



Dr. Zane K. Martin

Atmospheric Sciences

Colorado State University

Predicting the Madden-Julian oscillation using interpretable machine learning

Abstract

The Madden-Julian oscillation (MJO) is among the most important modes of tropical variability on the planet, and a dominant driver of subseasonal-to-seasonal prediction skill and predictability globally. The past decade has seen substantial advances in MJO prediction using dynamical forecast models, which now show higher skill than statistical MJO forecasts. Also in recent years, an increasing body of literature has demonstrated that machine learning methods represent a new frontier in Earth science with a wide range of applications. After a brief overview of the current state of MJO prediction, we discuss how state-of-the-art machine learning can be used to make real-time MJO forecasts. We introduce a particular type of machine learning model called a neural network, and then demonstrate how it can be used to predict MJO. We show that machine learning models have high skill relative to statistical models overall, but still underperform the very best dynamical MJO models. We close by discussing the strengths of these models and how they might be used and improved going forward, including their potential to lead to insights about the MJO. We also discuss cutting-edge techniques from the field of interpretable AI that allow us to visualize how these neural network makes predictions.

Zoom Link

<https://fsu.zoom.us/j/97840279436?pwd=YzlkdnNqZG1GaDhVMnJzSmZlb2VwQT09>

Time: Thursday, Mar. 25, 2021 @ 3:30 PM

Host: Dr. Allison Wing

Note: Meeting the speaker at 3:00 PM. A post-seminar student-speaker session will start immediately after the seminar.