



## Start Bay Directional Waverider Buoy

<b>Location</b>			
OS	284976 E 44777 N		
WGS84	Latitude: 50° 17.50' N Longitude: 03° 36.97' W		
<b>Instrument type</b>		Buoy in situ in Start Bay. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping)
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~10m CD		

### Data Quality

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

### Monthly Averages - 2015

All times are GMT

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	No. of days
January	0.82	9.8	5.1	176	10.4	31
February	0.79	9.4	4.9	156	8.6	28
March	0.67	9.6	4.5	161	8.9	31
April	0.59	8.3	4.1	152	10.2	30
May	0.58	7.7	4.2	165	11.7	31
June	0.50	7.7	4.0	156	13.7	30
July	0.50	7.4	4.0	166	15.2	31
August	0.47	7.3	4.0	160	16.2	31
September	0.68	6.6	4.0	138	16.3	30
October	0.85	7.1	4.3	135	15.2	31
November	0.86	8.8	4.5	172	14.0	30
December	1.43	9.6	5.0	179	12.4	31

### Monthly Averages - All Years (April 2007 – December 2015)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)
January	0.99	9.5	5.0	164	9.6
February	0.92	9.8	4.9	162	8.6
March	0.75	8.9	4.5	156	8.6
April	0.64	8.6	4.4	155	9.9
May	0.55	7.5	4.0	153	11.6
June	0.50	7.5	4.0	156	13.8
July	0.45	6.9	3.9	161	15.3
August	0.48	7.0	4.0	163	16.2
September	0.56	7.4	4.0	151	16.4
October	0.78	7.9	4.3	157	15.4
November	0.87	8.4	4.6	159	13.4
December	0.98	9.1	4.9	163	11.1

## 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)
30-Dec-2015 09:30	3.63	11.1	6.5	188	-	HW	~3.5	-	-
15-Jan-2015 02:00	3.22	11.1	6.3	174	-	HW +2	~1.6	-	-

## 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	-	-	1.93	1.71	1.43	1.15	17-Dec-2007 23:30	3.41
2008	3.60	2.98	2.66	2.34	1.78	1.38	17-Apr-2008 20:30	3.94
2009	3.19	2.67	2.44	2.21	1.83	1.47	01-Feb-2009 09:00	3.36
2010	3.53	2.5	2.21	2.05	1.72	1.43	16-Jan-2010 05:30	3.73
2011	2.87	2.36	2.17	1.94	1.61	1.29	24-Oct-2011 15:30	3.27
2012	3.84	2.64	2.36	2.1	1.65	1.32	30-Apr-2012 03:00	4.36
2013	3.58	2.95	2.67	2.38	1.90	1.57	11-Mar-2013 14:00	3.78
2014	4.57	2.95	2.60	2.27	1.80	1.40	14-Feb-2014 21:30	5.25
2015	3.22	2.44	2.22	2.00	1.69	1.43	30-Dec-2015 09:30	3.63

\* i.e. 5 % of the H<sub>s</sub> values measured in 2007 exceeded 1.43 m

## Distribution plots

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

- Annual time series of H<sub>s</sub> (red line is 3.0 m storm threshold)
- Incidence of storm waves for 2015. Storm events are defined using the Peaks-over-Threshold method. The highest H<sub>s</sub> of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H<sub>s</sub>, T<sub>p</sub>, T<sub>z</sub> and Direction for 2015
- Joint distribution of all parameters for all measured data, given as percentage of occurrence
- Wave rose (percentage of occurrence of direction vs. H<sub>s</sub>) for all measured data

\* Tidal information used to be obtained from the WaveRadar REX on Teignmouth Pier but this was put out of action on 03 Feb 2014 by damage to the pier. Accordingly, the tidal stage and range are estimated from the predicted tide levels since there are no adjacent tide gauges.

## 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 3-hourly records and are calculated for periods up to 10 times the record length, using a Weibull distribution.

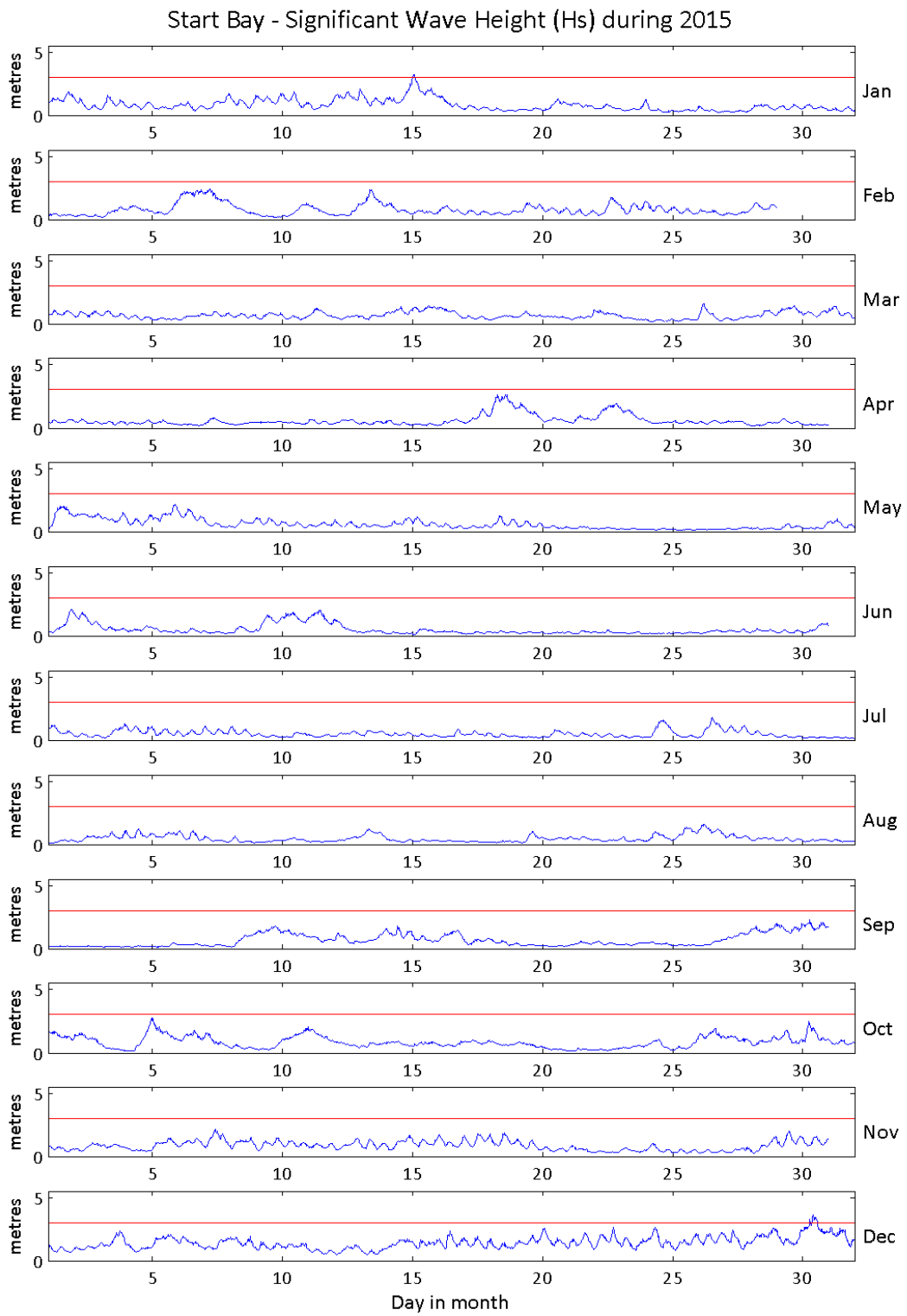
Return period (years)	Significant wave height (m)	Comments
1	3.9	No depth limitation
2	4.2	
5	4.5	Depth-limited at MLWS
10	4.8	
20	5.0	
50	5.4	

## General

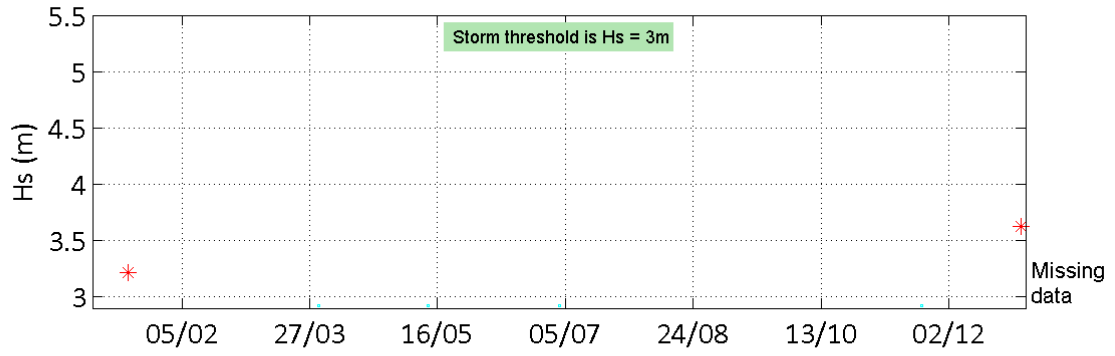
The buoy was first deployed on 5 April 2007, at which time the magnetic declination at the site was 3.2° west, changing by 0.15° east per year.

## Acknowledgements

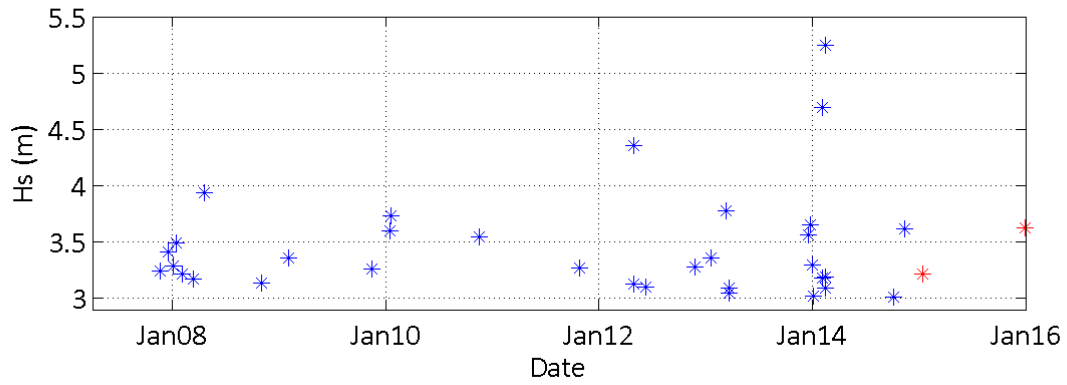
Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.



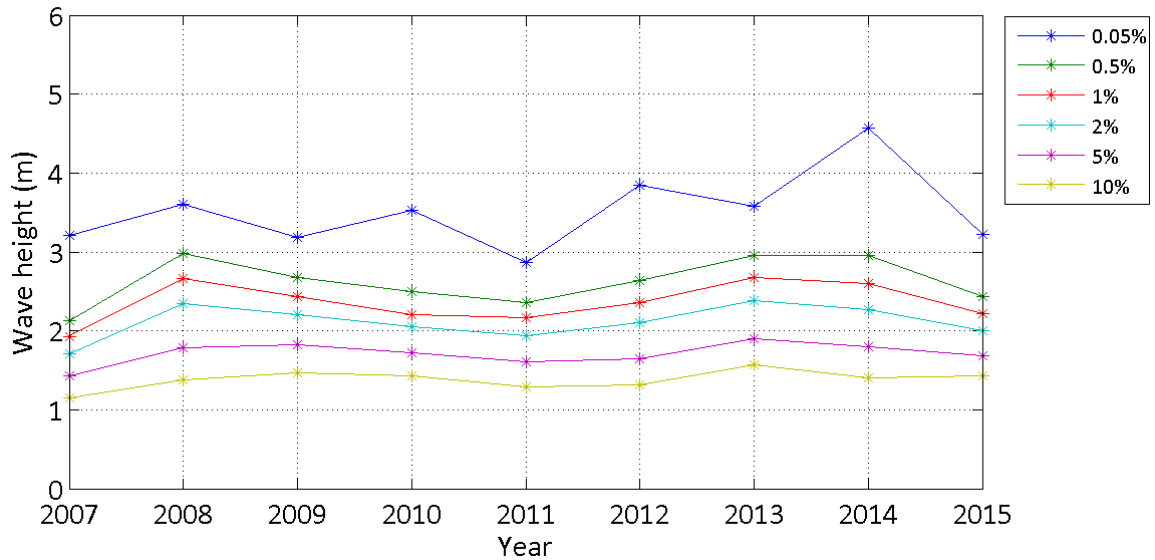
Storms at Start Bay during 2015



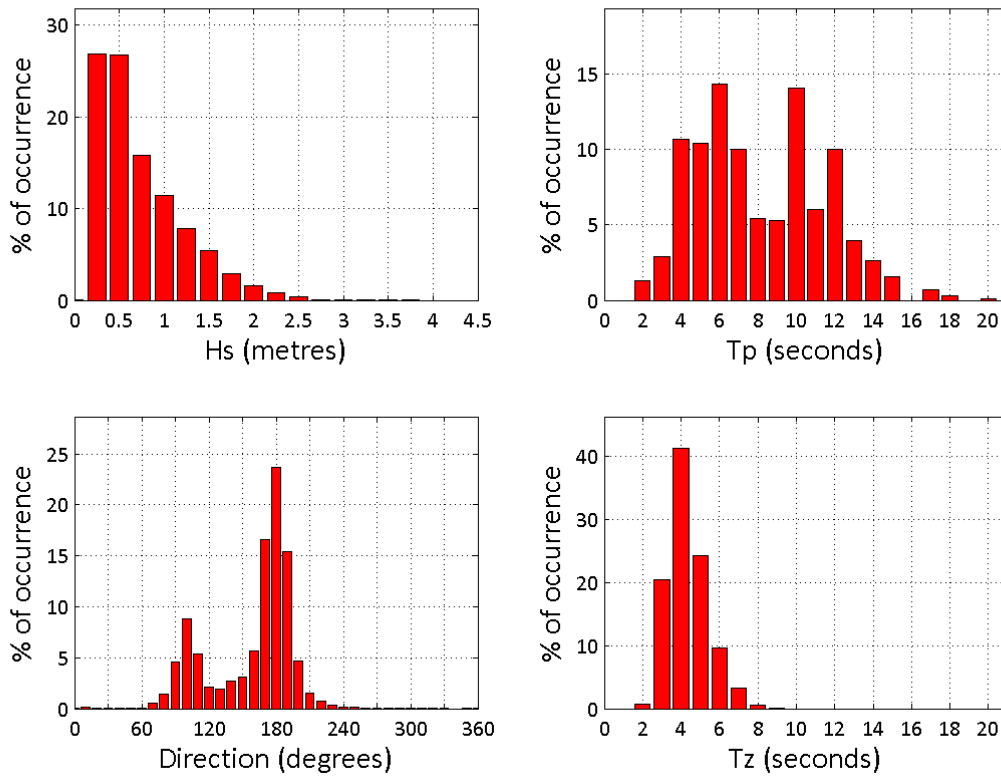
Storms at Start Bay - all years



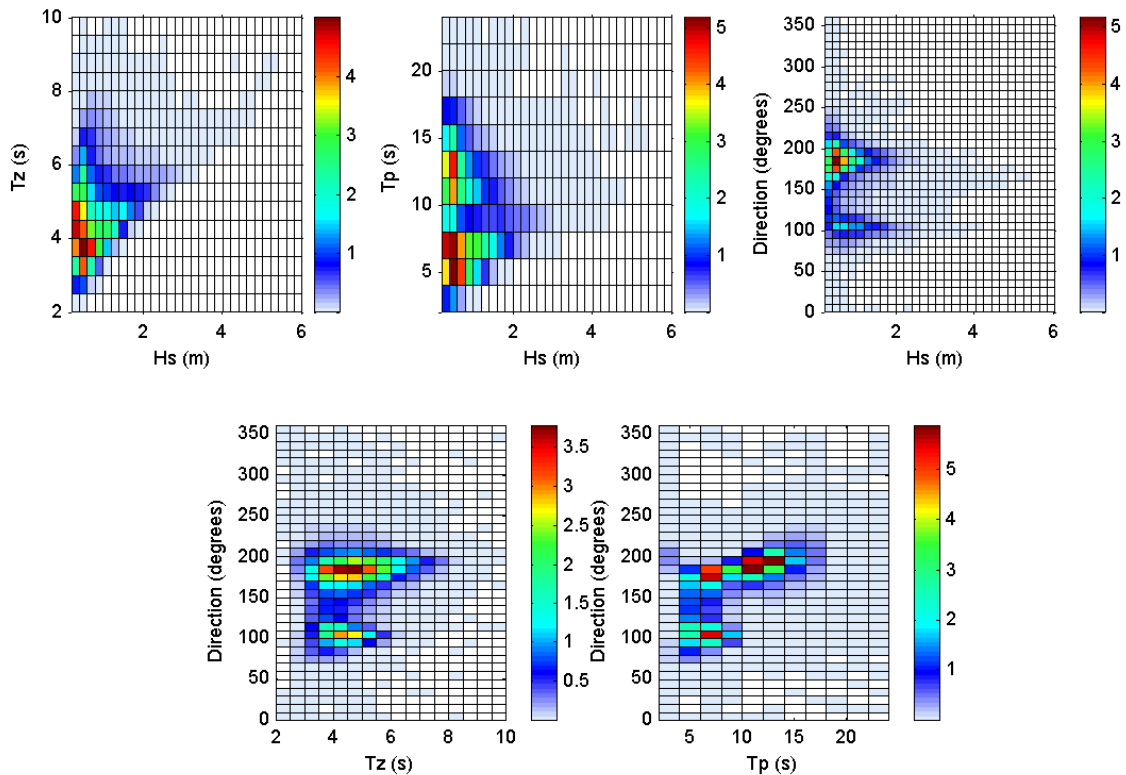
Start Bay - Wave height exceedence ( $H_s$ )



Start Bay 2015



Start Bay 2007 to 2015 - Joint distribution (% of occurrence)



### Offshore Wave Hs (m)

Start Bay WB : 05/04/2007 - 31/12/2015

