Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2020-190-RC1, 2020

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Wave height return periods from combined measurement–model data: A Baltic Sea case study" *by* Jan-Victor Björkqvist et al.

Anonymous Referee #1

Received and published: 2 July 2020

This is an interesting and very well written paper. I have no objection to it being published as submitted, but I would very much like to see the authors' responses to my comments.

The most interesting and novel part of the paper is the treatment of sampling variability in extreme value estimation. Figure 2 is very informative. I have not seen a spectral analysis of Hs history before. It is interesting that filtering removed information from time scales longer than three hours, despite the fact that the Gaussian filter half power point was one hour. The moving averages of course had side lobes. It might be worthwhile to investigate more sophisticated digital filters. But the more interesting

question is what time scales are really represented in hindcast data that is reported every hour but is based on three or six hour wind fields. Perhaps more work with filtering the continuous measurement time series would help answer that question.

Different users are interested in different time scales. Ship designers often want to know the three hour sea state for use in model basins. Calculating extreme values of individual wave heights from shorter averaging times where Hs is not varying may be more accurate. Would calculations of individual wave heights from the hindcast data match those from thirty minute measurements (or chi-squared augmented hindcasts)?

The difference in return periods between the chi-squared and filtered analyses deserves comment. If the chi-squared augmentation worked perfectly, wouldn't they be equal? Looking at Figure 3, it seems that the extreme wave height in the measurements has a larger deviation from the smooth curve than most of the artificial chi-squared data. That makes me think that the measurement is an outlier to the chi-squared distribution. Why don't you plot the variability of the measurements against a chi-squared distribution to check that?

And finally, why do you think the hindcast of the recent storm was so bad?

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