

## **Report on gauges in the South Atlantic**

## Gauges in the South Atlantic

In 2007, the Oceans 2025 funding programme, Theme 10 Sustained Observations, replaced what was formerly known as the ACCLAIM (Antarctic Circumpolar Current Levels by Altimetry and Island Measurements) programme in the South Atlantic and Southern Oceans under Work Package 7: The UK contribution to GLOSS. The project consists of measurements from coastal tide gauges and bottom pressure stations.

### Historical background to the ACCLAIM project

#### *Phase 1 of ACCLAIM Coastal Gauges*

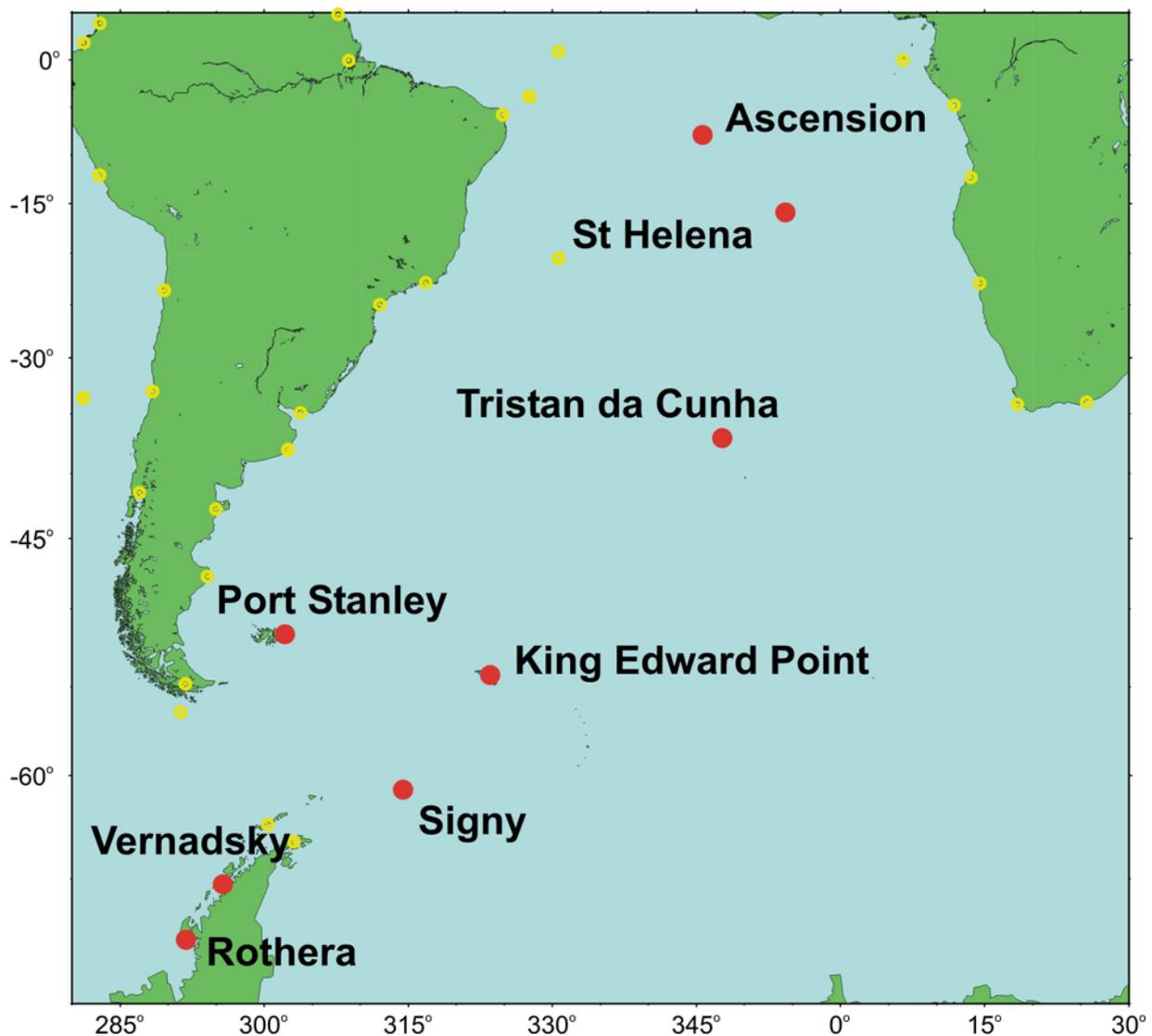
Phase 1 of ACCLAIM began in 1983, and measurements at coastal tide gauge sites took the form of sub-surface pressure (SSP) measurements (units of pressure e.g. mbar) rather than sea level (units of length e.g. centimetres). SSP is here defined as the total, measured pressure recorded by a sub-surface 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. However, the drifts in general 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.



### *UK Contribution to GLOSS*

Red dots on the above map indicate sites of POL's South Atlantic coastal tide gauge network, 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, Port Stanley and Rothera can be considered to be complete 'Phase 2' sites, while Tristan and Signy remain 'Phase 1' (i.e. simple pressure transducer sites). At Vernadsky (now owned by the 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/ntslf/acclaimdata>

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.

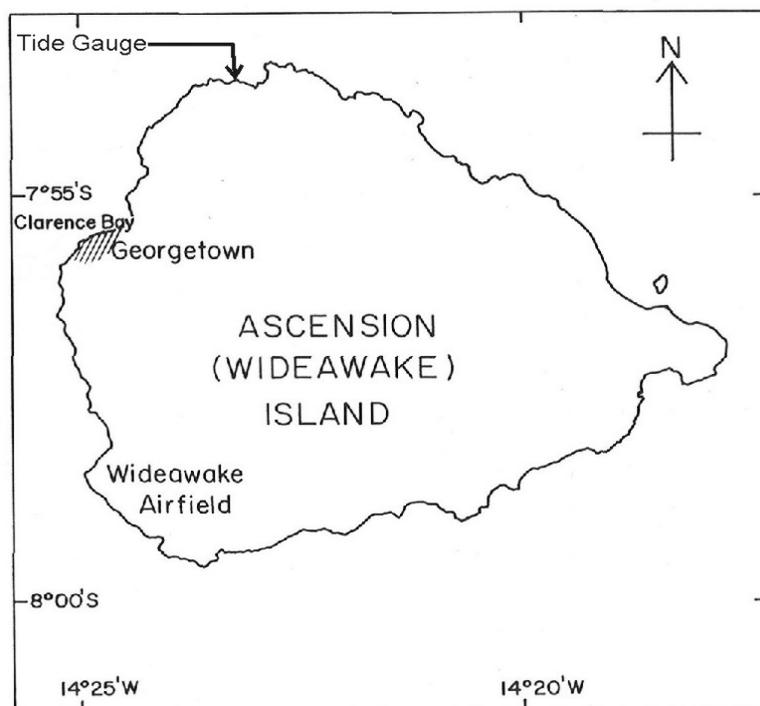
Benchmarks and Benchmark relationships:

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

The system was last refurbished in September 2005.

Real/near-real time data:

[http://www.pol.ac.uk/ntslf/sadata\\_islands\\_ntslf\\_radar.php?code=0008&span=1](http://www.pol.ac.uk/ntslf/sadata_islands_ntslf_radar.php?code=0008&span=1)



## King Edward Point, South Georgia

Latitude: 54° 17.0' S

Longitude: 036° 30.0' W

Instrument type: Real time Portux gauge with two KPSI pressure sensors returning data by email.

Site of Gauge: Located in boat shed next to jetty, with sensors mounted on quayside.

Benchmarks and Benchmark relationships:

TGZ is approximately 1878mm below the edge of the quayside. The quayside is 1340mm above ACD. Levelling needs to be carried out to confirm this.

Real/near-real time data:

[http://www.pol.ac.uk/ntslf/sadata\\_kep.php?code=PORTK001&span=1&opt=prs](http://www.pol.ac.uk/ntslf/sadata_kep.php?code=PORTK001&span=1&opt=prs)



## Port Stanley-B

Latitude: 51° 41.0' S

Longitude: 057° 49.0' W

Instrument type: Old style and new all-in-one 'B' pressure gauges, Kalesto radar gauge with DCP.

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

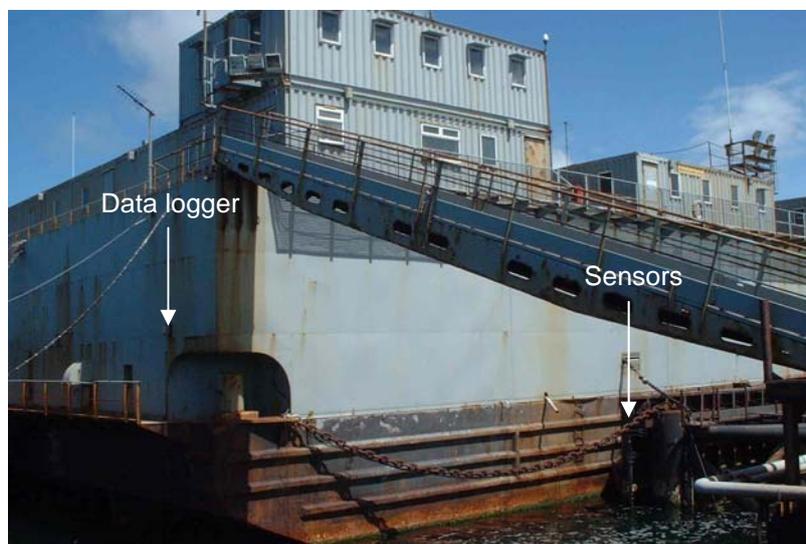
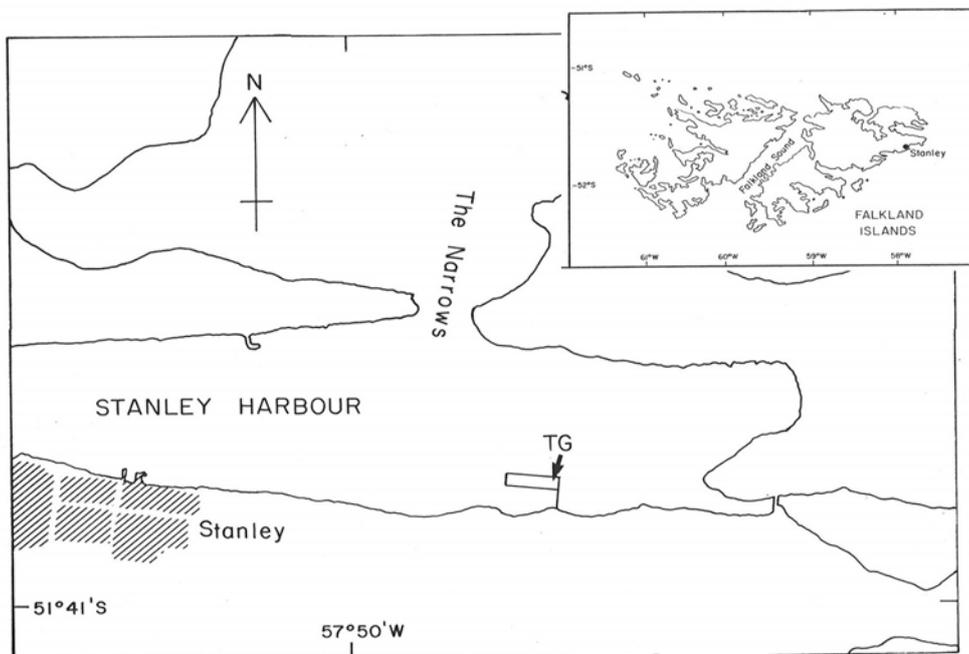
Benchmarks and Benchmark relationships:

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

The system was last refurbished in November 2005.

Real/near-real time data:

[http://www.pol.ac.uk/ntslf/sadata\\_sa.php?code=STN&span=1](http://www.pol.ac.uk/ntslf/sadata_sa.php?code=STN&span=1)



## Rothera Tide Gauge

Latitude: 67° 34.3' S

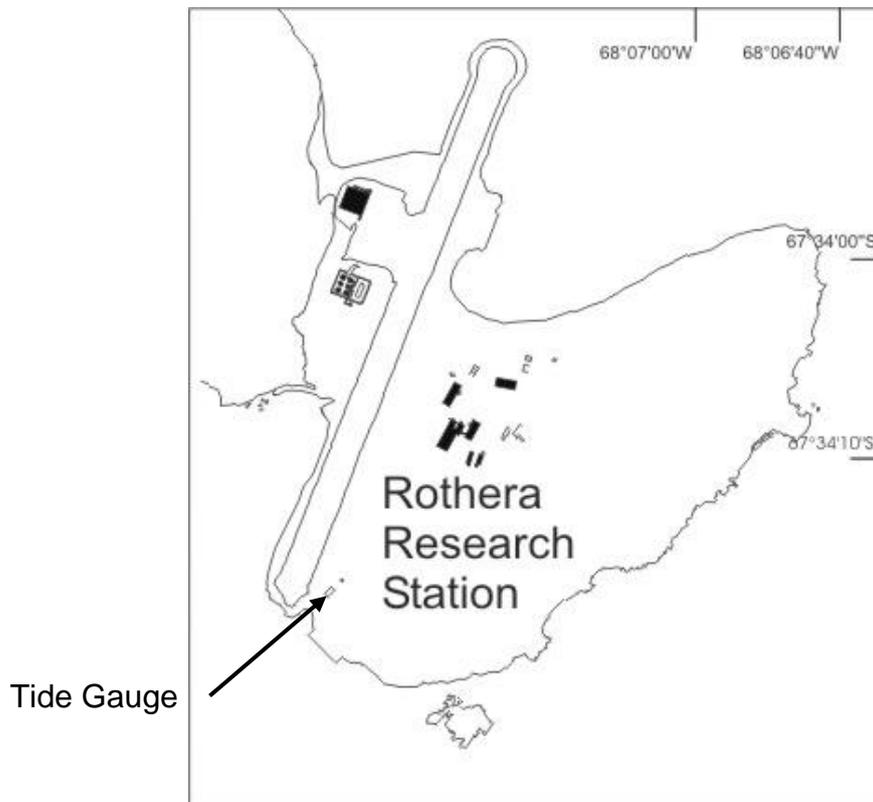
Longitude: 068° 07.7' W

Instrument type: 'B' pressure gauge.

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

Real/near-real time data:

[http://www.pol.ac.uk/ntslf/sadata\\_gumstix\\_rothera.php?code=TGUMR001&span=1&option=prs](http://www.pol.ac.uk/ntslf/sadata_gumstix_rothera.php?code=TGUMR001&span=1&option=prs)



## 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.

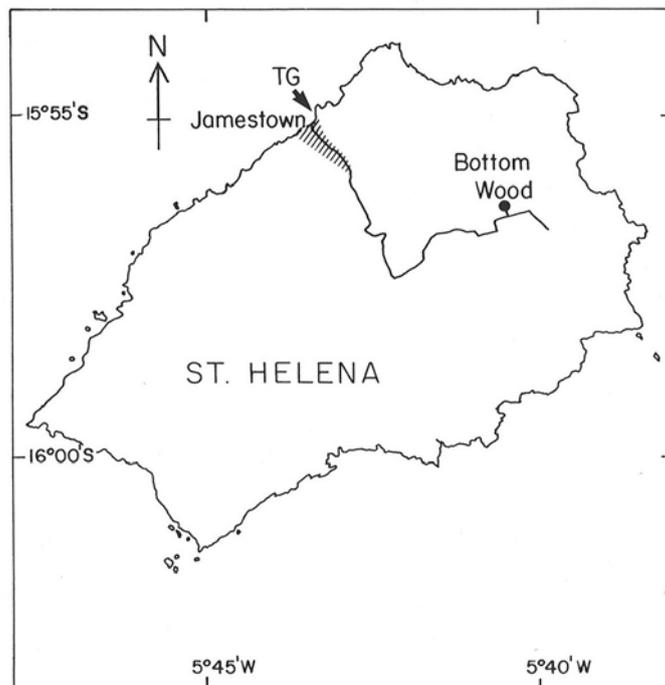
Benchmarks and Benchmark relationships:

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

Dial-up data downloads have not been available from St Helena for some time. Storm damage to the gauge was repaired locally during the year but it our intention to install a replacement gauge in St Helena during 2009 after harbour works are completed.

Real/near-real time data:

<http://www.pol.ac.uk/ntslf/sadata.php?code=STH&span=1>



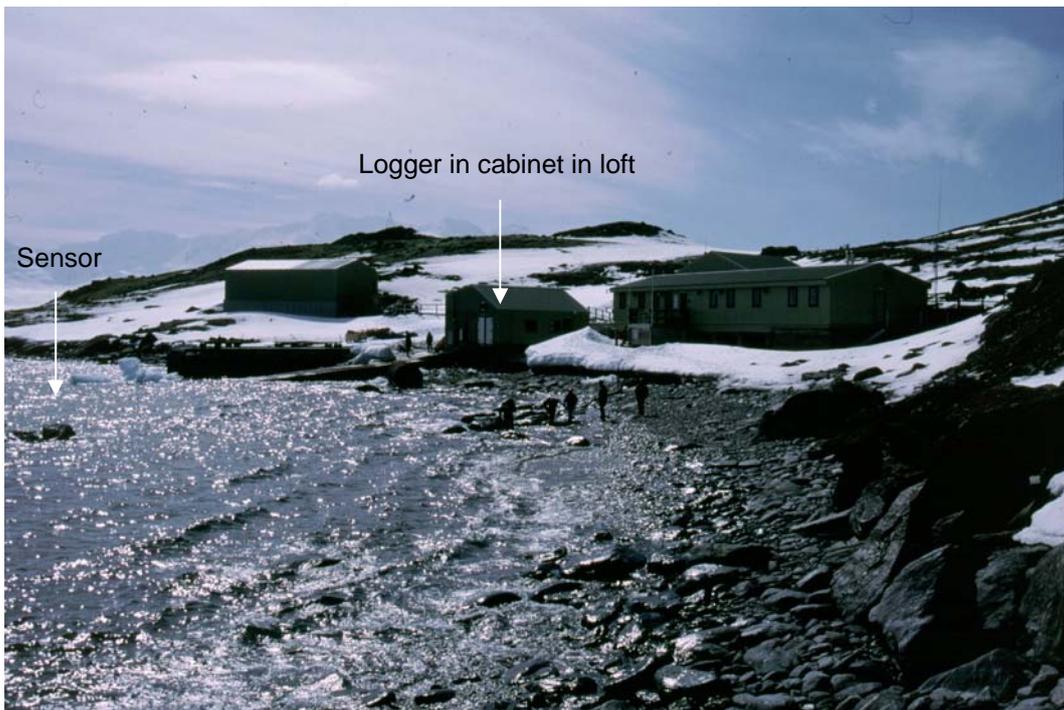
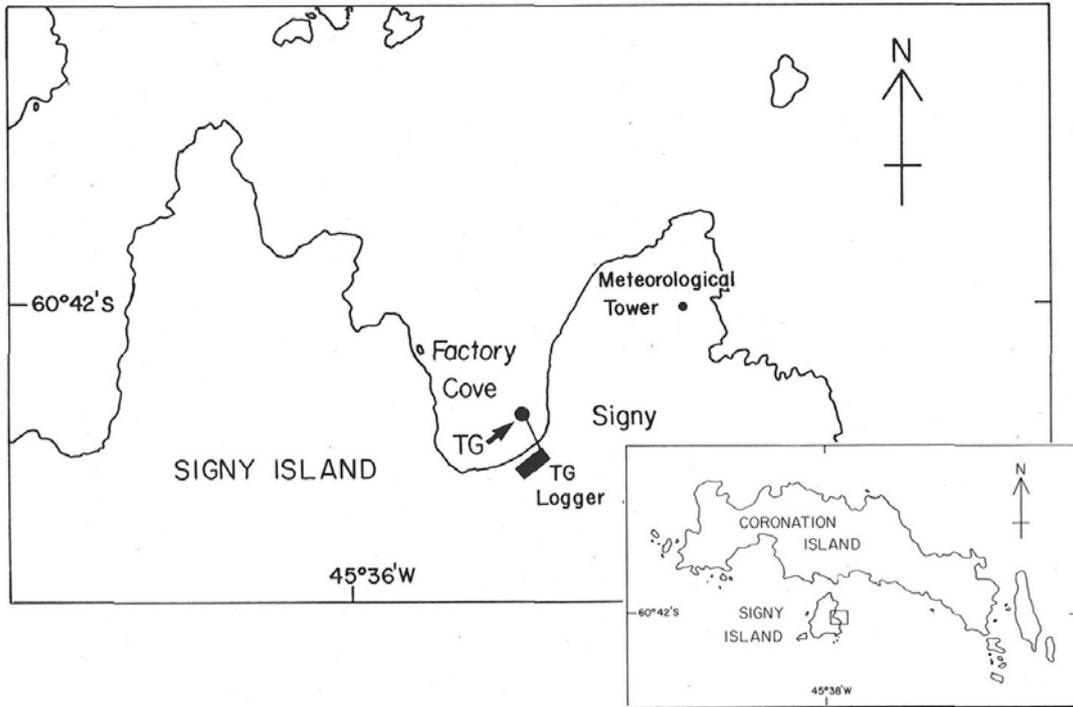
### Signy (South Orkney Islands)

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

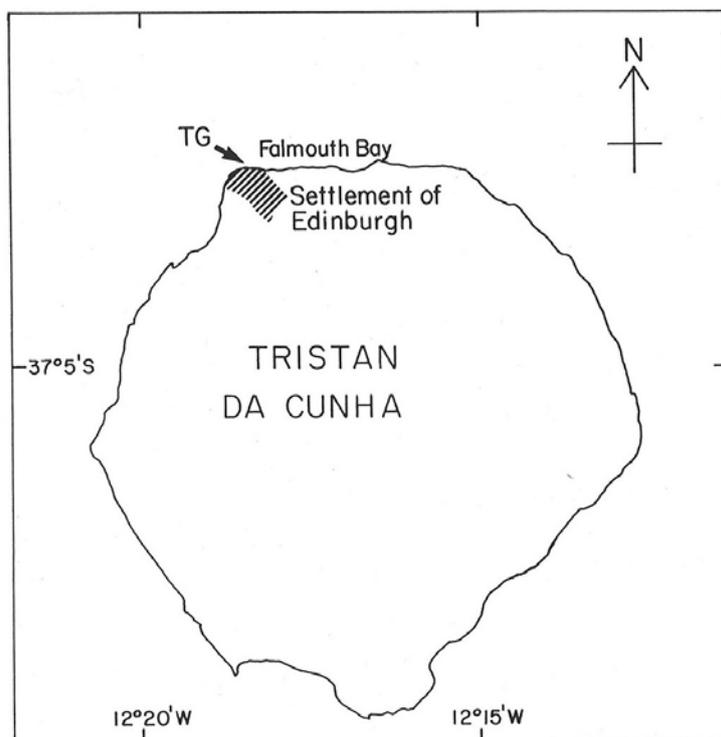
Latitude: 37° 03.0' S

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 totally new installation is required but has been delayed due to a major fire at the cannery which provides power for the whole island, including the tide gauge. The installation is now provisionally scheduled for 2009.



## Faraday / Vernadsky

Latitude: 65° 15.0' S

Longitude: 064° 16.0' W

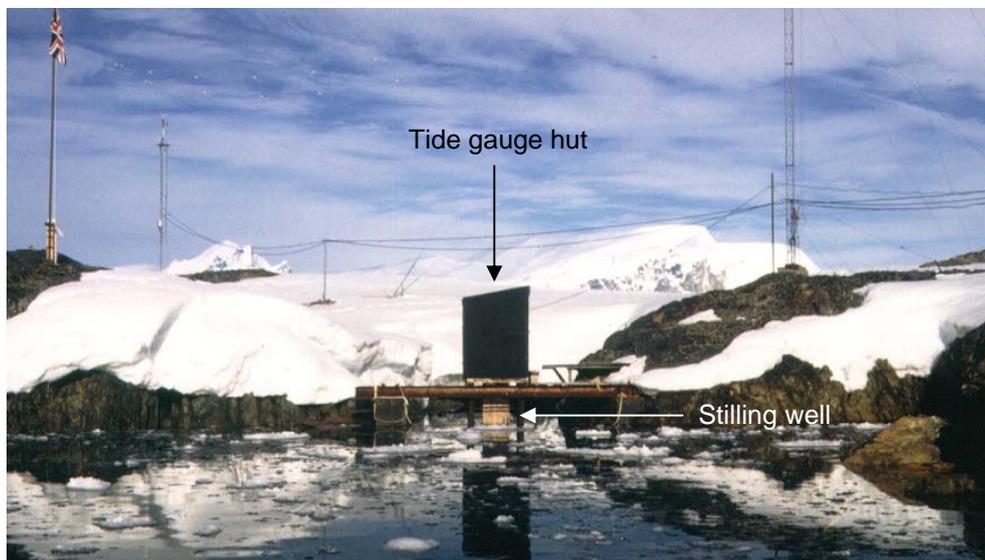
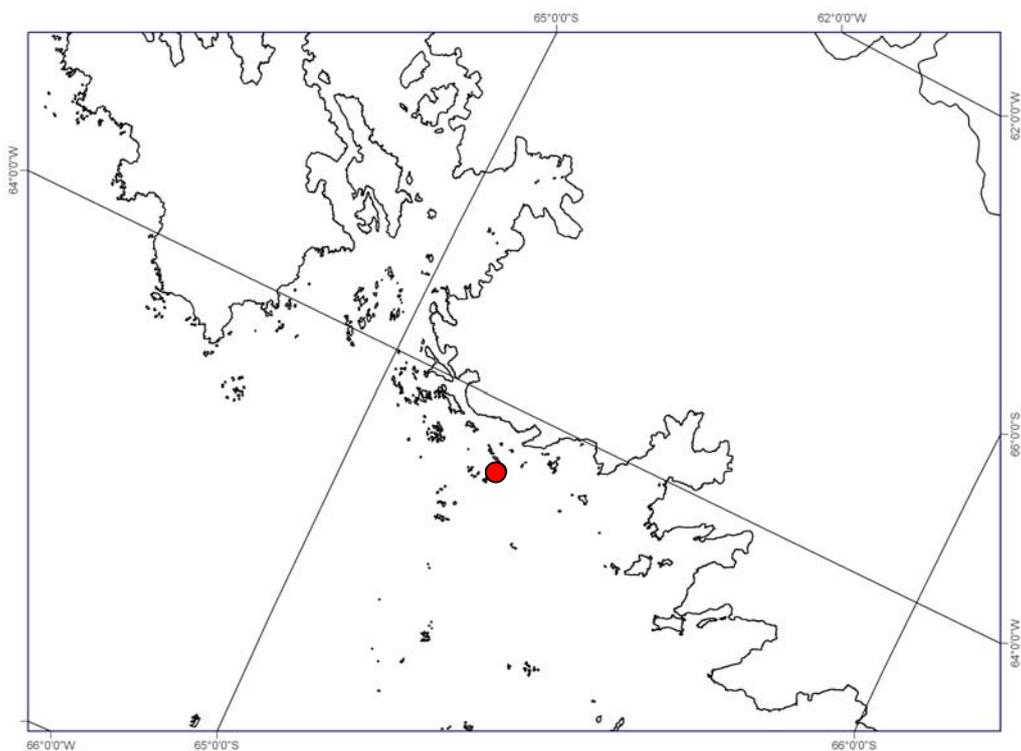
Instrument type: Float gauge, single Digiquartz pressure sensor, OTT pressure sensors with DCP.

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

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

Real/near-real time data:

[http://www.pol.ac.uk/ntslf/sadata\\_gts\\_faraday.php?code=UKVERNAD07&span=1](http://www.pol.ac.uk/ntslf/sadata_gts_faraday.php?code=UKVERNAD07&span=1)



## South Atlantic Activities in 2007

2007 was a relatively quiet year for tide gauge maintenance.

### King Edward Point

A completely new installation was carried out in 2007 at King Edward Point in South Georgia. The gauge consists of two KPSI pressure sensors and a Portux Linux system which emails back one minute data samples every 5 minutes. The system was mostly installed by local BAS personnel prior to POL arriving, but a problem with the first sensor interface board was able to be fixed during the POL visit by replacing the module.

### Port Stanley

A brief visit was made to Stanley in 2007. The data were downloaded from the Tidata logger and the system was powered down so that the SRAM battery could be replaced.

The dial-up modem replaced on the SOTG logger and the telephone line was tested by Cable & Wireless engineers to check the line quality. The Persistor module and CF1 card on the system were also replaced.

During the visit the old Orbcomm system was removed and replaced by a new OTT DCP system that returns data every 15 minutes via Meteosat.

### Rothera

Rothera received an upgrade to real time status during 2007. All data was downloaded without any problems from the Tidata logger and new SRAM cards fitted to both the main logger and the back up unit. The firmware was changed on the backup logger before a Portux Linux unit was connected to the main logger that receives data directly from the Tidata system and sends back emails every 15 minutes. The Portux was a replacement for the Gumstix board that was installed during 2005.

### Signy

A very brief visit was made to Signy Island during which a visual inspection of the tide gauge and pipework to the sensors was made. New lithium batteries were provided to the BAS personnel for the system along with a laptop for them to download the data with.

### Vernadsky

The new OTT gauge consisting of two pressure sensors and a DCP had not been functioning properly since installation but this problem was fixed during the visit. The wiring on the RS232 connection was reversed and data is now being returned consistently by the system.

While there, the existing OTT pressure sensors were replaced with new titanium KPSI pressure sensors and the LogoSens2 logger unit was also replaced as it had a damaged display.

Data wasn't downloaded from the Tidata logger this year due to time constraints.