UK Argo National Data Management Report 2010

1. Status

- *Data acquired from floats* - Data from all UK floats are received at BODC by automatic download from the CLS database every 12 hours. Since September 2009 the UK has deployed 25 floats including 6 with near surface firmware and 2 with ice detecting firmware. The aim was to setup floats for distribution of data to GTS and GDACs within a week of deployment. BODC also handles data from floats from Ireland, Mauritius and Saudi Arabia.
- *Data issued to GTS* - Data from all UK floats are sent to the GTS every 12 hours. Almost 100% of TESACs messages are available within 24h. Disruptions happened due to email server failures and server problems. BUFR message distribution has been setup and is operational with checks on the BUFR messages ongoing at the UK Met Office.
- *Data issued to GDACs after real-time QC* - All UK data received at BODC are passed through the agreed real-time quality control tests 1 hour after the data arrives at BODC. All data that have been processed at BODC are queued for transfer to both GDACs which occurs twice a day. Any file that fails to be transferred is queued for the next transfer attempt.
- *Data issued for delayed QC* – All delayed QC on BODC hosted floats is done within BODC.
- *Delayed data sent to GDACs* – The OW software is being used at BODC with latest reference data available from Coriolis. 99% of UK float profiles eligible for delayed mode QC have been processed and submitted to the GDACs in D-mode.
- *Web pages* - BODC hosts the main data information and access pages for the UK. These pages include a list of the current status of all UK floats deployed, automatic request system for all UK float data, links to both GDACs and other Argo related sites and an interactive map giving information on last known positions, deployment positions and direct links to profile plots of the last profile reported by every float. Other information about Argo is also available. Specifications are being produced for a UKArgo web-site to be hosted at BODC, the aim is to bring together the existing UK pages and make information on UK Argo more accessible to the Argo community, both within the UK and further afield.
- *Statistics of Argo data usage*: In addition to GDACs, BODC hosted Argo data are also available from the UK Argo Data Centre web-site via an interactive map interface. In addition the technical files are updated once a week and these files are used by CSIRO Marine to populate the technical web-site. The variable names in the technical files have been updated to the latest agreed variable name specification in September 2010. Under plans to develop a UK Argo web-site to be hosted at BODC, technical data will be included on UK Argo pages. During the last year, UK metadata, trajectory and profile files have been provided to users through

BODC website. The site has handled 54 requests, made by 20 enquirers from 6 countries. Under the EuroArgo project the usage of Argo by the UK Argo community was investigated and the following summarises the findings:

Operational and scientific use of Argo data at the Met Office

- Operational ocean forecasting. All Argo data (alongside other in-situ and remotely sensed ocean data) are routinely assimilated into the FOAM operational ocean forecasting system run by the National Centre for Ocean Forecasting (NCOF).
- Seasonal to decadal prediction. Argo data are also in the GloSea (Global Seasonal) coupled model run to make seasonal forecasts for several months ahead. These are more reliable for tropical regions than temperate climates. Seasonal forecasting is still an area in which the science is being developed. On longer timescales the Hadley Centre DePreSys (Decadal Prediction System) is being developed for climate predictions on decadal timescales. Idealised model experiments shown sub-surface data, as provided by Argo, is necessary to provide plausible predictions.
- Climate monitoring and prediction. The Hadley Centre maintains the HadGOA (sub-surface global analysis) dataset of historical temperature and salinity. Variables are on a 2-degree grid and computed on number of fixed isotherms and fixed depths at monthly resolution. The dataset includes available Argo data and will include near real-time updates using Argo data. The dataset is used for global ocean heat content analyses.

Scientific use of the data within NERC and the academic community

- Argo data are also used extensively in a wide range of research projects in UK Universities and research laboratories and is a central component of several PhD and MSc projects. A survey carried about John Gould has indicated there are almost 50 projects/researchers (excluding the Met Office) that are using Argo data. The UK Argo Users' Group has provided a forum for engagement between these scientists and the UK Argo programme, although this activity has to some extent been taken forward in the context of a European Argo Users Group under the Euro-Argo project, there remains a need to improve the interaction with UK users of Argo data and a Users Workshop was held at Exeter on 16th March 2010.
- During 2009 a report was prepared for the UK Argo funders detailing the latest results from the application and scientific use of Argo data. The report stresses that Argo is an essential element of our climate observation system and that data from Argo has already led to improvements in understanding climate-relevant ocean processes and for predictive models. It concluded that '*the long-term funding of the Argo array of profiling floats is of highest priority for UK climate*

science and to ensure that the best climate science is used to inform government policies on climate change mitigation and adaptation'. The report is available at: http://www.metoffice.com/weather/marine/observations/gathering_data/Science_case_for_Argo.pdf.

- *Products generated from Argo data* - Data from all Argo floats are assimilated in to the Forecasting Ocean Assimilation Model (FOAM) run at the Met Office.
- *Iridium present/future activities* (not applicable at this time, potential for proposals for the UK to purchase such floats in future though)

2. Delayed Mode QC (DMQC)

The DMQC system at BODC is operational using OW software and the CTD_for_DMQC_V1 and ARGO_for_DMQC_V02 reference datasets. Reference data are updated when new versions are available.

During the summer of 2010 the backlog in DMQC of BODC hosted (Argo UK, Ireland, Mauritius, Saudi Arabia) Argo profiles was cleared. As of October 2010 99% of eligible BODC profiles are submitted to GDACs in delayed mode. This equates to 95% of BODC hosted profiles; the figure is so high because the suspension in deployments during 2009 meant the majority of BODC floats were eligible for DMQC.

This work included the following improvements to the BODC data system and D-mode data files:

- The resolution of existing format errors identified by John Gilson's format checker. A format checker has not currently been implemented at the DAC level meaning a few profiles that fail the checks get to GDACs. It is hoped that that this check can be introduced operationally at GDAC level in the near future.
- Resolution of issues in BODC technical files identified by Jeff Dunn's (CSIRO) audit of pressure corrections applied to Argo profiles.
- The flagging of data for APEX TNPD issues is complete with a handful of floats in need of review when the definition of TNPD is revised or clarified by the ADMT.
- Production of notes for the historic "sharing of regional DMQC expertise" ADMT action item.
- The cell thermal lag corrections are not applied by BODC yet.

3. GDAC Functions

Section not applicable to BODC.

4. Regional Centre Functions

Four organizations participate in the Southern Ocean Argo Regional Centre - BODC (Atlantic Ocean Sector), CSIRO (“Australian sector”), JAMSTEC (Pacific Ocean Sector) and the University of Washington (Indian Ocean Sector).

BODC hosts the main data and information web pages. These pages contain an animation of the Forecast Ocean Assimilation Model (FOAM) outputs (potential temperature, salinity and velocity at five metres and 995.5 m) and an interactive map giving information on last known positions, deployment positions and direct links to both GDACs ftp sites.

Under the MyOcean project funding the amount of SO ARC activities at BODC should increase. Initial plans include the working up and submission of relevant CTD profiles to the NODC, the goal is for these to filter through to the Argo delayed-mode QC reference data. Collaborative work with Alastair Gemmell (ESSC, Reading) is beginning that compares the results of Argo QC to several meteorological office assimilation QCs. It is hoped to identify potential improvements for both the Argo QC and meteorological assimilation QC systems.