



Cleveleys Directional Waverider Buoy

Location			
OS	321487 E 445023 N		
WGS84	Latitude: 53° 53.73' N Longitude: 03° 11.77' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~10 m CD	Example buoy in situ. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping, image ©2016 TerraMetrics)

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	1.25	6.1	4.0	243	7.2	1	31
February	1.23	5.1	3.9	233	6.6	0	29
March	0.73	4.7	3.4	243	7.1	0	31
April	0.76	4.9	3.4	244	8.8	0	30
May	0.55	3.9	3.1	214	11.7	0	30
June	0.49	4.5	3.2	244	16.1	0	28
July	0.82	4.3	3.4	262	17.1	0	31
August	0.86	4.5	3.4	242	17.5	0	30
September	0.94	4.6	3.6	248	17.1	0	30
October	0.55	3.9	3.0	162	13.9	0	31
November	0.88	4.7	3.5	234	10.1	0	30
December	0.91	4.8	3.6	237	7.7	0	31

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

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.24	5.4	4.0	235	5.3	0
February	0.97	5.2	3.7	242	4.3	1
March	0.72	4.9	3.4	214	5.4	0
April	0.67	4.5	3.3	217	7.3	0
May	0.73	4.4	3.3	226	10.7	0
June	0.62	4.2	3.2	244	14.3	0
July	0.62	4.1	3.2	248	16.8	0
August	0.79	4.5	3.4	250	17.2	0
September	0.85	4.7	3.5	241	15.5	0
October	0.95	4.9	3.6	222	13.1	0
November	1.10	5.1	3.7	239	10.2	0
December	1.54	6.0	4.3	255	7.1	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)
02-Feb-2016 03:00	4.60	9.1	6.7	278	0.9	HW -2	3.8	-	-
26-Jan-2016 14:00	3.93	8.3	6.3	243	2.5	HW +1	7.8	-	-
08-Feb-2016 21:30	3.80	8.3	5.8	277	2.8	HW -1	7.8	-	-
29-Jan-2016 10:30	3.73	8.3	6.3	257	-0.9	HW -3	6.3	-	-

* Tidal information is estimated from the predicted tide levels (Admiralty Total Tide).

Annual Statistics

Year	Annual H _s exceedance** (m)						Annual Maximum H _s	
	0.05%	0.5%	1%	2%	5%	10%	Date	A _{max} (m)
2011	-	-	-	3.13	2.72	2.28	09-Dec-2011 01:00	4.32
2012	4.1	2.94	2.65	2.38	1.98	1.64	05-Jan-2012 00:30	5.03
2013	4.30	3.32	2.88	2.59	2.05	1.65	05-Dec-2013 13:30	4.71
2014	4.27	3.14	2.89	2.65	2.23	1.78	13-Feb-2014 00:00	4.87
2015	4.00	3.51	3.30	3.05	2.57	2.10	29-Nov-2015 19:00	4.52
2016	4.10	3.23	2.99	2.64	2.14	1.71	02-Feb-2016 03:00	4.6

** i.e. 5 % of the H_s values measured in 2011 exceeded 2.72 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 0.5 hourly and 3-hourly records and are calculated for periods up to 10 times the record length, using a Weibull distribution.

0.5-hourly records June 2011 – December 2016		
Return period (years)	Significant wave height (m)	Comments
1	4.8	Depth-limited at MLWS
2	5.0	
5	5.2	
10	5.3	
20	5.4	
50	5.6	

3-hourly records June 2011 – December 2016		
Return period (years)	Significant wave height (m)	Comments
1	4.6	Depth limited at MLWS
2	4.8	
5	5.1	
10	5.3	
20	5.5	
50	5.8	

Distribution plots

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

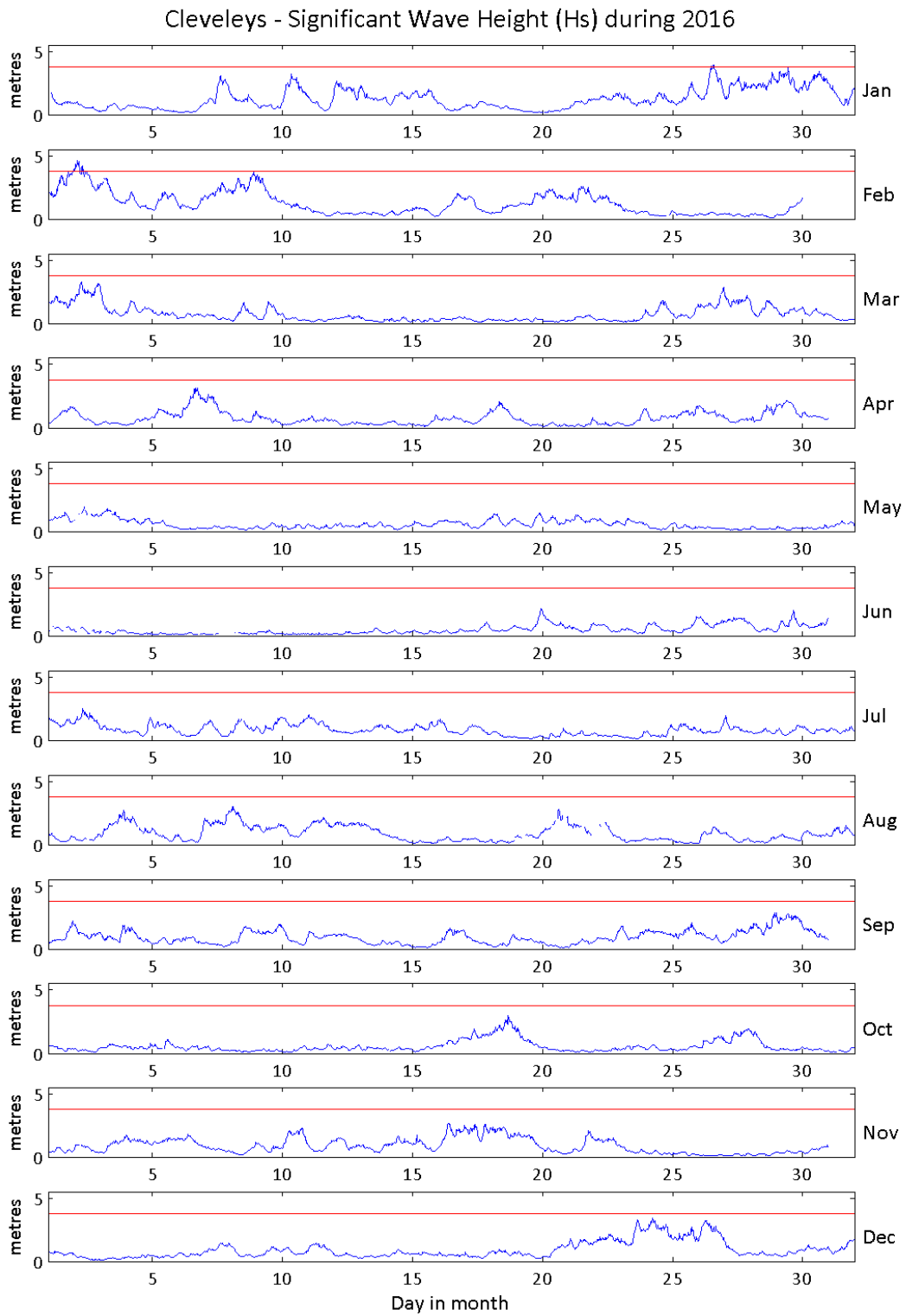
- Annual time series of H_s (red line is 3.75 m storm threshold)
- Incidence of storm waves for 2016. Storm events are defined using the Peaks-over-Threshold method. The highest H_s of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H_s , T_p , 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

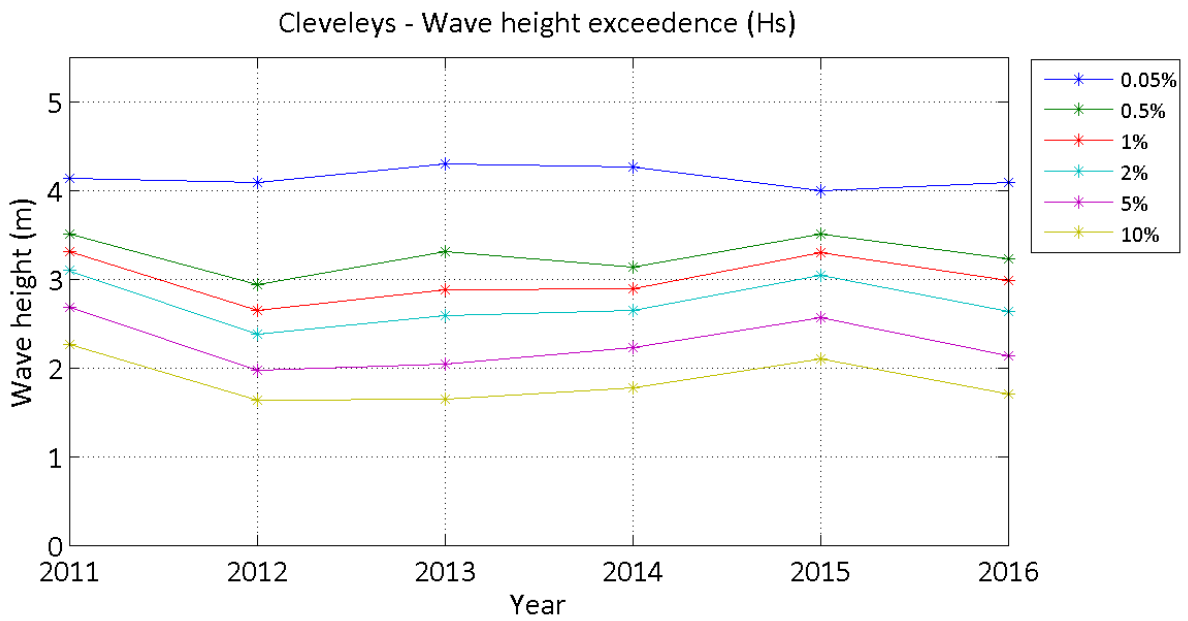
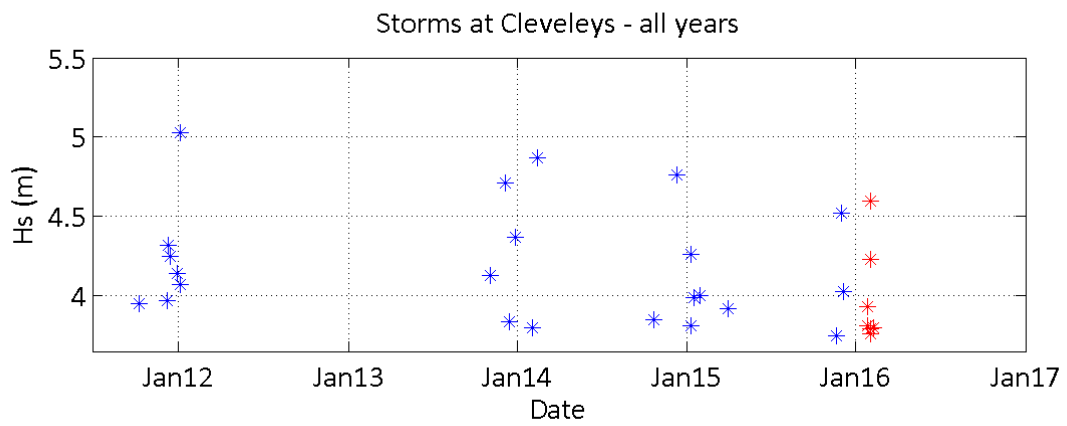
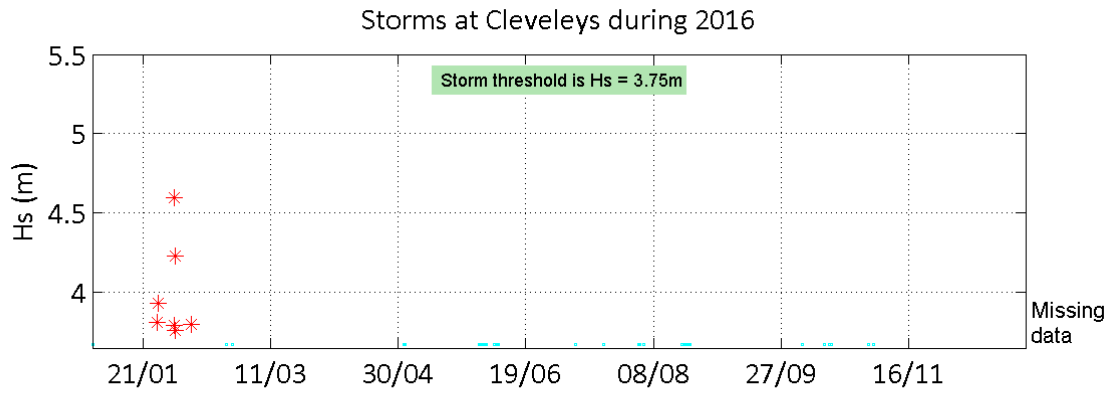
General

The wave buoy at Cleveleys, owned by Sefton Council, 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.

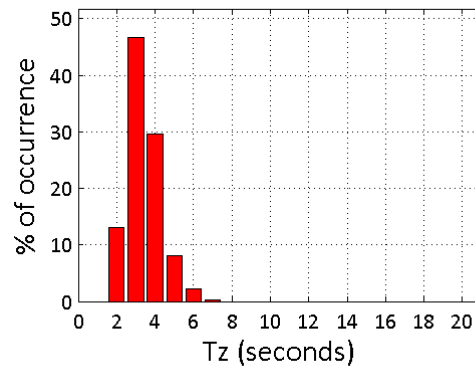
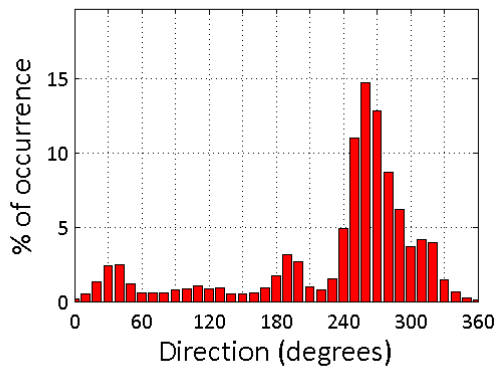
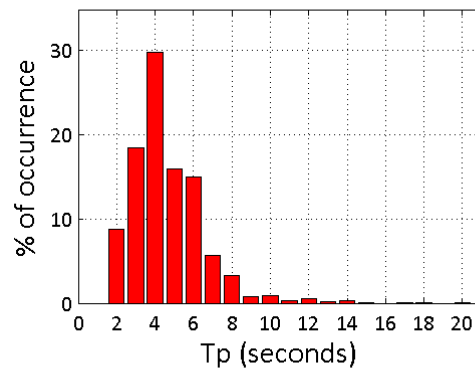
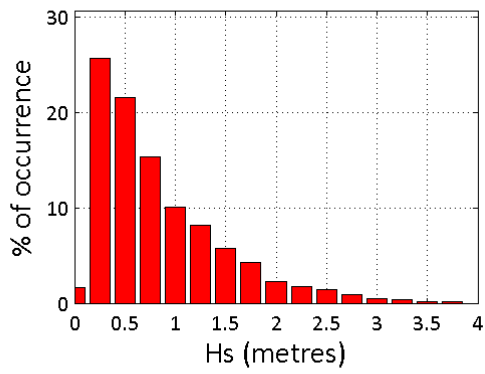
Acknowledgements

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





Cleveleys 2016



Cleveleys 2011 to 2016 - Joint distribution (% of occurrence)

