Argo Australia National Report 2019 – AST-20

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1. The status of implementation (major achievements and problems in 2018)

During 2018, Argo Australia deployed 42 core floats. This includes 15 Apex floats, 23 Navis floats, and 4 NKE floats. Deployments include 19 in the Indian Ocean, 5 in the Southern Ocean, and 18 in the Pacific Ocean. One Navis float was dead on deployment and one NKE float (deployed near the ice) has been problematic (sending split SBD messages).

We also deployed 2 BGC Navis floats in the Southern Ocean. Both performed poorly. Both were top heavy, and had trouble reporting data. This resulted in significant telecommunications costs and loss of data.

We encountered significant problems with APF11 firmware from Teledyne. Rebecca Cowley engaged closely with Teledyne to resolve the issues, and has solicited input from the Argo community. Teledyne plan to build a customer portal to specify who uses what firmware – hoping to improve transparency. Issues are still not fully resolved.

All data managed by Argo Australia follow the V3.1 file format for delayed-mode operations. We've also now upgraded to V2.0 of OWC. As of February 2019, 91% of eligible floats (both active and inactive) have been DMQC-ed.

Argo Australia currently manage 353 operational floats. Their latest locations are shown in Figure 1 Argo Australia have deployed 49 floats since February 2018. Their deployment locations are shown in Figure 2.

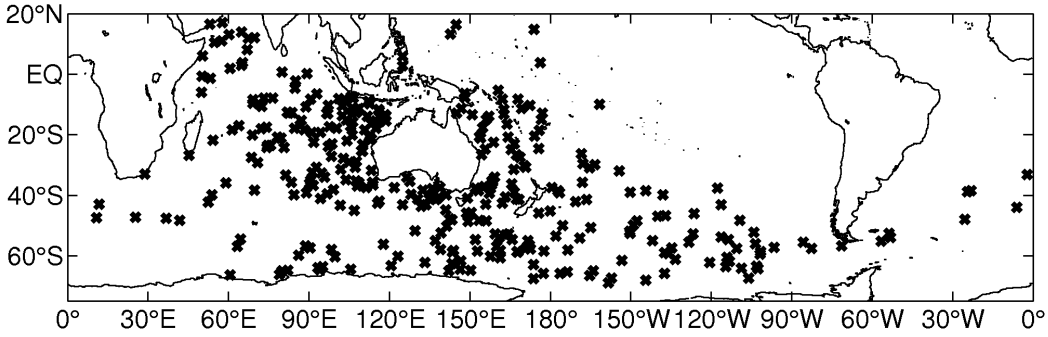

Figure 1: Latest locations of floats managed by Argo Australia. There are currently 353 operational floats managed by Argo Australia.

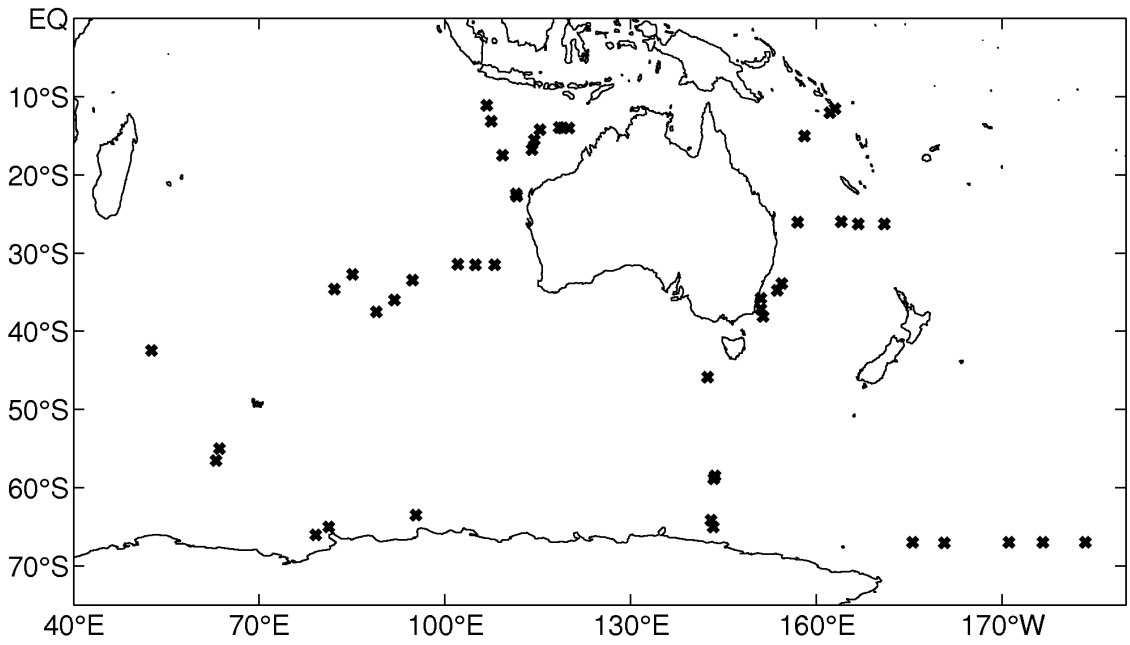

Figure 2: Deployment locations of floats deployed by Argo Australia between February 2018 and February 2019. Argo Australia deployed 44 floats in the year since February 2018.

2. Resourcing

Argo Australia is currently finalising contracting (until June 2022) with IMOS to secure funding for salary, operating, and float purchases needed to support the Australian effort. Funding for the core Argo program has increased slightly (to ~$6.4M over 4 years) and new funding for a BGC Argo Program is expected (~$2M over 4 years). Commitment from Australian partners (IMOS, CSIRO, Defence, ACE CRC, BoM) remains strong. Together the Australian partners are expected to purchase about 42 core floats per year on an ongoing basis. CSIRO also secured additional (one-off) funding to purchase an additional 70-80 floats between September 2018 and August 2020. IMOS has committed to funding the purchase of 2-3 BGC floats per year for the next 4 years. The ACE CRC (and its follow-on) plans to purchase ~2 Deep floats per year and possible some core floats (negotiations are ongoing).

For the core mission, Argo Australia has (some fraction of) two technical officers, three staff running real-time operations (one for software development), five staff contributing to the delayed-mode operations (one for software development), and two research scientists. Australian Argo supports 4.4 full-time-equivalent (FTE) staff per year to cover technical, real-time, and delayed-mode operations; and science leadership and applications. The BGC effort will likely include one full-time staff (at UTAS) dedicated to delayed-mode BGC operations and scientific applications, and some fraction of a science lead (Peter Strutton and Tom Trull will be Australia's BGC Argo leaders).

Argo Australia intends to continue providing funding to support operations of the RV Kaharoa (and its successor) and has secured funding for this out to 2022.

3. Summary of Deployment plans

For the remainder of 2019, Argo Australia intends to deploy 89 core floats and 3 BGC floats between April 2019 and January 2020. Approximate locations are denoted in Figure 3. This include 41 floats in the Pacific Ocean (Coral Sea, Tasman Sea, and east of New Zealand – including 3 BGC floats), 16 floats in the Indian Ocean (north of 39S), 27 floats in the Indian Ocean sector of the Southern Ocean (south of 39S, and west of 115E), and 8 floats in the Southern Ocean, south of Australia.

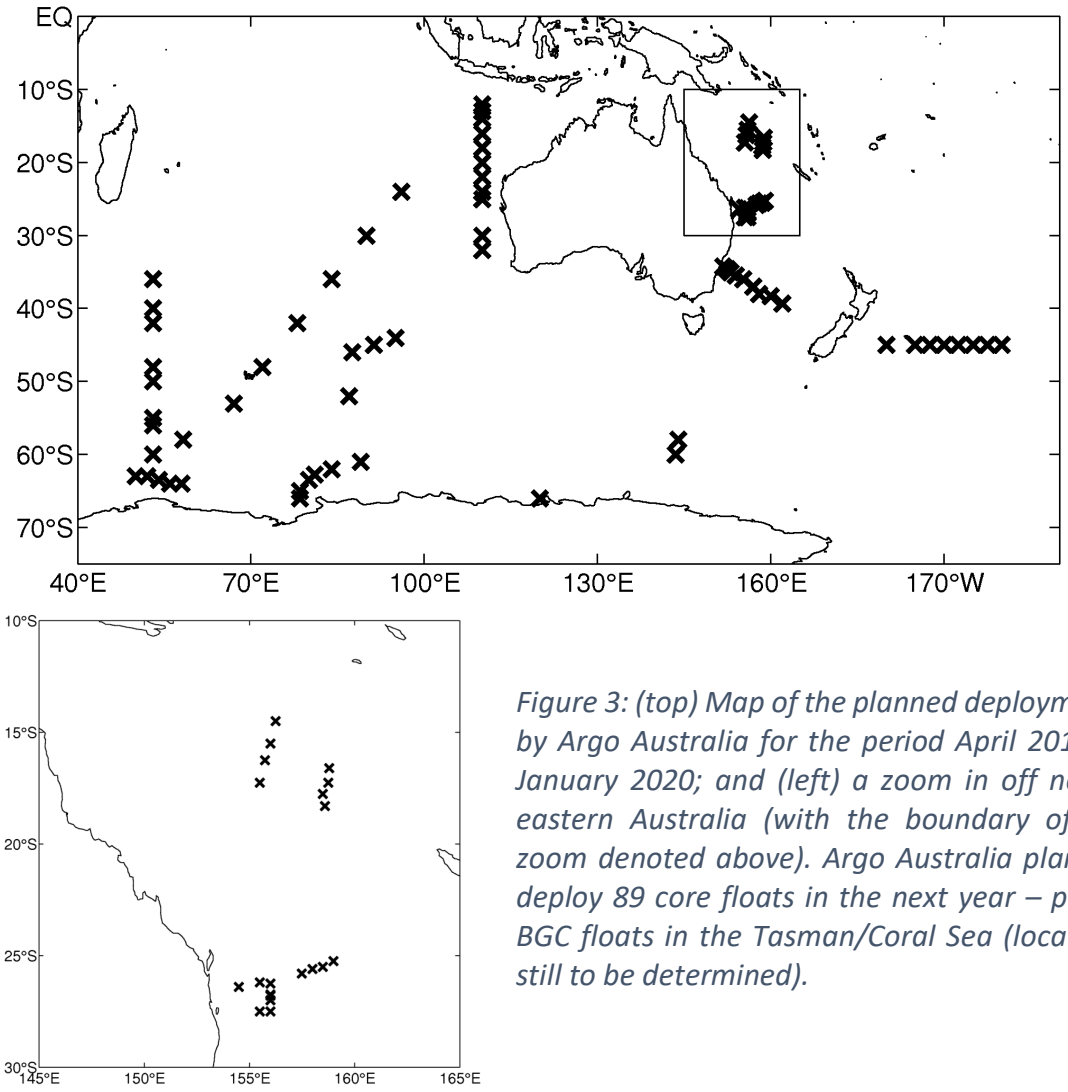

Figure 3: (top) Map of the planned deployments by Argo Australia for the period April 2019 to January 2020; and (left) a zoom in off north-eastern Australia (with the boundary of the zoom denoted above). Argo Australia plans to deploy 89 core floats in the next year – plus 3 BGC floats in the Tasman/Coral Sea (locations still to be determined).

4. Summary of national research and operational uses

Argo data are used operationally to underpin Australia's short-range ocean forecast system (OceanMAPS; www.bom.gov.au/oceanography/forecasts/) and seasonal prediction systems (POAMA; www.bom.gov.au/climate/ocean/outlooks/). Science applications include the investigation of decadal prediction, many climate applications (e.g., ocean heat content estimates), and some studies into eddy variability around Australia (e.g., Tasman Sea and Great Australian Bight).

5. Issues

The change from APF9 to APF11 controller boards for Apex floats has seen some bugs and improvements that have previously not been documented and shared with the community. Both the manufacturer and the users need to be responsible for publicising bugs. An online community forum where bug fixes and firmware improvements are listed is envisaged to help address the problem for Apex floats. It would be useful to see something similar developed for other float types to help prevent deployments of floats with known bugs.

We experienced a problem with the Navis BGC floats deployed during 2018. They were poorly balanced and didn't perform, we later found that others knew about the problem and it could have been easily fixed before deployment. We need to encourage better communication between the manufacturers and the users.

6. Reference data

All locally-collected measurements on Australian research vessels are made publicly available via the CSIRO data centre and the NCEI World Ocean Database.