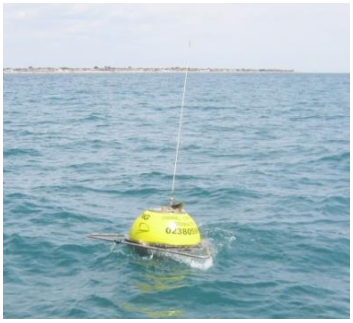
Bracklesham Bay Directional Waverider Buoy

Location	
OS	482056 E 92090 N
WGS84	*Latitude:* 50° 43.36' N *Longitude:* 00° 50.33' W
Instrument type	
Datawell Directional Waverider Mk III	
Water depth	~10m CD



Buoy in situ in Bracklesham Bay. Photo courtesy of Fugro GB Marine Limited

Location of buoy (Google mapping, image ©2016 TerraMetrics)

Data Quality

Recovery rate (%)	**Sample interval**
97	30 minutes

Monthly Averages - 2016

All times are GMT

Month	**H_s (m)**	**T_p (s)**	**T_z (s)**	**Dir. (°)**	**SST (°C)**	**Bimodal seas (%)**	**No. of days**
January	1.37	9.0	4.7	204	8.7	24	30
February	1.14	9.2	4.7	202	8.0	12	28
March	0.78	9.1	4.2	203	7.7	5	30
April	0.61	7.1	3.9	207	10.0	3	29
May	0.44	6.5	3.4	211	13.4	0	30
June	0.56	6.8	3.7	215	16.4	0	29
July	0.62	5.7	3.4	217	18.2	2	30
August	0.67	6.2	3.6	212	19.2	2	30
September	0.67	7.6	3.9	210	18.9	4	29
October	0.51	7.8	3.6	194	15.0	0	30
November	0.77	6.0	3.8	200	11.8	2	29
December	0.74	9.4	4.5	199	9.3	6	30

Monthly Averages - All Years (August 2008 – December 2015)

Month	**H_s (m)**	**T_p (s)**	**T_z (s)**	**Dir. (°)**	**SST (°C)**	**Bimodal seas (%)**
January	0.99	9.2	4.5	204	6.9	13
February	0.86	10.1	4.5	205	6.1	10
March	0.61	8.9	4.1	201	7.4	3
April	0.57	8.1	4.0	201	10.1	2
May	0.60	6.5	3.7	209	12.9	1
June	0.56	6.5	3.6	204	15.9	1
July	0.61	6.0	3.6	214	18.3	1
August	0.62	5.9	3.5	215	18.6	1
September	0.62	6.6	3.6	205	17.1	1
October	0.81	7.3	4.0	207	14.9	5
November	1.02	8.2	4.3	206	11.9	8
December	1.06	8.2	4.4	208	8.6	14

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)
08-Feb-2016 11:00	4.02	10.0	6.8	211	2.23	HW	3.61	0.28	0.50
28-Mar-2016 02:30	3.99	9.1	6.5	197	2.12	HW +1	3.99	0.53	1.17
22-Nov-2016 07:00	3.57	9.1	6.3	201	1.47	HW +1	2.28	0.20	0.36
08-Feb-2016 00:00	3.51	8.3	6.3	205	1.77	HW +1	3.61	0.12	0.46
06-Feb-2016 22:00	3.33	7.1	6.1	194	2.08	HW	3.40	0.48	0.56

** Tidal information is obtained from the National Network gauge at Portsmouth. The surge shown is the residual at the time of the highest Hs. 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)
2008	-	2.83	2.51	2.25	1.90	1.56	09-Nov-2008 23:00	3.28
2009	3.60	2.97	2.70	2.37	1.96	1.58	23-Nov-2009 13:00	3.83
2010	3.15	2.56	2.23	1.85	1.47	1.17	31-Mar-2010 09:30	3.46
2011	3.32	2.59	2.39	2.13	1.76	1.50	13-Dec-2011 00:00	3.64[+]
2012	3.42	2.80	2.58	2.31	1.90	1.52	03-Jan-2012 09:00	3.67
2013	3.79	2.98	2.71	2.41	1.93	1.50	24-Dec-2013 02:00	4.13
2014	4.03	3.21	2.88	2.55	2.10	1.70	15-Feb-2014 00:00	4.47[+]
2015	3.42	2.86	2.71	2.52	2.14	1.77	15-Jan-2015 05:00	3.66
2016	3.72	2.41	1.98	1.69	1.25	0.99	08-Feb-2016 11:00	4.02

*** i.e. 5 % of the H_s values measured in 2008 exceeded 1.90 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.

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 August 2008 – December 2016		
Return period (years)	**Significant wave height (m)**	**Comments**
1	4.3	Depth-limited at MLWS
2	4.4	
5	4.6	
10	4.7	
20	4.8	
50	5.0	

3-hourly records August 2008 – December 2016		
Return period (years)	**Significant wave height (m)**	**Comments**
1	3.9	No depth limitation
2	4.1	
5	4.3	Depth-limited at MLWS
10	4.5	
20	4.7	
50	4.9	

Distribution plots

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

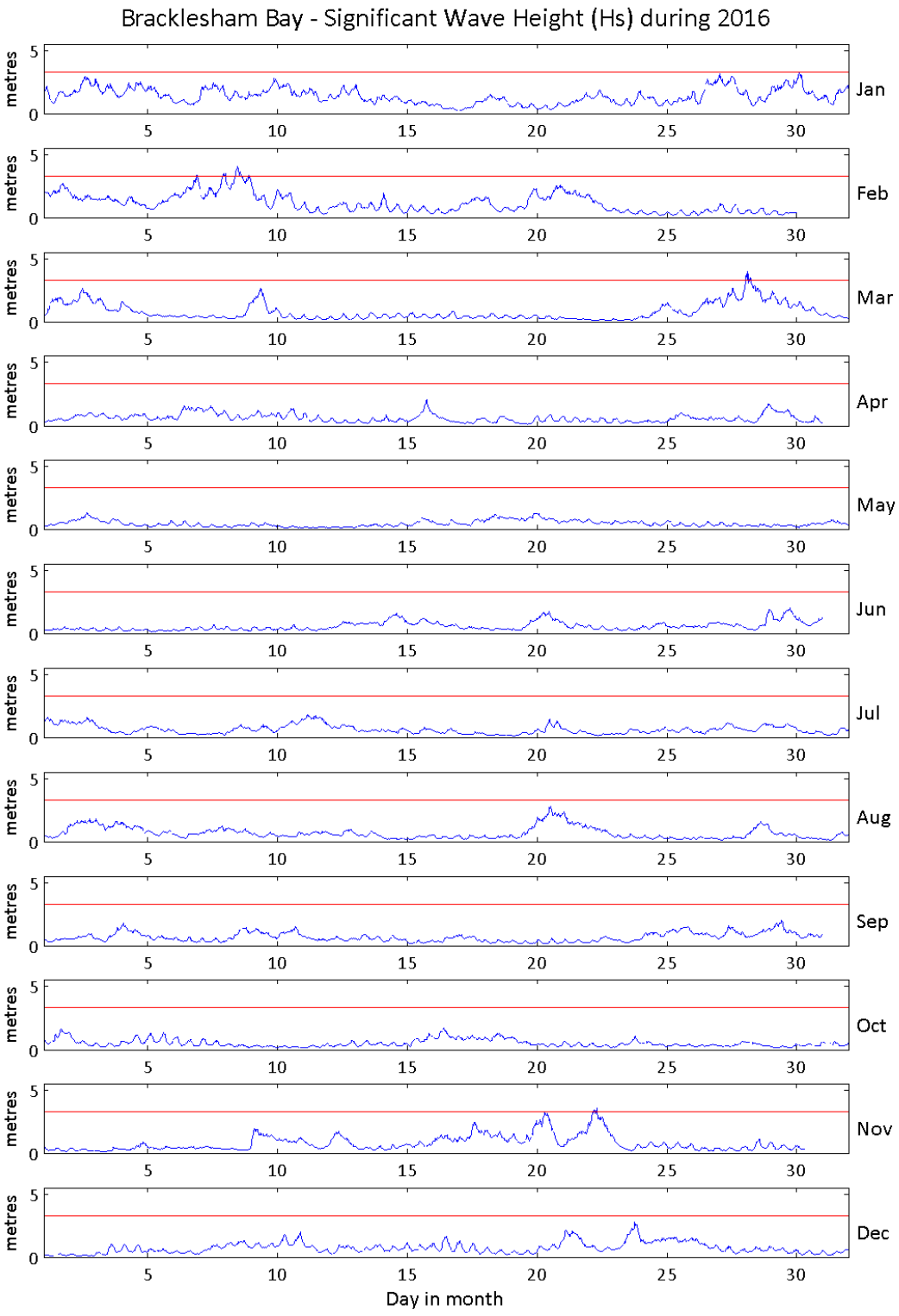
- Annual time series of H_s (red line is 3.3 m storm threshold)
- Incidence of storm waves for 2016. Storm events are defined using the Peaks-over-Threshold method. The highest H_s of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H_s, T_p, 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

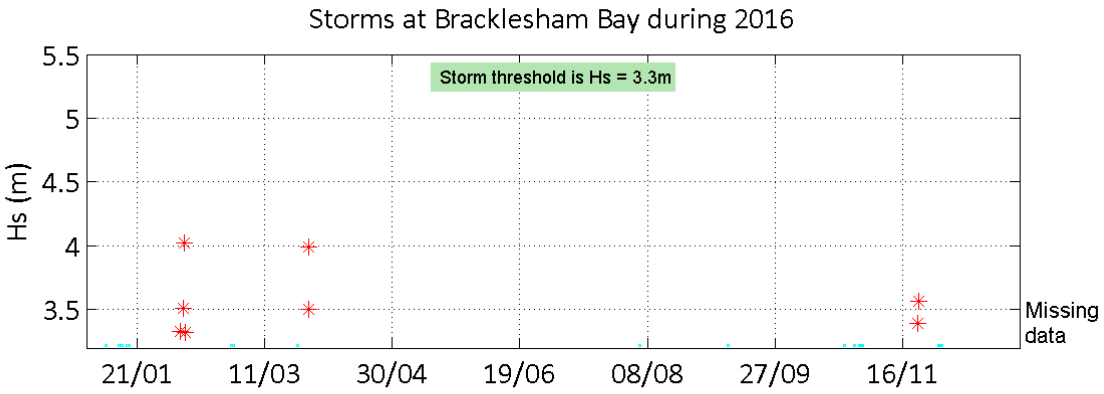
General

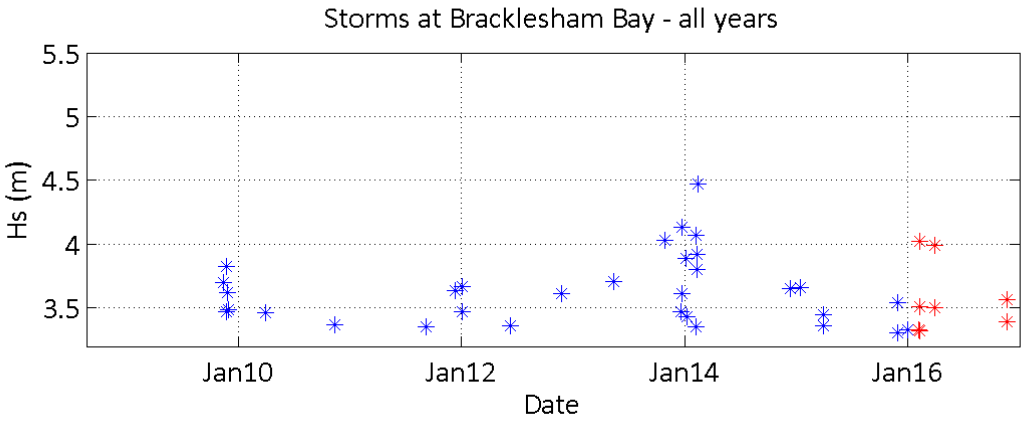
The buoy, owned by New Forest District Council, was first deployed on 22 August 2008, at which time the magnetic declination at the site was 2.1° west, changing by 0.14° east per year.

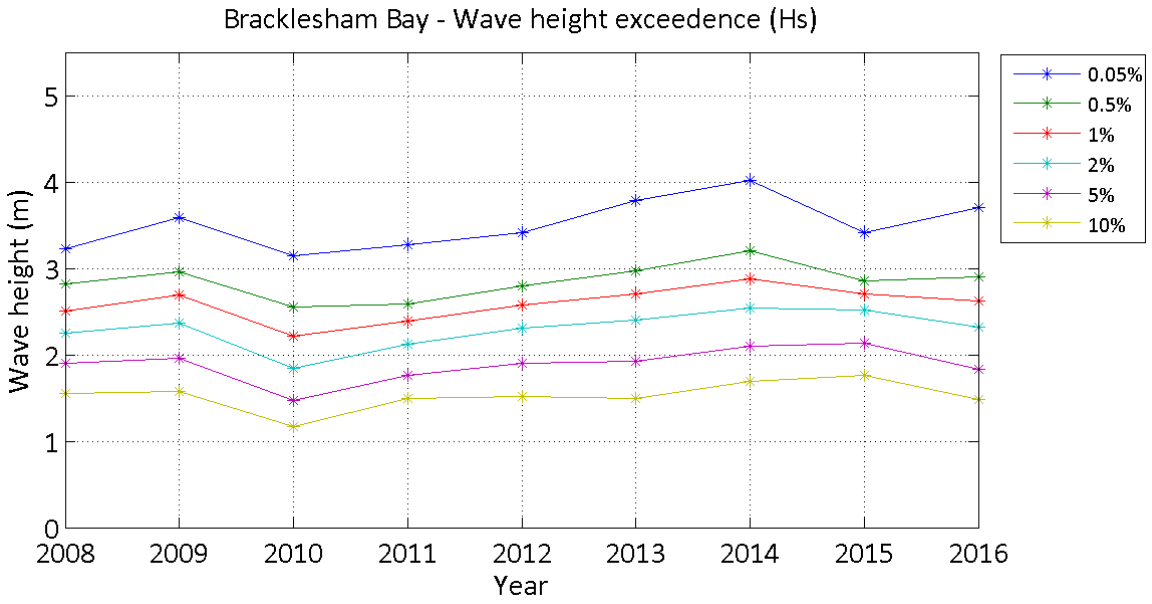
Acknowledgements

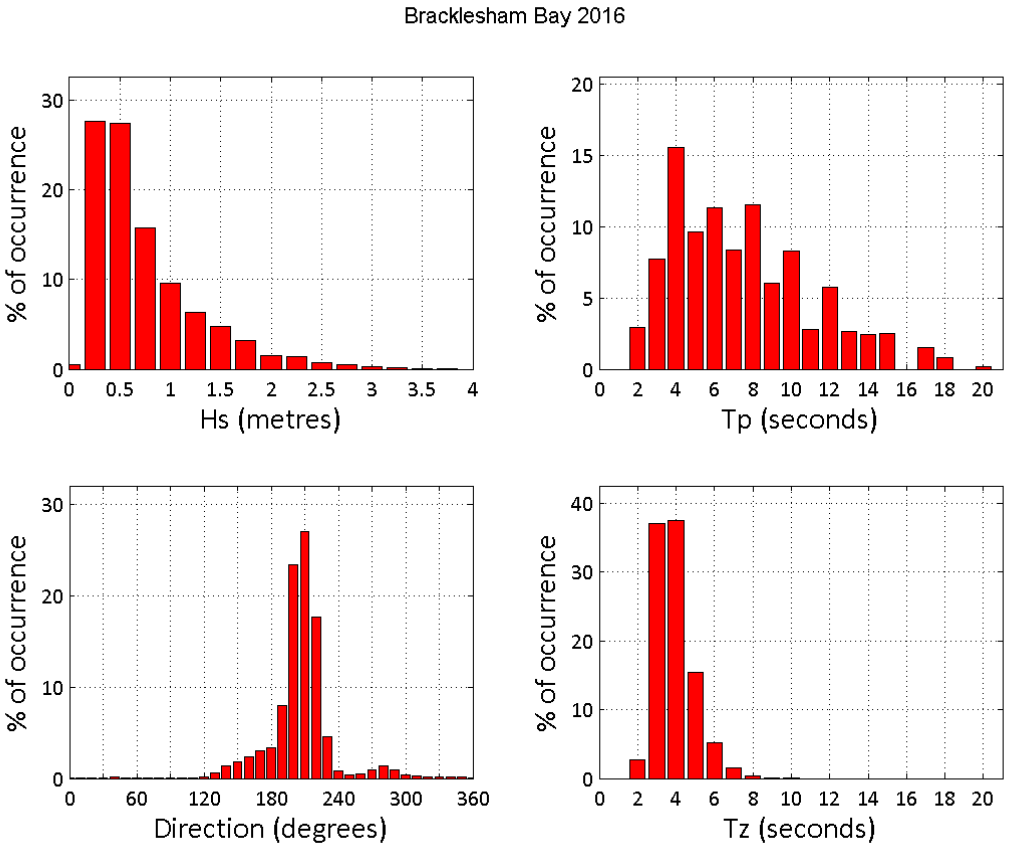
The shore station is kindly hosted by Fugro GB Marine Limited. Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research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

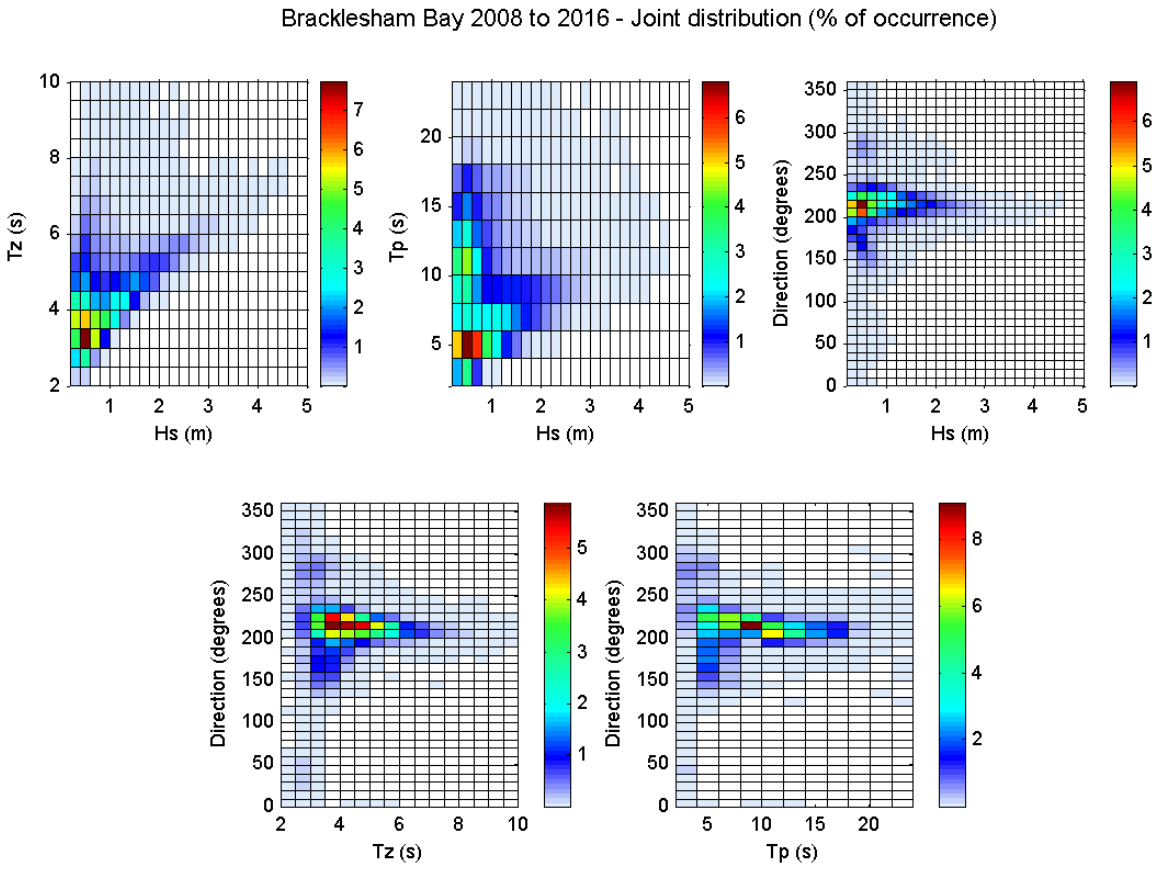

Bracklesham Bay - Significant Wave Height (Hs) during 2016
metres
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0
5
10
15
20
25
30
Day in month

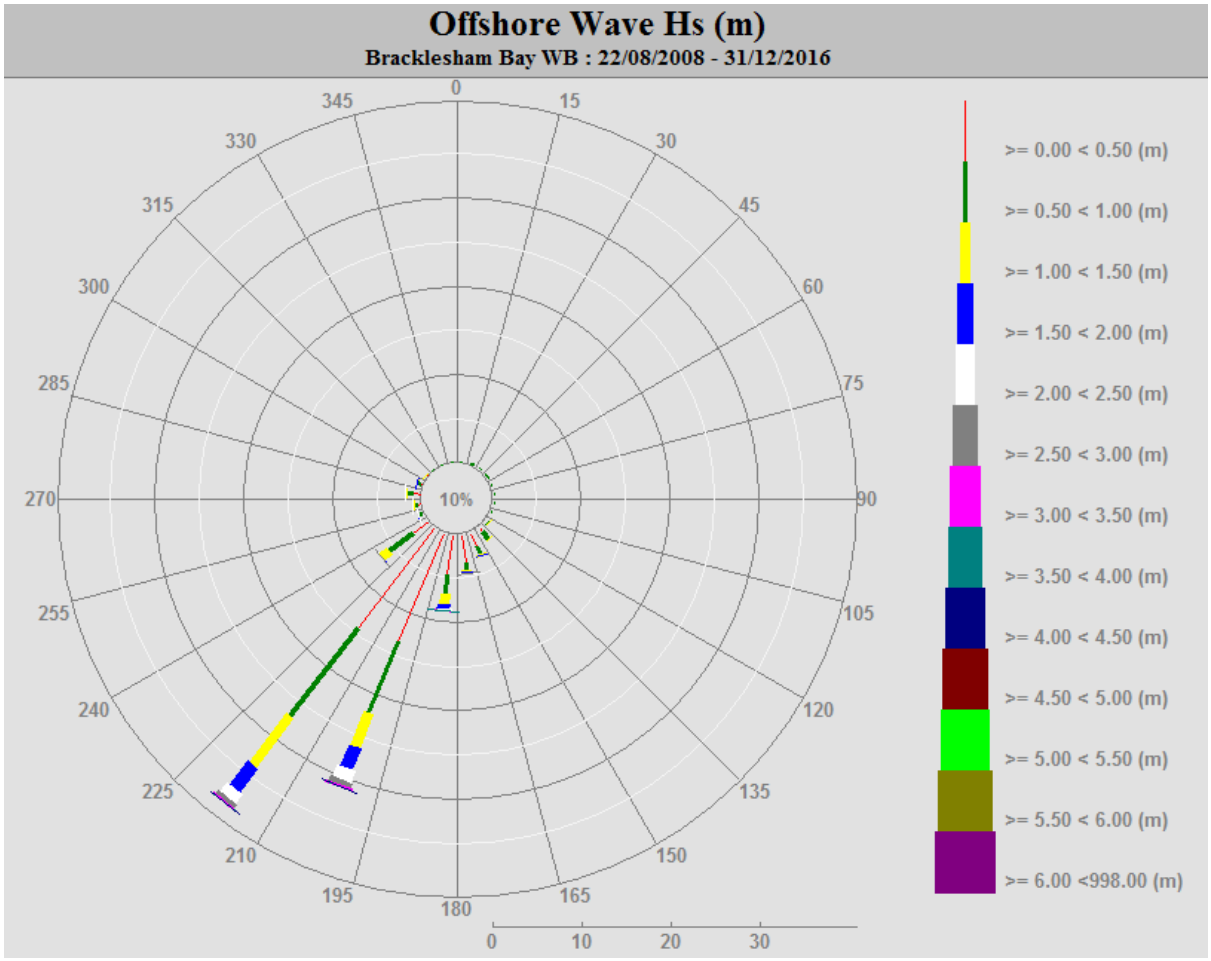

Storms at Bracklesham Bay during 2016
Storm threshold is Hs = 3.3m
Hs (m)
5.5
5
4.5
4
3.5
21/01
11/03
30/04
19/06
08/08
27/09
16/11
Missing data


Storms at Bracklesham Bay - all years
Hs (m)
5.5
5
4.5
4
3.5
Jan10
Jan12
Jan14
Jan16
Date


Bracklesham Bay - Wave height exceedence (Hs)
Wave height (m)
0
1
2
3
4
5
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
0.05%
0.5%
1%
2%
5%
10%


Bracklesham Bay 2016
% of occurrence
Hs (metres)
Tp (seconds)
Direction (degrees)
Tz (seconds)


Bracklesham Bay 2008 to 2016 - Joint distribution (% of occurrence)
Tz (s)
Hs (m)
Tp (s)
Direction (degrees)


Offshore Wave Hs (m)
Bracklesham Bay WB : 22/08/2008 - 31/12/2016
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
10%
0
10
20
30
>= 0.00 < 0.50 (m)
>= 0.50 < 1.00 (m)
>= 1.00 < 1.50 (m)
>= 1.50 < 2.00 (m)
>= 2.00 < 2.50 (m)
>= 2.50 < 3.00 (m)
>= 3.00 < 3.50 (m)
>= 3.50 < 4.00 (m)
>= 4.00 < 4.50 (m)
>= 4.50 < 5.00 (m)
>= 5.00 < 5.50 (m)
>= 5.50 < 6.00 (m)
>= 6.00 <998.00 (m)