



Felixstowe Directional Waverider Buoy

Location			
OS	633378 E 232069 N		
WGS84	Latitude: 51° 56.29' N Longitude: 01° 23.63' E		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~8m CD	Example buoy in situ. Photo courtesy of Fugro Marine GB Limited	Location of buoy (Google mapping, image ©2019 Landsat / Copernicus)

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	0.72	4.8	3.5	153	7.3	-	31
February	0.72	5.2	3.7	135	6.5	-	29
March	0.62	5.0	3.5	117	6.7	-	31
April	0.53	5.0	3.4	118	9.2	-	30
May	0.53	4.9	3.4	109	12.1	-	31
June	0.47	4.4	3.3	130	15.5	-	30
July	0.39	3.9	3.0	150	18.9	-	31
August	0.48	4.3	3.1	136	19.5	-	31
September	0.43	3.7	2.9	150	19.4	-	30
October	0.70	5.8	3.8	107	14.6	-	31
November	0.71	5.2	3.6	125	10.0	-	30
December	0.45	4.5	3.2	138	7.8	-	31

Monthly Averages - All Years (May 2012 – December 2019)

Month	H _s (m)	T _p (s)	T _z (s)	Dir. (°)	SST (°C)	Bimodal seas (%)
January	0.62	4.9	3.5	143	6.2	-
February	0.66	4.9	3.5	135	5.4	-
March	0.63	5.0	3.5	128	6.8	-
April	0.54	4.7	3.3	117	9.2	-
May	0.51	4.6	3.3	120	12.5	-
June	0.52	4.4	3.2	127	15.9	-
July	0.44	4.3	3.1	131	18.7	-
August	0.47	4.1	3.1	145	19.3	-
September	0.50	4.6	3.3	131	17.6	-
October	0.64	5.0	3.5	127	14.3	-
November	0.67	5.0	3.5	133	10.4	-
December	0.61	4.7	3.4	150	7.7	-

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)
07-Nov-2016 02:00:00	2.58	9.1	5.7	82	0.98	HW -2	2.50	-	-
25-Nov-2016 05:30:00	2.37	7.1	5.1	83	0.45	HW -3	2.30	0.13	0.19
28-Mar-2016 02:00:00	2.08	5.9	4.3	156	2.15	HW	3.60	0.38	0.39
15-Feb-2016 00:30:00	1.98	8.3	5.5	86	0.48	HW -4	3.06	0.55	0.60
07-Feb-2016 22:30:00	1.91	5.6	4.1	173	1.68	HW	2.92	-0.02	0.18
09-Mar-2016 09:30:00	1.9	7.7	4.4	132	0.87	HW -2	4.02	0.36	0.40

* Tidal information is obtained from the National Network gauge at Harwich 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)
2012	1.95	1.64	1.52	1.38	1.14	0.94	23-Sep-2012 23:30:00	2.07
2013	2.59	2.27	2.12	1.91	1.45	1.15	11-Oct-2013 15:30:00	2.77
2014	2.18	1.72	1.58	1.43	1.20	1.00	28-Dec-2014 04:00:00	2.54
2015	1.86	1.51	1.37	1.28	1.12	0.98	06-Feb-2015 09:30:00	2.09
2016	2.26	1.87	1.70	1.51	1.24	1.00	07-Nov-2016 02:00:00	2.58
2017	1.79	1.61	1.44	1.27	1.08	0.92	13-Feb-2017 23:30:00	1.88
2018	2.52	1.90	1.67	1.43	1.15	0.94	19-Nov-2018 18:00:00	2.62
2019	1.94	1.60	1.48	1.32	1.12	0.97	02-Nov-2019 14:30:00	2.13

** i.e. 5 % of the H_s values measured in 2012 exceeded 1.14 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 records and are calculated for periods up to 10 times the record length using a peaks-over-threshold method and Generalised Pareto Distribution (GPD).

Observation period	May 2012 to December 2019	
Return period (years)	Significant wave height (m)	Comments
0.25	1.90	No depth limitation
1	2.32	
2	2.48	
5	2.64	
10	2.74	
20	2.82	
50	2.90	

Distribution plots

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

- Annual time series of H_s (red line is 1.90 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
- 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

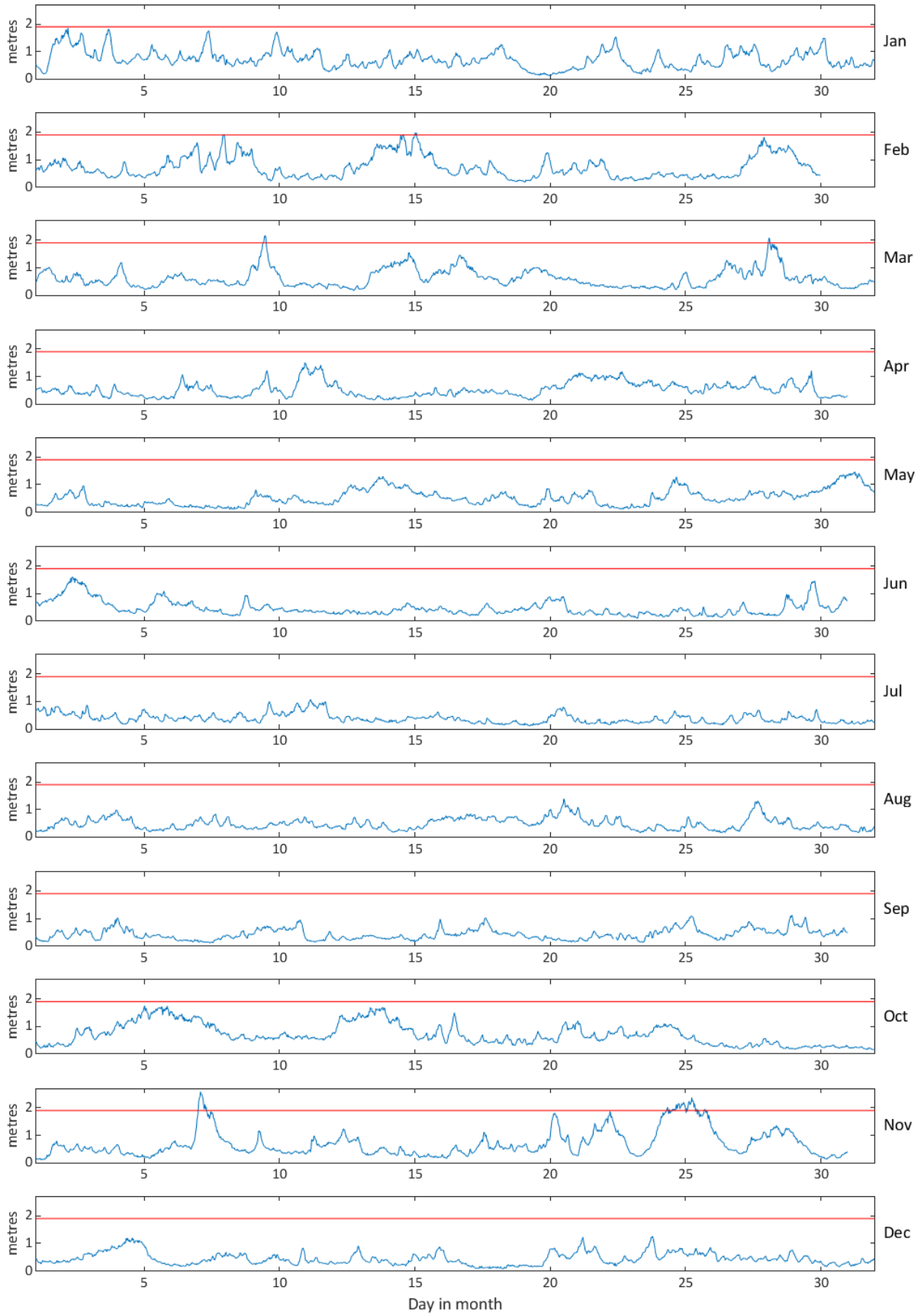
General

The buoy, owned by the Environment Agency, was first deployed on 13 May 2012, at which time the magnetic declination at the site was 0.89° west, changing by 0.17° east per year.

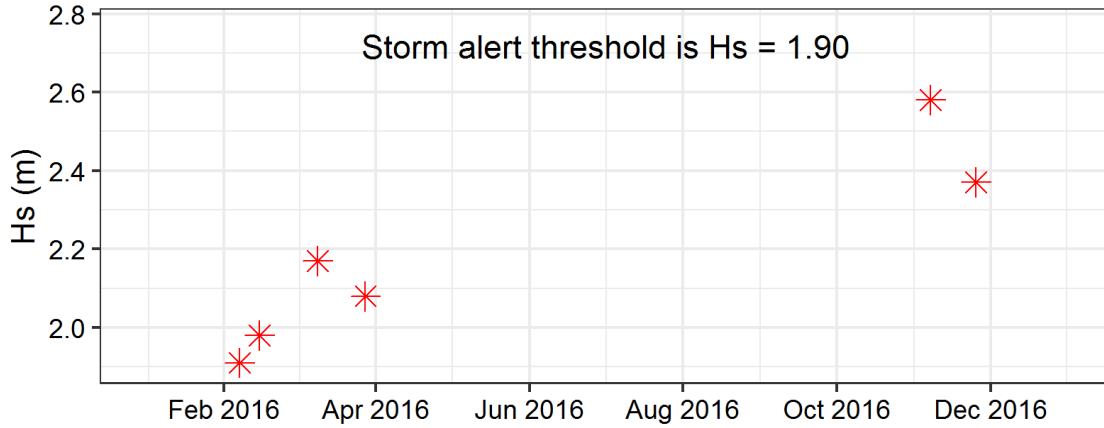
Acknowledgements

The shore station is kindly hosted by Clacton-on-the-Sea RNLI Lifeboat Station.

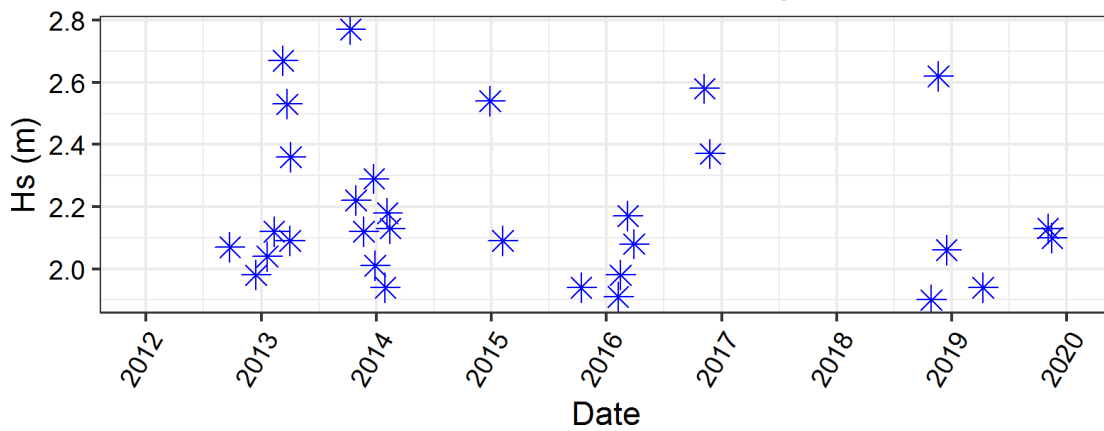
Felixstowe - Significant Wave Height (Hs) during 2016



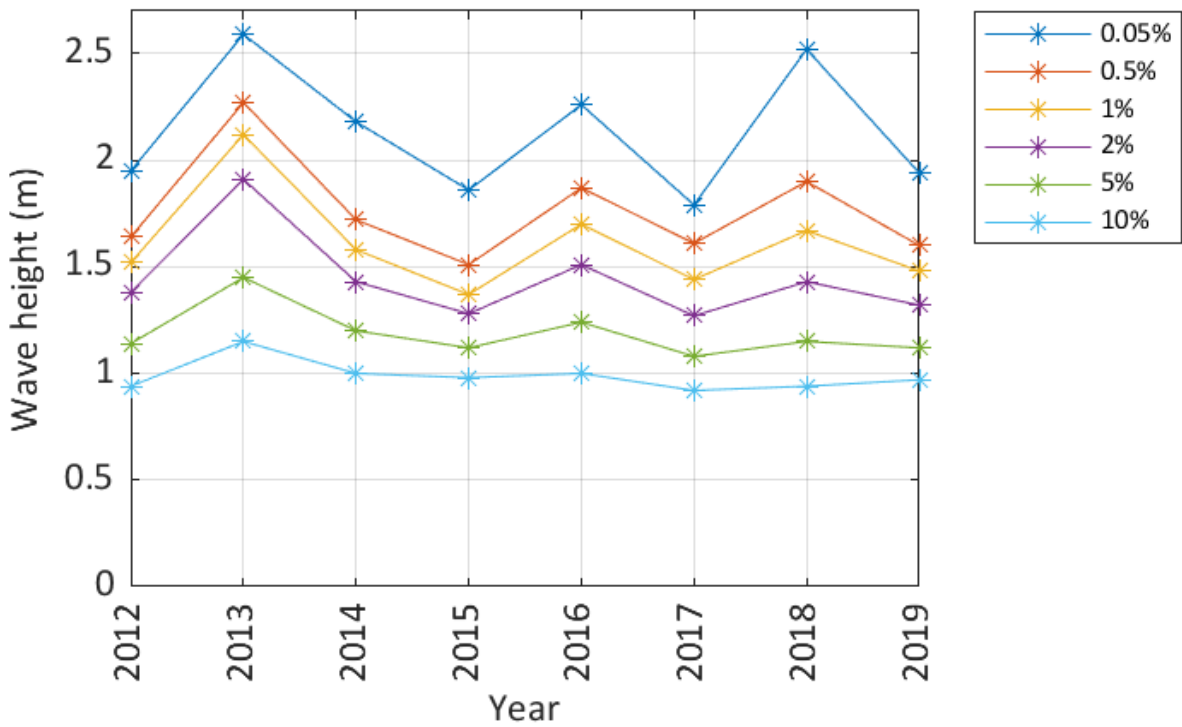
Storms at Felixstowe during 2016



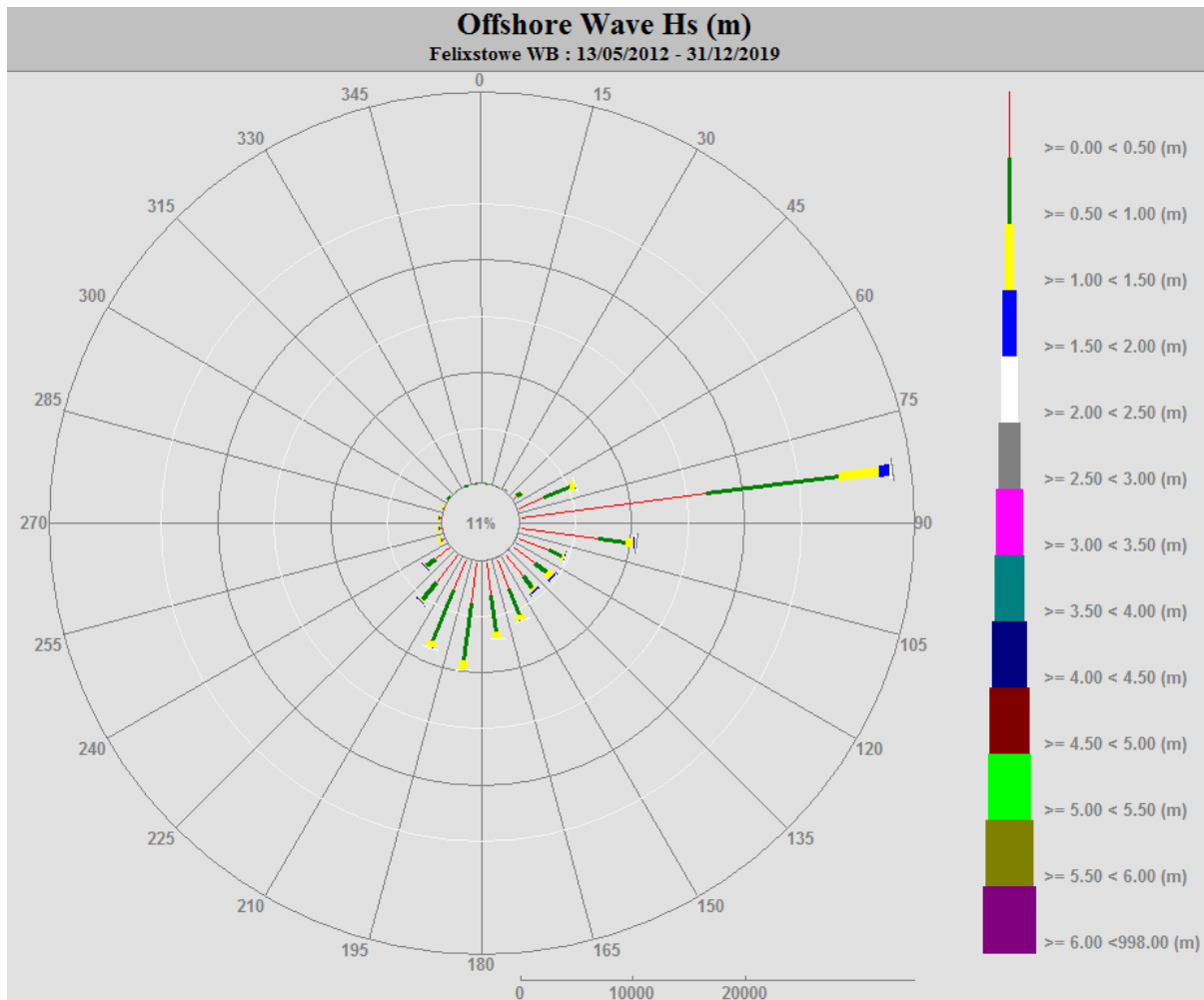
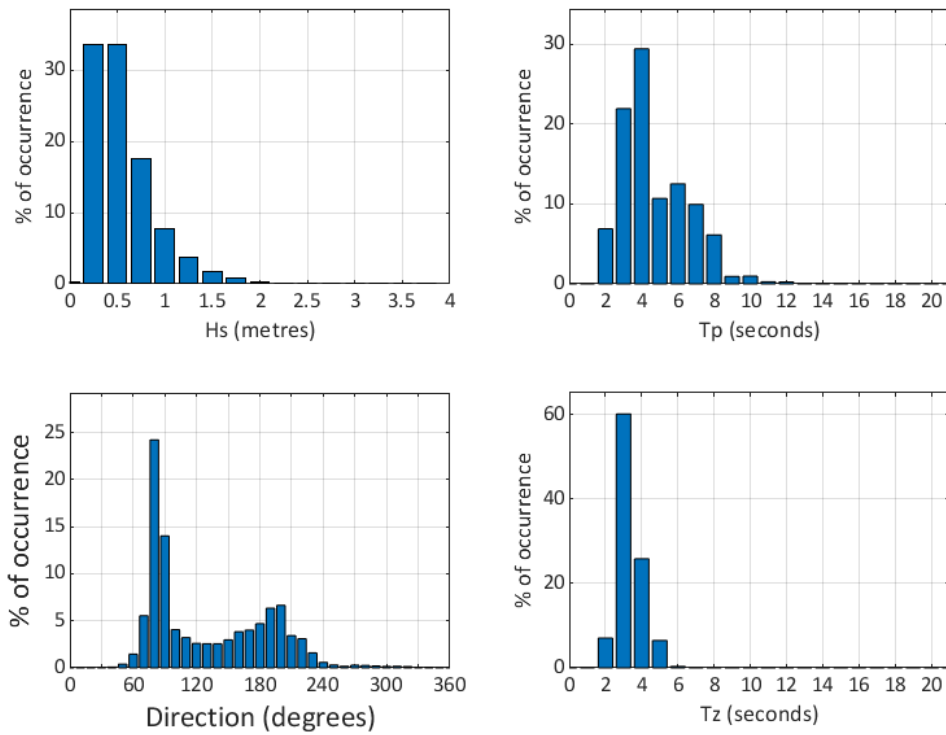
Storms at Felixstowe - all years



Felixstowe - Wave height exceedance (H_s)



Felixstowe 2016



Felixstowe 2012 to 2019 - Joint distribution (% of occurrence)

