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.

Phase 1 of ACCLAIM Coastal Gauges

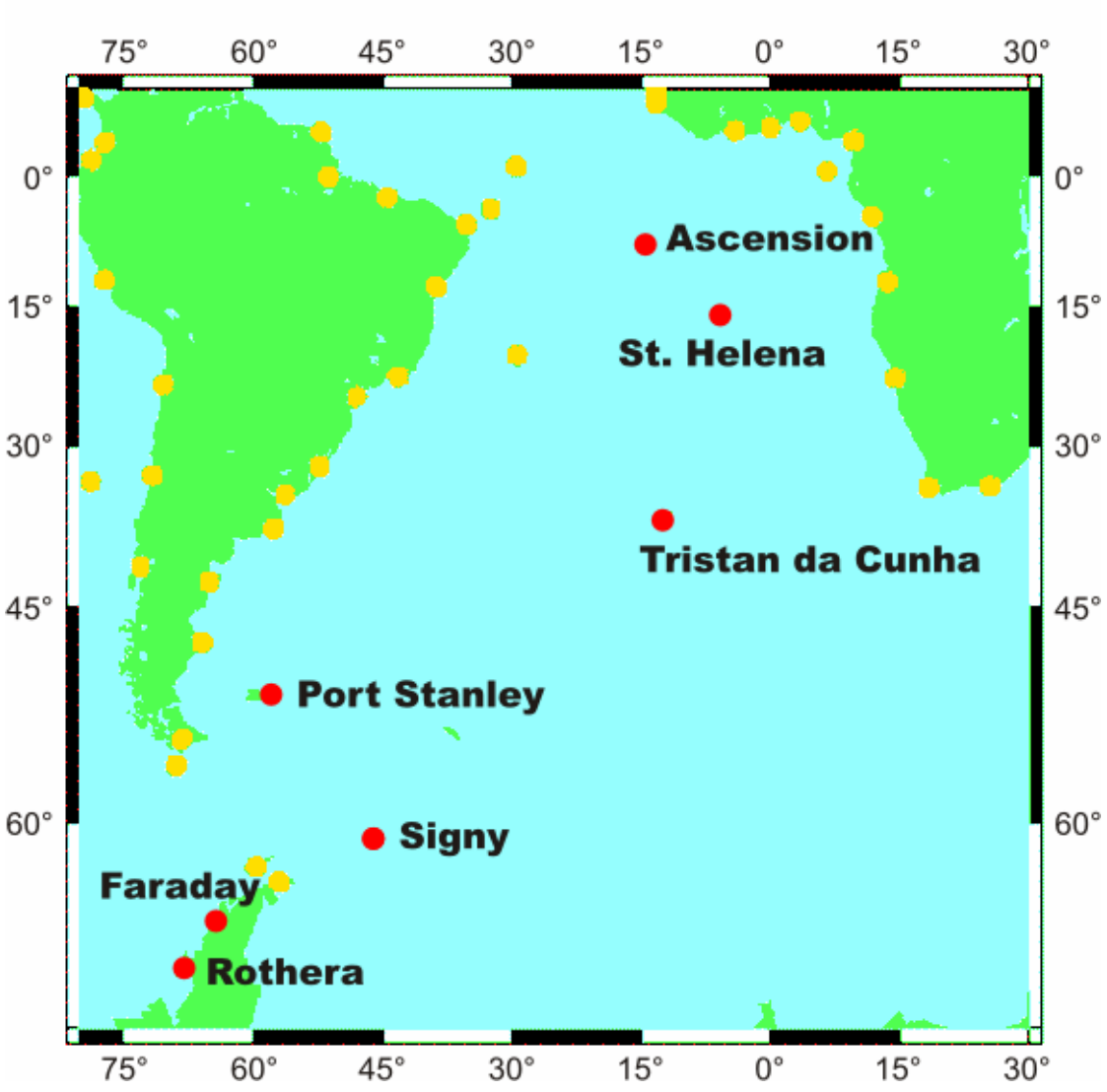
Phase 1 of ACCLAIM began in 1983, and measurements at coastal tide gauge sites took the form of sub-surface pressure (SSP) measurements (units of pressure, e.g. mbar) rather than sea level (units of length, e.g. centimetres). SSP is defined here as the total measured pressure recorded by a sub-surface pressure transducer, a measurement that includes the pressure load from the atmosphere as well as from the water column. It is 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. However, in general the drifts mean that, in most cases, the records should not be used for the study of timescales seasonal or longer, without further careful attention in particular studies.

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

Ascension

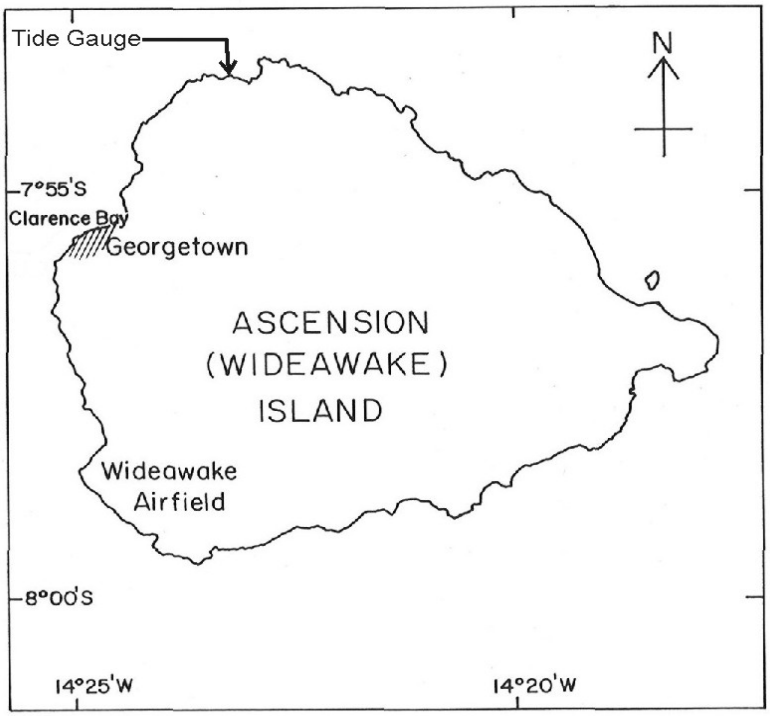
Latitude: 07° 54.0' S Longitude: 014° 23.0' W

Instrument type: All-in-one ‘B’ 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

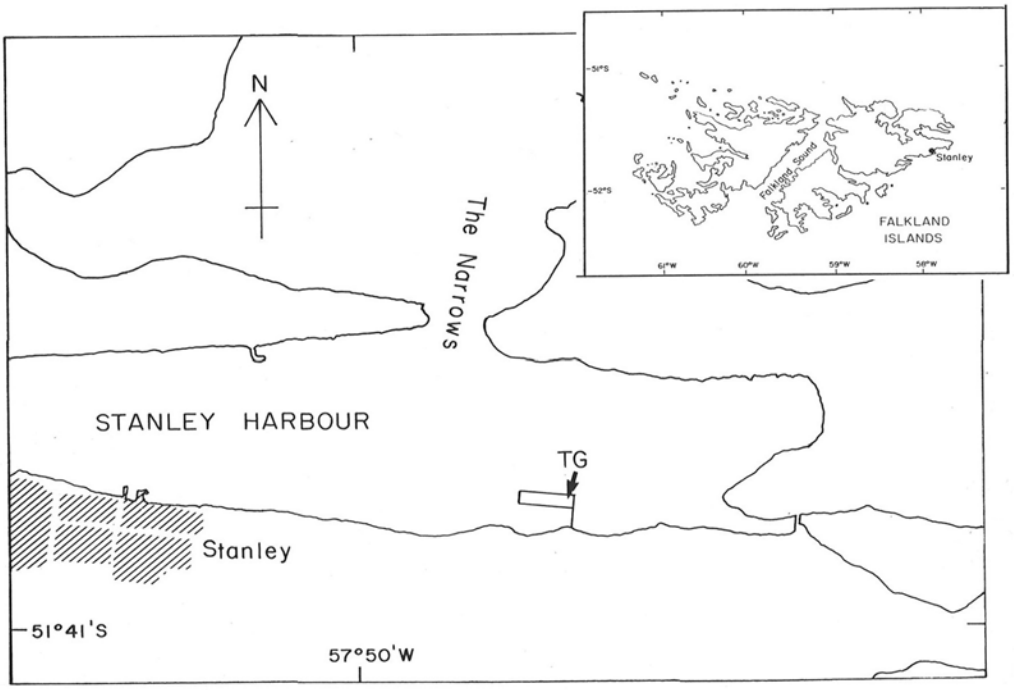
Latitude: 51° 41.0' S Longitude: 057° 49.0' W

Instrument type: Old style ‘B’ pressure gauge and new all-in-one ‘B’ gauge, 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.

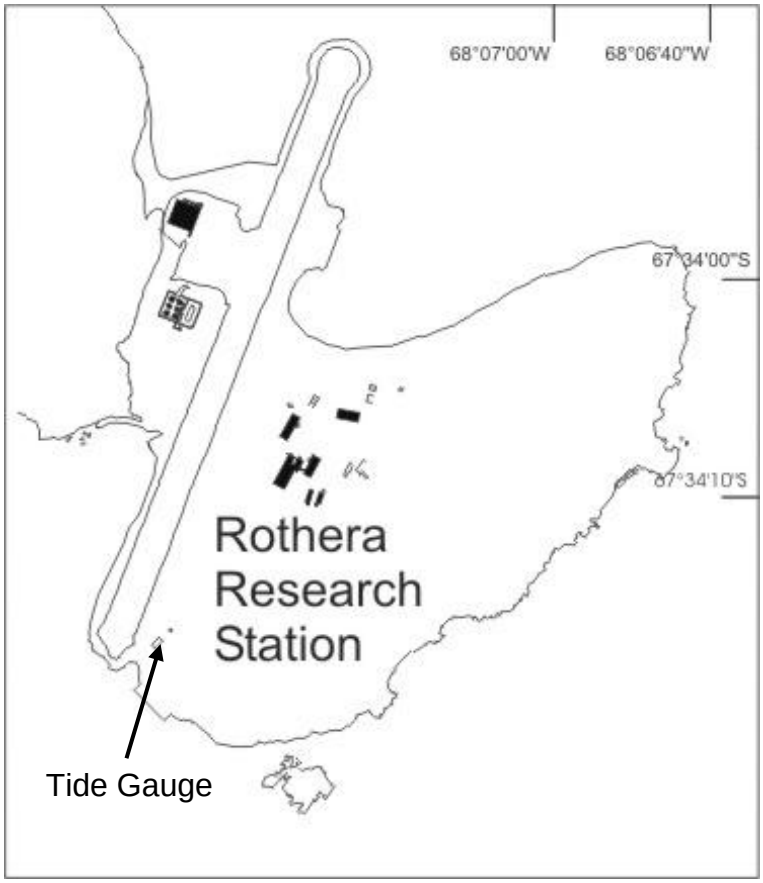


Rothera Tide Gauge

Latitude: 67° 34.3' S Longitude: 068° 07.7' W

Instrument type: ‘B’ pressure gauge.

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



St. Helena

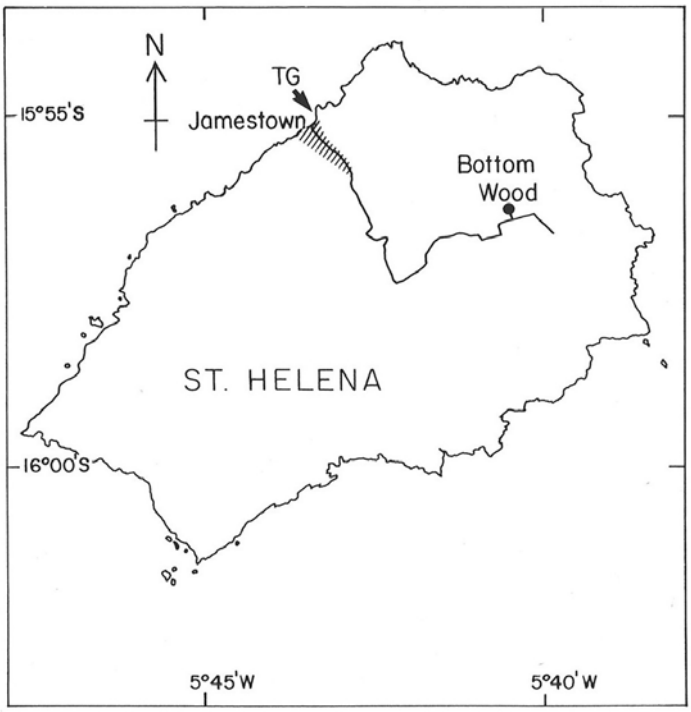
Latitude: 15° 55.0' S Longitude: 005° 43.0' W

Instrument type: ‘B’ 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.

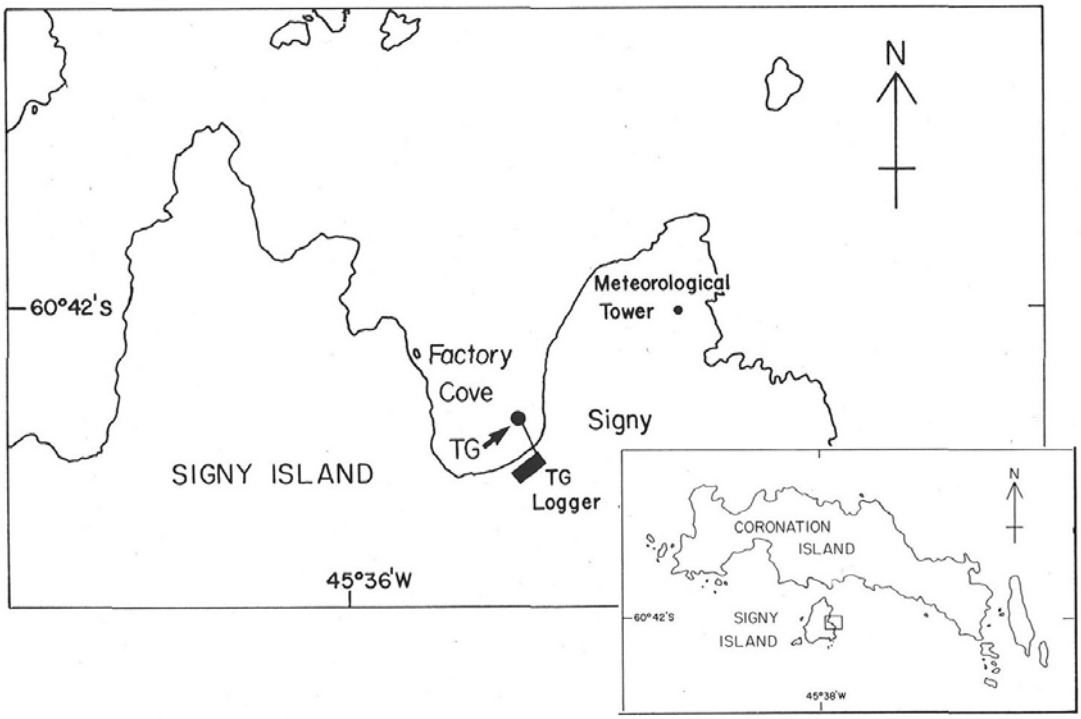


Signy (South Orkney Islands)

Latitude: 60° 43.0' S Longitude: 045° 34.0' W

Instrument type: Single Digiquartz pressure sensor

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



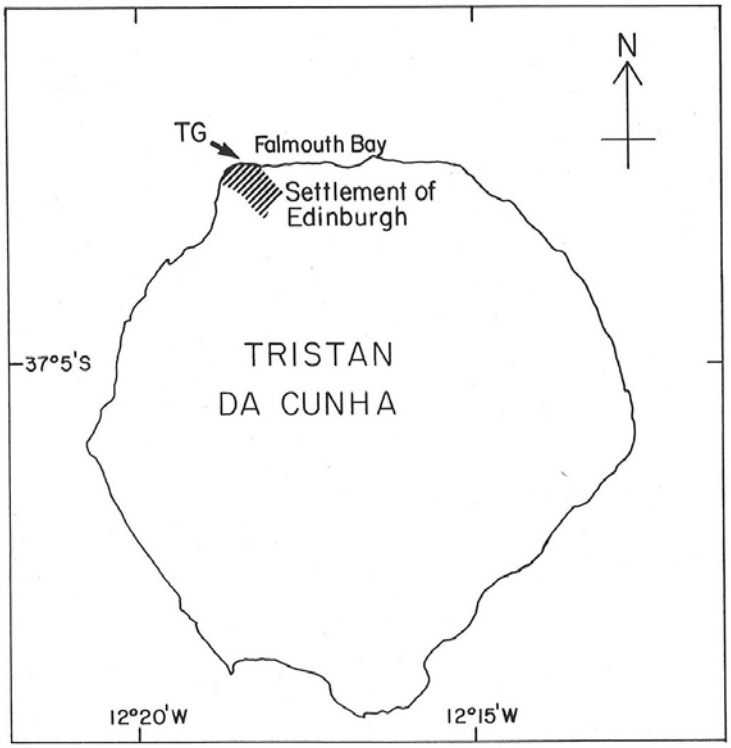
Tristan da Cunha

Latitude: 37° 03.0' S Longitude: 012° 18.0' W

Instrument type: Single 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.



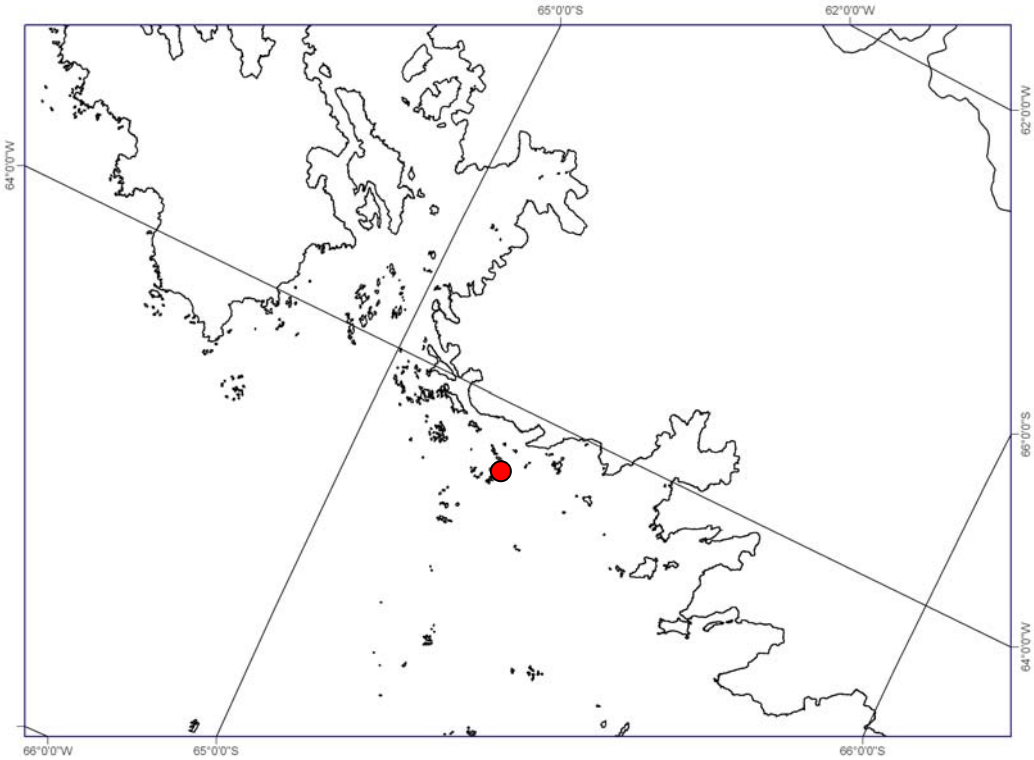
Faraday / Vernadsky

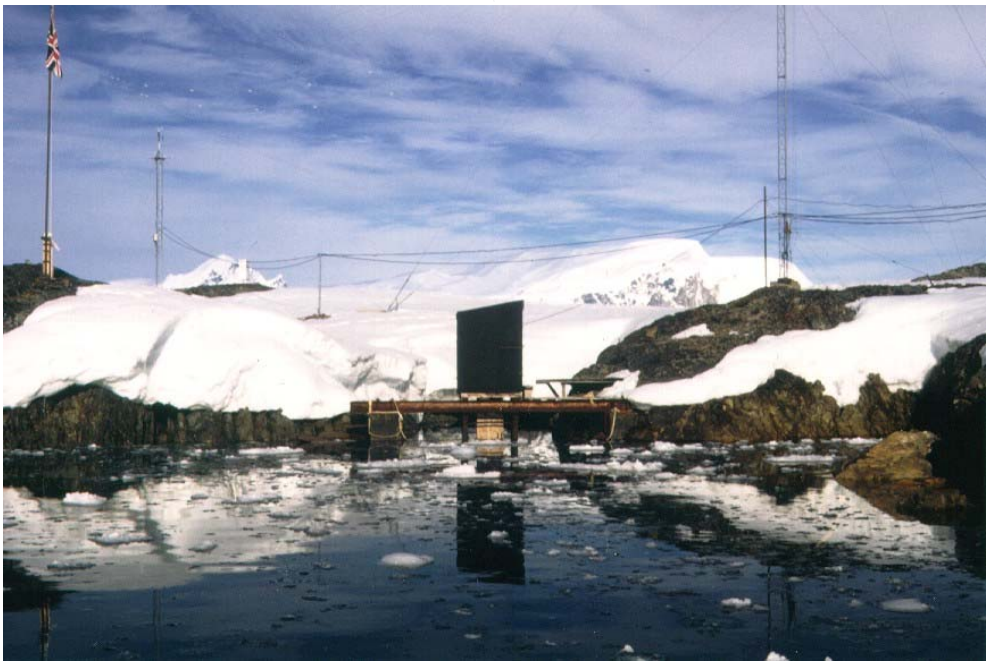
Latitude: 65° 15.0' S Longitude: 064° 16.0' W

Instrument type: Float gauge, single Digiquartz pressure sensor, OTT pressure sensors with DCP. Problems experienced with DCP transmissions, to be investigated next visit.

Site of Gauge: Located in tide gauge hut near to main base building.

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





South Atlantic Activities in 2006

2006 was a quiet year for tide gauge maintenance.

Ascension
No visit was made to Ascension in 2006. Data flow was good from all sensors.

Port Stanley
The original pressure gauge data were downloaded. There was some data corruption on the card so the card was replaced.

A replacement Orbcomm system was installed to replace the defective one installed last year. Problems now appear to have been resolved.

The ‘all-in-one’ gauge logger had a firmware upgrade to change the units of measurement from mm to mb.

There are ongoing quality issues with the telephone line that have been investigated by Cable and Wireless. Despite a line upgrade to most of the system, the problems have still not been sorted out.

Rothera
Rothera also only received a very brief visit during 2006. All data were downloaded without any problems.

A serial link was installed from the tide gauge to the Gumstix system, which will eventually allow real time data to be sent back.

St. Helena
Data were downloaded by the local operator without any problems. There were power cuts during the year but gauge is up and running. A new radar gauge and DCP will be sent out and installed in the coming year.

Signy
The gauge lasted throughout the winter this year and was downloaded by the Base Commander. The data looks good even though the temperature record shows a drop to –20°C.

Tristan da Cunha
A brand new gauge has been bought. It is intended that it will be installed in 2007.

Vernadsky
All data were downloaded during a brief visit. Due to problems with the memory card that was installed in 2005, some data were lost. The card was repaired by the Ukrainian scientists and is now functioning correctly. To avoid a repeat of problems with the memory card, the system was kept running during the download - which meant that about 2 hours of scans were lost.