

Argo Germany National Report 2013

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1. The status of implementation (major achievements and problems in 2013)

Data acquired from floats:

Most of the floats deployed by Germany are operated by BSH but additional funding has been acquired by various research institutes. BSH deployed 28 floats in 2013, 10 floats purchased in 2013 were kept in store because the deployment cruises were delayed. Some of these floats are presently deployed in the sub-polar and the tropical Atlantic by a Navy ship (see Fig.4a). The Alfred-Wegener-Institute (AWI) deployed additional 43 floats in the Atlantic Sector of the Southern Ocean and in the Weddell Sea between December 2012 and January 2013 by. 16 of the 43 AWI floats were deployed in 2013, which gives a total of 44 German float deployments in 2013.

Currently (February 19th, 2014) 155 German floats are active (Fig.1) and the total number of German floats deployed within the Argo program increased to 602.

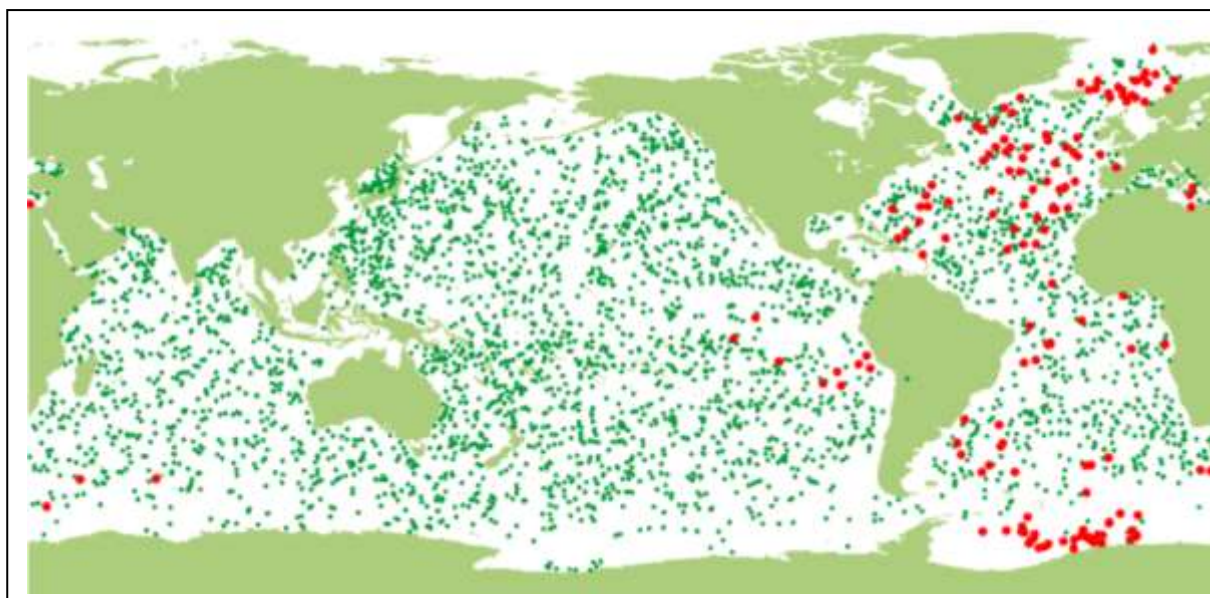


Fig. 1: Locations of active German floats (red) with active international floats (green) (Argo Information Centre, February 2014).

Most of the German floats are APEX floats purchased from Webb Research, but a smaller amount of floats are manufactured by the German company OPTIMARE. The company has been working in close collaboration with the AWI and has developed a float type suitable for partially ice covered seas. These floats are equipped with an ice sensing algorithm which prevents the float from ascending to the surface under ice conditions and prevents it from being crushed. Float profiles are stored internally until they can be transmitted during ice free conditions. Most of the German floats are equipped with the standard Seabird CTD but occasionally additional sensors as Aanderaa optodes and RAFOS acoustic receivers are

installed. The two NOVA (New generation Oceanographic Variable-buoyancy Autonomous) profiling floats bought from MetOcean in 2012 are functioning well and send good profiles.

The successful collaboration with our Mediterranean colleagues concerning the recovery of beached floats has been continued. In 2012 our Greek colleagues helped with recovery of a beached float. The float was damaged during the beaching and has been converted to a technical display after it was send back to BSH. A second float (6901084) found in the port of Beirut (Lebanon) was secured by the Lebanese Navy. With the help of MEDARGO a contact was established with the local oceanographers at the Institute of Aquaculture and Aquatic Science (Dept. of Biology) at the American University of Beirut and they could retrieve the float from the Navy. Pierre-Marie Poulain visited Beirut in April 2013, tested the float and showed the local oceanographers how to operate it (Fig.2). The float was donated to Lebanon and our Lebanese collaborators redeployed the float (new WMO-Id 6900895) about 10 nm off southern Lebanon on 27 August 2013. Its current position and trajectory are shown in Fig. 3.



Fig.2: Pierre-Marie Poulain (MEDARGO) and local oceanographers during technical tests of the beached float 6901084.

We discovered major technical problems with the alkaline batteries in our APEX floats deployed in 2011. More than 30 floats expired early with life cycles of about 700-800 days. The technical data send back from the floats indicate a sudden loss of battery voltage to values of around 7 Volt during the last profile and increased battery consumption during the

previous cycles. We have contacted TELEDYNE/WEBB about the problem and hope to solve the issue soon.

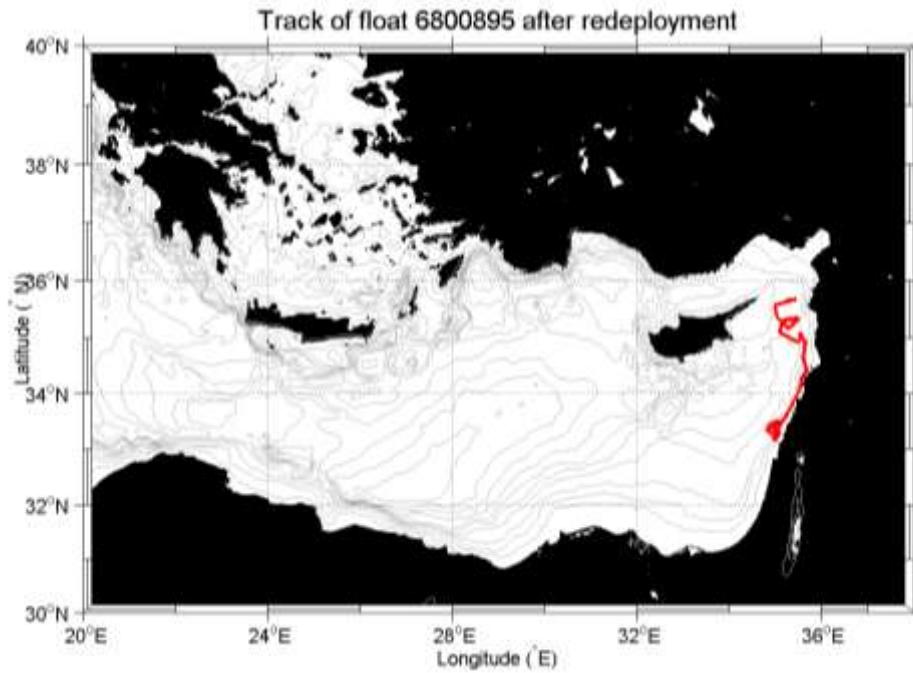


Fig. 3: Float track for float 6900885 after redeployment on 27 August 2013.

2. Deployment plan for 2014

The deployment plans for 2014 will comprise 44 floats from BSH in the Atlantic, the Nordic Seas and the Southern Ocean. Additionally 7 floats will be deployed by GEOMAR in the eastern subtropical Pacific and about 20 floats by AWI in the Southern Ocean and the Weddell Sea during the Antarctic summer season 2014/2015. The intended deployment positions for the BSH floats are shown in Fig. 4 a-g.

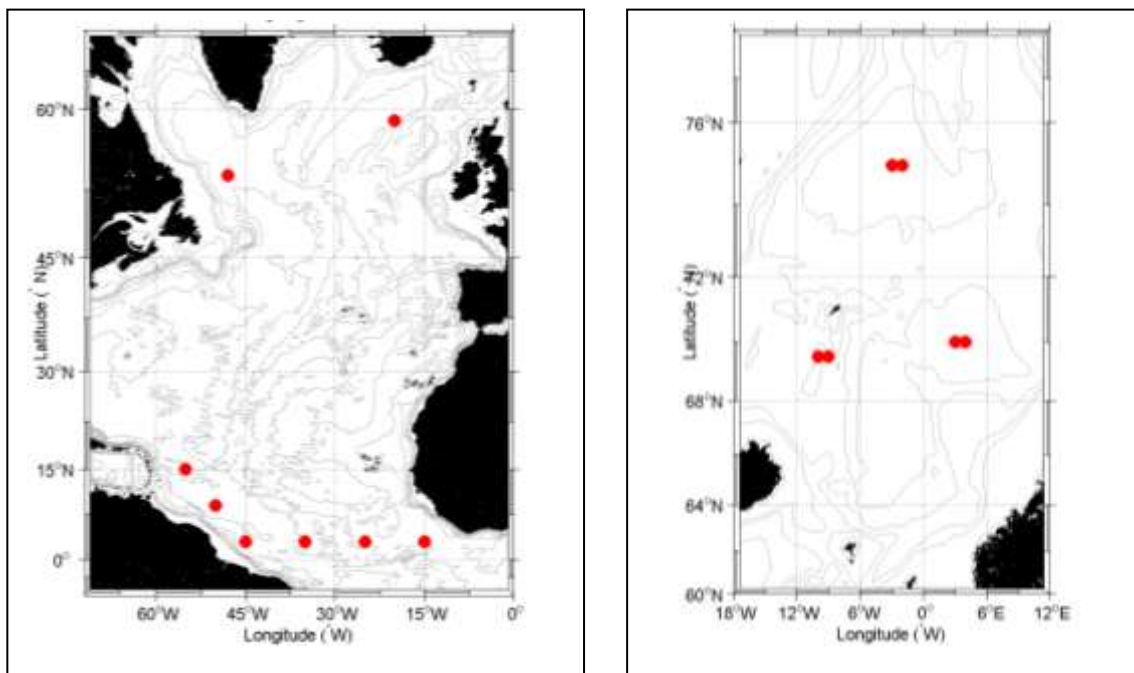


Fig. 4a, left: Deployment positions for 8 floats deployed by Navy vessel 'Bonn' in February-March 2014 and 4b, right: 6 deployment positions in the Nordic Seas in May/June 2014.

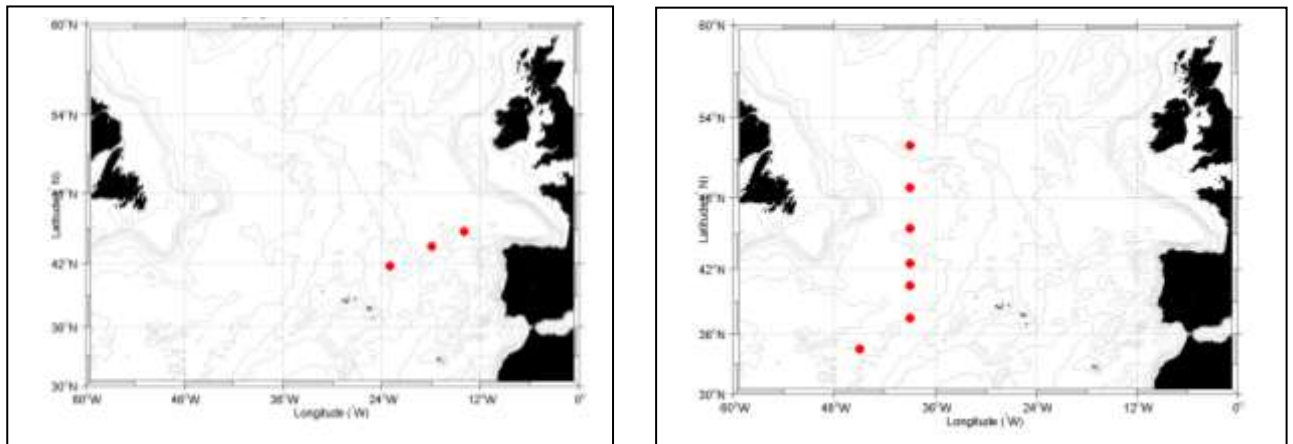


Fig. 4c, left: Deployment positions for 3 floats in the Northeast Atlantic and 4d, right: 7 deployment positions in the sub-polar North Atlantic.

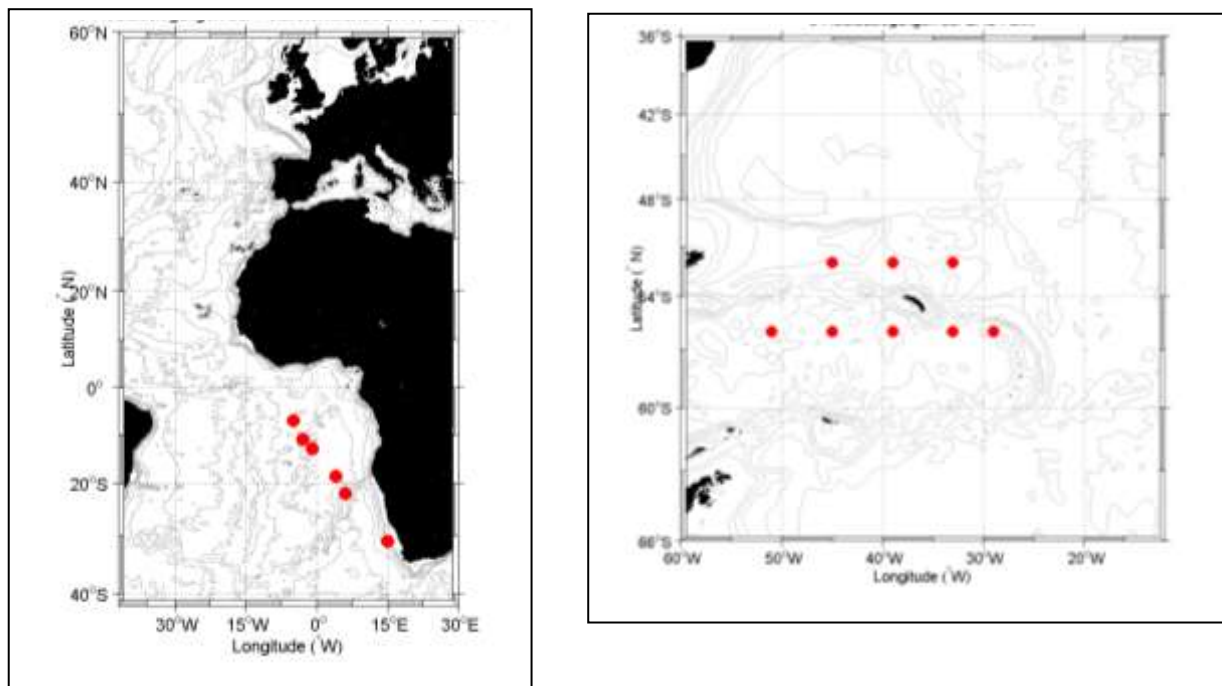


Fig. 4e, left: Deployment positions for 6 floats in the Southeast Atlantic and 4d, right: 8 deployment positions in the Southern Ocean.

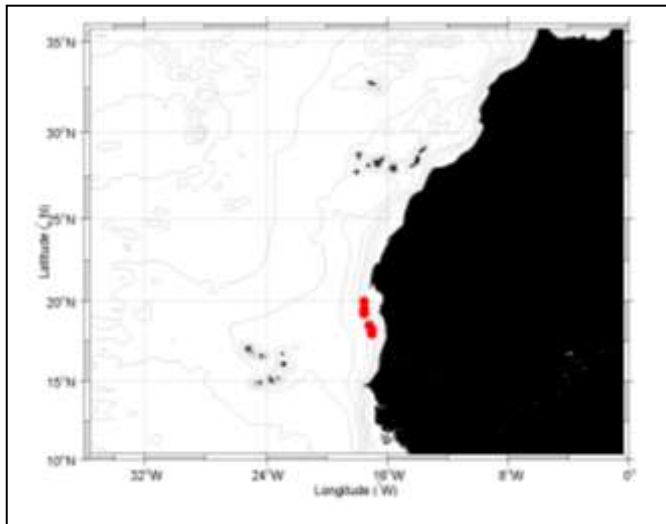


Fig. 4g, left: Deployment positions for 6 floats with oxygen sensors in the tropical Atlantic.

The floats to be deployed in the tropical Atlantic (see Fig. 4g) are all equipped with oxygen sensors and are a joint operation of BSH and GEOMAR. In total there are plans to deploy 71 floats in 2014 up to early 2015. Germany owns deployment capabilities for all oceans including the ice covered areas but foreign research cruises will be used as well to cover all intended deployment areas. The deployments in the Southern Ocean for example will be carried out on cruises conducted by the British Antarctic Survey (BAS). The main goal of our deployments is to support the global array in the Atlantic Ocean and we focus on data sparse regions, specifically in the Southern Ocean, the North Atlantic and the Nordic Seas.

3. Commitments to Argo data management

Data issued to GTS

The profiles for all German floats are processed by Coriolis and are distributed on the GTS by way of Meteo-France.

Data issued to GDACs after real-time QC

The real-time data processing for all German floats is performed at the Coriolis Center in France. Data processing follows the procedures set up by the Argo Data Management Team.

Data issued for delayed QC

The delayed mode processing is distributed between the various German institutions contributing to Argo, depending on their area of expertise. The Alfred-Wegener Institute is responsible for the Southern Ocean and GEOMAR is processing the Pacific floats. IfM-Hamburg together with BSH are processing the German floats in the Nordic Sea, while BSH is covering the tropical, subtropical and subpolar Atlantic. German floats in the Mediterranean on the other hand are processed by MEDARGO. The sharing of delayed-mode data processing will be continued in the coming years, but BSH will cover all German floats which have not been assigned to a PI. BSH has also adopted some European floats

which did not have a DMQC operator assigned to them, such as national Argo programs from the Netherlands, Denmark, Norway, Finland and Poland. All German institutions have been working in close collaboration with Coriolis and delayed mode data have been provided on a 6 monthly basis. Delays in delayed-mode data processing have occurred occasionally due to changes in personal and delay in data transmission in the Southern Ocean due to ice coverage. Delayed-mode data processing follows the rules set up by the Data Management Team. The DMQC process is well underway and no major delays have been encountered.

Delayed mode data send to GDACs

All delayed mode profiles from BSH have been sent to the Coriolis GDAC node. The total number of available profiles from BSH floats is 45181 (February 19th, 2013), the number of DM profiles is 39511. The percentage of DM profiles with respect to the total number of profiles is about 87%.

4. Summary of national research and operational uses of Argo data

Web pages

BSH is maintaining the Argo Germany Web site. The URL for the Argo Germany is:

<http://www.german-argo.de/>

It provides information about the international Argo Program, German contribution to Argo, Argo array status, data access and deployment plans. It also provides links to the original sources of information.

Statistics of Argo data usage

Currently no statistics of Argo data usage are available. The German Navy uses Argo data on a regular basis for the operational support of the fleet and uses their liaison officer at BSH to communicate their needs.

Products generated from Argo data

A key aspect of the German Argo program is to develop a data base for climate analysis from Argo data, to provide operational products for interpretation of local changes and to provide data for research applications.

Argo data are being used by many researchers in Germany to improve the understanding of ocean variability (e.g. circulation, heat storage and budget, and convection), climate monitoring and application in ocean models.

Germany contributes to the NARC and contributes recent CTD data to the Argo climatology.