

Nat. Hazards Earth Syst. Sci. Discuss., author comment AC1
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Reply on RC1

Anna Pavlova et al.

Author comment on "Storm surges and storm wind waves in the Caspian Sea in the present and future climate" by Anna Pavlova et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-244-AC1>, 2022

Thank you very much for your comments.

You can find our answers below:

"I have read the manuscript entitled "Storm surges and storm wind waves in the Caspian Sea in the present and future climate" from Pavlova et al. with interest. The authors use ADCIRC + SWAN to study the interplay between storm surge, flooding and winds at the Caspian Sea between 1979 and 2020, and validate their results against data from a lake level station. With additional statistical analysis, the authors quantify extreme levels and their associated return periods. The authors also study the wave climate of the area using WAVEWATCH III, and with additional statistical analysis the authors determine the trends associated with significant wave heights.

The topic of the manuscript is interesting and of both societal and scientific interest. However, as written the manuscript is hard to follow and it does not make justice to the amount of work that the authors might have devoted to produce the analysis and the results. I recommend this manuscript is rejected and the authors more carefully motivate their work, describe their methods, and discuss the implications and novelty of their approach."

Answer: Since the proposed work is absolutely new for the Caspian Sea, therefore, the motivation for us was to gain new knowledge. We admit our mistake that we did not describe it in more detail and clearly. For the Caspian Sea, long-term surge analysis based on the ADCIRC model has been performed for the first time. The joint experiment ADCIRC + SWAN was performed for the first time for the Caspian **Sea**. The analysis of the wave parameters was carried out earlier, but new results were obtained in this work. The analysis of the future climate of storms was carried out for the first time using an original method. We will add motivation and novelty to the text in more detail.

"Below I include some comments aimed to improve the quality of the manuscript in a future submission:"

Line 9: "from 1979 to 2017-2020" is unclear. The time period should be delimited by two dates, not three.

Answer: Storm surges were studied from 1979 to 2017, and wind waves from 1979 to 2020. We will change the period description.

Line 10: Acronyms in this sentence have not been previously defined.

Answer: We will carefully define all acronyms throughout the article.

Line 10-11: ...with grid size in the range between 300 and 700m... (if I understand correctly)

Answer: Yes, this is the grid size range.

Introduction: Overall I am missing a clear motivation of this work in terms of natural hazards. Are there vulnerable communities along the lake shoreline? What is the level of development? Is the rate of erosion along the lake line high? Are there erosion hotspots? The manuscript seems to be missing a significant body of literature tackling these questions.

Answer: we will add a small paragraph on this topic. The level of the Caspian Sea has historically changed significantly, so communities have suffered for a long time and many have already changed significantly.

Line 29: coastal protection strategies?

Answer: coastal protection strategies are created under the government

Line 39-40: What climatic conditions? What anthropogenic factors? References?

Answer: We will reformulate this part of the text in more detail.

Line 41-42: This sentence seems out of place. Perhaps bring it to line 35 in order to define what anemobaric-surges are at front.

Answer: We will correct the text and make it easier to read.

Line 45: Unclear what the authors mean by "covered"

Answer: It means that the research is focused not only along the Volga River, but also throughout the entire territory of the Caspian Sea. We will reformulate these sentences.

Line 86-89: This paragraph would benefit from some specific references on the Caspian Sea.

Answer: We will add references to the Caspian Sea.

Data and methods: I suggest the authors consider the possibility of including flowcharts to better describe the inputs and outputs of the models used. Perhaps it will also help reduce the number of equations included in this section, which are already extensively discussed in separate publications.

Answer: We will create a table for a more accessible understanding of the differences in model parameters.

Line 124: grid spacing is 500 m, but in the abstract 300 m?

Answer: Different models use different grid spacing. We will make it clearer.

Line 154-155: These equations seem distorted.

Line 158: I suggest replacing "the authors of the present paper" by "We".

Answer: We will simplify and replace by 'We'.

Line 200: 2.3?

Answer: Thanks for the comment. We will correct this in the text.