Doing our part to sustain ocean observations globally

by Tamaryn Morris

"If you like your weather forecast, thank an oceanographer"

Ocean observations are critically important not only for the continuous monitoring of ocean health and the resultant implications of climate change on these vast bodies of water, but also for use in weather and climate forecasting systems. Every day, thousands of instruments deployed within the global oceans are collecting and transmitting data to land-based stations for processing and dissemination to the Global Telecommunications System (GTS), and are used by various research and forecasting groups to produce global numerical weather predictions. These ocean data come from instruments such as moored surface expression buoys close to coastlines transmitting automatic weather station (AWS) data, from tide gauges, and commercial, sailing and research vessels equipped with data acquisition systems, both atmospheric and oceanographic, which are transmitting continuously along major shipping routes. Less well-known ocean observing systems include drifting buoys (www.aoml.noaa.gov/phod/gdp), tethered by sea anchors to the upper 15 m of the water column, which collect barometric pressure and sea surface temperature, and have recently been improved to collect wind speed and direction and wave parameters. Similarly, Argo floats (www.argo.ucsd.edu), autonomous ocean robots which collect temperature, salinity and pressure, profile the water column every ten days from depths of 2000 m to the surface. These free-floating ocean observing systems are not constricted by shipping lanes for data acquisition, thereby increasing the availability of data across the world's oceans to the GTS system.

The Southern Hemisphere is severely understudied owing to the reduced landmass and greater oceanic expanse when compared to the Northern Hemisphere, and the concentration of observing capacity in the Northern Hemisphere, due to the abundance of highly developed industrialised nations. That being said, South Africa is uniquely placed globally between three major ocean systems (Indian, Atlantic and Southern Oceans) and on our doorstep is the gateway for warm salty Indian Ocean water entering the cold fresh South Atlantic. This transport of water is critical for the Northern Hemisphere climate, which brings warmer conditions to the United Kingdom and Europe, without which they would exist in an almost perpetual freeze. The SAWS Marine team members are strongly involved with a number of the ocean observing platforms and the international panels that monitor and encourage these continued deployments globally. As such, we are ideally placed to assist with deploying ocean observing systems as part of our take-over and research cruises.

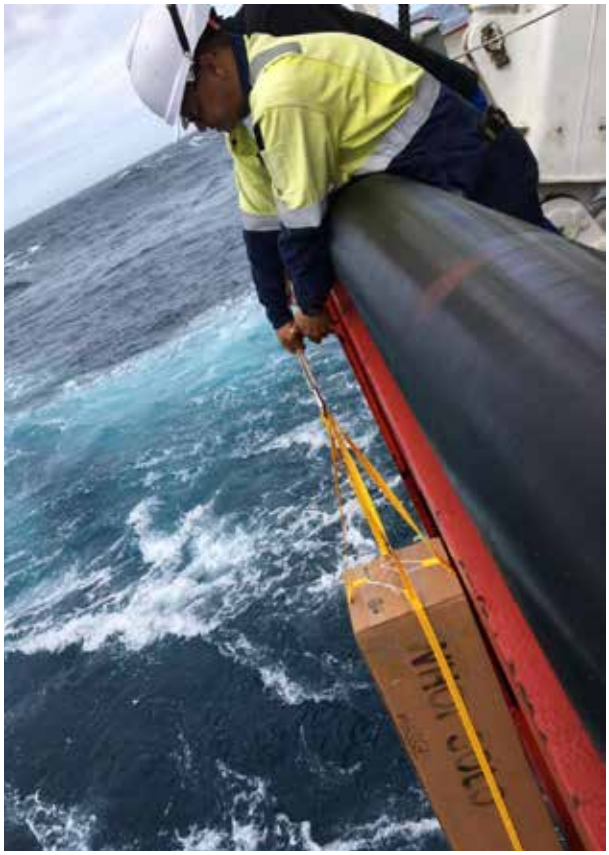

Photo 1: Bosun assisting with the deployment of a SOLO II Argo float from the stern of the SA Agulhas II. Photo credit: Lauren Smith

SAWS is not in a position to procure satellite-tracked drifters or Argo floats, given not only the costs of the infrastructure itself but also the satellite data time required. However, excellent working relationships exist between our team and the National Oceanic and Atmospheric Administration (NOAA), SOFAR Ocean (www.sofarocean.com), the UK Met Office, Euro-Argo, Woods Hole Oceanographic Institute (WHOI) and the Federal Maritime and Hydrographic Agency of Germany, all of whom sent observing platforms to South Africa for deployment in our oceans. On the Gough (September 2020) take-over cruise, six Argo floats and four satellite tracked surface drifters were deployed as the SA Agulhas II transited to Gough Island. This vessel track is critical to our own weather predictions, given that weather systems impacting the Western and Northern Cape develop in the South Atlantic and Southern Ocean.

In December 2020, the SA Agulhas II left Cape Town for Antarctica on the SANAE take-over cruise with 28 Argo floats, six satellite-tracked surface drifters and 15 SOFAR Ocean Spotter surface buoys, which collected wave height, along with wind speed and direction data, over and above tracking surface currents. Roughly half of these instruments were deployed on the southward leg of the take-over cruise, with the rest scheduled for deployment as the vessel makes its way back to Cape Town at the end of February 2021. Arguably, weather systems directly south of South Africa will not impact our country directly. However, they impact Marion Island, and the valuable data these observations acquire close to the Marginal Sea Ice Zone, and severely understudied Southern Ocean, input to our forecasts with regards our MetArea VII obligations.

Photo 2: Lauren Smith (SAWS), Asavela Somaxaka (SAWS) and Zinhle Shongwe (DEFF/SAWS) preparing a satellite tracked surface drifter for deployment. Photo credit: Lauren Smith

Photo 3: Lauren Smith (SAWS) and Zinhle Shongwe (DEFF/SAWS) deploying the satellite tracked surface drifter from the stern of the vessel. Photo credit: Lauren Smith

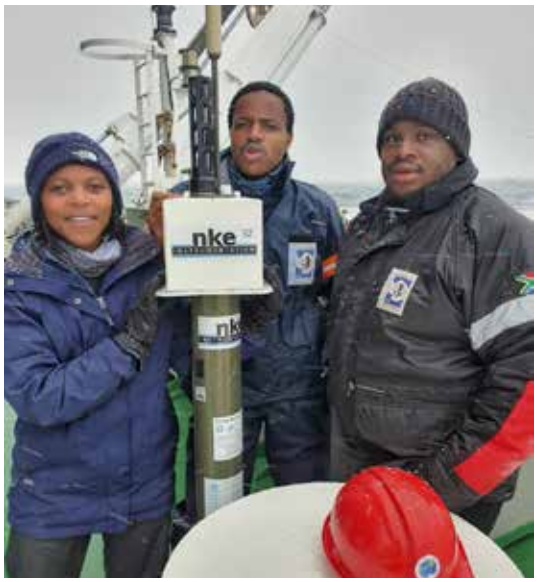

Photo 4: Thando Mazomba (UCT), Menthiam Sebesho (SAWS) and Kelcey Maewashe (UCT) preparing an NKE Argo float for deployment. Photo credit: Kelcey Maewashe

Captain Craig McLean, NOAA's Acting Chief Scientist, said it best during his opening address at the OceanObs '19 conference, "If you like your weather forecast, thank an oceanographer". Understanding the oceans surrounding South Africa, and indeed the full extent of MetArea VII region which is our responsibility, is critical to the work we do at the SAWS. One of the ways in which we do this is to collaborate with international teams, along with DEFF Antarctica and Islands, to deploy ocean observing systems, as far and as wide as possible.

This work has been made possible with the deployment assistance of the scientific teams involved with the Gough 2020 and SANAE 2020/2021 teams, along with the Captain, officers and crew of the SA Agulhas II.