

Annex1: Agenda

2nd Argo Data Management Meeting **12-14 November 2001** **IFREMER Brest/France** **IFRTP Conference Room**

12 November 2001

09h00 Local greetings (C. Marchalot)

09h15 Meeting objectives (co-chairs : B. Keeley and S. Pouliquen)

Review of activities since last meeting

09h30 Report from Hyderabad meeting (S. Pouliquen)

09h45 Data Handbook (R. Molinari and R. Keeley)

10h30 netCDF formats (T. Carval)

11h00 Coffee Break

11h30 netCDF formats (Continued)(T. Carval)

13h00 Lunch

14h00 netCDF formats (Continued) (T. Carval)

15h45 Coffee Break

Data Centre Activities, 16h00 (15 mn per country)

Each country or agency will be asked to give a brief review of the status of their data systems. This should include information about float deployment schedules, software system readiness, implementation schedule, products, problems, etc. Please highlight differences from procedures agreed upon at the last data management meeting.

- Canada (R. Keeley)
- France and Services for Germany and Danemark (L. Petit de la Villeon)
- Japan (Y. Takatsuki)
- Korea (S. Heo)
- Russia (M. Danchenkov)
- UK (L. Rickards)
- USA (C. Schmidt)

18h00 End of day 1

13 November 2001

09h00 DATA DISTRIBUTION Sylvie Pouliquen
Global ftp servers
Data server services beyond ftp

11h00 Coffee Break

11h30 AIC status and Role - Mathieu Belbeoch
Transition to BUFR - Mathieu Belbeoch

13h00: Lunch

14h15 QUALITY CONTROL
Real Time QC - Robert Keeley
Delayed mode data QC - Annie Wong & Dean Roemmich

16h30 Coffee Break

16h45 Long term archive - Charles Sun

18H00: End of day 2

20h00 Social event hosted by IFREMER

14 November 2001

8h30 Requirements from Argo Science Team - Dean Roemmich

9h00 Argo System Products - Robert Molinari

10h00 Data version control - Robert Keeley
Data system documentation - Robert Keeley

11h00 Coffee Break

11h30 Integration to other kinds of data - Gilbert Maudire

12h30 Provision of data to clients without Internet access - Sylvie Pouliquen

12h45 Monitoring and feedback tools - Sylvie Pouliquen

13h00 Inter-Meeting Work: How organising it? B. Keeley

13h15 Lunch

14h00 Review of Action list / timetable

15h00: Close of meeting

Annex 2: List of Participants

2nd Argo Data Management Meeting
12-14 November 2001. IFREMER Brest/France
IFRTP Conference Room

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Annex 3: Netcdf Formats

See http://www.ifremer.fr/coriolis/cdc/argo_rfc.htm

Annex4 Inter-session Working Groups

Argo Data Management Working Groups

Group	Purpose	Participants
NetCDF	Write the User Manual which describes the netCDF format for float data and information	Thierry Carval (editor) Yasushi Takatsuki Stephen Loch Bob Keeley Reyna Sabina
Suspended - Status Reporting	Devise data system implementation reporting procedures	Bob Keeley Claudia Schmid Sylvie Pouliquen Mathieu Belbeoch
Real-Time QC	Agree on additional tests that exploit characteristics of float data	Dean Roemmich Annie Wong Bob Molinari Bob. Keeley
GDAC Operations / Documentation	Revise documentation of the GDAC operations	Sylvie Pouliquen Mark Ignaszewski
Long Term Archive	Define Long Term Archive	Charles Sun Bob Keeley Sylvie Pouliquen
Delayed Mode Qc	Coordinate delayed mode QC process elaboration	Dean Roemmich Annie Wong Bob Molinari Bob. Keeley
AIC Operations	Guide Developments of this WWW site	Sylvie Pouliquen Bob Keeley Mathieu Belbeoch Another member
Transition to BUFR	Develop the needed descriptors and methods to send float data in BUFR on the GTS	Bob Keeley 2 other members
Argo Products	Propose a set of products for Argo system	Bob Molinari Mathieu Belbeoch Yves Desaubies Other members

Annex 5: National Reports

AN AUSTRALIAN CONTRIBUTION TO ARGO

A Joint CSIRO Marine Research and Bureau of Meteorology Pilot Project coordinated by the CSIRO/BMRC Joint Australian Facility for Ocean Observing Systems (JAFOOS).

<http://www.marine.csiro.au/~waring/cooe/>
<http://www.marine.csiro.au/JAFOOS>

Objectives:

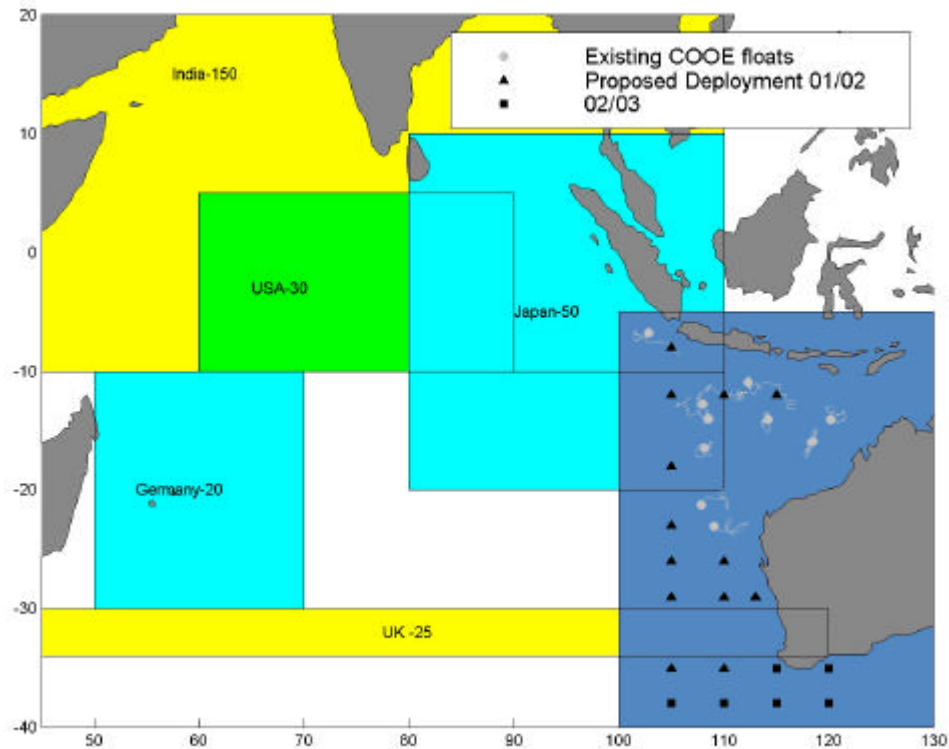
- To provide a quantitative description of the evolving state of the upper ocean in regions influencing Australia's climate and marine environment.
- To provide scientific quality, timely data for the initialisation of ocean and coupled forecast models, data assimilation and dynamical model testing in support of a wide range of applications.
- To enhance the value of the satellite altimeter through measurement of subsurface vertical structure ($T(z)$, $S(z)$)
- To support the scientific objectives of the Global Ocean Data Assimilation Experiment (GODAE) and the International Argo Project
- To contribute to the development of an Australian Ocean Observing System (AOOS) in support of marine and climate research and operational applications through integration with other observing systems elements.

Deployments:

- Initial focus in southeastern Indian Ocean
- 10 floats already deployed by CSIRO in 1999/2000.
- CSIRO and Bureau to deploy a further 20 floats in 2002
- Bureau of Meteorology to contribute 6-7 floats
- per year from 2002

Deployment modes:

- merchant vessels
- navy vessels
- research vessels



Data System:

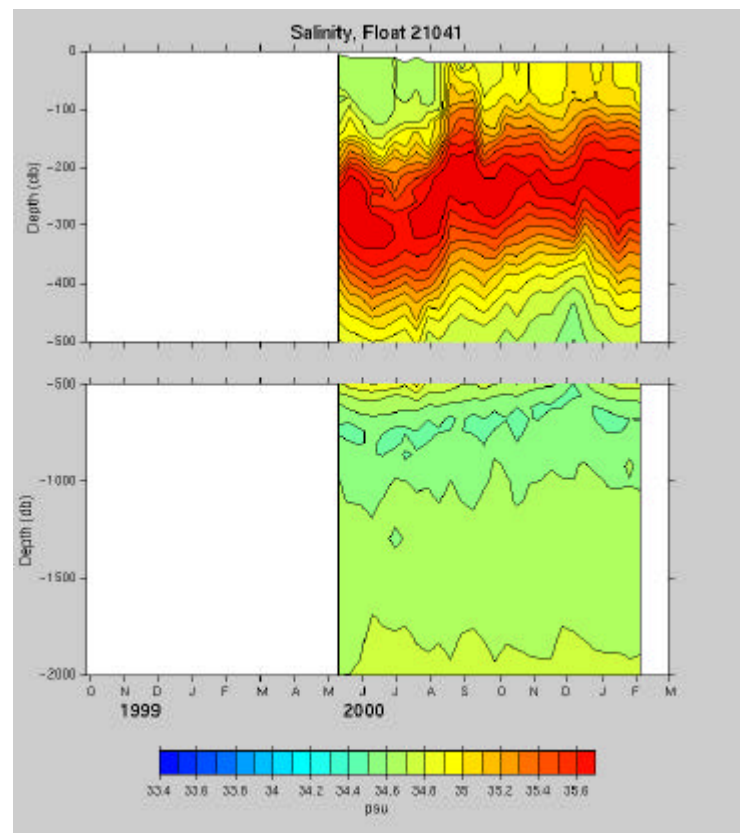
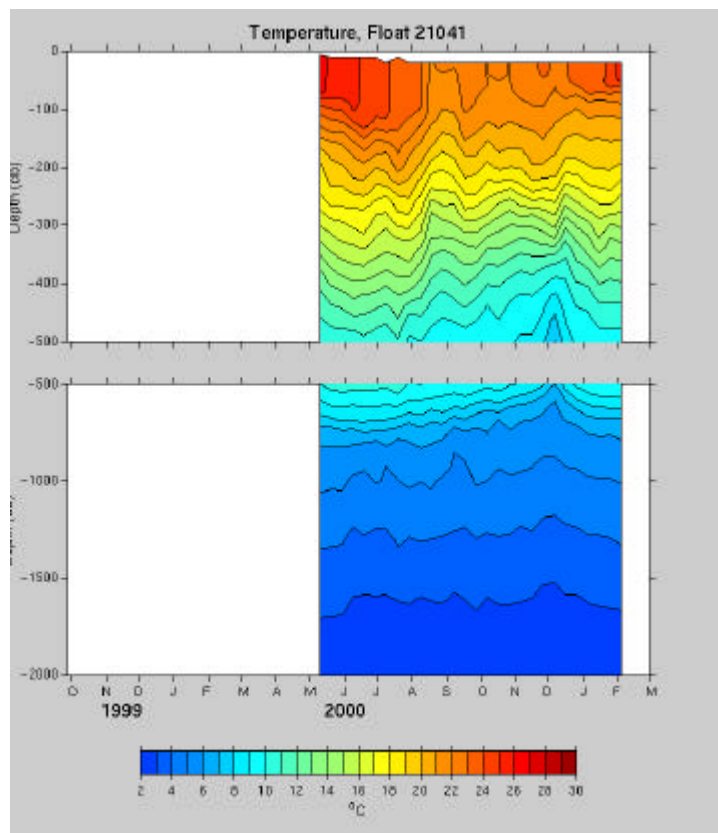
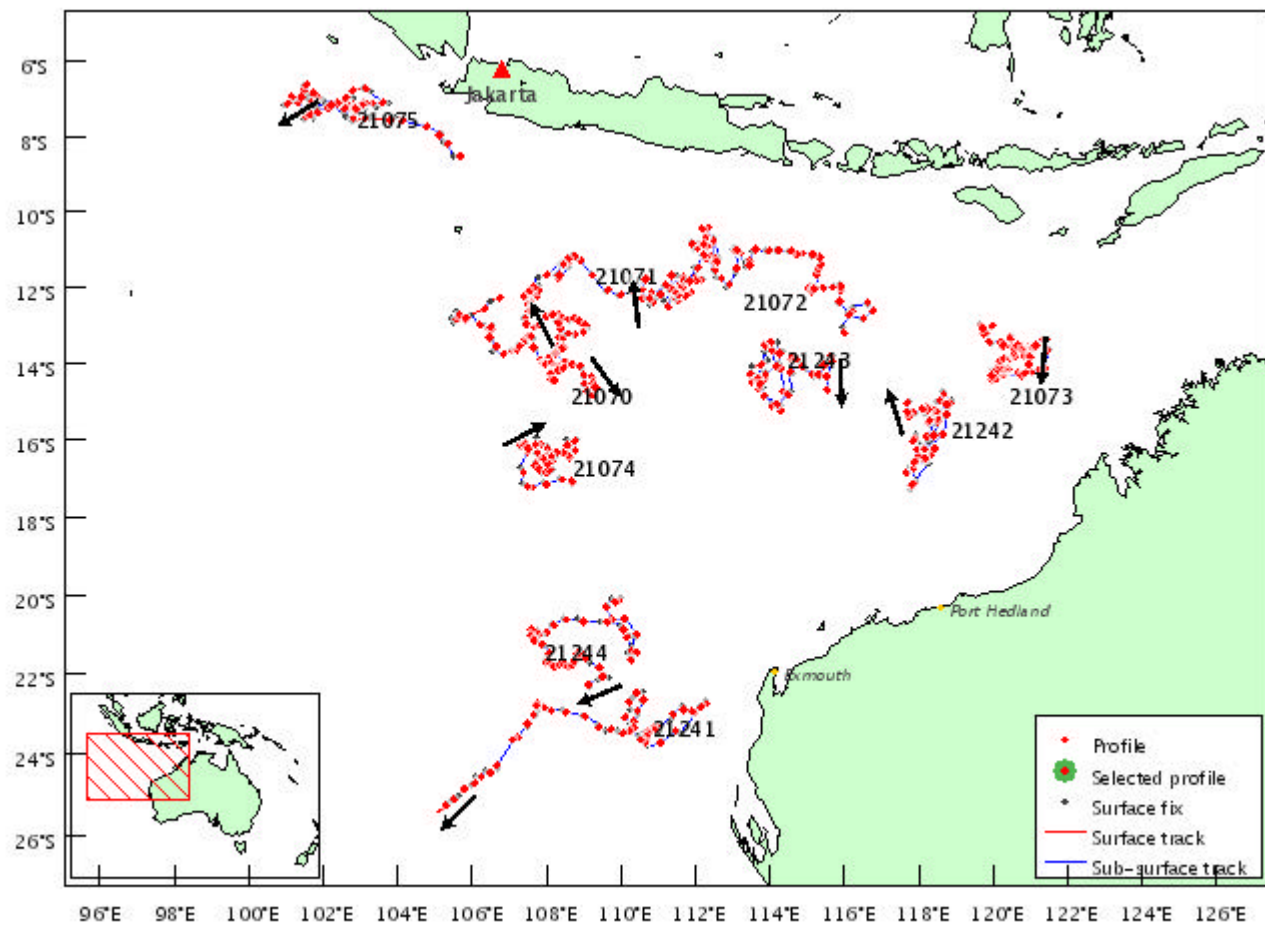
- developed and maintained by CSIRO, with support from the Bureau
- raw data accessed routinely from Argos
- QC checks
- TESAC formulation by CSIRO
- GTS insertion via BoM/Melb
- public web access to delayed mode data within 3 months

Quality Control:

- sensor performance continually monitored
- automated gross QC checks e.g, values out-of-range, formats, etc
- salinities calibrated and checked against nearby WOCE CTDs and Climatologies (Levitus, CARS)
- will introduce agreed Argo QC procedures and formats (< 12months)

Data System Plans

- data access also via JAFOOS DODS server when implemented (early 2002)
- data will be forwarded to Argo servers when they come on-line
- considering Regional Centre role in line with JAFOOS responsibilities as Indian Ocean UOT DAC for WOCE and GTSP (subject to resources).



Canadian National Report

Updates

- There are now 29 active floats operating, with 3 in the Labrador Sea and the rest in the northeast Pacific
- Two floats had apparent ballasting problems, but one has begun reporting again.
- Two more floats appear to have died.
- As of mid October, about 85% of the Canadian data get to the GTS within 24 hours.
- The Gulf of Alaska deployments have not been made, which puts us behind schedule. We expect them to be deployed in February.
- We expect to be back on schedule by the end of March 2002.
- We have ordered 15 more floats with the possibility of acquiring more by the end of March. We expect to provide some of these for deployment in the southern ocean. Howard Freeland will be making the decision.

Deployments

Canada has deployed 17 Argo floats (sampling to 2000 db, 10 day profiling cycle, T and S sensors) in the northeast Pacific. The deployment began in late May of this year and completed in late June. Of the 17, three floats have developed problems. One float ceased reporting after the second profile was received. A second float is reporting data at non-uniformly spaced pressures. The third appears to have a ballasting problem and has failed to report. It is hoped that it will begin to report as the low density surface layer erodes with the onset of winter.

A cruise is presently underway that will be deploying more floats in the same region. One float has been given to India for deployment in the Indian Ocean.

Software

MEDS' computers telnet to Service Argos every 6 hours. In each session, the query goes back 12 hours to ensure enough redundancy in the data. If two consecutive Telnet sessions are missed due to system malfunction, a manual Telnet is done. After acquisition at MEDS, the downloaded file passes through a series of checking and format programs to check its content and then it is stored into a database. The original downloaded files (in hexadecimal format) are also archived.

Software converts all downloaded Argos data and stores them in a database for later processing. The conversion software handles two different input formats, and can be expanded to manage others. The program checks that the message block number of each message is 32 bytes, performs a cyclic redundancy check to ensure that the Argos data contain no transmission errors.

Surface drift processing software gets all of the new position reports by the buoys and puts them into a permanent archive. This process checks for duplicates, validates dates, times and positions. Duplicates are removed, and bad positions, dates and times are flagged as bad.

TESACs are produced by gathering Argos messages from the database to produce new and complete profiles. Duplications are removed. The TESAC is only made when a message Type I transfer from the float is received and decoded correctly. Profiles are checked and flagged with automatic tests to find suspicious values according to agreed Argo real – time quality control tests. If for any reason, a TESAC can't be made within 2 days after the float first reports from the surface, a manual investigation is required with a subsequent delay in data being forwarded both to the GTS and GDACs.

TESACs are sent automatically as soon as they are created. MEDS link to the GTS is through the Canadian Meteorological Centre in Montreal. The TESAC only contains good data; bad data having been removed. Also, at this step the original file used to produce the TESAC is stored with a complete profile (good and bad data) for later use.

The original file used to produce the TESAC message is converted to netCDF. The information about trajectories for a specific float is also converted to netCDF format (for surface trajectory data). The trajectory file contains all of the position reports by a float since its deployment. All of the netCDF files are transferred to an FTP site at MEDS so that Canadian PIs can download the data. This process is still under construction.

MEDS has not yet started automatic transfers to the GDACs. We have been waiting for the final form of the netCDF formats to be decided. However, since we intend to send the same formatted data to both PIs and the GDACs, as soon as the format is stable, we will make appropriate adjustments and start routine downloads quite quickly.

Website

(http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/argo/ArgoHome_e.html)

The Argo can be found on the MEDS website under International Programmes or National Programmes. It is updated automatically each day and reports data received at MEDS in the form of graphs and plots. No analysis is done on the data.

The main page has three sections, Canadian Information, Canadian Products, and Global Information as well as links to other sites that are cooperating in Argo.

The Canadian Information section links to pages about individual Canadian floats. There are two ways to get to a float's report page. One uses two drop down lists marked Active (floats presently operating) and Inactive (floats no longer operating). A click on the ID of the float takes you to the correct page. The other option is to click on floats shown on a map. The map shows square markers indicating the last location of the float and are colored blue for active and grey for inactive.

Each float report page has temperature and salinity contour plots, a TS plot and a map of the surface drift track. At the top of each page, the dates of the last

temperature and salinity profile taken is indicated. Links to that float's metadata, drift data in CSV format and profile/drift data in netCDF are also available for download.

This section also links to a brief description of the various inputs and outputs of the MEDS processing system, as well as, documents describing the different formats that are used by Service Argos to send the profiling float data to MEDS.

The Canadian Products page is used to display or link to products derived from Argo data and generated by Canadian researchers. As of today, there is one link to Howard Freeland's P-Alace tracking pages which contains information about P-Alace floats tracked by IOS (Institute of Ocean Sciences).

The Global Information section contains basic data management information about the Argo programme. There are three graphs and a page of global maps. The first graph shows the monthly percentage of observations that are posted to the GTS within 24 hrs of the float reaching the surface. The second shows the number of floats currently reporting on the GTS, the number of stations and the number of stations reporting both temperature & salinity each month. This graph uses data starting from January 1998. The final graph shows the number and the cumulative number of continuous months that profiling floats report data (up to 60 months). The global maps show location and maximum depth of profiles for all profiling floats on a month by month basis starting in 1998. These displays are also available for just Canadian floats.

The following are some enhancements being developed for Version 2 of the website. A better mapping tool is currently being developed to give the user more flexibility in picking one of the floats from the clickable map sections. The new maps will give the user the ability to zoom in on an area which would allow a greater distinction between the float markers. As well, bathymetry will be added to the individual surface drift plots to show the various depths where profiles were taken. Documentation of the Canadian Argo processing system at MEDS will also be made available when completed.

ARGO Data Management Meeting: Ottawa 17-19 september 2001

Data Centre Activity : France

The CORIOLIS project is the french contribution to the operational oceanography and supports the french contribution to the ARGO.

Nationally funded until the end of 2005, it was designed in 3 phases:

- * preparation (on going until 2002)
- * demonstration (2003-2005)
- * evaluation (2004-2005)

CORIOLIS data centre is one of the five components of the CORIOLIS project:

- * instrumentation
- * float deployment
- * data acquisition on research vessels
- * scientific studies
- * data management

CORIOLIS Data Centre maintains a web site (<http://www.coriolis.eu.org>) and a ftp site from which the data can be accessed.

During the ARGO Data Management workshop (Brest, October 2000), the CORIOLIS Data Centre was proposed to be one of the 2 Global ARGO Data Centres.

The CORIOLIS Data Centre will perform from version V0 to version V2. Version V0 was the prototype and has been used until beginning of 2001. Version V1 is the version presently working and version V2 will be set up by 2002.

Within version 1, the next feature to implement will be the automatic QC in order to insure a GTS data delivery within a delay of 24 hours every day. Presently, a 24 hours delay (working days) is insured.

The most important features between the versions V1 and V2 will be:

- * develop a new web site where the interactivity will be increased (with comprehensive datasets on line selection)
- * take in account new data type like TSG and ADCP
- * increase the number of products (i.e. 3D gridded fields)

Coriolis Database contains 125 000 T/S vertical profiles. At least 95% of them come from the GTS through a GTSP-MEDS link and the remaining 5% come from:

- * the PROVOR drifters deployed from french programs
- * the APEX drifters deployed from the german program SBF 460

- * the APEX drifters deployed from the ARGO contribution of Denmark
- * the APEX drifters deployed from the European funded program GYROSCOPE
- * the XBT \tilde{O} s and CTD \tilde{O} s received from VOS and french research vessels
- * the XBT \tilde{O} s received from the European funded project MFSP

Coriolis Data Centre quickly quality checks the data received from the GTS. For the data coming directly from other drifters, a full process (reception, decoding, QC, database loading, dissemination through the web and the GTS) is made. To insure a full real-time data transmission from the floats to the Data Centre through the ARGOS, the ads (automatic delivery service) is used: ARGOS data are transmitted by email to the Data Centre. Then the drifters data are delivered in NetCDF and Medatlas formats.

Coriolis Data Centre has set up an ftp structure to exchange with the second Global Argo Data Centre (US Godae). This structure is presently ready to work and the ftp site is daily updated.

We also participate actively to the different ARGO formats discussions (Net CDF)

Floats deployments:

France has deployed a total of 26 PROVOR floats. The first deployment began by the end of 1999 and must be considered as test deployments. We now fixed up a general outline and work with Martec to industrialize float manufacturing. 11 floats are presently sending data (T from 5 floats and CT from 6 floats). 2 floats have just been launched and have not yet done their first cycles. All these floats have been deployed in the POMME area (Atlantic Ocean 600 nautical miles away from Portugal).

All the data are reported on the web site :
<http://www.coriolis.eu.org/coriolis/cdc>

France is also involved in the EU project GYROSCOPE. The first deployments (10 Apex) occurred in July 2001 and have been done by IFM Kiel (Germany).

Japan ARGO Data System

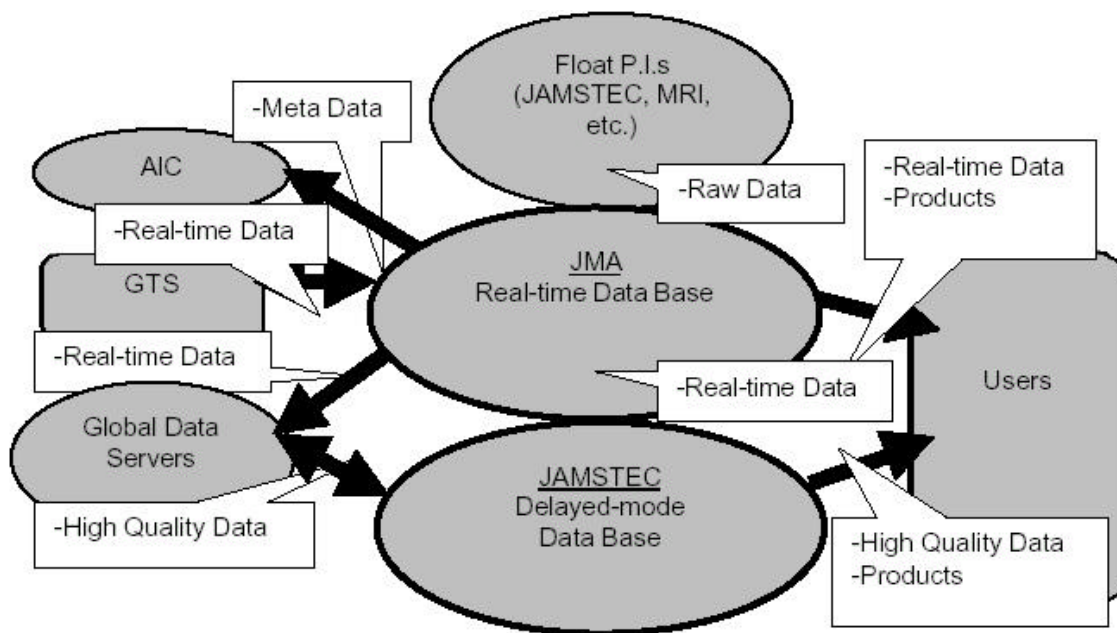
Takashi YOSHIDA, Japan Meteorological Agency

Yasushi TAKATSUKI, Japan Marine Science and Technology Center

prepared for the 1st session of Argo Data Management Subcommittee, Ottawa, September 2001

1. Overview

Japan ARGO Promotion Committee decided to establish a national Argo data system at its 2nd meeting held in November 2000. The data system consists of two databases: Real Time Database operated by Japan Meteorological Agency (JMA) and Delayed-mode Database by Japan Marine Science and Technology Center (JAMSTEC). Major service of the system is distribution of Japanese profiling floats data through GTS and Internet. JMA and JAMSTEC started some of functions of the databases in March 2001. Functions of the databases will be further expanded in accordance with the international standard of data processing procedure adopted by the Argo Data Management Subcommittee.



Overview of the Japan ARGO Data System

2. Japan ARGO Real Time Database operated by JMA

Present functions of Real Time Database are:

- insertion of Japanese profiling float data within 1 hour of collection from P.I.s to GTS;
- distribution of global GTS profiling float data through a web site within 1 hour of reception from GTS centers;
- distribution of oceanographic products prepared by JMA.

For the time being, no QC is performed at the Real Time Database for both the GTS transmission and the distribution through the web site. The majority of Japanese profiling

float data are transmitted from JAMSTEC to the Real Time Database after its own automatic QC within 12-32 hours (20 hours in average) of each descent of floats. Monthly mean sub-surface temperature charts in the Pacific Ocean as well as real time data are displayed on the web site

(<http://argo.kishou.go.jp/>).

Further enhancement of the database is planned on the following subjects:

- real time QC of Japanese profiling float data;
- real time distribution of Japanese profiling float data in NetCDF file;
- transmission of real time data to Global Data Servers.

The real time QC procedure and the NetCDF format used for the enhancement are expected to be fully consistent with the international standard to be adopted by the Argo Data Management Subcommittee.

3. Japan ARGO Delayed-mode Database operated by JAMSTEC

Present functions of Delayed-mode Database are:

- delayed-mode QC of Japanese profiling floats;
- distribution of high quality profiling float data.

Delayed-mode QC is performed only for obviously erroneous data at present. Web site of the delayed mode database is available at <http://www.jamstec.go.jp/ARGO/>.

JAMSTEC is improving the system in fiscal year (FY) 2001 as follows:

- to provide profile data, trajectory data and meta-data in standard format.;
- to develop a restoring module of a complete CTD profile from incomplete data set due to communication error;
- to develop and implement comprehensive delayed-mode quality control;
- to transfer updated data to Global Data Servers automatically;
- to get all of global Argo floats data from Global Data Servers and re-distribute through the web site.

Operation of anonymous ftp server for mirroring Global Data Servers at JAMSTEC is scheduled in March 2002. Furthermore, JAMSTEC will operate a basin-wide analysis for all floats deployed in the Pacific.

4. Deployment of floats

Further to 17 floats deployed in the western North Pacific in FY2000 initiated in April 2000, the deployment of 68 floats in the western North Pacific and two floats in the eastern Tropical Indian Ocean is scheduled in FY2001 by the joint efforts of Japanese Argo related organizations. As of September 2001, three of the 68 were put in the western North Pacific subarctic region. Among the 20 floats deployed in FY2000 and the first half of FY2001, 16 are now alive in the North Pacific. Deployment of the rest of 70 floats will be mainly made in early 2002.

ARGO Data Management in Korea

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Korea Meteorological Administration (KMA) under the Ministry of Science and Technology and Ministry of Marine Affairs and Fisheries (MOMAF) established jointly Korea ARGO Subcommittee (KAS) under Korea Oceanographic Committee (KOC) to carry out ARGO-related projects in Korea October 2000. KAS is composed of members from KMA, MOMAF, National Fisheries Research & Development Institute (NFRDI), Korea Ocean Research & Development Institute (KORDI) and experts in ARGO from university.

1. Floats deployment?

KMA and MOMAF will try to secure the national budget to increase 30 floats each year. Korea has a plan to purchase and deploy ARGO buoys in 2001 in seas around Korea and the eastern Pacific Ocean. Our plans in this year are below;

1) The Western Pacific 9 ea

? KORDI 2 ea

: deployed in May 2001 by R/V Onnuri, KORDI

? 1 ea APEX-CTD 18°N-130°E

? 1 ea APEX-TD 15°N-135°E

2) The Northwest Pacific 7 ea

? METRI/KMA 7 ea

: in November 2001 using merchandising ship

latitude longitude

K1 24° 30' 129° 13'

K2 22° 45' 130° 05'

K3 21° 15' 130° 45'

K4 19° 33' 131° 30'

K5 17° 38' 131° 55'

K6 15° 45' 132° 40'

K7 14° 05' 133° 20'



3) The Antarctic Region 2 ea

? KORDI 2 ea APEX-CTD (at Drake passage)
: in December 2001 by KARP, KORDI

4) The East Sea (Ulleung Basin region) 8 ea

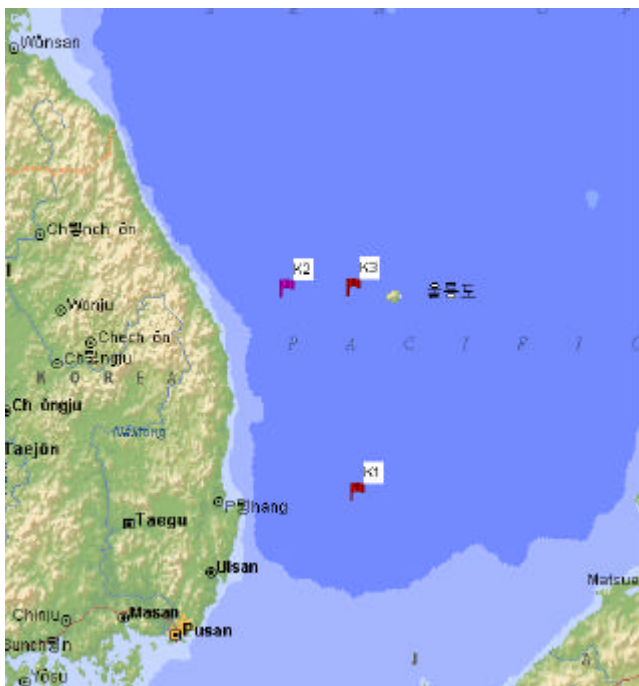
? KORDI 5 ea APEX-CTD
: deployed in 13-19 October 2001 by R/V Meteo-2000, METRI/KMA
receiving data per 10 days using e-mail

NO	latitude	longitude
1	36°44.8'	130°49.5'
2	37°19.4'	131°25.6'
3	37°17.6'	131°42.7'
4	37°23.5'	131°06.5'
5	38°31.4'	129°29.9'

? METRI/KMA 3 ea ; 3 ea APEX-CTD

: deployed in 17-18 October 2001 by R/V
receiving data per week using e-mail

NO	latitude	longitude
K1	36°10'	130°33'
K2	37°35'	129°54'
K3	37°35'	130°31'



2. Data archives and Data center

The Korea Oceanographic Data Center (KODC) operated by NFRDI have a plan in charge of the ARGO Delayed Mode Data Base (DMDB). Related to software system readiness, the KODC carrying out a project on ARGO DMDB from October 2001. Functions of the ARGO DMDB will be further expanded in accordance with the

international standard of data processing procedure adopted by the ARGO Data Management Subcommittee.

The functions of this ARGO DMDB software will be involved below;

- 1) To receive data from ARGO float
float -> ARGO Satellite -> ARGO Data server (located in KMA or KODC)
- 2) To receive data hour after hour from ARGO RTDB Data serve located in KODC
 - receiving the latest data except for already received data
 - make a report about received data
 - control of connection time
- 3) Real-time QC on repetition, time, position
- 4) After creating TESAC data, to transmit TESAC data using GTS net
- 5) Input of data in real-time DB
- 6) Construct WEB contents for real time data service
 - trajectory of floats
 - a drawing of vertical structure
 - a drawing of vertical section
 - a drawing of horizontal distribution
- 7) Receiving data at DMDB server connect with RTDB
- 8) QC on Argo DMDB with the assistance of several tools by specialist
 - graph
 - statistics
 - choose of boundary
- 9) Prepare for Net-CDF file and transmit data to Global ARGO Data Center
- 10) Service on constructing delayed mode WEB contents
 - trajectory of floats
 - a drawing of vertical structure
 - a drawing of vertical section
 - a drawing of horizontal distribution
- 11) Service on constructing delayed mode WEB contents receiving data from Global ARGO Data Center
 - trajectory of floats
 - a drawing of vertical structure
 - a drawing of vertical section
 - a drawing of horizontal distribution

3. A summary of future implementation plan of KAS are below;

- 1) step 1 (2001- 2002) establish of observation system and manage & control of observed data
 - international corporation
 - deploy of ARGO buoys
 - construct of ARGO DB, data QC
- 20 step 2 (2003-) to develop a application model
 - to develop assimilation technique
 - to develop prediction model on marine and climate

ARGO PROJECT IN RUSSIA

Danchenkov M.A., FERHRI, Vladivostok

In Russia national ARGO System is not established yet. Sets of documents is passed to Government. Next meeting of ARGO promoting Committee will be held in the beginning of 2002.

The ARGO Data in Russia in future is planned to be kept in two centers (databases)- Fig.1:

- **Real Time Database** (operated by Russian HydroMeteoCenter, Moscow)
- and **Delayed-mode Data base** for Pacific and Indian oceans (operated by Regional ARGO Center, FERHRI, Vladivostok).

- In next fiscal year (2002) is planned:
- to establish **Real Time Database** in Russian HydrometeoCenter;
- to transfer own floats data to Global Data Servers automatically;
- to get all of global Argo floats data from Global Data Servers and re-distribute through the web site.

Now only Delayed-Mode Data Base operates. But there is not Web-site of it yet. It is planned for the beginning of 2002.

Basic functions of Centers have to be the next:

- the distribution of data from Russian floats through GTS and Internet;
- the receiving of data of floats from GTS and from Internet;
- the processing of ARGO data and publication of results.

Delayed-Mode Data Base

Now in FERHRI there is Delayed-Mode Data Base that

- Receive ARGO data on Internet and e-mail;
- QC;
- Arrangement of 2 sets of Files (own and Web's: position; drift at two levels; TSdata; HQdata; errors; products).

QC of data was made in University of Washington. In FERHRI special data control carries out.

Data of 4 floats (106 stations) are accessible for any ARGO centers.

Between products of FERHRI Center are:

- charts of drift of floats at working level and at the surface;
- monthly sections of temperature, salinity and density in the Japan Sea.

Further development of the delayed-mode database is planned on the following subjects:

- real time receiving of foreign float data;
- real time distribution of float data by own Web-site;

Deployment of floats

Russia could pass the data of four floats deployed earlier in the Japan Sea jointly with JAERI. All of them finished their work to September 2001.

In next fiscal year 3 floats will be deployed in the Pacific ocean from own vessels. FERHRI is ready also to deploy any foreign floats by its vessels.

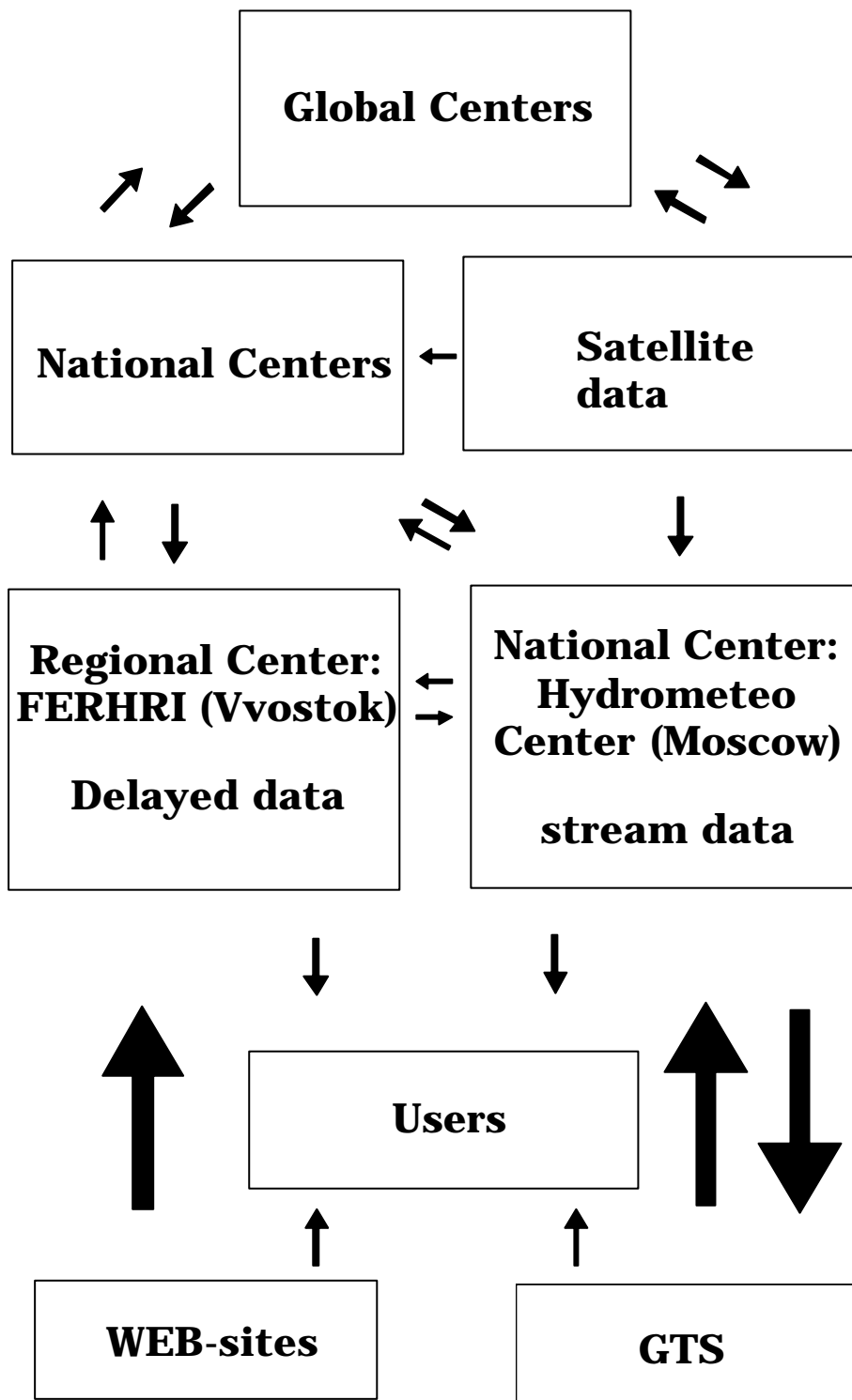


Fig.1. Two Russian ARGO Centers connections.

QUALITY CONTROL (QC) POSITION

Example of control of position of float made on limiting distance between stations presented at Fig.2. Unreal speed of float 285 (in November-December) and 287 (in October) could be explained by external influence only.

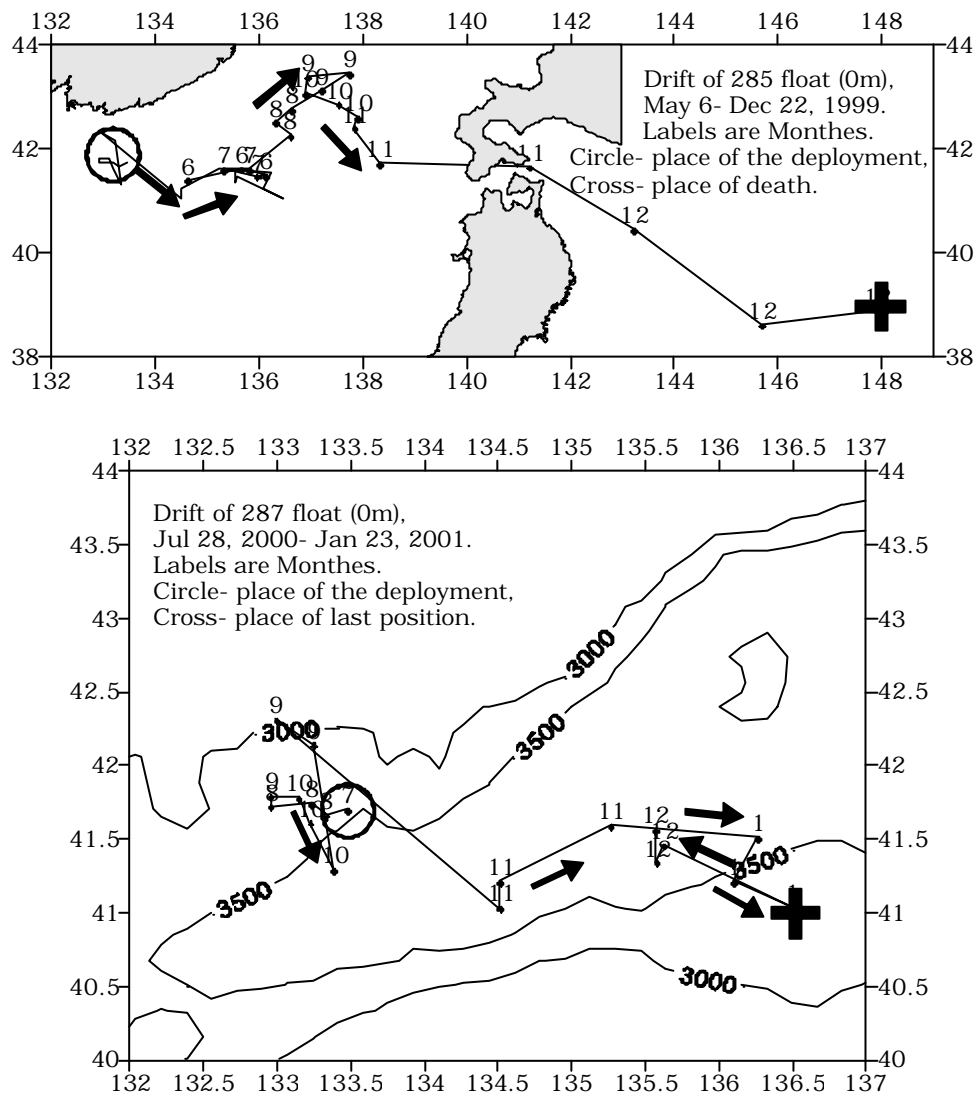


Fig.2. An example of over-limit drift of floats.

Charts of positions of every floats are made monthly (an example is at Fig.3).

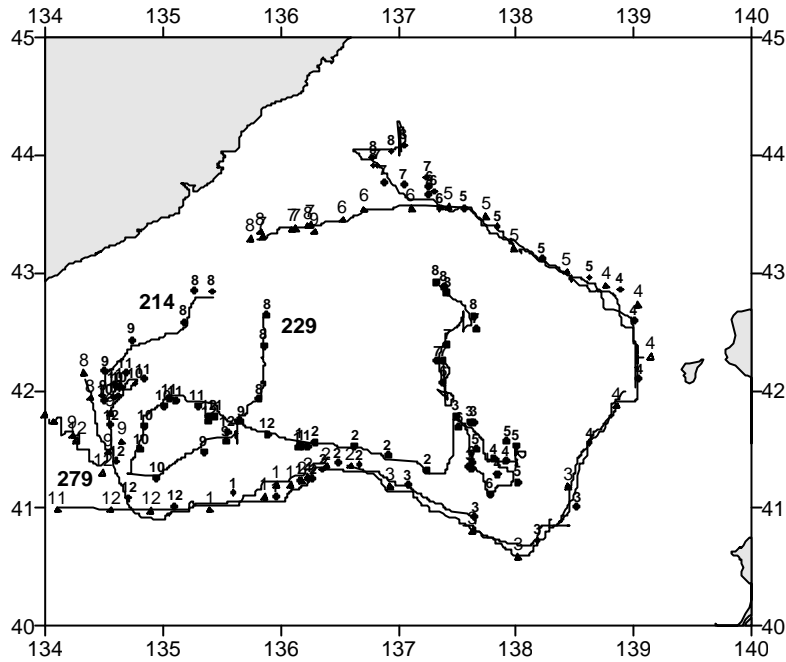


Fig.3. Positions of 3 floats in the Japan Sea.

ERRORS in Temperature, Salinity and density

3 sigma.

Example of Control of values more than 3 sigma usually reveals unreal water temperature.

PALACE data on level= 299.m

T-sr= S-sr= ST-sr=
.925 34.069 27.302

T-sig= S-sig= st-sig=
.244 .447 .428

3sigmaT= .733 Temperature-OUT

Longtit	Latitude	Temp,C	dT	Sal,o/oo	sigma-t	mn	year	stN
131.920	40.440	3.006	2.081	33.972	27.065	8	1999	88
131.950	40.550	2.682	1.757	33.981	27.101	8	1999	89

PALACE data on level= 699.m

T-sr= S-sr= ST-sr=
.400 34.065 27.332

T-sig= S-sig= st-sig=
.080 .442 .362

3sigmaT= .239 Temperature-OUT

Longtit	Latitude	Temp,C	dT	Sal,o/oo	sigma-t	mn	year	stN
134.030	41.360	.679	.279	34.070	27.320	8	1999	50
133.970	41.370	.701	.301	34.071	27.319	8	1999	51
131.920	40.440	.845	.445	34.065	27.306	8	1999	90
131.950	40.550	.793	.393	34.067	27.310	8	1999	91
133.590	41.650	.640	.240	34.074	27.325	8	2000	120

Control of T, S, sigma distribution on vertical

Data control of vertical distribution of parameters is carries out by different figures (Fig.4-6.)

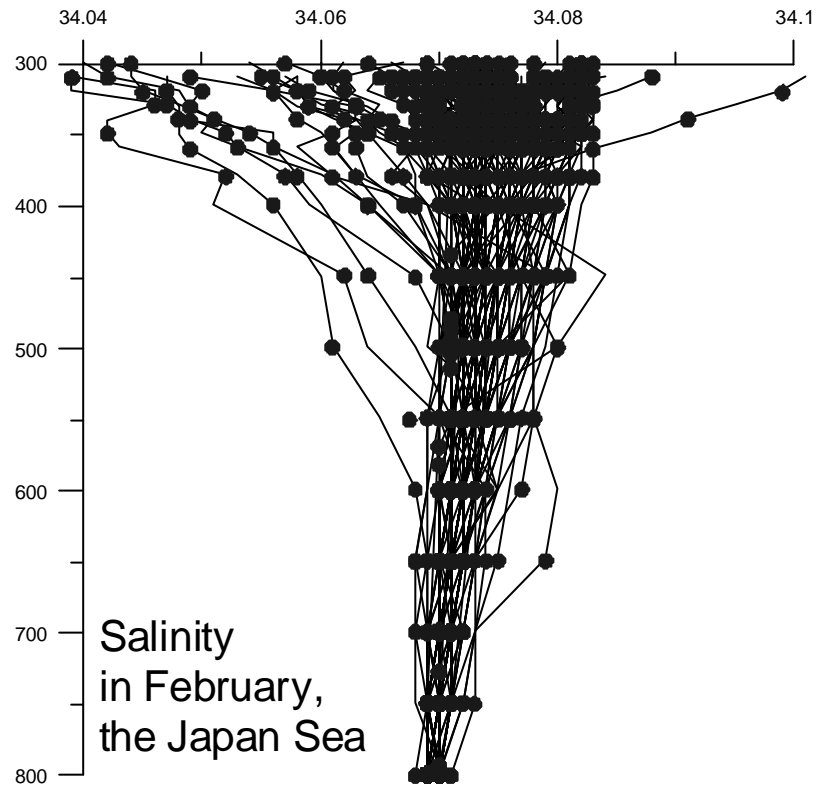


Fig.4. Salinity distribution on vertical.

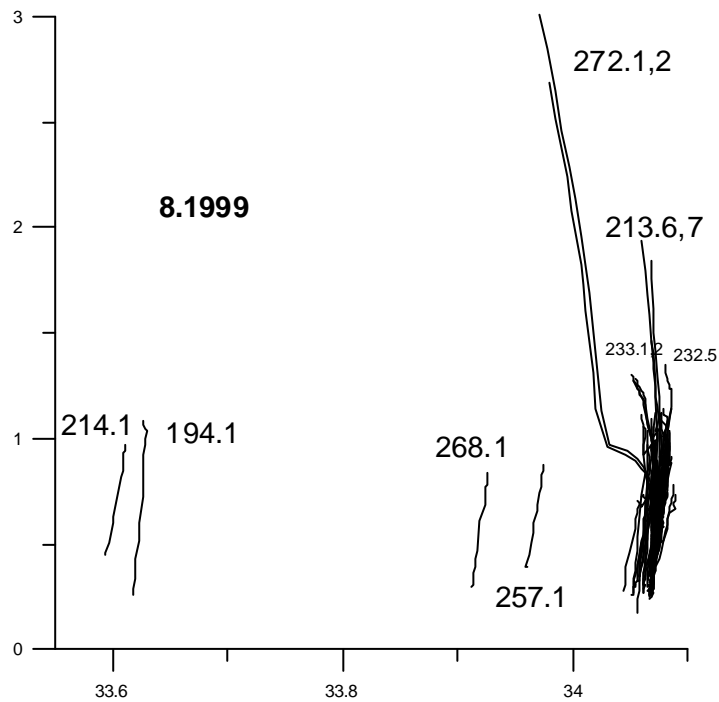


Fig.5. T(S)-curves.

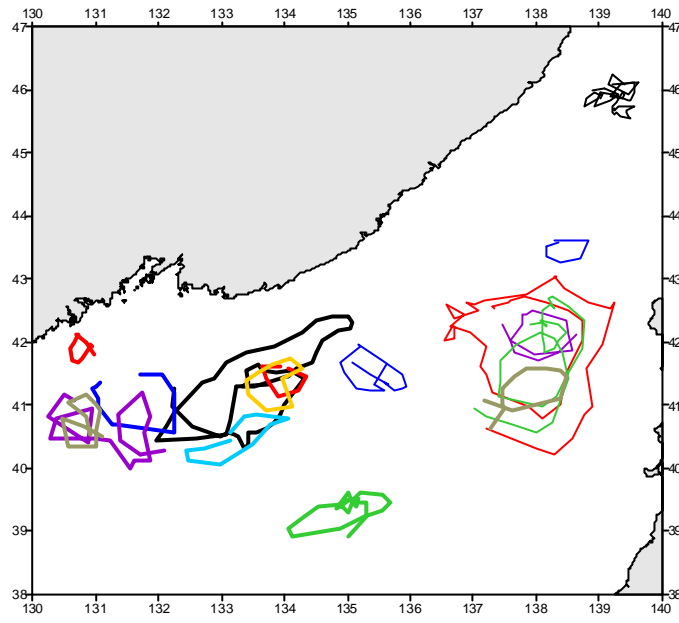


Fig.6. Special analysis of floats drift- eddies in the Japan Sea.

UK Report to the Argo Data Management Meeting
IFREMER, Brest, France
12-14 November 2001

Introduction/Background

The aim of the UK Argo project is to establish an operational system by 2003 with the capacity to deploy about 50 floats each year (maintaining about 100-150 floats in the water at any one time), and to capture all Argo data in real time in support of operational ocean forecasting, as well as processing UK float data in delayed mode for climatological and hydrographic purposes. Funding is being provided by the Department for Environment, Food and Rural Affairs (DEFRA), the Ministry of Defence (MoD) and the Natural Environment Research Council (NERC). Participating organisations include the Met. Office (Ocean Applications with technical assistance from Observations Supply branch on procurement and deployment of floats), the Southampton Oceanography Centre (SOC), the British Oceanographic Data Centre (BODC) and the UK Hydrographic Office (UKHO). Following completion of the pilot project it is hoped that there will be a joint long-term commitment from DEFRA and MoD for the continued operational funding of Argo floats.

1 CURRENT UK ARGO FLOAT STATUS

Twenty-five floats have been deployed to date from VOS (Icelandic container), a Norwegian research ship and UK research ships (*RRS Discovery*, *RRS Charles Darwin*). Ten have been deployed in the Irminger Sea, three in the Rockall area to the west of Scotland, two in the Norwegian Sea, five in the Arabian Sea and five in the south-west Indian Ocean. One south-west Indian Ocean float has ceased to transmit. The cause of failure is not known. A further 5 floats will be deployed by air drop in the northern part of the Arabian Sea by the US Navy (NAVOCEANO).

An order for 30 more floats has been placed. These are provisionally allocated for deployment in the South Indian Ocean (32°S section, 25 floats), South Atlantic (3) and eastern Mediterranean (2). Delivery of the floats is scheduled for early 2002. The Royal Navy (HMS Endurance) and US Navy (NAVOCEANO) platforms are being lined up for South Atlantic and Mediterranean deployments of these; *RRS Charles Darwin* will deploy floats in the Indian Ocean section. A further 3 floats will be deployed in the north-eastern part of the Norwegian Sea early in 2002.

Real-time data flow

For the UK float data, CLS are creating GTS bulletins containing TESAC messages and forwarding these to Meteo-France for quality control (following JCOMM procedures as outlined in IOC/WMO Manuals and Guides No.3, 1999) and insertion onto the GTS. At present the quality control is manual but Meteo-France are looking to automate the process to reduce delays. The UK Met. Office retrieve these data from the GTS for use with their Forecasting Ocean-Atmosphere Model (FOAM). There were some initial teething problems which have now been resolved and comparison of the TESAC messages with the detailed profiles extracted by SOC from the raw data shows overall agreement.

2 UK ARGO 'DELAYED-MODE' DATA CENTRE

BODC will operate an Argo 'Delayed-mode' Data Centre from 1 July 2001 for an initial period of four years i.e. until six months after the end of the Pilot Phase of Argo (the final six months is to ensure completion of the management and archival of data from the Pilot Phase and/or as a start-up for work on subsequent phases). The activity will be reviewed in late 2004 when the requirements for its longer term operation will be assessed.

The Data Centre will act a) as the 'delayed-mode' data centre for UK floats in the Argo programme regardless of their location and b) as the international Argo 'delayed-mode' data centre for the Southern Ocean.

The Data Centre will report regularly on progress to the UK Argo Expert Group, seeking advice and guidance from the Expert Group as and when required. Scientific guidance will be provided by SOC.

Through its collaboration with the international Argo community, the Data Centre will act to facilitate ready access to other Argo 'delayed-mode' data by UK marine scientists.

The Data Centre will collaborate with the UKHO in the validation of 'delayed-mode' data and ensure the timely delivery of such data to the UKHO's databases.

Data will be delivered to the Global Argo Data Centres once the BODC system is operational and the exchange formats have been fully defined.

3 UK ARGO DATA MANAGEMENT: PROGRESS TO DATE

The suggested model for the UK delayed-mode data management is a collaboration between BODC and the UKHO, utilising the expertise at the SOC, especially early on in the project.

The current situation is that the raw (hexadecimal) data are received by ftp at SOC. Scientists at SOC translate these to pressure, temperature and salinity and provide access to these data (together with profile plots and location maps) on their ftp server. Back-up CD-ROMs containing the raw data are provided by CLS on a monthly basis. In the near future the data will be forwarded to BODC by *ftp*, with back-up CD-ROMs also being provided to BODC.

BODC is in the early stages of developing a system to handle the delayed-mode Argo data. We have developed software to translate the incoming raw data, and intend to have the first version of our system running by the end of this year. This will automatically translate incoming data, pass them through automatic quality control checks, store them within the BODC system and make them available on the BODC Argo web-site. We are planning on storing the data in NetCDF within BODC, as we are moving to NetCDF as our archive format. The metadata will reside in Oracle and software will be developed to extract this and deliver it to the community in the internationally agreed format.

The UK Met. Office has a set of web pages describing the UK Argo project, linking to the SOC ftp server for the data and linking to other Argo web pages. Over the last

few weeks, a web-site (www.bodc.ac.uk/projects/argo) has been established at BODC. This provides some background to the project, links to other relevant Argo web-sites, including the Argo Information Centre. At present we link to the SOC site for access to the data, but over the next 1-2 months the data will be available directly from BODC.

BODC personnel intend to spend some time at SOC in the new year, going through their procedures in detail. The real-time quality control procedures suggested by the international Argo data management group – based on GTSP quality control tests – will be implemented. In addition, visual checks will be made on data and comparisons with other data sets will be carried out. In collaboration with SOC, particular attention will be paid to the salinity calibration and sensor/platform performance (to monitor different float types and different sensors (e.g. FSI/SeaBird etc.)). In the longer term, further data products will be generated.

Once the data have been fully quality controlled by BODC using standard Argo procedures they will be passed onto the UKHO in the format of their choice (for example, their in-house profile format or the NetCDF format adopted by Argo). It is suggested that this be done on a regular basis somewhere between daily and monthly. The UKHO will pass the data through their own procedures and against their existing data holdings. Suspect data will be flagged/edited and this information fed back to BODC, who will amend the master data set as necessary, forward it to the global centres, and make it available to the wider community via the Web/ftp in agreed formats as appropriate. Once validated by the UKHO, the profiles will be loaded to the UKHO database for Navy use.

BODC has also taken part in the discussions relating to the development of NetCDF formats for data and metadata exchange.

USA Report to the Argo Data Management Meeting

IFREMER, Brest, France

12-14 November 2001

Current USA Argo Float Status

There are presently 116 operating floats of which 79 were deployed in 2001. The data processing of these floats is fully automated from data acquisition to transmission to the GTS. Data from these floats are available by ftp from the AOML web pages. The agreed real-time QC procedures have been implemented. Profiles that fail these tests are extracted from the automatic processing stream and reviewed. Data QC flags are added to these profiles and if the visual process judges the profiles to be fine, they are routed back to GTS distribution. All data are placed on the ftp site.

In addition to the agreed set of real-time tests, two additional tests are performed. A test is performed against the Levitus 1998 climatology. A measurement fails this test if it lies N standard deviations outside of the mean. The value used for N is given in each data file.

An additional test is made against the NCEP weekly analysis data. A point fails this test if ???

A preliminary test of the performance of the real-time QC tests was made based on 128 profiles collected over about a 10 day period in early November. The results were as follows.

1. One profile had no position, likely because of a mixup in identifier.
2. 127 profiles were tested with automatic temperature QC procedures. All but 6 passed. (95% pass rate)
3. 112 profiles were tested against automatic temperature and salinity procedures. 4 failed temperature tests, 22 failed salinity tests and none failed both temperature and salinity tests.
4. 28 profiles failed the automatic tests and were sent to visual inspection. 14 of these passed visual inspection.

Monitoring is undertaken for data processing and QC. An analysis is made of all emails received from Service Argos. Statistics are kept of passed and failed profiles through both automatic and visual QC. Finally a list is created of all of the profiles transmitted to the GTS.

The AOML web pages contain float status reports, products, such as trajectories and hydrographic presentations, and coverage maps showing the locations of US floats. The pages also contain descriptions of Argo processing in the US, and details of the procedures implemented at AOML. Documents describe the metadata file format used by the US and software and error handling procedures. These pages are updated daily. The URL is <http://www.aoml.noaa.gov/phod/ARGO/HomePage>