# GERMAN ARGO PROGRAMME

# PRESENT STATUS AND FUTURE PLANS

B. Klein, BSH
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## 1. The status of implementation (major achievements and problems in 2009)

### 1.1 Floats deployed and their performance

Since 1998, more than 350 floats have been deployed by Germany in a number of different geographic areas and programmes. 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 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.

Overall, Germany plans to contribute to the Argo global array at the level of about 60-70 floats per year with funding from BSH/BMVBS (about 50 floats/year) and individual science programs (BMBF, DFG and national budgets at about 20 floats/year). The majority of the Argo-equivalent floats will be used for regional enhancements in the polar areas. In 2010 the agreed funding will amount (44/6) floats funded by BMVBS and (2/20) floats funded by science programmes. The numbers in parenthesis indicate core Argo/additional deployments.

| Year | Deployed floats |
|---|---|
| 2000 | 27 |
| 2001 | 21 |
| 2002 | 14 |
| 2003 | 27 |
| 2004 | 45 |
| 2005 | 65 |
| 2006 | 36 |
| 2007 | 39 |
| 2008 | 72 |
| 2009 | 35 |
| 2010 plans | 72 + 19 remaining from 2009 |
| 2011 plans | 75 |

Floats deployed by Germany as a contribution to Argo since 2000

### 1.2 Technical problems encountered and solved

The repair of the faulty pressure sensors on the Seabird CTDs has only been finished recently. Unfortunately the CTD units for the floats purchased in 2009 had already

been bought before the microleak problem was discovered which halted the release of all floats for 2009. A significant amount of floats deployed in 2008 shows pressure drift from the microleaks, some already show severe malfunctions. All these floats will need especial attention during the delayed-mode QC.

Software modifications have been installed to ensure that the Nemo floats report surface pressure without truncation.

1.3 Status of delayed mode quality control process

BSH has taken the lead in the delayed mode processing for Germany, but various German institutions contributing to Argo, are sharing the work depending on their area of expertise. AWI is responsible for the southern Ocean, IfM-Hamburg together with BSH is processing the German floats in the Nordic Sea, and BSH is covering the tropical, subtropical Atlantic and 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 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. There is no major backlog in delayed-mode profiles.

## 2. Present level of and future prospects for national funding for Argo

The level of support is indicated in the table below. Approximately 50 floats per year will be contributed to the global array by Germany through funding from the Ministry of Transportation. It 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.*

Germany will to 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 allocations 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. The research community has also secured funding for floats in the order of 20 floats per year for the next 3 years which will mostly be used for regional enhancements in the polar areas.

## 3. Summary of deployment plans

Float deployment in 2010 will be performed in co-operation with the German research institutes. 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 main goal is to support the global array in the Atlantic ocean. The intended deployment areas cover particularly data sparse regions in the Atlantic, the Nordic Seas and the Mediterranean. Additional floats will be deployed in the Weddell Sea. The repair of faulty pressure sensors in the SBE CTDs is nearly finished but additional software problems with the Nemo floats have to be solved first before the remaining floats purchased in 2009 can be deployed. It is planned to start deployments in summer with 8 floats in the Nordic Seas.

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

A key aspect of the German Argo programme is to develop a database 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 is planning to 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,…).

## 5. Issues to be resolved by Steering Team

Nothing

## 6. Contributions to Reference data base

German cruise data in the Nordic Seas have been contributed to the reference data base as part of the work in the North Atlantic ARC. A link to the ICES database has been established.

7. **Updates to the Argo bibliography**