



## Gwynt y Môr Directional Waverider Buoy

<b>Location</b>			
OS	300326 E 398867 N		
WGS84	Latitude: 53° 28.62' N Longitude: 03° 30.20' W		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~10m CD	Example buoy in situ. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 Bluesky)

## Data Quality

Recovery rate (%)	Sample interval
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	0.95	4.7	3.6	243	7.1	0	31
February	0.95	4.6	3.5	222	7.1	0	28
March	0.75	4.4	3.4	239	8.0	0	31
April	0.73	4.3	3.3	276	9.7	0	30
May	0.47	3.8	3.0	196	11.4	0	31
June	0.79	4.4	3.4	250	14.8	0	30
July	0.59	4.0	3.1	255	16.7	0	31
August	0.68	4.1	3.2	270	17.0	0	31
September	0.87	4.5	3.5	256	16.0	0	30
October	1.25	5.1	3.9	266	14.1	1	31
November	1.28	5.3	4.0	297	11.4	0	30
December	1.25	5.3	4.0	279	8.0	0	31

## Monthly Averages - All Years (Jan 2009 – December 2016)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.03	4.8	3.6	229	6.7	0
February	0.91	4.7	3.5	232	6.0	0
March	0.75	4.4	3.3	230	6.5	0
April	0.66	4.4	3.3	223	8.1	0
May	0.72	4.3	3.3	231	10.5	0
June	0.53	4.0	3.1	229	13.6	0
July	0.61	4.0	3.1	250	15.8	0
August	0.73	4.2	3.3	255	16.6	0
September	0.83	4.4	3.4	248	16.0	0
October	0.87	4.4	3.4	215	14.0	0
November	1.11	4.9	3.7	237	11.4	1
December	1.24	5.1	3.9	247	8.7	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)
23-Feb-2017 11:30	6.37	11.1	8.2	293	3.12	HW +1	6.46	1.99	2.00
13-Jan-2017 10:30	4.55	8.3	6.5	321	4.15	HW -1	8.10	0.00	0.54
22-Oct-2017 08:00	4.36	8.3	6.5	287	-2.32	HW -4	7.31	0.46	0.68
07-Dec-2017 23:00	3.87	8.3	5.9	294	~0.07	HW -4	7.50	0.00	~0.50
11-Jan-2017 18:00	3.78	8.3	6.1	297	-2.55	HW -4	7.80	0.20	0.47

\* Tidal information is obtained from the National Network gauge at Liverpool. 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)
2009	3.14	2.85	2.7	2.51	2.11	1.71	03-Sep-2009 06:00	3.34
2010	4.45	2.85	2.41	2.07	1.7	1.39	12-Nov-2010 03:30	4.87
2011	3.93	3.37	3.08	2.8	2.32	1.84	07-Dec-2011 14:30	4.1
2012	3.22	2.91	2.61	2.32	1.96	1.58	26-Nov-2012 20:30	3.45
2013	4.18	3.48	3.23	2.86	2.25	1.73	05-Dec-2013 13:30	4.61
2014	4.43	3.36	2.93	2.55	2.06	1.66	12-Feb-2014 19:30	4.72
2015	4.28	3.57	3.25	2.94	2.43	1.93	29-Nov-2015 18:30	4.49
2016	3.44	2.77	2.58	2.32	1.86	1.42	03-Mar-2016 00:30	4.01
2017	4.93	3.40	3.07	2.69	2.24	1.75	23-Feb-2017 11:30	6.37 <sup>+</sup>

\*\* i.e. 5 % of the H<sub>s</sub> values measured in 2009 exceeded 2.11 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	January 2009 to June 2017	
Return period (years)	Significant wave height (m)	Comments
0.25	3.89	No depth limitation
1	4.49	Depth-limited at MLWS
2	4.73	
5	5.01	
10	5.20	
20	5.38	
50	5.59	

## Distribution plots

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

- Annual time series of  $H_s$  (red line is 3.89 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

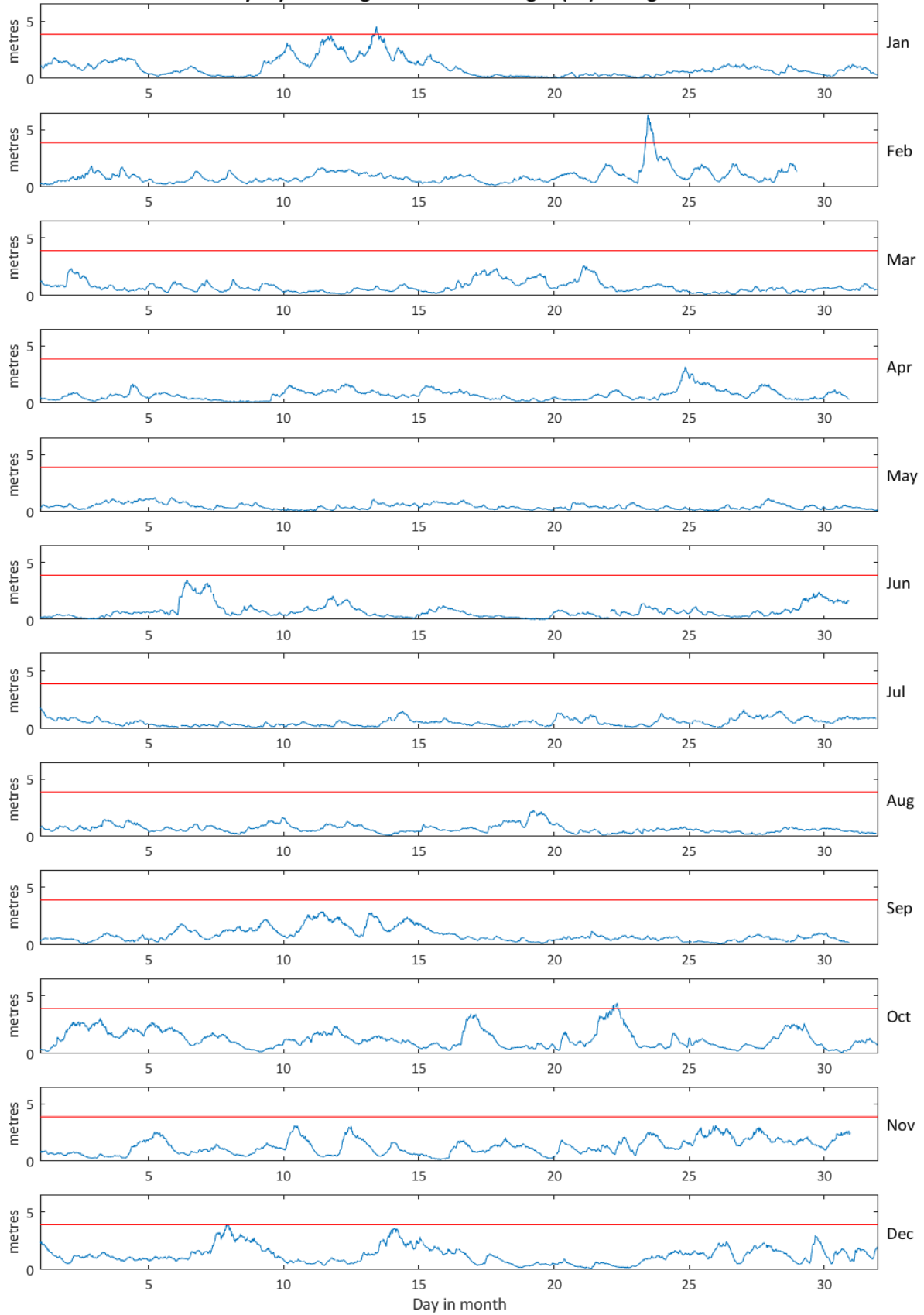
The buoy was first deployed on 27 April 2007, at which time the magnetic declination at the site was 3.79° west, changing by 0.16° east per year.

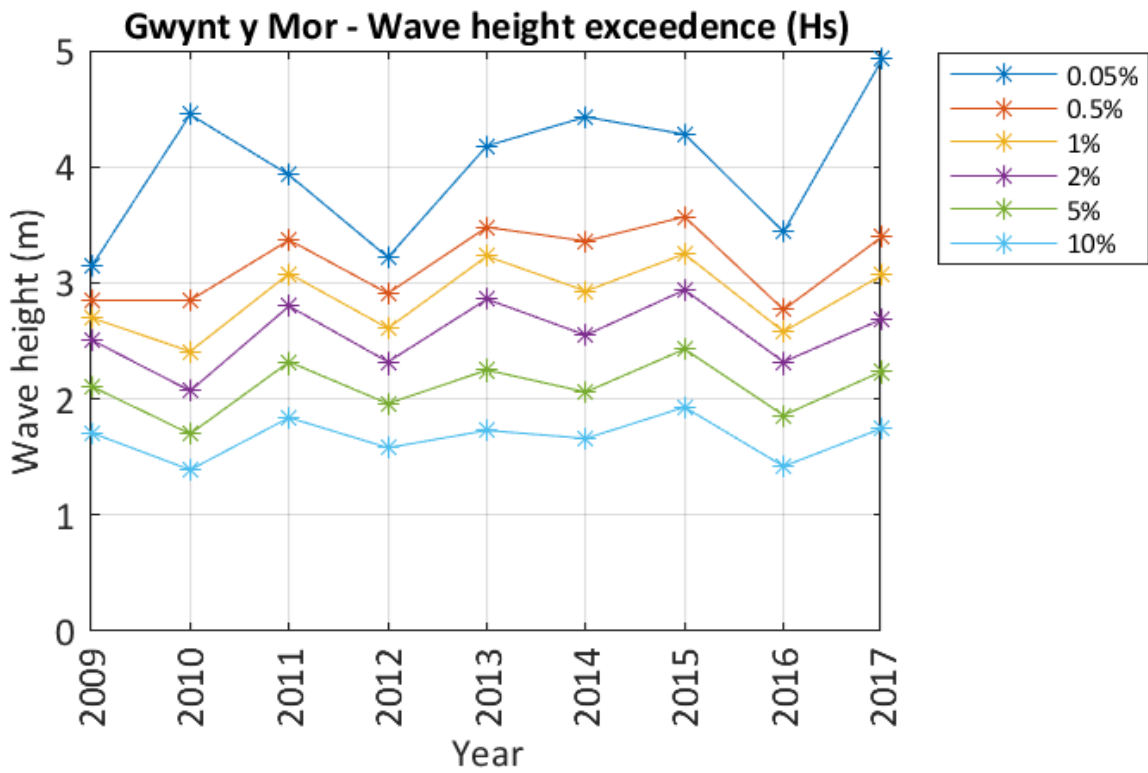
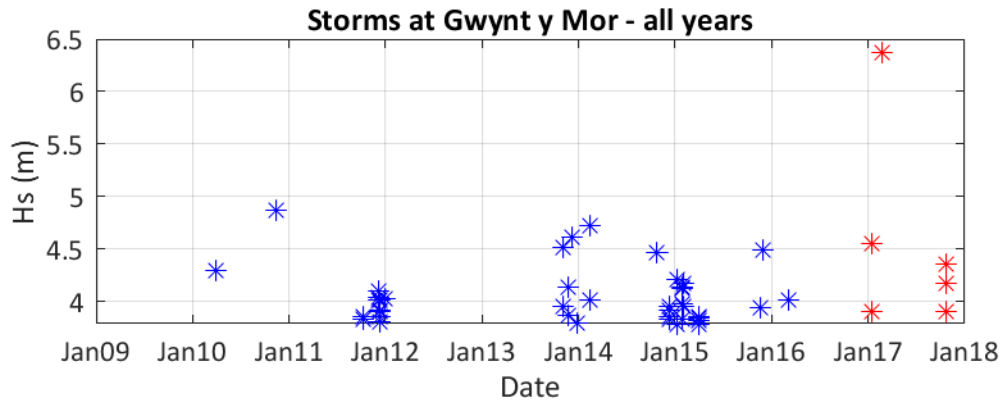
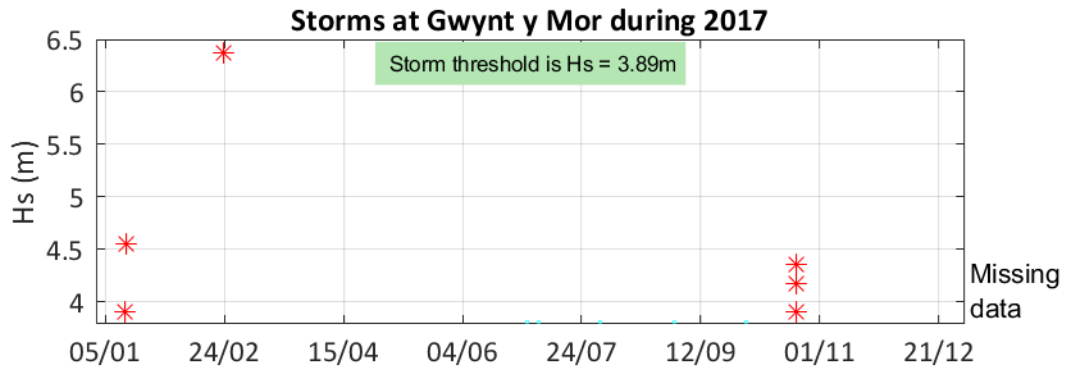
## Acknowledgements

The Datawell Directional Waverider Mk III is owned by RWE Innogy UK Limited, who have kindly agreed to make both real-time and archived data freely available under the Open Government Licence, via the Channel Coastal Observatory website (<http://www.channelcoast.org>).

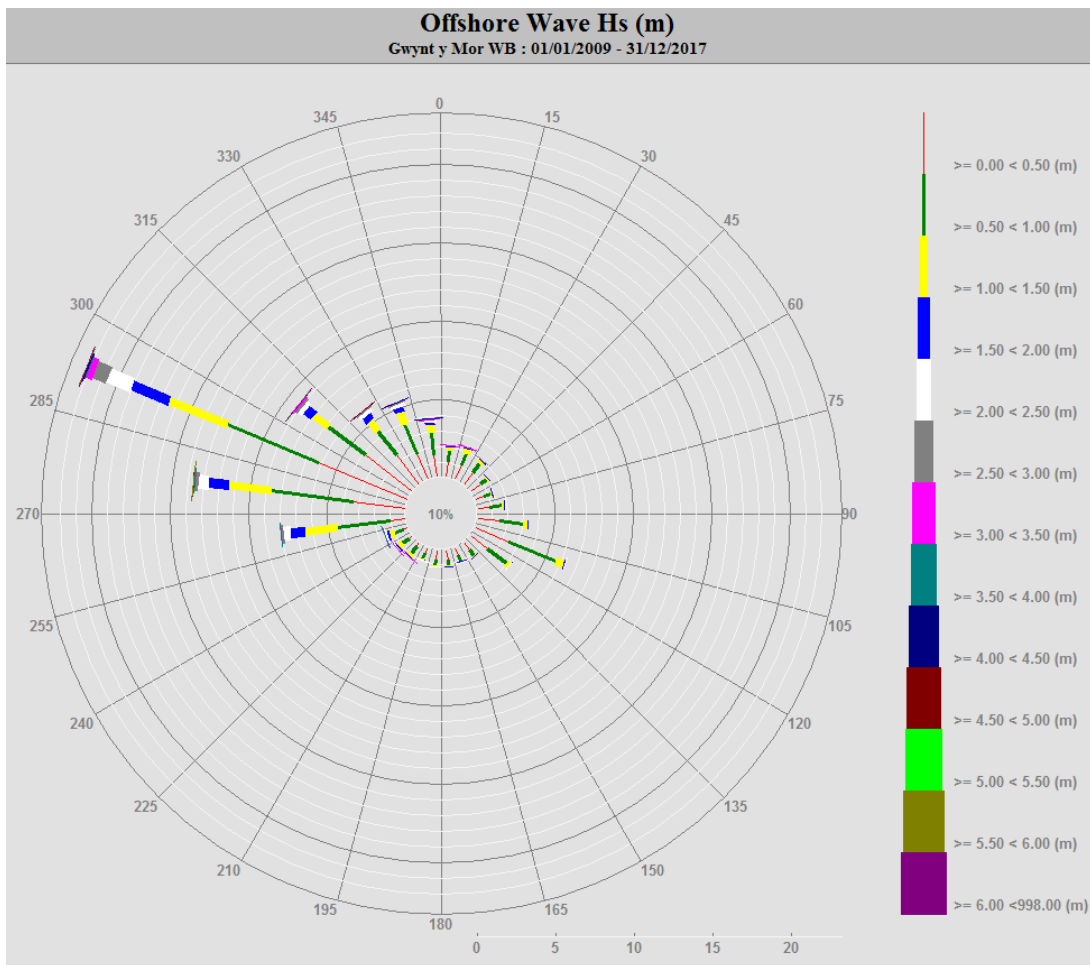
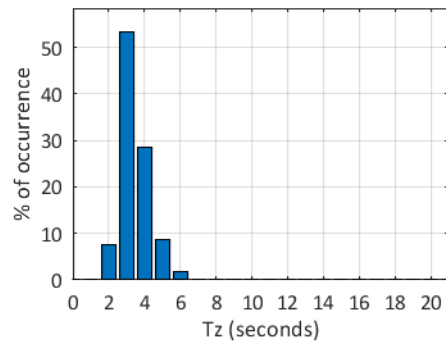
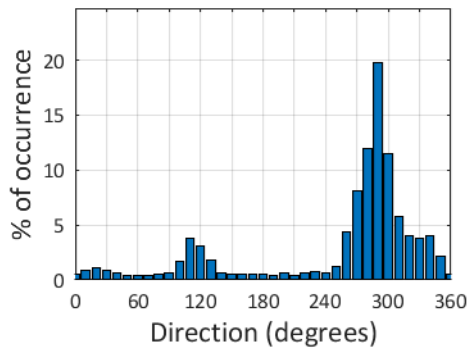
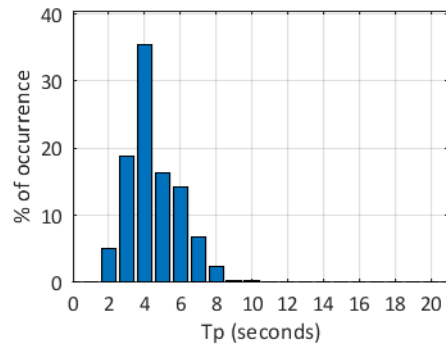
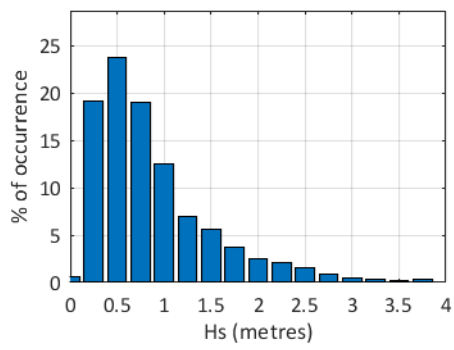
Tidal data at Liverpool were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.

### Gwynt y Mor - Significant Wave Height (Hs) during 2017





### Gwynt y Mor 2017



Gwynt y Mor 2009 to 2017 - Joint distribution (% of occurrence)

