

## SORS: "SFNO emulation of E3SMv2"

### Objectives

**Abstract:** The Fourier Neural Operator (FNO) family of deep learning architectures has been at the forefront of recent advancements in data-driven weather forecasting and global climate model emulation. FNO's are efficient vision transformers which carry out spatial convolutions in the Fourier domain. The Spherical Fourier Neural Operator (SFNO), developed by NVIDIA, takes into account the Earth's spherical geometry and is able to learn stable, years-long dynamics. In Summer 2023, the speaker worked with the Climate Modeling team at the Allen Institute for AI to develop a stable, decade-long SFNO-based emulator of the Energy Exascale Earth System Model version 2 (E3SMv2) global climate model at 1 degree horizontal and 6 hour temporal resolution. An overview of that work will be delivered, he will also discuss SFNO's ability to faithfully learn E3SMv2's global statistics and variability, along with possible directions for future research.



James Duncan

**Short Bio:** James is a 5th year PhD candidate in Biostatistics gratefully advised by Professor Bin Yu at UC Berkeley (MA Statistics '18 UC Berkeley; BA History '11 UW Madison). His research interests include high performance distributed computing for science applications, statistical software development and analysis, deep learning interpretability and domain adaptation, and machine learning algorithms development, with a focus on geophysical applications.

### Speakers

**Speaker:** James Duncan, UC Berkeley

**Host:** Hervé Petetin. Earth Sciences Department, BSC.

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