Response to Anonymous Referee #2

Many thanks for reviewing our manuscript. Your comments and suggestions are very helpful and constructive. We have addressed all of your concerns in the revised manuscript.

The issues proposed by the reviewers have all been addressed.

Please notice:
Reviewer comments in quotations; our responses in blue;
Main changes are:

Comments and Suggestions for Authors

Wave prediction is very important for fisheries, wave power generation and marine transportation. Numerical modelling (e.g., SWAN or WAVEWATCHIII model) is a common method for operational wave forecasting. Data-driven methods, such as neural network methods, are also very popular. This paper proposed a hybrid VMD-TCN-LSTM model to forecast significant wave height and wave period. The results show that the method is effective in predicting ocean waves. However, some issues need to be clarified.

1. The descriptions of the VMD, TCN and LSTM methods are very detailed. As these methods are widely used in other fields, the corresponding description can focus more on the improvement of these methods in this study.
Reply:
1) We gratefully appreciate for your valuable comment.
2) In the revised manuscript, we have simplified the description of the methodology, and the detail information the methods are migrated to the appendix.
3) On Lines 128-143, we have simplified the temporal convolutional networks model. On Lines 157-171, we have simplified the Bayesian optimization algorithm. We have given the detail information of the variational mode decomposition (VMD) algorithm and long short-term memory networks model in Appendix A and B, respectively. On Lines 185-187, we have simplified the parameter settings of the VMD algorithm.

2.In situ measurements from four buoys were used in this study. Does the hybrid VMD-TCN-LSTM wave prediction model use the same parameters measured at these buoy stations?
Reply:
1) Thank you for the question.
2) In this study, we use the Bayesian optimization algorithm for the hyperparameter finding of the VMD-TCN-LSTM wave prediction model. In the four buoys, we used the same parameters.

3.Line 104~105: The GST has a positive relation with SWH. Why not use this physical parameter to drive the model?
Reply:
1) We gratefully appreciate for your comment.

2) As you mentioned, The GST has a positive relation with SWH. However, as shown in Figure 3, the correlation between the GST (gust speed) and the WSPD (wind speed) is as high as 0.988, the WSPD and the GST have very similar characteristics of variation. Therefore, in order to reduce the redundancy of the input data to the forecast model, we just choose WSPD to represent the temporal variation of wind.

4.Line 211~212: The BO has two critical components. First, establish an agency model of the objective function through a regression model (e.g., Gaussian process regression) and subsequently use the acquisition function to decide where to sample next (Frazier, 2018). The word "build" and "use" should be revised as "establishing" and "using".
Reply:
1) We gratefully appreciate for your valuable comment.
2) In Lines 161~163 of the revised manuscript. we corrected the words as you suggested.

5. Line 628: "To quantify the prediction model performance" should be revised as "To quantify the performance of the prediction model".
Reply:
1) Thank you for your comment.
2) The first submitted version of the manuscript did not have line 628, perhaps you are referring to line 267 of the manuscript, which we changed in the revised version of the manuscript at line 210, as you suggested.

6.Line 294: "in 3-hour SWH and APD forecasts" and Line 414 "In the 3-hour SWH and APD forecasts". The word "in" should be revised as "for".
Reply:
1) Thank you so much for your careful check.
2) In Lines 232, 234 and 371 of the revised manuscript. we corrected the words as you suggested.

7. Line 375: Please add "at" before "Buoy 51004".
Reply:
1) Thank you so much for your careful check.
2) In Line 322 of the revised manuscript. we add "at" before "Buoy 51004" as you suggested.

8. Line 391: "the TCN cells is." Here, "is" should be "as".
Reply:
1) Thank you so much for your careful check.
2) In Line 337 of the revised manuscript. we corrected the "is" to "as" as you suggested.

The manuscript has been revised carefully according to the reviewer's comments. We are appreciated for the reviewer's constructive comments and kind help. The quality of the revised manuscript has been improved under the help of the reviewer, and hope that the correction will meet with approval.
Once again, thank you very much for your comments and suggestions.

Yours sincerely.

Manuscript title: Short-term Prediction of the Significant Wave Height and Average Wave Period based on VMD-TCN-LSTM Algorithm. (egusphere-2023-960)

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