@article{Labe2022c,
abstract = {Evaluating historical simulations from global climate models (GCMs) remains an important exercise for better understanding future projections of climate change and variability in rapidly warming regions, such as the Arctic. As an alternative approach for comparing climate models and observations, we set up a machine learning classification task using a shallow artificial neural network (ANN). Specifically, we train an ANN on maps of annual mean near-surface temperature in the Arctic from a multi-model large ensemble archive in order to classify which GCM produced each temperature map. After training our ANN on data from the large ensembles, we input annual mean maps of Arctic temperature from observational reanalysis and sort the prediction output according to increasing values of the ANN's confidence for each GCM class. To attempt to understand how the ANN is classifying each temperature map with a GCM, we leverage a feature attribution method from explainable artificial intelligence. By comparing composites from the attribution method for every GCM classification, we find that the ANN is learning regional temperature patterns in the Arctic that are unique to each GCM relative to the multi-model mean ensemble. In agreement with recent studies, we show that ANNs can be useful tools for extracting regional climate signals in GCMs and observations.},
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