

**Improved Precipitation Variability in the Community Atmosphere Model through
Implementation of a Neural-Network Deep Convection Scheme**

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Introduction

Supplementary S1 presents additional information regarding the offline training of NN-
CONV described in Section 2.4 (Fig. S1), as well as results supporting the findings
presented in Section 3.1 (Figs. S2-S5).

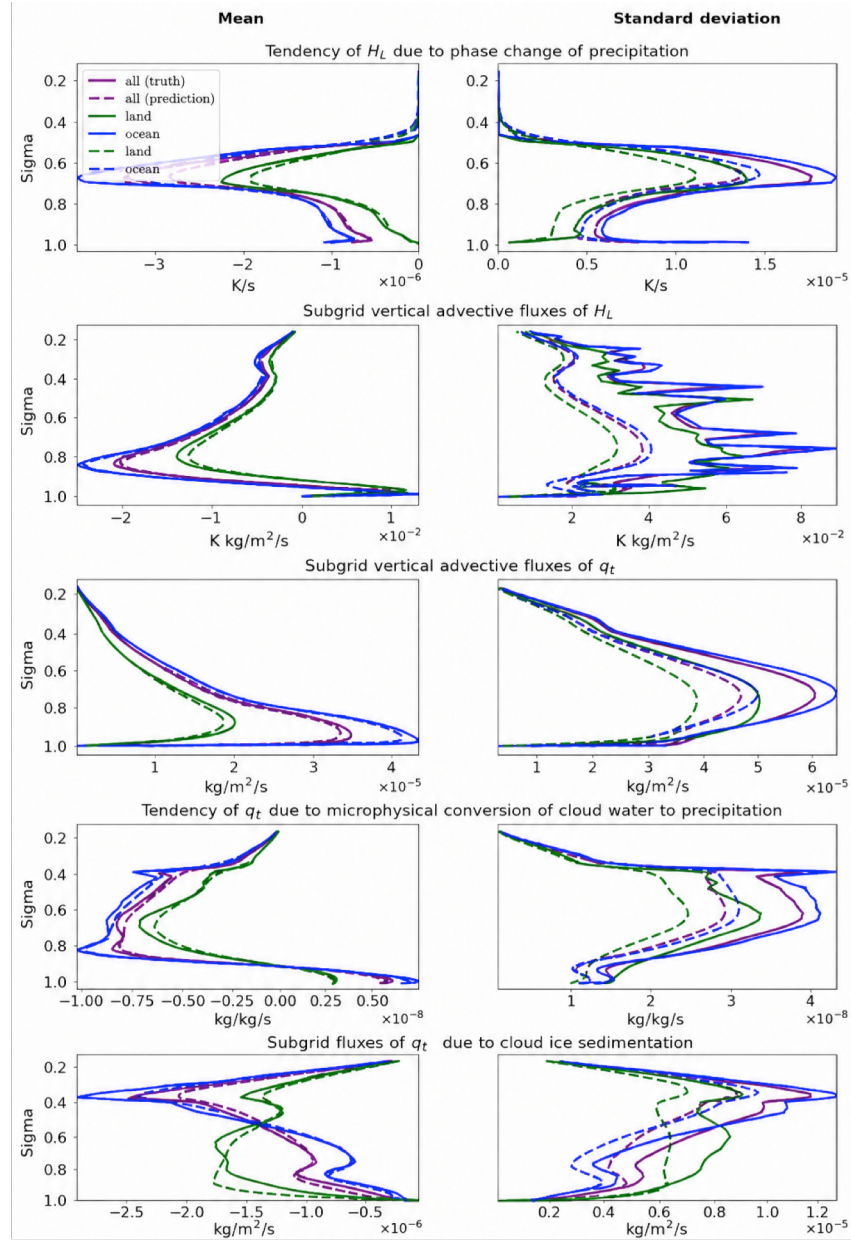


Figure S1. Offline results for the vertical structure of the area-weighted (left) mean and (right) standard deviation of each of the neural network parameterization predictions as a function of the sigma vertical coordinate. Results are based on the test dataset and show that the means of the neural network predictions (dashed lines) closely mirror the target data (solid lines) over both land (green) and ocean (blue) regions. The standard deviation is slightly underpredicted for most variables.

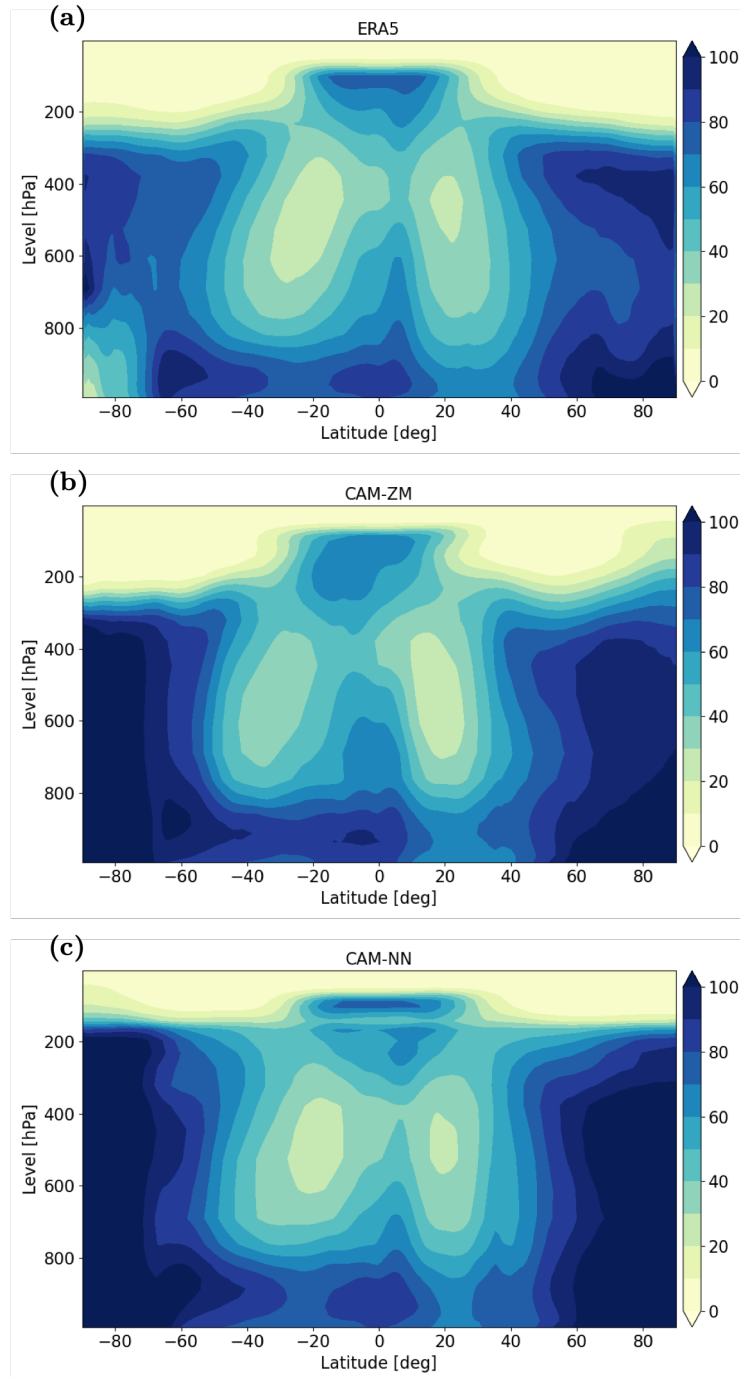


Figure S2. Zonal- and annual-mean relative humidity (%) from (a) ERA5 reanalysis, (b) CAM-ZM, and (c) CAM-NN.

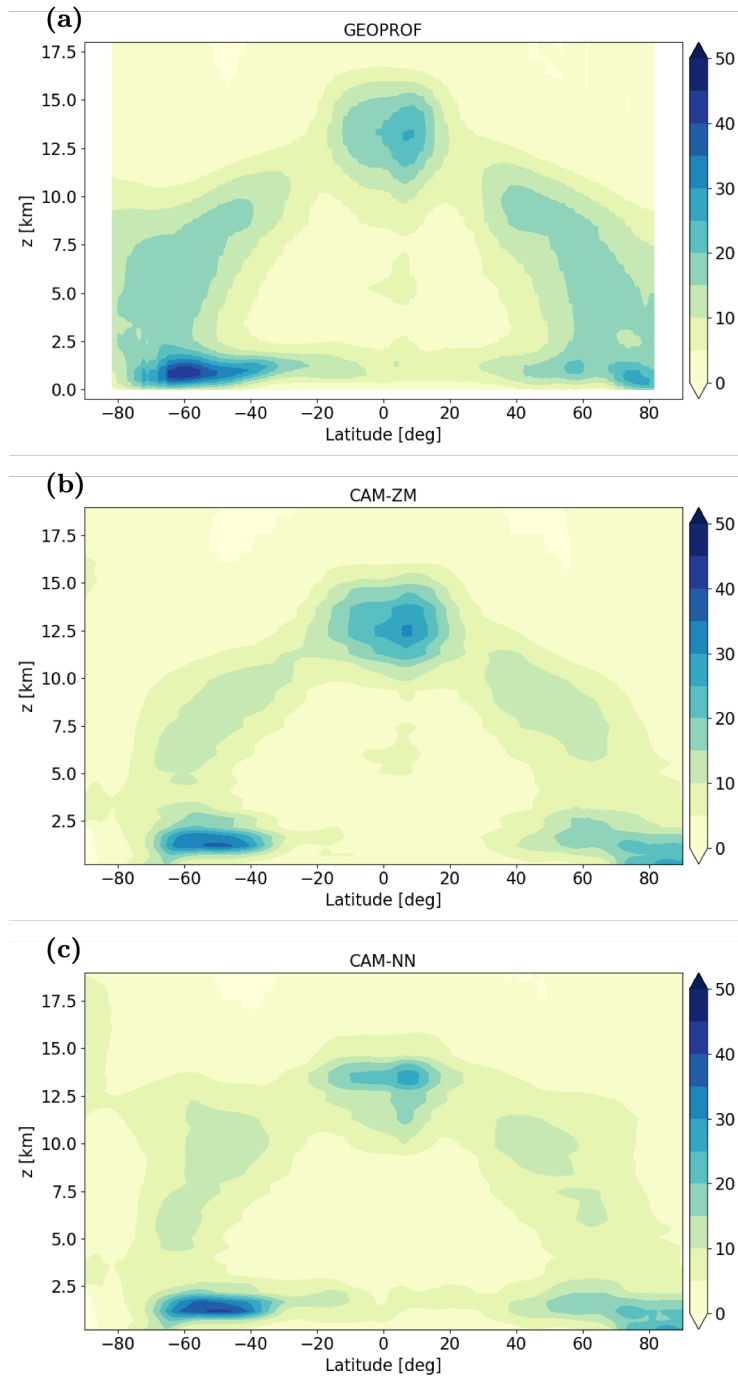


Figure S3. Zonal- and annual-mean cloud fraction (%) from (a) CALIPSO lidar observations, (b) CAM-ZM, and (c) CAM-NN.

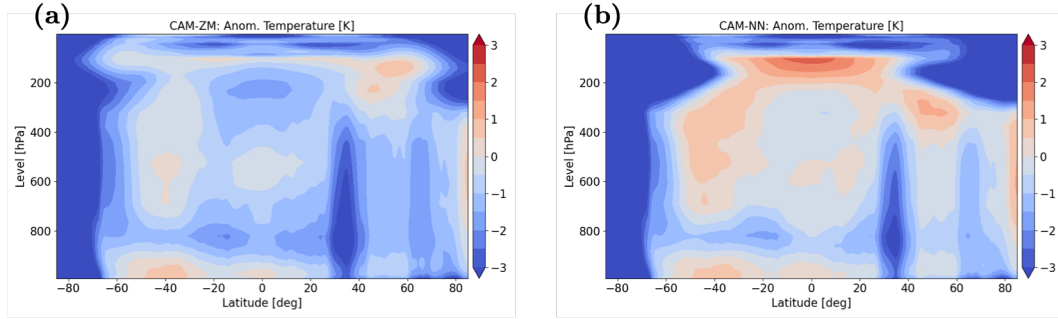


Figure S4. Zonal- and annual-mean temperature bias (K) relative to ERA5 reanalysis for (a) CAM-ZM and (b) CAM-NN.

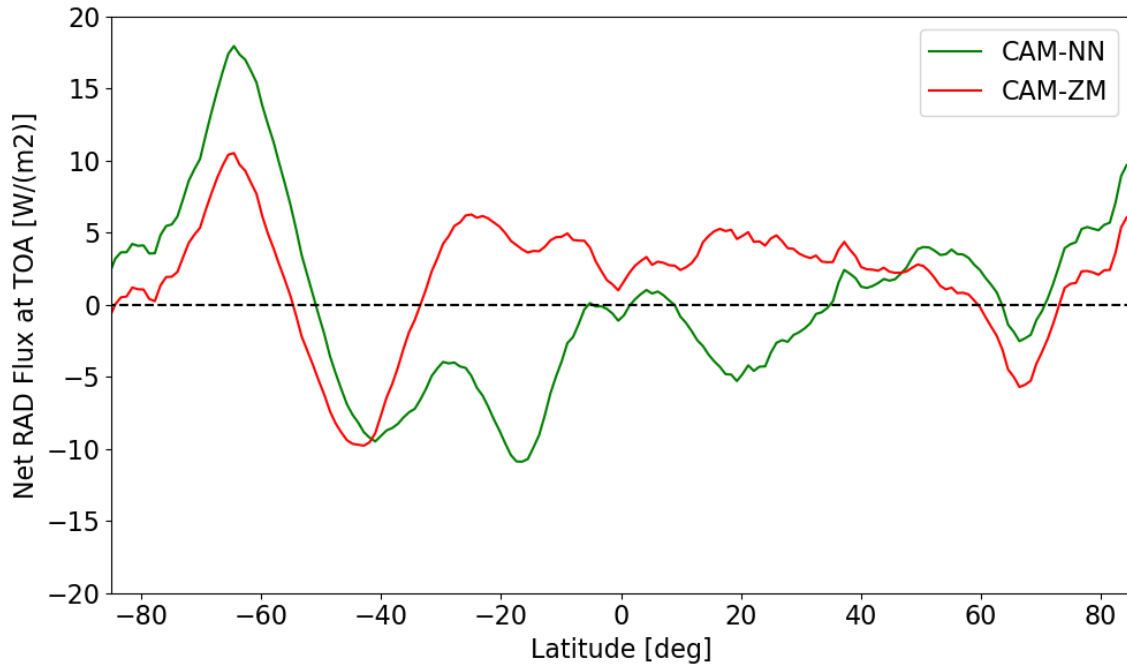


Figure S5. Top-of-atmosphere bias in time-mean outgoing longwave radiation (OLR) in CAM-ZM and CAM-NN with respect to CERES observations.