



October 22, 2020

Arctic Regional Hydrographic Commission Minutes of the 10th Conference

For the 10th Arctic Regional Hydrographic Commission Conference (ARHC-10)
13-14 August 2020, Virtual via Google Meets

Participant list and materials: <https://iho.int/en/arhc10-2020>

Thursday, August 13, 2020

A. Introduction and Administrative

A.1 Opening of the Conference, A.2 Welcome from the host, and A.3 Adoption of the agenda

RDML Shepard Smith (U.S., ARHC Chair) opened the virtual meeting and observed that the participation reflected quorum. RDML Smith conveyed the warm wishes and regrets of the Russian Federation on the convening of the important ARHC meeting. The Chair noted the valued participation of the IHO Secretary General and IHO Secretariat’s Assistant Director.

A.4 Review of ARHC9 (minutes and actions)

Mr. Jonathan Justi (U.S.) noted the review of actions included those from ARHC-9 and ARHC-VTC01. Some actions were updated at ARHC-VTC01, so the current review would not focus on those already reported completed. Mr. Justi expressed appreciation to those who had reported action status prior to the meeting and that some actions were addressed in the scope of the ARHC-10 agenda, through working group reports and through agenda items.

Regarding ARHC9-01, updating the ARHC Statutes, four out of the five ARHC full members had a VTC meeting on June 18, 2020 to address this action. Extensive notes of the conversation were taken and sent to the Russian Federation for input as they had been unable to attend the VTC. Another meeting of the five full members with the IHO Secretariat will be scheduled tentatively in September 2020, date to be determined, to discuss the way ahead.

Participants called for the creation of a summary paragraph for the ARHC website at <https://iho.int/en/arctic-rhc> - possibly derived from the Statutes - and development of a calendar of ARHC-relevant meetings for the upcoming year. See Annex D for the initial calendar developed during the meeting.

After reviewing the actions in the limited time allotted, Mr. Justi requested participants to provide any updates or corrections by correspondence following the meeting (jonathan.justi@noaa.gov).

Action ARHC10/01 ARHC Chair to pursue follow-up Statutes VTC of the five members and the IHO Secretariat as soon as practical and take appropriate subsequent steps

Action ARHC10/02 U.S. and CA to lead drafting team of ARHC to develop:

- a) a history summary for the IHO ARHC website (<https://iho.int/en/arctic-rhc>)
b) an ARHC relevant events calendar

A.5 Sharing views of goals, key decision, and outcomes for ARHC-10

Dr. Geneviève Béchar (CA) called for a need to consider next steps when articulating risk when navigating in the Arctic. Participants agreed to review and revisit the standing cautionary notice¹ developed in 2017 when the Polar Code was issued. In addition, as MSDI matures, geospatial visualization tools are being put together. How can we communicate risk visually, for groundings in the Arctic for example? Stakeholders do not necessarily interpret risk as hydrographers do. *CATZOC is the way to communicate risk visually.*

Mr. Evert Flier (NO) added two items--when we have our 10th Antarctic Hydrographic Commission (HCA) in Prague, combined with Antarctic Treaty Consultative Meeting (ATCM), we managed to get resolution on research vessels operating in the area to collect and contribute data. We have good contact with the Arctic Council who also works with the shipping industry. With the Emergency Prevention and Preparedness Response group (EPPR), can we achieve something similar? The Arctic Council and the ATCM are different, yet, can we get a statement from the Arctic Council, such as instruction to their research agencies to collect hydrographic data?

The UN Decade of Ocean Science presents a great opportunity for the IHO and Hydrographic Offices (HOs) to gain recognition contributing to ocean science in the coming decade. The Arctic as a region is even more so research focused than many. The IHO community has a big role to play. How can “we” as an Arctic community contribute to that?

Ms. Pia Dahl Højgaard Pia (DK) agreed. We could wish for better cooperation with others outside our community in regards to collection of data on the sea bottom, which make products available for safe navigation. We should make what we are doing more widely known. How can we cooperate with others, and highlight where we can cooperate with each other? Paper charts--what to do? Submission of HSCC papers is another opportunity. We can cooperate on how we get the data--crowd sourcing, for example, and how we present the data--ENC scheming for example.

Mr. Yves Guillam (IHO) noted the cautionary notice on navigating in the Arctic developed in 2017 in conjunction with the IMO Polar Code (see footnote 1). The ARHC should reconsider this notice and give it more publicity using graphics, noting the quality of data available, etc. (note Action ARHC10/05 below). The notice is now outdated.

B. IHO and National Reports

Action ARHC10/03 Explore, draft, vet, and take appropriate steps to develop an “ARHC Year in Review” report similar to ARHC_VTC01_2020_02F Rev

B.1 IHO Secretariat’s Report

Dr. Mathias Jonas (Secretary-General, IHO) updated the ARHC on Member State voting on proposals adopted by correspondence, such as the IHO resolution on RHCs (see IHO Resolution 2/1997 on the Establishment of RHCs, for example). Dr. Jonas noted the formation of the new Council and that the ARHC hydrographic offices have a strong presence in the Council. The new Council Chair/Vice Chair will be nominated and voted on by correspondence.

¹ See <https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/ARHC/MISC/Notice%20on%20caution%20required%20when%20using%20nautical%20charts%20in%20Arctic%20waters3.pdf>

The ARHC is very promising regarding ENC re-scheming goals, which will help in the transition to S-101 and WEND 100.

The IHO can be ‘helpers’ in the UN Decade of Ocean Science--we are the engineers, we can contribute to the aspirations of the "ocean we want"--clean, healthy, predicted, safe, sustainable, transparent. How to realize this and bring to action? The IHO has submitted comments to the most recent Draft Implementation Plan. Now the plan is ready for approval in September 2020 at the UN General Assembly. Dr. Jonas introduced the structure of the plan and highlighted Part 2, framework for design and implementation of actions. How do we contribute?

The four objectives were noted. The roles of the IHO and hydrography’s relevance and types of contributions was raised. Integrating local knowledge--RHCs can provide important insight for science to action. IHO is the authority on ENC and navigation--we can predict human/environment interaction. We need to make better use of what we have and advertise for the next generation of ENCs, AIS, and standardized data combined under the S-100 framework. Technology and engineering is underestimated in the UN Decade process, as the focus is still about science but not enough about technology and engineering.

Action ARHC10/04 Prospective IHO Council members from ARHC to consider if and how issues of the Arctic Region of interest for the IHO may be included into the Council programme of work

B.2 National Report of Canada

Dr. Geneviève Bécharde (CA) introduced the CA delegation. Executive positions within the CHS are now all fully staffed. HQ has been reorganized with Louis Malthais overseeing all navigation products and services and Chris Hemmingway overseeing “Blue Economy.” The new alignment mirrors IHO strategic directions.

CHS is in year one of a ten year digital transformation program which will require staff training/retraining. The timeline allows CHS to structure the transition. MSDI went live last fall, and last year, Canada started an interdepartmental working group to coordinate with agencies sharing responsibility for S-100 elements.

New ships and the retrofitting of ships to establish/expand multi-beam capacity is underway.

CHS funding increases have led to contracts and more surveying. Survey priorities in the Arctic focus on primary traffic corridors.

Regarding 2020 impacts, CHS has had to rethink work in the Arctic. Arctic communities have asked outsiders not to enter their communities. This presents some resupply challenges. CHS is working on a hydrographic surveys path forward focusing only on multi-beam surveys, and not utilizing small launches. There will be smaller crews on ship. CHS is testing some autonomous technologies for demonstration projects next summer. CHS anticipates a pan-Atlantic survey with Sairdron and the U.S. next year.

CHS is prioritizing ENCs over paper in the Arctic, including increased production of ENCs. In the past, there were more paper charts but now CHS is digitizing to ENCs.

A dynamic surface currents project service was released during summer 2020. It is available nationally for the whole of CA. CHS will start seeing many more standards being displayed, and MSDI will be the platform for non-navigable use and propagation.

CHS is accelerating digital transformation. In four to five years, CHS hopes to have a plan to complete surveying in CA.

MSDI is being used to support emergency response applications. CHS is looking at dynamically changing localities and where the agency can provide digital services and technologies rather than charts- because perhaps the chart is “not so up-to-date” with changing conditions.

Action ARHC10/05 Canada to update the Arctic Navigation Risk ‘standing cautionary notice’ developed previously in 2017 with relation to the Polar Code. Consider visualization of risk in communicating dangers (CATZOC compilation, OTWG Risk Assessment, etc.)

B.3 National Report of Denmark

Ms. Pia Dahl Højgaard (DK) explained that Nielsen Tvilling Larsen (Niels) has taken over for Rune who has left the agency. Niels is handling Greenland chart production which itself touches the very big task of surveying in Greenland. DK has done a lot this year and has exceeded performance targets. DK has been able to get a crew to Greenland and conduct surveys. A challenge remains, to get the survey data out to the navigators. DK is working on "Basis ENC"--how do we produce ENCs that don't have data for an entire area, but where we do have data in navigable areas? This effort is under development in the production flow.

Greenland Chart Ambassadors increase awareness of navigation safety issues. We hope to get this started over the summer 2020. Regarding ARHC-9 Action 25--what are DK plans for paper charts--answer: still in the process of defining plans.

B.4 National Report of Norway

Mr. Evert Flier (NO) began by noting COVID impacts. A new nautical chart authority has been established and is staffed. NO's digital nautical publication is up and operational with a web version available on apps and tablets. Harbors and municipalities are now responsible for updating their own information directly.

A three year pilot project between coastal municipalities and Norwegian government for new surveys and making new products available has been launched and has been well received. The new plan and vision for Norwegian Hydrographic Service is: "Norwegian waters shall have the world's most usable and dynamic geographic data."

Mr. Flier reviewed surveys that were completed in 2019.

Regarding proposed routings for ships, the coastal administration proposed this last year, so they needed to go into those areas and do surveys in smaller spots. We will see more of this in the future.

The MAREANO survey of North Sea and Berent Sea has collected 69,000sq km of data, and all data goes to DCDB.

NO is the Seabed 2030 and CSB coordinator for the ARHC. Regarding the current status of Seabed 2030 data in NO waters (based on NHS data), 63 percent of NO waters have been mapped and provided to DCDB, with 33 percent made publicly available (a five percent increase). If Olex data is included, that figure could be more.

Since 2018, 95,587sq km of multi-beam data has been collected.

The potential for CSB in NO waters is limited, as ships largely remain on established routes. Mostly scientific ships would be the ones to go to places where CSB could be a valuable contribution. Saldrones and unmanned vehicles are also potential contributors of new data in under surveyed waters.

The Seismic Survey Company PGS and Seabed 2030 signed an agreement recently. Seabed 2030 has engaged with RevOcean, a project with a Norwegian billionaire who is building a 180 meter research vessel. This is the

largest such vessel in the world. NO has also established an international high-level panel on sustainable ocean economy with 14 world leaders.

Ms. Birte Noer Borrevik (NO) noted the ten year transformation highlighted in the CA National Report. NO is focusing on the same kind of transition.

Action ARHC10/06 Noting the current developments by NIPWG, NO to organize follow up meeting and correspondence with interested hydrographic offices on innovations regarding Sailing Directions as discussed during ARHC-10

B.5 National Report of the Russian Federation

A National Report was not submitted on behalf of the Russian Federation. RU conveys regrets, and is working to get approval to participate in future VTCs. RU conveyed by correspondence its best wishes and regrets which were relayed at the start of the meeting and again noted by the chair.

B.6 National Reports of the United States of America

RDML Shepard Smith (U.S., ARHC Chair) presented that there is no change in U.S. hydrographic leadership at present but change is coming: NOAA OCS Director and Deputy Director positions will likely change over the upcoming months and year.

The ENC re-scheming status in Alaska was presented.

A brief introduction of a U.S.-CA-DK sponsored paper to the HSSC paper was offered. The main theme of the paper is a way forward to produce paper from ENC data as source. The paper authors are looking for guidance on this from NCWG. The paper is close to final, and will be submitted very shortly.

The ENC overlap with Russia was noted with RU ENCs in U.S. EEZ, but RU charts are at larger coverage. Until the U.S. builds up its charts in the area, in the interest of safety of navigation, the charts from Russia will be available.

Concerning an ENC regional plan, if we wish to have full coverage at Bands 1-3, we could divide up responsibility across the region.

Yves Guillam (IHO) reminded that these ENC regional plans for scheming should be prepared by the AICCWG as they fall under S-11 Part A (coordination between countries and transition plans to be addressed) for final decision and approval at ARHC Conferences.

Since a November, 2019 Presidential Memorandum was released, two important plans have been developed in the U.S. and were noted. The US expects to see budget initiatives to support these. One plan, "Mapping the Coast of Alaska: A Ten Year Strategy (June 2020)," should result in the improvement of data in coastal areas. The National Strategy for Mapping, Exploring and Characterizing the United States EEZ (June 2020)" (or NOMECE Strategy), is a White House level strategy. RDML Smith was one of the co-authors on this significant interagency effort. The focus is now to develop an implementation plan.

V-datum update 4.0.1 was released in October 2019. This supports tidal datum transformations for Southeast Alaska.

Finally, RDML Smith extended the invitation to participants to sign up online to receive a Coast Survey quarterly newsletter (see ARHC10-B6). The newsletter provides a digest of articles written and includes topics of navigation, survey, geodesy, tides, and others that hydrographic offices may find of interest.

B.7 National Report of Finland

Mr. Rainer Mustaniemi (FI) noted that FI has no real responsibility for surveying or charting in the Arctic. For information of activities that Finland does conduct aside from Arctic waters, please see the Baltic and Nordic Regional Hydrographic Commission meeting sites. One challenge being addressed now is converting datums to new datums, and harmonizing those with other Baltic states. There are limited resources to undertake this work. A new data management and chart production system just become operational. 1000 personnel have all been working remotely from home since April, 2020, and this will continue for now.

B.8 National Report of Iceland

Mr. Árni Vésteinsson (IC) noted that some retirements have taken place in the organization. With the addition of two new employees (a surveyor and a cartographer) to the small office, the staff has increased by 1/3 (from six to eight). Shallow waters are of particular focus at present--two large bays in west IC. Some work in Breiðafjörður is now put on hold (2017-19)--this is a passenger ferry area and the office feels the charting is good. A focus now is on Vestfirir, and the survey plan has started to be executed. There are un-surveyed fjords, at least four or five, in Isafjarórdjúp, and the plan is to survey these. Aquaculture and marine farming are growing in the area, providing an important local source of employment. Mr. Vésteinsson showed terminal moraines in two fjords, which is fascinating from a geological perspective. Future survey plans will focus on the northern western area. IC would like to see a plan that takes into consideration all aspects of navigational safety.

B.9 National Report of Italy

RDML Massimiliano Nannini (IT) noted that the Italian hydrographic ship involved in High North expedition pulled into harbor yesterday. The project has achieved its main goal, fully surveying and charting the target areas and 3d modeling the site. The deepest point of the surveyed area "hole" is over 5000 meters making this the deepest point of Arctic ocean now known. Generally, weather conditions were good and coverage has been good.

IT has been extensively discussing internally its role in Arctic. A multi-year plan for the Arctic has been approved and will span at least another three years. IT is very keen and happy to share data collected. This is especially important for a nation that is not an "Arctic Nation." Finally, the new national hydrographer, RDML Nannini, assumed position of Director of the hydrographic office as of summer 2020.

Discussion

RDML Smith expressed interest in the NO description regarding Sailing Directions and the fundamental way this is being changed in terms of distribution. Is there international guidance on next generation distribution of Sailing Directions?

Ms. Borrevik noted that the NO pilot is available through the online pilot guide. When planning a route from one location to another, a proposed route will come up as your first option.

Mr. Flier noted the fundamental change. Previously an annual expedition to gather information and make pictures of ports, etc., which is very demanding, led to only one update per seven years for each nautical book. This was "not very acceptable." Now, the coastal municipalities are responsible to contribute to nautical publications directly, which actually saves resources on one hand and provides a better product to the user.

Mr. Yves Guillam (IHO) noted that the project was introduced to NIWG last year, and that it is innovative. Data is collected and pushed forward at the local level, and at the same time new product specifications are under the S-100 framework. It is important not to create a divergence (among hydrographic offices and national approaches) but rather convergence of this digital nautical publication work into the future.

Ms. Borrevik observed that in light of COVID, NO received quite a lot of funding to contract private companies. Funding levels are beyond those expected. Two projects are linked to nautical pubs: 1) data of onshore facilities in harbors, and 2) support for the use of private companies to survey harbors and produce S-102 data. Flagship harbors are selected in hopes to inspire other harbors. One showcase uses S-102 data and onshore data from harbors. A NO oil company used S-102 to take a large crane into harbor and lift directly onto the barge. More than 1 million U.S. dollars was saved as a result of this operation and use of the S-102 data. Without S-102, they wouldn't have been able to do this. See a Youtube video [here](#). Now a private company is telling the story of how the hydrographic community is generating value and money.

Dr. B  chard asked a question about engagement related to sailing directions or MAIR project. How do you engage folks without a lot of examples initially? Is it hard to attract partners at first?

NO is now making efforts to generate those examples. With land mapping and hydrography in the same organization, NO is lucky to be able to use each other as ambassadors to tell stories and show interesting examples, and it is now picking up momentum.

Mr. Guillam noted that the chair of The International Harbour Masters Association (IHMA) participates in NIPWG meetings, which is developing new product specifications for "harbors."

Building on the DK report and "Basis ENC," DK is leading on getting those simplified ENC's out. Is this an interim step to having continuous maintenance of ENC's, or is this something that will continue for decades? How is your strategy built and where will you be going?

Mr. Jens Peter Hartmann (DK) responded that the Basis ENC now produced and distributed is an official ENC. For end users, it is an ENC that will be updated as an ENC. As more data becomes available, the Basis ENC will be built into an ENC.

Dr. B  chard noted this is a solution that CA can adopt as well, since CA also has many gaps also.

Mr. Chris Mathews (CA) expressed an eagerness to follow up with colleagues from DK, as CA has similar approaches looking at "Phase 1 ENC's" with limited data/legacy soundings/shorelines etc. Officially, these are ENC's meeting the S-57 specification. The idea is also when additional data becomes available, the new data can more easily be incorporated into the ENC. The effort is still quite labor intensive to get to "Phase 1."

Mr. Hartmann added that ARHC had a similar discussion in Greenland (Illusiat) at ARHC-7 (2017). NOAA also has preliminary ENC's--it is a good way to get survey data to the mariner more quickly.

RDML Smith noted that the more NOAA looked into this practice, we realized all of our ENC's are "incomplete." For example, we discovered there are un-surveyed areas in all our charts, for example the center of New York harbor.

Mr. Doug Brunt (CA) noted in the early days of ENC, CHS took this approach using the term "provisional ENC" which contained basic features--shoreline, 2-5-10 meter contour, etc. Regarding developing specifications for these "types" of ENC's (whether Basic, Provisional, Preliminary, etc.) maybe we want to make these consistent.

Mr. Guillam expressed a note of caution and concern: if the ARHC starts developing something specific, make sure that the ENC is compliant with the standard. Is the ENC sufficient for safe navigation? If there is a need to develop something specific missing in the current S-57 and S-101 standard it must be reported to the relevant IHO WGs to ensure that it remains compliant to SOLAS? Based on experience in Antarctica, there are liability issues.

Mr. Hartmann noted that when DK started the pilot project, they were very keen to make sure "Simple ENCs" followed the S-57 specification in order that Simple ENCs could be used in ECDIS system.

Mr. John Nyberg (U.S.) noted the last "preliminary product" NOAA released was in the Yukon River (Alaska) several years ago. This ENC used satellite bathymetry and nothing like that has been done since 2015 or so. Regarding the New York survey, highlighting un-surveyed areas in the chart, while it is "the right thing" to do, the verdict isn't out yet. We need to see what the customer says. When the soundings are removed from the chart, we will have to see what the reaction is. Users may have a false sense of security now.

Mr. Hartmann highlighted one more item: how long can a HO keep a survey until it is available for end user? One, two, three years? Data needs to be made available to the end user as soon as possible.

Mr. Guillam conveyed experiences of France. SHOM had a performance metric to get surveys processed to the time the information reaches chart or end user. Different standards are "fit for purpose" otherwise they have to be changed.

Dr. Jonas noted that the product must be safe for the mariner. The liability is on ENCs.

Ms. Højgaard noted this was a very important discussion and maybe it is difficult to explain what a Basis ENC is. It is the information that follows the standards, but there are areas where we don't have data. It is better than having nothing to share. This will be presented in tomorrow's presentation.

Mr. Hartmann noted for DK that before Basis ENCs are released, they have meetings with mariners and all users and stakeholders in Greenland and the Danish Maritime Authority to discuss the issues.

Mr. Brunt returned to the UN Decade of Ocean Science, noting Member States can really contribute to this effort. We, as an ARHC, should develop further ideas within this group. There is an assumption that HO's all act together and have all this data. We still need to contribute and work together.

Dr. Bécharde noted the need to connect and communicate the relationship of Basic ENCs and risk.

C. Maintaining IHO Momentum during COVID-19

C.1 IRCC—status update and plans

Mr. John Nyberg (U.S.) noted developments from a Member State perspective on the drivers and issues currently before the IRCC. The summary presented was developed in concert with IRCC Chair and Member State contributors. Mr. Nyberg highlighted three elements: 1) MSDI, 2) CB and 3) CSB.

MSDI is taking a regional national approach, but needs local applications as well. Mr. Nyberg noted powerful standards--climate change, natural disasters, marine resources, wind energy, etc., working closely with UNGGIM and MSDIWG. There is also a focus on data spanning the land/sea interface.

NO is taking over the work at CBSC. A challenge is capacity building for HOs moving to a digital world.

Mr. Evert Flier (NO) noted the CB Budget is very constrained. Korea and Japan contributions are earmarked. COVID and e-learning has promise, but takes resources to build and maintain. The incoming CSB Chair welcomed the initiative of an IHO e-learning center.

C.2 HSSC—status update and plans

Ms. Julia Powell (U.S.) reported the status of S-100 during this interesting time, and highlighted the S-100 roadmap. 2024 remains the target for S-101 ENC's production commencement. S-100 edition 5 is delayed to 2022 to give time to align S-10X to support the S-101.

The S-98 interoperability specification is fundamental. The key is it has been scoped down to support situational awareness for route planning and route monitoring.

The role of IMO is critical and requires much coordination. Updating ECDIS performance standards--most of the technical work will be at the IHO, but a key thing is stakeholder engagements on the user and producer side. How to show the user that S100 is really a good thing? Show how it leads to better decision-making? CIRM is the big industry body to help push this forward through IMO, proposing phase-in starts in 2024 and then becomes mandatory after 2028.

DF-ECDIS: Dual Fuel ECDIS is a big concept coming in. What is the definition of Dual Fuel ECDIS? "Fundamentals" and "principles" outlined in the pot.

C.3 Council—status update and plans and C.4 Assembly—status and plans

The status and role of the Council remains a moving target. The Council remains in effect until the new Council (C-4) is stood up after the second Assembly (A-2). The Council did reopen discussions of the draft IHO Strategic Plan and performance review following the delay of A-2 from spring to November. This review continues at the present time.

Dr. Mathias Jonas (IHO) offered reflections on the IRCC and HSSC. When the COVID outbreak happened, the Secretariat held serious concerns of functioning of the IHO machine. The basic work of the Secretariat is to coordinate support to the working groups and commissions, etc. Dr. Jonas extended compliments to ARHC participants who are staying engaged and progressing work.

A second charge of the IHO Secretariat is to represent the HOs on IALA, IMO, and other intergovernmental organizations. IMO is a focal point of attention as it responds to COVID and its decision making process. This creates a number of uncertainties with regard to S-100. It is difficult to see how those processes will continue when the IMO comes back. The IMO Council was held by correspondence from May to early August.

Ironically the pandemic has been an accelerator for the IHO community as illustrated by efforts in e-learning and MSDI. The IHO has started to adapt to the situation. New leadership has come in—Mr. Evert Flier (NO) to CBSC Chair, RDML Luigi Sinapi (IT) to come in as new IHO Director and to take over support to IRCC and CBSC. There is a new team of support to the IRCC.

The Council has been a positive force demonstrated through a good working relationship between Member States and the Secretariat. One important point is that humans have to meet personally. This is fundamental in the case for international organizations. We share different languages, cultural, time zones, etc.

The IHO Secretariat plan for HSSC and IRCC was to have hybrid meetings. Up until June/July, the IHO Secretariat was optimistic. This is the same for A-2 and Council rescheduled to convene in November. The Secretariat was hoping it could work in November. Now, in August, it will not be possible. For example, there are

no airline flights available in some places of the globe. The firm decision will be made in mid-August. If A-2 and C-4 are made to proceed as virtual meetings, certain difficulties will arise. A virtual meeting is not an option in the IHO Convention nor in the Rules of Procedure. The Secretariat has a duty to provide four working languages. Additional questions--how to establish quorum? How to vote? A virtual A-2 meeting would expectedly involve 200 to 300 people across multiple time zones.

The incoming membership is known for Council-4 (see [ACL 28/2020](#)). RDML Smith as Council Chair is fortunately available to continue until transition to the new Council Chair. The IHO proposes to elect the new Chair/Vice Chair in advance of Council. RDML Smith, as current Council Chair, would present achievements of Council which, in the opinion of the Secretary General, is a remarkable list. Nominations for new Chair/Vice are still open.

Mr. Guillam observed that no one can guarantee a physical meeting would even be possible next year (2021).

RDML Smith noted that we all want to support the IHO, IRCC, HSSC, etc. and get through this. We, as a community and an organization, can be even more nimble coming out of pandemic than before.

RDML Smith observed that nine months ago, we had grand plans and a good idea of how to accomplish them. Which elements of that are in greatest jeopardy now? There are interdependencies among elements in those plans.

Dr. Jonas expressed the relationship and decision-making process with the IMO is his biggest concern. The future of S-101 is unclear in the pandemic.

Ms. Powell noted the lack of face-to-face meetings will start to hurt the functioning of the work plan. Maintaining previously established timelines will get harder. There are very complicated technical matters that need to be worked through. If no face-to-face meetings can occur by June 2021, big impacts will start to be felt. Not getting to IMO will hurt the grand plan. IEC is onboard. OEM's are on board. We are on board.

The community needs to message that S-100 saves organizations money--how do we make an economic case for our work?

Dr. Bécharde expressed her primary concern if there are no face-to-face meetings, a big disconnect could develop among countries. There may be bilateral efforts to ensure we connect with affected countries, for example in the area of capacity building. Accelerating innovation is an opportunity where the hydrographic community may help some partners "skip" unnecessary steps and go to directly where we want to end up. We should make the most of lessons learned. There is a risk of disconnect where some countries are advancing and some are not.

Mr. Flier noted the situation goes both ways. With virtual meetings, we can have more people can attend. Numbers may increase but we need key participants.

Mr. Guillam noted since the pandemic, there have been three meetings. The WENDWG virtual meetings went well, but when the group turned to review metrics or spreadsheets, coordination become more complicated.

The July NIPWG virtual meeting became complicated with participant comments. In the short time windows of virtual meeting (three hours/day for example), sometimes it is hard to move forward much. Meetings must be pragmatic and concentrate on topics. Explore bilateral support and keep meetings short. Organizers must make sure some people are not left out.

RDML Smith noted that we haven't looked at the situation of Regional Hydrographic Commissions (RHCs). The ARHC is small and relatively technologically advanced. The MACHC will have some virtual meetings in its path forward. Are there any insights from other RHCs?

Ms. Powell noted that NOAA is working with NOAA National Weather Service Ocean Prediction Center on the S40# series of weather portrayals. The Center is leading interface with the WMO. Julia has advised the Center to understand the WMO approval process as it proceeds with work with the WMO.

RDML Smith called an end to the ARHC-10 Session and participants adjourned for happy hour.

Friday, August 14, 2020

The Chair inquired about technical and organizational smoothness of the ongoing meeting. Feedback was positive. He expressed appreciation to all participants for their receptivity and willingness to use the google platform, as it has worked best for the U.S. The Chair expressed special appreciation to the participants joining from Alaska, given the very early hour local time there.

F. Working Group Reports

F.1 OTWG (Operational and Technical Working Group)

Mr. Corey Allen (U.S.), OTWG Chair, presented the OTWG report (see ARHC10-F1). He reminded participants of the call for CATZOC data (Action ARHC9-03). He noted the planned update of the 2018 adequacy assessment² is planned for 2023. Accordingly, a call for refreshed data submissions for the update will be made in late 2021/early 2022.

In addition, an opportunity exists to revisit the methodology used in the 2018 assessment to improve the utility and robustness of the product. Members are asked to consider the methodology and offer suggestions from improvements through the OTWG.

Concerning V-datum in the Arctic, a number of different tools are used among the member states (U.S., CA, NO, and DK). Previously, information has been shared about BLAST from NO. What additional information and tools are available?

NO reported that in recent years, NO, U.S., and DK convened a discussion of BLAST. More than 30 participants studied this project a few years. The biggest challenge was the management of the project. Many, if not everyone, involved in the prior review wanted to continue to a "BLAST#2" but due to lack of resources, this did not come to fruition. Some software used today is built off of the BLAST project and experience.

DK noted, especially in Greenland, DK is working on improving "Latoid project" (?) based on satellite geoid data. It is "pretty accurate" for offshore areas, but close to coast and in fjords, the accuracy drops. Tide models off the coast are used with surveys, and the model is improving. Ideally, it is desirable to test the model on a larger spatial scale, such as the larger Arctic region or all of Greenland. There is significant "PhD-level" work to do to improve the model. Every year, 120km of coast is being studied at present, but unfortunately, resources are constrained.

IHO noted that in early July, the IHO Secretariat, together with the HO of the Netherlands on behalf of the Navy, published a note with Netherlands 3cm accuracy in their land/sea boundary model. This was an important step forward, especially in the North Sea and English Channel. An INF paper is being presented for the next HSSC, prepared by the Chair of DQWG. Please consult the note on the HSSC-12 webpage <https://iho.int/en/hssc12-2020>.

² See

https://www.iho.int/mtg_docs/rhc/ArHC/ARHC8/ARHC8-C1a_Arctic_Hydrographic_Adequacy_OTWG.pdf
<https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=2e0f077b8a0147149c8229c9204332d7>

IC noted that the contact information for IC member on the working group requires updating, and will be forthcoming to the OTWG Chair via email following the meeting.

FI noted that V-datum is addressed in the Finland National Report. Finland refers to the vertical reference system in the Netherlands and notes the need for a common vertical reference system. Finland and Sweden are working to implement this common system within four to five years to create a northern Europe common system.

The group should further explore interest among PhD students to study this question and the conversation should continue.

There is great opportunity for satellite derived means for vertical datum control. The need for baseline water level information is critical.

The discussion progressed to autonomous technologies and whether the ARHC may collectively utilize these platforms. Technologies demonstrated, for example the Saildrone project presented during the Science Forum, indicates that this field could present exciting opportunities. A number of Member States are interested in this. There is a possible operation on the Atlantic 'side' next year. It was also noted the last two (of the four) Saildrones arrived at Point Hope, Alaska during the week of the ARHC-10 meeting and they are now surveying on the 20m contour. Saildrone offers a number of strengths--essentially the model is to "buy the data." The HO does not undertake the operational, maintenance, software, or other aspects of in-house hydrographic survey operations. All look forward to future developments.

DK inquired of the selection process leading to the chosen survey area for Saildrone. Was it specific to topographic considerations? The response was "yes." The area selected is largely flat, and the HO (NOAA) is looking to gain more knowledge between 20 and 50 meter contour. How accurate are our current contours? From this, navigation corridors may be established.

CA observed the importance of near shore surveys that was noted at the Science Forum. In contrast, CA is focused on shipping corridors. Mr. Allen was asked whether Saildrone is best for collecting near shore data? Is it safer? Is it better in the protection of resources? Mr. Allen responded generally affirmatively, noting that NOAA is still realizing efficacy and opportunity of these autonomous technologies.

The IHO expressed appreciation for the reports at the Science Forum and the OTWG report and inquired further of the process of buying the data and assessing data quality. Prior experiences in LIDAR data demonstrated that processing and qualifying was an important component in their experience. Mr. Allen noted in writing the contract in this case--NOAA defined the specifications with which the data needed to comply. For the current Saildrone, NOAA was interested in reconnaissance and learning. As a result, some of the requirements were "relaxed." As of the ARHC meeting, a complete assessment is still premature as the data has not been reviewed yet.

Action ARHC10/07

- a) Call for data for CATZOC for updated assessment of survey adequacy for 2023 update (call in late 2021/early 2022)**
- b) Explore improved methodology for assessing survey adequacy update for 2023**
- c) Consider external databases as contributors such as ASTDB Inventory and assess V-datum tools available and next steps in the Arctic**

F.2 AICCWG (Arctic International Charting Coordination Working Group)

Mr. Evert Flier (NO), AICCWG Chair, presented the AICCWG report (see ARHC10-F2). The AICCWG has been "getting established" and is now underway with everyone onboard. The WG is now looking at a major task exploring a joint ENC grid schema in the Arctic. CA has been working with IIC technologies with a resulting study being discussed in collaboration with the WG. Mr. Flier informed the group of three potential options, but the national hydrographic *leadership* of Member States needs to provide direction directly to the WG on how to pursue next steps, if any. The three options are: 1) rectangular-rectilinear Grid, 2) DGGs hexagonal and 3) DGGs rHealPix.

The ARHC needs to agree on a scope and extent for next steps to proceed--scales, boundaries (just INT Region N?), etc. Member States are in different stages of gridding in the Arctic- some are well established, some are getting started, etc. This is the key ARHC topic, it is no longer about harmonization, but is now a question of actual gridding.

Mr. John Nyberg (U.S.) noted the effort is a noble and worthy endeavor. Many of the countries are working across regional commissions—especially for those national programs that are not exclusively within one RHC. Trying to make a national ENC suite work in a regional scheme (or in more than one region) is a challenge. Other RHCs (for example, MACHC) are working on their chart schemes. There may be need for a middle ground where they all work together. S-101 has guidelines for scales and bands as well.

Dr. Geneviève Bécharde (CA) noted that the Arctic is a special case. If we can get a pan-Arctic common scheme, it would last for a few decades. It is worth testing further. One fundamental question to ask—is there a desire to find something pan-Arctic? If so, other countries would have to put in some work to align. We do need more information. Another question--is there a *DESIRE* for pan-Arctic work?

Mr. Jens Peter Hartmann (DK) noted that DK supports a gridded approach. DK has just established a grid for Search and Rescue work that follows established international standards. From MSDI, we should widen the scope, and work with OGC to explore how we grid our data. There are more datasets than just S-101, for example.

Mr. Yves Guillaum (IHO) noted one important question--what is the scope of this project? Starting with a grid scheme is easy, but this must be put into context. When you define a grid scheme, understand chart aspects. Start with appropriate scales, and then move to larger scales and meet interests of bordering neighboring countries. The Arctic is good place to test since countries share boundaries, and this would produce good lessons learned for others.

Dr. Mathias Jonas (IHO) supported prior comments, and noted a need to avoid any "propriety solution." Dr. Jonas noted ISO 9121 for gridded data--size of grid, nomenclature.... Whatever we do should align with geodata guidelines, as we do not want a gridded approach that deviates from guidelines.

Mr. Nyberg (U.S.) suggested starting with looking at developing the international grid for Band 1 and 2s, as they are easier to build. Then use those as "feedstock" for producing products. We probably aren't going to make real 'large scale things' up there anyway.

Mr. Flier (NO) agreed that all are good comments. The WG should look at existing gridding for the Arctic for other topics. Marine biology? Are they pulling the ISO standard? Similar to adjacent regions, that is where as Arctic we may wish to deviate as projections deviate as you move to the high north. The ARHC could task the working group to start work on small scale band 1 and 2. If agreed, then large scale could be developed up to individual nations.

Dr. Bécharde (CA) noted that the scheming report was the product of a consultant. We could look at securing additional resources for another contract to study.

Action ARHC10/08

- a) **Based on national hydrographer guidance, pursue regional ENC chart scheme for Band 1 and 2 for the region in the near term**
- b) **Follow up on discussions regarding Northwest passage routing and routing measures**

F.3 ARMSDIWG (Arctic – Marine Spatial Data Infrastructure Working Group)

Mr. Sebastian Carisio (U.S.), ARMSDIWG Chair, presented the ARMSDIWG report (see ARHC10-F3). Due to COVID, there have been no in-person meetings, but three VTC meetings have been held since ARHC9. The WG is monitoring the UNGGIM and Arctic SDI and other working groups. The primary focus has been progressing the AVPG.

The AVPG initialization survey is complete. Twenty-four data sets were identified in the original ARHC study, and only 5 are supported by Members States. Which data could be made as web services? There are options for the AVPG going forward. In the past, the U.S. has offered the portal option. We could use the five most available data sets as a starting point. The HOs could commit to provide data as a web service. This may involve other agencies to see where data sets are housed and who provides those.

The "Hackathon" idea was mentioned. It would be better to see how the Baltic Sea Hackathon works out in the near term and see lessons learned from that. However, before any Hackathon, data still needs to exist. (NOTE: the hackathon concept was unclear to all, and was clarified somewhat further in the "chat box" of the VTC).

Mr. Carisio (U.S.) noted the final approval of a joint statement of intent was approved by the ARMSDIWG and the Arctic SDI Board (see ARHC10-F3). The joint statement would serve as a statement that the national mapping/land agencies of the Arctic SDI together with the ARHC Member State HOs share, as to what we are working toward. The effect would be to bring land and sea together. The ARHC approved the statement.

Mr. Carisio (U.S.) praised the great inventory of work conducted and the identification of next steps.

NO noted the efforts to link Arctic SDI, ARMSDIWG and the Arctic Council. The work to-date has been based on voluntary contributions. The ambition level for ARMSDIWG is higher than on Arctic SDI. Going forward, efforts should be supported on a case-by-case basis.

Action ARHC10/09

- a) **Proceed as proposed, presented and discussed during ARHC-10, including follow-up on the ARHC-SDI statement**
- b) **Review IGIF water theme with regard to the Arctic
Include IGIF and UNGGIM in the ARHC-11 agenda**

F.4 SPWG (Strategic Plan Working Group)

Mr. Evert Flier (NO), SPWG Chair, presented the SPWG report. SPWG work was suspended five years ago. As we are moving into a new decade with ARHC, Seabed 2030, etc., there are new horizons visible. The most value in any strategy work is the work itself and less about the result. We could come up with a good strategic plan for the ARHC. At the same time, a lot of strategy goes on during our (annual) ARHC meeting themselves. What is the strategy, path and outcome?

RDML Shepard Smith (U.S., ARHC Chair) recalled why we embarked on this action idea last year. Maybe we should be more intentional about how we use our time. What is the ARHC alignment with IHO goals, Seabed

2030, UN Decade of Ocean Science, etc.? A Plan could be a helpful signal to others of the ARHC and also help guide our own time.

DK supported the development of a plan to some extent, and cautioned not to replicate work of the IHO. The work is to come up with specific challenges in the Arctic. It could offer guidance on how we will set up grids; how we will work; where are we moving as HOs; what are the services we provide; and how are we going to collaborate with other actors in the Arctic.

CA noted that this could be an implementation plan that ARHC will do in the Arctic, under the larger framework. What will we do to meet user needs in the Arctic?

IHO noted that the IHO Strategic Plan is a very generic, top down approach. The ARHC should consider the IHO Strategic Plan and its interface in the region. It should be region specific, and address local challenges. CA agreed.

RDML Smith (U.S., ARHC Chair), hearing general support for an effort to do some planning in the region along the lines that CA articulated, asked if we want to stand up a group to develop this over the course of the year?

CA offered to lead this effort, noting internal discussions would be held immediately following the ARHC.³ NO and US also agreed to step up.

Action ARHC10/10 Explore a draft ARHC strategic plan and/or implementation plan for the ARHC covering the period 2021-2030 and including an indigenous (and local) communities element

G. ARHC Virtual Science Forum

G.1 Reflections and Actions—ARHC Virtual Science Forum

The ARHC Science Forum is a good example of the ‘open-half’ of the ARHC, and the openness of the event was well received. More than 180 registered to attend prior to the Forum; over 130 attended the Forum. In accordance with the ARHC Statutes, the “closed nature” of the ARHC itself is valuable, but so is the “open aspect” which the Forum enables.⁴

NO noted the very good format of the Forum, and echoed the value of the combination of the open Forum with the closed ARHC meeting for discussion. The Forum’s short presentations were like ‘teasers,’ where Member States could follow-up as desired. It was a good, broad way to see what is going on in the Arctic.

CA noted that “data” was a central recurring theme in the presentations and discussions. And, it was notable, and hadn’t been fully appreciated beforehand, that the majority of vessels operating in the Arctic are fishing vessels. This provided a broadened view of the users of data and the need for cooperation with PAME and the Arctic Council. The message received is that we have to make a concerted effort to cooperate.

NO noted that Sairdron received a lot of attention during the Forum discussions.

³ Regarding ARHC Strategic Plan exercise, since the conclusion of ARHC-10, Douglas Brunt (CA) is confirmed to chair the task with support from the ARHC.

⁴ See https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/ARHC/MISC/ARHC_Statutes_20170901.pdf especially Article 3 “Membership (including associate member and observers) ARHC meeting attendance being “by consensus.”

FI noted that the Forum was interesting and kept participant's attention. FI shared the invitation, as the U.S. had requested, with broad communities within Finland. It will be interesting to review the registered participants list and attendees list to see the nature of additional participation for FI.

ARHC must coordinate requirements with the broader community--habitat, modeling, coastal resilience, etc. What areas need to be surveyed to complement navigation safety analysis?

Action ARHC10/11 Post Arctic Science Forum Summary and documents to ARHC-10 website

H. Topics

H.1 Arctic Council (PAME, EPPR)

Mr. Jonathan Justi (U.S.) introduced ARHC10-H1 "ARHC PAME MOU Brainstorming Ideas" and invited reaction and input from the ARHC. Key highlights noted in the paper and/or echoed in the Science Forum included opportunities to contribute hydrographic content as appropriate to PAME Assessments (high level, broad audience products). There has also been interest expressed in earlier discussions this week in conducting a more detailed assessment of various databases available (interoperability and access to data sets across databases) and opportunities to make best use of the data available in the various platforms going forward. The response by the PAME Secretariat to the ARHC Chair regarding the notification by ARHC to PAME of the ATCM Resolution on hydrography and potential interests in the Arctic was noted (ARHC9-7Action). Noise impacts on Arctic mammals was another topic that has been touched upon in various discussions at each of the Science Forum, PAME, and ARHC.

DK noted ARHC10-H1 was a very good paper with very good thoughts, including aspects of navigational information, shipping, data for environmental protection, and other interests. The paper pointed out many good areas to explore further with PAME. This list was comprehensive and DK had nothing new to add. DK is developing a new Arctic strategy.

The ARHC empowered the Chair to take the next step to communicate with PAME on next steps. A correspondence will be circulated for vetting in the effort to meeting the timeline for upcoming PAME-II (2020) in September.

Dr. Geneviève Béchard (CA) mentioned that Chris Marshall is the Canada contact for PAME, and asked how we can translate information to the pan Arctic scope, for example finding new routes for which we may not currently have data. We may not know where this fits in at present, but it is a thought to consider collectively.

NO supports the excellent work done and endorses going ahead. From the beginning, the ARHC has engaged and developed a good relationship with PAME. The Arctic Council has six working groups, with the EPPR being another. Should we also engage with EPPR?

RDML Smith (U.S., ARHC Chair) noted that NOAA has a good point of contact with the EPPR presenter at the Science Forum (US Coast Guard, Commander Wes James, see ARHC_SF_2020_3). That is a good starting place.

Action ARHC10/12

- a) **ARHC-PAME MOU Correspondence to PAME II (2020)**
- b) **Correspond with Arctic Council EPPR from discussions and interests expressed during ARHC-10**

H.2 Regional Coordination Considerations in Alaska

Ms. Amy Holman (U.S.) provided a special presentation sharing experiences working locally across multiple disciplines and stakeholder groups as the NOAA regional coordinator in Alaska (see ARHC10-H2).

How do we plan for the future? Ms. Holman provided an overview of the role of a regional coordinator and the interagency coordination that is central in that work to integrate specialized knowledge for collaboration. She introduced the linkage from national services to state and local level benefits. Networks are critical. On the ground representation, visibility and support, is fundamental. Innovation to address local challenges is a constant need. Focus on logistics, contexts, desired outcome and communication were all underscored. She highlighted the importance of circulating back to local communities, and that maintaining consistency over the long-term is critical in building relationships with various community and stakeholder groups. She concluded with an invitation to the ARHC to join the community next year on the ground in Alaska.

CA asked about data--what examples are you sharing about how to get communities to appreciate and get excited about the importance of hydrographic data? Ms. Holman responded--we take the charts out and collaborate. People get interested in the chart when they see it. What is important to the community? How can the safety of their subsistence activities be enhanced? Where are they working? Why are migration patterns happening the way they do? Currents, temperature, and bathymetry all have a role to play. It is important to talk about outcomes when working locally.

The U.S. underscored and appreciated the inclusion of indigenous people. This is something we need to be paying attention to, and it is the something the UN, including through the specific work of the UNGGIM, is following.

CA expressed an interest to compare notes in the model used for coordinating and collaborating across groups. CA has had some success with local community consultation, although this can also be challenging. Sometimes it is also challenging coordinating with other sciences (such as fisheries). CHS works with other (non-hydrographic) scientists, so those scientists can speak on behalf of hydrography when opportunities arise and if the hydrographic specialists cannot speak directly.

H.3 Italian Navy in the Arctic

RDML Massimiliano Nannini (IT) provided an update and report on the High North 20 campaign. RDML Nannini announced that the Italian government has approved a new contract with the Italian Navy, adding three more years to continue the High North campaign. The central idea underscoring the reason a non-Arctic country like Italy should engage in Arctic hydrography is based on 6 pillars: data sharing, ocean knowledge, exploration, monitoring, new technology, and education.

The High North campaign has focused on the Svalbard Islands (see ARHC10-H3 for more information).

Matthew Borbash (U.S.) asked if the permanently moored sensors in the region are providing real or near real time data? Is the data accessible to interested parties? RDML Nannini noted that the data is not distributed real time, but is downloaded each year when the Italian expedition goes up. The data is available. The point of contact at the staff level for details is Maurizio Demarte (maurizio.demarte@marina.difesa.it).

Ms. Birte Noer Borrevik (NO) asked, if seismic data is collected during the surveys in addition to backscatter and multi-beam data. This data has proven very valuable when collected in combination with backscatter. RDML Nannini confirmed that seismic data is collected, and that the new software was pretty accurate with the backscatter. For any further questions following the meeting, please contact RDML Nannini (massimiliano.nannini@marina.difesa.it).

H.4 CSB/Seabed 2030

Mr. Evert Flier (NO & ARHC SB 2030/CSB Coordinator) and Ms. Jennifer Jencks (U.S., Chair CSBWG), provided a joint read out of the Crowd Sourced Bathymetry (CSB) and Seabed 2030 (SB 2030) effort and the current status. Six years ago the CSB initiative was started at the IHO (see ARHC10-H4 for additional details). Ms. Jencks also shared the current status of the IHO Circular Letters concerning CSB while noting CL 21/2020 "*IHO Crowdsourced Bathymetry (CSB) Data for public domain*" is currently out with a response deadline of September 4.

Ms. Jencks updated the ARHC with news of the June 2020 CSBWG meeting with positive news of great CIDCO progress. Ms. Jencks noted that 200 data loggers have been purchased and 1000 NMEA 2000. Loggers destined for Palau are en route, and 30 loggers are en route to Greenland. The focus is data collection in collaboration with local communities.

The ARHC is well represented when reviewing CSB WG participants. CA, IT, NO, DK, FI, and the U.S. will all contribute to both ARHC and CSBWG. The next CSBWG meeting is scheduled for spring 2021 in Stavanger, NO. See ARHC10-H4 for CSB outreach targets as well as tasks listed in the role of the CSB coordinator.

When data is contributed to the CSB pipeline destined for the IHO DCDB, an email notification automatically informs the RDACC (Larry Mayer and Martin Jakobsson) and DCDB (Jennifer Jencks) focal points.

Dr. Mathias Jonas (IHO) noted the status of CL 21/2000. In general, the principle of land mapping should also apply to ocean mapping--a land map shows mountains, rivers, cities, roads, forests, etc. We need a similar, accurate representation of the oceans.

IC indicated that it might be able to respond to the CL, whereas it had not previously. We wouldn't have a map of the globe (mountains, rivers, cities, etc.) otherwise--we all take this for granted.

RDML Shepard Smith (U.S., ARHC Chair) noted the IBCAO gap analysis is the best gap analysis we have for this reason. He recommended the ARHC adopt this as our gap analysis for the ARHC region and adopt it for developing progress measures. Doing so would allow the ARHC to track progress and contributions to improving the chart. NO agreed. The ARHC adopted the IBCAO gap analysis as stated to guide its progress assessment and reporting going forward.

The ARHC also agreed that the role of CSB coordinator and SB 2030 for the ARHC would be combined into one focal point, Mr. Flier.

RDML Smith expressed appreciation to Ms. Jencks and Mr. Flier for their steady leadership over the year.

Action ARHC10/13

- a) **With adoption With adoption of the IBCAO as a basis for assessing progress, continue to support Seabed 2030 project in the Arctic, including utilization of progress measures for the decade**
- b) **Hydrographic offices of the ARHC examine their national positions with regard to IHO CL/ 21 "IHO Crowdsourced Bathymetry (CSB) Data for Public Domain" Respond to IHO Secretariat by Sept 4 as appropriate**
- c) **Inform SB 2030/CSB Coordinator for ARHC of any developments**

[Observing the time and the meeting agenda, the Chair proposed adjustments to the sequence of the remainder of the agenda in order to allow Mr. Craig McLean to join the meeting at the scheduled time to deliver his report on the UN Decade of Ocean Science. This was agreed. Presentations as part of this summary are in agenda order, however following H.4 the meeting sequence ran I.1, H.5, I.2, and H.6]

H.5 Improved Content and Coverage for ENC's in Western Greenland

Ms. Elizabeth Helen Hahessy (DK) reported on "Improved content and coverage for ENC's in western Greenland" (see ARHC10-H5). She presented the existing ENC products, bands 3, 4, and 5, and paper products. Ms. Hahessy shared DK's experiences with the "ENC Base" and the "ENC Simple" trial.

Mr. Yves Guillam (IHO) offered congratulations on the excellent presentation and inquired further about the "Base ENC" concept, and whether DK would apply CATZOC to the data provided in "Base ENC's." The answer is yes.

Mr. Chris Mathews (CA) commented that CA is looking at a similar approaches to close ENC gaps, and addressing similar challenges considering geographic extent with a focus on navigation corridors. CA aims to meet mariner needs at the desired scale. The CA chart portfolio could increase dramatically. CHS will follow up the DK to compare notes and experiences progressing the similar work.

H.6 UNGGIM MGIWG Work Plan and IGIF Brief (ARHC9-26)

Mr. John Nyberg (U.S.) updated the ARHC on the work of the UNGGIM (see ARHC10-H6). IGIF water theme and ARMSDIWG are possible links to consider.

There was some discussion of the goal of UNGGIM engagement with regards to legal aspects.

Mr. Nyberg, as Chair of the UNGGIM Marine WG, welcomed participation and inclusion of the thematic IGIF, noting the aim is not to repeat efforts and to avoid injecting a "hyperlocal" context. If there is something different or unique that would apply in the Arctic, it is probably worth mentioning in the UNGGIM. The next meeting will be held in early September 2020 to finalize the document.

Mr. Nyberg concluded by highlighting things to consider in the course of the upcoming work: the International Geospatial Information Framework (IGIF) Water Theme, improved Representation (new members are welcome), addressing the challenge with the land/sea interface, and supporting proposed IHO Technology Laboratory. The next face-to-face meeting is scheduled for Singapore in 2021.

I. Relevant Ocean Initiatives

I.1 UN Decade of Ocean Science

Mr. Craig McLean (U.S. IOC Representative, NOAA Chief Scientist, and NOAA Assistant Administrator OAR) presented the background and upcoming events related to the UN Decade of Ocean Science (see ARHC10-I). Mr. McLean noted that the mapping community is best organized to make contributions for the next decade. The map of the ocean is a crucial starting point for all desired outcomes of the Decade. The nature of change is particularly notable in the Arctic, but is also seen worldwide. Mapping the Arctic has important implications for such areas as ecosystems, hydrography, shipping, national security, food security, Blue Economy, and indigenous peoples.

The IOC wants to do something about the challenges faced, and developed a proposal to the UN General Assembly concerning the "Ocean Decade" for the Blue Economy and sustainable oceans. The IOC is working now on an implementation plan before the upcoming General Assembly for consideration.

Mr. McLean noted the executive committee of the UN Decade, and representation of countries such as Mexico, Russia, South Africa, Sweden, Vietnam, Portugal, India, China, Japan, Fiji and Pacific Islands, and others.

The UN Decade has particular linkage to all the UN Sustainable Development Goals, especially Goal 14, “Life Below Water.” An important focus is societal outcomes.

Accessible data was also underscored as critical. We want to require that data be submitted so that people can discover, access and utilize data. Within the "scientific community," data is often not discoverable or accessible to the broad community.

On October 15, 2020, the UN will issue a UN Decade "Call for Actions." A statement noting ARHC activities, connection to Seabed 2030, and contributions to the decade in terms of data availability, commercial sector participation, philanthropy, and public awareness will be well received.

RDML Shepard Smith (U.S., ARHC Chair) noted the last decade goal, "inspiration," is the hardest for hydrographers. As a community, hydrographers are generally content to stay obscure and work quietly. We must promote the inspirational aspect of work needed to the public.

Dr. Mathias Jonas (IHO) noted that hydrographers are engineers who can interface with the science.

Mr. McLean noted the interest that all vessels should collect bathymetry en route to their destination. It would be an important step forward for all sponsoring nations and agencies to endorse this principle and incorporate hydrographers on ships to guide the collection of quality of hydrographic data.

In further elaboration, Mr. McLean noted that the October 15 “Call for Actions” is an initial call for proposals, which will feed into further submissions and the assembly of ideas received. The initial character of the Decade constitutes what is proposed and the process will become more open as countries, scientists, agencies, etc., are ready. Multinational and regional approaches are valued.

It is important to bring in those early in their careers, the young, and indigenous people into the oceans community. Effort should be made to make youth comfortable and excited to join our community.

Action: ARHC10-14 Monitor UN Decade and take appropriate actions

1.2 Arctic Science Ministerial

Ms. Laura Strickler (U.S.) provided an introduction and overview of the Arctic Science Ministerial (see ARHC10-I2). The ASM series shapes support for the future of Arctic science, with an emphasis on international research collaboration. Invitees include representatives from approximately 40 entities, including the eight Arctic States, six Indigenous groups with permanent representation on the Arctic Council, a number of non-Arctic States active in Arctic research, and international science organizations.

The first ASM was held in 2016 in Washington, DC, while Finland, Germany, and the European Commission hosted the second ASM in 2018 in Berlin, Germany.

Iceland and Japan are co-hosting the third ASM, to be convened in Tokyo, Japan in May 2021 (rescheduled from November 2020 due to the pandemic).

Action ARHC10/15

- a) **US to share ASM proposal template**
- b) **Explore ARHC interests by correspondence in regards to a multilateral proposal to the 3rd ASM (Tokyo, Japan, May 2021)**

J. Closing

J.1 Recap and Reflections Day Two

Participants briefly shared impressions of the organization and content of the meeting. Participants agreed the meeting was well organized and well chaired. In the future though, additional attention could be placed on meeting time constraints owing to the many time zones involved.

J.2 ARHC-10 List of Actions and Reference Calendar

Mr. Jonathan Justi (U.S.) presented a draft list of actions. Incremental edits and clarifications were made during the meeting owing to time constraints. Participants were asked to continue to review both the actions review presented at the start of Day One, as well as the actions developed and presented at the closing of Day Two following the meeting.

J.3 Chair and Vice-Chair

In order to minimize administrative dislocations, the ARHC-10 Chair (U.S.) and Vice-Chair (CA) are to remain in position providing services to the ARHC for the upcoming year in anticipation of ARHC-11.

J.4 Time and Venue for next ARHC Meeting

The U.S. reiterated that it very much looks forward to hosting the ARHC-11 in Alaska and to introducing the ARHC to the very special U.S. Arctic for the first time. The anticipated meeting venue for ARHC-11 will be August/September 2021 in Alaska. The US will follow-up with the ARHC and the IHO Secretariat on details of the ARHC-11 meeting and organization of any interim events.

[The meeting adjourned one hour beyond schedule.]

Annex A List of Actions

ACTIONS TABLE ARHC-10
August 13-14, 2020
(Virtual/VTC)

Initial draft August 17, 2020 & updated October 22, 2020

Action #	Agenda Item	Actions	Responsible	Deadline/Status
ARHC10-01	A.4	ARHC Chair to pursue follow-up Statutes VTC of the five members and the IHO Secretariat as soon as practical and take appropriate subsequent steps	ARHC Chair	Oct 15, 2020
ARHC10-02	A.4	U.S. and CA to lead drafting team of ARHC to develop: a) a history summary for the IHO ARHC website (https://iho.int/en/arctic-rhc) b) an ARHC relevant events calendar	US/CA	Dec 15, 2020
ARHC10-03	B	Explore, draft, vet, and take appropriate steps to develop an “ARHC Year in Review” report similar to ARHC_VTC01_2020_02F Rev ⁵	US	November 1, 2020
ARHC10-04	B.1	Follow-up on IHO Recommendations: a) Prospective IHO Council members from ARHC to consider if and how issues of the Arctic Region of interest for the IHO may be included into the Council programme of work <i>Other recommendations from IHO Secretary General incorporated within actions below as developed during the meeting to avoid redundancy.</i>	All	As soon as possible prior to meetings of the Council
ARHC10-05	B.2	Update the Arctic Navigation Risk summary bulletin developed previously in 2017 with relation to the Polar Code. ⁶ Consider visualization of risk in communicating dangers	CA	ARHC-11
ARHC10-06	B.4	NO to organize follow up meeting and correspondence with interested hydrographic offices on innovations regarding Sailing Directions as discussed during ARHC-10	NO	ARHC-11
ARHC10-07	F.1	Follow-up on OTWG: a) Call for data for CATZOC for updated assessment of survey adequacy for 2023 update (call in late 2021/early 2022) b) Explore improved methodology for assessing survey adequacy update for 2023	OTWG Chair	ARHC-11

⁵ https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/ARHC/ARHC_Teleconference_29April2020/2F_Formatted%20Arctic%20Year%20in%20Review_2019_rev.pdf

⁶ <https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/ARHC/MISC/Notice%20on%20caution%20required%20when%20using%20nautical%20charts%20in%20Arctic%20waters3.pdf>

		<ul style="list-style-type: none"> c) Consider external databases as contributors such as ASTDB d) Inventory and assess V-datum tools available and next steps in the Arctic 		
ARHC10-08	F.2	<p>Follow-up on AICCWG:</p> <ul style="list-style-type: none"> a) Based on national hydrographer guidance, pursue regional ENC chart scheme for Band 1 and 2 for the region in the near term⁷ b) Follow up on discussions regarding Northwest passage routing and routing measures 	<ul style="list-style-type: none"> a) AICCWG b) US and CA 	<ul style="list-style-type: none"> a) ARHC-11 b) ARHC-11
ARHC10-09	F.3	<p>Follow-up on ARMSDIWG:</p> <ul style="list-style-type: none"> c) Proceed as proposed, presented and discussed during ARHC-10, including follow-up on the ARHC-SDI statement d) Review IGIF water theme with regard to the Arctic Include IGIF and UNGGIM in the ARHC-11 agenda 	ARMSDIWG	ARHC-11
ARHC10-10	F.4	<p>Follow-up on SPWG:</p> <p>Explore a draft ARHC strategic plan and/or implementation plan for the ARHC covering the period 2021-2030 and including an indigenous (and local) communities element</p>	SPWG ⁸	ARHC-11
ARHC10-11	G.1	Post Arctic Science Forum Summary and documents to ARHC-10 website	US	September 10, 2020
ARHC10-12	H.1	<p>Follow-up on Arctic Council:</p> <ul style="list-style-type: none"> a) ARHC-PAME MOU Correspondence to PAME II (2020) b) Correspond with Arctic Council EPPR from discussions and interests expressed during ARHC-10 	ARHC Chair	<ul style="list-style-type: none"> a) September 7, 2020 b) March 2021
ARHC10-13	H.4	<p>Seabed 2030 & CSB:</p> <ul style="list-style-type: none"> a) With adoption of the IBCAO as a basis for assessing progress, continue to support Seabed 2030 project in the Arctic, including utilization of progress measures for the decade⁹ b) Hydrographic offices of the ARHC examine their national positions with regard to IHO CL/ 21 “IHO Crowdsourced Bathymetry 	ARHC SB 2030/CSB Coordinator (Evert Flier)	Ongoing

⁷ NOTE: IHO Recommendation: “ARHC to consider establishing an ENC Scheme for Region N and a transition plan for S-101 ENCs. As a test case, ARHC to consider the possibility of experimenting the provision of coordinated S-100 based products services covering Region N (what products?, who?, where?, when?) in accordance with WEND100 Principles”

⁸ Since the conclusion of ARHC-10, CA confirmed Mr. Doug Brunt will assume leadership of this effort.

⁹ NOTE: IHO Recommendation: “ARHC members are invited to: (a) identify further potential sources of bathymetric measurements and survey data providers to be facilitate the further completion of the DCDB data holdings [and... (b)] to consider the future invitation of Seabed 2030 project representatives to ARHC meetings to discuss options for deepened cooperation and support”

		(CSB) Data for Public Domain” Respond to IHO Secretariat by Sept 4 as appropriate. c) Inform SB 2030/CSB Coordinator for ARHC of any developments		
ARHC10-14	I.1	Monitor UN Decade and take appropriate actions	ARHC Chair	Ongoing
ARHC10-15	I.2	Follow-up on Arctic Science Ministerial: c) US to share ASM proposal template d) Explore ARHC interests by correspondence in regards to a multilateral proposal to the 3 rd ASM (Tokyo, Japan, May 2021)	US	a) September 4, 2020 b) February 2021

REMINDERS:¹⁰

- All participants to review actions tables presented during meeting and provide any revisions or updates to Jonathan.Justi@noaa.gov and Alexis.Maxwell@noaa.gov by September 4, 2020 (Friday). This includes both the review of actions during ARHC-10 agenda item A.4 and new actions agenda item J.
- Interested member states to continue discussion on new Sailing Directions publications, updates, maintenance. Correspond with NIPWG representatives. Consider summary read out at ARHC-11 (Lead: NO)
- Follow-up on Basis/provisional/preliminary ENC discussion following the meeting (DK, CA, and interested parties). DK interim online meeting. Consider summary read out at ARHC-11. (LEAD: DK)
- Assess if desirable and call a meeting if helpful mid-year. Interim report out of progress to-date May/June 2021 in anticipation of ARHC-11. Include status summary of actions taken to-date and any reminders in preparation to ARHC-11. (ARHC Chair)
- Follow up on model of working with local communities, communications interdisciplinary, partnerships, (Chris Marshall and Amy Holman)
- Make indigenous communities and community collaboration a part of the ARHC agenda going forward

¹⁰ Reminders are items that are not full actions, but should be kept in mind following the meeting

DRAFT ACTIONS Status Review for ARHC-10
includes List of Actions from
ARHC9 Meeting, Murmansk, Russian Federation (September 17-19, 2019)¹¹
&
ARHCVTC-01 (April 29, 2020)¹²

As of August 12, 2020

NOTE: Please send updates/corrections to Jonathan.Justi@noaa.gov & Alexis.Maxwell@noaa.gov by August 21, 2020 for final posting to ARHC-10 meeting site

Key:

Reported completed at ARHC VT01	Believed to be addressed in ARHC-10 agenda or completed or ongoing/permanent	Outstanding/ status unclear/ attention needed
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Action #	Agenda Item	Actions	Responsible	Deadline/Status	Comments As of 08/11/2020
ARHC9-01	A.5	Draft updated ARHC Statutes	CA & US	Before A-2 Prior to ARHC10	In progress VTC call was held June 18. Follow up call anticipated in September 2020
ARHC9-02	B.1	(SG recommended) ARHC Member States who are members of more than one RHC are encouraged to express their preferences at their earliest convenience and no later than 20 October 2019.	All		DONE/CLOSED
ARHC9-03	B.1	(SG recommended)	OTWG		In progress.

¹¹ <https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/ARHC/ARHC9/ARHC9%20Meeting%20Minutes%20ver08.pdf>

¹² https://iho.int/uploads/user/Inter-Regional%20Coordination/RHC/ARHC/ARHC_Teleconference_29April2020/ARHC%20VTC%20Action%20table.pdf

		ARHC to consider providing regional CATZOC practices to the DQWG.			This would be done after OTWG receives CATZOC data and supporting docs from ARHC MS. See ARHC9-15.
ARHC9-04	B.1	(SG recommended) ARHC members are invited to identify opportunities in national or regional funding agencies to incorporate hydrographic development in the broader projects supporting developing countries.	All		This is an ongoing activity.
ARHC9-05	B.1	(SG recommended) ARHC members are invited to identify further potential sources of bathymetric measurements and survey data providers to facilitate the further completion of the DCDB data holdings.	All		This is an ongoing activity.
ARHC9-06	B.1	(SG recommended) ARHC members are invited to consider the future invitation of Seabed 2030 project representatives to ARHC meetings to discuss options for deepened cooperation and support.	US + NO		DONE /CLOSED. NO reports that Seabed 2030 representatives (both from RDACC Arctic / North Pacific and director) are invited and will join for this specific topic. Ongoing correspondence.

					SB 2030 attended ARHCVTC01.
ARHC9-07	B.1	(SG recommended) ARHC to inform PAME on the new ATCM Resolution on hydrography that was adopted at ATCM42 (annexed to this report) and whether it would be appropriate to pursue along the same lines report to the PAME for the same purposes.	US		COMPLETED
ARHC9-08	B.1	(SG recommended) ARHC Member States are encouraged to replace the IHO old logo on all sorts of nautical publications and communication means by the IHO new logo soon the opportunity arrives.	All		This is an ongoing activity.
ARHC9-09	B.1	(SG recommended) ARHC Members are invited to submit papers for publication in the IHR and to look for continued contribution to the IHR Editorial Board.	All		Permanent
ARHC9-10	B.1	DK to report back to ARHC regarding information in the HELCOM report on detrimental effects of underwater noise exposure that may be applicable to the Arctic.	DK	ARHC10	COMPLETED See "Noise Sensitivity of animals in the Baltic Sea BSEP167.pdf" and DK comments
ARHC9-11	B.2	Add the appointment of an ARHC IHR rep to the agenda of ARHC10.	c/ARHC	ARHC10	Added to Agenda
ARHC9-12	C.1	OTWG to report back to ARHC regarding Arctic vertical datums.	OTWG	ARHC10	See OTWG report at ARHC-10
ARHC9-13	B.5	Draft ARHC report to A2	CA & US	ASAP	2019-12-15

					DONE/CLOSED SHOULD UPDATE FOR NOVEMBER A-2?
ARHC9-14	C.1	Confirm OTWG membership	All	28 Sept 2019	DONE/CLOSED
ARHC9-15	C.1	MS to provide the OTWG with their latest CATZOC data.	All	ASAP	In progress
ARHC9-16	C.2	Investigate the ENC scheme looking at the existing ENC coverages	c/AICCWG	ARHC10	See AICCWG report at ARHC-10
ARHC9-17	C.2	AICCWG to consider renaming their WG in recognition of focus on ENC's and other services	c/AICCWG		See AICCWG report at ARHC-10
ARHC9-18	C.2	AICCWG to consider appropriate gridding of ENC-schema for the Arctic, taking into consideration CA national report	c/AICCWG	30 November 2019	In progress. CA provided a presentation on its Arctic ENC grid cell schema study to ARHC 2020-04-21 & See AICCWG report at ARHC-10
ARHC9-19	D.1	Complete and submit AVPG questionnaire to c/ARMSDIWG	All	25 October 2019	CAN, FIN, DNK, ISL, NOR, USA responses by 29 APR 2020 & See ARMSDIWG Report at ARHC-10

ARHC9-20	D.1	Evaluate AVPG questionnaire and present a paper on the way forward with the AVPG	Chair ARMSDIWG	ARHC10	DONE See ARMSDIWG Report at ARHC-10
ARHC9-21	D.1	Confirm ARMSDIWG membership to its chair	All	25 October 2019	DONE/CLOSED 6 participating Member States and Associate Members 2020
ARHC9-22	D.1	MS are encouraged to ask their Arctic SDI representatives why they are not supporting collaborative ARHC projects.	All	ARHC10	OBE Update provided at ARHC Intersessional 2020
ARHC9-23	D.1 / D.4a	Evaluate the Arctic SDI portal for ARHC use	c/ARMSDIWG	ARHC10	DONE c/ARMSDIWG to update at ARHC Intersessional 2020
ARHC9-24	n/a	Member States are invited to send ENC samples to CA for paper chart 2.0 testing. Send to douglas.brunt@dfo-mpo.gc and louis.maltais@dfo-mpo.gc.ca	All	31 December 2019	This is an open-ended invitation.
ARHC9-25	D	Member States to include their plans for paper chart production/maintenance in their national reports next meeting	All	ARHC10	See National Reports at ARHC-10
ARHC9-26	D.1.4	Include UNGGIM MGIWG work plan and IGIF brief to next ARHC meeting.	c/ARHC10	ARHC10	See ARHC-10 Agenda item
ARHC9-27	D.3	Decision: Evert Flier nominated ARHC rep to Seabed 2030 project	n/a	Effective immediately	CLOSED

ARHC9-28	D.3	ARHC Seabed 2030 rep to deliver a gap analysis for Seabed 2030	ARHC Seabed 2030 liaison	ARHC10	See Arctic Science Forum presentation and ARHC-10 agenda
ARHC9-29	D.3	Review content of letter from d/DCDB and submit comments to c/ARHC10	All	25 October 2019	DONE/CLOSED
ARHC9-30	D.3	c/ARHC to respond to same letter from DCDB	c/ARHC	31 December 2019	Ongoing communications between ARHC and DCDB & CSB WG Chair & Response letter Transmitted by c/ARHC to DCDB Director (8/10/2020)
ARHC9-31	D.4a	Follow-up on Arctic Shipping Best Practice Information Forum and future cooperation with PAME (and perhaps baselines for other partnerships) and report to ARHC10	CA & US	ARHC10	US PAME briefed ARHC during intersessional VTC 2020-04-29 & see ARHC-10 agenda item
ARHC9-32	D.4	Decision: ARHC approves in principle the PAME-ARHC MOU	n/a	n/a	MOU was signed by both parties in April 2020
ARHC9-33	D.4	Decision: ARHC approved the signing of the non-binding PAME-ARHC MOU by the c/ARHC	n/a	n/a	MOU has been signed by both parties
ARHC9-34	F	Have extraordinary ARHC-meeting for core members only at	Chair	Prior to ARHC10	Initial discussion held

		A-2 with main purpose of revision of ARHC statutes			by VTC on June 18, 2020 & Follow-up Call anticipated in September 2020
ARHC9-35	F	Letter to UKHO in response to their application for associate membership	c/ARHC	25 October 2019	Pending outcome of discussions regarding ARHC 9-34 and ARHC 9-01

ACTION TABLE
ARHC VTC01 April 29, 2020

Action #	Description	Who	When	STATUS (8/2020)
ARHC VTC01-01	ARHC tasked AICCWG, chaired by NO, to organize a review of options and report back to ARHC-10, if possible. Arrange a discussion at the Director level at the appropriate time.	AICCWG Chair	ARHC-10	Update at ARHC-10
ARHC VTC01-02	Include this for discussion for charting implications at ARHC-10 meeting. John Lowell will share the url with the group for reference.	John Lowell	ARHC-10	
ARHC VTC01-03	Follow up on letter of intent with Arctic SDI from ARHC.	ARMSDIWG Chair	ARHC-10	DONE See ARHC-10 ARMSDIWG Report
ARHC VTC01-04	Review this concept document and provide feedback on usefulness and content to Alexis.Maxwell@noaa.gov and Jonathan.Justi@noaa.gov. Please indicate if you believe the ARHC should consider something similar after ARHC-	All	June 10	Only positive feedback. PROPOSE: Following ARHC-10, MS to review National Reports and

	10 meeting based on member state National Reports.			explore 2020 annual updated report
ARHC VTC01-05	Peter Oppenheimer will followup on the above question regarding ingesting data for the IHO INTogIS.	Peter Oppenheimer	July 01	Completed
ARHC VTC01-06	Member states to explore ASSR report and consider potential ARHC and PAME collaboration, such as a report that depicts areas of the Arctic that are charted to modern standards overlaid with current ship traffic patterns.	All	Ongoing	See ARHC-10 Agenda item regarding PAME
ARHC VTC01-07	DK will volunteer to attend the Arctic Regional Workshop and requests early cooperation of ARHC on any materials or messages, including talking points, to present.	DK	August	Update on Arctic Regional Workshop- It appears still scheduled for October 22 &23, 2020 See: www.oceandecade.dk
ARHC VTC01-08	US and CA to inform the NCWG of thinking and plans regarding a paper.	US and CA	ASAP	Completed See US and CA paper scheduled to be submitted to HSSC-12 (2020) by about 8/14/2020 Poc: John.Nyberg@noaa.gov ; Douglas.Brunton@dfo-mpo.gc.ca ; Colby.Harmon@noaa.gov

ARHC VTC01- 09	interested member states will look at joining the paper to HSSC and should follow-up with Douglas.Brunts@dfo-mpo.gc.ca (CA) and John.Nyberg@noaa.gov (USA) directly.	All	ASAP	See above ARHCVTC01-08 Poc: John.Nyberg@noaa.gov and Douglas.Brunts@dfo-mpo.gc.ca
ARHC VTC-01- 10	Member states to review and offer feedback to the USA on the Science Forum, ARHC agenda, and participants list.	All	July 01	Completed. Science Forum held August 11, 2020 See https://iho.int/en/arhc10-2020

Annex C Comments Offered in Chat Box during the Meeting

Chat Box Records for Thursday, August 13

Yves Guillam 8:43 AM

Genevieve, Doug, very good presentation, indeed. Do you use the Arctic Ship Traffic Database (presented at Arctic Science Forum) for operational planning of surveys in corridors and ENC charting schemes? Merci

Chris Marshall 8:49 AM

Hello Yves, the corridors we use to focus and prioritize our survey and chart priorities are based on historical AIS tracks taken together with client consultation. We are hoping to incorporate the new data from PAME work into our GIS planning tools to inform future plans and ENC scale and scheme

Yves Guillam 9:09 AM

Question for Colby/John Nyberg/Julia: are the US Arctic ENC schemes for all bands considered as formally approved by the AICCWG so they can be included in INTogIS II (S-11 Part B) and ARMSDIWG? Thanks

John Nyberg 9:10 AM

I don't think that the new schemes are formally approved by AICCWG yet.

IHO 9:12 AM

Question for Pia: how will the basis ENCs be distributed?

IHO 9:13 AM

Question for Evert: are marine base maps a kind of ENC or closer to bathymetric charts like S-102? Similarities to Denmark's basis ENCs?

Pia Dahl Højgaard 9:16 AM

Answer to IHO: Basis ENCs will be distributed like 'normal' ENCs via IC-ENC

IHO 9:17 AM

Thanks Pia, this means they will become part of IHO's global ENC catalogue

Pia Dahl Højgaard 9:18 AM

Yes

Evert Flier 9:20 AM

Answer to IHO regarding marine base maps; they are a tool for coastal zone management by coastal communities providing them with the most up-to-date bathymetric, geological and marine biological data layers.

Video on biggest crane ship using S-102 data: <https://youtu.be/5NWDJ3vDFpo>

Chat Box Records for Friday, August 14

Peter McRae 8:21 AM

While the Arctic is a unique geographic area that requires some unique approaches, with the move towards data centric geospatial processes (versus product/ chart based), the desire for global knowledge transfer and general interoperability desires, the approach chosen should attempt to address a result that could be applied universally. Agree to an ARHC-wide gap analysis method

Peter McRae 10:49 AM

I suspect that Ocean Science can only be enhanced by better geospatially defined extents...which means that better mapping makes better science.

RDML Shep Smith 10:49 AM

Should the ARHC consider submitting an action for the UN Decade?

Mathias Dirk Jonas 10:50 AM

But this mapping may not be limited to topography and the theme of surface navigation? Could be part of the local strategic plan consideration?

Pia Dahl Højgaard 10:51 AM

Agree--data contribute to both safe navigation and wider use for science in environment, climate, etc.

Jonathan Justi 10:52 AM

Could we parallel an effort for Ocean Decade and Arctic Science Ministerial which we will hear about as well shortly? We have streams of effort that can be packaged in a compelling way, I think

RDML Shep Smith 10:52 AM

I agree. One action could be to expand the scope of our work to include additional observations and requirements beyond navigation. Many of us already have been taking steps in this direction.

Mathias Dirk Jonas 10:52 AM

That about to bring HO's in charge to constantly monitor plastic pollution in their waters of responsibility?

Peter McRae 10:53 AM

Subsurface topography is critical to navigation, but it is key to many more aspects of waterborne uses and land/sea transitions even.

Mathias Dirk Jonas 10:54 AM

A strategic target to normalize vertical datum with the shoreline on a regional --> global scale

Annex D ARHC Reference Calendar



ARHC-related Events Planning Calendar

Updated August 19, 2020

2020

August 13-14

ARHC-10 (Virtual)

More information: <https://iho.int/en/arhc10-2020>

PoC: Jonathan Justi, NOAA, jonathan.justi@noaa.gov

September 15-25

PAME II-2020 (Virtual)

MPA Expert Group (15 and 16 September)

Shipping Expert Group pre-meeting (17 and 18 September)

Marine Litter Expert Group (17 and 18 September)

REDEG Expert Group (21 and 22 September)

EA Expert Group (21 and 22 September)

PAME II-2020 Plenary Meeting (23-25 September)

More information: <https://www.pame.is/protected-area/2020/pame-ii-2020>

PoC: pame@pame.is

September TBD

Tentative ARHC Statutes Call (Virtual)

Note: Five ARHC members + IHO Secretariat

PoC: Jonathan Justi, NOAA, jonathan.justi@noaa.gov

October 15

UN Decade—Call for Proposals

October 22

Regional Arctic Ocean Decade Action Plan development 2020-2021 Ocean Decade Arctic Workshop—Kick off Meeting (Virtual)

Note: Additional meetings scheduled for October 23, November 5, and November 18 (if necessary)

Online registration for the working group closes on September 25 ([register here](#))

More information: <https://www.oceandecade.dk/arctic-workshop>

PoC: dch@danskhavforskning.net

2021

February

PAME I (Copenhagen TBC)

More information: TBD

May	UN Decade Meeting (Berlin)
May 8-9	Arctic Science Ministerial (Tokyo) More information: https://asm3.org/
Fall	Arctic Shipping Best Practices Information Forum More information: TBD
September	PAME II (Anchorage TBC) More information: TBD
August /September	ARHC-11 (Alaska) More information: TBD

***EPPR—Identifying Upcoming Meeting Dates*