



Whitby Directional Waverider Buoy

Location			
OS	490239 E 513067 N		
WGS84	Latitude: 54° 30.29' N Longitude: 00° 36.48' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~17m CD	Buoy in situ off Whitby beach. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 The GeoInformation Group)

Data Quality

Recovery rate (%)	Sample interval
99	30 minutes

Monthly Averages - 2016

All times are GMT

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	1.43	9.0	5.3	77	7.9	3	31
February	1.26	10.2	5.3	66	6.7	14	29
March	0.98	7.7	4.8	75	6.5	3	31
April	1.20	8.1	5.1	66	7.3	10	30
May	1.01	7.4	4.8	67	9.3	4	31
June	0.97	7.6	4.9	56	11.9	1	30
July	0.45	6.2	3.9	121	13.7	0	31
August	0.71	6.9	4.4	88	14.2	2	31
September	0.54	6.5	3.9	112	13.9	0	30
October	1.38	8.5	5.4	59	12.5	8	31
November	1.34	8.6	5.1	70	9.8	5	30
December	0.71	11.3	5.0	53	8.9	5	31

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-2016 21:00	5.09	9.1	7.4	52	2.20	HW	2.77	0.36	0.45
06-Nov-2016 20:30	5.05	11.8	7.7	48	1.55	HW +1	2.93	-0.24	-0.08
14-Jan-2016 15:00	4.85	10.0	7.0	10	-0.05	HW -3	3.96	3.40	0.52
03-Jan-2016 10:00	4.68	11.1	8.5	58	0.96	HW	2.27	-0.39	-0.27

* Tidal information is obtained from the pressure transducer at Whitby Harbour. 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.

Annual Statistics

Year	Annual H _s exceedance** (m)						Annual Maximum H _s	
	0.05%	0.5%	1%	2%	5%	10%	Date	A _{max} (m)
2013	-	4.76	4.43	3.93	2.98	2.19	10-Oct-2013 20:00	6.26
2014	3.74	3.16	2.81	2.53	2.12	1.75	14-Oct-2014 05:30	4.10
2015	5.60	4.06	3.45	2.97	2.21	1.75	21-Nov-2015 07:30	6.68 ⁺
2016	4.71	4.02	3.54	3.06	2.45	2.06	21-Nov-2016 21:00	5.09

** i.e. 5 % of the H_s values measured in 2013 exceeded 2.98 m

⁺ 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.

Distribution plots

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

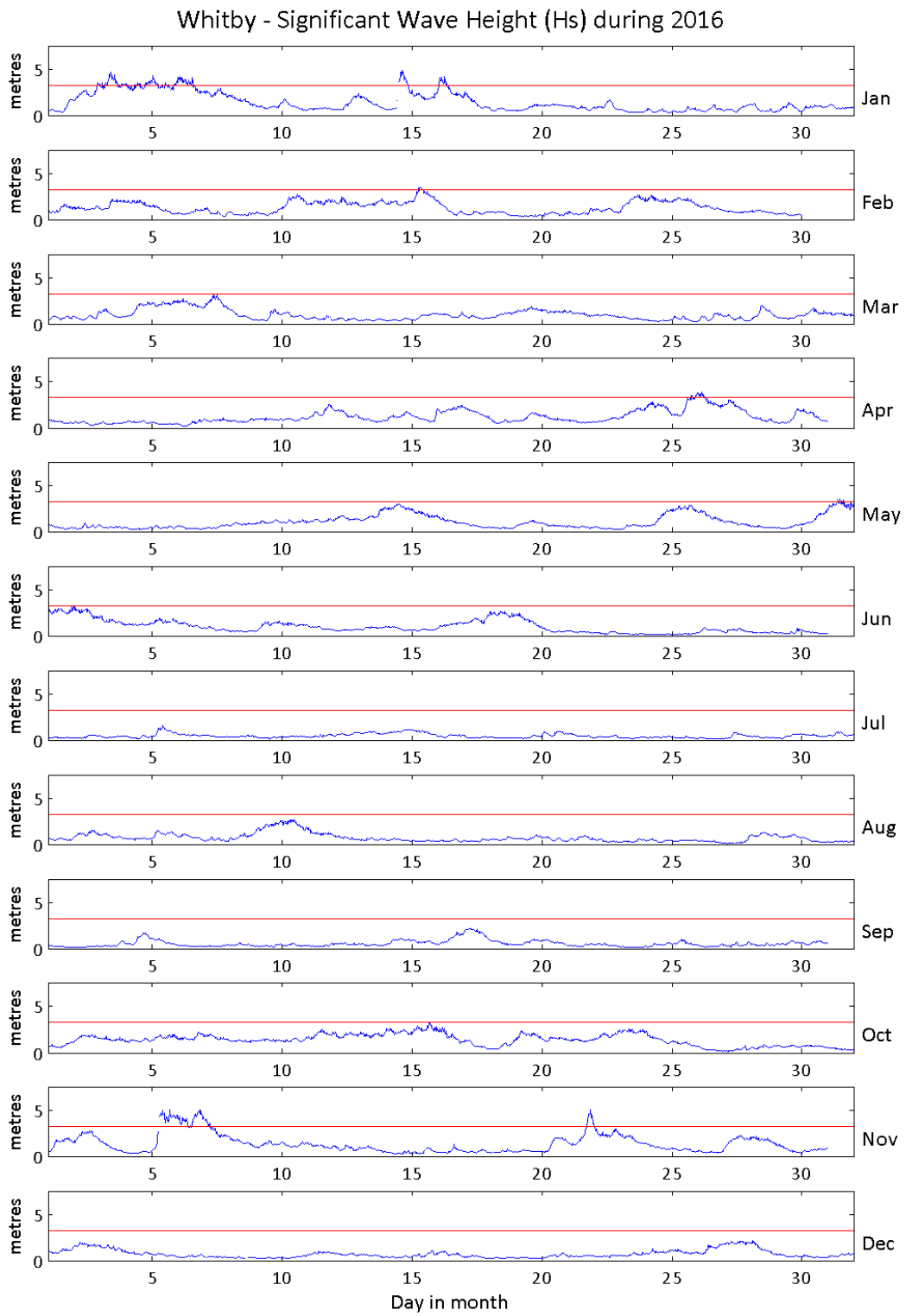
- Annual time series of H_s (red line is 3.25m storm threshold)
- Incidence of storm waves for 2016. Storm events are defined using the Peaks-over-Threshold method. The highest H_s of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H_s , T_p , T_z and Direction for 2016
- 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

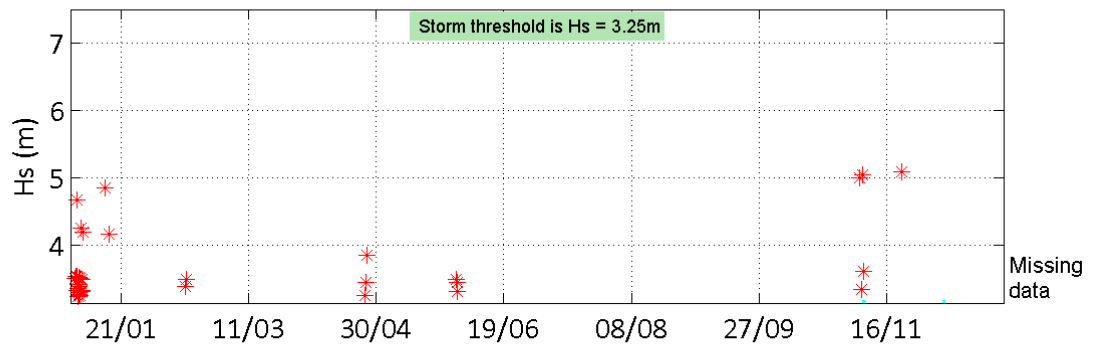
The buoy, owned by Scarborough Borough Council, was deployed on 18 January 2013, at which time the magnetic declination at the site was 1.8° west, changing by 0.18° east per year. A DWR had previously been deployed at this location from 20 May 2010 to 04 February 2011.

Acknowledgements

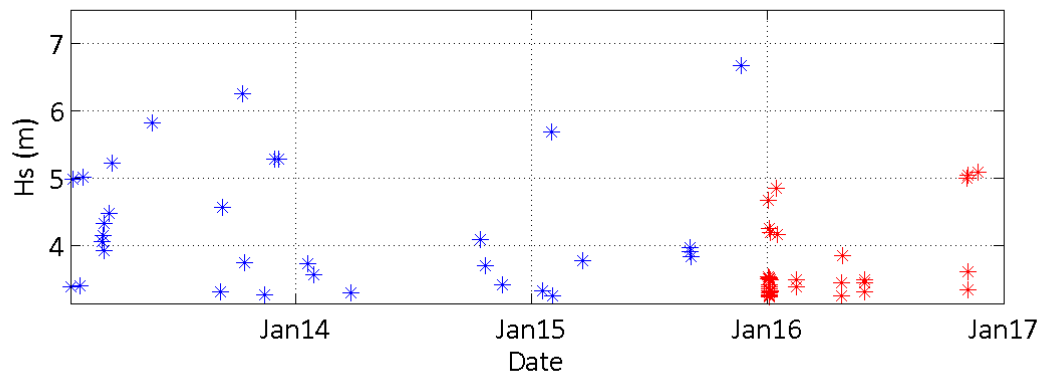
Tidal predictions were produced using the TASK windows edition software, kindly provided by the Marine Data Products team at the UK National Oceanography Centre (Liverpool).



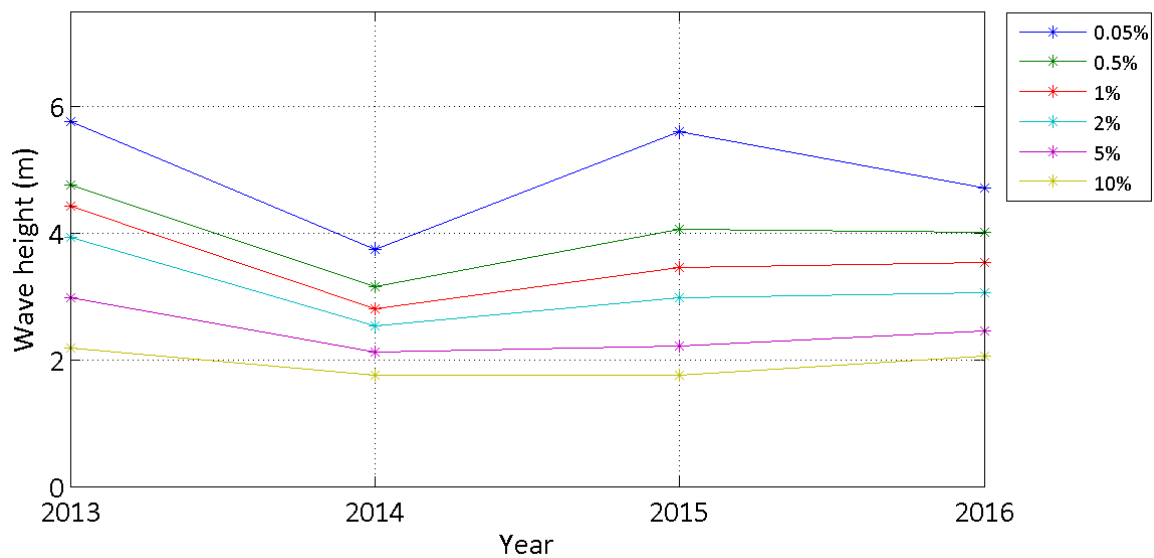
Storms at Whitby during 2016



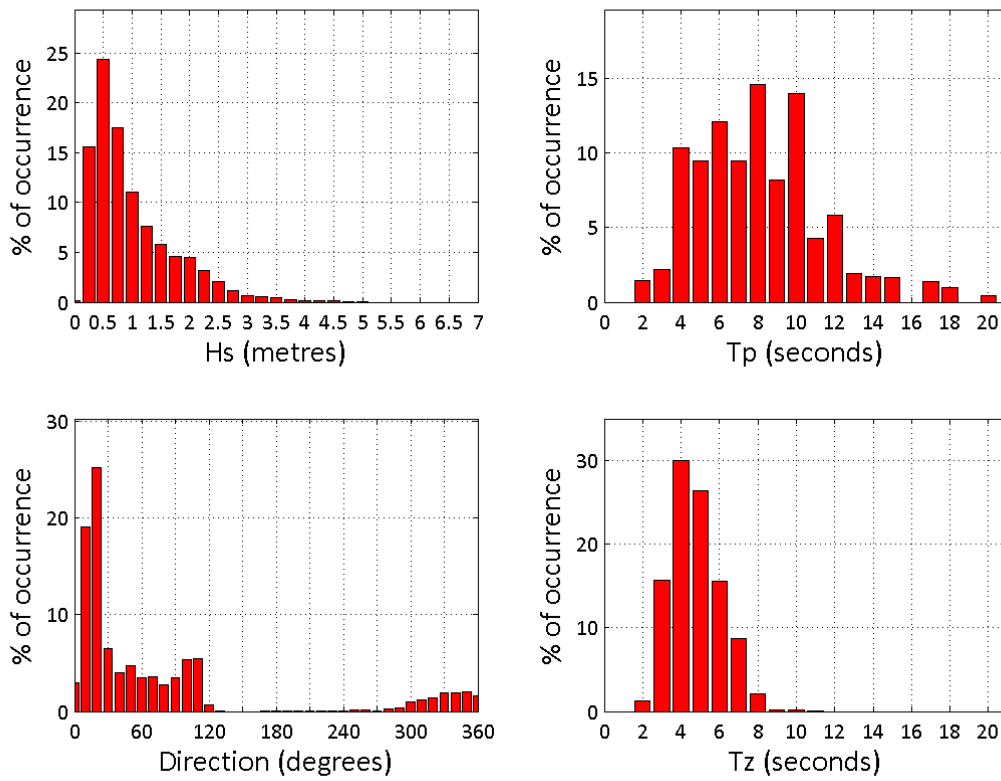
Storms at Whitby - all years



Whitby - Wave height exceedence (Hs)



Whitby 2016



Whitby 2013 to 2016 - Joint distribution (% of occurrence)

