



Weston Bay Directional Waverider Buoy

Location			
OS	329025 E 161957 N		
WGS84	Latitude: 51° 21.13' N Longitude: 03° 01.23' W		
Instrument type		Buoy in situ in Weston Bay. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Image ©2016 TerraMetrics)
Datawell Directional Waverider Mk III			
Water depth	~13m CD		

Data Quality

Recovery rate (%)	Sample interval
30	30 minutes

Monthly Averages - 2009

All times are GMT

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	-	-	-	-	-	-	-
February	-	-	-	-	-	-	-
March	-	-	-	-	-	-	-
April	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-
June	-	-	-	-	-	-	-
July	-	-	-	-	-	-	-
August	-	-	-	-	-	-	-
September	0.30	3.6	2.9	199	16.4	-	20
October	0.32	4.4	3.1	234	14.7	0	31
November	0.77	5.1	3.6	241	11.6	0	29
December	0.43	4.3	3.2	206	7.5	0	30

Monthly Averages - All Years (September 2009 – December 2019)

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	0.46	4.9	3.3	232	6.6	0
February	0.43	4.9	3.3	227	6.0	0
March	0.38	4.8	3.2	219	7.0	0
April	0.33	4.5	3.1	224	9.5	0
May	0.38	4.3	3.1	228	12.6	0
June	0.39	4.3	3.1	231	16.2	0
July	0.39	4.3	3.0	244	18.7	0
August	0.43	4.5	3.1	246	18.8	0
September	0.41	4.5	3.1	235	17.2	0
October	0.41	4.4	3.1	225	14.7	0
November	0.47	4.7	3.3	224	11.3	0
December	0.50	4.9	3.4	237	8.0	0

Storm Analysis

Date/Time	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	Water level elevation* (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
14-Nov-2009 15:00:00	2.42	6.7	4.7	264	4.74	HW -2	8.53	0.34	1.21
22-Nov-2009 22:30:00	2.40	5.9	4.9	263	4.96	HW +1	6.65	0.48	0.71

* Tidal information is obtained from the National Network gauge at Hinkley Point. The surge shown is the residual at the time of the highest H_s. The maximum tidal surge is the largest surge during the storm event.

Annual Statistics

Year	Annual H _s exceedance** (m)						Annual Maximum H _s	
	0.05%	0.5%	1%	2%	5%	10%	Date	A _{max} (m)
2009	2.38	1.71	1.59	1.42	1.20	1.02	14-Nov-2009 15:00:00	2.42
2010	2.28	1.44	1.22	1.07	0.85	0.69	11-Nov-2010 23:30:00	2.77
2011	1.85	1.64	1.51	1.35	1.13	0.93	13-Dec-2011 06:30:00	2.04
2012	2.15	1.69	1.48	1.27	1.01	0.84	05-Jan-2012 05:30:00	2.33
2013	1.81	1.46	1.37	1.24	1.03	0.83	02-Nov-2013 18:30:00	2.16
2014	2.22	1.82	1.58	1.37	1.07	0.86	15-Feb-2014 02:00:00	2.86
2015	2.32	1.80	1.63	1.44	1.18	0.98	17-Nov-2015 21:00:00	2.61
2016	2.25	1.67	1.46	1.28	1.04	0.86	08-Feb-2016 15:30:00	2.32
2017	2.07	1.72	1.55	1.36	1.09	0.90	13-Sep-2017 01:00:00	2.64
2018	1.97	1.64	1.43	1.25	0.99	0.79	18-Jan-2018 02:30:00	2.13
2019	2.28	1.87	1.61	1.42	1.13	0.90	27-Apr-2019 07:00:00	2.41

** i.e. 5 % of the H_s values measured in 2009 exceeded 1.20 m

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 records and are calculated for periods up to 10 times the record length using a peaks-over-threshold method and Generalised Pareto Distribution (GPD).

Observation period	September 2009 to December 2019	
Return period (years)	Significant wave height (m)	Comments
0.25	1.91	No depth-limitation
1	2.33	
2	2.47	
5	2.61	
10	2.70	
20	2.76	
50	2.82	
100	2.86	

Distribution plots

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

- Annual time series of H_s (red line is 1.91 m storm threshold)
- Incidence of storm waves for 2009. 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 2009
- Wave rose (percentage of occurrence of direction vs. H_s) for all measured data
- Joint distribution of all parameters for all measured data, given as percentage of occurrence

General

The buoy, owned by Teignbridge District Council, was first deployed on 10 September 2009, at which time the magnetic declination at the site was 2.8° west, changing by 0.15° east per year.

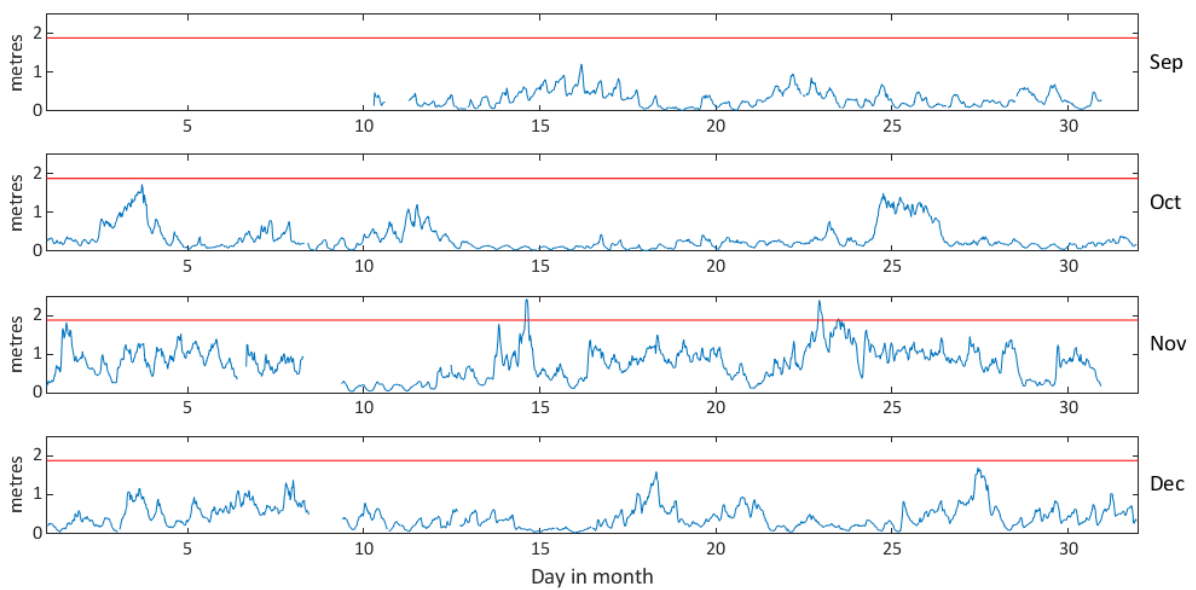
There is a notable tidal signature to significant wave heights at this location, given the water depth of the buoy (~13 m CD) and the spring tidal range (~10.9 m).

Acknowledgements

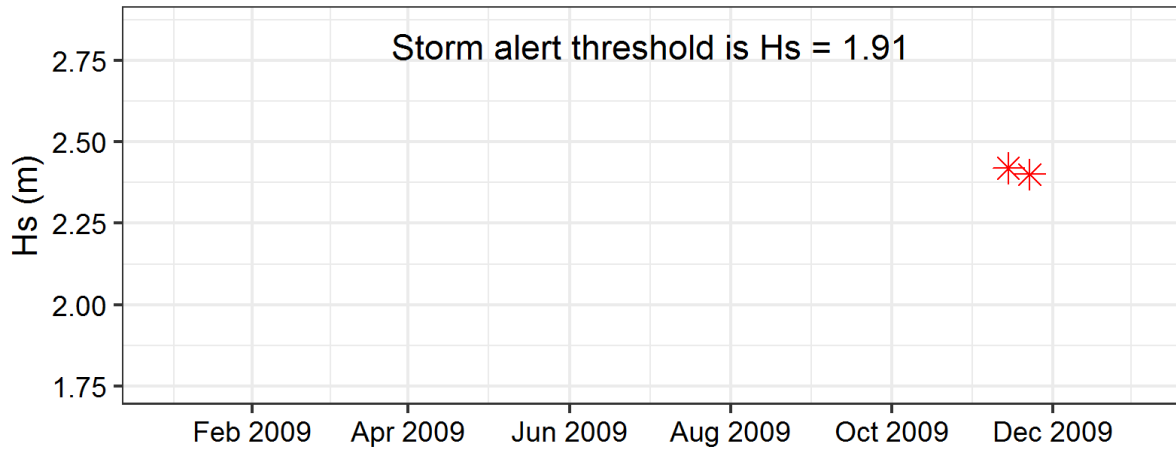
The shore station is kindly hosted by the beach office, Marine Parade.

Tidal data at Hinkley Point were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.

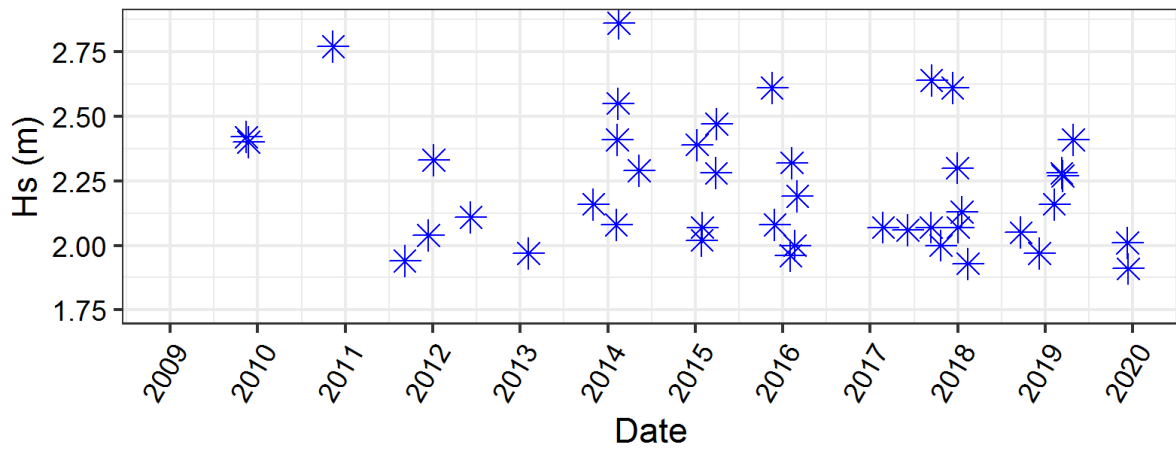
Weston Bay - Significant Wave Height (Hs) during 2009



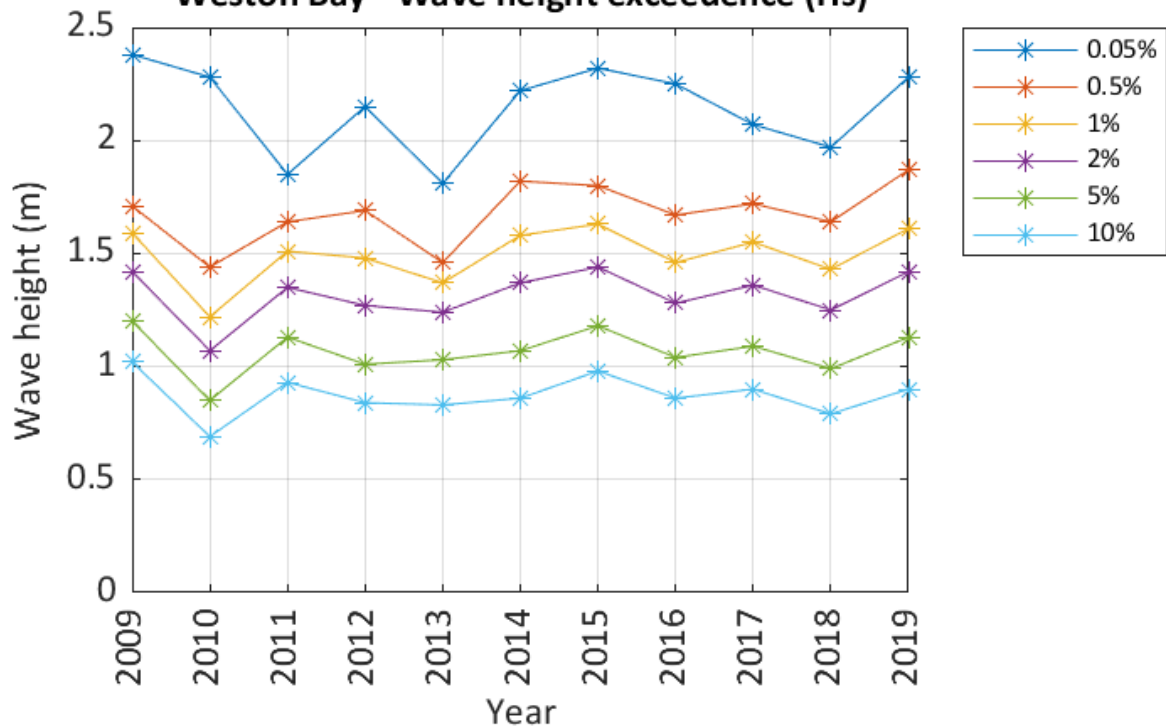
Storms at Weston Bay during 2009



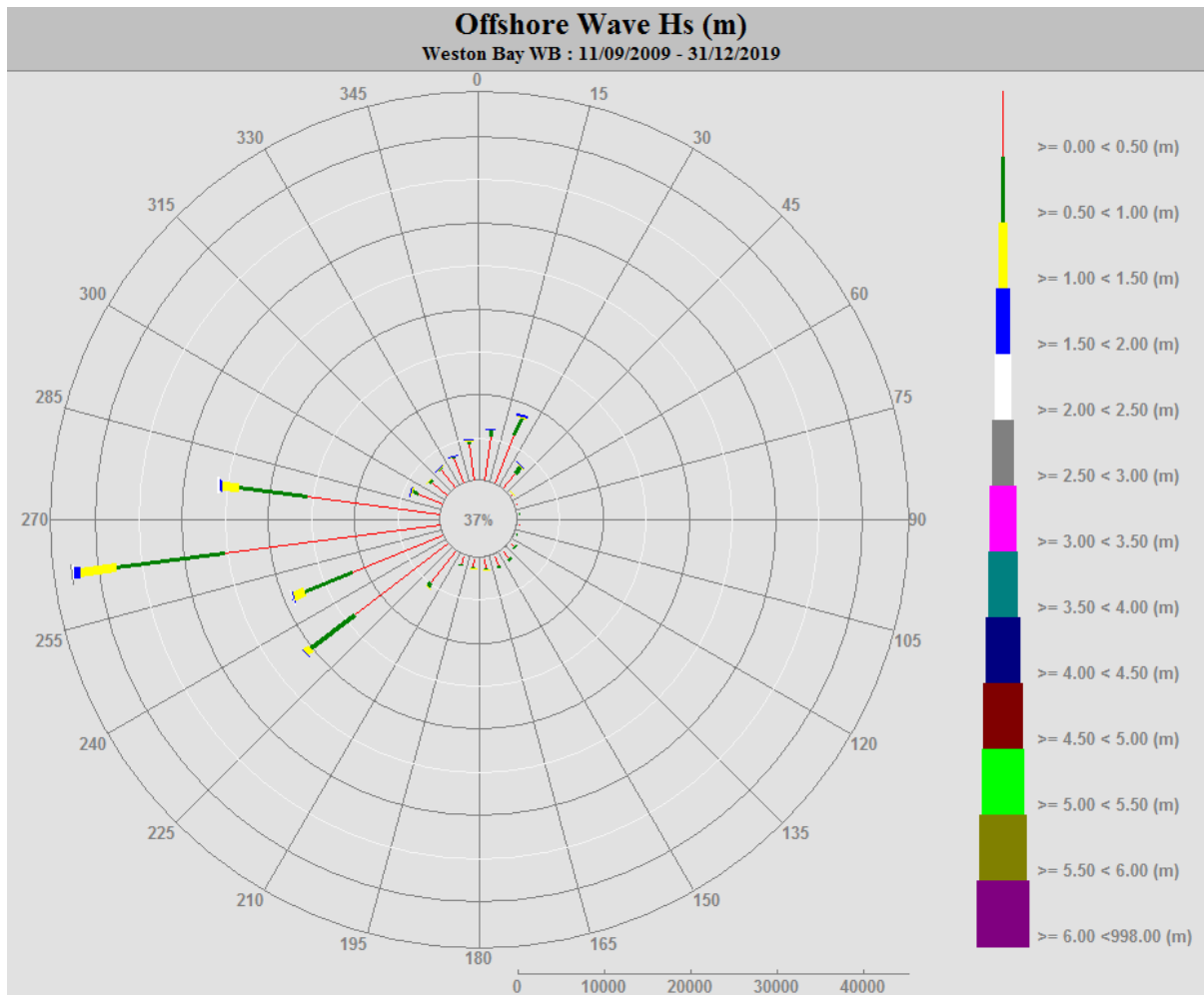
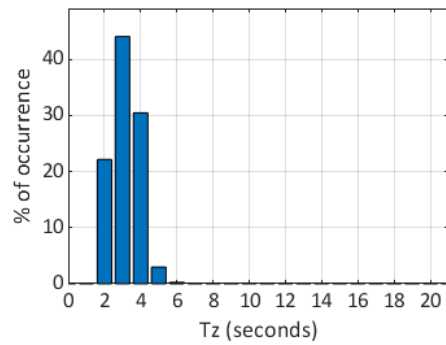
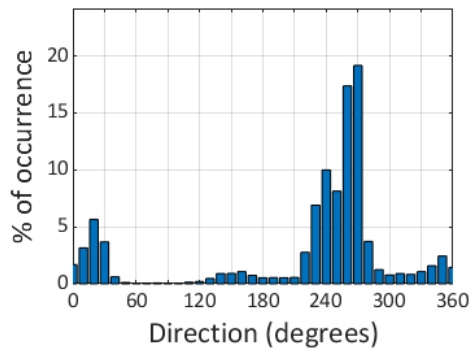
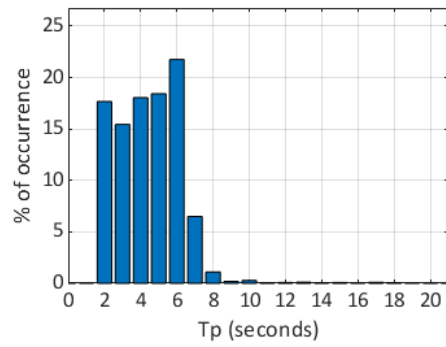
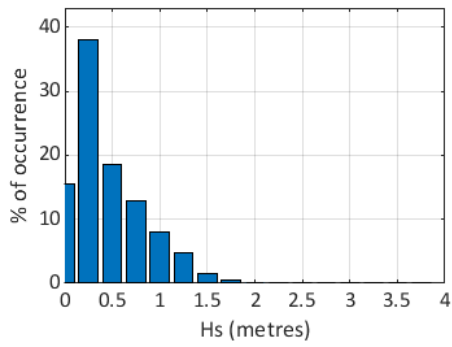
Storms at Weston Bay - all years



Weston Bay - Wave height exceedance (H_s)



Weston Bay 2009



Weston Bay 2009 to 2019 - Joint distribution (% of occurrence)

