Float Deployments

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A total of 14 profiling floats from 3 different programs were deployed during the 2021 A22 research cruise. 10 are part of the Core Argo program (<https://argo.ucsd.edu/>) (8 WHOI, 2 Argo Canada - RBR pilot program). The remaining 4 are part of the new Global Ocean Biogeochemical Argo array (<https://www.go-bgc.org/>). Both Core and Go-GBC floats measure temperature, salinity, and pressure. Go-BGC floats additionally measure O2, NO3, pH, and bio-optics. Details for each float type follow.

WHOI Core Argo Floats

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PIs:

\* Susan Wijffels (WHOI)

\* Steven Jayne (WHOI)

\* Pelle Robbins (WHOI)

Shipboard personnel:

\* Jesse Anderson (WHOI)

\* Elizabeth Ricci (UW SSSG)

\* Stephen Jalickee (UW SSSG)

A total of 8 WHOI Core Argo floats were deployed during the A22 cruise. All floats were MRV Systems Solo II (S2-A) floats equipped with Seabird SBE41-CP CTDs and Iridium antennas. Parameters measured are temperature, salinity, and pressure. These floats were readied for deployment by the skilled members of the WHOI float lab. Jessica Kozik (WHOI) handled dockside logistics for getting the floats to the R/V Thompson prior to the first leg of the A20/A22 cruise. Shock watches indicated that the floats were handled properly during transport from the WHOI float lab to the R/V Thompson main lab. Deployment training was provided via videoconference prior to ship departure. All floats were armed and ready for deployment prior to joining the ship. Pelle Robbins (WHOI) determined float deployment locations, prioritizing regions with coverage gaps for the target Argo spatial coverage.

At sea, R/V Thompson SSGs Elizabeth Ricci and Stephen Jalickee, and co-chief scientist Jesse Anderson were in charge of deployments. Additional assistance was provided by ABs and student CTD watch standers. Float deployment boxes were packaged in plastic bags and wrap to protect the cardboard boxes and cornstarch release harness. Just before deployment, the plastic layers were removed. Then, a slip-line and the 4 deployment bridle loops were passed through a carabiner. After lifting the box over the stern, the boxes were lowered to water level using the slip-line. All cornstarch water releases worked as designed and the float boxes were released without issues. Deployments occurred from the port stern while the ship slowly steamed away from station.

All floats will complete standard Argo missions. The floats will drift at 1,000 m then dive to 2,000 m before collecting data on the way back up to the surface every 10 days. All floats are working well. Data is publicly available via the Argo program GDACs.

Argo Canada

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PIs

\* Clark Richards (BIO)

\* Blair Greenan (Argo Canada)

Shipboard personnel:

\* Jesse Anderson (WHOI)

\* Elizabeth Ricci (UW SSSG)

\* Stephen Jalickee (UW SSSG)

2 profiling floats were deployed for Argo Canada. Both floats were NKE Instrumentation ARVOR-I floats equipped with RBR CTDs and Iridium antennas. These floats are part of the RBR Argo pilot program being tested for the Core Argo float array. Data collected from these two floats will be used to characterize RBR sensor dynamic response and pressure corrections. Parameters measured are temperature, salinity, and pressure. To aid in evaluating sensor performance, both floats were deployed at roughly the same location following A22 CTD cast 18. A companion float which is equipped with the CTD (SBE41-CP) used by most Core Argo floats was also deployed at this location. The deployment location in the Carribbean was chosen by Clark Richards to take advantage of deep water stability and thermohaline staircases when evaluating sensor responses.

After shipment from BIO to WHOI, Jessica Kozik (WHOI) readied the floats for deployment. Jessica also handled dockside logistics in Woods Hole prior to the preceding A20 cruise departure. Float initialization and deployment training were provided by Clark Richards via videoconference. At sea, Jesse Anderson started the float misson by removing the magnets attached with Velcro approximately 45 minutes before deployment. The expected slow 5 Ev and 5 pump activations were heard. Following a full auto-test, the buzzers started indicating that the floats were ready for deployment. The floats were deployed just after a GO-BGC float (UW float #19443, WMO # 5906437) while the ship was slowly steaming away from station. Floats were lowered into the water by a slip-line strung through the deployment collar hole. R/V Thompson SSG Stephen Jalickee was the deployer with help from ABs on watch.

The floats will complete Argo-type profile missions. Currently, the floats are set to profile from 2,000 m to the surface every 2 days, with a drift at 1,000 m between profiles. Data is collected during the upward profile and data is transmitted via Iridium at the surface. Both floats are performing well. Data is being processed by the MEDS DAC and are available to the public via the Argo program GDAC.

GO-BGC Argo Floats

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PIs:

\* Kenneth Johnson (MBARI)

\* Steven Riser (UW)

\* Jorge Sarmiento (Princeton)

\* Lynne Talley (UCSD/SIO)

\* Susan Wijffels (WHOI)

Shipboard personnel:

\* Jesse Anderson (WHOI)

\* Elizabeth Ricci (UW SSSG)

\* Stephen Jalickee (UW SSSG)

4 biogeochemical (BGC) Argo floats were deployed on A22 as part of the Global Ocean Biogeochemistry (GO-BGC) program ([https://go-bgc.org](https://urldefense.com/v3/__https:/go-bgc.org__;!!Mih3wA!U5GSfOTw0nheU4SSt8BzVTmr0lVevr5DV7bkh_SyMQZy86CdYQHOYi9B0L2ocsQ$)), which is funded by NSF Award 1946578. BGC Argo floats deployed during A22 are among the first dozen floats deployed for this new program, which is slated to grow to 500 floats globally over the next 5 years. GO-BGC contributes to international and US BGC-Argo, and all floats conform to Argo mission requirements. BGC-Argo floats will help to resolve seasonal cycles of many key properties relevant to global biogeochemical processes. The GO-BGC Atlantic sector is led by the WHOI Argo group (Susan Wijffels, Roo Nicholson; planning Pelle Robbins), who determined float deployment locations for A22 as well as the preceding A20 cruise.

All floats deployed were UW-modified Teledyne Webb Apex floats equipped with SBE41-CP CTDs, O2, NO3, pH, and FLBB bio-optical sensors. The floats for the A20/A22 cruises were readied at the UW float lab (S. Riser Argo lab) and shipped to WHOI. At WHOI, Argo engineer Greg Brusseau (UW) tested each float and armed them for deployment prior to being loaded on the R/V Thompson. WHOI provided excellent high-bay lab space with an adjacent outdoor parking which satisfied COVID-19 requirements for Greg to complete this work. Workspace and dockside logistics were coordinated by Jessica Kozik (WHOI). Deployment training was provided via videoconference.

At sea, R/V Thompson SSGs Elizabeth Ricci and Stephen Jalickee, and co-chief scientist Jesse Anderson were in charge of deployments. Before each deployment, Jesse Anderson carefully cleaned the NO3 and FLBB bio-optical sensors. Each sensor was rinsed with DI water, wiped/dabbed with lens wipes, rinsed with DI water again, then wiped/dabbed with lens paper. The floats were set to self-activate, so sensor cleaning was the only pre-deployment preparation required. Floats were deployed from the port stern as the ship steamed slowly away from the CTD station. Floats were lifted over the stern, then carefully lowered into the water with a slip-line strung through the deployment collar of the float. Deployments were completed by SSGs Elizabeth Ricci and Stephen Jalickee with assistance from ABs on watch. Ben Freiberger(SIO) helped with the last deployment. All deployments were clean with no tangling or hangups of the slip-line.

All floats operate on a standard Argo profiling 10-day cycle. After an initial test dive, the floats descend to a parking depth of 1000 m, and then drift for 10 days with the ocean currents. After 10-days, the floats dive to 2000 m and then ascend to the surface, during which data are measured and saved. The data are then sent to shore via Iridium Satellite communication All of the floats began reporting data immediately and the sensors are operating well. The only exception is UW float #19443 (WMO # 5906437) which has not reported data from the FLBB, potentially due to an issue with the cable. All data is publicly available via the GO-BGC data portals and the Argo GDAC.

All deployments occurred at “full” carbon stations so that all GO-SHIP carbon parameters were analyzed for each depth sampled (34 depths from surface to 10 m off bottom). Additionally, duplicate bottles were tripped at the surface (~ 5 m) and at the depth of the chlorophyll maximum to allow for the addition of POC and HPLC sampling at these stations. POC and HPLC samples were collected and filtered by the SIO/ODF team (Susan Becker and Alexandra Fine) and will be sent frozen for analysis at NASA for HPLC and SIO/UCSD for POC. Unfortunately, the transmissometer had spikey data on CTD cast 58 due to the tape covering the clamps coming loose.

All floats were adopted by different schools and organizations in the US as part of the Adopt-a-float program (https://www.go-bgc.org/outreach/adopt-a-float). Names and images provided by the adoptees were skillfully drawn onto the floats by ODF team member Caitlyn Webster (SIO). Each class received the details their deployment from Jesse Anderson via email and photographs via posts to the GO-BGC expeditions webpage by onshore personnel George Matsumoto (MBARI). Together with their teachers, the students will follow the float data, which can be easily downloaded and plotted from the website.