West Bay Directional Waverider Buoy

Location			
OS	347050 E 88507 N		
WGS84	*Latitude:* 50° 41.63' N *Longitude:* 02° 45.06' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~10m CD	Buoy in situ off West Bay. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Image ©2016 Getmapping plc)

Data Quality

Recovery rate (%)	Sample interval
91	30 minutes

Monthly Averages - 2008

All times are GMT

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	1.28	9.7	4.6	211	9.4	-	16
February	0.97	8.8	4.5	202	9.0	5	28
March	1.10	7.9	4.5	216	9.0	6	29
April	0.67	7.4	4.0	211	10.0	2	29
May	0.43	8.1	4.2	193	12.5	0	30
June	0.61	7.6	4.0	216	14.6	1	28
July	0.84	6.5	3.8	209	16.3	1	29
August	1.00	5.9	4.0	213	17.2	2	29
September	0.81	7.3	4.2	195	16.3	2	29
October	1.06	7.1	4.4	213	14.6	1	30
November	0.79	7.6	4.2	205	11.5	0	28
December	0.73	8.7	4.6	203	8.8	3	29

Monthly Averages - All Years (November 2006 – December 2019)

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.19	9.3	4.9	208	9.0	11
February	1.09	10.3	5.2	206	8.1	11
March	0.88	9.5	4.8	206	8.4	6
April	0.68	8.8	4.5	204	10.0	3
May	0.62	7.6	4.1	205	12.2	1
June	0.62	7.4	4.1	205	14.7	1
July	0.65	6.5	3.8	209	16.8	1
August	0.72	6.3	3.9	210	17.6	1
September	0.71	7.4	4.1	205	17.0	2
October	0.91	8.0	4.5	205	15.3	5
November	1.11	8.3	4.7	206	12.6	8
December	1.27	9.0	5.0	209	10.2	12

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)
10-Mar-2008 12:30:00	5.05	10.5	7.8	217	-1.65	HW +5	3.90	-	-
03-Feb-2008 17:30:00	4.28	8.3	6.6	187	1.06	HW +2	1.63	0.50	0.63
31-Jan-2008 12:00:00	4.16	10.0	6.8	217	0.85	HW	1.30	-	-

** Tidal information is obtained from the tide gauge at West Bay Harbour and/or estimated from the predicted tide levels (Admiralty Total Tide). 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)
2007	4.88	3.70	3.31	2.92	2.45	2.03	06-Mar-2007 02:00:00	5.61
2008	4.73	3.60	3.16	2.74	2.20	1.71	10-Mar-2008 12:30:00	5.05
2009	5.26	3.63	3.31	2.94	2.31	1.84	14-Nov-2009 15:00:00	6.00
2010	4.00	2.95	2.66	2.37	1.81	1.46	11-Nov-2010 08:00:00	4.35
2011	4.34	3.10	2.81	2.44	2.04	1.67	13-Dec-2011 00:30:00	4.84
2012	4.83	3.45	3.01	2.65	2.21	1.74	03-Jan-2012 11:00:00	5.55
2013	5.17	3.72	3.28	2.88	2.26	1.80	24-Dec-2013 00:30:00	6.42
2014	6.22	4.24	3.80	3.18	2.49	2.01	05-Feb-2014 11:00:00	7.08
2015	4.73	3.46	3.22	2.93	2.49	2.06	15-Jan-2015 01:00:00	5.25
2016	4.79	3.68	3.23	2.62	2.07	1.61	28-Mar-2016 03:00:00	5.54
2017	4.28	3.32	2.98	2.54	2.01	1.58	02-Feb-2017 23:30:00	5.31
2018	4.62	3.56	3.15	2.85	2.32	1.91	09-Nov-2018 21:00:00	5.83
2019	4.43	3.71	3.39	2.90	2.36	1.91	02-Nov-2019 07:30:00	5.84

*** i.e. 5% of the H_s values measured in 2007 exceeded 2.45 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	November 2006 to December 2019	
Return period (years)	**Significant wave height (m)**	**Comments**
0.25	4.05	No depth limitation
1	5.15	Depth-limited at MLWS
2	5.61	
5	6.13	Depth-limited at MHWS
10	6.47	Depth-limited at HAT
20	6.77	
50	7.11	
100	7.34	

Distribution plots

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

- Annual time series of H_s (red line is 4.05 m storm alert threshold)
- Incidence of storm waves for 2008. 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 2008
- 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

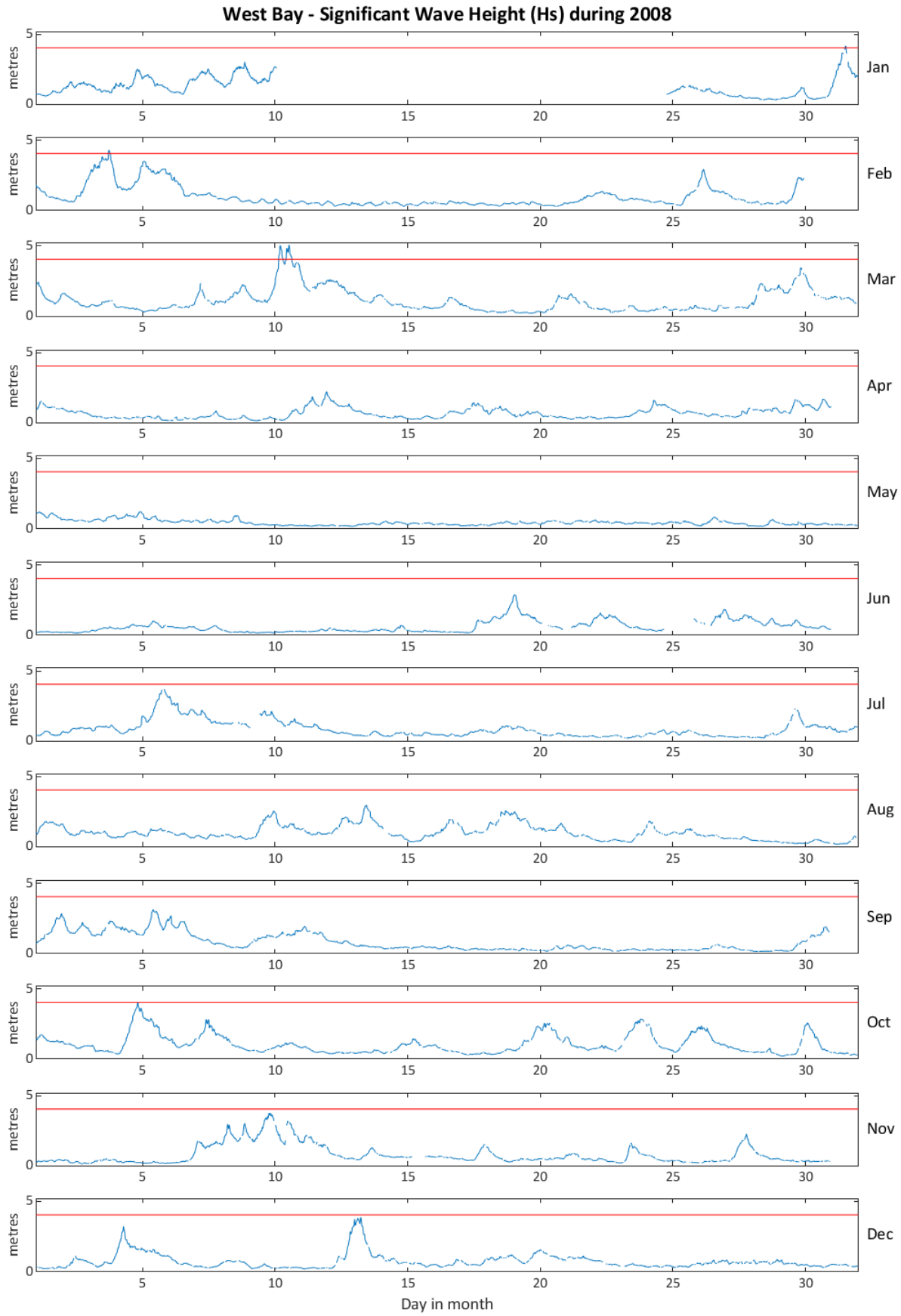
General

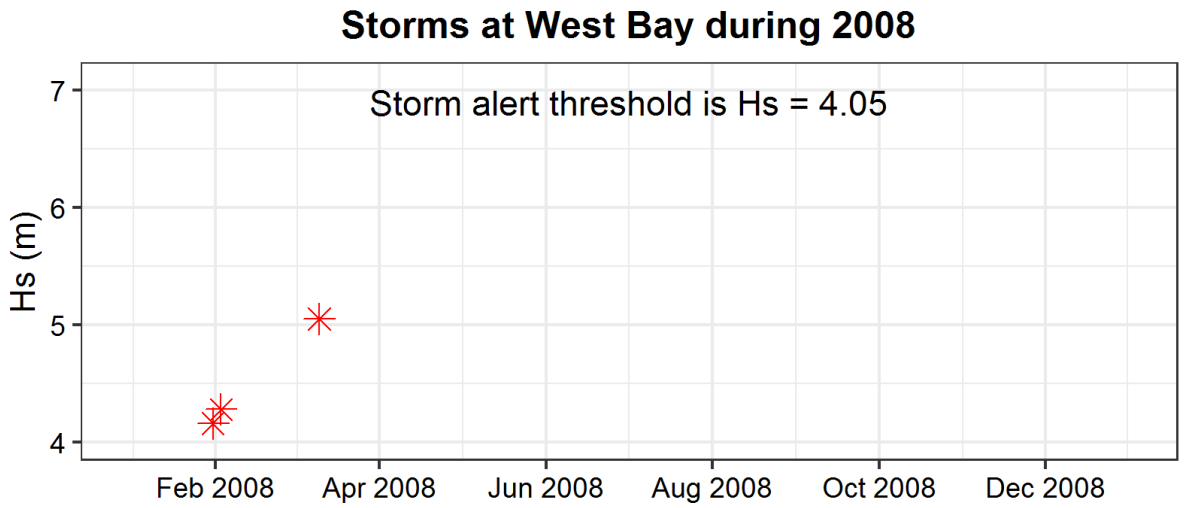
The buoy, owned by Teignbridge District Council, was first deployed on 19 November 2006, at which time the magnetic declination at the site was 3.0° west, changing by 0.15° east per year.

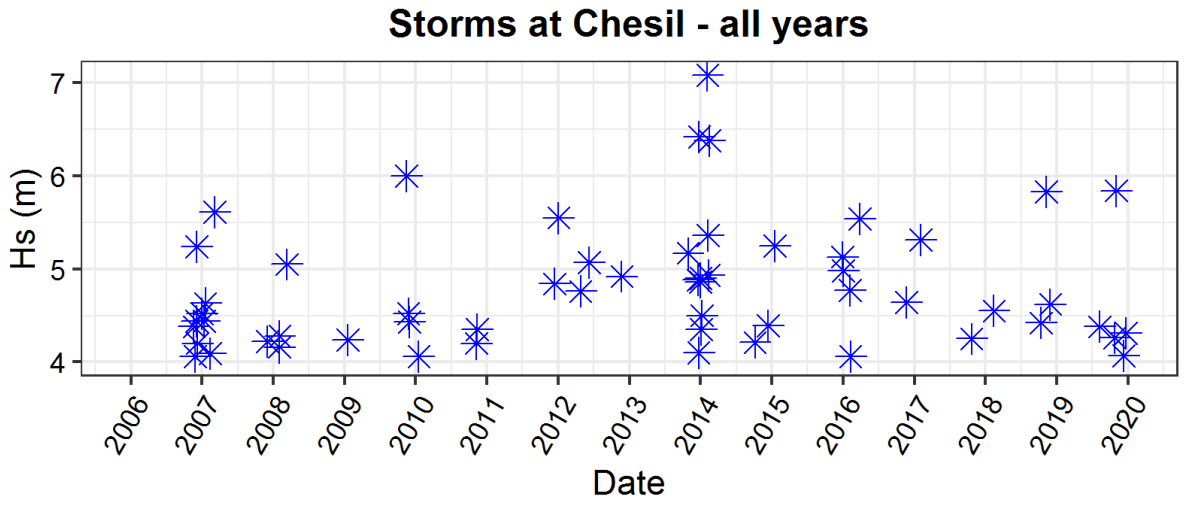
Acknowledgements

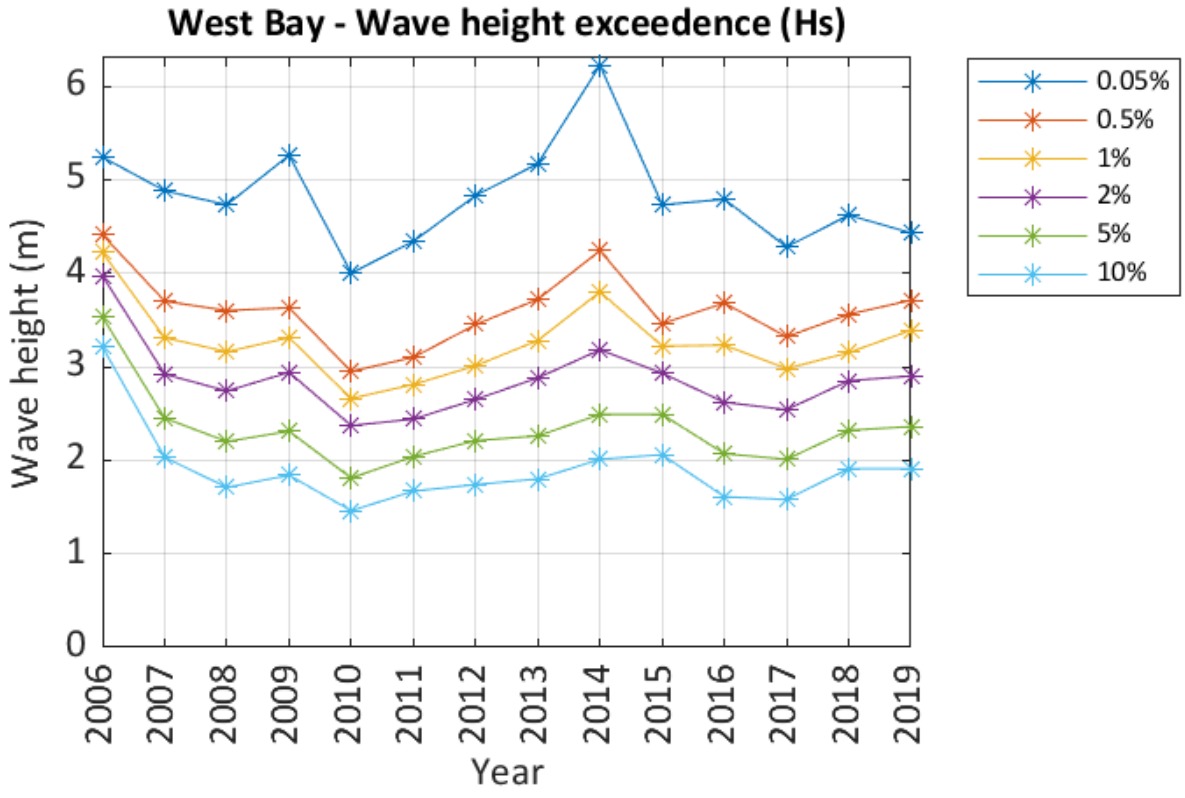
The shore station and tide gauge are kindly hosted by West Bay Harbourmaster.

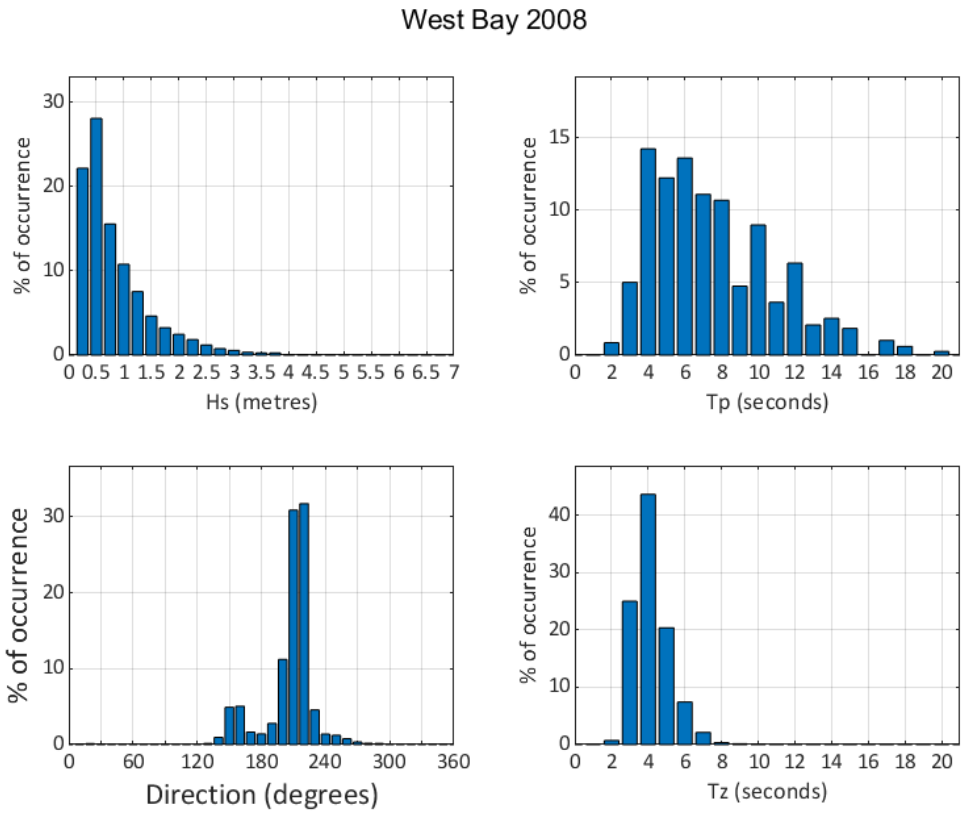
Tidal predictions were supplied by Fugro GB Marine Limited.

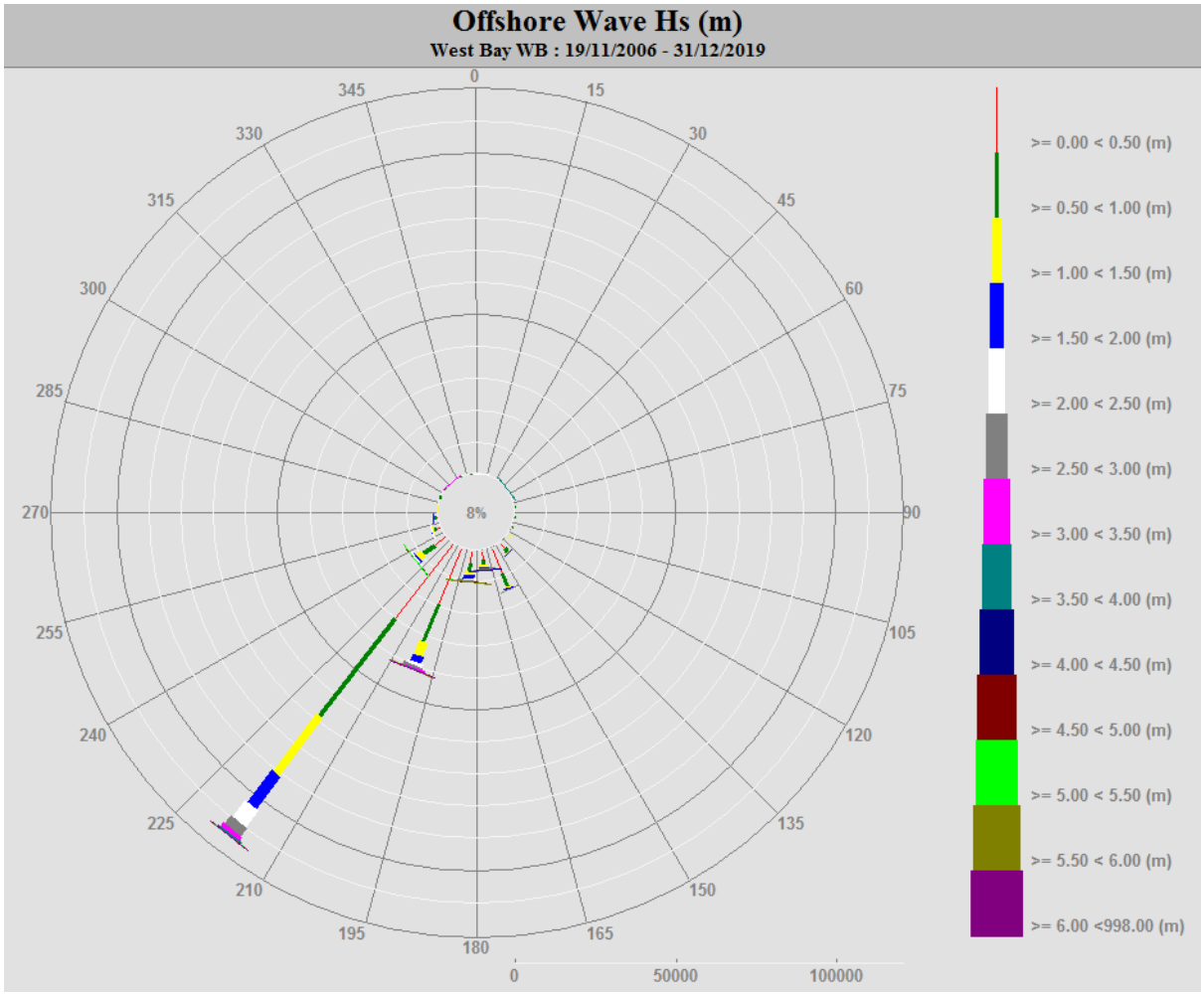

West Bay - Significant Wave Height (Hs) during 2008
metres
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0
5
10
15
20
25
30
Day in month

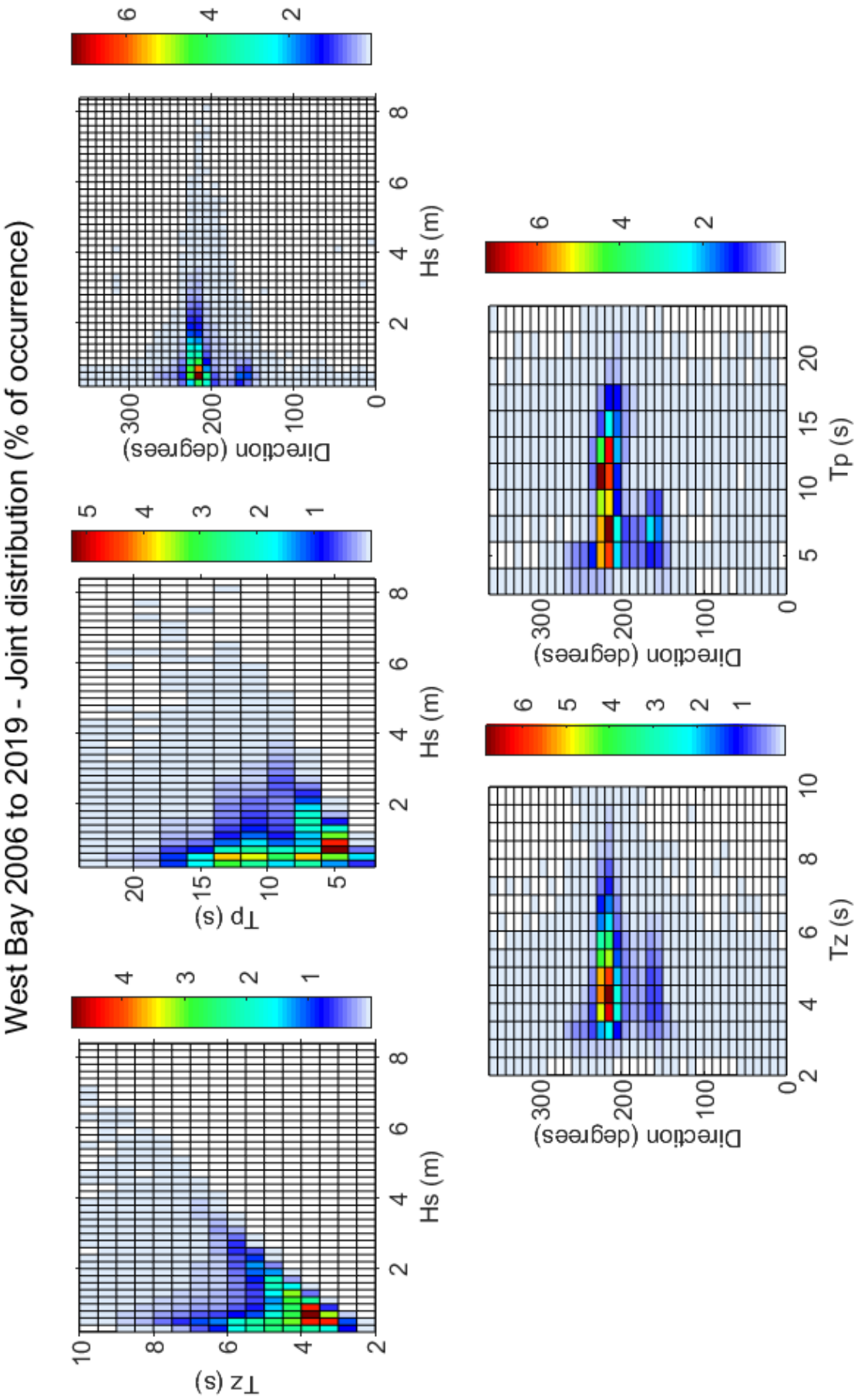

Storms at West Bay during 2008
Storm alert threshold is Hs = 4.05
Hs (m)
7
6
5
4
Feb 2008
Apr 2008
Jun 2008
Aug 2008
Oct 2008
Dec 2008


Storms at Chesil - all years
Hs (m)
7
6
5
4
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Date


West Bay - Wave height exceedence (Hs)
Wave height (m)
6
5
4
3
2
1
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
0.05%
0.5%
1%
2%
5%
10%


West Bay 2008
% of occurrence
Hs (metres)
Tp (seconds)
Direction (degrees)
Tz (seconds)


Offshore Wave Hs (m)
West Bay WB : 19/11/2006 - 31/12/2019
8%
>= 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)


West Bay 2006 to 2019 - Joint distribution (% of occurrence)
Direction (degrees)
Hs (m)
Tp (s)
Tz (s)