FIRE Climate Computing: A Course-Based Undergraduate Research Experience in Climate Modeling for First-Year Undergraduates

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What is FIRE at UMD?

The First-Year Innovation & Research Experience (FIRE) is an immersive, inclusive faculty-mentored course-based 3-semester research experience that drives accelerated career readiness and opportunity among a broad array of disciplines and fields from quantum machine learning, to fertility science, and even Climate Computing!



FIRE Timeline: FIRE is a 3-semester research experience with the option for the best students to become peer mentors.

About Climate Computing

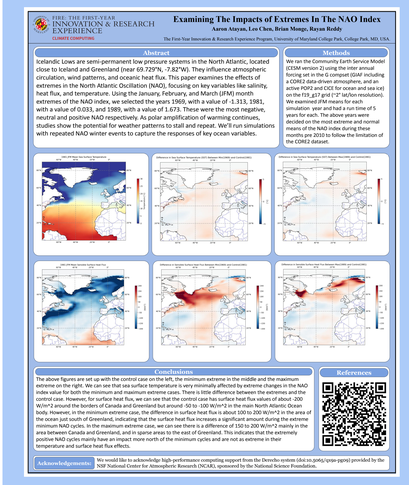
Students in my research stream have the following learning objectives over their 2nd and 3rd semester in the program:

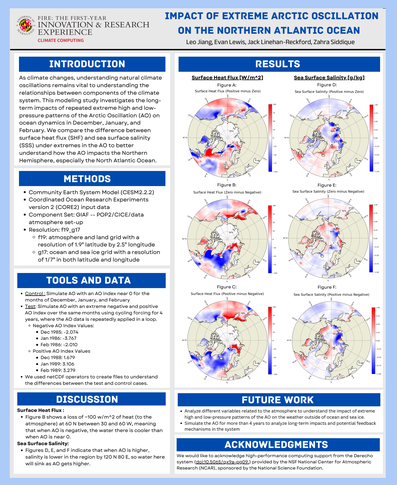
- Understand and apply knowledge of general weather and climate systems and parameters.
- Utilize programming and scripting to evaluate, analyze, and interpret basic weather and climate data from observations, reanalysis, and model output.
- Compose, execute, and describe experiments using the Community Earth System Model and the Weather Research and Forecast Model using the NCAR/CISL Derecho HPC.
- Develop written, visual, and oral scientific communication skills.
- Build collaborative relationships representing diverse cultures, races, ages, genders, religions, lifestyles, and viewpoints.

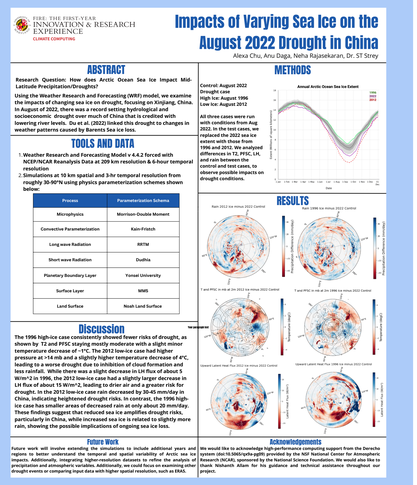
FIRE: THE FIRST-YEAR INNOVATION & RESEARCH EXPERIENCE
CLIMATE COMPUTING

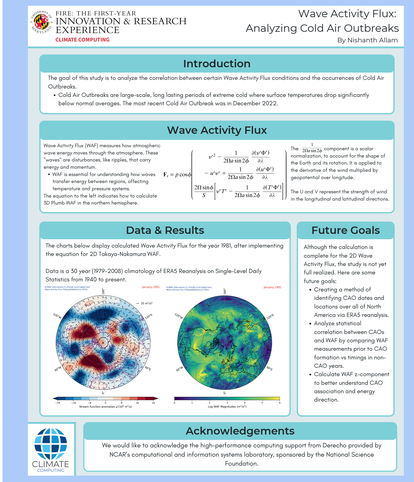
FIRE Summit 2025

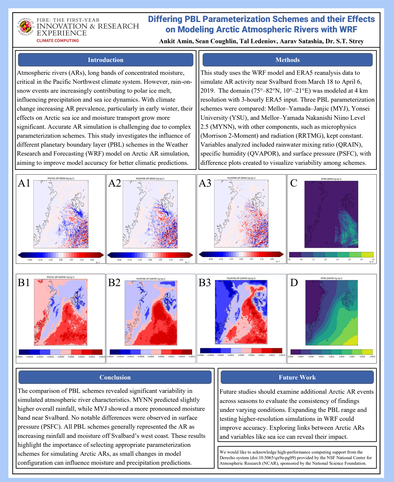
The 3-semester FIRE experience culminates in a poster session for all sixteen of the research groups. On 6 December 2024, the FIRE Summit took over the halls of the Edward St. John Teaching and Learning Center to present their work. The event was attended by campus partners and those just going through the building. Below is a sample of posters from the Climate Computing stream.

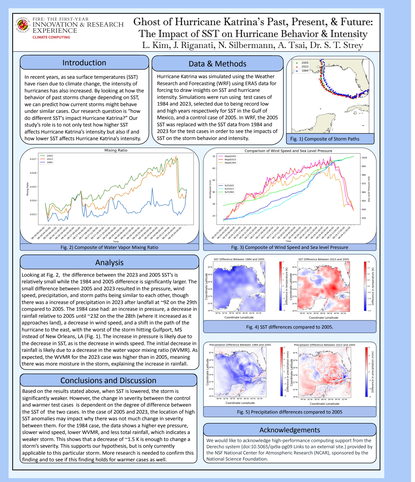












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FIRE Climate Computing 2024 cohort.

FIRE Semester 2

- Students are first introduced to basic weather and climate variables and concepts like temperature, pressure, moisture, and wind through reading, lectures, and applied programming lab activities.
- Through key journal articles and lab activities, students learn about the different components of the climate system and how they interact.
- Mini Project One gives them an introduction to CESM as a tool to investigate key climate issues.
- Mini Project Two focuses on weather case studies to learn more about WRF as a tool.

FIRE Semester 3

- Students design and propose their research experience with me within the umbrella topics of air-sea-ice interactions in phase one.
- During the second phase, students execute and analyze their projects.
- At the end of the semester, they participate in FIRE Summit where they present their findings and submit papers in the style of a Geophysical Research Letters article.

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For more information about the FIRE program, visit fire.umd.edu or use the Q-R Code above.