Workshop on Enhancing Image-based Biodiversity Assessments to Advance Deep-Sea Taxonomy

Terms of Reference

Organizers: ISA Secretariat, Ministry of Oceans and Fisheries of the Republic of Korea (MOMAF), National Marine Biodiversity Institute of Korea (MABIK)

Date: 2-day technical meeting for invited experts (12-13 October 2021), followed by one-day open meeting for registered participants (14 October 2021)

Modality: Online workshop (MS Teams)

Note: This virtual workshop will be held for 3-4 hours per day. The organizers will ensure that the activities of the workshop are within a convenient time of day for as many participants as possible.

Background

In accordance with the UN Convention on the Law of the Sea (UNCLOS), the International Seabed Authority (ISA) is mandated to administer the mineral resources in the Area and to control and organize current exploration activities, as well as future exploitation activities. UNCLOS also mandates ISA to protect the marine environment from the potential harmful effects that may arise from exploration for and recovery of seabed minerals in the Area[1]. Furthermore, ISA is required to promote and encourage the conduct of marine scientific research in the Area, and coordinate and disseminate the results of such research and analysis when available[2].

Scientific advancement plays a critical role in providing necessary data and information to inform the development and implementation of various measures for the effective protection of the marine environment, including the regulatory framework, regional environmental management plans, and monitoring programmes. The importance of marine scientific research with particular emphasis on research related to the protection of the marine environment is reflected in the ISA Strategic Plan[3] and the High-Level Action Plan[4] for the period 2019-2023, adopted by the Assembly in 2018 and 2019 respectively.

With a view to strengthening the work of ISA towards fulfilling these mandates and achieving relevant goals and targets of the 2030 Agenda for Sustainable Development through coordinated efforts, the Assembly adopted the ISA Action Plan in support of the United Nations Decade of Ocean Science for

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[1] Article 145
[2] Article 143 (2)
[3] ISBA/24/A/10
[4] ISBA/25/A/15

Sustainable Development[5] in 2020. One of the six strategic research priorities identified in the ISA Action Plan is focused on standardizing and innovating methodologies for deep-sea biodiversity assessment, including taxonomic identification and description, in the Area.

Among others, imaging is a non-destructive, cost effective, and easily replicable tool for studying marine biodiversity, which has been increasingly applied in environmental baseline studies in the Area. Collected images are easily sharable sources of information that enables environmental observations and monitoring from multiple angles, especially the identification and quantification of species and other environmental features. Image-based surveys also play a key role in providing the foundation for standardizing research methodologies and developing automated annotation tools using artificial intelligence. This can significantly increase the effectiveness and efficiency of species identification and description by a wider range of stakeholders across regions, disciplines, and with different levels of scientific capacity, thereby enabling holistic, inclusive, and broader-scale management of activities in the Area. However, the increasing volume of image data poses considerable challenges for exchanging, storing, and managing video and photographic data.

In this context, the ISA Secretariat, in collaboration with the Ministry of Oceans and Fisheries of the Republic of Korea (MOMAF) and the National Marine Biodiversity Institute of Korea (MABIK), is convening a workshop on *Enhancing Image-based Biodiversity Assessments to Advance Deep-Sea Taxonomy* to identify key elements for a standardized model of image data exchange, archiving and sharing to support biodiversity assessment and monitoring. Building on the outcomes of previous ISA taxonomic standardization activities, this workshop will focus on optimizing and standardizing the use and application of images for species identification and description in support of the work of ISA. In particular, this workshop will address challenges and opportunities for developing automated routine analyses of image data using artificial intelligence and machine learning methodologies, which were identified in the latest taxonomic standardization workshop in September 2020. The workshop will also discuss collaborative approaches to building capacity and literacy on relevant technologies, methodologies, and tools and their adequate application at a larger scale.

Objectives of the workshop:

The workshop aims at identifying key elements and technical means necessary for effective sharing and use of image data in a systematic and coordinated manner, with a view to enhancing deep-sea species identification and quantification, as well as increasing capacity and literacy in deep-sea taxonomy.

Expected Outcomes:

1. Improved synthesis of research outputs for enhancing scientific knowledge and assessment of deep-sea biodiversity in the Area;
2. Enhanced capacity of ISA members, in particular developing States; and
3. Increased awareness and literacy of the public and policymakers on deep-sea taxonomy and deep-sea in general, building a virtuous cycle of increased public engagement and political support.

Expected outputs:

1. Key elements identified for a standardized model of image-based biodiversity assessments;
2. Mechanism suggested for effective sharing of images and exchange of image-based assessments;

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[5] ISBA/26/A/17

3. Potential opportunities for collaboration identified for development of methodologies and tools for species identification; and
4. Potential opportunities for collaboration identified for capacity-building and deep-sea literacy programmes on image-based biodiversity assessments.

Expected participants:

Part I: Technical meeting for invited experts

The Secretariat will invite experts with the following expertise to contribute to this workshop:

1. Expertise on tools and technologies for image-based biodiversity assessments;
2. Expertise on collecting and utilizing images and data collected from images, including taxonomists, curators, educators, among other data users; and
3. Expertise on image data management and archiving.

Part II: Open meeting for registered participants

1. ISA members, contractors, observers, former ISA trainees, and other stakeholders as well as public, especially students and young scientists in the field of deep-sea taxonomy, biology, and other related disciplines;
2. Private companies and organizations in the field of research and development, research technologies, environmental monitoring and observations, and database management etc.; and
3. Relevant UN/international/regional organizations/bodies/programmes/initiatives.

Proposed workshop structure:

Part I: Technical meeting for invited experts

A technical meeting, with invited experts (20-30), will be held for 2 days covering topics related to:

1. Archiving and utilizing images for the development of species identification tools and facilitation of machine learning for automatic image recognitions on which future Artificial Intelligence-powered tools can rely;
2. Standardizing image annotation methodologies and tools;
3. Improving methods for image acquisitions and analyses; and
4. Innovating outreach activities using deep-sea taxonomy image platform.

Recordings of theme presentations may be made available online.

Part II: Open meeting for registered participants

The above-noted technical meeting will be followed by a one-day open meeting to inform various ISA stakeholders, including the public and policymakers, of the key results of the expert workshop. At this session, ISA will also present a roadmap to promote effective integration of deep-sea taxonomic information into ISA's efforts towards facilitating activities in the Area in an environmentally responsible

manner, which was drafted based on the results of the previous ISA-MABIK workshop on deep-sea taxonomic standardization, held in September 2020[6].

This roadmap will consolidate activities and priorities identified by the workshop in 2020, within the context of ISA Strategic Plan and High-level Action Plan for 2019-2023 as well as ISA Action Plan in support of UN Decade of Ocean Science for Sustainable Development, to promote coherent, collaborative, and scientifically robust ways and means for enhancing taxonomic knowledge in the Area.

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[6] https://www.isa.org.jm/event/workshop-deep-sea-taxonomic-standardization-strategic-approaches-collaboration