

# CGD SEMINAR

## Thompson Lecture Series



**DATE:** Tuesday, 23 April 2019

**TIME:** 11 am – 12 pm

**LOCATION:** NCAR, 1850 Table Mesa Drive  
Mesa Lab, Main Seminar Room

**TITLE:** Extracting climate signals from the noise with machine learning

**SPEAKER:** Libby Barnes, Colorado State University

### ABSTRACT:

The atmosphere is a noisy and chaotic place, and our job as scientists is to disentangle the signal from the noise, and thus, determine cause and effect. This talk focuses on two signals and the tools employed to extract them from their noise.

The first signal is that of remote Arctic and tropical drivers of subseasonal variations in the midlatitude jet-streams. Daily variations in the midlatitude jet-stream can lead both to devastating extreme events, or mild weather, and thus, understanding the drivers of jet-stream variations on sub-seasonal timescales is one step toward accurate predictions. However, internal variability makes it challenging to determine who is driving whom. The second signal is that of humanity's influence on climate. Identifying this signal in observations, and distinguishing it from internal variability across a range of timescales, often requires one estimate the signal from climate model simulations. However, uncertainty across model projections introduces yet another layer of noise.

Separating the signal from the noise is no easy task, and success requires that one have the right tools for the job. Here, we apply methods from machine learning, specifically, causal discovery techniques and artificial neural networks, to extract these very different signals from the background of internal climate variability and model uncertainty. While this talk is focused on two specific signals, we will also use it as an opportunity to provide a brief overview of some causal discovery and machine learning methods to highlight their relevance for climate dynamics research as whole.

**Live webcast:** <http://ucarconnect.ucar.edu/live>

For more information, contact Tracy Baker, [tbaker@ucar.edu](mailto:tbaker@ucar.edu) 303.497.1366