



Penzance Directional Waverider Buoy

Location			
OS	149663 E 29692 N		
WGS84	Latitude: 50° 06.86' N Longitude: 05° 30.18' W		
Instrument type		Buoy in situ in Mount's Bay. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 TerraMetrics)
Datawell Directional Waverider Mk III			
Water depth	~10m CD		

Data Quality

Recovery rate (%)	Sample interval
94	30 minutes

Monthly Averages - 2017

All times are GMT

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)	No. of days
January	0.70	9.0	4.4	182	10.3	1	29
February	0.98	9.6	4.8	182	10.0	9	26
March	0.79	9.2	4.5	181	10.3	2	28
April	0.32	9.1	4.6	172	11.5	1	27
May	0.54	8.0	4.1	176	12.9	0	29
June	0.47	8.2	3.9	185	14.7	0	30
July	0.40	7.2	4.1	181	15.4	0	31
August	0.40	6.5	4.0	185	15.6	0	31
September	0.62	8.4	4.5	185	15.2	0	30
October	0.65	8.3	4.3	183	14.5	2	31
November	0.51	9.1	4.4	192	13.1	0	30
December	0.70	9.2	4.5	179	11.3	0	23

Monthly Averages - All Years (April 2007 – December 2016)

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	0.96	10.0	5.0	184	9.5	7
February	0.83	10.4	4.9	181	8.8	7
March	0.63	9.6	4.5	179	8.9	2
April	0.56	9.1	4.4	178	10.1	1
May	0.48	8.2	4.2	181	11.7	0
June	0.46	7.9	4.1	180	13.7	1
July	0.46	7.1	4.1	184	15.0	0
August	0.49	7.5	4.2	182	15.4	0
September	0.46	8.3	4.2	178	15.4	0
October	0.70	8.3	4.4	180	14.4	1
November	0.75	9.0	4.6	185	12.6	3
December	0.93	9.5	4.7	183	10.7	8

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-2017 15:00	4.83	11.1	8.0	181	-1.26	HW -5	3.72	0.69	0.71
16-Oct-2017 14:30	3.48	15.4	7.1	194	2.27	HW	4.07	0.19	0.28
22-Nov-2017 18:00	2.95	9.1	6.1	193	2.18	HW -1	3.62	0.32	0.41

* Tidal information is obtained from the National Network gauge at Newlyn. 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)
2007	-	2.05	1.84	1.63	1.34	1.10	20-Jun-2007 09:00	2.96
2008	3.91	2.60	2.28	1.93	1.54	1.22	13-Jan-2008 11:30	4.54 ⁺
2009	4.25	2.83	2.52	2.15	1.75	1.43	14-Nov-2009 09:30	5.01 ⁺
2010	3.91	3.01	2.31	1.90	1.50	1.23	16-Jan-2010 03:30	4.70 ⁺
2011	2.95	2.26	2.06	1.86	1.55	1.27	10-Jan-2011 15:00	3.32
2012	3.60	2.63	2.26	2.00	1.59	1.23	22-Nov-2012 14:30	4.27
2013	4.03	2.88	2.47	2.19	1.80	1.45	23-Dec-2013 12:30	4.24 ⁺
2014	5.07	3.15	2.82	2.42	1.85	1.43	04-Feb-2014 19:00	6.06 ⁺
2015	3.94	2.62	2.39	2.14	1.72	1.41	30-Dec-2015 08:30	4.60
2016	3.82	2.74	2.43	2.04	1.61	1.27	01-Jan-2016 22:30	4.04
2017	4.24	2.55	2.23	1.93	1.52	1.19	02-Feb-2017 15:00	4.83 ⁺

** i.e. 5 % of the H_s values measured in 2007 exceeded 1.34 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.

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	April 2007 to June 2017	
Return period (years)	Significant wave height (m)	Comments
0.25	3.26	No depth limitation
1	4.33	Depth-limited at MLWS
2	4.89	
5	5.65	
10	6.24	Depth-limited at MHWS
20	6.84	Depth-limited at HAT
50	7.65	
100	8.27	

Distribution plots

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

- Annual time series of H_s (red line is 3.26 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

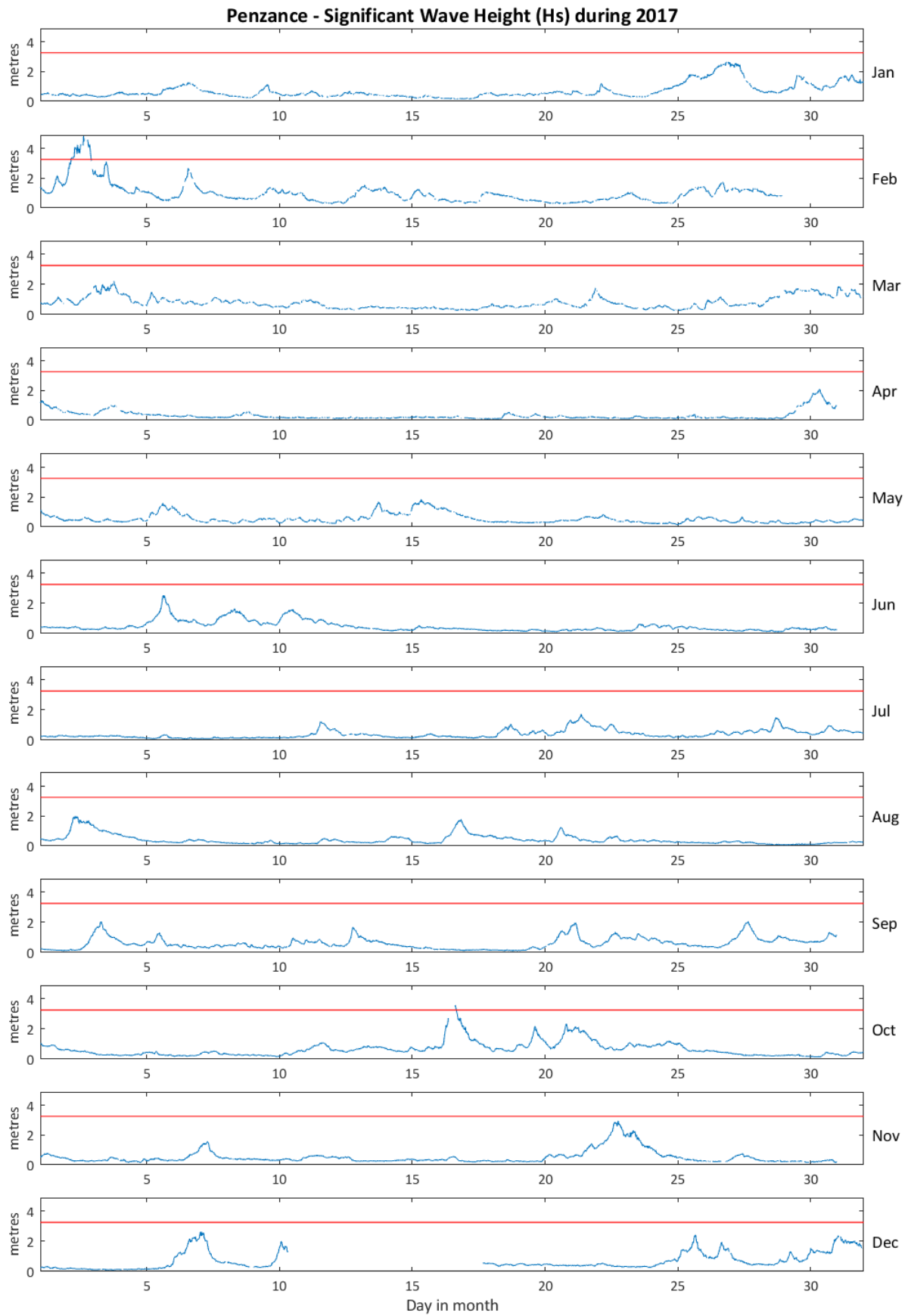
General

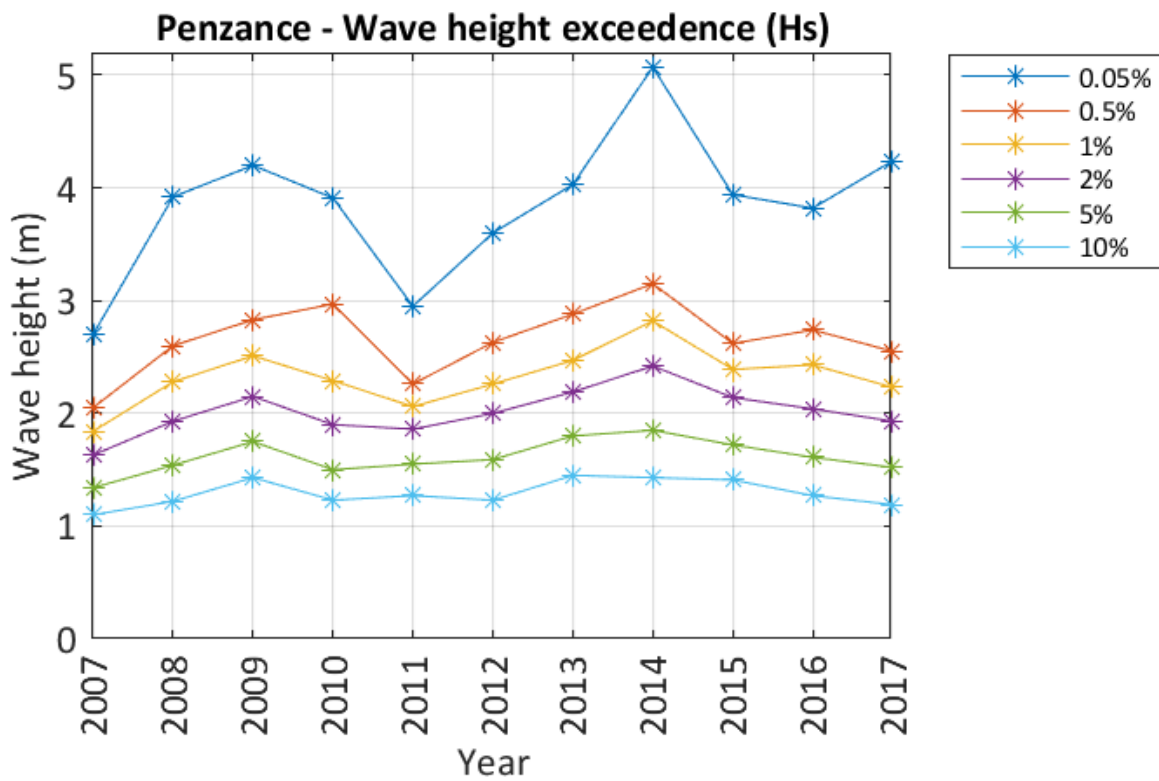
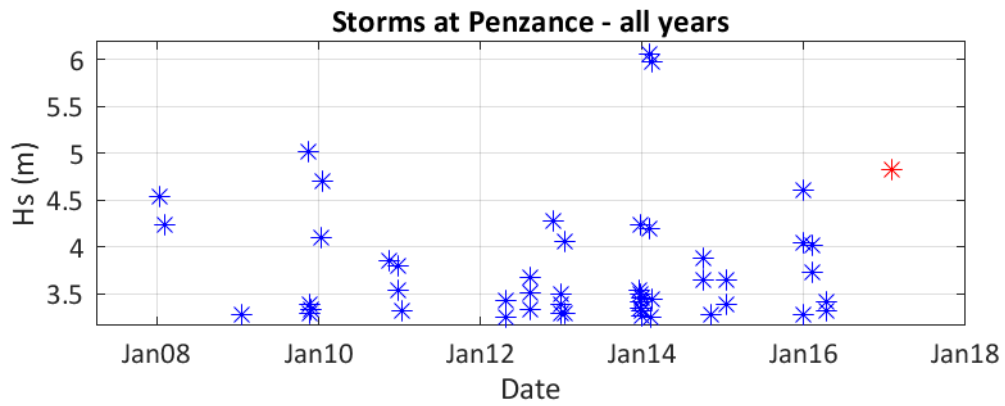
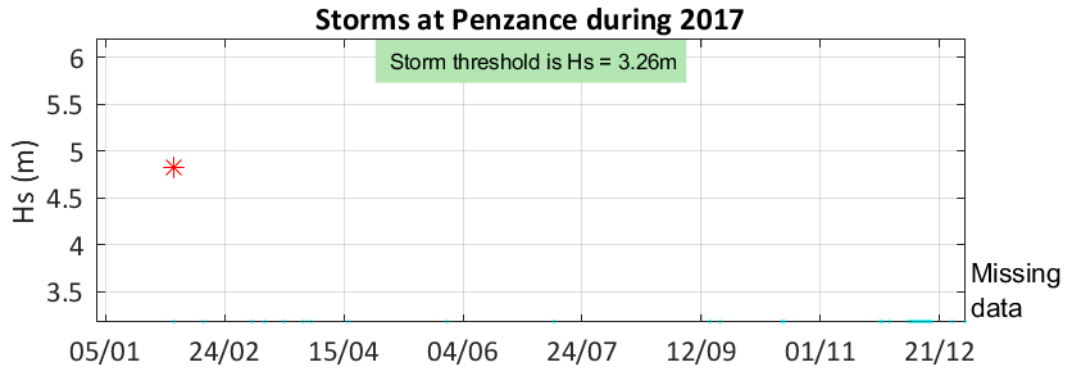
The buoy, owned by Teignbridge District Council, was first deployed on 6 April 2007 at which time the magnetic declination at the site was 3.9° west, changing by 0.15° east per year.

Acknowledgements

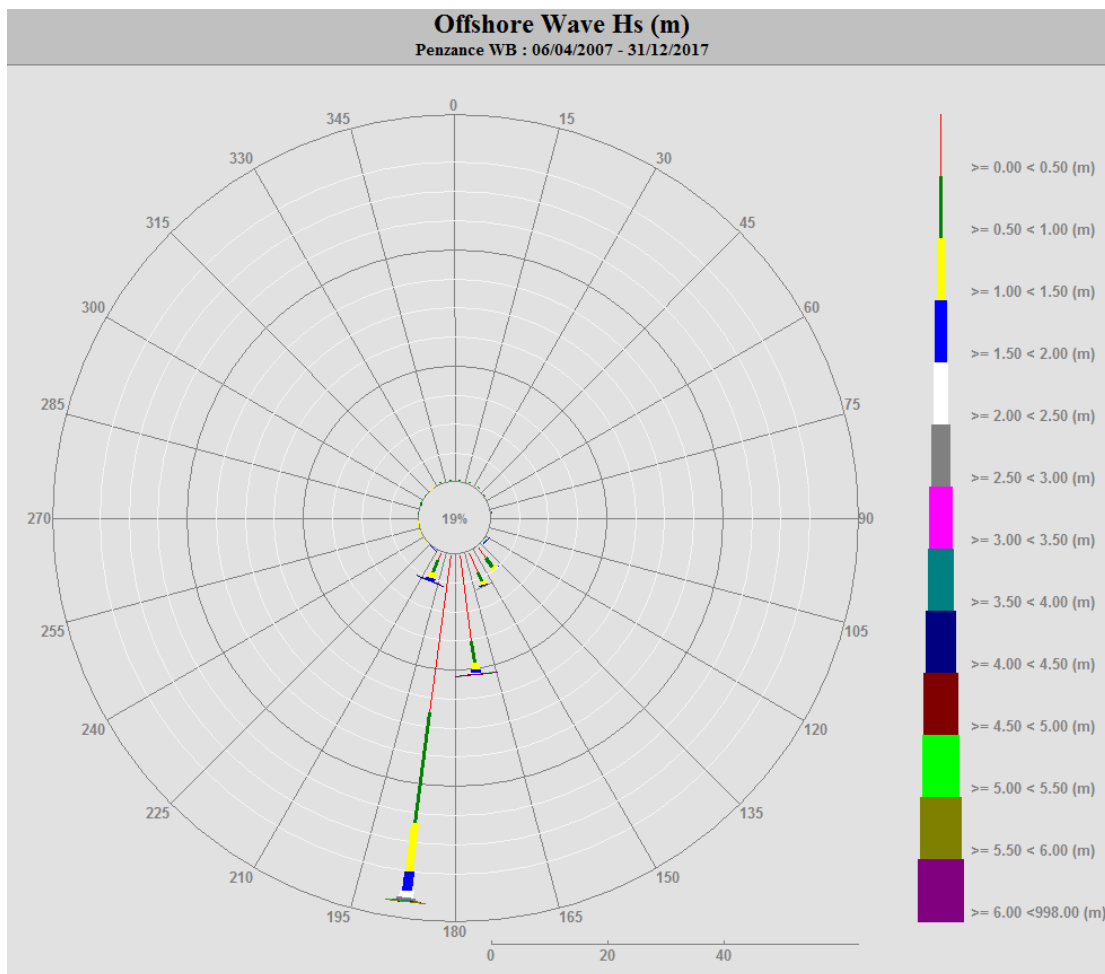
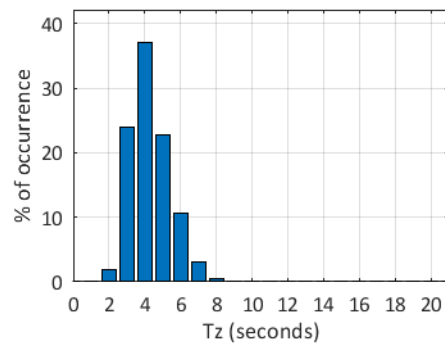
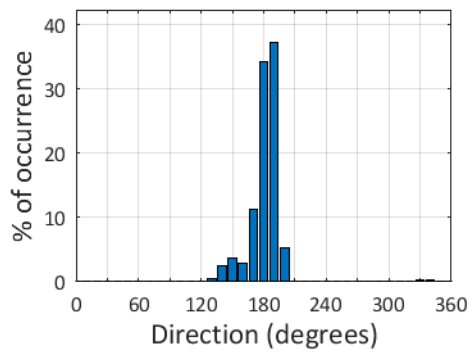
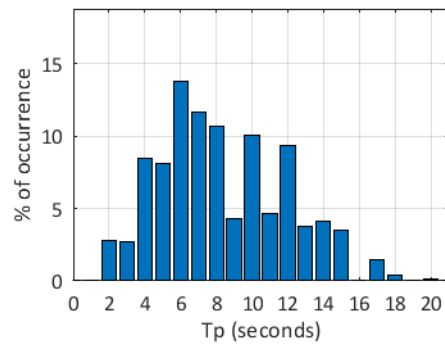
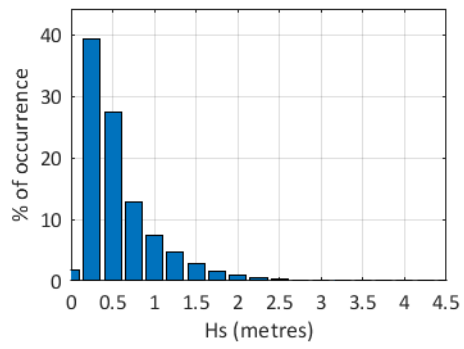
The shore station is kindly hosted by Penzance Harbourmaster.

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





Penzance 2017



Penzance 2007 to 2017 - Joint distribution (% of occurrence)

