

Comment on gmd-2021-213

Anonymous Referee #2

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-RC2>, 2021

ENSO is a main driver of worldwide weather and climate anomalies. Its prediction has been subject to a relatively lower skill since 2000. In this new study, it is an interesting and innovative attempt for ENSO prediction with deep learning. The encoder-decoder structure can capture more nonlinear characteristics of ENSO evolutionary process with the complex coupled multivariate interactions in ENSO events. The authors propose using the transfer learning to combine data of different resolutions, which is a good way to figure out the potential data restriction problem and to reduce the epochs on model training. By comparing with multiple traditional neural networks, the ENSO-ASC model clearly shows the improved prediction skills.

Minor comments:

(1) On the ablation experiment, "The calculation of this variable contains the region of SST, so the effect of the extra introduction of upper ocean heat content will be weakened" is at L533. I have a suggestion: if use upper ocean heat content to take place the SST in the model, how will the ENSO-ASC can perform?

(2) The initial letter of the sentence should be uppercase and some mistakes are found at line 103 and line 222.

(3) L374, "N40°-S40°, E160°-W90°", should be expressed as the region of 40°N-40°S, 160°E-90°W.

(4) In Figure 6, the text looks too small.