IMS Seminar
October 9, 2013
201 O'Neill, 3:30 pm

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Ph.D. proposal, Oceanography

Sea ice fungi: more than just a microbial loop

Dissertation title: *Diversity and functional role of chytrids in Arctic marine ecosystem*

As the most abundant organisms on earth, microbes control the health of marine ecosystems at every trophic level. As parasites of primary producers, aquatic micro-fungi redirect carbon by colonizing up to 90% of algae. Despite this, no contemporary primary production models account for parasitism of algae in any marine system. In Barrow, Alaska, chytridiacious fungi were observed parasitizing diatom species within sea ice, indicating a greater role of parasites in the regulation of primary production than previously thought. To date, chytrids have not been known to exist in sea ice. Several unique chytrid morphologies were observed, indicating a potential reservoir of undocumented fungal biodiversity in the Arctic. PCR, cloning, and culturing is being employed to characterize fungal isolates genetically, while zoosporic ultrastructure is being characterized by TEM. Spatial diversity and community restructuring in the presence of fungal pathogens is being explored metatgenomically over time. A metatranscriptomics analysis will supplement these data by exploring the expression of all genes in the presence and absence of fungal parasites. Identifying resistance genes is imperative for future biofuel farming, especially when developing disease-resistant algal lineages for growth. Lastly, a functional approach to chytrid parasitism will be conducted. Specifically, chlorophyll fluorescence will be recorded in the presence and absence of fungal parasites to quantify the loss of photosynthates over time. This work highlights important observations and suggests a need for closer examination of lesser-studied eukaryotes in aquatic nutrient cycling and the regulation of algal blooms.