washington, USA, 8th session of the IABP;
- 3-4 August 1998, Seattle, Washington, USA, The Arctic Buoy Program: Scientific Achievements from the first 20 years (conference sponsored by the DBCP).

Pierre Blouch represented the Panel at the following meetings:

- 18-19 June 1998, Reykjavik, Iceland, EGOS Management Committee & Technical sub-group meetings;
- 7-9 July 98, Kuala Lumpur, Malaysia, 3rd meeting of the IBPIO.

Bill Woodward represented the Panel at the following meeting:

- 10-14 August 98, Buenos Aires, Argentina, 5th session of the International South Atlantic Buoy Programme.

2.6.2.1. Global Drifter Program (GDP):

I assisted GDP for data processing of SVPB and Wind drifters and fixing a few problems with GTS distribution of the data.

SVPBs using WOTAN technique to measure wind speed (Wind Observation Through Ambient Noise) have been tested and deployed at sea by the Global Drifter Design Center (GDEC) at Scripps Institution of Oceanography (SIO) and by the Météo France, Centre de Météorologie Marine, Brest, France.

I visited Scripps Institution of Oceanography in June 1998 and worked in conjunction with Andy Sybrandy for updating SVPB construction manual and making it available via the web (see paragraph 2.1.16).

As suggested at the 13th session of the DBCP, Mark Bushnell provided me with a meta-data-base containing useful information to tentatively identify the cause of the SVPB early failures. I had to obtain copy of FileMaker Pro 3.0 in order to access the data base.

Meanwhile, Mark had identified 6 problems with the SVPBs so far (I quote from his reply):

Quote

- Barometer port Gore-Tex retainer - Clearwater. The Gore-Tex membrane rotation problem, identified by New Zealand in February 1996, was corrected by fastening the filter assembly with screws. The screw heads prevented O rings from seating. The repair kit distributed included a countersunk Gore-Tex filter retainer and screws with heads that have been ground short.
- Barometer port O ring seals - Clearwater, Technocean Machined barometer port components out of tolerance, causing O ring seals to fail. Temporary repair is to seal components and O rings with a hig grade marine adhesive/sealant (3M 5200)
- Barometer sensor/controller, <1000 hPa - Technocean. The Pacific Gyre controller incorrectly reads the AIR barometer sensor output whenever the pressure falls below 1000 hPa. The symptom is a large number of raw barometer counts equal to 0193, which are trapped at Argos before GTS distribution. The repair is new firmware now available from Pacific Gyre.
- Barometer lockup - Technocean. Some AIR barometer/controllers fail to restart after being powered down between samples. This lockup results in all zero barometer counts. The solution is to place a 10K resistor between power and ground of the AIR, and a daughter board interface between the controller and the AIR power supply.
- 120 day drifter failure - Clearwater. A programming problem causes the AIR barometer to become a large battery drain, leading to the premature failure of the drifter after 120 days. New programming solves the problem.
- Transmitter problem - Technocean. SOREP transmitters may perform satisfactorily prior to deployment but many become unstable after deployment. The result is most positions are Argos class 0. The solution was to switch to Seimac transmitters.

Unquote

2.6.2.2. TAO Implementation Panel (TIP):

At the TIP meeting in Reading, November 1997, I advocated TIP joining the DBCP as one of its action groups. The TAO Implementation Panel then formally applied for being an Action Group. This was formally accepted by the Chairman of the DBCP in February 1998.

Air Relative humidity data from TAO buoys are now being distributed on GTS. SST daily data (00UTC) are now also included in the subsurface reports from TAO buoys.

See also paragraph 2.1.4.

2.6.2.3. EGOS:

Torleif Lothe (Christian Michelsen Research, Norway) is the new EGOS Technical Secretary replacing Lars Golmen. I provided him with a Geomagnetic Variation matrix for implementation of an automatic correction at Oslo and Sondre Stromfjord LUTs for wind measuring buoys.

At the June 1998 EGOS meeting in Reykjavik, Pierre Blouch presented the report I prepared on advantages of connecting LUTs to the Argos Global Processing Centres (see annex A).

See also paragraph 2.1.5.

2.6.2.4. IABP:

I liaised with Roger colony regarding the DBCP sponsoring the 1998 IABP Arctic buoy conference. See also paragraph 2.1.18.

2.6.2.5. IPAP:

DBCP used to maintain a web page on behalf of the IPAB. IPAB developed it own web page (http://www.antcrc.utas.edu.aus) at the Australian Antarctic Division. DBCP server is now therefore linked to this site. See also paragraph 2.1.14.

2.6.2.6. ISABP:

I provided Louis Vermaak, SAWB, with access to the DBCP server for updating ISABP web. pages.

2.6.2.7. IBPIO:

Indian Ocean programme is benefiting from installation of an LUT in Cape Town and its connection to the Argos Global Processing Centres.

India deployed 12 moored buoys in the Indian Ocean, 8 off the shores of India, 2 in the Arabian Sea, and 2 in the Bay of Bengal. Buoys are SEAWATCH and WAVESCAN buoys (OCEANOR).

2.6.3. National Programmes

A few countries are initiating new drifting or moored buoy programmes or seem to gain interest in buoy deployment activities:

2.6.3.1. Qatar:

Qatar Petroleum Corporation is sponsoring a project to the Department of Meteorology to deploy 3 to 4 moored buoys in the Gulf.

2.6.3.2. Italy:

Servizio Idrografico e Mareografico nazionale will deploy 4 meteorological and oceanographic buoys in the Mediterranean and/or the Adriatic seas and wants to participate in DBCP activities.

Dr. Antonio Siccardi, Consiglio Nazionale delle Ricerche, Istituto per l'Automazione Navale, Genova, via a letter from Prof. C. Morelli, Italian Representative on the IOC Executive Council, expressed the desire in participating in DBCP activities.

2.6.3.3. Greece:

POSEIDON project, 12 moored buoys (via INMARSAT-C)

2.6.3.4. Portugal:

New project by the Meteorological Institute to deploy some 45 drifting buoys in 3 years.

New drifting buoy programme is being initiated by the Dpt. Ambiente Aquatico (DAA)/Oceanografia. Some 10 to 20 buoys are planned for deployment.

2.6.3.5. Spain:

Puertos del Estado with assistance from the National Meteorological Institute is managing RAYO project (Warning and Observation Marine Monitoring Network in the Spanish Coastal Waters) to deploy some 9 moored buoys near the shores of Spain (data collection via INMARSAT).

2.6.3.6. Brazil:

Brazilian National Buoy Programme (PNBOIA). Deployment of 20 SVP drifters (INPE) off East coast of Brazil started in July 97 (9 drifters deployed in November 97). DHN is deploying 3 ATLAS Buoys in the Tropical Atlantic as Brazilian participation in the PIRATA Programme. In 1998/1999, DHN will co-ordinate deployment of some 13 SVP drifters off East Coast of Brazil and 1 pilot moored buoy at Cabo Frio, Southeast Coast.

2.6.3.7. Ukraine:

Hydrophysical Institute (Sergey Motyzhev) is now making SVPB drifters and provided South African Weather Bureau with 3 prototypes.

2.7. DBCP

2.7.1. 14th DBCP session

I prepared a few DBCP session preparatory documents plus series of transparencies for DBCP-14:

- TC Report
- Quality Control
- Argos System and GTS sub-system
- Code matters
- Information exchange

2.7.2. Information exchange

2.7.2.1. DBCP Brochure

I worked in conjunction with Nigel Greenwood and Peter Dexter on a draft DBCP brochure which is available for discussion at the 14th DBCP session (refer to DBCP session agenda item number 6.2 for details).

2.7.2.2. DBCP Publications

I have been providing many individuals, mainly potentially new buoy manufacturers with DBCP publications and especially with publication No. 4 (SVPB construction manual). DBCP publications number 2 and 3 are now available via the web.

I worked with Andy Sybrandy on updating DBCP publication No. 4, SVPB construction manual.

Refer to DBCP session agenda item number 6.2 (information exchange) for details.

2.7.2.3. DBCP web server

DBCP web server has been substantially updated. New information and tools have been added. Below are examples of specific work of the Technical Co-ordinator concerning the DBCP web. Server:

- Updating the DBCP server and re-writing a number of pages;
- Upgrading data flow monitoring tools since AOML switched to a more powerful computer. New system now uses Relational Data Base Management System;

- Adding application of buoy data menu item;
- Description of the various kind of buoys;
- Information on GTS and report on why and how inserting buoy data on GTS;
- Adding many status graphics;
- Adding Action Group and National reports under Global Implementation menu item;
- Adding deployment methods and recovery methods menu items;
- Report on buoy monitoring statistics;
- DBCP publications No. 2 and 3 are available in electronic form;
- Update DBCP list of National Focal Points for logistic support;
- Thinking of possible future improvements.

Refer to DBCP session agenda item number 6.2 (information exchange) for details.

2.7.2.4. DBCP annual report, GOOS annual status report

I provided Yves Tréglos with documents and graphs for inclusion in the 1997 DBCP and GOOS status annual reports.

2.8. Argos

NOAA-K was successfully launched on 13 May 1998. Refer to DBCP session agenda item number 7.3 (Argos System) for details.

2.8.1. CLS

I liaised and/or provided assistance to CLS for following specific issues:

Processing of the TRITON JAMSTEC moored buoys through the GTS sub system;
Developing requirements expressed by buoy users;
Article dealing with DBCP web server in Argos Newsletter.

2.8.2. Service Argos, Inc.

I liaised and/or provided assistance to SAI for following specific issues:

- Specific issues regarding GTS distribution of buoy data.
- Counting GTS reports at various points in the data processing scheme;
- GTS technical file access;
- Documentation on GTS technical file access on the SAI Web. site.

2.8.3. CLS/DBCP agreement regarding TC DBCP work:

At its 13th session, the DBCP discussed the issue of the Technical Coordinator working part time on Argos development projects while CLS in exchange would take over certain routine monitoring and related activities of the Coordinator. In this context, it noted with interest a formal proposal to this effect which had been sent by the Director-General of CLS to the chairman of the DBCP prior to the DBCP session. During the ensuing discussion a number of concerns were raised with the proposal, relating to issues such as potential inequalities in the exchange, supervisory and oversight responsibilities, accountability, training of Argos personnel, and ultimate value to the Panel. Overall, however, it was recognised that such work for the panel would indeed directly benefit buoy operators, and help to ensure that future Argos developments were in line with Panel requirements. The Panel therefore agreed to the proposal, with the provision that:

(a) It would be initially for a one year trial period only, to be reviewed at DBCP-14, and that the two week opt-out clause be retained, as noted in the proposal;

(b) Full training of Argos staff in the routine tasks be undertaken, but that user contact on monitoring issues continue to be through the Technical Coordinator;

(c) The Technical Coordinator bi-monthly reports to the chairman of the DBCP clearly show the developing division of tasks with CLS staff;
(d) The Technical Coordinator should continue to remain under the direct supervision of the Panel chairman and Secretariats in all

During the intersessional period, I tried to keep a balance between what was provided by Service Argos and what I actually did for CLS. CLS offered training sessions on software development, programming, and Oracle data-base management system. Those training sessions are counted as TC participation to CLS projects. Since only limited staff support was provided to me during the period January 1998 to July 1998, I did not spend much time (13 days) on CLS projects during the period October 1997 to August 1998. However, since training sessions during the period were firmly scheduled and CLS did actually pay for them, I attended those anyway. So the balance was initially well in favour of the DBCP and I could not reasonably spend more time on CLS projects.

In August, and September 1998, substantial staff support could be provided by CLS. Fernand Cid, is now working half time on DBCP issues. I therefore anticipated further support from CLS afterwards and started to substantially work on CLS projects in September 1998 when I spent about 10 working days. As of 30 September 1998, balance is however still in favour of the DBCP by 20 days (i.e. CLS owes 20 days to DBCP).

Assistance actually provided by CLS during the period:

- Monitoring of my tools on the Argos computers: 4.5 days.
- Assistance with DBCP brochure: 4 days.
- Fernand Cid (CLS): 23.5 days (4 days in June 1998, 8 days in August, 11.5 days in September). I trained Fernand with a few simple monitoring activities and asked him to start preparing lists of wind buoys and land stations reporting in BUOY code.

Summary since September 1997 (days):

	TC for CLS	CLS for DBCP
Training	29	/
Argos 2001	23	/
Brochure	/	4
Monitoring	/	4.5
Staff support	/	23.5
Total	52	32

2.9. Other Systems

Mark Bushnell (GDC) has been testing 3 SVP buoys (Seimac) reporting via Orbcomm. Buoys are reporting once a day and record historical data. Data are delivered to GDC via Email.

GDC is also studying feasibility of a drifter reporting via Iridium.

2.10. Météo France

At its eleventh session, the Panel discussed the issue of the Technical Co-ordinator of the DBCP working part time at Météo France for the DBCP. It agreed that this would be in the best interest of the DBCP, of WMO and IOC, and of all Member States, in particular in facilitating monitoring and simulation studies by the Technical Co-ordinator using data in the Météo France data banks. In February 1996, Météo France offered the TC DBCP an office with full computer access. The NOAA National Ocean Service offered a Personal Computer for realising this access (90 MHz Pentium PC). I received the PC in mid March 1996 and since then am tentatively spending every Tuesday at Météo France (i.e. about 20% of my time) except of

course while I am in mission or vacation, or when my regular TC DBCP workload is too heavy (e.g. user assistance, preparation of DBCP session).

Because of substantial reorganisation within the Service Central d'Exploitation de la Météorologie (SCEM), I have been asked to move to another office at Météo France. I have basically same sort of computer access. I am now located within the central forecasting office.

At Météo France, I have basically been working on two issues, (i) sensitivity/case studies, and (ii) accessing GTS buoy data issues.

I spent less time at Météo France during this intersessional period (5%) than during the previous one (12%) because (i) considering that I spend less than a day a week at Météo France, I spend substantial amount of time upgrading my scripts to deal with data assimilation and model upgrades leaving not enough time to actually run those scripts and study the results (scripts run at night), and (ii) tools I developed for accessing GTS buoy data are working well, not evolving very much, and are accessible directly from my office at CLS via the Internet (telnet, ftp). For being efficient in sensitivity/case-studies, I would for example have to spend at least 2 days per week at Météo France: 1 day to prepare scripts, launch scripts and draw initial results: since scripts run at night and results are usually available on the morning, the next day would be spent on reading and interpretation of the results. I believe that the DBCP cannot afford its TC spending 40% of his time on such issues. I am therefore suggesting to stop my activities in sensitivity/case-studies.

Having an office at Météo France remains however important (i) because of the contacts I keep there with people involved with drifting and moored buoy matters, and (ii) because of numerous tools available to access buoy data or other meteorological products. It is also feasible that I spend more time at Météo France for DBCP issues which do not require Service Argos computer access.

2.10.1. Sensitivity/case studies

Since May 1996, Météo France is running a 3D Variational analysis. I had to modify software and scripts accordingly in order to run cases valid after this date.

I tested a couple of new meteorological situations in North and south Atlantic but did not come with any positive conclusion so far regarding impact of drifting buoys upon quality of weather forecast.

The proceedings of the CGC/WMO Workshop on Impact of various observing systems on numerical weather prediction, Geneva, 7-9 April 1997 have been published as WWW Technical Report No. 18 (WMO/TD No. 868). Although I did not attend the meeting, Bruno Lacroix of Météo France who attended the meeting reported on impact study I conducted on the UK case of 29 September 1995. Although general conclusions from the report legitimately give a predominant place to profile type information and calls for a more uniform radiosonde coverage, it is being stated that "some significant benefits could also be drawn from an improvement of the surface network over the data sparse areas of the oceans (for example by deploying more buoys), although the priority should be given to the upper air whenever possible".

In October 1997, a new Fujitsu VPP 700E computer was installed at Météo France for replacing the Cray C98 operationally in August 1998. I did not work on upgrading my scripts to run with the Fujitsu yet.

2.10.2. Data-flow control

Maintenance of related tools

3. Regular or normal tasks

3.1. Monitoring

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

3.1.1. Quality Control Guidelines

3.1.1.1. 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 buoy data quality control (PMOC). For rationalisation purposes, all the proposals are stored and archived in a data base.

3.1.1.2. Contacting PGCs

To contact the PGCs: The QC guidelines have been automated, so status change proposals are automatically being forwarded to the Principal GTS Co-ordinator (PGC) when the latter can be automatically identified and has an Email address. In the contrary, 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.

3.1.1.3. Checking Argos files

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

3.1.1.4. Feed back.

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

3.1.2. 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...

3.1.3. TC DBCP files.

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

3.2. User assistance

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

3.2.1. 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.

3.2.2. 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.

3.2.3. Meteorological Centres

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

3.2.4. Secretariats:

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

3.2.5. Buoy manufacturers.

Buoy manufacturers regularly contact me to be included in the DBCP list of drifting buoy manufacturers. I may also discuss technical issues with them.

3.2.6. Individual users

Individual users contact me to obtain information of drifting buoys and seek information on how to obtain buoy data. I would redirect them to adequate institutions in that case (e.g. RNODC/DB).

3.2.7. Acting as a Principal GTS Co-ordinator

e.g. the regular PGC is in vacation.

3.2.8. 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...).

3.2.9. Investigate various data loss problems.

3.3. Drifting Buoy Quarterly Report

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

3.4. Global Telecommunication System (GTS)

3.4.1. Status for drifting buoys reporting onto the GTS:

- In July 1991, 718 drifting buoys were operational, 264 of these reporting on GTS (i.e. 36.8%).
- In July 1992, 1162 drifting buoys were operational, 474 of these reporting on GTS (i.e. 40.8%).
- In early August 1993, 1269 drifting buoys were operational, 548 of these reporting on GTS (i.e. 43.2%).
- In early September 1994, 1246 drifting buoys were operational, 587 of these reporting on GTS (i.e. 47.1%).
- In early September 1995, 1429 drifting buoys were operational, 631 of these reporting on GTS (i.e. 44.2 %).
- In early September 1996, 1180 drifting buoys were operational, 638 of these reporting on GTS (i.e. 54.1%).

- In September 1997, 1159 drifting buoys were operational, 581 of these reporting on GTS (i.e. 50.1%).
- In August 1998, 1230 drifting buoys were operational, 543 of these reporting on GTS (i.e.44.1%)

See also figure 2.1 (distribution of active buoys by country), figure 2.2 (distribution of GTS buoy reports by country and variable), figure 5 (evolution of the number of buoy GTS air pressure reports since 1987), and figure 6 (evolution of mean RMS (Obs.-FG) for GTS air pressure data since 1987.

Météo-France provided me with Data Availability Index Maps on a monthly basis. The maps are useful to identify the data sparse ocean area for each kind of geo-physical variable and therefore to assist the various data buoy programmes in adjusting deployment strategies. A set of these maps valid for July 1998 is shown in figure 1. The maps show clearly the impact of the TAO array ATLAS moored buoys (wind) or of DBCP regional action groups such as the ISABP (air pressure).

3.4.2. GTS bulletin headers:

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

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

3.4.3. 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 DBCP session agenda item number 7.1 (Quality Control of buoy data) for details.

3.4.4. Non-standard wind sensor heights:

I keep up to date the list of drifting buoys making wind measurements and reporting on GTS using the BUOY code. 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.

3.4.5. 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.

3.4.6. 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.

3.5. 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 DBCP session agenda item number 7.3 (Argos) for details.

3.6. DBCP World Wide Web Internet server

The regular work of the Technical Co-ordinator concerning the newly established DBCP World Wide Web (W3) server 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 DBCP session agenda item number 6.2 (Information exchange) for details.

3.7. TC statistics and graphs.

3.7.1. 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 figure 2.1 (distribution of active buoys by country), figure 2.2 (distribution of GTS buoy data by country and variable), and figure 5 (evolution of the number of buoy air pressure data distributed on GTS since 1987).

3.7.2. Quality of air pressure.

I Computed on a monthly basis, the graph showing the distribution of the RMS (of Observation minus First Guess Field) of Air Pressure data according to ECMWF monthly monitoring statistics. This graph, which uses 6 months of data, gives a good estimate of the quality of the drifting buoy Air Pressure data. The graph is included in the TC monthly report. See figure 3. See also figure 6 (evolution of mean RMS (Obs. - FG) for GTS air pressure data since 1987.

3.7.3. 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. See figure 4.

3.8. Action Groups, Regional actions.

3.8.1. 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.

3.9. Miscellaneous

3.9.1. Drifting Buoy Quarterly Report.

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

3.9.2. Argos monthly status report.

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

3.9.3. 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.

3.9.4. 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 is list no more distributed by regular mail. 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.

3.9.5. TC DBCP bimonthly report.

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

3.9.6. List of buoy user requirements.

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

3.9.7. Documentation, assistance.

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

3.9.8. TC DBCP missions.

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

3.9.9. Preparation of the DBCP session.

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

- Report of the Technical Co-ordinator;
- Report on drifting buoy data Quality Control;
- Report on Argos developments (user requirements);
- Code matters (BUFR, BUOY);
- Information exchange.

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

$T_1T_2A_1A_2ii$ Approximate region of deployment or Programme

USGPC (Service Argos Inc., Landover, USA):

SSVX04 KARS North Atlantic Ocean;
SSVX06 KARS Northern Hemisphere;
SSVX10 KARS Southern Hemisphere;
SSVX12 KARS Arctic Ocean;
SSVX14 KARS Antarctic area;
SSVX16 KARS Specific experiments. Buoys from various ocean area;
SSVX18 KARS NWS GLDB drifters for NE Pacific Ocean ;
SSVX40 KARS ATLAS moored buoys in the Equatorial Pacific Ocean;
SSVX96 KARS Specific experiment conducted by the NDBC.

QC by NDBC (Mississippi, USA) based on data from the USGPC:

SSVX02 KWBC	Southern Hemisphere;
SSVX08 KWBC	Northern Hemisphere.

NIC (Washington-DC, USA) based on data received from the USGPC:

SSVX18 KWBC	Arctic Ocean.

FRGPC, (CLS, Service Argos, Toulouse, France):

SSVX01 LFPW	North Atlantic Ocean;
SSVX03 LFPW	Southern Hemisphere;
SSVX05 LFPW	Northern Hemisphere;
SSVX07 LFPW	Arctic Ocean;

Oslo LUT (NMI, Oslo, Norway):

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

Sondre Stromfjord LUT (DMI, Greenland):

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

Halifax LUT (Environment Canada):

SSVX01 CWHX	North-West Atlantic Ocean.

Edmonton LUT (Environment Canada):

SSVX02 CWEG	Arctic Ocean;
SSVX03 CWEG	Hudson Bay;
SSVX04 CWEG	North-East Pacific Ocean.

APPENDIX A

Advantages of connecting Local User Terminals to the Argos Global Processing Centres

Introduction

Argos data are collected via global receiving stations and regional receiving station (see figure 1).

Receiving stations receive Argos data from the satellites approaching the station. Those data are either regional data or global data:

- **Regional data** are those collected by the satellite while in view of the PTT and the receiving station at the same time. Basically, 50% of the regional data are delivered within 1 hour, 90% within 30 minutes.

- **Global data** are data collected by the satellite before being is view of a Global receiving station, recorded onboard, and then downloaded when the satellite approaches the station. Hence substantial orbital delays exist for global data. Delivery times vary from a few minutes to several hours (30% of the global data are received within 1 hour, 60% within 2 hours, 83% within 3 hours).

Global receiving stations are capable of receiving both regional and global data. There are presently 3 global receiving stations in the Argos system:

- Wallops Island, Virginia, USA
- Fairbanks, Alaska, USA
- Lannion, Brittany, France

Regional receiving station also called Local User Terminals (LUT) are only capable of receiving regional data. There are presently many LUTs in use:

- Some are connected to the Argos Global Processing Centres (GPC) and the data delivered in real time for data processing and distribution to the users with minimal delays:
  - Hawaii
  - Darwin, Northern Australia
  - Perth, South Western Australia
  - Melbourne, South Eastern Australia
  - Casey, Antarctica
  - Wellington, New Zealand
  - Cape Town, South Africa
  - Halifax, Canada
  - Monterey, USA
  - La Réunion Island, Indian Ocean

- Some are not connected to the GPCs. In that case the data are processed directly by the LUT independently from the GPCs. Location are performed, Argos messages decommuted and decoded, sensor data processed in geo-physical units, GTS reports encoded and finally distributed to the users with minimal delays :
  - Oslo, Norway
  - Sondre Stromfjord, Greenland
  - Edmonton, Canada (connection to USGPC is planned)
  - ...

Local User Terminals are crucial because they speed up availability of GTS data.

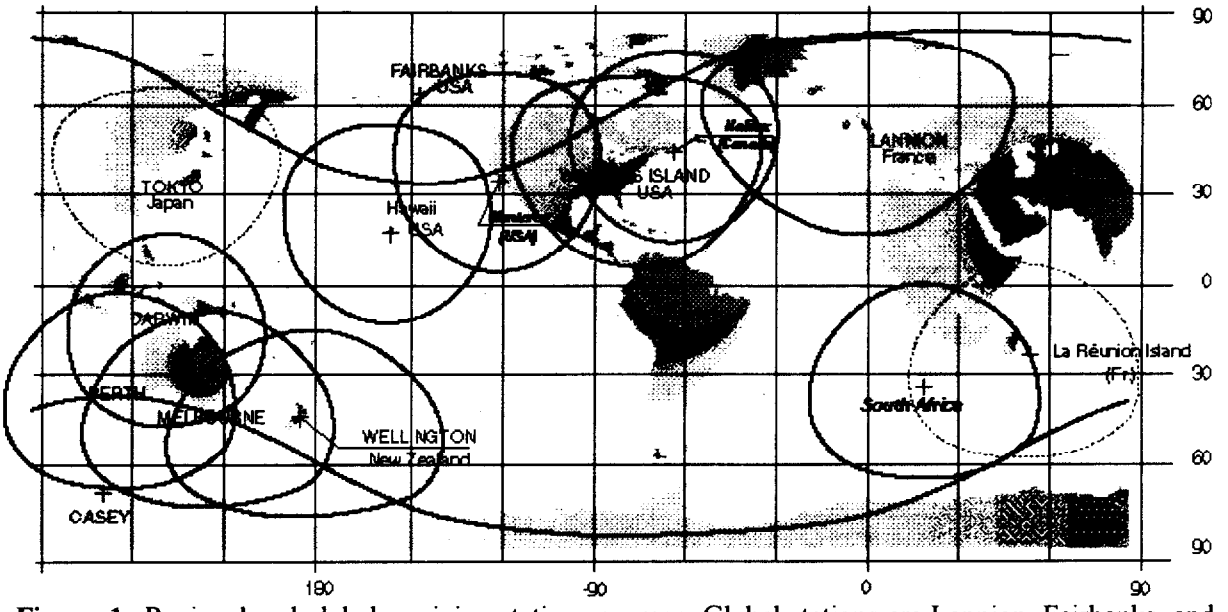


Figure 1: Regional and global receiving station coverage. Global stations are Lannion, Fairbanks, and Wallops Island. Circle indicates area where 30% of the data received through the global network are also received in real time through the LUT.

Advantages of connecting Local User Terminals to the GPCs

We are here discussing advantages of connecting LUTs to the Argos Global Processing Centres in order to process Argos platform data for GTS distribution (i.e. we are not considering non GTS platforms). Those LUTs are operated by independent institutions.

It is only recently that it has become practicable to connect a number of LUTs to the GPCs because of substantial decrease in telecommunication costs. With Internet (e.g. ftp), Argos data can now be sent with minimal delays to the GPCs. Commercial telecommunication link can be used on a case by case basis as a backup of Internet when delays are estimated too important. In fact, all the LUTs presently connected to the GPCs operate on this mode. Institutions operating the LUTs provide Service Argos with the data free of charge because they understood very well the all the advantages of connecting their antennae to the GPCs.

Those advantages are listed below:

1. **No addition cost**. For PTTs processed through LUTs which are not connected to the GPCs but are also processed via the GPCs there would be no additional cost involved for the buoy owner to connect the LUTs because (i) he already pays adequate service for Argos service, and (ii) there is no additional fee for GTS data processing at Service Argos. It is now rare that LUTs are solely used to save Argos costs by placing PTTs in backup mode. In that latter case, I realise it would be harder to convince users to have their platform processed via Service Argos.

2. **Better location**. Locations performed by Service Argos at the GPCs are better because they use a substantial network of orbitography platforms with excellent oscillator stability to obtain a better knowledge of the satellite orbits. Orbitography is corrected to take ionospheric effects into account. Location algorithms have been regularly improved and include classification of locations produced:

0: Radius of 66% confidence >= 1500 m
1: Radius of 66% confidence = 500 m and < 1500 m
2: Radius of 66% confidence = 250 m and < 500 m
3: Radius of 66% confidence < 250 m

In practice, classification is not available with LUTs. Location quality depends upon PTT oscillator stability plus some other factors, but in average, most of Service Argos processed data reached a location precision better than 500 metres. Location performed by LUTs is usually in the order to 10 to 15 Km. Although 10-15 Km is still acceptable for meteorological purposes considering a synoptic scale in the order of 150 Km, as shown on the example below this may also lead to higher RMS values when estimating sensor data quality by comparing model first guess field with observed data.

Example: January 1998 air temperature buoy monitoring statistics from Météo France (CMM) show that although bias values are almost identical for all 3 sources (BGSF = Sondre Stromfjord LUT, ENMI = Oslo LUT, LFPW = Toulouse GPC) and in the order of -0.8 degrees, RMS is much higher for data originating from Oslo LUT:

```
Date##,WMO##,Sns,Orig,C,Cntr#,Lat##,Long##,Rcei,Acpt,GE#,Bias#,SD##,RMS#,Rate,F
980124,65596, AT,BGSF,B,  CMM, 49.3, -29.7,  64,    ,  0, -0.8, 1.1, 1.4,    ,B
980123,65596, AT,ENMI,B,  CMM, 49.2, -29.7,  58,    ,  2, -0.8, 3.0, 3.1,    ,B
980123,65596, AT,LFPW,B,  CMM, 49.2, -29.7, 115,    ,  0, -0.9, 1.2, 1.5,    ,B
```

3. **No duplicates on GTS**. When platforms are processed at both not connected LUTs and Argos GPCs, GTS reports with same date of observation and same WMO number are distributed via different sources using different GTS bulletin headers. Besides, locations are different since different algorithms are used. This leads to confusion. In addition, since LUT data usually arrive before GPC data (i.e. local coverage versus global coverage), LUT data will preferably be inserted by the models while duplicate reports arriving later from GPC will be rejected although including better quality location. If all data were processed via GPCs we would avoid duplicates and inconsistency in Argos location, and make sure that better locations are being assimilated by the models.

4. **Calibration curve consistency**. Similarly, different calibration curves (i.e. coefficients), or even different algorithms to decode Argos messages might be applied at the LUTs and the GPCs. Although this should not be the case, experience shows that this actually happens as seen on the example below from the UK Met. Office 44th quarterly report on drifting buoys in the North Atlantic (October to December 1997):

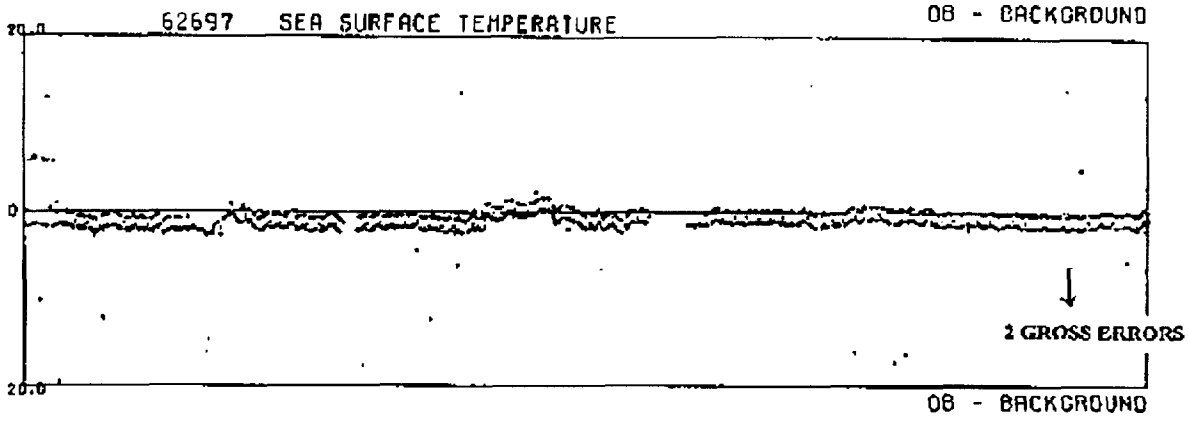


Figure 2: Difference between first guess field and observed SST for buoy WMO 62697 (UKMO buoy 2959) for the period October to December 1997. Curve typically shows two distinct sources of data, one being biased of about 2 degrees.

October 1997 Météo France (CMM) buoy monitoring statistics for the same buoy show that data from Sondre Stromfjord LUT (BGSF) are biased of about 1.5 degrees (i.e. 1.1 + 0.4) when compared with Oslo LUT (ENMI) and Toulouse GPC (LFPW):

```
Date##,WMO##,Sns,Orig,C,Cntr#,Lat##,Long##,Rcei,Acpt,GE#,Bias#,SD##,RMS#,Rate,F
971130,62697,SST,BGSF,B,  CMM, 47.4, -24.7, 300,    ,  0,  1.1, 0.5, 1.2,    ,B
971130,62697,SST,ENMI,B,  CMM, 47.5, -24.8, 166,    ,  1, -0.3, 0.6, 0.7,    ,B
971130,62697,SST,LFPW,B,  CMM, 47.5, -24.7, 359,    ,  5, -0.4, 0.6, 0.7,    ,B
```

5. **Advanced sensor data processing**. Flexibility of the Argos GTS sub-system at GPCs is such that even for complicated Argos message formats and calibration curves, there is basically no software development required when implementing a new buoy in the system for GTS distribution of the data. This might not be the case for platform data processed at LUTs.

6. **Quality control checks**. Data processed via the Argos GTS sub-system at GPCs pass through a range of automatic quality control checks. Data that fail either test are rejected from GTS distribution. Those tests include the following:

(a) Gross Error check. For each type of probe, sensor data are compared with constant limits. For example Atmospheric Pressure must be comprised between 800 and 1080 hPa.

(b) User Limits check. The limits are provided by the owner of the platform for each sensor on each platform (also called climatological limits);

(c) Sensor blockage test. Same sensor value reported consecutively a certain number of times during a certain period (this test is normally used only for Air Pressure sensors);

(d) All bits identical test. Sensor data rejected if all the bits of the sensor binary output are ones or zeros (this test is usually used only for Wind Speed, Wind Direction or Pressure Tendency);

(e) Compression Index by sensor. This is to avoid altered sensor data (i.e. bits corrupted) to be distributed on GTS. Alteration can happen in the transmission link between the platform, the satellite, the ground station and the processing centres. Considering high level of redundancy with Argos, compression permits to reject data containing bit errors (it is unlikely that bit errors appear at the same place in distinct Argos messages from a satellite pass). Identical sensor measurements from all the messages collected for a given satellite pass and platform are grouped together provided that the considered sensor is the same (i.e. same place in the Argos message), the level of the probe is the same, and the computed time of observation is the same. The number of identical sensor measurements is called the Compression Index by Sensor (CIS). Only sensor measurements with the highest compression index by sensor are stored and distributed on GTS. At least two identical sensor values for a satellite pass must be received (values don't have to be from consecutive Argos messages).

(f) Checksums. Checksums serve the same purpose as compression: checksums are used in order to validate Argos message integrity upon reception at the processing centres. For validating the data, the sum calculated by the platform based on binary words from the Argos message and then encoded in the Argos message must match the one re-computed at the Argos GTS sub-system. If not consistent it means that the message is corrupted and the data are therefore not distributed on the GTS. Checksums are optional. When used, compression index by sensor is ignored if checksum test validates the Argos message.

(g) Associated Level. For XBT stations, if the associated depth of a temperature measurement is not valid, then the temperature measurement will not be considered as valid either.

In addition, the following procedures are applied:

(a) Only the location with the highest probability of being correct is transmitted;

(b) When location processing is not performed during a satellite pass, the last known location is provided;

(c) For drifting buoys, data with location more than 48 hours old are not transmitted via the GTS (24 hours for ships, longer periods or no limit for other types of platforms).

7. **Geomagnetic variation correction** can be automatically applied if required for buoy measuring wind direction using a compass. Wind direction is measured as compared to the magnetic North instead of the geographic North. Hence a geo-magnetic variation correction is required. Correction depends upon buoy position and time of observation. Standard NOAA/NGDC IGRF model is used for that purpose. The

International Geomagnetic Reference Field (IGRF) is a series of mathematical models of the main geomagnetic field and its secular variation. A 7th generation (1995) revision of IGRF was adopted by the International Association of Geomagnetism and Aeronomy (IAGA) during the XXI General Assembly of the International Union of Geodesy and Geophysics held in Boulder, USA, in July 1995. This 1995 version of the IGRF model valid until year 2000 has been implemented within the Argos GTS sub-system.

8. **Variety of GTS codes**. Data processed via the Argos GTS sub-system can be encoded using a variety of WMO codes depending upon station type: BUOY, SYNOP, SHIP, BATHY, TESAC, HYDRA. Codes are regularly being upgraded to reflect code changes.

9. **Simplification for program managers** when having to deal with several LUTs and Argos GPCs. When a program manager in charge of tens of Argos platforms has to deal with many LUTs plus Argos GPC, it may happen that required status change modifications are not implemented at the same time or are not implemented at all at one of the LUT or GPC. It may even happen that different modifications are actually implemented at different sources. If LUTs are connected to the GPCs, this problem disappears since program manager would only have to deal with one GPC. Errors are more easily detected and identified using usual tools (e.g. buoy monitoring statistics) when there is only one source of GTS data.

10. **No software maintenance** at the LUT to process Argos data, compute location, decode Argos messages, convert binary data into geo-physical units (calibration curves), time tag the data, encode the data according to WMO standards, and distribute the data onto the GTS.

11. **No software upgrade** at the LUT when GTS code is upgraded. This happens from time to time. For example, in November 1997, a field Q_a was added in Section 0 of group 6 of BUOY code to indicate Argos location class.

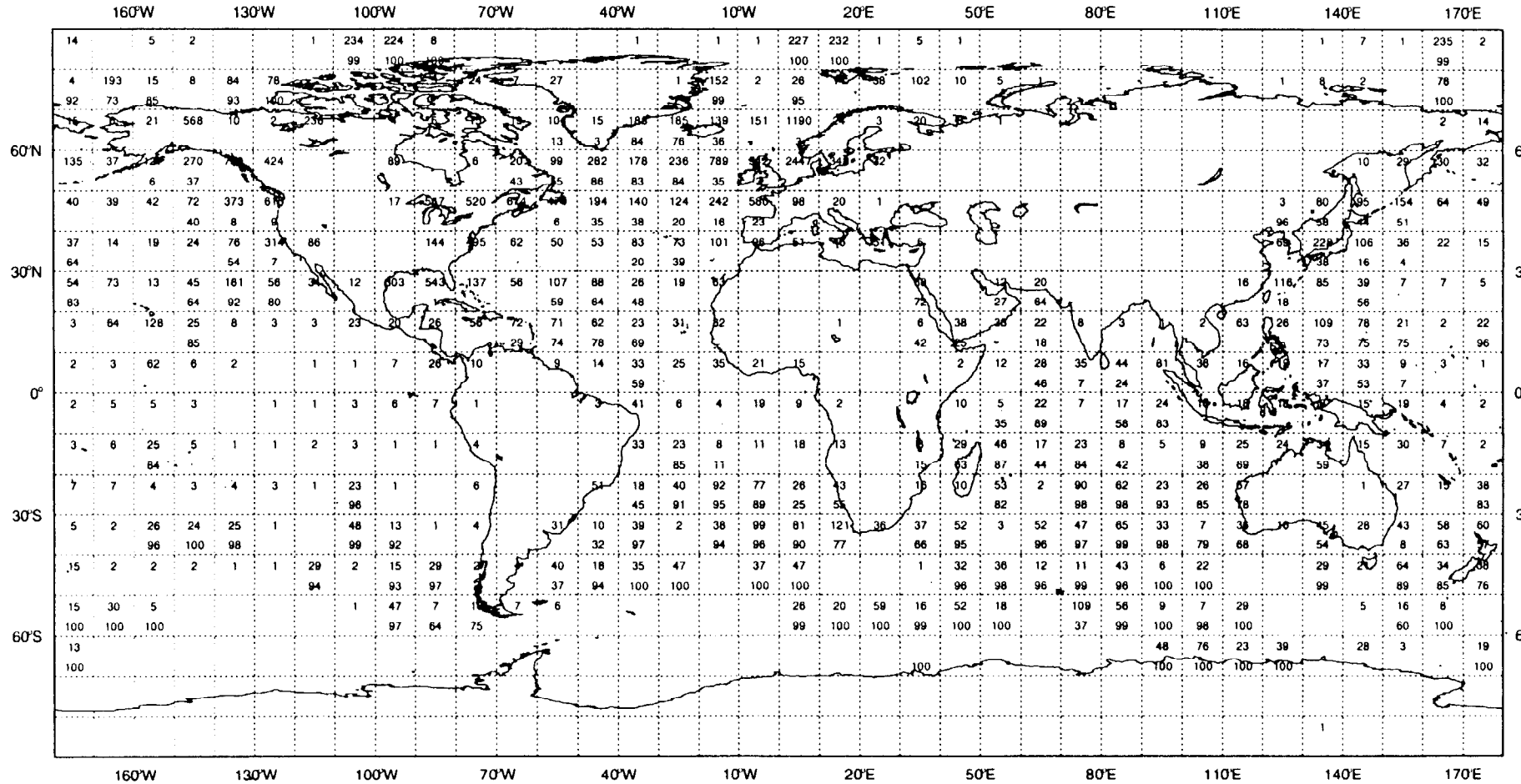
12. **Status change modifications** (e.g. remove a buoy from GTS or recalibrating a sensor) are automatically redirected onto the BUOY-QC mailing list so that all GTS users on the mailing list are informed that a modification has been done and at what time.

13. **Service Argos support** in case data are not being received. When for some reason platform data are not being received, Service Argos can offer its services to investigate the problem which can be due to various causes (e.g. buoy not transmitting, buoy not located because unstable oscillator, data rejected by QC checks...).

METEO FRANCE

METEO - FRANCE **PRESSURE** **JULY 1998**

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



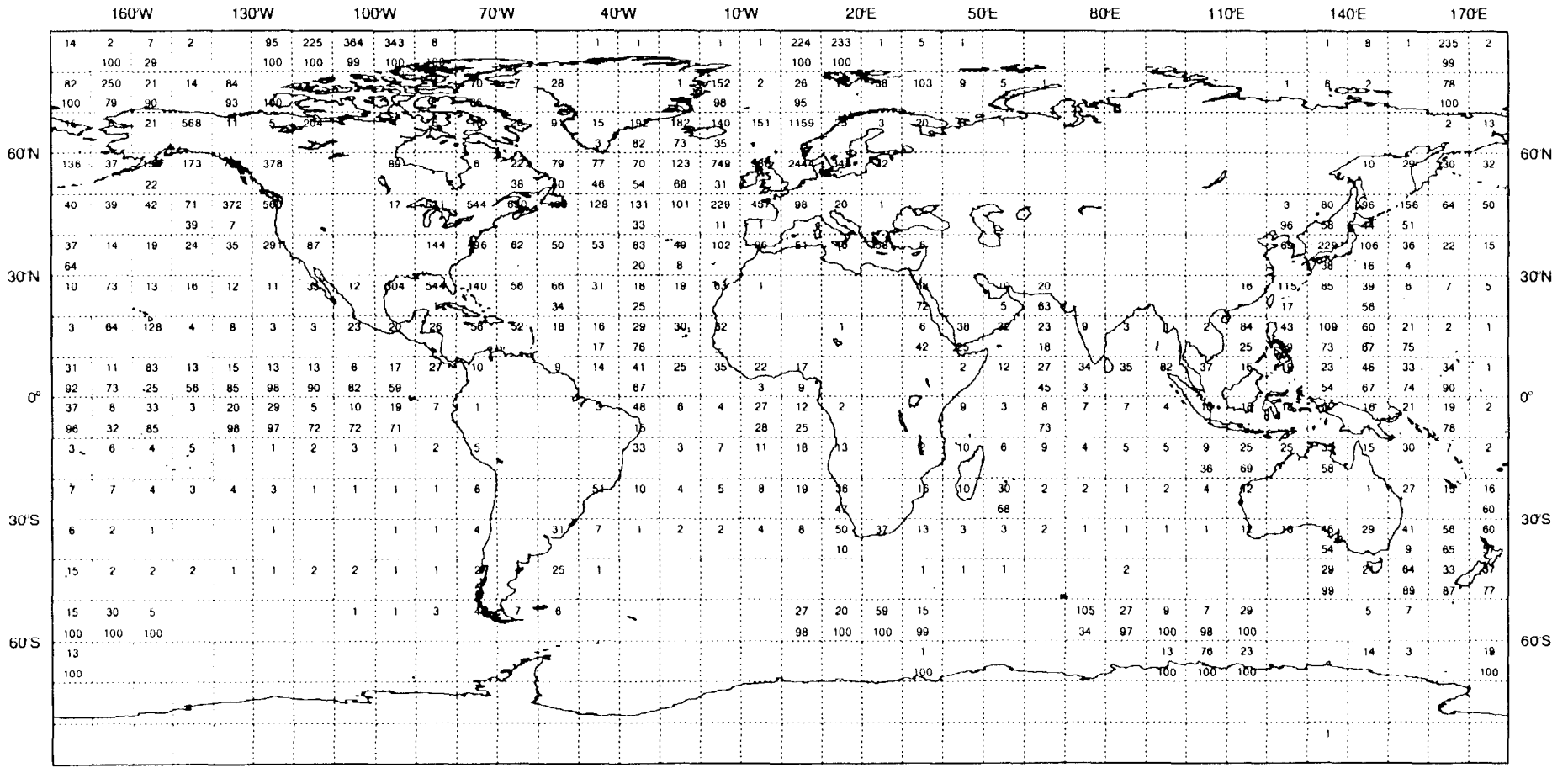
MAGICS 4.2 Solaris - mpma497 - 4 August 1998 15:01:58

Figure 1. Météo France July 1998 data availability Index maps by geophysical variable for SHIP and BUOY GTS reports (Air Pressure, Air Temperature, Sea Surface Temperature, Wind)

METEO
FRANCE

METEO - FRANCE **TEMPERATURE** **JULY 1998**

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

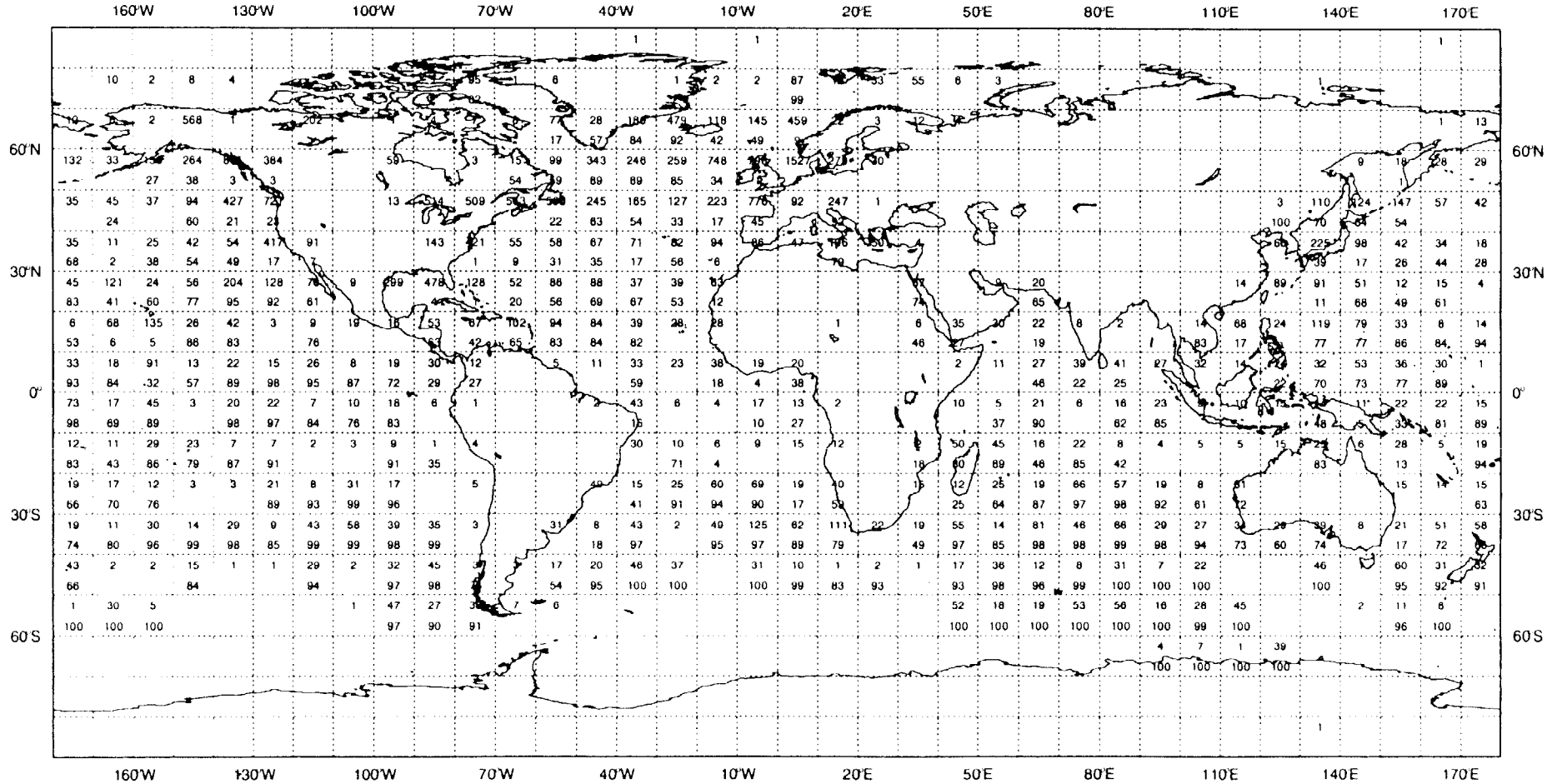


MAGICS 4.2 Solaris - mpma497 - 4 August 1998 15:02:11

METEO FRANCE

METEO-FRANCE SEA SURFACE TEMPERATURE JULY 1998

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

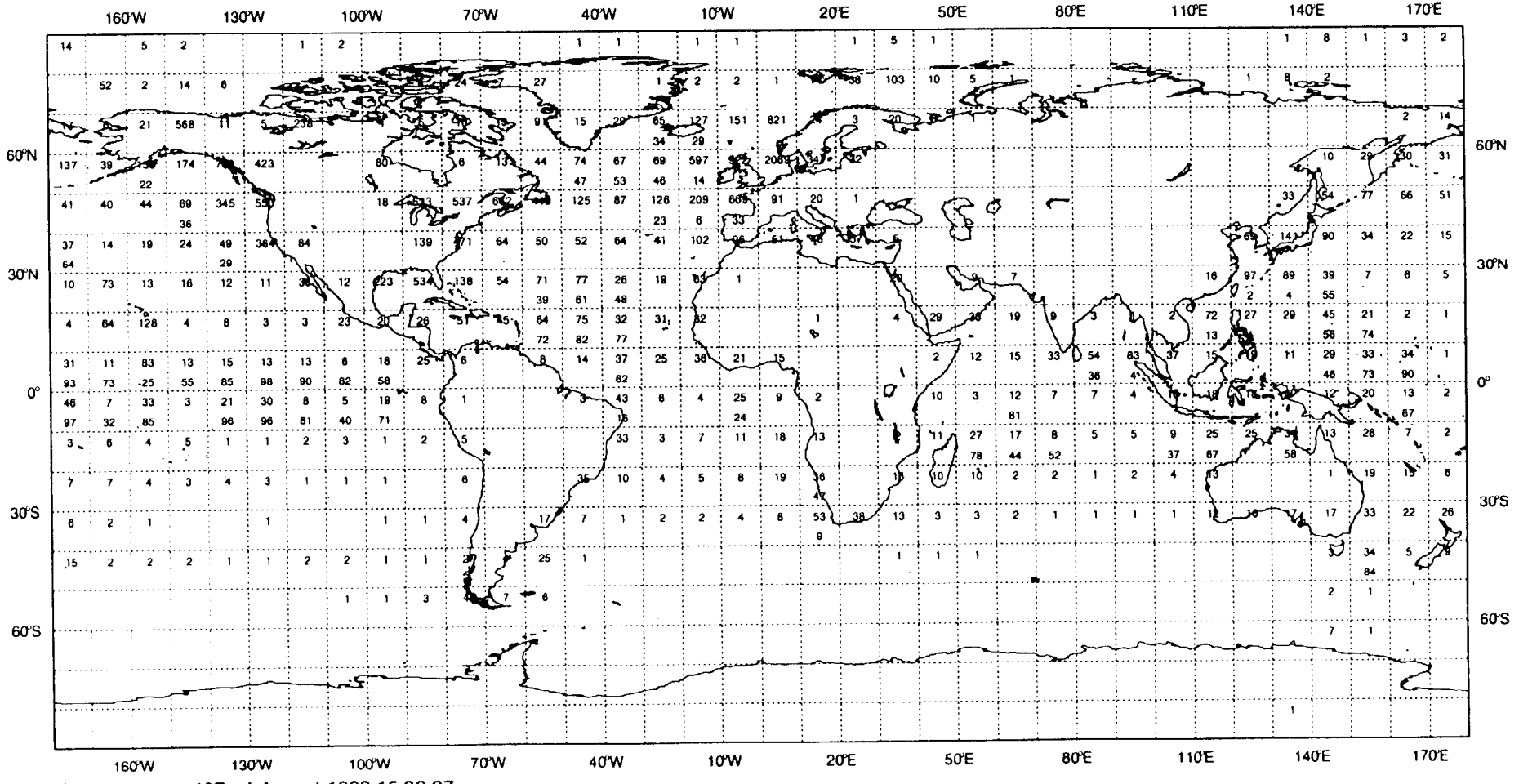


MAGICS 4.2 Solaris - mpma497 - 4 August 1998 15:02:02

METEO
FRANCE

METEO - FRANCE **WIND** **JULY 1998**

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



MAGICS 4.2 Solaris - mpma497 - 4 August 1998 15:02:07

Figure 2.1. Distribution of GTS and non-GTS platforms by country

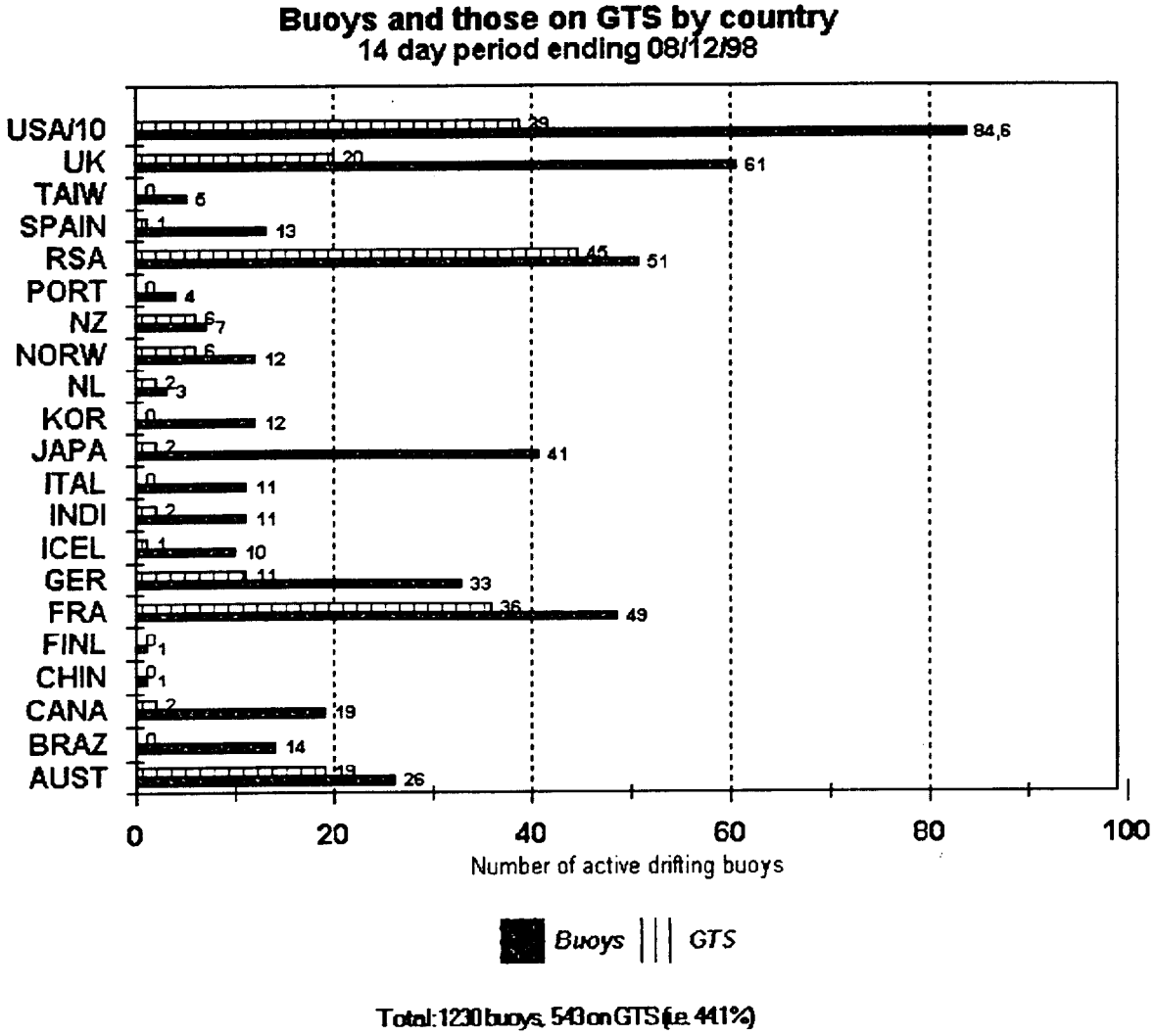


Figure 2.2: Distribution of GTS buoy reports by country and variable (cut off time 3 hours):

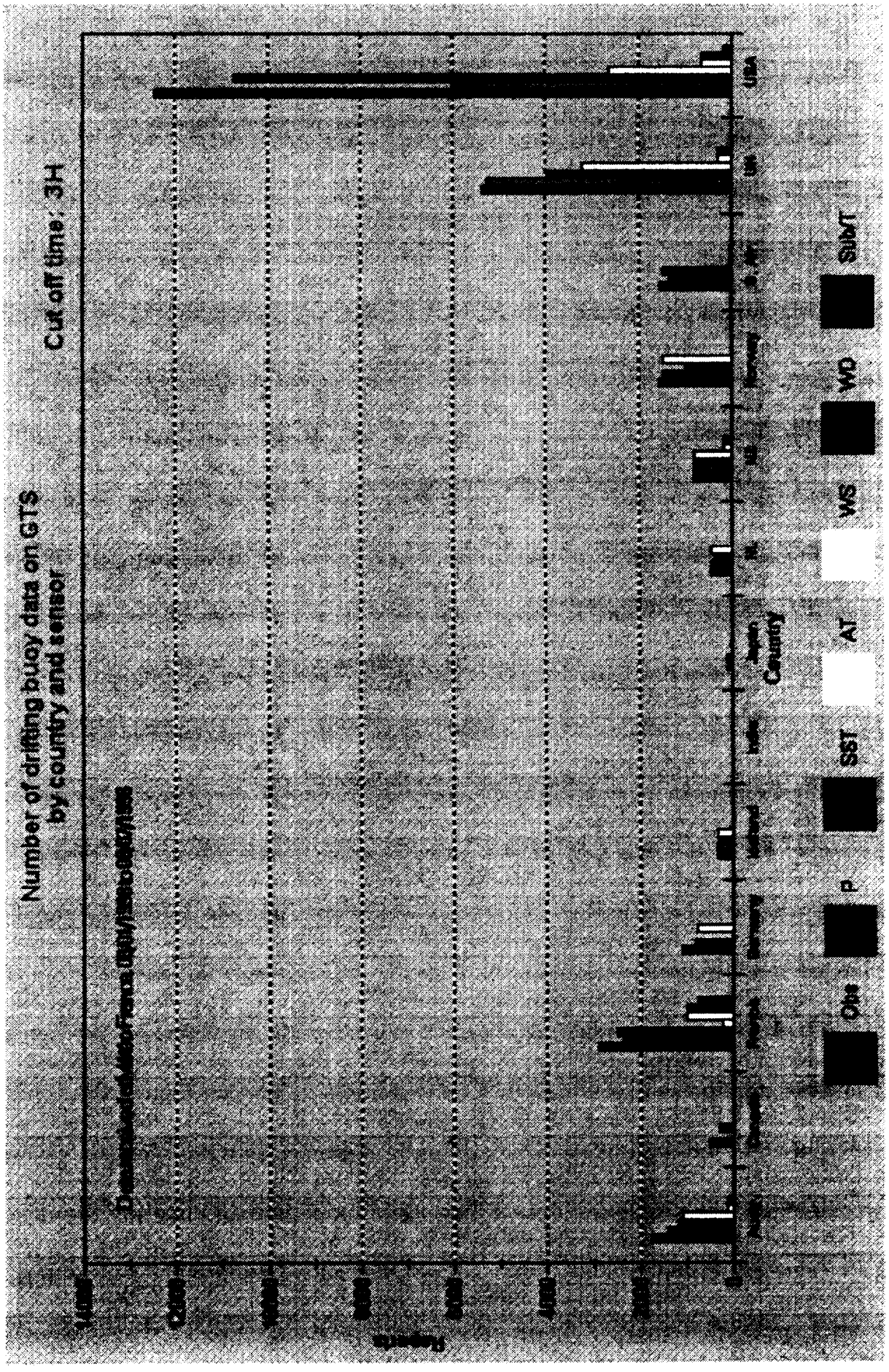


Figure 3. Distribution of RMS (Obs. - First Guess Field) for Air Pressure data

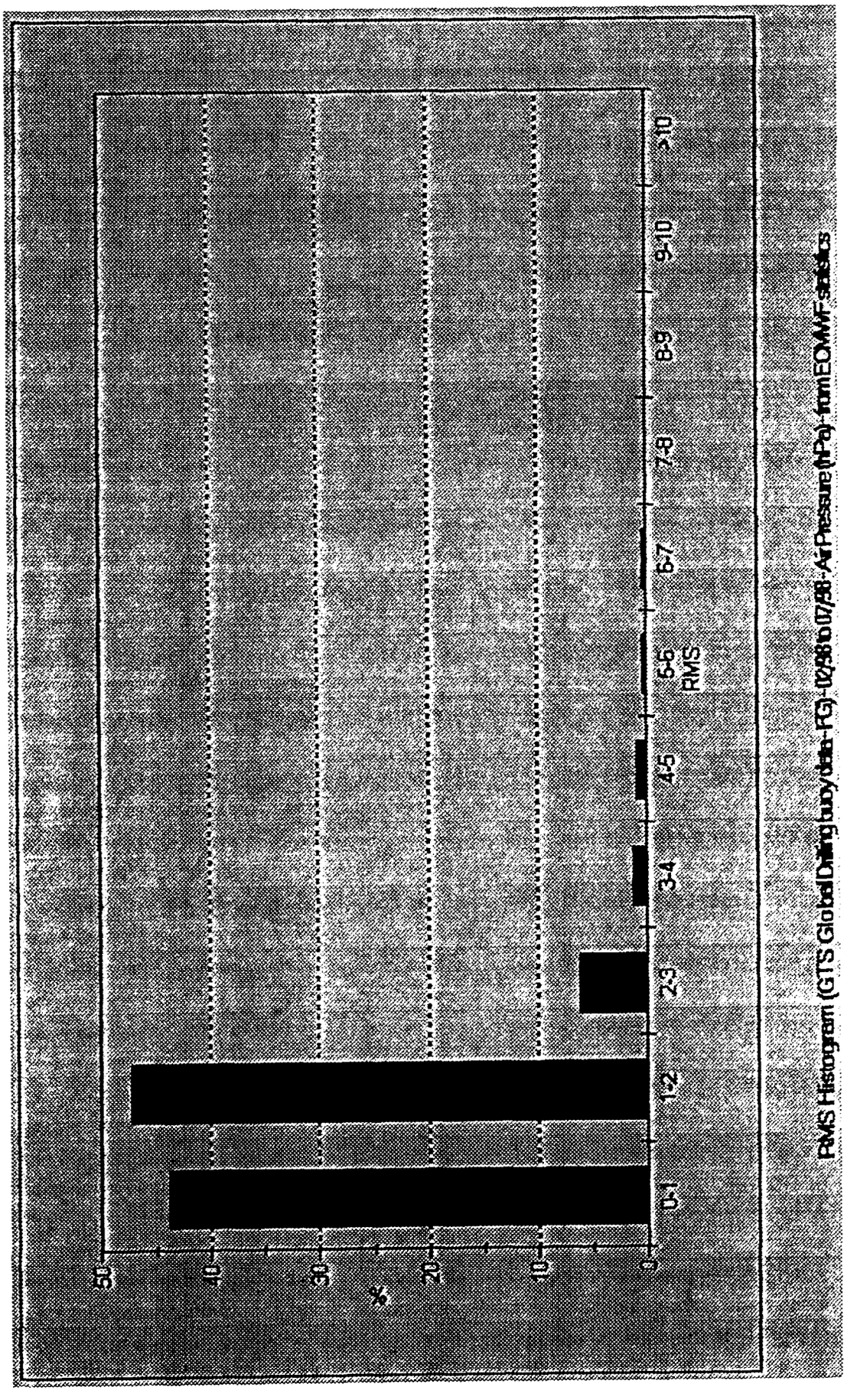


Figure 4. Distribution of the Life Time of the Air Pressure sensor

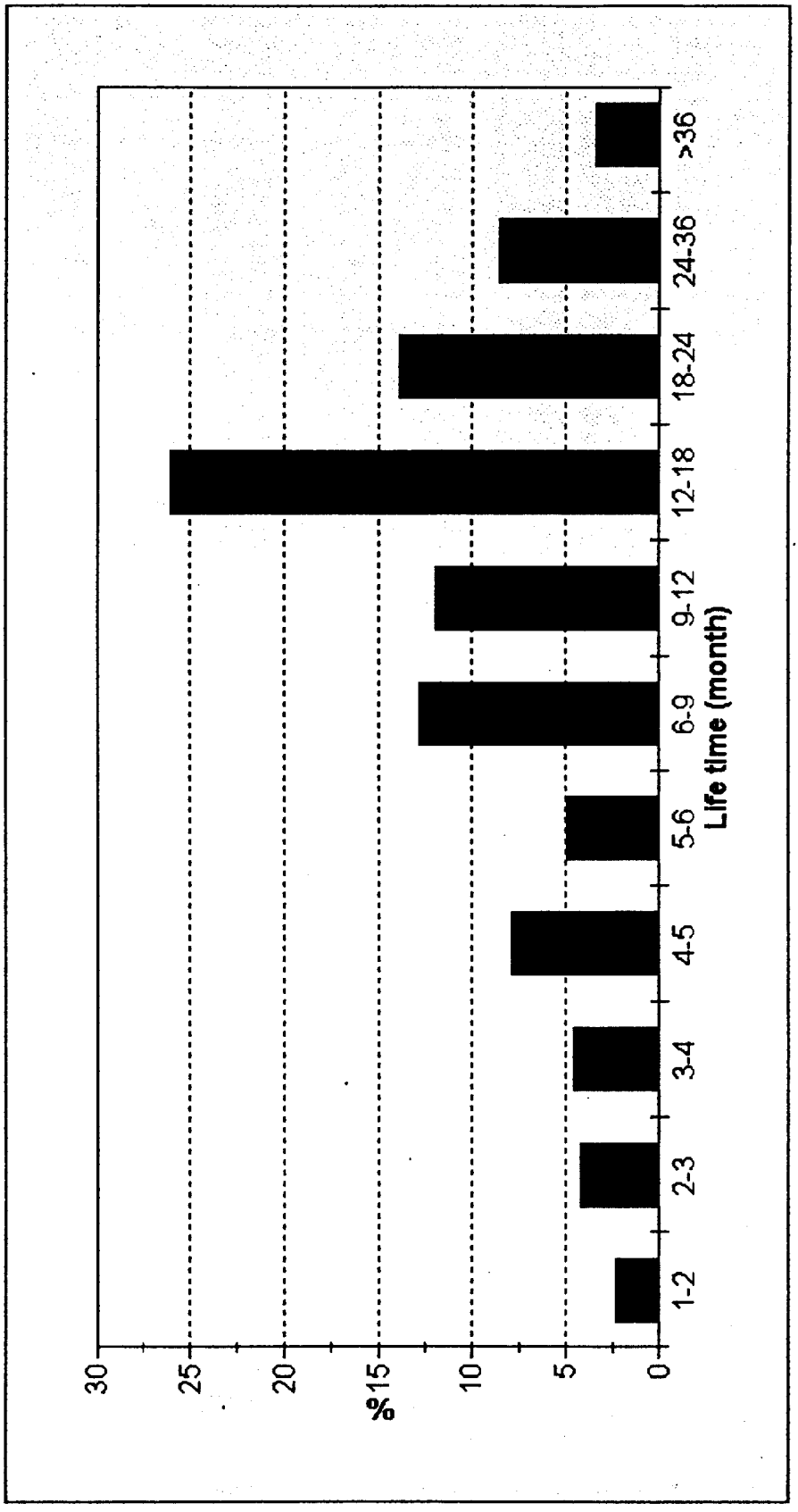


Figure 5. Evolution of the number of air pressure GTS reports by month since 1989 (from ECMWF statistics)

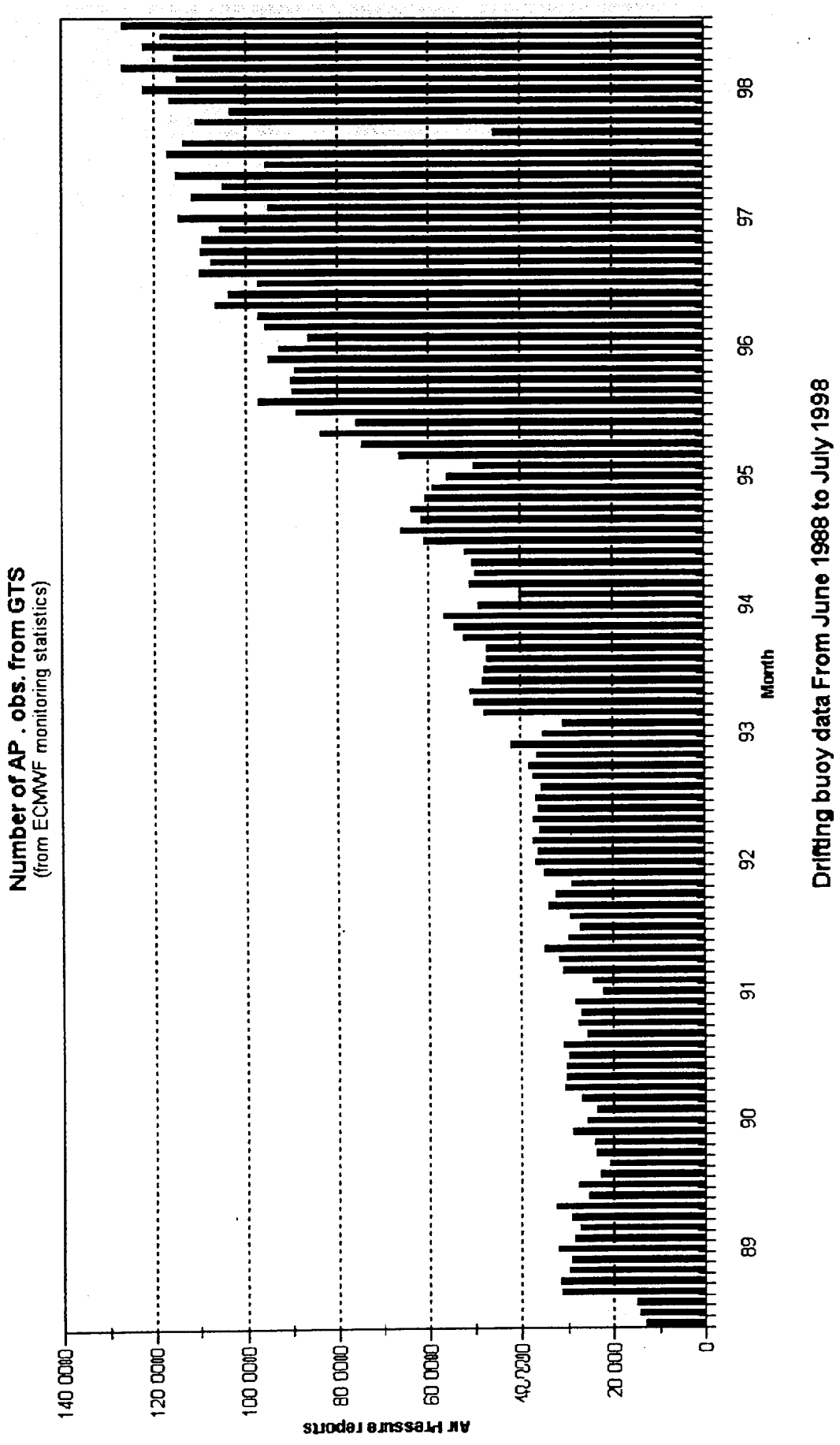
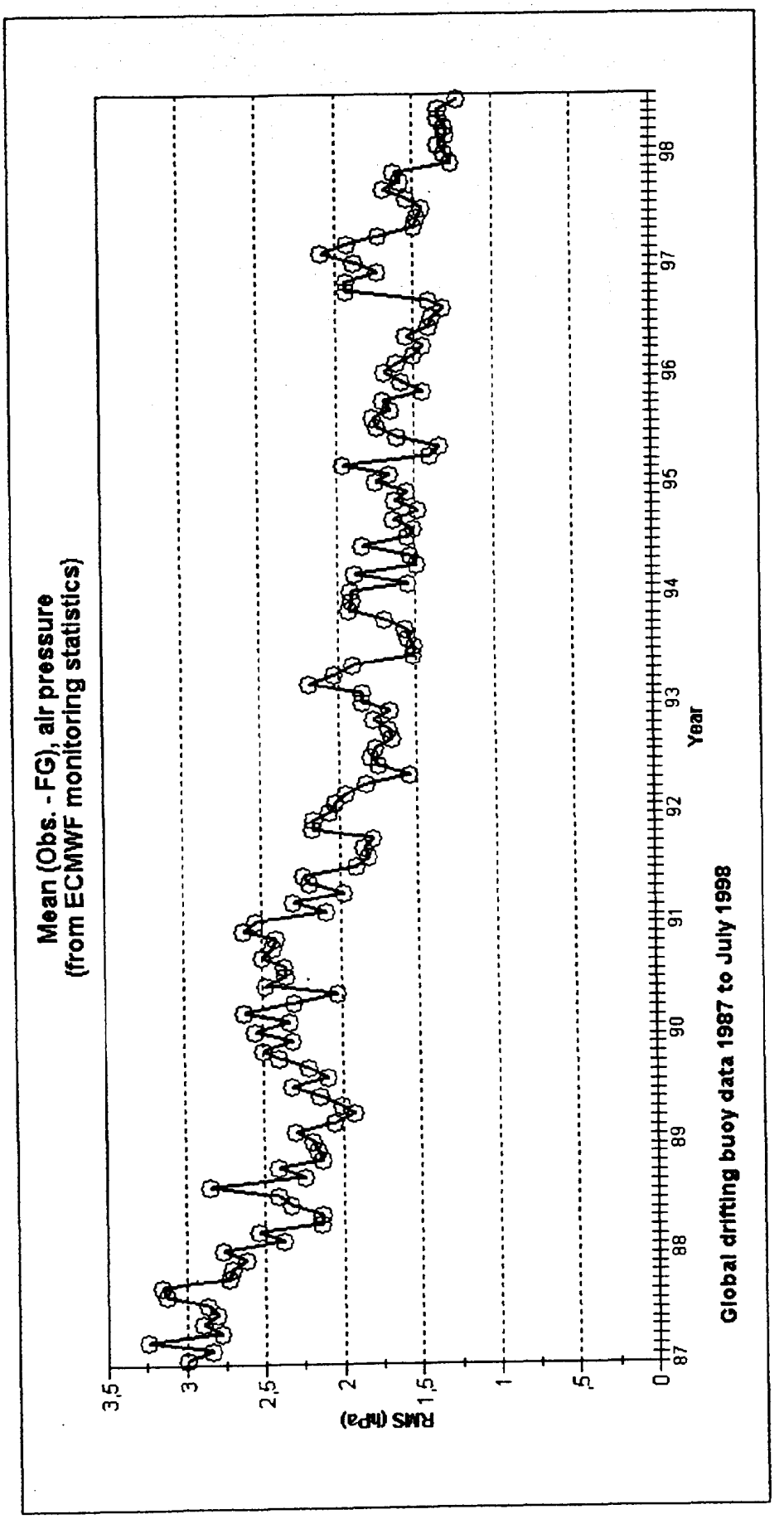


Figure 6. Evolution of mean RMS (Obs. - FG) by month for air pressure GTS data since 1987 (from ECMWF statistics)



ANNEX III

OBSERVATIONAL REQUIREMENTS OF WWW AND GCOS/GOOS OOSDP THAT COULD BE ADDRESSED BY DRIFTING BUOY NETWORKS

1. Ocean Observing System for Weather Forecasting (World Weather Watch)

Variable	Spatial resolution	Temporal resolution	Accuracy
Atmospheric pressure	100 km	1 h	0.5 hPa
Wind	100 km	1 h	2 ms^{-1}
Air temperature	100 km	1 h	1 K
Integrated precipitation	100 km	3 h	0.1 mm
Sea surface temperature	100 km	1 day	0.5 K
Wave height	100 km	1 h	0.5 m

(from the WMO World Weather Watch Fourth Long Term Plan, 1996-2005)

2. Ocean Observing System for Climate (OOSDP)

Variable	Spatial resolution	Temporal resolution	Accuracy
Sea surface temperature	500 km	1 week	0.1 K
Wind	250 km	1 month	0.5 ms^{-1}
Atmospheric pressure	250 km	1 day	1 hPa
Integrated precipitation	250 km	1 month	5 cm
Integrated heat flux	250 km	1 month	5 Wm^{-2}
Surface velocity	50 - 500 km	1 month	2 cms^{-1}
Sea ice velocity	250 km	1 month	2 cms^{-1}
CO_2, fluorescence	for ocean colour satellite calibration		

(adapted from the Final Report of the OOSDP, 1995 - 'Scientific Design for the Common Module of the Global Ocean Observing System and the Global Climate Observing System: an Ocean Observing System for Climate')

ANNEX IV

SAMPLING REQUIREMENTS FOR THE GLOBAL OCEAN

The table below contains a summary of the sampling requirements for the global ocean, based largely on OOSD (1995), but with revisions as appropriate. These are a statement of the required *measurement network* characteristics, not the characteristics of the derived field. The field estimates must factor in geophysical noise and unsampled signal. Some projections (largely unverified) have been included for GODAE.

Code	Application	Variable	Hor. Res.	Vert. Res.	Time Res.	#samples	Accuracy
A	NWP, climate, mesoscale ocean	Remote SST	10 km^2	-	6 h	1	0.1-0.3°K
B	Bias correction, trends	*In situ* SST	500 km^2	-	1 week	25	0.2-0.5°C
C	Climate variability	Sea surface salinity	200 km^2	-	10 day	1	0.1 PSU
D	Climate prediction and variability	Surface wind	2° x 2°	-	1-2 day	1-4	Dirn: 20% 2 m/s
E	Mesoscale, coastal	Surface wind	50 km^2	-	1 day	1	1-2 m/s
F	Climate	Heat flux	2° x 5°	-	month	50	Net: 10 W/m^2
G	Climate	Precip.	2° x 5°	-	daily	several	5 cm/month
H	Climate change trends	Sea level	50-1000 km^2	-	monthly means	30-50 gauges + GPS with altimetry or several 100s + GPS	1 cm, giving several * 0.1 mm/yr accuracy trends over 1-2 decades
I	Climate variability	Sea level anomalies	100-200 km^2	-	month	~ 10	2 cm
J	Mesoscale variability	Sea level anomalies	25-50 km^2	-	2 days	1	2-4 cm
K	Climate, short-range prediction	sea ice extent, concen.	~ 30 km	-	1 day	1	10-30 km 2-5%
L	Climate, short-range prediction	sea ice velocity	200 km^2?	-	Daily	1	cm/s?
M	Climate	sea ice volume	500 km^2	-	monthly	1	~ 30 cm
N	Climate	surface pCO_2	25-100 km^2	-	daily	1	0.2-0.3 µatm
O	ENSO prediction	T(z)	1.5° x 15°	15 m over 500 m	5 days	4	0.2°C
P	Climate variability	T(z)	1.5° x 5°	~ 5 vert. Modes	1 month	1	0.2°C
Q	Mesoscale ocean	T(z) for large-scale	500 km^2	~ 5 modes	10 days	1	0.2°C
R	Climate	S(z)	large-scale	~ 30 m	monthly	1	0.1 PSU
S	Climate, short-range prediction	U(surface)	600 km^2	-	month	1	2 cm/s
T	Climate model valid.	U(z)	a few places	30 m?	Mon. means	30	2 cm/s

ANNEX V

DEVELOPMENTS IN SATELLITE COMMUNICATION SYSTEMS

An update for October1998

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

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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.

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.

A number of sources, including presentations to the DBCP Technical Workshops, give good overviews of the topic, and these are listed in the Reference section.

2. LITTLE LEOS

2.1 ARGOS

Planned enhancements to the Argos on board equipment ('Argos-2') include increased bandwidth and sensitivity, and two-way communication. Future Argos equipment will fly on the Japanese ADEOS-II and European METOPS satellites in addition to a continuing programme of launches on board NOAA satellites. 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 MSS may impact the service that CLS/Service 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 expected to become operational soon, replacing NOAA-D (NOAA-12) as the morning satellite. Two new direct readout stations (Halifax and Edmonton) were added at the end of 1997, and two more (Cape Town and Réunion) are due to become fully operational this year. 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.

2.2 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, the last 12 months have seen considerable progress, with 28 satellites (more or less the complete constellation) now in orbit. Of those, 20 have been declared operational, although the dispersion of the B-plane satellites launched in August 1998 is not yet optimal. The C-plane satellites launched in late September 1998 are not yet available for commercial traffic. The A, B and C planes are at 45° inclination and therefore have poor coverage at high latitudes: only three satellites, in the F and G planes, offer a near-polar service.

The system offers both bent-pipe and store-and-forward two-way messaging capabilities, operating in the VHF (138-148 MHZ) band. Although there have been significant problems with interference close to urban areas, this is not expected to impact offshore operations, and some early trials of the system have been encouraging. Many more trials have now taken place, notably by Mark Bushnell at AOML, and operational confidence in the system is starting to grow.

The message structure currently consists of packets transmitted at 2400 bps (scheduled to rise to 4800 bps), and coverage will be global and near-continuous when the full constellation is in place. Messages are acknowledged by the system when correctly received. 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 expected to be similar to that offered by Argos.

Authorised transceiver manufacturers include Panasonic, Elisra (Stellar), Torrey Science, Magellan and Scientific Atlanta. Elisra, who are featured in the AOML buoys, are the first to offer a transceiver with a fully integrated GPS engine, while Scientific Atlanta have made a chip-set available to third-party integrators. CTI are about to enter the scene and are planning a hand-held communicator with a price tag of less than $200.

The ground segment has started to expand, with the commissioning of a station in Italy in addition to the four in the US. Further stations are planned for Argentina, Japan and Malaysia, and 16 international service distribution partners have been licensed. Non-US customers still face considerable difficulties because of the absence of ground stations, lack of spectrum licensing and the presence of other in-band users. Many operational details, and the costs of using the system, which will mainly be available to users through service providers ('resellers'), are only now starting to become known.

2.3 SAFIR

This is a two-way store-and-forward communication system comprising a number of LEO satellites. Two satellites are currently in orbit, but little operational experience has been reported.

Two types of platforms were initially offered: a microstation communicating at 300 bps, and a macrostation permitting transfer rates of 9600 bps. The microstation has since been withdrawn. Position determination is achieved by analysis of doppler shift data at the processing centre, or by inclusion of a GPS receiver. Data transfer takes place in response to a command from the satellite, and is unique in that the capability exists for transfers between platforms. For example, one platform may be incorporated within a data buoy, while the other is sited at the operator's home institute. There is no explicit limitation on message length.

2.4 STARSYS

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

2.5 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. No launches have yet been reported, although an 'attached payload' test system was to have been deployed in early 1998.

2.6 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. Currently there are two satellites in orbit, with two more planned. The 36-satellite GEMNET component has been cancelled.

2.7 FAISAT

This will use FAISAT-2 (also known as VITASAT-1) for initial commercial trials. The operational status of this satellite is unclear. FA's main constellation of 26 satellites is to be deployed in four launches by AKO Polyot, with scheduled service commencement in 2000.

2.8 LEO ONE

This consists of a planned 48 satellite constellation offering store-and-forward two-way messaging at 9600 bps and above. No further details about the launch schedule, except that a spectrum sharing agreement has apparently been signed.

2.9 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.

2.10 OTHER SYSTEMS

Six E-Sat satellites are planned, three to be launched in mid 1999. The system is aimed principally at the US utility industry for remote metering. Other planned systems include Temisat and Courier, both of which are intended to offer global coverage.

3. BIG LEOS

3.1 IRIDIUM

This system now has 72 satellites in orbit and the constellation, offering true global coverage, is essentially complete. The service was to have been launched in late September but has now been put back until sometime in November to allow technical problems with the inter-satellite communications traffic to be resolved. Of particular interest to data buoy operators is the Motorola L-band transceiver module, which may be integrated with sensor electronics in the same way as an Argos PTT. A data service using this module is expected to be available in 1999. The costs of using the system are expected to be broadly similar to Argos, but with the potential for much higher data volumes. The system may prove to be relatively costly for users sending only short data messages, but operational experience is needed before a true assessment can be made.

3.2 TELEDESIC

This 'Internet in the Sky' system plans to use 288 satellites to carry global broadband services such as video conferencing, the Internet and so on. It has received FCC licensing for operations in the USA.

3.3 GLOBALSTAR

This system has experienced a major setback following a catastrophic launch failure on 9 September 1998. All 12 satellites on board a Ukrainian Zenit-2 launcher were lost shortly after lift-off. This represents one quarter of the intended constellation and the company and its backers are now considering their options.

3.4 OTHER SYSTEMS

Other planned big LEOs include Ecco (by the owners of Orbcomm), Ellipso, Signal and SkyBridge.

4. MEOS

4.1 ICO

This 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. The first launch is scheduled for January 1999, with constellation completion planned for the year 2000. Thenceforth, 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.

4.2 WEST

9 satellites are planned, with service scheduled to begin in Europe in 2003.

5. GEOS

5.1 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, with uplink packets of up 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.

Transceiver manufacturers include JRC, Calian and STK-Atlas. The JRC unit features an integral GPS receiver and combined GPS/Inmarsat antenna, and is the first to receive type approval. The initial batch of 500 units have all been allocated, and no further production is currently planned.

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.

6. REFERENCES

Hanlon, J (1996). Overview of mobile satellite systems. In: *Proceedings of the DBCP Technical Workshop, Henley on Thames, October 1996.* DBCP Technical Document No 10, WMO, Geneva.

Hoang, N (in press). 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 xx, WMO, Geneva.

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

7. USEFUL WEB SITES

7.1 General information

http://www.ee.surrey.ac.uk/CSER/UOSAT/SSHP/const_list.html	little LEO status, launch dates
http://www.launchspace.com	International Space Industry Report newspaper
http://www.arrl.org/fcc/wrc97/players.html	summary of little LEO competitors
http://www.newspace.com/feature/newsline/home.html	small satellite newsletter
http://www.TELE-satellit.com/tse/	satellite encyclopaedia

7.2 Specific operators

http://www.argosinc.com/
http://www.orbcomm.com/
http://www.inmarsat.org/
http://www.vita.org/
http://www.finalanalysis.com/communication_services.htm
http://www.leoone.com/overview.html
http://www.ellipso.com/system.htm
http://www.globalstar.com/index.htm
http://www.iridium.com/
http://www.ico.com
http://www.saitrh.com/divland/saits/llms.asp

Overview of mobile satellite systems with possible data buoy applications

System	Implementation	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
Courier/Konvert	Planned	Little LEO		data		TBD	up to 12 satellites planned
ECCO	Planned	Big LEO	GPS required	voice/data	handheld	TBD	46 satellites planned by 2003
ELLIPSO	Planned	Big LEO	GPS required	voice/data	handheld	TBD	17 satellites in highly elliptical orbits, serving major land masses in 2000
EYESAT	Planned 1995+	Little LEO	GPS required	data: 60 bytes	handheld	5	1 satellite 1995, principally for radio amateurs
E-SAT	Planned 1999+	Little LEO	GPS required	data: TBD	TBD		6 satellites for utility metering
FAISAT	Planned 2000+	Little LEO	GPS required	data: 128 bytes	handheld	10	38 satellites 2000+
GEMNET	Cancelled	Little LEO	GPS required	data: no maximum	'laptop'	10	1st satellite 1995 - launch failure 36 satellites by ???
Globalstar	Planned 1999+	Big LEO	GPS required	voice/data: no maximum	handheld	1	Major launch failure in 1998 48 satellites 1999+
GOES, Meteosat, GMS	Operational	GEO	GPS required	data: various options	'laptop'	10	4 satellites; directional antenna desirable
GONETS-D	Planned	Little LEO	GPS/ Glonass	data	handheld	TBD	8 satellites in orbit, 36 more planned
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+	Pre-operational	GEO	GPS required	data: up to few kbytes	handheld	1	global pager using existing Inmarsat-3 satellites

System	Implementation	Orbit type	Buoy position	Message type	Terminal size	Power (watts)	Comments
ICO	Planned 2000+	MEO	GPS required	voice/data: no maximum	handheld	1	global cell-phone, inter-operable with terrestrial cellular networks
Iridium	Pre-operational	Big LEO	GPS required	voice/data: no maximum	handheld	1	72 satellites in orbit - constellation complete
IRIS/LLMS	Planned	Little LEO	Doppler + ranging	data: up to few kbytes	handheld	1	2 satellites 1999+
LEO One	Planned	Little LEO	GPS required	TBD			48 satellite constellation, store and forward
OCEAN-NET	Planned	GEO	Moored	no maximum	large		uses moored buoys + Intelsat
Odyssey	Cancelled	MEO	GPS required	voice/data: no maximum	handheld	1	12 satellites were planned
Orbcomm	Operational	Little LEO	Doppler or GPS	data: no maximum	handheld	5	28 satellites in orbit
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	Planned	Big LEO	GPS required	broadband			80 satellites planned by 2002
Starsys	Cancelled	Little LEO	Doppler + ranging	data: 27 bytes multiple msgs	handheld	2	12 satellites 1998+ 24 satellites 2000+
Teledesic	Planned	Big LEO	GPS required	broadband			288 satellites planned by 2003 FCC licence granted
Temisat	Planned	Little LEO		data			7 satellites planned
Vitasat	Planned	Little LEO	GPS required	data			2 satellites in orbit, 2 more planned
WEST	Planned	MEO	GPS required	broadband			9 satellites planned by 2003

ARGOS

ANNEX VI

CNES-NOAA

Argos System Use Agreement
Accord d'Utilisation du Système Argos

In order to use the Argos Data Collection System (Argos DCS) you must complete the System Use Agreement and sign it. After reviewing the completed agreement, the Argos Operations Committee co-chairs will sign and approve the agreement, as appropriate. The agreement will go into effect at the time of initial deployment of the platforms. The policies governing the use of the Argos DCS are printed on pages 4 to 6.

Pour utiliser le Système de Localisation et de Collecte de Données Argos (Système Argos), vous devez compléter et signer l'accord d'utilisation du système. Après examen de l'accord, les co-présidents du Comité des Opérations le signeront et l'approuveront en conséquence. Cet accord prendra effet à la date de première mise en service des plates-formes. Les règles d'utilisation du Système Argos sont données dans les pages 4 à 6.

Name of the program:
Nom du programme :

Program Administrator (User):
Responsable du programme (Utilisateur) :

Last name:
Nom :

First name:
Prénom :

Organization:
Organisme :

Department:
Service : _____

Mailing Address: _____
Adresse postale : _____

City:
Ville : _____

State/Province:
Département : _____

ZIP Code:
Code postal : _____

Country:
Pays : _____

Telephone: _____ ***E-mail:*** _____ ***Fax:*** _____

The User certifies that he/she has read and understands the policies governing the use of the Argos DCS and hereby undertakes to follow them. The User also certifies that there are no commercial space-based services that meet the User's requirements.
L'utilisateur certifie avoir lu et compris les règles d'utilisation du système Argos et s'engage à les respecter. L'utilisateur certifie également qu'il n'y a pas de services satellitaires commerciaux répondant à ses besoins.

User's signature
Signature de l'Utilisateur :

Date:

For Operations Committee use only **Cadre réservé au Comité des Opérations**

☐ *This agreement is approved and shall remain in force for up to* _____ *months (see section II.4)*
Cet Accord d'utilisation est approuvé et valide pour une période de _____ mois (voir section II.4)

☐ *This agreement is not approved*
Cet Accord d'utilisation n'est pas approuvé

Comments:
Observations : _____

Date
Argos Operations Committee
Co-Chair

Date
Comité des Opérations Argos
Le Co-Président

Category / Catégorie : NEW RENEW E/G E/NG/GI NE/G NE/LL

Name of the program:
Nom du programme : _____

Detailed description of Program objectives

(This description must be sufficiently detailed to enable the Operations Committee to determine the aims and the main characteristics, these elements being essential for the approval or rejection of the program agreement).

Description détaillée des objectifs du Programme

(Cette description doit être suffisamment détaillée pour que le Comité des Opérations puisse juger les objectifs du programme, en connaître les principales caractéristiques et se prononcer sur l'admissibilité du programme).

This Agreement is an:
Cet Accord d'utilisation concerne un :

☐ *Initial Agreement*
Nouveau programme

☐ *Renewal Agreement of Program Number:*
Renouvellement du programme N° : _____

The organization which will operate this program is a *(check all that apply):*
L'organisme qui exploitera ce programme est (cochez ce qui convient) :

☐ *Government user*
Utilisateur gouvernemental

☐ *Non-profit user*
Utilisateur à but non lucratif

☐ *Non-Government user*
Utilisateur non-gouvernemental

[Please include additional information] [Précisez]

_____

If not a government agency, please include additional information, e.g. agency name and contract or grant number:
S'il ne s'agit pas d'une agence gouvernementale, précisez avec quelle administration il existe un contrat ou une subvention et donnez ses références :

_____

Government User means agencies of international governmental organizations, national government or any other subdivision thereof, or any of those agencies' contractors or grantees, so long as the contractor is using the data collected by the Argos DCS to fulfill its contractual obligations to the government agency or in the case of a grantee, that these data are being used in accordance with the Statement of Work for the Award.
"Utilisateur gouvernemental" signifie agence des organisations internationales gouvernementales, d'un gouvernement national ou subdivision quelconque de ceux-ci, contractant ou bénéficiaire de subvention tant que les données collectées par le système Argos sont utilisées pour remplir leurs obligations contactuelles et dans le cas d'une subvention, pour servir les objectifs du projet subventionné.

Non-profit user means a not-for-profit academic, research, or other non-governmental organization, which is using these data, for education and/or scientific, non-commercial purposes.
"Utilisateur à but non lucratif" signifie une organisation non-gouvernementale de formation, de recherche ou autre qui utilise les données à des fins scientifiques ou éducatives non-commerciales.

_____

If not a Government organization, is there a government interest in the collection of the data ?
Si l'organisme n'est pas gouvernemental, y'a-t-il un intérêt gouvernemental dans la collecte des données ?

☐ *Yes (please explain)* Oui (merci de préciser) ☐ *No* Non

Government Interest means that the use is determined in advance to be of interest to a governmental entity of France, the United States, and, once they become an Argos Participating Agency, Japan and the EUMETSAT member states.
"Intérêt gouvernemental" signifie que l'utilisation présente par avance de l'intérêt pour une ou plusieurs entités gouvernementales des Etats-Unis, de France ou du Japon ou d'un pays membre d'EUMETSAT, lorsqu'ils deviendront Agences participant à Argos.

The purpose for which this program will be operated is:
L'objectif de ce programme est :

☐ *Environmental* Environnemental ☐ *Non-environmental* Non-environnemental

Environmental Use means the use of the Argos DCS for the collection of environmental data that: 1) relate to the characteristics of the Earth and its natural phenomena by helping to better understand, evaluate or monitor its natural resources ; or 2)relate to the characteristics of the Earth and its environment (including its ecosystem and the species which inhabit them) by helping to protect against any unreasonable adverse effects thereto.
"Utilisation environnementale" signifie l'utilisation du système Argos pour la collecte de données d'environnement qui : 1) se rapportent aux caractéristiques de la Terre et à ses phenomènes naturels en aidant à mieux comprendre, évaluer et surveiller ses ressources naturelles ; ou 2) se rapportent aux caractéristiques de la Terre et à son environnement (incluant ses écosystèmes et les espèces qui les habitent) en aidant à les protéger contre toutes les atteintes injustifiées.

If applying for Episodic Use, is there a significant possibility for the loss of life?
Pour une utilisation épisodique, y a-t-il un risque significatif de perte de vie ?

☐ *Yes /* Oui ☐ *No /* Non

Episodic Use means the use of the Argos DCS for short events where there is a significant possibility of loss of life, such as for Arctic expeditions or scientific campaigns into remote areas.
"Utilisation episodique" signifie l'utilisation du système Argos pour des évènements de courte durée avec un risque significatif de perte de vie humaine, tels que les expéditions polaires ou les campagnes scientifiques en régions isolées.

. *Planned initial deployment date of the PTTs:* _____ [M/D/Y]
Date prévue de première mise en service des plates-formes :

. *Planned duration of the program in months:*
Durée prévue du programme en mois : _____

[Note that initial agreements will be approved in accordance with section II 4]
[Les accords d'utilisation seront approuvés pour des durées en accord avec ce qui est mentionné en section II 4]

. *Please describe your requirements for use of the Argos System in terms of satellite coverage, accuracy, data throughput time, transmitter power consumption, size and weight, service continuity and reliability, platform compatibility, system access mode, and for governmental entities, cost-effectiveness [Note: it is the individual agency that determines what is cost-effective for their particular agency].*

Veuillez décrire vos besoins d'utilisation du système Argos en ce qui concerne la couverture satellitaire, la précision de localisation et le temps d'accès aux données, la taille, le poids et la consommation de l'émetteur, la continuité et la fiabilité du service, la compatibilité des plates-formes, les modes d'accès au système et pour les entités gouvernementales, l'optimisation des coûts [Note : chaque agence détermine ses propres critères d'évaluation des coûts].

_____

_____

_____

_____

_____

_____

Return to:
Renvoyer à :

CLS, 8/10 rue Hermès, 31526 Ramonville Cedex, France
Tél. : (33) (0)5 61 39 47 00 - Fax : (33) (0)5 61 75 10 14 - E-mail : info@cls.cnes.fr

All North American users are requested to send their Agreement to:

Service Argos, Inc., 1801 McCormick Drive, Suite 10, LARGO, MD 20774 - U.S.A.
Tel. : (1) 301 925 44 11 - Fax : (1) 301 925 89 95 - E-mail : useroffice@argosinc.com

I Background

The Argos Data Collection System (Argos DCS) is operated through a cooperative program between the United States' National Oceanic and Atmospheric Administration (NOAA) and France's Centre National d'Etudes Spatiales (CNES). The Argos DCS is managed by NOAA and CNES jointly through the Argos Operations Committee. The system consists of: instruments provided by CNES, which are flown aboard NOAA polar-orbiting satellites; user supplied platform transmitter terminals (PTTs); and global data processing centers. Argos instruments are also scheduled to fly on Japanese and European polar-orbiting satellites, when the system on these satellites are operational, NASDA and EUMETSAT, respectively, will become members of the Argos Operations Committee as well.

NOAA is authorized to enter this agreement under the authority granted to it in 15 USC 313 and 49 USC 44720.

CNES is authorized to enter this agreement under the authority granted to it by Act 61-1382 of 19 December 1961.

II Argos System Use Policy

1. Scope

a) This policy applies to any person who operates or proposes to operate data collection platforms to be used with the Argos DCS either directly or through an affiliate or subsidiary.
b) These policies apply to all existing Argos DCS users as well as all future agreements for use of the Argos DCS.

2. Definitions

For purposes of this agreement and policy:
a) Approving Authority means the Argos Participating Agencies, via the Argos Operations Committee.
b) Argos DCS means the system which collects data from fixed and moving platforms and provides platform location data. This system consists of platforms, the Argos French instrument on the Polar-orbiting Operational Environmental Satellites (POES) and planned to fly aboard the ADEOS II Japanese spacecraft and the EUMETSAT METOP spacecraft; a ground processing system; and telemetry ground stations.
c) Argos participating agencies means those agencies that participate in the management of the Argos DCS; currently this includes NOAA and CNES, but it will also include the National Space Development Agency (NASDA) of Japan and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) once the Argos instruments commence operations from their satellites systems.
d) Environmental data means environmental measurement and environmental protection data.
e) Environmental measurement data means data that relate to the characteristics of the Earth and its natural phenomena by helping to better understand, evaluate, or monitor its natural resources.
f) Environmental protection data means data that relate to the characteristics of the Earth and its environment (including its ecosystems and the species which inhabit them) by helping to protect against any unreasonable adverse effects thereto.
g) Environmental Use means the use of the Argos DCS for the collection of environmental data.
h) Episodic use means the use of the Argos DCS for short events where there is a significant possibility of loss of life, such as for Arctic expeditions or scientific campaigns into remote areas.
i) Government interest means that the use is determined in advance to be of interest to one or more governmental entities of the United States, France or, once they have become an Argos Participating Agency, Japan or a EUMETSAT member state.
j) Government user means agencies of international governmental organizations, national government or any subdivision thereof, or any of those agencies' contractors or grantees, so long as the contractor is using the data collected by the Argos DCS to fulfill its contractual obligations to the government agency or in the case of a grantee that these data are being used in accordance with the statement of work for the award.
k) Non-profit user means a not-for-profit academic, research, or other non-governmental organization, which is using these data, for education and/or scientific, non-commercial purposes.
l) Operational use means the use of data in a situation where the utility of the data are significantly reduced if not collected or delivered in a specific time window. This includes situations where extensive preparation work is in place and a delay in acquisition of data would jeopardize the project.
m) Operator means the Argos Operation Committee members elected to represent participating agencies for Argos users.
n) Platform compatibility means the compatibility of the platform with the space segment of the system, and includes elements such as message length and composition, signal strength, and transmission protocol (e.g., continuous versus event driven).
o) Testing use means the use of the Argos DCS by manufacturers of platforms for use in conjunction with the Argos DCS, for the limited purpose of testing and certifying the compatibility of new platforms with the technical requirements of the Argos DCS.
p) User means the entity and/or organization which owns or operates user platforms for the purpose of collecting and transmitting data through the Argos DCS.
q) User platform means devices, designed in accordance with the specifications delineated and approved by the Approving Authority, used for the in-situ collection and subsequent transmission of data via the Argos DCS. Those devices which are used in conjunction with the Argos DCS are referred to as Platform Transmitter Terminals (PTT).
r) User requirement means the requirement expressed and explained in the System Use Agreement.

I Préambule

Le système de Localisation et de Collecte de Données Argos (système Argos ou Argos DCS) est exploité au sein d'une coopération franco-américaine entre la NOAA (National Oceanic and Atmospheric Administration) et le CNES (Centre National d'Etudes Spatiales). Le système Argos est géré par le Comité des Opérations Argos et il est composé d'équipements fournis par le CNES et embarqués sur les satellites en orbite polaire de la NOAA ; des plates-formes fournies par les utilisateurs et équipées d'émetteurs ; et de centres de traitement globaux. Il est aussi prévu d'embarquer les équipements Argos sur les satellites japonais et européens en orbite polaire. Lorsque le système sera opérationnel sur ces satellites, la NASDA et EUMETSAT deviendront membres du Comité des Opérations Argos.

La NOAA est autorisée à signer cet accord en vertu des pouvoirs qui lui ont été conférés par les documents 15 USC 313 et 49 USC 44720.

Le CNES est autorisé à signer cet accord en vertu des pouvoirs qui lui ont été conférés lors de sa création par le Décret 61-1382 du 19 décembre 1961.

II Règles d'utilisation du système Argos

1. Objet

a) Ces règles s'appliquent à toute personne qui exploite ou se propose d'exploiter, soit directement soit par l'intermédiaire d'une filiale ou d'un ayant-droit, des plates-formes de collecte de données compatibles avec le système Argos.
b) Ces règles sont applicables aux utilisateurs actuels du système ainsi qu'à toutes les demandes futures d'utilisation du système Argos.

2. Définitions

Dans le cadre de cet accord et des règles le concernant :
a) Autorité d'approbation signifie les Agences participant à Argos, via le Comité des Opérations.
b) Système Argos signifie le système qui collecte des données de plates-formes fixes ou mobiles et fournit des localisations. Ce système est composé de plates-formes, des équipements français Argos à bord des satellites américains POES (Polar-orbiting Operational Environmental Satellites) et programmés sur les satellites japonais ADEOS II et européens METOP, d'un segment sol de traitement, et de stations sol de télémesure.
c) "Agences participant à Argos" signifie les agences qui participent à la gestion du système Argos ; actuellement ceci inclut la NOAA et le CNES mais sera élargi à la NASDA (National Space Development Agency) du Japon et à EUMETSAT (European Organization for the Exploitation of Meteorological satellites) dès que les équipements Argos seront opérationnels à bord de leurs satellites.
d) "Données d'environnement" signifie données de mesure de l'environnement ou données de protection de l'environnement.
e) "Données de mesure de l'environnement" signifie données qui se rapportent aux caractéristiques de la Terre et à ses phénomènes naturels en aidant à mieux comprendre, évaluer et surveiller ses ressources naturelles.
f) "Données de protection de l'environnement" signifie données qui se rapportent aux caractéristiques de la Terre et à son environnement (incluant ses écosystèmes et les espèces qui les habitent) en aidant à les protéger contre toutes les atteintes injustifiées.
g) Utilisation environnementale signifie l'utilisation du système Argos pour la collecte de données d'environnement.
h) "Utilisation épisodique" signifie l'utilisation du système Argos pour des évènements de courte durée avec un risque significatif de perte de vie humaine, tels que les expéditions polaires ou les campagnes scientifiques en régions isolées.
i) "Intérêt gouvernemental" signifie que l'utilisation présente par avance de l'intérêt pour une ou plusieurs entités gouvernementales des Etats-Unis, de la France ou ultérieurement du Japon ou d'un pays membre d'EUMETSAT.
j) "Utilisateur gouvernemental" signifie agence des organisations internationales gouvernementales, d'un gouvernement national ou subdivision quelconque de ceux-ci, contractant ou bénéficiaire de subvention tant que les données collectées par le système Argos sont utilisées pour remplir leurs obligations contractuelles et dans le cas d'une subvention, pour servir les objectifs du projet subventionné.
k) "Utilisateur à but non lucratif" signifie une organisation non-gouvernementale de formation, de recherche ou autre qui utilise les données à des fins scientifiques ou éducatives non-commerciales.
l) "Utilisation opérationnelle" signifie l'utilisation de données dans une situation où l'utilité des données est considérablement réduite si elles ne sont pas collectées ou distribuées dans un créneau de temps spécifique. Ceci inclut les situations où un travail de péparation important est déjà réalisé et où un retard dans l'acquisition des données rendrait le projet caduc.
m) "Opérateur" signifie les membres du Comité des Opérations Argos désignés pour représenter les agences participant à Argos auprès des utilisateurs.
n) "Compatibilité des plates-formes" signifie la compatibilité des plates-formes avec le segment spatial du système et inclut des éléments tels que la longueur et la composition du message, puissance du signal, stratégie d'émission (par exemple permanente ou sur événements).
o) "Utilisation en test" signifie l'utilisation du système Argos par des constructeurs de plates-formes afin de tester ou de certifier la compatibilité de nouvelles plates-formes avec les exigences techniques du système Argos.
p) "Utilisateur" signifie l'entité et/ou l'organisation qui possède ou exploite des plates-formes d'utilisateur afin de collecter et de transmettre des données via le système Argos.
q) "Plates-formes d'utilisateur" signifie les équipements conçus en accord avec les spécifications validées et signées par l'autorité d'approbation, utilisées pour la collecte de données in situ et leur transmission par le système Argos. Il est fait référence à ces équipements comme PTTs (Platform Transmitter Terminals).
r) "Besoin de l'utilisateur" signifie un besoin exprimé et expliqué dans l'Accord d'Utilisation du Système.

3. Use of Argos Data Collection System

a) Use of the Argos DCS will only be authorized in accordance with the conditions and requirements set forth in paragraphs (b), (c), and (d) of this section.

b)(1) Use of the Argos DCS will only be authorized where it is determined that there are no commercial space-based services available that meet the user's requirements.

(2) A determination under (b)(1), above, must be based on such factors as satellite coverage, accuracy, data throughput, platform power consumption, size and weight, service continuity and reliability, platform compatibility, system access mode, and, in the case of government agencies, cost-effectiveness.

c)(1) Except as provided in paragraphs (2), (3), (4), and (5) of this section, Argos DCS shall only be used for the collection of environmental data by governmental and/or non-profit users.

(2) Non-governmental, environmental use of the Argos DCS is only authorized where there is a Government interest in the collection and/or receipt of the data.

(3) Except as provided in paragraph (c)(4) of this section, non-environmental use of the Argos DCS is only authorized for government use and non-profit users where there is a government interest. Non-environmental use of the system shall not exceed five percent of the system's total use.

(4) Episodic use of the Argos DCS may also be authorized in specific instances when there is a significant possibility for loss of life. Such use shall be closely monitored.

(5) Testing use of the Argos DCS will only be authorized for manufacturers of Argos DCS platforms, that require access to the system in order to test and certify prototype and production models.

d) In the event that Argos DCS capacity limitations require that priority determinations be made, priority will be given to those platforms that provide environmental data of broad international interest, especially of an operational nature, and to those requiring the unique capabilities of the Argos DCS, such as platform location or polar coverage.

4. Argos Data Collection System Use Agreements

a) In order to use the Argos DCS, each user must have an agreement with the approving authority for that system.

b) These agreements will address, but may not be limited to, the following matters:

(1) The period of time the agreement is valid and procedures for its termination.

(2) The authorized use(s), and its priorities for use.

(3) The extent of the availability of commercial space-based services which meet the user's requirements and the reasons for necessitating the use of the Argos DCS.

(4) Any applicable government interest in the data.

(5) Required equipment standards.

(6) Standards of operation.

(7) Conformance with applicable ITU and national agency radio frequency agreements and regulations.

(8) Reporting time and frequencies.

(9) Data formats.

(10) Data delivery systems and schedules, and

(11) User-borne costs.

c) The Approving Authority shall evaluate user requests and conclude agreements for use of the Argos DCS.

d)(1) Agreements for the collection, via the Argos DCS, of environmental data by government agencies or non-profit institutions shall be valid for 3 years from the date of initial in-situ deployment of the platforms, and may be renewed for additional 3-year periods.

(2) Agreements for the collection of environmental data, via the Argos DCS, by non-government users shall be valid for 1 year from the date of initial in-situ deployment of the platforms, and may be renewed for additional 1-year periods, but only for so long as there exists a governmental interest in the receipt of these data.

(3) Agreements for the collection of non-environmental data, via the Argos DCS, by government agencies, or non-profit institutions where there is a government interest, shall be valid for 1 year from the date of initial in-situ deployment of the platforms, and may be renewed for additional 1-year periods.

(4) Agreements for the episodic collection of non-environmental data, via the Argos DCS, shall be of short, finite duration not to exceed 1 year without exception, and usually shall not exceed 6 months. These agreements shall be closely monitored and shall not be renewed.

(5) Agreements for the testing use of the Argos DCS by equipment manufacturers shall be valid for 1 year from the date of initial testing, and may be renewed for additional 1-year periods.

5. Treatment of Data

All Argos DCS users must agree to permit Argos Participating Agencies, and their governments' agencies, the full, open and timely use of all data collected from their platforms; this may include the international distribution of environmental data under the auspices of the World Meteorological Organization. Any proprietary data will be protected in accordance with applicable laws.

6. Technical requirements

a) All platform operators of the Argos DCS must use a data collection platform radio set whose technical and design characteristics are certified to conform to applicable specifications and regulations.

b) All platform operators are responsible for all costs associated with the procurement and operation of the platforms, and for the acquisition of data from those platforms, either directly from the satellite or from the applicable data processing center.

3. Utilisation du Système Argos

a) L'utilisation du système Argos sera seulement autorisée en accord avec les conditions et les besoins exposés dans les paragraphes (b), (c), et (d) de cette section.

b)(1) L'utilisation du système Argos sera autorisée seulement lorsqu'il est établi qu'il n'y a pas de systèmes spatiaux à caractère commercial disponibles et qui permettent de satisfaire les besoins des utilisateurs.

(2) Pour établir ce fait, on doit se baser sur des facteurs tels que la couverture satellitaire, la précision de localisation, les délais de distribution, le poids, la taille et la consommation électrique des plates-formes, la fiabilité et la pérennité du service, la compatibilité des plates-formes, le mode d'accès au système, et, dans le cas des utilisateurs gouvernementaux, le coût.

c)(1) Sauf dans les cas prévus au paragraphes (2), (3), (4) et (5) de cette section, le système Argos sera seulement utilisé pour la collecte de données d'environnement par des utilisateurs gouvernementaux et/ou à but non lucratif.

(2) L'utilisation environnementale non-gouvernementale du système Argos est seulement autorisée lorsqu'il y a un intérêt gouvernemental dans la collecte et/ou la réception des données.

(3) Sauf dans les cas prévus au paragraphe (c)(4) de cette section, l'utilisation non-environnementale du système Argos est seulement autorisée aux utilisateurs gouvernementaux et aux utilisateurs à but non lucratif lorsqu'il y a intérêt gouvernemental. L'utilisation non-environnementale du système ne dépassera pas cinq pour cent de l'utilisation totale du système.

(4) L'utilisation épisodique du système Argos peut aussi être autorisée dans des cas spécifiques lorsqu'il y a un risque significatif de perte de vie. De telles utilisations seront étroitement surveillées.

(5) L'utilisation en test du système Argos sera seulement autorisée aux constructeurs de plates-formes qui nécessitent un accès au système pour tester et certifier des prototypes et des modèles de production.

d) Dans le cas où des limitations de capacité du système Argos exigeraient que des priorités soient définies, la priorité sera donnée aux plates-formes qui fournissent des données d'environnement d'un large intérêt international et à celles nécessitant les capacités uniques du système Argos, telles que la localisation des plates-formes ou la couverture des régions polaires.

4. Accords d'utilisation du système Argos

a) Avant d'utiliser le système Argos, chaque utilisateur doit avoir conclu un accord avec l'autorité d'approbation pour ce système.

b) L'accord concernera mais ne se limitera pas aux sujets suivants :

(1) la durée de validité de l'accord et les procédures pour y mettre fin.

(2) les applications autorisées et leurs priorités d'utilisation.

(3) l'étendue de la disponibilité des services spatiaux à caractère commercial qui répondent aux besoins de l'utilisateur et les raisons rendant nécessaire l'utilisation du système Argos.

(4) tout intérêt gouvernemental possible dans les données.

(5) les spécifications applicables aux équipements.

(6) les procédures opérationnelles.

(7) la conformité aux réglementations et accords d'utilisation des fréquences émis par l'UIT et les agences de régulation nationales.

(8) la fréquence et la date des rapports périodiques.

(9) les formats des données.

(10) les systèmes et la programmation de distribution des données, et

(11) les coûts supportés par l'utilisateur.

c) L'autorité d'approbation évaluera les besoins de l'utilisateur et conclura les accords d'utilisation du système Argos.

d)(1) Les accords d'utilisation pour la collecte, via le système Argos, de données d'environnement par des agences gouvernementales ou des institutions à but non lucratif seront valides 3 ans à partir de la date initiale de déploiement sur site des plates-formes, et pourront être renouvelés pour des périodes additionnelles de 3 ans.

(2) Les accords d'utilisation pour la collecte, via le système Argos, de données d'environnement par des utilisateurs non-gouvernementaux seront valides 1 an à partir de la date initiale de déploiement sur site des plates-formes, et pourront être renouvelés pour des périodes additionnelles de 1 an, mais seulement tant qu'il existe un intérêt gouvernemental dans la réception de ces données.

(3) Les accords d'utilisation pour la collecte de données non environnementales, via le système Argos, par des agences gouvernementales ou des institutions à but non lucratif quand il y a un intérêt gouvernemental seront valides 1 an à partir de la date initiale de déploiement sur site des plates-formes, et pourront être renouvelés pour des périodes additionnelles de 1 an.

(4) Les accords d'utilisation pour la collecte épisodique de données non environnementales, via le système Argos, seront de durée courte et déterminée n'excédant pas 1 an sans exception, et ne dépassant pas 6 mois en général. Ces accords seront étroitement surveillés et ne seront pas renouvelés.

(5) Les accords d'utilisation pour l'utilisation en test du système Argos par des constructeurs d'équipement sera valide 1 an à partir de la date du premier essai et pourront être renouvelés pour des périodes additionnelles de 1 an.

5. Traitement des données

Tous les utilisateurs du système Argos doivent accepter de permettre aux agences participant à Argos, et aux agences de leurs gouvernements l'utilisation totale, libre et immédiate de toutes les données collectées par leurs plates-formes : ceci peut inclure la distribution internationale de données d'environnement sous les auspices de l'Organisation Météorologique Mondiale. Toutes les données relevant du droit de la propriété intellectuelle seront protégées en accord avec les lois en vigueur.

6. Exigences techniques

a) Tous les exploitants de plates-formes du système Argos doivent utiliser un émetteur dont les caractéristiques techniques et la conception sont certifiées conformes aux spécifications et réglementations applicables.

b) Tous les exploitants de plates-formes doivent assumer les coûts associés à l'achat et à l'exploitation des plates-formes, ainsi qu'à l'acquisition des données de ces plates-formes, soit directement du satellite soit à partir d'un centre de traitement.

III Understandings

a) The Argos Operations Committee reserves the right to terminate or suspend the user's participation in this program in the event of spacecraft or ground equipment limitations requiring curtailment or elimination of services.

b) PTTs which the user plans to implement as part of the Argos DCS are subject to type-certification by the operator before deployment. However, such certification does not imply any judgement or endorsement as to the PTT's performance.

IV Specific Responsibilities of the User

The User shall:

a) Notify the Operator, within a reasonable time, of any changes to the program.

b) Obtain and utilize PTTs manufactured and type-certified in accordance with the specifications and rules stipulated in the «Argos Platform Transmitter Terminal General Specifications and Certification» document available from the Operator upon request.

c) Obtain authorization from the appropriate national authorities to transmit on the frequency specified in the «General Specifications and Certification» document.

d) Comply with all applicable laws and regulations, and the terms and conditions for operation of the system which have been agreed to by the Argos Participating Agencies (and which shall be available upon request).

e) Provide periodic reports, upon request by the Operator, on the uses of location and sensor data.

f) Make all reasonable efforts to deactivate platforms which are either performing outside the system specifications, malfunctioning in a manner that interferes with the other platforms or with general system operations, or are in a program which has been terminated.

V Specific Responsibilities of Operator

The Operator shall:

a) Oversee the collection, processing, and transmission of Argos data.

b) Notify the User, through the Agent, of changes to the established operational plan. Notification will normally be prior to initiation of such changes, except when sudden abnormal spacecraft or operational conditions preclude such prior notification. In any event, notification will be made as soon as possible.

c) Notify the user, through the Agent, by the most efficient means available, whenever Argos System monitoring indicates that a platform is performing outside system specifications or is malfunctioning in a manner that interferes with the other platforms or with general system operation, and require the user to make every reasonable effort to deactivate such a platform.

VI Disclaimers

a) The Operator will make every effort to maintain the Argos DCS in full operation at all times subject to the availability of appropriations. The Operator will bear no responsibility for any losses as a result of the non-availability of the DCS.

b) The Operator can not guarantee the timeliness of data dissemination, the accuracy of the data provided or their suitability for any application whatsoever, and cannot be held responsible for any damage, including loss of life, resulting from defective operation of the Argos DCS.

c) In the event of damage being suffered by the goods or personnel of the User or third parties, and insofar as such damage arises out of the use of the equipment, the Operator shall not be liable.

d) The User agrees not to make any claim or bring any action against the Operators, or any of their employees or agents and the user agrees to indemnify and hold each such entity and individual harmless against any such claim or action brought by any third party and any award of damages, loss, or other expense incurred in connection therewith (including attorneys' fees) where such claim or action is based, directly or indirectly in whole or in part on the use of the Argos System. Indemnification shall not be applicable in those instances where the user is not allowed by applicable law to indemnify.

VII Period of Use/Termination

a) Either party to the System Use Agreement may request amendments by letter to the signatories of this System Use Agreement and such amendments will take effect upon the consent of all parties.

b) Within 30 days of the expiration of the approved period of use, users may request to renew the system use agreement. These agreements will be renewed in accordance with all applicable laws and regulations. Renewal is not automatic, however, and there may be instances when the agreements will not be renewed.

VIII Dispute Settlement

In the case of any disputes arising out of the terms of this agreement, the matter will be referred to the Argos Operations Committee for settlement.

III Limitations

a) Le Comité des Opérations Argos se réserve le droit de résilier ou de suspendre la participation de l'utilisateur au programme en cas de restrictions dans la disponibilité des satellites ou des équipements au sol rendant nécessaires la réduction ou la suppression de services.

b) Le type des émetteurs que l'utilisateur projette d'installer dans le système Argos doit avoir été certifié par l'opérateur avant déploiement. Cependant, cette certification n'implique aucune évaluation ou garantie quant aux performances de l'émetteur.

IV Responsabilités particulières de l'Utilisateur

L'utilisateur s'engage à :

a) Informer l'opérateur, dans un délai raisonnable, de tout changement dans son programme.

b) Se procurer et n'utiliser que des émetteurs fabriqués et certifiés en accord avec les spécifications et les règles détaillées dans le document « Electronique de transmission Argos- Spécifications générales et certification » qui est disponible sur demande auprès de l'opérateur.

c) Obtenir l'autorisation auprès des autorités nationales compétentes d'émettre sur la fréquence spécifiée dans le document «Spécifications générales et certification».

d) Se mettre en conformité avec les lois et réglementations en vigueur et les termes et conditions pour l'exploitation du système auxquels les Agences participant à Argos ont adhéré (et qui sont disponibles sur demande).

e) Fournir, à la demande de l'opérateur, des rapports périodiques sur l'utilisation des données mesurées et des localisations.

f) Faire tout ce qui est raisonnablement possible pour désactiver des plates-formes qui fonctionnent hors des spécifications du système ou interfèrent anormalement avec d'autres plates-formes ou avec l'exploitation générale du système ou qui appartiennent à un programme qui est terminé.

V Responsabilités particulières de l'Opérateur

L'opérateur s'engage à :
a) Superviser la collecte, le traitement et la distribution des données Argos.

b) Informer l'utilisateur des changements dans le plan des opérations prévu. L'information se fera normalement avant que ces changements n'interviennent sauf si des anomalies sur les satellites ou les moyens opérationnels ne permettent pas d'anticiper. Dans tous les cas, cette information se fera dans les meilleurs délais.

c) Informer l'utilisateur par les moyens les plus adaptés au cas où la surveillance du système Argos indique qu'une plate-forme fonctionne hors des spécifications du système ou dysfonctionne de manière à interférer avec d'autres plates-formes ou avec l'exploitation générale du système ; et nécessite que l'utilisateur fasse tout ce qui est raisonnablement possible pour désactiver une telle plate-forme.

VI Limites de responsabilité

a) L'opérateur fera tout son possible pour maintenir le système Argos totalement opérationnel en permanence, selon la disponibilité des moyens. L'opérateur ne sera pas responsable des pertes, quelles qu'elles soient, résultant de la défaillance du système Argos.

b) L'opérateur ne peut garantir les délais de distribution, la précision des données fournies et leur adéquation pour quelque application que ce soit, et ne peut être tenu pour responsable d'aucun dommage, y compris la perte de vie humaine, pouvant résulter d'un défaut de fonctionnement du système Argos.

c) En cas de dommage causé aux biens ou au personnel de l'utilisateur ou des tiers, et pour autant qu'un tel dommage ne survienne pas dans l'utilisation de l'équipement, l'opérateur n'en sera pas responsable.

d) L'utilisateur accepte de ne pas déposer de plainte ou intenter d'action contre les opérateurs, ou l'un de leurs employés ou agents et l'utilisateur accepte d'indemniser et de dédommager lesdites personnes physiques et morales pour toute réclamation ou action intentée par un tiers ou toute condamnation pour des dommages ou intérêts, pertes ou autres débours encourus à l'occasion desdites réclamations ou actions (y compris les honoraires de conseils et/ou d'avocats), lorsque ladite réclamation ou action sera fondée, directement ou indirectement, en tout ou partie, sur l'utilisation du système Argos. L'indemnisation ne sera pas applicable dans tous les cas où l'utilisateur n'est pas autorisé par la loi à verser des indemnités.

VII Durée d'utilisation et résiliation

a) Toute partie signataire à cet Accord d'Utilisation du Système peut demander des modifications par lettre aux autres signataires et de telles modifications prendront effet avec le consentement de toutes les parties.

b) Dans les 30 jours suivant l'expiration de la période d'utilisation approuvée, les utilisateurs peuvent demander le renouvellement de leurs accords d'utilisation. Ces accords seront renouvelés en accord avec toutes les lois et règlements en vigueur. Cependant, le renouvellement n'est pas automatique et il peut y avoir des cas où les accords ne seront pas renouvelés.

VIII Litiges

En cas de litiges portant sur les termes de cet accord, le cas sera soumis au Comité des Opérations Argos pour décision.

ANNEX VII

FINANCIAL STATEMENTS

Financial Statement by IOC
for the year 1 June 1997 to 31 May 1998
(all amounts in US $ unless otherwise specified)

BALANCE (from previous year)			**$ 25 562**
FUNDS TRANSFERRED FROM WMO (relevant to the period)			
105 000	(05.05.97)		
15 000	(09.07.97)		**$ 120 000**
	TOTAL RECEIPTS		**$ 145 562**
EXPENDITURES			
Technical Co-ordinator's employment:			
	- Salary:	65 361	
	- Allowances:	19 978	
	- Relocation (yearly provision):	3 803	**$ 89 142**
Technical Co-ordinator's missions:			
	- Saint-Petersburg (3-5 June 1997)	2 434	
	- Perth & Melbourne (21-25 July 1997)	3 334	
	- La Réunion (13-22 October 1997)	3 189	
	- Reading (4-5 November 1997)	1 083	
	- Paris (2-3 December 1997)	900	
	- Naples (11-13 May 1998)	1 692	**$ 12 632**
Contract with CLS/Service Argos:		FF 80 000	**$ 13 201**
	TOTAL EXPENDITURES		**$ 114 975**
BALANCE (at 1 June 1998)			**$ 30 587**

World Meteorological Organization

Data Buoy Co-operation Panel
Statement of Account as at 31 December 1997

	US$	US$
Balance from 1995		21'349
Contributions Paid for Current Biennium		285'344
Total Funds Available		306'693
Obligations Incurred		
Technical Co-ordinator	240'936	
Experts	6'420	
Prep Mtg - Indian Ocean Buoy Prog	2'073	
Travel	11'005	
Reports	11'429	
Administration direct	1'185	
		273'048
Balance of Fund		US $ 33'645
Represented by.		
Cash at Bank		35'606
Unliquidated obligations		1'961
		US $ 33'645

Contributions	Received 1996	Received 1997
Australia	25'000	
Canada	15'000	15'000
France	15'000	12'438
Greece	2'200	2'200
Iceland	1'500	1'500
Ireland	1'568	1'563
Netherlands	1'575	1'575
New Zealand	500	
Norway	3'150	1'575
South Africa		3'000
UK	30'000	15'000
USA	68'000	68'000
TOTAL	163'493	121'851

World Meteorological Organization

Data Buoy Co-operation Panel
Interim Account as at 30 September 1998

	US$	US$
Balance from 1997		33'645
Contributions Paid for Current Biennium		112'052
Total Funds Available		145'697
Obligations Incurred		
Technical Co-ordinator	118'400	
Experts	3'983	
Travel	7'372	
Reports	1'954	
		131'709
Balance of Fund		US $ 13'988
Represented by.		
Cash at Bank		22'406
Unliquidated obligations		8'418
		US $ 13'988

Contributions	Received 1998
Australia	12'500
Canada	10'000
France	11'400
Greece	2'200
Iceland	1'500
Ireland	1'377
Netherlands	1'575
New Zealand	500
South Africa	3'000
USA	68'000
TOTAL	112'052

PROVISIONAL ESTIMATE OF INCOME AND EXPENDITURE UNTIL 31 MAY 1999

Income		**USD**
Balance of fund from interim account		13,988
Expenditure		
Publications	*Existing obligations*	Nil
	New publications	3,000
Travel of chairman/vice-chairmen		5,000
Experts		2,991
Total		
Anticipated balance to transfer to 1999/2000 account		2,997

ANNEX VIII

DBCP EXPENDITURES AND INCOME FOR 1996-2000

(including the SOOP contributions agreed upon by January 1999)

	Actual 1996 and 1997 (2 years)	Estimated 1998/99 (1 year)	Draft Estimated 1999/2000 (1 year)
		USD	
Expenditures			
Technical Co-ordinator (Salary, Travel and Logistics)	240,936	118,400	133,000
Travel (chair and vice-chairs)	11,005	13,800	11,000
Experts	6,420	5,000	1,500
Prep meetings	2,073		0
Publications	11,429	5,000	11,000
WMO	1,185	500	500
Contingencies			347
TOTAL	**273,048**	**142,700**	**157,347**
Income			
Contributions	285,344	112,052	154,350
Carry over	21,349	33,645	2,997
TOTAL	**306,693**	**145,697**	**157,347**

INITIAL DRAFT TABLE OF PROVISIONAL CONTRIBUTIONS

	1997-1998	1998-1999	1999-2000
AUSTRALIA	12,500	12,500	12,500
CANADA	15,000	10,000	10,000
FRANCE	12,438 (FRF 75,000)	11,400 (FRF 70,000)	12,000 (FRF 70,000)
GREECE	2,200	2,200	2,200
ICELAND	1,500	1,500	1,500
IRELAND	1,563 (IR£ 1,000)	1,377 (IR£ 1,000)	1,500 (IR£ 1,000)
NETHERLANDS	1,575	1,575	1,575
NEW ZEALAND	500	500	500
NORWAY	1,575	1,575	1,575
SOUTH AFRICA	3,000	3,000	3,000
UNITED KINGDOM	15,000	15,000	15,000
USA	68,000	68,000	68,000
SOOP Contributions			
Germany			5,000
Japan			5,000
USA - NOAA			10,000
USA - private			5,000
SOOP Sub-totals			**25,000**
TOTAL	**134,851**	**128,626**	**154,350**

Contributions in Kind

Country	*Contribution*	*Approximate value (USD)*
Canada	Brochure printing	4,000

ANNEX IX

FUTURE WORK PROGRAMME FOR DBCP/SOOP TECHNICAL COORDINATOR

1. Early 99: Transition period while developing new tools for SOOP

2. Then, 35% TC on SOOP:

    2.1. 15% technical assistance & support to SOOPIP ad hoc working groups
    2.2. 5% maintaining SOOP Home Page
    2.3. 5% maintaining operator, call sign, XBT line, and other data bases as required
    2.4. 10% monitoring, coordinating, follow-up and correction of detected problems, and provision of feedback to SOOP operators and related agencies with regard to:

        2.4.1. Monthly GTS statistics
        2.4.2. Monthly real-time (RT) data tracking reports by call sign
        2.4.3. Monthly RT vessel data quality reports
        2.4.4. Annual delayed-mode (DM) data submissions tracking
        2.4.5. Annual and 6 monthly line report compilations

3. 10% WMO & IOC on SOOP:

    3.1. Administrative
    3.2. Secretariat support for SOOPIP meetings

4. Time saved on DBCP by:

    4.1. Telegraphic reports (TC monthly reports, DBCP preparatory documents)
    4.2. Spending less time at Météo France for DBCP (impact studies)
    4.3. Establishing priorities with regard to user assistance (i.e. action may be delayed)
    4.4. Establishing priorities with regard to DBCP server and getting support from DBCP members for updating it
    4.5. Sharing AG meetings with DBCP officers provided there are other opportunities to see buoy operators
    4.6. Not attending JTA
    4.7. Automating TC tools further

5. Time saved on SOOP by:

    5.1. Stressing to operators to provide information in a timely and regular fashion
    5.2. Automating tools

ANNEX X

DBCP IMPLEMENTATION AND TECHNICAL WORKPLAN FOR THE 14th YEAR

PART A - Summary of tasks

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

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

3. Implement data base of buoy programme information on DBCP WWW server.

4. Update and amend, as necessary, the DBCP World Wide Web server; include information on existing and planned data telecommunication systems.

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

6. Finalise latest version of SVP-B construction manual and make it available on DBCP server.

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

8. Organize scientific & technical workshop at DBCP-XV.

9. Publish on the web server a list of existing Argos message format with related advantages as guidelines for buoy operators designing new buoy programmes.

10 Investigate possibility to produce additional GTS data availability index maps according to GOOS and GCOS requirements, taking into account basic variables and different types of platforms.

11. Monitor and evaluate quality of wind data from SVPBW drifters.

12. Participate in GOOS interim implementation advisory group and attend the 30 November 1998 meeting of the group in Paris, France.

13. Archive QC messages (DBCP QC guidelines) and develop web page for accessing those messages.

14. Recommend that IPAB reviews its decision to cease submitting its data to NRODC/DB, and only to World Data Centres for Glaciology.

15. Evaluate feasibility and possibly develop a dedicated DBCP Internet forum.

16. Implement regional projects (by Action Groups) to monitor and document the availability and use of buoy observations.

17. Make proposal and possibly implement a new set of GTS bulletin headers to be used for drifting buoys with a view to easily monitor data flow from DBCP Action Groups and in particular from the Global Drifter Programme.

18. Provide the Technical Coordinator with deployment opportunities (maps and point of contact) for inclusion in the DBCP web server.

19. Provide the Technical Coordinator with documents in electronic form regarding deployment and recovery methods for inclusion in the DBCP web server.

PART B

TASK	CARRIED OUT BY*	SUPPORTED/ASSISTED BY	REPORTED TO/ACTION BY	RELEVANT TOR OF THE PANEL
1	Technical co-ordinator (1,8)	Vice-chairmen	Chairman for presentation to the panel	1, 2
2	DBCP	Panel members	Panel	7, 8
3	Technical co-ordinator (1,2,3)		Panel	2, 3, 6
4	NOAA/AOML and technical co-ordinator (1,2,3,4,6,7,8)	Vice Chairman (Meldrum)	Panel	7, 8
5	Vice-chairman (Meldrum) and technical co-ordinator (1, 7, 8)	Chairman and Panel members	Panel	1, 2, 6, 7
6	Technical Co-ordinator (4,8)	Scripps Institution of Oceanography	Panel	7
7	Regional action groups, GDC	Panel members, Technical co-ordinator (5,8)	Panel, GDP	1, 2, 3
8	Ron McLaren	Secretariats	Panel	7
9	Technical co-ordinator (4)	Panel members	Panel	6, 7
10	Météo France		Panel	2, 6
11	Technical Co-ordinator (8,2)	GDC, Panel members	Panel	2, 6
12	Technical Co-ordinator (1,5,7,8)	Secretariats	Panel	1, 3, 4, 8
13	MEDS	Techincal Co-ordinator (2,9)	Panel	1, 2, 7
14	Chairman	RNODC/DB	Panel	1
15	Technical Co-ordinator (7,6,4)	CLS, Météo-France	Panel	2, 6, 7
16	Regional Action Groups	Panel members	Panel	1, 2, 4, 7
17	Technical Co-ordinator (9,7,2)	Bill (Woodward)	Panel	2, 6
18	Members		Panel	1, 2, 4
19	Members		Panel	1, 2, 4, 7

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

DBCP ADMINISTRATIVE WORKPLAN FOR THE 14TH YEAR

PART A - **Summary of tasks**

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

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

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

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

5. If deemed necessary, make proposals for co-ordination activity as a result of the above actions to address 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 and planned buoy programmes and 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 and arrange for modifications as necessary.

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

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

10. Prepare annual report of the DBCP.

11. Support, as required, existing DBCP action groups (EGOS, IABP,IPAB, ISABP, IBPIO, GDP, TIP) and, 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.

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

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

15. Co-ordinate operation of DBCP QC guidelines.

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

17. Provide technical workshop papers to WMO Secretariat (end November) and publish proceedings (mid 1999).

18. Submit national reports in electronic form to the technical coordinator for inclusion in the DBCP server.

19. Prepare and distribute revised budget estimates for 1999-2000

20. Finalise and publish DBCP brochure.

21. Publish in DBC Technical series and on the web the Implementation Strategy

PART B

TASK	CARRIED OUT BY*	SUPPORTED/ASSISTED BY	REPORTED TO/ACTION BY	RELEVANT TOR OF THE PANEL
1	Technical co-ordinator (1, 8)	Panel members and Secretariats	Chairman for presentation to the panel	1, 2
2	Technical co-ordinator (1,2,3,8)	Panel members and Secretariats	Chairman and panel for information	1, 2
3	Secretariats	Panel members	Chairman and panel for information	1, 2, 8
4	Technical co-ordinator (1, 7), CLS/Service Argos	Panel members and Secretariats	Chairman and panel for information	6
5	Chairman and technical co-ordinator (1,2,4,5,6,7,8,9)	Secretariats and others as appropriate	To Panel for consideration and appropriate action or for direct action by chairman	1, 2, 3, 5
6	Technical co-ordinator (3,4,8)	Chairman, Secretariats and CLS/Service Argos	Wide circulation by Secretariats and CLS/Service Argos	7, 8
7	Technical co-ordinator (1,2,7) and chairman	Secretariats	Panel and users	1, 2, 6
8	Chairman and sub-committee	Secretariats	Secretariats	9
9	Panel/chairman		Panel (at next session)	9
10	Chairman and Secretariats	Technical co-ordinator (1,8)	Executive Councils of WMO and IOC	10
11	Chairman and Secretariats	Technical co-ordinator (1, 5, 8)	Panel	1
12	Chairman and Secretariats	Panel members	Panel	4
13	Chairman	Panel members	Panel	7, 8
14	Operational services, chairman, vice-chairmen and technical co-ordinator (1,4)	Panel members	Panel	1, 2, 3, 7, 8
15	Technical co-ordinator (1, 2)	Panel members and operational services	Panel	2, 3, 6
16	CLS/Service Argos	Technical co-ordinator (1, 6)	Panel, meeting on JTA	6, 7
17	Panel members, WMO Secretariat		Panel	7
18	Panel members, technical coordinator (5,8)		Panel	7, 8
19	Secretariats		Panel	8
20	WMO, Canada		Panel	2, 6, 7
21	WMO, technical coordinator (1,8)		Panel	2, 6, 7

* When the technical coordinator is involved in carrying out a task, the figures in parenthesis relate to the terms of reference for the technical coordinator

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ANNEX XII

LIST OF ACRONYMS AND OTHER ABBREVIATIONS

ABS	Acrylonitrile-Butadiene-Styrene
ADEOS	Advanced Earth Observing Satellite (Japan)
AG	Action Group (of the DBCP)
ALACE	Autonomous Lagrangian Circulation Explorer
AOML	Atlantic Oceanographic and Meteorological Laboratory (NOAA)
ARGO	Array for Real-time Geostrophic Oceanography (CLIVAR-GODAE)
ATLAS	Autonomous Temperature Line Acquisition System
BATHY	Bathythermograph Report
BOM	Australian Bureau of Meteorology
BUFR	Binary Universal Form for Representation of meteorological data (WMO)
BUOY	Report of a Buoy Observation (WMO code form)
CBS	Commission for Basic Systems (WMO)
CD ROM	Compact Disk - Read Only Memory
CGMS	Coordination Group on Geostationary Meteorological Satellites
CLIVAR	Climate Variability and Predictability (WCRP)
CLS	Collecte - Localisation - Satellite
CMM	Centre de météorologie maritime (Météo-France)
CMM	Commission for Marine Meteorology (WMO)
CNES	Centre national d'études spatiales (France)
DBCP	Data Buoy Co-operation Panel (WMO-IOC)
DBCP/TC	Technical Co-ordinator of the DBCP
DCS	Data Collection Systems
DHN	Diretoria de Hidrografia e Navegação (Brazil)
EC	Executive Council
ECMWF	European Centre for Medium-Range Weather Forecasts
EGOS	European Group on Ocean Stations
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FG	First Guess [field]
FM	WMO code form numbering system
FROST	Antarctic First Regional Observing Study of the Troposphere
FY	Fiscal Year
GCOS	Global Climate Observing System
GDAS	Global Data Assimilation System
GDP	Global Drifter Programme
GLOSS	Global Sea-level Observing System
GMS	Geostationary Meteorological Satellite (Japan)
GODAE	Global Ocean Data Assimilation Experiment (GOOS)
GOES	Geostationary Operational Environmental Satellite (NOAA)
GOOS	Global Ocean Observing System
GPS	Global Positioning System
GSC	GOOS Steering Committee
GTS	Global Telecommunication System (WMO)
I-GOOS	IOC-WMO-UNEP Committee for GOOS
IABP	International Arctic Buoy Programme
IBPIO	International Buoy Programme for the Indian Ocean
IGOSS	Integrated Global Ocean Services System (IOC-WMO)
INPE	Instituto Nacional de Pesquisas Espaciais (Brazil)
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange (IOC)
IOS	Initial Observing System (GOOS)
IPAB	International Programme for Antarctic Buoys
ISABP	International South Atlantic Buoy Programme
JAMSTEC	Japanese Marine Science and Technology Centre

JCOMM	Joint Commission for Oceanography and Marine Meteorology
JSTC	Joint Scientific and Technical Committee (GCOS)
kHz	Kilo-hertz
LUT	Local User Terminal
MEDS	Marine Environmental Data Service (Canada)
METEOSAT	EUMETSAT series of meteorological geostationary satellites
NAVOCEANO	US Naval Oceanographic Office
NCEP	National Center for Environmental Prediction (NOAA)
NCO	NCEP Central Operations
NESDIS	National Environmental Satellite Data Service (USA)
NMC	National Meteorological Centre
NOAA	National Oceanographic and Atmospheric Organization (USA)
NSIDC	National Snow and Ice Center (USA)
NWP	Numerical Weather Prediction
NWS	National Weather Service (USA)
OAR	Office of Atmospheric Research (NOAA)
ORSTOM	Institut français de recherche scientifique pour le développement en coopération
PALACE	Profiling ALACE
PIRATA	Pilot Research Moored Array in the Tropical Atlantic
PMOC	Principal Meteorological or Oceanographic Centre (DBCP)
PNBOIA	Programa Nacional de Boias (Brazil)
PSC	Polar Science Center
PTT	Platform Transmitter Terminal (Argos)
QC	Quality Control
RMS	Root Mean Square
RNODC	Responsible National Oceanographic Data Centre (IODE)
SHIP	Report of surface observation from a sea station (WMO code form)
SOC	Specialized Oceanograp^hic Data Centre (IGOSS)
SOOP	Ship-of-Opportunity Programme (IGOSS)
SOOPIP	SOOP Implementation Panel
SST	Sea Surface Temperature
SVP	Surface Velocity Programme (of TOGA and WOCE) [*replaced by GDP*] drifter
SVPB	SVP "barometer" drifter
SVPBW	SVP "barometer and wind" drifter
TAO	Tropical Atmosphere Ocean Array
TESAC	Temperature, salinity and current report from a sea station (WMO code form)
TIP	TAO Implementation Panel
TRITON	Triangle Trans-Ocean buoy Network
UKMO	United Kingdom Meteorological Office
UNESCO	United Nations Educational, Scientific and Cultural Organization
UTC	Universal Time Coordinated
WCRP	World Climate Research programme
WDC	World Data Centre
WHOI	Woods Hole Oceanographic Institution (USA)
WMO	World Meteorological Organization
WOCE	World Ocean Circulation Experiment (WCRP)
WWW	World Weather Watch (WMO)
XBT	Expendable Bathythermograph
Y2K	Year 2000