

Title: Viewing Climate Signals through an AI Lens

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Abstract: Much of climate science is often viewed as a signal-to-noise problem. Because of this, the field has many statistical methods for extracting the signal of interest. Here, we argue that artificial neural networks (ANNs) are an additional useful tool for the “climate toolbox”. As an example, we demonstrate their utility for extracting forced climate patterns from model simulations and observations. By identifying spatial patterns that serve as indicators of change, the ANN is able to determine the year from which the simulations came, without first separating the forced climate change signal from the noise of both internal climate variability and model uncertainty. Thus, the ANN indicator patterns are complex, non-linear combinations of signal and noise. While neural networks are often viewed as black boxes, we further demonstrate how to visualize what the network has learned using recent advances in visualization tools within the computer science community. This approach suggests that viewing climate patterns through an AI lens has the power to uncover new insights into climate variability and change.