



Looe Bay Directional Waverider Buoy

Location			
OS	228541 E 51547 N		
WGS84	Latitude: 50° 20.33' N Longitude: 04° 24.65' W		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~10m CD	Buoy in situ in Looe Bay. Photo courtesy of Fugro GB Marine Limited	Location of buoy (Google mapping, image ©2016 Getmapping plc)

Data Quality

Recovery rate (%)	Sample interval
100	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	0.85	8.4	4.3	198	10.1	7	31
February	1.24	9.6	4.9	200	9.6	13	28
March	1.07	8.2	4.7	200	9.9	6	31
April	0.41	8.4	3.9	190	11.1	2	30
May	0.72	7.3	4.2	190	12.6	1	31
June	0.66	7.0	4.1	207	14.8	2	30
July	0.60	5.8	3.8	202	16.1	0	31
August	0.58	5.7	3.9	208	16.1	0	31
September	0.85	6.8	4.3	210	15.8	1	30
October	0.92	7.5	4.4	208	15.1	4	31
November	0.71	7.7	4.4	206	13.4	2	30
December	0.95	9.0	4.7	207	11.1	5	31

Monthly Averages - All Years (June 2009 – December 2016)

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	1.26	9.5	5.1	204	9.9	12
February	1.20	10.4	5.2	203	9.0	15
March	0.85	9.6	4.6	195	9.0	5
April	0.78	8.4	4.5	194	10.0	4
May	0.65	7.1	4.0	201	11.6	1
June	0.64	7.0	4.1	196	13.9	1
July	0.62	6.4	3.9	205	15.6	1
August	0.68	6.7	4.1	208	16.1	1
September	0.64	7.7	4.1	199	16.0	1
October	0.95	7.7	4.4	196	15.1	6
November	1.14	8.5	4.8	200	13.2	7
December	1.30	9.0	5.0	204	11.1	11

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 22:00	5.85	16.7	9.8	212	1.78	HW	3.70	-	-
16-Oct-2017 16:00	4.66	14.3	8.2	215	2.02	HW +1	4.05	0.14	0.27
21-Oct-2017 08:00	3.57	8.3	6.7	218	2.05	HW +1	4.71	0.28	0.37
31-Dec-2017 02:00	3.52	9.1	6.5	215	~1.78	HW -2	3.95	~0.20	~0.30

* Tidal information is obtained from the National Network gauge at Devonport and/or estimated from the predicted tide levels (Admiralty Total Tide). 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)
2009	-	-	3.33	2.98	2.42	1.95	14-Nov-2009 03:30	5.25 ⁺
2010	4.06	3.04	2.75	2.40	1.94	1.57	16-Jan-2010 05:00	4.82
2011	3.71	2.97	2.71	2.41	2.02	1.69	08-Jan-2011 07:30	4.00
2012	4.54	3.37	2.88	2.56	2.18	1.73	22-Nov-2012 15:30	4.99 ⁺
2013	4.75	3.51	3.12	2.76	2.29	1.86	23-Dec-2013 23:30	5.53 ⁺
2014	6.31	4.05	3.53	3.08	2.40	1.94	14-Feb-2014 22:00	7.32 ⁺
2015	4.60	3.31	3.04	2.71	2.31	1.94	15-Jan-2015 01:00	5.05
2016	4.23	3.21	2.97	2.51	2.03	1.62	06-Feb-2016 16:00	5.02
2017	4.79	3.18	2.72	2.31	1.87	1.55	02-Feb-2017 22:00	5.85 ⁺

** i.e. 5 % of the H_s values measured in 2009 exceeded 2.42 m

⁺Note that waves were breaking at the buoy 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	June 2009 to December 2017	
Return period (years)	Significant wave height (m)	Comments
0.25	4.22	No depth limitation
1	5.01	Depth-limited at MLWS
2	5.32	
5	5.68	
10	5.93	Depth-limited at MHWS
20	6.16	Depth-limited at HAT
50	6.43	

Distribution plots

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

- Annual time series of H_s (red line is 4.25 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

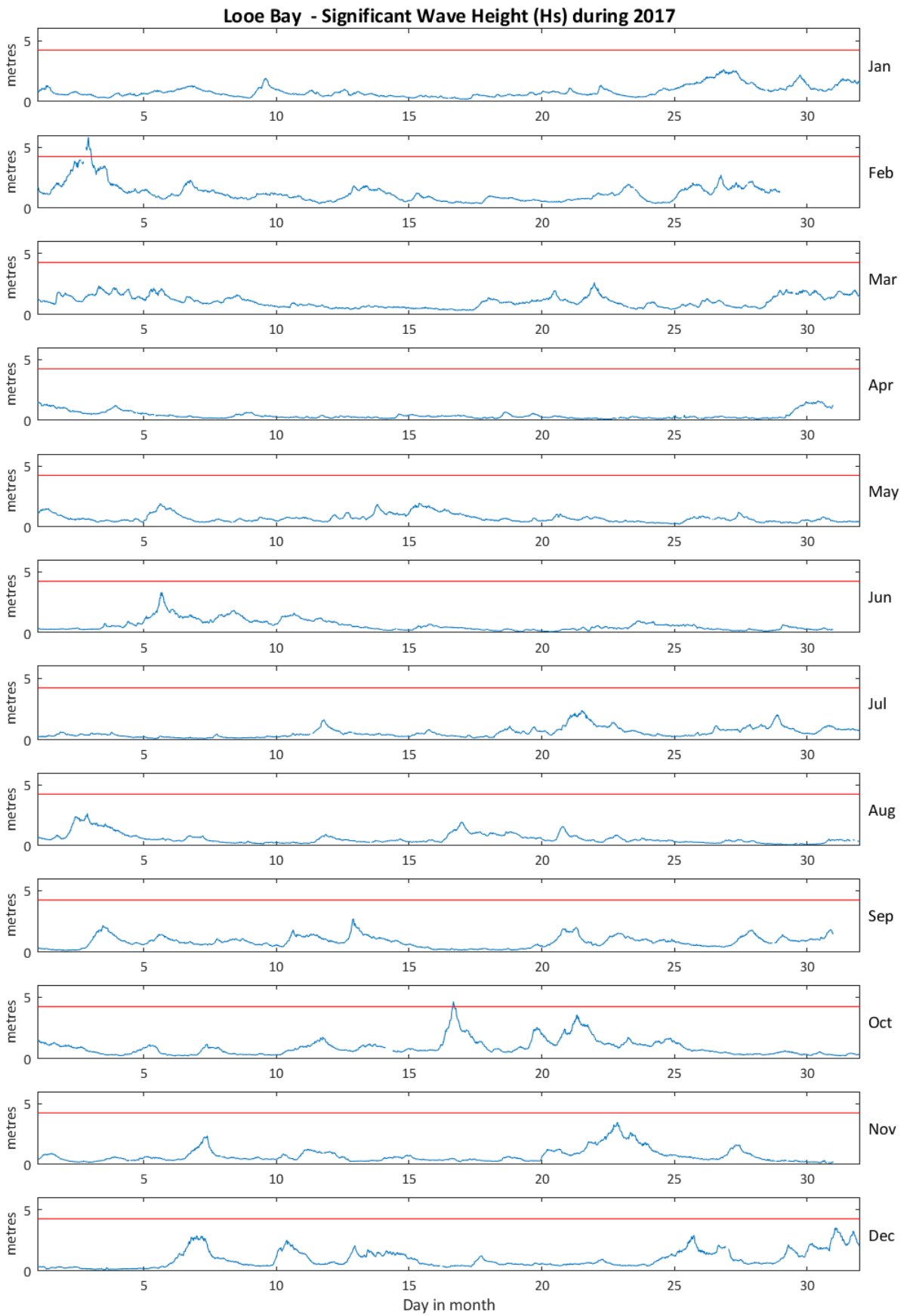
General

The buoy, owned by Teignbridge District Council, was deployed on 22 June 2009, at which time the magnetic declination at the site was 3.2° west, changing by 0.15° east per year.

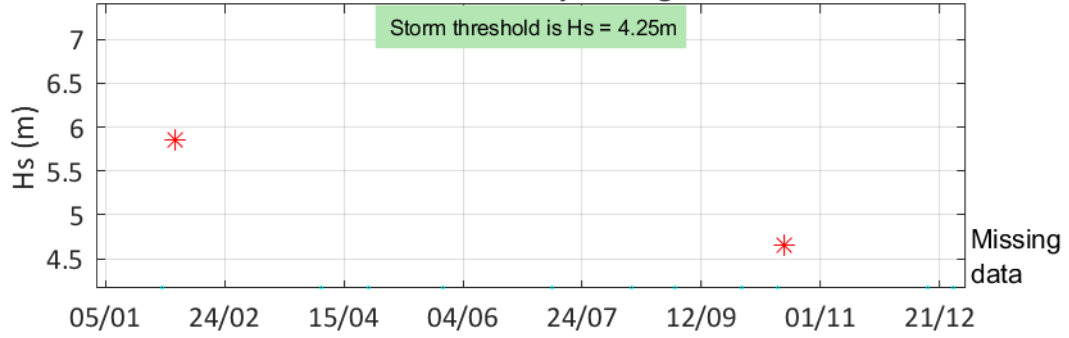
Acknowledgements

The shore station for the Waverider is kindly hosted by the Maritime & Coastguard Agency.

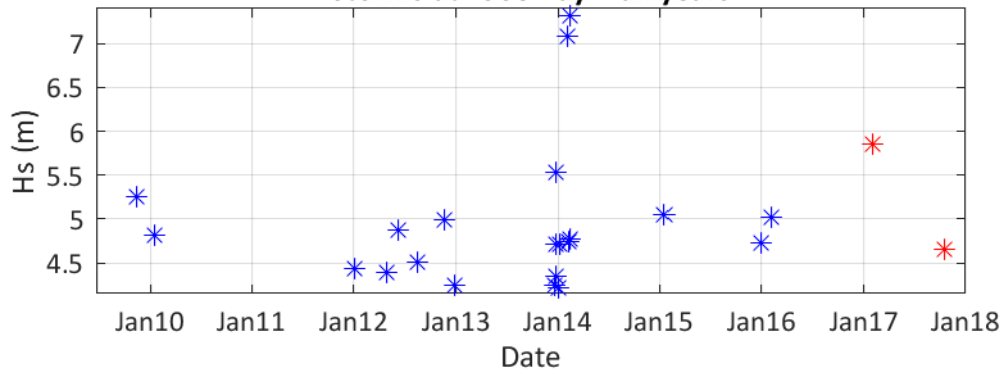
Tidal data at Devonport were provided by the British Oceanographic Data Centre from the UK national tide gauge network, owned and operated by the Environment Agency.



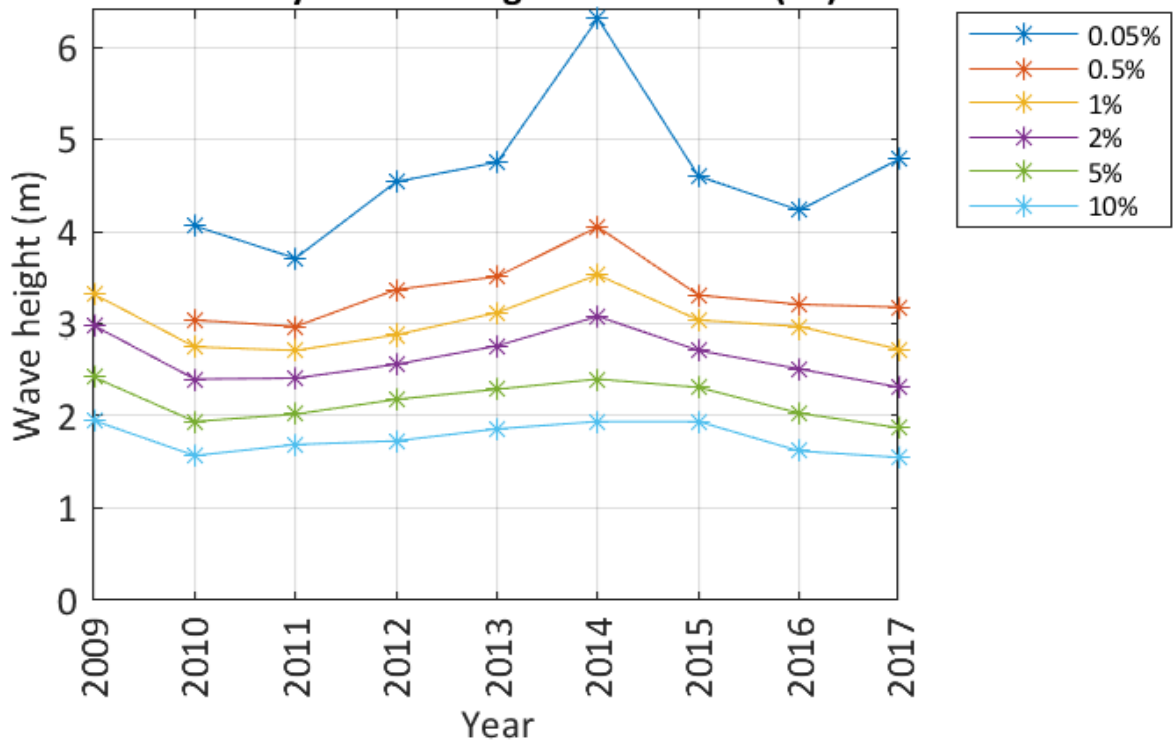
Storms at Looe Bay during 2017



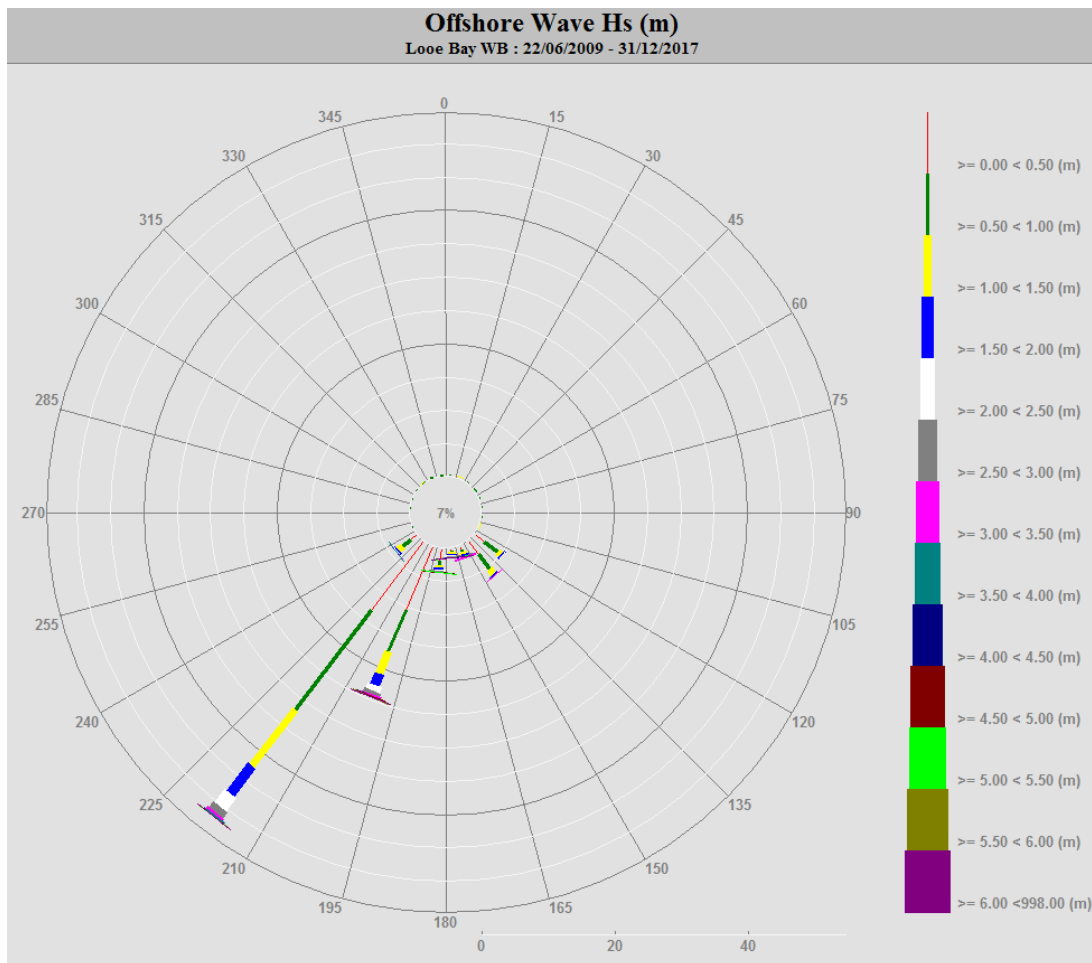
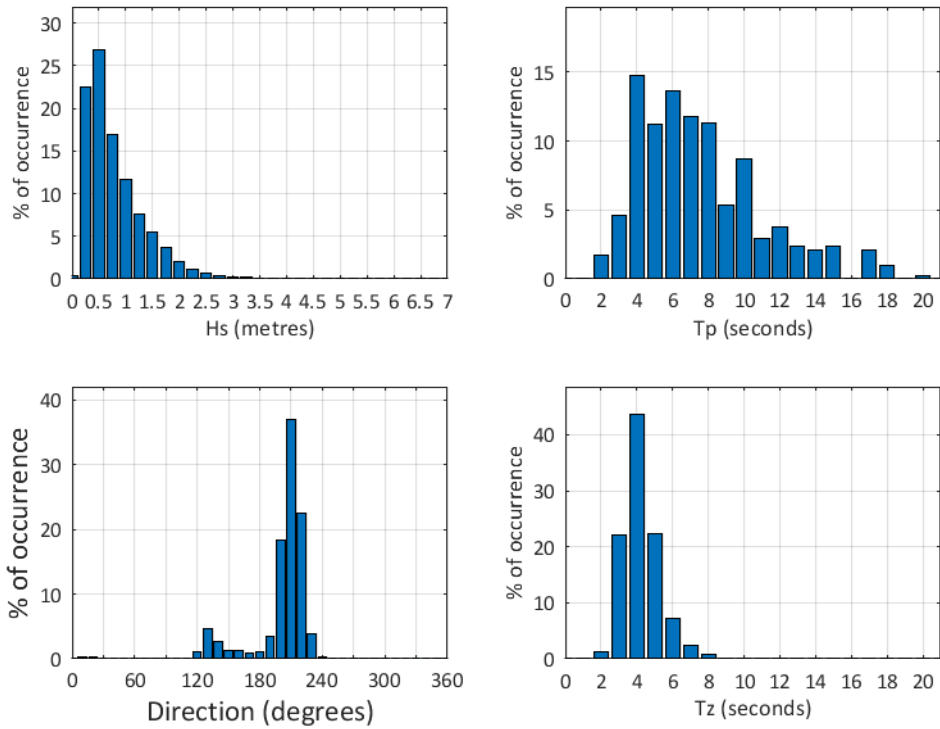
Storms at Looe Bay - all years



Looe Bay - Wave height exceedence (H_s)



Looe Bay 2017



Looe Bay 2009 to 2017 - Joint distribution (% of occurrence)

