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Ways of information technologies usage in the interests of mineral resources development of deep-water zones of the International Seabed Area

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SUMMARY

There are considered the latest digital resources of the International Seabed Authority (ISA), which should be used for:

- carrying out research in the International Seabed Area, particularly in the Clarion-Clipperton Zone, including modern information technology usage;
- formation of the marine geological and geophysical module of the Oceanographic Data Bank of the National Academy of Sciences of Ukraine with the aim to exchange oceanographic data with the ISA DeepData database, as well as to develop the National Geospatial Data Infrastructure and form a modern digital oceanographic data industry in Ukraine.

Introduction

The World Ocean plays an important role for all countries of the world at the current stage of human development, considering that the deep-sea mineral resources located in the international seabed area beyond the limits of national jurisdiction (hereinafter – the Area) are crucial for the accelerated development of the world economy and are a major factor of geopolitics. The Area is more than 54% of the total coverage of the world's oceans and has a special international legal regime under the jurisdiction of the International Seabed Authority (hereinafter – ISA). The Area and its resources are recognized as the common heritage of mankind (Marine, 2021). States parties to the 1982 United Nations Convention on the Law of the Sea (hereinafter – 1982 Convention) and the 1994 Agreement relating to the implementation of Part XI of the United Nations Convention on the Law of the Sea (hereinafter – 1994 Agreement) shall organize and carry out activities related to mineral resources in the Area under the auspices of the ISA (International, 2021).

Method and/or Theory

The ISA defined a 75,000 km² area in the Pacific Ocean bounded by the Clarion and Clipperton fractures (hereinafter – Clarion-Clipperton Zone) for the former USSR at the end of the twentieth century. The preliminary amount of ferromanganese nodules in the mentioned area are is estimated to be 787 million tons, including 6.68 million tons of nickel, 5.49 million tons of cooper, 1.1 million tons of cobalt and 142 million tons of manganese (Shchypstov, 2019).

According to the 1982 Convention, an essential component of the access system to the Area and its mineral resources is the mechanism of "reserved areas". This is one of the means provided by the 1982 Convention to ensure developing countries access to deep seabed mineral resources. Reserved areas are transmitted to the developed countries if they apply to the ISA for receiving exploration rights. Afterwards these areas are reserved to provide access for developing countries or the Enterprises (1982 Convention, Article 170, Annex IV and 1994 Agreement, Annex, Section 2). The ISA publishes information on the current state of the reserved areas of the Area on the official website: <https://www.isa.org.jm/files/files/documents/statusofreservedareas-01-2019-a.pdf>.

Since Ukraine is the successor of the USSR it has received the potential right to conduct scientific research and development in the Clarion-Clipperton Zone (Vares, 2012). In 1991-2000 Ukraine took a number of successful steps towards the ISA membership and obtaining the right to a share of the seabed, which was reserved for the International Joint Organization "Interoceanmetal" (Interoceanmetal Joint Organization, IOM) (Shchypstov, 2020). But due to subjective reasons the interaction of Ukrainian authorities and the IOM has not received proper development.

During the 72nd Session of the United Nations General Assembly in the "Oceans and the Law of the Sea" consolidated Resolution (Resolution 72/73, Part XI, Marine Science, para. 292) it was decided to declare the 10-year period beginning from 1 January 2021 as the United Nations Decade of Ocean Science for Sustainable Development (hereinafter – Decade). The overarching goals of the Decade are:

- I. Accumulation of scientific knowledge and development of scientific and technical base as well as partnership necessary for sustainable development of ocean resources.
- II. Implementation of maritime research programs and the provision of ocean data and information as a basis for policy development that ensures the effective functioning of marine ecosystems in the interests of comprehensive implementation of the goals of the Sustainable Development Agenda 2030.

The draft ISA Marine Research Action Plan to support the Decade as well as the consolidated list containing the ISA priority actions to contribute the Decade implementation are aimed at strengthening synergies in achieving the mentioned Decade goals, encouraging interdisciplinary maritime scientific research and implementing other initiatives of the Intergovernmental Oceanographic Commission (IOC) (Shchypstov and Shchypstov, 2019).

The representatives of the National Academy of Sciences of Ukraine took part in a meeting of heads of sectors of the National Commission of Ukraine for UNESCO

(<http://www.nas.gov.ua/UA/Messages/Pages/View.aspx?MessageID=6792>) on August 21, 2020 and presented a report outlining proposals of the National Academy of Sciences of Ukraine to improve Ukraine's participation in the activities of the Intergovernmental Oceanographic Commission and the International Seabed Authority, including proposals:

to intensify our country's participation in the work of the International Seabed Authority;

to amend the List of central authorities of the executive branch of government, other state bodies responsible for fulfilling the obligations arising from the membership of Ukraine in international organizations, approved by the Resolution of the Cabinet of Ministers of Ukraine of September 13, 2002 No. 1371, involving the National Academy of Sciences of Ukraine in cooperation with the International Seabed Authority.

According to the authors of this study, the priority measures should also include: preparation of an appeal to the ISA Secretary General concerning Ukraine's intentions as a member state of the ISA to extend membership in the IOM; ensuring the membership fees payment to the ISA budget in accordance with the terms of participation; implementation of a number of steps to continue Ukraine's membership in the IOM. The implementation of these measures will enable Ukraine to participate in the relevant deep-sea scientific research in the Area, and will allow in the future to pretend and obtain the right to exploit seabed in the Area.

An additional incentive for the deployment of work and conducting scientific deep-sea research may be the decision of the Presidium of the NAS of Ukraine from March 3, 2021 to launch the Purpose-oriented programme for scientific research of the NAS of Ukraine "Critical and strategic mineral resources of Ukraine in globalization and climate change" for 2021-2025 (Meeting, 2021).

Let us remind, that Ukrainian scientists participated actively in the implementation of the tasks of the National programme of research and use of resources of the Azov-Black Sea Basin and other areas of the World Ocean for the period up to 2000 (National, 1993), which consisted of several government programmes and projects. In particular, one of them was the state programme "Non-living Resources", which contained a pilot project "Nodules". Within the framework of that project, prospective areas of solid minerals in the Area were identified as well as ways of legal registration of such area for Ukraine were studied (Scientific, 1994).

Currently, one of the integral components of the technological process of Ukraine's future development of these mineral resources is access and analysis of the ISA digital resources. Mentioned resources are resulted of international interdisciplinary cooperation under the auspices of the ISA with the aim to form an applied segment of the global digital network of geospatial data, coordinate and disseminate marine scientific research results in the Area.

In 2019 the ISA launched the ISA Deep Seabed and Ocean Database (DeepData) (DeepData, 2021). As the global repository of data and information relating to activities in the Area, DeepData is a critical tool to support the ISA in organizing and regulating the activities in the Area; ensuring the effective management of prospecting, exploration and exploitation of deep seabed mineral resources; effectively protecting the marine environment; and equitably sharing knowledge derived from the conduct of marine scientific research in the Area for the benefits of humankind.

DeepData contains information on mineral resource assessment (geological data) and environmental baseline / assessment data. At the same time, only environmental data are freely available. Mentioned data include biological, physical and geochemical parameters of the marine ecosystems from the seabed to the ocean surface (Figure 1). The geological data are officially recognized as confidential in the regulations on prospecting and exploration of mineral resources (ISBA/19/A/9, ISBA/19/C/17, ISBA/16/A/12/Rev.1, ISBA/18/A/11).

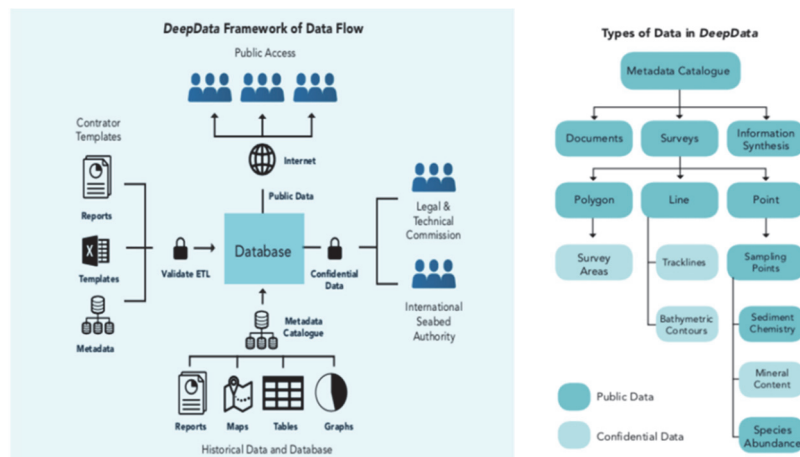


Figure 1 Functional diagram of the ISA Deep Seabed and Ocean Database (DeepData) (<https://isa.org.jm/index.php/deepdata/about#block-seabed-page-title>)

The types of data submitted by contractors to the ISA Database, as well as the procedures to be followed to ensure the confidentiality of data, are clearly set out in the Regulations on Prospecting and Exploration of Polymetallic Nodules in the Area (these Regulations are approved by the ISA Assembly). Contractors are required to submit to the ISA Database the metadata and results of sample analysis from exploration surveys in contract areas, using the reporting templates in accordance with the Recommendations for guidance of contractors for the assessment of the possible environmental impacts arising from exploration for marine minerals in the Area (ISBA/19/LTC/8). DeepData contains both structured report data and unstructured information, including maps, photographs, videos, graphics, and related publications in peer-reviewed journals received from contractors (DeepData, 2021).

The Geographical Information System (GIS) is an important part of DeepData functionalities. It allows visualization of contract areas, reserved areas and designated areas of particular environmental interest. DeepData GIS includes geospatial information about locations of samples containing biological, physical and/or geochemical parameters of marine ecosystems from seabed sediments, water column to the ocean surface as well as other environmental and resource data concerning the Area. The ISA Secretariat regularly publishes a file catalogue listing all publicly available data files contained in DeepData (DeepData, 2021).

In summary, it should be emphasized that the ISA seeks to work with the IOC to achieve the overall goals of the Decade, including the expansion of ocean observation networks.

ISA's experience concerning DeepData is extremely valuable and important for the formation of a modern digital oceanographic data industry in Ukraine (based on the principles laid down in the IOC International Oceanographic Data and Information Exchange Programme) considering the scale and complexity of hydrophysical processes occurring in World Ocean, multi-vector influence and use of research data and observations in economic activity.

The digital industry of geospatial oceanographic data is predicted to accelerate the modernization of the process of data production and disposal, to become decisive for the introduction of open access to scientific data and knowledge as well as for further commercialization of scientific research, innovation, products and services. At this stage, the important tasks are:

capacity building, strategy and roadmap development for integration of Ukraine into the digital ocean observation infrastructure of the ISA and the DeepData network;

concept development of creation of the specialized marine geological and geophysical module of geospatial data of the potential sector of Ukraine in the Area in the framework of the structure of the academic Oceanographic Data Bank;

ensuring the proper functioning and geospatial data filling of the academic Oceanographic Data Bank (with a full package of regulatory and administrative documents), including in the interests of

developing the National Geospatial Data Infrastructure (Law of Ukraine, 2020) as a powerful national geospatial data repository, as well as forming modern digital oceanographic data industry in Ukraine.

Conclusions

In order to develop oceanic nodules, Ukraine may claim a seabed part of the Area subject to: generation and synergy of the political will of the Government, strategic determination of the resource needs of the state, the interest of the business community and its effective support by scientists; carrying out scientific research in the International Seabed Area, including modern information technologies usage, to form a specialized marine geological and geophysical module of the Oceanographic Data Bank of the National Academy of Sciences of Ukraine.

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