

Whitby Harbour Tide Gauge

Location

OS: 489842E 511247N

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

Instrument

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 = 4.453 m 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
99	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 second 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	3.00	29-Jan-2016 19:30	-2.27	10-Jan-2016 22:20
February	3.05	10-Feb-2016 17:00	-2.56	12-Feb-2016 00:20
March	2.89	09-Mar-2016 16:10	-3.02	10-Mar-2016 23:30
April	3.01	09-Apr-2016 17:20	-2.75	08-Apr-2016 23:00
May	2.92	07-May-2016 16:10	-2.53	08-May-2016 23:20
June	2.61	06-Jun-2016 16:50	-2.46	06-Jun-2016 10:40
July	2.68	05-Jul-2016 04:10	-2.37	06-Jul-2016 11:10
August	3.00	21-Aug-2016 05:30	-2.39	22-Aug-2016 12:30
September	3.15	19-Sep-2016 05:10	-2.63	18-Sep-2016 11:00
October	3.10	18-Oct-2016 04:50	-2.69	17-Oct-2016 10:40
November	3.11	16-Nov-2016 16:50	-2.42	14-Nov-2016 09:20
December	2.92	15-Dec-2016 04:10	-2.38	15-Dec-2016 23:10

Month	Surge maxima		Surge minima	
	Value (m)	Date/Time	Value (m)	Date/Time
January	1.12	29-Jan-2016 21:30	-0.60	26-Jan-2016 13:50
February	0.66	01-Feb-2016 19:30	-0.60	16-Feb-2016 15:10
March	0.40	02-Mar-2016 04:30	-0.43	01-Mar-2016 08:30
April	0.53	25-Apr-2016 13:00	-0.31	01-Apr-2016 18:50
May	0.32	05-May-2016 23:50	-0.31	02-May-2016 08:00
June	0.28	20-Jun-2016 16:00	-0.21	19-Jun-2016 23:20
July	0.32	16-Jul-2016 10:00	-0.27	15-Jul-2016 19:30
August	0.61	08-Aug-2016 11:30	-0.26	11-Aug-2016 01:40
September	0.52	10-Sep-2016 11:50	-0.42	27-Sep-2016 12:30
October	0.37	28-Oct-2016 11:00	-0.32	16-Oct-2016 03:50
November	0.55	15-Nov-2016 11:20	-0.63	12-Nov-2016 02:50
December	1.34	26-Dec-2016 21:10	-0.77	23-Dec-2016 15:20

Month	Mean Level	
	No. of days	Elevation (OD)
January	30	0.334
February	29	0.363
March	29	0.211
April	30	0.295
May	28	0.288
June	30	0.269
July	30	0.306
August	31	0.316
September	30	0.377
October	30	0.313
November	30	0.395
December	30	0.416

Highest values in 2016			
Extreme		Surge	
Elevation (OD) (Surge component)	Date/Time	Value (m)	Date/Time
3.15 (0.13)	19-Sep-2016 05:10	1.34	26-Dec-2016 21:10
3.11 (0.29)	16-Nov-2016 16:50	1.26	26-Dec-2016 21:40
3.10 (0.00)	18-Oct-2016 04:50	1.15	26-Dec-2016 19:30
3.07 (0.18)	17-Nov-2016 05:10	1.12	29-Jan-2016 21:30
3.05 (0.28)	10-Feb-2016 17:00	0.98	24-Dec-2016 04:50
3.04 (0.19)	15-Nov-2016 16:00	0.92	27-Jan-2016 02:50
3.04 (0.05)	19-Oct-2016 05:30	0.91	25-Dec-2016 23:00
3.03 (0.58)	08-Feb-2016 15:40	0.86	27-Jan-2016 02:10
3.02 (0.03)	15-Nov-2016 03:50	0.79	24-Dec-2016 08:50
3.01 (0.07)	09-Apr-2016 17:20	0.79	25-Dec-2016 21:20

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%
2015	3.18 (0.31)	21-Feb-2015 17:40	1.18	13-Nov-2015 12:10	-	98%
2016	3.15 (0.13)	19-Sep-2016 05:10	1.34	26-Dec-2016 21:10	-	99%

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 Z₀ 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.

Acknowledgements

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). Tide levels were produced by Fugro EMU Limited.

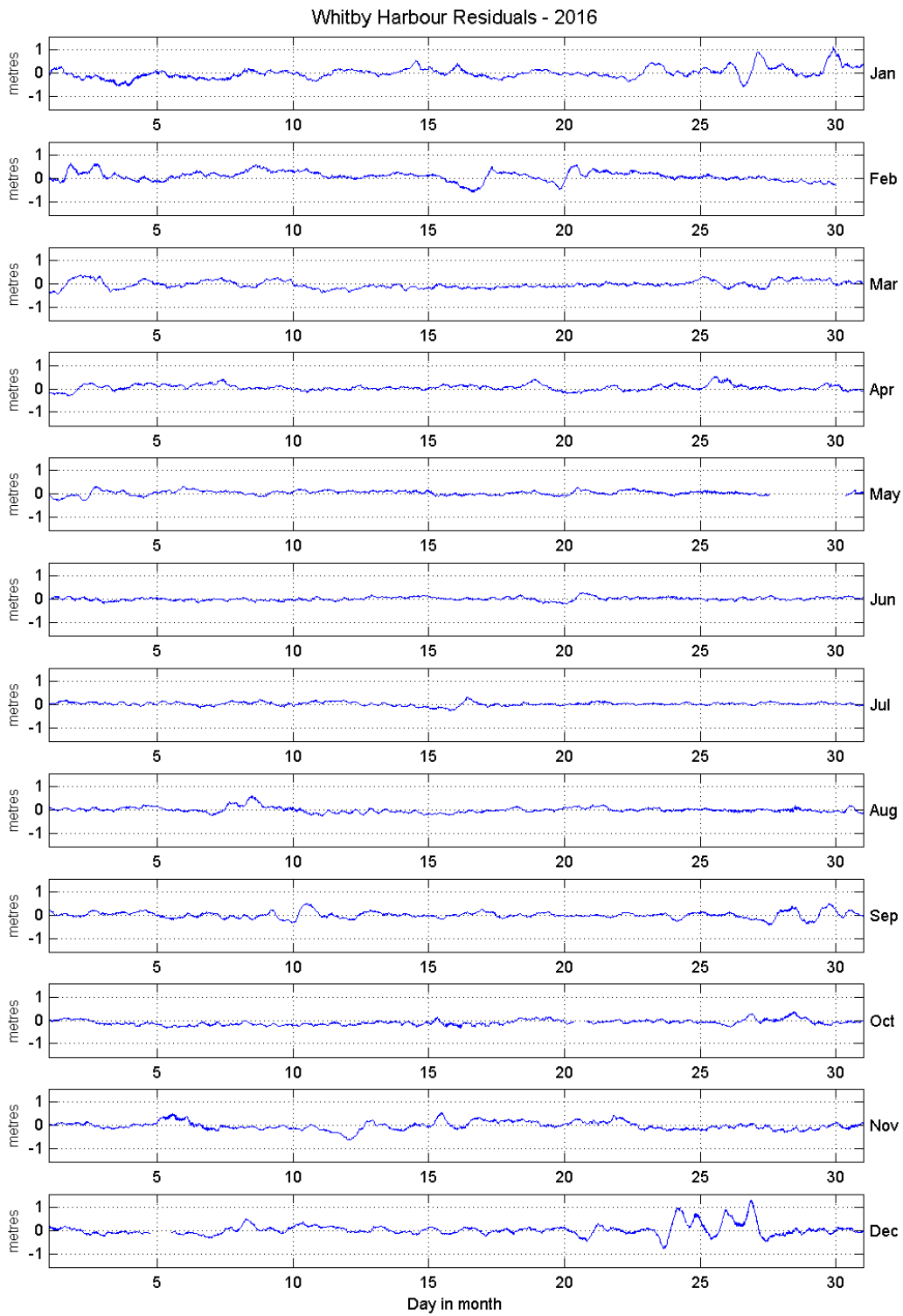


Figure 1: Whitby Harbour residuals for 2016

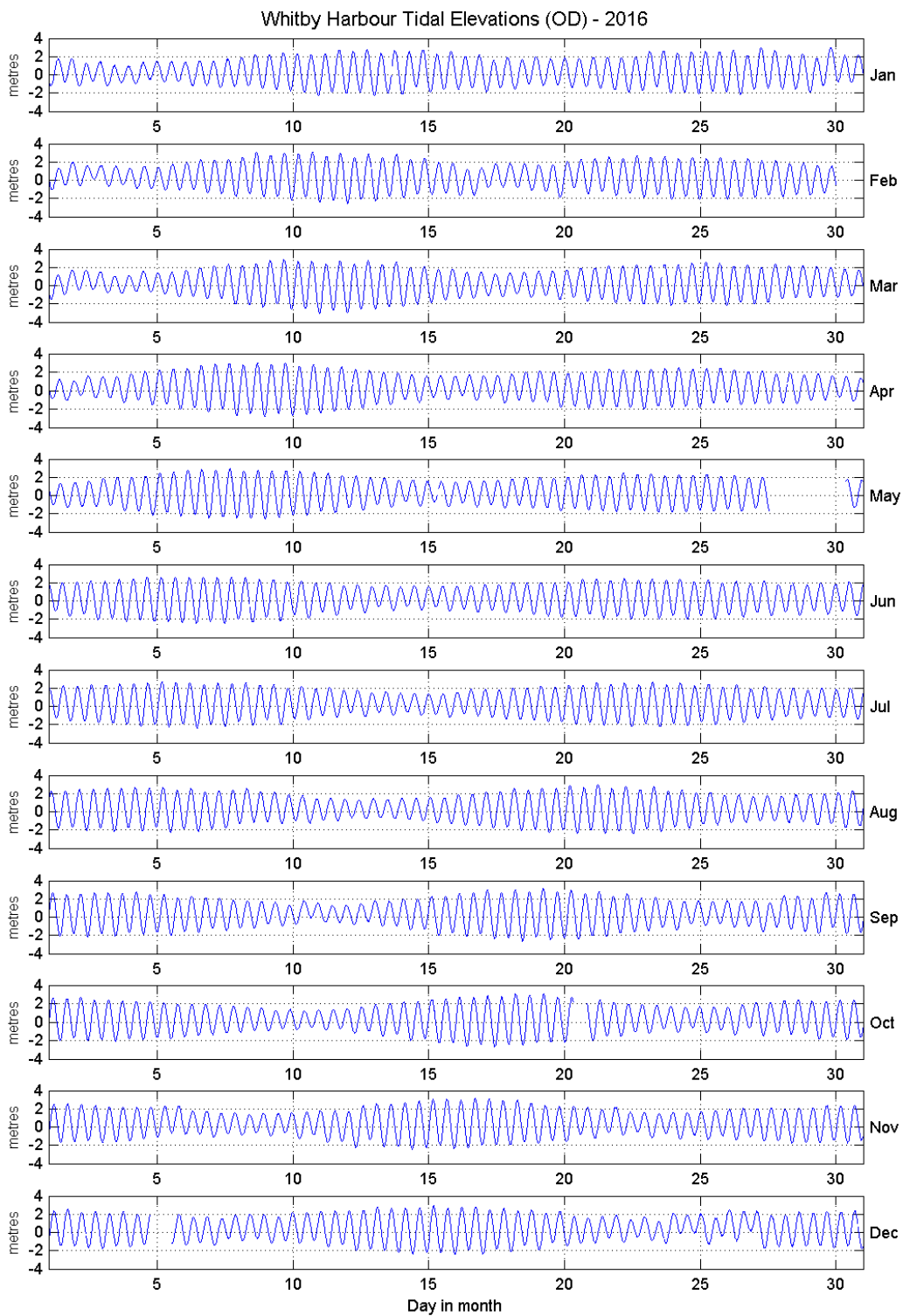


Figure 2: Whitby Harbour tidal elevations for 2016 relative to Ordnance Datum

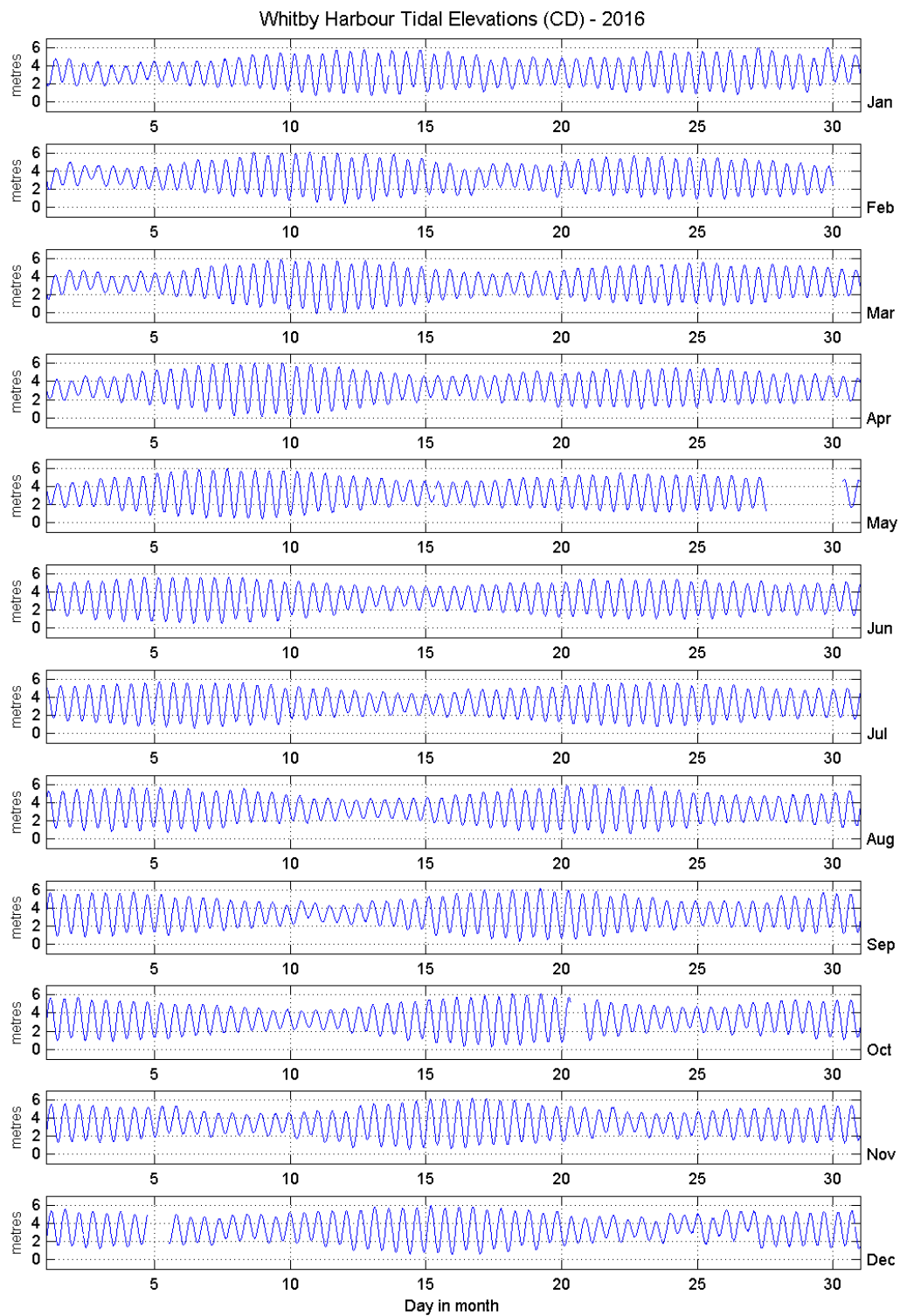


Figure 3: Whitby Harbour tidal elevations for 2016 relative to Chart Datum