USA Report to AST-15, March 2014. (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 Naval Research Laboratory (NRL/Monterey). 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. These contributions are gratefully acknowledged.

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 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, and are endorsed by the AST. 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:

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[1] The 517 U.S. floats deployed in 2006 have completed an average of 187 cycles (= 5.1 years mean lifetime), with 104 floats (20%) still active as of 03/2014. Source: Argo Information Center

The support level for U.S. Argo is aimed at providing half of the global Argo array. The target level is 1500 active floats, and was based on a deployment rate of about 412 floats per year. Due to level funding, the number of floats has decreased to less than 350 per year. However, with increases in the mean lifetime of floats, the actual number of active floats has increased.

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 began development and testing of Deep Argo floats. These instruments will profile from pressures as great as 6000 dbar, and be capable of 100+ cycles. Deployment of initial prototypes has begun, including both Deep APEX and Deep SOLO instruments. A multi-national (N.Z., Australia, U.S.) Deep Argo cruise is planned for June 2014, including further prototype deployments and testing of the SBE-61 CTD. A regional pilot array of Deep Argo floats is planned for deployment in 2015.

Status:

As of March, 2014, there are 2000 active U.S. Floats (source AIC) and these have completed an average of 127 cycles. Of the active floats (Fig 1), 1817 are provided by U.S. Argo and 183 by partnering Argo-equivalent programs. The number of US Argo float deployments (not including Argo-equivalent) decreased slightly in 2013 to 320 from 332 in 2012 (Fig 2).

Fig 1 Positions of 2000 active U.S. floats (green dots) as of March 2014.

The highest priority for U.S. Argo is to sustain the core global Argo array. Specific plans for 2014 float deployments, as they evolve, are posted on the AIC deployment planning links. A major U.S./New Zealand/Australia deployment cruise in the Southwest Pacific Ocean was carried out in mid-2013 on R/V Kaharoa, adding 75 floats to the western boundary region of that

ocean. A deployment voyage to the South Indian Ocean is planned beginning in October 2014. R/V Kaharoa has deployed 1215 Argo floats since 2004.
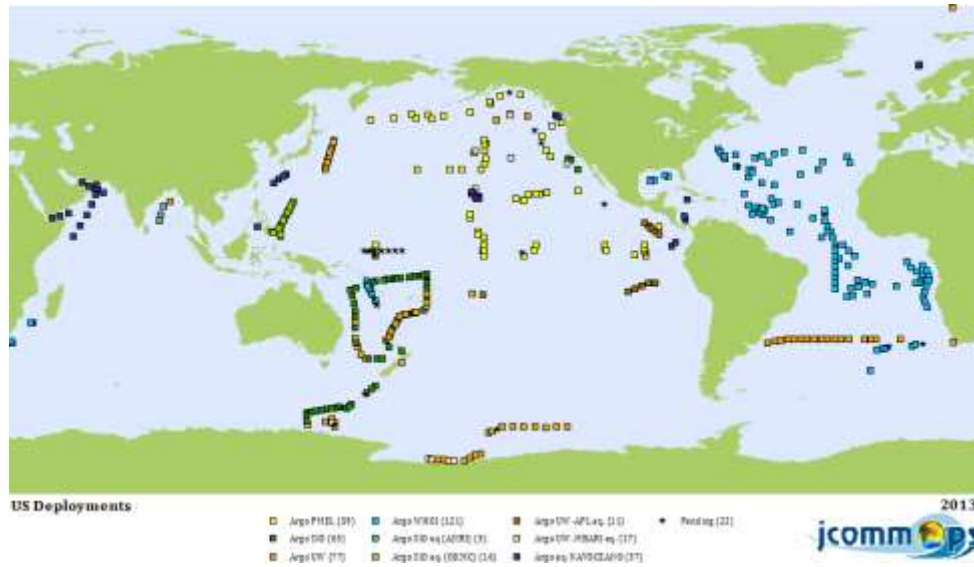

Fig 2. 2013 deployment of U.S. floats, including Argo-equivalent. (Source: AIC)

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 2013 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 the Naval Research Laboratory, Monterey. The two GDACs at NRL/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.
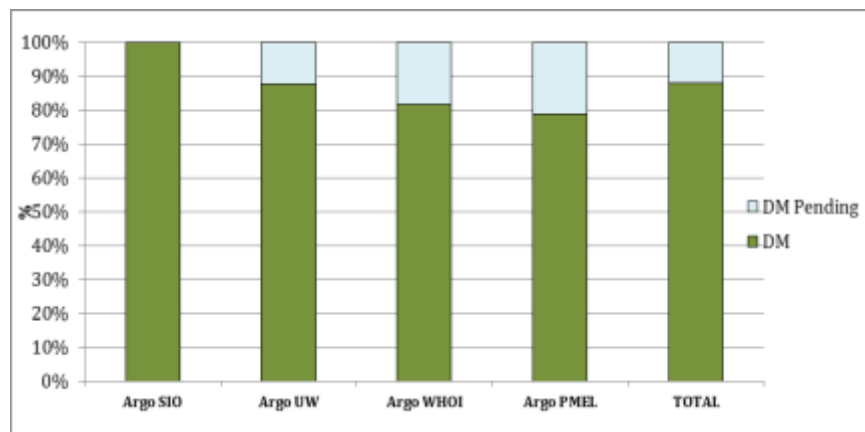

Fig 3. Percentage of DM-eligible profiles for U.S. Argo floats for which DMQC is completed (green) or pending (light blue). Source: AIC