

Severn Bridge Tide Gauge

Location

OS: 351580E 185927N
 WGS84: *Latitude: 51° 34.207' N Longitude: 02° 42.001' W*
 Mid-span of Second Severn Crossing

Instrument Type

Rosemount WaveRadar REX

Security considerations mean that no photographs of the tide gauge installation on the Severn Bridge may be made public.

Benchmarks

TGBM = 50.459 above Ordnance Datum Newlyn
 TGZ = 47.984m above Ordnance Datum Newlyn
 TGZ = 54.484 above Chart Datum
 TGZ = 2.475 below TGBM

Datum

All data are to Ordnance Datum Newlyn. The height of Chart Datum relative to Ordnance Datum at Avonmouth and Sudbury is -6.50m (Admiralty Tide Tables, Supplementary Table III).

Survey information

The site was surveyed on 29 May 2008, using a 25 hour occupation to account for tidal loading.

Site characteristics

The Bristol Channel/Severn estuary experiences large tides and strong tidal currents mid-stream. Spring tidal range is approx. 11.6m.

Data Quality

Recovery rate (%)	Sample interval
99	10 minutes

Service history

The REX became operational on 01 August 2011. It was last serviced in October 2012. No re-calibration of the instrument is required.

Measurements

Residuals and Elevations (OD and CD) for the whole year are shown in Figures 1 to 3 respectively. It should be noted that, given the very large tidal range at this site, tidal predictions are particularly difficult, both for elevation and especially for timing. Accordingly, there may be instances of apparent tidal surge and/or periodicity in the surge which are, in reality, an artefact of the predictions.

Statistics*All times GMT*

Month	Extreme maxima		Extreme minima	
	Elevation (OD)	Date/Time	Elevation (OD)	Date/Time
January	7.13	24-Jan-2012 08:00	-5.80	24-Jan-2012 02:50
February	7.05	10-Feb-2012 09:00	-6.40	11-Feb-2012 04:40
March	7.56	10-Mar-2012 08:40	-6.62	11-Mar-2012 04:30
April	7.84	09-Apr-2012 09:00	-6.33	08-Apr-2012 03:20
May	7.74	07-May-2012 20:20	-6.23	07-May-2012 02:50
June	7.39	05-Jun-2012 20:00	-6.02	05-Jun-2012 02:30
July	7.33	05-Jul-2012 20:40	-5.93	07-Jul-2012 04:40
August	7.45	03-Aug-2012 20:20	-5.92	20-Aug-2012 16:10
September	7.70	17-Sep-2012 20:10	-6.11	19-Sep-2012 04:10
October	8.15	17-Oct-2012 08:10	-6.07	17-Oct-2012 03:10
November	7.49	15-Nov-2012 20:20	-6.12	14-Nov-2012 14:30
December	7.78	15-Dec-2012 08:20	-5.90	14-Dec-2012 02:30

Month	Surge maxima		Surge minima	
	Value (m)	Date/Time	Value (m)	Date/Time
January	1.62	03-Jan-2012 05:40	-0.91	28-Jan-2012 05:10
February	0.63	22-Feb-2012 16:20	-1.07	02-Feb-2012 04:00
March	0.76	10-Mar-2012 02:40	-1.10	04-Mar-2012 22:20
April	1.10	10-Apr-2012 03:30	-1.38	29-Apr-2012 11:10
May	0.87	10-May-2012 03:50	-0.90	15-May-2012 21:10
June	1.32	08-Jun-2012 06:00	-0.91	04-Jun-2012 01:50
July	0.73	12-Jul-2012 21:20	-0.74	07-Jul-2012 04:50
August	0.81	18-Aug-2012 03:50	-0.80	14-Aug-2012 10:40
September	0.90	18-Sep-2012 02:40	-1.04	12-Sep-2012 23:20
October	1.18	17-Oct-2012 14:40	-0.86	11-Oct-2012 09:20
November	1.14	22-Nov-2012 17:30	-0.70	27-Nov-2012 13:20
December	1.16	14-Dec-2012 18:00	-0.85	08-Dec-2012 07:50

Month	Mean Level	
	No. of days	Elevation (OD)
January	30	0.302
February	29	0.128
March	29	0.123
April	30	0.298
May	30	0.264
June	29	0.389
July	30	0.364
August	31	0.398
September	30	0.385
October	30	0.457
November	30	0.472
December	30	0.487

Highest values in 2012			
Extreme		Surge	
Elevation (OD) (Surge component)	Date/Time	Value (m)	Date/Time
8.15 (0.80)	17-Oct-2012 08:10	1.62	03-Jan-2012 05:40
8.06 (0.82)	17-Oct-2012 20:30	1.32	08-Jun-2012 06:00
7.94 (0.54)	16-Oct-2012 07:30	1.18	17-Oct-2012 14:40
7.86 (0.42)	16-Oct-2012 19:50	1.16	14-Dec-2012 18:00
7.84 (0.60)	09-Apr-2012 09:00	1.14	22-Nov-2012 17:30
7.80 (0.73)	18-Oct-2012 08:50	1.12	14-Dec-2012 16:30
7.79 (0.35)	08-Apr-2012 08:20	1.11	08-Jun-2012 06:50
7.79 (0.70)	09-Apr-2012 21:20	1.10	10-Apr-2012 03:30
7.78 (0.66)	15-Dec-2012 08:20	1.05	31-Oct-2012 16:10
7.78 (0.38)	08-Apr-2012 20:40	0.99	09-Apr-2012 15:20

Year	Annual extreme maxima		Annual surge maxima		Z ₀ (OD)	Annual recovery rate
	Elevation (OD) (Surge)	Date/Time	Value (m)	Date/Time		
2011	7.89 (-)	29-Sep-2011 20:40	-	-	-	59%
2012	8.15 (0.80)	17-Oct-2012 08:10	1.62	03-Jan-2012 05:40	0.340	99%

Tidal levels		
Observation period	August 2011 to December 2012	
Tide Level	Elevation (OD)	Elevation (CD)
HAT	8.07	14.57
MHWS	6.14	12.64
MHWN	3.11	9.61
MSL	0.34	6.84
MLWN	-2.44	4.06
MLWS	-5.46	1.04
LAT	-6.90	-0.40

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 TASK2000 software, kindly provided by the Permanent Service for Mean Sea Level (PSMSL), Proudman Oceanographic Laboratory. Tide levels were produced by Fugro EMU Limited. The WaveRadar REX is installed on the Severn Bridge by kind permission of Second Severn Crossing Partnership.

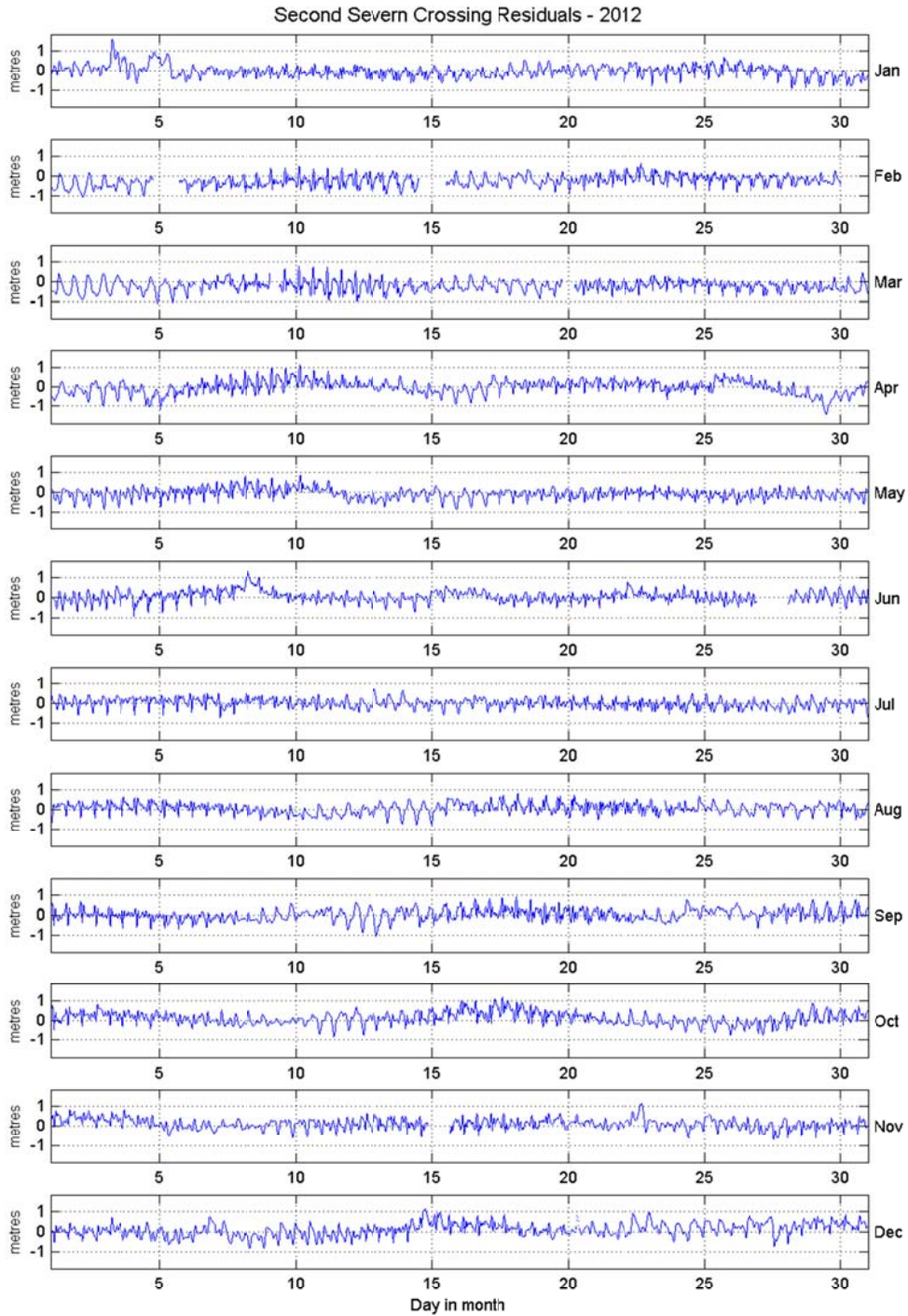


Figure 1: Severn Bridge residuals for 2012

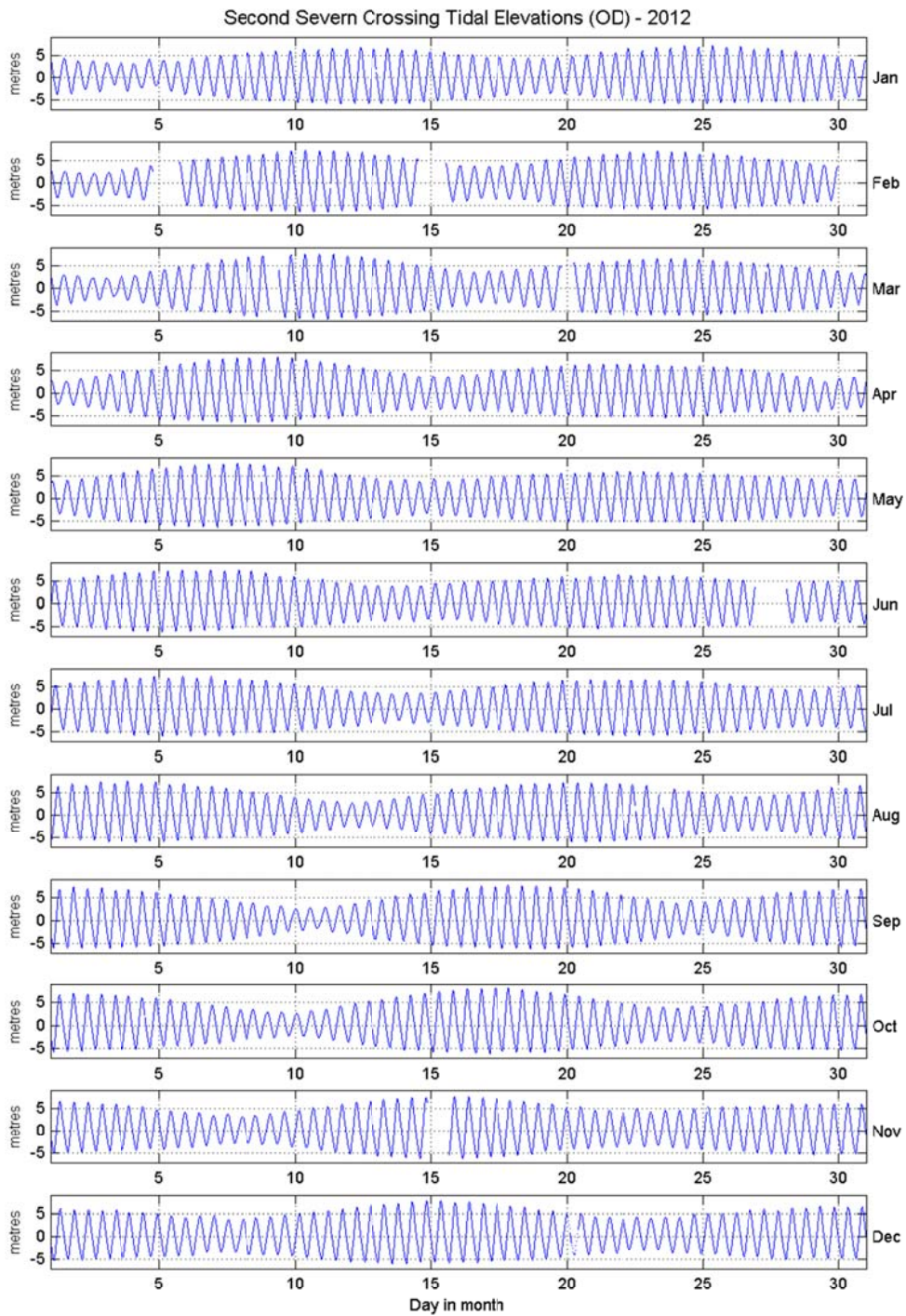


Figure 2: Severn Bridge tidal elevations for 2012 relative to Ordnance Datum

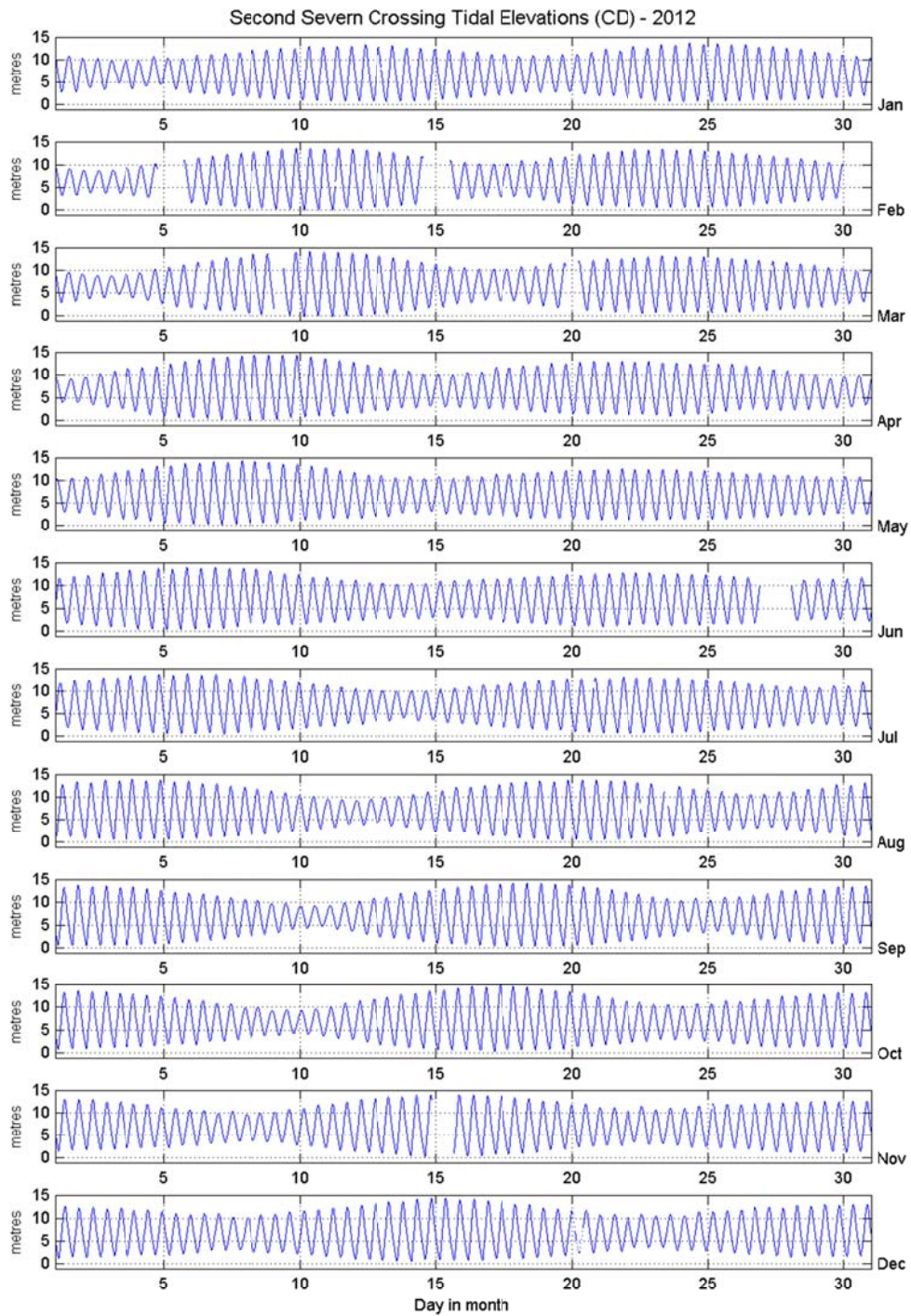


Figure 3: Severn Bridge tidal elevations for 2012 relative to Chart Datum