

Interactive comment on “Technical note: Common characteristics of directional spreading-steepness joint distribution in freak wave events” by S. H. Liu and X. Y. Yue

Anonymous Referee #2

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The study of freak waves is important because of their potential damages to ships, coastal and oceanic structures. However, they are very difficult to observe, which enables the wave model simulation a good choice besides experimental and theoretical approaches. A key study of freak waves is how to predict their occurrence. Usually, this question is studied using some wave parameters derived from wave spectrum. The authors of present study list these parameters, discuss their relationships with freak wave occurrence, find disadvantages of using single parameter and propose their new approach of multi-parameters. The study uses the well-developed third generation wave model—WaveWatch III to simulate wave spectra. The figures show compelling details and the explanations are reasonable. Their result is interesting and meaningful,

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giving useful information on future study of freak wave occurrence. The whole paper is well organized with beautiful results and proper discussions. I think it can be published with some modifications.

The following questions are related to this paper:

1. In page 4, lines 4-5: you mentioned that “Short-lived freak waves can last only for 1 to 10 wave periods”. I am not quite clear about the expression “wave periods”, does it have a value? or how to define this value?
2. In page 4, lines 10-12: in Section 2 “Model configurations”, I think it is not clear to readers on the following issues: 1) What is the outer/inner grid (or area) of the model, so you should explain how to define them. 2) You need to explain more about the model setup, i.e. how many source terms are considered in your calculations? 3) The data specification should be more detailed: the resolutions, the time span and your considerations on how to determine the time span (in other words, how do you determine the calculation period of the model).
3. In page 7, lines 1-3: you mentioned that “A continuous sea state with large steepness (> 0.08) and small directional spreading ($< 27^\circ$) lasting a long time means a “freakish” sea state. Do you have any idea about how long time is enough to generate freak waves?
4. You mentioned three parameters to study freak wave occurrence: steepness, spectral bandwidth and directional spreading. However, you only discussed the joint distribution of steepness and directional spreading. Actually, there are several combinations of these parameters. Why do not you discuss other combinations?

The following are some small suggestions:

1. In page 5: 1) You should explain every parameter in equations 1 and 2, and you missed θ , and the meaning of F is not exact. 2) Line 15: “spectra bandwidth” can be “spectral bandwidth” 3) Line 23: “BFI” should be “BFIs” 4) Line 25: “freak waves occurs”

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is wrong

2. Both “water waves” and “ocean waves” appear in this paper, I think it is better to use one of them for consistency.

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