USA Report to AST-13, March 2012. (Submitted by D. Roemmich)

Organization of U.S. Argo:

The U.S. Argo Program is supported with major funding provided by the National Oceanic and Atmospheric Administration (NOAA), and additional participation of the U.S. Navy. It is implemented by a U.S. Float Consortium that includes principal investigators from six institutions: Scripps Institution of Oceanography (SIO), Woods Hole Oceanographic Institution (WHOI), the University of Washington (UW), the Atlantic Oceanographic and Meteorological Laboratory (AOML), the Pacific Marine Environmental Laboratory (PMEL), and the Fleet Numerical Meteorology and Oceanography Center (FNMOC). Float technology development, production, deployment, array monitoring, and data system functions are distributed among these institutions on a collaborative basis.

In addition to U.S. Argo floats, Argo-equivalent floats have been provided from a number of U.S. float groups and programs, including the University of Hawaii, PMEL, AOML, NAVOCEANO, and Florida State University.

The present 4-year cycle of U.S. Argo implementation began in mid-2011, and extends to mid-2015.

Objectives:

Primary objectives identified in the present Work Plan (2011-2015) for U.S. Argo are:

i. In float technology, an evolution of the Argo array toward bi-directional communications (Iridium, ARGOS-3) will provide energy savings, reduction of surface time and hazards, greater data throughput and enhanced profile resolution, and new applications.

ii. Float lifetime will continue to be extended beyond 4 years[1] by deployment of next generation floats (SOLO-II), through improvements to existing (APEX) float models, and by evaluating new commercial floats (Navis). The technology improvements will also result in a greater fraction of active float cycles providing high quality profile data.

iii. Working together with international Argo partners, overall data quality will be improved by insuring (through repeated audits of the data system, and by automated checking at global data centers) the completeness and consistency of metadata, technical, profile, and trajectory files.

iv. U.S. Argo will respond to community consensus recommendations regarding enhancements in float coverage and new sampling protocols to meet user requirements. Recommendations are made through recognized community forums such as OceanObs'09, or by the major Argo user groups including CLIVAR, GODAE OceanView, and the operational centers. OceanObs'09 recommendations for temperature/salinity profile measurements from Argo include extension of coverage to include the seasonally ice-covered oceans, increased density of observations in western boundary regions, enhanced vertical resolution of profiles, profiling to the ocean floor (as deep as 6000 m) with a subset of floats, and taking measurements nearer to the sea

[1] The 519 U.S. floats deployed in 2006 have completed an average of 165 cycles (= 4.5 years mean lifetime), with 267 floats (51%) still active as of 02/2012. Source: Argo Information Center

surface. Enhancements will only be undertaken if they do not compromise the present core Argo sampling of 3° resolution every 10 days between 60°N and 60°S

Support level:

The support level for U.S. Argo is aimed at providing half of the global Argo array. The target level is 1600 active floats, based on a deployment rate of about 410 floats per year. Due to level funding, the number of floats has decreased to about 360 per year. However, with increases in the mean lifetime of floats, the target number of active floats has been maintained.

The U.S. Argo effort includes float production and deployment, technology improvement, communications, data system development and implementation for real-time and delayed-mode data streams, and participation in international Argo coordination, Regional Centers and outreach activities.

Beginning in 2011, U.S. Argo is funded for development and testing of Deep Argo floats. It is planned these instruments will profile from pressures as great as 6000 dbar, and be capable of 100+ cycles. Deployment of initial prototypes could occur by late 2012. Prototype deployments will be followed by a pilot program, whose goal will be to instrument two deep ocean basins.

Status:

As of March, 2012, there are 1847 active U.S. Floats (source AIC) and these have completed an average of 124 cycles. Of the active floats (Fig 1), 1765 are provided by U.S. Argo and 82 by partnering programs. The number of US float deployments decreased slightly from 387 in 2010 to 363 in 2011 (Fig 2).

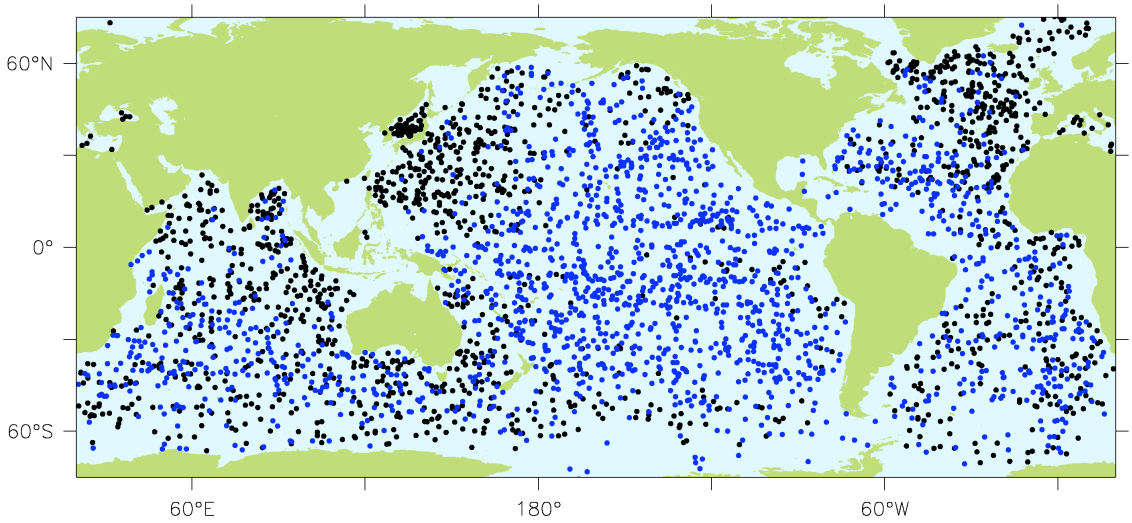

Fig 1 Positions of 1847 active U.S. floats (blue dots) as of March 2012.

The highest priority for U.S. Argo is to sustain the core global Argo array. Specific plans for 2012 float deployments, as they evolve, are posted on the AIC deployment planning links. A major U.S./New Zealand/Australia deployment cruise in the South Pacific Ocean was carried out in late 2011 on R/V Kaharoa, and another is planned beginning in January 2013. RV Kaharoa has deployed 985 Argo floats since 2004.

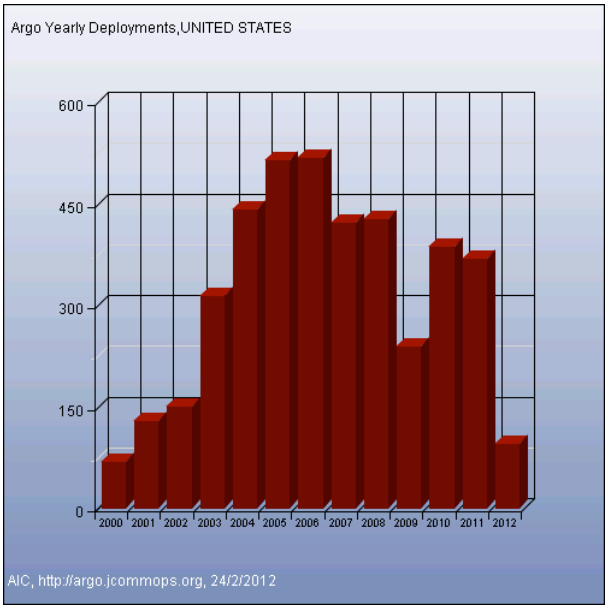

Fig 2. Yearly deployment of U.S. floats. (Source: AIC)

The U.S. Argo Data Center is based at NOAA/AOML. Real-time data from all U.S. Argo floats are transmitted via the GTS. GTS transmission uses parallel systems developed at AOML and housed at AOML and at Collect Localisation Satellites (CLS), implementing internationally-agreed quality control tests. The AOML data center serves as the national focus for data management and is the conduit for delayed-mode data to pass between the PIs and the GDACs. During 2011 further progress was made in delayed-mode quality control (Fig 3).

In addition to the national DAC, a Global Data Assembly Center (GDAC) is run as part of the GODAE server, located at FNMOC/Monterey. The two GDACs at FNMOC/Monterey and IFREMER/Brest are mirror images in their assemblies of Argo data from all international partners, and are responsible for dissemination of the data. Several U.S. institutions participate in Argo Regional Center activities, including AOML's role as focus for the South Atlantic ARC.

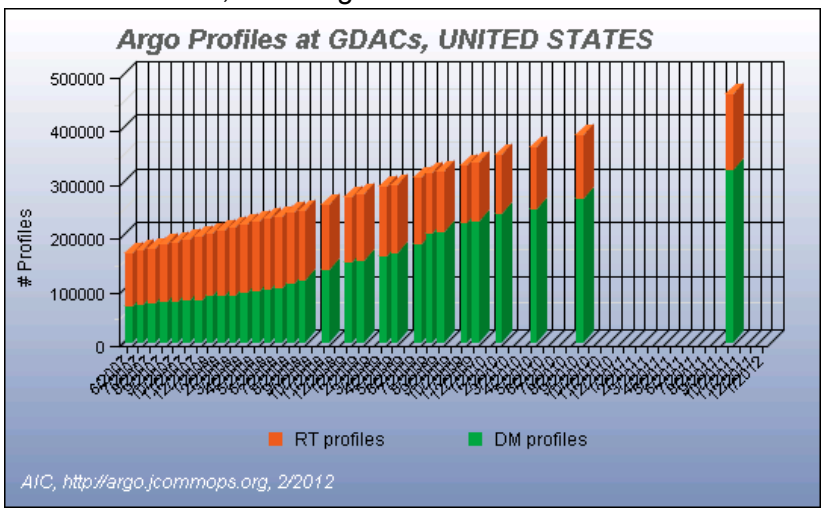

Fig 3. Number of profiles held at GDACs for U.S. floats (source: AIC), including those with delayed-mode and real-time levels of quality control. Roughly 65,000 of the RT profiles are less than one year old and not yet eligible for DM processing.