



## West Bay Directional Waverider Buoy

<b>Location</b>			
OS	347096 E 88467 N		
WGS84	Latitude: 50° 41.61' N Longitude: 02° 45.02' W		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~10m CD	Buoy in situ off West Bay. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Image ©2016 Getmapping plc)

## Data Quality

<b>Recovery rate (%)</b>	<b>Sample interval</b>
100	30 minutes

## Monthly Averages - 2016

All times are GMT

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	1.68	9.2	5.1	209	10.2	20	31
February	1.29	9.4	5.3	206	9.6	13	29
March	0.85	9.9	5.0	205	8.7	4	31
April	0.75	8.7	4.5	213	10.1	5	30
May	0.50	8.2	4.2	209	12.2	0	31
June	0.58	7.3	4.3	209	14.4	0	30
July	0.62	5.9	3.6	210	16.6	3	31
August	0.68	6.8	4.0	206	17.7	2	31
September	0.78	7.4	4.3	211	18.2	3	30
October	0.60	7.9	4.4	191	15.3	1	31
November	0.75	7.6	4.4	196	12.6	2	30
December	0.87	9.9	5.0	204	10.3	11	31

## Monthly Averages - All Years (November 2006 – December 2015)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.22	9.5	5.0	208	8.7	12
February	1.06	10.5	5.2	207	7.9	11
March	0.81	9.6	4.7	206	8.3	6
April	0.66	8.9	4.5	205	9.9	3
May	0.65	7.4	4.1	205	12.1	1
June	0.64	7.5	4.1	206	14.5	1
July	0.69	6.5	3.9	210	16.5	1
August	0.72	6.5	3.9	211	17.4	1
September	0.66	7.5	4.1	204	16.8	1
October	0.93	7.9	4.5	206	15.2	5
November	1.14	8.4	4.8	208	12.7	8
December	1.29	8.9	5.0	209	9.9	12

## Storm Analysis

Date/Time	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	Water level elevation* (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
28-Mar-2016 03:30	5.54	10.0	7.5	205	-	~HW +5	-	~0.8	~1.04
06-Feb-2016 19:00	5.12	11.1	7.5	214	-	~HW -3	-	-	-
02-Jan-2016 10:00	4.98	14.3	8.9	208	~1.37	~HW -1	-	~0.43	~0.65
20-Nov-2016 03:00	4.64	10.0	7.3	181	~0.185	~HW +5	~1.68	~0.83	~0.84

\* Tidal information is obtained from the step gauge at West Bay Harbour. The surge shown is the residual at the time of the highest H<sub>s</sub>. The maximum tidal surge is the largest surge during the storm event.

## Annual Statistics

Year	Annual H <sub>s</sub> exceedance** (m)						Annual Maximum H <sub>s</sub>	
	0.05%	0.5%	1%	2%	5%	10%	Date	A <sub>max</sub> (m)
2007	4.70	3.69	3.30	2.91	2.45	2.03	06-Mar-2007 02:30	5.61 <sup>+</sup>
2008	4.73	3.60	3.16	2.74	2.20	1.71	10-Mar-2008 13:30	5.05
2009	4.85	3.59	3.29	2.92	2.30	1.83	14-Nov-2009 15:30	6.00 <sup>+</sup>
2010	4.00	2.95	2.66	2.37	1.82	1.46	11-Nov-2010 09:00	4.29
2011	4.34	3.10	2.82	2.44	2.04	1.67	13-Dec-2011 01:00	4.84
2012	4.83	3.39	2.97	2.59	2.17	1.71	03-Jan-2012 11:00	5.55
2013	5.19	3.72	3.29	2.88	2.27	1.81	24-Dec-2013 01:00	6.42 <sup>+</sup>
2014	6.05	4.17	3.77	3.16	2.48	2.01	05-Feb-2014 11:30	7.08 <sup>+</sup>
2015	4.76	3.47	3.22	2.94	2.49	2.06	15-Jan-2015 02:30	6.24
2016	4.80	3.68	3.21	2.61	2.06	1.61	28-Mar-2016 03:30	5.54 <sup>+</sup>

\*\* i.e. 5 % of the H<sub>s</sub> values measured in 2007 exceeded 2.45 m

<sup>+</sup>Note that waves were breaking at the buoy for several hours during this storm; where breaking waves were clearly present in the measured time series, the parameters have been omitted. Accordingly, there may have been short periods where measured significant wave heights exceeded this value.

## Significant wave height return periods

Return periods for significant wave height can be calculated since the buoy has been deployed for more than 5 years. The return periods are based on 0.5-hourly and 3-hourly records and are calculated for periods up to 10 times the record length, using a Weibull distribution.

0.5-hourly records November 2006 – December 2016		
Return period (years)	Significant wave height (m)	Comments
1	6.2	Depth-limited at HAT
2	6.6	
5	7.0	
10	7.3	
20	7.6	
50	8.1	
100	8.4	

3-hourly records November 2006 – December 2016		
Return period (years)	Significant wave height (m)	Comments
1	5.5	Depth-limited at MHWS
2	5.9	Depth-limited at HAT
5	6.4	
10	6.9	
20	7.3	
50	7.8	
100	8.2	

## Distribution plots

The distribution of wave parameters are shown in the accompanying graphs of:

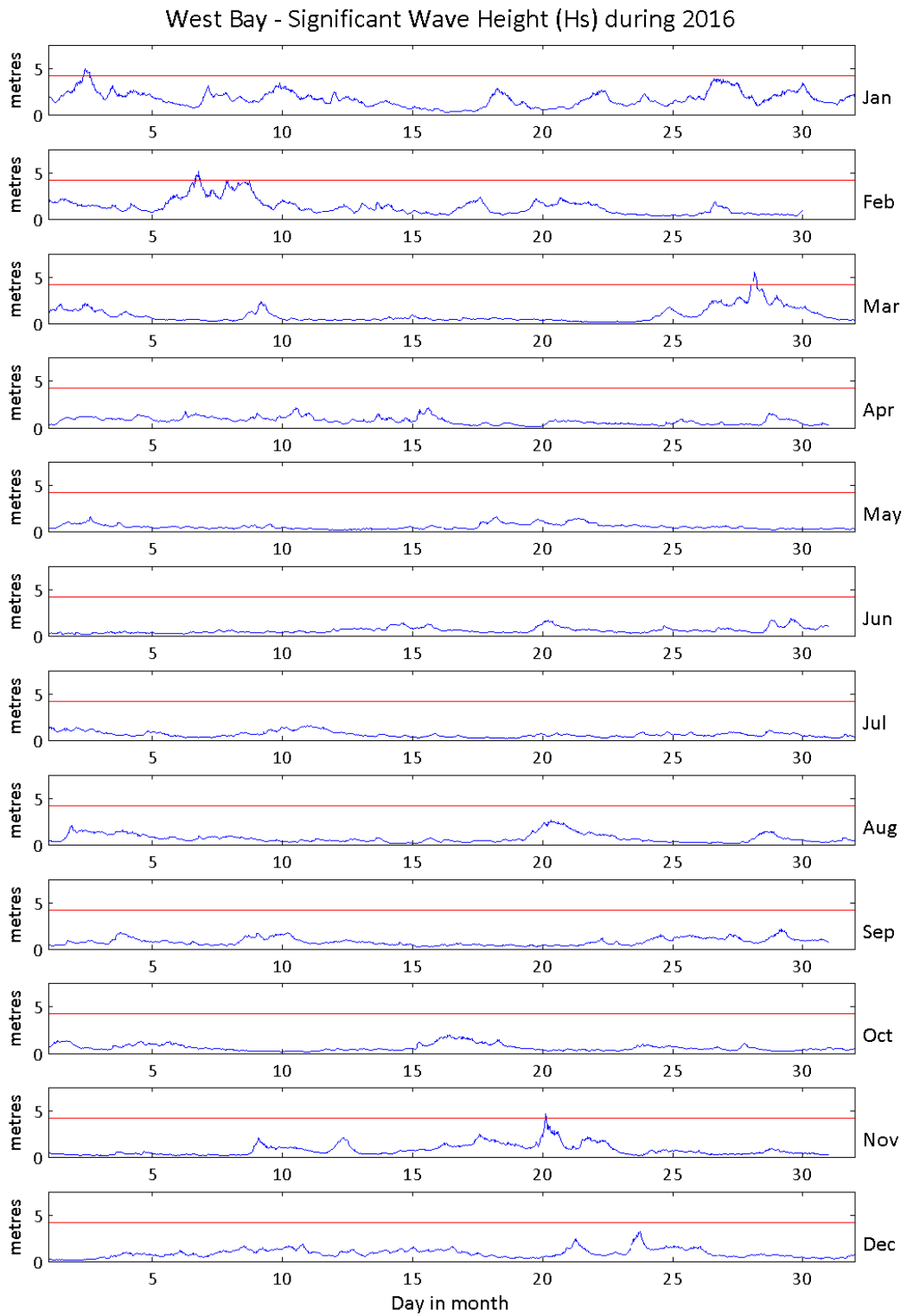
- Annual time series of  $H_s$  (red line is 4.2 m storm threshold)
- Incidence of storm waves for 2016. Storm events are defined using the Peaks-over-Threshold method. The highest  $H_s$  of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of  $H_s$ ,  $T_p$ ,  $T_z$  and Direction for 2016
- Joint distribution of all parameters for all measured data, given as percentage of occurrence
- Wave rose (percentage of occurrence of direction vs.  $H_s$ ) for all measured data

## General

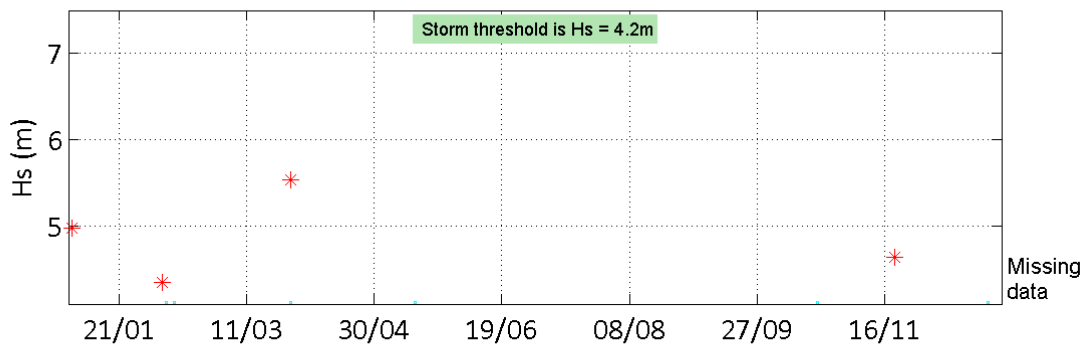
The buoy, owned by Teignbridge District Council, was first deployed on 19 November 2006, at which time the magnetic declination at the site was 3.0° west, changing by 0.15° east per year.

## Acknowledgements

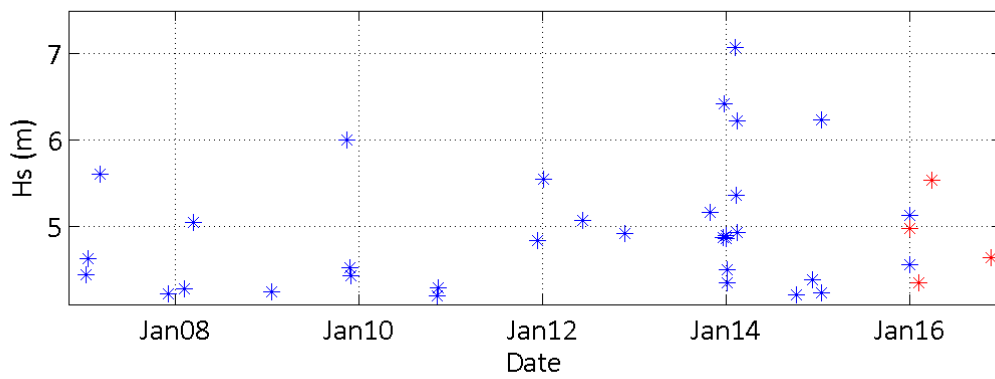
Tidal predictions were produced using the TASK windows edition software, kindly provided by the Marine Data Products team at the UK National Oceanography Centre (Liverpool).



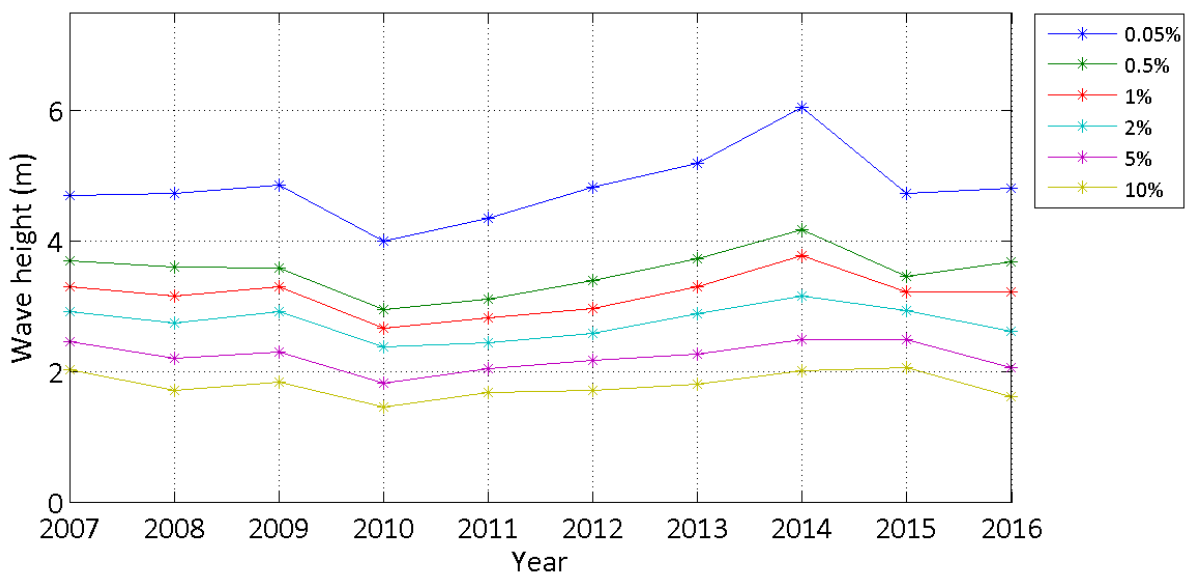
Storms at West Bay during 2016



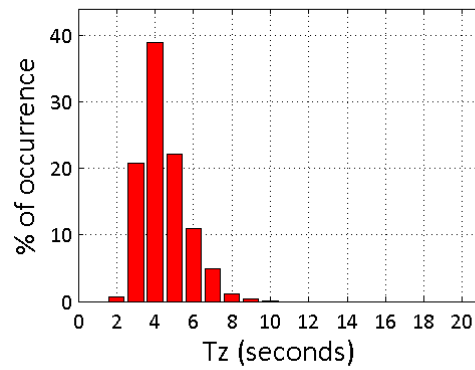
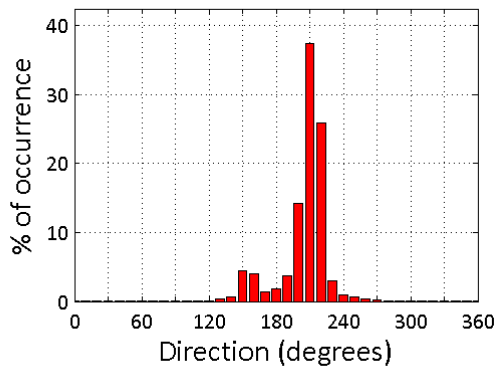
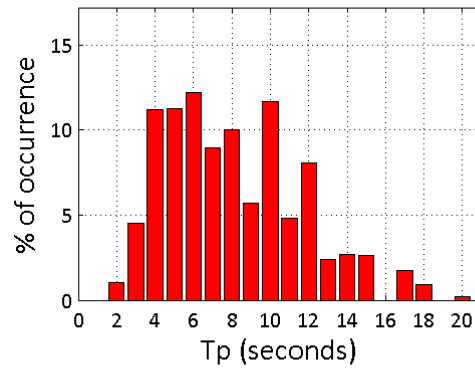
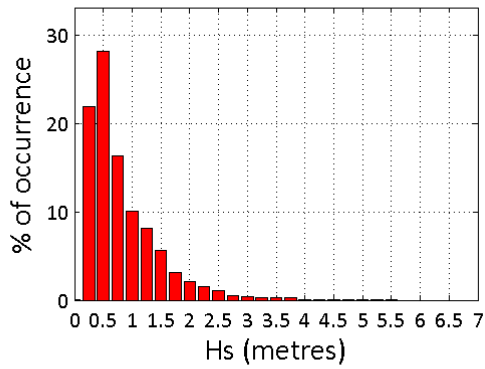
Storms at West Bay - all years



West Bay - Wave height exceedance ( $H_s$ )



West Bay 2016



West Bay 2006 to 2016 - Joint distribution (% of occurrence)

