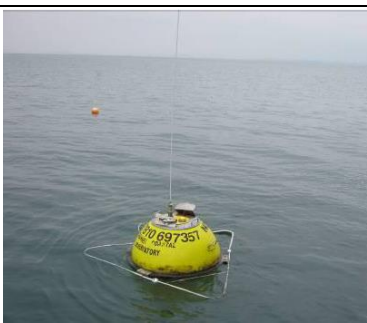



## Morecambe Bay Directional Waverider Buoy

<b>Location</b>			
OS	330198 E 455207 N		
WGS84	Latitude: 53° 59.29' N Longitude: 03° 03.96' W		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~10m CD	Buoy in situ in Morecambe Bay. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping)

### Data Quality

<b>Recovery rate (%)</b>	<b>Sample interval</b>
96	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	1.21	6.3	4.1	218	6.3	31
February	0.67	5.2	3.5	219	5.5	28
March	0.82	5.8	3.6	204	6.4	30
April	0.53	5.1	3.3	212	8.9	30
May	0.74	4.7	3.3	212	11.2	31
June	0.69	4.3	3.3	252	14.0	27
July	0.66	4.4	3.2	219	16.3	31
August	0.59	4.2	3.2	214	16.8	31
September	0.46	3.9	3.0	199	15.6	29
October	0.45	5.1	3.2	168	13.3	23
November	1.16	6.2	4.1	212	11.5	30
December	1.19	6.8	4.2	212	-	31

### Monthly Averages - All Years (June 2011 – December 2015)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)
January	0.92	5.6	3.7	203	6.1
February	0.72	5.4	3.5	208	5.3
March	0.57	5.1	3.3	183	6.6
April	0.52	4.6	3.1	185	8.7
May	0.56	4.2	3.1	195	11.5
June	0.51	4.1	3.1	217	14.8
July	0.48	4.0	3.0	214	17.2
August	0.60	4.4	3.2	216	17.6
September	0.61	4.7	3.3	205	15.8
October	0.72	5.1	3.4	190	13.1
November	0.78	5.5	3.5	205	10.1
December	1.12	6.2	4.1	216	7.5

## 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)
29-Nov-2015 12:00	3.94	7.7	5.7	218	-	HW -1	~8.2	-	-
09-Jan-2015 03:30	3.90	10.0	7.8	219	2.90	HW +2	7.1	0.97	1.47
15-Jan-2015 18:00	3.60	9.1	6.2	222	3.56	HW	4.3	1.06	1.16
10-Jan-2015 14:00	3.55	8.3	6.1	224	4.31	HW	7.1	0.37	1.06
16-Nov-2015 02:30	3.46	9.1	6.9	216	-	HW +1	~6.8	-	-

## 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)
2011	-	-	-	2.47	2.04	1.65	13-Dec-2011 12:00	3.65
2012	3.02	2.47	2.23	1.97	1.59	1.27	22-Feb-2012 12:00	3.38
2013	3.74	2.66	2.37	2.09	1.63	1.32	27-Dec-2013 06:30	4.38
2014	3.64	2.73	2.50	2.20	1.80	1.42	12-Feb-2014 21:30	4.46
2015	3.55	2.96	2.76	2.50	2.02	1.65	29-Nov-2015 12:00	3.94

\* i.e. 5 % of the H<sub>s</sub> values measured in 2011 exceeded 2.04 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 3.2 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

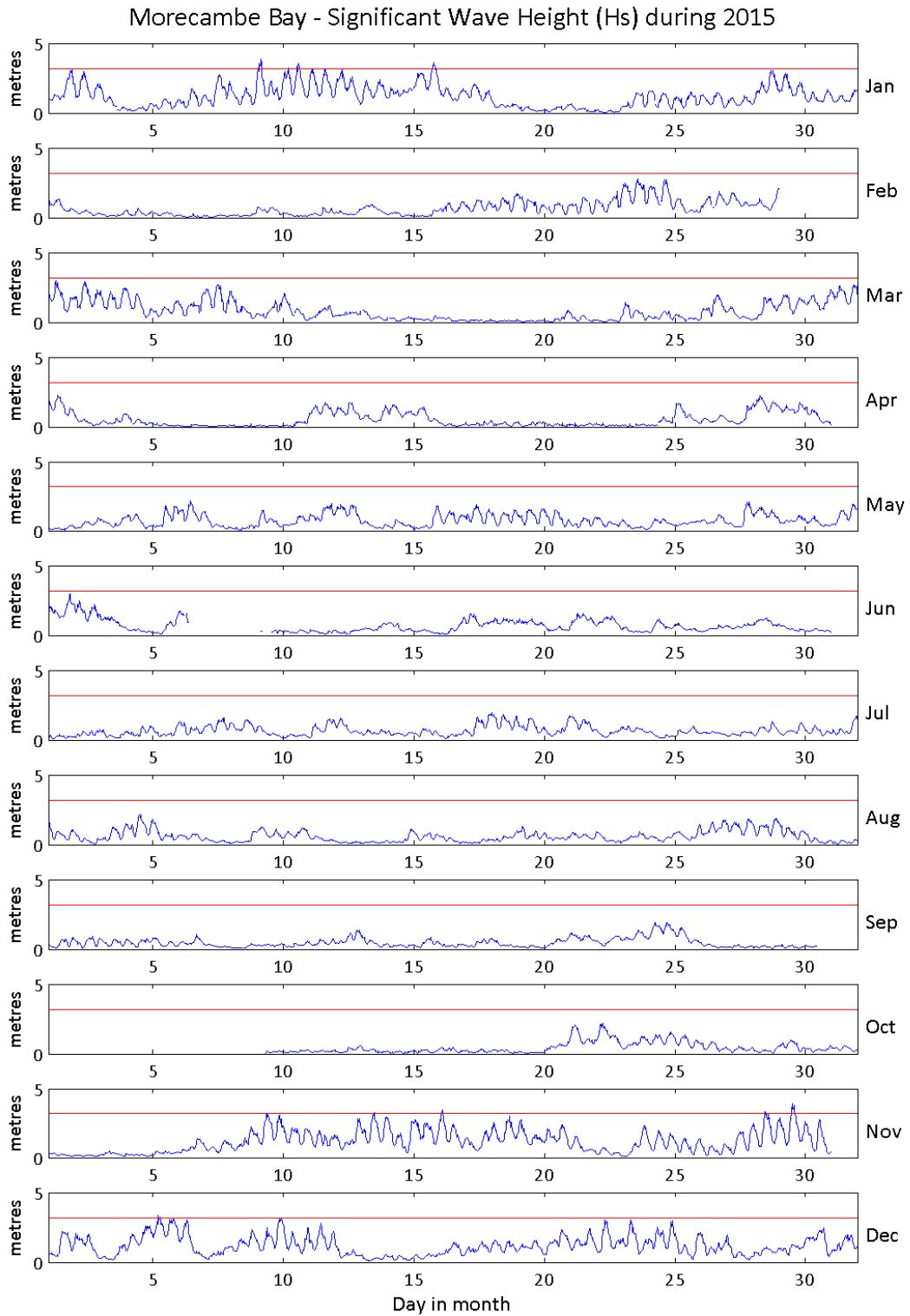
## General

The wave buoy was deployed on 29 June 2011, at which time the magnetic declination at the site was 3.0° west, changing by 0.16° east per year. There is a notable tidal signature to significant wave heights at this location, given the water depth of the buoy (~10m CD) and the spring tidal range (~8.5m).

\* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Heysham). 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.

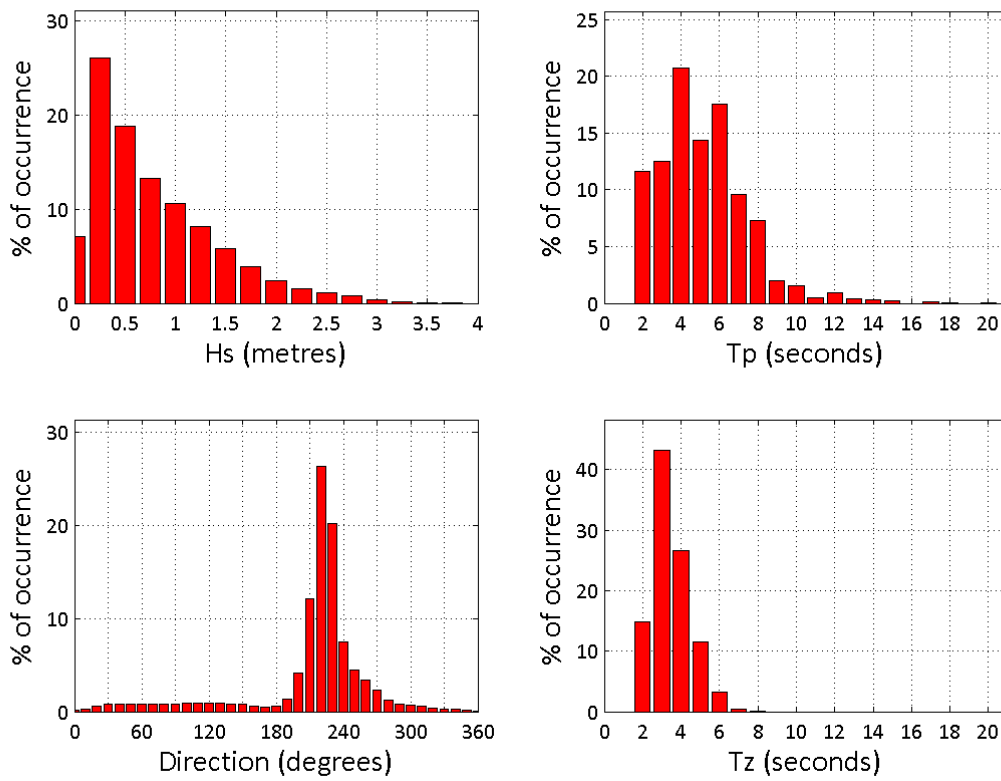
## Acknowledgements

The shore station is kindly hosted by Café Cove, Cleveleys. 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.





Morecambe Bay 2015



Morecambe Bay 2011 to 2015 - Joint distribution (% of occurrence)

