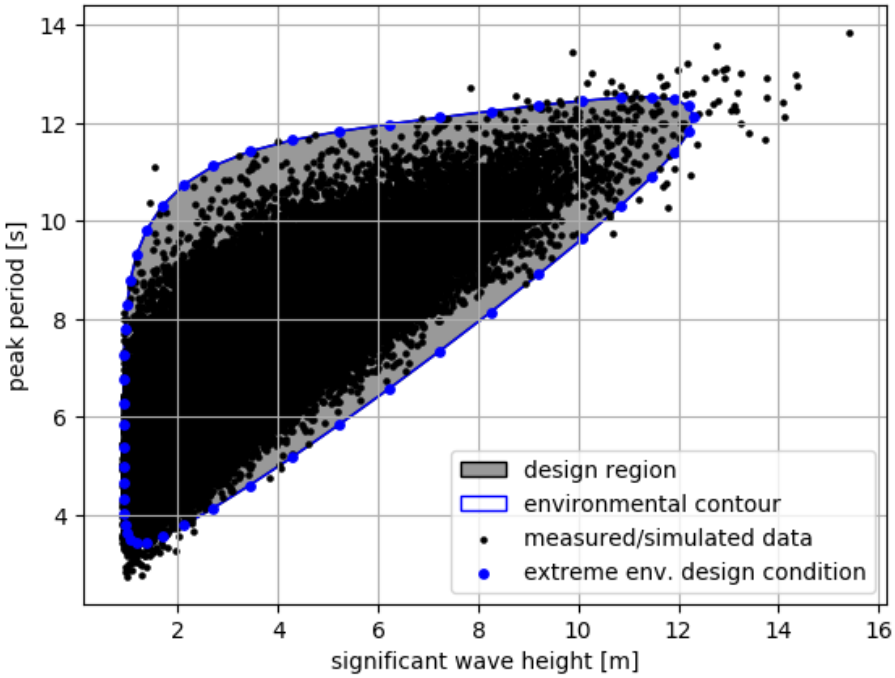
1 Results

1.1 Environmental contour



1.2 Extreme environmental design conditions

EEDC	significant wave height [m]	peak period [s]
1	0.90	5.39
2	0.90	5.00
3	0.91	4.64
4	0.91	4.31
5	0.92	4.03
6	0.94	3.80
7	0.98	3.61
8	1.05	3.48
9	1.17	3.42
10	1.38	3.44
11	1.68	3.56
12	2.13	3.79
13	2.71	4.14
14	3.43	4.60
15	4.28	5.17
16	5.22	5.83
17	6.21	6.57
18	7.24	7.34
19	8.25	8.13
20	9.21	8.90
21	10.08	9.63
22	10.85	10.30
23	11.47	10.90
24	11.93	11.40
25	12.21	11.81
26	12.30	12.12
27	12.21	12.34
28	11.93	12.47
29	11.47	12.52
30	10.85	12.51
31	10.08	12.45
32	9.21	12.35
33	8.25	12.24
34	7.24	12.11
35	6.21	11.97
36	5.22	11.82
37	4.28	11.64
38	3.43	11.42
39	2.71	11.12
40	2.13	10.74
41	1.68	10.30

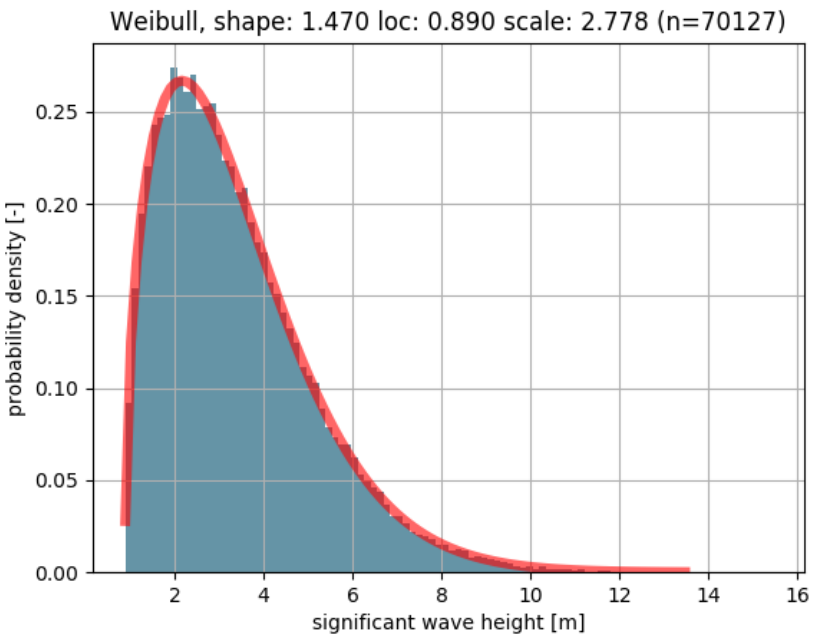
EEDC	significant wave height [m]	peak period [s]
42	1.38	9.81
43	1.17	9.31
44	1.05	8.80
45	0.98	8.29
46	0.94	7.78
47	0.92	7.27
48	0.91	6.77
49	0.91	6.29
50	0.90	5.83

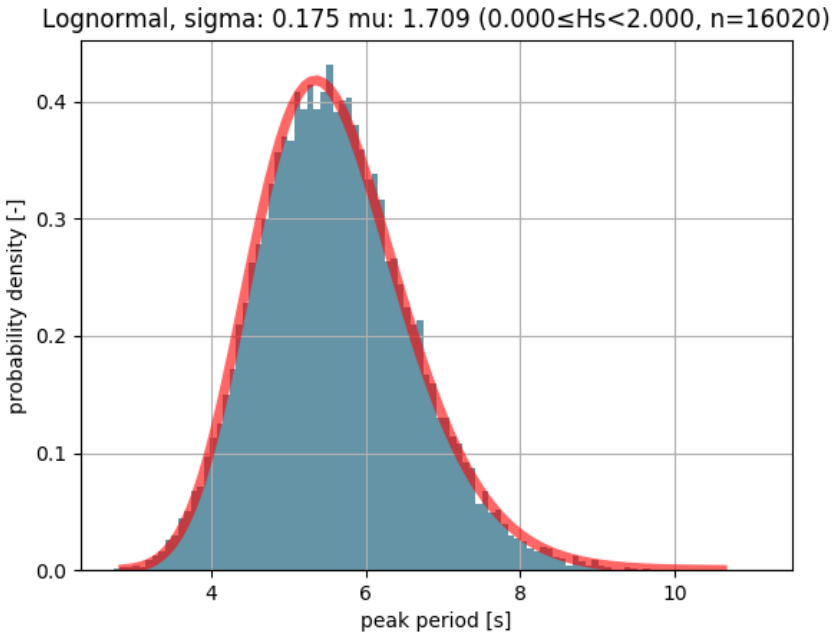
2 Methods

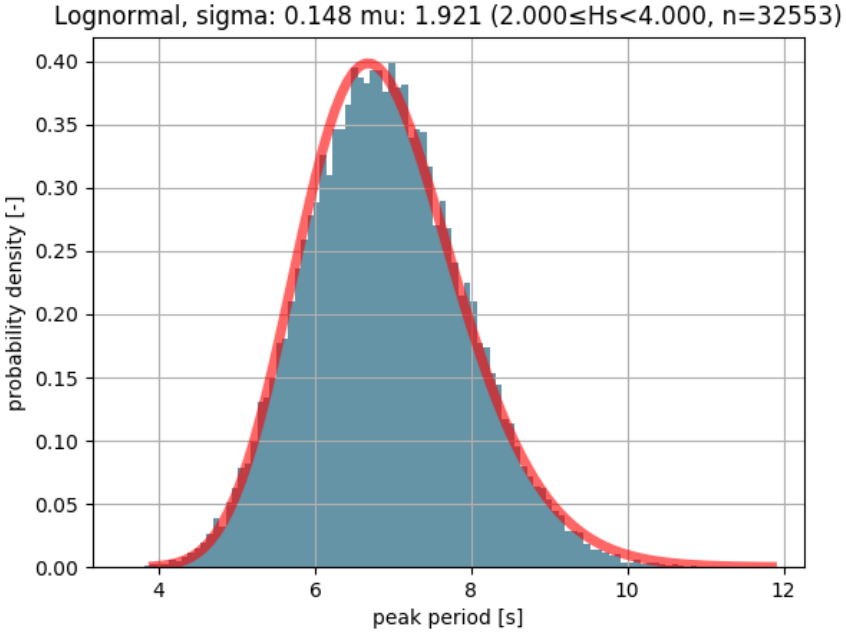
2.1 Associated measurement file

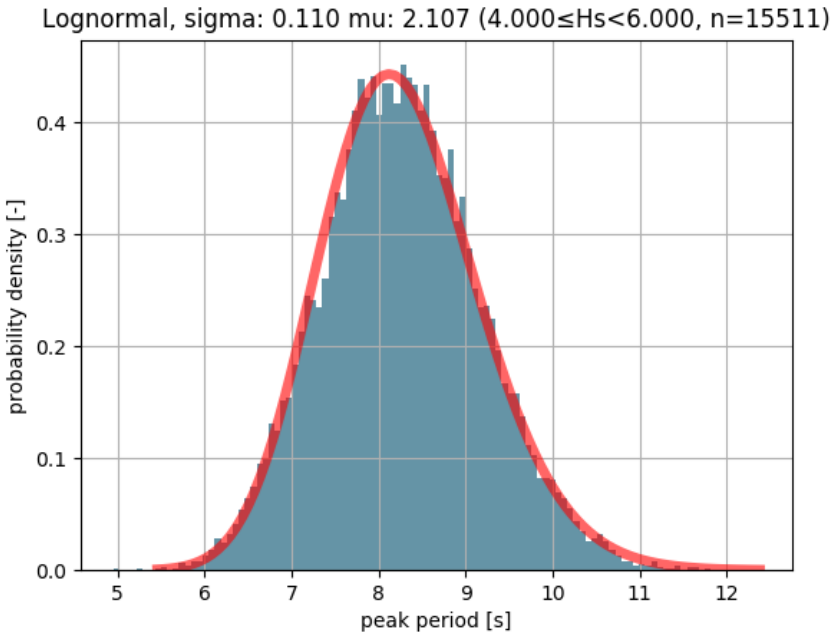
File: '`1 year Vanem2012`'

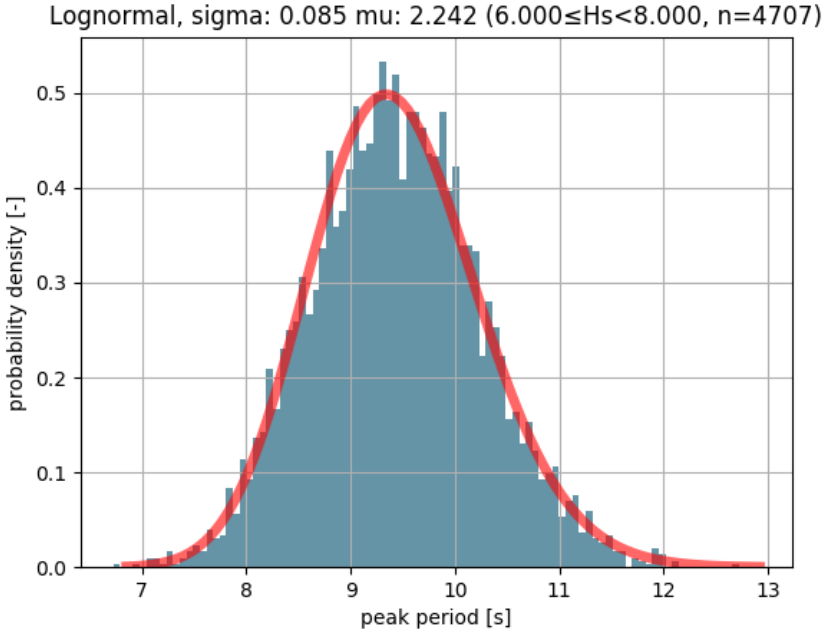
2.2 Fitting

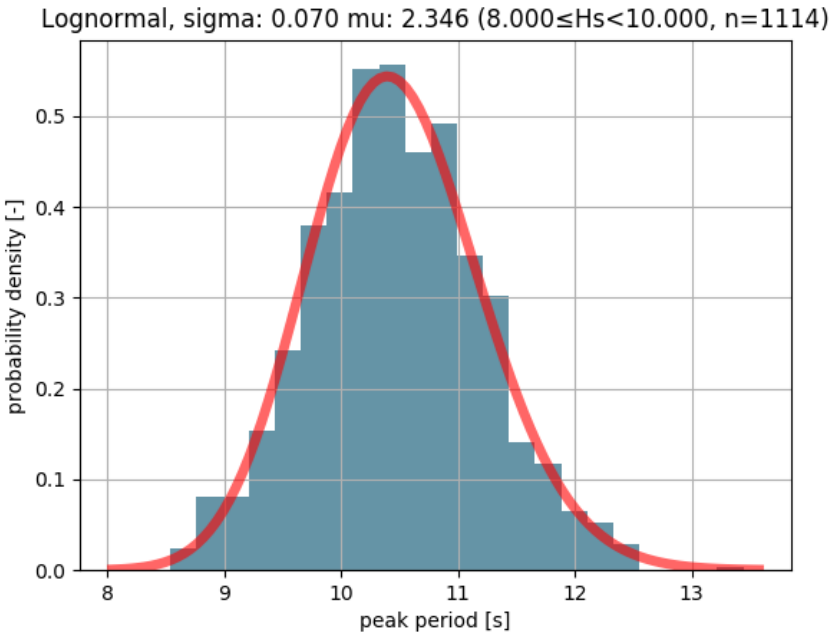


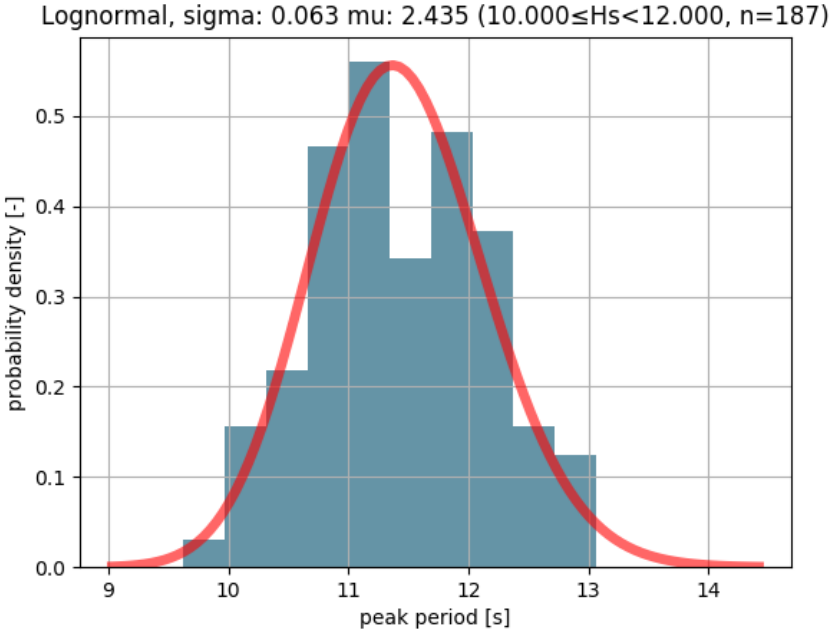

Lognormal, sigma: 0.175 mu: 1.709 (0.000≤Hs<2.000, n=16020)
probability density [-]
peak period [s]
0.0
0.1
0.2
0.3
0.4
4
6
8
10

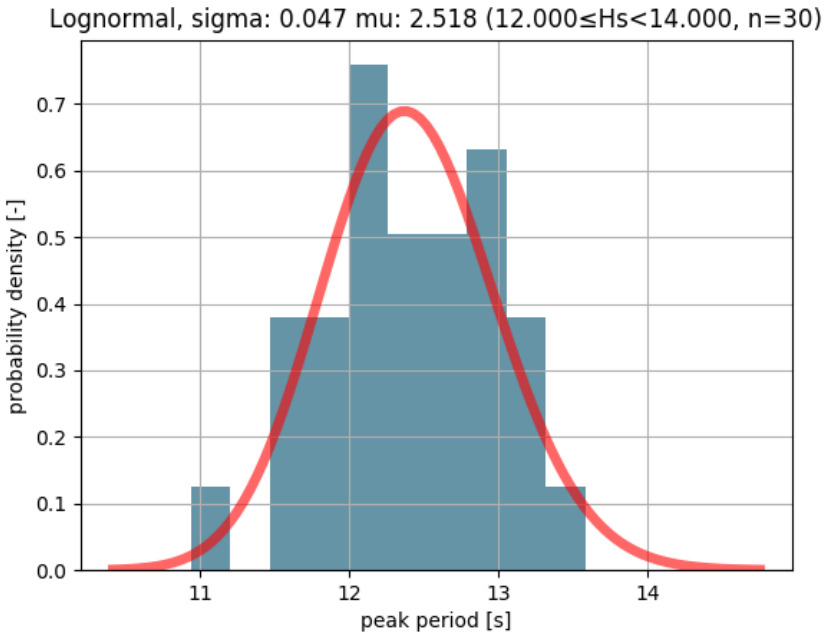

Lognormal, sigma: 0.148 mu: 1.921 (2.000≤Hs<4.000, n=32553)
probability density [-]
peak period [s]
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
4
6
8
10
12

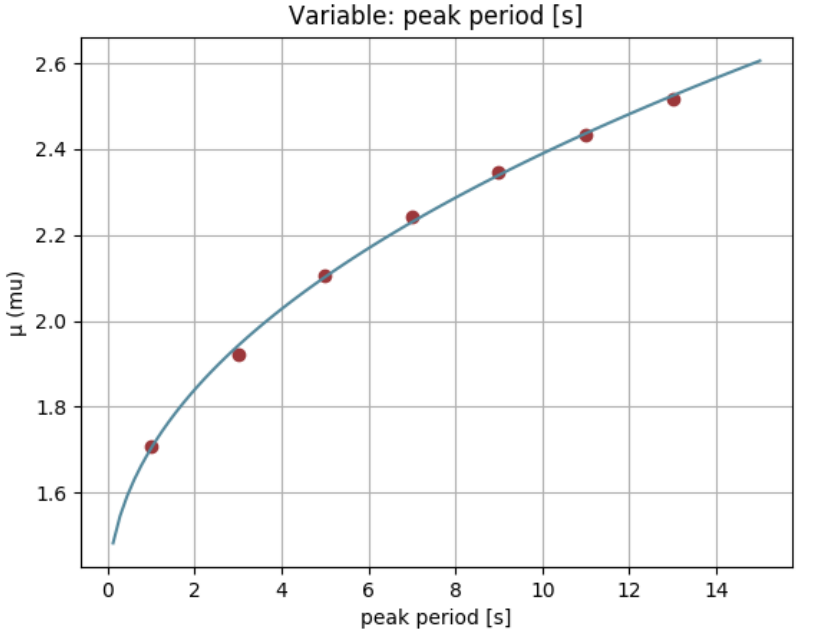

Lognormal, sigma: 0.110 mu: 2.107 (4.000≤Hs<6.000, n=15511)
probability density [-]
peak period [s]
0.0
0.1
0.2
0.3
0.4
5
6
7
8
9
10
11
12

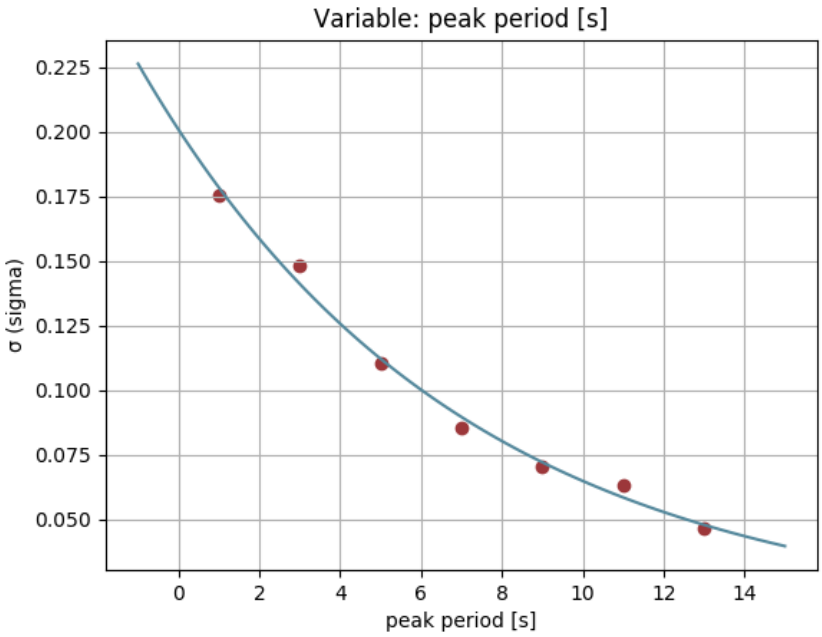

Lognormal, sigma: 0.085 mu: 2.242 (6.000≤Hs<8.000, n=4707)
probability density [-]
peak period [s]
0.0
0.1
0.2
0.3
0.4
0.5
7
8
9
10
11
12
13


Lognormal, sigma: 0.070 mu: 2.346 (8.000≤Hs<10.000, n=1114)
probability density [-]
peak period [s]
0.0
0.1
0.2
0.3
0.4
0.5
8
9
10
11
12
13


Lognormal, sigma: 0.063 mu: 2.435 (10.000≤Hs<12.000, n=187)
probability density [-]
peak period [s]
0.0
0.1
0.2
0.3
0.4
0.5
9
10
11
12
13
14


Lognormal, sigma: 0.047 mu: 2.518 (12.000≤Hs<14.000, n=30)
probability density [-]
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
11
12
13
14
peak period [s]


Variable: peak period [s]
μ (mu)
1.6
1.8
2.0
2.2
2.4
2.6
0
2
4
6
8
10
12
14
peak period [s]



2.3 Probabilistic model

Name: 'Vanem-Bitner interval width 2'

joint PDF:

$f(h_s, t_p) = f_{H_s}(h_s) f_{T_p|H_s}(t_p|h_s)$

1. variable, H_s :

$$f_{H_s}(h_s) = \frac{k_{h_s}}{\lambda_{h_s}} \left(\frac{h_s - \gamma_{h_s}}{\lambda_{h_s}} \right)^{k_{h_s}-1} \exp\left[- \left(\frac{h_s - \gamma_{h_s}}{\lambda_{h_s}} \right)^{k_{h_s}} \right]$$

with $\lambda_{h_s} = 2.77772$,
$k_{h_s} = 1.46974$,
$\gamma_{h_s} = 0.88973$.

2. variable, T_p :

$$f_{T_p|H_s}(t_p|h_s) = \frac{1}{t_p \tilde{\sigma}_{t_p} \sqrt{2\pi}} \exp\left[- \frac{(\ln t_p - \tilde{\mu}_{t_p})^2}{2\tilde{\sigma}_{t_p}^2} \right]$$

with $\tilde{\mu}_{t_p} = 1.3409 + 0.36141 h_s^{0.4626}$,
$\tilde{\sigma}_{t_p} = 0.01078 + 0.19001 e^{-0.12581 h_s}$.

2.4 Environmental contour

- Contour method: IFORM
- Return period: 1.0 years
- Number of points on the contour: 50