

## 2013 Argo Canada report of activities

(submitted by Denis Gilbert)



15<sup>th</sup> meeting of the Argo Steering Team (AST-15)

Halifax, Nova Scotia, Canada

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### 1. Status of implementation (major achievements and problems in 2013)

#### - floats deployed and their performance

In 2013, Argo Canada deployed 33 NOVA floats (14 in the northeast Pacific, 19 in the northwest Atlantic). Of these 33 floats, 2 did not report any data, and 5 floats died prematurely. The 26 remaining floats are still active and functioning properly.

#### - technical problems encountered and solved

We do not know the cause of premature float depths. This is unsolved.

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

ISDM (formerly MEDS) continues to acquire data from 100 active Argo floats. Of which 33 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 2013, Canada deployed 33 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 74% and 62% of data from January 2013 to February 2014 data were issued to the GTS within 24 hours of the float reporting in TESAC and BUFR format, respectively.

Since AST 14, we completed the following tasks:

- Developed the general decoder to handle old APEX format in order to reprocess data using Michel Ollitrault's method.
- Modified the current profile, technical, meta NetCDF format from version 2.0 to 3.0.
- Regenerated all of the profile and technical NetCDF files and resubmitted to GDAC.
- Migrated Canadian Argo product website from Pacific region to ISDM website.

- Modified the BUFR encoder to read NetCDF profile version 3.0 instead of version 2.0.
- Modified the density inversion QC test.
- The pressure is corrected automatically in real-time if needed.
- ISDM provides ADMT with 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 2014, 16% of all eligible floats, active and inactive, had their profiles QCed visually and adjusted for pressure and salinity according to the latest delayed-mode procedures. The salinity component of DMQC had been performed on 60% of all eligible cycles at least once.

**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 data transmission. Though the crystal ball for Argo Canada funding in 2014 and beyond remains 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). 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. Environment Canada and Fisheries & Oceans Canada are collaborating in a pilot project to deploy POPS (Polar Ocean Profiling Systems) in the Arctic Ocean in August 2014.

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, 0.9 FTE)
- Mathieu Ouellet (ISDM, Ottawa, 0.1 FTE)
- Igor Yashayaev (BIO, Halifax, 0.3 FTE)
- Doug Yelland (IOS, Sidney, 0.3 FTE)
- Denis Gilbert (IML, Mont-Joli, 0.9 FTE)
- Howard Freeland (IOS, scientist emeritus, 0.2 FTE)

In addition to the above persons, we benefit from the technical support of sea-going staff (Marie Robert and Svein Vagle at IOS, Adam Hartling and Andrew Cogswell at BIO) that follow pre-deployment protocols and perform the float deployments.

As of now, we have not yet identified someone who would commit to maintaining some of the data products developed by Howard Freeland, such as surface circulation maps of the Gulf of Alaska, Argo data interpolated to station Papa and projected onto Line P. Howard is continuing to update these products, and recently reported a very warm SST field (+4 s.d.) in the Gulf of Alaska.

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

In 2014, we plan to deploy 14 floats. Four floats will be deployed in the Gulf Stream's northern recirculation gyre. Four floats equipped with oxygen sensors by Roberta Hamme (U Victoria) are planned for deployment in the Labrador Sea. Two Bio-Argo floats equipped with oxygen, nitrate, fluorescence, backscattering and optical sensors will be deployed by Marcel Babin's Takuvik group in Baffin Bay in July. To avoid being crushed by overlying ice, these two floats will have altimeters and shock sensors. 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. Three POPS were ordered in December 2013 and are scheduled for August 2014 deployment from CCGS Amundsen in the Beaufort Sea. We currently have a single float left in inventory for deployment in the Gulf of Alaska.

**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 in experimental mode in 2013. 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. Migration from experimental mode to fully operational mode is expected to occur in October or November 2014. From that moment and onwards, Argo data will thus become part of the data assimilation schemes that are used in the production of weather forecasts in Canada. National Defence Navy scientists routinely use real time Argo vertical profiles of temperature into their Ocean Work Station to aid in the computation of sound velocity profiles.

**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. If you have specific comments, please include them in your national report.**

Nothing to report this year.

**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, but ISDM hasn't done any update since 2012. 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. Scientists from BIO send data to CCHDO on an ongoing basis.

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

1. Donohue, S.M. and Stacey, M.W., 2013. Simulation of the 2001–02 Anomalous Intrusion in the Northeast Pacific. *Atmosphere-Ocean*, **51**, 541-560.
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. Takeshita, Y.; Martz, T. R.; Johnson, K. S.; Plant, J. N.; Gilbert, D.; Riser, S. C.; Neill, C. & Tilbrook, B., 2013. A climatology-based quality control procedure for profiling float oxygen data *J. Geophys. Res.*, **118**, 5640-5650.