

## **Japan National Report**

(Submitted by Nobie Shikama)

### **1. Status of implementation (major achievements and problems in 2006)**

#### **1.1 Floats deployed and their performance**

Japan Agency for Marine-Earth Science and Technology (JAMSTEC) deployed 86 floats (84 APEXs, 2 NINJA) in FY 2006 from April 2006 to March 2007.

JAMSTEC introduced five APEXs using the Iridium Satellite System into Japan for the first time and deployed them in the MISMO cruise in the Indian Ocean in October 2006. These Iridium-APEXs are working well to send temperature-salinity profiles from 500db everyday. JAMSTEC really appreciates the assistance of Dr. S. Riser and D. Swift of University of Washington who provided their software to treat Iridium APEXs and gave a lot of useful advice in this introduction.

The Arctic research group of JAMSTEC deployed a POPS (Polar Ocean Profiling System) near the North Pole in the Arctic Sea in April 2006. POPS is an ice-based drifting buoy with a PROVOR float moving up and down along a 1000m cable. The observed data (temperature-salinity profiles of every 3 days, 3-hourly GPS position, atmospheric temperature and pressure) had been sent to the GTS until mid-January 2007 when it terminated its transmission probably due to its drift into a non-ice zone and submergence. We can really say "Arctic Argo has begun!".

An APEX of JAMSTEC beached on the shore of Maui/Hawaii and was kept by US Coast Guard in the end of January 2007. A technician of JAMSTEC will visit US Coast Guard of Maui to examine and ship it back to Japan safely in mid-March 2007. JAMSTEC really thanks both US Coast Guard for keeping the float safely and D. Swift of University of Washington for giving the first information about the beached float.

Among the 528 floats (447 APEXs, 72 PROVORs, 9 NINJAs) which JAMSTEC deployed in the Pacific, Indian and Southern Oceans, from 1999 to the end of January 2007, 308 (305 APEXs, 1 PROVOR, 2 NINJA) floats are now in normal operation, 213 floats (138 APEXs, 69 PROVORs, 6 NINJAs) terminated their mission and 7 floats (4 APEXs, 2 PROVORs, 1 NINJA) were recovered.

The Japan Meteorological Agency (JMA) deployed 16 floats (7 PROVORs, 9 APEXs) from January 2006 to December 2006 in the seas around Japan for operational ocean analysis and forecast as Argo equivalent floats. Among 23 floats (14 PROVORs, 9 APEXs) which JMA deployed from 2005 to 2006, 19 floats (10 PROVORs, 9 APEXs) are operating at the end of December 2006, while 4 PROVORs terminated the transmission in 2006.

National Research Institute of Fisheries Science, Fishery Research Agency deployed 1 APEX with a Wetlab chlorophyll sensor in the Kuroshio region in February 2006. As the chlorophyll data began to show unstable tendency 3 weeks after launch, the float was recovered in April 2006 by the same institute.

Tohoku University deployed 1 APEX with both a Sea-Bird oxygen sensor and a Wetlab chlorophyll sensor in February 2006. Reliable chlorophyll data was obtained during about 140 days after launch. Tohoku University also deployed 1 isopycnal APEX with an Aanderaa Oxygen Optode in July 2006.

## **1.2 Technical problems encountered and solved**

Chlorophyll sensor (Wetlab FLNTU) loaded on an APEX which was deployed by Tohoku University began to show unreliable data 140 days after launch. The cause of malfunction is now being examined at Webb. We heard that a similar malfunction was also experienced in Chilean float deployment.

In JMA's deployment, three in four floats ceased their operation in shallow waters before expiration of their expected lifetime. One PROVOR deployed in February 2006 did not submerge after launch but kept floating on the sea surface and sending a message "end of life mode". The reason of malfunction is unclear. Among 15 APEXs purchased in 2006, 3 APEXs failed the automated bladder function test and were sent back to the import agent.

## **1.3 Status of contributions to Argo data management**

### **Real time data management.**

The Japan DAC, JMA has operationally processed data from all the Japanese Argo and Argo-equivalent floats including 351 active floats as of February 5, 2007. Nine Japanese PIs have agreed to provide data to the international Argo data management. All profiles from those floats are transmitted to GDACs in netCDF format and issued to GTS using TESAC code after real-time QC on an operational basis.

### **Delayed mode data management**

JAMSTEC has modified the original algorithm of automated position QC by request of the participants of the Trajectory Workshop held in Korea in October 2006, and is ready to release the source code of new procedure to other DACs. JAMSTEC plans to revise the present reference data bases (SeHyD and IOHB) to accommodate them to the new DMQC tool (OW) after summer 2007.

## **2. Status of delayed mode quality control process**

### **2.1 Fraction of accumulated profiles processed**

JAMSTEC had submitted the data of 11,353 profiles to GDACs as of September 2006, and processed about 3,000 profiles for DMQC afterwards. These additional data are being submitted to GDACs.

### **2.2 Prospects for getting process up-to-date**

JAMSTEC is now preparing introduction of the new DMQC tool (OW). JAMSTEC is applying the cell thermal mass correction for SBE41 sensors of APEXs in the operational processing. Regarding the measured surface pressure of APEXs, JAMSTEC has been correcting it for the values between 0 and 20 db and flagging it over 20 db since 2003. If an integrated value like heat content is calculated by using uncorrected pressure data, a significant error might be produced.

**3. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo.**

Japan Argo had been conducted in a 5-year program from FY1999 to FY2004, as a part of Millennium Project implemented under cooperation among the Ministry of Education, Culture, Sports, Science and Technology (operation: JAMSTEC), the Ministry of Land, Infrastructure and Transport, JMA and Japan Coast Guard.

After the Millennium Project terminates in March 2005, JAMSTEC is to continue the operation until FY2008 nearly in the same scale (about 90 floats to be deployed every year) and JMA will continue to deploy 15 floats around Japan every year for operational ocean analysis and forecast.

**4. Summary of deployment plans (level of commitment, areas of float deployment) and other commitments to Argo (data management) for the upcoming year and beyond where possible.**

In FY2007, JAMSTEC will deploy 80 to 90 floats in total in the Pacific, Indian, and Southern Oceans. JMA will continue to deploy 15 floats around Japan every year for operational ocean analysis and forecast.

JMA continues serving as the Japan DAC for the upcoming year. JAMSTEC continues running the Pacific Argo Regional Center for the upcoming year.

**5. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers.**

Many groups in JAMSTEC, JMA and Japanese universities are using Argo data for oceanographic researches on water mass production and transport in the North Pacific, the mid-depth circulation, the mixed layer variation, the barrier layer variation and so on.

The global Argo TESAC messages are used for operational ocean analyses and forecasts by JMA. Various oceanographic charts in the sea adjacent to Japan based on the output of the Ocean Comprehensive Analysis System are operationally distributed through the JMA web site (in Japanese) for national use. Numerical outputs of the system are available from the NEAR-GOOS Regional Real Time Data Base (<http://goos.kishou.go.jp/>) and the Japan GODAE server (<http://godaie.kishou.go.jp/>) operated by JMA. Outputs of the Ocean Data Assimilation System and the El Nino Prediction System (an ocean- atmosphere coupled model) for monitoring and prediction of El Nino-Southern Oscillation are also distributed from the Tokyo Climate Center (<http://okdk.kishou.go.jp/>).

JAMSTEC is providing a variety of products related to DMQC for the Pacific Argo Regional Center (PARC) web site as a main contributor. Some information about consistency of the float data will be added to the web site in near future.