Remote Assignment of algae functional groups in the absence of extreme blooms: Application to Alexandrium fundyense in the Gulf of Maine

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The goal of this project was to quantify the variability in phytoplankton biomass in Harpswell Sound during the spring bloom period. My specific objectives were to see if the phytoplankton community, separated by a plankton net into >10 mm and <10 mm size fractions exhibited the same or different trends in space (along transect) and depth (at the Bowdoin buoy) with time. My team members and I gathered water samples from 9 locations along Harpswell sound including the Bowdoin buoy. On our cruises, water was filtered by a plankton net to separate the two communities of phytoplankton that inhabit the sound, those that are >10 mm and <10 mm. In the lab I filtered both water samples again to get rid of the water leaving behind a fiberglass filter pad with just pigment. I soaked the filters in acetone before placing them in a fluorometer that measures chlorophyll fluorescence, which is one of the most accepted proxies for phytoplankton biomass. The readings gathered from this instrument tell us the relative amount of phytoplankton present at each location along the sound and can tell us where a bloom is occurring and which community, big or small, is living there.

After using Matlab software to model the data into graphs, I concluded that at the beginning of the summer, May 25 to June 16, the surface of the sound was mostly inhabited by a bloom of >10 mm phytoplankton, then towards the middle, June 23, it was mixed >10 mm and <10 mm phytoplankton and then at the end of the summer, June 30 to July 13, the <10 mm phytoplankton became the dominate community. At two different depths (2.5 m and 10 m) at the Bowdoin buoy, I concluded that the phytoplankton were following this same pattern of >10 mm and <10 mm phytoplankton blooming and then decreasing but on a weekly basis. These results show that some mechanism is causing the phytoplankton to move vertically through the water column so frequently. A closer study of the temperature, salinity and nutrient distribution of the sound could help determine the cause of this behavior.

Ultimately this research could lead us to predictions of harmful algal blooms that cause paralytic shellfish poisoning in the area, which would be beneficial to everyone who has any interaction with the Gulf of Maine.

Faculty Mentor: Collin Roesler

Funded by the NASA Research Grant