The UK National Tide Gauge Network

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The UK national network of 'Class A' sea level gauges was established after violent storms in the North Sea in 1953 resulted in serious flooding in the Thames Estuary. The network comprises 44 gauges (see Table 1) related through the national levelling network to Ordnance Datum Newlyn. The Proudman Oceanographic Laboratory (POL) is responsible for modernising and maintaining this network, with the objectives of obtaining high quality tidal information through telemetry and to provide warning of possible flooding of coastal locations around the British Isles. Data are collected, processed and banked centrally by POL to provide long time-series of reliable and accurate sea levels. These data are required for research and operational use and to facilitate specific scientific studies of coastal processes such as tidal response, storm surge behaviour and sea level rise; and for underpinning local and national operational systems such as the Storm Tide Forecasting Service at the Meteorological Office. They also have wide applications in climate change studies and contemporary modelling scenarios.

In addition to the data collected by the tide gauges, measurement of vertical land movements using continuous GPS and absolute gravity are undertaken at key UK tide gauges and in the area of the maximum post-glacial rebound in Scotland to enable the separation of the absolute and relative sea level trends and the determination of their spatial variations.

The Tide Gauge Inspectorate based at POL is responsible for the operation, maintenance and development of the tide gauge network. With the need to improve data acquisition and the ability to identify and respond to faults in the network, a centralised data collection and monitoring system was designed and developed called DATARING (Data Acquisition for Tidal Applications by the Remote Interrogation of Network Gauges). The DATARING datalogger takes signals from DigiQuartz pressure transducers and pressure operated gauges which are connected to the tidal pressure by a bubbler system. Float operated gauges can also supply a sea level signal to the datalogger. A number of sites also feed in wind speed and wind direction data. Further details can be found on the POL web site (www.pol.ac.uk).

The signals are processed to take account of water density, datum offset and calibration factors. The data are averaged over a 15 minute period, with the centre points being on the hour, 15, 30 and 45 minutes past the hour. These readings are stored in internal memory and approximately 14 days can elapse before the data are likely to be overwritten. The data can be accessed either locally or remotely over the telephone line, but these forms of access are only open to POL and the Storm Tide Forecasting Service. The data are retrieved on a weekly basis and appended onto the existing database, giving a continuous record for that site.

The British Oceanographic Data Centre (BODC) has a special responsibility on behalf of POL for the remote monitoring and retrieval of quarter hourly sea level data from the National Tide Gauge Network. Daily checks are kept on the performance of the gauges. Any problems arising at the remote sites can therefore be quickly identified by the interrogating computer and appropriate action taken to minimise data loss. The data are downloaded weekly. These are then routinely processed and quality controlled prior to being made available for scientific use. Data from 1993 onwards have been processed using the BODC in-house EDTEVA software, and are readily available. In addition to maintaining a databank of the 15 minutes values, several databases are available containing information about surges, maximum and minimum levels, mean sea levels, etc. Further details are available on the BODC web site (www.bodc.ac.uk).

The situation with older data is more varied, for some sites, the data have been reviewed and are available from the BODC databank. For others, work is still necessary to reformat from old data formats used on previous computers, visually inspect data, compile benchmark details, and check datum information. Some work has been carried out over the past year on some of the longer records. It is hoped that in the future a CD-ROM can be produced of the hourly values from the National Network. The attached table shows the sites which comprise the UK national network, and the time periods where data have been collected.

Data from the three GLOSS sites on the network, Newlyn (241), Stornoway (238) and Lerwick (236) are available online from the POL/BODC Web pages. These data are also included on the WOCE Sea Level CD-ROM. Each month, these data are also passed on to the WOCE 'fast-delivery' Data Assembly Centre.

Figure 1 Map of UK National Tide Gauge Network Sites

Site	Latitude	Longitude	Data available
Aberdeen	57 08'38.9"N	02 04'43.2"W	1930-1936, 1946-1958, 1960-1962, 1964-1965, 1967-1975, 1980-
Avonmouth	51 30'25.6"N	02 42'41.2"W	1961-1962, 1972-1976, 1979-1984, 1986
Bangor	54 39'54.0"N	05 40'09.0"W	1994-
Barmouth	52 43'08.4"N	04 02'37.3"W	1987, 1991-
Bournemouth	50 42'48.0"N	01 52'24.0"W	1996-
Cromer	52 56'02.0"N	01 18'12.5"E	1973-1974, 1976, 1982, 1988-
Devonport	50 22'04.2"N	04 11'02.8"W	1961-1962, 1967-68, 1987, 1991-
Dover	51 06'49.3"N	01 19'27.8"E	1924, 1926, 1928, 1930, 1934-36, 1938, 1958-
Felixstowe	51 57'25.9"N	01 20'54.0"E	1982, 1984, 1986-
Fishguard	52 00'45.8"N	04 58'58.0"W	1963-1971, 1973-
Heysham	54 02'01.3"N	02 54'44.5"W	1964-1969, 1971-
Hinkley Point	51 12'35.1"N	03 07'43.1"W	1990-
Holyhead	53 18'32.0"N	04 37 50.0"W	1964-1973, 1977-1985, 1987-1991, 1995-
Immingham	53 37'58.2"N	00 11'13.0"W	1968-1971, 1977-
Jersey	49 11'00.0"N	02 07'00.0"W	1992-
Kinlochbervie	58 27'25.9"N	05 02'58.5"W	1991-
Leith	55 59'23.3"N	03 10'49.5"W	1981, 1989-
Lerwick	60 09'16.4"N	01 08'18.1"W	1959-1978, 1980-
Liverpool	53 26'57.9"N	03 01'00.0"W	1991-
Llandudno	53 18'53.4"N	03 49'25.2"W	1971, 1994-
Lowestoft	52 28'20.9"N	01 45'06.4"E	1964-
Milford Haven	51 42'24.7"N	05 03'02.3"W	1953-1954, 1961-1962, 1964-1965, 1967-
Millport	55 44'58.9"N	04 54'16.8"W	1978, 1981-1983, 1985-
Moray Firth	57 35'58.3"N	04 00'02.2"W	1994-
Mumbles	51 34'11.0"N	03 58'25.2"W	1989-1993, 1997-
Newhaven	50 46'52.6"N	00 03'31.0"E	1982-1987, 1991-
Newlyn	50 06'08.4"N	05 32'30.6"W	1915-
Newport	51 32'58.7"N	02 59'09.6"W	1993-
North Shields	55 00'26.1"N	01 26'17.9"W	1946-1947, 1949-1956, 1961, 1965-1975, 1978-
Port Ellen	55 37'40.1"N	06 11'21.4"W	1979-1980, 1991-
Port Erin	54 05'07.2"N	04 46'00.9"W	1992-1995, 1998-
Portpatrick	54 50'32.7"N	05 07'08.0"W	1968-
Portrush	55 12'00.0"N	06 40'00.0"W	1995-
Portsmouth	50 48'01.3"N	01 06'36.6"W	1991-
Sheerness	51 26'42.4"N	00 44'41.9"E	1952, 1958, 1965-1975, 1980-
St Mary's	49 55'04.4"N	06 18'56.0"W	1994-
Stornoway	58 12'29.2"N	06 23'16.4"W	1976, 1978-1981, 1983, 1985-
Tobermory	56 37'23.3"N	06 03'47.3"W	1990-
Ullapool	57 53'43.8"N	05 09'24.5"W	1966-1968, 1970-1972, 1974-1980, 1981, 1983, 1985-
Weymouth	50 36'28.5"N	02 26'47.4"W	1989, 1991-
Whitby	54 29'23.7"N	00 36'45.4"W	1980-
Wick	58 26'28.8"N	03 05'05.7"W	1965-1970, 1972-
Workington	54 39'02.2"N	03 33'58.2"W	1992-

Table 1: UK National Tide Gauge Network Sites

Example of UK National Tide Gauge Network Web page

http://www.pol.ac.uk/tech/tgiweb/lowe/lowe1.htm