UTSA ALVAREZ College of Business
The University of Texas at San Antonio

DEPARTMENT OF MANAGEMENT SCIENCE AND STATISTICS RESEARCH SEMINAR SERIES

Friday, Feb. 3
2 – 3 p.m. (CST)
Virtual meeting: https://utsa.zoom.us/j/5826540450

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R&D Statistician
Sandia National Laboratories

"An autotuning approach to DOE's earth system model"

Abstract
Calibration is the science (and art) of matching the model to observed data. Global Climate Model (GCM) calibration is a multi-step process done by hand and is a tedious and time-consuming process. GCM calibration involves both high-dimensional input and output spaces. Many rigorous calibration methods have been proposed in both statistical and climate literature, but many are not practical to implement. In this talk, I will demonstrate a promising and practical calibration approach on the atmosphere only model of the Department of Energy's Energy Exascale Earth System Model (E3SM). We generate a set of designed ensemble runs that span our input parameter space and fit a surrogate model using polynomial chaos expansions on a reduced space. We then use surrogate in an optimization scheme to identify input parameter sets that best match our simulated output to observations. Finally, we run E3SM with the optimal parameter set and compare prediction results across 44 spatial fields to the hand-tuned optimal parameter set chosen by experts. This flexible approach is straightforward to implement and seems to do as well or better than the tuning parameters chosen by the expert while considering high-dimensional output and operating in a fraction of the time.

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Bio

Lyndsay is a statistician at Sandia National Laboratories. She received her B.S in Mathematics at Bucknell University and PhD in Statistics from University of Illinois Urbana-Champaign in 2017 with a focus on spatio-temporal analysis. At Sandia, Lyndsay currently conducts and leads research centered around space-time statistics with applications to remotely sensed data, geoengineering, climate model calibration and disease modeling to name a few. Current research topics include nonstationary space-time methods, accounting for missing data in space-time point processes, Bayesian hierarchical modeling, and Spatial Dynamic Linear Models.