Whitby Harbour Tide Gauge

Location

OS: 489842E 511247N

WGS84: *Latitude:* 54° 29' 19.0731"N *Longitude:* 00° 36' 52.6886"W

Instrument Type

Valeport Tidemaster (Drück Pressure Transducer). The tide gauge transducer is fixed to a weighted stainless steel strop located in a stilling well.

Benchmarks

Benchmark	*Description*
TGBM = 4.453m above Ordnance Datum Newlyn	SW Bolt on mooring bollard adjacent to tide gauge, 50 mm above ground on fish quay outside Watch Keeper's Office (54° 29' 19.210"N, 000° 36' 52.620"W)

TGZ = 3.403 m below Ordnance Datum Newlyn

TGZ = 0.403 m below Chart Datum

TGZ = 7.856 m below TGBM

Datum

All data are to Ordnance Datum Newlyn. The height of Chart Datum relative to Ordnance Datum at Whitby is -3.00 m (Admiralty Tide Tables, Supplementary Table III).

Survey information

The site was surveyed on 05 September 2013.

Site characteristics

The tide gauge is located beneath the Fish Quay on the western side of the River Esk, 600 m from the Whitby Harbour entrance.

Data Quality

Recovery rate (%)	Sample interval
95	10 minutes

Service history

The gauge was first deployed on 8 May 2013 and is serviced at 6-monthly intervals.

Measurements

The pressure transducer samples at 8 Hz. Tidal elevations are derived every 1 minute, as the average of the 8 Hz readings over a 30 s burst. The time stamp is the start of the measuring burst. Data readings on the hour and at 10 minute intervals are transmitted.

Residuals and Elevations (OD and CD) for the whole year are shown in Figures 1 to 3 respectively.

Statistics

All times GMT

Month	Extreme maxima		Extreme minima	
	Elevation (OD)	Date/Time	Elevation (OD)	Date/Time
January	2.50	31-Jan-2014 03:50	-2.93	31-Jan-2014 22:40
February	3.09	02-Feb-2014 17:40	-2.93	01-Feb-2014 23:20
March	3.02	03-Mar-2014 17:20	-2.75	01-Mar-2014 22:20
April	2.82	01-Apr-2014 17:00	-2.40	15-Apr-2014 22:20
May	2.55	17-May-2014 05:20	-2.32	14-May-2014 21:50
June	2.67	16-Jun-2014 05:50	-2.47	15-Jun-2014 11:30
July	2.92	15-Jul-2014 05:40	-2.63	16-Jul-2014 12:50
August	3.15	13-Aug-2014 05:20	-2.72	12-Aug-2014 11:10
September	3.10	10-Sep-2014 04:20	-2.77	10-Sep-2014 10:40
October	3.14	09-Oct-2014 03:50	-2.44	08-Oct-2014 09:40
November	2.91	08-Nov-2014 04:20	-2.40	06-Nov-2014 09:20
December	2.92	23-Dec-2014 16:40	-2.44	26-Dec-2014 00:40

Month	Surge maxima		Surge minima	
	Value (m)	Date/Time	Value (m)	Date/Time
January	0.31	27-Jan-2014 08:50	-0.84	24-Jan-2014 21:00
February	0.45	24-Feb-2014 17:50	-0.67	13-Feb-2014 00:40
March	0.87	14-Mar-2014 23:30	-0.72	08-Mar-2014 15:40
April	0.46	18-Apr-2014 00:00	-0.29	16-Apr-2014 00:20
May	0.31	11-May-2014 13:10	-0.30	15-May-2014 00:00
June	0.29	19-Jun-2014 06:20	-0.19	17-Jun-2014 15:10
July	0.28	04-Jul-2014 23:40	-0.17	23-Jul-2014 17:50
August	0.39	10-Aug-2014 13:00	-0.32	03-Aug-2014 17:30
September	0.47	26-Sep-2014 12:30	-0.22	03-Sep-2014 16:30
October	1.06	21-Oct-2014 20:20	-0.38	22-Oct-2014 17:00
November	0.31	02-Nov-2014 17:10	-0.41	06-Nov-2014 20:50
December	0.78	10-Dec-2014 02:40	-0.93	09-Dec-2014 17:10

Month	Mean Level	
	No. of days	Elevation (OD)
January	16	0.151
February	28	0.301
March	31	0.256
April	30	0.271
May	31	0.226
June	30	0.257
July	31	0.304
August	31	0.324
September	30	0.319
October	31	0.426
November	30	0.376
December	31	0.387

Highest values in 2014			
Extreme		**Surge**	
Elevation (OD) *(Surge component)*	Date/Time	Value (m)	Date/Time
3.15 *(0.16)*	13-Aug-2014 05:20	1.06	21-Oct-2014 20:20
3.14 *(0.13)*	10-Oct-2014 04:30	0.95	21-Oct-2014 22:20
3.14 *(0.13)*	09-Oct-2014 03:50	0.87	14-Mar-2014 23:30
3.10 *(0.07)*	10-Sep-2014 04:20	0.83	14-Mar-2014 23:00
3.09 *(0.17)*	02-Feb-2014 17:40	0.78	10-Dec-2014 02:40
3.06 *(0.13)*	14-Aug-2014 06:00	0.78	10-Dec-2014 01:50
3.04 *(-0.04)*	11-Sep-2014 05:00	0.63	07-Mar-2014 22:50
3.03 *(0.11)*	12-Aug-2014 04:30	0.54	11-Dec-2014 00:10
3.02 *(0.12)*	03-Mar-2014 17:20	0.48	11-Dec-2014 04:10
2.96 *(0.07)*	02-Mar-2014 16:40	0.48	09-Mar-2014 06:10

Year	Annual extreme maxima		Annual surge maxima		Z_0 (OD)	Annual recovery rate
	Elevation (OD) *(Surge)*	Date/Time	Value (m)	Date/Time		
2014	3.15 *(0.31)*	13-Aug-2014 05:20	1.06	21-Oct-2014 20:20	-	95%

Tidal levels		
Observation period	January 2014 – July 2015	
Tide Level	Elevation (OD)	Elevation (CD)
HAT	3.14	6.14
MHWS	2.52	5.52
MHWN	1.41	4.41
MLWN	-0.79	2.21
MLWS	-1.91	1.09
LAT	-2.91	0.09

General

The time series of 10 minute tidal elevations for one year is quality-checked in accordance with ESEAS guidelines, flagged and archived. The archived time series is continuous and monotonic, with missing data given as 9999. The missing data shown are days where the entire 24 hours of data are missing.

Monthly extreme maxima/minima are the maximum and minimum water levels from all measured data for that month. Monthly surge maxima/minima (residuals) are calculated in a similar manner from the time series of residuals. Residuals are derived as the measured tidal elevation minus the predicted tidal elevation.

The monthly Mean Level is calculated as the average of all readings for the given month. The annual Z_0 is the value of Mean Sea Level derived by the harmonic analysis of the year's data. These values should not be used for any purpose without consideration of the recovery rate.

Acknowledgement

Tidal predictions were produced using the TASK windows edition software, kindly provided by the Marine Data Products team at the UK National Oceanography Centre (Liverpool).

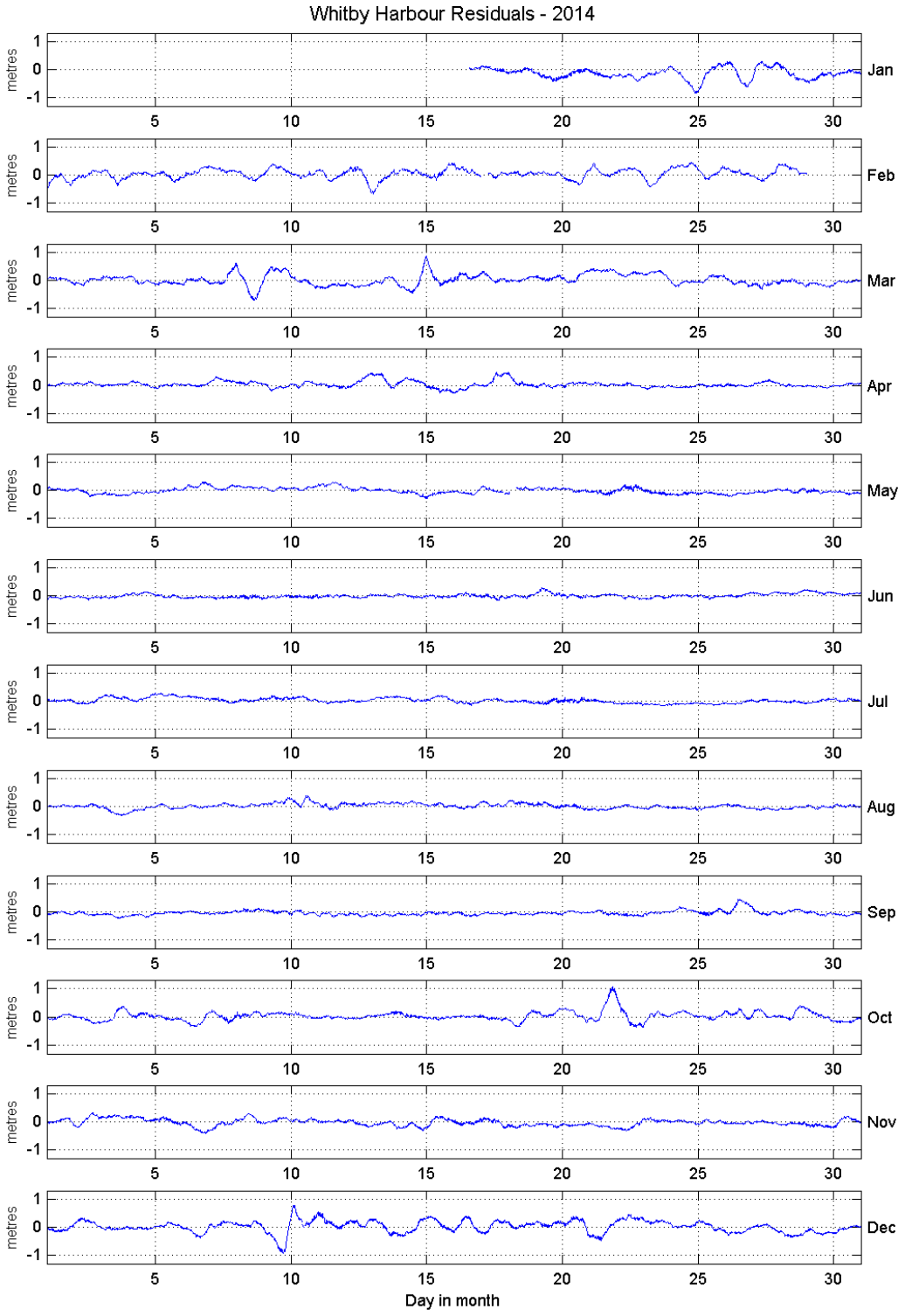

Figure 1: Whitby Harbour residuals for 2014

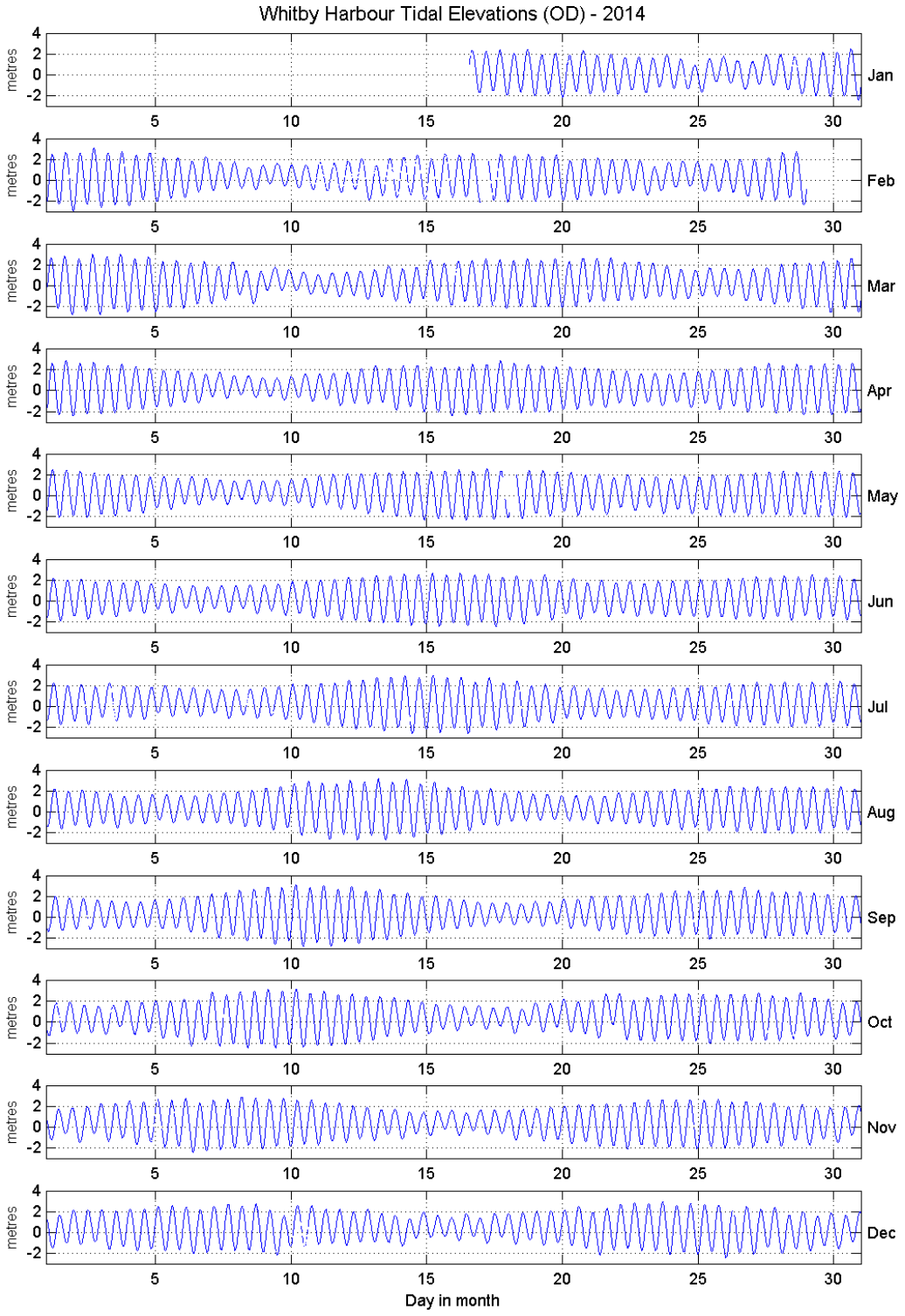

Figure 2: Whitby Harbour tidal elevations for 2014 relative to Ordnance Datum

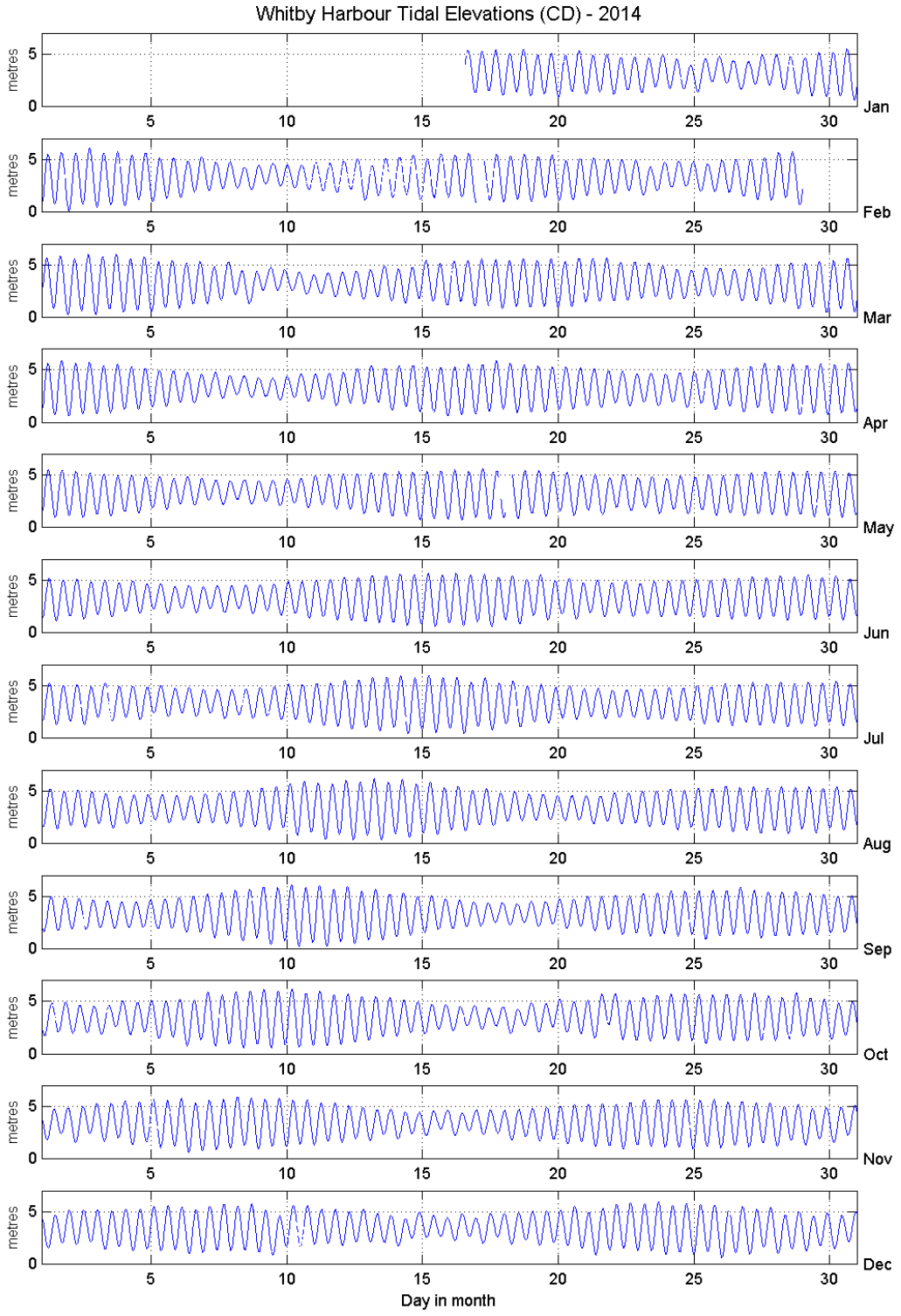

Figure 3: Whitby Harbour tidal elevations for 2014 relative to Chart Datum