



Newsletter of the international Argo project

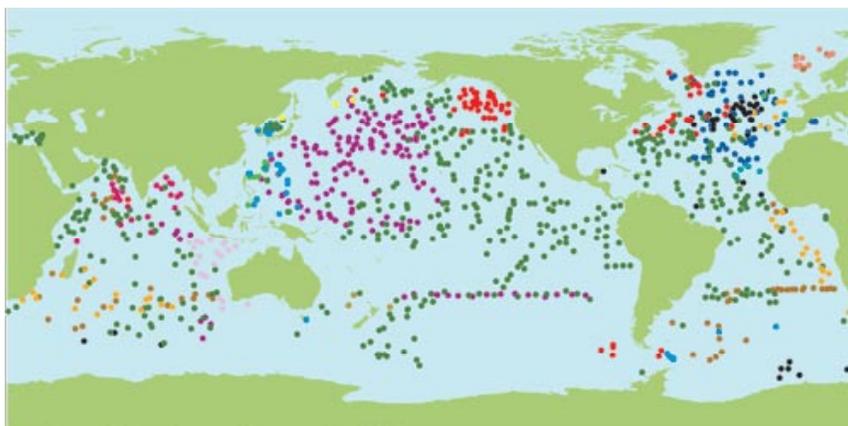
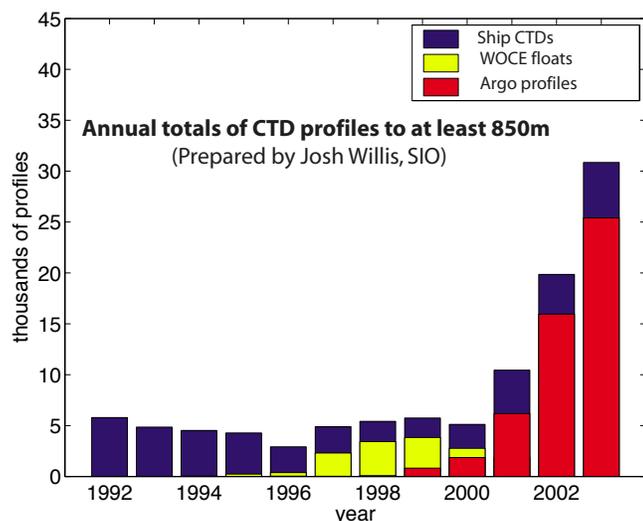
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Editorial

As 2003 draws to a close, Argo can quite justifiably congratulate itself on two notable events. The first is the success of Argo's **First Science Workshop**. The event far exceeded the organising committee's expectations in terms of the quality and breadth of the science that was presented and the number of people who attended. A report of the workshop is on Page 2. The Workshop was hosted and generously supported by JAMSTEC. Further financial support was provided by NOAA and this money, administered through IOC, was used to support the attendance of 16 scientists from 11 countries (Brazil, Chile, China, Costa Rica, Fiji, India, Indonesia, Korea, Mauritius, South Africa and Spain). The contributions of JAMSTEC, NOAA and IOC towards the workshop are gratefully acknowledged.

The second event is that we now have over **1000 floats operating**. Since all floats are really of equal value we are not going to reveal which was the 1000th, but the significance is that we are now over one third of the way towards our 3000 float goal. The rapid growth in the array and the number of profiles it delivers can be seen in the graph below.



Argo Network, as of December 2003
(1023 Floats)

● AUSTRALIA (20)	● FRANCE (38)	● MAURITIUS (1)
● CANADA (74)	● GERMANY (46)	● NEW ZEALAND (3)
● CHINA (11)	● INDIA (22)	● NORWAY (9)
● DENMARK (0)	● IRELAND(2)	● RUSSIAN FEDERATION (3)
● EUROPEAN UNION (64)	● JAPAN (158)	● SPAIN (6)
	● KOREA (Rep. of) (48)	● UNITED KINGDOM (62)
		● UNITED STATES (456)

Argo web sites. Since Argo began there has been a proliferation of sources of information on the project on the www and the present situation is likely to be confusing. Over the coming months we will rationalise these information sources. Our aim is to make it clearer, both for those familiar with Argo and for newcomers, where they should look for information. This simplification will become of increasing importance as the volume of data, and its geographical coverage, increases and we inevitably develop a growing community of "customers" for Argo data.

At present the four primary sources are the Argo Information Centre that has a statutory responsibility from IOC to deal with the various intergovernmental aspects of Argo and that provides monitoring of the growth of the Argo array, the Argo Science Team pages maintained at Scripps and the web sites of the two Global Data Centres in France and the USA.

Our aim will be to make the information as clear, concise and informative as possible.

Thank you The report of the Argo Data Team on page 3 notes that Bob Keeley has retired as the co-chair of that important panel. I would like to take this opportunity to thank Bob for helping to steer Argo through its difficult initial phase and I look forward to working with Mark Ignaszewsky the new co-chair who joins Sylvie Pouliquen in guiding the Data Team.

Finally The Argo bibliography is now available on the AST web site and some new entries are listed in this Newsletter. Please send me (wjg@ucsd.edu) any additions so that we can document the rapid increase in use of Argo data.

The First Argo Science Workshop

a personal account

John Gould,, Argo Director, Scripps, Institution of Oceanography, La Jolla CA 92093.

The idea of Argo holding its first workshop pre-dated my involvement with the project but by the time I arrived at Scripps in January 2003 and certainly by the Argo Science Team meeting in Hangzhou in March, it was requiring my attention.

The primary motivation had come from Japan and there had been some discussions between Kensuke Takeuchi and Steve Piotrowicz (US Argo project manager). The objectives were

- Exchange information on the early results obtained using Argo and other profiling floats
- Demonstrate the present and likely future value of Argo for a wide range of applications
- Identify ways in which Argo can best meet the needs of scientists and ocean applications and operational programmes

The first two of these points could be achieved during the workshop. The third one will require some analysis and, what in the commercial world would be termed, “market research”.

So how did the Workshop turn out? Dean Roemmich summed it up at the end by saying that it had been Argo’s best ever Workshop but since it was our first that was not a very useful assessment!

The attendance (220) exceeded the organising committee’s expectations, the breadth of the science was impressive and, most of all, there was a great deal of offline discussion during the coffee breaks and around the posters.



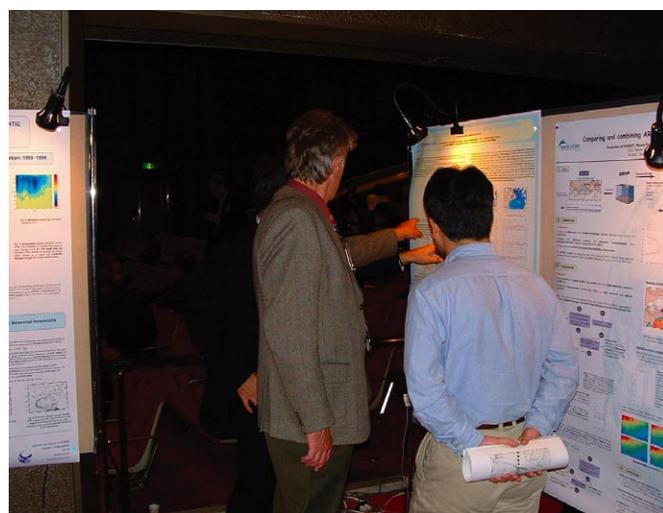
Part of the attentive audience in the Yakult Hall

Almost all the files of the oral and poster presentations from the Workshop web site (www.argo.ucsd.edu) so you can judge for yourself what was the most important/exciting science. The following are my personal views.

Annie Wong gave an excellent summary of the complex issue of delayed-mode quality control that has been the focus of much discussion over recent months. We are now starting to produce salinity data with the gross offsets and calibration jumps removed and the use of these data to address issues such as inter-annual water mass property variability will help us to further refine these delayed-mode quality control procedures. In all 17 of the presentations in some way or other were relevant to this issue.

GODAE (the Global Ocean Data Assimilation Experiment) is a sponsor of Argo and this link is strong if judged by the number of papers devoted to the assimilation of Argo data. The even distribution of Argo profiles (in both space and time) makes the data unlike any other subsurface information. This and their quantity (see graph on page 1) suits them for addressing basin and global scale problems.

While we tend to concentrate on the profile data from Argo, there were many examples shown of the exploration of circulation features - in the Bering Sea, the Okhotsk Sea, the Japan Sea. While Argo floats may not be able to explore with the detail possible from acoustically tracked floats, their ability to populate a region for long periods means that the tracks are likely to continue to reveal previously unknown circulation patterns and features.



Discussions around the posters

We saw two examples of how Argo velocity data can be used globally, Breck Owens’ invited talk showed the first results of putting together altimetry, float profiles and surface and subsurface velocity fields (from drifters and Argo) on a basin scale (in the North Atlantic) so as to produce velocity fields at any level. This will indeed be an exciting prospect when expanded globally. Kuh Kim showed how the data from the surface tracking of Argo floats can be used to extract statistics of inertial oscillations and their seasonal and regional variations. In short, we saw that the velocity data is a resource that we have yet to fully exploit.

The data gaps in the Southern hemisphere presently hinder the truly global analysis of profiling flat data but a study of global heat and fresh water storage by Gilson and Roemmich gave a hint of what will soon be possible. We also wait to see the results of the increasing use of Argo data by operational centres.

This was planned as a workshop not a conference but pressure of time and the need to allow as many scientists as possible to present their work and to allow adequate time to hold discussions round the posters meant that we could devote only 2 hours to an open forum discussion.

Sentiments/issues expressed in this discussion included

- The benefits to Argo scientists of better access to GODAE products
- Argo's present inability to make very near surface salinity measurements needs to be overcome
- Velocity data need to be made more easily accessible
- Steps need to be taken to broaden Argo's visibility.

These issues will all be considered by the Science Team in the run up to its next meeting in March 2004.

The final talk was given by Stan Wilson. He addressed the "Challenge for Argo" which he saw as being how "To Sustain the funding long enough to complete the global array and demonstrate its value." While in the short term we seem to have adequate funding to build the array, maintaining it long enough to demonstrate its value requires funding over a decade (longer than most research funding opportunities). We must continue to demonstrate through the published literature and at dedicated conference sessions how Argo enables us to address issues such as climate change and sea level rise that are of relevance not just to scientists but to society as a whole. Stan showed how GEO, the Group on Earth Observations, is closely related to Argo's goals. (See report of the POGO meeting).

With funding from NOAA and administered through IOC we were able to support the participation of 16 scientists who would not otherwise have been able to attend. This support broadened the geographical representation at the workshop and particularly enabled us to include scientists from South America (Brazil Chile and Costa Rica). Discussions started at the workshop should lead to a much greater involvement of this region in Argo.



Stan Wilson gives the closing address and Kensuke Takeuchi relaxes after the workshop

Another feature of the workshop was the involvement of commercial companies (float and sensor manufacturers and communications companies) who had displays and were able to interact with Argo scientists. They generously provided an icebreaker reception on the first evening. That contribution is gratefully acknowledged.

Finally we should all thank Kensuke Takeuchi and the staff at JAMSTEC for all their hard work in making the workshop possible.

Argo Data Team Report

Bob Keeley, Sylvie Pouliquen (Co-Chairs)

The 4th Argo Data Management meeting took place at Fleet Numerical Meteorological and Oceanographic Centre in Monterey on 5-7 Nov, 2003. There were 46 participants from 11 countries and 2 agencies. The report of the meeting will be available soon.

The main issues decided at the meeting centred around starting the transfer of delayed mode data to the global servers. This required agreement on the process of carrying out quality control procedures on delayed mode salinity data. This agreement required changes in the data format for profiles to handle the additional information resulting from the QC procedures. This in turn required agreement and a timetable to be agreed for converting the existing GDAC data files from the old to new format and for DACs to begin sending delayed mode data.

All of these items were agreed to. A description of the steps in the delayed mode QC has been written and will be made available quickly. The changes in the format are documented and this, too, will be available soon. The timetable for switching the archives at the GDAC was quite aggressive. It was agreed to try to have this all completed by very early 2004. This will allow delayed mode data to begin moving to the GDACs where the data have passed delayed QC with no adjustments required.

The meeting learned that two more DACs, one for Korea and one for India, are very near in establishing routine operations in support of Argo.

The Argo data system will begin active development to allow distribution of the data on the GTS in BUFR form. Exchange-

ing data in BUFR will permit delivery of a wider set of information than is possible using the TESAC code form. There are some issues to be resolved and these will be addressed by a working group constituted to do this.

Agreement was also reached on the basic functions that regional centres will be expected to perform in support of Argo.

The AIC was tasked with seeking out software tools that can be used to handle data in the Argo programme. This especially includes tools that can be used to convert netCDF to ASCII forms. Although both GDACs offer ASCII forms, these may not be in a form that users find most suitable. It was felt that the data system could not hope to support a wide variety of ASCII forms and so exposing existing tools developed by participants was a way to meet the demand.

DACs agreed to converge to a set of standard products that each would display at their web sites. What will be included in the set is to be determined by email and implemented over the next year.

The Long Term Archive for Argo showed a draft form of a CD that will deliver Argo data to users who do not have quick or simple access to the Internet. The target for distribution of this CD is September, 2004.

At the close of the meeting, Bob Keeley informed participants of his intention to step down as co-chair. After some discussion by the AST, it was agreed that Mark Ignaszewski from FMNOC would take his place.

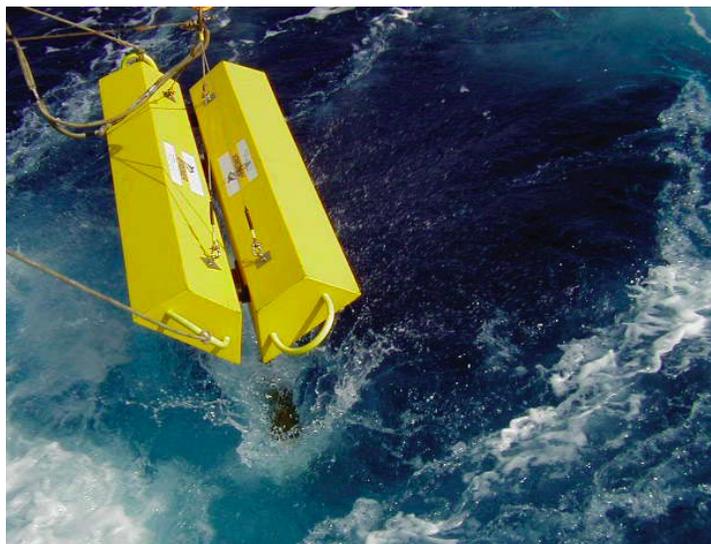
Spain joins the list of Argo float providers

Spain has for some years been a participant in Argo as a partner in the EU Gyroscope project. (www.ifremer.fr/lpo/gyroscope)

In the past year national funding has been obtained for Argo and as a result Spain deployed its first floats in the NE Atlantic in September 2003. The 6 APEX floats have parking depths of 1500m and profile to 2000m every 10 days. Five are located at around 25°N off West Africa and the sixth is in the Bay of Bisacay

Contacts for the project are :-

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*Photographs taken during the deployment of Provor floats in Gyroscope from the Spanish RV Vizconde Eza in 2002..
The floats are placed in a deployment box that is opened just above the sea surface.*

Fifth meeting of the Partnership for Observation of the Global Ocean (POGO)

POGO met in Yokohama immediately following the Argo science workshop. POGO (ocean-partners.org) is a consortium of research institutions that have the common goal of carrying out sustained observations of the global ocean. Argo and its sponsoring projects GODAE and CLIVAR are always represented at the POGO meetings. This year's meeting was particularly important since POGO now has an advisory role in the planning structure for Group on Earth Observations (GEO). POGO therefore prepared a "Yokohama Declaration" that was tabled at the second meeting of GEO in Baveno, Italy in early December.

The full "Yokohama Declaration" can be found on the POGO web site by clicking on "POGO-5".

The declaration includes calls for a number of actions that are seen as essential to the development of comprehensive ocean (and climate) observing system. The first call is for the Argo array to be completed and sustained long enough for its evaluation. The declaration also identifies the need for the continuing collection of high quality ship-based CTD data (essential for the delayed mode quality control of Argo observations and the open and rapid exchange of these data).

New co-Chairs of the Argo Data Team



Sylvie Pouliquen



Mark Ignaszewski

As noted on page 3 Mark Ignaszewski has replaced Bob Keeley as co-chair (with Sylvie Pouliquen) of the Argo Data Team. Mark has worked at the Fleet Numerical Meteorology and Oceanography Center (FNMOC) in Monterey for the past 15 years developing systems to receive and decode observation data, perform data quality control and assimilation, and manage observation databases.

We thank Bob for his hard work in steering Argo through its initial phase and look forward to further progress in the development of Argo's real-time and delayed mode data streams under Sylvie and Mark's guidance.

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Bibliography

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Timetable of Argo-relevant meetings

Dates	Venue	Event	More information
2004			
January 26 - 30	Portland, ORE, USA	AGU Ocean Sciences	www.agu.org/meetings/os04/
March 8 - 11	Brest, France	Argo Science Team - 6	www.argo.ucsd.edu/
March 16 - 19	London, UK	Oceanology International	www.oceanologyinternational.com/
April 13-15	Silver Spring, MD.	NOAA Climate Obs Workshop	diane.stanitski@noaa.gov
April 26 - 30	Nice, France	EGU	www.copernicus.org/EGS/EGS.html
May 10-14	Toulouse, France	JCOMM New Ocean Products Wkshop	
June 21 - 25	Baltimore, MD, USA	CLIVAR Conference	www.clivar2004.org/
Nov 29-Dec 1	Brest, France	POGO-6	ocean-partners.org
2005			
April 25 - 29	Nice, France	EGU	www.copernicus.org/EGS/EGS.html
August 22 - 26	Darwin, Australia	IAPSO - IAG	

Argonautics is the Newsletter of the international Argo project.

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Please send articles for inclusion in *Argonautics* to the above address or to Mathieu Beléoch, Argo Technical Co-ordinator, (belbeoch@jcommops.org).

Permission to quote an article from *Argonautics* should be obtained from the author

Information about Argo can be found at www.argo.ucsd.edu and from the Argo Information Centre argo.jcommops.org. The AIC site includes information about the present (and past) distribution of Argo floats.

Argo data may be downloaded from the Global Data Centres www.usgodae.org/argo/argo.html and www.ifremer.fr/coriolis/cdc/argo.htm