

# GERMAN ARGO PROGRAMME

## PRESENT STATUS AND FUTURE PLANS

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### 1. Background and organization of German Argo activities

The German Argo programme has been initialised as a partnership between three oceanographic institutions (AWI, BSH, IfM-Geomar) in Germany. German Argo began in 2004 and was funded by the Ministry of Research until the end of 2007. German Argo is an operational programme since the beginning of 2008 and the Ministry of Transportation is providing long-term funding for German Argo. BSH will manage the German contribution to the international programme. An expert group consisting of the BSH and partners from the oceanographic institutes has been established to coordinate the German deployment plans.

Deployment of profiling floats started as early as 1998 within several research projects. All pre-Argo floats were declared Argo-equivalent floats and the respective data sets have been submitted to the GDACs through Coriolis. Floats deployed by IfM-Hamburg in the context of the Mersea and WEN projects have also been made available for the Argo programme.

The BSH and KDM (a consortium of German research institutes) are participants in the Euro-Argo project. Euro-Argo will aim at promoting an European contribution to Argo and establish an European structure from the various national programmes (to be defined in the Euro-Argo PP) after 2011.

#### 1.1 Deployed floats

Since 1998, more than 320 floats have been deployed by Germany in a number of different geographic areas and programmes (ARGO\_AWI, ARGO\_Greenland, BSH, Clivar Marine German Programme, IFM2, IFM\_GEOMAR, SFB460, TROPAT, WECCON, WEN). Deployments have focused on meeting specific German research requirements, but contributed also to the global array. The German contribution is comparable to that from other developed countries and has provided a significant contribution to the growing Argo array.

The main interest of Germany will remain in the Atlantic, but in to maintain the global array floats could also be deployed in the other oceans if necessary. Recent deployments reflect the specific research interests and range from the Nordic Seas, the subpolar North Atlantic, the tropical Atlantic to the Atlantic sector of the southern Ocean.

Year	Deployed floats
2000	27
2001	21
2002	14
2003	27

2004	45
2005	65
2006	36
2007	39
2008	72
2009	~57

Floats deployed by Germany as a contribution to Argo since 2000

## **1.2 Float Development**

Most of the floats deployed by Germany are APEX floats purchased from Webb Research, but a smaller amount of floats are manufactured by the German company Optimare. Optimare 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. The ice sensing algorithm has been successfully tested in the Antarctic, in 2009 test will be performed in the Arctic also.

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.

## **1.3 Data management**

Real-time data processing. 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.

Delayed-mode data processing. The delayed mode processing is distributed between the various German institutions contributing to Argo, depending on their area of expertise. AWI is responsible for the southern Ocean, IfM-Hamburg is processing the German floats in the Nordic Sea, IfM-Geomar is covering the tropical and subtropical Atlantic and BSH is responsible for subpolar Atlantic. The sharing of delayed-mode data processing will be continued in the coming years, but BSH will cover all the German floats which have not been assigned a PI. BSH also has adopted some European floats which did not have a DMQC operator assigned to them. 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 personnel 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.

North Atlantic Argo Regional Centre (NA-ARC). Germany has contributed to the activities of the NA-ARC. Work has concentrated on acquiring recent CTD data to improve the reference data set for the North Atlantic Ocean needed for scientific QC of the float data and setting up the delayed mode processing in the different institutes.

#### **1.4. Operational and scientific use of Argo data**

A key aspect of the German Argo programme is to develop a data base for climate analysis from Argo data, to provide operational products (time series, climate indices) for interpretation of local changes and to provide data for research applications. German Argo will host an annual user workshop where research applications can be presented and requests for operational products can be specified.

Ocean science: 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 (assimilations, boundary conditions,...).

## **2. Funding**

### **2.1 Existing funding for German Argo**

As noted above the German Argo Project has been funded by the Ministry of Research from 2004-2007 and will be funded by the Ministry of Transportation from 2008 onwards. Funding in 2007 was meant to ensure a smooth transition into the operational phase and covered only personnel costs. Overall the level of support is indicated in the table below. Approximately 50 floats per year will be contributed to the global array by Germany. Funding from the Ministry of Transportation covers only costs related to float procurement and transmission costs, personnel will be provided by BSH. This will consist of 1 scientist and 1 technician.

Year	Float related costs	Manmonth/Year
2007	0k€	36
2008	550k€	24
2009	600k€	24
2010	600k€	24
2011	600k€	24
2012	600k€	24
2013	650k€	24

*Table 3. Previous and future funding for German Argo.*

### **2.2 On the future funding and organization for German Argo – links with Euro Argo PP**

Germany will contribute to the Argo global array at the level of about 50 floats per year. Requests for financial contribution have been included in the national budgets for 2009-2013, but final budget negotiations will be carried out on an annual basis. As part of the Euro-Argo preparatory phase, BSH will work with its funding ministry to agree on a long-term European structure.

## **3. Summary of deployment plans for 2009**

Float deployment in 2009 will be performed in co-operation with the German research institutes. The main goal is to support the global array in the Atlantic ocean. A preliminary map of the planned deployment positions in the Atlantic is given below. The deployment

areas cover particularly data sparse regions in the Atlantic, the Nordic Seas and the Mediterranean. Six additional floats will be deployed in the Weddell Sea, deployment positions will be assigned later this year.

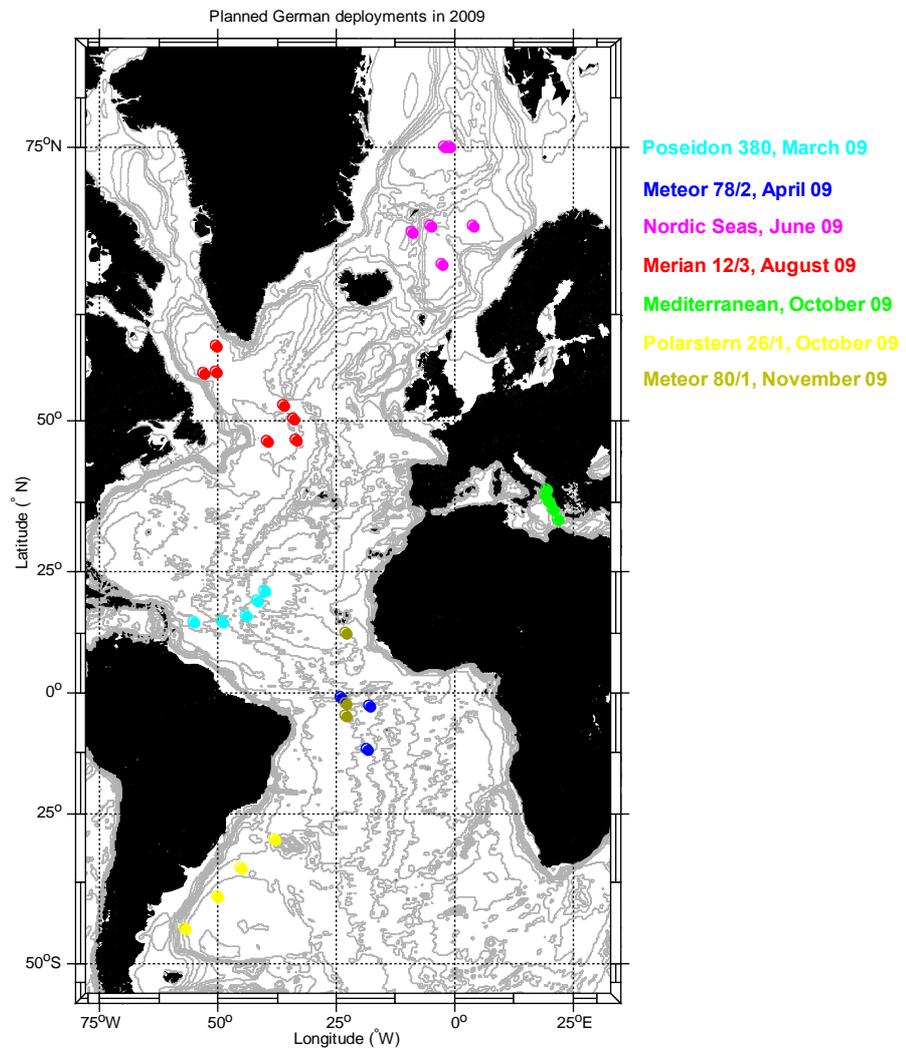


Fig. 1: Preliminary plan for deployment of German floats in 2009. Deployments will start in mid March 2009 earliest. Six more floats (not included in this map) will be deployed in the Weddell Sea at the end of 2009.