One major impact of climate change on human populations in the 21st century is likely to be sea level rise. While the majority of land ice is situated in ice sheets in the remote locations of Greenland and Antarctica, what happens in these locations has a significant impact on the billions of people around the world living in coastal areas, estimated to be about 25% of the global population. In order to adequately plan for and adapt to coming sea level change, governments and communities need accurate projections of how large the change is likely to be, but at present, there is a lot of uncertainty associated with these projections. One source of this uncertainty is limited understanding of ice-ocean interaction.

Over the past two decades, ice flow velocities of the Jakobshavn Isbræ glacier in western Greenland have more than doubled, making it an ideal place to study the influence of ocean circulation on ice dynamics. The acceleration has been linked to an influx of warmer water into Disko Bay and the Ilulissat ice fjord, where the glacier terminates (Holland 2008). This summer, I was able to accompany Dr. David Holland of New York University to Greenland to assist with his field work in Disko Bay, thanks to a Student Faculty Research grant from Dr. Mary Lou Zeeman, a Roberts Fund grant, and a Bowdoin Faculty Scholarship.

Dr. Holland has conducted annual transects of the bay since 2009, measuring profiles of temperature, salinity, dissolved oxygen concentration, and fluorescence at twelve locations. My duties began with two days in a shipping container, during which we moved and sorted through dozens of boxes, identifying and organizing the equipment we would need for our fieldwork. Life on the boat was more interesting: learning about marine field safety, jerry-rigging equipment with missing pieces, the CTD transect, retrieving a mooring from 400m depth, and sleeping with three other people in what amounted to a large closet during nights lit by the “midnight sun.” It was an incredible opportunity to learn about the realities of conducting fieldwork in a remote environment where limited supplies are available and overnight shipping is simply not an option – both a challenging and rewarding experience.

As a double-major in Earth and Oceanographic Science and Math, my research goal for my senior year is to look at several years worth of CTD data from Disko Bay to identify trends relating to changes in circulation. The fluorometer data has not yet been analyzed and could provide interesting insight into the bay’s productivity, using chlorophyll fluorescence as a proxy for phytoplankton concentration. I will also investigate the use of turbidity data as a proxy for glacial sediment input. Based on a literature review and my own interpretations of the data, I hope to then identify a few questions about circulation in Disko Bay and work on developing basic mathematical models of key ocean processes. This is an exciting opportunity to integrate my two fields of interest in a meaningful way as I begin to chart my path beyond Bowdoin.