

M.S. Defense Announcement
Jamin Rader
Tuesday, October 19, 2021, at 12:00 p.m.

Jamin Rader
M.S. Defense

October 19, 2021
12:00 p.m.

Defense
ATS Large Classroom (101 ATS) or via [Zoom](#)

Post Defense Meeting
Riehl Conference Room (211 ACRC)

Committee:
Elizabeth Barnes (Adviser)
Maria Rugenstein
Jessica Witt (Psychology)

Detection of forced change within combined climate fields using explainable neural networks

Assessing forced climate change requires the extraction of the forced signal from the background of climate noise. Traditionally, tools for extracting the forced climate change signals have only focused on one atmospheric variable at a time, however, using multiple variables can reduce noise and allow for easier detection of the forced response. Following previous work, we train artificial neural networks to predict the year of single- and multi-variable maps from forced climate model simulations. To perform this task, the neural networks learn patterns that allow them to discriminate between maps from different years—that is, the neural networks learn the patterns of the forced signal amidst the shroud of internal variability and climate model disagreement. When presented with combined input fields (multiple seasons, variables, or both), neural networks are able to detect the signal of forced change earlier than when given single fields alone by utilizing complex, nonlinear relationships between multiple variables and seasons. We use layer-wise relevance propagation, a neural network visualization tool, to identify the multivariate patterns learned by the neural networks that serve as reliable indicators of the forced response. These “indicator patterns” vary in time and between climate models, providing a template for investigating inter-model differences in the time evolution of the forced response. This work demonstrates how neural networks and their visualization tools can be harnessed to identify patterns of the forced signal within combined fields.

Topic: M.S. Defense: Jamin Rader
Time: Oct 19, 2021 12:00 PM Mountain Time (US and Canada)

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