

**Subject: Scholes cabin 5 (p): The weather generator**

**18 February 2010 0926 UTM -50.3474, 1.0584**

Dear Stirling,

I have been going on about how important the Southern ocean is to the climate, but for most South Africans, the more immediate importance is to the weather. Climate, of course, is just the long-term statistical behaviour of the weather.

A lot of South African weather (especially 'bad weather') originates in the South Atlantic and its extension into the Southern Ocean. They say that the best forecast of tomorrow's weather is today's weather. Well, an even better forecast is today's weather one day of wind travel upwind of your location. The South Atlantic is 'upwind' of South Africa, and much of our weather forecasting involves looking at what is coming across the ocean, and figuring out when it will arrive. Of course there are lots of satellite images and computer models and maps with squiggly lines involved, but the basic idea is that simple. Which is why the weather station on Gough Island is so important.

Gough Island is one of the Tristan de Cunha group, which technically belongs to Britain. It is halfway between Africa and South America, but a bit further south than Cape Town. It is uninhabited except for a team of South African meteorologists, who stay there for a year at a time. After the Agulhas gets back from Antarctica, its next trip is to replace the team on Marion Island (which because it is 'downwind' of South Africa, is much less critical for weather forecasting, but is an important fishery resource and bird nesting site), and the third trip each year (in about August) is to Gough Island. The Agulhas carries the underway instruments I am looking after on all those trips.

The South Atlantic weather is actually quite predictable. Every few days a wave of cold air, originating in Antarctica, sweeps across it. When that wave, called a front, reaches South Africa, it brings cooler weather and rain to the Cape. In summer the waves are further south, so they don't have such a strong effect, but in winter they are responsible for storms in the Cape and those cold, bright days in Johannesburg.

There is a pretty constant number of those waves in the Southern Ocean at any given time, going from west to east around Antarctica. They all have to fit into the available space, so they tend to be about ten days apart. They are shown on the weather map as a nest of circles, which are lines of equal pressure, with a spiral line with little blue teeth on it (the 'front') curling out from the middle. The atmosphere, just like the ocean, has three-dimensional structure, but weather maps have only two dimensions. What those lines are showing is a low pressure system - a column of upward-moving air - that is rotating clockwise (this being the southern hemisphere) and moving from west to east. The more lines there are, and the closer together, the fiercer it is.

Right now we are racing up the Greenwich meridian between two low pressure systems, hoping to squeeze through the gap without encountering any enormous seas. Just like crossing a busy road, really, and hoping not to get run over by a truck. It is cold and overcast, but the swells are much tamer than on the way down.

Love,

Dad