



## Hornsea Directional Waverider Buoy

<b>Location</b>			
OS	527129 E 448502 N		
WGS84	Latitude: 53° 55.03' N Longitude: 00° 03.95' W		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~12m CD	Buoy in situ off Hornsea 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>
99	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	0.96	9.9	4.7	56	7.0	6	31
February	1.14	7.5	4.2	80	6.7	3	28
March	0.72	9.3	4.4	57	7.1	10	30
April	0.81	8.0	4.3	61	8.6	2	29
May	0.77	6.2	3.9	72	10.5	0	31
June	0.59	6.2	3.6	103	13.2	2	30
July	0.57	4.9	3.5	98	14.4	0	31
August	0.50	6.2	3.5	87	15.0	0	31
September	0.66	5.6	3.6	96	14.1	1	30
October	0.81	7.3	4.0	100	12.9	2	31
November	1.03	9.8	4.7	41	10.5	5	30
December	1.06	9.9	4.8	48	7.6	8	31

## Monthly Averages - All Years (June 2008 – December 2016)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.04	8.0	4.3	81	6.4	4
February	1.01	8.1	4.4	72	5.6	5
March	0.86	8.2	4.4	71	6.1	3
April	0.78	7.6	4.2	67	7.5	4
May	0.75	6.6	3.9	82	9.6	3
June	0.67	6.5	4.1	68	12.2	1
July	0.59	6.0	3.7	81	14.2	0
August	0.59	5.9	3.6	89	15.0	0
September	0.69	6.6	3.8	82	14.4	1
October	0.96	7.5	4.2	79	12.9	4
November	1.00	7.8	4.2	78	10.7	4
December	0.97	8.3	4.2	76	8.1	5

## 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)
13-Jan-2017 17:30	4.37	12.5	8.5	21	3.10	HW -1	6.00	-	-
12-Feb-2017 03:00	3.99	9.1	6.6	49	-1.00	HW -4	6.00	-	-
04-Jan-2017 18:30	3.36	11.8	7.0	30	0.40	HW -3	4.50	-	-
09-Dec-2017 01:30	3.32	11.1	8.0	20	-1.10	HW +6	5.30	-	-

\* Tidal information is estimated from the predicted tide levels (Admiralty Total Tide)

## 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)
2008	-	3.03	2.78	2.52	1.77	1.44	22-Nov-2008 13:30	3.78
2009	4.34	3.37	2.93	2.34	1.77	1.44	17-Dec-2009 14:30	4.87
2010	3.78	3.39	3.12	2.77	2.24	1.80	10-Jan-2010 04:00	4.08
2011	2.83	2.41	2.17	1.93	1.65	1.38	23-Jul-2011 21:00	2.99
2012	4.30	3.08	2.73	2.34	1.88	1.51	04-Apr-2012 04:30	4.99
2013	4.22	3.74	3.34	2.90	2.32	1.76	23-Mar-2013 07:00	4.52
2014	3.21	2.44	2.17	1.97	1.67	1.40	14-Oct-2014 05:00	3.40
2015	3.39	2.41	2.14	1.92	1.56	1.31	21-Nov-2015 08:30	3.76
2016	3.81	2.70	2.51	2.24	1.92	1.56	06-Nov-2016 20:30	4.08
2017	3.71	2.96	2.63	2.39	1.95	1.58	13-Jan-2017 17:30	4.37

\*\* i.e. 5 % of the H<sub>s</sub> values measured in 2008 exceeded 1.77 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 Weibull distribution.

Observation period	June 2008 to December 2017	
Return period (years)	Significant wave height (m)	Comments
0.25	3.29	No depth limitation
1	4.07	
2	4.45	
5	4.92	Depth-limited at MLWS
10	5.27	
20	5.61	
50	6.05	

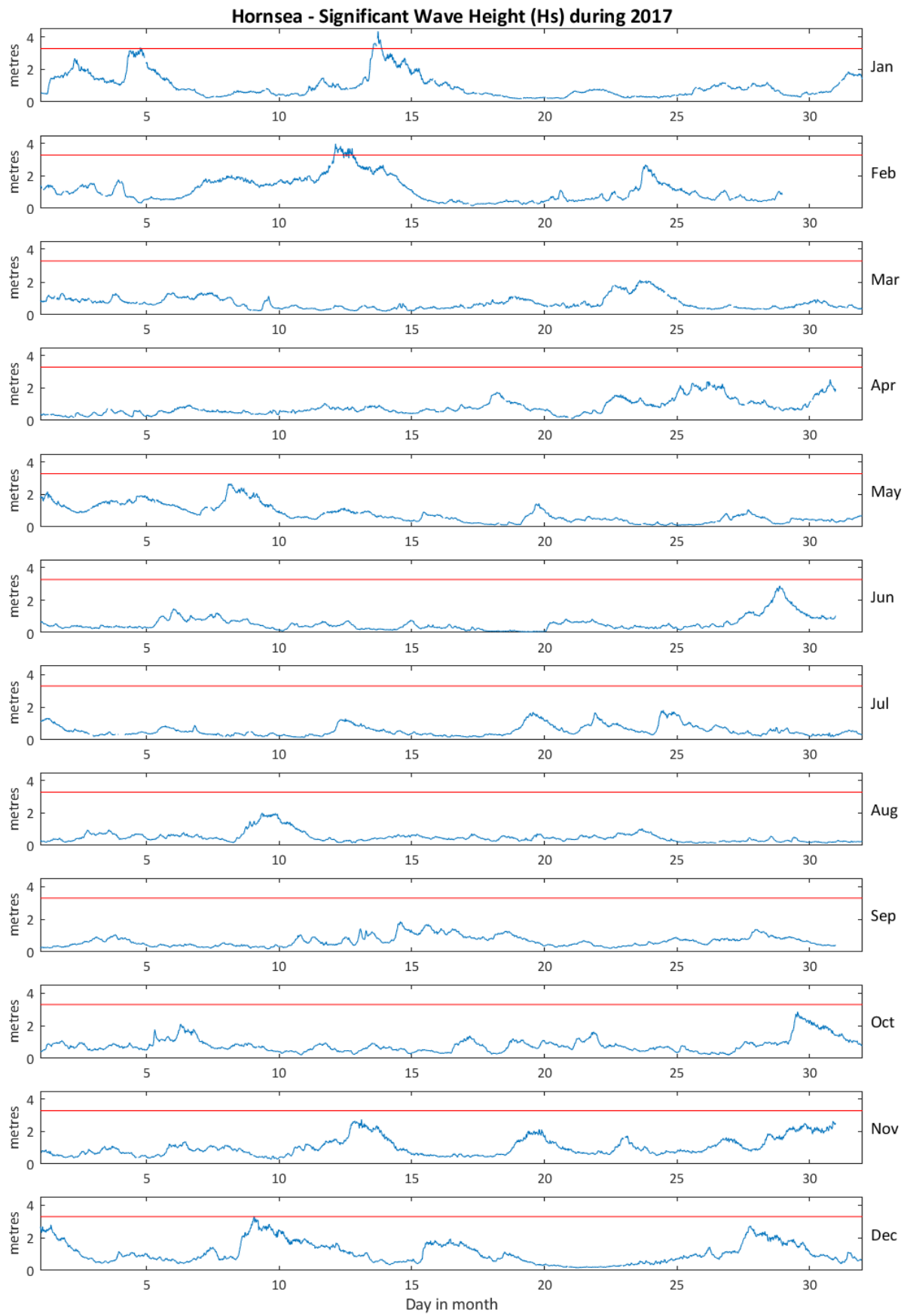
## Distribution plots

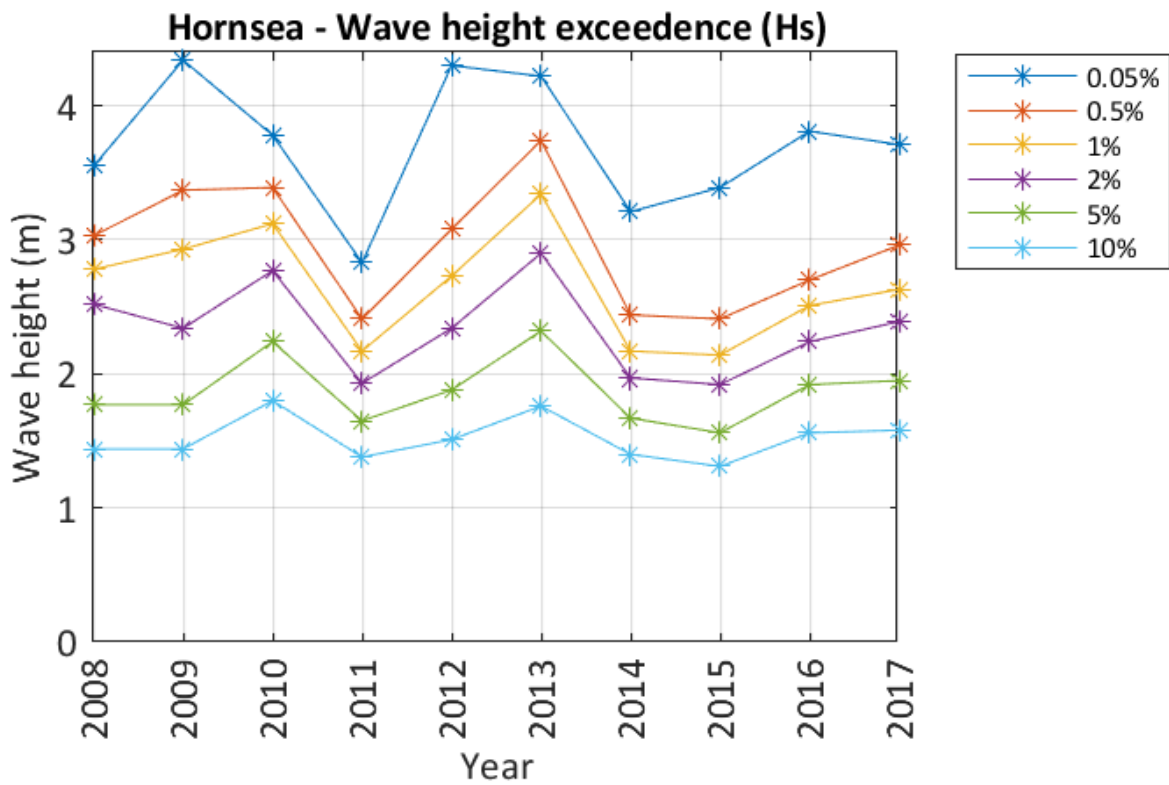
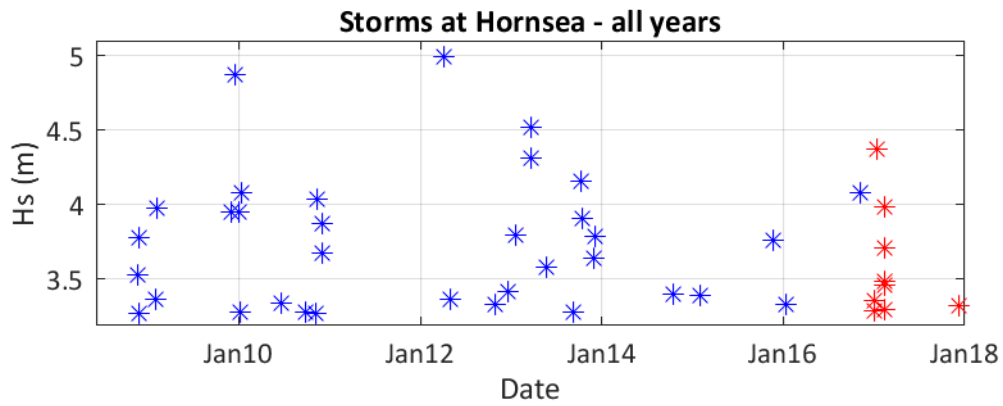
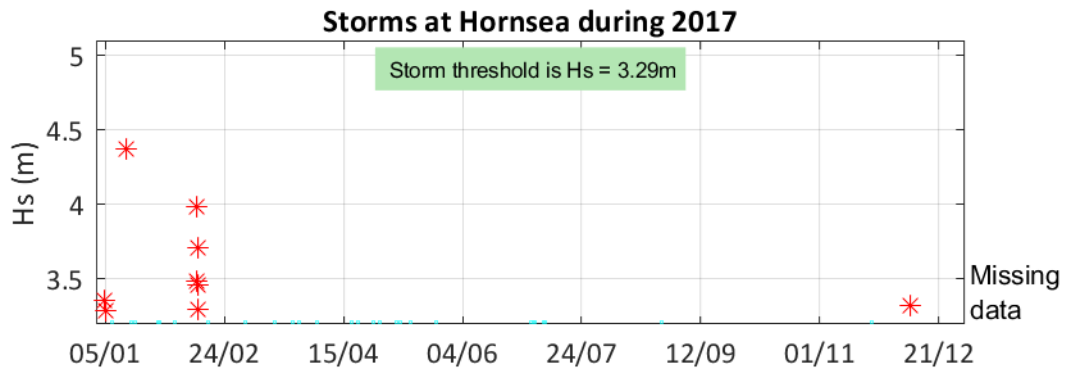
The distribution of wave parameters are shown in the accompanying graphs/tables of:

- Annual time series of  $H_s$  (red line is 3.29 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

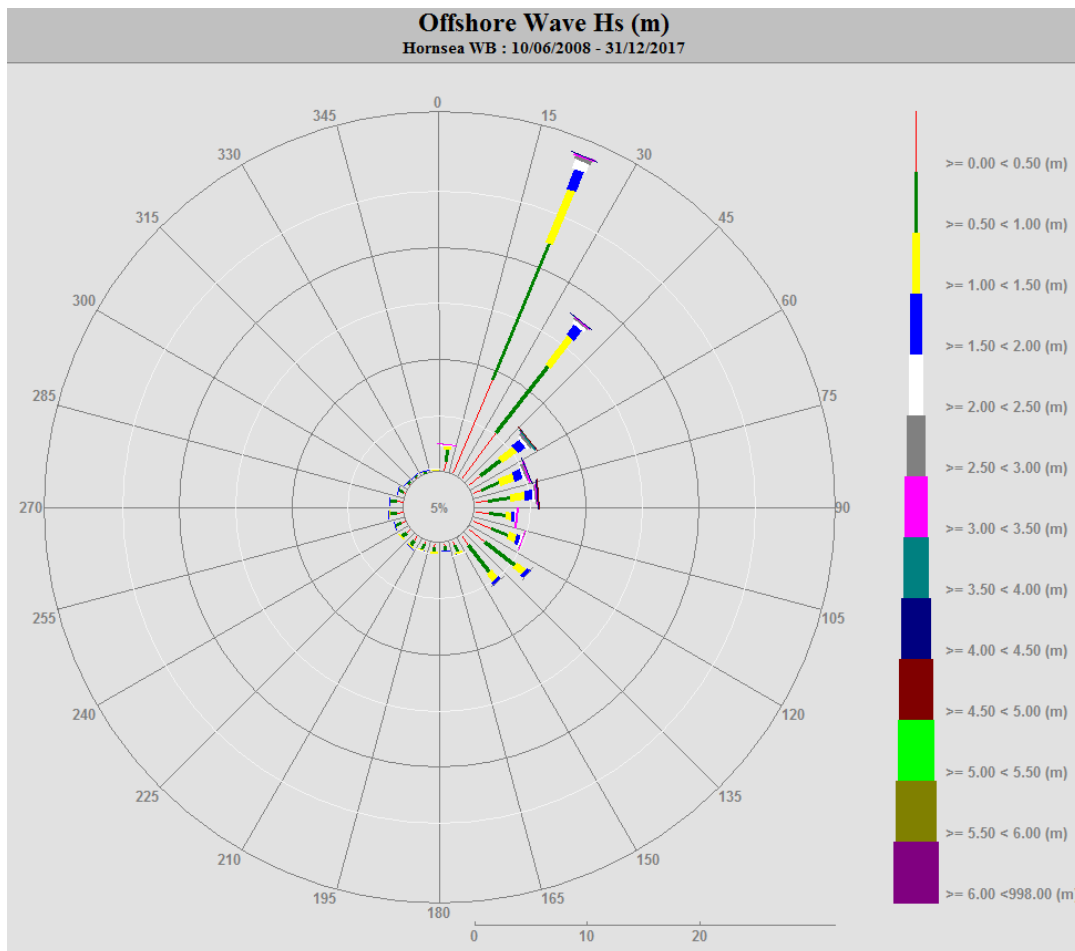
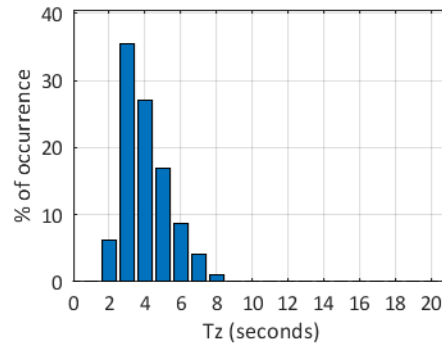
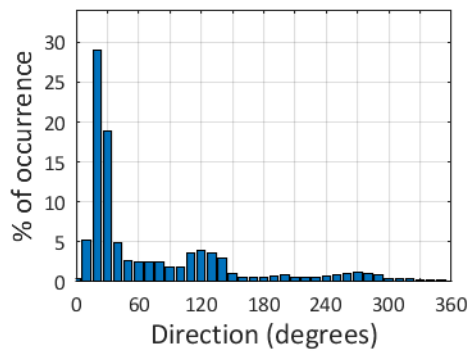
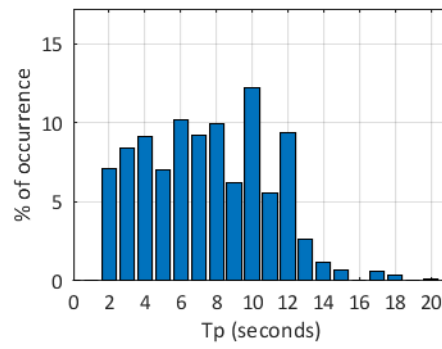
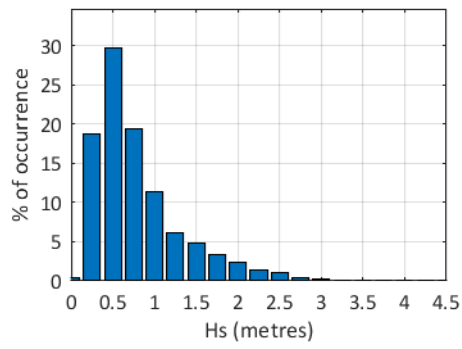
## General

The buoy, owned by East Riding of Yorkshire Council, was deployed on 5 June 2008, at which time the magnetic declination at the site was 2.2° west, changing by 0.15° east per year.





Hornsea 2017



Hornsea 2008 to 2017 - Joint distribution (% of occurrence)

