

2012 Argo Canada report of activities

(submitted by Denis Gilbert)

14th meeting of the Argo Steering Team (AST-14)

Wellington, New Zealand

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1. Status of implementation (major achievements and problems in 2012)

- floats deployed and their performance

In 2012, Argo Canada deployed 27 NOVA floats (16 in the northeast Pacific, 11 in the northwest Atlantic). Of these 27 floats, 2 did not report any data, and 3 floats died prematurely after 3, 4 and 7 profiles respectively. The 22 remaining floats are still active and functioning properly.

- technical problems encountered and solved

On some NOVA floats, the GPS unit intermittently failed to report valid positioning data. This forced us to use lower quality positioning data from the Iridium system. We would like to discuss this more broadly with others (see section 5).

- Status of contributions to Argo data management (including status of pressure corrections, technical files, etc)

ISDM (formerly MEDS) continues to acquire data from 110 active Argo floats. Of which 27 floats seemed to be in trouble and have not reported data for at least 6 months. Data are issued to the GTS and GDACs every 6 hours in TESAC, BUFR and netCDF format. We increase the frequency of data acquisition from the Argos server to hourly if we fail to access the system at a specific 6 hour interval. In 2012, Canada deployed 27 Nova floats from MetOcean. The data of all Canadian floats together with some graphics are posted on a website and updated daily:

<http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/argo/index-eng.html>.

On average 69% of data from January 2012 to February 2013 data were issued to the GTS within 24 hours of the float reporting. The percentage of data transmitted on the GTS within 24 hours decreased compared to last year due to the following factors:

- Delays in the developing of new decoder for Nova floats
- The instability of services provided by Joubeh on making data transmitted by floats on the FTP site available for MEDS to download
- The reliability of the program for batching jobs on our server
- Migration of ISDM servers from Windows platform to Linux platform

Since AST 13, we completed the following tasks:

- Developed decoders to handle data reported by NOVA floats and fixes when NOVA floats only reported Iridium positions.
- Fixed format error detected by format checkers for technical netCDF files.
- Developed Oracle database and programs to transfer current data in ISAM format to Oracle. This process is required to handle data that had been quality controlled by Michel Ollitrault's method and any new data reported by floats. This will ease the transition of current netCDF trajectory to netCDF trajectory version 3.0 once the format is approved by ADMT.
- Acquired BUFR data set received at JAMSTEC daily, Japan to ensure that all of the Argo BUFR messages transmitted on the GTS are counted in the statistic.
- ISDM provides ADMT quarterly reports on the performance of Argo data on the GTS in TESAC and BUFR formats.

- Status of delayed mode quality control process

As of March 2013, 17% of all eligible floats, active and inactive, had their profiles QCed visually and adjusted for pressure and salinity according to latest delayed-mode procedures. The salinity component of DMQC had been performed on 63% of all eligible cycles at least once. Updated delayed mode data have been processed and uploaded to the GDACs.

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

Financial resources

Unlike some other countries participating to Argo, Canada does not have multi-year commitments of money devoted to Argo. New paperwork and lobbying is necessary on an annual basis to renew the funding required to purchase new floats and for satellite telemetry of data. Year 2012 was excellent in that we were able to purchase 27 NOVA floats. We expect 2013 to be even better, with the purchasing of 34 NOVA floats. Though the crystal ball for Argo Canada funding in 2014 and beyond is opaque, we see more reasons for being optimistic than pessimistic. This cautious optimism has to do with the development of closer links between the Argo program and both the operational meteorology and operational oceanography R&D activities at the Canadian Meteorological Centre (Dorval, Québec). Denis Gilbert took the early initiatives of making contacts in this regard two years ago, and we are now starting to see some tangible benefits in terms of inter-departmental (Environment Canada, Department of National Defence, Fisheries and Oceans) cooperation and flow of money under the umbrella of the CONCEPTS (Canadian Operation Network of Coupled Environmental Prediction Systems) memorandum of understanding.

Human resources

Five persons from the Department of Fisheries and Oceans perform the bulk of the work related to running the Argo Canada program. But all five have other work commitments in addition to Argo. In FTE (Full-Time Equivalent) units, these five persons are:

Anh Tran (ISDM, Ottawa, 0.8 FTE)
Mathieu Ouellet (ISDM, Ottawa, 0.2 FTE)
Igor Yashayaev (BIO, Halifax, 0.5 FTE)
Howard Freeland (IOS, Sidney, 0.7 FTE)
Denis Gilbert (IML, Mont-Joli, 0.7 FTE)

In addition to the above persons, we benefit from the technical support of sea-going staff (Marie Robert and Svein Vagle at IOS, Rick Boyce, Adam Hartling and Bob Ryan at BIO) that follow established pre-deployment protocols and perform the float deployments. Administrative support from Helen Joseph and Carolyn Campbell (Ottawa) is gratefully acknowledged.

With Howard Freeland's imminent retirement from DFO, we are continuing to explore options for continuing some of his tasks. While Denis Gilbert replaced Howard as national director of the Argo Canada program, we will need someone to look after the logistics of float deployments in the northeast Pacific. Doug Yelland (IOS) volunteered to fill this particular gap. As of now, we have not yet identified someone who would commit to maintaining some of the data products developed by Howard, such as surface circulation maps of the Gulf of Alaska, Argo data interpolated to station Papa and projected onto Line P. Fisheries and Oceans Canada is facing tough budget restrictions, and one implication is that not all retirees are being replaced. We will need to continue to defend the value of Argo and its derived products in order to ensure the continuation of some of the data products developed by Howard over the years.

3. Summary of deployment plans (level of commitment, areas of float deployment, low or high resolution profiles) and other commitments to Argo (data management) for the upcoming year and beyond where possible.

In 2013, we plan to deploy 34 NOVA floats, 15 in the Pacific (Gulf of Alaska), and 19 in the Atlantic (Labrador Sea and Gulf Stream northern recirculation gyre, aka Slope Water). Anh Tran plans to continue to provide ADMT with quarterly reports on the performance of Argo data on the GTS in TESAC and BUFR formats.

4. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers. Please also include any links to national program Argo web pages to update links on the AST and AIC websites.

Environment Canada scientists Greg Smith and Mateusz Reszka from the Canadian Meteorological Centre (Dorval, Québec) began assimilating real-time Argo temperature

and salinity data into a pre-operational, coupled atmosphere-ocean-ice model in October 2012. Early results indicate better prediction skill than in the operational model that is currently being run by Environment Canada for issuing weather forecasts. Increased skill is mainly seen at forecast times of 48 hours and longer. Environment Canada plans to upgrade its operational model with the coupled model following more detailed testing in 2013-14. From then on, Argo data will thus be part of the data assimilation schemes that are used in the production of weather forecasts in Canada.

5. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo. These might include tasks performed by the AIC, the coordination of activities at an international level and the performance of the Argo data system.

With Iridium telemetry floats, we have sometimes experienced problems with the failure to acquire GPS position data. This forced us to use lower quality Iridium positioning data. We know this problem is not exclusive to NOVA floats as other PI's using Iridium have also faced the lack of GPS data. Should we collectively agree on which CEPradius values should be considered "garbage" and which ones could be retained in the calculation of Iridium positions? Should we calculate an average position from all received SBD packets with a CEPradius value less than the agreed upon threshold value? Or else should we retain the single best quality Iridium position, i.e. the one(s) with the lowest value of CEPradius?

6. To continue improving the number of CTD cruise data being added to the reference database by Argo PIs, it is requested that you include the number and location of CTD cruise data uploaded by PIs within your country to the CCHDO website in the past year. These cruises could be used for Argo calibration purposes only or could be cruises that are open to the public as well.

Most of the recently collected Canadian CTD data are transferred from ISDM to NODC and then to CCHDO. In addition, when Steve Diggs finds that recent data from particular monitoring surveys are missing, he gets in touch with data management staff working at individual laboratories from the Department of Fisheries of Oceans. In 2012, Steve contacted BIO personnel to get data from the AR7W line in the Labrador Sea.

7. Argo bibliography (<http://www.argo.ucsd.edu/Bibliography.html>).

1. Freeland, H.J., Gilbert, D., Ouellet, M., Tran, A. and Yashayaev, I., 2012. One million Argo float profiles. CMOS Bulletin SCMO, **40**, 185-188.
2. Freeland, H. J. 2013. Vertical velocity estimates in the North Pacific using Argo floats. Deep-Sea Res. II, **85**, 75-80. doi : 10.1016/j.dsr2.2012.07.019 (a special issue of Deep-Sea Research for Tom Rossby)

3. Freeland, H.J., 2013. Evidence of Change in the Winter Mixed Layer in the Northeast Pacific Ocean: A Problem Revisited, *Atmosphere-Ocean*, **51**, 126-133, doi:10.1080/07055900.2012.754330
4. Prakash, S., Nair, T.B., Bhaskar, T.U., Prakash, P., Gilbert, D. 2012. Oxycline variability in the central Arabian Sea: An Argo-oxygen study. *Journal of Sea Research*, **71**, 1-8.
5. Stepanov, V. N.; Haines, K. & Smith, G. C., 2012. Assimilation of RAPID array observations into an ocean model. *Quarterly Journal of the Royal Meteorological Society*, **138**, 2105-2117.