PURDUE UNIVERSITY | Department of Mathematics

Project-based research

Project Name:	Coupled Stochastic Models to Predict Climate Change	**Project ID:**	Leave Blank
Supervisor:	Di Qi (and Guang Lin?)	**Number of Positions**	1
Project Description:	In this project, we plan to assess the scope of skill using data-driven low-order stochastic models in predicting the large-scale coherent climate patterns in the coupled atmosphere-ocean system. The models incorporate fascinating climate phenomena called El Nino-Southern Oscillation (ENSO) and Madden-Julian Oscillation (MJO) that have great impacts on human activities. A mathematical tractable multiscale model is proposed to capture these large-scale structures, while the unresolved small-scale processes are paremterized using tools from stochastic superparameterization, machine learning and Bayesian data assimilation. Partial observation data is used to estimate the model states and parameters using Kalman filter and particle filter. The model prediction skill and model fidelity and sensitivity are further evaluated under a systematic fashion with uncertainty quantification.		
Final Deliverables:	1. Develop simple multiscale stochastic models to study specific climate patterns; 2. Develop efficient computational schemes to estimate states and parameters of the proposed stochastic models.		
Weekly Working Hours			
For Credits/Voluntary			
Desired Qualifications	Basic knowledge of linear algebra, stochastic process, and numerical analysis is preferable.		

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