Weymouth Directional Waverider Buoy

Location			
OS	370799 E 80412 N		
WGS84	*Latitude:* 50° 37.36' N *Longitude:* 02° 24.85' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~11 m CD	Buoy in situ in Weymouth Bay. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 Getmapping plc)

Data Quality

Recovery rate (%)	Sample interval
92	30 minutes

Monthly Averages - 2012

All times are GMT

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	0.52	6.3	3.9	161	9.7	1	31
February	0.39	7.3	4.1	154	7.8	0	29
March	0.31	7.6	3.8	155	8.9	0	31
April	0.58	6.4	4.0	154	9.8	1	29
May	0.34	5.4	3.6	153	11.7	0	31
June	0.52	5.6	3.6	157	14.0	0	30
July	0.35	5.2	3.5	166	15.8	0	31
August	0.45	5.7	3.6	158	17.4	0	31
September	0.35	5.4	3.6	162	16.9	0	30
October	0.59	6.5	3.9	153	14.6	0	31
November	0.52	5.9	3.9	159	12.2	-	22
December	0.86	7.4	4.0	164	10.0	-	10

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

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	0.62	7.6	4.2	157	8.9	2
February	0.59	8.3	4.2	155	8.1	2
March	0.49	7.1	3.9	154	8.3	1
April	0.41	6.5	3.8	150	9.9	0
May	0.37	5.7	3.6	152	12.1	0
June	0.35	5.6	3.6	154	14.8	0
July	0.34	5.2	3.4	160	17.0	0
August	0.36	5.2	3.5	161	17.8	0
September	0.40	5.6	3.6	155	17.2	0
October	0.52	6.3	3.8	153	15.5	0
November	0.58	6.5	4.1	156	13.0	1
December	0.61	7.3	4.1	157	10.4	2

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)
30-Apr-2012 04:30:00	3.34	8.3	6.3	152	0.09	HW +6	0.74	0.29	0.31
25-Apr-2012 06:30:00	2.79	7.1	5.7	149	0.66	HW -2	1.73	0.40	0.54

** Tidal information is obtained from the National Network tide gauge at Weymouth. 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	2.29	1.72	1.43	1.24	1.03	0.85	18-Nov-2007 13:00:00	2.56
2008	2.57	1.94	1.74	1.44	1.09	0.88	03-Feb-2008 12:30:00	2.74
2009	2.17	1.75	1.63	1.48	1.18	0.90	13-Nov-2009 23:00:00	2.62
2010	2.54	1.84	1.54	1.29	1.00	0.81	17-Nov-2010 09:30:00	2.81
2011	2.16	1.77	1.54	1.26	1.03	0.85	23-Oct-2011 23:30:00	2.30
2012	2.82	1.80	1.60	1.38	1.08	0.86	30-Apr-2012 04:30:00	3.34
2013	2.47	1.89	1.65	1.47	1.21	0.98	18-Dec-2013 20:00:00	2.70
2014	3.22	2.30	1.97	1.65	1.28	0.99	05-Feb-2014 00:00:00	4.02+
2015	2.43	1.71	1.52	1.31	1.11	0.95	30-Dec-2015 11:00:00	2.72
2016	3.25	1.95	1.66	1.44	1.12	0.88	20-Nov-2016 01:30:00	3.87
2017	2.07	1.65	1.50	1.29	1.01	0.78	03-Feb-2017 16:00:00	2.40
2018	2.60	2.17	1.88	1.55	1.24	0.98	13-Feb-2018 09:30:00	2.98
2019	2.39	1.78	1.63	1.51	1.24	0.99	05-Apr-2019 04:30:00	2.86

*** i.e. 5 % of the H_s values measured in 2007 exceeded 1.03 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 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	December 2006 to December 2019	
Return period (years)	**Significant wave height (m)**	**Comments**
0.25	2.12	No depth limitation
1	2.74	
2	3.04	
5	3.43	
10	3.71	
20	3.98	
50	4.33	Depth-limited at MLWS
100	4.58	

Distribution plots

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

- Annual time series of H_s (red line is 2.12 m storm alert threshold)
- Incidence of storm waves for 2012. 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 2012
- 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

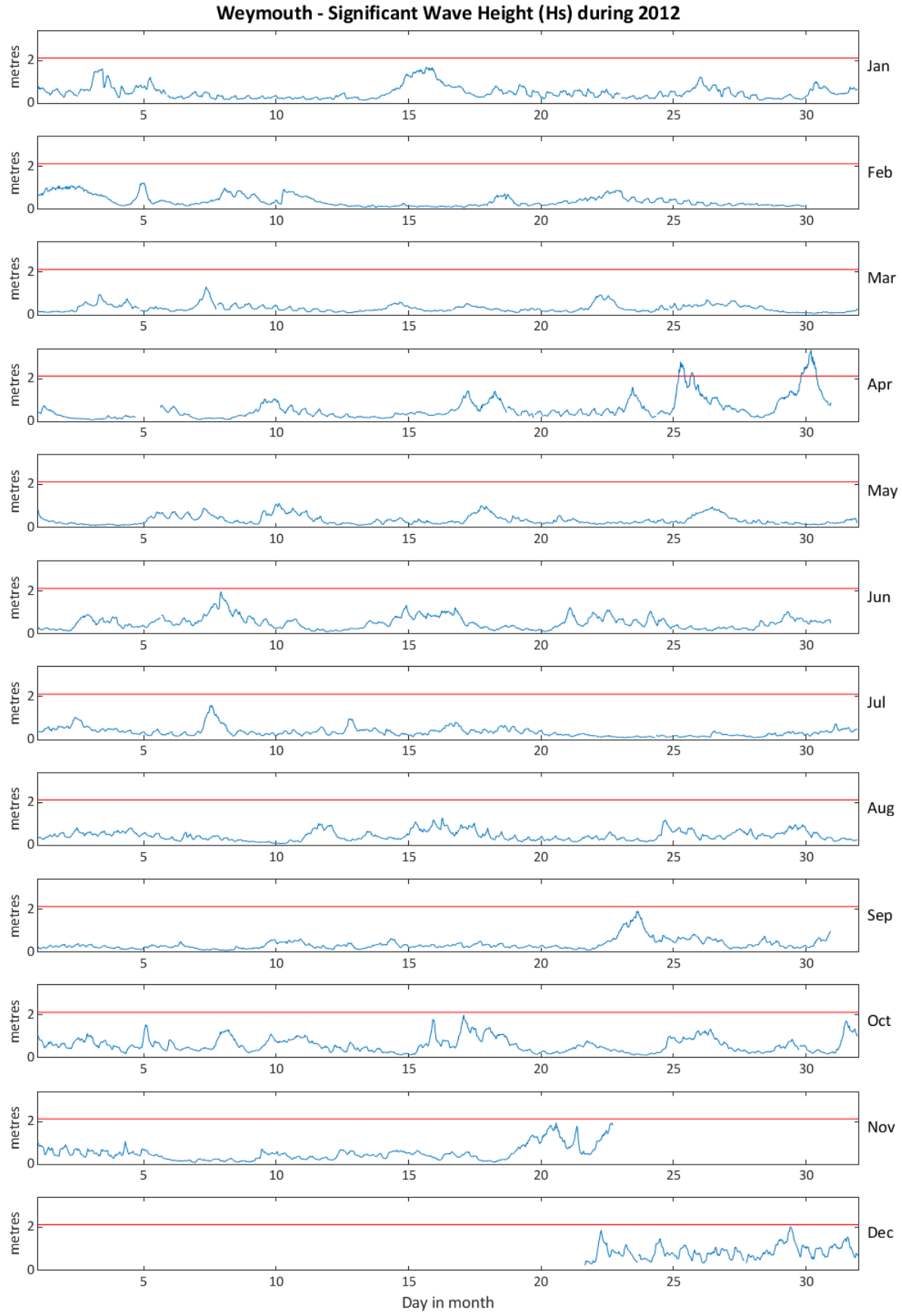
General

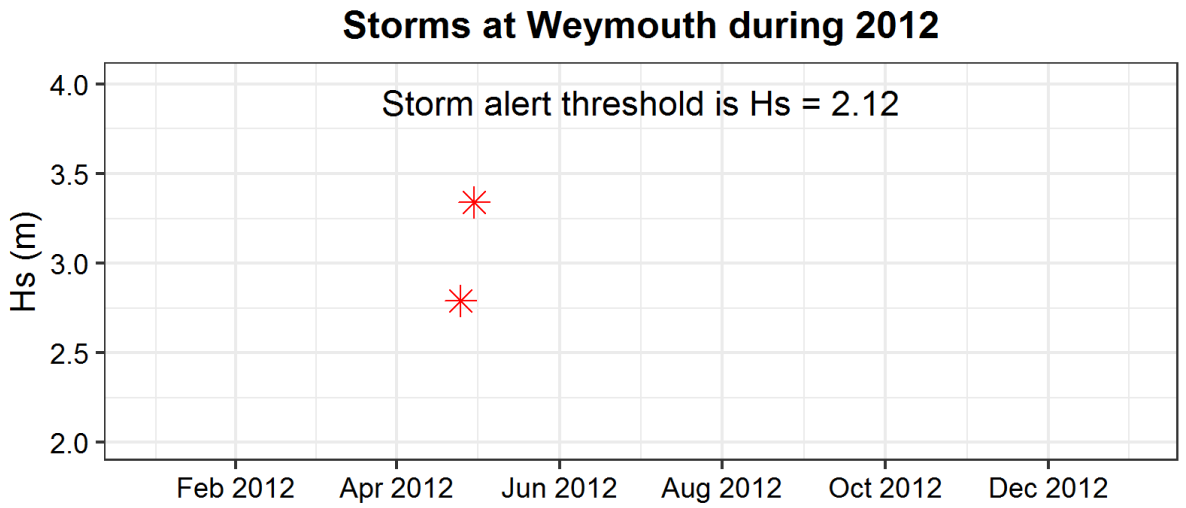
The buoy, owned by New Forest District Council, was first deployed on 18 December 2006, at which time the magnetic declination at the site was 2.9° west, changing by 0.15° east per year.

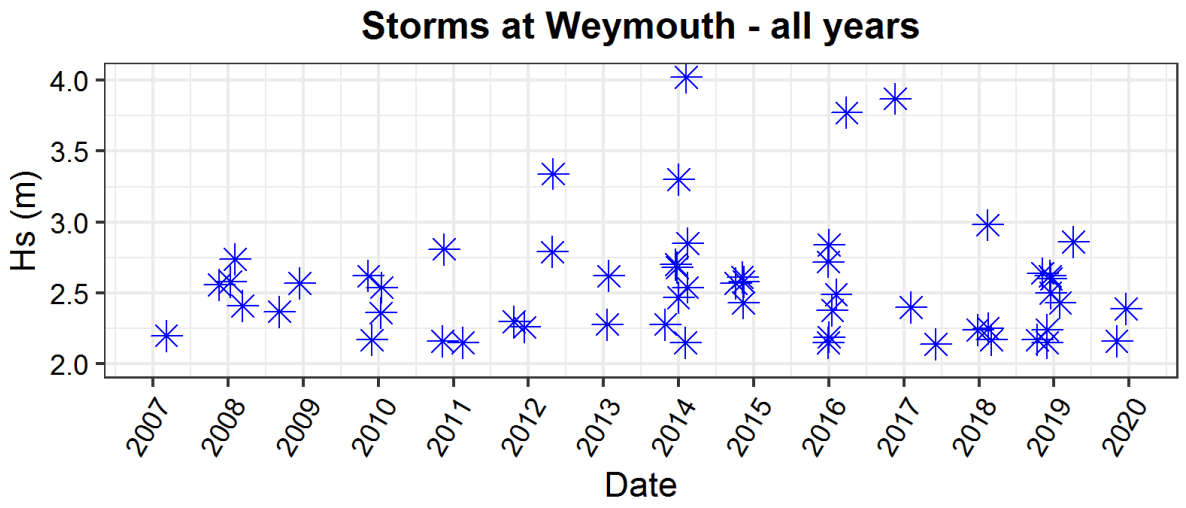
Acknowledgements

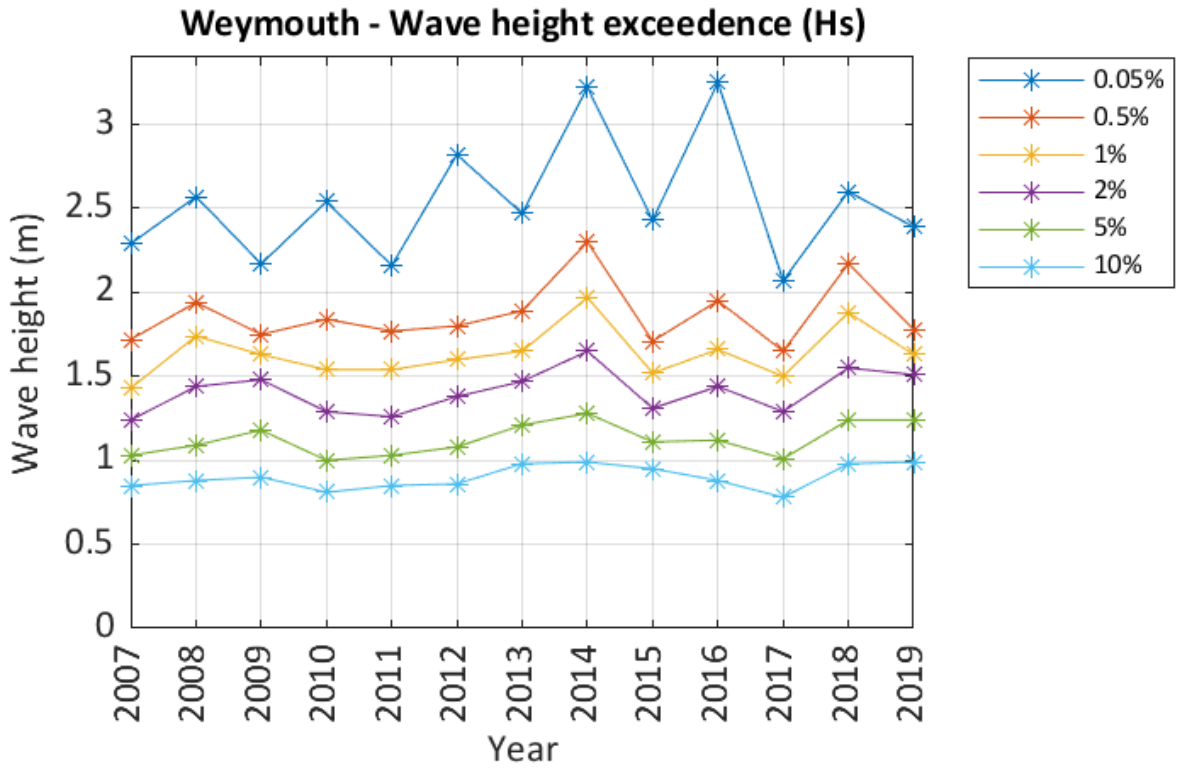
The shore station is kindly hosted by the Weymouth and Portland National Sailing Academy.

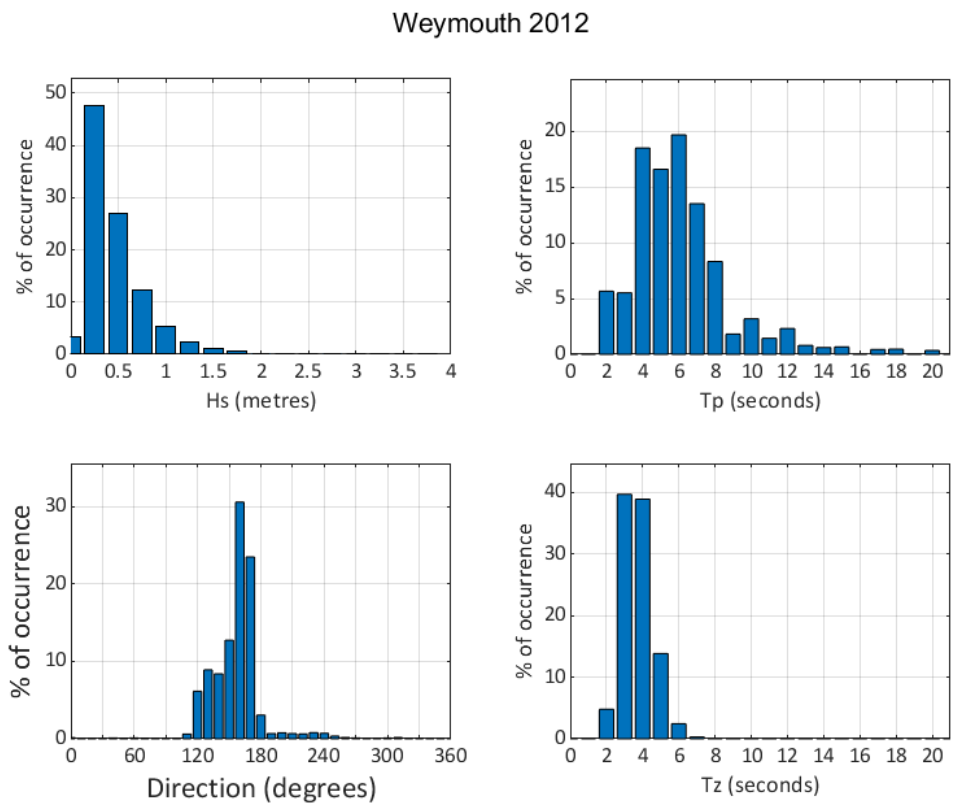
Tidal data at Weymouth were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.

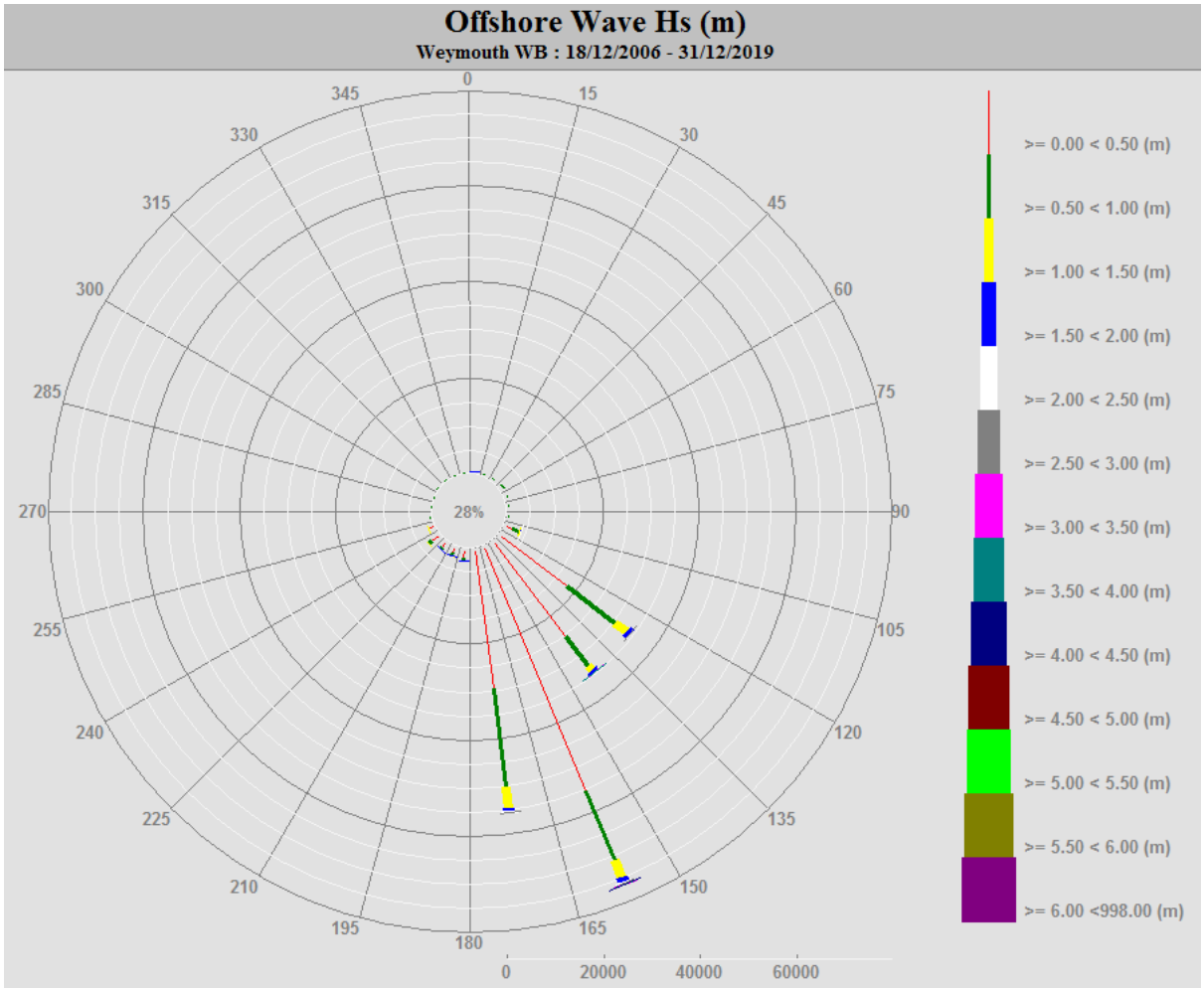

Weymouth - Significant Wave Height (Hs) during 2012
metres
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0
2
5
10
15
20
25
30
Day in month

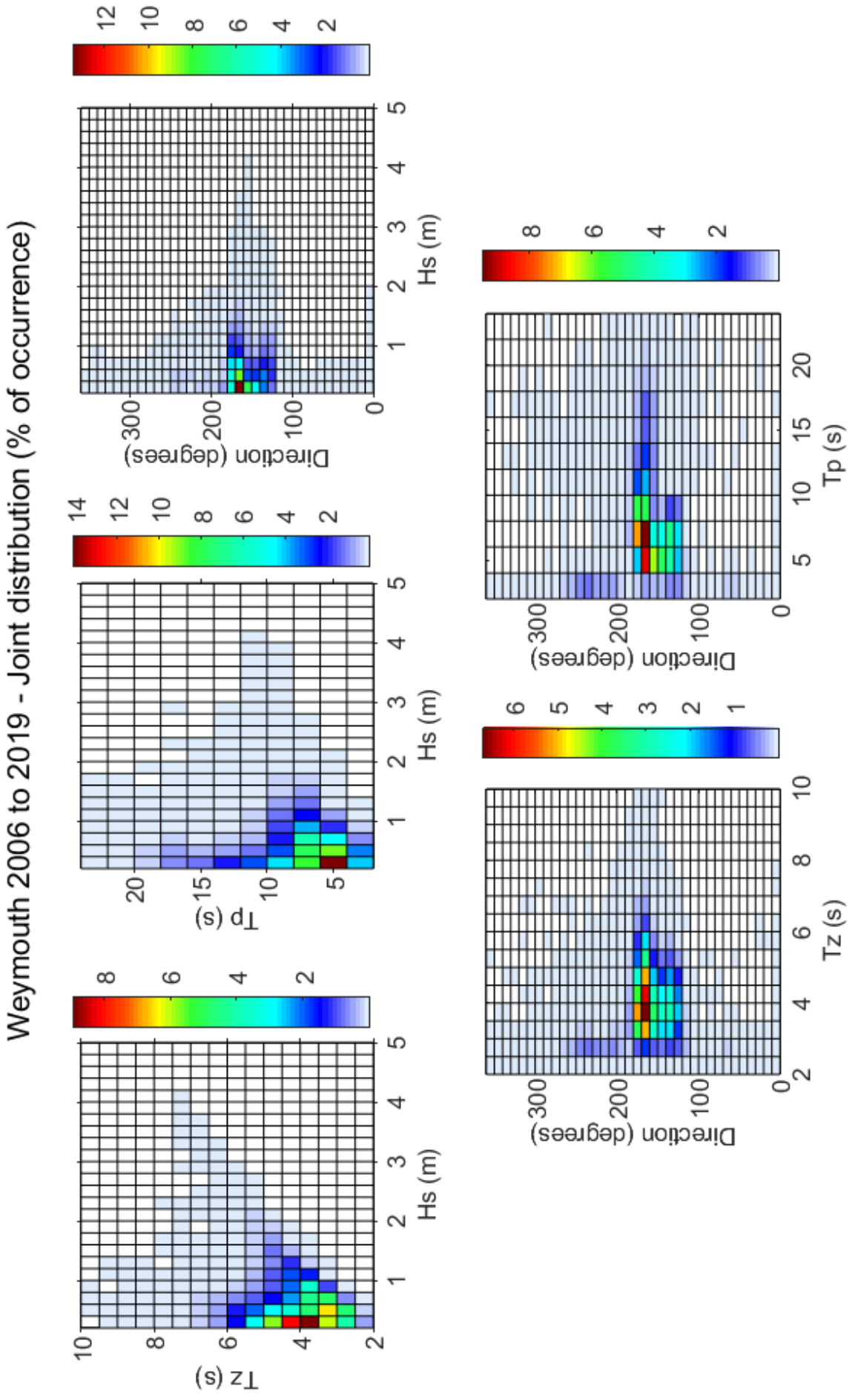

Storms at Weymouth during 2012
Storm alert threshold is Hs = 2.12
Hs (m)
4.0
3.5
3.0
2.5
2.0
Feb 2012
Apr 2012
Jun 2012
Aug 2012
Oct 2012
Dec 2012


Storms at Weymouth - all years
Hs (m)
4.0
3.5
3.0
2.5
2.0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Date


Weymouth - Wave height exceedence (Hs)
Wave height (m)
3
2.5
2
1.5
1
0.5
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Year
0.05%
0.5%
1%
2%
5%
10%


Weymouth 2012
% of occurrence
Hs (metres)
Tp (seconds)
Direction (degrees)
Tz (seconds)


Offshore Wave Hs (m)
Weymouth WB : 18/12/2006 - 31/12/2019
28%
>= 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)


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