

Dear Referee:

We are grateful to receive your comments. We have carefully revised and reflected on the manuscript accordingly, and have also proposed some responses based on our opinion, which we humbly look forward to sharing with you.

1. Regarding the reason for choosing VGGNet over other models in this study, it is because our research is inspired by the neural style transfer algorithm for photo artistry in popular culture. It was proposed by *Gatys et al. (2015)* and has a relatively fixed paradigm, as shown in the information we added in **Line 109**.
2. Regarding the loss function, we have referred to several existing examples of neural style transfer models on *Google AI Hub*, which use the Euclidean distance function and are proven to be effective. In this study, considering that the logical relationship between pairs of bathymetry data is relatively homogeneous, we consider the Euclidean distance function to be sufficient.
3. For the issue of the innovativeness of the VGGNet model used in this study, we have modified it to address the characteristics and data structure features of bathymetry data. We understand that, from a machine learning perspective, our improvements to the VGGNet model may be minor. However, oceanography and geophysics offer a different perspective. As summarized in the manuscript, in current practice, the high accuracy advantage of multibeam sonar bathymetry is limited by its low spatial coverage, while the large spatial coverage advantage of satellite altimetry is limited by its low accuracy. Therefore, we believe that the practice in this study is meaningful for fusing the data of both and extracting the advantages of each. Moreover, there are only a few studies on fusion of bathymetry data using deep learning methods, so our approach is still one of the few in the field, not to mention achieving better results than previous studies. To solve this paradox, we innovatively introduce the VGGNet algorithm inspired by neural style transfer into this traditional oceanographic research topic, which can not only provide the possibility to solve the problem of high-precision mapping of global seabed topography in an efficient and sustainable way, but also provide insight into the cross-border cooperation between these two fields. Therefore, we believe that this study is of academic significance.
4. Regarding the bathymetry data used in this study, their grid spatial resolutions are listed in **Table 1**. Since the rate of change of seafloor topography is extremely slow, it is usually not necessary to distinguish the acquisition time of bathymetry data obtained by modern technical means in oceanographic studies.

5. We used bilinear interpolation in ArcGIS Engine 10.6 to standardize the resolution of different bathymetry data. Due to the simplicity of the process, we did not elaborate on it in the manuscript.
6. For the size of the experimental dataset, we selected the three datasets used in the experiment based on the principle of three relatively uniformly distributed seas in the Pacific Ocean, and also taking into account the ease of data acquisition and processing (after all, the choice of seas with shipborne measurements is very limited, as mentioned in the manuscript). Compared to similar previous studies, the size of the dataset used in this study is not small ($>250,000 \text{ km}^2$) and is randomly selected to accommodate simulations of many different seafloor topographic conditions.
7. We apologize for the errors in [26] and [29] and have updated the correct reference format. The "previous studies" mentioned in the evaluation of experimental results section of the manuscript are mostly based on the results from *Jena et al. (2012)* and *Jha et al. (2013)*. The research methods and algorithms of similar studies are described in more detail in **Line 119** of the manuscript.
8. In **Line 138**, we provide some more detailed descriptions for modifying and improving the VGGNet model, including information related to the intermediate layer and the optimizer.
9. The figures and tables display have been reformatted to meet the need for more visualization.
10. Moreover, the manuscript has been professionally polished.
11. For minor formatting issues, the Topical Editor's opinion is to make final changes after the review phase is over.

Once again, we greatly appreciate your valuable comments, which have greatly benefited our manuscript. Above are our modification and responses accordingly. We would like to apologize for the mistakes and misunderstandings caused by our carelessness, and share our views with you with a sincere heart. We look forward to hearing from you again.

Yours respectfully,

Xiaowen Luo

Sept. 13, 2022