1. Opening of the Meeting

The Fifteenth annual meeting of the Participants of the IABP opened at 9:00 on 6 June 2005 in Seattle, Washington, USA. The Chairman of the IABP, Timothy Goos (TG), called the meeting to order. Ignatius Rigor welcomed meeting attendees, and provided logistics information for the meeting.

There were 16 Attendees, representing 10 of the 23 Participants. The list of Attendees is shown in Attachment 1, and the list of Participants is shown in Attachment 2.

2. Agenda Approval

The draft was reviewed, amended and approved (Attachment 3).

3. Review Minutes and Action Items from Fourteenth Meeting

Participants reviewed the Action Items from the Fourteenth meeting.

Action Items (Actions taken are shown in italics):

3.1. IABP Executive will finalize the minutes by 31 August 2004.

   The minutes from the Fourteenth meeting were reviewed, and approved by the attendees, and will be posted on the IABP web server.

3.2. IR will provide Metadata to DBCP (see Attachment 4 of the Minutes from the 14th Meeting for details).

   Ongoing.
3.3. IR will consult with Participants to determine satellite data communication requirements for the program (see Attachment 4 of the Minutes from the 14th Meeting for details).

Ongoing.

3.4. IR will contact inactive Participants regarding their continued interest in participating in the IABP (see section 6 of the Minutes from the 14th Meeting).

Ongoing.

Discussion

Pablo Clemente-Colon (PCC) asked “What are the benefits of joining the IABP?” It was noted that because of the strong collaboration and coordination between the Participants, many cost-efficiencies are realized. For example, through coordination, the overlap between observations is minimized, and a well space array is maintained. And by collaborating, our resources of logistics and equipment are better utilized.

IR reported that at the Arctic Science Summit Week Conference in Kunming, China there was some interest in the IABP from Chinese and Korean researchers. IR, PCC and Roger Colony (RC) offered to approach colleagues to cultivate the participation of these contacts in the IABP.

Christian Haas (CH) suggested that David Meldrum, in addition to Peter Wadhams, should be contacted to regarding the participation of the Scottish Association for Marine Sciences (SAMS) in the IABP.

Elizabeth Horton (EH) noted that Jon Turton (JT) is the new Drifting Buoy Coordinator for the UKMO. TG should contact JT regarding renewing the participation of the UKMO in the IABP.

3.5. IR will prepare a draft Letter of Intent (LOI) concerning the IABP plans with respect to the IPY. This will be circulated to Participants for their urgent review as it must be sent to the ICSU IPY Planning Group by late July with copy to Dr. Edward Sarukhanian, the special adviser to the WMO Secretary General on IPY (see section 9 of the Minutes from the 14th Meeting).

Done. Magda Hanna (MH), IR and other Participants of the IABP submitted LOI to ICSU. This will be discussed more during the meeting in section 9.
3.6. IR will lead the development by Participants of a document describing the vision/mission, plans, gaps and challenges of the IABP. This document will be used to inform possible collaborators, potential new participants and other agencies of the IABP (see section 9 of the Minutes from the 14th Meeting).

Ongoing.

3.7. IR will investigate the spatial resolution required by the operational and research communities (see section 10 of the Minutes from the 14th Meeting).

After reviewing the requirements established by the WMO and NOAA for meteorological and oceanographic observations (e.g. von Storch and Zwiers, 2001; and http://ioc.unesco.org/goos/docs/act_pl/act_pla2.htm ), it was determined that the IABP will strive for a spatial resolution of 250 km for the IABP buoy network.

3.8. Coordinator will add a deployment log to the IABP web pages (see section 4.0).

Ongoing. IR noted that the logs are available, but they have not been put on the web yet.

3.9. Meteorological Service of Canada (MSC) will investigate the feasibility of participating in the DBCP QC guidelines as a center responsible for the quality control of GTS buoy data in the Arctic.

Resolved. The MSC will participate in the DBCP QC guidelines to assure the quality of data for the IABP buoys.

4. Coordinator's Report

Ignatius Rigor reported on: 1.) the status of the buoy array, 2.) deployment plans and opportunities, and 3.) the progress of data management and publications related to the IABP.

The Coordinator’s report is given in Attachment 4, and is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/Coord.ppt .

Discussion

IR noted that since Argos is now providing Multi-satellite data processing at no-cost, this may effectively double the amount of data collected by each Participant and thus increase Argos Automatic Distribution Service (ADS) costs.
Action Items:
1. IR recommends that the Participants evaluate their need for Multi-satellite data processing.
2. Etienne Charpentier (EC) suggested that the Coordinator write a letter to the DBCP and JTA recommending a reduction ADS charges due to the increase in data transmission associated with Multi-satellite service.

5. Report from Data Buoy Co-operation Panel (DBCP) (E. Charpentier)

EC reported on the activities of the DBCP since the IABP-14 meeting. A status of global buoy programmes was presented. Details regarding current DBCP activities can be found at http://www.jcommops.org/.

This report is given in Attachment 5.

Discussion

Regarding the calibration procedures for buoys, it was noted that:
1. Calibration of the buoy observation is difficult given the short time-lines between funding, building and deployment of the buoys.
2. Instruments are rated by the manufacturers, are these ratings good enough?
3. Knut Bjørheim (KB): Observations errors may be more related to buoy design (i.e. lack of thermistor shielding), than instrument accuracy.

The DBCP is working on establishing a metadata collection scheme that can be used by the buoy operators and the action groups. The scheme facilitates the work both for the manufacturers and those in charge of the deployments. The DBCP is inviting the IABP to participate in the scheme or to work out the details of regularly submitting IABP metadata to JCOMMOPS.

ACTION: It was decided that the IABP will rely on the buoy manufacturers to provide the metadata for each buoy to the DBCP, and that the Coordinator will facilitate this process.

EC invited the IABP to consider posting IABP news on the JCOMMOPS web-site including deployment updates, opportunities etc.

EC reported that NOAA/NESDIS invited buoy operators and the DBCP action groups to provide information on satellite data communication requirements through a simple requirements matrix that they are invited to fill in.

ACTION: IR will consult with Participants to fill out the matrix regarding IABP needs and provide the results to EC.

IR reported that Metocean has sent a LOI to TG and has been officially accepted as a Participant of the Programme. We officially list 23 Participants from 10 different countries, and one international organization, the WCRP.

The list of Participants is shown in Attachment 2 and updated on the web site.

7. Status Reports from each Participant

7.1. Alfred Wegener Institute – C. Haas

This report is given as Attachment 6 and the PowerPoint presentation is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/AWI.ppt.

7.2. Environment Canada – E.T. Hudson

This report is given as Attachment 7 and the PowerPoint presentation is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/MSC.ppt.

7.3. Marine Environmental Data Service – C. Schock (presented by E.T. Hudson)

This report is given as Attachment 8 and the PowerPoint presentation is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/MSC.ppt.

7.4. Naval Oceanographic Office – E. Horton

NAVOCEANO, on behalf of CNMOC, deployed 7 IABP ICEX-AIR buoys in the Arctic in August 2004. There were no equipment failures during the deployment. The aircraft coordinator reported that the ice was in worse condition than the prior year. The CNMOC agreement for aircraft support was renewed for another five years starting in February 2005. Consequently, an aircraft has been secured for this year’s WHITE TRIDENT 05 and planning is well underway.

7.5. National Ice Center – M. Hanna
In 2004-2005 intercessional period, the U.S. Interagency Arctic Buoy Programme received fiscal support, manpower resources, and other services from six U.S. Government agencies.

Accomplishments:

1. Received three ICEX buoy contribution from NOAA Office of Global Programs.
2. Received one IMB buoy contribution from NOAA NESDIS.
3. NOAA Climate Transitions Program (NCTP) accepted joint proposal to support improvement of seasonal ice forecasting and improved ice thickness modeling using in situ observational data from IABP buoys.
4. NSF proposal submitted for data coordination and management of IABP.

Challenges:

1. ONR funding reduced by one half and then eliminated. Need to seek out ways to fill this gap.
2. Uncertainty with NASA continued funding.

Planned future activities:

1. Offer buoy data on the web in GIS compatible shapefile format.
   Maintain U.S. contribution of 3 ICEX and 1 IMB buoy for 2006.

the PowerPoint presentation is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/NIC.ppt.

7.6. International Arctic Research Center – J. Hutchings

This report is given as Attachment 9 and the PowerPoint presentation is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/MSC.ppt.

7.7. Christian Michelsen Research – A. Hageberg (presented by I. Rigor)

Research is currently celebrating their 75th Anniversary, and has built 7 buoys for this years WHITE TRIDENT deployments.

7.8. Other Participant Reports – I. Rigor
7.8.1. Cold Regions Research and Engineering Laboratory has been working with PMEL and PSC to build and deploy IMB buoys. Five IMB buoys were deployed last year. Nine more will be deployed this year.

7.8.2. Institute of Ocean Sciences is working with WHOI, CRREL and PSC to deploy collocated ocean and IMB buoys from the CCG Louis St. Laurent.

7.8.3. JAMSTEC currently has 1 JCAD buoys in the IABP array all of which are collocated with IMB buoys. One JCAD was deployed last year at the NPEO. A JCAD and POPS buoy will be deployed from the Healy in the summer of 2005 as part of the large ADS site with a PSC/CRREL IMB buoy, and some GPS buoys from IARC.

The PowerPoint presentation is available on the web at http://iabp.apl.washington.edu/IABP-15/Reports/JAMSTEC.ppt.

7.8.4. Nansen Environmental and Remote Sensing Center – IR has been working with Stein Sandven to deploy SITHOS buoys, possibly co-locating a SITHOS buoy with an IMB.

7.8.5. Norwegian Polar Institute currently has 1 ICEXAIR buoy in the IABP array, and funded the refurbishing of ICEXAIR 2415 (1905).

7.8.6. Pacific Marine Environmental Laboratory has been collaborating with the PSC to deploy weather stations, radiometer and IMB buoys at the NPEO, and to enhance the IABP through NOAA’s contributions to SEARCH.

7.8.7. United Kingdom METOFFICE currently has 1 buoy reporting.

8. New Business

8.1. DBCP Meetings

DBCP-21 will be held on October 2005 in Buenos Aires. EH will represent the IABP at the meeting. ETH will prepare the report and updated brochures.

Thanks were given to ETH and EH for preparing and presenting last years report. The full text of this report is given in Attachment 10.

8.2. Summary of Participant contributions
Contributions further the objectives of the IABP and are defined in the Operating Principles of the IABP, section 6.5.

The Participant contributions table is given in Attachment 11.

8.3. Location of 16th meeting

The Participants were invited by CH to Bremerhaven, and IR will discuss the possibility of Toulouse, France with Christian Ortega. CH also invited the Participants to consider scheduling the meeting in conjunction with the DAMOCLES meeting in Paris, and will investigate this option.

PCC offered to host the 17th meeting at the National Ice Center.

The Coordinator will provide the options to all Participants to gain their perspectives on the preferred option. The Executive and Coordinator will discuss the options and make a decision in the fall of 2005 and communicate to all Participants.

9. New Directions

9.1. Arctic Observing Systems [M. Hanna]
9.2. International Polar Year [I. Rigor]
9.3. GIS Shapefiles [M. Hanna]
9.4. Development of Seasonal Ice Buoys [I. Rigor]

10. Review and Approval of the IABP Operating Principles

The Operating Principles were amended to be more inclusive of all environmental observations that may be collected by the IABP.

Note in particular that a list of measurements that the IABP collects has been added to section 3.2.

The revised Operating Principles are given in Attachment 12.

11. Election of Officers

A nominations committee consisting of ETH and IR determined that all members of the Executive Committee were willing to serve another year. Nominations were solicited from other attendees.

In accordance with the IABP Operating Principles, the following officers were elected:
Ignatius Rigor was re-appointed as the Coordinator of the IABP.

12. Presentations
12.1. North Pole Environmental Observatory and JAMSTEC/METOCEAN JCAD buoys [J. Morison and G. Connor]
12.2. Upper Ocean Observations Using An Ice-Tethered Profiler [R. Krishfield]
12.3. Sea Gliders in the Arctic Observing System [J. Gobat]
12.4. Canadian Arctic Through flow Study (CATS) [E. Hudson]
12.5. Arctic sea ice thickness variability [C. Haas]
12.6. The WHEN of Arctic Change [R. Colony]
12.7. The thinning of Arctic Sea Ice: Have we passed a Tipping Point? [R. Lindsay]
12.8. Some Thoughts on Arctic Paradoxes [I. Rigor]
12.9. Satellite data from NMI [K. Bjørheim]

13. Review of Meeting, Recommendations, and Action Items

13.1. IABP Executive will finalize the minutes by 31 August 2005.
13.2. Review ongoing items from section 3.0.

14. Draft and Approve Meeting Minutes

Participants reviewed the draft minutes. The draft minutes will be available to all participants for final comment, and will be approved by 31 August 2005.
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# Attachment 2 - Membership and Letters of Intent
*(Last revised June 2005)*

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<td>Woods Hole, MA 02543-1541</td>
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<tr>
<td>JPS for WCRP</td>
<td>Vladimir Ryabinin</td>
</tr>
<tr>
<td>WMO Secretariat</td>
<td>phone: + 41 (0) 22 730 8486</td>
</tr>
<tr>
<td>7bis, Avenue de la Paix</td>
<td>fax: + 41 (0) 22 730 8036</td>
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<tr>
<td>CP2300, Geneva 2</td>
<td>Email: <a href="mailto:Ryabinin_V@gateway.wmo.ch">Ryabinin_V@gateway.wmo.ch</a></td>
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Attachment 3 – Agenda

Monday, 6 June 2005
0900 - 1200 IABP Business Meeting
1. Meeting Opens – Chairman, T. Goos
   1.1. Welcome & Meeting Information [I. Rigor]
   1.2. Call to order [T. Goos]
2. Agenda Approval [T. Goos]
3. Review and approve Minutes from Fourteenth Meeting [T. Goos]
   3.1. Review Action items
4. Coordinator's Report [I. Rigor]
5. Report from Data Buoy Co-operation Panel (DBCP) [E. Charpentier]

1300 – 1700 IABP Technical Session [Continued]
7. Status Reports from each Participant [T. Goos]
8. New Business [T. Goos]
   8.1. DBCP-21 meeting 2005 in Buenos Aires
   8.2. Summary of Participant contributions
   8.3. Location of 16th meeting

Tuesday, 7 June 2005
0900 - 1200 IABP Business Meeting [Continued]
10. New Directions [T. Goos]
   10.1. Arctic Observing Systems [M. Hanna]
   10.2. International Polar Year [I. Rigor]
   10.3. GIS Shapefiles [M. Hanna]
   10.4. Development of Seasonal Ice Buoys [I. Rigor]
11. Review and Approval of the IABP Operating Principles [T. Goos]
12. Election of Officers [T. Goos]

1300 – 1600 IABP Technical Session [I. Rigor]
12.1. North Pole Environmental Observatory and JAMSTEC/METOCEAN JCAD buoys [J. Morison and G. Connor]
12.2. Upper Ocean Observations Using An Ice-Tethered Profiler [R. Krishfield]
12.3. Sea Gliders in the Arctic Observing System [J. Gobat]
12.4. Canadian Arctic Through flow Study (CATS) [E. Hudson]
12.5. Arctic sea ice thickness variability [C. Haas]
12.6. The WHEN of Arctic Change [R. Colony]
12.7. The thinning of Arctic Sea Ice: Have we passed a Tipping Point? [R. Lindsay]
12.8. Some Thoughts on Arctic Paradoxes [I. Rigor]
12.9. Satellite data from NMI [K. Bjørheim]

1600 – 1700 Tour of APL [B. Odom]

Wednesday, 8 June 2005
0830 - 1200 IABP Business Meeting Conclusion
13. Review of Meeting, Recommendations, and Action Items [T. Goos]
14. Draft and Approve Meeting Minutes [T. Goos]
Attachment 4 – Coordinator’s Report

The Coordinator reported on: 1.) the status of the buoy array, 2.) deployment plans and opportunities, and 3.) the progress of data management and publications related to the IABP.

Status of the Buoy Array

- 33 buoys are currently reporting with Operational data: 30 of the 33 buoys have P & T sensors. All buoys are reporting on the GTS.
- Plan to deploy 23 more buoys this year:
  - 7 of which will be IMB, &
  - 3 of which will be Automated Drifting Stations (i.e. collocated IMB, Ocean Buoys, Ice Deformation Arrays).

Deployments

We need 7 more buoys for the WHITE TRIDENT air drop mission each year! This deployment opportunity provides the backbone of the IABP observational array.

This year the buoys that WHITE TRIDENT will deploy were contributed by AWI, 2 EC, NMI, and 3 US-IABP buoys funded by the US NOAA.

Other deployment opportunities are provided by EC, PSC, AARI, and by ships operating in the Arctic Ocean, i.e. the ice breakers CCG Louie St. Laurent, CCG Wilfred Laurier, Oden, Kapitan Dranitsin, Akademik Federov (Fig. 3).

Data and Publications

- Research data analyzed through 2003 – delayed funding.
- Publications:
  - Major redesign of IABP Web pages is in progress.
  - 500+ papers have used IABP data (Citations through 2004)
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38 new buoys were deployed since we last met.

Figure 1: Buoy Positions on 3 June 2003 (Last Meeting)

Figure 2: Buoy Positions on 1 July 2004
Figure 3: Remaining Buoy Deployment Plans for 2005. Purple dots show buoys deployed since June 2004.
1) 20th DBCP session

Session: 20th DBCP session was held in Chennai, India, 18-22 October 2004, and hosted by the National Institute of Ocean Technology. 40 people attended the meeting, representing Australia, Canada, France, Malaysia, Netherlands, New Zealand, Republic of Korea, South Africa, United Kingdom, Ukraine, USA, plus WMO and IOC secretariats, buoy manufacturers, and Service Argos.

Workshop: Scientific and technical workshop was held during the first 1 and ½ days of the meeting. Twenty papers were presented dealing with research and applications, operations, and technical developments and visions. Proceedings will be published on CD-Rom by the DBCP in mid-2005.

DBCP implementation strategy was reviewed and refined. The Panel plans to eventually reach the figure of 1250 drifting buoys operational by September 2005. This is impacting substantially deployment strategy as increased deployment opportunities are needed. The Panel agreed that air deployment opportunities offered from Member States navies were limited while these offered through other means were expensive. The Panel therefore agreed that it was de facto increasingly depending upon ship deployment opportunities. It considered establishing a trust fund for deployment opportunities, especially for the Southern Ocean and invited the Chairman to pursue the idea during the next intercessional period. As far as the southern Ocean Buoy Programme (SOBP) was concerned, it was planned to deploy 95 drifting buoys with barometers in the region during the period September 2004 to August 2005.

Action Groups: Report by IABP was presented by Elizabeth Horton. The Panel noted and accepted the application of the EUCOS Surface Marine Programme (E-SURFMAR) to be an Action Group of the DBCP, to replace EGOS. This became effective when E-SURFMAR took over from EGOS in January 2005.

Technological developments: Storm buoy concept was approved (adjusting resolutions based upon detected weather conditions). Smart buoy concept will be discussed during the next inter-sessional period. Interaction with data users will be needed in order to develop the best approach to design this cost effective drifter with appropriate transmission strategy that would substantially increase its life-time.

Vandalism: The Panel agreed that actions that have been taken is the last few years to prevent vandalism should be on-going (vandalism leaflet, information provided to mariners, provision of information through other international organizations or commissions such as IMO, FAO, IHO, ITC).

JCOMMOPS: The proposal to revise the JCOMMOPS Terms Of references in order for JCOMMOPS to eventually provide some coordination support to the JCOMM Ship Observations Team (SOT) was discussed and approved by the DBCP. New ToR will be presented at JCOMM-2 for approval. JCOMMOPS web site had been substantially upgraded in the last few months. Users are invited to visit new JCOMMOPS monitoring web pages (http://www.jcommops.org/).
David Meldrum was re-elected Chair. Vice chairs were also re-elected, i.e. K. Premkumar for Asia, Elizabeth Horton for North America, and Louis Vermaak for Southern Hemisphere.

Next DBCP session is planned in Buenos Aires, Argentina, 17-21 October 2005. Scientific and Technical workshop will be organized again by Ken Jarrott (K.Jarrott@bom.gov.au) in cooperation with Bill Scuba (wscuba@ucsd.edu). Themes for the 2005 workshop will be the same as for 2004.

2) Technical issues

2.1) BUFR

As decided at DBCP-19, developments for BUFR compression started at Service Argos in 2004. Implementation is planned in late 2005. This won’t change BUFR template presently used for GTS distribution of buoy data in BUFR.

The Panel agreed that BUFR template for wave data needed to be defined in close cooperation with the users. Work in this regard will take place during the intersessional period. Users of wave data are invited to document their needs in this regard and to provide information to the Technical Coordinator.

2.2) Metadata and buoy deployment notification scheme

The buoy metadata collection scheme which had been developed at JCOMMOPS was endorsed by the DBCP for global use. The Panel thanked EGOS for its financial contribution to this effort. Scheme is now operationally implemented and (http://w4.jcommops.org/cgi-bin/WebObjects/meta). Manufacturers are required to enter information in the system upon buoy purchase while buoy operators enter information upon buoy deployment and during the buoy operational life-time. Only manufacturers and buoy operators are authorized to enter information in the system so they are invited to contact the Technical Coordinator of the DBCP for registration.

A proposal for real-time distribution of metadata for SST and temperature profile data was discussed and agreed upon. Other in situ data collection systems than buoys are concerned (XBTs, VOS, floats …). Ad hoc working group is being established by JCOMM and a workshop will be organized in 2006 to eventually establish a pilot project to implement practical solution.

2.3) Argos ground receiving stations

The Panel was pleased to hear about substantial reduction of data delivery delays to users by Service Argos as since 2003 percentage of data received within one hour increased from 20% to 70%. This is mainly due to the recent development of the Argos network of regional receiving stations.

Reception and data processing of Stored Tiros Information Processing (STIP) were terminated at Lannion in 2000. DBCP was stressing and demonstrating in the last couple of
years that this had adverse effects on the timeliness of the buoy data distributed on GTS, particularly due to the “blind” orbits. Prior to DBCP-19, NOAA/NESDIS had reviewed the DBCP and JTA participant concerns, coordinated similar requirements from other users and evaluated the cost/benefits of the Lannion, France, and Barrow, Alaska sites. A consolidated requirement for POES “blind” orbit data was presented to NESDIS management for decision and was approved for implementation at the Barrow site.

HRPT data are now currently being captured at Point Barrow Alaska. However, Due to technical limitations only one stream of data may be collected per satellite pass. The US National weather Service has priority for AVHRR Imagery in the HRPT data stream. An upgrade to the hardware was proposed for 2005 but funding was not allocated.

In the meantime NOAA is interested in testing its equipment in place at Svalbard for risk reduction for the NPOESS mission. NOAA is considering downloading blind orbits for both of the operational satellites to accomplish this test. Testing should begin in early 2005. It is likely that blind orbit support will not be available at Barrow prior to the Salvard Ground station becoming operational.

The Panel recommended that NOAA/NESDIS speeds up the process of using Svalbard station to download Argos global. A recommendation to the JTA was made in this regard.

2.4) Other technical issues

DBCP “News” section on JCOMMOPS web site was endorsed by the Panel. DBCP news are available from http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/news?prog=DBCP. Panel members are invited to provide input for the News section through the Technical Coordinator. Icelandic Meteorological Office proposal for solving buoy-qc@vedur.is mailing list SPAM message issue was accepted. Mailing was renamed to buoy-qir@vedur.is. Change took place on 10 January 2005.

Service Argos is developing a new sensor data processing system which will eventually replace the existing Argos GTS sub-system. Operational implementation is planned for early 2006.

NOAA-18 (NOAA-N) was successfully launched on 20 May 2005. Spacecraft carries Argos 2 technology.

NOAA-N’ Satellite that was damaged at the contractor facility will be refurbished for launch in December 2007 (Argos 3 technology plus downlink). METOP which is planned for launch in April 2006 will carry Argos 3 and downlink.

Service Argos has plans to develop in collaboration with CNES, for mid-2007 and beyond, micro-satellites that would be equipped with Argos 3 and downlink capability. Cooperation with India is underway to eventually equip Indian Satellite Megha-Tropic (20° inclination) with Argos 3 and downlink capability by the end of 2009.

3) Argos JTA 24th session:

24th Argos joint Tariff Agreement meeting was held in Chennai, 25-27 October 2004.

Several recommendations were made by the DBCP. The following was decided by the JTA:
A “pilot project” for the tariff structure was established. New rules valid for 2005 and participating countries were defined for the pilot project. All countries accepted to participate in it except Canada, UK, and China. Under the new rules, bonus disappears. Any platform transmitting in a month will be charged €15 per month; in addition, full data collection & location platforms will be charged €6 per active day; €9 per active day for Argo floats, and €3 per active day for fixed platforms (200s, data collection only). Hence a drifting buoy fully operational during a year will be charged €2370. This basically makes a 40% reduction in Argos tariff compared to last year’s tariff (no bonus).

Argos multi-sat service is now provided free of charge (used to be charged 10%).

E-SURFMAR (or other willing organizations) will be authorized to participate in Argos Tariff negotiations as a Representative Organization (RO).

Establishing Svalbard ground station service for Argos as soon as possible. The Meeting noted the ongoing tests conducted by NOAA/NESDIS, and recognized with appreciation that NOAA/NESDIS would carry on testing its equipment in place at Svalbard with stored data from the two operational satellites.

Investigating the possibility of obtaining Argos data from Brazilian LUTs, as well as from the Brazilian DCS. The Meeting noted that, referring the information from OPSCOM 38, the INPE/MCT was planning to create an organization or to assign services to an existing organization to process, to store and to disseminate the acquired data to the users in a similar fashion to CLS Argos. Further regarding LUT provision, the Meeting asked to CLS to investigate the possibility of obtaining Argos data from Brazilian LUTs.

Recommendation that the new tariff structure be designed to circumvent the problem of transmissions spanning UTC midnight. The meeting decided that for profiling floats, transmission/location periods should be counted in units of ptt*6 hours (instead of ptt*days for other platform types).
Annex A
DBCP monthly status map, April 2005.

Following maps available from http://wo.jcommops.org/cgi-bin/WebObjects/MapSeek

DBCP status by country, April 2005 (data buoys reporting on GTS)

Drifting buoys: 1043
Moored buoys: 192

- AUSTRALIA (30)
- EUROPEAN UNION (2)
- INDIA (1, 10)
- NETHERLANDS (2)
- SOUTH AFRICA (11)
- MOORINGS
- BRAZIL/FRANCE/USA (8)
- FRANCE (31, 5)
- IRELAND (2, 2)
- NEW ZEALAND (8)
- UNITED KINGDOM (21, 6)
- CANADA (6, 25)
- GERMANY (14)
- JAPAN (4, 14)
- NORWAY (5)
- UNITED STATES (906, 122)
- UNKNOWN

Note: Data received from GTS via JCOMMOPS via Meteo-France; number of drifting and moored buoys in brackets respectively

Direct access to latest map: http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBM_CNTRY
Direct access to latest map via http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBM_SPW

See also http://w3.jcommops.org/WebSite/DBCP (dynamic map, monthly) and http://w3.jcommops.org/WebSite/DBCP_RT (dynamic map, daily).

Note: Data received from GTS at JCOMMOPS via Météo-France
Barometer Drifting Buoy status by country, April 2005 (data buoys reporting on GTS)

Drifting buoys: 270

- **AUSTRALIA** (27)
- **FRANCE** (29)
- **IRELAND** (0)
- **NEW ZEALAND** (8)
- **UNITED KINGDOM** (4)
- **CANADA** (4)
- **GERMANY** (3)
- **JAPAN** (1)
- **NORWAY** (3)
- **UNITED STATES** (182)
- **EUROPEAN UNION** (0)
- **INDIA** (1)
- **NETHERLANDS** (0)
- **SOUTH AFRICA** (8)
- **UNKNOWN**

Note: Data received from GTS at JCOMMOPS via Meteo-France; number of drifting buoys in brackets

Direct access to latest map: [http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBPM_CNTRY](http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa/wa/map?type=DBPM_CNTRY)
Annex B
Operational Drifting Buoys by country, April 2005

Following histogram and table available from http://wo.jcommops.org/cgi-bin/WebObjects/JCOMMOPS.woa.wa/PTFCountry

Operational Drifting Buoys by country, 2005-04

- Australia
- Bermuda
- Brazil
- Canada
- Chile
- China
- Denmark
- Europe
- Finland
- France
- Germany
- India
- Ireland
- Italy
- Japan
- Netherlands
- New Zealand
- Norway
- South Africa
- South Korea
- Spain
- UK
- USA/10y
- Total/10y

Drifting Buoys (2140)
Drifting Buoys on GTS (1043, i.e. 49%)
Attachment 6 – Participant’s Report from AWI

1. AWI buoys operating in 2004 and 2005 (until July 2005)

Two buoys deployed during White Trident 2002 and NABOS 2003 were still operating. In the reporting period, one ICEXAir buoy and two Denkmanufaktur buoys were deployed during White Trident and during NABOS in 2004. In April and May 2005, three lightweight Denkmanufaktur buoys were deployed in the Laptev and Lincoln Seas (see below). In addition, in May 2005 two IABP-Denkmanufaktur buoys were also deployed in the Lincoln Sea.

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<td>16.08.02 WT 2002</td>
<td>79.72</td>
<td>170.04</td>
<td>Still operating!</td>
<td></td>
<td></td>
<td>ICEXAir; No GPS since April 4, 2004</td>
</tr>
<tr>
<td></td>
<td>05.09.03</td>
<td>79.54</td>
<td>134.57</td>
<td></td>
<td></td>
<td></td>
<td>Denkmanufaktur*</td>
</tr>
<tr>
<td>10810</td>
<td>NABOS 2003</td>
<td>79.54</td>
<td>170.44</td>
<td>02.05.05 ??</td>
<td>77.60</td>
<td>171.11</td>
<td>ICEXAir</td>
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<tr>
<td>8063</td>
<td>18.08.04 WT2004</td>
<td>78.13</td>
<td>141.14</td>
<td>03.05.05 ??</td>
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<td></td>
<td>Denkmanufaktur*</td>
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<tr>
<td>25887</td>
<td>NABOS 2004</td>
<td>79.83</td>
<td>132.54</td>
<td>Operating only sporadically since 16.10.04</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>17.09.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10120</td>
<td>NABOS 2004</td>
<td>82.00</td>
<td>298.59</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3311</td>
<td>Poletrack</td>
<td>83.54</td>
<td>91.94</td>
<td>26.04.05</td>
<td>83.79</td>
<td>88.60</td>
<td>Denkmanufaktur*</td>
</tr>
<tr>
<td>9357</td>
<td>Poletrack</td>
<td>83.88</td>
<td>303.28</td>
<td></td>
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<td></td>
<td>Denkmanufaktur*</td>
</tr>
<tr>
<td>10812</td>
<td>Poletrack</td>
<td></td>
<td></td>
<td></td>
<td>22.05.05</td>
<td></td>
<td>Denkmanufaktur*</td>
</tr>
<tr>
<td>9366</td>
<td>GreenICE 2005</td>
<td>83.95</td>
<td>297.93</td>
<td></td>
<td></td>
<td></td>
<td>Denkmanufaktur*</td>
</tr>
<tr>
<td>9782</td>
<td>GreenICE 2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Denkmanufaktur*</td>
</tr>
</tbody>
</table>

* Denkmanufaktur, http://www.denkmanufaktur.de
2. Contributions in 2005:
Two Denkmanufaktur* buoys were deployed during the GreenICE2005 campaign off Alert/Ellesmere Island in the Lincoln Sea. One ICEXAir has been purchased to be deployed during WhiteTident 2005 (August). Additionally, Argos transmission times were provided for four PoleTrack buoys (see below).
3. Other activities:

3.1 Web site
The AWI buoy web site was established in 2004 at http://www.awi-bremerhaven.de/Modelling/SEAICE/Buoys with full reference to IABP and IPAB, showing live data (Pos, Tair, SLP) of all our buoys operating in the Arctic and Antarctic. The site also contains a web-based graphical-interface archive of all former data since the early 1980s. However, unfortunately experience has shown that there are some software problems with the real time display generation, making the service unreliable.

3.2. International Program of Antarctic Buoys IPAB
AWI has become the coordinator of the International Program of Antarctic Buoys IPAB, and Christian Haas has taken over responsibility to manage the coordination. Here, as much cooperation as possible is sought with IABP. AWI will set up a web site for IPAB, and will organize the next IPAB meeting in association with the IGS sea ice symposium in Dunedin, New Zealand, on December 3, 2005.

3.3. Special offers for IPY buoy orders
AWI has approached its buoy manufacturer Denkmanufaktur for special offers for orders of larger amounts of buoys for IPY. Denkmanufaktur is prepared to offer quite some discount if more than 10 buoys are purchased. For more than 40 buoys, the costs for each buoy are only 7200 €. AWI has very good experience with the usage of those buoys, which are equipped with Tair and SLP sensors of high standard.

3.4. Development of lightweight beacons for deployment by ground expeditions
AWI has initiated development of a lightweight meteorological Argos buoy which can be deployed by hikers to the North Pole. Four prototypes have been built by Denkmanufaktur for the PoleTrack project by Marc Cornelissen from the Netherlands (http://www.poletrack.com). The nominal lifetime of each of those beacons is only 0.5 years, minimizing battery capacity and therefore weight. In addition, the lightweight construction and deployment would probably become unstable during the summer melt season (see Figures below). Three beacons have been deployed so far. Only one could be deployed in the Laptev Sea, because internal political problems in Russia led to an abortion of the hiking expedition and prevented further deployments. Unfortunately, there are problems with electronic components in all three beacons, causing disappearance of the beacons after a few hours to a few weeks.
Figure: Photographs of the PoleTrack lightweight meteorological ice beacon produced by Denkmanufaktur. The right photograph shows the precautions taken to prevent early melting and loosening of the beacons during the onset of summer melt.
MSC Experiment Code 627 Status 1 June 2005

The 1 June 2005 IABP buoy map / status sheet shows MSC in-house assembled buoy Argos 5317 WMO 47538 deployed 1 April 2005 under MSC experiment code 627. Buoy Argos 5315 / WMO 48617 showed on the 2 May buoy map / status sheet under 627 but became inactive by 1 June. This buoy was an ICEX that was deployed in the August 2004 White Trident Exercise.

Deployments July 2004 to June 2005 (from IABP-14 to IABP-15)

During the period July 2004 to June 2005, 4 buoys had the Meteorological Service of Canada (MSC), Environment Canada, “touch” going on ice.

1. **August 2004 White Trident** - One of the 7 ICEX-AIR buoys deployed during August 2004 White Trident exercise was funded by MSC.

   **Expectation:** One MSC funded ICEX buoy has been deployed annually via the White Trident exercise since 1999. ICEX buoys routinely last 2 to 3 years. Thus, MSC expects that there will be at least 2 MSC ICEX buoys, operational at all times. 2 May 2005, only the 2004 deployed ICEX was operational.

2. **April 2005 Twin Otter landing on ice** - The annual Meteorological Service of Canada deployment flight via Twin Otter landing on ice was conducted 1 April 2005 out of Eureka. Polar Continental Shelf Project provided Twin Otter flying hours.

   **MSC in-house buoy and CRREL ice mass balance buoy** – MSC In-house assembled buoy Argos ID 5317 WMO ID 47538 and ice mass balance / met buoy Argos ID 25779 WMO 47504 were deployed co-located 1 April at 81:57 N 117:21 W.

   **US National Ice Center CES ZENO buoy** - CES Zeno buoy Argos 24225 WMO 47503 was deployed for the US National Ice Centre at 81:04:31 N Long 113:13:32 W:

   **Status:** 2 May – All 4 buoys were operational. However, the ice thermistor string on CRREL buoy failed.

   18 May, a team flying from Eureka out to the geomagnetic north pole made an attempt to locate the CRREL buoy to fix it but the first landing was unsuccessful and on the second landing a ski was broken.


   **Issue:** Operating out of Eureka limits the distance out in the pack that the Twin otter can fly and hence where buoys can be deployed. The resultant buoy spacing can be too close to land and/or lead to buoys that are too close to each other.

Participation in DBCP QC Guidelines as a centre Responsible for the quality control of GTS buoy data in the arctic

**Issue** – Will be resolved at IAB P-15.
In-house QC of MSC GTS data using NCO information

In an effort to ensure that the data MSC is processing and putting on circuit is OK, MSC Edmonton, courtesy Dennis Oracheski, via automated software accesses the NCO marine QC site http://www.ncep.noaa.gov/NCO/DMQAB/QAP/qcflags and from the links surf_mar_cd.qcflags and surf_mar_pd.qcflags retrieves respectively data “current day” and data “previous day”. Computer software at the NCO sites appears to flag / reject too much. Human intervention checks the flagged data and, if the flagged data looks real, “H”olds it. Only MSC LUT processed buoys or MSC buoys being processed by Argos are retrieved. The retrieval software is manually updated to add / delete WMO buoy ids to search the NCO site for. A job is run daily at 1530Z to download the two qcflags files, and extract the WMOs for Pacific, Arctic, Lake Winnipeg, Ontario, Quebec, and Atlantic. Applicable results are manually emailed to each of the respective regions. Sensors QC’ed are: pressure, wind, air temp, and sea temp. An 'H' in the column for the buoy indicates that the value was initially rejected by the computer objective analysis but was determined as OK by manned re-analysis. The oa may still reject the value on the 2nd go-around. A 'P' indicates the value was determined to be bad by the manned analysis as well as thus is probably truly bad.

-----Original Message-----
From: DennisOracheski [mailto:dennis@cs-dora.edm.ab.ec.gc.ca]
Sent: April 30, 2005 9:32 AM
To: dennis@cs-dora.edm.ab.ec.gc.ca; Hudson,Edward [Edm]; Lukawesky,Luke [Edm]; Hunter,Will [Edm]
Subject: 050430-1532z: Arctic NCO Manual Surface Marine QC Flags

NCO (NCEP Central Operations) Manual Surface Marine QC Flags
Retrieved 050430-1532z   PWAS status: P=purged(bad), H=held(good)

--- Arctic Moored ---
CallSign   Lat    Long  yyyymmdd hhmm  TypDPWAS CallSign
DataCorrections

--- Arctic Drifters ---
CallSign   Lat    Long  yyyymmdd hhmm  TypDPWAS CallSign
DataCorrections
47538     82.09 -117.00 20050429 1504  562 H
47538     81.99 -117.42 20050429 1516  562 H
48551     74.50 -135.75 20050430 0600  562 P
--END--
produced by cron job script /home/dennis/nco/nco.bat on system cs-dora

Brochures and Posters
Prompted by Estelle Couture, Science Advisor, Oceanography and Climate, Fisheries and Oceans Canada, an IABP poster and copies of an abbreviated IABP brochure were
produced for the GEOS-5 meeting held November 2004 in Ottawa, Canada. Ignatius Rigor provided some of the graphics used for the poster. Then, in turn, some graphics and style of the poster generated for the GEOS meeting were used for the poster done by Lt Magda Hanna, Ignatius Rigor, Mark Ortmeyer and Christian Haas for the December 2004 San Francisco Fall Meeting of the American Geophysical Union (AGU).

**IABP Chairman’s – Coordinators Report for DBCP**

Report “doc” and PowerPoint were provided to Elizabeth Horton for presentation at October 2004 DBCP meeting held at Chennai, India. 40 copies of an updated IABP brochure were also provided for distribution.

**MSC’s plans**

1. Effective this year (2005), increase participation in the annual White Trident Exercise from one to two ICEX AIR buoys.

2. Supported by Canadian Ice Service, provide total of 4 ICEX buoys for the White Trident 2007 (IPY) deployment. The 2 additional buoys are already “staged” at Christen Michelsen Research.

3. Review annual March or April Twin Otter landing-on-ice deployment out of Eureka with the coordinator and the U.S.-IABP representative(s). The deployment flight(s) is contingent on continued Polar Continental Shelf Project support and the U.S. National Ice Service providing buoys to deploy.

4. Participate in DBCP QC as a center responsible for the quality control of GTS buoy data in the Arctic.

5. Continue to provide updated brochures.

6. Continue to produce and/or contribute to production of IABP posters.

7. Continue to prepare IABP Chairman / Coordinators report and PowerPoint for annual DBCP meeting.
Attachment 8 – Participant’s Report from MEDS

As the Responsible National Oceanographic Data Center (RNODC) for drifting buoys, MEDS continues to capture, quality control and archive data distributed on the Global Telecommunication System (GTS) in BUOY code. Data is made available to the international scientific community on-line or through our request system.

Annual statistics

During the past year, May 2004 to April 2005, there were on average 34 Arctic buoys per month reporting data on the GTS producing approximately 20,400 messages per month. These numbers have greatly increased since last year with only 28 buoys and 13,000 messages per month. Arctic buoy data requests decreased by half with 9 requests in total, 5 of which were for the IABP CD that was created in 2000. The CD contains data, products and documents that were produced under the International Arctic Buoy Programme (IABP) between 1979 and 1999.

Summary of work carried out during the year

Duplicates Analysis

MEDS had noticed a large amount of duplicate and semi-duplicate buoy messages distributed over the GTS and has enhanced their duplicate software to deal more effectively with this issue. The new duplicates analysis combines and filters the GTS messages. Messages are combined which contain the same header information, such as buoy ID, observation date/time, position etc., but each having only a partial compliment of the complete set of measurements being reported. The system also screens out redundancies by filtering out messages that are duplicates in everything except observation time. For these messages, if the difference in time is within a half hour, only one is kept, which is determined by a priority list of the source of the data, the LUT (Local User Terminal). The procedures were developed in consultation with the practices of Argos transmissions.

The current duplicates analysis procedures have been in place since July 2004 and remove approximately 10% of the total messages as duplicates or redundancies. All data in MEDS real time drifting buoy archives have been reprocessed by these procedures. This has helped to make the data much cleaner and easier to understand and use in products and analysis.

Quality Control Flagging

MEDS quality control analysis for real time drifting buoy data, continues to use both automated checks and visual inspection. Recently, past practices in automated tests for buoy drift position and speed were changed. These used to compare the time of a
message position to the time of the measurement observations and set a position flag of “dubious” where these were different by some specified interval. This practice was removed and all data in MEDS real time drifting buoy archives were reprocessed for the track (date/time, latitude and longitude) position and speed test. The speed re-analysis of the track now takes into account the QC flags sent with the data such as QL, quality of location and QA, the class of buoy location.

Other Archive Improvements

MEDS continues to archive over 4 million reformatted, processed and quality controlled drifting buoy messages each year. Improvements were made to the archive data system in order to accommodate the increasing rate of acquisition. The changes have helped improve the accessibility for user retrievals and data product creation.

Delayed Mode Archival of AOML Drifter Data

Surface Velocity Program (SVP) data is sent from the Atlantic Oceanographic and Meteorological Laboratory (AOML) to MEDS in delayed mode for archival. This set is comprised of KRIG, P&S (position and sea surface temperature) and "raw" versions of drifter data. In 2001, AOML reprocessed all their data (1979-2000) and forwarded it to MEDS to update their archives. Since then, three annual updates were also received to include data up to December 2003. MEDS updated the system that handles the SVP data. New archives were created and now store additional observational data than just surface temperature. An issue concerning reusing buoy IDs was also dealt with.

Previously, the SVP was carried out under the World Ocean Circulation Experiment (WOCE) which ended in 2002. Another programme, Climate Variability (CLIVAR), is continuing the SVP. A new section, Surface Drifters as part of CLIVAR, was added to our website to replace the former SVP section under WOCE. All data received by AOML under the SVP programme is available on the website for download as well as maps and inventories of buoys by year.

DBCP QC Guidelines for Location Data

MEDS sent its first message on the BUOY-QC distribution list (buoy-qc@vendur.is) in October 2002 and continues to participate by sending monthly statistics on the number of erroneous positions on the distribution list. Maps displaying buoys tracks of the previous month for the Arctic, Antarctic and the rest of the world can be seen here: http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/RNODC/Buoy-QC/Buoy-QC.htm. These maps serve as a visual aid to the statistics file and allows the user to “mouse over” tracks to determine which buoys are reporting erroneous locations.

Implementing New BUFR Software

Drifting buoy data is now being reported on the GTS in both BUOY and BUFR (Binary Universal Form for Data Representation) format. A connection has been established to
the Canadian Meteorological Center (CMC) to receive the BUFR messages via FTP and we have been successful in splitting out the BUFR data into single messages. New software is currently being written to read and write BUFR format which will eventually replace the existing BUOY decoder. Functionality related to new editions, data compression and replication still need to be added. MEDS intends to have the BUFR software put into production by the end of 2005.

Goals for 2005/2006

Redesign the Drifting Buoy/RNODC section of our website
MEDS would like to redesign the look and content of the Drifting Buoy/RNODC section of the website for easier maintenance and to include more graphs and statistics on their archive and its contents.

Enhance RNODC annual report
MEDS is enhancing its annual RNODC report that is presented at DBCP to include more information on what we do and how, the partnerships we have, and more graphs and statistics of our archive. The aim is to give a better snapshot of our drifting buoy archive and what we have available.

Upgrade Drifting Buoy QC procedure
Drifting Buoy data is currently QC’d on a monthly basis, however, the need for drifter data in a more timely manner is increasing. MEDS will be looking into changing their processing system to a weekly or even daily operation.

Complete BUFR software and install into Drifting Buoy processing system

Contact:
Cara Schock
Fisheries and Oceans – Marine Environmental Data Service (MEDS)
12W082-200 Kent St.
Ottawa, Ontario, Canada
K1A 0E6

Phone: (613) 998-2886
Fax: (613) 993-4658
schock@meds-sdmm.dfo-mpo.gc.ca
Attachment 9 – Participant’s Report from IARC

In March-May 2003 9 GPS buoys, without telemetry, where deployed at the ONR ICEX03 ice camp in the Beaufort Sea. Data was recorded at 10 second intervals, for investigation of high frequency dynamics of a crack that later developed into a lead. This data will be included in the IABP database.

IARC continues to support buoy deployment for other institutes. During the 2004 NABOS expedition 2 CRREL Ice Mass Balance (IMB) buoys and AWI met buoys were deployed. Two IMB buoys will be deployed during the NABOS Sept. 2005, at the northernmost mooring locations in the Laptev Sea and north of the East Siberian Islands (see figure 1).

IARC is working with Oceanetic Measurements (Sydney B.C., Canada) to develop cheap GPS-ARGOS buoys to measure sub-mesoscale ice deformation, recording position only every 15 minutes. Six of these buoys will be deployed in a 10 mile radius array during the Healy/Oden Arctic transect in August 2005. This array will be colocated with a JAMSTEC J-CAD buoy, JAMSTEC POPs buoy, JAMSTEC Met station and CRREL IMB buoy, see figure 2.

IARC continues to fund IABP ($20,000) in the 2005-2006 fiscal year.
Fig 1: Planned cruise track for the NABOS 2005 expedition. CRREL IMB buoys will be deployed at two mooring sites, the first at the red spot in the Laptev sea, the second at the yellow spot north of the East Siberian Islands. Figure provided by Igor Dmitrenko.

Fig 2: Plan of autonomous drifting station to be deployed from the Healy in August 2005.
Participants of the IABP work together to maintain a network of drifting buoys on the ice of the Arctic Basin to provide meteorological and oceanographic data for real-time operational requirements and research purposes including support to the World Climate Research Programme (WCRP) and the World Weather Watch (WWW) Programme. http://iabp.apl.washington.edu

IABP 14th ANNUAL MEETING - Members of the International Arctic Buoy Programme met 7-9 July 2004 in Geneva, Switzerland. The meeting was hosted by the World Meteorological Organization.

IABP PARTICIPANT ACTIVITY - The annual reports of IABP Participants are available on the IABP web site: http://iabp.apl.washington.edu as part of the IABP-14 meeting report.

IABP EXECUTIVE AND COORDINATOR
Chairman: Timothy Goos, Environment Canada, Canada tim.goos@ec.gc.ca
Vice Chairman: Christian Haas, Alfred Wegener Institut, Germany chaas@awi-bremerhaven.de
Member: Ivan Frolov, Arctic and Antarctic Research Institute, Russia aaricoop@aari.nw.ru
Member: Elizabeth Horon, Naval Oceanographic Office, U.S.A hortone@navo.navy.mil
Coordinator: Ignatius Rigor, Polar Science Centre, U.S.A ignatius@apl.washington.edu

BUOY ARRAY - Monthly – and, new for 2004, daily - buoy mappings and status sheets can be accessed on the IABP web site: http://iabp.apl.washington.edu The mappings show all buoys on the Arctic Basin known to the IABP Coordinator. This includes some buoys where the data does not reach the GTS and other buoys that were deployed by non IABP participants. The suite of maps has been expanded from monthly only charts to include a daily chart and a daily track chart showing the previous 60 days of buoy tracks.

IABP Participants strive to maintain an array of at least 25 buoys evenly distributed across the Arctic Ocean providing surface air pressure and surface air temperature to GTS. The table shows statistics for April and September 2004. These dates represent when the arrays are typically at their minimum and maximum respectively as most of the annual deployments occur in the period April to August. The annual summer “White Trident” exercise where a total of 7 ICEX buoys provided by IABP participants are air dropped onto the ice of the Arctic Basin courtesy of the US Naval Oceanographic Command remains key to the IABP having an
appropriate array of buoys on ice from the perspective of both number and placement. For the 2004 deployment, the Alfred Wegener Institute (1), Norwegian Meteorological Institute (1), Norsk Polarinstitutt (1), Meteorological Service of Canada (1) and U.S. IABP Participants (3) provided ICEX buoys.

<table>
<thead>
<tr>
<th>2004</th>
<th>Buoys on map and status sheet(^1)</th>
<th>Buoys on GTS</th>
<th>Reporting surface air pressure and temperature</th>
<th>Reporting only surface air pressure</th>
<th>Reporting only surface air temperature</th>
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<tbody>
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<td>1 April</td>
<td>28</td>
<td>24</td>
<td>20</td>
<td>1</td>
<td>Nil</td>
</tr>
<tr>
<td>1 September</td>
<td>39</td>
<td>38</td>
<td>33</td>
<td>3</td>
<td>Nil</td>
</tr>
</tbody>
</table>

\(^1\)Plus one land station

Data from a few IABP buoys are not routinely made available on GTS but may be available from other sources. For example, data from JCAD buoys of the Japanese Marine Science and Technology Centre are available on their website [http://www.jamstec.go.jp/arctic/J-CAD\_e/jcadindex\_e.htm](http://www.jamstec.go.jp/arctic/J-CAD\_e/jcadindex\_e.htm)

**SOME PARTICIPANT HIGHLIGHTS**

**AWI (Alfred Wegener Institute)** - Set up web site that highlights their IABP and IPAB activities / buoys. [http://www.awi-bremerhaven.de/Modelling/SEAICE/Buoys](http://www.awi-bremerhaven.de/Modelling/SEAICE/Buoys)

**AARI (Arctic and Antarctic Research Institute)** - Established arctic drifting station SP-33 central Arctic Basin late summer. [http://www.aari.nw.ru/cigmi/np33](http://www.aari.nw.ru/cigmi/np33)

**JAMSTEC (Japan Marine Science and Technology Centre)** – collaborating with MetOcean in development of an ice-drifting buoy system tethering an ARGO type subsystem CTD profiler. [http://www.jamstec.go.jp/arctic/J-CAD\_e/jcadindex\_e.htm](http://www.jamstec.go.jp/arctic/J-CAD\_e/jcadindex\_e.htm)

**DATA AND PUBLICATIONS** - IABP data have been updated through December 2003 and are available on the web. Hardcopy of the draft 2003 IABP buoy report is available from the IABP coordinator. To the end of 2003, 450 plus papers have cited IABP data.

** ISSUES AND OPPORTUNITIES  
 o Acquiring the 7 ICEX buoys needed for the annual summer “White Trident” deployment via air drop from NAVO Hercules is struggle each year!  
   *The IABP Chairman and Coordinator welcome those who can fund ICEX buoys.* 

 o Encouraging agencies who put buoys on ice the Arctic Basin to join the IABP and get their basic met data onto GTS.

 o Ensuring that the IABP goal of a well positioned array of buoys providing the basics position, air temperature and sea level pressure is met / not forgotten as the science community moves to ever more sophisticated buoys deployments is a concern. IABP participants seek to partner to ensure that the “basic” parameters are measured and get onto the GTS.
Increasing the demonstrated value of IABP data to operational forecast services and hence getting more support from operational agencies to replace dwindling support, in some cases, from scientific agencies is a challenge that the IABP faces.

IABP AND THE POLAR YEAR

The IABP seeks to make best use of opportunities that the International Polar Year (IPY) 2007 affords. As cited by Participant Christian Haas and agreed to by all “Every Year is an IPY for the IABP”

It is hoped that the IPY will prompt new IABP Participants, Participants who will remain beyond the IPY 2007.

Timothy Goos
Chairman IABP
Director, Prairie and Northern Region
Meteorological Service of Canada
Environment Canada
Twin Atria Bldg - 2nd Floor
Edmonton, Alberta, T6B 2X3
Canada

Ignatius Rigor
Coordinator IABP
Polar Science Center
Applied Physics Laboratory
University of Washington
1013 NE 40th Street
Seattle, WA 98105
U.S.A
## Attachment 11 – Contributions to IABP

### IABP Participant Contributions† 2002 – 2005

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfred Wegener Institute for Polar and Marine Research, Germany</td>
<td>Deploy 3 met. buoys, 1 ICEX-AIR, ADP</td>
<td>Deployed 3 met. buoys, 1 ICEX-AIR, ADP</td>
<td>Deploy 2 met. Buoys, 1 ICEXAIR, 3 Pole Track, ADP</td>
<td>Deploy 2 met. Buoys, 1 ICEXAIR, 1 Pole Track buoy at NABOS, ADP</td>
</tr>
<tr>
<td>Christian Michelsen Research, Norway</td>
<td></td>
<td>Buoy research and production.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold Regions Research and Engineering Lab</td>
<td>2 IMB buoys</td>
<td>4 IMB buoys (2 NPEO, 1 Beaufort Gyre, 1 Oden)</td>
<td>3 IMB buoys</td>
<td>3 IMB buoys</td>
</tr>
<tr>
<td>International Arctic Research Center, University of Alaska Fairbanks, USA</td>
<td></td>
<td></td>
<td></td>
<td>6 GPS buoys at the ADS deployed by the Healy and Oden.</td>
</tr>
<tr>
<td>Japan Marine Science and Technology, Japan</td>
<td>2 JCAD buoy, ADP.</td>
<td>2 JCAD buoy, ADP</td>
<td>1 JCAD &amp; 1 POPS buoy, ADP</td>
<td>1 JCAD &amp; 1 POPS buoy, ADP</td>
</tr>
<tr>
<td>Marine Environmental Data Service, Canada</td>
<td>Development of Scalable Vector Graphics (SVG) Maps, Ongoing QC of locations on GTS.</td>
<td></td>
<td></td>
<td>Data Archive; IABP CDROM; IABP Monthly Inventories, Maps and Statistics (on web).</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Meteorological Service of Canada (MSC)</td>
<td>1 ICEX-AIR, deployed 2 CES buoys for NIC.</td>
<td>1 ICEX-AIR, deploy 2 CES buoys for NIC, and 1 EC buoy.</td>
<td>1 ICEX-AIR, deploy 1 CES and 1 IMB buoys for NIC.</td>
<td>2 ICEX-AIR, 1 MSC buoy, &amp; deploy 1-2 IMB buoys for NIC.</td>
</tr>
<tr>
<td></td>
<td>Chairs IABP, operates LUT, produces IABP brochures and promotional material, submits annual report for DBCP, deploys MSC and other Participants buoys via Twin Otter landing on ice.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Ice Center / US-IABP, USA</td>
<td>4 ICEX-AIR buoys funded by NOAA-OGP, 2 CES buoys</td>
<td>3 ICEX-AIR buoys funded by NSF, 2 CES buoys</td>
<td>3 ICEX-AIR buoys funded by NOAA OGP, 1 CES, &amp; 1 IMB funded by NOAA NESDIS.</td>
<td>2 ICEX-AIR buoys, 2 IMB.</td>
</tr>
<tr>
<td></td>
<td>Coordinates and represents the funding agencies of the US-IABP (NASA, NOAA NESDIS, NOAA ARO, NOAA OGP, NSF, ONR, USN, USCG). Funds the Coordinator of the IABP. Provides 3-7 ICEX-AIR, CES &amp; IMB buoys/year and logistics support. ADP.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naval Oceanographic Office, USA</td>
<td>Funded 3 more AARI buoys next spring.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WHITE TRIDENT buoy deployments.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Norwegian Polar Institute, Norway</td>
<td>ADP, Hosted Fourteenth Annual Meeting.</td>
<td>Refurbished 1 ICEX-AIR, ADP.</td>
<td></td>
<td>1 ICEX-AIR, ADP.</td>
</tr>
<tr>
<td>Norwegian Met Institute, Norway</td>
<td>1 ICEX-AIR, ADP, LUT.</td>
<td>1 ICEX-AIR, ADP, LUT.</td>
<td>1 ICEX-AIR, ADP, LUT.</td>
<td>1 ICEX-AIR, ADP, LUT.</td>
</tr>
<tr>
<td>Pacific Marine Environmental Laboratory, NOAA, USA</td>
<td>Buoys in Beaufort, and at NPEO</td>
<td>1 Weather Station, 1 Radiometer buoys at NPEO</td>
<td>1 Weather Station, 1 Radiometer buoys at NPEO</td>
<td>1 Weather Station, 1 Radiometer buoys at NPEO</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
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</tr>
<tr>
<td>Polar Science Center, Applied Physics Laboratory, University of Washington, USA</td>
<td>Deployed 6 buoys at NPEO, 2 CRREL IMB buoys</td>
<td>Deployed 7 buoys at NPEO, 5 CRREL IMB buoys</td>
<td>Deploy buoys at NPEO, 2 CRREL IMB buoys</td>
<td>Deploy buoys at NPEO, 5 CRREL IMB buoys</td>
</tr>
<tr>
<td></td>
<td>Data Management and Coordination of the IABP. Research on/using buoy data.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROSHYDROMET/AARI Russian Federation</td>
<td>Built 3 AARI buoys.</td>
<td>Deploy 3 AARI, 3 AWI met. buoys, &amp; 1 IMB buoy from NABOS cruise.</td>
<td>Deploy 2 IMB buoy from NABOS cruise.</td>
<td>Deploy 2 IMB buoy from NABOS cruise.</td>
</tr>
<tr>
<td>Service Argos, France and USA</td>
<td></td>
<td></td>
<td></td>
<td>Data Collection and support for meetings.</td>
</tr>
<tr>
<td>Woods Hole Oceanographic Institute, USA</td>
<td></td>
<td>ADP for IOEB</td>
<td></td>
<td>Surface Ocean Profiling buoys.</td>
</tr>
<tr>
<td>World Climate Research Programme</td>
<td></td>
<td></td>
<td></td>
<td>Travel support for some participants. Scientific advice.</td>
</tr>
</tbody>
</table>

**Other Contributions† to IABP 1999 – 2002**

<table>
<thead>
<tr>
<th>Scottish Association for Marine Sciences</th>
<th>3 Metocean SVPB buoys w/o drogue</th>
<th>1 Tilt meter (ice thickness) buoy north of Alert.</th>
<th>???</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom Meteorological Office, United Kingdom</td>
<td>ADP on 2 buoys.</td>
<td>ADP on 2 buoys.</td>
<td>ADP on 1 buoy</td>
</tr>
<tr>
<td>Univ. of Hamburg</td>
<td>9 buoys</td>
<td>11 buoys</td>
<td></td>
</tr>
</tbody>
</table>

† Contributions further the objectives of the IABP and are defined in the Operating Principles of the IABP, section 6.5.

Some abbreviations:
- ADP: Argos Data Processing
- IMB: Ice Mass Balance Buoy
- LUT: Local User Terminal
1. Objective

The objective of the International Arctic Buoy Programme (IABP) is to establish and maintain a network of data buoys in the Arctic Ocean to provide meteorological and oceanographic data for real-time operational requirements and research purposes, including support to the World Climate Research Programme (WCRP) and the World Meteorological Organization (WMO) World Weather Watch (WWW) Programme. The Programme will build upon cooperation among agencies and institutions with arctic interests.

2. Programme Responsibilities

The IABP will:

2.1. Maintain an observational network over the Arctic Ocean using data buoys;

2.2. Distribute meteorological, sea ice and oceanographic data and buoy location from the network in real time over the Global Telecommunication System (GTS) of the WMO and distribute relevant additional real-time data approved for public dissemination;

2.3. Ensure data from the network are archived;

2.4. Develop and distribute basic analyzed products;

2.5. Cooperate with and provide results of the Programme to the WCRP International Programme for Antarctic Buoys and other related programmes; and

2.6. Promote the use of Programme data and products.

3. Observation Programme

3.1. Operational Area

The operational area of the Programme will include the central Arctic Ocean and its marginal seas, excepting Exclusive Economic Zones where agreements of the Coastal States have not been obtained.

3.2. The IABP measurements include the following variables:

3.2.1. Sea level pressure
3.2.2. Surface air temperature
3.2.3. Sea ice motion
3.2.4. Snow depth
3.2.5. Sea ice thickness
3.2.6. Sea ice temperatures
3.2.7. Ocean temperatures and salinities

3.3. Additional variables are also desirable and buoy deployment, data collection, analysis and dissemination from these instruments will be facilitated by the Programme.

3.4. Basic Network Density

The Programme will strive to establish and maintain a network with observational points no more than 250 kilometers apart. As far as practical, buoys will be deployed to achieve and maintain this density over the operational area.

4. Data Acquisition and Distribution

4.1. Transmitters

All buoys in the network should be equipped with transmitters to enable transmission of data in real-time (synoptic and asynoptic observation times) using satellite telemetry such as Service Argos, and Iridium.

4.2. Global Telecommunication System

Participants are responsible to code appropriate data and buoy location in approved WMO code(s) and required to distribute data onto the GTS in real-time (See item 2.2).

5. Data Archiving

5.1. Operational Archiving

All data transmitted on the GTS will be archived by the Marine Environmental Data Service (MEDS) as the Responsible National Oceanographic Data Centre (RNODC) for Drifting Buoys of the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the WMO.

5.2. Research Data Base

A uniform, quality-controlled Programme data base has been established at the Polar Science Center, University of Washington for use by the research community, and is maintained by the Coordinator. Periodically these data will be submitted to World Data Centre A (Glaciology), World Data Centre B (Sea-Ice), and to MEDS.

6. Management Structure

6.1. Participants

Programme Participants can be operational agencies, meteorological and oceanographic institutes, research agencies, data centres, government and non-governmental organizations, and commercial services interested in the Arctic Ocean and contributing actively to the Programme. Participants will indicate their involvement in the Programme by means of a Letter of Intent.
On an annual basis, the Participants will review the membership to identify potential new Participants and to re-affirm the intent of existing Participants. Participants who chose not to re-affirm their participation will be deemed to have withdrawn.

Participants may withdraw from the Programme with a letter to the Chairman of the IABP.

A Participant who is unable to attend may designate a Participant to act as Proxy at an annual meeting by notifying the Chair in advance of the meeting.

6.2. Election of Programme Executives

The Programme is coordinated by the Participants. The Participants will arrange for the implementation of the Programme within the framework of the Programme Objective.

On an annual basis, the Participants will elect a Chair and Vice Chair and appoint a Programme Coordinator. The Chair, Vice Chair, and two representatives elected from the Participants will form the Executive Committee. Elections will be held at annual meetings of the Participants and will be decided by a simple majority if a quorum of Participants is present. A quorum will consist of a simple majority of Participants. If a quorum is not present at the annual meeting of Participants, elections will be by unanimous vote.

A Participant who is unable to attend the annual meeting may register a proxy vote delivered by an attending Participant if such authority is signified in writing to the Chair.

6.3. Executive Committee

The Executive Committee will be responsible for the day-to-day management of the Programme within the guidelines set at the annual meeting of Participants. The Executive Committee will provide guidance and direction to the Coordinator.

6.4. Coordinator

The Coordinator will act as the focal point for the Programme and will carry out the directives of the Executive Committee during intercessional periods. Specific responsibilities and duties of the Coordinator are contained in Appendix 1.

6.5. Funding Provisions

The Programme will be self-sustaining, supported by contributions of equipment, services (such as communications, deployment, archiving, and scientific or technical advice), coordination, and monetary contributions. As necessary, the Participants will establish a budget to implement the Programme. Other funding arrangements made between the Participants will be recognized as contributions to the IABP if they further the Objective of the Programme.
6.6. Programme Review

The management structure and operation of the Programme will be reviewed at the annual meeting of Participants. The operating principles and procedures will be reviewed and updated as necessary at the annual meeting.

7. Meetings

An annual meeting of the Participants will be held at a location to be determined by the Participants.
APPENDIX 1 to
The International Arctic Buoy Programme (IABP) Operating Principles

Terms of Reference for the Coordinator of the IABP

The Coordinator is appointed at the annual meeting of the Participants and is directed by the Executive Committee. The Coordinator's specific responsibilities are to:

1. Monitor and receive appropriate Argos and non-Argos data from the buoy network and to prepare a monthly status report of buoys;
2. Stay informed of the activities of non-Argos buoy programmes and other field operations and to make those data available, as possible;
3. Liaise with Principal Investigators and managers of individual buoy programmes in the Arctic Ocean;
4. Arrange for the maintenance of a research quality data base of ice motion and surface meteorological data, and to submit through the World Data Centre A (Glaciology) to World Data Centre B (Sea-Ice) and the RNODC/DB;
5. Develop a deployment strategy to maintain an optimum buoy network in the Arctic;
6. Identify and coordinate opportunities for buoy deployment;
7. Liaise on technical aspects of buoy deployment;
8. Prepare an annual summary of resources committed to the Programme;
9. Liaise, as needed, with the Technical Coordinator of the Data Buoy Cooperation Panel to ensure that; a) the proper quality control of arctic data is maintained; and b) the data are distributed over GTS. Provide the Technical Coordinator with deployment information;
10. Arrange for the purchase of buoys and ancillary equipment, as authorized;
11. Arrange for the payment of Argos data acquisition and Argos processing fees, as authorized;
12. Prepare and distribute an annual data report;
13. Maintain a distribution list for monthly status reports and annual data reports;
14. Respond to requests from the international arctic science community for reports on arctic climatology, global change, and advice on experiment design;
15. Maintain a web page that promotes the IABP, provides access to the IABP datasets, and provides news and information to the Participants and general community;
16. Organize the annual meeting of Participants, present a report of the preceding year's activities, and prepare a plan for the following year; and
17. Promote the IABP so as to attract potential Participants.

NOTE: Additional contractual duties of the Coordinator that may be required in the future will be approved through the Executive Committee.