



## Weston Bay Directional Waverider Buoy

|  |   |   |   |
|--|---|---|---|
| <b>Location</b>                          |   |  |  |
| OS                                       | 329183 E 162109 N                                   |   |   |
| WGS84                                    | Latitude: 51° 21.217' N<br>Longitude: 03° 01.101' W |   |   |
| <b>Instrument type</b>                   |   |   |   |
| Datawell<br>Directional Waverider Mk III |   |   |   |
| <b>Water depth</b>                       | ~13m CD   | Buoy in situ in Weston Bay.<br>Photo courtesy of Fugro<br>EMU Limited             | Location of buoy (Google<br>mapping)  |

## Data Quality

| Recovery rate (%) | Sample interval |
|-------------------|-----------------|
| 98                | 30 minutes      |

## Monthly Averages - 2014

All times are GMT

| Month     | H <sub>s</sub><br>(m) | T <sub>p</sub><br>(s) | T <sub>z</sub><br>(s) | Dir.<br>(°) | SST<br>(°C) | No. of<br>days |
|-----------|-----------------------|-----------------------|-----------------------|-------------|-------------|----------------|
| January   | 0.48                  | 4.9                   | 3.4                   | 245         | 7.2         | 31             |
| February  | 0.69                  | 5.4                   | 3.6                   | 247         | 6.6         | 28             |
| March     | 0.38                  | 5.8                   | 3.4                   | 230         | 8.1         | 31             |
| April     | 0.29                  | 5.2                   | 3.1                   | 242         | 10.5        | 30             |
| May       | 0.42                  | 4.6                   | 3.2                   | 246         | 13.5        | 31             |
| June      | 0.23                  | 4.1                   | 2.9                   | 235         | 17.1        | 30             |
| July      | 0.37                  | 4.4                   | 3.0                   | 244         | 19.8        | 31             |
| August    | 0.53                  | 4.5                   | 3.2                   | 251         | 18.9        | 31             |
| September | 0.20                  | 5.0                   | 2.9                   | 215         | 17.6        | 23             |
| October   | 0.46                  | 4.7                   | 3.2                   | 238         | 15.3        | 31             |
| November  | 0.31                  | 4.9                   | 3.1                   | 210         | 12.1        | 30             |
| December  | 0.60                  | 4.9                   | 3.4                   | 240         | 8.7         | 31             |

## 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) |
|-------------------|--------------------|--------------------|--------------------|----------|-----------------------------|----------------------------|-----------------|------------------|-----------------|
| 12-Feb-2014 15:30 | 2.55               | 5.9                | 4.8                | 269      | -                           | HW -1                      | 7.9             | 1.79             | 1.90            |
| 09-Feb-2014 12:00 | 2.41               | 5.9                | 4.8                | 269      | -                           | HW -3                      | 4.3             | -0.03            | 1.43            |
| 15-Feb-2014 03:30 | 2.33               | 6.7                | 4.7                | 280      | -                           | HW -3                      | 9.3             | 1.06             | 1.46            |
| 11-May-2014 00:00 | 2.29               | 6.3                | 4.7                | 277      | -                           | HW -4                      | 6.7             | 0.22             | 0.64            |
| 05-Feb-2014 20:00 | 2.08               | 5.9                | 4.3                | 276      | -                           | HW -3                      | 7.9             | 0.42             | 1.47            |

## 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 | -                                     | -    | -    | 1.42 | 1.20 | 1.02 | 14-Nov-2009 15:30             | 2.42                 |
| 2010 | 2.28                                  | 1.45 | 1.23 | 1.07 | 0.85 | 0.69 | 12-Nov-2010 00:00             | 2.77                 |
| 2011 | 1.85                                  | 1.64 | 1.52 | 1.36 | 1.14 | 0.93 | 13-Dec-2011 08:00             | 2.02                 |
| 2012 | 2.16                                  | 1.69 | 1.49 | 1.27 | 1.01 | 0.84 | 05-Jan-2012 06:00             | 2.33                 |
| 2013 | 1.81                                  | 1.47 | 1.37 | 1.24 | 1.03 | 0.83 | 02-Nov-2013 19:00             | 2.16                 |
| 2014 | 2.21                                  | 1.82 | 1.58 | 1.37 | 1.07 | 0.86 | 12-Feb-2014 15:30             | 2.55                 |

\* i.e. 5 % of the H<sub>s</sub> values measured in 2009 exceeded 1.20 m

## 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 1.75 m storm threshold)
- Wave roses (percentage of occurrence of direction vs. H<sub>s</sub>) for all measured data
- Percentage of occurrence of H<sub>s</sub>, T<sub>p</sub>, T<sub>z</sub> and Direction for 2014
- Incidence of storm waves for 2014. Storm events are defined using the Peaks-over-Threshold method. The highest H<sub>s</sub> of each storm event is shown
- Joint distribution of all parameters for all measured data, given as percentage of occurrence

\* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Hinkley Point). 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.

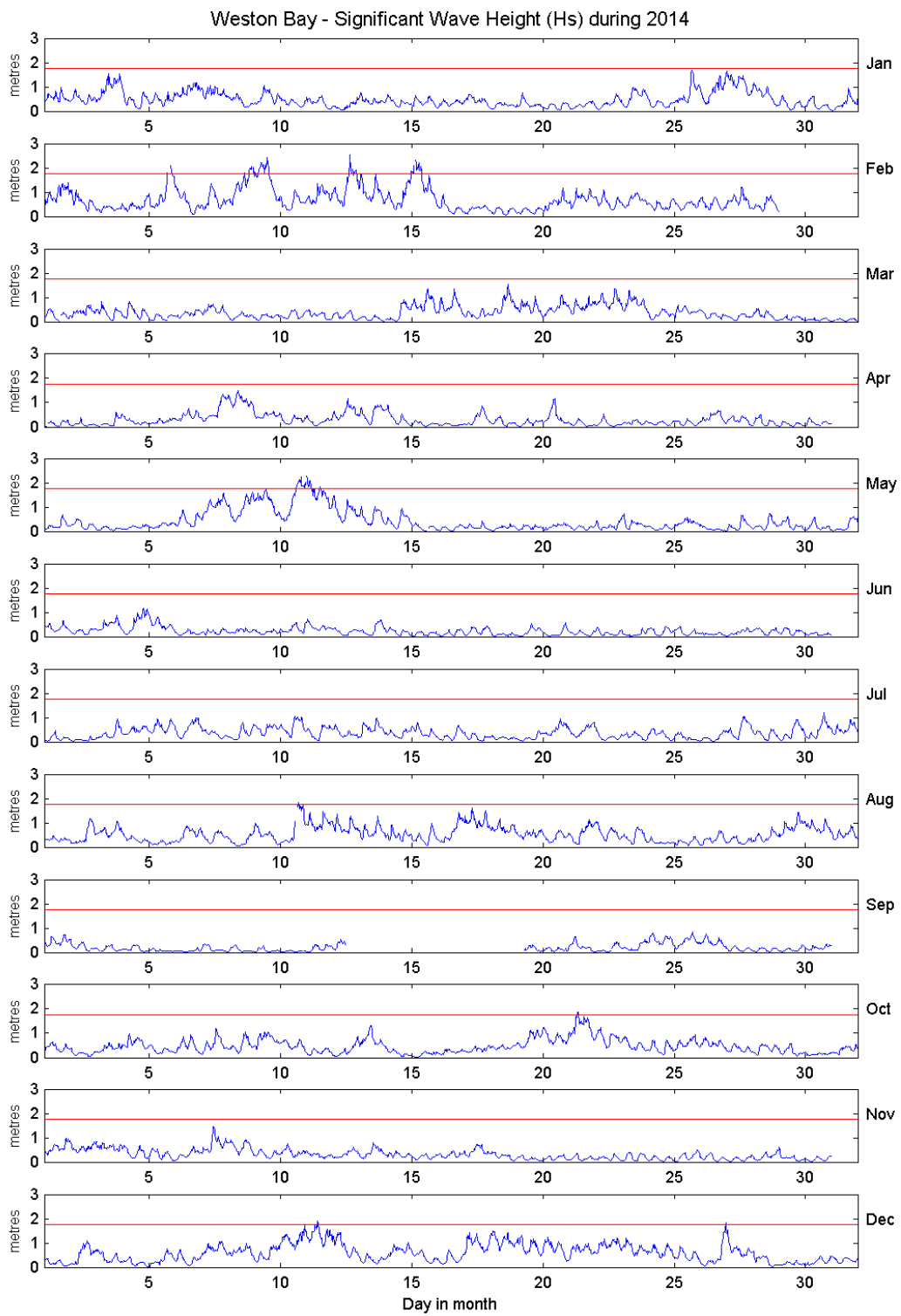
| Return period (years) | Significant wave height (m) | Comments            |
|-----------------------|-----------------------------|---------------------|
| 1                     | 2.4                         | No depth limitation |
| 2                     | 2.5                         |                     |
| 5                     | 2.7                         |                     |
| 10                    | 2.9                         |                     |
| 20                    | 3.0                         |                     |
| 50                    | 3.2                         |                     |

## General

The buoy was first deployed on 11 September 2009, at which time the magnetic declination at the site was 2.8° west, changing by 0.15° east per year. There is a notable tidal signature to significant wave heights at this location, given the water depth of the buoy (~13 m CD) and the spring tidal range (~10.9 m).

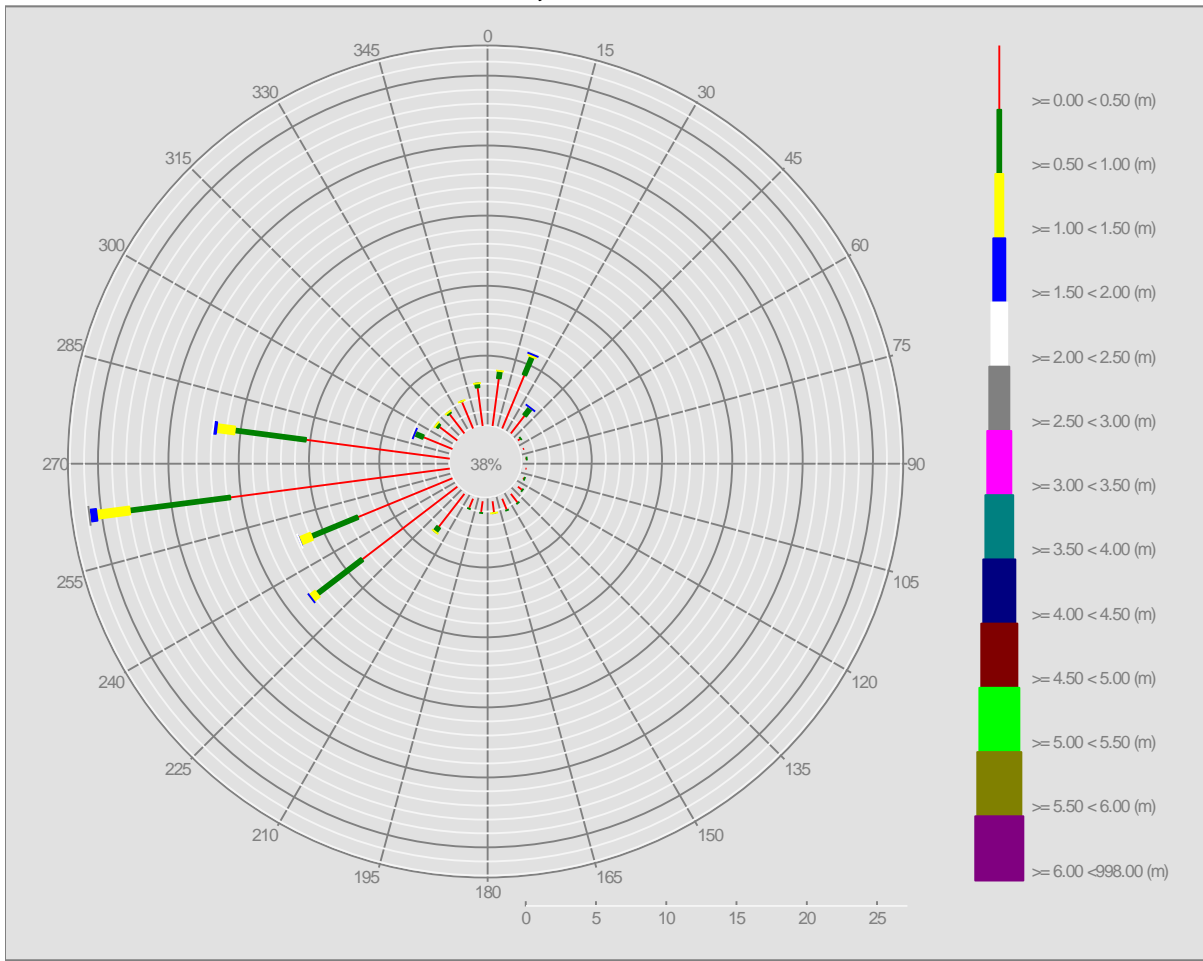
## Acknowledgements

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.

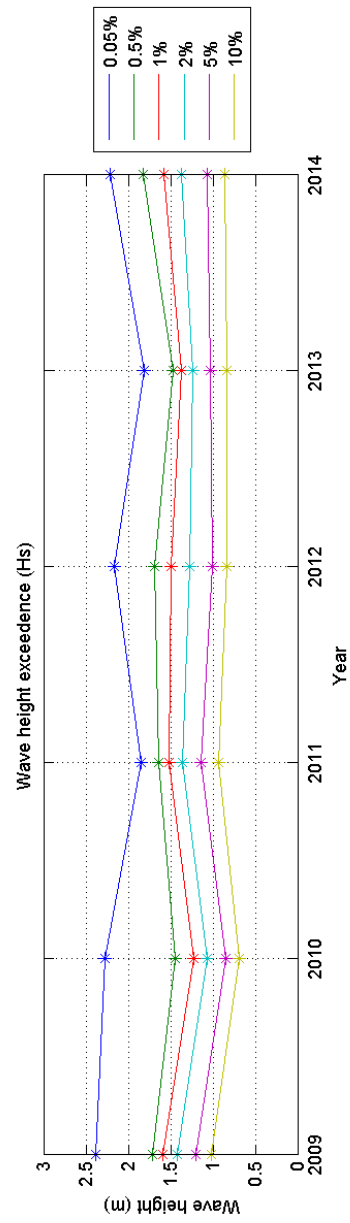
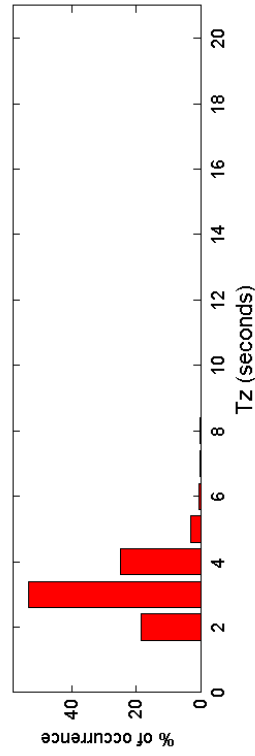
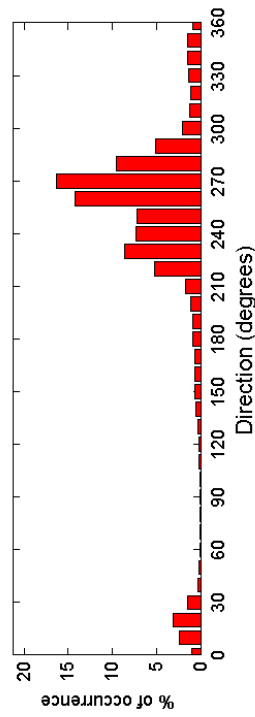
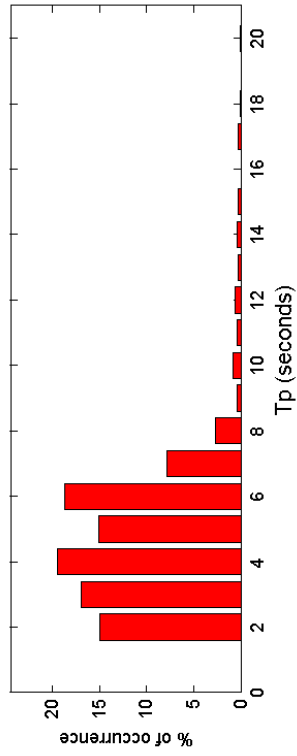
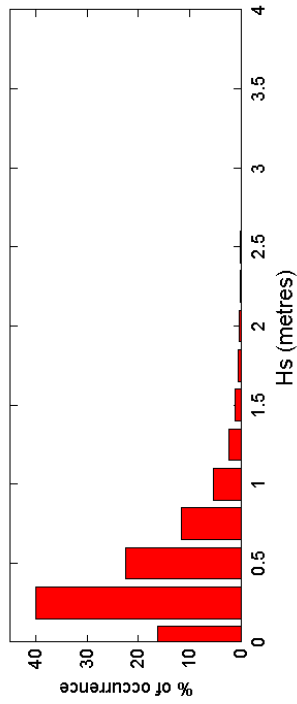


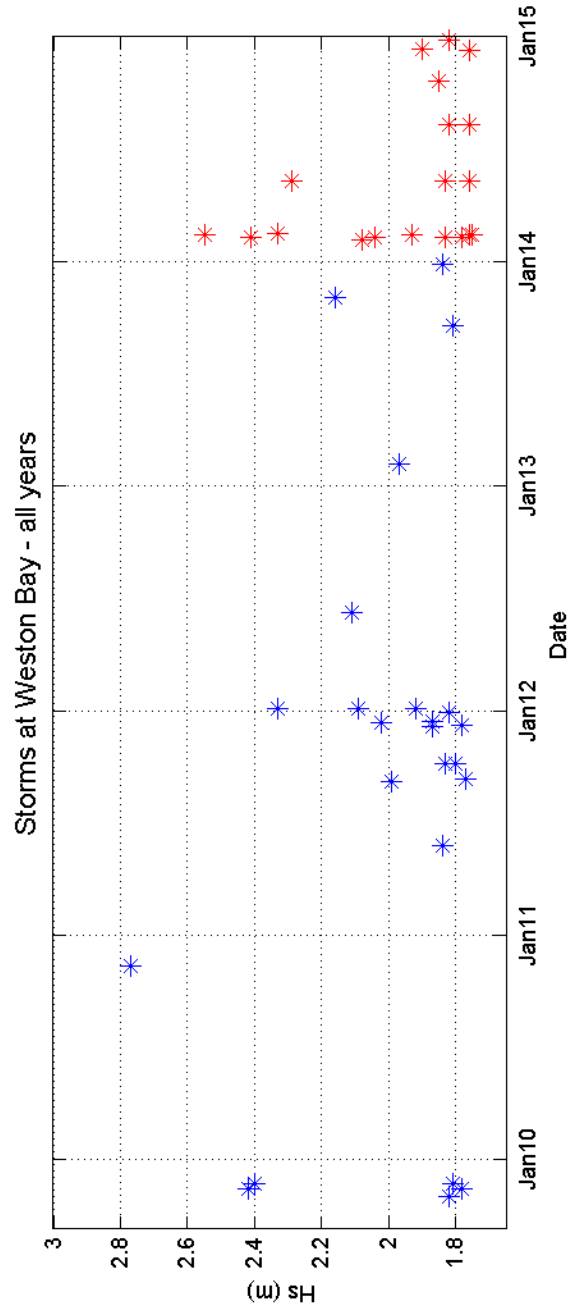
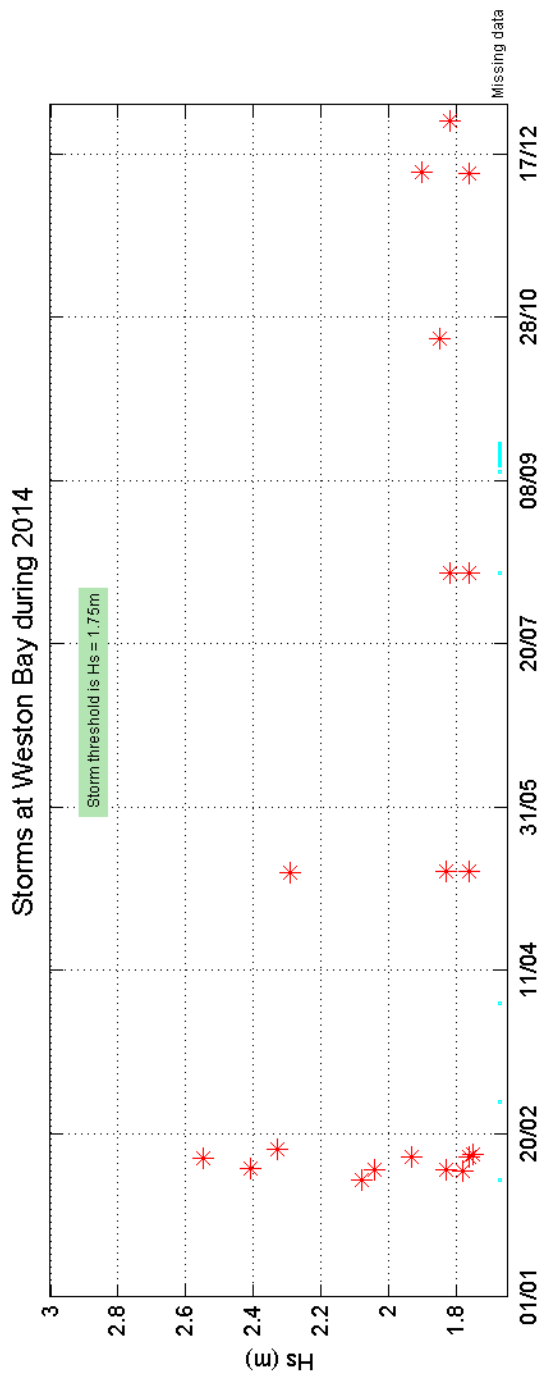
### Offshore Wave Hs (m)

Weston Bay WB : 11/09/2009 - 31/12/2014



Weston Bay 2014





Weston Bay 2009 to 2014 - Joint distribution (% of occurrence)

