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Project profile #4 - October 2010

Impact of climate change on the life of the Arctic Ocean floor

Summary

Life on the ocean floor is astonishingly diverse, but still very poorly known, especially in Polar Regions where ice cover has restricted sampling. Climate warming is driving a rapid transformation of polar ecosystems, and we urgently need to study the vulnerability of seafloor biodiversity to changes that are already underway.



Diversity at the Arctic Sea Floor

For instance, as wide areas of the Arctic are shifting from arctic to subarctic conditions, water temperatures are rising and ice cover is diminishing. Both of these factors will alter productivity patterns in the surface ocean and thus alter the delivery of organic matter to the seafloor. Major changes in food input will propagate throughout this ecosystem, affecting biodiversity and ecosystem processes.

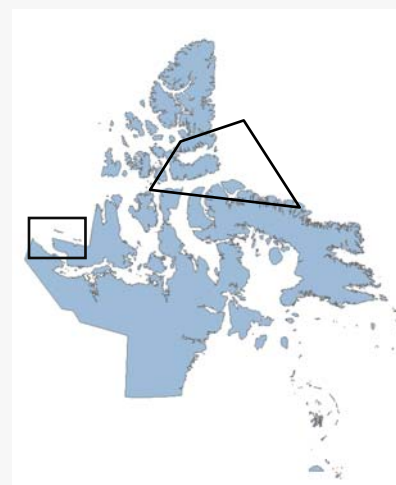


Benthic Flux Experiments

In this context of potential widespread changes to deep-water living organisms communities (benthic) in the Arctic, we propose to establish benchmarks at biodiversity ‘hotspots’ - areas with a high number of species and abundance - and ‘coldspots’ where opposite conditions prevail. We anticipate that impacts of climate warming on the seafloor life will be amplified at these sentinel sites that represent extremes of productivity and biodiversity.

Knowledge resulting from our research efforts will enable us to better understand how the arctic seafloor life will be affected by climate-driven changes in oceanographic conditions and resource exploitation. We have a unique opportunity to document almost pristine conditions before the Arctic Ocean undergoes major changes.

Study site locations



Canadian Beaufort Sea, Amundsen Gulf, Viscount Melville Sound, Barrow Strait, Lancaster Sound, North Water Polynya, Gibbs Fjord.

Local collaborations

Our interaction with northern communities is limited because we are working with small animals that live on or in the sediment at depths greater than 50 m. So our interaction with the northern communities remains on activities on board the CCGS Amundsen and community visits. The benthic lab participates every time in the Schools on Board program.

Questions to Researchers

ArcticNet recognizes the importance of framing climate change issues from various perspectives. Below we are asking a few questions to the project leaders in order to identify scientific priority issues and demonstrate how the research results can be used by policy and decision-makers in terms of community and climate change adaptation planning in the Eastern Canadian Arctic.

1) From your own research perspective can you identify and describe the key issues that are (will be?) affecting social, economic or environmental conditions in the Eastern Canadian Arctic?

From my perspectives of Arctic and Canadian seafloor biodiversity, the priority sciences issues revolve around: 1) describing marine biodiversity across the three Canadian Oceans, especially the Arctic where many seafloor areas are still to explore; 2) understand the role of biodiversity in marine ecosystem services (the "goods" provided to humans by living organisms) by linking biodiversity and ecosystem function measures; 3) predict the change in biodiversity, related to climate change (e.g. ice melting) or other anthropogenic activities, and its influence on the ecosystems functions.

2) How will your ArcticNet project contribute to a better understanding of these issues affecting the Eastern Canadian Arctic?

Our project will provide the relevant scientific information to specifically address the following objectives:

- To generate a list of benthic species living in Eastern Canadian Arctic and identify potential 'hotspot' of biodiversity
- To model the spatial biodiversity and relate it to environmental conditions
- To understand the importance of particular species or group of species for their functions in the ecosystems

- To quantify major fluxes and pathways of carbon and nutrients to gain an additional measure of productivity for benthic communities.
- To investigate the biodiversity-rugosity relationships at the seafloor
- To provide predictive models and tools to minimize anthropogenic impacts on seafloor biodiversity

3) Provide an example of how the results of your project may contribute to the decision-making process with respect to these issues.

For example, the results of our project could be used by marine conservation agencies. Furthermore, with the model that will be developed we will create marine benthic potential 'hotspot' of biodiversity. This model will greatly help in the planning of future marine conservation areas. The results of our field program could be used in impact assessment studies. Finally, our results have been used in a major effort to compile the marine species around the world (Census of Marine Life: <http://www.coml.org/>) and would be presented at an international event in October 2010 in London, UK at the Royal Institution of Great Britain. These results are also very useful for the Canadian Healthy Ocean Network (<http://www.marinebiodiversity.ca/CHONE>).

General information

Contact us if you have suggestions, feedback or questions regarding the research projects presented in this newsletter.

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Upcoming Newsletter

Researcher

Thierry Rodon

Research project

Improving access to university education in the Canadian Arctic

