

UK Tide Gauge Status Report – National Contribution to GLOSS

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The UK's contribution to the GLOSS Core Network comprises gauges from the UK National Tide Gauge Network, gauges in the British Dependent Territories of the South Atlantic and Gibraltar and gauges in Antarctica.

The UK National Tide Gauge Network is owned by the Environment Agency. It forms part of the UK Coastal Flood Forecasting (UKCFF) service. UKCFF is a partnership formed by the Environment Agency (EA), Scottish Environment Protection Agency (SEPA) Department for Agriculture and Rivers Agency Northern Ireland (RANI) and Natural Resources Wales (NRW). Through the partnership the authorities commission and deliver the capabilities in monitoring and forecasting of coastal conditions that underpin coastal flood forecasting and flood risk modelling throughout the UK. Three of the UK sites are committed to GLOSS.

At the end of 2016, the steelwork at 16 of the 41 National Tide Gauge Network sites was getting beyond its design lifespan, which was lowering the quality of the data. In 2015 no data were sent to the Permanent Service for Mean Sea Level (PSMSL) from the gauge at Newlyn and only one channel was of good enough quality from the gauge at Stornoway. In 2016, only one channel was producing data of a good enough quality from the gauges at Lerwick and Newlyn. In November 2016 the tide gauge network owners put out to tender urgent improvement works at fourteen of the National Tide Gauge Network sites.

Though the tsunami gauges at Lerwick and Stornoway are currently reporting data to the IOC sea level station monitoring facility, these data loggers and telemetry systems are no longer being maintained.

Lerwick (GLOSS 236)

The site at Lerwick is composed of two full-tide and a mid-tide bubbler gauges.

As part of the improvement works, the compressor leaking oil was to be upgraded. The pneumatic lines needed replacing and the system was to be cleaned.

- 01/12/2015 - Maintenance. Compressor change
- 15/09/2016 - Maintenance visit & levelling
- 27/03/2017 - Improvement works, levelling & dive survey

The GNSS at tide gauge (LWTG) ceased operation in February 2015.

Stornoway (GLOSS 238)

The site at Stornoway consists of two full-tide and a mid-tide bubbler gauges.

- 06/01/2016 - Maintenance. Compressor change. Investigation of one of the pneumatic lines losing pressure on occasions.
- 13/08/2016 - Maintenance visit, levelling & diving

The GNSS at tide gauge (SWTG) is functioning and data are sent to British Isles continuous GNSS Facility (BIGF - <http://www.bigf.ac.uk/>) and Sonel (<http://www.sonel.org/spip.php?page=gps&idStation=1908>).

Newlyn (GLOSS 241)

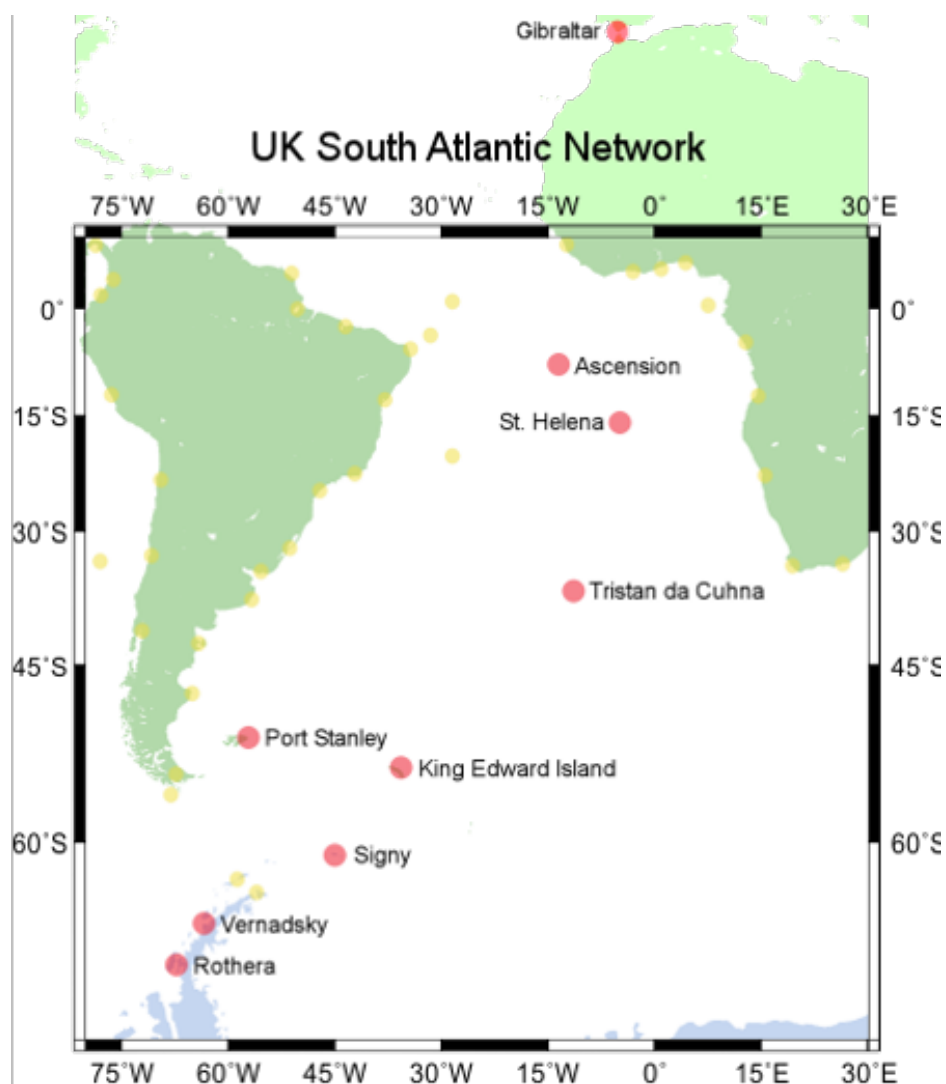
The site at Newlyn comprises a full-tide and mid-tide bubbler gauge and a back-up potentiometer attached to a Munro float gauge. A decision was taken in 2016 by the tide gauge owners to cease the use of the paper chart at Newlyn.

- 02/02/2017 - Maintenance Visit

The GNSS at tide gauge (NEWL) is functioning and data are sent to British Isles continuous GNSS Facility (BIGF - <http://www.bigf.ac.uk/>) and Sonel (<http://www.sonel.org/spip.php?page=gps&idStation=753>).

UK South Atlantic Network

The UK South Atlantic sea level network consists of tide gauges of various kinds at South Atlantic islands, Gibraltar and stations in Antarctica maintained by the National Oceanography Centre (NOC).



Gibraltar (GLOSS 248)

The site at Gibraltar has several gauges installed for different purposes. The installation includes a Kalesto radar gauge plus 2 KPSI differential sensors which report via Meteosat, as well as a Vega radar and a high rate tsunami sensor which use broadband. There is also an old float gauge in the harbour and co-located GPS.

The planned visit for 2016 was cancelled but the intention is to visit the gauge in 2017 with a consultant for a formal handover of the gauge from the UK Tide Gauge Inspectorate to the National Oceanography Centre Ocean Technology & Engineering group. The intention is to record all benchmarks and assess equipment needed to upgrade the site, which should occur in 2018/19.

Ascension (GLOSS 263)

Maintenance visit February 2014 – nothing operational, all batteries failed, Tidata (QT logger) had fallen off the wall. OTT DCP tide gauge had stopped, together with the Trimble GPS receiver.

The OTT DCP was replaced by a DAA Waterlog logger transmitting one minute data values every 15 minutes. DAA H-3611i radar, PS1(Full)=OTT PLS, PS2(half)=OTT PLS.

POL Tidata (original logger with Quartztronic sensors), electronics transferred from old corroded cabinet to the OTT cabinet and made operational again, but there is a fault with the time base stopping it from being synchronised to the 15 minute interval, i.e. the start button doesn't work and the timebase is running to an arbitrary time every 15 minutes. Timebase time at Ascension noted and recorded in the Ascension visit report.

A visit is needed to upgrade the DAA Waterlog logger to allow 1 second radar samples averaged over 1 minute to be used. Currently the gauge is intermittent due to a problem with batteries degrading due to the intense heat. The stilling well is to be assessed and if found to be in a good condition, to replace the half tide Quartztronic sensor which has failed. However, access to Ascension by air at the moment is not possible due to issues with the airport runway, which is due to be repaired in 2018/19. Permission is needed for travel by sea, which would require a 4 to 5 week trip.

DORIS beacon 6.5km away (ARIANE Tracking Station), GPS about 5 km away. A GPS receiver is fitted at the tide gauge hut but is currently non-operational and is to be sited to a position with permanent mains power and broadband. Permission is still being sought with regard to installing the GPS back into the Ariane Tracking Station where it was previously located.

St. Helena (GLOSS 264)

Jamestown gauge – Waterlog Logger/Transmitter (WaterLog DCP system fitted Jan/Feb 2011), OTT RLS Radar

Rupert's Bay – Waterlog Logger/Transmitter, Waterlog Radar 3611i

Engineers from NOC and Prof. Norman Teferle from the University of Luxembourg visited the island in April 2016 to carry out maintenance work on the Jamestown gauge and to assist in the installation of the new Tide Gauge and GNSS station at the new Wharf at Rupert's Bay. Maintenance work was carried out on the Jamestown gauge which is working well providing 1 minute averaged radar data.

The pressure sensor could not be repaired as the cable between the logger and the stilling well had been severely damaged due to high wave activity. This would likely reoccur if replaced.

The second tide gauge and GNSS station at Rupert's Bay have now been installed. The tide gauge uses a Waterlog radar unit and is transmitting 1 minute averaged data back every 15 minutes. It is envisaged that if pressure sensors were to be refitted that they would be installed at this station. The GNSS station is currently non-operational and is awaiting a power converter to bring it back on line. There is an active IGS site (identification STHL) collocated with the DORIS beacon 5.9km away.



Jamestown



Rupert's Bay



Rupert's Bay GNSS

Tristan da Cunha (GLOSS 266)

A Waterlog Logger/Transmitter (fitted in February 2011) and an OTT RLS Radar gauge.

Engineers from NOC and Prof. Norman Teferle from the University of Luxembourg visited the island in April 2016 to carry out repairs to the tide gauge and to install a GNSS station. Unfortunately, due to deteriorating weather conditions the visit was reduced from the allocated 3 days to just several hours. In the short time available, equipment was offloaded and plans were made about where the equipment could be situated. Norman Teferle is intending to visit the island in October 2017 to install the GNSS station and has agreed to install the tide gauge.

There is a GPS receiver and the antenna is mounted on the radio shack building, but a permanent installation will be made on the nearby DORIS monument in October 2017.

Port Stanley (GLOSS 305)

Waterlog DCP tide gauge, status – operational on all channels, solar charger and battery voltage good, one minute data values every 15 minutes. The sensors are: DAA H-3611i radar, PS1(Full)=OTT PLS, PS2(half)=OTT PLS.

POL Tidata (original logger with Digi quartz sensors) status – operational on all channels, data transmitted via email over broadband, data values every 15 minutes.

A maintenance visit was made in December 2016 where the gauge was checked and the data downloaded. As yet the steel dolphins have not been cleaned or repainted. When this goes ahead, a local contact will supervise to ensure that the sensors and equipment are not damaged. This may happen at the end of 2017 but has not been confirmed. A visit is planned for 2017 to upgrade the Waterlog logger to allow 1 second radar samples, averaged over 1 minute to be taken.

Two GPS sites about 2 and 4 km away (the one, ~4 km away, is an IGS site so the data are readily available).

King Edward Point (GLOSS 187)

POL Linux box with KPSI 500 sensors, status - operational on all channels, data transmitted via email over broadband, one minute data values every 5 minutes. Suffers from the occasional power down during generator maintenance, but copes during the power interruption. Position of half-tide sensor was reviewed and changed in 2011. A GPS receiver was installed by colleagues at the University of Luxembourg.

The gauge is fully operational, but the intention is to build a new tide gauge to be fitted by British Antarctic Survey personnel in 2018/19, with the possibility of installing a radar gauge as well as the pressure sensors.

Signy (GLOSS 306)

The POL Tidata (original logger with single Digiquartz sensor), was fully decommissioned as part of the Drake Passage cruise in 2016. The installed hardware was recovered and returned to NOC.

Vernadsky (GLOSS 188)

OTT DCP tide gauge, PS1(Full)=KPSI 500, PS2(half)=KPSI 500. Reporting now one minute data values every fifteen minutes through GOES.

POL Tidata (original logger with single Digiquartz sensor) status – operational on barometer channel only, pressure sensor working but port probably blocked, data logged locally.

The OTT tide gauge is now operational after a 6 month period. Spares were sent down in 2016 on the RSS James Clark Ross but due to the sea ice, the ship was unable to call. The equipment was placed on the RSS Ernest Shackleton which successfully delivered the parts in April 2017. The intention is to build a new Tide Gauge in 2017, fitted with two OTT PLS pressure sensors and a radar system similar to one installed at Rothera. The equipment will be shipped to Vernadsky where the station personnel will fit the gauge.

Rothera (GLOSS 342)

POL Tidata (original logger with Digiquartz sensors), status – operational on all channels, data transmitted via email over broadband, data values every 15 minutes. Suffers from frequent power downs, but copes well. VegaFlex81 Guided Wave Radar (installed early 2016).

Guided Wave Radar and heated/insulated stilling well, installed in early 2016 and has been working extremely well. Unfortunately the planned maintenance visit in late 2016 aboard the RSS James Clark Ross did not occur due to the large amounts of sea ice in the region.



There is a DORIS beacon <100m away (British Antarctic Survey) and there is also an IGS GPS site there also < 100m from tide gauge.

ODINAfrica

NOC scientists and engineers have been involved with the installation of tide gauges and the quality control of data for several sites in the Ocean Data and Information Network for Africa (ODINAFRICA) network. However, since the previous GLOSS GE meeting in 2015, most of the tide gauges in this network have ceased operating. Only two sites are still sending data to be quality controlled by PSMSL.

Aden, Yemen: Operating with large gaps in transmissions. Radar sensor is very noisy, Pressure sensor is operating well, Half Tide Pressure Sensor failed in April 2016.

Chabahar, Iran: Radar sensor operating well (except for a gap between September and November 2016). Pressure sensors are not operating.

Data availability

Data from the UK National Tide Gauge Network are available from https://www.bodc.ac.uk/data/hosted_data_systems/sea_level/uk_tide_gauge_network/.

Data from the South Atlantic Network are available from <http://www.ntsif.org/files/acclaimdata/>.

Data from the ODINAFRICA gauges are available from http://www.gloss-sealevel.org/data/africa_and_west_indian_ocean/.

Summary

GLOSS NO.	Site Name	Responsible country	Latitude	Longitude	Sensors (may not all be operational)
236	Lerwick	UK	60.15	-1.1333	Two full tide and a mid-tide bubbler gauge
241	Newlyn	UK	50.1	-5.55	Full tide and a mid-tide bubbler gauge and a back-up potentiometer attached to a Munro float gauge
238	Stornoway	UK	58.2	-6.3833	Two full tide and a mid-tide bubbler gauge
248	Gibraltar	UK	36.1482	-5.3649	Kalesto radar gauge plus 2 KPSI differential sensors which report via Meteosat, as well as a Vega radar and a high rate tsunami sensor which use broadband.
349	Ascension	UK	-7.9167	-14.4167	OTT DCP, Waterlog radar, PS1(Full)=KPSI 500, PS2(half)=KPSI 500, POL Tidata (original logger with Quartztronic sensors)
264	St. Helena	UK	-15.9667	-5.7	Jamestown gauge – Waterlog Logger/Transmitter, OTT RLS Radar Ruperts Bay – Waterlog Logger/Transmitter, Waterlog Radar 3611i
266	Tristan da Cunha	UK	-37.05	-12.3	Waterlog Logger/Transmitter, OTT RLS Radar gauge
305	Port Stanley	UK	-51.75	-57.9333	OTT DCP tide gauge, Waterlog radar 2x PLS pressure sensors, POL Tidata (original logger with Digi quartz sensors)
188	Vernadsky	Ukraine	-65.25	-64.2667	OTT DCP tide gauge, PS1(Full)=KPSI 500, PS2(half)=KPSI 500, POL Tidata (original logger with

					single Digiquartz sensor), float gauge
342	Rothera	UK	-67.5717	-68.1283	POL Tidata (original logger with Digiquartz sensors), VegaFlex81 Guided Wave Radar
306	Signy	UK	-60.7	-45.6	POL Tidata (original logger with 2 Digiquartz sensors)
3	Aden	Yemen	12.7833	44.9833	OTT Kalesto Radar Sensor, two OTT ODS4-K Pressure Sensors
349	Alexandria	Egypt	31.2167	29.9167	Failed in January 2016 OTT Kalesto Radar Sensor and an OTT ODS4-K Pressure Sensor
337	Chabahar	Iran	25.3	60.6	OTT Kalesto Radar Sensor and two OTT ODS4-K Pressure Sensors
2	Djibouti	Djibouti	11.6	43.15	Failed May 2016 OTT Kalesto Radar Sensor and two OTT ODS4-K Pressure Sensors
10	Inhambane	Mozambique	-23.9167	35.5	Not operational since 2015 OTT Kalesto Radar Sensor, OTT ODS4-K Pressure Sensor
30	Karachi	Pakistan	24.8	66.9667	Failed December 2016 OTT Kalesto Radar Sensor and two OTT ODS4-K Pressure Sensors
259	Lagos	Nigeria	6.4205	3.4073	Not operational since 2015 OTT Kalesto Radar Sensor and two OTT ODS4-K Pressure Sensors
n/a	Nouakchott	Mauritania	17.9896	16.037	Not operational since 2015 OTT Kalesto Radar Sensor and two OTT ODS4-K Pressure Sensors
11	Pemba	Mozambique	-12.9667	40.4833	Not operational since 2015 OTT Kalesto Radar Sensor
261	Pointe Noire	Republic of Congo	-4.7833	11.8333	Not operational since 2015 OTT Kalesto Radar Sensor and an OTT ODS4-K Pressure Sensor
350	Port Sonara	Cameroon	4.005	9.125	Not operational since 2015 OTT Kalesto Radar and an OTT ODS4-K Pressure Sensor
335	Takoradi	Ghana	4.8833	-1.75	Not operational since 2015 OTT Kalesto Radar Sensor and two OTT ODS4-K Pressure Sensors