



## BRIEFING NOTE

Global Ocean Observing System (GOOS) Endorsed Best Practice on the OneArgo Program and deployment of Core Argo Floats

February 2024

Prepared by: Dr Tamaryn Morris

Objective – A briefing note/policy brief aims to provide a concise outcome-based synopsis of recent research or expert opinion that may inform decision making and activities by authorities, NGOs and NPOs. The policy note series aims to complement the academic peer reviewed literature published by NRF-SAEON, and highlight key messages from high-level engagements.

### **Key Recommendations:**

1. For all South African research vessels, vessels of opportunity or small craft able to deploy a Core Argo float, the recommendations on the handling, deployment and metadata acquisition of Core Argo floats described in the Best Practice document should be adhered to.
2. Scientists, students and learners aiming to make use of freely available Core Argo data, should follow the guidelines of access and citing of datasets described in the Best Practice document.

### **Executive Summary:**

Core Argo floats are arguably the most widely deployed ocean observing instrument, providing extensive ocean data for use in weather and climate models, research on ocean circulation and sea level rise and the Intergovernmental Panel for Climate Change reports. A best practice looking at the physical handling, metadata and data considerations for Core Argo floats was compiled to help new and established users safely deploy Core Argo floats, but also to bring new users into the OneArgo Program by introducing them to the system and accessing the available data sets.

The Core Argo float data being described is available here:

Morris, T., Scanderbeg, M., West-Mack, D., Gourcuff, C. and Poffa, N. et al (2023) Best practices for Core Argo floats: Getting started, physical handling, metadata, and data considerations. Version 1. Cape Town South Africa, South African Environmental Observation Network (SAEON), 45pp. DOI: <https://doi.org/10.25607/OBP-1967>

## The OneArgo Program:

Argo floats are autonomous instruments (Fig. 1) deployed in the global oceans to collect data from 2000 m to the surface every 10 days as they drift freely with the ocean currents. The instruments remain at a safe depth of 1000 m in the interim period, still collecting data, and descend to 2000 m before profiling at a higher resolution to the surface (Fig. 2). Upon surfacing, they transmit the profile data via satellite communications to ground stations where post-processing takes place. Argo floats are capable of surviving in the oceans for up to five years, sometimes longer. At any given time, there is around 4000 Argo floats deployed globally, essentially taking the “pulse” of the ocean and providing critical information on sea level rise and the state of the ocean.

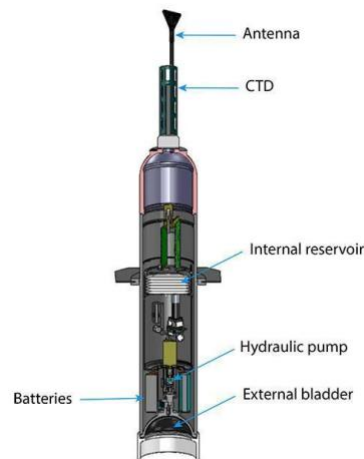


Figure 1: Diagram schematic of an Argo float showing key components ([www.argo.ucsd.edu](http://www.argo.ucsd.edu))

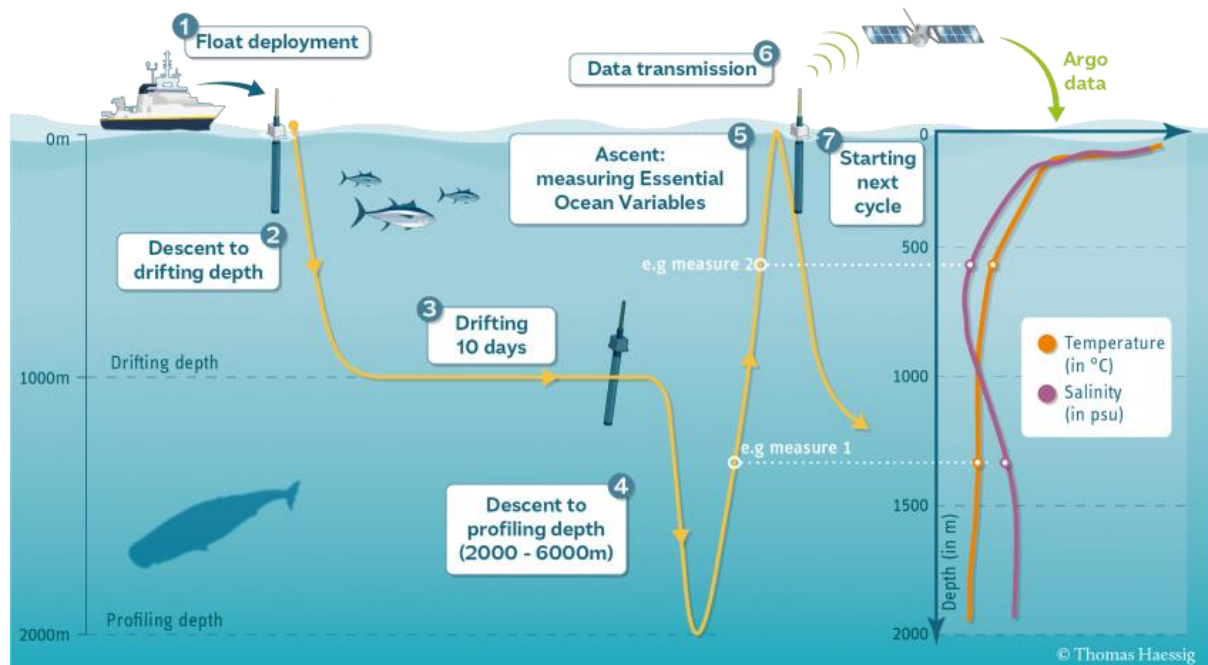


Figure 2: Standard Argo profile mission ([www.argo.ucsd.edu](http://www.argo.ucsd.edu))

Argo floats were developed in the 1990's following on from the successful World Ocean Circulation Experiment (WOCE) program. The objective was to collect similar profile data, but without having to send expensive ships to sea year round. The OneArgo program has acquired over 2 million profiles of

the global ocean since its inception, making it arguably the most successful ocean observing system within the Global Ocean Observing System (GOOS).

Argo float data is routinely used by the Intergovernmental Panel for Climate Change (IPCC) and State of the Ocean reports as reliable and accessible data to assess the status of the ocean to 2000 m. These assessments are critical at a stage where the earth is warming faster than predicted and the ocean is taking up over 90% of the anthropogenic excess heat emitted.

### **South Africa's role in the OneArgo Program:**

South Africa is uniquely positioned between three massive ocean basins and three distinct boundary current systems, with access to these systems difficult for the vast majority of funders of the OneArgo system (i.e. the global north). As part of the annual relief voyages to Marion and Gough Islands, and the SANAE IV base, Argo floats sent from Argo teams based in the US, Europe and Canada, have been deployed while the vessel, the SA Agulhas II, is underway, allowing for data acquisition in harder to reach regions around Southern Africa. Argo data is freely available via numerous portals for all scientists and students, and is used daily within global forecast models of the atmosphere and the ocean, allowing for weather and climate forecasts to be more accurately made.

Argo floats are not inexpensive pieces of equipment however, with the basic Core Argo float costing around R 500 000.00, without the additional year-on-year satellite communication costs required to receive data every 10 days. The Deep Argo (> 4000 m) and Biogeochemical (BGC) Argo floats are even more expensive, given their complex sensor technology. SAEON purchased two Core Argo floats in 2009, and SAPRI will purchase another six more in this financial year, increasing South Africa's contribution to the OneArgo program not only as unique geographic deployers of Argo floats, but also seeding the oceans around Southern Africa with infrastructure capable of monitoring the ocean.

### **Recommendations from the Core Argo Best Practice paper:**

With respect to deploying Core Argo floats, which South Africa is most actively involved with, the following are recommended:

1. Core Argo floats should be deployed at a maximum vessel speed of 2 knots. The vessel need not stop to deploy the Argo float, but should slow to 2 knots to allow the safe deployment of the instrument at the stern of the vessel.
2. Metadata is critically important to the post processing of Core Argo float data and the Best Practice provides a template which can be used for all types of Core Argo floats deployed. These metadata should be submitted to the Argo float providers as soon as possible after deployment.
3. Argo data is freely available and the ocean science community is encouraged to make use of these data wherever they deem appropriate. The correct citation for Argo data is available in the Best Practice paper and should be adhered to.