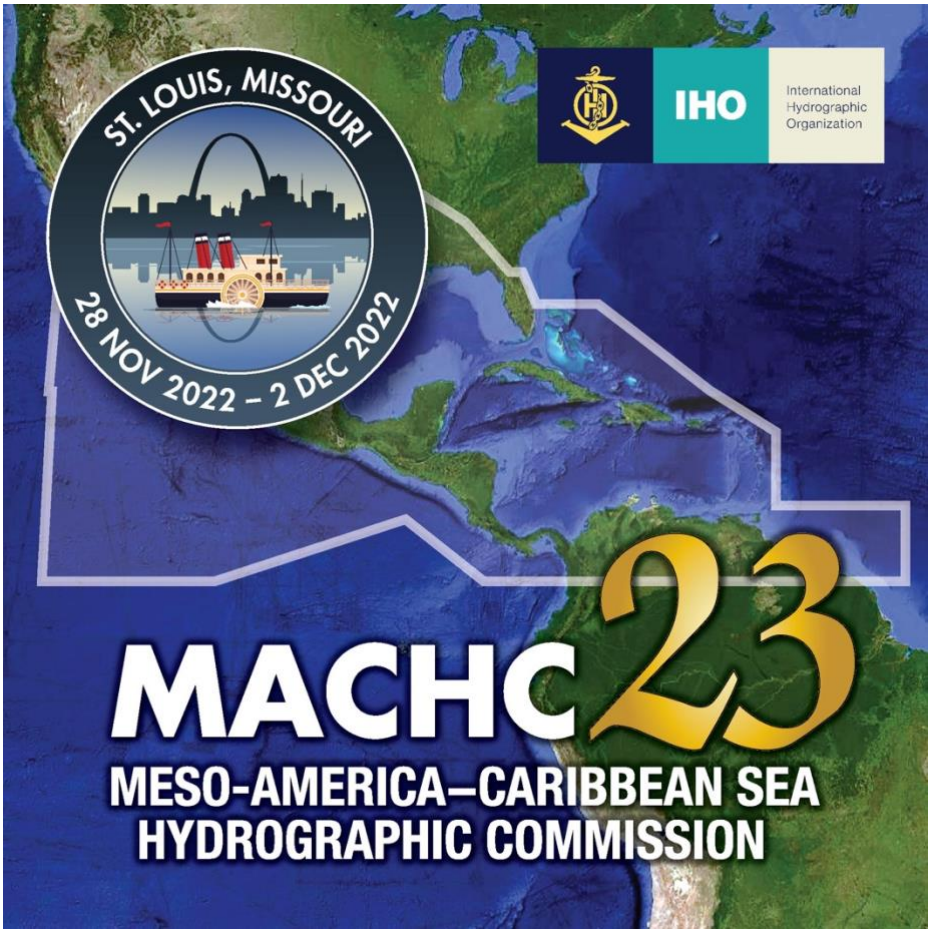
MESO AMERICAN & CARIBBEAN SEA HYDROGRAPHIC COMMISSION MACHC	**MESO AMERICAN - CARIBBEAN SEA HYDROGRAPHIC COMMISSION**	IHO International Hydrographic Organization

23rd CONFERENCE OF THE MESO AMERICAN - CARIBBEAN SEA HYDROGRAPHIC COMMISSION
(MACHC23)

Saint Louis, Missouri, United States of America
Hybrid
November 29th - December 2nd, 2022



Tuesday, November 29th, 2022

First Day of the Conference

Opening Remarks

Chair of the Meso American - Caribbean Sea Hydrographic Commission, Vice Admiral Renato Garcia Arruda

Vice Admiral Renato Garcia Arruda welcomed the many members of the MACHC within the region and from other parts of the world, Representatives of the International Hydrographic Organization Secretariat, Representatives of Observer States, Contributing Organizations, Academia, Industry Partners and other Observers. MACHC Chair expressed gratitude to the United States of America for providing the venue and the infrastructure that made this year Conference possible, after a long period with no face-to-face meetings or conferences.

MACHC Chair highlighted that the international maritime community benefits greatly from the work of the regional commissions. These commissions are intended to encourage all countries in the region to expand their mapping activities, seek advice and technical assistance from IHO and other organizations to improve their capacities, and provide guidance for the implementation of the S-100. In addition, MACHC Chair reported that partnerships between government and non-governmental organizations, academia and industry are crucial to the progress of the commission's work.

Captain John Lowell Junior, Department of Defense Hydrographer

Captain John Lowell Junior welcomed the nations, members of industry and academia and pointed that this is the first time NGA has hosted any Regional Hydrographic Commission. Also emphasized the importance of the inland transportation system for the nations and for the Meso American region and called the attention for the location of the city of Saint Louis, which seats by the junction of two major inland waterways. He put all the US team at the conference disposal for any technologies issues we face during the meeting.

Rear Admiral Benjamin Evans, NOAA's Office of Coastal Survey Director

Rear Admiral Benjamin Evans welcomed all to Saint Louis and thanked the NGA for hosting and organizing the event. He also pointed that having this meeting in a place that is so far from the coast is a valuable opportunity to highlight the role of inland navigation in our region. He also pointed the increasing demand for high resolution navigation data when it comes to inland navigation. He expressed the he was looking forward to discuss some technical challenges over the next few days, including the transition to ENC, developing and coordination of S-100 products and services on our region, also progressing on the goals of Seabed 2030 and the usage of data as part of MSDI. He reminded all that meetings like this are one of the critical ways to cooperate and build capacities toward those goals.

Mr. Matthew Borbash, Deputy Hydrographer of the United States Navy

Mr Matthew Borbash welcomed all to Saint Louis and thanked NGA for providing the facilities. He pointed that the US Navy is a global force with dynamic priorities and

variable challenges, but what remains constant is the need to continue collecting hydrographic data to ensure their forces can navigate safely and gain strategic access. What also remains constant, he said, is the value of international partnership, such as cooperative hydrographic survey, capacity building and data exchange. He pointed that venues like this provide the opportunity to grow professional and personal relationships, which build trust open doors for future cooperation. As hydrographers we are forged by the sea and we must be united to fully understand it and map it. He wished all the participants a great meeting.

Mr. Brett Markham, National Geospatial Intelligence Agency's Chief of Staff

Mr Brett Markham stated that it is an honor and a privilege to be part of this forum and thanked the senior leaders in the room and online for dedicating time energy and their precious resources in order to advance the cause of this commission. At NGA, they put emphasis on partnership and teamwork. MACHC, in his view, is an example of critical partnership on the region focused in safety of navigation and every participant of this conference has a role to play at enhancing the safety of navigation globally speaking. He commended the group for promoting safety of navigation through collaboration in a global sense and said we all benefit from that effort. He pointed that, although we were incapable to meet face-to-face in the last few years, if you look to the accomplishments of the nations and the commission region, it is quite an impressive list of things we have done, even in the face of a global pandemic, for example, since the last face-to-face meeting we have increased our maritime safety information by over 50%. He pointed the need to expand data sharing saying that we all benefit from that, not only for safety of navigation, but also to enhance the disaster response and scientific research. He also thanked the four working groups that worked behind the scenes to advance the goals of the commission and pointed that without the commitment, dedication and resources allocation of those teams, we would not be as successful as we have been over the years.

IHO Director Luigi Sinapi

IHO Director Luigi Sinapi expressed, on behalf of the IHO Secretariat and of himself, special greetings to all in the room and online on this 23rd meeting of the MACHC. Also thanked the Brazilian Hydrographic Office for chairing this important regional Hydrographic Commission and the UK for co-chairing MACHC. He thanked USA, specifically to NGA for hosting this event.

He said this meeting has special importance for the region and for the coastal nations as well for the IHO.

IHO Director Sinapi mentioned the enormous challenges that humanity faces in the marine and maritime sectors and the profound transformations that await the international community in the very near future, referring to the decade dedicated to the oceans by the United Nations.

IHO Director Sinapi concluded his remarks commenting the increasing engagement of the international hydrographic community with the IHO Strategic Plan from 2021 to 2026 the Roadmap for the S-100 Implementation Decade from 2020 to 2030 and the Principles of the World-Wide Electronic Navigational Database for S-100 Products.

Formal Opening

MACHC Chair thanked the speakers for their speeches and thanked IHO Director Luigi Sinapi for his strong support to the MACHC. He wished a very fruitful and productive conference and then declared the 23rd Conference of the Meso American - Caribbean Sea Hydrographic Commission officially open.

1. Meso American - Caribbean Sea Hydrographic Commission (MACHC) Administration and Organizational Issues

1.1 Introductions

MACHC Chair informed that there were 10 Full Members attending the meeting in the plenary room and 2 Full Members online, so the Commission would have the necessary quorum to hold the formal meeting.

23.1.1	Established the necessary quorum to carry out the MACHC23

1.2 Approval of Agenda

MACHC Chair informed that the revised Agenda was in effect and the latest changes to the Agenda were made.

MACHC Chair displayed and reviewed the topics of the four-day agenda and opened the floor for comments on the Agenda as presented. There were no comments and the Agenda was adopted

23.1.2	Approved the MACHC23 Plenary Agenda

1.3 List of Documents

MACHC Chair said that the List of Documents was available on the MACHC23 webpage along with the List of Participants. He noted that there were some presentations that were still missing and encouraged participants to submit their presentations as soon as possible in order to complete our webpage.

23.1.3	Approved the MACHC23 Lists of Documents and Participants

1.4 Matters Arising from Minutes of MACHC22 Conference

MACHC Chair noted that the MACHC Letter 1/2022 submitted the Draft Minutes of MACHC22 Conference asking for comments. All the comments received were addressed and the consolidated Minutes of the MACHC22 Conference were issued on March 18, 2022, leaving for approval at the Conference.

There were no objections and the minutes of the MACHC22 Conference were approved.

23.1.4	Approved the Minutes of the MACHC22 Conference

1.5 MACHC22 Action List Review (Mr. Rodrigo Obino, MACHC Secretary)

Mr Rodrigo Obino explained that with a total of 18 MACHC22 Actions, 8 of them were Completed and 4 would be already Continuous Actions. He listed the open actions with

expiration date up to the MACHC23 Conference. And he pointed out that one action on the recognition scheme for Latin American Hydrographers remained unresolved for more than 3 MACHC Conferences. Following the action review process, this action would be removed from the Action List.

23.1.5	Approved the revised version of MACHC22 Action List

MACHC Chair announced the end of the first item on the agenda and called for a break.

During the break, the official group photograph of the event was taken.

4. Reports from Observing States and Contributing Organizations

4.1 The Importance of the Mississippi River (Colonel Andy Pannier, Deputy Division Commander, Mississippi Valley Division, US Army Corps of Engineers)

Colonel Andy Pannier made the presentation about the importance of the Mississippi River and provided the explanation of the work done by the Mississippi Valley Division. He then asked Rear Admiral Benjamin Evans to provide some information of the work done by the Mississippi River Commission.

23.4.1	Noted the presentation on the Importance of the Mississippi River

2. Meso American - Caribbean Sea Hydrographic Commission (MACHC) Developments, International Hydrographic Organization (IHO) Bodies, Policy Aspects

2.1 IHO Secretariat Report (IHO Director Luigi Sinapi)

IHO Director Luigi Sinapi thanked the MACHC Chair for the opportunity to present the IHO Secretariat report to MACHC.

He gave an overview of the IHO membership status, highlighted the main outcomes of the 6th Meeting of the IHO Council in October 2022, presented how the 3rd Session of the IHO Assembly in May 2023 is being organized, showed the events proposed by MACHC that received funding from the CBWP and offered some recommendations to the Commission.

23.2.1	Noted the IHO Secretariat Report

23.2.1.1	Noted the recommendation to encourage and propose to the IHO Secretariat High Level Visits to those States not yet IHO Member States.
23.2.1.2	Noted the recommendation to continue on the implementation of the IHO Strategic Plan and support IRCC in identifying measures and values to measure those SPIs of regional interest allocated to IRCC, and to consider providing their CATZOC values - through the RENCs - to support the IHO Secretariat in the process of measuring SPI 1.2.2.
23.2.1.3	Noted the recommendation to note the updated version 2.0 of the S-100

	Implementation Roadmap, and the version 1.0 of the Guidelines on the Implementation of the WEND-100 Principles, with particular attention to the creation of a new role of S-100 Services Coordinator or the expansion of the role of Regional Chart Coordinator to include S-1xx products.
23.2.1.4	Noted the recommendation to declare the identity of the State/s selected to occupy the first 20 seats on the Council that are allocated on a regional basis.
23.2.1.5	Noted the recommendation to encourage Members to register on line their delegations to 3rd Session of the IHO Assembly and submit proposals if any by 20 December 2022.
23.2.1.6	Noted the recommendation to continue follow and evaluate the possibility to contribute to the CB Programme.
23.2.1.7	Noted the recommendation to participate at the EWH project and provide proposals via the specific webpage (https://iho.int/en/basic-cbsc-ewh) set up under the Capacity Building Sub-Committee (CBSC) for this project, and answer to the Questionnaire issued with IHO CL 26/2022.
23.2.1.8	Noted the recommendation to provide contributions of online learning material to the Project Team established for the IHO e-Learning Center at KHOA.
23.2.1.9	Noted the recommendation to encourage all information providers (NAV and MET Area Coordinators and RCCs) to complete agreements with all RMSS and commence the necessary testing of the SafetyCast system to progress towards declaring full operational status.
23.2.1.10	Noted the recommendation to establish and maintain effective communications with the relevant NAV and MET Area Coordinators to ensure the timely provision of MSI.
23.2.1.11	Noted the recommendation to use and follow the guidance provided in S-53 – Joint IMO/IHO/WMO Manual on Maritime Safety Information – to ensure the necessary facilities and capabilities are provided and maintained for the gathering and communication of MSI within their area of national responsibility.
23.2.1.12	Noted the recommendation to consider the impacts of the increasing global societal and United Nations (UN) driven need to complete the picture of the seafloor as well as the potential benefits to individual coastal States.
23.2.1.13	Noted the recommendation to make data freely available for inclusion in the DCDB and the widest possible use, in accordance with IHO Resolution 1/2017.
23.2.1.14	Noted the recommendation to Nominate the CSB-GEBCO-Seabed 2030 Regional Coordinator.
23.2.1.15	Noted the recommendation to consider to review national legislation to remove barriers restricting CSB activities within their waters.
23.2.1.16	Noted the recommendation to take note of the engagement of the IHO Secretariat in the United Nations Decade of Oceans for Sustainable Development initiative and the items (Global Ocean Observing System,

	Global Ocean Alliance, Organisation for Economic Co-operation and Development) for further consideration.
23.2.1.17	Noted the recommendation to review their entry in the IHO Yearbook and C-55 and to provide the IHO Secretariat with the appropriate updates or to report no change (CL 20/2019 refers).
23.2.1.18	Noted the recommendation to consider submitting papers for publication in the International Hydrographic Review.

2.2 IHO Council Update (Mr. Rodrigo Obino, MACHC Secretary)

Mr. Rodrigo Obino presented the issues discussed on the 6th Meeting of the IHO Council, held in Monaco in October 2022. He went over the aspects that were not mentioned by IHO Director.

He explained the news on the update of the Roadmap for the S-100 Implementation Decade, on the 'S-57 ENC to S-101 Conversion Guidance', on the progress made by the IHO-Singapore Innovation and Technology Lab, on the WEND100-IGIF matrix, on the IHO collaboration with IMO regarding document review, on the future of paper chart, on the Strategic Performance Indicators of the IHO Strategic Plan 2021-2026, and on the status of the Capacity Building budget to fund CB events.

23.2.2	Noted the IHO Council Update

2.2.1 Overview of election process for MACHC representatives to the IHO Council (Mr. Rodrigo Obino, MACHC Secretary)

MACHC Chair called for attention for the election process for MACHC representatives to the next IHO Council term.

Mr. Rodrigo Obino reminded the list of 10 MACHC Full Members that would be eligible in this process, according to IHO CL 43/2022, and that MACHC would have 2 seats allocated. He explained the election process in accordance with Annex 4 to the Statutes of the MACHC. Finally, Mr. Obino reminded about the MACHC Letter 24/2022 that called for nominations until December 1, 2022.

23.2.2.1	Noted the Overview of Election Process for MACHC representatives to the IHO Council

2.3 IHO Inter-Regional Coordination Committee Update (Mr. Rodrigo Obino, MACHC Secretary)

Mr. Rodrigo Obino presented the highlights of the last IRCC meeting in June 2022, with special attention to the Strategic Performance Indicators attributed by IRCC to the Regional Hydrographic Commissions (RHCs) and the recommendations for the RHCs.

Mr Obino presented 16 IRCC recommendations for MACHC, many of them were either completed or in progress. He also pointed the following IRCC Recommendations that he suggested to be considered by the Commission:

- RHC are encouraged to increase the collaboration with the Data Quality WG;
- RHC to discuss how HOs can assume a geo-coordinating role to help ensure provision of data on a regional level;
- RHC to start or proceed with the debate on how the climate change related activities can be further investigated and what can be the role of the IHO;

- RHCs to apply Action WENDWG12/33;
- RHC to reply to the WENDWG template SPI 1.3.1.

23.2.3	Noted the IRCC Update

23.2.3.1	Noted that Members should increase the collaboration with the IHO Data Quality Working Group and to evaluate the nomination of candidates for the vacancy of the Vice Chair and Secretary positions.

The following Actions were approved by the Commission:

23.2.3.2	Members to discuss how Hydrographic Offices can assume a geo-coordinating role to help ensure provision of data on a regional level.
23.2.3.3	Members to start or proceed with the debate on how the climate change related activities can be further investigated and what can be the role of the IHO
23.2.3.4	MACHC to apply Action WENDWG12/33 (WEND-100 Product Matrix will be made available on the WENDWG Repository webpage when finalized).
23.2.3.5	MACHC to reply to the WENDWG template Strategic Performance Indicator 1.3.1 (Ability and capability of Member States to meet the requirements and delivery phases of the S-100 implementation plan).

2.4 Maritime Safety Information / World-Wide Navigational Warning Service Sub-Committee Report (Mr. Christopher Janus, WWNWS-SC Chair)

Mr Christopher Janus presented the NAVAREAs included in the MACHC Region and the responsibilities involved to broadcast the Navigational Warnings. He also stated that there is a solid plan to get to the implementation of S-124 when it comes to Navigational Warnings. Mr Janus then showed the measurements on the Strategic Performance Indicator 3.1.1 (percentage of coastal States that are capable to provide MSI according to the Joint IMO/IHO/WMO Manual on MSI) for the Commission region for the past 3 years (from 2020 to 2022).
He finally listed the States that the NAVAREA XII Coordinator has not received MSI messages and that need to establish or confirm a point of contact regarding MSI.

23.2.4	Noted the WWNWS NAVAREA IV, V and XII Report

With that, the MACHC Chair invited all the in-person attendees to join the icebreaker cocktail that would take place at the lounge right outside the plenary room and to join the Conference the following day.

He then closed the first day of the Conference.

End of First Day of the Conference

Wednesday, November 30th, 2022

Second Day of the Conference

MACHC Chair opened the second day of the Conference thanking the Industry Partners for sponsoring the icebreaker cocktail after the end of the first day session of the Conference.

MACHC Chair asked the presenters to respect the time allocated for their presentation and distributed Members into three Breakout Groups in order to present their National Reports to their groups. After lunch, the Commission would meet in the plenary room to watch some presentations from IC-ENC and industry partners. After those presentations, the three Breakout Groups would resume their work in the designated rooms.
The distribution of the Members into 3 breakout groups was intended to:
- Provide an opportunity for greater discussion and engagement about the content of National Reports.
- Provide an opportunity for greater discussion and engagement on the context of the Implementation of S-100 based products and services in the MACHC Region in the afternoon session.
- Synthesize the discussion results to be considered by the plenary.

Each group had a Chair, Dominican Republic for Group A, Jamaica for Group B and France for Group C. Additionally, the Chairs have received templates to guide them in conducting the discussions in their Breakout Groups.

3. Breakout groups / National Reports presentations

Group A (Presentations in Spanish)*	**Group B (Presentations in English)**	**Group C (Presentations in English)**
Colombia	Antigua and Barbuda (A)	Belize (A)
Costa Rica (A)	Brazil	Barbados (A)
Cuba	Grenada (A)	**France (Chair)**
Dominican Republic (Chair)	**Jamaica (Chair)**	Guyana
El Salvador (A)	Netherlands	Haiti (A)
Guatemala	Saint Lucia (A)	St. Kitts and Nevis (A)
Honduras (A)	St. Vincent and the Grenadines (A)	Suriname
Mexico	Trinidad & Tobago	United Kingdom
Nicaragua (A)	United States of America	
Panama (A)		
Venezuela		

* With simultaneous translation from Spanish to English and vice-versa
(A) Associate Members

Dominica and Spain, MACHC Observer States, was invited to participate in Group C and Group 4, respectively.
In Group A, Costa Rica, Nicaragua, Panama and Venezuela did not attend the session.
In Group B, Saint Lucia and Trinidad & Tobago did not attend the session.
In Group C, Barbados did not attend the session.

After the presentations of the National Reports by the Members the participants of the MACCH23 Conference took a break.

9.5 Activities on S-100 Standard

9.5A IC-ENC S-100 Progress Update (Mr James Harper, IC-ENC General Manager)

Mr James Harper stated he brought mixed bag of information, since the audience were composed by offices with a senior knowledge on hydrography as well as by emerging countries that are not there yet. So he intended to show how hydrographic offices and arranged partners are working together in solutions for hydrographic offices with all the challenges the S-100 standard is bringing for them.
He explained the IC-ENC S-100 progress.
2026 is the beginning of operation of the new (S-100) ECDIS and IC-ENC membership (a group of 48 countries) has been working in this format to understand their methods of production and plans of implementation of the S-100 products.
Mr Harper also presented a flowchart for S-101 Service showed what the aim of this service is to establish an end-to-end S-101 service, data ingest, assessment and data output. He illustrated the progress on the workplan on S-101, S-102, S-104, S-111 services.
An additional aspect to mention is the approval of a new (S-100) IC-ENC service, which is to produce the S-128: Catalogue of Nautical Products (CNP) as part of the future RENC services to its Value Added Resellers. S-128 itself describes the status of nautical products and edition 1.0.0 was already endorsed at HSSC14 for implementation and testing.
Finally, regarding to the IC-ENC Learning Management System (LMS), it was established in 2021, it's a collaborative area for work and there are 85 active users at this moment from the MACHC Region, and 500 in total. It's a positive help as it has many discussion forums that users can discuss and get ideas and help concerning to the topics created. The IC-ENC LMS have many MACHC Member learner accounts.

9.5B IHO S-100 in support of e-Navigation and Port-Shipping Operations (Mr. Rafael Ponce, ESRI)

Mr Ponce started his presentation speaking about the fourth industrial revolution, which he called "The Cyber Physical Systems". He also introduced the concept of "seaconomics" and how the cargo transporting has reached interconnectivity, with the Internet of Things (IOT) and Artificial Intelligence and how it is crucial to our lives. It was commented that it has become a trend that everything is now digitized.
He also made considerations of some technological factors and presented the concept of the kubernets, which are containerized services. And mentioned virtual reality as

well as augmented reality. Some of those features have impact on the growth autonomous ships.
Mr Ponce alerted that we focus on the human factor on the S-100 data, but we need machine-readable data and that is what we need to keep in mind when developing those new standards. There are ports, like the Port of Rotterdam, there are fully automated.
IMO has decided that IHO standard S-100 should be the baseline for the IMO envisaged Common Maritime Data Structure (CMDS), which is, in his view, a subset of MSDI.
He announced that, for those developments, there was a council called PortCDM (Port Collaborative Decision Making) and they are in charge of developing the S-200 series. IALA is also developing S-200 standard through the PortCDM Council. He also made considerations on the S-211 standard and showed a map that indicated the points all the services needed to happen. And, in order to provide all those services to the ships, there is the concept of the "single window", which tries to enable a single point of contact for exchanging the information from the ship and also from the port and that is the connection with the MSDI.
So, in order to organizing all this information, addressing all these different concepts, we need, from the technologic point of view, a geospatial Infrastructure to integrate all those services and make them available.
In order to make the navigation more efficient, ESRI is supporting S-100 that is being developed and they are looking into the most efficient way of maintaining one single database, from which you can produce S-57/S-101, that is the challenge now, creating one single database to produce all S-100 products and also all the products that will be derived from this standard.
Mr Ponce concluded his presentation saying that all those concepts, that he briefly commented, come together for the future of Maritime which is happening now, it is the present.

9.5C Your roadmap to S-101 and S-57 production with CARIS (Mr. Andy Hoggarth, Teledyne Geospatial)

Mr Andy Hoggarth started his presentation with some guidance for the nations through the S-100 journey.
He presented the CARIS Ping-to-Chart workflow. He also said that CARIS was involved in the S-57 standard creation, as well as it is with the S-100. He announced that there is a tool they developed, more like a plugin to HPD, to convert S-57 into S-100. Then, he presented the conceptual HPD S-100 workflow, saying that the Hydrographic Offices could have a single database based on S-100, and sugegsted that they could use the converter to produce also S-57 and nautical paper charts to supply that to the market if they still need that.
He announced the module has already 90% of conversion ready to use and that the conversion rules are also editable
Mr Hoggarth concluded by asking if it would be better to continue working with nautical paper chart and S-57 in parallel with S-101, or if they could be more determined by modeling the world in S-100 and producing S-57 as a derivative work while we still need it.

9.5D SevenCs short update on S-100 tools (Mr. Ryan Heinz, SevenCs)

Mr Ryan Heinz announced he intended to present some S-100 activities they were doing and some of the new projects they've been working on.
SevenCs is also working on a tool to convert S-57 to S-101. Mr Heinz announced they have just released the 7Cs Analyzer 5.1 and presented its key features.
He stated that SevenCs is working on an analyzer conversion-readiness check editor.
To conclude his presentation, Mr Heinz explained the S-100 Data Management System.

3. Breakout groups (continuation) / Discussion on S-100 Implementation

For the next session, Members and Observers were invited to resume their work with the Breakout Groups, where they should discuss about the implementation of the S-100-based products and services in the MACHC Region.

The discussions involved the following issues:
- Role of the S-100 Coordinator;
- Conversion from S-57 to S-101 / 'Dual-Fuel' Concept;
- MACHC WEND-100 IGIF Matrix.

He also reminded that before the end of the session the groups should develop a final consensus to be presented for the plenary appreciation.

MACHC Chair gave also the directives for the first session of the third day of the Conference, when the Breakout Group Chairs should present the outcomes of their groups.

End of Second Day of the Conference

Thursday, December 1st, 2022

Third Day of the Conference

MACHC Chair welcomed all to the third day of Conference and reminded about the nomination for the seats on behalf of MACHC in the IHO Council next term.
He also thanked the Industry Partners for sponsoring the enjoyable river cruise reception the night before.

3B Breakout Groups Reports

3B.1 Breakout Group A (Capitán de Navío Pedro Antonio Ventura Polonia, Dominican Republic)

Capitán de Navío Pedro Antonio Ventura Polonia presented himself as the head of the Hydrographic Office of Dominican Republic.
The group was divided into two categories: those advanced in the development of hydrography (Mexico, Colombia and Cuba) and those that are still not as organized as they should be.
Those not organized have advanced in some aspects such as:
- They could tell that there is a will of strengthen the hydrographic offices of their countries.
- They have reached the production of nautical products, with help of both local and international alliances.
- They have advanced slowly on the matter of aids to navigation and the partial broadcasting of safety of navigation information.

Challenges/obstructions that are common to the members of this group:
- Sensitization of the authorities, he claimed IHO to use their power to convince the authorities about the importance of the hydrography strengthening.
- Capacity building, on subjects such as cartography, MSDI, MSI broadcasting, hydrographic software and what can be the most traumatic matter: the migration from S-57 to S-101.
- Budget – members of this group do not have an independent budget to advance in the matter of safety of navigation.

Plans for the future that affect the region:
- Local production of several nautical;
- Admission to the IHO (El Salvador, Honduras);
- Intensify cooperation between nations in order to strengthen hydrography.

23.3.A.1	Noted the Breakout Group A Chair presentation

23.3.A.2	Noted the National Report presentations from Colombia, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico

3B.2 Breakout Group B (Mr Diego Billings, Jamaica)

Overall Points of Synergy or Potential Collaboration:
- There is a need for different levels of capacity building depending on the countries (Antigua and Barbuda, Grenada and St. Vincent and the Grenadines needs basic IHO CAT A & B hydrography training).
- Unmanned Aerial Vehicles are currently being used by Brazil and Jamaica to map their shoreline, both countries will work closely to improve their operations by sharing knowledge and information.

Implications and Messages for MACHC Plenary: the capacity building plan could be tailor made to every country's need depending on their hydrographic capabilities. While some countries need high level visits (meaningful discussions at the ministry level), others need technical visits (focus on data management and processing). Consider a country level gap analysis to determine needs.

Significant projects and/or accomplishments: here are major developments across the Caribbean Islands, port expansions for cruise ships (Antigua and Barbuda-& Jamaica-Port Royal Cruise Port).

Surprising Achievements and Innovations:
- Unmanned Aerial Vehicles are currently being used by Brazil and Jamaica to map their shoreline, both countries will work closely to improve their operations by sharing knowledge and information.
- Brazil recently launch the first version of this geoportal, based on OGC platforms.

Role of the S-100 Coordinator:
- MACHC should work to coordinate S-101, S-102, S-104, S-111, S-124, S-128 and S-129 in the MACHC Region to reflect the WEND Matrix.
- MACHC should have an S-100 Coordinator, and may consider having a S-57/101 Coordinator and over the next 6 months: Develop TORs for the Coordinator roles, Select Coordinators, and Prepare short update for the WENDWG.
- According to WEND-100 Principles "ANNEX A" the MACHC should consider having MMSDIWG Coordinate S-1xx for other maritime uses.

Conversion from S-57 to S-101 / 'Dual-Fuel' Concept - Every country is in a different phase of the S-100 journey and the MACHC should support the exchange of experiences during this transition period.

23.3.B.1	Noted the Breakout Group B Chair presentation

23.3.B.2	Noted the National Report presentations from Antigua and Barbuda, Brazil, Grenada, Jamaica, Netherlands, St. Vincent and the Grenadines, United States

3B.3 Breakout Group C (Mr Pierre-Yves Dupuy, France)

Overall Points of Synergy or Potential Collaboration:

- Hydrographic surveys are carried out and SDB is acquired but more surveys, equipment and training (Cat A, Cat B and MSI) are needed.
- As PCA for some countries, UK and US carry out very beneficial close cooperation in hydrography (CB and surveys).
- S-101 transition is a challenge for the ENC producers of the group: more exchange of best practices would be beneficial.
- Some services in charge of hydrography are also responsible for AtoN which contributes to coherence.

Implications and Messages for MACHC Plenary:

- Some countries have implemented governance for Maritime Spatial Planning (MSP) and/or MSDI. The IHO visits appear to be a way to strengthen the integration of hydrography in those governance.
- An IALA workshop will be held in Suriname in 2023: the countries are invited to attend.
- Several countries have taken initiatives to empower women in hydrography.

Surprising Achievements and Innovations:

- MSP and MSDI governance were recently implemented in two. It seems to be a lever to take into account the usefulness of hydrography in all its dimensions (safety of navigation, environment protection).
- UK and France will be happy to share their joint experimentation of S-100 ECDIS (S-101 and other products) across the Channel.
- France presented the implementation next year of a platform which will disseminate navigational warnings in S-124 and for mobile apps near the coast.

Role of the S-100 Coordinator:

- The group tends to consider the coordination role for S-101 ENCs be assigned to the MICC coordinator.
- It appears useful to clarify by S-100 product the nature of the coordination role
- It also seems reasonable that the S-100 coordination role(s) be consistent across the Regional Hydrographic Commissions.
- If a WG were created for the S-100 used for safety products, it should be within the MICC.

Conversion from S-57 to S-101 / 'Dual-Fuel' Concept:

- UK, Suriname and France which are the ENC producers of the group intend to produce S-101 ENCs as early as 2026.
- France plans to have a database in S-101 and to consider the S-57 ENCs as derivative products from S-101. It intends to entrust a third party (preferably the RENC PRIMAR) with the production and the maintenance of S-57 data to mobilize its resources in the development of other S-100 products.

23.3.C.1	Noted the Breakout Group C Chair presentation

23.3.C.2	Noted the National Report presentations from Belize, France, Haiti, St. Kitts and Nevis, Suriname, United Kingdom

MACHC Chair thanked all the breakout groups Chairs who managed to convey and summarize so many important subjects.

4 Reports from Observing States and Contributing Organizations (continuation)

4.2 International Maritime Organization (IMO) (Mr Colin Young, IMO's Caribbean Regional Coordinator)

Mr Colin Young provided an update on the work of IMO in the context of hydrographic matters. He presented the topics: e-Navigation, ECDIS and Carib-SMART Preparatory Phase Project.

MACHC Chair thanked Mr Young on his active participation on behalf of IMO on the events of the Commission.

23.4.1	Noted the presentation on IMO Updates.

4.3 International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) – Updates on S-200 (Mr Minsu Jeon, IALA Technical Operations Manager)

Mr Minsu Jeon presented the role of IALA on the S-200 development. When it comes to S-200 publications, IALA has the Recommendation 147 on the Product Specification development and management and under this document, there are 3 guidelines:

- Management of IALA domain under IHO GI;
- Introduction to Preparing S-100 Product Specification;
- Producing S-200 Product Specifications.

Mr Jeon also said there would be a revision on those documents for the following year. He showed, for better understanding the S-200 World, a picture of the standards projected for the S-200 family (201-209: Aids to Navigation (AtoN); 210-219: Vessel Traffic Services (VTS); 220-229: Communication Systems; 230-239: AIS, ASM, VDES2; 240-249: Positioning Systems).

Mr Jeon shared the internet link to the S-200 testbed: http://tds.bluemap.kr/. The aim of this testbed would be to find unidentified issues and get better products specifications.

He concluded his presentation presenting the IALA Strategy.

23.4.2	Noted the presentation on IALA Updates on S-200 Development

4.4 IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE)

The Head of the UNESCO-IOCARIBE Secretariat apologized for not being able to make the presentation.

4.5 The Hydrographic Society of America (THSOA) (Mr Rafael Ponce, THSOA Chair)

Mr Rafael Ponce stated he was representing the Hydrographic Society of America, which is a non-profit organization to support hydrography in the US and in the

Americas, with 7 chapters (6 in the US and 1 Latin American Chapter). He also said that MACHC Members would be welcome to join the THSOA.
Mr Ponce invited the Members to attend the US Hydro 2023: "Hydrospatial: The Next Frontier of Hydrography", which would be held in Alabama.

23.4.3	Noted the presentation of The Hydrographic Society of America

8 Marine Spatial Data Infrastructure

8.1 MMSDIWG Report (Mr James Rogers, MMSDIWG Chair)

Mr James Rogers provided the plenary report for the MMSDIWG. He presented its key accomplishments:
- the MMSDIWG Secretary position was established and filled by Amrika Maharaj & Rachel Bobich,
- they reached out to other RHC MSDI WG to share best practices and knowledge and met with ARHC MSDI WG,
- they updated the MMSDIWG Work Plan (available on the "Initiatives of the MACHC" webpage),
- they updated the MMSDIWG webpage and used it as a method for sharing meeting materials and useful links.

He also showed a screen of the MMSDIWG webpage and invited members to visit it.
Regarding to MSDI, he listed the engagements and partnerships and showed some of the ongoing actions they are working on.
Mr Rogers also presented the future direction and the MMSDIWG Work Plan for 2023.

23.8.1	Noted the MMSDIWG Report

8.2 Progress on DHN Marine Spatial Data Infrastructure (LCDR Christopher Florentino, Brazil)

LCDR Christopher Florentino said that the fast development of new technologies would bring a huge volume of data and the marine spatial information would have a huge potential.
Regarding governance and geographic content, he showed the history of number of requests of data from the public, which in fact would be the major concern of DHN to share data. He also presented the types of customers and the types of data requested.
He said DHN MSDI was designed in 2016 and it was based on OGC platforms. The geoportal was expected to be launched in 2020/2021, but due to the pandemic restrictions it became available only in 2022.
The main achievement in the present year was the releasing of more than 500 metadata and some layers, organized in 9 categories in order to facilitate the access of the data. And it all contributes with the National Spatial Data infrastructure (NSDI) and to support the Marine Spatial Planning (MSP) in Brazil.
Regarding the challenges and perspectives, he concluded his presentation showing that DHN MSDI stills need:

- to conclude the necessary adjustments of GeoNetwork and GeoServer environments (data loading and integration process of another SDI),
- to development and implement more capabilities to user interact with the marine spatial data by the geoportal DHN MSDI,
- to reinforce the national maritime identity.

23.8.2	Noted the presentation on the Progress on the Brazilian MSDI

8.3 Unlocking the Value of the Information (Mr Rafael Ponce, OGC Marine Domain Working Group Co-Chair)

Mr Rafael Ponce informed that the Open Geospatial Consortium (OGC) have a working group dedicated to the marine domain. They have been trying to unlock the value of maritime information for non-navigational users and they would be working closely with the IHO and the UN-GGIM.
OCG would be an organization that brings together all the interested stakeholders in the geospatial community.
Geospatial data is everywhere and the hydrographic international community would need to collaborate to navigate through the massive amount of information.
In the marine domain, they would have a project that started in 2016, called Federated Marine SDI. Some of the outcomes of the Federated MSDI would be a technology demonstration showcasing that could connect those open APIs to the new standards, in this case, S-100. They evaluate the impact of those standards to the existing OGC standards and accommodating and connecting them, and also the impact of the OGC APIs to the IHO standards.
Mr Ponce concluded his presentation, summarised the demonstrations with some topics:
- the interface was created to be easy to use and understand for non-geospatial experts,
- web service ingest from a variety of sources including various government sources and from several Federated MSDI Project Server implementations,
- Multiple web service types (WMS, WFS, WMTS, OGC Features API and ArcGIS REST Service),
- IHO S-100 family of hydrographic and maritime data models ingest (S-104 and S-421).
He also exposed some take-aways from those services:
- web services allow implementers to easily expose GIS functionality and geospatial information over the internet,
- common standards for web services and data models make interoperability simple and straightforward,
- web services underpin the FAIR data principle making GIS data useable and reusable by governments and industry,
- the emergency management application of standards-based interoperability encourages to investigate geospatial data uses further.

23.8.3	Noted the presentation on the Open Geospatial Consortium Marine Domain Working Group (OGC Marine DWG)

8.4 Global Maritime Traffic Density Service – GMTDS (Mr Dave Kanoy, National Geospatial-Intelligence Agency)

Mr Dave Kanoy gave an introduction on the Global Maritime Traffic Density Service, which would be service that enables international maritime stakeholders to access tangible analysis of evolving marine traffic patterns and would provide decision-makers with actionable information to help prioritize ocean areas for nautical product coverage.

The access to GMTDS would be globalmaritimetraffic.org. The service would be open to access and the data could be shared with colleagues, academics, foreign partners, etc. Beyond web map, data would be available for further analysis and GIS uses.

Mr Kanoy concluded that GMTDS would be a living proof of concept for NGA that agile development methods could be implemented into contracts. GMTDS development/sustainment model would be scalable and could be leveraged to create dynamic GEOINT enterprise solutions in support of NGA strategic goals, evolving rigid processes.

23.8.4	Noted the presentation on the Global Maritime Traffic Density Service (GMTDS) (NGA/USA)

Session summary and implications:

Mr James Rogers summarised the discussions on this MSDI session listing the MSDIWG efforts. He congratulated the Brazil's effort to create a MSDI and make that possible. He also thanked OGC on the effort to try to standardize data from the MSDI perspective. Regarding GMTDS, it would be a great resource to be available to athe maritime community. From the overall MMSDIWG Work Plan for 2023, he asked the Commission approval.

The Commission approved the MMSDIWG Workplan for 2023.

23.8.1.1	Approved the MMSDIWG Work Plan for 2023

6.3 Industry Activities on Survey and Risk

6.3A Application and Benefits of Physics-based Satellite-derived Bathymetry within the MACHC Region (Mr Edward Albada, EOMAP)

Mr Edward Albada presented himself as representative of EOMAP in the US and presented the company. EOMAP is a German private Company with offices in USA, Indonesia, Dubai and Australia. Their focus is on satellite data analytics and software solution, specialized in aquatic environments.

What is satellite derived bathymetry (SDB)? Bathymetry mapping from space (airborne) sensors relies on a mix of passive or active sensors measuring the reflected light from the seafloor and the analytics.

He said EOMAP uses a different technology than most of their competitors, they use physics-based SDB.

He also presented EOMAP's SDB Projects in the MACHC Region and some applicable examples of SDB.

It can also be used for better understanding of spatial & temporal movement of sandbeds, volumetric analysis, sediment budget, identification of sensitive habitat areas, ability to track changes, seagrass coverage area stable, BUT meadow locations have migrated, understand structure impacts.
At the end of his presentation, Mr Albada let the audience know that there was a SDB online and also an APP they've developed and it is available for the convenience of the hydrographic offices.

4 Reports from Observing States and Contributing Organizations (continuation)

4.6 National Report from Observing State (Mr. Craig Laville, Dominica)

Mr Craig Laville presented the top achievements during the year:
- Navigational charts for coastal areas for Main Port was updated by UK (2019)
- New features and changes after Hurricane Maria have been taken into account in the updated charts.
- Coastal Master Marine Spatial Plan for Dominica completed.

Mr Laville also presented the top challenges and/or Obstructions
- Training is required to build capacity in the area of hydrography.
- Appropriate provisions of SOLAS Convention needs be domesticated, put into national law to provide legal basis to give full effect to this type of activity.
- Lack of Hydrographic Survey Equipment

To conclude his report, Mr Laville presented the top plans that affect the region:
- Collection of Hydrographic data.
- Dominica Coastal Master and Marine Spatial Plan. This will affect coastal regional investment in the Dominica Blue economic thrust.
- Harmonization and coordination hydrographic services in the OECS region.

23.4.6	Noted the presentation of the National Report of Dominica

9 Nautical Charts and Publications

9.1 MICC Report (Mrs Bernice Mahabier, MICC Chair)

Mrs Bernice Mahabier thanked all the members and observers that support the MICCWG because a lot of work is been done.
She started the presentation by showing the members and the work produced that has been taking place over this last period.
- The MACHC ENC Boundary – Brazil submitted to the group and some years ago a decision was made to extend the boundary to include parts of the Amazon River.
- Increasing production of ENC at the region, reaching the mark of 1114 ENC available at the region.
- No updates on INT Charts current coverage.
- The cruise ship port gap list is on the MACHC MICC webpage for members to fill the Gaps.

Regarding S-100 update, at MICCWG, it was discussed:
- The Role of the S-100 coordinator

- The S-100 implementation -WEND100-IGIF Matrix
- Test bed update: Netherlands: S-102 (Bathymetry Surface), USA: S-102, S-111 (Surface Currents), France: S-102, S-124 (Navigational Warnings), and UK.
- MACHC Regional Gridded ENC Scheme-Band 1 – MRES WG.
- Gridding plan of different members such as USA (NOAA), Venezuela and UK.
- IC-ENC (RENC) and MACHC Chart producers have incorporated S-100 services in their business plan.
- Capacity building opportunity for IC-ENC members and nonmembers through IC-ENC Learning Management System (LMS).
- The IC-ENC has a dedicated LMS dashboards and discussion forum for the MACHC for ENC Gridding. This allows sharing of good practice/ collaboration and the ability to ask and answer questions.

She showed the S-100 production plans for the next 10 years.

To conclude her report, Mrs Mahabier requested to approve the MICC 2023 Work Plan and the MACHC Regional Gridded ENC Scheme for Usage Band 1.

23.9.1	Noted the MICC Report

9.2 MRES Sub Working Group (Mr Julio Castillo, MRES Sub Working Group Co-Chair)

Mr Julio Castillo started his presentation saying that their goal within the MRES is to adhere to the following decisions outlined in previous MACHC Conferences in 2020 and 2021 including

- The endorsement in MACHC21 of an incremental approach towards a standardized regional ENC Scheme beginning with Usage Band 1 ENC cells.
- The listed endorsement in MACHC22 to continue discussions on regional ENC rescheming by our MICC Sub WG taking into account coastal states positions.

The MRES WG has also noted and incorporated a presentation by the UK on their future rescheming plans throughout the region and also discussions held at MACHC 22 supporting a continuation of discussions within the MICC while addressing benefits to mariners, end users, and producers.

And so pursuant to those previous actions and decisions, the MRES sent out two survey questions through circular letters to member states requesting answers and feedback.

The results to the first question of preference between three grids submitted for analysis were the UK planned scheme would be preferred due to the potential for seamless coverage and harmonized compilation scale across the MACHC Region and beyond. Concerns raised by member states center around benefits to end users and producers, potential issues relating to existing charting arrangements with neighboring charting authorities, and progressing too quickly without complete input from all coastal states affected. However, it was resolved that work could begin at usage band 1 if the ENC producers at this usage band were ready.

The second survey question is an intent to gather unanimous support from member states in endorsing the beginning of collaboration between the two ENC producers at usage band 1 in the MACHC, USA (NOAA) and the UK, which was achieved from the survey respondents of Brazil, Colombia, El Salvador, The Netherlands, Suriname, and

the United States, with France indicating that it has no preference as it is not an ENC producer in Usage Band 1.
At our MICC Pre Conference meeting, several issues were raised to consider going forward this next calendar year including generating more inclusive and technical discussion amongst the whole MICC WG when proceeding forward and increasing focus on the S-100 implications, benefits, and challenges faced by member states in the MACHC.
The MRES WG would like to recognize and take into account moving forward all the feedback and suggestions raised by member states, and take steps to encourage more frequent technical discussion between all member states in the MICC/MACHC going forward. The MRES WG also believes that there is an opportunity through the MICC ENC and the MACHC ENC Online viewers to allow easier access to technical data for all members to analyze more efficiently in the future.
Mr Castillo concluded his presentation requesting the Commission to consider endorsing a phased implementation of the UK Re-scheme Plan across the MACHC Region at the Usage Band 1 with the goals eliminating the risk of data coverage gaps and overlaps, harmonizing compilation scale of nautical features, and preparing for S-100 products in the future, and a path forward that involves noting and incorporating guidelines from the WENDWG and further discussion on how to proceed with future Usage Band 2 and 3 ENC producers.

23.9.2	Noted the MICC Sub WG on MACHC Regular ENC Scheme (MRES) Report (NOAA/USA)

Comment from Mr Pierre-Yves Dupuy (France):
Mr Pierre-Yves Dupuy pointed out that there were no new arguments in favour of a gridded scheme since the last year's Conference. The position of France written in the minutes of the last year's Conference remains unchanged: there is no obvious benefit either for the users of ENCs or the producers and so, they have no intention to change the scheme of the ENC they already produce. Also, he highlighted there was one issue that was more important, which is to harmonize the compilation scale across the same Usage Band.

Comment from Mr Rodrigo Obino (Brazil):
Brazil supports the proposal for approval of Usage Band 1 and also that it should put on hold the discussions on the proposal for Usage Bands 2 and 3.

23.9.2.1	Approved the MRES for Usage Band 1 (UB1)

9.3 WEND-100 Matrix (Mrs Bernice Mahabier, MICC Chair)

Mrs Bernice Mahabier started by informing that the matrix was distributed via circular letter and that there were some discussions about this issue, so, all members should be familiar with the matrix at that point. The matrix was designed to have a baseline of where we are standing as a regional hydrographic commission and she showed the results of MACHC about different products: S-101 = 57.4, S-102 = 75.6, S-104 = 40.5, S-111 = 72.9, S-122 = 37.8, S-124 = 35.1, S-128 = 29.7, S-129 = 29.7, MSDI = 70.2.

IHO Strategic Plan 1.3.1 - Ability and capability of Member States to meet the requirements and delivery phases of the S-100 implementation plan (2026: 50%).
Mr Dupuy (France) was globally very happy with the results but found the score of S-122 quite low, despite the international regulation and asked why it was so low. John Nyberg answered that he was open to revise and adjust the numbers and also said that there were some work on the area, but he couldn't tell if those data were not distributed yet on the S-100 format, and he certainly hoping to raise that number.

23.9.3	Noted the presentation on MACHC WEND-100 IGIF Matrix

9.4 S-100 Coordinator Role (Mrs Bernice Mahabier, MICC Chair)

Mrs Bernice Mahabier presented that the result of the breakout groups regarding the Role of the S-100 Coordinator is that MACHC should coordinate S-101, S-102, S-104, S-111, S-124, S-128 and S-129 in the MACHC Region to reflect the WEND Matrix and asked some feedback on this issue.

Mr. Rodrigo Obino from Brazil reminded that the matrix didn't have the S-129 product, but instead, there is an assessment on MSDI, and he suggested to remove S-129 from the role and include MSDI so it would reflect the products of the matrix.

Mrs Mahabier continued her presentation saying that there were some suggestions about the role of the S-100 coordinator:
- MACHC should have an S-100 Coordinator;
- The S-100 coordination role(s) must be consistent across the Regional Hydrographic Commissions. The WENDWG should provide guidance or clarification on the nature of the coordinator role by S-100 product;
- MACHC should consider a S-57/S-101 Coordinator;
- The coordination role for S-101 be assigned to the MICC coordinator;
- The WG for the S-100 for safety products, should be situated within the MICC;
- MACHC should consider a MMSDIWG coordinator S-1xx for other maritime uses.

Mr James Rogers commented that we could back to the WENDWG and ask for better guidance on the coordinator role and he was sure other Regional Hydrographic Commissions would appreciate it and that he would be happy to adopt that as an action for the WENDWG. He also stated that there were some good recommendations that MICC Chair should be responsible for S-57/S-101 and maybe we would need 2-3 people working on the coordination of all these things.

IHO Director Luigi Sinapi shared the experience we already have in other Hydrographic commission that, due to the complexity of this role, the specific attention on the different product requires a different approach. Probably there are more things to do in terms of the WENDWG. But, to give an example on how other regional hydrographic commissions are approaching to this, he brought the example of the Mediterranean and Black Sea Hydrographic Commission, where the role wasn't confined to one only person, but it was created a working group to take care of this new S-1xx product without making differences between which one deserved more or less attention. We should to the coordination of the S-100/S-101 production in terms of scheme to the

already existing ICCWG Coordinator for the region. But the main difference is to create a working group to take care of it. He said Mrs Bernice Mahabier mentioned 2-3 people but probably an approach made by a working group could help to face this important role and that would be a decision to be taken at the commission level.

Mr Pierre-Yves Dupuy from France stated that France supports the proposal to consider attributing to S-57 coordinator the S-101 coordination too and agreed with IC-ENC that products from 102 and beyond products we are not ready yet. He proposed that we decided if we would attribute to S-57 coordinator the S-101 coordination.

LCDR Christopher Florentino stated that Brazil supports the proposal to pursue this challenge, focusing on the dual-fuel concept on S-57 and S-101 and that it is the practical approach.

Regarding the conversion from S-57 to S-101 / 'Dual-Fuel', Mrs Mahabier said that:
- Members are in a different phase of the S-100 development,
- S-101 transition is a challenge for the ENC producers of the group: more exchange of best practices would be beneficial,
- Capacity building and training is required in Cartography, MSDI, Hydrographic software, and Conversion from S-57 to S-101,
- Financial resources for S-100 production are needed.

Mrs Mahabier concluded her presentation showing the S-100 Plans and experiences.

23.9.4	Noted the presentation on S-100 Coordinator Role.
23.9.4.1	MACHC should coordinate S-101, S-102, S-104, S-111, S-124, S-128 and MSDI in the MACHC Region to reflect the WEND-100 IGIF Matrix.
23.9.4.2	MACHC should have at least one S-100 Coordinator.
23.9.4.3	MACHC S-100 Coordinator role(s) should be consistent across the Regional Hydrographic Commissions.
23.9.4.4	Approved the joint Coordination of S-57/S-101 under the responsability of the MICC Chair, taking into account the tight schedule of the "dual-fuel" transition period.

Session summary and implications:
Mrs Mahabier presented the MICC Workplan for 2023, available on IHO MACHC23 webpage.

The Commission approved the MICC Work Plan for 2023.

23.9.1.1	Approved the MICC Work Plan for 2023.

5 Capacity Building

5.1 Capacity Building Committee Report (Ms Lucy Fieldhouse, CBC Chair)

Ms Lucy Fieldhouse informed that since MACHC22 Conference there were two CBSC meetings: CBSC20 Intersessional Meeting in VTC format and CBSC20 Meeting in-person mode. Both of these meetings discussed:

- Very few activities completed due to COVID. The long-term impacts on the IHO CB Work Programme and regional development would be unknown,
- Agreed funded activities not completed would be carried into the 2023 IHO CB Work Programme,
- Virtual meetings have helped with engagement, but poor connectivity and passive engagement highlight that those events could not fully replace face-to-face meetings,
- Development of IHO CB calendar.

Ms Lucy Fieldhouse presented the update on the CBSC Project Teams: Capacity Building Strategy Review Team, Empowering Women in Hydrography, and e-Learning Center.

Ms Fieldhouse handed the floor to Capitán de Fragata Jose Luis Sánchez de Lamadrid Jaques from the Spanish Hydrographic Office (Instituto Hidrográfico de la Marina - IHM) highlight some of the courses offered by IHM.

CF Sanches de Lamadrid presented the courses offered by IHM and that international students could apply: Hydrography specialization course of Category "A" (10 months), Hydrography specialization course of Category "B" (10 months), Hydrographic surveys basic course (8 weeks), Hydrography and Cartography middle course (15 weeks), Hydrographic equipment management basic course (8 weeks), Processing multibeam data and acquisition advanced course (15 weeks).

To conclude his part on this presentation, CF Sanchez de Lamadrid said that IHM is opened to collaborate in seminars, courses and workshops for Spanish-spoken language, with highly-qualified educators.

Ms Fieldhouse resumed her presentation moving on to the capacity building funded activities for 2022 and 2023. She was pleased to inform that 2023 will be a very busy year, with a great number of technical and High-Level Technical Visits to be conducted.

She reminded about the current IHO CB opportunity informed by the IHO CL 34/2022 "Master of Science Progamme in Hydrographic Science at the University of Southern Mississippi (USA) sponsored by the Republic of Korea, from August 2023 to August 2024", calling for nominations.

Ms Fieldhouse handed the floor to Ms Alexis Maxwell (NOAA International Team) to provide an overview of NOAA's contribution to the "Empowering Women in Hydrography" Project and the at-Sea Experience opportunities that have been realized in 2022 and those that are being offered for 2023. Potential participants are encouraged to respond to the IHO Circular Letter calling for applicants.

Regarding to the MACHC CB Plan 2023-2025, Ms Fieldhouse explained how it was structured and that is would be available on the "Initiatives of the MACHC" webpage.

Ms Fieldhouse presented the proposed activities for 2024 for endorsement:

- Technical Implementation Visits for identified coastal States,
- Awareness Seminar to precede the main MACHC Conference for identified coastal States,
- Data Management (supporting Goal 2, Target 2.3, SPI 2.3.1),
- S-1xx Awareness / Production for identified coastal States (supporting Goal 1, Target 1.3, SPI 1.3.1). This event would be a resubmission,
- MBES Processing for identified coastal States (supporting Goal 1, Target 1.2, SPI 1.2.2). Still seeking additional funding / support for this event.

To conclude, Ms Fieldhouse requested the Members and Observers to inform CB Coordinator of any wider CB opportunities that the MACHC Region can benefit from (also for inclusion in the IHO Calendar), to consider contributing to the "Empowering Women in Hydrography" Project, to review the MACHC Counties/Territories Capacity Building Phase Stage (Procedure 11) and provide updates to MACHC CB Coordinator, and to endorse the submission for IHO funding in 2024.

23.5.1	Noted the CBC Report

The Commission approved the following Actions:

23.5.1.1	Members to inform CB Coordinator of any wider CB opportunities that the MACHC Region can benefit from, including on the implementation of S-100 products
23.5.1.2	Members to review the Capacity Building Procedure 11 'MACHC Countries/Territories Capacity Building Phase Stage' within the MACHC CB Plan 2023-2025

5.2 MSI Workshop (Teniente de Navío Omar Sebastian Álvarez, Colombia)

Teniente de Navío Omar Sebastian Álvarez started his report by presenting the background of the MSI Workshop that took place in Colombia this year.
TN Alvarez showed the event agenda and he also commented the cost of this event was fully assumed by the CBSC and the organization effort was taken by DIMAR. There were 10 international students and 3 regional commissions also participated: MACHC, SWAtHC y SEPRHC.
The conclusion of this workshop is that the participants could stablish partnership bonds among the hydrographic services of the nations that attended the meeting, sharing growth in MSI. He also emphasized the knowledge about broadcasting MSI, as well as the standardization of the Notices to Mariners, coastal radio warnings and the NAVTEX system. Those were important to improve the capacities to bring safety of navigation both nationally and internationally.
TN Álvarez concluded his presentation showing some pictures of the event and thanked the institutions that support the event.

23.5.2	Noted the report on the MSI Workshop (Colombia)

5.3 The Challenges of Hydrography (Mr Carlos Tejada, Xylem HYPACK)

Mr Carlos Tejada started his presentation by saying his objective is to speak about the future challenges of Hydrography. Hydrography back on the day he first learned was, of course different but, back then, it used to happen changes, and the difference from today is thar those changes happen a lot faster. It is so fast that he shouldn't be speaking about future challenges, but about present challenges.

He presented the main issues obtained from communications between his company and users of HYPACK.

He also presented, to conclude his presentation, an exercise about the Hydrographer of the future, convened by the Canadian Hydrographic Service and showed some questions of the survey conducted and let the audience think about as an initial discussion about the Hydrographer of the future. The "ideal" hydrographer, as he could notice from this study, should present the following competences: team oriented, mix of technical and interpersonal skills, problem solver, agile and adaptable, innovative, mix of specialist and generalist, and data managers. He also noted that there is not the ideal hydrographer.

23.5.3	Noted the presentation on the Challenges of Hydrography (Xylem/Hypack)

5.4 NGA Strategic Partnerships (Mr Greg Brouk, National Geospatial-Intelligence Agency)

Mr Greg Brouk presented the NGA Strategic Partnerships, specifically partnerships with the industry. Using commercial solutions versus government solutions, he showed some documents aiming to illustrate that commercial has been part of their national strategy for a while. And that is why they are even more focused on it, because there is such a boom in the number of satellites and the amount of data that it is available… we have to take advantage of that, or simply, we are not going to be successful. On the other hand, there is so much data available that we cannot manage by ourselves. Part of the solution has to be commercial and part of it has to be artificial intelligence and machine learning to go searching through that data.

He gave the audience an idea of what is commercial Geointelligence (GEOINT).

Mr Brouk finished his presentation presenting a graphic called the mountain graphic and the point of this graphic is to illustrate how NGA can start doing business with a company that doesn't have a lot of experience in contracting with the federal government.

23.5.4	Noted the presentation on NGA Strategic Partnerships (NGA/USA)

5.5 SEPRHC Main Activities (Capitán de Fragata José Andrés Días Ruíz, on behalf of SEPHC)

Capitán de Fragata Jose Andres Días Ruíz from Colombia introduced the composition of the South-East Pacific Regional Hydrographic Commission (SEPRHC) with Chile, Peru, Equator, Colombia as Full Members and Panama as an observer State.

He stated that in 2022 SEPRHC had 3 video conferences.

Finally, Capitán de Fragata Días Ruíz presented the SEPRHC Capacity Building priorities and the SEPRHC cooperation with stakeholders (organizations, industry, etc)

23.5.5	Noted the presentation on SEPRHC main activities (Colombia)

Session summary and implications:
Ms Fieldhouse said there were very interesting presentations on this session that gave us a lot of "food for thought" and ideas to take forward. She also acknowledged the contribution Colombia made to the capacity building within the region and thanked their efforts. She thanked the other presenters, Mr Tejada, Mr Brouk for their very interesting presentations as it is interesting considering the future changes in hydrography and what we think now and what we will think in the future. Perhaps the way we think about capacity building will change. We need to think of how we can work more with the industry. So she would take those thoughts and consider them for the future workplan and finished by drawing the audience attention to not trying to solve the problems ourselves, but seeking other ways to fulfill those capacity building gaps.

The Commission approved the MACHC Capacity Building Plan from 2023 to 2025 and endorsed the submission of CB proposals for IHO funding in 2024.

23.5.1.3	Approved the MACHC CB Plan from 2023 to 2025.
23.5.1.4	Endorsed the submission of CB proposals for IHO funding in 2024.

5.6 Industry Activities on Capacity Building

5.6A IIC Academy (Mr Derrick Peyton, IIC Technologies)

Mr Derrick Peyton started his presentation stating that it would be more on capacity building and training and what it is available to hydrographers develop their careers.
He presented the institutional motivation and also from individually perspective
Mr. Peyton showed the "approaches to Certification" and spoke about the S-5B and S-8B courses
To conclude, Mr Peyton presented the plans for 2023 and beyond (partnering).

5.6B Building Satellite Derived Bathymetry Capabilities in the MACHC Region through Collaborative Projects (Ms Carol Fisher and Mr Kyle Goodrich, TCarta)

Ms Carol Fisher, Program Manager and Leader Cartographer at TCarta, started the presentation by introducing about TCarta, which is a satellite company specialized in marine environment. At this point, Mr Kyle Goodrich assumed the presentation. He presented the advantages of SDB which consists money, time and risk reducing and showed some work they performed in remote areas that would take a very long time do complete in the traditional way. He also showed their contribution to the seabed 2030 project, to the regional hydrographic commissions and to the universities.
Mr Goodrich presented the differences between planning a survey on the traditional way and using SDB.
To conclude the presentation, he also pointed the Reconnaissance and Risk Mitigation for Remote Survey Locations, which includes reducing risks to environment.

5.6C Capacity Building and collaboration programs from Kongsberg Maritime (Mr. Leonardo Figueroa, Kongsberg Maritime)

Mr. Leonardo Figueroa said his presentation would be about trainings, the products and the collaboration plans they have in the MACHC Region.

He said there were some technologic advances in the last few years and it demands trained professionals working together to survey one of the less surveyed areas. It requires support of the industries not only to provide technologic solutions, but also capacity building programs in order to provide professional growth.

He presented Kongsberg solutions in terms of sensors, equipment and software to operate them. So it turns hydrography into a complex science that gathers different techniques and technologies to get to a final product.

Due to pandemic, the last few years they had to focus on remote training in order to make the information reach the users of their products. He said Kongsberg has trainings in classroom format, local training, e-learning each one has its advantages and disadvantages.

He finished his presentation sharing the information that Kongsberg has biannual user conferences in which they can share experiences, capacity building and what's new on the field.

After the industry presentations, MACHC Chair ended the third day of the Conference.

End of Third Day of the Conference

Friday, December 2nd, 2022

Fourth Day of the Conference

MACHC Chair opened the fourth and last day of the Conference.

6. Survey and Risk

6.1 MACHC Seabed 2030 Crowdsourced Bathymetry Report (Ms Cecilia Cortina, MACHC Coordinator to Seabed 2030 Project and Crowdsourced Bathymetry)

Ms Cecilia Cortina reminded that the MACHC Seabed 2030 Work Plan addresses IHO Recommendations for Crowdsourced Bathymetry (CSB), GEBCO and Seabed 2030 Project.
She invited MACHC Members to pay attention to the following Actions:
- to consider the impacts of the increasing global societal and United Nations (UN) driven need to complete the picture of the seafloor as well as the potential benefits to individual coastal States,
- to make data freely available for inclusion in the DCDB and the widest possible use, in accordance with IHO Resolution 1/2017,
- to consider to review national legislation to remove barriers restricting CSB activities within their waters.

Regarding the UN Decade on Ocean Science, she presented that:
- the Ocean Decade Challenge 8 would develop a comprehensive digital representation of the ocean,
- The Nippon Foundation-GEBCO Seabed 2030 Project was officially endorsed as an UN Ocean Decade Program,
- MACHC-IOCARIBE Seabed 2030 Strategy 2021-2030 was officially endorsed as an UN Ocean Decade Project linked to the above UN Ocean Decade Program.

Ms Cortina presented an overview of the webinar that was held in 2022. Documents can be accessed on the MACHC Seabed 2030 Project webpage.
She showed the evolution of coverage of the Seabed 2030 Project since 2020, with a generous growth and also an overview of the data coverage in the MACHC Region.
Ms Cortina presented the Status of the Actions of the Work Plan for 2022 and listed the States that contributed, so far.
With respect to compliance with the Work Plan for 2022, some States have faced technical issues and other challenges in ollecting, compiling and sharing data and seeking solutions.

23.6.1	Noted the MACHC Coordinator to the Seabed 2030 Project/CSB Report.

Mr Pierre-Yves Dupuy from France said that France authorizes CSB activities in its national waters of jurisdiction, homeland and overseas. He thanked the Coordinator for her presentation and made a clarification: bathymetric data over French waters are accessible to all in the European portal EMODnet, and to avoid duplication of efforts, the IHO DCDB gives access to these data in this way.

23.6.1.1	Noted France recent decision to allow CSB in their waters.
23.6.1.2	Noted France manifestation that they have already made accessible their bathymetric data over French homeland and overseas waters in the European EMODnet portal and that IHO DCDB has access to EMODnet portal metadata.

Finally, she requested the Commission to approve the MACHC Seabed 2030 Work Plan for 2023 (retaining all the Actions from the MACHC Seabed 2030 Work Plan for 2022 with the proposed amendments).

The Commission approved the MACHC Seabed 2030 Work Plan for 2023.

23.6.1.3	Approved the MACHC Seabed 2030 Work Plan for 2023.

MACHC Chair announced he was informed by Ms Cecilia Cortina a couple of months ago that she would not be able to continue being the MACHC Coordinator to Seabed 2030 Project and Crowdsourced Bathymetry after the Conference, she looked for her replacement among the alumini of the GEBCO Program. He received recently the great news from Jamaica that nominated Mr. Diego Billings to replace her in that position.

He stated that Mr. Diego Billings took the 2019-2020 GEBCO Program. Mr Billings certainly knows well the GEBCO community and the work being done in other regions and by other countries. This certainly would be of great help for this coordination.

The Commission approved Mr. Diego Billings from Jamaica to be the next MACHC Coordinator to the Seabed 2030 Project/CSB replacing Ms. Cecilia Cortina from Mexico at the conclusion of the MACHC23 Conference.

23.6.1.4	Approved Mr. Diego Billings from Jamaica to be the next MACHC Coordinator to the Seabed 2030 Project/CSB at the conclusion of the MACHC23 Conference.
23.6.1.5	Acknowledged the work accomplished by Ms. Cecilia Cortina from Mexico as the MACHC Coordinator to the Seabed 2030 Project/CSB.

6.2 Risk Assessment and Mitigation Measures of Maritime Navigation in the Caribbean Sea

Ms Amrika Maharaj from the University of West Indies apologized for not being able to make the presentation.

6.3 Industry Activities on Survey and Risk (continuation)

6.3B What's new in HYPACK 2022 (Mr Carlos Tejada, Xylem HYPACK)

Mr Carlos Tejada informed that the new version of HYPACK would be launched in January 2023. He presented the new features. He said it would contain many updates, new features and bug fixing. He also introduced 3 new products:
- Hypack Echo replaces Hypack ultralight;

- Hypack Geophysics replaces Hypack Marine Search;
- Hypack Water Quality to work with ADCP.

He also presented the concept that it would no longer require the license in dongle format to enable the usage of the software and it would be internet-based format. It also would not need to be connected all the time, only one or two minutes of connection should be enough to activate the license for 9 days. It could be used in as many computers as someone want, but only one user could use at a time. The new update would also bring a more simple operation for the user.

6.3C Norbit Multibeam Products (Mr Rui Orsini, Norbit Subsea)

Mr Rui Orsini presented the Multibeam products from Norbit and said those products are expression of portability. He showed a family of sonars that had everything integrated in the sonar head. The system is portable and light-weighted.

Mr Orsini presented some examples of survey they have performed with the equipament and, in the end, he made a demonstration of the equipment he brought to show it was really portable.

6.3D Improving Current Measurements in Moored Buoys

AXYS Technologies apologized for not being able to make the presentation.

10 Closing Activities

10.1 Election of MACHC Representatives to IHO Council

For the MACHC Representatives to the IHO Council, there are two seats to be filled among the eligible MACHC Members, according to IHO Circular Letter 43 2022, and two Members submitted their nominations, Jamaica and Netherlands, as it was requested by MACHC Letter 24/2022.

USA and UK fully supported the nomination of Jamaica and Netherlands.

MACHC Chair explained that paragraph 5a of the Annex 4 to the Statutes of the MACHC explains the process when there are only two candidates to be MACHC Representatives to the IHO Council for the next term from 2023 to 2026.

It is stated that:

“If the number of candidate Members is equal to the number of number of seats on the Council assigned to the MACHC, then these candidate(s) will be designated as representatives of the MACHC.”

Therefore, we don’t need an election for that and I ask the Commission to approve the selection by acclamation of Jamaica and Netherlands to be the MACHC Representatives to the IHO Council.

23.10.1	Selected by acclamation Jamaica and the Netherlands as MACHC Representatives to the IHO Council seats.

As a consequence of the decision above, the Commission approved the following Action:

23.10.1.1	MACHC Chair to inform the selection of the new representatives of MACHC on IHO Council to the IHO Secretariat.

10.2 Election of Chair and Vice Chair

MACHC Chair read the Article 5c of the Statutes of the MACHC: "In order to assure continuity, it is suggested that the Vice Chair be elevated to the position of Chair for the next period."
Then, United Kingdom expressed their interest in ascending to the position of Chair.
MACHC Chair also announced that he received the nomination from Suriname of Mrs Bernice Mahabier to the position of Vice Chair.

The Commission elected United Kingdom of the Great Britain and the Northern Ireland to be the next MACHC Chair and Suriname to be the next MACHC Vice Chair, assuming these positions 3 months after the conclusion of this Conference, as stated in Article 5e of the Statutes of the MACHC.

23.10.2	Elected United Kingdom of Great Britain and Northern Ireland to the position of MACHC Chair and Suriname to the position of MACHC Vice Chair.

10.3 Any other business

United States presented the proposal for the establishment of a Maritime Safety Information Working Group.
Mr Christopher Janus, Branch Chief at NGA Maritime Watch - NAVAREA IV/XII, explained that over the last several years IMO approved new methods to enhance the provision of Maritime Safety Information (MSI) to mariners at sea.
One of the Objectives of the proposed Working Group is to engage with National Coordinators to:
- Facilitate that the GMDSS MSI services in the NAVAREA are arranged in compliance with the regulations and recommendations of the IMO, IHO and other relevant organizations.
- Facilitate cooperation concerning technical and administrative matters related to the MSI service.
- Facilitate the exchange of information about events that could affect safety at sea within the NAVAREA.
- Facilitate the exchange of advice concerning all aspects of daily MSI work.
- Facilitate harmonization of new and existing methods that make MSI and other relevant information to shipping available.
- Evaluate and compile views on new and changed methods of providing MSI and to forward these to the relevant body.
- Exchange information about major planned operations at sea that are expected to affect international shipping in coastal waters of adjacent countries.
- Improve and develop capacity building.

USA recommended that it would be the right time for the MACHC to endorse the establishment of a new Working Group for Maritime Safety Information to improve the delivery of new policy, communications and cooperation between NAVAREA IV/XII, NAVAREA V and constituent MSI providers. Through the work of this group, the MACHC will better engage our partners abroad in a suitable forum, particularly to understand requirements, consistency, and efficiency between all nations within our area of responsibility.
USA offered to serve as the initial Chair of the MACHC MSI Working Group and requested the Commision to endorse the establishment of the MACHC MSI Working Group.
UK fully supported the proposal.
The Commission approved proposal regarding the establishment of a Maritime Safety Information Working Group.

23.10.3	Approved the establishment of the MACHC Maritime Safety Information Working Group (MSIWG).
23.10.3.1	Elected the United States of America to the position of Chair of the MACHC MSIWG.

10.4 Review of Actions and Decisions (LCDR Thiago Soriano Quarenta, Brazil)

LCDR Thiago Soriano Quarenta read the draft list of actions and decisions approved during the MACHC23 Conference.
There were comments on the proposed decision 23.9.10:
- USA consider the establishment of the MICC Chair as the S-57/S-101 Coordinator;
- France supported the US proposal;
- Netherlands proposed to not refer to “dual-fuel” transition period, but to the “roadmap”.

The List of Decisions would be edited according to the considerations and it will be submitted to members within 10 days.
Regarding the proposed List of Actions, IHO Director Sinapi asked to change the status of the proposed Action 22.2.1.3/22.2.1.1.3 from “open - in progress”, as it is following the previous action, where MACHC is requesting to WEND a guidance by February 2023, to “receiving guidance from the WENDWG”.
Mr James Rogers supported IHO Director Sinapi comments and proposed that the proposed Action 23.9.1.2 should be considered “completed”, as well as the Action 23.2.3.4, since we had done that over the week of the Conference.

As there were many comments, MACHC Vice-Chair suggested that the Commission could work on this Action List and submit for the approval the days or weeks following the Conference.

23.10.4	Approved the Lists of Actions and Decisions as drafts.

10.5 Review results of Elections

The items 10.1 and 10.2 were fulfilled without the need for elections.

10.6 Next Meeting

MACHC Letter 19/2022 informed that Suriname had volunteered to host the MACHC Conference in 2023.

23.10.6.1	Noted the offer from Suriname to host the 24th Conference of the MACHC in 2023.

The Commission approved the Suriname proposal to host the MACHC24 Conference in 2023.

23.10.6.2	Approved the 24th Conference of the MACHC to be held in Suriname in 2023.
23.10.6.3	Noted the suggestion of the IHO Director that the next MACHC Conference be held between the end of November and the beginning of December.

As a consequence of the decisions above, the Commission approved the following Action:

23.10.6.4	Suriname to propose the period for the 24th Conference of the MACHC.

Jamaica representative offered to host MACHC25, but he still needed confirmation of the stakeholders after a meeting and maybe by January 2023 he would have a position on this matter.

23.10.6.5	Noted the interest of Jamaica in hosting the 25th Conference of the MACHC in 2024.

Ms Mahabier stated she would be confirming by the followig week after the MACHC23 Conference.

10.7 Close of Meeting

Rear Admiral Benjamin Evans and Captain John Lowell Junior were invited to join the Chairs at the steering table.
Rear Admiral Rhett Hatcher, current Vice Chair and Chair elected, provided his closing remarks on behalf of UK.
IHO Director Luigi Sinapi provided his closing remarks on behalf of IHO.
Captain John Lowell Junior provided his closing remarks on behalf of NGA.
Rear Admiral Benjamin Evans provided his closing remarks on behalf of NOAA's Office of Coastal Survey.
MACHC Chair provided his closing remarks, thanked all the stakeholders who made the Conference possible, congratulated all attendees for their participation and contribution.

With that, the MACHC Chair declared the 23rd Conference of the Meso American - Caribbean Sea Hydrographic Commission closed.

End of the Conference