Perranporth Directional Waverider Buoy

Location			
OS	174266 E 55172 N		
WGS84	*Latitude:* 50° 21.18' N *Longitude:* 05° 10.48' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~14m CD	Buoy in situ off Perranporth beach. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 Infoterra LTd & Bluesky)

Data Quality

Recovery rate (%)	Sample interval
100	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	2.54	12.3	6.8	283	10.5	12	31
February	2.42	12.9	6.7	283	9.8	19	28
March	1.91	12.1	6.3	284	9.3	16	31
April	1.29	9.3	5.3	292	10.3	6	30
May	0.96	9.6	5.1	282	12.3	5	31
June	1.17	8.8	5.5	279	14.6	5	30
July	1.26	8.6	5.2	276	16.3	5	31
August	1.35	9.1	5.3	275	16.5	6	31
September	1.64	11.0	6.1	280	16.4	15	30
October	1.08	11.8	6.4	283	14.8	8	31
November	1.59	9.7	5.4	298	12.6	21	30
December	1.74	12.9	7.1	280	11.4	4	31

Monthly Averages - All Years (December 2006 – December 2015)

Month	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	2.26	12.5	6.7	285	9.7	17
February	1.92	12.6	6.6	282	9.0	16
March	1.65	11.6	6.2	271	9.3	13
April	1.29	10.8	5.9	284	10.5	10
May	1.30	9.4	5.4	284	12.2	10
June	1.09	8.9	5.1	281	14.3	6
July	1.19	8.5	5.1	278	16.0	4
August	1.24	8.5	5.1	280	16.7	6
September	1.24	9.7	5.5	285	16.0	10
October	1.49	10.6	5.9	284	14.8	11
November	2.02	11.0	6.1	286	12.7	15
December	2.14	11.8	6.3	285	10.7	13

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)
08-Feb-2016 04:00	6.75	13.3	8.7	288	3.62	HW -1	6.32	0.54	0.75
02-Mar-2016 11:30	6.69	11.8	8.5	293	1.62	~HW +1	~3.39	0.04	0.33
09-Mar-2016 09:00	6.27	10.0	8.2	319	~-0.21	HW +4	~7.54	~0.16	~0.50
04-Jan-2016 04:00	5.28	16.7	8.7	283	-0.59	HW +5	2.77	0.31	0.33

** Tidal information is obtained from the step gauge at Port Isaac. The surge shown is the residual at the time of the highest Hs. 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	6.10	5.16	4.84	4.44	3.78	3.11	09-Dec-2007 13:30	6.90[+]
2008	6.21	4.57	4.18	3.84	3.27	2.86	12-Mar-2008 08:30	6.53[+]
2009	5.46	4.74	4.44	4.08	3.56	3.00	22-Nov-2009 21:00	5.69
2010	5.91	4.01	3.52	3.05	2.57	2.16	11-Nov-2010 20:30	6.30
2011	5.45	4.37	4.13	3.86	3.36	2.91	15-Dec-2011 04:30	6.75[+]
2012	5.59	4.63	4.23	3.76	3.18	2.70	18-Apr-2012 04:30	5.85
2013	6.02	4.82	4.50	4.14	3.55	2.97	02-Nov-2013 18:00	7.06[+]
2014	6.77	5.45	4.99	4.33	3.42	2.87	01-Feb-2014 18:30	7.28[+]
2015	6.07	4.98	4.63	4.29	3.74	3.20	24-Feb-2015 05:00	6.75[+]
2016	6.42	4.79	4.37	4.00	3.44	2.89	08-Feb-2016 04:00	6.75[+]

*** i.e. 5 % of the H_s values measured in 2007 exceeded 3.78 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 and 3-hourly records and are calculated for periods up to 10 times the record length, using a Weibull distribution.

0.5-hourly records December 2006 – December 2016		
Return period (years)	**Significant wave height (m)**	**Comments**
1	7.0	Depth-limited at MLWS
2	7.2	
5	7.5	
10	7.7	
20	7.9	Depth-limited at MHWS
50	8.1	Depth-limited at HAT
100	8.3	

3-hourly records December 2006 – December 2016		
Return period (years)	**Significant wave height (m)**	**Comments**
1	6.3	Depth-limited at MLWS
2	6.6	
5	7.0	
10	7.3	
20	7.6	
50	8.0	Depth-limited at MHWS
100	8.2	Depth-limited at HAT

Distribution plots

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

- Annual time series of H_s (red line is 5.25 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

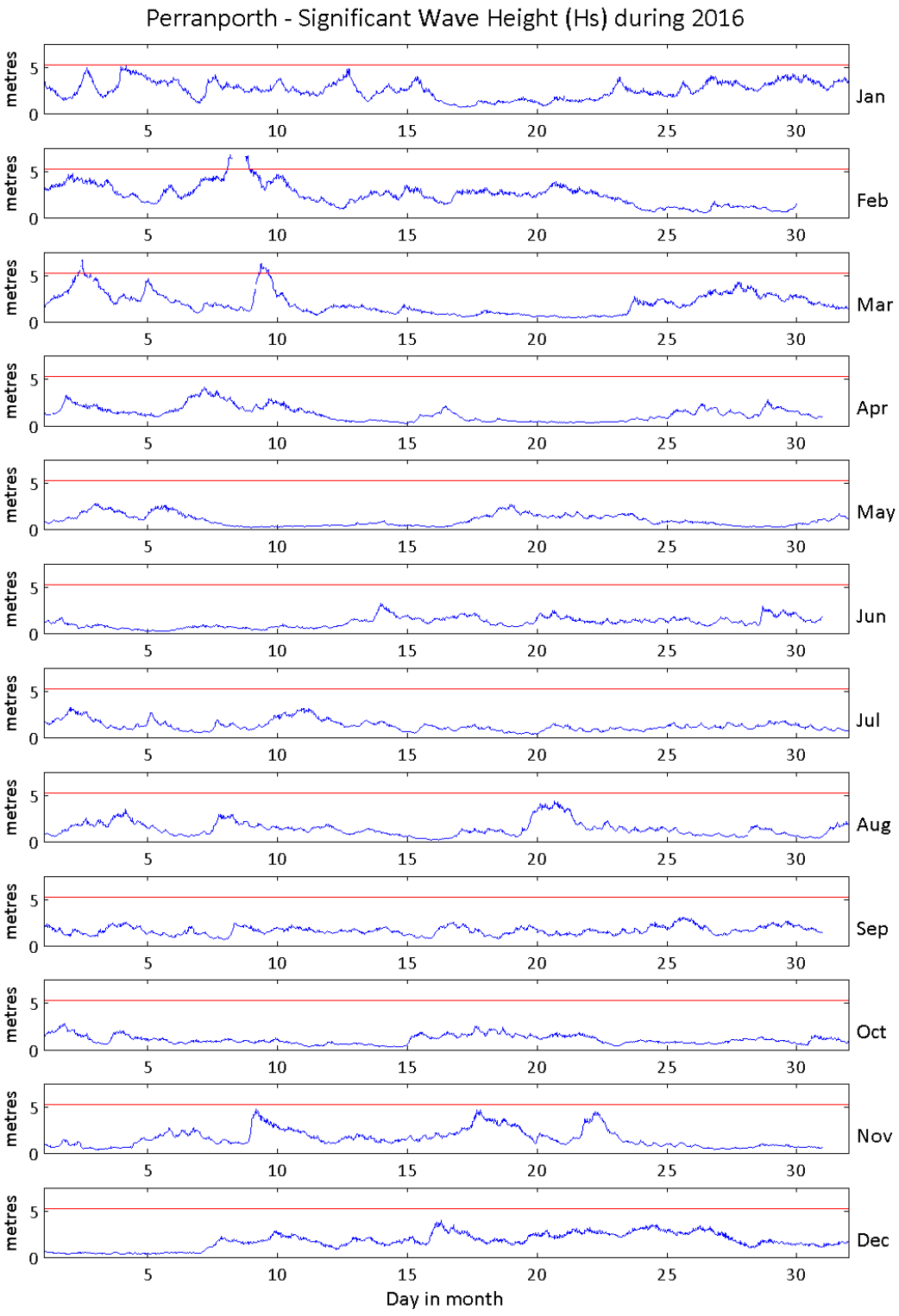
General

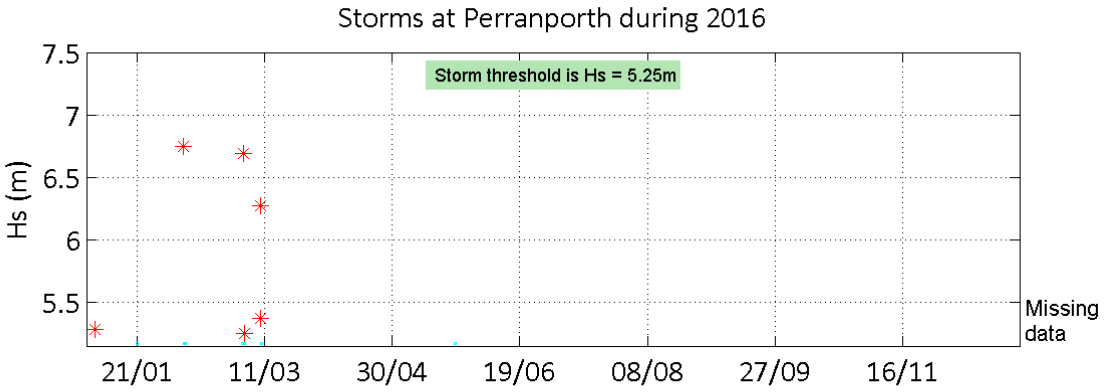
The buoy, owned by Teignbridge District Council, was first deployed on 18 December 2006, at which time the magnetic declination at the site was 3.9° west, changing by 0.15° east per year.

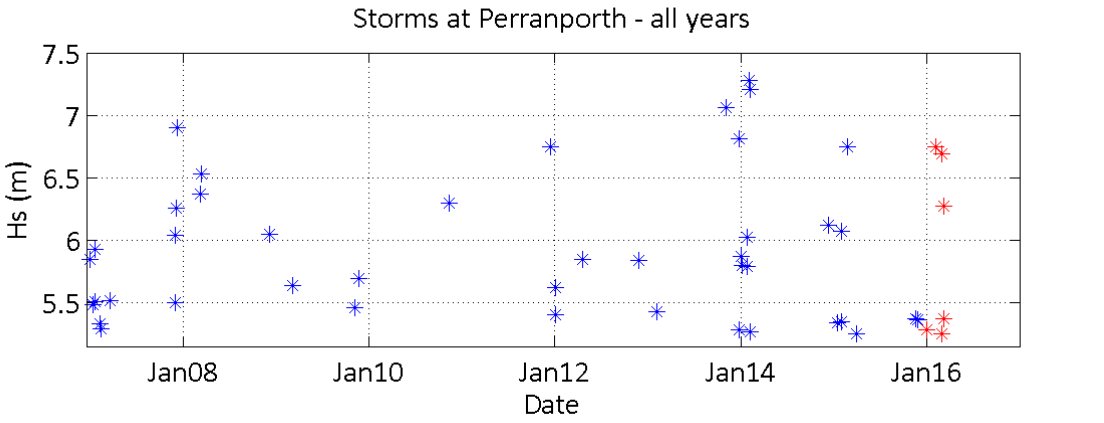
Acknowledgements

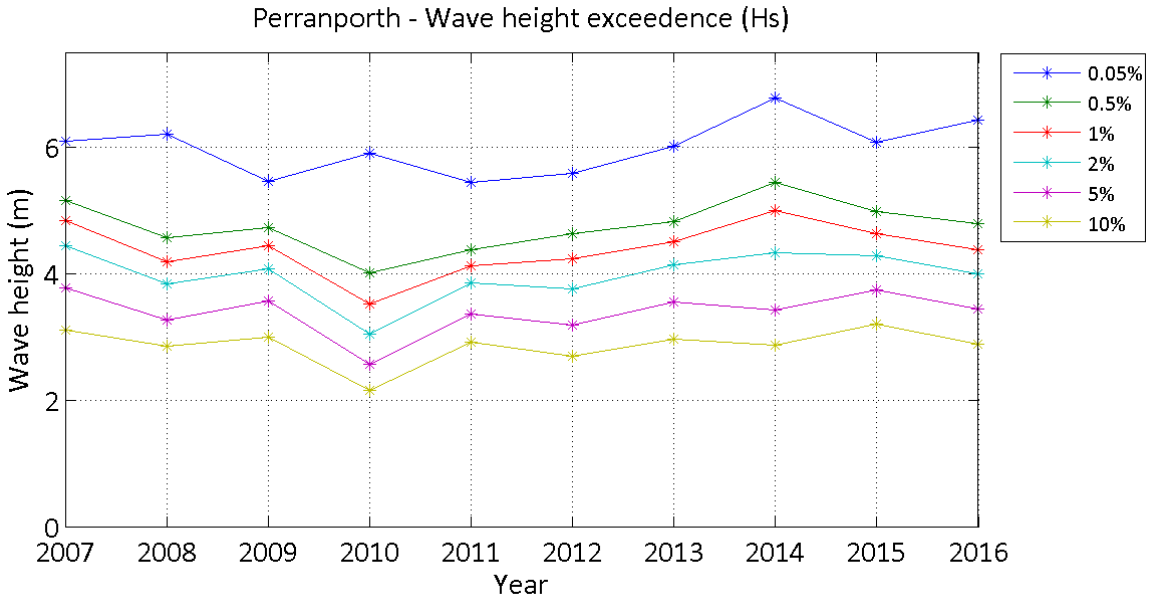
The shore station is kindly hosted by Perranporth Youth Hostel.

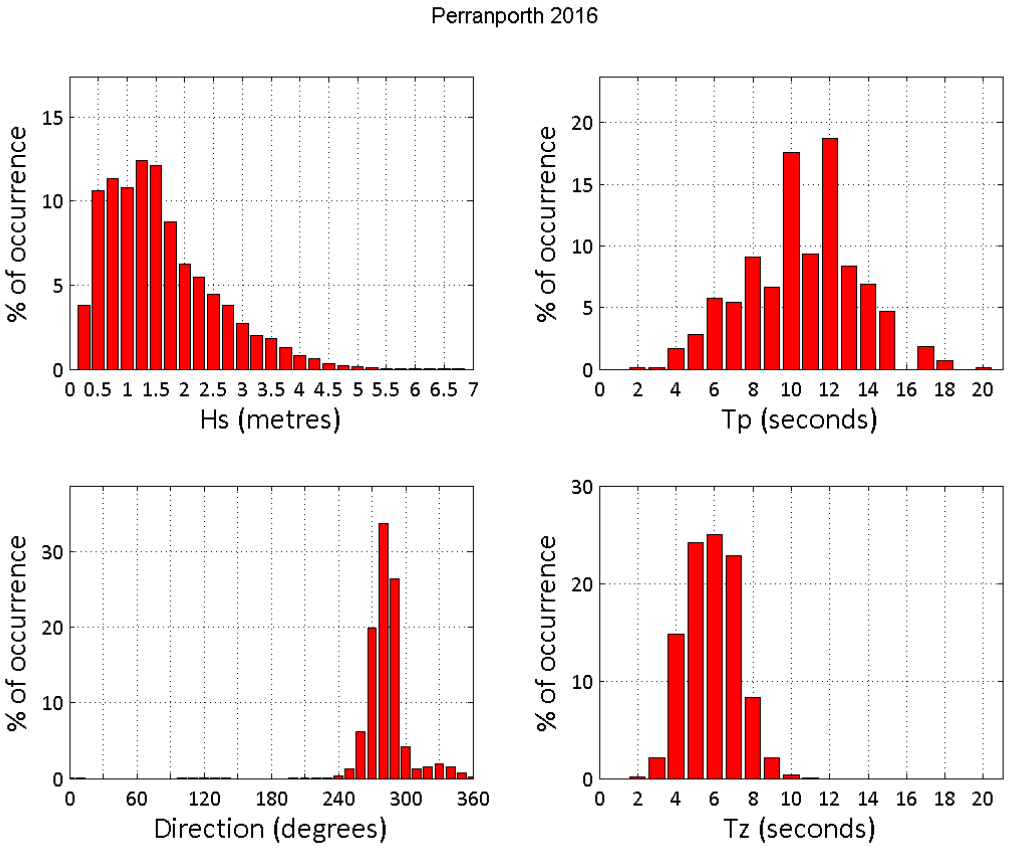
Tidal predictions were produced using the TASK windows edition software, kindly provided by the Marine Data Products team at the UK National Oceanography Centre (Liverpool).

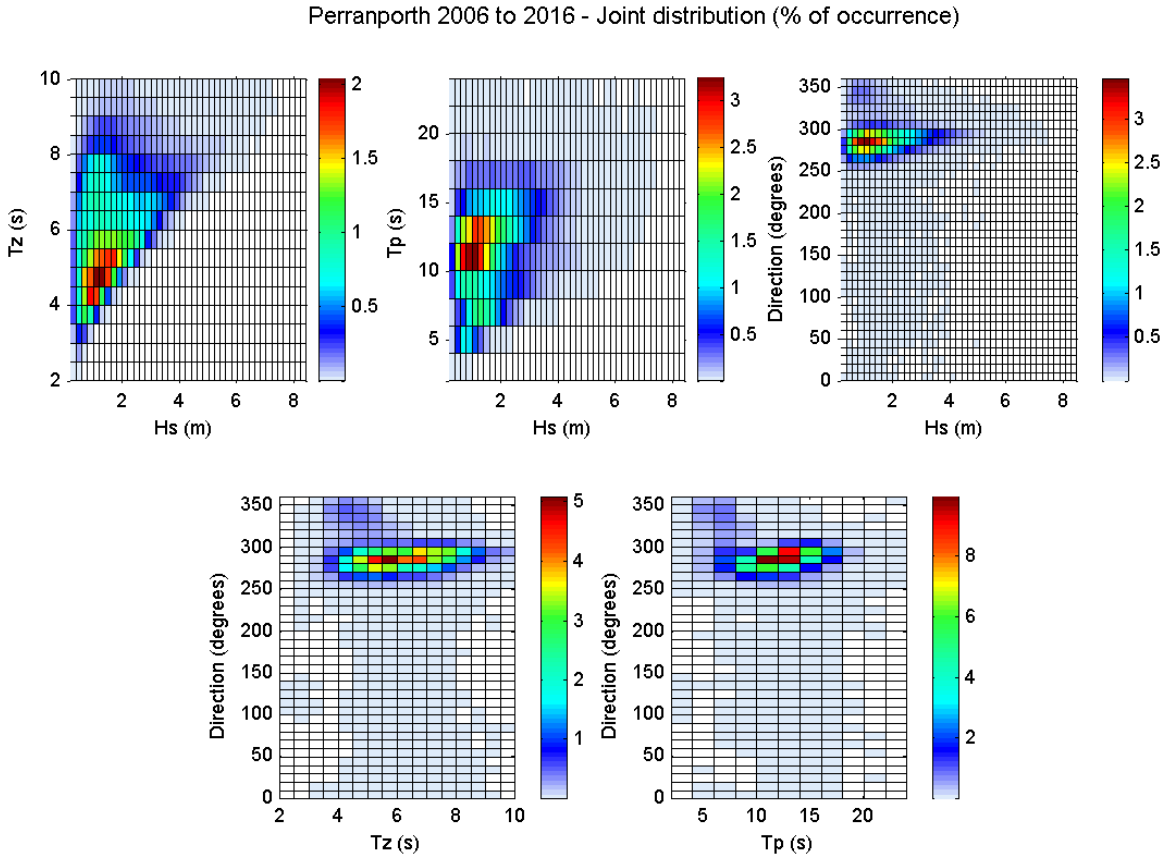

Perranporth - Significant Wave Height (Hs) during 2016
metres
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
0
5
10
15
20
25
30
Day in month

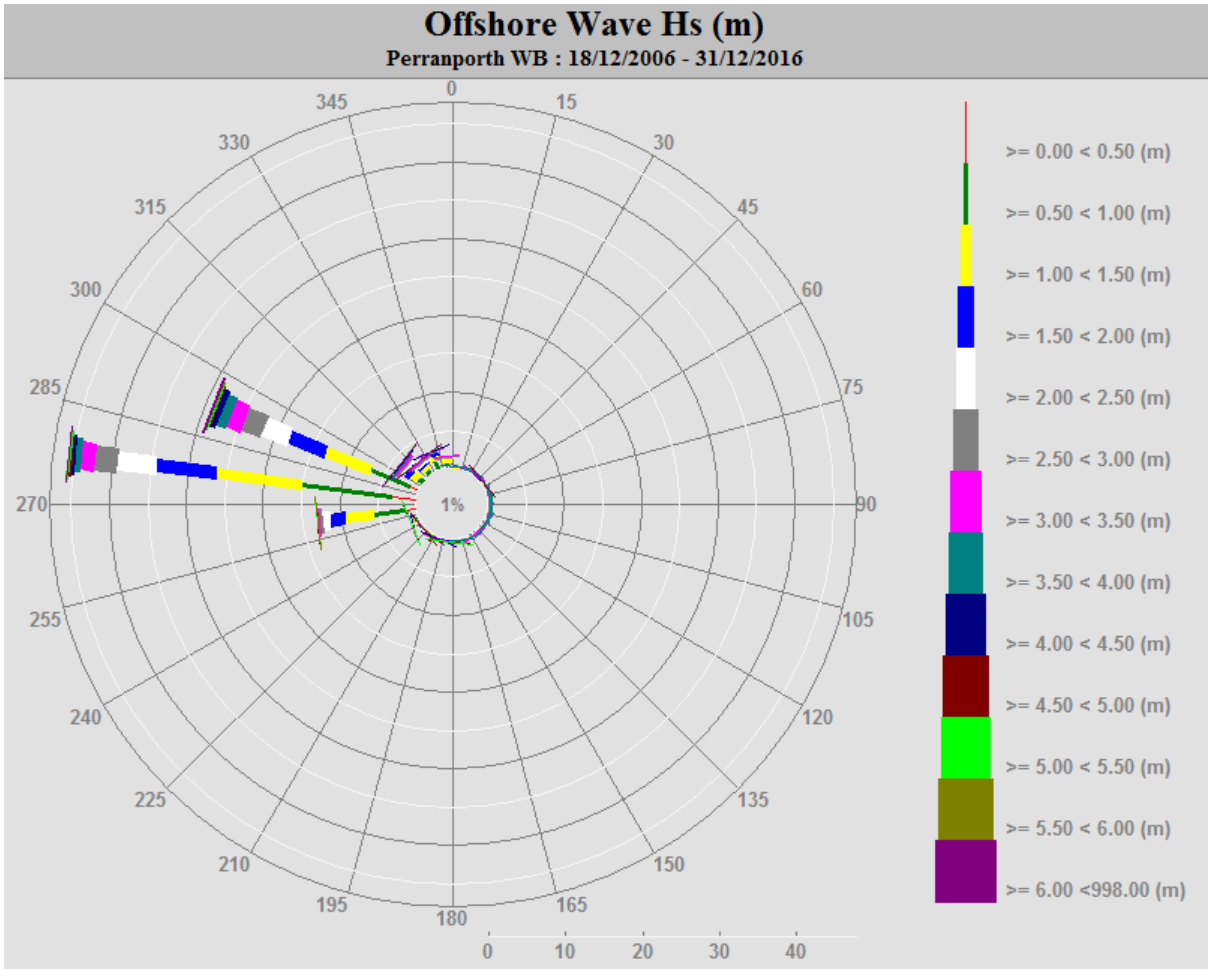

Storms at Perranporth during 2016
Storm threshold is Hs = 5.25m
Hs (m)
7.5
7
6.5
6
5.5
Missing data
21/01
11/03
30/04
19/06
08/08
27/09
16/11


Storms at Perranporth - all years
Hs (m)
7.5
7
6.5
6
5.5
Jan08
Jan10
Jan12
Jan14
Jan16
Date


Perranporth - Wave height exceedence (Hs)
Wave height (m)
0
2
4
6
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
0.05%
0.5%
1%
2%
5%
10%


Perranporth 2016
% of occurrence
Hs (metres)
Tp (seconds)
Direction (degrees)
Tz (seconds)


Perranporth 2006 to 2016 - Joint distribution (% of occurrence)
Tz (s)
Hs (m)
Tp (s)
Direction (degrees)


Offshore Wave Hs (m)
Perranporth WB : 18/12/2006 - 31/12/2016
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
1%
0
10
20
30
40
>= 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)