



Ocean Biology and Chemistry in a Warming Climate

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My project focused on investigating vertical mixing and various stratification indices throughout the ocean. Through vertical profiles of density and temperature computed from data by Argo floats (these are floats throughout the ocean that descend to depths of ~200m and take temperature and salinity measurements), time series for the period of 1997-2014 were generated for temperature and density at various depths. This allowed us to see how the changing climate and various climate indices (such as El Nino) affect the warming of the ocean. Additionally, stratification indices and their time series were calculated by subtracting surface temperature and density from temperature and density at 50m, 100m, and 200m.

Once these indices were calculated, they were correlated with data of biomass of phytoplankton to see how changing climate and consequently an increasing/decreasing stratification of the ocean affects biomass and biological productivity. This is of great importance for the field of oceanography and climate change, because the biomass of phytoplankton and their biological productivity are responsible for 50% of photosynthesis on the planet, and therefore play an important role in the storage of carbon in the ocean. This ability to store carbon in the ocean helps combat increasing levels of anthropogenic carbon dioxide in the atmosphere.

Through my research experience I learned data analysis skills and improved my ability to critically read academic papers. Working primarily with MATLAB, I developed invaluable coding skills and learned techniques for analyzing large data sets, such as interpolation and statistical analysis. I also read dozens of academic papers relevant to my project, and through discussions with my mentor and collaborators I learned how to utilize and analyze prior research that was done in the field. In addition to the concrete skills that I gained, this experience taught me how to apply physical and chemical concepts that I learned in the classroom into researching new ideas and concepts.