Are the pan-European seas a promising source for critical metals supply? GeoERA-MINDeSEA Marine Data and Information Management Best Practices

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Abstract

Covering 15 million km^2, the pan-European seas represent a promising new frontier for the exploration for mineral resources while sustainably managing the marine resource. An enormous challenge in terms of research, technological innovation, environmental protection, spatial planning and social acceptance is facing European and international research and sustainable development plans related to this potential marine resource. The GeoERA-MINDeSEA project is an ERA-NET action, Horizon2020 project, involving collaboration between eight GeoERA Partners and four Non-funded Organisations at various points of common interest for exploration and investigation on seafloor mineral deposits. MINDeSEA aims to develop harmonised data models, datasets and information products to assess seabed minerals potential. MINDeSEA data assets are based on detailed studies and compiled data on geology, geochemistry, mineralogy, environmental and regulatory issues of hydrothermal mineralisations, polymetallic nodules, ferromanganese crusts, phosphorites, marine placer deposits and exploration activities. Cobalt, lithium, tellurium, nickel, rare earth elements, copper, and other strategic and critical metals are being investigated in several seabed mineral deposits under the jurisdiction of European coastal States, looking for alternative sources to land-based mined deposits. MINDeSEA will identify areas for sustainable resourcing and information to support decision-making on management and Maritime Spatial Planning regarding extraction in pan-European seas as part of its core actions.
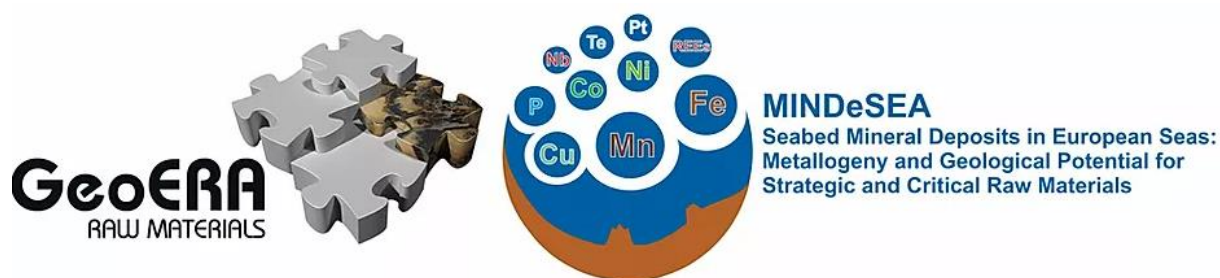
Figure 1: GeoERA Raw Materials MINDeSEA

Key to understanding the seabed minerals resource potential in pan-European seas is the acquisition, processing and management of reliable data and information on this unique marine asset. It is the position of this oral presentation to introduce 10 critical data management best practices guided by initiatives such as the World Wide Web Consortium (W3C), the INSPIRE Directive on spatial data infrastructures and SeaDataNet standards. These cross-thematic data management best practices are transferable across various marine domains where data and information exchange plays a critical role in understanding the marine resource.

MINDeSEA results are closely linked to the Seabed mineral deposits (WP7) of EMDOnet Geology,

one of several EMODnet portals with the purpose to strengthen blue growth in Europe. The European Marine Observation and Data Network (EMODnet) is a network of organisations supported by the EU's integrated maritime policy and aims to standardise data, services and products across the marine domain.

This position paper delivered by MINDeSEA partners under Work Package (WP) 8 Link to Information Platform has been harnessed from the W3C recommendations for publishing data on the Web known as Data on the Web Best Practices (DWBP) which support the development and encouragement of the continued expansion of the Web as the medium for the exchange of data. These Best Practices (BP) provide an ideal framework in which to build a guide for data management for MINDeSEA as a seabed mineral marine data and information platform as the ultimate goal of seabed minerals data management is delivery of this data on the GeoERA Web platform.

The 10 Best Practices for MINDeSEA marine and information data management to be presented are as follows:

1. **Metadata**
   - Provide metadata
   - Provide descriptive metadata
   - Provide structural metadata
2. **Licence** : Provide information about the license standard used, its caracteristics, permissions and restrictions.
3. **Provenance** : Information about the origins of the data and any changes made in the metadata lineage statement.
4. **Quality** : Information on the established quality standards and the applied quality plan.
   - Provide metadata quality information, following ISO 19115
   - Provide data quality information, following ISO 19157
5. **Versioning** : Information about the versioning policy to know the timing of the data and the changes made
   - Provide a version indicator
   - Provide version history
6. **Identifiers** : Use persistent identifiers, following INSPIRE data publication guidelines.
7. **Formats** : Use machine-readable and human-redable open and standardised formats.
8. **Vocabularies** : Reuse vocabularies, preferably standardised ones and normalize those that have not yet been registered.
9. **Access** : Provide bulk download.
10. **Enrichment** : Enrich data by generating new data.

These 10 Best Practices in MINDeSEA WP8 are being applied to data sourced and supported by MINDeSEA partners for seabed mineral occurrences for Seafloor Massive Sulphide Deposits (WP3); Ferro-manganese crusts, phosphorites and critical raw materials (WP4) ; Marine Placer Deposits (WP5) ; Polymetallic Nodules (WP6) and Exploration in the Atlantic, Mediterranean, Baltic and Black Sea (WP7). Since the INSPIRE codes recorded so far have always responded to the terrestrial domain, they are not complete enough to respond to the diversity of deposits that exist, for example, on the ocean floor and therefore should be expanded.