

Argo National Data Management Report

Japan

1. Status

The Japan DAC (Japan Meteorological Agency: JMA) has processed data from 350 Japanese profiling floats, including 219 active floats by the end of August 2004. There are seven national PIs who agreed to provide data to the DAC. ARGOS messages from the active floats are being transferred to the DAC in real-time. All profiles from the floats are issued to GTS in TESAC form after real-time QC. JMA started work for code migration to BUFR such as reviewing the proposed template for profiling data and proposing template for trajectory data. All the profiles issued to GTS are transmitted to GDACs in netCDF format at the same time when they are issued to GTS. JAMSTEC applies delayed QC to their own floats. By the end of August, delayed-mode QC have been applied to 10,109 (83%) profiles, and 67 delayed-mode profiles were sent to GDACs.

JMA and JAMSTEC have developed Argo web sites. The former shows global float coverage and each profile based on GTS TESAC messages and the status of Japanese floats (<http://argo.kishou.go.jp/>). JAMSTEC shows the tables, trajectories and (P,T,S) profiles of all floats that it is responsible for. JAMSTEC also provides search function for the float profiles, GDAC mirror site, ascii data sheets of each profile (up to March 2005) and so on through its web site (http://www.jamstec.go.jp/ARGO/J_ARGOe.html).

JMA uses Argo data for its operational oceanographic and climate prediction models. Surface temperature (observation at the shallowest level) data are useful source for its operational SST analysis and ground truth of satellite observations. Oceanographic products such as current, subsurface and surface temperature maps are available on the JMA web site. JAMSTEC is also one of the users of Argo data for OI mapping of physical oceanographic quantities such as Temperature, Salinity, Density, Dynamic Height Anomaly and Relative Geostrophic Current and for ocean data assimilation model. OI mapping, together with some statistics are shown on the JAMSTEC web site.

As one of the GOOS Regional Alliance activities, JMA has been operating NEAR-GOOS (North-East Asian Regional GOOS) regional real time data base, which provides global GTS messages to registered users through a web site and ftp server with maximum delay of one day after GTS input. There are about 130 registered users, who are potentially use Argo data scientifically or operationally.

2. Delayed Mode QC

JAMSTEC has to go through to write netCDF files for the delayed mode profiles. Our corrections from real-time profiles are as follows:

- 1) adding data by BitErrorRepair,
- 2) correction of the position (Lat, Lon) and time (Juld, Juld_Location),
- 3) manual change of flag of each layer by Visual QC,
- 4) change of Number of layers using delayed or repaired messages,
- 5) pressure correction using SSP and subsequent salinity recalculation,

6) salinity correction using WJO.

Description of the calibration and history records in netCDF file is given in **Appendix B**.

During the past year, JAMSTEC has done validation of salinity correction based on WJO about 8000 profiles using nearby CTDs (**Appendix C**).

A gray list of the floats which are judged to start reporting abnormal data have been developed by JAMSTEC and JMA. The gray list criteria and delayed-mode flagging procedures for doubtful pressure measurements are in **Appendix A**.

3. Regional Centre Functions

IPRC, CSIRO and JAMSTEC had the meeting about Regional Center of the Pacific in 28-30 July 2004. The followings were agreed at the meeting:

- ✓ Establish a regional website for the PACIFIC by IPRC.
- ✓ About a geographical ocean area, JAMSTEC does whole Pacific to ~30S (until 2008). CSIRO will do region around Australia, 90-200E (or 180), 10N (or 0N)-Antarctica. The duplicated zone along the equator will be set for inter-comparison among the Pacific-RCs. Who will do the SE Pacific?
- ✓ About functions, CSIRO and JAMSTEC do float-float and float-nearby CTD comparison of Argo (T,S) profile. IPRC gather recent data for QC and coordinate.

Other points at issue will be reported by P. Hacker at the meeting.

Appendix A.

Grey list criteria

Abnormal salinity drift and offset is judged by the salinity increase or decrease by the amount of 0.03 at around 2000db from the deployment.

Abnormal pressure is judged by the critical value of 2200db. If a float starts to report larger value, such as 3000db, it is nominated as a candidate. If subsequent cycle reports larger values and profile get shallower, it is listed in the table.

Delayed-mode flagging procedures when the pressure values are doubtful

1. When $PRES > 2200db$ or $PRES_QC = 4$ (by rQC),
flags of PRES, TEMP and PSAL = 4
2. Otherwise, profiles P-T, P-S, T-S of a cycle are compared with previous ones.
 - ✓ When they can be considered as normal (discrepancies are small),
 - ✧ flag of PRES, PSAL = 2 and flag of TEMP = 1
 - ✓ When the discrepancies are seen in all three figures,
 - ✧ flag of PRES, PSAL and TEMP = 3
 - ✓ When the discrepancies are seen in P-T and P-S figures but small in T-S,
 - ✧ flag of PRES = 3 and flag of PSAL, TEMP = 2
3. When the maximum depth is shallower than 500db,
flags of PRES, TEMP and PSAL = 4

Subsequent pressure correction using Surface Pressure is not performed in the cases that

- ✧ Surface Pressure is abnormal,
- ✧ flag of PRES = 3 or 4.

Appendix B

JAMSTEC puts delayed mode history records into the netCDF file as follows when:

- 2) correction of the position (Lat, Lon) and time (Juld_Location),
- 5) pressure correction using SSP and subsequent salinity recalculation,
- 6) salinity correction using WJO have done.

Here is an example.

Calibration Section (*N_PARAM=3, N_CALIB=2, only 3 in 6=2x3 are shown*)

```
PARAMETER =
  "PRES",           // Pressure correction
  "PSAL",           // Recalculation of Salinity
  "PSAL" ;         // Salinity adjustment using WJO
SCIENTIFIC_CALIB_EQATION =
  "PRES_ADJUSTED = PRES+ThisCycleSSP-NextCycleSSP",
  "PSAL_ADJUSTED = PSAL (PRES_ADJUSTED, TEMP, Conductivity)" ;
  "" or
  "PSAL_ADJUSTED = PSAL_ADJUSTED + deltaS, where deltaS is calculated by WJO" ;
SCIENTIFIC_CALIB_COEFFICIENT =
  "ThisCycleSSP=4.4, NextCycleSSP=4.4",
  "" ,
  "" or "r=0.9994(±0.0001), deepest deltaS=-0.025(±0.008)" ;
SCIENTIFIC_CALIB_COMMENT =
  "Pressure Correction using SeaSurfacePressure of this(before) and next(after)
cycle(profile) in Technical Data",
  "Salinity Recalculation using ADJUSTED Pressure" ;
  "No adjustment is needed" or "WJO(2003) salinity adjustment is adopted with SeHyDI" ;
```

History Section

```
HISTORY_INSTITUTION =
  .. ,
  "JM",           // Change JULD_LOCATION
  "JM",           // Change LATITUDE
  "JM",           // Change LONGITUDE
  "JM",           // Pressure correction
  "JM",           // Recalculation of Salinity
  "JM" ;         // Salinity adjustment using WJO
HISTORY_STEP =
  .. ,
  "ARGQ",         // JAMSTEC's rQC
  "ARGQ",         // JAMSTEC's rQC
  "ARGQ",         // JAMSTEC's rQC
  "ARCA",         // JAMSTEC's calibration (Pressure correction)
  "ARCA",         // JAMSTEC's calibration (Recalculation of Salinity)
  "ARSQ" ;       // JAMSTEC's calibration (Salinity adjustment using WJO)
HISTORY_SOFTWARE =
  .. ,
```

```

    "WJO";           // Schemes used in salinity adjustment
HISTORY_SOFTWARE_RELEASE =
    .. ,
    "I";           // program version of WJO
HISTORY_REFERENCE =
    ..... ,
    "SeHyDI";     // Name of the data set used with WJO
HISTORY_ACTION =
    .. ,
    "CV",         // Change Value of JULD_LOCATION
    "CV",         // Change Value of LATITUDE
    "CV",         // Change Value of LONGITUDE
    "CV" or "IP" , // ChangeValue or Operate on the complete input record of PRES
    "CV" or "IP" , // ChangeValue or Operate on the complete input record of PSAL
    "CV" or "IP" , // ChangeValue or Operate on the complete input record of PSAL
HISTORY_PARAMETER =
    .... ,
    "DAT$",       // Change Value of JULD_LOCATION
    "LAT$",       // Change Value of LATITUDE
    "LON$",       // Change Value of LONGITUDE
    "PRES",       // Pressure correction
    "PSAL",       // Recalculation of Salinity
    "PSAL" ;     // Salinity adjustment using WJO
HISTORY_START_PRES =
    .... ,
    99999.,
    99999.,
    99999.,
    99999.,     // Pressure correction
    99999.,     // Recalculation of Salinity
    99999. ;    // Salinity adjustment using WJO
HISTORY_STOP_PRES =
    .... ,
    99999.,
    99999.,
    99999.,
    99999.,     // Pressure correction
    99999.,     // Recalculation of Salinity
    99999. ;    // Salinity adjustment using WJO
HISTORY_PREVIOUS_VALUE =
    .... ,
    19402.0216435185, // JULD_LOCATION
    44.726,           // LATITUDE
    169.86,           // LONGITUDE
    99999.,           // Pressure correction
    99999.,           // Recalculation of Salinity
    99999. ;         // Salinity adjustment using WJO

```

Appendix C

Validation of Salinity Correction based on WJO method Using shipboard CTD : statistics

Definitions

Argo Float → S_{obs} : observed salinity

WJO estimation → S_{est} : estimated salinity

σ : estimation error

Defined quantities:

$$\Delta S = S_{est} - S_{obs}$$

For the validation we use an averaged value over whole profiles for each float.

$\Delta S = |S_{est} - S_{obs}|$: averaged over whole profiles

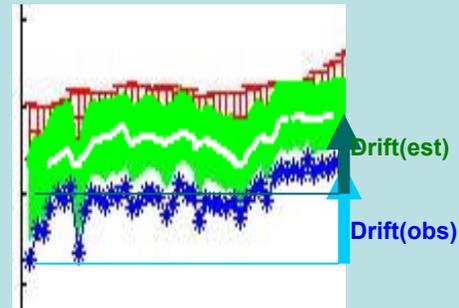
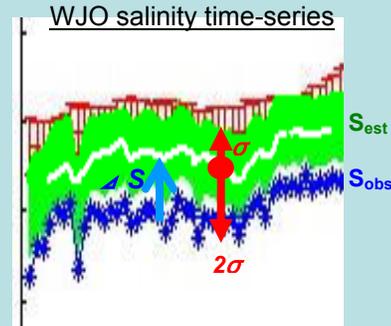
Drift(obs) = $S_{obs}(\text{first profile}) - S_{obs}(\text{last profile})$

Drift(est) = $S_{est}(\text{first profile}) - S_{est}(\text{last profile})$

For the validation we use a salinity observed by shipboard CTD.

→ S_{DP} : salinity observed at deployment of a float

→ S_{RC} : salinity observed at recovery of a float



Judgment whether our choices of S_{obs} or S_{est} are good or not is done on the inspection of S_{obs} and S_{est} time-series with CTD salinity on it, that is

$$|S_{obs} - S_{CTD}| < 0.01 \quad \text{for choice of } S_{obs}$$

$$|S_{est} - S_{CTD}| < 0.01 \quad \text{for choice of } S_{est} \quad (\text{threshold is taken } 0.01 \text{psu}).$$

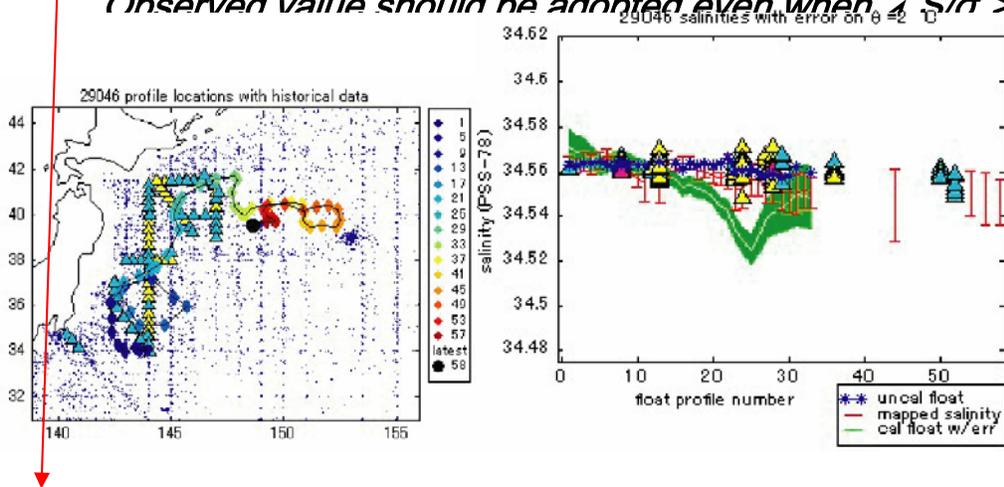
Number of floats that automatic choice is reserved ($1 < \Delta S / \sigma < 2$) amounts to 15% of all 104 floats used here. When reserved floats are reduced to Observed (Choice by $\Delta S / \sigma < 2$) or Estimated (Choice by $\Delta S / \sigma < 1$), a percentage of correct answers exceeds 90%. When reserved or all floats are inspected visually, a percentage of correct answers exceeds 95%.

Automatic Choice whether Adjusted Value = S_{obs} or S_{est}		Observed Value when $\Delta S/\sigma < 1$		Estimated Value when $2 < \Delta S/\sigma$		Reserved
Judgment by shipboard CTD	No.	Good	Bad	Good	Bad	
CTD@deployment	95	59 62%	3 3%	19 20%	0 0%	14 15%
nearby CTD	72	43 60%	0 0%	18 25%	1 1%	10 14%
CTD@recovery	6	5 83%	0 0%	1 17%	0 0%	0 0%

Mischoice by Automatic Choice

WMO29046(A2, 58cycles): $\Delta S/\sigma = 2.1$

Observed value should be adopted even when $\Delta S/\sigma > 2$



WMO2900277(A3, 21cycles): $\Delta S/\sigma = 0.4$

Estimated value should be adopted even when $\Delta S/\sigma$

