WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)
SHIP OBSERVATIONS TEAM

FOURTH SESSION

GENEVA, SWITZERLAND, 16 TO 21 APRIL 2007

SOT-IV/Doc. V-2.6
(15.II.2007)

ITEM V-2.6

Original: ENGLISH

SOOPIP-VII
PROGRAMME IMPLEMENTATION

Report on the Argo Pilot Project

(Submitted by Mr Mathieu Belbeoch, Technical Coordinator of the Argo JCOMMOPS, with input from Mr John Gould, Director, Argo Project and the AST)

Summary and purpose of document

This document describes the progress made by the Argo in the past years and the remaining challenge it faces. Additionally, it highlights the need to extend the cooperations between the Argo and the Ship Observations Team.

ACTION PROPOSED

The Ship Observations Team is invited to:

(a) Note and comment on this document, as necessary and/or as appropriate;

(b) Review the complementary nature of Argo & the Ship Of Opportunity Programme;

(c) Inform the Data Buoy Cooperation Panel (DBCP)/SOT Technical Coordinator of observations planning and status.

Appendices: A. Argo national contributions

B. Argo network density

C. Argo deployment planning

DISCUSSION

Introduction

From its inception in 2001, the Argo has made significant progress and has passed through a number of identifiable phases (i.e., planning, regional deployment, and globalization) each time meeting and overcoming particular challenges.

1. Achievements

The milestones reached to date include the following items:

- The array of 2804 floats is global and covers the ice free areas of the oceans at a global average density that is approximately 90% of the target 3°x3° (average) spacing;
- Twenty-four countries operate (or have operated) floats in the Argo array and share their data;
- In the past three years, annual float deployment numbers have been close to the level (ca 800) originally estimated as being required to maintain the array;
- A real-time data delivery and quality control system has been established that delivers 90% of profiles within 24-hours to users via two global data centres;
- Float reliability has improved year-on-year and float lifetime has been extended;
- Argo monitors the technical performance of the array and engages float manufacturers in the rapid diagnosis and rectification of incipient problems;
- A delayed-mode quality control system has been established and 43% of all eligible* profiles have had DMQC applied (*79,000 of 185,00 profiles more than 12 months old);
- Argo has developed a large user community in universities, government labs and meteorological/climate analysis/forecasting centres;
- The Argo Information Centre (AIC), operating within the JCOMMOPS, monitors the Argo network development through a large set of web based tools. These tools allow an optimization of deployment strategies, a rigorous tracking of the floats (and related metadata), an independent evaluation of the network efficiency, an optimization of data distribution. The AIC provides day-to-day support concerning all Argo issues and guarantees visibility for all Argo contributions. The AIC is encouraging the international cooperation around Argo through donor programmes and float retrieval procedures.

The array has been built primarily using float technologies that existed at the start of the programme in 2001. However, the success to date has depended on new technologies being developed and incorporated in the array that overcome the limitations of earlier float models.

Some of these developments also enhance the array's usefulness:

- A move being made towards the use of lithium batteries so as to extend float life;

- Seventy-five floats using high-capacity (Iridium and Orbcomm) data communication and GPS positioning have been deployed. These communication methods allow greater vertical resolution, better estimates of subsurface currents, and larger amounts of diagnostic data;

- Ninety-eight floats with oxygen sensors have been deployed of which seventy-five are presently operating. These floats have the potential to contribute to estimates of the global oceanic uptake of CO2;

- Floats incorporating ice-avoidance software are being evaluated to allow more reliable data collection in wholly or partially ice covered regions.

2. Challenges

As the array approaches its planned number of floats, the Argo now enters a new phase during which the primary requirement will be to maintain the array at or close to 3000 floats.

An obvious requirement for the new **sustained maintenance phase** is to secure stable long-term funding for national and regional Argo contributions to the array and the required data management and project oversight structures. In addition, the primary new objectives will include the following items:

- To further extend float lifetime in order to achieve and maintain the planned 3000 float array and to satisfy user requirements;

- To eliminate the continuing Northern Hemisphere bias in float distribution;

- To further improve the effectiveness and throughput of the delayed-mode quality control system and to learn through scientific analysis how to improve data quality;

- To improve the delivery of a high quality real-time data to meet the evolving needs of the user community;

- To continue and complete initial steps taken to produce high quality subsurface velocity data;

- To develop effective means to maintain the integrity of the array when floats reach the end of their operating life;

- To obtain more CTD data from research ships;

- To extend cooperation with other observing systems regarding deployment opportunities.

As in the past, these primary objectives will need to be supported by activities concerning technology and infrastructure. Argo will need to:

- Continue to monitor array performance and improve it through careful adjustments to the network design and through the deployment and evaluation of appropriate new sensors and communication systems;
- Maintain the two global data assembly centres and an appropriate network of national and regional centres;
- Evolve and sustain an effective project oversight structure within the existing intergovernmental and international framework.

The **sustained maintenance phase** will be considered complete when Argo has completed the following activities:

- Maintained the array at a level of 3000±250 floats for 5 years;
- Reached uniform global coverage (no northern hemisphere bias);
- Reached a point where float technical capabilities and survival rates have stabilised;
- Carried out an evaluation of the array's design and its benefits to users.

In addition Argo will:

- Need to maintain an effective dialogue with international and intergovernmental bodies concerned with the promotion and oversight of sustained global observations (i.e., the JCOMM, OOPC, GOOS/GCOS and GEOSS), so as to ensure that the central role of Argo is recognized;
- Maintain effective national and international outreach activities (e.g., through websites, lectures, meetings, publications and educational applications).

3. Argo, SOT & JCOMMOPS

The Argo would like to learn more about the quality of XBT data and how they are processed. This is crucial in calculating ocean heat storage. As Argo is almost fully implemented, it might be interesting to review in detail how the networks can better complement each other.

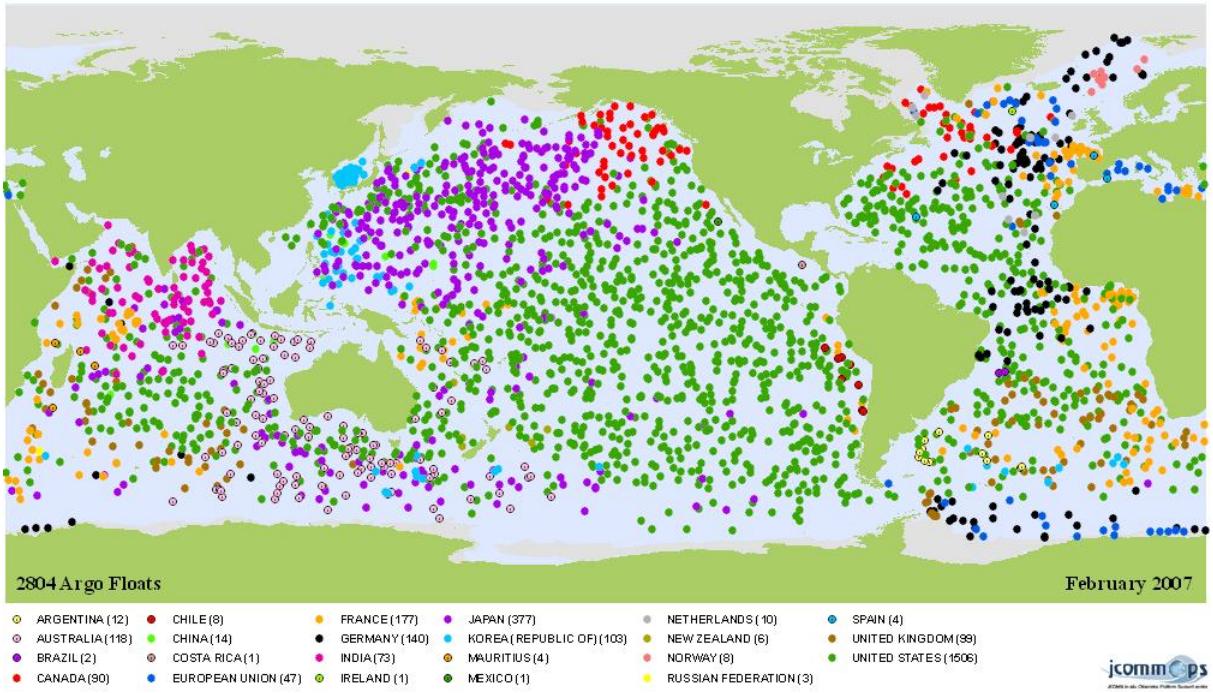
The cooperation between the Argo and SOT should be particularly developed through the sharing of deployment opportunities. To encourage such cooperation, it is vital to set up a better monitoring of the SOT status and planning. For now, metadata on SOT status are not gathered in advance or in near real-time. If the DBCP/SOT TC could gather information on SOT plans, and integrate it in the JCOMMOPS Information System, all respective Panels could benefit. With enhanced internationally coordinated planning and monitoring, the SOT would be able to optimize its network implementation through the use of the JCOMMOPS integrated products and services.

Finally, to allow such cooperation, the JCOMMOPS will need to make substantial progress to further integrate existing products. After six years of JCOMMOPS operations, it is to be noted that the lack of real technical (server's maintenance) or Secretariat (administration, communication) support has resulted in a break in its development. Hence, the SOT is encouraged to strengthen its support for the JCOMMOPS.

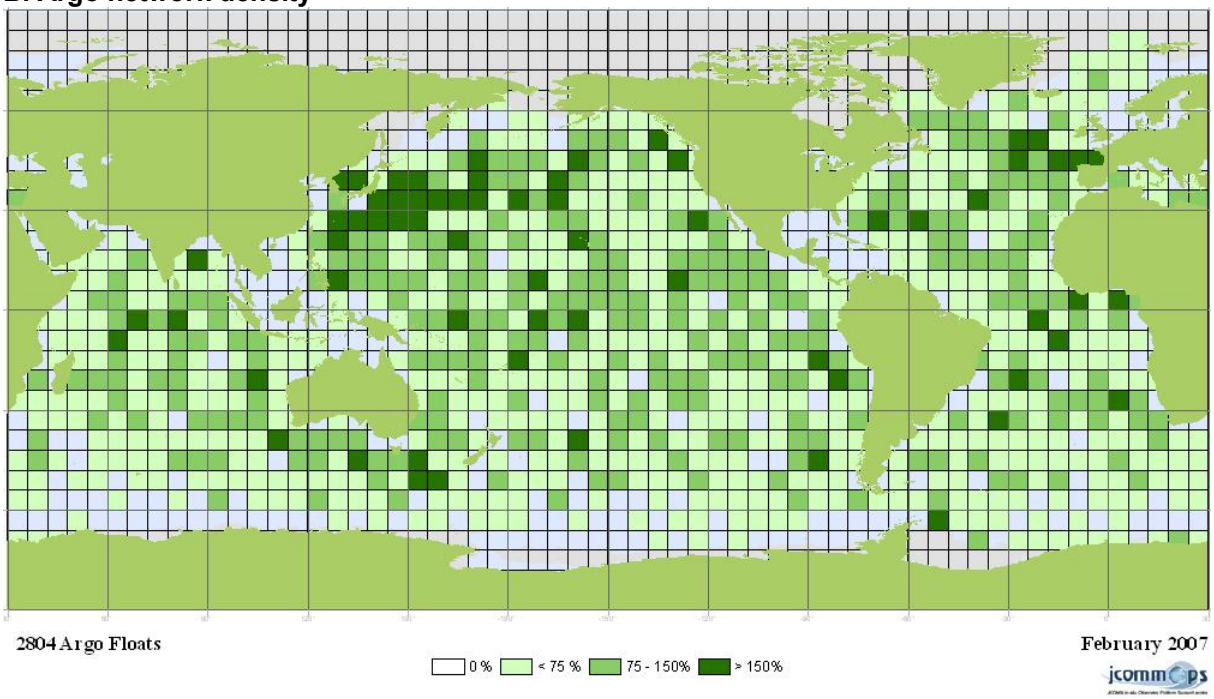
_____

Appendices

A. Argo national contributions



B. Argo network density



C. Argo deployment planning for 2007