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## How to calibrate a climate model with neural network based physics?

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Unlike the traditional subgrid scale parameterizations used in climate models, current neural network (NN) parameterizations are only tuned *offline*, by minimizing a loss function on outputs from high resolution models. This approach often leads to numerical instabilities and long-term biases. Here, we propose a method to design tunable NN parameterizations and calibrate them *online*. The calibration of the NN parameterization is achieved in two steps. First, some model parameters are included within the NN model input. This NN model is fitted at once for a range of values of the parameters, using an *offline* metric. Second, once the NN parameterization has been plugged into the climate model, the parameters included among the NN inputs are optimized with respect to an *online* metric quantifying errors on long-term statistics. We illustrate our method with two simple dynamical systems. Our approach significantly reduces long-term biases of the climate model with NN based physics.