**Outreach Section:**

**NJ Ocean Fun Days**

NJ Ocean Fun Days are an event held every spring to teach local families and particularly kids about the coastal environment and how to take care of our oceans!

Each year volunteers come to two locations – Sandy Hook and Island Beach State Park – to present interactive exhibits about local ecosystems, sustainable fisheries, conservation, climate science, and oceanography.

This year I participated in the NOAA-GFDL exhibit at the Island Beach State Park event. We presented experiments on ocean acidification and sea ice dynamics to teach visitors about some of the ways in which human activities are influencing the oceans.

For more information on this event please see their <a href=” http://njseagrant.org/education/special-events/ocean-fun-days/”>homepage</a>.

**Princeton Plasma Physics Lab's Young Women's Conference**

The PPPL Young Women’s Conference is devoted to encouraging middle- and high-school aged girls to pursue careers in STEM fields. Volunteers from local labs and research institutions lead presentations, hands-on-activities, and laboratory tours to introduce students to scientific careers accessible to them. I have been participating in this event for the last two years, and this year I coordinated the Princeton AOS/GFDL exhibit.

I and three volunteers designed several experiments to present, and were very happy to see how enthusiastic and knowledgeable the girls we spoke with were. I realized there is no lack of motivation to pursue science/engineering careers among young women, but rather a need for mentoring and helping such students navigate their education and careers.

For more information on this event please see their <a href=” <https://www.pppl.gov/YWC>”>homepage</a>.

**Volunteering in Elizabeth, New Jersey**

I volunteered for the nonprofit New Jersey-based organization Future City aimed at educating local communities about environmental issues, working with policy-makers and government agencies, and developing environmental initiatives. I participated in the City of Elizabeth Estuary Day and Environment Day where I performed lab experiments and discussed climate dynamics with groups of students from local schools. Additionally, I worked with summer interns at Future City during the summer of 2017 and had an interview with the city’s mayor to discuss environmental issues.

**Plainsboro Public Library**

I worked with the Plainsboro Public Library Youth Program to develop a workshop to teach elementary school students about the Arctic Ocean and its role in climate. The title of the program was “Motion in the Ocean: Our Oceans and You”. I presented hands-on experiments and spoke with students regarding their thoughts on climate science and a simplified summary of my research on Arctic dynamics.

<a href=”https://www.plainsborolibrary.org/”>Plainsboro Public Library</a>

**Trash-Free Waters, US EPA**

The Future City organization that I volunteered with collaborates with the NY/NJ Harbor Estuary Program to protect the habitat of one of the most populated estuaries and metropolitan areas in the world. I attended Trash Free Waters Meeting of the Environmental Protection Agency in New York City to lead discussions regarding pollution issues facing the NY/NJ Harbor Estuary and actions we can take to address these problems.

For more information on the Trash-Free Waters initiative please see their <a href=" https://www.epa.gov/trash-free-waters">website</a>.

About Section:

Throughout my life I have been repeatedly inspired by the beauty of the natural world. As a child I spent numerous summers in the Appalachian Mountains; I was moved by the timelessness of these areas and the vastness of geologic time that they convey. Growing up in Florida, I was exposed to another side of nature. When I was in middle school, South Florida experienced the most active Atlantic hurricane season on record, with hurricanes Wilma and Katrina both making landfall near my home weeks apart. I remember standing by the ocean prior to Katrina’s landfall and being amazed at the power contained within the waves. In 2015, I completed my Bachelor’s degree in Physics and Geophysics, and am presently in my fourth year of a Ph.D. program in Atmospheric and Oceanic Sciences. I continue to be fascinated by the complexity and elegance with which the earth functions. The oceans and atmosphere comprise a delicately balanced and intertwined system of processes on scales ranging from millimeters to hundreds of kilometers, seconds to millennia. These processes have deeply shaped human civilization, and continue to do so. I became a scientist to study such processes and to extend a curiosity and admiration for the natural world to people across all backgrounds. </br></br>

I am most interested in theoretical and modeling studies of geophysical fluids, in particular, studying small-scale processes and their effects on large-scale circulation and climate. My current project involves studying the dynamics of dense water formation and transport in the shelf regions of the Arctic Ocean. Dense overflows off the Arctic shelves are key drivers of Arctic circulation, influencing deep water formation and sea-ice processes. Their dynamics is a complex problem governed by local atmospheric forcing and air-sea processes that produce the dense waters; the basin-scale processes determining stratification and guiding the descent of the overflows; and the small-scale mixing that ultimately defines the properties of the descending water. The second direction of this project is to apply insights gained from high-resolution numerical simulations of these processes to improving the shear mixing and mesoscale eddy kinetic energy parameterizations within larger-scale ocean and climate models. My long-term career goal is to pursue research in ocean and climate dynamics as a university professor or research scientist at a government lab. </br></br>

Outside of research, I feel the greatest joys from acquiring new knowledge and abilities, spending time in nature, and being with my family/friends. A few of my current hobbies include yoga, climbing, studying languages, and music. During my first two years of graduate school I volunteered for a local parrot rescue, fostering parrots and helping with fundraising. I care a lot about animals and highly respect the people that stand up for their rights. I enjoy sharing what I learn, and learning from others. I value the importance of communicating knowledge across disciplines, as we become increasingly specialized and our challenges more urgent. Overall, I believe our species has made numerous environmental, societal, and moral mistakes over the course of our history. Nonetheless, I am inspired by the breakthroughs we each remain capable of; manifesting in the development of science, our understanding of the universe, the creation of art and music, and altruism. It is important for us to remember the chaotic qualities of nature, and strive for breakthroughs on whichever scale we are capable of achieving - they may have effects far beyond what we imagine.

Projects:

Parameterization:

As ocean models begin to approach resolving mesoscale flow features such as baroclinic eddies, the importance of properly representing submesoscale dynamics (flows marginally constrained by rotation, with Rossby and Richardson numbers near one) is becoming increasingly vital. In particular, the GFDL-MOM6 model in isopycnal coordinates is found to have difficulties capturing mixing from frontal instabilities. The Gent-McWilliams mesoscale eddy parameterization applies to larger flow features, while the shear mixing parameterization only captures instabilities driven by vertical shear and stratification. The goal of this work is to incorporate effects of symmetric instability and frontal mixing to improve submesoscale mixing parameterizations in large-scale ocean models. This work is guided by high-resolution numerical simulations performed in the nonhydrostatic MITgcm.