Making Waves

Maritime Domain Awareness Afloat: An Exciting CCG Pilot Study
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The Canadian Coast Guard (CCG) embarked on an innovative and important maritime domain awareness (MDA) pilot study this summer (2023) in the Arctic. MDA Afloat is a mobile MDA module 'in a box' that was carried on CCGS *Henry Larsen* for 28 days in the Northwest Passage.

The CCG is essential to contributing MDA to the federal government's Arctic maritime operating picture via the Marine Security Operations Centre in Halifax. MDA mostly focuses on vessels of interest, i.e., vessels and maritime activity that could adversely affect safety, the economy, or the environment.[1] The CCG has an expansive mandate which includes maritime search and rescue, aids to navigation, marine communications and traffic services, icebreaking services, as well as primary responsibility for oil spill cleanup in the Arctic when the polluter is not known, unwilling or unable to assist. Therefore, having adequate situational awareness is critical. The CCG spends June to November in Canada's Arctic and is on the watch for general traffic, hazards and vessels of interest to add to its maritime picture. The CCG realized that it was communicating this information largely internally or with other government departments, but not in real time and not *in situ*. There has always been a missing link of communication to local Arctic communities by federal agencies as to what is transpiring in the Arctic. MDA Afloat could change this soon.

One of the chief complaints of local hamlets has been that they are often not informed of impending cruise ship visits or other maritime activity that affects them. There are some exciting shore-side Automatic Identification System (AIS) projects in several Arctic hamlets as part of the Inuit Marine Monitoring Program (IMMP) but there is information that the CCG collects that may be helpful for communities because the CCG has considerable range in the Arctic and returns every summer which means it has access to legacy data as well.[2] Likewise, the local hamlets may have information on vessels, pollution spills or maritime activity that could be passed along to the CCG. Establishing communication between Arctic hamlets and the CCG is therefore one of the future goals. MDA Afloat is a stepping stone to that goal.

Credit: Canadian Coast Guard

CCGS **Henry Larsen** escorts the ferry **Qajaq W** in the Strait of Belle Isle, March 2022.

The pilot study, in the meantime, is baselining the data CCG collects, including footage from remotely piloted aerial vehicles (drones), Interdepartmental Maritime Integrated Command, Control and Communications (IM-IC3) systems and fusing it with other data sets using artificial intelligence to create an operating picture in real time.

This pilot study is essential for two reasons. First, it responds to harsh criticism by the Auditor-General's (AG) office in its 2022 "Arctic Waters Surveillance" Report. The Auditor-General lamented the fact that the federal government had not addressed longstanding issues that affect the surveillance of Canada's Arctic coastline.[3] While not a CCG-only function, the report noted that "federal organizations responsible for safety and security in the Arctic region do not have a full awareness of maritime activities in Arctic waters and are not ready to respond to increased surveillance requirements."[4]

Second, MDA Afloat may help address some of the gaps identified by a working group in 2011. The three major ones include:

1. limited capabilities to build a complete and uninterrupted picture of ship traffic in a region as remote as the Arctic;
2. the inability to track, monitor and identify non-emitting vessels reliably, notably small vessels and those not complying or carrying tracking equipment; and
3. challenges sharing information among organizations.[5]

Part of the problem is that maritime traffic is mostly monitored remotely and federal agencies are highly dependent on AIS on ships which require satellites to relay the information. Small ships are not required to have AIS and many hazards can arise that require eyes on them to know they exist. These concerns were echoed in a 2023 Senate report "Arctic Security Under Threat: Urgent Needs in a Geopolitical and Environmental Landscape."[6]
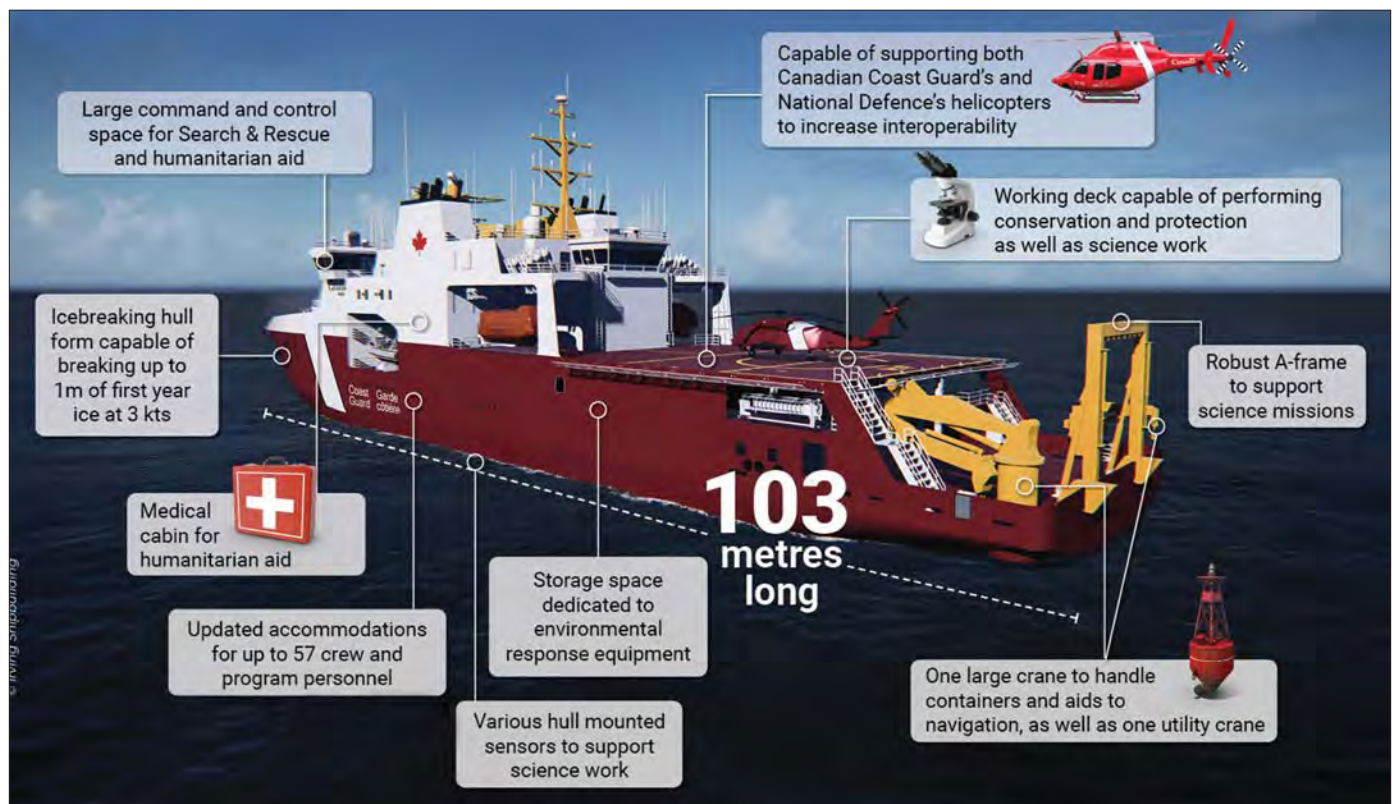
That is why MDA Afloat is such a novel idea; the CCG will be providing information in situ and in real time. Stage 2 of the pilot study will be to identify and articulate the sensor and information deficiencies that will inform future requirements. This study is coming at a propitious time as CCG fleet renewal has been budgeted and there is time to influence new ship designs. And, as this pilot study is testing a modular system, it could be modified for the Arctic and Offshore Patrol Ships which are well past the design stage.

In the future, assuming the CCG continues to have four or five ships in the Arctic at any time in the summer, an MDA Afloat-like capability on every ship would be a considerable sensing multiplier. It also means that rather than ships being narrowly concerned with their location relative to other ships, they can contribute to a real-time maritime picture instead of waiting for one to be collated at the Marine Security Operations Centre based in Halifax responsible for the Arctic picture. The next step is to feed information from ashore to ashore.

Help may be in hand. Transport Canada and the CCG have a web-based portal that resulted from the Oceans Protection Plan. The Enhanced Maritime Situational Awareness (EMSA) portal tool was co-developed with Indigenous communities and industry to provide near real-time information on vessel activity and other marine environmental information in local waters through a user-friendly web platform. Importantly, local knowledge is one of the sources of information.

If MDA Afloat can improve the domain awareness for the CCG and provide a real-time picture which could be shared via an EMSA-like portal and include IMMP data, Arctic maritime domain awareness should improve and could be used not only by other federal agencies but local hamlets and vessels that are nearby and agree to assist with the collection of information.

Of course, there are challenges ahead including the perennial communication challenges in the Arctic which are only partly solved with Starlink, a satellite internet service provider. There is also the matter of the size of Canada's Arctic coastline which is more than 162,000 kilometres or 75% of Canada's total coastline. Nevertheless, built in and/or modular MDA Afloat systems onboard more ships could help close the MDA gap. The CCG is to be commended for thinking outside the usual information-sharing box to the future benefit of local Arctic residents and better situational awareness. We should all look forward to the results of this important pilot study.

Credit: Canadian Coast Guard

Large command and control space for Search & Rescue and humanitarian aid

Capable of supporting both Canadian Coast Guard's and National Defence's helicopters to increase interoperability

Working deck capable of performing conservation and protection as well as science work

Icebreaking hull form capable of breaking up to 1m of first year ice at 3 kts

Robust A-frame to support science missions

Medical cabin for humanitarian aid

103 metres long

Updated accommodations for up to 57 crew and program personnel

Storage space dedicated to environmental response equipment

One large crane to handle containers and aids to navigation, as well as one utility crane

Various hull mounted sensors to support science work

Infographic accompanying steel-cutting ceremony for the first of two Canadian Coast Guard variant of the Arctic and Offshore Patrol Ship.

Infographic describing the Enhanced Maritime Situational Awareness System.

Notes

1. A Vessel of Interest (VOI) is a vessel of potential police, defence/security or intelligence value as a result of its registry, cargo, route, behaviour, or activities.
2. For information on the Inuit Marine Monitoring Program (IMMP) see https://immp.tunngavik.com/files/2017/09/AIS_HTO_2.pdf. AIS information can provide the name of the vessel, its identification number and radio call sign; the type of vessel and its cargo; its navigation status (at anchor, under way using engine(s), not under command, etc.); its position, speed, heading and destination; the dimensions and draught of the ship. However, the range of these AIS shore systems is limited.
3. Office of the Auditor-General of Canada, "Report 6: Arctic Waters Surveillance," 2022.
4. *Ibid.*, paragraph 6.12.
5. *Ibid.*, paragraph 6.23.
6. Senate of Canada, "Arctic Security Under Threat: Urgent Needs in a Geopolitical and Environmental Landscape," 44th Parliament, 1st Session, July 2023.
7. See Government of Canada, Transport Canada, "Expanding the Enhanced Maritime Situational Awareness Program," 2019.