Bideford Bay Directional Waverider Buoy

Location			
OS	240592 E 131213 N		
WGS84	*Latitude:* 51° 03.48' N *Longitude:* 04° 16.62' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~11m CD	Buoy in situ in Bideford Bay. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping)

Data Quality

Recovery rate (%)	Sample interval
99	30 minutes

Monthly Averages - 2015

All times are GMT

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	No. of days
January	2.21	11.2	6.5	284	9.3	31
February	1.40	11.9	6.0	285	7.9	28
March	1.60	12.1	6.9	282	8.3	31
April	0.89	11.1	6.2	283	9.9	30
May	1.10	8.6	4.8	275	11.9	31
June	0.90	8.5	4.8	277	14.3	30
July	1.08	8.7	5.0	282	16.6	31
August	0.89	8.6	5.0	284	17.1	31
September	0.79	8.5	4.6	287	16.3	30
October	0.85	10.7	5.6	282	15.1	30
November	2.07	10.7	6.4	282	13.5	29
December	2.30	12.3	7.0	280	11.9	31

Monthly Averages - All Years (June 2009 – December 2015)

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)
January	1.64	11.6	6.4	284	8.7
February	1.56	12.2	6.6	284	7.8
March	1.06	11.4	6.3	281	8.2
April	0.95	10.8	5.8	281	9.6
May	0.92	8.9	5.0	281	11.8
June	0.82	8.8	5.1	280	14.4
July	0.87	8.4	4.9	282	16.6
August	0.92	8.2	4.8	283	17.3
September	0.93	9.4	5.1	285	16.6
October	1.13	10.1	5.6	283	15.2
November	1.64	11.0	6.3	283	13.1
December	1.79	11.1	6.1	284	10.4

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)
29-Nov-2015 14:00	5.33	12.5	9.1	277	-	HW +6	~7.9	-	-
23-Feb-2015 17:00	5.31	11.8	8.7	280	-	HW -4	~8.5	-	-
15-Jan-2015 23:00	5.31	11.1	8.9	281	0.89	HW -3	3.5	0.20	0.61
30-Jan-2015 04:00	5.24	10.5	7.8	286	1.75	HW +2	5.1	0.49	0.51
24-Feb-2015 02:30	5.18	11.1	8.9	287	-	HW +5	~8.0	-	-

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	-	-	3.86	3.55	3.09	2.56	22-Nov-2009 15:30	5.16+
2010	4.55	3.04	2.75	2.43	2.02	1.65	11-Nov-2010 17:30	5.52+
2011	4.78	4.05	3.77	3.46	2.90	2.43	15-Dec-2011 07:30	5.14+
2012	5.02	4.1	3.66	3.16	2.56	2.05	04-Jan-2012 23:00	5.82+
2013	5.64	4.36	4.05	3.70	3.01	2.36	27-Dec-2013 10:00	6.93+
2014	6.18	4.80	4.44	3.90	3.02	2.45	09-Feb-2014 01:30	7.36+
2015	5.17	4.48	4.16	3.80	3.28	2.74	29-Nov-2015 14:00	5.33+

** i.e. 5 % of the H_s values measured in 2009 exceeded 3.09 m*

+ 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.

** Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Ilfracombe). 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.*

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 3-hourly records and are calculated for periods up to 10 times the record length, using a Weibull distribution.

Return period (years)	Significant wave height (m)	Comments
1	5.9	Depth-limited at MLWS
2	6.2	
5	6.7	
10	7.0	
20	7.3	
50	7.7	

Distribution plots

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

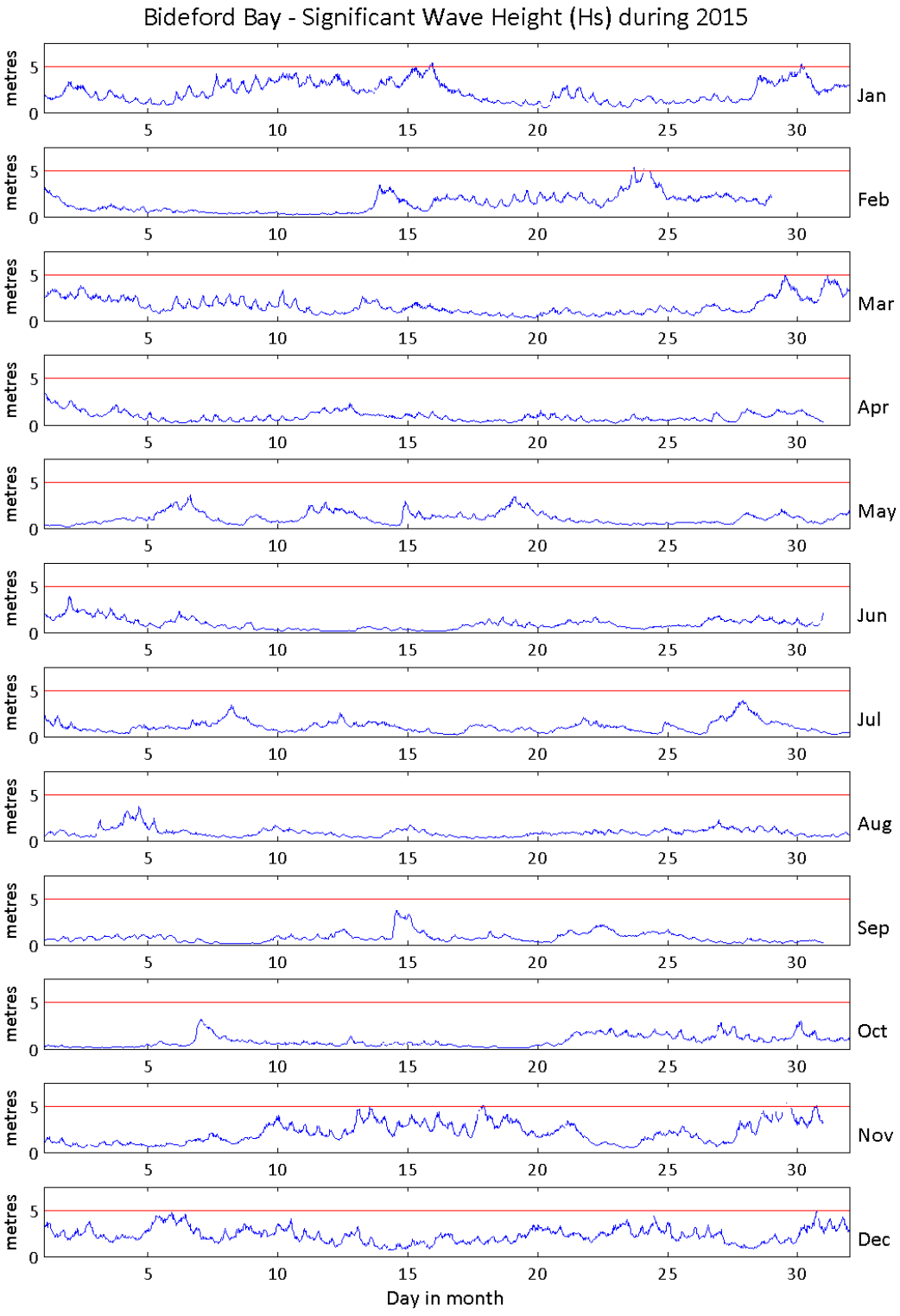
- Annual time series of H_s (red line is 5.0 m storm threshold)
- Incidence of storm waves for 2015. Storm events are defined using the Peaks-over-Threshold method. The highest H_s of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H_s, T_p, T_z and Direction for 2015
- 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

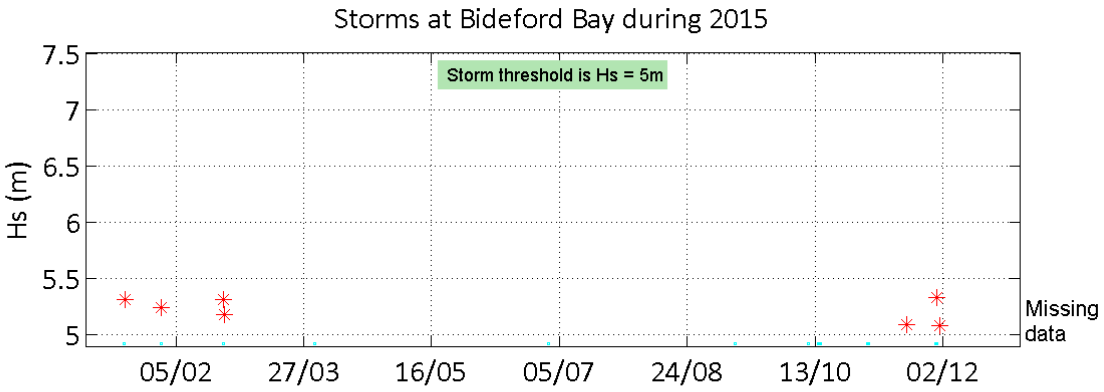
General

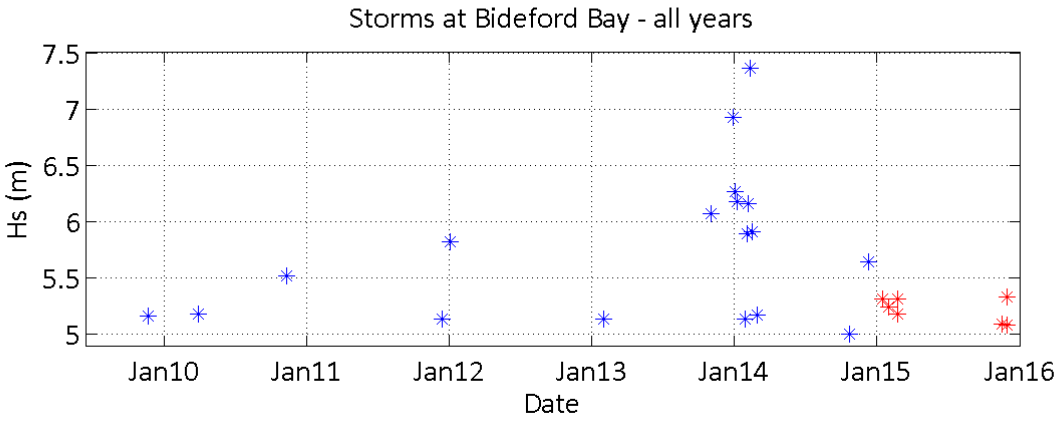
The buoy was first deployed on 17 June 2009, at which time the magnetic declination at the site was 3.3° west, changing by 0.15° east per year.

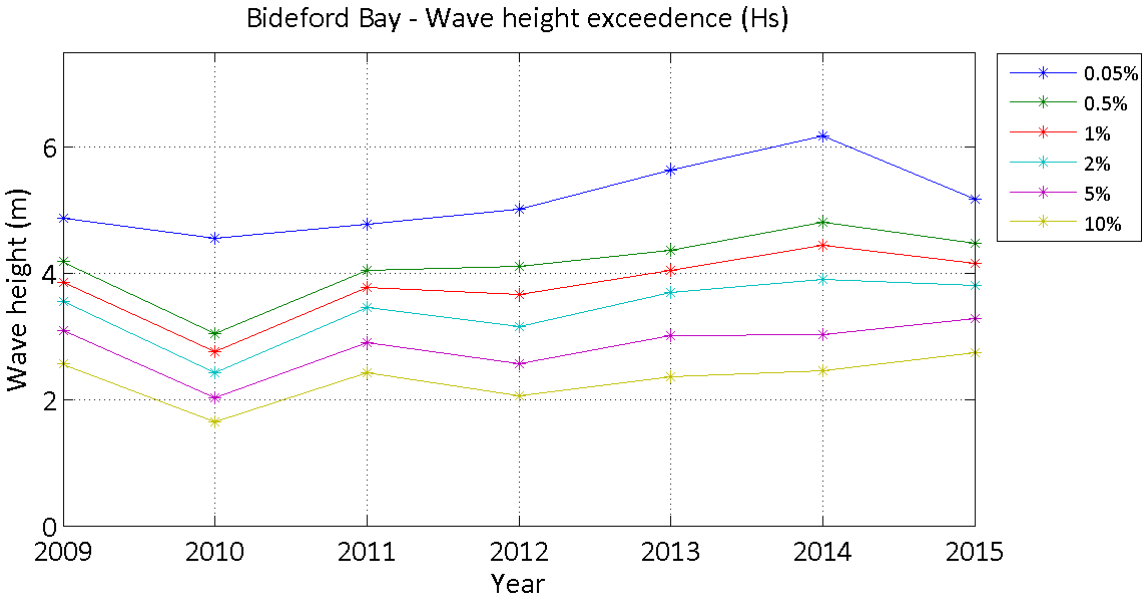
Acknowledgements

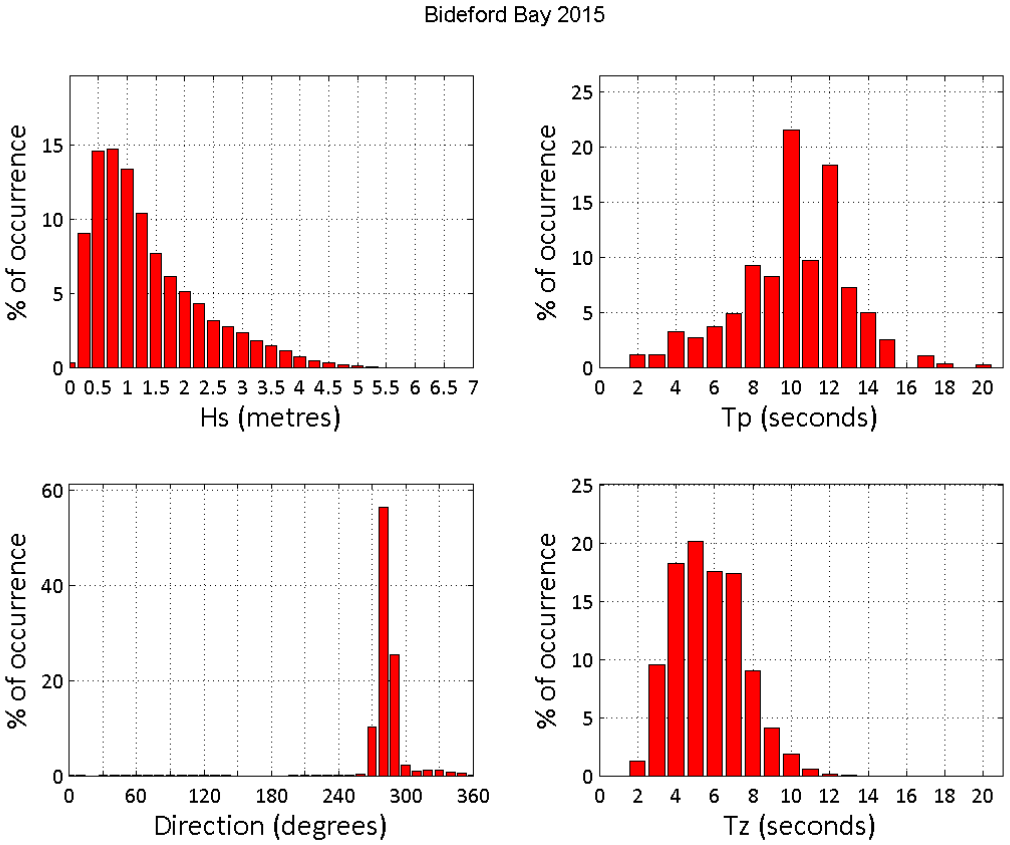
The shore station is kindly hosted by Appledore Lifeboat Station. Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.

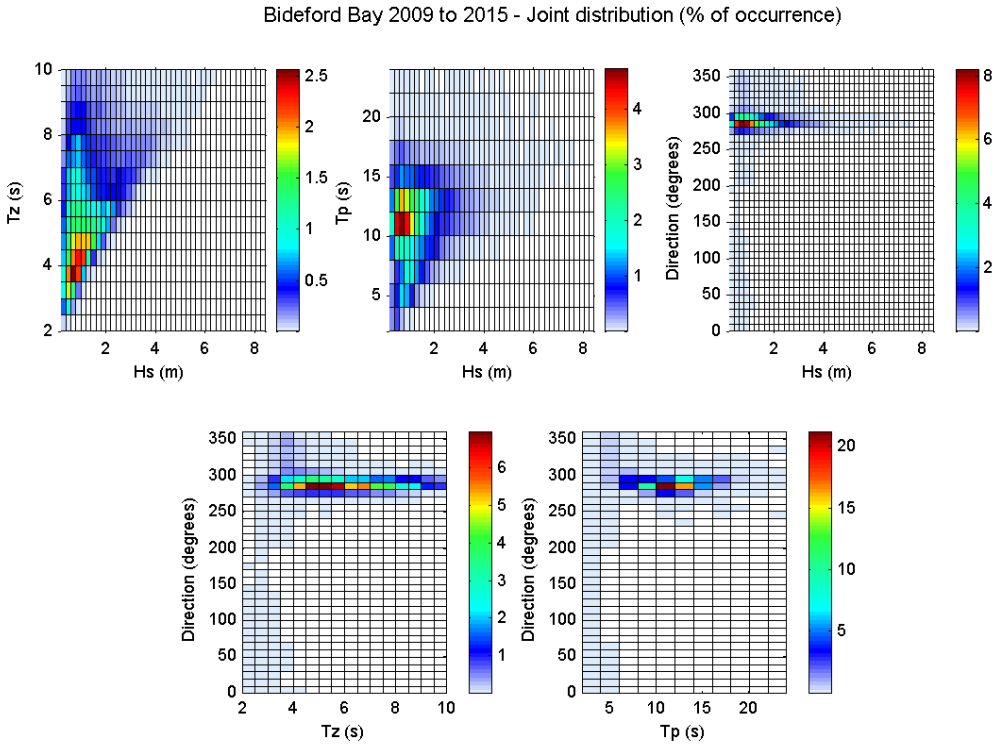

Bideford Bay - Significant Wave Height (Hs) during 2015
metres
5
0
5
10
15
20
25
30
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day in month


Storms at Bideford Bay during 2015
Storm threshold is Hs = 5m
Hs (m)
7.5
7
6.5
6
5.5
5
Missing data
05/02
27/03
16/05
05/07
24/08
13/10
02/12


Storms at Bideford Bay - all years
Hs (m)
7.5
7
6.5
6
5.5
5
Jan10
Jan11
Jan12
Jan13
Jan14
Jan15
Jan16
Date


Bideford Bay - Wave height exceedence (Hs)
Wave height (m)
0
2
4
6
2009
2010
2011
2012
2013
2014
2015
Year
0.05%
0.5%
1%
2%
5%
10%


Bideford Bay 2015
% of occurrence
Hs (metres)
Tp (seconds)
Direction (degrees)
Tz (seconds)


Bideford Bay 2009 to 2015 - Joint distribution (% of occurrence)
Tz (s)
Hs (m)
Tp (s)
Direction (degrees)

Offshore Wave Hs (m)

Bideford Bay WB : 17/06/2009 - 31/12/2015