

Review on the manuscript (Brief Communication)

“Is there a wind connection to freak wave occurrences?”

by P.C. Liu, R. Bouchard, W.E. Rogers, A.V. Babanin, and D.W. Wang

The paper reports the details of metocean conditions during an accident with a ferry traveling between Provincetown and Boston due to an unexpected huge wave, *rogue wave*. Luckily for the researchers, a NOAA buoy was situated in the vicinity of the accident location, and thus the detailed information about waves and winds is available. The authors draw attention that the accident occurred right after the wind had flattened, and speculate that this case may be an example, when '*Babanin-Rogers conjecture*' works. The idea by Babanin & Rogers (2014) is that the probability of anomalously high waves could be increased when strong wind suddenly stops blowing. If this idea holds, then we have a clear warning criterion for rogue wave forecasting, which may be utilized in routine practice.

Though the number of rogue wave observations is growing, commonly the reliable wave data (due to measurements in the vicinity) is absent, and the metocean conditions are known with certain degree of uncertainty. The reported case is a unique example when the wave accident is accompanied by complex instrumental measurements. The general idea that suddenly fading strong winds may result in anomalously high probability of rogue waves (suggested in a short review on rogue waves by Babanin and Rogers, 2014) is intuitively clear (strong wind just blows the wave crests away and thus limits the waves), but so far seems to have no firm confirmation. For example, in direct numerical simulations of rapidly changing winds (S.Y. Annenkov & V.I. Shrira, Evolution of kurtosis for wind waves. *Geophys. Res. Lett.* 36, L13603, 2009) such effect was not reported. On the other hand, it is difficult to discuss one single event in terms of probability. The manuscript can promote the suggested hypotheses, but unfortunately *cannot prove* its correctness (or incorrectness) without a dedicated *statistical* study.

Though with some criticism, I appreciate the paper and suggest its publishing in NHESS after some improvement.

I do not have comments to Sections 1-3, since they are descriptive. At the same time figures are to be improved. It is hardly possible to read captions and legends and to see the axis scales, especially when printed in black & white. In particular, a question to Fig. 1: it is difficult to see locations of the buoy and the accident. The scale of the map should be also shown. What is the mutual orientation between the path 'buoy-accident' and the dominate wave propagation direction?

Sec. 4 is devoted to promotion of the '*Babanin-Rogers Conjecture*'. I would add some debates to this section. Firstly, I would like to emphasize that Fig. 3 (which is the key element of the paper) shows the records of significant heights, but not wind velocities. Of course, they are linked in the first approximation, but following reasoning similar to the '*Babanin-Rogers Conjecture*' one could expect that during some short period after the drop of wind speed the significant wave height may continue rising as well (this idea seems to be a reasonable guess).

It is obvious that the record $H_s(t)$ (or wind speed vs time) may always have some plunges or simply dispersion in discrete measurements (due to various reasons, such as sampling variability, instrumental errors, wind variability of different scales, etc). Some discussion about the confidence range of the presented data is necessary.

I can see at least a few more drops down in Fig. 3, and they will be even more if the record resolution is finer. It is necessary to formulate the necessary scale (seemingly first of

all, – the time scale) of the wind reduction, which may be most favourable for rogue wave occurrence.

The authors introduce a new term '*freak wave*', which is actually equivalent to the already common '*freak wave*' or '*rogue wave*'. I suggest to avoid the new terminology without significant reasons. The new term may complicate the search through the Internet, etc.

The two most substantial parts of the manuscript (Secs. 4, 5) end with exclamation points. I suggest softening the tone of the letter.