# Chesil Directional Waverider Buoy

## Location

OS: 363033E 78457N

WGS84: *Latitude:* 50° 36.279' N *Longitude:* 02° 31.424' W

## Water Depth

10-12 m CD

## Instrument Type

Datawell Directional Waverider Mk III

## Data Quality

| Recovery rate (%) | Sample interval |
|---|---|
| 99 | 30 minutes |

## Statistics - 2012

*All times are GMT*

| Month | $H_s$ (m) | $T_p$ (s) | $T_z$ (s) | Dir. ($^o$) | SST ($^o$C) | No. of days |
|---|---|---|---|---|---|---|
| January | 1.23 | 8.0 | 4.6 | 221 | 9.7 | 30 |
| February | 0.67 | 9.8 | 5.0 | 217 | 7.5 | 29 |
| March | 0.62 | 10.8 | 5.2 | 218 | 8.9 | 31 |
| April | 1.01 | 8.1 | 4.7 | 211 | 9.8 | 30 |
| May | 0.62 | 7.3 | 4.6 | 217 | 11.5 | 31 |
| June | 1.14 | 7.8 | 4.7 | 225 | 13.9 | 30 |
| July | 0.82 | 6.6 | 4.2 | 225 | 15.2 | 30 |
| August | 0.99 | 7.9 | 4.5 | 224 | 17.1 | 31 |
| September | 0.78 | 7.3 | 4.1 | 216 | 16.7 | 30 |
| October | 1.12 | 8.3 | 5.3 | 219 | 14.4 | 31 |
| November | 1.14 | 8.2 | 4.8 | 218 | 11.9 | 30 |
| December | 1.57 | 9.0 | 5.3 | 222 | 10.0 | 31 |

## Storm Analysis

| Date/Time | $H_s$ (m) | $T_p$ (s) | $T_z$ (s) | Dir. ($^o$) | Water level elevation* (OD) | Tidal stage (hours re. HW) | Tidal range (m) | Tidal surge* (m) | Max. surge* (m) |
|---|---|---|---|---|---|---|---|---|---|
| 03-Jan-2012 12:00 | 5.87 | 11.1 | 7.8 | 226 | 0.59 | HW | 1.0 | 0.13 | 0.25 |
| 07-Jun-2012 21:30 | 4.89 | 11.1 | 7.4 | 224 | 1.74 | HW | 2.3 | 0.42 | 0.57 |
| 25-Apr-2012 22:30 | 4.54 | 13.3 | 8.0 | 214 | 1.18 | HW +2 | 1.6 | 0.42 | 0.70 |

* *Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Weymouth). The surge shown is the residual at the time of the highest $H_s$. The maximum tidal surge is the largest positive 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) |
| 2007 | 4.48 | 3.55 | 3.3 | 3.04 | 2.47 | 1.91 | 02-Dec-2007 11:00 | 4.87 |
| 2008 | 4.84 | 3.76 | 3.43 | 3.03 | 2.57 | 2.06 | 10-Mar-2008 13:00 | 5.37 |
| 2009 | 5.50 | 4.00 | 3.55 | 3.13 | 2.54 | 2.02 | 14-Nov-2009 14:30 | 6.50+ |
| 2010 | 3.97 | 3.14 | 2.83 | 2.46 | 1.94 | 1.56 | 11-Nov-2010 09:30 | 4.40 |
| 2011 | 4.41 | 3.45 | 3.03 | 2.66 | 2.23 | 1.85 | 12-Dec-2011 23:30 | 5.53 |
| 2012 | 5.01 | 3.64 | 3.21 | 2.9 | 2.4 | 1.94 | 03-Jan-2012 12:00 | 5.87+ |

** i.e. 5 % of the $H_s$ values measured in 2007 exceeded 2.47 m*

*+Note that waves were breaking at the buoy for several hours 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 $H_s$ (red line is 4.5 m storm threshold)
- Wave roses (Direction vs. $H_s$ and vs. $T_p$) for all measured data
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction for 2012
- Incidence of storm waves for 2012. Storm events are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm event is shown
- Joint distribution of all parameters for all measured data, given as percentage of occurrence

## 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.

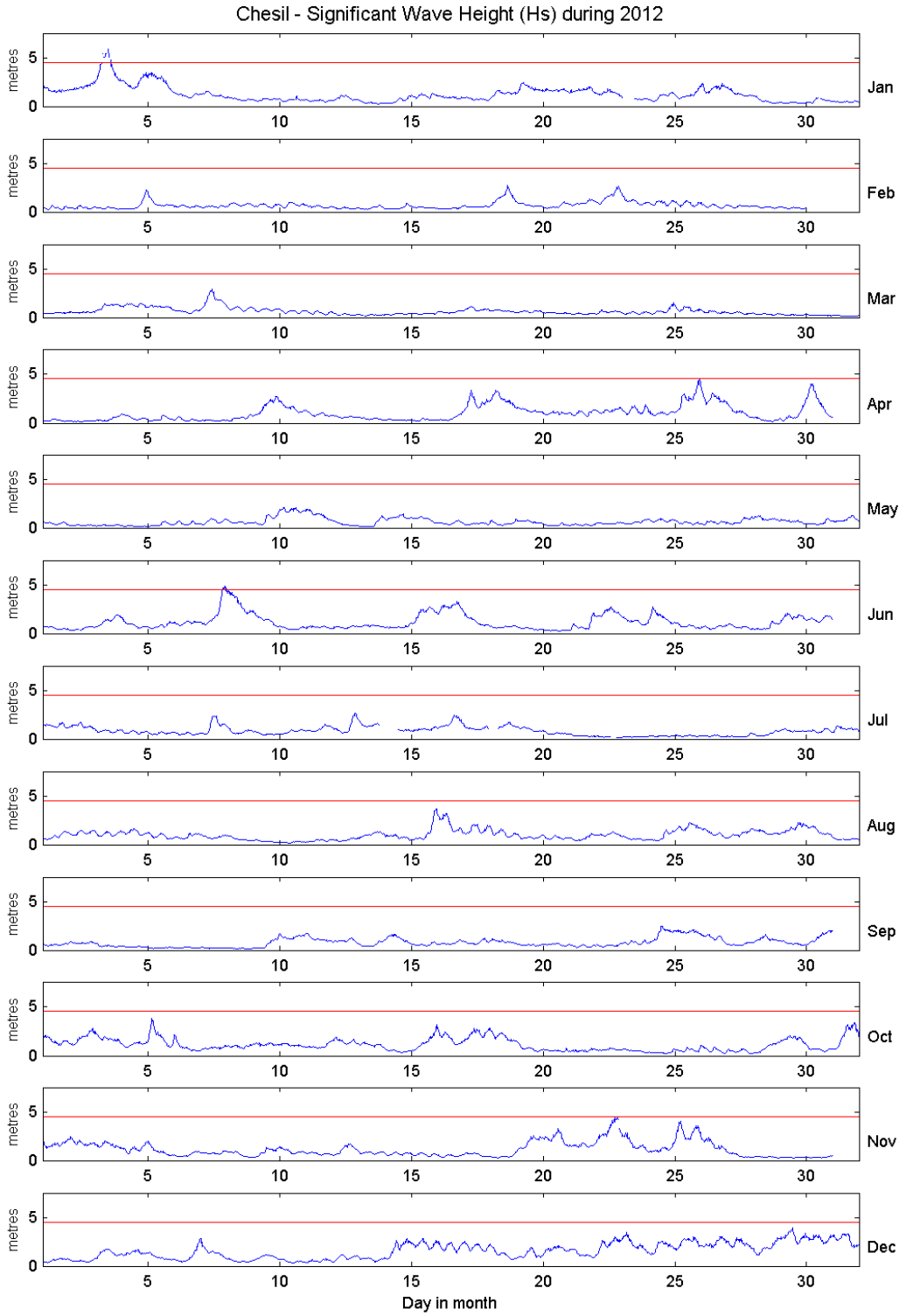
| Return period (years) | Significant wave height (m) | Comments |
|---|---|---|
| 1 | 5.2 | Depth-limited at MLWS |
| 2 | 5.5 | |
| 5 | 5.9 | |
| 10 | 6.1 | Depth-limited at MHWS |
| 20 | 6.4 | Depth-limited at HAT |
| 50 | 6.7 | |

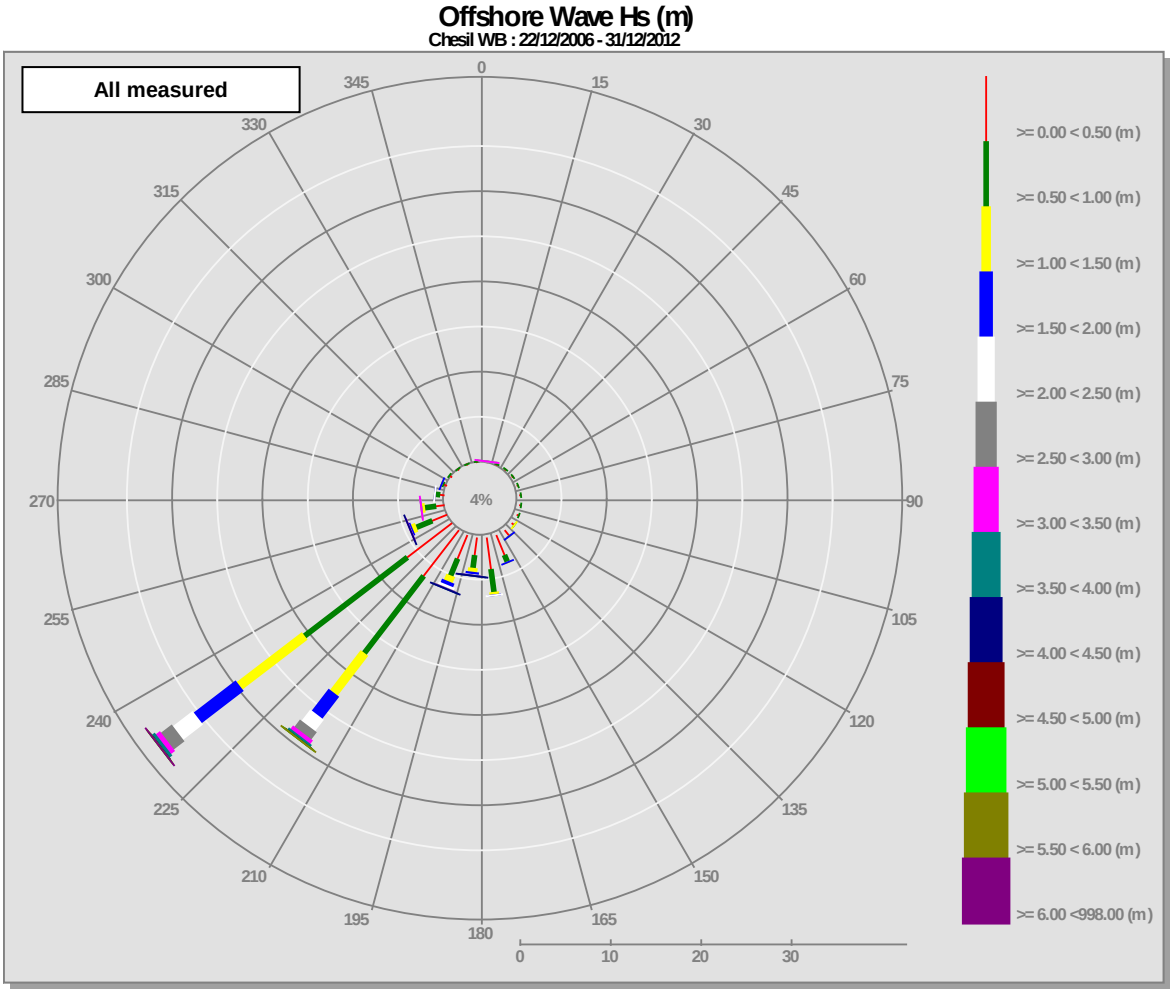
## General

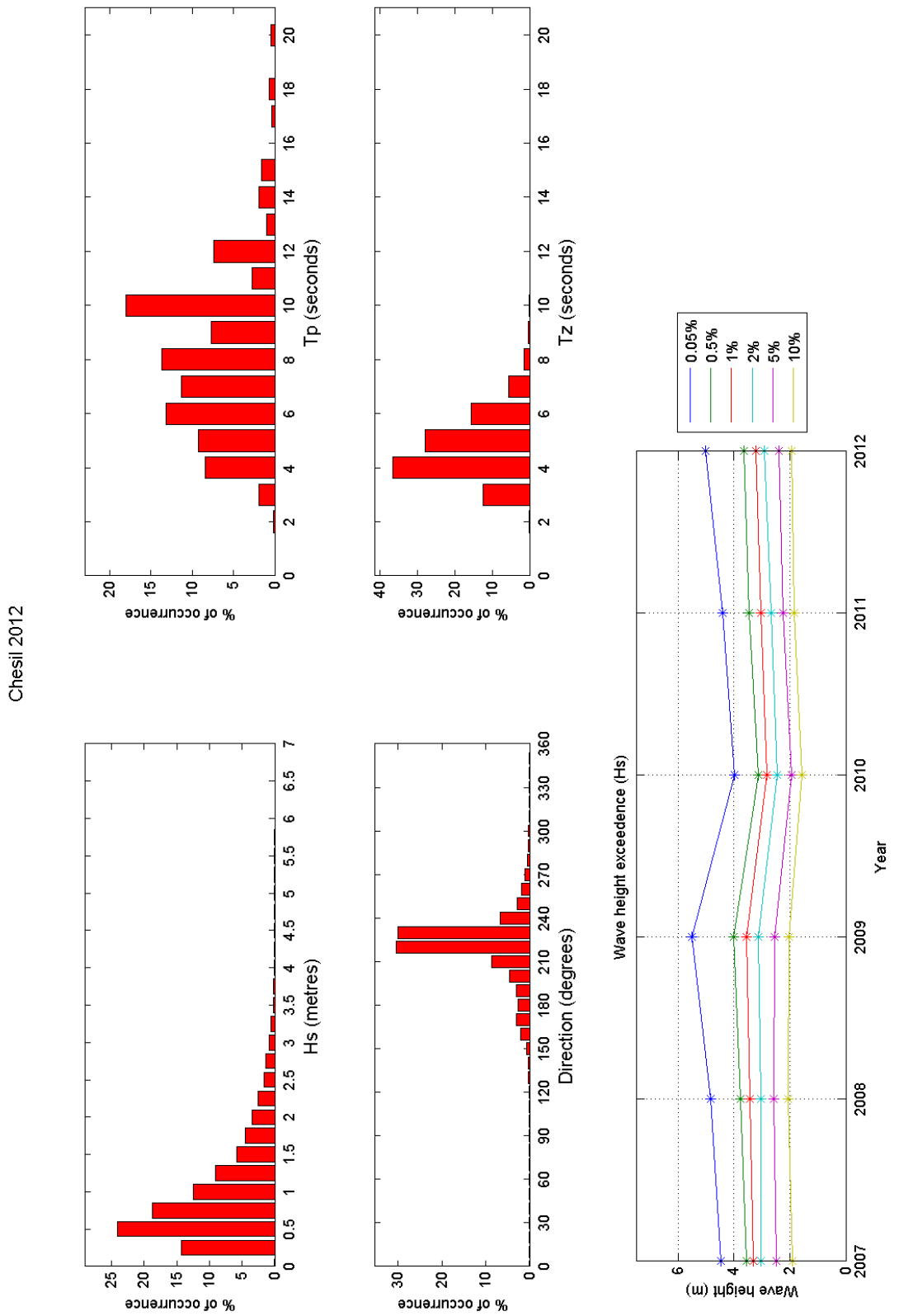
The wave buoy at Chesil was deployed on 22 December 2006 at which time the magnetic declination at the site was 2.9° west, changing by 0.15° east per year.

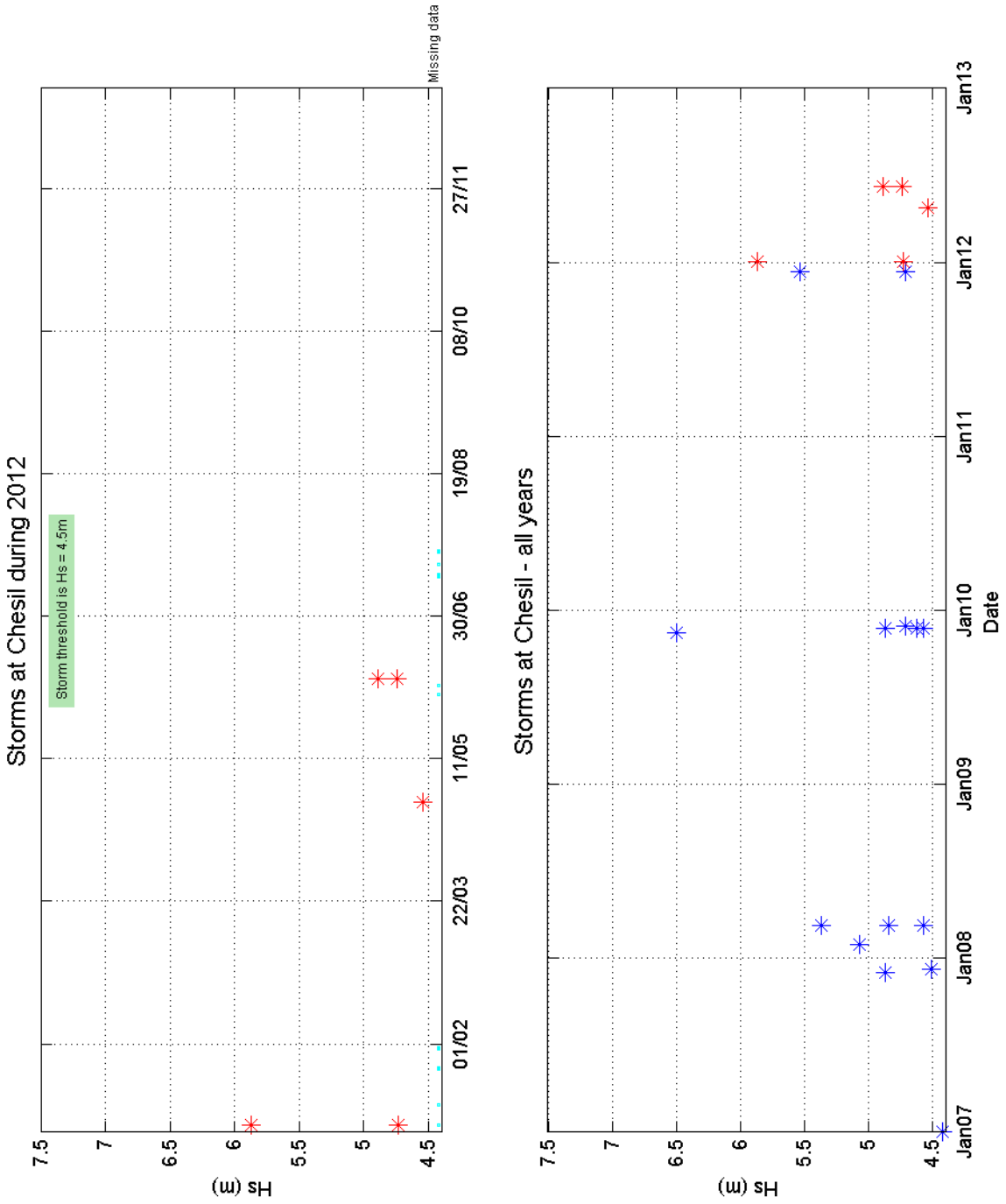
## Acknowledgements

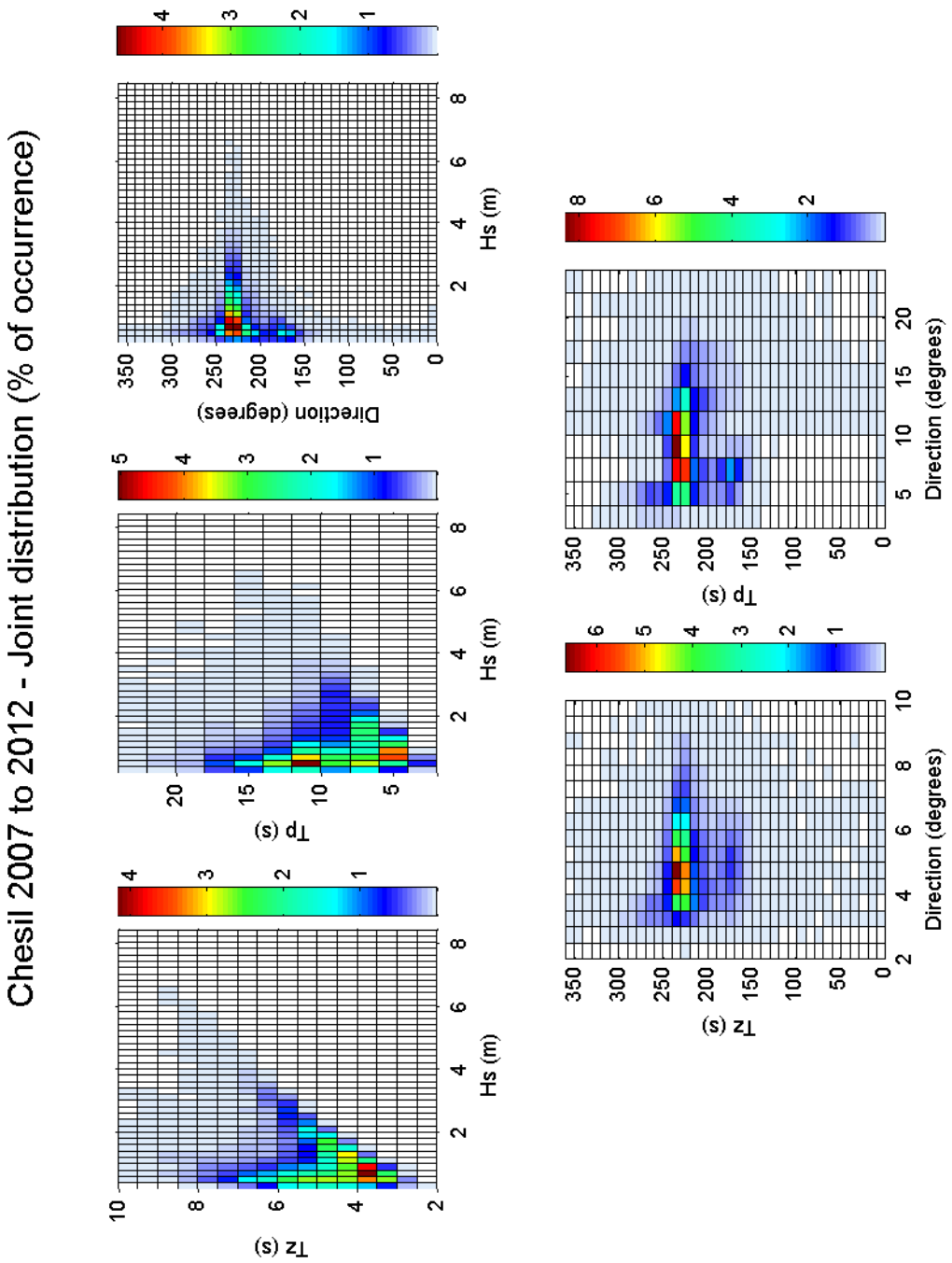
The shore station is kindly hosted by the Weymouth & Portland National Sailing Academy. Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural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


Chesil - Significant Wave Height (Hs) during 2012
metres
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Day in month


Offshore Wave Hs (m)
Chesil WB : 22/12/2006 - 31/12/2012
All measured
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
4%
0
10
20
30
>= 0.00 < 0.50 (m)
>= 0.50 < 1.00 (m)
>= 1.00 < 1.50 (m)
>= 1.50 < 2.00 (m)
>= 2.00 < 2.50 (m)
>= 2.50 < 3.00 (m)
>= 3.00 < 3.50 (m)
>= 3.50 < 4.00 (m)
>= 4.00 < 4.50 (m)
>= 4.50 < 5.00 (m)
>= 5.00 < 5.50 (m)
>= 5.50 < 6.00 (m)
>= 6.00 <998.00 (m)


Chesil 2012
% of occurrence
Hs (metres)
% of occurrence
Tp (seconds)
% of occurrence
Direction (degrees)
% of occurrence
Tz (seconds)
Wave height exceedence (Hs)
Wave height (m)
Year
0.05%
0.5%
1%
2%
5%
10%


Storms at Chesil during 2012
Storm threshold is Hs = 4.5m
Missing data
Hs (m)
7.5
7
6.5
6
5.5
5
4.5
01/02
22/03
11/05
30/06
19/08
08/10
27/11
Storms at Chesil - all years
Hs (m)
Jan07
Jan08
Jan09
Jan10
Jan11
Jan12
Jan13
Date


Chesil 2007 to 2012 - Joint distribution (% of occurrence)
Hs (m)
Tz (s)
Hs (m)
Tp (s)
Hs (m)
Direction (degrees)
Tp (s)
Direction (degrees)
Tz (s)