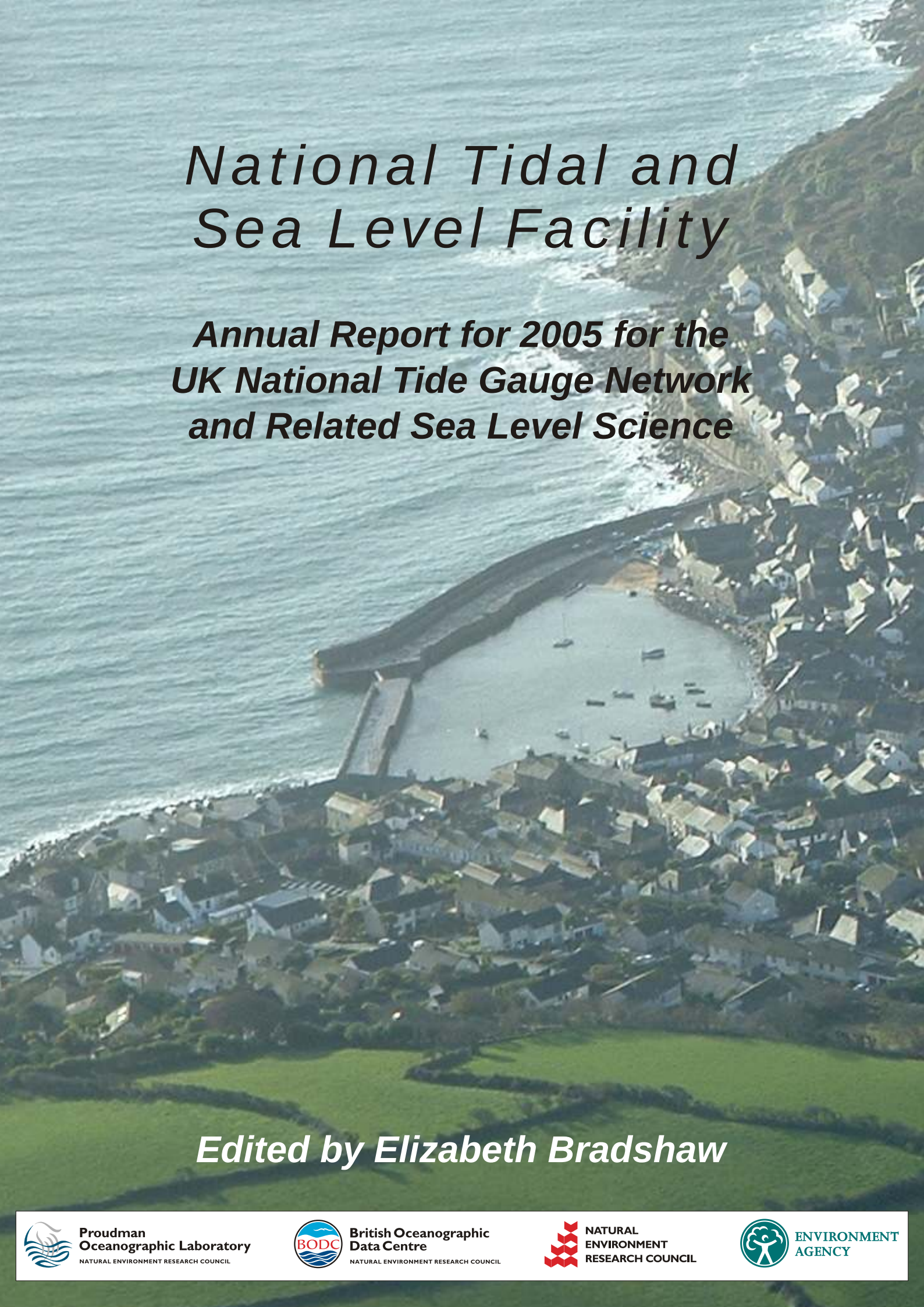


National Tidal and Sea Level Facility

Annual Report for 2005 for the UK National Tide Gauge Network and Related Sea Level Science

Edited by Elizabeth Bradshaw

Proudman Oceanographic Laboratory
NATURAL ENVIRONMENT RESEARCH COUNCIL

BODC British Oceanographic Data Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

NATURAL ENVIRONMENT RESEARCH COUNCIL

ENVIRONMENT AGENCY

National Tidal and Sea Level Facility

Annual Report for 2005 for the UK National Tide Gauge Network and Related Sea Level Science

Contributors to the Annual Report:

Les Bradley, POL	- Instrument documentation and site information
Dave Smith, POL	- Maps and site information
Peter Foden, POL	- South Atlantic Network Management
Simon Holgate, POL	- South Atlantic Network Management
Steve Loch, BODC	- Calculating statistics in Edteva
Richard Bingley, Univ. Of Nottingham	- Monitoring Vertical Land Movements at Tide Gauges

Editor of the Annual report: Elizabeth Bradshaw, BODC

NTSLF Coordination Committee Members and Main Interests:

Colin Bell, POL Applications	- Tide Gauge Data Products
Juan Brown, BODC	- Director BODC
David Blackman, POL	- Tide Gauge Data Products
Libby Macleod, BODC	- Tide Gauge Data Sets
Richard Downer, BODC	- Web Development and Management
Kevin Horsburgh, POL	- Operational Tide-Surge Models and Chair of NTSLF
Peter Foden, POL	- South Atlantic Network Management
Andrew Wilmott, POL	- Director POL
Simon Holgate, PSMSL	- Permanent Service for Mean Sea Level Aspects
Philip Knight, POL	- Web Management
Lesley Rickards, BODC	- Tide Gauge Data Sets
Dave Smith, POL	- Leader Tide Gauge Inspectorate
Simon Williams, POL	- GPS and Absolute Gravity Networks
Philip Woodworth, POL	- Director of the Permanent Service for Mean Sea Level

Thanks also to all those involved in the maintenance of the network, the data retrieval, processing, quality control and delivery.

Foreword

The UK National Tidal & Sea Level Facility (NTSLF) was established in 2002 to reflect the importance of sea level monitoring to the public, the government and the academic community. It brings together sea level expertise from the Proudman Oceanographic Laboratory (POL) and the British Oceanographic Data Centre (BODC), in collaboration with other groups that have scientific skills in sea level and geodesy.

The NTSLF satisfies an important strategic need for the UK where tidal processes, mean sea level and extreme coastal water levels have implications for coastal protection, sustainable housing development, management of the marine environment, industry and leisure. The NTSLF comprises the UK National Tide Gauge Network, geodetic networks for monitoring vertical land movements, and gauges in the British Overseas Territories. It is supported by the skills of BODC in data processing, quality control and dissemination. Practical and scientific applications of the data include tidal prediction, flood warning, navigation and climate change studies.

All tide gauge data are accessible free of charge via our web pages. We ensure effective knowledge transfer in order to demonstrate value for public money channelled through the Natural Environment Research Council (NERC). This report contains a summary of NTSLF activity for the period January-December 2005. Quality controlled tide gauge data can be downloaded from the BODC web site. Data from Gibraltar are now available, as well as real-time data from Ascension Island and Port Stanley. Information on technological developments, network status, numerical model forecasts and products for tidal analysis and prediction can be obtained from the NTSLF web site.

Over the past year, three sites in Scotland (Ullapool, Kinlochbervie and Leith) have been refurbished with new underwater steelwork. Mid-tide sensors were fitted at Ullapool and Kinlochbervie. A new building was installed at Leith and the float gauge recorder was replaced with a bubbler system. The tide gauge inspectorate is tasked with the continued development of improved data acquisition and site communications systems. GSM and Broadband technologies are currently under evaluation. The tide-surge numerical models used for coastal flood forecasting are also systematically upgraded. These models run four times a day at the Met Office, producing predictions up to two days ahead. The 12 km resolution surge model has been extended south to 40ºN and west to 20ºW in order to capture wind-generated surges originating in the Bay of Biscay. Research is under way to allow the numerical models to assimilate real-time data from key tide gauges. Fine resolution nested models of the Humber estuary, The Wash, the Thames estuary and Morecambe Bay are planned so as to give improved local forecasts in these regions.

Scientists from the NTSLF have contributed to new research aimed at quantifying the risk to the UK from tsunamis. Computer models were used to simulate tsunamis emanating from an earthquake off the Portuguese coast, similar to that which destroyed the city of Lisbon in November 1755. It was found that the spreading of wave energy resulted in low amplitudes (of the order 50 cm) by the time any tsunami reached the continental shelf break to the southwest of the UK. The rapid change of depth at the shelf break ensures that tsunamis move slowly across the Celtic Sea, thus providing a minimum of three hours warning that would permit well-positioned instruments to generate an effective emergency response.

The UK national Tide Gauge Network and operational model developments are funded by the Environment Agency. We would also like to acknowledge the support of all those who contribute scientifically towards, and make use of, the NTSLF.

Dr Kevin Horsburgh
Chair of NTSLF

Tide gauge instrument information, data processing procedures and gauge location

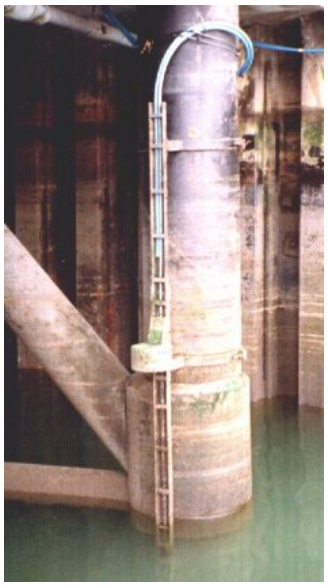
Instrument documentation

Bubbler tide gauge

The full tide bubbler system normally consists of two independent measuring systems. The pressure points are mounted approx 1m below Admiralty Chart Datum (ACD) so that negative surges may be recorded. The pressure points which you can see mounted underwater in the photograph are similar in appearance to an inverted bucket with a copper nozzle mounted on the side. This nozzle is the actual measuring point. A low flow of dry air (normally 7ml/min) is fed down an air tube to the top of the pressure point. When the air pressure in the air line equals the pressure exerted by the column of water above it, then the excess air is released as bubbles through the copper nozzle. This means that the pressure in the air line is proportional to the weight of the water column.

Mid-tide bubbler

The operation of the mid tide bubbler is similar to that of the full tide system, except that the measuring point is mounted at the mid tide height. This means that the pressure point is only immersed for half of the tidal cycle. The reason for this is that when the measuring point is exposed as in the photograph below it can be accurately levelled into the geodetic network. Once this is accomplished the full tide pressure points can be fitted to match the tidal curve produced by the mid tide pressure point, thereby connecting them to the geodetic network.

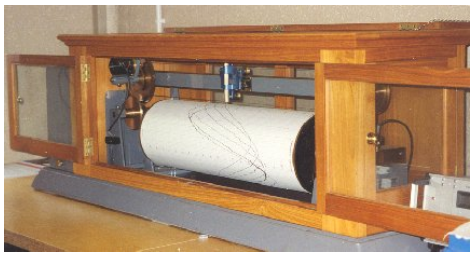


Pressure Transducer

These are differential transducers contained in a watertight housing. The reference port is vented to atmosphere via the power supply and signal cable tube, while the measuring port of the transducer is connected to a copper outlet nozzle on the top of the transducer housing. The copper nozzle, transducer measuring port and connecting tube are filled with oil so the pressure is transmitted to the crystal element via the oil, thus keeping the transducer components free from the effects of the saltwater.

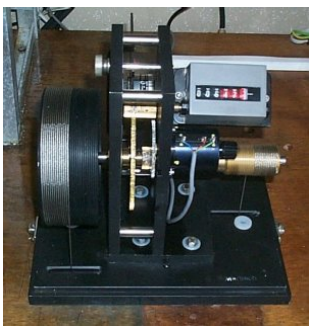
Munro float gauge

The Munro gauge measures sea level by means of a float in a stilling well. The float is about 45cm in diameter - the large diameter reduces inevitable errors in buoyancy due to friction of the gearing and small changes in the length of float wire. This wire is coiled round a drum on the end of the gauge and another drum contains a counter balance wire. The drum is geared to a slotted tape attached to a pen carriage which traces the tide curve on the chart during the rise and fall of the tide. A precision potentiometer is attached to the gauge to provide an input to the data logger.



Wellhead float gauge

The Wellhead gauge measures the sea level by means of a float in a stilling well. The float is usually of a smaller diameter than that used on a Munro gauge (about 45cm diameter), and has a counterweight attached to a smaller diameter pulley than that of the float so it is not immersed in the sea when the float rises. The Wellhead unit does not produce a chart but does give a readout of the height. It is interfaced to the data logger via a precision potentiometer.



Data Processing

The data are collected on demand each week at the Proudman Oceanographic Laboratory. The weekly files are then screened using our in-house visualisation package, Edteva. Suspect values are flagged and short gaps are interpolated where the accuracy is deemed not to be affected.

The weekly files are then concatenated into monthly files, with the residual added. These are then edited so that all values fall on the quarter hour and gaps are filled in with null values and marked with an 'N' flag. The files are placed on the web for users to download. Statistics are produced monthly again using Edteva.

Finally the monthly files are concatenated into yearly files and the metadata for the yearly files are then banked in a database.

Calculating Statistics in Edteva

There are essentially four types of summary information determined by Edteva:

- a history of when the tide gauge has been in operation (“history”)
- monthly extremes (“extremes”)
- monthly extreme surges (“surges”)
- monthly and daily mean sea level (“MSL”)

Gaps greater than 4.1 hours in the primary channel are registered as gaps in the history.

Extremes are the maximum and minimum calculated over all sampled data during the month. This excludes any interpolated data but may include rapidly sampled data. Extreme surges (residuals) are calculated in the same way from tidal residuals. Tidal residuals are defined to be the measured water level minus the predicted tide. The predictions derive from the database of tidal constants maintained by POL’s Applications Group (as defined at the time of the calculation) for the ports of UK and elsewhere.

Mean Sea Level is calculated from a filter working on quarter-hourly values derived from one or more cubic splines applied to the raw data. The filter is a convolution of Vassie’s 03B filter which converts 15-minute data to hourly values and Doodson’s X0 filter. Splines are not applied across gaps as defined above. Shortish gaps can therefore lead to the loss of a day of output data (the half length of the filter is 91 and a day is 96 samples). Provided there are some daily (@12:00Z) values these are then averaged to provide the monthly value.

Location of Tide Gauges Around the U.K.

Aberdeen Tide Gauge

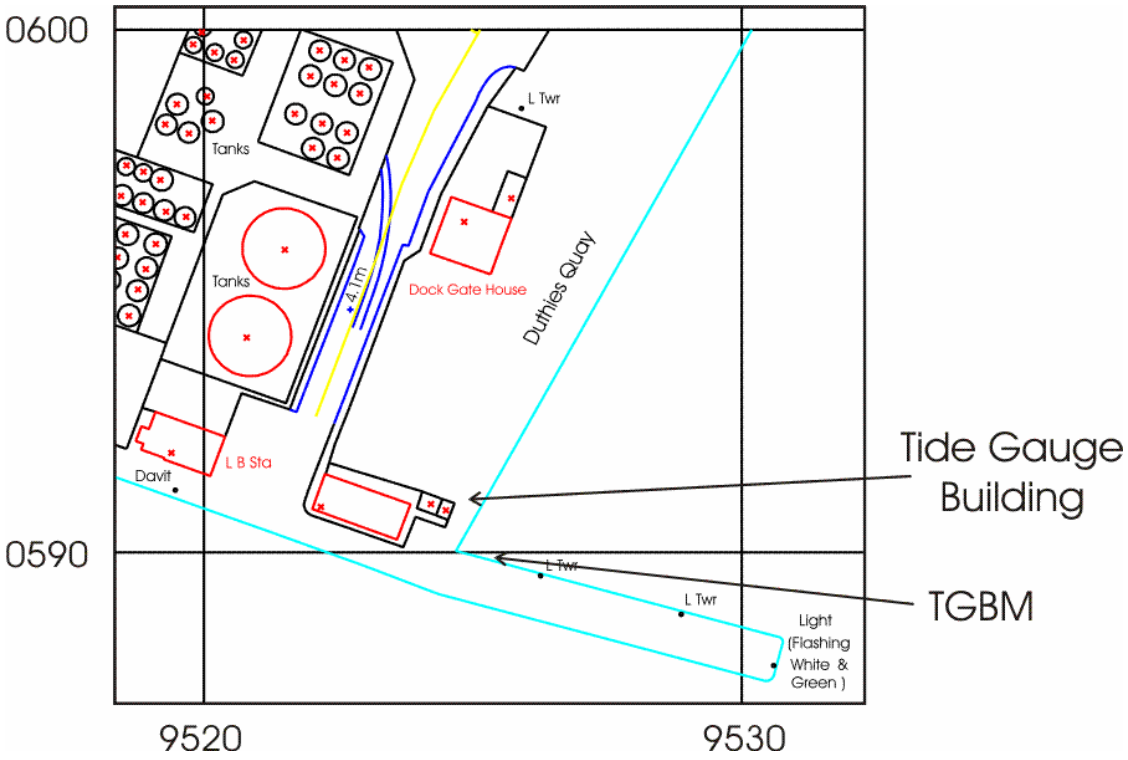
Latitude: 57° 08' 38.5" N Longitude: 02° 04' 48.8" W

Grid Reference: NJ 9524 0591

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is located on Waterloo Quay and the pressure points are located in the South West corner of Telford Dock.



Tide gauge location

Aerial view of site

Avonmouth Tide Gauge

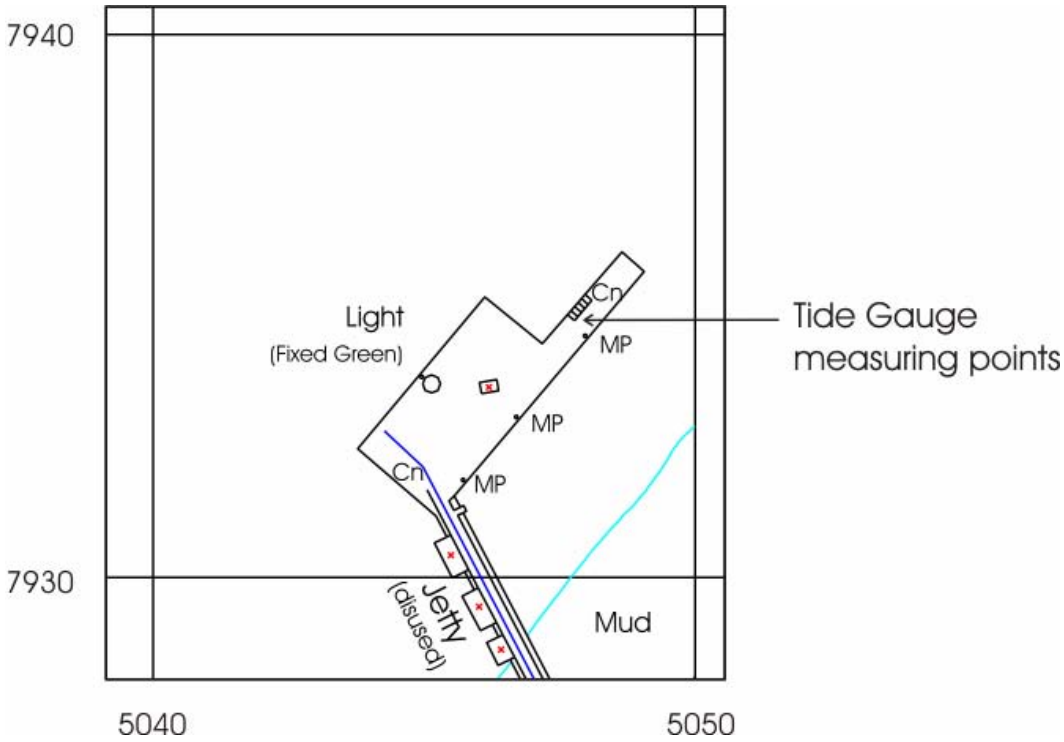
Latitude: 51° 30' 27.9" N Longitude: 02° 42' 45.9" W

Grid Reference: ST 5063 7900

Instrument type: Data acquisition system with dual underwater pressure transducers.

Site of Gauge:

The tide gauge building is located on land between the disused oil jetty and the fuel storage depot, with the measuring points being located at the seaward end of the jetty.



Bangor Tide Gauge

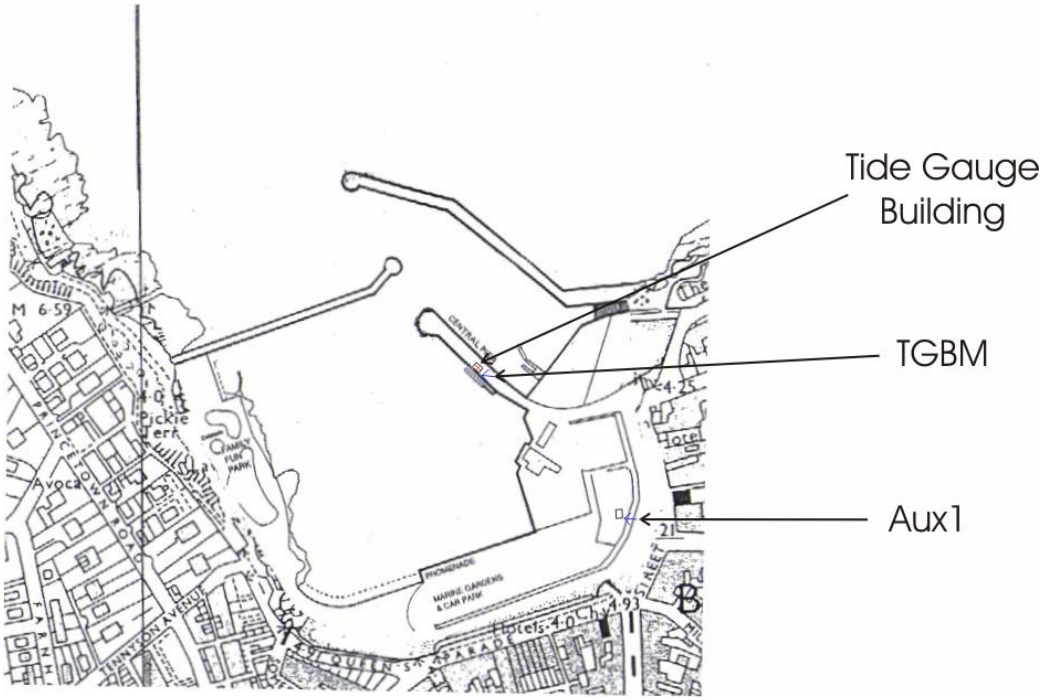
Latitude: 54° 39' 53.1" N Longitude: 05° 40' 10.1" W

Grid Reference: NW 6340 3620

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building and pressure points are located on Central Pier at Bangor Marina. The pressure points are on the seaward side of the open pier directly beneath the tide gauge building.



Barmouth Tide Gauge

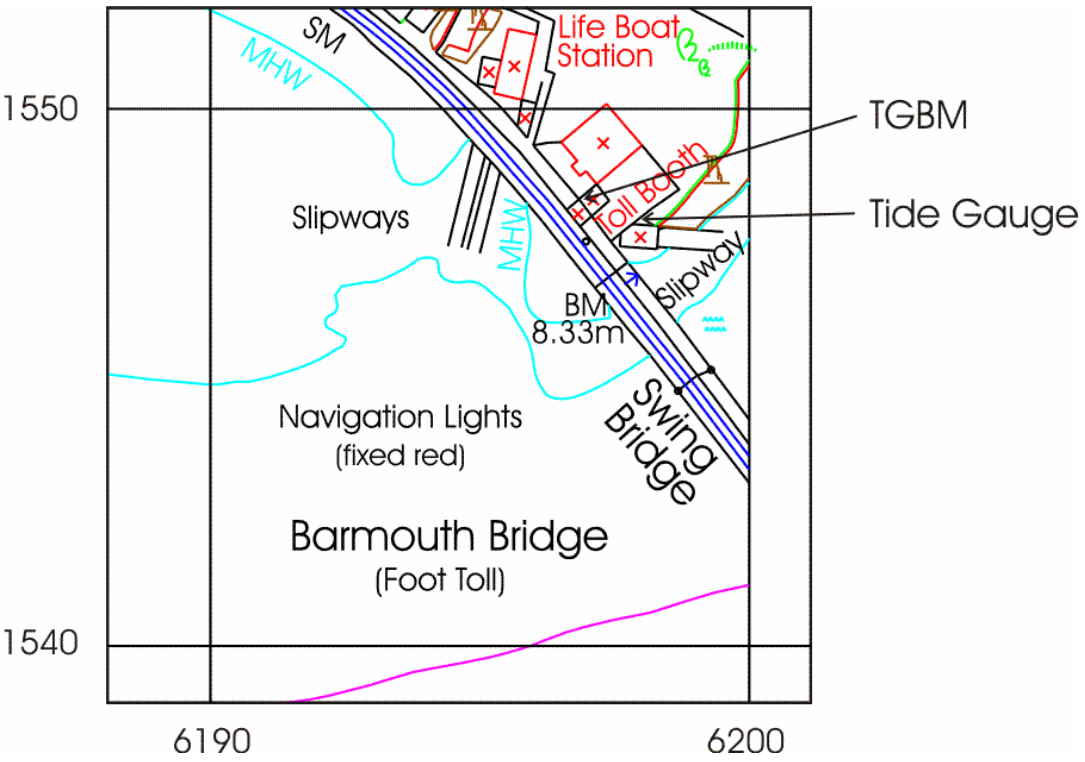
Latitude: 52° 43' 09.6" N Longitude: 04° 02' 42.1" W

Grid Reference: SH 6197 1548

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge cabinet is located in the toll booth on the north end of Barmouth railway bridge which crosses the river Mawddach. The pressure points are attached to the first leg of the railway bridge in the deep channel.



Bournemouth Tide Gauge

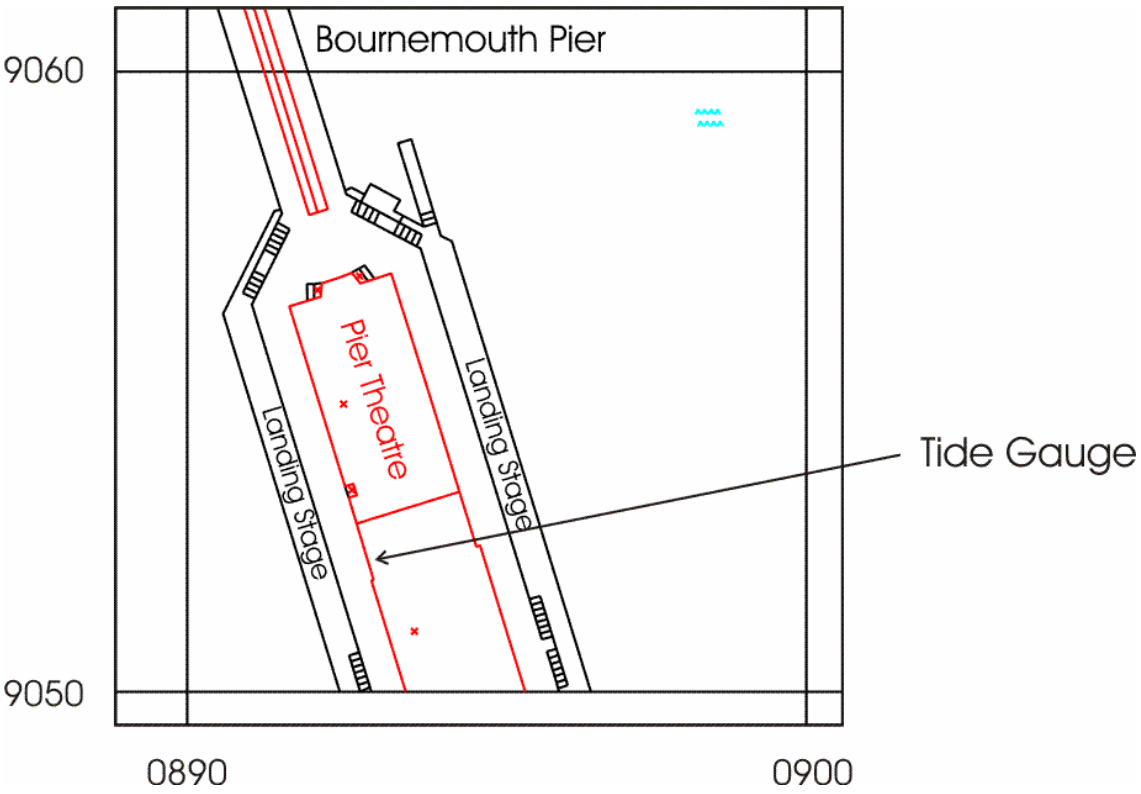
Latitude: 50° 42' 51.6" N Longitude: 01° 52' 29.5" W

Grid Reference: SZ 0893 9053

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge equipment is located in the pier electrical room at the west side of the South Pier. The measuring points are mounted directly below on one of the pier legs.



Cromer Tide Gauge

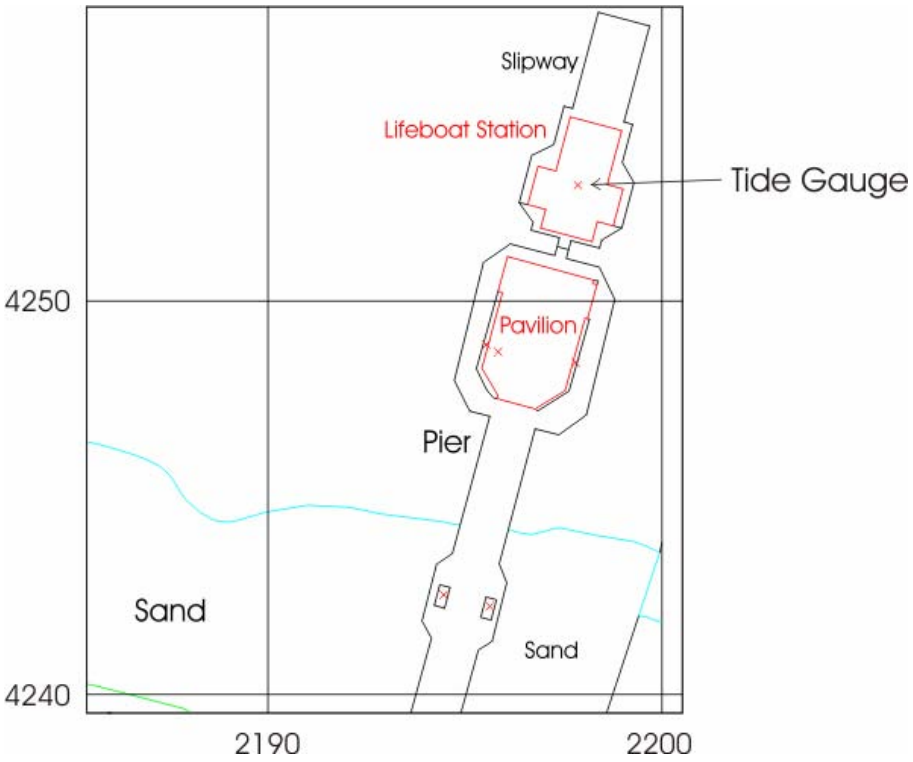
Latitude: 52° 56' 03.1" N Longitude: 01° 18' 05.9" E

Grid Reference: TG 2198 4253

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located within Cromer lifeboat station, with the pressure points attached to a leg of the lifeboat slipway.



Devonport Tide Gauge

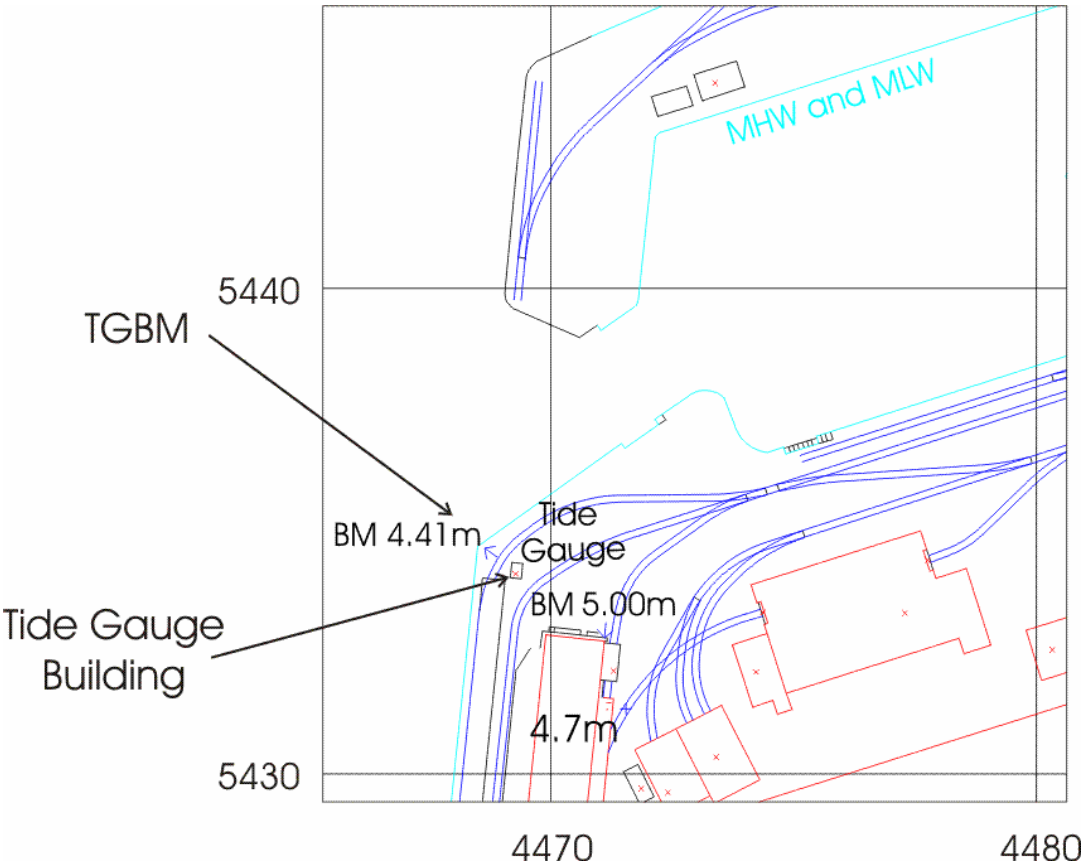
Latitude: 50° 22' 06.2" N Longitude: 04° 11' 06.9" W

Grid Reference: SX 4469 5434

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is situated on No. 1 Jetty in Devonport Royal Naval base. The pressure points are attached to the stilling well beneath the building.



Dover Tide Gauge

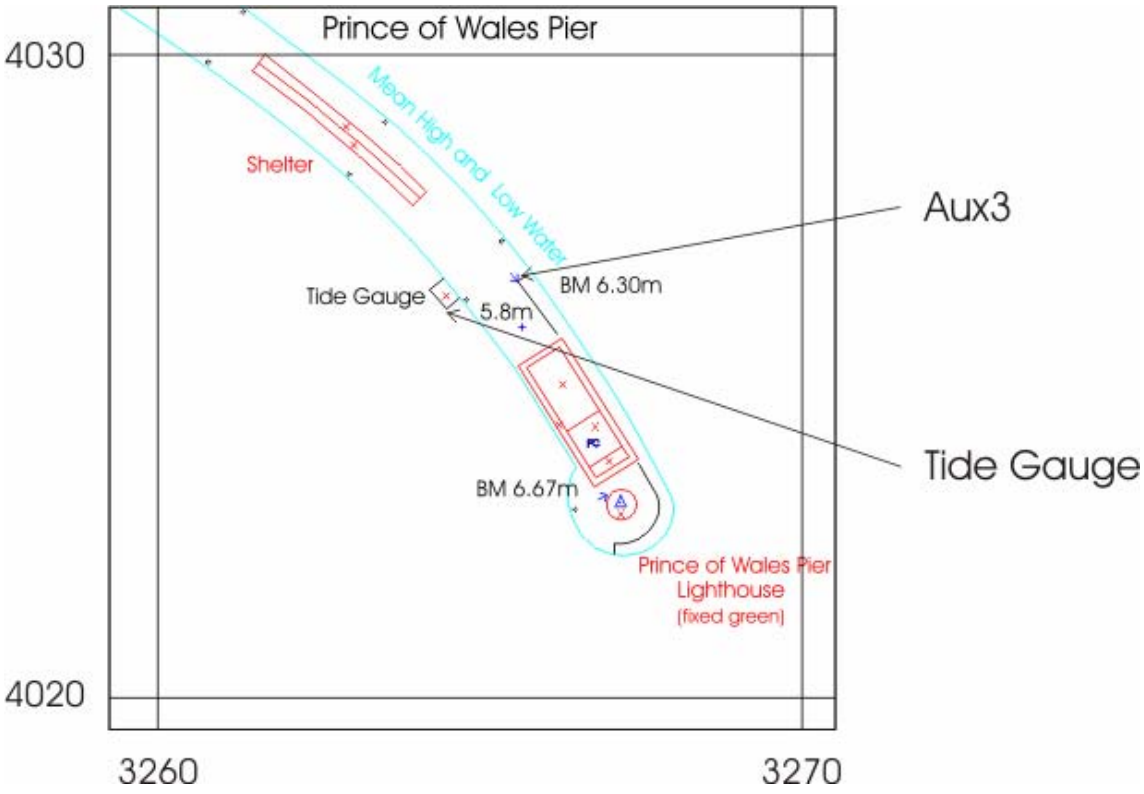
Latitude: 51° 06' 51.8" N Longitude: 01° 19' 21.1" E

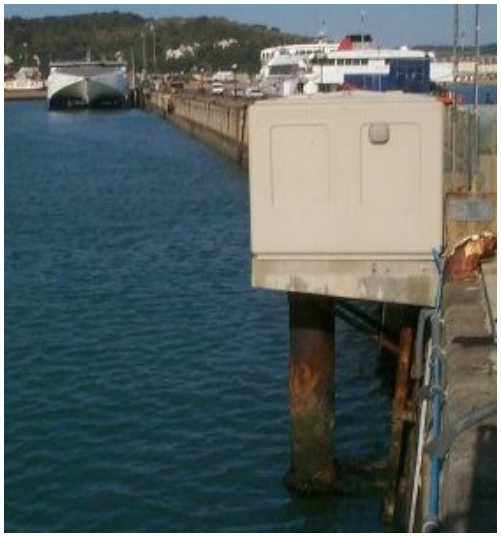
Grid Reference: TR 3264 4026

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is at the seaward end of Prince of Wales Pier, Western Dock, just before the lighthouse. The pressure points are attached to the stilling well.





Felixstowe Tide Gauge

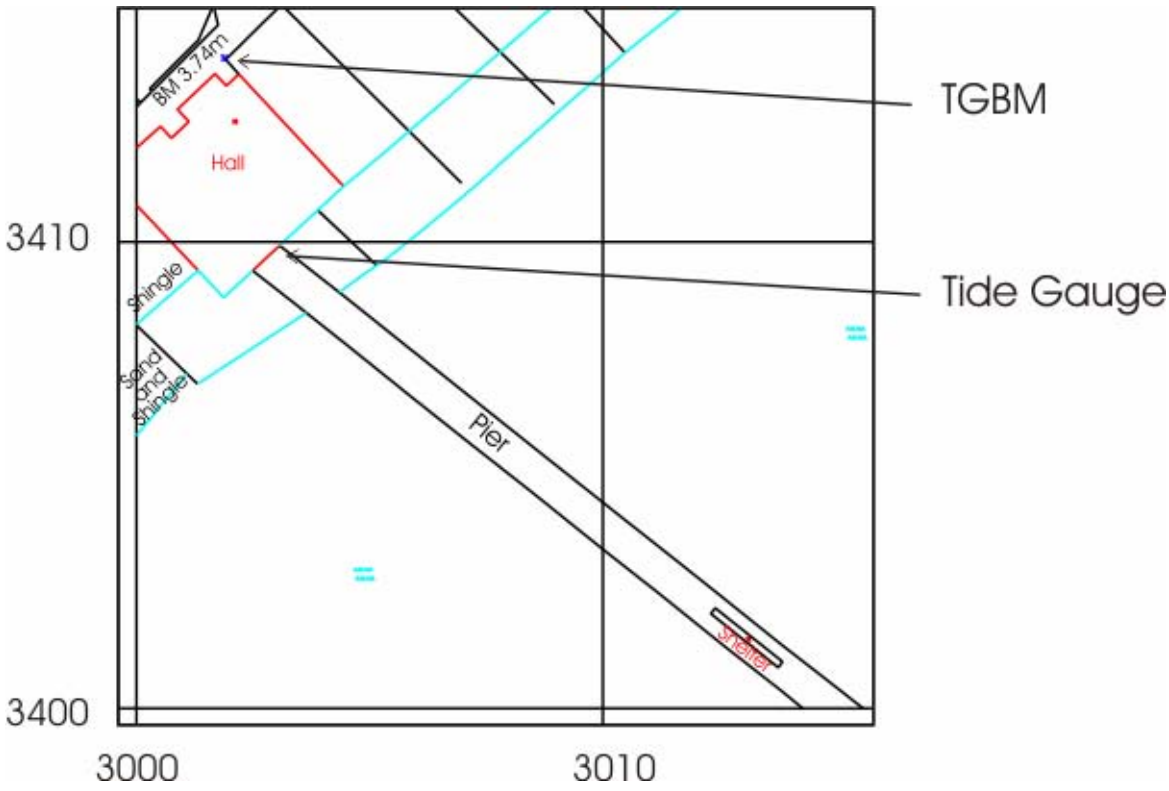
Latitude: 51° 57' 27.7" N Longitude: 01° 20' 47.6" E

Grid Reference: TM 3003 3409

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building and pressure points are located on Felixstowe pier. The equipment is located on the landward end and the pressure points are located in deep water at the seaward end.



Fishguard Tide Gauge

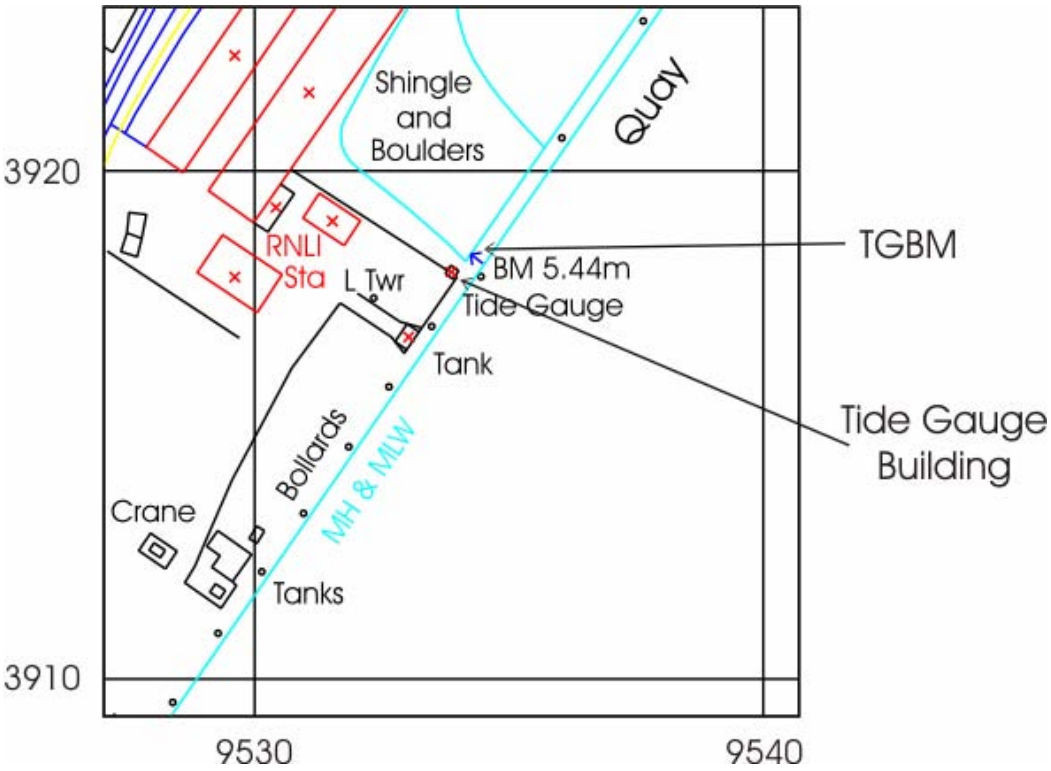
Latitude: 52° 00' 47.6" N Longitude: 04° 59' 01.5" W

Grid Reference: SM 9534 3918

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is located on Fishguard Quay adjacent to the RNLI station, and the pressure points are located approximately 10m from the end of the quay.



Harwich Tide Gauge

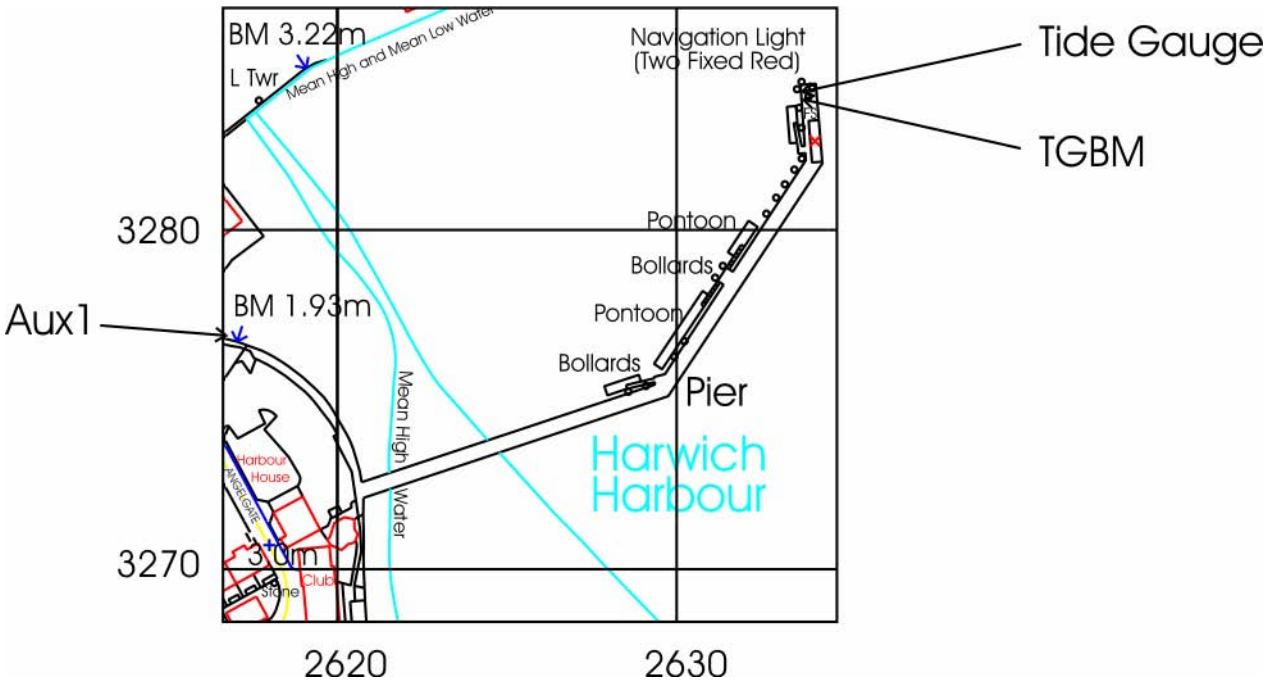
Latitude: 51° 56' 52.8" N Longitude: 01° 17' 31.4" E

Grid Reference: TM 2634 3284

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located on the seaward end of Harwich Haven Authority jetty. The pressure points are directly below the cabinet.



Heysham Tide Gauge

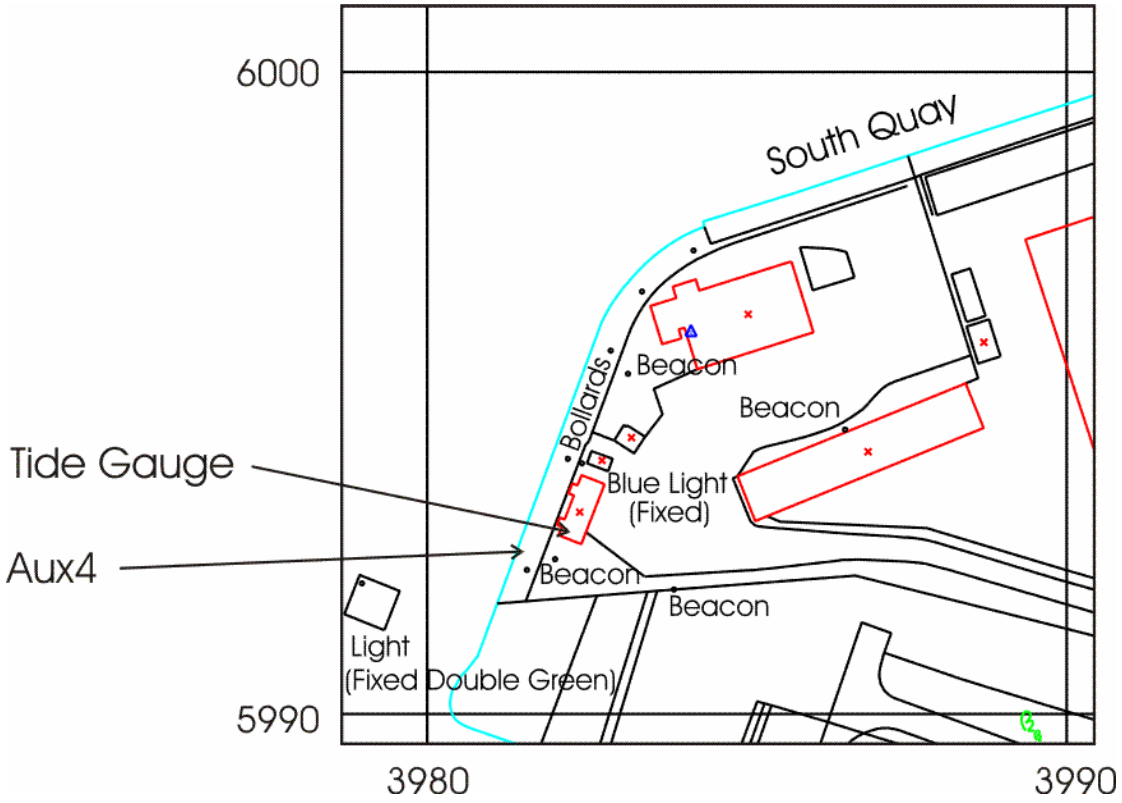
Latitude: 54° 01' 54.6" N Longitude: 02° 55' 12.9" W

Grid Reference: SD 3982 5993

Instrument type: Data acquisition system with two full tide bubbler gauges.

Site of Gauge:

The tide gauge building is located on the south side of the entrance to Heysham harbour.



Hinkley Point Tide Gauge

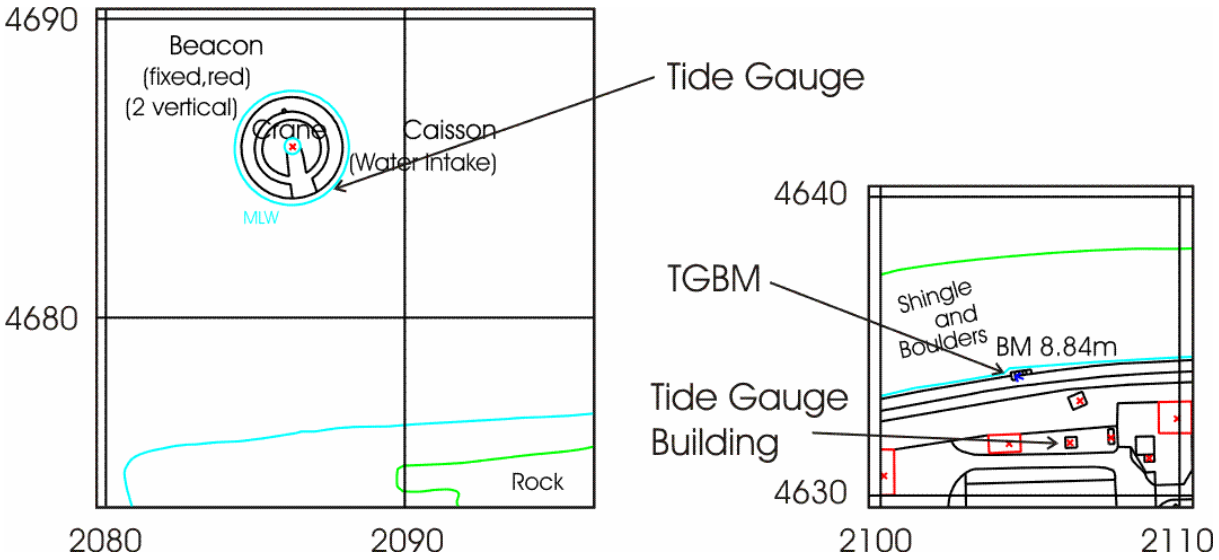
Latitude: 51° 12' 54.9" N Longitude: 03° 08' 04.1" W

Grid Reference: ST 2086 4684

Instrument type: Dataring system with dual underwater pressure transducers.

Site of Gauge:

The tide gauge building is located in the Hinkley Point "A" station. The transducers are located in underwater vented chambers, suspended from a steel pole attached to the structure of the water intake tower, some 400m offshore.



Holyhead Tide Gauge

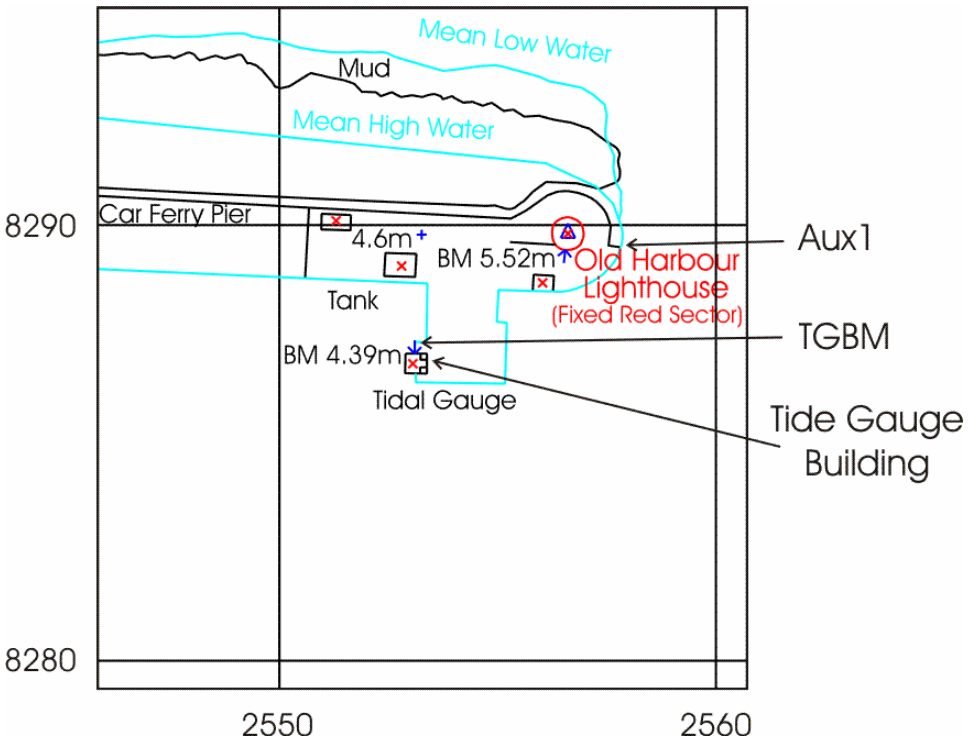
Latitude: 53° 18' 50.2" N Longitude: 04° 37' 13.5" W

Grid Reference: SH 2553 8287

Instrument type: Data acquisition system with a full tide and a mid-tide bubbler gauge and a back-up Munro float gauge installed. Wind speed and wind direction are also recorded.

Site of Gauge:

The tide gauge building, pressure points and stilling well are situated on Salt Island jetty, close to the old harbour lighthouse.



Ilfracombe Tide Gauge

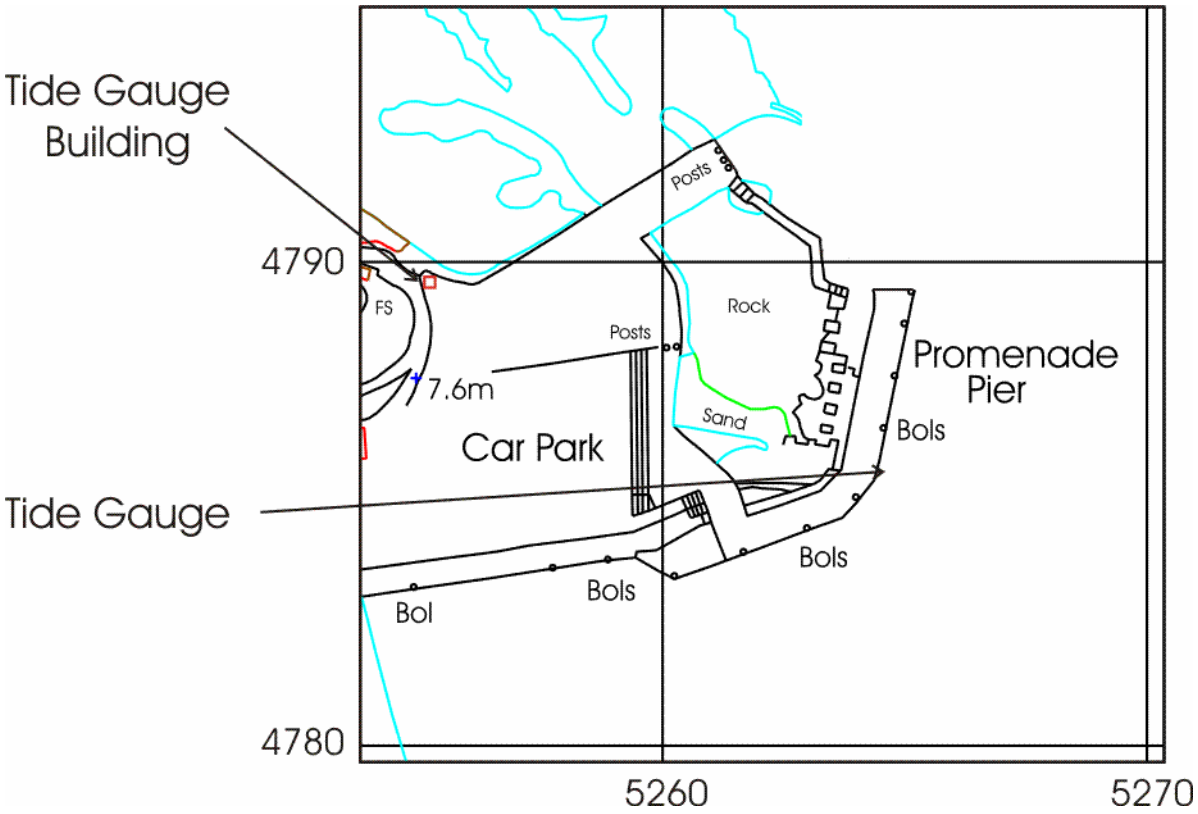
Latitude: 51° 12' 40.1" N Longitude: 04° 06' 44.6" W

Grid Reference: SS 5255 4789

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located in the north west corner of the car park, east of Lantern Hill. The pressure points are located on the seaward side of Ilfracombe pier at the harbour entrance.



Immingham Tide Gauge

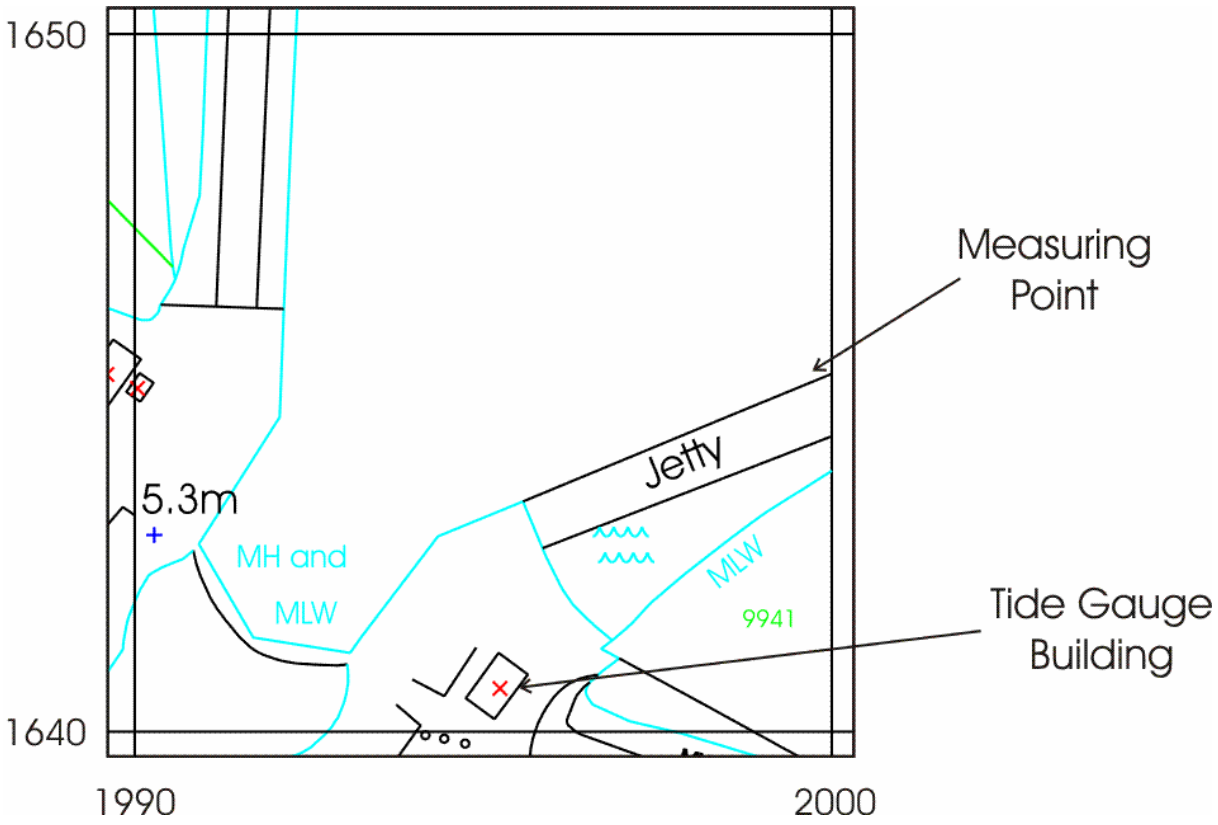
Latitude: 53° 37' 49.5" N Longitude: 00° 11' 15.1" W

Grid Reference: TA 1995 1640

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is east of the lock gates at the entrance to Immingham Docks. The pressure points are fixed to a leg of the lead-in jetty on the east side of the entrance to Immingham Docks.



Port Erin (Isle of Man) Tide Gauge

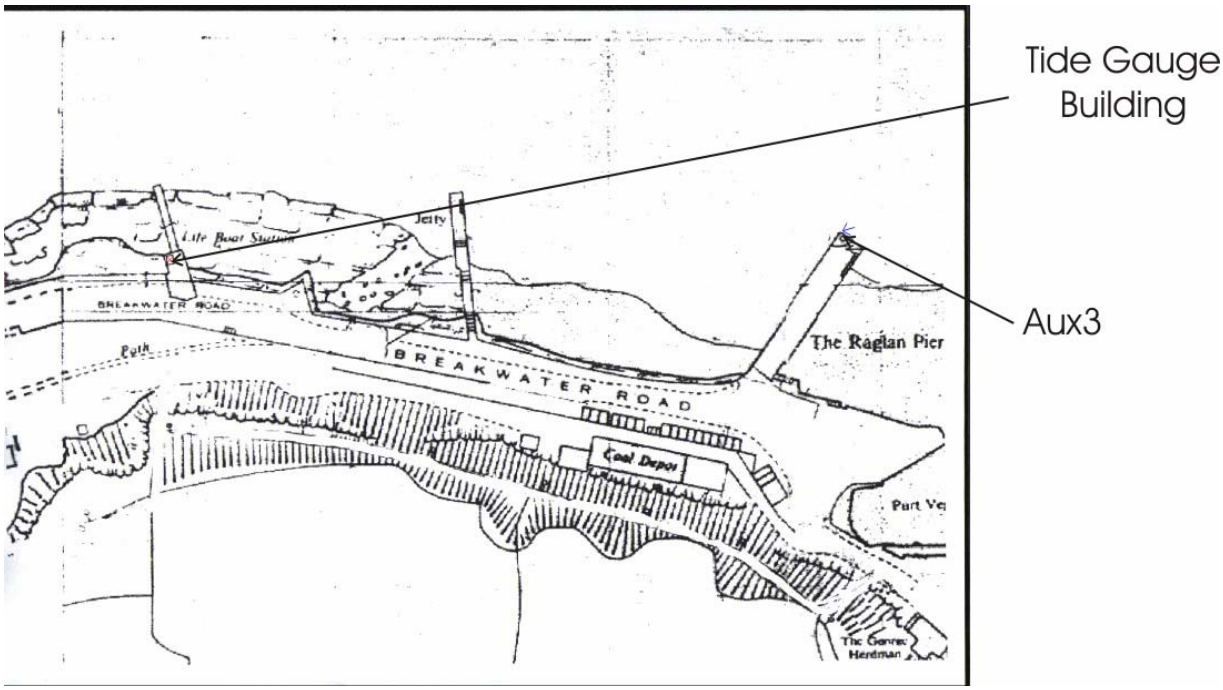
Latitude: 54° 05' 06.8" N Longitude: 04° 46' 05.0" W

Grid Reference: SC 1904 6902

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in Port Erin lifeboat station and the pressure points are mounted close to the end of the lifeboat slipway. The mid-tide pressure point is mounted on steelwork attached to a concrete leg of the boathouse.



Port Ellen (Isle of Islay) Tide Gauge

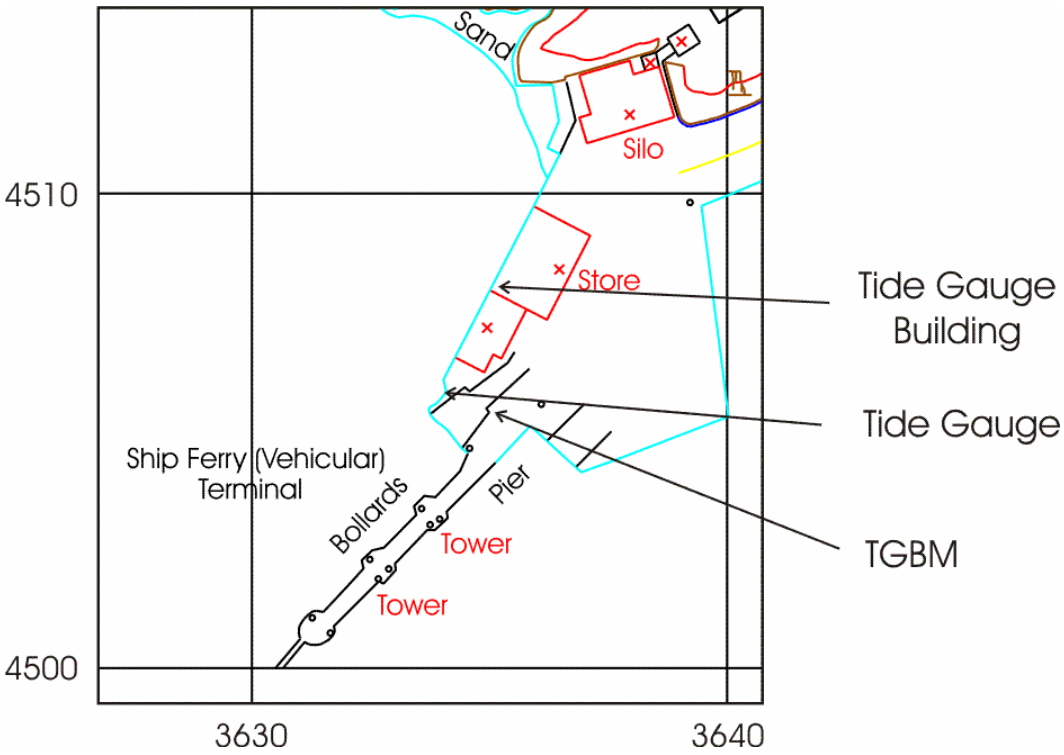
Latitude: 55° 37' 39.3" N Longitude: 06° 11' 23.7" W

Grid Reference: NR 3636 4508

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge cabinet is located in the Caledonian MacBrayne storeroom next to Port Ellen ferry terminal. The pressure points are located south west of the ferry terminal offices.



St. Helier (Jersey) Tide Gauge

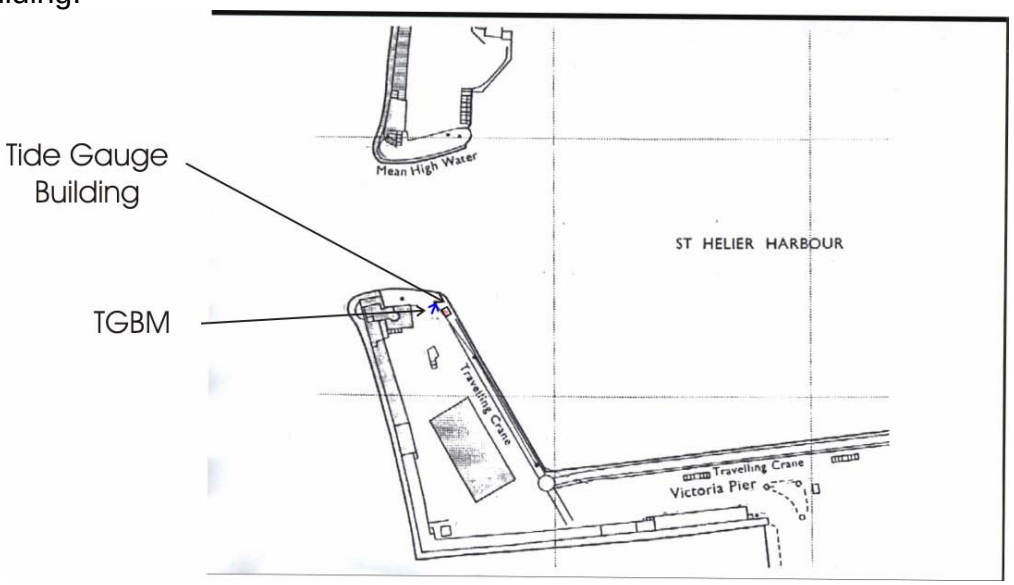
Latitude: 49° 11' 00" N Longitude: 02° 07' 00 " W

Grid Reference: 13/11 6466 4763

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on Victoria Pier, St. Helier, adjacent to the Port Control building. The pressure points are located on the inside wall of the pier, 2m from the tide gauge building.



Kinlochbervie Tide Gauge

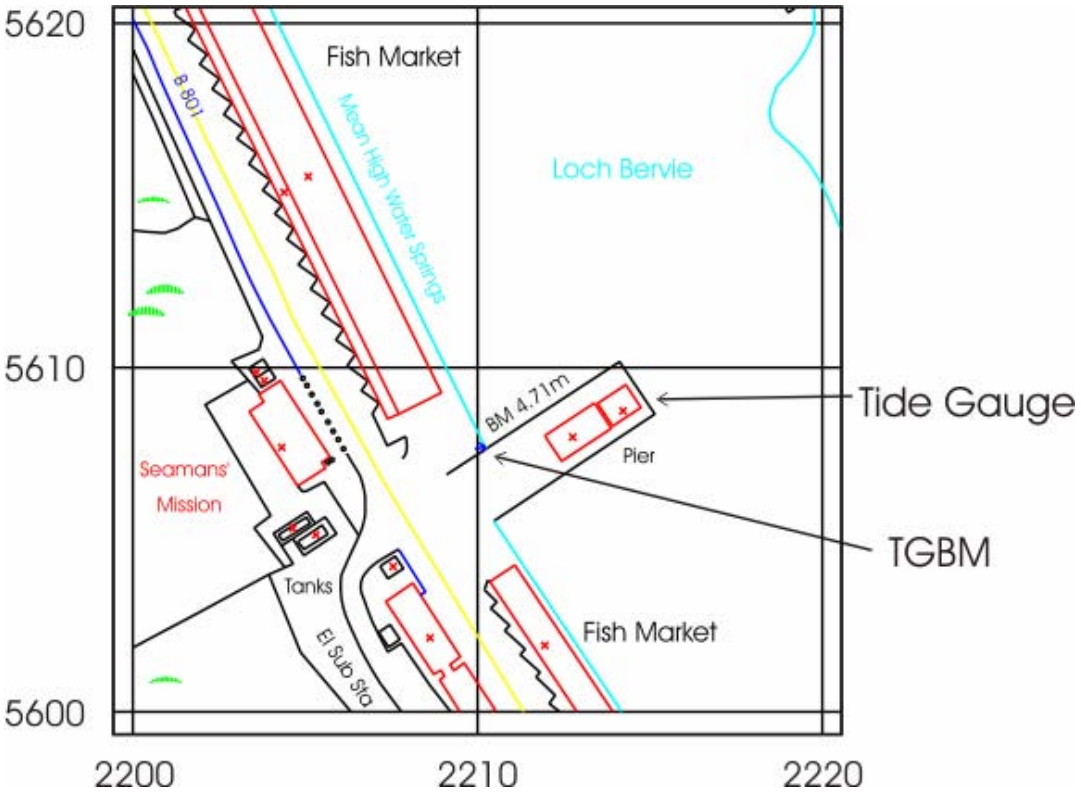
Latitude: 58° 27' 24.1" N Longitude: 05° 03' 00.8" W

Grid Reference: NC 2213 5609

Instrument type: Dataring system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge cabinet is located in the ice plant, on the pier. The pressure points are mounted on a leg of the jetty beneath the ice plant.



Leith Tide Gauge

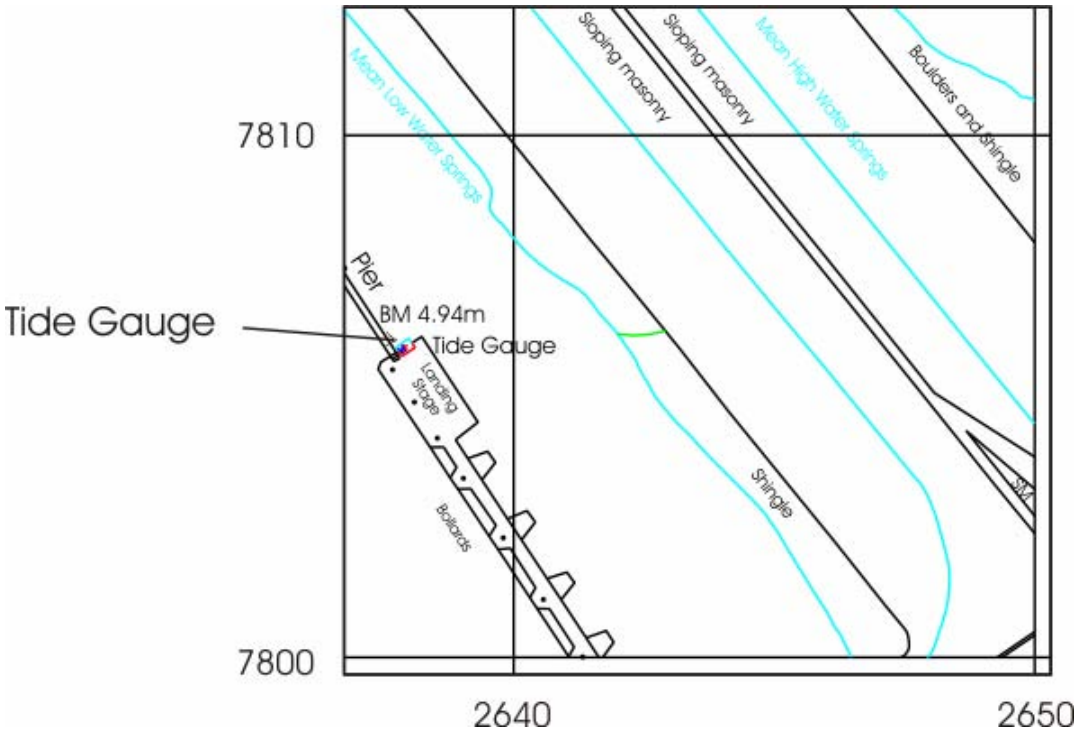
Latitude: 55° 59' 23.4"N Longitude: 03° 10' 54.1"E

Grid Reference: NT 2638 7806

Instrument type: Data acquisition system with a temporary full tide bubbler gauge.

Site of Gauge:

The tide gauge building and pressure points are located on the lead-in jetty, east of the entrance to Leith docks.



Lerwick Tide Gauge

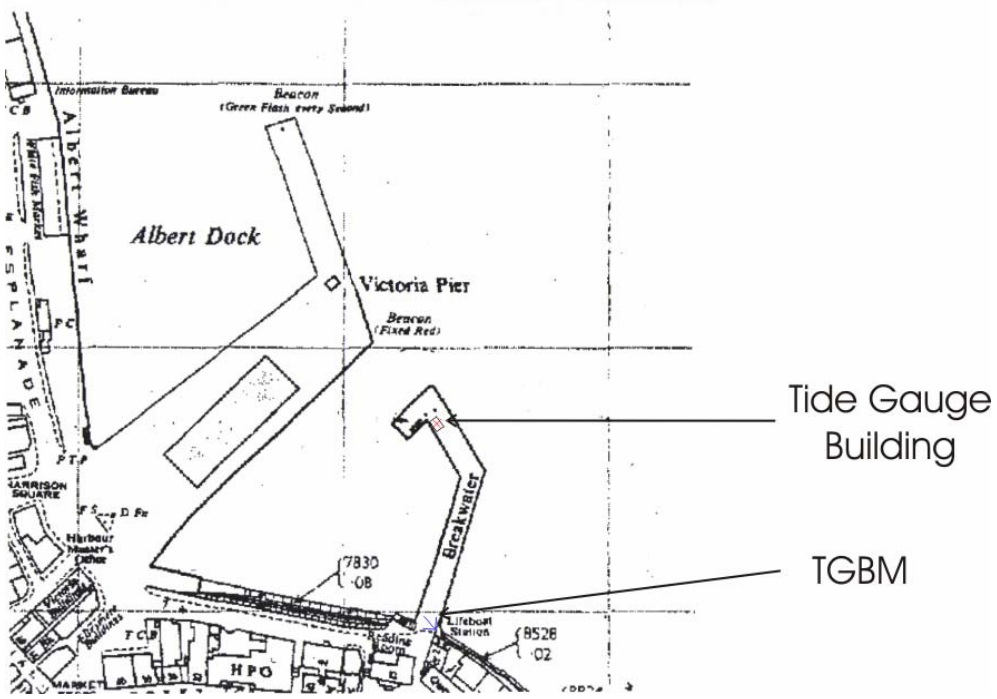
Latitude: 60° 09' 14.5" N Longitude: 01° 08' 25.1" W

Grid Reference: HU 4783 4137

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building and measuring points are located on the inner wall at breakwater entrance to the small boat harbour, south of Victoria Pier, Lerwick.



Liverpool Tide Gauge

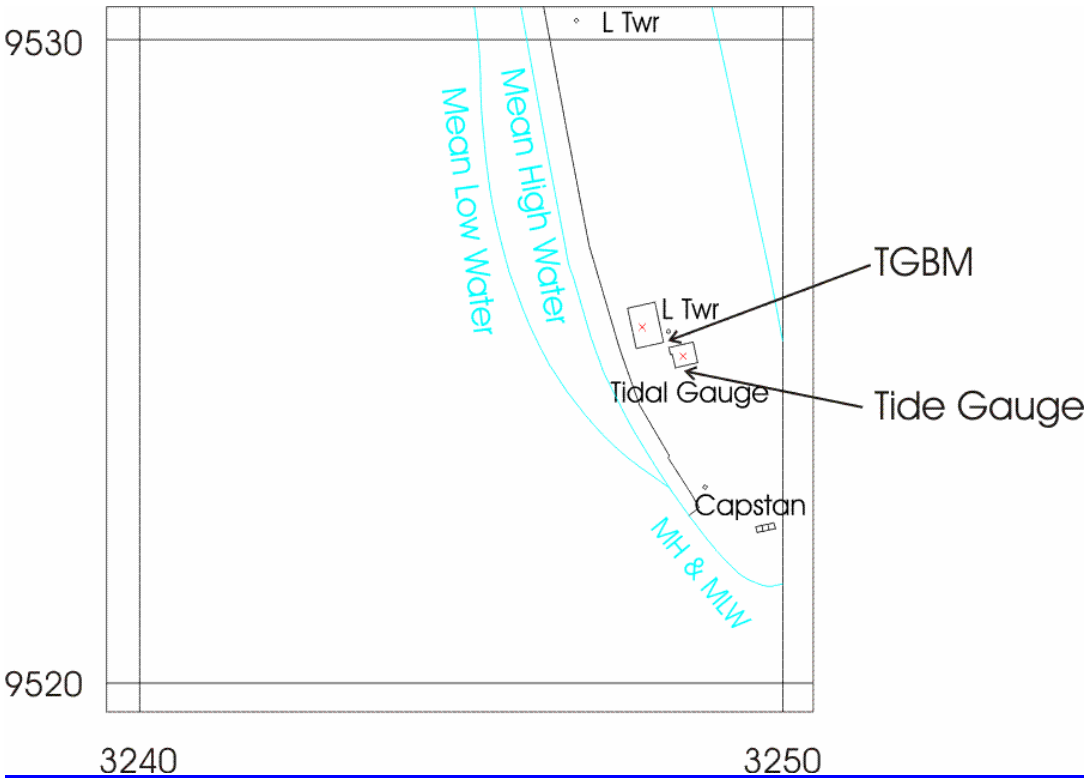
Latitude: 53° 26' 58.9" N Longitude: 03° 01' 05.3" W

Grid Reference: SJ 3248 9525

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed. Wind speed and wind direction also recorded up until June 2004.

Site of Gauge:

The Tide Gauge is located within the old Lock Keeper's office at the entrance to Gladstone Dock. The pressure points are located on the seaward side of Gladstone Dock. The wind speed and direction instruments are mounted at the top of the light tower located next to the tide gauge building.



Llandudno Tide Gauge

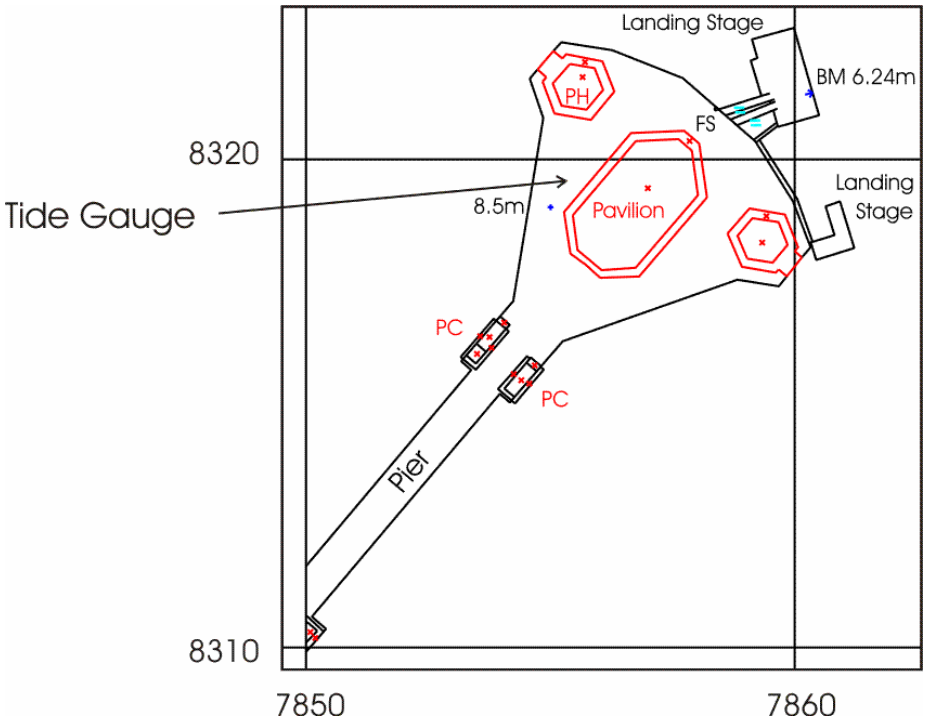
Latitude: 53° 19' 54.0" N Longitude: 03° 49' 30.8" W

Grid Reference: SH 7855 8319

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on the sub-platform under the pavilion at the seaward end of Llandudno pier. The pressure points are located on a leg of the pier below the tide gauge building.



Lowestoft Tide Gauge

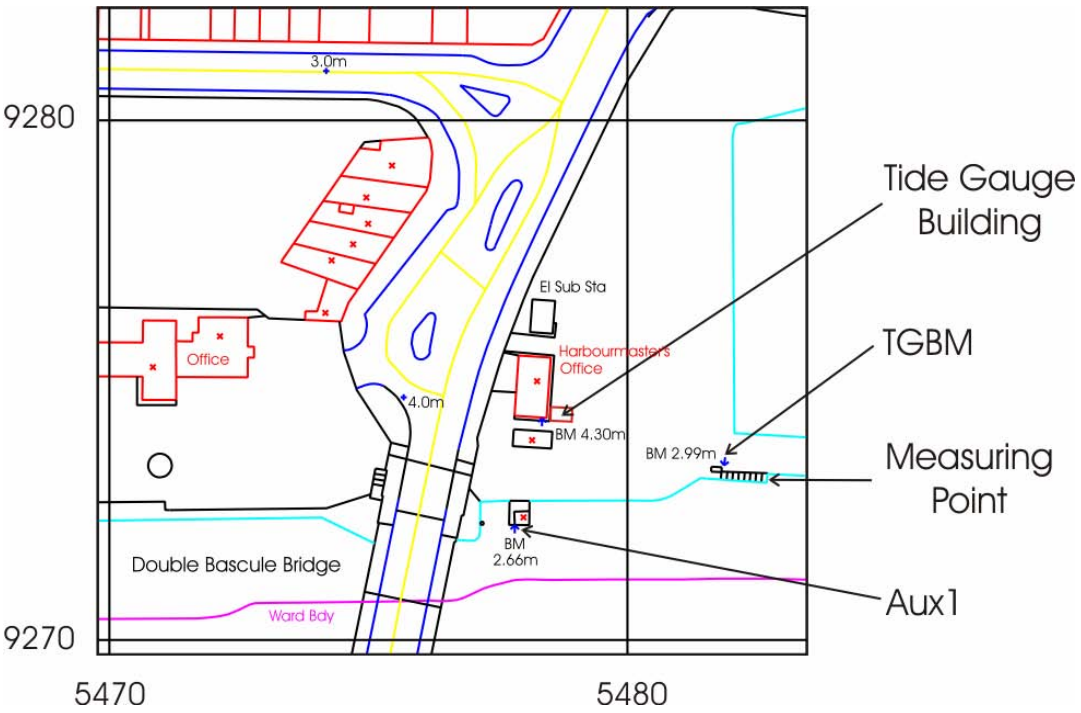
Latitude: 52° 28' 23.1" N Longitude: 01° 45' 00.9" E

Grid Reference: TM 5479 9274

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is situated east of the Harbour Master's office with the pressure points located on the quay wall, east of the tide gauge building.



Milford Haven Tide Gauge

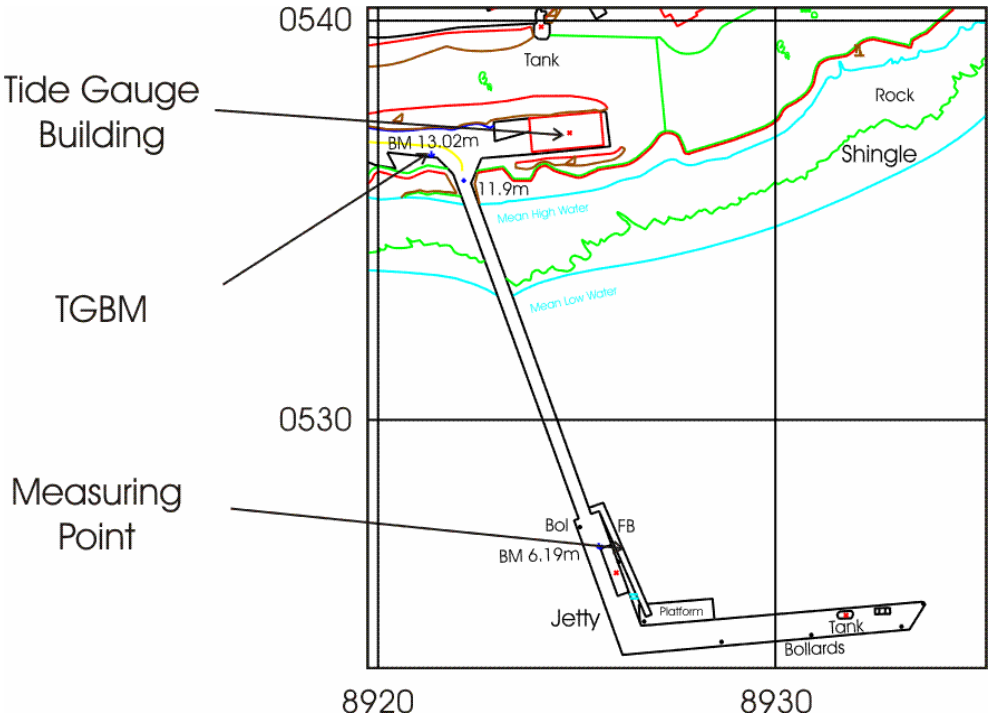
Latitude: 51° 42' 26.6" N Longitude: 05° 03' 06.4" W

Grid Reference: SM 8924 0537

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge is located in the store room at the shore end of Milford Haven Port Authority jetty. The pressure points are mounted at the seaward end of the jetty.



Millport Tide Gauge

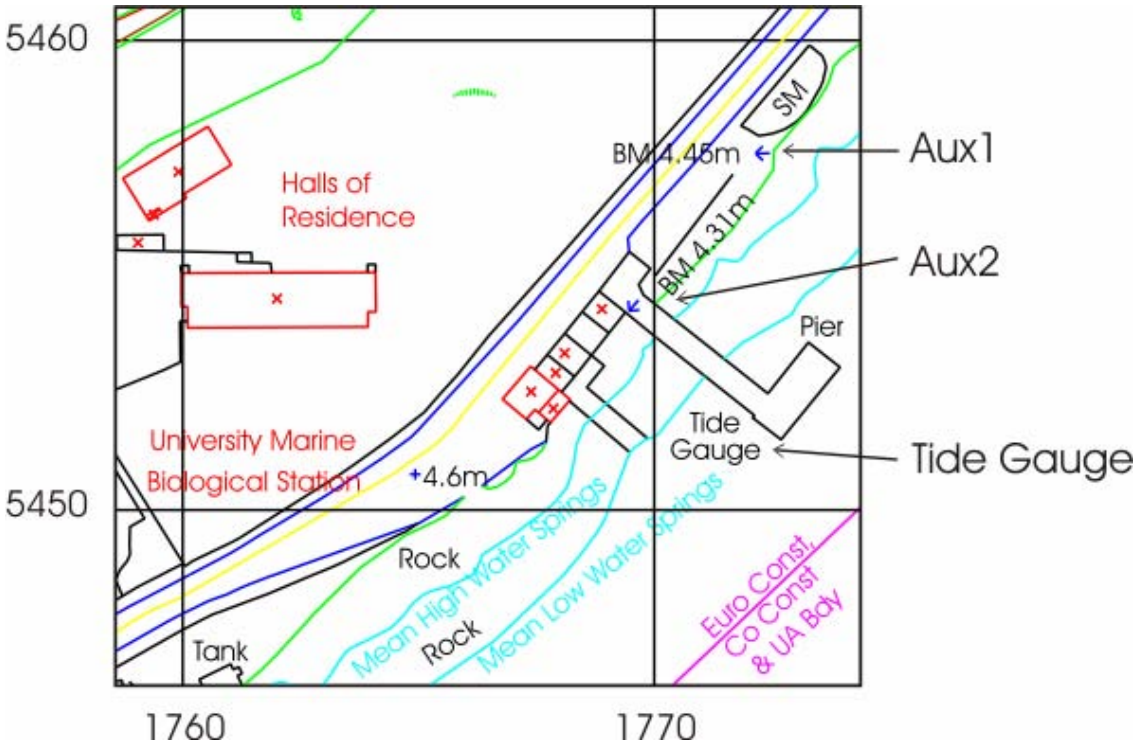
Latitude: 55° 44' 59.3" N Longitude: 04° 54' 22.8" W

Grid Reference: NS 1769 5454

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge is housed in a storeroom at the shore end of the University Marine Biological Station pier. The pressure points are mounted at the seaward end of the pier.



Mumbles (West Glamorgan) Tide Gauge

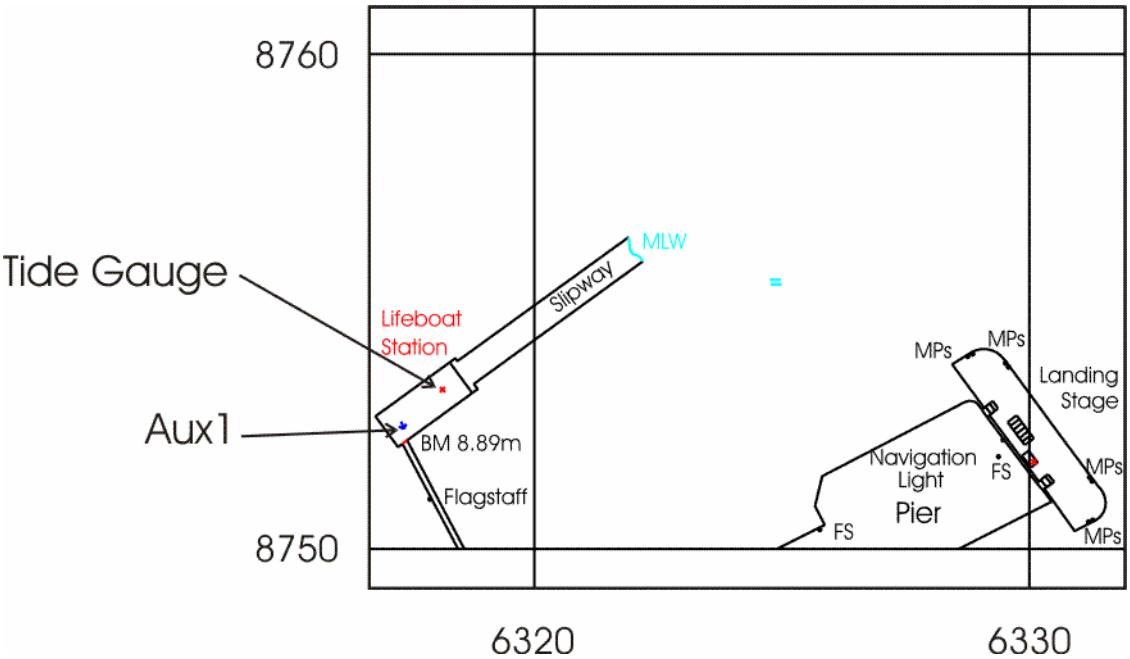
Latitude: 51° 34' 12.0" N Longitude: 03° 58' 31.7" W

Grid Reference: SS 6319 8753

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge cabinet is located in the Mumbles lifeboat station and the pressure points are mounted close to the end of the lifeboat slipway.



Newlyn Tide Gauge

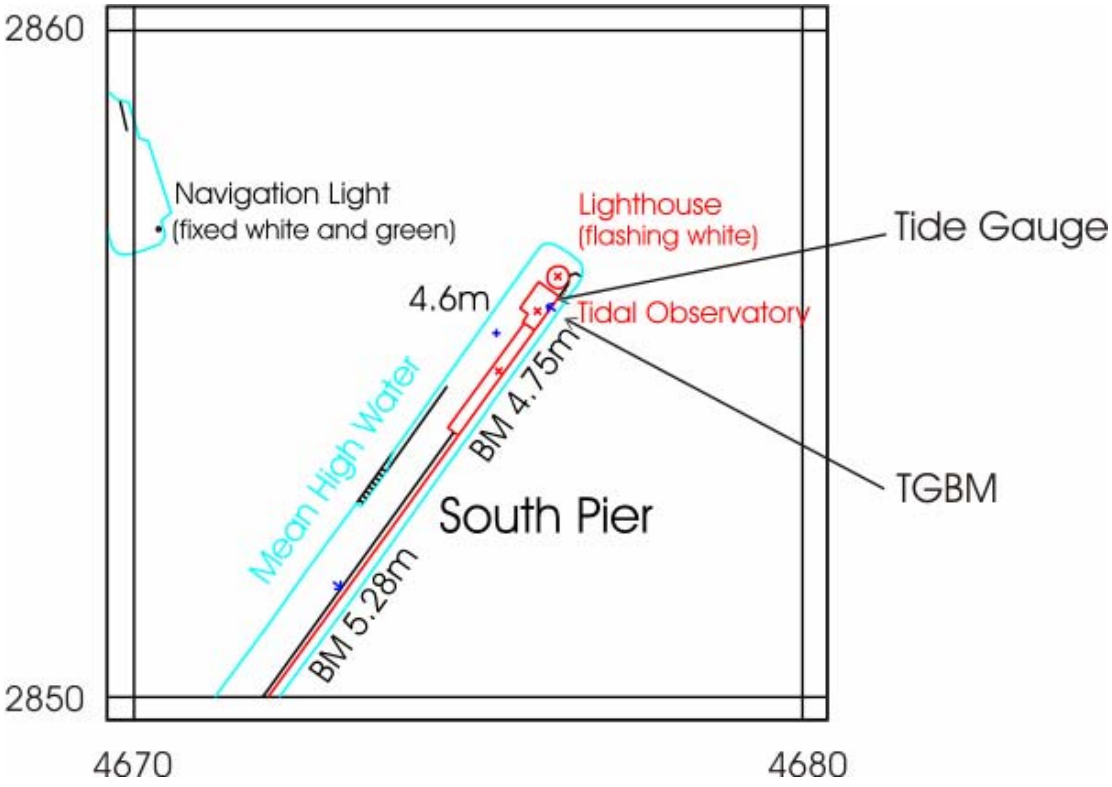
Latitude: 50° 06' 10.8" N Longitude: 05° 32' 33.9" W

Grid Reference: SW 4676 2856

Instrument type: Data acquisition system with a full tide, a mid-tide bubbler gauge and a potentiometer attached to a Munro float gauge installed.

Site of Gauge:

The Tidal Observatory is located at the end of South Pier, next to the lighthouse. The pressure points are located on the seaward side of the pier, behind the lighthouse.



Newhaven (Sussex) Tide Gauge

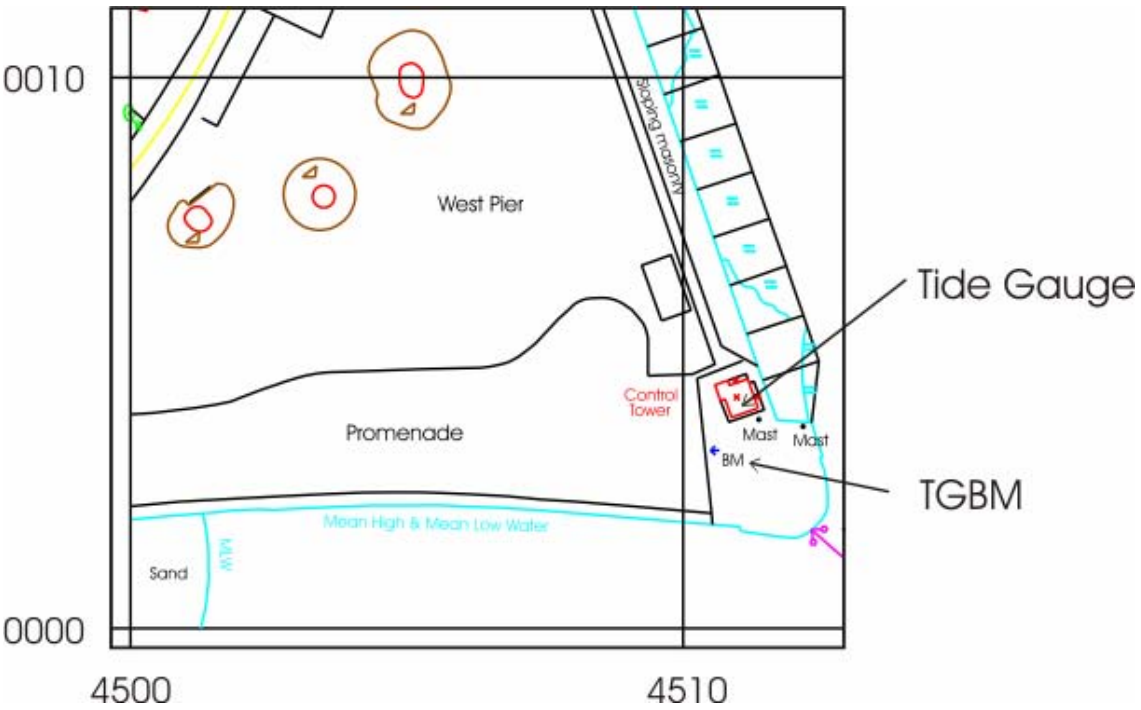
Latitude: 50° 46' 54.4" N Longitude: 00° 03' 25.3" E

Grid Reference: TQ 4511 0004

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge is located within the Port Control building on West Pier, and the pressure points are located on the pier wall, south east of the Port Control building. The anemometer and wind vane are located on the signals mast.



Newport (Wales) Tide Gauge

Latitude: 51° 33' 00.0" N Longitude: 02° 59' 14.8" W

Grid Reference: ST 3163 8392

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is located on the west side of the entrance to Newport Docks. The pressure points are attached to the dock wall on the west side of the dock entrance, close to the lock gates.

North Shields (Tyne and Wear) Tide Gauge

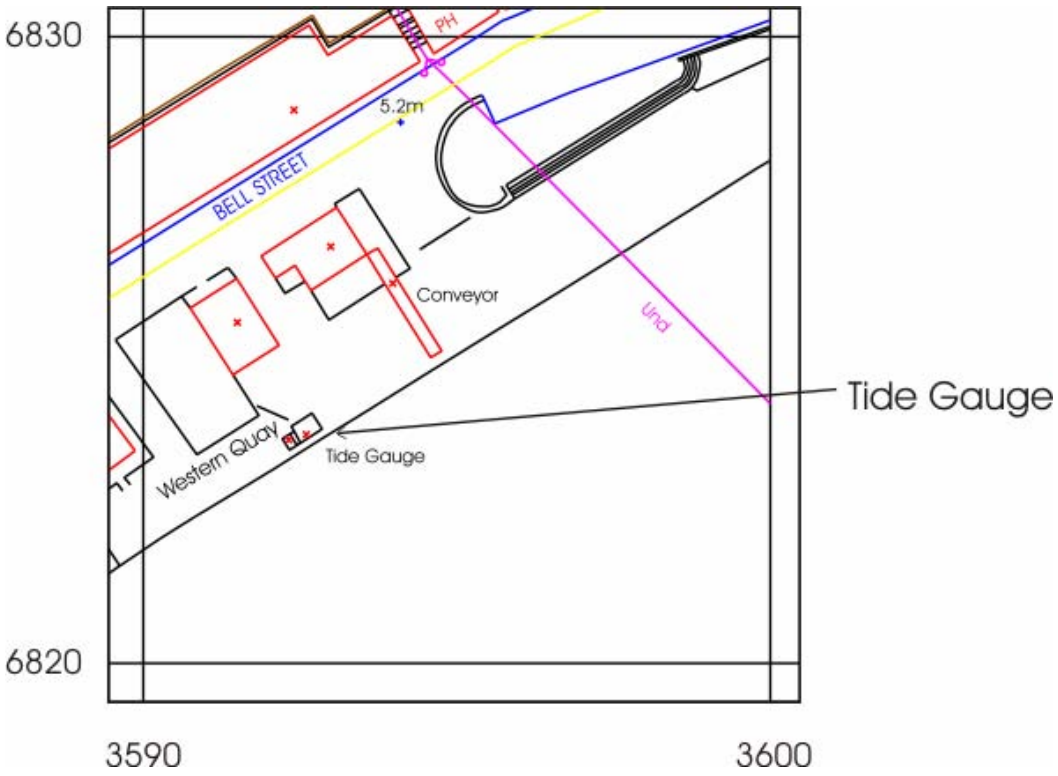
Latitude: 55° 00' 26.8" N Longitude: 01°26' 23.2" W

Grid Reference: NZ 3593 6824

Instrument type: Data acquisition system with potentiometers attached to the Munro float gauge and the Wellhead float gauge installed.

Site of Gauge:

The tide gauge building is located on the north side of the River Tyne, close to the Port of Tyne Authority offices.



Portpatrick (Scotland) Tide Gauge

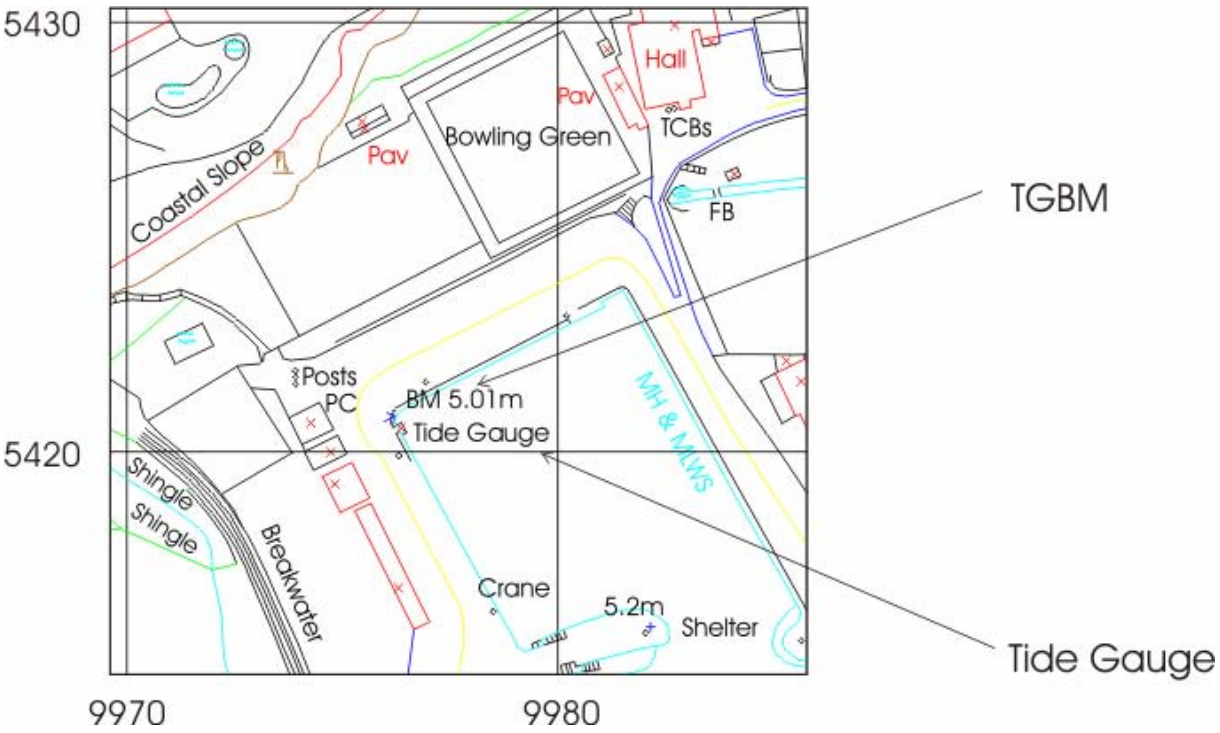
Latitude: 54° 50' 33.2" N Longitude: 05° 07' 12.1" W

Grid Reference: NW 9976 5421

Instrument type: Data acquisition system with a full tide bubbler gauge and a potentiometer attached to an installed Munro float gauge.

Site of Gauge:

The tide gauge building is mounted over the stilling well in the corner of Portpatrick harbour. The pressure point is located directly beneath the building.



Portrush (Northern Ireland) Tide Gauge

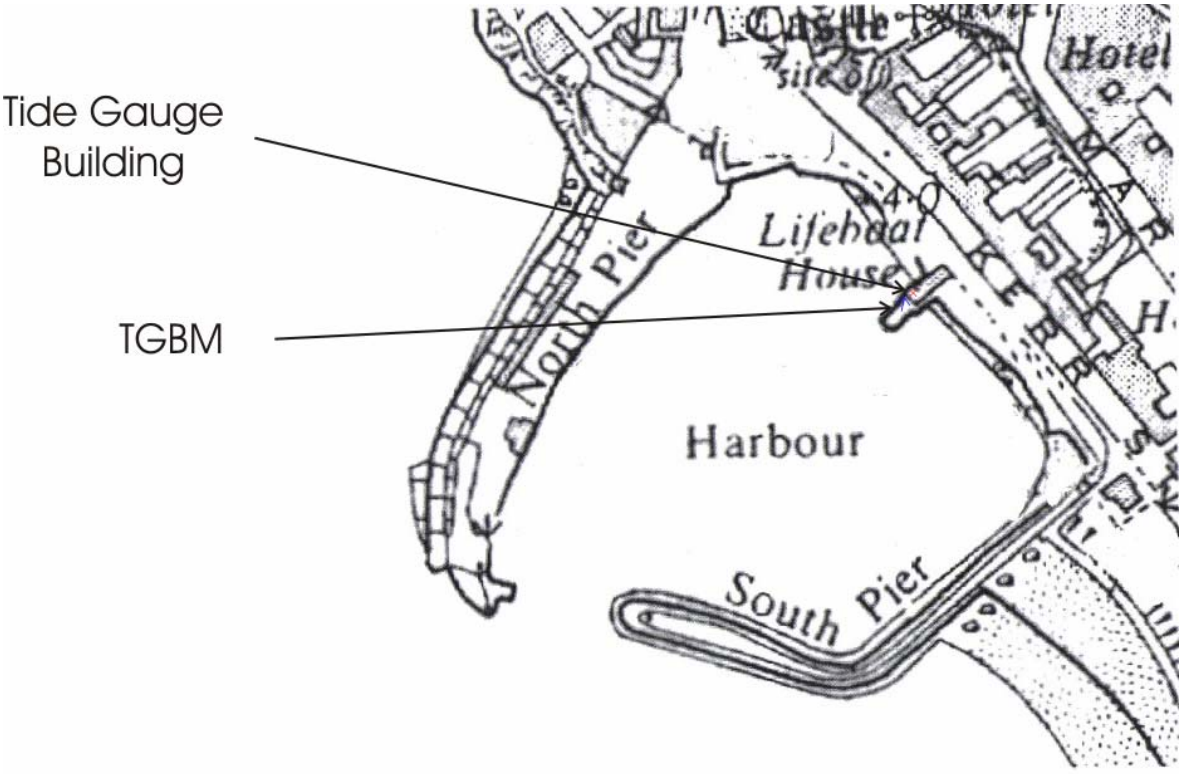
Latitude: 55° 12' 24.4" N Longitude: 06° 39' 24.6" W

Grid Reference: NW 0416 9952

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the RNLI boathouse, with the pressure points fixed to a leg of the slipway.



Portsmouth (Hampshire) Tide Gauge

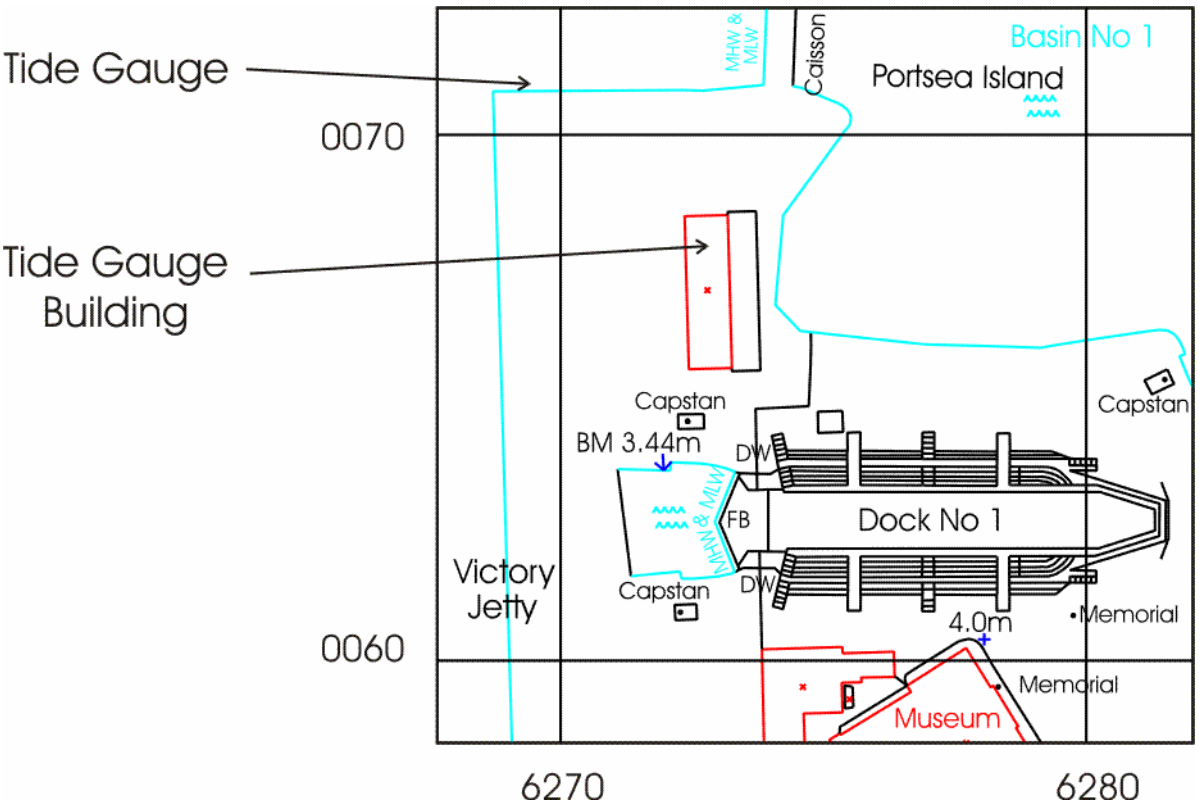
Latitude: 50° 48' 07.9" N Longitude: 01° 06' 40.5" W

Grid Reference: SU 6269 0067

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on Victory Jetty in the Royal Naval base. The pressure points are mounted on a leg at the north west corner of the jetty.



Sheerness (Kent) Tide Gauge

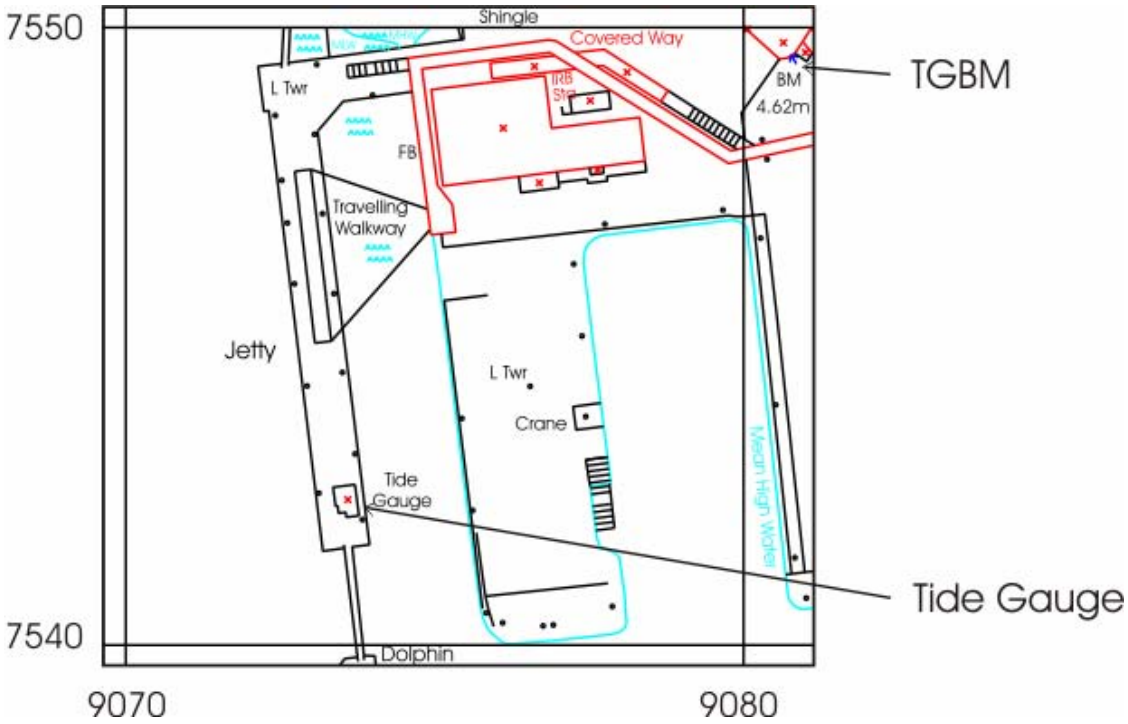
Latitude: 51° 26' 44.3" N Longitude: 00° 44' 36.1" E

Grid Reference: TQ 9074 7542

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on the jetty at Garrison Point, in the Port of Sheerness.



St. Mary's (Isles of Scilly) Tide Gauge

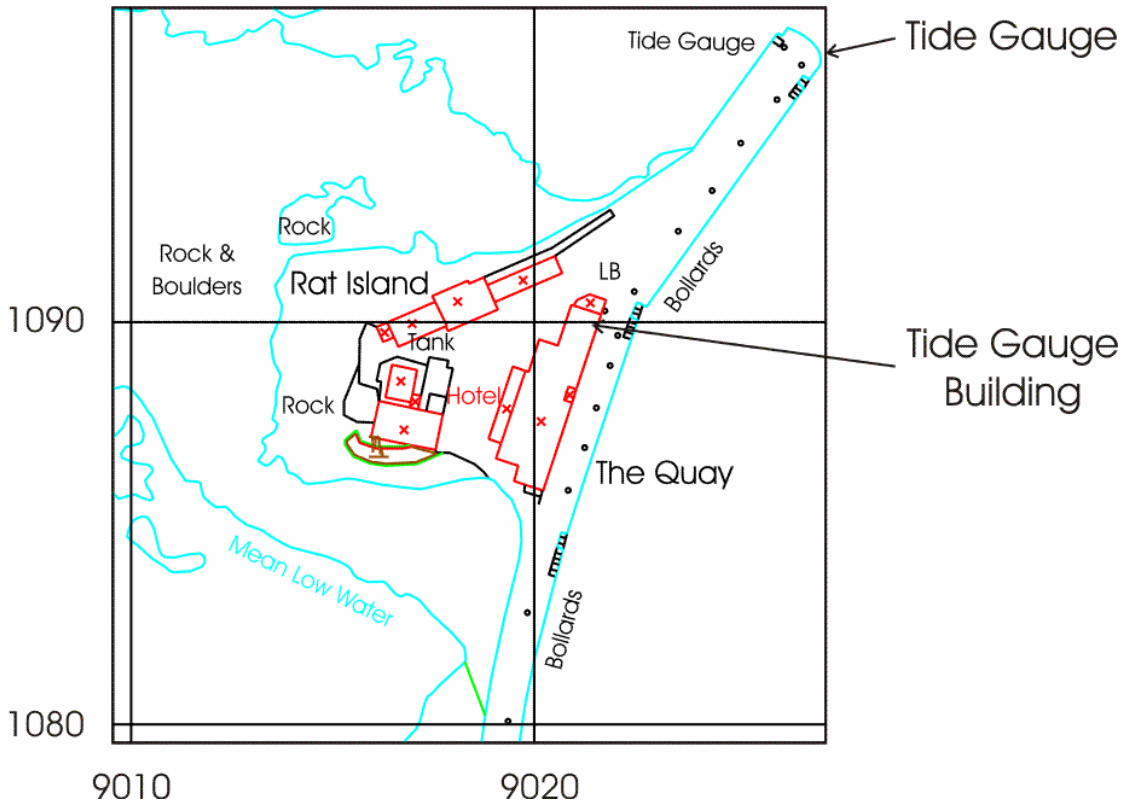
Latitude: 49° 55' 04.2" N Longitude: 06° 19' 01.7" W

Grid Reference: SV 9021 1090

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the Harbour Office storeroom on The Quay, Hugh Town. The pressure points are located on the nose of the quay.



Stornoway (Hebrides) Tide Gauge

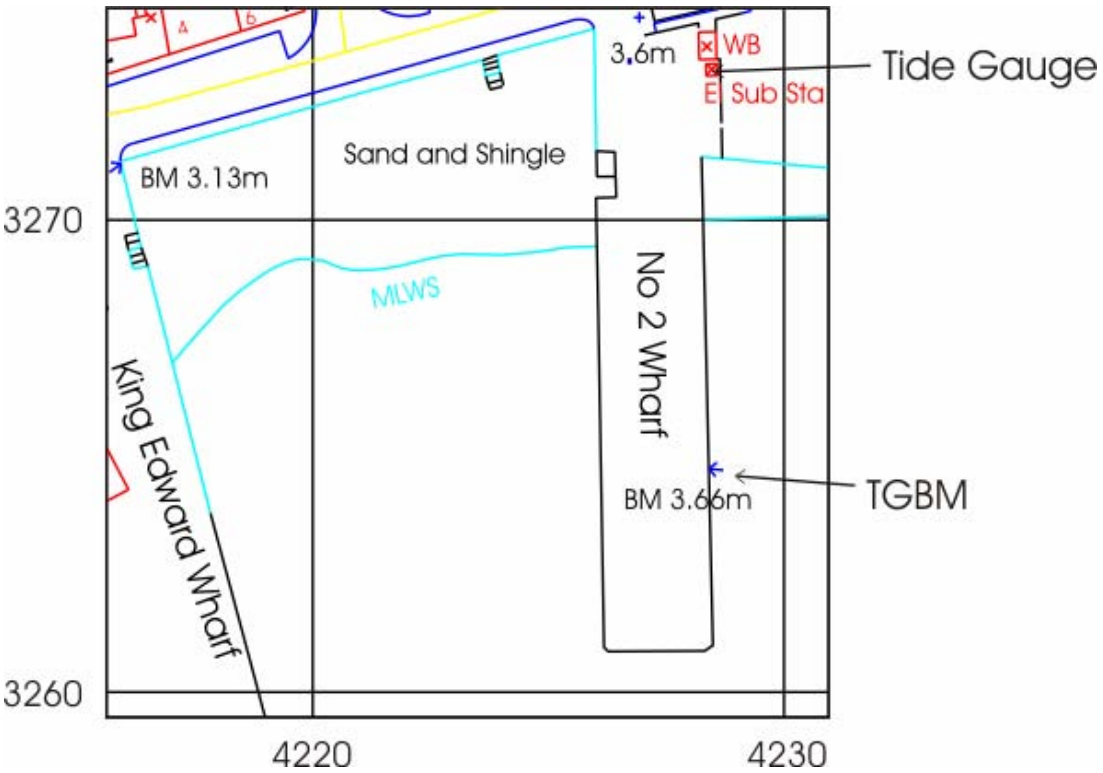
Latitude: 58° 12' 27.8" N Longitude: 06° 23' 20.0" W

Grid Reference: NB 4228 3273

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is located by the weighbridge at the entrance to Stornoway Port Authority, No. 2 wharf. The pressure points are attached to a leg on the east side of the wharf.



Tobermory (Mull) Tide Gauge

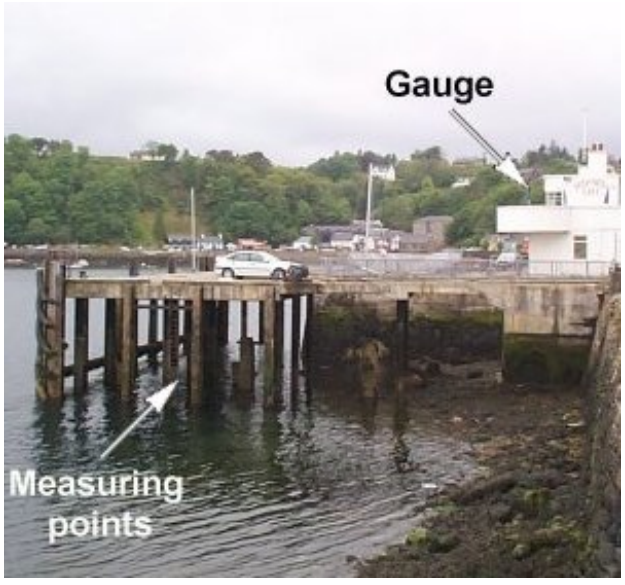
Latitude: 56° 37' 23.2" N Longitude: 06° 03' 51.2" W

Grid Reference: NM 5079 5531

Instrument type: Dataring system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the Caledonian MacBrayne ferry terminal on Mishnish Pier, Tobermory, and the pressure points are located on one of the pier legs.



Ullapool (Scotland) Tide Gauge

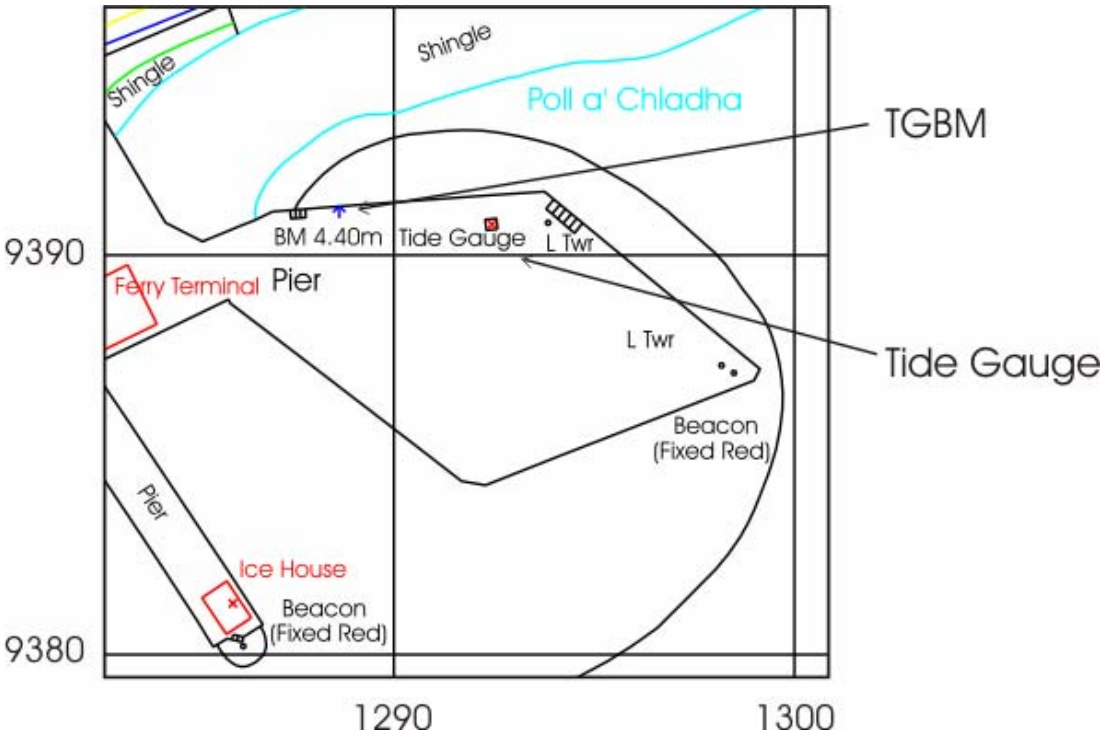
Latitude: 57° 53' 42.9" N Longitude: 05° 09' 29.0" W

Grid Reference: NH 1292 9391

Instrument type: Data acquisition system with a full tide, a mid-tide bubbler gauge and a potentiometer attached to an installed Munro float gauge. Wind speed and wind direction also recorded.

Site of Gauge:

The tide gauge building is located on the pier, Ullapool harbour. The pressure points are mounted below the tide gauge building.



Weymouth (Dorset) Tide Gauge

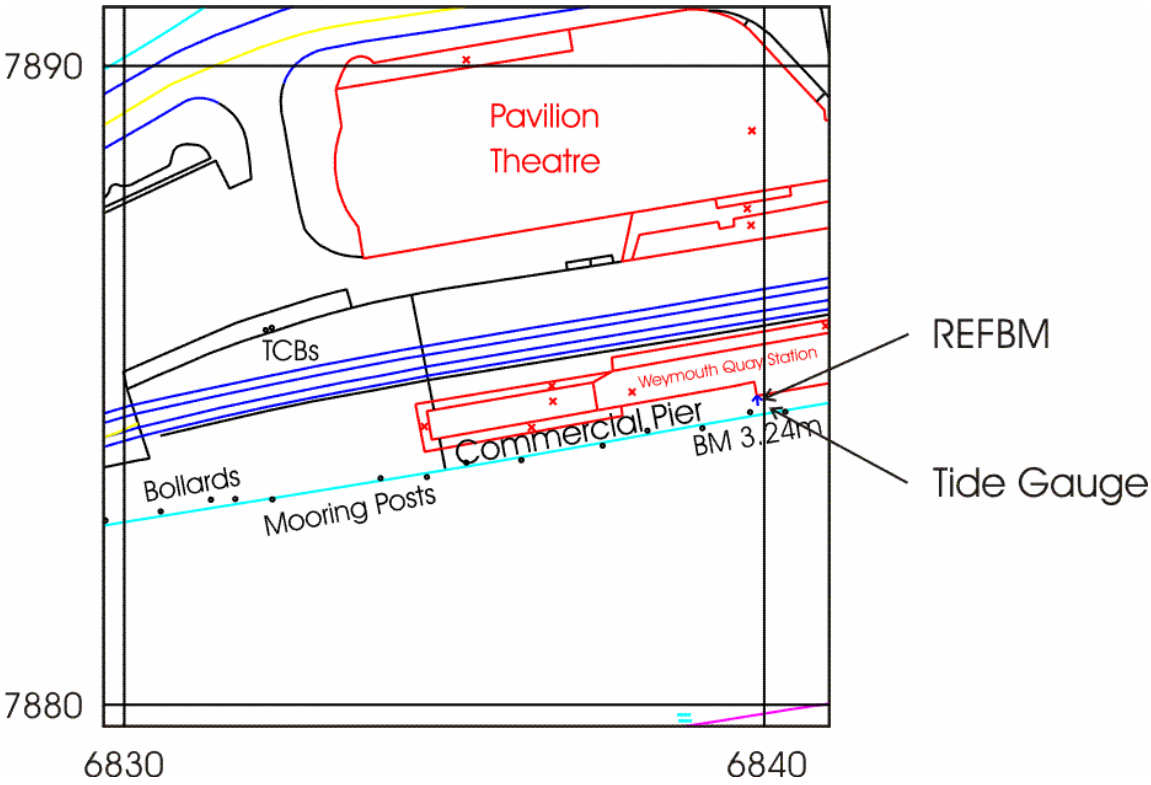
Latitude: 50° 36' 30.6" N Longitude: 02° 26' 52.6" W

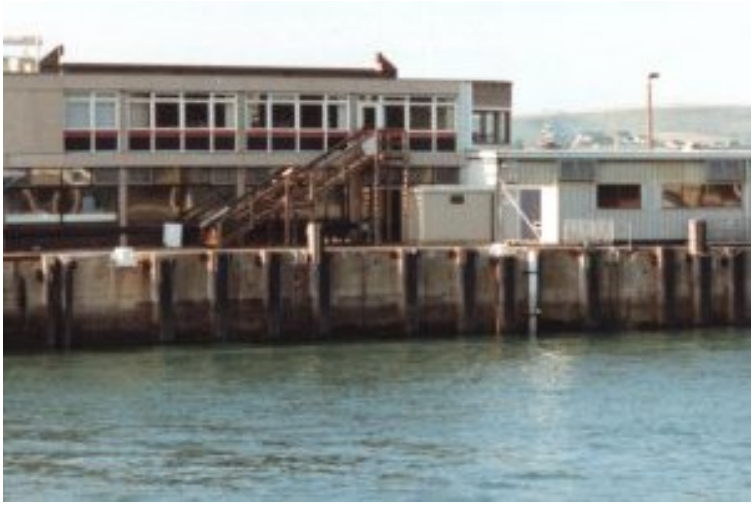
Grid Reference: SY 6840 7885

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is located on Commercial Pier, adjacent to the ferry terminal. The pressure points are located on the pier wall, directly in front of the tide gauge building.





Whitby (Yorkshire) Tide Gauge

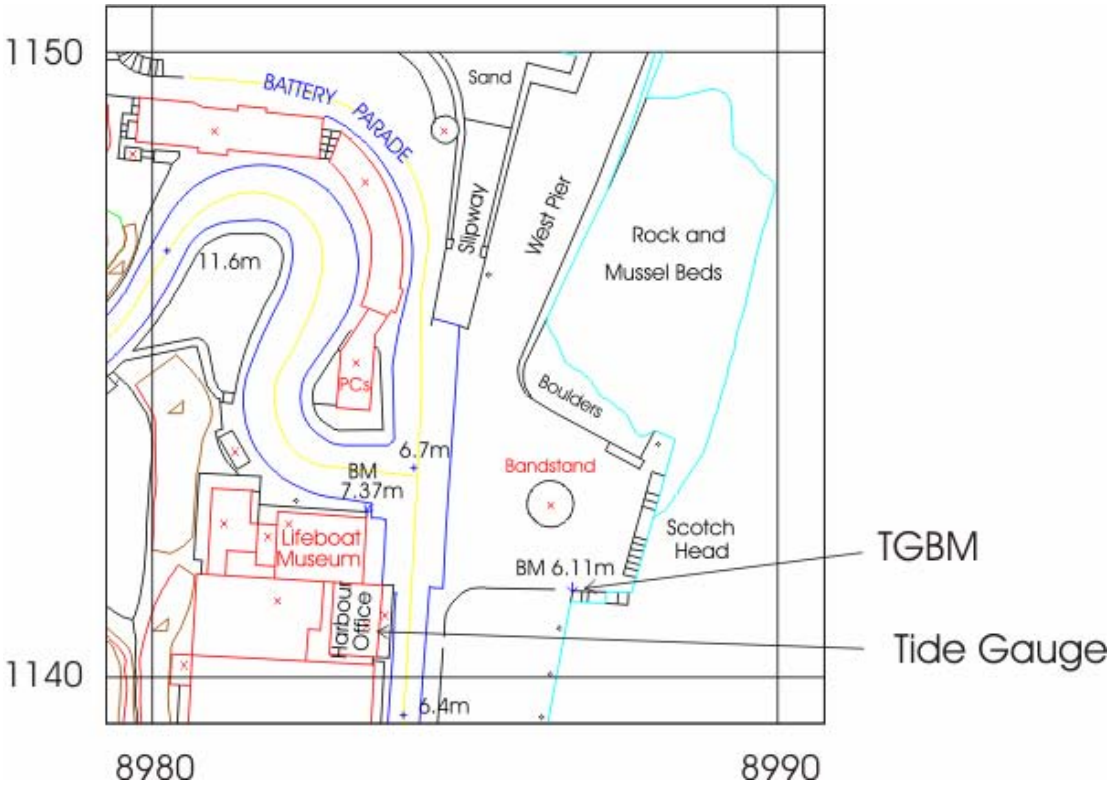
Latitude: 54° 29' 24.0" N Longitude: 00° 36' 52.9" W

Grid Reference: NZ 8986 1140

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge is located in the Harbour Master's office, Pier Road. The pressure points are positioned underneath the quay, adjacent to the Harbour Office.



Wick (Scotland) Tide Gauge

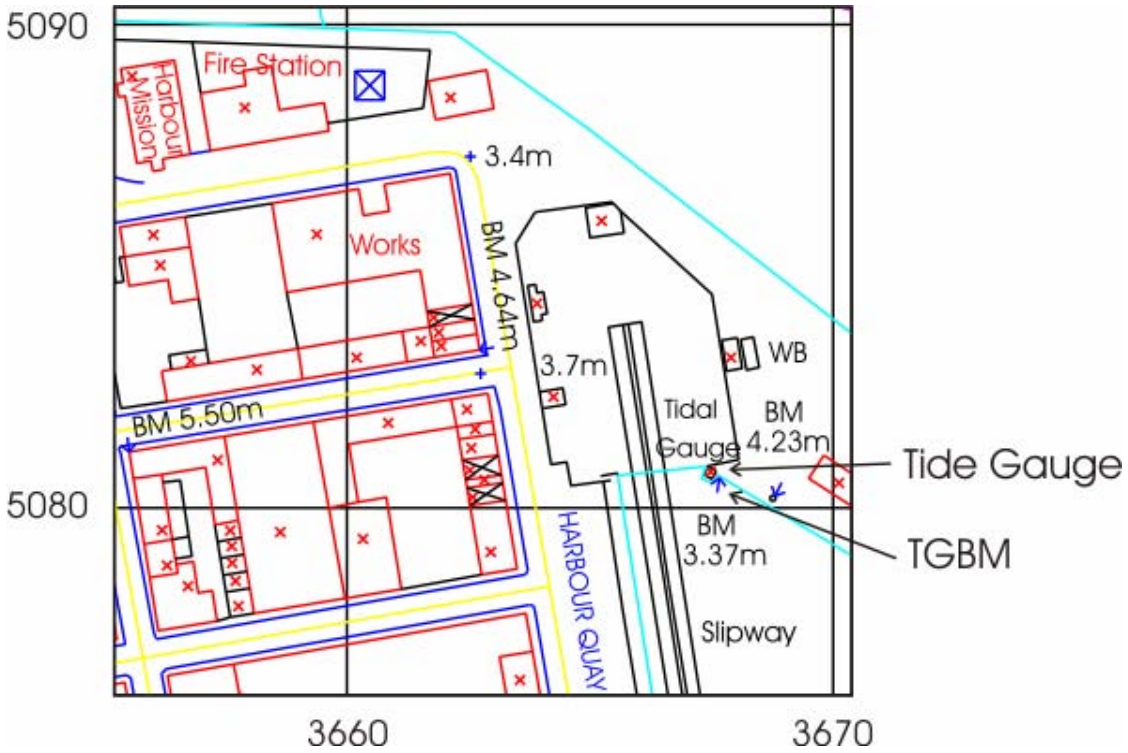
Latitude: 58° 26' 27.5" N Longitude: 03° 05' 11.0" W

Grid Reference: ND 3667 5081

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is sited in the north west corner of Wick harbour next to the ship repair slipway. The pressure points are attached to an unused stilling well beneath the building.



Workington (Cumbria) Tide Gauge

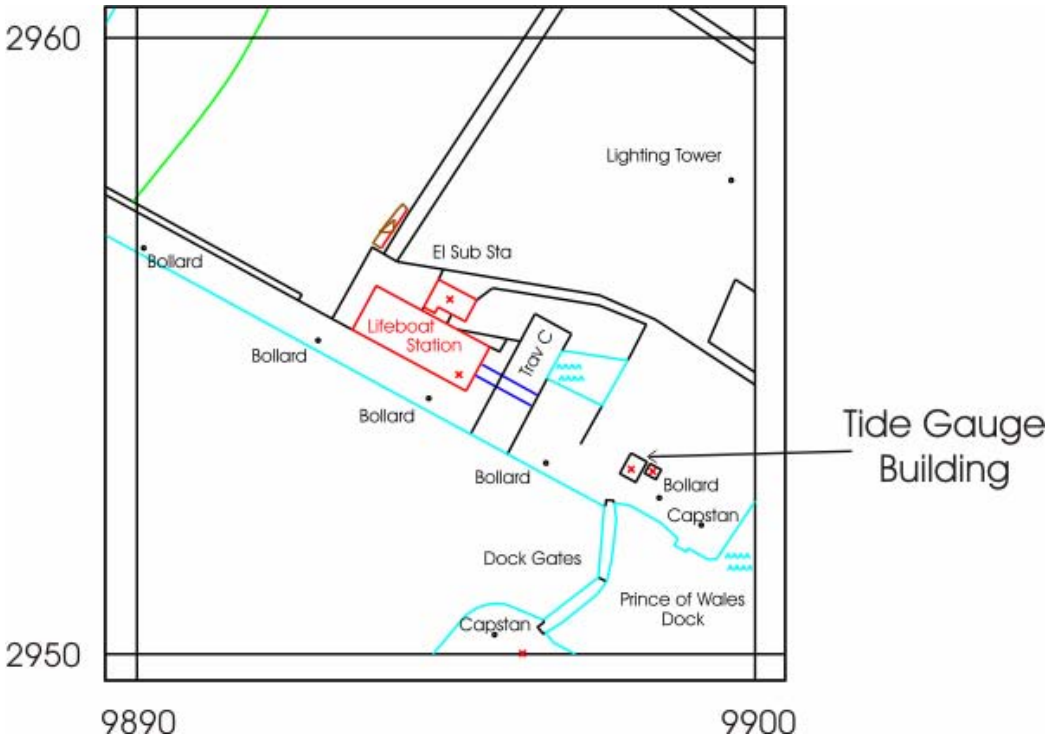
Latitude: 54° 39' 02.6" N Longitude: 03° 34' 01.8"W

Grid Reference: NX 9898 2953

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

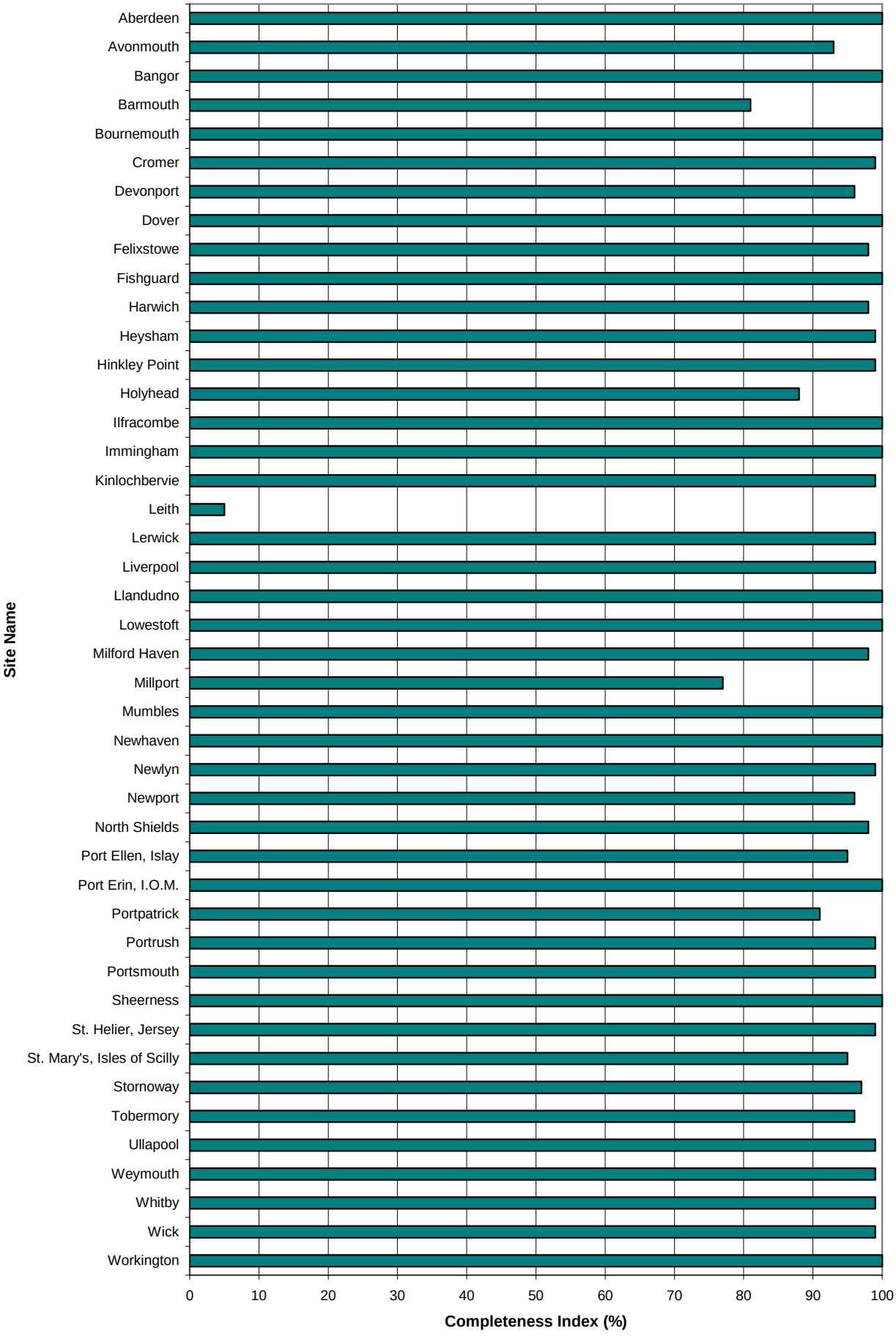
Site of Gauge:

The tide gauge is located in a concrete building on the north side of the dock entrance. The pressure points are located behind fender piles on the north seaward side of the dock gates. The wind speed and direction instruments are mounted at the top of the mast located next to the tide gauge building.



Report for 2005 on Data Quality and visits to sites

Histogram of Completeness Index (CI%) for UK Tide Gauge sites



Aberdeen Tide Gauge

Latitude: 57° 08' 38.5" N
Longitude: 02° 04' 48.8" W
Grid Reference: NJ 9524 0591

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NJ 9525 0590	New bolt N side jetty Waterloo Quay.
Aux1	NJ 9572 0593	Building NW side York Place SE face E angle
Aux2	NJ 9586 0571	Observatory Pocra Quay N face NW angle.
Aux3	NJ 9524 0600	Building NE side Waterloo Quay SW face S angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.25m below Ordnance Datum Newlyn (ODN)
TGZ = 6.318m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 041 General maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	0.892	12	11:00:00
February	0.447	10	09:30:00
March	0.489	17	00:30:00
April	0.55	29	13:15:00
May	0.291	27	00:00:00
June	0.297	23	10:15:00
July	0.554	3	18:30:00
August	0.748	24	21:00:00
September	0.451	27	18:30:00
October	0.499	31	07:30:00
November	0.788	8	13:45:00
December	0.276	31	12:00:00

Surge minima	Value	Day	Time
January	-0.443	11	22:45:00
February	-0.399	6	08:30:00
March	-0.434	6	04:00:00
April	-0.23	19	07:15:00
May	-0.157	13	11:00:00
June	-0.228	7	11:45:00
July	-0.173	10	14:15:00
August	-0.182	30	07:00:00
September	-0.206	26	10:00:00
October	-0.262	14	13:30:00
November	-0.564	25	23:15:00
December	-0.357	9	15:00:00

Extreme maxima	Value	Day	Time
January	5.306	12	14:30:00
February	4.861	10	14:15:00
March	4.756	11	13:45:00
April	4.423	9	13:45:00
May	4.368	26	14:45:00
June	4.434	23	14:00:00
July	4.559	24	02:45:00
August	4.662	22	02:30:00
September	4.97	20	02:00:00
October	4.591	20	02:30:00
November	4.869	15	00:00:00
December	4.486	31	13:00:00

Extreme minima	Value	Day	Time
January	0.158	11	20:00:00
February	0.238	11	21:15:00
March	0.062	9	18:45:00
April	0.238	8	19:00:00
May	0.671	6	18:15:00
June	0.353	25	09:15:00
July	0.247	24	09:00:00
August	-0.016	21	08:15:00
September	0.205	19	08:00:00
October	0.231	17	06:45:00
November	0.703	13	05:15:00
December	0.8	17	20:30:00

Mean sea level	No days	MSL
January	31	2.65
February	28	2.414
March	31	2.461
April	30	2.495
May	31	2.481
June	30	2.508
July	31	2.546
August	31	2.591
September	30	2.633
October	31	2.662
November	30	2.678
December	31	2.604
	Sum	Avg
	365	2.56

Avonmouth Tide Gauge

Latitude: 51° 30' 27.9" N
Longitude: 02° 42' 45.9" W
Grid Reference: ST 5063 7900

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	ST 5057 7881	OSBM bolt at base of bollard
Aux1	ST 5072 7859	Rivet adjacent to transit shed NW face W angle
Aux2	ST 5063 7898	Rivet base building NW side S angle
Ref M	ST 5047 7934	Ref mark on seaward end of jetty

TGZ = Admiralty Chart Datum (ACD)
TGZ = 6.50 m below Ordnance Datum Newlyn (ODN)
TGZ = 15.711 m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 027 TGI on site & restarted data logger. New battery.
Day 235 General maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
93	15 minutes	001-027	None

Statistics:

Surge maxima	Value	Day	Time
January	0.152	30	05:30:00
February	1.098	12	06:00:00
March	0.891	18	06:45:00
April	1.05	18	06:30:00
May	0.848	24	03:15:00
June	0.842	29	20:45:00
July	0.98	28	20:00:00
August	0.864	25	18:45:00
September	0.852	26	06:45:00
October	1.037	21	17:00:00
November	1.552	3	15:45:00
December	1.183	2	03:15:00

Surge minima	Value	Day	Time
January	-0.707	27	15:30:00
February	-0.921	13	20:30:00
March	-0.596	19	01:15:00
April	-0.772	19	22:00:00
May	-0.547	18	21:00:00
June	-0.507	17	21:00:00
July	-0.635	10	16:00:00
August	-0.574	22	13:45:00
September	-0.627	29	11:30:00
October	-0.659	13	22:30:00
November	-1.069	26	09:00:00
December	-0.726	12	23:30:00

Extreme maxima	Value	Day	Time
January	12.352	28	09:00:00
February	14.332	10	08:15:00
March	14.397	12	08:45:00
April	13.893	9	07:45:00
May	13.245	24	19:30:00
June	13.315	23	20:15:00
July	13.891	24	21:45:00
August	14.271	21	20:30:00
September	14.413	19	20:15:00
October	14.007	18	19:45:00
November	13.698	3	07:30:00
December	13.47	3	08:00:00

Extreme minima	Value	Day	Time
January	1.276	29	04:00:00
February	0.413	11	04:00:00
March	0.421	10	14:30:00
April	0.543	8	14:15:00
May	1.077	25	15:00:00
June	1.056	24	03:15:00
July	0.768	24	04:15:00
August	0.43	21	03:15:00
September	0.409	19	03:00:00
October	0.646	18	02:30:00
November	1.01	16	14:00:00
December	1.522	15	01:15:00

Mean sea level	No days	MSL
January	4	6.77
February	28	6.822
March	31	6.949
April	30	6.972
May	31	6.926
June	30	6.944
July	31	6.979
August	31	6.981
September	30	7.038
October	31	7.103
November	30	7.048
December	31	6.962
	Sum	Avg
	338	6.958

Bangor Tide Gauge

Latitude: 54° 39' 53.1" N
Longitude: 05° 40' 10.1" W
Grid Reference: NW 6340 3620

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	5043 8212 (Sheet 115)	S S Pin Tide gauge building Central Pier
Aux1	5038 8200 (Sheet 115)	Cut mark Clock tower

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.01m below Ordnance Datum Belfast (ODB)
TGZ = 5.592m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 005-006 On site. System purged.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	001-005,232,242-243,245-247,252-253,268-269,274-277,284-285,291-292,301-302,309-310,314-317,321-324,328-340,353-365

Statistics:

Surge maxima	Value	Day	Time
January	1.049	11	20:15:00
February	0.289	10	03:15:00
March	0.447	16	11:30:00
April	0.551	28	13:15:00
May	0.349	20	13:00:00
June	0.34	15	10:15:00
July	0.605	3	03:30:00
August	0.548	24	04:15:00
September	0.566	26	15:30:00
October	0.716	30	20:30:00
November	0.842	11	14:15:00
December	0.41	1	09:30:00

Surge minima	Value	Day	Time
January	-0.487	26	06:00:00
February	-0.65	13	20:30:00
March	-0.473	5	23:00:00
April	-0.361	8	13:15:00
May	-0.267	4	16:30:00
June	-0.232	9	06:15:00
July	-0.232	11	00:00:00
August	-0.251	20	06:00:00
September	-0.276	16	02:30:00
October	-0.336	2	07:30:00
November	-0.613	26	03:30:00
December	-0.474	12	08:00:00

Extreme maxima	Value	Day	Time
January	4.129	12	00:00:00
February	3.782	12	13:30:00
March	3.652	13	13:15:00
April	3.779	28	13:30:00
May	3.606	26	00:15:00
June	3.544	22	23:15:00
July	3.713	24	00:45:00
August	4.029	24	02:15:00
September	3.802	20	00:00:00
October	4.017	30	21:30:00
November	4.021	2	23:15:00
December	3.738	1	10:30:00

Extreme minima	Value	Day	Time
January	0.271	13	19:15:00
February	-0.171	13	20:30:00
March	-0.03	9	16:30:00
April	-0.02	8	16:45:00
May	0.25	4	14:30:00
June	0.171	25	07:15:00
July	0.241	25	07:45:00
August	0.05	21	05:45:00
September	0.112	18	04:45:00
October	0.26	17	04:15:00
November	0.317	14	03:15:00
December	0.346	16	17:30:00

Mean sea level	No days	MSL
January	25	2.033
February	28	1.839
March	31	1.965
April	30	2.004
May	31	1.988
June	30	2.004
July	31	1.999
August	27	2.032
September	20	2.086
October	19	2.205
November	11	2.242
December	12	1.93
	Sum	Avg
	295	2.027

Barmouth Tide Gauge

Latitude: 52° 43' 09.6" N
Longitude: 04° 02' 42.1" W
Grid Reference: SH 6197 1548

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SH 6197 1548	NBM rivet concrete 2.9M NE wall junction
Aux 1	SH 6173 1558	Rivet step NE side of road NW entrance path
Aux 2	SH 6186 1556	Rivet wall SE side road 17.6M E steps
Aux 3	SH 6196 1550	Rivet step E side lifeboat station

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.44m below ODN
TGZ = 10.363m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 035	Survey for imminent installation.
	Day 082	New software fitted.
	Day 187	New compressor fitted.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
81	15 minutes	001-069,081	069,176-187

Statistics:

Surge maxima	Value	Day	Time
March	0.451	22	00:00:00
April	0.76	7	02:30:00
May	0.445	28	03:15:00
June	0.443	15	19:15:00
July	0.365	24	05:15:00
August	0.778	24	08:00:00
September	0.803	26	19:00:00
October	0.847	29	22:00:00
November	0.84	11	12:45:00
December	0.583	2	04:30:00

Surge minima	Value	Day	Time
March	-0.238	11	00:15:00
April	-0.438	8	23:00:00
May	-0.326	4	14:45:00
June	-0.245	8	10:45:00
July	-0.249	10	00:30:00
August	-0.22	20	04:45:00
September	-0.373	24	00:30:00
October	-0.376	2	04:45:00
November	-0.659	25	00:30:00
December	-0.559	14	09:30:00

Extreme maxima	Value	Day	Time
March	5.578	12	09:30:00
April	5.323	9	08:30:00
May	5.16	24	20:30:00
June	5.071	23	21:15:00
July	5.495	23	22:00:00
August	5.628	21	21:30:00
September	5.72	19	21:15:00
October	5.473	17	20:00:00
November	5.617	3	08:30:00
December	5.318	2	08:15:00

Extreme minima	Value	Day	Time
March	0.647	11	04:30:00
April	0.615	9	04:15:00
May	0.759	10	04:30:00
June	0.798	24	05:15:00
July	0.764	24	18:00:00
August	0.748	22	18:00:00
September	0.745	20	17:30:00
October	0.764	4	04:15:00
November	0.778	16	16:00:00
December	0.844	14	14:45:00

Mean sea level	No days	MSL
March	19	2.721
April	30	2.672
May	31	2.657
June	23	2.653
July	25	2.634
August	31	2.671
September	30	2.731
October	31	2.811
November	30	2.769
December	31	2.672
	Sum	Avg
	281	2.699

Bournemouth Tide Gauge

Latitude: 50° 42' 51.6" N
Longitude: 01° 52' 29.5" W
Grid Reference: SZ 0893 9053

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
Aux1	SZ 0869 9066	Cut mark Wall
Aux2	SZ 0893 9083	Cut mark Pillar
REF A	SZ 0893 9052	Steelwork clamp
REF B	SZ 0893 9052	Mid-tide pressure point nozzle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.40m below ODN
TGZ = 5.96m below Aux1

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: There were no visits to site in 2005.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	0.482	20	20:15:00
February	0.26	13	15:30:00
March	0.259	24	01:00:00
April	0.268	17	19:00:00
May	0.344	21	22:30:00
June	0.25	28	19:45:00
July	0.337	24	17:15:00
August	0.352	25	10:00:00
September	0.256	9	02:45:00
October	0.434	29	22:30:00
November	0.649	1	23:45:00
December	0.979	2	15:45:00

Surge minima	Value	Day	Time
January	-0.481	26	11:45:00
February	-0.499	25	12:15:00
March	-0.383	6	05:15:00
April	-0.313	9	11:45:00
May	-0.244	5	09:15:00
June	-0.278	8	11:30:00
July	-0.247	10	00:30:00
August	-0.207	30	19:30:00
September	-0.293	29	07:00:00
October	-0.324	3	03:30:00
November	-0.44	23	02:15:00
December	-0.47	12	21:15:00

Extreme maxima	Value	Day	Time
January	2.521	11	09:00:00
February	2.513	11	10:30:00
March	2.513	12	10:00:00
April	2.302	7	07:45:00
May	2.226	24	08:45:00
June	2.326	24	22:30:00
July	2.608	24	23:00:00
August	2.488	21	22:00:00
September	2.502	19	21:45:00
October	2.46	18	21:00:00
November	2.706	3	09:45:00
December	2.687	2	09:15:00

Extreme minima	Value	Day	Time
January	0.086	12	17:00:00
February	0.059	9	16:00:00
March	-0.042	10	15:45:00
April	0.07	9	16:00:00
May	0.411	26	05:00:00
June	0.298	26	06:45:00
July	0.247	23	04:45:00
August	0.014	21	04:30:00
September	0.056	19	04:00:00
October	0.257	17	03:00:00
November	0.281	14	01:45:00
December	0.467	13	01:30:00

Mean sea level	No days	MSL
January	31	1.503
February	28	1.413
March	31	1.496
April	30	1.553
May	31	1.531
June	30	1.541
July	31	1.598
August	31	1.587
September	30	1.612
October	31	1.662
November	30	1.648
December	31	1.587
	Sum	Avg
	365	1.561

Cromer Tide Gauge

Latitude: 52° 56' 03.1" N
Longitude: 01° 18' 05.9" E
Grid Reference: TG 2198 4253

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TG 2193 4233	S Steel bolt on top of wall opposite E side of pier
Aux1	TG 2198 4253	Rivet on steps of catwalk NE angle of LB station
Aux2	TG 2195 4233	S Steel bolt bottom ramp S side at W corner

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.75m below Ordnance Datum Newlyn
TGZ = 10.117m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:

Day 040	General maintenance.
Day 297	Compressor changed & new maintenance-free battery installed.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	068	None

Statistics:

Surge maxima	Value	Day	Time
January	1.429	20	11:30:00
February	0.984	13	19:15:00
March	0.814	11	15:45:00
April	1.051	8	14:45:00
May	0.508	4	12:15:00
June	0.357	23	16:45:00
July	0.634	4	01:15:00
August	0.761	25	06:00:00
September	0.652	14	12:30:00
October	0.547	31	14:45:00
November	1.435	24	20:45:00
December	1.219	17	02:15:00

Surge minima	Value	Day	Time
January	-0.966	12	04:45:00
February	-0.492	6	12:30:00
March	-0.469	4	05:30:00
April	-0.713	6	12:30:00
May	-0.385	29	02:30:00
June	-0.354	1	18:00:00
July	-0.253	12	07:45:00
August	-0.634	24	13:00:00
September	-0.538	28	21:30:00
October	-0.615	10	02:15:00
November	-0.72	10	09:15:00
December	-0.686	30	15:30:00

Extreme maxima	Value	Day	Time
January	6.126	12	20:00:00
February	5.87	13	21:45:00
March	5.855	11	19:00:00
April	5.759	8	18:15:00
May	5.226	7	17:45:00
June	5.205	25	08:15:00
July	5.511	25	09:00:00
August	5.519	23	08:30:00
September	5.802	20	07:30:00
October	5.28	18	06:30:00
November	5.863	15	05:15:00
December	5.652	16	19:00:00

Extreme minima	Value	Day	Time
January	-0.029	12	02:30:00
February	0.11	10	02:00:00
March	0.191	10	01:00:00
April	0.36	10	01:45:00
May	0.602	24	01:00:00
June	0.562	26	16:30:00
July	0.508	24	15:30:00
August	0.212	21	14:30:00
September	0.278	19	14:00:00
October	0.318	17	13:00:00
November	0.849	3	13:45:00
December	0.729	30	12:30:00

Mean sea level	No days	MSL
January	31	3.03
February	28	2.915
March	31	2.889
April	30	2.899
May	31	2.915
June	30	2.926
July	31	3.009
August	31	3.017
September	30	3.018
October	31	3
November	30	3.088
December	31	2.999
	Sum	Avg
	365	2.975

Devonport Tide Gauge

Latitude: 50° 22' 06.2" N
Longitude: 04° 11' 06.9" W
Grid Reference: SX 4469 5434

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SX 4468 5434	Bolt on jetty wall. 6.6m NW angle T G building
Aux1	SX 4471 5433	Building N face NE angle
Aux2	SX 4487 5425	Bldg NW face W angle
Aux3	SX 4501 5454	Fl Br 11818 bldg W face NW angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.22m below ODN
TGZ = 7.631m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 025 New battery & general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	010-025	121,151,153-154,157,159,161-162,164,347-365

Statistics:

Surge maxima	Value	Day	Time
January	0.385	8	03:30:00
February	0.088	11	04:45:00
March	0.361	22	04:15:00
April	0.306	17	17:15:00
May	0.27	21	19:15:00
June	0.245	15	04:30:00
July	0.32	28	06:15:00
August	0.24	25	07:30:00
September	0.214	9	04:30:00
October	0.424	29	14:30:00
November	0.56	3	04:45:00
December	0.666	2	13:30:00

Surge minima	Value	Day	Time
January	-0.433	27	01:45:00
February	-0.446	13	22:15:00
March	-0.357	9	19:15:00
April	-0.299	9	20:15:00
May	-0.237	29	00:45:00
June	-0.242	9	05:45:00
July	-0.216	11	02:30:00
August	-0.253	22	21:45:00
September	-0.27	18	07:30:00
October	-0.307	5	23:15:00
November	-0.378	14	03:30:00
December	-0.303	9	14:15:00

Extreme maxima	Value	Day	Time
January	5.342	8	03:15:00
February	5.885	11	07:30:00
March	5.896	12	07:00:00
April	5.636	26	19:00:00
May	5.496	25	18:45:00
June	5.619	24	19:30:00
July	5.95	24	20:00:00
August	5.883	21	19:00:00
September	5.927	19	18:45:00
October	5.842	18	18:15:00
November	6.029	3	06:15:00
December	6.016	2	05:45:00

Extreme minima	Value	Day	Time
January	0.907	27	13:00:00
February	0.246	10	13:15:00
March	0.183	11	12:45:00
April	0.308	9	12:15:00
May	0.78	8	12:00:00
June	0.745	24	01:00:00
July	0.577	23	01:00:00
August	0.269	21	00:45:00
September	0.246	19	00:30:00
October	0.535	18	00:00:00
November	0.81	16	12:00:00
December	1.154	17	12:45:00

Mean sea level	No days	MSL
January	14	3.229
February	28	3.224
March	31	3.324
April	29	3.36
May	28	3.334
June	20	3.371
July	31	3.374
August	31	3.354
September	30	3.398
October	31	3.475
November	30	3.464
December	11	3.532
	Sum	Avg
	314	3.37

Dover Tide Gauge

Latitude: 51° 06' 51.8" N
Longitude: 01° 19' 21.1" E
Grid Reference: TR 3264 4026

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TR 3193 4074	Fl Br G4868 building. East side of works entrance
Aux 1	TR 3195 4095	No 29 Waterloo Crescent SW face S angle
Aux 2	TR 3228 4053	Rivet pier wall NE side of pier F junction
Aux 3	TR 3265 4026	Rivet steps NE side P of W pier 1.0M SE W angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.67m below Ordnance Datum Newlyn (ODN)
TGZ = 10.491m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 313 General maintenance & changed compressor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	1.081	20	16:45:00
February	0.752	13	12:45:00
March	0.746	11	20:30:00
April	0.77	8	19:15:00
May	0.447	16	15:15:00
June	0.32	24	23:15:00
July	0.441	21	21:30:00
August	0.618	25	11:00:00
September	0.589	14	18:00:00
October	0.447	21	11:00:00
November	1.033	24	22:45:00
December	0.938	16	15:30:00

Surge minima	Value	Day	Time
January	-0.744	10	10:15:00
February	-0.558	25	09:30:00
March	-0.4	4	09:30:00
April	-0.36	6	10:00:00
May	-0.301	11	22:15:00
June	-0.367	7	20:30:00
July	-0.301	12	11:45:00
August	-0.382	24	16:45:00
September	-0.376	26	17:30:00
October	-0.391	10	08:15:00
November	-0.514	14	07:00:00
December	-0.575	30	22:15:00

Extreme maxima	Value	Day	Time
January	7.552	13	00:30:00
February	7.352	13	01:45:00
March	7.49	11	23:45:00
April	7.449	8	23:00:00
May	6.78	7	22:30:00
June	6.779	25	13:15:00
July	7.11	24	13:00:00
August	7.06	23	13:15:00
September	7.295	20	12:15:00
October	6.833	18	11:15:00
November	7.233	15	10:00:00
December	7.103	16	23:30:00

Extreme minima	Value	Day	Time
January	0.481	12	07:30:00
February	0.397	10	07:15:00
March	0.358	10	06:15:00
April	0.525	10	07:15:00
May	0.758	25	19:15:00
June	0.837	26	21:45:00
July	0.716	23	20:00:00
August	0.402	21	19:45:00
September	0.42	19	19:15:00
October	0.496	17	18:15:00
November	0.946	3	19:00:00
December	0.858	30	17:30:00

Mean sea level	No days	MSL
January	31	3.767
February	28	3.666
March	31	3.679
April	30	3.707
May	31	3.699
June	30	3.701
July	31	3.789
August	31	3.794
September	30	3.797
October	31	3.794
November	30	3.851
December	31	3.782
	Sum	Avg
	365	3.752

Felixstowe Tide Gauge

Latitude: 51° 57' 27.7" N
Longitude: 01° 20' 47.6" E
Grid Reference: TM 3003 3409

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TM 3001 3414	Bolt on the SE side of prom NE face of arcade
Aux1	TM 2956 3393	Flush Bracket 2071 on No. 25 Langer Road W angle NW face.
Aux3	TM 3003 3409	Rivet outside TG building

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.95m below ODN
TGZ = 5.69m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 041	General maintenance
	Day 298	New data logger fitted to re-enable mid-tide channel but mid tide transducer has failed.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	292-298	None

Statistics:

Surge maxima	Value	Day	Time
January	1.219	20	14:45:00
February	0.93	13	22:45:00
March	0.672	11	20:00:00
April	1.009	8	18:30:00
May	0.373	4	15:45:00
June	0.213	23	19:45:00
July	0.5	4	05:15:00
August	0.612	25	01:30:00
September	0.634	14	17:15:00
October	0.445	29	09:30:00
November	1.379	25	00:15:00
December	1.178	16	12:45:00

Surge minima	Value	Day	Time
January	-0.911	10	07:00:00
February	-0.516	6	17:00:00
March	-0.542	6	12:00:00
April	-0.583	6	11:45:00
May	-0.397	29	05:15:00
June	-0.452	1	21:30:00
July	-0.314	3	04:45:00
August	-0.663	24	16:00:00
September	-0.572	26	19:00:00
October	-0.495	27	15:30:00
November	-0.71	11	21:15:00
December	-0.91	30	18:30:00

Extreme maxima	Value	Day	Time
January	4.568	13	01:15:00
February	4.405	13	02:30:00
March	4.345	12	00:45:00
April	4.291	8	11:30:00
May	4.001	27	01:30:00
June	4.055	25	01:30:00
July	4.224	21	23:30:00
August	4.205	25	03:00:00
September	4.145	21	01:15:00
October	4.01	31	22:30:00
November	4.496	15	10:45:00
December	4.675	16	12:00:00

Extreme minima	Value	Day	Time
January	-0.231	12	06:45:00
February	-0.098	10	06:15:00
March	-0.141	10	05:15:00
April	0.099	10	06:00:00
May	0.196	28	20:45:00
June	0.128	26	20:45:00
July	0.214	24	19:45:00
August	-0.035	21	18:45:00
September	0.056	19	18:15:00
October	0.053	17	17:15:00
November	0.267	10	12:00:00
December	0.166	30	16:45:00

Mean sea level	No days	MSL
January	31	2.087
February	28	1.982
March	31	1.965
April	30	1.982
May	31	1.994
June	30	2.004
July	31	2.092
August	31	2.109
September	30	2.122
October	22	2.112
November	30	2.172
December	31	2.101
	Sum	Avg
	356	2.06

Fishguard Tide Gauge

Latitude: 52° 00' 47.6" N
Longitude: 04° 59' 01.5" W
Grid Reference: SM 9534 3918

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SM 9534 3918	OSBM bolt on quay 3.6M NE end of railings (1987)
Aux1	SM 9513 3874	OS bolt con base railings 6.4M NW angle TG hut
Aux2	SM 9489 3849	Rivet step top of Goodwick Quay
Aux3	SM 9455 3820	Fl Br 11518 blding SW side railway bridge SE Face

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.44m below ODN
TGZ = 7.88m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 035 General maintenance.
Day 164 TGI & divers on site, levelling.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	0.895	8	02:30:00
February	0.365	12	04:45:00
March	0.462	22	03:00:00
April	0.536	17	19:30:00
May	0.372	28	04:30:00
June	0.372	15	07:00:00
July	0.375	2	21:45:00
August	0.535	24	08:15:00
September	0.467	26	18:45:00
October	0.643	30	04:15:00
November	0.739	3	03:45:00
December	0.66	2	03:00:00

Surge minima	Value	Day	Time
January	-0.353	19	00:45:00
February	-0.557	13	19:30:00
March	-0.274	6	00:15:00
April	-0.201	8	22:00:00
May	-0.165	4	14:00:00
June	-0.108	9	07:30:01
July	-0.118	11	12:30:00
August	-0.105	20	08:45:00
September	-0.197	29	03:00:00
October	-0.192	2	00:30:00
November	-0.477	24	20:15:00
December	-0.335	14	11:15:00

Extreme maxima	Value	Day	Time
January	5.21	11	07:30:00
February	5.377	10	08:15:00
March	5.334	12	08:30:00
April	5.057	9	07:30:00
May	4.863	24	07:15:00
June	4.897	24	21:00:00
July	5.277	23	20:45:00
August	5.339	21	20:30:00
September	5.424	19	20:15:00
October	5.271	17	19:00:00
November	5.273	3	07:30:00
December	5.147	2	07:15:00

Extreme minima	Value	Day	Time
January	0.555	12	15:15:00
February	0.398	10	15:00:00
March	0.338	10	14:00:00
April	0.362	8	13:45:00
May	0.874	7	13:00:00
June	0.82	25	03:45:00
July	0.664	23	02:45:00
August	0.348	21	02:45:00
September	0.39	19	02:15:00
October	0.673	18	01:45:00
November	0.785	16	13:30:00
December	1.01	14	12:45:00

Mean sea level	No days	MSL
January	31	2.708
February	28	2.595
March	31	2.723
April	30	2.754
May	31	2.735
June	30	2.731
July	31	2.744
August	31	2.73
September	30	2.784
October	31	2.879
November	30	2.834
December	31	2.765
	Sum	Avg
	365	2.749

Harwich Tide Gauge

Latitude: 51° 56' 52.8" N
Longitude: 01° 17' 31.4" E
Grid Reference: TM 2634 3284

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TM 2634 3284	Bolt at base of flag staff
Aux1	TM 2617 3277	Cut mark quay edge
Aux2	TM 2608 3271	Cut mark NW face of Bank building
Aux3	TM 2610 3258	Cut mark N side of ent St Nicholas's church

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.02m below ODN
TGZ = 6.17m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: Levelling was carried out in 2005.

T.G.I. visits to site: Day 041 General maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	292-294,355-357	None

Statistics:

Surge maxima	Value	Day	Time
January	1.376	20	15:15:00
February	1.051	13	22:45:00
March	0.82	11	20:00:00
April	1.135	8	18:45:00
May	0.528	16	13:00:00
June	0.317	20	17:15:00
July	0.669	4	06:00:00
August	0.735	25	01:45:00
September	0.712	14	18:15:00
October	0.579	31	17:30:00
November	1.572	25	00:30:00
December	1.153	16	19:30:00

Surge minima	Value	Day	Time
January	-0.953	8	10:15:00
February	-0.476	5	09:15:00
March	-0.472	4	06:30:00
April	-0.484	6	11:15:00
May	-0.45	24	00:45:00
June	-0.36	8	02:00:00
July	-0.237	19	23:30:00
August	-0.739	24	16:15:00
September	-0.591	26	19:15:00
October	-0.645	25	05:45:00
November	-0.711	8	11:15:00
December	-0.853	30	18:45:00

Extreme maxima	Value	Day	Time
January	4.699	13	01:30:00
February	4.575	10	12:45:00
March	4.509	12	13:15:00
April	4.513	8	11:45:00
May	4.222	27	01:45:00
June	4.277	25	01:45:00
July	4.441	21	23:45:00
August	4.42	25	03:15:00
September	4.351	21	01:30:00
October	4.229	21	13:30:00
November	4.645	15	11:00:00
December	4.887	16	12:00:00

Extreme minima	Value	Day	Time
January	-0.175	12	06:45:00
February	-0.059	10	06:30:00
March	-0.097	10	05:30:00
April	0.118	10	06:15:00
May	0.239	24	05:15:00
June	0.184	26	21:00:00
July	0.25	24	20:00:00
August	-0.003	21	19:00:00
September	0.071	19	18:30:00
October	0.092	17	17:30:00
November	0.311	10	11:45:00
December	0.201	30	17:00:00

Mean sea level	No days	MSL
January	31	2.204
February	28	2.098
March	31	2.086
April	30	2.102
May	31	2.108
June	30	2.114
July	31	2.203
August	31	2.214
September	30	2.217
October	27	2.206
November	30	2.252
December	26	2.2
	Sum	Avg
	356	2.167

Heysham Tide Gauge

Latitude: 54° 01' 54.6" N
Longitude: 02° 55' 12.9" W
Grid Reference: SD 3982 5993

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SD 4030 6012	OSBM bolt on south quay 40.8m SW from SE angle of dock.
Aux1	SD 4141 6005	Bridge parapet, E side of road.
Aux2	SD 4026 6033	Pivot pin harbour wall 6.1M SW N angle of harbour.
Aux3	SD 4026 6033	Rivet harbour wall 5.7M SW of N angle of Harbour.
Aux4	SD 3982 5992	Brass bolt quay edge.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.90m below Ordnance Datum Newlyn (ODN)
TGZ = 12.098m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 195	On site with Mersey Docks and Harbour Company with regard to levels.
	Day 217	On site for levelling & subsequent adjustment.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	195	124-195,217

Statistics:

Surge maxima	Value	Day	Time
January	2.076	8	07:00:00
February	0.778	12	07:45:00
March	0.58	14	23:00:00
April	0.788	6	06:15:00
May	0.451	1	15:30:00
July	0.368	18	06:30:00
August	0.985	24	08:30:00
September	0.756	14	00:15:00
October	0.847	30	21:15:00
November	1.129	11	14:00:00
December	0.476	30	22:00:00

Surge minima	Value	Day	Time
January	-0.663	23	06:45:00
February	-0.997	13	17:00:00
March	-0.581	6	00:15:00
April	-0.463	8	13:30:00
May	-0.281	4	04:15:00
July	-0.276	28	18:45:00
August	-0.358	21	06:30:00
September	-0.418	29	05:00:00
October	-0.456	2	06:30:00
November	-0.772	26	02:30:00
December	-0.604	16	19:45:00

Extreme maxima	Value	Day	Time
January	10.846	12	00:00:00
February	10.468	10	12:15:00
March	10.654	11	12:00:00
April	10.194	9	11:30:00
May	8.989	5	09:00:00
July	10.21	24	00:45:00
August	10.595	22	00:30:00
September	10.702	20	00:00:00
October	10.214	18	23:45:00
November	10.08	3	11:30:00
December	9.771	3	12:00:00

Extreme minima	Value	Day	Time
January	0.802	13	20:15:00
February	0.384	10	19:15:00
March	0.374	10	18:15:00
April	0.395	8	17:45:00
May	1.586	4	15:00:00
July	0.611	24	07:45:00
August	0.142	21	06:45:00
September	0.477	18	05:45:00
October	0.583	18	06:00:00
November	1.103	16	17:45:00
December	1.371	16	18:15:00

Mean sea level	No days	MSL
January	31	5.28
February	28	4.978
March	31	5.113
April	30	5.13
May	4	5.168
June		
July	15	5.16
August	31	5.178
September	30	5.23
October	31	5.291
November	30	5.273
December	31	5.175
	Sum	Avg
	292	5.18

Hinkley Point Tide Gauge

Latitude: 51° 12' 54.9” N
Longitude: 03° 08' 04.1” W
Grid Reference: ST 2086 4684

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	ST 2104 4634	Bolt on wall 0.962m NE of SE corner of steps.
Aux1	ST 2078 4626	Rivet on sea wall 41.28m SW of corner of outfall.
Aux2	ST 2094 4631	Bolt on sea wall 31.245m SW of end of railings.
Aux3	ST 2123 4634	Bolt sea defence wall.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.80m below Ordnance Datum Newlyn (ODN)
TGZ = 14.639m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: There were no visits to site in 2005.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	131	085,087-088,091-097,101,121-128,134-135,140-155,158-177,190-191

Statistics:

Surge maxima	Value	Day	Time
January	1.337	11	14:59:59
February	0.59	12	04:29:59
March	0.525	17	05:15:00
April	0.72	18	05:45:00
May	0.331	19	15:59:59
June	0.481	30	19:59:59
July	0.543	28	19:14:59
August	0.579	25	17:44:59
September	0.604	28	17:44:59
October	0.676	21	15:29:59
November	0.96	3	04:14:59
December	0.904	2	03:59:59

Surge minima	Value	Day	Time
January	-0.746	23	01:29:59
February	-0.787	13	19:29:59
March	-0.548	6	01:30:00
April	-0.418	19	21:15:00
May	-0.274	10	06:45:00
June	-0.288	26	13:29:59
July	-0.318	11	15:29:59
August	-0.332	29	00:29:59
September	-0.443	29	10:44:59
October	-0.476	4	01:14:59
November	-0.649	24	21:59:59
December	-0.515	8	14:59:59

Extreme maxima	Value	Day	Time
January	12.26	13	08:44:59
February	12.601	10	07:59:59
March	12.736	12	08:15:00
April	12.243	9	07:15:00
May	11.529	8	18:45:00
June	11.842	24	20:29:59
July	12.33	24	21:14:59
August	12.628	21	20:14:59
September	12.741	19	19:44:59
October	12.415	18	19:14:59
November	12.078	3	06:59:59
December	11.944	3	07:29:59

Extreme minima	Value	Day	Time
January	0.598	13	15:14:59
February	0.253	11	02:44:59
March	0.243	10	13:30:00
April	0.422	10	01:45:00
May	1.034	9	13:30:00
June	0.957	24	01:59:59
July	0.559	24	02:44:59
August	0.178	21	01:59:59
September	0.095	19	01:29:59
October	0.43	18	00:59:59
November	0.919	16	12:44:59
December	1.435	14	23:59:59

Mean sea level	No days	MSL
January	31	6.194
February	28	6.057
March	27	6.155
April	22	6.211
May	4	6.125
June	13	6.209
July	31	6.208
August	31	6.202
September	30	6.241
October	31	6.314
November	30	6.287
December	31	6.211
	Sum	Avg
	309	6.201

Holyhead Tide Gauge

Latitude: 53° 18' 50.2" N
Longitude: 04° 37' 13.5" W
Grid Reference: SH 2553 8287

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SH 2553 8287	Bolt on concrete foundation, N side of T G building.
Aux1	SH 2556 8289	Cut mark lighthouse.
Aux3	SH 2506 8292	Bolt Salt Island bridge.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.05m below Ordnance Datum Newlyn (ODN)
TGZ = 7.436m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 101	TGI on site, the power cables had been cut. Power reinstated but CH 2 has a leak on system.
	Day 109	TGI on site. New pneumatic panel fitted. General maintenance to hut.
	Day 209	On site, power had been switched off.
	Day 214	On site again.
	Day 337	TGI on site, modem replaced, some parts replaced.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	089-101,103-109,194-209,334,337-347	068-103,250

Statistics:

Surge maxima	Value	Day	Time
January	0.972	8	03:00:00
February	0.298	12	06:30:00
March	0.106	1	01:30:00
April	0.431	28	08:00:00
May	0.341	20	08:45:00
June	0.326	15	06:00:00
July	0.38	2	22:45:00
August	0.618	24	07:00:00
September	0.495	26	18:00:00
October	0.597	30	04:00:00
November	0.719	11	15:30:00
December	0.418	2	05:45:00

Surge minima	Value	Day	Time
January	-0.54	23	04:45:00
February	-0.781	13	20:15:00
March	-0.438	6	00:00:00
April	-0.072	20	04:30:00
May	-0.275	4	14:30:00
June	-0.18	9	06:45:00
July	-0.184	11	12:30:00
August	-0.189	20	05:15:00
September	-0.372	29	04:15:00
October	-0.379	2	05:00:00
November	-0.652	24	23:45:00
December	-0.459	16	18:00:00

Extreme maxima	Value	Day	Time
January	6.304	11	23:00:00
February	6.129	11	12:00:00
March	5.308	1	13:30:00
April	5.759	26	23:45:00
May	5.699	25	23:30:00
June	5.717	25	00:00:00
July	5.29	5	22:00:00
August	6.225	21	23:30:00
September	6.261	19	23:00:00
October	6.064	18	22:45:00
November	6.165	3	10:45:00
December	5.976	2	10:30:00

Extreme minima	Value	Day	Time
January	0.288	12	17:45:00
February	0.059	13	19:45:00
March	0.677	8	15:00:00
April	0.662	25	16:45:00
May	0.659	6	15:00:00
June	0.483	25	06:15:00
July	1.063	10	06:30:00
August	0.08	21	05:00:00
September	0.146	18	04:00:00
October	0.396	18	04:15:00
November	0.612	16	16:00:00
December	0.772	16	16:45:00

Mean sea level	No days	MSL
January	31	3.259
February	28	3.076
March	7	3.068
April	10	3.287
May	31	3.229
June	30	3.229
July	14	3.245
August	31	3.243
September	29	3.297
October	31	3.391
November	28	3.346
December	19	3.301
	Sum	Avg
	289	3.248

Ilfracombe Tide Gauge

Latitude: 51° 12' 40.1" N
Longitude: 04° 06' 44.6" W
Grid Reference: SS 5255 4789

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SS 5263 4791	OSBM Bolt on concrete pier, S.angle of T G hut.
Aux1	SS 5245 4782	Pier Hotel, The Quay
Aux2	SS 5251 4789	St Nicholas chapel N face 6.1M from NW angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.80m below Ordnance Datum Newlyn (ODN)
TGZ = 12.379m below TGBM
TGZ = 10.76m below Aux1
TGZ = 32.541m below Aux2

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 173 TGI on site.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	008,011-012,022-023,041,044-045,070-071,098

Statistics:

Surge maxima	Value	Day	Time
January	0.908	11	13:45:00
February	0.388	12	05:00:00
March	0.468	22	03:15:00
April	0.478	17	18:00:00
May	0.35	24	02:30:00
June	0.358	29	18:15:00
July	0.409	28	18:30:00
August	0.407	24	04:45:00
September	0.382	28	16:00:00
October	0.593	29	14:30:00
November	0.85	3	03:00:00
December	0.753	2	02:15:00

Surge minima	Value	Day	Time
January	-0.413	18	23:30:00
February	-0.418	14	06:45:00
March	-0.324	9	20:15:00
April	-0.352	8	21:15:00
May	-0.205	29	00:15:00
June	-0.195	8	06:15:00
July	-0.189	11	13:30:00
August	-0.178	15	16:00:00
September	-0.274	29	00:45:00
October	-0.248	2	21:30:00
November	-0.519	24	20:30:00
December	-0.388	14	14:00:00

Extreme maxima	Value	Day	Time
January	9.637	13	08:00:00
February	9.9	11	07:45:00
March	9.781	11	06:45:00
April	9.56	9	06:15:00
May	9.175	25	19:00:00
June	9.252	23	19:00:00
July	9.737	24	20:15:00
August	9.931	21	19:15:00
September	10.019	19	19:00:00
October	9.802	18	18:30:00
November	9.623	3	06:15:00
December	9.379	2	06:00:00

Extreme minima	Value	Day	Time
January	0.666	13	14:00:00
February	0.298	10	12:45:00
March	0.213	11	12:45:00
April	0.319	9	12:15:00
May	0.957	8	11:45:00
June	0.944	24	01:00:00
July	0.674	23	00:45:00
August	0.213	21	00:45:00
September	0.161	19	00:15:00
October	0.517	17	23:45:00
November	0.909	16	11:45:00
December	1.384	3	12:45:00

Mean sea level	No days	MSL
January	23	4.888
February	24	4.809
March	29	4.931
April	29	4.96
May	31	4.939
June	30	4.941
July	31	4.962
August	31	4.949
September	30	4.996
October	31	5.085
November	30	5.052
December	31	4.978
	Sum	Avg
	350	4.958

Immingham Tide Gauge

Latitude: 53° 37' 49.5" N
Longitude: 00° 11' 15.1" W
Grid Reference: TA 1995 1640

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TA 1989 1630	Docks office, north angle, north east face
Aux1	TA 2005 1631	Customs house, east angle, north east face
Aux2	TA 1994 1640	Bolt on concrete base of tide gauge building
Aux3	TA 2000 1648	Stud in camera tower

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.90m below ODN
TGZ = 9.131m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: There were no visits to site in 2005.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	045

Statistics:

Surge maxima	Value	Day	Time
January	1.301	20	10:00:00
February	0.628	13	19:30:00
March	0.856	11	14:30:00
April	0.784	8	12:45:00
May	0.44	4	09:00:00
June	0.399	23	14:30:00
July	0.607	3	23:30:00
August	0.812	25	03:00:00
September	0.604	14	11:45:00
October	0.621	31	12:45:00
November	1.076	8	19:00:00
December	1.035	16	09:00:00

Surge minima	Value	Day	Time
January	-1.124	8	11:00:00
February	-0.423	6	12:00:00
March	-0.449	6	06:30:00
April	-0.573	6	10:45:00
May	-0.399	29	01:15:00
June	-0.324	7	15:30:00
July	-0.208	12	06:45:00
August	-0.465	24	10:45:00
September	-0.531	26	15:30:00
October	-0.587	10	00:45:00
November	-0.716	10	03:45:00
December	-0.501	9	12:45:00

Extreme maxima	Value	Day	Time
January	8.285	12	19:00:00
February	7.88	10	19:00:00
March	8.002	11	18:30:00
April	7.704	8	17:45:00
May	7.31	7	17:15:00
June	7.275	24	07:00:00
July	7.678	25	08:30:00
August	7.683	22	07:30:00
September	8.03	20	07:00:00
October	7.592	19	06:30:00
November	8.044	15	04:45:00
December	7.415	16	18:00:00

Extreme minima	Value	Day	Time
January	0.022	12	01:30:00
February	0.306	10	01:15:00
March	0.31	11	00:45:00
April	0.464	10	01:00:00
May	0.853	24	00:00:00
June	0.783	26	15:30:00
July	0.641	24	14:30:00
August	0.256	21	13:30:00
September	0.268	19	13:15:00
October	0.542	17	12:00:00
November	1.188	14	10:30:00
December	1.213	4	01:30:00

Mean sea level	No days	MSL
January	31	4.213
February	25	4.094
March	31	4.118
April	30	4.136
May	31	4.129
June	30	4.142
July	31	4.22
August	31	4.237
September	30	4.245
October	31	4.256
November	30	4.277
December	31	4.223
	Sum	Avg
	362	4.191

Port Erin (Isle of Man) Tide Gauge

Latitude: 54° 05' 06.8" N
Longitude: 04° 46' 05.0" W
Grid Reference: SC 1904 6902

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SC 1904 6901	Bolt SE corner of the RNLI boathouse
Aux 2		Bolt on seawall NW of Marine labs
Aux 3	SC 1928 6903	Bolt base of light tower Raglan pier

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.75m below Ordnance Datum Local (ODL)
TGZ = 9.288m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: There were no visits to site in 2005.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	044,335

Statistics:

Surge maxima	Value	Day	Time
January	0.929	8	05:00:00
February	0.27	12	05:45:00
March	0.444	16	10:15:00
April	0.529	6	07:45:00
May	0.401	20	09:30:00
June	0.343	15	17:45:00
July	0.48	3	02:30:00
August	0.557	24	08:30:00
September	0.526	26	15:30:00
October	0.706	30	19:45:00
November	0.82	11	15:30:00
December	0.402	1	10:30:00

Surge minima	Value	Day	Time
January	-0.476	25	21:30:00
February	-0.78	13	21:15:00
March	-0.451	6	00:00:00
April	-0.355	8	17:30:00
May	-0.262	4	15:15:00
June	-0.193	10	11:30:00
July	-0.192	11	00:00:00
August	-0.209	20	05:30:00
September	-0.299	29	06:00:00
October	-0.364	2	06:45:00
November	-0.568	26	02:45:00
December	-0.493	12	08:00:00

Extreme maxima	Value	Day	Time
January	6.008	12	00:00:00
February	5.735	11	13:00:00
March	5.686	11	12:00:00
April	5.488	9	11:30:00
May	5.415	26	00:30:00
June	5.357	22	23:30:00
July	5.68	24	00:45:00
August	5.831	22	00:30:00
September	5.847	20	00:00:00
October	5.655	18	23:45:00
November	5.838	2	23:15:00
December	5.587	2	11:15:00

Extreme minima	Value	Day	Time
January	0.107	12	18:45:00
February	-0.31	13	20:45:00
March	-0.172	10	17:30:00
April	-0.232	8	17:00:00
May	0.386	6	16:00:00
June	0.146	25	07:30:00
July	0.11	24	07:15:00
August	-0.163	21	06:00:00
September	-0.089	18	05:00:00
October	0.123	17	04:30:00
November	0.329	16	17:15:00
December	0.409	16	17:45:00

Mean sea level	No days	MSL
January	31	2.921
February	26	2.726
March	31	2.847
April	30	2.879
May	31	2.869
June	30	2.871
July	31	2.871
August	31	2.89
September	30	2.95
October	31	3.037
November	29	2.987
December	31	2.909
	Sum	Avg
	362	2.896

Port Ellen (Isle of Islay) Tide Gauge

Latitude: 55° 37' 39.3" N
Longitude: 06° 11' 23.7" W
Grid Reference: NR 3636 4508

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NR 3635 4507	Bolt SE side Booking Office
Aux1	NR 3642 4515	Rivet angle wall NW side entrance to pier
Aux2	NR 3651 4526	Police Station SE side of road SW face W angle
Aux3	NR 3635 4521	Sea Farm C gable NW face W angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 0.19m below Ordnance Datum Newlyn (ODN)
TGZ = 2.839m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:

Day 213	On site installing DR2.
Day 222	No levelling changes made at site.
Day 325	On site, new modem fitted.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
95	15 minutes	041,138,213-214,299-312	None

Statistics:

Surge maxima	Value	Day	Time
January	1.271	11	19:44:59
February	0.252	10	01:29:59
March	0.472	16	12:29:59
April	0.734	28	12:15:00
May	0.476	28	12:44:59
June	0.376	15	10:59:59
July	0.72	3	03:14:59
August	0.65	24	03:00:00
September	0.601	26	16:30:00
October	0.537	24	15:15:00
November	1.026	11	13:45:00
December	0.469	29	20:15:00

Surge minima	Value	Day	Time
January	-0.504	25	20:44:59
February	-0.771	13	22:59:59
March	-0.451	5	23:59:59
April	-0.429	8	11:30:00
May	-0.226	4	14:00:00
June	-0.156	25	06:44:59
July	-0.172	10	22:29:59
August	-0.21	20	07:30:00
September	-0.271	16	06:15:00
October	-0.358	2	05:15:00
November	-0.706	26	04:00:00
December	-0.491	14	10:15:00

Extreme maxima	Value	Day	Time
January	1.807	11	18:44:59
February	1.181	10	06:14:59
March	1.121	15	17:29:59
April	1.248	28	16:45:00
May	0.968	25	18:29:59
June	0.873	22	17:44:59
July	1.166	3	03:14:59
August	1.306	24	04:30:00
September	1.341	26	16:30:00
October	1.34	24	15:30:00
November	1.851	11	13:45:00
December	1.169	1	13:45:00

Extreme minima	Value	Day	Time
January	-0.451	29	00:59:59
February	-0.814	13	23:44:59
March	-0.357	9	22:29:59
April	-0.472	8	22:15:00
May	-0.143	4	17:15:00
June	-0.172	25	12:59:59
July	-0.186	25	13:14:59
August	-0.306	22	12:30:00
September	-0.216	20	11:45:00
October	-0.203	2	09:45:00
November	-0.359	26	04:00:00
December	-0.237	16	23:30:00

Mean sea level	No days	MSL
January	31	0.49
February	28	0.242
March	31	0.386
April	30	0.429
May	28	0.402
June	30	0.422
July	30	0.41
August	29	0.453
September	30	0.532
October	25	0.539
November	22	0.43
December	31	0.473
	Sum	Avg
	345	0.434

St. Helier (Jersey) Tide Gauge

Latitude: 49° 11' 00" N
Longitude: 02° 07' 00 " W
Grid Reference: 13/11 6466 4763

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	6465 4764 Plan 13/11	Pin bollard Victoria Pier
Aux1	6516 4764 Plan 13/11	Cut mark wall N side of road Mount Bingham
Aux2	6509 4780 Plan 13/11	"J" stone E face wall car park South Hill
Aux3	6507 4779 Plan 13/11	Cut mark S face wall car park South Hill
Aux4	6506 4784 Plan 13/11	Cut mark E face wall E side Commercial Rd

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.88m below Ordnance Datum Local (ODL)
TGZ = 13.658m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 179, 180, 182 New compressor & maintenance free battery.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	179	179-180

Statistics:

Surge maxima	Value	Day	Time
January	0.663	18	07:30:00
February	0.419	12	05:30:00
March	0.46	22	04:15:00
April	0.433	26	17:45:00
May	0.279	22	01:15:00
June	0.339	29	18:45:00
July	0.438	24	17:00:00
August	0.541	25	06:45:00
September	0.443	7	06:00:00
October	0.539	21	05:15:00
November	0.799	3	04:30:00
December	0.935	2	15:15:00

Surge minima	Value	Day	Time
January	-0.463	23	08:00:00
February	-0.554	14	00:30:00
March	-0.415	6	03:00:00
April	-0.335	11	22:30:00
May	-0.26	30	13:00:00
June	-0.236	26	12:00:00
July	-0.218	21	07:30:00
August	-0.245	28	12:45:00
September	-0.263	21	10:45:00
October	-0.322	3	22:30:00
November	-0.419	22	23:45:00
December	-0.464	12	23:15:00

Extreme maxima	Value	Day	Time
January	11.255	12	07:30:00
February	11.752	11	08:15:00
March	11.83	12	07:45:00
April	11.245	10	07:15:00
May	10.864	25	19:30:00
June	10.976	24	20:15:00
July	11.523	24	20:45:00
August	11.797	21	19:45:00
September	11.878	19	19:30:00
October	11.624	18	19:00:00
November	11.201	3	06:45:00
December	11.038	3	07:00:00

Extreme minima	Value	Day	Time
January	0.885	13	15:15:00
February	0.483	10	14:15:00
March	0.479	11	14:00:00
April	0.605	9	13:30:00
May	1.344	25	01:30:00
June	1.293	24	02:00:00
July	0.944	24	03:00:00
August	0.457	22	02:30:00
September	0.378	19	01:30:00
October	0.816	18	01:00:00
November	1.375	16	00:30:00
December	1.958	17	13:45:00

Mean sea level	No days	MSL
January	31	5.945
February	28	5.864
March	31	5.959
April	30	5.998
May	31	5.964
June	28	5.974
July	31	6.019
August	31	6.003
September	30	6.032
October	31	6.105
November	30	6.082
December	31	6.021
	Sum	Avg
	363	5.997

Kinlochbervie Tide Gauge

Latitude: 58° 27' 24.1" N
Longitude: 05° 03' 00.8" W
Grid Reference: NC 2213 5609

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NC 2206 5613	Bolt S side harbour 19.5M SE angle of building
Aux1	NC 2210 5612	Rivet iceplant 7.45M from S angle of building
Aux2	NC 2210 5614	Rivet inside iceplant 3.5M E door
Aux3	NC 2203 5626	Rivet 12.3M SE N angle of building
Aux4	NC 2213 5621	Rivet 2.5M NW inside corner NE steps

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.50m below Ordnance Datum Newlyn (ODN)
TGZ = 7.213m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 170 On site with divers. New steelwork raised by ½ metre (to get pressure points out of mud).

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	068	170

Statistics:

Surge maxima	Value	Day	Time
January	1.672	12	03:15:00
February	0.359	10	01:00:00
March	0.521	16	15:15:00
April	0.634	29	00:00:00
May	0.324	26	09:30:00
June	0.349	23	02:15:00
July	0.732	3	09:45:00
August	0.817	24	11:00:00
September	0.61	26	20:45:00
October	0.734	31	00:45:00
November	1.127	11	21:30:00
December	0.363	30	01:00:00

Surge minima	Value	Day	Time
January	-0.611	26	09:45:00
February	-0.776	13	11:15:00
March	-0.519	5	13:30:00
April	-0.406	8	14:30:00
May	-0.253	9	19:45:00
June	-0.236	6	17:30:00
July	-0.235	29	15:00:00
August	-0.208	20	08:15:00
September	-0.212	16	12:45:00
October	-0.26	2	03:00:00
November	-0.803	25	22:30:00
December	-0.535	17	03:30:00

Extreme maxima	Value	Day	Time
January	6.277	12	08:30:00
February	5.602	10	08:00:00
March	5.283	11	07:45:00
April	5.029	9	07:15:00
May	4.918	25	20:15:00
June	5.089	22	19:30:00
July	5.138	23	20:45:00
August	5.418	21	20:30:00
September	5.564	19	20:00:00
October	5.22	18	19:45:00
November	5.276	3	07:30:00
December	5.169	31	07:15:00

Extreme minima	Value	Day	Time
January	0.247	13	15:30:00
February	0.135	13	16:45:00
March	-0.018	12	15:00:00
April	-0.092	8	13:15:00
May	0.553	8	13:30:00
June	0.481	25	03:30:00
July	0.269	24	03:30:00
August	0.094	21	02:15:00
September	0.228	18	01:00:00
October	0.303	18	01:15:00
November	0.568	16	01:00:00
December	0.846	17	14:45:00

Mean sea level	No days	MSL
January	31	2.959
February	28	2.657
March	31	2.75
April	30	2.811
May	31	2.749
June	27	2.797
July	31	2.812
August	31	2.883
September	30	2.969
October	31	3.028
November	30	2.974
December	31	2.901
	Sum	Avg
	362	2.858

Leith Tide Gauge

Latitude: 55° 59' 23.4"N
Longitude: 03° 10' 54.1"E
Grid Reference: NT 2638 7806

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NT 2643 7797	OSBM Bolt SE end of TG pier 0.9m N angle of pier.
Aux1	NT 2648 7797	Rivet on top step SW side of road 1.6m S angle of building.
Aux2	NT 2653 7789	Rivet top step SW side of road 11.9M W angle of building

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.90m below Ordnance Datum Newlyn (ODN)
TGZ = 7.84mm below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 157-158 On site, survey for re-installation of gauge
Day 305 On site, fitted compressor & pneumatic panel. Building has been erected but new steelwork is needed for pressure points. (This work will probably not be carried out until the new year).
As a temporary measure there will be a single channel from one of the existing pressure points when a data logger becomes available.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
5	15 minutes	001-348	None

Statistics:

Surge maxima	Value	Day	Time
December	0.75	16	21:00:00

Surge minima	Value	Day	Time
December	-0.12	21	09:45:00

Extreme maxima	Value	Day	Time
December	5.921	31	14:15:00

Extreme minima	Value	Day	Time
December	1.101	17	21:45:00

Mean sea level	No days	MSL
December	16	3.434
	Sum	Avg
	16	3.434

Lerwick Tide Gauge

Latitude: 60° 09' 14.5" N
Longitude: 01° 08' 25.1" W
Grid Reference: HU 4783 4137

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	HU 4783 4129	OSBM bolt on breakwater wall.
Aux1	HU 4784 4125	Queen's Hotel 7.5m SW face south angle.
Aux2	HU 4777 4110	Lerwick Parish Church North face NW angle.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.22m below Ordnance Datum Local (ODL)
TGZ = 4.57m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 123-124 On site to service compressor and pneumatic panel.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	159-160	None

Statistics:

Surge maxima	Value	Day	Time
January	0.602	12	14:45:00
February	0.329	10	05:30:00
March	0.237	16	18:00:00
April	0.332	7	05:45:00
May	0.238	26	20:45:00
June	0.245	23	06:00:00
July	0.285	3	17:00:00
August	0.476	24	23:30:00
September	0.354	27	20:45:00
October	0.445	30	16:15:00
November	0.425	11	21:15:00
December	0.266	30	14:45:00

Surge minima	Value	Day	Time
January	-0.438	24	06:00:00
February	-0.387	6	10:30:00
March	-0.364	9	12:45:00
April	-0.201	15	20:15:00
May	-0.182	13	01:45:00
June	-0.147	7	05:45:00
July	-0.15	12	00:15:00
August	-0.143	21	06:30:00
September	-0.138	10	07:30:00
October	-0.208	16	11:45:00
November	-0.44	26	00:45:00
December	-0.376	17	16:30:00

Extreme maxima	Value	Day	Time
January	2.862	12	12:00:00
February	2.612	10	11:45:00
March	2.413	11	11:30:00
April	2.27	7	09:15:00
May	2.199	27	00:30:00
June	2.256	23	23:30:00
July	2.321	24	00:30:00
August	2.499	25	02:00:00
September	2.685	19	23:30:00
October	2.477	31	22:00:00
November	2.51	3	23:45:00
December	2.417	31	10:45:00

Extreme minima	Value	Day	Time
January	0.157	13	19:15:00
February	0.048	26	18:30:00
March	-0.16	9	16:30:00
April	-0.009	8	16:45:00
May	0.304	10	06:00:00
June	0.173	25	07:15:00
July	0.164	24	06:45:00
August	-0.04	21	05:45:00
September	0.142	18	04:45:00
October	0.126	17	04:30:00
November	0.385	13	02:45:00
December	0.444	17	18:30:00

Mean sea level	No days	MSL
January	31	1.405
February	28	1.143
March	31	1.165
April	30	1.231
May	31	1.212
June	26	1.251
July	31	1.274
August	31	1.342
September	30	1.392
October	31	1.418
November	30	1.43
December	31	1.334
	Sum	Avg
	361	1.3

Liverpool Tide Gauge

Latitude: 53° 26' 58.9" N
Longitude: 03° 01' 05.3" W
Grid Reference: SJ 3248 9525

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SJ 3249 9525	NBM rivet NE face E angle base of building
Aux1	SJ 3250 9523	Rivet E side of quay above hinge SW dock gate
Aux2	SJ 3244 9538	Building wall E face SE angle
Aux3	SJ 3294 9558	Rivet concrete adjacent to building No 335

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.93m below Ordnance Datum Newlyn (ODN)
TGZ = 14.475m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 223	On site and purged system.
	Day 320	On site, system purged.
	Day 354	Both wind CHs disconnected. (Instruments no longer operational)

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	237	041,125-223,242-320

Statistics:

Surge maxima	Value	Day	Time
January	1.753	8	05:15:00
February	1.02	12	08:30:00
March	0.67	16	12:30:00
April	0.849	6	06:15:00
May	0.579	1	14:30:00
August	1.077	24	09:15:00
November	0.593	24	13:00:00
December	0.563	30	22:15:00

Surge minima	Value	Day	Time
January	-0.601	23	06:15:00
February	-0.702	13	23:00:00
March	-0.487	6	00:30:00
April	-0.239	9	01:30:00
May	-0.182	4	16:15:00
August	-0.23	21	08:00:00
November	-0.61	26	02:30:00
December	-0.511	12	04:15:00

Extreme maxima	Value	Day	Time
January	10.401	11	23:45:00
February	10.189	10	12:00:00
March	10.382	11	11:45:00
April	9.944	9	11:15:00
May	8.917	5	08:45:00
August	10.271	22	00:15:00
November	9.427	16	23:15:00
December	9.606	3	11:45:00

Extreme minima	Value	Day	Time
January	0.814	13	20:15:00
February	0.407	10	19:30:00
March	0.406	10	18:15:00
April	0.546	8	17:45:00
May	1.629	5	15:45:00
August	0.336	21	07:00:00
November	1.124	16	17:45:00
December	1.563	16	18:15:00

Mean sea level	No days	MSL
January	31	5.417
February	26	5.152
March	31	5.286
April	30	5.322
May	4	5.347
June		
July		
August	17	5.343
September		
October		
November	14	5.29
December	31	5.345
	Sum	Avg
	184	5.313

Llandudno Tide Gauge

Latitude: 53° 19' 54.0" N
Longitude: 03° 49' 30.8" W
Grid Reference: SH 7855 8319

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SH 7834 8292	Rivet stone butt gate entrance
Aux1	SH 7827 8255	OSBM bolt concrete step SE side of slipway
Aux2	SH 7840 8243	OSBM bolt bottom concrete step
Aux3	SH 7864 8229	OSBM bolt concrete ramp 6.5M NW C slipway

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.85m below Ordnance Datum Newlyn (ODN)
TGZ = 12.558m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 045 On site as the pier has been damaged in storm.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	0.979	8	04:30:00
February	0.457	12	07:30:00
March	0.448	16	11:45:00
April	0.523	6	04:45:00
May	0.377	1	14:30:00
June	0.325	15	14:30:00
July	0.401	2	23:30:00
August	0.735	24	08:00:00
September	0.534	28	18:30:00
October	0.652	30	19:30:00
November	0.818	11	15:45:00
December	0.384	30	08:30:00

Surge minima	Value	Day	Time
January	-0.657	23	05:15:00
February	-1.067	13	16:15:00
March	-0.6	5	22:00:00
April	-0.537	8	13:45:00
May	-0.326	13	10:15:00
June	-0.25	25	17:00:00
July	-0.268	7	05:45:00
August	-0.289	20	04:00:00
September	-0.499	29	05:15:00
October	-0.54	2	05:15:00
November	-0.922	26	01:15:00
December	-0.672	16	16:15:00

Extreme maxima	Value	Day	Time
January	8.305	11	23:30:00
February	8.267	11	12:15:00
March	8.279	11	11:15:00
April	7.993	9	11:00:00
May	7.703	25	23:45:00
June	7.738	23	23:30:00
July	8.147	24	00:15:00
August	8.38	22	00:00:00
September	8.447	19	23:30:00
October	8.125	18	23:00:00
November	8.067	3	11:00:00
December	7.785	2	10:45:00

Extreme minima	Value	Day	Time
January	0.065	12	18:30:00
February	-0.221	10	18:30:00
March	-0.205	10	17:15:00
April	-0.31	8	17:00:00
May	0.483	7	16:30:00
June	0.227	25	07:15:00
July	0.063	24	07:00:00
August	-0.236	21	06:00:00
September	-0.15	19	05:30:00
October	0.03	18	05:00:00
November	0.386	16	17:00:00
December	0.512	16	17:30:00

Mean sea level	No days	MSL
January	31	4.05
February	28	3.84
March	31	4.005
April	30	4.024
May	31	4.02
June	30	4.031
July	31	4.025
August	31	4.048
September	30	4.095
October	31	4.171
November	30	4.103
December	31	4.046
	Sum	Avg
	365	4.038

Lowestoft Tide Gauge

Latitude: 52° 28' 23.1" N
Longitude: 01° 45' 00.9" E
Grid Reference: TM 5479 9274

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TM 5482 9273	Bolt on quay wall S side of pier.
Aux1	TM 5477 9272	Bolt on concrete jetty at SW corner of TG building
Aux2	TM 5478 9274	CM Harbour Masters Office SE angle S face

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.50m below Ordnance Datum Newlyn (ODN)
TGZ = 4.483m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 040	On site repairing met. instruments & installing digital readout for port authorities.
	Day 297	On site. Compressor changed & new maintenance-free battery installed.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	1.352	20	12:30:00
February	0.963	14	00:15:00
March	0.738	11	18:30:00
April	0.955	8	16:00:00
May	0.454	4	13:45:00
June	0.28	23	18:15:00
July	0.545	4	02:45:00
August	0.736	25	05:45:00
September	0.659	14	14:15:00
October	0.47	31	16:00:00
November	1.419	24	22:45:00
December	1.174	16	15:30:00

Surge minima	Value	Day	Time
January	-0.743	10	07:30:00
February	-0.398	5	02:30:00
March	-0.381	6	13:00:00
April	-0.521	6	11:30:00
May	-0.302	19	15:45:00
June	-0.321	1	19:15:00
July	-0.216	3	03:45:00
August	-0.518	24	14:30:00
September	-0.477	26	20:00:00
October	-0.449	10	03:00:00
November	-0.602	10	09:30:00
December	-0.71	30	17:30:00

Extreme maxima	Value	Day	Time
January	3.679	12	22:30:00
February	3.543	14	00:15:00
March	3.212	11	22:00:00
April	3.28	8	20:15:00
May	2.73	7	20:45:00
June	2.695	25	11:30:00
July	2.912	25	12:00:00
August	2.992	25	12:45:00
September	3.048	20	10:15:00
October	2.813	2	08:15:00
November	3.395	15	08:30:00
December	3.418	16	21:45:00

Extreme minima	Value	Day	Time
January	-0.128	12	05:00:00
February	0.001	10	04:30:00
March	-0.037	10	03:30:00
April	0.262	10	04:15:00
May	0.287	28	19:00:00
June	0.231	26	19:15:00
July	0.35	24	18:00:00
August	0.061	21	17:00:00
September	0.141	19	16:30:00
October	0.126	17	15:30:00
November	0.171	10	10:15:00
December	0.277	9	09:45:00

Mean sea level	No days	MSL
January	31	1.727
February	28	1.596
March	31	1.57
April	30	1.583
May	31	1.596
June	30	1.604
July	31	1.701
August	31	1.712
September	30	1.713
October	31	1.685
November	30	1.762
December	31	1.688
	Sum	Avg
	365	1.661

Milford Haven Tide Gauge

Latitude: 51° 42' 26.6" N
Longitude: 05° 03' 06.4" W
Grid Reference: SM 8924 0537

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SM 8921 0536	OSBM Bolt on wall W side of entrance to jetty
Aux1	SM 8918 0541	Fl Br G4977 office buildings. SW face NW angle.
Aux2	SM 9001 0601	OSBM bolt wall Victoria Road

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.71m below Ordnance Datum Newlyn (ODN)
TGZ = 16.734m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 034 On site, general maintenance.
Day 165-166 TGI & divers on site, mid tide levelled.
New cabinet installed & new tubing fitted.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	159-166	None

Statistics:

Surge maxima	Value	Day	Time
January	0.851	11	13:00:00
February	0.235	12	04:30:00
March	0.402	22	05:30:00
April	0.485	28	07:00:00
May	0.339	28	04:45:00
June	0.399	15	11:30:00
July	0.389	28	19:00:00
August	0.435	24	06:15:00
September	0.464	26	18:30:00
October	0.674	29	14:00:00
November	0.863	3	03:00:00
December	0.742	2	02:00:00

Surge minima	Value	Day	Time
January	-0.447	18	23:15:00
February	-0.678	13	18:30:00
March	-0.353	6	03:00:00
April	-0.368	8	20:15:00
May	-0.18	4	13:45:00
June	-0.138	7	20:45:00
July	-0.116	11	11:15:00
August	-0.111	20	08:30:00
September	-0.218	29	01:15:00
October	-0.231	2	00:15:00
November	-0.518	24	21:30:00
December	-0.347	14	13:30:00

Extreme maxima	Value	Day	Time
January	7.345	11	06:45:00
February	7.526	11	08:00:00
March	7.546	12	07:30:00
April	7.225	9	06:30:00
May	6.95	24	06:15:00
June	7.087	24	19:45:00
July	7.509	23	19:45:00
August	7.635	21	19:30:00
September	7.727	19	19:00:00
October	7.561	18	18:45:00
November	7.57	3	06:30:00
December	7.323	2	06:15:00

Extreme minima	Value	Day	Time
January	0.496	12	14:00:00
February	0.166	10	13:30:00
March	0.117	11	13:15:00
April	0.194	8	12:15:00
May	0.786	8	12:15:00
June	0.798	25	02:15:00
July	0.579	23	01:15:00
August	0.198	21	01:15:00
September	0.211	19	00:45:00
October	0.523	18	00:15:00
November	0.763	16	12:15:00
December	1.109	16	12:45:00

Mean sea level	No days	MSL
January	31	3.774
February	28	3.651
March	31	3.777
April	30	3.815
May	31	3.797
June	21	3.846
July	31	3.877
August	31	3.859
September	30	3.921
October	31	4.025
November	30	3.981
December	31	3.898
	Sum	Avg
	356	3.852

Millport Tide Gauge

Latitude: 55° 44' 59.3" N
Longitude: 04° 54' 22.8" W
Grid Reference: NS 1769 5454

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NS 1757 5449	Fl Br G4602 Marine station
Aux1	NS 1772 5457	OSBM bolt rock SE side Rd 5M NE end wall
Aux2	NS 1769 5454	Rivet pier 0.8M prod SE face of TG building
Aux3	NS 1718 5451	No 45 Marine Parade NW angle N face

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.62m below Ordnance Datum Newlyn (ODN)
TGZ = 7.825m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:
Day 039 New modem fitted, but all previous data lost.
Day 097 TGI on site. New data logger fitted, system back on line.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
77	15 minutes	012-039, 040-097	None

Statistics:

Surge maxima	Value	Day	Time
January	1.471	11	20:15:00
February	0.192	9	00:15:00
April	0.741	28	12:30:00
May	0.534	28	12:30:00
June	0.387	15	09:30:00
July	0.602	3	01:30:00
August	0.693	24	04:00:00
September	0.726	26	15:15:00
October	0.886	30	21:45:00
November	1.099	8	00:30:00
December	0.482	30	10:15:00

Surge minima	Value	Day	Time
January	-0.406	2	15:00:00
February	-0.034	8	15:30:00
April	-0.546	8	11:30:00
May	-0.364	4	15:30:00
June	-0.236	25	20:15:00
July	-0.25	10	07:45:00
August	-0.307	20	05:30:00
September	-0.333	16	03:15:00
October	-0.439	2	05:00:00
November	-0.816	26	01:30:00
December	-0.616	14	08:45:00

Extreme maxima	Value	Day	Time
January	4.169	12	01:30:00
February	3.42	9	00:15:00
April	3.908	28	14:30:00
May	3.609	26	01:45:00
June	3.485	23	00:45:00
July	3.567	26	03:30:00
August	4.289	24	03:15:00
September	3.828	23	03:15:00
October	4.028	30	22:00:00
November	3.923	11	20:15:00
December	3.683	1	11:45:00

Extreme minima	Value	Day	Time
January	0.471	10	17:30:00
February	0.291	8	17:30:00
April	-0.335	8	17:30:00
May	0.033	4	15:00:00
June	-0.028	25	07:45:00
July	-0.019	24	07:45:00
August	-0.185	20	05:45:00
September	-0.097	18	05:30:00
October	0.028	17	05:00:00
November	-0.048	13	03:15:00
December	0.144	16	18:00:00

Mean sea level	No days	MSL
January	10	2.266
February		
April	22	1.924
May	31	1.913
June	30	1.925
July	31	1.907
August	31	1.945
September	30	2.024
October	31	2.107
November	30	2.055
December	31	1.965
	Sum	Avg
	277	2.003

Mumbles (West Glamorgan) Tide Gauge

Latitude: 51° 34' 12.0" N
Longitude: 03° 58' 31.7" W
Grid Reference: SS 6319 8753

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SS 6298 8743	OSBM bolt living rock S side of road
Aux1	SS 6317 8752	OSBM bolt lifeboat station Mumbles Pier
Aux2	SS 6284 8750	OSBM bolt concrete base bollard Lifeboat Cottages
Aux3	SS 6258 8760	Rivet SE side concrete chamber

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.00m below Ordnance Datum Newlyn (ODN)
TGZ = 13.821m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 034 On site, new battery & compressor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	0.834	11	14:00:00
February	0.257	12	05:15:00
March	0.478	22	03:45:00
April	0.529	28	07:30:00
May	0.348	28	07:15:00
June	0.282	30	19:30:00
July	0.398	28	19:00:00
August	0.361	25	17:00:00
September	0.439	28	16:45:00
October	0.572	29	15:15:00
November	0.765	3	03:45:00
December	0.634	2	03:00:00

Surge minima	Value	Day	Time
January	-0.639	23	02:15:00
February	-0.904	13	19:00:00
March	-0.496	6	01:15:00
April	-0.418	8	21:15:00
May	-0.331	29	01:15:00
June	-0.372	9	12:15:00
July	-0.374	10	00:30:00
August	-0.378	5	11:15:00
September	-0.469	29	00:15:00
October	-0.422	2	02:15:00
November	-0.732	24	21:00:00
December	-0.536	14	15:15:00

Extreme maxima	Value	Day	Time
January	9.875	13	08:15:00
February	10.145	11	08:00:00
March	10.174	12	07:30:00
April	9.813	9	06:30:00
May	9.427	24	18:30:00
June	9.495	23	19:15:00
July	9.987	24	20:45:00
August	10.161	21	19:30:00
September	10.261	19	19:15:00
October	10.022	18	18:45:00
November	9.93	3	06:30:00
December	9.626	3	07:00:00

Extreme minima	Value	Day	Time
January	0.813	13	14:30:00
February	0.422	10	13:30:00
March	0.38	11	13:00:00
April	0.468	8	12:00:00
May	1.097	8	12:00:00
June	1.058	24	01:15:00
July	0.796	23	01:15:00
August	0.337	21	01:00:00
September	0.3	19	00:45:00
October	0.638	18	00:15:00
November	1.029	16	12:00:00
December	1.478	16	12:30:00

Mean sea level	No days	MSL
January	31	5.143
February	28	5.01
March	31	5.135
April	30	5.175
May	31	5.15
June	30	5.149
July	31	5.168
August	31	5.151
September	30	5.201
October	31	5.29
November	30	5.257
December	31	5.176
	Sum	Avg
	365	5.167

Newlyn Tide Gauge

Latitude: 50° 06' 10.8" N
Longitude: 05° 32' 33.9" W
Grid Reference: SW 4676 2856

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SW 4677 2856	Brass bolt in the floor of the recorder hut.
Aux1	SW 4673 2851	Flush Bracket 1565 on wall S pier NW face 17.8m SW
Aux2	SW 4659 2841	F Bracket 1520 wall SE side of S Pier Rd NW face

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.05m below Ordnance Datum Newlyn (ODN)
TGZ = 7.801m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Ordnance Datum Newlyn (ODN) is based on mean sea level at Newlyn between 1915 and 1921 (inclusive).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 171	On site, gap in data. General maintenance. New battery (maintenance free).
	Day 237	On site changed compressor & installed maintenance free battery.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	171,236-237	None

Statistics:

Surge maxima	Value	Day	Time
January	0.363	11	12:00:00
February	0.08	7	13:30:00
March	0.399	22	03:30:00
April	0.348	17	16:00:00
May	0.295	21	16:45:00
June	0.257	28	16:30:00
July	0.336	28	05:15:00
August	0.208	31	15:30:00
September	0.231	24	18:30:00
October	0.492	30	01:15:00
November	0.563	3	01:15:00
December	0.548	2	06:30:00

Surge minima	Value	Day	Time
January	-0.33	18	23:00:00
February	-0.371	13	21:45:00
March	-0.263	9	19:00:00
April	-0.262	8	19:00:00
May	-0.166	5	17:30:00
June	-0.176	8	03:30:00
July	-0.141	11	09:45:00
August	-0.143	3	23:30:00
September	-0.186	29	08:45:00
October	-0.217	3	07:30:00
November	-0.315	24	19:00:00
December	-0.346	13	23:00:00

Extreme maxima	Value	Day	Time
January	5.863	14	07:30:00
February	5.919	11	06:15:00
March	5.95	12	06:00:00
April	5.655	25	05:00:00
May	5.517	25	17:45:00
June	5.64	24	18:15:00
July	5.987	24	19:00:00
August	5.953	21	18:00:00
September	5.981	19	17:30:00
October	5.904	18	17:00:00
November	5.932	3	05:00:00
December	5.948	2	04:30:00

Extreme minima	Value	Day	Time
January	0.509	12	12:45:00
February	0.296	10	12:15:00
March	0.264	11	12:00:00
April	0.391	9	11:30:00
May	0.816	7	10:30:00
June	0.771	25	01:15:00
July	0.613	23	00:15:00
August	0.335	21	00:00:00
September	0.339	18	23:30:00
October	0.641	17	23:15:00
November	0.789	16	11:00:00
December	0.986	16	11:15:00

Mean sea level	No days	MSL
January	31	3.112
February	28	3.049
March	31	3.163
April	30	3.197
May	31	3.175
June	30	3.178
July	31	3.199
August	27	3.175
September	30	3.231
October	31	3.306
November	30	3.273
December	31	3.205
	Sum	Avg
	361	3.189

Newhaven (Sussex) Tide Gauge

Latitude: 50° 46' 54.4" N
Longitude: 00° 03' 25.3" E
Grid Reference: TQ 4511 0004

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TQ 4510 0003	Bolt concrete 7.4M SW of SW angle of tower
Aux1	TQ 4495 0001	OSBM bolt concrete sea wall 154.3M SW of tower
Aux2	TQ 4503 0008	Steel ball Gun mount

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.52m below Ordnance Datum Newlyn (ODN)
TGZ = 8.783m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 313 On site, general maintenance & changed compressor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	0.793	20	18:00:00
February	0.424	13	13:15:00
March	0.482	11	23:00:00
April	0.354	7	08:30:00
May	0.266	1	02:30:00
June	0.231	15	12:15:00
July	0.32	31	12:45:00
August	0.527	25	11:00:00
September	0.337	14	18:30:00
October	0.42	29	20:00:00
November	0.571	24	23:45:00
December	0.566	2	20:15:00

Surge minima	Value	Day	Time
January	-0.448	26	20:45:00
February	-0.53	25	10:00:00
March	-0.403	6	09:15:00
April	-0.262	12	03:15:00
May	-0.275	29	07:45:00
June	-0.293	8	09:30:00
July	-0.221	12	05:45:00
August	-0.25	28	18:30:00
September	-0.287	29	02:30:00
October	-0.305	10	08:15:00
November	-0.416	14	07:15:00
December	-0.441	13	06:00:00

Extreme maxima	Value	Day	Time
January	7.26	13	01:00:00
February	7.246	11	00:45:00
March	7.354	12	00:15:00
April	7.069	8	23:15:00
May	6.694	7	22:45:00
June	6.727	24	00:15:00
July	7.088	24	13:15:00
August	7.003	22	13:00:00
September	7.144	20	12:30:00
October	6.957	19	12:00:00
November	6.935	15	10:15:00
December	6.783	31	23:30:00

Extreme minima	Value	Day	Time
January	0.415	12	19:00:00
February	0.362	9	18:00:00
March	0.27	10	17:45:00
April	0.401	9	18:00:00
May	0.647	25	06:00:00
June	0.699	26	08:30:00
July	0.584	23	06:30:00
August	0.352	22	07:00:00
September	0.322	19	06:00:00
October	0.457	18	05:30:00
November	0.762	14	03:45:00
December	0.937	3	18:30:00

Mean sea level	No days	MSL
January	31	3.604
February	28	3.506
March	31	3.563
April	30	3.59
May	31	3.567
June	30	3.577
July	31	3.646
August	31	3.641
September	30	3.659
October	31	3.692
November	30	3.706
December	31	3.642
	Sum	Avg
	365	3.616

Newport (Wales) Tide Gauge

Latitude: 51° 33' 00.0" N
Longitude: 02° 59' 14.8" W
Grid Reference: ST 3163 8392

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	ST 3163 8392	Brass bolt adjacent to TG building
Aux1	ST 3160 8414	Pin in quay west side of South Lock
Aux2	ST 3160 8426	Pin in quay east side of South Lock
Aux3	ST 3147 8427	Pin in quay south west corner of South Dock

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.81m below Ordnance Datum Newlyn (ODN)
TGZ = 14.525m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 033	On site. New battery & compressor.
	Day 103	TGI on site, new modem to be sent.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	089-103,334	171

Statistics:

Surge maxima	Value	Day	Time
January	1.765	11	15:45:00
February	0.91	10	14:45:00
March	0.898	11	14:30:00
April	0.983	18	06:00:00
May	0.69	24	02:45:00
June	0.797	29	20:00:00
July	0.953	28	19:30:00
August	0.993	22	03:15:00
September	0.925	19	14:30:00
October	1.092	21	16:45:00
November	1.393	3	15:15:00
December	1.136	2	04:45:00

Surge minima	Value	Day	Time
January	-0.941	27	03:15:00
February	-1.108	25	03:00:00
March	-0.603	9	13:45:00
April	-0.601	19	21:45:00
May	-0.464	14	06:45:00
June	-0.581	25	16:30:00
July	-0.602	10	16:00:00
August	-0.587	7	03:00:00
September	-0.602	4	02:15:00
October	-0.809	4	02:30:00
November	-0.909	26	08:45:00
December	-0.748	14	12:45:00

Extreme maxima	Value	Day	Time
January	12.707	13	09:15:00
February	13.064	10	08:15:00
March	13.111	12	08:30:00
April	12.275	25	20:00:00
May	12.028	24	19:30:00
June	12.14	23	20:00:00
July	12.717	24	21:30:00
August	13.057	21	20:30:00
September	13.161	19	20:15:00
October	12.833	17	19:00:00
November	12.487	3	07:30:00
December	12.402	3	07:45:00

Extreme minima	Value	Day	Time
January	0.47	13	16:30:00
February	0.191	27	04:00:00
March	0.049	10	14:45:00
April	0.294	25	14:45:00
May	0.388	8	14:00:00
June	0.396	24	03:15:00
July	0.367	24	04:15:00
August	0.203	23	04:45:00
September	0.168	20	03:45:00
October	0.147	18	14:45:00
November	0.49	16	14:00:00
December	0.804	15	01:00:00

Mean sea level	No days	MSL
January	31	6.101
February	28	5.936
March	28	6.058
April	16	6.111
May	30	6.066
June	30	6.071
July	31	6.11
August	31	6.11
September	30	6.169
October	31	6.233
November	30	6.196
December	31	6.122
	Sum	Avg
	347	6.107

North Shields (Tyne and Wear) Tide Gauge

Latitude: 55° 00' 26.8" N
Longitude: 01° 26' 23.2" W
Grid Reference: NZ 3593 6824

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NZ 3592 6823	Bolt adjacent to tide gauge building
Aux1	NZ 3626 6842	PA Bolt low lighthouse W face SW angle
Aux2	NZ 3630 6895	PA Bolt butt N side railway

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.60m below Ordnance Datum Newlyn (ODN)
TGZ = 6.754m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 256 On site, modem had been ‘zapped’ (electrical storm).

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	250-256	087-088

Statistics:

Surge maxima	Value	Day	Time
January	1.065	20	08:15:00
February	0.486	10	11:45:00
March	0.608	11	11:30:00
April	0.621	29	15:30:00
May	0.347	27	02:15:00
June	0.308	23	12:15:00
July	0.564	3	21:30:00
August	0.763	25	00:00:00
September	0.518	24	03:15:00
October	0.573	31	10:45:00
November	0.878	8	16:15:00
December	0.613	16	08:30:00

Surge minima	Value	Day	Time
January	-0.721	12	00:45:00
February	-0.362	6	11:00:00
March	-0.358	6	05:00:00
April	-0.268	29	00:45:00
May	-0.274	28	23:30:00
June	-0.229	7	12:00:00
July	-0.15	12	06:15:00
August	-0.187	30	07:15:00
September	-0.295	30	10:00:00
October	-0.372	9	22:30:00
November	-0.445	25	21:45:00
December	-0.395	9	17:15:00

Extreme maxima	Value	Day	Time
January	6.11	12	16:45:00
February	5.655	12	17:45:00
March	5.697	11	16:00:00
April	5.408	8	15:00:00
May	5.204	7	14:45:00
June	5.258	23	16:15:00
July	5.475	25	05:45:00
August	5.513	22	04:45:00
September	5.82	20	04:00:00
October	5.439	19	04:00:00
November	5.833	15	02:30:00
December	5.258	31	15:15:00

Extreme minima	Value	Day	Time
January	-0.127	11	22:30:00
February	0.186	9	22:15:00
March	0.112	9	21:30:00
April	0.317	9	22:15:00
May	0.668	23	21:15:00
June	0.461	26	12:45:00
July	0.295	24	11:45:00
August	-0.02	21	10:45:00
September	0.069	19	10:15:00
October	0.211	17	09:15:00
November	0.868	18	23:00:00
December	0.913	2	22:00:00

Mean sea level	No days	MSL
January	31	3.058
February	28	2.874
March	29	2.907
April	30	2.94
May	31	2.92
June	30	2.93
July	31	2.992
August	31	3.014
September	21	3.022
October	31	3.07
November	30	3.108
December	31	3.025
	Sum	Avg
	354	2.988

Portpatrick (Scotland) Tide Gauge

Latitude: 54° 50' 33.2" N
Longitude: 05° 07' 12.1" W
Grid Reference: NW 9976 5421

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NW 9976 5421	Bolt Harbour wall 13.84M NE angle of building
Aux1	NW 9977 5411	Rivet E side of Jetty wall 16.6M SE angle Lifeboat HQ
Aux2	NW 9995 5412	Rivet S angle No 53 Main St
Aux3	NX 0006 5423	Church hall SE side of Rd W angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.80m below Ordnance Datum Newlyn (ODN)
TGZ = 6.827m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:		
	Day 097	TGI on site. Processor mother board had developed a fault and was replaced.
	Day 265	On site, new compressor and general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
91	15 minutes	082-097,306,347-365	251,253-254

Statistics:

Surge maxima	Value	Day	Time
January	1.151	11	19:15:00
February	0.263	10	03:30:00
March	0.451	16	10:30:00
April	0.639	28	12:30:00
May	0.437	28	12:45:00
June	0.343	15	17:00:00
July	0.55	3	03:00:00
August	0.555	24	04:00:00
September	0.666	26	15:00:00
October	0.791	30	20:00:00
November	0.936	11	14:15:00
December	0.417	1	09:30:00

Surge minima	Value	Day	Time
January	-0.52	27	10:30:00
February	-0.796	13	20:30:00
March	-0.467	5	22:45:00
April	-0.403	8	10:45:00
May	-0.246	4	16:15:00
June	-0.176	10	12:15:00
July	-0.186	10	23:45:00
August	-0.218	20	06:00:00
September	-0.266	29	06:45:00
October	-0.366	2	06:00:00
November	-0.674	26	03:00:00
December	-0.517	12	07:30:00

Extreme maxima	Value	Day	Time
January	4.616	12	00:15:00
February	4.21	10	12:30:00
March	4.105	13	13:30:00
April	4.209	28	14:00:00
May	4.044	26	00:45:00
June	3.961	22	23:45:00
July	4.154	24	01:15:00
August	4.502	24	02:30:00
September	4.272	20	00:30:00
October	4.392	30	21:45:00
November	4.436	2	23:30:00
December	4.165	1	11:00:00

Extreme minima	Value	Day	Time
January	0.155	13	20:00:00
February	-0.4	13	21:00:00
March	-0.136	9	17:00:00
April	-0.254	8	17:30:00
May	0.207	4	14:45:00
June	0.071	25	07:45:00
July	0.078	25	08:15:00
August	-0.113	21	06:30:00
September	-0.044	18	05:15:00
October	0.131	17	05:00:00
November	0.132	13	03:00:00
December	0.323	12	02:30:00

Mean sea level	No days	MSL
January	31	2.192
February	28	1.947
March	21	2.042
April	22	2.132
May	31	2.124
June	30	2.133
July	31	2.123
August	31	2.146
September	30	2.222
October	31	2.305
November	30	2.249
December	11	2.255
	Sum	Avg
	327	2.156

Portrush (Northern Ireland) Tide Gauge

Latitude: 55° 12' 24.4" N
Longitude: 06° 39' 24.6" W
Grid Reference: NW 0416 9952

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	Sheet 6 C 8556 4079	Pin RNLI slipway
Aux1	Sheet 6 C 8567 4070	Cut mark wall Kerr St
Aux2	Sheet 6 C 8580 4055	Cut mark wall Kerr St

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.24m below Ordnance Datum Belfast (ODB)
TGZ = 2.844m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 005 On site, system purged.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	313-315	001-005

Statistics:

Surge maxima	Value	Day	Time
January	1.087	11	19:15:00
February	0.268	12	10:15:00
March	0.42	16	11:00:00
April	0.573	28	14:45:00
May	0.351	20	11:45:00
June	0.296	15	10:00:00
July	0.705	3	03:30:00
August	0.601	24	02:45:00
September	0.458	26	14:30:00
October	0.61	30	20:15:00
November	0.841	7	23:45:00
December	0.315	30	09:15:00

Surge minima	Value	Day	Time
January	-0.554	26	04:45:00
February	-0.595	14	02:00:00
March	-0.485	5	23:30:00
April	-0.396	8	11:45:00
May	-0.263	16	23:15:00
June	-0.216	25	07:00:00
July	-0.245	10	22:00:00
August	-0.299	20	05:15:00
September	-0.284	16	14:30:00
October	-0.404	2	04:45:00
November	-0.554	26	15:15:00
December	-0.432	16	17:45:00

Extreme maxima	Value	Day	Time
January	3.222	11	19:15:00
February	2.628	10	07:00:00
March	2.476	11	06:45:00
April	2.43	7	05:15:00
May	2.304	25	19:45:00
June	2.345	22	18:45:00
July	2.458	23	20:00:00
August	2.628	21	19:30:00
September	2.712	19	19:15:00
October	2.579	30	17:30:00
November	2.67	3	07:00:00
December	2.509	31	06:15:00

Extreme minima	Value	Day	Time
January	0.143	27	01:15:00
February	0.031	14	03:15:00
March	0.017	10	00:00:00
April	-0.072	8	12:15:00
May	0.319	9	13:00:00
June	0.269	25	14:30:00
July	0.275	25	15:00:00
August	0.03	22	14:00:00
September	0.103	20	13:30:00
October	0.238	18	12:15:00
November	0.318	13	10:00:00
December	0.37	17	00:45:00

Mean sea level	No days	MSL
January	26	1.282
February	28	1.068
March	31	1.194
April	30	1.231
May	31	1.206
June	30	1.234
July	31	1.223
August	31	1.253
September	30	1.327
October	31	1.397
November	25	1.319
December	31	1.266
	Sum	Avg
	355	1.25

Portsmouth (Hampshire) Tide Gauge

Latitude: 50° 48' 07.9" N
Longitude: 01° 06' 40.5" W
Grid Reference: SU 6269 0067

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SU 6269 0053	Bolt in concrete jetty TG building S angle
Aux1	SU 6330 9996	GP N side entrance to HMS Vernon
Aux2	SU 6274 0039	Building SW face 0.6M S angle
Aux3	SU 6283 0050	Building SW side of Main Rd NE face N angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.73m below Ordnance Datum Newlyn (ODN)
TGZ = 6.007m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 061 TGI on site, levelling & reinstating mid tide sensor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	061-062	None

Statistics:

Surge maxima	Value	Day	Time
January	0.603	20	19:15:00
February	0.273	11	01:00:00
March	0.372	12	00:30:00
April	0.312	7	09:30:00
May	0.341	22	01:45:00
June	0.247	15	09:00:00
July	0.338	25	02:00:00
August	0.423	25	12:00:00
September	0.325	14	19:45:00
October	0.454	29	20:45:00
November	0.655	2	01:00:00
December	0.903	2	17:00:00

Surge minima	Value	Day	Time
January	-0.518	26	16:45:00
February	-0.481	25	12:00:00
March	-0.377	6	11:15:00
April	-0.258	11	02:00:00
May	-0.269	12	02:15:00
June	-0.274	8	04:30:00
July	-0.242	10	06:00:00
August	-0.217	28	18:45:00
September	-0.275	29	03:15:00
October	-0.334	3	04:30:00
November	-0.474	14	02:00:00
December	-0.515	13	02:00:00

Extreme maxima	Value	Day	Time
January	5.133	13	01:00:00
February	5.042	11	00:45:00
March	5.131	12	00:30:00
April	4.867	8	23:30:00
May	4.687	7	23:00:00
June	4.742	24	00:15:00
July	5.028	24	13:45:00
August	4.857	22	13:15:00
September	4.955	20	12:45:00
October	4.978	19	12:15:00
November	5.166	3	11:15:00
December	5.021	2	11:00:00

Extreme minima	Value	Day	Time
January	0.351	12	18:15:00
February	0.294	9	17:15:00
March	0.192	10	16:45:00
April	0.245	9	17:00:00
May	0.629	26	06:00:00
June	0.591	26	07:30:00
July	0.499	23	05:45:00
August	0.24	21	05:30:00
September	0.262	19	05:15:00
October	0.482	17	04:00:00
November	0.598	14	02:45:00
December	0.843	13	02:15:00

Mean sea level	No days	MSL
January	31	2.788
February	28	2.688
March	27	2.793
April	30	2.817
May	31	2.796
June	30	2.804
July	31	2.865
August	31	2.855
September	30	2.881
October	31	2.93
November	30	2.924
December	31	2.861
	Sum	Avg
	361	2.834

Sheerness (Kent) Tide Gauge

Latitude: 51° 26' 44.3" N
Longitude: 00° 44' 36.1" E
Grid Reference: TQ 9074 7542

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	TQ 9080 7549	Flush bracket 11859, Garrison Fort, S angle, SW building.
Aux1	TQ 9133 7532	Flush bracket G.4790, on house, NW angle, N face
Aux2	TQ 9115 7533	Wall on SW side of road, NE angle.
Aux3	TQ 9147 7516	Bolt Ch. Dis, SW side of road, E face, NE angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.90m below Ordnance Datum Newlyn (ODN)
TGZ = 7.532m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 312 On site, general maintenance, system purged and changed compressor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	1.171	20	17:15:00
February	1.228	14	00:15:00
March	0.757	11	23:15:00
April	1.275	8	20:00:00
May	0.572	4	17:15:00
June	0.329	25	10:30:00
July	0.598	21	21:30:00
August	0.629	25	02:45:00
September	0.767	14	18:15:00
October	0.494	29	10:15:00
November	1.391	25	02:00:00
December	1.229	16	13:15:00

Surge minima	Value	Day	Time
January	-1.202	10	08:00:00
February	-0.534	12	10:45:00
March	-0.649	4	12:00:00
April	-0.659	6	13:30:00
May	-0.49	28	19:30:00
June	-0.522	1	23:30:00
July	-0.383	3	06:30:00
August	-0.779	24	17:30:00
September	-0.688	26	20:45:00
October	-0.82	25	06:30:00
November	-0.798	10	09:45:00
December	-1.027	30	20:00:00

Extreme maxima	Value	Day	Time
January	6.307	13	02:00:00
February	6.376	10	13:45:00
March	6.32	12	14:00:00
April	6.343	8	12:30:00
May	5.983	27	02:30:00
June	6.06	25	02:30:00
July	6.235	24	02:15:00
August	6.19	23	02:45:00
September	6.157	21	02:30:00
October	5.97	20	14:00:00
November	6.304	15	11:45:00
December	6.717	16	13:00:00

Extreme minima	Value	Day	Time
January	-0.073	12	08:15:00
February	-0.079	12	09:30:00
March	0.034	11	07:30:00
April	0.193	10	07:45:00
May	0.395	24	06:45:00
June	0.494	26	22:15:00
July	0.384	24	21:15:00
August	0.156	21	20:30:00
September	0.168	19	20:00:00
October	0.316	17	18:45:00
November	0.319	3	19:45:00
December	0.309	30	18:30:00

Mean sea level	No days	MSL
January	31	3.052
February	28	3.006
March	31	2.988
April	30	2.99
May	31	3.003
June	30	3.013
July	31	3.097
August	31	3.106
September	30	3.11
October	31	3.082
November	30	3.105
December	31	3.074
	Sum	Avg
	365	3.052

St. Mary's (Isles of Scilly) Tide Gauge

Latitude: 49° 55' 04.2" N
Longitude: 06° 19' 01.7" W
Grid Reference: SV 9021 1090

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	N/A	Bolt by VTS
Aux1	N/A	Bolt by VTS 2
Aux2	N/A	Bolt by top of steps
Aux3	N/A	Bolt by top of steps
Aux4	SV 9028 1097	Point above pressure points
Aux5	SV 9014 1071	Cut Mark east angle Mermaid Inn
Aux6	SV 9007 1065	Cut Mark Guard House top of Garrison Hill
VTS	SV 9023 1091	Tide staff 7.210 metre mark
VTS2	N/A	Tide staff 7.245 metre mark

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.91m below Ordnance Datum Local (ODL)
TGZ = 7.425m below TGBM
TGZ = 7.399m below Aux 1
TGZ = 6.776m below Aux 2

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 172 On site. New logger boards fitted. New battery (maintenance free).

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
95	15 minutes	047-056,155,163-172	041-047,187-223,310-315

Statistics:

Surge maxima	Value	Day	Time
January	0.291	8	01:30:00
February	0.028	26	18:45:00
March	0.35	22	03:30:00
April	0.262	17	15:45:00
May	0.233	21	16:00:00
June	0.263	30	07:45:00
July	0.202	2	18:30:00
August	0.18	25	15:15:00
September	0.198	9	06:30:00
October	0.475	30	02:00:00
November	0.475	3	00:30:00
December	0.488	2	07:15:00

Surge minima	Value	Day	Time
January	-0.342	27	02:00:00
February	-0.363	2	14:45:00
March	-0.308	9	18:30:00
April	-0.266	11	08:30:00
May	-0.157	5	17:30:00
June	-0.149	8	03:00:00
July	-0.008	4	11:30:00
August	-0.135	20	06:00:00
September	-0.17	18	07:15:00
October	-0.203	3	11:30:00
November	-0.293	24	20:15:00
December	-0.355	14	00:15:00

Extreme maxima	Value	Day	Time
January	5.915	14	07:30:00
February	5.968	10	05:45:00
March	6.082	12	06:00:00
April	5.749	9	05:00:00
May	5.667	25	17:45:00
June	5.741	24	18:30:00
July	5.16	5	16:00:00
August	6.069	21	18:00:00
September	6.13	19	17:30:00
October	6.038	18	17:00:00
November	5.989	3	04:45:00
December	6.016	2	04:45:00

Extreme minima	Value	Day	Time
January	0.421	12	12:15:00
February	0.174	10	12:00:00
March	0.155	11	11:45:00
April	0.28	9	11:15:00
May	0.733	7	10:15:00
June	0.702	25	01:00:00
July	1.431	5	22:45:00
August	0.191	20	23:45:00
September	0.206	18	23:15:00
October	0.544	17	22:45:00
November	0.727	16	10:45:00
December	0.921	15	10:30:00

Mean sea level	No days	MSL
January	31	3.074
February	12	3.01
March	31	3.118
April	30	3.143
May	31	3.126
June	16	3.147
July	4	3.226
August	19	3.135
September	30	3.177
October	31	3.278
November	23	3.236
December	31	3.182
	Sum	Avg
	289	3.154

Stornoway (Hebrides) Tide Gauge

Latitude: 58° 12' 27.8" N
Longitude: 06° 23' 20.0" W
Grid Reference: NB 4228 3273

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NB 4228 3264	OSBM bolt E side of No 2 wharf
Aux1	NB 4215 3271	OSBM bolt STS NE angle King Edwards Wharf
Aux2	NB 4212 3275	Amity House E side of Espl Rd N face NW angle
Aux3	NB 4223 3280	BK S side Worth Beach NW angle N face

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.71m below Ordnance Datum Local (ODL)
TGZ = 6.368m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 126-127 On site to install 12v compressor & battery.
New battery fitted for data logger.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
97	15 minutes	124-126,266,270-271,282-290	001-005,024-025,039-040,264-270,272-282

Statistics:

Surge maxima	Value	Day	Time
January	1.141	12	04:15:00
February	0.337	10	03:15:00
March	0.46	16	14:00:00
April	0.497	29	05:30:00
May	0.342	26	10:00:00
June	0.3	23	00:00:00
July	0.588	3	12:00:00
August	0.68	24	10:45:00
September	0.331	13	18:45:00
October	0.666	31	01:15:01
November	0.729	7	23:45:01
December	0.442	30	13:00:00

Surge minima	Value	Day	Time
January	-0.528	28	10:00:00
February	-0.638	13	11:15:00
March	-0.426	2	10:45:00
April	-0.333	8	14:15:00
May	-0.205	9	19:30:00
June	-0.176	6	17:30:00
July	-0.153	29	14:15:00
August	-0.169	20	07:30:00
September	-0.18	16	06:45:00
October	-0.113	24	00:45:01
November	-0.573	26	00:15:00
December	-0.41	12	05:15:00

Extreme maxima	Value	Day	Time
January	5.893	12	08:00:00
February	5.582	10	07:45:00
March	5.308	11	07:15:00
April	5.052	9	06:45:00
May	4.901	25	20:00:00
June	5.012	22	19:00:00
July	5.2	23	20:15:00
August	5.478	21	20:00:00
September	5.593	19	19:30:00
October	5.272	17	18:30:01
November	5.226	3	07:15:01
December	5.174	31	06:45:00

Extreme minima	Value	Day	Time
January	0.327	13	15:30:00
February	0.281	11	15:00:00
March	0.053	12	14:30:00
April	0.059	8	12:45:00
May	0.606	8	13:00:00
June	0.54	25	03:15:00
July	0.367	24	03:00:00
August	0.144	21	01:45:00
September	0.273	18	01:00:00
October	0.349	18	01:00:01
November	0.656	16	00:30:00
December	0.918	17	14:00:00

Mean sea level	No days	MSL
January	22	2.997
February	25	2.661
March	31	2.788
April	30	2.856
May	26	2.797
June	30	2.833
July	31	2.848
August	31	2.911
September	20	2.922
October	14	3.168
November	30	2.992
December	31	2.921
	Sum	Avg
	321	2.891

Tobermory (Mull) Tide Gauge

Latitude: 56° 37' 23.2"
N Longitude: 06° 03' 51.2" W
Grid Reference: NM 5079 5531

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NM 5069 5530	F bracket G5186 on SW angle of Royal bldg
Aux2	NM 5077 5529	NBM rivet in sea wall of Mishnish Pier

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.39m below Ordnance Datum Newlyn (ODN)
TGZ = Chart Datum = 6.856m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: There were no visits to site in 2005.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	068,138,237-243,250,300-306	None

Statistics:

Surge maxima	Value	Day	Time
January	1.47	11	19:00:00
February	0.289	10	01:45:00
March	0.467	16	13:45:00
April	0.715	28	15:00:00
May	0.388	28	16:00:00
June	0.338	14	18:45:00
July	0.819	3	03:45:00
August	0.725	24	02:30:00
September	0.631	26	18:45:00
October	0.536	9	23:30:00
November	1.236	7	23:45:00
December	0.385	30	19:15:00

Surge minima	Value	Day	Time
January	-0.552	26	11:30:00
February	-0.707	13	16:45:00
March	-0.444	6	03:00:00
April	-0.413	8	05:45:00
May	-0.221	9	20:00:00
June	-0.153	10	18:15:00
July	-0.197	11	21:15:00
August	-0.221	20	06:00:00
September	-0.252	16	05:30:00
October	-0.305	2	00:30:00
November	-0.671	26	01:45:00
December	-0.443	17	02:00:00

Extreme maxima	Value	Day	Time
January	6.062	11	19:00:00
February	5.17	10	06:30:00
March	4.955	11	06:15:00
April	4.714	7	04:45:00
May	4.71	25	19:00:00
June	4.697	22	18:00:00
July	4.895	23	19:30:00
August	5.186	21	19:15:00
September	5.264	19	18:45:00
October	4.978	17	17:45:00
November	5.171	11	14:30:00
December	4.833	31	05:45:00

Extreme minima	Value	Day	Time
January	0.552	13	02:00:00
February	0.27	11	01:30:00
March	0.184	12	01:15:00
April	0.179	8	11:45:00
May	0.691	9	12:45:00
June	0.67	25	14:30:00
July	0.586	24	14:15:00
August	0.284	22	14:00:00
September	0.352	20	13:30:00
October	0.505	18	12:15:00
November	0.738	16	12:00:00
December	0.855	17	00:45:00

Mean sea level	No days	MSL
January	31	2.768
February	28	2.505
March	31	2.634
April	30	2.684
May	31	2.65
June	30	2.682
July	31	2.672
August	24	2.693
September	30	2.799
October	25	2.795
November	27	2.771
December	31	2.73
	Sum	Avg
	349	2.699

Ullapool (Scotland) Tide Gauge

Latitude: 57° 53' 42.9" N
Longitude: 05° 09' 29.0" W
Grid Reference: NH 1292 9391

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NH 1288 9391	OSBM Pier NW Para 8.2M NE steps
Aux1	NH 1303 9425	PA bolt Church SW side of road NE face N angle
Aux2	NH 1288 9398	No 8 Shore Street SE face 0.3M S angle
Aux3	NH 1253 9376	Rivet Fnd No 21 West Shore Street S angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.75m below Ordnance Datum Newlyn (ODN)
TGZ = 7.155m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 169-170 On site with divers. New steelwork & levelling.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	169,257,355-358	169

Statistics:

Surge maxima	Value	Day	Time
January	1.505	12	04:15:00
February	0.327	12	14:15:00
March	0.514	16	14:30:00
April	0.559	29	00:00:00
May	0.339	26	03:45:00
June	0.297	23	02:45:00
July	0.655	3	10:15:00
August	0.708	24	10:30:00
September	0.56	26	21:00:00
October	0.707	31	00:30:00
November	1.08	11	21:00:00
December	0.328	30	05:30:00

Surge minima	Value	Day	Time
January	-0.641	26	16:45:00
February	-0.734	14	00:00:00
March	-0.516	2	10:30:00
April	-0.399	8	14:45:00
May	-0.25	9	20:00:00
June	-0.223	6	17:30:00
July	-0.221	29	14:45:00
August	-0.248	20	08:30:00
September	-0.258	16	07:00:00
October	-0.295	2	02:30:00
November	-0.73	25	23:30:00
December	-0.506	14	07:15:00

Extreme maxima	Value	Day	Time
January	6.443	12	08:15:00
February	5.949	10	08:15:00
March	5.667	11	07:15:00
April	5.379	9	07:00:00
May	5.218	25	20:00:00
June	5.337	22	19:00:00
July	5.476	23	20:30:00
August	5.792	21	20:00:00
September	5.917	19	19:30:00
October	5.612	18	19:15:00
November	5.565	3	07:15:00
December	5.455	31	06:30:00

Extreme minima	Value	Day	Time
January	0.35	13	15:15:00
February	0.226	13	16:30:00
March	0.052	12	14:45:00
April	0.053	8	13:00:00
May	0.644	8	13:00:00
June	0.557	25	03:15:00
July	0.35	24	03:00:00
August	0.167	21	01:45:00
September	0.338	20	02:15:00
October	0.332	18	01:00:00
November	0.708	16	00:45:00
December	0.967	17	14:00:00

Mean sea level	No days	MSL
January	31	3.165
February	28	2.874
March	31	2.969
April	30	3.02
May	31	2.97
June	27	3.011
July	31	3.016
August	31	3.082
September	29	3.159
October	31	3.223
November	30	3.173
December	25	3.105
	Sum	Avg
	355	3.064

Weymouth (Dorset) Tide Gauge

Latitude: 50° 36' 30.6" N
Longitude: 02° 26' 52.6" W
Grid Reference: SY 6840 7885
.
Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SY 6826 7882	Bolt corner of quay wall NW side N angle
Aux1	SY 6822 7886	Bolt sea wall 5.5M W steps
Aux2	SY 6813 7888	Right base NW pillar NE entrance Alexandra gardens
Aux3	SY 6810 7893	Bolt sea wall 10.1M NW shelter
Aux4	SY 6806 7908	Bolt N base STS aquarium E side of esplanade
REFBM	SY 6837 7884	Bolt concrete SW corner of building adjacent to Tide Gauge Hut

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.02m below Ordnance Datum Newlyn (ODN)
TGZ = 4.334m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: There were no visits to site in 2005.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	152	326

Statistics:

Surge maxima	Value	Day	Time
January	0.424	20	20:15:00
February	0.263	13	15:45:00
March	0.319	24	01:15:00
April	0.296	17	19:15:00
May	0.344	21	22:30:00
June	0.276	15	07:45:00
July	0.387	24	16:45:00
August	0.369	25	07:30:00
September	0.252	9	19:00:00
October	0.494	29	22:00:00
November	0.638	3	04:30:00
December	0.844	2	15:15:00

Surge minima	Value	Day	Time
January	-0.423	27	00:15:00
February	-0.441	25	12:30:00
March	-0.322	6	05:15:00
April	-0.261	9	12:00:00
May	-0.191	29	01:15:00
June	-0.232	8	00:00:00
July	-0.215	11	01:45:00
August	-0.163	6	10:45:00
September	-0.191	29	06:00:00
October	-0.314	2	23:15:00
November	-0.384	14	01:30:00
December	-0.44	13	08:45:00

Extreme maxima	Value	Day	Time
January	2.553	11	07:15:00
February	2.579	11	08:30:00
March	2.594	12	08:15:00
April	2.335	26	20:15:00
May	2.219	24	07:00:00
June	2.351	24	20:15:00
July	2.655	24	21:30:00
August	2.532	21	20:15:00
September	2.569	19	20:00:00
October	2.49	18	19:30:00
November	2.809	3	07:00:00
December	2.659	2	06:45:00

Extreme minima	Value	Day	Time
January	-0.191	12	16:15:00
February	-0.153	10	16:00:00
March	-0.24	10	15:00:00
April	-0.154	9	12:00:00
May	0.178	8	11:30:00
June	0.135	26	06:00:00
July	0.035	23	04:00:00
August	-0.223	21	03:45:00
September	-0.153	19	03:15:00
October	0.051	17	02:00:00
November	0.109	14	01:00:00
December	0.179	14	22:45:00

Mean sea level	No days	MSL
January	31	1.087
February	28	0.999
March	31	1.087
April	30	1.125
May	31	1.104
June	30	1.111
July	31	1.163
August	31	1.149
September	30	1.188
October	31	1.245
November	30	1.227
December	31	1.161
	Sum	Avg
	365	1.137

Whitby (Yorkshire) Tide Gauge

Latitude: 54° 29' 24.0" N
Longitude: 00° 36' 52.9" W
Grid Reference: NZ 8986 1140

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	NZ 8986 1141	E side of Pier Rd
Aux1	NZ 8992 1105	Bolt butt of Whitby Bridge
Aux2	NZ 8985 1134	Rivet quayside SE side of Pier Rd
Aux3	NZ 8983 1142	Rivet wall angle S side of road angle of lifeboat museum

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.00m below Ordnance Datum Newlyn (ODN)
TGZ = 9.105m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: Surveying & levelling for a new site was carried out in 2005.

T.G.I. visits to site:

Day 012	On site to fit new dataring boards, however the boards were faulty and will have to be replaced.
Day 019	New boards & software.
Day 285	On site surveying & levelling for a new site which is to be situated further upstream.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	012-013,019,201,267	001-012,013-019

Statistics:

Surge maxima	Value	Day	Time
January	1.196	20	08:00:00
February	0.728	14	00:45:00
March	0.724	11	11:30:00
April	0.943	8	10:30:00
May	0.471	4	05:45:00
June	0.407	23	13:30:00
July	0.659	3	22:00:00
August	0.871	25	01:45:00
September	0.612	14	10:15:00
October	0.618	31	10:45:00
November	0.979	24	18:15:00
December	0.967	16	09:00:00

Surge minima	Value	Day	Time
January	-0.451	19	20:00:00
February	-0.296	6	11:15:00
March	-0.315	6	06:45:00
April	-0.241	29	00:30:00
May	-0.185	28	23:15:00
June	-0.186	7	12:45:00
July	-0.082	12	06:00:00
August	-0.17	24	08:15:00
September	-0.267	30	10:30:00
October	-0.35	9	23:45:00
November	-0.385	10	04:45:00
December	-0.361	9	17:30:00

Extreme maxima	Value	Day	Time
January	5.38	27	17:30:00
February	6.265	12	18:30:00
March	6.284	11	16:45:00
April	6.162	8	15:30:00
May	5.746	7	15:15:00
June	5.8	23	16:45:00
July	6.037	25	06:30:00
August	6.059	23	06:00:00
September	6.364	20	04:45:00
October	5.984	19	04:30:00
November	6.426	15	03:00:00
December	5.879	17	05:00:00

Extreme minima	Value	Day	Time
January	1.07	30	00:45:00
February	0.446	9	22:45:00
March	0.435	10	22:30:00
April	0.599	9	22:45:00
May	0.956	23	21:45:00
June	0.762	26	13:15:00
July	0.601	24	12:15:00
August	0.266	21	11:15:00
September	0.335	19	10:45:00
October	0.492	17	09:45:00
November	1.209	14	08:15:00
December	1.274	3	23:00:00

Mean sea level	No days	MSL
January	11	3.438
February	28	3.354
March	31	3.358
April	30	3.386
May	31	3.381
June	30	3.391
July	31	3.468
August	31	3.488
September	30	3.496
October	31	3.51
November	30	3.569
December	31	3.49
	Sum	Avg
	345	3.444

Wick (Scotland) Tide Gauge

Latitude: 58° 26' 27.5" N
Longitude: 03° 05' 11.0" W
Grid Reference: ND 3667 5081

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	ND 3667 5081	New OSBM bolt quay E angle tide gauge building
Aux1	ND 3670 5084	Rivet base of wall 15.5M NE angle of building
Aux2	ND 3670 5083	NBM rivet base SE end of wall NE side of N pier
Aux3	ND 3705 5055	Wall base of steps SE side of pier

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.71m below Ordnance Datum (ODN)
TGZ = 5.084m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site: Day 040 On site, general maintenance and mid-tide fitted.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	040,355	073,075,243,280-281,285-286,293-296

Statistics:

Surge maxima	Value	Day	Time
January	0.938	12	07:45:00
February	0.378	10	07:00:00
March	0.487	17	00:00:00
April	0.579	29	11:15:00
May	0.301	26	13:00:00
June	0.319	23	06:45:00
July	0.558	3	16:45:00
August	0.719	24	19:00:00
September	0.496	27	16:15:00
October	0.553	31	03:45:00
November	0.71	8	14:00:00
December	0.289	30	07:30:00

Surge minima	Value	Day	Time
January	-0.479	26	11:15:00
February	-0.483	14	03:45:00
March	-0.474	6	02:45:00
April	-0.257	15	20:30:00
May	-0.168	13	19:30:00
June	-0.203	7	05:30:00
July	-0.175	29	16:15:00
August	-0.16	20	17:15:00
September	-0.183	17	01:30:00
October	-0.262	14	12:00:00
November	-0.584	26	00:45:00
December	-0.373	12	06:30:00

Extreme maxima	Value	Day	Time
January	4.499	12	12:30:00
February	4.054	10	12:15:00
March	3.846	11	12:00:00
April	3.608	9	11:30:00
May	3.594	26	13:00:00
June	3.648	22	23:45:00
July	3.725	24	00:45:00
August	3.907	24	02:15:00
September	4.14	20	00:00:00
October	3.772	31	22:00:00
November	3.897	14	21:45:00
December	3.739	31	11:00:00

Extreme minima	Value	Day	Time
January	0.192	13	19:30:00
February	0.205	26	18:45:00
March	-0.024	9	16:45:00
April	0.015	8	17:00:00
May	0.515	10	06:15:00
June	0.26	25	07:30:00
July	0.204	24	07:15:00
August	0.007	21	06:00:00
September	0.213	18	04:45:00
October	0.205	17	04:45:00
November	0.486	13	03:00:00
December	0.568	17	18:00:00

Mean sea level	No days	MSL
January	31	2.163
February	25	1.843
March	27	1.9
April	30	1.988
May	31	1.956
June	30	1.983
July	31	2.012
August	30	2.074
September	29	2.146
October	22	2.185
November	30	2.172
December	31	2.09
	Sum	Avg
	347	2.043

Workington (Cumbria) Tide Gauge

Latitude: 54° 39' 02.6" N
Longitude: 03° 34' 01.8"W
Grid Reference: NX 9898 2953

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
Aux1	NX 9917 2928	Building SW face 3.7M from S angle Workington Dock
Aux2	NX 9948 2967	NBM works building S side Rd N face NE angle

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.20m below Ordnance Datum Newlyn (ODN)
TGZ = 11.59m below Aux1

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2005.

T.G.I. visits to site:

Day 264	On site, new compressor & general maintenance.
Day 285	On site, general maintenance

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Statistics:

Surge maxima	Value	Day	Time
January	1.903	8	06:15:00
February	0.226	12	07:00:00
March	0.45	14	23:15:00
April	0.611	28	12:00:00
May	0.444	28	11:45:00
June	0.258	15	17:30:00
July	0.503	3	00:30:00
August	0.639	24	05:30:00
September	0.575	26	15:00:00
October	0.838	30	21:00:00
November	0.989	11	13:45:00
December	0.404	30	07:45:00

Surge minima	Value	Day	Time
January	-0.779	23	07:15:00
February	-1.156	13	17:15:00
March	-0.724	5	21:15:00
April	-0.622	8	14:00:00
May	-0.384	13	12:30:00
June	-0.34	26	18:30:00
July	-0.411	28	19:00:00
August	-0.391	22	17:00:00
September	-0.504	29	06:15:00
October	-0.518	2	07:30:00
November	-0.904	26	03:45:00
December	-0.698	16	20:30:00

Extreme maxima	Value	Day	Time
January	9.259	12	00:15:00
February	8.919	10	12:15:00
March	8.931	11	12:00:00
April	8.676	9	11:45:00
May	8.396	26	00:30:00
June	8.358	24	00:15:00
July	8.739	24	01:00:00
August	9.059	22	00:45:00
September	9.083	20	00:15:00
October	8.757	18	23:45:00
November	8.746	3	11:45:00
December	8.399	3	12:15:00

Extreme minima	Value	Day	Time
January	0.607	13	20:15:00
February	0.267	10	19:15:00
March	0.161	10	18:00:00
April	0.146	8	17:30:00
May	0.894	27	08:00:00
June	0.558	25	08:00:00
July	0.411	24	07:45:00
August	0.119	21	06:45:00
September	0.239	18	05:30:00
October	0.435	18	05:45:00
November	0.803	16	17:45:00
December	0.96	16	18:15:00

Mean sea level	No days	MSL
January	31	4.566
February	28	4.263
March	31	4.413
April	30	4.449
May	31	4.447
June	30	4.451
July	31	4.435
August	31	4.474
September	30	4.536
October	31	4.614
November	30	4.567
December	31	4.483
	Sum	Avg
	365	4.475

Monitoring Vertical Land Movements at Tide Gauges

Dr Richard Bingley,

Institute of Engineering Surveying and Space Geodesy,
University of Nottingham

Monitoring Vertical Land Movements at Tide Gauges

Global sea level has risen by 10 to 20 cm during the 20th century. Much of the evidence for this rise came from mean sea level (MSL) measurements obtained at tide gauges, which measure MSL with respect to a local tide gauge bench mark (TGBM). However, it is impossible to distinguish between any 'true sea level variations' and any changes in the level of the land at a tide gauge using these measurements alone. Around Britain sea levels have risen by different amounts over the last century, from a 7cm rise at Aberdeen to a 21cm rise at Sheerness. This is because different parts of the British Isles are rising and subsiding at different rates, due mainly to the removal of ice from the land at the end of the last ice age – so called, glacial isostatic adjustment (GIA). Therefore, to measure the climate related component of changes in sea level using a tide gauge, the rate of any vertical land movements at the specific tide gauge must be determined.

In recent years, modern geodetic techniques have developed to the stage where they can be used to measure such vertical land movements, which are typically of the order of 1 to 2 mm/yr for the British Isles. The two most suitable techniques for this purpose are measurements using the Global Positioning System (GPS) and measurements of absolute gravity.

With funding from Defra and the Environment Agency, POL, together with the Institute of Engineering Surveying and Space Geodesy (IESSG) at the University of Nottingham, have been carrying out research on these geodetic techniques since 1990. By 2004, this had resulted in the establishment of a network of continuous GPS (CGPS) stations at, or close to, the tide gauges of Aberdeen, Liverpool, Lowestoft, Newlyn, North Shields, Portsmouth and Sheerness, and a network of absolute gravity stations close to the tide gauges of Aberdeen, Lerwick and Newlyn, some of which have been operational since 1996. During 2005, three new CGPS stations were established at, or close to, the tide gauges of Dover, Lerwick and Stornoway.

The data from the ten CGPS stations at, or close to, tide gauges are archived as part of the British Isles GPS archive Facility (BIGF), which is also operated by the IESSG at the University of Nottingham. By the end of 2005, BIGF contained data for a total of 120 CGPS stations (a further increase on the 90 CGPS stations reported last year), some of which are also used to help to understand vertical land movements at non-coastal locations in the British Isles.

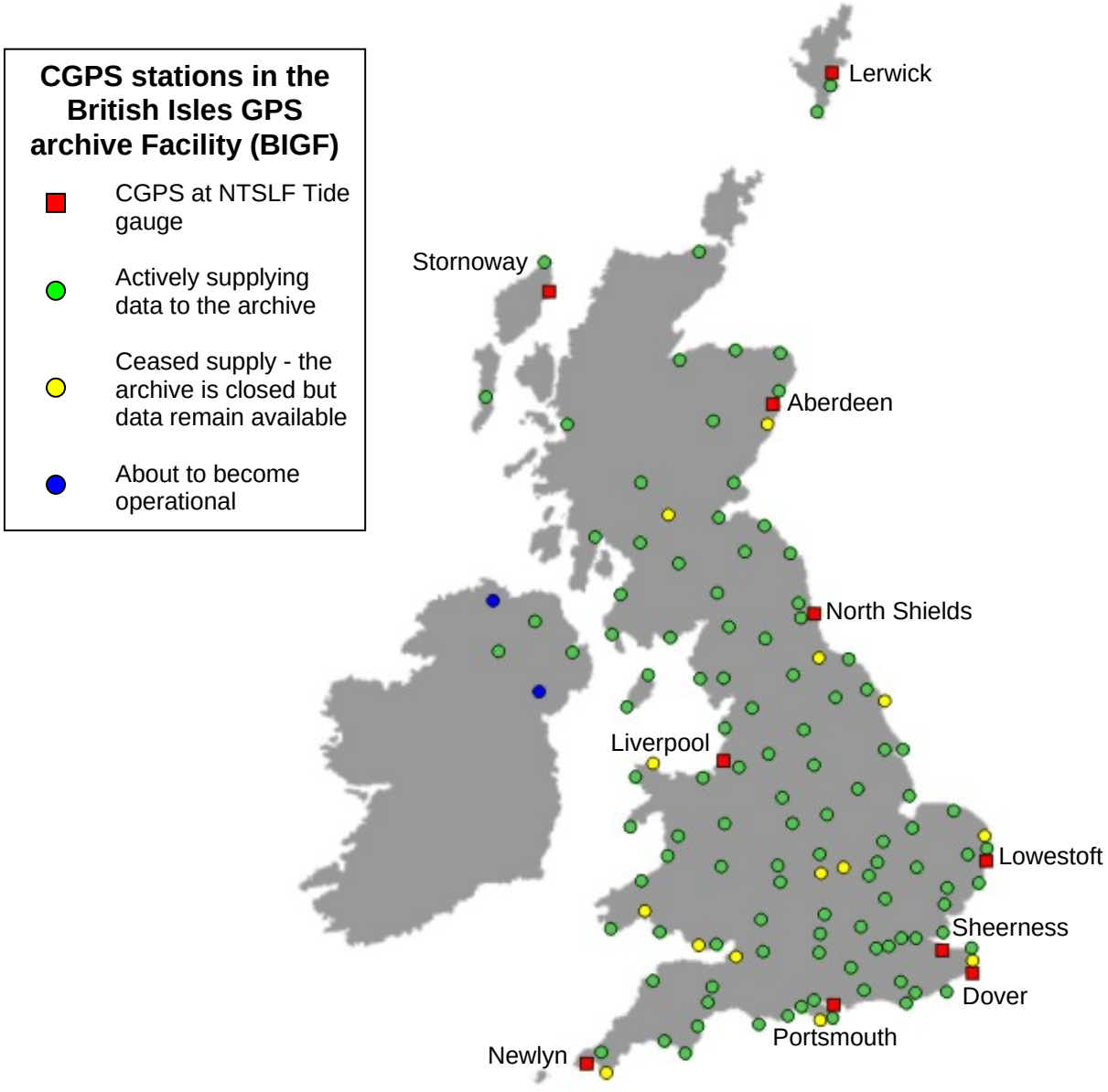
Data from seven of the CGPS stations at, or close to, tide gauges (namely Aberdeen, Liverpool, Lowestoft, Newlyn, North Shields, Portsmouth and Sheerness) are contributed to European initiatives, notably the European Sea Level Service (ESEAS); data from four of the CGPS stations at, or close to, tide gauges (namely Newlyn, Sheerness, North Shields and Aberdeen) are contributed to international initiatives, notably the International GPS Service (IGS) Tide Gauge Pilot Project (TIGA); and data from Newlyn are also contributed to the EUREF Permanent Network (EPN).

This report includes copies of the log files for the ten CGPS stations at, or close to, tide gauges along with a summary of their daily data availability and quality, based on the TEQC program available through the IGS. The plots show the time window length (taken as the period between the first and last epoch of data recorded on a single day), the number of observations (along with the maximum number of satellites available for a particular day), the multipath characteristics for the dual-frequency pseudo-range

observables (given as MP1 and MP2 values), and the number of cycle slips on the carrier phase observables (given as slips per thousand observations).

The data from the absolute gravity stations are processed and analysed by POL. The data from the CGPS stations are combined with data from other CGPS stations in Europe that form part of the IGS global network and processed by the IESSG using both in-house and third party scientific GPS software. The resultant time series are then analysed by POL and IESSG using in-house software.

The trends in the CGPS and absolute gravity time series so far appear to support the idea that GIA is the main contribution to current vertical land movements in the British Isles, with stations in Scotland rising with respect to stations in Southern England. The results are still preliminary; more reliable estimates of vertical land movements will be obtained after an extended monitoring period. However, it is clear that such estimates of vertical land movements should enable 'true sea level variations' around the British Isles to be measured to allow comparisons with predictions and observations of global sea levels and to enable a better understanding of the space- and time- variations.



Aberdeen

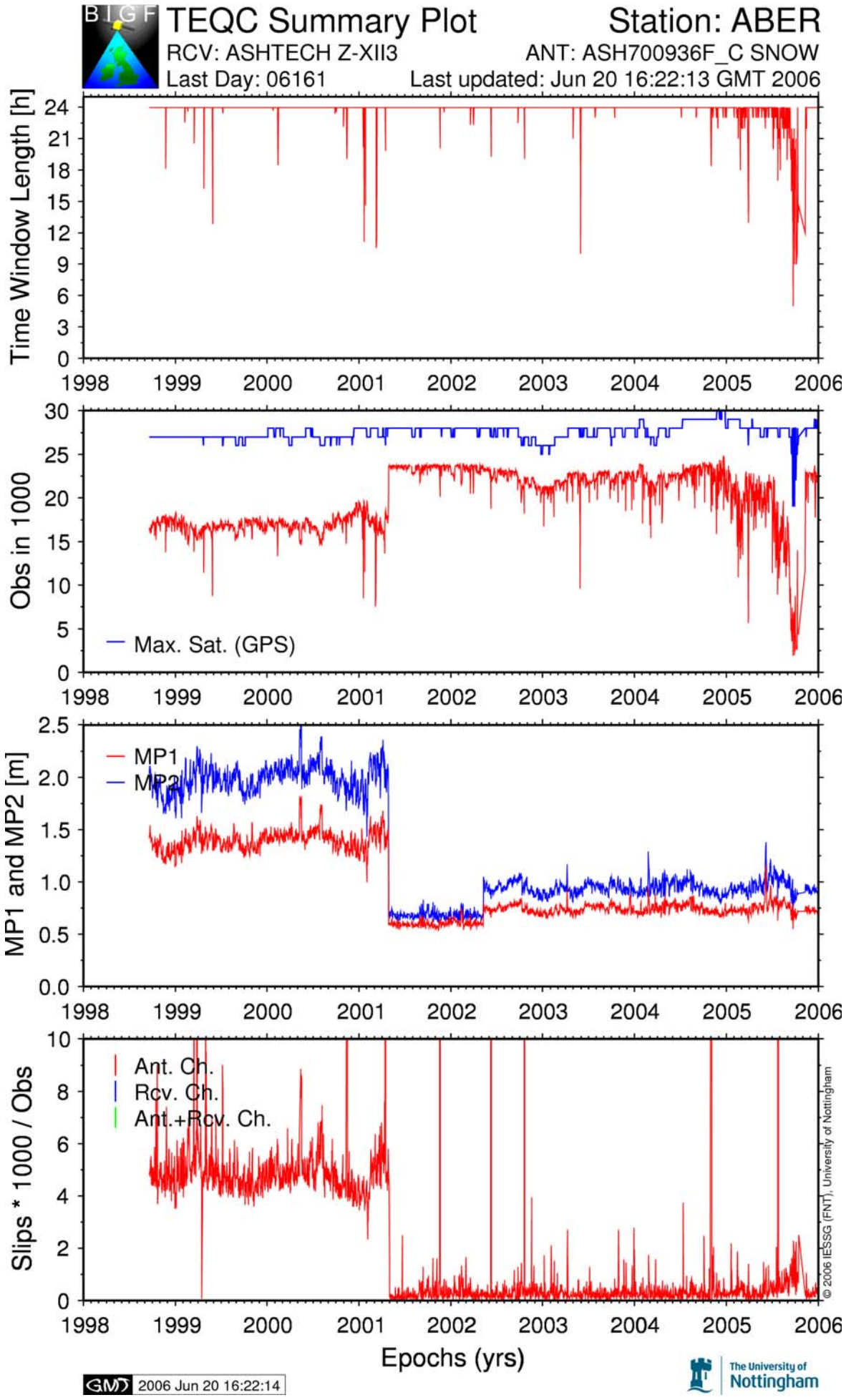
```
     ABER Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2001-12-12
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Aberdeen Tide Gauge
     Four Character ID        : ABER
     Monument Inscription     :
     IERS DOMES Number        : 13231M001
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 4.0m
       Monument Foundation    : QUAY
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1998-09-17T12:00Z
     Geologic Characteristic  : GLACIAL SAND AND GRAVEL
       Bedrock Type           : METAMORPHIC (QUARTZ-MICA-SCHIST)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted adjacent to the
                              : tide gauge building, which is located on a
                              : concrete quay, with piled foundations.
                              : The GPS antenna is located on the monument
                              : which consists of a 4m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the concrete
                              : quay.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Aberdeen
     State or Province        :
     Country                  : Scotland
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3466272.4
       Y coordinate (m)       : -125904.3
       Z coordinate (m)       : 5334662.3
       Latitude (N is +)      : +570838.42
       Longitude (E is +)     : -0020448.80
       Elevation (m,ellips.)  : 53.4
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03140
     Firmware Version         : 1F50
     Elevation Cutoff Setting : 5
     Date Installed           : 1998-09-18T00:00Z
     Date Removed             : 1999-08-15T23:59Z
```

```
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03140.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03140
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03140.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936F_C    SNOW
     Serial Number            : 14767
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   3.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1998-09-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 14767.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
```

```
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1998-09-17/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
```

```
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.1 Radio Interferences     : ANTENNA
       Observed Degradations  : SN RATIO/DATA GAPS
       Effective Dates        : 1998-09-17/2001-05-01
       Additional Information : Harbour antenna transmitting DGPS corrections.
                              : Fault on antenna repaired on 2001-05-01.

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Aberdeen Harbour Board
     Preferred Abbreviation   : (A10)
     Mailing Address          : 16 Regents Quay
                              : Aberdeen AB511SS
                              : UK
     Primary Contact
       Contact Name           : Port Surveyor
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
```

```
      E-mail                :
    Additional Information  : (multiple lines)


12.  Responsible Agency (if different from 11.)

    Agency                  : IESSG
    Preferred Abbreviation  : IESSG
    Mailing Address         : University of Nottingham
                            : University Park
                            : Nottingham NG72RD
                            : UK
    Primary Contact
      Contact Name          : Richard Bingley
      Telephone (primary)   : +44 (0)115 9513932
      Telephone (secondary) : +44 (0)115 9513880
      Fax                   : +44 (0)115 9513881
      E-mail                : richard.bingley@nottingham.ac.uk
    Secondary Contact
      Contact Name          : IESSG Experimental Officers
      Telephone (primary)   : +44 (0)115 9513921
      Telephone (secondary) : +44 (0)115 9513880
      Fax                   : +44 (0)115 9513881
      E-mail                : iessg@nottingham.ac.uk
    Additional Information  : ABER is operated by the IESSG for the
                            : Proudman Oceanographic Laboratory and
                            : the UK Department for the Environment, Food
                            : and Rural Affairs (DEFRA)


13.  More Information

    Primary Data Center     :
    Secondary Data Center   :
    URL for More Information : http://www.bigf.ac.uk
    Hardcopy on File
      Site Map              : Y
      Site Diagram          : Y
      Horizon Mask          : Y
      Monument Description  : Y
      Site Pictures         : Y
    Additional Information  : (multiple lines)
    Antenna Graphics with Dimensions

ASH700936F_C


                      +---------+
                     /     +     \                      <--  0.1280 L2
                    |      +      |                     <--  0.1100 L1
    +-----------------+------------+------------------+    <--  0.1008 TCR
    |                                                  |
    |                                                  |
    |                                                  |
    |                                                  |
  +-+--------------------------------------------------+-+  <--  0.0378
  +------------------+------------+--------------------+  <--  0.0348 BCR
                     |            |
                     |            |
                     +------x-----+                      <--  0.0000 BPA=ARP

  <--                     0.3794                     -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                 L2 : L2 Phase Center
   TCR: Top of Chokering                BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: ABER
RCV: ASHTECH Z-XII3
ANT: ASH700936F_C SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
GMT 2006 Jun 20 16:22:14
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

Dover

```
     DVTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2005-11-24
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Dover Tide Gauge
     Four Character ID        : DVTG
     Monument Inscription     :
     IERS DOMES Number        : (A9)
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 2.0m
       Monument Foundation    : PIER
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 2005-11-24T15:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (CHALK)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted about 15m from the tide gauge
                              : building, and located on the Prince of Wales Pier.
                              : The GPS antenna is located on the monument
                              : which consists of a 2m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the stone wall
                              : of the pier.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.

2.   Site Location Information

     City or Town             : Dover
     State or Province        : Kent
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       :
       Y coordinate (m)       :
       Z coordinate (m)       :
       Latitude (N is +)      :
       Longitude (E is +)     :
       Elevation (m,ellips.)  :
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 10207
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-11-24T15:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
```

```
                              : Full receiver serial number is ZR 2001 0207.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10215
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-11-24T15:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 0215.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2005-11-24/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information
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7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
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       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Port of Dover
     Preferred Abbreviation   :
     Mailing Address          : Harbour House
                              : Dover
                              : Kent CT17 9BU
                              : UK
     Primary Contact
       Contact Name           : Marine Services Manager
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
```

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       Fax                   : +44 (0)115 9513881
       E-mail                : iessg@nottingham.ac.uk
     Additional Information  : DVTG is operated by the IESSG for the
                             : Proudman Oceanographic Laboratory and
                             : the UK Department for the Environment, Food
                             : and Rural Affairs (DEFRA)


13.  More Information

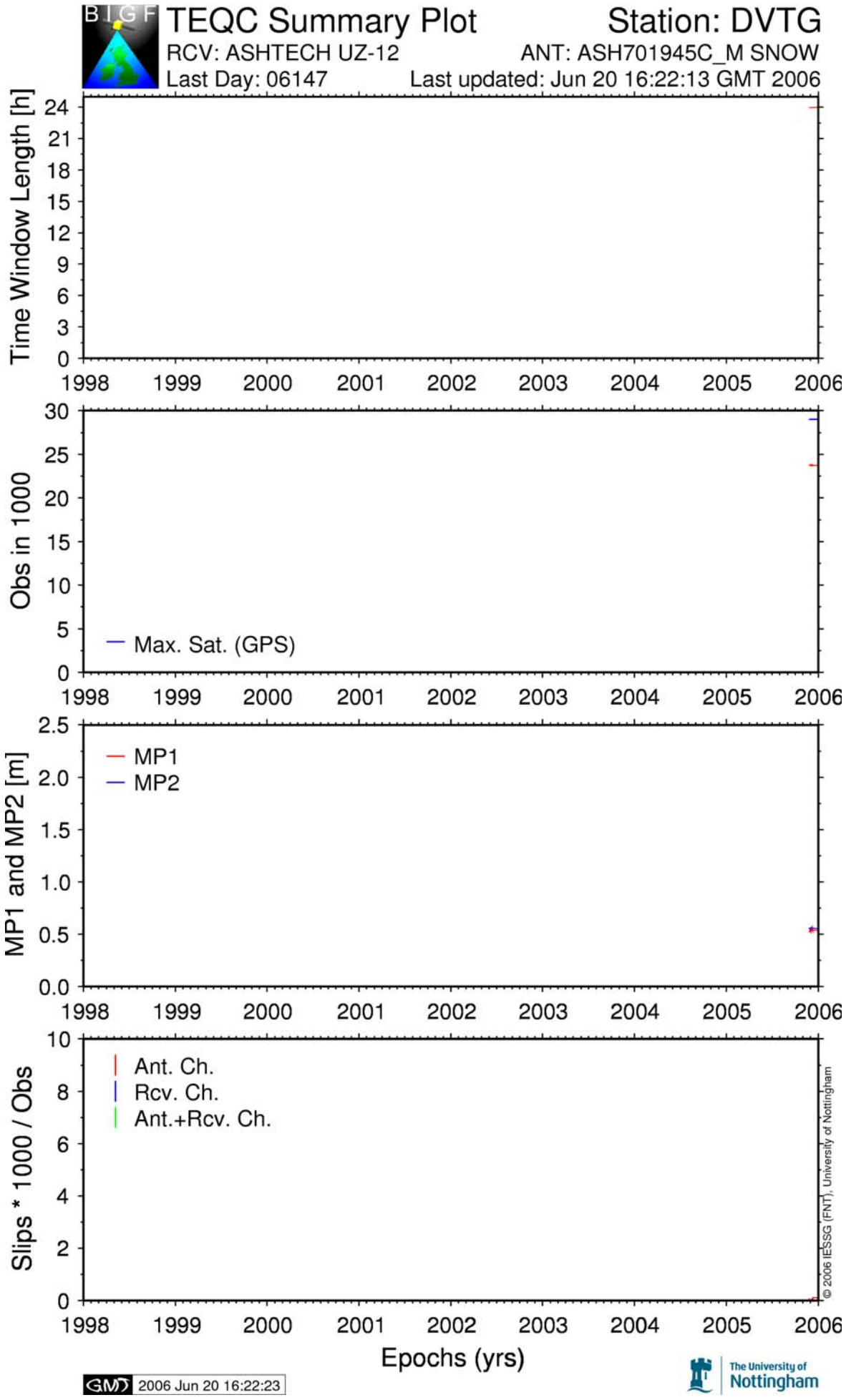
     Primary Data Center     :
     Secondary Data Center   :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map              : Y
       Site Diagram          : Y
       Horizon Mask          : Y
       Monument Description  : Y
       Site Pictures         : Y
     Additional Information  : (multiple lines)
     Antenna Graphics with Dimensions

ASH701945C_M

                       -----
                     /     +     \                      <--  0.128  L2
                    |      +      |                     <--  0.110  L1
   +-------------------------------------------------+   <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                     <--  0.000  BPA=ARP

<--                      0.381                      -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                 L2 : L2 Phase Center
   TCR: Top of Chokering                BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: DVTG
RCV: ASHTECH UZ-12
ANT: ASH701945C_M SNOW
Last Day: 06147
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
1998 1999 2000 2001 2002 2003 2004 2005 2006
Epochs (yrs)
GMT 2006 Jun 20 16:22:23
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

Liverpool

```
     LIVE Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2005-03-15
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : live_20011212.log
      Modified/Added Sections : 4.2


1.   Site Identification of the GNSS Monument

     Site Name                : Liverpool Tide Gauge
     Four Character ID        : LIVE
     Monument Inscription     :
     IERS DOMES Number        : 13233M001
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND STEEL PIPE
       Height of the Monument : 0.07m
       Monument Foundation    : CONCRETE PILLAR
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1999-02-03T12:00Z
     Geologic Characteristic  : ALLUVIUM
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on a 5m high
                              : concrete pillar which forms part of a
                              : wind-break and is about 5m from the
                              : tide gauge building, which is located
                              : on a stone pier, with piled foundations.
                              : The GPS antenna is located on the monument
                              : which consists of a 0.07m steel pipe mounted on
                              : a steel plate.
                              : The GPS antenna is attached to the steel pipe
                              : using a 5/8" thread.
                              : The steel pipe is attached to the steel plate
                              : using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Liverpool
     State or Province        : Merseyside
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3801351.8
       Y coordinate (m)       : -200433.1
       Z coordinate (m)       : 5100558.2
       Latitude (N is +)      : +532658.90
       Longitude (E is +)     : -0030105.62
       Elevation (m,ellips.)  : 66.0
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03145
     Firmware Version         : 1F50
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-02-04T00:00Z
```

```
     Date Removed             : 1999-08-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03145.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03145
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03145.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0)

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936F_C    SNOW
     Serial Number            : 14774
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0310
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1999-02-04T00:00Z
     Date Removed             : 2005-02-22T12:00Z
     Additional Information   : Full antenna serial number is CR 14774.

4.2  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 13141
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0310
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-03-15T09:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 13141.
                                The antenna cable was not replaced.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
```

```
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1999-02-04/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
```

```
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Mersey Docks and Harbour Company
     Preferred Abbreviation   : (A10)
     Mailing Address          : Maritime Centre
                              : Port of Liverpool
                              : Merseyside L21 1LA
```

```
                              : UK
     Primary Contact
       Contact Name           : Marine Operations Manager
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : LIVE is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)


13.  More Information

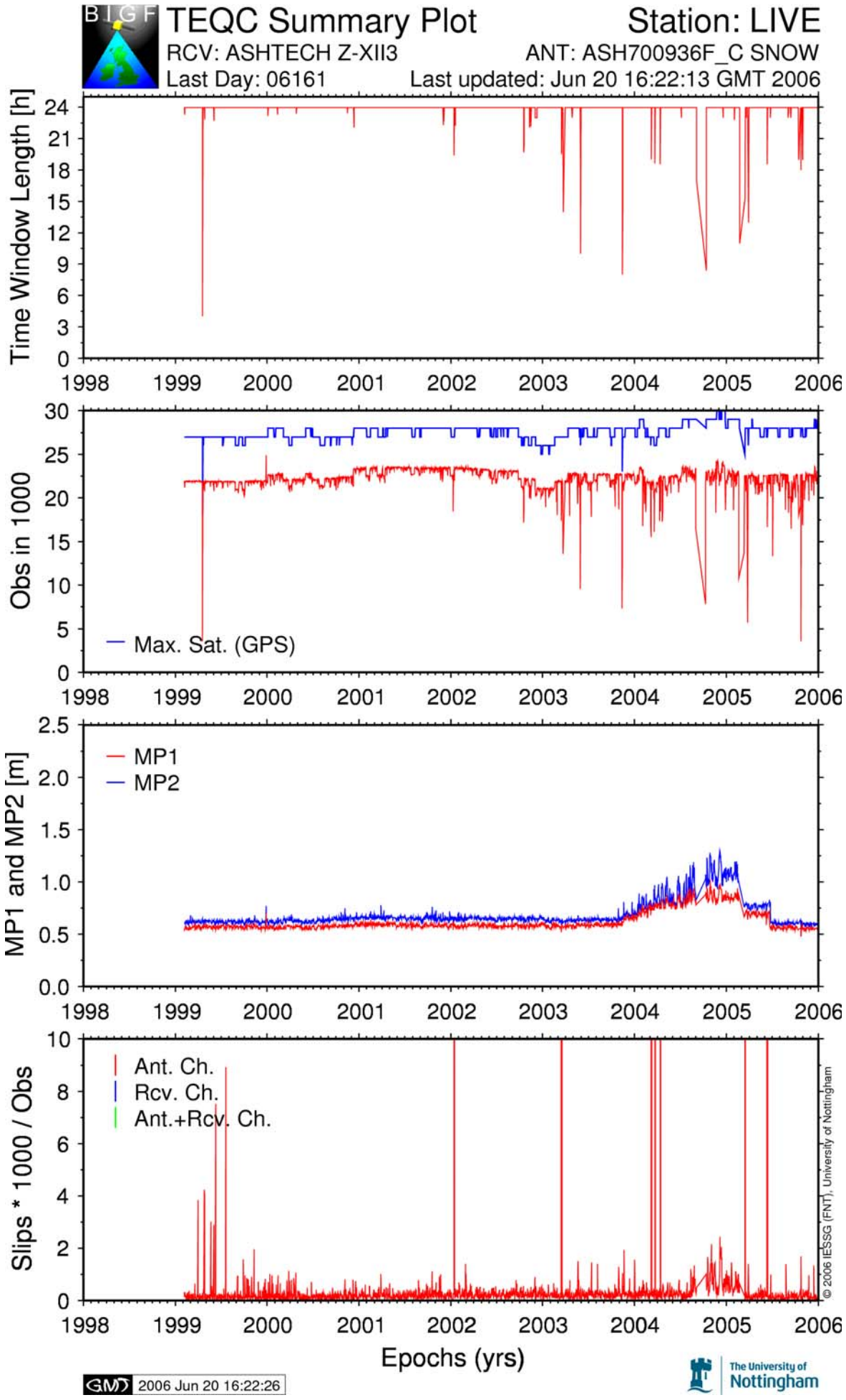
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH700936F_C


                       +---------+
                      /     +     \                      <--  0.1280 L2
                     |      +      |                     <--  0.1100 L1
    +-----------------+-------------+------------------+    <--  0.1008 TCR
    |                                                   |
    |                                                   |
    |                                                   |
    |                                                   |
  +-+---------------------------------------------------+-+  <--  0.0378
  +-------------------+-------------+--------------------+  <--  0.0348 BCR
                      |             |
                      |             |
                      +------x------+                     <--  0.0000 BPA=ARP

  <--                      0.3794                      -->

   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: LIVE
RCV: ASHTECH Z-XII3
ANT: ASH700936F_C SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
© 2006 IESSG (FNT), University of Nottingham
Epochs (yrs)
GMT 2006 Jun 20 16:22:26
The University of Nottingham

Lowestoft

```
     LOWE Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2001-12-12
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Lowestoft Tide Gauge
     Four Character ID        : LOWE
     Monument Inscription     :
     IERS DOMES Number        : 13232M001
     CDP Number               : (A4)
     Monument Description     : STEEL BRACKET AND CARBON FIBRE PIPE
       Height of the Monument : 0.80m
       Monument Foundation    : BUILDING
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL BRACKET
     Date Installed           : 1999-02-12T12:00Z
     Geologic Characteristic  : ALLUVIUM
       Bedrock Type           : SEDIMENTARY (CRAG)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the side
                              : wall of a two storey brick office
                              : building, adjacent to the tide gauge
                              : building, so that the antenna is raised
                              : above the roof
                              : The GPS antenna is located on the monument
                              : which consists of a 0.8m carbon fibre pipe
                              : mounted on a steel bracket.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : bracket using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel bracket and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Lowestoft
     State or Province        : Suffolk
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3891549.7
       Y coordinate (m)       : 118910.8
       Z coordinate (m)       : 5035092.8
       Latitude (N is +)      : +522823.60
       Longitude (E is +)     : +0014500.70
       Elevation (m,ellips.)  : 53.8
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03141
     Firmware Version         : 1F50
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-02-13T00:00Z
```

```
     Date Removed             : 1999-08-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03141.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03141
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : The full receiver serial number is LP 03141.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936F_C    SNOW
     Serial Number            : 14769
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.7620
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1999-02-13T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 14769.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
```

```
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1999-02-13/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)
```

```
8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Associated British Ports
     Preferred Abbreviation   : (A10)
     Mailing Address          : Port House
                              : Lowestoft
                              : Suffolk NR32 1BG
                              : UK
     Primary Contact
       Contact Name           : Harbour Master
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)
```

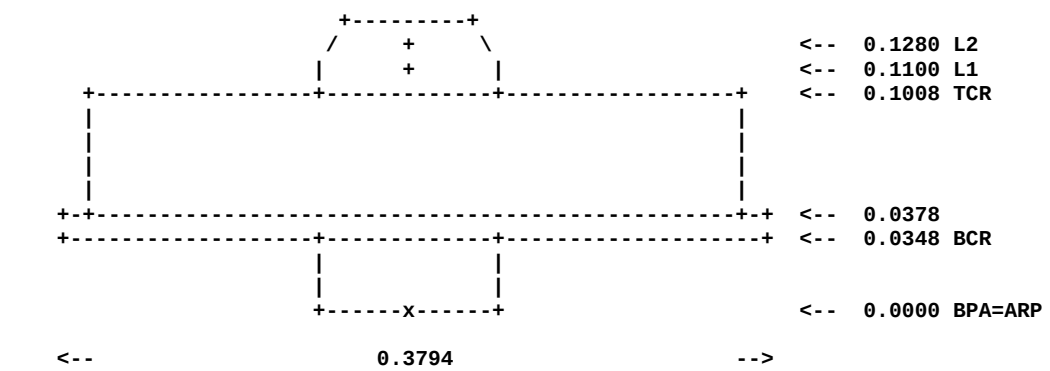
12. Responsible Agency (if different from 11.)

```
     Agency                  : IESSG
     Preferred Abbreviation  : IESSG
     Mailing Address         : University of Nottingham
                             : University Park
                             : Nottingham NG72RD
                             : UK
     Primary Contact
       Contact Name          : Richard Bingley
       Telephone (primary)   : +44 (0)115 9513932
       Telephone (secondary) : +44 (0)115 9513880
       Fax                   : +44 (0)115 9513881
       E-mail                : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name          : IESSG Experimental Officers
       Telephone (primary)   : +44 (0)115 9513921
       Telephone (secondary) : +44 (0)115 9513880
       Fax                   : +44 (0)115 9513881
       E-mail                : iessg@nottingham.ac.uk
     Additional Information  : LOWE is operated by the IESSG for the
                             : Proudman Oceanographic Laboratory and
                             : the UK Department for the Environment, Food
                             : and Rural Affairs (DEFRA)
```

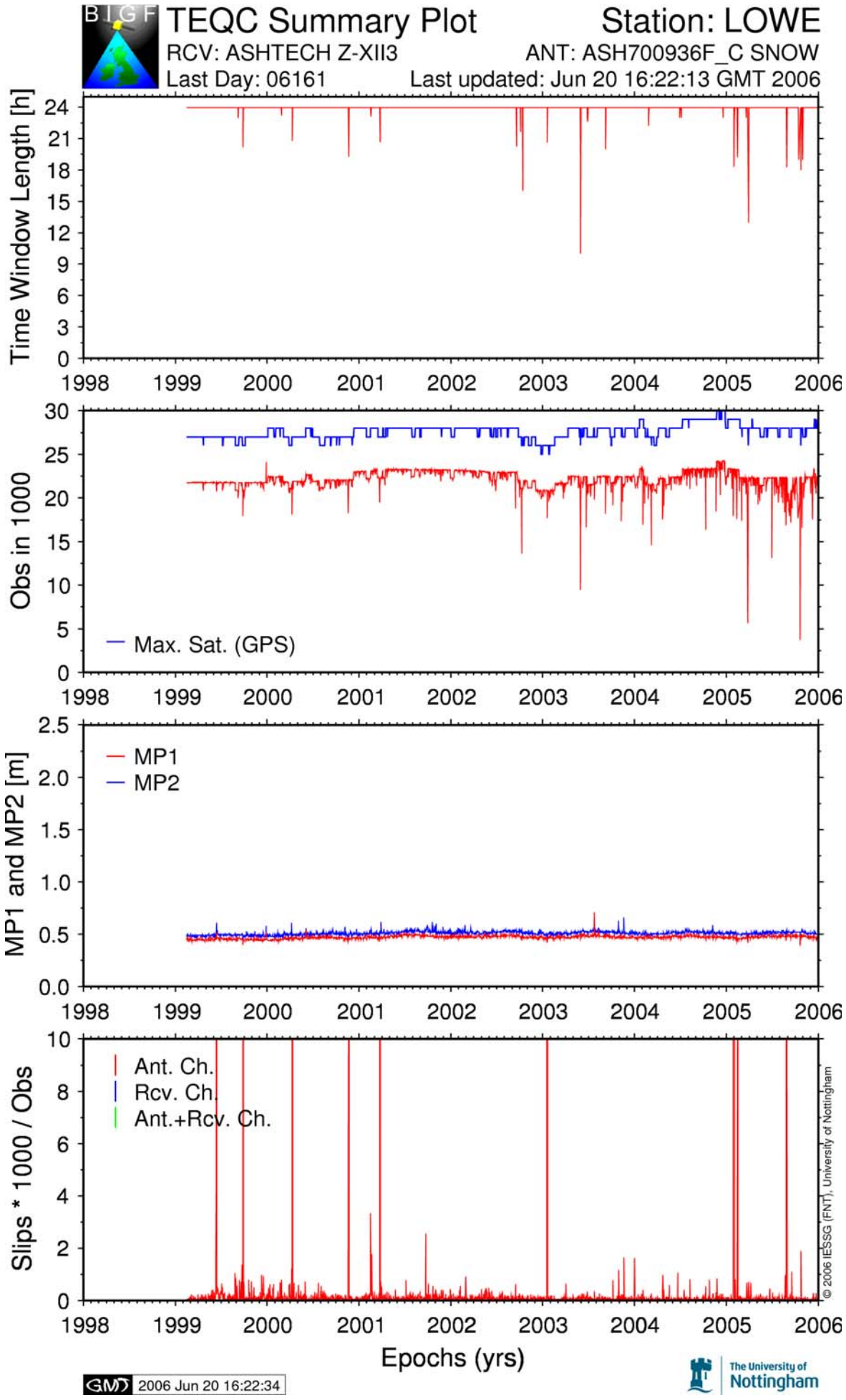
13. More Information

```
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions
```

ASH700936F_C




```
   ARP: Antenna Reference Point
   L1 : L1 Phase Center                L2 : L2 Phase Center
   TCR: Top of Chokering               BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: LOWE
RCV: ASHTECH Z-XII3
ANT: ASH700936F_C SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
© 2006 IESSG (FNT), University of Nottingham
Epochs (yrs)
2006 Jun 20 16:22:34
The University of Nottingham

Lerwick

```
     LWTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2005-08-19
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Lerwick Tide Gauge
     Four Character ID        : LWTG
     Monument Inscription     :
     IERS DOMES Number        : (A9)
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 3.0m
       Monument Foundation    : PIER/BREAKWATER
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 2005-08-17T15:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted adjacent to the
                              : tide gauge building, which is located on a
                              : stone pier/breakwater, built in 1913.
                              : The GPS antenna is located on the monument
                              : which consists of a 3m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to a concrete
                              : plinth on top of the pier/breakwater stone wall.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Lerwick
     State or Province        : Shetland
     Country                  : Scotland
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       :
       Y coordinate (m)       :
       Z coordinate (m)       :
       Latitude (N is +)      :
       Longitude (E is +)     :
       Elevation (m,ellips.)  :
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 13838
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-08-19T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
```

```
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR2 2001 3838.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 14803
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   3.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-08-19T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 4803.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2005-08-19/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)
```

```
7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
```

```
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Lerwick Port Authority
     Preferred Abbreviation   :
     Mailing Address          : Albert Building
                              : Lerwick
                              : Shetland ZE1 0LL
                              : UK
     Primary Contact
       Contact Name           : Harbour Master
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
```

```
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : LWTG is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)


13.  More Information

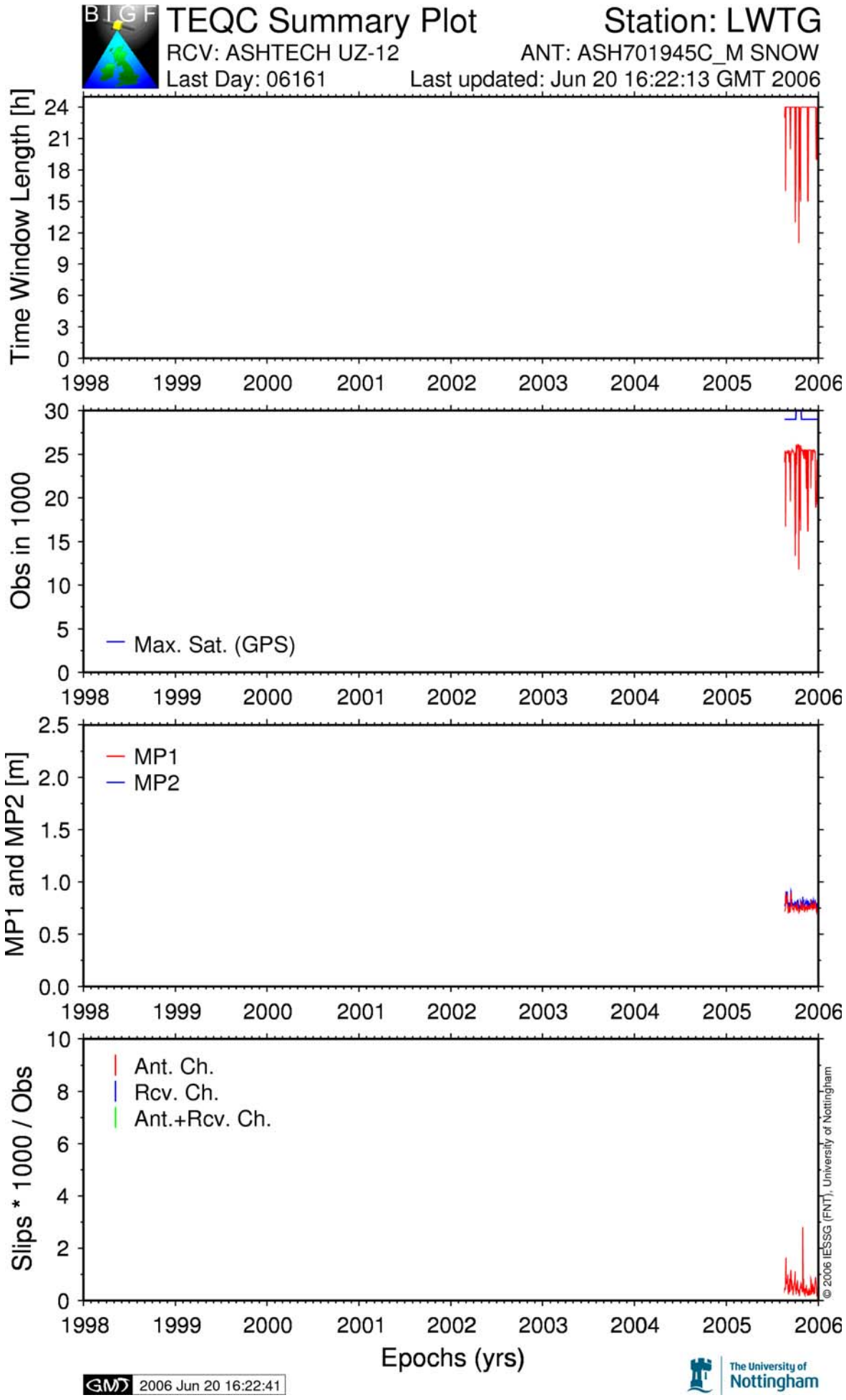
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH701945C_M

                        -----
                      /     +     \                      <--  0.128  L2
                     |      +      |                     <--  0.110  L1
   +-------------------------------------------------+    <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                      <--  0.000  BPA=ARP

<--                      0.381                       -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: LWTG
RCV: ASHTECH UZ-12
ANT: ASH701945C_M SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
1998 1999 2000 2001 2002 2003 2004 2005 2006
Epochs (yrs)
GMT 2006 Jun 20 16:22:41
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

Newlyn

```
     NEWL Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2003-12-12
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Newlyn Tide Gauge
     Four Character ID        : NEWL
     Monument Inscription     :
     IERS DOMES Number        : 13273M103
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 3.0m
       Monument Foundation    : LIGHTHOUSE
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1998-09-29T12:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the
                              : observation platform of a steel
                              : lighthouse adjacent to the tide gauge
                              : building, which is located at the end
                              : of a stone pier, which is founded
                              : on the Sandstone bedrock
                              : The GPS antenna is located on the monument
                              : which consists of a 3m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the
                              : observation platform.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Newlyn
     State or Province        : Cornwall
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 4079954.1
       Y coordinate (m)       : -395930.4
       Z coordinate (m)       : 4870196.8
       Latitude (N is +)      : +500610.90
       Longitude (E is +)     : -0053234.04
       Elevation (m,ellips.)  : 64.5
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 02964
     Firmware Version         : 1F50
```

```
     Elevation Cutoff Setting : 5
     Date Installed           : 1998-09-30T00:00Z
     Date Removed             : 1999-08-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 02964.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0)

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 02964
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 02964.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 15402
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1998-09-30T00:00Z
     Date Removed             : 2001-01-17T23:59Z
     Additional Information   : Full antenna serial number is CR 15042.
                              : Antenna cable damaged in 2001-01

4.2  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 15402
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2001-02-09T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 15042.
                              : New antenna cable installed

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
```

```
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1998-09-30/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
```

```
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Newlyn Pier and Harbour Commissioners
     Preferred Abbreviation   : NPHC
```

```
     Mailing Address          : Newlyn
                              : Penzance
                              : Cornwall
                              : UK

     Primary Contact
       Contact Name           : Andrew Munson (Harbour Master)
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           : Richard Turner (Tide Gauge)
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : NEWL is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department of Environment, Flooding
                              : and Rural Affairs (DEFRA)

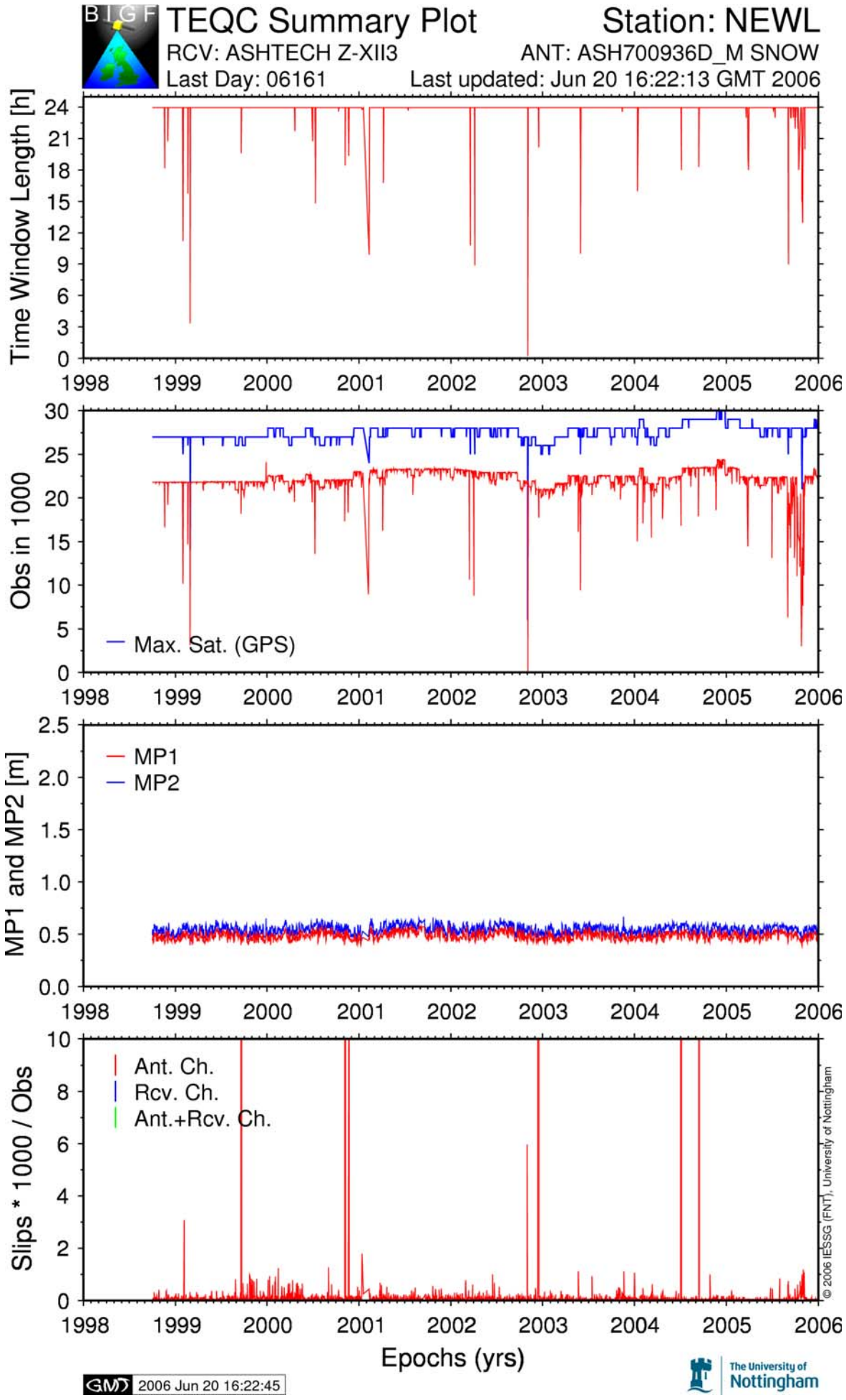

13.  More Information

     Primary Data Center      : BKGE
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH700936D_M
                        -----
                      /     +     \                      <--  0.128  L2
                     |      +      |                     <--  0.110  L1
   +-------------------------------------------------+    <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                      <--  0.000  BPA=ARP

<--                      0.381                       -->

   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: NEWL
RCV: ASHTECH Z-XII3
ANT: ASH700936D_M SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
© 2006 IESSG (FNT), University of Nottingham
Epochs (yrs)
GMT 2006 Jun 20 16:22:45
The University of Nottingham

North Shields

```
     NSTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2003-11-??
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : nstg_20031021.log
      Modified/Added Sections : 4.10


1.   Site Identification of the GNSS Monument

     Site Name                : North Shields Tide Gauge
     Four Character ID        : NSTG
     Monument Inscription     :
     IERS DOMES Number        : 13216M001
     CDP Number               : (A4)
     Monument Description     : ALUMINIUM POLE
       Height of the Monument : 4.00m
       Monument Foundation    : QUAY
       Foundation Depth       : 2.4m
     Marker Description       : BOTTOM OF 5/8" THREAD ON 4m ALUMINIUM POLE
     Date Installed           : 1998-03-07T12:00Z
     Geologic Characteristic  : BOULDER CLAY
       Bedrock Type           : SEDIMENTARY (WESTPHALIAN)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted in the
                              : tide gauge building, which is located
                              : on a concrete quay, with piled
                              : foundations
                              : The GPS antenna is located on the monument
                              : which consists of a 4m aluminium pole, which is
                              : fixed to the concrete quay, in the tide gauge
                              : building.
                              : The GPS antenna is attached to the aluminium
                              : pole using a 5/8" thread.
                              : The male part of the 5/8" thread is on the
                              : aluminium pole and the bottom of the thread
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : North Shields
     State or Province        : Northumbria
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3664792.2
       Y coordinate (m)       : -92117.3
       Z coordinate (m)       : 5201903.7
       Latitude (N is +)      : +550026.70
       Longitude (E is +)     : -0012623.53
       Elevation (m,ellips.)  : 56.9
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : ??????
     Firmware Version         : 1I00
     Elevation Cutoff Setting : 5
     Date Installed           : 1998-03-15T00:00Z
     Date Removed             : 1998-08-23T23:59Z
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Full receiver serial number not known.
                              : Not continuous operation.
                              : Download using HOSE?
                              : Conversion to RINEX using ASHTORIN
                              : (with codephase smoothing).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 982
     Firmware Version         : 1I00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-10T00:00Z
     Date Removed             : 1999-08-13T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number not known.
                              : Not continuous operation.
                              : Download using HOSE?
                              : Conversion to RINEX using ASHTORIN
                              : (with codephase smoothing).

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : ??????
     Firmware Version         : 1L00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-12-03T00:00Z
     Date Removed             : 1999-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number not known.
                              : Not continuous operation.
                              : Download using HOSE?
                              : Conversion to RINEX using ASHTORIN
                              : (with codephase smoothing).

3.4  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : 1L00
     Elevation Cutoff Setting : 5
     Date Installed           : 2000-02-12T00:00Z
     Date Removed             : 2000-10-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.

3.5  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2001-05-15T00:00Z
     Date Removed             : 2002-04-03T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.
                              : Operation using a direct modem connection
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.6  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 01845
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2002-04-05T00:00Z
     Date Removed             : 2002-05-16T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 01845.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.7  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2002-05-18T00:00Z
```

```
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936B_M
     Serial Number            : ?????
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : NONE
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 1998-03-15T00:00Z
     Date Removed             : 1998-08-23T23:59Z
     Additional Information   : Full antenna serial number is not known.

4.2  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 146
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 1999-08-10T00:00Z
     Date Removed             : 1999-08-13T23:59Z
     Additional Information   : Full antenna serial number is not known.

4.3  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : ?????
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 1999-12-03T00:00Z
     Date Removed             : 1999-12-09T23:59Z
     Additional Information   : Full antenna serial number is not known.

4.4  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 2000-02-12T00:00Z
     Date Removed             : 2000-10-15T23:59Z
```

```
     Additional Information   : Full antenna serial number is CR 13570.

4.5  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 10m
     Date Installed           : 2001-05-15T00:00Z
     Date Removed             : 2001-06-12T12:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.6  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2001-06-12T13:00Z
     Date Removed             : 2002-03-11T23:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.7  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10213
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2002-03-13T00:00Z
     Date Removed             : 2002-04-03T23:59Z
     Additional Information   : Full antenna serial number is CR5 2001 0213.

4.8  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2002-04-05T00:00Z
     Date Removed             : 2003-10-20T15:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.9  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2003-10-20T16:00Z
     Date Removed             : 2003-11-18T10:00Z
     Additional Information   : Full antenna serial number is CR 13570.
                              : Antenna cable replaced.

4.10 Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
```

```
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2003-11-18T11:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 13570.
                              : Antenna cable replaced.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1998-03-22/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)
```

```
8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)
```

```
9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Port of Tyne Authority
     Preferred Abbreviation   :
     Mailing Address          : Neville House
                              : Bell Street
                              : North Shields NE30 1LJ
                              : UK
     Primary Contact
       Contact Name           : Port Control
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           : Martin Robertson
       Telephone (primary)    : +44 (0)191 2227834
       Telephone (secondary)  : +44 (0)191 2226445
       Fax                    : +44 (0)191 2228691
       E-mail                 : Martin.Robertson@newcastle.ac.uk
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : NSTG is operated jointly by the
                              : University of Newcastle-upon-Tyne and
                              : the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)

13.  More Information

     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
```

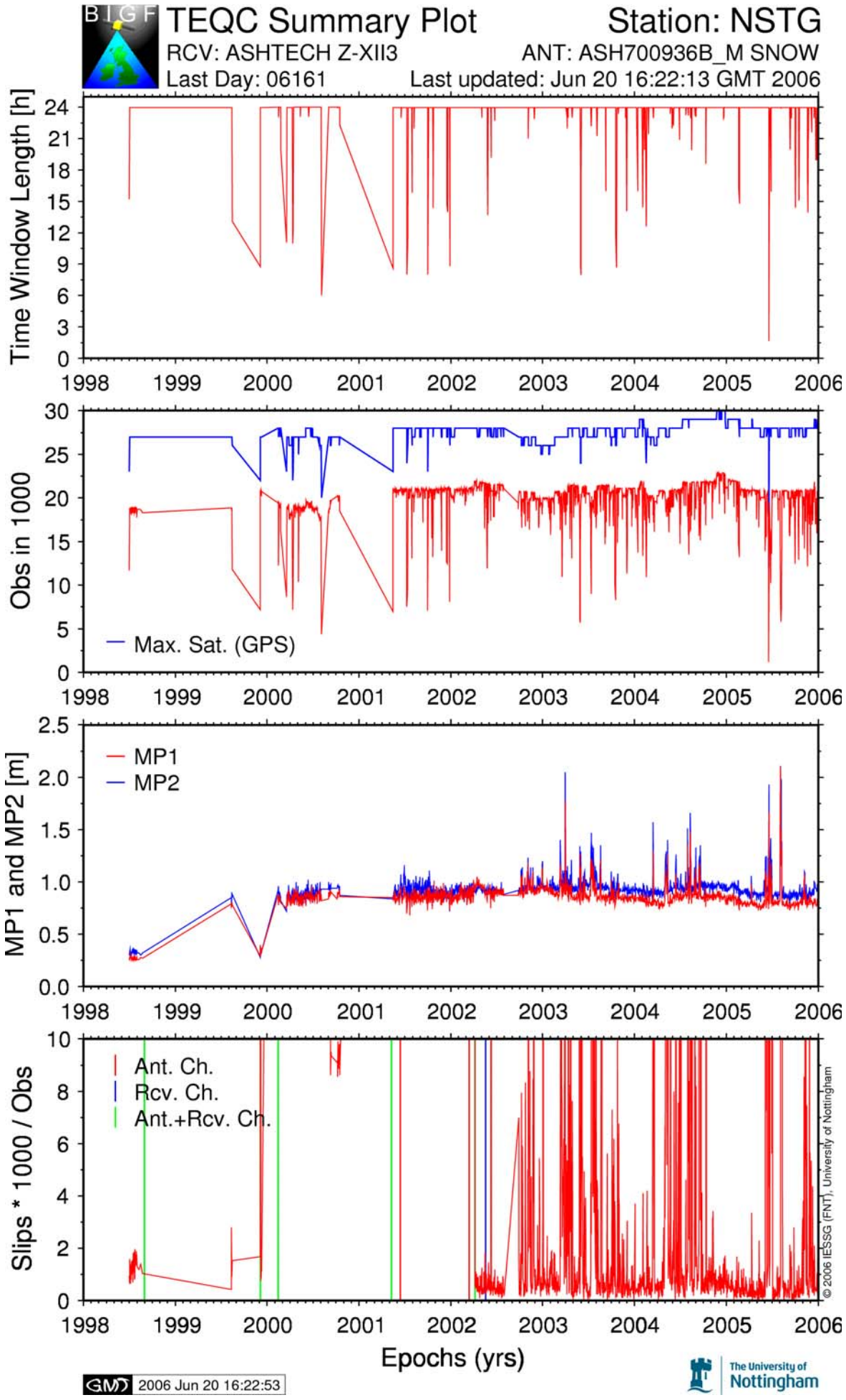
```
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH700936B_M

                      -----
                    /     +     \                       <--  0.128  L2
                   |      +      |                      <--  0.110  L1
  +------------------------------------------------+    <--  0.102  TCR
  |                                                |
  |                                                |
  |                                                |
  |                                                |
+-+------------------------------------------------+-+  <--  0.038
+-------------------+-------------+--------------------+  <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                      <--  0.000  BPA=ARP

<--                      0.381                       -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


BIGF
TEQC Summary Plot
Station: NSTG
RCV: ASHTECH Z-XII3
ANT: ASH700936B_M SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
1998
1999
2000
2001
2002
2003
2004
2005
2006
Epochs (yrs)
GMT 2006 Jun 20 16:22:53
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

Portsmouth

```
     PMTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2001-09-25
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Portsmouth Tide Gauge
     Four Character ID        : PMTG
     Monument Inscription     :
     IERS DOMES Number        : 13289M003
     CDP Number               : (A4)
     Monument Description     : STEEL BRACKET
       Height of the Monument : 1.5m
       Monument Foundation    : BUILDING
       Foundation Depth       : (m)
     Marker Description       : TOP OF 5/8" THREAD ON 1.5m STEEL POLE/BRACKET
     Date Installed           : 2001-09-25T12:00Z
     Geologic Characteristic  : ALLUVIUM
       Bedrock Type           : SEDIMENTARY (BAGSHOT BEDS)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the North end
                              : wall of a single storey brick building,
                              : which houses the tide gauge equipment,
                              : so that the antenna is raised above the
                              : roof apex.
                              : The GPS antenna is located on the monument
                              : which consists of a steel bracket with a 1.5m
                              : pole.
                              : The GPS antenna is attached to the steel pole
                              : using a 5/8" thread.
                              : The antenna height is taken as 0.000m (ie the
                              : survey marker is on the pole and is coincident
                              : with the GPS ARP).


2.   Site Location Information

     City or Town             : Portsmouth
     State or Province        : Hampshire
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 4038372.3
       Y coordinate (m)       : -78330.6
       Z coordinate (m)       : 4919718.8
       Latitude (N is +)      : +504808.36
       Longitude (E is +)     : -0010640.33
       Elevation (m,ellips.)  : 55.4
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 10206
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2001-09-25T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR 2001 0206.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10214
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2001-09-25T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 0214.
                              : The antenna radome is painted black.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2001-09-26/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)
```

```
7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
```

```
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Queen's Harbour Master
     Preferred Abbreviation   :
     Mailing Address          : HM Naval Base
                              : Portsmouth
                              : Hampshire
                              : UK
     Primary Contact
       Contact Name           : CPO Surveyor for Queen's Harbour Master
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
```

```
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : PMTG is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)


13.  More Information

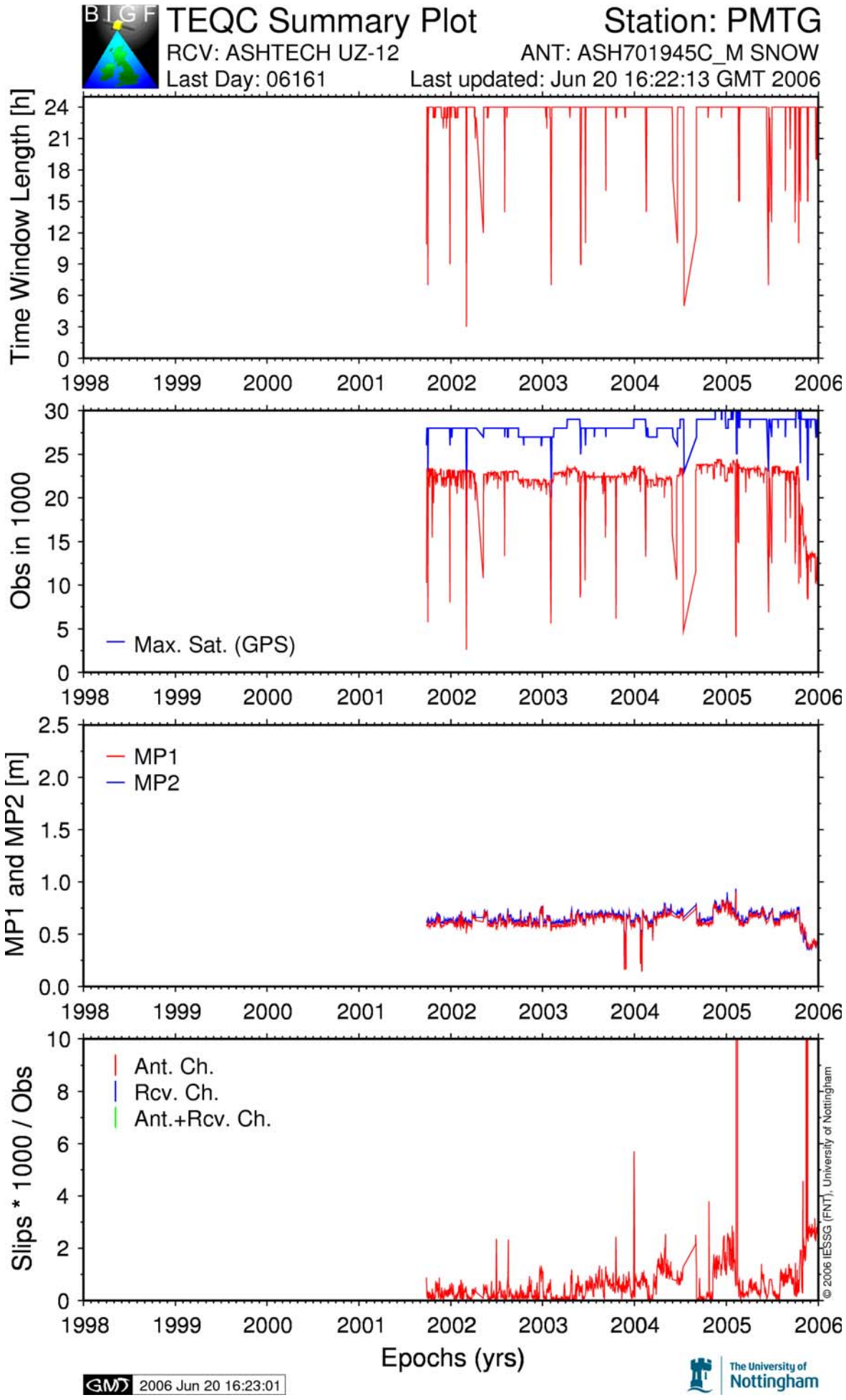
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH701945C_M

                        -----
                      /     +     \                      <--  0.128  L2
                     |      +      |                     <--  0.110  L1
   +-------------------------------------------------+    <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                      <--  0.000  BPA=ARP

<--                      0.381                       -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: PMTG
RCV: ASHTECH UZ-12
ANT: ASH701945C_M SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
1998 1999 2000 2001 2002 2003 2004 2005 2006
Epochs (yrs)
GMT 2006 Jun 20 16:23:01
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

Sheerness

```
     SHEE Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2001-06-01
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Sheerness Tide Gauge
     Four Character ID        : SHEE
     Monument Inscription     :
     IERS DOMES Number        : 13236M001
     CDP Number               : (A4)
     Monument Description     : STEEL BRACKET
       Height of the Monument : 0.16m
       Monument Foundation    : ROOF
       Foundation Depth       : (m)
     Marker Description       : TOP OF 5/8" THREAD ON STEEL BRACKET
     Date Installed           : 1997-03-05T12:00Z
     Geologic Characteristic  : ALLUVIUM (CLAY, SILT, PEAT)
       Bedrock Type           : SEDIMENTARY (CHALK)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the concrete
                              : slab roof of the tide gauge building,
                              : which is a single storey brick building
                              : located on a jetty with piled foundations.
                              : The GPS antenna is located on the monument
                              : which consists of a 0.16m high steel bracket
                              : fixed to the concrete roof of the tide gauge
                              : building.
                              : The GPS antenna is attached to the steel bracket
                              : using a 5/8" thread.
                              : The male part of the 5/8" thread is on the steel
                              : bracket and has a domed top, which serves as the
                              : survey marker.


2.   Site Location Information

     City or Town             : Sheerness
     State or Province        : Isle of Sheppey
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position (ITRF)
       X coordinate (m)       : 3983074.5
       Y coordinate (m)       : 51683.0
       Z coordinate (m)       : 4964639.6
       Latitude (N is +)      : +512644.44
       Longitude (E is +)     : +0004436.27
       Elevation (m,ellips.)  : 53.3
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : TRIMBLE 4000SSI
     Satellite System         : GPS
     Serial Number            : 16407
     Firmware Version         : 7.21
     Elevation Cutoff Setting : 15
     Date Installed           : 1997-03-27T00:00Z
     Date Removed             : 1999-08-19T23:59Z
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Full receiver serial number is 3628A16407.
                              : Operation using a direct modem connection.
                              : Download using RFILE v2.31 [21-MAR-97 TEST].
                              : Conversion to RINEX using DAT2RIN v2.20b.

3.2  Receiver Type            : TRIMBLE 4000SSI
     Satellite System         : GPS
     Serial Number            : 16407
     Firmware Version         : 7.29
     Elevation Cutoff Setting : 15
     Date Installed           : 1999-08-21T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is 3628A16407.
                              : Operation using a direct modem connection.
                              : Download using RFILE v2.35 (20 DEC 99).
                              : Conversion to RINEX using DAT2RIN v2.35a.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : TRM29659.00     NONE
     Serial Number            : 66923
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :  -0.0070
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : NONE
     Radome Serial Number     :
     Antenna Cable Type       : TRIMBLE 14553-00
     Antenna Cable Length     : 10m
     Date Installed           : 1997-03-27T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is 0220066923.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard
```

```
6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2001-03-27/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
```

```
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Medway Ports
     Preferred Abbreviation   : (A10)
     Mailing Address          : Sheerness Docks
                              : Sheerness
                              : Kent ME121RX
                              : UK
     Primary Contact
       Contact Name           : Mike Hillier
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           : Phillip Woodgate
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
```

```
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : SHEE is operated by the IESSG for the
                              : Environment Agency of England and Wales


13.  More Information

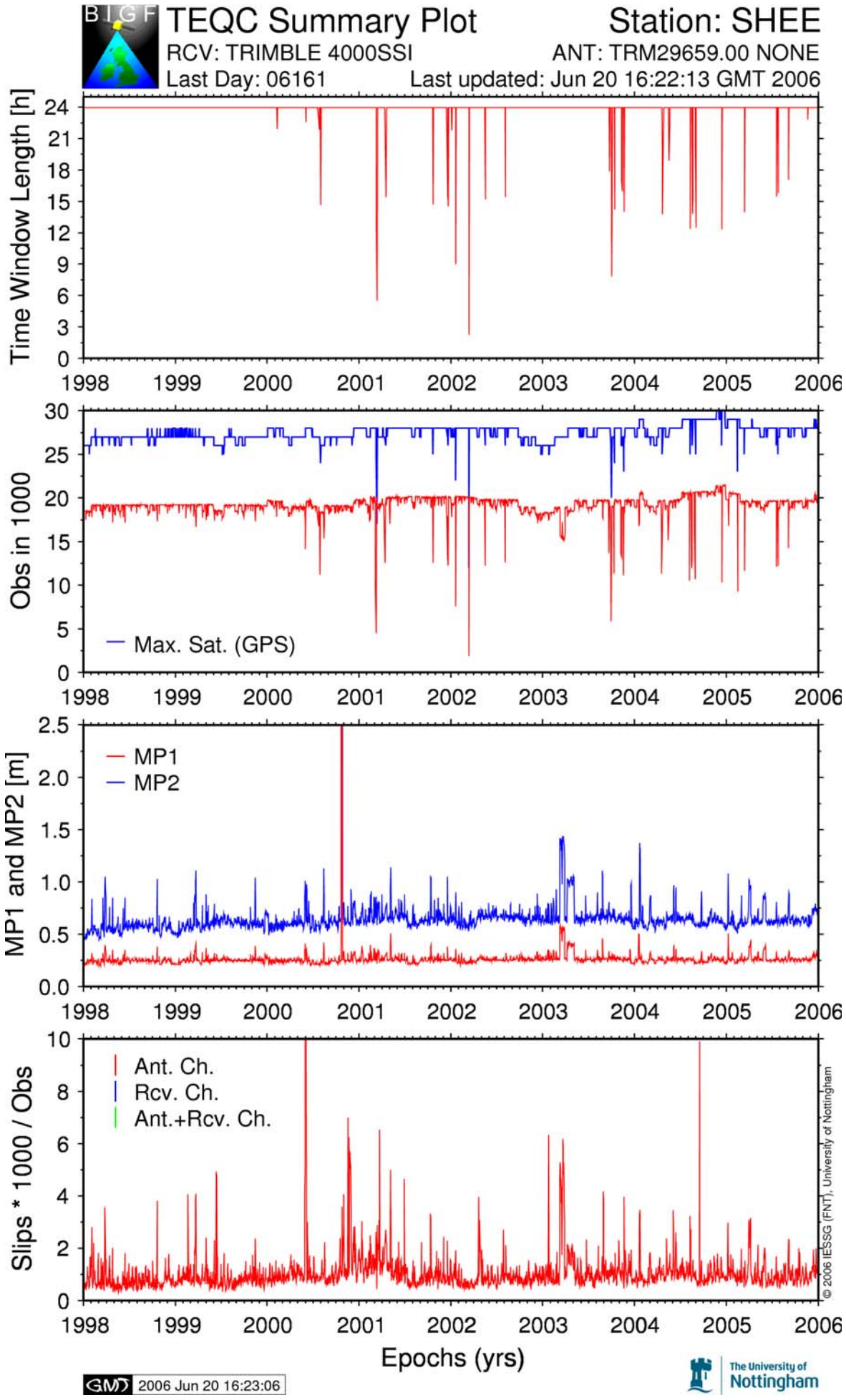
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

TRM29659.00

                        -----
                      /     +     \                       <--  0.128  L2
                     |      +      |                      <--  0.110  L1
   +-------------------------------------------------+    <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+--------------------+-------------+--------------------+  <--  0.035  BCR
                     |             |
                    =|             |
                     +------x------+                      <--  0.000  BPA=ARP

<--                        0.381                        -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: SHEE
RCV: TRIMBLE 4000SSI
ANT: TRM29659.00 NONE
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
GMT 2006 Jun 20 16:23:06
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

Stornoway

```
     SWTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2005-09-02
     Report Type              : NEW
     If Update:
      Previous Site Log       :
      Modified/Added Sections :


1.   Site Identification of the GNSS Monument

     Site Name                : Stornoway Tide Gauge
     Four Character ID        : SWTG
     Monument Inscription     :
     IERS DOMES Number        : (A9)
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 2.0m
       Monument Foundation    : WHARF
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 2005-09-01T15:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted about 20m from the
                              : tide gauge building, and located on No 2 Wharf.
                              : The GPS antenna is located on the monument
                              : which consists of a 2m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the concrete
                              : of the Wharf.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.

2.   Site Location Information

     City or Town             : Stornoway
     State or Province        : Isle of Lewis
     Country                  : Scotland
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       :
       Y coordinate (m)       :
       Z coordinate (m)       :
       Latitude (N is +)      :
       Longitude (E is +)     :
       Elevation (m,ellips.)  :
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 13830
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-09-02T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
```

```
                              : Full receiver serial number is ZR2 2001 3830.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 14802
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-09-02T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 4802.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2005-09-02/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information
```

```
7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
```

```
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Stornoway Port Authority
     Preferred Abbreviation   :
     Mailing Address          : Amity House, Esplanade Quay
                              : Stornoway
                              : Isle of Lewis HS1 2XS
                              : UK
     Primary Contact
       Contact Name           : Deputy Harbour Master
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
```

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       Fax                   : +44 (0)115 9513881
       E-mail                : iessg@nottingham.ac.uk
     Additional Information  : LWTG is operated by the IESSG for the
                             : Proudman Oceanographic Laboratory and
                             : the UK Department for the Environment, Food
                             : and Rural Affairs (DEFRA)


13.  More Information

     Primary Data Center     :
     Secondary Data Center   :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map              : Y
       Site Diagram          : Y
       Horizon Mask          : Y
       Monument Description  : Y
       Site Pictures         : Y
     Additional Information  : (multiple lines)
     Antenna Graphics with Dimensions

ASH701945C_M

                       -----
                     /     +     \                      <--  0.128  L2
                    |      +      |                     <--  0.110  L1
   +-------------------------------------------------+   <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                     |             |
                    =|             |
                     +------x------+                     <--  0.000  BPA=ARP

<--                      0.381                       -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                 L2 : L2 Phase Center
   TCR: Top of Chokering                BCR: Bottom of Chokering
```
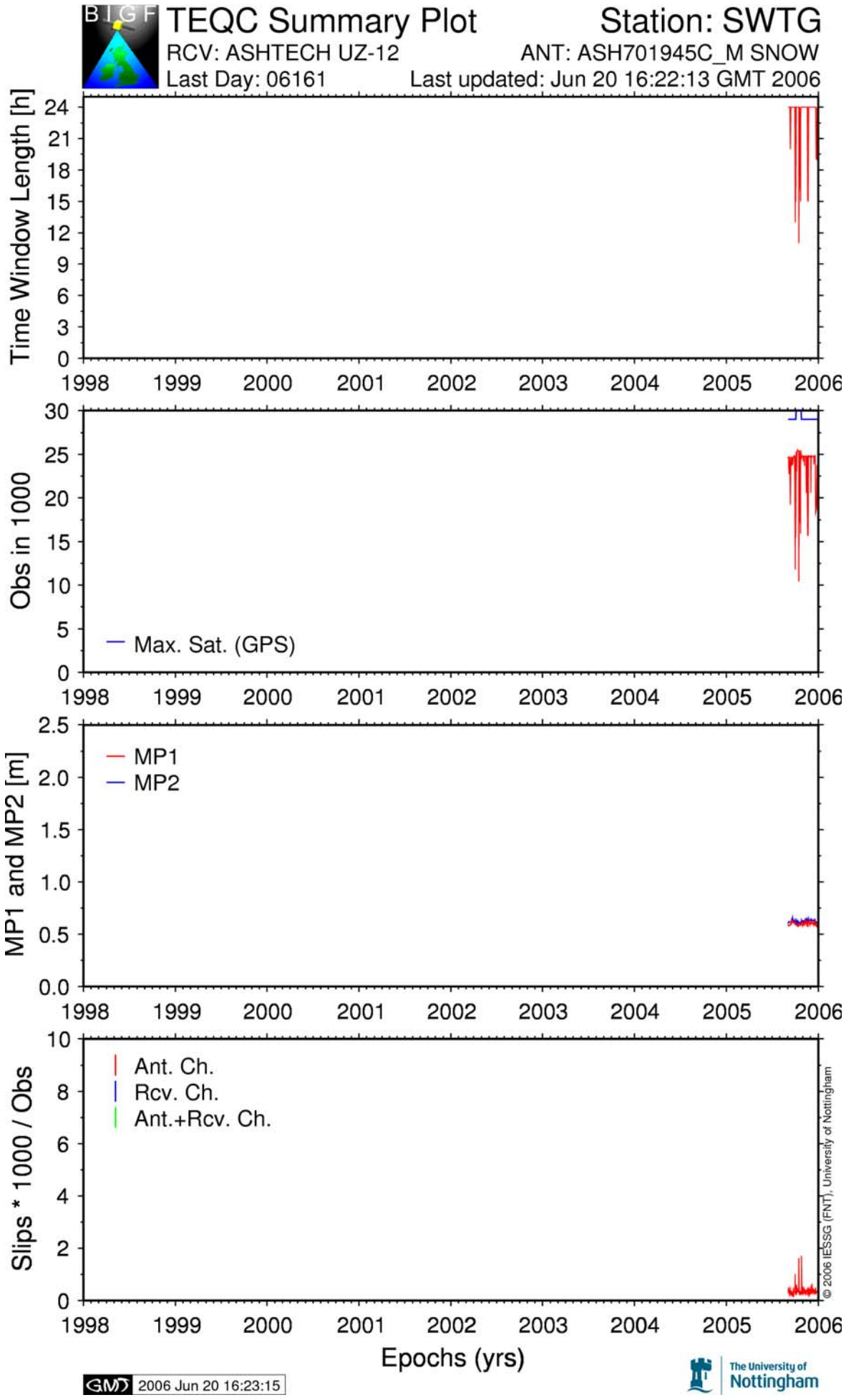


TEQC Summary Plot
Station: SWTG
RCV: ASHTECH UZ-12
ANT: ASH701945C_M SNOW
Last Day: 06161
Last updated: Jun 20 16:22:13 GMT 2006
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
1998 1999 2000 2001 2002 2003 2004 2005 2006
Epochs (yrs)
GMT 2006 Jun 20 16:23:15
© 2006 IESSG (FNT), University of Nottingham
The University of Nottingham

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

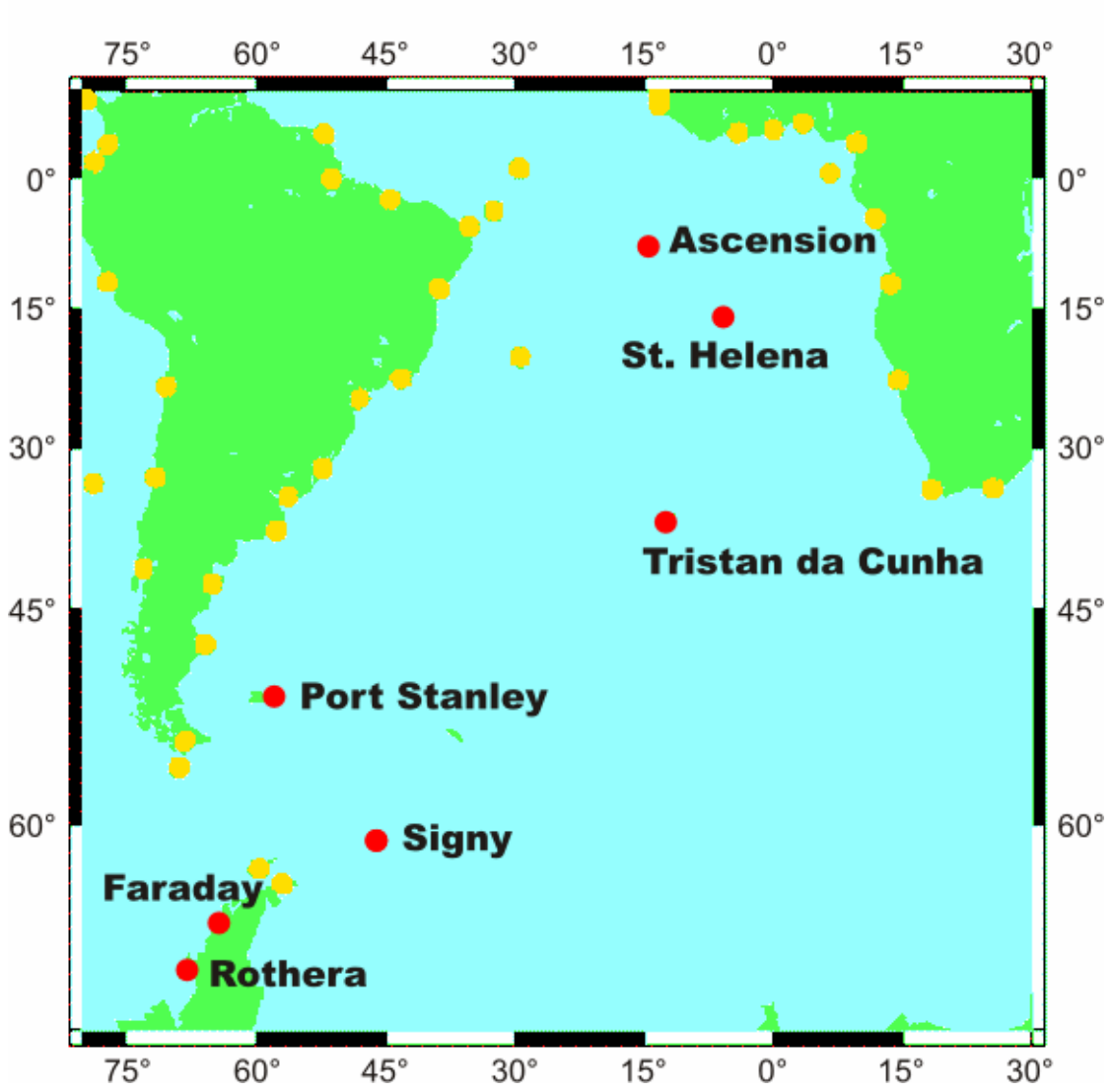
In Phase 1 of ACCLAIM from 1983, measurements at coastal tide gauge sites took the form of sub-surface pressure (SSP) measurements (units of pressure e.g. mbar) rather than sea level (units of length e.g. centimetres). SSP is here defined as the total, measured pressure recorded by a sub-surface pressure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

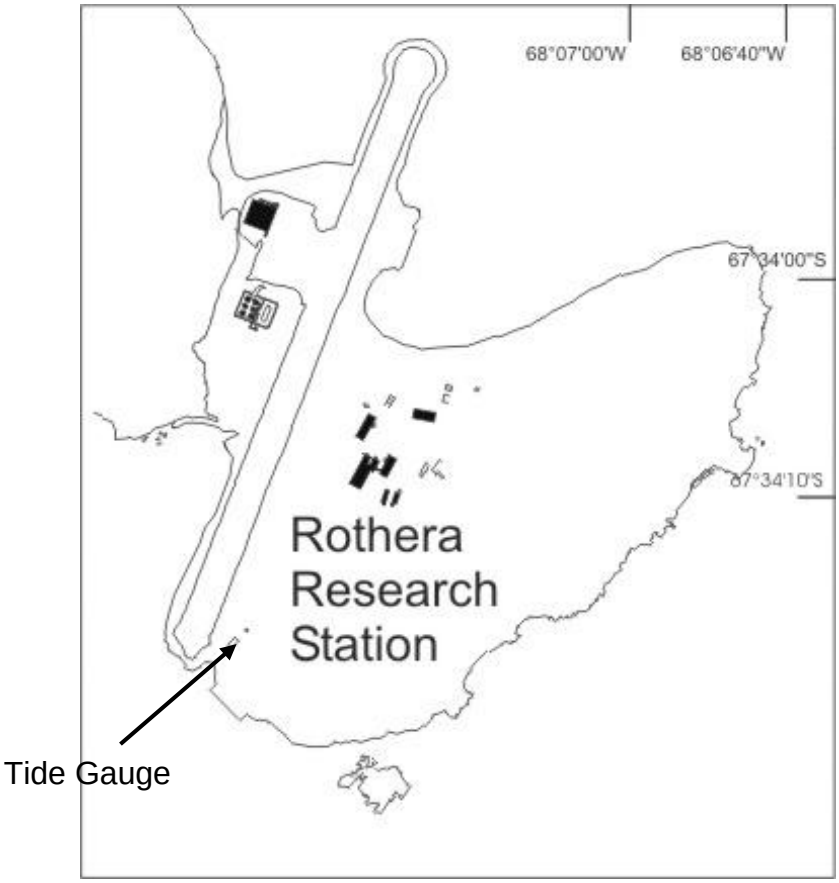
There are three directories: bprs, phase1 and phase2. Each has an inventory file, giving more information about the tide gauges.

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.

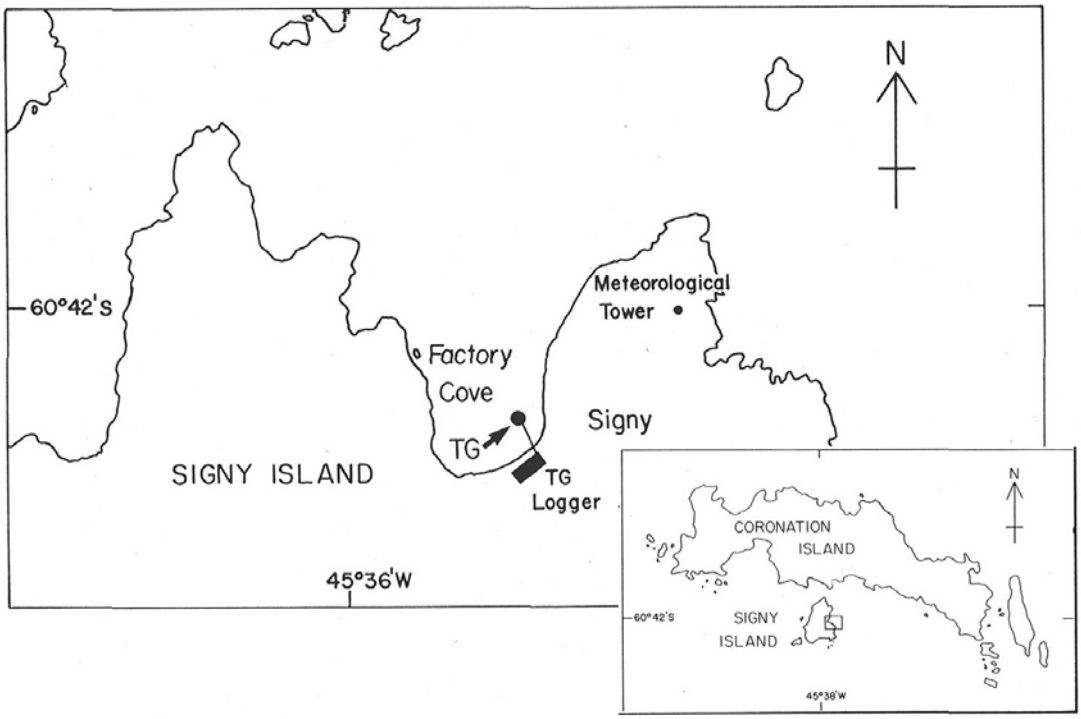


Signy (South Orkney Islands)

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.



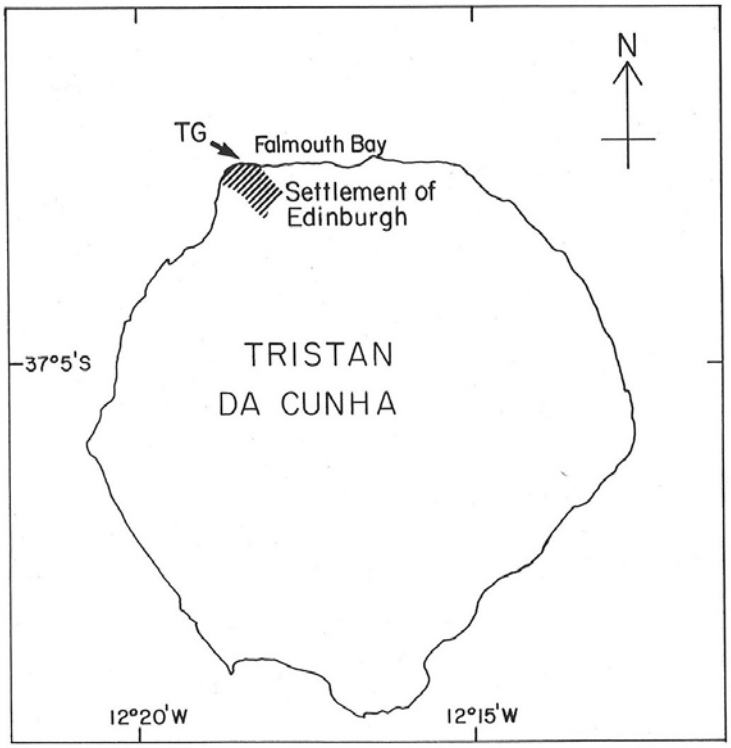
Tristan da Cunha

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

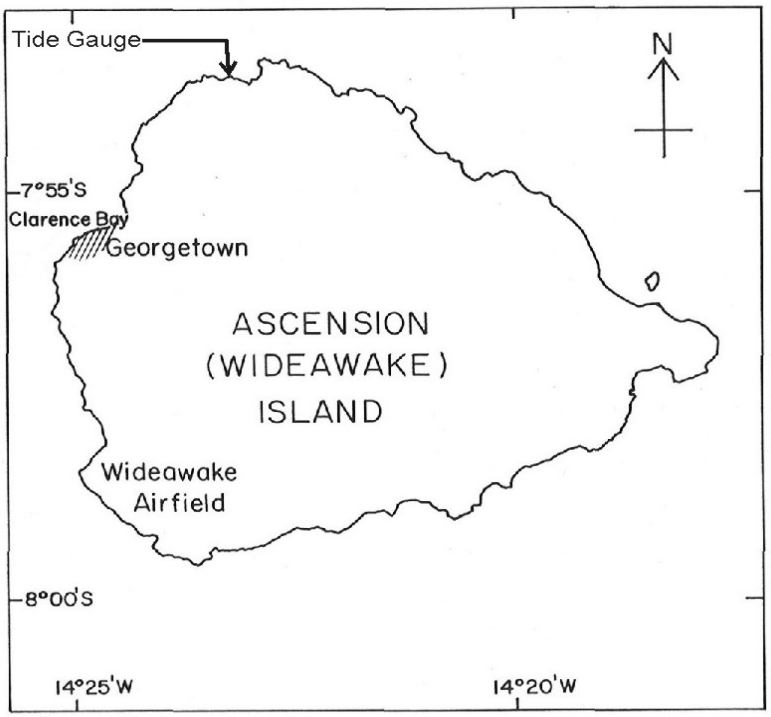
Latitude: 07° 54.0' S Longitude: 014° 23.0' W

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

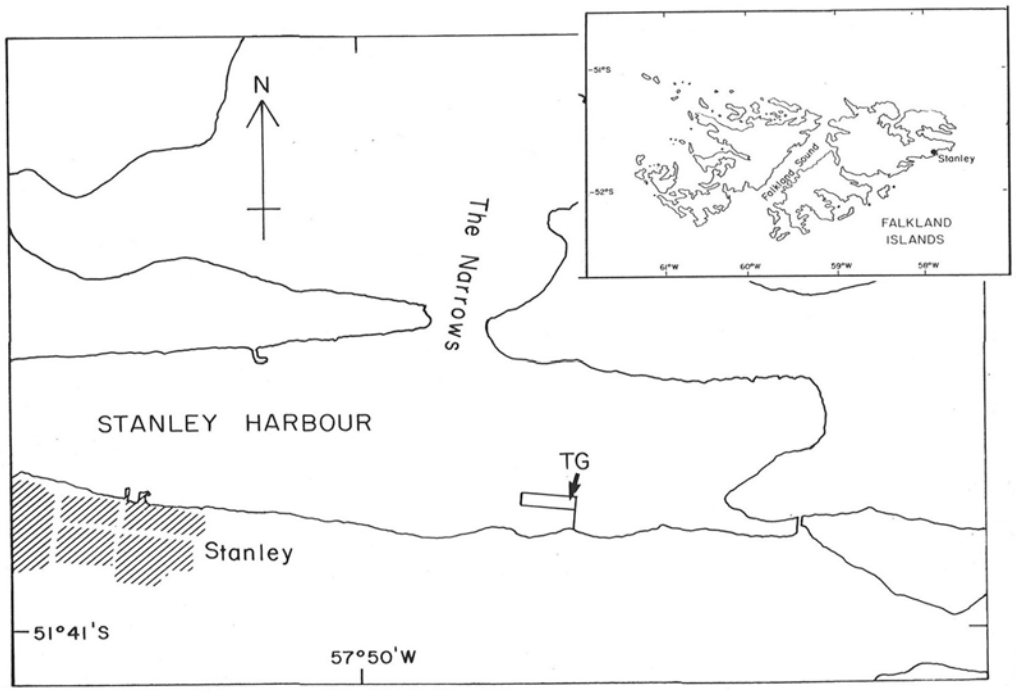
Latitude: 51° 41.0' S Longitude: 057° 49.0' W

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

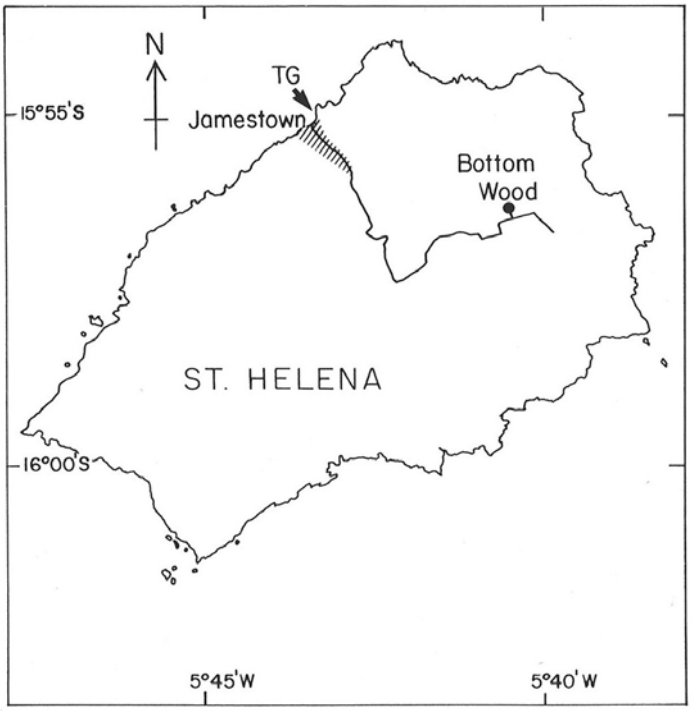
Latitude: 15° 55.0' S Longitude: 005° 43.0' W

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.



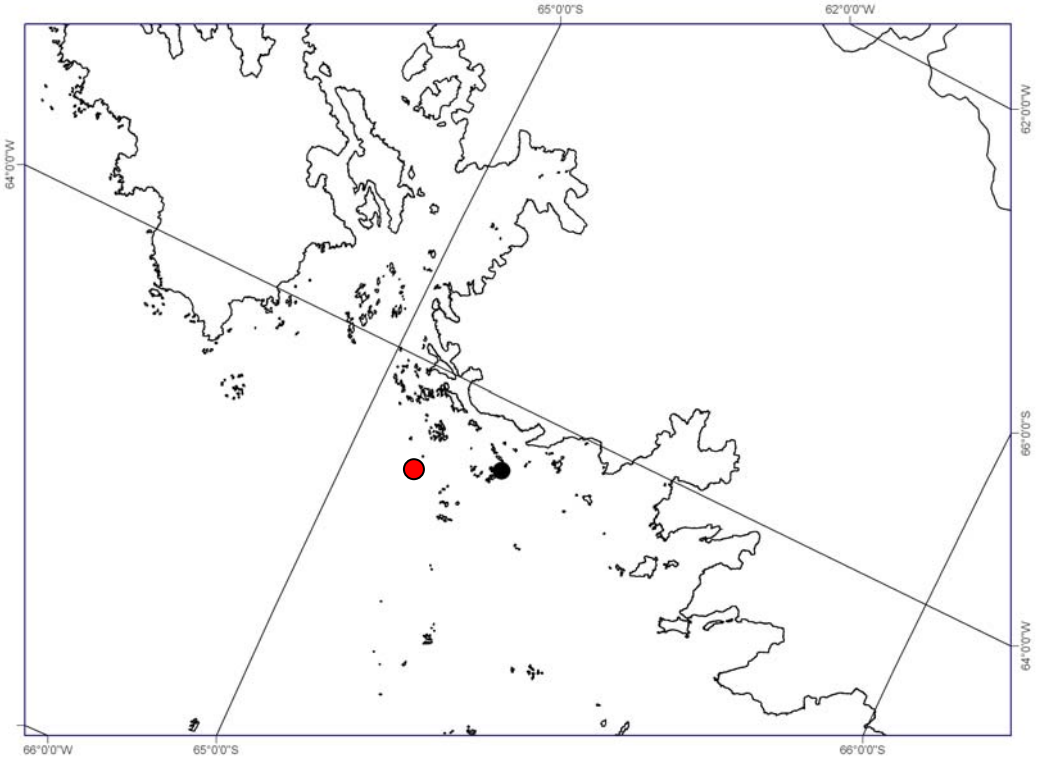
Faraday / Vernadsky

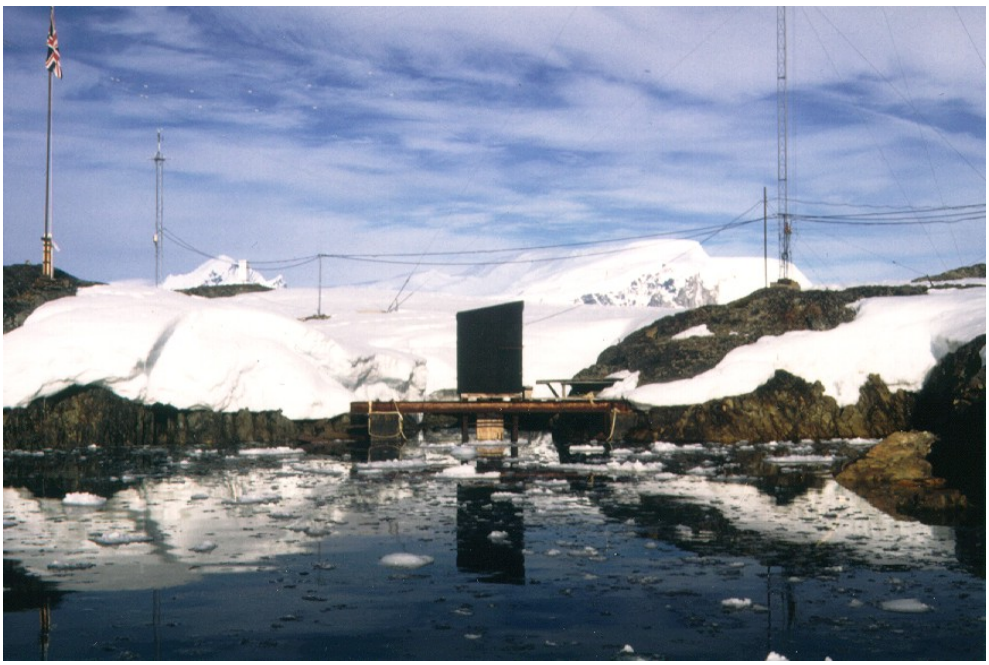
Latitude: 65° 15.0' S Longitude: 064° 16.0' W

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

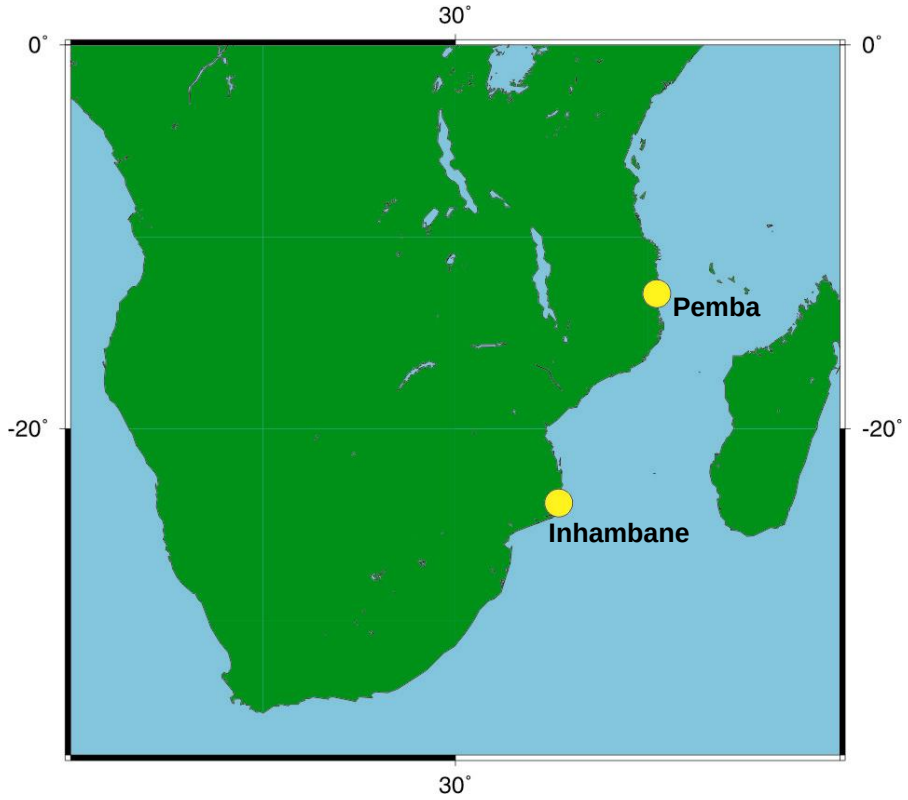
Rothera also only received a very brief visit during 2005. All data was downloaded without any problems.

Report on gauges in Mozambique

Mozambique Activities in 2005

New gauges were installed at Inhambane and Pemba in Mozambique with the help of some local people and South African colleagues. The installation at both sites consists of a radar gauge which reports back via Orbcomm and a single transducer with a dial-up connection. A backup OTT gauge was also installed fitted with a pressure sensor.

In addition to all the maintenance, four OTT Kalesto radar gauges have also been purchased for the ODINAFRICA project which will be installed at Nouakchott (Mauritania), Takoradi (Ghana), Port Sonora/Limbe (Cameroon) and Point Noire (Congo).



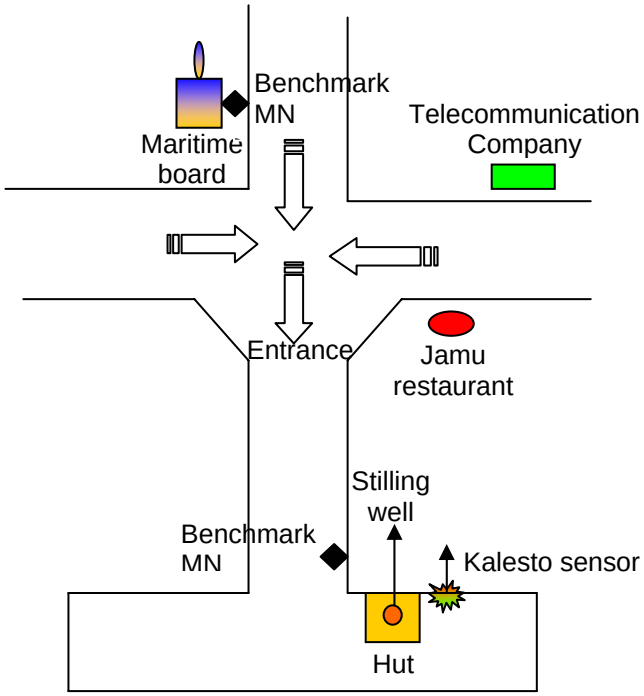
Inhambane (Mozambique)

Latitude: 23° 52.1' S Longitude: 35° 22.6' E

Instrument type: Radar gauge with Orbcomm and a single OTT pressure sensor.

Site of Gauge: Quayside in Inhambane harbour

Benchmarks and Benchmark relationships:
TGZ = 7.286m below benchmark SH-MN1-1980.



Kalesto sensor on quayside

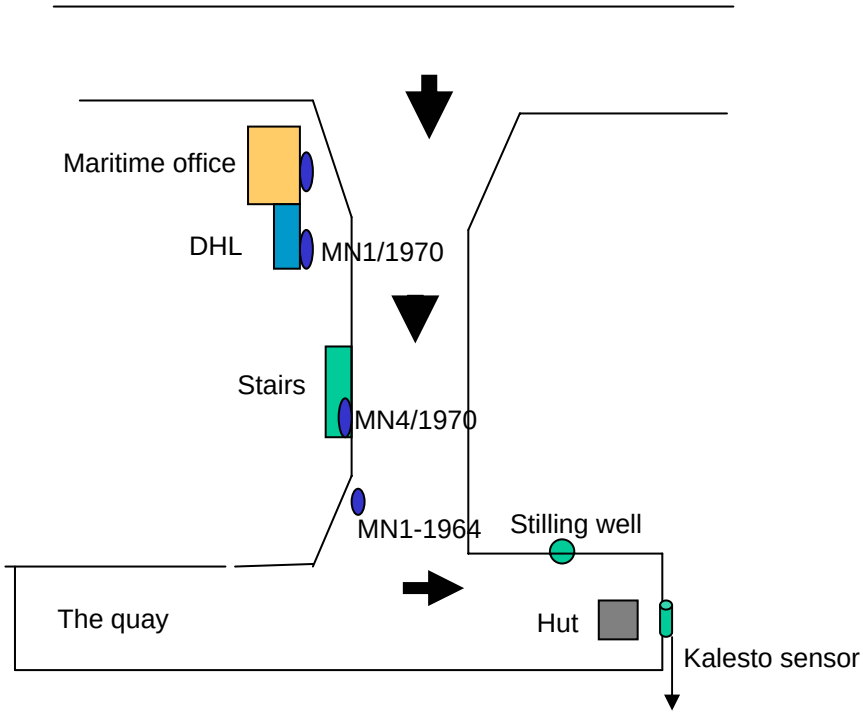
Pemba (Mozambique)

Latitude: 12° 57.6' S Longitude: 40° 29.2' E

Instrument type: Radar gauge with Orbcomm and single OTT pressure sensor.

Site of Gauge:Quayside of Pemba harbour.

Benchmarks and Benchmark relationships:
TGZ = 5.71 below benchmark MN1-1964.



Stilling well, with pressure sensor