Ocean Science
Discussions

[OSD]

Interactive
comment

Interactive comment on "Evaluation of extreme wave probability on the basis of long-term data analysis" *by* Kirill Bulgakov et al.

Anonymous Referee #2

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This paper presents a methodology to estimate the probability of real wave heights, starting from the significant wave height, a bulk wave parameter provided by wave models. The work is relevant to obtain information about extreme waves.

General comments:

While synthetic papers are certainly good, the readability of this one would benefit from the addition of more details, at least in the methodology. A discussion of the results is also missing.

Is this the only work that estimates the probability of extreme waves? If not, it might be worth mentioning the others and comparing with the proposed methodology.

In the introduction, the authors mention the definition of "freak" waves, is their work

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somehow helping to improve the state-of-the-art definitions?

In the introduction, there is a section about the differentiation between "through-to-crest wave height" and "wave height above mean level", this terminology is then lost in the methodology.

The methodology is presented as universal, how the authors can prove that? More information is needed better explaining eq. (2) and (3) and the data used.

The results are given in terms of 10^{-7} probability, why specifically 10^{-7}? Can the cumulative probability be given in terms of return period?

This paper needs major corrections, even if the results are possibly good, the paper needs to be properly written.

Specific comments:

Page 1

Lines 37-39: This sounds contradictory. It looks like this work does estimate real wave heights probability from Hs, while in this sentence authors say that "there are not enough data on Hs to evaluate the probability of real wave heights". Probably, it needs to be rephrased.

Page 2

Line 32 - It will make the paper more readable briefly explaining here what the 3-D model of potential waves is.

Line 34 - It is not clear what "Hs was calculated" means, is not Hs already provided by the numerical model?

Line 35 - It is missing the definition of eta.

Eq (2): Is this function always valid?

Line 46 - The authors should explain better what it is the "precise 3-D model based on

full non linear equations".

Line 47 - The authors should specify 3 million values of what, Hs? Spanning different years? Different locations?

Page 3

Line 1 - The author should better specify the data they were using (as well as limitations of Eq (2)), it could help to understand why this approximation is universal.

Eq (3) - The authors should specify better from where this equation come from. It is a crucial part in this work.

Line 7 - What is the initial data?

Line 8 - More details about the WAVEWATCH III model should be added. Which wind forcing was used? What was the performance? How long is the model run? Even if it is in the referenced paper, a couple of words here would improve readability

Line 10 - "Method 1-3". Author should not include Eq. (1) in their method, that is the standard equation to calculate Hs from the wave spectrum.

Line 24/25 - Are the authors giving the probability of extreme waves in terms of expectance time? If not, why are they mentioning it here? Maybe it is worth plotting and commenting this information.

Page 4

Fig. 2 - If the significant wave height is the starting point of this method, the authors should show first Hs and then the results of their method (just to follow a more logical order).

Page 7

Line 8: "outside approximation area of (2)". Could the authors elaborate a bit more on this?

Line 9/10 - "may have a certain practical importance". Could the authors explain why it has a practical importance?

Line 15 - statistical data? Is it not a long-term wave hindcast data (wave model data)?

Technical corrections

Page 1 Line 37 - 5 M (M should not be capital)

Page 2 Line 36 - missing space

Page 3 Line 24 - missing space

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