

Report on gauges in the South Atlantic

Gauges in the South Atlantic

The ACCLAIM (Antarctic Circumpolar Current Levels by Altimetry and Island Measurements) programme in the South Atlantic and Southern Oceans consists of measurements from coastal tide gauges and bottom pressure stations, together with an ongoing research programme in satellite altimetry.

Phase 1 of ACCLAIM Coastal Gauges

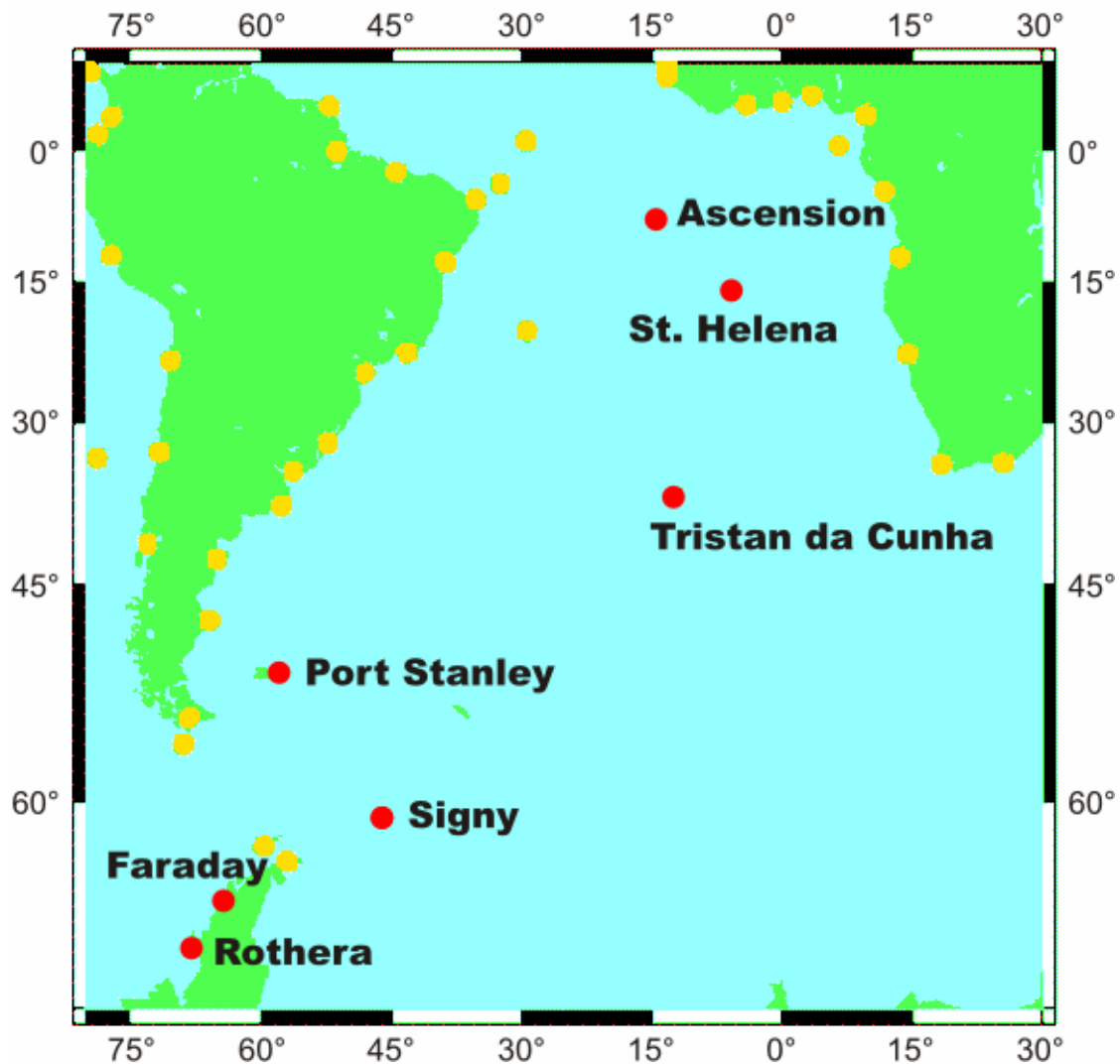
In Phase 1 of ACCLAIM from 1983, measurements at coastal tide gauge sites took the form of sub-surface pressure (SSP) measurements (units of pressure e.g. mbar) rather than sea level (units of length e.g. centimetres). SSP is here defined as the total, measured pressure recorded by a sub-surface pressure transducer, a measurement which includes the pressure load from the atmosphere as well as from the water column. It is absolutely essential that any user of ACCLAIM data realises which data type (either SSP or sea level) is being analysed.

The Phase 1 coastal SSP data were acquired in different ways (e.g. with a diver-replaced Aanderaa pressure gauge at Ascension, or with a Digiquartz in the sea sensor at St. Helena, see Spencer et al. 1993 for details) and with different pressure integration periods (e.g. quarter hour, half hour, one hour). For some data sets, the original data have been filtered to give one hour sampling. However, common to all records is an uncertainty connected with potential offset biases and drifts in the pressure sensors. At some sites (e.g. St. Helena) extensive tide pole data are also available and biases and long term drifts in the sensor data may eventually be rectified (this is under study at present). However, the drifts in general mean that in most cases the records should not be used, without further careful attention in particular studies, for the study of timescales seasonal or longer.

Phase 2 of ACCLAIM Coastal Gauges

From around early 1993, the gauges at several sites were replaced by 'B gauges' which record SSP, air pressure and sea level. These gauges have precise datum control and are used to provide long term sea level change data to the PSMSL.

Some Phase 1 and all Phase 2 coastal data will contain ancillary information on air pressures and sea temperatures from ACCLAIM sensors. Several of these records contain large gaps. However, POL has collected extensive sets of such ancillary data from meteorological agencies for its own analysis purposes, and should be able to provide further advice.



Red dots on the above map indicate sites of POL's South Atlantic coastal tide gauge network (ACCLAIM), while the yellow dots show gauges (not necessarily operational) committed to the GLOSS programme by other countries in the region.

At the present time the tide gauge sites at Ascension, St. Helena and Port Stanley can be considered to be complete 'Phase 2' sites, while Tristan, Signy and Rothera remain 'Phase 1' (i.e. simple pressure transducer sites). At Faraday (which contains the longest tide gauge record in Antarctica and which is now called Vernadsky and operated by groups from Ukraine) there is a conventional float gauge together with a 'Phase 1' transducer.

Information on data presented below is from the latest series collected. More information on this and previous data collected can be found at the ACCLAIM website:

<http://www.pol.ac.uk/psmslh>

There are three directories: bprs, phase1 and phase2. Each has an inventory file, giving more information about the tide gauges.

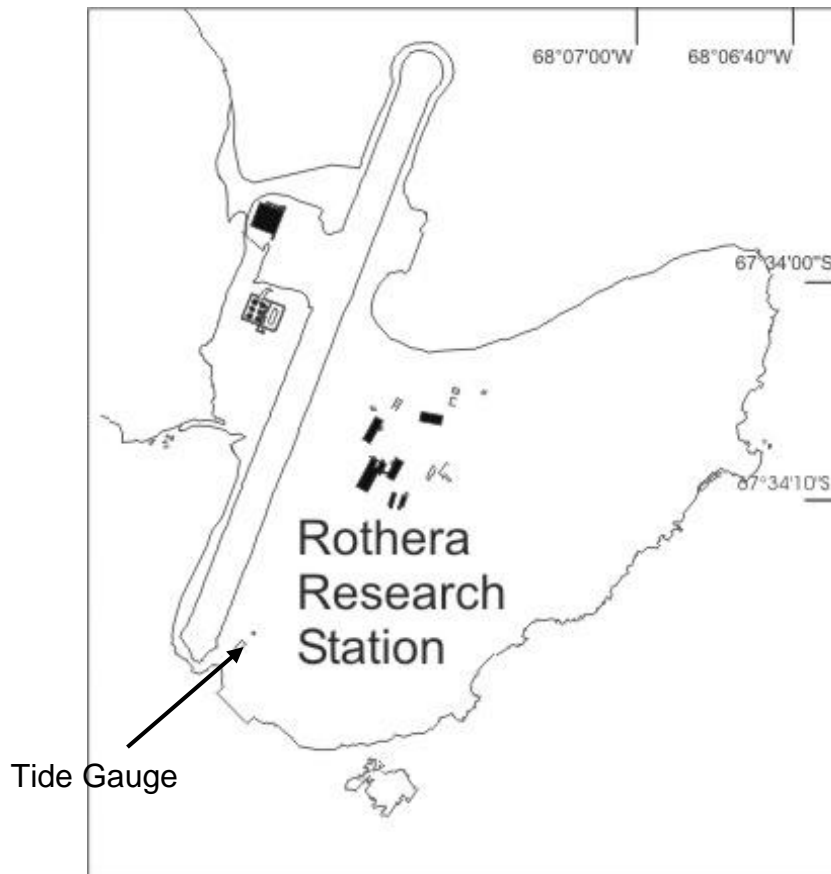
Rothera Tide Gauge

Latitude: 67° 34.3' S

Longitude: 068° 07.7' W

Instrument type: Full tide pressure gauge and half tide pressure gauge.

Site of Gauge: The tide gauge is mounted in a sea water well, approximately 100 metres shorewards of the main jetty.



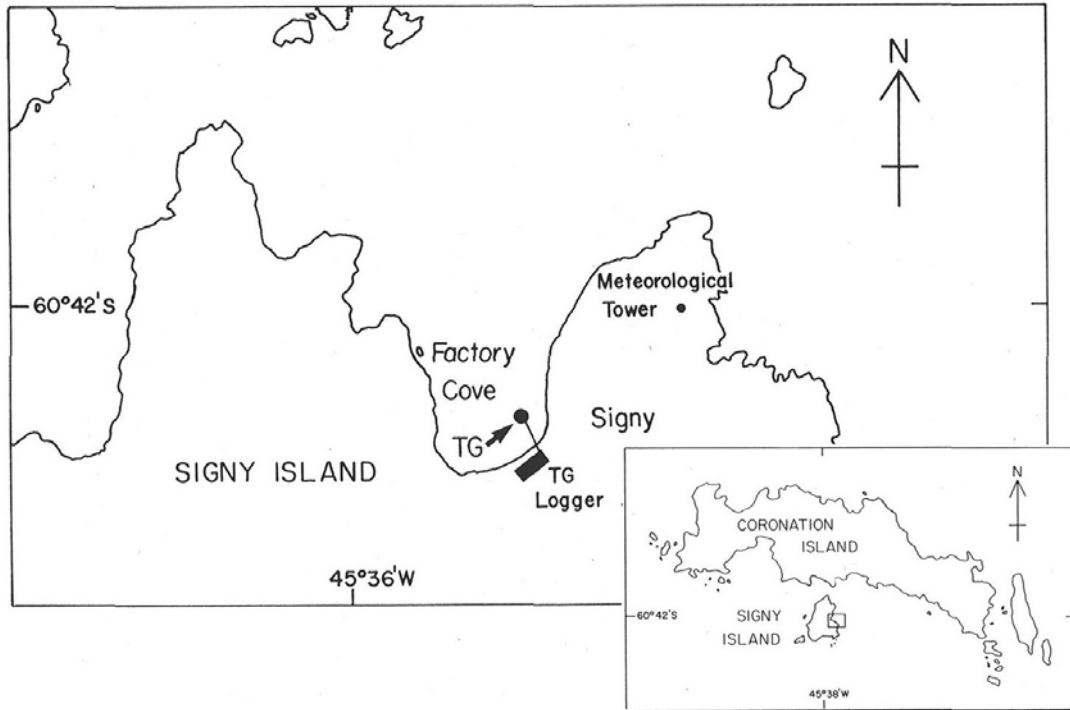
Signy (South Orkney Islands)

Latitude: 60° 43.0' S

Longitude: 045° 34.0' W

Instrument type: Digiquartz pressure sensor

Site of Gauge: Data logger in nearby British Antarctic Survey boat house / generator building.



Tristan da Cunha

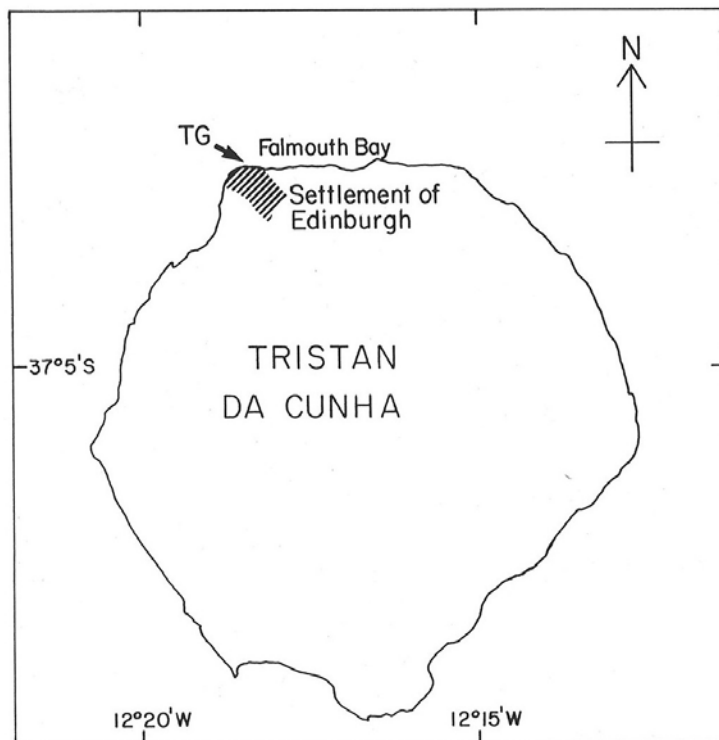
Latitude: 37° 03.0' S

Longitude: 012° 18.0' W

Instrument type: Digiquartz pressure sensor

Site of Gauge: Tristan da Cunha harbour (data logger in the nearby settlement of Edinburgh).

System totally destroyed by a storm in 2001. No repair is possible. A total new installation is required.



Ascension

Latitude: 07° 54.0' S

Longitude: 014° 23.0' W

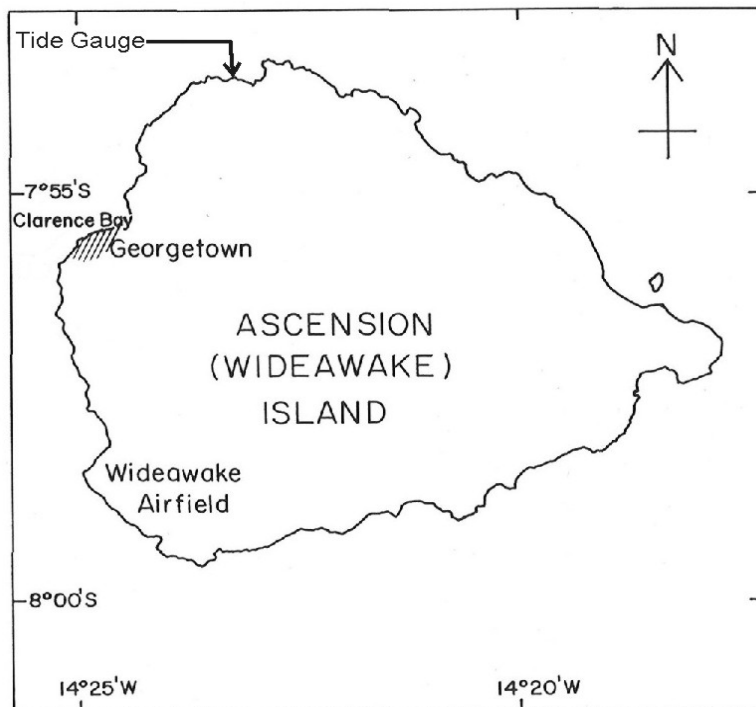
Instrument type: All-in-one B gauge (pressure gauge), Kalesto radar gauge with Orbcomm

Site of Gauge: English Bay, Hook Jetty.

Benchmarks and Benchmark relationships:

"Ascension B-datum March 1999" is 3.176m below benchmark POL13 (POL13 BM).

System totally refurbished in September 2005.



Port Stanley-B

Latitude: 51° 41.0' S

Longitude: 057° 49.0' W

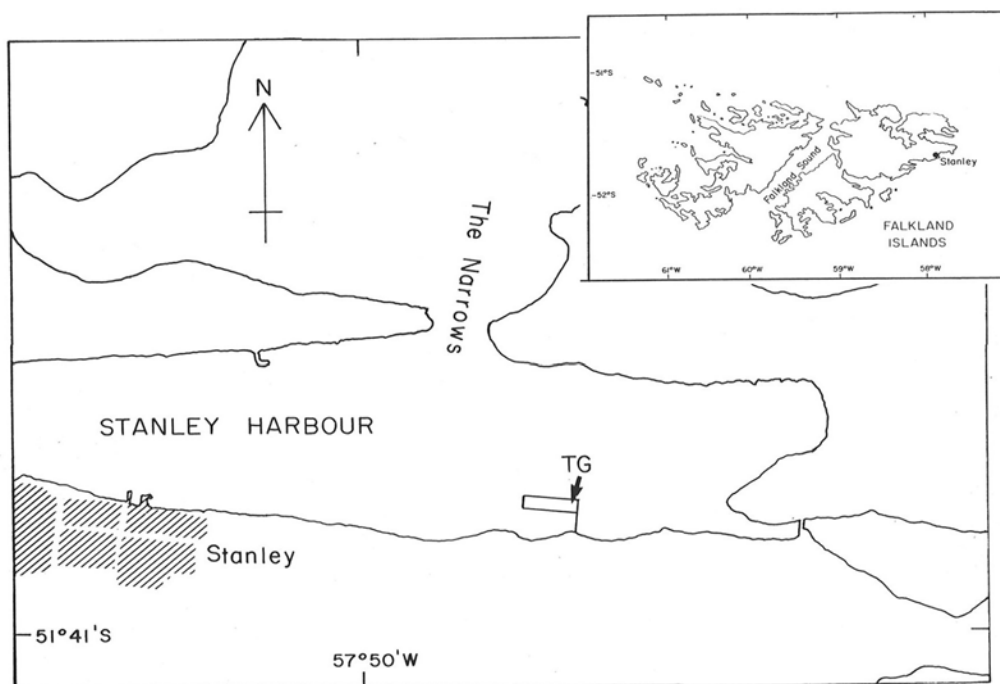
Instrument type: Old style and new all-in-one B gauges (pressure gauges), Kalesto radar gauge with Orbcomm

Site of Gauge: Eastern end of Port Stanley harbour by the 'floating warehouses' (FIPASS).

Benchmarks and Benchmark relationships:

"Stanley B-datum November 1998" is 2.935m below benchmark A (BM A).

System totally refurbished in November 2005.



St. Helena

Latitude: 15° 55.0' S

Longitude: 005° 43.0' W

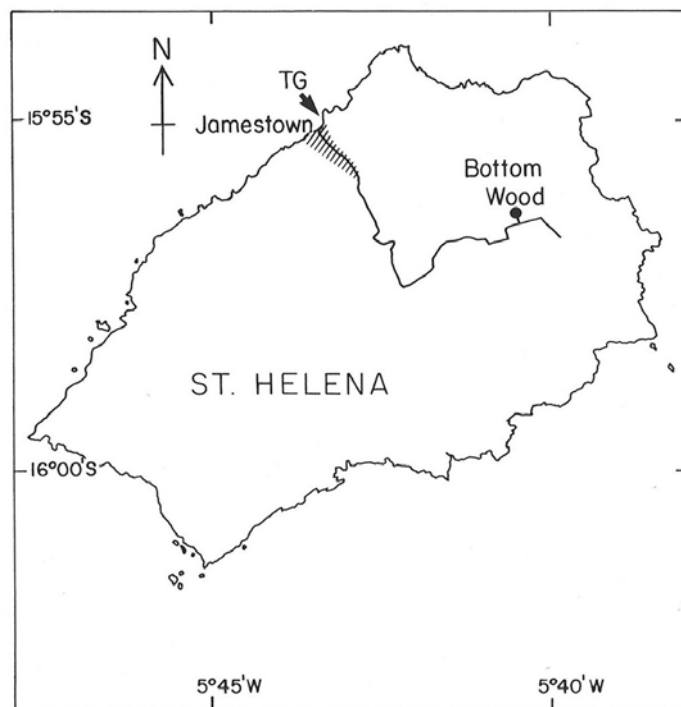
Instrument type: B gauge (pressure gauge)

Site of Gauge: Jamestown Harbour, by the landing steps.

Benchmarks and Benchmark relationships:

“St. Helena B-datum April 1997” is 2.871m below the top step benchmark (BM top step).

In October 2001 a rock fall destroyed power supplies to the gauge so that there will be a gap until August 2002. In addition, the gauge was taken out by the local people and reinstalled in the gap. Special attention must be paid to the reinstalled datum in the next batch of data.



Faraday / Vernadsky

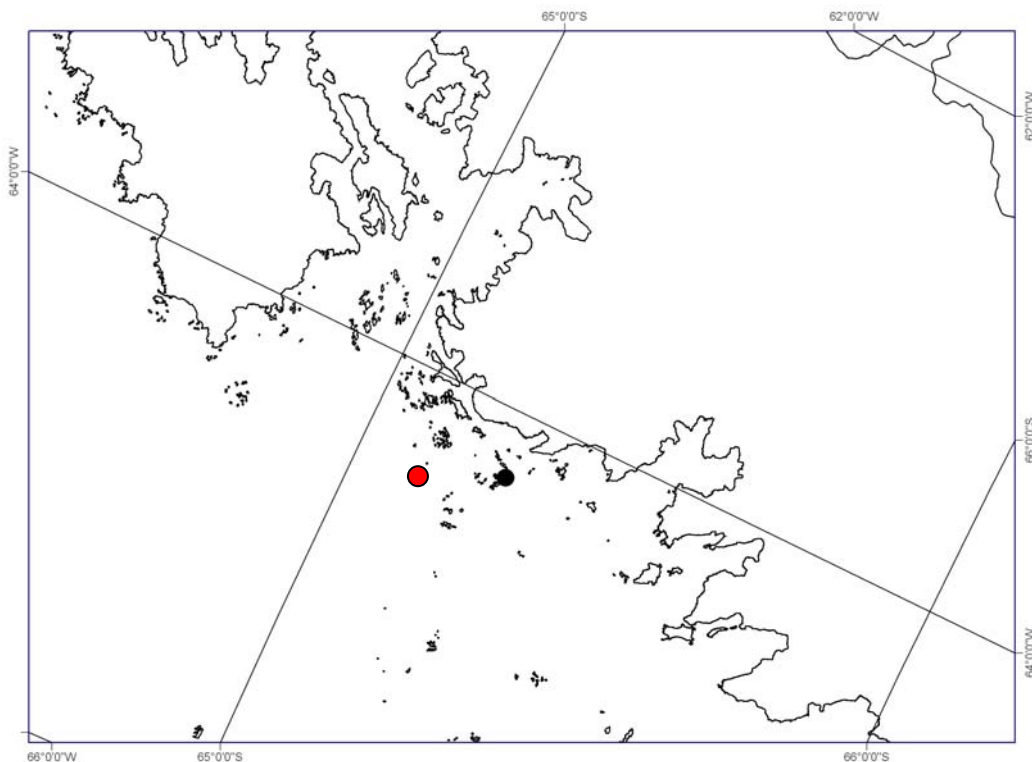
Latitude: 65° 15.0' S

Longitude: 064° 16.0' W

Instrument type: Float gauge, Digiquartz pressure sensor, OTT pressure sensors with DCP.

Site of Gauge: Located in tide gauge hut near to camp.

Benchmarks and Benchmark relationships:
TGZ = 2.750m below benchmark C (BM C).



South Atlantic Activities in 2005

2005 turned out to be a busy year for tide gauge maintenance.

Ascension

At Ascension, the old gauge steelwork was removed and refurbished with new “all-in-one” sensors in September. Alongside the pressure gauge, a radar gauge was also installed with an Orbcomm unit that sends back four 15 minute averages every hour, via satellite. With this new Orbcomm technology installed, the old Iridium interface was removed.

The Southern Ocean Tide Gauge (SOTG) logger was upgraded to provide 1 minute average data every hour via the dial-up connection to the local ISP. The background Tidata logger was also refurbished and data was downloaded from both loggers.

Ascension was visited again a few weeks later in November, when an additional solar panel was fitted. All power needs are now met by three solar panels operating in parallel. During the same visit, a fault which had developed with the Orbcomm antenna was able to be fixed.

Port Stanley

A new “all-in-one” gauge was installed at Stanley in November, alongside the original gauge and a radar gauge with Orbcomm was also added. As at Ascension, the Orbcomm sends back four 15 minute averages every hour and the SOTG logger was upgraded to send back one minute averages via dial-up every hour. The original pressure gauge and Tidata logger were both refurbished during the visit and data downloaded.

Port Stanley also received a second visit in December 2005. This was to upgrade the modem firmware to provide authentication after the ISP changed the protocol for sending emails via dial-up.

Vernadsky

All data was downloaded and the memory card was replaced during a very brief visit. Unfortunately the gauge doesn't appear to be functioning properly since the card was replaced and the fault is being investigated.

A new OTT gauge consisting of two pressure sensors and a DCP was delivered to the base and will be installed during 2006.

Rothera

Rothera also only received a very brief visit during 2005. All data was downloaded without any problems.