Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-213

Anonymous Referee #1

Referee comment on "ENSO-ASC 1.0.0: ENSO deep learning forecast model with a multivariate air–sea coupler" by Bin Mu et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-213-RC1, 2021

Based on the important synergies of multiple variables in ENSO dynamic mechanisms, a deep learning model is designed in this paper, in which the graph convolution module is used to capture the interaction between factors. Recently, climate prediction using artificial intelligence methods is a fast-evolving area, a vast majority of the research efforts isolate machine learning from conventional knowledge-based modelling, which limits the potential of these two modelling paradigms. However, the author incorporates ENSO knowledge with the deep learning model, and the use of the graphic convolution module to describe the coupling between predictors in ENSO events is very novel. In particularly, the model works well both in prediction of Nino3.4 Index and simulation of the ENSO events. I have enjoyed reading this important article, and recommend publication. My minor comments are as follows:

- 260: There's an in this formula but was not explained ahead. This is supposed to be an identity matrix, right? Please introduce it clearly.

- Figure17-Figure20: The data seems to be standardized and should be mentioned on the figure.

- A suggestion: In this paper, it is found that the best effect is to set the input sequence length as 3. This may be due to selecting the predictors with short memory (vapor, cloud). If predictors with long memory (such as heat content) are added, it may be more effective to set the length longer. Although Table 3 shows the prediction effect of the model with increased heat content data, the input sequence length is the same. This may be taken into consideration in a future study using global data.