Geotracerkitchen
http://geotracerkitchen.org
tel: 401.874.6676

UNIVERSITY OF RHODE ISLAND
GRADUATE SCHOOL OF OCEANOGRAPHY

The Geotracerkitchen at the University of Rhode Island School of Oceanography is seeking a postdoctoral scholar to lead an exciting new investigation into methane oxidation beneath sea ice in the Arctic. The successful applicant will initiate an interdisciplinary research program that will combine microbial measurements of the abundance and viability of marine methanotrophs and in-situ measurements of methane oxidation using an underwater mass spectrometer. The project will involve laboratory cold mesocosm studies and culminate with a field study on the sea ice near Barrow, AK.

Candidates must hold a PhD at the time of hire. Investigators with experience and skills related to microbial genomics are particularly qualified. Other desirable experiences include: past study of archaea and methanotrophic bacteria, experience with vacuum systems, membrane inlet analyzers, and linear quadrupole mass spectrometers. The ability to post-process and analyze data in Matlab, Python or R is also desirable.

The scholar will have the opportunity to interact with geobiologists, microbial ecologists and tracer geochemists. The position will be based at the University of Rhode Island Bay Campus. The duration is for one year with the potential to extend - the start date is flexible.

To apply, please submit:

- Cover letter describing your research interests, experience and how they would complement the methane oxidation project (see project description below).
- A curriculum vitae.
- Contact information for 3 professional references including name, telephone number and email address.
- Any representative publications.

Applications should be submitted by email to Brice Loose: brice@gso.uri.edu.

The University of Rhode Island is an equal opportunity employer. All qualified applicants will receive equal consideration for employment without regard to race, religion, gender, sexual orientation or national origin.

For more details of the project description, see below:

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Rates and controls on methane oxidation beneath sea ice

Abstract

Methane reserves in the Arctic Ocean may be as large as 18,000 Gt, but this estimate is very poorly constrained because we are still missing basic data for how methane is stored, transported and recycled in the sediments and water column. The Arctic Ocean is a challenging environment because the cold temperatures and intermittent ice cover affect the circulation, chemistry and microbiology of the methane cycle. The goal of this study will be to determine the rate and range of methane oxidation that can occur in ice-covered marine systems. We will use laboratory mesocosm experiments and in-situ field measurements to quantitatively describe the rates of aerobic methane oxidation and determine the variables that most directly govern these rates. We will compare these oxidation rates with coincident measurements of methane concentration, qPCR and RNA transcription assays for methanotroph abundance and activity, as well as temperature, salinity, ice thickness, shortwave radiation and to probe the sensitivity of oxidation rates to these basic environmental properties. The mesocosm experiments will be compared with in-situ rates of methane oxidation and microbial abundance during late spring in the coastal sea ice zone along Barrow, AK. The combination of laboratory and in-situ measurements will allow us to explore a broad range of environmental conditions and compare that range to rates observed in real ice-covered marine environments.

Prior studies of the marine methane cycle show near ubiquitous presence of methane in the Arctic marginal seas, including the Northwest Passage, the Beaufort Sea, the East Siberian Shelf and Greenland Sea near Svalbard. Methane in the Arctic Ocean is sourced from hydrates, inundated permafrost and from anoxic sediments. Broad regions of the Arctic surface ocean are over saturated in methane, especially where air-sea exchange is restricted by sea ice. At this stage, we have not quantified the bulk sedimentary fluxes and even less is known about the rate of aerobic methane recycling (production and oxidation) that produce this methane excess in the Arctic water column. In the surface ocean, aerobic methane oxidation rates may range over four orders of magnitude from turnover time of months to 50 years.

What emerges is a picture where the accumulation of methane beneath sea ice coincides with the algal and microbial habitats of seasonally ice-affected waters. Sea ice affected waters are known to host high concentrations of plankton and microbes, especially during the spring and summer months. Consequently, the potential for significant aerobic oxidation of methane may exist, but there is very little information available to determine the environmental parameters that control methane recycling, especially beneath sea ice.