



## **Convolutional Neural Network (CNN) for the ENSO prediction in a perfect model framework**

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This study develops a CNN-based statistical prediction system for the ENSO prediction. In this study, long-term Global Climate Model (GCM) output is utilized to train and validate the CNN model. As variables for the input layer, SST anomaly and heat content anomaly for February, March and April are given, and used the Nino 3.4 index of the subsequent DJF as a variable for the output layer. We used the multiple linear regression model (MLR) for comparison with the CNN model. As a result, correlation skill of the Nino3.4 index for the CNN model is 0.69 and for the MLR model is 0.38. To examine how the CNN model outperforms the MLR model, we analyze the El Niño events by dividing it into the cases that only the CNN model was successfully predicting the El Niño, and cases that both the CNN model and MLR model were successfully predicting the El Niño. It is shown that, the MLR model has been successfully predicted only for the typical El Niño, while the CNN model has performed well, not only for the typical El Niño, but also for El Niño which the development process is not canonical. Therefore, this study shown for the statistical ENSO prediction model can successful formulated using the CNN algorithm.