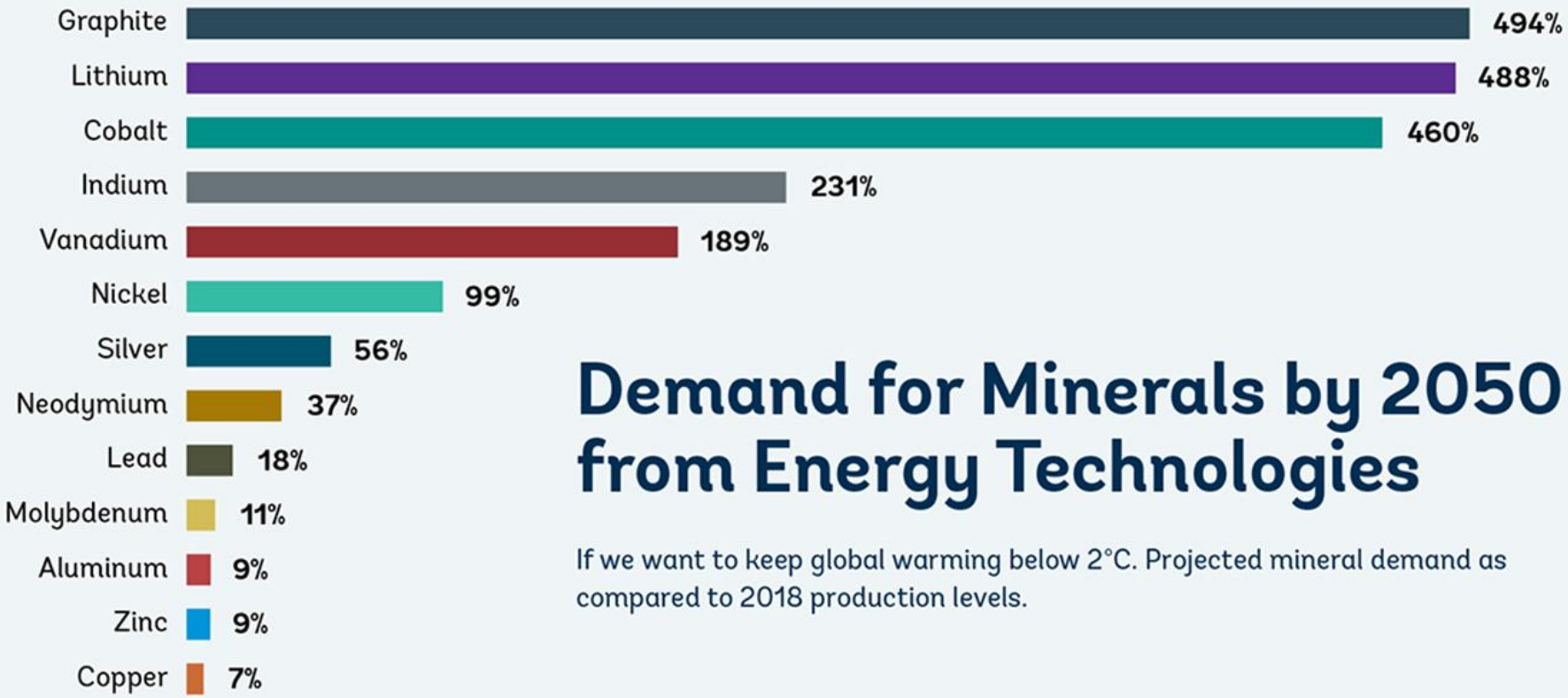
Are the pan-European seas a promising source for critical metals supply?

GeoERA-MINDeSEA

Trevor Alcorn, Javier Gonzalez, Xavier Monteys, Ana Lobato, Iker Blasco, and the **MINDeSEA** Team

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731166

Critical Metals



Minerals for Climate Action:
The Mineral Intensity of the Clean Energy Transition

WORLD BANK GROUP

Climate **Smart** Mining

generate sustainable growth and jobs for future generations.

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Project Partners

Project Lead

Instituto Geológico y Minero de España

WP Leads

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USGS science for a changing world

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W3C Data on the Web Best Practices

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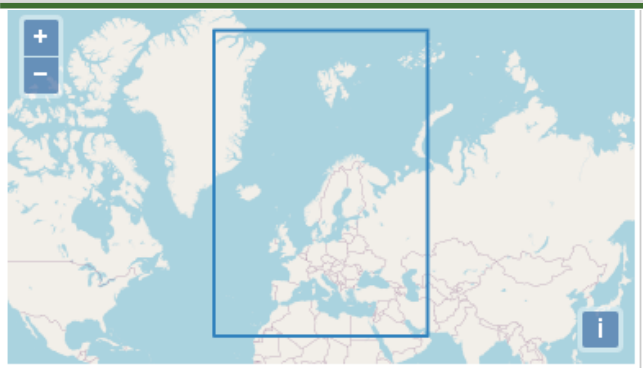
1. Metadata



Basic metadata / Full Metadata

MINDeSEA WP3 Seafloor Massive Sulphide Deposits (Point)

Abstract

Seafloor massive sulphides (SMS) are modern equivalents of on-shore (ancient) volcanogenic massive sulphides (VMS) which have constituted important mining targets through history in many regions of Europe. VMS deposits are generally stratiform accumulations of sulphides formed at or just beneath the seafloor as a result of volcano-magmatic activity. The sulphides are precipitated from hot hydrothermal solutions when they come in contact with cold seawater. Deposits of this type that form today are known as seafloor massive sulphides, and the associated sulphurous plumes are called black and white smokers. Data from ancient VMS deposits are essential for the present-day understanding of the formation, structure and composition of SMS deposits. VMS deposits are among the most important deposit types for a number of commodities, including copper (Cu), zinc (Zn), lead (Pb), silver (Ag) and gold (Au). In addition, they may contain economic grades of cobalt (Co), tin (Sn), barium (Ba), sulphur (S), selenium (Se), indium (In), bismuth (Bi), tellurium (Te), gallium (Ga) and germanium (Ge). Several of these minor constituents are considered critical raw materials by the EU. The modern equivalents are found on the ocean floor, along present-day spreading ridges and volcanic centres, and are the target of steadily increasing attention as a possible source for both base, precious and special metals.

Type	dataset -
Resource Locator	MINDeSEA - Project website
Identifier	https://egdi.geology.cz/5e997784-2860-483c-809c-42d70a010833
Language	English
Topic category	Environment Geoscientific information Oceans
Keywords	***GEMET - INSPIRE themes, version 1.0:*** ***Spatial scope:*** European ***GeoERA keywords:*** manganese barium

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2. Licence

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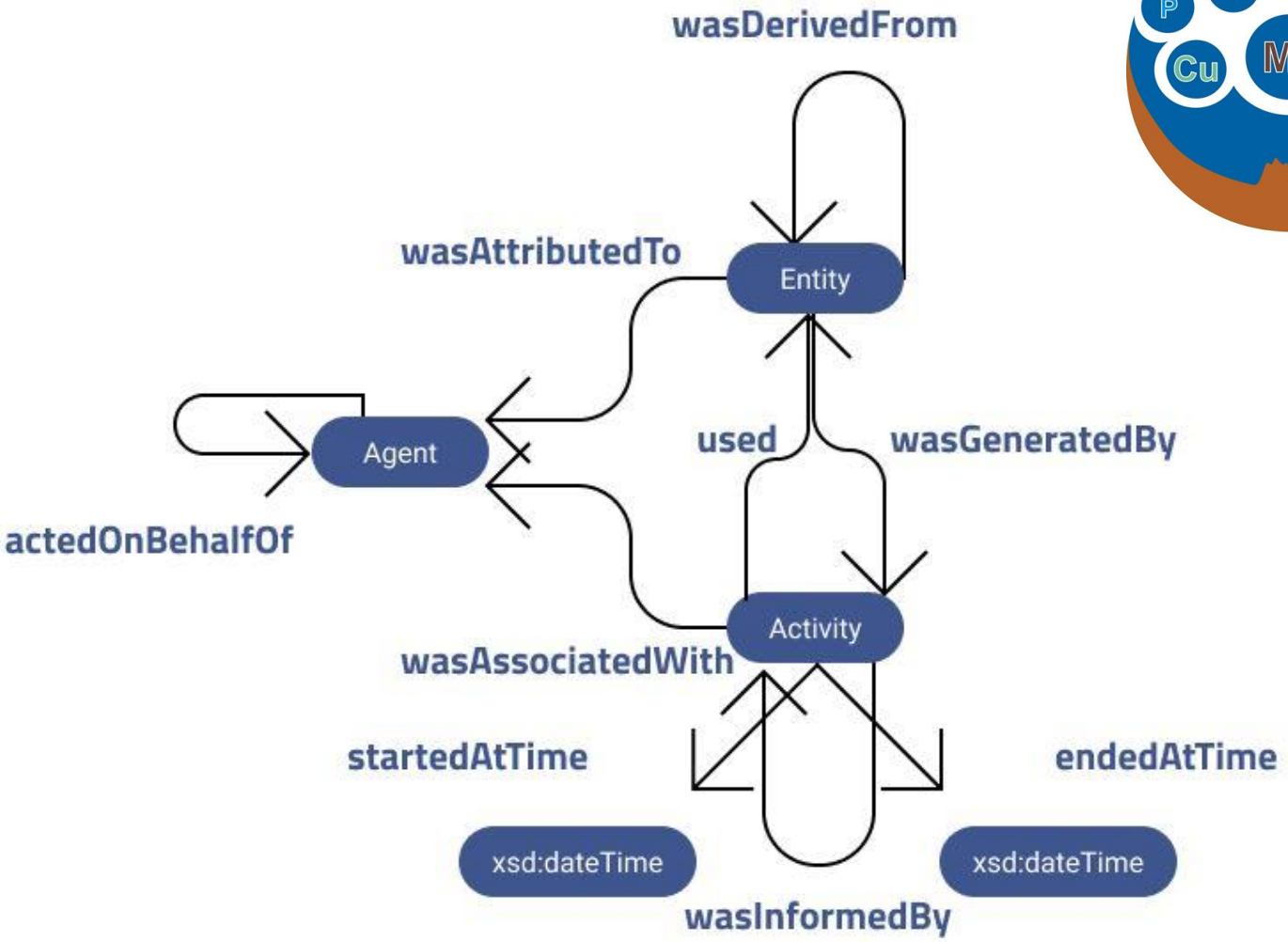
3. Provenance

How Provenance Is Modelled In W3C PROV-O



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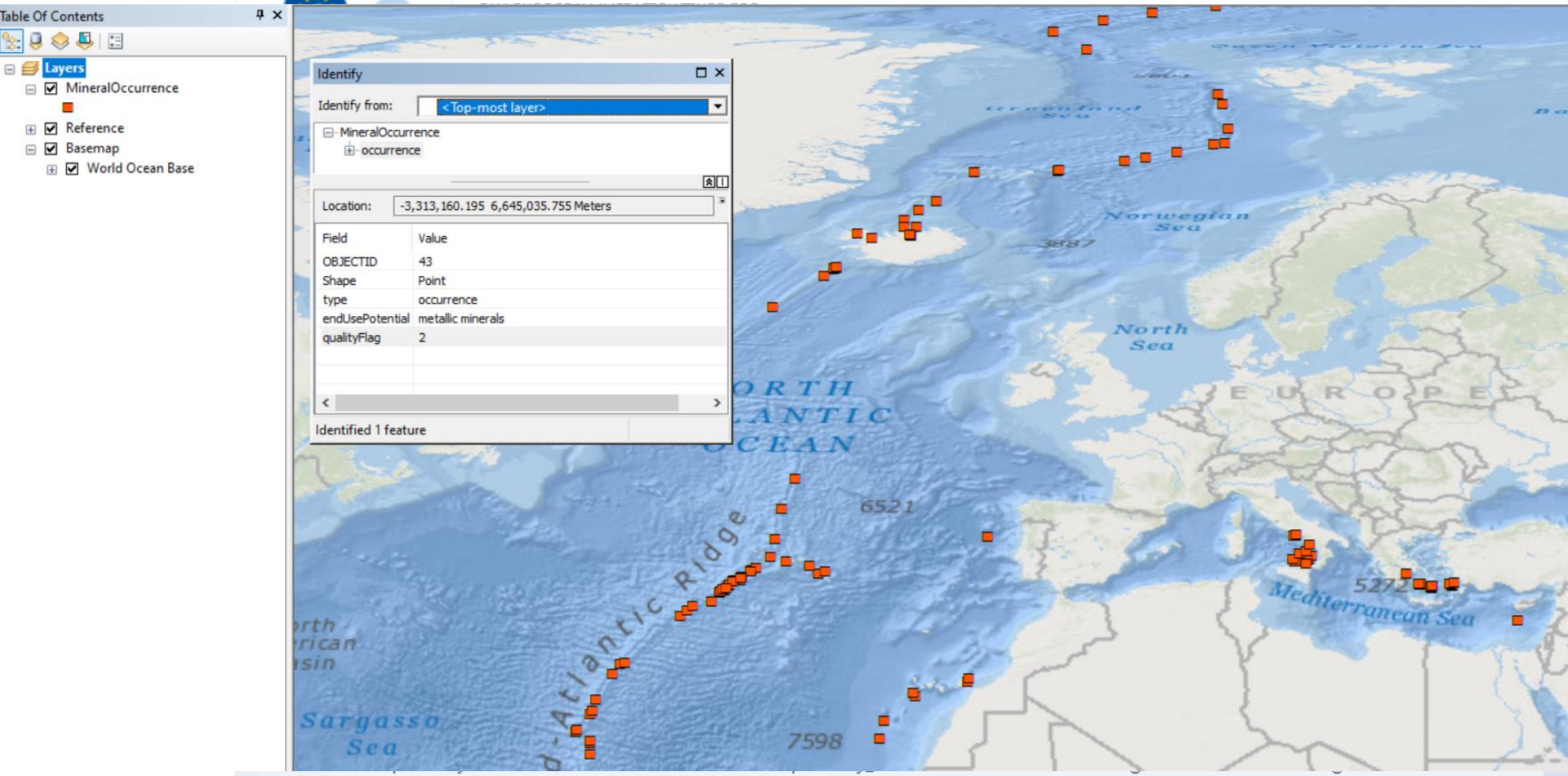
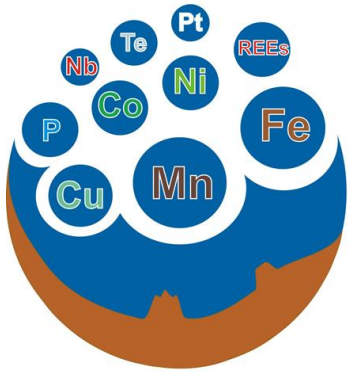
4. Quality



			quality control that forms part of a feature that is probably inconsistent with real phenomena.	
4	bad value	bad	An obviously erroneous data value.	5/17/2007 11:47:30
5	changed value	changed	Data value adjusted during quality control. Best practice strongly recommends that the value before the change be preserved in the data or its accompanying metadata.	5/17/2007 11:47:30

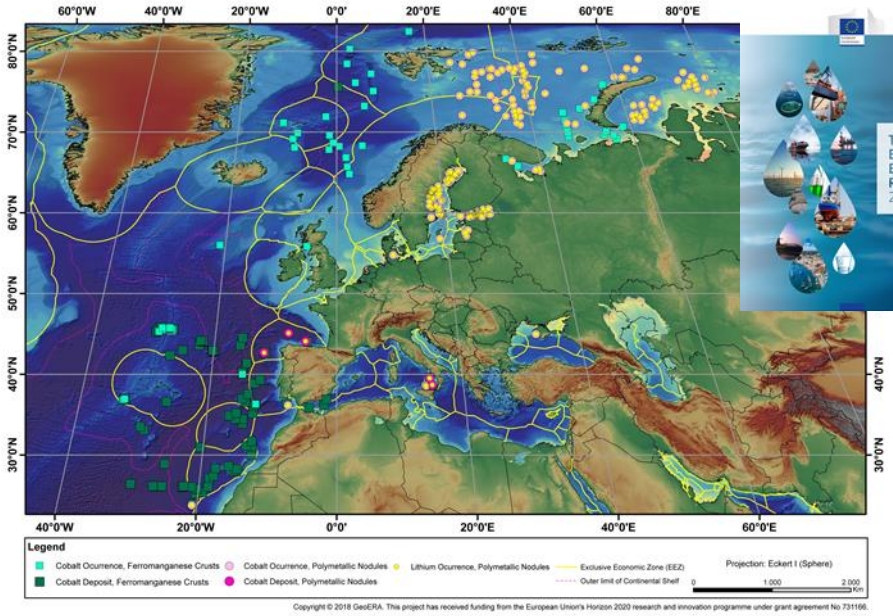
5. Versioning

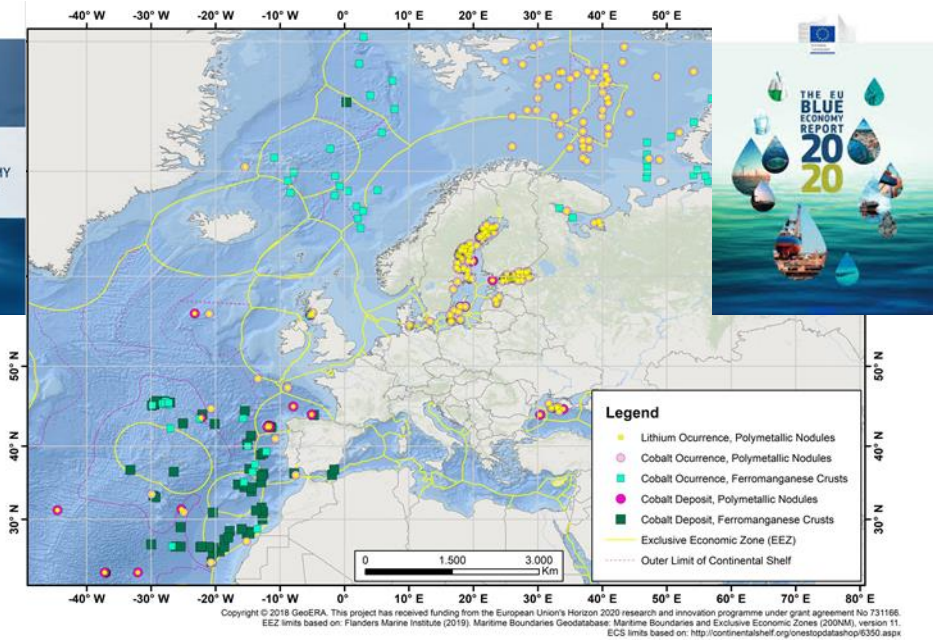


1. Assign and indicate a version number or date for each dataset

2. Provide a complete version history that explains the changes made in each version

Pan-European map of
Energy-critical elements Co and Li





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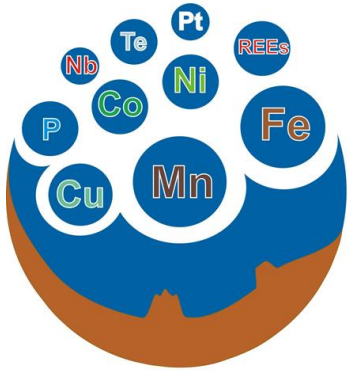
6. Identifiers

Why do we need persistent unique identifiers?



- Accurate identification of objects of interest
- **Findability of information**
- **Accessibility of information**
- **Interoperability of information and processes**
- **Reusability of data**
- Repeatability of survey results
- Reliability of results

- **Example**
  - **MR.MineralResource.IRL.MINDeSEA.WP7.Exploration.KRY20_01**

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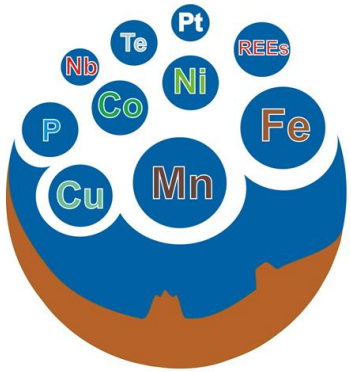
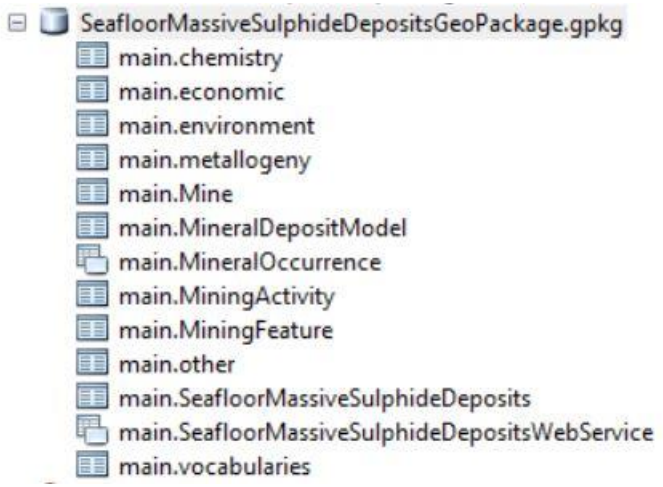
7. (Open) Formats

- open
- OGC standards-based
- platform-independent
- portable
- self-describing
- compact



INSPIRE

Mineral Resources



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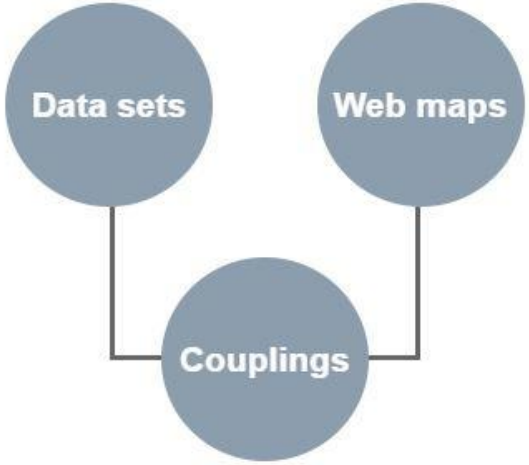
8. Access

EGDI Admin Data set Web map Couplings

EGDI ADMIN

This is where we register and maintain our data sets. Here, you can define new data sets and create interactive web maps on top.
Read the user manual here.



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Data sets

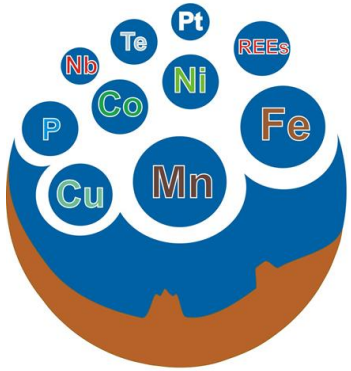
A data set is a well-defined table structure with visualization included. Sources can be database, WFS, WMS, shape files or geopackage.

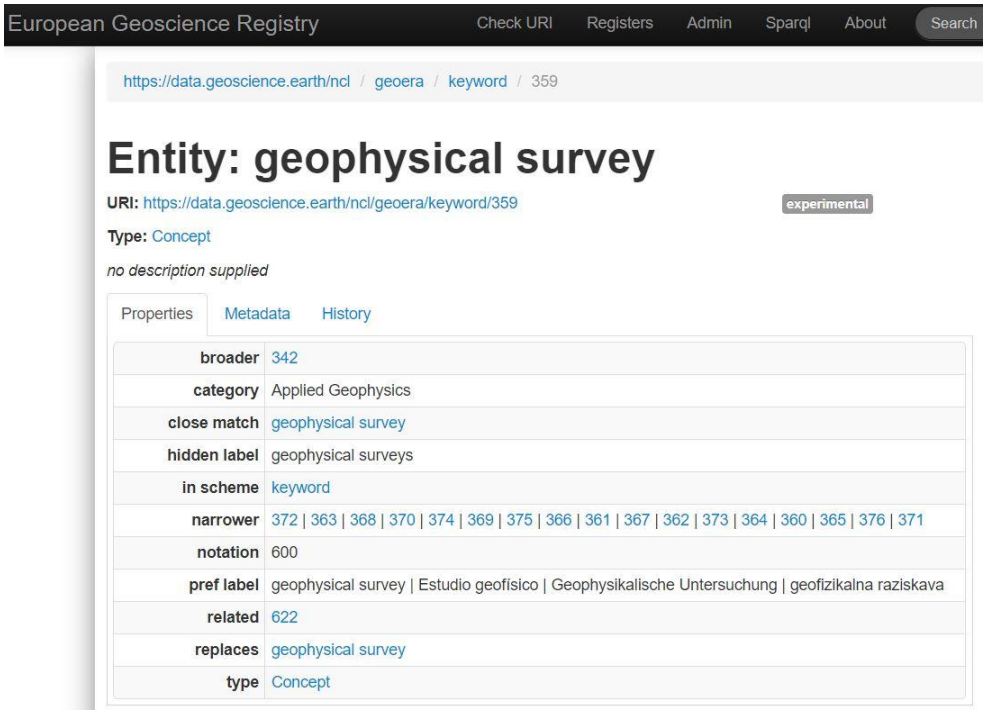
Upload GeoPackage / GeoTIFF file

9. Vocabularies

SeaDataCloud

Common Vocabulary Services





GeoNames

GEMET General Multilingual Environmental Thesaurus

EuroVoc

DBpedia

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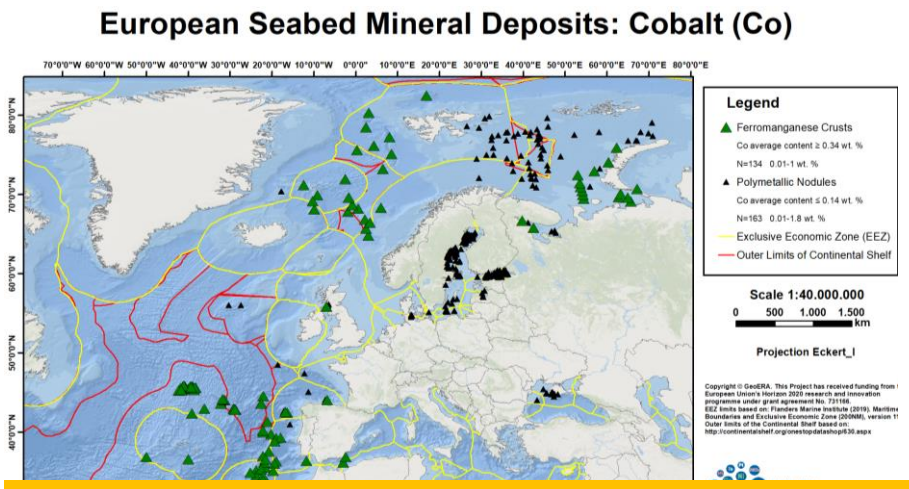
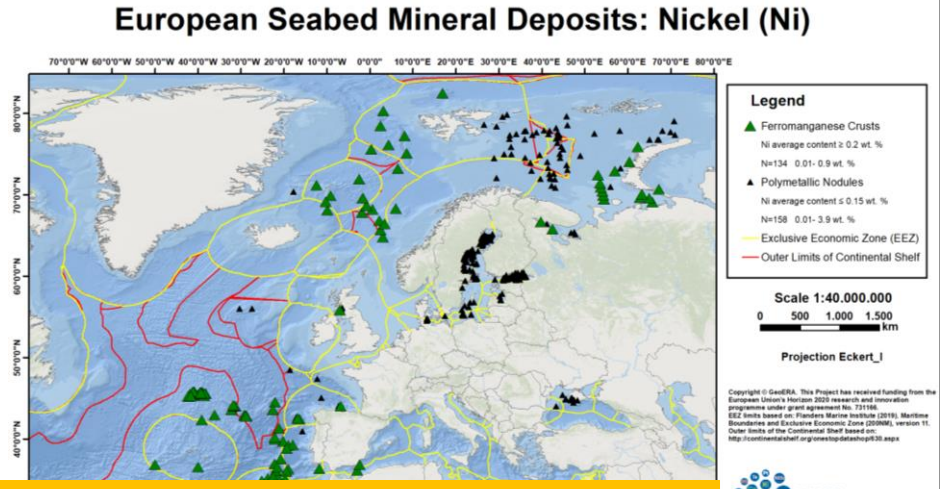
10. Enrichment



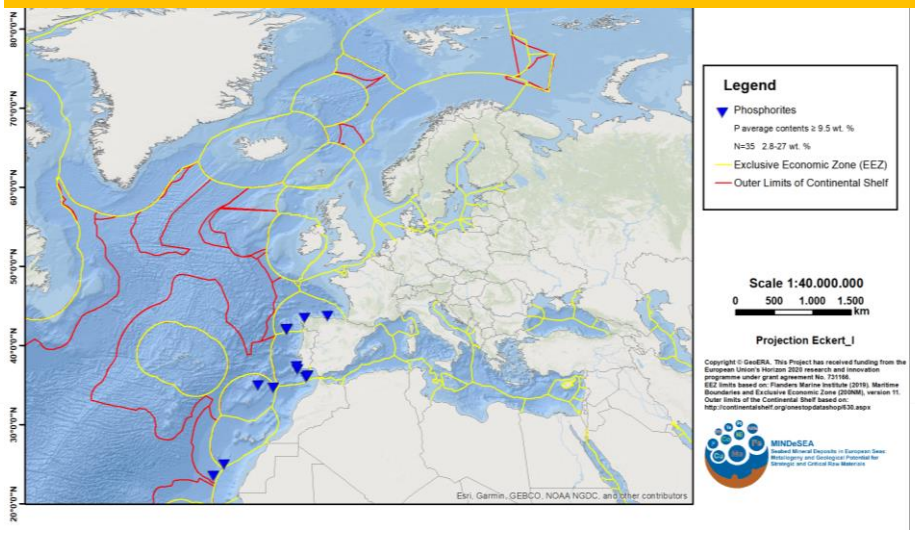


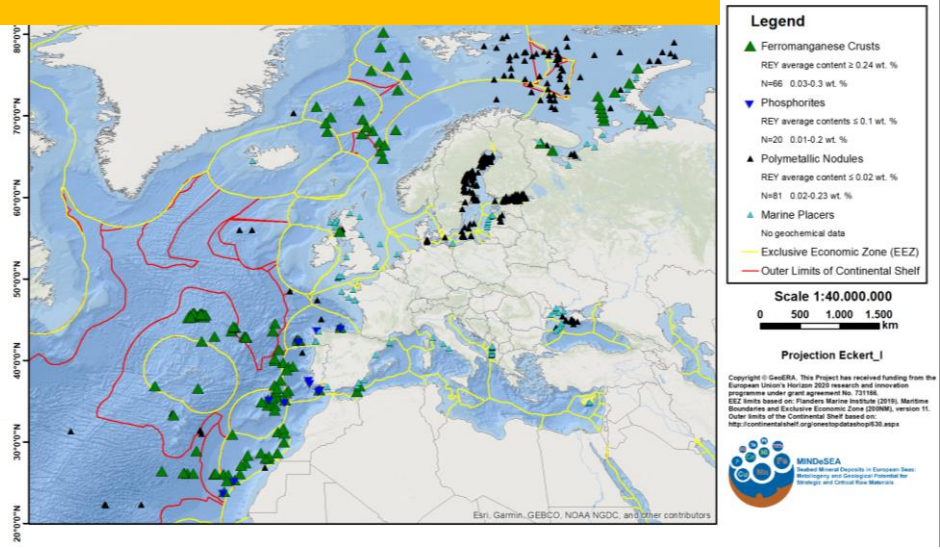
Maps for 14 CRM (Co, Li, REE, Te, Ni, V, Sb, PGE, Au, Ag, Ti, P, Mn, Cu)

5 deposit types (hydrothermal, ferromanganese crusts, phosphates, placers and polymetallic nodules)

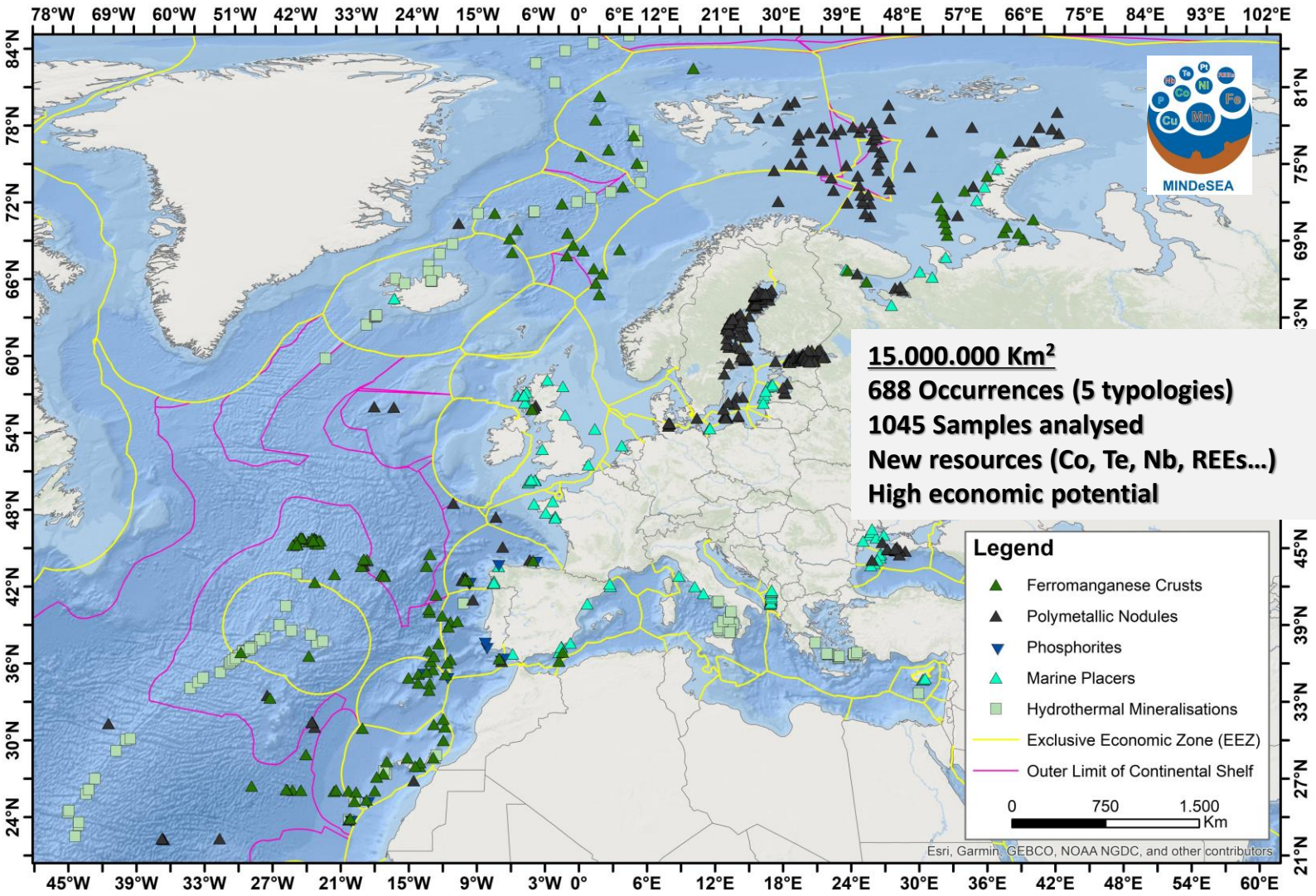
Geochemistry :

- **Mean content**
- **N samples**
- **Range of contents**





Pan-European Seabed Critcal Raw Materials (Potential)



EEZ limits based on: Flanders Marine Institute (2019). Maritime Boundaries Geodatabase: Maritime Boundaries and Exclusive Economic Zones (200NM), version 11.
ECS limits based on: http://continentalshelf.org/onestopdatashop/6350.aspx

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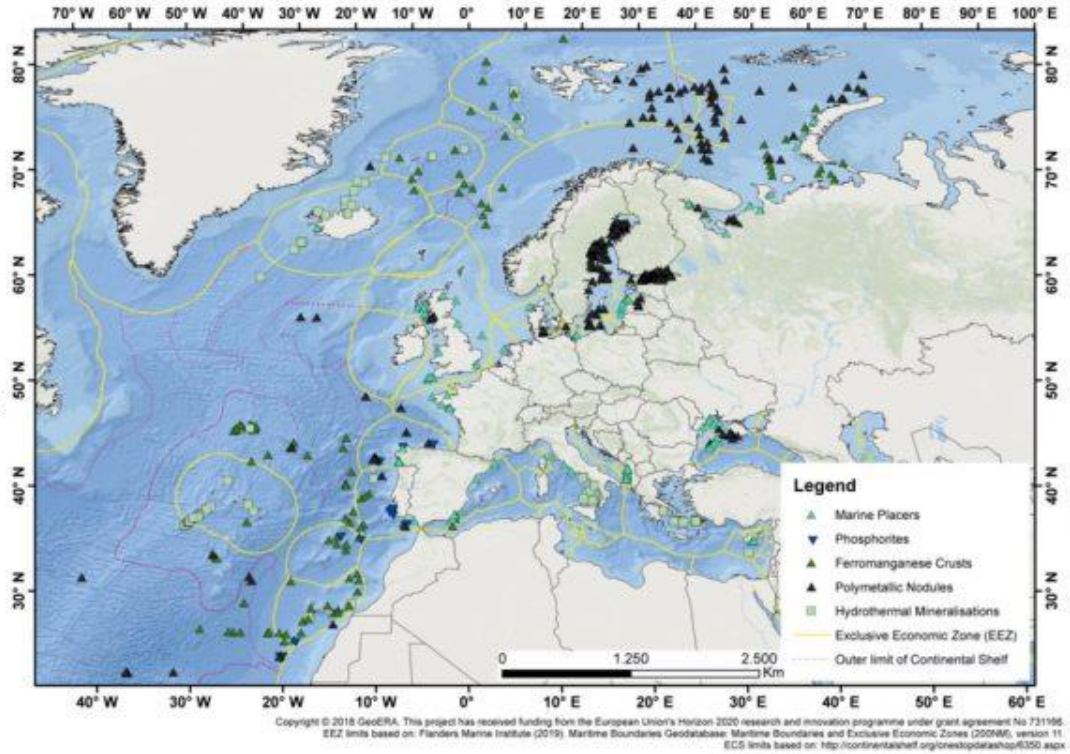
Pan-European Seas (Gold Rush Frontier)

Moytirra hydrothermal sulphides
NE Atlantic

Co-rich ferromanganese crusts & phosphorites
Central Atlantic-Canary Islands



Polymetallic nodules
Baltic Sea

Gold and rare earth elements sand beach placers
Aegean Sea

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