South African Argo Report

Juliet@saeon.ac.za, johan.stander@weathersa.co.za, isabelle.ansorge@uct.ac.za

South Africa has not purchased any further Argo floats but remains active and committed to the Argo program through deployment of floats and also outreach programs. There is a certain amount of commitment to become more actively involved in the next 5 years. Argo floats remain a line item on the budget, but as yet funding has not been approved. Thus instead of the national report template requested, please find below a detail of current marine activities of relevance to Argo.

SAEON – South African Environmental Observation Network,
Juliet@saeon.ac.za

Initiated the purchase of the first South African owned Argo floats in 2009, along with funding from the South African National Antarctic Program. SAEON provided all logistics and maintained support for the two floats. Additional floats remain on the budget each year but have not been given priority.
The Argo float program and data remains the key focus of the education program.

DEA OC – Department of Environmental Affairs, Oceans and Coasts,
ajohnson@dea.gov.za, cc oceangeoff@iafrica.com

DEA Oceans and Coasts has a mandate involving ocean research, with one focus on operational oceanography. As a new government department, funding for Argo will be seriously assessed and it is anticipated that within the next 5 years DEA_O&C will contemplate investing in Argo floats. Numerous Argo floats have already been deployed by DEA staff on South African vessels as part of international efforts, and this support for Argo will continue where possible.

SAWS – South African Weather Service,
johan.stander@weathersa.co.za

SAWS is the official mandated Government organisation with regards to Argo. SA focus on marine meteorology and oceanography has changed significantly to such an extent that one of the Government Department's sole mandate involves ocean research, with one focus on operational oceanography. For this reason Johan works closely with key oceanographers (in particular Juliet Hermes, SAEON, Isabelle Ansorge, UCT and Mike Roberts, DEA_OC) to support Argo and other operational oceanography. As such, Juliet was nominated by Johan to attend the Argo meeting.

UCT - University of Cape Town,
Chris.Reason@uct.ac.za, Isabelle.Ansorge@uct.ac.za

Remains the key oceanographic research and teaching organisation in SubSaharan Africa and continues to do research in the science underpinning operational activities, collaborating with operational organisations like SAWS and DEA_OC in helping SA to contribute towards operational global efforts like Argo.
UCT also hosts the Nansen-Tutu centre where we are working towards ocean state estimation in the ocean regions neighbouring SA in collaboration with NERSC in Bergen and other local and international institutions (see OceanSAfrica).
Students and postdocs often go on cruises and help with the deployment of Argo and surface drifters for operational purposes

OceanSAfrica,
Bjorn.backeberg@uct.ac.za, jennifer.veitch@uct.ac.za,
Mike Roberts squid@metroweb.co.za
Predominantly a network driven from the bottom-up to grow and support operational oceanography in South Africa. Members of all marine organisations sit on the technical task group. At present Argo is not being used, however it is recognised as being necessary for model validation and assimilation as we require more information about the ocean interior to properly assess and "tune" our models. The data is integral in the development of ocean model simulations that will eventually be run in nowcast and forecast mode. There is also the aspect of ground truthing satellite observations and developing 3-d ocean monitoring aspects combining proxies derived from vertical profiles and relating these to surface expressions observed from satellite platforms.

ACEP and ASCLME - African Coelacanth Ecosystems Program and Agulhas Somali Current Large Marine Ecosystem, tommy.bornman@asclme.org
Support the Argo program, primarily from deployment of Argo floats through NOAA, ongoing cruises in the SW Indian Ocean.

CSIR, SOCO - Centre for Scientific and Industrial Research and Southern Ocean Carbon Observations, sbernard@csir.co.za, PMonteir@csir.co.za
Input to the IOCCG Bio-Argo WG, *http://www.ioccg.org/groups/argo.html* of which the last draft report is currently being edited and the final report should be produced within the next few months.
Currently concentrating on gliders (6 - 8) starting this year and only go for design-specific (eg; bioArgo) floats in the context of seasonal and multi-year experiments in about 2013 or 2014. Our gliders will concentrate on regular missions in the upper water column 0-1000m between 40 - 50oS & 40W - 40E for a period of 3 - 5 years over the spring - autumn period. There will be periodic adhoc missions around experiments and process observations.

ACCESS – Applied Centre for Climate and Earth System Science,
nsweijd@access.ac.za
Newly formed Centre of Excellence (funded by the Department of Science and Technology) to support the Governments Global Change Grand Challenge and focus on capacity building of graduates as well as acting as a platform for Earth System Science Research. There is no involvement in Argo yet, but potentially in future.

SADCO – Southern African Data Centre for Oceanography,
mgrundli@csir.co.za, cc RvBalleg@csir.co.za
From here there is access to all validated CTD data collected in the southern African region. When Argo floats pass through SADCO target area, delayed mode data is loaded and available through SADCO.

South African Environmental Observation Network (SAEON) report on Argo floats from 2010

1 Description of Research Work

1. Introduction

The importance of the Southern Ocean with regards to our weather and climate, as well as global change, has recently been identified, yet observations in this region (especially south of South Africa) are sparse. The Southern Annular Mode is becoming increasingly topical and measurements from programs such as Argo will prove invaluable to its understanding. Argo plays a crucial role in monitoring climate change signals in the oceans and also in long range climate prediction (30 days to 2 years). Argo is capable of monitoring signals on intraseasonal and longer scales.

Argo floats allow continuous monitoring of the temperature, salinity, and velocity of the upper ocean, with all data being relayed and made publicly available within hours after collection. Unlike satellites, Agro floats are able to measure subsurface ocean variables. These measurements are essential because the ocean's upper layers can store 1,000 times more heat than the atmosphere does. Changes in subsurface currents, temperature, and salinity eventually change conditions at the surface, where the ocean interfaces with the atmosphere. Such data is necessary to improve our understanding of both long term anthropogenic climate change and natural modes of variability in the oceans. This will benefit not just researchers but also governments, policy makers and industries. Argo data provides a vital input for ocean models which will lead to a more accurate prediction of the ocean state and how it will change over time and with different forcing. Recent work has shown the importance of Argo float data for realistic model assimilations (Oke and Schiller[*]).

2. SAEON involvement

Obtaining South African owned Argo floats is of importance primarily because the oceans surrounding South Africa are sparse of observations and floats. Another important reason behind funding an Argo float is to enable South Africa (SAEON and SANAP) to be more involved in the Argo project by being recognized on the Argo website, increasing South Africa's scientific capabilities internationally.

SAEON has led this project from the beginning, instigating the initial funding and motivation to SANAP. SAEON also provided all of the support to purchase and import the floats and then worked closely with UCT and SANAP to deploy them.

A final, minor yet important, aspect to deploying South African owned Argo floats, is the possible use of the program in education. For example, school children would be able to track the South African float, download the data and manipulate it.

---

[*] P. R. Oke and A Schiller, 2007: Impact of Argo, SST, and altimeter data on an eddy-resolving ocean reanalysis. Geophysical Research Letters, 34, L19601, doi:10.1029/2007GL031549.

3. Progress to date

The logistics of setting up the South African Argo programme were varied and proved challenging at times but with the help of the French and South African teams, these challenges were overcome. The South African science and support vessel, the *SA Agulhas*, was the platform from which the floats were deployed. Scientists from SAEON and UCT decided that the floats would be deployed at specific locations, along the ship's course, coinciding with interesting ocean features. The deployment of the two floats occurred at 41°S, 10°E, within an ocean eddy and ~60°S, at the Antarctic Polar Front, as planned. Young researchers and students were trained, by Dr Isabelle Ansorge of UCT, in the techniques of deployment of the floats and they successfully completed the launching of the two floats from the SA Agulhas.

Since purchasing and deploying the floats, South Africa has been welcomed into the Argo community, invited to sit on the Argo steering Committee and a representative from the South African Weather Services will be attending the steering committee meeting in Scripts, California at the end of March.

SAEON Egagasini's education officer, Thomas Mtontsi, has been actively engaging with educators to develop the scope of how the Argo floats are able to aid and expand science education. He organized an educators' workshop, where he invited Dr Isabelle Ansorge to present information about Argo floats and their impact on the understanding of the world's oceans and climate. He has also made strong links with the Argo education community, specifically with Lisa Beal from the Rosenstiel School of Marine and Atmospheric science, and these will be taken forward in the upcoming weeks. Furthermore, a move to design an educational poster for learners is underway and will be created to stimulate science learning and education.

The data that has been collected by the South African floats can be viewed online. Data from the floats (identity numbers 1901470 and 1901469) can be viewed and downloaded at the following website **http://www.coriolis.eu.org/cdc/** and the ftp site **ftp://ftp.ifremer.fr/ifremer/argo/dac/coriolis/**.

2 Expected Impacts

The data collected by these Argo floats will feed into a network of floats around the world and add to the data being used to research the world's ocean systems. Dr Sebastian Swart is one of the South African scientists who used Argo data in his PhD research. Dr Swart's focus was on the Southern Ocean heat and salt fluxes, an area which has many unanswered questions. With the help of Argo data he was able to add new understanding to this topic. South African and international research being conducted south of South Africa and in the Southern Ocean region will benefit from the deployment of these floats as they provide more observations in a data poor area. Scientists, Oke & Schiller (2007), from the Commonwealth Scientific and Industrial Research Organization of Australia (CSIRO) have shown that Argo drifter paths play a vital role in the re-analysis and forecasting of meso-scale ocean systems. The

addition of the Argo drifter paths to the model creates a significantly more accurate representation of the ocean system.

Argo floats will assist in the development of the understanding of the importance of long term monitoring of the oceans, specifically with the public and learners. Argo floats generate excitement and curiosity and thus aid bringing the public and learners closer to scientific research. Furthermore, the involvement of South Africa in the Argo programme also brings exposure and recognition for our local scientists to the international scientific community.

3 Research team

SAEON, SANAP and UCT.

4 Additional Information

This project has been endorsed and received feedback from a number of scientific stakeholders and organizations: South African Weather Services, (SAWS) University of Cape Town (UCT), the South African Weather Service and Climate Variability Africa (CLIVAR Africa).

Photo 1 Argo float being held just before it is deployed off a ship

Photo 2 Students aboard a research vessel learn about the marine environment from a marine scientist.