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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Brief communication: The occurrence of rogue waves in the interior of the oceans: A modelling and computational study" *by* Kwok Wing Chow et al.

Anonymous Referee #2

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This manuscript discusses the formation of internal rogue waves. The topic is interesting for the audience of this journal and it is worth publication. Nevertheless, although this manuscript is prepared for a brief communication, it is too short to convene a significant and novel message that justifies a rapid communication. In my opinion, substantial work is needed before this manuscript can be considered for publication.

Specific comments:

1. Title is misleading. It mentions occurrence of rogue waves, which makes me think that formation of internal rogue waves is discussed within a proper statistical framework. However, this is not a case for the present manuscript.

2. There is an extensive literature discussing generation of internal rogue waves, but this is not discussed in details in the present manuscript. I am thinking, for example, to Grimshaw, R., Pelinovsky, E., Stepanyants, Y. and Talipova, T., 2006. Modelling internal solitary waves on the Australian North West Shelf. Marine and Freshwater Research, 57(3), pp.265-272; and Chapter 25 of Osborne, A.R., 2002. Nonlinear Ocean Wave and the Inverse Scattering Transform. In Scattering (pp. 637-666), and reference therein. To justify a rapid communication, more effort should be put to highlight the original contribution of the present manuscript.

3. The authors mention that "classical" modulation instability would cease at kh<1.36. However, there is evidence that instability can survive for shallower relative depth if the wave field is sufficiently directional (Toffoli, A., Fernandez, L., Monbaliu, J., Benoit, M., Gagnaire-Renou, E., Lefevre, J.M., Cavaleri, L., Proment, D., Pakozdi, C., Stansberg, C.T., Waseda, T., Onorato, M., 2013. Experimental evidence of the modulation of a plane wave to oblique perturbations and generation of rogue waves in finite water depth. Phys. Fluids, 25, 09170). Also, effects of current have been discussed in detail in Onorato M., Proment D., Toffoli A., 2011. Triggering rogue waves in opposing currents. Phys. Rev. Lett.,107, 184502, doi: 10.1103/PhysRevLett.107.184502; and Toffoli, A., Waseda, T., Houtani, H., Kinoshita, T., Collins, K., Proment, D., Onorato, M., 2013. Excitation of rogue waves in a variable medium: An experimental study on the interaction of water waves and currents. Phys. Rev. E, 87, 051201(R), before Liao et al 2017.

4. The theoretical framework, especially the NLS equation, seems to be already published. Nevertheless, the title mentions modelling study. What is the novel model the authors are proposing?

5. Section 3, Computational Simulations, is may major concern. It should be the core of the manuscript and yet it is reduced to 7 lines. This section does not convene a message at all and needs to be re-written and expanded.

6.What simulations did the author carried out? What are the initial conditions? Are regular or irregular waves considered? What are the values of key parameters? etc.. It also seems that no sensitivity analysis has been done and only one specific “lucky” case is discussed. What is the effect of wave steepness? What is the threshold of relative water depth below which internal rogue waves do not occur? what is the effect of density gradient? None of these points are discussed, leaving the reader completely unaware of the number computations. In addition, I am not sure to understand Figure 1. Or better, I can guess what it is and its meaning, but the authors did not put any effort to describe it.

7. Throughout the paper and in the title, it is mentioned that likelihood of occurrence of rogue waves is assessed. However, I do not see any discussion of a proper statistical framework that can justify new results on the probability of occurrence of internal rogue waves.

In conclusion, I think section 3 has to be significantly redeveloped and more details provided to support results. If this is done properly, this manuscript has the potential to become a significant contribution to ocean science.

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