



St Mary's Sound Directional Waverider Buoy

| | | | |
|--|---|--|---|
| Location | |  |  |
| OS | 90367 E 8029 N | | |
| WGS84 | Latitude: 49° 53.53' N Longitude: 06° 18.77' W | | |
| Instrument type | | | |
| Datawell Directional Waverider Mk III | | | |
| Water depth | ~53m CD | Buoy in situ in St Mary's Sound. Photo courtesy of Fugro GB Marine Limited | Location of buoy (Google mapping, image ©2016 Getmapping plc) |

Data Quality

| | |
|--------------------------|------------------------|
| Recovery rate (%) | Sample interval |
| 84 | 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 | 2.21 | 10.7 | 6.1 | 228 | 11.8 | - | 0 |
| February | 1.61 | 7.5 | 5.1 | 143 | 10.1 | - | 4 |
| March | 1.33 | 9.1 | 5.2 | 217 | 9.8 | 16 | 31 |
| April | 1.32 | 8.8 | 5.1 | 203 | 10.2 | 10 | 30 |
| May | 0.81 | 8.0 | 4.8 | 218 | 11.3 | 5 | 31 |
| June | 0.74 | 7.9 | 4.8 | 239 | 13.3 | 2 | 30 |
| July | 0.70 | 7.4 | 4.6 | 264 | 14.7 | 4 | 31 |
| August | 0.87 | 7.8 | 4.8 | 253 | 15.5 | 4 | 31 |
| September | 1.12 | 8.4 | 5.1 | 245 | 15.0 | 13 | 29 |
| October | 1.24 | 7.8 | 4.8 | 193 | 14.2 | 3 | 30 |
| November | 1.21 | 7.8 | 4.7 | 179 | 13.0 | 9 | 30 |
| December | 1.45 | 9.3 | 5.3 | 212 | 12.0 | 30 | 31 |

Monthly Averages - All Years (May 2014 – December 2019)

| Month | H _s (m) | T _p (s) | T _z (s) | Dir. (°) | SST (°C) | Bimodal seas (%) |
|-----------|-----------------------|-----------------------|-----------------------|-------------|-------------|---------------------|
| January | 1.48 | 9.0 | 5.2 | 227 | 11.0 | 19 |
| February | 1.64 | 9.0 | 5.3 | 204 | 10.1 | 25 |
| March | 1.47 | 9.3 | 5.3 | 219 | 9.8 | 19 |
| April | 1.18 | 8.6 | 5.0 | 208 | 10.3 | 10 |
| May | 0.89 | 8.4 | 4.9 | 223 | 11.5 | 5 |
| June | 0.82 | 7.6 | 4.6 | 216 | 13.5 | 3 |
| July | 0.75 | 7.6 | 4.6 | 238 | 15.2 | 2 |
| August | 0.83 | 7.5 | 4.6 | 244 | 15.4 | 2 |
| September | 1.01 | 8.0 | 4.7 | 213 | 15.1 | 8 |
| October | 1.31 | 8.5 | 5.0 | 206 | 14.1 | 11 |
| November | 1.53 | 8.6 | 5.2 | 210 | 13.0 | 15 |
| December | 1.76 | 9.1 | 5.5 | 219 | 11.9 | 22 |

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) |
|----------------------|-----------------------|-----------------------|-----------------------|-------------|-----------------------------------|----------------------------------|-----------------------|------------------------|-----------------------|
| 10-Apr-2016 14:00:00 | 5.13 | 8.3 | 6.9 | 135 | 1.39 | HW +1 | 2.70 | - | - |

* Tidal information is estimated from the predicted tide levels (Admiralty Total Tide).

Annual Statistics

| Year | Annual H _s exceedance** (m) | | | | | | Annual Maximum H _s | |
|------|--|------|------|------|------|------|-------------------------------|----------------------|
| | 0.05% | 0.5% | 1% | 2% | 5% | 10% | Date | A _{max} (m) |
| 2014 | 4.98 | 3.39 | 3.14 | 2.86 | 2.29 | 1.96 | 06-Oct-2014 02:00:00 | 5.30 |
| 2015 | 5.31 | 4.11 | 3.68 | 3.27 | 2.81 | 2.35 | 30-Dec-2015 05:30:00 | 5.87 |
| 2016 | 4.76 | 3.57 | 3.06 | 2.72 | 2.33 | 1.95 | 10-Apr-2016 14:00:00 | 5.13 |
| 2017 | 6.33 | 4.20 | 3.62 | 3.07 | 2.49 | 2.04 | 02-Feb-2017 15:30:00 | 6.72 |
| 2018 | 5.57 | 4.62 | 4.14 | 3.61 | 3.00 | 2.55 | 12-Oct-2018 14:30:00 | 6.10 |
| 2019 | 5.39 | 4.01 | 3.74 | 3.38 | 2.78 | 2.27 | 18-Dec-2019 17:00:00 | 6.12 |

** i.e. 5 % of the H_s values measured in 2014 exceeded 2.29 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 2014 to December 2019 | |
|-----------------------|-----------------------------|---------------------|
| Return period (years) | Significant wave height (m) | Comments |
| 0.25 | 4.36 | No depth limitation |
| 1 | 5.44 | |
| 2 | 5.87 | |
| 5 | 6.36 | |
| 10 | 6.67 | |
| 20 | 6.93 | |
| 50 | 7.23 | |

Distribution plots

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

- Annual time series of H_s (red line is 4.36 m storm alert 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

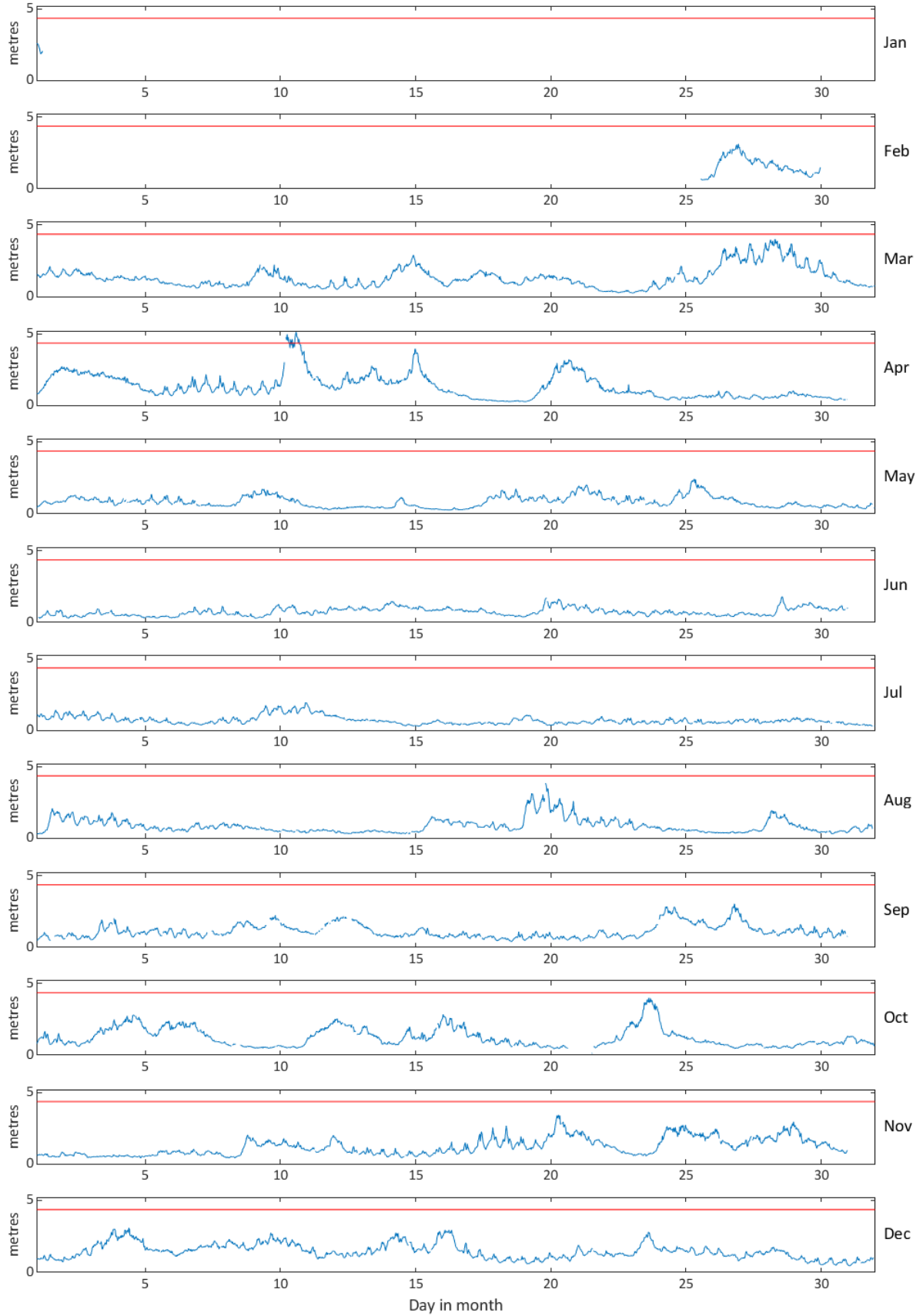
The buoy, owned by Teignbridge District Council, was first deployed on 15 May 2014, at which time the magnetic declination at the site was 3.03° west, changing by 0.17° east per year.

Acknowledgements

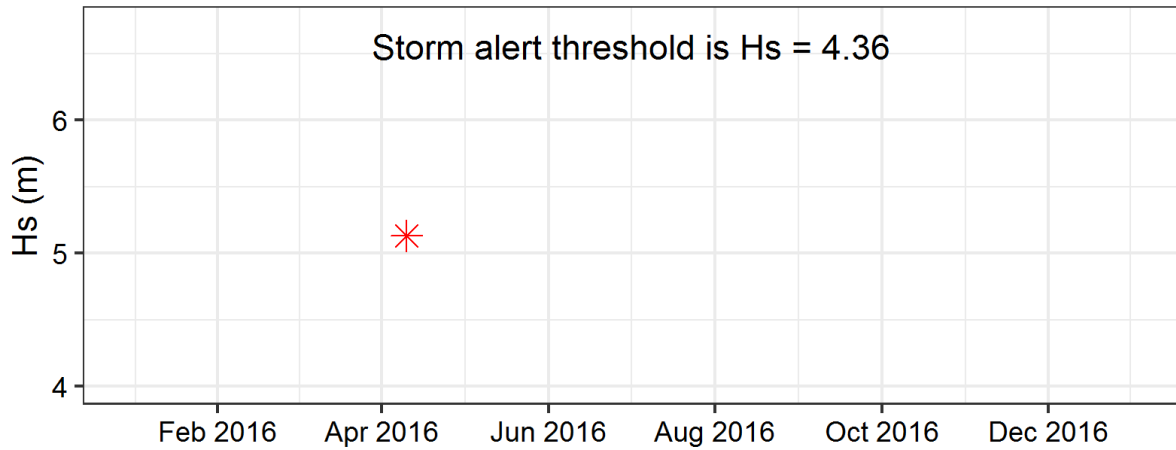
The shore station is kindly hosted by the leaseholder of the Coastguard Tower.

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

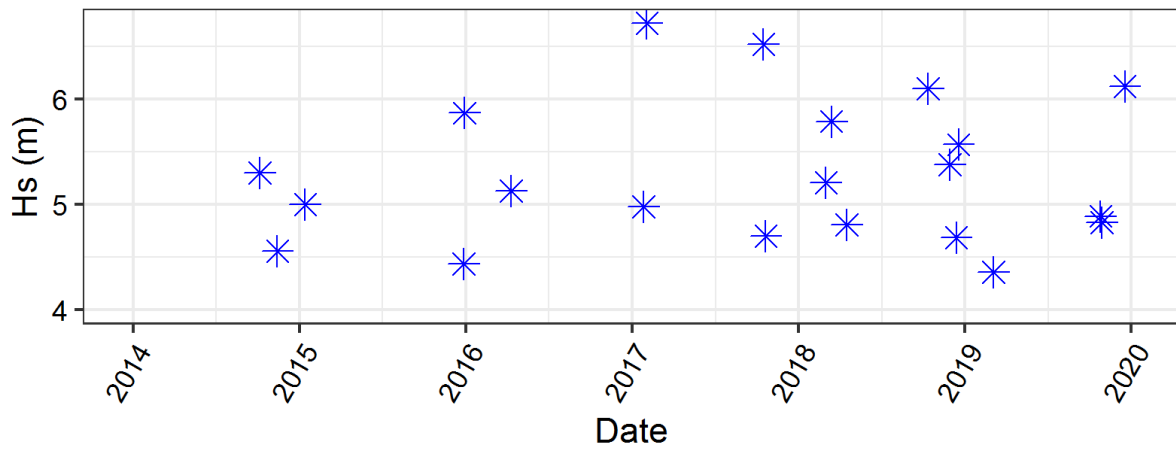
St Marys Sound - Significant Wave Height (Hs) during 2016



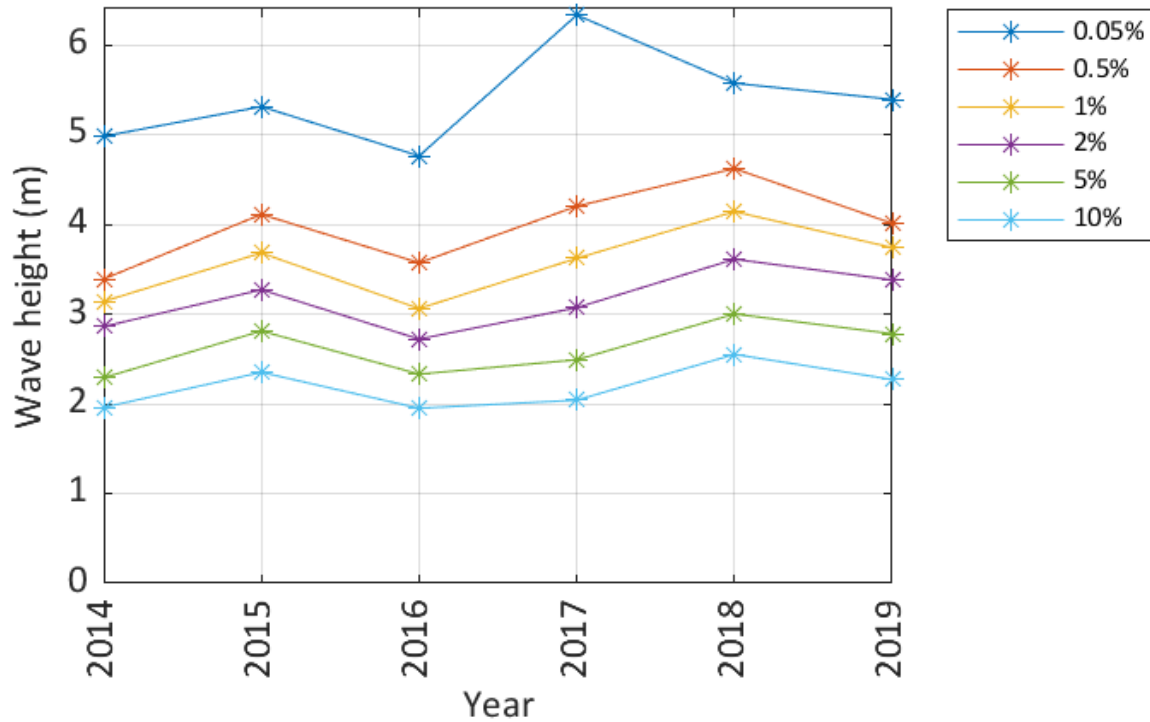
Storms at St Mary's Sound during 2016



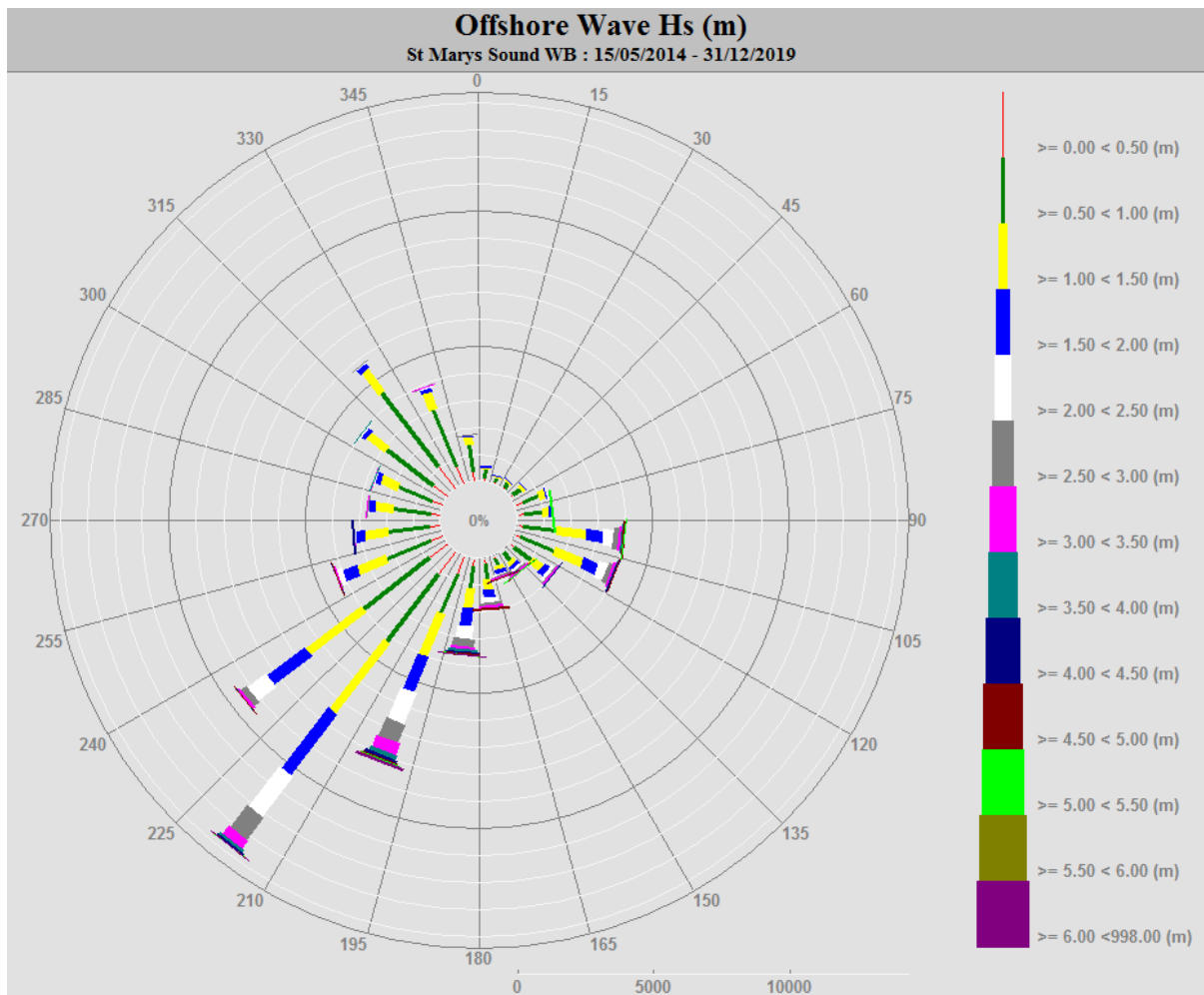
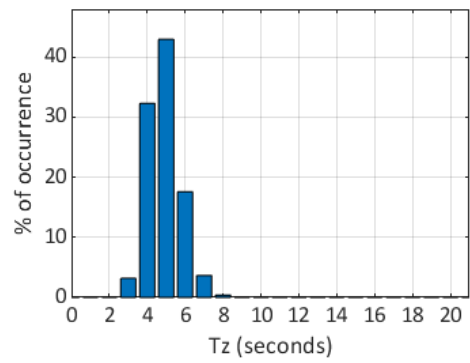
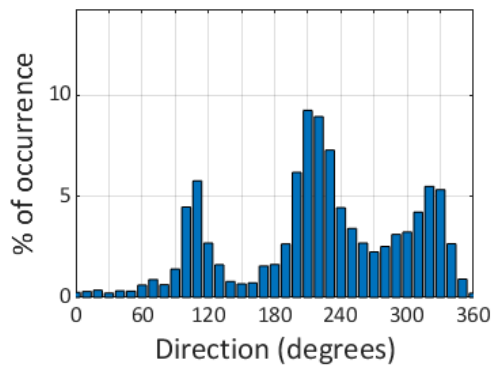
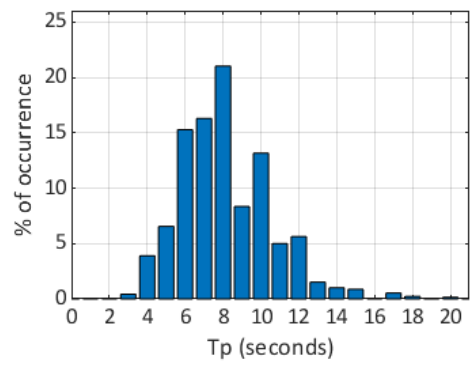
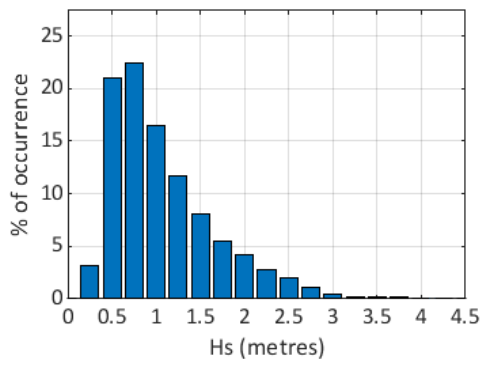
Storms at St Mary's Sound - all years



St Marys Sound - Wave height exceedance (H_s)



St Marys Sound 2016



St Marys Sound 2014 to 2019 - Joint distribution (% of occurrence)

