AMAW

User-driven monitoring of adverse marine and weather states, Eastern Beaufort Sea

http://meopar.ca

Principal investigator

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Areas of contribution

User-aspects and verification

Education

Observations

Outreach

Policy-relevant / cultural aspects

Economic aspects

Societal and/or behavioural aspects

Summary

This project builds upon an existing one being led by Atkinson. The intent is to continue working towards improved marine weather and storm information and preparedness for ocean waves, swell and storm surge for coastal communities (Ulukhaktok, Tuktoyaktuk and Sachs Harbour) and marine operations in the western Canadian Arctic.

Description

Needs and Impact:
The loss of sea ice in the western Canadian Arctic has been rapid. Sea-ice cover limits wave action by reducing fetch, which limits potential wave height, by dampening wave activity, and by armoring the coast with land-fast ice, preventing direct wave damage.
Computer modeling of waves in sea-ice areas has been poor, and so there are few climatologies showing coastal wave energy patterns. Hazards associated with loss of sea ice include greater wave heights, longer open-water seasons, and even some areas that no longer freeze completely, producing larger waves (pers. comm. Conf. calls, 2013; interviews 2014 with Tuktoyaktuk residents; Forbes 2011; Atkinson 2011). Larger waves increase coastal erosion, damage coastal infrastructure, compromise small/subsistence craft safety and interfere with larger ships, such as sea-lift operations. Tuktoyaktuk residents mention storm and sea-ice declines are resulting in more erosion along the Beaufort Sea coast (Forbes et al. 2014; Andrachuk 2008; Manson and Solomon 2007). In fact, at 2 m/yr, Tuktoyaktuk Island is eroding twice as fast as the surrounding coastline. This delivers large amounts of sediment to the nearshore system (Whalen et al. 2014). The contribution of sediments is controlled by external sources like the Mackenzie Delta (Tuktoyaktuk), surface run-off after heavy rains or coastal flooding and coastal erosion. The erosion of ice-rich coastlines is amplified during storm events. Improved coastal wave climatologies are needed.

In the last four years Atkinson and his team have established a solid relationship with a wide range of marine end-users in the western Canadian Arctic as part of several funded projects. This project focuses on three principal areas identified by these end-users as follows:

First: develop and provide wave or sea-state climatology products that have been tailored for open water users (hunters, tug-boat operators, Coast Guard) and for coastal engineering considerations. Sea-ice cover has declined over the last few decades, bringing increased occurrences of long open water fetch conditions and discontinuous (thinner) sea-ice cover. Both situations result in increased wave action. Marginal ice is of particular importance because it typically is not factored into wave model systems, yet it does allow the enhanced propagation of wave energy.

Second: increase the liaison work already established with Environment and Climate Change Canada (ECCC) regarding the on-the-ground impacts of particular synoptic patterns and explore ways to expand the flow of information back to ECCC to enhance their operational uses. The project will also facilitate an exploration of possible new ways of disseminating environmental prediction products to end users.

Third: provide technical training opportunities for end users. The availability of existing technical information products, and the proposed development of novel products, will require training in their interpretation and use. This proposal specifies a training program for people from communities and regional entities, such as the Inuvialuit Regional Corporation. Candidates, identified by the communities, will visit the University of Victoria for training and operational centers within the Meteorological Service of Canada and the Canadian Ice Service. This will allow them greater insight into how the forecasting process works to improve their understanding of

what types of information and feedback are relevant to aid prediction efforts undertaken at the forecast centers.

These activities correspond to the YOPP mandate in engaging forecast-stakeholder interaction and verification. It is expected that these activities will results in improved observing systems and gathering of additional information which also fit with YOPP main objectives. These activities also align with a primary objective of YOPP, which is to improve understanding of polar key processes.

Timeline

2017-07-01 - 2020-07-25

User relevant aspects

Weekly/biweekly engagement on discussions of impactful weather, sea-state and sea ice events.

Provider relevant aspects

Environment Canada will provide training to local experts on how to access and interpret products.

Regional emphasis

Northern hemisphere: Yes

Southern hemisphere: No

Key project deliverables

1. Wave climatology. Develop wave climatology information for open water areas of the western Canadian Arctic, tailored to end-users that include hunters, tugs, Coast Guard, as well as coastal engineering considerations.

2. Synoptic weather impacts. Identify end-user needs and respond with tailored tools, such as smart-phone apps. These include community and resource developers' needs, to better allow them to respond to short term events (e.g. specific weather), as well as longer term trends (e.g. climate change and climate trends).

3. Train local experts – Research Assistants (RA) – in the use of technical "environmental forcing" datasets and analytical products.
4. Forge the local experts into a new, regional network focused on coastal and marine vulnerability

(e.g. hunter safety, erosion and infrastructure damage) who, with on-going support from project academic partners, are able to advise on short-term weather and sea ice hazards and long-term planning issues.

Data management

Dr. Atkinson's office. Department of Geography, University of Victoria

Is data provided to WMO Global Telecommunication System

No

Real-time provision

Any non-culturally sensitive data (such as results from a wave climatology) will be disbursed via a server associated with Atkinson's laboratory at University of Victoria

Other information

Atkinson's laboratory has secured funding and in-kind support from a variety of sources for allied work in the Canadian and Alaskan north. Atkinson provided mentoring support for three other major MEOPAR projects that are now operating in the Canadian North, and he coordinates with allied efforts, such as the CACCON initiative led by Don Forbes and Trevor Bell, and the PPP-SERA project. Coordination with such efforts is crucial to work that takes place in the North and is recognized and embraced as a foundational element of the YOPP initiative.

Timelines

Location	Latitude	Longitude	Start date	End date	Activity
Tutkoyaktuk	69.4454° N	133.0342° W	2017-07-01	2018-07-25	Two meetings with existing Oversight committee, one in 2017 to select research assistant (RA) and one in 2018 as a follow up activity. Ongoing weekly/biweekly calls with with RA will take place during the duration of the project.
Ulukhaktok	70.7368° N	117.7704° W	2017-07-01	2018-07-25	Two meetings with existing Oversight committee, one in 2017 to select research assistant (RA) and one in 2018 as a follow up activity. Ongoing weekly/biweekly calls with with RA will take place during the duration of the project.

Location	Latitude	Longitude	Start date	End date	Activity
Sachs Harbour	71.9851° N	125.2465° W	2017-07-01	2018-07-25	Two meetings with existing Oversight committee, one in 2017 to select research assistant (RA) and one in 2018 as a follow up activity. Ongoing weekly/biweekly calls with with RA will take place during the duration of the project.
Inuvik	68.3607° N	133.7230° W	2017-07-01	2018-07-25	Two meetings with staff at the Inuvialuit Regional Corporation, one in 2017 to select research assistant (RA) and one in 2018 as a follow up activity. Ongoing weekly/biweekly calls with with RA will take place during the duration of the project.