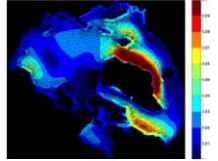
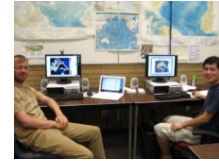
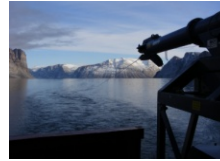


- ArcticNet project profile (2008-11)
- Scientific priority issues

Paul Myers



Paul is an associate professor and physical oceanographer at the University of Alberta.



Project profile #6 - October 2010

Past and present changes to the ocean and sea-ice in the Arctic Archipelago

Summary

The goal of this project is to provide the modelling framework for future impact studies on the Canadian Arctic Archipelago's pack ice, oceanography and marine food web. In developing a modeling capability (for both the ocean and sea-ice), using the newest and most advanced techniques for numerical modelling of the Canadian north and Arctic Archipelago, there is the potential to provide the tools for many future studies of this region.



Arctic field trip sampling

Once the tools (i.e. new advanced modelling techniques) have been developed and tested, they can be provided to other groups within Canada (such as the operational forecasting groups associated with Fisheries and Oceans Canada and the Canadian Ice Service).



Laboratory simulation - modelling

Additionally, with solid physical models, one can then foresee an improved ability to examine issues of ocean chemistry, biology, ecosystem or pollution through the coupling of these 'applied' models to the newly developed physical modeling capability.

Being able to simulate this large region of the Canadian North will be important given the many recent observations that suggest that significant changes are presently occurring in the Arctic, as reported in the recent Arctic Climate Impact Assessment.

There is also a strong need in both industry and government for greater numbers of individuals trained in developing, setting up, running and analyzing complex general circulation models. A larger pool of HQP will also be a legacy of this project.

Study site locations



The model domain includes the entire region from the Arctic Ocean through to the Labrador Sea, but focussed at a higher resolution on the Arctic Archipelago.

Local collaborations

Mainly still needing to be developed as the model has only just reached the stage where it can be used to answer questions relevant to people living in the north.

-Churchill Northern Studies Centre for snow on ice field validation studies.

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?

Looking at the ocean and sea-ice of the Arctic Archipelago, some of the biggest science questions will revolve around: **1)** Understanding how the sea-ice will evolve in terms of ice covered area, thickness, seasons and transport; **2)** How the fluxes of freshwater through to the North Atlantic Ocean will evolve, and the potential impact of that freshwater on the large scale global ocean circulation; **3)** How changes in the ocean and ice-regime will effect the upper ocean stratification and thus the provision of nutrients to the upper ocean, impacting biological productivity; and **4)** Will the ocean in the Canadian Arctic become a viable route for shipping and transport, and if so, can that shipping be done safely and in a fashion that is environmentally safe and sound.

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

Our project will generate relevant scientific information in a number of ways to provide useful scientific information for the eastern Canadian Arctic:

- Provide high resolution fields of the ocean and sea-ice for the past 40 years to allow present changes to be fit into the historical context;

- Provide high resolution fields of the ocean and sea-ice over the next century to allow study of detailed changes within and through the Archipelago, including communities;

- Provide fields that can be used as the input to help drive biological, chemical, pollution models;

- Provide improved estimates of fluxes through the Archipelago into the Labrador Sea and the North Atlantic Ocean;

- Provide a single model framework with easily focussed resolution and grids that can be used to answer questions on scales ranging from the entire Canadian Arctic down to detailed studies of processes important to a given passage or community;

- Train the next generation of modelers with skills relevant to the north.

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

Most studies and report assume that the sea-ice will retreat with climate change, leading to a northwest passage more open for shipping. But will this be the case. Less landfast ice may mean more ice drift and greater variability, as well as greater ridging and rafting which could actually locally increase ice thickness, as well as making it less predictable. Thus warming and a decrease in overall sea ice could make it more difficult to use the Northwest Passage commercially and/or supply communities by sea.

Although our model is not able to answer these questions yet, further development will allow for improved modelling capability that can be provided to government departments, for example, to help in their development of forecasting capability for these archipelagos.

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

Fiona Walton

Research project

Inuit Qaujimajatuqangit and the Transformation of High School Education in Nunavut

