



## Looe Bay Directional Waverider Buoy

<b>Location</b>			
OS	228551 E 51535 N		
WGS84	Latitude: 50° 20.33' N Longitude: 04° 24.64' W		
<b>Instrument type</b>			
Datawell Directional Waverider Mk III			
<b>Water depth</b>	~10m CD	Buoy in situ in Looe Bay. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping)

### Data Quality

Recovery rate (%)	Sample interval
99	30 minutes

### Monthly Averages - 2015

*All times are GMT*

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)	No. of days
January	1.25	8.9	5.0	212	10.4	30
February	0.87	9.4	4.7	190	8.9	28
March	0.83	9.7	4.4	203	9.1	31
April	0.64	7.4	4.0	189	10.6	30
May	0.85	7.1	4.2	205	11.6	31
June	0.56	6.1	3.7	190	13.6	30
July	0.75	6.5	4.0	205	15.4	31
August	0.67	7.3	4.1	204	15.9	31
September	0.65	6.9	3.8	188	15.8	30
October	0.84	8.0	4.3	179	14.9	31
November	1.28	7.1	4.6	209	13.7	30
December	2.14	8.7	5.4	208	12.3	31

### Monthly Averages - All Years (June 2009 – December 2015)

Month	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	SST (°C)
January	1.19	9.6	5.0	203	9.7
February	1.18	10.6	5.2	203	8.8
March	0.85	9.6	4.5	194	8.9
April	0.77	8.3	4.4	191	10.0
May	0.66	7.0	4.0	201	11.5
June	0.66	7.0	4.0	195	13.9
July	0.64	6.4	3.9	204	15.7
August	0.69	6.8	4.1	209	16.0
September	0.62	7.8	4.1	198	15.9
October	0.98	7.8	4.5	199	15.1
November	1.20	8.7	4.9	203	13.2
December	1.35	8.9	5.0	205	11.1

## Storm Analysis

Date/Time	H <sub>s</sub> (m)	T <sub>p</sub> (s)	T <sub>z</sub> (s)	Dir. (°)	Water level elevation* (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
15-Jan-2015 01:00	5.05	10.5	7.5	210	1.67	HW +1	2.3	0.65	0.70
30-Dec-2015 12:30	4.73	10.5	7.4	207	0.01	HW +4	4.2	0.36	0.61
20-Dec-2015 02:00	3.97	8.3	6.6	214	1.22	HW +2	3.0	0.25	0.42

## Annual Statistics

Year	Annual H <sub>s</sub> exceedance* (m)						Annual Maximum H <sub>s</sub>	
	0.05%	0.5%	1%	2%	5%	10%	Date	A <sub>max</sub> (m)
2009	-	-	3.33	2.98	2.42	1.95	14-Nov-2009 03:30	5.25 <sup>+</sup>
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 <sup>+</sup>
2013	4.75	3.51	3.12	2.76	2.29	1.86	23-Dec-2013 23:30	5.53 <sup>+</sup>
2014	6.31	4.05	3.53	3.08	2.40	1.94	14-Feb-2014 22:00	7.32 <sup>+</sup>
2015	4.60	3.31	3.04	2.71	2.31	1.94	15-Jan-2015 01:00	5.05

\* i.e. 5 % of the H<sub>s</sub> values measured in 2009 exceeded 2.42 m

<sup>+</sup>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.

## Distribution plots

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

- Annual time series of H<sub>s</sub> (red line is 3.75 m storm threshold)
- Incidence of storm waves for 2015. Storm events are defined using the Peaks-over-Threshold method. The highest H<sub>s</sub> of each storm event is shown
- Wave height exceedance each year since deployment
- Percentage of occurrence of H<sub>s</sub>, T<sub>p</sub>, T<sub>z</sub> and Direction for 2015
- Joint distribution of all parameters for all measured data, given as percentage of occurrence
- Wave rose (percentage of occurrence of direction vs. H<sub>s</sub>) for all measured data

\* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Devonport). The surge shown is the residual at the time of the highest H<sub>s</sub>. The maximum tidal surge is the largest surge during the storm event.

## 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 3-hourly records and are calculated for periods up to 10 times the record length, using a Weibull distribution.

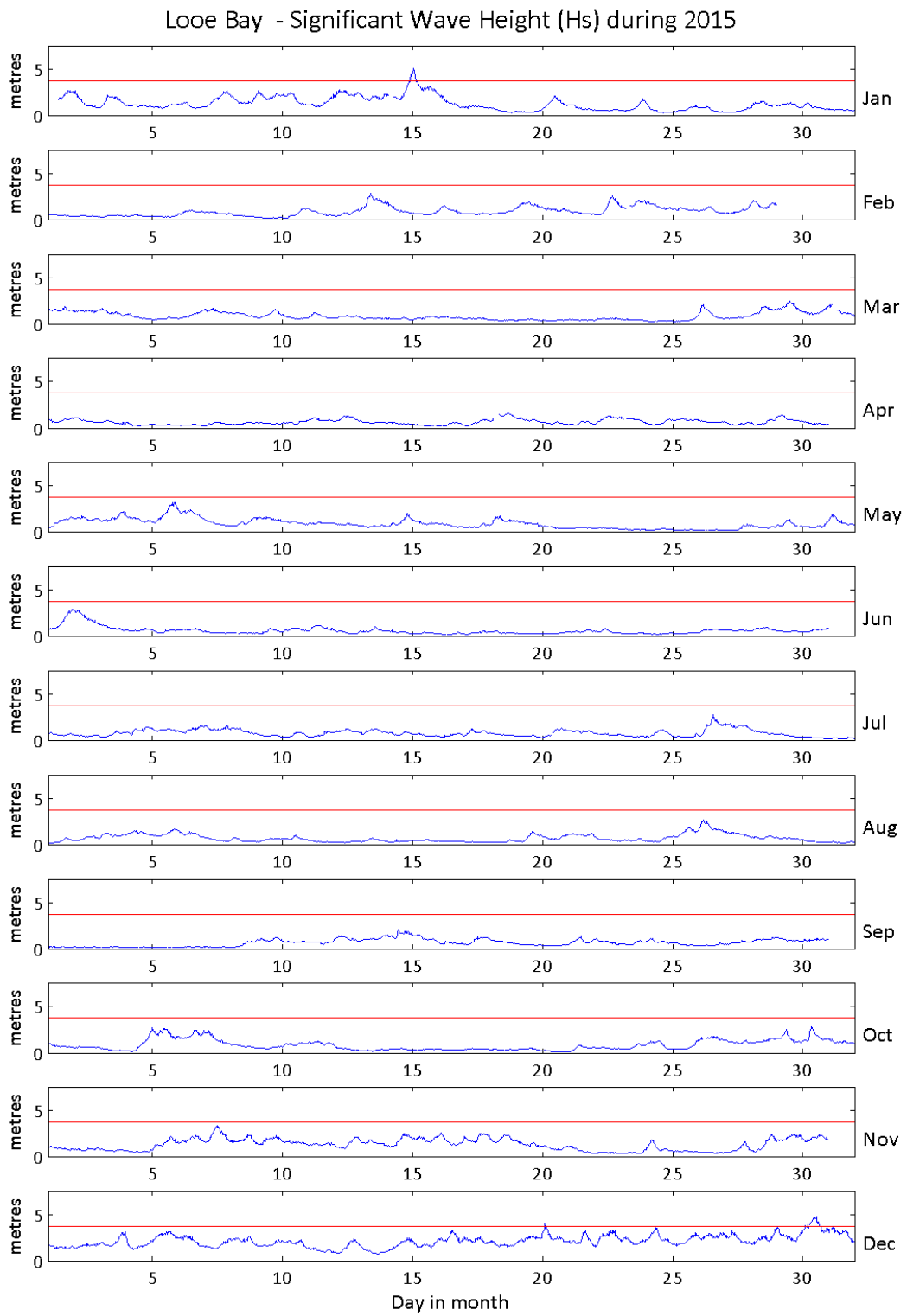
Return period (years)	Significant wave height (m)	Comments
1	5.5	Depth-limited at MLWS
2	6.0	Depth-limited at MHWS
5	6.6	Depth-limited at HAT
10	7.1	
20	7.5	
50	8.2	

## General

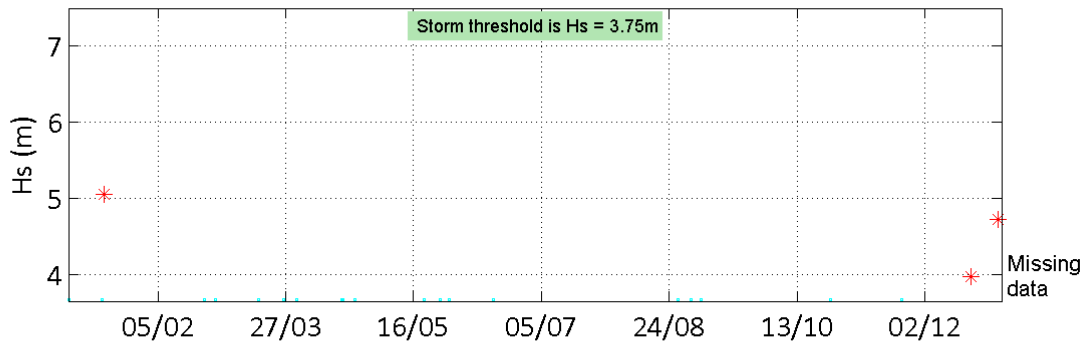
The buoy was deployed on 22 June 2009, at which time the magnetic declination at the site was 3.2° west, changing by 0.15° east per year.

## Acknowledgements

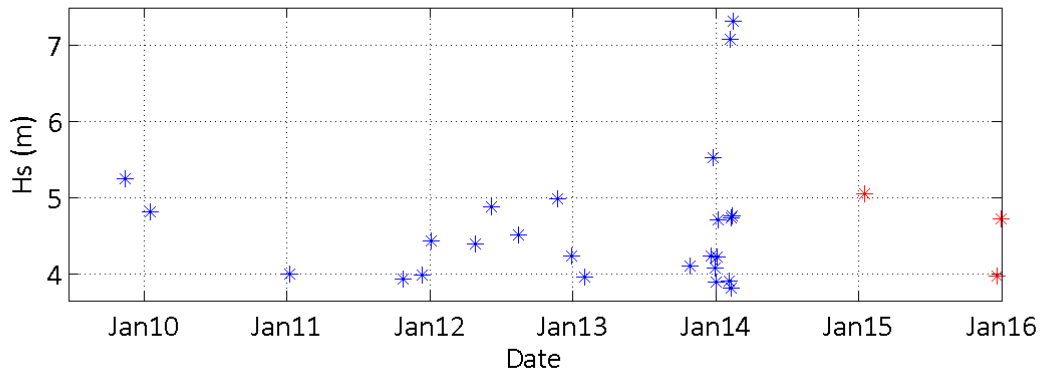
The shore station for the Waverider is kindly hosted by the Maritime & Coastguard Agency. Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.



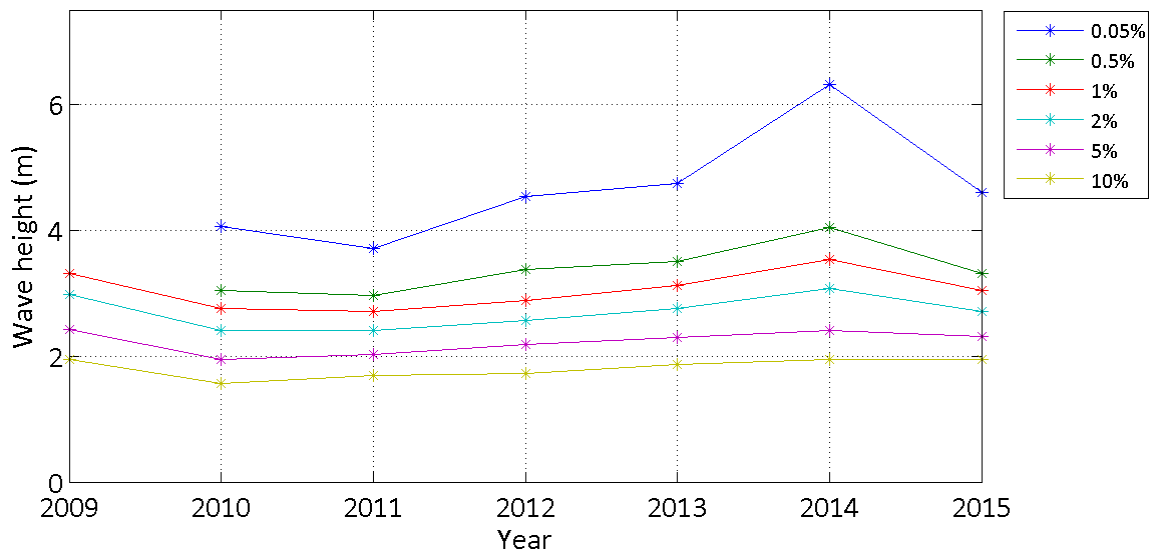
Storms at Looe Bay during 2015



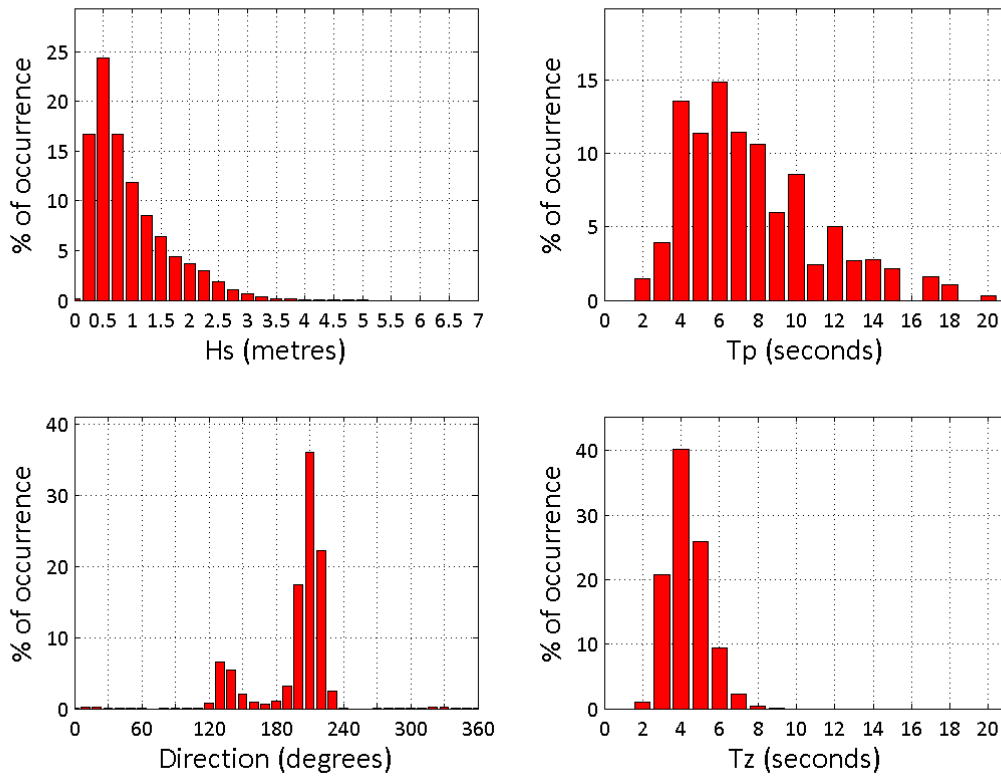
Storms at Looe Bay - all years



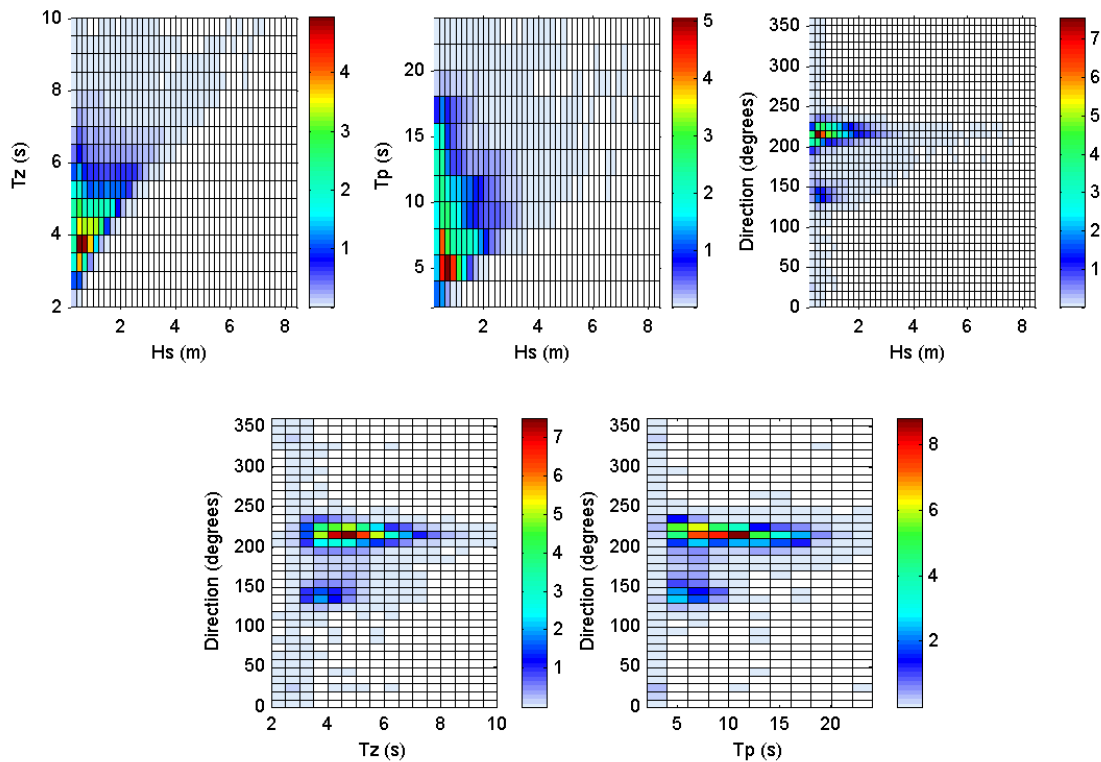
Looe Bay - Wave height exceedance ( $H_s$ )



Looe Bay 2015



Looe Bay 2009 to 2015 - Joint distribution (% of occurrence)



### Offshore Wave Hs (m) Looe Bay WB : 22/06/2009 - 31/12/2015

