NCAR OPERATED BY UCAR Community Earth System Model

Harnessing Machine Learning for CESM: Innovation and Integration
31st Annual CESM Workshop
June 17th, 2026

Wednesday, June 17th, 8:30 am - 12 pm

*All times are MST; **Speakers**: 10 min talk. Please leave 2 min at the end of your slot for questions.*

Time	Topic	Speakers	Organization
8:30	**Welcome and logistics**	Kirsten & Linnia	
8:35	Development of a prototype hybrid ICON-XPP-MLe model with physics-aware machine learning parameterizations	Julien Savre	German Aerospace Center (DLR)
8:45	Improving Extreme Precipitation Representation with ML-Based Warm-Rain Microphysics in CAM6	Addisu Semie	Columbia University
8:55	Evaluating a Neural-Network Approach to Deep Convection in CAM6: Improvements and Remaining Challenges	Xavier Levine*	Columbia University
9:05	Leveraging Machine Learning to Reduce the Computational Cost of Sea Ice-Wave Fracture	Geraint Webb*	University of Washington
9:15	Testing machine-learned basal-friction relationships for ice-sheet modeling	Racheet Matai	LDEO, Columbia University
9:25	Machine-Learned KPP Parameterization in CESM3: Implementation and Impacts on Coupled Climate Variability	Yakelyn Jauregui	NSF NCAR
9:35	Hybrid vertical mixing parameterizations for ocean models	Marta Mrozowska	Princeton University
9:45	Using Contrastive Learning to Identify Structural Deficiencies in Climate Models and Generate Calibrated Physics Ensembles	Da Fan	Columbia University
9:55	Discussion		
10:00	**Break**		
10:30	Training AI Emulators for CESM Components Using CREDIT	John Schrek	NSF NCAR
10:40	AIDE-WACCM (AI-driven emulation for the Whole Atmosphere Community Climate Model)	Shreyas Muralidharan	Reflective
10:50	Regional Emulation of Modular Ocean Model (MOM6) in the Caribbean	Aidan Janney	NSF NCAR
11:00	AI-based Kilometer-Scale Dynamical Downscaling	Yingkai Sha	NSF NCAR

	based on CESM-LENS2 over CONUS		
11:10	Physics-informed Neural ODEs for Climate Dynamics and Prediction: An ENSO Forecasting Example with a Neural Extended Recharge Oscillator	Kezhou (Melody) Lu	University of California, Los Angeles
11:20	Reducing Model Biases with Machine Learning Corrections Derived from Ocean Data Assimilation Increments	Danni Du	Princeton University
11:30	Reducing Parametric Uncertainty in ICON-XPP-MLe Land-Atmosphere Simulations Using History Matching	Max Bouman	German Aerospace Center (DLR)
11:40	K-Means Clustering as a Tool for Categorizing Arctic Sea Ice Decline in the CESM2 Large Ensemble and CMIP6	Leo Balcer	University of Wisconsin-Madison
11:50	Internal Variability Explains Nearly Half of the Observed–Model Difference in Spring Arctic Amplification	Sky Gale	University of Washington
12:00	**Lunch**		

Posters

	Future oceanic emissions of brominated short-lived halocarbons using ML and CESM model	Behrooz Roozitalab	NSF NCAR
	Beyond the Training Data: Confidence-Guided Mixing of Parameterizations in a Hybrid AI-Climate Model	Helge Heuer	German Aerospace Center (DLR)
	Machine learning-based parameterization of floe perimeter for CESM	Diajeng Wulandari Atmojo	University of Bremen
	Leveraging Data-Driven Weather Prediction (DWP) Model for Climate Modeling	Chia-Ying Tu	RCEC, Academia Sinica
	Quantifying Parameter Sensitivity in the TaiAM1 using Perturbed Parameter Ensemble, Machine Learning Emulators, and History Matching	Yi-Hsuan Chen	Academia Sinica, Taiwan
	From MAM to CARMA: an ML translator for stratospheric sulfate aerosol size distributions	Daniele Visioni	Cornell University
	Design principles for stable and generalizable data-driven discretizations for solving linear hyperbolic conservation laws	Antoine-Alexis Nasser	Princeton University
	Constraining Errors in Ice Microphysics Schemes with Perturbed Ensembles and Learned Latent Metrics	Joseph Ko	Columbia University