



Rhyl Flats Directional Waverider Buoy

Location			
OS	293579 E 388411 N		
WGS84	Latitude: 53° 22.91' N Longitude: 03° 36.08' 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
93	30 minutes

Monthly Averages - 2015

All times are GMT

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	No. of days
January	1.05	4.9	3.5	268	8.4	9
February	0.75	4.5	3.3	272	5.3	28
March	0.81	4.5	3.4	245	6.3	31
April	0.58	4.4	3.2	240	8.3	28
May	0.73	4.1	3.2	255	10.8	31
June	0.53	3.8	3.0	261	13.7	30
July	0.61	3.9	3.1	261	15.9	31
August	0.44	3.5	2.9	237	16.4	31
September	0.57	3.9	3.1	226	15.8	30
October	0.49	4.1	3.0	193	14.0	31
November	1.12	5.1	3.7	263	11.9	30
December	0.94	5.0	3.5	246	10.3	31

Monthly Averages - All Years (May 2007 – December 2015)

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)
January	0.80	4.8	3.4	242	6.5
February	0.71	5.0	3.3	245	5.9
March	0.69	4.5	3.2	240	6.7
April	0.55	4.0	3.1	224	8.5
May	0.58	4.0	3.1	223	11.5
June	0.49	3.8	3.0	242	14.5
July	0.51	3.7	3.0	248	16.6
August	0.59	4.0	3.1	264	17.0
September	0.68	4.2	3.2	249	15.9
October	0.72	4.4	3.2	231	13.6
November	0.90	4.7	3.5	250	10.8
December	0.95	5.0	3.5	255	8.1

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)
21-Nov-2015 06:00	3.77	7.7	6.2	349	-	HW	~5.2	-	-
01-Feb-2015 01:30	3.60	8.3	6.5	333	-	HW +4	~4.9	-	-
29-Nov-2015 20:00	3.34	10.0	6.1	314	-2.58	HW -5	~6.0	0.42	0.66

Annual Statistics

Year	Annual H _s exceedance* (m)						Annual Maximum H _s	
	0.05%	0.5%	1%	2%	5%	10%	Date	A _{max} (m)
2007	3.55	2.78	2.48	2.24	1.87	1.53	08-Nov-2007 21:00	3.66
2008	3.61	3.11	2.79	2.41	1.82	1.49	01-Mar-2008 06:00	3.97
2009	2.80	2.39	2.17	1.97	1.60	1.31	24-Mar-2009 00:30	2.97
2010	3.90	2.28	2.02	1.76	1.43	1.15	31-Mar-2010 10:00	4.22
2011	3.21	2.62	2.40	2.15	1.78	1.39	07-Dec-2011 09:30	3.47
2012	3.32	2.76	2.42	2.07	1.67	1.35	05-Jan-2012 12:00	3.47
2013	3.73	2.93	2.61	2.31	1.81	1.43	21-Nov-2013 01:00	4.02
2014	3.62	2.57	2.30	2.02	1.59	1.32	12-Feb-2014 19:30	3.83
2015	3.45	2.71	2.32	1.96	1.66	1.39	21-Nov-2015 06:00	3.77

* i.e. 5 % of the H_s values measured in 2007 exceeded 1.87 m

Distribution plots

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

- Annual time series of H_s (red line is 3.25 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

* 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.

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	3.8	No depth limitation
2	3.9	Depth-limited at MLWS
5	4.2	
10	4.4	
20	4.5	
50	4.7	

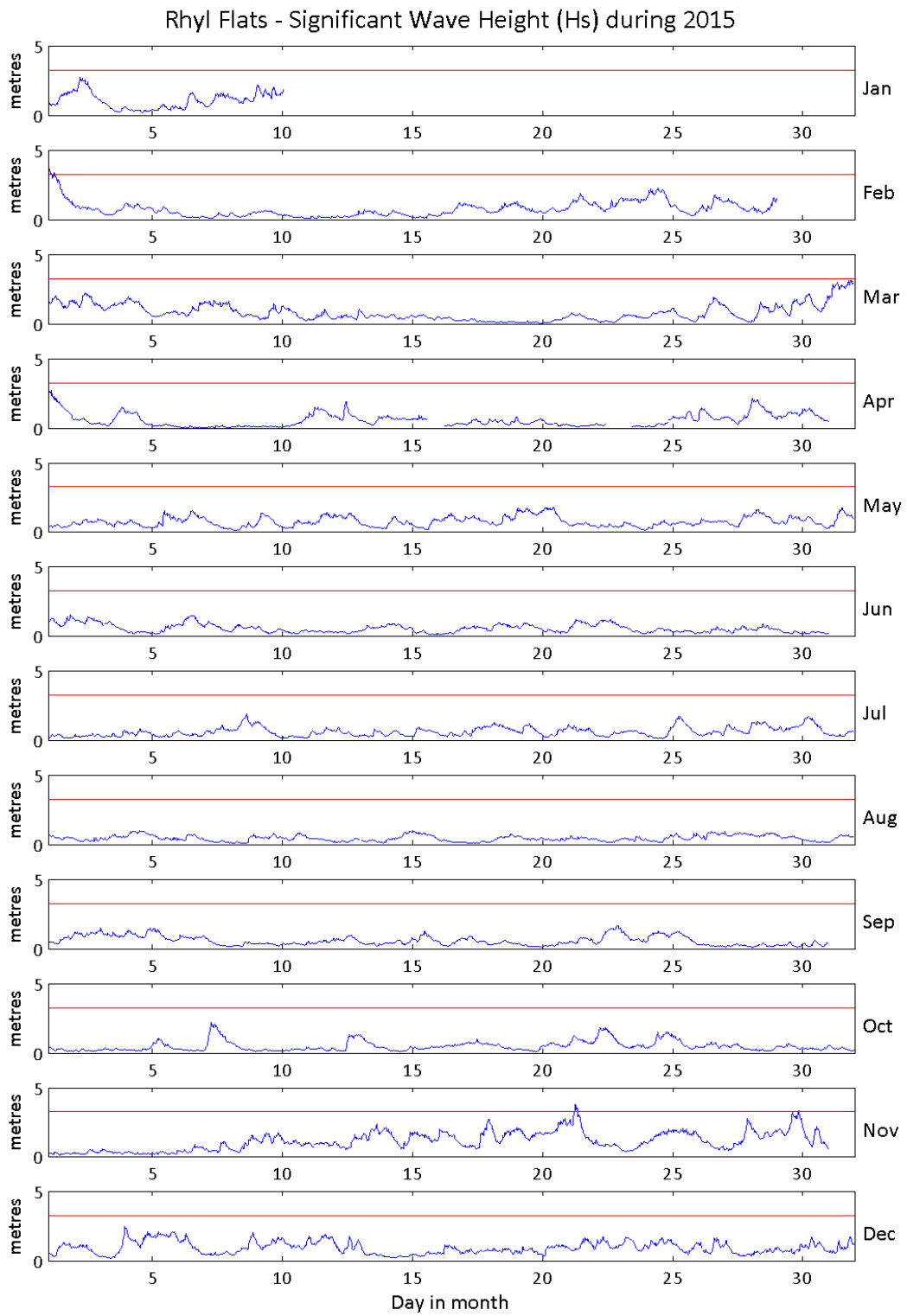
General

The buoy was first deployed on 01 May 2007, at which time the magnetic declination at the site was 3.4° west, changing by 0.16° east per year.

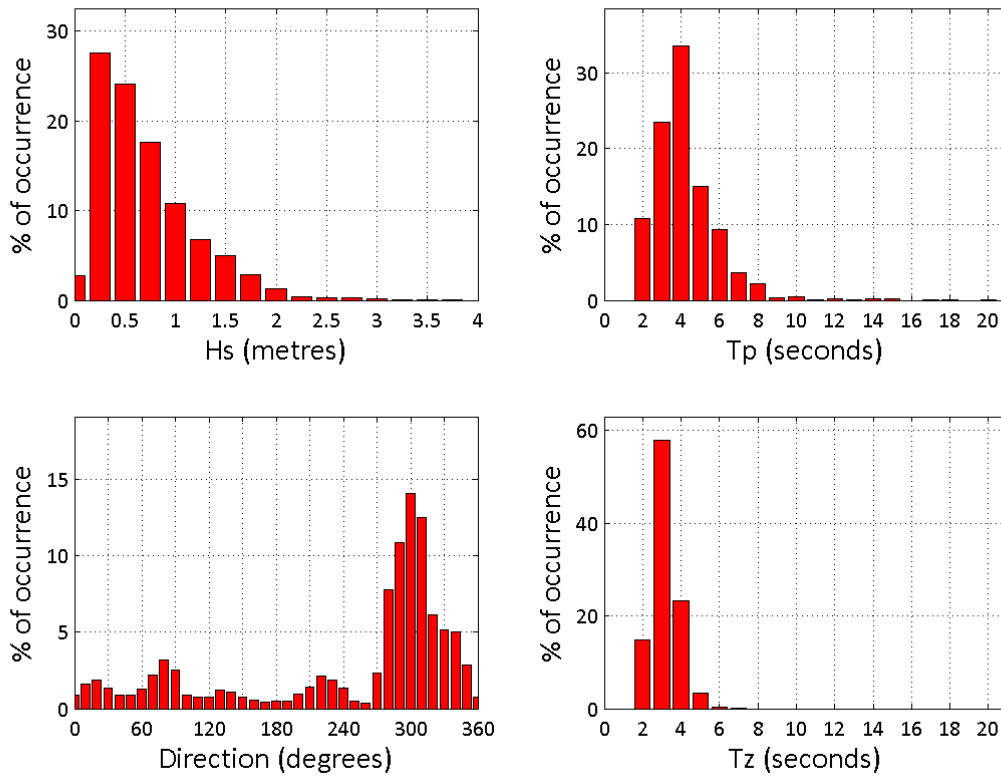
Acknowledgements

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.

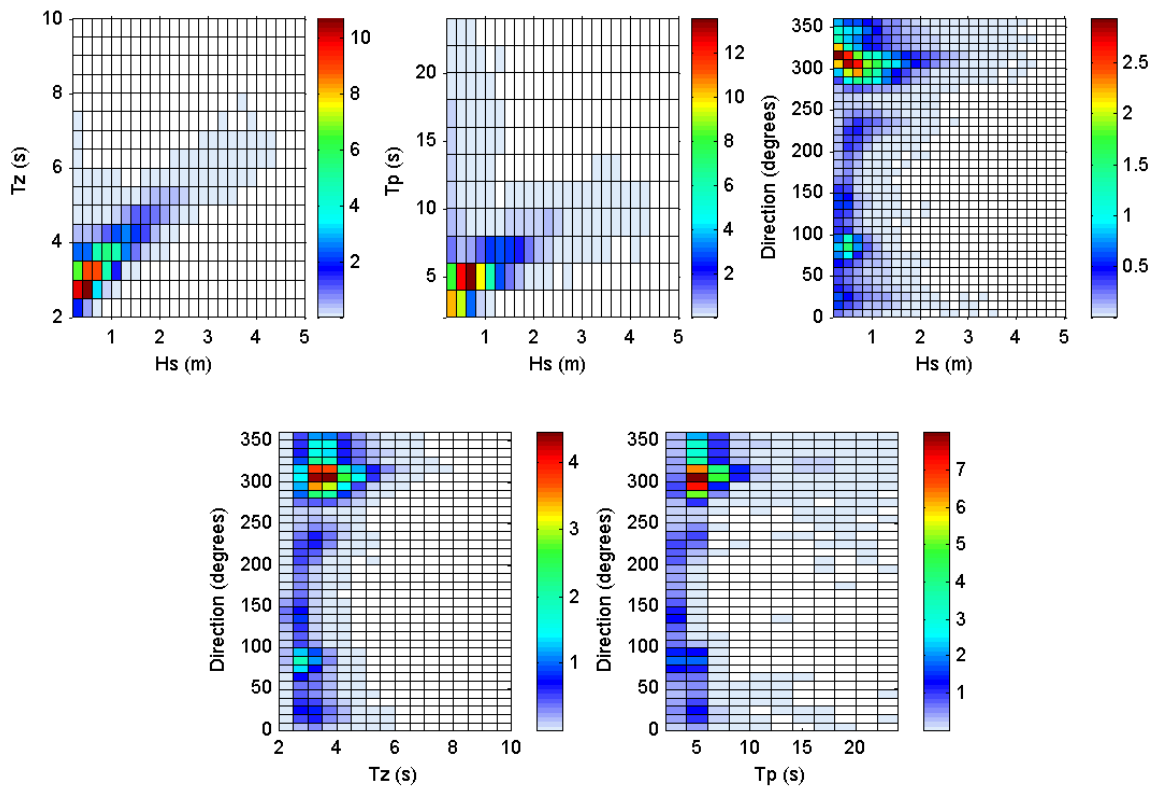
Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.



Rhyl Flats 2015



Rhyl Flats 2007 to 2015 - Joint distribution (% of occurrence)



Offshore Wave Hs (m) Rhyl Flats WB : 01/05/2007 - 31/12/2015

