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Corrigendum to " Some probabilistic properties of surf parameter " by Dag Myrhaug [Oceanologia 62(3) 2020, 395-401. https://doi.org/10.1016/j.oceano.2020.02.003]

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The author regrets to inform the readers that errors appeared in the article by Dag Myrhaug titled "Some probabilistic properties of surf parameter".

The correct content after Eq. (2) on p. 397 is as follows:

Here (Eq. (A2) in Appendix A)

$$\int_0^{\hat{\xi}_1} \hat{\xi}^n p_1(\hat{\xi}) d\hat{\xi} = v^n \, \Gamma \left[1 - \frac{n}{k}, (\frac{v}{\hat{\xi}_1})^k\right] \tag{3}$$

The correct content of Eq. (4) on p. 397 is as follows:

$$\int_{\hat{\xi}_1}^{\infty} \hat{\xi}^n p_2(\hat{\xi}) d\hat{\xi} = e^{n\mu+\frac{1}{2}n^2\sigma^2}(1 - \Phi\,[\frac{ln\hat{\xi}_1 - (\mu + n\sigma^2)}{\sigma}]) \tag{4}$$

The correct content of Eqs. (6), (7), (8) as well as the sentences after Eq. (7), and the sentence after Eq. (8) on p. 397 is as follows:

$$E[\hat{\xi}] = 1.171 \tag{6}$$

$$Var[\hat{\xi}] = 0.106 \tag{7}$$

Thus, the ratio between the standard deviation of the surf parameter and the mean value of the surf parameter, i.e.

the coefficient of variation, is $\sqrt{Var[\hat{\xi}]}/E[\hat{\xi}] = 0.278$.

Then, it follows that

$$E[\xi] = E[\hat{\xi}] \cdot \xi_{rms} = E[\hat{\xi}] \cdot \frac{m}{\sqrt{0.7 s_m}} = 1.748 \text{ m} \frac{T_z}{H_s^{1/2}} \quad (8)$$

with the coefficient of variation of ξ equal to 0.278.

The correct content of Eqs. (9) and (10) including the text following Eq. (9) on p. 397 is as follows:

$$E[\xi] = 5.84\, m \quad (9)$$

Then, by using the coefficient of variation of ξ equal to 0.278, the mean value (*m.v.*) plus and minus ($\pm$) one standard deviation (1 *SD*) of ξ is given by

$$m.v. \pm 1\, SD = (4.22\, m, 7.46\, m) \quad (10)$$

The correct content of Eqs. (11)-(16) on p. 397 is as follows:

$$\gamma = 1 (T_p = 5\sqrt{H_s}, T_p = 1.40 T_z): E[\xi] = 6.24\, m \quad (11)$$

$$m.v. \pm 1SD = (4.51\, m, 7.97\, m) \quad (12)$$

$$\gamma = 3 (T_p = 4\sqrt{H_s}, T_p = 1.29 T_z): E[\xi] = 5.42\, m \quad (13)$$

$$m.v. \pm 1SD = (3.91\, m, 6.93\, m) \quad (14)$$

$$\gamma = 5 (T_p = 3.6\sqrt{H_s}, T_p = 1.24 T_z): E[\xi] = 5.07\, m \quad (15)$$

$$m.v. \pm 1SD = (3.66\, m, 6.48\, m) \quad (16)$$

The correct content of the two last lines in the 3rd paragraph after Eq. (16) on p. 397 is as follows:

T_z; the values of $E[\xi]/m$ cover a wide range from 3.09 for $H_s = 2\ m, T_z = 2.5\ s$ to 14.86 for $H_s = 1\ m,\ T_z = 8.5\ s$.

The correct content of Table 1 on p. 398 is as follows:

Table 1. Conditional mean value $\pm$ one standard deviation of $E[\xi]/m$ for given sea states at Utsira.

T_z(s) H_s(m)	**2.5**	**3.5**	**4.5**	**5.5**	**6.5**	**7.5**	**8.5**	**9.5**	**10.5**
1	4.37 $\pm$1.21	6.12 $\pm$1.70	$\mathbf{7.87}$ $\pm\mathbf{2.19}$	$\mathbf{9.61}$ $\pm\mathbf{2.67}$	$\mathbf{11.36}$ $\pm\mathbf{3.16}$	13.11 $\pm$3.64	$\mathbf{14.86}$ $\pm\mathbf{4.13}$		
2	3.09 $\pm$0.86	4.33 $\pm$1.20	5.56 $\pm$1.55	6.80 $\pm$1.89	8.03 $\pm$2.23	9.27 $\pm$2.58	10.51 $\pm$2.92	11.74 $\pm$3.26	
3			4.54 $\pm$1.26	5.55 $\pm$1.54	6.56 $\pm$1.82	7.57 $\pm$2.10	8.58 $\pm$2.39	9.59 $\pm$2.67	10.60 $\pm$2.95
4			3.93 $\pm$1.09	4.81 $\pm$1.34	5.68 $\pm$1.58	6.56 $\pm$1.82	7.43 $\pm$2.06	8.30 $\pm$2.31	9.18 $\pm$2.55
5				4.30 $\pm$1.20	5.08 $\pm$1.41	5.86 $\pm$1.63	6.64 $\pm$1.85	7.43 $\pm$2.07	8.21 $\pm$2.28
6					4.64 $\pm$1.29	5.35 $\pm$1.49	6.07 $\pm$1.69	6.78 $\pm$1.88	7.49 $\pm$2.08
7						4.96 $\pm$1.38	5.62 $\pm$1.56	6.28 $\pm$1.75	6.94 $\pm$1.93
8							5.25 $\pm$1.46	5.87 $\pm$1.63	6.49 $\pm$1.80
9							4.95 $\pm$1.38	5.54 $\pm$1.54	6.12 $\pm$1.70
10								5.25 $\pm$1.46	5.80 $\pm$1.61
11								5.01 $\pm$1.39	5.53 $\pm$1.54
12									5.30 $\pm$1.47

The correct content of Table 3 on p. 398 is as follows:

Table 3. Types of breaking waves for Phillips and JONSWAP spectra for m = 0.10, 0.30, 0.50; the three types for each m represent the classification based on $E[\xi] - 1SD, E[\xi], E[\xi] + 1SD$, respectively.

Spectrum	***m* = 0.10**	***m* = 0.30**	***m* = 0.50**
Phillips Eqs. (9), (10)	SP, PL, PL	PL, PL, PL	PL, PL, SU
JONSWAP, $\gamma = 1$ Eqs. (11), (12)	SP, PL, PL	PL, PL, PL	PL, PL, SU
JONSWAP, $\gamma = 3$ Eqs. (13), (14)	SP, PL, PL	PL, PL, PL	PL, PL, CO
JONSWAP, $\gamma = 5$ Eqs. (15), (16)	SP, PL, PL	PL, PL, PL	PL, PL, CO

The correct content of the 2nd and 3rd paragraphs on p. 398 is as follows:

Based on this, the breaker types corresponding to the Phillips and JONSWAP spectra are given in Table 3. The three breaker types in each of the columns for m represent those corresponding to $E[\xi] - 1SD, E[\xi], E[\xi] + 1SD$, respectively. For each spectrum it is referred to the equations which the classification is based on. Based on $E[\xi] - 1SD, E[\xi], E[\xi] + 1SD$ it appears that all the waves break as plunging breakers for m = 0.30 for all the spectra. For m = 0.10 it appears that: based on $E[\xi] - 1SD$ the waves break as spilling breakers for all the spectra, while for $E[\xi], E[\xi] + 1SD$ the waves break as plunging breakers for all the spectra. For m = 0.50 it appears that: for $E[\xi] - 1SD, E[\xi]$ the waves break as plunging breakers for all the spectra, while for $E[\xi] + 1SD$ the waves break as surging breakers for Phillips and JONSWAP, $\gamma = 1$ spectra, and as collapsing breakers for JONSWAP, $\gamma = 3$ and $\gamma = 5$ spectra. However, it is noted that based on $E[\xi]$, all the waves break as plunging breakers.

Next, the classification of breakers in Table 2 based on the values of $E[\xi]/m$ given in Table 1 is provided in Table 4. The breaker types in each class of H_s, T_z represent those corresponding to the slopes $m = 0.10, 0.30, 0.50$, respectively. It appears that for most sea states the waves break as plunging and surging breakers; collapsing breakers occur in some H_s, T_z classes for m = 0.30, 0.50; while spilling breakers occur for some classes for m = 0.10. One should notice that the classification may be altered if it is based on $E[\xi] \pm 1SD$.

The correct content of Table 4 on p. 399 is as follows:

Table 4. Types of breaking waves classified in terms of $E[\xi]$; the three types in each class of H_s, T_z correspond to m = 0.10, 0.30, 0.50, respectively.

$T_z(s)$ / $H_s(m)$	**2.5**	**3.5**	**4.5**	**5.5**	**6.5**	**7.5**	**8.5**	**9.5**	**10.5**
1	*SP, PL, PL*	*PL, PL, CO*	*PL, PL, SU*	*PL, PL, SU*	*PL, CO, SU*	*PL, SU, SU*	*PL, SU, SU*		
2	*SP, PL, PL*	*SP, PL, PL*	*PL, PL, PL*	*PL, PL, CO*	*PL, PL, SU*	*PL, PL, SU*	*PL, CO, SU*	*PL, SU, SU*	
3			*SP, PL, PL*	*PL, PL, PL*	*PL, PL, CO*	*PL, PL, SU*	*PL, PL, SU*	*PL, PL, SU*	*PL, CO, SU*
4			*SP, PL, PL*	*SP, PL, PL*	*PL, PL, PL*	*PL, PL, CO*	*PL, PL, SU*	*PL, PL, SU*	*PL, PL, SU*
5				*SP, PL, PL*	*PL, PL, PL*	*PL, PL, PL*	*PL, PL, CO*	*PL, PL, SU*	*PL, PL, SU*
6					*SP, PL, PL*	*PL, PL, PL*	*PL, PL, CO*	*PL, PL, CO*	*PL, PL, SU*
7						*SP, PL, PL*	*PL, PL, PL*	*PL, PL, CO*	*PL, PL, CO*
8							*PL, PL, PL*	*PL, PL, PL*	*PL, PL, CO*
9							*SP, PL, PL*	*PL, PL, PL*	*PL, PL, CO*
10								*PL, PL, PL*	*PL, PL, PL*
11								*PL, PL, PL*	*PL, PL, PL*
12									*PL, PL, PL*

The correct content of the 3rd sentence after Eq. (18) on p. 399 is as follows:

By using Eqs. (6) and (8), i.e. $E[\xi] = E[\hat{\xi}]\xi_{rms} = 1.171\ m/\sqrt{0.7 s_m}$, together with $\hat{\xi}_m = \xi_m/m$ and $\xi_m = m/\sqrt{s_m}$, this yields $E[\xi] = 1.171\ m\ \hat{\xi}_m/\sqrt{0.7}$.

The correct content of Eq. (19) and the two paragraphs after Eq. (19) on p. 399 is as follows:

$$
\begin{aligned}
RU &= E[\xi]E[H_s] \\
&= 1.171(0.10/\sqrt{0.7})E[\hat{\xi}_m|E[H_s] = 2.11\,m]E[H_s] \qquad (19) \\
&= 1.171(0.10/\sqrt{0.7}) \cdot 4.81 \cdot 2.11\text{m}{=}1.42\,m
\end{aligned}
$$

For m = 0.30 and 0.50 the results are obtained by multiplying this with the factors 3 and 5, respectively, i.e. giving $RU = 4.26\,m$ and $RU = 7.10\,m$, respectively.

From Eq. (19) it follows that $E[\xi] = 1.42/2.11 = 0.67$, which according to Eq. (17) corresponds to plunging breakers. Consequently, the results for m = 0.30 and m = 0.50 are obtained by multiplying this with the factors 3 and 5, giving $E[\xi] = 2.01$ and $E[\xi] = 3.35$, corresponding to plunging and collapsing breakers, respectively, according to Eq. (17).

The correct content of the last part of the last paragraph on p. 399 starting in the 2nd sentence is as follows:

For wind sea, based on the mean values of the surf parameter, all the waves break as plunging breakers for the slopes 0.10, 0.30 and 0.50. For combined wind sea and swell, based on the mean values of the surf parameter, most of the waves break as plunging and surging breakers, while collapsing breakers occur in some H_s, T_z classes for the slopes 0.30 and 0.50, and spilling breakers occur for some H_s, T_z classes for the slope 0.10. One should notice that the classification of breakers may be altered if it is based on the mean values of the surf parameter plus and minus one standard deviation.

The correct content of Appendix A on p. 400 is as follows:

Appendix A

The first integral in Eq. (2), where the *pdf* is given by the Fréchet distribution, can be obtained by substituting $y = (v/\hat{\xi})^k$ where $\hat{\xi}$ is Fréchet distributed (see Eq. (1)) with $\hat{\xi} = 0$ and $\hat{\xi} = \hat{\xi}_1$ corresponding to $y = \infty$ and $y = (v/\hat{\xi}_1)^k$, respectively, using that $d\hat{\xi} = -dy/kv^k\hat{\xi}^{-(k+1)}$. Thus, it follows that

$$
\int_0^{\hat{\xi}_1} \hat{\xi}^n p_1(\hat{\xi})d\hat{\xi} = -v^n \int_{\infty}^{(v/\hat{\xi}_1)^k} y^{-n/k}e^{-y}dy \qquad \text{(A1)}
$$

By using the definition of the incomplete gamma function, i.e. $\Gamma(s,y) = \int_y^{\infty} t^{s-1}e^{-t}dt$ and $\Gamma(s,\infty) = 0$ (Abramowitz and Stegun, 1972) with $s-1=-n/k$ and $y=(v/\hat{\xi})^k$, Eq. (A1) yields

$$\int_0^{\hat{\xi}_1} \hat{\xi}^n p_1(\hat{\xi}) d\hat{\xi} = v^n \, \Gamma\left[1-\frac{n}{k}, (\frac{v}{\hat{\xi}_1})^k\right] \tag{A2}$$