



## Chesil Directional Waverider Buoy

<b>Location</b>			
OS	363094 E 78173 N		
WGS84	Latitude: 50° 36.13' N Longitude: 02° 31.37' W		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	10-12 m CD	Buoy in situ off Chesil beach. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 TerraMetrics)

## Data Quality

<b>Recovery rate (%)</b>	<b>Sample interval</b>
100	30 minutes

## Monthly Averages - 2017

All times are GMT

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	0.85	8.9	4.7	217	9.0	7	31
February	1.34	10.5	5.5	212	8.4	12	28
March	1.18	9.0	5.1	213	9.5	11	31
April	0.48	8.2	4.1	214	11.0	1	30
May	0.68	8.7	4.7	217	12.7	1	31
June	0.85	7.4	4.5	222	15.3	5	30
July	0.77	5.9	3.9	218	16.9	0	31
August	0.75	5.8	4.0	223	17.6	0	31
September	1.06	7.1	4.4	224	16.8	5	30
October	1.22	7.8	4.6	224	15.5	5	31
November	0.97	7.1	4.2	225	12.9	3	30
December	1.26	8.3	4.6	224	10.0	7	31

## Monthly Averages - All Years (January 2007 – December 2016)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.45	9.5	5.3	218	9.0	15
February	1.19	10.4	5.4	215	8.1	13
March	0.89	9.7	5.1	214	8.3	5
April	0.78	8.8	4.9	214	9.6	5
May	0.71	7.6	4.4	217	11.7	2
June	0.72	7.7	4.5	218	14.1	1
July	0.78	6.7	4.1	222	16.2	1
August	0.81	6.7	4.1	222	17.2	2
September	0.76	7.6	4.4	214	16.9	2
October	0.98	8.1	4.8	215	15.2	6
November	1.22	8.2	4.9	216	12.8	6
December	1.39	9.0	5.2	218	10.1	13

## Storm Analysis

Date/Time	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	Water level elevation* (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
03-Feb-2017 00:00	6.41	18.2	9.8	218	1.42	HW +2	~2.38	0.47	0.63
21-Oct-2017 18:30	4.86	9.1	7.3	224	1.96	HW	3.11	0.05	0.37
16-Oct-2017 20:30	4.84	14.3	8.0	221	-0.59	HW +5	2.95	0.11	0.46
10-Dec-2017 13:30	4.27	10.0	6.7	224	0.65	HW +2	2.10	-	-
31-Dec-2017 20:00	4.21	9.1	6.7	225	0.70	HW +3	3.10	0.38	0.65

\* Tidal information is obtained from the step gauge at West Bay Harbour and/or the predicted tide levels (Admiralty Total Tide). The surge shown is the residual at the time of the highest H<sub>s</sub>. The maximum tidal surge is the largest surge during the storm event.

## Annual Statistics

Year	Annual H <sub>s</sub> exceedance** (m)						Annual Maximum H <sub>s</sub>	
	0.05%	0.5%	1%	2%	5%	10%	Date	A <sub>max</sub> (m)
2007	4.48	3.55	3.3	3.04	2.47	1.91	02-Dec-2007 11:00	4.87
2008	4.84	3.76	3.43	3.03	2.57	2.06	10-Mar-2008 13:00	5.37
2009	5.50	4.00	3.55	3.13	2.54	2.02	14-Nov-2009 14:30	6.50 <sup>+</sup>
2010	3.97	3.14	2.83	2.46	1.94	1.56	11-Nov-2010 09:30	4.40
2011	4.41	3.45	3.03	2.66	2.23	1.85	12-Dec-2011 23:30	5.53
2012	5.01	3.64	3.21	2.9	2.4	1.94	03-Jan-2012 12:00	5.87 <sup>+</sup>
2013	5.52	3.97	3.6	3.11	2.48	1.97	24-Dec-2013 01:00	7.23 <sup>+</sup>
2014	6.11	4.59	4.03	3.42	2.69	2.21	14-Feb-2014 23:30	7.70 <sup>+</sup>
2015	4.85	3.82	3.55	3.30	2.79	2.31	15-Jan-2015 02:30	6.15
2016	4.97	4.03	3.51	2.92	2.31	1.86	02-Jan-2016 13:30	5.25
2017	4.84	3.68	3.15	2.79	2.28	1.83	03-Feb-2017 00:00	6.41

\*\* i.e. 5 % of the H<sub>s</sub> values measured in 2007 exceeded 2.47 m

<sup>+</sup>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 Weibull distribution.

Observation period	December 2006 to December 2017	
Return period (years)	Significant wave height (m)	Comments
0.25	4.83	No depth limitation
1	5.70	Depth-limited at MLWS
2	6.05	Depth-limited at MHWS
5	6.47	
10	6.75	Depth-limited at HAS
20	7.01	
50	7.33	
100	7.55	

## Distribution plots

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

- Annual time series of  $H_s$  (red line is 4.83 m storm alert threshold)
- Incidence of storm waves for 2017. 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 2017
- 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

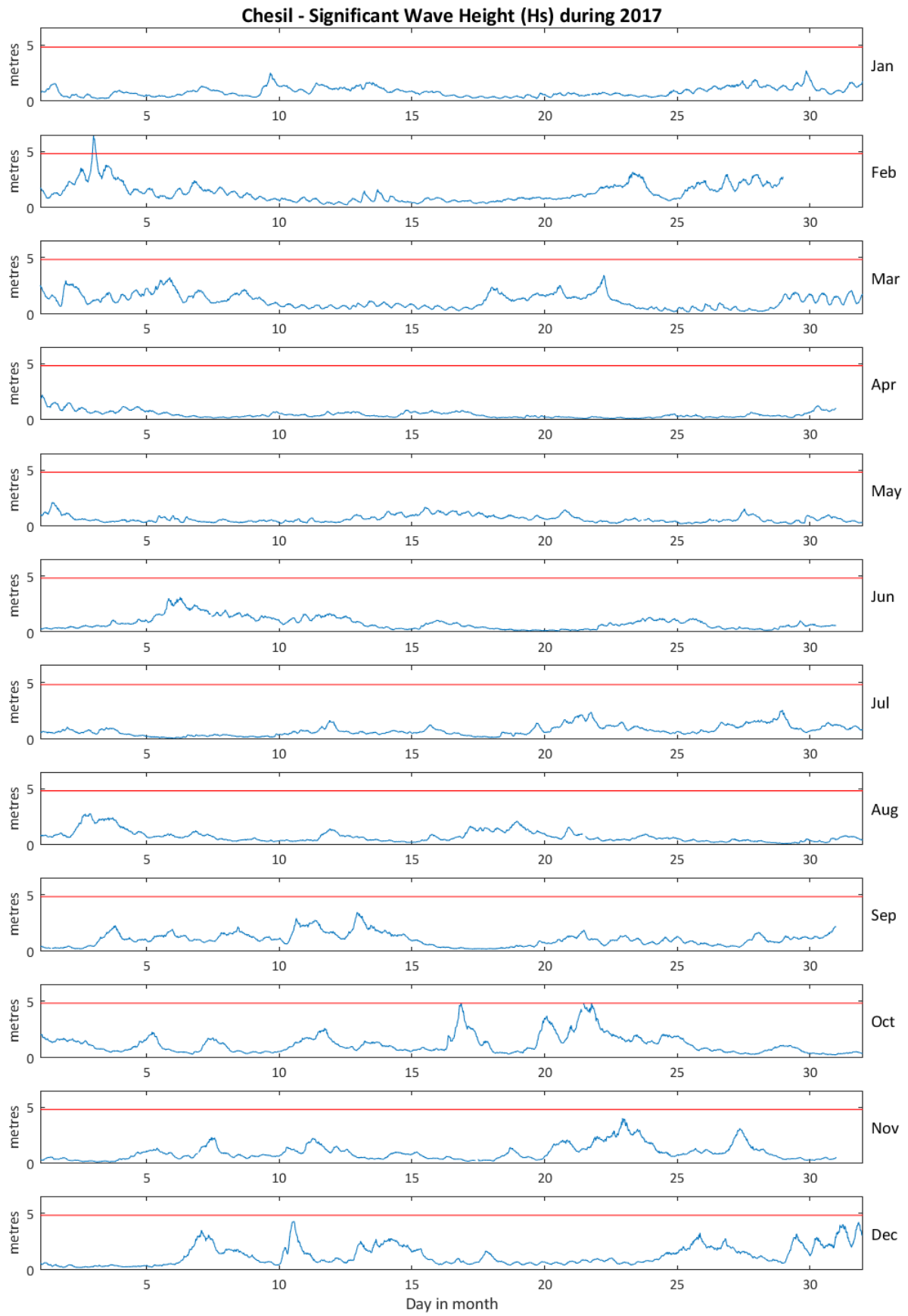
## General

The wave buoy at Chesil, owned by Teignbridge District Council, was deployed on 22 December 2006 at which time the magnetic declination at the site was 2.9° west, changing by 0.15° east per year.

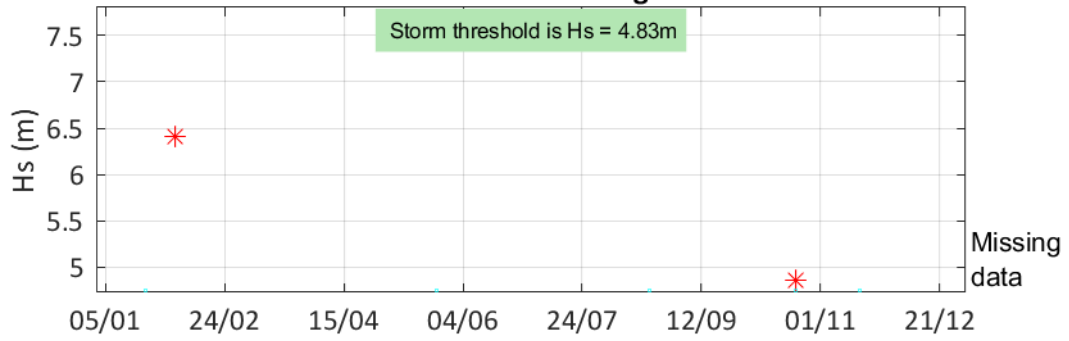
## Acknowledgements

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

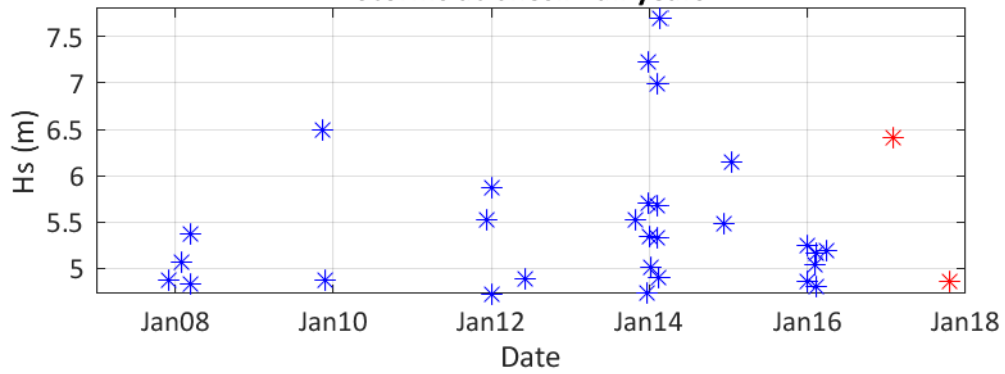
Tidal data at Dover were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.



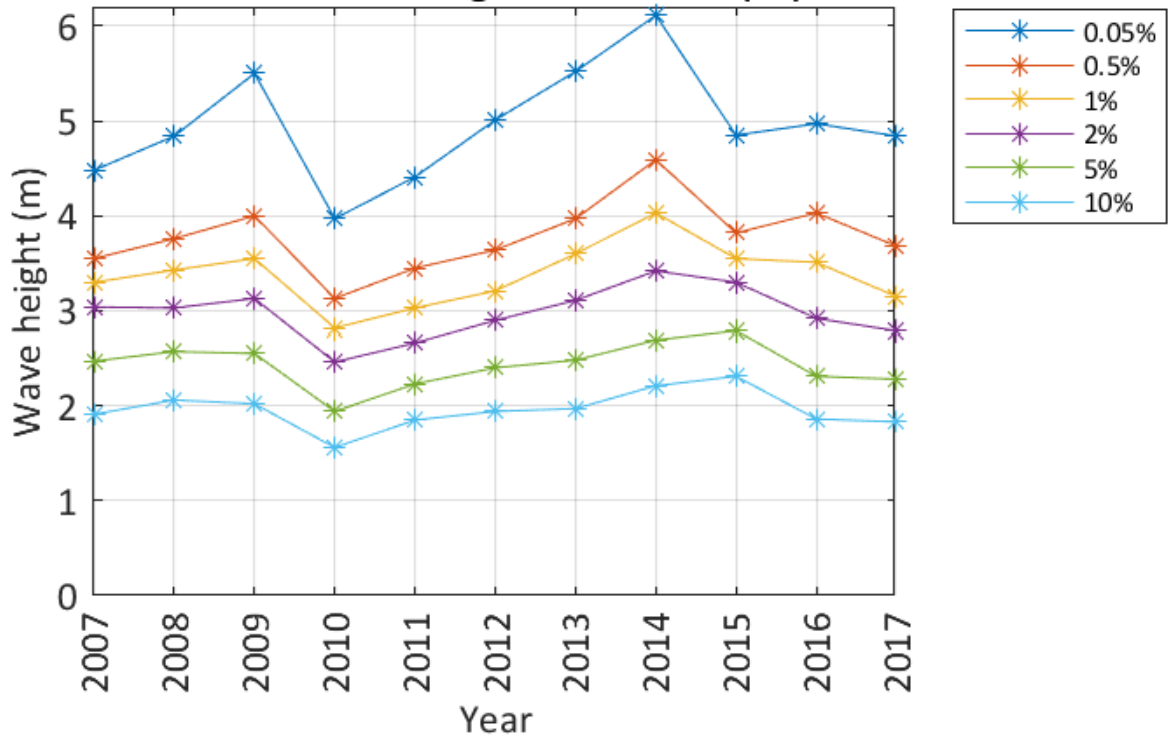
**Storms at Chesil during 2017**



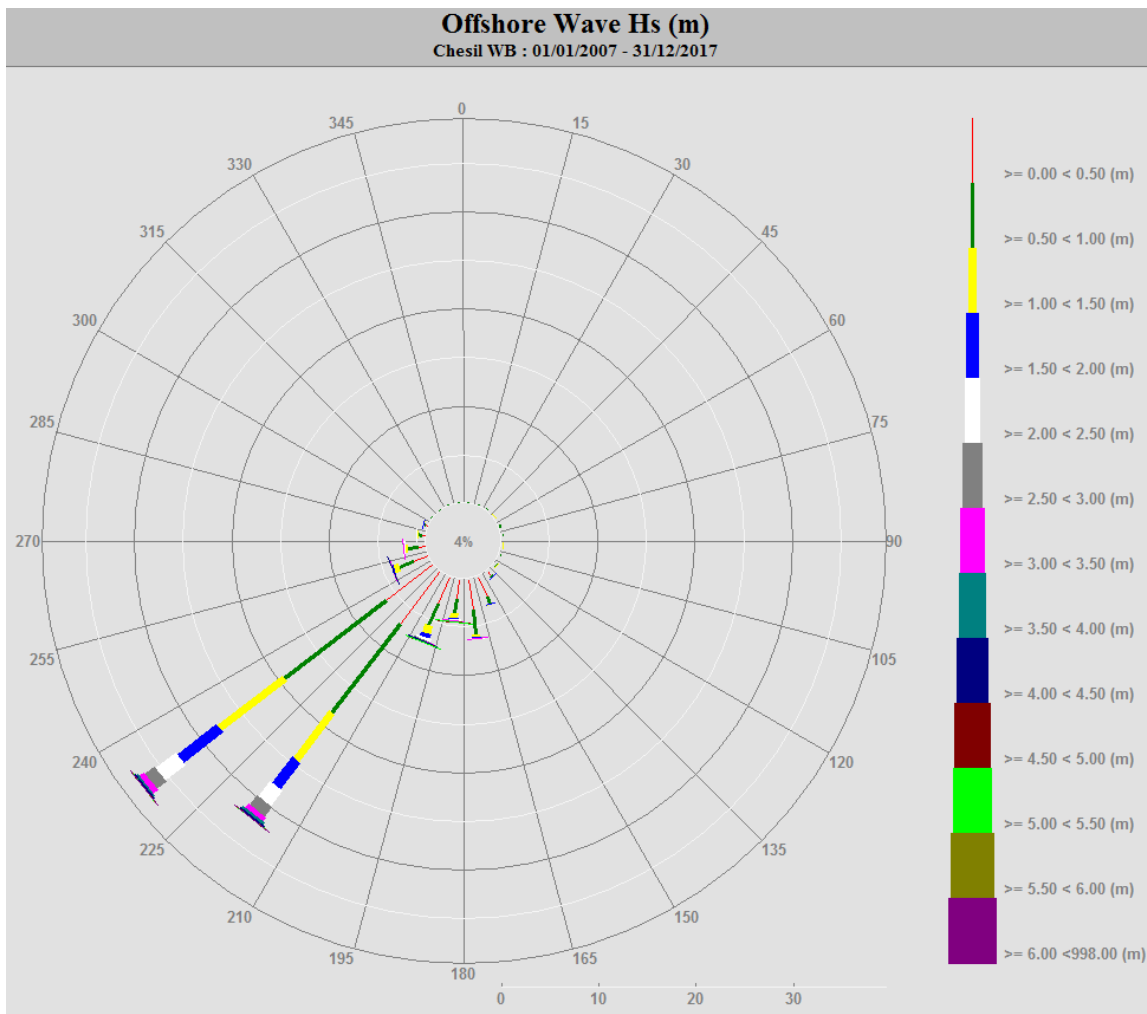
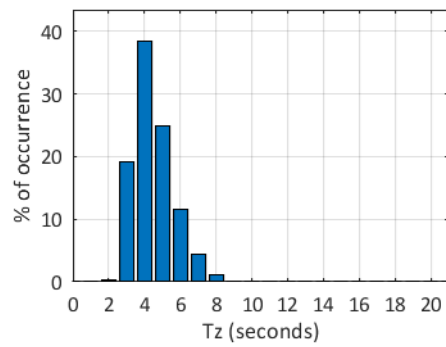
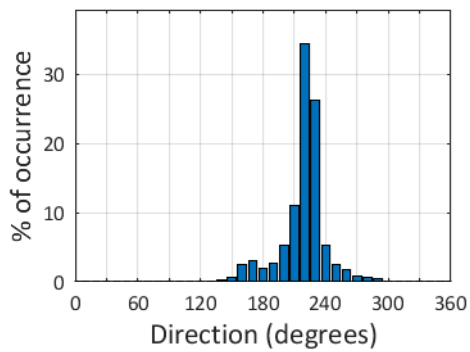
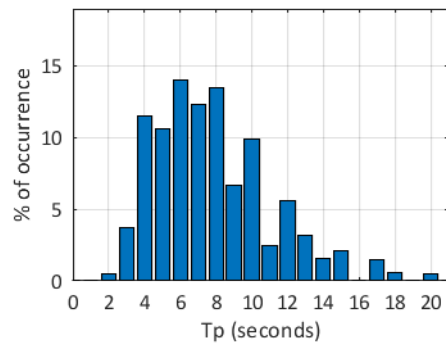
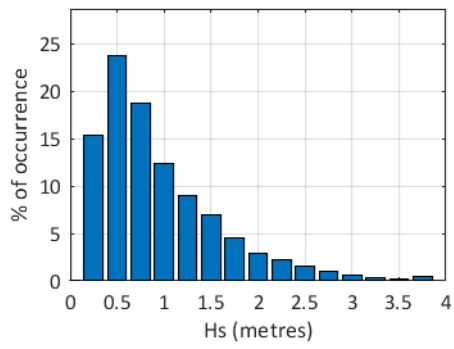
**Storms at Chesil - all years**



**Chesil - Wave height exceedence ( $H_s$ )**



Chesil 2017



Chesil 2007 to 2017 - Joint distribution (% of occurrence)

