POSTING: PhD Student

Observing and modelling sea ice algae in the coastal Canadian Arctic



We are seeking a motivated student for a PhD studentship to study sea ice algae within the Canadian Arctic coastal zone. The project will investigate physical and biological processes controlling sea ice algal production and fate in a dynamic coastal environment with a seasonal sea ice cover. A focus will be placed on processes that drive ice algae bloom timing, production and advection of organic matter as it settles to the ocean floor where it feeds the benthic realm. The student will have access to existing datasets as well as numerous opportunities to plan out and participate in field campaigns based out of coastal communities and research vessels within the Canadian Arctic. Furthermore, there will be an emphasis on coupling a sea ice biogeochemical model to a dynamic coastal ocean model to support investigations on bloom timing and advective processes. The modelling work will focus on the Belcher Islands (Qikiqtait) in southeastern Hudson Bay. The student is to be co-supervised by Drs. C.J. Mundy and Jens Ehn, with the close collaboration of Dr. Nadja Steiner at Fisheries and Oceans Canada. Their degree will be housed within the Centre for Earth Observation Science (umanitoba.ca/ceos), Department of Environment & Geography at the University of Manitoba, Winnipeg, Canada. The successful student will also become a member of the Arctic Science Partnership (asp-net.org) and ArcticNet (<u>http://www.arcticnet.ulaval.ca</u>) providing national and international opportunities above and beyond a standard graduate degree. The successful candidate will have a MSc (or equivalent) degree in physical and/or biological oceanography, or related field with a strong modelling/coding background. The studentship is fully funded as part of existing ArcticNet, NSERC, and Polar Knowledge Canada grants.

Brief Background: The coastal zone encompasses some of the most productive regions in the Arctic. In particular, localized areas within the coastal zone support seasonal and sometimes interannual aggregations of higher trophic level organisms. These biological hotspots play a critical ecosystem services role to nearby northern communities that depend on them for subsistence hunting, culture and overall well-being. However, our knowledge of the processes driving production in these hotspots and their potential response to a rapidly changing climate is rudimentary at best. Assuming the Arctic marine ecosystem is largely driven by bottom-up dynamics, a logical place to focus our efforts is on physical and environmental processes that control primary production in a region. For example, periodic tidal flow across a shallow-constricted strait can erode local surface stratification, mixing new nutrients into surface waters where they can enhance sea ice production. However, the strong currents and vertical mixing can also erode the bottom sea ice habitat, causing ice algae to periodically slough into the water column, while increasing light availability to the water column and benthic habitats. Furthermore, the strong currents can advect the sloughed ice algal cells, resulting in a decoupling between where production occurs and where it settles to the ocean floor and feeds the benthic community. This example is one of many mechanisms that can drive spatial variability in the production of country foods (fish, mussels, clams, scallops, etc.) harvested by local communities in the Arctic coastal zone.

Initial applications should be sent directly to Drs. Mundy (<u>CJ.Mundy@umanitoba.ca</u>) and Ehn (<u>Jens.Ehn@umanitoba.ca</u>) and include: a cover letter (<1 page) that talks to your previous research, experiences, interests, and aspirations relevant to the studentship, a CV with names of two academic references willing to write letters of support; a copy of your University transcripts; and an English Language test score, such as TOEFL or IELTS, if you are an international student with English as a second language. For further information, please contact Drs. Mundy and Ehn.

Application deadline: Open until filled







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