



The University of Hong Kong
School of Biological Sciences

**Guest
Seminar**

Knowledge-guided machine learning for the next generation of agroecosystem prediction

Date: February 23, 2024

Time: 1500 - 1600

Venue: 6N-11, KBSB



About the speaker:

Zhenong Jin is an Assistant Professor of digital agriculture at University of Minnesota, who has a broad focus on agricultural remote sensing, computational modeling and machine learning. His research is well-funded by the NSF CAREER award, along with many other NSF, NASA, DOE and USDA grants. He has been extensively published, including top journals like Nature Climate Change, and Nature Reviews Earth & Environment, Nature Food, and Nature Communications. Since 2023, Dr. Jin co-leads the National AI Institute for climate-smart agriculture and forestry (AI-CLIMATE), in which he directs the development of solutions for the measurement, monitoring, reporting, and verification (MMRV) of

Abstract:

Accurately estimating carbon, nutrient, and water cycles in agroecosystems is crucial for sustainable food production and environmental protection. While cropping system models are extensively used, they have limitations such as inadequate representation of processes and uncertainties in model parameters. Applying these models across diverse landscapes with limited observations can be problematic. Knowledge-guided machine learning (KGML) is a new research paradigm that integrates process-based models into neural networks to reduce data requirements and enhance prediction accuracy. This presentation outlines our progress in using KGML to model key processes in agroecosystems, such as crop photosynthesis, carbon allocation, soil decomposition, and greenhouse gas emissions, as well as innovative methods for incorporating remote sensing data and rapid model calibration. Our results highlight the potential of KGML in complex agroecosystem modeling and offer insights into developing the next generation of AI-empowered agroecosystem prediction frameworks.