Gwynt y Môr Directional Waverider Buoy

Location			
OS	300222 E 398884 N		
WGS84	*Latitude:* 53° 28.38' N *Longitude:* 03° 30.18' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~10m CD	Example buoy in situ. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping)

Data Quality

Recovery rate (%)	Sample interval
92	30 minutes

Monthly Averages - 2015

All times are GMT

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	1.63	5.7	4.3	265	7.3	1%	31
February	0.91	4.7	3.5	263	5.1	0%	28
March	1.03	4.9	3.7	241	5.7	0%	31
April	0.69	4.5	3.4	247	7.6	0%	29
May	0.86	4.5	3.4	251	9.9	0%	31
June	0.63	4.1	3.2	259	12.8	0%	30
July	0.72	4.2	3.3	258	14.9	0%	31
August	0.56	4.0	3.1	242	15.7	0%	28
September	0.63	3.9	3.1	233	15.5	0%	22
October	0.61	4.1	3.1	188	13.8	0%	29
November	1.49	5.5	4.1	255	11.7	0%	29
December	1.30	5.1	4.0	236	10.0	2%	17

Monthly Averages - All Years (Jan 2009 – December 2014)

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	0.92	4.6	3.5	222	6.5	0%
February	0.92	4.7	3.5	226	6.1	0%
March	0.70	4.3	3.3	223	6.5	0%
April	0.63	4.3	3.2	217	8.2	0%
May	0.73	4.3	3.3	229	10.5	0%
June	0.54	4.0	3.1	224	13.6	0%
July	0.59	4.0	3.1	246	15.8	0%
August	0.75	4.3	3.3	258	16.6	0%
September	0.86	4.4	3.4	247	15.8	0%
October	0.95	4.6	3.5	228	13.9	0%
November	1.06	4.8	3.6	233	11.5	1%
December	1.33	5.3	3.9	252	8.5	0%

Storm Analysis

Date/Time	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	Water level elevation * (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
29-Nov-2015 19:00	4.49	9.1	7.1	297	-2.55	HW + 6	6.89	0.50	0.66
10-Jan-2015 11:00	4.21	8.3	6.1	293	1.26	HW - 2	5.17	0.42	0.63
01-Feb-2015 00:30	4.18	8.3	6.7	328	-0.85	HW - 3	4.76	-0.40	-0.5
17-Nov-2015 21:30	3.94	8.3	6.2	280	-1.46	HW - 5	4.19	0.63	0.79
31-Mar-2015 04:30	3.86	9.1	6.3	288	-0.18	HW - 4	3.59	0.60	0.82

Annual Statistics

Year	Annual H_s exceedance* (m)						Annual Maximum H_s	
	0.05%	0.5%	1%	2%	5%	10%	Date	A_{max} (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

** i.e. 5 % of the H_s values measured in 2009 exceeded 2.11 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 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	4.43	No depth limitation
2	4.65	Depth limited at MLWS
5	4.93	
10	5.13	
20	5.33	
50	5.58	

** Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Llandudno). The surge shown is the residual at the time of the highest H_s. The maximum tidal surge is the largest surge during the storm event.*

Distribution plots

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

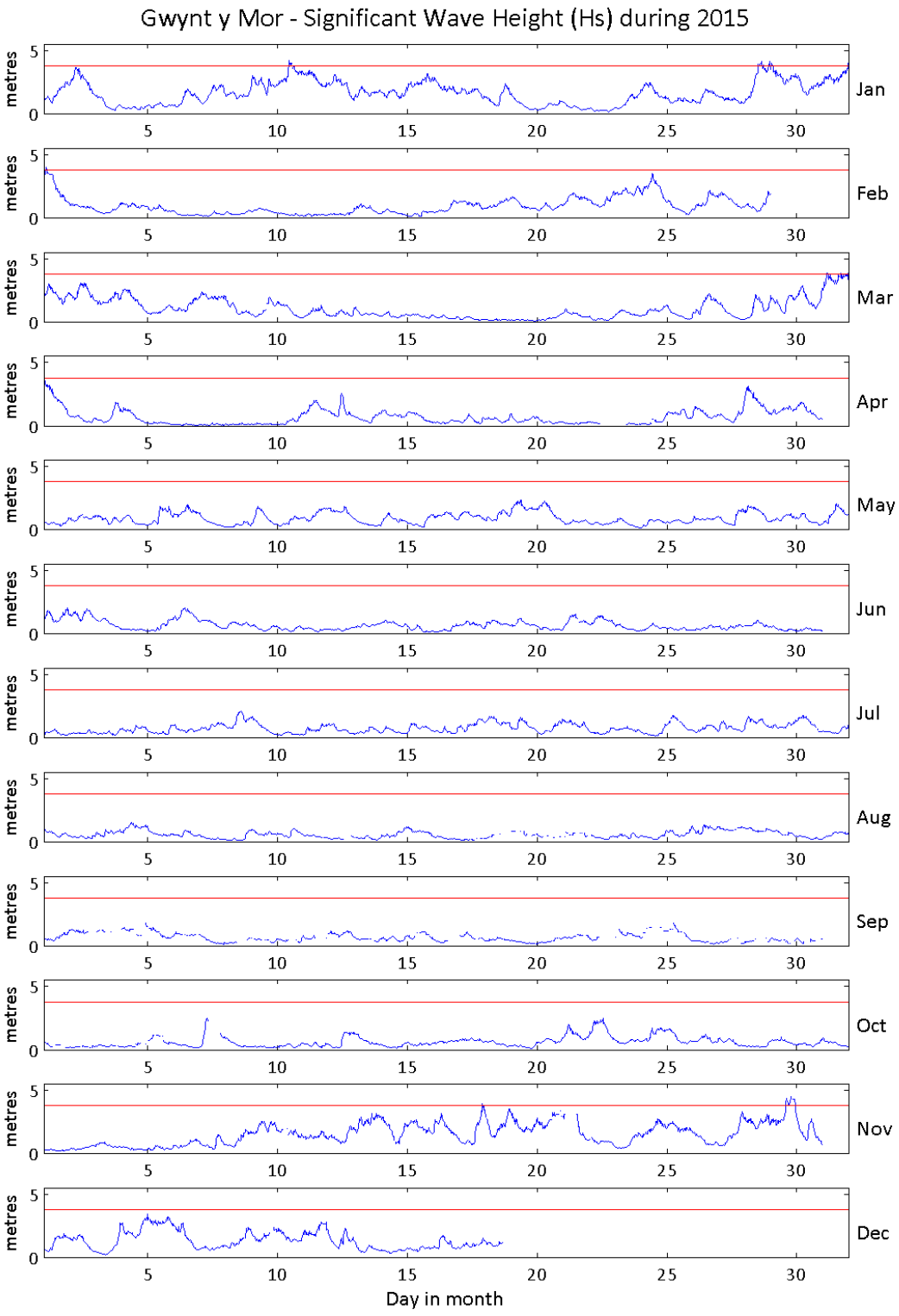
- Annual time series of H_s (red line is 3.75 m storm threshold)
- Incidence of storm waves for 2015. Storm events are defined using the Peaks-over-Threshold method. The highest H_s of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H_s, T_p, T_z and Direction for 2015
- Joint distribution of all parameters for all measured data, given as percentage of occurrence
- Wave rose (percentage of occurrence of direction vs. H_s) for all measured data

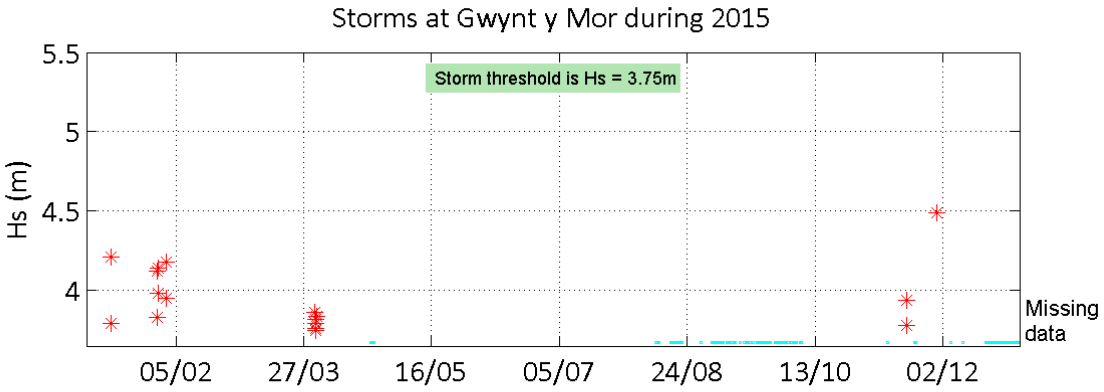
General

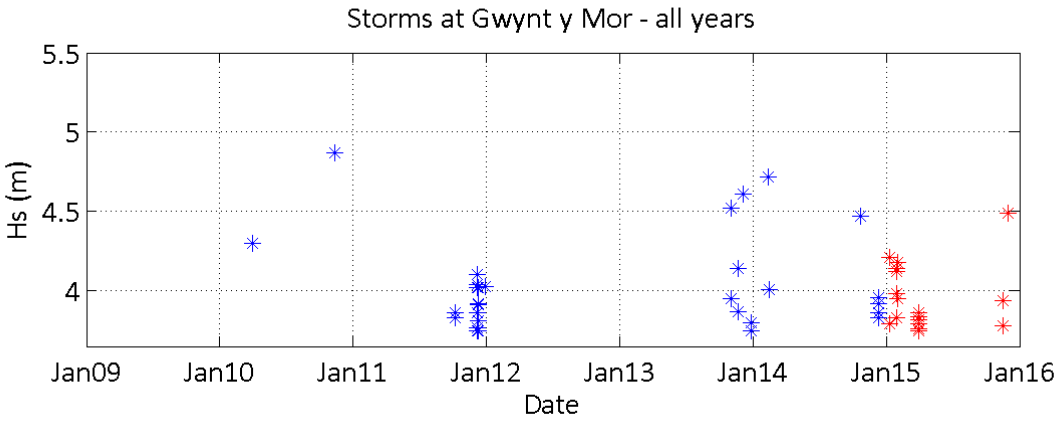
The buoy was first deployed on 27 April 2007, at which time the magnetic declination at the site was 3.79° west, changing by 0.16° east per year.

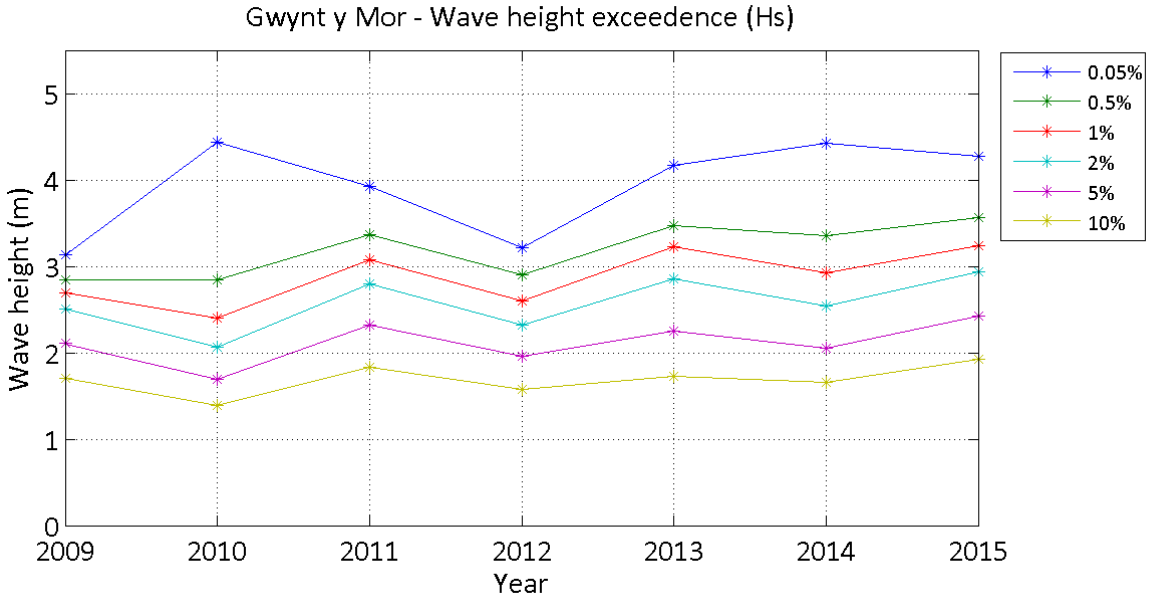
Acknowledgements

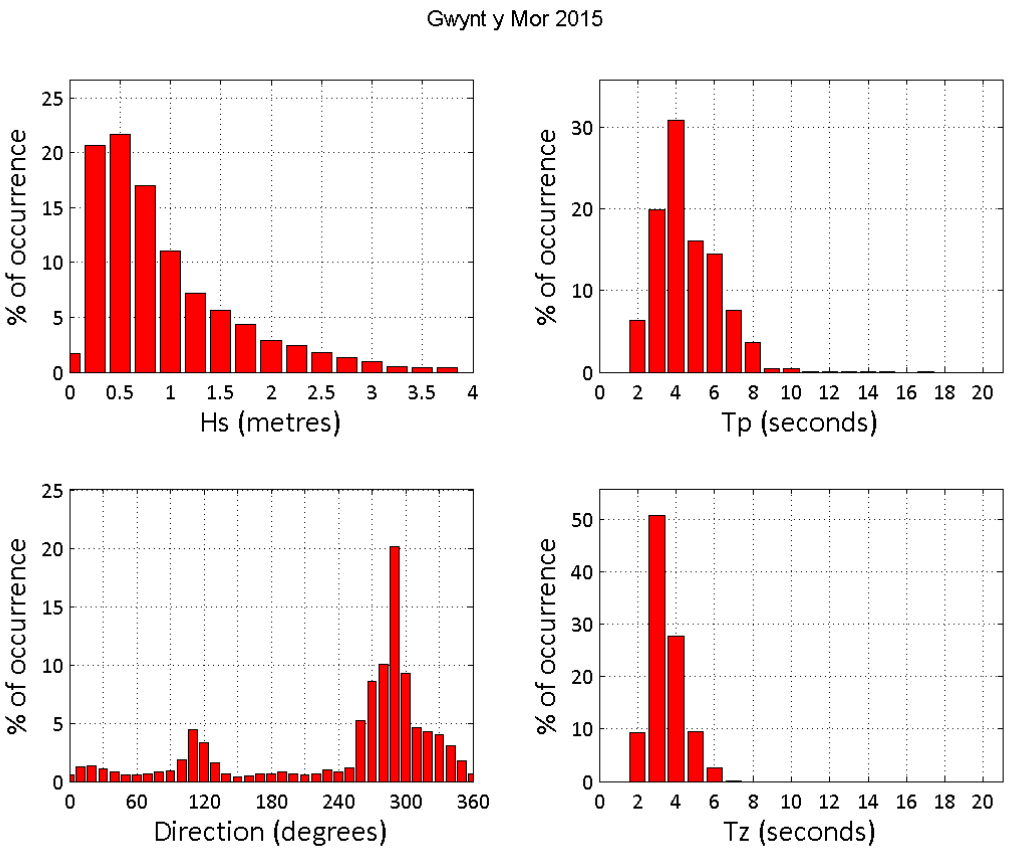
The Directional Waverider is owned by RWE Innogy UK Limited who have kindly agreed to make their real-time and archived data freely available.

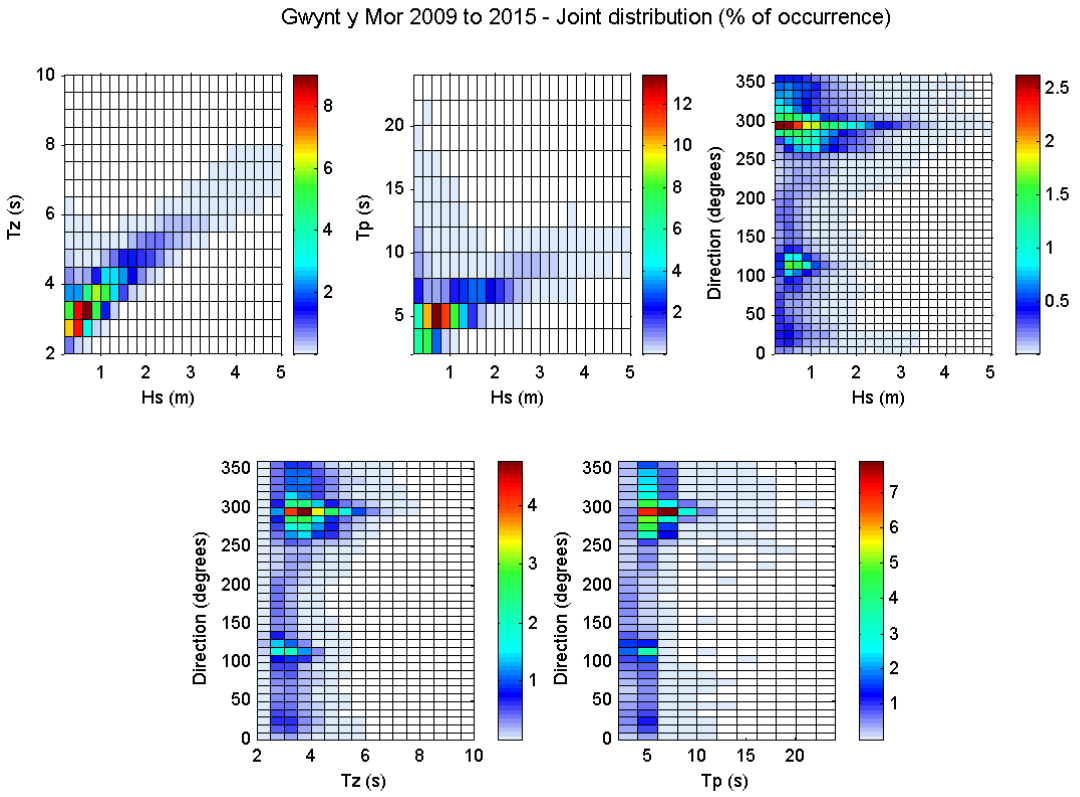

Gwynt y Mor - Significant Wave Height (Hs) during 2015
metres
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0
5
10
15
20
25
30
Day in month

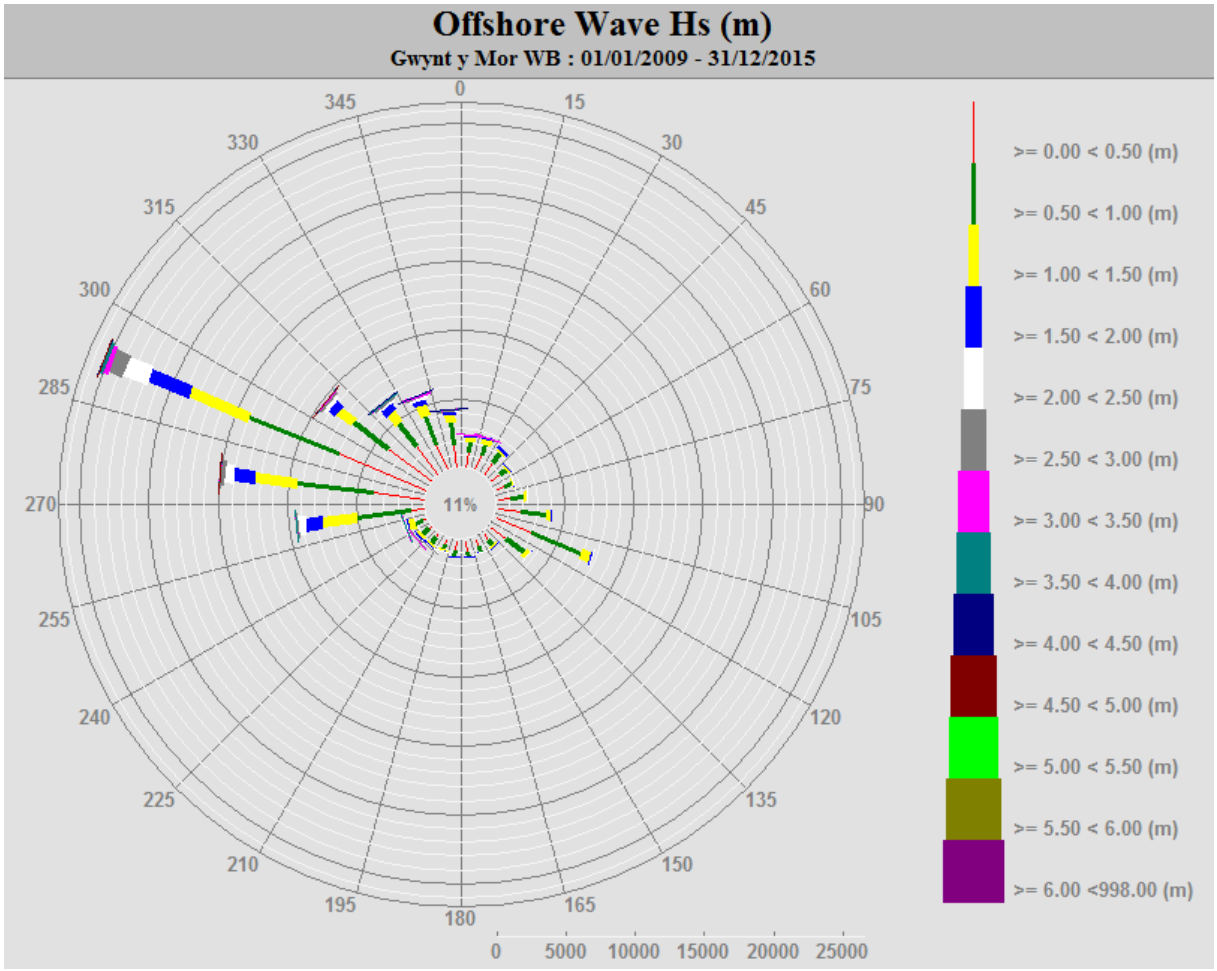

Storms at Gwynt y Mor during 2015
Storm threshold is Hs = 3.75m
Hs (m)
5.5
5
4.5
4
Missing data
05/02
27/03
16/05
05/07
24/08
13/10
02/12


Storms at Gwynt y Mor - all years
Hs (m)
5.5
5
4.5
4
Jan09
Jan10
Jan11
Jan12
Jan13
Jan14
Jan15
Jan16
Date


Gwynt y Mor - Wave height exceedence (Hs)
Wave height (m)
0
1
2
3
4
5
2009
2010
2011
2012
2013
2014
2015
Year
0.05%
0.5%
1%
2%
5%
10%


Gwynt y Mor 2015
% of occurrence
Hs (metres)
Tp (seconds)
Direction (degrees)
Tz (seconds)


Gwynt y Mor 2009 to 2015 - Joint distribution (% of occurrence)
Tz (s)
Hs (m)
Tp (s)
Direction (degrees)


Offshore Wave Hs (m)
Gwynt y Mor WB : 01/01/2009 - 31/12/2015
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
11%
0
5000
10000
15000
20000
25000
>= 0.00 < 0.50 (m)
>= 0.50 < 1.00 (m)
>= 1.00 < 1.50 (m)
>= 1.50 < 2.00 (m)
>= 2.00 < 2.50 (m)
>= 2.50 < 3.00 (m)
>= 3.00 < 3.50 (m)
>= 3.50 < 4.00 (m)
>= 4.00 < 4.50 (m)
>= 4.50 < 5.00 (m)
>= 5.00 < 5.50 (m)
>= 5.50 < 6.00 (m)
>= 6.00 <998.00 (m)