

Geosci. Model Dev. Discuss., referee comment RC2
<https://doi.org/10.5194/gmd-2022-140-RC2>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on gmd-2022-140

Anonymous Referee #2

Referee comment on "A VGGNet-based Method for Refined Bathymetry from Satellite Altimetry: Effectively Reducing the Errors" by Xiaolun Chen et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-140-RC2>, 2022

General impression:

The paper uses the deep neural network model VGGNet-19 to perform multibeam sonar-based bathymetry correction for satellite altimetry bathymetry data. Some seemingly good experimental results are obtained on three sets of bathymetry data from the West Pacific, Southern Ocean, and East Pacific. However, the paper is not really clear in terms of motivation and method, and is not innovative enough. Furthermore, the evaluation is small and insufficient.

Overall comments:

The paper does not explain clearly why the VGGNet-19 model is used for bathymetry correction. There are many existing deep models, all of which have achieved promising results in the field of image processing. Why is the VGGNet-19 model effective in this work and outperforms other models? The authors should summarize the relevant deep models and combine the characteristics of the experimental data to further illustrate the advantages of VGGNet-19 in this work. Except for synthesizing the data from multibeam sonar-derived bathymetry and satellite altimetry-derived bathymetry to obtain a corrected version of the latter, there is not any innovation seen in the current manuscript. The authors claim to propose a novel optimization algorithm, but the adopted VGGNet-19 model does not have any improvements in the network structure except for different input and output parameters. The design of the loss function only defines a common distance function, lacking some valuable constraints that can reveal the hidden physical mechanism. The authors only simply apply the conventional VGGNet-19 architecture to bathymetry correction, making the contribution of this research to related fields insufficient.

The original shipborne multibeam sonar bathymetry data and satellite altimetry data used

in the experiment need to be explained in detail. What are the spatial and temporal resolutions of these data? Which interpolation method is used for preprocessing? How to ensure data consistency after interpolation? Another weakness of the paper is the small experimental evaluation. As the authors mention that the proposed algorithm can achieve higher accuracy than the two similar studies in the literatures of [26] and [29], they should supplement the differences between the two studies and the proposed algorithm to further explain why the proposed algorithm can obtain better results. The simulation experiment lacks the hyperparametric analysis of the model. The authors also need to add more comparison methods for evaluation and to conduct a more detailed analysis and discussion of the experimental results.

The authors should supplement how to modify and improve a pretrained VGGNet neural network model with a depth of 19 layers in the abstract and reorganize the logical structure of the introduction. In addition, the authors should give a broader discussion on the advantages and disadvantages of the proposed solution and provide future research directions in the conclusion.

Figures and tables are not well presented. Some references are incorrectly formatted and cited, such as references [26] and [29]. English writing is poor. Sentences are somewhere complex and the proper meaning cannot be extracted. Please improve the readability with the help of natives.

Specific comments:

L30, L35, L144, L204, L332, and L361: What does the previous research that appears in these places refer specifically to? The authors should give a clear description or cite the source literature.

L282-284: Table 2 should not be displayed across pages.

L312-313: The title and picture of Fig. 5 should be displayed on the same page.

L482-483: This reference is not in alphabetical order.

There are many format problems in the text, which need to be carefully checked. Pages 4, 7, 8, and 11 have large blank areas at the bottom. It is suggested to re-typeset the manuscript.