## Research Profile:

## SA's research team on Gough Island

By Dr Alan Boyd Images by Millicent Makoala

very year, a small team of scientists and technicians are placed on Gough Island for a period of 13 months to man the weather station there and to undertake biological research, mainly on seabirds and marine mammals.

They are mostly South African, but also include international researchers, as Gough Island is British territory. The new team (and their supplies for a year) are taken there by the SA Agulhas II in September and the old team return home in late-September/ early October, 3-4 weeks later.

South African research on Gough Island (and during the voyage to the area) has a history of over 60 years. Projects are currently motivated for and approved as part of the South African National Antarctic Programme (SANAP) process, the same process applies to research conducted at our Prince Edward islands and in Antarctica, but all research on Gough Island also requires approval by the British Administration. Most of the work has varying degrees of international participation.

Gough Island has populations of sub-Antarctic fur seals as well as Southern Elephant seals and these are the only two seal species which breed on the Island, or are found there in significant numbers.

The main objective of current work is to have a better understanding of the role these seals play in the ecosystem and their vulnerabilities to change. The population of sub-Antarctic fur seals is the same species as at Marion Island, but Gough has 50 % of the global population and Marion Island only 10%. Thus work on Marion and Gough provide complementary aspects of the same broader assessment, and this would also apply to other species and other groupings of islands.

Regarding seabirds, Gough Island is a very important Island for many species, some of which are endemic or have almost the entire global population on the Island. Much of the seabird research focusses on the various albatrosses. The chicks of the Yellow-nosed and particularly the Tristan Albatross are vulnerable to predation by mice, introduced to the Island a long time back. Similar problems are experienced on other Islands including South Africa's Marion Island (but not Prince Edward Island).

Seabird research in the takeover period emphasizes surveys which require the availability of helicopters, multi-person surveys as well as training of new staff by experts. Although only two species of seabirds are surveyed for their entire population on the Island annually, namely the Tristan Albatross and the Southern Giant Petrel, systematic and quantitative measurements are made for six other species for a portion of their population each year. Parameters studied include productivity, which

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is a combination of the number of eggs laid, those which hatch, and those young which fledge, in relation to the adult population. Regarding links between South Africa's Prince Edward Islands and the (British) Tristan Archipelago and Gough Island, two species, the Sooty Albatross and Southern Giant Petrel, as well as several species of burrowing Petrel breed on both Island groups.

If the internationally proposed work on mice eradication goes ahead as planned on Gough Island in winter 2019, it will be very important to continue the current seabird work. Only by doing this will we be able to assess the success of mice eradication measures in terms of improved seabird productivity and other impacts on various species. There is also another alien invasive species on the Island, and that is the small plant Sagina procumbens around the area of the base, and it is also being combatted.

The other research and monitoring undertaken on these trips comprises of weather observations and oceanographic measurements along the ships track, which goes westwards from Cape Town to Tristan da Cunha, then south to Gough Island and then, after dropping of scientists on the Island, further south into the sub-antarctic region, where weather buoys are deployed before the ship returns along the same track. Sea surface temperatures range from 15-20 degrees centigrade between Cape Town and Tristan da Cunha, falling to 10 degrees at Gough Island and then less than 5 degrees in the rougher sub-Antarctic seas.

However due to technology, the voyage yields information far beyond the ships track or the period of the voyage. This is because some of the oceanographic and weather instruments drift with the currents in whole southern ocean and report back data by satellite, and keep doing so over a period of months to years. These data are used for both short-term weather forecasts as well as helping understand longer-term changes in the global ocean currents and climate change.

The importance of weather measurements on Gough Island itself is a consequence of its location in the direct path of many developing weather systems and the fact that observations are made daily every few hours throughout the year. Bearing in mind that the SA Agulhas II is only in the area for less than a month a year. Therefore data collected by the meteorological station on the Island is required input for Global weather forecast models, so they can accurately produce forecasts for South Africa and the Met Area 7 for which SA is mandated to be responsible by the World Meteorological Organisation (WMO).

Although consideration is being given to shifting the Met station to Tristan da Cunha (with its permanent settlement and due to the costs of the base on Gough Island borne by South Africa), there are many potential complications which could compromise the suitability of the data collected.

In addition the presence of the weather station on Gough Island has, according to Professor Peter Ryan, "facilitated (biodiversity) research at the Island, and for some groups of organisms, more is known about their status at Gough than the northern Islands". Therefore any change in the status of the Meteorological Station on Gough would impact the viability of other long-term research, mainly biological research, which provides information relevant to the overall conservation management in Southern Ocean.



**Above:** Weather balloons are released twice daily by the SA Meteorological Team to gather detailed information from the lower to the upper atmosphere, vital for global weather forecasts.



**Above:** In the wet hydrological laboratory of the SA Agulhas II, taking water samples which measure the oxygen content of the ocean.



**Above:** Looking down over pristine Gough Island vegetation towards the heli-deck and the South African Base and beyond that the South Atlantic towards Antarctica.



**Above:** Tristan da Cunha, at more than 1300 miles away from its neighbours, is the world's most isolated human settlement. (Note Gough Island, only 255 miles away, is a manned base, not a settlement).



**Above:**Having fun and staying fit on the heli-deck of the SA Agulhas II, with the coastal cliffs of Tristan da Cunha in the background.



Above: A nesting Atlantic yellow-nosed Albatross.