

Argo New Zealand National Report, March 2023.

Phil Sutton. National Institute of Water and Atmospheric Research (NIWA), Wellington, New Zealand

1. The status of implementation of the new global, full-depth, multidisciplinary Argo array (major achievements and problems in 2021)

a. floats deployed and their performance:

2 Solo2 floats were purchased and deployed (WMO #s 5906770 and 5906892).

New Zealand also deployed floats for other organisations on two voyages:

i) R/V Kaharoa Voyage (Western Pacific):

R/V Kaharoa deployments November 2022-January 2023.

- 8 Scripps Institution of Oceanography Deep Solo
- 35 University of Washington Apex
- 14 University of Washington Apex BGC
- 8 CSIRO
- 52 Scripps Institution of Oceanography Solo2

ii) R/V Tangaroa Voyage (Southern Ocean):

R/V Tangaroa deployments January-February 2023

- 12 Scripps Institution of Oceanography Solo2
- 4 Scripps Institution of Oceanography Deep Solo

b. technical problems encountered and solved:

The NZ floats are functioning well. Other partners will report on their floats.

c. status of contributions to Argo data management (including status of high salinity drift floats, decoding difficulties, ramping up to include BGC or Deep floats, etc):

none

d. status of delayed mode quality control process:

DMQC on NZ floats is performed by Scripps Institution of Oceanography (John Gilson).

2. Present level of and future prospects for national funding for Argo including a summary of the level of human resources devoted to Argo, and funding for sustaining the core mission and the enhancements: BGC, Deep, Spatial (Polar, equator, WBCs)

New Zealand Argo float funding continues on a year-to-year basis at the level of two floats per year. Funding for personnel is via a research programme, also funded year-to-year and a contract with Scripps Institution of Oceanography associated with the R/V Kaharoa charter. This supports of the order of 2 months of personnel time.

A voyage undertaking Deep Argo Development is planned for May 2023.

3. Summary of deployment plans (level of commitment, areas of float deployment, Argo missions and extensions) and other commitments to Argo (data management) for the upcoming year and beyond where possible.

New Zealand floats: planned purchase and deployment of 2 Solo2 floats in the South Pacific

Deployments for other countries:

a) Planned 2024 Kaharoa Voyage (~ January 2024)

This is being designed around the delivery voyage of the replacement 'Kaharoa' from Spain to New Zealand.

153 deployments are planned:

- 50 UW APEX (some BGC) from UW,
- 50 SIO SOLOs
- 5 SIO Deep SOLOs
- 15 WHOI Core (perhaps including BGC) and
- 1 WHOI Deep SOLO (to be confirmed),
- 12 CSIRO Core (perhaps including BGC) to be confirmed.
- 20 extra to be confirmed.

- b) R/V Tangaroa Tsunami servicing voyages (southwest Pacific): May 2023.
12 SIO floats.
- c) R/V Tangaroa DWBC and Deep Argo Development Voyage: May 2023.
4 SIO Deep SOLO.

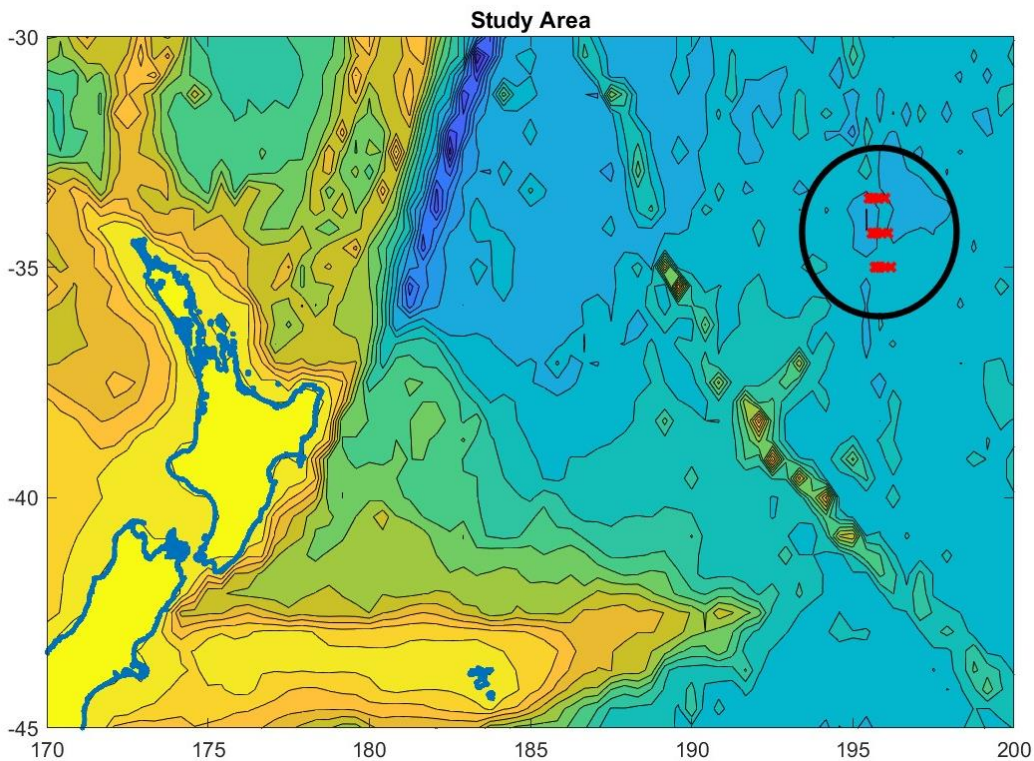
4. Summary of national research and operational uses of Argo data as well as contributions to Argo Regional Centers. Please also include any links to national program Argo web pages to update links on the AST and AIC websites.

Argo data and products are routinely used in research, including physical oceanography, marine ecosystems, climate and fisheries.

Deep Argo Development Voyage 3

A third R/V Tangaroa Deep Argo Development Voyage in collaboration with Scripps Institution of Oceanography (Nathalie Zilberman), Sea Bird Scientific and NOAA is planned for May 2023. The study area is east of New Zealand, targeting the eastern side of a deep ridge to combine a scientific study with the sensor development work.

A key aim of the voyage is to perform 6000m CTD casts with a number of experimental SBE sensors mounted on the CTD rosette to collect intercomparison data. Earlier work focused on pressure and conductivity sensors; this voyage will continue that work and will also focus on dissolved oxygen.



Study site bathymetry and station locations.

- 5. Issues that your country wishes to be considered and resolved by the Argo Steering Team regarding the international operation of Argo. These might include tasks performed by OceanOps, the coordination of activities at an international level and the performance of the Argo data system. If you have specific comments, please include them in your national report.**

No issues beyond those faced universally, i.e., funding, EEZ permissions and Covid-19 disruptions.

- 6. To continue improving the quality and quantity of CTD cruise data being added to the reference database by Argo PIs, it is requested that you include any CTD station data that was taken at the time of float deployments this year. Additionally, please list CTD data (calibrated with bottle data) taken by your country in the past year that may be added to the reference database. These cruises could be ones designated for Argo calibration purposes only or could be cruises that are open to the public. To help CCHDO track down this data, please list the dates of the cruise and the PI to contact about the data.**

CTD data from the Deep Argo Development Voyage will be provided for the reference database.

7. Argo bibliography ([Bibliography | Argo \(ucsd.edu\)](#))

Costa Santana, R. (2022). Intra-annual variability in the East Auckland Current and its impact on cross-shelf exchange (Thesis, Doctor of Philosophy). University of Otago. Retrieved from

<http://hdl.handle.net/10523/13777>

Behrens, E., & Bostock, H. (2023). The response of the Subtropical Front to changes in the Southern Hemisphere westerly winds—Evidence from models and observations. *Journal of Geophysical Research: Oceans*, 128, e2022JC019139. <https://doi.org/10.1029/2022JC019139>

Hitt, N.T., Sinclair, D.J., Neil, H.L., Fallon, S.J., Komugabe-Dixson, A., Fernandez, D., Sutton, P.J., Hellstrom, J.C. Natural cycles in South Pacific Gyre strength and the Southern Annular Mode. 2022. *Sci Rep* 12, 18090 (2022). <https://doi.org/10.1038/s41598-022-22184-2>

Fernandez, D., Bowen, M., Sutton, P. 2022. South Pacific Ocean dynamics Redistribute Ocean Heat Content and Modulate Heat Exchange with the Atmosphere. *Geophysical Research Letters* 49 (23). <https://doi.org/10.1029/2022GL100965>

Salinger, M.J., Diamond, H.J., Bell, J., Behrens, E., Fitzharris, B.B., Herod, N., McLuskie, M., Parker, A.K., Ratz, H., Renwick, J., Schofield, C., Shears, N., Smith, R.O., Sutton, P.J., Trought, M.C.T. 2023. Coupled Ocean-Atmosphere Summer Heatwaves in the New Zealand Region: an update. *Weather and Climate*. In press.

8. How has COVID-19 impacted your National Program’s ability to implement Argo in the past year? This can include impacts on deployments, procurements, data processing, budgets, etc.

- There are some restrictions on vessel access to minimise the risks of any crew or science party getting infected and sailing, in particular during mobilization. These are not too restrictive and can be managed.
- International shipping still isn’t back to pre-covid levels of service- in particular with respect to cost and timeliness.

9. Does your National Program have any deployment plans for RBR floats in the next couple of years? If so, please indicate how many floats will you be buying in 2023 and 2024 (if known) and where they might be deployed.

New Zealand currently has no intention to purchase RBR CTD floats. We will deploy other nations’ RBR-equipped floats (e.g. SIO, CSIRO).

10. Other/Outreach

A decorating party for BGC Argo floats

Written by NIWA Communications Team

A class from Silverstream Primary School in Upper Hutt visited NIWA Wellington last week with a very important job to do: decorate the Argo floats on behalf of the schools overseas who named them. Lucky for these kids, one student has a NIWA physical oceanographer for a mum, Denise Fernandez.

Denise approached Silverstream School with this exciting opportunity as part of the GO-BGC Adopt-a-Float program. In this programme schools overseas ‘adopted’ and named Argo floats with the aim to inspire and educate students about global ocean biogeochemistry and climate change.

“Since my son is in his final year at primary school, I thought it would be great for him as his class to actually see what I talk about at home all the time,” says Denise. “I went to the school and gave a talk about the floats and the teachers also played a few videos showing how the floats work and where are they going in the ocean and what they measure.”

Then, with colourful sharpies in hand, it was over to the students to get creative.

“They googled where the schools were located and their school emblems and were so creative with the float drawings,” says Denise.

“The school decided to call this float ‘Thunder Float’ because it is going into the stormy Southern Ocean,” said one student.

Rebecca Routhan, a teacher at Silverstream school was ecstatic that the children had this opportunity.

NIWA has been part of the international Argo programme for nearly two decades and this year *RV Kaharoa* deployed its 2000th float. *RV Tangaroa* has deployed around 300 and together NIWA has deployed the most of any single organisation.

“The *Kaharoa*’s gone to Chile, Hawaii, Tahiti, Durban, Mauritius ...,” says Physical Oceanographer Phil Sutton. The floats last typically four to six years. “One of the floats purchased by NIWA and deployed from *Kaharoa* in August 2013 looks to have just ‘died’ having not surfaced since 14 April. This means the float did 364 profiles over nearly ten years,” says Phil.

More photos and story here:

<https://www.flickr.com/photos/go-bgc/albums/72177720303802908>

