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Natural Hazards and Earth System Sciences
Discussions

# *Interactive comment on* "Time-frequency analysis of the sea state with the "Andrea" freak wave" *by* Z. Cherneva and C. Guedes Soares

**Anonymous Referee #5**

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This paper presents a time-frequency analysis of the "Andrea" wave recorded at Ekofisk complex. From the time record, Wigner spectra are deduced on the three main wave groups and analyzed. In my opinion, the main purpose of the study is not clearly stated and the writing has to be improved in several places for sake of clarity and completeness. In present form, the paper is not suitable for publication and specific effort has to be done to presentation/validation of method used and interpretation of results (e.g. extract general conclusions on physical processes of abnormal waves if this is the main goal). Main comments follow:

- In introduction, it is stated: "it [. . .] is possible to find many other time-frequency distributions". What has motivated your choice of distribution? This is important that readers understand this choice. Furthermore, authors indicate that different time-frequency en-



ergy distributions have been used, what are the differences between all of these?

- Section 2.1: "It is obvious that the carrier frequency $\omega 0$ does not coincide with the spectrum peak frequency $\omega p$." Could you detail?

- Section 2.2: More details are awaited in this part, since it is the core of the following analysis. Especially, the choice of Choi-Williams kernel seems arbitrary, could you give some elements about why this kernel instead of another. Furthermore, how the analysis is influenced by the parameterization of the time-frequency distribution chosen?

- Section 2.3: Signature of Benjamin-Feir instabilities does not appear clearly to me in the analysis provided in section 3. Then, even if BFI is a possible cause of rogue waves, one can wonder if this part is necessary in this paper.

- Section 3: As stated before, there is, in my opinion, a lack of physical analysis in this part. I would like to know what are the general conclusions you want to extract from your analysis. Furthermore, I would like to know if the process chosen is sensitive to the different choices in terms of parameterization. . .

- p.1490: In my experience, Welch method has to be carefully parameterized (number/length of segments. . .). When looking for integral properties, this is not crucial, but it may have a non-negligible influence on the peak-frequency evaluation. Any comments about this?

- p.1491: the reference from line 5 to tank experiments with wavemaker. . . are not clear at all? What do you refer to? This has to be explained in details.

- In the analysis, some reference to an expected(?) downshifting are done. However, I wondered if during the propagation of a wave group during few periods (what is the corresponding time-extent analyzed for the frequency part of time-frequency distribution?) nonlinear processes have time to allow such interactions (which take place in rather long time-scales).

- Comments about location of energy maxima have to be given carefully (with respect

to my previous comments). Furthermore, what is the frequency sampling of the time-frequency analysis presented?

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 1481, 2014.