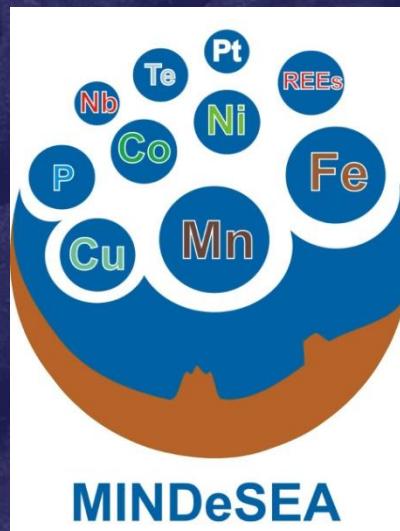




MINDeSEA

Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials



Deliverable 4.4: Metallogenetic Map of Ferromanganese Crust and Phosphorite Occurrences in pan-European Seas

WP1 leader: Geological Survey of Spain (IGME) - Spain		
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4.4	Fe-Mn crusts and phosphorites metallogenetic models
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Deliverable 4.4 – Models of formation for the main provinces of ferromanganese crusts and phosphorites - Metallogenic Map of Ferromanganese Crust and Phosphorite Occurrences in pan-European Seas	
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This document presents the metallogenic map for ferromanganese crusts and phosphorites in pan-European seas.	
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Metallogenetic Map of Ferromanganese Crust and Phosphorite Occurrences in pan-European Seas

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INTRODUCTION

This report contains explanatory material for the map of ferromanganese crust and phosphorite mineral occurrences and metallogenetic areas in pan-European seas. The map region includes North east Atlantic Ocean, Arctic Ocean, Baltic, Mediterranean and Black seas.

This is a cooperative product under the project “Seabed Mineral Deposits in European Seas: Metallogeny and Geological Potential for Strategic and Critical Raw Materials” (MINDeSEA), materialized in the frame of the GeoERA Raw Materials Theme (Grant Agreement № 731166, project GeoE.171.001), resulted from the collaboration between eight GeoERA Partners and four Non-funded Organizations at various points of common interest for exploration and investigation on seafloor mineral deposits.

This report is part of a series of MINDeSEA reports on the metallogenesis of European seafloor mineral resources. The studies include (1) detailed metallogenetic maps of submarine mineral occurrences; (2) a compilation of major seafloor mineral deposit models; (3) a series of metallogenetic provinces and descriptions; (4) location map of submarine mineral occurrences; (5) a database on seabed mineral occurrences; (6) vocabularies and (7) references material.

This report provides a digital file for maps of seafloor mineral occurrences and metallogenetic areas. The purpose of the digital map and brief descriptions in this report is to provide large-format color maps, mainly in Acrobat PDF format, as compared to the page-size figures in *Deliverable 4.4: Models of formation for the main provinces of ferromanganese crusts and phosphorites*. The digital version on the metallogenetic areas have been prepared and delivered as part of the report and will be made available through the European Geological Data Infrastructure (EGDI) information platform (<http://www.europe-geology.eu/>). Detailed descriptions of geology, mineral occurrences, and metallogenetic provinces depicted in the map are provided in the *Deliverable 4.4*.

The seafloor ferromanganese crusts and phosphorites database in pan-European seas includes more than 150 occurrences within the North-east Atlantic Ocean, the Arctic Ocean and the Western Mediterranean Sea. In the occurrence database, information on the occurrences includes the location, mining activity, metallic commodities, geological setting, age, ore mineralogy, chemistry, style of mineralisation, genetic models, and the primary sources of data with a comment onto data





quality. INSPIRE compliant and harmonized vocabularies have been used to design and complete the datasets. All information is collected from public sources of data including published literature, archive reports, press releases and company Internet pages. The coverage has mainly been created by digitization and synthesis of data after applying standardization and harmonization criterions. The input maps from all marine areas have been collected at a 1:250,000 scales or less and permits verification of this synthesis at a 1:10,000,000 scale. The structure of the database is described in detail in the *Deliverable 4.4*.

The database and the maps can be used in regional geological and metallogenetic research, in regional- and local-scale minerals exploration planning, environmental studies and maritime spatial planning.

The background bathymetric map of European seas is the ESRI's Ocean basemap. Data are from the General Bathymetric Chart of the Oceans (GEBCO) international terrain database. This base map was designed and developed by ESRI.


ACKNOWLEDGEMENT & DISCLAIMER

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Metallogenic Areas

Phosphorites	
Id - Occurrence Name	63 - Norwegian Sea 3
1 - Tropic Seamount	64 - Norwegian Sea 4
2 - Echo Seamount	65 - Norwegian Sea 5
3 - Galicia Bank	66 - Norwegian Sea 6
4 - Sancho	67 - Norwegian Sea 7
5 - Ortegal Terrace	68 - Norwegian Sea 8
6 - Le Danois Bank	69 - Norwegian Sea 9
7 - Ampère Seamount	70 - Norwegian Sea 10
8 - Lion Seamount	71 - Norwegian Sea 11
9 - Guadaluquivir Bank	72 - Greenland Sea 3
10 - Faro Plateau	73 - Gron Knoll
11 - Descobridores Seamounts	74 - Norwegian Sea 12
12 - Príncipe de Avis Seamounts	75 - Litke Trough
	76 - Greenland Sea 4
	77 - Mohns Ridge
Ferromanganese crusts	
Id - Occurrence Name	78 - Norwegian Sea 13
1 - Conception Bank	79 - Norwegian Sea 14
2 - Dacia Seamount	80 - Hovgaard Ridge
3 - El Banquete	81 - Jan Mayen Ridge
4 - Le Danois Bank (El Cachorro)	82 - Spring Plateau
5 - M1 Mount (E Lanzarote)	83 - Al Mansour Seamount
6 - North Conception Bank Seamount	84 - Amanay Seamount
7 - Pelicar Seamount	85 - Annika Seamount
8 - South El Hierro Ridge	86 - Macizo de la Polaca
9 - South La Palma Ridge	87 - Gran Canaria, off La Isleta
10 - Mid-Atlantic Ridge 1	88 - North Flank Tenerife Island
11 - Mid-Atlantic Ridge 2	89 - CDRC002832
12 - Mid-Atlantic Ridge 3	90 - CDRC00965
13 - Mid-Atlantic Ridge 4	91 - Guadaluquivir Bank
14 - Mid-Atlantic Ridge 5	92 - Tore Seamount
15 - Mid-Atlantic Ridge 6	93 - Tore Seamount
16 - Mid-Atlantic Ridge 7	94 - Salvador Correia Passage
17 - Mid-Atlantic Ridge 8	95 - CDRN001076; CDRN01077
18 - Mid-Atlantic Ridge 9	96 - Horseshoe Seamount
19 - King's Trough	97 - Gago Coutinho Seamount
20 - Hirondelle II Seamount	98 - Ampère Seamount
21 - CDRC003061	99 - MTR Seamount
22 - CDRC002690	100 - Josephine Seamount
23 - King's Trough 1	101 - Unicorn Seamount
24 - King's Trough 2	102 - Seine Seamount
25 - King's Trough 3	103 - Azores Seamount
26 - King's Trough 4	104 - FAMOUS Area
27 - King's Trough 5	105 - Plato Seamount
28 - King's Trough 6	106 - Mid-Atlantic Ridge 22
29 - Mid-Atlantic Ridge 10	107 - Mid-Atlantic Ridge 23
30 - Mid-Atlantic Ridge 11	108 - Antialtar Seamount
31 - Echo Seamount	109 - King's Trough 7
32 - The Paps Seamount	110 - King's Trough 8
33 - Pluma CAIR Seamount	111 - King's Trough 9
34 - Amuley Seamount	112 - Mid-Atlantic Ridge 24
35 - Bimbache Seamount	113 - Mid-Atlantic Ridge 25
36 - Las Hijas Seamount	114 - Mid-Atlantic Ridge 26
37 - Drago Seamount	115 - Mid-Atlantic Ridge 27
38 - Tropic Seamount	116 - Mid-Atlantic Ridge 28
39 - Sancho Seamount	117 - Mid-Atlantic Ridge 29
40 - Galicia Bank	118 - Barents Sea 1
41 - Mid-Atlantic Ridge 12	119 - Barents Sea 2
42 - Mid-Atlantic Ridge 13	120 - Barents Sea 3
43 - Mid-Atlantic Ridge 14	121 - Barents Sea 4
44 - Mid-Atlantic Ridge 15	122 - Barents Sea 5
45 - Mid-Atlantic Ridge 16	123 - Barents Sea 6
46 - Mid-Atlantic Ridge 17	124 - Barents Sea 7
47 - Mid-Atlantic Ridge 18	125 - Barents Sea 8
48 - Mid-Atlantic Ridge 19	126 - Barents Sea 9
49 - Mid-Atlantic Ridge 20	127 - Pechorskoye More
50 - Canary Island Seamount Province	128 - Pechorskoye More
51 - Josephine Seamount	129 - Pechorskoye More
52 - Josephine Seamount	130 - Kara Sea 1
53 - Godzilla Seamount	131 - Pechorskoye More
54 - Mid-Atlantic Ridge 21	132 - White Sea 1
55 - Tore Seamount	133 - Kandalakshskiy Zaliv
56 - Tore Seamount	134 - Loch Fyne
57 - Nameless Seamount	135 - CDRC002843
58 - Dragon Bank	136 - Azores-Biscay Rise 1
59 - Greenland Sea 1	137 - CDRC003258
60 - Norwegian Sea 1	138 - CDRC003292
61 - Norwegian Sea 2	139 - CDRC003292
62 - Greenland Sea 2	140 - CDRN001122
	141 - CDRC002832

