ARHC7-C.1b

Seventh Meeting of the Arctic Regional Hydrographic Commission (ARHC)

Ilulissat, Greenland, Denmark – 22-24 August 2017

Report of the Operations and Technology Working Group: Autonomous Vehicles

Submitted by: United States

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Executive Summary: The ARHC-6 tasked the OTWG to develop a discussion paper on autonomous

vehicles in the Arctic. A number of the member states have projects related to unmanned vehicles, and we expect that significant operational progress will be made in the next year. We recommend the OTWG collaborate on these projects and report out on their progress to the OTWG

Related Documents:

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**Introduction**

This report addresses the status of Action ARHC6-12 “*OTWG to provide ARHC7 with a discussion paper on autonomous vehicles vis-à-vis Arctic applications*.” We do not present a paper, but do report on current activities, which we expect to significantly advance in the next year.

**Current Status**

Following ARHC-6, the OTWG compiled the following input from the member states activities for unmanned vehicle work relevant to the Arctic.

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| Canada | The Canadian Hydrographic Service (CHS) has just recently procured two small ASV vehicles – CHS considered these developmental but indeed see the Arctic as an appropriate area for use, specifically as a force multiplier tool to augment surveys. CHS also has a project to convert a hydrographic survey launch to an optionally unmanned configuration.  |
| Denmark | The Danish Maritime Authority in cooperation with the DTU, has developed a pre-analysis that is intended as an inspiration for possible projects that may support the development of autonomous ships. See Appendix I (a).  Denmark’s next step is continued cooperation between the DTU and the Danish Maritime Authority on an electronic lookout project. Sensor technology opens up for new possibilities as regards ships' design, arrangement and mode of operation and, consequently, the project will, inter alia, concern testing, safety, the handling of defects, etc. |
| Norway | The Norwegian Hydrographic Service has little experiences with autonomous vehicles in the Arctic to date. They are, however, cooperating with the Norwegian company Maritime Robotics and NTNU AMOS (Centre for Autonomous Marine Operations and Systems at the Norwegian University of Technology) where they are looking at applying autonomous vehicles as a supplement to our ordinary survey vessels. One test was done with a “jetyak” in Kongsfjorden at Svalbard in January. From a mapping perspective, this was not a success, mainly due to the attitude sensor’s limited ability to compensate for the rapid movements of this very small vessel. Another test with two other unmanned vessels at the Norwegian Mainland is also completed, but the evaluation is not complete.Reference Document Shared with the Working Group: “A Pre-analysis on autonomous Ships” |
| Russian Federation | The Russian Federation has not reported to the OTWG on work on unmanned systems.  |
| USA | NOAA has developed a strategy for unmanned systems for mapping work generally and has operationally fielded man-portable systems. Like CHS, NOAA has an active project to convert manned survey platforms to an optionally manned configuration, and sees the Arctic as one theater where unmanned systems may be particularly effective. Production surveys in the U.S. Arctic have bene accomplished using unmanned systems through NOAA contract surveys in 2016-2017.Reference Document Shared with the Working Group:* “Office of Coast Survey Automation and Autonomous Systems Strategy” (April 2017)
* “Autonomous Systems Strategy Flier” (June 2017)
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As the technology for operating autonomous vehicles (including underwater, surface, and airborne) and the experience base of operations in the Arctic are still in early stages of research, testing and development, a discussion paper on the use of autonomous vehicles vis a vis Arctic applications is very limited at this time.

However, information provided by OTWG members since ARHC-6 does indicate that a number of participant have active projects in the prototype or early deployment stages and that this subject is an active area of interest. The U.S. unmanned systems strategy may provide a framework for discussion an further collaboration.

**Recommendation**

The OTWG recommends the ARHC discuss the current status of ARHC6-12 and offer guidance for the upcoming year.

The chair is willing to continue the effort to identify, collect, and assemble case study information for the development of discussion paper for ARHC-8 if the group decides to continue dialogue and information sharing on this topic.