ANNEX II

REPORTS FROM THE DBCP ACTION GROUPS

At its tenth session (La Jolla, November 1994), the Panel adopted the following guidelines regarding its action groups:

1. An action group of the DBC is an independent self-funded body that maintains, as a significant element of its responsibilities, an observational buoy programme providing meteorological and oceanographic data for real-time and/or research purposes in support of the World Weather watch, the World Climate Research Programme, the Global Climate Observing System, the Global Ocean Observing System and other relevant WMO and IOC programmes.

2. Action groups of the DBCP shall support the aims and objectives of the DBCP as set out in the terms of reference of the DBCP in particular with respect to:

(a) provision of good quality and timely data to users;

(b) insertion of real-time (or near real-time) data into the GTS;

(c) exchange of information on data buoy activities and development and transfer of appropriate technology.

3. An action group may be regional or national in nature provided that its programme benefits a regional or international community.

4. To be adopted as an action group of the DBCP the terms of reference or operating principles of the body or programme shall be submitted to a session of the DBCP for formal approval. Once approved these shall be lodged with the Secretariats of WMO and IOC.

5. On its part the DBCP shall support the activities of its adopted action groups and especially through the assistance of the officers of the DBCP, its technical co-ordinator and the Secretariats of WMO and IOC as far as resources allow.

6. Action groups of the DBCP shall submit annual reports of their activities to the chairman of the DBCP.

The Panel has at present seven action groups, the reports of which follow:

ACTION GROUPS page

INTERSESSIONAL REPORT OF THE EUROPEAN GROUP ON OCEAN STATIONS,
August 10 2000 - August 10 2001
Issued by The EGOS Technical Secretariat

1 THE ORGANISATION

Management and funding

The Management Committee met twice in the intersessional period:

- The winter meeting was held at the WMO headquarters in Geneva on December 5-6, 2000. At this meeting the Management committee elected Dr Volker Wagner, Deutscher Wetterdienst and Mr. Wil C.M. van Dijk as respectively Chairman and Vice-Chairman. Met Éireann offered to host the summer meeting of EGOS in 2001. A report on the conclusions and recommendations of the December 2000 meeting is in EGOS Tech. Doc. No. 224.
- The summer meeting was hosted by Met Éireann in Dublin Ireland, during June 5 and 6 2001. A report on the conclusions and recommendations of this meeting is in EGOS Tech. Doc. No. 232, draft. Representatives of the US Naval Oceanographic Office, Environment Canada and the National Data Buoy Center attended this meeting.

There have been no changes the number of members in EGOS. The nine participating countries are Denmark, France, Iceland, Ireland, Federal Republic of Germany, The Netherlands, Norway, Sweden and United Kingdom. The EGOS Common Fund is based on voluntary contributions, mainly to cover the service of the Technical Secretariat. WMO handles the EGOS Common Fund on behalf of the EGOS Management Committee.
Calls for national contributions for 2001 were issued by WMO.

On behalf of the EGOS Management Committee WMO established a contract with Christian Michelsen Research A/S (CMR) in Bergen, for the continued service of the EGOS Technical Secretariat for 2001.

During its meeting in December 2000 the Management Committee agreed that the calls for voluntary contributions to the Common Fund for year 2001 should be unchanged relative to 2000.

Deutscher Wetterdienst contributes to the work of EGOS through a bilateral contract with CMR.

2 TECHNICAL SECRETARIAT AND CO-ORDINATION

Technical Secretariat

The contract for the Technical Secretariat is a contract between WMO and CMR, and all main secretariat functions lie with Christian Michelsen Research, Norway, represented by Mr. Torleif Lothe.

All reports published later than December 1999 are available on pdf format on Internet at www.cmr.no/conmar/egos. Some older reports are also available. All reports except drafts are open.

Technical Co-ordinator

The Technical Co-ordinator is in charge of the technical and operational activities of contributors to EGOS programmes. He or she will be appointed by the committee from Parties to the programme, normally on an annual basis. At the meeting in December 2000, the Management Committee re-appointed Mr. Pierre Blouch, Météo-France as Technical Co-ordinator of EGOS.

The duties of the Technical Co-ordinator include making proposals for the deployment strategies, to co-ordinate the deployments of all available drifting buoys, and to arrange for the insertion of their data onto the GTS. The Technical Co-Ordinator shall, where appropriate, make arrangements for changes of the status of drifting buoys reporting on the GTS, with the agreement of the contributor.

The Technical Co-Ordinator also provides monthly statistics and status tables of buoy performance for inclusion in the EGOS monthly report.

3 EGOS DRIFTING BUOYS

Development of the operational programme

EGOS has continued to develop the operational programme through the intersessional period. Optimum usage of the available recourses through improved deployment strategies has been in focus. In particular, EGOS focused on the many early failures during air deployment of SVP-B Drifters. Air Deployment of SVP-Bs is now exclusively carried out in the spring in EGOS South. This has lead to an increased level of activity in EGOS South, with a corresponding decrease in EGOS North (figure 1).

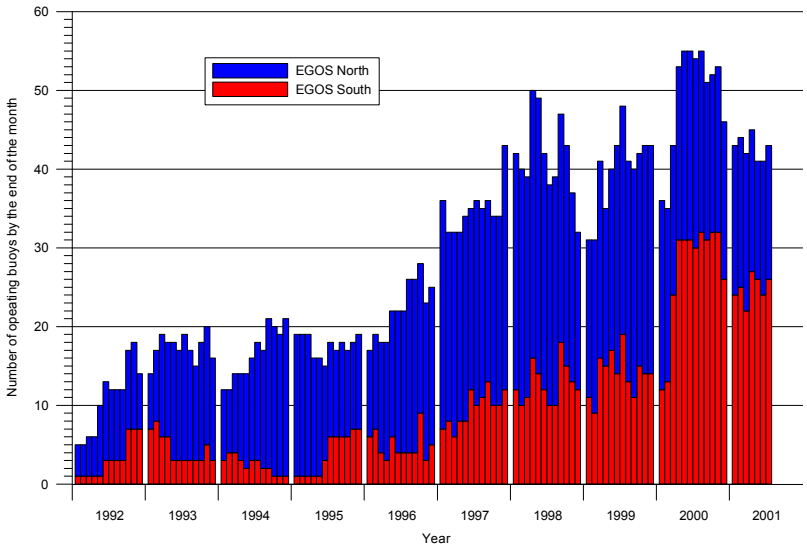


Figure 1. The number of operational EGOS drifting buoys by the end of each month 1992-July 2001.
The minimum number of operational drifting buoys by the end of each month in the intersessional period was 41, maximum was 55.

As at August 10th 2001, the number of operational buoys in EGOS was 43 with 17 in EGOS North and 26 in EGOS South (figure 2).

Very few (typically 1-2) non-EGOS drifters have operating north of the southern boundary of the EGOS area of interest (30 °N) in 2000/2001. A total number of 38 drifting buoys were deployed in EGOS in the intersessional period and 56 EGOS-buoys ceased to operate in the intersessional period.

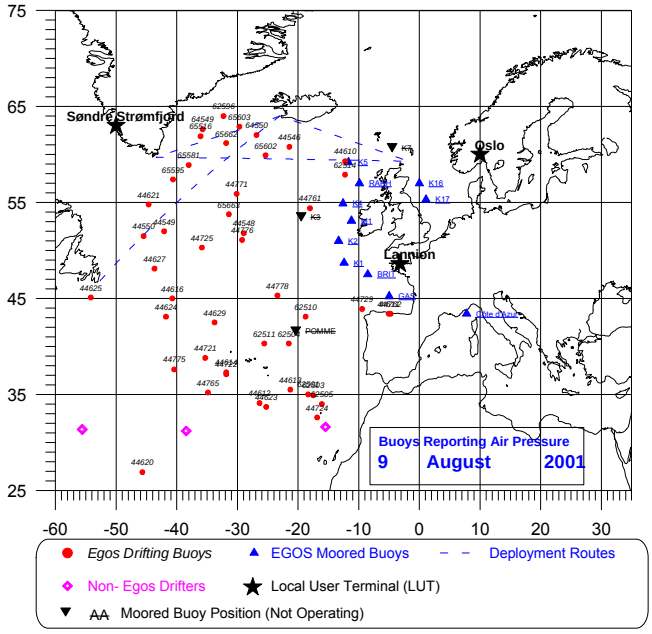


Figure 2. Distribution of EGOS buoys at August 9th, 2001.

Early failures

The number of SVP-B failures was 19% in 1998, 29 % in 1999 and 24 % in 2000. For the intersessional period this has improved dramatically. Of at total of 27 SVP-Bs deployed, only 3 suffered an early failure, or 11 %. The average lifetime for all EGOS buoys in the intersessional period was 334 days. This is compared to previous years in figure 3

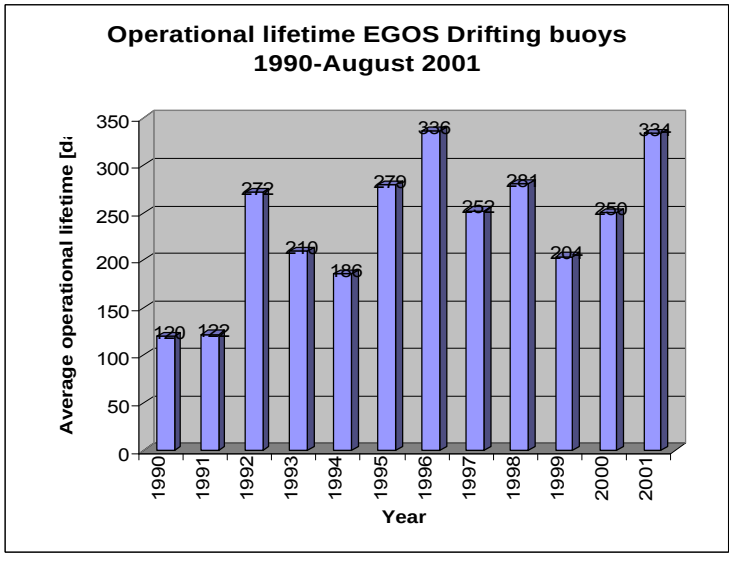


Figure 3 – The average lifetime for EGOS drifting buoys 1990-Aug 2001

Drogue losses

The tendency for the SVP-B Drifters to loose the drogues has continued into 2001. This is an important issue, since the wind measurements of the SVP-B rely on an attached drogue. As of August 10 2001, a total of 36 SVP-Bs were operating in EGOS. 14 of these or 39 % had lost the drogue.

4 EGOS MOORED BUOYS:

In addition to the drifting buoys, EGOS members operate moored buoys as a contribution to EGOS. At present the number of operational EGOS moored buoys is 12. Their positions are shown in figure 2 and in table 1.

Table 1- The EGOS Moored buoys as at August 2001.

Name	WMO No	Position
BRIT	62163	47.5 N -8.5 W
K 1	62029	48.70 N, 12.40 W
K 2	62081	51.00 N, 13.30 W
K 3	62108	Not Operating
K 4	62105	54.90N, 12.60W
RARH	62106	57.00 N, 09.90 W
K 5	64045	59.05 N, 11.47 W
K7	64046	Not operating.
K16	62109	57.00 N, 00.00 E
K17	62026	55.30N, 1.10E
Côte d'Azur	61001	43.40 N, 07.80 E
POMME	62002	Not Operating
GAS	62001	45.25 N – 5.00W
M1	62090	53.1 N - 11.2 W
M2	62091	53.5 N -5.4 W

INTERNATIONAL ARCTIC BUOY PROGRAMME (IABP)
http://IABP.apl.washington.edu
CHAIRMAN'S AND COORDINATOR'S REPORT
for the Seventeenth Session of the DATA BUOY CO-OPERATION PANEL
Perth, Australia, 22-26 October 2001
prepared 7 September 2001 by edward.hudson@ec.gc.ca

This report summarizes activities of the IABP that have occurred since the report filed September 2000 for the 16th session of the Data Buoy Co-operation Panel.

INTERNATIONAL ARCTIC BUOY PROGRAMME (IABP) ELEVENTH ANNUAL MEETING, YOKASUKA, JAPAN - Members of the International Arctic Buoy Programme met 30 May to 01 June, Yokosuka, Japan, for the eleventh annual business meeting. Host for the year 2001 meeting was the Japan Marine Science and Technology Centre (JAMSTEC). Participants were honored to be the first users of JAMTEC's International Guest House.

IABP EXECUTIVE AND COORDINATOR - The elected IABP executive and appointed coordinator:

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

BUOY ARRAY STATUS 04 SEPTEMBER - The buoy array in place 04 September 2001 per the map and sheet posted on the IABP web page - http://IABP.apl.washington.edu - showed 32 buoys on the Global Telecommunication System (GTS) 26 of which gave both surface air pressure and surface air temperature, 5 of which gave surface air pressure only, and 1 of which provided temperature only. Another buoy was added to the array mid September near the north pole. The IABP strives to maintain an array of at least 25 buoys evenly distributed across the Arctic Ocean.

DEPLOYMENTS 2001 - The following outlines some of the deployment strategies that resulted in buoys being deployed 2001.
White Trident August 2001 - The annual White Trident Deployment was conducted by the Commander, (U.S.) Naval Meteorology and Oceanographic Command. This deployment remains the key deployment strategy of the IABP. ICEX-AIR buoys for this years White Trident Exercise were provided by:

- (U. S.) National Ice Centre representing several agencies (3)
- Alfred Wegner Institute for Polar and Marine Research (1)
- Norwegian Meteorological Institute (1)
- U. K. Meteorological Office (1) and
- Meteorological Service of Environment Canada (1).

Buoys on Ice via Environment Canada - April 2001.
The photo shows one of the CES Zeno buoys deployed for US National Ice Service 23 and 24 April 2001 to the west of the Canadian Arctic Islands by Meteorological Service of Canada personnel via Twin Otter aircraft landing on ice. These deployments are an annual event and are supported by Polar Continental Shelf Project, Natural Resources, Canada.
Buoys on Ice via Icebreakers in Arctic Basin. - September 2001

The US Coast Guard icebreaker Healy and the Alfred Wegener Institute (AWI) for Polar and Marine Research vessel Polarstern were near the north pole summer 2001. An AWI buoy was deployed September as the Healy exited the area.

RECENT PUBLICATIONS

Papers

- Rigor, I.G., J.M. Wallace, and R.L. Colony, On the Response of Sea Ice to the Arctic Oscillation, J. Climate, accepted, 2001.

Buoy reports

- Rigor, I., and M. Ortmeyer, International Arctic Buoy Program 2000 Data Report, APL-- UW TM 4- 01, Applied Physics Laboratory, University of Washington, 2001.
- Rigor, I., and M. Ortmeyer, International Arctic Buoy Program 1999 Data Report, APL- UW TM 6- 00, Applied Physics Laboratory, University of Washington, 2000.
- Rigor, I., and M. Ortmeyer, International Arctic Buoy Program 1998 Data Report, APL- UW TM 3- 00, Applied Physics Laboratory, University of Washington, 2000.

CDs

- IABP CD See **http://www.meds-sdmm.dfo-mpo.gc.ca/alphapro/rnodc/IABP_CD_e.shtml**

PARTICIPANTS OF IABP - Participants of the IABP remain a mix of operational agencies, meteorological and oceanographic institutes, research agencies and non-government organizations that are interested in the Arctic Ocean and who contribute actively to the program.

PROBLEMS WITH RESPECT TO LUT POSITION ACCURACY - A problem was noted with positions as given on GTS by Edmonton processed buoys. Investigation showed that a similar position problem exists with positions given by other LUTS such as Oslo's.

The International Programme for Antarctic Buoys

1 Introduction

Seasonal sea ice covers a large part of the Southern Hemisphere and plays an important role in the climate of the Southern Ocean, yet remains one of the least known regions of the earth 's surface. Many processes relating to sea ice remain poorly understood, due in no small part to the lack of data from this inhospitable region. The optimum method of collecting long term in-situ surface data from the ice covered seas around the Antarctic continent is by the use of autonomous stations such as satellite tracked drifting buoys.

The International Programme for Antarctic Buoys (IPAB)was formally launched in 1995 to coordinate drifter deployments in the Antarctic sea ice zone, to optimize buoy distribution over this region and to create a central archive of Antarctic buoy data. IPAB is a self-sustaining project of the WMO/ICSU/IOC World Climate Research Programme (WCRP)and an Action Group of the WMO/IOC Data Buoy Co-operation Panel. The objectives of the program are to establish and maintain a network of drifting buoys in the Antarctic sea-ice zone in order:
i) to provide a buoy network to support research in the region related to global climate processes and to global change;
ii) to provide real-time operational meteorological data meeting the quality requirements of the WMO/World Weather Watch (WWW)programme;
iii) to establish a basis for on-going monitoring of atmospheric and oceanic climate in the Antarctic sea-ice zone.
The operational area of the Programme is south of 55 degrees South latitude, and includes that region of the Southern Ocean and Antarctic marginal seas within the maximum seasonal sea-ice extent.

IPAB was initially established for a period of 5-years, and at the third biennial meeting held in June 2000 participants, with support from the World Meteorological Organisation and WCRP,resolved to continue the programme indefinitely.

2 Participants and Organisation

Unlike the drifting buoy panels operating in other oceans of the world, IPAB does not have strong support from operational meteorological agencies, and the majority of IPAB buoy deployments are made to support specific research programmes, many of which are concerned with the movement of Antarctic sea ice. Membership of IPAB thus includes individual scientists who are supported by funding agencies to deploy buoys in support of Antarctic research programs. Participating organisations and scientists were asked in 2000 to reconfirm their commitment to a continuing IPAB programme. Fourteen Participants have done so (see Appendix).

IPAB Participants meet every two years and the program is managed by an Executive Committee of 5 plus the Coordinator .The Chairman of IPAB is Dr Enrico Zambianchi (Italy) whereas the transfer of the Co-ordinating office of IPAB from the Australian Antarctic Division (former coordinator: Dr Ian Allison, Australia) to the Scott Polar Research Institute is currently underway (new coordinator: Dr Peter Wadhams, United Kingdom). The current website of the project is http://www.ipab.aq, and is presently being updated. Until the completion of its development, the old IPAB pages can be found on the Australian Antarctic Division website http://www.antcrc.utas.edu.au/antcrc/buoys/buoys.html.

3 Review of IPAB, 1995-2001

More than 140 buoys providing data to the programme were deployed south of 55 °S in the seven-year period between 1995 and 2001. Most IPAB data buoys report through System Argos and the programme encourages buoy operators to equip platforms with basic pressure and temperature sensors and to contribute real-time operational meteorological data via the Global Telecommunications

System (GTS).Other platforms include more sophisticated meteorological instrumentation while others are position only platforms (often with GPS location) used in the study of sea ice drift and deformation.
Statistics of IPAB buoy activities since 1995 are shown in Figures 1 and 2.
Figure 1(a)shows the number of new buoys deployed each year broken down into 3 regions: the Weddell Sea (20 °E to 60 °W); East Antarctica (170 °E to 20 °E); and the Bellingshausen, Amundsen and Ross Seas (60 °W to 170 °E). Figure 1(b) shows the seasonal distribution of these deployments. Almost all deployments are made onto ice floes or into newly forming ice from ships, typically vessels re-supplying Antarctic bases. In the Weddell Sea the deployments are usually made in January and February, while off East Antarctica they are made from late March to early May as the ice edge starts to advance northward from its summer minimum almost at the coast. Most early IPAB deployments were concentrated in the Weddell Sea and off the coast of East Antarctica, but there have been new initiatives in the Ross and Bellingshausen Sea region since1998.The large peak in deployments in East Antarctica in 1995 and 1999 are due to short-term position-only buoy arrays deployed as part of winter sea-ice process studies in August of those years.
Figures 2(a) and 2(b) respectively show the number of IPAB buoys reporting each year, and the seasonal distribution of active buoys. The number of platforms with meteorological sensors, and reporting via the GTS has remained fairly constant since 1995, but even at a peak, the number of active drifters falls far short of the optimum requirement. Seasonally the buoy numbers show a peak in late autumn after the new deployments, besides the above mentioned biased august maximum. Buoy numbers drop steadily after the maximum due both to instrument failures, and to northward divergence, which takes many buoys out of the region of interest to IPAB. Although many drifters have sufficient battery power to operate for 2 or more years, most drift northward out of the ice and only very few survive within the Antarctic pack for a second winter.

Synoptic data from buoys reporting in real-time on the GTS are archived by the Marine Environmental Data Service, Canada, acting as the Responsible National Oceanographic Data Centre for drifting buoy data. Up to date information on those IPAB buoys reporting via the GTS can be found on the MEDS IPAB page, with plots of position and drifter statistics, i.e. at:
http://www.meds-sdmm.dfo-mpo.gc.ca/alphapro/modc/main_anta_e.shtml
The IPAB Co-ordinating Office also maintains a separate research database of data from all buoys, including those that do not report via the GTS and those that measure location only. These data have also been transferred to the National Snow and Ice Data Center, Boulder, Colorado and are available from the NSIDC at:
http://nsidc.org/NASA/GUIDE/docs/dataset_documents/ipab_antarctic_drifting_buoy_dataset_document.gd.html

Data from the IPAB programme are used operationally by meteorological agencies and in support of a wide variety of studies of the Antarctic sea ice zone, including initialisation and validation of numerical climate modelling, and for the validation of satellite remote sensing techniques for determining sea ice motion. The data show the highly dynamic nature of Antarctic sea ice. Ice drift is on average divergent over much of the Antarctic sea ice zone, and the drift and deformation play a major role in determining the ice thickness distribution.

Here is a list of IPAB related papers appeared on peer-reviewed journals and books over the last 5 years; for a comprehensive list see http://www.antcrc.utas.edu.au/antcrc/special/buoys/literature.html:

Eisen, O., and C. Kottmeier, 1999.
On the importance of leads in sea ice to the energy balance and ice formation in the Weddell Sea, J Geophys. Res.., 105(C6), 14045 - 14060.

Geiger, C.A., S.F. Ackley, and W.D. Hibler III, 1998.
Sea ice drift and deformation processes in the western Weddell Sea, in Antarctic sea ice physical processes, interactions and variability, Antarct. Res. Ser., (Ed. M.O. Jeffries), 74, 141 - 160, AGU, Washington, D.C.

Geiger, C.A., and M.R. Drinkwater, 2000.
Temporal and spatial sampling of meso- to large-scale sea ice deformation in the Weddell Sea, Scaling effects in ice mechanics and dynamics, Kluwer, 12pp. (submitted).

Haas, C., 2001:
The seasonal cycle of ERS scatterometer signatures over
perennial Antarctic sea ice and associated surface ice properties and
processes. Annals of Glaciology 33, 69-73.

Harms, S., E. Fahrbach, and V.H. Strass, 2000.
Ice transport in the Weddell Sea, J. Geophys. Res. (accepted)

Heil, P., V.I. Lytle, and I. Allison, 1998.
Enhanced thermodynamic ice growth by sea ice deformation, Ann. Glaciol. , 27, 433 - 437.

Heil, P., and I. Allison, 1999.
The pattern and variability of Antarctic sea-ice drift in the Indian Ocean and Western Pacific sectors, J. Geophys. Res., Vol 104 (C7),15789 - 15802.

Heil, P., I. Allison, and V.I. Lytle, 2000.
The Impact of Deformation on the Local Sea-Ice Growth Rate and Thickness in the East Antarctic Sector, Scaling effects in ice mechanics and dynamics, Kluwer, 16pp. (submitted).

Heil, P., C.W. Fowler, J. Maslanik, W.J. Emery, and I. Allison, 2000.
A comparison of East Antarctic sea-ice motion derived using drifting buoys and remote sensing, Ann. Glaciol., 33, 6pp. (accepted).

Hibler, W.D. III, P. Heil, and V.I. Lytle, 1998.
On simulating high frequency variability in Antarctic sea-ice dynamics models, Ann. Glaciol., 27, 443 - 448.

Kwok, R., A. Schweiger, D.A. Rothrock, S. Pang, and C. Kottmeier, 1998.
Assessment of sea ice motion from sequential passive microwave observations with ERS and buoy ice motions, J. Geophys. Res., 103(C4), 8191 - 8213.

McPhee, M., J. Morison, and C. Kottmeier, 1999.
Ocean heat flux in the Central Weddell Sea during winter, J. Physical Oceanogr., 29(6), 1166 - 1179.

Padman, L., and C. Kottmeier, 2000.
High-frequency ice motion and divergence in the Weddell Sea, J. Geophys. Res., 105 (C2), 3379 - 3399.

Timmermann, R., P. Lemke, and C. Kottmeier, 1999.
Formation and maintenance of a polynya in the Weddell Sea, J. Geophys. Res., 29(6), 1251 - 1264.

Uotila, J., T. Vihma, and J. Launiainen, 2000.
Response of theWeddell Sea pack ice to wind forcing, J. Geophys. Res., 105, 1135-1151.

Vihma, T., J. Launiainen, and J. Uotila, 1996.
Weddell Sea ice drift: kinematics and wind forcing, J. Geophys. Res., 101 (C8), 18279 - 18296.

Vihma, T., J. Uotila, B. Cheng, and J. Launiainen, 2000.
Surface Heat Budget over the Weddell Sea: Buoy results and comparison with large scale models, J. Geophys. Res., submitted.

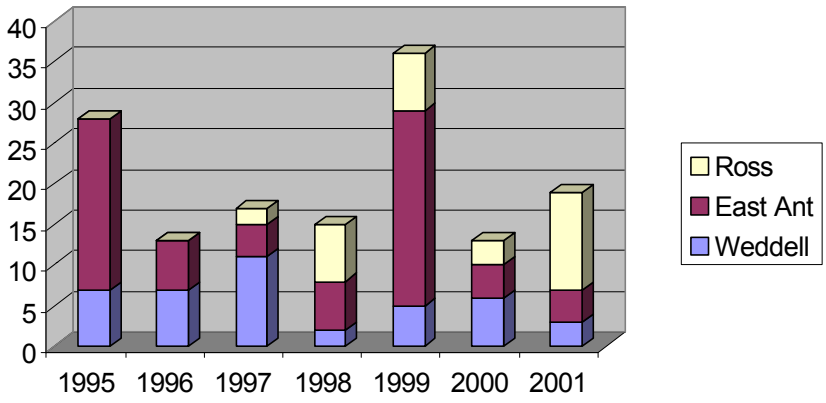


Fig. 1a – new buoy deployments per year 1995-2001

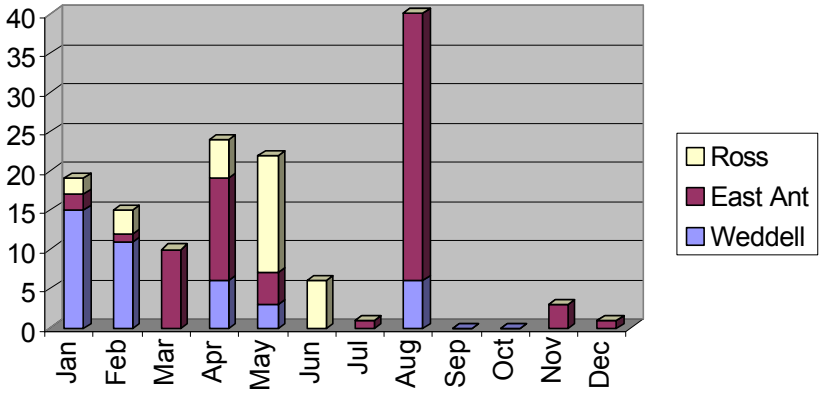


Fig. 1b – new deployments by month 1995-2001

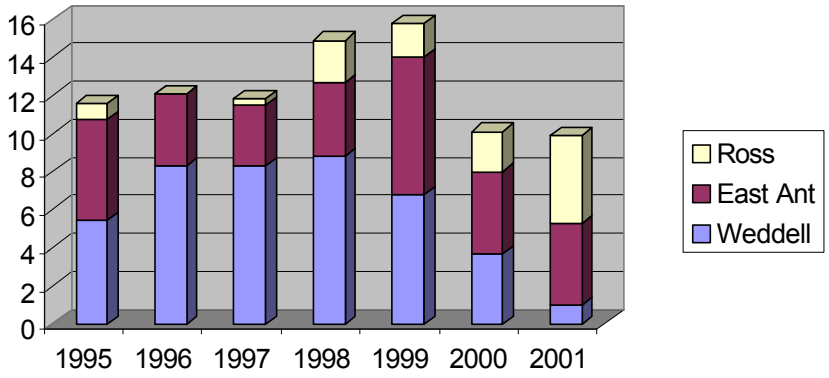


Fig. 2a – average number of active buoys per year 1995-2001

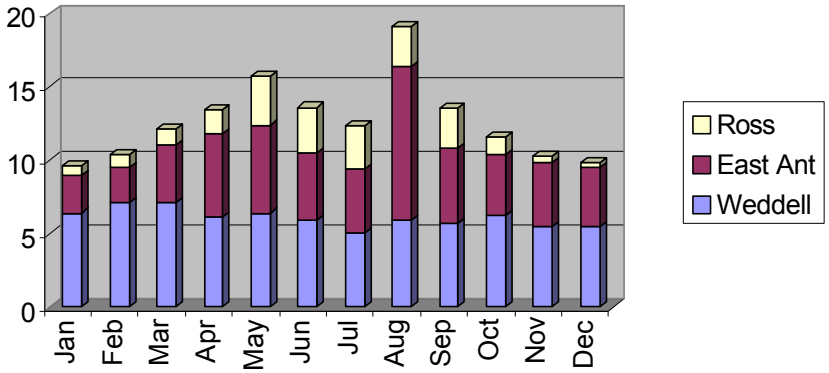


Fig. 2b – average monthly distribution of active buoys 1995-2001

4 Current activities.

After a relatively slow 2000, deployments of buoys contributing to IPAB in 2001 sum up to 19 instruments at October 2001. 3 buoys were deployed in the Weddell Sea, 4 off East Antarctica, 12 in the area between 170 E and 60 W, i.e. that of the Bellingshausen, Amundsen and Ross Seas.
At October 2001, the total number of active IPAB buoys in 2001 amounts to 25, 21 of which are equipped with an air pressure sensor, and 19 of which report their data via the GTS.
Given the current membership and/or intent status, this figures are just slightly lower than the number of contributing instruments the Programme expects for the next years.

Enrico Zambianchi
IPAB Chairman

October 2001

APPENDIX A
IPAB Participants at October 2001

Alfred Wegener Institut (Germany)
Australian Antarctic Division (Australia)
British Antarctic Survey (UK)
Finnish Institute for Marine Research (Finland)
Geophysical Institute,University of Alaska (USA)
Institut fur Meteorologie und Klimaforschung, Universitaet Karlsruhe (Germany)
National Ice Center (USA)
National Snow and Ice Data Center (USA)
Programma Nazionale di Ricerche in Antartide (Italy)
Scott Polar Research Institute (UK)
Service Argos (France)
South African Weather Bureau (South Africa)
Tasmania and Antarctica Regional Office, Australian Bureau of Meteorology (Australia)
United Kingdom Meteorological Office (UK)

REPORT OF THE INTERNATIONAL BUOY PROGRAMME FOR THE INDIAN OCEAN (IBPIO) - 2001

1. INTRODUCTION

The International Buoy Programme for the Indian Ocean was formally established at a meeting in La Reunion, in 1996. The primary objective of the IBPIO is to establish and maintain a network of platforms in the Indian Ocean to provide meteorological and oceanographic data for both real time and research purposes. This task includes support to the World Weather Watch Programme (WWW), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP), the Global Ocean Observing System (GOOS), tropical cyclone forecast and monitoring, as well as to the research activities of participating institutions.

The programme is self-sustaining, supported by voluntary contributions from participants in the form of equipment, services (such as communications, deployment, storage, archiving, coordination...).

To date, five organizations are formally participating in the International Buoy Programme for the Indian Ocean.

- Bureau of Meteorology (BoM), Australia;
- Global Drifter Center of NOAA/AOML (GDC), USA;** (see note below)
- Meteo-France;
- National Institute of Oceanography (NIO), India; ** (see note below);
- South African Weather Bureau (SAWB).

**Note: Navoceano (USA), and the National Institute of Ocean Technology (NIOT), India, have also provided significant active support to the IBPIO, and are expected to become formal participants in the near future.

2. PROGRAMME MEETING

The fifth Programme Committee meeting of the IBPIO will be held in Perth, Australia, from the 17th to the 18th of October 2001, prior to the DBCP meeting.

3. OPERATIONAL PROGRAMME

3.1 Drifting buoys

About **75 drifting buoys** have been deployed from September 2000 to August 2001. Ninety percent of them have been lagrangian drifters and 45% have been measuring air pressure (AP).

Year	SVP	SVP-B	SVP-BW	FGGE	FGGE-W	Other	Total
1996-97	30	42	0	5	3	0	80
1997-98	1	21	2	6	7	6	43
1998-99	67	55	1	4	2	5	134
1999-00	48	49	4	3	0	2	106
2000-01	42	26	0	5	3	0	76

Table 1. Number of drifting buoys deployed in IBPIO according to their type

In practice, participants contributed to the programme in various ways during this period: provision buoys and drifters (BoM, GDC, Meteo-France, Navoceano and NIO) ; funding of barometer upgrades

to SVP drifters provided by GDC (BoM and Meteo-France) ; deployment arrangements (all) ; coordination (Meteo-France) and data transmission (Meteo-France and SAWB).

As for previous years, many deployments were carried out by research vessels and ships of opportunity plying the Indian Ocean from many ports such as Perth (Australia), Goa (India), Durban and Cape Town (South Africa) and La Reunion. Some ship voyages to remote islands were also used, for deployments in the southern latitudes: Heard I. from Australia; Amsterdam I., Kerguelen and Crozet Is. from La Reunion and Marion Is. from South Africa. 38% of the buoys were deployed by air, thanks to Navoceano.

Year	1996-97	1997-98	1998-99	1999-00	2000-01
Ship	54	27	110	76	47
Air	26	16	24	30	29
% Air	33%	37%	18%	28	38
Total	80	43	134	106	76

Table 2. Number of drifting buoys deployed in IBPIO
According to their way of deployment

By the end of August 2001, **the number of operating buoys carrying out AP measurements is 58** (out of 115). This number has been stable since November 2000. It represents double that achieved in mid-1999, and is the highest since the start of IBPIO. The fact that only 34 buoys of that kind were deployed over the past 12 months shows that their mean lifetime is increasing and that there are fewer premature failures than in the past.

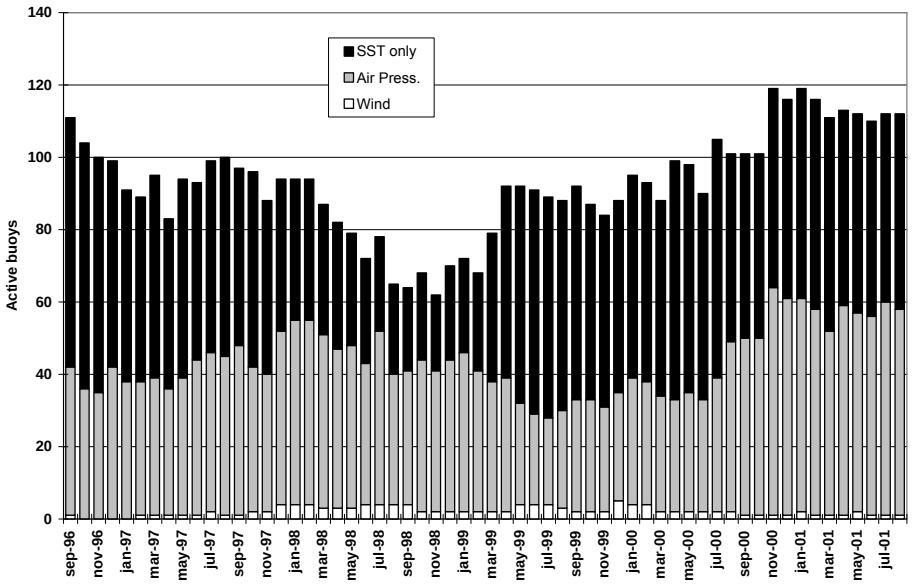


Figure 1. Number of drifting buoys operating in IBPIO
according to the parameters they measure

The number of buoys measuring SST only - in addition to their position - has been stable since April 1999 (~56 buoys in average). The number of drifting buoys measuring wind speed and wind direction in IBPIO remains marginal (less than two on average).

Some buoys, owned by SAWB and GDC, migrate from the South Atlantic Ocean, westerly driven to the Indian Ocean. This flux (10 buoys from Sept. 2000 to Aug. 2001, including 3 owned by SAWB) is

more or less compensated by the escape of other buoys to the south of Australia (5 buoys, mainly owned by BoM, during the same period).

Owner	SST only	Air Pressure	Wind
Australian Bureau of Meteorology	-	6	-
Global Drifter Center	52	29	-
Météo-France	-	2	-
National Institute of Oceanography	1	4	-
Navoceano	1	12	-
South African Weather Bureau	-	4	1
Total	**54**	**57**	**1**

Table 2. Operating drifting buoys by the end of July 2001

All drifting buoys are using the Argos system to report their data. Most of them are fitted with the DBCP-M1 format which significantly increases the availability and the timeliness of the data onto the GTS.

3.2 Moored buoys

The National Institute of Ocean Technology (NIOT), India, operates a network of 12 moored buoys in Indian waters. Seven of them were operational on August 31st, 2001. Data transmission is via the Inmarsat system. Surface meteorological parameters have been sent on the GTS in "FM 18 BUOY" code through the Indian Meteorological Department since mid-2000. Bulletin headers are SSVX01 DEMS. The number of BUOY reports transmitted for each buoy should increase in the next months. The transmission delays should also be reduced.

The IBPIO participants were informed by the Japan Marine Science and Technology Center (JAMSTEC) that two TRITON buoys should be deployed in the eastern tropical Indian Ocean in November 2001. Nominal positions are 1.5°S – 90°E and 5°S – 95°E respectively.

4. PLANS

IBPIO participants are continuously encouraged to increase their contributions of buoys, or to fund barometers to equip SVP drifters provided by GDC. For the sixth consecutive year, Meteo-France is funding 10 barometers for the Indian Ocean in 2001. This number should increase in 2002. BoM has also been funding 10 barometer upgrades per year since 2000. This action will be renewed in 2001/2002.

4.1 Tropical regions

Efforts are mainly aimed at filling data gaps in the tropical regions, mainly during the cyclone seasons. In the southern tropical area, air deployments of SVP-B drifters, done at least once a year by Navoceano in November, should continue in the next few years. These buoys are provided by NOAA/GDC, and 10 barometers are funded by Meteo-France each year. Further east, BoM plans to deploy 3 buoys with wind measurement capabilities in the northwest of Australia, for the next tropical season. NIO plans to continue to provide and deploy about 15 SVP-B drifters plus three buoys fitted with wind sensors, in the Arabian Sea and in the Gulf of Bengal.

4.2 Southern seas

In the Southern part of the Indian Ocean, the deployment of SVP-B drifters provided by Meteo-France and GDC (with barometer upgrades funded by BoM) will continue thanks to RV Marion Dufresne during her rotations between La Reunion, Crozet, Kerguelen and Amsterdam islands. Meteo-France

plans to fund 5 more SVP drifters for this region. As for 2001, some opportunities will also be found from Cape Town (RV Agulhas) and Fremantle (merchant ships, RV Shirase). BoM plans to upgrade 10 SVP drifters to be deployed in this area in the next 12 months. It also will provide 4 other buoys.

As for the previous years, GDC will be the main contributor to the IBPIO. Many drifters are standard SVP. They measure SST only in addition to the surface current deduced from their move. GDC also funds barometer upgrades to a significant number of its drifters.

5. INFORMATION ON THE IBPIO

IBPIO information is available on the World Wide Web at *http://www.shom.fr/meteo/ibpio*. The main pages give a description of the programme, its objectives and management, listings of participants and links to related subjects such as DBCP data quality control information. Some pages are updated monthly with buoy status, buoy trajectories, data availability charts, deployment log.

A promotional leaflet on the IBPIO can be obtained from the Chairman or the Programme Coordinator.

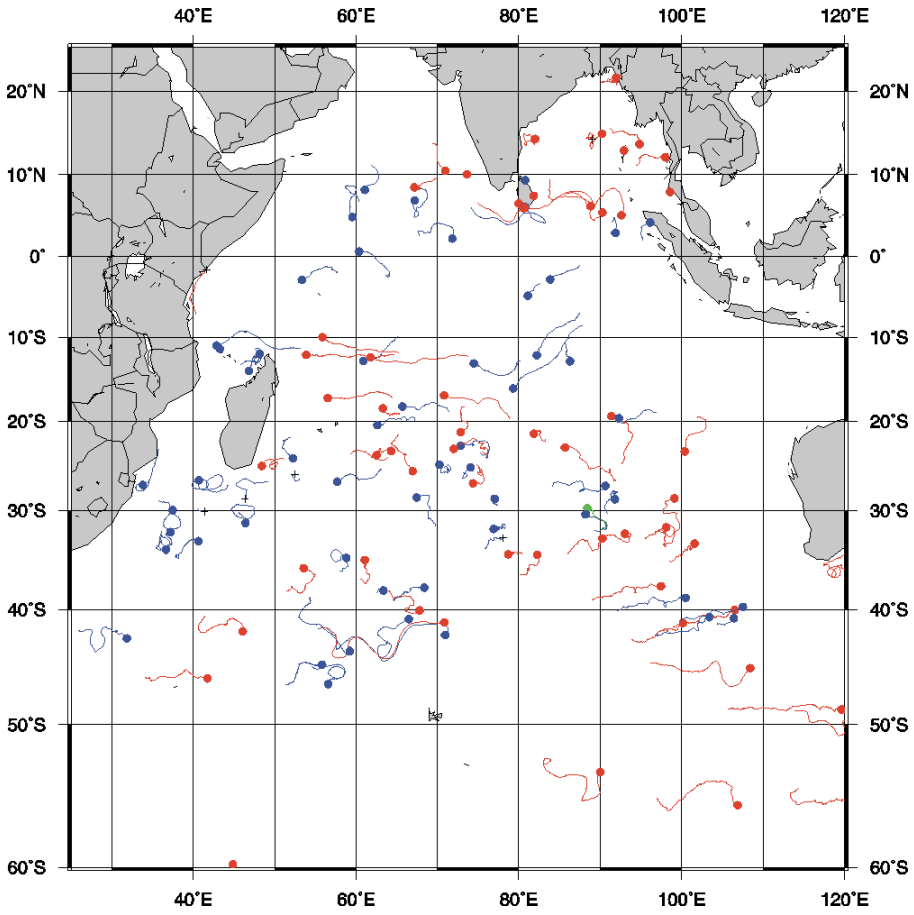


Figure 2. Buoys drifting in the Indian Ocean - August 2001

INTERNATIONAL SOUTH ATLANTIC BUOY PROGRAMME
Report to the 17th Session of the Data Buoy Cooperation Panel
Perth, Australia, 22-26 October 2001

1. INTRODUCTION

The International South Atlantic Buoy Programme (ISABP) was established in 1993at a meeting in Buenos Aires, Argentina, in order to address the problem of data sparseness in the South Atlantic Ocean. The main objective of ISABP is to establish and maintain a network of platforms in the Tropical and South Atlantic Ocean in order to provide meteorological and oceanographic data for both real-time and research purposes. The task includes support to the World Weather Watch Programme (WWW), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP), the Global Ocean Observing System (GOOS), as well as to the research activities of participating institutions.

2. PARTICIPANTS TO ISABP

The following are organisations or institutions who are participating in the program.

• Servicio Meteorologico Nacional	Rep. of Argentina
• Servicio de Hidrografia Naval	Rep. of Argentina
• The Met Office	United Kingdom
• Atlantic Oceanographic and Meteorological Laboratory	USA
• National Data Buoy Center	USA
• The Meteorological Service	Namibia
• Directoria de Hidrografia e Navegacao	Brazil
• South African Weather Service	South Africa
• Marine and Coastal Management	South Africa
• MEDS	Canada
• CLS/Service ARGOS	France/USA
• Instituto Nacional de Meteorologia(INMET)	Brazil
• Naval Meteorology and Oceanography (COMNAVMETOCCOM)	USA
• Caribbean Meteorological Organisation	Caribbean
• National Space Research Institute (INPE)	Brazil
• Marine Hydrophysical Institute of National Academy of Science of Ukraine	Ukraine

The programme is open to any institution interested and committed to the objectives and operating principles of the programme. It is self-sustaining and supported by voluntary contributions from participants in the form of equipment (buoys) and/or services such as communications, storage, deployments, data archiving and co- ordination.

3. ANNUAL MEETING

The eight International South Atlantic Buoy Programme meeting was held at the National Fisheries Research Institute facility in Mar del Plata, Argentina. The meeting was hosted by the Naval Hydrographic Office, Argentina. A Technical and Scientific workshop preceded the meeting during which 11 papers were presented, covering a wide spectrum of applications, including Meteorology, Oceanography, Satellite communications and buoy manufacturing. During the meeting the status of the LUT's in the South Atlantic were discussed, while the importance of Quality control was emphasized.

During the meeting Alaor Moacyr Dall' Antonia Jr from Brazil was re-elected as chairman and Javier Valladares from Argentina as vice-chairman. Louis Vermaak from South Africa was re-appointed as Programme Co-ordinator. The steering committee also proposed a joint meeting with the International Programme for the Antarctic Buoys (IPAB) in Cape Town, South Africa in 2002.

4. OPERATIONAL PROGRAMME

4.1 DATA COVERAGE IN THE ISABP AREA

The data coverage in the ISABP area are good at this moment but are constantly coming under threat. In the mid Atlantic there are still big gaps. The Programme Committee, thanked the participants who have put effort into maintaining the network, by either deploying buoys or deploy buoys on behalf of other organizations. It is however of concern that the array of buoys providing pressure data is gradually decreasing.

In the area south of 20S there are still a good array of SVP and SVPB in this area. The large gap that existed east of Argentina in the previous period has been addressed. A gap are also visible south of 50S but it remains a challenge to any institution to deploy drifters that far south due to the danger of pack ice.

In the area between 20S and 10N large gaps exist in the area. The PIRATA array exist near the equator. It remains a challenge to deploy more drifters over the eastern parts of the Tropical Atlantic Ocean.In the area 10N to 20N there are a good array of SVP and some SVP-B drifters in the area, with a gap from the West Coast of African to 20W. The Programme Committee thanked GDP for the deployments in this area with special consideration to the hurricane season.

4.2 DRIFTING BUOY DEPLOYMENTS

The Global Drifter Center deployed or arranged the deployment of a total 148 drifters during the inter-session period. This consists of 119 SVP, 10 SVP-G (GPS), 17 SVP-B and 2 SVP-BWD drifters. All these deployments were done from ships of opportunity.

In the Tropical Atlantic region north of 10S, GDC deployed 105 SVP drifters, 10 SVP-G, 6 SVP-B and SVP-BWD drifters. The US Naval Oceanographic Office air deployed 6 SVP-BWD and 12 SVP drifters.

The rest of the SVP drifters were deployed further south by ships of opportunity , for example the SA Agulhas, Nolizwe and Falklands/Malvines.

The South African Weather Service deployed in total 41 drifters in the inter-session period of which 26 is in the South Atlantic. 10 SVP-B and 16 SVP drifters. These were done from the SA Agulhas. The Weather Service experienced some failures with the SVP-B drifters.

Brazil deployed 9 drifters and 2 fixed buoys. They also recovered one drifter. They also experienced some difficulties. One of the moored buoys sensors was damaged during a storm. They continue to have problems with fishermen tampering with the drifters.

4.3 FIXED STATIONS

There are fixed stations on virtually all Island stations in the ISABP area, with a few problems at some of the stations.

- The SA Weather Service reported that the installation of the AWS on Southern Thule was not successful and will be replaced by a anchored SVP-B.
- The anchored SVP-B drifter on Tristan da Cunha is operating well.
- Brazil's program is already involved in the installation of two Automatic Weather Stations. One of those will be used as a reference station for the moored buoys.
- All other stations are operating well and good data is being received.

4.4 DATA RECEPTION AND DISSEMINATION

The South African Weather Service is operating two LUT"S on Gough and Marion Islands and are operating well. Unfortunately only South Africa is receiving the processed data due to bandwidth

limitations. The Weather Service will continue to find a solution for the problem. This will enable the Weather Service to send the raw data from the Islands directly to ARGOS to be processed and distributed on the GTS.

The hardware/software for a LUT was installed on the Falkland/Malvines early in 1999, but due to technical problems with communications the LUT is still not operational. The UK Met Office is presently installing the necessary internet connections so that the data can be send by e-mail to Argos, via Bracknell. The UK Met Office is optimistic that the system could be operational by the end of this year.

After a successful agreement between Argos and Argentina data is now also being disseminated from the LUT in Argentina.

All data is recovered through the Argos system and sent on the GTS via the processing centres of Toulouse and Landover,

4.5 DATA QUALITY CONTROL

Buoy program owners are encouraged to develop methods to do quality control on data from their platforms. Any anomalies must be corrected as soon as possible as incorrect data not only effects local weather forecasting but also the numerical models. There are various QC tools available on the internet for example, DBCP, MEDS and Meteo-France.

5. INFORMATION ON THE ISABP

ISABP information is available at: http://dbcp.nos.noaa.gov/dbcp/isabp/.
The pages, regularly updated, give a description of the programme, its objectives and management, listing of participants and meeting reports.

6. CONCERNS AND RECOMMENDATIONS

All participants continue to be concerned by the gradual decrease in barometer drifters in the South Atlantic. Programs were encouraged to make more use of the offer from the USA to upgrade NOAA drifters. Participants are also concerned about the high processing costs, which limit their participation in the program.

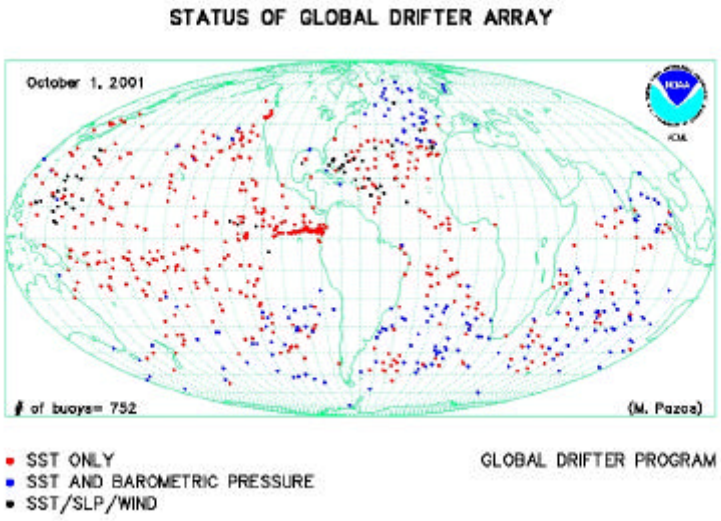
Participants were encourage to continue canvassing participation from other countries in the South Atlantic region.

Report on NOAA's contribution to Global Drifter Program in 2001

(By Craig Engler, NOAA/AOML/GOOS Center)

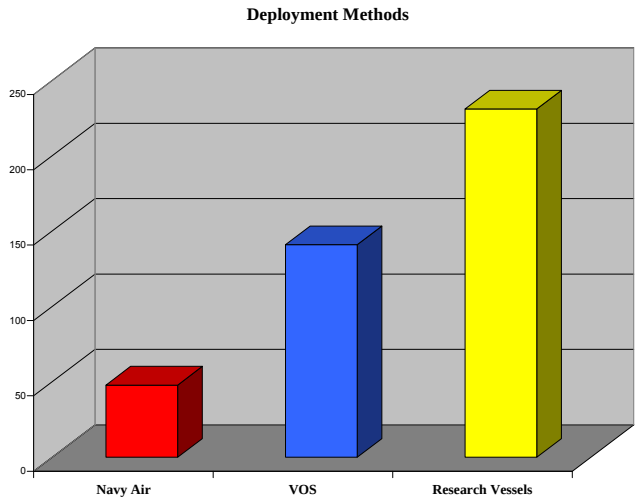
1. INTRODUCTION

The **Global Drifter Program (GDP)** is a branch of NOAA's Global Ocean Observing System (GOOS) Center located at the Atlantic Oceanographic and Meteorological Laboratory (AOML) in Miami, Florida. The objective of the GDP is to maintain a global array of ARGOS tracked Lagrangian or Surface Velocity Program (SVP) Drifters to meet the need for an accurate and globally distributed set of in-situ sea-surface temperature (SST) and surface velocity observations. The GOOS Center attempts to maintain a distribution of Drifters within a five degree by five degree array. The data from the drifter array supports short-term (seasonal-to-interannual) climate predictions as well as climate research and monitoring.



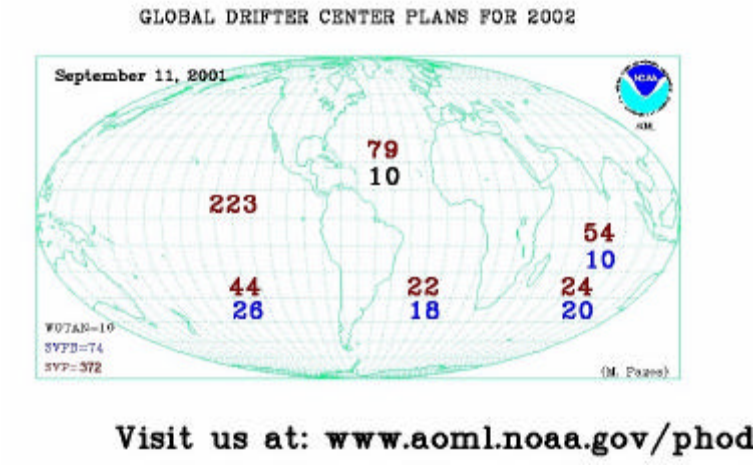
2. OPERATIONAL PROGRAM

A total of 402 buoys were deployed between October 2000 and September 2001. 39 of the SVP buoys had been upgraded with a barometer sensor. The Australian Bureau of Meteorology, Meteo-France, New Zealand Met Service and NOAA/SIO funded the barometer upgrades. Ten were specialized BP/WSD buoys that report Barometric Pressure, Wind Speed and Wind direction in addition Sea Surface Temperature and position. This information is transmitted on the GTS to support hurricane forecasting. Naval Aircraft, Research Vessel, and Voluntary Observation Ships were utilized to deploy the drift buoys.



3. PLANS

Plans are to deploy 446 drifters between October 2001 and September 2002. A number of SVP buoys are being upgraded with barometers. Ten SVP buoys will be upgraded with Barometers by Meteo-France, 40 by NOAA/SIO, ten by the Australian Bureau of Meteorology, eight by the South African Weather Service and ten by the New Zealand Met Service. Additionally, ten Barometer and Wind Speed/Direction (BP/WSD) Drifters will be deployed in the Hurricane formation region of the tropical Atlantic Ocean. Efforts will continue to deploy Drifters in data sparse regions of the world by working with the other organizations within the DBCP.



4. INFORMATION ON THE GDP AND BAROMETER UPGRADE OPPORTUNITY

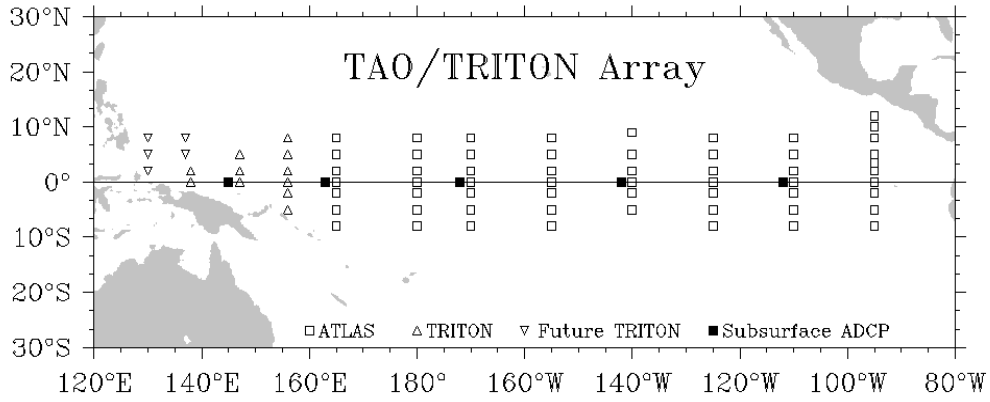
GDP information is available on the World Wide Web at http://www.aoml.noaa.gov/phod/dac/. The GDP also provides an opportunity for Meteorological agencies to add Barometers to SVP drifters deployed in the Southern Ocean. More information can be found on the DBCP website under SVPB Upgrade Opportunity link http://dbcp.nos.noaa.gov/dbcp/.

Tropical Moored Buoy Implementation Panel (TIP)
Report to the 17th Session of the Data Buoy Cooperation Panel
Perth, Australia, 22-26 October 2001

The TAO/TRITON (Tropical Atmosphere Ocean/Triangle Trans-Ocean Buoy Network) moored buoy array is a central component of the ENSO Observing System, deployed specifically for research and forecasting of El Nino and La Nina. The present composition of TAO/TRITON consists of 55 ATLAS moorings maintained by PMEL (Pacific Marine Environmental Laboratory), 10 TRITON moorings maintained by JAMSTEC (Japan Marine Science and Technology Center), and 5 subsurface ADCP (Acoustic Doppler Profiler) moorings (4 maintained by PMEL and 1 by JAMSTEC). Two additional sites of the TAO/TRITON array at 8EN and 5EN, 137EE will be occupied by TRITON moorings in October 2001.

In addition to the core moorings of the area, there are several moorings deployed or planned as enhancements. Among those presently deployed are 3 ATLAS moorings along 95EW (at 12EN, 10EN and 3.5EN) for the Eastern Pacific Investigation of Climate Processes (EPIC) and a TRITON mooring at 0E 138E. TRITON moorings will be deployed along 130°E in October 2001 (2°N) and in 2002 (5°N, and 8°N). Two TRITON moorings will also be deployed in the Indian Ocean in October 2001.

Conversion of all PMEL moorings from standard ATLAS to Next Generation ATLAS technology will be completed by December 2001. Next Generation ATLAS moorings provide higher



temporal resolution (10-min sample rates) for both surface measurements (wind speed and direction, air temperature, relative humidity and sea surface temperature) and subsurface temperatures. In addition, they provide the option of enhanced surface (rainfall, short and long wave radiation, barometric pressure) and subsurface (salinity, currents) measurements. At present, salinity and rainfall sensors are deployed on 28 ATLAS moorings, short wave radiation sensors on 17 moorings, current meters on 14 moorings, barometric pressure on 13 moorings and long wave radiation on 10 moorings.

The analysis of data from a two-month long, land-based intercomparison of TAO, TRITON and WHOI-IMET surface instrumentation conducted in the summer of 2000 is continuing. Initial examination indicates that data from the three systems compare well. A detailed description of the intercomparison and analysis of the data will be published as a technical report.

TAO/TRITON data return remains good, with an overall value for real-time data availability of over 80%. Damage to moorings and sensors due to fishing activity continues to be of concern. This damage accounts for a significant amount of data loss, especially in the far eastern and far western portions of the Pacific basin.

PIRATA (Pilot Research Moored Array in the Tropical Atlantic) is beginning a 5-year (2001-2006) consolidation phase during which the pilot array will be continued in a 10-mooring configuration and evaluated for its utility in support of research and operational forecasting.

Vandalism continues to be of concern, especially in the Gulf of Guinea. PIRATA data return is lower than for TAO, mainly because of vandalism and maintenance cruises; TAO moorings are routinely serviced on a semi-annual schedule, while PIRATA moorings are limited to annual maintenance.

An International Workshop for Review of the Tropical Moored Buoy Network was conducted at PMEL on September 10-12, 2001 under sponsorship of International CLIVAR, the IOC/WMO OOPC, and the TIP. The workshop was attended by about 40 participants representing the research community and operational weather and climate forecasting communities from the United States, France, the United Kingdom, Japan, Peru, Chile, Germany, India, and South Africa. Unanimous support for the tropical moored buoy network in the Pacific and for the development of PIRATA in the Atlantic was expressed by the workshop participants. National initiatives to develop moored buoy programs in general were commended and encouraged, especially in light of emerging plans for expansion into the Indian and southeast Pacific Oceans. The scientific rationale for making these measurements as a foundation for improved understanding and prediction of seasonal to interannual climate variability was reiterated. It was also noted that these networks provide the backbone for a global ocean observing system and a framework for conducting process studies. Additional discussion points included possible adjustments in sampling strategies in terms of vertical, horizontal and temporal resolution of the measurements; enhanced capabilities for air-sea flux, salinity, currents, and CO2 measurements; and the development metrics to quantify the value of the moored time series data for climate forecasting.

In the past year, the TIP was reorganized and reconstituted as the Tropical Moored Buoy Implementation Panel. The panel is now responsible for co-ordination and implementation of moored buoy programs in all three tropical ocean regions as part of an integrated approach to observing the climate system. The new TIP, like the old, is sponsored by CLIVAR, GOOS, and GCOS, and will address both research and operational objectives; it likewise remains an action group of the DBCP. The Chair is appointed through an agreement between the sponsoring groups, and is currently Michael McPhaden of NOAA/PMEL. Attendance at TIP meetings will be open to all interested parties. However, to ensure proper co-ordination with CLIVAR research initiatives, four CLIVAR representatives have been designated (currently from Brazil, France, Japan and South Africa). A first meeting of the new TIP to discuss organizational issues was held in Seattle coincident with the moored buoy review workshop in September 2001.