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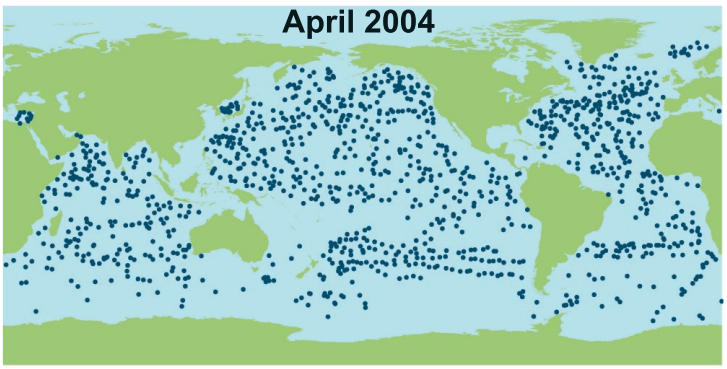
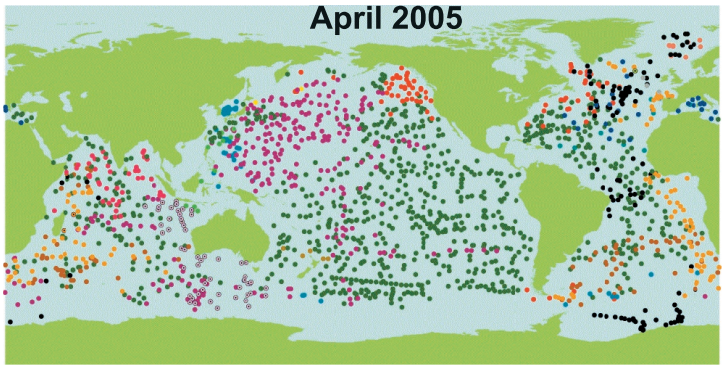
Argonautics

Newsletter of the international Argo project





	N Pacific	S Pacific	N Atlantic	S Atlantic	Indian	Southern <40S	Global
April 2002	183	47	149	21	51	14	465
April 2003	296	48	196	26	141	90	797
April 2004	375	159	232	81	189	122	1158
April 2005	492	307	288	135	255	311	1788
Increase '04 to '05	**117**	**148**	**56**	**54**	**66**	**189**	**630**

Editorial

I apologise for the delay since you received the last Newsletter in December 2004. I am now in Hobart, Tasmania where I have been made very welcome by the CSIRO Marine Research Division - a founder contributor to Argo. Their first four Argo floats were deployed in the Indian Ocean in October 1999 and each collected over 80 profiles. Australia now has 56 operating floats. It also has a collaborative programe with the UK on float reliability. On page 4 is an article on Bluelink an Australian ocean forecast system that uses Argo data. The Bluelink and MedArgo articles continue our theme of Argo use and describe two prototype assimilation systems that rely on Argo.

So what has happened to Argo in the past months? Well, the array has grown by almost 300 floats and most of these have been deployed in the Southern hemisphere. The growth of the array is well demonstrated in the table above that shows the number of active floats on April 1 each year. There are now very few ocean areas that are float-free (there are holes in the South Atlantic and West Pacific but steps are being taken to fill these). The two maps on this page and the associated statistics tell the story.

We are developing a web page that will bring together a number of measures of Argo "performance" that are presently scattered in a number of places on Argo web sites. This will cover, not just the simple statistics like "How many floats are operating", but information about "How many of those are producing data that pass quality control tests", "How quickly do the data appear on the GTS" and "How have the lifetimes of floats increased and early float failures been reduced". The first version of this page will appear within the coming month. In recent weeks we also detected some deficiencies in the GTS delivery of data to operational centres and will now put in place a monitoring system that will give an early indication if such problems appear again.

There have been two important meetings both of which are reported on in this Newsletter. The Argo Executive met in Perth in February and in mid-April Argo held its workshop on Delayed-Mode Quality Control. Both these meetings made decisions that have wide-ranging consequences.

We are also starting to plan a second Argo Science Workshop in 2006 (date and venue are not yet fixed). The first Workshop in Tokyo in November 2003 was a great success and at the second there will be even more science and Argo applications to discuss.

This growth is reflected in the bibliography of Argo and neutrally buoyant float papers that continues to grow. The papers deal with both the technical performance of Argo and with the scientific and operational use of the data.

On the weekend of May 1 "The Weekend Australian" newspaper had an article with the headline "***Robots 'confirm' global warming***". This and many other press articles described a paper in *Science* by James Hansen and co-workers about the earth's energy imbalance. Those 'robots' are the Argo floats. So, while you shouldn't believe everything you read in the newspapers, a lot of people around the world now know about the role that Argo plays in addressing these important issues.

John Gould
Hobart

MEDARGO: A Profiling Float Program in the Mediterranean.

Pierre-Marie Poulain, Instituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Trieste, Italy (E-mail: ppoulain@ogs.trieste.it)

As a contribution to MEDARGO, which is part of the EU-sponsored MFSTEP project, profiling floats have been deployed throughout the Mediterranean to provide temperature and salinity data in near-real time to forecasting models of the Mediterranean. Two types of float are operated, the APEX and the PROVOR. All floats are equipped with Sea-Bird CTD sensors. They are programmed in the "Park and Profile" configuration with a neutral parking depth of 350 m (near the salinity maximum of the Levantine Intermediate Water - LIW) and a maximum profiling depth of 700 m, with a cycling period of 5 days. Every ten cycles, the floats are programmed to profile between 2000 m and the surface in order to sample deep water mass properties. When at the surface the floats are located by, and transmit data to, the Argos system onboard the NOAA satellites. The sampling intervals for the vertical profiles are 5 m (above 100 m), 10 m (between 100 and 700 m) and 50 m (below 700 m).

These technical and sampling characteristics were tailored to the specific Mediterranean hydrological and morphological conditions. In addition, statistical calculations and numerical simulations using MFSTEP models were carried out to assess the adequacy of the float characteristics and their deployment strategy to the MFSTEP goals (e.g., to assure robust sub-surface velocity estimates and independent hydrographic observations in most areas of the Mediterranean). The floats were deployed from both research vessels and from ships of opportunity. In particular, some floats were released from container and gas tanker ships cruising along MFSTEP Volunteer Observing Ship (VOS) XBT lines with typical speeds of 15 knots. Using the VOS cardboard boxes, both APEX and PROVOR floats were successfully deployed. Figure 1 shows the release of a PROVOR in its VOS deployment box from the aft deck of LNG/LPG carrier Annabella in the southern Ionian Sea. The PROVOR VOS box was specifically developed and tested by IFREMER as part of the MEDARGO project. Figure 2 depicts an APEX float within its cylindrical VOS box about to the deployed in the Levantine Sea from container ship Britain Star.

Fig 1 Left. *Release of a PROVOR in its VOS deployment box from the aft deck of LNG/LPG carrier Annabella in the southern Ionian Sea (Photo courtesy of A. Cruzado).* ***Right.*** *APEX float in its cylindrical VOS box about to the deployed in the Levantine Sea from container ship Britain Star (Photo courtesy of I. Gertman).*

The float data are processed and archived in near-real time at the CORIOLIS Data Centre (Brest, France) and are distributed on the GTS following the standards of the international Argo program. MEDARGO full datasets can be viewed and downloaded in quasi-real time from CORIOLIS (http://www.coriolis.eu.org/cdc/projects/cdcMFSTEPFloats.asp). Float trajectory plots are also produced in near-real time at the MEDARGO Thematic Expert Data Center (OGS, Trieste) and can be viewed at http://doga.ogs.trieste.it/WP4/real_time.html . An example is shown as Figure 2. At the end of February 2005, sixteen MEDARGO floats had been deployed and were still operational in most basins of the Mediterranean. The release of four remaining floats is scheduled for spring 2005.

Between June 2004 and Feb 2005 MEDARGO collected over 400 temperature - salinity profiles in the Catalan Sea, Liguro-Provençal and Algerian basins, Tyrrhenian and Ionian Seas, and Levantine basin. Comparing MEDARGO temperature - salinity data to the MEDAR MEDATLAS II climatology (mostly collected in the last century) shows that the Western Mediterranean in the mid-2000s is significantly warmer and more saline (Figure 3).

Along with XBT and satellite data, the near-real time MEDARGO temperature - salinity data are the backbone of the basin-scale data assimilation and forecast system developed in MFSTEP (http://www.bo.ingv.it/mfstep/work packages 7 and 8). Additionally, intermediate depth (350 m) mean currents are estimated near the LIW main core from the profiler displacements at their neutral depth. It is expected that the combination of the float temperature, salinity and subsurface velocity data will enhance the value of sea level measurements made by satellite altimeters through a better estimation of the mean dynamic topography.

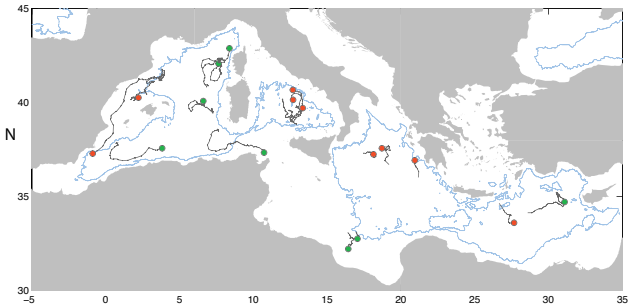


Figure 2. MEDARGO float tracks and positions (Red APEX, Green PROVOR) as of 14 February 2005.

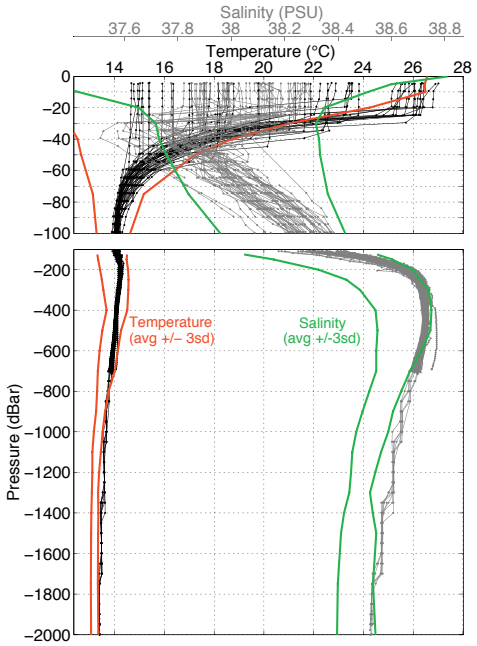


Figure 4. Temperature and salinity profiles from three MEDARGO floats in the central Tyrrhenian Sea, along with MEDAR MEDATLAS II annual climatology (mean ± 3SD).

Acknowledgments. MEDARGO is supported by the European Commission (V Framework Program - Energy, Environment and Sustainable Development) as part of the MFSTEP project (contract number EVK3-CT-2002-00075). We wish to thank all the scientists and crew members for their skilled and enthusiastic assistance during the float deployments. In particular, we are grateful to the following MFSTEP partners for their contribution to MEDARGO: A. Cruzado, J. Font, I. Gertman, A. Griffa, S. Le Bras, C. Millot, L. Petit de la Villeon, V. Rupolo and L. Santoleri.

Argo Delayed-Mode Quality Control Workshop: an inital report.

Brian King, Southampton Oceanography Centre, Southampton, SO14 3ZH,UK (Brian.King@soc.soton.ac.uk). Annie Wong, NOAA PMEL, Seattle WA, USA. (awong@ocean.washington.edu)

The First Argo Delayed-Mode Quality Control (DMQC) Workshop was held at the Scripps Institution from 8 to 13 April 2005. Scientists and delayed-mode data analysts attended from all but one of the countries that maintain an Argo Data Assembly Centre (DAC). The principal objectives of the workshop were to improve the consistency with which DMQC procedures are being applied across the Argo fleet, and to agree on the procedures that should be applied to quality-control data from float sensors that exhibit unusual behaviour.

The workshop began with a two-day Phase I session (8-9 April) discussing in detail the application of standard methods and diagnostic tools, some of which have been reported in previous issues of Argonautics. This provided an opportunity for DM operators to share their experiences of what has worked well, and more importantly, the situations in which previously proposed methods have not provided clear and reliable evidence of float salinity accuracy.

Phase I was followed by a three-day Phase II session (11-13 April) with the additional attendance of a number of extra float scientific PIs. This larger group undertook a thorough review of the known modes of sensor error, and the basis for decisions about whether and by how much to adjust float salinies that have sensor error. The decision process includes statistical comparison with reference datasets (chiefly historical climatology), subjective and objective comparison with published hydrographic data and with nearby floats in the Argo fleet. The workshop confirmed that the principal reference for assessing the absolute accuracy of Argo salinity data is comparison with quality-controlled CTD data that have been calibrated against Standard Seawater.

The workshop agreed that in the light of experience gained by DM operators and PIs over the past 12 months (during which period approximately 20,000 profiles had been assessed in delayed-mode using statistical methods and submitted to the GDACs as delayed-mode files), guidance previously made available to DM operators was incomplete: it did not cover the varieties of sensor performance and ocean variability that have been encountered. The Argo DM community now has a much greater understanding of how to interpret the variations and possible offsets in raw float data. As a consequence of the workshop discussion, all adjusted profiles already submitted as delayed-mode (whose file names begin with 'D' and have the DATA_MODE parameter 'D') will be reviewed by their DM operators and PIs. The review of previously-submitted adjusted profiles and the release of adjusted profiles older than 12 months are expected to be complete by the end of 2005. It is anticipated that a proportion of the previously-submitted adjusted profiles will need to be revised. Hence users who keep copies of Argo data on their local computers should therefore be aware that revised versions of files in both 'R' and 'D' mode could appear on the GDACs at any time. New versions of adjusted data can be identified by inspection of the CALIBRATION_DATE and DATE_UPDATE parameters.

The workshop recognised that there would be considerable benefit and interest in the user community if delayed-mode knowledge about floats that are known to have sensor offsets could be applied in the real-time stream (i.e. in GTS messages and in real-time Rxxxxxxx_xxx.nc files). It was agreed that hindcast experiments would be undertaken to assess the reliability of such real-time adjustments, and possible mechanisms for applying real-time adjustments would also be investigated. Under all circumstances, unadjusted raw data will continue to be available.

The conclusions of the workshop will be available in a meeting report, and will be incorporated into the Argo data documentation as appropriate.

Lastly, the workshop co-chairs would like to thank all workshop attendees for their enthusiastic participation, and the local hosts John Gilson, Tomomi Ushii, Dean Roemmich and Uwe Send for dealing with local logistic arrangements.

Caution

Please note that, following the decisions taken at the DMQC workshop, some profiles that have already had DMQC carried out (denoted by DATA_MODE parameter D), may undergo further adjustment between now and the end of 2005. Users of delayed mode data should be aware of this.

Argo needs your recent CTD data

As noted in the article above, Argo relies on reference data sets of high quality ship-based CTD data in order to estimate the offsets to be applied to float salinities. The oceans are variable in both space and time and so, to be of maximum use and to provide the best float calibrations, these reference data sets need to be regularly updated through the addition of new observations.

Argo started with a big advantage of having followed the unprecedented global WOCE Hydrographic Programme survey. So, for the 1990s we have an excellent baseline. Since WOCE there have been reoccupations of WOCE lines - notably at 30°S across each of the Southern Hemisphere oceans and as contributions to the Global Carbon Survey conducted by CLIVAR and IGBP.

The data centre that handled WOCE data is now the Carbon and Climate Hydrographic Data Centre (CCHDO) and Argo needs hydro data collected since the end of WOCE in 1998 and that a) goes to at least 1000m and b) has been calibrated against IAPSO Standard Seawater to be sent to the CCHDO (http://whpo.ucsd.edu/index.htm).

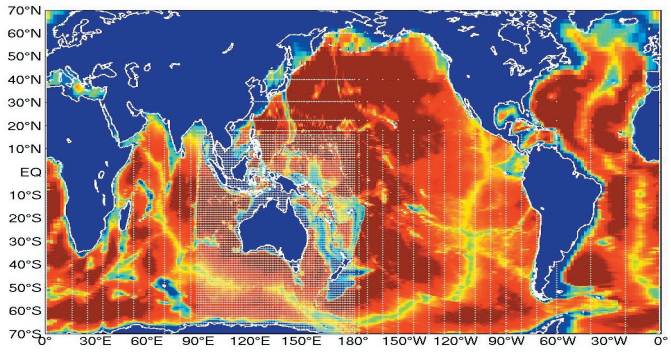
It is also very helpful to know what Hydrographic work is planned and we ask that you enter the details of planned cruises on the web site maintained by CLIVAR at http://www.clivar.org/carbon_hydro/hydro_table.php

Australia' s Bluelink project approaches first milestone

Craig Macaulay, Andreas Schiller, Peter Oke, CSIRO Marine Research, Australia
(Andreas.Schiller@csiro.au)

BlueLink, Australia's foray into ocean forecasting was formally launched by the Australian Government in 2003. BlueLink is a joint research initiative involving the marine and atmospheric arms of national research agency CSIRO that will join into a common structure in 2005, the Bureau of Meteorology and the Royal Australian Navy. Dr Schiller (CSIRO), and the Chair of GODAE, Dr Neville Smith (Bureau of Meteorology), lead BlueLink,

Australia has good reason to develop its own regional ocean forecasting system. Responsible for ocean territory nearly twice the size of its landmass, the country is bounded by three ocean basins and influenced by key oceanic features (the Indonesian throughflow system of currents and El Niño and La Niña) that affect rainfall across the continent. Ninety per cent of the Australian population lives within 50 kilometres of the coast. Significant investment is bound up in coastal structures associated with mining, shipping, and oil and gas extraction, its waters are generally nutrient poor for fishing, oceanic conditions influence two of the country's largest aquaculture endeavours - southern bluefin tuna and Atlantic salmon, and northern Australia is subject to tropical cyclones. The December 26, 2004 tsunami off Sumatra has brought an additional focus to ocean prediction in the region, although one that is outside the scope of BlueLink.



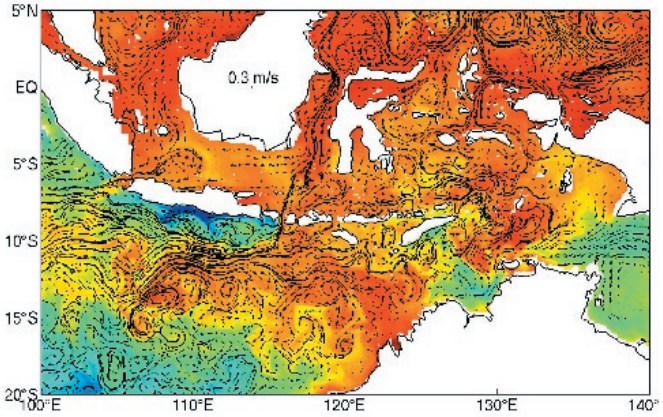
Bluelink topography and grid (every tenth grid point shown)

Central to BlueLink is the development of a global and local ocean prediction system. BlueLink will deliver operational short-range ocean forecasts for the Asian-Australian region by 2006 (test results will be available at http://www.marine.csiro.au/bluelink/). The forecasts will provide information on coastal and ocean currents and eddies, surface and subsurface ocean properties, that impact on, and are linked to, maritime and commercial operations, defence applications, safety-at-sea, ecological sustainability, and regional and global climate.

The model has a resolution telescoping from 2° in the North Atlantic to 1/10th degree in the Asian-Australian region (90° E to 180° E, 16° N to 75° S). The model will form the backbone of the operational ocean forecasting system run by CSIRO and the Bureau of Meteorology with ocean forecasts of up to 28 days with twice weekly releases. First operational forecasts are scheduled for 2006. Future research applications beyond the operational implementation will include a global biochemical component.

In addition, CSIRO currently develops a high-resolution, coupled atmosphere-ocean model predicting out to three days and that was specifically designed for coastal and continental shelf applications. This model will provide accurate data for ocean winds, sea surface height, three-dimensional fields of ocean temperature, salinity and currents closer to Australia. Boundary conditions will be provided by the global operational ocean forecast system. The model will be run from a visual interface, allowing the user to specify the modelled region and resolution. Success of the system depends on successful development, testing and fine-tuning of the prototype ocean model and assimilation system, with the hindcasting process now underway.

A team of nearly 30 scientists and data analysts based in Hobart and Melbourne has been preparing for the first hindcasting run, a computer simulations for 1992-2004, that is compared with an historical 12-year record of observations for the same period. "The reanalysis is set to provide an unprecedented view of the ocean state and constitutes the initial prototype of the modelling system that will be run operationally at the Bureau," says Neville Smith.



Currents at 50m depth north and west of Australia computed from Bluelink and overlaid on satellite SST data.

The ocean reanalysis development is a foundation feature of BlueLink. "The signs have been very positive and by the latter part of the year we hope to be in a position to describe conditions today as a prelude to development of the ocean forecasting capability" says project co-leader, Andreas Schiller, from CSIRO. "One of the features we will be looking for is the simulation of the Indonesian Throughflow and how closely our reanalysis replicates features recently observed by the international INSTANT project team" Dr Schiller said.

BlueLink relies on the evolving global ocean observing system, where Australia is also actively participating. Australia is stepping up its deployment of Argo floats, with another 17 going into the Southern Ocean south of Australia this summer, bringing to 70 the number of floats deployed since 1999.

For more information: http://www.marine.csiro.au/bluelink/

Not all salinity research is oceanographic!

This photograph and caption appeared on the CSIRO web site. It seems unlikely that this salinity sensor would retain its calibration when cycled to 2000m

CSIRO researcher, Dr Hayley Norman, met His Royal Highness the Prince of Wales in Perth to discuss CSIRO's salinity research.

Argo - GODAE session

"Argo and GODAE - global and regional partners"

John Gould and Neville Smith are co-convenors of this session. The rapid growth of the Argo profiling float array has raised our ability to observe the global oceans in real-time to a new level. GODAE uses ocean data assimilation to deliver estimates and forecasts of the ocean state. Papers submitted cover research on, and applications of, Argo profile and velocity data and related ocean model assimilation and prediction systems.

The programme for this and other sessions will appear at http://www.dynamicplanet2005.com/
We look forward to seeing you in Cairns

Indian Ocean Observations - Some Argo conclusions. *Gary Meyers - CSIRO, Hobart (Gary.Meyers@csiro.au)*

The CLIVAR/GOOS Indian Ocean Observations Panel held its second meeting in April 2005. While all aspects of sustained Indian Ocean observations were discussed, including the development of moored arrays, much discussion centred on Argo. The following are key points relating to Indian Ocean Argo :-

- Argo is an essential part of Indian Ocean CLIVAR research. Due to the variability of water mass composition, Argo salinity profiles are necessary for the interpretation of data provided by other systems such as altimetry, SST or XBTs.
- Argo is important for obtaining improved mixed-layer distributions for air-sea interaction modelling, in particular in regions of barrier layers. Recommendations will be made by the Panel for optimising near-surface Argo sampling depths.
- Indian Ocean Argo is well underway. Deployment opportunities will be explored and publicized by INCOIS, including R/V opportunities during routine mooring maintenance cruises and process studies as well as contacts to enable air-deployment or deployments from chartered ships in remote regions that are not regularly crossed by commercial shipping.
- Argo data submission and availability to the user community was found to be in agreement with the international Argo protocols.
- Discussion focussed on whether sampling should be carried out frequently enough to resolve the strong intraseasonal variability of the tropical- subtropical Indian Ocean. Model/observing system experiments presented by G. Vecchi strongly suggest that little is gained by 5-day sampling and there may be significant disadvantages to doing so. Instead, the effectiveness of 10-day Argo sampling (when integrated with data from the planned Indian Ocean mooring array) should be assessed.
- Some of the most scientifically challenging and interesting areas are upwelling regimes (such as those off Somalia and Oman, northeast of Madagascar and off Sumatra) where floats tend to diverge during their surfacing times. Reseeding should be planned to avoid gaps in Argo coverage.
- Indian Ocean water masses are known for their theta/S variability, particularly Red Sea water around 800m. The Panel recommended that Argo sampling should reach below 1000m frequently enough to maintain calibration checks on the conductivity sensor.

Timetable of Argo-relevant meetings

2005			
July25 - August 5	Kingston, Rhode Island	Lagrangian Summer School	trossby@gso.uri.edu
August 22 - 26	Cairns, Australia	IAPSO - IAG - IABO	http://www.dynamicplanet2005.com
Sept 19 - 28	Halifax, Canada	JCOMM-II	http://ioc.unesco.org/jcomm/jcomm2/index.php
Sept 19-21	Seattle, WA, USA	APEX float Techical workshop	riser@ocean.washington.edu
October 11-15	Concepcion, Chile	CLIVAR S Pacific Workshop	http://www.clivar.org/organization/pacific/implementation/south_pac.html
November 7 - 9	Tokyo, Japan	Argo Data Management Team - 6	Documents will appear at http://www.ifremer.fr/coriolis/cdc/argo_rfc.htm
November	Tokyo Japan	CLIVAR Global Hydrography Workshop	fksw@jamstec.go.jp
2006			
Jan 16-18	Hyderabad, India	POGO-7	http://www.ocean-partners.org
Jan 18-20	Hyderabad, India	Argo Steering Team -7	http://www.argo.ucsd.edu
Feb 20-24	Honolulu, Hawaii	Ocean Sciences	http://www.agu.org/meetings/os06/

Report of the Argo executive meeting - Perth, Australia (February 14-16, 2004)

The Argo Executive met in Perth, Australia, thanks to the hospitality of the Australian Bureau of Meteoreology and the help of IOC Perth Office. The Executive is a subset of the Steering Team with representatives from each continent. The time and location were chosen to link to the Indian Ocean Marine Environment Conference (IOMEC) at which an Argo session was convened.

Argo status. The Executive meeting started by reviewing the status of the project. We now have an almost global (if sparse) array that is already the most abundant source of open ocean profile data. This resource is now ready to be exploited for both academic research and as input to a wide range of operational and pre-operational applications. Securing stable long-term funding for Argo is in large part dependent on demonstrating the value of the data and the cost-effectivness of the project as a whole. Cost-effectiveness depends on efficient means of float deployment, on improving float reliability and lifetime, and on maintaining the timeliness and quality of data. As a follow-on to decisions made at the earlier Argo Data Management Team Meeting the Exec agreed to monitor a set of key performance indicators. A prototype web site for this is now under review and will soon be publicly visible.

The Argo Executive reiterated that the basic recommended characteristics of the Argo global array were floats parking at a depth of 1000m and profiling every 10 days to 2000m. Exceptions to these characteristics would be acceptable if regional ocean characteristics meant that departures from the canonical parameters would reduce the risk of float grounding, if the stability of deep theta-S characteristics allowed less frequent deep profiling so as to prolong battery life while not compromising delayed-mode quality control and if more frequent sampling was needed to capture essential ocean variability.

Regional co-ordination. The Exec were concerned that Argo would need more effective regional co-ordination of float deployments particularly as the array reaches maturity and gaps appear randomly as float batteries become exhausted. The Argo Project Office will work with designated regional co-ordinators to stimulate information flow and develop predictions of where these gaps are likely to appear.

Argo technical issues. The growth of the array depends on both the rate of float deployments (currently at over 800 floats per year) but also on the survival rates of floats already in the water. This means reducing early float failures, defining best practice for transporting floats and for deployment from research and volunteer ships and from aircraft, rapidly diagnosing early signs of problems with floats and working with float and sensor manufacturers to ensure that production methods are corrected to eliminate the failure mode. There are several groups working to monitor float technical performance. WRC APEX floats make up 65% of the present array. The performance of most (but not all) APEX floats is monitored at the University of Washington (http://flux.ocean.washington.edu/). Steps will be taken to broaden this to include virtually all APEX floats. It was also thought important that all groups concerned with APEX technical performance should meet to exchange information and experience and to that end a workshop will be held in Seattle in September 2005. (See list of meetings on Page 5). For other major float types technical issues are monitored by Scripps Institution of Oceanography (Solo - 25% of array) and IFREMER (Provor - 10% of array).

New sensors. Profiling floats as used by Argo have enormous potential for collecting other types of information. Successful demonstrations have already been made of measuring dissolved oxgen, vertical shear, wind speed and rainfall, microstructure and organic carbon. Other sensors will no doubt be tested. The Executive agreed that the incorporation of new sensors into the array should only be allowed following a full assessment of the scientific benefits compared with the possible disbenefits (increased energy consumption, decreased float life) and after consideration of data management issues.

Floats washed ashore. Since the start of Argo a small (less than 2% of all floats deployed) but significant number of floats have washed ashore or picked up at sea. Some of these have been recovered by their original deployers but often only after extensive work by the AIC and others to confirm float identity (only 47% of floats presently operating carry the official Argo label). Argo derives considerable benefit from studying floats that are recovered since they may provide evidence of why the float failed. The Exec agreed on a set of actions that would result in Argo taking a more systematic attitude to this issue. A new, smaller label is to be designed that can be stencilled onto floats (no risk of label washing off and changing float ballasting). The label will use icons to advise on safe float handling and storage . All float operators will be expected to assume responsibility for the costs and logistics of float recovery and to take these costs into account when planning budgets.

Environmental issues. The first draft of an Argo environmental impact statement was prepared about a year ago and this is to be refined and made available.

Visibility and outreach. Argo has already resulted in many refereed publications and with the array now being global, many other possibilities arise. Argo data can be used (both alone and in combination with other data sources such as satellite altimetry) to monitor the state of the ocean. A demonstration of this potential will come from the construction of ocean indices. Examples are global and regional e.g equatorial heat content, (McPhaden 2005) and Argo-based representations of ocean time series stations. Undoubtedly, Argo's visibility would be enhanced by a paper based primarily on Argo data being published in Nature or Science. New results from the previously data-sparse Southern Oceans where Argo has had the greatest impact may provide an opportunity for this. An article will also be prepared for possible publication in *Scientific American*.

From a wider perspective, attempts will be made to get an article on Argo published in Scientific American. A proposal has also been submitted to the International Council for Science (ICSU) for funding to assist the development of material that would make up a web-based educational interface to Argo. This would exploit Argo's open data policy and enable high school students (and later the general public) to learn through Argo about the role of the oceans in global and regional climate and ocean issues.

Infrstructure support. It was agreed to consult with the Intergovernmental Oceanographic Commission (IOC) of UNESCO and with Argo contributiong countries to arrange for the funding of both a full time Argo Director and the Argo Technical Co-ordinator who could work closely together to provide support for the project from mid-2006 onwards.

AST chairmanship. Dr Howard Freeland, IOS, Pat Bay, Canada agreed to become Argo Steering Team co-chairman, a post that he shares with Dean Roemmich, UCSD, USA.

John Gould

News in brief

Japanese floats deployed by fisheries high school students

Eitarou Oka, Institute of Observational Research for Global Change, 2-15 Natsushima-cho, Yokosuka, Kanagawa 237-0061, Japan. okae@jamstec.go.jp

In December 2004, Japanese floats were deployed for the first time by fisheries high school students. Ten floats were deployed near 25°N, 170°E-180° by Training Ship Shonan-maru belonging to Misaki Fisheries High School, on its way from Honolulu after, training off Hawaii, to Misaki (a fishing port near JAMSTEC). This deployment was educational for the students, making them concerned with environmental issues, and also was a good opportunity to fill a large float gap located in the middle of the North Pacific.

The high school took a very cooperative stance toward

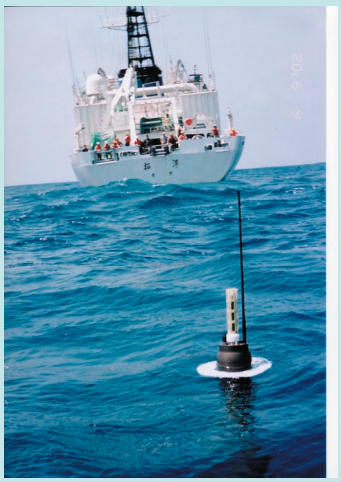
this voluntary work, and the Japan Argo team expects that this deployment will spark widespread deployment by fisheries high schools throughout Japan, which have various routes over the Pacific.

Mexico deploys its first float

Thanks to a generous donation from the Spanish Institute of Oceanography (IEO), the Centro de Investigacion Cientifica y de Educacion Superior de Ensenada (CICESE), has deployed its first float (WMO ID 1900377) in the Pacific Ocean near .25° 39N 115° 05 W. The PROVOR float was deployed on May 3 2005 from R/V Francisco de Ulloa that carried out a calibration CTD station at the deployment site.

The float is being operated by Dr Jose Luis Ochoa de la Torre (jochoa@cicese.mx). We thank IEO for its generosity and particularly to Dr Gregorio Parrilla (IEO) and all who were concerned in bringing this collaboration about. This is yet another example of international collaboration that broadens the Argo community. J.G.

Argo featured in new Swedish science text book



The Argo project office was recently contacted by a publisher in Sweden who asked permission to use the "famous" picture used on the poster for the first Argo Science Workshop. The photo is to be used in a new science textbook "Naturkunskap" that roughly translated means "Basic science". Maybe Argo really does capture people's imagination.

The photograph is of the recovery of a Japanese APEX float by the Japanese Coast Guard Vessel *Takuyo*. *J.G.*

Argo certificates

We try to recognise the outstanding contribution made by people in implementing Argo. Some of the "unsung" Argo heroes are the crews and technicians on board float-deploying ships and to mark these contributions Argo issues certificates. The first of these was given to the New Zealand Research Vessel *Kaharoa* (See Argonautics 4) in recognition of the amazing work this small (28m, 300 tonnes) ship did in filling the South Pacific.

We have recently issued certificates to the US research vessels Melville, Roger Revelle and Ka'imimoana and to the Indian RV Sagar Kanya, to the TAO project and to Scripps Technicians.

If you know of others who deserve to be recognised please contact argo@ucsd.edu. J.G.

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Please inform us of any recent papers not yet listed in *Argonautics* or at www.argo.ucsd.edu

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How to acknowledge Argo data

Argo data are available to anyone. As the project develops we expect Argo data users to include research groups and countries not directly involved in Argo float deployment or data management. The Argo Steering Team encourages the use of a standard acknowledgement in publications that use Argo data as follows :-

" These data were collected and made freely available by the International Argo Project and the national programmes that contribute to it. (www.argo.ucsd.edu, argo.jcommops.org). Argo is a pilot programme of the Global Ocean Observing System".

People using Argo float data should, as a courtesy, contact the person responsible for the floats used and outline the type of research or analysis that they intend to carry out.

Argonautics is the Newsletter of the international Argo project. It is compiled by the Argo Project Director, John Gould (wjg@ucsd.edu) presently at CSIRO Marine Research, GPO Box 1538, Hobart, Tasmania 7001, Australia. Phone +61 3 6232 5172 Fax +61 6232 5123. From July 2005 at National Oceanography Centre, Empress Dock, Southampton, SO14 3ZH, UK

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Information about Argo can be found at www.argo.ucsd.edu and from the Argo Information Centre argo.jcommops.org. The AIC site includes informtion 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