Summary Report of the Second Annual Meeting of the International Arctic Buoy Program Oslo, Norway, 2-4 June 1992

1. Opening of meeting.

   Brian O'Donnell, Chairman of the Program, opened the meeting. Thanks were expressed to the Norske Polarinstitutt for hosting the meeting. Special thanks were also expressed to WCRP and WWW for their assistance. The list of attendees is given in Attachment 1.

   Nils Are Øritsland, Director of the Norske Polarinstitutt (NP), addressed the meeting with his personal views concerning the importance of sharing and coordinating facilities, planning priorities, and of keeping abreast with modeling efforts being made in other fronts in the world so that we might guard against developing isolated camps.

2. Approval of agenda

   The agenda as approved is given in Attachment 2.

3. Approval of minutes of first annual meeting

   The minutes of the first annual meeting were reviewed and approved.

   List of Original Participants (attachment 2 of the minutes of the first meeting): It was agreed that a new list of participants will be prepared each year at the annual meeting.

   The List of Participants in IABP as of June 1992 is attached to these minutes as Attachment 3.

4. Review of the Principles of the Program

   IABP Operating Principles (attachment 4 of the minutes of the first meeting). The following changes were agreed on:

   #2. Objective, line 5. Insert "Program" before acronym (WCRP); line 6, delete "s" to read "Program" after acronym (WWW).

   #3. Program Principles, 3.2, second line. Insert acronym (GTS) after "System".

   #6. Data Achieving, 6.1. Operational Achieving, second line. Insert acronym (MEDS) after "Service"; 6.2. Research Data Base, fourth line: replace "Centers A & B: Glaciology" with "Centers A (Glaciology) & B (Sea Ice)"

   #9. Glossary. The question was raised of whether the variable "position" (buoy location) should be placed in # 4.2 Variables. It was agreed that the present order was more favorable in case the participants wish to add other variables later.

The extent to which IABP should have a more active role in other programs was discussed. Members agreed to insert an addition to the Operating Principles:

3.5 Cooperate with and provide results of the Program to other related programs.

The question was raised regarding individual vs. common ownership of buoys. At the first meeting it was decided that the participants would own their own buoys. No change was made.

5. Coordinator's report.

A three-part proposal has been sent to NOAA to secure funding for the following activities: Coordinating and administrative business of IABP, maintenance of the scientific archive of buoy data, and liaison with scientific community to coordinate data with IABP. It is anticipated that funding for the coordinator's activities will begin September 1992.

R. Colony described the required activities of the coordinator:

- Publishing of annual data reports.
- Mailing of monthly buoy status charts.
- Achieving of all available raw Argos data.
- Providing information about buoy designs, including a handbook giving physical descriptions and the variables monitored.
- Providing liaison with MEDS for monitoring of data availability on GTS as well as possible access to the data.

Appreciation and praise was expressed to R. Colony for the good work done as Coordinator.

T. Kvinge raised the question of the need for in situ intercalibration of equipment. Long-term unattended testing has not been done by IABP, which would be dependent upon buoy configuration. D. Benner suggested that Participants consult CRREL (Cold Regions Research and Engineering Laboratory), New Hampshire, USA, regarding advice on, and possible assistance with calibration of buoys.

6. Regional Action Group, Drifting Buoy Cooperation Panel.

B. O'Donnell gave the background to and results of the request to be a regional action group of the DBCP, and of the implications of this. The possible establishment of an IABP common fund was raised. P. Dexter (WWW/WMO) informed participants on the operation of the DBCP and EGOS trust funds, which have been established by WMO on behalf of these bodies. T. Kvinge explained how the trust fund system functions for EGOS.

It was decided that the Chairman should request WMO to establish a trust fund account for the IABP and that participants should contact the Chairman regarding the process for making financial contributions to this trust fund in support of the Program. It was agreed that the Chairman could authorize payments from this trust fund, on behalf of the Participants and in consultation with the Executive. A statement of account for the trust fund should be provided for approval of the Participants at each annual meeting. It was further agreed that IABP financial arrangements should be formally included in the Operating Principles, and the Chairman was requested to provide an amendment to this effect, for consideration at the next annual meeting.

7. <u>Status of Membership Roll</u>
R. Colony gave an overview of future partners interested in being advised of IABP activities. The list is presented in Attachment 4.

8. <u>Status reports from Participants</u>
In a round table discussion each participant gave a brief, general presentation. R. Colony commented that some of the buoys in the Arctic area are not part of the IABP (e.g. 6 German Buoys and 2 from Woods Hold Institute, the latter which we are working to get on GTS).

9. <u>Overview of NP Program by N.A. Øritsland</u>
Director N.A. Øritsland spoke briefly on the history of the Norske Polarinstitutt, the Institute’s advisory, mapping and research functions in both the Arctic and Antarctic polar areas, and the building up of an international research station in Ny Alesund, Svalbard.

10. <u>New Business</u>

a. <u>Data distribution via GTS and the new Argos GTS Processing Chain</u>
A general discussion developed around the current use of the GTS for distributing data from IABP buoys. The need for an updated list identifying GTS bulletin headers for IABP data, as well as information on each IABP buoy reporting on the GTS, was agreed. The Coordinator, WMO Secretariat and the Technical Coordinator MBCP were requested to coordinate to provide such a list, and also to survey operational users of IABP data, to ensure that they are aware of and receiving all such available data through the M. The coordinator agreed to include the list of IABP GTS bulletin headers, as well as Local Users Terminal (LUT) sources, in his monthly status report.
C. Ortega presented the new Service Argos GTS Processing Chain functions, which should be operative in January 1993. They will give increased capacity for raw data assimilation and make it possible to process different synoptic data inserted in the same message.

b. <u>Discussion on Quality control of data (operational)</u>
E. Charpentier laid forth two items to be considered:

i. who is responsible for asking Service Argos to make buoy status changes when necessary on the GTS, and

ii. if there is any Centre or Participant willing to undertake quality control procedures on behalf of the IABP in order to propose such status changes.

Regarding item (i.) it was agreed that this should be a Principal Investigation function. Regarding item (ii.), data quality control can be taken as a recommendation and the Coordinator and Chairman were requested to come with a specific proposal for the next general meeting.

Valid points were made concerning the importance of receiving a current plan of buoy deployments. Specific methods for filling gaps are worthy of discussing at the annual meeting. Several of the apparent network "gaps" will be filled during the summer 1992 deployments. According to the situation and planning at the time of the first annual meeting, IABP is pretty much on schedule. It was agreed that three maps showing: the current (spring '92) array, those buoys currently on the GTS, and the planned buoy network would be attached to these minutes (Attachment 5 a, b, c)

c. Recommendations for increased data transmission capability on Argos

D. Benner set forth problems with the present transmission capacity of Argos: higher location accuracy requirements, increased number of sensors per platform, and error checking during transmission window. Accuracy is adequate when considered with the present capability of handling large quantities of data. Fifteen of 44 buoys presently in operation in the Arctic are using the full 32 eight bit word capacity. This indicates that the present Argos data transmission capacity may not be adequate for some applications.

The changes planned over the next couple of years by Services Argos, at the request, and with support of the DCBP, specifically the new GTS Processing Chain, will overcome some of the problems.

d. Use and requirements for surface air temperature observations

R. Colony briefly gave the background on the problems associated with putting air surface temperature data on GTS. He raised two questions for discussion:

i.) How do the operational users regard buoy temperature data? and ii.) Should there be any requirements for the quality of temperature measurement put on GTS? V. Savtchenko made reference to the Arctic Climate System Study (ACSYS) Concept Document (WCRP 72 In Publication) which states:

> "The IABP should expand its measurement programme to include accurate, long-term monitoring of surface air temperature from the Argos buoys. The acquisition, quality control and objective analysis of all buoy data from the Arctic Ocean, carried out previously under the Arctic Data Buoy Programme, must be continued by the IABP to meet the needs of ACSYS."

A discussion developed around the importance of specifying accurate air temperature as a part of the IABP as wen the possibility of encouraging participants to use platforms, which are capable of measuring ambient air temperature.

The members discussed the problem of measuring air temperature, the quality and accuracy of the data and its application to operational programs. If these data are unusable, then the members were concerned that the IABP goals are not being achieved. In this respect, the participants concluded that IABP should encourage the development of buoy designs, which would work toward solving these problems, development of new deployment technologies and the sharing of this information among partners and others.

e. <u>Use and requirements for surface wind observations</u>

R. Colony asked if the IABP should recommend the addition of anemometers on those buoys which, may be deployed from ships or ice stations.

Referring again to the ACSYS Concept Document, V. Savtchenko pointed out that the ACSYS ice and ocean modeling strategy is based on the use of in situ observations of atmospheric pressure incorporated into NWP objective analyses of the surface pressure and wind fields.

V. Savtchenko stated that the required accuracy of wind forcing for sea ice and ocean circulation modeling was defined by the Working Group on Sea Ice and Climate, to be 2 m/s. If IABP measurements provide this accuracy then the data are useful and there are no specific recommendations at this time. Members agreed that this accuracy was being achieved from the calculation of wind from pressure data. It was agreed that individual principal investigators should take their own decision on incorporation of wind measurement systems on buoys.

f. <u>Canadian/American 1993 transpolar cruise</u>

R. Colony called attention to this proposed cruise (July/Aug. 1993) as a logistical opportunity for the deployment of buoys with anemometers or other sensors. The cruise will undertake hydrography and ice studies. If funded it runs from the Chukchi Sea to the Fram Strait. Three non-nuclear ice breakers will be used: two from the United States and one from Canada.

R. Colony encouraged individual principal investigators to consider the cruise for buoy deployment.

g. Cruise of Sovetskiy Soyuz

The Stanford Alumni Association is sponsoring this two week cruise to the North Pole on board the Russian nuclear icebreaker Sovetskiy Soyuz. The expedition is led by Stephen Schneider. R. Colony has asked if some buoys could be made available to deploy in the Arctic Basin. D. Benner will attempt to provide one buoy for deployment.

11. Election of Officers and Appointment of Coordinator

In accordance with IABP Operating Principles, elections to the following offices took place on 3 June, 1992, at the second annual meeting:

Executive Committee		Coordinator
Chairman	Brian O'Donnell	Roger Colony
Vice Chairman	Torgny Vinje	
Member	David A. Benner	
Member	Evgeniy G. Nikiforov	

At a meeting of the Executive Committee, it was recommended that the next meeting of the IABP be held at Toulouse, France in June 1993 subject to confirmation from Service Argos.

12. Review of Meetings and Recommendations

The draft report of the meeting was reviewed and revisions made. These minutes will be distributed to members for approval at the next meeting.

13. Technical and Scientific Presentations

Brief Abstracts of the presentations made during the Technical and Scientific Presentations are included as Attachment 6.

14. The meeting ended on Thursday, June 4, 1992.

Attachment 1

List of Attendees Second Annual IABP Meeting
2-4 June, 1992, Oslo, Norway

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Attachment 2

Second Annual Meeting of the
International Arctic Buoy Program
Oslo, Norway, 2-4 June 1992

AGENDA

Tuesday, 2 June 1992
Morning

Main Business Meeting

1. Opening of Meeting and Welcome by Director, Norske Polarinstitutt (N.A. Øritsland)
2. Approval of Agenda
3. Approval of Minutes from First Annual Meeting
4. Review of the Principles of the Program
5. Coordinators Report
6. Regional Action Group, Drifting Buoy Cooperation Panel
7. Status of Membership Roll
8. Status Reports from Participants

Afternoon

Technical and Scientific Presentations

1. Etienne Charpentier, DBCP, “Deferred Time Quality Control Guidelines”
2. Jim Overland, PMEL, “Mesoscale Meteorology in the Arctic”
3. Victor Savtchenko, WCRP, “Arctic Climate System Study (ACSYS)”
4. Roger Colony, PSC, “Monitoring Air Temperature in the Arctic”
5. Torgny Vinje, NT, “The Nansen Centennial Arctic Program”
6. Terry Bryan, OGP, “How to Pay Your
7. Victor Sawchenko, WCRP, “An International Antarctic Drifting Buoy Program”
8. Evgueniy Nikiforov, AARI, “The AARI Buoys”

Wednesday, 3 June 1992
Morning

Main Business Meeting

9. Overview of NP Program by N.A. Øritsland
10. New Business
    a. data distribution via GTS and the new Argos GTS Processing Chain
    b. discussion on.quality control of data (operational)
    c. recommendations for increased data capability on Argos
    d. use and requirements for air temperature observations
    e. use and requirements for surface wind observations
    f. Canadian/American 1993 transpolar cruise
    g. cruise of Sovietskiy Soyoz

11. Election of Officers and Appointment of Coordinator

Afternoon

Technical and Scientific Presentations

1. Odd Rogne, IASC, “International Arctic Science Committee”
2. John Dugan, ONR Europe, “Office of Naval Research, London”
3. David Benner, RC, “Design and Testing a Pick Buoy”
4. Bill Hume, AES, “A Comparison of Data from Two Buoys”
5. Tede Loyning, NP, “Drifting Buoys in the Barents Sea”
6. Thor Kvinge, CMI, “CMI Experience With Arctic Buoys”
7. Sergei Vasiljev, Roscom Hydromet, “Data Exchange”
8. Christian Ortega, Argos, “New GTS Processing Chain and Automatic Distribution

Thursday, 4 June 1992

Main Business Meeting

12. Review of Meetings and Recommendations

Attachment 3

List of Participants in
the International Arctic Buoy Program
June, 1992

The following organizations have indicated a willingness to participate in the International Arctic Buoy Program:

1.	The Atmospheric Environment Service	Canada
2.	The Navy/NOAA Joint Ice Center*	USA
3.	The Norwegian Meteorological Institute	Norway
4.	The Norske Polarinstitutt	Norway
5.	The Russian Committee for Hydrometeorology and Monitoring of Environment	Russia
6.	The U.K. Meteorological Office	U.K.
7.	The Marine Environmental Data Service	Canada
8.	Alfred-Wegener-Institute for Polar and Marine Research	Germany
9.	Institute of Ocean Sciences	Canada
10.	Pacific Marine Environmental Laboratory	USA
11.	Polar Science Center, University of Washington	USA
12.	Scott Polar Research Institute	U.K.
13.	Naval Oceanography Command	USA
14.	U.S. Naval Oceanographic Command	USA
15.	Service Argos	France,USA
16.	Chr. Michelsen Institute	Norway
17.	Arctic and Antarctic Research Institute	Russia
18.	Canadian Coast Guard	Canada
19.	WMO/ICSU World Climate Research Program	Switzerland
20.	Nansen Environmental and Remote Sensing Centre	Norway

***Representing several U.S. agencies**

Attachment 4

List of Agencies Interested in
the International Arctic Buoy Program
June, 1992

National Energy Board, Canada
Danish Polar Center
Finnish Institute of Marine Research
EGOS
Japanese Meteorological Administration
Japan National Institute of Polar Research

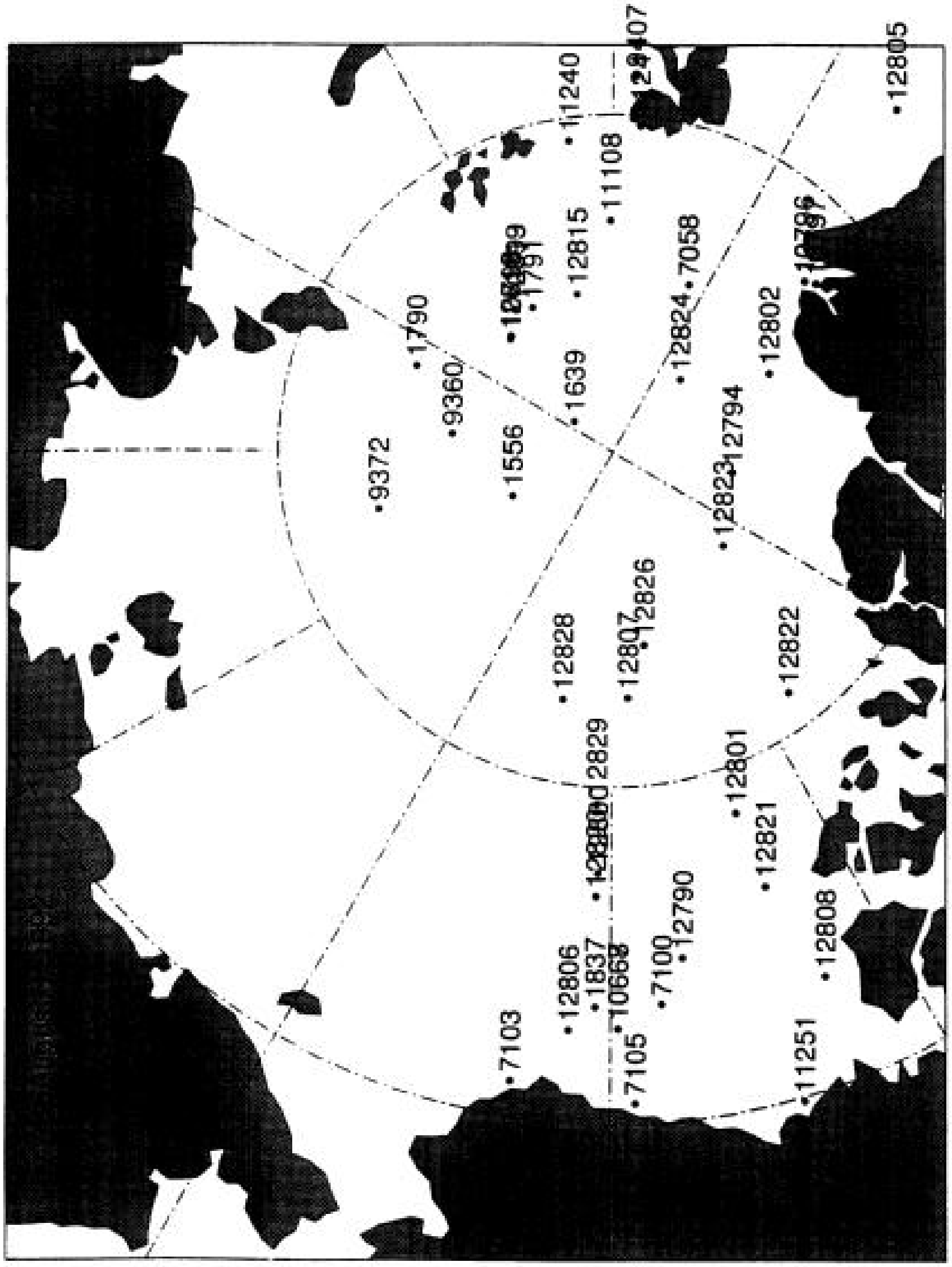
List of Argos Buoys Monitored by the IABP

August 3, 1992

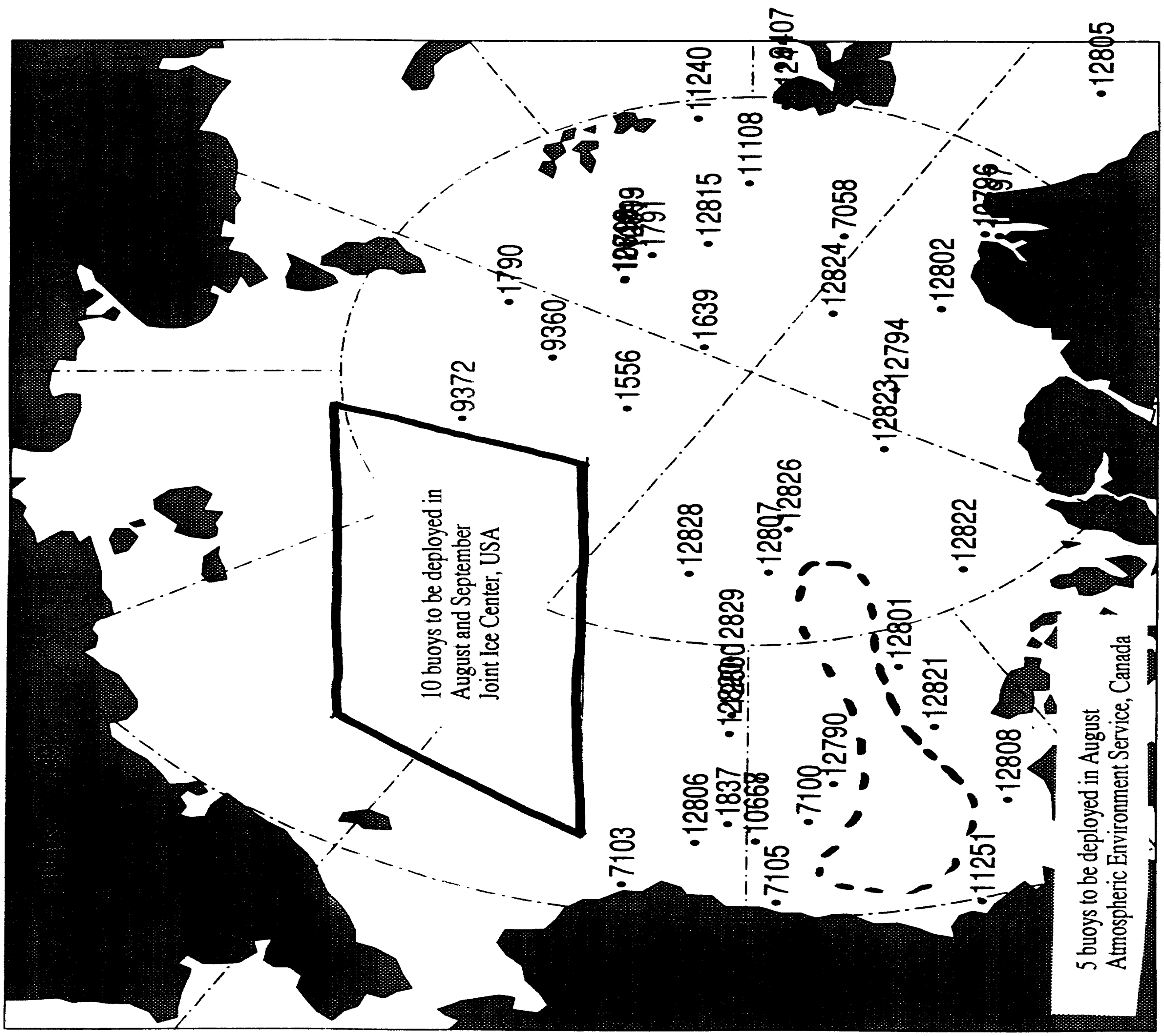
DATE DEPLOYED	ARGOS ID	WMO ID	EXPR NUMBER	GTS HEADER	POSITION ° LAT	POSITION ° LONG	DATA BYTES	P	T
May 92	1556	25561	154		86.696	143.556			
May 92	1639	26532	484		88.526	82.938	16	√	√
May 92	1790	26532	29		83.557	96.966	16	√	√
May 92	1791	26531	29		85.116	60.002	16	√	√
Mar 92	1837	48567	695		73.526	-151.694	32	√	√
Aug 91	7058	25527	557		84.574	5.487	4	√	√
Mar 92	7100	48568	695		73.551	-144.799	32	√	√
Nov 91	7103	48571	695		71.066	-159.246	32	√	√
Nov 91	7105		695		70.624	-147.902	32	√	√
May 92	9360	65662	918		85.122	114.022			
May 92	9372	65663	918		82.751	133.615			
Jul 92	9407		154		78.864	26.592	16	√	√
May 92	10667		1016		72.880	-149.355			
May 92	10668		1016		72.881	-149.346	32	√	√
Apr 91	10796		111		82.366	-18.808	4		
Apr 91	10797		111		82.157	-20.815	4		
Apr 92	10798		111		85.410	72.517	32		
Apr 92	10799		111		84.877	65.521	32		
Sep 90	11108	25542	282		83.132	30.782	32	√	√
Aug 91	11240	48601	636		80.683	38.446	16	√	√
Aug 91	11241	48602	636		80.315	25.266	16	√	√
Jul 92	11251		633		69.878	-133.328			
Apr 92	12790	47604	282		74.878	-141.942	20		
Apr 92	12794	47606	282		86.374	-69.647	20		
Mar 91	12800	48518	282		77.495	-151.919	4	√	√
Mar 91	12801	48520	282		78.637	-131.036	4	√	√
Mar 91	12802	48554	282		84.781	-33.829	4	√	√
Mar 91	12805	25537	282		76.741	-10.172	4	√	√
Mar 91	12806	48555	282		72.788	-154.301	4	√	√
Mar 91	12807	48556	282		82.642	-146.516	4	√	√
Mar 91	12808	48557	282		73.213	-127.673	4	√	√
Apr 92	12813	26509	282		84.879	65.493	32	√	√
Apr 92	12815	26510	282		85.221	43.257	32	√	√
Apr 92	12819	26511	282		85.447	73.257	32	√	√
Apr 92	12820	48519	282		76.815	-152.075	4	√	√
Apr 92	12821	48558	282		76.321	-130.442	4	√	√
Apr 92	12822	48559	282		81.078	-113.813	4	√	√
Apr 92	12823	47601	282		85.667	-100.427	4	√	√
Apr 92	12824	48560	282		87.091	-13.282	4	√	√
Apr 92	12826	48562	282		84.171	-140.817	4	√	√
Apr 92	12828	48564	282		82.470	-161.423	4	√	√
Apr 92	12829	48565	282		79.492	-152.494	4	√	√

Data from these buoys having a WMO number are distributed over the Global Telecommunications System.

August 3,1992



August 3,1992



Attachment 6

INTERNATIONAL ARCTIC BUOY PROGRAM

Second Annual Meeting
June 2/3, 1992
Oslo, Norway

TECHNICAL AND SCIENTIFIC PRESENTATIONS

DEFERRED THE QUALITY CONTROL GUIDELINES

Etienne Charpentier
Drifting Buoy Cooperation Panel

The Guidelines were decided by the DBCP at its fifth session, Toulouse, October 1992, and implemented the 1 January 1992. The goal is to rationalize and speed up any status change process when necessary (e.g. remove a buoy from GTS distribution, recalibrate a biased sensor,...).

Various Principal Meteorological or Oceanographic Centres for drifting buoy data quality control (PMOC) are indeed given the opportunity via an electronic bulletin board (BUOY.QC on Oment/ScienceNet) to make status change proposals according to deferred time quality control procedures they normally undertake (e.g. comparison of observed data series with first guess field, expertise of meteorologists,...). The Technical Coordinator of the DRCP has been given the task of regularly reading the proposals and then contacting Principal GTS Coordinators (PGC). PGC's are designated by Principal Investigators, for being responsible to ask Service Argos or Local User Terminal operators to actually implement status changes. For recalibrated sensors, feed-back information is then deposited on the bulletin board by Service Argos so that every GTS user knows at what time and what modification was actually implemented.

The following Meteorological Centres are presently acting as PMOC's, and participating actively in the guidelines:

- The Australian Bureau of Meteorology,
- The European Centre for Medium Range Weather Forecast,
- Meteo France,
- The National Data Buoy Centre of NOAA,
- The Ocean Products Centre of NOAA,
- The United Kingdom Meteorological Office.

The Guidelines have proved so far to be very successful. For the period 20 January 1992 to 20 April 1992, for the 614 drifting buoys that reported at least once onto the GTS we received 151 status change proposal via the bulletin board relating to 91 buoys. As a consequence, 49 buoys were actually removed from GTS distribution and 23 sensors were recalibrated.

SURFACE STRESS/GEOSTROPHIC WIND SQUARED RATIO

Jim Overland
PMEL/NOAA

The geostrophic drag ratio and surface wind turning angle were measured from a drifting ship and a 120km array of six drifting buoys for the fall 1988 in the eastern Arctic. Fifty percent of the observations of the ratio of the surface stress to geostrophic-wind-speed-squared varied within ±30% of the median value. This variability is due in part to atmospheric stability based on the difference between the surface temperature and the temperature at the top of the arctic inversion (~900 mb). See Tellus 44A, P. 54-66, 1992.

Arctic Climate System Study

V. Savtchenko
WCRP

The global thermohalene circulation is primarily driven by the formation of deep water in the northern Atlantic. This forcing is largely controlled by the fresh water inflow from higher latitudes. Although the Arctic Ocean covers about five percent of the world ocean area, it receives 10 percent of the world's total river runoff. Because of the considerable export of sea ice and fresh water to lower latitudes, through the Fram Strait and the Canadian Archipelago, the Arctic Ocean plays an important role in the earth's climate.

The Thirteenth Session of the MC for the World Climate Research Program recommended that the Arctic Climate System (ACSYS) should become a major scientific program of the WCRP. It will study the large scale dynamics of the Arctic Ocean, the sea ice and the energy and fresh water budgets of the Arctic basin and neighbouring regions. To achieve the scientific goals of ACSYS the co-operation and support of the International Arctic Buoy Program will be required. The IABP will be the primary source of data on large scale patterns of atmospheric surface pressure and sea ice motion. ACSYS recommends that it should expand its program to include accurate, long term monitoring of surface air temperature from data buoys.

Towards Establishment of an
International Antarctic Buoy Program

V. Savtchenko
WCRP

Since the First GARP Global Experiment (FGGE, 1979), launchings of drifting buoys have been carried out by several countries in the sea ice zone surrounding Antarctica. However, buoys are generally deployed at latitudes well north of the Antarctic Seasonal Ice Zone and a need exists for more buoys to be positioned within the Zone. Several experiments have already established that appropriately designed buoys can survive and operate successfully in the Antarctic ice pack.

The World Climate Research Program is now studying the feasibility of organizing a co-operative International Antarctic Drifting Buoy Project (IAnDBP) in the ice covered ocean around Antarctica. This program will document the drift of sea ice and measure atmospheric pressure as required for global weather forecasting and long-term climatological studies.

The WCRP has welcomed the offer of Australian institutions to coordinate the IAnDBP through the new Co-operative Research Centre for the Antarctic and Southern Ocean Environment based in Hobart, Tasmania. The first IAnDBP meeting is planned to be held at the University of Tasmania in Hobart in August 1992. Issues to be discussed include requirements of WCRI, WWW and other programs for drifting buoy data in the Antarctic, technical questions relating to buoy design, data quality control, archiving and distribution, and the overall program management perspectives.

MONITORING AIR TEMPERATURE IN THE ARCTIC

ROGER COLONY
Polar Science Center

Climate models simulate a high latitude amplification of surface global warming in response to increased CO_2.

In the arctic this increase can be as large as 18° for mean January temperature in a 2 x CO_2 regime. Recent analysis shows the internal variance (1950-1990) of mean January temperature to be 8-10°C2 over the pack ice of the Central Arctic Basin. This combination of large signal and relatively small climate "noise" suggests the perennial ice pack of the Arctic Basin as a site for monitoring greenhouse warming. The automatic data buoys of the IABP are capable of measuring the 2m surface air temperature to the required accuracy. Furthermore, monitoring objectives of the IABP are consistent with requirements for detecting global climate change.

The temperature time series of 2m temperature shows a spring warming transitional to an isothermal summer followed by a fall cooling. The isothermal period is related to the melting of the upper part of pack ice; 30-50 cm is melted during the summer. In many cases the transition time separating spring and summer is easily identified. These transitions times (1950-1990) tend to be contained in a narrow window (14-19 June) suggesting that a change in transition time statistics may be an indicator of global warming (i.e. an increase flux of energy to the surface) for the arctic summer. Similar analysis show the favoured transition time for freezing is 11 August and typical duration of summer melt of 50-60 days.

NANSEN CENTENNIAL ARCTIC PROGRAMME (NCAP)

T. Vinje
Norske Polarinstitutt

This programme is designed to study the past and present Arctic environment, in particular the climate changes. To meet the scientific objectives the NCAP board proposes to freeze in a vessel at 85 deg. N-120 deg. E. as a primary research platform. In addition, two small manned satellite camps will be deployed on sea ice 100 km to either side of the ship to be used as advanced bases for regional surveys within a 300 km wide corridor along the drift path. Comprehensive monitoring programmes and special campaigns will be carried out by personnel being rotated every second/third month by aircraft. The NCAP drift is planned to start in the autumn of 1994 with an exit through the Fram Strait 1.5-2 years later.

HOW TO PAY YOUR ARGOS BILL
ARGOS JOINT TARIFF AGREEMENT

Terry Bryan,
NOAA Office of Global Programs

This presentation provided an overview of the Argos Joint Tariff Agreement, a cooperative effort to implement a preferential tariff for services provided to qualifying users of the Argos Data Collection and Platform Location System. The history and philosophy for establishing the Agreement and the eligibility and participation requirements were discussed. The services provided under the Agreement, the costs for these services and other financial obligations, and the means of negotiation were defined. Potential future changes to the Agreement and recommendations for optimum use by the IABP were proposed.

NEW TOOLS FOR THE ARCTIC BUOY PROGRAM

Cristian Ortega,
CLS Argos

A presentation was given of 2 new operational tools being implemented at the Argos Global Processing Centre.

The first one concerns Argos data distribution through GTS. A dedicated GTS chain, built around a Data Base Management System, is being implemented. The objective is to increase quantity and quality of data transmitted over GTS.

A wide range of new data processing techniques: computation of observation times, multi-plexed messages, enhanced conversion into physical values etc...allowing flexible computation of sophisticated Argos message will achieve the quantity objective.

Nine levels of quality control will guarantee a better quality of data transmitted. This new chain, being developed in close cooperation with the DBCP technical coordinator, will come into operation in January 1993 and should be mostly completed in July 1993. Some processing options are still under discussion.

A second operational tool is the Argos Automatic Distribution Service (ADS). This service automatically sends data stored in the Argos GPC's to any user. Transmissions are secured by additional protocols. Two strategies exist: realtime results are sent each time the GPC produces a new result and periodical results are delivered on a regular cyclical basis. Data can be distributed through most existing channels, i.e. telex. fax. X.25 packed switching networks, SPAN, GTS.

THE AARI BUOYS

E. Nikiforov,
AARI

Having become a participant in the IABP, Russia, which is represented by Russian Committee for Hydrometeorology (Roscoinhydromet) and its main investigator for the Arctic - the AARI, deployed in summer 1991, 6 Russian and 1 U.S. buoys during the cruise of "Sovetsky Soyez". Buoys were deployed by helicopter in the northern part of Laptev Sea and 1 buoy is on the island of Johor (Laptev Sea). To increase the accuracy of buoy location calculation, we use satellite "Ocean - O" which carries a retranslator of data from the drifting buoys. The receiving stations are situated on Dikson Island and in the AARI (St. Petersburg). Since the re-translator doesn't work properly data from drift buoys reaches AARI with 4-6 hours delay and operational needs for WWW are not met. Therefore, data from drifting buoys is only of limited value. Part of the data was sent to the IABP coordinator, Dr. R. Colony. The remainder will be sent to him in June.

This spring using long distance helicopters we deployed 3 buoys; 2 of them are drifting buoys, and the 3rd buoy was deployed again on Johor island. They all work well.

This summer we plan to deploy 6 buoys from an icebreaker. They will be deployed in areas not covered by observational data. Should the new satellite "Ocean - O" be launched, as expected in July this year, we hope to be able to fulfil the tasks set by IABP.

Now we are trying to increase the accuracy of pressure measurements. Also, this year, we plan to use batteries which can increase buoy life to 1.5 years.

We are working to switch the system of buoy data collectors from satellite "Ocean - O" to another system which will utilize special telecommunications satellites. The decision may be taken in July, 1992. If this fails, we can come back to the suggestion which was under discussion in Edmonton - to consider installation of Argos transmitters on our buoys.

We also plan an instrument for surface atmosphere ozone measurements to be installed on a new modification of buoy. This can be interesting and useful for the objectives of ACSYS.

RECEIPT OF DATA FROM BUOYS

S. Vasiljev

So far we have been unable to arrange regular receipt of arctic buoy data on GTS. We have discussed this problem in Edmonton with the technical coordinator of the DBCP who checked the data routing on the GTS chain. From time to time, we required data from 2-3 arctic buoys. Not having sufficient information of WMO indexes of buoys, it is impossible to get the required data from GTS.

DESIGN AND TESTING A PICK BUOY

David A. Benner,
NAVY/NOAA Joint Ice Center

The Navy/NOAA Joint Ice Center, as manager of the U.S. Interagency Arctic Buoy Program (USIABP), identified program objectives which include the investigation of new drifting buoy technology and design in order to standardize the measurement of environmental parameters in the Arctic. The USIABP has placed particular emphasis on the accurate performance of meteorological sensors which collect data for both operational weather/sea ice forecasts and research concerning Global Climate Change. The USIABP recognizes that atmospheric pressure instruments must minimize long-term drift while air temperature thermistors should be positioned external to the buoy housing to standardize their exposure to the environment.

In the past, the majority of drifting buoys deployed in the Arctic contained thermistors internal to the housing and were designed to lie on the sea ice surface. This configuration subjected the air temperature measurement to environmental contamination by solar heating and insulation by drifting snow. Thus, the standardization of air temperature measurement is dependent on the following factors: adequate ventilation of the thermistor, protection by a radiation shield and insulation of the instrument from other hardware. A comparison of air temperature observations reported from surface deployed buoys with external thermistors, and collocated Russian manned ice stations indicate a high degree of compatibility and a significant improvement in the detection of temporal variations (Colony, pers. comm.).

The USIABP, in the attempt to effectively utilize all available deployment assets, investigated the design of an A-size meteorological buoy which could be deployed from U.S. Navy P-3 aircraft and still fulfil the above air temperature measurement requirements. The A-size TIROS Arctic Drifter (ATAD) is built on an icepick hull which is designed to penetrate the ice and allow the buoy to remain in a vertical position during data collection and transmission. The main body of the buoy is a watertight housing that contains a Paroscientific barometer, a tilt switch to detect the inclination of they buoy, an Argos Platform Transmitter Terminal and lithium batteries with an operating design life of 15 months on a 50% duty cycle. The antenna/parachute housing at the top portion of the buoy contains the barometer breather port, a Yellowsprings thermistor in a self-aspirating radiation shield, a quarter wave whip antenna, and an 8 inch cross parachute designed to stabilize the buoy during deployment prior to impact.

Field tests of these buoys began with the successful deployment of two ATAD buoys at an ice camp during April, 1992. Initial results were positive in terms of buoy survivability and the vertical positioning of the buoy. The argos data collection system was not evaluated due to the short period of time between deployment and the evacuation of the ice camps. Due to this shortfall, both buoys were recovered for future deployment and long-term performance evaluation during the summer of 1992.

AN INTERCOMPARISON OF TWO BUOYS

Bill Hume,
AES, Edmonton, Canada

Temperature and pressure data from two drifting buoys located on the multi-year ice pack in the Southern Beaufort Sea were compared. Buoy 1107 built by MetOcean Inc. was deployed at 132W/75N in November 1990 and buoy 12806 built by DSI was deployed in March 1991 within 60 km of the MetOcean buoy. Data were abstracted from the raw data archives at the Edmonton LUT. Three period of records were examined: April 1991, October 1991, and mid-April - mid-May 1992. Barometer readings were comparable although a 2 mb high bias was evident in the MetOcean buoy while its internal temperature had faster thermal response than the DSI buoy.

DRIFTING BUOYS IN THE BARENTS SEA

T. Brinck Loyning,
Norske Polarinstitutt

Altogether 42 sea ice and 19 iceberg buoy-derived drift tracks have been correlated with the geostrophic wind obtained from the DNAG Hindcast data set and grouped with respect to very open pack ice (O<IC<0.3), open pack ice (0.3<IC<0.6), and close to very close pack ice (0.6<IC<1.0). A linear least square method with complex numbers, has been applied in the study.

To investigate the effect of the bottom topography and subsurface currents on the drift of sea ice and icebergs, the Barents Sea has been divided into areas with different bathymetric characteristics.

The average sea ice drift speed, given in percentage of the geostrophic wind speed, is found to be about 5% for the two lower ice concentration intervals and 2.5% for the higher one. The corresponding average percentage for the iceberg drifts indicates only a slight increase with increasing ice concentrations, from about 1.5% to about 2%.

On an average, the sea ice drift is directed about 10 degrees to the right of the geostrophic wind direction. This angular deviation seems to be independent upon the ice concentration. The corresponding average angular deviation for the iceberg drift suggest a more complicated dependence of the ice concentration, with a deviation of 20 degrees to the left for the intermediate ice concentrations and 10 degrees to the right for the lowes and highest ice concentrations. This non-linear dependency may indicate a change in the turning of the wind induced currents with depth being dependent upon the ice concentration.

The background surface current which is determined by the constant in the least square linear equations shows a fairly good agreement with previous investigations. The difference in the background currents as obtained from the sea ice and iceberg drift analysis, suggests a topographical steering, and an effect of subsurface currents on the iceberg drift, particularly in Storfjordrenna.

In general, the sea ice and icebergs drift in parallel for close to very close sea ice concentrations, with speed amounting to 2- 2.5% of the geostrophic wind speed, and about 10 degrees to the right of the geostrophic wind direction. For lower ice concentrations the sea ice drifts with a speed amounting to 5% of the geostrophic wind speed and this is twice as fast as the drift of the icebergs for a given geostrophic wind speed.