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Ocean Science Discussions

Interactive comment on "Hybrid improved EMD-BPNN model for the prediction of sea surface temperature" *by* Zhiyuan Wu et al.

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Response to comments of Reviewers

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Anonymous Referee #2 Received and published: 3 February 2019

The authors are grateful to this reviewer for pin-point and pertinent comments and checking the paper. All comments are addressed point by point, each starting with an original comment and followed by a response in italic, as follows.

In this paper, authors discussed the prediction of sea surface temperature. In this

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Discussion paper

paper, an SST predicting method based on improved empirical mode decomposition (EMD) algorithms and back-propagation neural network (BPNN) is proposed. Statistical analysis of the case study demonstrates that applying the proposed hybrid CEEMD-BPNN model is effective for the SST prediction. I recommend this paper to be publicated. And it is better if the authors consider the following mentioned remarks and further improve the manuscript before submitting the final version. Response: We are grateful to these positive comments.

1. More methods in practical application or commercial application need to be introduced. Which can make this paper more persuasive. Response: Thank you for your suggestion. As the reviewer said, many noise cancellation methods based on the scale-adaptive remixing and demixing of Intrinsic Mode Functions (IMFs) constructed using Empirical Mode Decomposition (EMD) had been provided in the practical application or commercial application. We briefly stated these in the introduction section.

2. The relationship and difference among EMD, EEMD and CEEMD method should be more specific and clear. Response: Thank you for your suggestion, and we added the following statement to the revised manuscript. The ensemble empirical mode decomposition (EEMD) method is a noise assisted empirical mode decomposition algorithm. The CEEMD works by adding a certain amplitude of white noise to a time series, decomposing it via EMD, and saving the result. In contrast to the EEMD method, the CEEMD also ensures that the IMF set is quasi-complete and orthogonal. The CEEMD can ameliorate mode mixing and intermittency problems. The CEEMD is a computationally expensive algorithm and may take significant time to run.

3. We all known the complexity of the marine environment, I suggest you can list which factors can make predicting the sea surface temperature more difficult. And these factors can also be added in your simulation. Response: Thank you for the professional comment. Indeed, when we used empirical orthogonal function descriptions of the spatial structure in this study, it is found that SST variability is spatially complex (being spread over many spatial modes, some of which have small-scale changes)

but is dominated by low-frequency changes. The use of linear statistical estimators to examine predictability is discussed and the importance of limiting the number of candidate data used in a correlation starch is underscored. Using linear statistical predictors, it is found that SST anomalies can be predicted from SST observations several months in advance with measurable skill. We have stated some factors affecting the SST prediction in the revised manuscript.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2018-101/os-2018-101-AC2-supplement.pdf

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