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Upper Air Weather Observations

The atmosphere is like a layer cake. The work of a Weather Observer is limited only to observe, identify and report weather phenomena currently occurring in the lower layer of the atmosphere near to the ground called the Stratosphere. We must examine all the layers in the atmosphere before we can compile a complete picture of what the weather is all about. The lower layer is important because it is where we live, but what happens at ground level is really a result of the integrated behavior at all the different levels.



One of the technological wonders of gathering weather related information in the upper atmosphere is via Upper Air Ascents/Soundings. So, before we can put together a good forecast, we must figure out what is going on above the ground. The upper air sounding system help to compile weather phenomena in the first two layers of the atmosphere, namely the Stratosphere and the Troposphere. This is a vertical height into the atmosphere of at least 30 000m or sometimes reaches a pressure level of 10hPa. Pressure decreasing with height. For example, the pressure at Gough Island can be 1014hPa. The balloon burst most of the time at a pressure level of 12hPa. Upper air Ascents are mostly done at 12:00 noon and 00:00 midnight GMT.

A digital Viasala Radiosonde RS92-SGP, attached to a 500 gram meteorological balloon manufactured in Japan, is released up into the atmosphere.

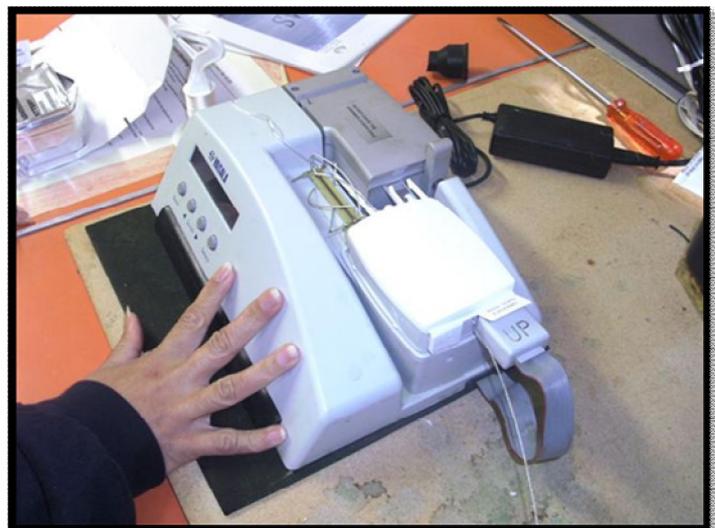
What is a radiosonde?

A radiosonde is a balloon-borne instrument that measures and transmits meteorological data of temperature, pressure, humidity, wind speed and wind direction at different heights. This radiosonde features a GPS receiver for wind finding. It has a silicone pressure sensor, heated twin humidity sensor and a small fast temperature sensor. The radiosonde can be powered by two different kinds of battery sets: the RSB511 Dry-cell Battery Set or the RSB912P Water-activated Battery. At Gough island we are using the Dry-cell Battery Set.

At the Meteorological Station a sounding system is used to track the balloon-borne instrument through which the weather parameters is obtained. When performing the sounding preparations, the Viasala Ground Check Set GC25 is connected to the DigiCORA sounding system via cable and operated with the help of the DigiCORA sounding software.

To tune the radiosonde to the same frequency as the DigiCORA sounding system, the radiosonde is first connected to the Ground Check Set. The DigiCORA sounding software goes through reconditioning, frequency tuning, timer setting and ground checking. The weather surface observation data is also entered in the DigiCORA Sounding System by the Observer.

When the DigiCORA sounding software is finished,



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the message “Ready for sonde release” appears on the display. Then it is safe to remove the radiosonde from the Ground Check Set and to disconnect the communication cable.

The Dry-cell Battery must then be connected to the radiosonde for it to be activated. After activation of the radiosonde, the weather parameters must then appear on the DigiCORA sounding software. This means the telemetry link is working well. The radiosonde is then ready to be launched. In order to ensure 120 minutes of flight time, it is recommended that the radiosonde is launched within 15 minutes of battery connection.

The balloon is inflated with 1.5 bar of Hydrogen Gas. Each Weather Station has a Hogen Hydrogen Generator to produce its own gas. Huge storage tanks are used in which the gas is stored. The ra-

diosonde has an unwinder to be tied directly to the balloon. The string length between the radiosonde and the unwinder must be kept as short as possible when the balloon is released from the Observer’s hand, to prevent the string from running out before the release.

Immediately after the release, the reception of the radiosonde frequency needs to be checked on the receiver to ensure that the sounding is in operation. The sounding needs to be monitored with the DigiCORA Sounding System for the duration of the ascent. The data is then transmitted back to the DigiCora Sounding System via satellite, at given intervals. For example, every few milibars of ascent, the switch goes on and data is sent. The balloon’s position is known and the pressure in hectoPascal is given, along with temperature, wind and humidity measurements.

On the DigiCORA Sounding System a graph is digitally drawn as the balloon ascents up into the atmosphere. Through this, areas of moisture are clearly discernable in the atmosphere. By using this upper air graph, forecasters can also determine where cloud bases starts and the level of cloud tops.

Upper Air observations provide an immediate vertical profile of the atmosphere and are invaluable as a forecast tool, particularly for severe weather and general aviation forecasts.

Daphne Hollenbach





Attempt at Guinness World Record

The team on Gough Island decided to have an attempt on the record – or for that matter be the first ones – for the amount of mice we can catch.

The European mouse (*Mus musculus*) was accidentally introduced to the island. The exact time when this happened is not known, but already in 1888 it was recorded as numerous and in 1891 it was describe that the island was overrun by mice. Taking in account that they have a gestation period of 19 days (longer if lactating), average litter per month are six pups and pups are weaned at 14 days and can start breeding at 35 – 40 days, this is the answer to the big number of mice on Gough.



Because of the lack of natural predators, mice keep accumulating on the island, and are now threatening the Tristan albatross and Atlantic Petrel population by attacking and killing the chicks. They are also a nuisance in the food store and all the electrical wires, and so “operation mouse- catch” started.

We all set traps with peanut butter – after some research from the scientists; peanut butter was found to work the best.

The day comes when everybody has to help to clean the food store after we saw mice running around. We vacuumed, and scrub and cleaned, and in 24 hours we caught 43 mice.

So the race is on, are we going to set a record? We will keep you informed in the next issues of The Bunting.

Sonja Lizemore

A mouse being weighed (above) and a few mice caught in the food store (right)





Route of the Month – The Glen

..we are words on a journey,
not the inscriptions of settled people.
-W.S. Merwin
"An Encampment at Morning"

A trip to The Glen lends meaning to sayings that life is about the journey more than the destination. Leaving base on the heels of a storm, we set out hoping for fine weather to make our trip into uncharted territory easier. After the short steep mudholey climb to Tafelkop, the rest of the ascent to South Peak is a friendly saunter up along a nice firm ridgeline. Our weather hopes were realised, with a stunning sunny clear view from South Peak – the Rowetts, Hag's Tooth and down into the maze of ridges, dykes and steep gullies that make up The Glen and Sophora Glen. Most of the terrain looked pretty unfriendly, desperately steep and often impassable with bluffs blocking every turn, so we decided to stick with our friends the ridges for as long as we could.



Graham standing near the top of South Peak, just before we drop down Disney Ridge (the ridgeline just behind him) to find our way down into The Glen. The striped Rowetts are to the far left, with the round of Edinburgh Peak (Gough's highest peak) just behind. Hag's Tooth is the dark knob down from the Rowetts.

So off we scrambled, following Disney Ridge. If anyone knows how it got its name, we'd love to hear – maybe from the rock formations which look like fabulous beasts? As you can see, it's steep and exposed but happily the going was pretty good. No sinking, no burrows to fall into, too steep for peat-mud sinkholes or sphagnum bogs.. Instead, the sphagnum just sloughs off the slopes when you take a step - and you wouldn't want to be up there in a decent wind.

However, photography ceased in the battling-through-fernbush zone further down. We mazed into tree ferns taller

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Disney Ridge with cliffs of The Glen in the background. The steep poky rock spire, top left, is The Fid.

than us, got bluffed out so dropped off the ridge to avoid the bluffs, slipped and sloughed our way down wet mossy slopes, thrashed through and wormed under more *Blechnum* and *Phylica*.. Once we (semi-accidentally) got back onto the ridge, the vegetation was suddenly just down to bracken – spiky and nasty but still so much more friendly than the fernbush had been.

Welcome to The Glen, tucked tidily into Quest Bay on the east of the island.

Not so easy to access by sea, landings were not attempted on Gough Island for nearly 200 years after it was first discovered. However, by the 1800s The Glen had become a favoured landing spot. Attracted by the (small, steep and rocky) landing beach and the surprisingly large river, it is thought that ships sent landing parties to stock up on fresh water and presumably birds and eggs. We know that the bay was also used fairly regularly by sealers, with sealing continuing until as late as the 1950s. A cave chiselled out under a cliff overhang to the side of the beach remains from the sealers – ironically now inhabited by fur seals.

The Glen was also the site of a small base used by the Gough Island Scientific Survey (1955 – 1956), who called the base Gonçalo Alvarez after the gentleman who first spotted Gough. A few years later the Glen became home to a permanent meteorological base. Built 1956, the foundations are still there, perched precariously on the small patch of semi-flat ground between cliff, beach-dumping surf and river. The mountain weather funnels straight from the peaks down the valley, which somewhat compromised meteorological observations. By 1963 the base had been relocated to where it is now, in the more gentle climate of the southern coast.

Now, the Glen is a steep scramble over several peaks and down some breathtaking valleys. After the lack of human impact in the uplands, the Glen feels positively crowded with people stuff but in fact, there isn't that much around. Pipes still run up the river, presumably from the old water supply. Elephant seals sun on the old concrete

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To the left we have The Glen, home to hundreds of fur seals, over a thousand penguins, some giant petrels and skuas and three elephant seals. To the right of the ridge lies Sophora Glen, an even narrower equally steep valley. The story behind the name is the *Sophora* or kowhai trees that live partway up the valley. Unfortunately our planned visit over to Sophora the next day to say hi to the kowhai was foiled by weather (downpour + river flooding = tent day).

foundations and completely ignore a concrete tub, an old engine, some bits of rebar and the odd scrap of timber. Fortunately we had done our exploring when we first got into The Glen, since rain started overnight and didn't stop pouring until evening the next day. In that time the nice tumbling mountain river became an impassable torrent. We took the hint and stayed tent-bound, listening to boulders roll in the river.

The next morning we climbed out in dense fog, tracking our way back up through the Disney Ridge rock-monsters. Thoroughly soggy, more from drenched vegetation than rain itself, the climb was a steep grunt. Fortunately we were already back at Tafelkop when heavy fog became downpour again, lending us wings on our descent down to base.



Nature Notes

November has almost come to a close here on Gough and technically speaking it's spring. But the fickle spring weather of the roaring forties has had many of us reaching for our winter hats one day and pulling out the sunblock the next. For the abundant wildlife, though, the summer breeding season continues.

Last month I reported that many of the team had some intimidating encounters with a pair of Skuas that decided to nest on the heli-pad catwalk. To our surprise, this month the pair of Skuas that centre their territory around the Base front door decided to nest even closer. No sooner had Tshepo trimmed a grassy area adjacent to the bar braai (read BBQ for the non-South Africans), the Skuas had laid an egg and begun incubating. Now we can all look five metres out the dining room window and watch these dedicated parents taking turns sitting on their single egg through howling gales, heavy rain and chilly southerlies. Unlike most nesting Skuas, this pair is very tolerant of our wandering past the nest as long as we don't get too close. It will be interesting to see if they get a bit noisier and more defensive once they have a chick in the nest. Needless to say, we are giving the parents some peace and are not using the bar braai area for the time being.



The base skua male on an evening with a stunning sunset.

A recent trip to the mountains had us enjoying an amazing sight on a windy blustery day. The Tristan albatross, with their three-metre wing spans are truly the giants of the bird world on Gough. Also known as Gonies, Tristan albatross breed in the higher mountain regions of Gough. The chicks take almost a year to reach maturity before they finally fly away from Gough for their first time. On a day with strong northerlies we watched chicks flapping their wings into the wind and launching a metre or so off the ground. They then hovered in a not particularly coordinated looking manner before landing again for what seemed like a rest. Considering these birds take three to five years to return to land once they first leave, and are capable of flying over 1000km in a day, we felt pretty privileged watching what may have been their very first flights. Unfortunately it was another poor breeding year on

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Gough for Tristan albatross; predation of Tristan albatross chicks by mice continues to cause huge amounts of chick mortality.



Southern Giant Petrel chick and parent.

In regard to travelling long distances, we also found a rather wayward little fellow during a recent trip to the Glen. Standing out like a sore thumb, we spotted a Macaroni penguin perched on a rock in the middle of a few hundred nesting Northern Rockhopper penguins. Macaroni penguins only breed on islands 50° or further south, the closest to Gough being Bouvetøya Island. This fellow was well off course, or perhaps just on an exotic and comparatively-tropical holiday...

The team on the island celebrated the first hatchings of Atlantic Yellow-nosed albatross chicks. Also known as Mollies, the parents incubate their single egg for 70 days, each taking shifts that can last more than three weeks! Chicks will be fed at the nest for the next four months, until they are big enough to take flight and head to sea. The chicks won't return to land and breed as adults until they are at least five years old. There are an estimated 5000 pairs of Mollies on Gough. However, like most albatross species, they are killed as by-catch in a lot of long-line fisheries and recent research shows adult Molly survival on Gough is too low to maintain a stable population.

Greater shearwaters are well into egg-laying now, with almost every large burrow around base full of subterranean shearwater calls. Many of the smaller burrows are home to soft-plumaged petrels, which have just started laying eggs.

The penguins are further along – all of their eggs have hatched now. The chicks are small fat 'peepy' balls of grey down with beak and feet poking out. Moorhen chicks, on the other hand, are much harder to spot. They are even smaller, black scuttling little fluff-balls with ridiculously oversized feet who leave the nest as little as two days after hatching. Size is hardly a problem with the giant petrel chicks though. Some are now so large that a

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parent trying to brood its chick sits tipped at a 45° angle. Like all the other chicks, giant petrels have beautifully soft down, in this case light grey, but the comparison stops there.

Finally, this newsletter's namesake is now officially breeding. Buntings in the highlands have been busy building little grass-lined cup nests, sometimes padded with down from the fledgling albatrosses and laying one to three small blue-ish eggs. The nests are particularly well hidden in rock crevices, hollows in stream banks or under the dense *Blechnum* fern fronds. Our only hope of finding Bunting nests is to spot the female when she takes a brief break from incubating and flies out to meet her mate and feed. Although certainly a rather enjoyable challenge in the mountains of Gough as the wind always blows.

G.P and K.R.-H.



The visiting Macaroni penguin among a colony of Northern Rockhopper penguins

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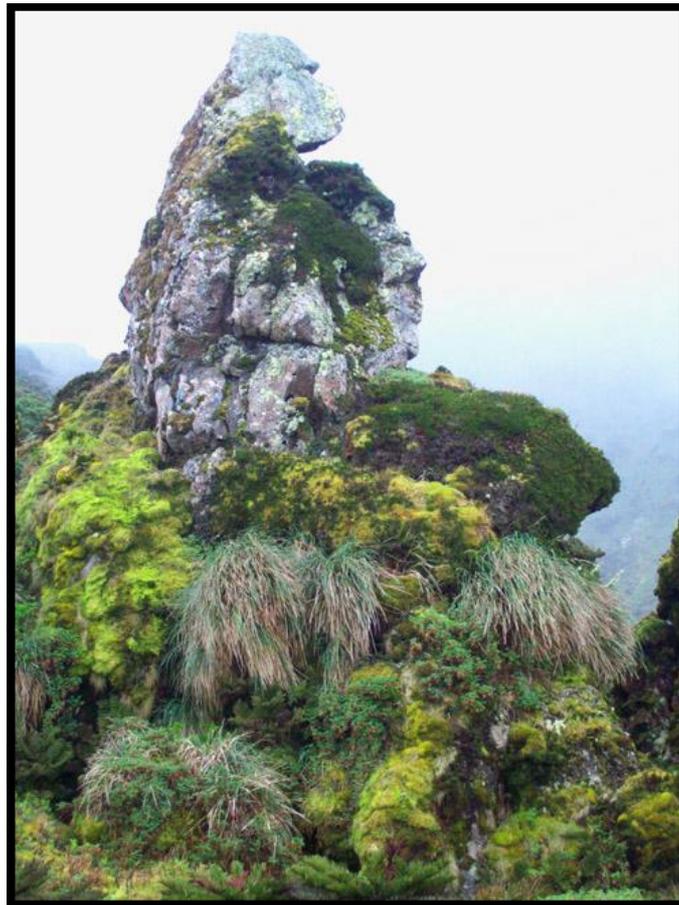
Photo Synthesis



Presented here is a selection of photos taken by the team during their time here on Gough island. *Please vote for your favourite photo.*

Email: gough@sanap.ac.za
Telephone: 021 405 9470
Facebook group **Gough 55**

Winning Photo for October - Spot the gorilla



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L'OREAL

THE PRODUCT FOR PEOPLE IN EXTREME WEATHER CONDITIONS



The Gough 55 team received a very generous donation from L'Oreal S.A for a year while staying on the Island. Even the men are using their products to protect and keep their skin in a good condition while working outside.

Gough Island is situated approximately 2610km from Cape Town at 40°21'S and 9°52'W. It is a British possession, forming part of the Tristan da Cunha Island group and is uninhabited except for the meteorological station manned by 6 South Africans and two New Zealanders.

In 1996 Gough Island was granted 'World Heritage Site' status, and has been little affected by human activities. Therefore it is a resource of great conservation and scientific research significance. Because of this the Island presents a site of unspoilt natural beauty.

The weather data collected on Gough Island is of major importance, not only for forecasting purposes, but also for the establishment of maritime and aviation meteorological information regarding the Southern Oceans, as well as global computer weather models. The weather data collected there is also of great value for agriculture in South Africa. This is one of the main functions of the South African team sent out on the expedition every year, but they would also be very involved in research projects for different institutions. The team members do not only have to work under rather unusual and often extremely hazardous conditions, but they also have to cope with being isolated for the duration of the expedition. The team members will under no circumstances be able to take leave from the Island during the year (with the exception of medical emergencies, when evacuation is needed).

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Taking all this in consideration, it is a great privilege to be spoiled by a company such as L'Oreal for everything each person in the team need for skin and hair care. We want to thank L'Oreal's representative Me. Celeste Tema for this generous contribution for the Gough 55 Team. Because of you we are going to keep our skincare perfect under these harsh conditions.



Kalinka looking at the products from L'Oreal



Even the men got skincare products, and a demonstration how to use the products from L'Oreal.

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Pressure

Ave Max Pressure	1008.5hPa
Ave Min Pressure	999.0hPa
Ave Pressure	1003.4hPa
Max Pressure	1017.6hPa
Min Pressure	984.3hPa

Temperature

Ave Max Temp	13.5 °C
Ave Min Temp	9.1 °C
Ave Temp	11.3 °C
Max Temp	15.7 °C
Min Temp	5.8 °C

Humidity

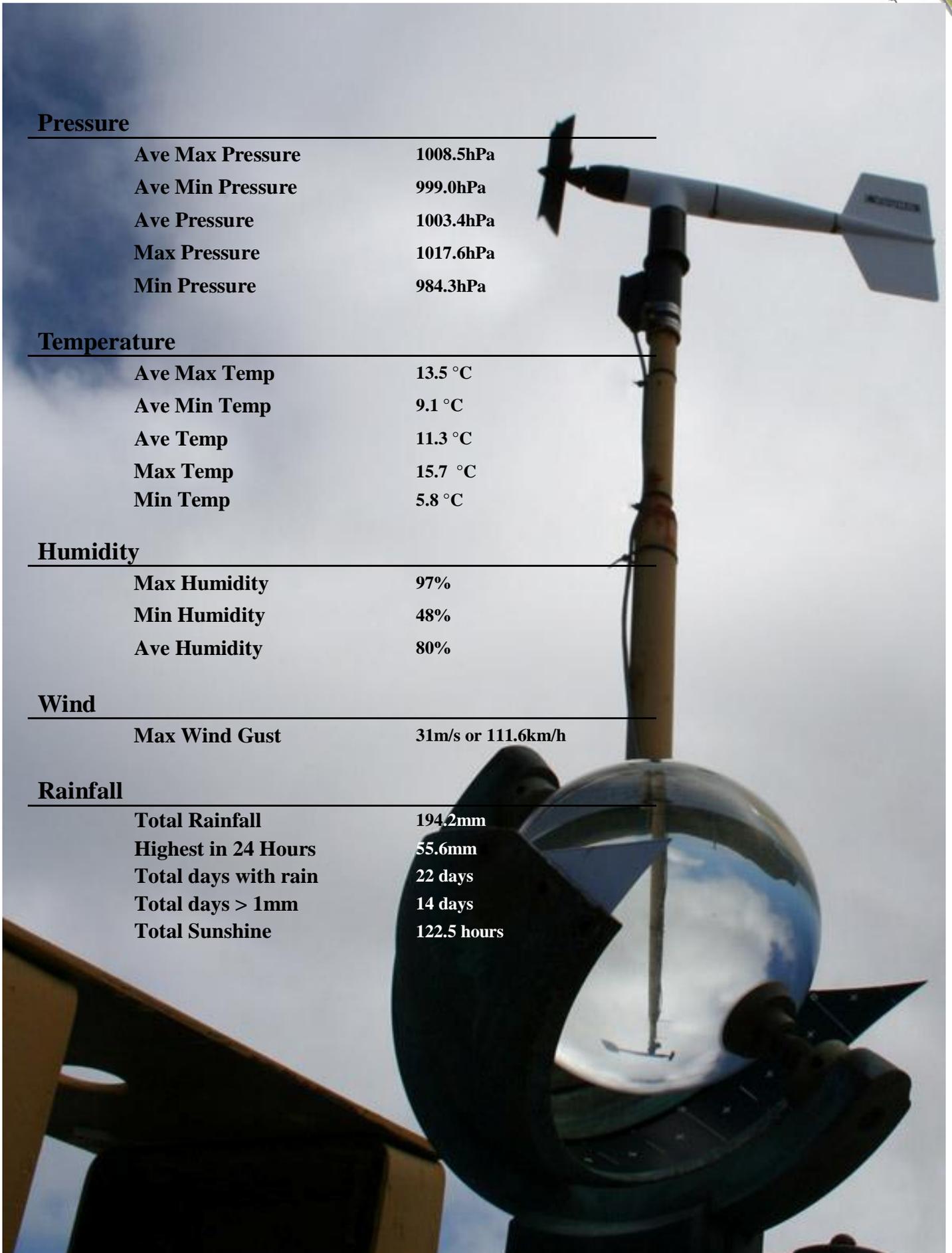
Max Humidity	97%
Min Humidity	48%
Ave Humidity	80%

Wind

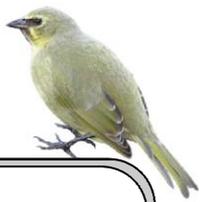
Max Wind Gust	31m/s or 111.6km/h
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Rainfall

Total Rainfall	194.2mm
Highest in 24 Hours	55.6mm
Total days with rain	22 days
Total days > 1mm	14 days
Total Sunshine	122.5 hours



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Sponsors

We would like to thank the following sponsors for making life on Gough island even more exciting.

